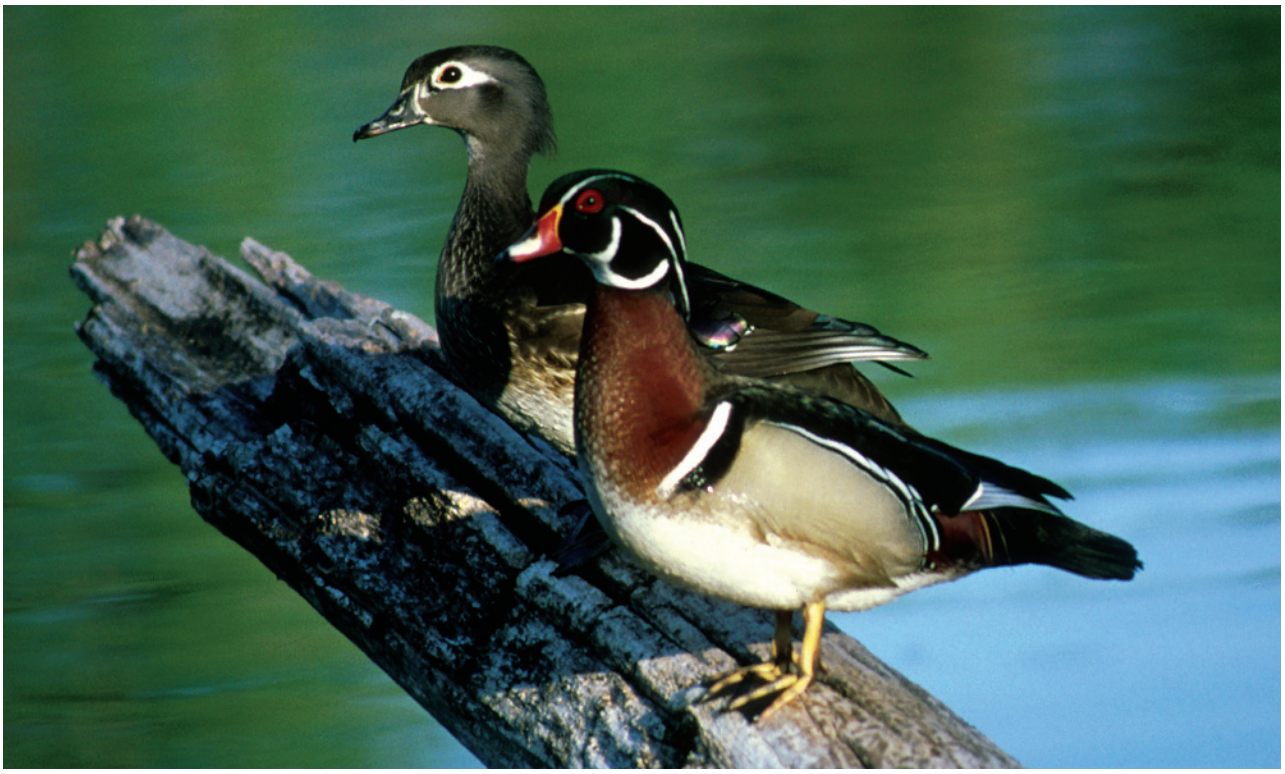
6 Implementation of the Proposed Action



Dave Menke/USFWS

Male and female wood duck paired for the breeding season.

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

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

6.1 Identification of the Proposed Action

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

The Service is responsible for recommending a proposed action that

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

The Service has identified alternative B as the proposed action for management of the nine districts.

USFWS

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

6.2 Summary of the Proposed Action (Draft CCP)

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

District staffs would manage wetland and upland habitats to meet the district vision and goals by carrying out the objectives described below. Management objectives for habitat types are based on the habitat preferences of groups of target (indicator) species, which consist of members of taxonomic groups such as waterfowl, shorebird, grassland, and upland species. District staffs would emphasis adaptive management, including monitoring the effects of habitat management practices and using research results to direct ongoing management. Wetland management would benefit migratory birds, particularly waterfowl species. Management efforts would be expanded to benefit species of the Central Flyway.

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

6.3 Goals, Objectives, Strategies, and Rationale

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

Habitat and Wildlife Goal

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

Wetlands in Easements

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

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

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

Wetlands in Easements Objective 1

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

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

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

Strategies

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

Rationale

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

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

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

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

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

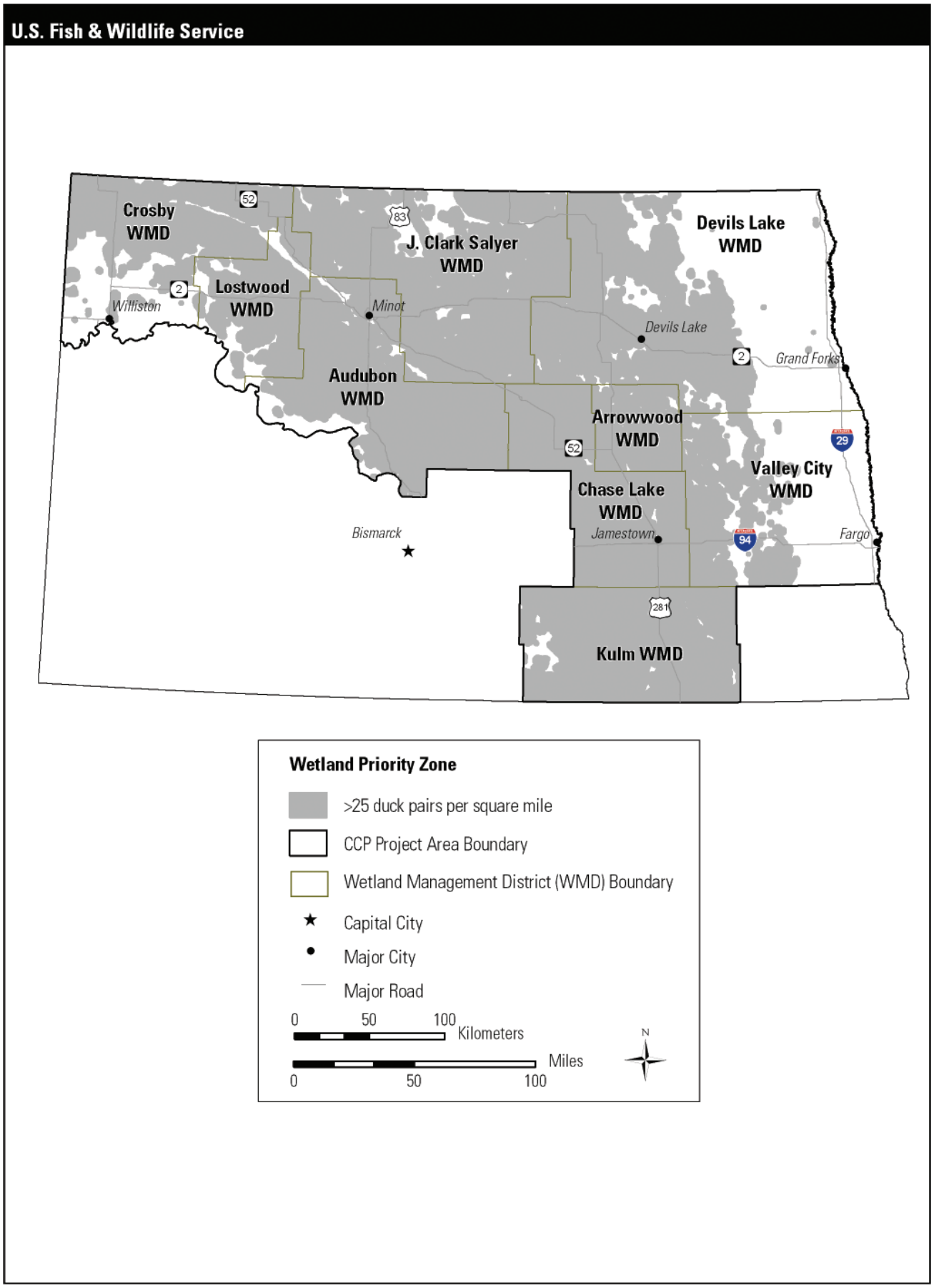


Figure 12. Map of the wetland priority zones in the nine districts, North Dakota.

