Chapter 3: The Environment

Geographic/Ecosystem Setting

Three landscapes come together in Minnesota: prairies, deciduous woods, and coniferous forests of the north. This variation in landscape is caused by changes in climate and precipitation from north to south and is reflected in the wide diversity of plants and animals inhabiting the state (Wendt and Coffin 1988; Hargrave 1993; Aaseng, et al. 1993). The Districts own land within all three habitat types and all have changed dramatically since settlement, none more than the prairie landscape (Figure 3).

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Prairie Grasslands

At one time, the western edge of Minnesota was continuous prairie and scattered woodlands dotted with small wetlands, known as potholes. Snow melt and spring rains were contained in these small wetlands and released slowly into surrounding streams. The wetlands acted like a natural flood control system. All of this has changed since settlement. Now, only 150,000 acres of native prairie remain out of an original 18 million (Noss, et al. 1995). In some areas, virtually all of the potholes have been drained. Remnants of prairie and their associated wetlands are scattered and rare. They form the last refuge for many species of prairie plants and wildlife.

Deciduous Woods

The deciduous forest of Minnesota extends from the northern aspen parkland to maple basswood forests of the southeast. The term "deciduous" refers to trees that lose their leaves in the fall. There are many forest communities within this landscape. The northern aspen parkland is typical of a more Canadian landscape, with open understory, wet meadows, aspen, willow, and alder thickets. The communities include wild flowers like the northern gentian and prairie-fringed orchid, wildlife such as the moose, Sandhill Crane, Sharp-tailed Grouse, Black-billed Magpie and Yellow Rail. Further south, the deciduous forest changes to one dominated by maple and basswood and scattered oak savannahs. Birds of these hardwood forests include the Tufted Titmouse, Scarlet Tanager, Eastern Screech Owl, Broad-winged Hawk, Barred Owl, Red-eyed Vireo, and Wood Thrush to name just a few. Wild flowers in the spring are a special feature of these woods including trillium, hepatica, blood root, trout lily, Dutchman's breeches, and spring beauty (Moyle and Moyle 1977; Henderson and Lambrecht 1997).

Figure 3: Minnesota Wetland Management Districts Ecosystems

Coniferous Forest

The coniferous forests dominate the northeastern portion of Minnesota. They are characterized by red and white pines, balsam-fir, spruce, and white cedar mixed with other deciduous species. While the coniferous forests dominate Minnesota landscapes, the Districts own very little in this landscape because it is not particularly productive for waterfowl.

Climate

The climate of Minnesota is seasonal and highly variable. Average annual precipitation ranges from 20 inches in the northern aspen parklands to 32 inches in the southwestern prairie coteau. Within the eastern Great Plains, precipitation falls during two peak periods, one in early summer and a less pronounced peak in September. Average maximum annual temperature ranges from 50 degrees Fahrenheit in the northern aspen parklands to 58 degrees Fahrenheit in the prairie coteau. Average minimum annual temperature ranges from 23 degrees F in the aspen parklands to 36 degrees F in the prairie coteau. The growing season ranges from 125 days in the aspen parklands to 180 days in the prairie coteau (Hargrave 1993; Ostlie et al. 1996).

Hydrology

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Conversion of the prairie to agriculture and the general development of the area over the past 130 years has greatly changed the region's hydrology.

The Districts contain five major watersheds: the Red, the Upper Mississippi, the Minnesota, the Missouri, the Cedar and Des Moines Rivers (Figure 4). Of these, the Red, Minnesota, and Des Moines are clearly the most important hydrologically and culturally in terms of water flow, impacts to land use, and associated water resources. The Minnesota River is considered the state's most polluted river. The Red River watershed has been degraded by dam construction, agricultural practices, channelization, and loss of riparian vegetation.

The Red River is the only major American river that drains northward into Hudson Bay. Total drainage area in the U.S. is 39,200 square miles, of which 17,806 are in Minnesota. Due to regional patterns in precipitation, evapotranspiration, soils, and topography, the Red receives most of its flow from its eastern tributaries. Ten of these tributaries traverse the Districts.

Many rivers in the Districts have been channelized in the downstream reaches to improve agricultural drainage. Most of the small wetlands that once held spring melts have been drained for agriculture through ditches or subsurface tile systems. As a result of this facilitated drainage, damaging summer floods are becoming more common.

River hydrology has been further altered through the construction of approximately 270 flood control structures within the Minnesota basin of the Red River. Despite these flood control projects, the Red remains a flood-prone system due to heavy spring snow melt, the flatness of the area, and snow/ice melting in the upstream area of the basin before that in the downstream areas.

Figure 4: Minnesota Wetland Management Districts Hydrology and Key Rivers

The Roseau, Red Lake, Wild Rice, and Buffalo rivers account for three-fourths of the flood damage on the Minnesota tributaries.

The Minnesota River drains an area of 15,500 square miles within the District area. The Minnesota River begins in Browns Valley, where it is separated from the watershed of the Red River (Lake Traverse) by the Big Stone Moraine. As it flows toward its meeting with the Mississippi, the Minnesota River is impeded by four flood control reservoirs located at Big Stone, Big Stone/Whetstone, Marsh Lake, and Lac Qui Parle. Two smaller dams near Granite Falls slow the flow, but do not impound any water within the floodplain. One small hydroelectric dam operates near Mankato on the Blue Earth River. Flooding along the Minnesota is common within the floodplain, but does not have the same cultural or ecological impacts as on the Red River because the steep slopes of the Minnesota contain the river.

Southwestern Minnesota differs dramatically from the flat topography to the north and east. The Coteau des Prairies region grades from gently undulating to steeply rolling and hilly. These glacial moraines and ridges are well drained and have few depressions. This area flows mostly southwest into the Missouri River. The outer edges of the Coteau are less well drained and contain numerous wetlands and lakes. The Big and Little Sioux rivers are the two largest rivers in this area. Both flow to the southwest and into Iowa.

Geology

The area has a varied geological history but throughout the region, the departure of the last glacier, The Wisconsin, is still evident upon the land. The retreating glacier left behind gently rolling hills of gravel deposits with many scattered potholes, remnants left by melting glacial ice. In relative geologic time, the rivers that drain this land are new and inefficient (Ojakangas and Matsch 1982).

The southwest corner of Minnesota escaped the Wisconsin glaciation and features more bedrock exposures because that area escaped a blanket of glacial till or drift. Big Stone District is named after some of the rocky features of the bedrock exposure. Rivers and streams in this area are better developed, resulting in more efficient drainage systems.

Thousands of natural basins were left in the wake of thawing ice. Glacial lakes, the largest of these being Lake Agassiz, left behind a series of beaches and as they overflowed, they cut huge river channels. Lake Agassiz created a moraine at Browns Valley that spilled over to become the glacial River Warren, later to become the Minnesota River. The water volume of the Minnesota is a fraction of the River Warren, which flowed through its broad river valley with high stream terraces, dwarfing today's river. The Minnesota has eroded deeply into the glacial sediment and has exposed some of the world's oldest rocks along its narrow valley.

Wind-blown loess was also a major influence in the soils of Minnesota, especially in southwest Minnesota. The disintegration of the Wisconsin Glacier left a distinctive, fine-textured till containing a high volume of Paleozoic limestone and Cretaceous shale fragments. Combined with the loess swept by surface winds, it is the parent material for most of today's prairie soils of western and southern Minnesota.

District Resources

Wildlife

Waterfowl

The prairie pothole region has historically been recognized as the most important waterfowl production area in North America. Surveys have shown that although this area represents only 10 percent of the breeding habitat, it averages 50 to 75 percent of the duck recruitment each year in North America.

Waterfowl species that use the prairie wetlands of Minnesota include: Redhead, Northern Shoveler, Blue-winged Teal, Mallard, Gadwall, Wood Duck, Canvasback, and Canada Goose. Other waterfowl use the prairie wetlands to a lesser degree: Pintail, Lesser Scaup, and Ring-necked Duck. These species rely on grains for food most of the year but during the spring and summer, they shift to aquatic plants and insects. They depend on the wetlands for food during the breeding season.

