III. Summary Waubay Complex and Resource Descriptions

Geographic / Ecosystem Setting

Waubay WMD is situated in the northeastern corner of South Dakota, covering Marshall, Roberts, Day, Grant, Clark, and Codington counties. It is comprised of 40,000 acres of Waterfowl Production Areas (WPAs), 105,000 acres of wetland easements, 126,000 acres of grassland easements, and 5,260 acres of Farmer's Home Administration (FmHA) conservation easements. Waubay NWR is located in northeastern Day County and is comprised of 4,650 acres.

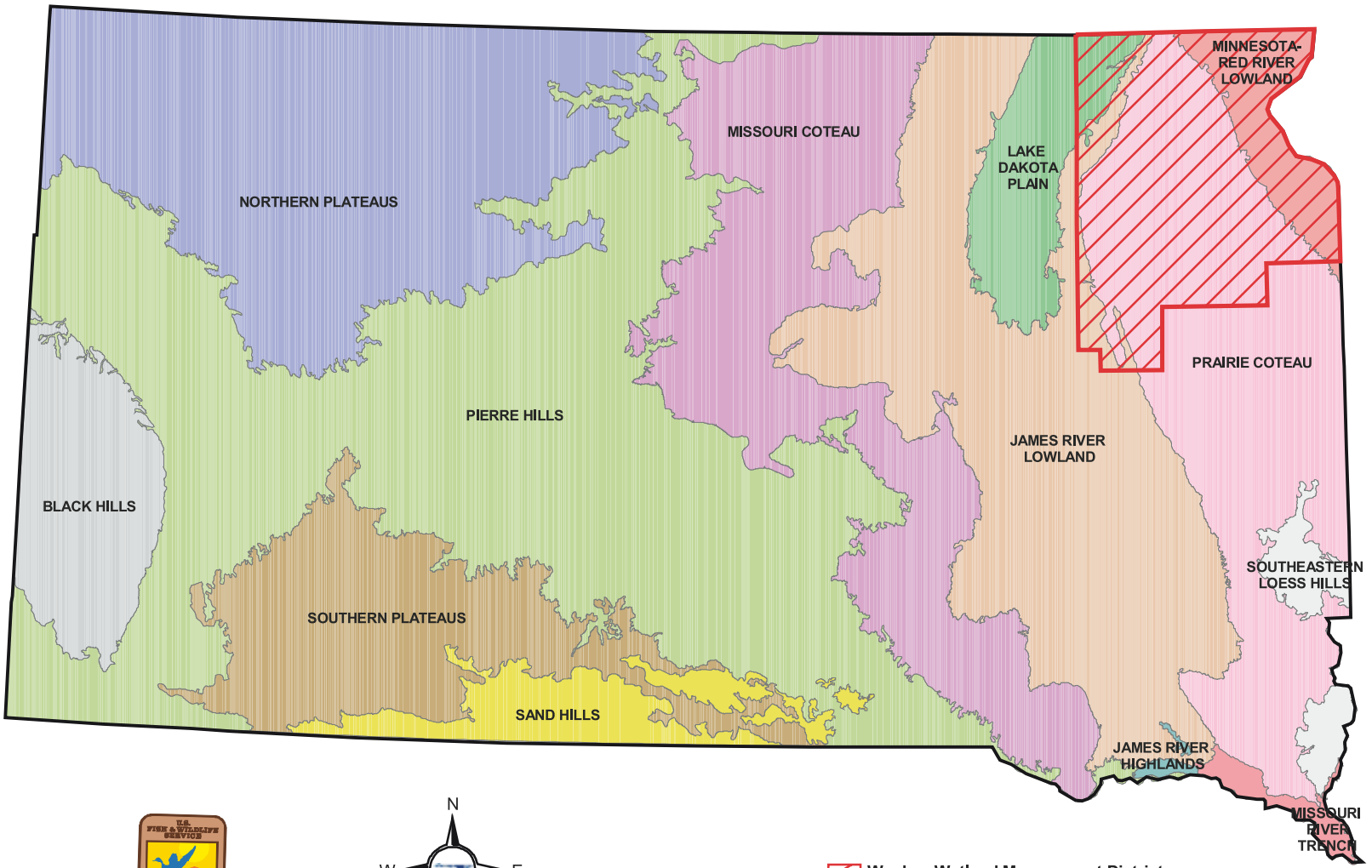
Northeastern South Dakota is within the Central Lowlands Province, a major physiographic province (Westin and Malo 1978). Prairie potholes, the major land feature, were formed between 12,000 and 40,000 years ago during Pleistocene glaciations. The first ice sheet covering eastern South Dakota was the Nebraskan, followed by the Kansan, Illinoisan, and Wisconsin ice sheets. The Wisconsin ice sheet had four separate advances. Four distinct physiographic regions cover Waubay Complex from east to west: Minnesota River-Red River Lowlands, Coteau Des Prairies, Lake Dakota Plain, and the James River Lowland (Map 4).

The Minnesota River-Red River Lowland was formed from sediment deposited on the bottom of ancient Glacial Lake Agassiz. Drainage runs north into the Red River of the North or south into the Minnesota River along the Continental Divide. This Divide, unlike the one located in the Rockies, separates the continent depending on whether water flows north to Hudson Bay or south to the Gulf of Mexico. The Coteau des Prairies is a series of north-south parallel moraines which rise 800 feet or more in elevation above adjacent lowlands. Numerous wetland basins are a prominent feature of this land form. About 80 percent of Waubay Complex is situated within the Coteau des Prairies. The Lake Dakota Plain was formed from silt and sand deposits under old Lake Dakota. Flowing water drains into the James River. The James River Lowland is a large glacially-eroded valley drained by the James River.

Waubay Complex is located wholly within the Prairie Pothole Region of the Upper Great Plains (Figure 1). It is also part of the Prairie Pothole Joint Venture area, a geographic region of importance to the North American Waterfowl Management Plan. The prairie pothole wetland complexes and associated grasslands are an integral component of the prairie landscape, providing a wide array of ecological, social, and economic benefits. A high density of wetlands in this region helps produce the majority of game ducks, yet contains only 10 percent of the breeding habitat in the continent (Baldassarre and Bolen 1994).

Figure 1. Prairie Pothole Region

South Dakota Major Physiographic Regions



Map 4 - South Dakota Major Physiographic Regions

There are four flyways denoting major migration pathways that funnel waterfowl from wintering to breeding habitat and back. Continental waterfowl management today is based on this flyway concept. Waubay Complex is on the eastern edge of the Central Flyway.

Waubay Complex falls under the jurisdiction of Region 6 of the U.S. Fish & Wildlife Service and is part of the Mainstem Missouri River ecosystem (Map 5). Goals and objectives for this Ecosystem can be found in Appendix I.

Waubay Complex also falls within the bounds of numerous other ecosystems and other planning efforts such as The Nature Conservancy's Ecoregional Plan for the Tallgrass Prairie, North American Waterfowl Management Plan and the Prairie Pothole Joint Venture, Partners in Flight, and the South Dakota Natural Heritage Program. A brief listing of these and other programs or planning efforts that affect Waubay Complex is listed in Appendix M.

The Sisseton-Wahpeton Sioux Tribe owns thousands of acres within Lake Traverse Reservation. The Reservation, created by treaty in 1867, covers portions of five northeastern counties in South Dakota and two southeastern counties in North Dakota. Much of the land within the reservation was opened up to Euro-American settlement in 1892. Native American landownership within the reservation then took on two forms: tribal land and heirship trust land, the latter owned by the descendants of male tribal members who had received allotments of land in 1892. Heirship trust land is managed for the owners by the Bureau of Indian Affairs.

Historically, the landscape of northeastern South Dakota consisted of a vast expanse of tall and mixed grass prairie with numerous shallow and deep wetlands. Woodlands would have developed and been protected from prairie fires around larger lakes and in the cooler, moister coulees coming off of the Coteau. No nonnative plants would have been present. A rich assortment of native plants and wildlife existed, evolved with, and were maintained by fire, periodic defoliation by large herds of grazing animals, and climate.

As European settlement of the Northern Great Plains progressed, many changes occurred on the land. Two of the processes which shaped grassland communities were suppressed or eliminated (fire and herds of bison and elk) and settlers began planting shelterbelts and woodlands to control soil and wind erosion. Agriculture soon dominated the landscape and lifestyles of the inhabitants in the early-to-mid-1900s. Nonnative grasses were planted for pastures and hay, while large portions of native prairie were plowed up for cropland. Wetlands were drained to provide more cropland and make farming operations easier and more profitable. The vast prairie that once existed was soon covered by roads, railroads, houses, towns, trees, noxious weeds, and nonnative grasses.

Climate

The climate is typically continental, characterized by cold winters and hot summers. Winter and summer temperatures can vary from extremes of -43^{0}F to 104^{0}F. More common temperatures range from -26^{0}F to 95^{0}F. Average annual precipitation is 20.9 inches and is normally heaviest in late spring and early summer. Intense thunderstorms are normal occurrences in summer. Frequent spells of dry years often alternate with years that are wetter than average. Wetland levels can fluctuate widely with these precipitation changes. The average seasonal snowfall is 30 to 35 inches. Combined snow and high winds often produce blizzard conditions in the area. Prevailing winds are from the northwest. Wind speeds average 13 miles per hour, but can often be much higher, especially in the spring. The growing season varies from 109 to 112 days.

