CHAPTER 3
Resources of Concern

This chapter describes resources of concern on the Kulm WMD.

3.1 Identification of Resources of Concern

Identification of priority species, hereafter resources of concern, 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, and include 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) and those that would likely decline without proactive and strategic conservation. Ultimately, consideration of species–habitat relationships at landscape- and local-scales within the SHC conservation design was designed to improve the efficiency of conservation delivery in landscapes that yield the highest biological returns (primarily waterfowl carrying capacity and production).

Strategic habitat conservation approach 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 abundance models to link conservation of ROCs at the scale of Kulm WMD to the conservation of migratory bird populations within the United States portion of the mixed-grass prairie ecosystem within the PPR. Kulm WMD 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 a portion of their annual life cycle. 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);
- USFWS Birds of Conservation Concern (USFWS 2008*b*);

- scientific literature and migratory bird population trends in the PPR;
- USFWS spatial models for individual migratory bird species.

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) available online at http://ecos.fws.gov/ecos/indexPublic.do and then reviewing relevant recovery plans for listed species.

Staff evaluated the potential of these trust species to serve as ROC that could be targeted for conservation during the next 9 years as outlined in this HMP. Individual species were considered potential ROC by reviewing national, regional, and state conservation plans/lists that identify overlapping priority migratory bird species of conservation need within the PPR.

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 9 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 identified for Kulm Wetland Management District, North Dakota.

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 or 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 were important factors influencing habitat selection for ROC. Perennial grasslands can be actively managed 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 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	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,

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 9 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 that have a cropping history to diverse stands of native grasses and forbs also 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. The Service is actively engaged in a long-term study, Native Prairie Adaptive Management (NPAM) that is evaluating factors influencing the success of restoring native sod and BIDEH, as described in Chapter 4 (Moore et al. 2010, USFWS 2011c). 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 mixed-grass prairie ecosystem 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, 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 wildlife populations in the PPR.

3.4 Habitat Requirements 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., In Press).

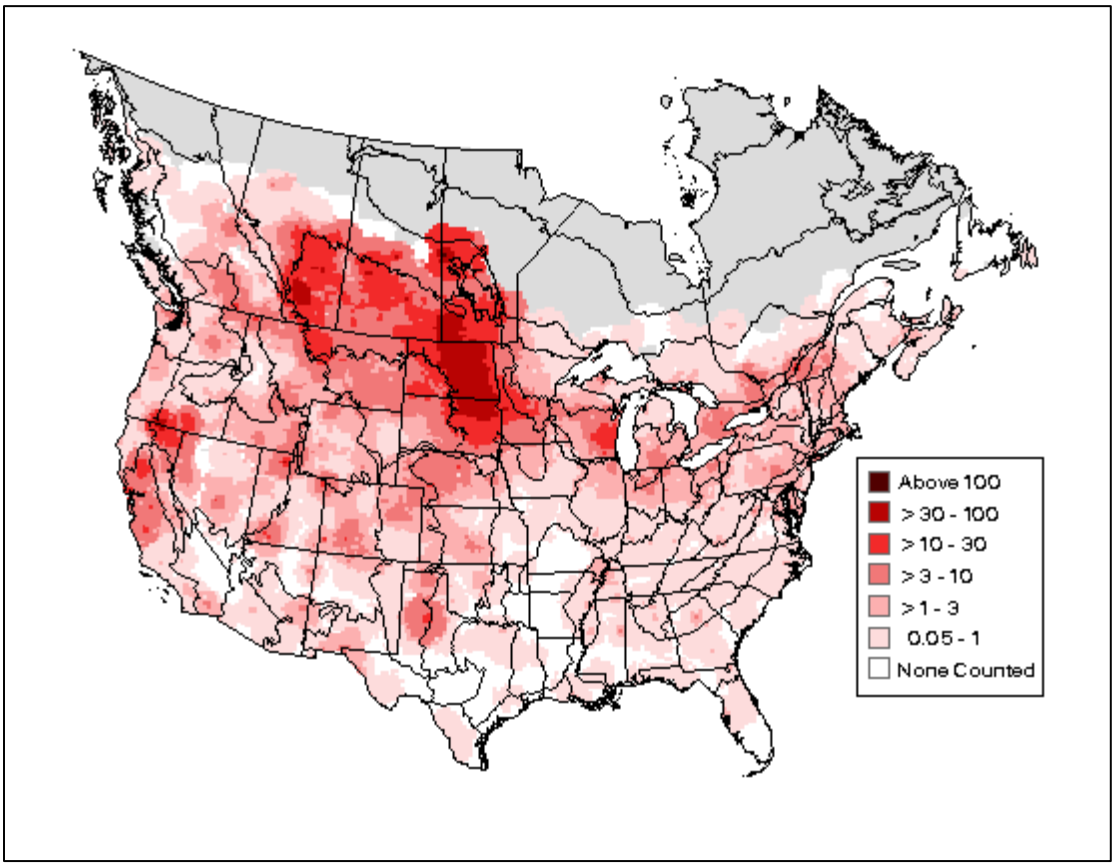

Figure 3-1. Breeding distribution of mallard (*Anas platyrhyncos*) in North America based on relative abundance breeding bird survey data from 2006-2012.

(Sauer et al. 2014).

