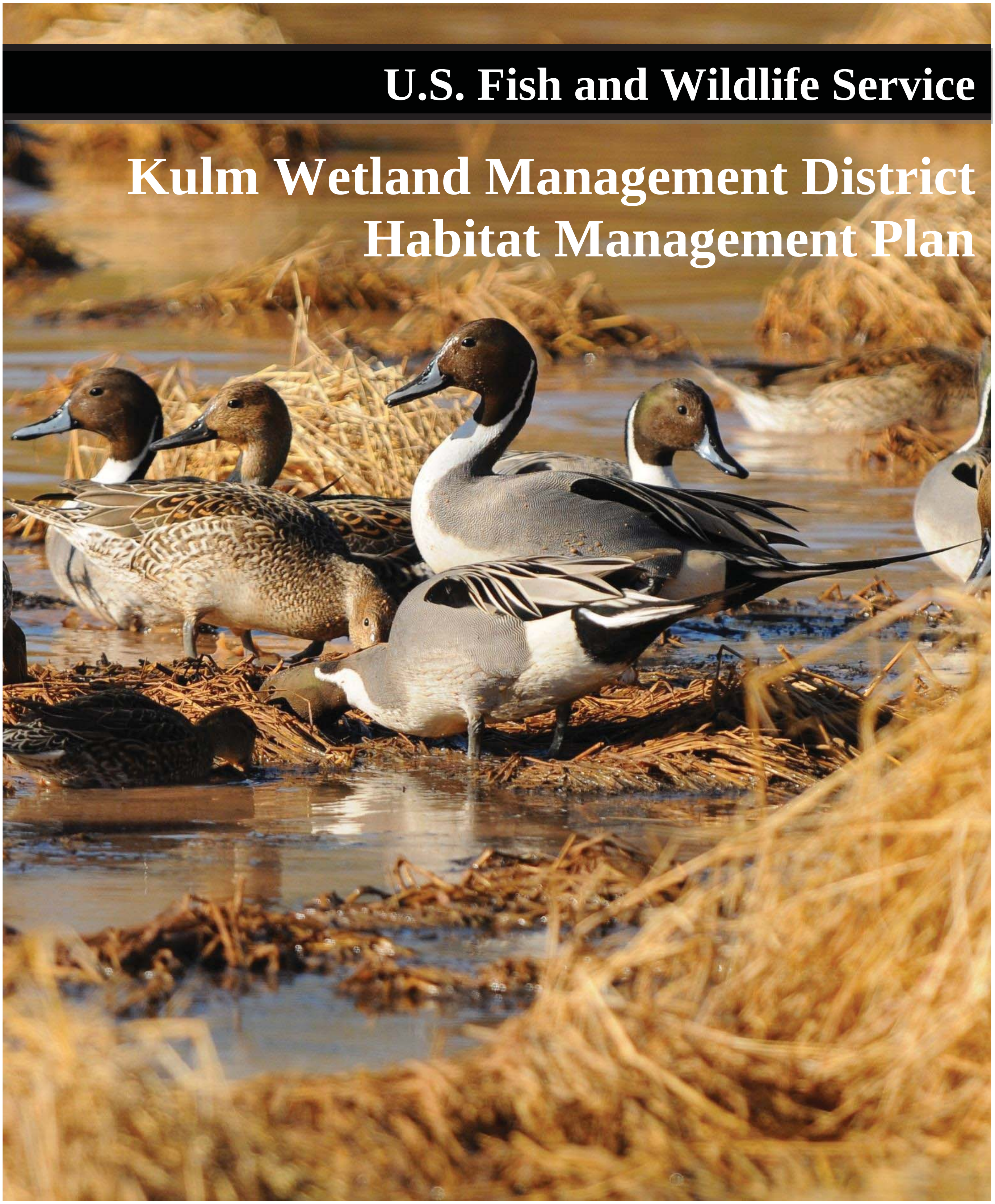
U.S. Fish and Wildlife Service

Kulm Wetland Management District Habitat Management Plan



Credit: Cole Morris

June 2015

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

U.S. FISH & WILDLIFE SERVICE

DEPARTMENT OF THE INTERIOR

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NATIONAL WILDLIFE 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.

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Habitat Management Plan

Kulm Wetland Management District

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Executive Summary

The U.S. Fish and Wildlife Service (Service) has selected strategic habitat conservation (SHC) as its business model for conservation which requires that conservation delivery be focused at the landscape level, along with resource allocation, in areas that will have the greatest conservation benefit to priority trust species. The need for efficient conservation delivery has never been greater because of recent acceleration in wetland drainage and conversion of grasslands for agricultural purposes throughout the Prairie Pothole Region (PPR; Stephens et al. 2008, Fargione et al. 2009, Oslund et al. 2010, Doherty et al. 2013, Johnston 2013, Wright and Wimberley 2013, Johnston 2014). Staff at Kulm Wetland Management District (District) have prepared an SHC-based Habitat Management Plan (HMP), a step-down management plan from the North Dakota Comprehensive Conservation Plan (CCP; USFWS 2008a), to direct conservation delivery in landscapes that can support the highest biological outcomes for priority migratory bird species such as breeding waterfowl (*Anas* spp.). The District primarily protects wetland and grassland habitat in perpetuity on 126,519 acres of wetland easements and 61,029 acres of grassland easements and on 45,302 acres of fee-title waterfowl production areas (WPAs; N = 201). This HMP uses defensible science including empirical species–habitat relationship models to link conservation of priority species at the scale of Kulm WMD to the conservation of their populations within the North Dakota, South Dakota, and northeast Montana portions of the United States PPR. This HMP would be implemented through 2022 (≈8 years) when the next revision of the CCP is scheduled to take place.

Implementation of SHC also requires that conservation design and delivery be explicitly tied to population objectives (i.e., desired population size, occupancy, demographic rate, densities) in landscapes where the desired biological outcomes are predicted to occur (Johnson et al. 2009). Therefore, staff at Kulm WMD has selected the following population objectives to guide conservation delivery within the SHC design during the next 8 years:

1) Target wetland conservation in landscapes that support ≥25 breeding duck pairs/mi^2 to maximize carrying capacity levels for breeding waterfowl (*Anas* spp.) and contribute to stable populations within the Prairie Pothole Region;

2) Target grassland conservation in landscapes that support ≥60 breeding duck pairs/mi^2 (*Anas* spp.) and nest success levels above population maintenance levels (≥15–20% nest success) (Cowardin et al. 1985) to maximize waterfowl production and contribute to stable populations within the Prairie Pothole Region;

3) Increase habitat protection in landscapes that support high brood occupancy rates (Walker et al. 2013a) characterized by high densities of small- to mid-size wetland basins and a high proportion of grassland within a 4 mi^2 area to maintain waterfowl recruitment potential within the Prairie Pothole Region;

4) Target habitat conservation in landscapes that support high densities of priority wetland- and grassland-dependent migratory bird species identified in this HMP.

The goals, objectives, and strategies included in this HMP are linked to the SHC population objectives using a waterfowl-based landscape classification model that functions as a decision support tool to target resource allocation in landscapes where biological potential is the highest to support waterfowl carrying capacity, waterfowl production, and meet the habitat requirements of priority wetland- and grassland-dependent migratory birds (referred to as resources of concern [ROC]). **The classes do not represent priority order from 1A to 5, rather each class may have a different set or combination of conservation treatments (acquisition, enhancement, management) that can be used by managers to achieve the waterfowl population objectives of the SHC approach while benefitting other priority ROC**. For example, acquisition of wetlands in 1A, 1B, and 4A landscapes would provide the highest biological return to support the carrying capacity of waterfowl and pulses in their productivity that occur during wet periods in the PPR (Walker et al. 2013b). This includes targeting protection and acquisition of conservation easements, enhancement and restoration of wetlands and grasslands on private lands under the USFWS Partners for Fish and Wildlife Program, restoration of native mixed-grass prairie and reconstruction of non-native grasslands to diverse native stands on fee-title WPAs, and management of vegetation structure for nesting priority species on fee-title WPAs.

Because a large proportion of wetland (>50%) and grassland (>90%) habitat on private lands is currently unprotected in the District (USFWS Kulm WMD, Kulm, North Dakota, unpublished data), future conservation of these habitats is critical for the District to support the SHC population objectives in this plan. The highest priority conservation treatment under the SHC conservation design is to acquire wetland easements on at-risk wetlands that occur in cropland-dominated landscapes because they support waterfowl carry capacity and pulses in waterfowl populations that coincide with high spring pond density (Walker et al. 2013b). The rate of future easement acquisition will likely depend on: 1) obtaining sufficient funding levels, 2) maintaining landowner interest and acceptance of the easement program, and 3) rate of land-use change influenced by demand for commodities and public policy (Doherty et al. 2013). Although the District is uniquely positioned to implement landscape conservation, if habitat protection does not outpace habitat losses in the future, then the goals and objectives identified in this HMP and other regional conservation plans may need to be refined to reflect what can actually be achieved (Doherty et al. 2013). Therefore, the District will continue to acquire wetland and grassland conservation easements from willing landowners in the shortest amount of time possible to protect these habitats before they are converted.

The District intends to track the outcomes of our conservation actions on selected priority species through assumption-based research and focused monitoring to determine the level of progress (contribution to populations within U.S. PPR) that the District is achieving. This iterative process requires flexibility in conservation delivery that can be modified as new scientific information is obtained during the strategic habitat conservation process.

Ultimately, if biological outcomes are the currency that managers desire as a return on their conservation investment, then directing specific conservation treatments to different landscape types provides an efficient means for conservation delivery under an SHC framework (USFWS 2006b, 2008c).

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Acronyms and Abbreviations

Acres	ac
Biological Integrity, Diversity, and Environmental Health	BIDEH
Bird Conservation Region	BCR
Circa	ca.
Comprehensive Conservation Plan	CCP
Conservation Reserve Program	CRP
Cropland Data Layer	CDL
Dakota Grasslands Conservation Area	DGCA
Dense Nesting Cover	DNC
Ecological Site Description	ESD
Farmers Home Administration	FmHA
Feet	ft
Geographic Information System	GIS
Glaciated Plains	Drift Prairie
Great Plains Fire District	GPFD
Habitat Management Plan	HMP
Habitat and Population Evaluation Team	HAPET
Hectare	ha
Historic Climax Plant Community	HCPC
Inches	in
Inventory and Monitoring	I&M
Inventory and Monitoring Plan	IMP
Integrated Pest Management Plan	IPM
Kulm Wetland Management District	District, Kulm WMD
Landscape Conservation Cooperative	LCC
Major Land Resource Area	MLRA
Meters	m
Migratory Bird Treaty Act	MBTA
Miles	mi

Miles per hour	mph
National Agricultural Statistics Service	NASS
National Environmental Policy Act	NEPA
National Historic Preservation Act	NHPA
National Wildlife Improvement Act of 1997	Improvement Act
National Wildlife Refuge	Refuge or NWR
National Wildlife Refuge System	NWRS
Native Prairie Adaptive Management	NPAM
Natural Resources Conservation Service	NRCS
North American Waterfowl Management Plan	NAWMP
North American Bird Conservation Initiative	NABCI
North Dakota	ND
Prairie Pothole Joint Venture	PPJV
Prairie Pothole Region	PPR
Mountain-Prairie Region	Region, Region 6
Resources of Concern	ROC
Standard Deviation	SD
State-and-Transition Model	STM
Strategic Habitat Conservation	SHC
U.S. Fish and Wildlife Service	Service, USFWS
United States Prairie Pothole Region	U.S. PPR
Visual Obstruction Reading	VOR
Waterfowl Production Area	WPA
Wetland Management District	WMD
Wildlife Development Area	WDA
Year	yr

Chapter 1
Introduction

The Kulm Wetland Management District (District) was established in 1971 to conserve habitat for the benefit of waterfowl and other migratory birds. The District primarily protects wetland and grassland habitat in perpetuity on 126,519 acres of wetland easements and 61,029 acres of grassland easements and on 45,302 acres of fee-title waterfowl production areas (WPAs; N = 201). Limited-interest conservation easements are purchased voluntarily from willing landowners to conserve important wetland and grassland habitats to meet the breeding requirements for waterfowl and other migratory birds. Waterfowl production areas (WPA) are purchased using funds generated primarily from the sale of federal Duck Stamps in fee-title to protect and restore habitat for waterfowl production.

1.1 Scope and Rationale

The purpose of this habitat management plan (HMP) is to provide a strategic plan for consistently and effectively protecting, acquiring, enhancing, restoring, and managing wetland and grassland habitat for waterfowl and other priority migratory bird species (hereafter resources of concern) in the District. A recently completed North Dakota Wetland Management Districts Comprehensive Conservation Plan (CCP; U.S. Fish and Wildlife Service [USFWS] 2008a) and a North Dakota Limited-interest National Wildlife Refuges CCP (USFWS 2006a) provide overarching authority and guidance regarding habitat acquisition, protection, and management in the District. The HMP will serve as the primary step-down management plan from the CCP (USFWS 2008a) that will provide managers with specific guidance to work within a landscape context to support the strategic habitat conservation (SHC; USFWS 2006b) population objectives in this plan. This SHC approach will guide administration of conservation easements, private lands enhancement and restoration, and management activities on WPAs throughout the District for the next 8 years when the next CCP is scheduled for completion. Staff identified 5 primary factors that describe the need for this HMP to inform conservation delivery on the District:

1. Establish habitat conservation goals and objectives that step down from the CCP that increase the efficiency and biological return of conservation activities using the principles of SHC.

2. Establish measurable targets for individual goals and objectives based on clear rationales to conserve wetland and grassland habitat for priority resources of concern in the District. Carefully planned conservation treatments with quantifiable outcomes described in this HMP will be a catalyst for adaptive management and iterative decision making using SHC.

3. Ensure that management decisions are consistent with the mandates of the National Wildlife Refuge System Administration Act of 1966 and the National Wildlife Refuge System (NWRS) Improvement Act of 1997.

4. Design an effective Inventory and Monitoring Plan that will provide biologists and managers with meaningful scientific information acquired from assumption-based research and focused inventories and monitoring to facilitate biologically defensible management decisions.

5. Provide the public including adjacent landowners, visitors, other state and federal agencies and private organizations with a transparent approach for conservation decisions in the District.

The District has stewardship over an important network of public lands and conservation easements held on private lands that protect habitat for the benefit of waterfowl and other migratory birds, threatened and endangered species, and resident wildlife. By administering these conservation lands, the District (Figure 1-1) contributes to a much larger network of districts and national wildlife refuges located in the Prairie Pothole Region (PPR) that collectively function to support migratory bird populations, ecosystem services, and the mission of the NWRS.

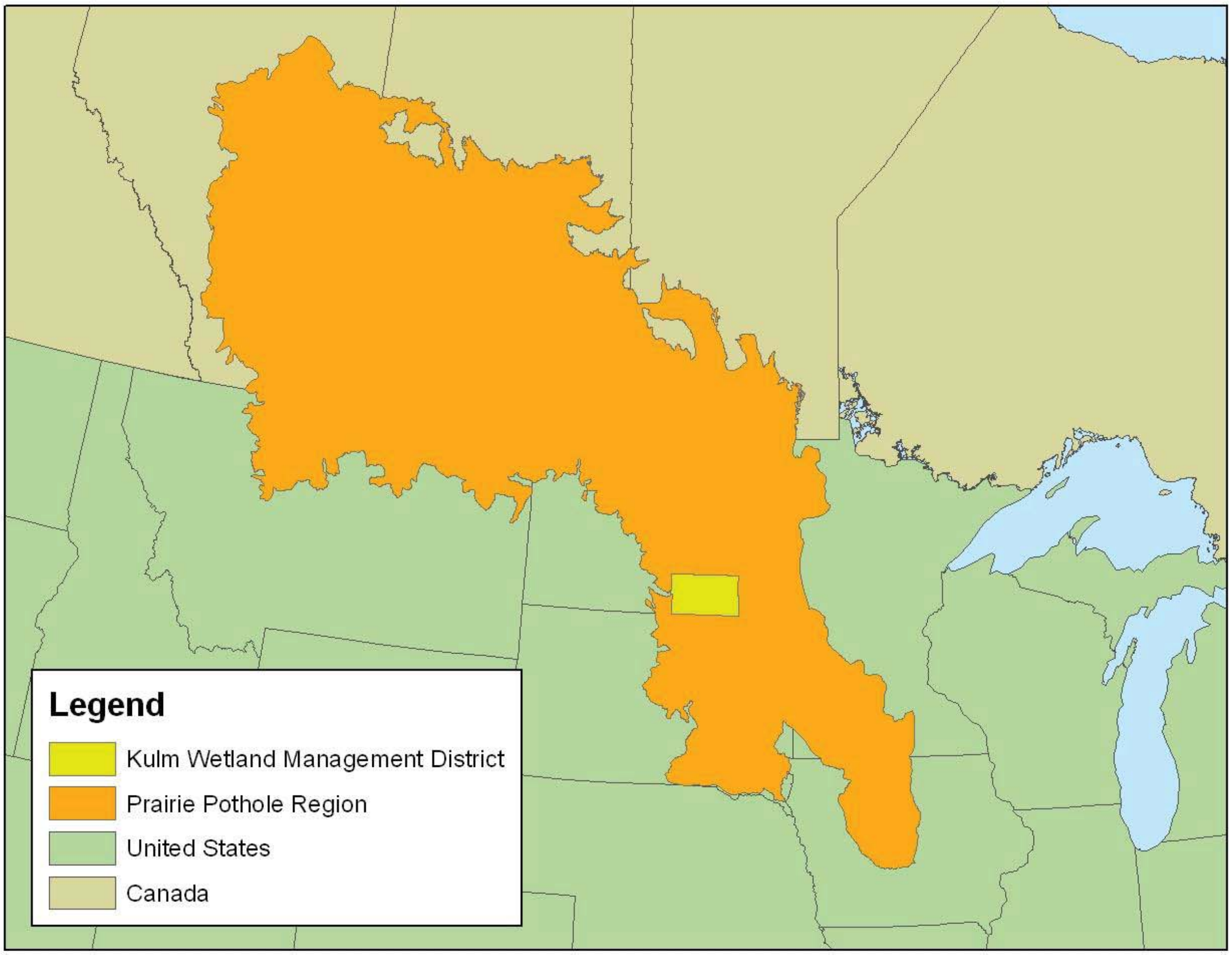


Figure 1-1. Location of Kulm Wetland Management District within the Prairie Pothole Region of North America.

The contribution of the District to the NWRS mission is guided by the principles set forth in the wildlife and habitat vision of the Improvement Act. These principles are:

- Wildlife comes first.
- Ecosystems, biodiversity, and wilderness are vital concepts in refuge management.
- Refuges must be healthy.
- Growth of refuges must be strategic.

- The NWRS serves as a model for habitat management with broad participation from others.

The HMP provides a framework for continued conservation of waterfowl and other migratory birds at landscape- and local-scales using the principles of SHC (USFWS 2006b, 2008c) and adaptive management (Williams et al. 2009). Successful implementation of this HMP will increase the District's contribution to migratory bird populations through focused conservation delivery that accounts for factors influencing the persistence of their habitats such as grassland conversion, wetland drainage, landowner acceptance of conservation programs, conservation policy, and climate change. Multiple priority species referred to as resources of concern (ROC; USFWS 2002) were selected for inclusion in the HMP because their conservation benefits larger guilds of species that use habitats and respond to management similarly (Lambeck 1997, Noon et al. 2009). Staff selected species with sufficient data describing their ecology, life history, and associated habitat relationships to allow for development of optimal management strategies and greater likelihood for their persistence (Noon et al. 2009). The Service's SHC approach uses priority species to help managers make better decisions about managing trust species on lands under stewardship (Johnson et al. 2009). Because one outcome of SHC is to develop objectives for each general habitat type (Johnson et al. 2009), the District selected species as ROC whose habitat requirements were indicative of the perceived habitat requirements of larger guilds of similar species in the PPR.

Development of this HMP required a critical evaluation of the current and future management direction of the District. Information used to develop the goals, objectives, and strategies (described in Chapters 4 and 5) was obtained from relevant scientific literature, prior inventory and monitoring data, species-habitat relationship models, and Service expertise. This HMP also was peer-reviewed by credible independent experts to ensure that the proposed SHC approach was based on scientifically defensible strategies for conserving habitat that were transparent and replicable within the PPR. The District will conduct a thorough review of the HMP every 5 years to incorporate new scientific information and if necessary, modify conservation design and delivery where appropriate.

1.2 Legal Mandates

STATUTORY AUTHORITY

Similar to national wildlife refuges, wetland management districts are managed to achieve the mission and goals of the NWRS and their designated purpose(s) as described in establishing legislation, executive orders or other establishing documents. Administration and guidance of the NWRS are provided in the Refuge System Administration Act of 1966 (P.L. 87-714), Title 50 of the Code of Federal Regulations, the Service Manual, and the Improvement Act.

The Improvement Act provided a unified mission for the NWRS:

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

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

- to fulfill the mission of the NWRS;

- to fulfill the individual purposes of each refuge;
- to consider the needs of fish and wildlife first;
- to fulfill the requirement of developing a CCP for each unit of the NWRS and fully involve the public in the preparation of these plans;
- to maintain the biological integrity, diversity, and environmental health (BIDEH) of the NWRS;
- to recognize that wildlife-dependent recreation activities including hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation, are legitimate and priority public uses;
- to retain the authority of refuge managers to determine compatible public uses.

ESTABLISHING LEGISLATION AND DISTRICT PURPOSES

The District was established in 1971 as part of the Small Wetlands Acquisition Program under the authority of the Migratory Bird Hunting and Conservation Stamp Act of 1934 ("Duck Stamp Act") as amended by Public Law 85-585 in August 1958. This legislation allowed for the acquisition of WPAs and conservation easements for waterfowl production.

The purposes of the District were established by the following legal authorities:

1. Migratory Bird Hunting and Conservation 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."

2. Migratory Bird Conservation Act 16 USC 715(d) – "For any other management purposes, for migratory birds."

A December 2006 memorandum from then Region 6 Assistant Regional Director Richard A. Coleman further reaffirmed that the purpose of all Region 6 Districts is "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."

Conservation Easements

The legal authority for the Service to acquire conservation easements to protect grasslands and wetlands is granted under the Migratory Bird Hunting Stamp Act 16 USC 718dI, the Fish and Wildlife Act of 1956, (16 U.S.C. 742a-742j), the Emergency Wetlands Resources Act of 1986, (16 U.S.C. 3901), the Land and Water Conservation Fund Act [16 U.S.C. 4601-9(a)(1)], and the North American Wetlands Conservation Act (16 U.S.C. 4401 – 4412).

Farmers Home Administration (FmHA) conservation easements in the District were not acquired as part of the Small Wetlands Acquisition Program. FmHA easements were established "for conservation purposes" by the U.S. Farm Service Agency under the Consolidated Farm and Rural Act of 1981 and 1985 (7 U.S.C. 331 and 335), Executive Orders 11990 and 11988, and Section 1314 of the 1985 Food Security Act.

Waterfowl Production Areas

Waterfowl production areas are public lands purchased in fee-title by the federal government for the production of waterfowl and other migratory birds on behalf of the American public. Funding resources used to buy WPAs generally comes from the purchase of federal Duck Stamps by sportsmen and the general public. All WPAs are administered by the Service within an administrative WMD boundary that defines the geographical extent of the District. WPAs are open to the public for hunting, fishing, bird watching, trapping, hiking and most other non-motorized and non-commercial outdoor recreation.

Wildlife Development Areas

Wildlife Development Areas (WDAs) were purchased in fee-title by the Bureau of Reclamation as part of North Dakota's Garrison Diversion Unit. Wildlife development areas were transferred to the Service through a memorandum of agreement between the Service, Bureau of Reclamation and the North Dakota Game and Fish Department. The District manages the Pilgrims Rest WDA, a 640 acre unit, similar to WPAs to benefit waterfowl and other migratory birds.

Limited-interest National Wildlife Refuges

The District has three limited-interest national wildlife refuges (NWR) that were established in 1939 "as a refuge and breeding ground for migratory birds and other wildlife" by Executive Orders 8162 ([Bone Hill NWR; 640 acres] and [Maple River NWR; 712 acres]) and 8117 (Dakota Lake NWR; 2,799 acres). A North Dakota Limited-interest National Wildlife Refuges CCP (USFWS 2006a) provides guidance on the administration of these NWRs.

1.3 Relationship to Other Plans

This HMP is a stepdown plan from the North Dakota Comprehensive Conservation Plan (USFWS 2008a). The goals, objectives, and strategies described in this HMP provide a more refined vision of conservation delivery for the District. The District also acknowledges several existing local, regional, and national conservation plans (described below). The contribution of the District to these conservation plans mainly occurs through the acquisition and protection of conservation easements and management of wetland and grassland habitat on WPAs that benefit migratory birds. Most regional and national conservation plans tend to be broad in context, focus on landscape-scale conservation, and generally coincide with the purposes of the District and the mission of the NWRS. The District plans are existing plans (i.e., North Dakota WMD CCP; USFWS 2008a) that have been the foundation for previous management since their implementation. All conservation plans listed below were reviewed, and where appropriate, specific goals and objectives were integrated into this HMP.

NATIONAL PLANS

North American Waterfowl Management Plan

The North American Waterfowl Management Plan (NAWMP; U.S. Department of the Interior and Environment Canada 2012) provides an internationally coordinated strategy to restore waterfowl populations through habitat protection, restoration, and enhancement. A diverse set of conservation partners including federal, state, provincial, tribal, and local governments, businesses, conservation organizations, and individual citizens implement the plan through regional joint ventures that identify important habitats to sustain waterfowl populations and benefit other wetland-associated species.

USFWS Migratory Bird Program Strategic Plan

The Migratory Bird Program completed a 10-year strategic plan in 2004 (USFWS 2004). The strategic plan seeks to conserve and manage migratory bird populations and their habitats. The Service is the principle federal agency charged with protecting and enhancing populations of migratory birds and their habitat. This strategic plan sets goals for ensuring the long-term sustainability of all migratory bird populations and for maintaining their intrinsic, ecological, recreational, and economic significance.

North American Bird Conservation Initiative

The North American Bird Conservation Initiative (NABCI) contributes to a strategic and nationally coordinated series of plans that seek to conserve and manage migratory bird populations and their habitats throughout North America. A NABCI committee provides oversight to advance bird conservation in North America based on defensible science and cost-effective management at the landscape scale in region-specific Bird Conservation Regions (BCRs); the District occurs within BCR 11, Prairie Potholes. Conservation of North American birds is described under four planning initiatives: the North American Landbird Conservation Plan (Rich et al. 2004), U.S. Shorebird Conservation Plan (Brown et al. 2001), the North American Waterbird Conservation Plan (Kushlan et al. 2002) and NAWMP (U.S. Department of the Interior and Environment Canada 2012).

Recovery Plans for Federally Listed Threatened or Endangered Species

Where federally listed threatened or endangered species occur in the District, the Service applies the management goals and strategies outlined in the following species recovery plans:

- The District lies on the eastern edge of the migration pathway for the endangered whooping crane (*Grus americana*). Recovery of this species is guided by the International Whooping Crane Recovery Plan (Canadian Wildlife Service and USFWS 2007). Whooping cranes are occasionally observed during migration on the District. The District consults the Whooping Crane Contingency Plan (USFWS 2001a) for appropriate actions when dealing with a confirmed observation of whooping cranes.

- Sprague's pipit (*Anthus spragueii*) is considered a candidate species whose breeding range includes the District. A Sprague's Pipit Conservation Plan provides information on their life-history and outlines goals to maintain or increase their current population size and viability throughout their distribution (Jones 2010). A step-down document, Management Strategy and Guidelines for Sprague's Pipit on U.S. Fish and Wildlife Service Lands in Region 6, offers recommendations for identifying and managing Service-owned prairies, especially in cases where the site-specific occurrence of Sprague's pipit has yet to be determined, or they are known to occur (USFWS 2011a).

- Several other species are protected in the District including gray wolf (*Canis lupus*; endangered), rufa red knot (*Calidris canutus rufa*; threatened), and northern long-eared bat (*Myotis septentrionalis*). These species are considered to be rare to extremely rare because the District occurs outside of their primary breeding range. Thus, implementation of this plan and relevant recovery plans for these species in the District would not directly or indirectly affect (neither negative nor beneficial) their populations.

- Piping plovers (*Charadrius melodus*), a threatened species, have been documented in Logan and McIntosh counties on both public and private lands. The District contains designated critical habitat in these counties (Figure 1-2) and follows the Piping Plover Recovery Plan for the Northern Great Plains (USFWS 1988) and the Draft Revised Recovery Plan for Piping Plovers Breeding on the Great Lakes and Northern Great Plains of the United States (USFWS 1994).

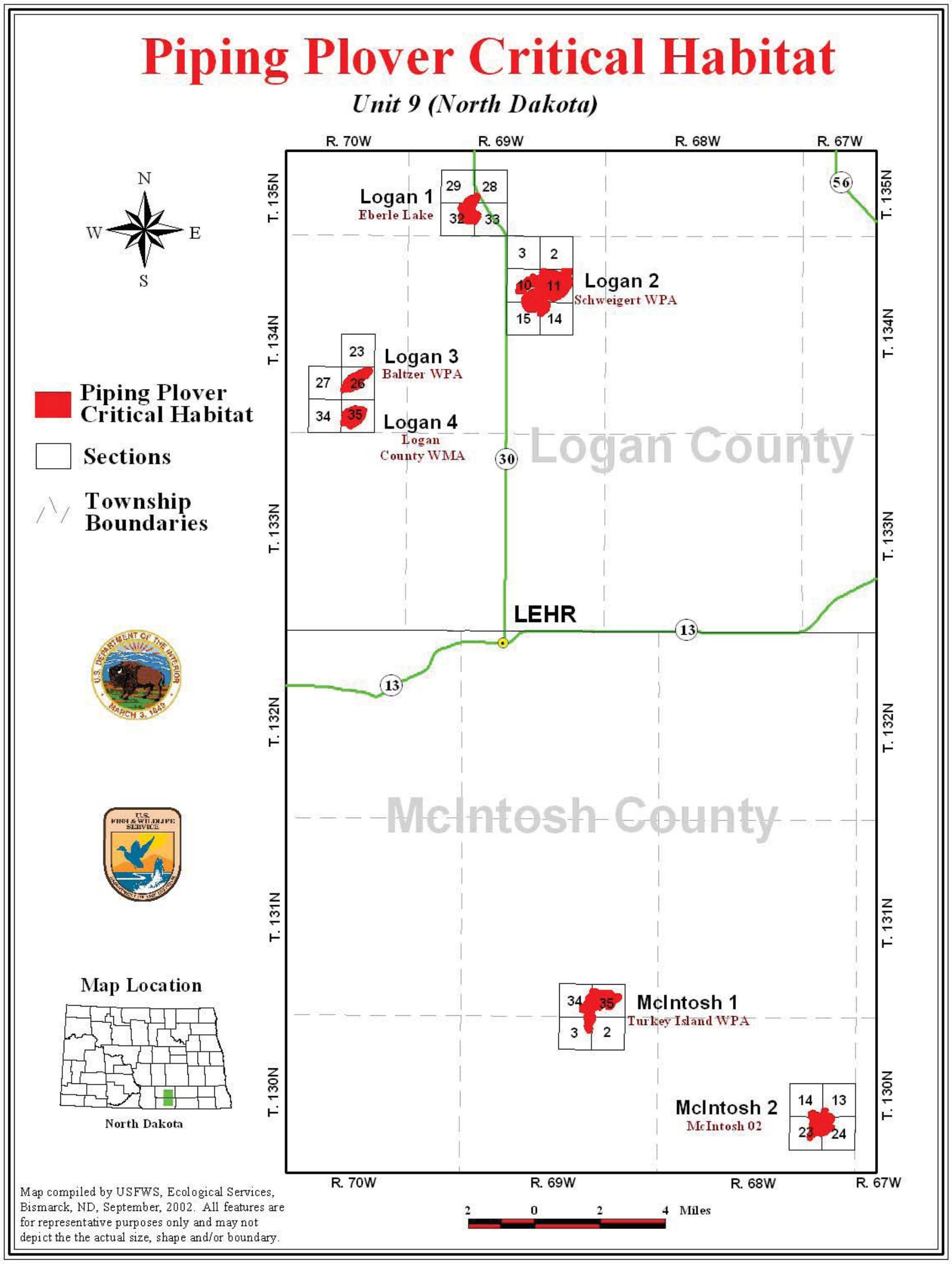


Figure 1-2. Location of designated piping plover critical habitat within Kulm Wetland Management District.

REGIONAL PLANS

Plains and Prairie Potholes Landscape Conservation Cooperative

Landscape Conservation Cooperatives (LCCs) are applied conservation science partnerships focused on a defined geographic area that inform on-the-ground strategic conservation efforts at landscape scales. LCCs aim to enable resource management agencies and organizations to collaborate in an integrated fashion within and across landscapes (USFWS 2010a). The Service and its partners work within the Plains and Prairie Potholes LCC to facilitate landscape-scale conservation.

Prairie Pothole Joint Venture Implementation Plan

The Prairie Pothole Joint Venture (PPJV) was established under the framework of the NAWMP. Partners within the PPJV have identified a conservation goal of 0.57 million ha of wetlands and 4.2 million ha of grasslands to maintain migratory bird populations in the future (Ringelman et al. 2005). The PPJV Implementation Plan provides a conservation framework for all migratory birds in the Montana, North Dakota, South Dakota, Minnesota, and Iowa portions of the PPR (Ringelman et al. 2005). The plan incorporates stepped-down objectives for waterfowl, waterbirds, shorebirds and landbirds with conservation measures that focus on sustaining migratory bird populations at objective levels through targeted wetland and grassland protection, restoration and enhancement programs.

Land Protection Plan for the Dakota Grasslands Conservation Area

The majority of the District is included in the Dakota Grasslands Conservation Area (DGCA; Figure 1-3) which aims to conserve 240,000 acres of wetlands and 1.7 million acres of grasslands within the mixed-grass prairie ecosystem of North Dakota and South Dakota (USFWS 2011b). The purpose of the DGCA is to provide for the long-term viability of breeding waterfowl populations through the conservation of existing habitats while considering the needs of other migratory birds, threatened and endangered species, and other wildlife. The DGCA follows the goals and objectives outlined in the PPJV plan and aims to conserve all migratory birds through the permanent protection of wetland and grassland habitat through conservation easements purchased from willing sellers. At current acquisition rates, the goal for the proposed DGCA would be achieved within 30 years.

Northern Prairie and Parkland Waterbird Conservation Plan

The Northern Prairie and Parkland Waterbird Conservation Plan is a joint Canada/United States effort that provides guidelines for the conservation, maintenance and management of waterbirds and their habitats throughout the region (Beyersbergen et al. 2004).

Northern Plains/Prairie Potholes Regional Shorebird Conservation Plan

This regional shorebird conservation plan outlines goals aimed at maintaining breeding shorebird populations and their habitat used during migration (Skagen and Thompson 2000). The plan also describes factors that are challenging shorebird populations along with management and monitoring needs for shorebird species.

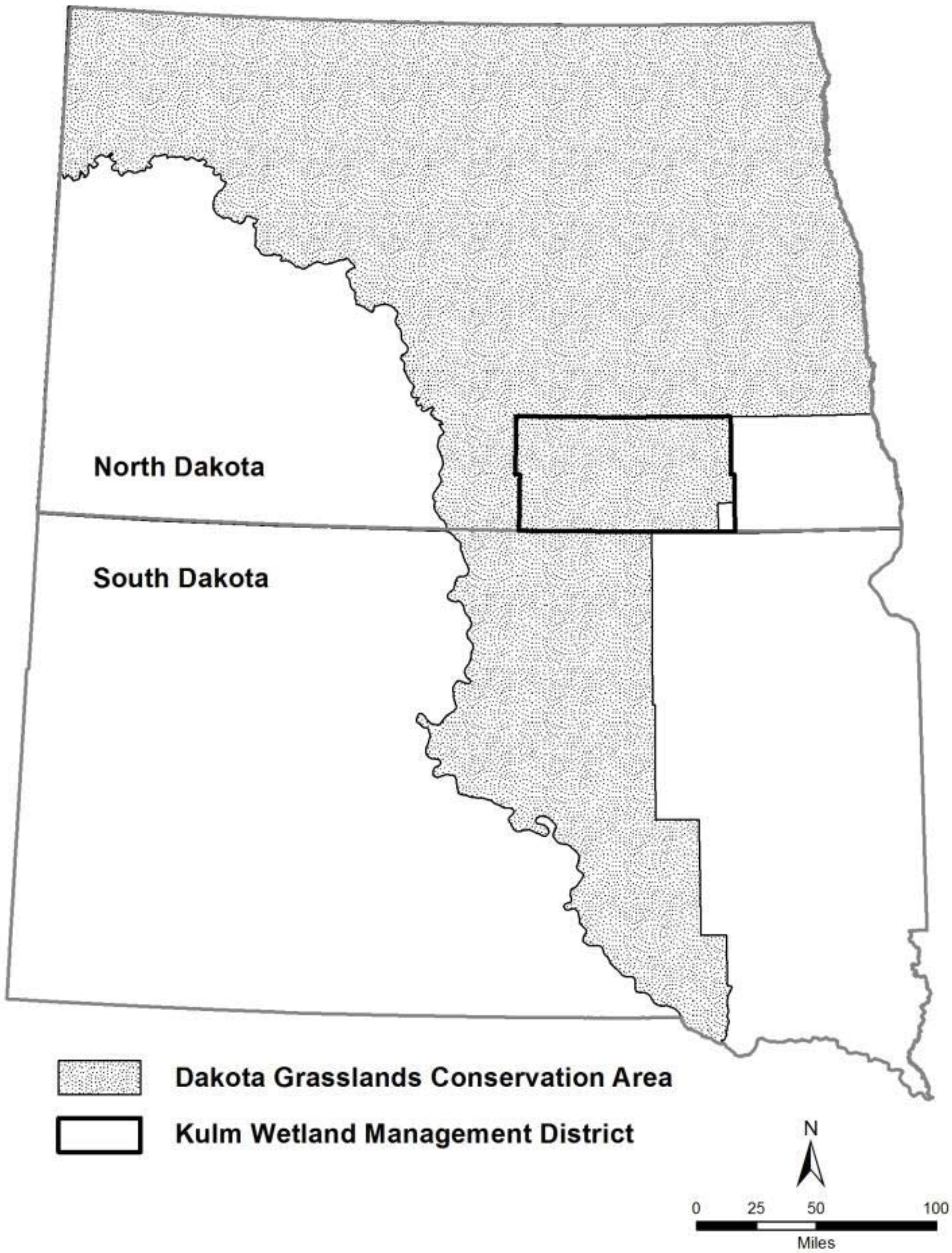


Figure 1-3. Location of Kulm Wetland Management District within the Dakota Grasslands Conservation Area.

Partners in Flight Bird Conservation Plan for the Northern Mixed-grass Prairie

This plan provides a long-term framework for ensuring that viable populations of landbirds continue to exist and function within larger avian communities (Fitzgerald et al. 1999). The plan also describes opportunities for the integration of population objectives with other regional plans, the ecological requirements for these species and habitat management strategies that benefit landbird communities.

North Dakota Comprehensive Wildlife Conservation Strategy

North Dakota's Comprehensive Wildlife Conservation Strategy was developed by the North Dakota Game and Fish Department and it provides strategic vision for preserving wildlife diversity within the state (Hagen et al. 2005). It is intended to identify species of greatest conservation need, provide fundamental background information, strategic guidance and provide a framework for developing and coordinating conservation actions to safeguard all fish and wildlife resources.

DISTRICT PLANS

Comprehensive Conservation Plans

The North Dakota Wetland Management District CCPs (USFWS 2006a, USFWS 2008a) provide broad guidance on the stewardship of District lands and related management activities for a period of 15 years. The CCPs identified the role that the District has in supporting the NWRS mission and specific goals and objectives were developed to provide a framework for managing District resources. This HMP is a step-down management plan from the North Dakota WMD CCP (USFWS 2008a) that will integrate and refine the CCP goals and objectives (Appendix C) and provide specific management strategies that are consistent with establishing purposes of the District.

Integrated Pest Management Plan

The District's Integrated Pest Management (IPM) plan provides a comprehensive strategy for controlling or eliminating key invasive species. The IPM plan specifically outlines chemical, biological, mechanical and cultural application methods and best management practices used to help reduce the abundance of invasive species on the District. This HMP will provide detailed strategies for controlling exotic cool-season grasses within specific habitat types (i.e., native prairies, reconstructed prairies, or seeded introduced grasslands) using application methods that are scientifically appropriate in timing, frequency and intensity.

Chapter 2
Inventory and Description of Habitat

2.1 District Location and Description

The District is located in south-central North Dakota and provides administration of lands within a 4-county area (Figure 2-1). The District boundary coincides with the peripheral extent of Dickey, LaMoure, Logan and McIntosh; total area for Dickey, LaMoure, Logan and McIntosh Counties is 736,610 ac, 731,038 ac, 647,222 ac, and 636,484 ac, respectively.

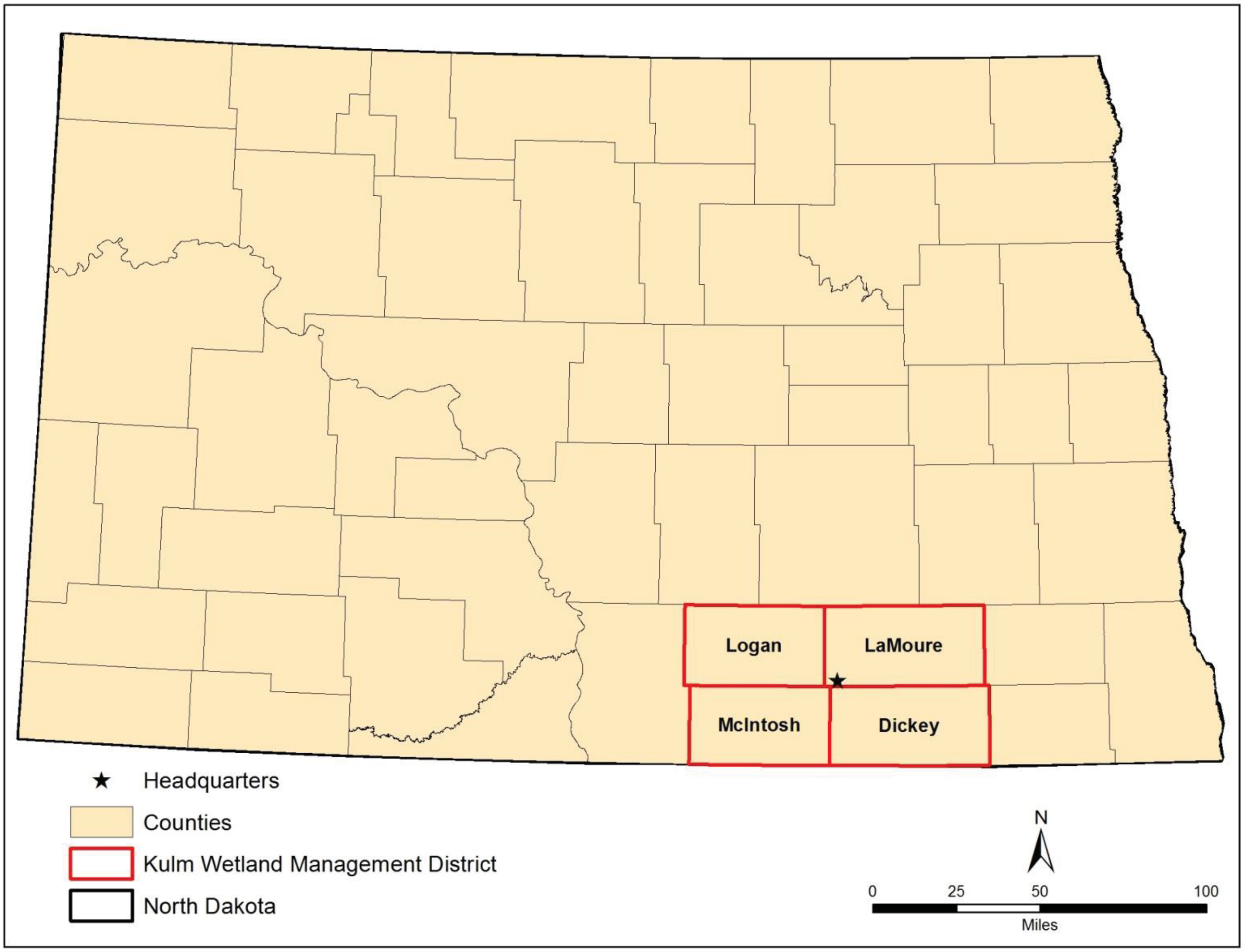


Figure 2-1. Location of Kulm Wetland Management District in North Dakota.

Similar to most of eastern North Dakota, the District is located in a rural, agriculturally based region with a low human population density that generally does not exceed five people per square mile (U.S. Census Bureau 2010). The nearest metropolitan centers from the District headquarters located in Kulm, North Dakota (Figure 2-1), include Bismarck, North Dakota (130 mi), Fargo, North Dakota (150 mi), Sioux Falls, South Dakota (285 mi), and Minneapolis, Minnesota (330 mi).

The District protects wetland and grassland habitat on 187,548 acres of conservation easements (USFWS North Dakota Wetland Acquisition Office, data current to February 27, 2014) and 45,402 acres of fee-title land (200 WPAs & 1 WDA; WPAs hereafter) for the benefit of waterfowl and other migratory birds (Figure 2-2).

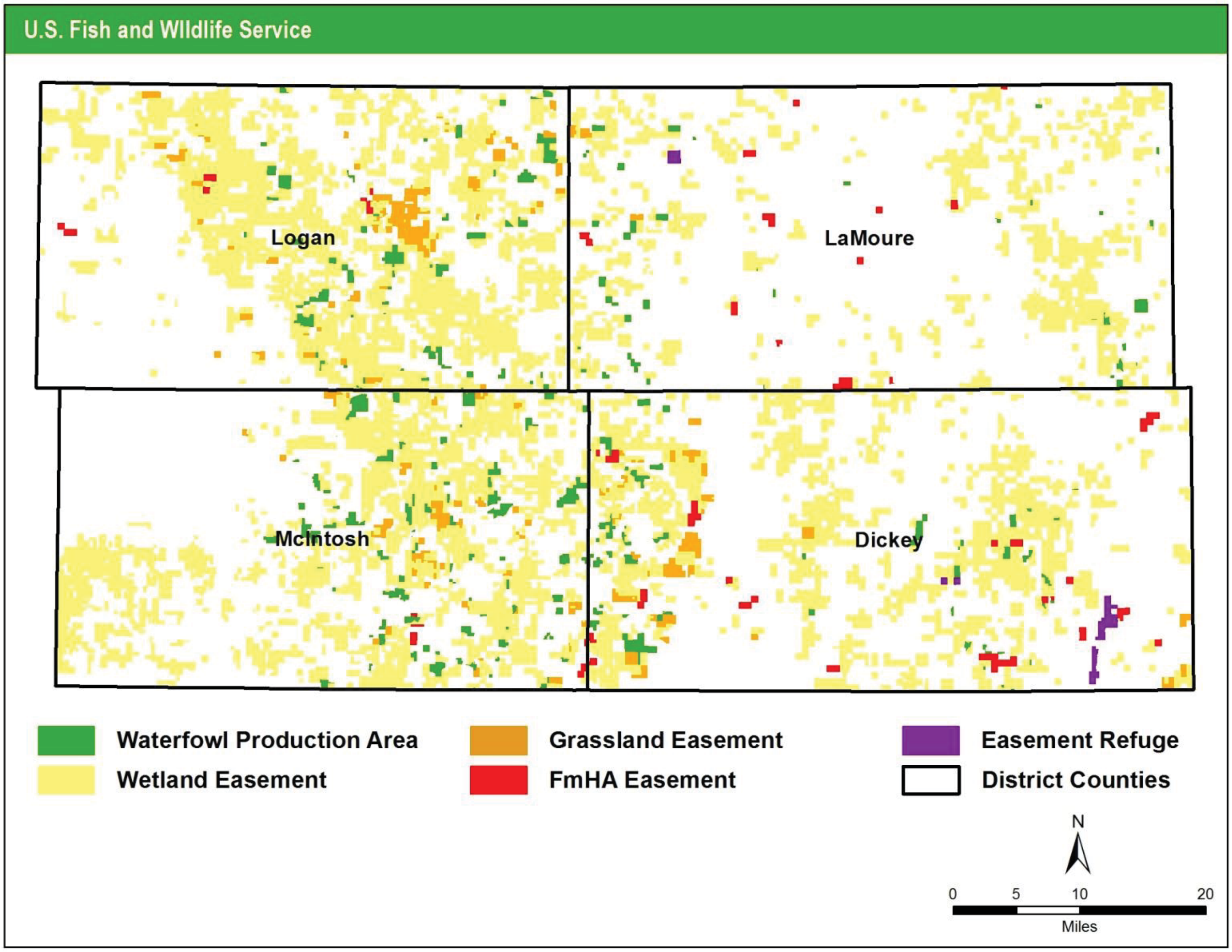


Figure 2-2. Lands administered by Kulm Wetland Management District. Wetland, grassland, and FmHA conservation easement data was data current to February 27, 2014. The USFWS makes no claim as to the accuracy or completeness of the displayed information. Shaded areas depicting USFWS conservation easements and WPAs are for illustrative purposes only and do not represent legal boundaries or in the case of easements, acreage of wetland or grassland resources included in the easement contract. For more detailed information on the boundaries of conservation easement or WPA lands, contact the USFWS Realty Office located in Bismarck, North Dakota.

2.2 Management Units

CONSERVATION EASEMENTS

The District administers 126,519 acres of wetland easements and 61,029 acres of grassland easements. The Service purchases limited-interest conservation easements from willing private landowners that have voluntarily sold a portion of their property rights to allow for perpetual protection of wetland and/or grassland habitat. All land remains in private ownership. Property tax and land management, including control of noxious weeds and other invasive plants and trees, remains the responsibility of the landowner. Landowners maintain complete control of public access to the land under easement. The Service actively enforces conservation easements to ensure that the Service's legal interest is not compromised.

While the easement contract specifies perpetual protection, it does not eliminate all activities. Wetland easements generally prohibit draining, burning, filling, or leveling and grassland easements generally prohibit the plowing, breaking sod, or permanent alteration of grassland habitat or alteration of natural topography. However, protected wetland basins may be hayed or grazed without restriction and farmed during natural dry cycles. Grassland easements prohibit conversion to cropland or alteration of natural topography, but do not restrict grazing or seed harvesting in any way and haying is permitted after July 15 each year.

The District has 30 FmHA easements which are administered by the Service primarily to protect wetlands. However, FmHA easements can vary from easement to easement based on the provisions outlined in the quitclaim deed for each property. Generally, most FmHA easements were acquired for conservation, recreation, or wildlife purposes, but some included provisions for historical and cultural resources as well.

LIMITED-INTEREST EASEMENT NATIONAL WILDLIFE REFUGES

The District also administers a total of 4,152 acres on the following limited-interest easements NWRs: Bone Hill NWR, Maple River NWR, and Dakota Lake NWR. These limited-interest easement NWRs permanently protect wetland habitat for migratory birds. Wetlands on these NWRs are generally permanent wetland types (e.g., lakes, riverine) that waterfowl and other wetland-dependent birds use during migration and to a lesser extent for breeding and nesting purposes. The Service manages these NWRs following the goals and objectives outlined in the North Dakota limited-interest CCP (USFWS 2006). The Service's water management capability on these NWRs is limited to an earthen/sheet pile dam with stop log on Dakota Lake NWR and an earthen dam and sheet pile weir on Maple River NWR.

WATERFOWL PRODUCTION AREAS

The District manages 45,402 acres held in fee-title ownership on 201 WPAs (WPA range = 0.3 – 1,756 acres) comprised of 24,549.7 acres of natural wetlands and 20,852.3 acres of grasslands that are actively managed in the District. The Service actively manages native sod prairie, low- and high-diversity reconstructed prairies, seeded introduced grasslands composed of dense nesting cover (DNC; intermediate wheatgrass (*Thinopyrum intermedium*), tall wheatgrass (*T. ponticum*), and alfalfa (*Medicago sativa*) or sweetclover (*Melilotus officinalis*) on individual management units within each WPA for nesting birds (Figure 2-3). Management of these grasslands aims to enhance the condition of nesting cover for waterfowl and other migratory birds using a variety of management techniques including the use of prescribed fire, grazing, haying, prairie reconstruction, tree removal and invasive species management. Wetlands on WPAs also serve as important habitat that are used by waterfowl during migration, breeding, nesting, and brood-rearing periods and as a primary source of forage, concealment from predators, and for courtship displays and social interactions. However, the Service does not have the ability to manipulate water levels on natural wetlands within WPAs. Therefore, wetlands on WPAs are influenced by ecosystem processes (see Euliss et al. 2008) and adjacent land use practices.

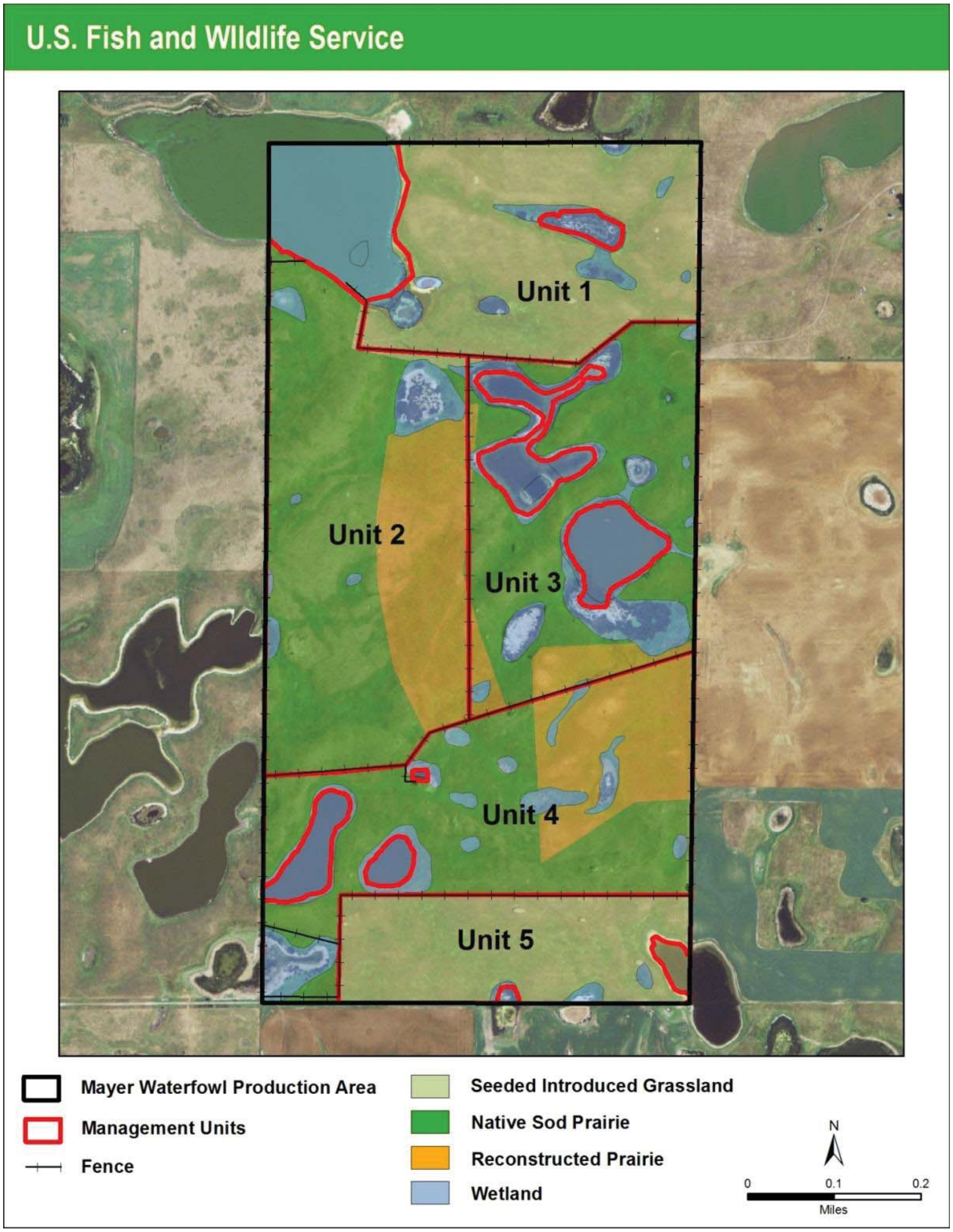


Figure 2-3. An example of individual management units and different habitat types occurring on the Mayer Waterfowl Production Area in Logan County, North Dakota.

2.3 Geographical Setting

PRAIRIE POTHOLE REGION

The PPR encompasses 347,492 mi^2 and extends southeast from the provinces of Alberta, Saskatchewan, and Manitoba in Canada through portions of Montana, North Dakota, South Dakota, Minnesota, and Iowa (Gleason et al. 2005; Figure 1-1). Although much of the native grassland (70% in ND; Conner et al. 2001) and wetland habitat (49% in ND; Dahl 1990) in the PPR has been converted primarily for agricultural purposes, the remaining habitat supports approximately 50% of the breeding waterfowl (Batt et al 1989) in North America and is critically important to other migratory birds (Igl and Johnson 1997, Niemuth et al 2009). Remaining habitat also helps maintain important ecosystem services including regional and national biodiversity, attenuation of floodwater, nutrient cycling, carbon sequestration, and groundwater recharge (Hubbard 1988, Knutsen and Euliss 2001, Euliss et al. 2008, Gleason et al. 2011).