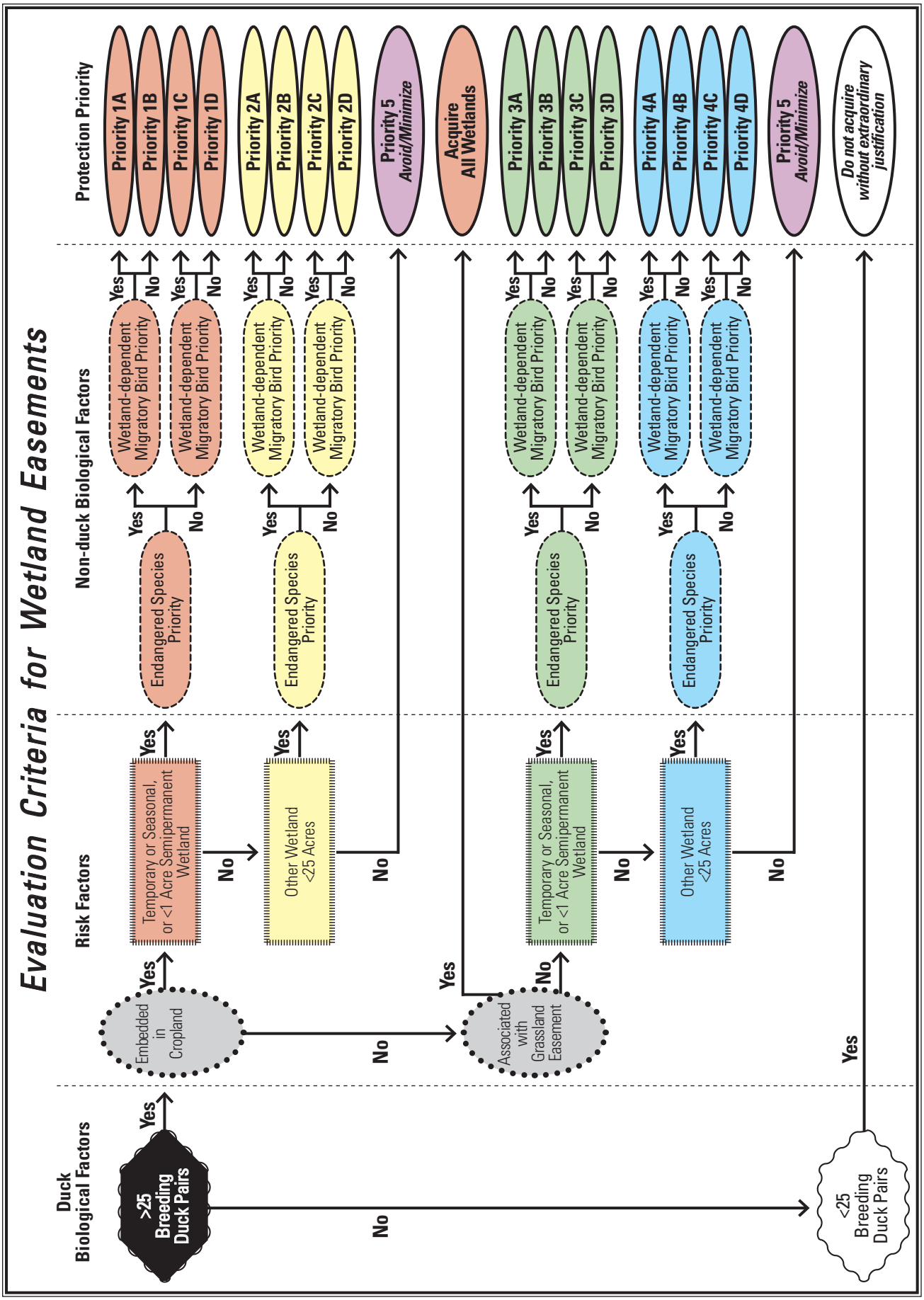


Figure 13. Evaluation criteria for wetland easements.

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

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

Wetlands in Easements Objective 2

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

Strategies

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

USFWS

Wildflowers create a ring around a wetland.

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

Rationale

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

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

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

Uplands in Easements

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

USFWS

Grassland easements protect a variety of grass and flower species.

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

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

More specifically, the purposes of a grassland easement are

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

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

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

Uplands in Easements Objective 1

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

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

Strategies

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

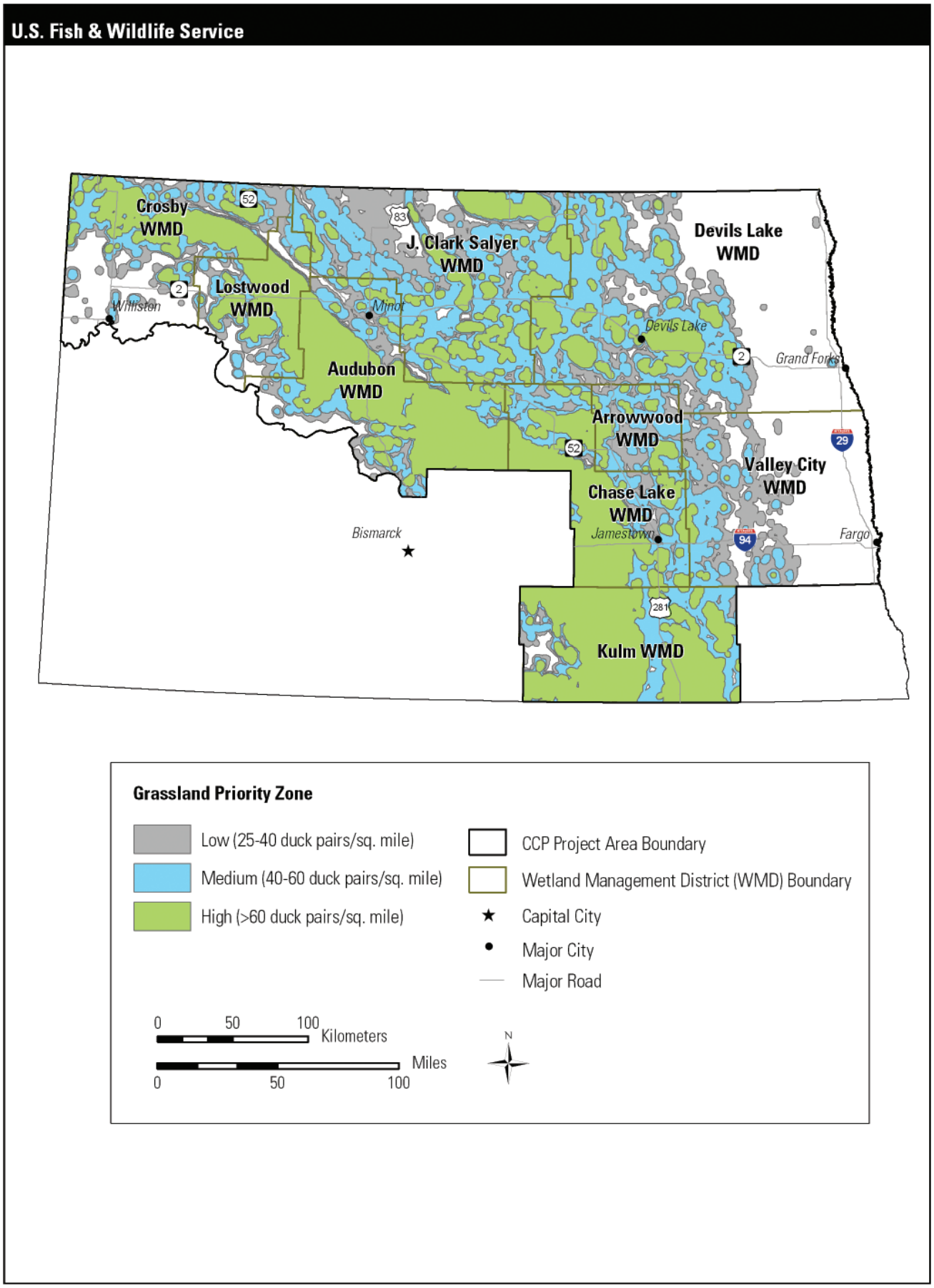


Figure 14. Map of the grassland priority zones in the nine districts, North Dakota.