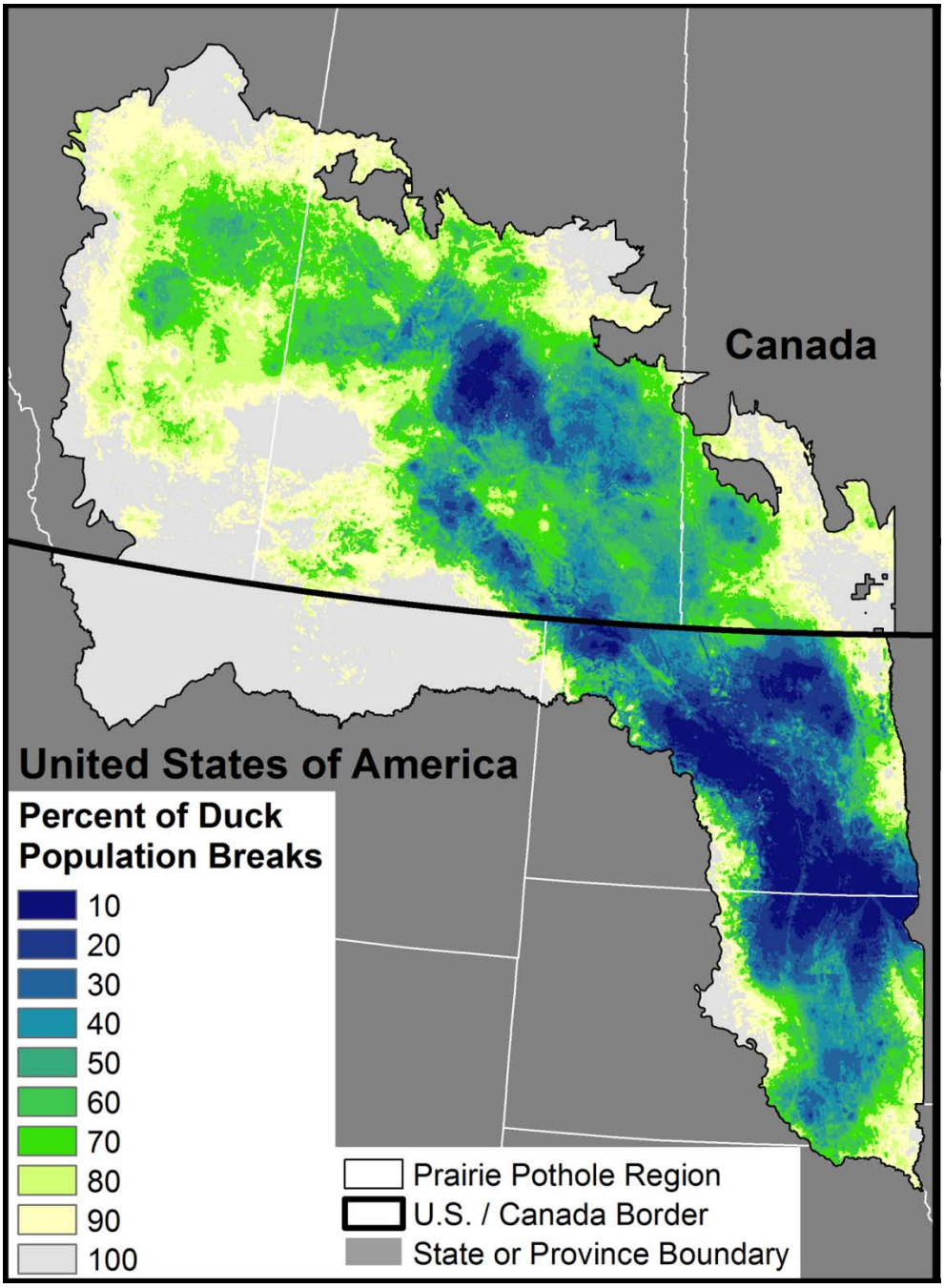

Figure 3-2. Abundance and distribution of five species of dabbling ducks across the Canadian and Montana, North Dakota, and South Dakota portions of the U.S. Prairie Pothole Region.

These species included mallard (Anas platyrhynchos), blue-winged teal (Anas discors), gadwall (Anas strepera), northern shoveler (Anas clypeata), and northern pintail (Anas acuta). 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 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).

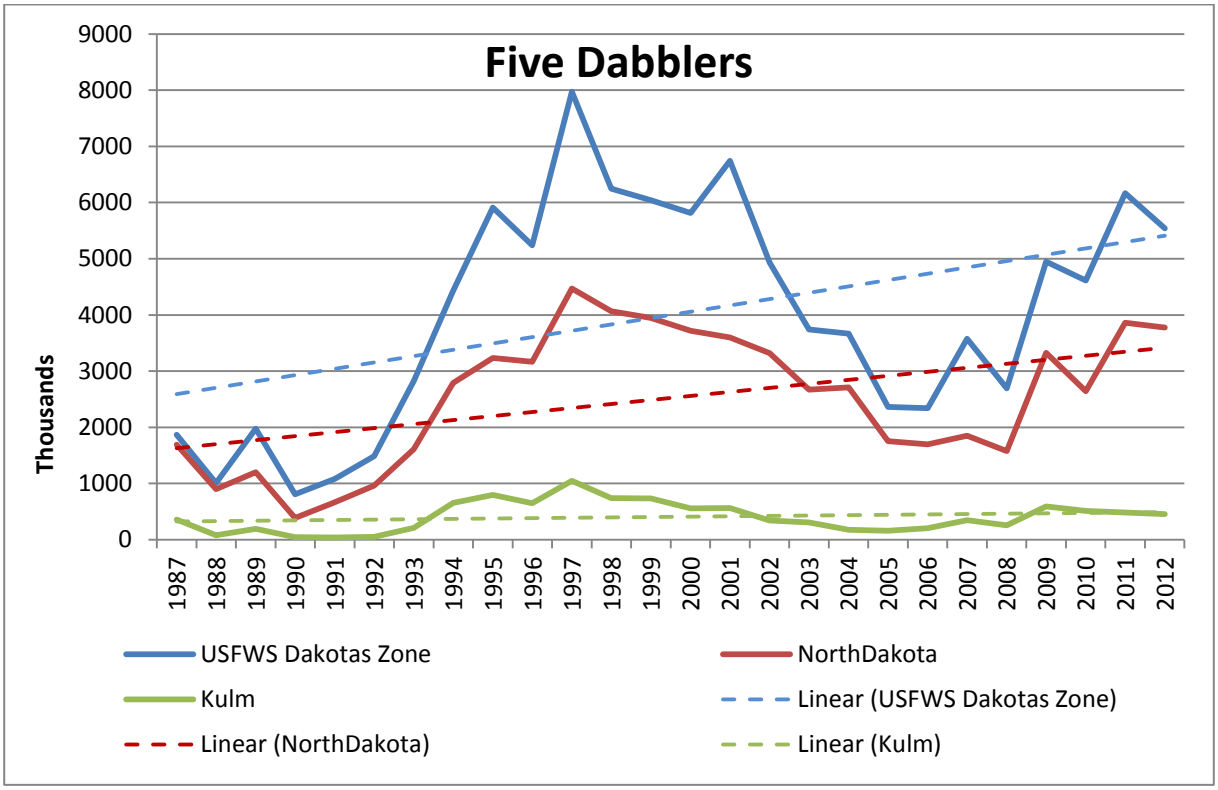

Figure 3-3. Estimated combined number of annual duck recruits for mallard, blue-winged teal, gadwall, northern shoveler, and northern pintail in the USFWS Dakotas Zone, North Dakota, and Kulm Wetland Management District.

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. Conservation of wetland/grassland complexes also is important because these areas have high occupancy by waterfowl broods (Walker et al. 2013a).

