Draft Comprehensive Conservation Plan and Environmental Assessment

North Dakota Wetland Management Districts

August 2008

Prepared by

U.S. Fish and Wildlife Service

Arrowwood Wetland Management District
Audubon Wetland Management District
Chase Lake Wetland Management District
Crosby Wetland Management District
Devils Lake Wetland Management District
J. Clark Salyer Wetland Management District
Kulm Wetland Management District
Lostwood Wetland Management District
Valley City Wetland Management District

and

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Abbreviations

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

Service	U.S. Fish and Wildlife Service
SWG	State Wildlife Grant
USC	United States Code
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
VOR	visual obstruction reading
WDA	wildlife development area
WG	wage grade (employment)
WMD	wetland management district
WPA	waterfowl production area
WUI	wildland–urban interface

Summary

USFWS

Blue-winged teal nest within the uplands in district lands.

This is a summary of the draft comprehensive conservation plan and environmental assessment for nine of the U.S. Fish and Wildlife Service's wetland management districts in North Dakota: Arrowwood, Audubon, Chase Lake, Crosby, Devils Lake, J. Clark Salyer, Kulm, Lostwood, and Valley City.

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 wetland management district. Chapter 6 contains the draft plan for the nine districts; the final plan is scheduled for completion in 2008 and will guide management of the districts for the next 15 years.

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. Complexes of wetlands scattered throughout the nine wetland management districts attract breeding duck pairs.

The Districts

A wetland management district provides oversight for all of the U.S. Fish and Wildlife Service's small land tracts in a multicounty area. These nine wetland management districts in North Dakota manage 1,208 waterfowl production areas, tens of thousands of conservation easements, and 37 wildlife development areas in 34 counties. These district lands, totaling 1,125,084 acres, are part of the National Wildlife Refuge System, a network of lands set aside to conserve fish and wildlife and their habitat.

(Note: Management of the limited-interest refuge is covered by a separate plan—"Comprehensive Conservation Plan for the North Dakota Limited-interest Refuges.")

The 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 districts.

Issues

Public scoping for the wetland management districts that the Service started in 2007, along with district information, identified five major areas of concern about management of the districts.

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

Previously farmed uplands have since been restored, the bulk of which 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.

Energy Development

The physical structure of wind power turbines has unknown effects on birds. In addition, it is unknown if wind power would affect the potential for future habitat protection through conservation easements. Effects on waterfowl production areas—including salt-water contamination, filling of wetlands, and road development—have been increasing as additional oil and gas 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.

Wildlife Management

Threatened and endangered species, predators, and wildlife disease are issues for the districts.

Steve Hillebrand/USFWS

The whooping crane is an endangered species.

Threatened and Endangered Species

The piping plover is a threatened shorebird that occurs in small numbers on alkali wetlands in the Audubon, Crosby, and Lostwood wetland management districts. Endangered whooping cranes can be observed in the marshes across the districts. The primary issues related to threatened and endangered 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

Wetland management districts in North Dakota have a history of botulism outbreaks. Success in combating botulism occurs at the expense of other resources.

Visitor Services

Hunting, fishing, wildlife observation and photography, and environmental education and interpretation are uses currently authorized on lands administered by the districts. Some of the commenting public would like to see more opportunities to participate in not only the six priority uses, but also in trapping.

Operations

Funding and staff are not sufficient to fulfill the purposes and meet the goals of the districts. 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. District 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 districts 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 Districts

The issues, along with resource conditions, were important considerations during the development of the vision and goals for the nine wetland management districts.

Vision

Wetland management districts conserve an important network of public and private wetland and upland habitat in North Dakota. This network preserves the integrity of the historical and vital resting and breeding grounds of North America's migratory waterfowl.

As part of the National Wildlife Refuge System, these lands benefit ducks, other migratory birds, threatened and endangered species, and resident wildlife.

The responsible management and protection of this expanding network requires adequate funding, dedicated personnel, and successful partnerships.

District communities and visitors value grasslands and marshes as a beneficial and important component of a diverse, healthy, and productive prairie landscape.

Current and future generations enjoy wildlife-dependent uses of these lands and partners, especially waterfowl hunters, actively support and encourage the districts' habitat conservation programs.

Goals

The following goals were developed to meet the vision for the districts.

Habitat and Wildlife Goal

Protect, restore, and enhance the ecological diversity of grasslands and wetlands of the North Dakota Prairie Pothole Region. Contribute to the production and growth of continental waterfowl populations to meet the goals of the North American Waterfowl Management Plan. Also, support healthy populations of other migratory birds, threatened and endangered species, and other wildlife.

Monitoring and Research Goal

Use science, monitoring, and applied research to advance the understanding of the Prairie Pothole Region and management within the North Dakota wetland management districts.

Cultural Resources Goal

Identify and evaluate cultural resources in the North Dakota wetland management districts 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 quality opportunities to enjoy hunting, fishing, trapping, and other compatible wildlife-dependent recreation on Service-owned lands and expand their knowledge and appreciation of the prairie landscape and the National Wildlife Refuge System.

Partnerships Goal

A diverse network of partners joins with the North Dakota wetland management districts to support research; protect, restore, and enhance habitat; and foster awareness and appreciation of the prairie landscape.

Operations Goal

Effectively employ staff, partnerships, and volunteers and secure adequate funding in support of the National Wildlife 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, funding, staff levels, and management activities at the districts would not change. Programs would follow the same direction, emphasis, and intensity as they do at present:

- The Service prioritizes management of wildlife habitat and associated species at the districts' WPAs into high, medium, and low areas. Only high-priority WPAs receive consistent management.
- District staffs conduct limited, issue-driven research and limited monitoring and inventory of birds and vegetation.
- The district staffs monitor all conservation easements; however, only the high-priority easement violations are consistently enforced.
- On a multiyear rotation among districts, the staffs conduct public use events and workshops with such groups as school districts, youth groups, and conservation groups.

Alternative B—Moderately Enhanced Management (Proposed Action)

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

- Management objectives for habitat types would be based on the habitat preferences of groups of target species such as waterfowl, migratory shorebirds, grassland birds, and threatened and endangered species.
- The district staffs would focus on high-priority tracts and medium-priority tracts. District staffs would carry out compatible techniques to enhance production of targeted migratory bird populations.
- The district staffs would expand existing environmental education and visitor services programs, with additional waterfowl emphases.
- The Service proposes, at a future date, (1) one new administration and visitor center facility each for Audubon and Kulm wetland management districts, and (2) one new visitor contact station each for Arrowwood, Devils Lake, Lostwood, and Valley City wetland management districts.

Alternative C—Enhanced Management

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

- As a priority, district staffs would seek out restoration projects that expand and return native grasslands to quality native prairie.
- This alternative would have potential for additional management options that address habitat requirements and needs of specific groups of water-dependent birds such as waterfowl and shorebirds.
- The staffs would develop new environmental education and visitor services programs.
- The Service proposes, at a future date, (1) one new administration and visitor center facility each for Audubon and Kulm wetland management districts, and (2) one new visitor contact station each for Arrowwood, Devils Lake, Lostwood, and Valley City wetland management districts.

1 Introduction

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Mallards are one of the common waterfowl species on district lands.

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 nine wetland management districts (districts) in North Dakota (see figure 1, vicinity map):

- Arrowwood Wetland Management District
- Audubon Wetland Management District
- Chase Lake Wetland Management District
- Crosby Wetland Management District
- Devils Lake Wetland Management District
- J. Clark Salyer Wetland Management District
- Kulm Wetland Management District
- Lostwood Wetland Management District

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 districts. 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 districts. The proposed action is the Service's recommended course of action for management of the districts. "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).

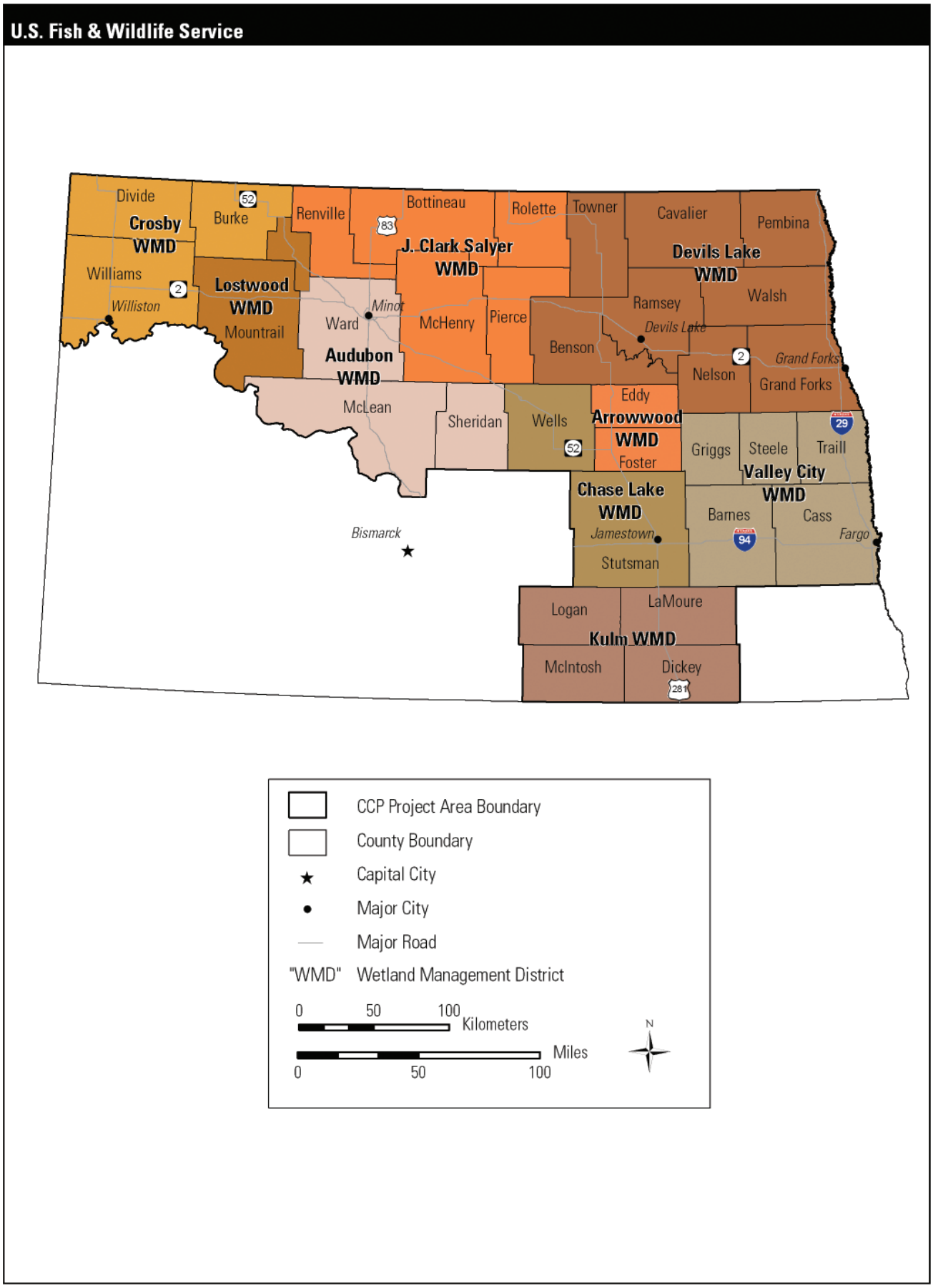


Figure 1. Vicinity map of the nine districts, North Dakota.

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 nine North Dakota districts. Wildlife is the first priority in district management, and the Service allows and encourages public use (wildlife-dependent recreation) as long as it is compatible with the districts' purposes.

1.1 Purpose and Need for the Plan

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

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

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

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

to provide a basis for development of budget requests for the districts' 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 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:

- Employed 169 people in North Dakota.
- Assisted by 539 volunteers who donated more than 10,200 hours with Service projects.
- Managed two national fish hatcheries and one fish and wildlife management assistance office.
- Managed 65 national wildlife refuges encompassing 343,145 acres (0.8% of the state).
- Managed 11 wetland management districts.
  - 284,660 acres of fee waterfowl production areas (WPAs) (0.6% of the state)
  - 1,080,636 wetland acres under various leases or conservation easements (2.4% of the state)
- Hosted 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 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 Fish and Wildlife Program.
- Employed 11 Partners for Fish and Wildlife Program biologists.
- Paid North Dakota counties $435,325 under the Refuge Revenue Sharing Act (money 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 (that is, each unit of the Refuge System, which includes wetland management districts) shall be managed

to fulfill the mission of the Refuge System;

to fulfill the individual purposes of each refuge and district;

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 recreation activities 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 habitat and wildlife vision for each unit of the Refuge System stresses the following principles:

- Wildlife comes first.
- Ecosystems, biodiversity, and wilderness are vital concepts in refuge and district management.
- Habitats must be healthy.
- Growth of refuges and districts 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 and wetland management districts. Consistent with the Improvement Act, the Service prepares all CCPs in conjunction with public involvement. Each refuge and each district 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 and wetland management districts. 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 and districts (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 on refuges and districts, and a requirement that each refuge and district 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 and district 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 and district.

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 and districts are in the "Refuge System Manual" and "The Fish and Wildlife Service Manual."

1.4 District Contributions to National and Regional Plans

The North Dakota districts 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] 1999), 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 habitat and wildlife, 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.

Bird Conservation

"All-bird" conservation planning in North America is being achieved through the North American Bird Conservation Initiative (NABCI). Started in 1999, the NABCI committee is a coalition of government agencies, private organizations, and bird initiatives in the United States working to advance integrated bird conservation based on sound science and cost-effective management that will benefit all birds in all habitats. Conservation of all birds is being accomplished under four planning initiatives: the North American Landbird Conservation Plan (Partners in Flight), the U.S. Shorebird Conservation Plan, the North American Waterbird Conservation Plan, and the North American Waterfowl Management Plan.

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 nine wetland management districts are within the "prairie avifaunal biome" in BCR 11, the Prairie Pothole Region.

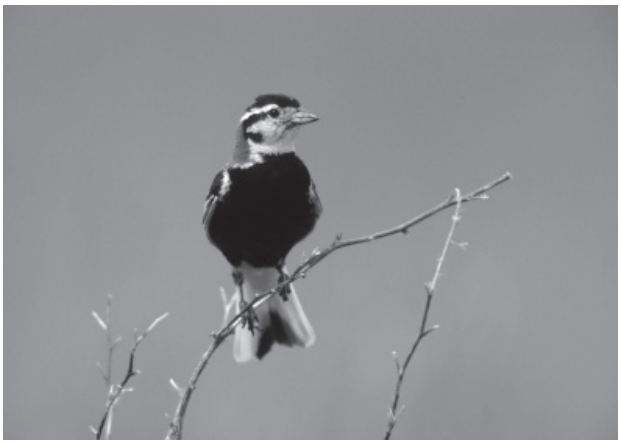
BCR 11 is the most important waterfowl production area on the North American continent, despite extensive wetland drainage and tillage of native grasslands. The density of breeding dabbling ducks commonly exceeds 100 pairs per square mile in some areas during years with favorable wetland conditions. 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.

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.



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The chestnut-collared longspur breeds in BCR 11.

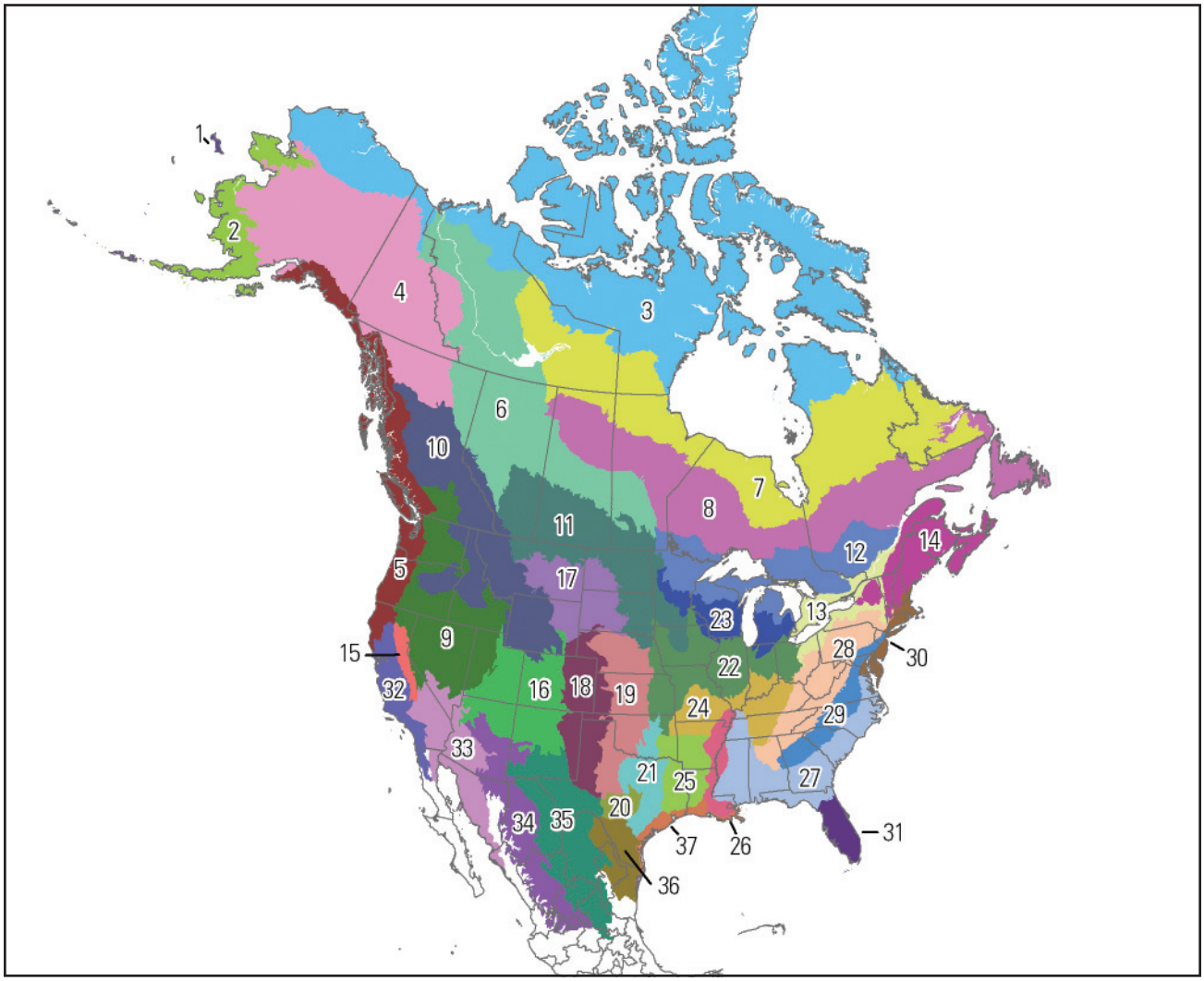

Figure 2. Map of the bird conservation regions of North America.

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

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

The North Dakota districts lie within the Prairie Pothole Joint Venture (PPJV), which covers the Prairie Pothole Region of Montana, North Dakota, South Dakota, Minnesota, and Iowa. 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 outlines the 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.

Recovery Plans for Federally Listed Threatened or Endangered Species

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

The districts are following the recovery plans for these species:

- Piping plovers (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).

USFWS

The piping plover is a threatened species that uses district shorelines for feeding and nesting.

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 using 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 districts 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 3, ecosystem map).

Major threats identified for these ecosystems include native prairie conversion to cropland, expansion of invasive plant species, and wetland drainage and degradation. The districts play a major role in (1) continued leadership and support of regional initiatives such as the PPJV, and (2) continued support of 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 EA for the districts is intended to comply with the Improvement Act, the NEPA, and the implementation regulations of the acts. The Service issued its Refuge System planning policy in 2000. This policy established requirements and guidance for refuge and district 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 4, steps in the planning process).

Figure 4 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 districts, 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 district program status, compiled and analyzed relevant data, and determined the purposes of the districts. Table 1 summarizes accomplishment of the main planning steps for this CCP effort.

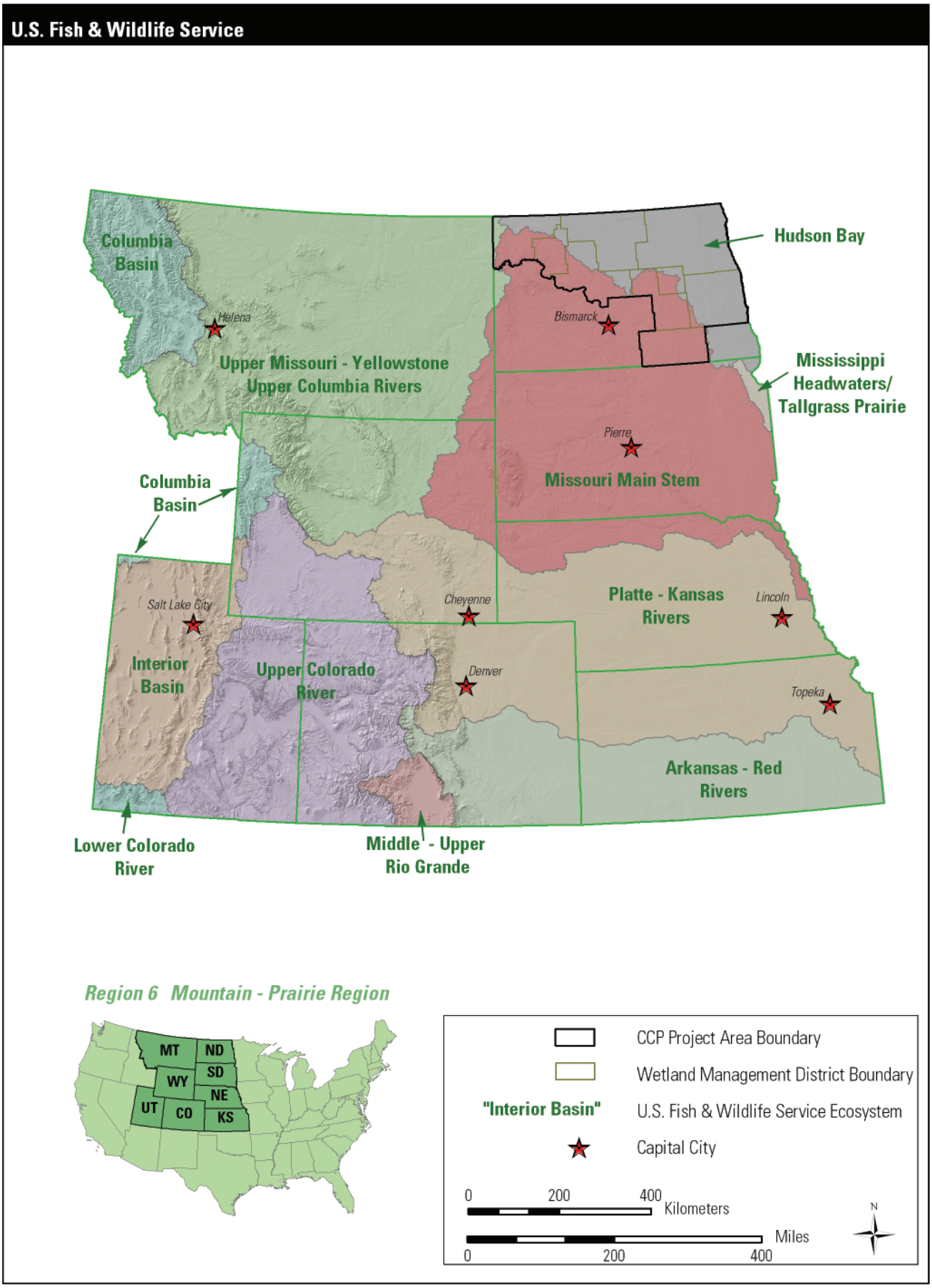

Figure 3. Ecosystem map for region 6 of the U.S. Fish and Wildlife Service.

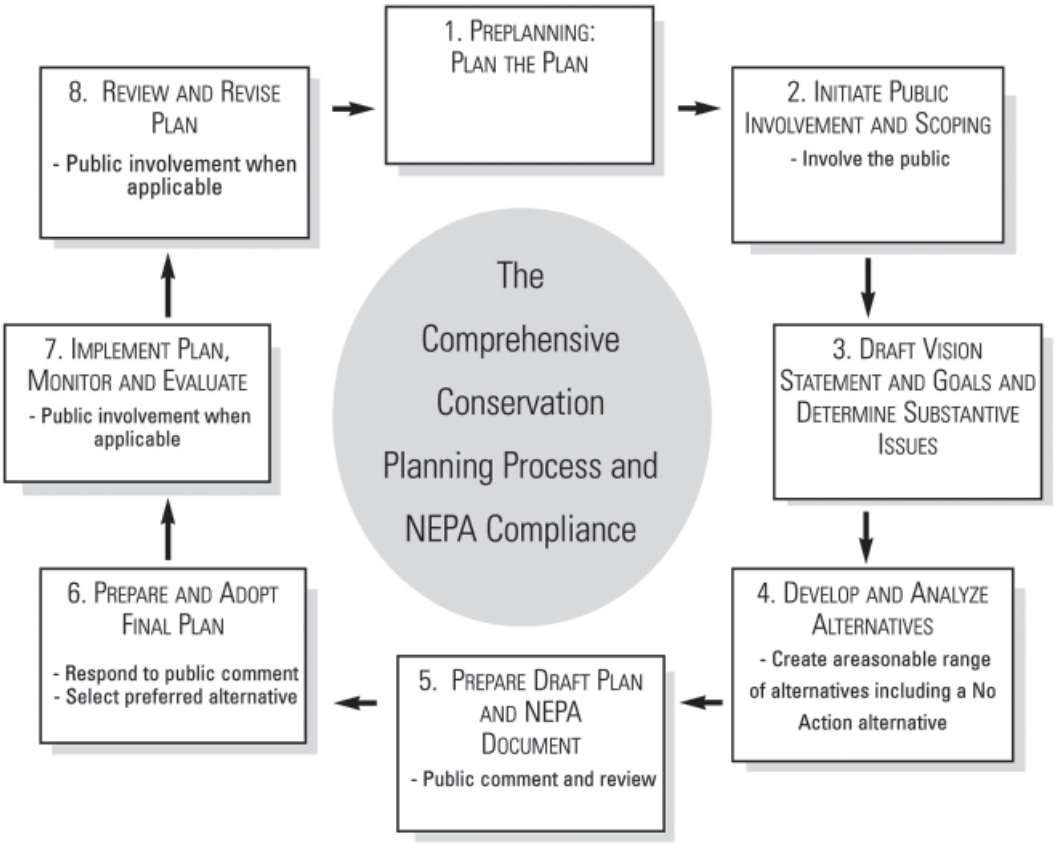

Figure 4. Steps in the planning process.

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 districts 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 district 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.

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 districts 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 districts, 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 district management overview. Each attendee was given a comment form to submit additional thoughts or questions in writing.

The Service received 46 written comments throughout the scoping process. Input obtained from meetings and correspondences, including emails, were considered in development of this draft CCP and EA.

Table 1. Planning Process Summary for the Nine Districts, North Dakota.

Date	*Event*	*Outcome*
May 2006	Initial meeting with North Dakota project leaders.	CCP overview.
August 2006	Meeting with district 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.	District 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 *Federal Register*.
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 district management were developed and drafted by the planning team.
February–August 2007	Development of biological objectives.	Objectives and strategies were developed and drafted by the planning team for the biological aspects of district 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 districts.
April 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.

State Coordination

In 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 district 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 correspondences, 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 districts are resolved or given priority over the life of the final CCP. “Chapter 2, The Districts” summarizes the identified issues, along with a discussion of effects on resources.

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

2 The Districts

USFWS

Waterfowl production areas are paid for with Duck Stamp dollars to protect habitat for waterfowl.

A wetland management district provides oversight for all of the U.S. Fish and Wildlife Service's small land tracts in a multicounty area. The nine districts manage 1,208 waterfowl production areas (232,509 acres), ten of thousands of conservation easements, and 50 wildlife development areas (18,540 acres) in 34 counties in North Dakota. These district lands (totaling 1,125,084 acres) are part of the National Wildlife Refuge System, a network of lands set aside to conserve fish and wildlife and their habitat.

- The Service bought these WPAs with funds generated from the sale of federal Duck Stamps to protect and restore waterfowl habitat.
- The Bureau of Reclamation (Reclamation) bought the wildlife development areas (WDAs) as part of North Dakota's Garrison Diversion Unit. Developed for wildlife by restoring drained wetlands and planting cropland acres to grass, the Service manages these areas primarily for the production of migratory birds.
- The conservation easements are on private lands where landowners have sold some of their property rights to the Service for protection and restoration of wildlife habitat.

This chapter describes the history, special values, purposes, vision, goals, and planning issues for the nine North Dakota wetland management districts.

2.1 Establishment, Acquisition, and Management History

The nine districts were established in the early 1960s, with the major objectives of wetland preservation, waterfowl and wildlife production, and maintenance of breeding grounds for migratory birds. The districts also provide a northern staging area and habitat for migration.

Habitat Protection

The Service manages the WPAs for the benefit of waterfowl, other migratory birds, threatened and endangered species, and resident wildlife.

The districts protect habitat primarily with two tools—WPAs and conservation easements, which are described below. On May 5, 1960, the Service bought the first WPA (212 acres in LaMoure County) within the nine-district geographic area.

- WPAs are public lands bought by the federal government for increasing the production of migratory birds, especially waterfowl. The purchase of land is also known as "ownership in fee title," where the federal government holds ownership of land on behalf of the American public. Money to buy WPA lands generally comes from the public purchase of a federal Duck Stamp. This important program is to ensure the long-term protection of waterfowl and other migratory-bird-breeding habitat that is located primarily in the Prairie Pothole Region of the northern Great Plains. All WPAs are within districts managed by Service staff. WPAs are open to the public for hunting, fishing, bird watching, trapping, hiking and most other nonmotorized and noncommercial outdoor recreation. (Recreational trapping is an activity that has been authorized by 50 CFR, part 31.16.)
- Conservation easements are acquired to protect migratory bird species habitat on private land. Typically used where fee acquisition is not desirable or needed, perpetual easements are bought from willing landowners within a wetland management district. Conservation easements have several advantages over the outright purchase of lands by the Service. First, they are more cost-effective, both in terms of initial purchase, and in long-term management responsibilities. While conservation easement contracts do require attentive enforcement to ensure their integrity, they do not carry the other burdens of ownership; for example, maintenance of facilities such as fences and signs, control of invasive plants, and mowing of ditches. Second, the operator owns and manages the land in much the same way as it was before the conservation easement purchase. This is because the program was developed and carried out by managers, biologists, and realty specialists with an interest in protecting resources at the landscape scale while minimally affecting, and even complementing, other agricultural practices. Therefore, a single-habitat conservation easement is often referred to as either a "wetland easement" or a "grassland easement." Conservation easements generally prohibit the cultivation of grassland habitat, while still permitting the landowner traditional grazing uses. A wetland easement generally prohibits grazing, burning, and leveling.

The federal Migratory Bird Conservation Fund finances the habitat protection programs—WPAs and conservation easements. The Migratory Bird Conservation Fund provides the U.S. Department of Interior (DOI) with monies to acquire migratory bird habitat. The 1958 amendment to the Duck Stamp Act authorized the Small Wetlands Acquisition Program and provided for the acquisition of WPAs in addition to the previously authorized habitats. Receipts from the sale of the Duck Stamp are used to acquire habitat under the provisions of the Migratory Bird Treaty Act (16 USC 715). The purpose of this important program is to ensure the long-term protection of waterfowl and other migratory bird breeding habitat that is located primarily in the Prairie Pothole Region of the northern Great Plains (see figure 5, map of the Prairie Pothole Region). The Service's perpetual conservation easements are key components of the Small Wetlands Acquisition Program; these easements, together with WPAs, have contributed greatly to the conservation and maintenance of prairie-nesting migratory birds.

The legislation authorizing the use of Duck Stamp money for wetland easement acquisitions through the Small Wetlands Acquisition Program required state approval. In North Dakota, approvals have been granted over time on a county-by-county basis. Soon after the passage of the 1958 amendment to the Duck Stamp Act, a team of Service biologists evaluated wetland habitats in North Dakota and made recommendations on the number of acres that should be protected in each county north and east of the Missouri River and two counties to the south and west. The original plan was for the state of North Dakota to protect half of these acres and for the Service to protect the other half with easements. The Service, therefore, proposed an acreage figure for each county based on this assumption. The state approved these figures, which became the respective "caps" for number of wetland acres that could be covered by Service easements in each county, even though they represented only half of what the Service recommended should actually be protected. In some counties, these caps have been met and no additional wetland easements can be bought with Duck Stamp funds without further approval from the governor; however, easements can be bought with non-Duck Stamp funds. To keep track of the number of acres bought in each county, the Service created and maintained easement summaries, which identify the number of wetland acres for which landowners were paid.

WDAs are another means through which the districts conserve habitat. Reclamation bought valuable wetland habitat and transferred these lands to the Service for management to offset habitat losses resulting from the development of the Garrison Diversion Project in western North Dakota. Through a memorandum of agreement between the Service, Reclamation, and NDGF, the Service manages these lands as part of the Refuge System within wetland management districts for migratory birds, particularly waterfowl. There are 37 WDAs (19,829 acres) scattered across North Dakota. The management of and regulations for public use at WDAs are similar to that for WPAs.

There are other conservation easements administered by the districts, but these were not acquired through the Small Wetlands Acquisition Program. The most common of these are Farmers Home Administration conservation easements—"FmHA easements" (also known as RECD [Rural Economic and Community

Figure 5. Map of the Prairie Pothole Region of the United States and Canada.

Development] easements, Farm Service Agency "Ag-Credit easements," and U.S. Department of Agriculture [USDA] conservation easements, depending on the status of the USDA program responsible for these properties at the time they were in federal inventory). The 1985 Farm Bill Consolidated Farm and Rural Development Act was the initial authorization for FmHA easements. The Farmers Home Administration was given authority to establish easements for conservation, recreation, and wildlife purposes on properties that were foreclosed on by the federal government ("inventory" properties), and the Service was designated easement manager for those easements worthy of inclusion into the Refuge System.

The Farmers Home Administration's inventory lands were inspected for wetlands and identified similarly as if the Service were to accept wetlands for its Small Wetlands Acquisition Program. However, protection of wetlands, floodplains, and their watersheds, along with historical and cultural resources (that is, "Native Tree Claims") required a variety of provisions and restrictions in these conservation easements. The quitclaim deed that was prepared when the inventory lands were sold outlined these provisions—rights reserved by the Service are listed in the "Covenants by the Landowner" and vary from easement to easement.

District Descriptions

The nine wetland management districts are home for all waterfowl species found in the Prairie Pothole Region (see figure 1, vicinity map, in chapter 1). The nine districts manage approximately 1,146,322 acres. Below is a brief description for each of the nine districts.

Arrowwood Wetland Management District

- Foster and Eddy counties
- Headquarters—Pingree, North Dakota
- Part of the Arrowwood Wetland Management District Complex
- All district lands—26,932 acres
  - 28 WPAs: 6,144 acres
  - wetland easements: 19,055 acres
  - grassland easements: 0 acres
  - FmHA easements: 1,733 acres
  - WDAs: 0 acres

The district, in east-central North Dakota, was established in 1961 as a breeding ground for migratory birds and other wildlife. Wildlife species often observed at the WPAs include waterfowl, upland game birds, songbirds, birds of prey, deer, and numerous furbearers. The WPAs offer many opportunities for wildlife observation, hiking, hunting, photography, winter sports (cross-country skiing), and education and interpretation for organized groups.

Audubon Wetland Management District

- McLean, Ward, and Sheridan counties
- Headquarters—Coleharbor, North Dakota
- Part of the Audubon Wetland Management District Complex
- All district lands—188,751 acres
  - 101 WPAs: 18,584 acres
  - wetland easements: 95,061 acres
  - grassland easements: 55,022 acres
  - FmHA easements: 7,400 acres
  - 20 WDAs: 12,684 acres

The district includes WPAs and WDAs. Reclamation developed these WDAs for wildlife by restoring drained wetlands and planting cropland acres to grass. The WDAs were transferred to the Service to be managed primarily for the production of migratory birds and for public use.

All public lands managed as the Audubon Wetland Management District contain wetland and grassland habitat for waterfowl, other migratory birds, and many other species of wildlife. Rotational grazing, haying, and prescribed burning are common techniques used to improve and maintain grasslands for nesting birds. These public lands help sustain North America's waterfowl populations by providing secure wetland and grassland habitats.

Chase Lake Wetland Management District

- Stutsman and Wells counties
- Headquarters—Woodworth, North Dakota
- Part of the Arrowwood National Wildlife Refuge Complex
- All district lands—111,680 acres
  - 129 WPAs: 35,473 acres
  - wetland easements: 56,057 acres
  - grassland easements: 14,812 acres

USFWS

American white pelicans rest at Chase Lake Wetland Management District.

- FmHA easements: 1,608 acres
- 5 WDAs: 3,730 acres

Located in the Prairie Pothole Region of the United States, the district and surrounding area provide breeding and resting habitat for more than 293 bird species. The district is comprised of native prairie, dense nesting cover, and an amazing density of wetlands. The majority of this land has not been altered since Euro-American settlement times.

The WPAs, purchased since 1960, have been used by researchers to provide important information about waterfowl and wetland densities. The diversity and abundance of wildife species at these WPAs provide excellent opportunities for outdoor recreation such as hunting, trapping, and wildlife observation.

Crosby Wetland Management District

- Burke, Divide, and Williams counties
- Headquarters—Crosby, North Dakota

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Baird's sparrow.

© Bob Gress

Birding groups nationwide know North Dakota as the best area for opportunities to view the unique Baird's sparrow and Sprague's pipit (above).

- Part of the Lostwood Wetland Management District Complex
- All district lands—114,552 acres
  - 99 WPAs: 18,730 acres
  - wetland easements: 70,019 acres
  - grassland easements: 25,083 acres
  - FmHA easements: 720 acres
  - WDAs: 0 acres

Wetlands and grasslands have been preserved on private property by the purchase of easements from landowners who have agreed not to drain, fill, or burn their wetlands, or to till their grasslands. Several hundred easement contracts protect wetlands and native grasslands.

The district, located in northwestern North Dakota, shares a border with Canada and the state of Montana. This area is known as one of the finest nesting and breeding sites for hundreds of species of birds.

Devils Lake Wetland Management District

- Benson, Cavalier, Grand Forks, Nelson, Pembina, Ramsey, Towner, and Walsh counties
- Headquarters—Devils Lake, North Dakota
- Part of the Devils Lake Wetland Management District Complex
- All district lands—210,717 acres
  - 257 WPAs: 48,885 acres
  - wetland easements: 150,182 acres
  - grassland easements: 4,264 acres
  - FmHA easements: 4,606 acres
  - 11 WDAs: 2,780 acres

The district primarily provides wetland areas needed by waterfowl in the spring and summer for nesting and feeding. Primary objectives of the Devils Lake Wetland Management District are wetland habitat preservation and improvement, waterfowl and wildlife production, maintenance of migration habitat, and provision of winter cover for resident wildlife.

Devils Lake Wetland Management District is home for all waterfowl species found in the Prairie Pothole Region. Mallard, gadwall, and blue-winged teal are the most abundant ducks. Giant Canada geese have been reintroduced and efforts are underway to expand the range of this historically important species. Spectacular concentrations of migratory birds gather in the district each spring and fall including snow geese, whose vast numbers are a magnificent sight. The WPAs also provide habitat for white-tailed deer, pheasant, turkey, sharp-tailed grouse, Hungarian partridge, and occasional moose.

The WPAs provide many opportunities for year-round outdoor enjoyment including hunting, trapping, wildlife observation, photography, and environmental study.

J. Clark Salyer Wetland Management District

- Bottineau, Kenville, McHenry, Pierce, and Rolette counties
- Headquarters—Upham, North Dakota
- Part of the J. Clark Salyer Wetland Management District Complex
- All district lands—197,691 acres
  - 127 WPAs: 27,332 acres
  - wetland easements: 135,321 acres
  - grassland easements: 28,065 acres
  - FmHA easements: 6,973 acres
  - WDAs: 0 acres

The district's lands are important feeding and resting areas for hundreds of thousands of waterfowl that annually migrate through the Central Flyway. The district has developed into one of the most important duck production areas in the United States.

The district has become a favorite spot for birds of all descriptions to stop on their migrations north and south. Gadwall, blue-winged teal, mallard, and Canada goose are the most numerous nesting waterfowl. Many species of shorebirds and grebes, American white pelican, sandhill crane, lark bunting, longspurs, and sparrows—including Baird's and Le Conte's—are among the birds that take summer residence at the district. Managing upland areas for waterfowl nesting habitat has also benefited upland game birds. The sharp-tailed grouse, ring-necked pheasant, gray partridge, ruffed grouse, and wild turkey are all occupants of the district.

