# Environmental Assessment

# Eastern South Dakota Fire Management Plan

*Administrative Units Covered:*

*Huron Wetland Management District*

*Lake Andes National Wildlife Refuge Complex (Excluding Tripp County)*

*Madison Wetland Management District*

*Sand Lake National Wildlife Refuge Complex (Excluding Corson and Dewey Counties)*

*Waubay National Wildlife Refuge Complex*

**South Dakota**

**January 20, 2017**

**Prepared by**


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Madison Wetland Management District
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Sand Lake National Wildlife Refuge Complex
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Waubay National Wildlife Refuge Complex
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Waubay, SD 57273
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*Prescribed fire on Raysby WPA, Lake Andes NWRC USFWS*

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

The mission of the National Wildlife Refuge System is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans.

# Environmental Assessment

## for

## Eastern South Dakota Fire Management Plan

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**Huron Wetland Management District**

**Lake Andes National Wildlife Refuge Complex**

**Madison Wetland Management District**

**Sand Lake National Wildlife Refuge Complex**

**Waubay National Wildlife Refuge Complex**

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**United States Fish and Wildlife Service, Region 6**

**JANUARY 20, 2017**

*Eastern South Dakota grasslands. USFWS*

# Acronyms Used in this Document

| | |
|---|---|
| CAR | communities at risk |
| CCP | comprehensive conservation plan |
| CEQ | Council on Environmental Quality |
| CFR | Code of Federal Regulations |
| COI | communities of interest |
| CWPP | community wildfire protection plan |
| DENR | Department of Environment and Natural Resources |
| DOI | Department of the Interior |
| EA | environmental assessment |
| EMDS | Ecosystem Management Decision Support |
| EPA | US Environmental Protection Agency |
| ESA | Endangered Species Act |
| FMP | fire management plan |
| FONSI | finding of no significant impact |
| FPZ | fire protection zone |
| HFR | hazardous fuels reduction |
| NAAQS | National Ambient Air Quality Standards |
| NEPA | National Environmental Policy Act |
| NFP | National Fire Plan |
| NWR | national wildlife refuge |
| NWRC | national wildlife refuge complex |
| PM | particulate matter |
| SFMP | spatial fire management plan |
| USC | United States Code |
| WMD | wetland management district |
| WPA | waterfowl production areas |
| WUI | wildland urban interface |

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Appendix B: Dakota Skipper Conservation Guidelines and

Poweshiek Skipperling Status Assessment and Conservation Guidelines https://www.fws.gov/mountain-prairie/pressrel/documents/ESD_EA/Appendix_B_DakotaSkipperConservationGuidelinesJan2015Update.pdf

Appendix C: The National Bald Eagle Management Guidelines https://www.fws.gov/northeast/ecologicalservices/eaglenationalguide.html

Appendix D: Region 6 Cultural Resource Project Review Guidancehttps://www.fws.gov/mountain-prairie/pressrel/documents/ESD_EA/Appendix_D_%20Req_Cult_Res_Rev_Rx_Burn_Version.pdf

Appendix E: Tribal Involvement https://www.fws.gov/mountain-prairie/pressrel/documents/ESD_EA/Appendix_E_Tribal_Consultation.pdf

Appendix F: Public Involvement (to be completed after review period) https://www.fws.gov/mountain-prairie/pressrel/documents/ESD_EA/EA_Comment_%20Form_%20tbl.pdf

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# Chapter 1. **Purpose and Need**

## 1.1 **Introduction**

The United States Fish and Wildlife Service ("Service") is proposing to develop and implement a fire management plan (FMP) for five Service administrative units in South Dakota (SD) that are contained in the Great Plains Zone of Service Region 6 (Figure 1). The FMP will specify fire management direction for the National Wildlife Refuges (NWRs) and Wetland Management Districts (WMDs) that are contained in this document. The fire management direction is described in detail through a set of goals, objectives, and strategies. The administrative units included in this environmental assessment (EA) are:

1. Huron WMD
2. Madison WMD
3. Lake Andes NWR Complex (NWRC), which includes the following units:
   - Karl E. Mundt National Wildlife Refuge (NWR)
   - Lake Andes NWR
   - Lake Andes WMD (excluding Tripp County)
4. Sand Lake NWRC, which includes the following units
   - Sand Lake NWR
   - Sand Lake WMD (excluding Corson and Dewey Counties)
5. Waubay NWRC, which includes the following units
   - Waubay NWR
   - Waubay WMD

### 1.1.1 **Wildland Fire Terminology**

The term 'wildland fire' encompasses two categories of fire, wildfire and prescribed fire.

Wildfires include two sub-categories, naturally occurring wildfires and human caused wildfires. Under all alternatives discussed in this EA, all human-caused wildfires and all escaped prescribed fires are suppressed.

The following definitions apply throughout this document:

- **Wildland Fire**. Any non-structural fire that occurs in vegetation or natural fuels in the wildland. Wildland fire includes prescribed fire and wildfire as outlined above.
- **Prescribed Fire.** Any fire intentionally ignited by management actions in accordance with applicable laws, policies, and regulations to meet specific objectives.
- **Wildfire.** An unplanned, unwanted fire in the wildland - including unauthorized human-caused fires, escaped prescribed burn projects, and all other wildland fires where the objective is to put the fire out.

- **Suppression**. Management action to extinguish a fire or confine fire spread beginning with its discovery.

### 1.1.2 Fire Management Planning Policy

Department of the Interior (DOI) and Service policy requires that every area with burnable vegetation must have an approved FMP (DOI Manual Part 620 DM 1.4 and Service Manual 621 FW 1.10). The FMP must meet agency policy and guidance outlined in the following:

- Department of Interior Manual Part 620 DM 1
- Service Manual 621 FW 1
- Service Fire Management Handbook (revised annually)
- Interagency Standards for Fire and Fire Aviation Operations (revised annually) (also known as Red Book)
- A National Cohesive Wildland Fire Management Strategy (WFLC 2014)
- Guidance for Implementation of Federal Wildland Fire Policy (USDI and USDA 2009)

Among other policies, the FMP must provide for firefighter and public safety while it adheres to the DOI policy stated in 620 Department Manual 1 by giving full consideration to the use of wildland fire as a natural process during the fire management planning process.

A FMP identifies and integrates all wildland fire management and associated activities within the context of an approved land or resource management plan (USDI and USDA 2016) and associated NEPA document(s). For the Service's Refuge System, the land management plan is known as a Comprehensive Conservation Plan (CCP) and a FMP is then stepped-down plan from a CCP. Within the FMP, operational plans, including but not limited to preparedness plans, preplanned dispatch plans, fuels treatment plans, and prevention plans, help to ensure that wildland fire management goals and objectives are coordinated (USDI and USDA 2016).

A FMP needs to be periodically reviewed and/or revised. A FMP is dynamic and reflects current situations and policies; therefore, to maintain currency, the fire management plan is periodically reviewed using a nationally established review process. Minor plan updates are accomplished through an amendment added to the plan and signed by the local agency administrator and servicing fire management officer.

A FMP can be revised at any time; however, revisions are required following the completion or revision of a CCP or when significant changes occur. FMP revisions require the plan to be reviewed by the Regional Office and signed by the Regional Director. Refer to the most recent version of the Service's *Fire Management Handbook* (FMH) for current Service policy on FMP reviews and/or revisions.

The *Federal Wildland Fire Management Policy and Program Review – Final Report* (USDI and USDA 1995*)* provides guiding principles that are fundamental to the success of the federal wildland fire management program and implementation of review recommendations. These recommendations include federal wildland fire policies in the areas of safety, planning, wildfire, prescribed fire, preparedness, suppression, prevention, protection priorities, interagency cooperation, standardization, economic efficiency, wildland/urban interface, and administration and employee roles. The *Review and Update of*

*the 1995 Federal Fire Management Policy* (USDI et al. 2001) addressed 17 distinct items, the foremost being safety; all FMPs and fire management activities must reflect this commitment.

In 2009, implementing Federal wildland fire policy changed with the release of *Guidance for Implementation of Federal Wildland Fire Management Policy* (USDI and USDA 2009). The 2009 Implementation Guidance provides for a full range of responses and the opportunity for wildland fires to be managed for multiple objectives. The guidance allows portions of a wildland fire to be managed using different strategies and these strategies can change through time. This represents a significant departure from past fire management practices. In addition, the guidance now contains only two types of wildland fires; wildfires (unplanned ignition or prescribed fires that are declared wildfires) and prescribed fires (planned ignition).

Wildfires are managed wholly or in part to benefit resource objectives if these strategies are addressed in the FMP and associated land management plans. Management objectives can change as the fire spreads across the landscape.

Responses to wildland fire will be coordinated across levels of government regardless of the jurisdiction at the ignition source. Initial action on human-caused wildfire will be to suppress the fire at the lowest cost with the fewest negative consequences with respect to firefighter and public safety.

Wildland fires that escape initial attack or exceed initial response will utilize a decision support process to guide and document wildfire management decisions. The process will provide situational assessment, analyze hazards and risks, define implementation actions, and document decisions and rational for those decisions. Currently, this process is the Wildland Fire Decision Support System (WFDSS).

The FMP will provide direction and continuity in establishing operational procedures to guide all fire management activities. As CCPs or fire management policies evolve or change, the FMP is updated and/or revised to reflect these changes.

The FMP for the administrative units within this EA will meet or exceed the goals and performance measures of the *National Cohesive Wildland Fire Management Strategy* (Cohesive Strategy) (USDI and USDA 2014), *National Action Plan* (WFLC 2014) and the *Western Regional Action Plan* (WRSC 2013). The vision and goals of the Cohesive Strategy are as follows:

**Cohesive Strategy Vision**

To safely and effectively extinguish fire, when needed; use fire where allowable; manage our natural resources; and as a Nation, live with wildland fire.

**Cohesive Strategy Goals**

1. Restore and Maintain Landscapes
2. Fire-Adapted Communities
3. Response to Wildfire

In addition, the *Guidance for Implementation of Federal Wildland Fire Management Policy* (USDI and USDA 2009) and Service's *Fire Management Handbook* policies will be followed. Among other policies, the FMP will also incorporate and adhere to the Department of the Interior policy stated in 620

Department Manual 1 by giving full consideration to the use of wildland fire as a natural process and tool during the land management planning process.

The Service manages fire to conserve, protect, and enhance fish, wildlife, and plants, and their habitats while protecting Service facilities and surrounding communities. Fire management is integrated into the Service's land management program.

The Service fire management program includes wildfire management, wildfire prevention and education, fuels reduction, and resource management. This involves technical expertise in firefighting and prescribed fire, an understanding of fire ecology, and interaction with the public. Wildland fire management involves multiple objectives and dynamic strategies depending upon conditions and objectives outlined in a fire management plan for a specific unit.

Restoring and/or maintaining all Service lands in desirable conditions by utilizing prescribed fire and the use of wildfire is a cost-effective, long-term fire management strategy. It reduces wildfire risk to maximize long-term protection to communities while minimizing the costs of fire suppression and emergency rehabilitation of lands damaged by wildfire.

Every wildfire on Service lands requires a management response. The management response to wildfires is based on the likely consequences to firefighter and public safety and welfare; the ecological, social, and legal consequences of the fire; the circumstances under which the fire occurs; and cost effectiveness.

*Jay Peterson / USFWS*

**Figure 1. Great Plains Fire Management Zone**

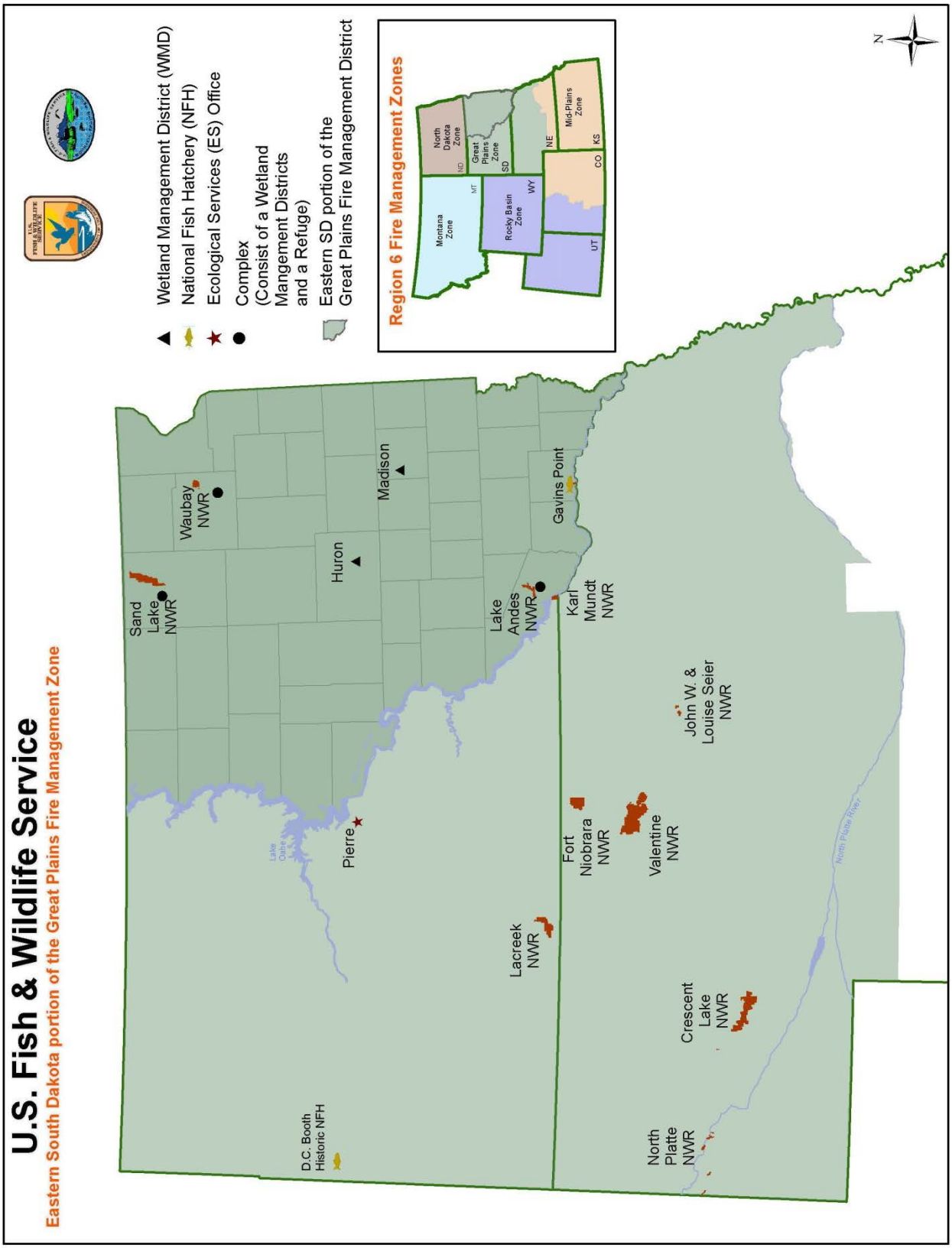
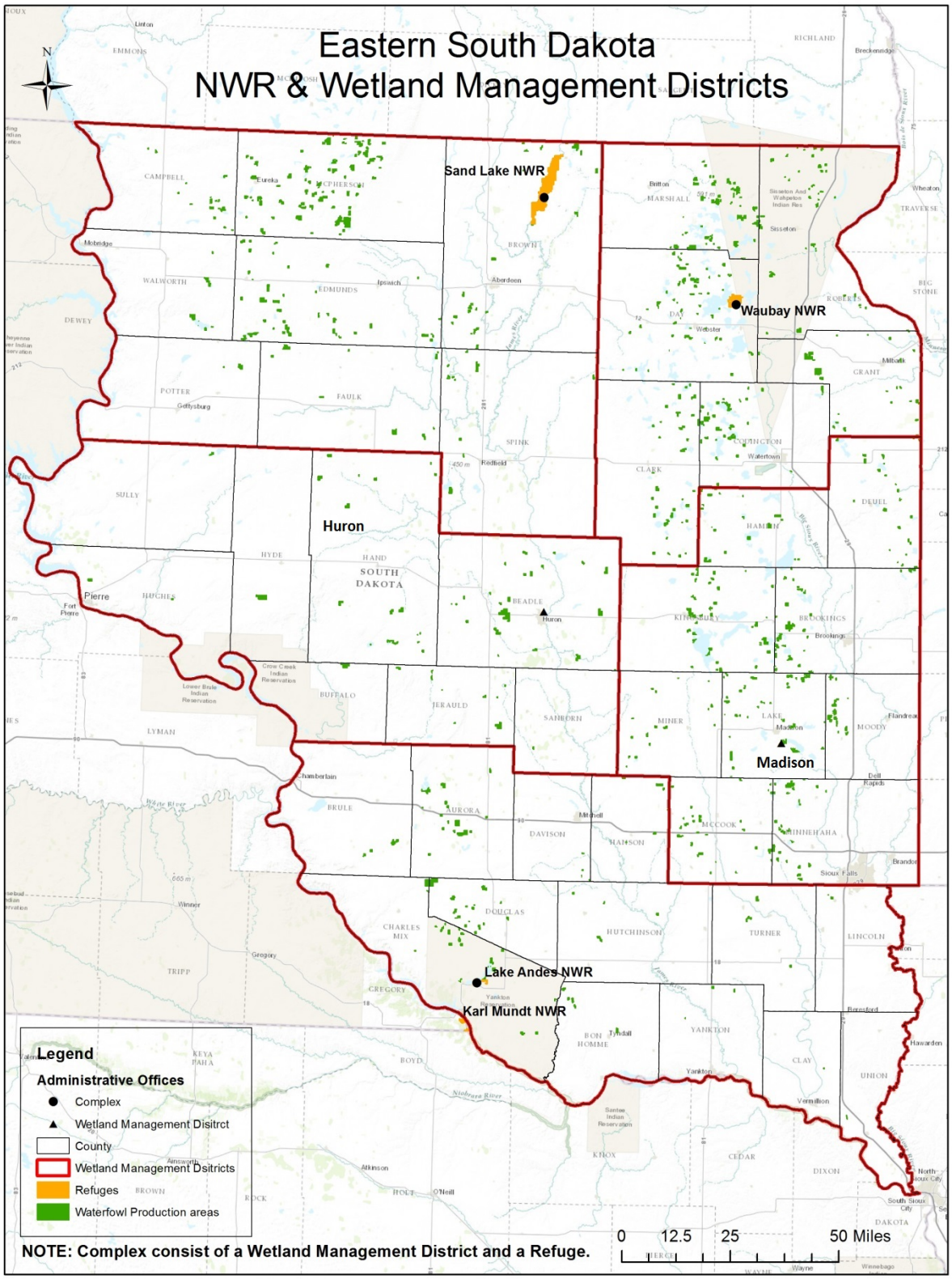


**Figure 2. Great Plains Zone - Service Units within EA**



### 1.1.3 Environmental Assessment for the FMP

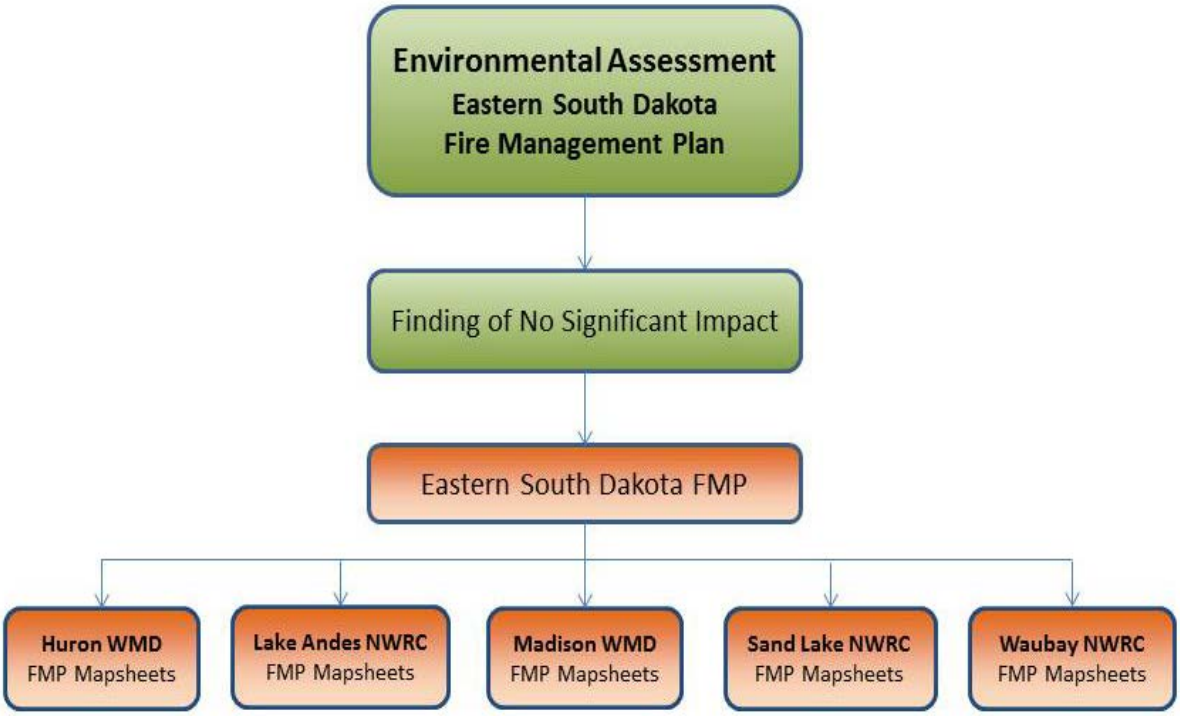
This EA is being prepared to evaluate the effects associated with the proposed federal action and complies with the ***National Environmental Policy Act*** (NEPA) in accordance with Council on Environmental Quality (40 CFR 1500-1509), the National Archives and Records Act (NARA) 2015 and DOI (43 CFR 46 et seq) regulations as well as DOI (516 DM 8) and Service (550 FW 3) policies. NEPA requires examination of the effects of proposed actions on the natural and human environment. Chapter 2 of this EA presents three alternatives and Chapter 3 describes the environmental consequences of each alternative.

The preferred alternative proposes using prescribed fire, wildfire, and non-fire (mechanical and chemical) treatments to achieve land and fire management goals and objectives for the five administrative units. The proposed treatments are based on the approved CCPs and the fire management planning efforts of the five administrative units of the Great Plains Zone. The management actions proposed in the preferred alternative (based on the analysis in this EA) will become the management guidance for the development of the FMP for the five administrative units in the Great Plains Zone.

The goal of this EA is to present an ***ecosystem-based approach*** for protecting natural resources at the five administrative units in the Great Plains Zone. An ***ecosystem-based approach*** is an environmental management methodology that recognizes the full array of interactions, including humans, within an ecosystem rather than considering single issues, such as just humans, species, or ecosystem services in isolation.

The following diagram shows the relationship between this EA, its Finding of No Significant Impact, and the FMP.

**Figure 3. Relationship between EA, FONSI, and FMP**



### 1.1.4 National Wildlife Refuge System

The mission of the National Wildlife Refuge System is "to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans". The Refuge System encompasses 563 national wildlife refuges and more than 36,000 fee and easement Waterfowl Production Areas (WPAs) protecting approximately 150 million acres of land and water. There are wildlife refuges in every state, and at least one within an hour's drive of every major American city. Refuges provide a much-needed refuge for people as well as wildlife.

### 1.1.5 Wetland Management Districts (WMDs)

The WMDs were created to administer the Small Wetlands Acquisition Program to save wetlands from various threats—particularly drainage. The main authorities in establishment of the program are briefly discussed below:

- *Migratory Bird Hunting and Conservation Stamp Act* (16 USC 718d[b])—"as waterfowl production areas (WPAs) subject to all provisions of the *Migratory Bird Conservation Act* . . . except the inviolate sanctuary provisions." The *Duck Stamp Act* provides for the conservation, protection, and propagation of native species of fish and wildlife, including migratory birds that are threatened with extinction.
- *Migratory Bird Conservation Act (*16 USC 715d[2])— "for any other management purposes, . for migratory birds." This act addresses the obligations of the United States under the *Migratory Bird Treaty Act* through the following mechanisms:
  - Lessening the dangers threatening migratory game birds from drainage and other causes.
  - The acquisition of areas of land and water to furnish in perpetuity reservations for the adequate protection of such birds.
  - Authorizing appropriations for the establishment of such areas, their maintenance and improvement, and for other purposes.

The purpose of the districts is "to assure the long-term viability of the breeding waterfowl population and production through the acquisition and management of waterfowl production areas, while considering the needs of other migratory birds, threatened and endangered species, and other wildlife" (memorandum from Region 6 Assistant Regional Director Richard A. Coleman, December 2006). This purpose statement applies to all Region 6 wetland management districts.

The WPAs are a component of the National Wildlife Refuge System and account for 18% of System lands in the lower 48 states. The WMDs provide oversight and management for all WPAs in a multicounty area.

The Small Wetlands Program began in 1958 as an amendment to the *Migratory Bird Hunting Conservation Stamp Act of 1934* (also known as the *Duck Stamp Act*). It authorized the Service to use Duck Stamp funds to acquire the WPAs, small wetland and pothole areas and interests managed by the National Wildlife Refuge System for the benefit of migratory waterfowl. Since then, the Service has permanently protected nearly 3 million acres of prairie habitat. The wetlands and native grasslands in this glacially created landscape are among the most endangered habitats in the country. While the region

accounts for just 10% of North American waterfowl breeding habitat, it produces nearly half the continent's total ducks. It is worth noting that the WMDs manage both Fee-title WPAs and Easement WPAs (both grassland and wetland). Easement WPAs are private lands where the Service and landowner have entered into an agreement to protect or limit specific landowner practices. For the lands within this EA, fire management applies only to lands the Service owns in fee-title and not to easements.

## 1.1.6 Summary of Five Administrative Units in the Great Plains Zone

### 1.1.6.1 Huron WMD

The Huron WMD (Figure 4), established in 1992, encompasses lands that were previously under the management of both the Lake Andes and Sand Lake WMDs. Huron WMD includes eight counties (Beadle, Buffalo, Hand, Hughes, Hyde, Jerauld, Sanborn, and Sully) in east-central South Dakota. In 2015, the District administered 64 WPAs, totaling approximately 17,883 acres of fee-title lands (USFWS 2015).

This region of South Dakota overlaps two major physiographic provinces, the Great Plains Province and the Central Lowlands Province (Figure 11). The major land features associated with this area of South Dakota are products of the Pleistocene glaciations, which formed the Missouri River and the prairie potholes sometime between 12,000 and 40,000 years ago.

The WMD is located within two distinct physiographic regions, the Missouri Coteau and the James River Basin (Figure 12).

### 1.1.6.2 Lake Andes NWR Complex

#### Lake Andes NWR

Lake Andes NWR was authorized on February 14, 1936, by President Franklin D. Roosevelt through Executive Order No. 7292 as "a refuge and breeding ground for migratory birds and other wildlife . . . for use as an inviolate sanctuary, or for any other management purpose, for migratory birds."

Lake Andes NWR (Figure 5) was formally established in 1939 when the state of South Dakota granted an easement allowing the Service to operate a refuge for migratory birds and other wildlife. Lake Andes NWR manages 5,677 acres, of which 4,702 acres are an easement from the state of South Dakota, and 975 acres are owned in fee-title.

This Refuge, which is located in Charles Mix County, South Dakota, includes Lake Andes, a 4,700- acre lake created by the last ice age. The lake's shallow waters are very attractive to migrating and nesting waterfowl, shorebirds, and other water birds. Water levels in the lake vary from 0 to 12 feet, depending entirely on climatic conditions and precipitation. The lake supports a boom-and-bust fishery that depends on water quality and water quantity. Grasslands surrounding the lake provide optimal habitat for nesting waterfowl and grassland songbirds.

#### Lake Andes WMD

Lake Andes WMD (Figure 5) was authorized on August 1, 1958, under the authority of P.L. 85–585, which amended the *Migratory Bird Hunting and Conservation Stamp Act of 1934* (16 USC 718c). As of September 2015, Lake Andes WMD currently manages 85 WPAs totaling 19,467 acres of fee-title lands

and 98,216 acres of easements (USFWS 2015). Lake Andes WMD covers 14 counties (Aurora, Bon Homme, Brule, Charles Mix, Clay, Davison, Douglas, Hanson, Hutchinson, Lincoln, Tripp, Turner, Union, and Yankton) in southeastern and south central South Dakota. This EA covers only counties east of Missouri River; thus, Tripp County is not included.

#### Karl E. Mundt NWR

Karl E. Mundt NWR (Figure 5) was authorized on April 17, 1975, under the authority of the *Endangered Species Act of 1973* (16 USC 1531–1543) to "to conserve fish, wildlife, or plants which are listed as endangered or threatened species." The Refuge is located along the Missouri River approximately 1.5 miles downstream from the Fort Randall Dam. This Refuge consists of 757 acres of fee title land and 305 acres of easement land all of which lie adjacent to the river.

Karl E. Mundt NWR is located in Gregory County, South Dakota, and Boyd County, Nebraska and encompasses a portion of the Missouri National Recreational River. This Refuge was established in 1975 when the National Wildlife Federation and the Southland Corporation donated 700 acres of land and 300 acres of easement to the Service for the primary purpose of bald eagle conservation. Currently, the Refuge encompasses 1,082 acres within an approved acquisition boundary of 3,050 acres. The Karl E. Mundt NWR was the first NWR established for the conservation of bald eagles, and since establishment, the Refuge has also provided important habitat for Neotropical migratory birds that require riparian forests to migrate and nest.

### 1.1.6.3 Madison MWD

Established in 1969, the Madison WMD (Figure 6) evolved from the withdrawal of four counties from Waubay WMD and five counties from Lake Andes WMD. Deuel, Brookings, Hamlin, Kingsbury, Miner, Moody, McCook, Lake, and Minnehaha counties are included within the District. The District extends west from the Minnesota border through the Big Sioux Basin and Prairie Coteau ecoregions. Tallgrass prairie and agricultural lands comprise most of the District. As of September 2015, the Madison WMD administered 221 WPAs totaling approximately 39,224 acres fee-title and 141,409 acres of easements.

### 1.1.6.4 Sand Lake NWR Complex

#### Sand Lake NWR

Sand Lake NWR (Figure 7) is located in Brown County, South Dakota, approximately 25 miles northeast of Aberdeen. The Refuge (established in 1935) lies in north-central South Dakota and covers 21,419 acres. This area of South Dakota is in the heart of the prairie–pothole region of the northern Great Plains and plays a major role for migratory birds associated with the Central Flyway.

Five authorities exist for the acquisition and establishment of Sand Lake NWR:

- Executive Order 7169 (September 4, 1935), "as a refuge and breeding ground for migratory birds and other wild life. . . ."
- Migratory Bird Conservation Act, "for use as an inviolate sanctuary, or for any other management purpose, for migratory birds. . . ."
- The Fish and Wildlife Act, "for the development, advancement, management, conservation, and protection of fish and wildlife resources. . . ."

- National Wildlife Refuge System Administration Act, "conservation, management, and . . . restoration of the fish, wildlife, and plant resources and their habitats…for the benefit of present and future generations of Americans. . . ."
- The Refuge Recreation Act, "for (1) incidental fish and wildlife-oriented recreational development, (2) the protection of natural resources, (3) the conservation of endangered species or threatened species. . . ."

The Refuge was specifically established to improve and maintain habitat for nesting and resting waterfowl and other migratory birds, such as diving and puddle ducks, geese, grebes, herons, egrets, gulls, and terns.

*Sand Lake NWR. John and Karen Hollingsworth*

### Sand Lake WMD

Established in 1961, Sand Lake WMD (Figure 7) is the largest WMD in the country. The District lies in ten counties in northeast and north central South Dakota: Brown, Spink, McPherson, Edmunds, Faulk, Campbell, Walworth, Potter, Corson, and Dewey. This EA covers only counties east of Missouri River; thus, Corson and Dewey counties are not included. As of September 2015, the WMD comprises 162 individual WPAs, totaling 44,995 acres and protects 642,982 acres of private lands through wetland and grassland conservation easements in partnership with the landowner. The District provides habitat for nesting and migrating birds and other wildlife and provides the public with a variety of year-round recreational opportunities.

## 1.1.6.5 Waubay NWR Complex

### Waubay NWR

Waubay NWR (Figure 8), established in 1935, includes 4,650 acres of lakes, marshlands, grasslands, and woodlands that support diverse and abundant wildlife. Located in the Central Flyway, bird species with distributions in both eastern and western United States frequent the Refuge, which provides a safe place for migrating birds to feed and rest.

## Waubay WMD

*Prescribed fire on McCarlson WPA, Waubay WMD. USFWS*

In 1959, the very first WPA was established in Waubay WMD and Waubay WMD was established in 1962. In 1966, Waubay WMD consisted of 10 counties: Brookings, Clark, Codington, Day, Deuel, Grant, Hamlin, Kingsbury, Marshall, and Roberts. In 1970, Brookings, Deuel, Hamlin, and Kingsbury counties were transferred to Madison WMD, leaving the remaining six, which make up Waubay WMD today. As of September 2015, Waubay WMD comprises 189 WPAs for 41,024 acres and 255,098 acres of easements (USFWS 2015).