Waubay NWR has been an official weather station since 1953. Climatological conditions have generally been extremely wet since 1992 (Figure 2). Every year since then has recorded higher than average precipitation. Low evaporation conditions also prevailed throughout this period. This has led to water levels not seen in 200 to 500 years in many closed basins in the WMD. For example, Waubay Lake has risen more then 20 feet in 12 years (Figure 3).

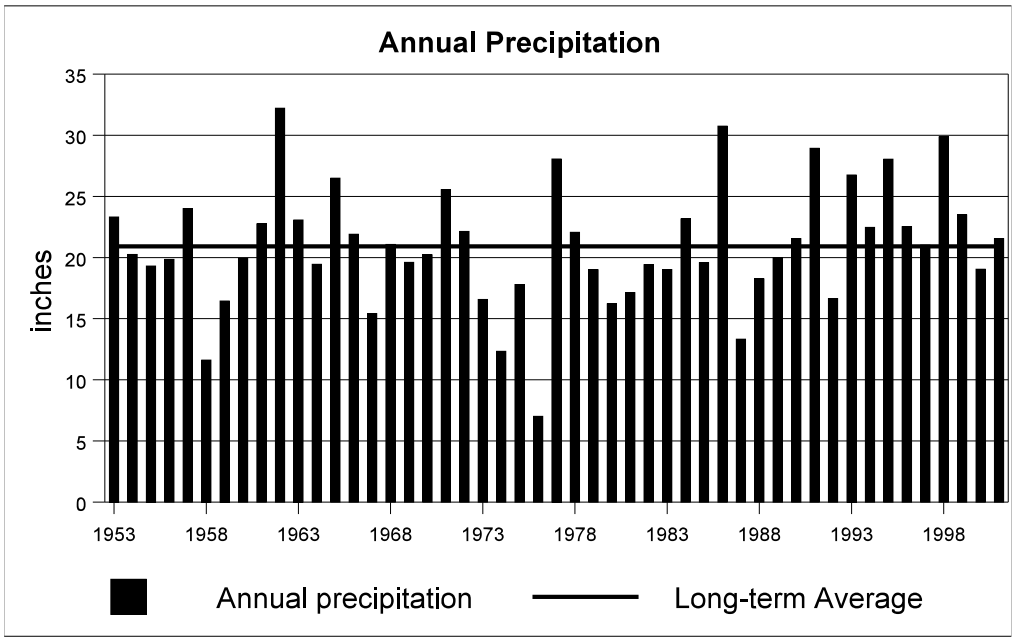


Figure 2. Annual and long-term average precipitation at Waubay NWR, 1953-2001.

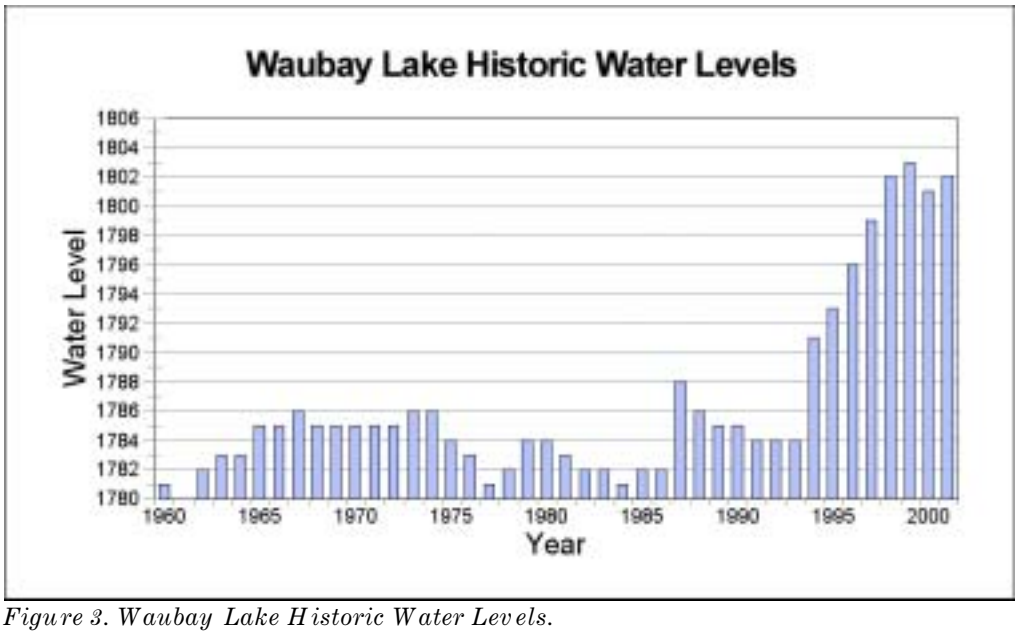
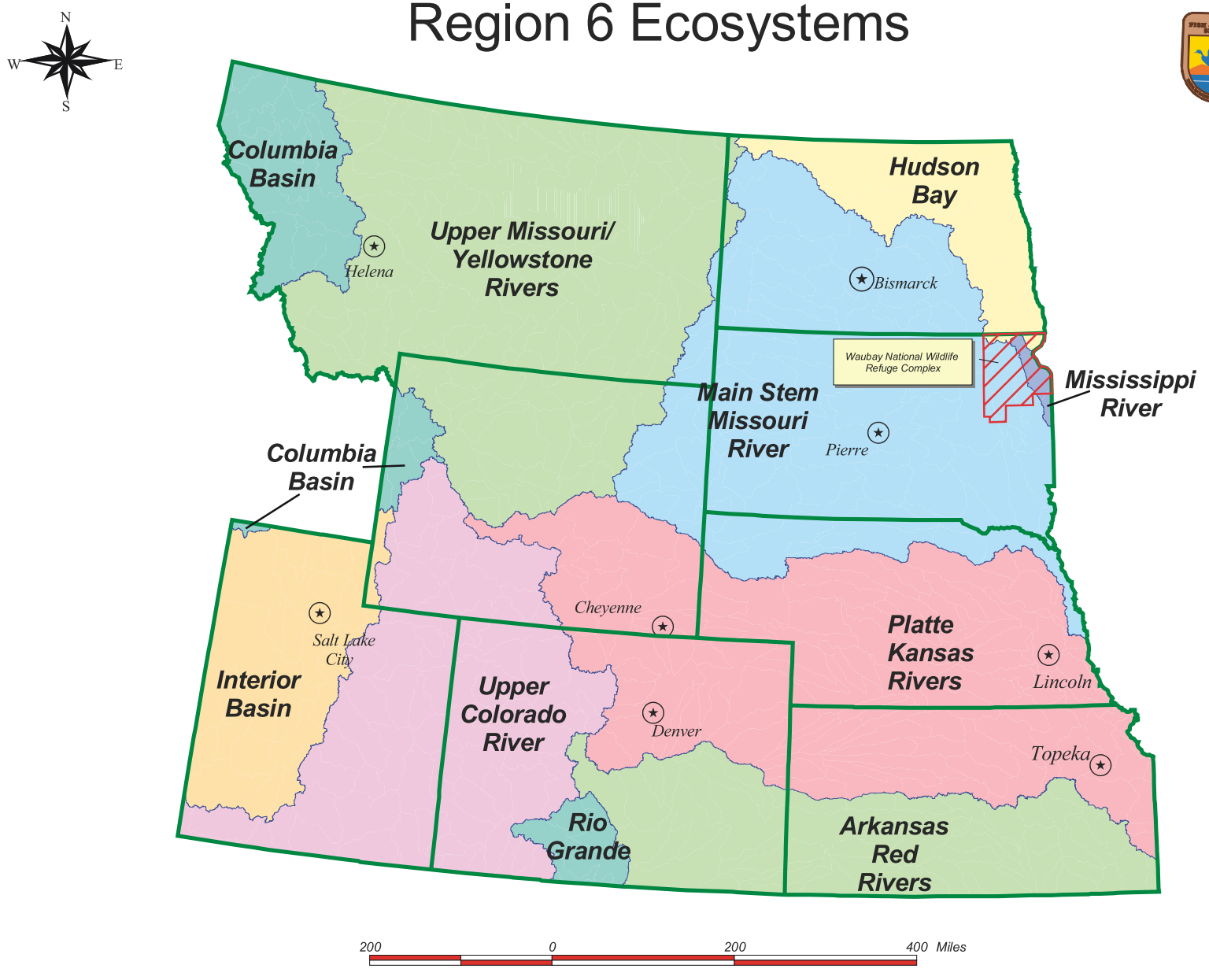


Figure 3. Waubay Lake Historic Water Levels.

Region 6 Ecosystems



Map 5 - USFWS Region 6 Ecosystems

Air Quality

Waubay Wetland Management District, encompassing the National Wildlife Refuge, meets attainment status for pollutants as reported by South Dakota Department of Environment and Natural Resources.

Soils

Soils have been inventoried and mapped, and county soil surveys have been published for the Waubay Complex. The soil associations vary greatly according to the physiographic regions. The soils are derived from parent materials which include glaciolacustrine sediments, early Wisconsin glacial drift, and late-Wisconsin glacial drift (loess).

