A GUIDE TO MINNESOTA PRAIRIES

The Natural Heritage Program
Minnesota Department of Natural Resources

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PREFACE

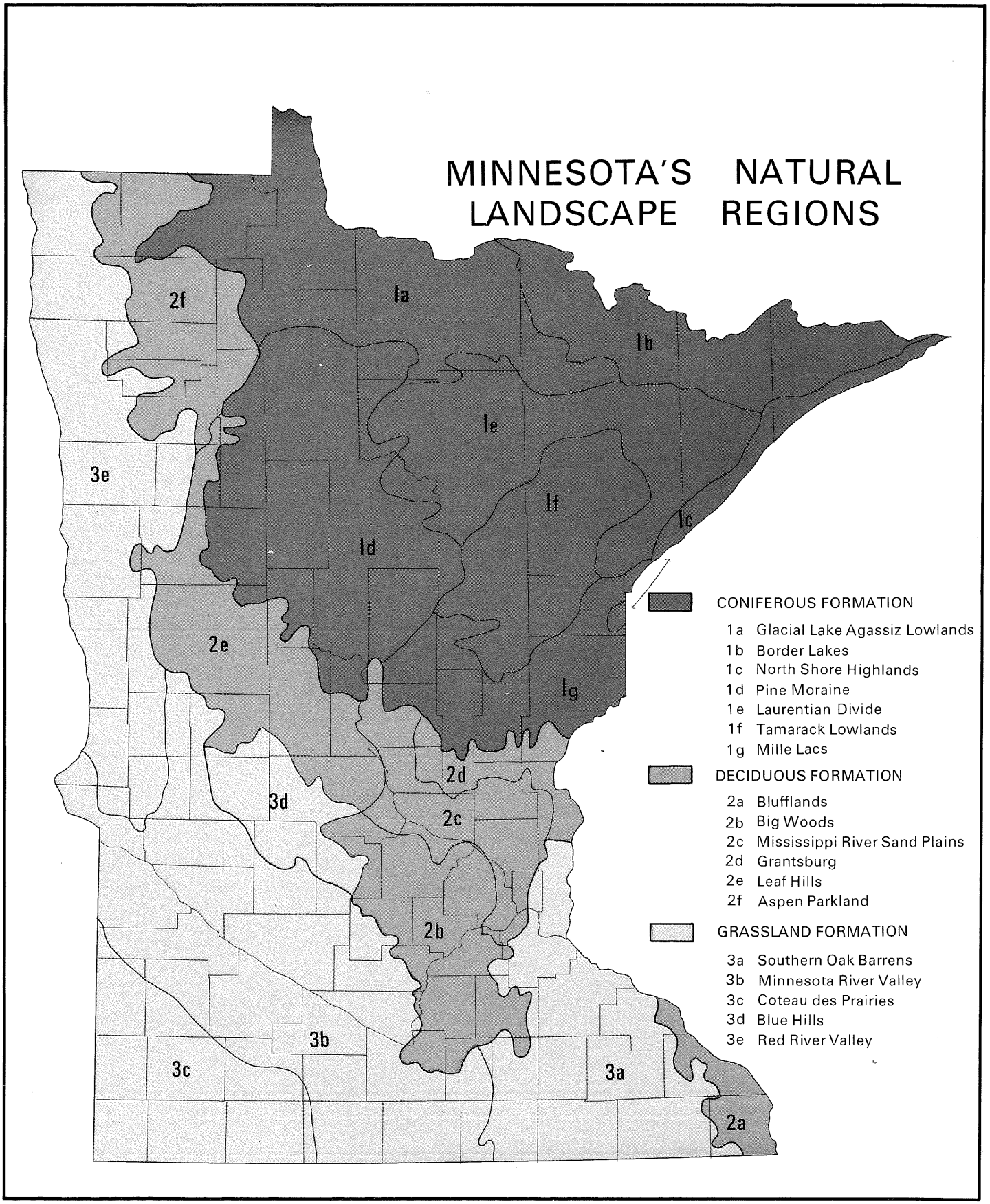
Minnesota has established an outstanding system of tallgrass prairie preserves. No state in the Upper Midwest surpasses Minnesota in terms of acreage and variety of tallgrass prairie protected. Over 45,000 acres of native prairie are protected on a wide variety of landforms that span the 400 mile length of the state from its southeast to northwest corner.

This publication provides an introduction to the diversity of prairie types found in the state, an assessment of the ownership and protection status of Minnesota prairie, and a directory to 40 select prairie preserves where the reader can observe, study, and appreciate first hand the native prairie landscape.

Information on the prairie preserves listed in the text was gathered largely from the data management system of the Minnesota Natural Heritage Program. Important contributions to the preparation of this booklet were made by Barbara Coffin, Welby Smith, and Almaz Tsehay of the Natural Heritage Program staff; Lee Pfannmuller of the Nongame Wildlife staff; and Peter Buesseler and Robert Djupstrom of the Scientific and Natural Areas Program. Helpful ideas made at the early stages of the manuscript were made by Kathy Bolin, Robert Dana, and Dr. Thomas Morley. Jennifer Jaron expertly edited the final text. In addition, I thank the state park managers, area wildlife managers, staff members of The Nature Conservancy, and others who reviewed specific prairie site maps and descriptions.

This project was funded cooperatively by the Natural Heritage Program, the Scientific and Natural Areas Program, the Nongame Wildlife Program, and the Section of Wildlife. Within the Minnesota Department of Natural Resources' Section of Wildlife, the above three programs work closely together and represent the Department's commitment to protect and manage those plants, animals, and natural communities that have not been the focus of traditional resource management.

Figure 1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INTRODUCTION

A vast tallgrass prairie once stretched across western Minnesota from the Canadian to Iowa border. Dense forests of maple, elm and oak — the "Big Woods" — formed a broad, diagonal belt through the middle of the state. And at the zone of transition, between forest and prairie, orchard-like savannas occupied the landscape.

Extensive stands of spruce and fir, southern outliers of the boreal forests of Canada, thrived in the colder climate and deep snows of the north. They graded into the large, continuous peatlands of Glacial Lake Agassiz, and on dry sandy uplands they met red and white pine forests.

The land was rich with free-flowing streams, and dotted with pristine glacial lakes and ponds bordered by wet meadow and marsh. Numerous smaller, more specialized habitats also abounded and supported assemblages of plants and animals of different origins and histories.

This was the landscape that comprised presettlement Minnesota. A wide array of ecosystems supported over 2,500 species of plants and animals. This impressive biotic diversity resulted from the state's complex geological history and its particular location on the North American continent at the merging of three major biomes: the northern coniferous forest, the eastern deciduous forest, and the tallgrass prairie (Figure 1). Today, after more than a century of European settlement, nearly all the biotic communities comprising these biomes have been substantially altered. Only small remnants of most of the state's original ecosystems remain in relatively untouched and natural condition.

Throughout the tallgrass prairie biome, large-scale alteration of the natural landscape has been more complete than in any other area of the state. Shortly after 1850, as agriculture became the backbone of the state's economy, the entire native prairie landscape had all but disappeared under the plow. In the south and southwest, the prairies were quickly converted into fields of corn and soybean. Later, in the Red River Valley of the north, the extensive wet prairies were drained and replaced by cultivated wheat, sunflowers and sugar beets. The result of 130 years of settlement has been the loss of over 99 percent of the original tallgrass prairie in Minnesota.

Its near elimination and the recognition of the importance of maintaining diverse natural environments has spurred a movement to identify and preserve remnant examples of prairie throughout the state. Fine examples of native prairie now have been preserved. A few of these preserves are large enough to display the full range of habitat transitions and variability which originally existed on the presettlement landscape. Many others contain only small fragments of prairie habitat and can only suggest the vast grasslands of a century earlier. Nevertheless, they are viable sanctuaries for many native species whose existence depends upon them, and they give us a record of an all but vanished landscape.

This booklet is offered as an overview of the kinds of prairie communities found in Minnesota and as an assessment of the preservation status of prairie in each natural region of the state. In addition, 40 select managed areas are listed and described as a guide to the protected prairies and prairie-savannas in Minnesota.

Grasslands

At first glamce, the space may seem empty but one only needs to look more closely to gain an appreciation for the rich diversity of life that has adapted to this unusual and harsh environment.

Water is the lifeblood of the prairie. Annual precipitation, either snow or rain, primarily determines how productive the land is on an annual basis.. Average precipitation is 15 inches, thus grasses and other plants adapted to semi-arid environment are the rule.. Trees and shrubs are found almost exclusivley along river drainages and intermittent creeks. The long, narrow fingers of woody draws are a sharp contrast to the open grasslands and provide critical habitat for many woodland wildlife species.

Few natural ponds exist on the grasslands but for those people who enjoy getting away from it all, hunting and fishing are great....