The District composes only 1.2% (1,113,433 ha) of the total land area within PPR, but has a crucial role in supporting the carrying capacity and production of waterfowl and other migratory birds due to the remaining grassland and wetland habitat in the four counties. In fact, waterfowl pair density exceeds 100 duck pairs per square mile in many parts of the District (Figure 2-4). These areas are associated with high wetland densities (which can exceed 100 wetland basins per square mile) that are attractive to most migratory birds in the PPR (Johnson and Grier 1988). Continued protection and management of grassland and wetland habitat within the District also contributes to the goals and objectives outlined in the aforementioned national, regional and local conservation plans.

MIXED-GRASS PRAIRIE ECOSYSTEM

The District lies within the mixed-grass prairie ecosystem which is one of the largest grassland dominated ecosystems in North America (Bragg and Steuter 1996). Historically, this ecosystem was characterized by a mosaic of mixed-grass prairie and dynamic wetlands that were not converted for agricultural purposes until the onset of European settlement during the 1830’s to 1880’s (Samson and Knopf 1994, Severson and Hull Sieg 2006). Although approximately two-thirds of the mixed-grass prairie has been converted for agricultural purposes (National Wildlife Federation 2001), the remaining grasslands in this region are highly productive and support North America’s largest and most diverse assemblage of breeding waterfowl (Batt et al. 1989), shorebirds (Skagen and Thompson 2000), waterbirds (Kushlan et al. 2002) and grassland songbirds (Rich et al. 2004).

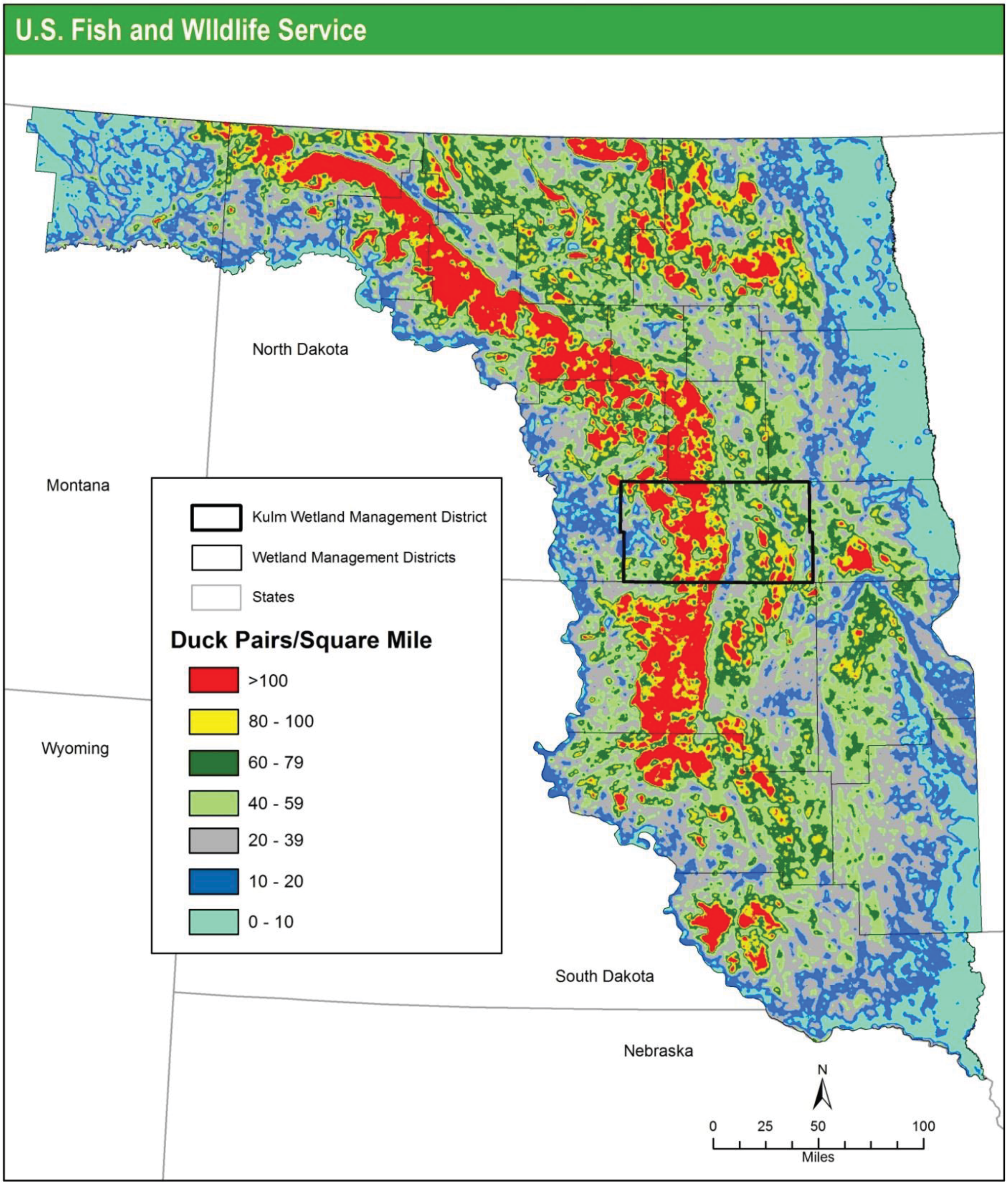


Figure 2-4. Average density and distribution of five combined dabbling ducks including mallard (*Anas platyrhynchos*), blue-winged teal (*Anas discors*), gadwall (*Anas strepera*), northern shoveler (*Anas clypeata*), northern pintail (*Anas acuta*) in the Kulm Wetland Management District and USFWS Dakotas Zone (northeast Montana, North Dakota, South Dakota portions of the U.S. Prairie Pothole Region) from surveys conducted from 1987-2011. Estimates were derived from breeding waterfowl pair surveys conducted during the USFWS four square mile breeding waterfowl and habitat survey during 1987-2011.

PHYSIOGRAPHIC REGIONS AND TOPOGRAPHY

Major physiographic regions that formed through glacial processes from west to east include the Missouri Coteau Slope, Missouri Coteau, and Glaciated Plains (hereafter Drift Prairie) (Figure 2-5). The Missouri Coteau Slope descends from the Missouri Coteau to the east and is bordered along its western margin by the Missouri River. Numerous draws and coulees naturally drain the area and though wetlands are still prevalent, they are less numerous than in the Missouri Coteau or Drift Prairie. Dissecting the District from north to south is the Missouri Coteau, a terminal moraine created during Wisconsin glaciation ca. 10,000 years ago. Elevation increases nearly 305 m (1,000 ft) above the James River Valley which transcends the Drift Prairie. The greatest topographic relief (up to 500 ft) occurs along the escarpment in the Missouri Coteau. The Missouri Coteau is characterized by rough and hilly terrain intermixed with abundant wetlands exceeding >100 wetlands per square mile. This area also supports most of the remaining intact native mixed-grass prairie grasslands in the District because the dissected topography and highly erodible soils are less suitable for row crop agriculture. The combination of wetland/grassland habitat in relatively large blocks makes the Missouri Coteau an important physiographic area in the District for waterfowl production (Stewart and Kantrud 1973, Cowardin et al. 1995, Reynolds et al. 2001, Reynolds et al. 2007). The Drift Prairie lies east of the Missouri Coteau and also contains areas where wetland density exceeds 100 wetlands per square mile. The highly fertile soils of the Drift Prairie along with the flatter terrain are more amenable to row crop agriculture.

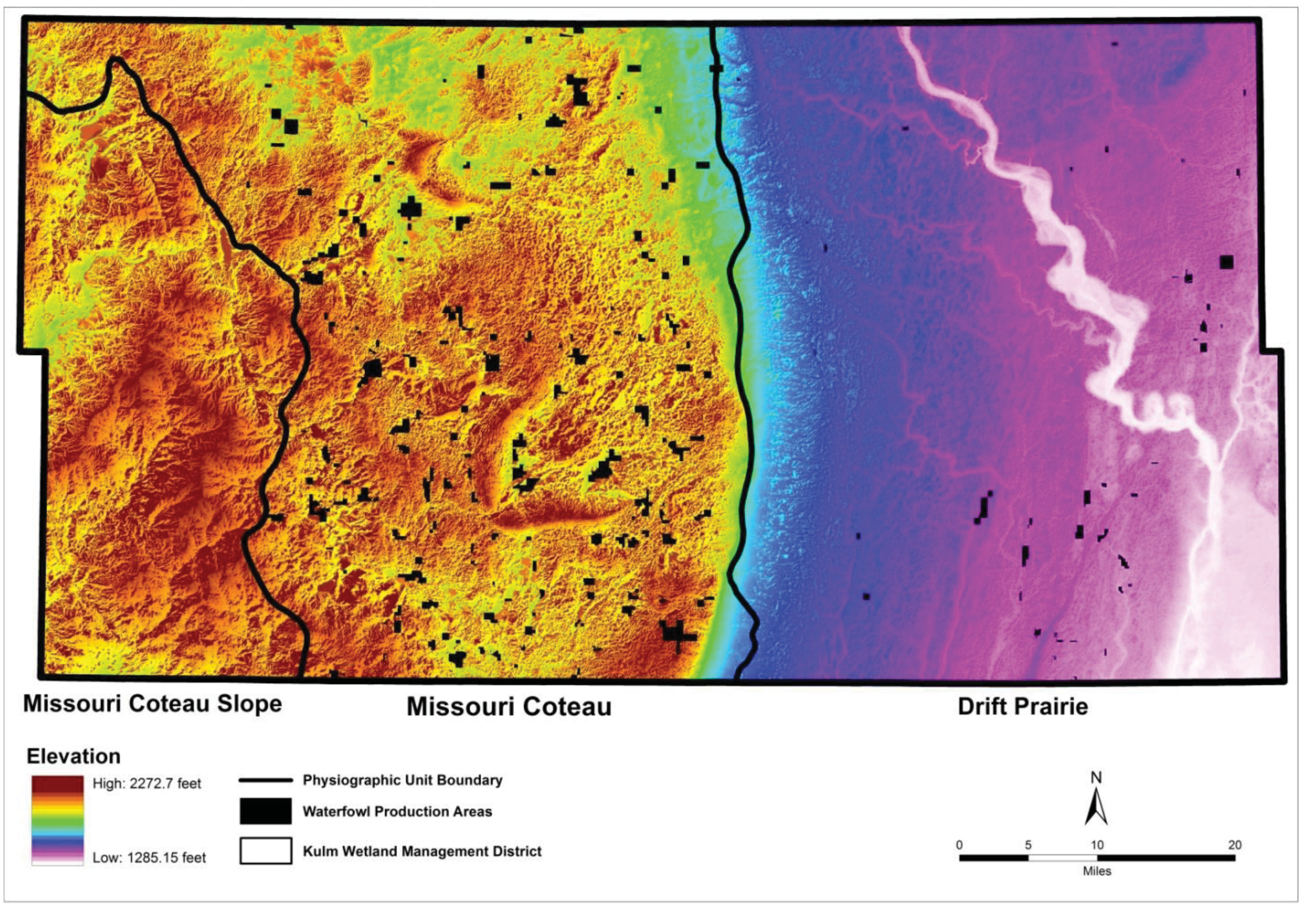


Figure 2-5. Major physiographic units representing level 3 ecoregions from west to east including the Missouri Coteau Slope, Missouri Coteau, and Drift Prairie within Kulm Wetland Management District.

ECOREGIONS WITHIN KULM WETLAND MANAGEMENT DISTRICT

Level 3 Ecoregions

The District occurs within 3 primary ecoregions (Omernik 1987, 1995, U.S. Environmental Protection Agency 2003) from west to east: Northwestern Glaciated Plains Ecoregion 42, Northwestern Great Plains Ecoregion 43, and Northern Glaciated Plains Ecoregion 46.

The Northwestern Glaciated Plains level 3 ecoregion 42 marks the westernmost extent of continental glaciations. This moraine 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 row crop farming in Drift Plains ecoregion 46i (level 4 ecoregion) to the east and the predominance of cattle ranching and farming to the west in Northwestern Great Plains ecoregion 43 (level 3).

The Northwestern Great Plains level 3 ecoregion 43 is limited to the extreme southwest corner of Logan County within the District. 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.

The Northern Glaciated Plains Ecoregion 46, commonly referred to as the Drift Prairie, formed from prolonged glacial activity between 70,000 and 10,000 years ago. This ecoregion is characterized by flat to gently rolling topography and sub-humid conditions that historically fostered a grassland transition between the tall- and short-grass prairies in North America. The remaining seasonal and temporary wetland basins in this ecoregion provides important breeding habitat used by waterfowl and other migratory birds.

Level 4 Ecoregions

The District also lies within 8 level 4 ecoregions (Omernik 1987, 1995; Figure 2-6). The Missouri Coteau Ecoregion 42a is characterized by rolling topography and abundant shallow wetlands. This ecoregion formed during the prolonged retreat of the Wisconsin glaciation that stalled at the Missouri escarpment for thousands of years and slowly melted beneath a mantle of sediment to create the characteristic pothole topography found throughout the Missouri Coteau. Land use is a mixture of tilled agriculture in flatter areas and grazing land on steeper slopes. Remaining wetland and grassland habitat represents one of the most productive areas for breeding waterfowl in North America.

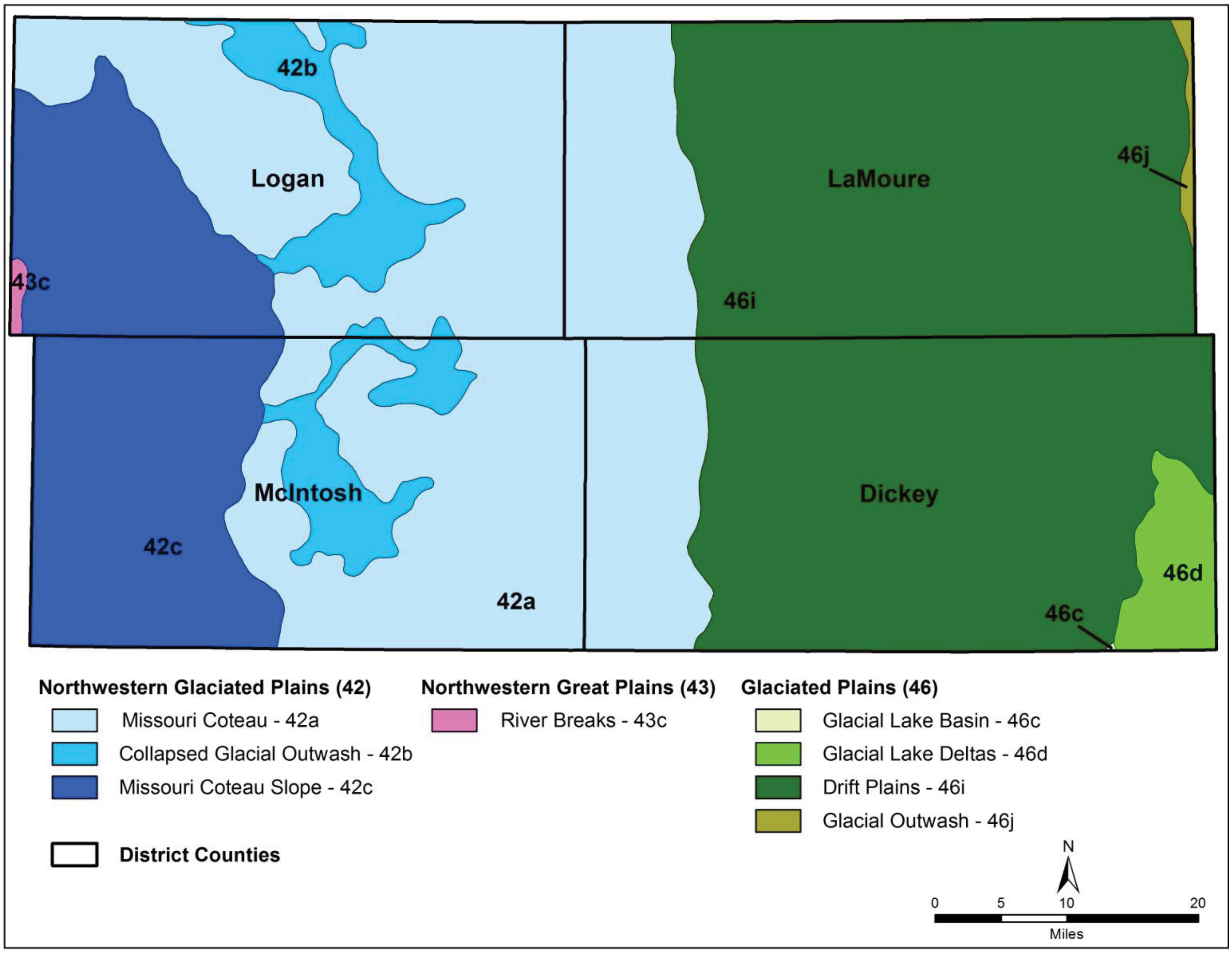


Figure 2-6. Level 3 and 4 ecoregions (Omernik 1987, 1995, U.S. Environmental Protection Agency 2003) within Kulm Wetland Management District.

The Collapsed Glacial Outwash Ecoregion 42b formed from gravel and sand that was deposited by glacial meltwater and precipitation runoff over stagnant ice. Many large shallow wetlands and lakes are found in this ecoregion that 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.

The Missouri Coteau Slope Ecoregion 42c declines in elevation from the Missouri Coteau Ecoregion 42a to the Missouri River. Unlike Missouri Coteau Ecoregion 42a, 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 the Missouri Coteau Ecoregion 42a. Cattle ranching occurs on the steeper land along drainages.

The River Breaks Ecoregion 43c is characterized by broken terraces and uplands that descend to the Missouri River and its tributaries. The dissected topography, wooded draws, and uncultivated areas are conducive for wildlife.

The Glacial Lake Basin Ecoregion 46c was formed when major stream or river drainages were blocked by glacial ice during the Pleistocene. The ecoregion is heavily tilled and is limited to a small area in the southeast corner of Dickey County in the historical Lake Dakota basin.

The Glacial Lake Deltas Ecoregion 46d was formed from river deposits the entering glacial lake basins. The heaviest sediments, mostly sand and 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 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 irrigating agriculture.

The Drift Plains Ecoregion 46i generally has level to rolling topography formed by the retreating Wisconsin glaciation. Because of the productive soil and level topography, this ecoregion is almost entirely cultivated, with many wetlands drained or simply tilled and planted. However, abundant temporary and seasonal wetlands are found throughout this ecoregion which are highly attractive to waterfowl.

The Glacial Outwash Ecoregion 46j generally has smooth topography, highly permeable soils with low water-holding capacity, and is poor to fair for crop production that is used for irrigated agriculture. This ecoregion is limited to the extreme eastern portion of LaMoure County in the District.

Watersheds

The District lies almost entirely within the Missouri Main Stem region which is the primary drainage area for the Missouri River (USFWS 2008). There are also six eight-digit hydrologic units (also called cataloging units or watersheds) within the District that are included in the aforementioned drainage area: Apple, Beaver, Elm, Upper James, Upper Lake Oahe, and West Missouri Coteau; the Western Wild Rice eight-digit hydrologic unit is part of the Hudson Bay drainage area (Figure 2-7). These eight-digit hydrologic units are considered watersheds that typically drain more than 700 square miles (USDA NRCS 2011a).

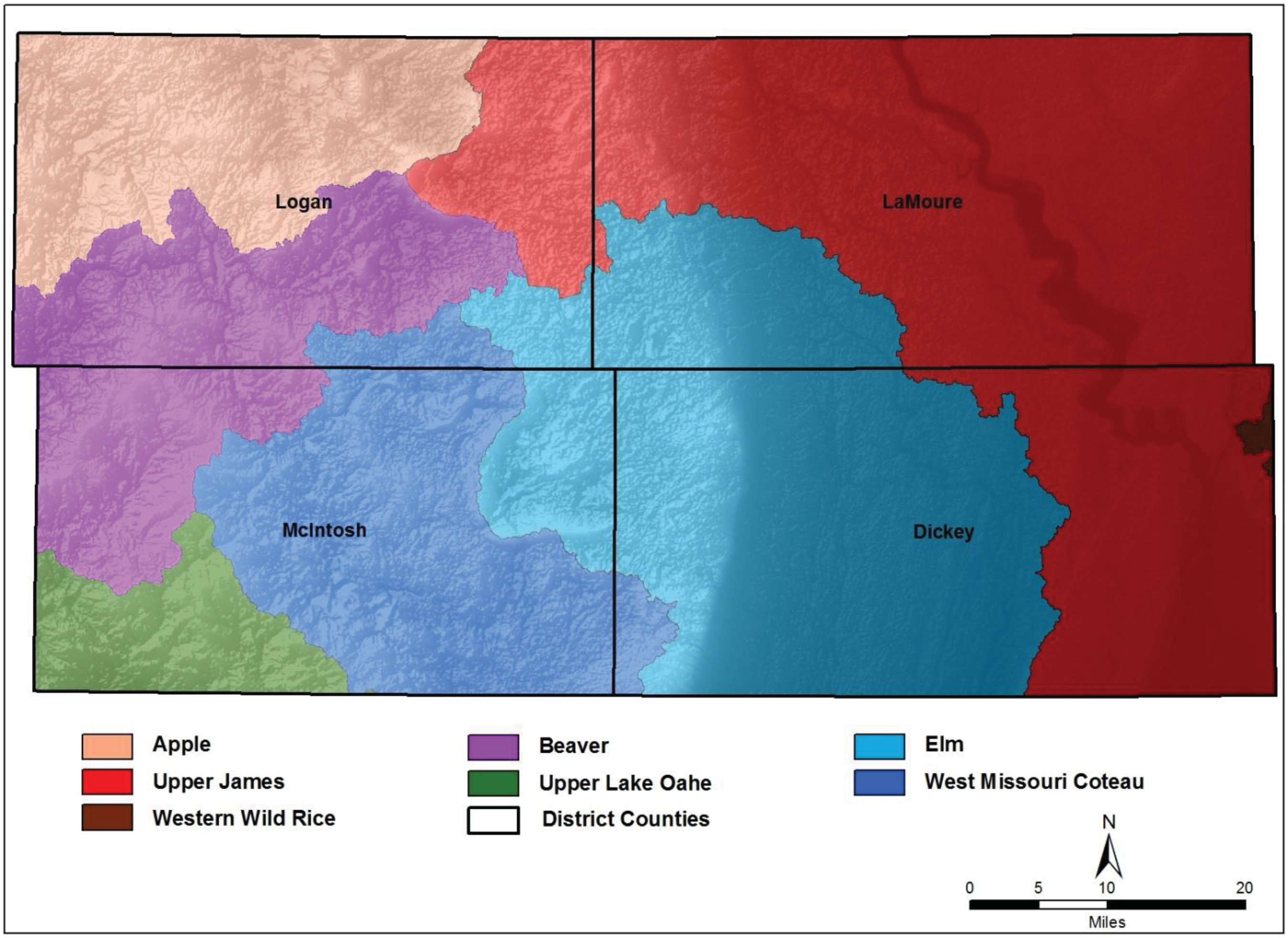


Figure 2-7. Eight-digit watersheds within Kulm Wetland Management District (USDA NRCS 2011a).

2.4 Physical Environment

CLIMATE

North Dakota has a continental climate with large daily and seasonal variation in temperatures. The climate has been relatively stable for the last 2,500 years compared to the period between 2,500 to 7,000 years ago when south-central North Dakota transitioned from a forest-dominated landscape to the mixed-prairie grassland-dominated landscape that occurs today (Bluemle 1975). Mean monthly temperatures from 1901–2010 in Edgeley, North Dakota, located approximately 15 miles northeast of Kulm (the approximate center of the District), during January are 8.7° F and 69.6° F in July with mean monthly low temperatures of -1.6 °F in January and monthly highs that average 83.4 °F in July (High Plains Regional Climate Center 2011). The last freezing temperature below 28 °F in the spring typically occurs by May 5 and the first killing frost (≤28° F) typically occurs around October 5 at Edgeley (USDA NRCS 2011b). On average, there are 127 growing days in the District where the temperature exceeds 28° F (USDA NRCS 2011b).

Mean annual precipitation received from 1901-2010 at Edgeley was 18.09 inches (range = 9.74–28.75 in) with May (2.67 in) and June (3.57 in) being the wettest months and January (0.44 in) and December

(0.37 in) receiving the least precipitation. Mean annual snowfall during this period was 25.4 inches in Edgeley (High Plains Regional Climate Center 2011). However, annual snowfall can approach 70 inches during extreme winters. Annual precipitation generally increases from west to east in the District with portions of Dickey County receiving the highest amount of annual precipitation (Figure 2-8). The bulk of the precipitation that the District receives can be attributed to thunderstorms that occur from May through July. Winds are generally moderate (less than 20 mph) though it is not uncommon for winds to exceed 30 mph with periodic gusts over 40 mph.

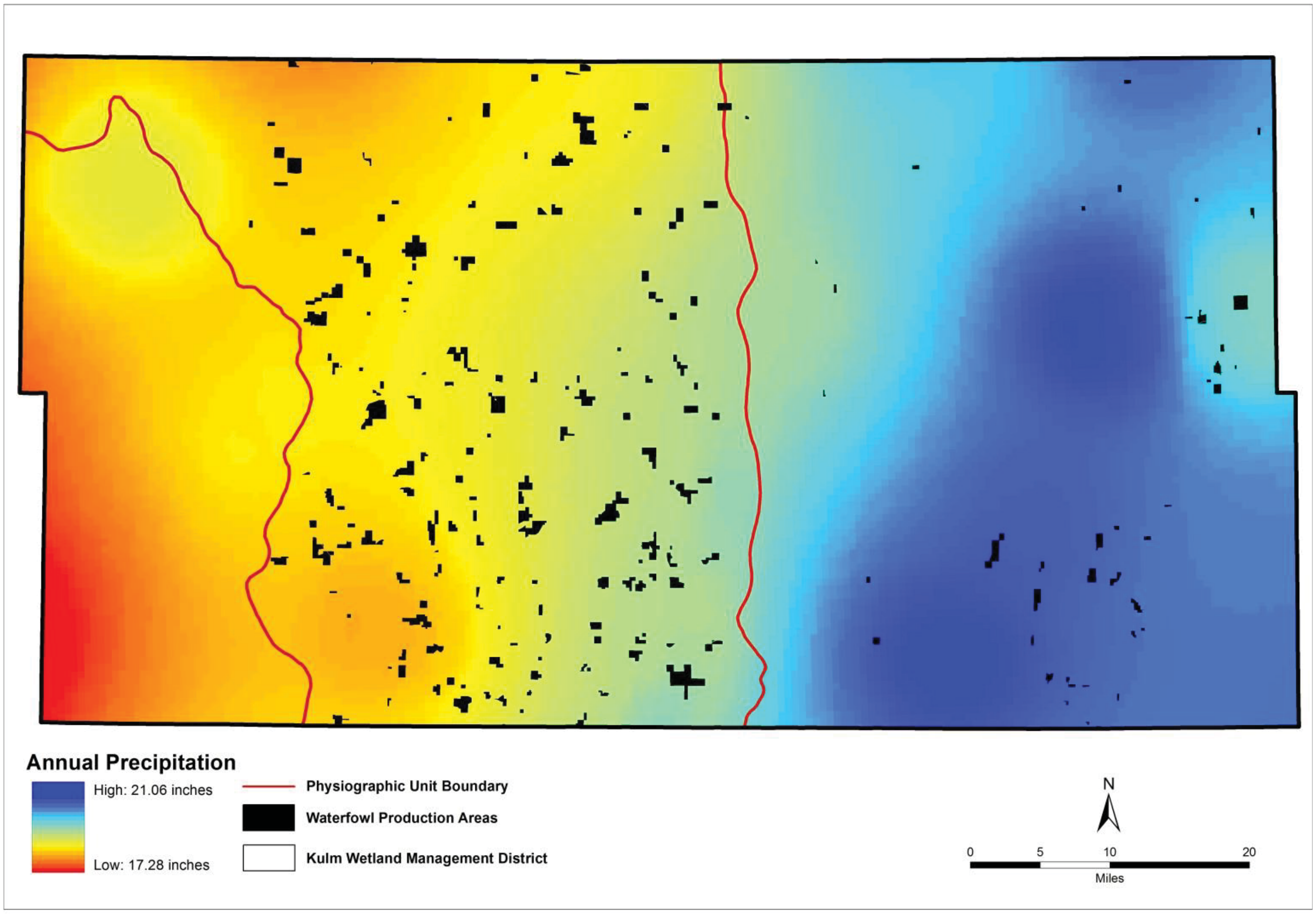


Figure 2-8. Mean annual precipitation from 1971–2000 for Kulm Wetland Management District. Map data were developed using Parameter-elevation Regressions on Independent Slopes Model (PRISM) climate data derived from fine-scale grid-based estimates of climatic parameters such as precipitation, temperature, and dew point (USDA NRCS 2011c).

GEOLOGY

The geologic character (soils and topography) of the District was constructed by several glaciers that occupied south-central North Dakota during the Pleistocene Epoch. Prior to several glaciated periods, the last ending approximately 12,000 years ago, south-central North Dakota resembled areas west of Mandan, North Dakota, with buttes, and large-scale, wind- and water-sculpted scenery (Bluemle 1975). Today, the landscape reflects several glaciation periods that deposited various materials comprised of sand, silt, clay, gravel, boulders, and mineral rich soils created by glaciers grinding rock and constant bacterial action and weathering of the sedimentary glacial drift layer (Bluemle 1975). Two types of sedimentary rock are found in the District: glacial drift and bedrock. The shallow glacial drift layer occurs above a much more extensive layer of sedimentary bedrock consisting of sandstone, shale, and lignite created 50–80 million years ago during the late Cretaceous to Tertiary periods (Bluemle 1975).

SOILS

Data obtained from the Natural Resources Conservation Service (NRCS) indicate a diversity of soils types on the District. Number of soil types identified includes 96, 84, 78, and 76 for LaMoure, Dickey, Logan, and McIntosh Counties, respectively. The top 10 soil types account for 79.7%, 54.6%, 54.7%, and 56.7% of the totals within each of the respective counties. LaMoure County is primarily dominated by Barnes-Svea and Svea-Barnes loams. Dickey County is dominated by Barnes-Svea, Hamerly-Tonka-Parnell, and Barnes-Cavour loams. Logan County is dominated Zahl-Williams and Buse-Barnes loams. McIntosh County is also dominated by loams, primarily Zahl-Williams, Bearpaw-Zeeland, and Wabek-Appam sandy loams. In general, intensity of row crop agriculture follows an east–west gradient with cropping intensity highest in the east (LaMoure and Dickey Counties) with fields planted primarily to corn (*Zea mays*), soybeans (*Glycine max*), and wheat (*Triticum aestivum*). In comparison, in the west (Logan and McIntosh counties) livestock ranching on grasslands and small grain farming [i.e., wheat, barley (*Hordeum vulgare*), sunflowers (*Helianthus annuus*)] are more prevalent.

LANDSCAPE COMPOSITION

In 2013, land use in the District was comprised of 53.2% agricultural crops (19% corn [*Zea maize*], 23% soybeans [*Glycine max*], 5.4% wheat [*Triticum* spp.]), and other cropland (5.8%), 32.8% grassland, 9.6% wetland, 0.6% forest, and 3.8% developed (low to high intensity human modification) (Figure 2-9; NASS 2013).

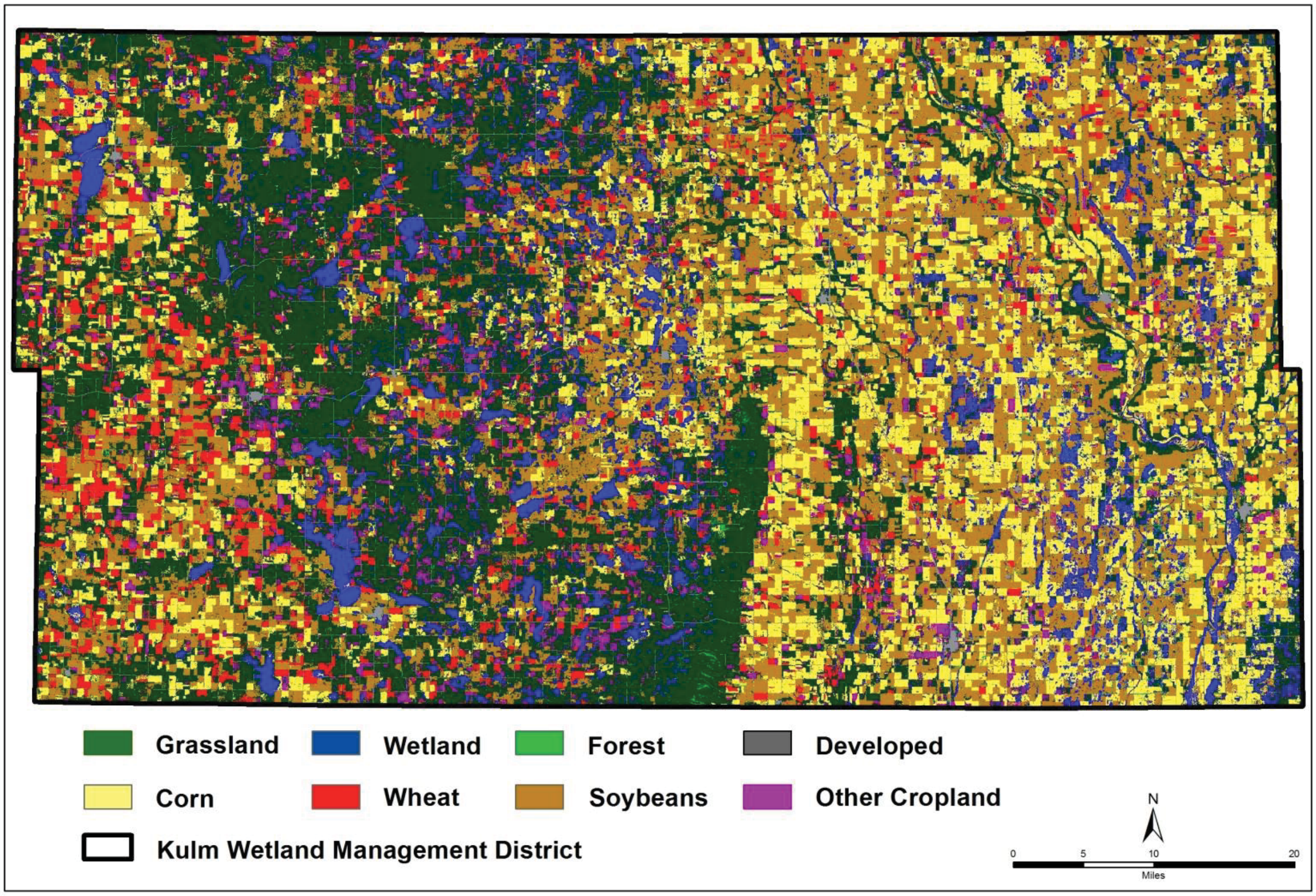


Figure 2-9. Variation in land use at Kulm Wetland Management District based on the 2013 National Agricultural Statistics Service, North Dakota Cropland Data Layer. Other cropland included all non-corn/wheat/soybean agricultural crops and fallow/idle cropland. Grassland was classified using grassland/pasture, switchgrass, and barren categories.

National Wetlands Inventory data identified 163,704 wetland basins covering 125,717.1 ha in the District (Figure 2-10). Wetland area was comprised of temporary (15,758 ha), seasonal (47,055 ha), semipermanent (44,114 ha), lake (16,309 ha) and riverine (2,479 ha) types (Cowardin et al. 1979), respectively. Approximately 47.9% and 44.3% of all wetlands are temporary and seasonal basins.

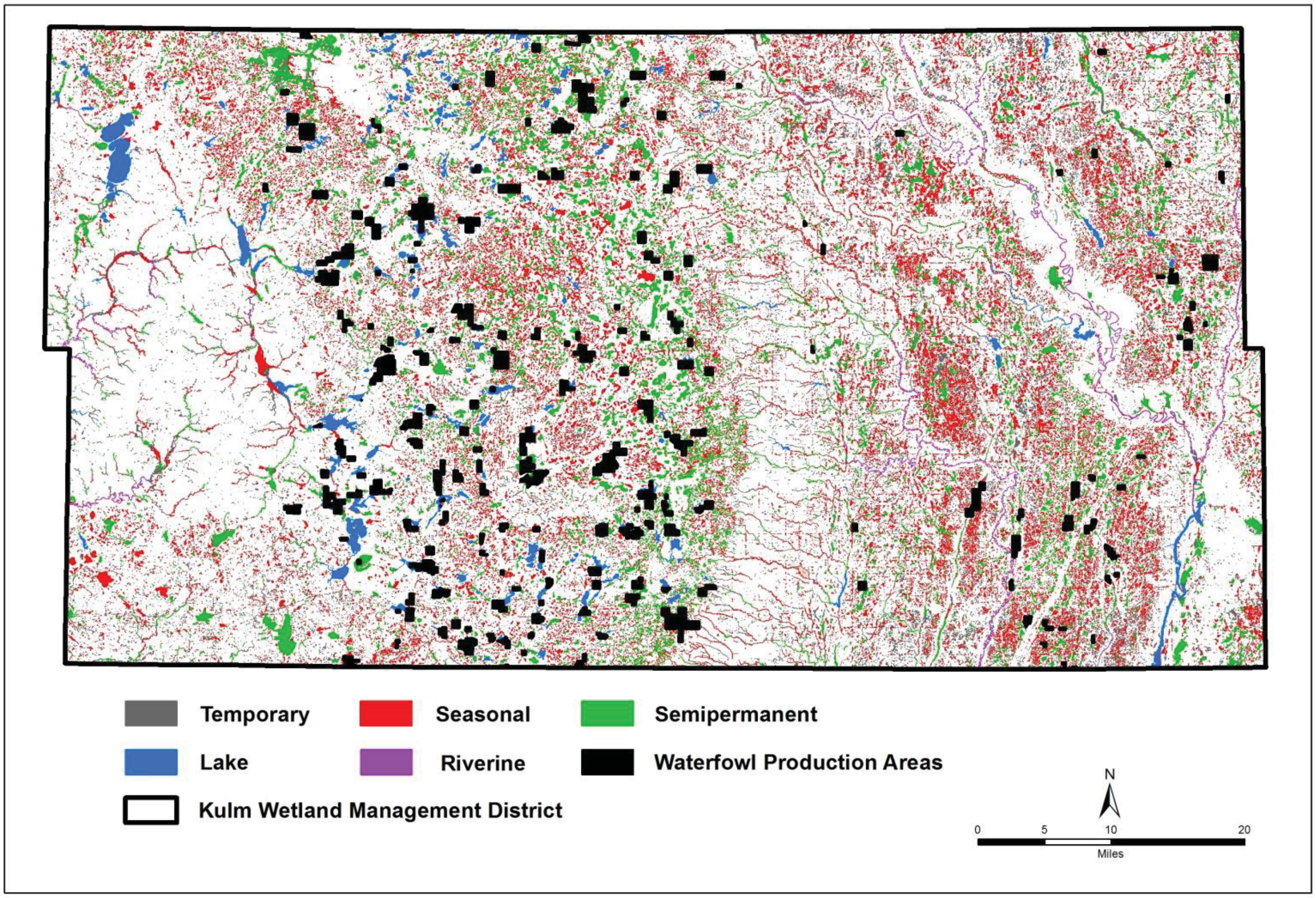


Figure 2-10. Distribution and classification (Cowardin et al. 1979) of wetland basins based on National Wetland Inventory data and waterfowl production areas in Kulm Wetland Management District.

VEGETATION

Native Sod Prairie – Historically, the composition and function of mixed-grass native prairie communities was shaped by weather, precipitation, fire, and grazing by free-roaming herbivores (Sedivec and Printz 2012). The potential composition and ecological function of these native sod prairies have been characterized using ecological site descriptions (ESDs) for North Dakota (Sedivec and Printz 2012). The potential plant community on ecological sites is influenced by surface soil depth, soil texture, available soil moisture, land slope and exposure, precipitation, and soil fertility and salinity.

The District currently has 7,969.3 acres of native sod prairie on 139 of 201 WPAs The observed plant community is strongly influenced by the timing, frequency, intensity, and duration of previous defoliation treatments. Management aims to stimulate native plants and limit invasion by exotic cool-season grasses to provide optimal nesting cover (Murphy and Grant 2005, Grant et al. 2009, Ellis-Felege et al. 2013). The majority of native sod prairie (≈78%) on WPAs in the District has >75% plant community composition that is dominated by smooth brome (*Bromus inermis*) and/or Kentucky bluegrass (*Poa pratensis*) due to either decades of rest and/or infrequent defoliation (Kirsch et al. 1978, Kirby et al. 1992). Thus, the Service is engaged in the Native Prairie Adaptive Management study (USFWS 2013) aimed at restoring these prairies. Specific restoration goals, objectives and strategies are described in Chapters 4 and 5 of this HMP.

Because the District is dominated by loamy soils, staff selected loamy ESD as an example of the potential plant communities that exist on native sod mixed-grass prairies on WPAs. Vegetation for loamy ESDs for the Central Brown Glaciated Plains major land resource area (MLRA) #053B (Printz et al. 2012a) and Central Black Glaciated Plains MLRA #055B (Printz et al. 2012b) is as described:

> *Central Brown Glaciated Plains #053B* – The historic climax plant community (HCPC) evolved with grazing by large herbivores and occasional fires. The HCPC can be maintained or can be improved on degraded ecological sites using precise management treatments such as prescribed grazing and fire that allow for adequate recovery periods (Printz et al. 2012a). Potential vegetation in the HCPC is approximately 85% grasses or grass-like plants, 10% forbs, and 5% shrubs. The HCPC is dominated by western wheatgrass (*Pascopyrum smithii*) and green needlegrass (*Nassella viridula*) and includes other grasses and grass-like plants including needle-and-thread (*Hesperostipa comata* ssp. *comata*), blue grama (*Bouteloua gracilis*), porcupine grass (*Hesperostipa spartea*), bearded wheatgrass (*Elymus trachycaulus* spp. *subsecundus*), and sedges (needleleaf sedge [*Carex duriuscula*] and thread-leaved sedge [*Carex filifolia*]). Common forbs include American vetch (*Vicia Americana*), green sagewort (*Artemisia dracunculus*), silverleaf scurfpea (*Pediomelum argophyllum*), and Missouri goldenrod (*Solidago missouriensis*). Common shrubs include prairie rose (*Rosa arkansana*), leadplant (*Amorpha canescens*), winterfat (*Krascheninnikovia lanata*), and fringed sagewort (*Artemisia frigida*).
>
> The plant community shifts away from the HCPC under adverse management (e.g., continuous season-long grazing or annual early spring grazing) or during extended periods of rest (Printz et al. 2012a). The resulting plant community states include community phases 2.2 – western wheatgrass/green needlegrass/Kentucky bluegrass, 3.3 – blue grama/sedge, and 4.4 – Kentucky bluegrass.
>
> *Central Black Glaciated Plains #055B* – This HCPC also evolved through disturbance by periods of intense, short-duration grazing and frequent fire. When properly managed, ecological sites resemble the HCPC (Printz et al. 2012b). The HCPC is dominated by cool-season grasses including green needlegrass and western wheatgrass and includes other grasses such as slender wheatgrass (*Elymus trachycaulus*), bearded wheatgrass, needle-and-thread, and porcupine grass and big bluestem (*Andropogon gerardii*), blue grama, and sideoats grama (*Bouteloua curtipendula*) warm-season grasses. A variety of leguminous and non-leguminous perennial forbs can occur, but in small amounts (Printz et al. 2012b).
>
> Heavy continuous grazing and/or continuous spring grazing that do not allow ecological sites to recover or extended periods of rest will cause these sites to shift away from the HCPC (Printz et al. 2012b). The resulting plant community states include community phases 1.2 – big bluestem/sideoats grama/western wheatgrass, 1.3 – snowberry/chokecherry/grasses, 2.1 – green needlegrass/western wheatgrass/Kentucky bluegrass, 2.2 – Kentucky bluegrass/blue grama/sedge, 3.1 – invaded by Kentucky bluegrass or smooth brome, 3.2 – Kentucky bluegrass sod/forbs, 3.3 – annual/pioneer perennial, 4.1 – green ash/bur oak/shrubs, 4.2 – bur oak/green ask/ironwood/Sprengel sedge, 5.1 – oak/sedge, 5.2 – mature oak/Kentucky bluegrass, 5.3 – buckthorn/oak, 5.4 – oak/eastern redcedar, and 5.5 – buckthorn/Kentucky bluegrass.

Additional ESDs for the District including a full description of each HCPC and other community phases can be located online at https://esis.sc.egov.usda.gov/.

Seeded Introduced Grassland – These grasslands known as dense nesting cover (DNC; intermediate wheatgrass, tall wheatgrass, and alfalfa or sweetclover) produce tall, dense vegetation for nesting waterfowl (Duebbert et al. 1981, Higgins and Barker 1982). The District does not currently seed DNC on WPAs. These seeded introduced grasslands occur on WPAs having former cropland (cropland present prior to acquisition by the Service) that were seeded during the 1970's and 1980's. They are highly degraded by smooth brome due to prolonged rest. Density and extent of noxious weeds such as Canada thistle (*Cirsium arvense*), yellow toadflax (*Linaria vulgaris*), absinth wormwood (*Artemisia absinthium*), and leafy spurge (*Euphorbia esula*) also is typically higher in these grasslands than native sod or reconstructed prairies. The District reconstructs these grasslands using diverse native grass and forb seed mixes. However, this process is expected to take 40-50 years if the District reconstructs an average of 200 acres per year.

Reconstructed Prairie – Reconstructing prairie on formerly cultivated land on WPAs provides an opportunity for the District to create heterogeneous nesting habitat for migratory birds (see Salo et al. 2004, Fuhlendorf et al. 2006, Bloom et al. 2013) that is more sustainable and resistant to invasion by exotic grasses and noxious weeds (Berger 1993, Cramer 1991, Jacobs and Sheley 1999, Norland et al. 2013). Currently, low-diversity reconstructed prairie occurs on 48 of 201 WPAs in the District. The majority of these grasslands were seeded over 20 years ago using low-diversity native grass-dominated mixes that are now invaded by smooth brome and/or Kentucky bluegrass. To restore plant community diversity to these low-diversity reconstructions, the District aims to plant species-rich seed mixes that are representative of the HCPC on ecological sites as prescribed in this plan. Specific ESDs contain the best available information that describes potential species dominance and community composition targets that managers can use to create site-appropriate seed mixes (Sedivec and Printz 2012).

2.5 Habitat Condition of the District

PRE-SETTLEMENT

Historically, the mixed-grass prairie ecosystem was composed of vast expanses of intact grasslands and high densities of wetlands which exceeded 104 basins/mi^2 in some areas (Kantrud et al. 1989) and covered 20 to 60% of the PPR (Seabloom and van der Valk 2003). Grasslands consisted of highly functional native plant communities that allowed natural ecosystem services to persist for nearly 10,000 years following the retreat of the Wisconsin glaciation. Native prairies consisted a mix of tallgrass and shortgrass species including both cool- and warm-season species (Dekeyser et al. 2013) that were maintained by periodic grazing by millions of bison (*Bison bison*) and other native herbivores and burning as a result of natural man-caused fires. Bison are thought to have created a mosaic of seral stages and different vegetation heights and species composition across the landscape by grazing new plant growth on recently burned sites.

INFLUENCE OF EUROPEAN SETTLEMENT

The onset of European settlement and the initial conversion of native prairie for low-intensity agriculture in the PPR occurred from the 1830's to 1880's (Samson and Knopf 1994, Severson and Hull Sieg 2006). In North Dakota, the number of Euro-American settlers increased from 1,200 in 1870 to 290,000 by 1900 (Severson and Hull Sieg 2006). During this period, humans wantonly and indiscriminately killed the millions of bison that once grazed the grasslands of North Dakota; the last herd (≈300 animals) was sighted near Carrington, North Dakota in 1874 (Wilcox 1907). The extirpation of bison and conversion of grasslands for agriculture permanently altered the form and function of remaining grasslands in this region. Wetlands remained largely undrained prior to the 1950's when advances in machinery and technology provided the means to drain large areas (Severson and Hull Sieg 2006).

CURRENT CONDITION OF THE DISTRICT

Landscape-scale – Losses in grassland and wetland habitat have recently accelerated in the PPR due to conversion and drainage for crop production (Stephens et al. 2008, Oslund et al. 2010, Rashford et al. 2011, Doherty et al. 2013, Johnston 2013a,b, Wright and Wimberly 2013). Consequently grassland-dependent birds have substantially declined in the PPR and are considered one of the most imperiled guilds of birds in North America (Brennan and Kuvlesky 2005, Askins et al. 2007). The carrying capacity of waterfowl and other wetland-dependent birds in the PPR also has been and will continue to be reduced as wetlands are drained in the future. Yet, over 50% of the breeding waterfowl population is supported by remaining wetland and grassland habitat in the PPR (Batt et al. 1989). If habitat losses continue at rates at or above those estimated by Rashford et al. (2011) and C. R. Loesch (USFWS Habitat and Populations Evaluation Team [HAPET], Bismarck, North Dakota, unpublished data), conservation agencies (e.g., USFWS and its partners) will only have until 2082 and 2111, respectively, to conserve grasslands and wetlands when these habitats are either converted or protected; only 37 and 55% of the 2006 grassland and wetland extent would be protected in perpetuity (Doherty et al. 2013). If habitat loss accelerates beyond these rates, even greater levels of Migratory Bird Conservation Funds (i.e., Duck Stamp dollars) than those allocated to the Region 6 portion of the U.S. PPR in fiscal years 2013–2015 will be needed to protect grasslands and wetlands before they are permanently converted or drained. The rate of future conservation easement acquisition by the Service will likely depend on: 1) obtaining increased funding levels, 2) maintaining landowner interest and acceptance of the easement program(s), and 3) rate of land-use change influenced by demand for commodities and public policy. If habitat protection does not outpace habitat losses in the future, then habitat protection goals of the PPJV may need to be refined to reflect what can actually be achieved (Doherty et al. 2013).

Local-scale – Currently, a large proportion of privately owned native grasslands in the District are continuously grazed from May through October each year. Although some grassland birds such as chestnut-collared longspur (*Calcarius ornatus*), upland sandpiper (*Bartramia longicauda*), marbled godwit (*Limosa fedoa*), and willet (*Tringa semipalmata*) respond positively to these season-long grazing systems, breeding bird densities are highest in light to moderately grazed pastures in the Missouri Coteau (Salo et al. 2004). Overgrazing pastures on private lands also negatively affects waterfowl nest success (Bloom et al. 2013), attractiveness to waterfowl (Gilbert et al. 1996, Fondell and Ball 2004), and the production of most upland nesting migratory birds (Kirsch et al. 1978). Consequently, local-scale operating decisions result in landscape-level effects when intense grazing is conducted by the majority of private landowners in the District.

On fee-title WPAs, the District has management capability on upland habitat types consisting of native sod prairie, low- and high-diversity reconstructed prairie, and seeded introduced grassland (i.e., dense nesting cover [DNC]). These grasslands are managed to provide moderate to tall vegetation structure preferred by nesting waterfowl (Kantrud and Higgins 1992, Devries and Armstrong 2011, Bloom et al. 2013) and the majority of other migratory birds (Salo et al. 2004). However, a high proportion of these grasslands are highly degraded by exotic cool-season grasses (smooth brome and Kentucky bluegrass; see Ellis-Felege et al. (2013) for a complete summary on the effects of exotic cool-season grasses on terrestrial plant and wildlife communities) that create monotypic stands of vegetation structure.

The District provides heterogeneous nesting cover on these grasslands for waterfowl and other migratory birds by restoring native sod using active management or reconstructing old (>15 years) DNC grasslands using species-rich native mixes. Because smooth brome and Kentucky bluegrass exotic grasses tend to dominate native sod grasslands, managers will target individual exotic cool-season grasses using specific management treatments described in this HMP that reduce these invaders and stimulate native plants to improve habitat condition. Although the District is actively grazing grasslands on WPAs to maintain stand vigor and restore plant community composition, the District has limited ability to conduct prescribed fires on native sod and reconstructed prairies that mimic historic fire intervals. Therefore, managers use grazing treatments and prescribed fires as resources allow to attempt to achieve the goals, objectives, and strategies for grassland management on WPAs outlined in this HMP.

Chapter 3
Resources of Concern

Credit: USFWS

3.1 Identification of Resources of Concern

Identification of priority species, hereafter resources of concern (ROC), is important during the biological planning phase of SHC and is considered the focal point of a HMP. Staff considered ROC to be those identified in the purpose(s) of the District or individual species, species groups, plant or animal communities, and threatened and endangered species (HMP policy 620 FW 1; USFWS 2002) that represent the needs of other species that use habitats and respond to conservation similarly (Noon et al. 2009) that would likely decline without proactive and strategic conservation.

The District's SHC approach described in this plan aims to achieve the highest landscape-scale biological outcomes for priority species, measured by the degree of impact that conservation actions have on wildlife populations. This HMP uses a science-driven approach including empirical species–

habitat relationship models to link conservation of ROC at the scale the District to the conservation of migratory bird populations within the United States portion of the PPR. Staff intends to track the outcomes of our conservation actions to selected ROC through focused monitoring and research using an adaptive management framework to determine the level of progress (contribution to populations within U.S. PPR) that the District is achieving. This iterative process requires flexibility in conservation delivery that can be modified as new scientific information is obtained during the adaptive management process.

POTENTIAL RESOURCES OF CONCERN

Kulm WMD administers a network of fee-title and limited-interest easement lands primarily for the production of waterfowl. However, a diverse group of migratory wading birds, shorebirds, songbirds, and raptor species also rely on these lands to meet their habitat requirements during the breeding season. The primary sources of information the District used to identify potential migratory bird ROC included:

- continental, regional, and state conservation plans for waterfowl, land birds, shorebirds, raptors, and waterbirds applicable to the PPR (see Chapter 1);
- scientific literature and migratory bird population trends in the PPR;
- USFWS spatial models for individual migratory bird species developed by HAPET.

Species listed as threatened, endangered, or candidates for listing under the Endangered Species Act of 1973 also were considered as potential ROC. Federally threatened, endangered, and candidate species were identified using the Environmental Conservation Online System (ECOS) at http://ecos.fws.gov/ecos/indexPublic.do.

3.2 Priority Resources of Concern

Selection of individual ROC included a detailed evaluation of bird species response to landscape-scale features, proximate (site-specific) characteristics, or a combination of both (Cunningham and Johnson 2006). Because there is variability in habitat selection patterns among bird species in the PPR, meeting the requirements of all species can be challenging (USFWS 2012). Therefore, selection of a subset of species that was representative of the needs of many grassland-dependent and/or wetland-dependent species helps the District target habitat protection and management efforts in landscapes where biological outcomes are expected to be high. Conservation of wetland and grassland habitat is important to support the production of approximately 50–80% of continental waterfowl populations (Cowardin et al. 1983, Batt et al. 1989) and over 200 migratory bird species that breed in the PPR (USFWS 2008a).

Incorporation of Strategic Habitat Conservation

The USFWS has adopted SHC as its business model for targeting resources in landscapes predicted to have the greatest conservation benefit to fish and wildlife populations (USFWS 2006b, Johnson et al. 2009). SHC has four primary components: biological planning, conservation design, conservation delivery, and assumption-based monitoring and research. The Service identified guidelines for selecting a set of priority ROC as part of the biological planning phase of SHC that included: 1) reviewing existing scientific information pertaining to species habitat requirements, 2) identifying measures of population performance, and 3) identifying population objectives that account for relevant limiting factors or threats to populations (Johnson et al. 2009). Staff then selected a set of priority ROC (Table 3-

1) to guide conservation delivery within Kulm WMD that was primarily focused on meeting waterfowl population objectives, but will likely have significant benefits to other migratory bird populations during the next 8 years. These species were considered as priority ROC (Table 3-1) because the District occurs within their primary breeding range and each ROC occurred at densities sufficient to detect their response to management treatments.

We acknowledge that Kulm WMD lies within an administrative boundary and is not a stand-alone ecological unit. However, conservation of selected ROC through acquisition of priority wetland and grassland habitat (Table 3-2) along with the management of fee-title WPAs, and habitat restoration and enhancement on private lands is important to contribute to the sustainability of migratory bird populations in the PPR. Other species that would be assumed to benefit from targeted conservation of an individual ROC would be those with similar habitat requirements at both landscape- (i.e., density of wetlands, amount of grassland in landscape) and local-scales (i.e., vegetation structure).

Table 3-1. Priority resources of concern (ROC) identified for Kulm Wetland Management District, North Dakota.

Resources of Concern	
Species	**Guild**
Blue-winged teal (*Anas discors*)	waterfowl
Mallard (*Anas platyrhyncos*)	waterfowl
Gadwall (*Anas strepera*)	waterfowl
Northern shoveler (*Anas clypeata*)	waterfowl
Northern pintail (*Anas acuta*)	waterfowl
Marbled godwit (*Limosa fedoa*)	shorebird
Bobolink (*Dolichonyx oryzivorus*)	passerine
Grasshopper sparrow (*Ammodramus savannarum*)	passerine
Clay-colored sparrow (*Spizella pallida*)	passerine
Northern harrier (*Circus cyaneus*)	raptor
Black tern (*Chlidonias niger*)	waterbird

Table 3-2. Priority habitat types and associated limiting factors and threats at Kulm Wetland Management District, North Dakota.