**Figure 4. Huron Wetland Management District**

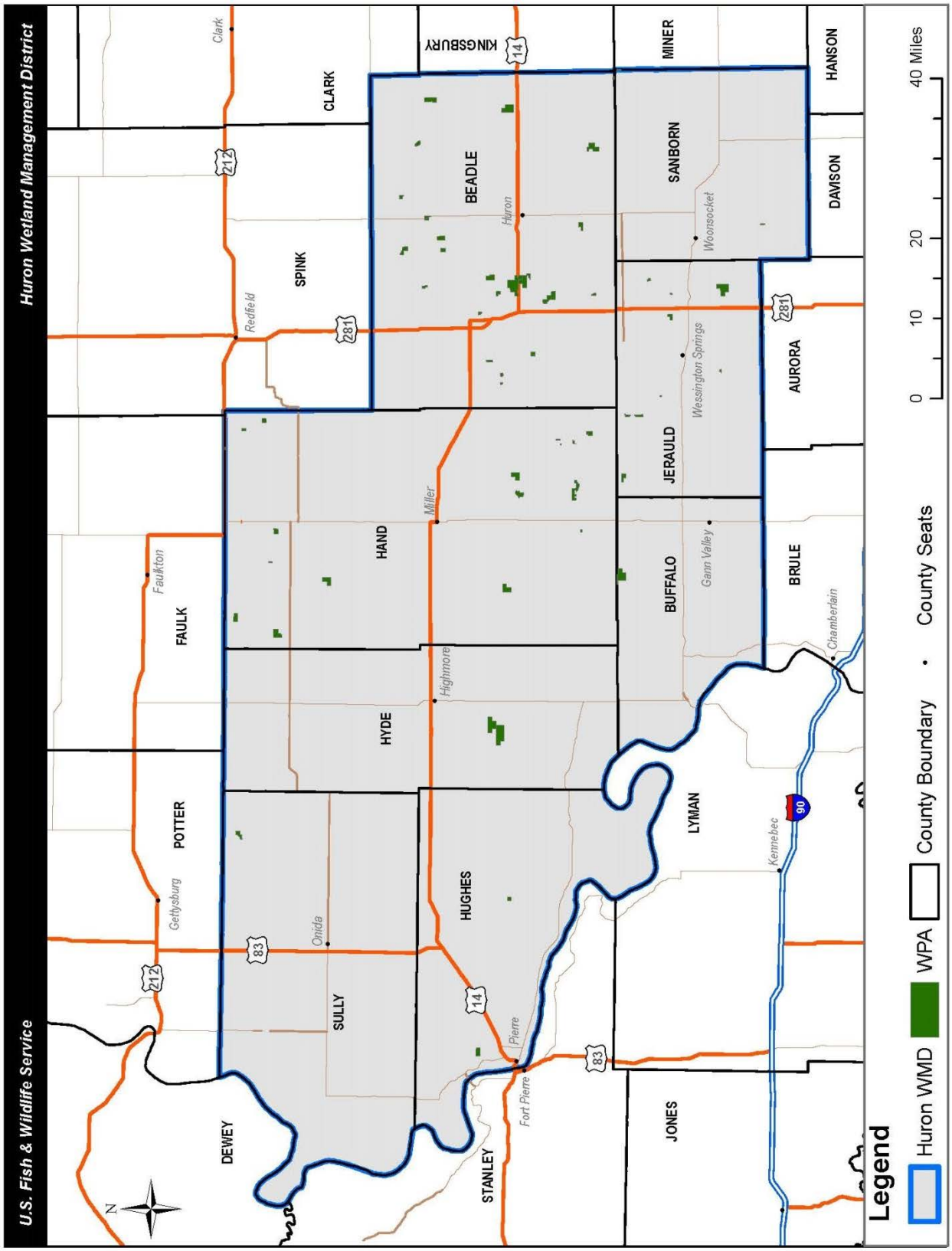


**Figure 5. Lake Andes National Wildlife Refuge Complex**

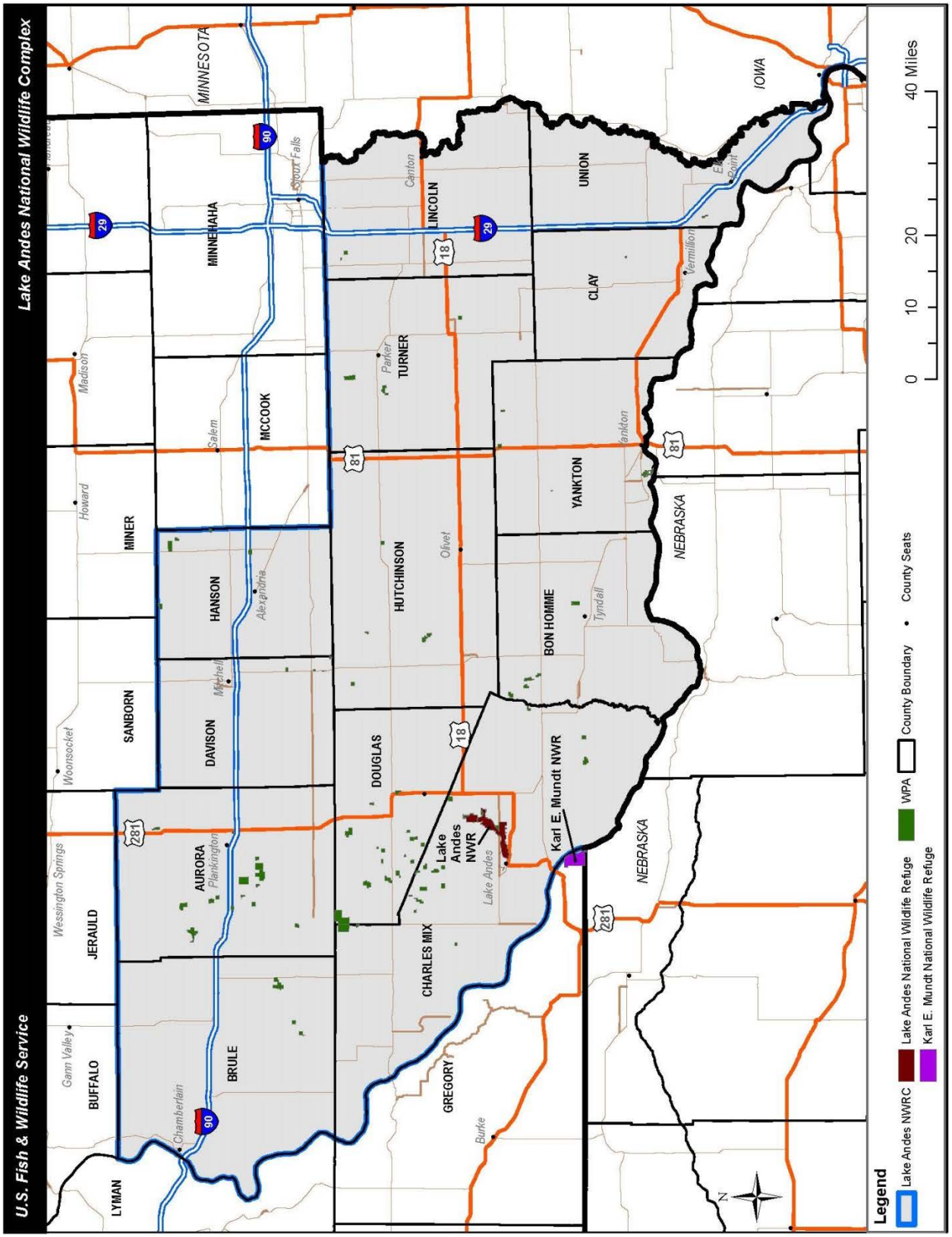


**Figure 6. Madison Wetland Management District**

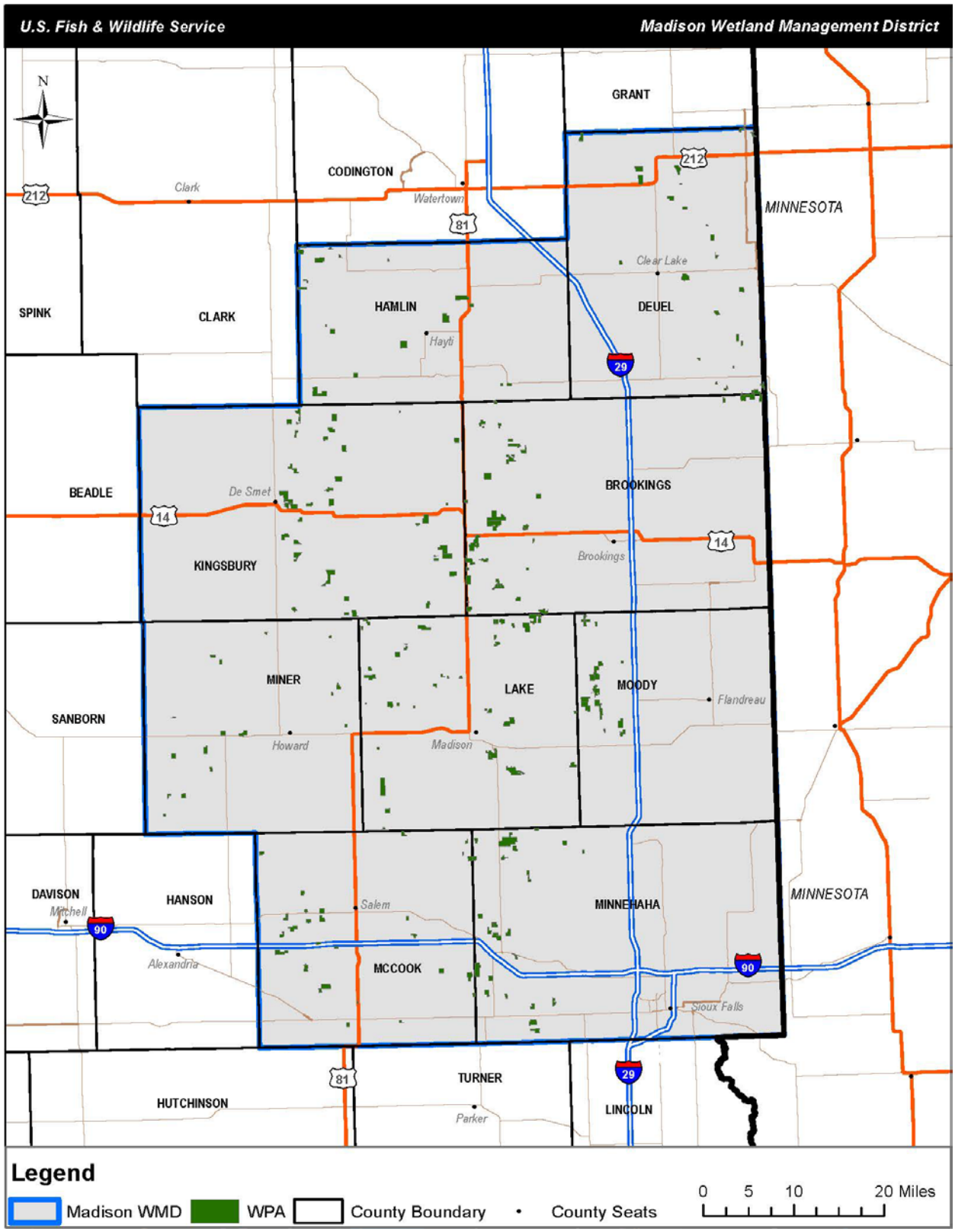


**Figure 7. Sand Lake National Wildlife Refuge Complex**

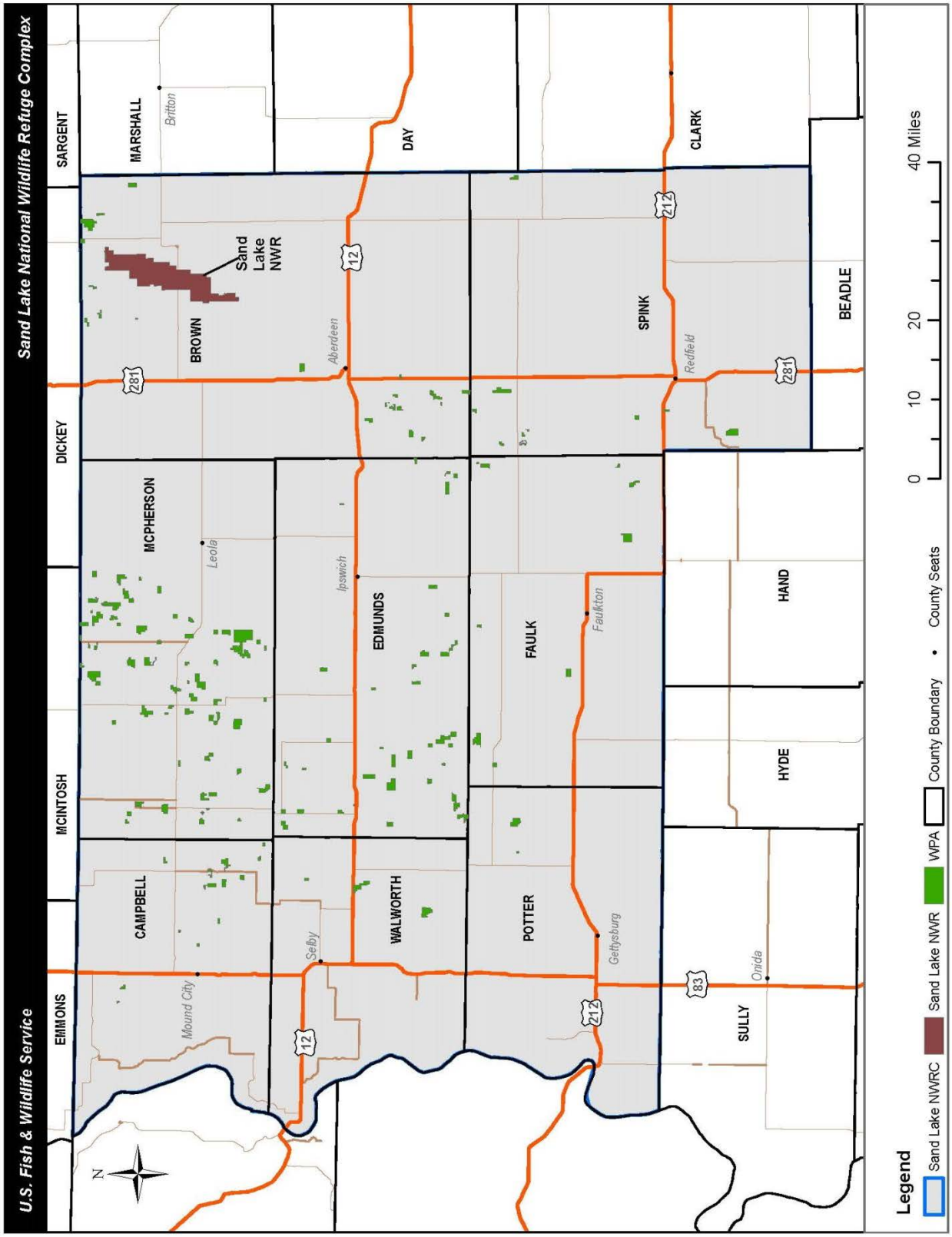
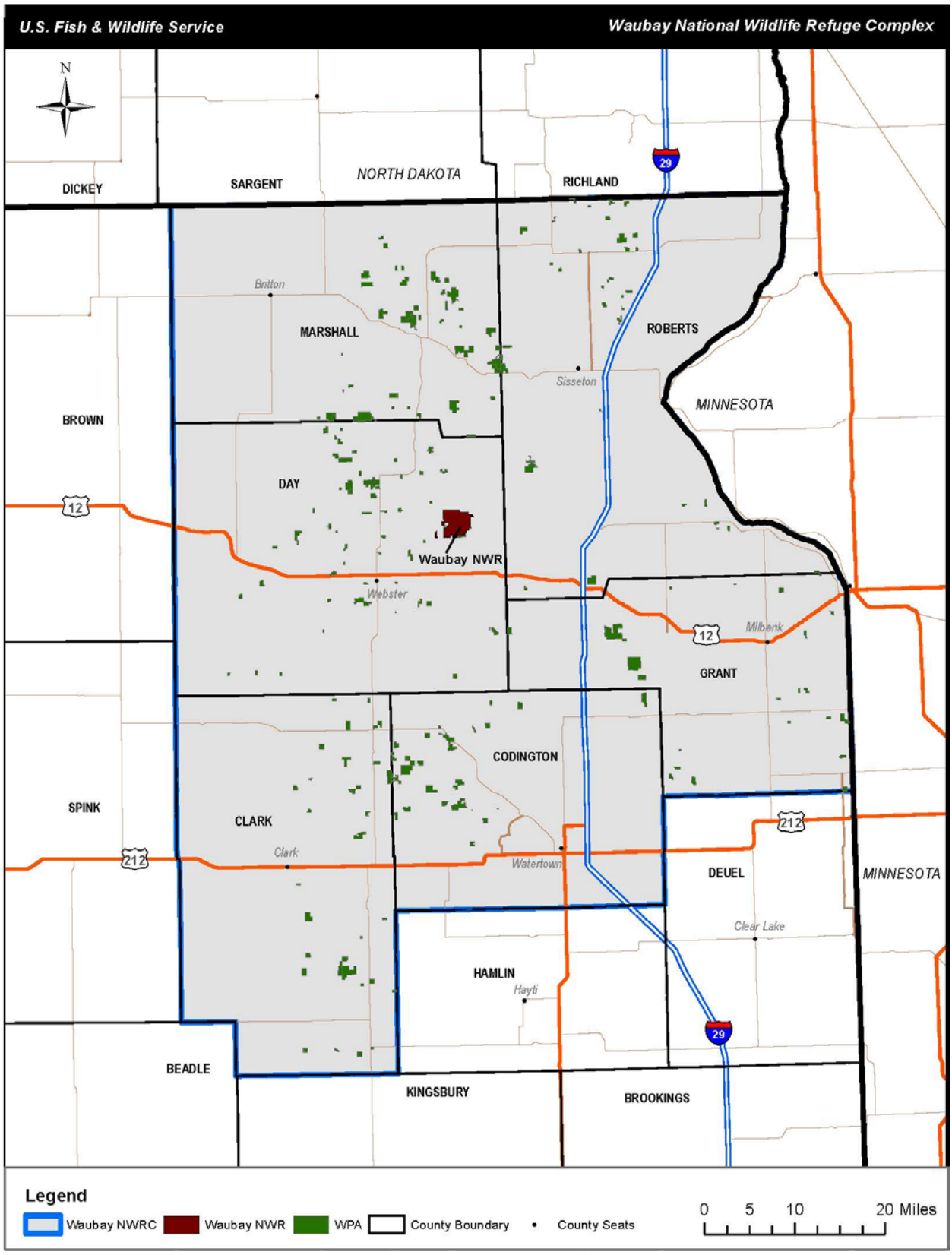


**Figure 8. Waubay National Wildlife Refuge Complex**



### 1.1.7 Burnable Acres on the Service Units

**Table 1. Land Base Acres and Burnable Acres**

| Location | Land Base Acres | Burnable Acres |
|---|---|---|
| Huron WMD | 17,883 | 17,000 |
| Madison WMD | 39,224 | 38,000 |
| Lake Andes NWR | 5,677 | 901 |
| Lake Andes WMD | 19,467 | 19,467 |
| Karl E. Mundt NWR | 1,082 | 1,082 |
| Sand Lake WMD | 44,995 | 39,032 |
| Sand Lake NWR | 21,419 | 16,498 |
| Waubay NWR | 4,650 | 3,086 |
| Waubay WMD | 41,024 | 26,767 |
| Totals | 195,421 | 161,833 |

Source: Land Base Acres from Annual Report of Lands Under Control of US Fish and Wildlife Service (2015)

### 1.1.8 Historical Use of Fire

Prior to European settlement, wildfires and herbivory (primarily by bison, prairie dogs, and insects) were the primary ecological disturbances that revitalized North American grasslands. Wildfires, either set by Native Americans or caused by lightning, typically occurred during summer and fall. Depending on weather conditions, a single wildfire might burn thousands of acres, creating a mosaic of burned, unburned, and herbivory effected areas.

A paucity of information exists on the historic occurrence of fire in the areas encompassing the eastern South Dakota units. Limited data suggests that historical fire frequency was probably highly variable but has decreased since European settlement (Umbanhowar 1996). Evidence of fire return intervals in the mixed-grass prairie suggests about every 5 to 10 years in the mesic habitats and around 25 years on dry habitats (Wright and Bailey 1980; Frost 1998). In general, during dry periods in areas where precipitation is limited, such as the western and central grasslands, a long-term decline in grass production occurs when burning is more frequent than 5 to 10 years. This fire frequency may be best for natural fire management of grasslands, such as the short- or mixed-grass prairies, although fire exclusion may be best for other purposes (Bragg 1995). Tallgrass prairie tends to have a shorter fire return interval than mixed-grass prairie. Evidence suggests roughly a 3- to 7-year fire return interval for most of the tallgrass prairie.

## 1.2 Purpose and Need for Fire Management Actions

The purpose and need for fire management actions is based on information described within the Comprehensive Conservation Plans (CCPs) developed for the individual units within this EA. Unit specific CCPs are incorporated by reference in this EA and provide the overarching management goals and objectives for informing the fire management programs. The following ‘purposes’ along with the desired future conditions informed the development of the three proposed alternatives discussed in Chapter 2.

**PURPOSE 1.** Protect life, property, natural, and cultural resources from the threat of wildfire on and adjacent to Service lands.

**Need Based on Existing Conditions**.

The purpose is to provide for firefighter and public safety, reduce the potential for wildfires by reducing fuels on Service lands, protect homes in the wildland-urban interface, and accomplish habitat management objectives as outlined in the CCPs. To achieve these interconnected goals, fire program staff will collaborate with refuge personnel and seek additional supplemental support.

Fire management is a tool for habitat management and is not a separable process; accordingly, the strategies developed for prescribed fire and wildfire support the achievement of goals of the National Cohesive Wildland Fire Management Strategy while adhering to Federal policy and habitat objectives for uplands, river bottoms, riparian areas, wetlands, and shorelines.

**PURPOSE 2.** Where applicable, protect, restore, and maintain the health, vigor, and resiliency of the northern Great Plains ecosystems by subjecting vegetation to periodic disturbance.

Protect, restore, and maintain the ecological integrity of native biological communities to support a diversity of fauna and flora occurring on Service lands.

**Need Based on Existing Conditions**.

There is a need to increase and maintain the production of high-quality habitat for waterfowl, other migratory birds, and non-migratory native wildlife on Service lands. The prairie evolved through the interactions of climate, herbivory, and fire (Anderson 1990; Axelrod 1985; Pyne 1982, 1986; Sauer 1950; Webb 1983; Wells 1970). Grasslands are disturbance-dependent systems that are significantly affected by the presence or absence of these disturbances. Without disturbance, grassland systems degrade and lose functionality. Grasslands composed of diverse native grasses and forbs are resilient to invasion by exotic species, provide ecological functions, and create heterogeneous structure for habitat needs. Healthy grasslands were established under the natural conditions of the prairie and need to be maintained to achieve the purposes and objectives of the WMDs/NWRs. Migratory bird habitat has declined during recent decades due to fragmentation, and degradation. The prairie was once the most common ecosystem in North America, but the modern loss of prairie habitats exceeds that of most other major ecosystems in North America (Noss et al. 1995; Samson and Knopf 1994). Consequently, grassland birds have experienced steeper, more consistent, and more widespread population declines than any other group of North American birds (Herkert 1995; Igl and Johnson 1997; Peterjohn and Sauer 1999).

Additionally, the ability to manage all uplands on Waterfowl Production Areas (WPAs) is limited by the logistics of WMDs - primarily the scattered distribution of WPA's on the landscape. Lack of management results in the accumulation of plant litter and adversely affects the system functions of grasslands. According to Knapp and Seastedt (1986), plant litter limits available light energy input into the system; alters the microclimate and physiology of emerging shoots such that carbon dioxide

($CO_2$) uptake is reduced; limits intake of inorganic nitrogen from rainwater as well as nitrogen fixing by free-living microbes and blue-green algae; and reduces soil temperature. These conditions diminish root productivity as well as invertebrate and microbial activities. Gibson and Hulbert (1987) determined that in tallgrass prairie, the diversity and percent cover of warm-season grasses decreases as time increases since fire occurrence. Briggs and Gibson (1992) determined that tree invasion is a function of the burning regime, dispersal vectors, habitat availability, and reproductive mode.

There is a need to increase the ratio between management and rest periods on uplands, wetlands and riparian areas on WPAs. The current ratio is not sufficient to maintain or improve habitat conditions.

**PURPOSE 3.** Where applicable, control or eradicate invasive and noxious plant species.

**Need Based on Existing Conditions**.

Historically: The northern Great Plains was a grassland-dominated ecosystem where fire and grazing restricted natural tree growth to riparian floodplains, wooded draws, islands in lakes, and small patches along leeward wetland edges (Higgins 1986). These patches and corridors of trees and shrubs were the only woodland features in the prairie landscape (Rumble et al. 1998).

The prevalence of fire in the pre-European settlement prairie created an environment inhospitable to trees (Higgins 1986; Severson and Sieg 2006). The growing points of most native grassland species are usually protected from fast moving fires at the base of the plant. In contrast, woody vegetation 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 tallgrass and mixed-grass prairie types that cover South Dakota produce large quantities of fuels that dry quickly and burn easily (Steuter and McPherson 1995). Specifically, bluestem prairies recover quickly post-fire and can even provide enough fuels for multiple burns in a single growing season (Bragg 1982).

Currently: Planted or volunteer trees and shrubs occur in many WPAs. Although most woody plantings existed before Service ownership of these lands, the Service did establish tree planting after acquisition in attempts to improve wildlife habitat. Volunteer trees are prevalent primarily due to lack of fire. Planted trees and shrubs such as green ash (*Fraxinus pennsylvanica*), cottonwood (*Populus* section *aigeiros*), and buffaloberry (*Shepherdia argentia*) are native to North America; however, many others, such as caragana (*Caragana arborescens*), Russian olive (*Elaeagnus angustifolia*) , and Siberian elm (*Ulmus pumila*), are nonnative species. The most troublesome species planted in South Dakota is eastern red cedar (*Juniperus virginiana*). While a native tree, the species' extreme adaptability has enhanced the spread of these trees into areas where they were formerly rare or absent. Additional increases in their spread are due to tree plantings and the selection of the most aggressive cultivars (Ortman et al. 1996). Most of these plantings are considered unnatural components of the historical habitat. Additionally, nonnative species 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 ecosystems contributes significantly to the recovery of grassland bird populations (Herkert 1994). Recent research indicates that the elimination and reduction of invasive and planted woody vegetation will benefit most grassland-dependent bird species (Bakker 2003; Grant et al. 2004b; Johnson and Temple 1990; Naugle and Quamen 2007; Patten 2006 et al; Shaffer et al. 2003; Sovada et al. 2005). Although many woodland bird species might nest in planted woodlands, few are of management concern (Kelsey et al. 2006). This suggests that the loss of planted woodlands will have negligible effects on woodland bird species whose populations are stable or expanding.

## 1.3 Management Direction that Influences the Scope of this Environmental Assessment

### 1.3.1 Comprehensive Conservation Plans

As described above, the purpose of Comprehensive Conservation Plans is to guide the management, protection, and restoration of wildlife habitat and protection of significant values on Service lands. Each Service unit is responsible for land management planning, including setting land use goals and objectives, implementing appropriate actions to accomplish the objectives, achieving outcomes and results, and evaluating the outcomes and results against the intended objectives. The objectives contained in a CCP provide the basis for the development of fire management objectives and the fire management program in the designated area (USDI and USDA 2016).

All Service units discussed in this EA have completed CCPs. The following CCPs, and accompanying EA/FONSIs, are incorporated by reference in their entirety into this EA:

- Comprehensive Conservation Plan and associated EA Huron WMD, Madison WMD, and Sand Lake WMD (USFWS 2011; USFWS 2012a)
- Comprehensive Conservation Plan and associated EA Lake Andes NWRC (USFWS 2012b; USFWS 2012c)
- Comprehensive Conservation Plan and associated EA Sand Lake NWR (USFWS 2005a; USFWS 2005b)
- Comprehensive Conservation Plan and associated EA Waubay NWRC (USFWS 2002a; USFWS 2002b)

The alternative selected from this FMP EA for implementation (and as described in an approved FONSI) will become the fire management guidance for the units within the EA.

### 1.3.2 Cost Efficiency

Fire management focused only on suppression for a response is often very expensive. Today it is common for suppression operations on a large single wildfire to exceed 1 million dollars a day. Although fire suppression offers many benefits to society, other cost-effective options for fire management exist. While these options cannot completely replace fire suppression as a fire management tool, other management options accomplished in advance can play an important role in overall fire management and can affect the costs of fire suppression.

The application of fire management tools requires making certain tradeoffs. Table 2 presents a sample of factors that affect costs and the primary benefits associated with the tools currently used in fire management. Current approaches to fire management are an almost complete turnaround compared to historic approaches. It is commonly accepted that the past use of only fire suppression, along with other factors, has resulted in larger, more intense wildfire events that are seen today (WFLC 2011). As is the case with many public policy issues, costs and benefits associated with particular fire management tools are difficult to quantify (WFLC 2011). Ultimately, costs and benefits should be weighed against one another on a case-by-case basis in planning wildland fire management operations (WFLC 2011).

Depending on the tradeoffs that a land manager is willing to make, a combination of fire management tools may be used. For instance, a wildland fire and/or mechanical fuels reduction may prevent or lessen the intensity of a future wildfire thereby reducing suppression costs. In addition, wildfires, prescribed fire, and/or mechanical fuels reduction may improve soil conditions in fields or forests to the benefit of natural resources.

**Table 2. Factors That Affect Costs and Primary Benefits of Wildland Fire Management Tools**

| Management Tool | Factors That Affect Costs | Primary Benefits |
|---|---|---|
| Suppression | • Labor intensive<br>• Requires high level of planning<br>• Can be very expensive<br>• Particular strategies can be very inefficient (such as aerial retardant drops)<br>• Can increase intensity and likelihood of future wildfires<br>• Inhibits natural ecological processes in many cases | • Can reduce human health impacts from smoke<br>• Can protect forest and agricultural resources<br>• Can save private dwellings and commercial buildings |
| Prescribed Fire for Fuels Reduction | • Can be expensive to implement<br>• Requires skilled workforce to implement<br>• Requires high level of planning<br>• Can impact human health (smoke and its effect on those with asthma or allergies) | • Can provide habitat for wildlife<br>• Can improve forest and agricultural resources<br>• Can reduce hazardous fuel loading<br>• Mimics natural processes but under more controlled circumstances |
| Mechanical Fuels Reduction | • Requires use of heavy machinery (resulting in fossil fuels consumption, soil compaction, and so forth.)<br>• Can be expensive to implement<br>• Does not mimic natural processes | • Can provide habitat for wildlife<br>• Can improve forest and agricultural resources<br>• Can reduce hazardous fuel loading<br>• Does not produce large amounts of smoke |

Source: WFLC 2011

## 1.4 Regulatory Framework

### 1.4.1 National Environmental Policy Act

The *National Environmental Policy Act* (NEPA) requires all federal agencies to initiate interdisciplinary planning that considers and discloses environmental effects in their decisions. To meet NEPA requirements, federal agencies must prepare a statement that describes the effects of federal actions, through an EA, Environmental Impact Statement (EIS), or Categorical Exclusion (CE). This NEPA document has been prepared under Council on Environmental Quality regulations for implementing NEPA at 40 CFR 1500 et seq.

### 1.4.2 Endangered Species Act of 1973

The *Endangered Species Act* (ESA) gives the U.S. Secretary of the Interior and the U.S. Secretary of Commerce joint authority to list a species as threatened or endangered (16 USC 1533[c]). Pursuant to the requirements of ESA section 7, an agency reviewing a proposed project within its jurisdiction must determine whether any federally listed threatened or endangered species may be present in a project area and determine whether the proposed project will have a likely effect on listed and candidate species.

### 1.4.3 Migratory Bird Treaty Act (16 USC Sec. 703)

This law implements the treaties that the United States has signed with a number of countries to protect birds that migrate across United States borders. The law makes it illegal to take, possess, or sell protected species. The *Migratory Bird Treaty Act* currently protects 836 species of migratory birds (see the following website for detailed information: http://www.fws.gov/laws/lawsdigest/migtrea.html).

### 1.4.4 Neotropical Migratory Bird Conservation Act (16 USC 6101-6102)

The Congress of the United States passed the *Neotropical Migratory Bird Conservation Act* on July 20, 2000. The purposes of the Act are to (1) perpetuate healthy populations of Neotropical migratory birds; (2) assist in the conservation of Neotropical migratory birds by supporting conservation initiatives in the United States, Canada, Latin America, and the Caribbean; and (3) provide financial resources and foster international cooperation for those initiatives. The Service's Division of Bird Habitat Conservation is responsible for managing the grants program that implements the Act (see the following website for detailed information: (http://www.fws.gov/birds/grants.php).

### 1.4.5 Bald and Golden Eagle Protection Act (16 USC 668)

This law provides for the protection of the bald eagle (the national emblem) and the golden eagle by prohibiting, except under certain specified conditions, the taking, possession, and commerce of such birds. (http://www.fws.gov/midwest/eagle).

### 1.4.6 Other Legislation, Mandates, and Policies That Guide Management of Service Lands

- *Fish and Wildlife Coordination Act* (1934), as amended (16 USC 661-666)
- *Conservation of Nature Protection and Wildlife Preservation in the Western Hemisphere Act of 1940* (56 Stat. 1354)
- *Refuge Revenue Sharing Act of 1964* (16 USC 715s), as amended (P.L. 95-469)
- Protection and Enhancement of Environmental Quality Executive Order of 1970 (Executive Order 11514, dated March 5, 1970)
- *Environmental Education Act of 1975* (20 USC 1531-1536)
- *Land and Water Conservation Act of 1965*, as amended (16 USC 460L-460L-11) and as amended through 1987
- *Refuge Trespass Act* (18 USC 41; Stat 686)
- *Federal Aid in Wildlife Restoration Act* (16 USC 669-669i), as amended
- *The Native American Graves Protection and Repatriation Act of 1990*
- *Clean Air Act* (42 USC 1857-1857f; 69 Stat.322), as amended
- *Federal Noxious Weed Act of 1975 (*Public Law 93-629 (7 USC 2801 et seq.; 88 Stat. 2148)
- *Fish and Wildlife Act of 1956*, as amended (16 USC 742-742j)
- *Fish and Wildlife Conservation Act of 1979* (PL 96-366, dated September 29, 1980). (Nongame Act) (16 USC 2901-2911;94 Stat. 1322).
- *National Wildlife Refuge System Administration Act of 1966* (16 USC 668dd-668ee)
- *Administrative Procedures Act* (5 USC 551-559, 701-706, 1305, 3344, 4301,5362,7521; 60 Stat. 237), as amended (PL 79-404)
- *Antiquities Act of 1906* (16 USC 431)
- *Fish and Wildlife Improvement Act of 1978* (16 USC 7421; 92 Stat. 3110) P.L. 95 -616, November, 1978
- *Historic Sites Act of 1935* (16 USC 461)
- *Archeological Resource Protection Act of 1979* (PL 95-96, Sta. 721, dated October 1979) (16 USC 470aa-47011)
- *Lacey Act of 1900 (16 USC 3371-3378), as amended*
- *National Historic Preservation Act of 1966* (16 USC 470)
- *National Wildlife Refuge System Improvement Act of 1997 (Public Law 105-57) (16 USC 668dd)*

## 1.5 Climate Change

The U.S. Department of the Interior issued Secretarial Order 3289 9/14/2009 reinstating Secretarial Order 3226 of 2001, requiring federal agencies, under its direction that have land management responsibilities, to consider potential climate change effects as part of long-range planning endeavors. Climate change has begun to influence the severity, frequency, and magnitude of wildfires in many regions of the United States. Records of wildfire show increasing area burned in Canada (Stocks et al. 2002; Gillett et al. 2004; Kasischke and Turetsky 2006); Alaska (Kasischke and Turetsky 2006); and the western United States (Westerling et al. 2006) over the past few decades. In the western United States, the annual area burned by large forest wildfires greater than 990 acres during the period from 1987 to 2003 was more than six times than that during the period from 1970 to 1986 (Westerling et al. 2006).

Wildfire behavior is modified by climate, forest management, and fire suppression (Allen et al. 2002; Noss et al. 2006), and understanding the reasons for changing wildfire behavior is further complicated by changes in fire reporting over the period of record. However, recent changes in climate were likely the main drivers for increases in area burned in both the western United States (Westerling et al. 2006) and Canada (Gillett et al. 2004; Kasischke and Turetsky 2006; Girardin 2007). The Mountain Prairie Fire Management Program follows Service guidance on climate change.

Wildland fire releases $CO_2$ directly into the atmosphere from the biomass consumed during combustion. As a greenhouse gas, $CO_2$ released into the atmosphere is a concern to many who study climate change. The effects of wildland fire on carbon storage of vegetation and soil organic carbon (SOC) is variable and depends on many factors such as wildland fuels being consumed and conditions under which wildland fire occurs. Dai et al. 2006 documented, in a southern mixed grass savannah in north central Texas, an increase in carbon and nitrogen stocks for summer fires and summer-winter fires; however, this increase was hypothesized to be the result of the Nitrogen (N) fixing mesquite trees present within the study area. In tall grass prairie, SOC was not significantly less for burned vs unburned areas (Seastedt and Ramundo 1990; Dell 1998). Owensby and Wyrill III (1973) reported no reduction in soil organic matter following 48 years of annual burning in Kansas Flint Hills.

Areas that contain peat type soils (such as wetlands) can contribute significant amounts of carbon dioxide and other gases to the atmosphere when burned. Page et al. (2002) estimated the 1997 wildfires in Indonesia burned about 796,000 hectares. Peat soils represent 32% of Indonesia soils. Of the 796,000 hectares burned, 91.5% were peat. Page et al. (2002) concluded that the most likely amount of carbon released from burning of peat and its surface vegetation in Indonesia was between 0.81 and 2.57 billion tons (Gt). This is 13–40% of the current global annual carbon emissions from the burning of fossil fuel (6.4 Gt/Calendar year). The gaseous and particulate emissions from the Indonesian Fires in 1997 exceeded emissions from the Kuwait oil fires of 1991 (Levine 1999). About 17% of the total area burned in 2004 in Alaska and Canada were peat areas; these areas contributed about 27% of total emissions in Alaska and 58% of emissions in Canada (Turquety et al 2007).

Adaptive management will increasingly be more important to assess climate change effects on management activity outcomes. Due to climate change, fire management treatments need to anticipate where the biota will be in the future with or without the treatments. There is no reasonable expectation that communities of species will remain static in the face of changes in climatic conditions. Fire management must be agile and adept to anticipate and respond to changes in conditions as changes in climate occur.

Monitoring of fire management treatments and scientific investigation must be part of management to assess the need to adapt or maintain treatments that are currently being used. Fire management must be agile and adept to anticipate and respond to changes in conditions as changes in climate occur.

## 1.6 Decision to Be Made

The Responsible Official (decision maker) for approving this action is the Region 6 Regional Director. The Regional Director will use the overarching purposes (described above in section 1.4) together with the proposed alternatives that include fire management goals and objectives outlined in 2.0 along with actions and potential environmental effects, as evaluation criteria to select the alternative that would best fulfill the purposes and satisfactorily meets environmental guidelines.

This EA provides an evaluation of the beneficial and adverse effects of the alternatives and provides information to help the decision maker fully consider these effects and any proposed mitigation. Using the analysis in this EA, the decision maker will decide whether there may be any significant effects associated with the alternatives that would require the preparation of an Environmental Impact Statement (EIS) or whether the EA and associated FONSI are adequate.

## 1.7 Permit and License Requirements

### 1.7.1 Prescribed Fire

A prescribed fire plan will be developed and approved prior to implementation of each prescribed fire. All prescribed fire projects will comply with applicable regulations and policies of the Service and the South Dakota Department of Agriculture Conservation and Forestry.

Fire management activities which result in the discharge of pollutants (carbon monoxide (CO)), particulate matter (PM), and other pollutants from wildland fires are subject to and must comply with all applicable Federal, State, and local air pollution control requirements as specified in Section 118 of the Clean Air Act, as amended, 1990 (42 USC 1857 et seq.). Air quality in South Dakota is regulated by the Air Quality Program of the South Dakota Department of Environment and Natural Resources (DENR). The responsibility of the DENR is to maintain air quality levels in South Dakota that protect human health, safety and welfare, and the National Ambient Air Quality Standards established through the *Clean Air Act*. The DENR achieves this goal by monitoring the ambient air quality throughout the state, and by regulating businesses and facilities that emit air pollution.