The Coteau des Prairies consists of relief that is undulating to steep. The landscape is characterized by many potholes or depressions. The drainage pattern is poorly defined, except near the Big Sioux River where the level to moderately sloping loamy Brookings-Kranzburg-Vienna soils predominate. Coteau soils consist primarily of the Forman-Aastad-Buse association which are well drained, nearly level to steep loamy soils formed in glacial till. Stones and boulders scattered on the surface in some areas limit the use of these soils for cultivation.

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 consists of level to rolling, loamy soils that are moderately well drained. The principal associations within this region are the Niobell-Noonan-Williams, Barnes-Svea, and Bryant. Drainage systems of these associations are poorly defined, and many terminate to form small basins.

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, and silty or loamy.

Waubay Complex Resources

The Service has management and administrative responsibility on essentially five different types of land holdings. This does not include the Private Lands Program. These land holdings are described as follows:

1. National Wildlife Refuge

Waubay is derived from a Lakota word meaning "a place where numbers of birds make their nests." Waubay National Wildlife Refuge was purchased to further the purposes of the Migratory Bird Conservation Act. It is owned by the Service in fee-title and managed to provide high-quality wetlands and nesting cover primarily for waterfowl and other migratory birds. Many other wildlife species also benefit from the management, including white-tailed deer and ring-necked pheasant. The Refuge is open for deer hunting and ice fishing as well as wildlife observation, wildlife photography, environmental education and interpretation.

The Refuge consists of 4,650 acres. Habitat types are approximately 48 percent grassland, 35 percent wetland, 14 percent woodland/brush, and 3 percent cropland (Map 6). Woodlands are surrounded by large glacial lakes and are thought to have developed because they were protected from prairie wildfires that commonly occurred on surrounding open prairie. Bur oak, basswood, green ash, American elm, hackberry, and cottonwood are the major tree species.

The following types of land holdings are located within the boundaries of the Wetland Management District:

2. Waterfowl Production Areas

Waterfowl Production Areas (WPAs) are lands purchased by the Service under the provisions of the Migratory Bird Hunting and Conservation Stamp Act, as amended in 1958. Funding for these purchases comes from the sale of Migratory Bird Hunting and Conservation Stamps (Federal Duck Stamp). These lands are owned by the Service in fee-title and managed to provide high quality wetlands and nesting cover primarily for waterfowl and other migratory birds. Other wildlife species also benefit from these areas. WPAs are open to the public for hunting, fishing, and trapping. New WPAs are currently purchased only if they are round-outs to existing WPAs or have some special features. On average, a new WPA is purchased every 5 years.

The Service owns and manages a total of 39,885 WPA acres within the WMD (Map 7). There are 199 WPA units which range from 3 acres to over 1,325 acres and may consist of more than one acquisition tract. Habitat types are approximately 56 percent grassland, 40 percent wetland, 0.5 percent cropland, 1.8 percent woodland, and 1.3 percent brush.

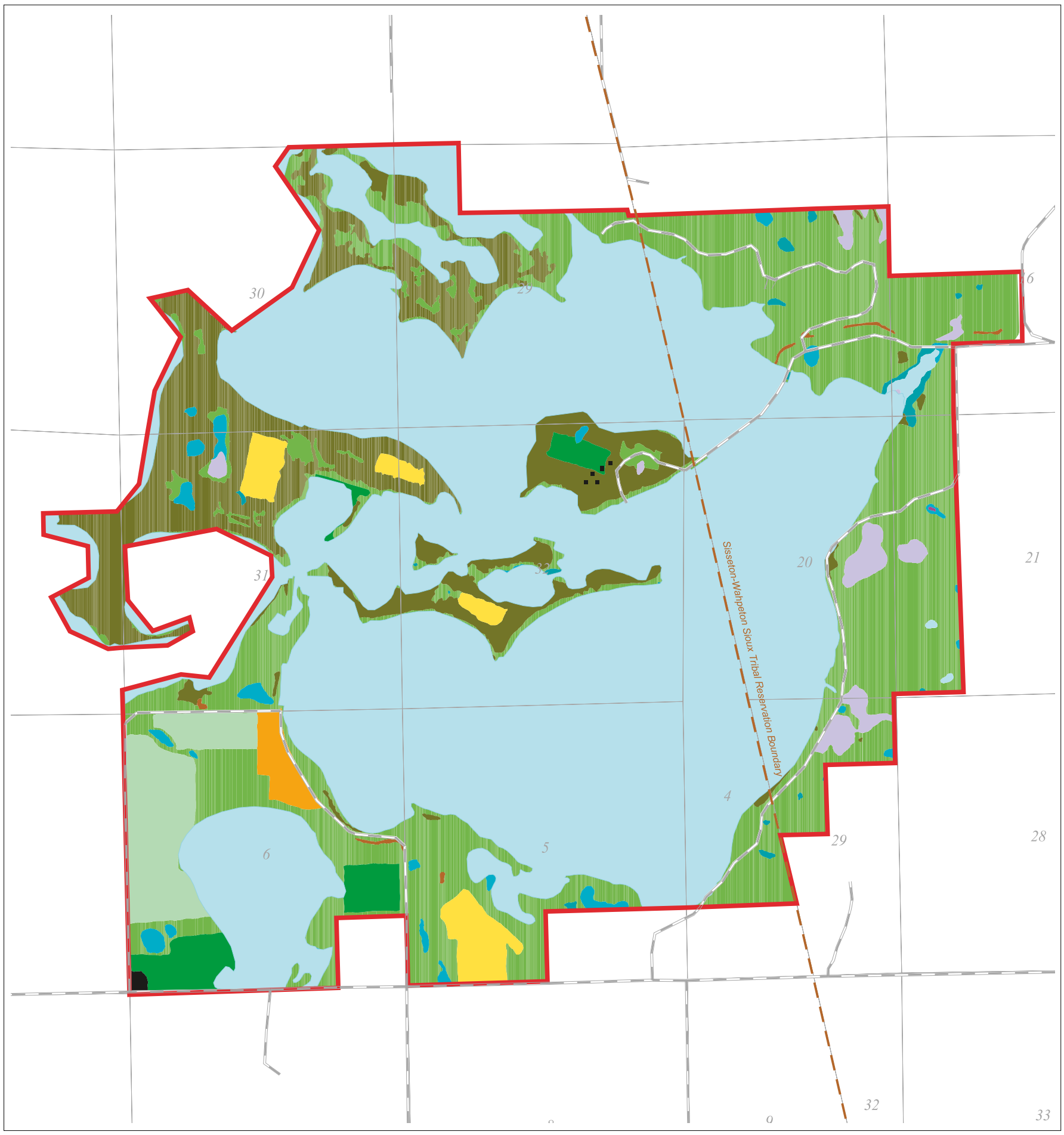
3. Wetland Easements

The wetland easement program was authorized by Congress on August 1, 1958, and like WPAs, is financed by receipts from the sale of Federal Duck Stamps. Under this program, willing landowners are paid one lump sum payment to not drain, burn, level, or fill natural wetlands. Wetlands must be of value to waterfowl before they are considered for easement purchase. These easements cover only the wetland acres on the land and are perpetual, that is, they are permanent. Ownership remains with the landowner and the Service acquires no other management rights with the easement. Easements do not affect normal farming practices such as cropping, haying, grazing, plowing, or cultivating wetlands when they are dry due to natural conditions.

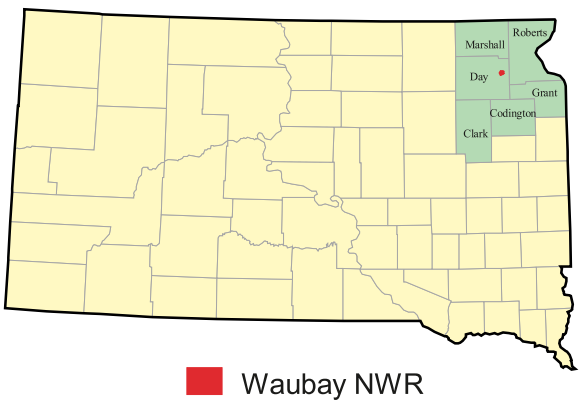
The WMD currently protects approximately 105,000 acres of wetlands with waterfowl management easements. Acres of easements change regularly as acquisition is still active. All wetlands under easement are inspected annually by Service personnel for possible violations of the easement contract.