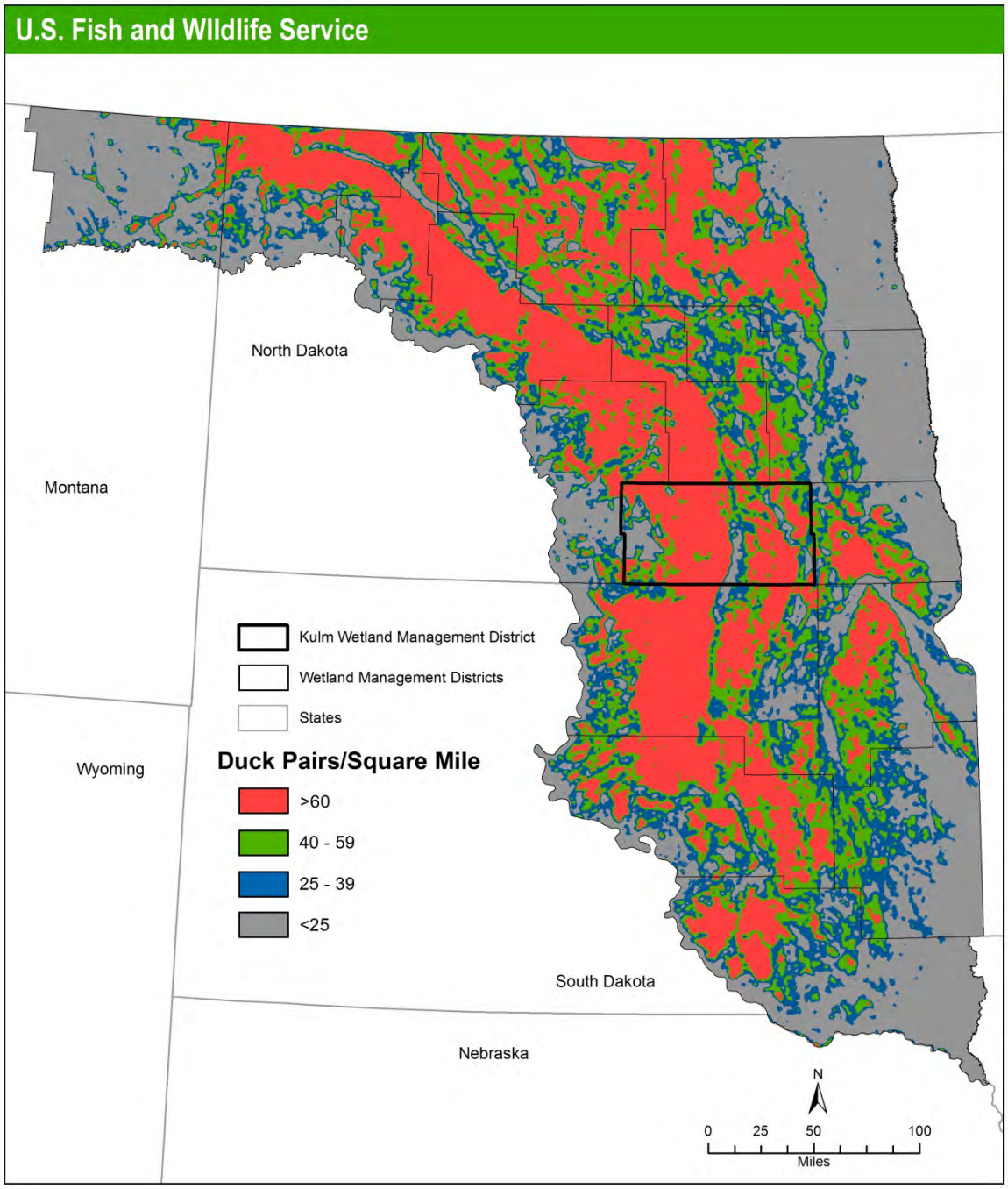

Figure 3-4. Density and distribution of five dabbler species in the Montana, North Dakota, and South Dakota portions of the U.S. Prairie Pothole Region.

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 success are positively influenced

by vegetation density and height (Koper and Schmiegelow 2007, Devries and Armstrong 2011, Bloom et al. 2013). Removing excessive litter also is important because, otherwise, 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).

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., In Press) 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 or conducting management treatments after the nesting season will attract greater densities of nesting waterfowl (Barker et al. 1990, 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).

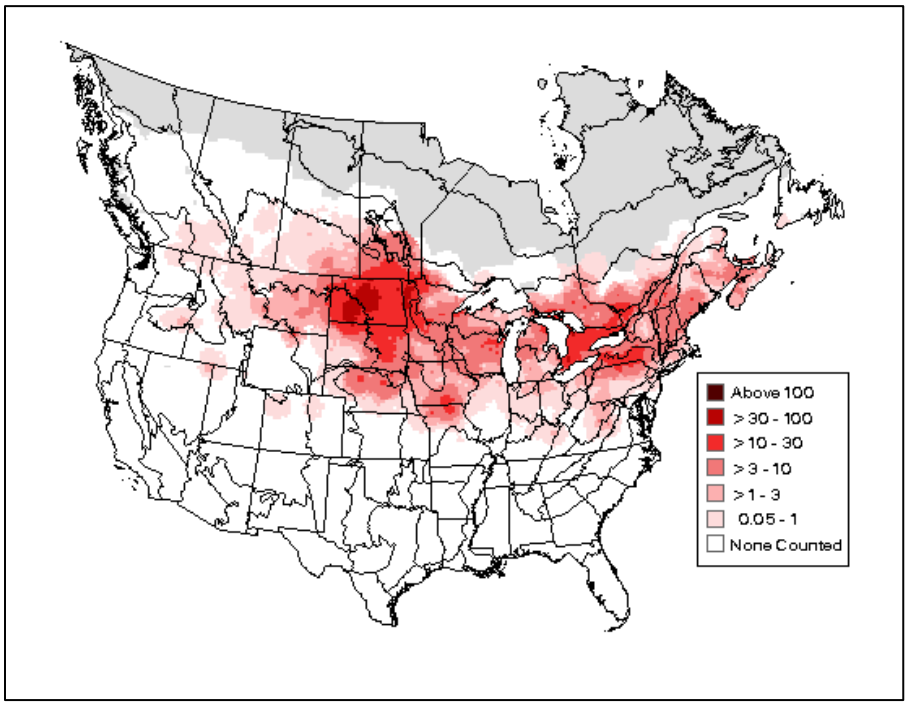

Figure 3-5. Breeding distribution of bobolink (*Dolichonyx oryzivorus*) in North America based on relative abundance breeding bird survey data from 2006–2012.

(Sauer et al. 2014).

Population Status—From 1966–2012, bobolink populations declined by 2.2% across their breeding range (Sauer et al. 2014). A 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) (Unpublished data, USFWS PPJV, Bismarck, North Dakota).

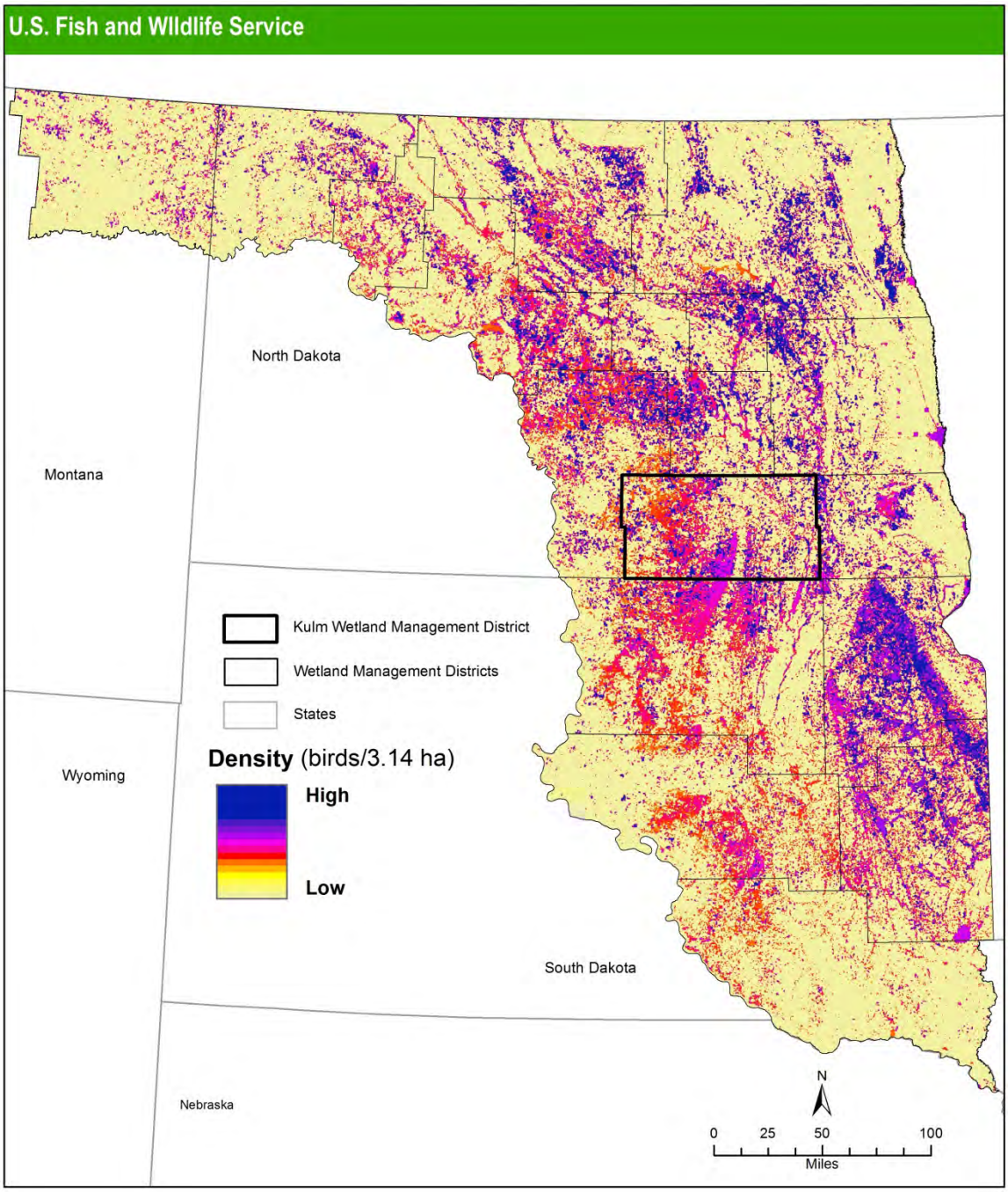

Figure 3-6. Density and distribution of bobolink (*Dolichonyx oryzivorus*) in the National Wildlife Refuge System Dakotas Zone.