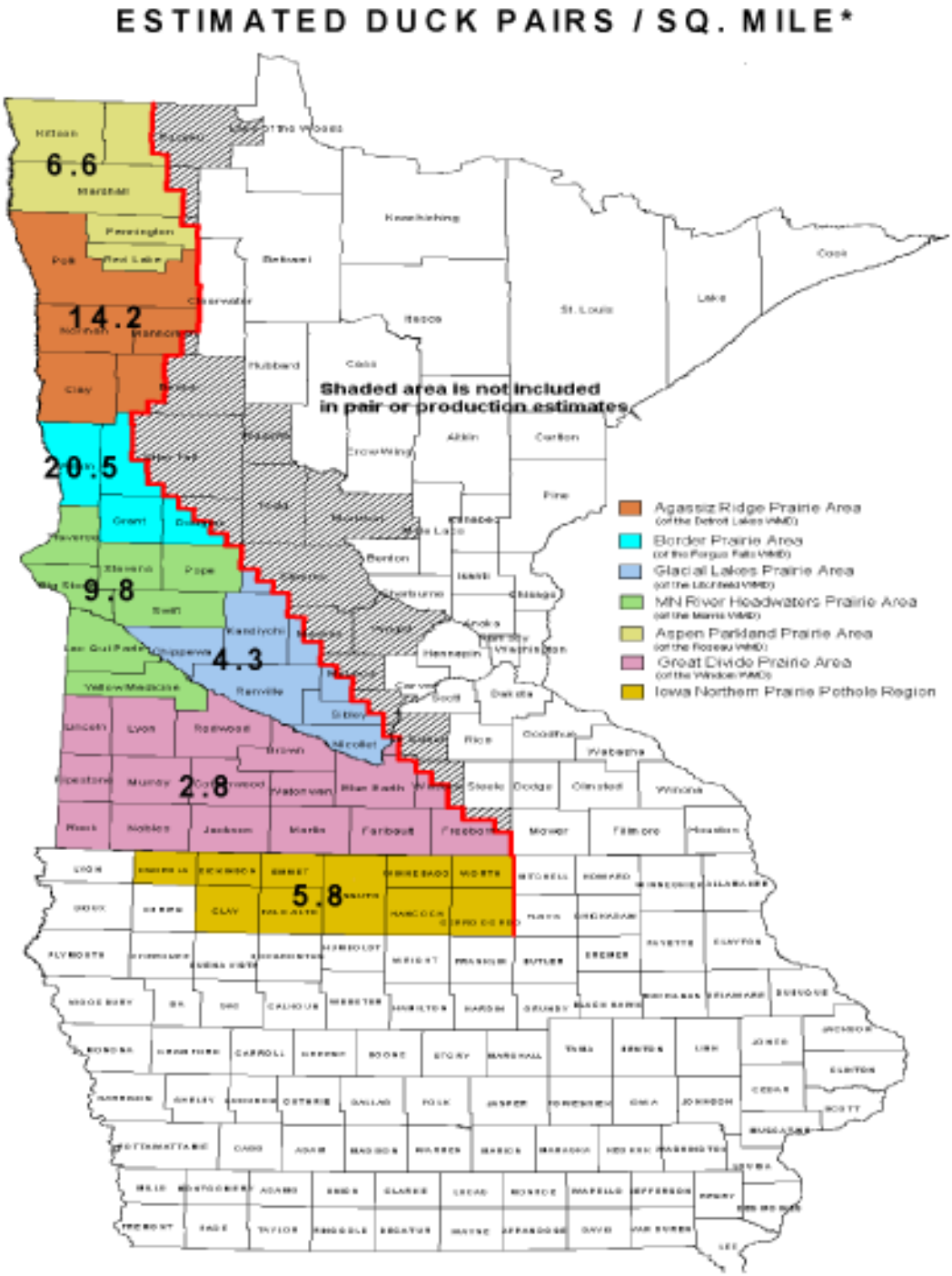
Photo Copyright by Jan Eldridge

The Habitat and Population Evaluation Team (HAPET) Office census waterfowl populations within the Wetland Management Districts of western Minnesota. Summary statistics generated by HAPET provide a necessary overview of waterfowl production and land use in the Districts. Their results show the variability between districts in breeding pair density. The average duck pair density ranges from 23.5 in the Fergus Falls WMD to 3.7 in the Windom WMD (Figure 5).

Rich soils and prairie wetlands make the region ideal for waterfowl, but also highly productive for agriculture. The corn and soybean belt overlaps extensively with the southern prairie pothole region. Massive conversion of wetlands and prairie to agricultural fields has dramatically altered the landscape, the hydrology, and the region's carrying capacity for waterfowl

Some waterfowl species are more susceptible than others to the transformation of prairie into agriculture. Mallards and Blue-winged Teal have been fairly successful in agricultural landscapes such as western Minnesota. Northern Pintails, on the other hand, have declined more dramatically than any other waterfowl species in North America (Ducks Unlimited 1990). At the turn of the century, Pintails were probably as common in the prairies as Mallards (Roberts 1932). Pintails favor ephemeral ponds, which were the first and easiest to drain. They often nest far from water and ducklings have to move overland to get to ponds shortly after they hatch. In the current landscape, newly hatched ducklings cross plowed agricultural fields in the spring and they are vulnerable to predation. Like Pintails, Gadwalls were once very common in this region. In 1879, Gadwalls were reported to be as abundant as Mallards if not more so (Roberts 1932, in Galatowitsch and van der Valk 1994). Now, Gadwalls comprise less than 1 percent of the breeding population in western Minnesota (Green and Janssen 1975). Roberts (1930) reported, the Gadwall "...suffered most severely from the settling of the country, probably as much from breaking-up of the prairie, where it commonly nested, as from the hunters." (Galatowitsch and van der

Figure 5: Estimated Average Duck Pair Density, 1987-1999



Valk, 1994). At the turn of the century, Canvasback and Redheads were common on the largest lakes and marshes. Initially, over-hunting depleted Canvasback populations but the decline of wetland habitat, especially the wild celery beds, made it difficult for them to recover (Galatowitsch and van der Valk 1994). Another diving duck, the Scaup, was also common but is now primarily a migrant through the region.

Research has shown that ducks nesting in large blocks of grassland habitat (1,000 to 10,000 acres) reproduce more successfully than ducks nesting in smaller blocks (200 to 500 acres) (Burger et al. 1994; Ball et al. 1995). Ron Reynolds of the HAPET Office in North Dakota found waterfowl production increased on WPAs near large blocks of CRP land (personal communication). His results show the importance of working with partners to increase effective habitat block size and offset habitat fragmentation.

A major factor depressing duck numbers is low nest success due to nest destruction by predators on small units of habitat. Predators are quick to find these remnant areas and concentrate their hunting activities on the vulnerable ground nests of waterfowl. In some habitats, predators such as red fox, raccoon, mink, and skunk are able to take virtually every duck nest and many of the attendant hens.

Although agriculture has been an important feature in this area for over 100 years, it has been particularly intensive during the last several decades. Conversion from small, diverse family farms to large agricultural operations specializing in monocultures of small grain and row crops has eliminated habitat on private lands such as pasture, hayland, and wetlands. Grassland birds are forced to nest in ever-dwindling fragments of remaining cover. Often the only nesting sites available are small isolated areas such as roadside ditches, abandoned farmsteads, rock piles or isolated patches of habitat such as our Waterfowl Production Areas (WPAs).

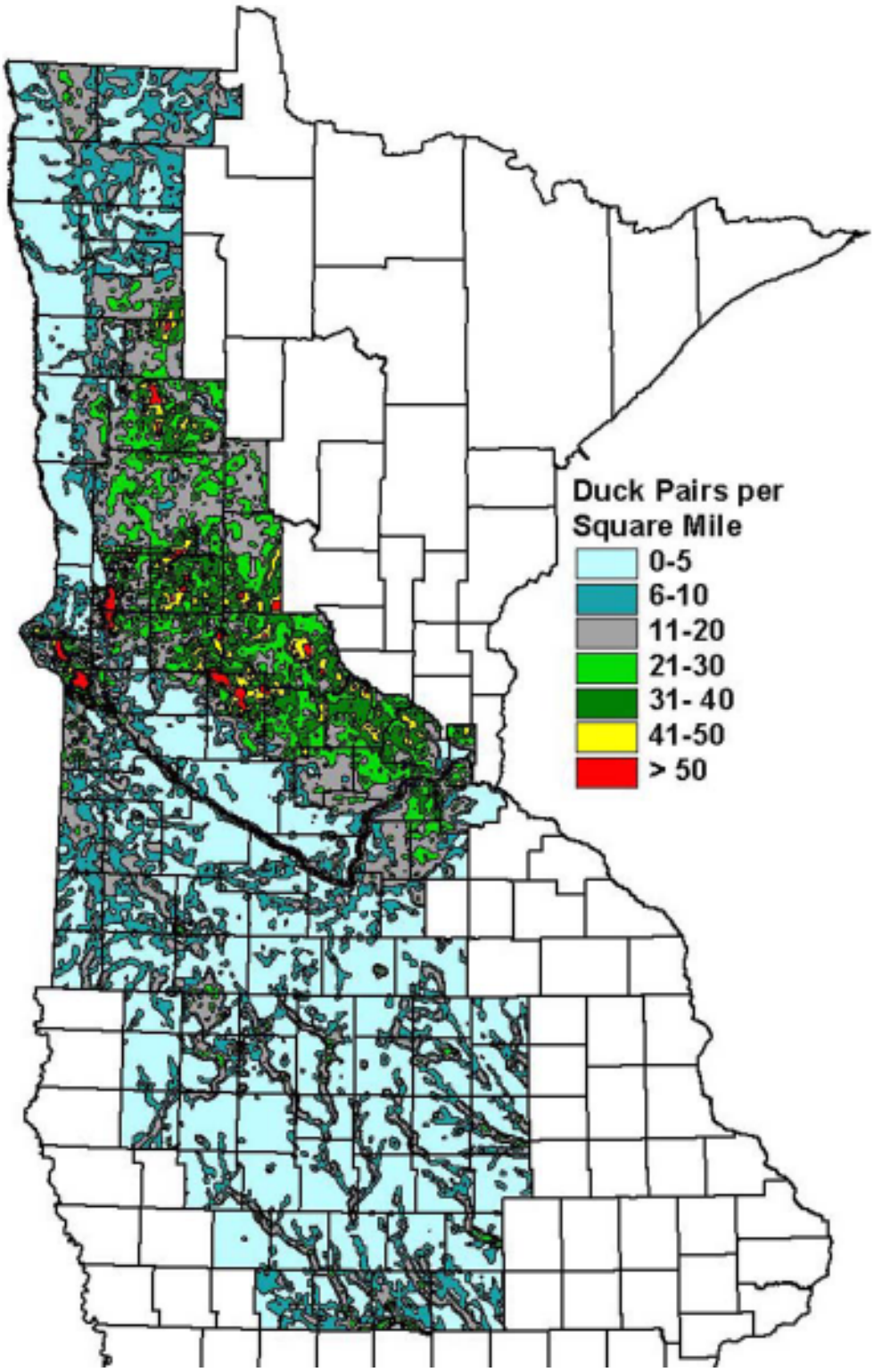
The average block size for Waterfowl Production Areas in western Minnesota is only 210 acres. In part, the small size of most acquisitions is due to the nature of the Small Wetlands Acquisition Program (SWAP). The original SWAP approach was simple — purchase only a minimum of acres in fee-title and surround them with permanent easements.