Habitat Type	Associated Resources of Concern	Limiting Factors/Threats
Perennial grassland (including native sod and seeded grasslands)	Contributes to breeding requirements for all ROC (blue-winged teal, mallard, gadwall, northern shoveler, northern pintail, marbled godwit, grasshopper sparrow, bobolink, clay-colored sparrow, northern harrier, black tern). Percent grassland at various scales on the landscape and vegetation height-density at local scales was important factors influencing habitat selection for ROC. Perennial grasslands can be actively conserved to meet habitat requirements for ROC.	Grassland conversion for agricultural purposes, fragmentation by energy development, overgrazing, degradation by invasive species or lack of grazing and fire.
Wetland	Supports breeding requirements for 8 of the 11 ROC (blue-winged teal, mallard, gadwall, northern shoveler, northern pintail, marbled godwit, black tern, northern harrier). Annual abundance and distribution of wetlands influence habitat selection for ROC. Active management does not occur on natural wetlands in the District.	Wetland drainage and degradation by agricultural practices resulting in wetland loss, nutrient loading from runoff, and sedimentation.

3.3 Resources of Concern and Biological Integrity, Diversity, and Environmental Health

The National Wildlife Refuge System Improvement Act of 1997 states that, in administering the NWRS, the Service shall "ensure that the biological integrity, diversity, and environmental health (BIDEH) of the NWRS are maintained…" The Service's policy on biological diversity, integrity, and environmental health (601 FW 3; USFWS 2001) provides managers with an evaluation process to analyze their refuge and recommend the best management direction to prevent further degradation of environmental conditions, and where appropriate and in concert with refuge purposes and System mission, restore lost or severely degraded components. The Service defines BIDEH as follows:

- **Biological Diversity** – the variety of life and its processes, including the variety of living organisms, the genetic differences between them, and the communities and ecosystems in which they occur;

- **Biological Integrity** – biotic composition, structure, and functioning at genetic, organism, and community levels comparable with historic conditions, including the natural biological processes that shape genomes, organisms, and communities;

- **Environmental Health** – composition, structure, and functioning of soil, water, air, and other abiotic features comparable with historic conditions, including the natural abiotic processes that shape the environment.

Meretsky et al. (2006) stated that the BIDEH policy (USFWS 2001) directs units of the NWRS to assess their importance across landscape scales and "forge solutions to problems arising outside refuge boundaries." Scott et al. (2004) further recommended that the NWRS focus conservation outside fee-title lands to maintain BIDEH because refuges can become isolated in a landscape matrix of urban and agricultural development without adjacent land protection. Conservation easements purchased by the Service from willing landowners allow the Service to protect wetlands or grasslands outside fee-title boundaries. Thus, the District's primary contribution to BIDEH during the next 8 years will be through acquisition and protection of important wetland and grassland habitats on private lands using limited-interest conservation easements that support migratory bird populations.

Restoration of degraded wetland and grassland habitats on fee-title lands also contributes to BIDEH, but to a lesser extent than conservation easements, due to the much smaller land area that comprise fee-title lands. For example, reconstructing tracts of degraded, homogeneous stands of degraded dense nesting cover on fee-title lands to diverse stands of native grasses and forbs contributes to BIDEH by increasing ecosystem services of these grasslands (Werling et al. 2014). Secondly, restoration of native sod grasslands on fee-title lands is specifically aimed at improving BIDEH as the diversity and composition of native plant communities is restored. By combining prairie reconstruction with native prairie restoration on fee-title lands, the District increases the potential for BIDEH to be supported in part by fee-title WPAs in the District.

The extent that wetland and grassland habitats (and associated BIDEH) are maintained in the future within the U.S. PPR will largely depend on the 1) extent of wetlands and grasslands protected, 2) rate of future land use change caused conversion of grasslands or drainage of wetlands, and 3) changes in agricultural and energy policies (Doherty et al. 2013). Although other factors such as climate change have the potential to influence wildlife populations. However, landscape-level land use changes caused by conversion of wetland and grassland habitats (Stephens et al. 2008, Fargione et al. 2009, Oslund et al. 2010, Doherty et al. 2013, Johnston 2013, Wright and Wimberley 2013, Johnston 2014) currently pose an immediate and much greater threat to the persistence of ROC populations in the PPR.

3.4 Habitat Requirement of Resources of Concern

The following synthesis of selected ROC and their habitat requirements is intended to briefly summarize important trends, demographic rates, landscape patterns of abundance or occurrence, and local-scale habitat requirements. This information was used by staff to link landscape- and local-level patterns of habitat selection of ROC to potential biological outcomes (i.e., nest success, brood occupancy, density) described under the SHC design described in Chapter 4. Individual goals and objectives throughout Chapter 4 also explicitly tie the expected biological outcomes for individual ROC to the population objectives of the SHC design.

FIVE PRIMARY DABBLERS – MALLARD, BLUE-WINGED TEAL, GADWALL, NORTHERN PINTAIL, NORTHERN SHOVELER

We selected mallard, blue-winged teal, gadwall, northern pintail, and northern shoveler because they are the most abundant and widely distributed breeding duck species in the PPR (Loesch et al. 2012). Consequently, conservation of wetlands and grasslands in the PPR is targeted in landscapes that coincide with these species populations.

Breeding Range – Although mallard, blue-winged teal, gadwall, northern pintail, and northern shoveler breed throughout many parts of the United States and Canada (i.e., mallard distribution in Figure 3-1), approximately 51% of all breeding ducks in North America occur in the PPR (Batt et al. 1989). Critical, internationally recognized conservation areas have been identified for these five dabblers based on their breeding distribution in the PPR (Figure 3-2) (Doherty et al. 2015).

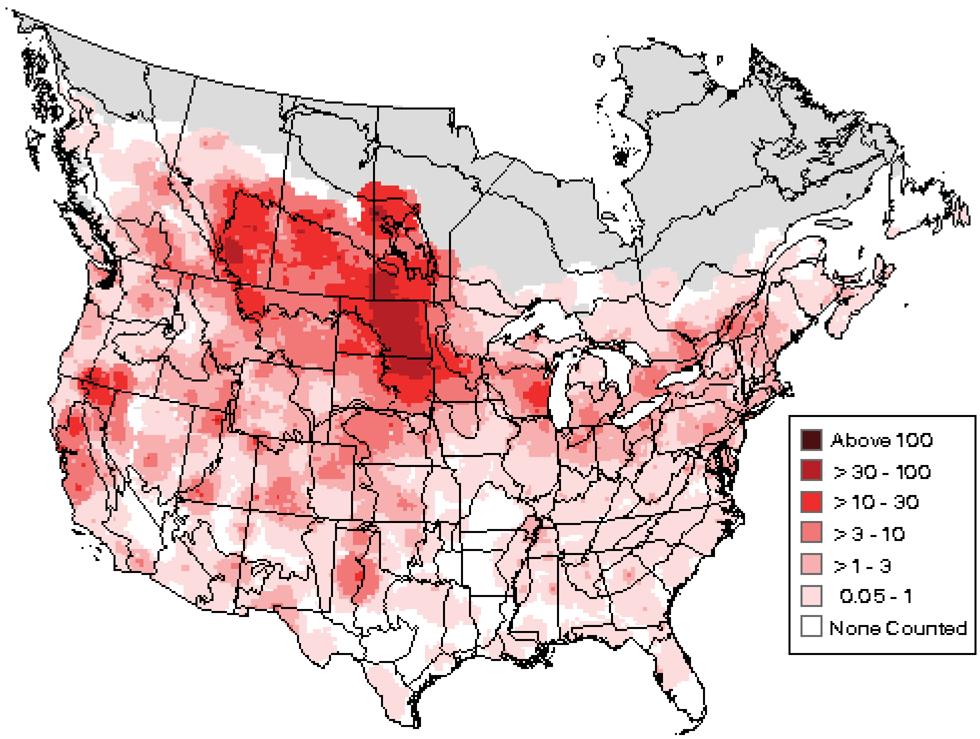


Figure 3-1. Breeding distribution of mallard (*Anas platyrhyncos*) in North America based on relative abundance breeding bird survey data from 2006-2012 (Sauer et al. 2014).

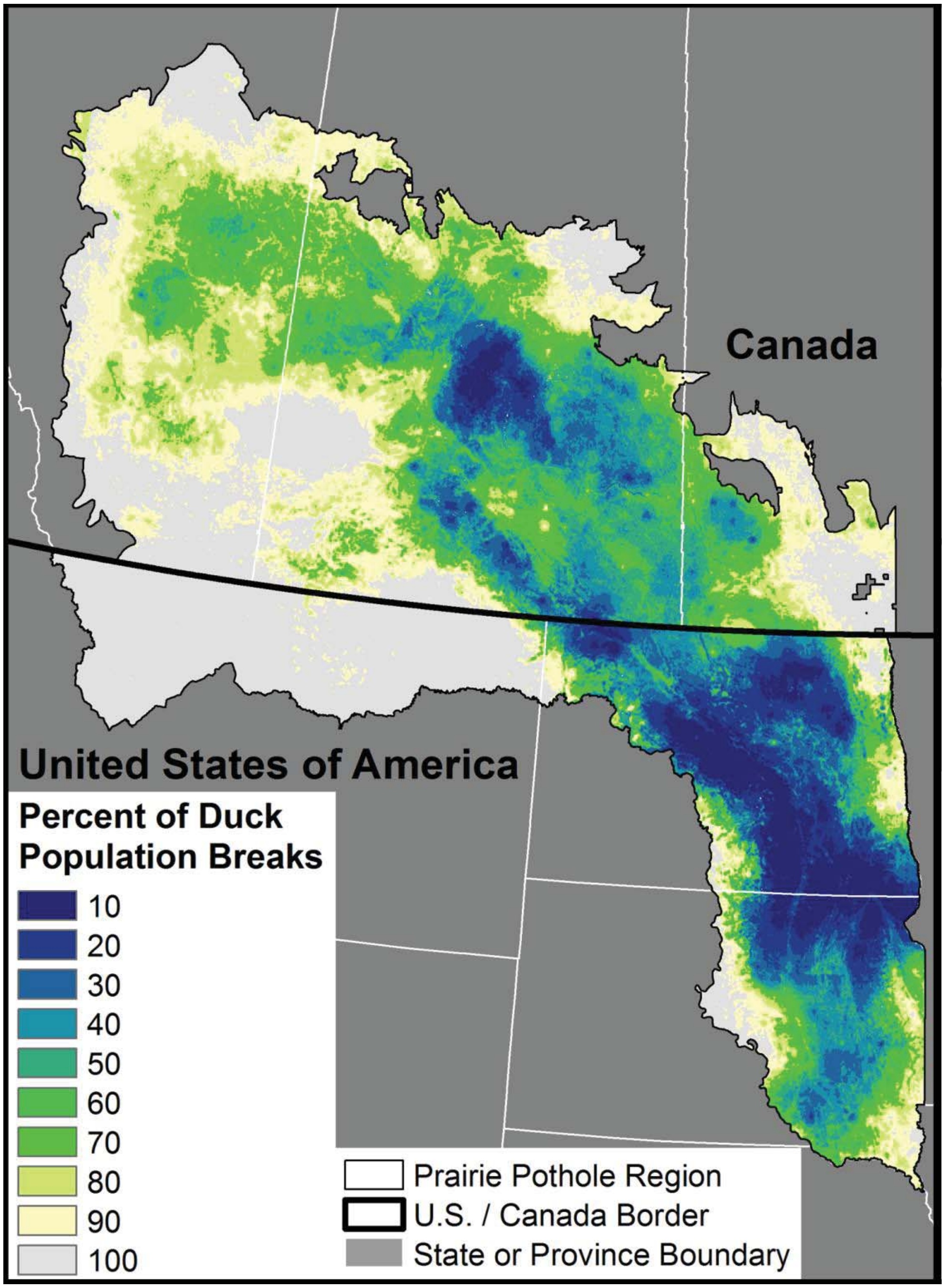


Figure 3-2. Abundance and distribution of five species of dabbling ducks across the Canadian and Montana, North Dakota, and South Dakota portions of the U.S. Prairie Pothole Region; these species included mallard (*Anas platyrhynchos*), blue-winged teal (*Anas discors*), gadwall (*Anas strepera*), northern shoveler (*Anas clypeata*), and northern pintail (*Anas acuta*) (Doherty et al. 2015). Map depicts the mean abundance from 2002 – 2010 from the traditional Waterfowl Breeding Pair and Habitat Survey area. Mean population estimates were summed across the entire landscape and grouped into 10 percent bins, such that a value of 10 represents the smallest area in which 10% of the population is contained relative to each year.

Population Status – From 1987–2012, the annual number of total recruits for the 5 primary dabblers has increased across the USFWS Dakotas Zone (all WMDs in North Dakota, South Dakota, and in northeast

Montana), North Dakota, and has remained stable for Kulm WMD (Figure 3-3). Population levels in the PPR appear to be linked to the annual abundance of wetlands with population decreases during dry periods (Rohwer et al. 2002) and pulses in populations during wet years (Walker et al. 2013b).

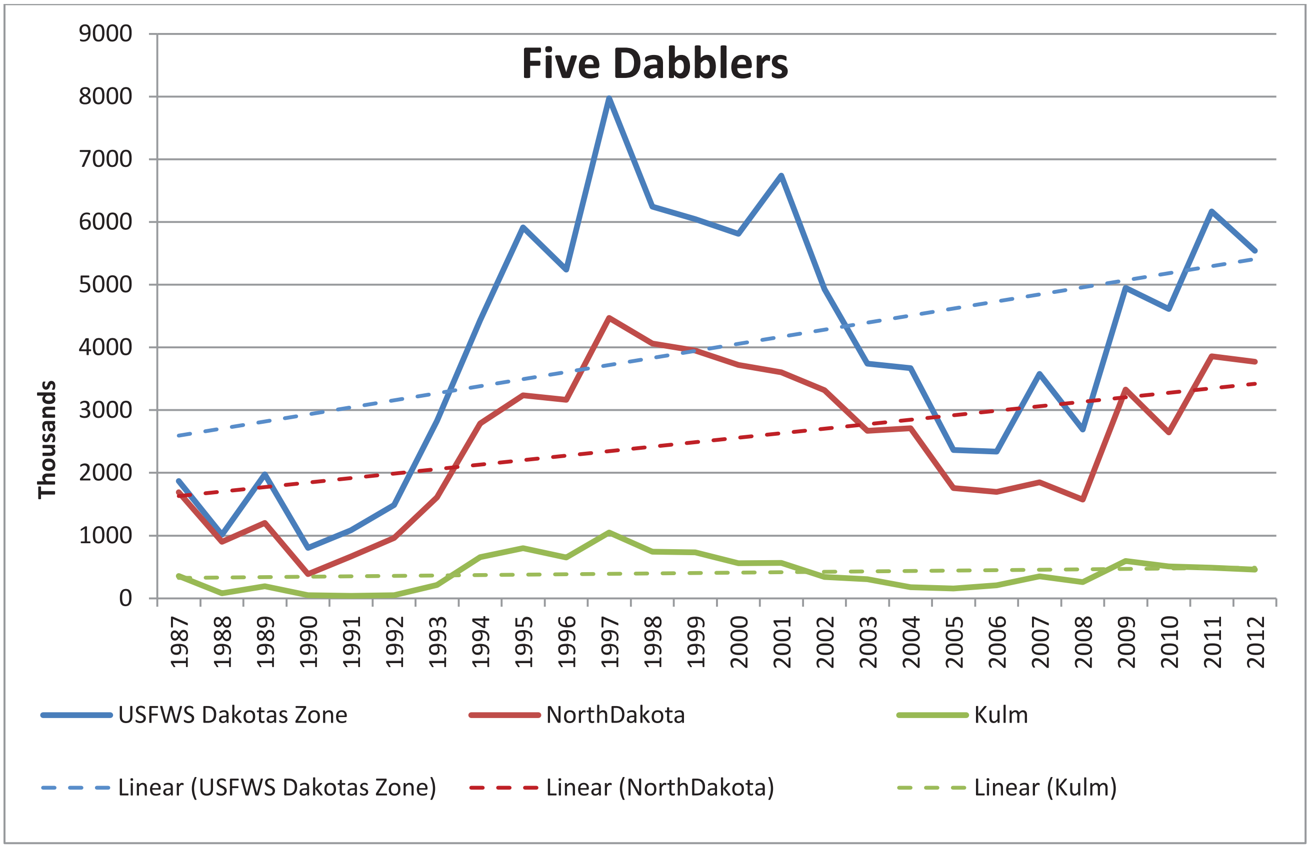


Figure 3-3. Estimated combined number of annual duck recruits for mallard, blue-winged teal, gadwall, northern shoveler, and northern pintail in the USFWS Dakotas Zone, North Dakota, and Kulm Wetland Management District based on four-square mile survey data collected from 1987–2012 (USFWS HAPET, Bismarck, North Dakota, unpublished data).

Landscape-level Species–Habitat Relationships – The density and distribution of mallard, blue-winged teal, gadwall, northern pintail, and northern shoveler coincides with the abundance of wetlands on the landscape (Figure 3-4) (Stewart and Kantrud 1973, Krapu et al. 1983, Johnson and Grier 1988, Loesch et al. 2012); temporary and seasonal basins attract approximately 70% of breeding pairs when they are present (Loesch et al. 2012). These species also depend on grasslands for nesting. Thus, landscapes containing large expanses of grasslands and abundant wetlands are considered critical conservation areas for waterfowl (Greenwood et al. 1995, Reynolds et al. 2001, Sovada et al. 2000, Phillips et al. 2003). For example, research indicates that the amount of perennial grassland cover (Greenwood et al. 1995, Reynolds et al. 2001, Horn et al. 2005, Stephens et al. 2005), amount of cropland (Drever et al. 2007, Devries and Armstrong 2011, Bloom et al. 2013), and abundance of wetland basins (Walker et al. 2013b) on the landscape were primary factors influencing nest success of waterfowl in the PPR.

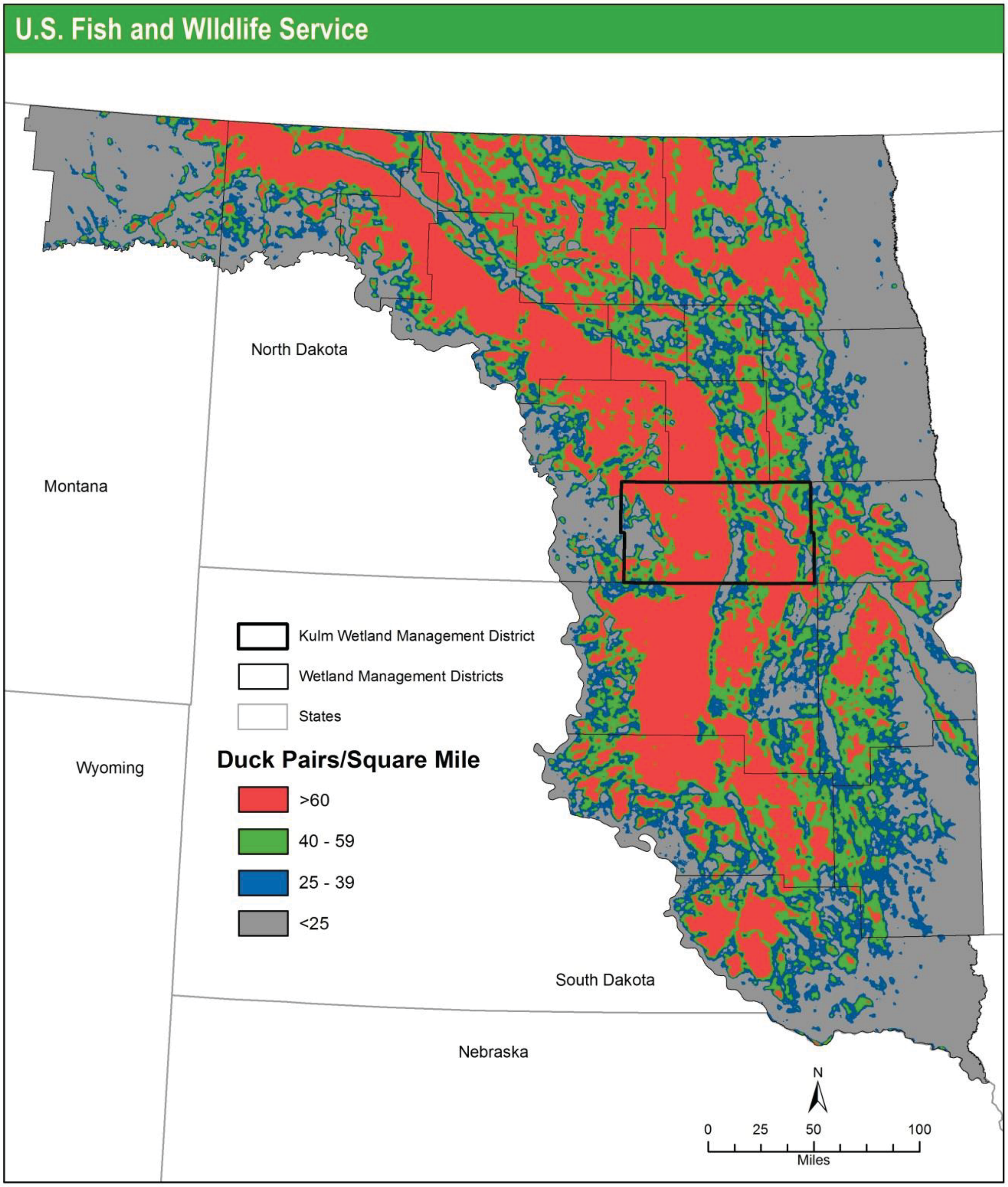


Figure 3-4. Density and distribution of five dabbler species in the Montana, North Dakota, and South Dakota portions of the U.S. Prairie Pothole Region; these species included mallard (*Anas platyrhynchos*), blue-winged teal (*Anas discors*), gadwall (*Anas strepera*), northern shoveler (*Anas clypeata*), and northern pintail (*Anas acuta*). Map reflects the mean density of breeding pairs from 1987 to 2011 from four-square mile survey data compiled by the U.S. Fish and Wildlife Service Habitat and Population Evaluation Team.

Local-level Species–Habitat Relationships – Upland-nesting waterfowl generally prefer tall, dense grassland cover for nesting (Duebbert and Frank 1984, Higgins and Barker 1982, Lokemoen 1984). Both nest density (Lokemoen et al. 1990, Fondell and Ball 2004) and nest success also are positively influenced by vegetation density and height (Koper and Schmiegelow 2007, Devries and Armstrong 2011, Bloom et al. 2013).

Management Considerations – Because the presence of wetlands are not static in space or time in the PPR (Niemuth et al. 2010), wetland conservation must include protecting a diversity of wetland types across a large geographic extent to ensure that suitable habitat is available on an annual basis to support the carrying capacity for breeding waterfowl (Doherty et al. 2015) and other wetland-dependent populations (Niemuth and Solberg 2003). Conservation of grasslands should focus on protecting grasslands in areas of high waterfowl pair density and providing tall, dense cover on public and private lands supporting high concentrations of breeding waterfowl. Managers also should consider potential effects of treatments (e.g., grazing, prescribed fire) on nesting waterfowl (Naugle et al. 2000a, Bloom et al. 2013). Leaving grasslands idle during the nesting season will support greater densities of nesting waterfowl (Bloom et al. 2013). Management should be conducted when grassland stand vigor and vegetation structure have declined, which negatively affects waterfowl production (Devries and Armstrong 2011).

BOBOLINK (*DOLICHONYX ORYZIVORUS*)

Breeding Range – Bobolink are considered continuous breeders across their range (Figure 3-5) wherever suitable habitat exists (Martin and Gavin 1995).

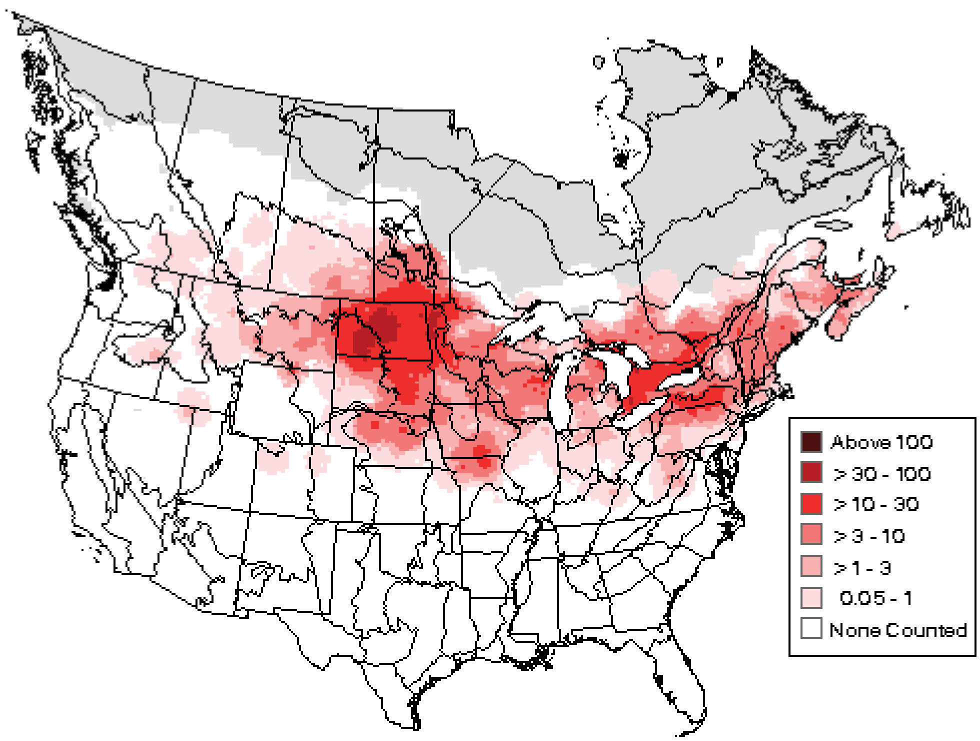


Figure 3-5. Breeding distribution of bobolink (*Dolichonyx oryzivorus*) in North America based on relative abundance breeding bird survey data from 2006–2012 (Sauer et al. 2014).

Population Status – From 1966–2012, bobolink populations annually declined by 2.2% across their breeding range (Sauer et al. 2014). An annual decline of 0.3% also occurred in the PPR, but an increase of 1.1% occurred in North Dakota during this same time period.

Breeding Season Phenology
Bobolinks arrive on the breeding grounds in late April to early May and depart from July to September (Shaffer et al. 2006a). Both males and females exhibit high fidelity to breeding sites (Bollinger 1998). Nest initiation occurs in early to mid-June and may persist through mid-July (Stewart 1975, Winter et al. 2004).

Landscape-level Species–habitat Relationships – Bobolink are considered an area sensitive species because their presence has been positively correlated to the size of remaining grassland patches (Johnson and Igl 2001, Quamen 2007, Ribic et al. 2009). Density of bobolink also is negatively correlated with the percentage of trees and shrubs (Winter et al. 2006) and amount of agricultural edge in the landscape (Fletcher and Koford 2002). Density of bobolink varies across the USFWS Dakotas Zone in conjunction with grassland availability (Figure 3-6) (USFWS PPJV, Bismarck, North Dakota, unpublished data).

Local-level Species–habitat Relationships – Bobolink use native or tame grasslands having moderate to tall vegetation structure (height–density, height), moderate forb cover, and minimal woody vegetation, and moderate litter depths (Winter et al. 2005, Shaffer et al. 2006a, Winter et al. 2006). Documented habitat characteristics at use sites include 3.9–52.8 inches vegetation height, 2.4–10.2 inches visual obstruction, 17–65% grass cover, 15–33% forb cover, ≤22% shrub cover, ≤35% bare ground, 5–75% litter cover, and ≤3.5 inches litter depth (Shaffer et al. 2006a).

Management Considerations – Refrain from applying management treatments (e.g., grazing, prescribed fire, haying) during nesting (Bollinger 1991). If treatments are conducted on individual units, ensure that suitable habitat exists on adjacent units for nesting bobolinks (Bollinger 1988). Density of bobolinks is directly correlated to the intensity of management treatments (Kantrud 1981, Salo et al. 2004). For example, on grazed sites, bobolinks occur at low densities or avoid intensely treated grasslands, but occur at high densities on light to moderately grazed sites where ≥50–65% of vegetation height remains following treatment (Salo et al. 2004).

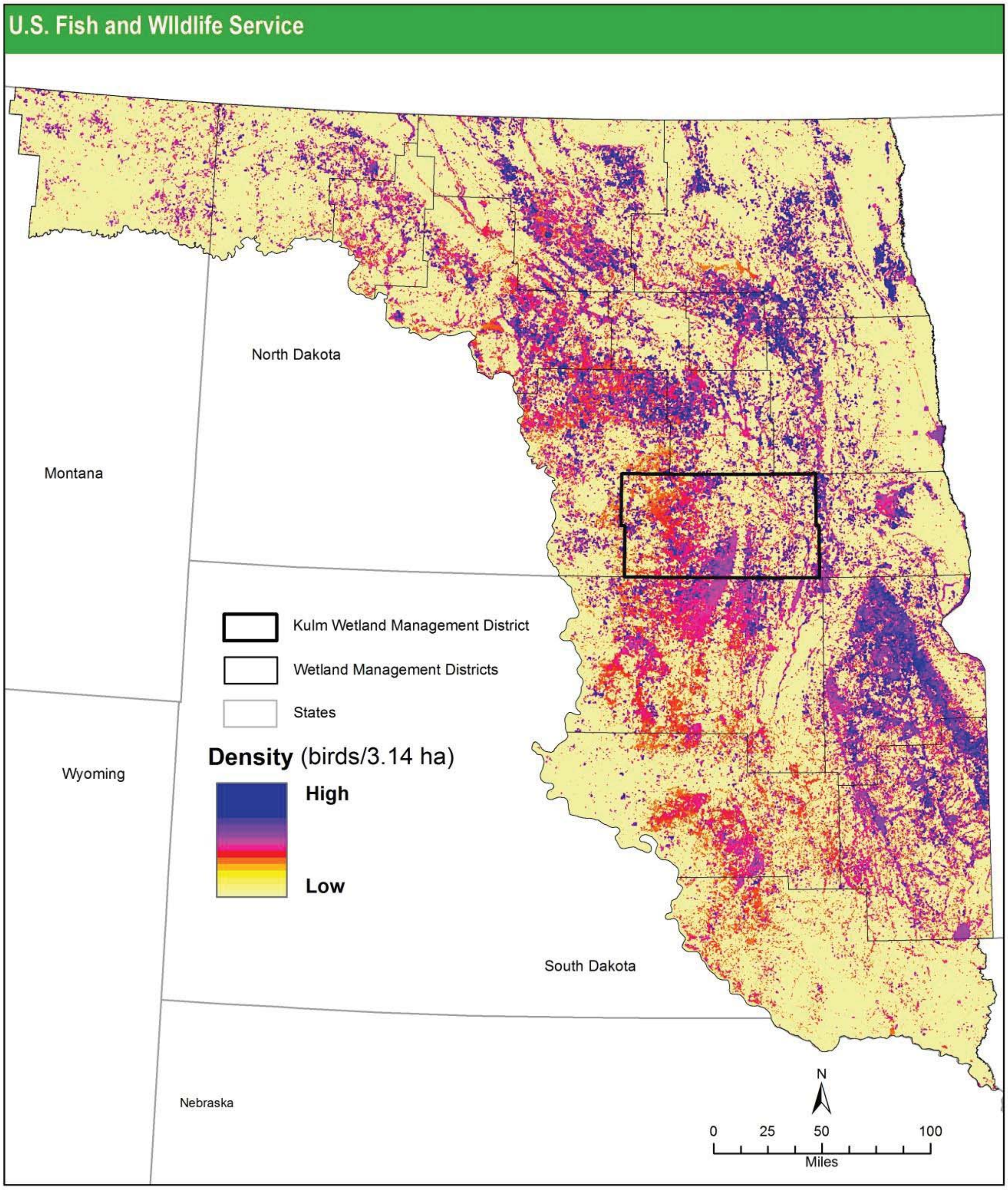


Figure 3-6. Density and distribution of bobolink (*Dolichonyx oryzivorus*) in the National Wildlife Refuge System Dakotas Zone. Map data derived from Quamen (2007) and 2003 HAPET landcover.

GRASSHOPPER SPARROW (*AMMODRAMUS SAVANNARUM*)

Breeding Range – Although the grasshopper sparrow breeding distribution is widely spread in North America, their core breeding area occurs in the Great Plains (Figure 3-7) (Sauer et al. 2014).

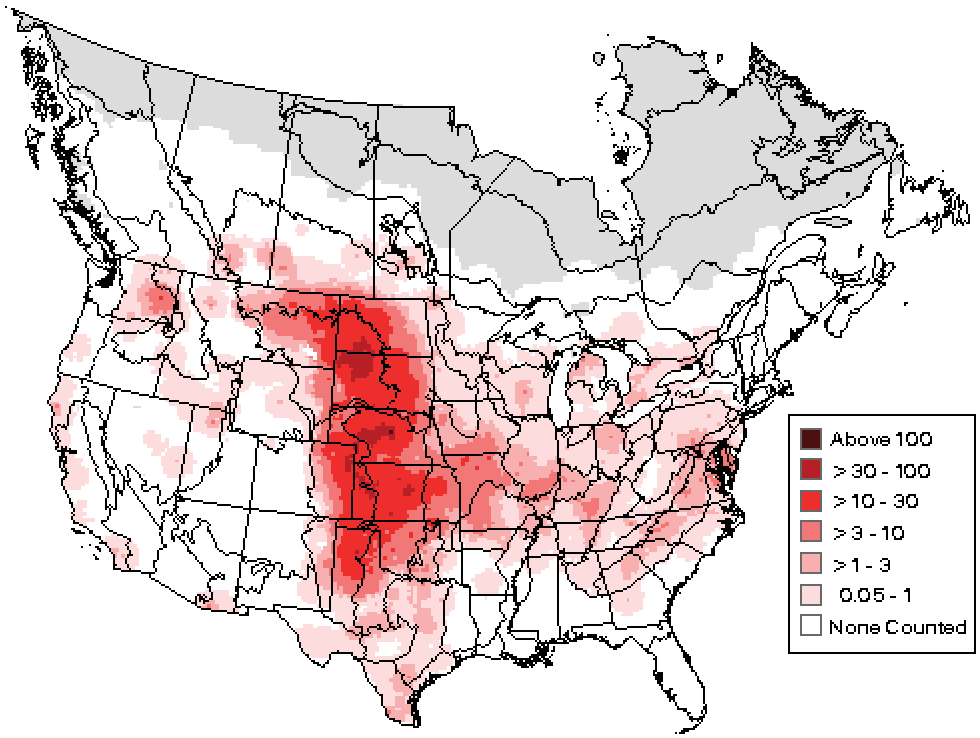


Figure 3-7. Breeding distribution of grasshopper sparrow (*Ammodramus savannarum*) in North America based on relative abundance breeding bird survey data from 2006–2012 (Sauer et al. 2014).

Population Status – From 1966–2012, grasshopper sparrow populations annually declined by 2.9% across their breeding range (Sauer et al. 2014). An annual decline of 2.2% and 3.9% also occurred in the PPR and in North Dakota portions of their breeding range.

Breeding Season Phenology – Grasshopper sparrows arrive on the breeding grounds in April and depart to their wintering grounds by mid-September (Shaffer et al. 2006b). Grasshopper sparrows can produce up to two broods, one in late May and one in early July (Smith 1968), but one brood is likely more typical in the northern portion of their range (Shaffer et al. 2006b).

Landscape-level Species–habitat Relationships – Grasshopper sparrows are considered an area-sensitive species that positively responds to the amount of grassland on the landscape (Bakker et al. 2002, Davis 2004). In the NWRS Dakota Zone, grasshopper sparrows occur at their highest densities in landscapes dominated by native grasslands (Figure 3-8) (USFWS PPJV, Bismarck, North Dakota, unpublished data).

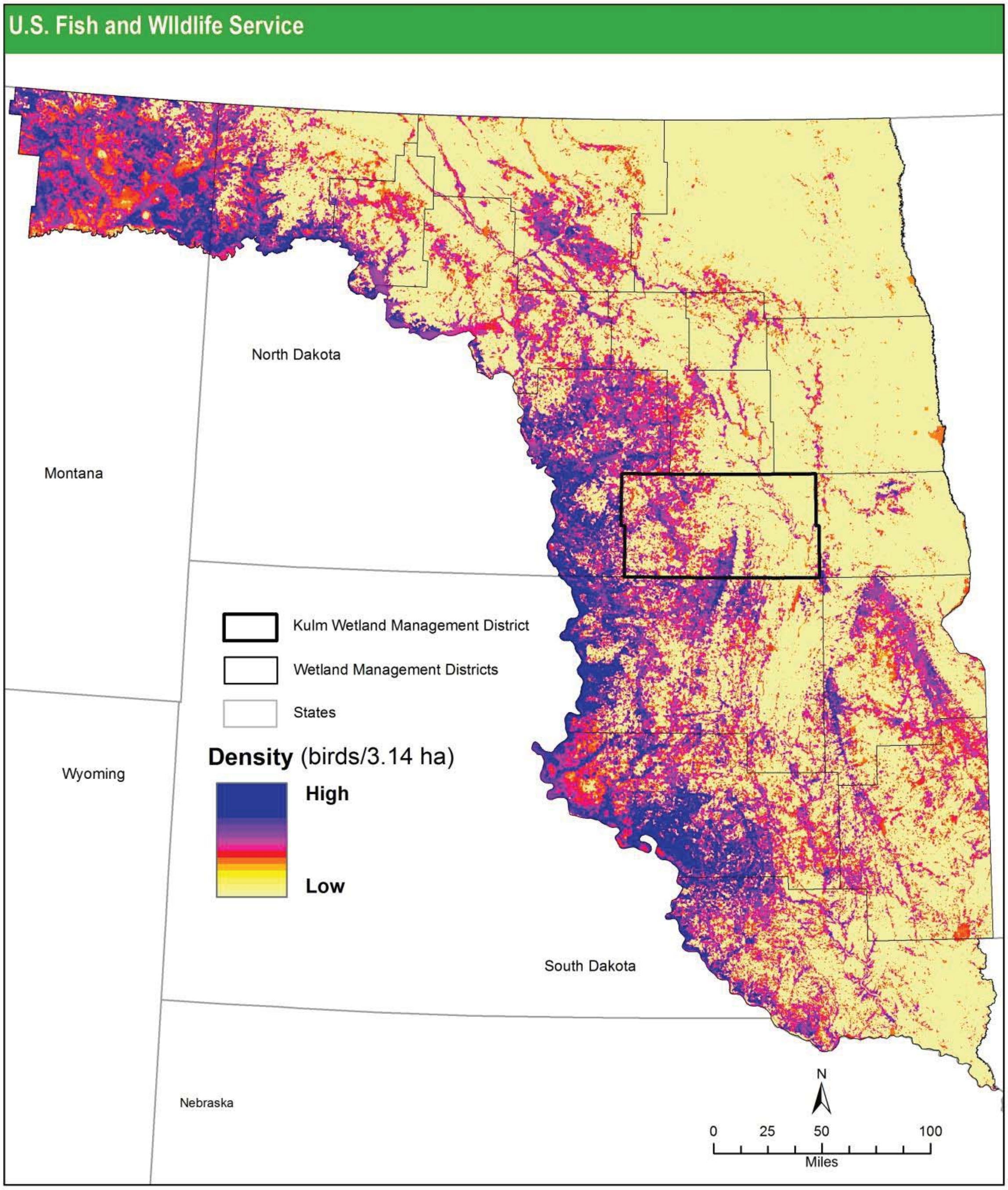


Figure 3-8. Density and distribution of grasshopper sparrow (*Ammodramus savannarum*) in the National Wildlife Refuge System Dakotas Zone. Map data derived from Quamen (2007) and 2003 HAPET landcover.

Local-level Species–habitat Relationships – Grasshopper sparrows occupy native and tame grasslands having intermediate vegetation heights. Response of grasshopper sparrows to presence of forbs, shrubs, bare ground, and litter are variable (Schaffer et al. 2006b). Documented habitat characteristics at use sites include vegetation height of 5.9–18.9 inches, 2.4–15.7 inches visual obstruction, 33-72% grass cover, 4–33% forb cover, <35% shrub cover, <35% bare ground, 6–61% litter cover, and ≤3.5 inches litter depth (Shaffer et al. 2006b).

Management Considerations – In mixed-grass prairies, density of grasshopper sparrows is low immediately following prescribed fire (Madden et al. 1996, Grant et al. 2010) or when <35% of vegetation remains following heavy grazing treatments (Salo et al. 2004). When possible, management treatments should not occur during the breeding season (Bollinger 1991). However, managers should consider appropriately timed treatments as grasshopper sparrow density increases 2–4 years post burn (Grant et al. 2010) and also was higher on lightly to moderately grazed grasslands versus idle grasslands (Kantrud and Kologiski 1982).

CLAY-COLORED SPARROW (*SPIZELLA PALLIDA*)

Breeding Range – Clay-colored sparrows breed in portions of shortgrass, mixed-grass, and tallgrass prairies in Canada and the United States (Figure 3-9).

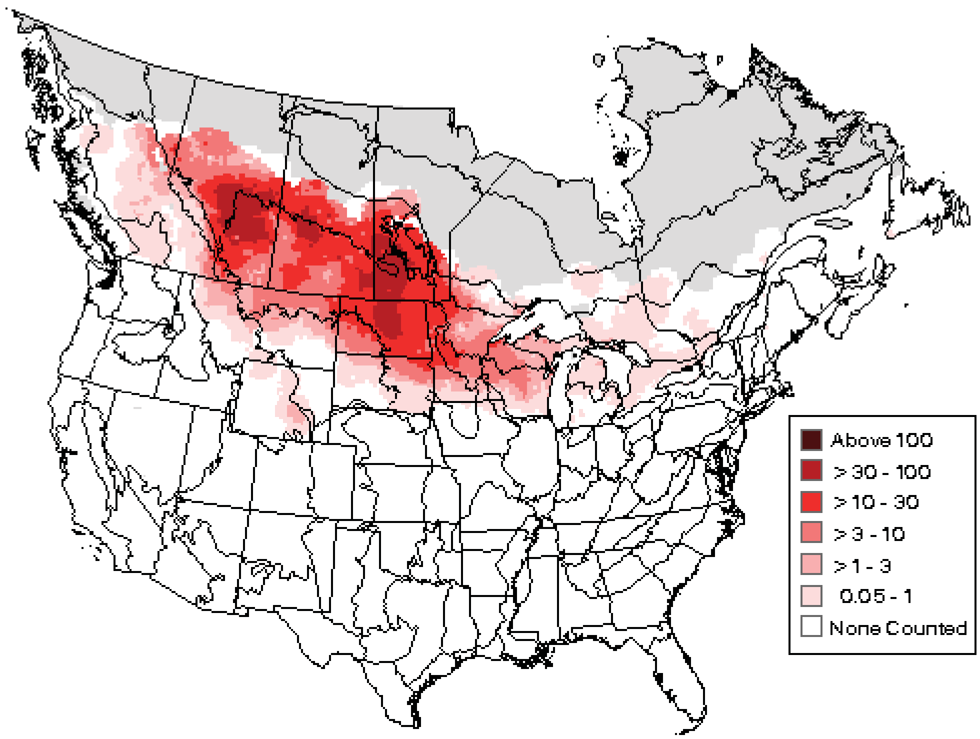


Figure 3-9. Breeding distribution of clay-colored sparrow (*Spizella pallida*) in North America based on relative abundance breeding bird survey data from 2006–2012 (Sauer et al. 2014).

Population Status – From 1966–2012, clay-colored sparrow populations annually declined by 1.4% across their breeding range (Sauer et al. 2014). Similarly, clay-colored sparrow populations annually declined by 0.9% in the PPR and by 0.4% in North Dakota during the same period.

Breeding Season Phenology – Clay-colored sparrows arrive on their breeding grounds in late April and depart to their wintering grounds by October. In North Dakota, clay-colored sparrows nest from mid-May to mid-July (Winter et al. 2004). They also exhibit high site fidelity to their breeding areas (Knapton 1978).

Landscape-level Species–habitat Relationships – In the Minnesota and Iowa portions of the U.S. PPR, density of clay-colored sparrow has been documented to be high in landscapes containing a high proportion of grassland (Quamen 2007). In the NWRS Dakota Zone, the highest densities occur in portions of North Dakota and northeast Montana (Figure 3-10) (USFWS PPJV, Bismarck, North Dakota, unpublished data).

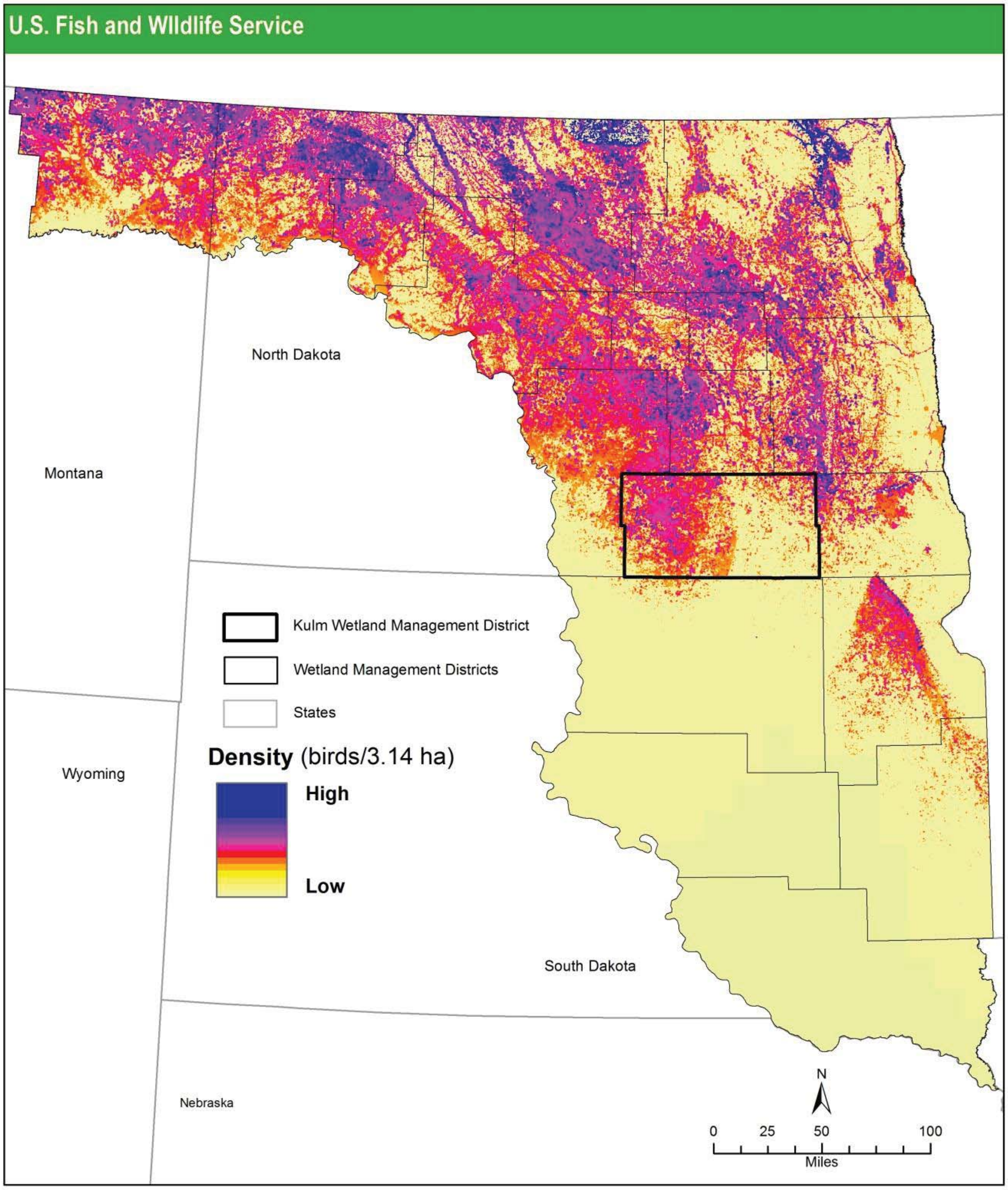


Figure 3-10. Density and distribution of clay-colored sparrow (*Spizella pallida*) in the National Wildlife Refuge System Dakota Zone. Map data derived from Quamen (2007) and 2003 HAPET landcover.

Local-level Species–habitat Relationships – Clay-colored sparrows use native or tame grasslands having low shrubs or in dense grasslands where woody vegetation is not present (see Dechant et al. 2003). They prefer to nest in dense grasslands containing western snowberry (*Symphoricarpos occidentalis*) and silverberry (*Elaeagnus commutata*) (Knapton 1978, Schneider 1998, Winter et al. 2004). In North Dakota, their abundance also was positively influenced by percent forb cover, vegetation height–density, and litter depth (Schneider 1998).

Management Considerations – The presence of shrub cover in grasslands may be the most important factor to consider when evaluating habitat suitability for this species. Clay-colored sparrows respond positively to longer intervals (5–10 yr) between prescribed burns that allow woody shrubs to persist on grasslands (Madden et al. 1999). Idle grasslands and those that are lightly grazed also can contain high densities of clay-colored sparrows (Madden 1996, Salo et al. 2004), especially if shrub cover is present (Bock et al. 1993).

BLACK TERN (*CHLIDONIAS NIGER*)

Breeding Range – Black terns primarily breed in the PPR, but isolated populations occur in Canada and the United States (Figure 3-11).

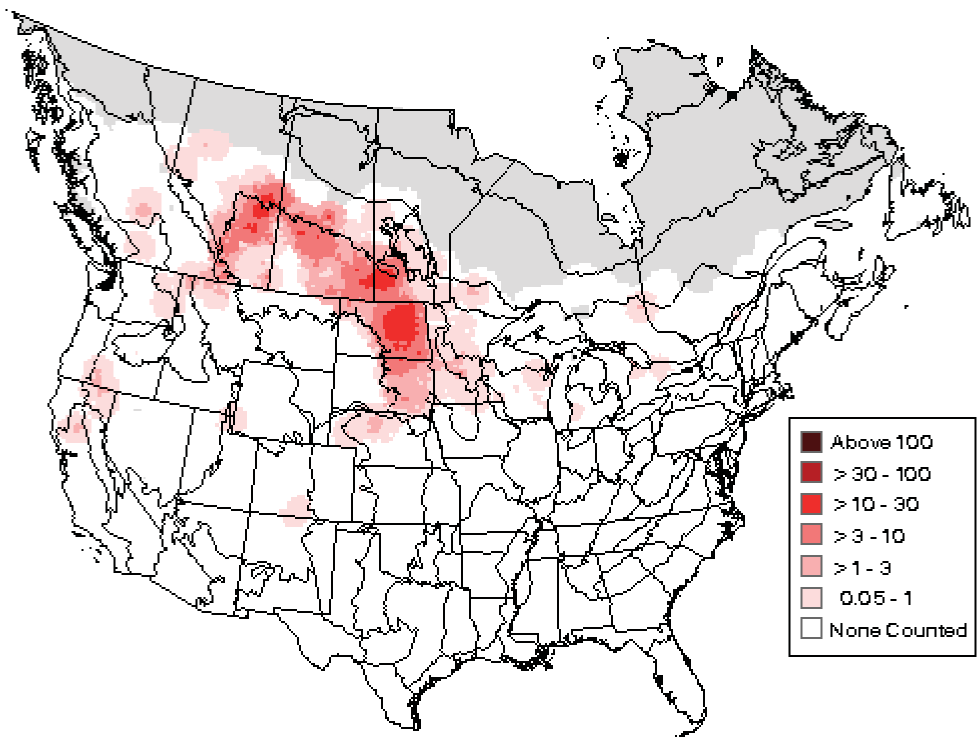


Figure 3-11. Breeding distribution of black tern (*Chlidonias niger*) in North America based on relative abundance breeding bird survey data from 2006–2012 (Sauer et al. 2014).

Population Status – From 1966–2012, black tern populations annually declined by 2.4% across their breeding range (Sauer et al. 2014). Similarly, an annual decline of 1.2% and 2.6% occurred in the PPR and in North Dakota during the same period.

Breeding Season Phenology
Black terns arrive on the breeding grounds in late March to early June and depart to their wintering grounds from late July through October (see Zimmerman et al. 2002). Nesting begins in mid-May (Dunn

and Agro 1995) where they will nest in consecutive years if favorable water and vegetation conditions exist (Dunn and Agro 1995).

Landscape-level Species–habitat Relationships – Research indicates that the area of seasonal (Steen and Powell 2012) and semipermanent wetlands positively influence breeding black terns (Naugle et al. 1999*a*, 2000, 2001). In the North Dakota portion of the PPR, occurrence of black terns was highest in northeast North Dakota (Figure 3-12). Black terns also prefer to nest in wetlands where less than 50% row crop agriculture occurs in the surrounding landscape (Naugle et al. 2000b).

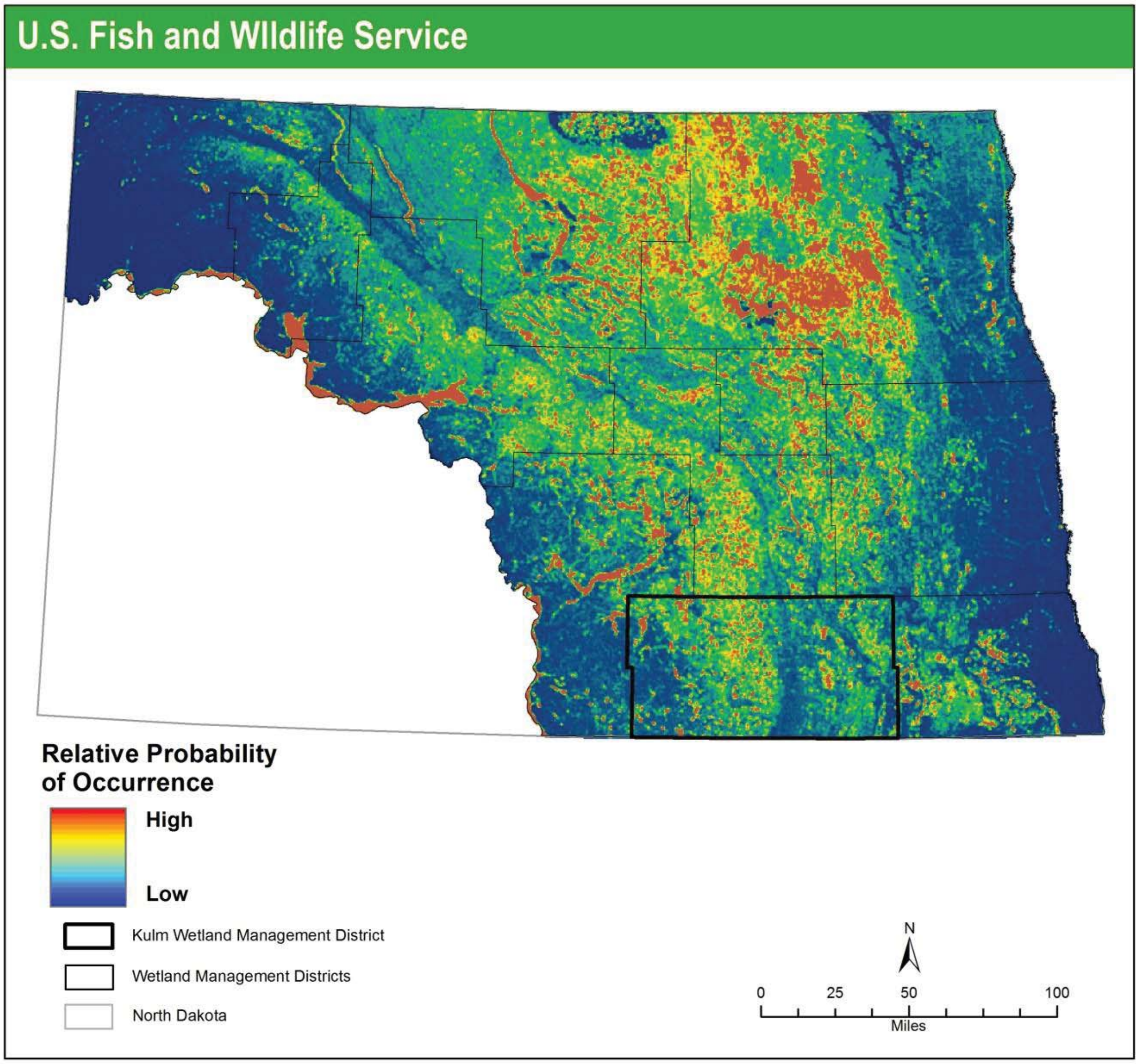


Figure 3-12. Relative probability of occurrence of black tern (*Chlidonias niger*) in the North Dakota portion of the PPR (USFWS HAPET, Bismarck, North Dakota, unpublished data).