Map data derived from Quamen (2007) and 2003 HAPET landcover.

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 10–134 cm vegetation height, 6–26 cm

visual obstruction reading, 17–65% grass cover, 15–33% forb cover, ≤22% shrub cover, ≤35% bare ground, 5–75% litter cover, and ≤9 cm 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 or renesting 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 remains following treatment (Salo et al. 2004).

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)

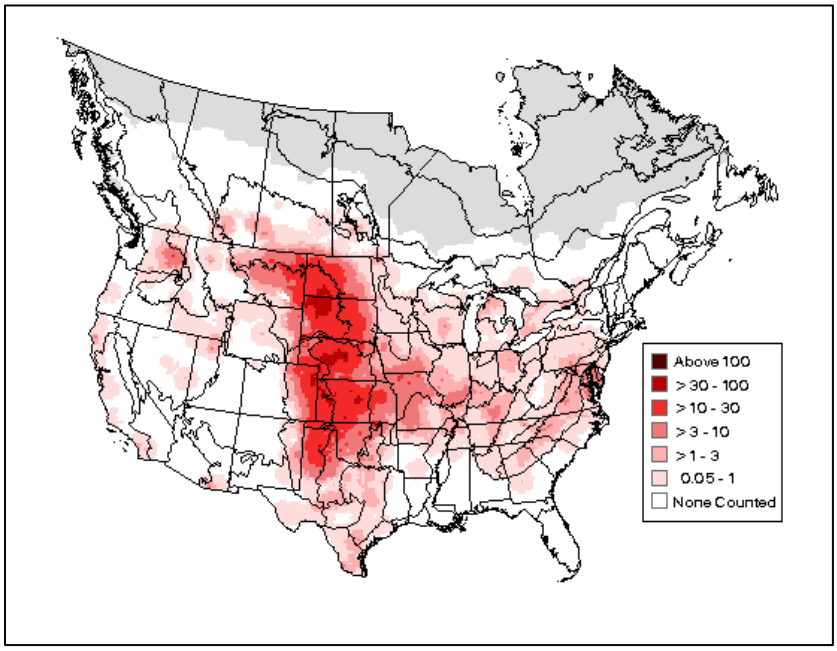

Figure 3-7. Breeding distribution of grasshopper sparrow (*Ammodramus savannarum*) in North America.

Based on relative abundance breeding bird survey data from 2006–2012 (Sauer et al. 2014).

Population Status—From 1966–2012, grasshopper sparrow populations declined by 2.9% across their breeding range (Sauer et al. 2014). 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) (Unpublished data, USFWS PPJV, Bismarck, North Dakota).

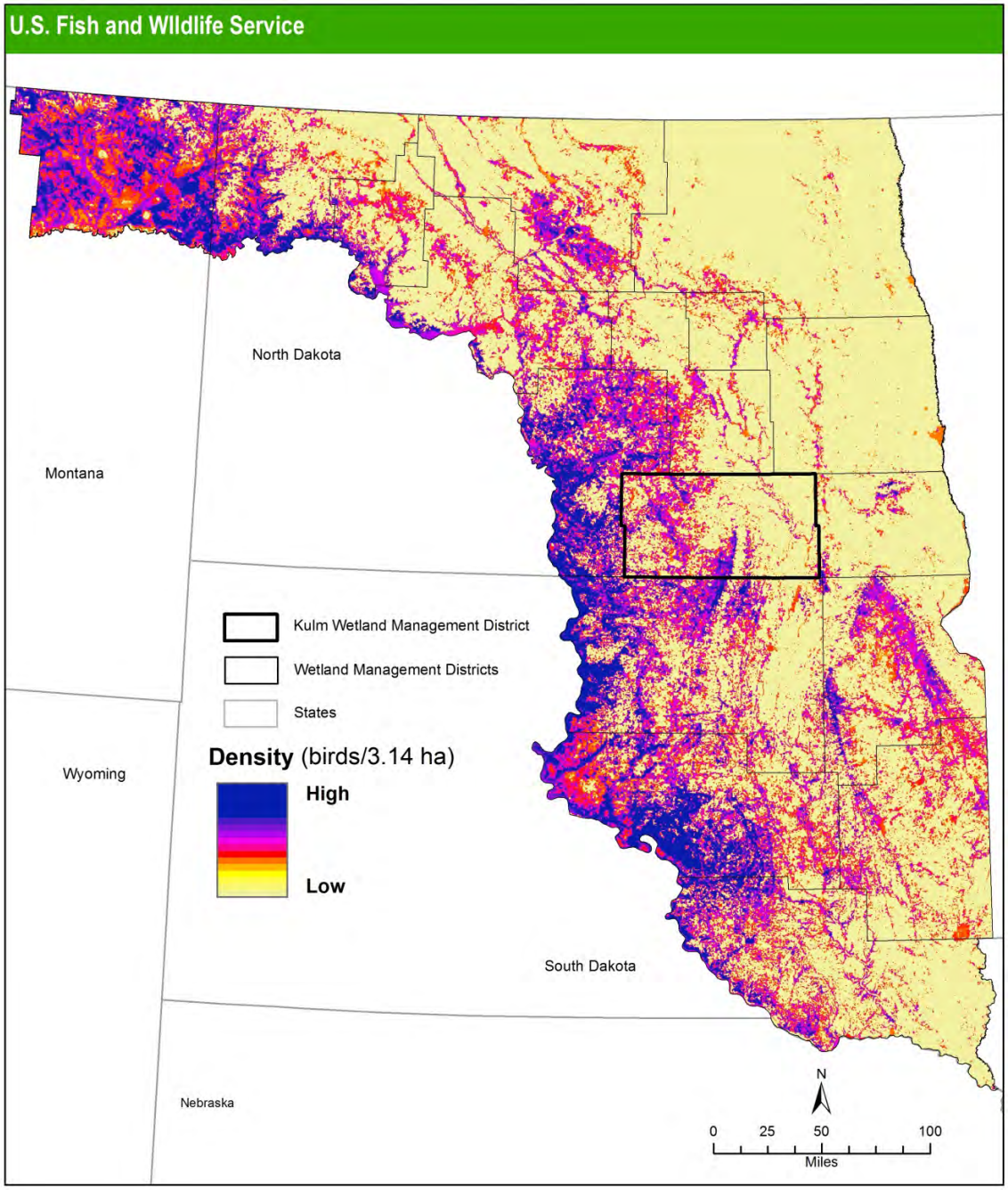

Figure 3-8. Density and distribution of grasshopper sparrow (*Ammodramus savannarum*) in the National Wildlife Refuge System Dakotas Zone.

Map data derived from Quamen (2007) and 2003 HAPET land cover.

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 15–48 cm, 6–40 cm visual obstruction reading, 33-72% grass cover, 4–33% forb cover, <35% shrub cover, <35% bare ground, 6–61% litter cover, and ≤9 cm 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).