In truth, it is difficult to purchase large tracts of land in prime agricultural areas. What research identifies as an optimal size for wildlife is not always possible given the competing needs for the land. Local county land boards often will not support taking large blocks of land out of agricultural production and off the tax role. Areas that are important for waterfowl may not be available or for sale. To purchase land strategically, managers are faced with the difficult task of finding willing sellers in the most productive areas for waterfowl.

The landscape level monitoring by the HAPET Office, shows that waterfowl success varies depending on location within the state. There is even great variance between WPAs within a single District. The HAPET Office has produced a map for each district that ranks locations for waterfowl production. The maps are known as "thunderstorm maps" because they resemble doppler radar weather maps (Figure 6).

Existing GIS mapping data can be used to evaluate land acquisitions. Available information can be compiled to pick land parcels that have high potential for waterfowl and that are located near other conservation lands, such as state, county, or CRP set-aside land to increase the "effective size" of each unit. This approach can aid in setting priorities of acquisition. Ideally, managers could use these maps to identify "hot spots" within their district for purchase as WPAs.

Figure 6: Predicted Settling Density of Dabbling Duck Pairs



The Districts are trying to combat the unnatural impact of predators in small pieces of habitat by removing abandoned buildings and brush. Abandoned farmsteads are prime denning sites for major nest predators such as skunks (Lariviere and Messier 1998a, 1998b; Lariviere et al.1999). In addition, the Districts place nesting platforms in many wetlands, and predator control is practiced on a limited scale in conjunction with electric fence exclosures on 350 acres in Fergus Falls and 10 acres in the Morris Wetland Management Districts.

Another threat to waterfowl reproduction is the increasing application of agricultural chemicals such as fertilizers, insecticides, and herbicides on cropland adjacent to WPAs. Research has identified agricultural chemicals as important factors in decreasing bird populations directly as well as affecting their food resources in wetlands (see Chapter 3, External Threats).

Not all species of waterfowl are in decline. In recent years, the population of Giant Canada Geese has exploded across many of the Districts. Many WPAs contain the large wetlands favored by geese. These wetlands are often adjacent to private agricultural land. Canada Geese are upland grazers and, like most wildlife, will take advantage of the bounty planted nearby, whether it be succulent sprouts of soybeans, corn, or the grass of lawns and golf courses. On certain areas, geese can cause considerable financial hardship for farmers by wiping out relatively large areas of crops.

Although the more common species of ducks and geese in Minnesota have increased over the last decade, many are still below the goals of the North American Plan.

Migratory Birds

Minnesota Wetland Management Districts contain habitat important to bird species other than waterfowl, including songbirds, marsh and wading birds, shorebirds, raptors, and upland game birds. Approximately 243 species of birds regularly use the Districts at some time during the year, with 152 nesting species (Appendix B).

The U. S. Fish and Wildlife Service and the Minnesota Department of Natural Resources, Partners in Flight, an international bird conservation initiative, and others have evaluated the status of migratory birds, identifying "species of concern" at the state, regional, and national levels. Partners in Flight have developed a bird conservation plan that focuses on declining grassland and wetland birds in the Northern Tallgrass Prairie Bird Conservation Region. This plan provides information on the habitat needs of these species and proposes a model of landscape-level habitat conservation for grassland birds (Fitzgerald et al. 1998). In the Districts, 48 birds identified as "species of concern" are rare, declining, or dependent on vulnerable habitats, including 43 that breed there. This list does not include hunted waterfowl or federally-listed threatened or endangered species, which are dealt with in another section of this document (Appendix B).

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About 44 percent of the species of concern depend on some type of grassland habitat. Important habitats in the District include native and restored prairies, seeded grasslands (cool- or warm-season grasses), light- to moderately-grazed pastures, Conservation Reserve Program lands (CRP), sedge meadows, old fields, and hayfields (if not mowed before July 15). In North America, grassland birds have exhibited steeper declines than any other avian group. Their decline has a number of causes: loss of

breeding and wintering habitat from agriculture, urbanization, habitat degradation from fire suppression, inappropriate grazing regimes, woody plantings, pesticides, and nest predation and cowbird parasitism.

Within the category of "grassland birds," individual species show a variety of habitat preferences based on vegetation height, cover density, grass/forb ratio, soil moisture, litter depth, degree of woody vegetation, and plant species composition. It is important to maintain a mosaic of grassland habitats to meet the varying needs of grassland birds.

Some of the species of concern found in the Districts are area-sensitive, which means they require large, contiguous blocks of habitat to reproduce successfully. Area-sensitive species include the Greater Prairie-chicken, Northern Harrier, Upland Sandpiper, Bobolink, Henslow's Sparrow, and Savannah Sparrow.

Vertebrate and Invertebrate Species of Concern

"Species of concern" refers to those species for which the Service has incomplete and inconclusive information, but which might be declining in range, numbers, or security. Service and state agency biologists and other experts confer on and use natural heritage data bases and other published and unpublished information to follow the welfare of these species. They have no protection under the Endangered Species Act (Act) and are not candidates for listing.

Species of concern are a diverse group of animals united by two factors: (1) the Service is watching them, and (2) they occur within the general area and thus could appear in or near tracts within the Districts. Some of these animals occur only in prairie habitats. Some of the arthropods can live only in good tallgrass prairie habitat and thus are good indicators of high quality prairies. It is not possible to predict which, if any, of the species may occur on tracts within the Districts, nor predict how their occurrence would be a factor in decisions regarding individual tracts. They are necessary components of a healthy, functioning tallgrass prairie ecosystem and are indicators of prairie tract quality.

Region 3 of the Service has developed a Resource Conservation Priorities (RCP) document that includes all species of concern within the Region (U.S. Fish and Wildlife Service 2002). The Minnesota Department of Natural Resources maintains an official state list of animals being watched for changes in abundance and distribution, and of animals that are endangered or threatened and protected by state law. The Service will consider species listed by the State of Minnesota along with Service species of concern in evaluating prairie sites and developing site protection measures.

Reptiles, Amphibians, and Insects, Vertebrates and Invertebrates

Reptiles, amphibians, and insects may have limited popular appeal, but each species plays an important role in the prairie ecosystem. The degree of interconnectedness in the tallgrass prairie ecosystem is high. Landmark species such as the Eagle, badger and coyote find their food sources in these groups. Prairie plant diversity depends upon pollination and seed dispersal, as well as soil aeration by the great variety of insects. Grasshoppers (family Orthoptera) are major herbivores in the prairie ecosystem, and many native prairie flowers rely on bees, butterflies and others for pollination. Numerous prairie birds, amphibians, reptiles, and small mammals feed exclusively or partly on insects. The web of successes and failures within tallgrass prairie communities is anchored to every point of diversity within the system, and the protection of this entire spectrum is necessary for the persistence of its varied parts.

Listed Endangered and Threatened Vertebrates and Invertebrates

This section describes animals that are Federally listed under the Endangered Species Act of 1973, as amended, and are listed as either endangered or threatened.