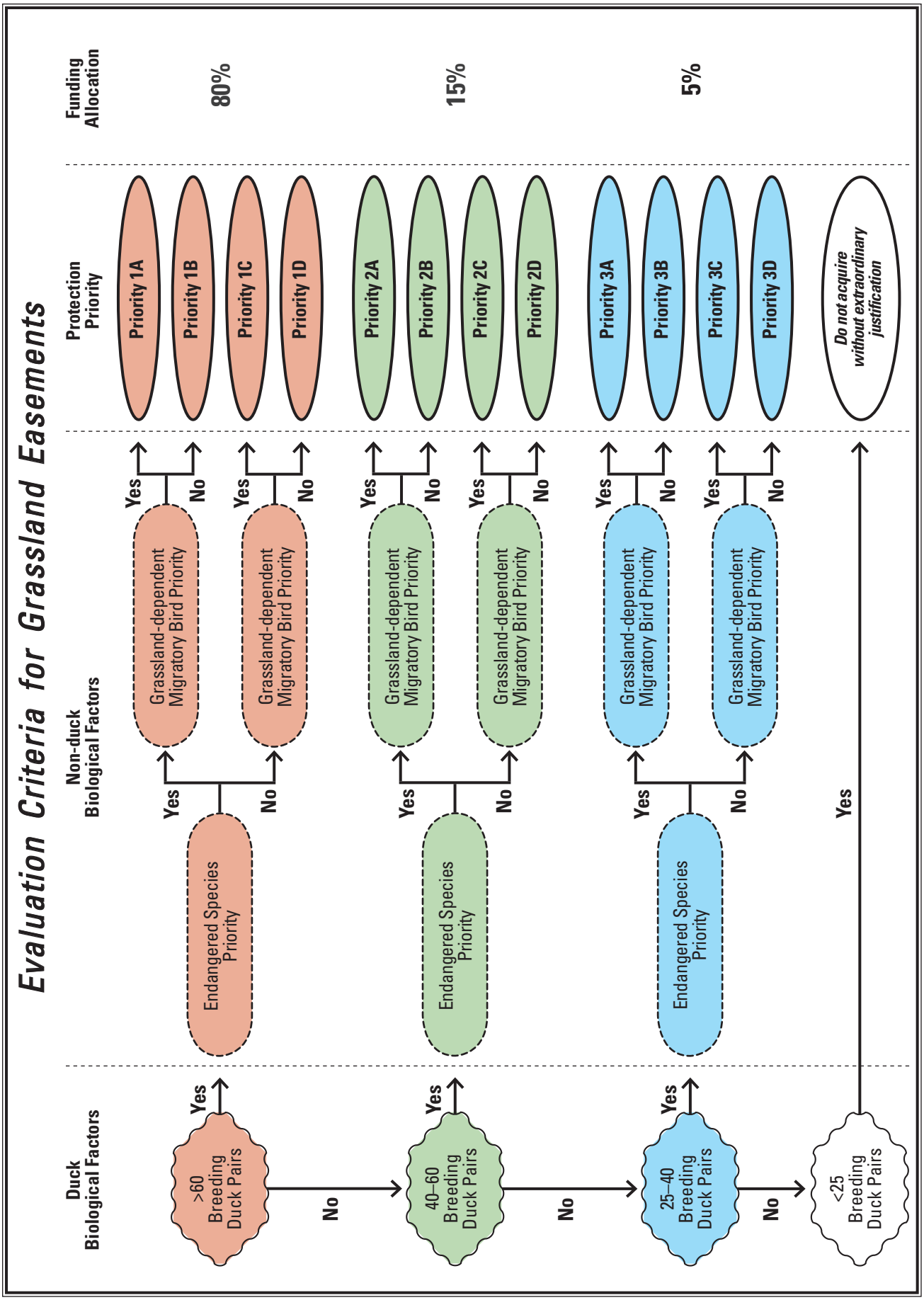


Figure 15. Evaluation criteria for grassland easements.

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

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

Rationale

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

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

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

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

Uplands in Easements Objective 2

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

Strategies

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

USFWS

Harebell.

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

Rationale

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

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

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

Developed Wetlands in WPAs

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

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

Developed Wetlands in WPAs Objective 1

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

Strategies

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

Rationale

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

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

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

Growing-season drawdowns can effectively manipulate plant community composition. Drawdowns and, more specifically, drawdown intervals can influence plant species composition, structure, and seed production (Frederickson 1991).

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

Developed Wetlands in WPAs Objective 2

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

Strategies

- Randomly sample vegetative zones (wet meadow, shallow marsh, deep marsh, and open water) (Stewart and Kantrud 1971) along transects.
- Randomly sample invertebrate abundance and biomass in all major vegetative zones.
- Sample water quality for salinity and total dissolved solids.

Rationale

Understanding how water management actions alter developed wetlands is critical to ensuring long-term health and sustainability. The composition of aquatic plant and invertebrate communities supported is directly related to hydrology and water chemistry and, in turn, affects habitat. For example, salinity can negatively influence invertebrate composition directly by affecting physiology (Williams and Crawford 1989, Euliss et al. 1999) or indirectly by affecting habitat structure and foods (Krull 1970, Wollheim and Lovvorn 1996). Other examples include documented reports that high concentrations of suspended silt and clay are toxic to zooplankton, and agrichemicals can cause significant mortality of aquatic invertebrates (Borthwick 1988).

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

The vegetative community of a wetland is one of the most significant driving forces in the makeup of that wetland's other biotic components (for example, invertebrates and birds). Wetland vegetative structure and floristic composition is important to nearly all waterbirds from the standpoint of nesting, brood-rearing, foraging, and migration stopover habitat (Laubhan and Roelle 2001). The same vegetative factors influence invertebrate community composition (Voigts 1976). Managing for a diversity of wetland flora in a wetland community generally equates to a corresponding diversity of waterbirds. Decreased waterbird use generally equates to decreased heterogeneity of a wetland's floral community. Variability in a wetland's floral community is driven in part by the temporal influence of climate (Euliss et al.2004), but may also be tied to alterations that affect fundamental processes (for example, hydrology, water chemistry, and sediment dynamics) and might alter system tolerance with respect to the germination and growth of certain wetland plant species (Laubhan et al. 2006).

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

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

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

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

USFWS

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

Undeveloped Wetlands in WPAs

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

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

The prairie potholes of North Dakota and South Dakota support a wide diversity of wildlife, but they are most famous for their role in waterfowl production. Although the Prairie Pothole Region occupies only 10% of North America's waterfowl breeding range, it produces approximately 50% of the continent's waterfowl population (Kantrud 1983).

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

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

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

Undeveloped Wetlands in WPAs Objective

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

Strategies

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

Rationale

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

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

Native Prairie in WPAs

The following three objectives consider tracts of native prairie on fee-title lands within the districts. Native prairie is defined as native ("unbroken") sod and exists in all of the nine districts in various acreages and with broad management histories. Most of the northern mixed-grass prairie and tall-grass prairie have been destroyed through conversion to agriculture, and remnant tracts appear to be particularly vulnerable to invasion by smooth brome and Kentucky bluegrass (Murphy and Grant 2005). Losses are more severe in the Drift Plain physiographic region than the Missouri Coteau physiographic region.

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

Native Prairie in WPAs Objective 1

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

Strategies

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

Rationale

A prerequisite to setting detailed objectives for native prairies is to complete a basic inventory of existing native prairie. Thus, this objective calls for such an inventory, and the next objective states that once the inventory is complete, each district would develop a system to prioritize native prairies and subsequently develop detailed objectives for desired vegetation conditions. The third objective notes that, for units designated as lower priority, the management emphasis would be on providing appropriate structural diversity to meet the needs of a broad array of waterfowl and other grassland bird species.

Native Prairie in WPAs Objective 2

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

Strategies

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

Rationale

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

Smooth brome generally is more difficult to control once established than Kentucky bluegrass and more significantly alters the quality and structure of native prairie. Therefore, restoration management would focus more on strategies to reduce brome.

Although the focus of this objective is on the restoration and maintenance of floristic composition in native prairie, wildlife such as prairie birds and butterflies would also benefit.

Examples of objectives to prioritize native prairies and describe desired vegetation conditions were developed for J. Clark Salyer Wetland Management District and are provided in appendix K. However, each district staff would need to develop objectives specific to their area and situation.

Native Prairie in WPAs Objective 3

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

Strategies

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

Rationale

By 2 years after CCP approval, districts would have identified high-priority native prairie tracts to manage for floristic quality, floristic composition, and landscape characteristics that underlie the quality of nesting habitat of grassland-dependent birds. This would improve the chances of restoring at least some native prairie by more intensively managing these areas. For the remaining native prairie tracts, it is likely most of the prairie has passed a threshold such that restoration of a modestly diverse, native herbaceous flora is an unrealistic and impractical goal. With modest effort, the prevalent, introduced cool-season grasses and scattered low shrubs can be managed to provide a mix of postdisturbance structural types attractive to a broad array of native grassland bird species, with a focus on waterfowl.