Permitting procedures for open burning do not exist currently on federal, state and private lands in eastern South Dakota. The Service will utilize a Simple Approach Smoke Estimation Model, or other form of smoke management analysis for all prescribed fires that occur on Service owned lands.

### 1.7.2 Mechanical Treatments

A plan will be developed and approved prior to implementation of mechanical treatment. All mechanical treatments will comply with applicable regulations. Mechanical treatments will be implemented outside the nesting seasons to avoid conflict with the Migratory Bird Treaty Act Requirements.

### 1.7.3 Chemical Treatments

In accordance with regulations of the South Dakota Department of Agriculture, all herbicide applications at the NWRs and WMDs must be performed by a licensed pesticide applicator or by a registered technician under their supervision. Only products approved by the United States Environmental Protection Agency (EPA) will be used. The Service requires that a Pesticide Use Proposal (PUP - see Appendix A https://www.fws.gov/mountain-prairie/pressrel/documents/ESD_EA/PUP.pdf) be submitted, reviewed, and approved prior to implementing treatment(s).

# Chapter 2. Goals, Objectives and Alternatives

## 2.1 Goals and Objectives

Habitat goals and objectives are the unifying elements of successful refuge management. They identify and focus management priorities, provide a context for resolving issues, guide specific plans or projects, provide rationale for decisions, and offer a defensible link among management actions (strategies) set forth in the proposed alternatives, refuge purpose(s), Service policy, and the National Wildlife Refuge System mission.

### 2.1.1 Goals

Goals are broad statements of desired conditions that should be achieved by implementing specific actions, either independently or in conjunction with other treatments. The following are the goals for using wildland fire, mechanical fuels treatments, and chemical treatments to manage fuels and Service ecosystems on the five administrative units and to implement fire management actions in the wildland urban interface (WUI) areas:

**GOAL 1.** Provide for firefighter and public safety.

**GOAL 2.** Use prescribed fire, naturally ignited wildfires, mechanical, and chemical treatments as a mechanism of disturbance to mimic natural processes in order to maintain a naturally functioning system and increase the resiliency of the landscape.

**GOAL 3.** Reduce the negative impacts of wildfires by reducing fuel loading through mechanical, chemical, and wildland fire treatments.

**GOAL 4.** Decrease the potential for wildfires in the wildland urban interface by reducing wildland fuels within the Northern Great Plains ecosystem.

### 2.1.2 Objectives

Objectives are specific statements of purpose that support the goals. An alternative must meet for the planning and environmental analysis process to be considered a success. Meeting an objective is part of what makes an alternative “reasonable.” Meeting the fire management objectives stated below for the Service lands within this EA is the basis for federal action.

**OBJECTIVE 1.** Protect life, property, and cultural resources from the threat of wildfire through fuel treatments, prevention, education, mitigation, and post-wildfire restoration actions on and adjacent to Service lands.

- Commensurate with public and firefighter safety, all wildfires within the defined WUI will be suppressed with aggressive tactics.
- The administrative units within this EA will minimize the potential threat to cultural resources. All fuels treatments will follow Departmental, Service, and R6 Cultural Resource policy.
- The administrative units in this EA will mitigate wildfire threat through prevention and education.

- Post wildfire restoration will follow Departmental and Regional policy set forth by the Service.

**OBJECTIVE 2.** Protect, restore, and maintain the health, vigor, and resiliency of the Northern Great Plains ecosystem by subjecting vegetation to periodic disturbance with wildland fire (prescribed fire and wildfire) and chemical and mechanical treatments on Service lands.

- Implement 90% or more of treatments using wildland fire, mechanical, and chemical within the priority one areas as outlined in section 2.5 of this document.

**OBJECTIVE 3.** Control or eradicate invasive and noxious plant species using wildland fire, mechanical, and chemical treatments.

- Implement 90% or more of treatments using wildland fire, mechanical, and chemical for the reduction of invasive and noxious species within the priority one areas as outlined in section 2.5 of this document.
  - Use prescribed fire to target Kentucky bluegrass (*Poa pratensis)* and smooth brome (*Bromus inermis).*
  - Use mechanical and chemical treatments for eradication of non-native species such as Russian olive (*Elaeagnus angustifolia*).
  - Use mechanical and chemical treatments for the reduction and eradication of undesirable native species such as eastern red cedar (*Juniperus virginiana*).

### 2.1.3 Current Application of Wildland Fire and other Treatments to Meet Goals and Objectives

The guiding principles of Service's fire management program include responsible stewardship, fuels reduction, Wildland Urban Interface (WUI) management, and habitat management strategies based on conserving ecological integrity, meeting the objectives of federal fire policy, and establishing effective partnerships. The emphasis of the Service's fire management program has been to use wildland fire and other management tools to achieve ecosystem restoration, habitat maintenance and affect positive ecosystem change on a landscape scale while meeting the national fire policy objectives.

**Prescribed Fire**

Prescribed fire may be used to:

- restore, or maintain diversity within native plant communities;
- restore and perpetuate native wildlife species through habitat restoration;
- stimulate grass and forb growth;
- reduce accumulated wildland fuels;
- restore natural conditions;
- improve ecosystem health;
- maintain or restore healthy wildlife habitat;

- create barriers for the purpose of protecting high-value areas such as private property or administrative sites;
- control spread of noxious weeds;
- enhance soil ph and increase soil nutrients; and
- aid in the suppression of wildfires.

Although prescribed fire can occur at any time of year, most prescribed fires are implemented in spring, early summer, and into fall, depending on the prescribed fire's objectives and the associated effects on plants and animals. Spring burning is often preferred because it provides opportunities to manage invasive cool-season grasses, open up shorelines, vegetation-choked wetlands, and provide areas of green browse attractive to migratory waterfowl. The Service units within this EA have treated about 74,000 acres since 2001.

Grasslands and wetlands are burned primarily to manipulate vegetation and enhance the biological productivity and diversity of specific organisms or to accomplish specific objectives. Specific objectives may be broad (prairie restoration and maintenance) or narrow (management for endangered or rare species or reduction of woody plants).

Where native prairie is not a major component of the management area, nearly all prescribed fires seek to reduce vegetative litter, to help control noxious weeds, or to improve the height and density of planted cover. Where native prairie is a major part of a management area, the primary reasons for burning are to restore, improve, or enhance the prairie habitat for wildlife.

Prescribed fire can also be used to suppress or control targeted weed species. Fire frequency, seasonality, fire intensity, and severity can be managed to decrease certain non-native species (such as Kentucky bluegrass, smooth brome grass, or other undesirable plant species) and/or increase the competitive advantage of native grasses over non-native species.

**Non – Fire Treatments**

Mechanical treatments are implemented using hand-held tools, chain saws, bulldozers, tractors, masticators, excavators, chippers, and other specialty equipment. Mechanical treatments may also be used in conjunction with chemical and wildland fire treatments as part of the overall treatment process to meet project objectives and attain desired condition.

Chemical treatments will be used to treat invasive plant species, crop plants, federally and state-listed noxious plant species, and to restore and maintain native habitats. Chemical treatments may also be used in conjunction with mechanical and wildland fire treatments as part of the overall treatment process to meet project goals.

### 2.1.4 Protection of Values

Fire protection involves protecting resource values that might fall within the perimeter of a wildfire. Table 3 identifies the approximate number of acres listed by resource.

**Table 3. List of Resources within the Service Units**

| Resources to Protect | Huron WMD | Lake Andes NWRC | Madison WMD | Sand Lake NWRC | Waubay NWRC |
|---|---|---|---|---|---|
| Commercial Timber | 0 | 0 | 0 | 0 | 100 |
| Cultural / Historical / Archeological / Paleontological | 10 | 100 | 0 | 100 | 500 |
| Improvements — Non WUI | 600 | 1,000 | 542 | 709 | 800 |
| Natural Area of Social Concern | 8,916 | 9,726 | 10,364 | 52,600 | 11,969 |
| Non-Commercial Timber | 95 | 1,494 | 7,357 | 373 | 500 |
| Rangeland | 16,436 | 19,325 | 21,028 | 42,172 | 25,810 |
| Social Areas of Social Concern | 17,883 | 26,216 | 39,224 | 66,414 | 45,674 |
| Threatened & Endangered Species / Associated Habitat | 650 | 6,500 | 11,617 | 503 | 30,415 |
| Wilderness / Roadless/RNA | 0 | 0 | 0 | 0 | 0 |
| Wildland Urban Interface | 0 | 100 | 1,015 | 240 | 391 |
| Wildlife Habitat | 17,883 | 26,216 | 39,224 | 66,414 | 45,674 |
| Total Fee Title Acres | 17,883 | 26,216 | 39,224 | 66,414 | 45,674 |
| Combined acres by attribute per Administrative Unit | 62,473 | 90,677 | 130,371 | 229,525 | 161,833 |

Acreage from CCPs

## 2.2 Alternatives

Alternatives are different approaches to the management of Service lands within this EA and designed to resolve issues; achieve the purposes, vision, and goals as identified in the CCPs; achieve the goals and objectives for fire management described above; and help fulfill the System's mission and comply with current laws, regulations, and policies. NEPA requires an equal and full analysis of all reasonable alternatives considered for implementation.

### 2.2.1 Alternative Development

Alternatives were formulated to address the significant issues identified by the Service, the public, and the governmental partners during the internal and public scoping process and throughout the development of the draft plan. This chapter contains the following sections:

- Elements Common to All Alternatives
- Description of Alternatives

This chapter describes three management alternatives that represent different approaches to enhancing the fire management program within the five administrative units. Alternative A, Current Management (No Action), describes ongoing management. The No Action alternative is a basis for comparison with alternatives B and C. Alternative C is the Service's proposed action. Each alternative was evaluated based on its expected success in meeting the vision and goals as identified in the CCPs as well as the goals and objectives for fire management.

The three management alternatives for the administrative units are:

**Alternative A: Current Management - No Action**: All wildfires, regardless of cause, are suppressed and not managed for multiple objectives. Prescribed fire, mechanical, and chemical treatments are used for fuels reduction and habitat management.

**Alternative B:** All wildfires, regardless of cause, are suppressed and not managed for multiple objectives. Use only mechanical and chemical control for fuels reduction.

**Alternative C (preferred alternative)**: Suppress all human caused wildfires, and, when appropriate, utilize naturally occurring wildfires for fuels reduction and habitat management. Increase use of prescribed fire, and continue current management for mechanical and chemical treatments.

### 2.2.2 Elements Common to All Alternatives

- Fuels reduction by mechanical and chemical treatments
- Cost effectiveness ensured when suppressing wildfires
- Collaboration with partners
- Prevention and education implemented as needed
- Ecosystems management for natural health with the use of mechanical and chemical treatments
- Species of concern and threatened and endangered species protected by maintaining habitat with the use of mechanical and chemical treatments and suppressing human caused wildfires.
- Post-wildfire treatments will follow Departmental and Service policy(ies).
- Service lands managed for habitat improvement.
- Service Unit resources (Table 3 above)

### 2.2.3 Description of the Alternatives

Fire management actions to advance the mission and the purpose and vision of the administrative units under each of the alternatives are summarized below. The alternatives reflect options to address significant threats, problems, and issues raised by public agencies, private citizens, and interested organizations. Each alternative differs in its ability to achieve the long-term goals and objectives of the WMDs/NWRs and fire management. However, each is similar in its approach to managing Service lands.

**Alternative A – Current Management (No Action)**

**Summary**

Under Alternative A, fire management activities currently conducted by the Service at the five administrative units in the Great Plains Zone would not change. Fire management activities currently implemented include wildfire suppression, prevention, preparedness, developing and maintaining interagency partnerships, fuels treatments utilizing prescribed fire, mechanical, and chemical; and post wildfire treatments and monitoring.

The no-action alternative provides the baseline against which to compare other alternatives. It is also a requirement of NEPA that a no-action alternative be addressed in the planning process. The Service would not develop any new treatment methods under Alternative A. Funding and staff

levels would not change, and the fire management program would follow the same direction, emphasis, and intensity as it does at present.

**Wildfire Suppression**

All wildfires are full suppression. Suppression actions may include the construction of fireline by firefighters, engines, heavy equipment, and aircraft and maybe suppressed by refuge and fire staff, volunteer fire departments and/or with a South Dakota statewide agreement. Wildfires are suppressed using appropriate tactics to meet the objectives defined by the Incident Commander (IC) with consideration of Minimum Impact Suppression Tactics (MIST), when applicable. Fireline requiring soil disturbance will be minimized in native sod, waterways, riparian areas, cultural sites and critical habitat - if the situation justifies it. When this occurs, prior consultation with a resource advisor (READ) will be done if time allows. Service guidance restricts the use of heavy equipment breaking native sod for the construction of fireline and other management actions.

Tactics, such as burning out from roadways or allowing the fire to burn into areas of natural confinement, may be appropriate as well. The Federal Wildland Fire Policy gives fire managers the latitude to determine and implement the management response based on the current and expected conditions.

Wildfire ignitions across Service lands in eastern South Dakota vary greatly depending on the time of year, adjacent farming practices, drought, and local fuels conditions. Recorded ignition causes in the past have included arson, railroad, power lines, children playing with matches, lightning, equipment, debris and agricultural burning practices, fireworks, and abandon campfires; the most common occurrence coming from debris /agricultural burning.

The following data are the 2006 through 2015 10-year average historical wildfire occurrences as recorded in Fire Management Information System (FMIS) database:

- Huron WMD reported 7 wildfires within this 10-year period for an average of 0.7 wildfires/year. The average fire size was 21.5 acres.
- Lake Andes NWRC reported 3 wildfires within this 10-year period for an average of 0.3 wildfires/yr. The average fire size was 66.0 acres.
- Madison WMD reported 6 wildfires within this 10-year period for an average of 0.6 wildfires/yr. The average fire size of 23.0 acres.
- Sand Lake NWRC reported 9 wildfires within this 10-year period for an average of 0.9 wildfire/year. The average fire size was 18.4 acres.
- Waubay NWRC reported 7 wildfires within this 10-year period for an average 0.7 wildfires/year. The average fire size was 14.4 acres.

**Prevention**

Prevention education is accomplished through local outreach to area schools. School groups can attend local refuges where they participate in hands-on activities that showcase the positive and negative effects of wildfires.

**Prescribed Fire**

Prescribed fire is a management tool used to manipulate vegetation. Units within this EA have been using prescribed fire since the 1970s. Service biologist and fire managers recognize that

there is no ecological equivalent to fire; no other fuels treatment method or natural disturbance yields the effects that result from the occurrence of fire.

Prescribed fire is a well-established practice used by public and private land managers. Often, multiple fire protection and resource management benefits are achieved concurrently and often with multiple agencies as encouraged by the Cohesive Strategy.

Prescribed fires may include broadcast prescribed fire, in which fire is applied across the landscape, or pile burning. Historically, the treatment size and number of prescribed fires conducted on Service lands have varied considerably to meet fuels reduction and habitat management needs. Broadcast prescribed fires may range in size from as little as 1 acre up to 3,750 acres. Since 2006, total acres treated annually within all five administrative units ranges from 1,492 acres to 12,374 acres depending on specific management objectives, funding and weather. The average acreage burned from 2006 through 2015 is about 5,900 acres. Burning is conducted year-round, but the typical prescribed fire season generally occurs between March 15 and May 30 and September 1 through October 31. Pile burning would usually occur in the winter (November through February), but may also occur during the growing season.

Prescribed fire is used to restore native biological communities in order to provide optimum feeding, breeding, and wintering habitat for a diversity of migratory birds, migratory waterfowl, native herbivores, native pollinating invertebrates, and other native wildlife that are present. Prescribed fire may also be used as a management tool in wetlands and moist soil units to reduce invasive species such as cattail. Prescribed fire also provides a needed mechanism of disturbance across all habitats that have evolved with fire.

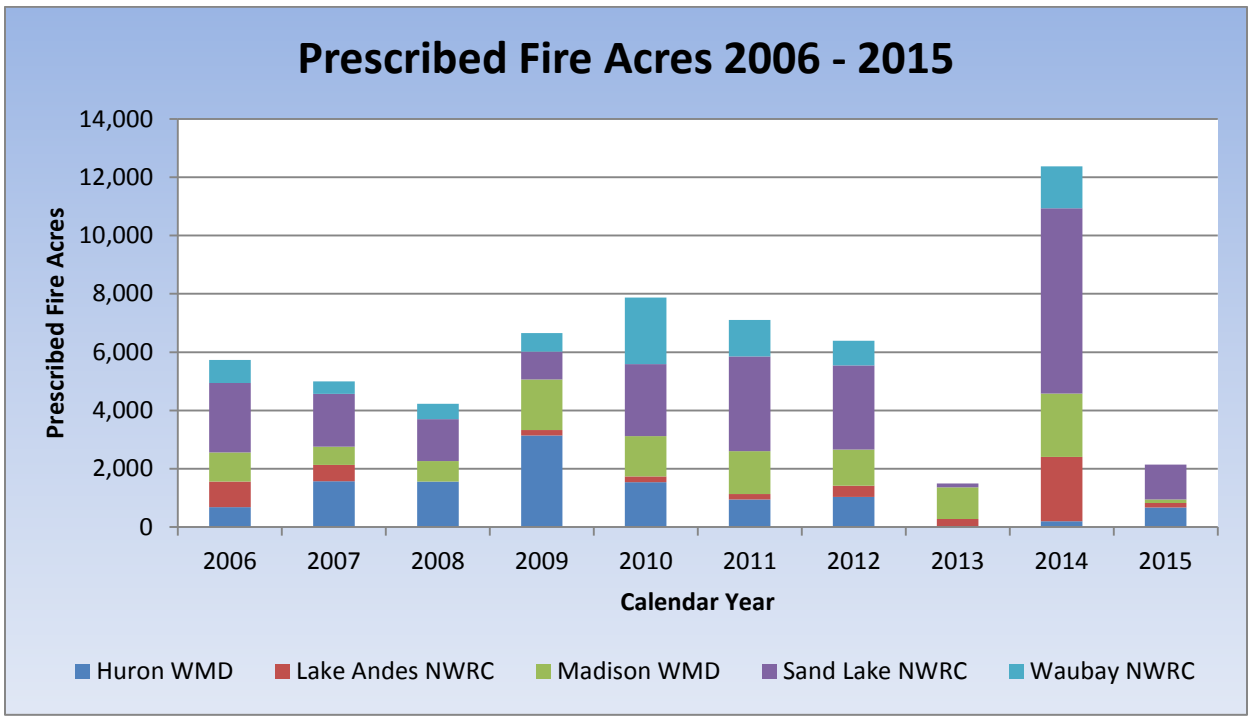
*Prescribed fire on Lake Andes NWRC. USFWS*

**Table 4. Acres Treated with Prescribed Fire 2006 - 2015**

| Administrative Unit | Total Acres Treated | Total Number of Treatments | Average Acres per Year | Average Number of Treatments |
|---|---|---|---|---|
| **Huron WMD** | 11,353 | 57 | 1,135 | 5.7 |
| **Lake Andes NWRC** | 5,019 | 36 | 502 | 3.6 |
| **Madison WMD** | 11,539 | 111 | 1,153 | 11.1 |
| **Sand Lake NWRC** | 22,885 | 66 | 2,288 | 6.6 |
| **Waubay NWRC** | 8,167 | 53 | 816 | 5.3 |
| **Totals** | 58,967 | 323 | 5,896 | 32.3 |

Past prescribed burning has taken place across many of the Waterfowl Production Areas (WPAs) in many of the 50 counties in eastern South Dakota. The specific location for prescribed fires is dependent upon management objectives, weather conditions, fuels conditions, and topographic features. Past fuels treatments have occurred in the WUI, reseeding restorations, and tracts of native unbroken sod.

**Figure 9. Prescribed Fire Acres 2006 - 2015**




*Source: USFWS Fire Management Information System (FMIS) database*

### Mechanical Treatments

Mechanical treatments are implemented using hand-held tools, chain saws, bulldozers, tractors, masticators, excavators, chippers, and other specialty equipment. Mechanical treatments may also be used in conjunction with chemical and wildland fire treatments as part of the overall treatment process to meet project objectives and attain desired condition.

Mechanical treatments are used to change the fuel loading and to return areas to their natural condition. When properly used, mechanical treatments reduce fire hazards, improve the proper distribution of plant communities, increase plant diversity, control noxious weeds, and improve the quality of vegetation for wildlife and livestock. Treatment increases ground cover, which often results in increased soil infiltration rates and decreases in surface runoff, soil erosion and stream sedimentation.

Mechanical treatments over the past 10 years have varied from 1 acre in size to 265 acres in size with the majority of the treatments used to remove shelterbelts and invasive woody species. This includes, but is not limited to, eastern red cedar, Rocky Mountain juniper (*Juniperus scopulorum*), Russian olive trees, Siberian elm trees, standing snags, or hazard trees and isolated pockets of woody brush.

**Mechanical Treatments Types and Acres:** Mechanical treatments types include mowing, haying, chopping, bucking, shearing, and mulching of woody material. The number of completed treatments over the last 10 years include the following:

- Huron WMD — 12 treatments for 194 acres
- Lake Andes NWRC— 7 treatments for 173 acres
- Madison WMD — 24 treatments for 2,053 acres
- Sand Lake NWRC—0 treatments for 0 acres
- Waubay NWRC— 4 treatment for 58 acres

### Chemical Treatments

Chemical treatments will be used to treat invasive plant species, federally and state-listed noxious plant species, and to restore and maintain native habitats. Chemical treatments are also used in conjunction with mechanical and wildland fire treatments as part of the overall treatment process to meet project goals.

Chemical herbicide treatments rarely achieve long-term fuels reduction. Herbicides are used to prevent the suckering or re-sprouting of invasive woody vegetation or to pre-treat fuels in order to promote the fire spread in the canopy fuels of eastern red cedar. Application is usually done by “hack and squirt” methods to avoid non-targeted species. Herbicide treatments may be used after wildfires to control invasive weeds, and as part of the process for reseeding native grasses. All Service units that use chemical treatments must prepare an annual pesticide use proposal. The chemicals most often used are Pathfinder II, Garland 4, and glyphosate products with various commercial names. The effects of using herbicide treatments are discussed in Chapter 3.

**Partnerships**

Collaboration and partnerships with communities, state governments, tribes, and other stakeholders in support of local economies remains a priority for the Service and Department and is a suggested practice of the Cohesive Strategy. All projects funded within the fuels program must result from a collaborative process. Because of this direction, an interagency partnership has been formed between the USFWS, The Nature Conservancy (TNC), National Park Service (NPS), State of South Dakota, US Forest Service (USFS), and local governments within wildland fire management community. The partnership is known locally as the Eastern South Dakota Training Exchange. The parties are working together to cross train employees, educate the public about the benefits of prescribed fire, prioritize treatments, and implement prescribed fire.

In addition to training, the Bureau of Indian Affairs (BIA), TNC, State of SD, and the Service implement prescribed fires across agency boundaries.

**Monitoring**

Current conditions are established through on-site evaluation of species composition, stand structure, and fuel load. Pre-treatment methods to collect and analyze data may include the establishment of photo points, collecting fuel samples to determine fuel loading and fuel moisture, and/or the establishment of monitoring plots to establish a comprehensive data set of species present within the site. For purposes of developing individual burn plans for a specific treatment, Scott and Burgan's (2005) 40 fuel models were used to depict general characteristics such as vegetative continuity, height, tons per acre of live/dead fuels, and basic fire behavior characteristics. Post fire monitoring would include fire effects documentation.

**Post-wildfire Treatments**

If Emergency Stabilization (ES) or Burned Area Rehabilitation (BAR) is utilized, Departmental and Service policy will be followed.

Natural recovery is the preferred choice for vegetative recovery following a wildfire. However, when natural recovery is not a viable option, then Emergency Stabilization and/or Burned Area Rehabilitation treatments may need to be initiated. Rehabilitation and restoration efforts may be undertaken to protect and sustain ecosystems, public health, safety, and to help communities protect infrastructure.

To date, the administrative units within this EA have not utilized post-wildfire treatments. Service lands are dominated by grass fuels, and grass fuels generally recover naturally and quickly following wildfires.

**Alternative B –** All wildfires, regardless of cause, are full suppression and not managed for multiple objectives. Use only mechanical and chemical control for fuels reduction.

**Summary**

Under alternative B, wildfire suppression and prevention would be the same as Alternative A. Prescribed fire would not occur. Fuels reductions would be accomplished using previously authorized management activities including prescribed grazing and haying. Mechanical and chemical techniques for the reduction of fuels would be the same as Alternatives A and C. Partnerships would be reduced, and monitoring may decrease compared to Alternative A. Post wildfire treatments would be same as Alternative A.

**Wildfire Suppression**

Suppression of wildfires would be the same as Alternative A.

**Prevention**

Prevention would be the same as Alternative A.

**Prescribed Fire Treatments**

Prescribed fire treatments would not occur under Alternative B.

**Mechanical Treatments**

The use of mechanical treatments for fuels reduction and habitat management would be the same as Alternative A.

**Chemical Treatments**

The use of chemical treatments for fuels reduction and habitat management would be the same as Alternative A.

**Partnerships**

Collaboration with partners would still occur. However, compared to Alternative A, a decrease in interagency fire management partnerships would most likely occur with the loss of prescribed fire as a management tool. The South Dakota Training Exchange would be reduced as there would be less opportunities for training due to fewer areas to conduct prescribed burns.

**Monitoring**

Monitoring would be the same as alternative A with the exception that post fire effects monitoring would not take place due to prescribed fire not being utilized.

**Post-wildfire Treatments**

Same as Alternative A.

**Alternative C -** (preferred alternative) - Suppress all human caused wildfires, and, when appropriate, utilize naturally occurring wildfires for fuels reduction and habitat management. Increase prescribed fire, and continue current management for mechanical and chemical treatments.

**Summary**

Fuels reduction is accomplished through use of wildland fire, mechanical, and chemical treatments. This alternative meets Service and 2009 Federal Wildland Fire Policy by allowing wildfires to be managed for habitat benefits.

**Wildfire Suppression**

Allowing some wildfires to be managed for multiple objectives meets Service and 2009 Federal Wildland Fire Policy. The Agency administrator’s decision to utilize multiple objective wildfire is based on a number of factors including but not limited to:

- firefighter and public safety
- values at risk
- environmental conditions

- the ecological, social, and legal consequences of the fire
- the circumstances under with the fire occurs and
- cost effectiveness.

The Service units in this EA have low wildfire occurrence (all less than 1 wildfire/year) and the majority of wildfires are human caused. In addition, most wildfires occurring on the WPAs are suppressed by local fire departments and it is anticipated these departments will continue to do full suppression as their standard procedure. Due to low fire occurrence and suppression performed by local fire departments, we anticipated that the opportunities to manage a wildfire for multiple objectives will be limited on Service lands.

Under this alternative, all human caused wildfires would be suppressed but naturally occurring wildfires could be managed for multiple objectives where and when appropriate. This alternative meets Service and 2009 Federal Wildland Fire Policy by allowing wildfires to be managed for habitat benefits.

**Prevention**

Prevention would be the same as Alternative A.

**Prescribed Fire Treatments**

The Service goal would be to implement a five-year fire return interval in an effort to ‘fully restore’ the historic fire regimes of eastern South Dakota. This would require an increase in prescribed fire activities to treat approximately 20% of the total burnable acres on Service lands annually. As shown above in Table 1, the number of total burnable acres is 137,980. Applying prescribed fire and naturally occurring wildfire to 20% of those acres would equate to 27,596 acres annually.

**Mechanical Treatment**

The use of mechanical treatments for fuels reduction and habitat management would be the same as Alternative A.

**Chemical Treatments**

The use of chemical treatments for fuels reduction and habitat management would be the same as Alternative A.

**Partnerships**

Partnerships will increase with local cooperators. Increased coordination and cooperation would occur with this alternative due to the increase in operations needed for implementing a greater number of prescribed fire treatments across agency boundaries further meeting the intent of the Cohesive Strategy.

**Monitoring**

Same as alternative A

**Post-wildfire Treatments**

Same as Alternative A

### 2.2.4 Comparison of Alternatives

**Table 5. Alternatives Table**

| Preliminary Alternative | Use of Wildfire | | Utilization of Treatments | | Meets Purpose & Need? | Meets Objectives? |
|---|---|---|---|---|---|---|
| | Naturally Ignited | Human Ignited | Non-fire Treatments | Prescribed Fire Treatments | | |
| A. **No Action** – (Current Management). All wildfires, regardless of cause, are full suppression and not managed for multiple objectives. Prescribed fire, mechanical, and chemical treatments are used for fuels reduction and habitat management. | Full suppression regardless of ignition source | Full suppression regardless of ignition source | Continue Mechanical and Chemical Treatments | Continue Prescribed FireTreatments | Meets purpose but does not take full advantage of wildland fire management options. It is a more costly alternative. | Partially meets |
| **B**. All Wildfires regardless of cause are full suppression and not managed for multiple objectives. Use only mechanical and chemical control for fuels reduction | Suppressed | Suppressed | Continue Mechanical and Chemical Treatments | No prescribed fire | Partially – does not maintain full resiliency of the landscape and is not logistically feasible. Limited restoration potential. | Partially meets |
| **C**. (preferred) Suppress all human caused wildfires, and, when appropriate, utilize naturally occurring wildfires for fuels reduction and habitat management. Increase prescribed fire, and continue current management for mechanical and chemical treatments. | Ability to use naturally caused wildfire for multiple objectives and benefit. | Suppressed | Increase Mechanical and Chemical Treatments | Increase Prescribed fire | Fully meets | Fully meets |

### 2.2.5 Alternatives Considered but Eliminated from Detailed Study

No additional alternatives were proposed.

## 2.3 Policy Requirements for Prescribed Fire and Non-Fire Fuels Reduction Activities

All prescribed fires and non-fire fuels reduction activities will follow DOI and Service policy identified in Service's *Fire Management Handbook* and *Interagency Standards for Fire and Fire Aviation Operations*. Any additional regional or local policies and/or guidance regarding the use of prescribed fire or non-fire fuels treatments will also be followed including the most recent versions of:

- Prescribed Fire Complexity Rating System Guide (NWCG 2004).

- Prescribed Fire Smoke Management Guide (NWCG 2001).
- Guidance for Implementation of Federal Wildland Fire Policy (USDI and USDA 2009).
- National Incident Management System: Wildland Fire Qualifications System Guide (NWCG 2015).
- Interagency Prescribed Fire Planning and Implementation Procedures Guide (NWCG 2014a).

The Service's *Fire Management Handbook* provides specifics regarding management, planning, project review, approval, and prescribed fire implementation.

### 2.3.1 Prescribed Fire Plan

A prescribed fire plan will be prepared prior to the implementation of any prescribed fire. An annual plan that describes program priorities for prescribed fire generally begins with consultation between the Service Fire Management Officer and each agency administrator to formulate the annual need for prescribed fire. Prescribed fire plans can vary greatly in their degree of detail. The size and complexity of the prescribed fire project will generally determine the level of detail required. The prescribed fire plan is a legal document that provides the agency administrator the information needed to approve the plan and the Prescribed Fire Burn Boss with all the information needed to implement the prescribed fire. Prescribed fire projects must be implemented in compliance with the written plan. For prescribed fire plan preparation and approval, the latest version of the *Interagency Prescribed Fire Planning and Implementation Procedures Reference Guide* will be used for the development and review of prescribed burn plans. In addition, agency policies identified in the Service *Fire Management Handbook* and the *Interagency Standards for Fire and Fire Aviation Operations* as well as Regional and any local policies regarding burn plan development and/or approval will be followed.

Each agency administrator will be responsible for final approval of the prescribed fire plan and will identify when the prescribed fire plan can be implemented. Results from the prescribed fire will be documented and lessons learned are used to develop the next prescribed fire. This supports the continued improvement of operations and adaptive management.

### 2.3.2 Non-Fire Fuels Reduction Activities

Service personnel prepare plans, as needed, for the use of chemical and mechanical treatment methods. Non-fire fuels reduction activities must be implemented in a similar process to that described above in Section 2.3.1. Any memoranda of understanding, agreements, cost shares, or contracts must be in place prior to any on the ground implementation. All planning aspects must comply with and/or meet the planning elements (that is, address management treatment objectives, project must be addressed in the applicable FMP, been through the appropriate NEPA process, meet requirements of the *National Historic Preservation Act*, analysis under the *Endangered Species Act*, so forth) identified in the Service *Fire Management Handbook*. All planning aspects are subjected to project review and approval before implementation can proceed. The fire staff supports the preparation and implementation of these plans.

## 2.4 Treatment Implementation

The number of treatments implemented may vary widely on an annual basis. This variation is based, in part, on specific habitat management and fuels reduction objectives, availability of funding and resources, and current and long-term weather and fuels conditions. Some locations may only need treatment once every 3 to 20 years or more while other areas require more frequent treatments to improve or maintain desired conditions. Fuels reduction and the creation and maintenance of firebreaks in WUI areas would most likely require treatments that are more frequent.

## 2.5 Prioritizing Treatments

Priority will be given to projects that protect values-at-risk and achieve fire management objectives identified in applicable management plans (such as Community Wildfire Protection Plans (CWPP)), land/fire management plans (such as the Service CCPs), and local risk assessments.

The following principles guide the overall direction and strategy for prioritization of treatments in the Great Plains Zone:

- Adhere to Federal Wildland Fire priorities regarding public, firefighting personnel, and natural and cultural resources.
  - Firefighter and public safety is always the first priority. All FMPs and activities must reflect this commitment. (620 DM).
- Support the mission of the agency and the National Wildlife Refuge System.
  - Recognize that fire is an integral ecological process necessary to protect the biological integrity of the refuge system.
  - Balance the Congressional intent and Departmental policies with the mission of the Refuge System.
- Actions to protect communities should maintain or enhance habitats and the wildlife populations they support.
  - Human safety is always the first priority.
  - Pursue dual-benefit opportunities whenever possible by using wildland fire and non-fire treatments to reduce fuel loads *and* benefit native habitats.
- Incorporate fuels reduction considerations as well as ecological objectives of fire in Service land management plans.
  - Address fuels issues, threats to firefighter and public safety, and mitigations in land use documents.
- Use the best science and data available to set priorities for decision-making.
- Look at fire management needs at a landscape scale, such as opportunities and threats that develop beyond our jurisdictional boundaries.
- Use an approved treatment prioritization process and an adaptive management approach with management considerations to prioritize fuels treatments.

With the above principles adhered to, <u>a second tier</u> of prioritization considerations may guide selection and ranking. They may include projects that specifically accomplish the following:

- Protect the wildland urban interface (WUI) or will influence the risk to the WUI if not treated.
- Support a CWPP or CWPP equivalent.
- Provide economic opportunities for communities, tribal members, or youth.
- Perform work through the use of a contractor or cooperator.
- Provide biomass potential.
- Restore and maintain resilient landscapes, as described in the Cohesive Strategy goals — Priority will be given to projects that move landscapes toward desired condition, or projects that maintain desired conditions, including those which specifically:
    - Protect special interest species.
    - Promote carbon sequestration.
    - Minimize greenhouse gases.
    - Provide collaboration opportunities.
- Include joint labor and funding across agencies
- Ensure project efficiencies
- Maintain previous investments
- Mitigate wildfire impacts — give priority to projects that provide the greatest opportunities to mitigate wildfire impacts, including projects that specifically:
    - Provide for public and firefighter safety.
    - Minimize private property loss.
    - Minimize impacts to T&E species.
    - Reduce large fire costs.

In keeping with the Cohesive Strategy goals, treatments do not have to be limited to jurisdictional boundaries. Identification of on and off-site values provides practical information to assist refuge management and neighboring landowners with identification and implementation of mitigation measures and management actions.

Management flexibility is essential for maintaining resources and other identified values across the planning area (which may include off-refuge lands).

### 2.5.1 Community Wildfire Protection Plans (CWPP)

The Cohesive Strategy encourages the development of a CWPP, and communities (or counties), at their option, may develop a plan. A CWPP enables local communities to improve their wildfire mitigation capacity and work with government agencies to identify high fire risk areas and prioritize areas for mitigation, fire suppression, and emergency preparedness. The minimum requirements for a CWPP, as stated in the act, are as follows:

1. **Collaboration:** Local and state government representatives, in consultation with federal agencies or other interested groups, must collaboratively develop a CWPP.

2. **Prioritized Fuels Reduction:** A CWPP must identify and prioritize areas for hazardous fuels reduction and treatments. Furthermore, the plan must recommend the types and methods of treatment that will protect Communities at Risk (CARs) and Communities of Interest (COIs) and their essential infrastructures.
3. **Treatments of Structural Ignitability:** A CWPP must recommend measures that communities and homeowners can take to reduce the ignitability of structures throughout the area addressed by the plan.

At the local level, successful implementation of fuels treatments must include decision makers collaborating with federal, state, and local governments; Tribes; community-based groups; landowners; and other interested persons. Collaboration establishes priorities, cooperation on activities, and increase public awareness and participation to reduce the risks to communities and surrounding lands.

In the WUI, these plans provide a seamless guide for fuels reduction across ownerships, identifying those treatments to be completed by public agencies and those to be completed by private landowners.