Threatened Mammals

Gray wolf, *Canis lupus*: Experts estimate approximately 2,000 gray wolves presently occur in Minnesota. Wolf numbers and range appear to be increasing in Minnesota. Wolves are no longer exclusive residents of Minnesota's forested wilderness areas, and adult wolves from Minnesota have dispersed through central and western Minnesota to North and South Dakota. The Service recognizes the improving range and security of the species and reclassified the wolf from endangered to threatened.

Threatened/Endangered Birds

Bald Eagle, *Haliaeetus leucocephalus*: Bald Eagles have increased in abundance and distribution across the United States, including Minnesota, and have been reclassified from endangered to threatened. In the 1990s nesting territories increased in Minnesota every year from 437 in 1990, to 618 in 1995. Increasing numbers of migrating and wintering eagles also occur across Minnesota where they find sheltered night roosts and feed on waterfowl, smaller wild mammals, and fish in open water areas. Bald Eagles became endangered because of habitat loss, but especially because of DDT use following World War II. Today, the DDT threat is largely gone. Now the challenge is to prevent contamination and loss of sites that eagles depend on for nesting, feeding, migration, and wintering.

Piping Plover, *Chadarius melodus*: Piping Plovers are tenuously present in Minnesota. They nest in Lake of the Woods, east of the Districts. Piping Plovers nest in coastal areas, but they are also prairie birds, nesting across the Great Plains of the United States and Canada, but in perilously low numbers. The Great Plains population is listed as threatened. The loss of prairie wetland areas contributes to their decline. Like many shorebirds, Piping Plovers feed on immature and adult insects and other invertebrates at the water's edge. They winter primarily along beaches, sandflats, and algal flats on the Gulf of Mexico.

Least Tern (eastern population), *Sterna antillarum*: Listed as endangered, the Least Tern nests along large rivers of the Colorado, Red, Mississippi, and Missouri River systems. This species is a potential nester in the Missouri River area. It nests on sand and gravel bars and protected beach areas of large rivers and winters in coastal Central and South America. The species is endangered because human disturbance and alteration of river systems has rendered much of its nesting habitat unusable. Pesticides may reduce food available to the tern by reducing the numbers of small fish in their feeding areas.

Reintroductions

The public has an interest in seeing presettlement native wildlife species returned to the landscape. Examples include Greater Prairie Chickens, Trumpeter Swans, bison, and wolves. Giant Canada geese, once thought extinct, have returned to the prairies of Minnesota in numbers as a result of captive breeding and reintroduction programs. However, at times restoration efforts, and the ensuing adaptability of the species like the Canada Goose, can create its own set of management problems (see next issue). Due to the relatively small size of WPAs and the concerns for impacts off of WPAs, reintroductions of species like bison and wolves are not practical. However, Trumpeter Swan reintroductions have been successful and well-received by the public, while Prairie Chicken reintroduction is showing some sign of success depending on the area. There is also the potential for reintroducing species of prairie plants and native

small mammals, reptiles and amphibians, and even insects like the Dakota Skipper butterfly on certain units.

Management of Resident Species

Federal trust species are generally those that cross state and international boundaries or are afforded national protection through various laws and treaties, such as the Migratory Bird Treaty Act and the Endangered Species Act. The well-being of waterfowl populations is a classic Federal trust responsibility and the main purpose for the creation of the Small Wetland Acquisition Program in the 1960s. This does not mean that resident species such as white-tailed deer and Pheasants found on WPAs should not receive management attention. Rather it is the degree of management focus, based on the knowledge that management for trust resources like waterfowl will usually benefit the myriad of resident wildlife that share the prairie-wetland landscape.

Local and regional residents, however, may often favor the management for those species like white-tailed deer and pheasant that provide consumptive recreation opportunities. Thus, managers are often faced with requests for food plots, tree and shrub plantings, or direct stockings of game species that may have a negative effect on the primary purpose of waterfowl production and the broader goals of restoring native plant communities. The key is to seek the proper balance between practices focused on trust species and those that can accommodate the public's desire for resident wildlife management.

Habitat

Wetlands and Riparian Habitat

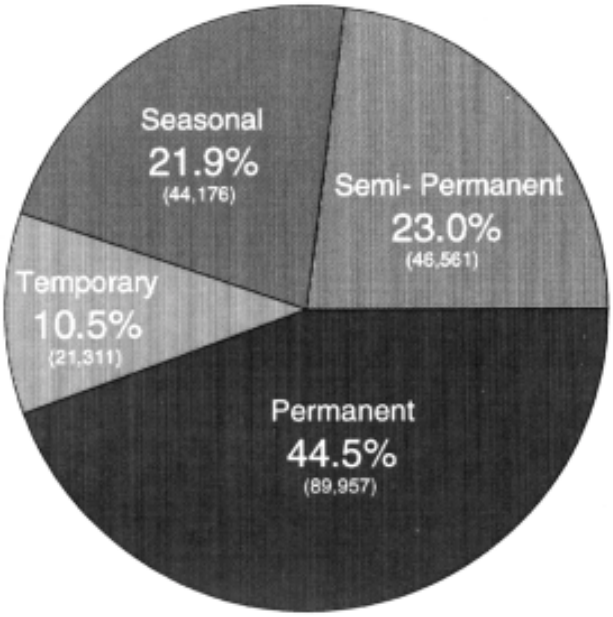
Prairie wetlands and prairie streams are an important part of the prairie ecosystem. Minnesota is naturally rich in wetland and riverine habitats (Appendix D). Western Minnesota is part of the prairie pothole region, characterized by numerous, shallow wetlands known as potholes. These wetlands provide essential fish and wildlife habitat, permit ground water recharge, and act as filters of sediment and pollutants. They reduce floods by storing water and delaying runoff. The region once included about 20 million acres of these small wetlands. They were unconnected and poorly drained and in the spring they retained water, acting like a great landscape sponge. Over the course of the season, water drained slowly.

Settlers found the shallow wetlands difficult to farm. In addition, the wetlands kept the water table high so much of the land was saturated in a wet year. When the land was converted to farms, the new owners built drainage ditches, straightened streams and drained shallow wetlands off their land. Today, only about 5.3 million acres remain in 2.7 million basins within five states. Now, in the spring, water rushes off the land and floods the streams and rivers. Drainage has been so extensive that in many areas the water table has been lowered and the hydrology of the entire region has been transformed.

More than 78 percent of the remaining wetland basins are smaller than 1 acre in size. Nearly two out of three of the remaining wetlands in Minnesota are privately owned; consequently, they are vulnerable to continued drainage, development, and pollution.

The Wetland Management Districts have focused on saving and restoring the small wetlands of Western Minnesota. They have been remarkably successful in saving a variety of wetland types (Figure 7). Wetland diversity is important because wetlands change continuously; a single wetland can not be maximally productive all the time.

Figure 7: Wetland Distribution by Type, Fergus Falls WMD



Waterfowl use specific types of wetlands at different times during the breeding season. Laying hens may forage in ephemeral, temporary, and seasonal wetlands early in the season and shift to semipermanent and permanent wetlands after the brood is hatched. Marsh birds need a variety of wetlands in close proximity so they can shift from one wetland to another as the wetlands cycle through different phases. It is very important that natural wetland complexes be preserved. Wetland complexes include a variety of basins, some shallow and some deep, in close proximity. Diverse wetland complexes are rare today because most shallow ephemeral, temporary, and seasonal basins have been drained.

Saving single, isolated wetlands is much less valuable than saving several wetlands in a wetland complex. The Wetland Management Districts focus on acquiring wetland complexes with a variety of wetland types.

The fluctuating water levels in the shallow wetlands are natural to the dynamic pattern of precipitation in the prairie. The changing water level results in circular bands of vegetation around each basin because different plant species have different tolerances for saturated soils. The depth of the basin also affects the kind of vegetation that grows. The drying pattern is one of the features used to classify wetland basins (Cowardin et al.). Deeper basins have perreneal emergent vegetation such as cattail and dry every 5 to 10 years. Wetlands that dry every other year or on a several year cycle are called semi-permanent or permanent wetlands. Basins that dry every year are temporary and seasonal wetlands. Some very shallow basins dry early in the spring after the frost leaves the ground and as a result are called ephemeral wetlands.

Freshwater wetlands like those in the prairie pothole region are among the most productive in the world (Weller 1982). The dynamic water cycle creates a rich environment for many waterfowl and other marsh birds. Cycling water accelerates decomposition of marsh vegetation, resulting in a natural fertilizer. When the basins

Figure 8: Marsh Vegetation Cycles

recharge in the spring, the water becomes a soup of nutrients and supports a diverse and healthy population of aquatic invertebrates, which feed reproducing waterfowl and marsh birds throughout the spring and summer. In the larger basins, the vegetation changes from densely closed cattail or bullrush cover to completely open over a period of years (Figure 8). In the process of transition, the cover vegetation moves through a phase, known as hemi-marsh, when clumps of emergent vegetation are interspersed with open water (Weller 1982). In this phase, the structure of the vegetation itself creates habitat and stimulates the production of aquatic invertebrates. The marsh, in this phase, hosts the maximum number of marsh birds. Unfortunately, the phase is only temporary and most wetlands cycle out of it in 1 to 3 years.