Kulm Wetland Management District

- Dickey, LaMoure, Logan, and McIntosh counties
- Headquarters—Kulm, North Dakota
- Part of the Kulm Wetland Management District Complex
- All district lands—200,712 acres
  - 231 WPAs: 44,739 acres
  - wetland easements: 112,692 acres
  - grassland easements: 38,251 acres
  - FmHA easements: 4,390 acres
  - 1 WDA: 640 acres

In the heart of the Prairie Pothole Region of the United States, the district is in southeastern North Dakota. Glacial action molded the landscape of the area, leaving a wealth of wetlands. Vegetation that developed on the glacially scoured area and glacial end moraine hills represents a transition between tall-grass and short-grass prairie. Bison, waterfowl, and early native people thrived.

The James River, running through the eastern part of the district, forms a major migration corridor for numerous species of migratory birds. Although highly altered following the influx of European immigrants, the area retains many of its wetlands and numerous acres of native grass. A wide variety of migratory birds uses the district for breeding grounds, nest sites, and migration rest stops. Preservation and management of the migratory bird resource is the primary duty of the district.

Lostwood Wetland Management District

- Mountrail County
- Headquarters—Kenmare, North Dakota
- Part of the Lostwood Wetland Management District Complex
- All district lands—84,145 acres
  - 56 WPAs: 12,506 acres
  - wetland easements: 35,000 acres
  - grassland easements: 36,034 acres
  - FmHA easements: 605 acres
  - WDAs: 0 acres

The district is located in northwestern North Dakota and extends from eastern Burke County, north to the Canadian border, west to the Montana line, and south to Lake Sakakawea. A variety of wildland habitats are present ranging from (1) prairie creeks and rivers to rolling hills covered with native prairie grasses and dotted with numerous wetlands, and (2) flat croplands to gradual slopes leading downward toward Lake Sakakawea and the rough breaks and bluffs that border this impoundment in the Missouri River system. The WPAs in the district provide more than 2,700 acres of prairie grasses, wildflowers, and wetlands habitat as a great opportunities for hunting, trapping, and wildlife observation within the coteau (hilly upland) prairie.

Valley City Wetland Management District

- Barnes, Cass, Griggs, Steele, and Traill counties
- Headquarters—Valley City, North Dakota
- Part of the Arrowwood Wetland Management District Complex
- All district lands: 61,218 acres
  - 82 WPAs: 17,653 acres
  - wetland easements: 41,583 acres
  - grassland easements: 0 acres
  - FmHA easements: 1,982 acres
  - WDAs: 0 acres

The district is located in east-central North Dakota. The eastern one-third of the district is located in the Red River Valley. This area, characterized by flat, intensively farmed lands, was once the lake bed of Glacial Lake Agassiz. The remaining two-thirds of the district is part of the glaciated Prairie Pothole Region known as the Drift Prairie. The area is characterized by a gentle and smooth rolling topography with numerous wetlands, ranging from under an acre to several hundred acres. The district staff promotes conservation farming and ranching practices, protects unique prairie ecosystems, increases waterfowl and other prairie wildlife species, and provides consumptive and nonconsumptive public use.

District Information Summary

Mallard, gadwall, and blue-winged teal are the most abundant ducks, with several other species of diving and dabbling ducks common to the districts. Giant Canada geese have been reintroduced and efforts are underway to expand the range of this historically important species. Spectacular concentrations of waterfowl and other migratory birds gather in the districts each spring and fall, including snow geese, whose vast numbers are a magnificent sight.

In addition, WPAs provide habitat for many resident species of wildlife including white-tailed deer, pheasants, turkeys, and sharp-tailed grouse. Creating habitat diversity and managing wildlife cover in WPAs result in an increase in wildlife abundance, an important objective of the U.S. Fish and Wildlife Service.

The districts use many management practices to benefit waterfowl. These techniques include construction of nesting structures, creation and restoration of wetlands, management of water levels in wetlands, establishment of winter food plots, management of nesting cover, prescribed burning, haying and grazing (see appendix D, draft compatibility determinations), and law enforcement. These techniques enhance and create a diversity of habitats that are used by many wildlife species.

2.2 Special Values

Early in the planning process, the planning team and public identified the outstanding qualities of the nine wetland management districts. District qualities are the characteristics and features of each district that make it special, valuable for wildlife, and worthy of Refuge System status. It was important to identify the special values of each district to recognize its worth and to ensure that the special values of the districts are preserved, protected, and enhanced through the planning process. District 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 districts unique and valued:

- The districts have a very high density of wetlands for waterfowl and migratory birds.

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District staffs work with private landowners to protect wetland habitat under easement.

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District habitats are essential to breeding waterfowl populations.

- Very large blocks of intact native prairie ecosystem are protected through the districts' conservation easements and fee ownership.
- The districts provide protected and managed wetlands and uplands for breeding and staging habitat for waterfowl and shorebirds during migration within the Central Flyway.
- Visitors can find diverse and abundant possibilities for public use at the districts.
- The districts provide for quality environmental education.
- The districts provide for the protection of breeding areas for endangered species such as the piping plover.
- The districts protect and manage unique landscapes such as the deciduous forest of the Turtle Mountains.

2.3 Purposes

The districts were designated as part of the Small Wetlands Acquisition Program in the 1950s to save wetlands from various threats, particularly drainage. The passage of Public Law 85-585 in August 1958 amended the Migratory Bird Hunting and Conservation Stamp Act of 1934 ("Duck Stamp Act") and allowed for the acquisition of waterfowl production areas and conservation easements for waterfowl production.

The main authorities in establishment of the districts follow:

- Migratory Bird Hunting Stamp Act 16 USC 718(c)—"As waterfowl production areas subject to all provisions of the Migratory Bird Conservation Act … except the inviolate sanctuary provisions."
- Migratory Bird Conservation Act 16 USC 715d—"For any other management purposes, for migratory birds."

The districts are "to assure the long-term viability of the breeding waterfowl population and production through the acquisition and management of waterfowl production areas, while considering the needs of other migratory birds, threatened and endangered species, and other wildlife" (memorandum from Region 6 Assistant Regional Director Richard A. Coleman, December 2006). This purpose statement was developed for all region 6 wetland management districts. The districts provide a northern staging area and habitat for migration.

For this CCP, the Service has combined the nine districts for evaluation as a group and program. The purposes and management capabilities and challenges are similar for the nine districts.

All nine districts were established under two authorities—the Migratory Bird Hunting Stamp Act of March 16, 1934, and the Migratory Bird Conservation Act of February 18, 1929:

- The Migratory Bird Hunting Stamp Act ("Duck Stamp Act") provides for the conservation, protection, and propagation of native species of fish and wildlife, including migratory birds that are threatened with extinction.
- The Migratory Bird Conservation Act works toward meeting the obligations of the United States under the migratory bird treaty with Great Britain by the following:

- Lessening the dangers threatening migratory game birds from drainage and other causes.
- The acquisition of areas of land and water to furnish in perpetuity reservations for the adequate protection of such birds.
- Authorizing appropriations for the establishment of such areas, their maintenance and improvement, and for other purposes.

2.4 Vision

At the beginning of the planning process, the Service developed a vision for the districts. The vision describes the focus of district 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 districts follows.

Wetland management districts conserve an important network of public and private wetland and upland habitat in North Dakota. This network preserves the integrity of the historical and vital resting and breeding grounds of North America's migratory waterfowl.

As part of the National Wildlife Refuge System, these lands benefit ducks, other migratory birds, threatened and endangered species, and resident wildlife.

The responsible management and protection of this expanding network requires adequate funding, dedicated personnel, and successful partnerships.

District communities and visitors value grasslands and marshes as a beneficial and important component of a diverse, healthy, and productive prairie landscape.

Current and future generations enjoy wildlife-dependent uses of these lands and partners, especially waterfowl hunters, actively support and encourage the districts' habitat conservation programs.

2.5 Goals

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

Habitat and Wildlife Goal

Protect, restore, and enhance the ecological diversity of grasslands and wetlands of the North Dakota Prairie Pothole Region. Contribute to the production and growth of continental waterfowl populations to meet the goals of the North American Waterfowl Management Plan. Also, support healthy populations of other migratory birds, threatened and endangered species, and other wildlife.

Monitoring and Research Goal

Use science, monitoring, and applied research to advance the understanding of the Prairie Pothole Region and management within the North Dakota wetland management districts.

Cultural Resources Goal

Identify and evaluate cultural resources in the North Dakota wetland management districts 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 quality opportunities to enjoy hunting, fishing, trapping, and other compatible wildlife-dependent recreation on Service-owned lands and expand their knowledge and appreciation of the prairie landscape and the National Wildlife Refuge System.

Partnerships Goal

A diverse network of partners joins with the North Dakota wetland management districts to support research; protect, restore, and enhance habitat; and foster awareness and appreciation of the prairie landscape.

Operations Goal

Effectively employ staff, partnerships, and volunteers and secure adequate funding in support of the National Wildlife 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. Summaries of these key issues are below.

Wetland and Upland Habitats

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

Invasive Plants

The districts 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.

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 districts. The production of biofuels, coal, oil, gas, and wind energy has the potential to impact effectiveness of many district 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 district lands—including salt-water contamination, filling of wetlands, and road development—have increased as increasing exploration takes place in North Dakota.

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Canada thistle is one of the invasive plants that are troublesome on district lands.

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 1985 Farm Bill (amended 1990, 1996, 2002).

Wildlife Management

Threatened and endangered species, predators, and wildlife disease are issues for the districts.

Threatened and Endangered Species

The piper plover is a federally listed, threatened, shorebird. Breeding piping plovers occur in small numbers on numerous alkali wetlands in the Audubon, Crosby, and Lostwood wetland management districts. Endangered whooping cranes can be observed in the marshes across the districts. The primary issues related

to these and other species of concern 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 districts administer migratory bird programs and have the lead role in addressing wildlife and, in particular, bird disease issues. Wetland management districts 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 district programs, and managing botulism.

Visitor Services

Hunting, fishing, wildlife observation and photography, and environmental education and interpretation are uses currently authorized on lands administered by the districts. A growing demand for public recreation in North Dakota and the nation makes these 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 not only the six wildlife-dependent recreational uses, but also in trapping.

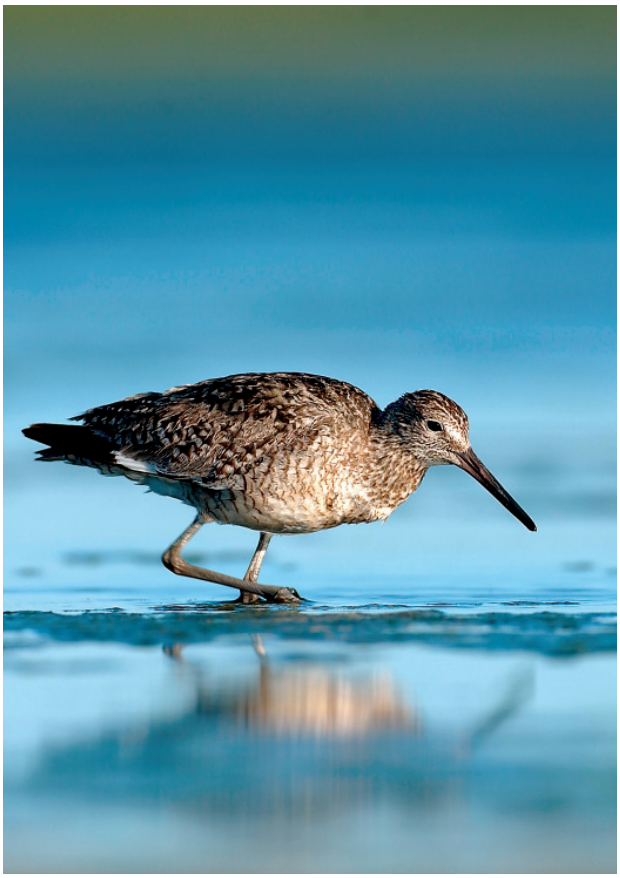
Operations

Funding and staff are not sufficient to fulfill the purposes and meet the goals of the districts. Identification of priorities and direction of resources efficiently will always be an issue for the districts. 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. District facilities need to be evaluated and upgraded.

Monitoring and Research

Monitoring habitat and wildlife populations is an essential element in achieving the primary goals and objectives of the districts. 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 districts as a research field station could make valuable strides in development of new directions in management and expansion of the knowledge of field biologists.

3 Alternatives



USFWS

The willet finds an important food source in district wetlands in North Dakota.

Alternatives are different approaches for management of the nine wetland management districts that are designed to resolve issues; achieve the districts' 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 districts: 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 district. This was the most logical approach given the following circumstances:

- Nine wetland management districts are addressed in the plan.
- There is a mixture of fee-title and conservation easement authorities.
- There is a similar purpose, vision, and goal for each district.
- 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 2)

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 district 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 districts. 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 districts 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 Service has developed criteria, applicable to all alternatives, to determine priorities for management of WPAs. Because each district is unique, specific thresholds will need to be developed for each criterion. These criteria are described in chapter 4 (4.2 Biological Resources, Wildlife, Strategic Planning for Waterfowl).

The Service recently completed a "decision tree" that outlines how the Service will set priorities for grassland and wetland acquisitions (see chapter 6, 6.3 Goals, Objectives, Strategies, and Rationale; Wetlands in Easements Objective 1; Uplands in Easements Objective 1). These priorities apply to all alternatives.

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.

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 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 nine wetland management districts 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 districts.

Each alternative

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

Donna Dewhurst/USFWS

A green-winged teal rests on its travel north to nest during the spring.

Alternative A—Current Management (No Action)

Under alternative A, management activities being conducted by the Service throughout the nine districts 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 districts. 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 WPAs. Currently, only high-priority WPAs receive consistent management. Service staffs monitor all conservation easements; however, only the high-priority easement violations are consistently enforced. Acquisition efforts by the division of realty focus on high-priority tracts, and those are mostly to secure easements from willing private landowners.

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

District 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 district lands by federally listed species such as piping plovers and whooping cranes. The staffs would continue to close areas to public use in order to protect federally listed species using district lands, especially during nesting season.

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 district 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

The districts' hunting, trapping, and fishing programs would continue with season dates paralleling the regular statewide seasons. WPAs would continue to be open to all waterfowl, small game, and furbearer hunting, consistent with state regulations. Access would continue to be limited to foot traffic on all Service lands, with the exception of identified motorized vehicle trails at specific WPAs. Recreational trapping is available at all WPAs, in accordance with state trapping regulations (authorized by 50 CFR, part 31.16, recreational trapping is administered by the Service).

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

District informational brochures and publications would continue to be updated periodically. Visitor service facilities including displays and signs, along with brochures, would be maintained at each district's headquarters and throughout each district.

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

Partnerships

The district staffs would work to preserve existing partnerships need to address resource information needs, protect and enhance habitat (both public and private), and promote public use, education, and outreach. Current partners include local private landowners—for management, acquisition of grassland and wetland easements, weed initiatives, and outreach.

The districts 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 WPAs. Operations for the districts 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 Management (Proposed Action)

Under alternative B, wildlife habitat management would provide for enhanced wetland and upland management, where warranted, on district 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 threatened and endangered species. District staffs would focus on high-priority properties, also known as tracts, and on medium-priority tracts. The district staffs would carry out compatible production enhancement techniques for targeted migratory bird populations.

The district staffs would expand existing environmental education and visitor services programs, with additional waterfowl emphases.

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, endangered species). The focus of the district staffs would be to maintain and enhance native prairie through enhanced management at high- and medium-priority WPAs 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 and grazing (see appendix D), (2) prescribed burning, and (3) 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 district staffs decided that it is the most appropriate management for the benefit of target species.

Under this alternative, the HAPET would help district 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 conservation easements and some of the highest priority fee tracts, 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 district staffs would incorporate compatible production enhancement techniques such as island trapping for predators and artificial nesting structures.

As in alternative A, the district staffs would continue to monitor and document the presence and use of district lands by federally listed species such as piping plovers and whooping cranes. The staffs would continue to close areas to public use in order to protect federally listed species using district lands, especially during nesting season.

Monitoring and Research

Current monitoring and research would continue as described for alternative A. District staffs would also complete some baseline monitoring at high- and medium-priority tracts. The staffs would participate in landscape-level analysis to (1) guide acquisition, (2) promote management-level research to improve habitat management practices, and (3) 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 districts (every 3 years, a different district 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. District 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.

USFWS

Duck hunting is permitted at all WPAs within a district.

The Service proposes, at a future date, (1) one new administrative and visitor center facility each for Audubon and Kulm wetland management districts, and (2) one new visitor contact station each for Arrowwood, Devils Lake, Lostwood, and Valley City wetland management districts. An administrative and visitor center facility is a building with office space for district and refuge staffs, along with space that provides visitors with interpretive and brochure information. A visitor contact station is a small space that provides visitor information such as a free-standing kiosk, brochure rack, or small room attached to the main district office.

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 districts. This alternative would also promote developing and fostering partnerships with local communities, such as "friends groups," to inform the public of district programs and special events.

Operations

This alternative would necessitate an increase in district 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, district staffs would apply more intensive and widespread management of the native prairie and wetland complexes. District 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.

Habitat and Wildlife

All WPAs 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 and expand acquisition of conservation easements, along with enforcement through mapping and strong enforcement. Acquisition efforts would be directed at high-priority conservation easements, fee-title WPAs, and "roundouts." The acquisition of easements on native prairie and wetlands would be of highest priority.

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 district staffs would continue to monitor and document the presence and use of district lands by federally listed species such as piping plovers and whooping cranes. The staffs would continue to close areas to public use in order to protect federally listed species using district lands, especially during nesting season.

Monitoring and Research

The districts' 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 conducted:

- 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, air base).
- Conduct waterfowl population and density surveys.
- Conduct cooperative (with NDGF) upland bird and deer surveys.
- Conduct research on migratory bird response (especially of shorebirds, waterbirds, and waterfowl) to large-scale wind farms.
- 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. In addition, the district 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 district staffs would develop programs to enhance public 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 district 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 WPAs.

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.

As in alternative A, the Service proposes, at a future date, (1) one new administrative and visitor center facility each for Audubon and Kulm wetland management districts, and (2) one new visitor contact station each for Arrowwood, Lostwood, and Valley City wetland management districts.

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 further partnerships with community members ("friends groups") who have an appreciation for and interest in the welfare of the districts.

Operations

As in alternative B, monitoring and enforcement would be expanded at all conservation easements. Conservation easement enforcement would be increased through projects such as landowner notification letters.

3.4 Comparison of Alternatives

Table 2 summarizes the actions and predicted consequences of each alternative.

Table 2. Comparison of Alternatives for the Nine Districts, North Dakota.

Alternative A	*Alternative B*	*Alternative C*
Current Management (No Action): Current funding, staff, and programs. Only the highest priority actions are addressed.	*Moderately Enhanced Management (Proposed Action): Management of high- and medium-priority habitats. Production enhancement for targeted migratory bird populations.*	*Enhanced Management: Widespread management of native prairies and wetland. Expanded restoration of grasslands. New visitor services programs.*
Habitat and Wildlife—Actions		
Prioritize WPA management, with only high-priority WPAs receiving consistent management. Monitor all conservation easements; only enforce high-priority violations. Focus acquisition on high-priority tracts; use mostly conservation easements. Manage legally identified invasive plants at high-priority WPAs. Use prescribed fire, grazing, farming, and invasive plant control to maintain and improve native prairie and tame grass units.	Manage only medium- and high-priority WPAs. Monitor and enforce all conservation easements. Monitor the effects of management and restoration on migratory birds. Focus acquisition on high-priority conservation easements and some of the highest priority fee tracts. Manage legally identified invasive plants at high- and medium-priority WPAs. Apply compatible production enhancement techniques for targeted migratory bird populations.	Manage all WPAs. 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. Emphasize restoration of representative examples of native mixed- and tall-grass prairies, to benefit ground-nesting species of migratory birds. Manage the low-priority old cropland and degraded prairies to increase nest and brood survival for high densities of waterfowl species that use DNC. Expand conservation easement acquisition and enforcement through proactive mapping and strong enforcement. Direct acquisition efforts at high-priority conservation easements (native prairie and wetlands), fee-title WPAs, and "roundouts." Manage legally identified invasive plants at all fee tracts.
Habitat and Wildlife—Environmental Consequences		
The current productivity of wetland and upland vegetation communities would be maintained at high-priority WPAs. The current support of waterfowl, shorebird, and upland species use would be maintained. There would be a gradual long-term deterioration of habitats at medium- and low-priority WPAs.	The productivity of vegetative wetland and upland communities would be improved at all WPAs for bird species migration, breeding, and recruitment. Waterfowl recruitment would be increased through improved habitat conditions and control of predators. Additional habitat at high-priority WPAs would be protected through acquisition. Native prairie grasses and forbs conditions for targeted species would improve.	The productivity of vegetative wetland and upland communities would be improved at all WPAs for bird species migration, breeding, and recruitment. Management of intact landscapes would provide a structural mosaic of native vegetative communities with less fragmentation, which would lead to less invasive plant species. *(continued)*

Table 2. Comparison of Alternatives for the Nine Districts, North Dakota.

Alternative A	*Alternative B*	*Alternative C*
Current Management (No Action): Current funding, staff, and programs. Only the highest priority actions are addressed.	*Moderately Enhanced Management (Proposed Action): Management of high- and medium-priority habitats. Production enhancement for targeted migratory bird populations.*	*Enhanced Management: Widespread management of native prairies and wetland. Expanded restoration of grasslands. New visitor services programs.*
Habitat and Wildlife—Environmental Consequences *(continued)*		
		Additional WPAs with high-priority habitat would be acquired using progressive HAPET mapping. The occurrence of all invasive plants on all district lands would be mapped.
Monitoring and Research—Actions		
Conduct mandated surveys and some baseline monitoring on high-priority tracts. Periodically complete vegetation line transects at a limited number of WPAs to track progress of management activities to improve native prairie. Complete 4-square-mile waterfowl pair counts.	Conduct mandated surveys and some baseline monitoring on high- and medium-priority tracts. Periodically complete vegetation line transects at a limited number of WPAs to track progress of management activities to improve native prairie. Complete 4-square-mile waterfowl pair counts. Support landscape-level analysis to guide acquisition. Promote management level research to improve habitat management practices.	Conduct mandated surveys and baseline monitoring. Conduct specific research to answer management questions (money is available for graduate student work and self-directed research). Increase monitoring of grasslands, wetlands, and wildlife: ■ Expand vegetation transects on native prairie to include more district units and do annually. ■ Conduct research on reseeding uplands to native mixes. ■ Monitor water quality to assess upstream threats. ■ Conduct waterfowl population and density, upland bird, and deer surveys. ■ Conduct research on migratory bird response to large-scale wind farms. ■ Conduct a reptile and amphibian inventory.
Monitoring and Research—Environmental Consequences		
Although limited, any information gathered would be beneficial to the staffs in analysis of management needs.	The additional monitoring and research would lead improved habitat conditions and health of migratory and resident species that use district lands.	*Same as alternative B.*

Table 2. Comparison of Alternatives for the Nine Districts, North Dakota.

Alternative A *Current Management (No Action): Current funding, staff, and programs. Only the highest priority actions are addressed.*	*Alternative B* *Moderately Enhanced Management (Proposed Action): Management of high- and medium-priority habitats. Production enhancement for targeted migratory bird populations.*	*Alternative C* *Enhanced Management: Widespread management of native prairies and wetland. Expanded restoration of grasslands. New visitor services programs.*
Cultural Resources—Actions		
Conduct cultural resource evaluations in response to activities that are "undertakings" under section 106 of the NHPA. Comply with cultural resource laws including protection, when possible, of resources eligible for the National Register of Historic Places.	*Same as alternative A.*	*Same as alternatives A and B, plus the following.* Develop educational programs and interpretive opportunities for the public.
Cultural Resources—Environmental Consequences		
Cultural resources that would be potentially affected by an undertaking would be identified and, if significant, preserved when possible.	*Same as alternative A.*	*Same as alternatives A and B, plus the following.* More of the public would learn about cultural resources in the districts.
Visitor Services—Actions		
Conduct visitor services events such as teacher workshops on a multiyear rotation among districts. Occasionally update brochures and publications. Occasionally do media outreach.	Conduct visitor services events such as teacher workshops and waterfowl identification on a 3-year rotation among districts. Annually conduct media outreach. Annually review brochures and publications; complete updates as needed. Construct new administrative and visitor center facilities: ❑ Audubon WMD ❑ Kulm WMD Construct new visitor contact stations: ❑ Arrowwood WMD ❑ Devils Lake WMD ❑ Lostwood WMD ❑ Valley City WMD *(continued)*	Enhance visitor services. Develop outdoor classroom activities. Add interpretive exhibits and displays. Annually conduct visitor services events such as teacher workshops and waterfowl identification. Annually review and renew brochures and publications. Develop new publications and educational materials. Do outreach with the media and partner groups such as wildlife clubs and nonprofit conservation groups. Make presentations to the area public and schools. Construct visitor center and contact station facilities (*same as alternative B*).

Table 2. Comparison of Alternatives for the Nine Districts, North Dakota.

Alternative A *Current Management (No Action): Current funding, staff, and programs. Only the highest priority actions are addressed.*	*Alternative B* *Moderately Enhanced Management (Proposed Action): Management of high- and medium-priority habitats. Production enhancement for targeted migratory bird populations.*	*Alternative C* *Enhanced Management: Widespread management of native prairies and wetland. Expanded restoration of grasslands. New visitor services programs.*
Visitor Services—Actions *(continued)*		
	Redesign the visitor contact station at Crystal Springs WPA in the Chase Lake WMD. Construct a new interpretive sign for the auto tour route at Chase Lake WMD. Develop an interpretive display for Crosby WMD.	
Visitor Services—Environmental Consequences		
Opportunities would continue at or near existing levels.	Through the development of additional workshops, brochures, and exhibits, the public and school groups would better understand the species and habitat relationships and the general mission of the Refuge System. The establishment of visitor centers and contact stations would increase public visitation and knowledge of the districts. There may be irreversible damage to relatively small areas of vegetation due to facility construction. Construction equipment may cause short-term disturbance to wildlife.	*Same as alternative B.*
Partnerships—Actions		
Use partnerships with the public, primarily landowners adjacent to the WPAs, to cooperatively manage district habitats. Continue coordination with the NDGF to manage hunting at WPAs.	*Same as alternative A, plus the following.* Develop "friends" groups, expand partnerships with universities, and improve relations with neighbors.	*Same as alternative B, plus the following.* Expand and improve existing partnerships with the local public and NDGF. Develop new partnerships to benefit mutual programs.
Partnerships—Environmental Consequences		
Without new partnerships, the districts 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.	Expanded partnerships would enable the districts to meet the needs of visitors. Partners would assist staff in monitoring and research, which would expand knowledge about habitat management and restoration.	*Same as alternative B.*

Table 2. Comparison of Alternatives for the Nine Districts, North Dakota.

Alternative A	*Alternative B*	*Alternative C*
Current Management (No Action): Current funding, staff, and programs. Only the highest priority actions are addressed.	*Moderately Enhanced Management (Proposed Action): Management of high- and medium-priority habitats. Production enhancement for targeted migratory bird populations.*	*Enhanced Management: Widespread management of native prairies and wetland. Expanded restoration of grasslands. New visitor services programs.*
Operations—Actions		
Maintain current staff, equipment, and other resources.	Increase resources necessary to (1) meet legal and obligated mandates, (2) provide management at high- and medium-priority WPAs, and (3) provide limited resources to other projects. 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. Increase resources to be able to monitor and enforce all conservation easements. Enhance enforcement of conservation easements through projects such as landowner notification letters.
Operations—Environmental Consequences		
Current levels of operation would be maintained. Property and equipment would be safe and workable, but districts would lack state-of-the-art equipment for habitat improvement.	The district 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 districts to visitors.	*Same as alternative B.*

4 Affected Environment

USFWS

Sunrise over a Wells County wetland.

The nine wetland management districts manage thousands of noncontiguous tracts of federal land totaling 1,125,084 acres. These lands include 1,208 WPAs, 37 WDAs, and tens of thousands of conservation easements.

This chapter describes the physical environment and biological resources of these district lands. In addition, the affected environment includes the fire and grazing history, cultural resources, visitor services, socioeconomic environment, and operations of the districts.

4.1 Physical Environment

The districts are primarily east and north of the Missouri River, from the Canadian border south to the state line of South Dakota. Because districts 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 district is located. Five physiographic regions occur in the nine-district area: Red River Valley, Glaciated Plains, Turtle Mountains, Missouri Coteau, and Coteau Slope (see figure 6, map of physiographic regions). These physiographic regions correspond closely to the level 3 ecoregions described below with the exception of the Turtle Mountains, which is described as a level 4 ecoregion.

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.

Complexes of wetlands scattered throughout the wetland management districts 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.

Global Warming

The 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.

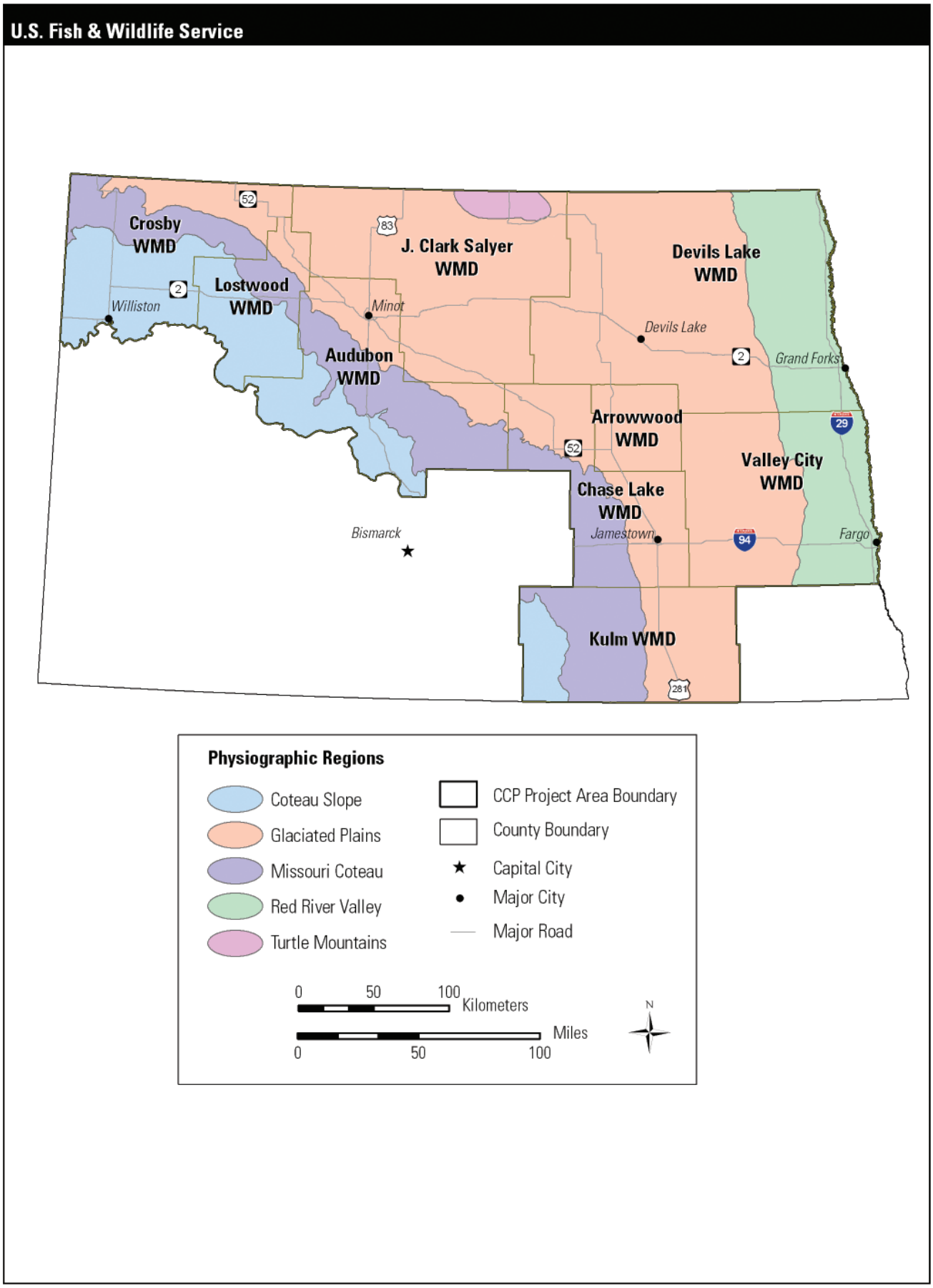


Figure 6. Map of the physiographic regions in the nine districts, North Dakota.

The U.S. 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_2) 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 considered during 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_2.

One Service activity in particular—prescribed burning—releases CO_2 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 consideration 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 section 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 portion of the state) to about 38 inches in a belt extending diagonally across the state northeast–southwest (Jensen, no date).

Physiography, Geography, and Soils

This section describes the districts' ecoregions and soils.

Ecoregions

Four level 3 ecoregions cover the nine districts (see figure 7): 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; level 4 ecoregions are the finest level in the hierarchy (Bryce et al. 1996). Table 3 displays the level 3 ecoregions in which each district occurs.

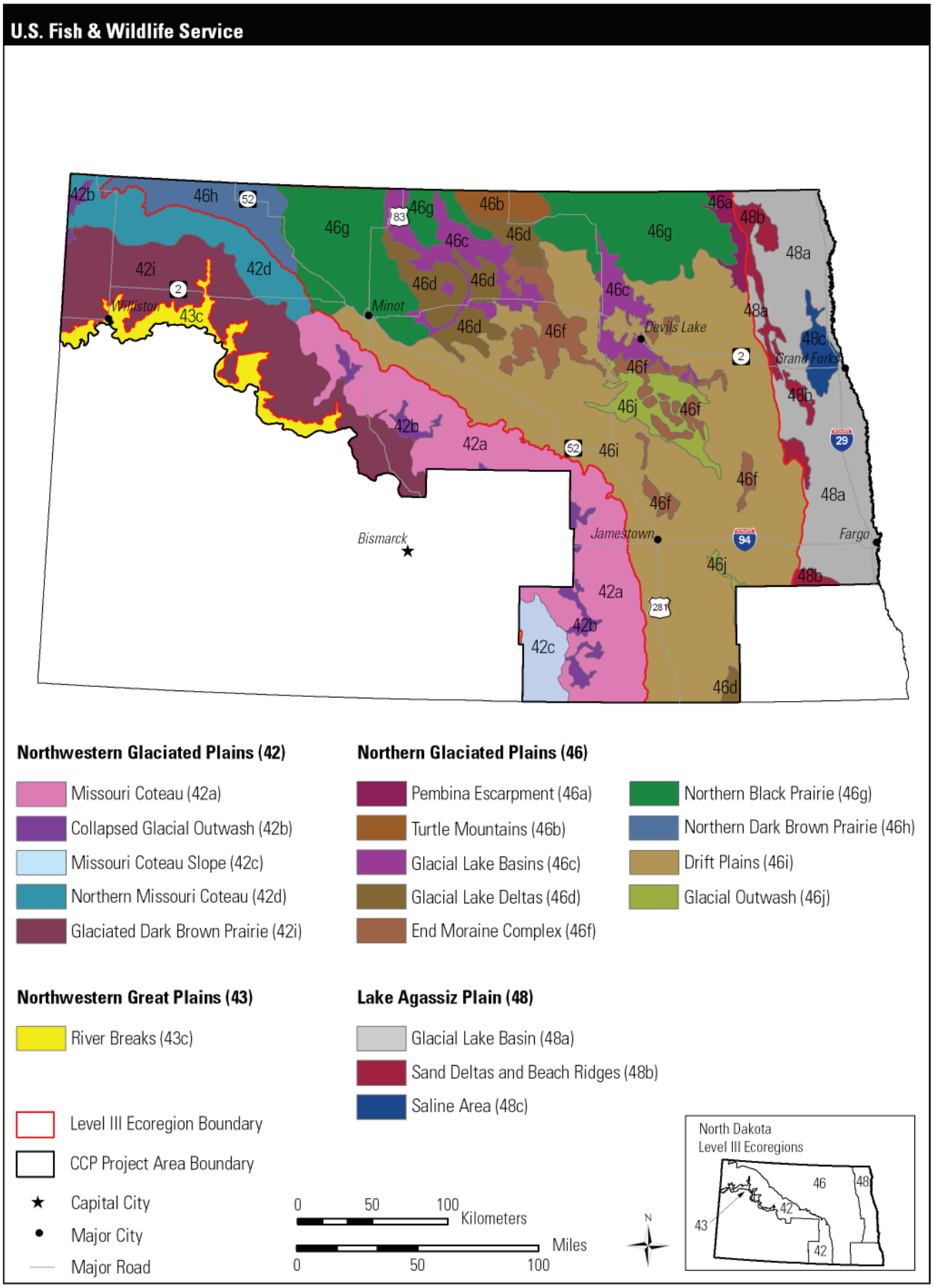


Figure 7. Map of the level 4 ecoregions in the nine districts, North Dakota.

Table 3. Ecoregions in the Nine Districts, North Dakota.

Wetland Management District	*Level 3 Ecoregion*
Arrowwood	Northern Glaciated Plains Ecoregion 46
Audubon	Northwestern Glaciated Plains Ecoregion 42
	Northwestern Great Plains Ecoregion 43
	Northern Glaciated Plains Ecoregion 46
Chase Lake	Northwestern Glaciated Plains Ecoregion 42
	Northern Glaciated Plains Ecoregion 46
Crosby	Northwestern Glaciated Plains Ecoregion 42
	Northwestern Great Plains Ecoregion 43
	Northern Glaciated Plains Ecoregion 46
Devils Lake	Northern Glaciated Plains Ecoregion 46
	Lake Agassiz Basin Ecoregion 48
J. Clark Salyer	Northern Glaciated Plains Ecoregion 46
Kulm	Northwestern Glaciated Plains Ecoregion 42
	Northern Glaciated Plains Ecoregion 46
Lostwood	Northwestern Glaciated Plains Ecoregion 42
	Northwestern Great Plains Ecoregion 43
	Northern Glaciated Plains Ecoregion 46
Valley City	Northern Glaciated Plains Ecoregion 46
	Lake Agassiz Basin Ecoregion 48

Descriptions of the four level 3 ecoregions and their level 4 ecoregions relevant to the districts follow (see figure 7). Most text and graphics in this section are from "Ecoregions of North Dakota and South Dakota" (USGS 2006).

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North Dakota's prairie is a haven of unique species.

Northwestern Glaciated Plains Ecoregion 42 (Level 3)

Portions of Audubon, Chase Lake, Crosby, Kulm, and Lostwood wetland management districts occur within this ecoregion.

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 (described below).

Missouri Coteau Ecoregion 42a (Level 4)

Like closely spaced ocean swells, the rolling mounds of the Missouri Coteau enclose countless wetland depressions or potholes. During its slow retreat, the Wisconsinan glacier stalled at the Missouri escarpment for thousands of years, melting slowly beneath a mantle of sediment to create the characteristic pothole topography of the coteau. The wetlands of the Missouri Coteau and the neighboring Prairie Pothole Region are the major WPAs in North America. Land use on the coteau is a mixture of tilled agriculture in flatter areas and grazing land on steeper slopes.

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The vastness of the North Dakota prairie is protected by grassland easements throughout the districts.

Collapsed Glacial Outwash Ecoregion 42b (Level 4)

Areas of Collapsed Glacial Outwash formed from gravel and sand that was deposited by glacial meltwater and precipitation runoff over stagnant ice. Many large, shallow lakes are found in these areas; these lakes and wetlands tend to be slightly to very alkaline depending upon 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.

Missouri Coteau Slope Ecoregion 42c (Level 4)

The Missouri Coteau Slope ecoregion declines in elevation from Missouri Coteau ecoregion 42a to the Missouri River. Unlike Missouri Coteau ecoregion 42a, where there are few streams, the Missouri Coteau Slope has a simple drainage pattern and fewer wetland depressions. Due to the level to gently rolling topography, there is more cropland than in Missouri Coteau ecoregion 42a. Cattle graze on the steeper land that occurs along drainages.

Northern Missouri Coteau Ecoregion 42d (Level 4)

The Northern Missouri Coteau lies in a transition zone to a more boreal climate to the north and a more arid climate to the west. Willow and aspen, southern occurrences of aspen parkland to the north, may occur at wetland margins. Rough fescue, also a northern species, appears in grassland associations. Wetlands tend to dry out earlier in the summer than in Missouri Coteau ecoregion 42a to the south and east. Mixed dryland agriculture is the major land use.

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.

Northwestern Great Plains Ecoregion 43 (Level 3)

Small portions of the Audubon, Crosby, and Lostwood wetland management districts occur within this ecoregion.

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.