The WUI is composed of three categories of communities that meet this description. The Great Plains Zone focuses on all three categories but higher emphasis is placed on Category 1 and 2. In accordance with the NARA (2001), a structure is understood to be either a residence or a business facility, including, federal, state, and local government facilities.

**Category 1 Interface Community**.

The Interface Community exists where structures directly about wildland fuels. The development density of an interface community is usually three or more structures per acre.

**Category 2 Intermixed Community**.

The Intermixed Community exists where structures are scattered throughout a wildland area. The development density for intermixed communities ranges from structures very close together to one structure per 40 acres.

**Category 3 Occluded Community**.

The Occluded Community generally exists in a situation, often within a city, where structures abut an island of wildland fuels. The development density for an occluded community is usually similar to those found in the interface community, but the occluded area is usually less than 1,000 acres in size.

Interface and intermix communities are both defined as areas where human habitation and development meet or intermix with wildland fuels (NARA 2001). Human encroachment upon wildland ecosystems within recent decades is increasing the extent of the WUI and is therefore having a significant influence on wildland fire management practices.

Not every county has prepared a CWPP. If one is not prepared, the county will be contacted for inclusion in the development of a document with Service fire management prioritizing fuels treatments in-lieu of a county- wide CWPP. Information for all CWPPs in the Great Plains Zone is available by contacting one the Eastern South Dakota Administrative unit offices.

### 2.5.2 Fuels Allocation and Accountability System (FAAS) Hazard Zone Maps

Another methodology to prioritize treatments for maintaining resilient landscapes is the utilization of the FAAS Hazard Zone maps. It represents a data set that identifies WUI areas directly adjacent to Service lands. Areas identified within a Hazard Zone receive higher priority for treatment than those not within the Hazard Zone.

The delineation of priority treatment areas was determined by using a combination of factors. However, the focus of delineating High, Moderate, and Low priority areas is based on the type of wildfire response that may be needed for a specific tract of land. For example, an isolated small island surrounded by water would not require the same level of management response as a tract of land immediately adjacent to the wildland urban interface. Other considerations in determining priority treatment areas include; evaluating and determining the type of WUI (i.e., Interface Community, Intermixed Community, and Occluded Community) in close proximity to Service lands; the potential for large fire growth (based on surrounding fuels and topography) — high, moderate or low; threats to utilities (power poles, pipelines, and wind towers/wind farms); the ingress and egress of roads (good, fair, poor); and the potential consequences if a fire is not caught quickly (high, moderate, and low).

One of the most important considerations when planning a prescribed fire is what features of the landscape surrounding a burn may be impacted by smoke produced from a prescribed fire. Any houses, businesses, or roads are obvious examples of smoke-sensitive areas because these locations can pose health and safety problems for the people living and working or traveling on them. Burning in or near cities or towns can be particularly complicated and problematic because concentrations of people and traffic may make it difficult to find conditions that prevent or limit smoke. Likewise, South Dakota's rural landscape contains similar areas encountered in more typically urban settings. Managed ventilation systems are in place on most modern livestock production facilities that may be impacted by smoke. Power and communications transmission lines can be negatively affected by smoke.

The method currently used to analyze the potential impact of smoke on smoke-sensitive receptors is to use the Simple Approach Smoke Estimation Model (SASEM) to calculate the consumption of fuel, emission of particles, and dispersion of these pollutants produced by prescribed burning of forest and rangeland vegetation. This model, although not required, is recommended when preparing a prescribed fire plan.

## 2.6 Mitigation Measures

The planning, implementation, and operation constraints listed on the FMP mapsheets for the Five Administrative units within this EA reflect mitigation measures used for resource protection (Table 6). The constraints are incorporated as part of the proposed alternatives and are listed within the FMP. The resource protection measures and constraints are identified to avoid or substantially reduce a treatment's adverse environmental effects.

**Table 6. Mitigation Measures**

| Resource | Mitigation Measure |
|---|---|
| **Human Health and Safety** | |
| ***Prescribed Fire*** | • The prescribed fire plans, which will include smoke management requirements, will be prepared by the Agency Administrator and the Great Plains Zone staff prior to implementing prescribed fires.<br>• Prescribed fires will comply with applicable regulations of the South Dakota Division of Wildland Fire and the South Dakota DENR Air Quality Division and will be carried out in accordance with the constraints identified within the units FMP.<br>• Agency or local law enforcement may be requested for traffic control if smoke impacts visibility on roads or highways.<br>• Warning signs will be posted to advise motorists of a prescribed burn in progress and the potential for reduced visibility on roads that may be impacted by a prescribed burn.<br>• Ample notification will be given to landowners within a 1-2 mile area adjacent to Service lands. Notices and news releases may also be used to inform other adjacent landowners or nearby communities of prescribed fires.<br>• Press releases will be provided to the local media to inform the public in advance of a prescribed fire.<br>• The Great Plains Interagency Dispatch Center, local fire departments, county sheriffs' offices, and other parties as identified within the individual burn plan will be notified prior to implementing a prescribed fire.<br>• Prescribed fires will identify contingency forces with in the individual prescribed fire plans.<br>• Ensure that proper personal protective equipment (PPE) is provided and utilized. |
| ***Mechanical, Public*** | • Exclude public while mechanical treatment operations are occurring by posting notification signs.<br>• Press releases will be provided to local media to inform the public in advance mechanical treatments. |
| ***Mechanical, Operators*** | • Provide training and certification for operation of all equipment requiring certification.<br>• Ensure that proper personal protective equipment (PPE) is provided and utilized.<br>• Ensure all equipment needed for the execution of the mechanical treatment is appropriate for the implementation of the treatment and is in functioning operational order. |
| ***Herbicide Use, Public*** | • Measures will be taken to avoid exposure to unit staff and visitors, which will include such practices as prior notification of planned outdoor activities or planned pesticide use, avoidance of occupied areas, signage and/or direct observation of the site until the re-entry interval has passed, or application during times when the unit is closed, as appropriate.<br>• The location and weather conditions for the pesticide application will comply with the product label.<br>• Off-site drift will be avoided by using such practices as limiting allowable wind speed to 10 miles per hour (mph) or less, using nozzles that create large droplet size, or methods of application that are unlikely to drift.<br>• Material Safety Data (MSD) sheets will be maintained for all chemicals used. |
| ***Herbicide Use, Applicator*** | • Personnel using pesticides will have training in appropriate procedures for safe application, first aid, and spill cleanup.<br>• Pesticide applicators will use personal protective equipment (PPE) as required by the product label. Standard PPE used for most pesticide applications includes long-sleeve shirt, long pants, shoes, and socks. Other PPE sometimes required or recommended include eye protection and chemical-resistant gloves. Other measures sometimes required are rubber boots or protective aprons or coveralls. No pesticide products to be used require the use of a respirator. All types of PPE, including those not required, will be available to the applicator to use at his or her discretion.<br>• Personnel who are mixing, loading, and applying pesticides will have appropriate medical monitoring, as specified in Service policy. |
| **Wildlife** | |
| ***Threatened and Endangered Species*** | • There is no need to consult on the wildfire itself. Wildfire can and often does destroy endangered species and alters critical habitat. Fire itself is considered a disaster or an act of God in the sense of 50 CFR 402.05. Consultation is conducted on the agency response to wildfires for those actions under control of the consulting agency. However, these consultations are in a special category, Emergency Consultations, and are handled in a very expeditious manner. |

| Resource | Mitigation Measure |
|---|---|
| | • Burned Area Emergency Response (BAER) projects are also considered emergencies under Section 7 Consultation. While developing the BAER plan, the BAER team should consult with Ecological Services on projects that may adversely affect listed and proposed species or their habitat. Ecological Services will provide suggestions on how to avoid or minimize these effects.<br>• Prescribed fires, non-fire fuels reduction treatments, and Burned Area Rehabilitation treatments will be submitted to Ecological Services for Section 7 consultations as necessary prior to initiation of treatments, which may affect threatened and endangered species or their habitats. Consultation with South Dakota Game, Fish, and Parks officials will also occur for fuels treatment activities that may affect State listed species.<br>• Least Tern. The sandbars along rivers will be avoided if a known population is present, and refuge management will initiate consultations with Ecological Services.<br>• Piping Plover. The shorelines of alkaline lakes will be avoided if a known population is present and refuge management will initiate consultations with Ecological Services.<br>• Sprague Pipit. Avoid yearly consecutive burning to avoid population declines, delay mowing until after July 15. Use a rotational schedule of every other year for any mowing of hay land.<br>• Whooping Crane. Studies have shown whooping cranes utilize burned areas for foraging. Fuels treatment will either have no influence or create attractive habitat.<br>• Topeka Shinner. Avoid burning during late May and June during the spawning season. Burning should not take place prior to any spring flooding to prevent sediment and ash from entering the waters prior to and during spawning times.<br>• American Burying Beetle. Monitor units for species existence and if found seek consultation.<br>• A full list of guidelines on management actions to mitigate negative impacts to the Dakota Skipper and Poweshiek Skipperling can be found in Appendix B.<br>• Northern Long-eared Bat. A full list of guidelines on management actions to mitigate negative impacts to the Northern Long-eared Bat can be found at https://www.fws.gov/Midwest/endangered/mammals/nleb/index.html |
| ***Other Wildlife*** | • Upland game birds and grassland birds (such as dove, prairie grouse, pheasants, and turkeys. Burning and other hazard fuels reduction treatments will be avoided (when possible) once cool-season vegetation reaches 100% green-up and when the warm-season grasses' new growth retards fire growth. This time-period (approximately) from the first part June through July 15 should allow adequate time for nesting upland and migratory birds to re-nest and hatch their broods.<br>• In order to protect freshwater invertebrates and fish, all herbicide use will strictly follow label direction. Garlon 4 Ultra (or similar product) will not be used where drift or runoff could reach riparian areas, wetlands, ponds, streams, rivers.<br>• Bald Eagle: no known eagle nests will be damaged or destroyed by fuel management treatments. All activities in or near known nesting sites will follow the Service National Bald Eagle Management recommendation for avoiding disturbance and activity specific guidelines. |
| **Sensitive and Rare Plants** | |
| ***Threatened and Endangered Species*** | Western Prairie Fringed Orchid: No known populations exist in the Five Service Units of the Great Plains Zone. If any are found the following strategies will be used. |
| ***Prescribed fire*** | • A prescribed fire plan will include a section 7 consultation along with specific prescription requirements. |
| ***Pre-treatment*** | • Prior to implementing any vegetation treatment, Service employees will be trained to recognize the Western prairie fringed orchid and the habitat in which it is commonly found. Invasive plant control should be done with care, using manual means as much as possible or chemical methods with selective products or at times the orchid is dormant.<br>• Create herbicide-free buffers around non-target plants and known sensitive and rare plants and sensitive areas. |
| ***Herbicide Use Application*** | • Apply herbicide by foliar spray when wind speed is less than 10 mph.<br>• Shield sensitive and rare plants with suitable material, such as a 5-gallon bucket or tree shelter, if practical. |

| Resource | Mitigation Measure |
|---|---|
| ***Mechanical*** | • Mechanical treatments will not occur during the flowering stage. |
| ***Post-treatment*** | • Monitor before, during, and after herbicide application to assess effects on the orchid, non-target plants, and the environment. |
| **Terrestrial Invasive/Exotic Plants** | |
| ***Prevention*** | • Vehicles will minimize driving in areas infested with invasive/exotic plants at a time when movement of seeds is likely; and when this is not possible, vehicles and equipment will be cleaned after leaving an infested area. Vehicles and equipment will be considered clean when a visual inspection does not disclose seeds, soil, vegetative matter, and other debris that could contain or hold seeds.<br>• A designated location will be identified for the cleaning described above. This will be in a spot not conducive to exotic weed establishment and will be monitored for incipient weed populations. |
| ***Control and Monitor*** | • Conduct post-treatment surveys in treated areas and use site-specific evaluations to determine appropriate treatment to control any invasive/exotic plants that are located. Continue to monitor mechanically treated and sprayed and burned areas for invasive/exotic plants.<br>• New noxious weed populations, resulting from project implementation, will be treated and monitored. |
| **Invasive Aquatic Animal and Plant Species** | |
| ***Zebra Mussels and Eurasian Watermilfoil*** | • Some treatments may be conducted from watercraft, and the following measures are applicable to all users.<br>• Personal watercraft, boats, trailers, and live wells should be washed anytime watercraft is used outside South Dakota borders in order to help stop the spread of zebra mussels and Eurasian watermilfoil from spreading. The following are additional mitigations measures.<br>o Always inspect the boat and trailer, and look for visible plants and animals before traveling, and dispose of them in a trash bin.<br>o Always drain all interior compartments (live wells, bilges, etc.) upon leaving a waterbody.<br>o Always inspect and clean equipment by washing equipment with 140-degree water (the local car wash hot water rinse), a 10% chlorine bleach and water solution, or a hot saltwater solution. Do not forget to wash clothing after wading or swimming in infested waters.<br>o Always allow equipment to completely dry, when possible, in the sun before launching in a different waterbody.<br>o Always report questionable species because early detection may help prevent spreading. |
| **Water Resources** | |
| | • Prevent cross-contamination of watersheds especially between Hudson Bay Watershed and Missouri/Mississippi Watershed.<br>o Do not transport un-treated water from one drainage to another.<br>o Always inspect the boat and trailer, and look for visible plants and animals before traveling, and dispose of them in a trash bin.<br>o Always drain all interior compartments (live wells, bilges, etc.) upon leaving a waterbody.<br>o Always inspect and clean equipment by washing equipment with 140-degree water (the local car wash hot water rinse), a 10% chlorine bleach and water solution, or a hot saltwater solution. Do not forget to wash clothing after wading or swimming in infested waters.<br>o Always allow equipment to completely dry, when possible, in the sun before launching in a different waterbody.<br>• Minimize soil disturbance and thus potential for sediment delivery to streams and ponds during prescribed fire by using previously prepared vegetated firebreaks or existing barriers such as roads and trails, even if this results in a slight increase in burned area.<br>• Prevent or minimize soil erosion and thus potential for sediment delivery to streams and ponds by avoiding breaking fibrous sod root systems.<br>• Heavy equipment will be closely monitored in designated areas to minimize adverse effects on wetlands and other resources at risk.<br>• Retardants and foams will not be used within 300 feet of any waterway. |

| Resource | Mitigation Measure |
|---|---|
| | • Ensure fuel spill containers are utilized for pumps set up near water sources. |
| **Soils** | |
| | • Prevent or minimize soil erosion by avoiding breaking fibrous sod root systems if practicable.<br>• Minimize fireline construction that causes soil disturbance by using previously prepared vegetated fire breaks or existing barriers such as roads, trails, and streams, even if this results in increased burned area.<br>• Prevent or minimize soil compaction by limiting vehicles to designated roads.<br>• Heavy equipment use will require approval from refuge manager or designee for each incident.<br>• Ground disturbed by suppression activities will be rehabilitated. |
| **Cultural Resources** | |
| | • The Regional Historic Preservation Office (RHPO) or Zone Archeologist will be consulted during the planning phase of any proposed treatment and will determine the need for additional cultural resource review in consultation with the South Dakota Historic Preservation Office.<br>• The administrative officer will be contacted immediately if previously unrecorded cultural resources are discovered during any vegetation treatments. Activity will stop in that area and the cultural resources will be recorded and evaluated.<br>• In accordance with Section 106 of the National Historic Preservation Act, identify and evaluate all cultural resources. Include resource advisors at all stages of wildfires and prescribed fires (prevention, planning, implementation, restoration).<br>• Plot firelines/firebreaks to minimize contact with known cultural resources.<br>• Map, mark, or flag cultural resources during wildfire suppression and rehabilitation and prescribed burn implementation.<br>• Provide all fire workers with basic training on cultural resources.<br>• Design plans to protect resource values at risk.<br>• Where wildfire poses risks to cultural resources, reduce fuels near archaeological and historic sites mechanically or with prescribed fire to reduce damages from future wildfire.<br>• Determine effects of heat treatment and fire suppression tactics (such as foams, retardants) on cultural resources at risk (exposed resources).<br>• In instances of wildfire, develop a post-fire data recovery and/or restoration program that is sensitive to cultural resource concerns.<br>• Construct buffer areas around cultural sites for the application of chemicals. |

# Chapter 3. Affected Environment and Environmental Consequences

## 3.1 Introduction

This chapter describes current conditions (affected environment) and the potential beneficial and adverse effects (environmental consequences) that could result from implementation of any of the following alternatives:

**Alternative A: No Action**—(Current Management): All wildfires, regardless of cause, are full suppression and not managed for multiple objectives. Prescribed fire, mechanical, and chemical treatments are used for fuels reduction and habitat management.

**Alternative B:** All wildfires, regardless of cause, are full suppression and not managed for multiple objectives. Use only mechanical and chemical control for fuels reduction.

**Alternative C: (preferred alternative**) Suppress all human caused wildfires, and, when appropriate, utilize naturally occurring wildfires for fuels reduction and habitat management. Increase prescribed fire, and continues current management for mechanical and chemical treatments.

## 3.2 Assessing Resources and Effects

### 3.2.1 Resources Analyzed in Detail

The affected environment and environmental consequences analyzed and described together for each of the following:

Section 3.3 Fuels and Fire Management

Section 3.4 Vegetation/Habitat

Section 3.5 Wildlife

Section 3.6 Water and Soil Resources

Section 3.7 Air Quality

Section 3.8 Cultural Resources

Section 3.9 Service Values

Section 3.10 Recreation and Public Use

### 3.2.2 Resources Not Analyzed

The following topics were not analyzed in this environmental assessment (EA) because they would not be affected by any of the three alternatives:

- Environmental justice concerns because there would be no disproportionately high or adverse human health or environmental effects on minority populations and low-income populations.
- Social and economic values and conditions – effects on game species are discussed under the “Wildlife” section.

- Transportation systems.

### 3.2.3 Definitions for Evaluating Effects

The "Environmental Consequences" section for each resource describes the types of effects that would result from taking no action or implementing any of the two action alternatives; those effects are described according to the definitions in section 3.2.3.1 and 3.2.3.2.

#### 3.2.3.1 Types of Effects

Beneficial effects are those that would result in a positive change in the condition or nature of the resource, usually with respect to a standard or objective. It is a change that would move a resource toward its desired condition.

Adverse effects are those that would result in a negative change in the condition or nature of the resource, usually with respect to a standard or objective. It is a change that would move a resource away from its desired condition.

Direct effects are caused by the action and would occur at the same place and time as the action.

Indirect effects are also caused by the action, would occur later in time, and are further removed in distance but are still reasonably foreseeable; or the response of the target resource is triggered by the reaction of another resource to the proposed action.

Cumulative effects are those that would result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions.

#### 3.2.3.2 Intensity of Effects

"Intensity" refers to the severity of effects or the degree to which an action may adversely or beneficially affect a resource. The following intensity definitions are used throughout this chapter to describe effects.

Negligible effects would be at the lowest levels of detection and would have no appreciable impact on resources, values, or processes.

Minor effects would be perceptible but slight and localized. If mitigation were needed to offset any adverse effects, it would be relatively simple to implement and would likely be successful.

Moderate effects would be readily apparent and widespread, and would result in a noticeable change to resources, values, or processes. Mitigation measures would probably be necessary to offset adverse effects and would likely be successful.

Major effects would be readily apparent and widespread, and would result in a substantial alteration or loss of resources, values, or processes and would likely be permanent. Mitigation measures to offset major adverse effects would be necessary and extensive, and their success could not be guaranteed.

#### 3.2.3.3 Indicators

Indicators are measureable factors that are used to describe resource conditions. The indicators used to describe desired and current conditions are the same indicators used to predict the potential effects that

could result from implementation of either of the proposed alternatives described in Chapter 2. The focus of this EA is on the analysis of effects from implementing a fire management program. Therefore, the indicators are only described and used in the "Section 3.4. - Vegetation/Habitat."

### 3.2.4 Analysis of Cumulative Effects

The Council on Environmental Quality (CEQ) regulations (40 CFR 1508.7) define a cumulative impact [effect] as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time."

The CEQ provided additional guidance (memorandum prepared by James L. Connaughton, Chairman, White House Council on Environmental Quality, June 24, 2005 [CEQ 2005]) on the extent to which agencies of the federal government are required to analyze the environmental effects of *past actions* when they describe the cumulative environmental effects of a proposed action.

CEQ interprets the *National Environmental Policy Act* (NEPA) and its regulations on cumulative effects as requiring analysis and a concise description of the identifiable present effects of past actions to the extent they are relevant and useful in analyzing whether the reasonably foreseeable effects of the agency proposal for action and its alternatives may have a continuing, additive, and significant relationship to those effects. In determining what information is necessary for a cumulative effects analysis, agencies should use scoping to focus on the extent to which information is "relevant to reasonably foreseeable significant adverse impacts, is essential to a reasoned choice among alternatives, and can be obtained without exorbitant cost" (40 CFR 1502.22).

### 3.2.5 Present and Reasonably Foreseeable Future Actions on or in the Vicinity of the Service Units

The *2015 National Prescribed Fire Use Survey Report* (NASF and CPFC 2015) stated prescribed fire was used to treat between 15,001 and 50,000 acres in South Dakota in 2014 – a relatively low percentage of total land-base. Of these acres between 1,000 and 50,000 were broadly classified as "forestry" acres (burning for timber management, habitat, fuels reduction, etc.). The 2012 National Prescribed Fire Use Survey Report (NASF and CPFC 1012) stated prescribed fire was used to treat between 50,001 and 200,000 acres in South Dakota. Of these acres between 1,000 and 50,000 were loosely classified as "forestry" acres (burning for timber management, habitat, fuels reduction, etc.) with the remainder (up to 150,000 acres) classified as "agricultural".

Both fire and non-fire activities are, and will continue to be, an important component in the management and maintenance of vegetative fuels. However, the present and reasonably foreseeable future actions on or in the vicinity of Service lands in Eastern South Dakota will be dependent upon federal funding and budgets.

Federal and state agencies have and will continue to cooperate and collaborate as outlined in the Cohesive Strategy in developing unit-specific plans for joint fuels treatments, habitat treatments, and landscape-scale treatments where possible. Examples of treatments near or adjacent to Service lands include the treatment of South Dakota Game Production Areas in unison with Service treatments on WPAs and NWRs.

Agricultural burning on private lands is a valuable and highly used tool for removing crop residue, restoring pasturelands, and rejuvenating native grasses for the agricultural industry. Equipment and agricultural field burning account for the majority of human-caused fire starts. The agricultural field-burning season usually occurs during the early spring and fall and is widespread throughout the WMDs. Private landowners are not subject to the same burning regulations as government agencies.

During the past 10 years, the Service has burned 323 units for a total of 58,967 acres of federal, state, and private property in the vicinity of the Service lands covered by this EA. These fuels treatments vary from 1 acre to 3,750 acres in size. The BIA and South Dakota Game Fish and Parks also treat lands, but represent a small percentage of fuels treatments occurring. Private land ownership represents the largest land base within this EA, and fuels treatments do occur on these lands, however there is not an accomplishment and recording system for these treatments.

The private lands used as agricultural lands are subject to changing land use practices due to the following: crop rotation, agricultural commodity prices, variable livestock grazing practices, and summer fallowing. The surrounding agricultural fuels are typically characterized as cultivated cropland or planted cropland. Planted cropland is characterized by one of the following dynamic fuel models:

- Scott and Burgan Fire Behavior Fuel models GR1, GR2, GR4 (short grasses): This model is characterized by cured short herbaceous grain crops with an average fuel depth of approximately 1-2 feet (for example, soybeans, alfalfa, oats, and millet).
- Scott and Burgan Fire Behavior Fuel Models GR6, GR7, and GR9 (tall grasses): This model is characterized by tall cured cultivated grains that have not been harvested and have an average fuel depth of approximately 3 feet (for example, corn, sunflowers, wheat, and Sudan grass) and also lands enrolled in the Conservation Reserve Program.

Voluntary trees and shrubs are prevalent primarily due to the lack of fire. Trees and shrubs prevalent in the area covered by the EA are green ash, cottonwood, buffalo berry, Russian olive, Siberian elm and eastern red cedar. The most troublesome species in South Dakota is the eastern red cedar. The red cedar's extreme adaptability has enhanced the spread of these trees into areas where they were formerly rare, to areas where they readily spread from Service-owned lands and nonservice-owned lands into new areas. The flammability and volatility of this species during certain times of the year is high and can generate extreme fire behavior.

*Invasive nonnative plants, such as Russian olive tree, can degrade prairie habitat if they remain unchecked. Bridgette Flanders-Wanner/USFWS*

## 3.3 Fuels and Fire Management

This section summarizes the current fuels conditions and potential fire behavior for each of the administrative units in this EA and the effects from taking no action or from implementing any of the two action alternatives. This section analyzes the effects of fuels treatments on fuel loads, flame length, rate of spread, fire behavior, and fire risk and hazard. It does not cover the use of fire for vegetation and habitat benefits; this is discussed in the "Vegetation" and Wildlife and Habitat" sections.

**Scope of the Analysis**

**Analysis Area**. The analysis area for the fire and fuels analysis includes the administrative units in eastern South Dakota depicted on the map above (Figure 2).

**Analysis Period**. Analysis period used for wildfire and prescribed fire averages is ten year (2006 through 2015).

### 3.3.1 Current Condition Analysis

A method to help determine fuels and vegetation is through on-site evaluation of species composition, stand structure, and fuel load. Pre-treatment methods to collect and analyze data may include the establishment of photo points, collecting fuels samples to determine fuel loading and fuel moisture, and/or the establishment of monitoring plots to establish a comprehensive data set of species present within the site. For purposes of developing individual burn plans for a specific treatment, Scott and Burgan's (2005) 40 Fire Behavior Fuel Models are used to depict general characteristics such as vegetative continuity, height, tons per acre of live/dead fuels, and basic fire behavior characteristics.

The following sections discuss other methodologies or factors considered in this process.

#### 3.3.1.1 Fire Intensity Level

Resilient landscapes that are not managed have an increasing fire intensity level directly correlating with the lack of management. Fire Intensity Level (FIL) is based on flame length or Burning Index (BI) and is used in the analysis to reflect differences in difficulty of suppression and fire effects on resource outputs. The six FILs are as follows:

**Table 7. Fire Intensity Level**

| Fire Intensity Level | Flame Length | Burning Index |
|---|---|---|
| 1 | 0-2 feet | 0-20 |
| 2 | 2.1-4 feet | 21-40 |
| 3 | 4.1-6 feet | 41-60 |
| 4 | 6.1-8 feet | 61-80 |
| 5 | 8.1-12 feet | 81-120 |
| 6 | 12.1 feet and over | 121 and over |

#### 3.3.1.2 Fire Regime

A natural fire regime is a general classification of the role fire would play across a landscape in the absence of modern human mechanical intervention, but including the influence of aboriginal burning (Agee 1993, Brown 1995). Coarse-scale definitions for natural (historical) fire regimes have been developed by Hardy et al. (2001) and Schmidt et al. (2002) and interpreted for fire and fuels management by Hann and Bunnell (2001). The five natural (historical) fire regimes are classified based on average number of years between fires (fire frequency) combined with the severity (amount of replacement) of the fire on the dominant overstory vegetation (NIFC 2003). Fire regimes and definitions are found in Table 7.

Service lands within this EA are located in the Northern Plains Grassland Biophysical Setting (LANDFIRE Map Zone 39) with wheatgrass-bluestem-switchgrass and needlegrass vegetation communities. The dominant Fire Regime is Regime II (less than 35 years/stand replacement) with the replacement fire at 80 %, meaning that when an area burns, approximately 80% or more of the area will be burned. Riparian areas tend to be fire regime III and IV.

**Table 8. Fire Regimes**

| Fire Regimes | | |
|---|---|---|
| **Group** | **Frequency** | **Severity** |
| I | 0-35 years | Low (surface fire most common) to mixed severity (less than 75% of the dominant overstory vegetation replaced) |
| II | 0-35 years | High (stand replacement) severity (greater than 75% of the dominant overstory vegetation is replaced) |
| III | 35-100+ years | Mixed severity (less than 75% of the dominant overstory vegetation is replaced) |
| IV | 35-100+ years | High (stand replacement) severity (greater that 75% of the dominant overstory vegetation replaced) |
| V | 200+ years | High (stand replacement) severity |

### 3.3.2 Indicators

The indicators used to predict current and future fire behavior are the Scott and Burgan (2005) Fire Behavior Fuel models (described below in Section 3.3.6). The fuel models categorize fuels by fuel load, flame length, rate of spread, moisture content of vegetation, and other factors. The higher the number of each fuel model category, the higher the fuels hazard and potential fire severity.

**Indicator: Fuels**

Measurement: Fuel Load. The weight of dead and down woody fuels is measured in tons per-acre. The weight of standing brush and foliage can also be predicted if all or a portion is expected to be added to the dead and down fuel loading. Fuel loading is used to predict fire behavior by using the current and expected fuel loading to select the correct fuel model (see the discussion below under “Affected Environment”) to use in fire behavior prediction systems. Components of fuel loading include fuel sizes and their proportion, arrangement, and continuity. Total fuel is all fuel, both living and dead, present on a site. Available fuel is the amount of fuels that will burn under a specific set of fire conditions.

Measurement: Flame Length. This is the length of flame measured in feet, from the base of the flame to the tip of the flame. Longer flame lengths increase resistance to control and the likelihood of torching events and crown fires in forest areas. Flame length is influenced by fuels, weather, and topography and presence of volatile resins or oils in living vegetation. As illustrated in Table 8, increasing flame lengths above 4 feet may present serious control problems to firefighters because they are too dangerous to be directly contained by hand crews (Schlobohm and Brain 2002; Anderson 1982). Flame lengths over 8 feet are generally not controllable by ground-based equipment or aerial retardant and present serious control problems, including torching, crowning, and spotting.

**Table 9. Fire Suppression Interpretations from Flame Length**

| Flame Length | Description |
|---|---|
| Less than 4 feet | Fires can generally be attacked at the head or flanks by firefighters using hand tools. A hand line should hold the fire. |
| 4–8 feet | Fires are too intense for direct attack at the head with hand tools. A hand line cannot be relied on to hold the fire. Bulldozers, engines, and retardant drops can be effective. |
| 8–11 feet | Fire may present serious control problems, such as torching, crowning, and spotting. Control efforts at the head will probably be ineffective. |
| Greater than 11 feet | Crowing, spotting, and major fire runs are probable. Control efforts at the head of the fire are ineffective. |

**Source:** NWCG 2014b.

Measurement: Rate of Spread. Rate of spread is the horizontal distance that the flame zone moves per unit of time (feet per minute) and usually refers to the head fire segment of the fire perimeter. It is directly related to the amount of heat received by the fuels ahead of the flaming zone. Rate of spread is strongly influenced by fuels, winds, and topography—it generally increases with increasing wind speed, slope, and amount of fine fuels. As the rate of spread increases, resistance to control increases as well.

### 3.3.3 Fire Risk and Fire Hazard

The likelihood of future fires causing unacceptable resource damage is influenced by two factors - fire risk and fire hazard. *Fire risk* is the probability of a fire occurring in any of the administrative units and is based on historic fire records. *Fire hazard*, on the other hand, is dependent upon fuels conditions, including the accumulation of dead and living vegetation, and fire weather. Under historic fire return intervals, fuels accumulation would be considerably less than current levels. A particular area may have a low historic risk of fire occurrence; but the fuels hazard, and thus fire severity, may be high enough to result in unacceptable lethal levels of vegetation mortality (lethal effects are those where fires result in greater than 70% mortality of vegetation) (USFS 2000).

### 3.3.4 Fire Behavior

Fire behavior describes how a fire burns, where it burns, how fast it travels, how much heat it releases, and how much fuels it consumes. It is important to understand what controls fire behavior and how to predict it because this knowledge helps predict wildfire risk and fire effects, control wildfires, and to conduct prescribed fires.

Fire behavior is controlled by three interacting components: fuels, weather, and topography. Fuels provide the energy source for fire. Fuels availability, which depends on both fuel arrangement and fuel moisture, determines if fires will burn as surface or crown fires. Weather elements, such as temperature, relative humidity, wind, precipitation, and atmospheric stability, also combine to influence fire behavior by regulating fuel moisture and rate of spread. Topography can influence fire indirectly, by mediating wind patterns, or directly—fires burning upslope spread faster than fire burning on flat land.

**Component: Fuels**

Fuel is all living and dead plant material that can be ignited by a fire. Fuels characteristics strongly influence fire behavior and the resulting fire effects on ecosystems. Fires vary widely in the kind of fuels that burn (for example, live vs. dead fuels, surface vs. ground fuels), the total amount of fuels that burn,

and the rate or intensity at which these fuels burn. These characteristics of fuels consumption, in turn, determine peak temperatures reached, the duration of heat, and the stratification of heat above and below the soil surface (NWCG 2014b).

Predicting the potential behavior and effects of wildland fire is an essential task in fire management. Mathematical surface fire behavior and fire effects models and prediction systems are driven in part by fuelbed inputs such as load, bulk density, fuel particle size, heat content, and moisture of extinction. Fuelbeds are classified in six strata or layers: (1) tree canopy; (2) shrubs/small trees; (3) low vegetation; (4) woody fuel; (5) moss, lichens, and litter; and (6) ground fuel (duff). Each of these strata can be divided into separate categories based on specific characteristics and relative abundance. Modification of any fuels stratum has implications for fire behavior, fire suppression, and fire severity (Graham et al. 2004).

*Prescribed fire behavior in cattail wetlands on Sand Lake NWR. USFWS*

**Component: Weather**

Of the three fire behavior components, weather is the most likely to fluctuate. Accurately predicting fire weather remains a challenge for forecasters particularly during drought conditions. As spring and summer winds and rising temperatures dry fuels, particularly on south-facing slopes, conditions can deteriorate rapidly, creating an environment that is susceptible to wildland fire. Fine fuels (grass and leaf litter) cure rapidly, making them highly flammable in as little as one hour following light precipitation. Low live fuel moistures (typical in drought conditions throughout South Dakota) of shrubs and trees can significantly contribute to fire behavior in the form of crowning and torching.

Four remote Automatic Weather Stations (RAWS) have been installed in the Great Plains Zone. These weather stations will enable fire managers to correlate a more accurate weather history in relation to fire danger and fire preparedness. Within the Great Plains Zone, Service staff are currently responsible for maintaining the Service RAWS stations and ensuring that annual maintenance is completed on time to provide good quality data.

**Table 10. RAWS within Area Covered by EA**

| RAWS Name | NWS ID Number | County / State | Installed Date | Owner |
|---|---|---|---|---|
| Huron | 393101 | Hand, SD | 11/13/2003 | USFWS |
| Lake Andes | 395901 | Charles Mix, SD | 11/06/2003 | USFWS |
| Marshall County | 390701 | Marshall, SD | 06/10/2008 | USFWS |
| Sand Lake | 390501 | McPherson, SD | 05/13/2005 | USFWS |

**Table 11. Other RAWS Near Area Covered by EA**

| RAWS Name | NWS ID Number | County / State | Installed Date | Owner |
|---|---|---|---|---|
| Fort Pierre | 393801 | Lyman, SD | 07/01/2003 | USFS |
| Bear Creek | 391201 | Dewey, SD | 07/28/1993 | BIA |
| Grand River | 390301 | Corson, SD | 06/08/2010 | BIA |
| Big Stone NWR | 213501 | Lac qui parle, MN | 03/03/2005 | USFWS |
| Redstn | 216901 | Pipestone, MN | 06/26/2008 | NPS |

**Component: Topography**

Topography is the third component and is important in determining fire behavior. Steepness of slope, aspect (direction the slope faces), elevation, and landscape features can all affect fuels, local weather (by channeling winds and affecting local temperatures), and rate of spread of wildfire. Aspect and slope can assert significant influence on fire behavior; so where topography does fluctuate, flame lengths and rate of spread can vary considerably. Other topographic features that could be significant are coulee's and drainages in the Missouri and Prairie Coteau, escarpments along the Missouri River Breaks and Prairie Coteau, James River lowlands, and the Big Sioux River Basin, which may all funnel fire and intensify fire behavior. Narrow river channel width with riparian woodlands and presence of vegetated islands are also topographic features that could influence fire spread.

### 3.3.5 Desired Conditions

The desired conditions is that fire risk and fire hazard will be reduced because treatments have been implemented to remove or minimize the amount of total fuels (through use of wildland fire and/or other non-fire treatment methods). The potential for a wildfire to result in negative impacts would also be reduced on Service lands in Eastern South Dakota. If identified, fuels would be treated to reduce fire behavior (low rate of spread and short [less than 4 feet] flame lengths) and resistance to control.

Generally, the following will help achieve desired conditions for fire behavior:

- Large prescribed fire projects and other fuels treatments will reduce the excessive accumulations of fuels.
- When and where appropriate, allowing naturally-occurring wildfires to be managed for benefits.
- A natural fire return interval of 5 to 10 years.