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

Invasive Plants

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

Invasive Plants Objective 1

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

Strategies

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

Elaine Haug/Smithsonian Institution

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

Rationale

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

Invasive Plants Objective 2

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

Strategies

- Conduct inventories following the USFWS Strike Team operational guidelines, when completed, which will include mapping criteria.

- Store all inventory data in RLGIS.
- Repeat inventories at a minimum of 10-year intervals.

Rationale

Invasive plants are a major threat to native ecosystems in the United States, considered second only to habitat destruction in significance. Invasive plants have infested approximately 2 million acres of Refuge System lands. Infestations of invasive plants have a direct effect on the ability of the districts to fulfill their wildlife conservation mission including species recovery and maintenance and restoration of biological diversity, biological integrity, and natural functions.

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

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

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

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

As of July 2007, the Service's ISSTs have operational guidelines in a draft form. The draft mission statement is as follows: "To protect the natural resources of the Refuge System from the impacts caused by invasive plants, primarily through early detection and rapid response principals, which may include prevention, control, monitoring, restoration and education."

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

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

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

Once a baseline inventory has been completed for Service lands in North Dakota, the focus would shift to more scientific surveys to provide quantifiable

data. Surveys would be conducted every 3–5 years on priority areas to provide information about effectiveness of treatment, response to an IPM strategy, or results of grassland restoration.

Invasive Plants Objective 3

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

Strategies

- Identify, for each district, the priority WPAs by 2 years after CCP approval.
- Apply early detection, rapid response strategies to attack new infestations before they become large and costly to treat.
- Use the GIS to predict areas at greatest risk of new infestations.
- Conduct a surveillance program for new infestations of invasive plants every 2 years.
- Every 5 years, complete surveys for invasive plants, GPS-map locations, create a baseline map, and collaborate with partners to map records for neighboring lands.
- Monitor change over time by collecting RLGIS cover-type data for all invasive plant species.
- GPS-map and store in the RLGIS anecdotal observations of infestations made by Service staffs while conducting other work activities.

USFWS

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

- Respond promptly to all landowner or other public complaints.
- Map sites of invasive plant treatment each year in the RLGIS.
- Monitor infestation rates and effectiveness of control efforts.
- Share GIS layers of invasive plant infestations with partners.
- Attain help with invasive plants (applications and monitoring) by pursuing additional money through partnerships, grants, and invasive plant programs.
- Communicate with and educate local, state, and federal agencies and the public about invasive plant issues. In a timely manner, make known information about new infestations, effective or ineffective treatment methods, and new treatment options.
- Coordinate invasive plant control by meeting at least once per year with county weed boards, representatives from weed management areas, and other partners to share information and discuss control strategies.
- Address public complaints about invasive plants on Service-owned lands, while using IPM strategies.
- Ensure all seed used to restore habitat is certified weed-free. Avoid purchasing seed from sources known to have violated the weed-free seed regulation.
- Begin habitat management treatments to develop habitat that will be more resilient to invasive plants.

Rationale

Leafy spurge (993,644 acres), Canada thistle (956,335 acres), and absinth wormwood (452,594 acres) are the most widespread and common species infesting lands across North Dakota, as reported by warm-season city weed boards (North Dakota Department of Agriculture 2006). These problem plants can displace native vegetation over large areas and have the ability to form nearly monotypic stands in the absence of management; therefore, these plants threaten native biodiversity (Watson 1985, Bedunah 1992, Trammell and Butler 1995, Svedarsky and Van Amburg 1996, Hutchison 1992). Due to the large acreage of infestation, these three species have been the priority invasive plants on Service lands.

The first step to control is to prevent the introduction, reproduction, and spread of invasive plants. Many of the newer invasive plant and "watch" species were introduced via seed imported from states and countries that have invasive plants. The most common sources are the states of California, Oregon, and Washington and the country of Argentina (Ken Eraas, North Dakota Department of Agriculture, personal

communication, 2007); seed from these locations should be avoided. Wherever possible, all grass seed should be bought from seed grown in North Dakota to minimize the introduction or spread of new invasive plant species.

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

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

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

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

Old Cropland in WPAs

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

Declining Grassland Bird Species

According to Conner et al. (2001), the human impacts to the diversity of the biota of the North American grasslands are likely the most significant of all terrestrial ecosystems on the continent. Specifically, the bird species that use grasslands have shown dramatic and consistent declines (Knopf 1994). According to Knopf (1995) and Rich et al. (2004), as an overall group, grassland birds show higher declines than birds of other North American vegetative associations. Breeding Bird Survey data from 1966–1996 indicates that populations of 13 species of North American grassland birds declined significantly and, conversely, populations of only 2 species increased (Peterjohn and Sauer 1999). It is hypothesized that major contributing factors to this decline are grassland fragmentation and habitat loss. The native sod conversion to cropland directly impacted wetland and grassland birds by reducing and fragmenting the available breeding cover for grassland-nesting species (Sugden and Beyersbergen 1984, Batt et al. 1989). Further, many grassland- and wetland-dependent birds have few alternatives to the Great Plains (Igl and Johnson 1995), whereas birds associated with woody vegetation appear to have larger distributions across the continent (Johnson et al. 1994).

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

Old Cropland Areas

Many of the upland acres associated with district lands were previously cultivated and are referred to as "old cropland." Traditionally, these areas were reseeded to herbaceous mixtures that included

species such as cool-season introduced grasses and legumes (intermediate wheatgrass, tall wheatgrass, alfalfa, or sweetclover) and primarily provided nesting cover for mallards and other ducks. This seed mixture has been referred to as DNC (dense nesting cover). Although a viable mixture that is beneficial on multiple levels, this mixture requires intensive inputs to maintain over the long term. First, DNC has a limited lifespan and provides attractive cover to nesting ducks for perhaps only 6–8 years after seeding and up to 15 years with certain management (Higgins and Barker 1982, Lokemoen 1984).

At the end of the DNC lifecycle, a field is typically cultivated and farmed for 2–3 years, and then reseeded. This leads to a rotation of seeding–managing–farming–seeding into perpetuity. Oftentimes, fields are not reseeded at the prescribed frequencies, which leave decadent, invasive plant-infested uplands across the landscape that are limited in attractiveness to migratory birds. Further, the need to repeat this rotation on a regular basis negatively affects other ecological factors in the surrounding environment. For example, cultivation increases soil erosion, and herbicide use is increased to prepare the seedbed for each new seeding.

Restoration Efforts

As part of this CCP, the nine wetland management districts would restore priority WPAs of old cropland back to native vegetation. These areas would be revegetated with a diversity of native vegetation that, with modest management, would be relatively resistant to infestation by invasive plant species including noxious weeds. This would benefit grassland and wetland birds, because providing habitat that is most similar to the historical vegetative condition likely provides habitat for more grassland-dependent wildlife.

According to Howell (1988), re-creating the elements found in the original communities may be the optimal method for ensuring continued species interactions and natural selection. As an example, Baird's sparrow and Sprague's pipit appear to use short, sparse grass structure and mostly associate with native bunchgrasses, rather than the broad-leaved, introduced species used for DNC mixes (Madden et al. 2000). Further, according to Stewart (1975), and Kantrud and Higgins (1992), marbled godwit and willet typically select native grass cover over tame grass cover.

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

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

Experimentation with native seeding that took place 10–20 years ago in the Drift Prairie and Red River Valley areas of North Dakota usually included three to five, native warm-season grasses. Current research indicates that this may not be an optimal mixture for success of establishment and management. Tilman (1996) states that biological diversity is dependent on the functionality and sustainability of the ecosystem, lending to the thought that grassland restorations should attempt to include diverse seed mixtures. Guo and Shaffer (2006) completed their research in North Dakota, which indicated that the saturation rate for one of their study sites was between 16 and 32 species of native plants.

Inclusion of forbs in native mixtures appears to be necessary in attempts to restore variables such as nutrient cycling and energy flow (Pokorny et al. 2005). Sheley and Half (2006) indicate that seeding a wide range of forbs increases the likelihood that more niches will be filled and facilitates overall survival of the forbs. The use of multiple forbs may help to overcome the temporal weather variations because at least certain species should germinate and respond to the dynamic weather conditions that annually persist (Sheley and Half 2006). More specifically, varying numbers and combinations of species in differing developmental phases may be a requirement for a native seeded area to achieve the best possible results. It is likely too that, as a stand matures, a diverse mixture may play an important role in the belowground community by providing a well-developed root system for sustainability over time (Guo and Shaffer 2006). Further, another benefit to establishment of native vegetation is the suggestion that species-rich seed mixtures may reduce infestation of invasive plants in restored grasslands (Blumenthal 2003, Carpinelli 2001, Pokorny 2002, Sheley and Half 2006, Tilman 1996). In a study by Pokorny et al. (2005), they determined that native forbs resisted invasion by spotted knapweed better than grasses. The overall

theory in the literature indicates that seeding a diverse seed mixture increases the inclusion of various functional groups among plant species. With extremely limited data on the reestablishment of native flora mixtures in North Dakota, there is a need to begin long-term research in this area. Ensuring science-based management for reseeding these areas is of chief importance to the perpetuation of the grassland resources.