River Breaks Ecoregion 43c (Level 4)

The River Breaks form broken terraces and uplands that descend to the Missouri River and its major tributaries. They have formed in soft, easily erodible strata, such as Pierre shale. The dissected topography,

wooded draws, and uncultivated areas provide a haven for wildlife. Riparian gallery forests of cottonwood and green ash persist along major tributaries such as the Moreau and Cheyenne rivers, but they have mostly been eliminated along the Missouri River by impoundments.

Northern Glaciated Plains Ecoregion 46 (Level 3)

All nine districts have portions of their management area 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.

Pembina Escarpment Ecoregion 46a (Level 4)

The Pembina Escarpment is a rugged, forested slope that marks the boundary between Northern Black Prairie ecoregion 46g (below) and the Lake Agassiz Plain. Though small, the Pembina Escarpment is a distinctive level 4 ecoregion. Originally formed by the undercutting of Cretaceous sandstones by the ancestral Red River, glacial scouring later steepened the escarpment. The vista today, of wooded hills with small farms tucked into valleys, is reminiscent of pastoral sections of New England. Streams flowing off the escarpment have high gradients and a cobble substrate.

Turtle Mountains Ecoregion 46b (Level 4)

The undulating landscape and abundant wetlands of the Turtle Mountains are similar to Missouri Coteau ecoregion 42a (previous). However, the Turtle Mountains contain larger, deeper, and more numerous lakes. Additionally, this ecoregion receives about 10 inches more precipitation than the surrounding drift plains; thus, it supports a forest cover of aspen, birch, bur oak, elm, and ash. The forest soils are erodible and poorly suited for cropland, although there is some clearing for pastureland.

Glacial Lake Basins Ecoregion 46c (Level 4)

Lake Souris, Devils Lake, and Lake Dakota once occupied the Glacial Lake Basins. These proglacial (adjacent to a glacier) lakes were formed when major stream or river drainages were blocked by glacial ice during the Pleistocene. 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.

Glacial Lake Deltas Ecoregion 46d (Level 4)

The Glacial Lake Deltas were deposited by rivers entering glacial lake basins (for example, Glacial Lake Souris, Devils Lake, and Lake Dakota). The heaviest sediments, mostly sand and fine gravel, formed delta fans at the river inlets. As the lake floors were exposed during withdrawal of the glacial ice, wind reworked the sand in some areas into dunes. In contrast to the highly productive, intensively tilled glacial lake plains, the dunes in the delta areas have a thin vegetative cover and a high risk for wind erosion. These areas are used mainly for grazing or irrigated agriculture.

End Moraine Complex Ecoregion 46f (Level 4)

The End Moraine Complex is a concentration of glacial features in east-central North Dakota. Blue Mountain and Devils Lake Mountain are comprised of blocks of surface material scraped off and thrust up by the continental glacier at the south end of the Devils Lake basin. In the western part of the ecoregion, patches of stagnation moraine similar to Missouri Coteau ecoregion 42a (previous) have high densities of wetlands. Favorable precipitation, aspect, and slightly higher elevations result in wooded lake margins and morainal (stone debris carried by glaciers) ridges for the moraines south of Devils Lake basin.

Northern Black Prairie Ecoregion 46g (Level 4)

The Northern Black Prairie represents a broad range of biological events (such as flowering, seeding, and propagation) within this transition zone that is influenced by the boreal climate. Aspen and birch appear in wooded areas, willows grow on wetland perimeters, and rough fescue, common to the Rocky Mountain foothills, becomes evident in grassland associations. This ecoregion has the shortest growing season and the lowest January temperatures of any level 4 ecoregion in North Dakota and South Dakota. Most of the area is used for growing small grains, with durum wheat being a major crop.

Northern Dark Brown Prairie Ecoregion 46h (Level 4)

The Souris and Des Lacs rivers generally divide the Northern Dark Brown Prairie from Northern Black Prairie ecoregion 46g. These ecoregions differ in precipitation, soil, and vegetation characteristics. The Souris River is within the broad transitional zone between subhumid and semiarid climatic conditions. Soils west of the Souris River developed under drier conditions than those soils further east; they have less organic material, which gives them a lighter color. In addition, crop and native grass production is generally lower than in ecoregions further east.

Drift Plains Ecoregion 46i (Level 4)

On the Drift Plains, the retreating Wisconsinan glaciers left a subtle, rolling topography and a thick mantle of glacial till (mixture of clay, sand, and rocks). A greater proportion of temporary and seasonal wetlands are

found in the Drift Plains than in the coteau areas, where semipermanent wetlands are numerous. Because of the productive soil and level topography, this ecoregion is almost entirely cultivated, with many wetlands drained or simply tilled and planted. However, valuable waterfowl habitat still remains, concentrated in state- and federally sponsored duck production areas. The historical grassland in the Drift Plains was a transitional mix of tall-grass and short-grass prairie. The prairie grasses have been largely replaced by fields of spring wheat, barley, sunflowers, and alfalfa.

Glacial Outwash Ecoregion 46j (Level 4)

The separated areas of Glacial Outwash differ from outwash areas in Missouri Coteau ecoregion 42a (previous) in that they generally have a smoother topography. The soils are highly permeable with low water-holding capacity. Areas of excessive soil permeability have a poor to fair potential for dryland crop production. Some areas are used for irrigated agriculture. The risk for blowing soil in droughty areas is reduced by retaining native range grasses like little bluestem, needle and thread, and green needlegrass.

Lake Agassiz Basin Ecoregion 48 (Level 3)

Devils Lake and Valley City wetland management districts occur 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.

Glacial Lake Agassiz Basin Ecoregion 48a (Level 4)

From the Pembina escarpment, the view of the Glacial Lake Agassiz Basin is an extremely flat patchwork of cultivated farmland. Because the Red River of the North has a poorly defined floodplain and very low gradient, flooding can be a problem. Outside of channelized areas in the floodplain, muddy valley streams meander within narrow buffer strips of cottonwood, elm, ash, and willow. Soils range from silty to clayey in texture. Most have high water tables and are extremely productive.

Sand Deltas and Beach Ridges Ecoregion 48b (Level 4)

The varying relief of the Sand Deltas and Beach Ridges interrupts the extremely flat and intensively farmed land of the Lake Agassiz Plain. The beach ridges appear as parallel lines of sand and gravel formed by wave action on the varying shoreline levels of glacial Lake Agassiz. Three sand deltas—

Jennifer Anderson/USDA–NRCS PLANTS Database

Big bluestem.

the largest being the Sheyenne River delta in the south—occur where major rivers entered glacial Lake Agassiz and dropped their sediment load. A high erosion risk exists in the sand dune areas.

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

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

Soils

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

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

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

Water Resources

The districts cover the prairie basins of the Red River Valley basin to the east, to the Missouri basin to the west. Prairie basin wetlands of North Dakota and South Dakota are part of a series of community profiles on ecologically important wetlands of national significance. The shallow wetlands of North Dakota and South Dakota form the bulk of the portion of the Prairie Pothole Region lying within the United States. This region is famous as the producer of at least half of North America's waterfowl and an unknown, but large, proportion of other prairie-dwelling marsh and aquatic birds.

Hydrology

The wetlands described here lie in relatively small, shallow basins that vary greatly in their ability to maintain surface water, and in their water chemistry, which varies from fresh to hypersaline. These wetlands occur in a wide variety of hydrological settings, in an area where annual and seasonal precipitation varies greatly in form and amount. Thus, the presence of surface water in these wetlands is largely unpredictable. Superimposed on these phenomena are the effects of a variety of land uses including pasture, cultivation, mechanical forage removal, idle conditions, and burning. All these factors greatly affect the plant and animal communities found in these basins (Kantrud et al. 1989).

These wetlands described as lacustrine basins and palustrine basins (wetlands that lack flowing water including marshes, swamps, bogs, and floodplains) have water regimes that are temporarily flooded, seasonally flooded, and semipermanently flooded. Basins with these water regimes compose about 90% of the basins in the Prairie Pothole Region of North Dakota and South Dakota. This profile outlines the wetland subsystems, classes, and subclasses that occur in these basins and provides a useful reference to their geologic, climatic, hydrologic, and pedologic (natural composition, distribution, and formation of soils) setting (Kantrud et al. 1989).

Glacially created wetlands in the Prairie Pothole Region, in combination with the surrounding grasslands, provide breeding habitat that supports half of the continent's waterfowl production (Kantrud 1983). The original density of wetlands in the Prairie Pothole Region is thought to have been about 80 wetlands per square mile before historical settlement. Since European settlement, 49% of North Dakota's wetlands have been drained for agriculture or development (Dahl 1990). The Prairie Pothole Region is a major world supplier of cereal grains. Consequently, wetlands in the region are often drained for crop production or otherwise cropped when water conditions permit.

Wetlands exist because specific geologic settings and hydrologic processes favor pooling of water or soil saturation. A unique combination of glaciation and climatic conditions in the Prairie Pothole Region has produced a large number of dynamic aquatic ecosystems that have a tendency to not receive or contribute to channelized surface flow. These basins have the potential to impound large volumes of water and undergo long-term, extreme changes in water depth and biotic conditions in response to climatic trends. The water level fluctuates in typical, seasonal and semipermanent North Dakota wetlands. The low-grade shorelines of prairie wetlands combine with the semiarid climate to produce dynamic wetlands; for example, small increases in water level cause great increases in the proportion of a basin inundated and, conversely, hot, dry conditions often remove surface water from large areas of a basin in a relatively short time (Kantrud et al. 1989).

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

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Wetlands are a natural filter for the nation's water resources.

for solid-waste disposal has also destroyed the basins (Kantrud et al. 1989).

Water Rights

During the 1930s, the U.S. Bureau of Biological Survey on behalf of the federal government submitted "declarations of filing" in North Dakota for many impoundments on national wildlife refuges. Such filing applies for and documents the claim of ownership of the right to use water for current purposes. In 1930, there was a fire at the state capitol that destroyed 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 following paragraph) in the same manner as the newer water right permits. There is one documented filing on a conservation easement for Billings Lake WPA.

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 only seen 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.

There are no water rights associated with Crosby, Kulm, and Lostwood wetland management districts. Tables 4–9 list the water rights for Arrowwood, Audubon, Chase Lake, Devils Lake, J. Clark Salyer, and Valley City wetland management districts, respectively.

Table 4. Water Rights for Arrowwood Wetland Management District, North Dakota.

Declaration of Filing	*Conditional Permit Number*	*Perfect Water Permit Number*	*Priority Date*	*County*	*Area*	*Structure Type*	*Use*	*Flow Rate*	*Storage Acre-feet*	*Seasonal Acre-feet*
—	—	—	—	Stutsman	Hawks Nest WDA	Dikes	Fish, wildlife	—	—	—

Table 5. Water Rights for Audubon Wetland Management District, North Dakota.

Declaration of Filing	*Conditional Permit Number*	*Perfect Water Permit Number*	*Priority Date*	*County*	*Area*	*Structure Type*	*Use*	*Flow Rate*	*Storage Acre-feet*	*Seasonal Acre-feet*
—	—	—	—	Dunn	Audubon WMD	Lake Ilo G-6	—	—	1.80	—
—	—	—	—	Slope	Audubon WMD	White Lake G-1 Dugout	—	—	0.30	—
—	—	—	—	Dunn	Audubon WMD	Lake Ilo G-5 Dam	—	—	0.90	—
—	—	—	—	Dunn	Audubon WMD	Lake Ilo Wl-3 Dam	—	—	0.80	—
—	—	—	—	Dunn	Audubon WMD	Lake Ilo G-6 Dam	—	—	1.40	—
—	—	—	—	Dunn	Audubon WMD	Lake Ilo A-6	—	—	0.20	—
—	—	—	—	Dunn	Audubon WMD	Lake Ilo G-5 Dugout	—	—	0.80	—
—	—	—	—	Dunn	Audubon WMD	Lake Ilo G-5 Channel Dam	—	—	1.50	—
—	—	—	—	Slope	Audubon WMD	White Lake G-2 Dugout	—	—	0.60	—
—	—	—	—	McLean	Coal Coulee WDA	—	Fish, wildlife	—	—	—
—	—	—	—	Sheridan	Goodrich WDA	Dikes	Fish, wildlife	—	—	—
—	—	—	—	McLean	Heckers Lake WDA	—	Fish, wildlife	—	—	—
—	—	—	—	Sheridan, Wells	Johnson Lake WDA	—	Fish, wildlife	—	2,591.00	—
—	—	—	—	McLean	Koenig WDA	Muskrat Wetland #2	Fish, wildlife	—	—	—
—	—	—	—	McLean	Koenig WDA	Cattail Wetland #207	Fish, wildlife	—	—	—
—	—	—	—	McLean	Koenig WDA	Gravel Pit Wetland #154	Fish, wildlife	—	—	—
—	—	—	—	McLean	Koenig WDA	Cattail Wetland #215	Fish, wildlife	—	—	—
—	—	—	—	McLean	Koenig WDA	Willow Wetland #519	Fish, wildlife	—	—	—
—	—	—	—	McLean	Koenig WDA	Laibs Marsh #49	Fish, wildlife	—	—	—
—	—	—	—	McLean	Koenig WDA	Seepage Wetlands #551, 562, 730	Fish, wildlife	—	—	—

Table 5. Water Rights for Audubon Wetland Management District, North Dakota.

Declaration of Filing	*Conditional Permit Number*	*Perfect Water Permit Number*	*Priority Date*	*County*	*Area*	*Structure Type*	*Use*	*Flow Rate*	*Storage Acre-feet*	*Seasonal Acre-feet*
—	—	—	—	McLean	Koenig WDA	Cattail Wetland #3	Fish, wildlife	—	—	—
—	—	—	—	McLean	Koenig WDA	Dave's Wetland	Fish, wildlife	—	—	—
—	—	—	—	McLean	Koenig WDA	Sump Wetland	Fish, wildlife	—	—	—
—	—	—	—	McLean	Koenig WDA	Hippie Slough	Fish, wildlife	—	—	—
—	—	—	—	McLean	Koenig WDA	Sectionline Slough	Fish, wildlife	—	—	—
—	—	—	—	McLean	Koenig WDA	Droplog Wetland	Fish, wildlife	—	—	—
—	—	—	—	McLean	Koenig WDA	Cattail Wetland #2	Fish, wildlife	—	—	—
—	—	—	—	McLean	Koenig WDA	Fisher Lake	Fish, wildlife	—	—	—
—	—	—	—	McLean	Koenig WDA	Gravel Pit Wetland #173	Fish, wildlife	—	—	—
—	—	—	—	McLean	Lake Holmes Outlet WDA	Pool 2	Fish, wildlife	—	42.40	—
—	—	—	—	McLean	Lake Holmes Outlet WDA	Pool 5	Fish, wildlife	—	86.20	—
—	—	—	—	McLean	Lake Holmes Outlet WDA	Pool 6	Fish, wildlife	—	57.40	—
—	—	—	—	McLean	Lake Holmes Outlet WDA	Pool 4	Fish, wildlife	—	90.80	—
—	—	—	—	McLean	Lake Holmes Outlet WDA	Pool 3	Fish, wildlife	—	10.80	—
—	—	—	—	McLean	Lake Holmes Outlet WDA	Pool 1	Fish, wildlife	—	29.40	—
—	—	—	—	McLean	Lake Williams North WDA	—	Fish, wildlife	—	—	—
—	—	—	—	McLean	Lake Williams South WDA	—	Fish, wildlife	—	—	—
—	—	—	—	Sheridan	Lincoln Valley South WDA	—	Fish, wildlife	—	—	—
—	—	—	—	McLean	Lost Lake West WDA	—	Fish, wildlife	—	—	—
—	—	—	—	Wells	Pony Gulch WDA	—	Fish, wildlife	—	—	—
—	—	04499	7/22/1991	Ward	Rovig WPA	Dam	Fish, wildlife	—	108.50	46.50
—	—	04500	7/22/1991	Ward	Rovig WPA	Dam	Fish, wildlife	—	47.00	16.90
—	—	—	—	McLean	Turtle Creek 2 WDA	—	Fish, wildlife	—	—	—

Table 5. Water Rights for Audubon Wetland Management District, North Dakota.

Declaration of Filing	*Conditional Permit Number*	*Perfect Water Permit Number*	*Priority Date*	*County*	*Area*	*Structure Type*	*Use*	*Flow Rate*	*Storage Acre-feet*	*Seasonal Acre-feet*
—	—	—	—	McLean	Turtle Creek 3 WDA	—	Fish, wildlife	—	—	—
—	—	—	—	McLean	Turtle Lake 1 WDA	Central Marsh	Fish, wildlife	—	—	—
—	—	—	—	McLean	Turtle Lake 2 WDA	Nygaard Slough	Fish, wildlife	—	—	—
—	—	—	—	McLean	Turtle Lake 2 WDA	Overflow Wetlands 1, 2, 3	Fish, wildlife	—	—	—
—	—	—	—	McLean	Turtle Lake 2 WDA	Hanson Hay Slough	Fish, wildlife	—	—	—
—	—	—	—	McLean	Turtle Lake 3 WDA	Turtle Lake	Fish, wildlife	—	—	—

Table 6. Water Rights for Chase Lake Wetland Management District, North Dakota.

Declaration of Filing	*Conditional Permit Number*	*Perfect Water Permit Number*	*Priority Date*	*County*	*Area*	*Structure Type*	*Use*	*Flow Rate*	*Storage Acre-feet*	*Seasonal Acre-feet*
—	—	01720	6/23/1970	Wells	Crystal Lake WPA	Dike	Fish, wildlife, recrea-tion	—	37.80	10.50
—	—	03986	6/21/1988	Sheridan, Wells	Indian Hills WDA	Dikes	Fish, wildlife	—	74.00	29.00
—	—	03985	6/21/1988	Sheridan, Wells	Indian Hills WDA	Dikes	Fish, wildlife	—	31.00	9.00
—	—	01481	9/14/1967	Stutsman	Mt. Moriah WPA	Dike	—	—	171.00	162.00
—	—	03962	3/3/1988	Wells	Pipestone WDA	Dike	Fish, wildlife	—	105.30	52.40
—	—	01361	4/19/1966	Stutsman	Thiesen Marsh WPA	Dike	Fish, wildlife, recrea-tion, stock	—	32.00	51.00
—	—	01339	11/17/1965	Stutsman	Vashti WPA	Dikes	Stock, wildlife	—	49.00	45.00
—	—	05229	3/2/1998	Stutsman	Woodworth Station WPA	Dike, water control structure	Fish, wildlife	—	18.10	10.00

Table 7. Water Rights for Devils Lake Wetland Management District, North Dakota.

Declaration of Filing	*Conditional Permit Number*	*Perfect Water Permit Number*	*Priority Date*	*County*	*Area*	*Structure Type*	*Use*	*Flow Rate*	*Storage Acre-feet*	*Seasonal Acre-feet*
—	—	03924	6/9/1987	Ramsey	Avocet Island WDA	Dam	Fish, wildlife	—	290.00	104.00
—	—	—	—	Towner	Big Coulee WDA	Dikes	Fish, wildlife	—	—	—
Yes	—	—	9/1/1934	Cavalier	Billings Lake WPA	Dam, dikes	Fish	—	216.00	216.00
—	—	03543	3/19/1982	Cavalier	Billings Lake WPA (center)	Stop log	Fish, wildlife	—	60.00	54.00
—	05256	—	4/20/1998	Cavalier	Billings Lake WPA (north)	Dam	Fish, wildlife	—	39.00	24.00
—	—	04981	2/12/1996	Cavalier	Edwards WPA (Dike 1)	Dam	Fish, wildlife	—	34.37	31.92
—	—	04982	2/12/1996	Cavalier	Edwards WPA (Dikes 2, 3)	Dam	Fish, wildlife	—	154.45	74.56
—	—	04468	5/8/1991	Walsh	Forest River WPA	Dike	Fish, wildlife	—	311.00	91.30
—	—	—	—	Nelson	Goose River WDA	17 dikes	Fish, wildlife	—	—	—
—	—	03905	1/26/1987	Grand Forks	Hofer WPA	Dam	Fish, wildlife	—	66.00	20.30
—	—	03049	2/27/1978	Benson	Hofstrand Lake WPA	Dam	Fish, wildlife	—	1,425.00	1,425.00
—	05425	—	4/14/2000	Towner	Kitsch WPA	Dam	Fish, wildlife		69.20	61.00
—	05439	—	5/22/2000	Towner	Kitsch WPA, McLaughlin Lake	Pump	Fish, wildlife	10,000 gpm*	69.20	—
—	—	—	—	Ramsey	Kneeling Moose WDA	Dikes, water control structure	Fish, wildlife	—	—	—
—	—	—	—	Ramsey	Lake Alice WDA	—	Fish, wildlife	—	—	—
—	—	—	—	Cavalier	Mulberry Creek WDA	Dikes	Fish, wildlife	—	—	—
—	—	04814	10/20/1994	Towner	Nikolaisen WPA	Dam	Fish, wildlife	—	13.00	13.00
—	—	04813	10/20/1994	Towner	Nikolaisen WPA	Dam	Fish, wildlife	—	48.40	48.40
—	—	—	—	Benson	Rolling Rock WDA	—	Fish, wildlife	—	—	—
—	—	—	—	Nelson	Rugh Lake WDA	Dikes	Fish, wildlife	—	—	—
—	—	—	—	Cavalier	Storlie WDA	—	Fish, wildlife	—	—	—

Table 7. Water Rights for Devils Lake Wetland Management District, North Dakota.

Declaration of Filing	*Conditional Permit Number*	*Perfect Water Permit Number*	*Priority Date*	*County*	*Area*	*Structure Type*	*Use*	*Flow Rate*	*Storage Acre-feet*	*Seasonal Acre-feet*
—	—	04469	5/9/1991	Grand Forks	Turtle River WPA	Dike	Fish, wildlife	—	122.00	75.90
—	—	04730	11/8/1993	Cavalier	Weaver WPA	Dam	Fish, wildlife	—	63.10	43.50
—	pending	—	—	Cavalier	Wengeler South WPA	Dam	Fish, wildlife	—	34.30	14.80
—	—	03482	4/12/1982	Cavalier	Wengeler WPA, Phase 1	—	Fish, wildlife	10,000 gpm	55.37	—
—	—	04608	6/5/1992	Cavalier	Wengeler WPA, Phase 1	Dam	Fish, wildlife	10,000 gpm	14.63	30.40
—	—	04804	8/19/1994	Cavalier	Wengeler WPA, Phase 2	Dam	Fish, wildlife	—	47.60	42.80
—	—	04902	5/5/1995	Cavalier	Wengeler WPA, Phase 3	Dam	Fish, wildlife	10,000 gpm	174.00	60.00

**gpm=gallons per minute.*

Table 8. Water Rights for J. Clark Salyer Wetland Management District, North Dakota.

Declaration of Filing	*Conditional Permit Number*	*Perfect Water Permit Number*	*Priority Date*	*County*	*Area*	*Structure Type*	*Use*	*Flow Rate*	*Storage Acre-feet*	*Seasonal Acre-feet*
—	05021	—	5/31/1996	Renville	Brudvik WPA	Dam	Fish, wildlife	—	200.00	280.00
—	—	03806	6/28/1985	Bottineau	Holsten Slough WPA	Slough	Fish, wildlife	50 cfs*	180.00	334.00

**cfs=cubic feet per second.*

Table 9. Water Rights for Valley City Wetland Management District, North Dakota.

Declaration of Filing	*Conditional Permit Number*	*Perfect Water Permit Number*	*Priority Date*	*County*	*Area*	*Structure Type*	*Use*	*Flow Rate*	*Storage Acre-feet*	*Seasonal Acre-feet*
—	—	01362	4/25/1966	Steele	Fullers Lake WPA	Dam, stop logs	Fish, wildlife, recreation, flood control	—	1,044.00	1,218.00

Air Quality

Air quality receives protection under several provisions of the Clean Air Act, including the national ambient air quality standards (NAAQS) and the prevention of significant deterioration program. The NAAQS 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 areas, which include 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 descriptions 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 districts. 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 10). 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 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.

Table 10. Prairie Decline in North Dakota.

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

Source: National Wildlife Federation (2001).

A combination of factors is to blame for this loss. Large-scale agriculture and intensive grazing are often criticized but fire suppression, introduction of invasive plants, altered hydrology, and modified animal communities have contributed. The loss of diversity and distribution of prairie grass and forbs are of great concern, but it is not just plants that have suffered. Grasslands not only provide primary nesting habitat for a variety of bird species, but also are very important staging and feeding areas for waterfowl and shorebirds during long migratory flights. In addition, prairies provide an important food source for small mammals and insects that, in turn, support larger wildlife species. From a human standpoint, prairies can help to maintain clean air and water, control erosion, provide rich soil, are rich in history and folklore, and provide community income from wildlife-related recreation and tourism. All this combined makes it easy to see why prairies are considered the most endangered ecosystems.

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

Many prairie birds currently show population declines. The western prairie fringed orchid is now a rare flower of the tall-grass prairie; its habitat occurs at Devils Lake and Valley City wetland management districts. 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, WPAs, 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 1988).

The landscape component across the districts 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 remains

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North Dakota's unbroken prairie.

or has 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 (Samson et al. 1998).

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

Located in southeastern North Dakota (Richland and Ransom counties), the 70,000-acre Sheyenne grassland straddles the ancient Sheyenne River Delta, where prehistoric 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 districts were historically found predominantly in the eastern one-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).

Initially the Service focused on protection of wetlands in the Prairie Pothole Region. However, data also revealed the importance of upland grasslands to successful nesting of waterfowl. With the continued conversion of grassland to cropland and consistent declines in the populations of grassland-dependent birds, the need to protect adjacent grassland habitats became evident. Like a wetland easement, a grassland easement transfers limited perpetual rights to the Service for a one-time, lump-sum payment. The purpose of a grassland easement is to prevent the conversion of grassland to cropland while minimally restricting existing agricultural practices.

More specifically, the purposes of the grassland easement are

- to improve the water quality of wetlands by reducing soil erosion and the use of chemicals and fertilizers on surrounding uplands;
- to improve upland nesting habitat for all ground-nesting birds, especially waterfowl, and enhance nesting success on private lands;
- to perpetuate grassland cover established by other federal programs (for example, the Conservation Reserve Program);
- to provide an alternative to the purchase of uplands in fee title, thus maintaining lands in private ownership.

Bluestem.

Grassland easements restrict the landowner from altering the grass by digging, plowing, disking, or otherwise destroying the vegetative cover. Haying, mowing, and seed harvest is restricted until July 15 of each year. The landowner can graze without restriction.

Initially, the tracts in all districts that were considered for a grassland easement were on native prairie, at least 160 acres in size, and situated in an area supporting at least 40 waterfowl pairs per square mile. Most of the native grassland fitting these criteria lies within the Missouri Coteau. The first grassland easement within the nine-district area was in acquired in Chase Lake Wetland Management District (Stutsman County; tract 558G, 1; 520 acres) on November 7, 1990. To date, 556 grassland easements have been bought covering 243,130 acres in the districts.

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).

Turtle Mountains

The Turtle Mountains are located in the extreme north-central extent of the Drift Prairie. This landform is known as an erosional outlier and covers nearly 1,000 square miles and rises 800 feet above the surrounding landscape (NDGF 2005).

Forested habitats are found in only a few locations in North Dakota, and they do not cover large contiguous areas. A majority of the forest habitat is in riparian zones. The Turtle Mountains and a forested section of northeastern North Dakota contain some of the largest stands of aspen and bur oak in the state (NDGF 2005).

Aspen and oak make up 42% of North Dakota's forested lands. Aspen is the dominant forest species, but bur oak, balsam poplar, boxelder, green ash, and paper birch are also present. Shrubs associated with this forest type are beaked hazel, highbush cranberry, juneberry, chokecherry, and raspberry. These stands are often associated with lakes, wetlands, and grassy meadows (NDGF 2005).

Invasive Plants

North Dakota has designated the invasive plants in table 11 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.

Control of state-listed noxious weeds is a priority for the Service. However, many other invasive plants are threatening wildlife habitat and interfering with the Service's management objectives. District 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.

Table 11. State-listed Noxious Weeds Found at Waterfowl Production Areas in North Dakota.

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

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

Invasive plants on Service lands have reduced wildlife habitat and biodiversity. The presence of invasive plants can alter the functioning of ecosystems by loss of wildlife habitat, displacement of native species, change in carrying capacity from reduced forage production, lower plant diversity, and increased soil erosion and sedimentation. These plants are not only problematic on the Service's fee-title lands, but invasive plants infest rangelands and croplands across North Dakota. The spread of invasive plants occurs by root spread or by seed dispersal via wind, water, district 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 districts. Potential exists for large wildland fires to occur; however, this has generally not been the case.

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Prescribed fire is an important tool for keeping grasslands healthy.

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

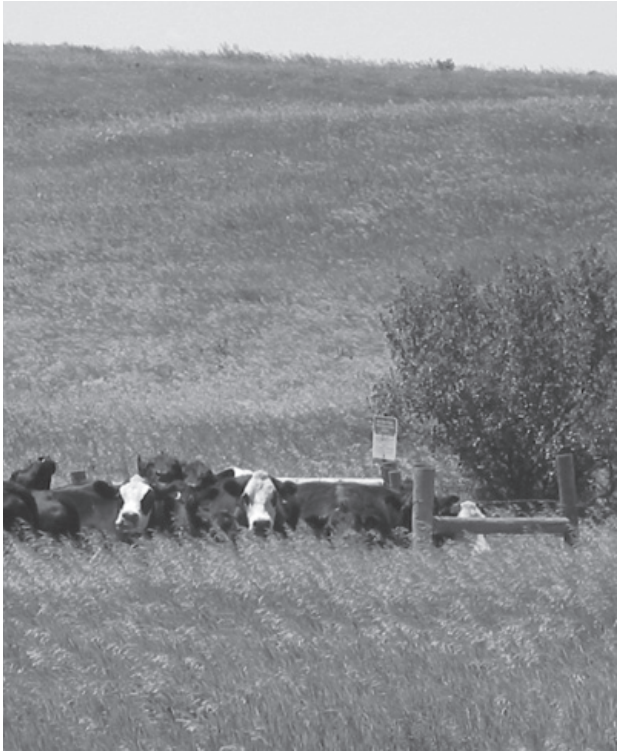
The district staffs use prescribed fire to simulate the historical influence wildland fire had on plant communities. Historically, wildfires likely would have occurred during the summer and fall. Most prescribed fires are applied in spring through early summer or in early fall to allow for some recovery of vegetation before winter. These periods present opportunities to use fire to manage invasive cool-season grasses, open up shorelines and vegetation-choked wetlands, and 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 districts have occasionally used this management strategy; however, the strategy shows promise for more frequent use in the future. Overall guidance for use of prescribed fire and management of wildland fire is in the descriptions 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.

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



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The districts use grazing in the uplands during spring and early summer and again in the fall.

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 nine districts. 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 districts. Instead, district 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.

Wildlife

This section describes the birds and mammals that are common within district lands, as well as the threatened and endangered species that occur in North Dakota and have habitats in district 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 districts. 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 district lands—making North Dakota a primary destination for outdoor enthusiasts. Bird species that occur at the districts are listed in appendix G.

Three vegetative groups distinguish the districts—mixed-grass prairie, tall-grass prairie, and the Turtle Mountains—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. Fluviatile (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.

Turtle Mountains

Within this small, unique portion of North Dakota, natural basin wetlands are numerous and include many, deep, permanent ponds and lakes as well as many wetlands that are temporary, seasonal, or semipermanent. Swamps dominated by shrubs or trees are numerous. Other habitats of local significance include farmsteads and residential resort areas on some of the larger fishing lakes.

The main breeding birds are a mixture of species that typify the north-central and eastern avifaunas. Large populations of northern avifaunal species are common, and very limited numbers of five species of the western avifauna (turkey vulture, western kingbird, black-billed magpie, mountain bluebird, and Brewer's blackbird) are present.

The characteristic breeding birds in the Turtle Mountains include 19 primary species, 54 secondary species, and 60 tertiary species. The primary and secondary species for this area are listed in appendix H.

Strategic Planning for Waterfowl

Waterfowl habitat protection and restoration are the primary emphases of the wetland management districts. 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 Service's Habitat and Population Evaluation Team (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 8 shows the predicted concentrations of duck pairs throughout the districts. The coteau across North Dakota has the highest predicted concentrations, with up to 100 or more duck pairs per square mile. Consequently, district managers can prioritize habitat protection and management for WPA lands.

The Service uses ranking criteria to determine high, medium, and low priorities for management of WPAs in the districts.

Priority	
High	Meets minimum thresholds for at least three criteria.
Medium	Exceeds the minimum threshold for two criteria.
Low	Meets one criterion.

North Dakota's wetland management districts occur within various major landforms (for example, Missouri Coteau). The districts' WPAs vary in size, proportion of upland and wetland habitat, and surrounding land use (for example, cropland versus grassland). As such, each WPA has unique attributes that can be used to rank it relative to other WPAs within a district. Because each district is unique, specific thresholds need to be developed for each of the criterion below. WPAs purchased or managed for threatened and endangered species are exempt from this ranking process and are given high priority.

Criteria

1. *Waterfowl Pair Density.* Priority is given to WPAs within landscapes that support high densities of breeding waterfowl.

   These areas are spatially defined in available GIS databases, based on models that factor in the type and density of wetlands, developed by the HAPET.

   Example:

   WPAs in Audubon Wetland Management District have a higher ranking if they support >40 pairs of breeding waterfowl per square mile (see figure 8).

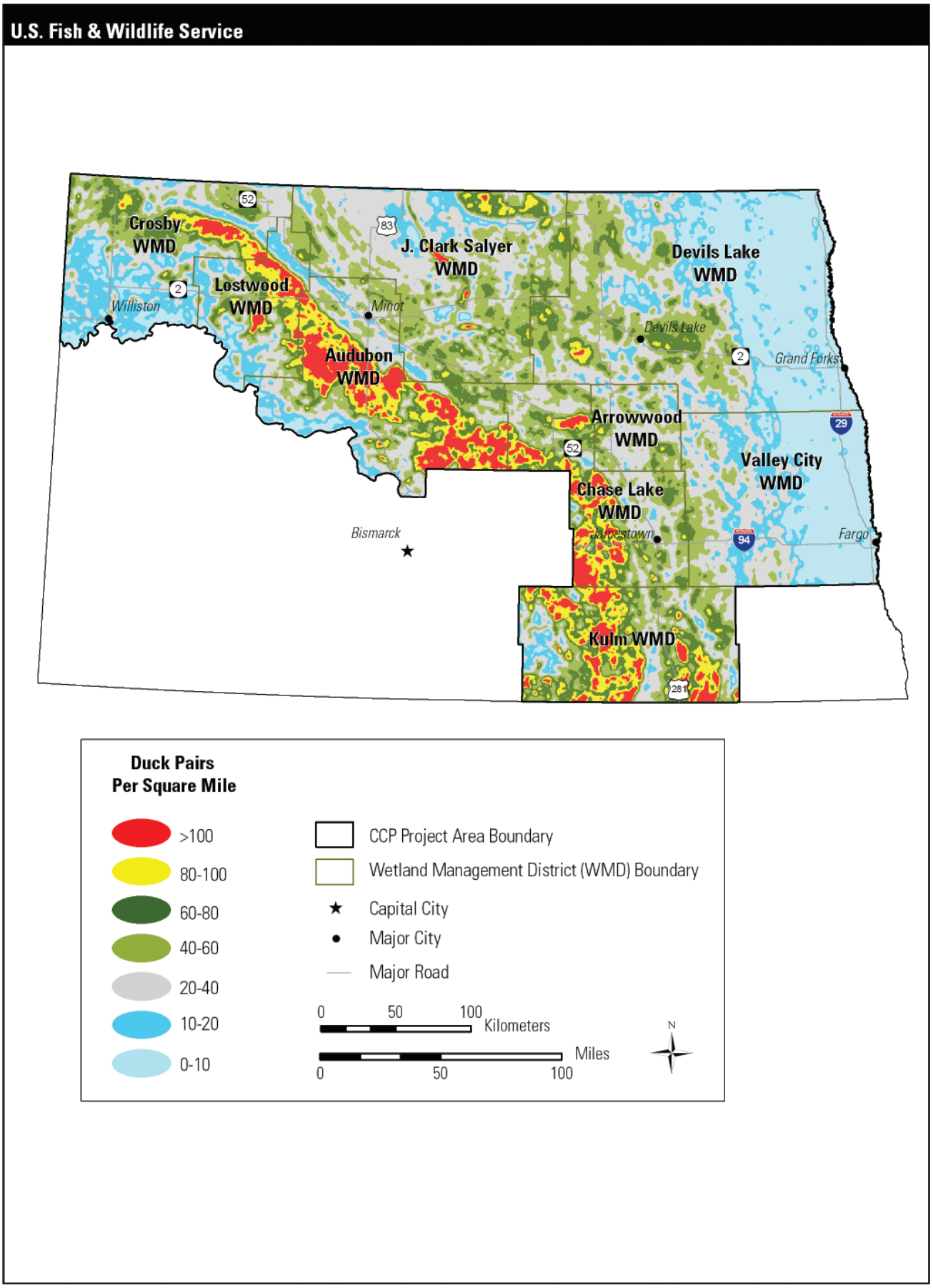

Figure 8. Map of the predicted duck-pair concentrations in the nine districts, North Dakota.

2. *Landscape Context.* Priority is given to WPAs within "conservation areas."

   Conservation areas (spatially defined through GIS databases developed by the HAPET) recognize landscape-level juxtaposition of wetland and grassland habitats that support characteristic species.

   Example:

   WPAs have a higher ranking if they are within grassland bird conservation areas (see figure 9).

3. *WPA Size.* Priority is given to large WPAs.

   Many wetland- and grassland-dependent species of wildlife prefer large patches of habitat. Regardless of surrounding land use, large WPAs are more valuable than small WPAs because they can be easier to manage and support a more diverse assemblage of plants and animals.

   Example:

   WPAs in Devils Lake Wetland Management District have a higher ranking if they are >125 acres in size.

4. *Ecological Integrity.* Priority is given to large tracts (independent of WPA size) of native prairie that is dominated by native grasses and forbs.

   WPAs dominated by native sod, without a previous cropping history, usually support more diversity of grassland-dependent species of wildlife. However, many areas of native sod are badly infested with undesirable plants and, thus, are less valuable and more costly to manage. By 2008, the vegetative composition of all Service-owned native sod >40 acres in North Dakota will have been inventoried.

   Example:

   WPAs in J. Clark Salyer Wetland Management District have a higher ranking if they have >80 acres of native prairie comprised of >30% native grasses and forbs and <40% smooth brome.

A 2007 report by the Government Accounting Office analyzed the effectiveness of Service acquisitions under the WPA program. As a result, the Service recently completed a "decision tree" matrix that outlines how to set priorities for grassland and wetland acquisitions. The details of this prioritization can be found in chapter 6 (6.3 Goals, Objectives, Strategies, and Rationale; Wetlands in Easements Objective 1; Uplands in Easements Objective 1) and appendix I.

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).

Donna Dewhurst/USFWS

This gadwall finds sanctuary on a district pond.

Today at the districts, 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, there are occasionally confirmed sightings of moose, elk, and pronghorn on or adjacent to district lands. Additionally, the district staff has 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 districts—piping plover, whooping crane, interior least tern, western fringed prairie orchid, and Dakota skipper (butterfly).