Waubay National Wildlife Refuge

Landcover



Vicinity Map



Legend

Refuge Landcover*
- Cropland : Alfalfa
- Cropland : Other
- Dugout
- Grassland : Dense Nesting Cover
- Grassland : Native Prairie
- Grassland : Tame Grasses
- Gravel Pit
- Trees & Shrubs : Native Trees
- Trees & Shrubs : Planted Trees

Wetlands
- Temporary Wetland
- Seasonal Wetland
- Semipermanent Wetland
- Lake

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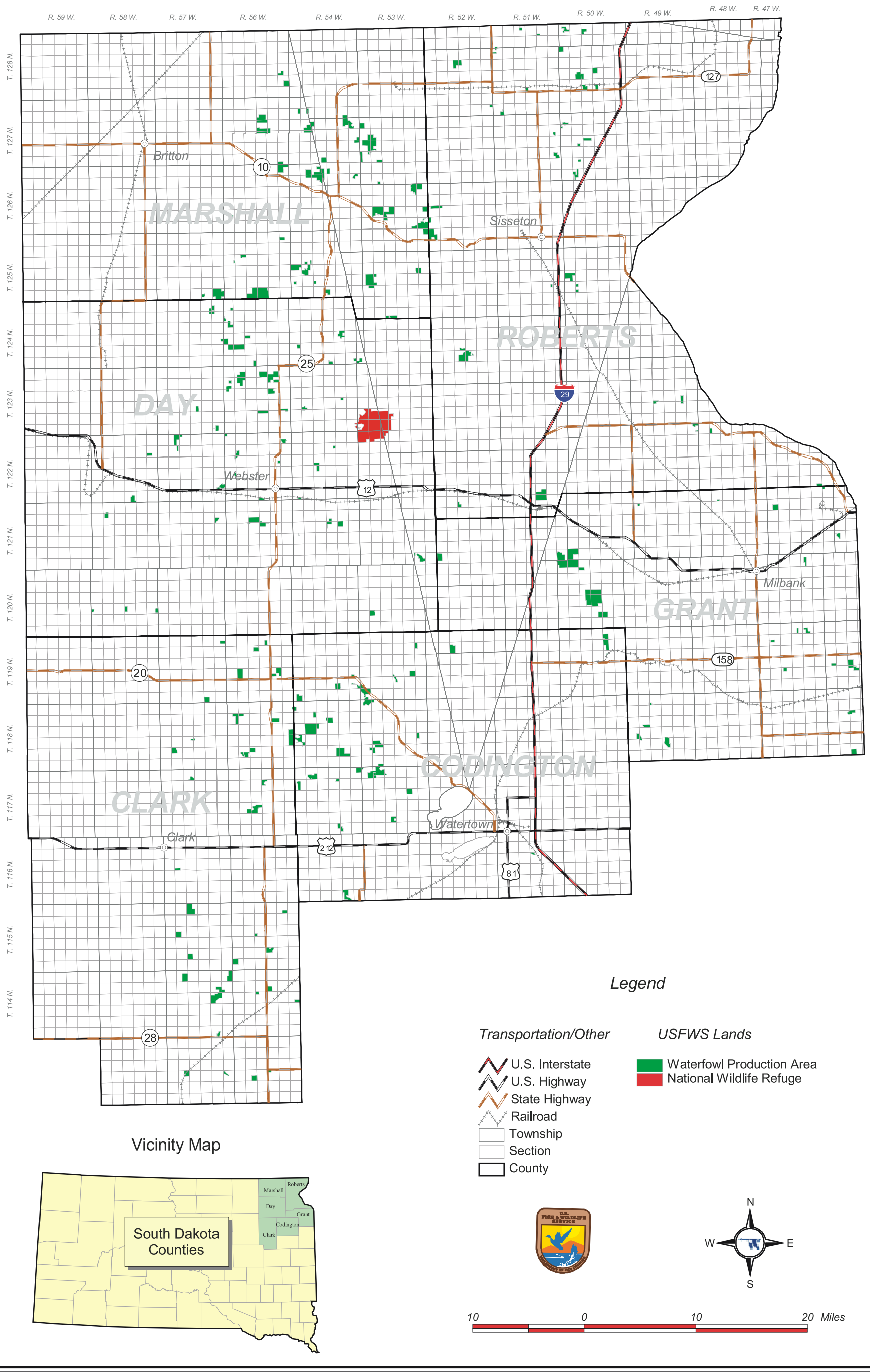
0.6 0 0.6 1.2 Miles

Map 6 - Waubay NWR Landcover Types

Waubay Wetland Management District

U. S. Fish and Wildlife Service Fee-Title Lands



Vicinity Map

Legend

Transportation/Other

- U.S. Interstate
- U.S. Highway
- State Highway
- Railroad
- Township
- Section
- County

USFWS Lands

- Waterfowl Production Area
- National Wildlife Refuge

N W E S

10 0 10 20 Miles

Map 7 - Waubay WMD Fee-Title Lands

4. Grassland Easements

In 1989, the Service began the grassland easement program to protect important nesting cover and enhance water quality on privately owned lands. Like wetland easements, grassland easements are perpetual, with the Service purchasing certain rights to the grassland acres. Under this program, willing landowners retain ownership and grazing is unrestricted. However, disturbance of the soil, such as in the production of agricultural crops, is prohibited and haying is allowed only after July 15 each year to reduce disturbance to ground-nesting birds. All grassland easement tracts are also covered by wetland easements. Grassland easements are inspected yearly for possible violations of the easement contract.

Each potential easement is evaluated for its value to wildlife. Lands must rate 40 pairs/square mile or higher on the Waterfowl Breeding Pair Distributions (Map 8). Large native grass tracts with good wetland complexes that include brood water are given the highest priority. Tracts must protect at least 160 acres and have perpetually protected brood water within one mile of the tract to be considered for an easement. Easements less than 160 acres must be adjacent to other grassland easements, WPAs, or South Dakota Game, Fish and Parks (SDGFP) lands, to make up 160 acres of protected grasslands. Occasionally, a tract is purchased with a portion of the land still in crop production. The landowner enters into an agreement to seed the cropland back to a recommended grass mixture to qualify for the easement.

Grassland easements within the WMD range in size from approximately 40 to over 2,720 contiguous acres. Currently, approximately 126,000 acres are protected under the grassland easement program. This program is expanding with new easement contracts written every month. The Service acquires no other management rights with the easement document.

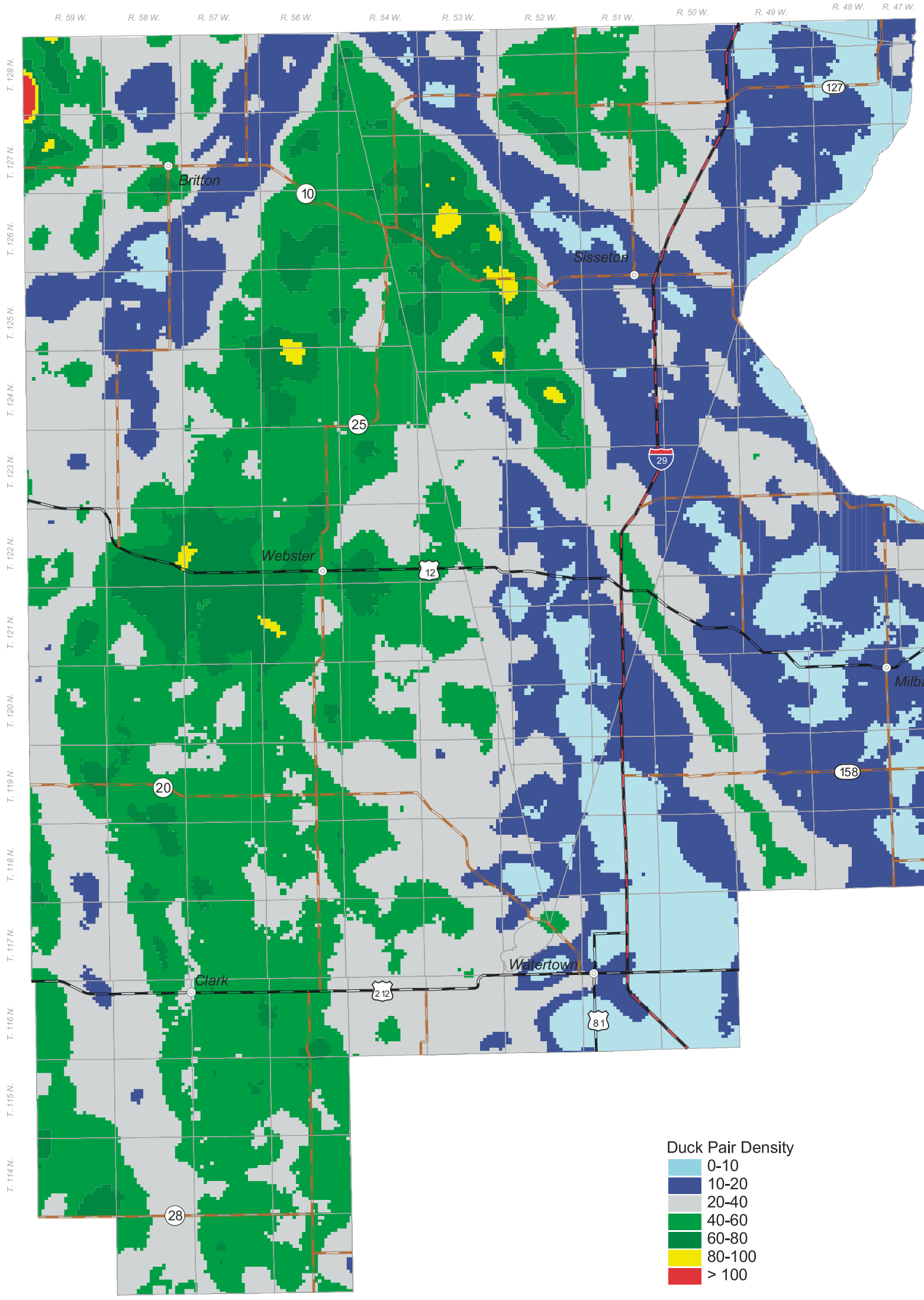
The Dakota Tallgrass Prairie Wildlife Management Area (DTP-WMA) is a new Refuge addition intended to eventually preserve 190,000 acres of remaining northern tallgrass prairie in eastern South Dakota and southeastern North Dakota. The DTP-WMA augments the decade old grassland easement program, funded by Migratory Bird Stamps, by purchasing grassland easements in areas in which the Service cannot use Migratory Bird Stamp funding. The DTP-WMA boundary includes over 80 percent of the remaining northern tallgrass prairie. The DTP-WMA includes parts of 4 counties in North Dakota and 28 counties in South Dakota, including all of the counties in the Waubay WMD. Large blocks of prairie of 10,000 - 20,000 acres are the primary targets for enrollment into the program. Preservation of the prairie will mainly be in the form of grassland protection easements. Stipulations and ground disturbing restrictions are the same as on the above stated grassland easements purchased with Migratory Bird Stamp monies. Funding for the DTP-WMA comes directly from Congressional appropriations in the form of Land and Water Conservation Funds (LWCF). The northern tallgrass prairie is the most altered and possibly the most endangered ecosystem in North America. Today, less than 4 percent of the original northern tallgrass prairie remains. This means that almost 45 million acres of northern tallgrass prairie have disappeared, mostly due to continuous conversion of prairie to croplands since the late 1800s. The rich diversity of the northern tallgrass prairie consists of at least 300 species of plants, 113 species of butterflies, 35 reptile and amphibian species, 60 mammal species, and 260 species of birds that are known to breed in or use the area.