Western wheatgrass and green needle grass predominate on the flats and ridges, with big and little bluestem, side-oats gamma and porcupinegrass being major grasses on the slpoes.

In the late 1800's and early 1900's thousands of people encouraged by promotional campaigns and offers for free land, moved to the Great Plains. Further inspired by a series of wet years and market demand for wheat and red meat during and after WW I, homesteadeers had cultivated and or heavily grazed most of the Great Plains by the mid 1920's. Much of the land was marginal and according to many should never have been plowed. Resulting from depleted cropland, overstocked rangelands, and severe droughts of the 1930's an estimated two and a half million people abondoned the small farms and ranches on the Plains.

The tall prairie grass, a belt of lush grass deep enough in places to hide bison, once stretched from southern Mannitoba southward into Oklahoma and eastward to Indiana. Three kinds the tall grass prairie on the eastern edge the mixed grass prairie in the middle and the shortgrass prairie on the western plains in the rain shadow of the Rockies.

The prairie, like an iceberg, lies mostly under the surface. Roots benath a single square yard of prairie plants can total 20 miles long, most forming a muscular sod, some reachingseveral yards deep into soil to drink the stored water of last year's rain.

Until recently bison roamed the prairie in numbers almost unimaginable - 30 to 70 million strong. Despite their size and numbers, bison ate less than the prairie's vast army of voles, ground squirrels, grasshoppers and voracious nematodes.

The last wild bison in Minnesota was spotted in 1880 in Norman County.

Depending on tall grass, the prairie chicken have become scarce as native priaire has all but dissapppeared.

Prairie fire help free plants from mats of dead vegetation, release nutrients, and kill encroaching sumac and oak. Grasses grow from the base, not the tip and recover very quickly after fire.

Shortly after 1850, as agriculture became the backbone of the state's economy, the native prairie landscape all but disappeared under the plow. In the south and southwest were converted to corn and soybeans while the northwest in the Red River Valley was converted to wheat, sunflowers and sugar beets.

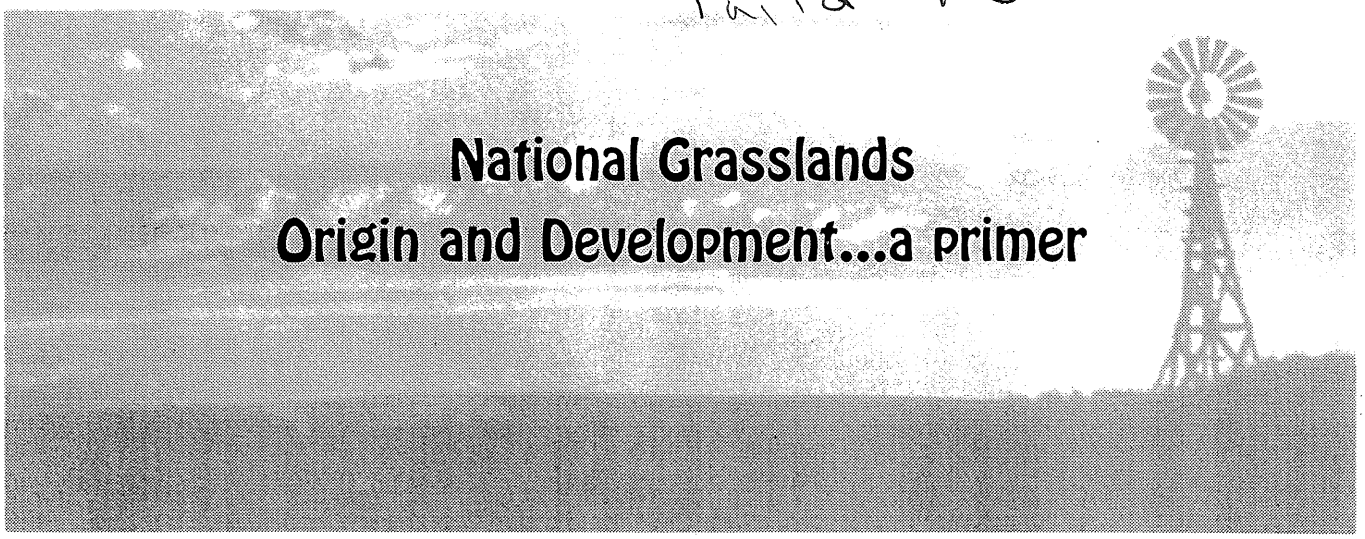
The result of 130 years of settlement has been the lose of over 99 percent of the origianl tall grass prairie in Minnesota.

Coteau des Prairies

The Coteau des Prairies or Highlands of the Prairie is the dominant physiographis feature of southwest Minnesota and adjacent eastern South Dakota. This massive plateau contain some of the highest land in Minnesota contains some of the highest elevations in the state with crest elevations over 2,000 feet above sea level.

The Minnesota River Valley straddles the MN River most of the region is a generally featureless till plain consisting of undulating to rolling topography dotted with marshy depressions.

Tailor to MV



National Grasslands
Origin and Development...a primer

• These lands are the ancestral homes of many Indian tribes, including Kiowa, Comanche, Pawnee, Cheyenne, Arapahoe, Crow, and Lakota.

• Under the Homestead Act of 1862, land was provided to individuals who would live on it and make certain improvements.

• By the end of the 1870's, use of the lands changed as cattle barons replaced the buffalo with cattle. Prospectors, trappers, soldiers, railroad builders, and a host of others seeking their fortunes in the west pushed back the last frontier.

• In the late 1920's and early 1930's, drought, dust storms, floods and insects struck at the heart of agricultural regions. A national conference on land utilization was called in 1931.

• In 1932 a National Land Use Planning Committee was made up of representatives of Federal bureaus and land grant colleges.

• On May 1, 1935, the transfer of responsibility for the land utilization program was given to the Resettlement Administration, Department of Agriculture.

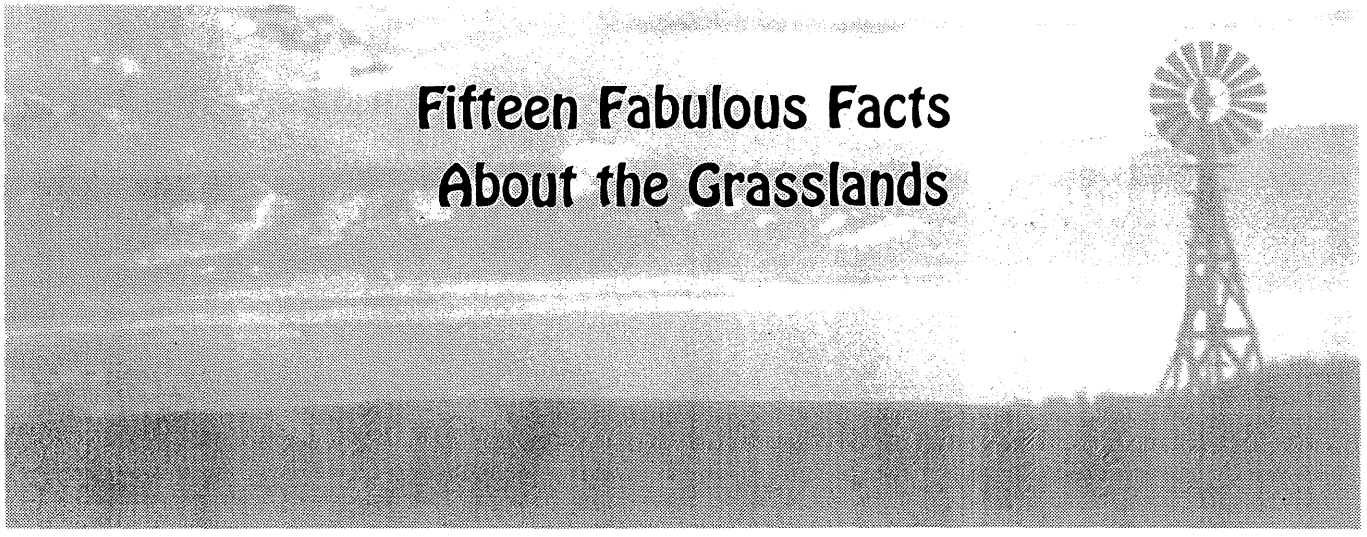
• A more permanent status was provided with the passage of the Bankhead-Jones Farm Tenant Act in 1937. Under Title III, the Secretary of Agriculture was directed "to develop a program of land conservation and land utilization, including the retirement of lands which are submarginal or not primarily suitable for cultivation in order thereby to correct maladjustments in land use."

• On September 1, 1937, transfer of the land utilization program from the Farm Security Administration to the Bureau of Agricultural Economics. The Farm Security Administration was formed September 1, 1937 as successor to the Resettlement Administration.