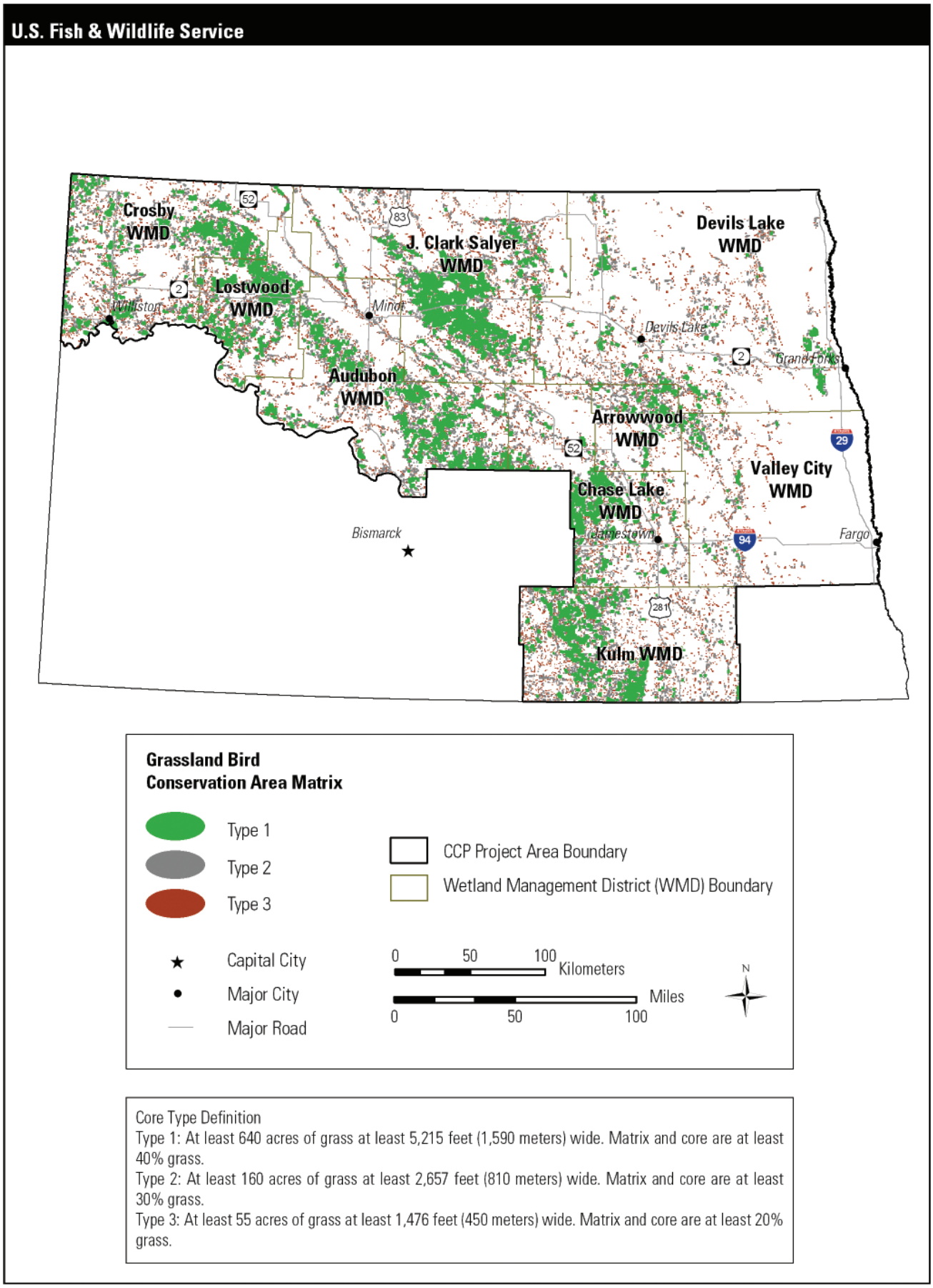

Figure 9. Map of the grassland bird conservation area matrix for the nine districts, North Dakota.

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

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

Piping Plover (Threatened)

Breeding piping plovers occur in small numbers on numerous alkali wetlands in the Audubon, Crosby, and Lostwood wetland management districts. 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 stretching from central North Dakota to northeastern Montana (see figure 10, map of the core area for piping plover). Plovers in this core area breed on barren shorelines associated with alkali lakes and wetlands.

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 wild, migratory population in the world 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 the districts as migratory stopover areas en route to their summer and winter grounds (see figure 11, map of whooping crane sightings).

© Jerome Negaard

Whooping cranes rest on wetlands near Crosby Wetland Management District.

Interior Least Tern (Endangered)

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

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

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

Western Prairie Fringed Orchid (Threatened)

The Devils Lake and Valley City wetland management districts are within the range of and have suitable habitat for the western prairie fringed orchid, an endangered flower of the tall-grass prairie. However, there are no records of this orchid occurring in district 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.

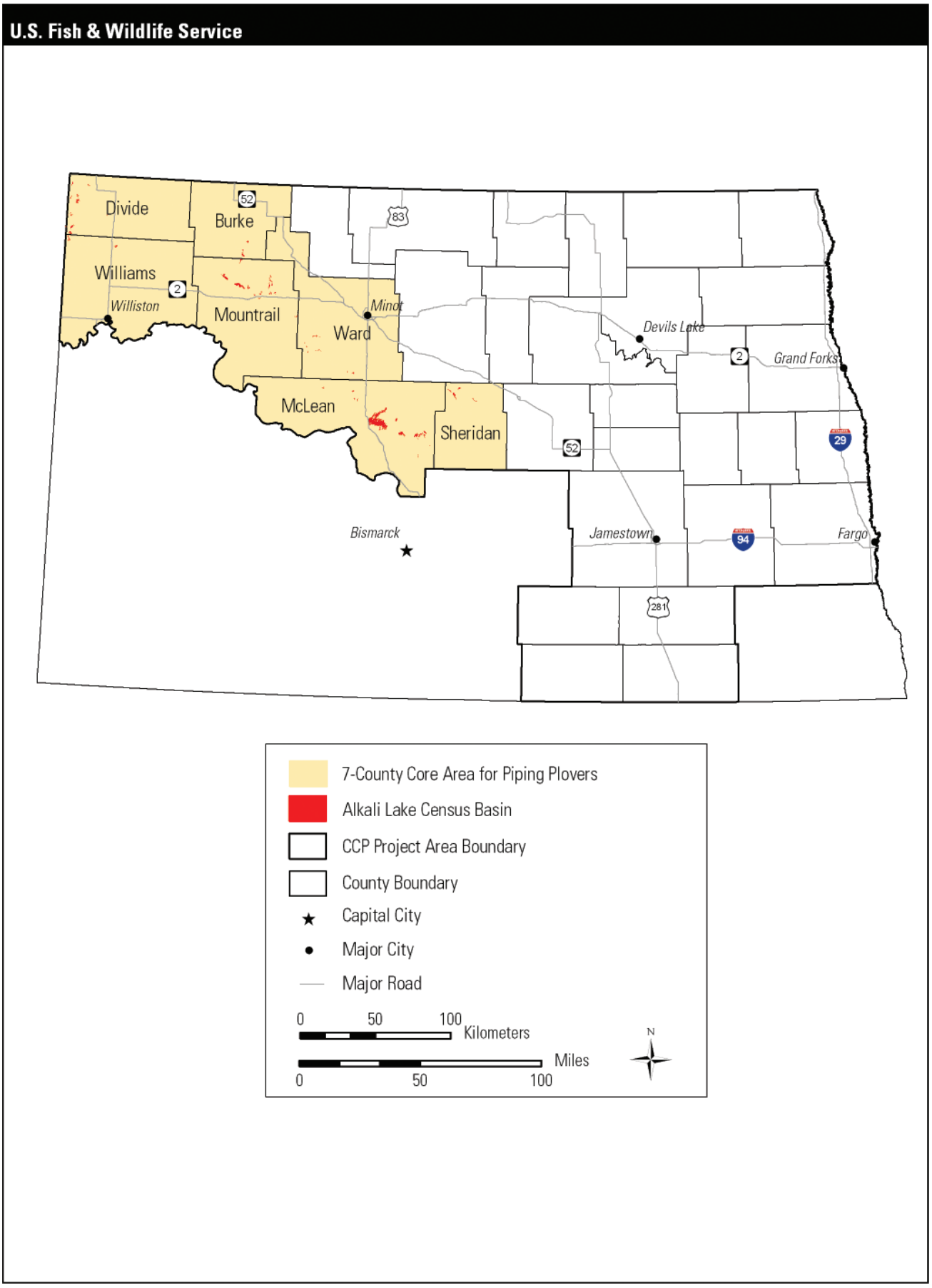

Figure 10. Map of the seven-county core area for piping plover in North Dakota.

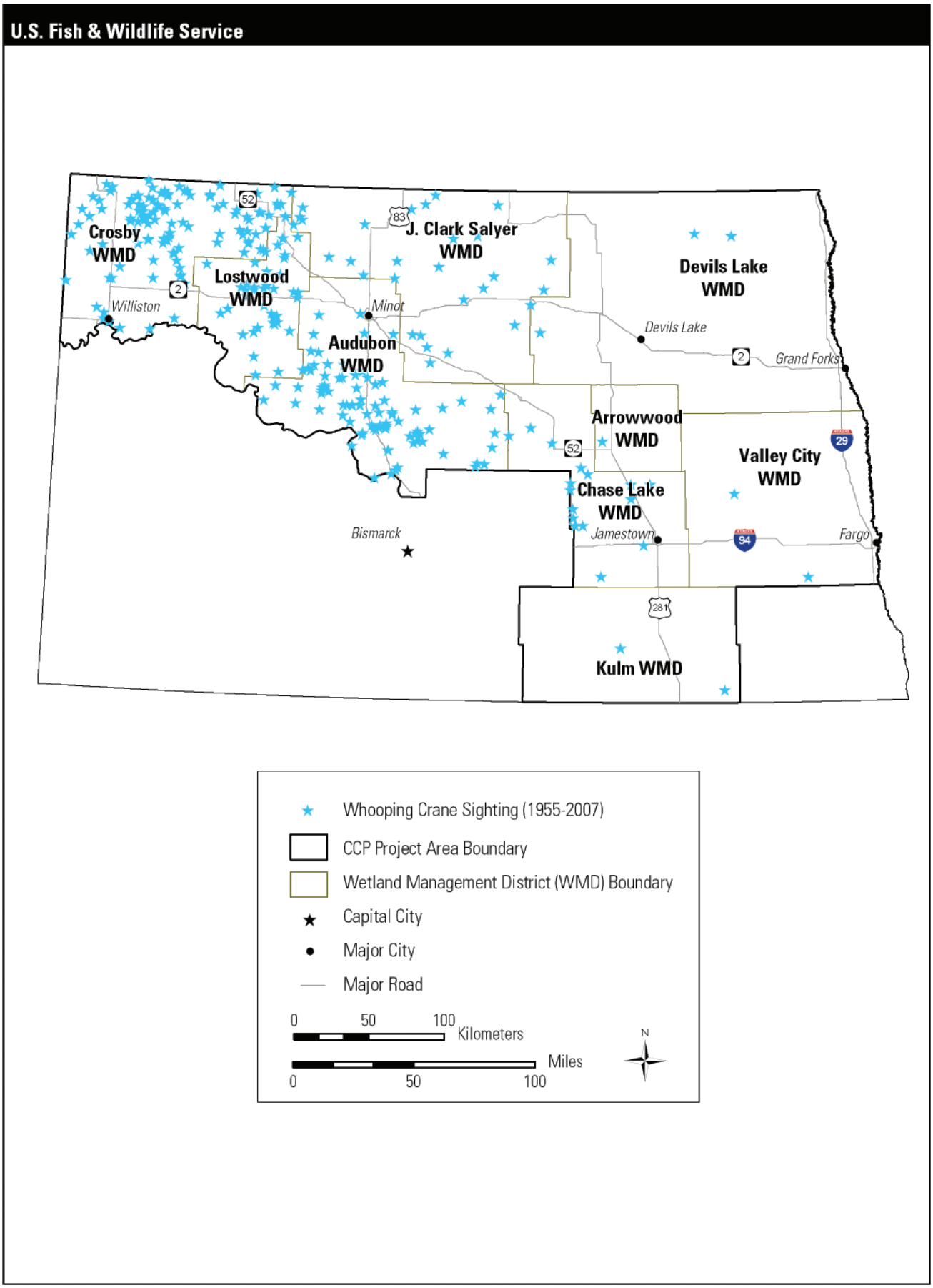

Figure 11. Map of the whooping crane sightings in the nine districts, North Dakota.

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Western prairie fringed orchid.

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)

All of the districts contain habitat suitable for the Dakota skipper, and this species occurs within each district. 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.

Robert Dana/USFWS

The Dakota skipper is a prairie inhabitant whose numbers have decreased.

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 districts 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 Visitor Services

The Improvement Act emphasizes the importance of compatible, wildlife-dependent recreation. The act identifies these six priority public 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 wetlands and potholes areas. With the settlement of the prairie states, certain hunting restrictions were established for the protection and propagation of wildlife.

Migratory waterfowl hunting is allowed at WPAs, where only federally approved nontoxic shot is permitted. All other state regulations apply at WPAs.

Most of the WPAs are open to hunting for upland birds (ring-necked pheasant, sharp-tailed grouse, gray partridge). The districts also offer archery, rifle, and muzzleloader hunting for deer.

Fishing

Fishing is allowed year-round at the districts; although, during the winter months ice fishing seems to be the most popular. Restrictions on vehicle access into WPAs may be limited to designated trails. Permanent lakes at the districts offer fishing for northern pike, walleye, yellow perch, and a few other species.

The NDGF has also stocked many permanent wetlands. Anglers commonly seek yellow perch and northern pike in these areas.

Due to the abundance of aquatic life in the permanent wetlands, growth rates of fish are often very high. Fishing in WPAs, as with all fishing of Service lands, requires the angler to follow both state fishing regulations and special refuge regulations.

Wildlife Observation and Photography

The districts 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 some areas, viewing blinds are available in the spring for visitor observation of wildlife in their native habitat.

Environmental Education and Interpretation

Each district has either a standalone headquarters or a headquarters co-located with a national wildlife refuge. Each headquarters facility has interpretative information associated with its small visitor center. The visitor center includes exhibits and a variety of informational pamphlets about the Service, district, 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 district.

Jackie Jacobson/USFWS

The wetland management districts provide an outdoor experience for North Dakota's youth.

District 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 districts. District staffs are involved in local, regional, and statewide programs.

Trapping

Recreational trapping is available at all WPAs and WDAs, in accordance with state trapping regulations. Authorized by 50 CFR, part 31.16, recreational trapping is administered by the Service.

4.5 Partnerships

The district staffs have established partnerships with local, state, and national groups in efforts to achieve habitat objectives and to improve and expand environmental education. Most districts 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 districts 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 district 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 districts have also developed working relationships with various oil and wind industry companies.

4.6 Socioeconomic Environment

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

The nine wetland management districts cover a majority of the area in the state north and east of the Missouri River. 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 districts may either increase or decrease visitation and, thus, affect the amount of visitor spending in the local economy.

Population and Demographics

The population of the nine districts' 34-county area represents about 70% of the total population of North Dakota. The population of this 34-county area has declined over the past 25 years from almost 460,000 in 1980 to 450,000 in 2005, similar to a 2% decline in the population of the entire state. The population decrease in North Dakota has come from nonmetropolitan areas of the state, while metropolitan areas have experienced some growth.

Population projections from the North Dakota State Demography Office suggest that the population of the 34-county area and the entire state will rebound slightly by 2010. Population growth in metropolitan areas is expected to be the driving force behind statewide growth in the future.

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 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%). Between 2001 and 2005, employment in the 34-county area grew from 318,000 to 333,000 jobs according to the Bureau of Economic Analysis. Within the 34-county district area, local unemployment rates ranged from 2.1% in Williams County to 9.3% in Rolette County in 2006. 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.

District Operations and Activities

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, 66 of which are involved with management of the nine districts. Because many district 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 districts 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 nine districts support 49.5 FTEs in North Dakota.

The districts offer many recreational and educational opportunities, which include hunting, fishing, and nonconsumptive activities such as hiking, photography, and wildlife observation. Hunting is very popular at the districts, especially at Kulm, Audubon, and Devils Lake. The hunting of waterfowl, pheasant, grouse, and partridge is most popular. White-tailed deer are also commonly hunted in the districts. According to visitation data collected as part of the "Refuge Annual

Performance Plan" (RAPP), hunting accounts for 64% of all visitor days to North Dakota districts. Trapping is also permitted at all WPAs within the districts.

Nonconsumptive activities such as hiking and wildlife observation draw casual visitors, outdoor enthusiasts, educational tours, photographers, and others to the districts. Many districts have a good deal of interpretive material for recreational visitors, and they offer educational programs to school groups on an appointment basis. Visitors engaged in these recreational activities account for 27% of all visitor days to North Dakota districts.

Visitor Levels and Spending

According to 2007 RAPP data, visitation to the nine districts will have totaled 177,000 visitor days by the end of the year. 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 same rate of nonresident visitation to the districts, approximately 78,600 nonresident visitor days occur annually at the nine districts under consideration, of which 50,500 are for hunting, 7,200 are for fishing, and 20,800 are for nonconsumptive recreational activity.

Baseline Economic Activity

Combining the effects of Service employment and visitor spending, the total economic activity generated by the districts on their local economies is approximately $5,505,000 per year.

The districts affect their local economies through the visitor spending they generate and the employment they support. The districts generate direct local economic activity through employee earnings. The districts' 49.5 FTEs account for $2,674,000 in employee compensation, or roughly $54,000 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 districts contribute about $2,113,000 to North Dakota local economies through employee spending.

The districts' nonresident visitation of 78,600 visitor days per year, combined with spending averages reported in the 2004 Banking on Nature study (Caudill and Henderson 2005), total visitor expenditure generated by the districts is estimated to be almost $3,392,000 per year. Of this total, approximately $2,776,000 (82%) comes from hunting, $244,000 (7%) from fishing, and $373,000 (11%) from nonconsumptive recreational activity.

4.7 Operations

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

All but one of the districts, Kulm Wetland Management District, has 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). Kulm Wetland Management District has its own staff and a standalone facility that are not part of a complex.

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 districts and their resources.

5 Environmental Consequences

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An American bittern hides in wetland grasses.

This chapter describes the environmental consequences for the management alternatives considered for the nine wetland management districts (see chapter 3). The Service assessed the environmental consequences of carrying out each alternative on the districts' physical, biological, and cultural resources and social and economical environments.

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 districts. These actions would contribute positively to efforts to mitigate human-induced global climate change.

The use of prescribed fire, which releases CO_2, 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 districts 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 district 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.

The management alternatives are not anticipated to have any adverse effects on the areas' 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 districts 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 districts have been limited on the Service's fee-title lands. Therefore, additional surveys would be required before any new construction or excavation to fully satisfy provisions of the NEPA 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.

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

Public Health and Safety

Based on the nature of each alternative, the location of the districts, 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 2 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 WPAs would be prioritized with only the high-priority WPAs receiving consistent management.

All conservation easements would be continue to be monitored, but only those high-priority easements violations would be consistently enforced. Habitat protection through acquisition efforts would focus on high-priority tracts. 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 districts would have improved quality of the native vegetation on high-priority tracts and a status quo vegetative condition on medium- and low-priority tracts.

District staffs would continue the current level of monitoring and documenting the presence and use of district lands by federally listed species, such as

piping plover and whooping crane. The staffs would continue to close areas to public use in order to protect federally listed species using the districts.

Monitoring and Research

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

Visitor Services

The hunting and fishing programs at the WPAs would continue to be valued as two of the six wildlife-dependent recreational (priority) uses and would provide hunters with many opportunities to hunt without compromising the Refuge System mission and goals.

The current level of environmental education and interpretation programs would continue to be valued as wildlife-dependent recreational (priority) uses and would provide visitors with many opportunities to learn about the districts and the Refuge System. Visitor services events such as teacher workshops would be conducted on a multiyear rotation among districts. The district 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 district staffs to accomplish much more than they could in the absence of partnerships. The district staffs would continue to improve and build partnerships with the local public, primarily landowners adjacent to the WPAs. Partnerships with the NDGF would help the staffs manage hunting at the WPAs.

Operations

This alternative would maintain district staffs at existing levels. The districts would continue with the current level of operations and maintenance, including the maintenance of equipment and vehicles in good working conditions 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 medium- and high-priority WPAs. For lands protected by conservation easements within the districts, the district staffs would monitor and enforce all conservation easements. The monitoring would evaluate the effects of management and restoration on target migratory birds.

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 with this, 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

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Fall migration of waterfowl.

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 district 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 districts affect overall habitat productivity.

This alternative would increase the extent of land at the WPAs 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 district 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.

District 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 districts, and media outreach would be conducted annually. Brochures and publications would be reviewed annually and updates completed as needed.

With expanded and new visitor facilities, the district 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 public use opportunities. District 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

In alternative B, increased funding would be needed for staff, equipment, and supplies (such as fuel and native grass seed). The increased resources would give district 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 districts to meet legal and obligated mandates and to provide management at high- and medium-priority WPAs, 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

Dave Menke/USFWS

A common yellowthroat in its breeding plumage surveys the surrounding grassland.

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 conservation easements that would provide additional habitat protection: high-priority conservation easements, fee-title WPAs, and "roundouts." The highest priority for conservation easements would be native prairie and wetlands.

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

Using GIS mapping, district staffs would identify invasive plants to target with limited management at high- and medium-priority WPAs.

Monitoring and Research

The district 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 district staffs would complete mandated surveys and baseline monitoring.

Grassland-, wetland-, and wildlife-monitoring activities would be increased through additional funding and resources. Vegetation transects on native prairie habitats would be expanded to include more district 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 districts and a better ability for staffs to maintain and improve recruitment of various wildlife populations.

Through additional research, the district 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. 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.

Public 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. District staffs would annually conduct or support visitor services events such as teacher workshops and waterfowl identification.

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

Partnerships

There would be the same effects as for alternative B.

Operations

There would be the same effects as for alternative B. In addition, increased funding would be needed for facility and program development, as well as for possible increased costs for operations and staff. Increased resources would enable district staffs to monitor and enforce all conservation easements.

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 environmental 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)

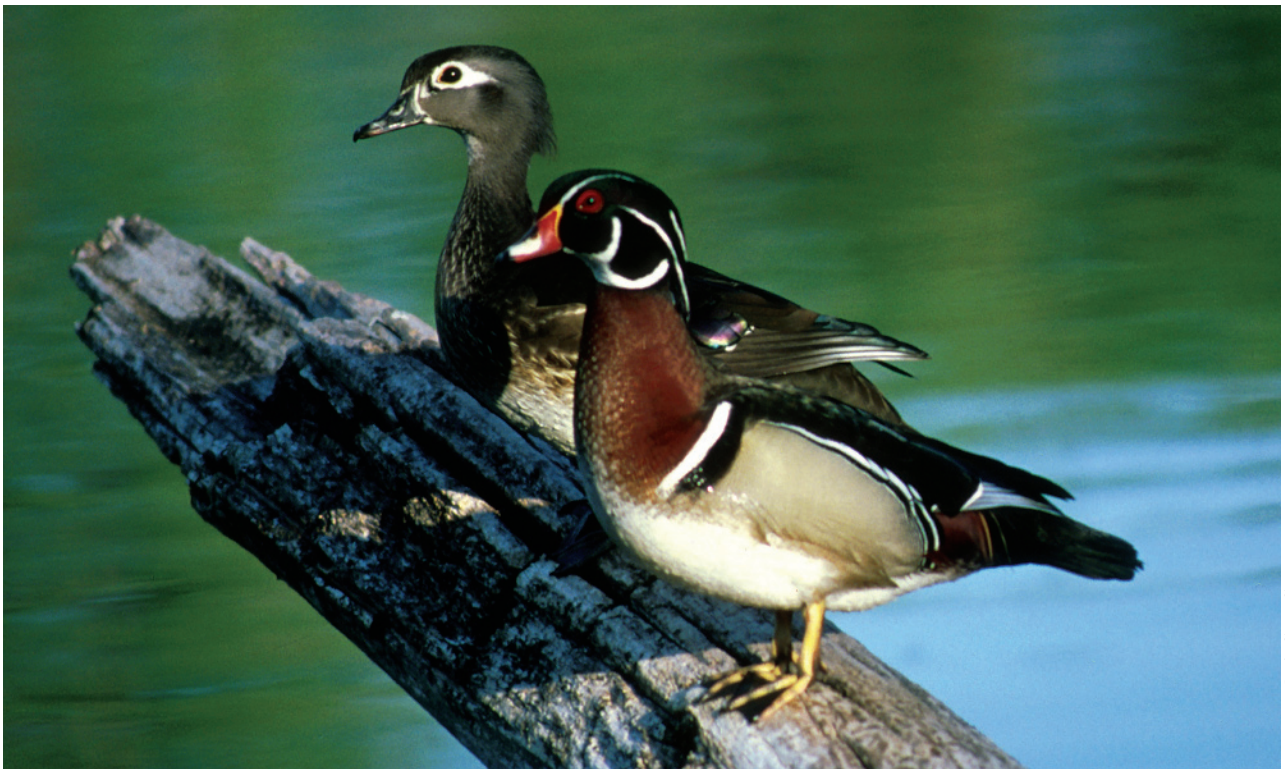
The cumulative effects analysis for this draft CCP is based on reasonably foreseeable future actions that, if carried out, would contribute to the effects of the alternatives. No reasonably foreseeable actions are anticipated. Impacts would be monitored during the implementation of the final CCP. Implementation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



Dave Menke/USFWS

Male and female wood duck paired for the breeding season.

This chapter presents the draft CCP—details of how the Service would carry out its proposed action (alternative B) for management of the nine wetland management districts 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 districts 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 district staffs.

The Service is responsible for recommending a proposed action that

- best achieves the districts' purposes, vision, and goals;
- helps fulfill the Refuge System mission;
- maintains and, where appropriate, restores the ecological integrity of each district 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 nine districts.

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Bird watchers enjoy the spring migration of songbirds near Audubon Wetland Management District.

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 districts.

District staffs would manage wetland and upland habitats to meet the district 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, and upland species. District staffs would emphasis adaptive management, including monitoring the effects of habitat management practices and using research results to direct ongoing management. Wetland management would benefit migratory birds, particularly waterfowl species. Management efforts would be expanded to benefit species of the Central Flyway.

The districts and refuges in North Dakota received more than 385,000 visitors during fiscal year 2007. It is a high priority for the district staffs to foster an appreciation, support, and understanding of the districts' vision and provide opportunities for wildlife-dependent recreational use. Arrowwood, Audubon, Kulm, Lostwood, and Valley City wetland management districts would improve visitor contact stations and office space to facilitate visitor use and provide for a safe, quality visit. Districts would enhance trails, kiosks, and interpretive displays to provide the public with an awareness of district resources. The Service would maintain the fishing and hunting programs at the districts' WPAs and WDAs 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 districts.

Habitat and Wildlife Goal

Protect, restore and enhance the ecological diversity of grasslands and wetlands of the North Dakota Prairie Pothole Region. Restore and maintain examples of aspen-oak woodland/wetland communities with characteristic of the mid-1800s Turtle Mountain Physiographic region. Contribute to the production and growth of the continental waterfowl populations to meet the goals of the North American Waterfowl Management Plan. Also support healthy populations of other migratory birds, threatened and endangered species, and other wildlife.

Wetlands in Easements

The first wetland easements within the nine wetland management districts were bought on November 29, 1960, and were located in LaMoure County (LaMoure "21x" and "27x"—two of a few 20-year conservation easements). These easements were not renewed after they expired. To date, the Service has purchased 11,359 wetland easements (705,679 acres). Through effective enforcement, these easements continue to provide the continent's most important waterfowl breeding habitat.

Wetland easement contracts signed before 1976 state that "all" wetlands "occurring or reoccurring due to natural causes" are protected on the described property, except those that were specifically excluded (deleted from the provisions of the easement agreement and shown on a drainage facility map). Beginning in 1976, the Service began to include a map (known as Exhibit A) with the conservation easement document. Exhibit A shows the wetland basins protected by the provisions of the easement, as well as the wetlands that may exist on the described property but are excluded from protection.

In 1997, the United States Eighth Circuit Court of Appeals affirmed that the Service's wetland easements were valid and its law enforcement efforts were legal. However, the court also addressed the Service's easement summaries for those conservation easements bought before 1976 and held that the agreement be consistent with those acres listed. Consequently, as a part of the enforcement process, the Service is required to map the protected wetlands for conservation easements bought before 1976.

Wetlands in Easements Objective 1

During the 15 years after CCP approval, secure protected status on 40,000 wetland acres, with efforts focused on unprotected temporary and seasonal basins

that are partially or totally embedded in cropland and that occur in areas that support ≥25 breeding duck pairs per square mile.

Wetland priority zones are shown in figure 12. Figure 13 summarizes the evaluation criteria (decision tree) for wetland easements (detailed in appendix I) that field biologists will use to set priorities for protection of additional wetlands.

Strategies

- Continue to focus the protection of wetlands with conservation easements in areas where the Service is also protecting priority grasslands. Because of the administrative process involved in calculating values (using the assessed value of the land and a multiplier derived from the relationship between the sales price of similar properties and the assessed values of those properties), it is most efficient for the Service's division of realty to focus acquisition efforts in specific areas (for example, counties) before moving on to another area. Focusing on specific areas and making multiple offers to many landowners cuts down on the administrative burden of purchasing conservation easements, thereby increasing the number of acres that can be protected.
- Continue with the initiative to secure protected status on wetlands at highest risk of degradation that are situated in the Drift Prairie. This initiative began as a pilot project in 2004 with a renewed effort to focus wetland protection in Dickey, LaMoure, Barnes, and Griggs counties in the Kulm and Valley City wetland management districts. It had been some 20 years since acquisition of wetland easements had occurred in these areas, and it was unknown whether or not landowners would be receptive. The results have been positive indicating that acquisition of priority wetlands can be sustained, or even expanded to other areas of the Drift Prairie.
- Use mass mailings to prospective sellers with information about the conservation easement program. Targeted mailings can generate sufficient interest to keep the division of realty staff busy in a specific locale for months, if not years, at a time.
- Continue to "piggyback" on the Partners for Fish and Wildlife Program as a way to inform prospective sellers of the Service's conservation easement program. Oftentimes, staff of the Partners for Fish and Wildlife Program is the first point of contact for many landowners who might not otherwise be aware of the conservation programs available to them.
- Opportunistically buy additional WPAs, including "roundouts" whenever possible.
- Continue to use the Service's strong partnership with Ducks Unlimited and other conservation organizations to generate non-Duck Stamp funding to buy conservation easements.
- Use North American Wetlands Conservation Act (NAWCA) funding to buy wetland easements in counties where the cap has already been met on the total wetland easement acreage the Service can attain with Duck Stamp funding (as explained in chapter 2, 2.1 Conservation Easements).

Rationale

Given a constant acquisition budget over the next 15 years, it is projected that more than 42,000 wetland acres can be protected with conservation easements in North Dakota (Stuart Wacker, USFWS, division of realty, personal communication, 2007). An estimated 40,000 acres within the nine districts can be protected by wetland easements (after subtraction of acres identified in Long Lake Wetland Management District's CCP, as well as those that might be protected in the Tewaukon Wetland Management District, which also has a completed CCP). The amount of additional acres protected in fee title over the next 15 years would likely be negligible.

The HAPET has identified those wetlands that are especially at risk—temporary and seasonal wetlands, often less than 1 acre in size, and totally or partially embedded in cropland. The pressure to drain and fill these wetlands to allow tillage agriculture puts these basins at higher risk of conversion than those within grasslands. At the same time, the value of these wetlands to the waterfowl resource is great. According to HAPET, for every ten 1-acre wetlands in the Prairie Pothole Region, there will predictably be 20 breeding pairs of ducks; whereas one 10-acre wetland would likely support only seven duck pairs.

Based on predictive models developed by the HAPET, the Service has prioritized conservation easement acquisitions to focus on the following:

- wetlands that are not protected
- wetlands capable of supporting more than 25 breeding duck pairs per square mile
- wetlands embedded in cropland, where the risk of degradation is especially high
- wetlands at greatest risk of degradation (from drainage and filling)–seasonal and temporary basins
- semipermanent and permanent wetlands less than 1 acre in size

According to the HAPET, waterfowl pairs in the PPJV are supported on 7.33 million wetland acres, of which 1.49 million are currently protected by wetland easements or WPAs. An estimated 1.15 million duck pairs reside in these wetlands, leaving the majority of pairs (3.10 million, or 73%) dependent on wetlands that are currently unprotected except through the "Swampbuster" provision of the Farm

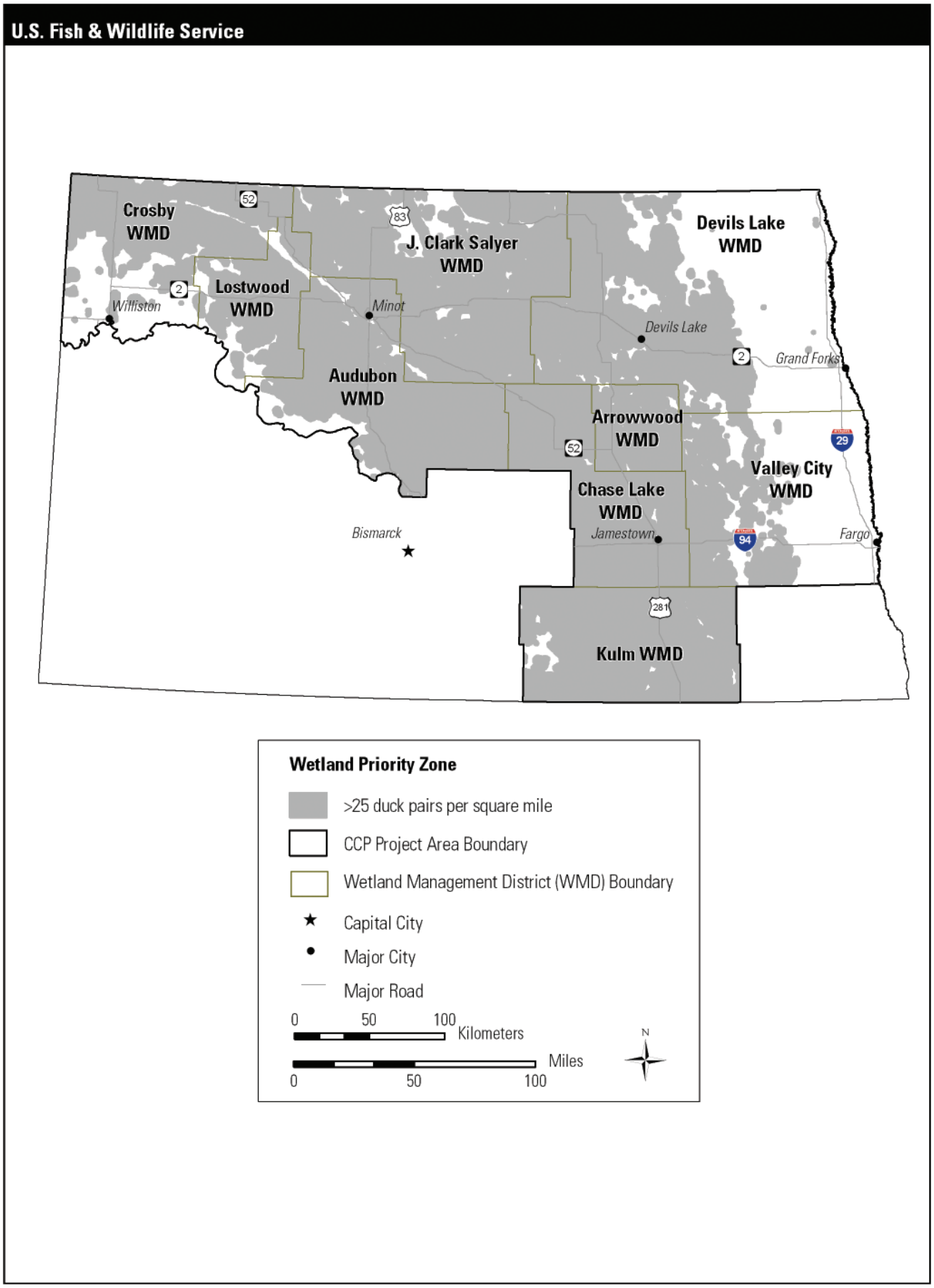

Figure 12. Map of the wetland priority zones in the nine districts, North Dakota.

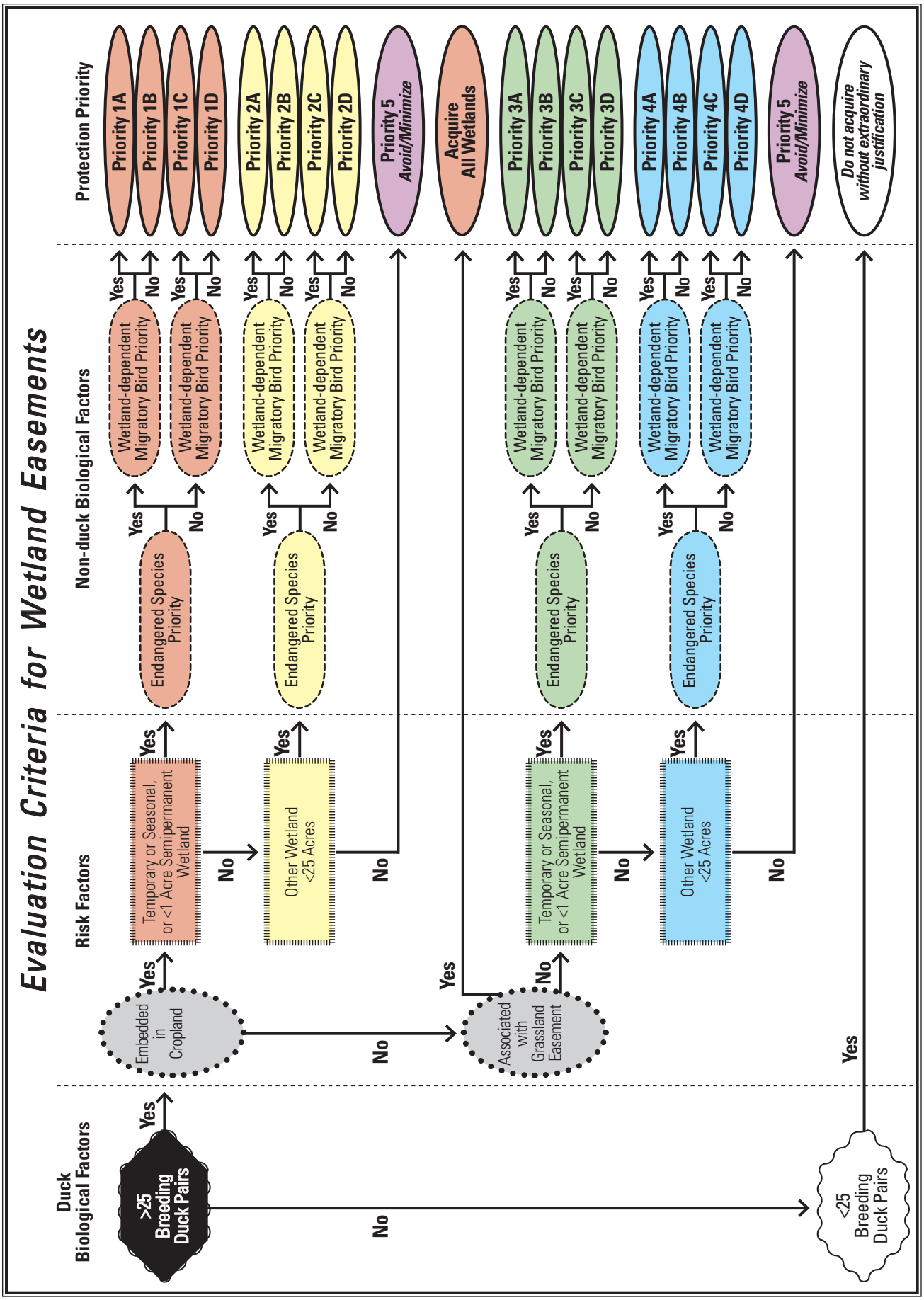

Figure 13. Evaluation criteria for wetland easements.

Bill. Using the criteria above, the HAPET identified 1.4 million acres of priority wetlands within the area encompassed by the PPJV that are in greatest need of protection; these wetlands would support 1.5 million duck pairs (see figure 12, map of wetland priority zones). This figure has been adopted as a protection goal by both the Dakota Working Group (a team consisting of refuge managers and project leaders from refuges and districts in North Dakota and South Dakota) and the PPJV (Ringelman 2005). Securing protected status on 40,000 priority wetland acres in the next 15 years would advance the Service toward these goals and would prevent the loss of habitat for an estimated 39,423 waterfowl pairs (Chuck Loesch, USFWS, HAPET, North Dakota, personal communication, 2007).

Protection of priority wetlands with conservation easements would not only benefit waterfowl, but would also have significant impacts to other migratory waterbirds. Niemuth et al. (2006) presented results that demonstrate the importance of temporary and seasonal wetlands embedded in agricultural landscapes to migrant shorebirds in the Prairie Pothole Region. Specifically, they found that temporary wetlands were selected by migrant shorebirds, but point out that presence of water and lack of drainage activity were also strong predictors of shorebird presence.

Wetlands in Easements Objective 2

Over a 15-year period, through active monitoring and law enforcement, protect all wetland areas under perpetual Service easement according to the provisions of the conservation easement contracts.

Strategies

- Following the guidelines contained in the "Easement Manual" for enforcement procedures, conduct annual surveillance flights to detect potential conservation easement violations and promptly follow up with needed enforcement action.
- Annually send letters to new landowners informing them of existing conservation easements on their property, including associated easement provisions.

USFWS

Wildflowers create a ring around a wetland.

- Proactively map pre-1976 wetland easements and provide maps to landowners along with a copy of the easement contract containing provisions.
- Annually review FmHA easements to ensure all wetland provisions are enforced.
- Complete a workforce analysis to discern law enforcement staff needs and strengthen these areas through position management or new staff, or both. This will prevent protected wetlands from being lost through violations as a result of insufficient law enforcement staff.

Rationale

At the beginning of the Small Wetlands Acquisition Program more than 40 years ago, the Service believed that conservation easements would require little to no maintenance or enforcement efforts. However, it soon became evident that in order to protect the government's interest in these conservation easements, a systematic approach was necessary for easement administration and enforcement.