Local-scale Species–habitat Relationships – Black terns occupy wetlands with >11.8 inches in depth during the breeding season within large wetland complexes that contain both interspersed emergent vegetation and open water and abundant nest substrates (see Zimmerman et al. 2002). However, their presence is negatively correlated with the amount of woody vegetation along the periphery of wetlands (Naugle et al. 1999b, Shutler et al. 2000).

Management Considerations – Management of water levels on semipermanent wetlands with control structures that provide nearly equal portions of emergent cover and open water and stable water levels (> 11.8 inches in depth) could provide suitable habitat (Zimmerman et al. 2002). The effect of managing grasslands adjacent to wetlands occupied by black terns is unknown. Protection of large wetland complexes has been suggested as the primary form of conservation for black terns (Naugle et al. 2000b).

MARBLED GODWIT (*LIMOSA FEDOA*)

Breeding Range – Marbled godwits primarily breed in the PPR of North America (Figure 3-13).

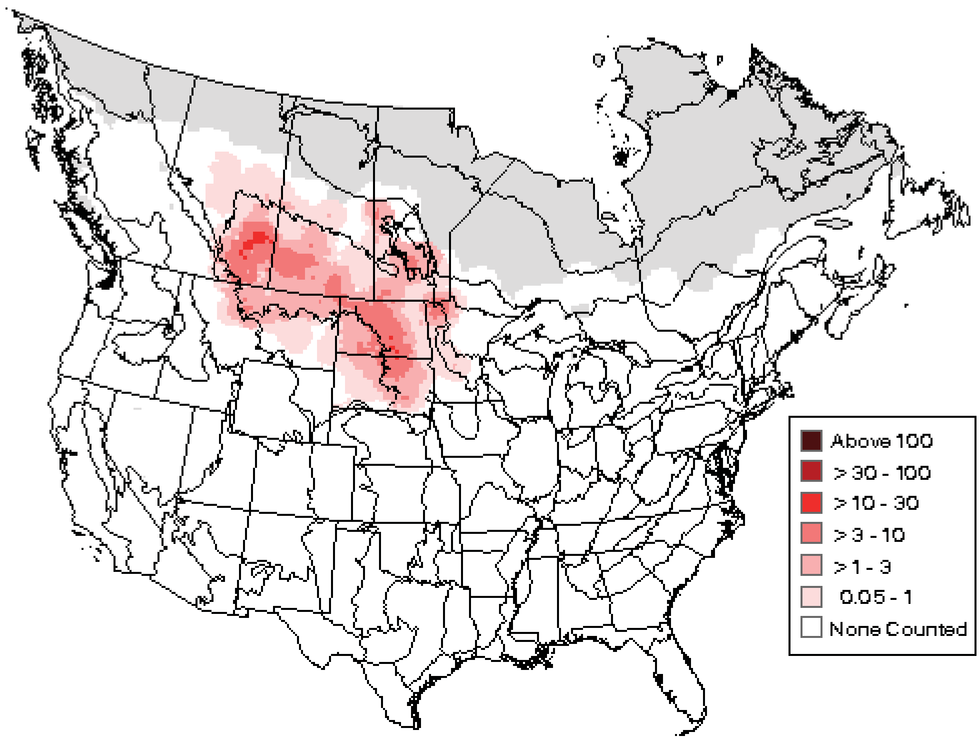


Figure 3-13. Breeding distribution of marbled godwit (*Limosa fedoa*) in North America based on relative abundance breeding bird survey data from 2006–2012 (Sauer et al. 2014).

Population Status – From 1966–2012, marbled godwit populations have remained relatively stable (0.2% annual decline) across their breeding range (Sauer et al. 2014). Similar trends also occurred in the PPR (0.7% annual decline) and in North Dakota (0.6% annual increase) during the same period.

Breeding Season Phenology – Marbled godwits breed from mid-April through late July and nest in mid-to-late May (Kantrud and Higgins 1992, Sedivec 1994). Following nesting, they begin to form flocks in mid-to-late July (Maher 1973) and depart to their wintering grounds by late August (Ryan et al. 1984).

Landscape-level Species–habitat Relationships – Presence of marbled godwits is positively associated with wetland abundance and the amount of grassland on the landscape (Ryan 1982, Ryan et al. 1984). In

North Dakota, landscapes containing relatively intact wetland–grassland complexes had high occurrences of marbled godwits (Figure 3-14).

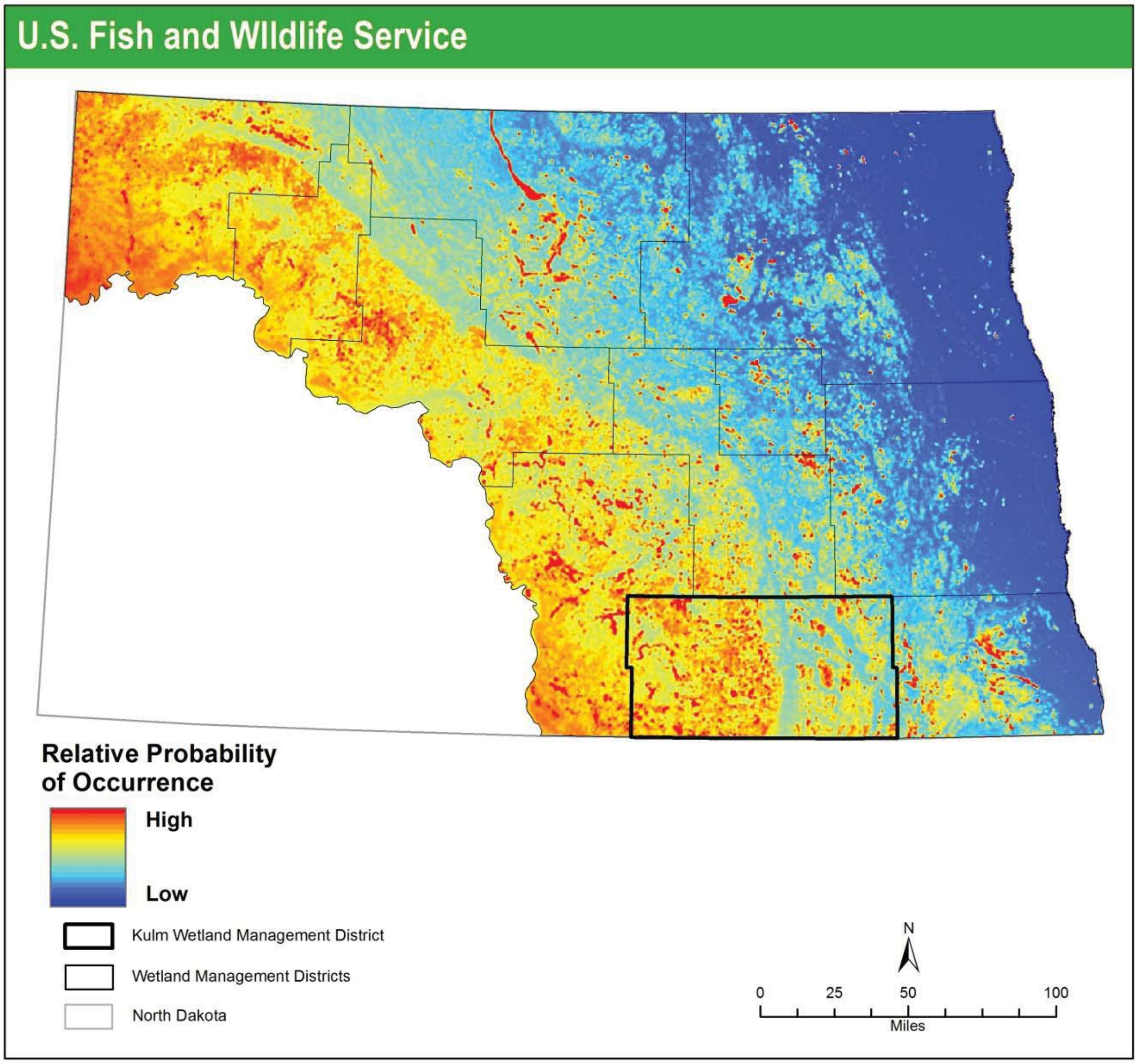


Figure 3-14. Relative probability of occurrence of marbled godwit (*Limosa fedoa*) in the North Dakota portion of the PPR (Niemuth et al. 2009).

Local-level Species–habitat Relationships – Marbled godwits prefer native versus nonnative grassland with short (<5.9 in) vegetation height and wetlands with bare soil, open water, and sparse-to-moderately dense shoreline vegetation (Ryan et al. 1984, Dechant et al. 2001).

Management Considerations – Management for marbled godwit should include maintaining short vegetation height (<5.9 in) on native grasslands within large wetland–grassland complexes (Ryan et al. 1984, Kantrud and Higgins 1992). Protection of large expanses of grasslands containing a diversity of wetland types also is critical.

NORTHERN HARRIER (*CIRCUS CYANEUS*)

Breeding Range – The breeding distribution of northern harrier is widely distributed across North America (Figure 3-15). However, they reach their highest levels of abundance in the PPR (Sauer et al. 2014).

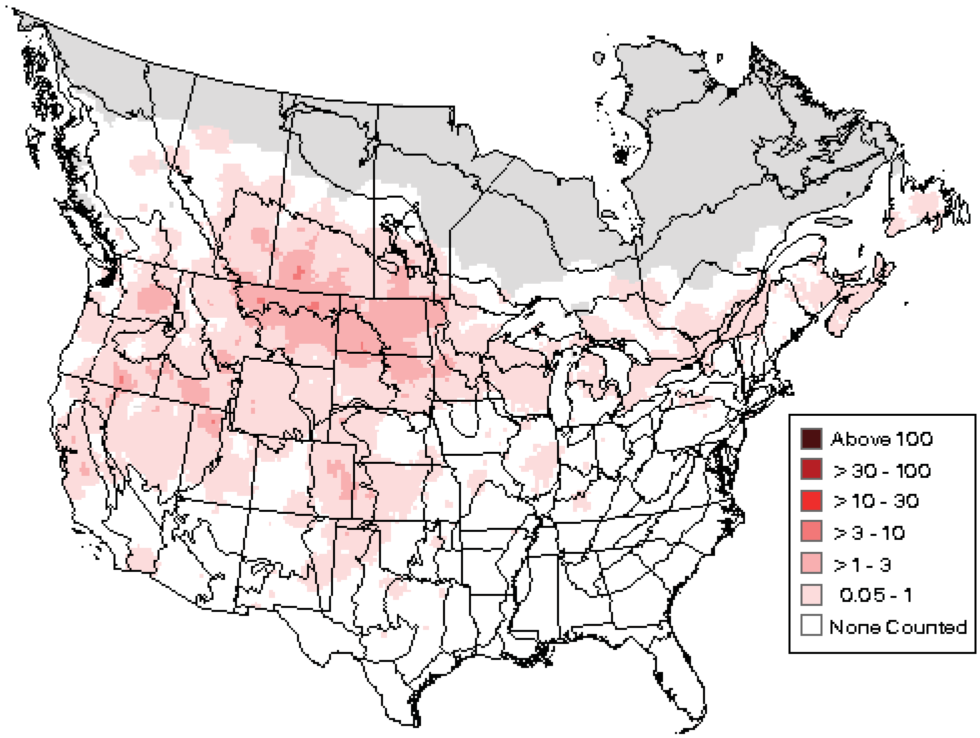


Figure 3-15. Breeding distribution of northern harrier (*Circus cyaneus*) in North America based on relative abundance breeding bird survey data from 2006–2012 (Sauer et al. 2014).

Population Status – From 1966–2012, northern harrier populations decreased by 1% annually across their breeding range (Sauer et al. 2014). During the same period their population annually decreased by 0.9% in the PPR and increased by 1.3% in North Dakota.

Breeding Season Phenology – Northern harrier arrive on the breeding grounds in late March to early April, nest from April to July, and depart to wintering grounds between August and November (see Dechant et al. 2002).

Landscape-level Species–habitat Relationships – Northern harrier are considered a grassland obligate species as they respond positively to the amount of grass in the landscape (Herkert et al. 1999, Johnson and Igl 2001). The highest densities of northern harrier in North Dakota occur in landscapes with large expanses of grassland (Figure 3-16).

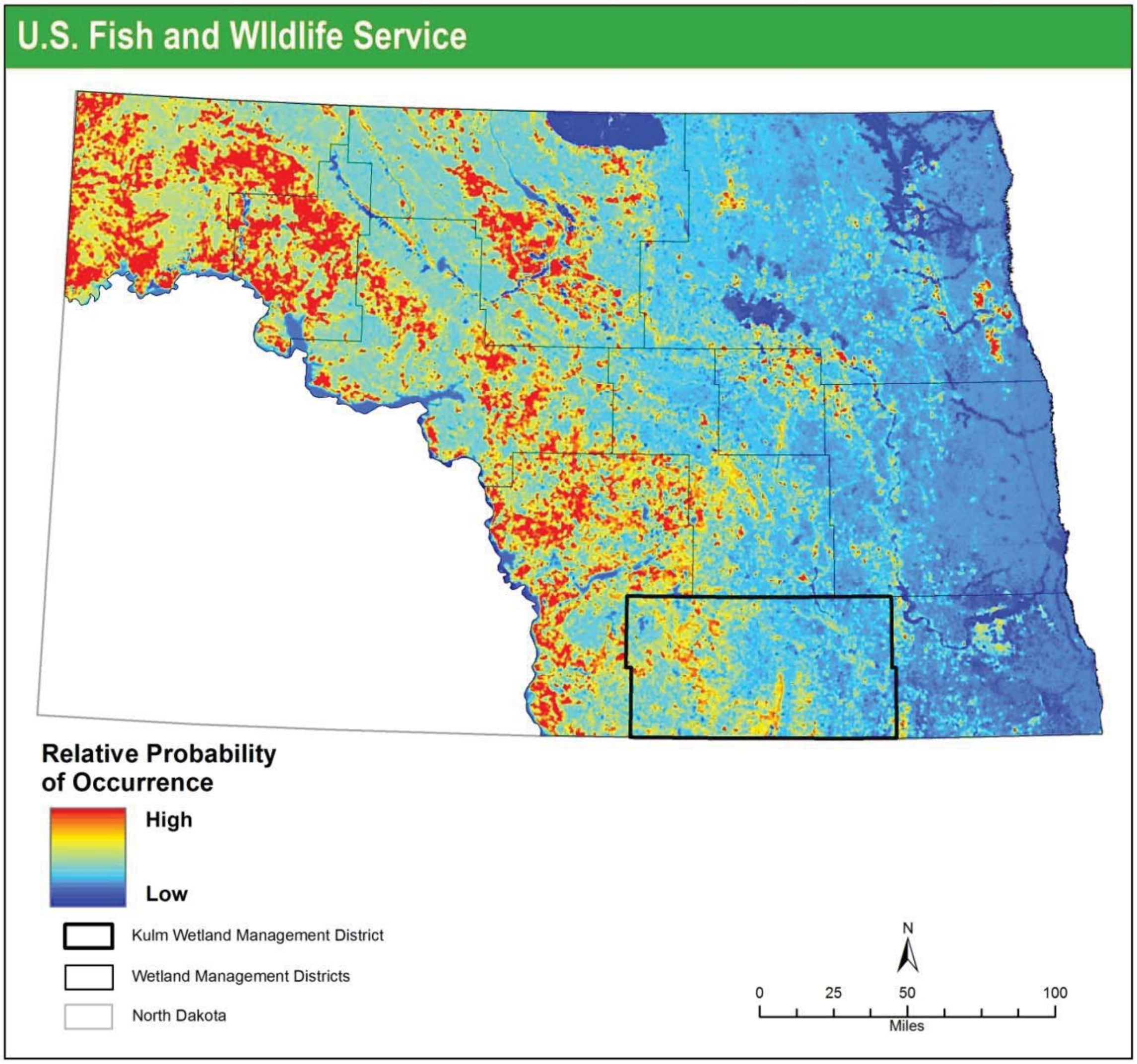


Figure 3-16. Relative probability of occurrence of northern harrier (*Circus cyaneus*) in the North Dakota portion of the PPR (Niemuth et al. 2005).

Local-level Species–habitat Relationships – Northern harrier nest in tall, dense grasslands or on platforms of vegetation surrounded by emergent vegetation in wetlands (Clark 1972, Kantrud and Higgins 1992). They have been documented to use habitats with vegetation heights of 5.9–32.3 in, visual obstruction readings of 2.8–21.3 in, 33–53% grass cover, 18–25% forb cover, <2% shrub cover, 23–30% litter cover, and 0.8–2.4 in litter depth (Dechant et al. 2002).

Management Considerations – Protection of large contiguous grasslands and wetlands is important to the sustainability of this species (Kantrud and Higgins 1992). Managers should maintain dense stands of grasslands using light-to-moderate grazing treatments (Bock et al. 1993), by burning every 3–5 years to ensure prey availability remains high (Leman and Clausen 1984, Kaufman et al. 1990), or by maintaining idle fields (Sedivec 1994).

3.5 Potential District Contributions to the Habitat Needs of Resources of Concern

The District primarily supports the habitat needs for waterfowl and other ROC by maintaining a perpetual limited interest on 187,548 acres of conservation easements (combined wetland and grassland easements) (USFWS North Dakota Wetland Acquisition Office, Bismarck, North Dakota, unpublished data current to 27 February 2014) and on 45,402 acres of habitat on fee-title WPAs.

Waterfowl and other migratory birds in the District are supported by wetland and grassland habitat occurring on private land, conservation easements, and fee-title WPAs. These lands produced an average of 406,954 duck recruits (SD = 267,685) for the 5 primary dabblers on an annual basis from 1987 – 2012 (Figure 3-17; USFWS HAPET, Bismarck, North Dakota, unpublished data). The District also contributes to the carrying capacity for the 5 primary dabblers in the PPR by supporting an average of 293,310 breeding pairs (SD = 171,143) from 1987 – 2012. Additionally, an average of 53,034 breeding pairs (SD = 29,758) for 8 other waterfowl species (Amercian wigeon [*Anas 67honologi*], green-winged teal [*A. crecca*], wood duck [*Aix sponsa*], redhead [*Aythya valisineria*], canvasback [*A. 67honologi*], lesser scaup [*A. affinis*], ring-necked duck [*A. collaris*], ruddy duck [*Oxyura jamaicensis*]) were supported during the same time period.

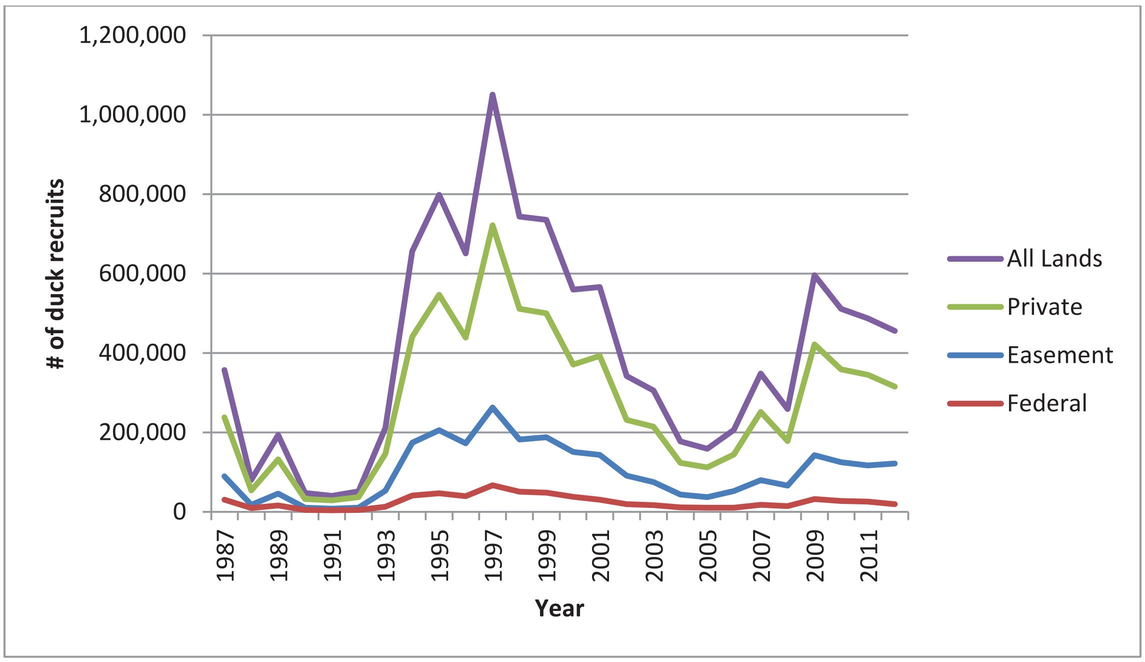


Figure 3-17. Average duck production for Kulm Wetland Management District from 1987 to 2012 for 5 primary dabbler species (mallard, gadwall, blue-winged teal, northern shoveler, and northern pintail derived from four-square mile survey data (USFWS HAPET, Bismarck, North Dakota, unpublished data). Red = fee-title only, blue = limited-interest wetland and grassland easements, green = private lands without easements, and purple = all fee-title, easement, and private lands combined.

The District primarily contributes to maintaining the populations of other ROC in the PPR through protection of existing easements and acquisition of new easements on priority wetlands and grasslands. For example, wetland and grassland habitat at Kulm WMD supports other populations of ROC including

5.6% of bobolink, 5.9% of clay-colored sparrow, 4.1% of grasshopper sparrow populations that occur in the USFWS Dakotas Zone (all WMDs in North Dakota, South Dakota, and in northeast Montana) and 11.9% of marbled godwit, 7.9% of northern harrier, 7.6% of black tern populations occurring in North Dakota wetland management districts (USFWS HAPET, Bismarck, North Dakota, unpublished data). However, a large proportion of wetland (>50%) and grassland (>90%) habitat on private lands is unprotected in the District (USFWS Kulm WMD, Kulm, North Dakota, unpublished data). Future conservation of these unprotected habitats is critical to the ability of the District to meet the population objectives for waterfowl and benefit other ROC populations in the PPR. Therefore, the District will continue to acquire wetland and grassland conservation easements from willing landowners to increase the District's contribution to the habitat needs of waterfowl and other ROC.

At local scales, management of grassland habitat on WPAs or enhancement of grasslands and restoration of wetlands on private lands under the USFWS Partners for Fish and Wildlife Program contributes to meeting the habitat requirements of ROC. The District actively manages grassland habitat on WPAs to provide vegetation structure preferred by waterfowl and other migratory birds for nesting. The restoration of highly degraded native sod grasslands and the reconstruction of old (>15 year since seeding) dense nesting cover to diverse grasslands also is aimed at improving habitat condition for ROC and improving BIDEH.

3.6 Reconciling Conflicting Habitat Needs for Resources of Concern

A primary purpose of this HMP is to develop effective conservation strategies that better enable the District to meet its establishing purpose of producing waterfowl and other migratory birds and contribute to the mission of the Service. Five waterfowl species and several other ROC were identified to guide conservation during the 8 years of this plan. The following conservation strategies (listed in priority order) are considered optimal for the District (based on the ability of a strategy to affect populations) to meet the habitat requirements for the selected ROC:

1) acquisition and protection of wetland and grassland habitat using conservation easements;
2) delivering a targeted and efficient Partners for Fish and Wildlife Program to enhance or restore habitat on private lands;
3) management of uplands on fee-title WPAs to provide nesting cover for waterfowl and other migratory birds, and wetlands to provide waterfowl breeding pair and brood habitat.

The District has identified five factors that limit the ability of the District to deliver "optimal" conservation strategies to meet the habitat needs for ROC during the next 8 years.

FUTURE ACQUISITION OF CONSERVATION EASEMENTS

The District purchases wetland and grassland easements from willing landowners to secure habitat for breeding waterfowl and other ROC in perpetuity. However, grassland once viewed as having moderate-to-marginal potential for agriculture and small wetlands that have been avoided in the past are now being converted (via tiling or ditching) for crop production (Higgins et al. 2002, Rashford et al. 2011, Doherty et al. 2013, Wright and Wimberly 2013) due to the combined effect of larger equipment, new crop varieties, and high commodity prices that have enabled farming of these previously marginal lands (Fargione et al. 2009, Rashford et al. 2011). Although the Service cannot immediately reconcile these habitat losses, the Service could accelerate wetland and grassland acquisition to protect remaining breeding habitats before they are converted. However, the rate of future easement acquisition will likely depend on 1) obtaining sufficient funding levels, 2) maintaining landowner interest and acceptance of the easement program, and 3) the rate of land-use change influenced by public policy and demand for commodities. If habitat protection does not outpace habitat losses in the future, then habitat protection goals may need to be refined to reflect what can actually be achieved (Doherty et al. 2013).

Because current trends indicate that habitat losses will continue, managers have adopted an SHC design (described in chapter 4) to most effectively utilize the limited staff and resources of the District. The District will focus current and future easement acquisition activities in landscapes that support the current wetland and grassland acquisition strategies identified in the North Dakota CCP (USFWS 2008a) and the population objectives identified in this plan.

GRAZING PRACTICES ON PRIVATE LANDS

Grassland habitat throughout the District is being lost due to expanded corn and soybean production in the region (Higgins et al. 2002, Fargione et al. 2009). Consequently, a high proportion of remaining grasslands available in private ownerships is intensely grazed because cattle must be produced on far fewer grassland acres. The resulting low vegetation structure from overgrazing negatively affects use by waterfowl and other migratory birds because most prefer moderate-to-tall vegetation structure for nesting (Gilbert et al. 1996, Fondell and Ball 2004, Salo et al. 2004, Bloom et al. 2013). These local-scale decisions have become landscape-level effects when intense grazing is conducted by the majority of private landowners in the District.

During the next 8 years, the Service will work cooperatively with willing landowners under the Partners for Fish and Wildlife Program to design grazing strategies that are proven to increase livestock performance and financial returns while improving rangeland condition and vegetation structure (Holecheck et al. 1999). These benefits will increase habitat suitability on private lands for waterfowl and other ROC throughout the District. Thus, the District could contribute to landscape-level benefits to ROC on private lands by working with multiple landowners each year to implement rotational grazing systems.

RESTORATION AND RECONSTRUCTION OF GRASSLANDS ON WPAS

Managers aim to provide heterogeneous nesting cover on fee-title WPAs in the District. However, a large proportion of these grasslands are highly degraded by exotic cool-season grasses. Because these invasive grasses tend to create monotypic stands of vegetation that can dominate entire fields, restoration of native sod grasslands and reconstruction of old (>15 year) stands of dense nesting cover to diverse grasslands significantly improves nesting cover and ecological value to wildlife (Werling et al. 2014). The District has committed to this process during the next 8 years with the realization that some short-term losses in nesting cover will occur, but habitat condition and value to migratory birds is expected to increase over the long term. Therefore, the long-term ecological benefits of using species-rich native seed mixtures (Larson 2011, Werling et al. 2014) on WPAs include reducing future invasion by weeds (Carpinelli 2001, Pokorny et al. 2005, Blumenthal et al. 2003, Sheley and Half 2006), increasing grassland sustainability (Berger 1993, Cramer 1991, Jacobs and Sheley 1999), supporting animal food webs (Rowe and Holland 2013), and attracting a wide range of migratory birds (e.g., ROC) and other prairie-obligate species (pollinators) (Black et al. 2007).

The District has identified landscapes having the highest biological potential (described in Chapter 4) to meet the habitat requirements of ROC and maximize the limited availability of staff time and resources. The District will focus its restoration and reconstruction efforts in landscapes where biological return is expected to be the highest. The District will re-evaluate restoration and reconstruction efforts over the next 8 years to determine if these efforts are yielding desired effects and to ensure that they coincide with future priorities.

PRESCRIBED FIRE MANAGEMENT ON WPAS

Mixed-grass prairies are disturbance dependent meaning they require frequent defoliation to set back or rejuvenate community succession and maintain species diversity (Collins and Barber 1985). At Kulm WMD, native sod and reconstructed prairie is managed using various forms of disturbance (primarily grazing) to maintain grassland vigor and community state, reduce invasive species, and limit encroachment by woody vegetation to provide suitable habitat for nesting ROC. However, the District has difficulty obtaining the appropriate level of prescribed fire (i.e., 1 burn every 5-6 years) to rejuvenate native sod and reconstructed prairies on individual WPAs. Limited staff, a large geographic distribution of WPAs, and a narrow treatment window (i.e., burn timing) to conduct management treatments are factors that limit the availability of prescribed fire as a management tool on individual WPAs.

Although the District has the capacity to manage grasslands using prescribed grazing on WPAs, the lack of prescribed fire at sufficient levels to manage native vegetation will challenge the ability of the District to successfully restore and reconstruct prairies. The District may need to modify restoration and reconstruction strategies during the next 8 years if the availability of fire as a management tool does not improve and grazing treatments alone do not improve or stabilize already declining prairies.

CLIMATE CHANGE AND HABITAT CONSERVATION

The District recognizes and supports the importance of identifying potential impacts of global climate change on the habitats of the ROC. However, the more immediate threat to the sustainability of waterfowl and other migratory bird populations is direct habitat loss from the conversion of grasslands and drainage of wetlands across the PPR (Niemuth et al. 2014). Although some have hypothesized that climate change could shift availability of wetland habitat in the PPR (Johnson et al. 2010), current acquisition strategies for waterfowl conservation that target conservation in the central and western PPR provide the best benefit-to-cost ratio for waterfowl production (Loesch et al. 2012). Protection of intact habitats also has been suggested as a viable strategy to allow wildlife populations to adapt to climate change in the future (Hannah and Hansen 2005). Therefore, the most effective strategy to maintain waterfowl populations and prepare for climate change is to continue acquiring and protecting wetland and grassland easements throughout the District and the PPR.

Chapter 4
Goals and Objectives

An HMP is considered a step down plan from a comprehensive conservation plan (CCP) as it steps down from goals and objectives that were developed for multiple wetland management districts (WMDs) during the completion of the North Dakota WMD CCP (USFWS 2008a). The goals represent broad statements of the desired future conditions of the Kulm Wetland Management District (District) The objectives are concise ideas that specify what needs to be achieved, how much needs to be achieved, when and where it needs to be achieved, and who is responsible for the work. In many cases, the habitat goals and objectives from a CCP do not provide the level of specificity necessary to develop an HMP or effectively manage habitat on District lands. Therefore, staff has developed additional goals, sub-goals, and objectives in this HMP that reflects a refined conservation approach that coincides with the establishing purposes of providing habitat for the production of waterfowl and other migratory birds in the District. These represent the biological foundation for conservation and management during the next 8 years. Strategies, which are specific actions, tools, or techniques required to achieve objectives, will be discussed in Chapter 5.

4.1 Focusing Conservation Using Strategic Habitat Conservation

The Service has selected a conservation approach founded on SHC that requires efforts to be focused at the landscape level, along with resource allocation, in areas that provide the greatest conservation benefit to priority trust species (USFWS 2006b). However, strategically targeting conservation requires an understanding of how landscape structure affects demographic rates for priority species that yield desired outcomes (Wiens et al. 1993). Furthermore, the need for efficient conservation delivery at the landscape level has never been greater because of accelerated wetland drainage and conversion of grasslands for agricultural purposes throughout the PPR (Stephens et al. 2008, Fargione et al. 2009, Oslund et al. 2010, Doherty et al. 2013, Johnston 2013, Wright and Wimberley 2013, Johnston 2014).

Implementation of SHC requires that conservation design and delivery be explicitly tied to population objectives (i.e., desired population size, occupancy, demographic rate, density) in landscapes where the desired biological outcomes are predicted to occur (Johnson et al. 2009). Therefore, staff selected the following population objectives to guide conservation delivery using SHC during the next 8 years:

1) Target wetland conservation in landscapes that support ≥25 breeding duck pairs/mi^2 to maximize carrying capacity levels for breeding waterfowl (*Anas* spp.) and contribute to stable populations within the Prairie Pothole Region.

2) Target grassland conservation in landscapes that support ≥60 breeding duck pairs/mi^2 (*Anas* spp.) and nest success levels above population maintenance levels (≥15-20% nest success) (Cowardin et al. 1985) to maximize waterfowl production and contribute to stable populations within the Prairie Pothole Region.

3) Increase habitat conservation in landscapes that support high brood occupancy rates (Walker et al. 2013a) characterized by high densities of small- to mid-size wetland basins and a high

proportion of grassland within a 4 mi^2 area to maintain waterfowl recruitment potential within the Prairie Pothole Region.

4) Target habitat conservation in landscapes that support high densities of priority wetland- and grassland-dependent migratory bird species identified in this HMP.

This HMP represents the biological planning and conservation design phases of SHC that identified the potential of the landscape to contribute to the carrying capacity and production of waterfowl, while benefitting other migratory bird populations. Staff used USFWS predictive species models to link conservation of priority ROC at the scale of the District to the conservation of migratory bird populations within the PPR. The conservation design was intentionally waterfowl focused but also considers benefits to other migratory birds by targeting landscapes where densities of ROC are the highest. Staff selected this SHC approach because districts are uniquely positioned to implement landscape conservation for migratory bird populations using conservation easements to secure habitat on private lands, enhance and restore private lands under the Partners for Fish and Wildlife Program, and manage fee-title waterfowl production areas (WPA).

SELECTION OF BIOLOGICAL THRESHOLDS

Staff selected a set of landscape variables (Table 4-1) under the SHC conservation design that represent the potential of different landscapes to contribute to waterfowl population objectives. Breeding duck pairs was used as a variable in the model (Figure 4-1) to identify important landscapes with sufficient wetland densities to support waterfowl populations. Duck pair thresholds (25, 40, & ≥60 pairs mi^2) were selected because they coincided with existing conservation delivery frameworks for grassland and wetland (≥25 pairs only) easement acquisition identified in the North Dakota Wetland Management District CCP (USFWS 2008a). Percent grassland was used a variable in the model because of the positive relationship to waterfowl nest success (Greenwood et al. 1995, Reynolds et al. 2001, Horn et al. 2005, Stephens et al. 2005, Howerter et al. 2014), brood occupancy (Walker et al. 2013a), and the landscape-scale selection requirements of all 11 ROC. A threshold of 40% grassland per 4 mi^2 area was included because these landscapes support maintenance level nest success (≥15–20%; Reynolds et al. 2001) for mallard, northern pintail, blue-winged teal, gadwall, and northern shoveler populations (Cowardin et al. 1985, Klett et al. 1988). Further, three percent grassland thresholds (≥60, 40-59, <40% grassland per 4 mi^2) were identified based on densities of non-waterfowl ROC in Figures 4-8 to 4-10; percent grassland was considered equivalent to one minus cropland for these figures. Density of non-waterfowl ROC generally increased in landscapes with <40% cropland, remained stable in landscapes with 40-59% cropland, and decreased when >60% cropland occurred on the landscape.

The landscape classification model produces different landscape classes with varying potential to support waterfowl and other migratory bird populations. Landscape classes were assigned based on a range of waterfowl pair density and similarity in grassland categories for classes 1A to 3B (>40% grassland) or 4A to 4C (<40% grassland) within a 4 mi^2 area. **The classes do not represent priority order from 1A to 5, rather each class may have a different set or combination of conservation treatments (acquisition, enhancement, management) that can be used by managers to achieve the waterfowl population objectives of the SHC approach while benefitting other priority ROC.** For example, acquisition of wetlands in 1A, 1B, and 4A landscapes would provide the highest biological return to support the carrying capacity of waterfowl and pulses in productivity that occur during wet periods in the PPR (Walker et al. 2013b).

Ultimately, landscapes identified for conservation within the District can be classified using a landscape-scale model to guide conservation delivery using specific conservation treatments that maximize contributions to waterfowl and other ROC populations under the SHC conservation design.

Table 4-1. Landscape variables used in the strategic habitat conservation model of the potential of the landscape to support waterfowl and other migratory bird populations in Kulm Wetland Management District.

Landscape Variable	Description
Breeding Duck Pairs	Average number of pairs/mi^2 from 1987-2011. Waterfowl pair density generated using geographic information system (GIS) modeling techniques using USFWS National Wetland Inventory digital data, the USFWS Region 6 Four Square Mile Breeding Waterfowl Survey results, and regression equations predicting duck pair/wetland relationships developed by the USFWS Habitat and Population Evaluation Team and U.S. Geological Survey Northern Prairie Wildlife Research Center.
% Grassland	Percent grassland within a 4 mi^2 area. Percent grassland was generated using the National Agricultural Statistics Service (NASS) cropland data layer (CDL) derived from 2012 satellite imagery. We created a 2012 grass-dominated layer by combining all grassland dominated classes in the NASS CDL including native grassland, grass/pasture, grass/hay, and pasture/hay.

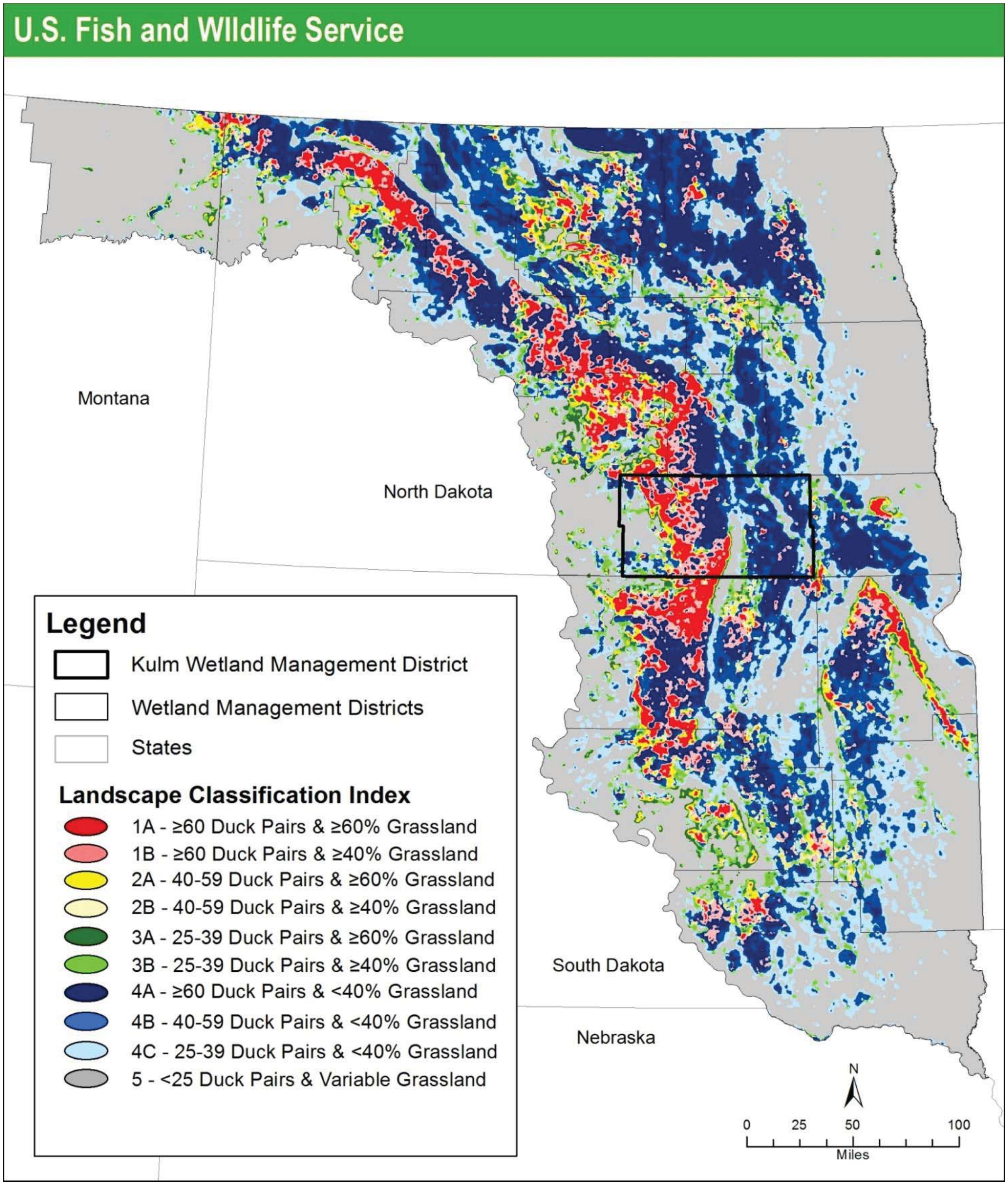


Figure 4-1. Strategic habitat conservation design for migratory bird conservation at Kulm Wetland Management District. Map data reflect the mean density of breeding waterfowl pairs per square mile from 1987-2011 and percent grassland in a four square mile area within the North Dakota, South Dakota, and northeast Montana portions of the U.S. Prairie Pothole Region. Percent grassland was generated using 2012 National Agricultural Statistics Service cropland data layer.

INTEGRATED CONSERVATION DELIVERY

This SHC conservation design provides a transparent plan that targets conservation in different landscapes to maximize the production of waterfowl and other migratory birds. Staff will prioritize conservation delivery as identified in the conservation pyramid (Figure 4-2) during the next 8-years:

1) Conservation Easements – "*Acquire and Protect What We Can*"
    - Easements form the base for population-level sustainability of waterfowl and other migratory bird populations in the PPR. Acquire and protect all wetland and grassland habitats in priority areas first.

2) Partners for Fish and Wildlife Program – "*Enhance What We Can*"
    - Maximize the extent of suitable wetland and grassland habitat on private lands in landscapes highly attractive to waterfowl first.

3) Fee-title Lands – "*Manage What We Have*"
    - Ensure that fee-title lands located in landscapes with high potential to contribute to the production of waterfowl and other ROC are optimally managed.

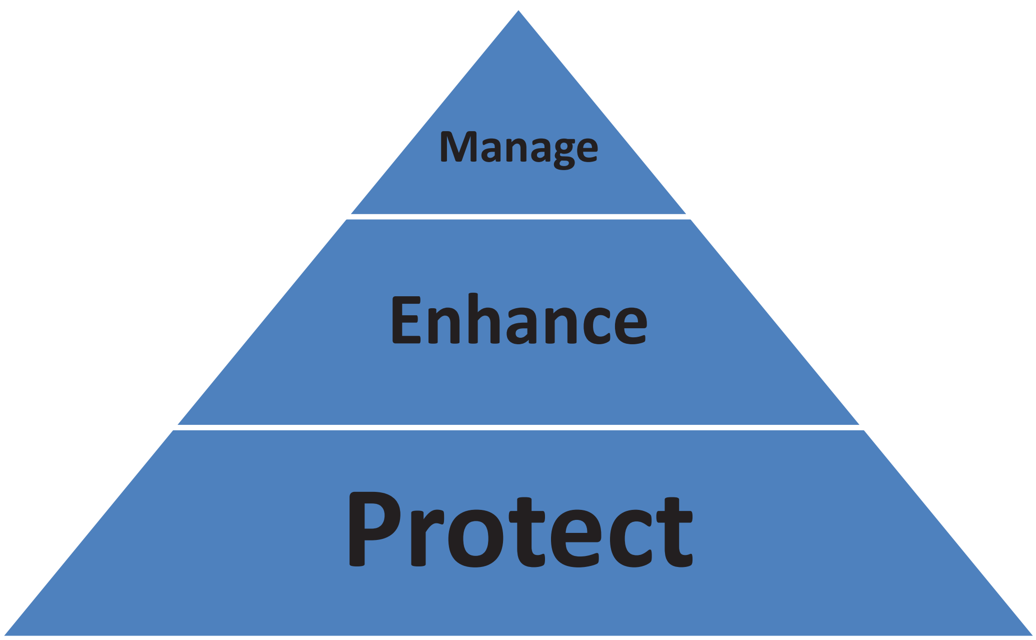


Figure 4-2. Three-tier conservation delivery approach for Kulm Wetland Management District aimed at sustaining waterfowl and other migratory bird populations in the Prairie Pothole Region. Conservation easements (Protect) represent the base for sustaining populations, private lands (Enhance) represent the opportunity to enhance and/or restore function to landscapes important to waterfowl and other migratory birds, and fee-title lands (Manage) represent areas to maximize production of waterfowl and other migratory birds in functional landscapes.

This SHC approach will allow staff to work more efficiently given limited availability of resources while improving the transparency and accountability of our actions. The District intends to track the outcomes of our conservation actions on priority ROC through assumption-based research and outcome-based monitoring. This iterative process requires flexibility in conservation delivery that can be modified as new scientific information is obtained. Because the landscape is continually changing, it will be critical that District staff update the SHC conservation design at ≤5-year intervals to account for changes in the availability and juxtaposition of wetland and grassland habitat.

Ultimately, if biological outcomes are the currency that managers desire as a return on their conservation investment, then directing specific conservation treatments to different landscape types provides an efficient means for conservation delivery under an SHC conservation design.

ASSUMPTIONS AND LIMITATIONS OF THE SHC CONSERVATION DESIGN

The following set of assumptions and limitations were incorporated into the development of the landscape classification model. Use of the model as a decision support tool also would be affected by the degree that each limitation impacts conservation delivery.

Assumptions

1) The distribution of breeding duck pairs in the PPR is positively correlated to the density and composition of wetlands available on the landscape (Stewart and Kantrud 1973, Krapu et al. 1983, Johnson and Grier 1988, Loesch et al. 2012).
2) Landscapes with high wetland densities are critical to waterfowl productivity in the PPR (Higgins 1977, Krapu et al. 1983, Cowardin et al. 1985, Krapu et al. 2006, Walker et al. 2013b); spring wetland conditions are positively correlated with clutch size, nesting effort, and duckling survival (Krapu et al. 1983, Cowardin et al. 1985, Rotella and Ratti 1992, Greenwood et al. 1995).
3) Protection of a diversity of wetland types across a wide geographic extent is critical to support base waterfowl carrying capacity levels (Doherty et al. 2015) and pulses in waterfowl populations (Walker et al. 2013b).
4) Landscapes having ≥40% grassland per 4 mi^2 area support maintenance level nest success (≥15–20%; Reynolds et al. 2001) for mallard, northern pintail, blue-winged teal, gadwall, and northern shoveler populations (Cowardin et al. 1985, Klett et al. 1988).
5) The proportion of perennial grassland cover on the landscape positively influences waterfowl nest success (Greenwood et al. 1995, Reynolds et al. 2001, Horn et al. 2005, Stephens et al. 2005, Howerter et al. 2014) and brood occupancy (Walker et al. 2013a) in the PPR; <40, ≥40, and ≥60% grassland thresholds (per 4 mi^2) are hypothesized thresholds to resources of concern that occur in these landscapes. Landscapes with ≥60% grassland were considered intact.
6) The proportion of cropland on the landscape negatively influences waterfowl nest success (Drever et al. 2007, Devries and Armstrong 2011, Bloom et al. 2013) and the density of multiple migratory bird species across several guilds in the PPR (Figures 4-9, 4-12 to 4-14).
7) Landscapes with <40% cropland (≈60% grassland) were considered important conservation areas because they supported high densities for 14 of 18 migratory bird species evaluated.
8) Density of migratory birds is a reliable indicator of habitat quality when combined with a demographic rate (Van Horne 1983), such as using nesting success as a measure of population response (Niemuth et al. 2005) for waterfowl.
9) Landscapes containing large expanses of grasslands and abundant wetlands are highly productive areas for waterfowl (Greenwood et al. 1995, Sovada et al. 2000, Phillips et al. 2003) and other migratory birds (Bakker et al. 2002, Niemuth et al. 2006) in the PPR.

10) Conservation delivery implemented under this framework will increase the contribution of Kulm WMD to migratory bird populations in the PPR. Contributions to the population objectives identified in this plan will largely be derived from wetland and grassland easements and work on private lands under the Partners for Fish and Wildlife Program. Management of fee-title WPAs also will be important to meet the designated purpose of waterfowl production on these lands.

Limitations

1) Breeding duck pair estimates assigned to the landscape represent the 25–year average derived from 4-square mile survey estimates from 1987–2011. Because of the inherent variation in wetlands in the PPR (Niemuth et al. 2010, Loesch et al. 2012), actual patterns of waterfowl use may vary between dry and wet periods.
2) Breeding duck pair estimates used in the model do not account for wetland losses that are rapidly occurring throughout the District.
3) The model does not account for future losses in native sod grasslands in the District. Future iterations of the model will be developed at ≤5 year intervals to account for grassland loss.
4) Interannual environmental conditions influence the annual distributions of many migratory birds such as grassland songbirds (Fontaine et al. 2009, Swanson and Palmer 2009). Thus, actual densities of migratory birds vary annually in space and time.
5) Implementation of SHC at Kulm WMD alone will not stabilize entire migratory bird populations that are dependent upon sufficient breeding habitat being available across the PPR.
6) The actual degree in intactness (i.e., connectedness and juxtaposition) within <40, ≥40, and ≥60% grassland landscapes is variable, which likely influences the breeding success of many wetland- or grassland-dependent migratory birds.
7) Current staffing levels at Kulm WMD will challenge full implementation of the framework.
8) Additional assumption-based research and outcome-based monitoring will be required to test hypotheses included in the SHC conservation design. Obtaining sufficient internal and external funding in conjunction with large-scale research grants will be critical to testing the assumptions of the framework.

4.2 Landscape-scale Changes in Wetlands and Grasslands

The following rationale provides important context for how staff incorporated the role of recent land use patterns and importance of wetland and grassland habitats on the landscape into the overall SHC conservation strategy designed to benefit waterfowl and other migratory bird populations.

Small, shallow wetlands with varying hydroperiods along with diverse stands of tall-grass, mixed-grass, and short-grass prairies once dominated the landscape in the PPR. However, extensive conversion of wetlands (Oslund et al. 2010, Dahl 2014) and grasslands has occurred in this region for agricultural purposes (Fargione et al. 2009, Wright and Wimberly 2013, Johnston 2014). As of 2010, 54.2% and 45.6% of grasslands in North Dakota and South Dakota had been lost (Doherty et al. 2013). In conjunction with grassland losses, Dahl (2014) estimated that between 1997 and 2009, 4% of all wetland/water basins (107,177 basins) and 1.1% of the total wetland area (74,340 acres) lost in the U.S. PPR. However, these wetland habitat loss rates may be conservative because detection of drainage efforts (e.g., contour draining, tile drainage) is difficult (Doherty et al. 2013).

Although PPJV partners have made substantial gains in conservation by protecting 18.4% of grasslands and 34.4% of wetlands as of 2010 (Doherty et al. 2013), a significant amount of unprotected habitat is at risk of being lost and current migratory bird population levels may not be sustainable unless substantial gains in habitat acquisition are achieved. Recent increases in pasture and cropland values (Figure 4-3) coincide with high demand for energy sources (Figure 4-4) and have contributed to extensive losses in Conservation Reserve Program (CRP) lands (approximately 23.8% of all grass cover in PPJV, (Figure 4-5) (Doherty et al. 2013) that provide nesting cover for waterfowl and other migratory birds. Thus, economic pressures to convert remaining unprotected lands due to the attractiveness of high commodity prices and changes in U.S. agricultural and energy policies will continue to challenge the ability of the USFWS and PPJV partners to secure habitat in perpetuity from willing landowners (Doherty et al. 2013).

Targeting conservation delivery as quickly and efficiently as possible in landscapes with abundant wetlands and wetland/grassland complexes is necessary to support stable populations of waterfowl and other migratory birds. Continued high levels of funding such as the 70% of Migratory Bird Conservation Funds that were allocated to the U.S. PPR in fiscal years 2013–2015 are instrumental to secure remaining habitat before grasslands are converted and wetlands are drained. However, conservation goals established by the PPJV will not be reached in the future without continued landowner interest in the easement program and high levels of funding because of the limited amount of time remaining to secure habitat given current conversion rates (Doherty et al. 2013).

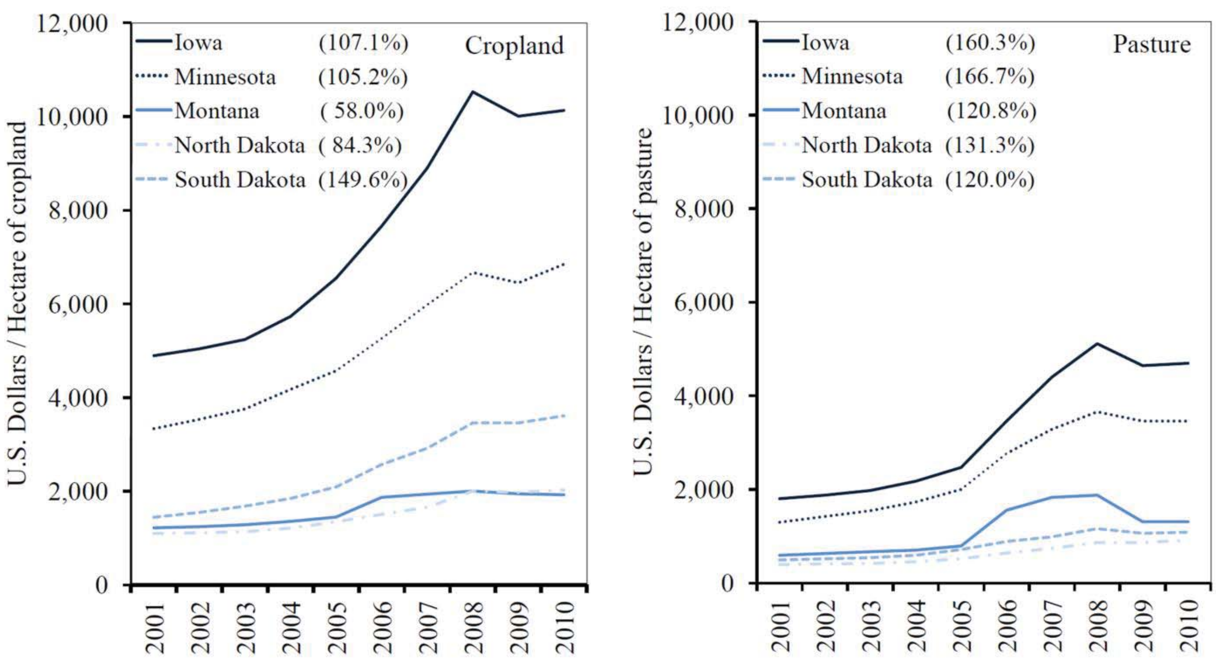


Figure 4-3. Values of cropland and pasture based on National Agricultural Statistics Service data from 2001 through 2010 in the Prairie Pothole Region (Doherty et al. 2013).

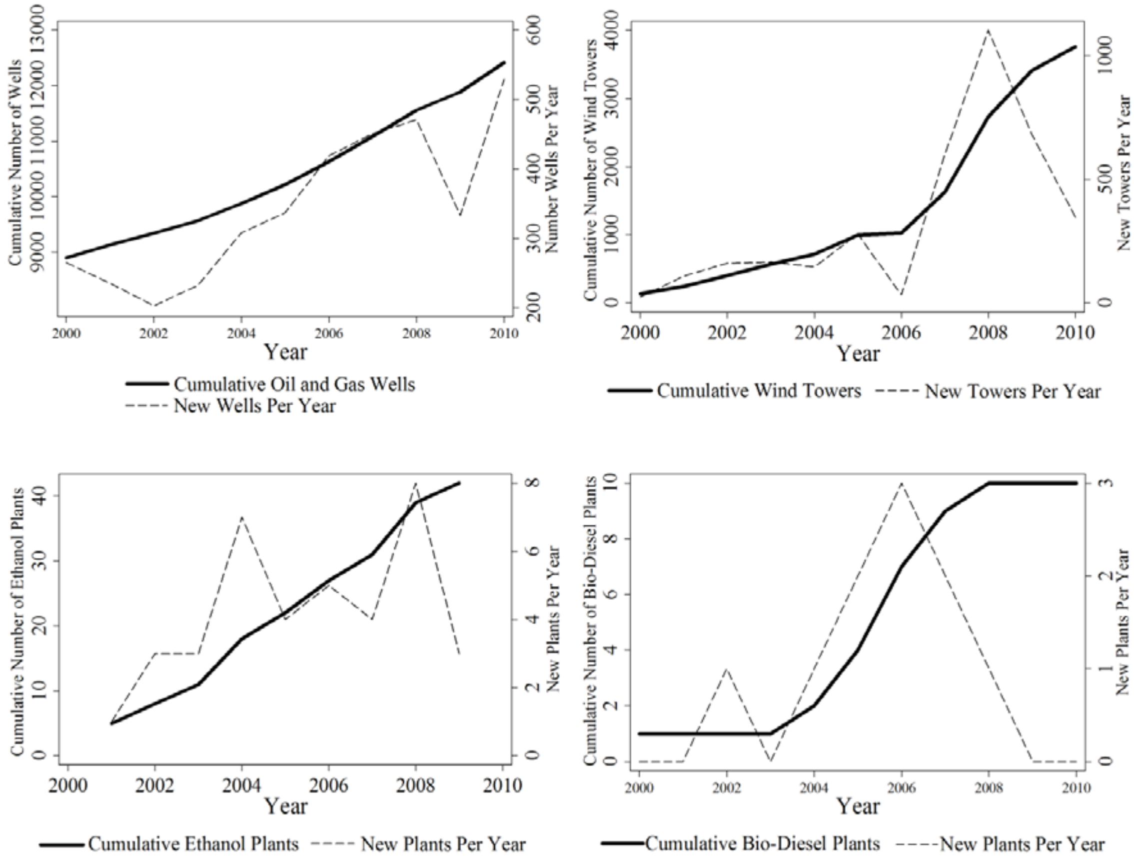


Figure 4-4. Cumulative increased demand for energy resources from 2000 through 2010 in the Prairie Pothole Region (Doherty et al. 2013).