• In 1938, administration of the lands was transferred to the Soil Conservation Service.

• In 1954, a review of the land utilization projects was made to determine where they could be best administered. Some went to the National Park Service others to the Fish and Wildlife Service, the Bureau of Land Management, and the USDA Forest Service, and several states.

• On June 23, 1960, nearly 4 million acres of LU Projects, primarily located in the Great Plains region, became "National Grasslands" to be managed by the Forest Service as part of the National Forest System.



Fifteen Fabulous Facts About the Grasslands

• There are 20 National Grasslands - nearly 4 million acres of publicly owned land administered by the USDA Forest Service.

• The Cimarron National Grassland is the only land administered by the Forest Service in the state of Kansas.

• There are approximately 275 different species of birds on the Comanche National Grassland.

• The Ft. Pierre National Grassland gets the most rainfall of all the grasslands - 18 inches per year on average.

• The smallest National Grassland is McClelland Creek National Grassland in Texas with 1,449 acres.

• The biggest National Grassland is the Little Missouri National Grassland in North Dakota with 1,028, 051 acres.

• The largest coal producing mine in the world (Thunder Basin Coal Mine) is on the Thunder Basin National Grassland in Wyoming.

• The Buffalo Gap National Grassland is home to the National Grasslands Visitor Center in Wall, South Dakota - open 7 days a week year long!

• The Caddo/LBJ National Grasslands in Texas are within a 4 hour drive of 4 million people.

• The Comanche National Grassland in Colorado has the longest dinosaur trackway in the world.

• The 20 National grasslands are home to 1,736 producing oil wells.

• There are 22 campgrounds and 14 picnic sites on the 20 National Grasslands.

• The Sheyenne National Grassland is the only National Grassland in the tall grass prairie region.

• The largest population of the Greater Prairie Chicken in North Dakota is on the Sheyenne National Grassland.

• The 20,000 acre LBJ National Grassland is named for the former President of the United States, Lyndon B. Johnson.

prevalent forbs include bottle gentian *(Gentiana andrewsii)*, yellow star grass *(Hypoxis hirsuta)*, New England aster *(Aster novae-angliae)*, and blazing star *(Liatris pycnostachya)*. Wet blacksoil prairies occur throughout the prairie region of the state and are especially frequent along water courses and in swales between the beach ridges of Glacial Lake Agassiz. In the absence of frequent fires these prairies may be invaded by lowland shrubs and trees.

SALINE PRAIRIE

Saline prairies occur on soils that are heavily impregnated with salts and are found on irregularly flooded mud flats and alkali seeps. The salty or alkaline soils are detrimental to the growth of most plants and support a distinctive vegetation and animal life. The common occupants of this habitat are saltgrass *(Distichlis stricta)*, glasswort *(Salicornia rubra)*, and sea blite *(Suaeda depressa)*. These grow in association with other salt-tolerant species, including alkali grass *(Puccinellia nutalliana)*, arrow grass *(Triglochin maritima)*, and alkali blite *(Chenopodium rubrum)*. Saline prairies, although common in the Great Plains, are rare in Minnesota and occur only on the western border of the state.

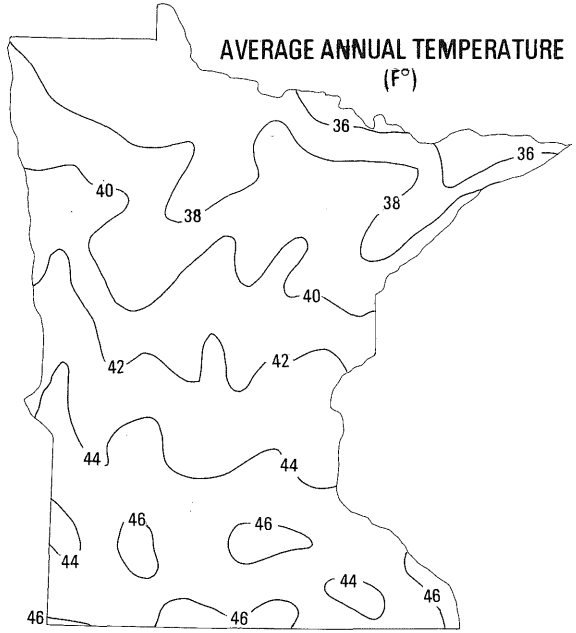
The above five prairie classes intergrade through a number of ecotones with other floras. On wet sites, prairie grades into sedge meadow and fen, and on all sites prairie grades into deciduous or coniferous forest through an intermediate vegetation type called savanna. Savannas are prairie-like communities supporting scattered trees. The savanna physiognomy in Minnesota may range from an orchard-like grove composed of open prairie dotted with widely spaced, open-grown trees to a chaparral-like community consisting of stunted trees and shrubs forming a dense thicket. The structure of savanna is largely determined by soil conditions and frequency of fire. Savannas, like prairies, require periodic fires to maintain their characteristic structure and species composition. The savanna community was the common ecotonal community along the prairie-forest border. This zone, where prairie and forest vegetation meet, extends from the southeast to northwest corner of the state (Figure 3). The oaks — especially bur oak *(Quercus macrocarpa)* and northern pin oak *(Quercus ellipsoidalis)* — are the dominant savanna trees. In addition, jack pine *(Pinus banksiana)* is found in association with prairie on dry sand plains and dunes; and in extreme northwest Minnesota, aspen *(Populus tremuloides)* is found in a groveland mosaic with wet prairie and sedge meadow — called aspen parkland.

Each of the five major prairie classes, including savanna, encompasses a broad segment of environmental variation. The classes have been stratified into more narrowly defined natural community types in an attempt to characterize this variability. As outlined in Table 1, the natural community types contained within a class share the same dominant vegetation but differ in other attributes such as topographic position, edaphic features, subdominant vegetation and/or landform type. The natural community type is defined by and named by its most characteristic biotic or abiotic feature. Thus, natural community names include sand dune prairie, dolomite prairie, (SE) mesic blacksoil prairie, and oak sand savanna. This, in effect, is a habitat or ecological based classification system, relating particular kinds of vegetation to the characteristics of the abiotic environment that they grow in.

The natural community classification was developed by the Natural Heritage Program to efficiently inventory and catalogue information on Minnesota prairies for the purpose of determining their relative endangerment and hence preservation priority. The classification scheme attempts — as fully as possible — to identify the complete spectrum of Minnesota prairie types. This helps ensure that the state's growing system of prairie preserves captures adequately large and balanced samples of all the major existing prairie community types in Minnesota.

TABLE 1 — CLASSIFICATION OF MINNESOTA PRAIRIES

NATURAL COMMUNITY TYPES	ENVIRONMENTAL SITES	DOMINANT SPECIES
DRY LIME PRAIRIES	SHALLOW AND/OR EXCESSIVELY DRAINED SOILS ON LIMESTONE	LITTLE BLUESTEM-SIDEOATS GRAMA. STRONGEST FLORISTIC AFFINITY TO THE GREAT PLAINS PRAIRIES
Gravel Prairie	Gravelly glacial kames and hills, crests of beach ridges	
Dolomite Prairie	Thin glacial drift over limestone terraces, Minnesota River Valley	
Bluff (Goat) Prairie	Limestone-capped bluffs in the Driftless Area	
Glacial Till Hill Prairie	Soils formed in calcareous glacial till on steep hillsides	
DRY SAND PRAIRIES	SHALLOW AND/OR EXCESSIVELY DRAINED SOILS ON SANDS	SAND REED-LITTLE BLUESTEM-JUNE GRASS. CHARACTERISTIC SAND PLANTS INCLUDE *HUDSONIA TOMENTOSA, SELAGINELLA RUPESTRIS,* AND *POLYGALA POLYGAMA*
Sand Prairie	Sandy river terraces, beach ridges and sand outwash plains	
Sand Dune Prairie	Inland sand dune complexes	
MESIC BLACKSOIL PRAIRIES	DEEP, MESIC (WELL DRAINED) SILT LOAM SOILS	BIG BLUESTEM-INDIAN GRASS. HIGHEST SPECIES RICHNESS OF MINNESOTA PRAIRIES, CHARACTERISTIC PLANTS VARY BY GEOGRAPHIC REGION
(SE) Mesic Blacksoil Prairie	Deep mesic soils of till plains and lake plains of the southeast	
(EC) Mesic Blacksoil Prairie	Deep mesic soils of till plains, and outwash plains and terraces of the Minnesota and Mississippi Rivers	
(SW) Mesic Blacksoil Prairie	Deep mesic soils in till on moraines in the southwest	
(NW) Mesic Blacksoil Prairie	Deep mesic soils of the Glacial Lake Agassiz Basin and the surrounding till plain upland	
WET (LOW) BLACKSOIL PRAIRIES	DEEP, WET (POORLY DRAINED) MINERAL SOILS OF LOW AREAS	PRAIRIE CORDGRASS-BLUEJOINT GRASS. SEDGES MAY BE A PROMINENT COMPONENT
(SE) Wet Blacksoil Prairie	Level, wet soils on moraines and floodplains	
(EC) Wet Blacksoil Prairie	Level, wet soils on outwash plains and terraces	
(SW) Wet Blacksoil Prairie	Level, wet soils in tills on moraines	
(NW) Wet Blacksoil Prairie	Level, wet soils on lake plains and beach ridge swales	
SALINE PRAIRIE	IRREGULARLY FLOODED MUD FLATS AND ALKALI SEEPS, SALINE SOILS	SALTGRASS-GLASSWORT-SEA BLITE, ALSO *PUCCINELLIA NUTALLIANA, TRIGLOCHIN MARITIMA, CHENOPODIUM RUBRUM*