"Swampbuster" provisions of the Farm Bill (which prohibit conversion of wetlands for the production of commodity crops by Farm Bill participants) not withstanding, pressures to drain and fill wetlands have continued to intensify. As farm implements such as drills, sprayers, and tractors become larger, landowners increasingly view small isolated wetlands as nuisance spots because they are tired of working around them. Other Farm Bill programs can also unintentionally increase pressure to violate wetland easement provisions. One such program, "prevented planting," provides compensation to a landowner for acres that cannot be seeded to a crop. To qualify for payment, the operator must only make an attempt to farm the acres (oftentimes, these are wetland acres). Simply plowing the ground once in the fall, when wetlands are naturally dry, can constitute an attempt. To facilitate plowing, oftentimes landowners will first burn off the wetland vegetation. It is common for these burns to occur on conservation easement-protected wetlands in absence of the required permit from the administering district, which is a violation of the easement provisions.

In the absence of active and effective enforcement, the Service's conservation easement interests could be lost forever, as opposed to those resources that the government owns outright. Hypothetically, should the Service "walk away" from its fee-title land for 15 years, it is reasonable to expect that the habitat would remain intact. However, the same cannot be said of habitat on private land that is protected only by a Service easement. A 15-year hiatus in enforcement action would likely result in the irreparable harm to the Service's easement interests and permanent loss of habitat.

Uplands in Easements

The initial focus of the Small Wetland Acquisition Program was primarily on the protection of wetlands by purchasing land in fee title and acquiring perpetual wetland easements. However, data also revealed the importance of upland grasslands to successful nesting of waterfowl. With the continued conversion of grassland to cropland, and consistent declines in the populations of grassland dependent birds, the need to protect adjacent grassland habitats became evident.

USFWS

Grassland easements protect a variety of grass and flower species.

The Service was authorized and began to acquire grassland easements in South Dakota and Montana in 1989. The first conservation easements were bought in North Dakota in 1991 with Land and Water Conservation Funds.

Like a wetland easement, a grassland easement transfers limited perpetual rights to the Service for a one-time, lump-sum payment. The purpose of a grassland easement is to prevent the conversion of grassland to cropland, while minimally restricting existing agricultural practices.

More specifically, the purposes of a grassland easement are

> to improve the water quality of wetlands by reducing soil erosion and the use of chemicals and fertilizers on surrounding uplands;
>
> to improve upland nesting habitat for all ground-nesting birds, especially waterfowl, and enhance nesting success on private lands;
>
> to perpetuate grassland cover established by other federal programs (for example, Conservation Reserve Program);
>
> to provide an alternative to the purchase of uplands in fee title, thus maintaining lands in private ownership.

Grassland easements restrict the landowner from altering the grass by digging, plowing, disking, or otherwise destroying the vegetative cover. Haying, mowing, and seed harvest is restricted until July 15 of each year. The landowner can graze without restriction. (See appendix D, draft compatibility determinations.)

Initially, in all districts (and continuing presently in some districts) tracts considered for a grassland easement were on native prairie, at least 160 acres in size, and situated in an area supporting at least 40 waterfowl pairs per square mile. Most of the native grassland fitting these criteria lies within the Missouri Coteau. The first grassland easement (tract 558G, 1; 520 acres) in the nine districts was acquired in Stutsman County on November 7, 1990. To date, 556 grassland easements have been bought covering 243,130 acres.

Uplands in Easements Objective 1

Over a 15-year period, secure perpetual protected status on 425,000 acres of grassland. Focus on grasslands ≥55 acres located in areas that support ≥25 breeding duck pairs per square mile.

Grassland priority zones are shown in figure 14. Figure 15 summarizes the evaluation criteria (decision tree) for grassland easements (detailed in appendix I) that field biologists will use to set priorities for protection of additional uplands.

Strategies

- Continue to protect wetlands with conservation easements in areas where the Service is also protecting priority grasslands. Because of the administrative process involved in calculating values (using the assessed value of the land and a multiplier derived from the relationship between the sales price of similar properties and the assessed values of those properties), it is most efficient for the Service's division of realty to focus acquisition efforts in specific areas (for example, counties) before moving on to another area. Focusing on specific areas and making multiple offers to many landowners cuts down on the administrative burden of purchasing conservation easements, thereby increasing the number of acres that can be protected.
- Adopt the use of a new combined easement contract that protects both the grassland and wetland habitats in the described property. This new conservation easement contract contains the same grassland protection provisions as the original grassland easement contract and restricts the right to fill or pump water from identified wetlands within the tract. The use of the combined easement contract would eliminate the need for separate grassland and wetland easement contracts and would be more cost effective.
- Use mass mailings to prospective sellers with information about the conservation easement program. Targeted mailings can generate

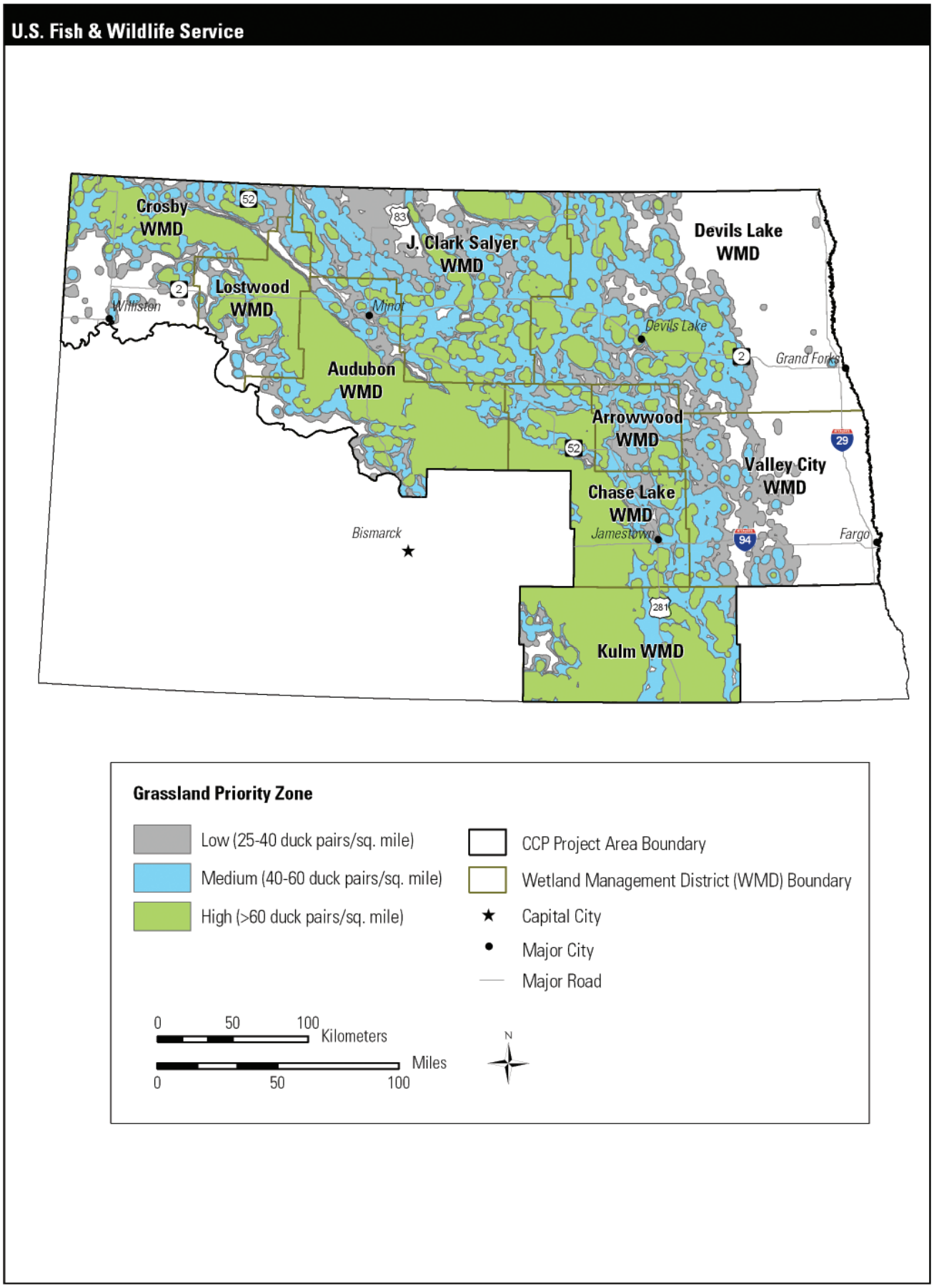

Figure 14. Map of the grassland priority zones in the nine districts, North Dakota.

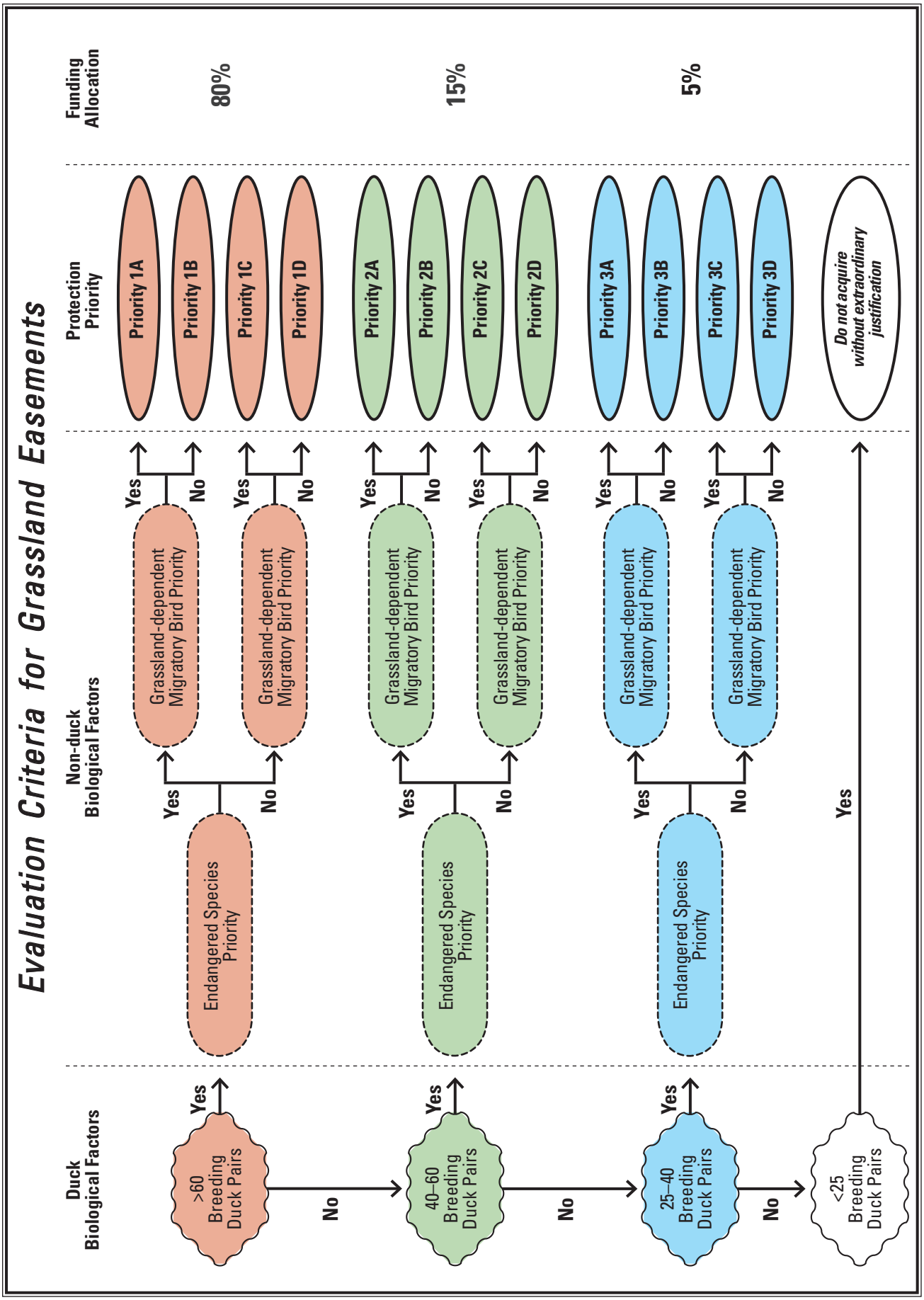

Figure 15. Evaluation criteria for grassland easements.

sufficient interest to keep realty staff busy in a specific area for months, if not years, at a time.

- Continue to "piggyback" on the Partners for Fish and Wildlife Program as a way to inform prospective sellers of the Service's conservation easement program. Oftentimes, staff of the Partners for Fish and Wildlife Program is the first point of contact for many landowners who might not otherwise be aware of the conservation programs available to them.
- Buy those lands in WPAs that make management cost effective, when possible.
- Continue to use the Service's strong partnership with Ducks Unlimited and other conservation organizations to generate non-Duck Stamp funding to buy conservation easements.

Rationale

Considering the strong and ongoing partnership with Ducks Unlimited and consistent success of using Ducks Unlimited's nonfederal money to help acquire NAWCA grants, it is likely the Service's grassland easement program will enjoy stable, if not increasing, funding over the next 15 years. Given this scenario, the Service would secure protected status for more than 500,000 grassland acres in that time period in North Dakota (Stuart Wacker, USFWS, division of realty, personal communication, 2007). An estimated 425,000 acres within the nine districts can be protected by grassland easements (after subtraction of acres identified in Long Lake Wetland Management District's CCP, as well as those that might be protected in the Tewaukon Wetland Management District, which also has a completed CCP). The amount of additional acres protected in fee title over the next 15 years would likely be negligible.

The HAPET has developed a model that shows the distribution of priority grassland patches (≥55 acres) in relation to breeding duck pairs (≥25 per square mile) and predicts that for every 1% decline of priority grassland in the Prairie Pothole Region, there will be 25,000 fewer ducks in the fall (see figure 9 in chapter 4). Protection of priority grassland patches not only benefits waterfowl, but also a wide variety of grassland-dependent migratory birds such as the western meadowlark (Johnson and Igl 2001).

The HAPET identified 11.56 million acres within the PPJV area of North Dakota and South Dakota and eastern Montana that meet the above criteria. By subtracting grasslands already protected in WPAs or grassland easements, the HAPET identified an additional 10.4 million grassland acres in need of protection. As with the wetland protection goal, both the Dakota Working Group and the PPJV (Ringelman 2005) have adopted this figure as a protection goal. Securing protected status on 425,000 acres of priority grassland in the next 15 years would advance the Service toward meeting these goals and would prevent the loss of habitat for an estimated 738,620 waterfowl recruits during that period (Chuck Loesch, USFWS, HAPET, North Dakota, personal communication, 2007).

Additionally, the HAPET model has identified larger grassland areas with respect to area-dependent grassland-nesting birds such as northern harrier, upland sandpiper, and grasshopper sparrow (Johnson and Igl 2001). These areas consist of contiguous grass cover ≥640 acres in size with ≤30% of their area being comprised of permanent or semipermanent wetlands. Protection of these large, contiguous blocks of grass within a larger, grassland dominated-landscape should provide adequate protection for a wide range of grassland-dependent migratory bird species that are of management concern (Estey 2007).

Uplands in Easements Objective 2

Over a 15-year period, through active monitoring and law enforcement, protect all grassland areas under perpetual Service conservation easement according to the provisions of the easement contracts.

Strategies

- Following the guidelines contained in the "Easement Manual" for enforcement procedures, conduct annual surveillance flights to detect potential conservation easement violations and promptly follow up with needed enforcement action.
- Send letters to new landowners informing them of existing conservation easements on their property, including associated easement provisions.

USFWS

Harebell.

- Review FmHA easements to ensure all wetland and grassland provisions are enforced.
- Develop a step-down plan following the recommendations provided by the Region 6 Refuge Wind Energy Advisory Group to administer wind development requests for existing conservation easements. The plan would also address new conservation easements for lands encumbered by wind lease options with existing wind farms.

Rationale

At the beginning of the Small Wetlands Acquisition Program more than 40 years ago, the Service believed that conservation easements would require little to no maintenance or enforcement efforts. However, it soon became evident that in order to protect the government's interest in these conservation easements, a systematic approach was necessary for easement administration and enforcement.

Since most grassland easements protect native prairie, the major enforcement concern is cultivation. While violations involving the conversion of native prairie to cropland are extremely rare, full restoration is arguably impossible (although restoration of grassland is possible to regain compliance with the grassland easement provisions, which do not specify native prairie). Therefore, enforcement is essential to the protection of these habitats. Haying, mowing or harvesting seed before July 15, in violation of the conservation easement provision, could cause direct losses to grassland-nesting birds including waterfowl. While the cutting of hay on native prairie is not common, it is more likely to occur on tame grasses. Enforcing early hay violations affords another opportunity to meet and visit with landowners and operators. These contacts may serve to remind landowners and operators of the conservation easement provisions and hopefully prevent more serious violations in the future. As with any law enforcement, the goal is voluntary compliance.

In the absence of active and effective enforcement, the Service's conservation easement interests could be lost forever, as opposed to those resources that the government owns outright. Hypothetically, should the Service "walk away" from its fee-title land for 15 years, it is reasonable to expect that the habitat would remain intact. However, the same cannot be said of habitat on private land that is protected only by a Service easement. A 15-year hiatus in enforcement action would likely result in the irreparable harm to the Service's easement interests and permanent loss of habitat.

Developed Wetlands in WPAs

Developed wetlands have a water control structure or some capability for managers to manipulate water levels. 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 generally quite 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.

Developed Wetlands in WPAs 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 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 reflood 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).

Developed Wetlands in WPAs Objective 2

Within 10 years of the CCP approval, establish a monitoring plan for high-priority WPAs for water quality, aquatic invertebrates, and emergent and submergent aquatic vegetation.

Strategies

- Randomly sample vegetative zones (wet meadow, shallow marsh, deep marsh, and open water) (Stewart and Kantrud 1971) along transects.
- 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 and long term could be negatively affected, because plant community structure and composition influences use by invertebrates and vertebrates such as birds (Laubhan and Roelle 2001). Both plants and invertebrates play significant roles in nutrient cycling and are integral to components in the food chains of a wide variety of vertebrates (Murkin and Batt 1987).

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

USFWS

The coteau region of North Dakota has a high density of wetlands.

Undeveloped Wetlands in WPAs

Undeveloped wetlands occur naturally and have nature-dependent water levels. Service-owned wetlands within the nine districts consist of a wide variety of wetland sizes and regimes (temporary, seasonal, semipermanent, and permanent) (Stewart and Kantrud 1971). The majority of wetlands in Service lands are undeveloped wetlands, that is, those with no water level management capabilities. Most undeveloped wetlands are dynamic systems—some are influenced by spring runoff and rainfall only (temporary and seasonal wetlands), whereas others are also influenced by groundwater interaction (semipermanent and permanent wetlands). However, all are at the mercy of nature with respect to temporal fluctuations in water levels, abiotic conditions such as salinity, and biotic communities such as plants and invertebrates.

Euliss et al. (2004) stressed the need to consider the changes these prairie wetland systems undergo, as a result of normal climatic variation, when evaluating biological wetland data or a wetland's expressed condition (for example, dry, devoid of emergent vegetation, and choked with emergent vegetation) at a given point in time. Differences in wetland density and a variety of water regimes exist in different physiographic regions and ecoregions. More specifically, densities of temporary, seasonal, and semipermanent wetlands are greatest in the Missouri Coteau ecoregion, whereas the greatest density of large, shallow, alkali lakes exists in the Collapsed Glacial Outwash ecoregion.

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 (Kantrud 1983).

Complexes of depressional, palustrine wetlands scattered throughout North Dakota attract breeding duck pairs, drive nesting and renesting intensity, and provide brood habitat (Kantrud et al. 1989). While semipermanent and permanent wetlands best serve to provide brood-rearing habitat and migratory stopover habitat, respectively, it is the smaller temporary and seasonal wetlands that draw breeding duck pairs to North Dakota and South Dakota and other parts of the Prairie Pothole Region.

For every ten 1-acre wetlands, there will predictably be 20 duck pairs, whereas one 10-acre wetland will likely support only seven duck pairs. The availability of wetlands is a major factor driving duck breeding in the Prairie Pothole Region (Ron Reynolds, USFWS, division of realty, personal communication, 2007).

Meeting the objectives for undeveloped wetlands would require that limited habitat management is conducted by a variety of Service staff. The Service would restore and enhance wetland habitat and protect against wetland degradation such as sedimentation and invasive plant infestation.

Undeveloped Wetlands in WPAs Objective

Over a 15-year period, restore at least 100 acres of degraded (drained, filled, leveled, cattail-choked, and contaminated) wetlands for increased water-holding capacity and improved wetland function on fee-title lands.

Strategies

- Identify wetlands with restoration or enhancement potential and begin restoration actions.
- Fill ditches and remove fill and sediment from basins in fee-title lands.
- On selected wetlands, control the invasion of narrowleaf cattail, hybrid cattail, and reed canarygrass.

Rationale

Wetland managers have been restoring prairie wetlands since the 1960s (Dornfeld 1988). Most wetland restorations in North Dakota are accomplished by plugging ditches with simple clay-core dams and seeding the surrounding upland to perennial grassland cover (Knutsen and Euliss 2001). Fill and sediment may be removed to restore hydrologic function.

It has generally been concluded that, whenever possible, restoration efforts in the Prairie Pothole Region should focus on restoring wetland complexes (groups of wetlands in close proximity to one another that consist of multiple regimes [for example, seasonal, permanent]), rather than individual basins. Knutsen and Euliss (2001) suggested that targeting large blocks of wetlands for restoration would increase the chances for the successful return of all wetland characteristics, including wildlife.

Native Prairie in WPAs

The following three objectives consider tracts of native prairie on fee-title lands within the districts. Native prairie is defined as native ("unbroken") sod and exists in all of the nine districts 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 WPAs should contribute to the conservation of native prairies unique to North Dakota.

Native Prairie in WPAs Objective 1

Within 2 years of CCP approval, each district 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 district 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.

Native Prairie in WPAs Objective 2

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

Strategies

- Following the example from J. Clark Salyer Wetland Management District provided in appendix K, 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.

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 K. However, each district staff would need to develop objectives specific to their area and situation.

Native Prairie in WPAs Objective 3

Each district 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, districts 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 (for example, VORs, Robel et al. 1970) of bird species vary widely. 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 districts. Because WPAs are "waterfowl first" lands, it is appropriate to manage for a high percentage of high and medium VOR acres (>40% and >25%, respectively) and low percentage of low VOR acres (>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.

Elaine Haug/Smithsonian Institution

Spotted knapweed is an invasive plant in North Dakota's grasslands.

Rationale

The Service has developed an IPM plan for each district. 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.

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 districts 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 districts 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 district to hire and train individuals to identify and treat invasive plants. Many Service lands in the districts 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.

Invasive Plants Objective 3

Carry out measures to reduce and control 50% of invasive plants, including noxious weeds, on priority WPAs by 15 years after CCP approval.

Strategies

- Identify, for each district, the priority WPAs by 2 years after CCP approval.
- 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, 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.

USFWS

The Service uses a variety of methods, including biological (beetles above), to control leafy spurge.

- 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 warm-season 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; therefore, these plants 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. See the Old Cropland Objective for detailed information on using certain seed mixtures to reduce infestations.

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, draft compatibility determinations.)

Grazing by sheep or goats can be used to maintain an invasive plant population at a level that the plant no longer presents an economic hardship. Grazing may also be used as a pretreatment to prepare for herbicide application. (See appendix D, draft compatibility determinations.)

The use of biological control agents—flea beetles (*Apthona* species)—for leafy spurge control has shown excellent results. Widespread use of these insects needs to be made by monitoring insectaries for the 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 Dalmation toadflax, yellow star-thistle, knapweeds, and purple loosestrife.

Old Cropland in WPAs

This section provides descriptions of declining grassland bird species, old cropland areas, restoration efforts, priority WPAs, 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 upland acres associated with district lands 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 nine wetland management districts would restore priority WPAs of old cropland back to native vegetation. These areas would be revegetated with a diversity of native vegetation that, with modest management, would be relatively resistant to infestation by invasive plant 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 interventions. Management of district lands 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.

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 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 WPAs

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, WPAs 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 Schmniegelow 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 districts' focus on using native plants to restore WPAs 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 in WPAs Objective

In an attempt to restore grasslands that resemble presettlement conditions, over the next 15 years reseed at least 10,000 acres to native herbaceous mixtures in priority WPAs that, 10 years postestablishment, will be comprised of >60% native grasses and forbs.

(For this objective, planning team members used their knowledge and expertise to obtain an acreage estimate. This acreage seems achievable based on the adequacy of funding and staff levels included in the draft CCP. The proposed level of 60% presence

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Phalarope chicks find refuge in nesting cover.

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

- Identify priority restoration sites in WPAs based on habitat blocks of wetlands and grasslands that are greater than 125 acres.
- 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.
- 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 in WPAs

As described under Old Cropland, certain old cropland WPAs 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, and then reseeded. This leads to a rotation of seeding–managing–farming–seeding into perpetuity to maintain the intended cover.

The WPAs included in the following objective are old croplands that are not part of the acreage listed in the previous old cropland objectives. Ideally, the majority of these tracts would be seeded back to a native mixture; however, certain situations may limit this opportunity. Often, newly acquired district 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 district 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 in WPAs Objective

Over 15 years, continue to use other options for grassland cover (such as DNC and tame grass) on old cropland WPAs to address site-specific migratory bird cover. Carry out appropriate management that maintains this cover at a minimum of every 4–7 years.

Strategies

– Use appropriate site preparation techniques to ensure weed-free seedbeds.

– Use farming activities to provide an appropriate seedbed for seeding (see appendix D).

– Manage this habitat using varying tools such as fire, haying and grazing (see appendix D), and idling.

– Reseed introduced species mixes such as DNC every 10–15 years.

– 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 consists of 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 in WPAs

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 possesses 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 percentage 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 WPAs 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 WPAs. 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 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 (see figure 9 in chapter 4, map of the grassland bird conservation area matrix). Sites for tree removal at WPAs are prioritized based on this matrix, with the majority of removal acres existing in the areas with the largest blocks of grass (see figure 14, map of grassland priority zones). Reducing fragmentation in these core areas (see figure 9 in chapter 4, map of the grassland bird conservation area matrix) has the potential to provide the most benefit to grassland-dependent birds. In addition, the proposed removal of woody species >3.28 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 in WPAs Objective

Over a 15-year period, eliminate >50 acres of invasive or planted woody vegetation that are >3.28 feet tall at type 1–3 core area WPAs and >25 acres at noncore area WPAs (see figure 9 in chapter 4, map of the grassland bird conservation area matrix).

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.

USFWS

The Service uses many tools, including prescribed fire, to control woody vegetation in grasslands.

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 commonly 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 also 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).

Turtle Mountains Habitat

The Turtle Mountains are unique to North Dakota, representing the most extensive forested area in the state. The area is an "island" of aspen-dominated forests with a high density of permanent lakes surrounded by a sea of prairie. Located along the United States–Canada boundary, the Turtle Mountains are approximately 40 miles long and 25 miles wide and occupy an area of 500 square miles.

The J. Clark Salyer Wetland Management District manages approximately 1,600 acres at eight WPAs in Bottineau and Rolette counties in the Turtle Mountains. Approximately 800 acres is forested and the other 800 acres are wetlands. Most of the forested acres are located in Rolette County in the Baxtrom, Carlisle Lake, and Willow Lake WPAs.

Only a small fraction of the Turtle Mountains in North Dakota is in public ownership. About 40% of the historical woodland cover has been converted to cropland or hay land and many wetlands have been drained or modified. In contrast, the Canadian portion of the Turtle Mountains (almost half the total area) is mostly protected as a provincial park, consisting of intact forest–wetland complexes.

Bird (1961) felt the vegetation of the Turtle Mountains might be a distinct unit or a southern extension of the aspen parkland. In the north, the aspen parkland occurs between the boreal forest (northern coniferous) and the true prairie and is characterized by groves of poplars (Bird 1930). Bird (1961) considered the entire parkland an ecotone between grassland and coniferous forest. Within the parkland, Moss (1932, 1955) noted competition between the poplar area and the boreal forest was primarily a struggle between the dominants. White spruce is the dominant tree of the boreal forests, but balsam poplar and trembling aspen will invade a white spruce forest after a fire and Moss (1932) attributed the low frequency of white spruce in poplar stands to frequent fires. Potter and Moir (1961) examined the relationship between fire and vegetation in the Turtle Mountains and found that conifers, although not naturally present today, grew there in the not too distant past.

The recovery of an ecosystem following a major disturbance is called "secondary succession" (Dickman and Leefers 2003). Aspen forest is a secondary succession forest type maintained or regenerated by periodic disturbance, especially fire. When aspen trees are cut or burned, they regenerate by sprouting suckers from root clones. Without disturbance, mature aspen stands (40–60 years old) will begin to die and be succeeded by more shade-tolerant and fire-sensitive trees species such as green ash, American elm, and boxelder. The objective for the Turtle Mountains is to promote the regeneration of aspen by removing mature trees to maintain structural diversity (various age classes of regeneration), thereby providing habitat to a broad spectrum of species.

Historically, fire has been a major factor affecting the vegetative structure and composition of woodlands in the Turtle Mountains (Potter and Moir 1961). Fires were more frequent before settlement, but have become less common since settlement in the late 1800s. The last extensive wildland fire in the Turtle Mountains was in 1886, which burned and killed most of the trees. Currently, fires are suppressed as soon as possible to protect homes and other property. Without fire disturbance, aspen stands will mature, thus reducing forest diversity and the inhabiting species.

Some of the highest wetland and waterfowl densities occur in the Turtle Mountains. Numerous wetlands support high densities of mallard, canvasback, blue-winged teal, and ring-necked duck. In addition, this is the only place in the state where four cavity-nesting species occur: bufflehead, wood duck, hooded merganser, and common goldeneye. Waterfowl densities are two times greater in areas where complexes of aspen woodland and wetlands are intact. Other characteristic wetland species include common loon, red-necked grebe, and American white pelican. The Turtle Mountains support the most diverse woodland bird population in North Dakota.

Turtle Mountains Habitat Objective

Within 15 years after CCP approval, opportunistically rejuvenate 20–50 acres of mature (>40–60 years old) aspen woodland in WPAs to provide structural diversity (various age classes of aspen) important for providing habitat for a broad suite of woodland birds and other native wildlife. Conserve other native trees in the stand by selective retention of these species.

Strategy

- Use a bulldozer with a blade to shear off mature aspen trees in 3–10 acre patches during winter freeze-up. Remove or leave trees on the ground. Avoid harvest of hardwood species such as green ash, American elm, boxelder, and oak trees to promote stand diversity.

Rationale

Ideally, large forest-wetland complexes in the Turtle Mountains include a mix of wetland types and age classes of aspen and oak woodland. Wildlife, especially birds, use these various wetland types and age classes of aspen forest to meet their needs. For example, ruffed grouse rely on many age classes of aspen during their life cycle. The ruffed grouse feeds extensively on aspen buds (DeByle and Winokur 1985). Other species such as yellow warbler and willow flycatcher breed mainly in young (<20 years old) aspen woodland. Many species, such as ovenbird, veery, and hairy woodpecker, nest only in mature aspen–oak woodland. Compared with coniferous forests, aspen stands have a rich understory of shrubs and herbaceous species (Gruell and Loope 1974). The forage in a stand of aspen can be up to six times as rich as that under coniferous forests (DeByle 1981). An aspen stand has three to four layers of vegetation—from small trees like chokecherry and juneberry, to small shrubs like hazelnut, to wildflowers and grasses.

Threatened and Endangered Species

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

Piping Plover

Wetlands in the Audubon, Crosby, and Lostwood wetland management districts have been historical nesting habitat for the threatened piping plover.

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 stretching from central North Dakota to northeastern Montana (see figure 10, map of the core area for piping plover, in chapter 4). Plovers in this core area breed on barren shorelines associated with alkali lakes

Edward Henry/USFWS

Piping plover.

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 Audubon, Crosby, and Lostwood wetland management districts, 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 exclosures, or both.
- Monitor the success of protected nests by searching for "pip chips" in or near the nest bowl; or timing nest visits based on known or suspected nest initiation date, laying rate, and mean incubation period; or both.
- Monitor hatched young to fledging.
- Identify lands sensitive to piping plover nesting for consideration of added protection through land acquisition.

Rationale

The Service listed the northern Great Plains population of piping plovers as threatened in the United States due to a poorly understood decline in abundance. Mabee and Estelle (2000) suggested that nest predation is a major problem limiting piping plover nest success throughout their range. 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 exclosures (cages) over individual nests. Recruitment has improved with these cages in the northern Great Plains (Murphy et al. 2003). Service staff plans to erect these exclosures 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. Exclosures 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 districts 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 district 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 Audubon, Crosby, and Lostwood wetland management districts, which have historical nesting habitat for piping plovers.

Strategy

- 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 (Whyte 1985, 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 district staffs to develop a better understanding of where to use nest protection measures (see Piping Plover Objective 1, previous) 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 districts as migratory stopover areas en route to their summer and winter grounds (see figure 11, map of whooping crane sightings, in chapter 4).

Ryan Hagerty/USFWS

Whooping crane.

Whooping Crane Objective

Over a 15-year period, annually inform the public of migrant whooping cranes stopping in the districts, 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, when 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 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. The only naturally occurring wild, migratory population of whooping cranes in the world numbers fewer than 215 individuals (Tom Stehn, USFWS, personal communication).

In addition to occasional whooping cranes, several thousand sandhill cranes stage in the districts 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 district lands, 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 districts for multiple days.

Dakota Skipper

The Dakota skipper butterfly 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.

Dakota Skipper Objective

At 5-year intervals, reevaluate native prairie portions >80 acres in WPAs 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 district lands 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 in WPAs

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

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

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

Waterfowl Nest Success

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

USFWS

A canvasback hen keeps a watchful eye on her ducklings.

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

At breeding grounds in 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 (Balsar 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 exclosures 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.

John J. Mosesso/National Biological Information Infrastructure

Predators such as the red fox prey on waterfowl nests and have a significant impact on nest success.

Predator Management in WPAs Objective

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

(Several predator management techniques are available for use in North Dakota; therefore, it is reasonable for each district 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 WPAs.
- Annually maintain established predator exclosures at WPAs.
- Install and maintain nesting structures at WPAs.
- Remove artificial microhabitats such as rock piles, abandoned buildings, downed fences, and miscellaneous junk at WPAs. Remove invasive and planted trees from WPAs.

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 districts 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 WPAs, 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. These intensively cultivated areas cannot sustain nest success for stable populations of waterfowl species. In addition, waterfowl are more susceptible to predation in cultivated areas. In these situations, predator management is extremely beneficial to nesting waterfowl.

Wildlife Disease

There is a wildlife disease contingency plan specific to each district (completed in 2006). Each staff would annually review the district 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 district lands are the 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 districts 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 from handling birds with botulism are relatively minor (Friend and Franson 1999) and West Nile virus (Domek 1998). However, the highly pathogenic H5N1 strain of HPAI presents Service staff 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 and, 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 personnel 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 the Prairie Pothole Region and management within the North Dakota wetland management districts.

Monitoring and Research

Habitat goals and objectives are the basis for monitoring and research priorities for district lands. 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 the individual district or WPA level, but can be influenced indirectly through appropriate or inappropriate management of habitat. Because the CCP is a broad umbrella plan that provides general concepts and specific management and operational objectives for Service lands, it is imperative that step-down plans such as inventory and monitoring plans and habitat management plans are produced. The purpose of step-down plans is to provide detail and clear direction to Service managers and other employees who will carry out the strategies described in the CCP. A habitat management plan provides staff with detailed information about various management practices. An inventory and monitoring plan outlines 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 districts.

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 districts 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 district will complete a habitat management plan.

Strategy

- 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 district. 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.

USFWS

A basic inventory of habitats is essential.

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 districts and refuges in North Dakota and South Dakota that have intact native prairie or native sod never broken and cropped. The grassland monitoring team successfully competed for USGS Science Support Program funding to complete vegetation inventories of plant communities on native prairie tracts for most districts and refuges 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, to increase knowledge about effectiveness of techniques 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.

USFWS

Waterfowl banding allows Service personnel to track bird movement.

- 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 (Much of the native prairie at J. Clark Salyer Wetland Management District may have passed a threshold of infestation by invasive plants, such that restoration of a modestly diverse, native herbaceous flora is an unrealistic goal. However, maintenance or restoration of a native, biological diverse flora may be possible on some remaining tracts.)
- 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 in the North Dakota wetland management districts 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 NHPA, at all times.

Strategy

- Continue cultural resource review of the districts' projects to identify concerns.

Cultural Resources Objective 2

Always successfully integrate the process for section 106 of the NHPA into all applicable district 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 NHPA 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.

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 quality opportunities to enjoy hunting, fishing, trapping, and other compatible wildlife-dependent recreation on Service-owned lands 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.

Under federal law established by international treaties with Canada, Mexico, and other countries with which the United States shares migratory birds, the Service has ultimate responsibility for regulating migratory bird hunting nationwide. Through a regulatory process that begins each year in January and includes public consultation, the Service establishes the frameworks that govern all migratory bird hunting in the United States. Within the boundaries established by those frameworks, state wildlife agencies have the flexibility to determine season length, bag limits, and areas for migratory game bird hunting.

Each state has primary responsibility and authority over the hunting of wildlife that lives within state boundaries. State wildlife agencies that sell hunting

licenses are the best sources of information regarding hunting seasons and areas open and closed to hunting.

Hunting Objective

At WPAs and WDAs, throughout the life of the plan, maintain a good-quality experience for hunters of waterfowl and other resident species. Continue to provide information about public opportunities for hunting, in accordance with state and federal regulations.

Strategies

- Develop brochures for each district that describe all the WPAs and WDAs.
- Post all WDA boundaries with WPA signs to avoid confusing the public and hunters about boundary regulations.
- Identify areas that are suitable for hunters with special needs and provide universal access to select hunting areas.
- Explore opportunities for development of universally accessible facilities and designation of hunting days for hunters with special needs. Work with partners such as Wheeling Sportsmen and Wilderness on Wheels to help fund this type of facility development.
- Establish criteria for eligibility to use the special needs hunter privileges such as drive-in access.

USFWS

Waterfowl hunting is popular at many WPAs.

- Work cooperatively with the NDGF to conduct law enforcement patrols at the districts to ensure compliance. Ensure state and federal hunting regulations can be enforced.

Rationale

The popularity of hunting at the WPAs and WDAs 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 as game is dispersed.

Pressure for hunting is intensifying on Service lands. The number of nonresident hunters is increasing. In addition, there is a growing number of private property acres off limits to hunting, along with fewer grassland acres within private lands that were in the Conservation Reserve Program.

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 wheelchair-bound hunters. Hunting by young people is already occurring, because the WPAs and WDAs are managed in accordance with the state regulations that include hunt days for youths.

Fishing

The districts' abound with fishing opportunities. Fishing generates tremendous economic benefit through 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 plant species eradication.

Fishing Objective

Throughout the life of the plan, provide access to open-water and ice-fishing opportunities at the districts.

Strategies

- Work with the state to maintain healthy fish populations (for example, restocking).
- Seek out partnerships to develop facilities that accommodate anglers with special needs (for example, universally accessible piers).
- Work cooperatively with the NDGF to conduct law enforcement patrols at the districts to ensure compliance.
- Continue to work with partners and neighbors to provide access points to fishing areas.

Rationale

Fishing within districts is available summer and winter. Winter ice fishing is far more popular than fishing during warmer weather. Permanent lakes

within the districts provide fishing for northern pike, perch, walleye, and a few other species. Parts of these lakes may be in WPAs and WDAs. These areas are open to fishing according to state regulations and special refuge regulations. Because districts have a combination of private ownership with Service conservation easements and Service ownership, access is limited to the public. Historically, there has been conflict with public access to fishing areas and damage to croplands and grassland vegetation.

Wildlife Observation and Photography

Wildlife observation and photography is available to visitors all year at the WPAs and WDAs. Due to the vast distribution of districts 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 WPAs and WDAs, wildlife observation and photography can usually be done from rural roads adjoining the boundaries of district lands.

Appendix D contains the draft compatibility determination for wildlife observation and photography.

Wildlife Observation and Photography Objective

Throughout the life of the CCP, provide opportunities for wildlife observation and photography and increase awareness of observation and photography opportunities.

Strategies

- Ensure the public is aware of wildlife observation and photography opportunities at the districts and identify open observation areas to the public through signage, publications, and maps.
- Conduct media outreach and review brochures and publications annually. Complete updates as needed.

Bob Savannah/USFWS

- Incorporate district lands into the birding drives by promoting WPAs and WDAs as stops. 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.
- Host bird identification events in conjunction with International Migratory Bird Day in May.
- Develop website-based observation materials such as bird lists and information, maps, and web cams.
- Where feasible, develop a simple map for each district's visitor center or contact station 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 both wildlife-dependent recreational (priority) uses listed in the Improvement Act. In fiscal year 2007, wildlife photography alone accounted for more than 26,000 visits to North Dakota's districts and refuges. Facilities that support these activities include visitor centers, interpretive displays, auto routes, overlooks and observation platforms, and informational kiosks.