5. Farmers Home Administration Conservation Easements

The Federal agency previously called the Farmers Home Administration (FmHA) of the U.S. Department of Agriculture (USDA) is required by Executive Order 11990 to preserve and protect all wetlands that were in FmHA ownership. The 1985 and 1990 Food Security Acts (Farm Bill) gave direction as to how and by whom this should be accomplished. Cooperating with FmHA, the Service would recommend "conservation easements" on FmHA inventory properties. When these properties sold to private ownership, the Service accepted the responsibility of enforcing the terms of the conservation easements. Presently, 5,263 acres of former FmHA inventory properties are under some type of conservation easement. These easements, at a minimum, protect the wetlands from burning, draining, or filling. There are 1,242 acres of wetlands protected. In some cases, the easements protect adjacent upland habitat as well. Some upland easements protect the land from ever being farmed, while others restrict nearly all uses of the land. Due to a change in the way USDA defines wetlands, it is expected that there will be no additional conservation easements.

Waubay Wetland Management District

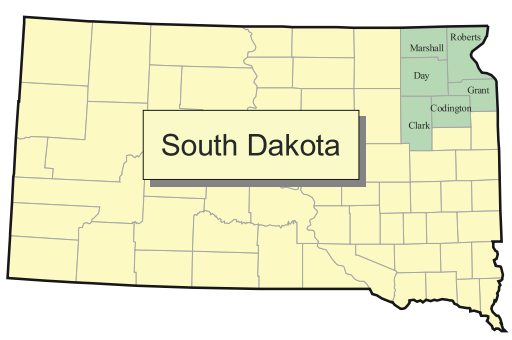
Waterfowl Breeding Pair Distributions



Duck Pair Density

- 0-10
- 10-20
- 20-40
- 40-60
- 60-80
- 80-100
- > 100

Map Location



N W E S

10 0 10 20 Miles

Map 8 - Waubay WMD Waterfowl Breeding Pair Distributions

Water Resources and Associated Wetlands

Wetlands are lands where saturation with water is the dominant factor determining the nature of soil development and the types of plant and animal communities living in the soil and on its surface (Cowardin et al. 1979). It is estimated that the contiguous United States contained 221 million acres of wetlands just 200 years ago (Dahl 1990). By the mid-1970s, only 46 percent of the original acreage remained (Tiner 1984). Wetlands now cover about 5 percent of the landscape of the lower 48 states. Wetlands are extremely productive and important to both migratory and resident wildlife. They serve as breeding and nesting areas for many migratory birds and as wintering habitat for many species of resident wildlife. Humans also benefit from wetlands, which can improve water quality and quantity, reduce flooding effects, and provide sites for recreation. Economically, wetlands provide places to hunt, fish, trap, or bird-watch for millions of Americans. In the 1996 Survey of Fishing, Hunting and Wildlife Associated Recreation, about 40 percent of U.S. residents 16 years or older participated in wildlife related activities. More than $100 billion was spent in pursuit of these activities, most of which depend on productive wetlands (USFWS 1996).

"Greater familiarity with marshes on the part of more people could give man a truer and more wholesome view of himself in relation to Nature . . . . Marshes comprise their own form of wilderness. They have their own life-rich genuineness and reflect forces that are much older, much more permanent and much mightier than man."
Paul Errington

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 nontidal 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.
- Semipermanently 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.

Even though drainage and other wetland decimating factors have taken their toll, wetlands are still a prominent feature of the Complex's landscape (Map 9). The National Wetland Inventory has identified 348,482 wetland acres in the WMD. These include ponds ranging from 0.1 acre with temporary water regimes to large glacial lakes to major rivers and smaller tributaries.

In the James and Minnesota-Red River lowlands, temporarily and seasonally flooded basins are more predominant while semipermanently and permanently flooded wetlands are most abundant on the Prairie Coteau. The average size of wetlands in eastern South Dakota is only .4 acre; 72.9 percent of wetlands are ≤1 acre and 92.1 percent are ≤5 (Johnson and Higgins 1997).

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 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.

Vegetation

Upland Vegetation

The following native plant communities as developed by The Nature Conservancy (Anderson et al. 1998) and used by State Natural Heritage Programs can be found in the WMD.

Native Prairie

Little Bluestem-Porcupine Grass Dry-Mesic Hill Prairie

Hill prairie is found 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.

Northern Mesic Tallgrass Prairie

Some of the largest remaining tracts of 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.

Northern Wet-Mesic Tallgrass Prairie

This is found 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. Common forbs include Rocky Mountain blazing star.

Forests, Woodlands and Savanna

Northern Bur Oak Mesic Forest

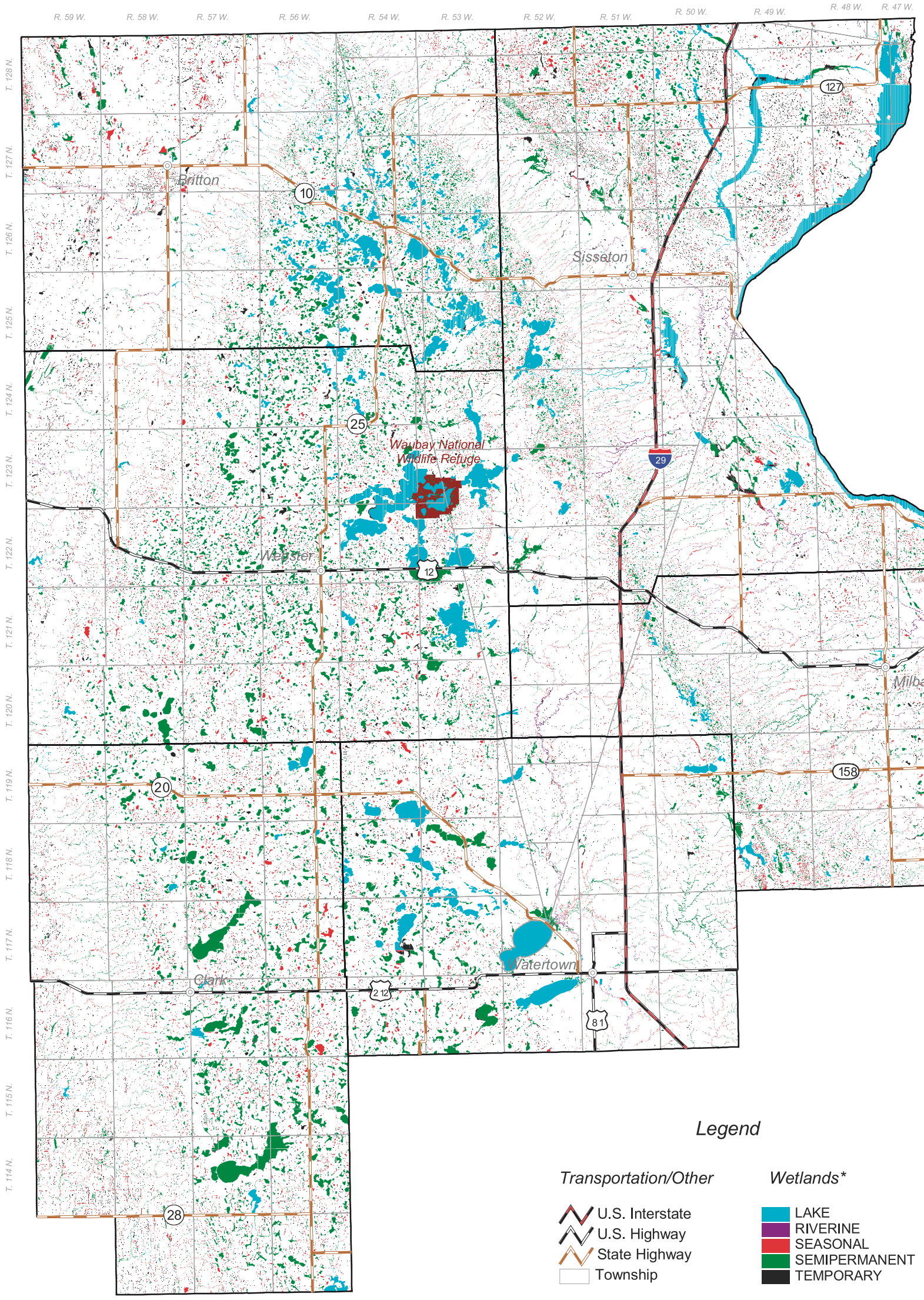
This plant community is found primarily in coulees and adjacent uplands and is more common on the eastern edge of the Coteau. It is mostly found on south or west-facing slopes and with moist soils. The canopy is dominated by bur oak, with smaller amounts of basswood and green ash. Ironwood is a common small tree/subcanopy 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.