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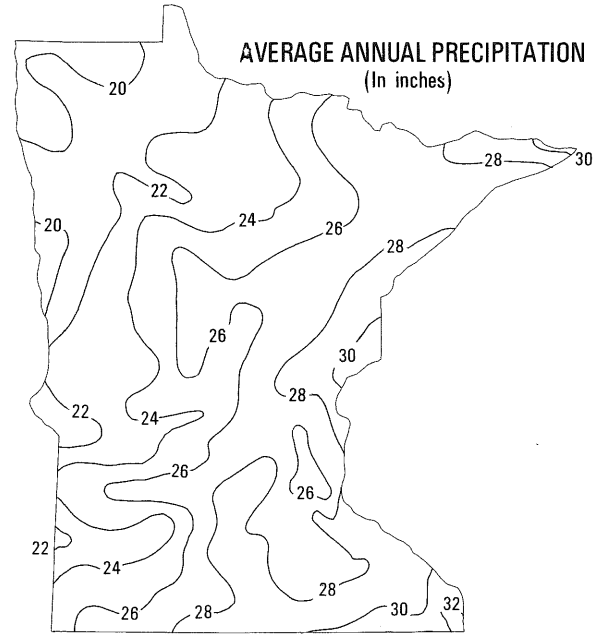

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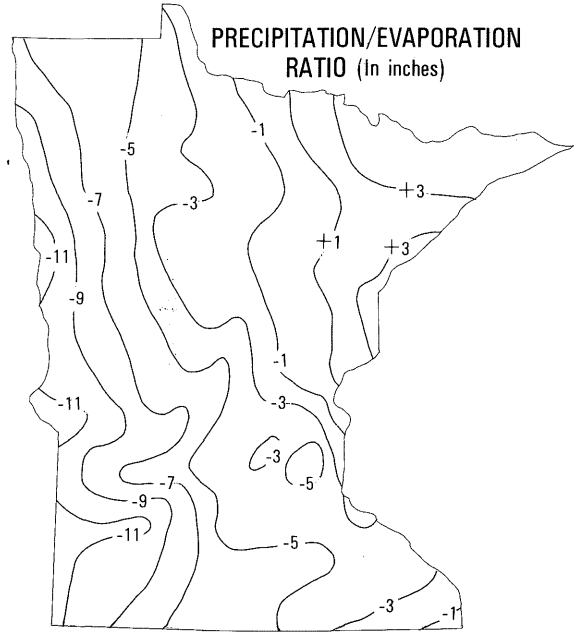
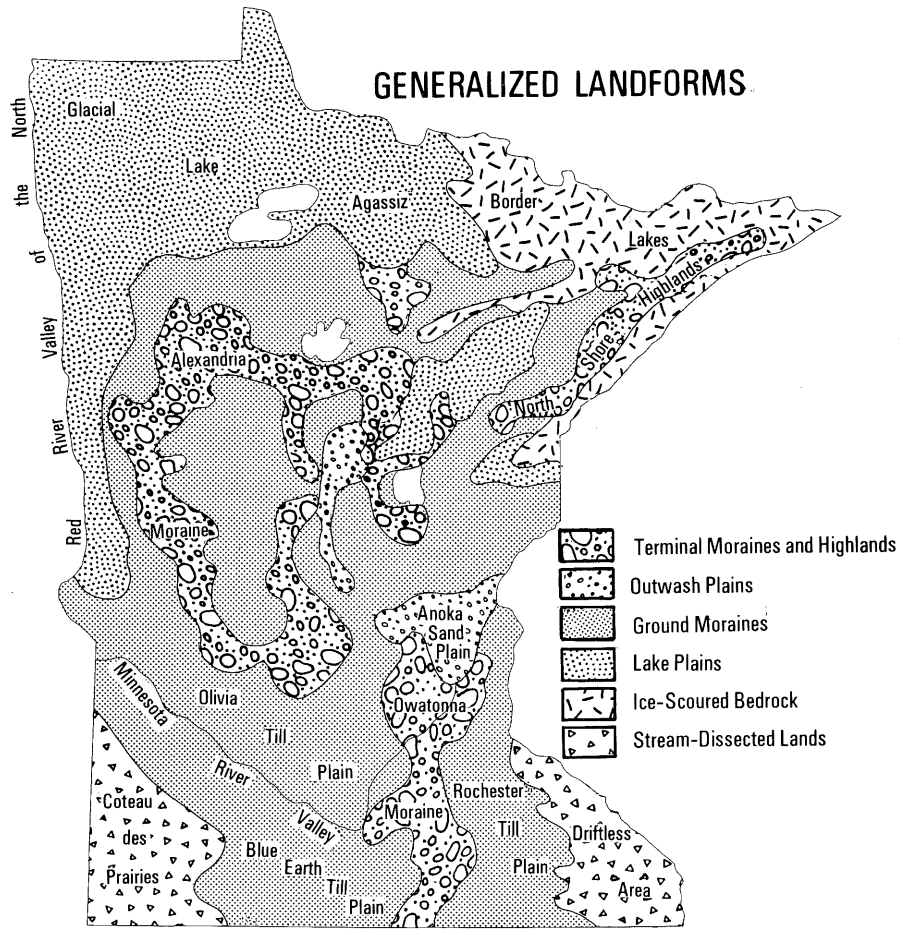
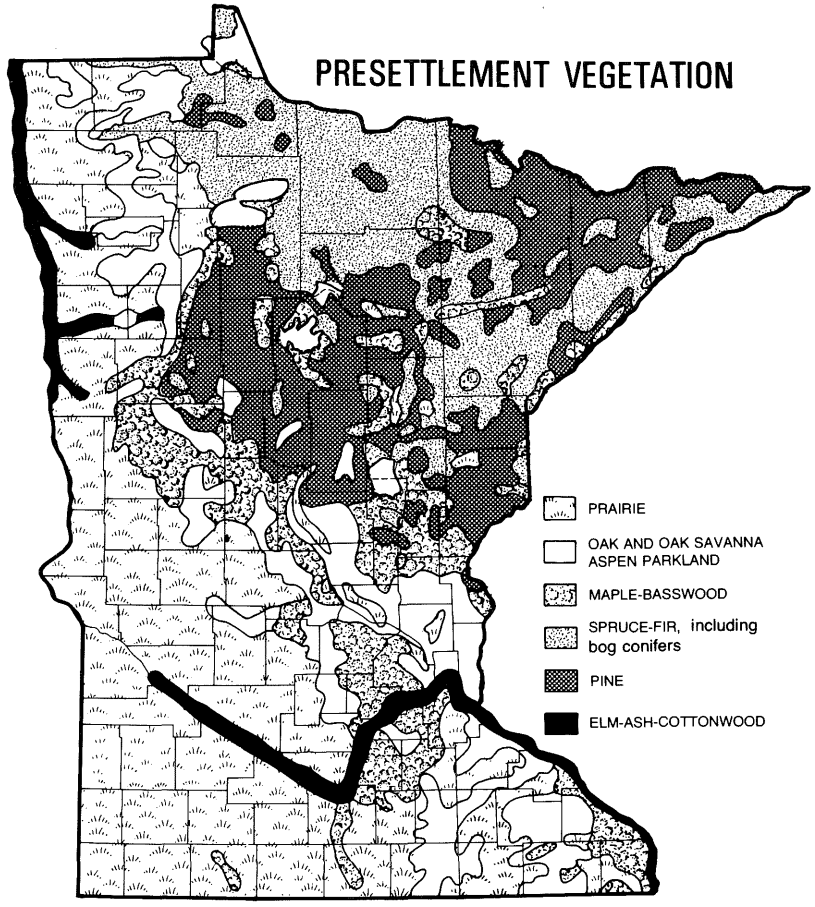




Source: Modified from Wright in Sims and Morey, 1972.



Presettlement vegetation types in Minnesota. (Adapted by Patricia Burwell from an unpublished map drawn by F. J. Marschner in 1930 for the United States Department of Agriculture, Washington, D.C.)