Environmental Education and Interpretation

Parents, educators, and civic groups have been visiting WPAs for an educational outdoor experience for many years. Special use permits are available in support of education, and educators are encouraged to use the areas 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, district resources, and management activities that conserve habitat and wildlife.

Strategies

- Conduct visitor services events such as teacher workshops and waterfowl identification workshops on a three-year rotation among districts.

- Within 5 years of CCP approval, identify the key WPAs within the districts that could support visitor use information such as signage and information kiosks. By 15 years after CCP approval, develop this visitor use infrastructure.
- Ensure WPAs and WDAs have boundary signage; post WDAs as WPAs.
- Keep data current so the state can incorporate district lands' information in the "Private Lands Open to Sportsmen" guide.
- Work with the North Dakota tourism department to promote the WPAs and WDAs and their resources.
- Keep each district website up-to-date.
- Conduct information sharing with the media (for example, local newspapers), chambers of commerce, congressional contacts, and tourism outlets. Limit outreach to wildlife, conservation, and community groups.
- Educate educators, Scout leaders, and others so they can educate their students and group members.
- Promote programming that incorporates the "Children in Nature" national initiative in both structured and unstructured ways. Encourage family visits or family awareness of the districts.
- 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 wetland management districts.
- Construct a new interpretive sign for the auto tour route at Chase Lake Wetland Management District.
- Redesign the visitor contact station at Crystal Spring WPA in Chase Lake Wetland Management District.
- Build on the state's Outdoor Wildlife Learning Site program (Valley City Wetland Management District has an Outdoor Wildlife Learning Site).
- Expand educational and interpretive programming to foster greater visitor awareness and appreciation of district habitats.
- Continue to coordinate and promote the junior Duck Stamp program.

Rationale

Targeting teachers in the districts is an efficient means of promoting awareness of the districts and developing support for the Refuge System. Teachers educate the students who, in turn, explain to their families about wetland ecosystems and the districts.

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 of the districts.

Visitor Service Facilities

Environmental education and interpretation are two of the six wildlife-dependent recreational (priority) uses listed in the Improvement Act. The districts use self-guided exhibits, interpretive panels, and brochures. District facilities used to support visitor

Visitors to the WPAs will see one or more of these signs.

services include visitor center exhibits, although some contact stations are ill-equipped to handle any exhibits or provide for in-house educational opportunities. The districts and refuges in North Dakota received more than 385,000 visitors during fiscal year 2007. Interpretative programming and special events help foster an appreciation, support, and understanding of district-specific topics and the Refuge System.

Visitor Services Facilities Objective

Identify locations for other visitor contact stations at the districts within 3 years of CCP approval.

- At Arrowwood Wetland Management District, remodel the office entrance to include a visitor contact station with interpretive exhibits within 10 years of CCP approval.
- At Arrowwood Wetland Management District, build two kiosks within 5 years of CCP approval: one at Bauer's Lake WPA (Foster County) and one at Wallace WPA (Eddy County).
- At Audubon Wetland Management District, design and construct an education center to house exhibits, classrooms, visitor information, and office space within 5 years of CCP approval.
- At Crosby Wetland Management District, improve the entrance road to the office within 2 years of CCP approval.
- At Devils Lake Wetland Management District, develop a visitor contact station and office at a WPA within 5 years of CCP approval.
- At Kulm Wetland Management District, develop a visitor contact station and office at Patzer WPA within 5 years of CCP approval.
- At Lostwood Wetland Management District, improve the entrance road to the office within 2 years of CCP approval, and remodel the existing office to add a visitor contact station within 5 years of CCP approval.
- At Valley City Wetland Management District, improve and update the visitor contact station by adding exhibits and enhancing the visitor experience within 5 years of CCP approval.
- At Valley City Wetland Management District, work with the Cass County wildlife club and other partners to secure funding and help to improve the trail and build kiosks and interpretive panels at Alice WPA within 3 years of CCP approval.
- At Valley City Wetland Management District, make improvements to the Outdoor Wildlife Learning Site adjacent to the district office, including paving the trail to make it universally accessible and design and construction of interpretive facilities, within 5 years of CCP approval.
- In the eastern portion of Valley City Wetland Management District, construct a handicap-accessible blind and interpretive trail within 5 years of CCP approval.

Strategies

- Inventory all districts to determine what facilities are in place and where new or updated facilities are needed.
- Identify and locate facilities to support volunteers (for example, hook ups and amenities).

Rationale

The districts are near metropolitan areas such as Bismarck, Fargo, Grand Forks, and Minot. The districts also have numerous visitors from Canada, from the provinces of Saskatchewan and Manitoba. The districts have potential for outreach and education through establishment of new facilities and update of existing facilities.

Trapping

Trapping generally follows the regulations of the state and trappers are required to have state licenses. Trapping programs conducted for resource management reasons are conducted by district staffs, by trappers under contract, and by the public through issuance of special use permits.

Trapping programs conducted primarily to provide recreational opportunities to the public do not require a special use permit, except at WPAs. Special use permits and contracts often impose specific stipulations that may restrict trapping activities more than state regulations. These stipulations are required to ensure that trapping programs are compatible with the districts' purposes and otherwise in the public interest.

Trapping Objective

Throughout the life of the plan, provide trapping opportunities at the districts at the current level.

Strategy

- Work cooperatively with the NDGF to conduct law enforcement patrols at the districts to ensure compliance.

Rationale

Trapping is done in accordance with requirements of the Refuge Recreation Act, the Administration Act (as amended in 1997) and the NEPA. Authorized by 50 CFR, part 31.16, recreational trapping is administered by the Service.

Partnerships Goal

A diverse network of partners joins with the North Dakota wetland management districts to support research; protect, restore, and enhance habitat; and foster awareness and appreciation of the prairie landscape.

Partnerships

The nine districts reach across much of the North Dakota landscape with fee-title ownership and wetland and grassland easements. The districts have potential to affect neighbors and communities. Communication is vital through various outlets, as well as on an individual basis. Staffs participate in local events and activities that maintain and support district 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.

Strategies

- Work with partners (wildlife groups and other agencies) to continue the JAKES (Juniors Acquiring Knowledge, Ethics, and Skills) event at Valley City Wetland Management District. Maintain and where appropriate build the statewide approach to environmental education (North Dakota Education Team). If possible, increase the number of Service representatives on the team within 5 years of CCP approval.
- Maintain the partnership with Cass County Wildlife Club to maintain the Alice WPA trail at Valley City Wetland Management District.
- Maintain the partnership with Logan County Sportsman Group to maintain the boat ramp at Mundt Lake WPA at Kulm Wetland Management District.

Rationale

Many of the districts' wildlife, habitat, and visitor services programs would not continue without 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

Effectively employ staff, partnerships, and volunteers and secure adequate funding in support of the National Wildlife 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 nine districts, staffs are limited and often shared with other units such as refuges. The demand on the districts' 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 districts 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 wetland management districts and national wildlife refuges. Throughout the life of the plan, as needed, increase law enforcement staff to oversee the expanded programs and to work with NDGF. Throughout the

life of the plan, recruit volunteers to support annual events, visitor services, and biological, maintenance, and administrative programs.

Strategies

- Work with the North Dakota working group to determine strategic locations for placement of additional staff.
- Research methods for recruiting volunteers. Determine what other districts 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, interagency annual parks pass).
- Develop "friends groups" to help each district (except for Audubon and Chase Lake wetland management districts, which already have "friends groups").

Rationale

The Improvement Act identifies six wildlife-dependent recreational (priority) 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 districts. Other uses can occur but must support, or not conflict with, a wildlife-dependent recreational use. No use of a district can detract from accomplishing the purposes of the district or the mission of the System. North Dakota's districts and refuges received more than 385,000 visitors that enjoyed 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 district 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 districts 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: 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. Date 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 nine districts is a broad umbrella plan that (1) outlines general concepts and objectives for habitat, wildlife, visitor services, cultural resources, and partnerships, and (2) guides management of the districts for the next 15 years.

Step-down management plans provide detail needed to carry out specific actions authorized by the CCP. Tables 12–20 list the step-down management plans that are anticipated to be needed for each district, along with their current status and revision dates.

Table 12. Step-down Management Plans for Arrowwood Wetland Management District, North Dakota.

Plan Type	*Completion Year*	*Revision Year*
Fire management plan	2008	2013
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
Water management plan (annual)	2007	2008

Table 13. Step-down Management Plans for Audubon Wetland Management District, North Dakota.

Plan Type	*Completion Year*	*Revision Year*
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 14. Step-down Management Plans for Chase Lake Wetland Management District, North Dakota.

Plan Type	*Completion Year*	*Revision Year*
Fire management plan	2008	2013
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
Water management plan (annual)	2007	2008

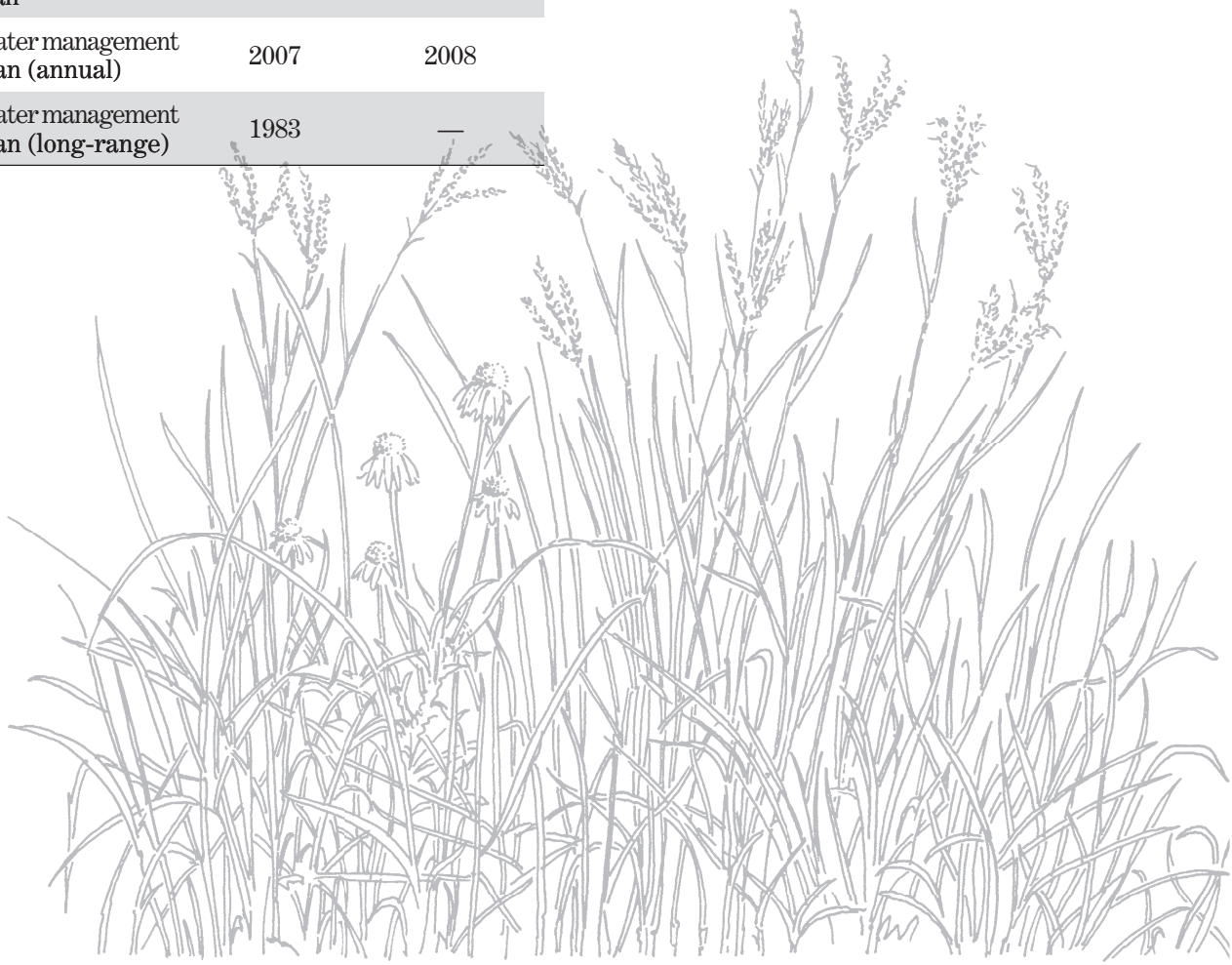

Table 15. Step-down Management Plans for Crosby Wetland Management District, North Dakota.

Plan Type	*Completion Year*	*Revision Year*
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	—

Table 16. Step-down Management Plans for Devils Lake Wetland Management District, North Dakota.

Plan Type	*Completion Year*	*Revision Year*
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 17. Step-down Management Plans for J. Clark Salyer Wetland Management District, North Dakota.

Plan Type	*Completion Year*	*Revision Year*
Fire management plan	1999	2008
Grassland management plan	—	2011
Habitat work plan (annual)	2007	2008
IPM plan	2005	2010
Law enforcement plan	—	2013
Predator management plan	2004	2011
Safety plan	2006	2011
Water management plan (annual)	2007	2008

Table 18. Step-down Management Plans for Kulm Wetland Management District, North Dakota.

Plan Type	*Completion Year*	*Revision Year*
Fire management plan	2000	2008
Grassland management plan	—	2011
Habitat work plan (annual)	2007	2008
IPM plan	2004	2011
Law enforcement plan	—	2013
Predator management plan	2004	2010
Safety plan	2001	2008
Water management plan (annual)	2007	2008

Table 19. Step-down Management Plans for Lostwood Wetland Management District, North Dakota.

Plan Type	*Completion Year*	*Revision Year*
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	2011
Water management plan (annual)	2007	2008

Table 20. Step-down Management Plans for Valley City Wetland Management District, North Dakota.

Plan Type	*Completion Year*	*Revision Year*
Fire management plan	2001	2008
Grassland management plan	—	2011
Habitat work plan (annual)	2005	2008
IPM plan	2005	2010
Law enforcement plan	—	2013
Predator management plan	2004	2010
Safety plan	2006	2011
Water management plan (annual)	2007	2008

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 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 16, the adaptive management process).

To apply adaptive management, specific survey, inventory, and monitoring protocols would be adopted for each of the nine wetland management districts. 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 Service would revise the CCP.

6.7 Plan Amendment and Revision

The Service will annually review the final CCP to determine the need for revision. A revision will occur 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 wetland management districts' 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.

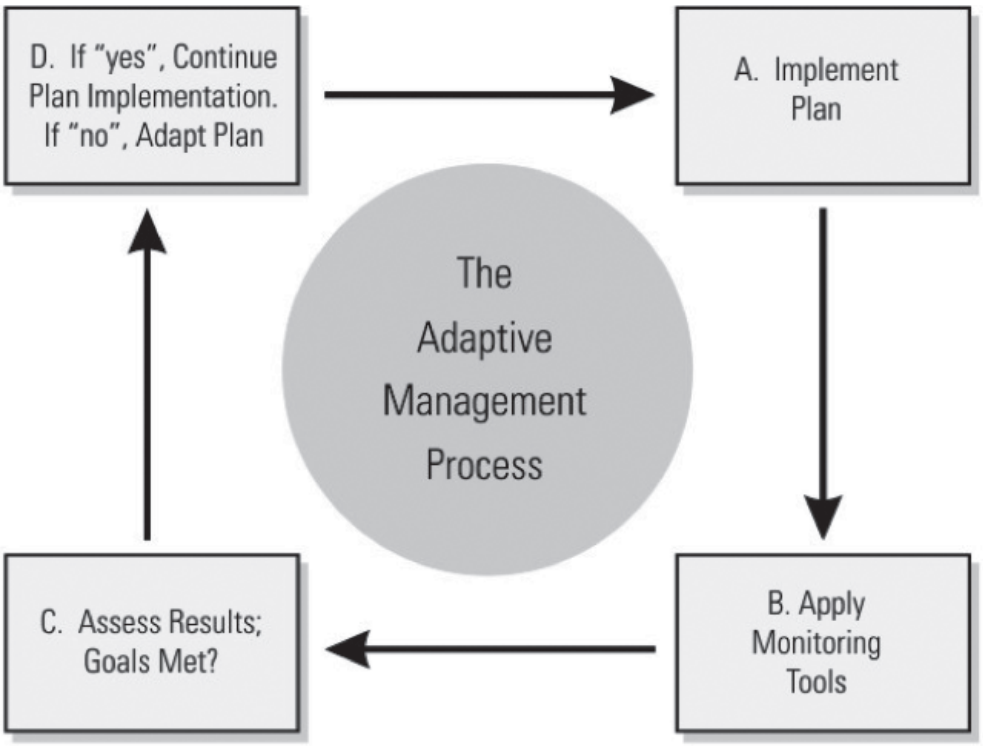

Figure 16. The adaptive management process.

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.

buffer zone, *also* **buffer strip**—Protective land borders around critical habitats or water bodies that reduce runoff and nonpoint source pollution loading; areas created or sustained to lessen the negative effects of land development on animals and plants and their habitats.

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.

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."

conspecific—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.

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*.

district purpose—See *purpose of the 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.

fluvial—Regarding flowing water, usually rivers and streams. Important fluvial processes include erosion, downcutting of channels, and suspension and transport of sediments.

FmHA—Farmers Home Administration.

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.

lek—A physical area where males of a certain animal species gather to demonstrate their prowess and compete for females before or during the mating season.

local agencies—Municipal governments, regional planning commissions, or conservation groups.

macrophyte—Plant, especially a marine plant, that is large enough to be visible to the naked eye.

management alternatives—See *alternatives.*

management plan—Plan that guides future land management practices on a tract of land. See *cooperative agreement*.

mechanical control—Reduction in numbers or elimination of unwanted species through the use of mechanical equipment such as mowers and clippers.

microhabitat—Habitat features at a fine scale; often identifies a unique set of local habitat features.

migration—Regular extensive, seasonal movements of birds between their breeding regions and their wintering regions; to pass usually periodically from one region or climate to another for feeding or breeding.

migratory bird—Bird species that follow a seasonal movement from their breeding grounds to their wintering grounds. Waterfowl, shorebirds, raptors, and songbirds are all migratory birds.

migratory game bird—Bird species, regulated under the Migratory Bird Treaty Act and state laws (legally hunted, including ducks, geese, woodcock, and rails).

mission—Succinct statement of purpose or reason for being.

mitigation—Measure designed to counteract an environmental impact or to make an impact less severe.

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

monitoring—Process of collecting information to track changes of selected parameters over time.

monotypic—Having only one type or representative.

moraine—Mass of earth and rock debris carried by an advancing glacier and left at its front and side edges as it retreats.

NABCI—North American Bird Conservation Initiative.

national wildlife refuge—Designated area of land, water, or an interest in land or water within the Refuge System, but does not include coordination areas; a complete listing of all units of the Refuge System is in the current "Annual Report of Lands Under Control of the U.S. Fish and Wildlife Service."

National Wildlife Refuge System (Refuge System)—Various categories of areas administered by the Secretary of the Interior for the conservation of fish and wildlife including species threatened with extinction, all lands, waters, and interests therein administered by the Secretary as wildlife refuges, areas for the protection and conservation of fish and wildlife that are threatened with extinction, wildlife ranges, game ranges, wildlife management areas, and waterfowl production areas.

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

native species—Species that, other than as a result of an introduction, historically occurred or currently occurs in that ecosystem.

NAWCA—North American Wetlands Conservation Act.

NDGF—North Dakota Game and Fish Department.

Neotropical migrant, *also* **Neotropical migratory bird**—Bird species that breeds north of the United States–Mexico border and winters primarily south of this border.

NEPA—National Environmental Policy Act.

nest success—Percentage of nests that successfully hatch one or more eggs of the total number of nests started in an area.

NHPA—National Historic Preservation Act.

nongovernmental organization—Any group that does not include federal, state, tribal, county, city, town, local, or other governmental entities.

North American Waterfowl Management Plan—North American Waterfowl Management Plan, signed in 1986, recognizes that the recovery and perpetuation of waterfowl populations depends on restoring wetlands and associated ecosystems throughout the United States and Canada. It established cooperative international efforts and joint ventures comprised of individuals; corporations; conservation organizations; and local, state, provincial, and federal agencies drawn together by common conservation objectives.

notice of intent—Notice that an environmental impact statement will be prepared and considered (40 CFR 1508.22); published in the *Federal Register*.

noxious weed, *also* **invasive plant**—Any living stage (including seeds and reproductive parts) of a parasitic or other plant of a kind that is of foreign origin (new to or not widely prevalent in the U.S.) and can directly or indirectly injure crops, other useful plants,

livestock, poultry, other interests of agriculture, including irrigation, navigation, fish and wildlife resources, or public health. According to the Federal Noxious Weed Act (PL 93-639), a noxious weed (invasive plant) is one that causes disease or has adverse effects on humans or the human environment and, therefore, is detrimental to the agriculture and commerce of the United States and to public health.

NRCS—Natural Resources Conservation Service; agency of the U.S. Department of Agriculture.

objective—Concise statement of what is to be achieved, when and where it is to be achieved, and who is responsible for the work. Objectives are derived from goals and provide the basis for determining management strategies. Objectives should be attainable, time-specific, and measurable.

palustrine—Refers to a nontidal wetland dominated by trees, shrubs, persistent emergents, and emergent mosses or lichens; or a wetland in tidal areas where salinity due to ocean-derived salts is below 0.5 parts per thousand.

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 district—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 district or district subunit ("Draft U.S. Fish and Wildlife Service Manual" 602 FW 1.5).

RAPP—Refuge Annual Performance Plan.

Reclamation—Bureau of Reclamation; agency of the U.S. Department of the Interior.

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 System—See *National Wildlife Refuge System.*

region 6—Mountain-Prairie Region of the U.S. Fish and Wildlife Service, which administers Service programs in Colorado, Kansas, Montana, Nebraska, North Dakota, South Dakota, Wyoming, and Utah.

rest—Free from biological, mechanical, or chemical manipulation, in reference to refuge lands.

restoration—Artificial manipulation of a habitat to restore it to something close to its natural state. Involves taking a degraded grassland and reestablishing habitat for native plants and animals. Restoration usually involves the planting of native grasses and forbs, and may include shrub removal and the use of prescribed fire.

rhizomatous—A plant having rhizomes.

rhizome—A continuously growing, horizontal, underground stem that produces roots and sends shoots upward at intervals (for example, many iris species).

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

RLGIS—Refuge lands geographic information system.

"roundouts"—Odd shapes in boundaries of Refuge System lands that are "straightened" by the purchase of land tracts.

runoff—Water from rain, melted snow, or agricultural or landscape irrigation that flows over the land surface into a waterbody.

sandhills—Sand dunes created by wind and wave action following the melting of large glaciers about 8,000–10,000 years ago. Soils are sand and silt. Local relief exceeds 80 feet in some places.

scoping—Process of obtaining information from the public for input into the planning process.

sediment—Material deposited by water, wind, and glaciers.

Service—See *U.S. Fish and Wildlife Service.*

Service Asset Maintenance Management System—National database that contains the unfunded maintenance needs of each refuge; projects include those required to maintain existing equipment and buildings, correct safety deficiencies for the implementation of approved plans, and meet goals, objectives, and legal mandates.

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

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

sound professional judgment—Finding, determination, or decision that is consistent with principles of sound fish and wildlife management and administration, available science and resources, and adherence to the requirements of the National Wildlife Refuge System Administration Act and other applicable laws.

spatial—Relating to, occupying, or having the character of space.

special status species—Plants or animals that have been identified through federal law, state law, or agency policy as requiring special protection of monitoring. Examples include federally listed endangered, threatened, proposed, or candidate species; state-listed endangered, threatened, candidate, or monitor species; the Service's species of management concern; and species identified by the Partners in Flight program as being of extreme or moderately high conservation concern.

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

species of concern—Those plant and animal species, while not falling under the definition of special status species, that are of management interest by virtue of being federal trust species such as migratory birds, important game species, or significant keystone species; species that have documented or apparent populations 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.

temporarily flooded—Surface water is present for brief periods during the growing season.

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.

WDA—Wildlife development area.

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 untrammeled 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 "untrammeled" 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.

WPA—Waterfowl production area.

WUI—Wildland–urban interface.

Appendix A

Key Legislation and Policies

Administration of units of the National Wildlife Refuge System is governed by (1) bills passed by the U.S. Congress and signed into law by the president of the United States, and (2) by regulations developed by the various branches of the government. Following are brief descriptions of some of the most pertinent laws and statutes establishing legal parameters and policy direction for the Refuge System.

In alphabetical order of the name of the act, order, or regulation.

Americans with Disabilities Act (1992): Prohibits discrimination in public accommodations and services.

Antiquities Act (June 8, 1906; 16 USC 431–3; 34 Stat. 225): Authorizes the president to designate as national monuments objects or areas of historic or scientific interest on lands owned or controlled by the United States. Requires that a permit be obtained for examination of ruins, excavation of archaeological sites, and the gathering of objects of antiquity on lands under the jurisdiction of the Secretaries of Interior, Agriculture, and Army, and provided penalties for violations.

Archaeological Resources Protection Act (Public Law [PL] 96-95; October 31, 1979; 16 USC 470aa–II; 93 Stat. 721): Largely supplants the resource protection provisions of the Antiquities Act for archaeological items. Establishes detailed requirements for issuance of permits for any excavation for or removal of archaeological resources from federal or Indian lands. Establishes civil and criminal penalties for the unauthorized excavation, removal, or damage of any such resources; for any trafficking in such resources removed from federal or Indian land in violation of any provision of federal law; and for interstate and foreign commerce in such resources acquired, transported, or received in violation of any state or local law. In addition, PL 100-588 (November 3, 1988; 102 Stat. 2983) lowers the threshold value of artifacts triggering the felony provisions of the act from $5,000 to $500, makes attempting to commit an action prohibited by the act a violation, and requires the land managing agencies to establish public awareness programs regarding the value of archaeological resources to the nation.

Architectural Barriers Act (1968): Requires federally owned, leased, or funded buildings and facilities to be accessible to persons with disabilities.

Archeological and Historic Preservation Act (PL 86-523; June 27, 1960; 16 USC 469–469c; 74 Stat. 220 [as amended by PL 93-291; May 24, 1974; 88 Stat. 174]): Carries out the policy established by the Historic Sites Act; directs federal agencies to notify the Secretary of the Interior whenever they find a federal or federally assisted, licensed, or permitted project may cause loss or destruction of significant scientific, prehistoric, or archaeological data. Authorizes use of appropriated, donated, and transferred money for the recovery, protection, and preservation of such data.

Clean Water Act (1977): Requires consultation with the U.S. Army Corps of Engineers for major wetland modifications.

Criminal Code of Provisions of 1940 (as amended, 18 USC 41): States the intent of Congress to protect all wildlife within federal sanctuaries, refuges, fish hatcheries, and breeding grounds. Provides that anyone (except in compliance with rules and regulations promulgated by authority of law) who hunts, traps, or willfully disturbs any such wildlife, or willfully injures, molests, or destroys any property of the United States on such land or water, shall be fined up to $500 or imprisoned for not more than 6 months or both.

Emergency Wetland Resources Act of 1986: Authorizes the buy of wetlands from Land and Water Conservation Fund monies, removing a prior prohibition on such acquisitions. Requires the Secretary to establish a national wetlands priority conservation plan, requires the states to include wetlands in their comprehensive outdoor recreation plans, and transfers to the Migratory Bird Conservation Fund amount equal to import duties on arms and ammunition.

Endangered Species Act of 1973 and recent amendments (16 USC 1531–43, 87 Stat. 884; as amended): Provides for conservation of threatened and endangered species of fish, wildlife, and plants by federal action and by encouraging state programs. Specific provisions include the listing and determination of critical habitat for endangered and threatened species and consultation with the

Service on any federally funded or licensed project that could affect any of these agencies; prohibition of unauthorized taking, possession, sale, transport, etc., of endangered species; an expanded program of habitat acquisition; establishment of cooperative agreements and grants-in-aid to states that establish and maintain an active, adequate program for endangered and threatened species; assessment of civil and criminal penalties for violating the act or regulations.

Environmental Education Act of 1990 (PL 101-619; November 16, 1990; 20 USC 5501–10; 104 Stat. 3325): Establishes the Office of Environmental Education within the Environmental Protection Agency to develop and administer a federal environmental education program. Responsibilities of the office include developing and supporting programs to improve understanding of the natural and developed environment and the relationships between humans and their environment; supporting the dissemination of educational materials; developing and supporting training programs and environmental education seminars; managing a federal grant program; and administering an environmental internship and fellowship program. Requires the office to develop and support environmental programs in consultation with other federal natural resource management agencies including the Service.

EO 11644—Use of Off-road Vehicles on Public Lands (1972): Provides policy and procedures for regulating off-road vehicles.

EO 11988—Floodplain Management (May 24, 1977): Prevents federal agencies from contributing to the "adverse impacts associated with occupancy and modification of floodplains" and the "direct or indirect support of floodplain development." In the course of fulfilling their respective authorities, federal agencies "shall take action to reduce the risk of flood loss, to minimize the impact of floods on human safety, health, and welfare, and to restore and preserve the natural and beneficial values served by floodplains."

EO 11990—Protection of Wetlands.

EO 12996—Management and General Public Use of the National Wildlife Refuge System (1996): Defines the mission, purpose, and priority public uses of the Refuge System; presents four principles to guide management of the system.

EO 13007—Indian Sacred Sites (1996): Directs federal land management agencies to accommodate access to and ceremonial use of Indian sacred sites by Indian religious practitioners, avoid adversely affecting the physical integrity of such sacred sites, and where appropriate, maintain the confidentiality of sacred sites.

Federal Noxious Weed Act (1990): Requires the use of integrated management systems to control or contain undesirable plant species, and an interdisciplinary approach with the cooperation of other federal and state agencies.

Federal Records Act (1950): Requires the preservation of evidence of the government's organization, functions, policies, decisions, operations, and activities, as well as basic historical and other information.

Federal Water Pollution Control Act of 1972, Section 401 (PL 92-500, USC 1411, 86 Stat. 816.33): Requires any applicant for a federal license or permit to conduct any activity that may result in a discharge into navigable waters to obtain a certification from the state in which the discharge originates or will originate, or, if appropriate, from the interstate water pollution control agency having jurisdiction over navigable waters at the point where the discharge originates or will originate, that the discharge will comply with applicable effluent limitations and water quality standards. Requires that a certification obtained for construction of any facility must also pertain to subsequent operation of the facility.

Federal Water Pollution Control Act of 1972, Section 404 (PL 92-500, 86 Stat. 816): Authorizes the Secretary of the Army, acting through the Chief of Engineers, to issue permits, after notice and opportunity for public hearing, for discharge of dredged or fill material into navigable waters of the United States, including wetlands, at specified disposal sites. Requires that selection of disposal sites be in accordance with guidelines developed by the Administrator of the Environmental Protection Agency in conjunction with the Secretary of the Army. States that the Administrator can prohibit or restrict use of any defined area as a disposal site whenever she/he determines, after notice and opportunity for public hearings, that discharge of such materials into such areas will have an unacceptable adverse effect on municipal water supplies, shellfish beds, fishery areas, wildlife, or recreational areas.

Fish and Wildlife Act of 1956 (16 USC 742a–742j, 70 Stat. 1119; as amended): Establishes a comprehensive fish and wildlife policy and directs the Secretary of the Interior to provide continuing research and extension and conservation of fish and wildlife resources.

Fish and Wildlife Conservation Act of 1980 (PL 96366; September 29, 1980; 16 USC 2901–11; as amended 1986, 1988, 1990, and 1992): Creates a mechanism for federal matching funding of the development of state conservation plans for nongame fish and wildlife. States that subsequent amendments to this law require that the Secretary monitor and assess migratory nongame birds, determine the effects of environmental changes and human activities, identify birds likely to be candidates for endangered species listing, and identify conservation actions that would prevent this from being necessary. In 1989, Congress

also directed the Secretary to identify lands and waters in the Western Hemisphere, the protection, management, or acquisition of which would foster conservation of migratory nongame birds. All of these activities are intended to assist the Secretary in fulfilling the Secretary's responsibilities under the Migratory Bird Treaty Act and the Migratory Bird Conservation Act, and provisions of the Endangered Species Act implementing the Convention on Nature Protection and Wildlife Preservation in the Western Hemisphere.

Fish and Wildlife Coordination Act (1958): Allows the U.S. Fish and Wildlife Service to enter into agreements with private landowners for wildlife management purposes.

Fish and Wildlife Improvement Act of 1978: Improves the administration of fish and wildlife programs and amends several earlier laws including the Refuge Recreation Act, the National Wildlife Refuge System Administration Act, and the Fish and Wildlife Act of 1956. Authorizes the Secretary to accept gifts and bequests of real and personal property on behalf of the United States. Authorizes the use of volunteers for Service projects and appropriations to carry out volunteer programs.

Historic Sites, Buildings and Antiquities Act (August 21, 1935; 16 USC 461–2, 464–7; 49 Stat. 666; known as the "Historic Sites Act" [as amended by PL 89-249; October 9, 1965; 79 Stat. 971]): Declares it a national policy to preserve historic sites and objects of national significance, including those located at refuges and districts. Provides procedures for designation, acquisition, administration, and protection of such sites. Provides for designation of National Historic and Natural Landmarks.

Land and Water Conservation Fund Act of 1965: Provides money from leasing bonuses, production royalties, and rental revenues for offshore oil, gas, and sulphur extraction to the Bureau of Land Management, the USDA Forest Service, the U.S. Fish and Wildlife Service, and state and local agencies for purchase of lands for parks, open space, and outdoor recreation.

Migratory Bird Conservation Act of 1929 (16 USC 715–715d, 715e, 715f–r): Establishes the Migratory Bird Conservation Commission, which consists of the Secretaries of the Interior (chair), Agriculture, and Transportation; two members from the House of Representatives; and an ex-officio member from the state in which a project is located. States that the commission approves acquisition of land and water, or interests therein, and sets the priorities for acquisition of lands by the Secretary of the Interior for sanctuaries or for other management purposes. Requires that, to acquire lands or interests therein, the state concerned must consent to such acquisition by legislation. Such legislation has been enacted by most states.

Migratory Bird Conservation Act of 1929 (16 USC 715s, 45 Stat. 1222, as amended): Authorizes acquisition, development, and maintenance of migratory bird refuges; cooperation with other agencies in conservation; and investigations and publications on North American birds. Authorizes payment of 25% of net receipts from administration of national wildlife refuges to the country or counties in which such refuges are located.

Migratory Bird Hunting and Conservation Stamp Act of 1934 (March 16, 1934; 16 USC 718–718h; 48 Stat. 51; known as The "Duck Stamp Act"; as amended): Requires each waterfowl hunter 16 years of age or older to possess a valid federal hunting stamp. Authorizes the requirement of an annual stamp for the hunting of waterfowl; proceeds go toward the purchase of habitat for waterfowl and other wildlife. Duck stamps are also bought (1) for entry into some refuges, (2) by conservationists, and (3) for stamp collections. Receipts from the sale of the stamp are deposited in a special Treasury account known as the Migratory Bird Conservation Fund and are not subject to appropriations.

Migratory Bird Treaty Act of 1918 (16 USC 703–11; 50 CFR, subchapter B; as amended): Implements treaties with Great Britain (for Canada) and Mexico for protection of migratory birds whose welfare is a federal responsibility. Provides for regulations to control taking, possession, selling, transporting, and importing of migratory birds and provides penalties for violations. Enables the setting of seasons and other regulations (including the closing of areas, federal or nonfederal) related to the hunting of migratory birds.

National and Community Service Act of 1990 (PL 101-610; November 16, 1990; 42 USC 12401; 104 Stat. 3127): Authorizes several programs to engage citizens of the United States in full and part-time projects designed to combat illiteracy and poverty, provide job skills, enhance educational skills, and fulfill environmental needs. Provides for grants to states for the creation of programs for citizens over 17 years of age. Programs must be designed to fill unmet educational, human, environmental, and public safety needs. Initially, participants will receive postemployment benefits of up to $1,000 per year for part-time participants and $2,500 for full-time participants.

Several provisions are of particular interest to the Service:

> *American Conservation and Youth Service Corps:* As a federal grant program established under subtitle C of the law, the corps offers an opportunity for young adults between the ages of 16 and 25, or in the case of summer programs, between 15 and 21, to engage in approved human and natural resources projects that benefit the public or are carried out on federal or Indian lands. To be eligible

for assistance, natural resources programs will focus on improvement of wildlife habitat and recreational areas, fish culture, fishery assistance, erosion, wetlands protection, pollution control, and similar projects. A stipend of not more than 100% of the poverty level will be paid to participants. A commission established to administer the Youth Service Corps will make grants to states, the Secretaries of Agriculture and Interior, and the Director of ACTION to carry out these responsibilities.

Thousand Points of Light: Creates a nonprofit Points of Light Foundation to administer programs to encourage citizens and institutions to volunteer to solve critical social issues, discover new leaders, and develop institutions committed to serving others.

National Environmental Policy Act of 1969 (PL 91-190; January 1, 1970; 42 USC 4321–47; 83 Stat. 852 [as amended by PL 94-52; July 3, 1975; 89 Stat. 258] [as amended by PL 94-83; August 9, 1975; 89 Stat. 424]): Requires all agencies, including the Service, to examine the environmental impacts of their actions, incorporate environmental information, and use public participation in the planning and the implementation of all actions, federal agencies must integrate the act with other planning requirements, and to prepare appropriate documents to facilitate better environmental decision making (40 CFR 1500). Declares national policy to encourage a productive and enjoyable harmony between humans and their environment.

Section 102 of that act directs that "to the fullest extent possible the policies, regulations, and public laws of the United States shall be interpreted and administered in accordance with the policies set forth in this act, and all agencies of the Federal Government shall ... insure that presently unquantified environmental amenities and values may be given appropriate consideration in decision making along with economic technical considerations."

Section 102(2)c of 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, ¾ 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, ¾ of 1% of fair market value or 25% of net receipts, whichever is greatest, whereas the old law provided a payment of ¾ 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[l–4]–[l–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 nine North Dakota wetland management districts. Many others contributed insight and support.

Planning Team

The planning team comprises the project leaders for the Refuge System units that administer the districts, a biology subteam, a visitor services subteam, and extended team members.

Refuge System Project Leaders

Team Member	*Position*	*Work Unit*
Michael Erickson	Project leader	Kulm Wetland Management District
David Gillund	Project leader	Lostwood Wetland Management District Complex
Tedd Gutzke	Project leader (retired)	J. Clark Salyer National Wildlife Refuge Complex
Kim Hanson	Project leader	Arrowwood National Wildlife Refuge Complex
Kelly Hogan	Project leader	J. Clark Salyer National Wildlife Refuge Complex
Roger Hollevoet	Project leader	Devil's Lake Wetland Management District Complex
Lloyd Jones	Project leader	Audubon National Wildlife Refuge Complex

Biology Subteam

Team Member	*Position*	*Work Unit*
Dave Azure	Deputy project leader	Arrowwood National Wildlife Refuge Complex
Dave Bolin	Wetland management district manager	J. Clark Salyer National Wildlife Refuge Complex
Cami Dixon	Wildlife biologist	Devil's Lake Wetland Management District Complex
Mike Goos	Wetland management district manager	Audubon National Wildlife Refuge Complex

Team Member	*Position*	*Work Unit*
Tim Kessler	Wetland management district manager	Crosby Wetland Management District
Paulette Scherr	Wildlife biologist	Arrowwood National Wildlife Refuge Complex
Richard Schroeder	Wildlife biologist	USGS, Fort Collins, CO

Visitor Services Subteam

Team Member	*Position*	*Work Unit*
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 National Wildlife Refuge

Extended Team Members

Team Member	*Position*	*Work Unit*
Jim Alfonso	Deputy project leader	Devil's Lake Wetland Management District Complex
Mike Artmann	Wildlife biologist and GIS specialist	USFWS, regional office, Lakewood, CO
Natoma Buskness	District manager	Chase Lake National Wildlife Refuge
Gary Eslinger	Biological technician	J. Clark Salyer National Wildlife Refuge Complex
John Esperance	Planning team leader	USFWS, regional office, Lakewood, CO
Mike Estey	Wildlife biologist and GIS specialist	HAPET, Bismarck, ND
Paul Halko	Refuge manager	Devil's Lake Wetland Management District (south unit)
Randy Kreil	Division chief	NDGF

Team Member	*Position*	*Work Unit*
Greg Link	Assistant chief	NDGF
Chuck Loesch	Wildlife biologist and GIS specialist	HAPET, Bismarck, ND
Edward Meendering	Wetland management district manager	Valley City Wetland Management District
Neil Niemuth	Wildlife biologist and GIS specialist	HAPET, Bismarck, ND
Ron Reynolds	Project leader	HAPET, Bismarck, ND
Neil Shook	Refuge manager	Devil's Lake Wetland Management District (north unit)
Kurt Tompkins	Refuge manager	Kelly's Slough National Wildlife Refuge
Brain Vose	Refuge manager	Lake Alice National Wildlife Refuge
Stu Wacker	Realty field supervisor (retired)	Wetland acquisition office, Bismarck, ND
Stacy Whipp	Refuge operations specialist	Valley City Wetland Management District
Gary Williams	Deputy project leader	Audubon National Wildlife Refuge Complex
Kevin Willis	State coordinator	Partners for Fish and Wildlife

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.