### 3.3.6 Affected Environment

The current conditions that can affect fire behavior are presented according to six fuel model types (Scott and Burgan 2005): grass, grass-shrub, shrub, timber-understory, timber-litter, and non-burnable. It is important that fire and fuels managers apply the fuel models in order to predict the current and predicted fuels hazard and fire severity. The fuel models for the Service units within this EA are primarily grass, grass-shrub, and timber-understory. As discussed above, fuel is all living and dead plant material that can be ignited by a fire. Fuel characteristics strongly influence fire behavior and the resulting fire effects on ecosystems. Table 12 presents a description of the applicable Scott and Burgan (2005) fuel models that were used represented in the units in the Great Plains Zone.

**Table 12. Current Fuel Models at the Administrative Units**

| Fuel Model Fuel Type | Fuel Model Code (Number) | Summary Characteristics | Adjective Class for Predicted Fire Behavior |
|---|---|---|---|
| GR<br>Grass | GR2 (102) | Low Load, Dry Climate Grass (Dynamic)<br>The primary carrier of fire is grass, though small amounts of fine dead fuels may be present. Moderately coarse continuous grass; average depth about 1 foot. Shrubs, if present, do not affect fire behavior. | ROS: high<br>FL: moderate |
| | GR4 (104) | Moderate Load, Dry Climate Grass (Dynamic)<br>The primary carrier of fire in GR4 is moderately coarse continuous dry-climate grass. Load and depth are greater than GR2; fuelbed depth is about 2 feet. | ROS: very high<br>FL: high |
| | GR7 (107) | High Load, Dry Climate Grass (Dynamic)<br>The primary carrier of fire in GR7 is moderately coarse continuous dry-climate grass. Load and depth are greater than GR4. Grass is about 3 feet tall. | ROS: very high<br>FL: very high |
| GS<br>Grass-Shrub | GS2 (122) | Moderate Load, Dry Climate Grass-Shrub (Dynamic)<br>The primary carrier of fire in GS2 is grass and shrubs combined. Shrubs are 1 to 3 feet high, grass load is moderate. | ROS: high<br>FL: moderate |
| SH<br>Shrub | SH7 (147) | Very High Load Dry Climate Shrub<br>The primary carrier of fire in SH7 is woody shrubs and shrub litter. Very heavy shrub load, depth 4-6 feet. | ROS: high<br>FL: Very High |
| TL<br>Timber–Litter | TL6 (186) | Moderate Load Broadleaf Litter<br>The primary carrier of fire in TL6 is moderate load broadleaf litter, less than TL2 | ROS: moderate<br>FL: low |
| NB<br>Non-burnable | NB3 (93) | Open water — land covered by open bodies of water such as lakes, rivers, and oceans.<br>Non-burnable Land – roads, fields (plowed to mineral soil). | ROS: none<br>FL: none |

*Source: Scott and Burgan (2005)*
*ROS = rate of spread; FL = flame length*

### 3.3.7 Environmental Consequences

Fuels reduction is the most frequently cited example of pre-suppression activities that are nearly unanimously favored over the reactive system of suppression. Active management can improve the health and resiliency of the land, which contributes to reducing fire hazard (WFLC 2011). The use of prescribed fire and wildfire is, overall, the most cost-effective long-term fire management strategy for restoring and maintaining lands in a desirable condition. All fuels reduction actions would help reduce fire risk to maximize long-term protection to communities and natural and cultural resources while minimizing the costs of fire suppression and emergency rehabilitation of lands damaged by wildfire and maximizing available resources for fire suppression on other federal, tribal, state, and private lands.

A primary goal of fuels treatments, in each of the fuel models, is to affect future predicted fire behavior. This is done by reducing or removing ground, ladder and crown fuel in order to maintain desirable fuel models or to change to a fuel that has lower fire behavior. The majority of Service lands have evolved with fire. The wildlife and plants supported by grasslands, shrub-lands, riparian/wetland areas, and

woodlands/forests depend on fire for their survival. Lack of periodic fire in these wildlands (due to fire suppression or fragmentation of landscapes from human development) has actually increased the risk of catastrophic wildfire. Catastrophic fire may include, but is not limited to, the loss of human life, primary residences, businesses, the loss of major utility infrastructure, the loss of a threatened and endangered species or critical habitat, and/or the loss of cultural resources.

Alternative A, the 'no action alternative' is the alternative that maintains the current management level for both prescribed fire and wildfire suppression. Prescribed fire applications would continue to be implemented in order to achieve fuels reduction and habitat management objectives. Wildfires will be suppression only with this alternative, which does not allow for using wildfire for multiple objectives or benefit. Although this level of treatment will have some benefits, it will not create or maintain the units in the Great Plains Zone in a desired, resilient condition into the future. This is due to the limited number of treatments implemented under this alternative.

The dangers of limiting or excluding natural fire include large and damaging wildfires, loss of life or serious injury to firefighters and the public, property loss and damage, adverse health effects and impaired visibility from intense or extended periods of unmanageable smoke, loss of plant and animal species and their habitats, and damage to soils and watersheds.

Mechanical treatments have two options for objectives. The first removes fuels from the site. The fuels reduction benefits obtained through successful treatments will be dramatic at the beginning with a gradual return to higher amounts of fuel loading, eventually reaching pretreatment levels. The rate of return to pretreatment levels depends on environmental factors such as annual precipitation. The second treatment option changes the arrangement of fuels but leaves them on site. The benefits will be short term and will generally last one year or less.

Chemical treatments would increase the availability of fuels short-term due to converting live vegetation to dead fuels. These dead fuels may be removed by either natural decay, mastication, prescribed fire, removal from site or a combination of these, depending on management objectives.

Treatments implemented by other organizations in the Service's area are spread over a large geographic area and result in no negative cumulative effects. Opportunities to collaborate on fuels reduction treatments along jurisdictional boundaries, including private property, would be actively continued as these treatments meet both the Service objectives and meet the intent of an ecosystem-based approach to land management as described in the Cohesive Strategy (WFLC 2014). All collaborative treatments may produce short-term negative impacts; however, long-term results will yield beneficial cumulative effects. The fuels reduction benefits obtained through successful treatments will be dramatic at first with a gradual return to higher amounts of fuel loading (pre-treatment levels) depending on environmental factors (i.e., annual precipitation).

In order to prevent cumulative negative effects on fauna and flora from all treatment options described above, implementation of treatment timing needs to be varied based on growing season to ensure maximum species diversity. A variety in treatment implementation timing occurs naturally as a result of operational constrains related to weather.

# 3.4 Vegetation / Habitat

The following documents contain detailed information about the resources at the administrative units:

- Comprehensive Conservation Plan and associated EA for Huron WMD, Madison WMD, and Sand Lake WMD (USFWS 2011 and USFWS 2012a).
- Comprehensive Conservation Plan and associated EA for Lake Andes NWRC (USFWS 2012b; USFWS 2012c)
- Comprehensive Conservation Plan and associated EA for Sand Lake NWR (USFWS 2005a; USFWS 2005b)
- Comprehensive Conservation Plan and associated EA for Waubay NWRC (USFWS 2002a; USFWS 2002b)

Please note that the common and scientific names of South Dakota plant and animal species are available in the CCPs. We will not include the scientific names for species in the following sections.

## 3.4.1 Affected Environment

*Grasslands and wetland on the Millerdale Waterfowl Production Area. Bridgette Flanders-Wanner / USFWS*

### 3.4.1.1 Vegetation Communities

#### Huron WMD

**Woodlands/Shelterbelts**

Woodlands are divided into two categories, native and nonnative populations. The native populations consist of willow, cottonwood, bur oak, and green ash. The native woodland population in the District is primarily located in the James River flood plain. These woodlands are mostly deciduous trees and shrubs located where moisture conditions allow for their growth.

Nonnative populations consist of native species with the addition of nonnative species such as Siberian elm and Russian olive. Early farm settlers planted many of these types of plantings as soil conservation measures following the Dust Bowl years of the 1930s. These populations are the

largest percentage of woodlands and are man- planted shelterbelts and farmstead groves. With few exceptions, the nonnative populations were established before the Service took ownership of the lands. All of the nonnative populations are within historical grassland ecosystems. The Service is actively working towards removing the nonnative populations as part of restoring the grasslands.

On Service-owned lands in the WMD, woodland vegetation is limited and is listed as “other upland habitat,” in the CCP along with roads, trails, and administrative areas. Total “other upland habitat” comprises about 4% of the uplands.

**Grasslands**

Dominant grass species in the mixed-grass prairie are prairie Junegrass, little bluestem, needle and thread, blue grama, green needlegrass, porcupine grass, prairie cordgrass, northern reedgrass, plains muhly, western wheatgrass, and Kentucky bluegrass (Dyke et al. 2015).

The grassland vegetation on the 17, 883 acres of WPAs on the Huron WMD is as follows:

- Approximately the eastern one-third of the WMD is referred to as the mixed-tall grass transition prairie, consisting of the key native grassland species of wheatgrass and bluestem. The majority of the land in the eastern one-third of the WMD has been farmed. However, some of the farmed land has been established to exotic grass species.
- The western two-thirds of the WMD is considered the mixed grass prairie. The key native grassland species in the mixed grass prairie are wheatgrass and needlegrass. This portion of the Huron WMD is approximately 46% native prairie and 54% land, which is being farmed or has been planted to exotic grass species.

**Wetlands**

Wetlands can be classified by vegetation, water regimes (the length of time water occupies a specific area), and water chemistry. More specifically, prairie potholes are described using the following non-tidal water regime modifiers from Cowardin et al. (1979).

- Temporarily flooded - surface water is present for brief periods during the growing season. The water table usually lies below the soil surface most of the season, so plants that grow in both uplands and wetlands are characteristic.
- Seasonally flooded - surface water is present for extended periods especially early in the growing season, but is absent by the end of the season in most years. When surface water is absent, the water table is often near the surface.
- Semi-permanently flooded - surface water persists throughout the growing season in most years. When surface water is absent, the water table is usually at or very near the land surface.
- Permanently flooded - water covers the land throughout the year in all years. Vegetation is composed of obligate hydrophytes, such as cattails.

A wide variety of aquatic plants occur in the prairie wetlands. However, the vegetative communities of prairie wetlands are determined by the fluctuating hydrologic regime, which creates a wet-dry cycle in wetlands (Kantrud et al. 1989). Several basic zones in prairie wetlands—wet meadow, shallow marsh, deep marsh, open water, and alkali—also affect the species of aquatic plants that are expressed. Wet meadow is the transition of upland into wetland and is characterized by grasses, fine sedges, and forbs. Shallow marsh is characterized by mid-

height grasses and coarse sedges. Deep marsh is characterized by tall coarse herbaceous plants (such as cattail and bulrush species). The open water zone can be occupied by submergent or floating aquatic plants. Alkali zones are often devoid of vegetation or contain salt-tolerant species such as widgeongrass.

## Lake Andes NWR Complex (Including Karl E. Mundt NWR)

### Woodlands/Shelterbelts

The woodland vegetation on Service-owned lands in the Complex is limited to less than 1.0% of the land base.

Karl E. Mundt NWR is located on the Missouri River corridor. Historically, the untamed Missouri River would flood low-lying lands stimulating the seeding and growth of a native tree population. However, since the Army Corps of Engineers installed dams on the Missouri River, these deciduous forests have been in a state of decline. The lack of flooding combined with the dispersal of eastern red cedar seeds by the wildlife, has promoted widespread distribution of this invasive species.

*Woodlands on Karl E. Mundt NWR. USFWS.*

The broken topography of the river breaks provides a valuable riparian habitat. Draws and northern aspects are heavily wooded with deciduous species that provide essential roosting and nesting sites for bald eagles and many other migratory birds. Potential sites exist in the cottonwood trees along the river. The dominant native trees of the riparian woodlands include prairie cottonwood, green ash, American elm, box elder, hackberry, peach-leaved willow, bur oak, white mulberry, common hackberry, and honey locust. Within these wooded areas, the eastern red cedar is expanding beyond its historical population densities and is encroaching beyond its traditional environment into historic grasslands. This expansion results in increased wildfire potential and a degradation of the habitat, both in the riparian area and grasslands.

The rest of the complex's woodlands are divided into two categories, native and nonnative populations. Native populations of willow and cottonwood consist of small wood lots located along the shores of larger bodies of water and muddy flats. The common shrubs within the Lake Andes NWRC include roughleaf dogwood, riverbank grape, woodbine, narrowleaf willow, and sandbar willow.

Nonnative populations primarily consist of shelterbelts and farm groves. These populations include native species with the addition of nonnative species such as Siberian elm and Russian olive. Early farm settlers planted many of these types of plantings as soil conservation measures following the Dust Bowl years of the 1930s. These populations represent the largest percentage of woodlands in the complex. With few exceptions, the nonnative populations were established before the Service took ownership of the lands, and all of the nonnative populations are within

historical grassland ecosystems. The Service is actively working towards removing the nonnative populations as part of restoring the grasslands.

On Service-owned lands in the WMD, woodland vegetation is limited and is listed as “other upland habitat,” in the CCP along with roads, trails, and administrative areas. Total “other upland habitat” comprises about 4% of the uplands.

#### Grasslands

The most common mixed-grass prairie grass species in the Complex are western wheatgrass, slender wheatgrass, blue grama, sideoats grama, needleandthread, Indiangrass, switchgrass, big bluestem, little bluestem, and Canada wildrye. Common upland forbs include American licorice, annual sunflower, Canada goldenrod, curlycup gumweed, heath daisy, hemp dogbane, leadplant, Maximilian sunflower, meadow anemone, Missouri goldenrod, showy milkweed, silverleaf scurfpea, smartweed, stiff goldenrod, stiff sunflower and woolly verbena. Prairie rose and prickly rose are the most prevalent shrubs found throughout Complex uplands.

The dominant native grasses of the tall-grass zone consist of big bluestem, Indiangrass, switchgrass, and other warm-season grasses. The mixed-tall grass prairie transition zone covers the majority of the Complex. The dominant native grasses in this area are western wheatgrass, big bluestem, and porcupine grass. The vast majority of the Complex's waterfowl production areas are located within this zone. Waterfowl and other wildlife populations are highest in this zone as well. The western most vegetative zone, mixed-grass prairie, has dominant native grass species of little bluestem, western wheatgrass, needleandthread, and blue grama.

The dominant plants of the uplands of riparian areas include switchgrass, big bluestem, little bluestem, sideoats grama, western wheatgrass, green needlegrass, silver buffaloberry, and yucca. Riverbottom grasses and forbs are primarily Canada wildrye, prairie sandreed, big bluestem, switchgrass, dogbane, milkweed, white snakeroot, downy brome, sand dropseed, sedge, ragweed, sweetclover, and prairie cordgrass.

#### Wetlands

Refer to the “wetlands” discussion for Huron WMD for wetlands information for Lake Andes WMD.

Lake Andes NWR is dominated by Lake Andes Lake. Water levels in the lake vary from 0 to 12 feet, depending entirely on climatic conditions and precipitation, and the lake supports a boom-and-bust fishery that depends on water quality and water quantity.

Two roadway dikes separate Lake Andes into three units – North Unit, Center Unit, and South Unit. Lake Andes has a drainage area of about 230 square miles. Andes Creek flows into the North Unit and is the largest contributor of inflow to the Lake Andes Basin. The water level of the lake is entirely dependent on watershed runoff, thus fluctuations between flooding and a completely dry lakebed are common.

### Madison WMD

#### Woodlands/Shelterbelts

Woodlands are divided into two categories, native and nonnative populations. Native woodland vegetation in the WMD is primarily located within the Sioux and Vermillion River flood plains and the border of the larger lakes in the Coteau du Prairie. These woodlands are primarily

deciduous trees and shrubs located where moisture conditions allow for their growth. The native species consist of willow, cottonwood, bur oak, and green ash.

Nonnative populations consist of native species with the addition of nonnative species such as Siberian elm and Russian olive. Early farm settlers planted many of these types of plantings as soil conservation measures following the Dust Bowl years of the 1930s. These populations are the largest percentage of woodlands and are man planted shelterbelts and farmstead groves. With few exceptions, the nonnative populations were established before the Service took ownership of the lands. All of the nonnative populations are within historical grassland ecosystems. The Service is actively working towards removing the nonnative populations as part of restoring the grasslands.

On Service-owned lands in the WMD, woodland vegetation is limited and is listed as "other upland habitat," in the CCP along with roads, trails, and administrative areas. Total "other upland habitat" comprises about 2.5%.

#### Grasslands

The Grassland vegetation within Madison WMD is as follows:

- The eastern three-fourths of the District is in the tallgrass prairie zone. Key native grassland species in the tallgrass prairie are big and little bluestem, indiangrass, switchgrass, porcupine grass, sideoats grama, and tall dropseed. Some of the principal forbs are leadplant, groundplum, milkvetch, American licorice, white and purple prairie clover, the scurfpeas, onions, pussytoes, black sampson, perennial sunflowers, false boneset, and prairie rose. It is estimated that only 10%–15% of this tall grass prairie has not been tilled.
- The western one-fourth of the District is tall grass/mixed grass transition prairie. The key native grassland species in the mixed grass prairie are western wheatgrass, big bluestem, and porcupine grass. Principal forbs include American vetch, goldenrod, yarrow, many-flowered aster, and prairie rose. The majority of this portion of the Madison WMD has been farmed, and it is estimated that only 15%–20% has not been tilled.

#### Wetlands

Refer to the "wetlands" discussion for Huron WMD for wetlands information.

### Sand Lake NWR Complex

#### Woodlands/Shelterbelts

Woodlands are divided into two categories, native and nonnative populations. Native woodland vegetation in the complex is primarily located within the James River flood plain and the border of the larger lakes in the Coteau du Prairie. These woodlands are deciduous trees and shrubs located where moisture conditions allow for their growth. The two primary native species are willow and cottonwood. The complex's lands also fall within the historic range of bur oak and green ash but any potential populations are limited.

Nonnative populations consist of native species with the addition of nonnative species such as Siberian elm and Russian olive. Early farm settlers planted many of these types of plantings as soil conservation measures following the Dust Bowl years of the 1930s. These populations are the largest percentage of woodlands and are man planted shelterbelts and farmstead groves. With few exceptions, the nonnative populations were established before the Service took ownership of the

lands. All of the nonnative populations are within historical grassland ecosystems. The Service is actively working towards removing the nonnative populations as part of restoring the grasslands.

On Service-owned lands in the WMD, woodland vegetation is limited and is listed as “other upland habitat,” in the CCP along with roads, trails, and administrative areas. Total “other upland habitat” comprises about 3% of the uplands.

#### Grasslands

The eastern part of Sand Lake NWRC can be categorized as a transitional zone between tall and mixed-grass prairie. Mixed grass prairie becomes more dominant within the central and western part of the District.

Dominant grass species in the mixed-grass prairie are prairie junegrass, little bluestem, needleandthread, blue grama, green needlegrass, porcupine grass, prairie cordgrass, northern reedgrass, plains muhly, western wheatgrass, and Kentucky bluegrass (Dyke et al. 2015).

Transition prairie is found between the more xeric mixed-grass prairie and the mesic (wet) tallgrass prairie. Transition prairie is characterized by western wheatgrass, big bluestem, and needlegrasses, representing a mix of influences from both tallgrass and mixed-grass prairies. Transition prairie in the three-district area is closely associated with the Drift Plains, James River Lowlands, Glacial Lake Basins, and Glacial Lake Deltas.

#### Wetlands

For Sand Lake WMD, refer to the “wetlands” discussion for Huron WMD for wetlands information.

The James River flows through the Sand Lake NWR. It is a unique portion of the total James River ecosystem in South Dakota. At the Refuge, the flow of the sluggish James River is interrupted by two natural pools (Mud and Sand lakes) that have been regulated by low, earthen dams and water control structures. Both lakes are shallow; Mud Lake averages about 1.5 feet in depth and Sand Lake averages about 2.75 feet in depth with current management. The maximum depths of the pools are approximately 6 feet. Margins and other shallow areas of both impoundments produce dense stands of emergent vegetation.

## Waubay NWR Complex

### Waubay NWR

#### Woodlands/Shelterbelts

Waubay NWR consists of 4,650 acres of marsh, prairie, and woodland habitat. Native woodlands make up 14% of the habitat at Waubay. The woodlands are surrounded by large glacial lakes and are thought to have developed because they were protected from prairie wildfires that historically occurred in the Northern Great Plains. Most of the acres are comprised of northern bur oak forest, woodlands or savanna. Waubay NWR offers a unique glimpse at plant species normally seen in eastern deciduous forests. Basswood, hop-horn beam, American elm, wild grape, jack-in-the-pulpit, trillium, and Dutchman's breeches are some of the plant species at the very western edge of their range. Other species found in these woodlands are bur oak, basswood, and green ash with an understory composed of dogwood, ironwood, hazelnut, gooseberry, and serviceberry.

Unfortunately within some of these woodlands are small grassland openings that were once agriculture fields used for food plots to provide artificial feeding sites for wildlife. . In 2014, thirty bur oak and thirty basswood trees were planted to speed up reforestation of one of these fields in West Woods.

The 75-acre woodland area north of Hillebrand's Lake is designated by the Society of American Foresters as a Research Natural Area because of its unique bur oak/little bluestem cover type.

#### Wetlands

Waubay NWR is dominated by Waubay Lake. High water conditions since the mid 1990's have connected four lakes (North Waubay, South Waubay, Spring, and Hillebrands) into Waubay Lake. Waubay Lake is 15,000 plus acres in size, has a maximum depth of 31 feet, and supports an important fishery.

### Waubay WMD

#### Woodlands/Shelterbelts

The Service owns and manages about 41,024 WPA acres within the WMD. There are 189 WPA units, which range from 3 acres to over 1,325 acres. Forestlands and woodlots found scattered across the WMD consist of shelterbelts, farmstead tree plantings, and occasional natural wood lots along the shores of larger bodies of water. The woodlands and brush compose about 3% of fee title lands. Bur oak, green ash, hackberry, and cottonwood are the major tree species.

The northern bur oak mesic forest plant community is found primarily in coulees and adjacent uplands and is more common on the eastern edge of the Coteau. It is mostly found on south or west-facing slopes and with moist soils. The canopy is dominated by bur oak, with smaller amounts of basswood and green ash. Ironwood is a common small tree/sub-canopy species. The shrub layer may have American hazelnut, dogwood, gooseberry, prickly ash, rose, and serviceberry. The herb layer has a diversity of species including hog peanut, Pennsylvania sedge, columbine and sweet cicely.

The plains basswood forest type is found primarily on the north or east-facing slopes on moist soils in coulees and adjacent uplands. It is found only on the eastern edge of the Coteau because the coulees on the eastern side are deeper and wider than those on the western side, as well as east or northeast- facing, providing a more suitable microclimate for this forest type. The canopy is dominated by American basswood, with smaller amounts of green ash, bur oak, hackberry, and quaking aspen. Sugar maple can be locally dominant on the northeast portion of the Prairie Coteau, the only place on this landform where it occurs. Ironwood is a common small tree or sub-canopy species. The shrub layer may include gooseberry and serviceberry. The herb layer may include Virginia waterleaf, sweet cicely, blue cohosh, bloodroot, and red baneberry. Some of the herbs found here, as well as in the northern bur oak mesic forest, are typical eastern deciduous forest species and are on the western edge of their range.

The bur oak woodland community occurs on dry to mesic sites and is floristically and structurally intermediate between northern bur oak mesic forest and bur oak savanna. It has a patchy canopy and an understory dominated by shrubs and tree saplings. The primary species in the canopy is bur oak. The shrub layer can range from scattered to a dense thicket. It may include raspberries, gooseberries, dogwoods, American hazelnut, and prickly ash. Prairie vegetation, if present, only

occurs in small openings in the tree or shrub layer. The herbaceous layer is generally sparse and floristically poor.

The bur oak savanna is a dry-to-dry-mesic community dominated by bur oak. Shrub cover is variable and consists of oak grubs, American hazelnut, serviceberry, and buckbrush. The herbaceous layer is dominated by species typically found in Little Bluestem-Porcupine Grass Dry-Mesic Hill Prairie. This is a fire maintained community and, due to fire suppression, much of it has probably converted to bur oak woodland or forest.

**Wetlands**

Refer to the "wetlands" discussion for Huron WMD for wetlands information for Waubay WMD.

**Waubay NWR Complex**

**Grasslands**

Tallgrass prairie is the wettest of the grassland types and is largely characterized by sod-forming bunch-grasses. Like other grasslands, species composition of tallgrass prairie varies geographically (Sims 1988). Grassland groupings of the tallgrass prairie are (1) bluestem prairie from southern Manitoba through eastern North Dakota and western Minnesota south to eastern Oklahoma, and (2) wheatgrass, bluestem, and needlegrass prairie from south-central Canada through east-central North Dakota and South Dakota to southern Nebraska. The dominant grass species in these areas are big bluestem, little bluestem, switchgrass, Indiangrass, prairie dropseed, slender wheatgrass, porcupine grass, mat muhly, fescue sedge, and meadow sedge. A unique feature within the tallgrass prairie is the Hill prairie.

Hill prairie is located on moderate to steep slopes with soils that are dry. This community is dominated by grasses such as little bluestem, porcupine grass, sideoats grama, and western wheatgrass. Common forbs include leadplant, rigid goldenrod, purple and prairie coneflowers. Some of the largest remaining tracts of northern mesic tallgrass prairie occur in the Prairie Coteau where rolling, rocky topography prevented conversion to cropland. It is found on level to gentle slopes with mesic soils. The prairie is dominated by tall grasses such as big bluestem, along with shorter grasses like northern dropseed and porcupine grass. Common forbs include leadplant, prairie lousewort, and golden alexander. The northern wet-mesic tallgrass prairie is located in low-lying areas and drainage ways but rarely occupies more than a few acres in size. The water table is often near the surface. It is dominated by big bluestem and Canada bluejoint. A common forb is the Rocky Mountain blazing star.

### 3.4.1.2 Endangered Plant Species within the Administrative Units

The Western prairie fringed orchid (*Platanthera praeclara*) is the only known endangered plant species that could potentially occur on the five WMDs/NWRs. The plant communities supporting the orchid include tallgrass calcareous silt loam prairie or sub-irrigated sand prairies. Historically, the orchid occurred in wet meadows in the Big Sioux River Valley located in Waubay, Madison, and Lake Andes WMDs. Although there are no known occurrences of the orchid in South Dakota, potential habitat does exist. In areas where the western prairie fringed orchid has been found, they are usually enhanced by periodic prescribed burning. Burning reduces mulch buildup and control the increase of nonnative plant species.

### 3.4.1.3 Terrestrial Noxious and Invasive Plant Species within the Administrative Units

**Noxious Weeds**

There are 31 species of plants listed by the state of South Dakota as noxious (NRCS 2016a). Many of these noxious plant species are present on the WMDs/NWRs. All of the noxious plant species often compete with and have a very negative effect on native plant species. The control of noxious plants is important to benefit native plant communities and is required by State law.

*Canada thistle invading grasslands. Mason Sieges / USFWS.*

Leafy spurge (*Euphorbia esulaand*) and Canada thistle (*Cirsium arvense*) are the most widespread and difficult to control. Tamarisk, although not as widespread, is also very difficult to control. In the riparian areas, the presence of these species can reduce the integrity of the riparian habitat. Canada thistle has infested almost all riparian margins in eastern South Dakota, including those that lie in the five administrative units. Leafy spurge and musk thistle (*Carduus nutans*) are also becoming widespread invaders in these areas. This is particularly troublesome because invasive plants in riparian areas provide a constant supply of seed to downstream areas through water movement.

**Invasive Species**

Cool season invasive grasses, which include smooth brome (*Bromus inermis*), Kentucky bluegrass (*Poa pratensis*) and crested wheatgrass (*Agropyron cristatum*), heavily invade the grasslands of the Service units. The appropriate use of prescribed fire and grazing allows native grass communities to better compete against the invasive grasses.

Methods of Control for Noxious and Invasive Species

Currently, methods for controlling both noxious and invasive species include; grazing, haying, prescribed fire, biological agents (release of beneficial insects), hand-pulling and herbicides.

Noxious, invasive and undesirable plants on the administrative units:

- Huron WMD**.** The plants of most concern on WPAs within the WMD are Canada thistle, sow thistle, leafy spurge, wormwood sage, smooth brome, Kentucky bluegrass and crested wheatgrass. There are also nonnative trees species (such as Siberian elm and Russian olive) that are encroaching into grassland habitats.

- Lake Andes NWRC**.** The plants of most concern on Lake Andes are Canada thistle, sow thistle, leafy spurge, wormwood sage, musk thistle, smooth brome, Kentucky bluegrass and crested wheatgrass. Russian olive and eastern red cedar are invasive tree species that are beginning to dominate the landscape.
- Madison WMD**.** The plants of most concern on Madison WMD are Canada thistle, sow thistle, leafy spurge, wormwood sage, musk thistle, smooth brome, and Kentucky bluegrass.
- Sand Lake and Waubay NWRCs . There are many noxious plant species in the two NWRCs. The plants of most concern on Sand Lake and Waubay NWRC are Canada thistle, sow thistle, leafy spurge, wormwood sage, musk thistle, smooth brome, Kentucky bluegrass and crested wheatgrass.

#### 3.4.1.4 Aquatic Invasive Plant Species within the Administrative Units

The two predominant shallow marsh invasive plant species within the Service units are purple loosestrife (*Lythrum salicaria*) and phragmites (*Phragmites australis var).* Both are invasive emergent aquatic plants often located among cattails and other emergent plants (NRCS 2016b). The most common aquatic invasive plant in the Service units is typically a wet meadow species known as reed canarygrass (*Phalaris arundinacea*).

Data regarding fire effects on purple loosestrife are sparse with the limited sources indicating that it does not burn well considering moist or inundated soils. Burning biomass of this plant (even if following an herbicide treatment) potentially increases seed production. Additional information available at: http://www.fs.fed.us/database/feis/plants/forb/lytsal/all.html#FIRE EFFECTS.

Fire has negligible effects on *Phragmites* considering moisture and high temperatures necessary for rhizome lethality. Although top-kill may occur with fire, surviving rhizomes will re-sprout often causing re-infestation. (http://www.fs.fed.us/database/feis/plants/graminoid/phraus/all.html#FIRE EFFECTS) Reed canarygrass forms monocultures within the wet meadow and sometimes the shallow marsh zone of wetlands. This species typically reestablishes quickly following fire, especially if it was the predominant plant prior to burning. The rhizomes often survive a fire even though top-kill occurs, and creating bare soil conditions increase opportunities for seed viability. (Additional information available at: http://www.fs.fed.us/database/feis/plants/graminoid/phaaru/all.html#FireEffectsAndManagement).

### 3.4.2 Environmental Consequences

#### 3.4.2.1 Effects of Alternative A on Vegetation/Habitat

**Alternative A: Current Management - No Action:** All wildfires, regardless of cause, are suppressed and not managed for multiple objectives. Prescribed fire, mechanical, and chemical treatments are used for fuels reduction and habitat management.

**Woodlands/Shelterbelts**

Woodlands and shelterbelts are a small fraction of the landbase within the Service units. Because of this, woodlands are not a primary focus for treatments in general. However, the non-native woodlands and shelterbelts planted since European settlement may be targeted as a restoration project using prescribed fire, mechanical, and chemical treatments. Where these treatments occur, the object will be to restore native grasslands. Broadcast prescribed fire is used in grasslands where trees are encroaching into

grasslands. Usually prescribed fire treatment is only effective where trees are small and immature. For mature trees or those established in shelterbelts, mechanize equipment is used to uproot the trees. They are then piled and burned in place. The area is then replanted with native plants.

### Wetlands

Wetlands in the prairie pothole region are dynamic systems that (when functioning) cycle through various stages. Each stage is defined by the amount and configuration of emergent aquatic vegetation and water level. The primary driver in wetland systems is climate. The amount of precipitation minus evaporation and transpiration is what determines water levels and thus wetland vegetation. Surrounding land use also affects wetland conditions. The extent of the effect of land use is dependent on the wetland stage. There is minimal research available on wetland ecology and fire effects in the prairie pothole region. Most of the research on the effect of fire on wetlands was beneficial to breeding waterfowl, primarily seen by an increase in pair density. This is attributed to an improvement in breeding habitat conditions through and increase in interspersion of cover and open water, and an increase in the (food source) invertebrate population (Kantrud 1986).

### Grasslands

Grasslands are disturbance dependent systems, and limiting treatments such as burning and grazing has proven detrimental (Grant et al. 2009). One of the primary management concerns related to grasslands is the invasion of shrubs, trees, introduced cool-season grasses, and noxious weeds. Protecting, maintaining, and restoring grasslands to healthy diverse habitat, results in long-term minor to major beneficial effects for wildlife species.

### Prescribed Fire

In both the short and long term, the beneficial effects of prescribed fire would range from minor to major. The duration and degree of beneficial effects depends of the frequency, intensity, timing, and seasonality of the prescribed fires. Additionally, the number of acres burned at each refuge/WMD in a given cycle, recent and historical precipitation, vegetation types being burned, and the individual burn unit's defoliation history also influences the beneficial effects. Burning paradigms should not be focused on a single season (e.g., spring, summer, fall) over the long-term. Uniformity in the timing or frequencies of burns simplifies the functionality of a complicated grassland system.

The biggest challenge with managing native prairie on the modern day landscape in the administrative units is the dominance of smooth bromegrass and Kentucky bluegrass. Considering these species, the current vegetation state, and subsequent objectives, will provide the best insights into the burning time and frequency. Multiple sources indicate that management to reduce smooth brome, may increase Kentucky bluegrass and vice versa (Murphy and Grant 2005, Hendrickson and Lund 2010). In addition, the knowledge base on the varying cultivars of smooth brome and Kentucky bluegrass is limited, which could be a major factor in defoliation outcomes. Considering these challenges, there are varying and even conflicting recommendations to reduce the prevalence of these introduced species (Blankespoor and Larson 1994, Grace et al. 2001, Felege et al. 2013). Using defoliation techniques such as burning in the mixed grass prairie regions of South Dakota provides increased challenges compared to the tallgrass prairie because of the morphological and physiological similarities of smooth brome and Kentucky bluegrass to the native cool-season grasses. Increasing the latter is critical to decreasing the former species.

Measuring the success of a prescribed fire is determined in the short- and long-term dependent on the targeted unit objectives. Often, the season following a fire, positive results are observed; for example, on tallgrass sites, a smooth brome model exists that documents how to increase native warm-season grasses and decrease smooth brome after a single burn. This is effective if there is ≥20% native warm-season grasses, and smooth bromegrass is at the five leaf stage when burned (Willson and Stubbendieck 2000). If continued defoliation does not occur in subsequent years on a site, the smooth brome cover will recover from the initial burn effects. Depending on the objective, continued burning of this site during the same period across the years is not recommended. This increases the potential to reduce native plant diversity, especially cool-season species.

Reducing litter with fire is potentially another measure of short-term success. If the burning occurs at such a frequency that litter build up is not excessive, this will provide opportunities for native plant growth, and appropriate habitat for grassland-dependent wildlife. Results depend on the current vegetation state on the respective unit.

Long-term success could ideally be measured by monitoring certain ecological processes such as nutrient cycling, soil properties (biotic and chemical), energy capture, to name a few. These processes occur below ground where changes occur slower and across years of burning, grazing, or idling. Typically, success is based on the above ground results (e.g., litter decrease and shifts in plant composition) because these are easier metrics to monitor. Prescribed fire is critical to restoring some of these ecological processes that may improve the plant composition for prairies. For example, the prairie is considered a nitrogen limited system under pristine conditions (Nyren 1979); the modern day landscape provides for higher nitrogen levels in the soil which appear to enhance smooth brome production by creating a competitive advantage through positive feedback between growth and soil nitrogen (Vinton and Goergen 2006). Fire facilitates the removal of nitrogen, but it is difficult to measure this effect. Nitrogen removal may be one of the keys to long-term prairie restoration.

Prescribed fire may reduce woody plants such as Russian olive, if the timing is appropriate and coupled with other treatment techniques (e.g., herbicide). Top-kill may result from the prescribed fire, but without additional herbicide treatment, re-sprout often occurs from the trunk, root crown, and roots. Additional information available at: http://www.fs.fed.us/database/feis/plants/tree/elaang/all.html#FIRE EFFECTS.

Fire, grazing, and climate interactions played a major role in developing the grasslands of the Northern Great Plains. Fire favors many grass [such as switchgrass (*Panicum virgatum*), big bluestem (*Andropogon gerardii*), little bluestem (*Schizachrium scoparium*), western wheatgrass (*Pascopyrum smithii*), green needlegrass (*Nassella viridula*)] and forb species [lead plant (*Amorpha canescens*), purple coneflower (*Echinachea spp*), blazing star (*Liatris spp*), milkweed (*Asclepias spp*)], by increasing occurrences, productivity, and cover. Plants that fail to regenerate or produce seed in the first season following fire may still recover in the second year (Blaisdell 1953). The possible negative impacts to plants from prescribed fire are relatively temporary and minor compared to the long-term benefits that burning could provide. In contrast to applying prescribed fire, the potential negative effects of not burning are greater. (Cuomo et al. 1998).