Figure 3.

The nature, complexities, and distribution of Minnesota's presettlement vegetation corresponded with differences in climatic, soil, and landform patterns across the state. Fire, by interacting with these factors, also played a significant role in determining the vegetation cover. Temperature and precipitation are the most important climatic factors controlling vegetation. The interaction of these two factors is best measured by changes in the P/E ratio or precipitation/potential evaporation. This figure is lowest (—11 to —5) in the prairie region of the state where the climate is relatively drier and warmer. The P/E ratio increases to the north and east (upwards to + 3) as prairie is replaced by oak and maple forest which are in turn replaced by conifer forest in the coldest, most humid region of the state.

PROTECTION STATUS OF MINNESOTA PRAIRIE

Prior to European settlement, native tallgrass prairie covered over 18 million acres of the Minnesota landscape, approximately one-third of the state. The savanna ecosystem covered an additional 5 million acres. Prairie was the dominant vegetation feature in the natural regions which comprised the grassland formation, and also a lesser component in scattered localities throughout the deciduous and coniferous formations where savanna was a characteristic feature. Today about 75,000 acres of prairie remain, less than one-third of 1 percent of the original total. The remaining prairie occurs as isolated remnants scattered throughout the grassland formation (now referred to as the agricultural zone of Minnesota). These prairies are not evenly distributed across the prairie region of Minnesota. Relatively large prairie tracts — both protected and unprotected — are now restricted to the western part of the state. Much of the remaining prairies are marginal lands on thin or poorly drained soils, steep hills, and rocky areas. A significant portion of these have been degraded by intensive grazing, haying, and fire suppression. Proper management and safeguarding, however, may restore these sites to their former condition.

There is opportunity yet in Minnesota to protect relatively large tracts of native prairie — at least in the northwest and in the hilly areas of the southwest. These tracts, however, are quickly being lost to the plow as greater standardization of agricultural techniques and economic incentives allow marginal lands to be put into crop production. In 1983 alone, over 5,000 acres of contiguous blacksoil prairie was plowed under in one northwestern county.

The continual loss of biological diversity within the prairie region of the state has heightened an awareness of the need for natural area protection. Of the 75,000 remaining prairie acres, approximately 45,000 acres receive some degree of protection. Many programs now exist to preserve and protect the state's last remaining prairies. They range widely in effectiveness and permanence. Some programs secure voluntary, short-term protection while others offer legally binding, long-term preservation. The following programs, public agencies, and private organizations have extended the greatest amount of protection to the Minnesota prairie:

MINNESOTA DEPARTMENT OF NATURAL RESOURCES (DNR)

The DNR-Section of Wildlife acquires lands for wildlife management purposes. Over 10,000 acres of prairie — ranging from near pristine to highly degraded — are located on Wildlife Management Areas (WMAs). These units are managed for the benefit of native wildlife species. A number of high quality prairie tracts within the WMA system have been included on the Minnesota Natural Heritage Register. The Register program — a product of the Natural Heritage Program's on-going statewide inventory — identifies and recognizes Minnesota's finest natural areas on public lands. Register sites are managed for the protection and maintenance of their significant natural features. The managing agency voluntarily agrees to protect these sites and to notify the Natural Heritage Program of any plans to change use.

The DNR-Scientific and Natural Areas (SNA) Program owns and manages 800 acres of prairie. In addition, privately owned sites — such as 11 Nature Conservancy preserves — are leased to the SNA Program. This arrangement allows qualifying private preserves to be dedicated as state Scientific and Natural Areas, assuring long term protection. These sites are managed solely for the preservation and enhancement of the native prairie ecosystem. This program provides the highest amount of legal protection that natural land can receive in Minnesota. The SNA system contains outstanding examples of Minnesota's prairie remnants.

The DNR-Section of Parks manages prairie remnants in 15 of their state parks. A number of these

prairie tracts — because of their state significance — have been designated state Scientific and Natural Areas.

MINNESOTA NATIVE PRAIRIE TAX CREDIT PROGRAM

The Minnesota Native Prairie Tax Credit Program protects approximately 10,000 acres of prairie in 35 state counties. Unlike the above agencies — that preserve prairie through fee purchase — the tax credit program protects prairie by retaining it in private ownership. The program, authorized by the Minnesota legislature in 1980, exempts approved native prairie land from property taxes. In addition, the landowner receives a credit on taxes paid on the rest of his property. Through this voluntary program, the landowner receives tax credit as long as the natural state of the approved prairie is maintained. The Prairie Tax Credit Program is a temporary safeguard and does not ensure long-term preservation.

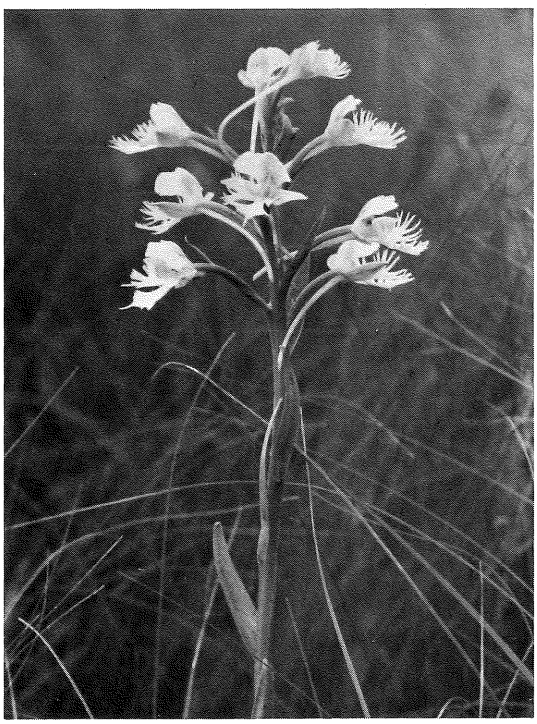
THE NATURE CONSERVANCY (TNC)

The Nature Conservancy, a private nonprofit conservation group, owns over 12,000 acres of prairie in Minnesota. The principal objective of TNC is the preservation of undisturbed natural communities and habitats supporting rare and endangered plant and animal species. TNC owned prairies are found in 26 counties of the state. Eleven of these sites have been given added protection by designation as state Scientific and Natural Areas.

U.S. FISH AND WILDLIFE SERVICE (USFWS)

The USFWS manages prairie wetlands and associated upland areas as part of the federal Wetland Acquisition Program. The program's primary objective is the production of waterfowl. Over 13,000 acres of upland prairie are currently protected on these federally owned Waterfowl Production Areas (WPAs). Not all of these acres are virgin prairie; however, restoration efforts in recent years have begun to heal the wounds from past grazing and unsuccessful attempts at cultivation. The WPA lands are located in 18 counties, all in western Minnesota.

The continuous tallgrass prairie is, of course, gone, but by preserving carefully selected remnants we can represent at least some of its original diversity. These prairie remnants — where diverse populations of native plant and animal life thrive — provide us with the direct experience of an all but vanished landscape. Minnesota's impressive system of prairie preserves evokes memories of the great and varied sea of grass that once defined the Midwestern landscape.



Top: Goat prairie at Queen's Bluff (site 1). Left: Management burn at Blazing Star Prairie (site 28). Below: An endangered species, the white-fringed prairie orchid is protected at several Minnesota prairie preserves.

A DIRECTORY OF PRAIRIE PRESERVES

The following section is a guide to 40 managed areas containing examples of native prairie and savanna. These sites are a good representation of the variety of prairie community types now protected in the state. The managed areas are organized geographically by natural region (Figure 4). The natural regions — distinguished according to differences in glacial history, topography, bedrock, soils and distribution of native flora and fauna — provide a basis for establishing a balanced prairie preserve system throughout the state. For each natural region containing protected prairie sites, a brief description of its landscape features, original flora and fauna, and present land use is given. A map accompanying each natural region shows the location of the managed areas in relation to major towns and roads. For each managed area you will find a detailed site map and a brief description of its location, size, and natural features. Unless otherwise specified, the site maps reproduced throughout this book are taken from U.S. Geological Survey 1:24,000-scale topographic maps. Because of the large size of the managed areas in the Red River Valley region, in addition to these large-scale maps, groups of sites are mapped on small-scale (1:250,000) topographic maps.

The listed preserves are open to the public for hiking and nature study; scientific research is allowed with advance permission. Please observe any posted rules and regulations and sign in at visitor boxes where provided. Collecting of plants is generally not permitted.