Plains Basswood Forest

This 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 land form where it occurs. Ironwood is a common small tree / subcanopy 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.

Waubay Wetland Management District

Wetland Resources (Based on 1987 NWI)



Legend

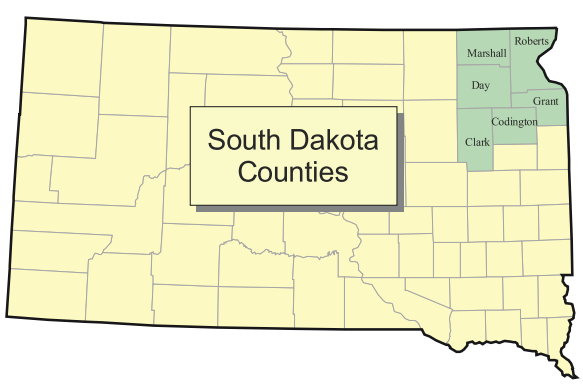
Transportation/Other

- U.S. Interstate
- U.S. Highway
- State Highway
- Township

*Wetlands**

- LAKE
- RIVERINE
- SEASONAL
- SEMIPERMANENT
- TEMPORARY

Vicinity Map



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Map 9 - Waubay WMD Wetland Resources

Bur Oak Woodland
This 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 herbacious layer is generally sparse and floristically poor.

Bur Oak Savanna
This dry to dry-mesic community is dominated by bur oak. The stature and spacing of trees is somewhat variable, reflecting differences in soils, topography, and climate, factors that strongly affect local droughtiness and fire frequency. 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.

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. No special management occurs from this designation.

The six counties of northeastern South Dakota encompass 3.4 million acres, half of which has been converted to cropland (Map 10). Of the 1.3 million acres of remaining grasslands, approximately 1.0 million acres is considered native prairie. This "native" prairie is defined as grassland that has never been plowed, but in reality all plant communities have been altered somewhat from pristine conditions due to exotic plant introductions, livestock grazing impacts, lack of fire, and other factors since European settlement.

Grassland vegetation makes up approximately 54 percent of Service lands within the Complex. On WPAs, approximately 95 percent of uplands consist of grasslands. On the Refuge, 71 percent of uplands are grasslands, with the remainder in trees, brush or developments. Of these grassland acres, approximately 65 percent is native grassland and 35 percent is seeded exotic grass/forb mixes or restored native grasses.

As part of the Northern Great Plains, two major vegetation types are represented within the Complex - tallgrass prairie and northern mixed-grass prairie (Johnson and Larson 1999). The tallgrass, or true prairie, extends along the eastern Dakotas and Nebraska into Minnesota and Iowa. Less than 4 percent of the original tallgrass prairie ecosystem is left and more is lost each year (Steinauer and Collins 1996). All of the Minnesota River-Red River Lowland and much of the Coteau des Prairies lie within this vegetation type. Tallgrass prairie gradually gives way to northern mixed-grass prairie to the west, generally covering the Lake Dakota Plain and James River basin. Remnant stands of eastern deciduous forest grow in ravines and north-facing slopes along the Coteau des Prairies and adjacent to bigger lakes on the Coteau.

In addition to these natural vegetation types, approximately 35 percent of Service lands are covered by planted tame (or exotic) grasses or restored natives. Tame grasslands generally consist of smooth brome or Kentucky bluegrass, and few forbs. Both of these exotic grasses can be found on native prairie tracts, often compromising the health, vigor, and diversity of native sites. Restored native sites generally consist of a mix of four or five grass species such as big and little bluestem, sideoats grama, switchgrass, green needle grass, and a legume such as alfalfa or Canada milkvetch. Currently, no other forbs are used in restoration efforts, mostly due to high costs and difficulty in acquiring seeds suited to this location.

There are two primary ways to evaluate grassland condition. One is range condition, which is based on percentages of selected native plant species present at a given time as compared to percentages present under a climax range condition. The second is forage or vegetative condition, which is more commonly referred to as grassland vigor. This method does not evaluate grasslands based on species composition, but rather health of the plants. In general, both range condition and vegetative condition of WPAs are in fair-to-poor condition.

Wetland Vegetation

Wetland vegetation refers to those plants which grow in water or in soils which are saturated for most of the growing season. Wetland vegetation is broken down into four major categories of plants, based on their growth form and the wetland zone they inhabit. These categories are free-floating, submergent, emergent, and amphibious.

Free-floating are those wetland plants which float at or beneath the surface of the water without attached roots. Common examples are duckweed, bladderwort, and coontail. Submergent plants are those which have roots in the substrate, and do not emerge above the surface of the water, except some may have floating leaves. Examples are pondweed, water milfoil, waterweed, and widgeongrass. Emergent wetland plants are rooted in the substrate and the foliage grows partially or entirely above the water surface. Arrowhead, cattail, common reed, and bulrush are common examples. Amphibious refers to wetland plants that can grow as either a submergent or an emergent. Commonly, water levels drop, leaving these plants growing in a temporarily dry site. Some common plants are yellow water-crowfoot, pepperwort, and water smartweed.

Wetlands cover approximately 40 percent of WPAs and 35 percent of the Refuge. Most of these acres have one or more types of wetland plants. It is not uncommon for a single wetland to have all four categories of aquatic vegetation.

Endangered Plants

The Western prairie fringed orchid is the only known federally threatened plant species that may be present on the Complex. Historical locations have included sites in the Big Sioux River valley in the southeastern part of South Dakota. It occurs in moist, tallgrass prairies and sedge meadows, both of which can be found in the WMD. It appears to have been extirpated from South Dakota, but remote populations may have been overlooked as it does occur in adjacent counties of Minnesota, North Dakota, Iowa, and Nebraska.

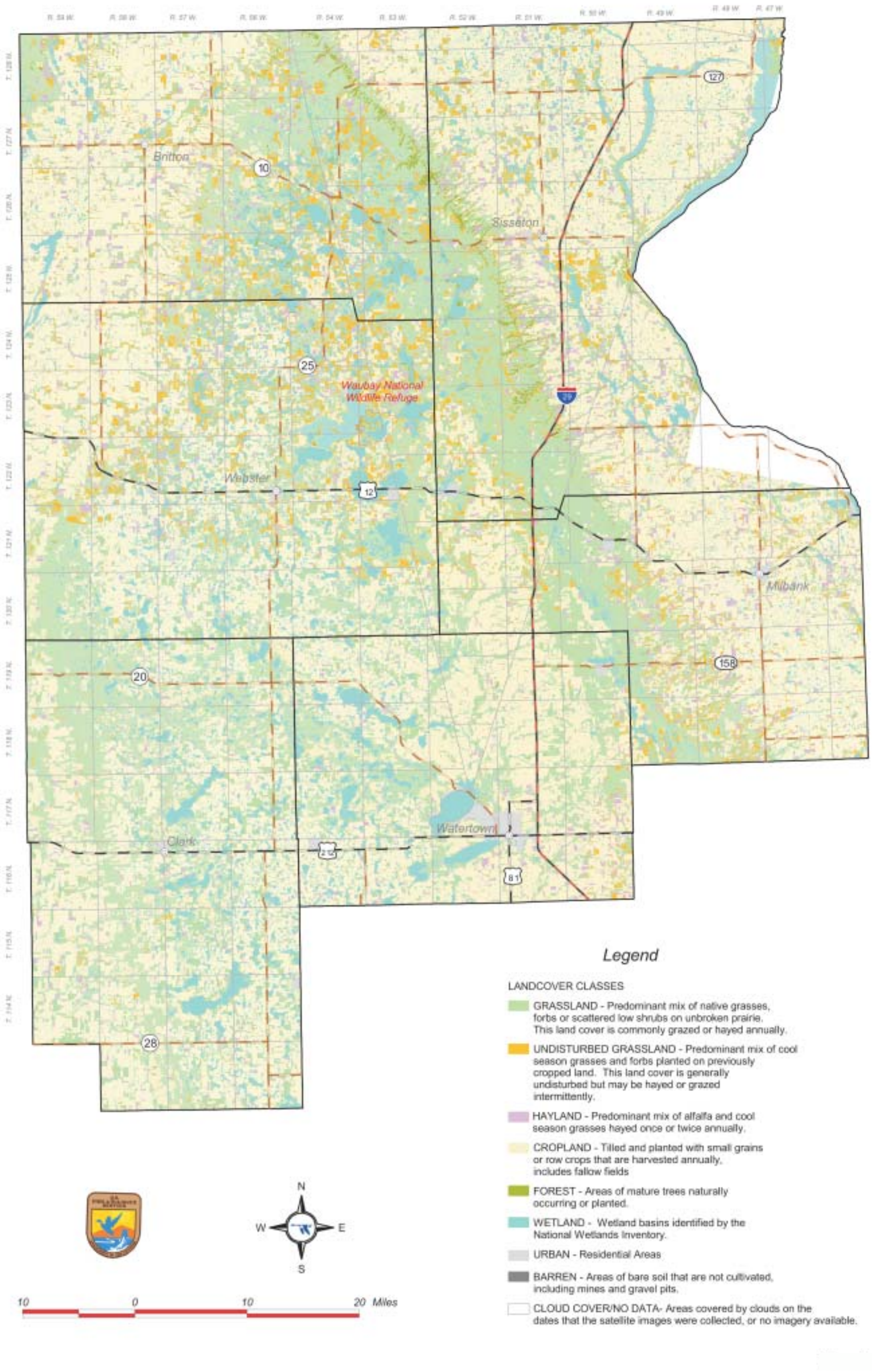
The major reason for its decline is the conversion of native prairie habitat into cropland and tame pasture. Heavy grazing, early haying, lack of fire, and noxious weed infestations can all have detrimental effects on this orchid. Widespread use of herbicides can also be a problem. Conversely, using herbicides in localized areas only, can be beneficial by removing competing, nonnative species. Preserves where the Western prairie fringed orchid is currently located are often managed by prescribed burning. Burning is used to reduce mulch buildup and control the increase of nonnative and woody plant species. This species of orchid is well adapted to survive periodic fires. It is not known whether carefully timed short-duration grazing or haying will have similar beneficial effects. Research is continuing in these areas. Moderate uses of these tools may have no effect as orchids have been known to persist on private lands in some grazed prairies and hayland (USFWS 1993; MN Department of Natural Resources 1991).