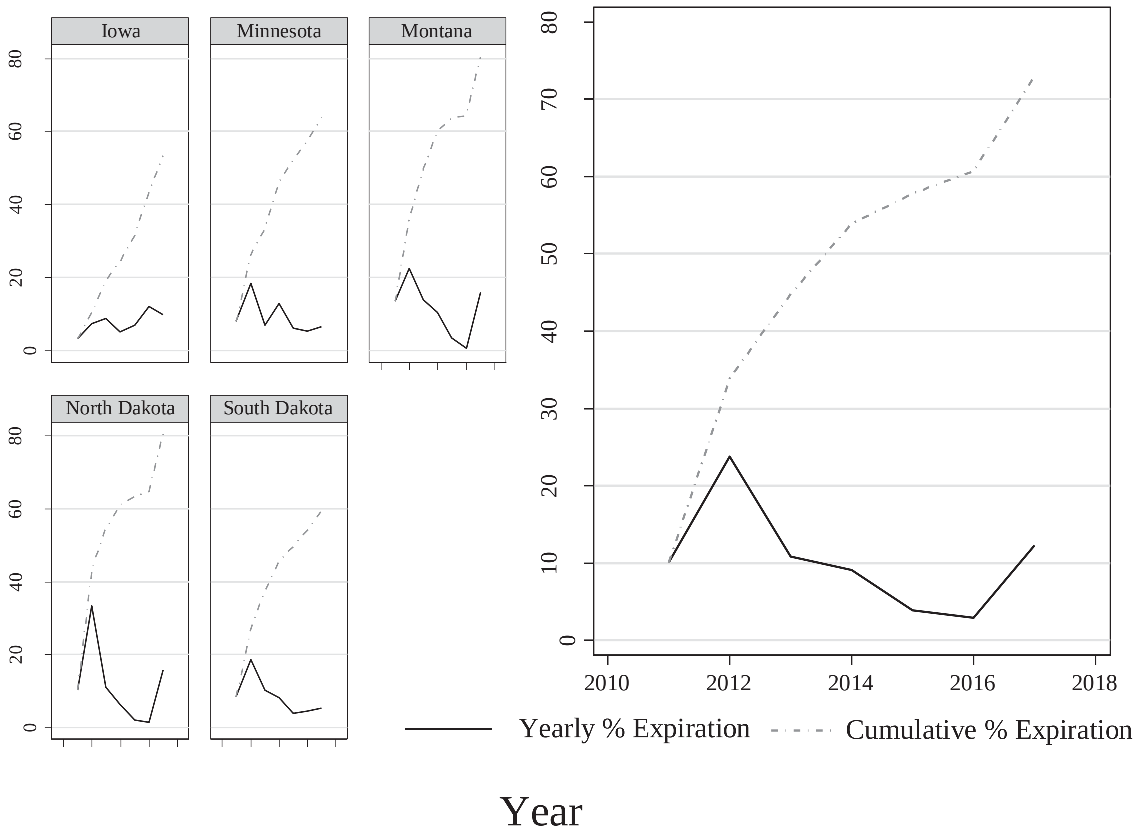


Figure 4-5. Percent of September 2010 Conservation Reserve Program (CRP) area expiring during 2011 – 2017 by state areas within the U.S. Prairie Pothole Region (Doherty et al. 2013).

4.3 Overview: Importance of Wetlands to Waterfowl Populations

The District considered an extensive set of scientific literature demonstrating the importance of wetlands to define a number of descriptive landscape classes for conservation and prioritization discussions. An overview of the importance of wetlands to waterfowl is provided below.

DISTRIBUTION AND ABUNDANCE

Abundance and availability of wetlands in the PPR greatly influences the size, distribution, and/or productivity of waterfowl populations and other migratory birds (Stewart and Kantrud 1973, Krapu et al. 1983, Kantrud and Stewart 1984, Kantrud et al. 1989, Niemuth and Solberg 2003, Niemuth et al. 2006, Loesch et al. 2012, Walker et al. 2013b, Doherty et al. 2015). The distribution of waterfowl generally coincides with the density of wetlands on the landscape (Stewart and Kantrud 1973, Krapu et al. 1983, Johnson and Grier 1988, Loesch et al. 2012); temporary and seasonal basins attract approximately 70% of breeding pairs when they are wet (Loesch et al. 2012). The importance of these wetland basins to breeding waterfowl is apparent during years when percent wet area of ponds is high creating optimum environmental conditions for breeding ducks (Stewart and Kantrud 1973) (Figure 4-6). Temporary and seasonal wetlands are preferred habitat by wetland-dependent wildlife (Kantrud and Stewart 1984, Niemuth et al. 2006, Loesch et al. 2012) because they warm early in the spring and produce critical food resources (i.e. aquatic invertebrates and carbohydrate-rich plant seeds; see Swanson et al. 1974, Euliss et al. 1999, Krapu et al. 2004a) that nesting female waterfowl rely on to optimize body condition (Pietz et al. 2000) and ducklings rely on to enhance their growth and survival (Cox et al. 1998) prior to fledging (Swanson and Duebbert 1989). Consequently, the Service annually monitors waterfowl populations and wetland conditions throughout the PPR and have identified areas important to breeding waterfowl populations (Figure 3-3) using results from the 4-square mile survey initiated in 1987.

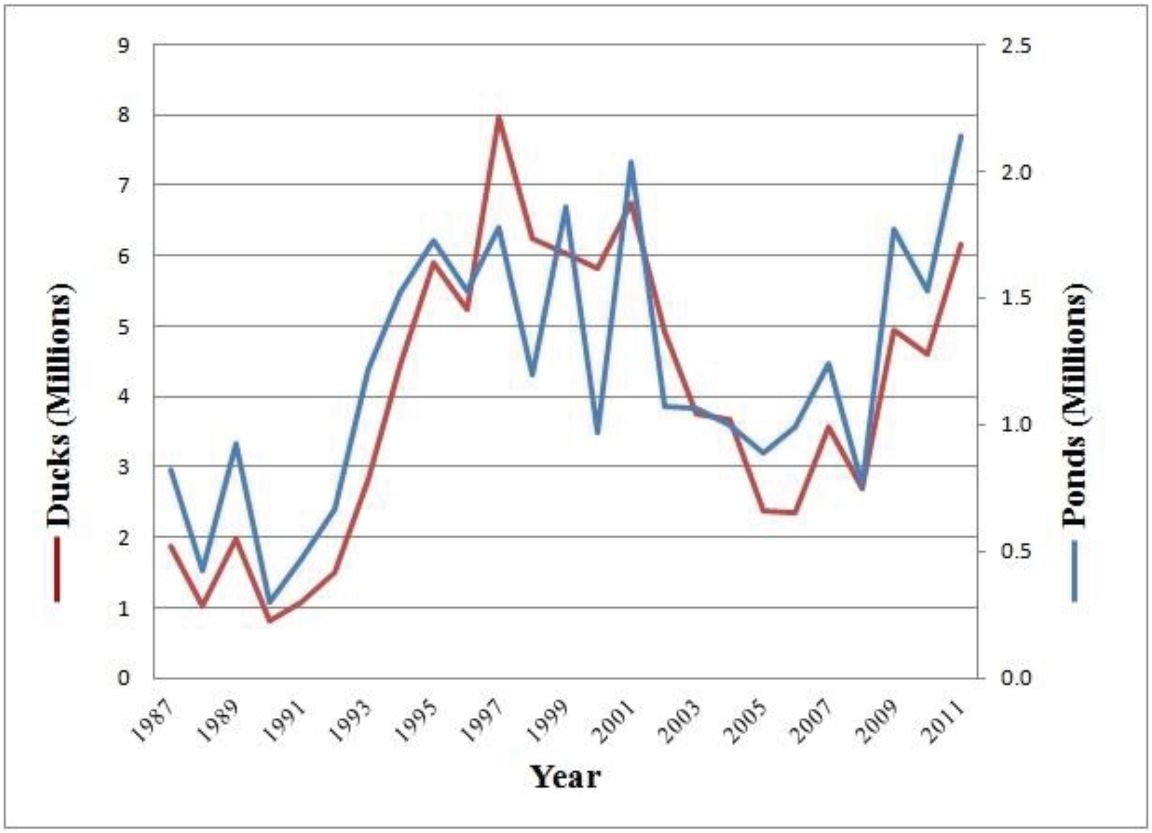


Figure 4-6. Relationship between May pond abundance and number of breeding waterfowl (5 primary dabbler species) derived from USFWS four square mile breeding duck pair survey results from 1987-2011 for the North Dakota, South Dakota, and northeast Montana portions of the U.S. Prairie Pothole Region.

REPRODUCTIVE EFFORT

Researchers have documented that nest survival of upland-nesting waterfowl is positively correlated May wetland conditions (Drever et al. 2007, Walker et al. 2013b). Other studies have documented a negative relationship between nest survival and the number of wetland basins (Phillips et al. 2003, Drever et al. 2004, Stephens et al. 2005). However, the disparity between these studies may be related to a spatial and temporal response in both current and recent primary productivity in conjunction with wetland conditions that was evaluated by Walker et al. (2013). Future long-term studies are needed to quantify the effect of complex ecological relationships (i.e., predator community dynamics [Sargeant et al. 1993] and wetland conditions [Krapu et al. 1983]) that coincide with pulses in wetland abundance and/or changes in landscape composition on waterfowl populations. Also, research is needed to quantify the effects of wetland drainage on the quality of remaining wetlands and waterfowl production.

Nesting effort for the five primary upland nesting ducks in the PPR also has been found to be positively correlated to the abundance of ponds during the breeding season (Krapu et al. 1983, Cowardin et al. 1985, Greenwood et al. 1995, Bloom et al. 2013). For example, renesting propensity of mallards (Krapu et al. 1983, Cowardin et al. 1985) and pintails (Richkus 2002) is related to pond abundance. Because the energetic cost of incubation is high (Afton and Paulus 1992), exogenous resources (e.g., aquatic invertebrates) (Krapu and Reinecke 1992) consumed after failure of the initial nest are critical for clutch formation (Krapu 1974, Krapu 1981, Esler and Grand 1994). Females may terminate nesting after failure of an unsuccessful nest in years when pond abundance is low to enhance their future reproductive potential (Richkus 2002). Although nest success can be high in dry years (Krapu et al. 1983), recruitment may remain low because brood survival (Krapu et al. 2000) and renesting potential is low during these years (Krapu et al. 1983, Cowardin et al. 1985).

REPRODUCTIVE OUTPUT.

During wet years such as 1993 in North Dakota that followed a dry period (1988-1992), foraging conditions for nesting dabbling ducks were optimal and blue-winged teal, gadwall, and mallard nested late into the summer (Krapu et al. 2001). Exceptionally productive years coincide with high quality foraging conditions (Krapu et al. 2004b) that can result in larger clutch sizes (Pietz et al. 2000) and smaller overall declines in clutch sizes during the nesting season (Krapu et al. 2004b) in response to favorable environmental conditions. For example, gadwalls acquire lipid reserves required for egg development after arriving on the breeding grounds (G. Krapu, Jamestown, North Dakota, unpublished data). Reproductive output of gadwall increases with percent basin wet area and pond density by producing a larger clutches (additional 1-2 eggs per clutch) during years when water conditions are favorable (Pietz et al. 2000). Likewise, gadwall, pintail, and blue-winged teal can maintain larger clutch sizes in wet years (Krapu et al. 2004c). Although these types of reproductive responses are complex, improved lipid reserves acquired on the breeding grounds in gadwall (Pietz et al. 2000), blue-winged teal, northern shoveler, and pintails (effect in pintails occurs after failure of initial nest [Krapu et al. 2004b]) increases their productivity during years when wetlands are abundant in response to increases in local food availability (i.e., plant seeds or production of aquatic invertebrates coincides with wetland reflooding following periods of drawdown [Chura 1961, Euliss et al. 1999]). Protein acquired from aquatic invertebrates, a major component of female dabbling ducks diet during egg production (Krapu and Reinecke 1992), is important to maintain energetic and nutrient reserves that are especially important during renesting (Krapu 1981).

WATERFOWL BROODS

Availability of abundant wetlands is important to brood survival of mallards (Rotella and Ratti 1992, Krapu et al. 2000, Amundson and Arnold 2011). Brood occupancy also is closely associated with increasing wet area and perennial grass cover on the landscape (4 mi^2 area; Walker et al. 2013a). Large seasonal and semi-permanent wetlands are important to broods (Rotella and Ratti 1992, Krapu et al. 2006, Walker et al. 2013a), as ≥90% of mallard broods can occur on these basins (Krapu et al. 2004a). Recent findings by Walker et al. (2013) also indicate that many clustered small- to mid-sized wetlands have higher occupancy rates than larger wetlands. Consequently, focusing conservation (i.e., grassland and wetland protection) in areas with high perennial grassland and complexes of small- to mid-sized wetlands may be important to breeding waterfowl (Walker et al. 2013a). Because of the spatial variation in wetlands across time (Niemuth et al. 2010), protecting a diversity of wetland types also is important to waterfowl broods because they increase their use of seasonal wetlands and decrease their use of semi-permanent wetlands during wet years (Krapu et al. 2006). This pattern of seasonal wetland use by broods during wet years also reduces the likelihood of predation by mink because they prefer permanent to semi-permanent wetlands (Krapu et al. 2004b). Therefore, protecting seasonal habitat appears to be particularly important to mallard production because duckling survival is higher when >40% of seasonal basins contain water (Krapu et al. 2006).

4.4 Overview: Importance of Grasslands to Waterfowl and Other Migratory Bird Populations

Grassland conservation is essential to maintain the productivity of migratory birds (Herkert et al. 2003, Stephens et al. 2003, Reynolds et al. 2001, Bloom et al. 2013) and other ecological services (Werling et al. 2014). The Service has allocated significant resources to protect more than 3,861 mi^2 of grasslands and wetlands (primarily through perpetual conservation easements; Loesch et al. 2012) to support waterfowl populations. However, recent conversion of grasslands (Stephens et al. 2008, Rashford et al. 2011, Doherty et al. 2013, Johnston 2013, Wright and Wimberly 2013, Johnston 2014) for agricultural use has resulted in extensive losses of grasslands that migratory birds rely on for nesting. Therefore, conservation of remaining intact landscapes may be critical because they disproportionately contribute to sustaining biodiversity (Kiesecker et al. 2011), ensure that ecological processes persist at levels necessary to support migratory birds (Greenwood et al. 1995, Herkert et al. 2003, Stephens 2003), and provide the best opportunity for species to adapt to climate change (Hannah and Hansen 2005, Mawdsley et al. 2009). Grasslands also provide important ecosystem services including biodiversity, soil fertility, flood and drought mitigation, nutrient cycling, climate stabilization, pollination, and prevention of soil erosion (Gleason et al. 2008, Maczko and Hidinger 2008, Werling et al. 2014). Maintaining these ecosystem services also yields important social and economic benefits including livestock production, recreation, and bioenergy production. An overview of the importance of grasslands to waterfowl and other migratory birds is provided below:

Previous research indicates that waterfowl nest success in the PPR was positively influenced by the amount of perennial grassland (Greenwood et al. 1995, Reynolds et al. 2001, Horn et al. 2005, Stephens et al. 2005, Howerter et al. 2014; Figure 4-7) and abundance of wetland basins (Walker et al. 2013b), and negatively by the amount of cropland (Drever et al. 2007, Devries and Armstrong 2011, Bloom et al. 2013) on the landscape. Because nest success is believed to be an important factor affecting waterfowl populations (Cowardin et al. 1985, Greenwood et al. 1995, Hoekman et al. 2002, Howerter et al. 2014), targeting specific conservation treatments in areas with a minimum of 40% grassland cover (Reynolds et al. 2001) and high wetland densities (e.g., $\geq$60 duck pairs/mi^2) will be important to contribute to waterfowl population objectives while benefitting ROC. Conservation of wetland/grassland complexes also is important because these landscapes have high biological potential to support waterfowl broods (Walker et al. 2013a) and their survival (Krapu et al. 2000).

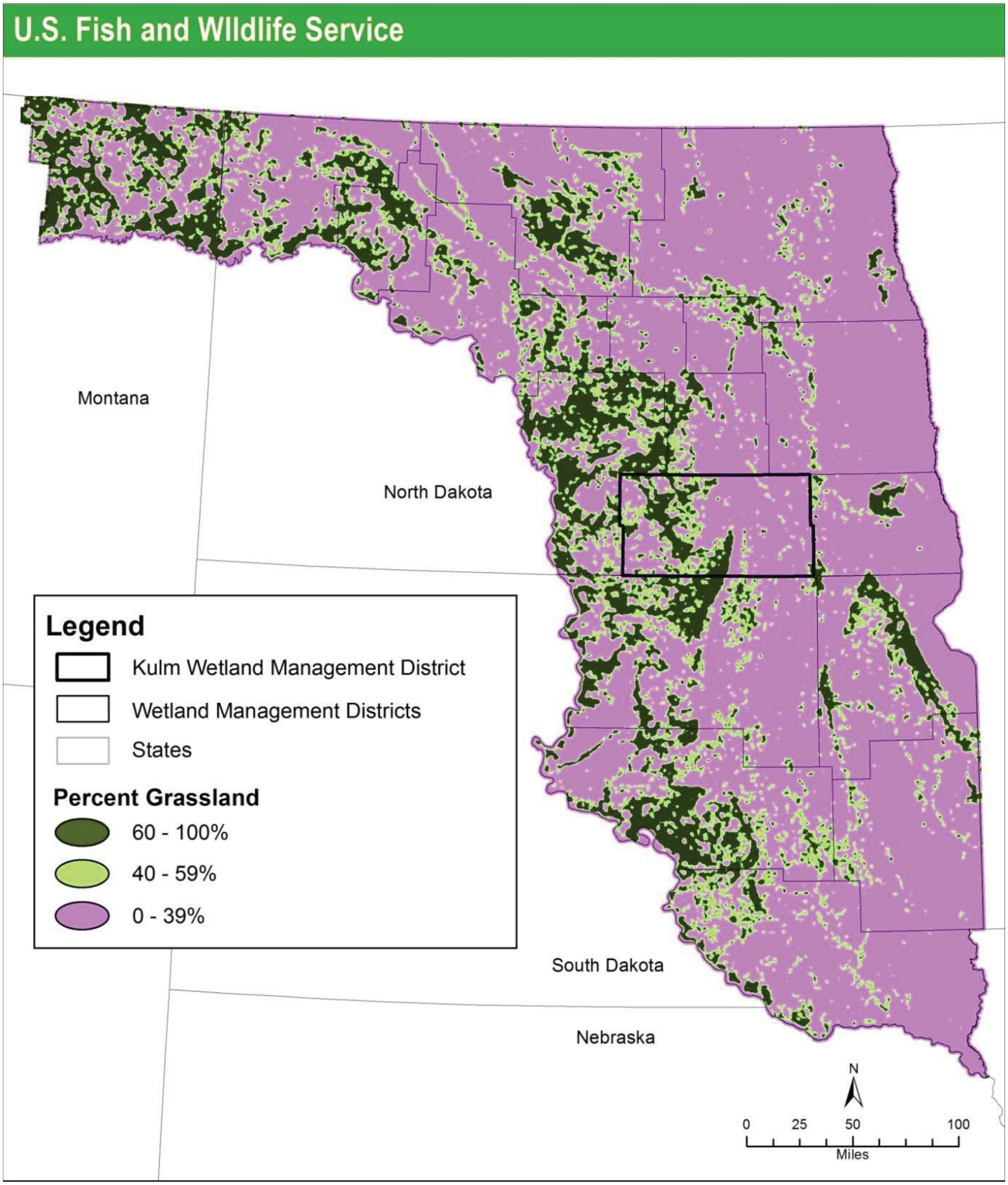


Figure 4-7. Distribution of ≥60, ≥40, and <40% grassland cover (4 mi^2 scale) within Kulm Wetland Management District and the USFWS Dakotas Zone. Percent grassland was generated using National Agricultural Statistics Service (NASS) cropland-data layer for 2012 within the North Dakota, South Dakota, and northeast Montana portions of the U.S. Prairie Pothole Region.

Waterfowl nest success in landscapes with <40% grassland composition is highly variable and has been shown to be positively influenced by the annual abundance of wetlands (Walker et al. 2013b) and negatively by predator abundance (Sargeant et al. 1993) and proportion of cropland in the landscape

(Drever et al. 2007, Devries and Armstrong 2011, Bloom et al. 2013). Loss of grassland and wetland habitat to intensive agriculture in these landscapes forces ducks to nest in remaining fragmented and isolated upland patches of upland habitat where predation rates by red fox (*Vulpes vulpes*) and other mesopredators can be high (Sovada et al. 2000, Phillips et al. 2003). In the absence of suitable upland habitat, ducks will nest in residual cover in croplands, but nest success tends to be low (0.3 to 17 %; Higgins et al. 1977, Cowardin et al. 1985, Klett et al. 1988) due to direct losses to agricultural equipment or predation. For example, from 1966 to 1984, Klett et al. (1988) found that 51-57% of northern pintail nests were located in cropland in the PPR, but only 5% of nests were successful. Managers can offset the impacts to nest success in cropland dominated landscapes by controlling predators within individual upland patches (Beuchamp et al. 1996, Pieron and Rohwer 2010). However, sufficient resources (staff time and funding) must be available to control predator populations. Thus, wetland protection in landscapes dominated by row crop agriculture may be the most efficient conservation option to prevent wetlands from being filled or drained (Fargione et al. 2009, Rashford et al. 2011) and to support the carrying capacity for breeding waterfowl populations in the PPR (Reynolds et al. 2006).

Influence of Predator Communities on Waterfowl Production – Predation is a primary factor limiting both hen and nest survival (Sargeant and Raveling 1992, Sovada et al. 2001, Horn et al. 2005, Walker et al. 2013b), but variation in predation rates are related to changes in predator community composition that occur with the amount of grassland on the landscape (Horn et al. 2005). Nesting migratory birds are impacted by changes in predator community composition that occurs at ≈50% grassland on the landscape (Horn et al. 2005). Intact grasslands tend to be dominated by coyotes (*Canis latrans*) compared to areas with abundant cropland and scattered small isolated blocks of grasslands that contain abundant meso-predators such as red fox, raccoon (*Procyon lotor*), and striped skunk (*Mephitis mephitis*) (Sargeant et al. 1987, Sovada et al. 1995, Horn et al. 2005). Meso-predator populations coincide with increasing fragmentation of grasslands (Cowardin et al. 1983, Phillips et al. 2003) and negatively affect recruitment of breeding duck populations (Sargeant et al. 1984, Sargeant et al. 1993). Nest success of waterfowl is positively correlated with presence of coyotes (Sovada et al. 1995, Sovada et al. 2000) because they displace red fox to the periphery of their home ranges (Sargeant et al. 1987) where coyote activity is lower (Sovada et al. 2000).

Coyote home ranges also tend to be centered on large roadless blocks of grassland devoid of human activity (Sargeant et al. 1987) where duck nest success is typically high (Sovada et al. 2000, Reynolds et al. 2001) and predator foraging efficiency is diluted (Phillips et al. 2003). Conversely, duck nest success tends to be low in cropland dominated landscapes because nesting females are exposed to high levels of predation (Sovada et al. 2000) resulting from saturation of red fox and abundant skunk in areas with high amounts of agricultural-wetland edges (Phillips et al. 2003). However, increased production can occur in low grassland landscapes when fox succumb to sarcoptic mange (*Sacroptes scabiei*) and/or skunk contract rabies (Charlton et al. 1991). For example, Pieron and Rohwer (2010) reported high duck nest success (36.6 to 71.8%) on study sites with ≤40% grassland which was attributed to a reduction in red fox from a sarcoptic mange outbreak and an influx in coyotes. For a more complete review of the influence of predators on waterfowl production, see Sovada et al. (2005).

Importance of Intact Grasslands to Grassland Songbirds. – The loss of vast expanses of grasslands in North America has resulted in population declines for many species of grassland-dependent songbirds (Murphy 2003, Peterjohn 2003, Brennan and Kuvlesky 2005, Askins et al. 2007). Remaining grasslands may function differently in terms of meeting grassland songbird life history requirements depending on the presence of suitable habitat on the landscape (configuration and quality of habitat) (Cunningham and

Johnson 2006). Many species of grassland songbirds are considered to be area-sensitive because they depend on large expanses of intact grassland to persist (Johnson and Igl 2001, Bakker et al. 2002) and respond negatively to small grassland patches (Johnson and Temple 1986, Winter et al. 2006). Protection of large intact grasslands also is important because nest success of grassland birds is positively influenced by the amount of grass in the landscape (Herkert et al. 2003). Thus, Stephens et al. (2003) suggested that prioritizing conservation in contiguous grasslands to maximize nest success of migratory birds.

Several studies have found that grassland songbirds respond to landscape features from 400 to 1600 m or more (Bergin et al. 2000, Soderstrom and Part 2000, Ribic and Sample 2001, Bakker et al. 2002, Johnson et al. 2010). Grassland songbird populations also are highly influenced by environmental variation (Igl and Johnson 1997) and interannual variation in nest success (George et al. 1992, Davis 2003). Density of grassland songbird species also has been shown to be positively influenced by the size of grassland patches on the landscape (Johnson and Igl 2001, Winter et al. 2006). Therefore, we investigated the effect that the amount of cropland (inverse of grassland) in the landscape had on the density of 10 common grassland songbird species using empirical spatial models developed in the PPR (Doherty et al., unpublished data). Five songbird species exhibited a positive attraction to landscapes with <50% cropland as their densities were 10 to >200% higher than mean population density levels (Figure 4-8). Although songbird density does not necessarily equate to high reproductive success (Vickery et al. 1992, Hughes et al. 1999), we hypothesize that protecting intact landscapes with ≥60% grassland remaining will likely afford area-sensitive grassland songbirds the highest probability to find suitable habitat that meets their life-history requirements. As expected, other wetland-dependent songbirds such as sedge wren and Le Conte’s sparrow and grassland generalist songbirds such as Savannah sparrow were not influenced by the amount of cropland on the landscape (Figure 4-9).

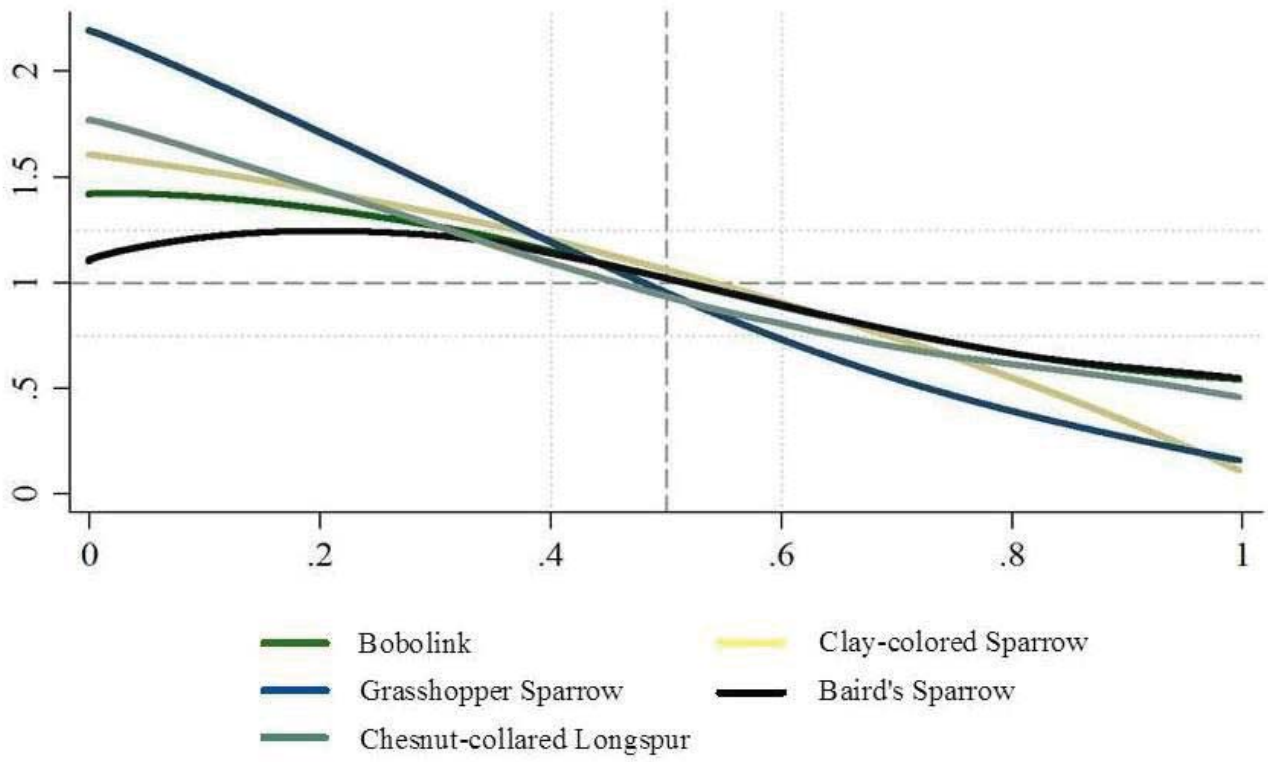


Figure 4-8. Documented relationships between density of bobolink (*Dolichonyx oryzivorus*), clay-colored sparrow (*Spizella pallida*), grasshopper sparrow (*Ammodramus savannarum*), Baird's sparrow (*Ammodramus bairdii*), and chestnut-collared longspur (*Calcarius ornatus*) populations and the proportion of cropland within a 1–mile radius within the U.S. Prairie Pothole Region of USFWS Region 6.

Figures 4-8 to 4-10 represent a Biological Currency Index in which a value of 1.0 represents the mean density across the entire region (dark grey dashed line). For example, a value of 1.25 and 0.75 (light grey dashed lines) equate to a 25% increase and a 25% decrease in grassland bird densities respectively. Vertical dotted lines represent reference lines for the proportion of cropland. The Biological Currency Index was created by dividing predicted bird population densities by the mean grassland bird density for each species across the entire U.S. PPR in USFWS Region 6. Spatial models that were sampled to graphically show biological relationships were estimated using zero-inflated Poisson models on 3,154 call points collected during 2003–2006. Curves were generated using a Lowess smoothing function on 50,000 sample points in which we sampled both grassland bird population data and habitat characteristics in a geographic information system.

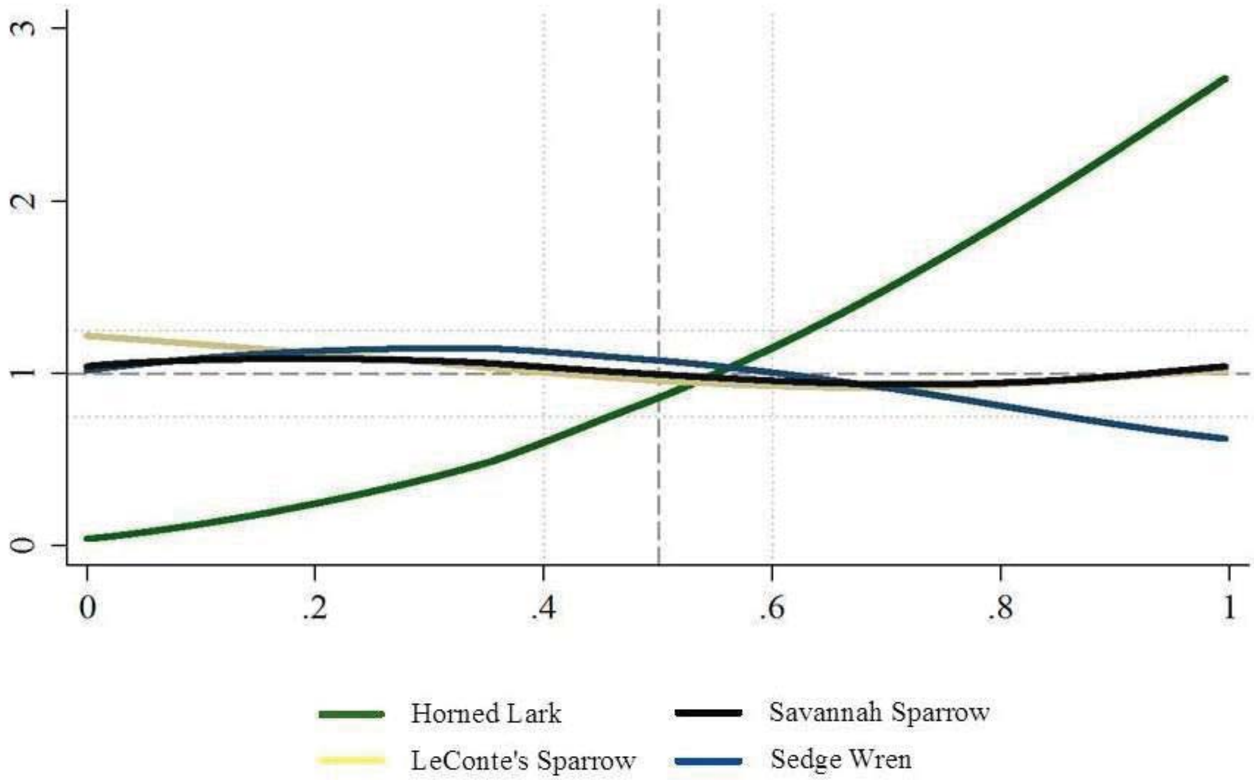


Figure 4-9. Documented relationships between density of horned lark, LeConte’s sparrow (*Ammodramus leconteii*), Savannah sparrow (*Passerculus sandwichensis*), and sedge wren (*Cistothorus platensis*) populations and the proportion of cropland within a 1–mile radius within the U.S. Prairie Pothole Region of USFWS Region 6.

Importance of Intact Grassland to Other Migratory Birds. – We also assessed patterns of American bittern, black tern, marbled godwit, and northern harrier relative probability of occurrence in North Dakota to determine if patterns of cropland avoidance were consistent with those of waterfowl and passerine species. These species all respond negatively to the amount of cropland on the landscape as they are ~35 to 300% higher than the mean population levels as the amount of cropland decreased on the landscape (Figure 4-10). These results support previous research that has linked the amount of grassland in the landscape to the presence of American bittern (USFWS HAPET, Bismarck, North Dakota, unpublished data), black tern (Naugle 2004), marbled godwit (Niemuth et al. 2009), and northern harrier (Niemuth et al. 2005). Even wetland-dependent species such as black tern benefit from protection of landscapes with intact grasslands because wetlands in these landscapes typically have not been drained (Naugle 2004). Landscapes with <50% grassland remaining are also less likely to be occupied by nesting black terns in available wetlands (Naugle 2004). These nongame birds showed similar responses relative to mean population levels of waterfowl and grassland songbirds. In fact, we observed a consistent transition in migratory bird densities between 40 and 60% cropland on the landscape which provided additional support for the hypothesized grassland thresholds used in the SHC conservation design.

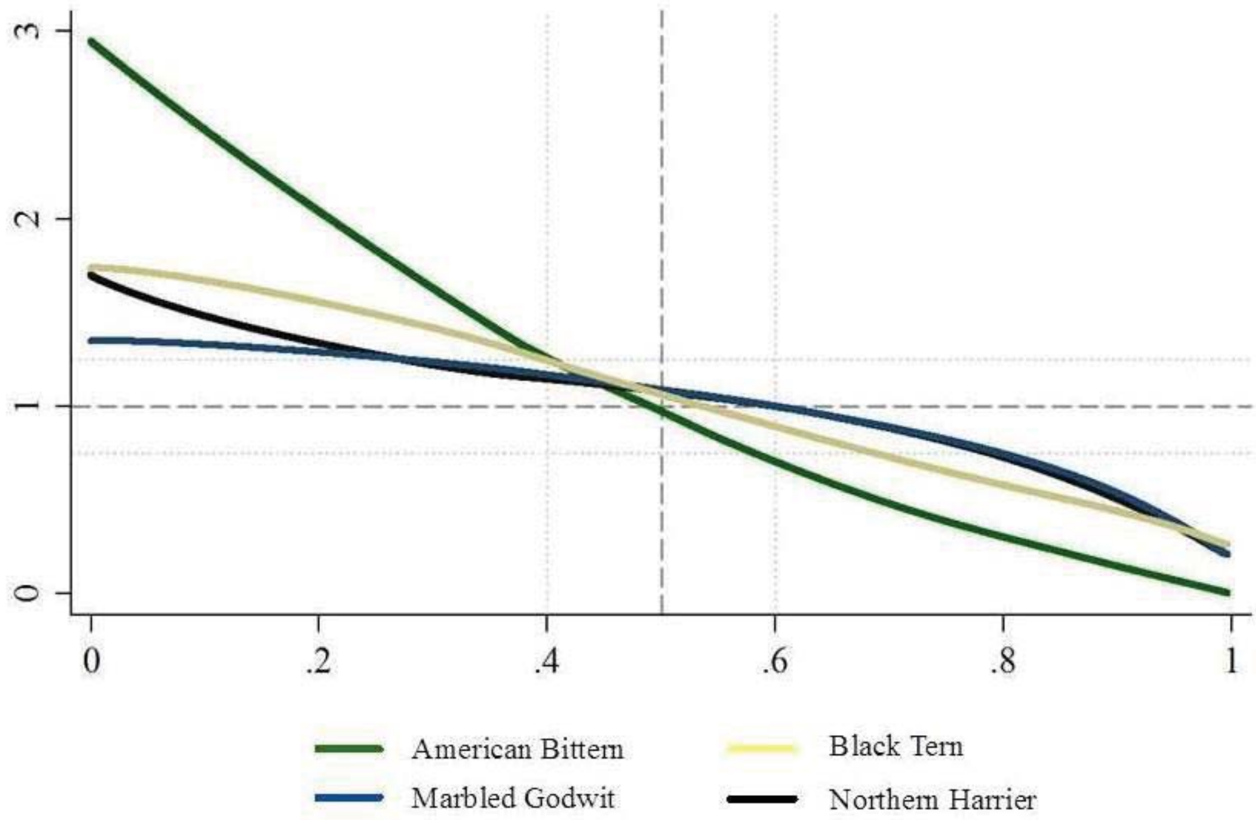


Figure 4-10. Documented relationships between density of American bittern (*Botaurus lentiginosus*), black tern (*Chlidonias niger*), marbled godwit (*Limosa fedoa*), and northern harrier (*Circus cyaneus*) bird populations and the proportion of cropland within a 1–mile radius within the U.S. Prairie Pothole Region of USFWS Region 6.

Thus, conservation of grasslands and wetlands in landscapes with ≥40% grassland cover (4 mi^2 area) and high concentrations of breeding waterfowl pairs (≥60 pairs mi^2) appear to be zones of high biological importance to waterfowl and other migratory bird species to maintain their populations in the PPR. Additionally, protection of remaining wetlands in cropland-dominated landscapes (i.e., <40% grassland) and high breeding duck pairs will continue to be an effective strategy for the Service to support the carrying capacity of waterfowl (Doherty et al. 2015) and other wetland dependent migratory birds (Niemuth et al. 2006). Cropland dominated landscapes with high densities of wetlands also are critically important to protect as they support pulses in waterfowl populations that occur during wet years (Walker et al. 2013b).

4.5 Goals and Objectives: Landscape-scale Conservation Delivery

The District has developed specific goals, sub-goals, and objectives in this plan that are linked to the SHC population objectives and conservation design to improve the biological return of conservation actions. Each objective was developed to help staff target conservation treatments such as acquisition of conservation easements, enhancement of private lands, and management of fee-title WPAs within different landscape classes (1A to 5) (Figure 4-1). **The landscape classes do not represent priority order from 1A to 5, rather each class may have a different set of conservation treatments (acquisition, enhancement, management) that can be used by managers to contribute to the waterfowl population objectives of the SHC conservation design while benefitting other priority ROC.**

GOAL 1 – LANDSCAPE CONSERVATION

Maximize the contribution of the District to the sustainability of waterfowl and other migratory bird populations in the PPR through implementation of strategic habitat conservation that targets conservation delivery within landscapes having the highest biological potential to maximize waterfowl carrying capacity, nest success, and brood occupancy, while sustaining contiguous portions of the mixed-grass prairie ecosystem for the benefit of the ROC and associated native wildlife and plant communities.

OBJECTIVE 1.1 – ACQUISITION OF WETLAND CONSERVATION EASEMENTS

Over the next 8 years, continue to secure protected status on 100% of wetlands offered by willing landowners in wetland priority zones as identified in the North Dakota WMD CCP (USFWS 2008a) in the District that support ≥25 breeding duck pairs per square mile (1A to 4C landscapes) to contribute to maximizing the current carrying capacity for waterfowl and other wetland-dependent migratory bird populations in the Prairie Pothole Region.

Rationale:

Because extensive wetland losses have occurred in the PPR in recent years (Oslund et al. 2010, Loesch et al., Bismarck, North Dakota, unpublished data, Doherty et al. 2013, Johnston 2013) due to increases in row crop agricultural production (Fargione et al. 2009), the highest-priority conservation treatment under the SHC conservation design is to conserve at-risk, high wetland densities that occur in cropland-dominated landscapes (e.g., 4A). These wetlands are vital to preserving existing carrying capacity and future pulses in waterfowl production that coincides with high spring pond density (Walker et al. 2013b). Protection of a diversity of wetland types across a wide geographic area also is critical to support base waterfowl population levels (Doherty et al. 2015).

Wetland and grassland easements are the most cost-effective means to conserve important habitats at the landscape scale that support waterfowl populations the U.S. PPR. Although the USFWS and PPJV partners protect approximately 53,800 ha of wetland habitat on an annual basis in the PPR, only 34% of all wetlands had protected status as of 2010 (Doherty et al. 2013). Further, unprotected wetlands lost to drainage limit the ability of the Service and its partners to achieve wetland conservation goals. For example, from 2001–2010, wetland losses varied annually between 0.05–0.57% (Loesch et al., unpublished data, Oslund et al. 2010), which may not appear to be significant, but the cumulative effects of annual, incremental wetland losses through time results in dramatic losses (Doherty et al. 2013). For example, a constant loss rate of 0.57% in the future would result in all wetlands either being protected or drained in the year 2111 (letter B in Figure 4-11). Thus, if wetland loss rates accelerate beyond existing levels, even greater funding levels than those allocated to the PPR in fiscal years 2013 and 2014 will be needed to protect wetlands, with help from remaining willing landowners before they are drained.

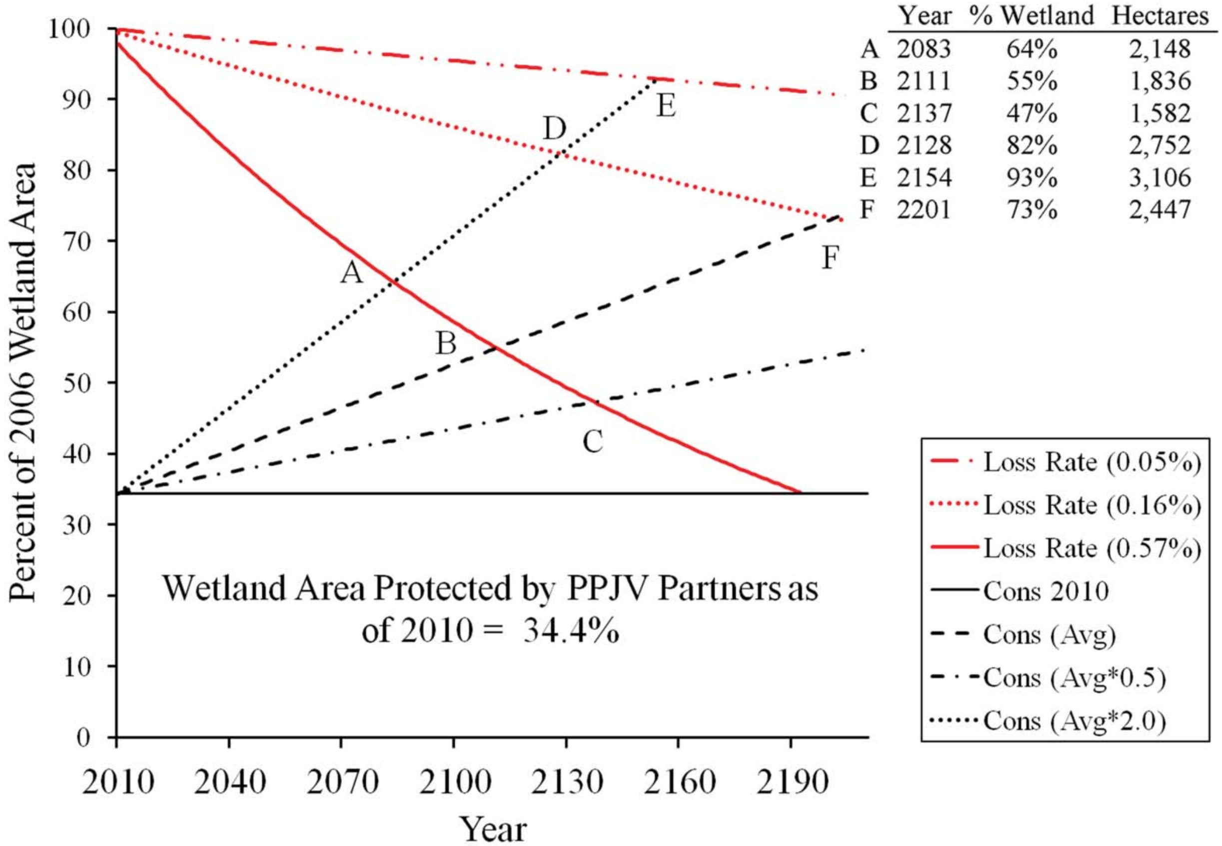


Figure 4-11. Percent of 2006 wetland area protected within the PPJV and 200 year projections of wetland protection and wetland loss. Area is in thousands of hectares. Asterisk represents multiplication.

Projected yearly conservation areas in Figure 4-11 are based upon an annual rate of habitat area protected by PPJV partners during 2001–2010. Doherty et al. (2013) applied a constant loss rate derived from published literature and a USFWS study specific to the PPJV region to project annual wetland losses. Intersection points are labeled to illustrate potential future conservation outcomes.

The Kulm WMD SHC conservation design does not deviate from the existing wetland priority acquisition zone developed by the USFWS (USFWS 2008*a*). All future wetland acquisitions would focus on the following criteria:

- wetlands that are not protected;
- capable of supporting ≥ 25 breeding duck pairs per square mile;
- embedded in cropland or associated with a grassland easement;
- seasonal and temporary basins with the greatest risk of drainage or filling;
- semipermanent and permanent wetlands ≤ 1 acre in size;
- sther semipermanent wetlands <25 acres in size.

Focusing wetland protection in grassland and cropland-dominated landscapes is critical to maintain the potential carrying capacity for breeding waterfowl in the PPR (Reynolds et al. 2006, Walker et al. 2013b) and ensure that sufficient wetland densities exist in wet years to positively affect nest success (Walker et al. 2013b), re-nesting propensity (Krapu et al. 1983, Cowardin et al. 1985), brood occupancy

(Walker et al. 2013a), and brood survival (Krapu et al. 2006, Amundson and Arnold 2011, Amundson et al. 2012). The combination of these components can lead to substantial pulses in population. A high proportion of breeding waterfowl consistently utilize landscapes with <40% grassland cover because wetland availability remains high in many portions of the PPR dominated by agriculture (Loesch et al. 2012). The majority of these wetlands are temporary and seasonal basins which are preferred habitat by wetland-dependent wildlife because they tend to warm early in the spring and produce critical food resources (i.e., aquatic invertebrates and carbohydrate-rich plant seeds) (Swanson et al. 1974, Euliss et al. 1999, Krapu et al. 2004*c*) that nesting female waterfowl rely on to optimize body condition (Pietz et al. 2000). The Service is actively protecting wetlands embedded in cropland because they are vulnerable to drainage at higher loss rates (i.e., 96% of all wetland basins drained from 1997–2009 were temporarily flooded or farmed wetlands) (Dahl 2014) than in grassland dominated landscapes. Therefore, staff at Kulm WMD will continue to use the process for evaluating and protecting wetlands identified in the North Dakota WMD CCP. Emphasis will be placed on at-risk wetlands located in landscapes with ≥60 breeding duck pairs per square mile (1A, 1B, 4A) because high wetland densities are critical to waterfowl populations.

OBJECTIVE 1.2 – ACQUISITION OF GRASSLAND CONSERVATION EASEMENTS

Over the next 8 years, as funding sources become available, secure protected status on 100% of grasslands offered by willing landowners in grassland priority zones, as identified in the North Dakota WMD CCP (USFWS 2008a), in the District. Also, focus grassland protection in landscapes that have the highest potential to maximize waterfowl production (1A, 1B, 4A), support high brood occupancy rates for waterfowl, and support high densities of ROC.

Rationale:

The importance of intact grasslands to migratory birds was thoroughly discussed in Section 4.4. Clearly, the conservation of remaining grasslands in landscapes with ≥60 breeding duck pairs per square mile (1A, 1B, and 4A) are critical for breeding waterfowl (Greenwood et al. 1995, Reynolds et al. 2001, Horn et al. 2005, Stephens et al. 2005, Walker et al. 2013a). Grassland easement acquisition in landscapes with >25 pairs/mi^2 (USFWS 2008a) is necessary to support waterfowl population goals identified by the PPJV (Ringelman et al. 2005). The grassland easement acquisition strategy also is designed to benefit threatened or endangered species and grassland-dependent migratory birds. Because limited resources are available to purchase grassland easements in the District, staff would focus acquisition only in the highest priority zones (USFWS 2008a) unless additional funding becomes available. Consequently, failure to sufficiently protect contiguous expanses of grasslands in the PPR will likely result in continued declines for many grassland songbirds (Brennan and Kuvlesky 2005, Askins et al. 2007, Sauer and Link 2011), increased nest depredation from mesopredators (Sargeant et al. 1993, Phillips et al. 2003), increased susceptibility to climate change (Hannah and Hansen 2005, Mawdsley et al. 2009), and further losses in ecosystem services such soil erosion, water quality, and flood retention (Gleason et al. 2008). Thus, the USFWS aims to protect remaining unprotected grasslands in the least amount of time possible because 68 to 139 years likely remain before all grasslands are either protected or converted (Figure 4-12) (Doherty et al. 2013).

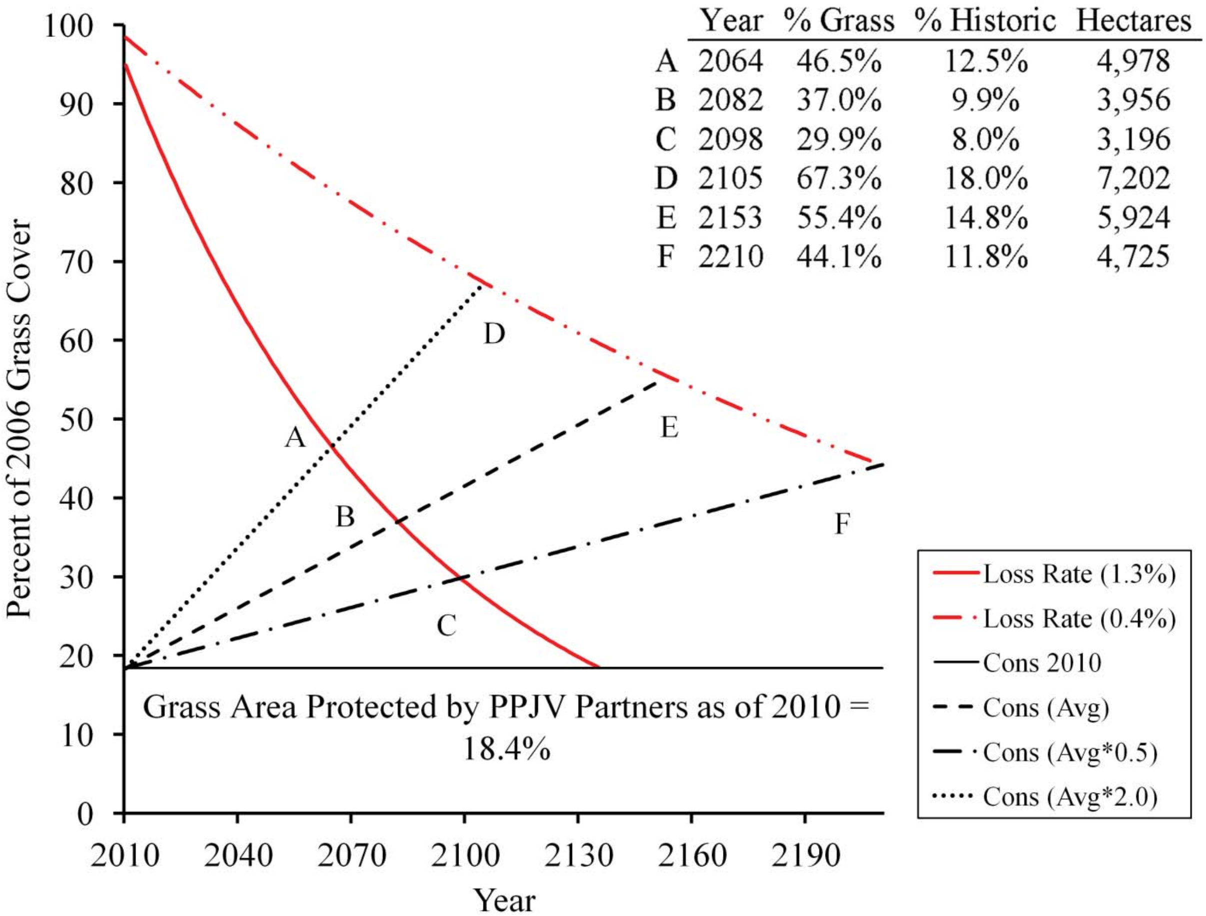


Figure 4-12. Percent of grass cover protected within the PPJV and 200 year projections of grassland protection and grassland loss. Asterisk represents multiplication.

Projected yearly conservation areas in Figure 4-12 are based on the annual rate of habitat area protected by PPJV partners during 2001–2010. Doherty et al. (2013) applied a constant loss rate derived from published literature and a USFWS study specific to the PPJV region to project annual grassland losses. Intersection points are labeled to illustrate potential future conservation outcomes.

The District intends to secure protected status on 100% of priority, "at-risk" grasslands offered by willing landowners as fund sources become available. At-risk grasslands are those having sufficient soil quality for crop production (e.g., soil land capability classes 1-4 in Figure 4-13). The Kulm WMD SHC conservation design does not deviate from the existing priority zones for grassland easement protection (USFWS 2008a). However, priority grasslands identified using the existing grassland easement evaluation criteria also will be initially targeted for protection in 1A, 1B, and 4A landscapes because these areas are important to contribute to the SHC population objectives. Therefore, staff at Kulm WMD considered these landscapes as zones of highest biological potential (e.g., biological benefits/acre). Focusing acquisition on areas with the high production potential (1A, 1B, and 4A landscapes) allows the District to maximize conservation benefits for waterfowl and other migratory birds using limited funds available for securing grassland easements in North Dakota.

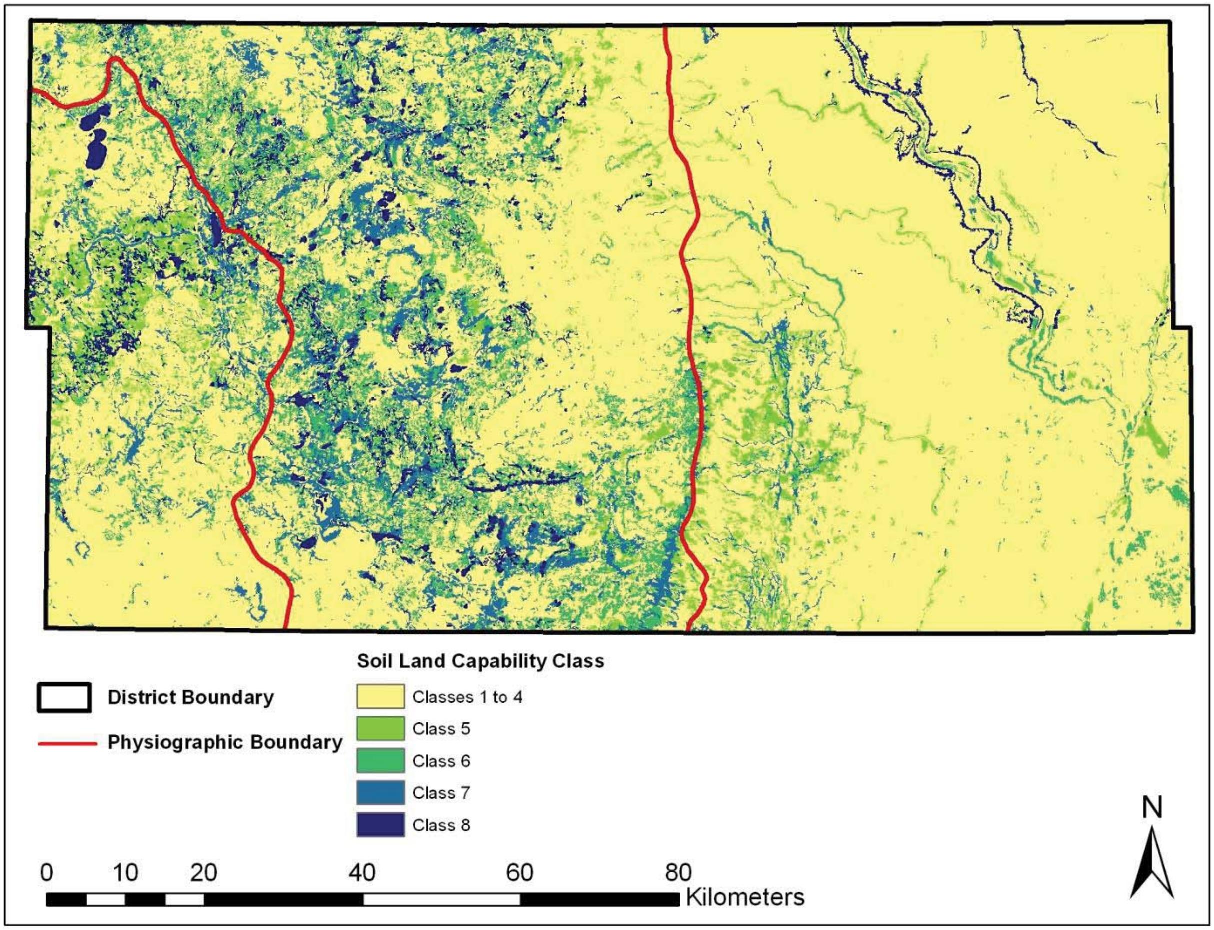


Figure 4-13. An index of potential grassland conversion for Kulm Wetland Management District based on Soil Survey Geographic (SSURGO) data for belowground soil productivity. Non-irrigated soil land capability classes 1-4 in are generally considered suitable for crop production, classes 5-6 have severe limitations for crop production, and classes 7-8 have extreme limitations that make them unsuitable to crop production.