MAP SYMBOLS

- Management Area Boundary
- Red River Valley Site Locations
- Paved Road
- Gravel/Graded Road
- Dirt Road
- County Road/County Highway
- Federal Highway
- Interstate
- Parking
- Marsh
- Wooded/Brush Land
- Depression Contour
- Railroad
- Fence/Field Line
- Private Land
- Power Line

Figure 4. Managed areas in each natural region containing examples of native prairie

Map	Managed Area by Natural Region	County	Acres	Ownership*
	BLUFFLANDS (2a)			
1	Queen's and King's Bluff-O.L. Kipp SP	Winona	20	DNR
2	Beaver Natural Area-Whitewater WMA	Winona	200	DNR
3	Kellogg-Weaver Dunes SNA	Wabasha	624	DNR/TNC
	SOUTHERN OAK BARRENS (3a)			
4	Wild Indigo SNA	Mower	155	DNR
5	Racine Prairie SNA	Mower	6.5	DNR
6	Cartney WMA	Mower	400	DNR
7	Dodge County Prairie SNA	Dodge	34	DNR
	MINNESOTA RIVER VALLEY (3b)			
8	Jeffers Petroglyphs Historic Site	Cottonwood	80	MHS
9	Schaefer Prairie	McLeod	160	TNC
10	Salt Lake WMA	Lac Qui Parle	99	DNR
11	Kemen WMA	Lac Qui Parle	99	DNR
12	Prairie WMA and Victory WMA	Big Stone	675	DNR
13	Big Stone Lake SP (Bonanza Unit)	Big Stone	30	DNR
14	Staffanson Prairie	Douglas	97	TNC
	COTEAU DES PRAIRIE (3c)			
15	Kilen Woods SP/SNA	Jackson	200	DNR
16	Lundblad Prairie	Murray	80	TNC
17	Expandere WMA	Cottonwood	560	DNR
18	Blue Mounds SP	Rock	1995	DNR
19	Pipestone National Monument	Pipestone	283	NPS
20	Hole-in-the-Mountain Prairie	Lincoln	246	TNC
21	Prairie Marshes WMA	Lyon	240	DNR
22	Sioux Nation WMA	Yellow Medicine	250	DNR
	BLUE HILLS (3d)			
23	Roscoe Prairie SNA	Stearns	57	DNR/TNC
24	Ordway Prairie	Pope	582	TNC
25	Glacial Lakes SP	Pope	1345	DNR
	MISSISSIPPI RIVER SAND PLAINS (2c)			
26	Helen Allison Savanna SNA	Anoka	86	DNR/TNC
	RED RIVER VALLEY (3e)			
27	Bluestem Prairie SNA & Buffalo River SP	Clay	2600	DNR/TNC
28	Blazing Star Prairie SNA	Clay	160	DNR/TNC
29	Twin Valley Prairie SNA	Norman	259	DNR/TNC
30	Zimmerman Prairie	Becker	80	TNC
31	Waubun WMA	Mahnomen	640	DNR
32	McKinney-Hellickson WPA	Becker	1365	USFWS
33	Santee Prairie and Wambach WMA	Mahnomen	1729	TNC/DNR
34	Agassiz Dunes SNA	Polk/Norman	417	DNR/TNC
35	Pembina Trail Preserve SNA	Polk	2044	DNR/TNC
36	Pankratz Prairie	Polk	775	TNC
37	Malmberg Prairie SNA	Polk	80	DNR/TNC
	ASPEN PARKLANDS (2f)			
38	Twin Lakes WMA	Kittson	80	DNR
39	Norway Dunes	Kittson	320	TNC
40	Beaches WMA	Kittson	17914	DNR

*DNR — Minnesota Department of Natural Resources
WMA, Wildlife Management Area
SP, State Park
SNA, Scientific and Natural Area

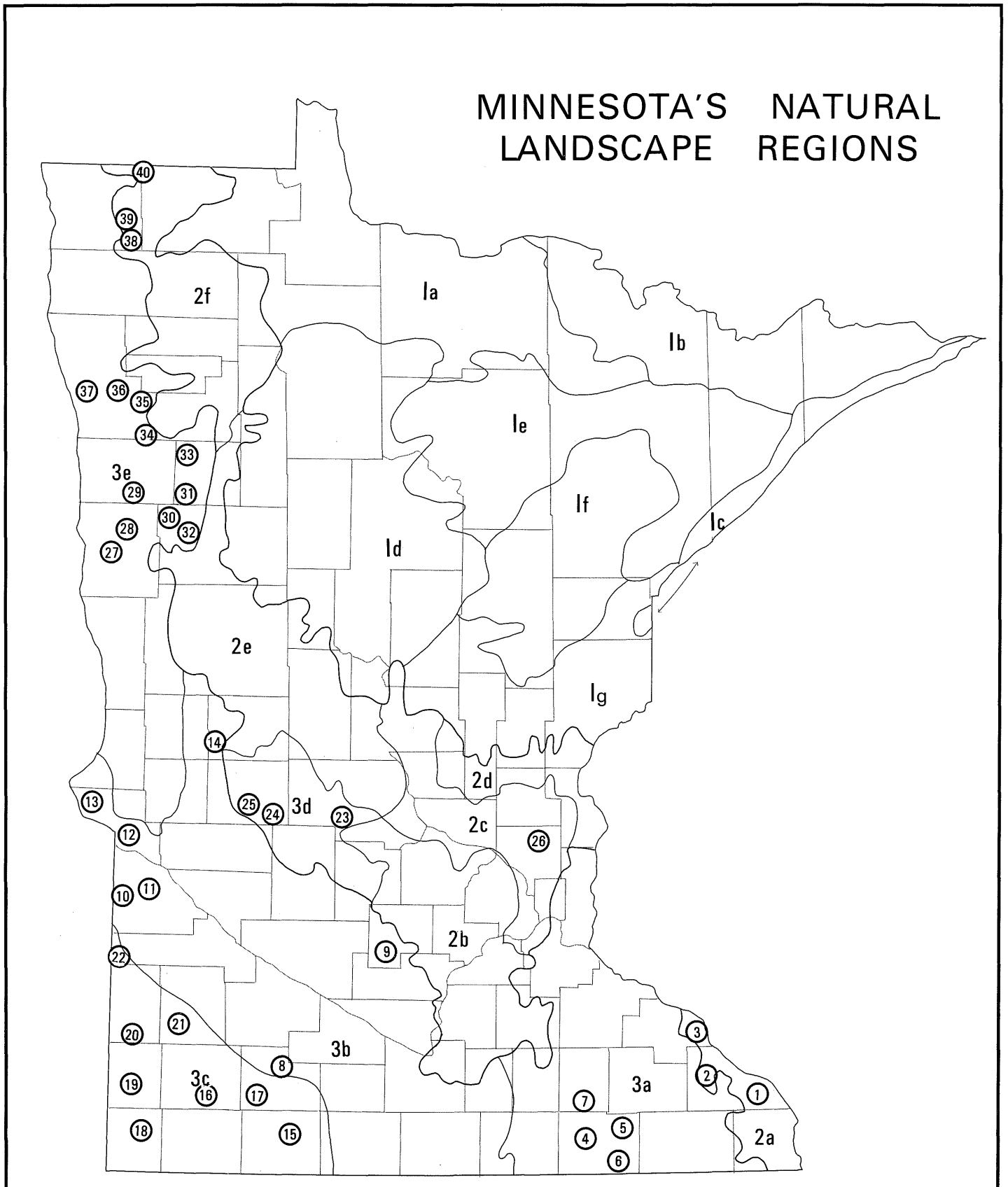
MHS — Minnesota Historical Society

NPS — National Park Service

TNC — The Nature Conservancy

USFWS — U.S. Dept. of Interior, Fish and Wildlife Service
WPA, Waterfowl Production Area

Figure 4


MINNESOTA'S NATURAL LANDSCAPE REGIONS
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Blufflands