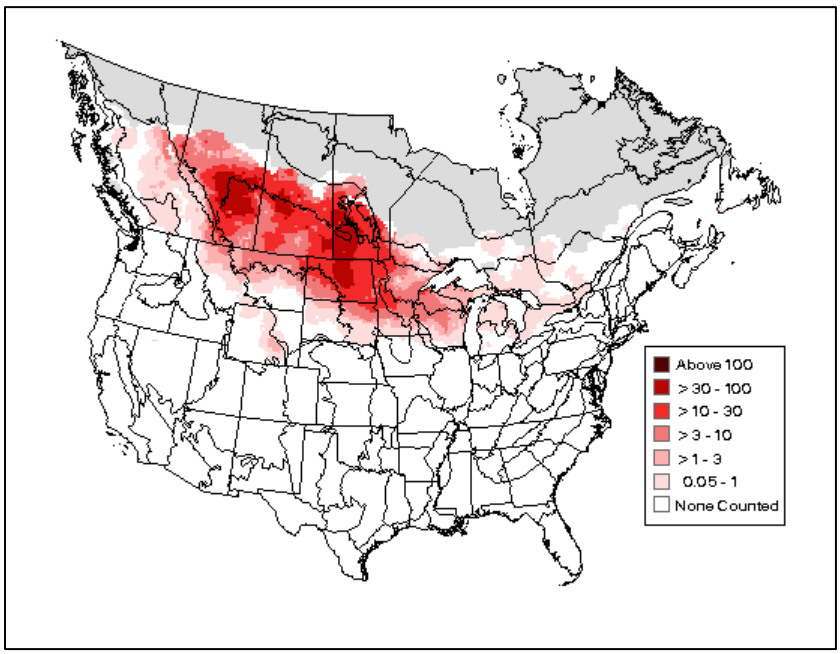

Figure 3-9. Breeding distribution of clay-colored sparrow (*Spizella pallida*) in North America.

Based on relative abundance breeding bird survey data from 2006–2012 (Sauer et al. 2014).

Population Status—From 1966–2012, clay-colored sparrow populations declined by 1.4% across their breeding range (Sauer et al. 2014). Similarly, clay-colored sparrow populations 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, they 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, the 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) (Unpublished data, USFWS PPJV, Bismarck, North Dakota).

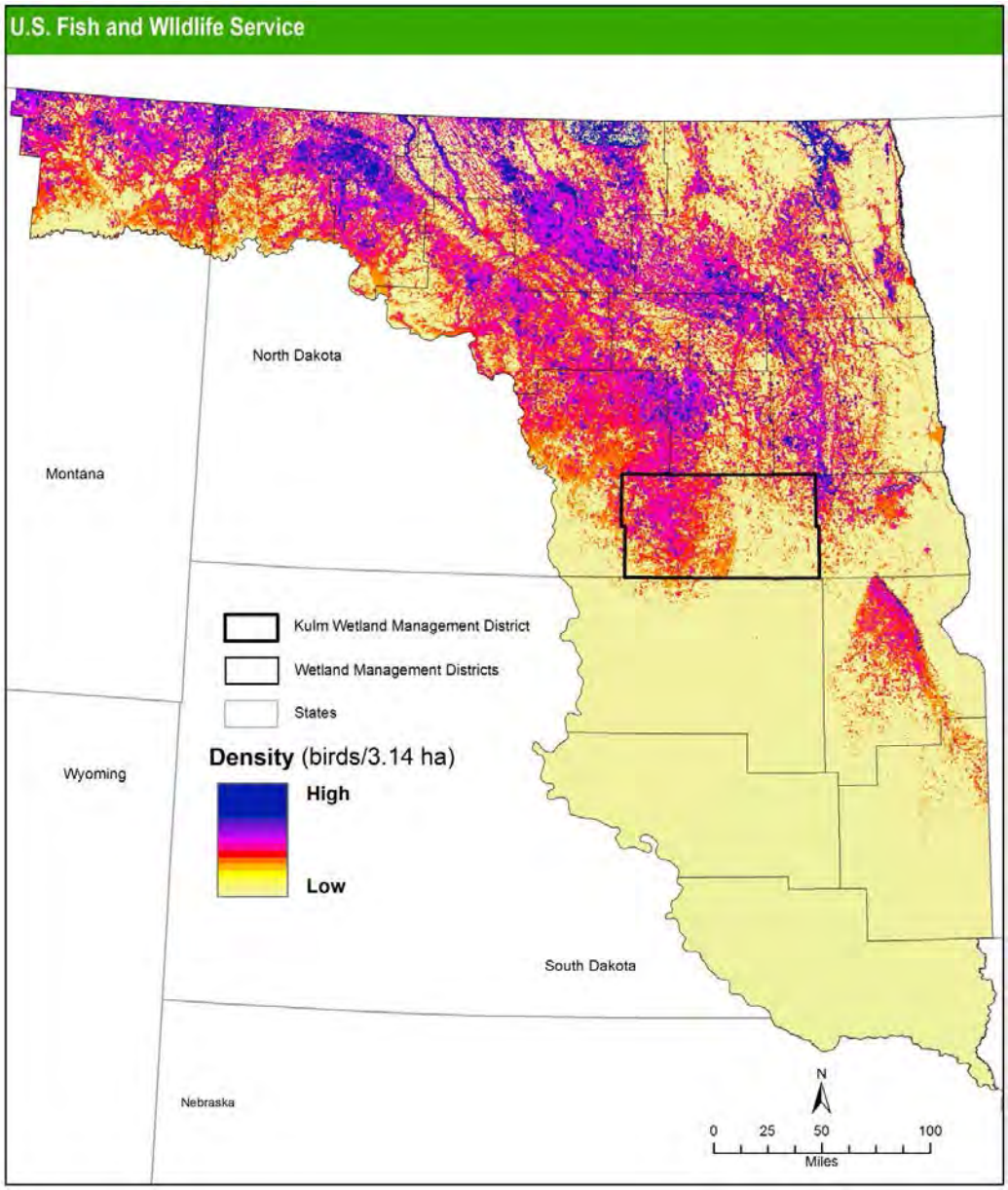

Figure 3-10. Density and distribution of clay-colored sparrow (*Spizella pallida*) in the National Wildlife Refuge System Dakota Zone.

Map data derived from Quamen (2007) and 2003 HAPET land cover.

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).

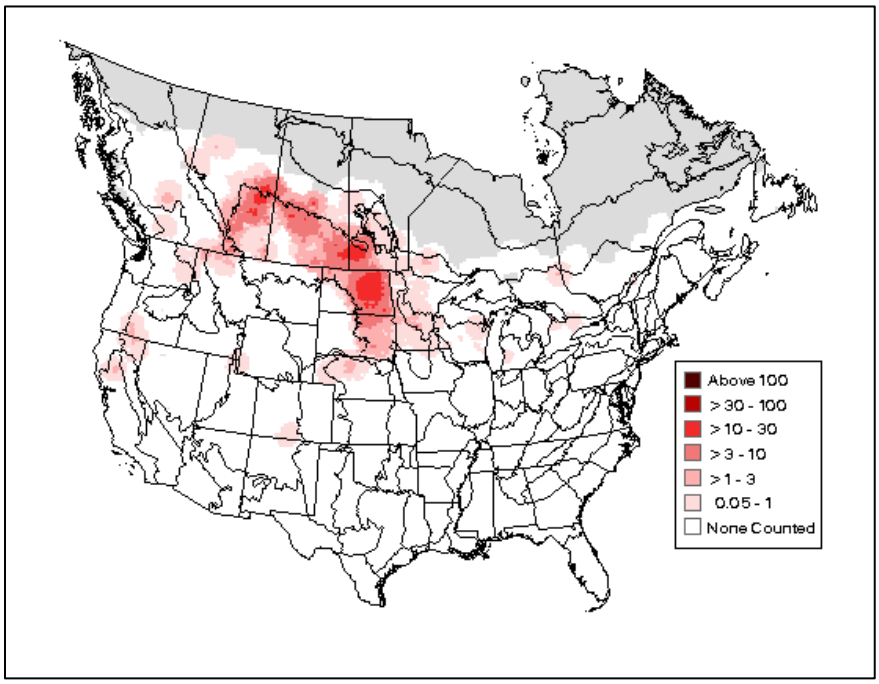

Figure 3-11. Breeding distribution of black tern (*Chlidonias niger*) in North America.