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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

Team Member	*Position*	*Work Unit*
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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 nine North Dakota wetland management districts 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 districts 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 district 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

District Names

Arrowwood Wetland Management District
Audubon Wetland Management District
Chase Lake Wetland Management District
Crosby Wetland Management District
Devil's Lake Wetland Management District
J. Clark Salyer Wetland Management District
Kulm Wetland Management District
Lostwood Wetland Management District
Valley City Wetland Management District

Establishing and Acquisition Authorities

- Migratory Bird Hunting and Conservation Stamp Act (16 USC 718[c])
- Migratory Bird Conservation Act 16 USC 715d(2)
- Migratory Bird Conservation Act 16 USC 715i(a)

Purposes

"Small areas, to be designated as 'Waterfowl Production Areas' may be acquired without regard to the limitations and requirements of the Migratory Bird Conservation Act, but all of the provisions of such Act which govern the administration and protection of lands acquired thereunder, except the inviolate sanctuary provisions of such Act, shall be applicable to areas acquired pursuant to this subsection."

Migratory Bird Hunting and Conservation Stamp Act (16 USC 718[c])

"For use as an inviolate sanctuary, or for any other management purpose, for migratory birds."

Migratory Bird Conservation Act 16 USC 715d(2)

"Areas of lands, waters, or interests therein acquired or reserved pursuant to this subchapter shall … be administered … to conserve and protect migratory birds in accordance with treaty obligations with Mexico, Canada, Japan and the Union of Soviet Socialist Republics, and other species of wildlife found thereon, including species that are listed … as endangered or threatened species, and to restore and develop adequate wildlife habitat."

Migratory Bird Conservation Act 16 USC 715i(a)

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

All WPAs are open to recreational hunting in accordance with the Migratory Bird Hunting and Conservation Stamp Act. The Service would continue to provide recreational hunting and expand programs at WPAs where programs can be provided in a compatible manner. The Service would allow continued recreational hunting of waterfowl, deer, ring-necked pheasant, sharp-tailed grouse, and other approved state game species according to state regulations.

Availability of Resources

Sufficient resources are available to carry out the recreational hunting program.

Anticipated Impacts of Use

Some wildlife disturbance would occur during recreational hunting activities. There would be no negative effects on cultural resources or threatened or endangered species.

Determination

Recreational hunting is compatible.

Stipulations Necessary to Ensure Compatibility

- Continue to provide the hunting programs at WPAs as prescribed by legislation.
- Require the use of nontoxic shot, in accordance with current hunting regulations for migratory birds and upland game.

- Prohibit vehicle access beyond approved access roads, trails, and parking lots.
- Prohibit camping, overnight use, and fires.
- Require that hunting be in accordance with federal and state regulations.
- Promote sound hunting practices for hunter safety and quality experiences.
- Annually review recreational hunting activities to ensure these activities are compatible.

Justification

The Improvement Act identifies hunting on Refuge System lands as a wildlife-dependent recreational (priority) use. Additionally, 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 within the nine wetland management districts in this draft CCP would not interfere with the habitat goals and objectives or purposes for the districts.

Mandatory 15-year Reevaluation Date: 2023

Description of Use:
Recreational Fishing

All WPAs are open to recreational fishing in accordance with the Migratory Bird Hunting and Conservation Stamp Act. The Service would continue to provide recreational fishing at designated fishing areas in accordance with state regulations. Fishing within districts is available summer and winter. Permanent lakes on district WPA lands offer fishing for northern pike, perch, walleye, and a few other species.

Availability of Resources

Sufficient resources are available to carry out the current recreational fishing program. The CCP does not call for the implementation of any new fishing programs.

Anticipated Impacts of Use

Fishing and other human activities may cause disturbance to wildlife. There would be no negative effects on cultural resources or threatened or endangered species.

Determination

Recreational fishing is compatible.

Stipulations Necessary to Ensure Compatibility

- Require that fishing follow state and federal regulations.
- Monitor existing use to ensure that facilities are adequate and disturbance to wildlife continues to be minimal.

Justification

The Improvement Act identifies fishing on Refuge System lands as a wildlife-dependent recreational (priority) use. Based on the biological impacts anticipated above and in the EA, it is determined that recreational fishing within the nine wetland management districts in this draft CCP would not interfere with the habitat goals and objectives or purposes for the districts.

Mandatory 15-year Reevaluation Date: 2023

Description of Use:
Wildlife Observation and Photography

All WPAs are open to wildlife observation and photography in accordance with the Migratory Bird Hunting and Conservation Stamp Act. The Service would provide opportunities that support these wildlife-dependent recreational uses.

The draft CCP proposes to continue the above uses and add the following to improve wildlife observation and photography:

- Provide the public with wildlife observation and photography opportunities at the districts by identification of open observation areas to the public through signage, publications, and maps.
- Provide the public with birding opportunities through identification of birding drives and promotion of WPAs as stops. Provide support materials to guide visitors through the state and direct them to key birding spots.
- Develop and construct a district map with a clear plastic overlay for each visitor center or contact station where visitors can record their bird observations.
- Construct a computer kiosk where visitors can access birding information (for example, bird songs from a product such as “Thayer Birding Software”).

Availability of Resources

Existing programs such as current WPA and district signs and brochures can be updated with available resources. Construction of new facilities described in the draft CCP is closely tied to funding requests (projects through the Refuge Operating Needs System and Service Asset Maintenance Management System).

Anticipated Impacts of Use

Minimal disturbances to wildlife and wildlife 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 some minor damage to vegetation, littering, and increased maintenance. There would be no negative effects on cultural resources or threatened or endangered species.

Determination

Wildlife observation and photography are compatible.

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.
- Develop trails and viewing areas that have minimal impact on wildlife and their habitats.
- Annually review wildlife observation and photography activities to ensure these activities are compatible.

Justification

Based on the biological impacts addressed above and in the EA, it is determined that wildlife observation and photography at the nine wetland management districts within this draft CCP would not interfere with the habitat goals and objectives or purposes for the districts.

Wildlife observation and photography are priority public uses listed in the Improvement Act. By facilitating 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 districts and the mission of the Refuge System.

Mandatory 15-year Reevaluation Date: 2023

Description of Use:
Environmental Education and Interpretation

All WPAs are open to environmental education and interpretation in accordance with the Migratory Bird Hunting and Conservation Stamp Act. The Service would provide opportunities for environmental education and interpretation. Environmental education consists of activities conducted by district staffs, volunteers, and teachers. Interpretation occurs in less formal activities with district staffs, volunteers, or through exhibits, educational "trunks," signs, programs, and brochures. Currently, environmental education and interpretation activities are conducted at district offices and various off-site WPA locations where activities and programs are presented.

The proximity of the districts to North Dakota's major population base provides potential to substantially expand environmental education and interpretation programs at individual districts. The draft CCP proposes to continue with current uses, as well as with the identified additional staff, to improve environmental education and interpretation for all visitors.

The following are facility and program improvements described in the draft CCP:

- Install boundary signs at WPAs.
- Identify key WPAs within the districts that could support visitor use information and construct signage and information kiosks at these areas.
- At Arrowwood National Wildlife Refuge Complex (includes the district), remodel the office entrance to include a visitor contact station with interpretive exhibits.
- At Arrowwood Wetland Management District, build two kiosks: one at Bauer's Lake WPA (Foster County) and one at Wallace WPA (Eddy County).
- At Audubon National Wildlife Refuge Complex (includes the district), construct an education center to house exhibits, classrooms, visitor information, and office space.
- At Crosby Wetland Management District, improve the entrance road to the office.
- At Devils Lake Wetland Management District, develop a visitor contact station and office at a WPA.
- At Kulm Wetland Management District, construct a visitor contact station and office at Patzer WPA.
- At Lostwood Wetland Management District, improve the entrance road to the office and remodel the existing office to add a visitor contact station.
- At Valley City Wetland Management District, improve and update the visitor contact station by adding exhibits to enhance the visitor experience.
- At Valley City Wetland Management District, construct and improve the trail system and build kiosks and interpretive panels at Alice WPA.
- At Valley City Wetland Management District, make improvements to the Outdoor Wildlife Learning Site adjacent to the district office, including paving the trail to make it universally

accessible and design and construction of interpretive facilities.

- In the eastern portion of Valley City Wetland Management District, construct a handicap-accessible blind and interpretive trail.
- Construct additional interpretive panels for trails and parking lots.

Availability of Resources

Existing programs such as district signs and brochures can be updated with available resources. Construction of new facilities and upgrade of existing facilities described in the draft CCP are closely tied to funding requests (projects through the Refuge Operating Needs System and Service Asset Maintenance Management System).

Anticipated Impacts of Use

Minimal disturbances to wildlife and wildlife 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 some minor damage to vegetation, littering, and increased maintenance. There would be no negative effects on cultural resources or threatened or endangered species.

Determination

Environmental education and interpretation are compatible.

Stipulations Necessary to Ensure Compatibility

- Allow environmental education and interpretation only in designated areas or under the guidance of district staffs, volunteers, or trained teachers to ensure minimal disturbance to wildlife, minimal damage to vegetation, and minimal conflicts between groups.
- Prohibit vehicle access beyond parking lots.
- Develop trails and viewing areas that have minimal impact on wildlife and their habitats.
- Annually review environmental education and interpretation activities to ensure these activities are compatible.

Justification

Based on biological impacts addressed above and in the EA, it is determined that environmental education and interpretation within the nine wetland management districts would not interfere with or detract from the districts' purposes.

Environmental education and interpretation are priority public uses listed in the National Wildlife Refuge System Improvement Act of 1997. By facilitating environmental education, district 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 districts and the mission of the Refuge System.

Mandatory 15-year Reevaluation Date: 2023

Description of Use:
Prescribed Grazing

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. During 1996–2000, the Service annually used prescribed grazing on approximately 470,000 acres of grasslands in fee title in North Dakota's WPAs.

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 WPA 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 district'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.

There would be no negative effects on cultural resources or threatened or endangered species.

To eliminate any appearance of favoritism or impropriety, managers follow “Refuge Manual” procedures for cooperator or permittee selection.

Determination

The use of grazing is compatible.

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 WPAs. 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

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 district 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 or endangered species.

Determination

Prescribed haying of grasslands is compatible.

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 WPAs. 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

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 (wetland, grassland, or FmHA). 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. Farming is done by a cooperating farmer acting under authority of a cooperative farming agreement or special use permit issued by the project leader or district manager. Terms of the agreement ensure that the farmer follows all current Service and district restrictions. North Dakota WPAs and refuges 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.

The WPAs average about 200 acres in size. Generally, farmed areas (before reseeding to more desirable plant species) would not cover more than 50% of the tract. Areas at the WPAs 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 district. 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 districts' 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 WPAs and easements. 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 or endangered species.

Determination

Cooperative farming is compatible.

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 WPAs. 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

Signatures

Kim Hanson Date
Project Leader
Arrowwood National Wildlife Refuge Complex
(Arrowwood, Chase Lake, and Valley City wetland management districts)

Lloyd Jones Date
Project Leader
Audubon Wetland Management District Complex

Roger Hollevoet Date
Project Leader
Devil's Lake Wetland Management District Complex

Kelly Hogan Date
Project Leader
J. Clark Salyer Wetland Management District Complex

Michael Erickson Date
Project Leader
Kulm Wetland Management District

David Gillund Date
Project Leader
Lostwood Wetland Management District Complex
(Crosby and Lostwood wetland management districts)

Reviewed

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

Approved

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

Appendix E

Fire Management Program for Wetland Management Districts Within the Eastern North Dakota Fire District

The Service has administrative and fire management responsibility for approximately 200,000 acres in fee title within the Arrowwood, Chase Lake, Devils Lake, Kulm, and Valley City wetland management districts, 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 districts 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 districts and refuges 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 districts and refuges 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 districts. 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 districts 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 districts. 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 WPAs and refuges) 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 five districts listed above, as well as the other districts and refuges within this fire district.

Appendix F

Fire Management Program for Wetland Management Districts Within the Western North Dakota Fire District

The Service has administrative and fire management responsibility for approximately 100,438 acres in fee title within the Audubon, Crosby, J. Clark Salyer, and Lostwood wetland management districts, which are within the Western North Dakota Fire District. This includes 374 WPAs, 9 national wildlife refuges, and 20 WDAs. 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 wetland management districts 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 districts 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 district lands covered by the CCP. The FMP may require a separate environmental assessment if district managers deem necessary. The FMP may be done as (1) an FMP that covers the wetland management districts, (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 within the districts 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. This level of application is needed at approximately 200 WPAs covering more than 45,000 acres. 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 districts 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 district 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 districts. 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 WPAs, refuges, 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 Districts

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									
pied-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			l		2													X
Swainson's hawk		1		X		X	X	X			l	l														
ferruginous hawk		1		X	X	X	X			X	l		6													X
golden eagle		2	S3		X	X																				
bald eagle		2	S1					X			l		5		6											
merlin			S2																							
American kestrel																				X						

Species	USFWS Endangered Species List	North Dakota Species of Conservation Priority	Rare North Dakota Species	Birds of Conservation Concern				Species of Management Concern in Region 6	Game Birds Below Desired Condition	USFWS Migratory Bird Management Focal Species	PPJV Implementation Plan	PIF North American Landbird Conservation Plan	PIF Physiographic Area (PA) 37 Mixed-grass Prairie Plan	PIF PA 38 West River ES (No Plan)	PIF PA 40 Tall-grass Prairie Plan	North American Waterbird Conservation Plan	Northern Prairie and Parklands Waterbird Plan	U.S. Shorebird Plan, Northern Plains/ Prairie Potholes National and Regional Priority	Breeding Bird Survey Declining Species in North Dakota (1980–2005)	Breeding Bird Survey Declining Species in "Black" Prairie (1966–2005)	Breeding Bird Survey Declining Species in Drift Prairie (1966–2005)	Breeding Bird Survey Declining Species in Glaciated Missouri Plate (1966–2005)	Breeding Bird Survey Declining Species in Great Plains Roughlands (1966–2005)	National Audubon Society Watch List for North Dakota	Birds of the Prairie Pothole Region That Warrant Attention
				BCR 11	BCR 17	Region 6	National																		
Citation Number (See end of table.*)	1	2	3	4				5			6	7	8	9	10	11	12	13	14					15	16
prairie falcon		2	S3		X	X	X	X																	
peregrine falcon	E	3	S1	X	X	X	X			X															
sharp-tailed grouse		2									l	l	4												
greater prairie-chicken		2	S2								l	l	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							X															
sandhill crane										X															
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	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		X	s		2		7			X						X	X
Bonaparte's gull																M									
Franklin's gull		1									m		3		3	M	H								X
Caspian tern										X							M								
common tern							X			X							M								
least tern	E	2	S1				X	X		X			5			H									X
black tern		1						X		X	m		4		7		H			X					X
mourning dove										X															
black-billed cuckoo		1		X	X	X	X	X		X	l		4		1				X	X			X		
short-eared owl		2		X	X	X	X			X	l	l	3												X
burrowing owl		2		X	X	X	X			X	l		6									X			X
northern saw-whet owl										X															
red-headed woodpecker		2		X		X	X			X	l	l	3		2				X	X					
yellow-bellied sapsucker										X															
northern flicker											l				4				X	X	X		X		
pileated woodpecker			S3																						
olive-sided flycatcher							X			X		l													
willow flycatcher											l	l	4												
eastern kingbird													4												
western kingbird													4												
loggerhead shrike		2		X		X	X			X	l		6		7										X
warbling vireo																									
Philadephia vireo			S3																						
Bell's vireo			S3			X	X				l	l	I											X	
American crow								X			l														
horned lark											l								X		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 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
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Citation Number (See end of table.*)	1	2	3	4				5			6	7	8	9	10	11	12	13	14					15	16
wood thrush							X			X														X	
Sprague's pipit		1	S3	X	X	X	X	X		X	1	1	1								X			X	X
chestnut-sided warbler			S3																						
ovenbird								X																	
dickcissel		2			X	X	X				1	1	3		3				X	X					
American tree sparrow											(1)	1													
clay-colored sparrow											1		4		7										X
Brewer's sparrow		3	S3		X	X	X																X		
Baird's sparrow		1		X	X	X	X	X		X	1	1	1	X					X				X	X	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			X	1		1												X
Henslow's sparrow				X			X			X		1													
Nelson's sharp-tailed sparrow		1		X		X	X				1	1	1		1									X	X
vesper sparrow											1		4		5					X			X		
lark bunting		1						X			1	1	3	X					X						X
Harris' sparrow							X				(1)	1													
white-throated sparrow			S3																						
swamp sparrow			S3																						
McCown's longspur		3	S2	X	X	X	X	X			1	1	1	X										X	X
chestnut-collared longspur		1		X	X	X	X	X		X	1	1	4	X					X		X		X		
Smith's longspur							X			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

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*Citations

1 USFWS Endangered Species List <http://ecos.fws.gov/tess_public/StateListing.do?state=ND&status=listed>

E=endangered, T=threatened

2 Comprehensive Wildlife Conservation Strategy
Table 1. North Dakota's 100 Species of Conservation Priority:
Level 1=Species having a high level of conservation priority in North Dakota or across their range, or a high rate of constituting the core of the species' breeding range, but non-"State Wildlife Grant" funding is not readily available to them.
Level 2=Species having a moderate level of conservation priority or a high level of conservation priority, but a substantial amount of non-"State Wildlife Grant" funding is available to them.
Level 3=Species having a moderate level of conservation priority, or a high level of conservation priority, but a substantial amount of non-"State Wildlife Grant" funding is available to them.

3 Rare North Dakota Species (North Dakota Natural Heritage Inventory 2002)

Natural Heritage Global Ranks:
G1=Critically imperiled. Critically imperiled globally because of extreme rarity or because of some factor of its biology making it especially vulnerable to extinction.
G2=Imperiled. Imperiled globally because of rarity or because of other factors demonstrably making it very vulnerable to extinction or elimination throughout its range.
G3=Vulnerable. Vulnerable globally either because it is very rare and local throughout its range, found only in a restricted range (even if abundant at some locations), or because of other factors making it vulnerable to extinction or elimination throughout its range.

Natural Heritage State Ranks:
S1=Critically imperiled. Critically imperiled in the state because of extreme rarity or because of some factor of its biology making it especially vulnerable to extirpation from the state.
S2=Imperiled. Imperiled in the state because of rarity or because of other factors making it very vulnerable to extirpation from the state.
S3=Vulnerable. Vulnerable in the state either because it is rare and uncommon, or found only in a restricted range (even if abundant at some locations), or because of other factors making it vulnerable to extirpation.

4 Birds of Conservation Concern USFWS 2002.

5 USFWS Species of Management Concern 2005 <http://www.fws.gov/migratorybirds/reports/speccon/tblconts.html>

6 Prairie Pothole Joint Venture 2005 Implementation Plans
Waterfowl Plan: Focal species=w
Shorebird Plan: Conservation priority of regularly occurring shorebird species where the region is highly important to the population=s
Waterbird Plan: Conservation assessment of high in BCR 11=m
Landbird Plan: Native landbird species for which ≥25% of the continental population occurs in BCR 11 and Watch List=l or (l) for wintering

7 PIF North American Landbird Conservation Plan
Part 1, Table 1. PIF Species of Continental Importance for the United States and Canada.
Part 2, Table 7. Species of Continental Importance in the Prairie Avifaunal Biome.

8 PIF Bird Conservation Plan for the Northern Mixed-grass Prairie (Physiographic Area 37)—June 25, 1999
Table 1. Partners in Flight Priority Species.

9 PIF Bird Conservation Plan for the Northern Tallgrass Prairie (Physiographic Area 40)—August 4, 1998
Table 1. Partners in Flight Priority Species.

10 PIF West River Executive Summary (Physiographic Area 38) (*no plan*)
List of priority bird populations.

11 North American Waterbird Conservation Plan, version 1
Table 2. Conservation Status and Distribution of Colonial Waterbirds

12 Northern Prairie and Parklands Waterbird Conservation Plan—2004
Table 7. Conservation Vulnerability Rankings (High [H] and Moderate [M] Concern)

13 U.S. Shorebird Plan and Northern Plains/Prairie Potholes Regional Shorebird Plan
Table 2. National and Regional Priority Score ≥ 4

14 USGS North American Breeding Bird Survey Trend Results <http://www.mbr-pwrc.usgs.gov/bbs/reglist05.html>

15 National Audubon Society Watch List for North Dakota <http://audubon2.org/webapp/watchlist/viewWatchlist.jsp>

16 Conservation Planning in the Prairie Pothole Region of the United States: Integration Between an Existing Waterfowl Plan and an Emerging Non-game Bird Model (David N. Pashley and Rick Warhurst)
Table 1. Birds of the Prairie Pothole Region That Warrant Conservation Attention

Appendix H

Primary and Secondary Bird Species of the North Dakota Prairie

The characteristic breeding birds are categorized according to relative abundance, as follows:

- Primary species that are often common or abundant.
- Secondary species that are usually fairly common.
- Tertiary, or minor, species that are uncommon or rare.

The primary and secondary bird species in North Dakota are listed by habitat type below.

Mixed-grass Prairie

Primary Species

gadwall
mallard
northern pintail
blue-winged teal
northern shoveler
American coot
black tern
mourning dove
horned lark
western meadowlark
red-winged blackbird
yellow-headed blackbird
brown-headed cowbird
Savannah sparrow
clay-colored sparrow
chestnut-collared longspur

Secondary Species

eared grebe
pied-billed grebe
American bittern
black-crowned night-heron
American wigeon
green-winged teal
canvasback
redhead
ruddy duck
Swainson's hawk
red-tailed hawk
northern harrier
sharp-tailed grouse
ring-necked pheasant
gray partridge
sora
killdeer
upland plover
willet
marbled godwit
American avocet
Wilson's phalarope
Franklin's gull
ring-billed gull
black-billed cuckoo
northern flicker
eastern kingbird
western kingbird
willow flycatcher
bank swallow
barn swallow
cliff swallow
common crow
house wren
marsh wren
brown thrasher
gray catbird
American robin
cedar waxwing
yellow warbler
common yellowthroat
house sparrow
bobolink
common grackle
American goldfinch
lark bunting
Baird's sparrow
grasshopper sparrow
vesper sparrow
song sparrow
great horned owl

Tall-grass Prairie

Primary Species

mourning dove
horned lark
common crow
western meadowlark
common grackle
brown-headed cowbird

Secondary Species

red-tailed hawk
American kestrel
killdeer
black-billed cuckoo
great horned owl
northern flicker
eastern kingbird
western kingbird
barn swallow
blue jay
house wren
brown thrasher
gray catbird
American robin
cedar waxwing
starling
warbling vireo
yellow warbler
common yellowthroat
house sparrow
bobolink
red-winged blackbird
Baltimore oriole
American goldfinch
dickcissel
Savannah sparrow
vesper sparrow
clay-colored sparrow
song sparrow

Turtle Mountains

Primary Species

mallard
blue-winged teal
broad-winged hawk
red-tailed hawk
ruffed grouse
yellow-bellied sapsucker
northern flicker
least flycatcher
common crow
American robin
veery
red-eyed vireo
yellow warbler
American redstart
red-winged blackbird
brown-headed cowbird
Baltimore oriole
rose-breasted grosbeak
clay-colored sparrow

Secondary Species

common loon
red-necked grebe
eared grebe
horned grebe
pied-billed grebe
double-crested cormorant
American bittern
American wigeon
green-winged teal
northern shoveler
canvasback
redhead
ring-necked duck
ruddy duck
Cooper's hawk
northern harrier
sora
American coot
killdeer
spotted sandpiper
Wilson's phalarope
black tern
mourning dove
black-billed cuckoo
great horned owl
common nighthawk
belted kingfisher
ruby-throated hummingbird
hairy woodpecker
eastern kingbird
willow flycatcher
tree swallow
purple martin
barn swallow
black-capped chickadee
house wren
long-billed marsh wren
short-billed marsh wren
brown thrasher
gray catbird
cedar waxwing
warbling vireo
northern waterthrush
common yellowthroat
mourning warbler
bobolink
western meadowlark
yellow-headed blackbird
common grackle
American goldfinch
Savannah sparrow
vesper sparrow
chipping sparrow
song sparrow

Appendix I

Evaluation Criteria for Easements

The Prairie Pothole Region of the United States supports some of the highest breeding duck populations in the nation and is particularly important to upland-nesting species such as mallard, northern pintail, gadwall, blue-winged teal, and northern shoveler. The Prairie Pothole Region of North Dakota and South Dakota has approximately 7% of the principal breeding area for ducks in North America; this area supported >20% of all breeding ducks in the traditional survey area during 1996 –2005. In addition to the importance of the Prairie Pothole Region to duck populations, the region also provides critical breeding and migration habitat for many species of shorebirds, waterbirds, and grassland birds.

The Small Wetlands Acquisition Program was created to perpetuate migratory bird populations, particularly waterfowl, by acquisition and maintenance of critical breeding habitat in the Prairie Pothole Region. The Service acquires waterfowl production areas comprised of fee-title lands and grassland and wetland easements to fulfill the goals of this program.

Conservation Strategy

To guide the acquisition of grassland and wetland easements in the Prairie Pothole Region of region 6, the "Dakota Working Group" developed and adopted a conservation strategy in 2004 that focuses on the five primary upland-nesting ducks, which provided for benefits to other trust species. This strategy applies an adaptive approach to integrate biological priorities with current socioeconomic threats to habitat to target acquisition of grassland and wetland easements for the Small Wetlands Acquisition Program. The goal of this strategy is to permanently protect adequate grassland and wetland habitat to support >90% of the duck productivity observed in the region between 1987 and 1998. This goal equates to approximately 3.6 million breeding duck pairs and a recruitment rate of 0.6.

The conservation strategy consists of two primary elements:

- Protection of the capacity of the landscape to attract breeding ducks through the acquisition of wetland easements.
- Protection of the productivity of breeding ducks through the acquisition of grassland easements.

The Service used models developed by the HAPET to identify the extent and location of grasslands and wetlands required to meet the protection goal. These models indicated that protection of all grasslands and wetlands within areas accessible to >25 pairs of ducks, plus a 1-mile buffer, would meet the conservation goal of protecting adequate habitat to support >90% of the duck productivity. It is currently estimated that an additional 1.4 million high-priority wetland acres and 10.4–16 million grassland acres are needed to meet the goal.

This conservation strategy is based on the knowledge that breeding duck distribution is determined by the wetland community, while reproductive success is determined by the characteristics of surrounding wetlands and uplands and is positively related to the amount of perennial grass cover in the landscape. Due to the willingness of hens to travel some distance from core wetlands to nesting cover, grassland protection is most effective when applied to areas accessible to the greatest number of hens. HAPET models indicated that if all grasslands accessible to >25 duck pairs were protected, they would be accessible to >90% of the breeding duck population. Due to the landscape influences of surrounding grassland on duck nest success, a 1-mile buffer was added to the >25 duck pair zone. It is assumed that protection of grasslands accessible to >25 duck pairs, plus supporting grassland within 1 mile of these areas, will maintain adequate nesting habitat. In addition, protection of wetlands within this same area will maintain adequate breeding pair and brood habitat for >90% of the duck population.

Wetland Easement Prioritization

Priority areas will be identified by HAPET models and updated as new information becomes available. The Service will also periodically update short-term objectives to reflect changes in opportunities and risks. Opportunities for new protection will decrease through time as more of the remaining habitat is either protected or converted to cropland.

Acknowledging that, in addition to ducks, many other trust species benefit from wetland protection and

that risk of wetland drainage varies among wetlands, the Service adopted a decision tree to integrate the benefits and risk factors of multiple trust species into the prioritization process for wetland easements.

Decision Tree

The decision tree identifies hierarchical priorities that incorporate risk of drainage and consider benefits to other priority trust species, while preventing lower priorities from inappropriately influencing higher-level priorities. The decision tree (see figure 13, chapter 6) portrays the structure of the decisionmaking process, while the associated map (see figure 12, chapter 6) shows the distribution of conservation opportunities resulting from application of spatial models driven by the decisionmaking process.

Duck Biological Factors

Protection of wetlands in areas accessible to >25 duck pairs, plus a 1-mile buffer, is the primary determinant for prioritizing wetland easements. In order for areas identified as high priority for acquisition of grassland easements (nesting habitat) to continue to be productive, the associated high-priority wetlands, which attract and support breeding duck pairs to an area, also must be protected. However, protection of these wetlands is necessary regardless of the habitat within which they occur.

Temporary wetlands, seasonal wetlands, and small (<1 acre) semipermanent wetlands attract higher densities of ducks than more permanent and larger wetlands, although all associated wetlands contribute to attracting duck pairs, Short-term objectives were set to prioritize wetlands supporting the highest densities of breeding pairs. These wetlands were divided into the following three categories:

- temporary wetlands, seasonal wetlands, and semipermanent wetlands ≤1 acre
- semipermanent wetlands >1–25 acres
- semipermanent wetlands >25 acres and lakes

Risk Factors

Because the risk of wetland drainage differs among wetlands, risk criteria were incorporated into the prioritization process. These risk criteria consider size and class of the wetland and surrounding land use. Drainage history in the Prairie Pothole Region, as well as numerous past efforts to modify or remove "Swampbuster Provisions" of the farm bill, demonstrate that the risk of wetland drainage is highest and most immediate for the smaller, less permanent wetlands embedded in cropland.

Current information suggests that about 70% of all breeding waterfowl pairs in the Prairie Pothole Region occur in wetlands in crop fields. The Service adopted short-term objectives for new wetland easement acquisitions to allow a reasonable level of flexibility to accommodate local opportunities and needs, maximize acquisition of the highest priority wetlands, and remain consistent with biological priorities. These short-term objectives apply five priority levels to wetlands within priority waterfowl areas, based on the risk of wetlands being drained and the capacity of wetlands to attract duck pairs.

Wetlands Embedded in Cropland

Priority 1: Temporary wetlands, seasonal wetlands, or semipermanent wetlands <1 acre

Priority 2: Semipermanent wetlands or lake wetlands <25 acres

Wetlands Embedded in Grassland

Priority 3: Temporary wetlands, seasonal wetlands, or semipermanent wetlands <1 acre

Priority 4: Semipermanent wetlands or lake wetlands <25 acres

Wetlands Embedded in Cropland or Grassland

Priority 5: Wetlands >25 acres

The Service applies these priority levels to potential easement tracts based on the highest priority (1–5) wetland associated with a tract. Wetland easement offers under consideration should be prioritized to acquire the highest priority tracts available for priorities 1–4. Although acquisition of some priority 5 wetlands may be necessary to acquire higher priority wetlands, this should be minimized when possible. Priority 5 wetlands are generally at low risk of drainage due to their large size and water permanency.

Non-duck Biological Factors

Secondary priorities focus on wetland easements that would benefit recovery efforts for listed species (endangered or threatened); these are noted as A or B in the decision tree (figure 13, chapter 6). Wetland easements that would be appropriate conservation actions for migratory birds (excluding the five primary upland-nesting duck species) are the third highest priority; these are noted as C or D in the decision tree (figure 13, chapter 6).

Managers will determine when and which species to incorporate into the prioritization process for their respective areas of responsibility. The HAPET will provide assistance with model development and integration of these additional species.

Pending incorporation of endangered species or other migratory bird priorities, wetland easement prioritization will occur based solely on the duck prioritization criterion. Inclusion of endangered species and other migratory birds will further refine selections within, but not between, priority 1–5 wetland tracts (for example, priority 2–5 tracts with endangered species or other migratory bird benefits do not rise to a higher priority than priority 1 tracts without these additional species benefits).

Additional Criteria

After using the decision tree to identify the biological priority zone for a tract, the below criteria will be applied prior to final acceptance of a tract for easement purchase. These criteria provide additional guidance on current policies and logistical and economic considerations relevant to wetland easement acquisition.

Highest Habitat Value per Dollar Spent

For tracts within the same biological priority zone, preference will be given to parcels where the Service can acquire the best habitat at the lowest financial and administrative cost. The "Government Accounting Office Report of September 2007" (page 31) stated that "analysis indicate that an important opportunity for gains in efficiency would be for the Service to target the lowest cost easements in the high priority zone." In addition to biological prioritization, the following guidance will further aid in reaching the Service's acquisition goals as quickly and efficiently as possible:

1. When funds are limiting, place emphasis on acquisition of tracts that are the lowest cost per acre.
2. When personnel needed to complete the required evaluations, site visits, document preparation, etc., are limiting, place emphasis on acquisition of larger tracts.

Other Funding Sources

If a district has secured a partner(s) and additional funding and the proposed acquisition lies in a biological priority area, the Service may consider meeting the terms of the partner's contribution. For example, if a tract would be excluded based on the "highest habitat value per dollar" criterion, but the partner(s) are willing to contribute adequate support to overcome the deficit, the tract should be acquired.

Circumstances in a particular district may require the easement acquisition be completed using grants through the North American Wetlands Conservation Act, Ducks Unlimited contributions, Pheasants Forever monies, or any other special funds that may become available. Acquisitions of this type need to be coordinated with the regional realty division chief, to make the realty division aware of the special monies available.

Funding Restrictions

In North Dakota, the Service's ability to acquire wetland easements is limited by an agreement with the governor of North Dakota. This agreement places a county-level cap on the number of wetland acres that the Service can acquire under easement using funds from the MBCF. As a result, the Service should use funds from the MBCF only for the highest risk wetlands (priorities 1 and 2) in North Dakota and should use other funding sources for acquisition of lower risk wetlands (priorities 3 and 4).

Grassland Easement Prioritization

Priority areas will be identified by HAPET models and updated as new information becomes available. The Service will also periodically update short-term objectives to reflect changes in opportunities and risks. Opportunities for new protection will decrease through time as more of the remaining habitat is either protected or converted to cropland.

Acknowledging that, in addition to ducks, many other trust species benefit from grassland protection and that risk of grassland loss is high throughout the Prairie Pothole Region, the Service adopted a decision tree to integrate the benefits and risk factors of multiple trust species into the prioritization process for grassland easements.

Decision Tree

The decision tree identifies hierarchical priorities that incorporate risk of loss and consider benefits to other priority trust species, while preventing lower priorities from inappropriately influencing higher-level priorities. The decision tree (see figure 15, chapter 6) portrays the structure of the decisionmaking process, while the associated map (see figure 14, chapter 6) shows the distribution of conservation opportunities resulting from application of spatial models driven by the decisionmaking process.

Duck Biological Factors

Grasslands accessible to the greatest number of breeding duck pairs will be the primary determinant for prioritizing grassland easements. Although the long-term goal for grassland protection includes all grasslands accessible to >25 duck pairs, plus a 1-mile buffer, short-term objectives were developed. These objectives were set to prioritize grasslands accessible to the greatest number of breeding ducks. Grasslands were divided into the following three categories:

- grassland accessible to >60 duck pairs
- grassland accessible to 40–60 duck pairs
- grassland accessible to 25–40 duck pairs

Risk Factors

Threats to grasslands are extremely high throughout the Prairie Pothole Region due to (1) the pervasive and dynamic nature of grassland loss resulting from changes in landowner demographics, (2) farm implement size, efficiency, and capability, (3) crop genetics and types, and (4) markets for agricultural commodities. In addition to these risk factors, waterfowl distribution varies spatially and temporally due to variations in precipitation.

Because of the high degree and broad distribution of risks and the spatial and temporal variation in habitat conditions in the Prairie Pothole Region, the Service's best strategy for grassland protection is to apply the above prioritization within each district to protect the best areas within each district, rather than focusing efforts on any particular district.

The Service adopted short-term objectives for new grassland easement acquisitions to allow a reasonable level of flexibility to accommodate local opportunities and needs, maximize acquisition of the highest priority grasslands, and remain consistent with biological priorities. Three priority levels are based on the risk of grassland conversion and the accessibility of grasslands to nesting ducks. Within these priority levels, annual targets will ensure that new grassland easements are accessible to the greatest number of duck pairs.

- *Priority 1:* Acquire ≥80% of new acres in areas accessible to >60 duck pairs per square mile.
- *Priority 2:* Acquire ≤15% of new acres in areas accessible to 40–60 duck pairs per square mile.
- *Priority 3:* Acquire ≤5% of new acres in areas accessible to 25–40 duck pairs per square mile.

Non-duck Biological Factors

Secondary priorities focus on grassland easements that would benefit recovery efforts for listed species (endangered or threatened); these are noted as A or B in the decision tree (figure 15, chapter 6). Grassland easements that would be appropriate conservation actions for migratory birds (excluding the five primary upland-nesting duck species) are the third highest priority; these are noted as C or D in the decision tree (figure 15, chapter 6).

Managers will determine when and which species to incorporate into the prioritization process for their respective areas of responsibility. The HAPET will provide assistance with model development and integration of these additional species.

Pending incorporation of endangered species or other migratory bird priorities, grassland easement prioritization will occur based solely on the duck prioritization criterion. Inclusion of endangered species and other migratory birds will further refine selections within, but not between, priority 1–3 grassland tracts (for example, priority 2 or 3 tracts with endangered species or other migratory bird benefits do not rise to a higher priority than priority 1 tracts without these additional species benefits).

Additional Criteria

After using the decision tree to identify the biological priority zone for a tract, the following criteria will be applied prior to final acceptance of a tract for easement purchase. These criteria provide additional guidance on current policies and logistical and economic considerations relevant to grassland easement acquisition.

Highest Habitat Value per Dollar Spent

For tracts within the same biological priority zone, preference will be given to parcels where the Service can acquire the best habitat at the lowest financial and administrative cost. The "Government Accounting Office Report of September 2007" (page 31) stated that "analysis indicate that an important opportunity for gains in efficiency would be for the Service to target the lowest cost easements in the high priority zone." In addition to biological prioritization, the following guidance will further aid in reaching the Service's acquisition goals as quickly and efficiently as possible:

1. When funds are limiting, place emphasis on acquisition of tracts that are the lowest cost per acre.
2. When personnel needed to complete the required evaluations, site visits, document preparation, etc., are limiting, place emphasis on acquisition of larger tracts.

Vegetation Type

For tracts within the same biological priority zone, preference will be given to unbroken prairie. Protection of all grassland habitats within priority areas is necessary to meet the conservation strategy goals. Tame grass is not precluded from acquisition; however, preference will be given to unbroken prairie for the following reasons:

1. The biological diversity and ecological functions associated with native prairie habitats are of value to numerous trust species. Although some of the diversity and functionality can be restored, it is unlikely that the full functionality of native prairie ecosystems can ever be fully restored once lost.
2. Planted grass requires greater long-term management input by landowners and, therefore, increased support and enforcement efforts by the Service.
3. Conservation of unbroken prairie is more acceptable to state and local governments, and, therefore, receives greater support than conservation of planted grass. Many view conservation of unbroken prairie as being supportive of the ranching industry, while others view conservation of planted grass as a conflict with the farming industry. Sensitivity to these views will enable the Service to more effectively acquire grassland easements.

Other Funding Sources

If a district has secured a partner(s) and additional funding and the proposed acquisition lies in a biological priority area, the Service may consider

meeting the terms of the partner's contribution. For example, if a tract would be excluded based on the "highest habitat value per dollar" criterion, but the partner(s) are willing to contribute adequate support to overcome the deficit, the tract should be acquired.

Circumstances in a particular district may require the easement acquisition be completed using grants through the North American Wetlands Conservation Act, Ducks Unlimited contributions, Pheasants Forever monies, or any other special funds that may become available. Acquisitions of this type need to be coordinated with the regional realty division chief, to make the realty division aware of the special monies available.

Appendix J

North Dakota's Threatened and Endangered Species

Group	*Common Name*	*Scientific Name*	*Status*
Plants	western prairie fringed orchid	*Platanthera praeclara*	threatened
Insects	Dakota skipper	*Hesperia dacotae*	candidate
Birds	interior least tern	*Sterna antillarum*	endangered
	whooping crane	*Grus americana*	endangered
	piping plover	*Charadrius melodus*	threatened
Fishes	pallid sturgeon	*Scaphirhynchus albus*	endangered
Mammals	black-footed ferret	*Mustela nigripes*	endangered
	gray wolf	*Canis lupus*	endangered

Appendix K

Priority-setting Example for Native Prairie Portions of Fee-title Lands

The following is an example of a district-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 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 regrazing of individual smooth brome plants at least once within a grazing period, but move livestock to the next cell before native plants are regrazed. 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 WPAs 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.