The role of prescribe fire in wetlands is the cycling of nutrients, litter consumptions, and plant growth stimulation. Wetland function decreases with habitat homogeneity, specifically in the dominance of tall, robust hdyrophytes; such as hybrid cattail (*Typa glauca*) and phragmites (*Phragmites australlis*). Prescribe fire has been documented to decrease this homogeneity and maintain wetland function (Higgins

et al. 1989). According to Higgins et. al, (1989), the use of prescribe fire in wetlands has been documented to increase desirable wetland vegetation such as whitetop (*Scholochloa festucacea*), spikerush (*Eleocharis spp*.), and sedges (*Carex spp*.).

**Mechanical Treatments**

These treatments involve machines to accomplish objectives and are essential to the protection of communities, resources, and the ecosystem. Mechanical fuels treatments have been identified as one method for reducing fuel loads in fuel breaks and other strategic areas in the WMDs/NWRs thus reducing the probabilities of high-intensity, damaging wildfires. Mechanical treatments are often used in areas in, or directly surrounding, communities, as well as in combination with other types of treatments (Prestemon and Abt 2007).

Implementing mechanical treatments could result in temporary to short-term minor to moderate adverse effects on non-target vegetation during treatments; but could result in long-term moderate to major beneficial effects as hazardous fuel loads are reduced, invasive species are removed, and conditions that support the growth of desirable native vegetation are promoted and maintained. In the short-term, invasive species may occupy areas where mechanical treatment were implemented. To address this problem, mechanical treatments should occur in conjunction with chemical and prescribed fire treatments as part of the overall treatment process.

Invasive plant species often compete with and create very negative effects on native plant species. The control of invasive plants (both native and nonnative) is important to benefit native plant communities and, in the case of noxious weeds, is required by State law. Under Alternative A, mechanical treatments would continue to remove invasive shrubs and trees on grasslands and to prevent the further encroachment of Russian olive, Siberian elm, eastern red cedar, unwanted cultivated shelterbelts, and other nonnative woody encroachments into grassland habitats. Additionally, mechanical treatments would be used to manage density of wormwood stands to maintain a diversity of grass and forb species.

On all Service lands, the use of heavy equipment to carry out mechanical treatments will be closely monitored to minimize impacts.

**Chemical (Herbicide) Treatments**

Herbicides need to be judiciously used on any areas that are native prairie or old cropland areas possessing native forbs. Usually this type of treatment is used for noxious weeds such as leafy spurge, Canada thistle, wormwood, and yellow toadflax. It is preferred that herbicides be used only when other treatment methods (such as hand pulling or use of a weed trimmer, chainsaw, and brush cutter) do not achieve the desired results in vegetation communities. Herbicides are used as a control mechanism to meet the goal of eliminating invasive plant species and to treat cut stumps and sprouts following mechanical removal. Eradicating noxious weeds with herbicides results in beneficial effects on the native grass species because treatments help reduce competition for resources (such as soil nutrients, sunlight, and moisture) and promote diverse native grassland plant communities, however there is great concern for collateral damage on native forbs. The continued management of invasive plants would result in long-term minor to major beneficial effects on native vegetation and also in reducing fuel loads.

An adverse effect could result if herbicides drift onto susceptible non-target vegetation. The Service herbicide application crews avoid drift damage by observing best management practices such as spraying

when the wind speed is less than 10 mph, using nozzles that reduce drift potential, or using alternative application methods. Similar damage could occur when the non-target species is intermingled with the target species. In this situation alternatives for chemical application that may be used include: using a selective product (one that does not affect certain non-target species); using a directed application to prevent or reduce application onto the non-target plants; or applying treatment at a time when the non-target plants are dormant. In some cases, a certain amount of damage to common species of non-target plants is acceptable. Other precautions include creating herbicide-free buffers around sensitive areas and non-target plants, and shielding non-target and sensitive plants with suitable material (refer to Table 6 for mitigation measures). The proper use of herbicides would result in negligible to minor adverse effects on non-target plants in the short term, and long-term minor to major beneficial effects on native vegetation as invasive nonnative plants are controlled and eradicated.

**Wildfire Suppression**

Suppression actions may include the construction of fireline by firefighters using hand tools, engines, heavy equipment (such as dozers), and aircraft. Some suppression actions using heavy equipment or aircraft may be restricted based on the presence of cultural sites, riparian habitat, waterways, and critical habitat. Tactics such as burning out from roadways or allowing the fire to burn into areas of natural confinement may be appropriate as well.

It is difficult to express the exact effects of suppression actions because there are so many variables, such as the size and location of a wildfire, weather conditions at the time of the fire, vegetation type and moisture content of the vegetation, and fuel model(s) where the fire is occurring. Depending on these variables, adverse effects could be short or long term and range from minor to major. Beneficial effects would be realized when human life and property, Service and community infrastructure, and natural and cultural resources are protected. All ground disturbed during suppression activities will be rehabilitated.

Larson and Newton (1996) evaluated fire retardant Phos-Chek G75-F®, and fire suppressant foam Silv-Ex® in 0.5%-solution, on mixed-grass prairie vegetation communities at the Woodworth Study Area, a research site of the Northern Prairie Science Center in Jamestown, North Dakota. Vegetation in the study area was dominated by Kentucky bluegrass (*Poa pratensis*), an exotic cool-season grass. Other grass species found during previous studies on the site include green needlegrass (*Nassella viridula*, needleandthread (*Hesperostipa comate*), quackgrass (*Elymus repens*, plains muhly *(Muhlenbergia cuspidata),* and smooth bromegrass (*Bromus inermis*). Prairie wild rose (*Rosa arkansana*), silverberry (*Elaeagnus commutata*), and western snowberry (*Symphoricarpos occidentalis*) were common woody plants. The study, however, concentrated on four species: *P. pratensis, S. occidentalis, R. arkansana*, and *Solidago rigida* (stiff goldenrod).

Overall, the Silv-Ex® application had little effect on the vegetation characteristics that were measured, and any effects detected were subtle. Changes were noted in the number of species, ratio of chewed to total leaves per shoot in *S. occidentalis* and *R. arkansana*, and mean shoot length and leaf length in S. occidentalis were affected by treatment. Of the 24 response variables, five showed a significant effect involving Phos-Chek G75-F® treatment. The application resulted in increased biomass, whether or not the plots were burned. The effect was transitory, however; biomass did not differ among treatments the following year.

Larson and Newton (1996) also documented changes in herbaceous biomass in a California oak-savanna rangeland after a diammonium phosphate (DAP) retardant was applied to extinguish an October fire. Herbage yield the season after application was significantly higher on plots to which DAP had been applied, whether burned or unburned. By the second season, DAP plots were statistically indistinguishable from burned, untreated plots. The fertilization effect in the study seemed to be concentrated in *P. pratensis* (Kentucky bluegrass). Grass not only was longer on plots treated with retardant, but the effect was enhanced over the course of the growing season.

Any adverse effects on vegetation from using fire suppressant foam or fire retardant would be negligible to moderate and temporary to short term.

### 3.4.2.2 Effects of Alternative B on Vegetation/Habitat

**Alternative B:** All wildfires, regardless of cause, are fully suppressed and not managed for multiple objectives. Use only mechanical and chemical control for fuels reduction.

Effects on vegetation from mechanical and chemical treatments and wildfire suppression actions would be the same as described above for Alternative A.

Mechanical and chemical treatments alone would not produce the same benefits that fire provides, such as greater seed production, germination, and establishment because burning allows plant nutrient cycling. Mechanical and chemical treatments conducted without prescribed fire would help change species composition but would not necessarily reduce fuel loading. It is possible to remove materials left behind from mechanical or chemical treatments but the cost can be prohibitive. Utilizing prescribed fire in conjunction with the mechanical or chemical treatment helps to remove existing undesirable plants above the soil surface and promotes the growth of native grasses and forbs, providing a competitive advantage for the native species.

The full process of the mechanical and chemical treatments within the Service units of the Great Plains Zone generally includes prescribed fire. This process is utilized to increase the productivity of native plant species following a wildland fire. In addition, growth is stimulated by the removal of litter and preparation of the seedbed. The majority of Service lands have evolved with fire, the wildlife and plants supported by grasslands, shrublands, riparian/wetland areas and woodlands depend upon wildland fire for their survival. The lack of periodic fire in the wildlands (due to wildfire suppression or fragmentation of landscapes from human development) has actually increased the risk of catastrophic wildfire.

The dangers of excluding wildland fire from the landscape are numerous. These dangers result from the accumulation of flammable vegetation resulting in large damaging wildfires. Potential adverse impacts include the loss of life or serious injury to firefighters and the public; property loss and damage; adverse health effects and impaired visibility from intense or extended periods of unmanageable smoke; long-term loss of plant and animal species and the habitats; and damage to soils and watersheds.

### 3.4.2.3 Effects of Alternative C on Vegetation/Habitat

**Alternative C** (preferred alternative): Suppression of all human caused wildfires, and, when appropriate, utilize naturally occurring wildfires for fuels reduction and habitat management. Increase prescribed fire, and continue current management for mechanical and chemical treatments.

Effects on vegetation from prescribed fire and wildfire suppression actions would be the same as described above for Alternative A. Increasing the use of prescribed fire and utilizing naturally occurring wildfires for fuels reduction and habitat management would result in greater beneficial effects because a shorter fire return interval could be achieved which could accomplish management goals and objectives sooner.

Effects of mechanical treatments and chemical treatments would be the same as described in Alternative A.

### 3.4.3 Cumulative Effects on Vegetation/Habitat

There would be no cumulative adverse effects on vegetation from wildland fire and non-fire treatments when considered with present or future fuels reduction treatments that may be conducted on lands adjacent to Service lands (i.e., WUI). There would be beneficial cumulative effects when fuels reduction or non-fire treatments are implemented on and off refuge, complementing each other to increase the effectiveness of all treatments.

There is a potential to have cumulative effects that would be adverse if all treatments were conducted during the same timeframe.

## 3.5 Wildlife

The CCPs contain extensive information about the wildlife species that occur on each of the Service units. Section 3.5.3 summarizes the types of wildlife that occur on the administrative units and identifies any special status animal species present.

**Priority/Focal Wildlife Species and Habitat Requirements**

Effective and efficient management of natural resources on Service lands means knowing the species and habitats most in need of conservation efforts. The priority species were identified by comparing lists of species and habitats and considering those species listed under the *Endangered Species Act* (ESA) as well as the South Dakota sensitive species list. The Service considers the historic, current, and potential of Service lands to contribute to the conservation of the species and habitat.

The underlying ecological principle in prioritization is that a focused management action on priority species also benefits other species of wildlife. In other words, focused action on priority species will extend benefits to most species using wildlife habitat on Service lands. Focal species represent guilds of species (a guild is group of organisms that use the same environmental resources [such as habitat] in the same way). By making focal species a priority and managing habitat for them, healthy ecosystems are supported for the benefit of multiple species. The point is to make sure that a focal species does represent a broader guild.

Section 3.5.3 identifies priority and focal wildlife species if that information was provided in a refuge CCP. Otherwise, a broad representation of wildlife species is provided.

## 3.5.1 Affected Environment

### 3.5.1.1 Invertebrate Populations

Wetlands associated with WPAs normally carry high invertebrate populations. Nesting waterfowl, waterfowl broods, marsh and water birds, and shorebirds are highly dependent on these protein food sources for healthy, vigorous growth. Invertebrates associated with the wetlands include the following Taxonomic orders: *Conchostraca* and *Anostraca* (crustaceans), *Annelids* (worms), *Diptera* (midges and other flies), *Coleoptera* (beetles), *Odonata* (dragonflies and damselflies), and *Trichoptera* (caddisflies).

**Special Status Invertebrate Species**

There is one federally listed endangered beetle species that occurs or has the potential to occur in the area cover by this EA. Two butterfly species are known to occur within the administrative units that are candidate species for federal listing under the Endangered Species Act:

- American burying beetle (*Nicrophorus americanus*). The American burying beetle is a federally listed endangered species that is known, or is believed to occur, in Bennett, Gregory, Todd, and Tripp counties (USFWS 2013). Service units will be monitored for species existence, and if found, Service staff will document and seek consultation.
- Dakota skipper (*Hesperia dacotae*). Dakota skipper is a federally listed threatened species and state listed endangered species. Populations have declined historically due to widespread conversion of native prairie for agriculture and other uses. This has left the remaining Dakota skipper populations isolated from one another in relatively small areas of remnant native prairie. States and Canadian provinces in the original range of Dakota skipper have each lost 85-99% of their historical tallgrass prairie and 72-99.9% of their historical mixed-grass prairie. This has left isolated fragments of native prairie, only some of which are suitable for Dakota skippers. Critical habitat units occur within this fire plan area, but most are not considered occupied.
- Poweshiek Skipperling (*Oarisma poweshiek*). The Poweshiek skipperling is listed as endangered on both federal and state lists. This is due to degradation of its native prairie habitat by overgrazing, invasive species, gravel mining, herbicide applications; inbreeding, and population isolation. Prescribed fire threatens some populations. Prairie succeeds to shrubland or forest without periodic fire, grazing, or mowing; thus, the species is also threatened at sites where such disturbances are not applied. The Service, State agencies, and NGOs (such as The Nature Conservancy) protect and manage some Poweshiek skipperling sites. Critical habitat units occur within this fire plan area, but none are considered occupied.

Appendix B contains the conservation guidelines for both butterflies.

### 3.5.1.2 Fish Populations

There are 100 species of freshwater fish that inhabit the waters and waterways of South Dakota. Sixty-eight of these species have the potential to occur in lakes and wetlands in the Service units in this EA. The fishery is classified as a warm-water fishery with varying numbers of game fish and high numbers of minnows, carp, and suckers. Due to the shallow nature of the majority of the lakes and wetlands within the Service units, they have a high probability of fish winter or summer kill.

**Special Status Fish Species**

There is one federal endangered fish species and several state threatened fish species that are present on the WMDs/NWRs (SDGFP 2012).

- Banded killfish (*Fundulus diaphanus*). The killfish is not a federally listed species, but it is a state endangered species.
- Northern pearl dace (*Margariscus nachtriebi*). The pearl dace is not a federally listed species, but it is a state threatened species.
- Northern redbelly dace (*Chrosomus eos*). The redbelly dace is not a federally listed species, but is a state threatened species.
- Topeka shiner (*Notropis topeka*). This shiner is both a federally listed and state listed endangered species. The shiner is known, or is believed, to occur in numerous counties throughout South Dakota. Critical habitat is present on Huron and Madison WMDs and Sand Lake NWRC.

### 3.5.1.3 Reptiles and Amphibians

Thirty-three species of reptiles occur in South Dakota, and 20 of these species potentially occur within the five administrative units. Several examples of reptiles found in eastern South Dakota include the painted turtle, prairie skink, six-lined racerunner, Western hognose snake, plains garter snake, and the common garter snake. The painted turtle uses a combination of habitats including marsh, wetlands, and riverine areas as well as upland shrub and riparian forestlands near open water. The prairie skink and six-lined racerunner can be found in open fields, woodland edges and in upland grasses. The western hognose snakes prefer uplands grasses/forb habitats, upland shrub, riparian meadows and open riparian forest. The garter snake habitat is similar but also includes tall and short emergent marshes or upland habitat near open water.

There are 17 species of amphibians that occur in South Dakota: the tiger salamander, spadefoot toad, and northern leopard frog are among these species. These species all could potentially occur on Service lands within this EA. The tiger salamander and spadefoot toad use a combination of habitats including marsh, wetland, and riverine areas, as well as upland shrub communities near open water. Leopard frogs are found along vegetated margins of riverine permanent water, open ponded water and tall emergent marshes. Other wetland and riparian areas may be used when close to water or flooded.

**Special Status Reptile and Amphibian Species**

No Federally listed reptiles or amphibians are known to occur on the on Service lands within this EA. State threatened species include, Northern red-bellied snake, Eastern hognose snake, and false map turtle. Additional information is located at: http://gfp.sd.gov/wildlife/threatened-endangered/rare-animal.aspx.

### 3.5.1.4 Birds

Since South Dakota is in the Northern Great Plains, grassland birds are the predominant bird life in the state. All of the naturally occurring species evolved under periodic disturbance of the prairies.

- Huron WMD. Approximately 240 bird species regularly occur in the District, and about 113 of these species nest in the District. Several of the focal species include blue-winged teal, gadwall, marbled godwit, northern shoveler, short-eared owl, and upland sandpiper.

- Lake Andes NWRC. Approximately 239 bird species are recorded as regularly occurring in the Complex, and about 113 of these species nest there. Twenty-four other species have been sighted once or twice in the Complex.
- Madison WMD. Approximately 304 different bird species have been sighted in the District, and there are 57 Neotropical nesting species there. Several of the focal species include blue-winged teal, bobolink, northern pintail, and Wilson's phalarope.
- Sand Lake NWRC. Several of the focal species include Baird's sparrow, bobolink, chestnut-collarded longspur, and willet.
- Waubay NWRC. Approximately 247 bird species are recorded as regularly occurring in the Complex. About 109 species nest at Waubay, such as Blue-winged teal, upland sandpiper, and Savanah sparrow.

**Shore and Wading Birds**

The diversity of wetlands associated with uplands attracts a great variety of shorebirds and wading birds. Many shorebirds use the mudflats and shallows along the wetland edges or the shallows as wetland levels recede during their migrations in the spring and fall.

The wetlands in the WMDs/NWRs provide breeding habitat for a number of species of marsh and water birds, including eared grebes, Western grebes, pied-billed grebes, great blue herons, black-crowned night herons, cattle egrets, American bitterns, white-faced ibis, Virginia rails, sora rails, American coots, killdeer, upland sandpipers, willets, American avocets, Wilson's phalaropes, Franklin's gulls, Forster's terns, and black terns.

**Raptors**

Red-tailed hawks, Swainson's hawks, ferruginous hawks, and Northern harriers are the most common raptors using and nesting the WMDs/NWRS. All of these species nest in trees except Northern harriers, which nest on the ground in grasslands. Other species are sharp-shinned hawks, Cooper's hawks, rough-legged hawks, golden eagle, bald eagle, prairie falcon, Merlin, and American kestrel. Periodic grassland management benefits all these species.

**Waterfowl**

All five administrative units lie within the Prairie Pothole Region of North America. This area is of prime importance for producing many of the nation's ducks. In addition, the administrative units receive migrational use by 25 species of waterfowl.

- The tundra swan is the only species of swan to occur, with most use occurring during the fall migration.
- Four species of geese pass through the WMDs/NWRs in the spring and fall: Canada goose, greater white-fronted goose, snow goose, and Ross' goose. Canada geese and snow geese are the most abundant species. Canada geese are also common nesters in the area.
- Duck species that nest in the WMDs/NWRs are mallard, gadwall, Northern pintail, green-winged teal, blue-winged teal, American wigeon, Northern shoveler, wood duck, redhead, canvasback, lesser scaup, and ruddy duck. The duck species that migrate through the WMDs/NWRs include cinnamon teal, ring-necked duck, common goldeneye, bufflehead, hooded merganser, common merganser, and red-breasted mergansers.

### Upland Game Birds and Grassland Birds

The morning dove, Chinese ring-necked pheasant, gray partridge, turkey, and sharp-tailed grouse are common upland species. The greater prairie chicken nests in the WMDs/NWRs but is less common. The ring-necked pheasant and gray partridge, which are introduced species, have displaced the native greater prairie chicken and the sharp-tailed grouse. Now, the native prairie grouse are rarely seen.

All of the native species respond positively to upland habitat management such as burning. These species depend upon a healthy grassland condition for nesting sites and escape cover from predators.

### Passerine and Other Bird Species

Approximately 183 other bird species nest and/or migrate through the WMDs/NWRs.

### Special Status Bird Species

- American dipper (*Cinclus mexicanus).* This dipper is not federally listed but it is a State threatened species.
- Bald eagle (*Haliaeetus leucocephalus*). The bald eagle is no longer listed as endangered under the Endangered Species Act, but it is still a State threatened species. It can be seen throughout the WMDs, primarily along rivers and large lakes as the eagles migrate through in the spring and fall. In addition to the eagles that migrate through, active nests occur throughout eastern South Dakota. The National Bald Eagle Management Guidelines are included in Appendix C. https://www.fws.gov/northeast/ecologicalservices/eaglenationalguide.html
- Interior least tern (*Sterna antillarum*). This tern is both a federal and state endangered species that nests along the Missouri River in central South Dakota.
- Osprey (*Pandion haliaetus*). The osprey is a state-listed threatened species that can be found along the Missouri River and occasionally in the northeast. No known nesting has occurred in South Dakota since 1883. Upland management on the Karl E. Mundt NWR will have positive impacts on this species since it is dependent on the Missouri River and its riparian habitats for survival.
- Peregrine falcon (*Falco oeregrinus*). This falcon is not federally listed but is a state endangered species. It is occasionally observed throughout the WMDs/NWRs. This species is an uncommon migrant in the early spring and fall with occasional sightings during the winter.
- Piping plover (*Charadrius melodus*). This plover is both a federally threatened and state threatened species that occurs along the Missouri River and may be found on alkali wetlands. Habitat use by piping plovers is limited to wetland sites.
- Sprague's pipit (*Anthus spragueii*). The Service reviewed the conservation status of Sprague's pipit in 2010 to determine whether the species warrants protection under the Endangered Species Act. The status review found that listing Sprague's pipit as threatened or endangered is warranted; but federal listing of the species at this time is precluded by the need to complete other listing actions of a higher priority. The pipit is a federal candidate species but not state listed.
- Whooping crane (*Grus americana*). The whooping crane is both a federal and state endangered species that passes through the WMDs/NWRs during its migration. Most

sightings occur in the western counties of the Huron WMD. Whooping cranes primarily use shallow wetlands and adjacent uplands on WPAs.

#### 3.5.1.5 Mammals

There are an estimated 55 mammal species found within the Service units in this EA. The mammals range in size from the pygmy shrew weighing only a fraction of an ounce to the white-tailed deer weighing over 200 pounds. Species of mice common to prairie ecosystems are very abundant, and certain species of bats are very uncommon.

**Special Status Mammal Species**

The South Dakota Game, Fish, and Parks Department has identified several mammal species that are federally or state listed or both. None of these species has been documented to occur on Service lands within this EA in recent times.

- Northern long-eared bat (*Myotis septentrionalis*). This bat is a federal and state listed species due to White-nose syndrome. The 4(d) ruling became effective on February 16, 2016. Karl E Mundt NWR has potential roost sites in the cottonwood trees along the Missouri River. Prescribed burns at Karl E. Mundt NWR most likely will not be conducted in potential habitat; but if prescribed burns are considered for fuel or habitat management, the appropriate steps will be completed after consulting with Ecological Services.
- Northern river otter (*Lutra canadensis*). This otter is not federally listed but is a state threatened species.
- Swift fox (*Vulpes velox).* This fox is not federally listed but is a state threatened species.

**Invasive Wildlife Species**

The Zebra mussel (*Dreissena polymorpha*) is a small freshwater mussel. Veligers (immature larvae) were possibly discovered in the Missouri River below Fort Randall and Gavin's Point Dams in 2003, but no adults have been found in South Dakota. Zebra mussels can cause problems because they can reach high densities causing problems for water intakes, docks, boat motors, and infrastructure. They also filter vast quantities of water for a microscopic organism; thus, potentially altering the entire food web in a water body. Zebra mussels cannot be controlled once they establish themselves in a body of water, but they can be prevened from spreading to other bodies of water.

### 3.5.2 Environmental Consequences

#### 3.5.2.1 Effects of Alternative A on Wildlife

The wildlife species that inhabit grassland areas would benefit from a greater abundance of native grass and forb species. Protecting native plant species would help maintain the diverse structure in grasslands that creates cover and nesting sites for an array of grassland-dependent wildlife that already inhabit Service lands or more that could in the future. Native grasses provide nesting, brood rearing, escape, and roosting cover. The presence of forbs in managed grasslands is important because they diversify structure and invertebrate resources. Many bird species are most abundant in fields with a strong forb component. Plant diversity increases food sources, such as seeds, in addition to increasing the number of different insects that use a grassland area. Insects are an extremely important food source for young birds as they begin to grow and fledge.

### Prescribed Fire

The effects of prescribed fire on wildlife can be both adverse and beneficial. Prescribed fire used to reduce fuel loads can have secondary beneficial effects by improving habitat that is a value to wildlife. Fire removes dry, dead plant matter that has accumulated over the years, opening up space for new growth and creating thicker, younger cover and increasing food availability by stimulating seed production. The burned areas provide better nesting cover and attract ground-nesting birds. The burned areas also provide improved brood-rearing habitat by increasing the amount and variety of food available for young birds. According to Madden et al. (2000), a mosaic (provided by fire and grazing) of successional types will maximize diversity of prairie bird species. Grassland songbirds and waterfowl appear to have lower densities in recently burned units; however in the second growing season, there is an increase, and usually a stabilization or sometimes declines in densities in subsequent years (hence the reason for continued burn treatments) (Grant et al. 2010, Grant and Shaffer 2004). A study by Higgins et al. (1992) determined that nest success is highest in grasslands treated with fire compared to idling and grazing.

The temporary negligible to minor adverse effects on grassland wildlife can be minimized by planning early or late season burns to avoid the breeding and nesting season of most wildlife. Birds and some mammals usually leave the area ahead of the fire. Higgins (1986) determined that waterfowl nesting success was significantly higher after a fall burn compared to a spring burn. Few animals are unable to escape prescribed fire, and small mammals and herpetiles (reptiles and amphibians) that inhabit grasslands find shelter by burrowing under a log or staying in an underground burrow. Any nests destroyed by the fire are usually replaced through re-nesting. However, some direct mortality of wildlife can result from fire. The mortality most often occurs in sedentary species of herpetiles or immobile life stages such as the egg or pupal stage of many insects. Considering a grassland bird's lifecycle, the primary concern is female survival for re-nesting. Prescribed fire implementation across the administrative units occurs on a small scale (the average burn acreage is 183 acres). If nest initiation starts prior to the fire, the female will fly to adjacent habitat for re-nesting efforts; she may still provide overall recruitment to the species in that year. Butterflies and other invertebrates with smaller home ranges are still a concern; and therefore, Service staff utilizes guidance from documents such as Dakota Skipper Conservation Guidelines to produce the best outcomes for wildlife.

The effects of prescribed fire and other fuels reduction treatments on upland game birds and grassland birds (such as the morning dove, sharp-tailed grouse, pheasants, turkeys, and prairie chickens) would be eliminated or reduced by avoiding treatments (when possible) once cool season vegetation reaches 100% green-up and when the warm season grasses new growth retards fire growth. This time period (approximately) from the first part June thru July 15 should allow adequate time to for nesting upland and migratory birds to re-nest and hatch their broods.

Ring-necked pheasants are an exotic introduced species from Asia. Fires in ring-necked pheasant habitat during the nesting season can destroy ring-necked pheasant nest, eggs, and broods. Fire effects on ring-necked pheasants may be both beneficial and adverse. The effect of fire on ring-neck pheasants during the first post-fire year is generally adverse if valuable cover is lost. However, fire is an important factor in creating and maintaining ring-necked pheasant habitat and has a beneficial effect over the long term (Tesky 1995).

**Special Status Wildlife Species**

- Bald eagle. Prescribed fire could potentially affect the bald eagle. The mitigation measures listed in Table 6 would be implemented to reduce or eliminate the potential for known eagle nests to be damaged or destroyed by fuels management treatments, thus resulting in no or negligible short- or long-term adverse effects on eagles. All activities in or near known nesting sites will follow the National Bald Eagle Management Guidelines (see Appendix C) recommendations.
- Interior least tern. Typically, these birds use sandbars along rivers and are aquatic feeders. No habitat suitable for interior least terns is found on WPAs so there would be no potential to affect this species. The sandbars along rivers will be avoided if a known population is present and consultations will begin with refuge management and Ecological Services. The sandbar habitat generally does not support continuous vegetation receptive for fuels treatments or prescribed burning activities, thus, prescribed fire should result in no or negligible adverse effects on these birds if any are present.
- Piping plover. Typically, these birds use shorelines of alkaline lakes. Very little suitable piping plover habitat exists on WPAs so the likelihood of prescribed fire to affect the plover is non-existent to low. However, these areas will be avoided if a known population is present, and consultations will begin with refuge management. The shoreline habitat does not support continuous vegetation receptive for fuels treatments or prescribed burning activities, thus, prescribed fire should result in no or negligible adverse effects on these birds if any are present.
- Sprague pipit. Little is known about habitat use during migration so it is not possible to fully predict effects of prescribed fire.
- Whooping crane. Cranes are very opportunistic during migration and use a wide range of habitats. Studies have shown whooping cranes use burned areas for foraging. Prescribed fire would have little or no adverse effects on cranes. Fire could create attractive habitat resulting in long-term beneficial effects.
- Grey wolf. Fire effects and fuels treatments maybe beneficially or adversely affect grey wolf habitat. If a confirmed sighting or if a known population becomes established, it will warrant Endangered Species Act and Service management consultation.
- Peregrine falcon. Prescribed fire would have little or no effect on peregrine falcons. If any effect were to occur, it would likely be beneficial because populations of potential prey species could be increased.
- Poweshiek skipperling. Depending on the timing and percentage burned, prescribed fire could potentially negatively impact Poweshiek skiperlings. However, no sites are known to be occupied in South Dakota at this time.
- Dakota skipper. The mitigation measures (Table 6) and conservation guidelines (Appendix B) will be implemented prior to any treatments in an effort to reduce or eliminate adverse effects on the Dakota skipper. The mitigation measures and guidelines would offer the same level of protection for the poweshiek skipperling. Spring burns should be conducted as early as possible to limit larval mortality. For example, in southwest Minnesota, burns on or before May 1 may be early enough to ensure that Dakota skipper larvae have not yet emerged from their buried shelters. Dakota skipper larvae are less vulnerable to fire before they have resumed activity in the spring and after they have ceased activity in the fall (that is, when they are in shelters at or below the ground surface). Moreover, late spring burns may delay

flowering of early and midsummer blooming forbs thereby limiting nectar sources for Dakota skippers during their flight period (Dana 1991). Fall burns, however, may result in higher soil temperatures than early spring burns and greater mortality of larvae even after they have retreated for the season to shelters at or below the ground surface. In addition, the removal of plant material by fall burns may expose larvae to greater temperature extremes during winter - which may reduce their survival.

If fires need to be conducted in late spring to address a particular management need (for example, control of smooth brome), other precautionary measures will be especially important. These include: the division of occupied Dakota skipper habitat into multiple burn units (at least three); ensuring that fires stay within planned burn areas; allowing for the maximum number of years between fires (minimum of four year rotation); and reducing fuel loads in Dakota skipper habitat in units where frequent or intense fire is not necessary. Also, if suitable skipper habitat exists off the federal land and is not being burned, it can be used for a refugia for the Dakota skipper.

If a site is managed with prescribed fire, subdivide Dakota skipper habitat into rotational burn units (see above) even if all burning will likely be done when Dakota skippers are in sub-surface shelters. Other species of butterflies that rely on native prairie (such as Iowa skipper and Poweshiek skipperling) may still be vulnerable to high fire mortality even during early spring fires because these species' diapausing (dormant) larvae may be present in the foliage above the ground surface. Moreover, subsurface temperatures may reach lethal levels where fuel loads are especially high. Thus, there is the potential for adverse effects on the butterflies.

If feasible to achieve management objectives, conduct spring burns as early as is feasible – this may limit larval mortality because larvae may still be in shelters at or below the ground surface. Late spring burns may also delay flowering of early and midsummer blooming forbs, which may limit nectar sources for Dakota skippers during their flight period (Dana 1991). Fall burns may result in higher soil temperatures than early spring burns and greater mortality of larvae, even after they have retreated for the season to shelters at or below the ground surface. In addition, the removal of plant material by fall burns may expose larvae to greater temperature extremes during winter. When possible allow fires to burn in a patchy (”fingering”) pattern within units.

Adverse effects can be avoided by not using prescribed fire to manage Dakota skipper habitats if the smallest feasible burn unit would burn most or all of their habitat in one year unless it is possible to identify an area, with reasonable certainty, that Dakota skippers will recolonize the burned area. This requires a good understanding of the Dakota skipper populations in the potential source area and of the management planned for that area during the relevant time period. Acquisition and restoration of adjacent habitat or alternate management strategies (such as light grazing or late summer/fall haying) may be necessary to conserve Dakota skippers on relatively small and isolated sites.

- Topeka shiner. Avoid burning during late May and June during the spawning season. Burning should not take place prior to any spring flooding to prevent sediment and ash from entering the waters prior to and during spawning times.
- Northern long eared bat. Karl E Mundt NWR has potential roosting sites in the cottonwood trees along the river. Prescribed fire is a useful management tool. However, there are potential negative effects from prescribed burning, including direct mortality to the northern long-eared bat. Therefore, when using prescribed burning as a management tool, fire frequency, timing, location, and intensity all need to be considered to lower the risk of incidental take of bats.

The use of prescribed fire, where warranted, will, in any given year, impact only a small proportion of the northern long-eared bat's range during the bats active period. In addition, there are substantial benefits of prescribed fire for maintaining forest ecosystems. There is no evidence that prescribed fire has led to population level declines in this species nor is there evidence that regulating the incidental take that might occur would meaningfully change the conservation status or recovery potential of the species in the face of White-nose syndrome. Prescribed burns at Karl E. Mundt NWR most likely will not be conducted in potential habitat; but if prescribed burns are considered for fuels or habitat management, the appropriate steps will be completed after consulting with Ecological Services.

**Mechanical Treatments**

Depending on the extent of treatment, wildlife may be displaced during mechanical treatments which would result in temporary negligible to minor adverse effects. Adverse effects would increase to minor or moderate and last longer as a result of fuel break construction or maintenance activities if burrows are covered or ground fuels (such as litter or logs) that provide cover are removed.

**Chemical Treatments**

All herbicides used will have a PUP completed by the Service unit implementing the treatment. Two chemicals commonly used are Garlon 4 Ultra® and glyphosate. Garlon 4 Ultra® (active ingredient is triclopyr butoxyethyl ester or triclopyr BEE) is used strictly to treat wood brush stems to prevent root suckering by injecting basal cambium treatments into the stems of individual invasive trees (such as eastern red cedar and Russian olive) and broadcast applications on the stalks of recently cut shrubs (wormwood). It has little or no effect on grasses. This ester form of triclopyr is moderately toxic to birds and fish. The ester form hydrolyses rapidly to the acid form; and for this reason, researchers have concluded there is little chance the ester would impact these organisms. As with the amine form of triclopyr, this product does not bio-accumulate (EPA 1998).

Glyphosate is used in the process of re-establishing native grasslands. The chemical is used to kill existing vegetation (generally non- native species) for the purposes of preparing a seedbed for rehabilitation of the site. Glyphosate binds tightly to soil and is broken down by bacteria in the soil. It can persist in soil for up to 6 months depending on the climate and the type of soil. The EPA describes glyphosate as no more than slightly toxic to birds and is practically nontoxic to fish, aquatic invertebrates, and honeybees (EPA 2016).

**Wildfire Suppression**

Suppression actions would result in both adverse and beneficial effects. Adverse effects could be minor to major and long term, depending on the size of the fire, the extent of firelines or fuel breaks (if created), and the location of the wildfire in relation to wildlife habitat threatened (particularly critical habitat). Long-term beneficial effects on wildlife would be realized if suppression efforts protected important habitat areas or minimized loss of habitat. Beneficial effects would be immediate and long term and range from minor to major.

### 3.5.2.2 Effects of Alternative B on Wildlife

The effects on wildlife from mechanical and chemical treatments would be the same as those described above for Alternative A.

#### 3.5.2.3 Effects of Alternative C on Wildlife

The effects on wildlife from prescribed fire would be the same as those described above for Alternative A but Alternative C would increase the amount of treatments and the scale of treatments.

Proposed mechanical and chemical treatments are the same as Alternatives A and would have the same effects on wildlife.

The effects of naturally occurring wildfire would be the same as prescribed fire.

### 3.5.3 Cumulative Effects on Wildlife

There would be no cumulative adverse effects on wildlife from wildland fire and non-fire treatments when considered with present or expected future fuels reduction treatments that may be conducted on lands adjacent to Service lands (that is, in WUIs, CARs, and COIs). There would be beneficial cumulative effects when fuels reduction treatments are conducted on and off refuge complement each other to increase the effectiveness of all treatments.

## 3.6 Water and Soil Resources

The Comprehensive Conservation Plans (CCPs) contain extensive information about water resources at each WMD/NWR (refer to reference section).

### 3.6.1 Affected Environment

#### 3.6.1.1 Water Resources

The more prominent wetland features throughout the WMDs/NWRs are the glaciated "prairie potholes." These prairie wetlands are more numerous in the Coteau regions, but they are found throughout the entire WMDs. It is the richness and diversity of the wetlands that are of primary interest to the Service in South Dakota. These prairie wetlands are extremely productive and very attractive to both migratory and resident wildlife and serve as breeding and nesting areas for many migratory birds and as wintering habitat for many species of resident wildlife.