The prairie potholes are too shallow to be fish habitat but they have been used in the past as hatcheries for minnows and walleye fingerlings. Leeches are also harvested from these shallow ponds. Unfortunately, many of these artificially introduced native species consume the same aquatic invertebrates as waterfowl. Fathead minnows occur naturally in some wetlands in the region and have a significant negative effect on the invertebrate populations of the wetlands (Hanson and Zimmer 1999).

Wetland restoration and management are high priorities in the Districts. In many areas, the entire hydrology of the area has been altered and restoration is not always a straightforward matter of plugging drains and filling in ditches (Galatowitsch and van der Valk 1994). Restored wetlands employ water control structures for water level management to mitigate the disruptive impact of wide scale drainage that has altered natural water cycles. Many wetlands on WPAs are flooded because surrounding wetlands on private land have been drained and the excess water moves into the WPA. Water control structures are often necessary, but these structures require funding to install and staff to maintain. Neither are in adequate supply to do what is needed.

Partners for Fish and Wildlife Program

Wetland Districts in Minnesota have led the nation in the sheer number of wetlands restored through the cooperation of private landowners in the Partners for Fish and Wildlife Program (Private Lands). The program assists private landowners with the improvement or restoration of wildlife habitat on their land. Technical assistance, contracting, cost-sharing assistance, and actual earth work is provided to private landowners throughout the Districts. Since the program's inception in 1987, 12,000

wetlands totaling more than 40,000 acres have been restored. However, some Districts are now finding it more difficult to find landowners willing to restore wetlands. More staff effort is required with longer trips and greater expense to seek out landowners willing to restore wetlands. Managers have also begun to explore assisting landowners with efforts to restore native prairie and riparian areas.

Districts have also restored more than 10,000 acres of native grasslands on private property through the Partners for Fish and Wildlife Program during the same period. In the past 2 years, new funding sources within the Partners for Fish and Wildlife Program have placed added emphasis on riparian and instream habitat restoration, and this has the potential to create additional opportunities for the Districts to accomplish habitat restoration on private lands.

U.S. Department of Agriculture (USDA) programs have created many new opportunities for Districts to assist in the restoration of a variety of trust resource habitats on private lands. The USDA's Conservation Reserve Program (CRP) has placed an emphasis on wetland and native prairie restoration as a condition of enrollment, and many new participants are making their lands available for wildlife habitat restoration. This presents an important role for the Districts to lend their restoration experience and expertise to make these CRP restorations as high-quality as possible. The USDA's Wetlands Reserve Program (WRP) likewise presents opportunities for Districts to accomplish migratory bird objectives on private lands utilizing other agency programs and dollars by making experience and expertise available to implement habitat restoration projects.

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The Districts' perpetual easement program, which encompasses both wetland and conservation easements (both wetlands and uplands on a property), has greatly benefited from the success of the Partners for Fish and Wildlife Program over the past 10 years. Many of the private landowners who have restored wetlands on their lands through the Partners Program have since come back to the District seeking establishment of a permanent easement on their property to offer protection to their project in future years. In some Districts it is fair to say that the vast majority of new easements recorded in the past few years first started as Partners projects. This continues to meet the needs of landowners who wish to improve their land for wildlife, for themselves and for future generations.

By providing habitat restoration funds to complete restoration projects initiated by the Districts as well as technical assistance funds to provide restoration experience and expertise to other agencies' programs, the Partners for Fish and Wildlife Program puts the Wetland Management Districts in a wonderful position to accomplish a multitude of, and a variety of, trust species habitat restoration projects over the next 10 years.

Prairie Restoration

Prairie landscapes are much more diverse than they seem at first glance. They contain hundreds of species of plants, invertebrates, and wildlife. Some prairies contain as many as 200 plant species. The landscape is dominated by a relatively small number of widespread, sod-forming bunch grasses such as big bluestem, northern

dropseed, and porcupine needlegrass, but flowering plants constitute the greatest number of species (80 percent in some areas). Most abundant members are from the pea and sunflower families such as wild indigos, prairie clovers and scurf peas (pea family); and asters, gay-feathers, goldenrods, coneflowers, and sunflowers (aster family) (Henderson and Lambrecht, 1997).

Over the past decade, virtually all plantings of upland cover on Waterfowl Production Areas have been with native grasses. In recent years, a more diverse mixture of native forbs and warm and cool season native grasses have been used. Plants within a single species vary with latitude (called ecotypes) and an effort is being made to plant local ecotypes in restorations. Harvesting techniques of existing tallgrass prairie and refinement of the cleaning and seeding process has made seed gathering easier. However, many native prairie forbs remain in short supply and are extremely costly for large areas.

Prescribed fire remains a critical tool for maintaining the diversity and vigor of existing and restored prairie plants. Prescribed burns can only be done during a small window of time in the spring, so the number of acres that can be burned each spring is limited. As a result, most WPAs can not be burned on a rotation frequent enough to suppress invading shrubs and trees. Some of the Districts use haying and grazing as additional means of maintaining grassland integrity.

The Districts also manage grasslands through the selective application of herbicides during restoration. In 1990, 15,825 pounds of active ingredients representing 20 herbicides were applied to 15,533 acres of Service-managed lands in Minnesota (USFWS 1990). The most heavily and most frequently used chemical was 2,4-D. In 1987, approximately $100,000 was spent on noxious weed control on approximately 16,000 acres of District lands (USFWS 1992). Because of concern that chemical use could impact water quality (See Issue 9), the Twin Cites Ecological Services Field Office conducted a 2-year study beginning in 1992 to determine the impact of the herbicide application on wetlands in the Districts. Results indicated that concentrations of 2,4-D were consistently low and at concentrations that have not been shown to have an adverse affect on aquatic life (Ensor and Smith 1994).

Rare Communities

Waterfowl Production Areas provide one of the last bastions of grassland and wetland habitat in the prairie area of Minnesota. These areas provide some of the last remaining habitat for threatened, endangered, rare or unique wildlife and plants. Examples include the threatened western prairie fringed orchid and prairie bush clover, and numerous species of grassland and wetland-dependent species that are declining in numbers. There is a need to have better baseline information on what species are present on each WPA, and to monitor the effects of wetland and prairie restoration efforts on these species of special concern.

Minnesota County Biological Survey (Survey) conducted systematic surveys of rare biological features from 1987-1995. The goal of the Survey was to identify significant natural areas and to collect and interpret data on the distribution and ecology of rare plants, rare animals, and natural communities. The Nature Conservancy, through a cooperative agreement with the Service, consolidated these data and the data of the Natural Heritage Information Systems of the Minnesota Natural Heritage, and Nongame Research Program. From this data, the existing protected areas within Minnesota were mapped and community types were identified.

Within the northern tallgrass prairie ecoregion (Iowa, Manitoba, Minnesota, North Dakota, and South Dakota), 97 terrestrial natural communities have been documented.

Rare communities most at risk are the mesic, wet, and dry prairie types. Three grassland communities (mesic tallgrass prairie, sedge meadow, and lake plain wet prairie) are critically endangered in the United States (Noss et al., 1995). The tallgrass prairie ecosystem includes the following community types:

Dry Prairie	Mixed Emergent Marsh
Mesic Prairie	Shrub Swamp
Wet Prairie	Aspen Woodland
Mesic Brush Prairie	Aspen Openings
Wet Brush Prairie	Dry Oak Savanna
Calcareous Seepage Fen	Mesic Oak Savanna
Rich Fen	Oak Woodland/Brushland

Some community types are broken down into subtypes, for example: Sand-Gravel Subtype of the Dry Prairie Type. Others include hill and barrens (dry prairie type), saline (wet prairie type), and prairie (calcareous seepage fen type). The prairie type of Calcareous Seepage Fen is one of the most valued of the rare plant communities in the Districts. These fens typically are surrounded by wet-mesic prairie species. The seepage area itself commonly contains patches of emergent aquatic species such as cattail, hard-stemmed bulrush, and common reed. Such areas occur throughout the Districts but are more common in the Lake Agassiz Beach Ridges.

Prairie community types are diverse, some are rarer than others; but with less than 1 percent of all northern tallgrass prairie remaining, special consideration is warranted for all types and subtypes. It can be argued that all intact prairie plant communities are rare. Tallgrass prairies have the highest percentage (65 percent) of rare community types of any group. The importance and uniqueness of individual tracts become apparent when ecotype variation is considered. For instance, warm season grasses generally vary one day in flowering time with each 9-14 miles in a north-south gradient. No doubt many more subtle ecotype variations occur.

Due to the disproportionate loss of community types, individual plant species of the prairie are becoming rare. For example, the western prairie fringed orchid was historically widespread and common in calcareous mesic to wet mesic prairies and sedge meadows. Wholesale conversion of its habitat to agriculture has resulted in the plant being placed on the Federal endangered species list.