Priority WPAs

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

Integrity Policy

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

Old Cropland in WPAs Objective

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

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

USFWS

Phalarope chicks find refuge in nesting cover.

of native grasses and forbs across seeded areas considers the management challenges associated with control of invasive plants, while targeting a reasonable percentage for maintaining dominance of seeded species. Monitoring these seeded sites is critical for measuring the acreage and percentage listed in the objective.)

Strategies

- Identify priority restoration sites in WPAs based on habitat blocks of wetlands and grasslands that are greater than 125 acres.
- Use appropriate site preparation techniques to ensure a weed-free seedbed, which may include a combination of cropping and chemical fallowing using glyphosate-based herbicide.
- Develop a seed mixture with a nearly equal cool-season to warm-season grass and forb component.
- Drill or broadcast the native seed mixture.
- Use a variety of tools in postseeding management, including clipping, prescribed fire, prescribed grazing (see appendix D), and necessary IPM strategies.
- Monitor results of vegetation establishment.
- To ensure that grassland restoration efforts are science-based, conduct research on selected newly seeded sites to determine the establishment success of species included in the mixtures. From this data, within 15 years of CCP approval,

develop a decision matrix to help with selecting optimal species to use in grassland restorations.

– To ensure effectiveness of native seed mixes containing grasses and forbs, conduct research on wildlife response that focuses on Lepidoptera and grassland-dependent migratory birds (waterfowl, shorebirds, and songbirds) within 10 years of CCP approval.

Rationale

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

Dense Nesting Cover in WPAs

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

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

DNC tracts must also be managed to maintain optimal vigor throughout the seeding's lifecycle. Especially within cropland-dominated areas, invasive plant problems will persist and require appropriate treatments to control (see the invasive plant objective). Other management methods such as grazing (see appendix D) and fire may also be used in certain situations to stimulate the height and density of DNC mixtures. Additionally, mechanical methods such as haying may also benefit seedings by removing the litter layer. Finally, the most productive stands of DNC are those that are reseeded approximately every 10–15 years, including appropriate crop rotation frequency as seedbed preparation (Duebbert et al. 1981).

Dense Nesting Cover in WPAs Objective

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

Strategies

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

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

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

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

– Control invasive plants using IPM strategies (see the invasive plants objective).

Rationale

Old cropland tracts that have not begun the seedbed preparation process would be maintained in an idle state that generally consists of a predominance of introduced, cool-season grass species. Before seedbed preparation for seeding to native grass, these sites are of relatively low priority. Management efforts can be better directed toward higher priority upland areas such as native prairie, tracts already reseeded to native grass, and tracts being prepared for native reseeding. Some studies have indicated that, despite

the presence of introduced, cool-season perennial grass cover, DNC would likely support multiple plant species and generalist birds including upland-nesting ducks (Mark Sherfy, USGS, unpublished data).

Invasive and Planted Woody Vegetation in WPAs

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

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

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

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

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

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

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

Historically, most of the WPAs in the state were part of a grassland-dominated system, where fire, grazing, and drought restricted natural tree growth to limited areas (Higgins 1986). Now, planted trees and shrubs occur at many WPAs. Although most woody plantings existed before Service ownership of these lands, the Service did some planting after acquisition. Planted trees and shrubs such as green ash, cottonwood, and

buffaloberry are native to North America; however, many others are nonnative species such as caragana, Russian olive, and Siberian elm. Most of these plantings are considered unnatural components of historical habitat. Additionally, nonnative species of woody vegetation such as Russian olive and Siberian elm are invasive and readily spread from both Service-owned and non-Service-owned plantings into new areas.

Preventing the encroachment and planting of woody vegetation into grassland systems contributes significantly to the recovery of grassland bird populations (Herkert 1994). Several sources indicate that the elimination and reduction of existing invasive and planted woody vegetation would benefit most grassland-dependent bird species (Bakker 2003, Grant et al. 2004, Patten 2006, Shaffer et al. 2003, Naugle and Quamen 2007, Johnson and Temple 1990, Sovada et al. 2005). Although many woodland bird species might nest in planted woodlands, few are of management concern. This suggests that the loss of planted woodlands would have negligible effects on these species whose populations are stable or expanding. In addition, tree plantings on the prairie fail to provide habitat for forest birds that are of management concern (Kelsey et al. 2006).

Considering all of this data, systematic removal of invasive and planted woody vegetation from Service lands is central to improvement of habitat for grassland-dependent birds. As described in the objective, the HAPET developed a grassland bird conservation area matrix (Niemuth et al. 2005), which highlights significant blocks of grassland (see figure 9 in chapter 4, map of the grassland bird conservation area matrix). Sites for tree removal at WPAs are prioritized based on this matrix, with the majority of removal acres existing in the areas with the largest blocks of grass (see figure 14, map of grassland priority zones). Reducing fragmentation in these core areas (see figure 9 in chapter 4, map of the grassland bird conservation area matrix) has the potential to provide the most benefit to grassland-dependent birds. In addition, the proposed removal of woody species >3.28 feet tall should target the removal of larger shrubs and trees that are problematic across Service lands, rather than the native, small shrubs such as prairie rose, lead plant, and western snowberry that are an important component of grassland composition.

Invasive and Planted Woody Vegetation in WPAs Objective

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

Strategies

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

USFWS

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

Rationale

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

Today, although numerous patches of native woodlands still exist in the northern Great Plains, once large expanses of nearly treeless prairie are now intermixed with cropland and scattered small (less than 5 acres) linear and block-shaped tree plantings (also commonly referred to as windbreaks, shelterbelts, and tree belts). Baer (1989) estimated that these plantings cover 3% of the land area in the state. Tree plantings are designed to reduce soil erosion from croplands (Baer 1989) and are viewed by many as striking landscape features that symbolize settlement of the western

United States. However, they also further fragment remaining grasslands by creating abrupt boundaries that increase edge effects (O'Leary and Nyberg 2000, Winter et al. 2000, Ribic and Sample 2001). Additionally, the suppression of ecological processes such as fire and grazing has allowed an increase in the encroachment of woody plants into grasslands (Bakker 2003). These factors have been linked to the deterioration of grassland bird populations, which are declining faster and more consistently than any other group of North American birds (Samson and Knopf 1994, Herkert 1995). Research indicates that native grassland birds need large, uninterrupted tracts of treeless grasslands (Herkert 1994, Winter et al. 1999, Bakker et al. 2002). The literature overwhelmingly indicates that invasive and planted trees in prairie landscapes often negatively affect a variety of bird groups (Bakker 2003). Specifically, trees on the prairie are correlated with negative consequences to ducks (Rumble and Flake 1983), wetland birds other than ducks (Naugle et al. 1999), prairie grouse (Hanowski et al. 2000, Niemuth 2000), grassland songbirds (Winter et al. 2000, Grant et al. 2004), and ring-necked pheasant (Snyder 1984, Schmitz and Clark 1999).

Turtle Mountains Habitat

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

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

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

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

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

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

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

Turtle Mountains Habitat Objective

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

Strategy

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

Rationale

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

Threatened and Endangered Species

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

Piping Plover

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

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

In any given year, 50%–80% of the piping plovers that nest in the United States' portion of the northern Great Plains do so in an eight-county area stretching from central North Dakota to northeastern Montana (see figure 10, map of the core area for piping plover, in chapter 4). Plovers in this core area breed on barren shorelines associated with alkali lakes

Edward Henry/USFWS

Piping plover.

and wetlands. Unlike the Missouri River, alkali lake habitat is relatively more stable within and between years and it is free of the social, political, and economic conflicts that plague piping plover recovery along the river. In addition, piping plover productivity is more stable from year to year on alkali lakes, whereas the Missouri River is a "boom or bust" environment for plovers (Adam Ryba, piping plover coordinator, USFWS, North Dakota, personal communication).

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

Piping Plover Objective 1

Over a 15-year period, annually protect piping plover nests found within the Audubon, Crosby, and Lostwood wetland management districts, and monitor the success of protected nests and hatched young. Strive for fledging rates of >1.24 per pair in the Alkali Lake core area to stabilize the northern Great Plains population (Larson et al. 2002), in an attempt to reach a population goal of 2,300 breeding pairs in the United States (USFWS 1994a).