Based on relative abundance breeding bird survey data from 2006–2012 (Sauer et al. 2014).

Population Status—From 1966–2012, black tern populations declined by 2.4% across their breeding range (Sauer et al. 2014). Similarly, a 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 there are less than 50% row crop agriculture in the surrounding landscape (Naugle et al. 2000b).

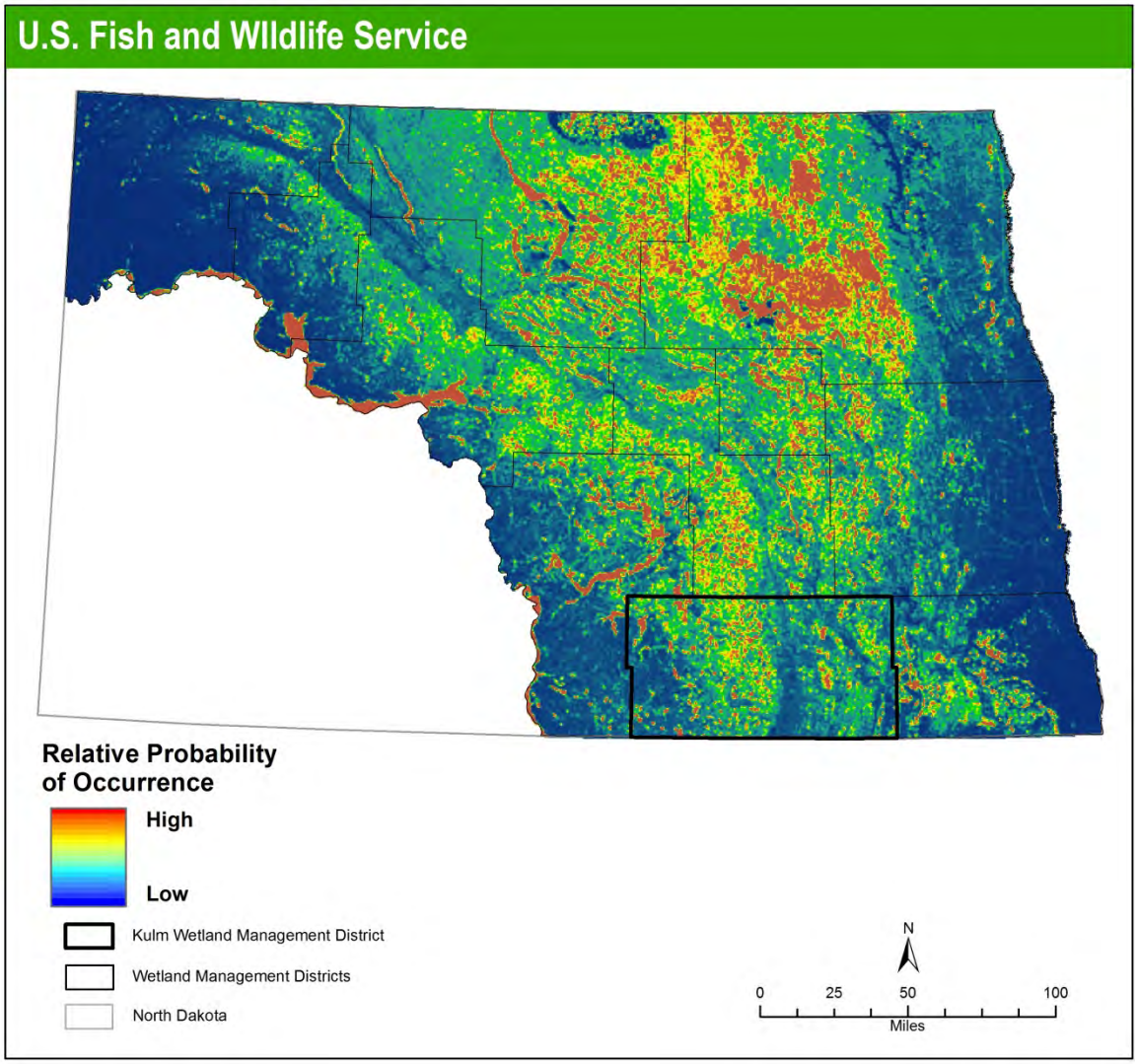

Figure 3-12. Relative probability of occurrence of black tern (*Chlidonias niger*) in the North Dakota portion of the PPR.

(Unpublished data, USFWS HAPET, Bismarck, North Dakota).

Local-scale Species–habitat Relationships—Black terns occupy wetlands with >30 cm 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 (> 30 cm 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).

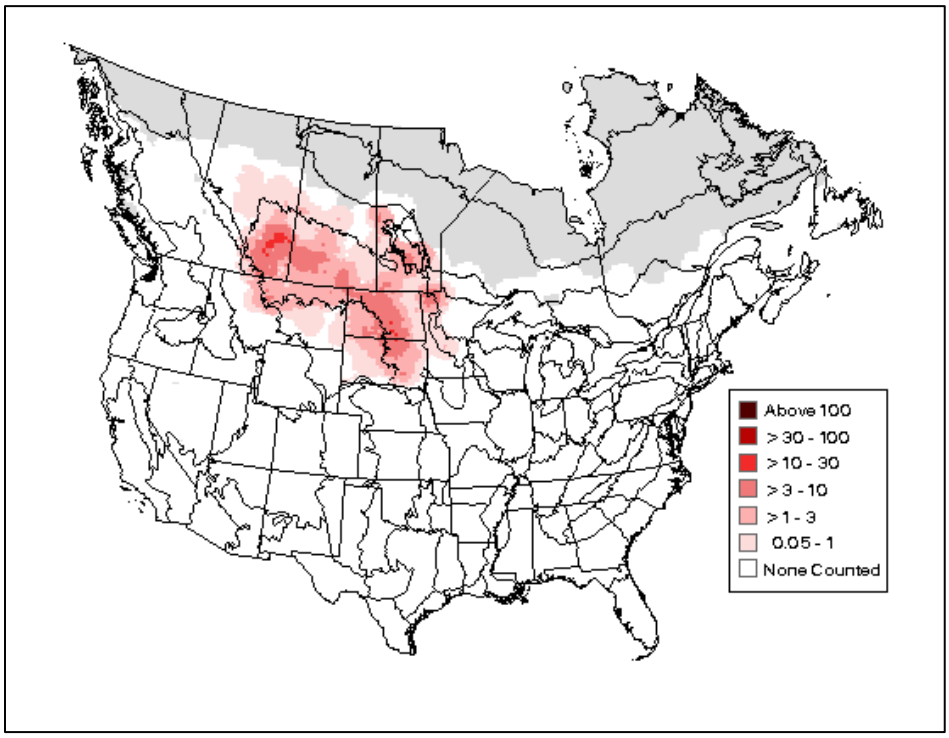

Figure 3-13. Breeding distribution of marbled godwit (*Limosa fedoa*) in North America.

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% decline) across their breeding range (Sauer et al. 2014). Similar trends also occurred in the PPR (0.7% decline) and in North Dakota (0.6% 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).