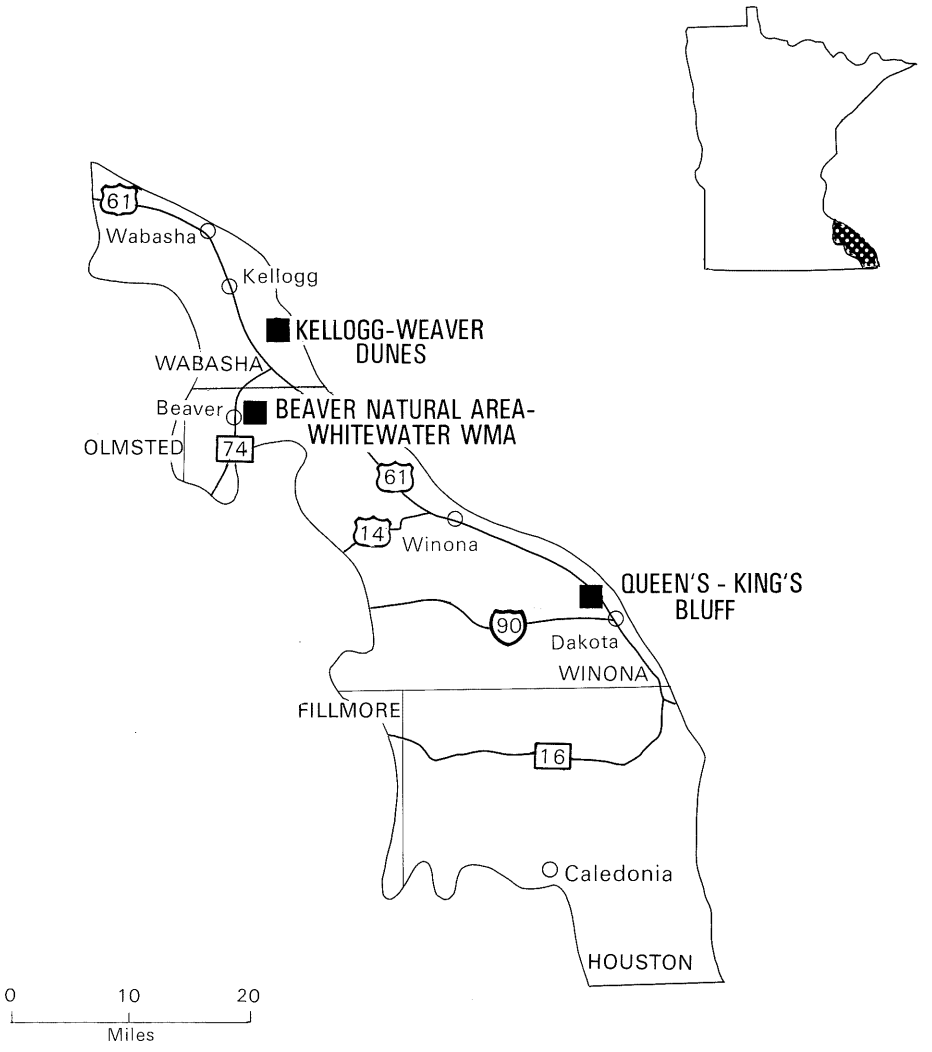
The Blufflands region, located in extreme southeastern Minnesota, makes up part of the "Driftless Area." This area — believed to have escaped glacial cover during the most recent glaciations — is geologically and botanically one of the most interesting places in the Upper Midwest. The land is heavily stream dissected and is characterized by steep, rugged bluffs that border the Mississippi River and its minor tributaries. Physiographically the Blufflands can be separated into two geomorphic regions: 1) the nearly level terraces and bottoms along the major river valleys, and 2) the steep to very steep bluffs and ridges adjoining stream valleys.

The original vegetation of the Blufflands was predominantly forest. Maple-basswood forest and mixed oak forest occupied much of the uplands with floodplain forest found on the bottomlands. Prairie was confined to small areas in a variety of habitats: steep south to west-facing bluffs, sandy river terraces above the floodplain, and gently rolling uplands subjected to frequent fires. Despite the rugged topography of this region, much of the original vegetation cover has been altered since settlement. By the turn of the century, many of the flat blufftops and valley bottoms had been cultivated, and many hillsides were cleared of timber, turning woodland into pasture. Today, only the steepest, rockiest, or least fertile lands retain their original flora. Examples of two prairie natural community types — dry sand prairie and goat prairie — have largely escaped destruction due to their low agricultural value. Blacksoil prairies, requiring deeper, more fertile soils and once found on the loess-capped uplands, may have been entirely destroyed.

The goat prairies are still found over much of their original range within the Blufflands. They occupy the steep, south to west-facing limestone capped bluffs, occurring as openings in otherwise forested slopes. These prairies are typically small, often less than 10 acres in size. The goat prairies are dominated by the mid-grasses, little bluestem and side oats grama, which form a bunched growth pattern on the shallow rocky soils. Characteristic forbs include compass plant *(Silphium laciniatum)*, leadplant *(Amorpha canescens)*, silky aster *(Aster sericeus)*, and blazing star *(Liatris cylindracea)*. Queen's and King's Bluff in Winona County are excellent examples of this community type.

On the dry sandy soils of the Mississippi River terraces, a distinctly different prairie community occurs — the dry sand prairie. Although most of the level terraces have been cultivated or heavily pastured, undisturbed prairie can be found today on the driest, least fertile sites. These occur primarily on sand dunes where agricultural activity is limited. The dry sand prairies within the Blufflands region contain a number of species found nowhere else in Minnesota, including fame flower *(Talinum rugospermum)*, sand milkweed *(Asclepias amplexicaulis)*, and goats rue *(Tephrosia virginiana)*. The Kellogg-Weaver Dunes preserve is an extraordinary example of the original flora and fauna typical of the sand dune formations along the Mississippi River.

The geological and botanical diversity of the Blufflands region make it equally rich in animal life. A variety of reptiles and amphibians, not found elsewhere in the state, is characteristic of the region. Many species are common further south but reach the northern limits of their distribution in the Blufflands. Two species, the six-lined racerunner and the timber rattlesnake, may both be found on some of the dry sand prairies or goat prairies of the area. Also characteristic of grasslands in the region are several interesting bird and butterfly species, such as the Henslow's sparrow, lark sparrow, and Karner blue butterfly.


61
Wabasha
Kellogg
KELLOGG-WEAVER
DUNES
WABASHA
Beaver
BEAVER NATURAL AREA-
WHITEWATER WMA
OLMSTED
74
61
14
Winona
QUEEN'S - KING'S
BLUFF
90
Dakota
WINONA
FILLMORE
16
Caledonia
HOUSTON
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10
20
Miles

1 QUEEN'S AND KING'S BLUFF, WINONA COUNTY

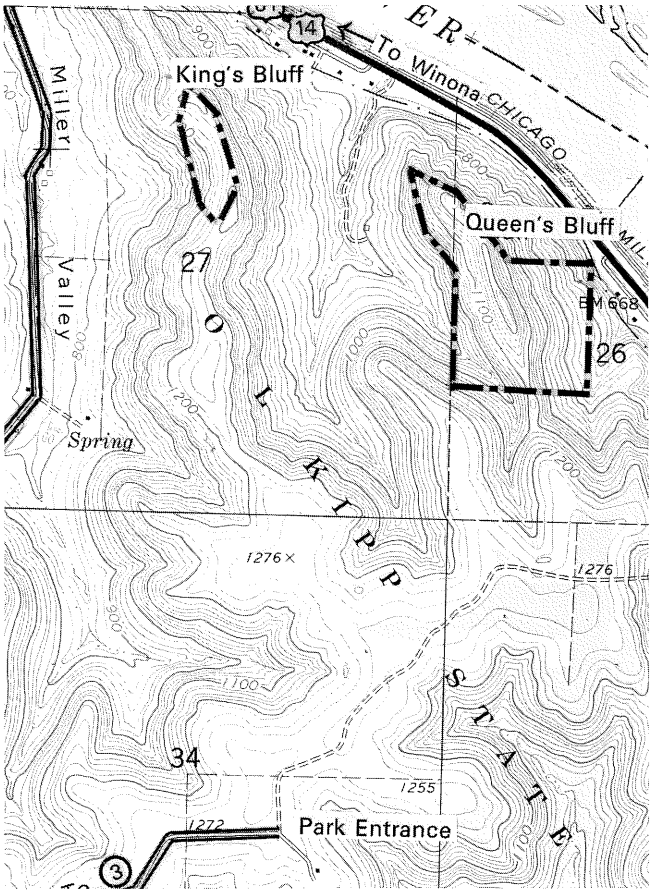
LOCATION: (T106N, R5W parts of Section 26 and 22). Both sites are located within the boundaries of O.L. Kipp State Park. The park is about 11 miles southeast of Winona along the Mississippi River. Exit off I-90 at Co. 12, take Co. 3 north 1 mile to the park entrance.

SIZE: The goat prairies at both sites are approximately 10 acres in size.

NATURAL FEATURES: Queen's Bluff rises nearly 500 feet over the Mississippi River and provides a spectacular view of the river valley. On the steep (40 to 50°) south to southwest facing slopes is a fine representation of the goat prairie community. A small bur oak savanna occurs at the top of the bluff, and deciduous forest occurs on the lower slopes. King's Bluff, just northwest of Queen's Bluff, also supports a goat prairie on its southwestern slopes with deciduous forest on the opposite (NE) slope.

PRESERVE STATUS AND MANAGEMENT: Queen's and King's Bluff are managed by the MN DNR, Div. of Parks. Portions of the King's Bluff complex remain in private ownership. Management includes prescribed burning and control of foot traffic. Visitors should inquire at the O.L. Kipp State Park headquarters for hiking trail information.

INTERPRETIVE AND RESEARCH REFERENCES: MN Department of Natural Resources, 1979c.