Strategies

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

Rationale

The Service listed the northern Great Plains population of piping plovers as threatened in the United States due to a poorly understood decline in abundance. Mabee and Estelle (2000) suggested that nest predation is a major problem limiting piping plover nest success throughout their range. However, according to Murphy et al. (2003), predators can successfully be deterred from depredation of eggs of piping plovers by placing large (10-foot diameter) mesh exclosures (cages) over individual nests. Recruitment has improved with these cages in the northern Great Plains (Murphy et al. 2003). Service staff plans to erect these exclosures over piping plover nests that are encountered within the boundaries of the Alkali Lake core area, not limited to Service lands, when permission is granted on private property. Exclosures placed after one or more eggs have been laid in the nest bowl have resulted in <2% nest abandonment in the northwestern portion of the state and northeastern Montana (Adam Ryba, piping plover coordinator, USFWS, North Dakota, personal communication).

Piping Plover Objective 2

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

Strategies

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

Rationale

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

Piping Plover Objective 3

Over a 15-year period, continue the International Piping Plover Census for the presence of piping plovers in 100% of the wetland basins across the Audubon, Crosby, and Lostwood wetland management districts, which have historical nesting habitat for piping plovers.

Strategy

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

Rationale

Beginning in 1991, biologists throughout North America collaborated in a monumental effort known as the International Piping Plover Census (Haig and Plissner 1993). Plovers nest on open gravel patches and avoid areas dominated by mud, heavy cobbles, or dense vegetation (Whyte 1985, Prindiville-Gaines and Ryan 1988). Both breeding and wintering habitats are censused in an effort to (1) establish benchmark population levels for all known piping plover sites, (2) survey additional potential breeding and wintering sites, and (3) assess the current status of the species relative to past population estimates.

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

Whooping Crane

Each spring and fall, endangered whooping cranes use wetlands and agricultural fields within all the districts as migratory stopover areas en route to their summer and winter grounds (see figure 11, map of whooping crane sightings, in chapter 4).

Ryan Hagerty/USFWS

Whooping crane.

Whooping Crane Objective

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

Strategies

- Post warning signs in the areas being used by whooping cranes.
- Contact the local media (radio, television, newspapers), upon confirmed observations, when it appears that whooping cranes will stay in the area for multiple days and where hunting activity exists or is likely.
- Actively patrol areas being used by whooping cranes to periodically monitor their whereabouts and inform the public of their presence.
- On a case-by-case basis for each occurrence of a whooping crane, consider the merits of a possible voluntary hunting closure on private lands where whooping crane use is occurring regularly. If this is deemed appropriate, contact the necessary landowner(s) to discuss a possible voluntary closure in accordance with the whooping crane contingency plan (USFWS 2001).

Rationale

The whooping crane is one of the most endangered birds in North America. The only naturally occurring wild, migratory population of whooping cranes in the world numbers fewer than 215 individuals (Tom Stehn, USFWS, personal communication).

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

Dakota Skipper

The Dakota skipper butterfly is a species of concern whose numbers have decreased. Its current distribution straddles the border between tall-grass prairie and mixed-grass prairie. The Dakota skipper occurs in two types of habitat (USFWS 2002):

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

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

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

Dakota Skipper Objective

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

Strategies

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

Rationale

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

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

Predator Management in WPAs

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

Predator–Prey Dynamics

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

After settlement, the near elimination of the gray wolf from this area had a profound effect on mesopredators (intermediate predators), especially canids such as the red fox and coyote. Wolves are territorial and intolerant of other canids; thus, fox and coyote abundance was limited and somewhat controlled by wolves. However, after the extermination of gray wolves from the prairie, fox and coyote populations grew. Subsequently, coyotes were targeted with a bounty and populations were driven down. This increased the abundance and distribution of the red fox, which adversely affected waterfowl populations because red fox are a primary predator of nesting waterfowl and eggs (Sargeant et al. 1993, Sovada et al. 1995). Populations of other species that were scarce and narrowly distributed expanded greatly as well, including raccoon and American crow.

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

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

Waterfowl Nest Success

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

USFWS

A canvasback hen keeps a watchful eye on her ducklings.

In the late 1980s and early 1990s, this area experienced widespread drought, which reduced the already limited wetland habitat available to waterfowl and caused significant reductions in productivity (Samson et al. 1998). Such conditions resulted in poor nesting efforts and success and low survival rates of young (Austin 1998). Varying precipitation characteristic of the area greatly influenced the number and distribution of waterfowl despite restoration and regulatory practices that were becoming more prominent across the landscape (Batt et al. 1989). As an example, before the drought years, most of the area encountered a wet cycle that began in late 1993 and continued through the 1990s. Most populations of waterfowl appeared to recover quickly at the onset of the wet years, with obvious reasons being (1) the increased quality of readily available wetland habitat (Austin 1998), and (2) the large number of cropland acres (about 4.8 million acres in the Prairie Pothole Region) that were converted to perennial grass through the Conservation Reserve Program (Kantrud 1993). Greenwood and Sovada (1996) indicate that other factors likely contributed to the large and rapid recovery of waterfowl following the drought years.

Specifically, low red fox populations likely were a significant factor in the increased nest success in ducks, while duck survival was also enhanced by the low mink numbers (Austin 1998). The landscape conditions were ideal for a boom in waterfowl populations—favorable water conditions, reduced predator pressure, and increased availability of upland cover. However, these conditions that favor increased duck numbers appear to be in synchronization for only a short time following the drought years. Habitats highly dominated by agriculture, which are commonplace across the Prairie Pothole Region of North Dakota, may only generate high duck production for 2–3 years out of 10 (Lynch et al. 1963).

Predator Management

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

In addition to predation of waterfowl, predation of songbirds and other nongame birds is an important cause of nest failure (Martin 1988, 1995). Predator communities in fragmented landscapes such as the Prairie Pothole Region do not provide safe nesting sites for songbirds (Dion et al. 2000). An independent group of ornithologists (Berkey et al.1993) stated that the following species would benefit from predator fence exclosures designed to reduce the impact of medium- to large-sized mammals: sedge wren, common yellowthroat, dickcissel, clay-colored sparrow, lark bunting, Savannah sparrow, song sparrow, bobolink, and red-winged blackbird. Berkey et al. (1993) concluded that predator barriers (fences) are very beneficial to larger nongame migratory birds such as northern harrier, short-eared owl, and American bittern. Additionally, Helmers and Gratto-Trevor (1996) determined that predation causes a significant impact on shorebird nest success, especially in southern areas of their breeding range. Witmer et al. (1996) indicate that two factors—protection and restoration of habitat and predator management—may curtail listing and extinction rates of bird species.

John J. Mosesso/National Biological Information Infrastructure

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

Predator Management in WPAs Objective

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

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

Strategies

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

Rationale

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

The Red River Valley, Drift Prairie, and eastern portions of the Missouri Coteau lie within a cropland-dominated landscape. The cropland-dominated landscape is an area altered to such a degree that, despite perpetual habitat protection of WPAs, consistently maintaining recruitment of migratory birds above maintenance levels is not possible. It is likely that this area consists of less than 20%–40% grassland cover, with the majority of the landscape in agricultural commodity production. These intensively cultivated areas cannot sustain nest success for stable populations of waterfowl species. In addition, waterfowl are more susceptible to predation in cultivated areas. In these situations, predator management is extremely beneficial to nesting waterfowl.

Wildlife Disease

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

Wildlife Disease Objective

Annually review and update disease contingency plans.

Strategies

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

Rationale

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

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

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

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

Monitoring and Research Goal

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

Monitoring and Research

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

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

Monitoring and Research Objective 1

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

Strategies

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

Rationale

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

Monitoring and Research Objective 2

Within 2 years of gathering baseline floristic composition data (see Monitoring and Research Objective 1), each district will complete a habitat management plan.

Strategy

- Develop specific habitat goals and objects for priority management units based on data from baseline surveys.

Rationale

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

Monitoring and Research Objective 3

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

USFWS

A basic inventory of habitats is essential.