**Huron WMD**

The western edge of Huron WMD is bordered by two large Missouri River impoundments – Lake Oahe and Lake Sharpe. Another prominent water feature is the James River which enters South Dakota just above Sand Lake NWR in Brown County and joins the Missouri River near Yankton, South Dakota. The James River has the flattest gradient of any river its length in North America. As it flows through the Dakota Lake Plain physiographic region, the overall gradient is about 1.5 inches per river mile. The water takes about one month to travel through South Dakota. The James River and its tributaries are typical prairie rivers in that they often flood during the spring runoff period and commonly have no flows at all during the hot mid-summer period. However, when they are wet, they offer tremendous benefits to the many species of wetland-dependent plants and animals.

**Lake Andes NWR Complex**

The western and southern edge of the Complex is bordered by two large Missouri River impoundments - Lake Francis Case and Lewis and Clark Lake. The Karl E. Mundt NWR is bordered by the Missouri

River on the east. The Missouri River is one of the major river systems in the United States, and the entire Complex is within its vast watershed. Another prominent water feature is the James River, which enters the Complex near Hanson County, and joins the Missouri River near Yankton, South Dakota. The James River flows through three of the 13 counties in the Lake Andes WMD. Lake Andes NWR includes 4,700 of water comprising the lake of Lake Andes.

**Madison WMD**

Most of the WMD is in the Missouri River's vast watershed of 529,000 square miles. Prominent tributaries to the Missouri River in the WMD are the Sioux and Vermillion rivers and numerous small tributaries to the James River. The extreme northeastern corner of Deuel County contains tributaries of the Minnesota River. The tributaries are typical prairie streams that often flood during the spring runoff period and commonly are dry or have small flows during the hot mid-summer period. When they are wet, however, they offer tremendous benefits to the many species of wetland-dependent plants and animals. Lake Thompson and Lake Poinsett, South Dakota's largest natural lakes are located in the Madison WMD. The lakes provide numerous recreational uses and provide large open water areas for migrating waterfowl.

**Sand Lake NWR Complex**

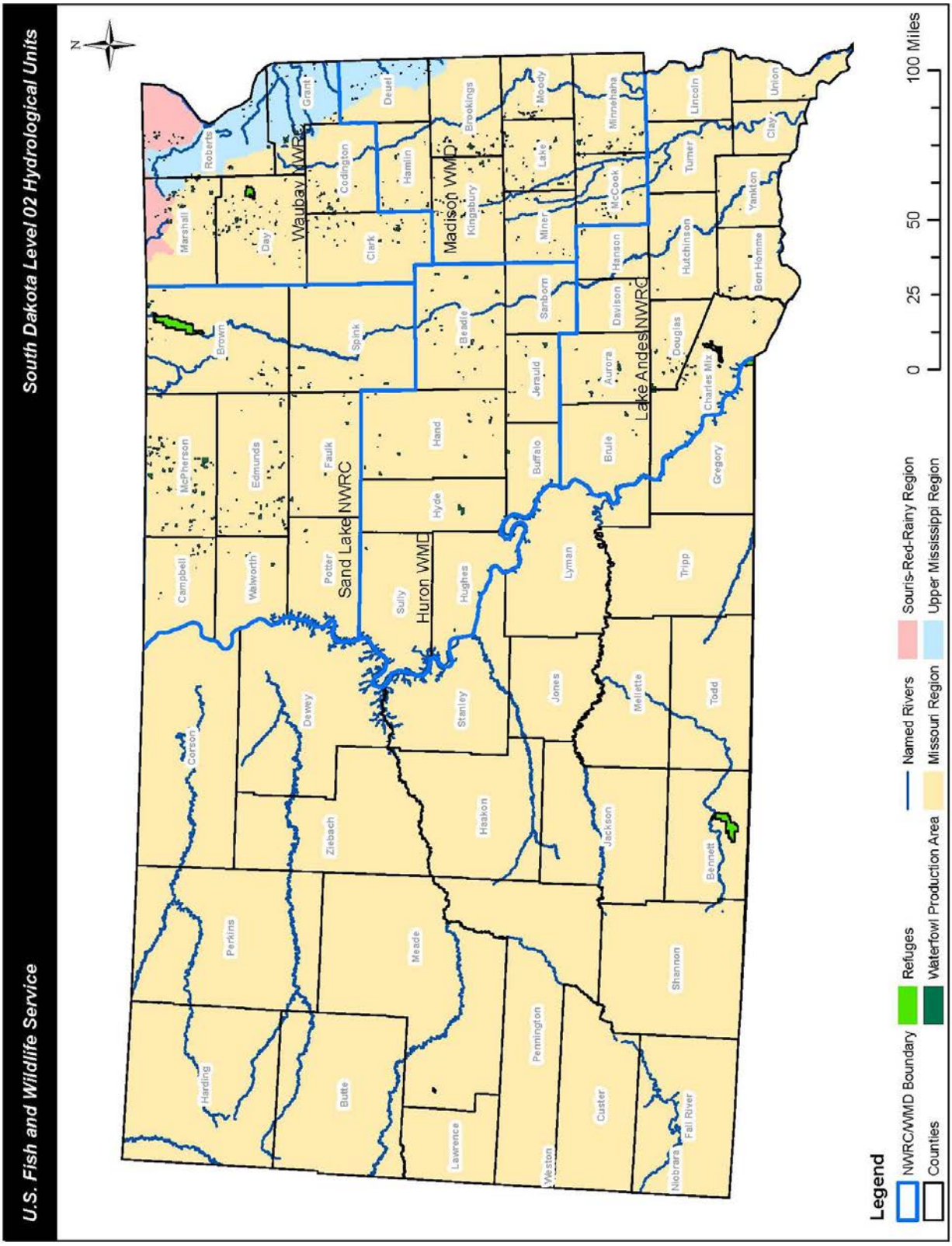
The James River flows through the Refuge north to south. The river was impounded by the Works Progress Administration (WPA) in the late 1930s to create two lakes: Sand Lake (6,100 acres) and Mud Lake (5,300 acres). Other smaller impoundments also are located on the Refuge to provide additional wetlands habitat. The WMD predominantly lies between the James River and the impoundment of Lake Oahe on the Missouri River. Wetlands in the Prairie Pothole Region often do not receive or contribute to channelized surface flow.

**Waubay NWR Complex**

The National Wetland Inventory has identified 348,482 wetland acres in the Waubay WMD. These include ponds ranging from 0.1 acre with temporary water regimes to large glacial lakes to major rivers and smaller tributaries. The eastern edge of the WMD is bordered by Big Stone Lake, an impoundment of the Minnesota River, and Lake Traverse, an impoundment of the Red River of the North. The Red River of the North is part of the Hudson Bay drainage. The Big Sioux River drains the south-central portion of the WMD and empties into the Missouri River in southeastern South Dakota. The Big Sioux is a typical prairie river, often flooding in spring and drying up in summer. When wet, however, the Big Sioux offers tremendous benefits to many species of wetland-dependent plants and animals.

The Hudson Bay drainage and Mississippi/Missouri River drainage are distinct drainages; and as such, have distinct species. Therefore, care must be taken to avoid contamination between the drainages.

**Figure 10. South Dakota Level 02 Hydrological Units**



### 3.6.1.2 **Soils**

The soils in the counties comprising the five administrative units have been inventoried and detailed soil mapping is available. The soil associations vary greatly according to the physiographic regions. The soils are derived from parent materials that include glaciolacustrine sediments, early Wisconsin glacial drift, middle Wisconsin glacial till, and late Wisconsin glacial drift (loess). Living organisms play an important part in soil formation. The tall and mid prairie grasses have influenced soil formation more than any other living organisms. As a result of these grasses, the surface layer of many soils has a moderate or high content of organic matter.

The Coteau du Prairie was developed under the stagnant-ice conditions of the Middle Wisconsin age. The features of the stagnant ice-wall lakes with the associated collapse features are fairly common and are easily seen on aerial photographs (Clayton and Treers 1967). The principal associations in the Coteau du Prairie are the Egan-Viborg-Wentworth-Whitewood-Worthing. They are generally deep, silty, and well drained with areas of poorly drained depressions.

The Lake Dakota Plain extends into the western counties of Marshall and Day and is a plain of lacustrine material. Lacustrine deposits are alternating levels of clay and sandy sediments. The primary soil associations are the Great Bend-Beotia and Harmony- Aberdeen-Nahon associations. Soils are generally silty and moderately well drained, but there are areas with poor drainage.

The James River Lowland is a subdivision of the Central Lowlands physiographic region and consists of nearly level to undulating glacial till plain with loamy soils that are moderately well drained. The James River Basin consists of level to rolling loamy soils that are also moderately well drained. The principle associations in this region are the Niobell-Noonan, Williams, Barnes-Svea, and Bryant. The drainage systems of these associations are poorly defined and many terminate to form small basins.

The Missouri Coteau consists of relief that is undulating to hilly. The landscape is characterized by many potholes or depressions. The drainage pattern is poorly defined except near the Missouri River where the level to moderately sloping silty Highmore soils predominate.

The Minnesota River-Red River Lowland extends into the eastern half of Roberts and Grant counties on a plain of lacustrine silts. Principal associations include Heimdal-Svea-Sisseton, Poinsett-Eckman-Heimdal, and Forman-Aastad. Soils are moderately well drained, nearly level to sloping silty or loamy.

**Figure 11. Physiographic Provinces and Sections in South Dakota**

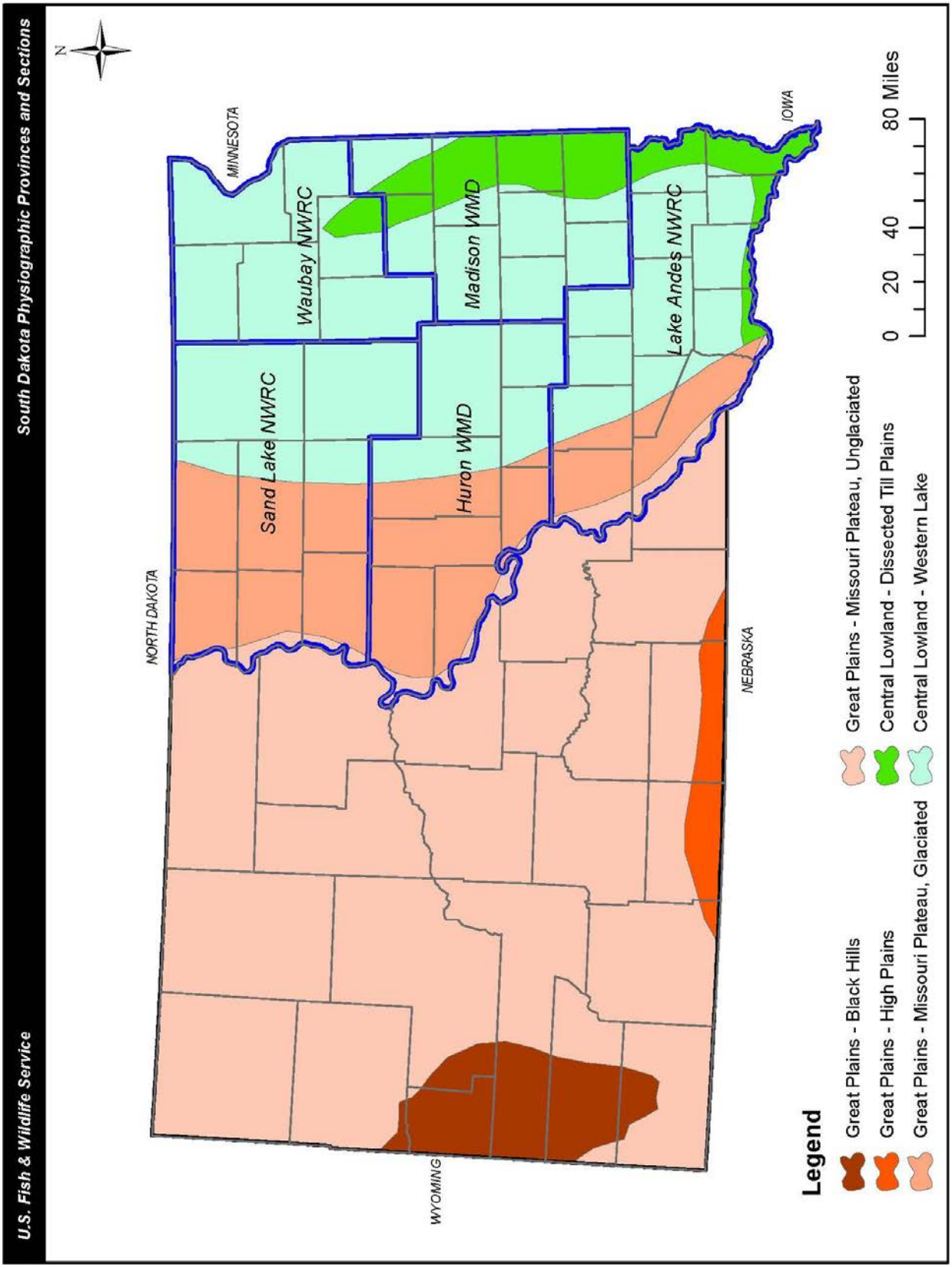


**Figure 12. Physiographic Regions of South Dakota**

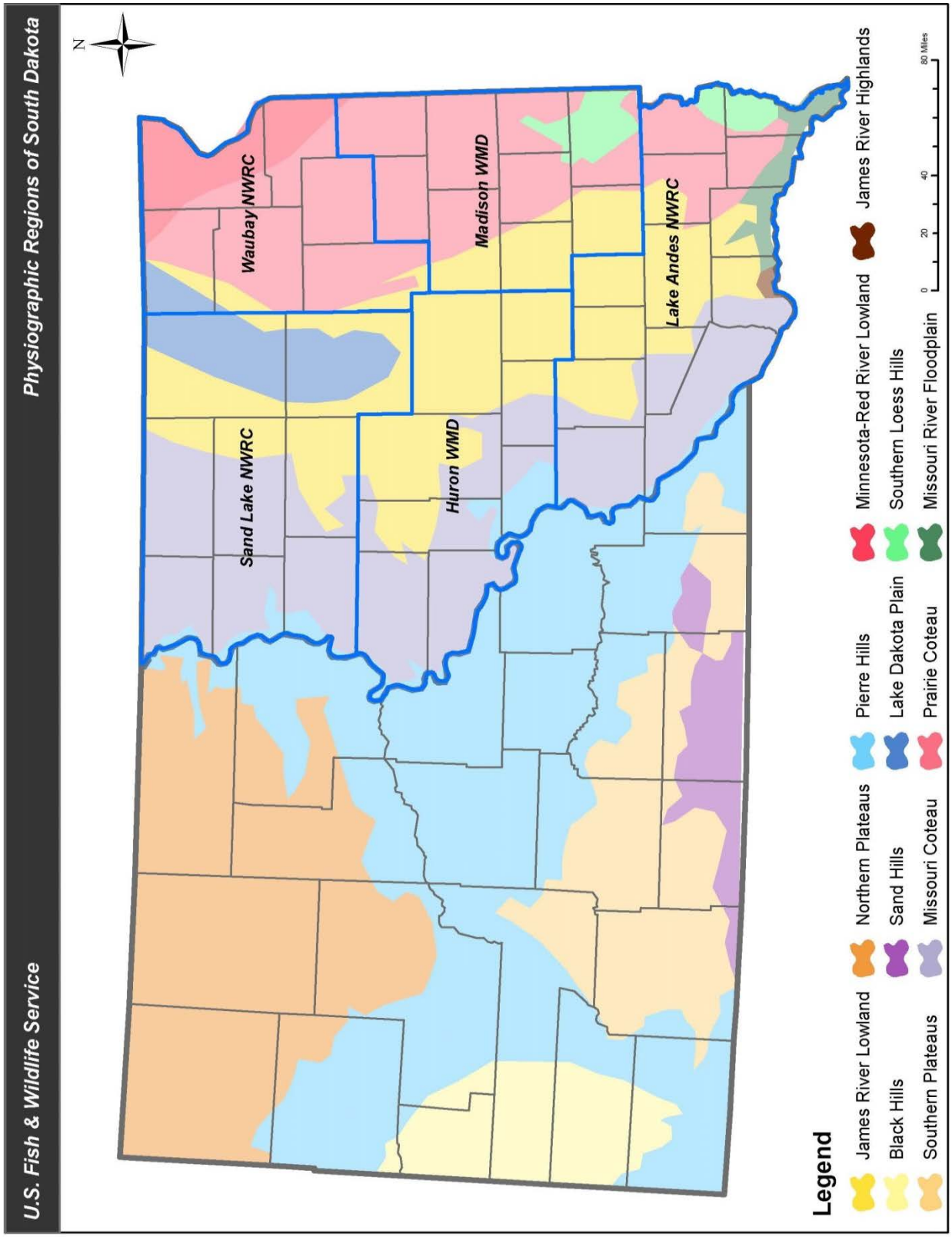
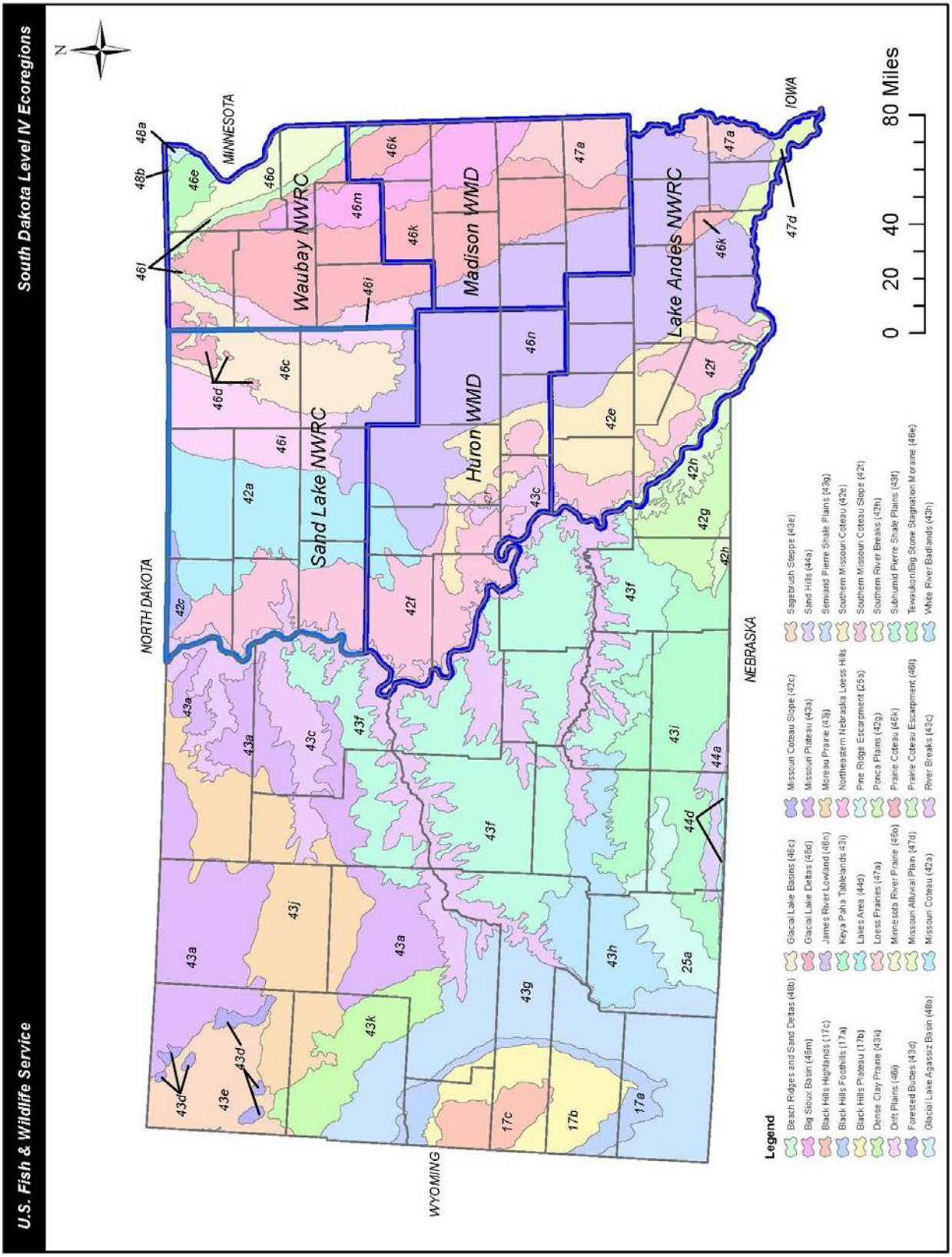


**Figure 13. Level IV Ecoregions of South Dakota**



## 3.6.2 Environmental Consequences

### 3.6.2.1 Effects of Alternative A on Water and Soil

**Prescribed Fire**

Prescribed fires are usually low-severity fires by design because they are conducted when fuel loads, fuel moisture, and weather conditions are favorable for a low-intensity fire (Neary et al. 2005). Wildfires, on the other hand, are usually high-severity fires because they typically occur when temperature, wind speed, and fuel loading are high, and humidity and fuel moisture are low (Neary et al. 2005). Due to these burning conditions, wildfires often have greater effects on ecosystems than do prescribed fires.

**Water**

Fire can have either beneficial or adverse effects on the physical, chemical, and biological structure of aquatic systems. The effects of fire on water quality are dependent upon the fire size, intensity, and severity. Low-intensity fires have had little effect on stream water quality (Neary et al. 2005). Even where sedimentation and dissolved nutrients increase in stream water in response to burns, the amounts are often negligible.

Fire effects also depend on the proximity of fires to streams and other water sources as well as the timing of fires in relation to precipitation events. The effects of fire on aquatic ecosystems can be divided into direct and indirect effects. Direct effects may include increases in temperature, ash, nutrients, and charcoal. The indirect effects of fire may include increases in sediment deposition, turbidity, and alterations to channel morphology (Neary et al. 2005).

The main effect burning can potentially have on water quality is the potential for increased runoff of rainfall. Runoff may carry suspended soil particles, dissolved inorganic nutrients, and other materials into adjacent streams and lakes, reducing water quality and degrading fish habitat (Wade and Lundsford 1988). However, most studies indicate that adverse effects of prescribed fire on water quality are minor and of short duration (Tiedemann et al. 1979).

**Soils**

Prescribed fire is used to reduce fuel loads as well as used during site preparation to modify existing vegetation or physical site conditions to improve germination, survival, and subsequent growth of desired seedlings. One purpose of site preparation is to cause scarification, which modifies soil surface layers to loosen upper soil, to break up the organic layer, to expose mineral soil by removing undecomposed litter and humus; or to mix surface organic materials with mineral layers. The beneficial effects of scarification are improved seedbed conditions and increased root penetration and infiltration. Mixing organic materials with mineral soil increases decomposition, nutrient release, and moisture-holding capacity (Nyland 1996). Site preparation is used to produce beneficial effects by:

- enhancing conditions (forage and browse) for wildlife, and
- reducing fuels that potentially increase the risks of damage from future wildfire.

Fire may alter several physical soil properties such as soil structure, texture, porosity, wet-ability, infiltration rates, and water holding capacity. Depending on fire intensity (a measure of the rate of heat released by a fire), fire severity, and fire frequency, the extent of adverse fire effects on these soil physical properties varies considerably. In general, most fires do not cause enough soil

heating to produce significant changes to soil physical properties (Hungerford et al. 1991). This is particularly true for low-intensity prescribed fires. Even where fires do cause direct changes to soil physical properties, their indirect effects on soil hydrology and erosion will vary greatly depending on the condition of the soil, forest floor, topography, and climate.

The long-term adverse effects of fire on soil physical properties range from a single season to many decades depending on the fire severity, rate of recovery as influenced by natural conditions, post-fire use, and restoration and rehabilitation actions. Persistent soil degradation following fire is more common in the cold and/or arid climates typical of the western United States.

The use of prescribed fire on Service lands in Eastern South Dakota would result in no effect or negligible adverse effects on soil properties.

## Mechanical Treatments

### Water and Soils

The use of chainsaws and other hand-held equipment to remove fuels or invasive plants would not result in adverse effects on soils or water quality.

Fire breaks are generally created and maintained with mechanical treatments through the use of heavy equipment to remove heavy fuel loading, mow “green” firebreaks, grade two-track roads to remove vegetation, and to remove single or small groups of trees by hand. These activities would result in temporary or short-term minor to moderate adverse effects on soils that are directly disturbed but no effects beyond the treated area. There would be no long-term adverse effects on soil compaction. There would be no adverse effects on water quality.

Mechanical treatments are often used prior to or in conjunction with prescribed fire to both remove the cut material and prevent sapling trees from encroaching onto the treated site. These types of treatments would continue in order to prevent the further encroachment of invasive plants (such as eastern red cedar) into grassland and savanna habitats and to manage the density of eastern red cedar stands to maintain a diversity of grass and forb species. These activities would result in temporary or short-term minor to moderate adverse effects on soils that are directly disturbed but no effects beyond the treated area. There would be no adverse effects on water quality.

## Chemical Treatments

### Water

Water quality usually is not affected by herbicides if adequate buffer strips are maintained around perennial streams so that direct applications to streams are avoided.

### Soils

Nyland (1996) considers the effects of herbicides on soils to be positive. Using herbicides to control competing vegetation reduces soil disturbance and erosion compared to sites preparation with machines. Off-site movement of herbicide residues is strongly affected by herbicide type and placement, application rate, mobility, and climatic events after application. The triclopyr ester in Garlon 4 Ultra® and glyphosate both have low mobility in soil. The risk of groundwater contamination from either use is relatively low.

**Wildfire Suppression**

**Water and Soils**

The effects on soils and water would be the similar to those described above for mechanical treatments.

Fire retardants and foams will not be used within 300 feet of any waterway so there is little to no potential for adverse effects on water quality.

The commonly used foams all contain surfactants, foaming, and wetting agents. The foaming agents affect the rate at which water drains from the foam and how well it adheres to the fuels. These retardants lose their effectiveness once the water has evaporated or drained from them (Adams and Simmons 1999), thus there would be no adverse effect on soils.

#### 3.6.2.2 Effects of Alternative B on Water and Soil

Effects on water quality and soils from mechanical treatments, chemical treatments, and wildfire suppression actions would be the same as described above for Alternative A.

#### 3.6.2.3 Effects of Alternative C on Water and Soil

Effects on water quality and soils for prescribed fire, mechanical treatments, chemical treatments, prescribed fire and naturally occurring wildfires managed for benefit would be the same as described above for Alternative A.

### 3.6.3 Cumulative Effects on Water and Soil

The cumulative effects of prescribed fire by other organizations have been minimal based on occurrence of treatments and would most likely continue to be an occasional project. Opportunities to collaborate on fuels reduction treatments along jurisdictional boundaries, including private property, would be actively continued as these treatments meet both the FWS objectives and meet the intent of an ecosystem-based approach to land management (NASF and CPFC 2012). All treatments conducted by the Service, in combination with other organizations, would result in temporary to short-term negligible to minor adverse cumulative effects on the fuel models. However, short- to long-term minor to major beneficial cumulative effects would result when fuel models are improved as a result of all fuels reduction treatments.

## 3.7 Air Quality

### 3.7.1 Affected Environment

Pursuant to the *Clean Air Act*, as amended in 1977, the Service has an affirmative responsibility to protect air quality related values on national wildlife refuges with special emphasis on Class I Wilderness Areas (areas in excess of 5,000 acres formally designated as Wilderness prior to August, 1977). Congress gave the Service, a federal land manager of wilderness areas, the responsibility to protect the air quality and natural resources, including visibility, of the area from man-made pollution. Polluted air injures wildlife and vegetation, causes acidification of water, degrades habitats, accelerates weathering of buildings and other facilities, and impairs visibility.

Under the *Clean Air Act*, the EPA has established primary air quality standards to protect public health. The EPA has also set secondary standards to protect public welfare. Secondary standards relate to

protecting ecosystems, including plants and animals, from harm, as well as protecting against decreased visibility and damage to crops, vegetation, and buildings (EPA 42 USC 85).

The EPA has developed National Ambient Air Quality Standards (NAAQS) for six principal air pollutants (also called "criteria pollutants"). They are ground-level ozone ($O_3$), particulate matter (PM), nitrogen dioxide ($NO_2$), sulfur dioxide ($SO_2$), carbon monoxide (CO), and lead (Pb) (EPA 40 CFR 50). South Dakota, a generally rural state, is currently one of only a handful of states that meet all the NAAQS or is "in attainment." Attainment status is based on data collected through an ambient air monitoring network, comprising various sites throughout the state. Although the data are not collected on a county-by-county basis, data collected in one county is representative of other similar areas. Despite the operation of energy facilities along South Dakota's eastern edge of the state, the state boasts some of the cleanest air in the nation.

Prescribed fire on the NWRs/WMDs complies with South Dakota Department of Environment and Natural Resources requirements. Prescribed fire activities on the NWR/WMDs meet federal and state regulations and are not violating air quality standards.

## 3.7.2 Environmental Consequences

### 3.7.2.1 Effects on Alternative A on Air Quality

**Prescribed Fire**

Particulates in the smoke can impair visibility. The amount and nature of smoke produced depends upon the size of the burn, the type of fire (head, backing, flanking), the general moisture conditions at the time of the burn, and the characteristics of the plant species burned. Higher fuel moisture causes more smoke to be produced. Smoke effects can be mitigated by burning with a light wind and unstable atmospheric conditions, which loft the smoke into the air and dissipate most ground-level smoke.

Wetlands that burn during drought conditions could cause adverse air quality for extended periods due to organic/peat types of soils burning. An example would be a prescribed burn initiated on August 23, 2011 at Agassiz NWR in Minnesota that was re-classified as a wildfire on October 24, 2011 due to smoke impacts to the local community. This fire was burning in peat soils and continued to burn into late November (Service 2011).

Prescribed fire implementation will be limited during times of poor smoke dispersion due to the potential for the formation of inversions that may affect human health. Treatments will be spread out over time and space that limits the impacts on air quality.

Given the proximity of several of the Service units to rural communities and other rural smoke receptors, smoke and its associated effects on public health and safety has the potential to create public concern. Smoke from a wildland fire may cause heath issues especially to people with respiratory conditions. Smoke is also a visibility hazard for traffic. Fire consumes grass fuels rapidly; thus, smoke production is usually of a short duration. However, fires in dry marshes or timbered areas can produce smoke for a much longer duration of time – perhaps weeks or months depending on fuels conditions.

For additional information, refer to the following:

- *Interagency Standards for Fire and Fire Aviation Operations* (USDI and USDA 2016) https://www.nifc.gov/policies/pol_ref_redbook.html
- *Smoke Management Guide for Prescribed and Wildland Fire* (NWCG 2001) http://www.fs.fed.us/pnw/pubs/journals/pnw_2001_ottmar001.pdf
- *Principles of Smoke Dispersion from Prescribed Fires in Northern Rocky Mountain Forest* (Beaufait and Cramer 1969, rev. 1972). This publication covers the subject well but is confined to the Northern Rocky Mountains.
- Other useful publications can be found at the NIFC Smoke Management website: http://www.nifc.gov/smoke/

*Smoke from prescribed fire, Sand Lake NWR. USFWS*

**Mechanical and Chemical Treatments**

Mechanical and chemical treatments would not contribute to non-attainment of NAAQS.

**Wildfire Suppression**

Wildfires are exempt from the Clean Air Act as a wildfire is an unplanned event. However, the effects of smoke on both the public and firefighters is a factor in considering wildfire suppression strategies and tactics.

### 3.7.2.2 Effects of Alternative B on Air Quality

**Mechanical and Chemical Treatments**

Effects of mechanical and chemical treatments would be same as Alternatives A.

**Wildfire Suppression**

Effects of wildfire suppression would be same as Alternative A.

#### 3.7.2.3 Effects of Alternative C on Air Quality

**Prescribed Fire**

The increased use of prescribed fire would lead to an increase in smoke production over current levels. However, this increase would not contribute to non-attainment of the NAAQS. Fuels within eastern South Dakota are mostly fine grass fuels and have rapid combustion rates which leads to rapid smoke dispersion.

**Mechanical and Chemical Treatments**

Effects of mechanical and chemical treatments would be same as Alternative A.

**Wildfire Suppression**

Allowing naturally occurring wildfires to be managed for fuels reduction and habitat management (benefits) could also increase smoke production and duration. The potential increase in smoke from wildfires managed for resource management is not anticipated to negatively affect air quality standards as natural occurring wildfires are rare in eastern South Dakota.

### 3.7.3 Cumulative Effects on Air Quality

Weather patterns and operational constraints limit total prescribed fire operations on Service and private lands. As a result, the total volume of particulates being generated at a given time would have no negative cumulative effects.

## 3.8 Cultural Resources

Federal legislation, such as the *National Historical Preservation Act* and the *Archaeological Resources Protection Act*, have been established to protect cultural resources due to recognition of the fragility of cultural resources and the concern of members of the general public, agency officials, tribal members, lawmakers, and researchers. The legislation regulates the ways that cultural resources are identified, evaluated, and managed. Both wildfire suppression plans and prescribed fire plans are required to include provisions to determine the effect their activities will have on significant cultural resources and mitigate adverse effects to historic properties.

The Region 6 “Cultural Resource Review Procedures for Projects” will be followed. Service staff will complete the Region 6 “Request for Cultural Resource Review for Prescribed Burns and Mechanical Fuels Reduction” (Appendix D) form prior to implementation of any fuels reduction actions.

Cultural resources are nonrenewable so their protection is a crucial component of fire management and a concern for resource managers before, during, and after a fire. Resource advisors (typically an archaeologist), with the assistance of fire personnel, protect cultural resources to preserve their value as markers of social identity and scientific data.

## 3.8.1 Affected Environment

Several cultural resources have been recorded on the Service lands within this EA although there have only been limited efforts to identify sites and properties. Documented occupation of the area spans a 10,000-year period. The probability that additional significant cultural resources are present on some of the thousands of acres of native prairie is good.

All fuels treatments — prescribed burning and non-fire activities — integrate the process for section 106 of the *National Historic Preservation Act* (NHPA) into all applicable 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. On occasion, the fire staff has been requested to notify the cultural resource staff once a project has been completed because additional surveys are needed to further identify unknown sites.

It is possible that some large cultural resources that maybe encountered could include teepee rings, homesteads remains, wagon train remnants, Army fort / military outpost remnants and soldier remnants, unmarked grave sites, and buffalo jump sites, just to name a few. The people who passed through or used the resource of these lands over thousands of years left evidence of their occupation. Within the past 150 years, fur trade and pioneer migration west brought Europeans through the region, resulting in the eventual establishment of trading centers, Army forts and outposts, private land ownership, and communities. Smaller cultural resources that maybe found underneath or below the sod layer may include stone tools, and European settlement articles that may have been dropped or abandon (examples include arrowheads, shards of pottery, buttons, coins, and other miscellaneous items).

## 3.8.2 Environmental Consequences

### 3.8.2.1 Effects of Alternative A on Cultural Resources

The potential for adverse effects is minimal because the Regional Historical Preservation Offices (RHPO) will be consulted during the planning phase of any proposed project. The RHPO will determine the need for a cultural resource inventory in consultation with the South Dakota Historic Preservation Office, and the appropriate Service manager will be contacted immediately if previously unrecorded cultural resources are discovered during any vegetation treatments. The cultural resources will be recorded, delineated, and protected. Any damage to a cultural resource could potentially be a permanent major adverse effect.

**Prescribed Fire**

There is the potential for adverse effects on cultural resources during prescribed fire if those resources have not been marked and documented prior to the burn. Known cultural resources are fragile and highly susceptible to vandalism. Old homesteads and other wooden structures are particularly susceptible to fire.

**Mechanical Treatments**

These treatments pose the greatest threat to cultural resource that have not been marked or documented prior to implementing the treatment. The use of heavy pieces of equipment and steel tracked equipment with implement attachments (such as mowers, choppers, grinders, and loaders) can physically damage large artifacts. Likewise, the use of this heavy equipment adjacent to wetlands can result in soil compaction and the breaking of the sod layer, resulting in damage to smaller artifacts below the sod layer.

**Chemical Treatments**

Chemical treatments will not impact the soil or physical arrangement of the soil. They would target changing the vegetative species composition, with a goal of removing non-native plants and returning the environment to a more natural state comprised of native species. Chemical treatments will follow the same cultural review processes as other treatments.

**Wildfire Suppression**

Wildfire suppression activities have potential to damage and/or destroy cultural resources. Heat from fire itself can scald artifacts on or near soil surface. However, fires in grasslands have rapid combustion rates and usually do not approach temperatures were scalding and cracking occurs. In addition, most of these areas already have a history of fire so artifacts on soil surface have already been exposed to wildland fires. Of greater threat in wildfire suppression activities is the use of tactics which disturb soil (such as hand or mechanical lines). These activities can damage or destroy cultural artifacts. To reduce potential damage to cultural resources, maps and/or cultural resource specialist should be consulted prior to implementing suppression tactics that involve soil disturbance.

### 3.8.2.2 Effects of Alternative B on Cultural Resources

**Mechanical and Chemical Treatments**

Effects would be the same as described above for Alternative A.

**Wildfire Suppression**

Effects would be the same as described above for Alternative A.