Plant Species of Concern

"Species of concern" is an informal term in this document for species which the Service has incomplete and inconclusive information, but which might be declining in range, numbers, or security. Service biologists confer with state agency botanists and other experts, and use state natural heritage program data bases and other published and unpublished information to follow the welfare of these species. Species of concern have no standing or protection of any kind under the Endangered Species Act (Act) and they are not candidates for listing under the Act. Nevertheless, the Service is interested in them and is alert for need to provide early assistance to these species to avoid the need to list them under the Act.

These species are a diverse group of plants united by two factors: (1) the Service is watching them, and (2) they occur within the general area and thus could appear in or

near District tracts. It is impossible to predict which, if any, of the species may occur on tracts managed by the Districts. It is also impossible to predict how the occurrence of one of these species on or near a tract would factor in decisions regarding individual tracts beyond the Service's intent to recognize these species as valid and necessary components of a healthy, functioning tallgrass prairie ecosystem and as indicators of prairie tract quality.

The Minnesota Department of Natural Resources maintains an official state list of plants being watched for changes in abundance and distribution, and of plants that are endangered or threatened and protected by state law. There are approximately 80 such species in the counties of Minnesota. Biologists of the state natural resource agency and the Service maintain ongoing communication regarding these species, some of which are excellent indicators of prairie quality.

Listed Plants
This section describes plants that are federally listed under the Endangered Species Act of 1973, as amended, and are listed as either endangered or threatened.

Prairie bush clover, *Lespedeza leptostachya*: Occurs in dry, gravelly hill prairies and in thin soil prairies over granite bedrock. Common on prairies with big bluestem (*Andropogon gerardi*) and Indian grass (*Sorghastrum nutans*). More sites are known for this species than were known when it was listed and it appears able to grow in disturbed areas. The species may be stable or, if declining, declining slowly. The need for protection remains.

Western prairie fringed orchid, *Platanthera praeclara:* Occurs in moist, calcareous subsaline prairies and prairie sedge meadows and swales (Coffin and Pfannmuller 1988). The species may be stable, but loss of tallgrass prairie habitat has markedly reduced its original range. Present sites are threatened by human activities and land use changes and by invasion by leafy spurge (*Euphorbia esula*).

External Threats

Drainage and Pesticides
Waterfowl Production Areas are often islands in a sea of intensive agriculture. Natural drainage patterns have been altered throughout the landscape, increasing the frequency, intensity, and duration of water flowing into many units. Siltation, nutrient loading, and contamination from point and non-point sources of pollution are a serious problem on many WPAs. Waterfowl Production Areas are also threatened by farming trespass, dumping, wildfires, and pesticide applications on adjacent agricultural land. A recent study in Ontario examined the effects of habitat and agricultural practices on birds breeding on farmland and determined that the most important variable decreasing total bird species abundance was pesticide use (Freemark and Csizy 1993).

Recent changes in agriculture have accelerated the impact of pesticides on surrounding land. Genetically altered Round-up ready corn, soybeans, cotton and sugar beats have expanded the window of opportunity for pesticide applications and promises to kill everything green on fields except the genetically altered crops. Another altered crop, Bt. Corn, contains a genetically engineered insecticide. Even the pollen from this plant can kill certain insects, such as monarch butterflies.

Research has shown that insecticides commonly used for sunflowers, soybeans and corn can kill wildlife directly and indirectly (e.g., by decreasing the amount of food available to ducks). For example, ducks feed on grain much of the year but in the spring they shift to aquatic invertebrates (insect larvae, amphipods, snails, etc.) and

depend on this food source for reproduction and survival. Even when aerial pesticide applications are done carefully and wetlands are avoided, the chemicals drift into wetlands in measurable amounts and kill aquatic invertebrates (Tome et al. 1991 and Grue et al. 1986).

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Insecticides have a direct effect by killing aquatic invertebrates, but herbicides also have an indirect effect on food available to waterfowl. The Service conducted a study of the impact of agricultural chemicals on selected wetlands in four of the Wetland Management Districts (Ensor and Smith, 1994). Herbicides from surrounding agricultural land enter wetlands and disrupt the functional interaction between vegetation structure and aquatic invertebrate life. The changing dynamic reduces food available to breeding waterfowl.

Seasonal and semipermanent wetlands (the majority of WPA wetlands) are the most exposed to agricultural chemicals. These wetlands are small and interspersed with croplands, which increases the probability of pesticides from over-spray and aerial drift. Most herbicides and insecticides are applied to crops in the spring and early summer, coincident with maximum runoff and waterfowl breeding. Ensor and Smith (1994) write:

> "A result of our survey... indicates that prairie pothole wetlands may involve interactions of multiple herbicides (and potentially insecticides) comprising chemical "soups" unique to individual wetlands."

This study showed that "typical agricultural use" of pesticides on surrounding land had a significant impact in reducing the biological quality of WPA wetlands. Currently, the Minnesota Pollution Control Agency (MPCA) exempts "normal farming practices" from the State's wetland protection (See: Specific Standards of Quality and Purity for Class 2 Waters of the State; Aquatic Life and Recreation, Minnesota Chapter 7050, 1994).

Invasive Species

Noxious weeds are a continuing problem both ecologically and socially/politically. Invasive species present a daunting challenge to land managers. Canada thistle, leafy spurge and spotted knapweed can displace native vegetation over large areas and are a serious concern to neighboring farmers and county officials. Purple loosestrife can effectively displace cattails and other native wetland vegetation and turn productive marshes into a sea of purple flowers. Carp can destroy native submergent vegetation, which provides the base for invertebrates. Minnows, often from past stockings by bait dealers, can cause serious damage to wetland food chains by reducing invertebrate populations needed by breeding waterfowl and ducklings.

Control of these problem species is often costly, both in terms of chemicals, equipment, and staff time. Managers strive to use a balanced approach in controlling these species. Direct control, such as chemical application or mowing, is often needed on

serious problem areas. Once healthy native plant communities are reestablished, they can often compete successfully against invasive weeds. Water level control, including complete drawdowns, can eliminate carp and minnow populations on wetlands where this capability is present. Virtually all Districts are experimenting with biological controls by introducing insects that control the invading plant in its native country.

Rural Development
Rural development also threatens District lands in counties with growing populations, such as Wright County. Lands adjoining WPAs are often seen as highly desirable rural building lots that are purchased as small hobby farms or rural homesites. This can result in the WPA being "ringed" by homes, with a series of negative impacts on the WPA. Such development can limit future management such as prescribed fire; increase trespass on District lands by neighbors using ATVs, horses, or vehicles; increases threats to wildlife from stray pets (cats and dogs); increases use of District land by neighbors for illegal uses such as dumping, gardening, equipment storage, etc.; and can place hunters and neighbors at odds over concerns about safety during the hunting seasons. Large-scale rural development would also bring threats from noise and storm water runoff.

Cultural Resources

Archeological and Cultural Values

Responding to the requirement in the law that comprehensive conservation plans will include "the archaeological and cultural values of the planning unit," the Service contracted for a cultural resources overview study of Minnesota Wetland Management District. This section of the CCP derives mostly from the report, "*Cultural Resources Overview Study,*" by Teresa Halloran and others, Loucks & Associates Inc., dated August 1998. Several other sources have been used.

Context
Archeological evidence for human occupation in western Minnesota extends back 10,000 years when the last glaciers retreated to the north. Small bands of hunters moved into the tundra and boreal forest and left behind their distinctive Clovis and Folsom fluted lanceolate spear points and other tools. Now identified as PaleoIndian, these people lived in diverse settings and often on the margins of lakes and wetlands.

The long Archaic period began with a warmer and drier climate that peaked with the altithermal around 4700-3000 B.C. Surface waters evaporated and rivers shriveled; bison herds dwindled, and so did the human population. In the harsh conditions, the people developed an array of stone, bone, and copper tools. The human population expanded after the altithermal.

The subsequent Woodland period commenced around 500 B.C. and extended to the arrival of Europeans. The climate and vegetation were similar to 20th century conditions. The people of this period constructed pottery and burial mounds, used the bow and arrow, and adopted agriculture. Some people lived in larger, even fortified, summer villages. The seasonal round included bison hunting, maple sugar collecting, and wild rice harvesting. Exotic trade items came from more complex societies to the south and from other sources.

Natural and human events disrupted the traditional patterns and tribal locations. The Little Ice Age began about A.D. 1550 and caused many prairie tribes to relocate.

Arrival of Europeans with Western culture goods and material and practices also caused tribes to change traditional cultural patterns and territory. Thus connecting modern Indian tribes with prehistoric antecedent cultures found in the archeological record is problematic.