Strategies

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

Rationale

In 2005, the Dakota Working Group's grasslands monitoring team put together a grassland habitat management/monitoring survey to assess management issues and threats to grasslands in Service lands. The survey resulted in identification of smooth brome invasion as the most common threat to native prairie. Following a 2-day technical meeting, the "Brome Summit," to discuss the ecology and control strategies for smooth brome, the grasslands monitoring team started the smooth brome research project. This project is a large-scale investigation of the efficacy and effectiveness of various management treatments used to promote recolonization by native species. The project has the potential to involve all districts and refuges in North Dakota and South Dakota that have intact native prairie or native sod never broken and cropped. The grassland monitoring team successfully competed for USGS Science Support Program funding to complete vegetation inventories of plant communities on native prairie tracts for most districts and refuges in North Dakota and South Dakota during the 2007 and 2008 field seasons. Completion of all inventories will provide a baseline for monitoring changes and evaluating success of management actions, as well as be used to develop a monitoring plan.

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

Monitoring and Research Objective 4

Over the 15-year life of the CCP, begin at least one monitoring or research project every 2 years that investigates needs identified in Monitoring and Research Objective 3, to increase knowledge about effectiveness of techniques to achieve habitat and wildlife goals and objectives.

Strategies

- Develop a research team with responsibility to develop study plans, apply for funding, and begin the selected research.
- Participate in large-scale monitoring and research projects by providing on-the-ground study plots or indirectly by providing equipment or staff for data collection.

USFWS

Waterfowl banding allows Service personnel to track bird movement.

- Design and conduct issue-driven research.
- Focus wildlife population research on assessments of species–habitat relationships.
- Promote research and science priorities within the broader scientific community. Ensure that cooperative research addresses information needs identified in habitat management goals and objectives.
- Annually complete progress reports that summarize the current year's monitoring and research efforts. If applicable, include discussion on past and current techniques that did or did not produce expected results.

Rationale

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

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

- Ensure that predator management in "blocks" does not negatively affect nongame migratory birds—research would determine the nest success of breeding shorebirds and ground-nesting songbirds on controlled and trapped sites within 15 years of CCP approval.
- Ensure functionality of restored temporary and seasonal wetlands—conduct research on appropriate levels of sediment removal in wetlands.

- Ensure that grassland restoration efforts are science based—conduct research on newly seeded sites that focuses on the establishment success of species included in the mixtures. From these data, within 15 years of CCP approval, develop a decision matrix for selection of optimal species to use in grassland restorations.
- Ensure the effectiveness of native seed mixes that contain grasses and forbs—conduct research on wildlife response, focusing on Lepidoptera and grassland-dependent migratory birds (waterfowl, shorebirds, and songbirds) within 10 years of CCP approval.
- Identify restorable prairie tracts using objective criteria that focuses on (1) contemporary composition, emphasizing diversity and prevalence of native plants, and (2) landscape area and connectivity to adjacent grasslands, especially native prairies (large tracts of high-quality native prairie provide the most suitable habitat for grassland birds, especially those species of significant conservation concern)—conduct research in the next decade that investigates threshold levels for infestation of invasive plants (Much of the native prairie at J. Clark Salyer Wetland Management District may have passed a threshold of infestation by invasive plants, such that restoration of a modestly diverse, native herbaceous flora is an unrealistic goal. However, maintenance or restoration of a native, biological diverse flora may be possible on some remaining tracts.)
- Review the list of seven current research needs identified by Naugle et al. (2000), which provides ideas for development of a prioritized research list.

Cultural Resources Goal

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

Cultural Resources Objective 1

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

Strategy

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

Cultural Resources Objective 2

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

Strategies

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

Rationale

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

Visitor Services Goal

Provide visitors with quality opportunities to enjoy hunting, fishing, trapping, and other compatible wildlife-dependent recreation on Service-owned lands and expand their knowledge and appreciation of the prairie landscape and the National Wildlife Refuge System.

Hunting

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

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

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

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

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

Hunting Objective

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

Strategies

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

USFWS

Waterfowl hunting is popular at many WPAs.

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

Rationale

The popularity of hunting at the WPAs and WDAs is increasing and, as a result, crowding is becoming an issue that affects the quality of the hunting experience. Crowds of hunters lead to unsafe hunting conditions and compromised harvest opportunities as game is dispersed.

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

To ensure a good-quality hunting experience, it would be essential to maintain healthy populations of resident wildlife and migratory birds through habitat management. There is a growing demand for hunting opportunities accessible to hunters with special needs such as wheelchair-bound hunters. Hunting by young people is already occurring, because the WPAs and WDAs are managed in accordance with the state regulations that include hunt days for youths.

Fishing

The districts' abound with fishing opportunities. Fishing generates tremendous economic benefit through taxes on fishing equipment. Revenues paid by anglers are distributed by the Service to North Dakota's state government and spent by state resource agencies on aquatic habitat enhancement, fishing and boating access, education, and invasive plant species eradication.

Fishing Objective

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

Strategies

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

Rationale

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

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

Wildlife Observation and Photography

Wildlife observation and photography is available to visitors all year at the WPAs and WDAs. Due to the vast distribution of districts throughout North Dakota, the public from major cities of the state and Canada seize on the tremendous opportunities for viewing wildlife resources. Because of the relatively small size of many WPAs and WDAs, wildlife observation and photography can usually be done from rural roads adjoining the boundaries of district lands.

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

Wildlife Observation and Photography Objective

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

Strategies

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

Bob Savannah/USFWS

- Incorporate district lands into the birding drives by promoting WPAs and WDAs as stops. Seek out partners to establish and promote birding drives. Provide support materials to guide visitors through the state and direct them to key birding spots.
- Host bird identification events in conjunction with International Migratory Bird Day in May.
- Develop website-based observation materials such as bird lists and information, maps, and web cams.
- Where feasible, develop a simple map for each district's visitor center or contact station where visitors can record what they saw and where (for example, a laminated map that people can write on with a dry-erase marker or magnet board).
- Where feasible, provide a computer kiosk where visitors can access birding information (for example, songs, using Thayer birding software).

Rationale

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

Environmental Education and Interpretation

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

Appendix D contains the draft compatibility determination for environmental education and interpretation.

Environmental Education and Interpretation Objective

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

Strategies

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

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

Rationale

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

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

Visitor Service Facilities

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

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

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

Visitor Services Facilities Objective

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

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

Strategies

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

Rationale

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

Trapping

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

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

Trapping Objective

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

Strategy

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

Rationale

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

Partnerships Goal

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

Partnerships

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

The Service assigns personnel to the Partners for Fish and Wildlife Program (Partners Program), which is an internal Service partner that works with neighboring private landowners. This program helps with restoration and enhancement of habitat to benefit federal trust species, while also helping Refuge System units through a landscape-scale approach to conservation. The Partners Program provides technical assistance to private landowners to give them the information they need to apply for other habitat improvement programs. In addition, program personnel work with private landowners interested in perpetual conservation easements with the Service to maintain wetland and grassland ecosystems for future generations. Private lands adjacent to Refuge System lands benefit species that require larger landscapes for their survival. These partnerships benefit many sensitive fish and wildlife species.

Partnerships Objective

Join a wide range of partners to support and promote awareness of the Refuge System and foster an appreciation of the grassland, prairie pothole ecosystem.

Strategies

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

Rationale

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

Operations Goal

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

Staff and Volunteers

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

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

Volunteers for the districts are

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

Staff and Volunteers Objective

Within 3 years of CCP approval, identify strategic locations to station outdoor recreation planners to coordinate programming among North Dakota's wetland management districts and national wildlife refuges. Throughout the life of the plan, as needed, increase law enforcement staff to oversee the expanded programs and to work with NDGF. Throughout the

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

Strategies

- Work with the North Dakota working group to determine strategic locations for placement of additional staff.
- Research methods for recruiting volunteers. Determine what other districts have done to attract and retain volunteers. If possible, tap into existing volunteer networks to recruit volunteers. Determine incentives or benefits for volunteers (for example, privileged access, amenities, interagency annual parks pass).
- Develop "friends groups" to help each district (except for Audubon and Chase Lake wetland management districts, which already have "friends groups").

Rationale

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

6.4 Funding and Staff

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

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

6.5 Step-down Management Plans

The CCP for the nine districts is a broad umbrella plan that (1) outlines general concepts and objectives for habitat, wildlife, visitor services, cultural resources, and partnerships, and (2) guides management of the districts for the next 15 years.

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

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

Plan Type	*Completion Year*	*Revision Year*
Fire management plan	2008	2013
Grassland management plan	—	2011
Habitat work plan (annual)	2008	2009
IPM plan	2005	2010
Law enforcement plan	—	2013
Predator management plan	2004	2010
Safety plan	2006	2011
Water management plan (annual)	2007	2008

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

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

Table 14. Step-down Management Plans for Chase Lake Wetland Management District, North Dakota.