Bibliography

Adamus P.R. 1996. Bioindicators for assessing ecological integrity of prairie wetlands. EPA/600/R-96/082. Corvallis, OR: U.S. Environmental Protection Agency, National Health and Environmental Effects Research Laboratory, Western Ecology Division. [Pages unknown.]

Anderson, R.C. 1990. The historic role of fire in the North American grassland. In: Collins, S.L.; Wallace, L.L.; editors. Fire in North American tallgrass prairies. Norman, OK: University of Oklahoma Press. 8–18.

Austin, J.E. 1998. Highlight box: waterfowl in the Prairie Pothole Region. In: Mac, M.J.; Opler, P.A.; Puckett Haecker, C.E.; Doran, P.D.; editors. Status and trends of the nation's biological resources, vol. 2. [Internet]. Version 21JAN2000. Jamestown, ND: Northern Prairie Wildlife Research Center online. <http://www.npwrc.usgs.gov/resource/2000/grlands/grlands.htm> 456–7.

Baer, N.W. 1989. Shelterbelts and windbreaks in the Great Plains. Journal of Forestry 87:32–6.

Bakker, K.K. 2003. A synthesis of the effect of woody vegetation on grassland-nesting birds. In: Proceedings of the South Dakota Academy of Science; [Date of conference unknown]; [Location of conference unknown]. [Location of publisher unknown]: [Publisher unknown]. 119–41.

Bakker, K.K.; Naugle, D.E.; Higgins, K.F. 2002. Incorporating landscape attributes into models for migratory grassland bird conservation. Conservation Biology 16:1638–46.

Balser, D.S.; Dil, H.H.; Nelson, H.K. 1968. Effect of predator reduction on waterfowl nesting success. Journal of Wildlife Management 32:669–82.

Barker, William T.; Whitman, Warren C. 1988. Vegetation of the northern Great Plains. Rangelands 10(6):266–72.

Bartonek, J.C. 1968. Summer foods and feeding habits of diving ducks in Manitoba [PhD dissertation]. Madison, WI: University of Wisconsin–Madison. [Pages unknown].

Bartonek, J.C. 1972. Summer foods of American wigeon, mallards, and a green-winged teal near Great Slave Lake, N.W.T. Canadian Field-Naturalist 86:373–6.

Batt, B.D.; Anderson, M.G.; Anderson, C.D.; Caswell, F.D. 1989. The use of prairie potholes by North American ducks. In: van der Valk, A.; editor. Northern prairie wetlands. Ames, IA: Iowa State University Press. 204–27.

Beauchamp, W.D.; Koford, R.R.; Nudds, T.D. [et al.] 1996. Long-term declines in nest success of prairie ducks. Journal of Wildlife Management 60:247–57.

Bedunah, D.J. 1992. The complex ecology of weeds, grazing, and wildlife. Western Wildlands 18:6–11.

Berkey, G.; Crawford, R.; Galipeau, S.; Johnson, D.H. [et al.] 1993. A review of wildlife management practices in North Dakota [unpublished report]. On file at U.S. Fish and Wildlife Service, Lakewood, CO. 51 p.

Blumenthal, D.M.; Jordan, N.R.; Svenson, E.L. 2003. Weed control as a rationale for restoration: the example of tallgrass prairie. Conservation Ecology 7(1):6.

Borthwick, S.M. 1988. Impacts of agricultural pesticides on aquatic invertebrates inhabiting prairie wetlands [master's thesis]. Fort Collins, CO: Colorado State University. [Pages unknown].

Bragg, T.B. 1982. Seasonal variations in fuel and fuel consumption by fires in a bluestem prairie. Ecology 63(10):7–11.

Bragg, T.B. 1995. The physical environment of Great Plains grasslands. In: Keeler, K.; Joern, A.; editors. The changing prairie. New York: Oxford University Press. 49–81.

Bragg, T.B.; Steuter, A.A. 1996. Prairie ecology—the mixed prairie. In: Samson, F.B.; Knopf, F.L.; editors. Prairie Conservation. Washington DC: Island Press. 53–65.

Bryce, S.A.; Omernik, J.M.; Pater, D.A. [et al.] 1996. Ecoregions of North Dakota and South Dakota [color poster with map, descriptive text, summary tables, and photographs]. Reston, VA: U.S. Geological Survey. [Map scale 1:1,500,000].

Burger, L.D.; Burger, L.W., Jr.; Faaborg, J. 1994. Effects of prairie fragmentation on predation on artificial nests. Journal of Wildlife Management 58:249–54.

Carpinellil. M.F. 2001. Designing weed-resistant plant communities by maximizing niche occupation and resource capture [PhD dissertation]. Bozeman, MT: Montana State University. [Pages unknown].

Caudill, James; Henderson, Eric. 2005. Banking on nature 2004: the economic benefits to local communities of national wildlife refuge visitation. [Location of publisher unknown]: U.S. Fish and Wildlife Service, division of economics. [Pages unknown].

Charnov, E.L. 1976. Optimal foraging, the marginal value theorem. Theoretical Population Biology 9:129–36.

Conner, R.; Seidl, A.; VanTassell, L.; Wilkins, N. 2001. U.S. grasslands and related resources: an economic and biological trends assessment. Texas Cooperative Extension Reports and Publications. [Location of publisher unknown]: [Publisher unknown]. 153 p.

Cook, H.H.; Powers, C.F. 1958. Early biochemical changes in the soils and waters of artificially created marshes in New York. New York Game and Fish Journal 5:9–65.

Dahl, T.E. 1990. Wetland losses in the United States 1780s to 1980s. Washington DC: U.S. Department of the Interior, Fish and Wildlife Service. 13 p.

Dai, X.; Boutton, T.W.; Hailemichael, M. [et al.] 2006. Soil carbon and nitrogen storage in response to fire in a temperate mixed-grass savanna. Journal of Environmental Quality 35:1620–8.

Daubenmire R. 1959. A canopy-coverage method of vegetational analysis. Northwest Science 33:43–64.

Davis, S.; Brigham, R.M.; Shaffer, T.L.; James, P.C. 2006. Mixed-grass prairie passerines exhibit weak and variable responses to patch size. The Auk 123(3):807–21.

Dion, N.; Hobson, K.A.; Lariviere, S. 2000. Interactive effects of vegetation and predators on the success of natural and simulated nests of grassland songbirds. The Condor 102:629–34.

Dixon, C.; Hollevoet, R. 2005. Ground-nesting bird management on cropland dominated landscapes within the prairie pothole region of North and South Dakota: a step-down plan from the Prairie Pothole Joint Venture [unpublished report]. [Location where on file unknown]. U.S. Department of the Interior, Fish and Wildlife Service. [Pages unknown].

Domek, Tom. 1998. Last call for tallgrass in North Dakota. [Internet]. Version 02OCT1998. Jamestown, ND: Northern Prairie Wildlife Research Center online. <http://www.npwrc.usgs.gov/resource/plants/tallgras/lastcall.htm> North Dakota Outdoors 60(10):14–19.

Dornfeld, R. 1988. Wetland restoration; a mid-continent waterfowl management project final activity report. Twin Cities, MN: U.S. Department of the Interior, Fish and Wildlife Service. 36 p.

Duebbert, H.F.; Frank, A.M. 1984. Value of prairie wetlands to duck broods. Wildlife Society Bulletin 12:27–34.

Duebbert, H.F.; Jacobson, E.T.; Higgins, K.F.; Podoll, E.B. 1981. Establishment of seeded grasslands for wildlife habitat in the prairie pothole region. Special Scientific Report—Wildlife No. 234. Washington DC: U.S. Department of the Interior, Fish and Wildlife Service. [Pages unknown].

Duebbert, H.F.; Lokemoen, J.T. 1980. High duck nesting success in a predator-reduced environment. Journal of Wildlife Management 44:428–37.

Espie, R.H.M.; Brigham, R.M.; James, Paul C. 1996. Habitat selection and clutch fate of piping plovers (*Charadrius melodus*) breeding at Lake Diefenbaker, Saskatchewan. Canadian Journal of Zoology 74:1069–75.

Estey, Mike. 2007. [Title of unpublished report unknown]. [Location where on file unknown]. U.S. Department of the Interior, Fish and Wildlife Service, Habitat and Population Evaluation Team. [Pages unknown].

Euliss, N.H., Jr.; LaBaugh, J.W.; Fredrickson, L.H. [et al.] 2004. The wetland continuum: a conceptual framework for interpreting biological studies. Wetlands 24:448–58.

Euliss, N.H., Jr.; Wrubleski, D.A.; Mushet, D.M. 1999. Wetlands of the prairie pothole region: invertebrate species composition, ecology, and management. In: Batzer, D.; Rader, R.B.; Wissinger, S.A.; editors. Invertebrates in freshwater wetlands of North America—ecology and management. New York: John Wiley and Sons. 471–514.

Flannery, T. 2001. The eternal frontier. [Location of publisher unknown]: Atlantic Monthly Press. [Pages unknown].

Fredrickson, L.H. 1991. Strategies for water level manipulations in moist-soil systems. U.S. Fish and Wildlife Service, Waterfowl Management Handbook, Fish and Wildlife Leaflet 13.4.6. Washington DC: U.S. Department of the Interior, Fish and Wildlife Service.

Friend M.; Franson, J.C. 1999. Field manual of wildlife diseases, general field procedures and diseases of birds. U.S. Department of the Interior, Geological Survey, Information and Technology Report 1999-001. [Pages unknown].

Garrettson, P.R.; Rohwer, F.C. 2001. Effects of mammalian predator removal on production of upland-nesting ducks in North Dakota. Journal of Wildlife Management 65:398–405.

Garrettson, P.R.; Rohwer, F.C.; Zimmer, J.M. [et al.] 1996. Effects of mammalian predator removal on waterfowl and non-game birds in North Dakota. In: Transactions of the North American Wildlife and Natural Resources Conference; [Date of conference unknown]; [Location of conference unknown]. [Location of publisher unknown]: [Publisher unknown]. 61:94–101.

Gazda, R.J.; Meidinger, R.R.; Ball, I.J.; Connelly, J.W. 2002. Relationships between Russian olive and duck nest success in southeastern Idaho. Wildlife Society Bulletin 30:337–44.

Grant, T.A.; Madden, E.; Berkey, G.B. 2004. Tree and shrub invasion in northern mixed-grass prairie: implications for breeding grassland birds. Wildlife Society Bulletin 32:807–18.

Greenwood, R.J.; Sargeant, A.B.; Johnson, D.H. [et al.] 1995. Factors associated with duck nest success in the Prairie Pothole Region of Canada. Wildlife Monograph 128. [Pages unknown].

Greenwood, R.J.; Sargeant, A.B.; Piehl, J.L. [et al.] 1999. Foods and foraging of prairie striped skunks during the avian nesting season. Wildlife Society Bulletin 27:823–32.

Greenwood, R.J.; Sovada, M.A. 1996. Prairie duck populations and predation management. In: Transactions of the North American Wildlife and Natural Resources Conference; [Date of conference unknown]; [Location of conference unknown]. [Location of publisher unknown]: [Publisher unknown]. 61:31–42.

Grondahl, C.; Evelsizer, A. 2002. Prairie wildflowers and grasses of North Dakota. Jamestown, ND: North Dakota Game and Fish Department–Bismarck, ND.

Grue, C.E.; Tome, M.W.; Messmer, T.A. [et al.] 1989. Agricultural chemicals and prairie pothole wetlands: meeting the needs of the resource and the farmer—U.S. perspective. In: Transactions of the North American Wildlife and Natural Resources Conference; [Date of conference unknown]; [Location of conference unknown]. [Location of publisher unknown]: [Publisher unknown]. 54:43–58.

Gruell, G.E.; Loope, L.L. 1974. Relationships among aspen, fire, and ungulate browsing in Jackson Hole, Wyoming. Ogden, UT: USDA Forest Service, Intermountain Region. [Pages unknown.]

Guo, Q.; Shaffer, T. 2006. Community maturity, species saturation and the variant diversity–productivity relationships in grasslands. Ecology Letters 9:1–9.

Haig, S.M.; Plissner, J.H. 1993. Population status of the threatened/endangered piping plover in 1991. In: Higgins, K.F.; Brashier, M.R.; editors. Proceedings, the Missouri River and its tributaries: piping plover and least tern symposium; [Date of symposium unknown]; Brookings, SD. Brookings, SD: South Dakota State University. 32–5.

Hanowski, J.M.; Christian, D.P.; Niemi, G.J. 2000. Landscape requirements of prairie sharp-tailed grouse *Tympanuchus phasianellus campestris* in Minnesota, USA. Wildlife Biology 6:257–63.

Helmers, D.L. 1993. Shorebird management manual. Manomet, MA: Western Hemisphere Shorebird Reserve Network. [Pages unknown].

Helmers, D.L.; Gratto-Trevor, C.L. 1996. Effects of predation on migratory shorebird recruitment. In: Transactions of the North American Wildlife and Natural Resources Conference; [Date of conference unknown]; [Location of conference unknown]. [Location of publisher unknown]: [Publisher unknown]. 61:50–61.

Herkert, J.R. 1994. The effects of habitat fragmentation on Midwestern grassland bird communities. Ecological Applications 4:461–71.

Herkert, J.R. 1995. An analysis of Midwestern breeding bird population trends: 1966–1993. American Midland Naturalist 134:41–50.

Higgins, K.F. 1986. Interpretation and compendium of historical fire accounts in the northern Great Plains. Resource Publication 161. Washington DC: U.S. Department of the Interior, Fish and Wildlife Service. [Pages unknown].

Higgins, K.F.; Barker, W.T. 1982. Changes in vegetation structure in seeded nesting cover in the prairie pothole region. U.S. Fish and Wildlife Service Special Science Report—Wildlife 242. Washington DC: U.S. Department of the Interior, Fish and Wildlife Service. [Pages unknown].

Hoff, M.J. 1999. Predator trapping on township-sized blocks: does duck nesting success increase? [master's thesis]. Baton Rouge: Louisiana State University. [Pages unknown].

Howell, E.A. 1988. The role of restoration in conservation biology. Endangered Species 5:1–4.

Hutchinson, M. 1992. Vegetation management guideline: Canada thistle (*Cirsium arvense* [L.] Scop.). Natural Areas Journal 12:160–1.

Igl, L.D.; Johnson, D.H. 1995. Migratory bird population changes in North Dakota. In: LaRoe, E.T.; Farris, G.S.; Puckett, C.E. [et al.]; editors. Our living resources. [Location of publisher unknown]: U.S. Department of the Interior. 298–300.

Info Please. 2007. North Dakota almanac. [Internet]. <http://www.infoplease.com/ipa/A0108256.html> [access date unknown].

Jensen, Ray E. [No date]. Climate of North Dakota. [Internet]. Version 02APR98. Fargo, ND: National Weather Service, North Dakota State University. Jamestown, ND: Northern Prairie Wildlife Research Center online. <http://www.npwrc.usgs.gov/resource/habitat/climate/index.htm>

Johnson, D.H.; Igl, L.D. 2001. Area requirements of grassland birds: a regional perspective. Auk 118:24–34.

Johnson, Douglas H. 2006a. Terrestrial bird communities on the Woodworth study area. [Internet]. Revised August 3, 2006. Jamestown, ND: Northern Prairie Wildlife Research Center online. <http://www.npwrc.usgs.gov/resource/habitat/woodwort/johnson.htm>

Johnson, Douglas H. 2006b. Conservation Reserve Program (CRP) grassland bird use of conservation reserve program fields in the Great Plains. In: Farm Bill Contributions to Wildlife Conservation. [Internet]. Wildlife Habitat Management Institute online. <ftp://ftp-fc.sc.egov.usda.gov/WHMI/WEB/CompRev/Johnson19-34.pdf> 19–33.

Johnson, Douglas H.; Haseltin, Susan S.D.; Cowardin, Lewis M. 1994. Wildlife habitat management on the northern prairie landscape. [Internet]. Version 30APR2001. Jamestown, ND: Northern Prairie Wildlife Research Center online. <http://www.npwrc.usgs.gov/resource/habitat/whabmgt/index.htm> Landscape and Urban Planning 28:5–21.

Johnson, Douglas H.; Igl, Lawrence D.; Dechant Shaffer, Jill A. [series coordinators]. 2004. Effects of management practices on grassland birds. [Internet]. Version 12AUG2004. Jamestown, ND: Northern Prairie Wildlife Research Center online. <http://www.npwrc.usgs.gov/resource/literatr/grasbird/index.htm>

Johnson, R.G.; Temple, S.A. 1990. Nest predation and brood parasitism of tall grass prairie birds. Journal of Wildlife Management 54(1):106–11.

Kadlec, J.A.; Smith, L.M. 1992. Habitat management for breeding areas. In: Batt, B.D.J.; Afton, A.D.; Anderson, M.G. [et al.]; editors. Ecology and management of breeding waterfowl. Minneapolis: University of Minnesota. [Pages unknown].

Kantrud, H.A. 1993. Duck nest success on Conservation Reserve Program land in the prairie pothole region. Journal of Soil and Water Conservation 48:238–42.

Kantrud, H.A.; Higgins, K.F. 1992. Nest and nest site characteristics of some ground-nesting non-passerine birds of northern grasslands. Prairie Naturalist 24:67–84.

Kantrud, Harold A. 1983. An environmental overview of North Dakota: past and present. [Internet]. Version 16JUL97. Jamestown, ND: Northern Prairie Wildlife Research Center online. <www.npwrc.usgs.gov/resource/habitat/envovrvw/index.htm>

Kantrud, Harold A.; Krapu, Gary L.; Swanson, George A.; Allen, James A. 1989. Prairie basin wetlands of the Dakotas: a community profile. [Internet]. Version 16JUL97. Jamestown, ND: Northern Prairie Wildlife Research Center online. <http://www.npwrc.usgs.gov/resource/wetlands/basinwet/index.htm>

Kelsey, K.W.; Naugle, D.E.; Higgins, K.F.; Bakker, K.K. 2006. Planting trees in prairie landscapes: do the ecological costs outweigh the benefits? Natural Areas Journal 26(3):254–60.

Klett, A.T.; Duebbert, H.F.; Heismeyer, G.L. 1984. Use of seeded native grasses as nesting cover by ducks. Wildlife Society Bulletin 12:134–8.

Knopf, F.L. 1994. Avian assemblages on altered grasslands. Studies in Avian Biology. 15:247–57.

Knopf, F.L. 1995. Declining grassland birds. In: LaRoe, E.T.; Farris, G.S.; Puckett, C.E. [et al.]; editors. Our living resources. [Location of publisher unknown]: U.S. Department of the Interior. 296–98.

Knutsen, G.A.; Euliss, N.H. 2001. Wetland restoration in the Prairie Pothole Region of North America: a literature review. U.S. Geological Survey, Biological Science Report. [Location of publisher unknown]: U.S. Geological Survey. 55 p.

Koper, N.; Schmiegelow, F. 2006. A multi-scaled analysis of avian response to habitat amount and fragmentation in the Canadian dry mixed-grass prairie. Landscape Ecology 21:1045–59.

Krapu, G.L.; Swanson, G.A. 1975. Some nutritional aspects of reproduction in prairie nesting pintails. Journal of Wildlife Management 39:156–62.

Krull, J.N. 1970. Aquatic plant–macroinvertebrate associations and waterfowl. Journal of Wildlife Management 34:707–18.

Kuehl, A.K.; Clark, W.R. 2002. Predator activity related to landscape features in northern Iowa. Journal of Wildlife Management 66:1224–34.

Larson, M.A.; Ryan, M.R.; Murphy, R.K. 2002. Population viability of piping plovers: effects of predator exclusion. Journal of Wildlife Management 66:361–71.

Laubhan, M.K.; Gleason, R.A.; Euliss, N.H., Jr. [et al.] 2006. A preliminary biological assessment of Long Lake National Wildlife Refuge, North Dakota. U.S. Department of Interior, Fish and Wildlife Service, Biological Technical Publication, FWS/BTP-R6006-2006. Washington DC. [Pages unknown].

Laubhan, M.K.; Roelle, J.E. 2001. Managing wetlands for waterbirds. In: Rader, R.B.; Batzer, D.P.; Wissinger, S.; editors. Biomonitoring and management of North American freshwater wetlands. New York: John Wiley and Sons. 387–411.

Lokemoen, J.T. 1984. Examining economic efficiency of management practices that enhance waterfowl production. In: Transactions of the North American Wildlife and Natural Resources Conference; [Date of conference unknown]; [Location of conference unknown]. [Location of publisher unknown]: [Publisher unknown]. 49:584–607.

Lorenzana, J.C.; Sealy, S.G. 1999. A meta-analysis of the impact of parasitism by the brown-headed cowbird on its hosts. Studies in Avian Biology 18:241–53.

Lynch, J.; Evans, C.D.; Conover, V.C. 1963. Inventory of waterfowl environments of the prairie Canada. In: Transactions of the North American Wildlife and Natural Resources Conference; [Date of conference unknown]; [Location of conference unknown]. [Location of publisher unknown]: [Publisher unknown]. 28:93–109.

Mabee, T.J.; Estelle, V.B. 2000. Assessing the effectiveness of predator exclosures for plovers. Wilson Bulletin 112:14–20.

Madden, E.M.; Murphy, R.K.; Hansen, A.J.; Murray, L. 2000. Models for guiding management of prairie birds habitat in northwestern North Dakota. The American Midland Naturalist 144(2):377–92.

Martin, T.E. 1988. Processes organizing open-nesting bird assemblages: competition or nest predation? Evolutionary Ecology 2:37–50.

Martin, T.E. 1995. Avian life history evolution in relation to nest sites, nest predation and food. Ecological Monographs 65:101–27.

Mense, B. 1996. The effects of predator removal and nest-site selection on productivity of overwater nesting birds in North Dakota [master's thesis]. Pittsburg, KS: Pittsburg State University. [Pages unknown].

Meyer, M.I.; Swanson, G.A. 1982. Mosquitoes (Diptera: Culicidae) consumed by breeding Anatidae in south central North Dakota. Prairie Naturalist 14:27–31.

Milchunas, D.G.; Sala, O.E.; Lauenroth, W.K. 1988. A generalized model of the effects of grazing by large herbivores on grassland community structure. American Midland Naturalist 132(1):87–106.

Murkin, H.R.; Batt, B.D.J. 1987. The interactions of vertebrates and invertebrates in peatlands and marshes. Memoirs of the Entomological Society of Canada 140:15–30.

Murphy, R.K.; editor. 2005. Conservation strategy and guidelines for Dakota skippers on Service lands in the Dakotas [unpublished report]. Bismarck, ND: U.S. Department of the Interior, Fish and Wildlife Service, refuges and wildlife and ecological services, Dakota skipper committee. 23 p.

Murphy, R.K.; Grant, T.A. 2005. Land management history and floristics in mixed-grass prairie, North Dakota, USA. Natural Areas Journal 25:351–8.

Murphy, R.K.; Michaud, I.M.G.; Prescott, D.R.C. [et al.] 2003. Predation on adult piping plovers at predator exclosure cages. Waterbirds 26:150–5.

National Wildlife Federation. 2001. The American prairie: going, going, gone? A Status Report on the American Prairie. [Location of publisher unknown]: National Wildlife Federation. [Pages unknown].

Naugle, David E.; Higgins, Kenneth F.; Bakker, Kristel K. 2000. A synthesis of the effects of upland management practices on waterfowl and other birds in the northern Great Plains of the United States and Canada. University of Wisconsin–Stevens Point, College of Natural Resources, Wildlife Technical Report No. 1. Stevens Point, WI. 39 p.

Naugle, D.E.; Higgins, K.F.; Nusser, S.M. 1999. Effects of woody vegetation on prairie wetland birds. Canadian Field-Naturalist 113:487–92.

Naugle, D.E.; Quamen, F. 2007. Assessing the impacts of tree plantings on grassland birds in North and South Dakota. Completion Report for North Dakota State Wildlife Grant #T19. [Location where on file unknown]. 25 p.

Nelson, J.G.; Leege, T.A. 1982. Nutritional requirements and food habitats. In: Thomas, J.W.; Toweill, D.E.; editors. Elk of North America. Harrisburg, PA: Stackpole Books. [Pages unknown].

Newcombe, C.P.; MacDonald, D.D. 1991. Effects of suspended sediments on aquatic ecosystems. North American Journal of Fisheries Management 11:72–82.

Niemuth, N.D. 2000. Land use and vegetation associated with greater prairie chicken leks in an agricultural landscape. Journal of Wildlife Management 64:278–86.

Niemuth, N.D.; Estey, M.E.; Loesch, C.R. 2005. Developing spatially explicit habitat models for grassland bird conservation planning in the Prairie Pothole Region of North Dakota. In: Ralph, C.J.; Rich, T.D.; editors. Bird conservation implementation and integration in the Americas: proceedings of the third international Partners in Flight conference 2002; [Date of conference unknown]; [Location of conference unknown]. PSW-GTR-191. Albany, CA: USDA Forest Service. 469–77.

Niemuth, N.D.; Estey, M.E.; Reynolds, R.E. [et al.] 2006. Use of wetlands by spring-migrant shorebirds in agricultural landscapes of North Dakota's Drift Prairie. Wetlands 26:30–9.

North Dakota Department of Agriculture. 2006. 2005 Noxious weed list survey: reported acres. [Location where on file unknown].

North Dakota Game and Fish Department. 2005. Mixed-grass prairie (Missouri Coteau). In: North Dakota comprehensive wildlife conservation strategy. [Internet]. <http://gf.nd.gov/conservation/docs/section%205.3%20mixed-grass%20prairie-missouri%20coteau.pdf> 54–7.

North Dakota Parks and Recreation Department. [No date]. North Dakota prairie—our natural heritage. [Internet]. Version 05MAY99. Jamestown, ND: Northern Prairie Wildlife Research Center online. <http://www.npwrc.usgs.gov/resource/habitat/heritage/index.htm>

O'Leary, C.H.; Nyberg, D.W. 2000. Treelines between fields reduce the density of grassland birds. Natural Areas Journal 20:243–9.

Patten, M.A.; Shochat, E.; Reinking, D.L. [et al.] 2006. Habitat edge, land management, and rates of brood parasitism in tallgrass prairie. Ecological Applications 16:687–95.

Pedlar, J.H.; Fahrig, L.; Merriam, G.H. 1997. Raccoon habitat use at 2 spatial scales. Journal of Wildlife Management 61:102–12.

Peterjohn, B.G.; Sauer, J.R. 1999. Population status of North American grassland birds. Studies in Avian Biology 19:27–44.

Plissner, J.H.; Haig, S.M. 2000. Status of a broadly distributed endangered species: results and implications of the second International Piping Plover Census. Canadian Journal of Zoology 78:128–39.

Pokorny, M.L. 2002. Plant functional group diversity as a mechanism for invasion resistance [master's thesis]. Bozeman, MT: Montana State University. [Pages unknown].

Pokorny, M.L.; Sheley, R.L.; Zabinski, C.A. [et al.] 2005. Plant functional group diversity as a mechanism for invasion resistance. Restoration Ecology 13(3):448–59.

Prindiville-Gaines, E.; Ryan, M.R. 1988. Piping plover habitat use and reproductive success in North Dakota. Journal of Wildlife Management 52:266–73.

Recher, H.F. 1966. Some aspects of the ecology of migrating shorebirds. Ecology 47:393–407.

Remele, Larry. 1988 North Dakota history: overview and summary. In: North Dakota Blue Book. Bismarck, ND: North Dakota Secretary of State's Office. 2–5.

Ribic, C.A.; Sample, D.W. 2001. Associations of grassland birds with landscape factors in southern Wisconsin. American Midland Naturalist 146:105–21.

Rich, T.D.; Beardmore, C.J.; Berlanga, H. [et al.] 2004. Partners in Flight North American landbird conservation plan. Ithaca, NY: Cornell Lab of Ornithology. [Pages unknown].

Ringelman, James K.; editor. 2005. Prairie Pothole Joint Venture 2005 implementation plan. Bismarck, ND: U.S. Department of the Interior, Fish and Wildlife Service. 160 p.

Robel, R.J.; Briggs, J.N.; Dayton, A.D.; Hulbert, L.C. 1970. Relationships between visual obstruction measurements and weight of grassland vegetation. Journal of Range Management 23:295–7.

Robinson, Elwyn B. 1966. History of North Dakota. Lincoln, NE: University of Nebraska Press. 58, 67–8, 113–5, 129, 134.

Romig, G.P.; Crawford, R.D. 1995. Clay-colored sparrows in North Dakota parasitized brown-headed cowbirds. Prairie Naturalist 27:193–205.

Rosenberg, D.M.; Danks, H.V. 1987. Aquatic insects of peatlands and marshes in Canada: introduction. Memoirs of the Entomological Society of Canada 140:1–4.

Royer, R.A.; Austin, J.E.; Newton, W.E. 1998. Checklist and "pollard walk" butterfly survey methods on public lands. American Midland Naturalist 140:358–71.

Rumble, M.A.; Flake, L.D. 1983. Management considerations to enhance use of stock ponds by waterfowl broods. Journal of Range Management 36:691–4.

Ryan, M.R.; Root, B.G.; Mayer, P.M. 1993. Status of piping plovers in the Great Plains of North America: a demographic simulation model. Conservation Biology 7:581–5.

Samson, F.; Knopf, F. 1994. Prairie conservation in North America. BioScience 44:418–21.

Samson, Fred B., Knopf, Fritz L.; Ostlie, Wayne R. 1998. Grasslands. In: Mac, M.J.; Opler, P.A.; Puckett Haecker, C.E.; Doran, P.D.; editors. Status and trends of the nation's biological resources, vol. 2. [Internet]. Version 21JAN2000. Jamestown, ND: Northern Prairie Wildlife Research Center online. <http://www.npwrc.usgs.gov/resource/2000/grlands/grlands.htm> 437–72.

Sargeant, A.B. 1972. Red fox spatial characteristics in relation to waterfowl predation. Journal of Wildlife Management 36:225–36.

Sargeant, A.B.; Allen, S.H.; Hastings, J.O. 1987. Spatial relations between sympatric coyotes and red foxes in North Dakota. Journal of Wildlife Management 51:285–93.

Sargeant, A.B.; Arnold, P.M. 1984. Predator management for ducks on waterfowl production areas in the northern plains. In: Proceedings of the Vertebrate Conference; [Date of conference unknown]; [Location of conference unknown]. [Location of publisher unknown]: [Publisher unknown]. 11:161–7.

Sargeant, A.B.; Greenwood, R.J.; Sovada, M.A.; Shaffer, T.L. 1993. Distribution and abundance of predators that affect duck production in the Prairie Pothole Region. U.S. Fish and Wildlife Service, Resource Publication 194. [Location of publisher unknown]: U.S. Department of the Interior, Fish and Wildlife Service. [Pages unknown].

Sargeant, A.B.; Raveling, D.G. 1992. Mortality during the breeding season. In: Batt, B.D.J.; Afton, A.D.; Anderson, M.G. [et al.]; editors. Ecology and management of breeding waterfowl. Minneapolis: University of Minnesota Press. 396–422.

Sargeant, A.B.; Sovada, M.A.; Shaffer, T.L. 1995. Seasonal predator removal relative to hatch rate of duck nests in waterfowl production areas. Wildlife Society Bulletin 23(3):507–13.

Schmitz, R.A.; Clark, W.R. 1999. Survival of ring-necked pheasant hens during spring in relation to landscape features. Journal of Wildlife Management 63:147–54.

Schroeder, R.L.; Holler, J.I.; Taylor, J.P. 2004. Managing national wildlife refuges for historic or non-historic conditions: determining the role of the refuge in the ecosystem. Natural Resources Journal 44(4):1183–1210.

Severson, K.E.; Sieg, C.H. 2006. The nature of eastern North Dakota: pre-1880 historical ecology. Fargo, ND: North Dakota State University, North Dakota Institute for Regional Studies. 308 p.

Shaffer, J.A.; Goldade, C.M.; Dinkins, M.F. [et al.] 2003. Brown-headed cowbirds in grasslands: their habitat, hosts, and response to management. Prairie Naturalist 35(3):145–186.

Sheley R.L.; Half, M.L. 2006. Enhancing native forb establishment and persistence using a rich seed mixture. Restoration Ecology 12(4):627–35.

Shutler, D.; Mullie, A.; Clark, R.G. 2000. Bird communities of prairie uplands and wetlands in relation to farming practices in Saskatchewan. Conservation Biology 14:1441–51.

Sims, P.I. 1988. Grasslands. In: Barbour, M.G.; Billings, W.D.; editors. North American terrestrial vegetation. Cambridge: Cambridge University Press. 266–86.

Skagen, S.K.; Oman, H.D. 1996. Dietary flexibility of shorebirds in the Western Hemisphere. Canadian Field-Naturalist 10:419–44.

Snyder, W.D. 1984. Ring-necked pheasant nesting ecology and wheat farming on the high plains. Journal of Wildlife Management 48:878–88.

Sovada, M.A.; Anthony, R.M.; Batt, B.D. J. 2001. Predation on waterfowl in arctic tundra and prairie breeding areas: a review. Wildlife Society Bulletin 29(1):6–15.

Sovada, M.A.; Burns, M.J.; Austin, J.E. 2005. Predation of waterfowl in prairie breeding areas. Jamestown, ND: Northern Prairie Wildlife Research Center. 70 p.

Sovada, M.A.; Sargeant, A.B.; Grier, J.W. 1995. Differential effects of coyotes and red foxes on duck nest success. Journal of Wildlife Management 59:1–9.

Stephens, D.W.; Krebs, J.R. 1986. Foraging theory. Princeton, NJ: Princeton University Press. [Pages unknown].

Steuter, A.A.; McPherson, G.R. 1995. Fire as a physical stress. In: Bedunah, D.J.; Sosebee, R.E.; editors. Wildland plants: physiological ecology and developmental morphology. 550–79.

Stewart, R.E.; Kantrud, H.A. 1971. Classification of natural ponds and lakes in the glaciated prairie region. Bureau of Sport Fisheries and Wildlife, Resource Publication 92. Washington DC. [Pages unknown].

Stewart, Robert E. 1975. Breeding birds of North Dakota. [Internet]. Version 06JUL2000. Fargo, ND: Tri-College Center for Environmental Studies. Jamestown, ND: Northern Prairie Wildlife Research Center online. <http://www.npwrc.usgs.gov/resource/birds/bbofnd/biog.htm> 295 p.

Sugden, L.G.; Beyersbergen, G.W. 1984. Farming intensity on waterfowl breeding grounds in Saskatchewan parklands. Wildlife Society Bulletin 12:22–6.

Svedarsky, D.; Van Amburg, G. 1996. Integrated management of the greater prairie chicken and livestock on the Sheyenne National grassland. Bismarck, ND: North Dakota Game and Fish Department. [Pages unknown].

Swanson, G.A. 1978. A water column sampler for invertebrates in shallow wetlands. Journal of Wildlife Management 42:670–2.

Swanson, G.A.; Adomaitis, V.A.; Lee, F.B. [et al.] 1984. Limnological conditions influencing duckling use of saline lakes in south-central, North Dakota. Journal of Wildlife Management 48:340–9.

Swanson, G.A.; Krapu, G.L.; Serie, J.R. 1979. Foods of laying female dabbling ducks on the breeding grounds. In: Bookhout, T.A.; editor. Proceedings of a 1977 symposium waterfowl and wetlands—an integrated review; [Date of symposium unknown]; [Location of symposium unknown]. Madison, WI: North-central Section of the Wildlife Society. 47–57.

Tilman, D. 1996. Community invisibility, recruitment limitations, and grassland biodiversity. Ecology 78(1):81–92.

Trammell, M.A.; Butler, J.L. 1995. Effects of exotic plants on native ungulate use of habitat. Journal of Wildlife Management 59:808–16.

Transeau, E. 1935. The prairie peninsula. Ecology 16(3):423–7.

[DOI] U.S. Department of the Interior. 2004. The United States Department of the Interior budget justification and performance information, fiscal year 2004, Fish and Wildlife Service. Washington DC: U.S. Department of the Interior. [Pages unknown].

[USFWS] U.S. Fish and Wildlife Service. 1990. Interior population of the least tern recovery plan. [Location of publisher unknown]: U.S. Department of the Interior, Fish and Wildlife Service. [Pages unknown].

———. 1994a. Draft revised recovery plan for piping plovers breeding on the Great Lakes and northern Great Plains of the U.S. [Location of publisher unknown]: U.S. Department of the Interior, Fish and Wildlife Service. [Pages unknown].

———. 1994b. Whooping crane recovery plan. [Location of publisher unknown]: U.S. Department of the Interior, Fish and Wildlife Service. [Pages unknown].

———. 1996. Western prairie fringed orchid (*Plantanthera praeclara*) recovery plan. [Location of publisher unknown]: U.S. Department of the Interior, Fish and Wildlife Service. 101 p.

———. 1999. National strategy for management of invasive species, WH-7. In: Fulfilling the promise. Arlington, VA: U.S. Department of the Interior, Fish and Wildlife Service. 94 p.

———. 2001. 2000–2001 contingency plan: federal–state cooperative protection of whooping cranes [unpublished report]. On file at U.S. Fish and Wildlife Service in Albuquerque, NM. 42 p.

———. 2002. Status assessment and conservation guidelines, Dakota skipper. [Location of publisher unknown]: U.S. Department of the Interior, Fish and Wildlife Service. [Pages unknown].

———. 2004. Chronic wasting disease plan for U.S. Fish and Wildlife Service lands in the Dakotas [unpublished report]. [Location where on file unknown]. 17 p.

[USGS] U.S. Geological Survey. 2006. Ecoregions of North Dakota and South Dakota. [Internet]. Jamestown, ND: Northern Prairie Wildlife Research Center online. <http://www.npwrc.usgs.gov/resource/habitat/ndsdeco/ecotext.htm> [Date accessed unknown].

———. 2007. Wetlands of North Dakota. [Internet]. Water Science Center. <http://nd.water.usgs.gov/wetlands/index.html> [accessed March 2007].

U.S. North American Bird Conservation Initative Committee. 2007. Bird conservation region 11. [Internet]. <http://www.nabci-us.org/bcr11.html> [Date accessed unknown].

Vallentine, J.F. 1990. Grazing management. New York: Academic Press. [Pages unknown].

Vogl, R.J. 1974. Effect of fire on grasslands. In: Kozlowski, T.T.; Ahlgren, C.E.; editors. Fire and ecosystems. New York: Academic Press. [Pages unknown].

Voigts, D.K. 1976. Aquatic invertebrates abundance in relation to changing marsh vegetation. American Midland Naturalist 95:313–22.

Watson, A.K. 1985. Introduction: the leafy spurge problem. In: Watson, A.K.; editor. Leafy spurge. Weed Science Society of America Monograph 3:1–6.

Weaver, J.E. 1954. North American prairie. Lincoln, NE: Johnsen Publishing Company. [Pages unknown].

Weaver, J.E.; Albertson, F.W. 1936. Effects of the great drought on the prairies of Iowa, Nebraska and Kansas. Ecology 17(4):567–639.

Weaver, J.E.; Albertson, F.W. 1956. Grasslands of the Great Plains: their nature and use. Lincoln, NE: Johnsen Publishing Company. [Pages unknown].

Weller, M.W.; Spatcher, C.S. 1965. Role of habitat in the distribution and abundance of marsh birds. Department of Zoology and Entomology Special Report Number 43. Ames, IA: Iowa State University, Agricultural and Home Economics Experiment Station. [Pages unknown].

Williams, M.A.; Crawford, R.D. 1989. Use of earthen islands by nesting ducks in North Dakota. Journal of Wildlife Management 53:411–7.

Wilson, S.D.; Belcher, J.W. 1989. Plant and bird communities of native prairie and introduced Eurasian vegetation in Manitoba, Canada. Conservation Biology 3(1):39–44.

Winter, M.; Johnson, D.H.; Faaborg, J. 1999. Patterns of area sensitivity in grassland nesting birds. Conservation Biology 13:1424–36.

Winter, M.; Johnson, D.H.; Faaborg, J. 2000. Evidence for edge effects on multiple levels: artificial nests, natural nests, and distribution of nest predators in Missouri tallgrass prairie fragments. Condor 102:256–66.

Witmer, G.W.; Bucknall, J.L.; Fritts, T.H.; Moreno, D.G. 1996. Predator management to protect endangered avian species. In: Transactions of the North American Wildlife and Natural Resources Conference; [Date of conference unknown]; [Location of conference unknown]. [Location of publisher unknown]: [Publisher unknown]. 61:102–8.

Wollheim, W.M.; Lovvorn, J.R. 1996. Effects of macrophyte growth forms on invertebrates communities in saline lakes of the Wyoming High Plains. Hydrobiolgia 323:83–96.

Wyoming Partners in Flight. 2002. Growing grassland birds: best management practices for grasslands to benefit birds in Wyoming. Lander, WY: Wyoming Game and Fish Department. [Pages unknown].

Zimmer, J.M. 1996. Effects of predator reduction on the survival and movements of northern shoveler broods [master's thesis]. Baton Rouge, LA: Louisiana State University. [Pages unknown].