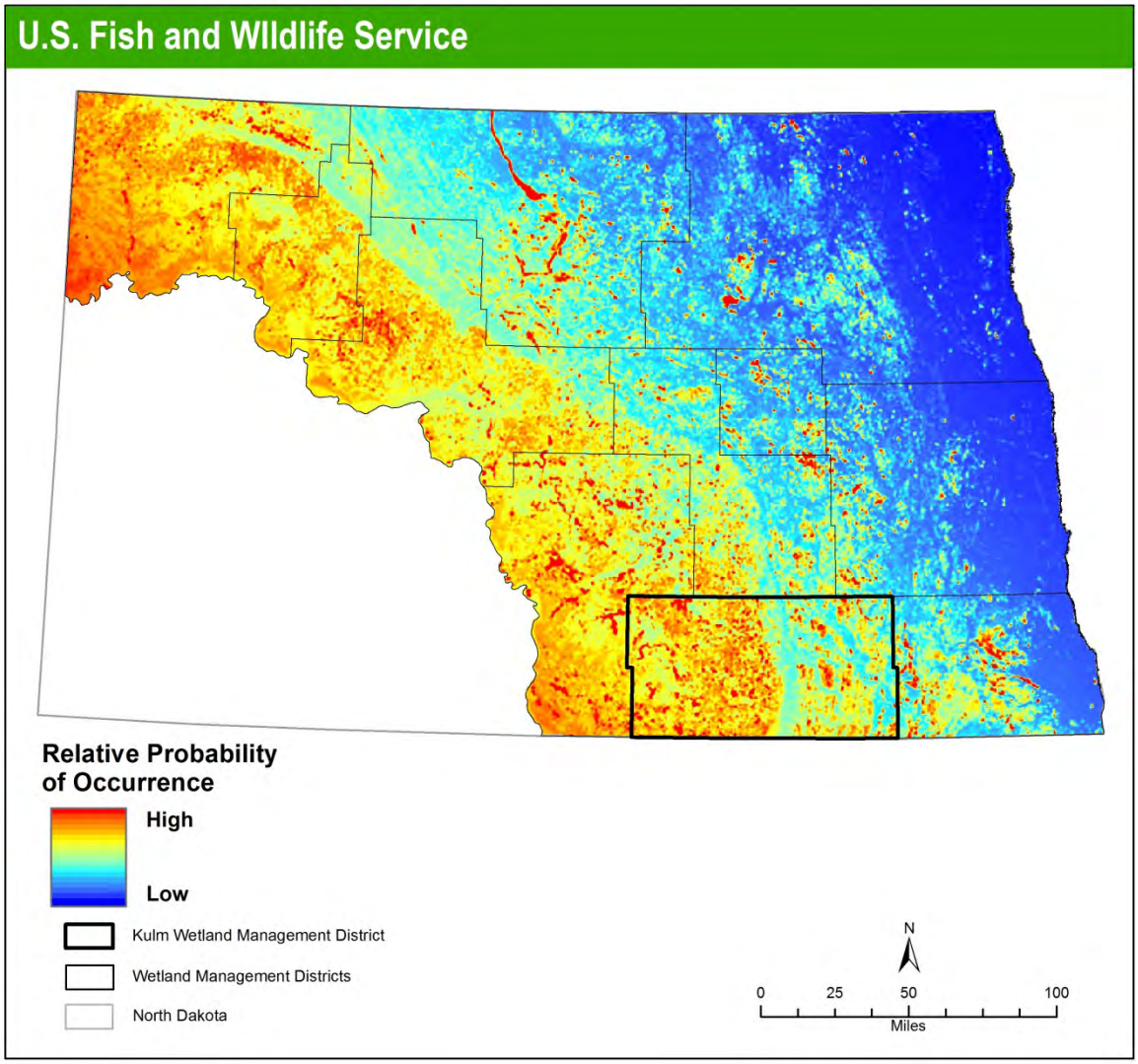

Figure 3-14. Relative probability of occurrence of marbled godwit (*Limosa fedoa*) in the North Dakota portion of the PPR.

(Niemuth et al. 2009).

Local-level Species–habitat Relationships—Marbled godwits prefer native versus nonnative (seeded) grassland with short (<15 cm) 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 (<15 cm) 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).

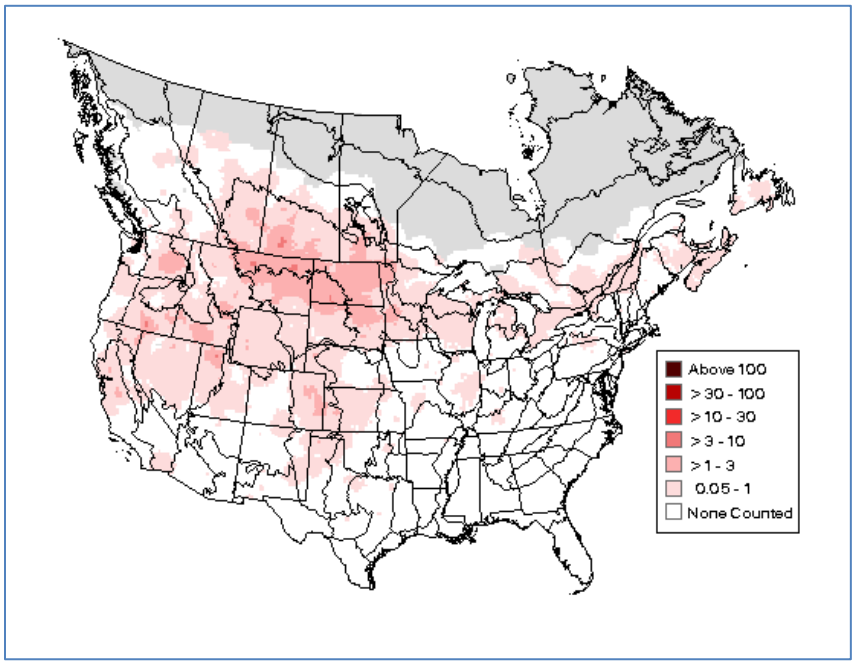

Figure 3-15. Breeding distribution of northern harrier (*Circus cyaneus*) in North America.

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% across their breeding range (Sauer et al. 2014). During the same period their population 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).