Plan Type	*Completion Year*	*Revision Year*
Fire management plan	2008	2013
Grassland management plan	—	2011
Habitat work plan (annual)	2008	2009
IPM plan	2005	2010
Law enforcement plan	—	2013
Predator management plan	2004	2010
Safety plan	2006	2011
Water management plan (annual)	2007	2008

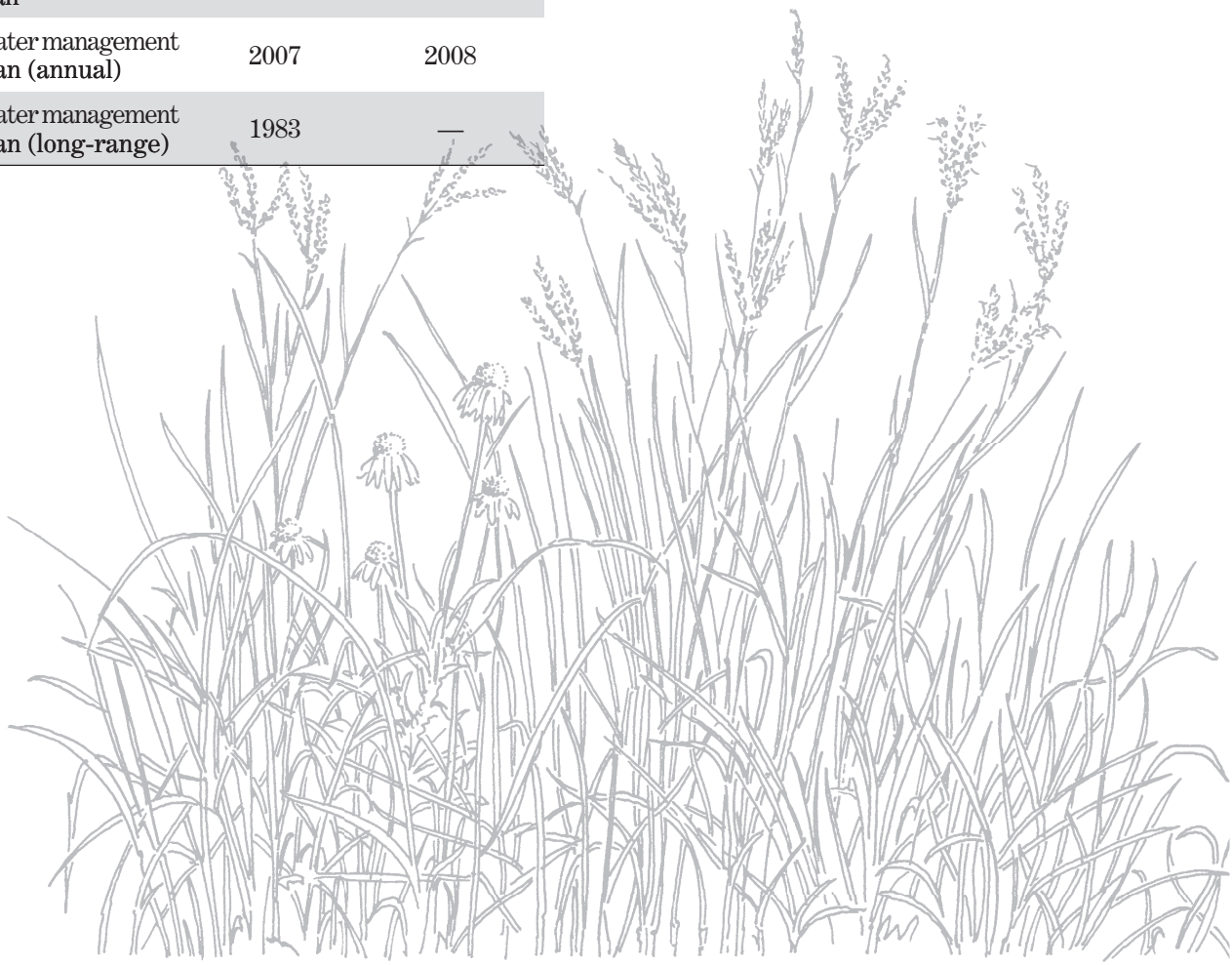


Table 15. Step-down Management Plans for Crosby Wetland Management District, North Dakota.

Plan Type	*Completion Year*	*Revision Year*
Fire management plan	2000	2008
Grassland management plan	2007	2008
Habitat work plan (annual)	2007	2008
IPM plan	—	2008
Law enforcement plan	—	2013
Predator management plan	2004	2010
Safety plan	1995	2011
Sign plan	1987	—

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

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

Table 17. Step-down Management Plans for J. Clark Salyer Wetland Management District, North Dakota.

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

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

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

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

Plan Type	*Completion Year*	*Revision Year*
Fire management plan	2000	2008
Grassland management plan	2007	2008
Habitat work plan (annual)	2007	2008
IPM plan	—	2008
Law enforcement plan	—	2013
Predator management plan	2004	2010
Safety plan	1995	2011
Sign plan	1987	2011
Water management plan (annual)	2007	2008

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

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

6.6 Monitoring and Evaluation

Adaptive management is a flexible approach to long-term management of biotic resources. The results of ongoing monitoring activities and other information are evaluated to guide adaptive management over time. Adaptive management is a process by which projects are carried out within a framework of scientifically driven experiments to test the predictions and assumptions outlined in the final CCP (see figure 16, the adaptive management process).

To apply adaptive management, specific survey, inventory, and monitoring protocols would be adopted for each of the nine wetland management districts. The habitat management strategies would be systematically evaluated to determine management effects on wildlife populations. This information would be used to refine approaches and determine how effectively the objectives are being accomplished.

If monitoring and evaluation indicate undesirable effects for target and nontarget species or communities, the management projects would be altered accordingly. Subsequently, the Service would revise the CCP.

6.7 Plan Amendment and Revision

The Service will annually review the final CCP to determine the need for revision. A revision will occur when significant information becomes available. The final CCP will be supported by detailed step-down management plans to address the completion of specific strategies in support of the wetland management districts' goals and objectives. Revisions to the CCP and the step-down management plans will be subject to public review and NEPA compliance.

At a minimum, the Service will evaluate the final CCP every 5 years and revise it after 15 years.

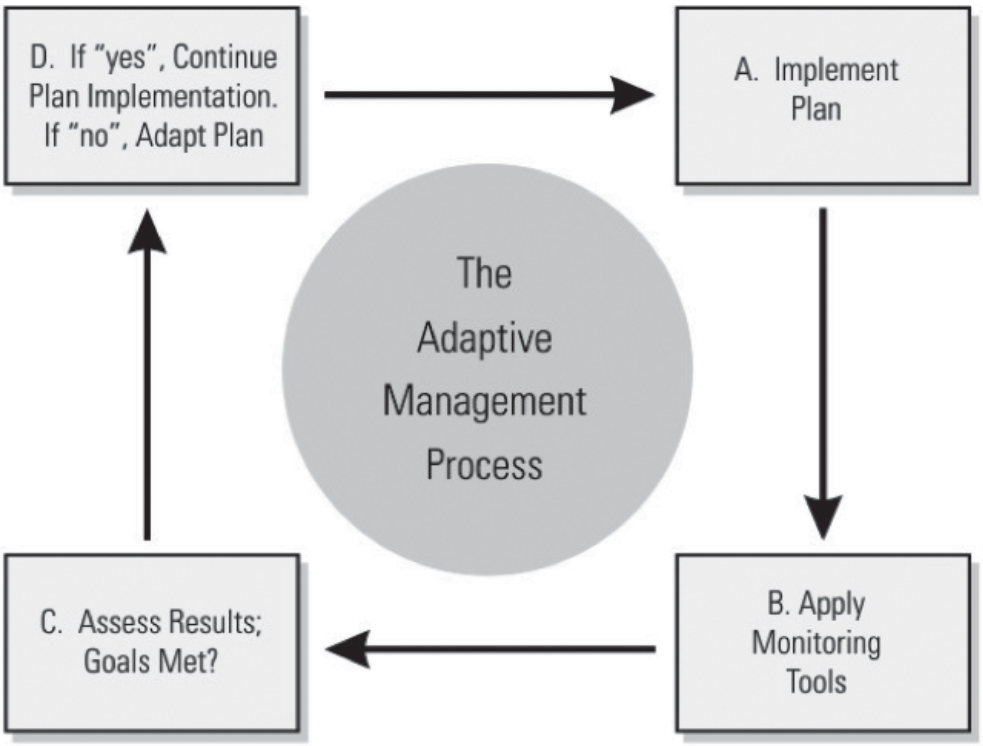


Figure 16. The adaptive management process.