Seventeenth century French and English fur traders built posts at the confluence of rivers or on the shores of larger lakes, usually near Indian villages. Western Minnesota became part of the United States as part of the Louisiana Territory, and in the second half of the 19th century immigrants settled the land as railroads expanded accessibility and markets. Settlers soon replaced dugouts and sod houses with frame houses and larger farms and farmsteads. Indian wars and treaties led to concentration of Indian tribes on reservations within and beyond the state. Highway construction, farm consolidation, urbanization, and recreational pursuits characterized the second half of the 20th century.

Existing Conditions and Cultural Resources Potential

A review of the National Register of Historic Places showed, as of October 16, 2000, the 40 Minnesota counties having WPAs and easements contained 426 properties listed on the National Register of Historic Places. The vast majority of these properties are buildings in towns and cities. A number of the properties are located in rural areas and are indicative of the kinds of historic properties that can be found on the Districts: farmsteads and farm buildings, especially barns; bridges; segments of the Red River Oxcart trail; mill sites; battle sites; prehistoric archeological sites such as mounds, villages, camps, and rock art. Historic archeological sites can also be found.

Many more cultural resources sites are reported on and around the waterfowl production areas, including:

- Big Stone WMD has eight sites on WPAs, none eligible for the National Register, and 188 additional sites in the two counties.
- Detroit Lakes WMD has 114 sites on WPAs, of which 33 are not eligible for the National Register, and 531 additional sites in the five counties.
- Fergus Falls WMD has 130 sites on WPAs, of which 51 are not eligible for the National Register, and 616 additional sites in the four counties.
- Litchfield WMD has 95 sites on WPAs, of which 30 are not eligible for the National Register, and 1,128 additional sites in the nine counties.
- Morris WMD has 91 sites on WPAs, of which 17 are not eligible for the National Register, and 555 additional sites in the eight counties.
- Windom WMD has 44 sites on WPAs, of which 12 are not eligible for the National Register, and 980 additional sites in the twelve counties.

Archeological surveys have been completed on 7,400 acres of District lands.

Although cultural resources can be found almost anyplace on the landscape, prehistoric archeological sites are often found on the shores (especially the east shore) of lakes larger than 40 acres, on islands and peninsulas, where streams enter and exit lakes, and near permanent streams. Early historic period sites are often associated with water. Thus, WPAs are often in the same setting as archeological sites.

Museum collections include art, ethnography, history, documents, botany, zoology, paleontology, geology, environmental samples, and artifacts. A museum collection at a District office or visitor center must adhere to the requirements in 411 DM. At this time only Morris WMD has identified a museum collection that consists of five historic objects. Archeological collections from WPAs are stored at the Minnesota Historical Society under terms of a cooperative agreement. Big Stone WMD has none; Detroit Lakes WMD has one collection of 29 items; Fergus Falls WMD has one collection of 40 items; Morris WMD has four collections of 698 items, and Windom WMD has seven collections of approximately 1,010 items. All District museum collections are covered under the Region-wide Scope of Collections Statement.

Indian Tribes and Other Interested Parties

Several Federal laws and executive orders respond to the part of the American public for whom cultural resources are an important part of the human environment and of understanding the American past and present.

For the intent of these laws to be met, persons and organizations need to be informed of Federal activities that could affect cultural resources. Contacts with Indian tribes are government-to-government unless the tribe has a Tribal Historic Preservation Officer. Seventeen tribes have been identified as having potential interest in one or more of the Districts. Other contacts include the county historical societies, local governments, state government agencies such as the Department of Natural Resources, and other Federal agencies such as the Natural Resources Conservation Service.

In addition, the District Manager issues a news release in the project area.

Management of Cultural Resources

Cultural Resources are "those parts of the physical environment - natural and built - that have cultural value to some kind of sociocultural group ... [and] those non-material human social institutions...." Cultural resources include historic sites, archeological sites and associated artifacts, sacred sites, traditional cultural properties, cultural items (human remains, funerary objects, sacred objects, and objects of cultural patrimony), and buildings and structures.

An undertaking is any Federal or federally-funded, -licensed, -permitted, or -assisted activity or project that could affect a significant (i.e., historic) property. Ground disturbance, buildings and structures modification or neglect, and landscape changes must be analyzed for impacts on archeological sites, farmsteads, objects, traditional cultural properties, sacred sites, and cultural items.

The District Managers inform the Regional Historic Preservation Officer early in the planning stage of all undertakings to allow qualified analysis, evaluation, consultation, and mitigation as necessary.

Archeological investigations and collecting are performed only in the public interest by qualified archeologists working under an Archaeological Resources Protection Act permit issued by the Regional Director. District Managers take steps to prevent unauthorized collecting by the public, contractors, and FWS personnel. Violations are reported to the Regional Historic Preservation Officer (RHPO).

If the public turns over to District personnel "found" artifacts, the District Manager will try to determine provenance, will attempt to replace the artifact where found if it can be secure from further public collections, or will hold it until the RHPO is notified and can move it to the historical society.

Cultural Resources Management Objective: Establish a plan to fulfill requirements of Section 14 of the Archaeological Resources Protection Act for surveying lands to identify archeological resources; and Section 110(a)(2) of the National Historic Preservation Act for a preservation program.

People

Public Use of Waterfowl Production Areas

The Refuge Improvement Act established six priority uses of the Refuge System, which includes the more than 800 WPAs in Minnesota. These priority uses all depend on the presence of, or expectation of the presence, of wildlife, and are thus called wildlife-dependent uses. These uses are hunting, fishing, wildlife observation, photography, environmental education, and interpretation. Waterfowl Production Areas have been open to these uses for decades. Although Congress clearly expects managers to facilitate these priority uses, they must be compatible with the purpose for which the unit or WPA was established and the mission of the Refuge System. Compatibility Determinations for these priority uses and numerous other uses in compliance with the Refuge Improvement Act and national compatibility policy and regulations are included (Appendix E).

Most recent estimates show that 250,000 people visit WPAs each year for hunting, wildlife observation, photography, interpretive and environmental education, fishing, trapping, and other uses. Waterfowl Production Areas differ from national wildlife refuges in that they are open to hunting, fishing, and trapping by specific regulation, and open to the other wildlife-dependent activities by notification in general brochures available at each District office. New and existing WPAs are thus "open until closed" versus national wildlife refuges, which are "closed until opened."

Hunters and hunting have a long and linked history with WPAs. When Congress amended the Migratory Bird Hunting and Conservation Stamp Tax Act (Duck Stamp Act) in 1958, it authorized the acquisition of wetlands and uplands as WPAs and waived the usual "inviolate sanctuary" provisions for new migratory bird units. Thus, WPAs were intended to be open to waterfowl hunting, in part because waterfowl hunters, through the purchase of Duck Stamps and support for price increases of the stamp, played a major role in acquisition of these areas. Hunting, for both waterfowl and resident game species, accounts for more than half of the visits to WPAs. Wildlife observation, interpretation, and environmental education are encouraged on WPAs and increasing in popularity with the public. Districts are taking a more active role in fostering these uses by developing wildlife trails, interpretive signs and kiosks, outdoor classrooms, and even auto tour routes on select WPAs. At the Fergus Falls Wetland Management District, the Prairie Wetlands Learning Center provides residential environmental education programs to schools throughout Minnesota.

In addition to these wildlife-dependent public uses, each District receives on a regular basis requests for various non-wildlife-dependent uses such as dog trials, horseback riding, plant collecting, berry picking, and special events. Also, various economic uses such as haying, grazing, and timber harvest are used as habitat management tools and

involve the issuance of special use permits. There are numerous other "uses" which managers must make regular decisions on including rights-of-way requests for new or expanded roads, utilities, pipelines, and communications equipment.

To promote an understanding of what uses are and are not allowed, or allowed only on a case-by-case evaluation, the operations section describes the policies that will guide uses on WPAs.

Two major issues surfaced during plan development related to overall public use on WPAs. First, there is debate on the value of WPAs to the general public and local units of government due to changes in land use and taxation when WPAs are purchased from willing sellers. Second, funding and staff for adequate programs and facilities to better serve the public have never been on par with the generally larger and better known national wildlife refuges.

When land is purchased for a WPA, it becomes the property of the United States government and is exempt from taxation. To offset this loss in tax revenue for local governments, the Service pays three-fourths of 1 percent of the appraised value of the land to the counties in which the WPA is located. In most years, Congress has not appropriated sufficient funds to cover this level of entitlement. The result is resentful local governments and a serious issue when new tracts are brought before county commissioners and the Minnesota Land Exchange Board for approval.

The Refuge Improvement Act mandates that compatible, wildlife-dependent recreational uses involving hunting, fishing, wildlife observation, wildlife photography, environmental education and interpretation are the priority public uses of the Refuge System. In accordance with law and regulation, waterfowl production areas are open to hunting, fishing, wildlife observation, photography, trapping and environmental education.

Many WPAs lack the basic facilities, such as parking and trails, that help the public enjoy these wildlife-dependent uses. Also, Districts do not have the funds to provide quality maps that show the public how to find WPAs. Interpretive and environmental education opportunities are limited by the lack of trained public use specialists.