OBJECTIVE 1.3 – CONSERVATION EASEMENTS

By 2017, contact 100% of landowners located in 1A to 4C landscapes within the District to determine their interest in obtaining a wetland and grassland conservation easement, conduct 100% of easement evaluations within 6 months of determining individual landowner interest, and submit 100% of completed evaluations to the USFWS Region 6 Division of Realty for further evaluation to ensure that all potential conservation easements are purchased from willing landowners in a reasonable amount of time.

Rationale:

Staff at Kulm WMD has identified completing an inventory of potential landowner interest in the USFWS easement program as the highest-priority task within the next 3 years. As of October 2013, staff had completed a 2-year inventory of landowner interest in Dickey and LaMoure Counties, which resulted in several thousand acres of wetland and grassland habitat being protected in perpetuity. The majority of these counties are located in 4A landscapes within the Drift Prairie where nearly all wetlands were considered to be at risk of being drained. By completing these counties first, staff protected a large proportion of the most at-risk wetlands in the District. However, future wetland losses on unprotected lands (>50% of wetlands in the District) could significantly reduce the potential of District to annually recruit an average of ~396,000 ducks (mean recruitment for 5 primary dabbler species from 1987–2009 (USFWS HAPET, Bismarck, North Dakota, unpublished data) into the fall flight. Because the rate of wetland losses appears to be accelerating in recent years, it is imperative that the District complete this inventory of landowner interest before additional habitat is lost and ecological services such as floodwater storage provided by wetlands are reduced.

Protecting 100% of the wetlands offered by willing landowners is critical to building the base of protected lands within the PPR to permanently support stable breeding waterfowl carrying capacity levels. The process used to inventory, evaluate, and submit potential easements to the Region 6 Division of Realty for an entire county takes an exorbitant amount of time. Staff at Kulm WMD will continue to promptly conduct and submit easement evaluations to ensure that landowners have the opportunity to consider an easement offer before their interest in the program changes. This process takes less than 1 month to complete if conducted before crops are planted in the spring or after they are harvested in the fall. However, some evaluations may require up to 6 months to complete if interest is determined early in the winter (when snow covers the ground and the easement evaluation cannot be conducted) or after the first week of June when crop heights typically limit the observations of wetlands.

Future interest in the USFWS easement program may be challenged by the increasing world demand for agricultural production (Lutz et al. 2001), decreasing enrollment in conservation programs such as Conservation Reserve Program, and insufficient funding levels that do not increase according to land values (Doherty et al. 2013). Thus, completing this inventory is the most important population-level conservation work that the USFWS can conduct in the near future (i.e., ≤5 years) in the U.S. PPR because of the long-term benefits that limited-interest conservation easements provide to migratory birds and the mixed-grass prairie ecosystem.

OBJECTIVE 1.4 – FEE-TITLE WATERFOWL PRODUCTION AREAS IN 1A TO 3B LANDSCAPES

During the next 8 years, target 80% of all habitat management activities on 136 WPAs (32,870 ac) located in 1A [n = 61], 1B [n = 72], 2A [n = 1], 2B [n = 2], 3A, and 3B landscapes that support ≥25 duck pairs per square mile and contain ≥40% grass cover within a 4 mi^2 area that that yield ≥15-20% waterfowl nest success. Managers aim to provide diverse, heterogeneous nesting habitat that meets the habitat requirements of waterfowl (*Anas* spp.) and other ROC, including grasshopper sparrow, clay-colored sparrow, bobolink, marbled godwit, and northern harrier.

Rationale:

The Service has developed a science-driven SHC approach to focus conservation at landscapes scales using defensible, transparent, and replicable approaches to achieve predicted biological outcomes necessary to sustain wildlife populations (USFWS 2006b). Staff developed an SHC conservation design (Figure 4-1) to target conservation delivery across a range of landscape types (1A to 4C) to achieve the highest benefits to waterfowl and other migratory bird populations while contributing to maintaining the ecological function within the mixed-grass prairie ecosystem. Staff identified WPAs in 1A to 3B landscapes as having high biological potential to support a long-term average waterfowl nest success rate of 15–20% (Cowardin et al. 1985), maintain high waterfowl brood occupancy and survival in 1A and 1B landscapes (Krapu et al. 2006, Walker et al. 2013a), and benefit non-waterfowl ROC populations.

The District will attempt to maximize habitat suitability and ecosystem services (Werling et al. 2014) to the extent possible on individual fee-title WPAs by focusing 80% of management activities on WPAs located in 1A to 3B landscapes. Priority management activities include: providing suitable vegetation structure for waterfowl and other ROC, reconstructing former seeded introduced grasslands to diverse native vegetation, and restoring native prairie. Implementation of this SHC approach is anticipated to improve the District's management efficiency across a network of 201 WPAs with a finite set of resources. The expected gain in efficiency using this SHC approach would result from using a targeted landscape conservation approach to achieve a measurable population response (e.g., nest success, brood occupancy, and density of ROC) along with scientifically-based habitat objectives that are focused on meeting the habitat requirements of ROC at local scales (e.g., individual habitat types on WPAs).

OBJECTIVE 1.5 – FEE-TITLE WATERFOWL PRODUCTION AREAS IN 4A TO 4C LANDSCAPES

During the next 8 years, target 20% of all habitat management activities on 64 WPAs (12,542 ac) located in 4A [n = 51], 4B [n = 10], and 4C [n = 3] landscapes that support ≥25 duck pairs per square mile and contain <40% grass cover within a 4 mi^2 area to maximize upland nesting waterfowl (*Anas* spp.) nest success and benefit other habitat generalist migratory birds such as Savannah sparrow and sedge wren.

Rationale:

Landscapes dominated by cropland that contain abundant wetlands are critical conservation areas because they support high carrying capacity levels for waterfowl populations (Reynolds et al. 2006) and pulses in waterfowl populations during wet years (Walker et al. 2013b). Nest success is highly variable in these landscapes (i.e., 4A to 4C) and has been attributed to fluctuations in wetland conditions (Walker et al. 2013b), amount of cropland (Drever et al. 2007, Devries and Armstrong 2011, Bloom et al. 2013), and abundance of mesopredators (Sovada et al. 2000, Phillips et al. 2003). Periods of high nest success that occur in agricultural landscapes when predators such as red fox are absent (Pieron and Rohwer 2010) or when predators are removed from nesting areas (Garrettson and Rohwer 2001, Chodachek and Chamberlain 2006) contribute to increases in waterfowl production. Nonetheless, maintaining tall, dense habitat on WPAs in these landscapes allows waterfowl the best opportunity to successfully nest (Duebbert and Kantrud 1974). Therefore, targeting 20% of management activities on WPAs located in 4A to 4C landscapes will allow managers to maintain tall, dense stands of vegetation required by nesting waterfowl, while benefiting other migratory bird species such as western meadowlark, Savanna sparrow, sedge wren, or Le Conte's sparrow with limited management treatments implemented to remove excessive litter and maintain grassland stand vigor.

OBJECTIVE 1.6 – GRAZING SYSTEMS ON PRIVATE LANDS

By 2016, partner with private landowners to annually establish a minimum of 20 rotational grazing systems on grassland tracts (≥160 acres) within 1A and 1B landscapes to improve nesting conditions for waterfowl (*Anas* sp.) and other ROC such as clay-colored sparrow, bobolink, grasshopper sparrow, and northern harrier.

Rationale:

A large proportion of privately owned native grasslands in the District are intensely grazed from May through October each year. Although some grassland birds such as chestnut-collared longspur, horned lark, upland sandpiper, marbled godwit, and willet respond positively to these season-long grazing systems, breeding bird densities are highest in lightly to moderately grazed pastures in the Missouri Coteau (Salo et al. 2004). Overgrazing pastures on private lands also negatively affects waterfowl nest success (Bloom et al. 2013), attractiveness to waterfowl (Gilbert et al. 1996, Fondell and Ball 2004), and the production of most upland nesting migratory birds (Kirsch et al. 1978). Cattle ranchers also can benefit from less-intense grazing systems because livestock average daily weight gain and body condition have been shown to be higher in lightly to moderately grazed rotational systems (Salo et al. 2004). Plant community composition also shifts to a Kentucky bluegrass-dominated community in overgrazed mixed-grass prairies, which decreases livestock production potential unless more moderate grazing strategies are implemented (Patton et al. 2007). As pastures become increasingly invaded by exotic grasses, reproductive success for grassland birds such as chesnut-colored longspur can be reduced compared to more diverse native prairies (Lloyd and Martin 2005).

Bird response to differing grazing intensities is a function of the residual vegetation structure (height–density and presence of a litter layer) that birds select to meet their nesting requirements (Kantrud and Higgins 1992, Salo et al. 2004). Light to moderate stocking rates (animal unit months [AUM]/ha) that utilize 35-50% of standing forage each year have been shown to produce average late June vegetation structure consisting of 6.9-7.8 in visual obstruction readings (VOR), vegetation heights of 18.9-20.9 in, and litter depths of 1.8-2.1 inches in the Missouri Coteau near Kulm WMD (Salo et al. 2004). This strategy of grazing after June 1 with light to moderate stocking rates should provide a late May average vegetation structure of 7.8 inches VOR and 11 inches height to positively affect waterfowl nest density and success (Bloom et al. 2013).

By improving habitat structure on private lands in 1A and 1B landscapes that have high production potential for waterfowl and other migratory birds, the District will maximize the potential of these grasslands to benefit migratory bird populations. The District will work with the Partners for Fish and Wildlife Program to administer available programs. Implementation of prescribed grazing systems other than season-long grazing on private lands is important to increase vegetation structure, temporarily prevent native rangeland from conversion, and sustain the ecological benefits that these grasslands provide to migratory birds and their habitats.

The District will initially target rotational grazing systems on grasslands in 1A or 1B landscapes that meet the following criteria in descending order:

1) located on unprotected grasslands at high risk of conversion;
2) located on existing grassland easements;
3) located adjacent to WPAs or within the 4 mi^2 area surrounding the WPA.

OBJECTIVE 1.7 – ADAPTIVE LANDSCAPE CONSERVATION

At 5-year intervals, update the District's SHC conservation design to incorporate changes in landscape types that coincide with changes in land use trends and/or ROC habitat requirements to continue to adaptively deliver conservation in areas having the greatest biological potential to benefit resources of concern.

Rationale:

Grassland habitat within the Missouri Coteau of North and South Dakota was converted at a rate of 0.4% annually (36,540 hectares) from 1989 to 2003 (Stephens et al. 2008) and 1.33% across the entire U.S. PPR from 1979 to 1997 (Rashford et al. 2011). If commodity prices continue to remain high, grassland losses will likely continue at or above this rate in the PPR (Rashford et al. 2011). More than 70% of all CRP contracts are also set to expire in the U.S. PPR by the end of 2017 (Figure 4-5) (Doherty et al. 2013) which will significantly alter the extent of remaining grassland occurring in the USFWS Dakotas Zone (Figure 4-14). For example, we evaluated the extent of 40% grass landscapes in the NWRS Dakotas Zone during 3 time periods: 2005 (34.5%) when CRP acreage was near an all-time high, the 2012 extent (23.2%), and the potential 2018 extent (17.7%), which excluded expiring CRP contracts between 2013 and 2018 and showed that from 2005 to 2018, the extent of 40% grass landscapes decreased by 50% in the USFWS Dakotas Zone (Figure 4-15). We could not account for future losses in native grasslands in our 2018 map of 40% grasslands, but we anticipate that these losses could lower the 2018 extent of 40% grasslands below the 17.7% area that we estimated. We realize that the 2018 extent is a hypothetical example of how the landscape could change if CRP contracts are not renewed and that the differences in landcover sources affect accuracy of interpretation. However, given recent trends in the conversion of grasslands to cropland (Fargione et al. 2009, Doherty et al. 2013, Wright and Wimberly 2013, Johnston 2014) and recent data showing that 51.5% of CRP grasslands were lost in North Dakota alone from 2007–2013 (USDA Farm Service Agency 2014), it is likely that the amount of CRP on the landscape will approach record lows by 2018. This could negatively affect waterfowl populations in the PPR as CRP increases attractiveness to settling waterfowl (Shaffer and Wangler 2013) and increases waterfowl production (i.e., 25.7 million ducks produced from 1992-2003 attributed to CRP; Reynolds [2005]).

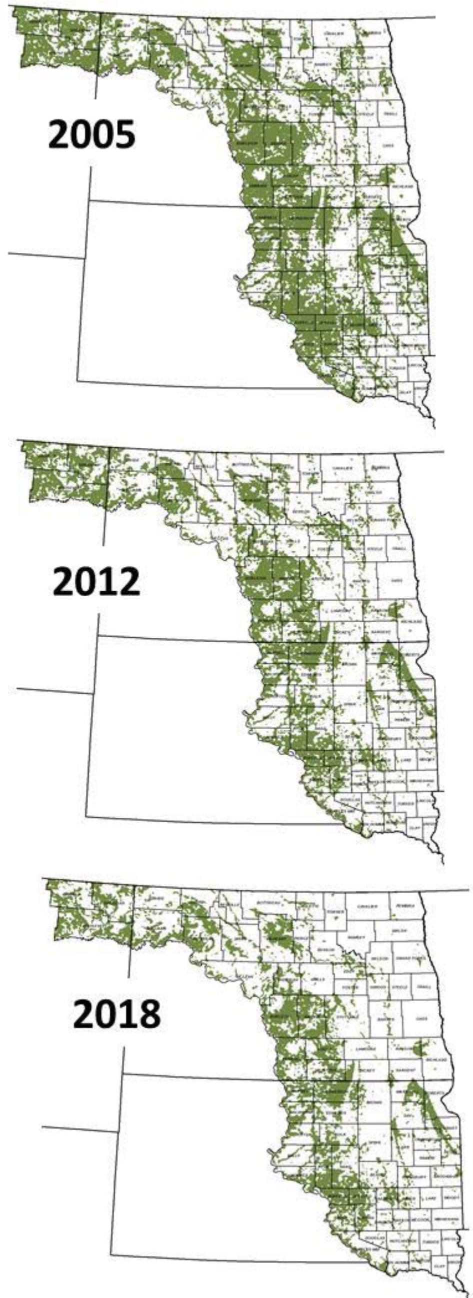


Figure 4-14. Coarse-scale change in 40% grassland area using a 4 mi^2 moving window analysis from 2005 to 2012 and potential change in 40% grassland by 2018 if all expiring conservation reserve program (CRP) lands are not re-enrolled in the USFWS Dakotas Zone (North Dakota, South Dakota, and northeast Montana portions of the U.S. Prairie Pothole Region); 40% grassland area was 34.5% in 2005, 23.2% in 2012, and 17.7% in 2018. For 2005, percent grassland was generated using USFWS Habitat and Population Evaluation Team landcover derived from 2003-2005 imagery for disturbed and undisturbed grasslands. For 2012, percent grassland was generated using the National Agricultural Statistics Service (NASS) cropland data layer (CDL) derived from 2012 satellite imagery; grassland was classified as all native grassland, grass/pasture, grass/hay, and pasture/hay classes. For 2018, percent grassland was generated using the 2012 NASS CDL layer and by removing all CRP grasslands with expiring contracts from 2012-2017.

If grassland conversion rates continue at rates at or above those estimated by Rashford et al. (2011), resource agencies (e.g., USFWS and its partners) that conserve grasslands will only have until 2082 before all grassland is either converted or protected leaving only 37% of the 2006 grassland extent being protected in perpetuity (Doherty et al. 2013). Likewise, wetland drainage will continue to increase across the PPR if grasslands are converted for agricultural purposes (Johnston 2013). Thus, it will be important for the District to review and update the SHC conservation design to account for these potential future changes and continue to deliver conservation in landscapes having the highest biological returns (USFWS 2006b) for waterfowl and other ROC populations.

4.6 Goals and Objectives: Local-scale Conservation Delivery

The District has developed specific goals, sub-goals, and objectives that are linked to the SHC population objectives and conservation design to improve the biological return of conservation actions. At the local-scale, staff will focus efforts on the management of fee-title WPAs (Appendix D) to provide quality nesting cover for waterfowl and other migratory birds within the various landscape classes (1A to 5). **The classes do not represent priority order from 1A to 5, rather each class may have a different set of conservation treatments that can be used by managers to contribute to the waterfowl population objectives of the SHC conservation design while benefitting other priority ROC.**

SUB-GOAL 2 – NATIVE OR RECONSTRUCTED PRAIRIE

Maximize native vegetation diversity and composition on individual tracts of native sod and reconstructed native prairie on WPAs using adaptive management to provide heterogeneous vegetation structure required by upland-nesting resources of concern (ROC) and contribute to biological integrity, diversity, and enhancement (BIDEH) within the mixed-grass prairie ecosystem.

OBJECTIVE 2.1 – NATIVE PRAIRIE ON NATIVE PRAIRIE ADAPTIVE MANAGEMENT UNITS

Over the next 8 years, restore 391 acres of native prairie occurring on 9 Native Prairie Adaptive Management study units using the full adaptive management process to apply appropriate and precise disturbance as recommended in each management year (September 1 to August 31), optimally increasing native plant frequency by an average of ≥1 to 5% during any 5-year interval, to increase resistance to invasion by exotic cool-season grasses, improve habitat condition for migratory birds and other prairie obligate species (e.g., pollinators), and enhance ecological services such as BIDEH on individual WPAs included in the study.

Rationale:

The District aims to continually improve the native plant community towards the potential historic climax plant community (HCPC) state to increase resistance to invasion by exotic cool-season grasses, improve habitat condition for migratory birds and other prairie obligate species (e.g., pollinators), and enhance ecological services such as BIDEH on individual WPAs included in the study.

Restoring plant community composition on remnant native prairie tracts occurring on fee-title WPAs is important to maintain terrestrial ecological processes such as net primary productivity (Tilman and Downing 1994, Tilman et al. 1996), resistance to invasion by exotic species (Hopper et al. 2005), root decomposition (Madritch and Hunter 2002), and nutrient cycling (Hobbie 1992) that provide stability to biotic communities. Loss of species richness is correlated with declines in ecosystem services (Werling et al. 2014) such as reduced plant production and nutrient retention, resilience to environmental fluctuation (e.g., drought), and susceptibility to invasion by undesirable species (Hooper et al. 2005). Because native plant composition and diversity strongly influence ecosystem processes (Tilman et al. 1997, Werling et al. 2014) and future adaptability to climate change (Craine et al. 2013), a primary goal of the Service is to restore native prairies to support diverse assemblages of native wildlife and plant communities within the mixed-grass prairie ecosystem. However, native prairie diversity and composition on WPAs has been severely degraded due to decades of rest (Murphy and Grant 2005, Grant et al. 2009). Therefore, the Service has identified a subset (N = 120 units) of remaining native prairie tracts for inclusion in NPAM, a large-scale, long-term adaptive monitoring effort aimed at restoring native prairie on WPAs across the USFWS Region 3 and 6 portions of the U.S. PPR. The impetus for this project resulted from research conducted by Murphy and Grant (2005) that showed that Service-owned native prairies were highly invaded by smooth brome and Kentucky bluegrass and continued degradation of native prairies could be expected unless intensive restoration occurred.

The Service has collaborated with the USGS to develop a model to guide the adaptive restoration process through NPAM (Gannon et al. 2013, USFWS 2013). Output from the model is used to guide management decisions about defoliation actions at the management unit level based on the current vegetation composition of each unit. The decision framework was designed to operate adaptively, in which data from past management actions are formally recorded and interpreted to improve the outcomes of future decisions. This approach to decision making coincides with a framework for adaptive management developed by the Department of the Interior (Williams et al. 2009).

Kulm WMD is an active cooperator in the NPAM project. Staff is committed to annual implementation of NPAM management recommendations on the 9 NPAM units in the District for the next 8 years. However, the District typically only burns ~5 management units per year due to a lack of resources available to conduct prescribed fires. The District's small staff size trained in prescribed fire-fighting and fluctuation in budgets in the coming years will continue to challenge implementation of a sufficient number of prescribed fires in the District.

OBJECTIVE 2.2 – NATIVE PRAIRIE ON WPAS IN 1A TO 3B LANDSCAPES

Over the next 8 years, restore or maintain native prairie community assemblage on native prairie occurring on WPAs located in 1A to 3B landscapes using appropriate and precise disturbance in each management year (September 1 to August 31) to provide suitable nesting habitat for waterfowl and other migratory birds while shifting the existing native plant community towards the potential historic climax plant community state for specific ecological sites and enhancing BIDEH on individual WPAs. Specific management thresholds include:

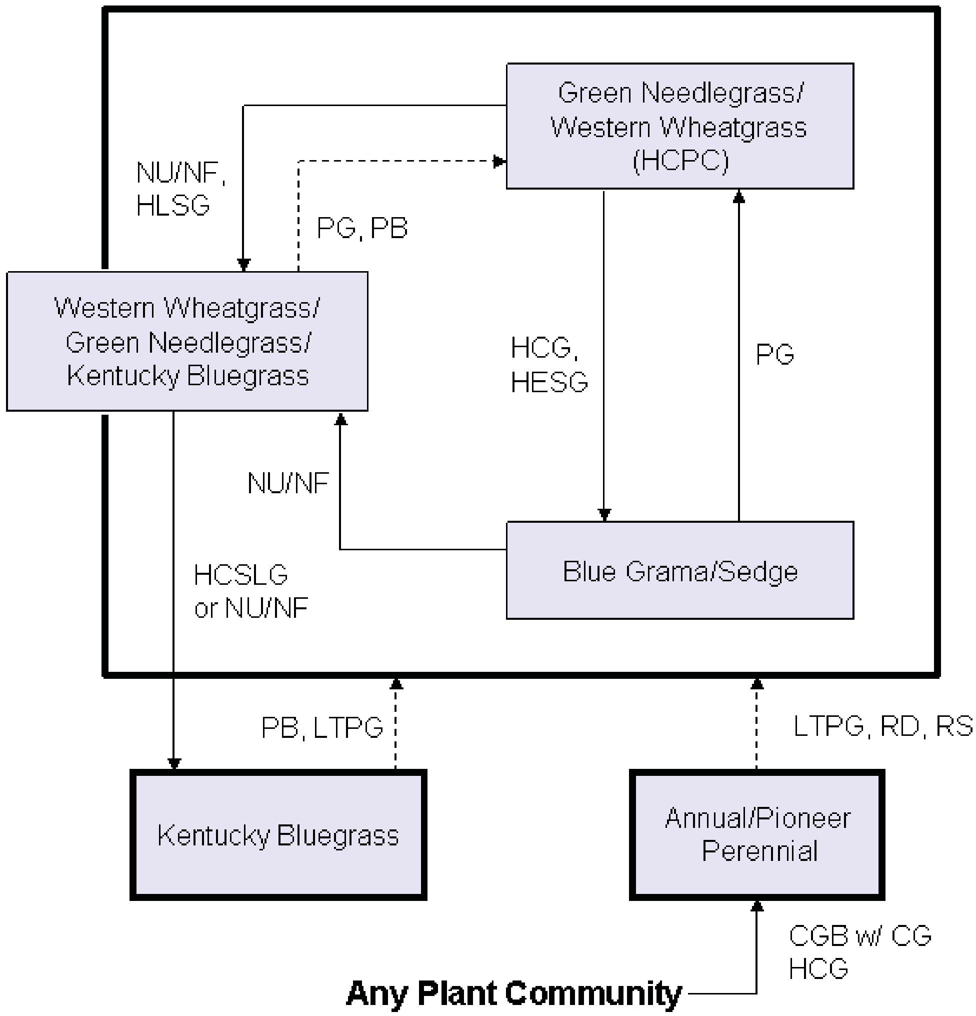
- Manage tracts with 25 to 55% native vegetation remaining to increase native plant vigor, density, and seedling recruitment and prevent further degradation within ecological sites.
- Manage tracts with >55% native vegetation remaining to maintain or enhance native plant communities on ecological sites.
- Manage tracts with <25% native vegetation remaining exclusively as nesting habitat for waterfowl and other ROC.

Rationale:

Targeting restoration in landscapes (i.e., 1A to 3B) that best resemble historic ecosystem structure and composition may allow restored sites to function optimally (Suding 2011). Approximately 91% of all native sod prairies on WPAs are located in 1A to 3B landscapes. By focusing restorations in landscapes with more contiguous grasslands (i.e., 1A to 3B), success is likely to be higher because of increased native plant dispersal, immigration, and colonization from adjacent native pastures (Primack 2002, Cully et al. 2003). Restoring native grasslands in 1A to 3B landscapes also is critical to improve habitat quality for nesting ROC that depend on intact grasslands to meet their breeding requirements (Lloyd and Martin 2005).

Local, site-level tradeoffs of restoring native plant communities may reduce available nesting habitat for species that require moderate to high vegetation structure on specific tracts with 25-55% native composition remaining. Therefore, the District will determine if moderate to dense vegetation structure can be provided on adjacent management units on WPAs or on adjacent private lands (e.g., CRP grasslands) to ensure that suitable nesting habitat exists for waterfowl and other migratory birds within the surrounding landscape. This will result in a mosaic of vegetation structure on and adjacent to WPAs created by defoliation treatments that vary in time and space across the landscape. However, managers may choose not to intensively restore native prairie if other management units do not exist on WPAs or if adjacent private lands do not have tall, dense vegetation structure required by waterfowl and most upland nesting migratory birds (Salo et al. 2004, Bloom et al. 2013). When multiple management units on a WPA do exist, each will have a gradient of vegetation structure across units that will be attractive to all upland nesting ROC that exhibit different habitat preferences (Salo et al. 2004, Fuhlendorf et al. 2006, Bloom et al. 2013). By balancing the habitat needs of ROC with native prairie restoration, the District will be able to increase native plant community composition on ecological sites to improve their long-term resilience and function (Tilman et al. 1997, Craine et al. 2012, Rowe and Holland 2013, Werling et al. 2014), increase suitable habitat to native prairie fauna (e.g., pollinators), and improve BIDEH on fee-title lands.

Establishing degradation thresholds is an important part of allocating restoration effort when resources are limited (Bestelmeyer 2006). Although restoration of ecological sites to a historical benchmark may not be realistic, restoring the structure and function of a desired plant community state within ecological sites is a reasonable alternative (Monaco et al. 2012). Therefore, the District will utilize NRCS state-and-transition models (STM) and active monitoring to identify the plant community state on specific ecological sites and apply specific management treatments (principally grazing and/or prescribed fire) to shift the plant community back towards the HCPC. A STM describes the ecological dynamics that influence each plant community state (boxes), transitional pathways (solid or dashed arrows), and management treatments (bold letters) that influence transition between states. Ecological sites have unique physical characteristics (e.g., soil properties, slope) that produce distinct plant communities (Sedivec and Printz 2012). Plant species composition varies among ecological sites due to differences in soil, water, and topographic conditions (Sedivec et al. 1991). For example, restoration of a loamy ecological site in the Central Dark Brown Glaciated Plains major land resource area (MLRA) 53B, from a western wheatgrass/green needlegrass/Kentucky bluegrass (community phase 2.2 in Figure 4-15) towards the HCPC will require frequent and precisely timed grazing and burning to reduce litter buildup, increase tiller stimulation, and improve sunlight penetration to the soil surface (Printz et al. 2012a). Thus, the use of STM as a monitoring tool can be an effective way to interpret the ecological dynamics of a management unit in response to various disturbance regimes and predict plant community response (Sedivec and Printz 2012).



CGB w/ CG – Cropped go-back with continuous grazing; **HCG** – Heavy continuous grazing; **HCPC** – Historical Climax Plant Community; **HCSLG** – Heavy continuous season-long grazing; **HESG** – Heavy early seasonal grazing; **HLSG** – Heavy late seasonal grazing; **LTPG** – Long-term prescribed grazing; **NU/NF** – Extended period of non-use & no fire; **PB** – Prescribed burning; **PG** – Prescribed grazing; **RD** – Removal of disturbance; **RS** – Range seeding with prescribed grazing.

Figure 4-15. State and transition model (STM) for a loamy ecological site in Central Dark Brown Glaciated Plains major land resource area #053B (Printz et al. 2012a).

The District regularly monitors plant community composition on native prairie tracts ≥5 acres using the belt-transect method (Grant et al. 2004) on WPAs throughout the District. The information derived from these surveys provides an index of the composition of the remaining native plant community. Rather than complete intensive vegetation monitoring using quadrats and identifying individual species, the belt-transect method allows the observer to classify segments along transects into plant association groups (listed in Grant et al. 2004) based on the dominant species present. Summarizing by plant groups allows managers to efficiently characterize the composition of native prairies and deliver appropriate management treatments. Classification of each native prairie into a degradation threshold (i.e., <25%, 25-55%, >55%) will be based on the frequency of native-dominated vegetation (plant groups 41-43, 46, 48, 49, 53, 63, and 76 [Grant et al. 2004]).

By incorporating STM with monitoring data collected on a regular basis, the District can adaptively manage native prairie tracts in 1A to 3B landscapes that are either at risk of losing the integrity of the remaining plant community (i.e., 40% native dominated plant composition) or have high potential to increase native vegetation through active restoration (i.e., >55% native dominated plant composition). The District will target restoration efforts based on a **threshold of 40% native plant composition** on ecological sites which appears to be ecologically important to the potential of a site to be restored. Preliminary studies indicate that this threshold may occur when Kentucky bluegrass exceeds 30% of the plant community and native grasses represent less than 40% of the plant community composition. The District has added a ±15% standard error around the 40% threshold to target restoration efforts on all tracts with 25–55% native vegetation remaining.

Native Prairie Tracts having 25-55% Native Vegetation Remaining

The District will intensely manage tracts with 25-55% native vegetation remaining because these sites are on the verge of becoming unrestorable based on the 40% native plant composition threshold. There is currently 1,365 acres of native prairie grasslands in this threshold. Once prairies are invaded by Kentucky bluegrass and smooth brome, these species will continue to displace the remaining native prairie community (Murphy and Grant 2005, Grant et al. 2009, Dekeyser et al. 2013) by forming shallow, dense root masses and numerous reproductive tillers (Bonos and Murphy 1999) and by modifying soil conditions (Vinton and Goergen 2006, Jordan et al. 2008). This results in reduced structural heterogeneity (Hendrickson and Lund 2010) of habitat that is less attractive to a wide array of upland nesting migratory birds (Salo et al. 2004, Fuhlendorf et al. 2006, Coppedge et al. 2008, Bloom et al. 2013) and lower reproductive success in grassland obligate songbirds (Lloyd and Martin 2005) and other native fauna (Rowe and Holland 2013).

To increase the native vegetation on these tracts, frequent, precisely timed defoliation (i.e., 4 out of every 5 years) treatments such as prescribed burning and grazing will be required during the spring management window (May 1 to June 15) (USFWS 2013). Applying management actions based on differences in plant morphology (Kentucky bluegrass vs. smooth brome) and phenological cues (Table 4-2) will be critical to shift plant communities towards the desired state. For example, timing defoliation of smooth brome during the 5-leaf stage and from stem elongation to initial development of the inflorescence can reduce its abundance (Wilson and Stubbendieck 1997, DiTomaso et al. 2006, Mousel and Smart 2007). Repeated grazing of smooth brome also prevents the development of damaging soil conditions (i.e., increased soil nitrogen) (Vinton and Goergen 2006) that enable this plant to dominate ecological sites (Dekeyser et al. 2009). Similarly, Kentucky bluegrass can be reduced by intensive early season grazing (Hanson et al. 2010) or spring burning (Towne and Kemp 2008). However, improperly timed defoliation such as summer grazing can lead to increases in Kentucky bluegrass (Murphy and Grant 2005, Patton et al. 2011). Ideally, a combination of spring burning with frequent early season grazing would be used to reduce invasive cool-season grasses (Dekeyser et al. 2013) on these tracts. (See Chapter 5 for specific strategies and prescriptions).

Table 4-2. Predicted phenological cues for conducting defoliation of native prairie during the spring management window in the grassland systems in the Prairie Pothole Range (USFWS 2013).

Within Window	Outside Window
>50% of smooth brome has at least 5 leaves And <50% of smooth brome has visible inflorescences	>50% of smooth brome has fewer than 5 leaves (before window) Or >50% of smooth brome inflorescences are visible or passed (after window)

Native prairie tracts having >55% native vegetation remaining

These tracts could require more maintenance-level disturbance (i.e., spring burn every 4-5 years and/or periodic grazing) as the plant community becomes more representative of the HCPC state. There is currently 174 acres of native prairie grasslands in this threshold. Disturbance frequency on these tracts also may mirror the historic disturbance return interval for mixed-grass prairies (Wright and Bailey 1982, Collins and Gibson 1990, Bragg 1995). The NPAM study considers a prairie to be restored when >75% of native-dominant species occur within a specific tract (USFWS 2011c). The criteria of a >75% native dominant species is hypothesized as a threshold where a native prairie unit can be managed using periodic defoliation without further degradation. Because prairies are dynamic and evolved with frequent disturbance (Severson and Hull Sieg 2006), the District will use different defoliation treatments to attempt to reduce any further loss of native vegetation on ecological sites (based on STM and remaining percentage of native-dominated vegetation; i.e., plant groups 41-43, 46, 48, 49, 53, 63, and 76 [Grant et al. 2004]). For example, a sandy ecological site having lower soil moisture and ~50% native vegetation may not require as frequent or intense of defoliation treatments as a mid-slope loamy ecological site having moderate soil moisture and a similar degree of native vegetation to prevent further degradation of the community (see Dekeyser et al. 2009). Loamy sites are the most common ecological site in the District and tend to be dominated by Kentucky bluegrass and smooth brome (Dekeyser et al. 2009) when soil moisture is high (Stevens 1950, Dekeyser et al. 2013). Thus, adaptive management will be a key step to controlling invasive cool-season grasses and restoring BIDEH on Service-owned native prairies (Gannon et al. 2010).

The District will actively monitor these tracts and incorporate new science as it becomes available that identifies causal mechanisms for reducing invasion of cool-season grasses. This iterative process should improve the effectiveness of future restoration strategies outlined in this HMP. In all cases, the highest priority for the District is to provide suitable nesting habitat for waterfowl and other ROC during the long-term process (i.e., 30–50 years; Grant et al. 2009) of restoring native prairie. Thus, it will be critical for staff to consider the conditions of grassland tracts both on WPAs and on adjacent private lands near native prairie tracts actively being restored to formulate management prescriptions.

Native prairie tracts having <25% native vegetation remaining

Without regular management, Kentucky bluegrass and smooth brome may completely dominate tracts and cause restoration to be unlikely (Murphy and Grant 2005). Native prairie tracts with <25% native vegetation remaining (15% below the 40% native vegetation threshold for maintaining a native plant community) will be managed exclusively as nesting habitat for waterfowl and other migratory birds. There is currently 5,371 acres of native prairie grasslands in this threshold. These tracts will still require periodic defoliation to prevent excessive accumulation of litter and to maintain stand vigor (Naugle et al. 2000a). Managing these tracts every 5–6 years will provide a mosaic of vegetation structure across years as visual obstruction typically peaks 2–3 years post-management and litter depths tend to be low 3 years post-management, but increases thereafter (Naugle et al. 2000a, Devries and Armstrong 2011). At the tract level, nesting waterfowl should respond positively 2-4 years post-management because vegetation structure should achieve the 7.8 inches of vegetation density and 11 inches in vegetation height shown to positively influence nest survival (Bloom et al. 2013). Grassland songbird densities (i.e., clay-colored sparrow, grasshopper sparrow) also should be highest when vegetation density exceeds 9.8 inches and vegetation height exceeds 11 inches (i.e., 2–4 years post-management) during the breeding season (typically late May to early July) in south-central North Dakota (Kantrud and Higgins 1992, Salo et al. 2004). Whereas, marbled godwit, chestnut-collared longspur, upland sandpiper, and willet should respond positively to vegetation structure from 0–1-years post-management (Ryan et al. 1984, Sedevic 1994, Gratto-Trevor 2000). However, additional research and/or monitoring are needed to determine if grasslands dominated by exotic grasses significantly affect the density, nesting success, and recruitment of waterfowl and other ROC.

OBJECTIVE 2.3 – NATIVE PRAIRIE ON WPAS IN 4A TO 4C LANDSCAPES

Over the next 8 years, maintain or enhance native prairie community assemblage on native prairie occurring on WPAs located in 4A to 4C landscapes using appropriate and precise disturbance in each management year (September 1 to August 31) to provide nesting habitat for waterfowl and other migratory birds while preventing further degradation within the existing native plant community state for specific ecological sites. Specific management criteria include:

- Manage tracts with 25 to 55% native vegetation remaining to increase native plant vigor, density, and seedling recruitment and prevent further degradation within ecological sites.
- Manage tracts with >55% native vegetation remaining to maintain or enhance native plant communities on ecological sites.
- Manage tracts with <25% native vegetation remaining exclusively as nesting habitat for waterfowl and other ROC.

Rationale:
Restoration of native prairie on WPAs located in highly fragmented landscapes (i.e., 4A to 4C) is likely to have fewer overall biological benefits to ROC when embedded in cropland-dominated landscapes (Figures 4-8, 4-9, 4-11) (Sovada et al. 2000, Bloom et al. 2013). Nonetheless, land use patterns could change in the future (i.e., return of large scale CRP lands) and restoration of these tracts could increase facilitation of ecosystem services (Werling et al. 2014) or improve resistance to invasion by non-desirable species (e.g., exotic grasses, noxious weeds). For example, Werling et al. (2014) documented that native grasslands in cropland-dominated landscapes were important to the conservation of migratory birds, pollination, pest suppression, and methane consumption. Yet, native prairie tracts located in 4A to 4C landscapes may be more difficult to restore due to a lack of native plant dispersal, immigration, and colonization from adjacent native pastures (Primack 2002, Cully et al. 2003). Because available staff time and management resources (e.g., prescribed fire) are expected to be limited during the 8-year duration of this HMP, the District will allocate the majority of restoration effort to 1A to 3B WPAs where the biological potential to support ROC populations is higher. Approximately 9% (682 ac) of all native sod prairies occur on WPAs in 4A to 4C landscapes.

These WPAs tend to be occupied by high densities of nesting waterfowl that can be productive in years when wetlands are abundant (Higgins 1977, Walker et al. 2013b). However, area-sensitive grassland songbirds (Johnson and Igl 2001, Bakker et al. 2002) would likely occur at low densities in cropland-dominated landscapes (Figure 4-9) even if they are restored and these sites may act as population sinks (Schrott et al. 2005, Fletcher et al. 2006, Winter et al. 2006). As resources allow, the District will attempt to maintain or enhance existing native prairie communities through targeted management using the decision rules described under Objective 2.2. At minimum, managers will attempt to provide moderate to dense vegetation structure (≥7.8 in of horizontal vegetation density, ≥11 in of vegetation height) by late May in 3 of 4 management years on tracts with limited opportunities for restoration (<25% native plant composition) to benefit nesting waterfowl (Bloom et al. 2013). This approach assumes that the optimal management strategy for these highly degraded tracts may be to maximize vegetation height-density with limited management effort to benefit nesting waterfowl.

OBJECTIVE 2.4 – RECONSTRUCTED PRAIRIE

During the next 8 years, maintain ≥75% native plant composition and diversity representative of stable plant communities on ecological sites on all established (typically 3–7 years after initial seeding) reconstructed prairie tracts on WPAs using active management to provide attractive heterogeneous nesting habitat for waterfowl and other ROC while contributing to BIDEH within the mixed-grass prairie ecosystem.

Prairie reconstruction is defined as the seeding of a native herbaceous seed mixture that comprises multiple prairie species including grasses, forbs, and small shrubs on previously cultivated lands (USFWS 2013). This definition differs from *prairie restoration* which focuses on utilizing management treatments (e.g. prescribed burning and grazing) to increase native plant composition on native sod (i.e. no cultivation history).

Rationale:

Reconstructing prairie on tame grasslands on formerly cultivated land provides an opportunity to create high-quality heterogeneous nesting habitat for migratory birds (see Salo et al. 2004, Fuhlendorf et al. 2006, Bloom et al. 2013) that is more sustainable and resistant to invasion by exotic grasses and noxious weeds (Berger 1993, Cramer 1991, Jacobs and Sheley 1999). Active post-establishment management (typically 3–7 years after initial seeding depending upon environmental and site conditions) will be critical to maintain ≥75% native plant composition and diversity on these sites. There is currently 2,054 acres of reconstructed prairie grasslands in the District. Because of the significant investment in time and resources that these reconstructions require, the District will actively manage these sites to limit invasion from exotic grasses and noxious weeds post-establishment following the management criteria in Native Prairie Objective 2.2, while considering the habitat needs of nesting migratory birds. For example, post-establishment management (when native vegetation composition and diversity should exceed 75%) will focus on removing excess litter accumulation that negatively affects waterfowl production (Naugle et al. 2000a), maintaining grassland structure and vigor (Higgins and Barker 1982), increasing native species retention and belowground root and rhizome biomass of seeded plants (Seastedt and Ramundo 1990).

During the next 8 years, the District will primarily target reconstruction on WPAs located in 1A to 3B landscapes that have the highest biological potential to achieve the SHC populations goals (i.e., 15-20% waterfowl nest success, support waterfowl brood success, attract high densities of breeding ROC). Staff expects that approximately 3% of fee-title lands would be farmed on an annual basis as a means to prepare the seedbed for grassland reconstruction. Tracts targeted for reconstruction generally consist of old (>15 year) seeded introduced grassland (i.e., DNC consisting of intermediate wheatgrass [*Thinopyrum intermedium*], tall wheatgrass [*T. ponticum*], and alfalfa [*Medicago sativa*] or sweetclover [*Melilotus officinalis*]) or low-diversity seeded native vegetation that are heavily invaded by Kentucky bluegrass, smooth brome, and noxious weeds. To restore plant community function to these degraded grasslands, the District will reconstruct tracts using seed mixes that are representative of the HCPC for ecological sites to improve the likelihood of successful establishment. Sedivec and Printz (2012) outline potential plant communities for ecological sites within MLRA such as 53B (Missouri Coteau) in the Dakotas. Specific ecological site descriptions (ESDs) contain the best available information that describes potential species dominance and community composition targets that managers can use to create site-appropriate seed mixes (Sedivec and Printz 2012). When feasible, the District would use sculpted seedings (prescriptive seeding using different seed mixes in correlation with variation in ecological sites) to reconstruct individual tracts with multiple ecological sites (Jacobson et al. 1994). In some cases, variation between ecological sites in plant communities may not be significant and managers may create seed mixes that capture the variation between adjacent sites to simplify seeding.

Managers also may choose to prioritize reconstructions on sites where invasion by problematic noxious weeds (i.e., leafy spurge or yellow toadflax) dominate grasslands. In addition to monitoring, the District also will rely on information from spatial models that predict high suitability for individual noxious weeds. For example, District staff worked with Region 6 Invasive Species staff to create habitat suitability models for yellow toadflax (Figure 4-16) and leafy spurge. Managers will incorporate these suitability models to target reconstructions on WPAs with high biological potential to benefit ROC and high probability of invasion by leafy spurge and/or yellow toadflax. By increasing competition using native plant species that are functionally similar to noxious weeds (Norland et al. 2013), the District could prevent invasions on WPAs that may have occurred if they were not reconstructed (see Pokorny et al. 2005, Biondini 2007). Therefore, the District will consider reconstructing prairies on sites dominated by highly invasive noxious weeds using functionally similar native species on a case-by-case basis.

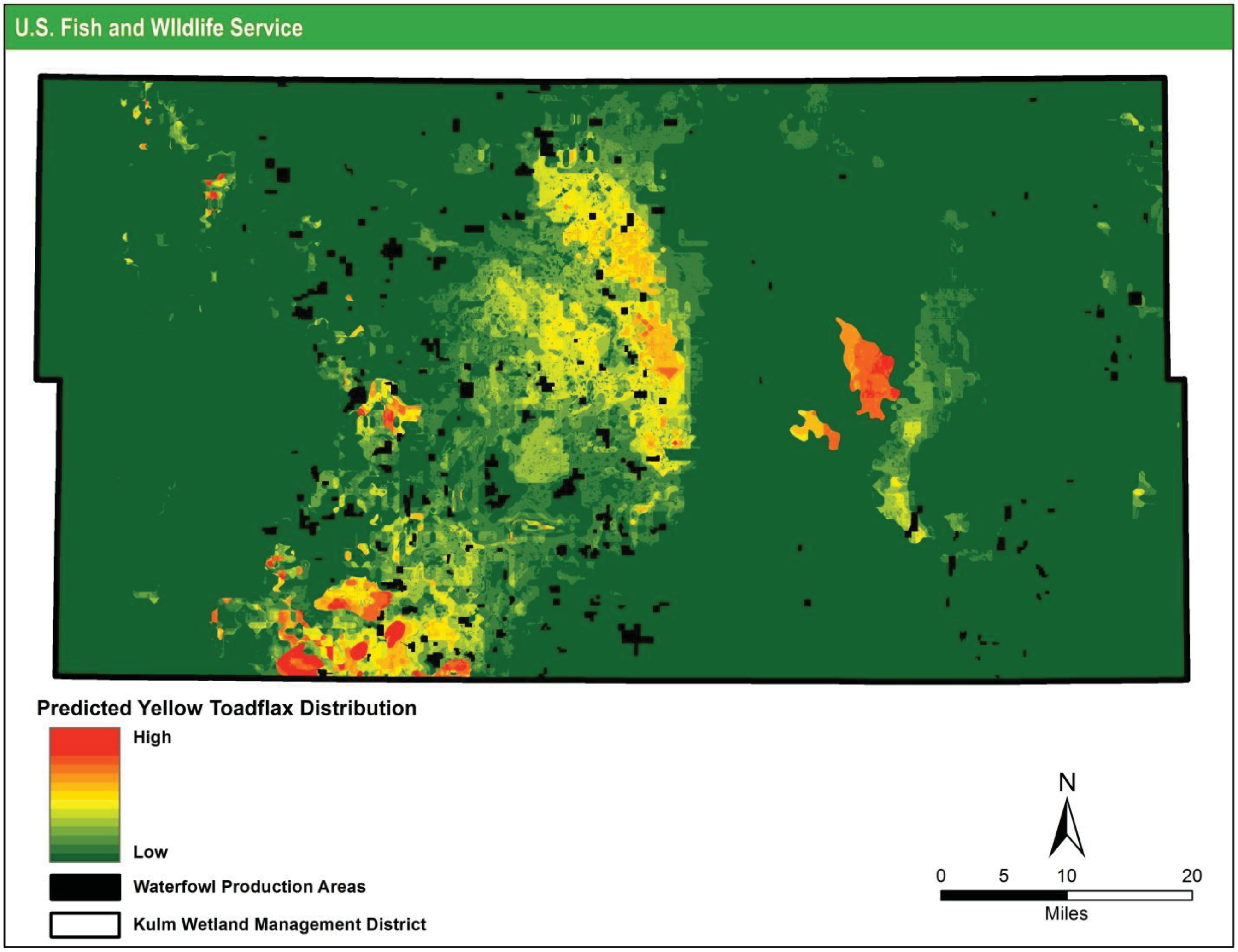


Figure 4-16. Predicted yellow toadflax suitability model relative to Waterfowl Production Areas within Kulm Wetland Management District.

SUB-GOAL 3 – SEEDED INTRODUCED GRASSLANDS

Provide suitable nesting habitat on existing seeded introduced grasslands to maximize waterfowl (*Anas* spp.) nest success and occupancy by ROC on WPAs and reconstruct seeded introduced grasslands on WPAs located in 1A to 3B landscapes throughout the District to diverse native vegetation to benefit upland nesting ROC and enhance ecological services within the mixed-grass prairie ecosystem.

OBJECTIVE 3.1 – RECONSTRUCTION OF SEEDED INTRODUCED GRASSLANDS

Over the next 8 years, reconstruct an average of 1,000 acres of seeded introduced grasslands on 1A to 3C WPAs at 5-year intervals using functionally diverse seed mixtures (approximately 50% grasses [minimum of 9 species] and 50% forbs [minimum of 10 species] by weight) that are representative of a stable plant community on ecological sites post-establishment (typically 3–7 years) while providing heterogeneous nesting habitat for upland nesting ROC including waterfowl (*Anas* spp.), clay-colored sparrow, grasshopper sparrow, bobolink, and northern harrier.

Rationale:

Reconstruction of seeded introduced grasslands is designed to recreate the diversity and function of stable native plant communities on WPAs within the mixed-grass prairie ecosystem. These reconstructed prairies will provide more permanent vegetation cover post-establishment, and when actively managed, will increase available staff time to conduct other priority activities such as easement acquisition and enforcement, developing partnerships with private landowners, and improving infrastructure on WPAs for enhanced management. Therefore, the District has set a realistic target of reconstructing an average of 200 acres per year on WPAs located in 1A to 3B landscapes during the next 8 years.

Seeded introduced grasslands provide tall, dense nesting cover that is attractive to waterfowl (Duebbert and Frank 1984, Higgins and Barker 1982, Lokemoen 1984). However, these grasslands have a limited lifespan (7 to 15 years), are highly susceptible to invasion by noxious weeds, and they lack heterogeneous vegetation structure preferred by many migratory birds (Salo et al. 2004, Fuhlendorf et al. 2006). Therefore, the District intends on using species-rich seed mixtures (Guo et al. 2006, Larson 2011) on WPAs located in 1A to 3B landscapes to reduce weed invasion on seeded grasslands (Carpinelli 2001, Pokorny 2002, Blumenthal et al. 2003, Sheley and Half 2006), increase grassland sustainability (Berger 1993, Cramer 1991, Jacobs and Sheley 1999), support animal food webs (Rowe and Holland 2013), and attract a wide range of migratory birds (e.g., ROC) and other prairie obligate species (Werling et al. 2014).

The District will use functionally diverse seed mixes (Levang-Brilz and Biondini 2002, Pokorny et al. 2005, Biondini 2007) representative of the potential HCPC on ecological sites (Sedivec and Printz 2012) consisting of a minimum of 9 grasses and 10 forbs (approximately 50% grasses and 50% forbs by weight [i.e., 4 lbs grasses & 4 lbs forbs per acre]) because this has been shown to provide higher plant diversity retention, higher resistance to invasion by exotic grasses and noxious weeds, and increased sustainability over time (Larson 2011). District reconstructions would then be within the range of 16 to 32 species considered the saturation rate for most seedings (Guo et al. 2006). Sheley and Half (2006). Use of diverse seed mixes also ensures a well-developed root system which increases the vigor of the belowground community to compete against invasive grasses (Guo et al. 2006). Thus, the goal of choosing many species from several functional groups is to increase above- and below-ground competition against invasion by undesirable species by occupying niches with functionally similar species (i.e., similar nutrient requirements and morphological traits; Carpellini 2001, Pokorny et al. 2005, Norland et al. 2013).

The USFWS also has begun to use “spiked” seed mixes that contain 3–5 forb species that are additive to the typical diverse seed mix and are functionally similar to Canada thistle (*Cirsium arvense*) to reduce invasion following seeding (Norland et al. 2013). Their results indicate that diverse, spiked seedings improved competition between native plants and undesirable weeds and significantly reduced infestation 1-2 years post-seeding. This approach appears to be promising when 900 to 3,000 seeds/m^2 cover the reconstruction site compared to sites having 300 seeds/m^2. Selecting a combination of several forb species to “spike” such as hoary vervain (*Verbena stricta*; 512,000 seeds/lb) black-eyed susan (*Rudbeckia hirta*; 1,600,000 seeds/lb), plains coreopsis (*Coreopsis palmate*; 1,650,000 seeds/lb), purple prairie clover (*Dalea purpurea*; 290,000 seeds/lb), and maximilian sunflower (*Helianthus maximiliani*; 250,000 seeds/lb) has reduced invasion by Canada thistle (Norland et al. 2013).

OBJECTIVE 3.2 – SEEDED INTRODUCED GRASSLANDS ON WPAS IN 1A TO 3B LANDSCAPES

Over the next 8 years, provide moderate to tall nesting habitat consisting of a minimum of ≥7.8 inches of horizontal vegetation cover density and average vegetation height of ≥11 inches by late May on seeded introduced grasslands in ≥4 of 6 management years prior to initiation of reconstruction to diverse native vegetation on WPAs located in 1A to 3B landscapes. This would be done to maximize nest success of upland nesting waterfowl (*Anas* spp.) and other grassland-obligate migratory birds.

Rationale:

The process of reconstructing prairie on seeded introduced grasslands on WPAs located in 1A to 3B landscapes is expected to be completed in phases over the course of ~49 years. There is currently 7,071 acres of DNC grasslands on WPAs in 1A to 3B landscapes. The District will progressively reconstruct grasslands in 1A to 3B landscapes across all WPAs in the District. Thus, many WPAs in 1B to 3B landscapes will need to remain in seeded introduced grassland cover for ≥10 years before reconstruction is initiated. Because these grasslands occur in landscapes with high amounts of grassland cover, they are likely to be occupied by many ROC if a range of cover is provided on an annual basis. For example, Davis et al. (2013) found that grassland specialist species such as Sprague's pipit (*Anthus spragueii*) and Baird's sparrow (*Ammodramus bairdii*) occupied seeded introduced grasslands even when they were surrounded by native tracts. They also found that bobolinks were most common in seeded introduced grasslands occurring in intact native grassland dominated landscapes (i.e., 1A to 3B). Therefore, maintaining tracts of seeded introduced grassland in grassland-dominated landscapes where migratory bird densities are high should provide nesting habitat for most ROC even if habitat quality is lower (Lloyd and Martin 2005) prior to reconstruction.

Although most of these seeded introduced grasslands are degraded by exotic grass species, waterfowl nest success should be moderate to high in these landscapes 2–4 years post-management when vegetation density and height are optimal and litter depths are not excessive (Devries and Armstrong 2011). However, nest success in DNC fields averaged 12% in nesting studies conducted from 1966 to 1984, which indicates that these fields may be below the 15–20% nest success level required to sustain waterfowl populations during the long-term (Klett et al. 1988). Nonetheless, removing excessive litter is important otherwise these grasslands can function as prey reservoirs (abundant *Microtus* spp.) that attract predators and negatively affect waterfowl nest success (Voorhees and Cassel 1980, Norrdahl and Korpimaki 2000, Devries and Armstrong 2011). Thus, Naugle et al. (2000b) recommended that managers use litter depth to determine when to treat mesic mixed-grass prairie grasslands given that management intervals of once every 3-10 years were effective at reducing excessive litter accumulation. They also recommend that managers wait 1-2 years versus over-managing grasslands if they are uncertain whether the vigor of the stand has declined. Nonetheless, achieving 7.8 inches of horizontal vegetation cover density and vegetation height of 11 inches to maximize waterfowl nest success (Bloom et al. 2013) by late May should be attainable if these grasslands are managed once every 5-6 years.

OBJECTIVE 3.3 – SEEDED INTRODUCED GRASSLANDS ON WPAS IN 4A TO 4C LANDSCAPES

Over the next 8 years, opportunistically manage seeded introduced grasslands on 4A to 4C WPAs to provide moderate to tall vegetation structure consisting of a minimum of ≥7.8 inches of horizontal vegetation cover density and average vegetation height of ≥11 inches by late-May in ≥4 of 6 management years to maximize nest success of upland nesting waterfowl (*Anas* spp.) and other grassland-generalist migratory birds such as Savannah sparrow, western meadowlark, and sedge wren.

Rationale:

Reconstruction of seeded introduced grassland on WPAs located in 4A to 4C landscapes will not occur during the next 8 years because the District will be focusing staff time and resources on reconstructions in 1A to 3B landscapes that have higher biological potential to contribute to the SHC population goals. Existing seeded introduced grasslands will be opportunistically managed to promote waterfowl nest success and occupancy by grassland generalist birds that are less sensitive to differences in landscape structure (Johnson and Igl 2001, Davis et al. 2006, Koper and Schmiegelow 2006). There is currently 2,956 acres of DNC grasslands on WPAs in 4A to 4C landscapes. The District will attempt to follow management criteria described under Seeded Introduced Grasslands Objective 3.2. Management, including haying, grazing, or burning, would occur opportunistically on these WPAs. However, opportunities to graze these WPAs may be limited since 1) few private landowners maintain cattle herds in cropland-dominated landscapes, 2) most landowners would not be willing to move cattle long distances to implement rotational grazing systems, and 3) sufficient fencing infrastructure to implement rotational grazing systems is limited on most of these WPAs.