### 3.8.2.3 Effects of Alternative C on Cultural Resources

**Prescribed Fire**

Alternative C proposes treating more areas with prescribed fire that have not had fire occurrence. This creates a greater potential to adversely affect cultural resources during prescribed fire if those resources have not been marked and documented prior to the burn.

**Mechanical and Chemical Treatments**

Effects would be the same as described above for Alternative A.

**Wildfire Suppression**

Alternative C proposes allowing naturally caused wildfires to be managed for fuels reduction or habitat management. This creates a greater potential to adversely affect cultural resources if those resources have not been marked and documented prior to the wildfire.

## 3.8.3 Cumulative Effects on Cultural Resources

There would be no cumulative adverse effects from fuels reduction treatments when considered with present or future fuels reduction treatments that may be conducted on lands adjacent to Service lands.

# 3.9 Service Values

## 3.9.1 Affected Environment

The purpose and need section in Chapter 1 explains that there is a need to protect significant values and assets on Service lands. The estimated replacement cost of government-owned facilities is $81,426,273 ($29,067,398 for buildings and $52,358,875 for fencing). The table below lists the Service assets.

**Table 13. Building Assets**

| Description | Building Type | Replacement Cost | Size (Square Feet) |
|---|---|---|---|
| **Huron WMD** | | | |
| Old Shop Building on Maga Ta-Hohpi | Warehouse Equipment, Vehicle | $423,167.70 | 2,560.00 |
| Pole Barn 40'X120' on Maga Ta-Hohpi, Re-sided and re-roofed, Horse Barn. | Warehouse Equipment, Vehicle | $789,634.16 | 4,800.00 |
| Seed Shed 10'X16' on Maga-Ta Hohpi WPA. | Warehouse Seed Feed | $22,012.28 | 160.00 |
| Maga Ta-Hohpi, Cleary Storage Bldg. 40'X120' | Warehouse Equipment, Vehicle | $807,029.73 | 4,800.00 |
| Butler Storage Building at shop area on Maga Ta-Hohpi WPA. This building is used for the prescribed fire equipment storage and cache area. (Old RPI Number 13) | Warehouse Equipment, Vehicle | $967,296.68 | 5,760.00 |
| Shop building, wood working, vehicle servicing area with floor hoist, includes concrete storm shelter (Old RPI Number 71) | Service Shop Maintenance | $1,635,754.76 | 7,000.00 |
| Environmental education classroom building with 12' x 38 concrete patio. | Environmental Education Center | $153,387.58 | 988.00 |
| Fire Cache Storage Shed 12' x 16' with overhead steel door. | Warehouse Fire Cache | $29,051.96 | 192.00 |
| Gunnison vault handicapped toilet with privacy screen. East toilet located on the Maga-Ta-Hohpi WPA. (6' 6" W x 14' 7 1/2" L x 9' 6" H) | Vault Toilet/Pit Toilet | $45,195.11 | 105.00 |
| Gunnison vault handicapped toilet with privacy screen. West toilet located on the Maga-Ta-Hohpi WPA. (6' 6" W x 14' 7 1/2" L x 9' 6" H) | Vault Toilet/Pit Toilet | $45,195.11 | 105.00 |
| Bunkhouse on Maga Ta-Hohpi WPA (28' x 50') | Dorm / Bunkhouse / Barrack | $289,926.00 | 1,400.00 |
| Public Use Shelter (metal bldg on concrete slab) at the western end of the trail on the Maga-Ta-Hohpi WPA. Concrete aprons along east (15' x 18') and west (19' x 18) side. | Environmental Education Center | $115,880.27 | 728.00 |
| | **Totals for Huron WMD** | **$5,323,531.34** | **28,598.00** |
| **Lake Andes NWR** | | | |
| Maintenance shop concrete/brick — includes tornado shelter | Service Shop Maintenance | $804,958.34 | 6,100.00 |
| Pole/Metal Siding — dirt floor | Warehouse Equipment, Vehicle | $319,720.53 | 3,058.00 |
| Wood Frame/ Metal Exterior/ Concrete/ Floor — 40'X152' known as "west storage building" 6 | Warehouse Equipment, Vehicle | $635,678.41 | 6,080.00 |
| Pre-fabricated vault toilet in picnic area | Vault Toilet/Pit Toilet | $20,523.39 | 45.00 |
| Wood Frame/Metal Roof 1800 SQ FT. three-sided with open side facing south | Warehouse Equipment, Vehicle | $188,194.50 | 1,800.00 |

| Description | Building Type | Replacement Cost | Size (Square Feet) |
|---|---|---|---|
| | **Totals for Lake Andes NWR** | **$1,969,075.17** | **17,083.00** |
| **Lake Andes WMD** | | | |
| Wood Frame/Asphalt Roof LA detached Quarters Garage | Garage Detached | $28,526.55 | 488.00 |
| Headquarters Office/Visitor Center, Wood Frame/Cedar | Office | $692,072.30 | 3,050.00 |
| Wood Frame/Tin Roof/3-Car Headquarters Garage | Warehouse Equipment, Vehicle | $98,383.86 | 941.00 |
| Wood Frame/Siding/Asphalt Roof La Quarters #27 w/attached garage. Built by Corps of Engineers in 1947 and later moved to Refuge headquarters site, includes septic system | Dorm / Bunkhouse / Barrack | $415,717.11 | 2,512.00 |
| 45'X 31.5', Open End, Pole Const, W/Metal Siding & Roof (Hubers) | Warehouse Equipment, Vehicle | $148,254.99 | 1,418.00 |
| Quonset 20' X 36' Metal (Hubers) | Warehouse Equipment Vehicle | $75,277.16 | 720.00 |
| 33' X 49' Dairy Barn Wood/Gable Roof (Hubers), including a (50' x 53') and (33' x 16.5') loafing shed addition (previous SAMMS# 10031354) with cement floor. Includes open face area. | Barn Stable | $536,980.91 | 5,136.00 |
| Quarters Residence at Black Thunder, Wood/Metal, 3 Bedroom, Full Poured Unfinished Basement, with Attached 2-car garage, includes septic system | Housing, Single Family | $563,985.87 | 3,806.00 |
| | **Totals for Lake Andes WMD** | **$2,559,198.75** | **18,071.00** |
| **Madison WMD** | | | |
| Main WMD Office Wood Siding with basement Payne WPA | Office | $1,465,100.65 | 5,870.00 |
| Building - Shop (Steel) Payne WPA, include 1000 gallon propane tank | Service Shop Maintenance | $384,164.12 | 2,520.00 |
| Storage Building - Eddies\Steel Siding Payne WPA, Cold Storage | Warehouse Equipment, Vehicle | $159,736.02 | 1,440.00 |
| Storage Building - Large Pole Building Payne WPA Carpentry Shop | Warehouse Equipment, Vehicle | $463,391.91 | 3,200.00 |
| Storage Building - Oil Storage, Steel Payne WPA | Warehouse Chemical | $26,622.13 | 240.00 |
| Storage Building - POLE BUILDING Payne WPA North Building | Warehouse Equipment, Vehicle | $199,670.29 | 1,800.00 |
| Storage Building - Chemical Storage Building Payne WPA | Warehouse Chemical | $37,984.09 | 240.00 |
| Storage Building - Seed Storage Building Payne WPA | Warehouse Seed Feed | $79,867.47 | 720.00 |
| Storage Building - Utility Bldg #2 Pearson Life Use Estate, Pearson WPA | Warehouse Equipment, Vehicle | $106,490.68 | 960.00 |
| House - Daryl Pearson House Life Use Estate | Housing, Single Family | $344,157.94 | 1,592.00 |
| Restrooms – Karl E. Mundt Public Restrooms - 2 units | Vault Toilet/Pit Toilet | $50,703.63 | 71.00 |
| House - Daniel Johnson House Life Use Estate | Housing, Single Family | $16,529.89 | 702.00 |
| House - Stan Hansen House Life Use Estate | Housing, Single Family | $16,529.89 | 900.00 |
| Storage Building - Barn Stan Hansen Life Use Estate | Warehouse Equipment, Vehicle | $16,529.89 | 1,000.00 |
| Storage Building - Barn Daniel Johnson Life Use Estate 30'x30' | Warehouse Equipment, Vehicle | $16,529.89 | 900.00 |

| Description | Building Type | Replacement Cost | Size (Square Feet) |
|---|---|---|---|
| Storage Building - Storage Shed Daniel Johnson Life Use Estate 25x48 | Warehouse Equipment, Vehicle | $16,529.89 | 1,200.00 |
| Storage Building - Cold Storage West Building, Payne WPA | Warehouse Equipment, Vehicle | $665,566.21 | 6,000.00 |
| Building - Machine Shed at Bjornlie WPA (Metal Bldg./Pole framed 36' x 64') | Warehouse Equipment, Vehicle | $16,529.89 | 2,304.00 |
| AUC - Environmental Education Facility - Payne WPA | Environmental Education Center | $0.00 | 0 |
| | **Totals for Madison WMD** | **$4,082,634.48** | **31,659.00** |
| **Sand Lake NWR** | | | |
| Wood Frame, Granary (South Site) | Warehouse Seed Feed | $23,366.30 | 1,936.00 |
| Cinderblock, Manager's Residence Q-17, includes a 500 gallon propane tank | Housing, Single Family | $289,090.67 | 1,468.00 |
| Cinderblock, Refuge/Office of Law Enforcement Storage Bldg. (Formerly old office, shop with bunkroom,Q-18) | Warehouse Equip Vehicle | $466,615.18 | 4,303.00 |
| Cinderblock, W/Metal Siding, Birdhouse, Q-19, bunkhouse | Dorm / Bunkhouse / Barrack | $208,512.33 | 1,040.00 |
| Wood Framed/7-Stall, Garage with an additional stall converted to a storage area | Warehouse Equip Vehicle | $242,037.01 | 2,232.00 |
| Wood/Concrete, Sign and Lumber | Warehouse | $100,197.90 | 924.00 |
| Cinderblock, Pumphouse, HQ | Pump House Well House | $26,218.74 | 108.00 |
| Steel/Aluminum/6-Stall, Garage | Warehouse Equip Vehicle | $242,904.82 | 2,240.00 |
| Steel, 2 Stall Garage, (realty) | Warehouse Equip Vehicle | $138,802.30 | 1,280.00 |
| Toilet, Concrete Block, Rec Area | Comfort Station/Restroom | $247,377.39 | 432.00 |
| Biological Equip. Storage Building, Steel | Animal Shelter | $139,709.32 | 903.00 |
| Steel, Fire Cache | Warehouse Fire Cache | $373,097.88 | 2,500.00 |
| Oil and Seed Storage Building, Steel | Warehouse Chemical | $81,329.60 | 750.00 |
| Wood Frame/2-Stall, Garage, Q-17 | Garage Detached | $42,786.65 | 576.00 |
| Wood Frame, Q-194 - South Site | Housing, Single Family | $548,935.32 | 2,688.00 |
| Wood Frame, Q-195 (north site) | Housing, Single Family | $548,935.32 | 2,688.00 |
| Wood Frame, Q-196 | Housing, Single Family | $548,935.32 | 2,688.00 |
| Wood Frame, Hqtrs | Office | $1,647,736.28 | 9,274.00 |
| Heavy Equipment Storage Building | Warehouse Equip Vehicle | $650,636.78 | 6,000.00 |
| Butler Building 48x90x15, North Site | Warehouse Equip Vehicle | $468,458.70 | 4,320.00 |
| Model 1FR Firerated Hazardous Chemical Storage Unit, 16'6" x 8'6" wide x 9'0" high | Warehouse Chemical | $21,660.34 | 140.00 |
| Maintenance Shop | Service Shop Maintenance | $820,948.41 | 6,600.00 |
| North Garage/Shop Storage Building | Garage Detached | $130,728.29 | 1,080.00 |
| Detached Garage (26' x 32') located at Qtrs. 196; (Wood frame, steel siding, two overhead doors and one walk through door). | Garage Detached | $90,221.76 | 832.00 |
| Detached garage located at Q-194 South Site, Wood Framed w/steel siding, 30' x 50', 3 Bay and one walk through door. | Bld Garage Detached | $162,659.20 | 1,500.00 |
| Realty Parking Garage | Warehouse Equip Vehicle | $345,416.00 | 1,500.00 |

| Description | Building Type | Replacement Cost | Size (Square Feet) |
|---|---|---|---|
| | **Totals for Sand Lake NWR** | **$8,607,317.81** | **60,002.00** |
| **Waubay NWR** | | | |
| Refuge Residence (cinderblock) | Housing, Single Family | $539,084.78 | 2,352.00 |
| Bunkhouse (Wood) | Bunkhouse | $500,000 | 1,350.00 |
| 2 door 4-stall garage (wood frame/metal clad) | Warehouse Equip Vehicle | $208,953.81 | 1,200.00 |
| 7-stall garage with 2 stall carpenter shop (concrete block/metal clad) | Warehouse Equip Vehicle | $569,489.21 | 3,224.00 |
| Vault toilet (wood frame/wood clad) | Vault Toilet/Pit Toilet | $27,547.49 | 64.00 |
| Residence garage (wood frame/vinyl siding) | Warehouse Equip Vehicle | $96,460.45 | 551.00 |
| Pump house (wood frame/wood clad) | Pump House Well House | $10,426.29 | 64.00 |
| Morton Building (wood frame/metal clad) | Warehouse Equip Vehicle | $688,951.15 | 4,158.00 |
| Visitor Center/Headquarters (wood frame/basement) | Office | $1,566,910.31 | 5,360.00 |
| Oil shed (steel frame/steel clad/12'X20' | Warehouse Chemical | $41,656.56 | 240.00 |
| Seed storage shed (wood frame/metal clad | Warehouse Seed Feed | $57,782.25 | 420.00 |
| Chemical storage bldg. (Model 22) | Warehouse Chemical | $38,072.17 | 207.00 |
| 4 door 4-stall garage (wood frame/metal clad) | Warehouse Equip Vehicle | $351,235.68 | 2,048.00 |
| Maintenance Shop | Service Shop Maintenance | $2,034,003.46 | 9,100.00 |
| Concrete vault toilet | Vault Toilet/Pit Toilet | $15,495.46 | 36.00 |
| | | | |
| | **Totals for Waubay NWR** | **$6,525,640.57** | **30,374.00** |

**Table 14. Footage and Cost of Fencing**

| Location of Fencing | Replacement Cost | Size (Linear Feet) |
|---|---|---|
| **Huron WMD** | | |
| Johnson WPA fence; four strand barbed wire with steel posts | $56,093.22 | 7,920.00 |
| Maga Ta-Hohpi WPA, 6' chain link fence around shop area | $107,893.06 | 3,798.00 |
| Parent Barbed Wire Fences — Jerauld County | $822,006.54 | 116,062.00 |
| Parent Barbed Wire Fences — Beadle County | $2,665,858.88 | 376,402.00 |
| Parent Barbed Wire Fences — Hand County | $1,539,844.03 | 217,416.00 |
| Parent Barbed Wire Fences — Buffalo County | $280,466.12 | 39,600.00 |
| Parent Barbed Wire Fences — Hughes County | $149,581.92 | 21,120.00 |
| Parent Barbed Wire Fences — Hyde County | $654,420.96 | 92,400.00 |
| | **$6,276,164.73** | **874,718.00** |
| **Lake Andes NWR** | | |
| Lodgepole Pine /2-Rail Fence — Environmental Ed Area | $11,705.40 | 480.00 |
| Parent Barbed Wire Fences — Lake Andes NWR | $209,079.64 | 46,992.00 |
| | **$220,785.04** | **47,472.00** |
| **Lake Andes WMD** | | |
| Barbed Wire/3-Strand/Steel Posts — Anderson WPA | $21,164.45 | 5,280.00 |
| Barbed Wire/3-Strand/Steel Posts — Collar WPA | $55,888.60 | 13,992.00 |
| Pine Logs/Wood Posts— Headquarters 2-Rail Split Rail Fence | $21,862.73 | 792.00 |
| Parent Barbed Wire Fences — Brule County | $270,541.19 | 67,760.00 |
| Parent Barbed Wire Fences — Douglas County | $1,167,883.68 | 289,678.00 |
| Parent Barbed Wire Fences — Davison County | $122,374.22 | 30,584.00 |
| Parent Barbed Wire Fences — Hanson County | $415,996.73 | 103,328.00 |
| Parent Barbed Wire Fences — Hutchinson Coutny | $228,812.79 | 57,200.00 |
| Parent Barbed Wire Fences — Lincoln County | $61,266.57 | 15,312.00 |
| Parent Barbed Wire Fences — Turner County | $247,001.07 | 58,168.00 |
| Parent Barbed Wire Fences — Aurora County | $1,244,614.46 | 307,644.00 |
| Parent Barbed Wire Fences — Bon Homme County | $410,851.54 | 102,784.00 |
| Parent Barbed Wire Fences — Charles Mix County | $1,209,916.20 | 299,168.00 |
| Parent Barbed Wire Fences — Yankton County | $127,233.34 | 29,920.00 |
| | **$5,605,407.57** | **1,381,610.00** |
| **Madison WMD** | | |
| Parent Barbed Wire Fences — Hamlin County | $770,954.68 | 168,765.00 |
| Parent Barbed Wire Fences — Kingsbury County | $1,841,167.70 | 403,015.00 |
| Parent Barbed Wire Fences — Lake County | $1,923,692.12 | 420,962.00 |
| Parent Barbed Wire Fences — McCook County | $1,183,673.19 | 259,018.00 |
| Parent Barbed Wire Fences — Miner County | $605,547.74 | 132,528.00 |
| Parent Barbed Wire Fences — Minnehaha County | $1,407,509.23 | 308,280.00 |
| Parent Barbed Wire Fences — Moody County | $915,283.96 | 200,446.00 |
| Parent Barbed Wire Fences — Deuel County | $1,046,539.36 | 229,092.00 |
| Parent Barbed Wire Fences — Brookings County | $1,675,750.14 | 367,086.00 |
| | **$11,370,118.12** | **2,489,192.00** |
| **Sand Lake NWR** | | |
| Parent Barbed Wire Fences — Sand Lake NWR | **$1,238,527.34** | **278,707.00** |

| Location of Fencing | Replacement Cost | Size (Linear Feet) |
|---|---|---|
| **Sand Lake WMD** | | |
| Parent Barbed Wire Fences — Campbell County | $519,489.74 | 124,917.00 |
| Parent Barbed Wire Fences — McPherson County | $4,470,383.79 | 1,009,945.00 |
| Parent Barbed Wire Fences — Walworth County | $151,416.60 | 34,023.00 |
| Parent Barbed Wire Fences — Edmunds County | $1,960,595.19 | 471,830.00 |
| Parent Barbed Wire Fences — Spink County | $833,788.36 | 201,562.00 |
| Parent Barbed Wire Fences — Brown County | $1,169,582.15 | 271,240.00 |
| Parent Barbed Wire Fences — Potter County | $113,523.78 | 26,152.00 |
| Parent Barbed Wire Fences — Faulk County | $572,395.37 | 138,830.00 |
| | **$9,791,174.98** | **2,278,499.00** |
| **Waubay NWR** | | |
| Cedar split rail fence (Staunton Memorial site) Currently flooded. | $12,259.72 | 600.00 |
| Predator fence, currently flooded. | $26,204.47 | 935.00 |
| Parent Barbed Wire Fences | $1,166,739.08 | 164,736.00 |
| | **$1,205,203.27** | **166,271.00** |
| **Waubay WMD** | | |
| Fence, Ash-Moe, Clark County, Barbed wire 4 strand | $35,745.26 | 5,047.00 |
| Fence, Lardy, Day County, Barbed wire 4 strand | $176,495.33 | 24,920.00 |
| Fence, Jensen, Grant County, Barbed wire 4 strand | $53,685.18 | 7,580.00 |
| Fence, Loehrer, Grant County, Barbed wire 4 strand | $48,160.85 | 6,800.00 |
| Fence, Likness, Marshall County, Barbed wire 4 strand | $18,612.75 | 2,628.00 |
| Fence, Buffalo Lake, Marshall County, Barbed wire 4 strand | $70,010.28 | 9,885.00 |
| Parent Barbed Wire Fences — Clark County | $2,038,053.86 | 287,760.00 |
| Parent Barbed Wire Fences — Codington County | $3,007,524.70 | 424,643.00 |
| Parent Barbed Wire Fences — Marshall County | $4,491,813.77 | 621,543.00 |
| Parent Barbed Wire Fences — Grant County | $1,955,486.34 | 276,102.00 |
| Parent Barbed Wire Fences — Roberts County | $1,863,421.20 | 269,703.00 |
| Parent Barbed Wire Fences — Day County | $2,892,484.01 | 404,590.00 |
| | **$16,651,493.53** | **2,341,201.00** |

## 3.9.2 Environmental Consequences

### 3.9.2.1 Effects of Alternative A on Service Values

There would be no adverse effects on Service assets under this alternative. The treatments would result in beneficial effects by reducing fuel loads and creating fuels breaks and buffers to protect Service assets and the natural and cultural resources.

### 3.9.2.2 Effects of Alternative B on Service Values

Alternative B would not offer the same level of fuels reduction and protection of assets that would be realized under Alternative A. There would still be some potential for damage to or loss of Service assets in the absence of the full suite of fuels reduction methods; but mechanical and chemical treatments, even without prescribed fire, would still be effective in reducing hazardous fuels. Depending on the extent of damage or loss, adverse effects could range from minor to major and both short and long term.

Suppression efforts would still be conducted to protect assets which would result in long-term beneficial effects.

#### 3.9.2.3 Effects of Alternative C on Service Values

Alternative C would offer an increased level of fuels reduction and protection of assets than that realized under Alternative A. An increased use of prescribed fire would provide better protection of Service assets. Suppression efforts would be more effective due to defensible space maintained around the assets.

### 3.9.3 Cumulative Effects on Service Values

There would be no cumulative adverse effects from treatments on the five administrative units when considered with present or future fuels reduction treatments that may be conducted on lands adjacent to Service lands. There would be beneficial cumulative effects when fuels reduction treatments are conducted on and off refuge. These treatments would complement each other to increase effectiveness of all treatments.

## 3.10 Recreation and Public Use

### 3.10.1 Affected Environment

Wildlife observation and photography, hunting, fishing, environmental education, and interpretation are six priority public uses of the National Wildlife Refuge System. These uses have been found to be appropriate uses and shall receive priority consideration in refuge planning and management (*Refuge Improvement Act of 1997*). The five Service units within the Great Plains Zone offer each of these public uses.

#### 3.10.1.1 Wildlife Observation and Photography

Visitor counts for the five WMDs/NWRs estimate that wildlife observation is one of the most popular public uses. Most wildlife observation activities occur year-round and vary from watching eagles fishing along the Missouri River near the Karl E. Mundt NWR, observing migratory waterfowl in the spring and the fall, ice fishing at Waubay Lake, to taking the auto tour route at Sand Lake NWR. Much of the optimum wildlife watching opportunities occur adjacent to rivers and lakes and along woodland edges near river bottoms.

#### 3.10.1.2 Hunting and Fishing

Hunting is the most popular public use on Service lands in eastern South Dakota. Hunting season is usually between September 1 and mid-February. Hunting is permitted for select game species in accordance with state regulations. The most common hunted species are whitetail deer, ducks, geese, pheasants, sharp-tailed grouse, prairie chickens, and cottontail rabbits. Other species open to hunting include red fox, raccoon, jackrabbits, coot, mourning doves, and coyotes. Certain areas are closed to hunting to protect refuge facilities and provide resting and feeding habitat for migratory birds. Most WPAs are open to hunting and fishing.

Fishing primarily focuses on perch, bluegill, small and largemouth bass, crappie, walleye, and northern pike. The South Dakota Game, Fish, and Parks stocks fish in many of the South Dakota lakes, like Waubay Lake, that will not winter kill. Fishing at all of the refuges is subject to state regulations.

#### 3.10.1.3 Environmental Education and Interpretation

Environmental education is usually conducted while touring the NWRs and WMDs with school, scout, and civic groups. The demand for these tours and education outreach programs, such as Prairie Fest at Huron WMD, Blue Goose Days at Sand Lake, 1-2-3 to the Refuge at Waubay, and water festivals at Madison WMD and Lake Andes is continual. Other educational and interpretation items found at the NWRs and WMDs include interpretive kiosks, trails, visitor viewing areas, observation platforms, and dedicated indoor space for interpretive exhibits.

#### 3.10.1.4 Other Public Uses

Other public uses include Global Positioning System (GPS) navigation courses, hiking, picnicking, backpacking, and non-motorized boating.

More than 90% of all refuge boating is non-motorized. The lack of motorized boats provides solitude for visitors and wildlife and promotes excellent wildlife viewing.

### 3.10.2 Environmental Consequences

#### 3.10.2.1 Effects of Alternative A on Recreation and Public Use

**Prescribed Fire**

Smoke from prescribed fire increases particulate and gaseous emissions, particularly $PM_{10}$, $PM_{2.5}$, CO, and $CO_2$. Prescribed fires could briefly reduce air quality in the immediate vicinity of the WMDs/NWRs. Any adverse effects on staff and visitors from the prescribed fires would be temporary and could range from negligible to minor because the burns would be conducted according to the mitigation measures (Table 6) and additional guidance contained in the FMP. There would be no long-term adverse effects on public health and safety under this alternative. Off-site adverse effects are expected to be negligible given the relatively small units that would be burned at one time.

*Prescribed fire operations – Donat WPA, Waubay WMD. USFWS*

Due to safety concerns, public entrance into a prescribed fire area is restricted during prescribed fire operations. These restrictions would minimally effect public use as they are temporary and generally last less than a day.

Smoke emissions during prescribed fires may temporarily reduce visibility in some locations; but, implementation of smoke management practices and plans (such as burning during favorable weather conditions when smoke is carried away from sensitive areas) and using the best available fire and

emission control measures would minimize visibility impairments. Thus, emissions can be directed away from sensitive receptors, minimizing health hazards.

Hunters would be minimally affected because the Service typically avoids prescribed burning during hunting season or conducts a very small number of treatments so fuels reduction activities would not affect hunters.

The treatments would result in beneficial effects by reducing fuel loads and creating fuel breaks and buffers to protect Service staff, visitors, and communities.

**Mechanical Treatments**

There would be no adverse effects on public health and safety from implementation of mechanical treatments. There would be long-term minor to major beneficial effects from creation and maintenance of fuel breaks and reduction of hazardous fuels in the WUI, CARs, and COIs.

**Chemical Treatments**

The triclopyr butoxyethyl ester or triclopyr BEE in Garlon 4 Ultra® has been classified by the EPA as "practically nontoxic" (the least toxic category used by EPA). Toxicological studies show no evidence that triclopyr causes cancer, birth defects, genetic damage, genetic mutation, or adverse effects on the immune system or nervous system in humans. Glyphosate has low toxicity for humans (EPA 2015.) All chemicals used will have a PUP completed before use.

**Wildfire Suppression**

Public access to wildfire operations is restricted due to safety concerns. These restrictions are temporary and would minimally effect public use.

#### 3.10.2.2 Effects of Alternatives B on Recreation and Public Use

Effects of mechanical treatments, chemical treatments, and wildfire suppression would be the same as described above for Alternative A.

#### 3.10.2.3 Effects of Alternatives C on Recreation and Public Us

Under Alternative C, the effects of prescribed fire, mechanical treatments, chemical treatments, and wildfire suppression on recreation and public use would be the same as Alternative A.

### 3.10.3 Cumulative Effects on Recreation and Public Use

There would be no cumulative adverse effects from treatments on Service lands when considered with present or future fuels reduction treatments that may be conducted on lands adjacent to Service lands.

There would be beneficial cumulative effects when fuels reduction treatments conducted on and off the WMDs/NWRs complement each other to increase the effectiveness of all treatments.

## 3.11 Short-term Uses and Long-term Productivity

The *National Environmental Policy Act* requires consideration of "the relationship between short-term uses of man's environment and the maintenance and enhancement of long-term productivity" (40 CFR

1502.16). As declared by Congress under the act, this includes using all practicable means and measures, including financial and technical assistance, in a manner calculated to foster and promote the general welfare; to create and maintain conditions under which man and nature can exist in productive harmony; and fulfill the social, economic, and other requirements of present and future generations of Americans.

Short-term uses and their effects are those that occur within the first few years of project implementation. Long-term productivity refers to the capability of the land and resources to continue producing goods and services long after the project has been implemented. Long-term productivity would be maintained through the application of the resource protection measures described in Chapter 2.

None of the proposed alternatives would affect short-term uses or alter long-term productivity of resources at any of the Service units.

## 3.12 Unavoidable Adverse Effects

Unavoidable adverse effects could occur during implementation of prescribed fires and naturally occurring wildfires managed for fuels reduction and habitat management. Some wildlife may be temporarily displaced and/or killed. There would be some unavoidable temporary negligible adverse effects such as delays or detours due to smoke on roads. These smoke impacts may affect staff, visitors, and private landowners. These management activities, which include short-term negative effects, are necessary to achieve long-term biological objectives. Table 6 presents the mitigation measures designed to minimize or eliminate potential adverse effects.

## 3.13 Irreversible and Irretrievable Commitment of Resources

An *irreversible* commitment of resources is a permanent or essentially permanent loss of nonrenewable resources, such as mineral extraction, heritage (cultural) resources, or to those factors that are renewable only over long time spans or at great expense (for example, soil productivity), or to resources that have been destroyed or removed. No irreversible commitments of resources would result from any of the alternatives.

*Irretrievable* commitment applies to losses that are not renewable or recoverable for future use. The loss of production would be irretrievable, but it would not necessarily be irreversible. None of the alternatives constitutes an irretrievable commitment of resources.

## 3.14 Cumulative Effects

Cumulative effects are discussed in the individual resource sections earlier in this chapter.

## 3.15 Energy Requirements, Conservation Potential, Depletable Resource Requirements

Consumption of fossil fuel by vehicles and equipment would occur with the action alternatives during management activities. No unusual energy requirements are included nor do opportunities exist to conserve energy at a large scale.

## 3.16 Prime Farmland, Rangeland, and Forest Land

As designated by the United States Department of Agriculture–National Resource Conservation Service and described in the National Soil Survey Handbook (USDA-NRCS 2010), the Service units do contain prime farmland and rangeland, but do not contain prime forest land. Prime farmland is defined as land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and that is available for these uses. Prime farmland information may be supplemented with separate designations of soil map units that have statewide, local, or unique importance as farmland capable of producing crops.

Production of row crops is used as a management treatment to prepare upland areas for reseeding to native grasses and forbs. A firm, weed-free seedbed is a critical component of the native ecosystem restoration process. If weed populations are not eliminated by farming or repeated chemical treatments, there is little hope that the new seeding could become established due to competition from undesirable vegetation. Under a cooperative farming agreement, cooperators pay a set percentage of the current county rental rate or the unit is competitively bid out for the opportunity to farm these areas, and crops are harvested using normal agricultural practices. Farming is allowed for two to five successive years, and soybeans are planted the final year of the cropping period. The soybean residue remaining in the field the year after harvest is minimal creating an adequate, weed-free seedbed in which it is suitable to plant native grasses and forbs by using a no-till drill.

Cooperative farming is a cost-effective way to prepare this seedbed. The practice generates revenue that is used to purchase native plant seed, fence and water development for the area. If Service personnel prepared these areas, it would result in a significant investment in time, materials, and equipment to perform the same task and require another source of funding to purchase seed. Further, the community benefits from the additional revenue generated by crop production.

## 3.17 Possible Conflicts with Other Land Use Plans

The land management actions would take place entirely on Service lands and would not conflict with fuels and fire management actions under any county's CWPP but rather would complement other actions.

## 3.18 Other Required Disclosures

The proposed activities could potentially affect federally listed plant or wildlife species. Refer to Section 3.4 and 3.5 for more information about potential effects. Unknown cultural resources could be affected during treatment implementation. Refer to Section 3.8 for more information about potential effects.

# Chapter 4. **Consultation and Coordination**

## 4.1 **Preparers and Reviewers**

**EA Reviewers:**

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Susan Hale
Consultant, Project Support Services
EA Writer and Editor

## 4.2 **Fire Management Coordination**

### 4.2.1 **Internal Partnerships**

- USFWS Ecological Services, Pierre, SD

- USFWS National Wildlife Refuge System, Albuquerque, New Mexico; Anchorage, Alaska; Arlington, Virginia; Atlanta, Georgia; Fort Snelling, Minnesota; Hadley Massachusetts; Portland, Oregon; Shepherdstown, West Virginia; Washington, DC
- National Interagency Fire Center, Boise, ID

### 4.2.2 External Partnerships

- The Nature Conservancy – SD Chapter, Timber Lake, SD
- Great Plains BIA Regional Office, Aberdeen, SD
- Cheyenne River Agency, Eagle Butte, SD
- Winnebago Agency, Winnebago, NE
- Crow Creek Agency, Ft. Thompson, SD
- Lower Brule Agency, Lower Brule, SD
- Yankton Agency, Wagner, SD
- Sisseton Agency, Agency Village, SD
- Standing Rock Agency, Ft Yates ND
- Rosebud Agency, Rosebud, SD
- Pine Ridge Agency, Pine Ridge, SD
- Fort Totten Agency, Ft. Totten, ND
- USFS Black Hills National Forest, Custer, SD
- USFS Nebraska National Forest, Chadron, Nebraska
- USDA Farm Services Agency and NRCS State Offices, Huron, SD
- National Park Service, Midwest Regional Office, Omaha, Nebraska
- USGS Northern Prairie Wildlife Research Center, Jamestown, ND
- National Park Service, Wind Cave National Park, Northern Great Plains Fire Management; Hot Springs, SD
- National Park Service Niobrara National Scenic River, Valentine, Nebraska
- South Dakota Wildland Fire Suppression, Rapid City, SD
- South Dakota Department of Game Fish and Parks, Pierre, SD
- South Dakota Department of Agriculture, Pierre, SD
- South Dakota Department of Environment and Natural Resources, Pierre, SD
- South Dakota National Guard, Rapid City, SD
- National Weather Service –Aberdeen Office, Aberdeen, SD
- National Weather Service – Sioux Falls Office, Sioux Falls, SD

### 4.2.3 Interagency Agreements and Planning Documents

- South Dakota Cooperative Suppression Agreement
- South Dakota State Digital Truncated Radio authorization and use Agreement
- Black Hills National Forest and USFWS Radio Frequency Authorization MOU
- Inter-Agency Agreement For Fire Management Among –Bureau of Land Management, Bureau of Indian Affairs, National Park Service, Fish and Wildlife Service, of the Department of interior and the U.S. Forest Service of the Department of Agriculture.
- All Hazard Mutual Aid Agreement between the State of South Dakota Emergency Management and Sand Lake NWR.
- Inter-Agency Cooperative Agreement Between the Department of Interior Bureaus (BLM, NPS, FWS, and BIA), the State of SD department of Wildland Fire Suppression, The State of Nebraska –Nebraska Forest Service, the State of Wyoming – Wyoming State Forestry Division, the USDA Forest Service- the Nebraska National Forest, and the USDA Forest Service the Black Hills National Forest for the effective operations of the Northern Great Plains Inter-agency Dispatch Center,
- MOU between The Nature Conservancy and the U.S. Fish and Wildlife Service
- Numerous MOUs between the Eastern South Dakota Service Field Stations and local Rural Fire Departments - South Dakota State, with County Rural and Volunteer Fire Departments:

Huron WMD

Beadle County Hyde County

Buffalo County Jerauld County

Hand County Sanborn County

Hughes County Sully County

Lake Andes NWR /WMD and Karl E. Mundt NWR

Aurora County Hanson County

Bon Homme County Hutchinson County

Brule County Lincoln County

Charles Mix County Turner County

Clay County Union County

Davison County Yankton County

Douglas County

Madison WMD

Brookings County McCook County

Deuel County Miner County

Hamlin County Minnehaha County

Kingsbury County Moody County

Lake County

Sand Lake NWR/WMD

Brown CountyFaulk County

Spink CountyCampbell County

McPherson CountyWalworth County

Edmunds CountyPotter County

Waubay NWR/WMD

Clark CountyGrant County

Codington CountyMarshall County

Day CountyRoberts County

- Rocky Mountain and Great Plains Interagency Mobilization Guide.
- Rocky Mountain Area Fire Weather Annual Operating Plan.
- South Dakota Radio Communications Interoperability Plan.
- Great Plains Interagency Dispatch Center Aviation Operations Guide 2013.
- Great Plains Zone Fire Danger Rating Operating Plan 2013.
- Great Plains Interagency Dispatch Center Aviation and Crash Response Guide 2013.
- Great Plains Interagency Dispatch Center Continuity of Operations Plan.
- Great Plains Zone Serious Incident Management Guide.
- Interagency Agreement for Meteorological Services (National MOA or National Agreement)

## 4.3 Availability of the Final Environmental Assessment and Finding of No Significant Impact

This Final Environmental Assessment and Finding of No Significant Impact are available on the refuge websites:

- Huron WMD:
- Lake Andes NWRC:
- Madison WMD:
- Sand Lake NWRC:
- Waubay NWRC:

Notices announcing the availability of these two documents were published in the following local newspapers; Aberdeen American News, Madison Daily Leader, and the Sioux Falls Argus Leader.

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