Noxious Plants

Many noxious plant species exist within the WMD. Most are introduced species with no natural controls. The primary ones on WPAs are Canada thistle, leafy spurge, and wormwood sage. These 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.

Waubay Wetland Management District

Landcover



Map 10 - Waubay WMD Landcover Types

Wildlife

Wildlife communities have changed significantly since settlement. Knickerbocker (1869) listed elk, buffalo, antelope, grey wolf, black bear, otter, and marten as occurring in the vicinity of Fort Sisseton, in Marshall County. All have been extirpated from the region. Small herds of antelope have been reintroduced and some buffalo are raised in domestic herds on ranches. The Fort commander issued an order in 1876 prohibiting killing prairie chickens on the military reservation, due to serious reductions in the population. Prairie chicken numbers have been low since the 1940s although a small breeding population has recently been observed in Clark County. A list of wildlife species present in the Complex can be found in Appendix A.

The following synopsis describes various species potentially occurring on Service lands. This information is not intended to represent or describe all species.

Invertebrate Populations

Wetlands associated with Service lands 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 Complex wetlands include worms, crustaceans, snails, and insects.

Fish Populations

Over 100 species of freshwater fish inhabit South Dakota waters and waterways. Thirty-nine are known, and 68 of these species have the potential, to occur in lakes and wetlands on WMD lands. The fishery associated with Service lands is classified as warm-water with low numbers of game fish and high numbers of minnows, carp, and suckers. Due to the shallow nature of lakes and wetlands, there is a high probability of fish winterkill. The exception are the Refuge lakes which are now part of Waubay Lake due to rising water levels. This lake is currently providing excellent northern pike, walleye, and yellow perch fishing.

Reptiles and Amphibians

Thirty-three species of reptiles occur in South Dakota. Ten are known, and 20 of these species potentially, occur within the Complex. Broad reptile groups include turtles, skinks, and snakes. There are 16 species of amphibians that occur in South Dakota. Eleven could potentially occur on Service lands (Fischer et al. 1999). These species consist of salamanders, toads, and frogs.

Birds

Two-hundred forty-seven bird species are recorded as regularly occurring within the Complex (USFWS 1988). About 109 of these species nest within the Complex. Another 12 species are accidentals or extirpated. A complete listing can be found in Appendix A. Species in the Complex listed in the Office of Migratory Bird Management's "Migratory Nongame Birds of Management Concern in the United States: The 2000 List" (USFWS 2000) are shown with an asterisk in the Appendix.

Waterfowl and Other Water Birds

Waubay Complex lies within the Prairie Pothole Region of North America. This area is of prime importance for producing many of the nation's ducks. In addition, as part of the Central Flyway, other waterfowl species use the area as important stopover sites on migrational routes. The tundra swan is the only species of swan to occur within the Complex. They are most often seen during fall migration. Three species of geese visit the Complex during migration. Canada geese, white-fronted geese, and snow geese pass through in the spring and fall. 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 Complex are: mallard, gadwall, northern pintail, green-winged teal, blue-winged teal, American wigeon, northern shoveler, wood duck, redhead, canvasback, lesser scaup, ring-necked duck, and ruddy duck. Common goldeneye, bufflehead, hooded merganser, common merganser, and red-breasted mergansers migrate through the region.

The diversity of wetlands associated with uplands on Service lands attracts a great variety of shorebirds, wading birds, and passerines. Many shorebirds use the mudflats and shallows along wetland edges or as water levels recede during their migrations in the spring and fall. Wetlands provide breeding habitat for a number of species of marsh and water birds including: eared, horned, red-necked, western, and pied-billed grebes; great blue herons; black-crowned night herons; American bitterns; Virginia rails; soras; American coots; killdeer; upland sandpipers; willets; American avocets; Wilson's phalarope; Franklin's gulls; and Forster's, common, and black terns. Red-winged and yellow-headed blackbirds are quite common in and around wetlands as are marsh and sedge wrens.

Grassland Birds

Since South Dakota is in the Northern Great Plains, grassland birds are the predominant bird life. Grassland bird species are of particular concern since they have shown consistent population declines over the past 30 years (Sauer et al. 1997). Some passerines that depend on grasslands include bobolink; dickcissel; savannah, grasshopper, vesper, and clay-colored sparrows; and western meadowlark. Other species that use grasslands for nesting, feeding, or resting areas include waterfowl, some shorebirds and wading birds, as well as short-eared owl, northern harrier, and Swainson's hawk. Sharp-tailed grouse are common upland species that nest within the Complex. The greater prairie chicken historically nested in the region, and a small breeding population was recently found in Clark County.

The brown-headed cowbird is a grassland species whose range has exploded across most of North America in response to the conversion of forests to farms and pastures. Once associated with the moving herds of bison, it is now less migratory and has successfully parasitized 144 of 220 species in whose nests its eggs have been found (Ehrlich et al. 1988). Cowbirds can be particularly destructive to the reproductive success of species that have not evolved or learned to recognize the foreign eggs. Cowbird eggs generally hatch one day earlier than host eggs and the larger, more aggressive cowbird young will out compete the host species hatchlings for food. Species that may be susceptible to cowbird parasitism include yellow warblers, red-eyed and warbling vireos, and song sparrows.

Other Migratory Birds

Raptors including eagles, hawks, falcons, and owls are found on the Complex. The most common are the red-tailed hawk, northern harrier, and Swainson's hawk. Smaller hawks, such as Cooper's and sharp-shinned hawks, and American kestrels have been documented as nesting in the Complex. The most common owl is the great horned owl. Other species that might be seen during migrations include osprey, northern goshawk, broad-winged hawk, and prairie falcon.

Refuge woodlands and area coulees provide habitat for many migrating warblers including palm, Tennessee, orange-crowned, yellow-rumped, mourning, blackpoll, and black-and-white warblers. They also provide habitat for yellow warblers, red-eyed and warbling vireos, rose-breasted grosbeaks, hairy and downy woodpeckers, black-capped chickadees, and numerous other woodland species.

No long-term studies of avian communities have been conducted in wooded draws. Casual observations have found five species of warblers during spring migration as well as reports of turkey vultures and pileated woodpeckers in wooded coulees in Roberts County. One study of woodland types in the Little Missouri National Grasslands found that certain neotropical migrants (red-eyed vireo, black-and-white warbler, yellow-breasted chat, American redstart, lazuli bunting, rufous-sided towhee, lark sparrow, and American goldfinch) were significantly more abundant in ash woodlands than in juniper, pine or even cottonwood habitats (Hopkins et al. 1986).

Mammals

An estimated 43 mammal species are found within the six county Waubay Complex. They range in size from tiny shrews weighing an ounce or less to large ungulates, such as the common white-tailed deer or the rarely seen wandering moose, weighing hundreds of pounds. Abundance varies with species. Prairie insectivores and native mice common to prairie ecosystems are very abundant, and species like the opossum and some species of bats are very uncommon on Service lands. No State or Federal endangered or threatened mammals are known to occur in Waubay Complex.