Chapter 5
Conservation Strategies

This chapter provides an overview of how the District intends to achieve objectives described in Chapter 4. Because wetland management districts administer landscape conservation using conservation easements, enhancement and restoration of habitat on private lands via the Partners for Fish and Wildlife Program, and fee-title management of WPAs, this chapter integrates strategies aimed at maximizing the production of waterfowl and other ROC at multiple scales (landscape to local). Habitat conservation on WMDs must integrate the role of the surrounding landscape to ensure that the establishing purposes of producing waterfowl while benefiting other migratory birds are met. Therefore, staff developed strategies and prescriptions (defined below) that contribute to these purposes as part of the SHC conservation design outlined in Chapter 4.

- *Strategies* – specific techniques (i.e., prescribed fire or grazing) used to protect, manage, or enhance habitat to achieve objectives.
- *Prescriptions* – specific details describing how strategies will be implemented based on timing, frequency, intensity and location.

Ultimately, the District intends to use the SHC conservation design to target conservation delivery in areas with highest biological potential to contribute to the sustainability of waterfowl populations in the PPR. The strategies and prescriptions included in this HMP are linked to biological potential of different landscapes to achieve the SHC population goals and objectives that were identified by extensive review of relevant scientific literature, consultation with subject matter experts, and from evaluation of individual migratory bird species–habitat population models. Managers may need to modify actual prescriptions on fee-title lands based on inter-annual variation in environmental conditions (e.g., precipitation, temperature) that influence changes in migratory bird distribution and nesting conditions.

5.1 Conservation Units

The SHC conservation design described in Chapter 4 has identified a range of landscape types (1A to 5; Figure 5-1) that will be used to maximize the contribution of the District to the population goals with a limited set of resources.

The District's SHC design focuses conservation delivery at landscape and local scales using the following conservation units:

- landscape classes 1A, 1B, 2A, 2B, 3A, 3B, 4A, 4B, 4C, and 5.
- individual grassland tracts or wetland basins on private lands.
- waterfowl production areas (N = 201).

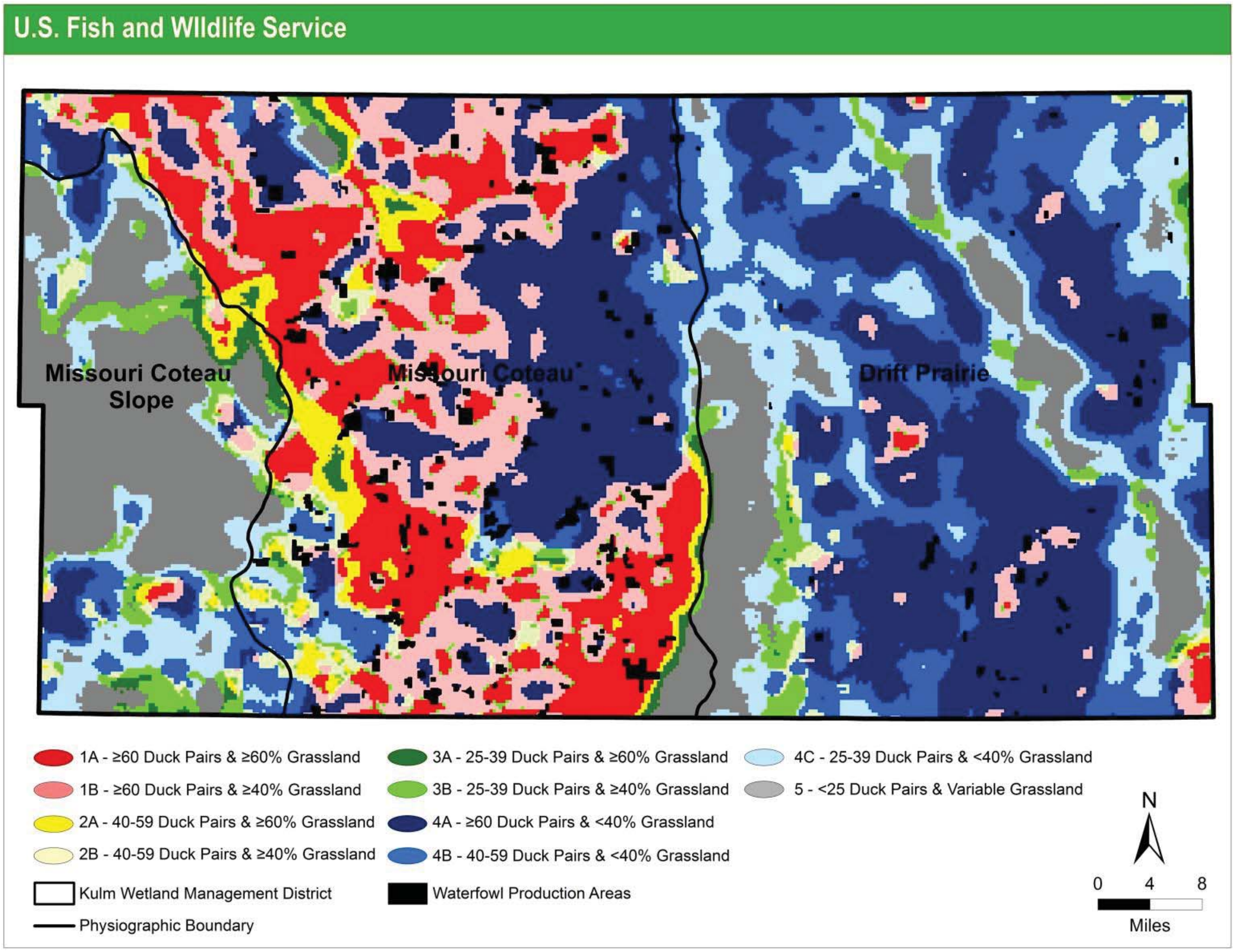


Figure 5-1. Strategic habitat conservation design for migratory bird conservation within Kulm Wetland Management District. Map data reflect the mean density of breeding waterfowl pairs per square mile from 1987-2011 and percent grassland in a four square mile area within Kulm Wetland Management District. Percent grassland was generated using 2012 National Agricultural Statistics Service cropland data layer.

At the largest scale, conservation units such as 1A landscapes under the SHC conservation design have the highest potential to support all population objectives (i.e., 15–20% nest success rates required for waterfowl population stability [Cowardin et al. 1985]; contribute to waterfowl carrying capacity; high occupancy by waterfowl broods (Walker et al. 2013a); and attract high densities of upland-nesting ROC. Whereas, landscape type 5 (<25 duck pairs/mi) has the lowest potential to attract and support waterfowl populations because these landscapes have low wetland densities. **The classes do not represent priority order from 1A to 5, rather each class may have a different set of conservation treatments that can be used by managers to contribute to the waterfowl population objectives of the SHC conservation design while benefitting other priority ROC.** Thus, use of landscape classes as conservation units to target conservation delivery provides an effective, biologically-based means for landscape conservation on WMDs.

The District also has selected objectives and strategies that contribute to the goals of the SHC conservation design on private lands. As a conservation unit, acquiring conservation easements and restoring and enhancing habitat on private lands has the highest potential to support the population objectives identified in this plan. It is essential that the District continue to acquire these habitats under the USFWS easement program and work with private landowners to implement rotational grazing systems or restore wetland basins under the Partners for Fish and Wildlife Program in 1A to 4C landscapes to successfully implement SHC.

Staff decided not to develop specific management prescriptions for individual management units on WPAs in this HMP (i.e., Figure 2-3). Rather, staff will develop individual annual work plans for each WPA that use the objectives and strategies identified in this HMP to select prescriptions based on habitat conditions occurring on each WPA. Management prescriptions will be adjusted as necessary on an annual basis to coincide with changes in environmental conditions.

The potential for WPAs to contribute to the goals and objectives of the SHC conservation design largely depends on landscape type. Staff has intentionally selected strategies that can differ between landscape types to ensure that management of WPAs meets the habitat requirements of ROC. For example, a WPA located in a 4A landscape is highly attractive to waterfowl (Loesch et al. 2012) where production can be high in wet years (Walker et al. 2013b), but area-sensitive grassland migratory bird densities are low (unpublished data, USFWS PPJV, Bismarck, North Dakota). Thus, managers in 4A landscapes could focus on wetland protection, maintaining tall, dense cover for waterfowl on WPAs, and restoring wetland basins on private lands. By incorporating realistic and strategic conservation targets, the District has selected appropriate strategies to support migratory bird populations on private lands and WPAs across a range of landscape types.

5.2 Strategies and Prescriptions: Landscape-scale Conservation

This section provides a listing of the HMP sub-goals and objectives with selected strategies that managers may use to deliver conservation at landscape scales. For each objective, a list of potential management strategies is listed and these should be considered as treatment options that can be used collectively or individually to achieve or contribute to the objective.

The District will incorporate new strategies as new scientific information is obtained through adaptive management, assumption-based monitoring and research, or from relevant research studies conducted in the PPR. This iterative SHC approach is designed as a decision support tool to improve landscape-scale conservation on the District during the current climate of lean budgets and rapid conversion of wetland and grassland habitat. Specific prescriptions that coincide with the implementation of inventory and monitoring strategies will be identified in a step down Inventory and Monitoring Plan.

GOAL 1 – LANDSCAPE CONSERVATION

Maximize the contribution of the District to the sustainability of waterfowl and other migratory bird populations in the PPR through implementation of strategic habitat conservation that targets conservation delivery within landscapes having the highest biological potential to maximize waterfowl carrying capacity, nest success, and brood occupancy, while sustaining contiguous portions of the mixed-grass prairie ecosystem for the benefit of the ROC and associated native wildlife and plant communities.

OBJECTIVE 1.1 – ACQUISITION OF WETLAND CONSERVATION EASEMENTS

Over the next 8 years, continue to secure protected status on 100% of wetlands offered by willing landowners in wetland priority zones as identified in the North Dakota WMD CCP (USFWS 2008a) in the District that support ≥25 breeding duck pairs per square mile (1A to 4C landscapes) to contribute to maximizing the current carrying capacity for waterfowl and other wetland-dependent migratory bird populations in the Prairie Pothole Region.

Conservation Strategies and Prescriptions

- Use the evaluation criteria for wetland easements as identified in the CCP (USFWS 2008a) to determine acquisition priority.
- Ensure that all at-risk wetlands in landscapes having ≥60 breeding duck pairs per square mile (1A, 1B, 4A landscapes) are protected with help from willing landowners because these wetland dense landscapes are critically important to support pulses in waterfowl productivity (Walker et al. 2013b), brood occupancy (Walker et al. 2013a), and brood survival (Krapu et al. 2006).
- Contact landowners who were not interested in the wetland easement program during the initial inventory at 5-year intervals or sooner if land use trends change.
- Continue to partner with Ducks Unlimited and other organizations to co-locate staff within the District that work with private landowners to protect, enhance, or restore important wetland habitats.

Inventory and Monitoring Strategies

- Annually evaluate landownership of unprotected wetlands by monitoring land sales in each county in the District and contacting all new landowners to determine their interest in the wetland easement program.
- By 2016, complete the inventory of potential landowner interest in the wetland easement program in 1A to 4C landscapes in the District.
- Annually monitor all wetland easements in the District to ensure that they are protected under the provisions of the conservation easement contracts (see wetland in easements Objective 2 in North Dakota WMD CCP (USFWS 2008a).

OBJECTIVE 1.2 – ACQUISITION OF GRASSLAND CONSERVATION EASEMENTS

Over the next 8 years, as funding sources become available, secure protected status on 100% of grasslands offered by willing landowners in grassland priority zones, as identified in the North Dakota WMD CCP (USFWS 2008a), in the District. Also, focus grassland protection in landscapes that have the highest potential to maximize waterfowl production (1A, 1B, 4A), support high brood occupancy rates for waterfowl, and support high densities of ROC.

Conservation Strategies and Prescriptions

- Because grassland easement funding resources are limited, initially protect at-risk grasslands in priority 1A zones identified in the grassland easement evaluation criteria (USFWS 2008) and in 1A, 1B, and 4A landscapes identified in the SHC conservation design (Figure 4-1) because these areas have the highest potential to contribute to the SHC waterfowl population objectives.
- Protect all wetlands within the boundaries of any grassland easement purchased from willing landowners in the District.

- Through the Partners for Fish and Wildlife Program, develop partnerships with private landowners who may not be enrolled in the grassland easement program to increase their likelihood of protecting their land from conversion with a perpetual grassland easement.
- Contact landowners who were not interested in the grassland easement program during the initial inventory via mass mailings and phone calls at 5-year intervals or sooner if land use trends change.
- To maintain productivity of WPAs, protect all wetlands and grasslands within a 4 mi^2 area surrounding each WPA in 1A and 1B landscapes because these landscapes have the highest probability of contributing to the SHC population objectives. In 2015, resources available for grassland easement acquisition are extremely limited in North Dakota. Therefore, the District must strategically purchase grassland easements in landscapes where the biological benefits would be highest to upland nesting migratory birds. **This strategy does not supersede acquisition of grasslands with higher breeding pairs located independently of WPAs.**

Inventory and Monitoring Strategies

- Annually evaluate landownership of unprotected grasslands by monitoring land sales in each county in the District and if resources are available, contact all new landowners to determine their interest in the grassland easement program.
- By 2017, complete the inventory of potential landowner interest in the grassland easement program in 1A, 1B, and 4A landscapes.

OBJECTIVE 1.3 – CONSERVATION EASEMENTS

By 2017, contact 100% of landowners located in 1A to 4C landscapes within the District to determine their interest in obtaining a wetland and grassland conservation easement, conduct 100% of easement evaluations within 6 months of determining individual landowner interest, and submit 100% of completed evaluations within 2 months to the USFWS Region 6 Division of Realty for further evaluation to ensure that all potential conservation easements are purchased from willing landowners in a reasonable amount of time.

Conservation Strategies and Prescriptions

- Allocate all available staff resources to complete this wetland and grassland conservation easement inventory by 2017.
- Contact landowners who were not interested in the wetland and grassland easement program during the initial inventory via mass mailings and phone calls at 5-year intervals or sooner if land use trends change.
- Continue to use the existing system to determine landowner interest in the District until the inventory is completed. Staff will utilize a 3-step process to determine landowner interest: 1) send mass mailings to all landowners having unprotected wetlands, 2) contact each individual landowner by phone to determine their interest, and 3) send final notice letter to landowners who did not respond to the initial letter or to phone calls.
- Conduct easement evaluations immediately after crops are harvested in the fall and after the snow melts in the spring to ensure that all evaluations are completed within 6 months of determining landowner interest in the easement program.
- Continue to work closely with the Region 6 Division of Realty to ensure that all submitted easement evaluations and associated documents are efficiently processed. This strategy is necessary because landowners may change their interest in the easement program if easements are not purchased in a timely manner.

Inventory and Monitoring Strategies

- Annually evaluate landownership of unprotected wetlands and grasslands by monitoring land sales in each county in the District and contact all new landowners to determine their interest in the grassland easement program.
- Annually contact landowners on recently converted grasslands to determine their interest in the wetland easement program. Some landowners may be willing to protect wetlands on their land even if the adjacent uplands were converted for agricultural purposes. This strategy could be the last attempt by the Service to protect wetlands before they are drained.

OBJECTIVE 1.4 – FEE-TITLE WATERFOWL PRODUCTION AREAS IN 1A TO 3B LANDSCAPES

During the next 8 years, target 80% of all habitat management activities on 136 WPAs (32,870 ac) located in 1A [n = 61], 1B [n = 72], 2A [n = 1], 2B [n = 2], 3A, and 3B landscapes that support ≥25 duck pairs per square mile and contain ≥40% grass cover within a 4 mi^2 area that that yield ≥15-20% waterfowl nest success. Managers aim to provide diverse, heterogeneous nesting habitat that meets the habitat requirements of waterfowl (*Anas* spp.) and other ROC, including grasshopper sparrow, clay-colored sparrow, bobolink, marbled godwit, and northern harrier.
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Conservation Strategies and Prescriptions

Staff would use assumption-based research and outcome-based monitoring to measure the biological return achieved from this SHC conservation design. Specific actions include:

- Evaluate migratory bird and habitat responses to management actions through focused research.
- Iteratively adapt the SHC conservation design as new scientific information is obtained.
- Develop annual work plans that allocate 80% of all management activities (i.e., native prairie restoration or reconstruction, prescribed fire and grazing) on WPAs in 1A to 3B landscapes.
- Use the principles of adaptive management and SHC to integrate new scientific findings into applied habitat management on WPAs located in 1A to 3B landscapes.
- By 2018, develop 5-year individual management plans for all WPAs located in 1A to 3B landscapes to increase the efficiency and continuity of restoration, reconstruction, and enhancement activities in the District.
- Continue to develop partnerships with private landowner cooperators to deliver precisely timed defoliation treatments that meet the goals and objectives outlined in this plan. For example, development of 5-year agreements would likely increase the commitment of cooperators to the terms of individual WPA plans because they could better anticipate their grazing needs within their operations compared to annual agreements.
- Focus the majority of noxious weed control efforts in 1A to 3B landscapes to limit further degradation of grasslands that are actively being enhanced, reconstructed, and/or restored using specific management treatments.

Inventory and Monitoring Strategies

- Test the assumptions of the SHC conservation design using focused research, inventories, or monitoring to adaptively administer conservation within the District. Ensure that all studies are sufficient in time and space to account for variation between landscape types.
- Monitor the effectiveness of management treatments to restore, enhance, or maintain grassland plant communities for the benefit of migratory bird populations. Monitoring should account for inter-annual variation in environmental conditions to determine the appropriate frequency,

timing, and intensity of defoliation treatments. Monitoring is aimed at identifying increasing or decreasing trends in native plant communities and the degree of invasion by Kentucky bluegrass or smooth brome.

- Monitor the biological response (i.e., reproductive success, density) of waterfowl and other migratory birds (e.g., ROC) to management treatments aimed at providing suitable nesting habitat across the range of landscape types to determine their effectiveness to contribute to the goals and objectives of the SHC approach.
- By 2016, complete an accurate spatial inventory of individual habitat types (native prairie, reconstructed prairie, or seeded introduced native) to improve the efficiency of management that coincides with habitat types described in this HMP. This information also is important to create an effective biological program centered on these habitat types and to aid the Wildlife Biologist in the development of future research, inventories, and monitoring on WPAs. There are inconsistencies in existing spatial layers. Therefore, a comparative analysis of Resource Inventory Planning (RIP) cards recorded from approximately 1970 to 1985, the national vegetation classification system (NVCS) geospatial layer, evidence from each WPA management file, field verification, and institutional knowledge from managers is needed to create accurate spatial layers that can better inform management.
- By 2020, complete an inventory of native prairie ecological sites on WPAs to determine their plant community state. Variation within ecological sites can be determined using state-and-transition models. Information from these models can be used by managers to select management actions to restore the observed plant community (see Sedivec and Printz 2012).
- Monitor the effectiveness of management treatments to influence change in plant community state on ecological sites (Sedivec and Printz 2012).
- Develop focused research that evaluates potential variation in reproductive success and density of migratory birds that may occur across plant community states (see state-and-transition models; Sedivec and Printz 2012).

OBJECTIVE 1.5 – FEE-TITLE WATERFOWL PRODUCTION AREAS IN 4A TO 4C LANDSCAPES

During the next 8 years, target 20% of all habitat management activities on 64 WPAs (12,542 ac) located in 4A [n = 51], 4B [n = 10], and 4C [n = 3] landscapes that support ≥25 duck pairs per square mile and contain <40% grass cover within a 4 mi^2 area to maximize upland nesting waterfowl (*Anas* spp.) nest success and benefit other habitat generalist migratory birds such as Savannah sparrow and sedge wren.

Conservation Strategies and Prescriptions

- Focus management on WPAs located in 4A to 4C landscapes on maintaining dense stands of moderate to tall grassland cover through litter reduction management treatments at 5-6 year intervals to benefit nesting waterfowl (Naugle et al. 2000a, Devries and Armstrong 2011, Bloom et al. 2013).
- Use the principles of adaptive management and SHC to integrate new scientific findings into applied habitat management on WPAs located in 4A to 4C landscapes.
- Develop annual work plans that allocate 20% of all management activities (i.e., native prairie restoration or reconstruction, prescribed fire and grazing) on WPAs in 4A to 4C landscapes.
- By 2020, develop 5-year individual management plans for all WPAs located in 4A to 4C landscapes to increase the efficiency and continuity of restoration, reconstruction, and enhancement activities in the District.

- Conduct litter reduction management treatments (e.g., haying or fall prescribed fires) after August 1 to ensure that nesting migratory birds such as waterfowl, sedge wren, and Savannah sparrow are not adversely affected by management treatments.
- Continue to develop partnerships with private landowner cooperators to deliver precisely timed defoliation treatments such as grazing or haying that meet the objectives identified in this plan.
- Target available staff time and resources for controlling noxious weeds to highly invasive species (e.g., yellow toadflax, leafy spurge) occurring as new or small (<0.5 ac) infestations to prevent further degradation of grasslands. Managers will use their discretion to determine actual impacts to habitat and surrounding lands of limiting weed control on 4A to 4C WPAs.

Inventory and Monitoring Strategies

- Test the assumptions of the SHC conservation design using focused research, inventories, or monitoring to adaptively administer conservation within the District. Ensure that all studies are sufficient in time and space to account for variation between landscape types and years.
- As resources allow, monitor the effectiveness of management treatments to restore, enhance, or maintain grassland plant communities for the benefit of migratory bird populations.
- Monitor litter accumulation on 4A to 4C WPAs at 5-6 year intervals to determine if management is required to maintain grassland stand vigor.
- As resources allow, monitor the effectiveness of different grazing or haying treatments to remove litter and improve grassland vigor on 4A to 4C WPAs.
- By 2016, complete an accurate spatial inventory of individual habitat types (native prairie, reconstructed prairie, or seeded introduced native) to improve the efficiency of management and to aid the Wildlife Biologist in the development of future research, inventories, and monitoring on 4A to 4C WPAs.
- By 2020, complete an inventory of native prairie ecological sites on 4A to 4C WPAs to identify plant community state and appropriate state-and-transition models. Information from these models can be used by managers to determine management actions to restore the observed plant community (see Sedivec and Printz 2012).

OBJECTIVE 1.6 – GRAZING SYSTEMS ON PRIVATE LANDS

By 2016, partner with private landowners to annually establish a minimum of 20 rotational grazing systems on grassland tracts (≥160 acres) within 1A and 1B landscapes under the Partners for Fish and Wildlife Program to improve nesting conditions for waterfowl (*Anas* sp.) and other ROC such as clay-colored sparrow, bobolink, grasshopper sparrow, and northern harrier.

Conservation Strategies and Prescriptions

- The District will initially target rotational grazing systems on grasslands in 1A or 1B landscapes that meet the following criteria in descending order:
    1) Located on unprotected grasslands at high risk of conversion.
    2) Located on existing grassland easements.
    3) Located adjacent to WPAs or within the 4 mi^2 area surrounding the WPA.
- By 2018, contact all private landowners with grassland easements and develop rotational grazing system agreements with willing landowners through the Partners for Fish and Wildlife Program that improve the habitat structure of grasslands on private lands during the nesting season for waterfowl and other migratory birds.
- Develop similar agreements with private landowners not enrolled in the grassland easement program to maintain grassland status and improve habitat structure for nesting migratory birds.

Progressively contact landowners in 1A to 4C landscapes with unprotected, at-risk grasslands (Figure 4-13).
- Increase the availability of moderate to tall vegetation structure that is preferred by most nesting migratory birds (Barker et al. 1990, Salo et al. 2004, Bloom et al. 2013) within a 4 mi^2 area surrounding each 1A to 3B WPA by developing rotational grazing systems on private lands.
- Inform private landowners interested in obtaining a grassland easement offer of the benefits of the Partners for Fish and Wildlife Program such as increased beef production and higher suitability to wildlife (Barker et al. 1990, Salo et al. 2004).

Inventory and Monitoring Strategies
- As resources allow, monitor the implementation of rotational grazing systems along with grass utilization rates on private lands that are intended to improve habitat structure for the benefit of migratory bird populations.
- Conduct research to determine the biological response (i.e., density, nest density, nest success) of waterfowl and other migratory birds to different grazing systems on public and private lands.
- Annually evaluate landownership of unprotected grasslands by monitoring land sales in each county in the District and contact all new landowners to determine their interest in the grassland easement program and the Partners for Fish and Wildlife Program.

OBJECTIVE 1.7 – ADAPTIVE LANDSCAPE CONSERVATION

At 5-year intervals, update the District's SHC conservation design to incorporate changes in landscape types that coincide with changes in land use trends and factors influencing the production of waterfowl and other migratory birds as part of an adaptive approach to deliver conservation in areas having the greatest biological potential to benefit resources of concern.

Conservation Strategies and Prescriptions
- Incorporate significant scientific advances in waterfowl ecology into future iterations of the SHC conservation design.
- Collaborate with USFWS HAPET and PPJV staff and other waterfowl ecologists to develop future iterations of the SHC conservation design.

Inventory and Monitoring Strategies
- Incorporate findings from assumption-driven research, inventories, and monitoring activities designed to test the assumptions of the SHC conservation design into the goals and objectives in this plan.

5.3 Strategies and Prescriptions: Local-scale Management

SUB-GOAL 2 – NATIVE OR RECONSTRUCTED PRAIRIE

Maximize native vegetation diversity and composition on individual tracts of native sod and reconstructed native prairie on WPAs using adaptive management to provide heterogeneous vegetation structure required by upland-nesting resources of concern (ROC) and contribute to biological integrity, diversity, and enhancement (BIDEH) within the mixed-grass prairie ecosystem.

OBJECTIVE 2.1 – NATIVE PRAIRIE ON NATIVE PRAIRIE ADAPTIVE MANAGEMENT UNITS

Over the next 8 years, restore 391 acres of native prairie occurring on 9 Native Prairie Adaptive Management study units using the full adaptive management process to apply appropriate and precise disturbance as recommended in each management year (September 1 to August 31), optimally increasing native plant frequency by an average of ≥1 to 5% during any 5-year interval, to increase resistance to invasion by exotic cool-season grasses, improve habitat condition for migratory birds and other prairie obligate species (e.g., pollinators), and enhance ecological services such as BIDEH on individual WPAs included in the study.

Management Strategies and Prescriptions

- Follow recommended management strategies and prescriptions for the duration of the NPAM effort to ensure that information used to test restoration models is accurate.
- Conduct management treatments within NPAM-designated spring defoliation window (Table 4-2) (USFWS 2013).
- Prioritize the limited availability of prescribed fire to NPAM units within the District. Applying prescribed fire on NPAM units is important to determine if restoration efforts are achieving desired results.

Inventory and Monitoring Strategies

- Annually monitor native prairie composition on NPAM units using existing protocols (USFWS 2013) to inform models designed to improve our understanding of factors influencing native prairie restoration.
- Collect inventories of additional biotic and abiotic datasets to include in NPAM models.

OBJECTIVE 2.2 – NATIVE PRAIRIE ON WPAS IN 1A TO 3B LANDSCAPES

Over the next 8 years, restore or maintain native prairie community assemblage on native prairie occurring on WPAs located in 1A to 3B landscapes using appropriate and precise disturbance in each management year (September 1 to August 31) to provide suitable nesting habitat for waterfowl and other migratory birds while shifting the existing native plant community towards the potential historic climax plant community state for specific ecological sites and enhancing BIDEH on individual WPAs. Specific management thresholds include:

- Manage tracts with 25 to 55% native vegetation remaining to increase native plant vigor, density, and seedling recruitment and prevent further degradation within ecological sites. (**Option A)**;
- Manage tracts with >55% native vegetation remaining to maintain or enhance native plant communities on ecological sites. (**Option B)**;
- Manage tracts with <25% native vegetation remaining exclusively as nesting habitat for waterfowl and other ROC. (**Option C)**.

The following management strategies and prescriptions provide managers with a range of management treatments that are designed to benefit upland nesting migratory birds while attempting to restore native prairie communities. Managers can select the appropriate strategies to manage native prairie based on the amount of native vegetation remaining and community phase on ecological sites under options A, B, or C. Using this approach, managers realize that specific short-term tradeoffs exist when selecting a specific strategy over another because of the need to restore highly degraded native prairie communities

(Murphy and Grant 2005, Grant et al. 2009) while providing vegetation structure preferred by most breeding migratory birds (Barker et al. 1990, Salo et al. 2004, Naugle et al. 2000a, Bloom et al. 2013). For example, intensely managing tracts to restore a degraded tract under **Option A** may require defoliation in ≥4 of 5 years and would result in short vegetation structure that is preferred by fewer upland nesting migratory birds (Kirsch et al. 1978, Kantrud and Higgins 1992, Salo et al. 2004, Fuhlendorf et al. 2006). However, managers will only implement Option A if sufficient tall, dense nesting cover required by waterfowl occurs on adjacent WPA management units or private lands.

There is a dire need to restore highly degraded native prairie (Grant et al. 2009) because exotic cool-season grasses can completely dominate native prairie sites causing restoration to be unlikely (Murphy and Grant 2005). Because restoration of native prairie tracts is a long-term process (i.e., 30–50 years [Grant et al. 2009]), staff have decided to use a hybrid approach for restoring prairie while providing suitable habitat for waterfowl production to meet the establishing purposes of the District. Restoration of native plant communities is important to attract diverse assemblages of birds (Murphy and Sondreal 2003), improve floristic composition (Murphy and Grant 2005), prevent further losses in ecosystem services (Hobbie 1992, Hooper et al. 2005, Jordan et al. 2008, Werling et al. 2014) and best enable mixed-grass prairies to respond to a changing climate (Craine et al. 2012).

Management Strategies and Prescriptions

- Use appropriate defoliation treatments for **Options A, B, and C** to provide a range of habitat structure to meet the needs for nesting ROC:
    - Waterfowl – provide 7.8 inches of vegetation density based on visual obstruction and 11 inches of vegetation height by late May to positively influence nest survival (Bloom et al. 2013). **Option B, C.**
        a. Defoliate vegetation using an intense grazing or fire treatment every 5–6 years to remove litter and maintain grassland vigor (Naugle et al. 2000a).
        b. Integrate prescribed fire as resources allow to enhance vegetation structure, but not more than once during any 5 year period. **Option B, C.**
    - For marbled godwit, chestnut-collared longspur, willet and other migratory birds that prefer short vegetation structure, provide suitable nesting cover consisting of ~2.8 to 8.7 inches vegetation density and 6.7 to 10.6 inches vegetation height (Kantrud and Higgins 1992, Salo et al. 2004) by late May. **Option A, B, C.**
        a. Defoliate vegetation using heavy to extreme grazing intensities utilizing 65–80% of vegetation in any year (Salo et al. 2004).
        b. Integrate prescribed fire as resources allow in ≤3 of 5 years.
    - For clay-colored sparrow, grasshopper sparrow, bobolink, American bittern, northern harrier, and other migratory birds that prefer moderate to tall vegetation structure – provide suitable nesting cover of ≥9.84 inches vegetation density and ≥11 inches vegetation height (Kantrud and Higgins 1992, Salo et al. 2004) by early June. **Option B, C.**
        a. Defoliate vegetation using light to moderate grazing intensities that utilize 35–50% of vegetation in any year to provide nesting habitat for most non-game, mixed-grass prairie bird species (Salo et al. 2004).
        b. Integrate prescribed fire as resources allow, but not more than once during any 5-year period.
- Improve native plant communities within ecological sites towards the historic climax plant community (HCPC) using information derived from state-and-transition [STM] models and appropriate defoliation treatments. **Option A, B.**

    - By 2018, complete an inventory of native prairie ecological sites on WPAs to determine their plant community state. Information from STM can be used by managers to select management actions to restore the observed plant community (see Sedivec and Printz 2012).
- Modify the frequency, duration, and intensity of defoliation treatments based on native plant composition, community state of ecological site, and with annual fluctuations in environmental conditions (e.g., temperature, precipitation, soil moisture) that affect plant community phenology and vigor. **Option A, B, C.**
- Prevent build-up of litter with regular defoliation treatments (primarily grazing and fire) on sites dominated by exotic cool-season grasses to aid restoration efforts (**Option A, B)** and maintain vigor of grassland structure to benefit nesting migratory birds (**Option B, C**).
    - Prevent litter accumulation on Kentucky bluegrass dominated sites to maintain water movement between the plant community and the soil (Weaver and Rowland 1952) and to maintain soil conditions necessary for seedling germination by native forbs (Bosy and Reader 1995). **Option A, B.**
    - Prevent litter accumulation in smooth brome dominated sites to reduce the rate of smooth brome decomposition that alters soil nitrogen levels and contributes to its persistence (Vinton and Goergen 2006, Jordan et al. 2008). **Option A, B.**
- Opportunistically apply prescribed fire to disturb invasive grasses such as Kentucky bluegrass or smooth brome (**Option A, B**), provide heterogeneous structure (**Option B, C**), and reduce litter accumulation (**Option A, B, C**).
    - Annually prioritize fire management on **Option A or B** native tracts over **C** tracts. Use of fire as a restoration tool is a higher priority than for litter reduction because several options (grazing or haying) exist to reduce litter.
    - Combine spring or fall burning with intensive spring grazing to reduce exotic cool-season grasses (Smart et al. 2010). **Option A, B.**
    - Use prescribed fire as a tool to disturb Kentucky bluegrass: **Option A, B.**
        a. Conduct prescribed burns during the spring (i.e., late April to mid-May) during tiller elongation (Grace et al. 2001) to reduce the frequency of Kentucky bluegrass (Knops 2006, Engle and Bultsma 1984, Hendrickson and Lund 2010).
            1. Burning may be conducted later in May on dry sites (Zedler and Loucks 1969) or during drought years to damage Kentucky bluegrass (Engle and Bultsma 1984, Nagle et al. 1994).
            2. Conduct burning when Kentucky bluegrass is 4–6 inches of height to reduce its composition in native prairies (Svedarsky et al. 1986).
        b. Conduct annual or biennial spring burning to decrease cover of Kentucky bluegrass (Knops 2006).
    - Use prescribed fire as a tool to disturb smooth brome: **Option A, B.**
        a. Conduct prescribed burns during tiller elongation (i.e., mid-May to early June) during the 4- to 5-leaf stage to reduce the density of smooth brome (Willson 1991, Willson and Stubbendieck 2000).
        b. Conduct repeated spring burns to decrease the presence of smooth brome (Willson and Stubbendieck 1997, 2000, Stacy et al. 2005).
        c. Avoid burning in early spring (April to early May) because smooth brome may increase due to increased light reaching growing leaves when litter is removed from the burn (Higgins et al. 1989, Willson and Stubbendieck 2000).
        d. Avoid burning until the following year if tiller inflorescences are present (Willson and Stubbendieck 2000).

- Apply prescribed grazing on native grassland tracts to disturb invasive grasses such as Kentucky bluegrass or smooth brome (**Option A, B)**, provide heterogeneous structure (**Option B, C**), or reduce litter accumulation (**Option A, B, C)**.
  - Utilize patch-burn-graze systems as a restoration tool as fire management resources allow. For example, light stocking rates and a 3-year burn rotation can be used to promote structural diversity and increase forb abundance on sites where native composition is high (>60%) because cattle will selectively consume grasses (Helzer 2011). **Option A, B.**
  - Utilize grazing as a tool to suppress invasion of Kentucky bluegrass. **Option A, B.**
    a. Conduct intensive early season grazing to damage Kentucky bluegrass (Hanson et al. 2010). **Option A, B.**
    b. Avoid the use of summer grazing on sites where Kentucky bluegrass is prevalent to prevent further invasion (Murphy and Grant 2005, Patton et al. 2011). **Option A, B.**
  - Utilize grazing as a tool to suppress invasion of smooth brome. **Option A, B.**
    a. Intensely graze pastures from tiller elongation (mid- to late May) through boot stages (early June) to stress growth and development of smooth brome (Helzer 2011, Murphy and Grant 2005, Stacy et al. 2005, Mousel and Smart 2007). **Option A, B.** This strategy is designed to remove actively growing points (tiller) and leaf material to damage the plant (Mousel and Smart 2007).
    b. Conduct repeated annual spring grazing of smooth brome as this strategy has been shown to be effective at controlling smooth brome without harming desirable native plants on mixed-grass prairies (Stacy et al. 2005). **Option A, B.**
- On a limited basis, work with private landowners (cooperators) to remove excessive litter accumulation after August 1 via haying and raking when options for rotational grazing systems may not exist. Haying also can be conducted on sites with excessive noxious weed invasions to suppress further spread on native prairie tracts. **Option A, B, C.**
- Progressively remove trees from 1A to 4C WPAs to reduce further encroachment and remove raptor perching and nesting sites and raccoon den sites that attract predators and negatively affect upland nesting birds. **Option A, B, C.**

Inventory and Monitoring Strategies

- Conduct research on the response of ROC and other native wildlife species within the hypothesized native prairie plant community thresholds (<25%, 25-45%, >55% native prairie dominated composition [plant groups 41-43, 46, 48, 49, 53, 63, and 76] [Grant et al. 2004]) and across various landscape types (1A to 4C). **Option A, B, C.**
- Monitor native prairie plant communities to determine if changes occur between plant community phases on ecological sites at a minimum of once every five years to adjust management prescriptions as necessary to maintain desired habitat conditions. **Option A, B, C.**
- As resources allow, monitor the effectiveness of management treatments to influence change in plant community state on ecological sites (Sedivec and Printz 2012). Develop focused research that evaluates potential variation in reproductive success and density of migratory birds that may occur across plant community states. **Option A, B, C.**
- By 2022, complete an inventory of floristic quality using common metrics (i.e., Shannon-Wiener index of diversity, coefficient of conservatism, floristic quality index, native species composition) on ecological sites to provide a baseline to compare future changes in native plant diversity and density over time on managed sites (i.e., Whittaker 1967, Whittaker 1975, Swink and Wilhelm 1994, Taft et al. 2006, Sivicek and Taft 2011). **Option A, B.**

- Monitor the response of native prairie communities to defoliation treatments (i.e., grazing, fire) and adjust management prescriptions (timing, frequency, and intensity) or identified thresholds using an adaptive management approach (Gannon et al. 2010). **Option A, B, C.**
  - Monitor grass utilization rates to determine effectiveness of grazing treatments (see Johnson et al. 1994).
  - As resources allow, monitor the effectiveness of prescribed fires based on area burned, fire intensity, litter consumption and impact to Kentucky bluegrass duff in relation to weather conditions during the fire.
- Evaluate soil moisture prior to conducting prescribed burns because Kentucky bluegrass control is strongly related to soil moisture conditions (Anderson 1965, Zedler and Loucks 1969). **Option A, B.**
- Conduct research on the efficacy of over-seeding native grasses and forbs into a range of degraded native prairie sites. **Option C.**
- Conduct research on the timing of exotic versus native cool-season grass emergence during the spring (late March to May). This information is important to determine if there is a window in early spring when exotic grasses are emerging, but native grasses are still dormant. **Option A, B. C.**

OBJECTIVE 2.3 – NATIVE PRAIRIE ON WPAS IN 4A TO 4C LANDSCAPES

Over the next 8 years, maintain or enhance native prairie community assemblage on native prairie occurring on WPAs located in 4A to 4C landscapes using appropriate and precise disturbance in each management year (September 1 to August 31) to provide nesting habitat for waterfowl and other migratory birds while preventing further degradation within the existing native plant community state for specific ecological sites. Specific management criteria include:

- Manage tracts with 25 to 55% native vegetation remaining to increase native plant vigor, density, and seedling recruitment and prevent further degradation within ecological sites. (**Option A**).
- Manage tracts with >55% native vegetation remaining to maintain or enhance native plant communities on ecological sites. (**Option B**).
- Manage tracts with <25% native vegetation remaining exclusively as nesting habitat for waterfowl and other generalist migratory birds. (**Option C**).

Management Strategies and Prescriptions

- Opportunistically utilize strategies and prescriptions identified in Objective 2.2 – **Options A, B, and C**.

Inventory and Monitoring Strategies

- Monitor the response of ROC and other native wildlife species within the hypothesized native prairie thresholds (<25%, 25-55%, >55% native prairie dominated composition in plant groups 41-43, 46, 48, 49, 53, 63, and 76 [Grant et al. 2004]) and in various landscape types [1A to 4C]). **Option A, B, C.**
- As resources allow, monitor native prairie plant community phase and litter accumulation on ecological sites at a minimum of once every five years (**Option A, B)**.
- As resources allow, monitor the response of native prairie communities to defoliation treatments (i.e., grazing, fire) and adjust management prescriptions (timing, frequency, and intensity) or identified thresholds using an adaptive management approach (Gannon et al. 2010, USFWS 2013). **Option A, B, C.**

  - Monitor grass utilization rates to determine effectiveness of grazing treatments (see Johnson et al. 1994).
  - As resources allow, monitor the effectiveness of all prescribed fires based on fire coverage, fire intensity, litter consumption, impact to Kentucky bluegrass duff in conjunction with phenological stages of exotic grasses and weather conditions during the fire.
- Conduct research on the efficacy of over-seeding native grasses and forbs into a range of degraded native prairie sites. **Option C.**
- Conduct research on the timing of exotic versus native cool-season grass emergence during the spring (late March to May). This information is important to determine if there is a window in early spring when exotic grasses are emerging, but native grasses are still dormant. **Option A, B, C.**
- Conduct research on the efficacy of different herbicides to restore highly degraded native grasslands. **Option C.**

OBJECTIVE 2.4 – RECONSTRUCTED PRAIRIE

Over the next 8 years, maintain ≥75% native plant composition and diversity representative of stable plant communities on ecological sites on all established (typically 3–7 years after initial seeding) reconstructed prairie tracts on WPAs using active management to provide attractive heterogeneous nesting habitat for waterfowl and other ROC while contributing to BIDEH within the mixed-grass prairie ecosystem.

Management Strategies and Prescriptions

- Utilize strategies and prescriptions identified under **Option A and B** in Objective 2.2 when reconstructions become established. Because significant resources are invested in each reconstructed prairie, managers will use all available resources to maintain ≥75% native plant composition and diversity on these sites post-establishment.
- Re-initiate reconstruction on ecological sites when ≤30% of the seeded native plant community composition remains because native species on these tracts may not be sustainable if they function similar to degraded native prairies (see rationale for Objective 2.2). Occasionally, reconstructions fail for a variety of reasons (e.g., weather, soil conditions, planting techniques, etc.) and managers will need to start the reconstruction process over in these cases.

Inventory and Monitoring Strategies

- Annually and progressively allocate management to native prairie reconstructions on 1A to 4C WPAs.
- As resources allow, monitor the response of ROC and other wildlife species on established reconstructed prairies to estimate trends in reproductive success, species density, and nest density across the range of landscape types (1A to 4C).
- Monitor the state (composition and diversity) of established reconstructed prairies and litter accumulation within ecological sites at a minimum of once every five years.
- By 2022, complete an inventory of floristic quality using common metrics (i.e., Shannon-Wiener index of diversity, coefficient of conservatism, floristic quality index, native species composition) on ecological sites to provide a baseline to compare future changes in native plant diversity and density over time on managed sites (i.e., Whittaker 1967, Whittaker 1975, Swink and Wilhelm 1994, Taft et al. 2006, Sivicek and Taft 2011).

- Monitor vegetation structure and composition on reconstructed prairies following defoliation treatments (i.e., grazing, fire, haying) and adjust management prescriptions (timing, frequency, and intensity) to meet the habitat requirements of ROC.
  - Monitor grass utilization rates to determine effectiveness of grazing treatments (see Johnson et al. 1994).
  - As resources allow, monitor the effectiveness of all prescribed fires based on fire coverage, fire intensity, litter consumption, and weather conditions during the fire.
- Conduct research on the efficacy of over-seeding native grasses and forbs into reconstructed sites with ≤75% native plant community composition.

SUB-GOAL 3 – SEEDED INTRODUCED GRASSLANDS

Provide suitable nesting habitat on existing seeded introduced grasslands to maximize waterfowl (*Anas* spp.) nest success and occupancy by ROC on WPAs and reconstruct seeded introduced grasslands on WPAs located in 1A to 3B landscapes throughout the District to diverse native vegetation to benefit upland nesting ROC and enhance ecological services within the mixed-grass prairie ecosystem.

OBJECTIVE 3.1 – RECONSTRUCTION OF SEEDED INTRODUCED GRASSLANDS

Over the next 8 years, reconstruct an average of 1,000 acres of seeded introduced grasslands on 1A to 3C WPAs at 5-year intervals using functionally diverse seed mixtures (approximately 50% grasses [minimum of 9 species] and 50% forbs [minimum of 10 species] by weight) that are representative of a stable plant community on ecological sites post-establishment (typically 3–7 years) while providing heterogeneous nesting habitat for upland nesting ROC including waterfowl (*Anas* spp.), clay-colored sparrow, grasshopper sparrow, bobolink, and northern harrier.

Management Strategies and Prescriptions

- Progressively reconstruct grasslands beginning with 1A WPAs [N = 61] and then on 1B to 3B WPAs [N = 75] to benefit waterfowl and other migratory birds.
- Review Herbaceous Vegetation Establishment Guidelines (USDA NRCS 2010a) to identify the appropriate reconstruction methods and seeding dates within Major Resource Land Areas
- Ensure that sites targeted for reconstruction undergo adequate seedbed preparation to limit invasion from noxious weeds and/or exotic grasses.
  - Develop 3–5 year cooperative farming agreements with local farmers to prepare the seedbed. The timeline for seedbed preparation typically includes:
    a. In the fall before row crop planting – herbicide and then till the site in the fall to allow frost to kill existing vegetation during the winter (Schramm 1990).
    b. A variable length farming agreement depends on the severity of weed infestation.
    c. Collect soil samples and test for nitrogen and phosphorus levels to ensure that the site is ready for seeding to native plants. If necessary, extend farming agreements to improve soil conditions.
  - On sites with high erosion potential, alternative methods such as no-till or chemical fallow may be required to prepare the seedbed.
- Use a minimum of 9 grasses and 10 forbs in the seed mix on all sites (Larson 2011). This combination has been shown to be effective using broadcast plantings during the dormant period (November to early April) in North Dakota.
  - Use ecological site descriptions (Sedivec and Printz 2012) to determine the appropriate species to include in the seed mix.

    a. Utilize sculptured seed mixes when multiple ecological sites occur on individual WPAs (Jacobson et al. 1994, Sedivec and Prinz 2012).
  - Use a 60:40 or 50:50 grass to forb ratio in the seed mix by weight (Smith et al. 2010, Larson 2011).
  - Use local ecotype seeds representative of species endemic to the mixed-grass prairie.
  - Increase grass seed by 25% to compensate for seed loss in dormant season plantings (Henderson and Kern 1999).
  - Adapt seed mix to capture variation in site topography. For example, seed mixes on sites with south-facing hillslopes should include more xeric species adapted to drier conditions, while low areas (e.g., drainages) should include more mesic species that can tolerate higher soil moisture and lower soil temperatures (Laubhan et al. 2012).
  - As resources allow, increase the number of forb species (~20-30 species [Guo et al. 2006, Larson 2011] in the seed mix to attempt to match variable conditions that occur between years and within sites to increase resistance to invasion by noxious weeds (Sheley and Half 2006).
  - As resources allow, use spiked forb seed mixes to reduce the invasion of Canada thistle (Norland et al. 2013) and other common weeds post-seeding.
  - Include a minimum of 3-4 functional groups (see Levang-Brilz and Biodini 2002, Piper and Pimm 2002, Biondini 2007) in the seed mix to increase the resistance to invasion by exotic grasses and noxious weeds (Biondini 2007, Biondini et al. 2011).
- Invasive species control should be considered during development of the seed mix by selecting functionally similar, highly competitive native plants (Pokorny et al. 2005, Sheley and Half 2006, Biondini 2007). However, the following strategies may be used:
  - On a case-by-case basis, mowing can be used in the first and second year to reduce annual weeds and allow for sufficient light to increase germination of native forbs (Williams et al. 2007). Mowing is typically conducted before weed seed becomes viable leaving 8–10" of stubble over the course of multiple occasions (USDA NRCS 2010a).
  - On a limited basis, precise spot-treatments of herbicide could be used to remove highly invasive noxious weeds (e.g., yellow toadflax).
  - Biological control agents (i.e., flea beetles [*Apthona* spp.] for leafy spurge) should be used over herbicide treatments if available.
- Conduct a prescribed burn during the third or fourth year following seeding (Rowe 2010). Adjust timing of the burn as necessary to improve vigor of the stand. For example, early spring burns encourage cool-season grasses, while late spring burns encourage growth of warm-season grasses (Higgins et al. 1989, Willson and Stubbendieck 2000).
- A graze in year 4 or 5, depending on the condition of stand, can be used to defoliate, reduce litter accumulation and maintain stand vigor.
- Once established, manage reconstructions using similar strategies and prescriptions as identified under **Options A and B** in Objective 2.2.

Inventory and Monitoring Strategies
- Prior to establishment:
  - Monitor noxious weed infestation until the site is established.
  - Monitor the effectiveness of releases of biological control agents.
  - Monitor the effectiveness of defoliation treatments (burning, grazing, mowing) to maintain grassland stand quality.
- Post-establishment:

- Utilize inventory and monitoring strategies listed under **Options A** and **B** in Objective 2.2 and under Objective 2.4.

OBJECTIVE 3.2 – SEEDED INTRODUCED GRASSLANDS ON WPAS IN 1A TO 3B LANDSCAPES

Over the next 8 years, provide moderate to tall nesting habitat consisting of a minimum of ≥7.8 inches of horizontal vegetation cover density and average vegetation height of ≥11 inches by late May on seeded introduced grasslands in ≥4 of 6 management years prior to initiation of reconstruction to diverse native vegetation on WPAs located in 1A to 3B landscapes. This would be done to maximize nest success of upland nesting waterfowl (*Anas* spp.) and other grassland-obligate migratory birds.

Management Strategies and Prescriptions

- Prior to reconstruction of DNC fields to diverse native stands, utilize appropriate defoliation treatments to provide a range of habitat structure to meet the needs for nesting ROC:
  - Waterfowl – provide 7.8 inches of vegetation density based on visual obstruction and 11 inches of vegetation height in late May to positively influence nest survival (Bloom et al. 2013).
    a. Maintain idle grasslands in 5 of 6 management years to increase both waterfowl nest survival and nest density (Bloom et al. 2013).
    b. Defoliate vegetation using grazing or fire once every 5–6 years to remove litter and maintain grassland vigor (Naugle et al. 2000a).
    c. Conduct grazing after the waterfowl breeding season is complete to ensure that suitable nesting habitat exists for waterfowl (Bloom et al. 2013).
    d. If more frequent defoliation is desired, light to moderate grazing regimes that utilize 20–35% of vegetation could be conducted in any year to provide nesting habitat for most ROC (Salo et al. 2004) and minimize impacts to waterfowl nest survival and nest density (Bloom et al. 2013).
    e. Haying treatments that utilize a rake implement also are effective to remove litter build-up.
- Progressively reconstruct seeded introduced grasslands using diverse native mixes beginning with 1A WPAs [N = 61] and then on 1B to 3B WPAs [N = 75] to benefit waterfowl and other migratory birds as described in Objective 3.1.

Inventory and Monitoring Strategies

- Annually and progressively allocate management of DNC grasslands on 1A to 3B WPAs.
- Monitor the effectiveness of management treatments to influence desired changes in plant community physiognomy (vegetation structure [based on visual obstruction reading and vegetation height] and litter accumulation) at a minimum of once every six years and adjust management prescriptions (timing, frequency, and intensity) as necessary to maintain habitat quality.
- As resources allow, monitor the response of ROC and other wildlife species on DNC fields to estimate trends in reproductive success, species density, and nest density across the range of landscape types (1A to 4C).

OBJECTIVE 3.3 – SEEDED INTRODUCED GRASSLANDS ON WPAS IN 4A TO 4C LANDSCAPES

Over the next 8 years, opportunistically manage seeded introduced grasslands on 4A to 4C WPAs to provide moderate to tall vegetation structure consisting of a minimum of ≥7.8 inches of horizontal vegetation cover density and average vegetation height of ≥11 inches by late-May in ≥4 of 6 management years to maximize nest success of upland nesting waterfowl (*Anas* spp.) and other grassland-generalist migratory birds such as Savannah sparrow, western meadowlark, and sedge wren.

Management Strategies and Prescriptions

- Opportunistically use strategies and prescriptions identified in Objective 3.2 to provide suitable nesting habitat for upland-nesting waterfowl and grassland-generalist migratory bird species.
- Progressively reconstruct grasslands using diverse native mixes following the completion of reconstruction on 1A to 3B WPAs beginning with 4A WPAs and then 4B to 4C WPAs to benefit waterfowl and other migratory birds as described in Objective 3.1.

Inventory and Monitoring Strategies

- Annually and progressively allocate management to DNC grasslands on 4A to 4C WPAs.
- Monitor the effectiveness of management treatments to influence desired changes in plant community physiognomy (vegetation structure [based on visual obstruction reading and vegetation height] and litter accumulation) on DNC fields at a minimum of once every six years and adjust management prescriptions (timing, frequency, and intensity) as necessary to maintain habitat quality.
- As resources allow, monitor the response of ROC and other wildlife species on DNC fields to estimate trends in reproductive success, species density, and nest density across the range of landscape types (1A to 4C).

5.4 Adaptive Management

Species–habitat relationships at landscape- and local-scales were used to develop specific goals and habitat objectives for the priority ROC for this plan. Development of these objectives was based on published scientific evidence including a set of assumptions and limitations that may influence the ability of the District to achieve desired biological outcomes. Making informed management decisions also can be difficult without long-term data collection because the desired response may be influenced by natural variability (Lyons et al. 2008). Therefore, the District will use adaptive management practices (Williams et al. 2009) to evaluate and apply findings from research and inventory and monitoring efforts to work towards achieving habitat objectives. Adaptive management is an iterative decision making process associated with actions or decisions that recur over time (i.e., actions taken early on may result in learning that improves the management later). Monitoring is an integral part of adaptive management as it reduces uncertainties and provides feedback as decisions are made or actions are taken (Williams et al. 2009). Adaptive management requires using the current state of knowledge about a system to make predictions on one or more of the possible outcomes resulting from management actions.

Adaptive management is not a "trial and error" process, rather, it is a deliberate process of predicting, monitoring, learning, and adjusting future management actions based on new information. Successful implementation of adaptive management requires three attributes: collaboration with partners, practical and informative decision framework components, and a sustained commitment to the process (Moore et al. 2010). Internal and external partnerships with multiple partners are utilized to address habitat management issues in the PPR. The District is building the components of science-driven adaptive management through development of this HMP, applying predictive models developed by HAPET and the PPJV, and by implementing an inventory and monitoring program, through which data will provide the feedback loop necessary to update and improve management decisions.

5.5 Inventory and Monitoring

A detailed inventory and monitoring plan (IMP) also will step down from the conservation goals and objectives identified in this HMP and the CCP (USFWS 2008). It will focus on measuring the progress of the District's conservation efforts, in conjunction with conservation efforts at larger scales (i.e., USFWS Dakotas Zone), and inform the adaptive management process to ensure that conservation is targeted in landscapes that achieve the greatest biological outcomes for waterfowl and associated ROC.

Implementation of the IMP will allow the District to evaluate management outcomes and adapt future treatments to achieve higher biological outcomes. Specifically, management activities where we anticipate the strongest ongoing need to integrate new science using adaptive management to improve conservation delivery include:

- smooth brome and Kentucky bluegrass control/eradication on native sod grasslands;
- native prairie reconstruction on WPAs;
- ROC response to plant community state and associated management treatments.

Many factors outside of the control of management (i.e., continued conversion of habitat, environmental variation, emergence of new invasive species) could affect the ability of the District to achieve desired goals and objectives. These factors are uncertainties in the adaptive management process that may be able to be addressed through monitoring to improve management decisions (Williams et al. 2009). Nonetheless, this HMP provides a framework for efficient, transparent, and defensible conservation delivery during the next 8 years.

Chapter 6
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Appendix A
List of Preparers and Reviewers

List of Preparers

Author's Name	***Position***	***Work Unit***
Chris Swanson	Wildlife Biologist	Kulm WMD (Kulm, North Dakota)
Michael Erickson	Project Leader	Kulm WMD (Kulm, North Dakota)
Wayne Henderson	Deputy Project Leader	Kulm WMD (Kulm, North Dakota)
Krista Lundgren	Wildlife Refuge Specialist	Kulm WMD (Kulm, North Dakota)
Cami Dixon	Zone Refuge Biologist	Chase Lake WMD (Woodworth, North Dakota.)
Soch Lor*	Regional Inventory and Monitoring (I&M) Coordinator	Regional Office (Lakewood, Colorado)
Kevin Doherty**	Science Coordinator	Prairie Pothole Joint Venture (Bismarck, North Dakota)
Chuck Loesch	Wildlife Biologist	Region 6 HAPET (Bismarck, North Dakota)
Jennifer Zorn	I&M GIS and Database Manager	Lostwood NWR (Kenmare, North Dakota)
Lindy Garner	Regional Invasive Species Coordinator	Benton Lake NWR (Great Falls, Montana)
Mitchel Werner	Writer-Editor	Regional Office (Lakewood, Colorado)

*Present location: USFWS, Anchorage, Alaska.
**Present location: USFWS, Lakewood, Colorado.