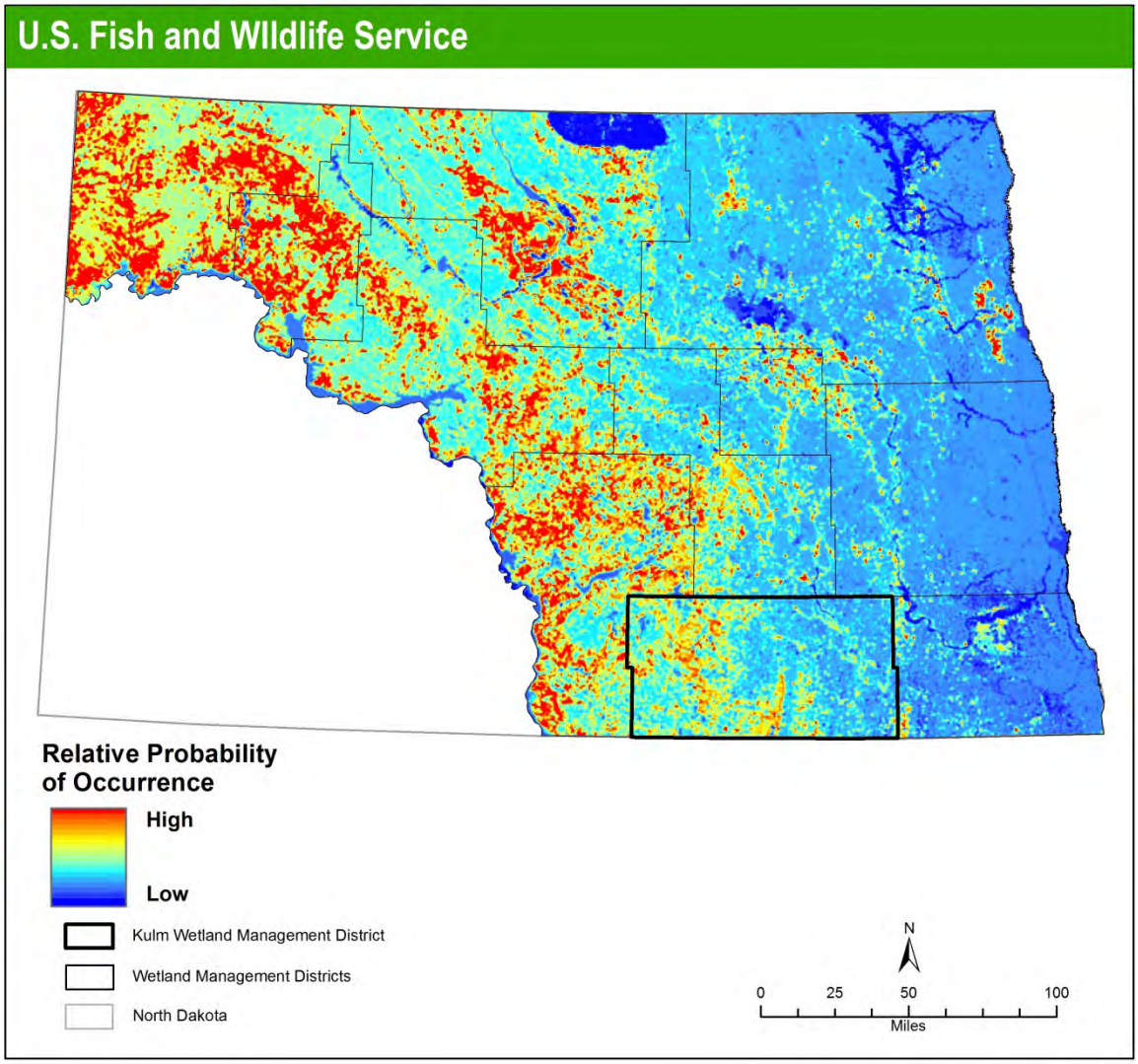

Figure 3-16. Relative probability of occurrence of northern harrier (*Circus cyaneus*) in the North Dakota portion of the PPR.

(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 15-82 cm, visual obstruction readings of 7–54 cm, 33–53% grass cover, 18–25 forb cover, <2% shrub cover, 23–30% litter cover, and 2–6 cm 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 primary role of the District is to contribute to the production of waterfowl and other migratory birds in the PPR. It supports the habitat needs for waterfowl and other ROC by maintaining a perpetual limited interest on 187,548 acres of combined wetland and grassland conservation easements (Unpublished data current to February 27, 2014, USFWS North Dakota Wetland Acquisition Office, Bismarck) and on 45,402 acres of habitat on fee-title WPAs. Conservation easements are purchased from willing landowners to permanently protect wetlands or grasslands and the landowner typically manages the land in same way as it was before the easement was purchased. Wetland easements generally prohibit draining, burning, filling or leveling, and grassland easements generally prohibit the cultivation of grassland habitat, while still permitting the landowner traditional grazing uses.

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) (Unpublished data, USFWS HAPET, Bismarck, North Dakota). 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 (American wigeon [*Anas americana*], green-winged teal [*A. crecca*], wood duck [*Aix sponsa*], redhead [*Aythya valisineria*], canvasback [*A. americana*], lesser scaup [*A. affinis*], ring-necked duck [*A. collaris*], ruddy duck [*Oxyura jamaicensis*]) were supported during the same time period.

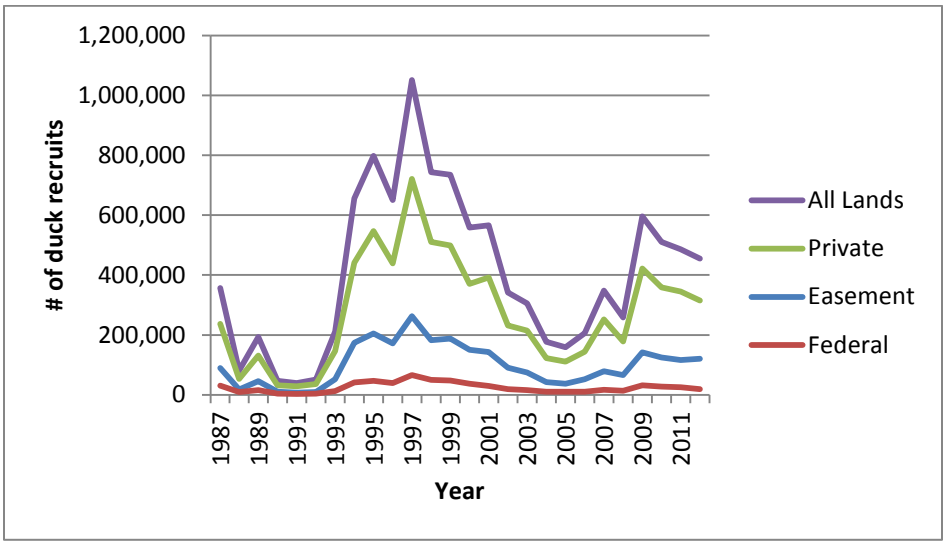

Figure 3-17. Average duck production for Kulm Wetland Management District from 1987 to 2012 for 5 primary dabbler species (mallard, gadwall, blue-winged teal, northern shoveler, and northern pintail.

Derived from four-square mile survey data (Unpublished, USFWS HAPET, Bismarck, North Dakota). Red: fee title only, blue: limited-interest wetland and grassland easements, green: private lands without easements, and purple: combined fee title, easement, private lands.

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 (Unpublished data, USFWS HAPET, Bismarck, North Dakota). However, a large proportion of wetland (>50%) and grassland (>90%) habitat on private lands is unprotected in the District (Unpublished data current to October 2012, USFWS Kulm WMD, Kulm, North Dakota). 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

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 9 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" management strategies to meet the habitat needs for ROC during the next 9 years.

Future Acquisition of Conservation Easements

The District purchases wetland and grassland easements from willing landowners to secure these habitats in perpetuity and to contribute to the habitat protection goals aimed at sustaining waterfowl populations identified by the Prairie Pothole Joint Venture (Ringelman et al. 2005). However, grassland habitats 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 of the PPJV 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). Further, local-scale decisions become landscape-level effects when intense grazing is conducted by the majority of private landowners in the District.

During the next 9 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 high diversity grasslands significantly improves nesting cover and ecological value to wildlife (Werling et al. 2014). Therefore, a priority of the District is to restore degraded native sod grasslands using precisely timed defoliation treatments to reduce the presence of exotic grasses and increase composition of native grasses and forbs, as well as reconstruct former croplands to diverse stands of native vegetation. The District has committed to this process during the next 9 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. Similarly, reconstruction of fields containing dense nesting cover to diverse stands of native vegetation also requires a short-term loss (3–5 years) of nesting cover while the seedbed is being prepared using cooperative farming agreements. 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 9 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 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.

The District is located within the USFWS Great Plains Fire District (GPFD) along with six other Districts in the Dakotas. Primary fire staff from the GPFD along with collateral duty fire staff coordinates each prescribed fire across the GPFD. However, conducting multiple burns in each WMD, across all seven WMDs, is challenging due the time required to mobilize fire crews and conduct prescribed fires within the narrow treatment window during the spring. 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 during the next several years. The District may need to modify restoration and reconstruction efforts during the next 9 years if the availability of fire as a management tool does not improve and/or if grazing treatments alone do not improve or stabilize already declining prairies.

Climate Change and Habitat Conservation

The District recognizes and supports the importance of the identifying potential impacts of global climate change on the habitats of the ROC. However, the effects of global climate change are likely to occur gradually rather than over a brief, catastrophic period. 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.