State and Federal Endangered and Threatened Species

Bald eagles, a federally listed threatened species, are an uncommon migrant throughout the State, but can winter in large numbers along the Missouri River (South Dakota Ornithologists' Union 1991). They were historically a rare breeder in the extreme southeast part of the State. Bald eagles were previously only seen during migration in Waubay WMD, but within the last 3 years, pairs have been found nesting in Roberts and Marshall Counties.

Piping plovers, a federally threatened species in South Dakota, are a locally common resident albeit primarily in the Missouri River valley. They are generally an uncommon migrant elsewhere in the State and have nested in Day and Codington counties only rarely (South Dakota Ornithologists' Union 1991). The last known nesting attempt in Day County occurred in 1985 between North and South Waubay lakes (SDGFP 1994). Loss of breeding and wintering habitat are its biggest threats. It needs open sand and gravel beaches with sparse vegetation for nesting and is a common breeding associate with the interior least tern.

The whooping crane, a federally listed endangered species, only rarely passes through the Complex during its migration. Most sightings occur farther west in the State. The most recent sighting in the WMD was in Clark County in fall of 2000. Before that, whooping cranes hadn't been seen in the District since 1985. The Eskimo curlew, endangered, is nearly extinct. They pass through the Great Plains on their migrations and can potentially occur in wet meadows within the Complex. The interior least tern, endangered, nests along the Missouri River in central South Dakota. It is an uncommon migrant in this area.

The osprey is a state threatened species whose numbers were drastically reduced as a result of DDT use in the country. It is an uncommon migrant throughout the state and previously nested in the southeastern part of the state (South Dakota Ornithologists' Union 1991), with a confirmed nest record in the Black Hills in 1991 (Peterson 1995). More recently in Waubay WMD, it has been reported during the spring, late summer, and fall in scattered locations, mostly in Day County.

The American burying beetle, an endangered species, was once common over most of eastern North America. It has since disappeared from over 90 percent of its historic range (Lomolino and Creighton 1996). Hypotheses explaining its widespread decline range from deforestation (Anderson 1982) to loss of available carrion in the required size (especially with the extirpation of passenger pigeons and greater prairie chicken) and increased competition for these resources from other scavengers such as raccoons, fox, and skunks (Amaral et al. 1997). Recent trapping efforts have found American burying beetles in extreme south central South Dakota, primarily in Tripp and Gregory counties (Backlund and Marrone 1995). A trapline set up on the Refuge in 1996 produced no American Burying beetles. Additional surveys should be done to completely rule out the presence of this endangered species. Current management tools used, especially prescribed burns and pesticides, could negatively affect invertebrate populations. Not knowing for sure if American burying beetles are present or how they may be affected by current practices leaves this species at risk.

The Topeka shiner is the only federally listed endangered fish species that may occur on the Complex. Although it was believed to be missing from much of its historic locations in South Dakota, recent surveys found healthy populations in many of the tributaries of the James, Vermillion and Big Sioux Rivers. As an indicator of stream health, finding the Topeka shiner suggests these systems are still relatively intact. Locating the Topeka shiner is the first step to protecting vital waterways and watersheds which sustain native fisheries as well as the human populations which also depend on clean water.

No federally listed reptiles or amphibians have been observed. The only State threatened species in this region is the northern redbelly snake. The usual habitat for this snake is moist woodlands. Waubay NWR is known to host this snake.

The Dakota skipper butterfly is listed as imperiled in South Dakota because of its rarity and vulnerability to extinction. It was also considered for Federal listing under the Endangered Species Act. Other rare prairie-dependent butterfly species found in the Complex include the powesheik skipper and the regal fritillary. Generally, large, undisturbed native prairie tracts are required habitat for these species. Management of sites where these butterflies are found will need to be adjusted to protect these species. Primarily, sites should be divided into smaller management units, to prevent management activities, such as burning or haying, from affecting the whole unit at once.

State threatened fish species that may occur on Service lands include the northern redbelly dace and trout-perch. State endangered species include the central mudminnow and the banded killifish.

Cultural Resources

A 1981 archaeological survey by Keller and Zimmerman found 27 archaeological resource sites on the Refuge. Their cultural inventory report concluded that four sites were significant resources. Artifacts found included lithics, ceramics, animal remains, and stone tools.

Additional sites exist in Day and Marshall Counties. The Waubay Complex lies within the Upper James, Prairie Coteau, Upper Big Sioux, and Northeast Lowland Archaeological Regions of the State. Documented occupation of the area spans a 10,000-year period. Significant cultural resources are probably present on some of the thousands of acres of native prairie. The Regional Archaeologist is consulted during the planning phase of any proposed project. The need for a cultural resource inventory is determined in consultation with the South Dakota Historic Preservation Office.

Public Use

The majority of outdoor recreational uses in northeast South Dakota are centered around fishing and hunting. Numerous glacial lakes provide many opportunities for fishing in the area. Due to the increase in water levels, Waubay Lake has become a premier fishery, featured in several sportsmen's magazines. In the past, the Complex was also well-known for its ring-necked pheasant and white-tailed deer hunting. Pheasant populations are recovering slowly from a low in 1997. Deer are still abundant, but many of the trophy bucks have been harvested due to a lack of emergent vegetation, which was used as escape cover. The area also offers some of South Dakota's finest waterfowl hunting and other small game hunting which attracts hunters from all parts of the United States. Many public lands provide the quality and quantity of hunting sites needed for residents and visitors to use.

Other outdoor activities such as photography, camping, hiking, and bird-watching are also popular in this region. The South Dakota Game, Fish and Parks Department has many State Parks and Recreation Areas that are used primarily in spring, summer, and fall seasons for these activities.

Facilities for visitors to Service lands are somewhat limited. Information kiosks with leaflet dispensers are located at the Headquarters building and tower. Refuge entrances and boundaries are marked with signs; limited directional and regulation signs are on the Refuge. A Visitor Center is located in the Headquarters building which provides information and exhibits for Refuge visitors. However, the building is currently only open during regular office hours (Monday-Friday 8:00 am to 4:30 pm), with no weekend hours. Two walking trails are available during daylight hours. One is ½ mile long and is located near the Headquarters building. A portion of this trail is accessible to persons with disabilities. The other trail travels ¼ mile up a small hill for a view of Spring Lake and native prairie. Both trails include interpretive signs. A 110-foot observation tower is also open for public use providing panoramic views of the Refuge and surrounding area.

All WPAs have boundary signs. No kiosks or designated hiking trails are located on WPAs. There are eight redwood recognition signs in the WMD that acknowledge from whom the Service purchased the property. These are usually located along well-traveled highways. Grassed parking lots are located at many of the larger WPAs to provide off-road parking.

Without a person on staff dedicated to public use, environmental education opportunities on the Complex are limited. Currently, these duties tend to fall on the wildlife biologist or any of the managers on staff. Talks and tours are offered at the Refuge when requested, if no conflicts occur with other duties. Programs offered to area schools or communities are also offered on an availability basis. Oftentimes, only a few programs are presented each year. Through an agreement with Ne-So-Dak's Glacial Lakes Outdoor School, educators from Ne-So-Dak use the Refuge as a base for their environmental education efforts. Approximately 250 to 350 school-age children visit the Refuge each year thanks to this partnership.

Economic Environment

The Refuge is in Day County, approximately 25 miles northeast of the city of Webster, the county seat and biggest town in the county, with a population of 2,200. The rural population is very sparse due to its agricultural nature. Recent low farm prices, coupled with water inundating many acres of cropland, have put a strain on the local economy.

Approximately 2.6 percent of the land in the six county WMD is owned by State or Federal agencies. To help achieve goals and objectives, upland habitat management is often accomplished by authorizing local farmers to hay or graze on Service lands. Weed control also helps economically by protecting neighboring land from infestation by noxious weeds. Surrounding landowners and economies may also be assisted through development of new weed control methods such as using flea beetles or other management tools and techniques.

The economy of the area is based primarily on ranching and tourism. Waubay Complex contributes to the local economy primarily by attracting tourists, bird-watchers, and hunters. The State collects hunting license fees for deer hunting on the Refuge. In 1999 the receipts for Refuge deer licenses totaled $4,270. Many out-of-state and resident hunters are drawn to the WMD for public waterfowl hunting. Most of them will spend money in this area for licenses, motels, food, fuel, and other hunting necessities. The permitting of some grazing and haying on Service lands benefits the local economy. In 1999 nearly 4,000 acres in the WMD were grazed, 67 were hayed, and 18 were farmed. Payments made to counties in-lieu of taxes for Service lands also provide economic benefit. In 1998 these payments totaled $50,513.

Interstate 29 cuts through the center of the WMD, north and south. U.S. Highways 12 and 212 go through east to west. The nearest airport with scheduled passenger service is in Watertown, the Codington County seat. Codington is the fifth most populated county in the State.

Most of the land adjacent to the Refuge is in private ownership. The Sisseton-Wahpeton Tribal boundary borders the Refuge to the east.

Special Designations

The woodland 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. No special management occurs due to the designation.

To be considered for Wilderness designation a site must be greater than 5,000 acres. No lands in the Complex qualify for this designation. No rivers qualify for Wild and Scenic River status.