List of Reviewers

Reviewer's Name	***Position***	***Work Unit***
Bernie Peterson	Zone Refuge Supervisor	Regional Office (Lakewood, Colorado)
Keenan Adams	Chief, Biological Resources	Regional Office (Lakewood, Colorado)
Chuck Loesch	Wildlife Biologist	HAPET (Bismarck, North Dakota)
Neal Niemuth	Integrated Bird Scientist	HAPET (Bismarck, North Dakota)
Mike Estey	Wildlife Biologist	HAPET (Hartford, Kansas)
Jeffery Gleason	Fish and Wildlife Biologist	Alabama Ecological Services (Daphne, Alabama)

Appendix B
Environmental Compliance

Environmental Action Statement

U.S. Fish and Wildlife Service, Region 6
Lakewood, Colorado

Within the spirit and intent of the Council on Environmental Quality's regulations for implementing the National Environmental Policy Act and other statutes, orders, and policies that protect fish and wildlife resources, I have established the following administrative record. I have determined that the action of implementing the "Habitat Management Plan—Kulm Wetland Management District" is found not to have significant environmental effects, as determined by the attached "finding of no significant impact" and the environmental assessment.

5-19-2015

Michael Erickson — Date
Project Leader
Kulm Wetland Management District
U.S. Fish and Wildlife Service
Kulm, North Dakota

5/27/15

Bernie Peterson — Date
Refuge Supervisor
U.S. Fish and Wildlife Service, Region 6
Lakewood, Colorado

6/1/15

Will Meeks — Date
Assistant Regional Director
U.S. Fish and Wildlife Service, Region 6
Lakewood, Colorado

U.S Department of the Interior
FISH AND WILDLIFE SERVICE
Region 6, Denver, Colorado

FINDING OF NO SIGNIFICANT IMPACT

Habitat Management Plan – Kulm Wetland Management District
Dickey, LaMoure, Logan, McIntosh Counties, North Dakota

The U.S. Fish and Wildlife Service (Service) has completed a habitat management plan (HMP) to outline the habitat goals and objectives for the Kulm Wetland Management District (District). This plan describes goals for both landscape- and local-scale conservation of wetlands and grasslands under a strategic habitat conservation (SHC) framework. The SHC framework aims to target resource allocation in landscapes where biological potential is the highest to support waterfowl carrying capacity, waterfowl production, and meet the habitat requirements of priority wetland- and grassland-dependent migratory birds. This includes protection and acquisition of conservation easements, enhancement and restoration of wetland and grassland on private lands under the USFWS Partners for Fish and Wildlife Program, restoration of native mixed-grass prairie and reconstruction of non-native grasslands to diverse native stands on fee-title WPAs, and management of plant community composition and structure on fee-title WPAs. The resulting Environmental Assessment (EA) evaluates two alternatives: Alternative A, a no action alternative; and Alternative B, the preferred alternative, to implement the strategies included in the habitat management plan.

Alternative B, the preferred alternative, was selected for implementation because it best meets the Service's mission to sustain fish and wildlife populations. The District would achieve its purpose of maintaining productive landscapes for waterfowl and other migratory bird populations by strategically: 1) conserving wetlands and grasslands using limited-interest conservation easements as they provide stability to these populations that breed in the Prairie Pothole Region, 2) enhancing grasslands and restoring wetlands on private lands to contribute to the productivity of these populations, and 3) managing grassland habitat on fee-title waterfowl production areas to meet the nesting requirements of these populations.

<u>Public Involvement</u>
On November 3, 2014, the District issued a public scoping notice which announced the release of a draft HMP and associated EA for 30 days of public comment to the public in the District and through the station's website. The station received informal comments from several organizations and agencies which were incorporated into the document. However, no public comments were received on the document.

<u>Effects of the Proposed Action</u>
This EA has taken a hard look at the environmental impacts to inform the public and ourselves about the consequences of the proposed action (the Service's preferred alternative).

In determining whether this project is a major action significantly affecting the quality of the human environment, we looked at both the context and intensity of the action (40 CFR § 1508.27, 40 CFR § 1508.14) as required by NEPA. In terms of context, the preferred alternative will occur on the Kulm Wetland Management District where we evaluated whether implementation of the preferred alternative would have effects on the human environment. Because the human environment and the relationship of people with that environment (40 CFR § 1508.14), in addition to our thorough analysis of physical environmental effects, we carefully considered the manner in which the local people and natural resources relate to the surrounding environment, though economic and social effects are not intended by themselves to require preparation of an environmental impact statement (40 CFR § 1508.14).

This HMP represents the biological planning and conservation design phases of SHC that identified the potential of the landscape to contribute to the carrying capacity and production of waterfowl and other migratory birds in the District. Staff selected a set of species considered as priority resources of concern to guide conservation delivery within Kulm WMD that is primarily focused on waterfowl conservation, but has significant benefits to other migratory bird populations. The HMP utilizes a landscape-scale waterfowl population decision support tool to target different conservation treatments (acquisition, enhancement, management) within defined landscape classes (i.e., 1A to 5 based on a combination of waterfowl density and percent grassland) to achieve the SHC population goals identified in this plan. At the landscape level, the goals and objectives in this HMP will benefit waterfowl populations including priority resources of concern through strategic conservation of wetland and grassland habitat on private lands through conservation easements and the Partners for Fish and Wildlife Program. At the local level, the goals and objectives in this HMP will benefit these species by restoring degraded native prairie grasslands, reconstructing diverse grasslands on former cropland, and ensuring that breeding birds have sufficient nesting cover on waterfowl production areas to meet their needs.

Decision and Finding of No Significant Impact

The analysis indicates that there will not be a significant impact[1], individually or cumulatively, on the quality of the human environment[2] as a result of this proposed action. I agree with this conclusion and therefore find that an EIS need not be prepared. This determination is based on the following factors.

1. Environmental consequences of implementing the strategies included in the habitat management plan based on the SHC framework will result in largely beneficial impacts to fish and wildlife resources.

2. The proposed action would pose no known risk to public health or safety.

3. The effect on the quality of the human environment is not highly controversial.

[1] 40 CFR § 1508.27 "Significantly" as used in NEPA requires considerations of both context and intensity (a) Context. This means that the significance of an action must be analyzed in several contexts such as society as a whole (human, national), and affected region, the affected interests, and the locality. Significance varies with the setting of the proposed action. For instance, in the case of site-specific action, significance would usually depend upon the effects in the locale rather than in the world *as a* whole. Both short- and long-term effects are relevant; and (b) Intensity. This refers to the severity of impact. Responsible officials must bear in mind that more than one agency may make decisions about partial aspects of a major action.

[2] 40 CFR § 1508.14 "Human environment" shall be interpreted comprehensively to include the natural and physical environment and the relationship of people with that environment. (See the definition of "effects" (40 CFR § 1508.8).) This means that economic and social effects are not intended by themselves to require preparation of an environmental impact statement. When an environmental impact statement is prepared and economic or social and natural or physical environmental effects are interrelated, then the environmental impact statement will discuss all of these effects on the human environment.

4. The proposed action will not affect sites, structures, or objects listed in or eligible for listing in the National Register of Historic Places, nor would it likely cause any loss or destruction of significant scientific, cultural, or historic resources.

5. No significant cumulative effects were identified through this assessment. The EA discussed the cumulative effects on and off the District with those actions proposed by others.

Therefore, in light of the compelling science in support of the plan, and my review of the information contained in the supporting reference, I have determined that implementing the strategies contained in the habitat management plan for the Kulm Wetland Management District is not a major federal action that would significantly affect the quality of the human environment with the meaning of Section 102(2)(C) of NEPA.

The Finding of No Significant Impact (FONSI) and supporting NEPA analysis will be available to the public upon request. Copies of the EA are available for all affected agencies, private groups, and other interested parties. These documents are on file at the Kulm Wetland Management District, 1 First Street SW, Kulm, North Dakota, 58456 (telephone: 701-647-2866).

6/1/15

Will Meeks Date
Assistant Regional Director, Region 6
U.S. Fish and Wildlife Service
Lakewood, Colorado

Supporting Reference:

U.S. Fish and Wildlife Service. 2015. Kulm Wetland Management District Habitat Management Plan, Kulm, North Dakota. U.S. Department of the Interior, Fish and Wildlife Service, Mountain-Prairie Region.

Originating Person: Michael Erickson Date Reviewed: March 26, 2015

Telephone Number: 701-647-2866

I. **Service Program and Geographic Area or Station Name**:
Kulm Wetland Management District (WMD)

II. **Flexible Funding Program** (e.g. Joint Venture, etc) if applicable:
N/A

III. **Location**: Location of the project including County, State and TSR (township, section & range):
Dickey (DI), LaMoure (LA), Logan (LO), and McIntosh (MI) counties, North Dakota

IV. **Species/Critical Habitat**: List federally endangered, threatened, proposed, and candidate species or designated or proposed critical habitat that may occur within the action area.

Gray wolf (*Canis lupus*) – Endangered Species (DI, LA, LO, MI counties) – Occurrence of gray wolves within Kulm WMD is considered extremely rare as their presence typically coincides with large, intact temperate forests which do not occur in the District.

Piping plover (*Charadrius melodus*) – Threatened Species (LO, MI counties) – Critical habitat exists both in Logan (sites 1-4) and McIntosh (sites 1-2). Occupancy of nesting sites within Kulm WMD is highly dependent upon annually fluctuating water levels which directly affects habitat suitability for this species.

Rufa Red Knot (*Calidris canutus rufa*) – Threatened Species (LO, MI counties) – Rufa red knots are considered rare migrants within Kulm WMD. Their primary breeding area occurs in the northern portions of the arctic tundra in Canada.

Northern Long-eared Bat (*Myotis septentrionalis*) – Proposed Endangered Species (DI, LA, LO, MI counties) – Occurrence of northern long-eared bats is considered rare within Kulm WMD because they prefer to build colonies in forests.

Whooping crane (*Grus americana*) – Endangered Species (DI, LA, LO, MI counties) – Whooping cranes are considered rare migrants within Kulm WMD as they use wetlands and agricultural fields as migratory stopover areas en route to their summer and winter ranges.

Sprague’s pipit (*Anthus spragueii*) – Candidate Species (DI, LA, LO, MI counties) – Sprague pipit are considered a rare breeding bird within Kulm WMD. Their primary breeding area occurs in northwest North Dakota, northern Montana, and parts of Canada.

Project Description: Describe proposed project or action or, if referencing other documents, prepare an executive summary (attach additional pages as needed):

The Kulm Wetland Management District (District) was established in 1971 to conserve habitat for the benefit of waterfowl and other migratory birds. The District primarily protects wetland and grassland habitat in perpetuity on 126,519 acres of wetland easements and 61,029 acres of grassland easements. These conservation easements are purchased voluntarily from willing landowners to conserve important habitats to meet the breeding requirements for waterfowl and other migratory birds. The District also manages a total of 45,402 acres distributed over 201 individual fee-title waterfowl production areas (WPAs). The U.S. Fish and Wildlife Service (Service) purchased conservation easements and WPAs with funds generated primarily from the sale of federal Duck Stamps to protect habitat for waterfowl production. By administering these conservation lands, the District contributes to a much larger network of Districts, national wildlife refuges (Refuges) and conservation easements located in the Prairie Pothole Region (PPR) that collectively function to support migratory bird populations, ecosystem services, and the mission of the Refuge System.

In 2011, Kulm WMD began development of this habitat management plan (HMP). The purpose of the HMP is to provide a structured plan for consistently and effectively protecting, acquiring, enhancing, restoring, and managing wetland and grassland habitat for waterfowl and other migratory birds in the District. This HMP clearly identifies the habitat management goals, objectives and strategies necessary to conserve important habitats at landscape- and local-scales for the benefit of waterfowl and other migratory birds. This HMP will guide administration of conservation easements, habitat enhancement and restoration on private land and management activities on WPAs throughout the District by the Service until 2023 when the next Comprehensive Conservation Plan (CCP) is scheduled for completion. A CCP for North Dakota Wetland Management Districts (USFWS 2008a) and a North Dakota Limited-interest National Wildlife Refuges (USFWS 2006a) provide overarching authority and guidance regarding habitat goals, objectives, management, and protection in the District. The HMP will serve as the primary step-down management plan of the District CCPs and will provide managers with specific guidance to work within a landscape context to implement strategic habitat conservation.

The proposed action is to implement the HMP for the Kulm WMD. The scope of this HMP is to:

1. Identify important resources of management concern on Kulm WMD.

2. Develop goals and objectives that, once achieved, will ensure perpetuation of those resources.

3. Identify conservation strategies necessary to contribute to stated goals and objectives.

4. Identify appropriate inventory and monitoring strategies or focused research to measure progress toward achieving goals and objectives.

Further, the Service would implement the goals, objectives, and strategies included in this HMP using strategic habitat conservation to target resource allocation in landscapes where biological potential is the highest to support waterfowl carrying capacity, waterfowl production, and meet the habitat requirements of wetland- and grassland-dependent migratory birds. This includes protection and acquisition of conservation easements, enhancement and restoration of wetland and grassland on private land under the USFWS Partners for Fish and Wildlife Program, restoration of native mixed-grass prairie and reconstruction of non-native grasslands to diverse stands of native vegetation on fee-title WPAs, and management of plant community composition and structure on WPAs.

VI. **Determination of Effects:**

(A) Description of Effects: Describe the action(s) that may affect the species and critical habitats listed in item IV. Your rationale for the Section 7 determinations made below (B) should be fully described here.

Gray wolf (*Canis lupus*) Status: Endangered	No effect – Implementation of the goals, objectives, and strategies in this HMP would not directly or indirectly affect this species because the USFWS does not protect, manage, or enhance forested habitats in the District where this species could occur.
Piping plover (*Charadrius melodus*) Status: Threatened	No Effect – Implementation of the goals, objectives, and strategies in this HMP would not directly or indirectly affect this species because the USFWS conservation easement program does not target large, alkaline wetlands where a high proportion of piping plover nests occur in the District for permanent protection because they are difficult to drain. Further, management on WPAs would not impact this species because nesting piping plovers are subject to natural fluctuation of wetland conditions.
Rufa Red Knot (*Calidris canutus rufa*) Status: Threatened	No Effect - Implementation of the goals, objectives, and strategies in this HMP would not directly or indirectly affect this species because it is a rare migrant that breeds in the northern portions of the arctic in Canada.
Northern Long-eared Bat (*Myotis septentrionalis*) Status: Proposed Endangered	No Effect - Implementation of the goals, objectives, and strategies in this HMP would not directly or indirectly affect this species because the USFWS does not protect, manage, or enhance forested habitats in the District where this species would establish a colony.
Whooping crane (*Grus americana*) Status: Endangered	May Effect (beneficial) – Permanent protection of existing and future wetland habitat through the USFWS conservation easement program will secure stopover habitat for this species in Kulm WMD. The goals, objectives, and strategies implemented from this HMP provide a strategic habitat conservation framework to that is designed to conserve important habitats for wetland-dependent species.
Sprague's pipit (*Anthus spragueii*) Status: Candidate	May Effect (beneficial) – Permanent protection of existing and future grassland habitat through the USFWS conservation easement program will benefit the nesting requirements for this species in Kulm WMD. The goals, objectives, and strategies implemented from this HMP provide a strategic habitat conservation framework to that is designed to conserve important habitats for grassland-dependent species.

(B) Determination: Determine the anticipated effects of the proposed project on species and critical habitats listed in item IV. Check all applicable boxes and list the species (or attach a list) associated with each determination.

	Determination
No Effect: This determination is appropriate when the proposed project will not directly or indirectly affect (neither negatively nor beneficially) individuals of listed/proposed/candidate species or designated/proposed critical habitat of such species. **No concurrence from ESFO required.**	X
May Affect but Not Likely to Adversely Affect: This determination is appropriate when the proposed project is likely to cause insignificant, discountable, or wholly beneficial effects to individuals of listed species and/or designated critical habitat. **Concurrence from ESFO required.**	X
May Affect and Likely to Adversely Affect: This determination is appropriate when the proposed project is likely to adversely impact individuals of listed species and/or designated critical habitat. **Formal consultation with ESFO required.**	______
May affect but Not Likely to Jeopardize candidate or proposed species/critical habitat: This determination is appropriate when the proposed project may affect, but is not expected to jeopardize the continued existence of a species proposed for listing or a candidate species, or adversely modify an area proposed for designation as critical habitat. **Concurrence from ESFO optional.**	______
Likely to Jeopardize candidate or proposed species/critical habitat: This determination is appropriate when the proposed project is reasonably expected to jeopardize the continued existence of a species proposed for listing or a candidate species, or adversely modify an area proposed for designation as critical habitat. **Conferencing with ESFO required.**	______

Signature: Mike Gruber Date: 3-25-2015

Concurrence: [signature] Date: 5/1/2015

1.0 Introduction

This EA documents the purpose of and the issues, alternatives, and analysis associated with implementation of a HMP for the Kulm Wetland Management District (District).

The EA provides a comparison of two alternatives: (1) not implementing a habitat management plan for the District (no action) and (2) implementation of the habitat management plan for the District (proposed action). This represents the full range of alternatives and evaluates potential effects on resources protected by the District and associated cultural, socioeconomic, and aesthetic resources that may be affected during implementation of the habitat management plan.

1.1 Kulm Wetland Management District

The District was established in 1971 to conserve habitat for the benefit of waterfowl and other migratory birds. The District primarily protects wetland and grassland habitat in perpetuity on 126,519 acres of wetland easements and 61,029 acres of grassland easements. These conservation easements are purchased voluntarily from willing landowners to conserve important habitats to meet the breeding requirements for waterfowl and other migratory birds. The District also manages a total of 45,402 acres distributed over 201 individual fee-title waterfowl production areas (WPAs). The Service purchased conservation easements and WPAs with funds generated primarily from the sale of federal Duck Stamps to provide habitat for waterfowl production. By administering these conservation lands, the District contributes to a much larger network of Districts and national wildlife refuges (Refuges) that collectively function to support migratory bird populations, ecosystem services, and the mission of the National Wildlife Refuge System in the PPR.

1.2 Background

The HMP is a step-down management plan of the North Dakota Wetland Management Districts CCP that was approved in 2008 (USFWS 2008a). The intent of the HMP is to provide additional details regarding specific strategies and implementation schedules for meeting goals and objectives set forth in the CCP until 2023 when the next CCP is scheduled to be completed. In addition, an HMP provides an opportunity to evaluate the applicability of goals and objectives previously established in the CCP and determine if changes are required based on available data and other information. HMPs are dynamic documents that are modified using an adaptive management process that is based on monitoring progress toward achieving goals and objectives. In addition, the HMP is evaluated when a district considers revisions to the CCP (at least every 15 years) or at 5-year intervals using a peer-review process (USFWS 2002).

Section 4(a) and 4(b) of the Improvement Act directs the Secretary, when administering the National Wildlife Refuge System, to “ensure that the biological integrity, diversity, and health of the System are maintained for the benefit of present and future generations of Americans…” The Improvement Act clearly mandates the use of sound professional judgment when determining the relationships between Refuge purposes and biological integrity, diversity, and environmental health (BIDEH). Further, the BIDEH policy (USFWS 2001a) clearly emphasizes management that restores historical ecosystem processes and functions as they are directly related to biological integrity and health. Collectively, these mandates instruct Refuge Managers to evaluate the potential to restore BIDEH when critical elements have been lost or severely degraded. The District HMP plays a key role in this process by strategically protecting important wetland and grassland habitat for waterfowl and other migratory bird populations.

1.3 Proposed Action

The Service began development of this HMP in 2011. The proposed action is to implement the HMP for the District using the principles of strategic habitat conservation (SHC) and adaptive management. The scope of this HMP is to:

1. Identify important resources of management concern on the District.
2. Develop goals and objectives that, once achieved, will ensure perpetuation of those resources.
3. Identify conservation strategies necessary to attain stated goals and objectives.
4. Identify appropriate monitoring strategies to measure progress toward achieving goals and objectives.

Further, the Service would implement the goals, objectives, and strategies included in this HMP using SHC to target resource allocation in landscapes where biological potential is the highest to support waterfowl carrying capacity, waterfowl production, and meet the habitat requirements of wetland- and grassland-dependent migratory birds. This includes protection and acquisition of conservation easements, enhancement and restoration of wetland and grassland on private lands under the USFWS Partners for Fish and Wildlife Program, restoration of native mixed-grass prairie and reconstruction of non-native grasslands to diverse native stands on fee-title WPAs, and management of plant community composition and structure on fee-title WPAs.

1.4 Decisions to Be Made

Based on the analysis provided in this final EA, the Service will make two decisions:

1. Determine whether the Service should implement a habitat management plan for Kulm Wetland Management District, in accordance with its planning policy.

2. If yes, determine whether the selected alternative will have a significant impact on the quality of the human environment. This decision is required by the NEPA. If the quality of the human environment would not be affected, a "finding of no significant impact" will be signed and will be made available to the public. If the preferred alternative would have a significant impact, an environmental impact statement will be prepared to further address those impacts.

1.5 Relation to Statutes, Regulations, and Other Plans

The District was established in 1971 as part of the Small Wetlands Acquisition Program under the authority of the Migratory Bird Hunting and Conservation Stamp Act of 1934 ("Duck Stamp Act") as amended by Public Law 85-585 in August 1958. This legislation allowed for the acquisition of WPAs and conservation easements for waterfowl production. The purposes of the District were established by the following legal authorities:

3. 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."

4. Migratory Bird Conservation Act 16 USC 715(d) – "For any other management purposes, for migratory birds."

A December 2006 memorandum from Region 6 Assistant Regional Director Richard A. Coleman further reaffirmed the purpose of all Region 6 Districts – "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."

Conservation Easements

The legal authority for the Service to acquire conservation easements to protect grasslands and wetlands is granted under the Migratory Bird Hunting Stamp Act 16 USC 718d(c), the Fish and Wildlife Act of 1956, (16 U.S.C. 742a-742j), the Emergency Wetlands Resources Act of 1986, (16 U.S.C. 3901), the Land and Water Conservation Fund Act [16 U.S.C. 4601-9(a)(1)], and the North American Wetlands Conservation Act (16 U.S.C. 4401 - 4412).

Farmers Home Administration (FmHA) conservation easements in the District were not acquired as part of the Small Wetlands Acquisition Program. FmHA easements were established "for conservation purposes" by the U.S. Farm Service Agency under the Consolidated Farm and Rural Act of 1981 and 1985 (7 U.S.C. 331 and 335), Executive Orders 11990 and 11988, and Section 1314 of the 1985 Food Security Act.

Waterfowl Production Areas

Waterfowl production areas are public lands bought by the federal government for increasing the production of migratory birds, especially waterfowl. These lands are owned in fee-title whereby the federal government holds ownership of the land on behalf of the American public. Money to buy WPAs generally comes from the public purchase of federal Duck Stamps. All WPAs are administered by Service staff within an administrative boundary that defines the geographical extent of the District. WPAs are open to the public for hunting, fishing, bird watching, trapping, hiking and most other non-motorized and non-commercial outdoor recreation.

Wildlife Development Areas

Wildlife Development Area was purchased in fee-title by the Bureau of Reclamation as part of North Dakota's Garrison Diversion Unit. WDAs were transferred to the Service through a memorandum of agreement between the Service, Bureau of Reclamation and the North Dakota Game and Fish Department. The District manages the Pilgrims Rest WDA, a 640 acre unit, similar to WPAs to benefit waterfowl and other migratory birds.

Limited-interest National Wildlife Refuges

The District has three limited-interest easement refuges that were established in 1939 “as a refuge and breeding ground for migratory birds and other wildlife” by Executive Orders 8162 ([Bone Hill NWR; 640 acres] and [Maple River NWR; 712 acres]) and 8117 (Dakota Lake NWR; 2,799 acres).

Additional relevant statutes, regulations, and/or plans follow:

National Environmental Policy Act
NEPA (42 USC 4321-4370f) requires federal agencies to examine the environmental impact of their actions, incorporate environmental information, and utilize public participation, as appropriate, in the planning and implementation of their actions. NEPA compliance is required only when a federal agency takes an action.

- The HMP is a step-down management plan from the North Dakota Wetland Management Districts CCP (USFWS 2008a).

National Historic Preservation Act of 1966, as Amended

Section 106 of the National Historic Preservation Act (NHPA) requires federal agencies to assess the effects of an undertaking on historical and cultural resource sites. This is accomplished by inventorying proposed disturbance areas or the area of potential effect, evaluating site importance and eligibility to the NHPA, assessing the effect of the undertaking on NHPA-eligible sites, and consulting with appropriate historic preservation agencies. Compliance with Section 106 of NHPA was followed for the disturbance activities described in this EA.

Archaeological Resources Protection Act of 1979

The Archaeological Resources Protection Act of 1979 (16 USC 470aa-470mm) and amendments provide for the protection of archaeological resources on public and Native American lands and provide for exchange of information between governmental entities and academic or private archaeological researchers. An archaeological resource under this act is defined as material remains of past human life or activities that are of archaeological interest and includes but is not limited to pottery, basketry, bottles, weapons, tools, structures, rock paintings or carvings, intaglios, graves, and human skeletal materials.

Migratory Bird Treaty Act and Migratory Bird Conservation Act

The MBTA (16 USC 703-712) implements various treaties between the United States and other nations of the MBTA, and provides for the protection of migratory birds and specifies penalties for harming or unlawfully killing migratory birds.

Endangered Species Act

The Endangered Species Act (16 USC 1531-1544) provides for the protection of endangered and threatened species and the habitats upon which they depend. Section 7 of the act requires federal agencies to consult with the Secretary of the Interior or the Secretary of Commerce in cases where the agencies’ action may affect a listed species, to ensure that actions they authorize, fund, or carry out are not likely to jeopardize the continued existence of threatened or endangered species or result in the destruction or adverse modification of critical habitat for these species. Where federally listed threatened or endangered species occur in the District, the Service applies the management goals and strategies outlined in the following species recovery plans:

- Gray wolf (*Canis lupus*) – Endangered Species (DI, LA, LO, MI counties) – Occurrence of gray wolves within Kulm WMD is considered extremely rare as their presence typically coincides with large, intact temperate forests which do not occur in the District.

- Piping plover (*Charadrius melodus*) – Threatened Species (LO, MI counties) – Critical habitat exists both in Logan (sites 1-4) and McIntosh (sites 1-2). Occupancy of nesting sites within Kulm WMD is highly dependent upon annually fluctuating water levels which directly affects habitat suitability for this species.

- Rufa Red Knot (*Calidris canutus rufa*) – Threatened Species (LO, MI counties) – Rufa red knots are considered rare migrants within Kulm WMD. Their primary breeding area occurs in the northern portions of the arctic tundra in Canada.

- Northern Long-eared Bat (*Myotis septentrionalis*) – Proposed Endangered Species (DI, LA, LO, MI counties) – Occurrence of northern long-eared bats is considered rare within Kulm WMD because they prefer to build colonies in forests.

- Whooping crane (*Grus americana*) – Endangered Species (DI, LA, LO, MI counties) – Whooping cranes are considered rare migrants within Kulm WMD as they use wetlands and agricultural fields as migratory stopover areas en route to their summer and winter ranges.

- Sprague's pipit (*Anthus spragueii*) – Candidate Species (DI, LA, LO, MI counties) – Sprague pipit are considered a rare breeding bird within Kulm WMD. Their primary breeding area occurs in northwest North Dakota, northern Montana, and parts of Canada.

Prairie Pothole Joint Venture Implementation Plan

The PPJV was established under the framework of the NAWMP. The PPJV Implementation Plan provides a conservation framework for all migratory birds in the Prairie Pothole Region (Ringelman et al. 2005). The plan incorporates stepped-down objectives for waterfowl, waterbirds, shorebirds and landbirds with conservation measures that focus on sustaining migratory bird populations at objective levels through targeted wetland and grassland protection, restoration and enhancement programs.

Land Protection Plan for the Dakota Grasslands Conservation Area

The majority of the District is included in the proposed DGCA which aims to protect wetlands and grasslands within the mixed-grass prairie ecosystem of North Dakota and South Dakota. The purpose of the DGCA is to provide for the long-term viability of breeding waterfowl populations through the conservation of existing habitats while considering the needs of other migratory birds, threatened and endangered species, and other wildlife. The DGCA follows the goals and objectives outlined in the PPJV plan and aims to conserve all migratory birds through the permanent protection of wetland and grassland habitat through conservation easements purchased from willing sellers (USFWS 2011b). If implemented, the DGCA would be to conserve 240,000 acres of wetlands and 1.7 million acres of grassland. At current acquisition rates, the goal for the proposed DGCA would be achieved within 30 years.

Comprehensive Conservation Plans

The North Dakota Wetland Management District CCPs (USFWS 2006a, USFWS 2008a) provide broad guidance on the stewardship of District lands and related management activities for a period of 15 years. The CCPs identified the role that the District has in supporting the NWRS mission and specific goals and objectives were developed to provide a framework for managing District resources. This HMP is a step-down management plan from the District CCPs that will integrate and refine the CCP goals and objectives and provide specific management strategies that are consistent with purposes of the District and the overall mission of the NWRS.

2.0 Description of Alternatives

This section describes the two alternatives identified for this project:

- no-action alternative
- proposed action, giving the Service the authority to implement a habitat management plan for Kulm Wetland Management District

These alternatives were developed according to NEPA §102(2)(E) requirements to "study, develop, and describe appropriate alternatives to recommend courses of action in any proposal which involves unresolved conflicts concerning alternatives uses of available resources." The alternatives consider the effects of planned habitat management activities within the District.

In addition, alternatives that were eliminated from detailed study are briefly discussed.

2.1 Alternative A – (no action)

The Service would continue with its management of the District in accordance with the goals and objectives outlined in the North Dakota Wetland Management Districts CCP (USFWS 2008a).

2.2 Alternative B – (proposed action)

The Service would implement the goals, objectives, and strategies included in this HMP using strategic habitat conservation and adaptive management techniques to target resource allocation in landscapes where biological potential is the highest to support waterfowl carrying capacity, waterfowl production, and meet the habitat requirements of wetland- and grassland-dependent migratory birds. This includes protection and acquisition of conservation easements, enhancement and restoration of wetland and grassland on private lands under the USFWS Partners for Fish and Wildlife Program, restoration of native mixed-grass prairie and reconstruction of non-native grasslands to diverse native stands on fee-title WPAs, and management of plant community composition and structure on fee-title WPAs.

2.3 Alternatives Considered but Eliminated from Further Analysis

The HMP is a step-down management plan. There was little controversy associated with the direction outlined in the North Dakota Wetland Management Districts CCP (USFWS 2008a) and there were no additional alternatives considered in this analysis.

3.0 Affected Environment

Please see a discussion of the resources and affected environment in Chapters 2 and 3 of the HMP in this volume.

4.0 Environmental Consequences

For alternatives A and B described in section 2, the following narrative documents the analysis of any significant environmental effects expected to occur from implementing each of the alternatives. For the purposes of this EA, the Service analyzed the potential effects of implementing each alternative on all resources protected by the District, including the following:

4.1 Effects on the Physical Environment

The estimated effects of each alternative on mineral, soil, and water resources, and on the Service's ability to address climate change, are described below.

Alternative A
The land surface of District has been shaped largely by glacial processes which formed the Missouri Coteau Slope, Missouri Coteau, and Glaciated Plains physiographic regions. Historically, this ecosystem was characterized by a mosaic of mixed-grass prairie and wetlands that remained largely undisturbed until the onset of European settlement and the initial conversion of native prairie for low-intensity agriculture during the 1880's (Severson and Hull Sieg 2006). However, extensive conversion of wetlands (Oslund et al. 2010, Doherty et al. 2013, Johnston 2013, Dahl 2014) and grasslands (Stephens et al. 2008, Fargione et al. 2009, Rashford et al. 2011, Doherty et al. 2013, Wright and Wimberly 2013, Johnston 2014) for agricultural use has resulted in vast losses in habitat that migratory birds rely on for nesting. Under alternative A, the Service would continue with its management of the District in accordance with the goals and objectives outlined in its CCP and in accordance with relevant policies.

Alternative B
Implementation of the HMP includes several steps that are considered beneficial to soil and water resources (wetlands) occurring in the District. Protection of wetland and grassland habitats through the USFWS easement program contributes to maintaining important ecological services and restoration and enhancement of wetlands and grasslands under the USFWS Partners for Fish and Wildlife Program and restoration of native plant communities on fee-title WPAs will have beneficial effects on soils and water quality on the District. In addition, the combination of maintaining intact landscapes under these USFWS programs and restoring native plant communities will support the future resiliency of the mixed-grass prairie ecosystem to potential effects from climate change to benefit wildlife populations within the District.

4.2 Effects on the Biological Environment

This section describes the likely effects of the project on the selected priority species and their habitats.

Alternative A

The Service administers a network of conservation easements and fee-title WPAs to benefit waterfowl and other migratory birds during their breeding period. Under alternative A, the Service would continue to implement conservation delivery within the District in accordance with the goals and objectives outlined in the North Dakota Wetland Management District CCP (USFWS 2008a). The CCP provides broad conservation strategies for wetland and grassland easement acquisition, restoration of native prairie, reconstruction of former cropland using native grasses and forbs, and limited application of the Partners for Fish and Wildlife Program to enhance and restore habitat on private lands. Under alternative A, the Service would not implement the strategic habitat conservation based conservation design described in the HMP. Although significant conservation gains have been attained under the CCP, the more-refined conservation approach outlined in the HMP provides a solid foundation for resource allocation within specific landscapes that would increase benefits to waterfowl and other migratory birds.

Under alternative A, the Service will continue to manage and restore grasslands on fee-title WPAs, but at lower levels than identified in the HMP. The Service also would continue to focus reconstruction of seeded introduced grasslands (grasslands on former cropland) broadly across all WPAs under this alternative.

The HMP fully describes the importance of strategically allocating resources in important landscapes to protect important breeding habitats for waterfowl and other migratory birds. Under alternative A, the Service would not explicitly tie goals, objectives, and strategies to population objectives identified in the HMP that are designed to contribute to the stability of waterfowl populations in the Prairie Pothole Region.

Alternative B

This HMP represents the biological planning and conservation design phases of SHC that identified the potential of the landscape to contribute to the carrying capacity and production of waterfowl and other migratory birds, while protecting functional portions of the mixed-grass prairie ecosystem. Staff selected a set of species considered as priority resources of concern (Table 3-1) to guide conservation delivery within Kulm WMD that is primarily focused on waterfowl conservation, but has significant benefits to other migratory bird populations.

The proposed action would implement an SHC framework to achieve the highest landscape-scale biological outcomes for the selected resources of concern through focused conservation delivery. To increase biological return under this approach, the Service would use a landscape classification model (Figure 4-1 of HMP) to implement specific treatments that are tied to the following population objectives:

1) Target wetland conservation in landscapes that support ≥25 breeding duck pairs/mi^2 to maximize carrying capacity levels for breeding waterfowl (*Anas* spp.) and contribute to stable populations within the Prairie Pothole Region.

2) Target grassland conservation in landscapes that support ≥60 breeding duck pairs/mi^2 (*Anas* spp.) and nest success levels above population maintenance levels (≥15–20% nest success) (Cowardin et al. 1985) to maximize waterfowl production and contribute to stable populations within the Prairie Pothole Region;

3) Increase habitat protection in landscapes that support high brood occupancy rates (Walker et al. 2013) characterized by high densities of small- to mid-size wetland basins and a high proportion of grassland within a 4 mi^2 area to maintain waterfowl recruitment potential within the Prairie Pothole Region;

4) Target habitat conservation in landscapes that support high densities of priority wetland- and grassland-dependent migratory bird species identified in this HMP.

By integrating population goals with conservation treatments under the SHC conservation design, the District aims to improve the efficiency of conservation delivery at multiple scales (landscape to local) to meet the requirements of resources of concern and the establishing purposes of the District. Furthermore, linking each conservation treatment to individual goals, objectives, and strategies provided a highly detailed approach for integrated conservation of wetland and grassland easements, restoration and enhancement of private lands under the Partners for Fish and Wildlife Service Program, and management of fee-title WPAs as described in this HMP. This comprehensive approach to conservation is based on the potential contribution of Kulm WMD to migratory bird populations within the Prairie Pothole Region. This SHC conservation design will allow staff to work more efficiently given limited availability of resources while improving the transparency and accountability of our actions.

Lastly, implementation of the HMP would benefit piping plover, whooping crane, and Sprague's pipit to the extent possible within the District by securing important wetland and grassland habitats on conservation easements in perpetuity.

4.3 Effects on Cultural Resources

The estimated effects of each alternative on cultural resources are described below.

Alternative A
No effect. Under alternative A, the Service would continue with its management of the District in accordance with the goals and objectives outlined in its CCP (USFWS 2008a) and in accordance with the National Historic Preservation Act of 1966 and Archaeological Resources Protection Act of 1979.

Alternative B
No effect. Under alternative B, the Service would implement the HMP in accordance with the goals and objectives outlined in its CCP (USFWS 2008a) and in accordance with the National Historic Preservation Act of 1966 and Archaeological Resources Protection Act of 1979. The HMP does not include activities that will impact cultural or historic sites on lands administered by the District.

4.6 Effects on Socioeconomic Environment

This section describes the estimated effects of the alternatives on land use, ecosystem services, land ownership, and the regional economy.

Alternative A
No effect. Similar to most of eastern North Dakota, the District is located in a rural agriculturally based region with a low human population density that generally does not exceed five people per square mile (U.S. Census Bureau 2010). Under alternative A, the Service would continue with its management of the District in accordance with the goals and objectives outlined in its CCP with little to no effect on the local economy.

Alternative B
Implementation of the HMP provides the opportunity to clearly identify habitat conservation goals and objectives for the District. Implementation of alternative B will not only provide increased habitat quality for wildlife, but will enhance opportunities for the public to pursue wildlife-dependent recreation on the District. These increases are important to neighboring rural communities, but they are not a significant impact to the regional economy of south-central North Dakota.

4.7 Irreversible and Irretrievable Commitment of Resources

Any commitments of resources that may be irreversible or irretrievable because of carrying out alternatives A or B are described below.

Alternative A
There would be no additional commitment of resources by the Service if alternative A were selected. The Service could still exercise its existing authority to manage the District in accordance with the CCP (USFWS 2008a).

Alternative B
Implementation of the HMP would not, of itself, constitute an irreversible or irretrievable commitment of resources. The implementation of habitat management activities and appropriate monitoring of these actions would represent a minor increase in overall Service administrative costs to the District.

4.8 Cumulative Impacts

As defined by NEPA regulations, a cumulative impact on the environment "results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes such other actions" (40 CFR 1508.7). The following describes the past, present, and reasonably foreseeable actions related to the proposed HMP. A discussion follows regarding the cumulative impacts of these actions in combination with the actions of alternatives A and B.

Past, present, and reasonably foreseeable future actions
The Service completed its CCP in 2008 (USFWS 2008a) which provided broad guidance on the stewardship of District lands and related management activities for a period of 15 years. In addition, the Service will release an Inventory and Monitoring Plan that steps-down from the HMP that will inform the adaptive management process based on the contribution of the District to the selected resources of concern.

Alternative A
Under alternative A, there would be no cumulative impacts on the environment since the Service would not undertake any of the habitat conservation activities included in the HMP.

Alternative B
This HMP provides a strategic plan for consistently and effectively protecting, acquiring, enhancing, restoring, and managing wetland and grassland habitat for the resources of concern on the District. Conservation delivery at the scale of the District is often incorrectly considered as independent of those occurring in the mixed-grass prairie ecosystem. Instead, these actions contribute to a much larger

network of districts and national wildlife refuges located in the Prairie Pothole Region that collectively function to support migratory bird populations, ecosystem services, and the mission of the National Wildlife Refuge System. The goals, objectives, and strategies outlined in the HMP do have a positive impact on waterfowl and other migratory bird populations at larger scales, but the cumulative impacts of these actions are not considered significant.

5.0 Coordination and Environmental Review

This section describes how the Service coordinated with others and conducted environmental reviews of various aspects of the project proposal and analysis. Additional coordination and review would be needed to carry out the proposed action, if selected.

5.1 Agency Coordination

The Service has discussed the HMP with the State of North Dakota (North Dakota Game and Fish Department) and non-governmental organizations including Ducks Unlimited and Delta Waterfowl through a series of meetings and correspondence.

The Service coordinated internally in the development of this EA. District staff conducted the analysis and prepared this document, as well as the HMP. An intra-service Endangered Species Act section 7 was conducted to evaluate the potential finding of “May affect but not likely to affect” ESA protected or candidate species. Staff from the Region 6 HAPET and I&M Initiative also assisted with the development of resources of concern and specific habitat management activities.

5.2 National Environmental Policy Act

The Service conducted this environmental analysis under the authority of and in compliance with NEPA, which requires an evaluation of reasonable alternatives that will meet stated objectives, and an assessment of the possible effects on the natural and human environment.

5.3 Environmental Assessment

This EA will be the basis for determining whether the implementation of the proposed action would constitute a major Federal action significantly affecting the quality of the natural and human environments. NEPA planning for this EA involved other government agencies and the public in the identification of issues and alternatives for the proposed project.

5.4 Distribution and Availability

The Service will make the EA (with the associated HMP in the same volume) available to the project mailing list, which includes federal and state agencies; nongovernmental organizations; and interested individuals. Copies can be requested from the District office in Kulm, North Dakota.

6.0 Public Comments

On November 3, 2014, the District issued a public scoping notice which announced the release of a draft HMP and associated EA for 30 days of public comment to the public in the District and through the station’s website. The station received informal comments from several organizations and agencies which were incorporated into the document. However, no public comments were received on the document.

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Appendix C

List of Comprehensive Conservation Plan Goals and Objectives

2008 North Dakota Wetland Management District Comprehensive Conservation Plan

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The following list is a compilation of all of the Goals and Objectives described in the CCP for North Dakota Wetland Management Districts that pertain to Kulm Wetland Management District. They are listed here primarily for reference, to give the reader a sense of the broad conservation guidance described in the CCP. The majority of these goals and objectives step down to the HMP management goals and objectives described in this plan. The difference is that the HMP goals and objectives will tie the habitat needs of the Resources of Concern at landscape- and local-scales.

A. Habitat and Wildlife Goal:

1. 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 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.

B. Habitat and Wildlife Objectives:

1. 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.

2. Wetland 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.

3. Uplands in Easements – Objective 1 – Over a 15-year period, secure 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.

4. Uplands in Easements – Objective 2 – Over a 15-year period, protect all grassland areas under perpetual Service easement according to the provisions of the conservation easement contracts.

5. Developed Wetlands in WPAs – Objective 1 – Provide between 30% and 70% coverage of emergent vegetation (over water) on average, over 11 of 15 years.

6. 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.

7. Undeveloped Wetlands in WPAs – Objective 1 – 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.

8. 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.

9. 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.

10. 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).

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

12. Invasive Plants – Objective 2 – Within 5 years of CCP approval, establish a baseline inventory of all invasive plants, including noxious weeds, on Service lands.

13. 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.

14. Old Cropland in WPAs – Objective 1 – In an attempt to restore grasslands that resemble pre-settlement conditions, over the next 15 years reseed at least 10,000 acres to native herbaceous mixtures in priority WPAs that, 10 years post establishment, will be comprised of >60% native grasses and forbs.

15. Dense Nesting Cover in WPAs – Objective 1 – 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.

16. Invasive and Planted Woody Vegetation in WPAs – Objective 1 – 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.

17. Threatened and Endangered Species, Whooping Crane – Objective 1 – 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.

18. Predator Management in WPAs – Objective 1 – 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.

C. Monitoring and Research Goal:

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

D. Monitoring and Research Objectives:

1. 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.

2. Monitoring and Research – Objective 2 – Within 2 years of gathering baseline floristic composition data, each district will complete a habitat management plan.

3. Monitoring and Research – Objective 3 – Within 1 year of CCP approval, identify and prioritize research needs required to meet the goals and objectives.

4. 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 integrates needs identified in Monitoring and Research Objective 3, to increase knowledge about effectiveness of techniques to achieve habitat and wildlife goals and objectives.

E. Cultural Resources Goal:

1. 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.

F. Cultural Resources Objectives:

1. 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.

2. 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 resources staff early in the planning process and, whenever possible, completing the review without delay to the project.

G. Visitor Services Goal:

1. 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.

H. Visitor Services Objectives:

1. Hunting – Objective 1 – 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.

2. Fishing – Objective 1 – Throughout the life of this plan, provide access to open-water and ice-fishing opportunities at the districts.

3. Wildlife Observation and Photography – Objective 1 – Throughout the life of the CCP, provide opportunities for wildlife observation and photography and increase awareness of observation and photography opportunities.

4. Environmental Education and Interpretation – Objective 1 – 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.

5. Visitor Services Facilities – Objective 1 – Identify locations for other visitor contact stations at the districts within 3 years of CCP approval.

6. Trapping – Objective 1 – Throughout the life of this plan, provide trapping opportunities at the districts at the current level.

I. Partnerships Goal:

1. 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.

J. Partnerships Objective:

1. Partnerships – Objective 1 – 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.

K. Operations Goal:

1. Effectively employ staff, partnerships, and volunteers and secure adequate funding in support of the National Wildlife Refuge System's mission.

L. Operations Objective:

1. Staff and Volunteers – Objective 1 – 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.

Appendix D

2012 Landscape Classification Index for Waterfowl Production Areas

Kulm Wetland Management District – Habitat Management Plan
Dickey, LaMoure, Logan, and McIntosh counties, North Dakota

Waterfowl Production Area (WPA)	County	Acres	Duck Pairs	Grassland Category	2012 Landscape Class
Opp	Logan	80.8	145	>60	1A
Werth	Logan/McIntosh	786.7	139	>60	1A
Lazy M	Dickey	1756.7	139	>60	1A
Hoffman	McIntosh	159.6	138	>60	1A
Karius	Logan	76.3	135	>60	1A
Bollinger	McIntosh	120.7	130	>60	1A
Zigenhagel	McIntosh	591.1	129	>60	1A
North Muonio	Logan	64.5	128	>60	1A
Grabau Estate	Logan	40.0	127	>60	1A
Buchholz	Logan	100.4	126	>60	1A
Lehr	Logan	67.2	122	>60	1A
Baltzer	Logan	781.4	118	>60	1A
Ulmer	McIntosh	49.6	117	>60	1A
LSB	Dickey	272.0	115	>60	1A
Wic	McIntosh	222.9	114	>60	1A
Jones	McIntosh	79.9	113	>60	1A
North Brinkman	Logan	309.9	113	>60	1A
Mundt Lake	Logan	673.0	113	>60	1A
Knecht	Logan	484.4	111	>60	1A
Knopp	Dickey	119.6	111	>60	1A
Moldenhauer	Logan	599.7	111	>60	1A
Zahn	Dickey	64.9	109	>60	1A
Rutschke	Dickey	202.9	109	>60	1A
Brunner	Logan	154.5	109	>60	1A
Kautz	Logan	802.2	108	>60	1A
Kauk	Logan	145.4	108	>60	1A
Kappes	McIntosh	212.3	107	>60	1A
Rienke	Dickey	286.6	107	>60	1A
Erlenbusch	Dickey	386.8	107	>60	1A
Kempf	McIntosh	648.3	106	>60	1A
Sperling	Logan	81.2	106	>60	1A

Waterfowl Production Area (WPA)	County	Acres	Duck Pairs	Grassland Category	2012 Landscape Class
Larson	Logan	1380.3	105	>60	1A
Dalke	McIntosh	247.8	103	>60	1A
Schopp	McIntosh	158.8	103	>60	1A
Heinrich	McIntosh	89.3	102	>60	1A
Geiszler	McIntosh	581.5	101	>60	1A
Jenner	McIntosh	310.6	99	>60	1A
Sukut	Logan	200.4	97	>60	1A
Coldwater	McIntosh	107.6	96	>60	1A
Wigeon	McIntosh	239.7	95	>60	1A
Camp Lake	McIntosh	40.3	95	>60	1A
Roesler Lake	Logan	1214.3	91	>60	1A
Lux	McIntosh	123.2	90	>60	1A
Ernst	Dickey	642.0	88	>60	1A
Ehley	McIntosh	139.3	86	>60	1A
North Rutschke	Dickey	20.1	86	>60	1A
Betsch	McIntosh	56.8	86	>60	1A
McIntosh PDL 1b	McIntosh	14.5	85	>60	1A
Brinkman	McIntosh	1243.9	80	>60	1A
West Schneider	McIntosh	159.5	79	>60	1A
Fandrich	Logan	39.3	77	>60	1A
Marzolf	McIntosh	160.1	76	>60	1A
Krueger	Logan	480.8	75	>60	1A
Eszlinger	McIntosh	514.9	74	>60	1A
Mcintosh PDL 1c	McIntosh	0.0	72	>60	1A
Boschee	Logan	473.6	72	>60	1A
Barr	Logan	313.3	71	>60	1A
Todd	Lamoure	160.0	71	>60	1A
Kisselberry	McIntosh	649.1	65	>60	1A
McIntosh PDL 1	McIntosh	0.2	60	>60	1A
Mcintosh PDL 1a	McIntosh	0.3	60	>60	1A
Pintail	McIntosh	79.2	156	>40	1B
Ruff	McIntosh	160.8	151	>40	1B
Kosanke	Logan	143.3	146	>40	1B
George	McIntosh	130.4	141	>40	1B
Kroll	Logan	337.7	140	>40	1B
Miller	Logan	160.6	136	>40	1B
Hehn	Logan	152.6	135	>40	1B
Mayer	Logan	316.8	133	>40	1B
Logan PDL 1b	Logan	40.1	130	>40	1B
Hochhalter	Logan	88.8	125	>40	1B
West Kusler	Logan	40.0	124	>40	1B

Waterfowl Production Area (WPA)	County	Acres	Duck Pairs	Grassland Category	2012 Landscape Class
Dewald	McIntosh	160.6	123	>40	1B
Klein	McIntosh	299.7	119	>40	1B
Mund	McIntosh	591.6	117	>40	1B
Maiss	McIntosh	50.0	117	>40	1B
Sarkinen	Logan	86.6	117	>40	1B
North Nitschke	Logan	80.4	115	>40	1B
North Wentz	Logan	19.9	115	>40	1B
Grabau	Logan	8.0	111	>40	1B
Graham	Dickey	304.8	110	>40	1B
West Wishek	McIntosh/Dickey	269.0	109	>40	1B
Wishek	Dickey	246.8	109	>40	1B
Muonio	Logan	280.2	108	>40	1B
McIntosh PDL 1g	McIntosh	39.3	107	>40	1B
West Dewald	McIntosh	103.7	106	>40	1B
Ketterling	Logan	82.5	106	>40	1B
Hille	Dickey	620.7	105	>40	1B
McIntosh PDL 1f	McIntosh	120.4	102	>40	1B
Kvigne	Dickey	81.9	101	>40	1B
Schmidt	Logan	146.3	99	>40	1B
Klettke	Dickey	226.6	99	>40	1B
Schneider	Dickey	157.6	96	>40	1B
Lepp	Logan	31.3	93	>40	1B
Quashnick	Dickey	40.0	93	>40	1B
Bertsch	McIntosh	320.1	93	>40	1B
Young	Dickey	322.3	93	>40	1B
Logan PDL 1g	Logan	79.8	91	>40	1B
Haberman	Lamoure	81.3	91	>40	1B
Stone	McIntosh	49.3	90	>40	1B
Hildebrand	McIntosh	161.3	90	>40	1B
Logan PDL 1e	Logan	80.2	90	>40	1B
Clay	Dickey	39.6	89	>40	1B
Schumacher	McIntosh	55.2	89	>40	1B
Enger	Dickey	327.8	88	>40	1B
Brummond	Dickey	64.7	88	>40	1B
Weisz	McIntosh	277.9	88	>40	1B
Logan PDL 1f	Logan	162.9	88	>40	1B
Bender	McIntosh	424.2	88	>40	1B
Logan PDL 1d	Logan	79.0	87	>40	1B
Sackmann	McIntosh	249.0	87	>40	1B

Waterfowl Production Area (WPA)	County	Acres	Duck Pairs	Grassland Category	2012 Landscape Class
Goehring	McIntosh	19.6	86	>40	1B
Dallman	Logan	48.3	85	>40	1B
Edna	McIntosh	26.7	84	>40	1B
Klipfel	McIntosh	180.7	83	>40	1B
Logan PDL 1a	Logan	119.2	82	>40	1B
Neu	McIntosh	127.5	79	>40	1B
Fey	McIntosh	180.6	78	>40	1B
Pfeifle	McIntosh	344.5	78	>40	1B
Iszler	Logan	10.7	78	>40	1B
Salzer	McIntosh	201.2	77	>40	1B
Spitzer	Logan	182.8	77	>40	1B
Koepplin	McIntosh	294.0	77	>40	1B
Green Lake	McIntosh	32.8	76	>40	1B
Ham	McIntosh	61.0	75	>40	1B
Nitschke	McIntosh	237.7	74	>40	1B
Henne	Lamoure	39.7	71	>40	1B
Malm	Lamoure	322.5	71	>40	1B
Lippert	McIntosh	19.5	70	>40	1B
McIntosh PDL 1e	McIntosh	39.6	70	>40	1B
North Henne	Lamoure	23.2	69	>40	1B
Kessel	McIntosh	162.1	69	>40	1B
Denning	McIntosh	808.6	68	>40	1B
Thurn	McIntosh	321.9	50	>60	2A
Rothfusz	McIntosh	79.8	51	>40	2B
Meidinger	McIntosh	329.8	44	>40	2B
Wentz	Logan	681.5	146	<40	4A
Provost	Dickey	36.0	131	<40	4A
Kusler	Logan	55.3	126	<40	4A
Liechty	Lamoure	81.0	120	<40	4A
Vasvick	Dickey	33.5	115	<40	4A
Koskiniemi	Logan	221.2	112	<40	4A
West Holmes	Dickey	24.0	111	<40	4A
Burkhardt	Dickey	39.8	107	<40	4A
Shock	Lamoure	80.0	107	<40	4A
Holmes	Dickey	32.0	106	<40	4A
Hamann	Dickey	106.2	105	<40	4A
Kramlich	McIntosh	159.5	102	<40	4A
White	Dickey	155.5	102	<40	4A
Redlin	Dickey	356.0	101	<40	4A
Bjornstad	Dickey	38.3	101	<40	4A
Lundgren	Lamoure	161.7	100	<40	4A
Olson	Lamoure	241.2	100	<40	4A

Waterfowl Production Area (WPA)	County	Acres	Duck Pairs	Grassland Category	2012 Landscape Class
Patzer	Lamoure	123.2	99	<40	4A
Grunneich	Dickey	560.4	98	<40	4A
Herman	Dickey	171.3	96	<40	4A
Lee	Dickey	796.1	95	<40	4A
Gackle	Lamoure	320.6	94	<40	4A
Logan County	Logan	39.6	92	<40	4A
Bovey	McIntosh	359.7	89	<40	4A
Dittus	Lamoure	39.9	88	<40	4A
Carlson	Lamoure	242.4	87	<40	4A
Scaup	Dickey	98.6	86	<40	4A
Heine	Dickey	159.6	86	<40	4A
Borth	Lamoure	162.2	86	<40	4A
Raatz	Lamoure	20.0	85	<40	4A
Marek	Dickey	228.8	84	<40	4A
Schmidt	Lamoure	220.5	81	<40	4A
Kannowski	Lamoure	212.6	81	<40	4A
German	Dickey	210.8	80	<40	4A
Nelson	Lamoure	82.5	78	<40	4A
Enzinger	Lamoure	165.0	78	<40	4A
Wetzel	Lamoure	37.2	77	<40	4A
Laney	Lamoure	244.1	77	<40	4A
Cornell	Lamoure	319.6	72	<40	4A
Retzlaff	Dickey	79.1	72	<40	4A
Grady	Dickey	68.2	71	<40	4A
Hauser	Dickey	32.3	70	<40	4A
Domine	Lamoure	32.0	69	<40	4A
Lahlum	Lamoure	87.6	69	<40	4A
Knutson	Lamoure	214.1	68	<40	4A
Pilgrims Rest	Lamoure	643.0	68	<40	4A
Barton	Dickey	75.4	67	<40	4A
Allison	Lamoure	319.2	66	<40	4A
Wolf	McIntosh	1365.6	65	<40	4A
Maple River	Dickey	413.7	64	<40	4A
Leisikow	Lamoure	80.8	61	<40	4A
Schnabel	McIntosh	39.8	59	<40	4B
Kaseman	McIntosh	40.2	59	<40	4B
Kessel	Lamoure	40.1	58	<40	4B
Jackson	Lamoure	72.1	57	<40	4B
Berlin Church	McIntosh	1110.6	55	<40	4B

Waterfowl Production Area (WPA)	County	Acres	Duck Pairs	Grassland Category	2012 Landscape Class
Wendt	Lamoure	49.9	54	<40	4B
Lake	McIntosh	79.4	51	<40	4B
Roth	McIntosh	152.7	49	<40	4B
Hickey	Lamoure	30.8	48	<40	4B
Moch	Lamoure	20.8	44	<40	4B
Linnard	Lamoure	60.0	35	<40	4C
Musland	Lamoure	27.6	32	<40	4C
Straham	Lamoure	90.6	29	<40	4C