Disabled User Access

Each of the wetland management districts will provide compatible and accessible wildlife-dependent recreation on Waterfowl Production Areas. Each WMD will eventually develop at least one WPA per county or cluster of counties with enhanced opportunities for disabled users. These features might include accessible hunting blinds, accessible trails or scenic vistas, or other opportunities for accessible wildlife-dependent recreation. Disabled users will be directed to these units with improved accessibility. We do not plan to provide exclusive use for disabled users on these units. These WPAs will be open to all users but will provide a place for disabled visitors to enjoy wildlife-dependent recreation without having to seek special privileges. Disabled visitors who prefer not to use these enhanced facilities may be given special privileges at other WPAs. These privileges would be granted at the manager's discretion and would be limited to driving on existing trails. No user, disabled or otherwise, will be given permission to drive off of existing trails. Disabled users who receive special access privileges will be granted special use permits restricting their travel to designated routes on designated WPAs. The permit will include a map identifying allowable routes of travel.

For the purposes of this section, we intend to follow state standards on disabilities for special hunting privileges. The State of Minnesota is reviewing these standards. We expect the revised standards to roughly include people dependent on wheelchairs or supplemental oxygen as a reasonable standard of a disability requiring enhanced opportunities for access. If state standards do not meet our needs, we may develop our own standards in the future.

Operations

Individual WPA Development Plans

At the heart of on-the-ground restoration and management of WPAs is the writing of individual WPA development plans. These plans inventory existing resources and describe plans for wetland and grassland restoration, structure and debris removal, and planned facilities such as parking, fencing, and wildlife observation sites. They are also means for recording management activities to provide a history for future management decisions. As miniature comprehensive conservation plans, they are critical step-down plans to carry out the goals, objectives, and strategies outlined in this comprehensive conservation plan.

However, many WPAs lack development plans. With new technology employing Geographic Information Systems, this planning and recording of management actions has become simpler and faster, as illustrated in Figure 9. Each District is currently setting up a GIS planning system, but the entering of data is hampered by lack of staffing devoted to the effort. In addition, once all plans are done, they will need to be updated on a rotational basis to be useful in the future.

Consistent Use

The visiting public, WPA neighbors, local units of government, and the Minnesota Department of Natural Resources benefit when management and permitted uses on WPAs are consistent from one end of the State to the other. This comprehensive conservation plan provides the opportunity to articulate policies that have been in place for many years but have not always been consistently applied or communicated. New national policies and regulations governing management and use of the Refuge System also prompted a review and fine tuning of what uses will and will not be allowed, and the stipulations all Districts will follow when allowing certain uses.

The following is a summary of generally prohibited and permitted uses and activities on WPAs in Minnesota. For each of the permitted activities, the reader is encouraged to review the compatibility determination for each found in Appendix E. Stipulations or operating guidelines in each compatibility determination will be followed by each District when administering the uses.

In addition to these policies, there will be a continuing need to ensure consistency of operations on a variety of management issues such as law enforcement, native seed types and seeding methods, signing, and land acquisition. Goal 10 speaks to this ongoing need.

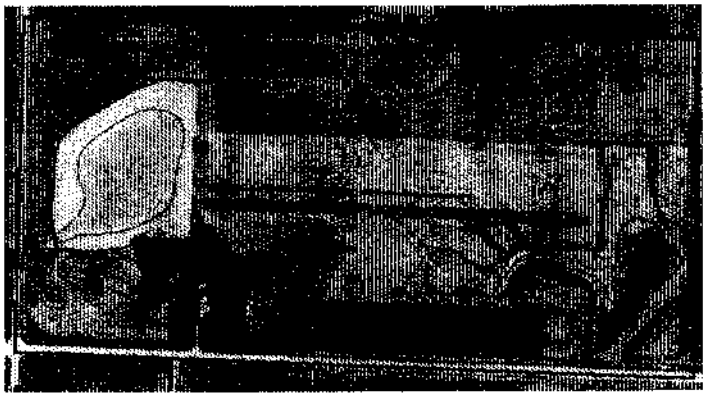
Public Uses Generally Prohibited

- Off-road vehicle use, including snowmobiles and ATVs
- Camping
- Open fires

Figure 9: GIS for WPA Development Planning

GIS used for initial planning:

- Identification and delineation of existing and potential habitats and structures (parking lots, fences, etc.)
- Area/length measurements
- Cost and material calculations
- Generate development schedule



Dovray WPA Development Schedule

5/3/01

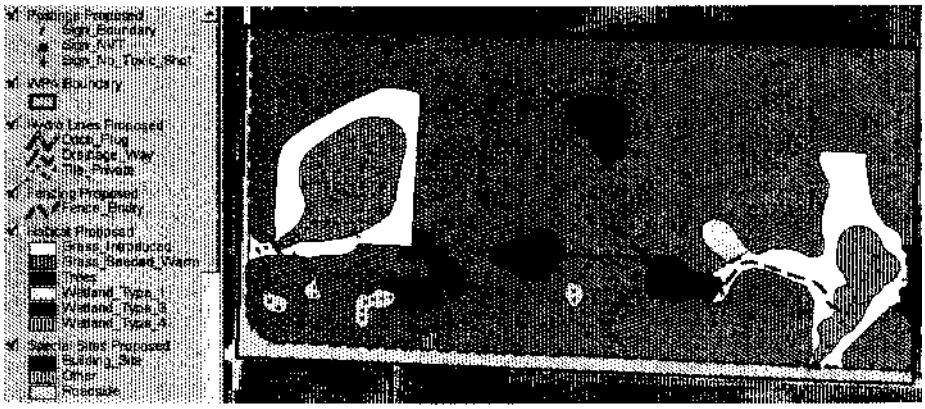
FEATURE	UNIT NAME	DESCRIPTION	PRIORITY	STATUS	DATE	ACRES
Grass_Seeded_Warm						
Grass_Seeded_Warm	Dovray	seed local natives	1	Development Needed	5/1/02	1.1
Grass_Seeded_Warm	Dovray	seed local natives	1	Development Needed	5/1/02	55.9
2						**57.0**
Wetland_Type_1						
Wetland_Type_1	Dovray	tile/ditch plug	1	Development Needed	8/15/01	0.4
Wetland_Type_1	Dovray	tile/ditch plug	1	Development Needed	8/15/01	0.3
Wetland_Type_1	Dovray	tile/ditch plug	1	Development Needed	8/15/01	0.2
Wetland_Type_1	Dovray	tile/ditch plug	1	Development Needed	8/15/01	0.1
Wetland_Type_1	Dovray	remove tile	1	Development Needed	8/15/01	0.1
5						**1.1**
Building_Site						
Building_Site	Dovray	Remove/bury	1	Development Needed	9/30/01	0.5
1						**0.5**
Other						
Other	Dovray	Parking Lot	2	Development Needed	9/15/02	0.1
1						**0.1**

GIS Maps Assist Habitat Restoration and Other Development Activities

- On-site coordination with contractors and field staff.

- GIS used to document restoration and other development accomplishments.

-Development maps become the base map to record future management accomplishments (ie. burning, weed control, etc.)



- Discharge of firearms except during State hunting seasons
- Use of motorized water craft
- Dog trials
- Horseback riding
- Commercial bait collecting
- Beekeeping

Public Uses Permitted (See Compatibility Determinations in Appendix E)

- Hunting in accordance with State seasons and regulations
- Wildlife observation
- Photography
- Fishing in accordance with State seasons and regulations
- Environmental education
- Interpretation for individuals or groups
- Trapping in accordance with State seasons and regulations
- Berry and nut collecting for personal use
- Limited plant and seed collection for decorative purposes

(Note: these uses include the use of non-motorized means of access including hiking, snowshoeing, cross-country skiing, or where appropriate, bicycling on existing trails)

Generally Permitted Management Activities Done by Others, and Miscellaneous Activities/Programs

(See Compatibility Determinations in Appendix E)

- Haying for grassland management
- Farming for grassland management
- Grazing for grassland management
- Timber or firewood harvest
- Food plots and feeders for resident wildlife
- Wildlife nesting structures
- Archaeological surveys
- Special access for disabled users
- Irrigation travelways across easement wetlands
- Temporary road improvement outside of existing right-of-way
- Special dedications/ceremonies
- Wetland access facilities
- WPA parking facilities
- Local Fire Department Training – Prescribed Burning
- Local Fire Department Training – Burning of Surplus Buildings on New Acquisitions

Other Reoccurring Uses Handled on Case-by-Case Basis

- New or expanded rights-of-way requests
- Major new facilities associated with public uses
- Commercial filming
- Special events
- Animal collecting requests
- Other requests for uses not listed above

Drainage

We often receive requests to maintain, improve, or construct drainage systems onto or across WPAs. See Appendix N for a copy of the Fergus Falls WMD drainage policy. In summary, legitimate drainage maintenance will be allowed to the original scope and effect of the drainage system. No new drainage will be allowed.