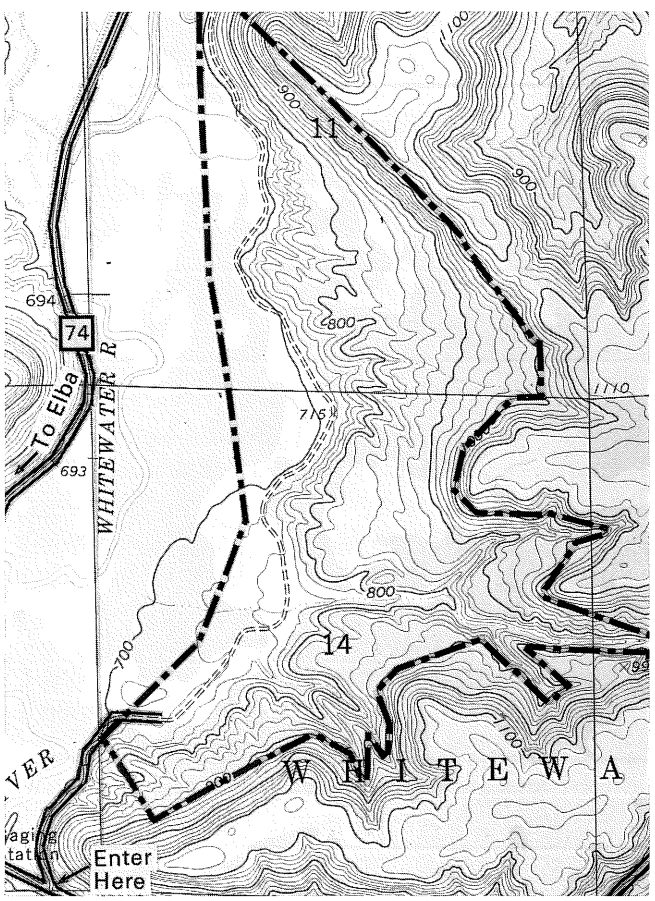
2 BEAVER NATURAL AREA-WHITEWATER WMA, WINONA COUNTY

LOCATION: (T108N, R10W portions of Sections 11 and 14). From the WMA headquarters north of Elba, on County Rd 74 proceed north about 2 miles, turn east on County Rd 30, a gated road on the north side of Co. 30 leads into the Beaver Natural Area.

SIZE: 200 acres.

NATURAL FEATURES: This portion of the 26,000 acre Whitewater WMA contains several natural features of ecological significance. Oak sand savanna and sand prairie occur on high sandy terraces and harbor a number of species rare to Minnesota. These species, restricted to the southeastern part of the state, include sand milkweed *(Asclepias amplexicaulis),* goat's rue *(Tephrosia virginiana)* and fame flower *(Talinum rugospermum).* In addition, two species of rare butterflies, the ottoe skipper and the Karner blue, are found at this site. Portions of this sandy habitat had been subjected to grazing and unsuccessful attempts at cultivation in the early 1900s. The native vegetation has now recovered much of its original character. Above the river terraces, goat prairies are found on the steep southwest facing bluffs.

PRESERVE STATUS AND MANAGEMENT: The 200 acre parcel known as the Beaver Natural Area was included on the Minnesota Natural Heritage Register in 1983. It is located within the Whitewater WMA where no trespassing is allowed September 1 — May 1 of each year.



3 KELLOGG-WEAVER DUNES, WABASHA COUNTY

LOCATION: The site encompasses three management units: the SNA unit (T109N, R9W, NE1/4 Section 6); the TNC unit (T109N, R9W, parts of Section 7 and 8); and the WMA unit (T110N, R10W, Sections 35 and 36, T109N, R9W, Sections 6, 7, and 18, T109N, R10W, Sections 1, 2, 11, 12, 13, and 14). The sites are located between the towns of Kellogg and Weaver, Minnesota. The SNA and TNC units are within 1 mile of each other and are both on the east side of County Hwy 84.

SIZE: SNA unit (182 acres), TNC unit (442 acres), WMA unit (2,678 acres).

NATURAL FEATURES: These three sites encompass a good portion of the largest sand dune complex along the Mississippi River in southeast Minnesota. The area is part of an unusual area of rolling sand dune topography on a Mississippi River terrace well above floodplain level. The dunes contain a remarkable series of successional stages, ranging from active sand blowouts to sands stabilized by dry to wet prairie vegetation and by scattered trees including northern pin oak, bur oak, and jack pine. The sand dune habitat is primarily confined to the SNA and TNC tracts where 14 rare plant species and three rare animal species occur, including the state's largest known population of Blanding's turtle. The McCarthy Lake Wildlife Management Area, to the west, protects a small area of dune habitat and extensive wetlands. Prior to preservation, portions of the area were utilized for grazing and hay mowing.

PRESERVE STATUS AND MANAGEMENT: Plans have begun for cooperative inventory and management of the three tracts by the three managing agencies: MN DNR-Wildlife, MN DNR-Scientific and Natural Areas, and The Nature Conservancy.

INTERPRETIVE AND RESEARCH REFERENCES: Galatowitsch, 1984.

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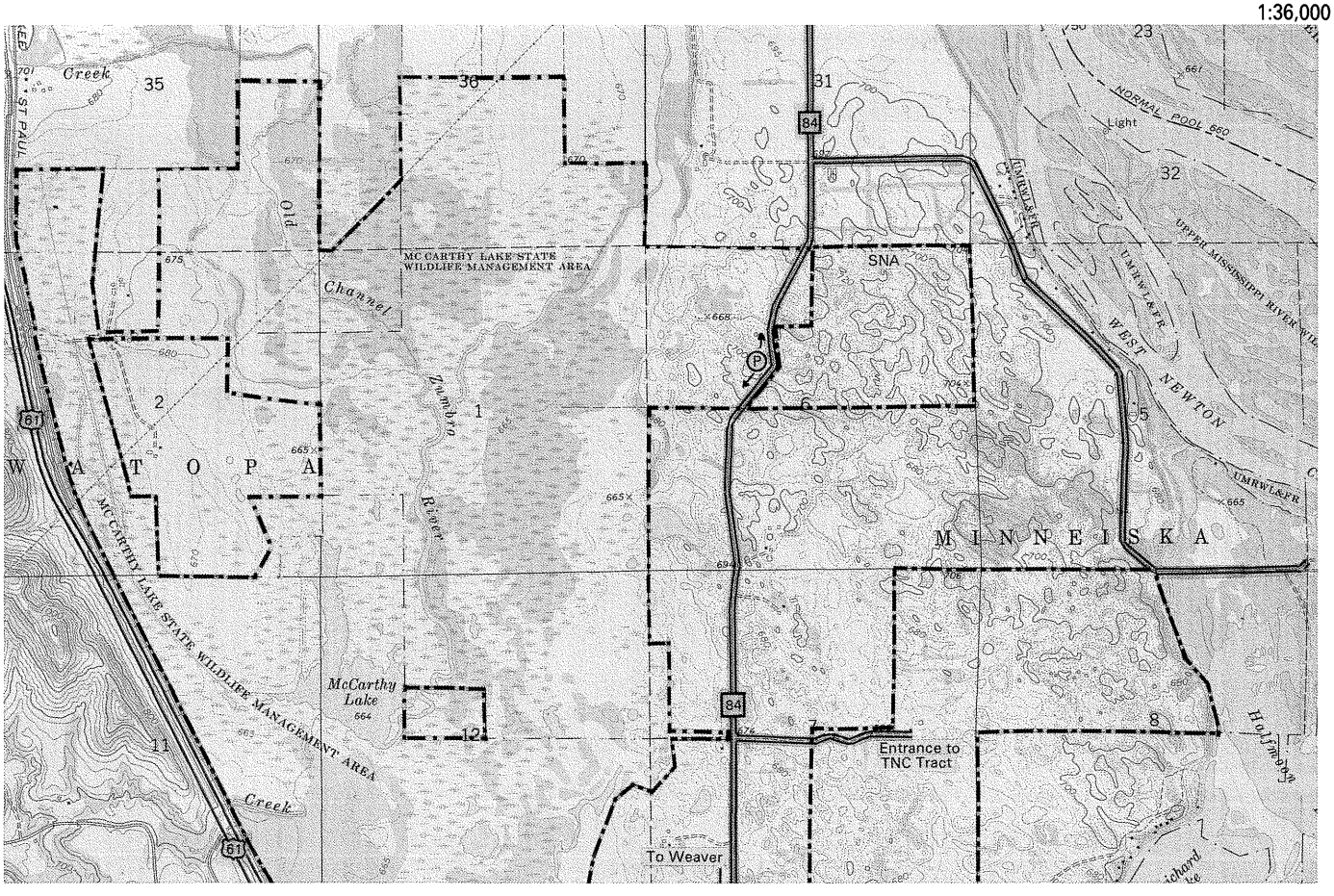
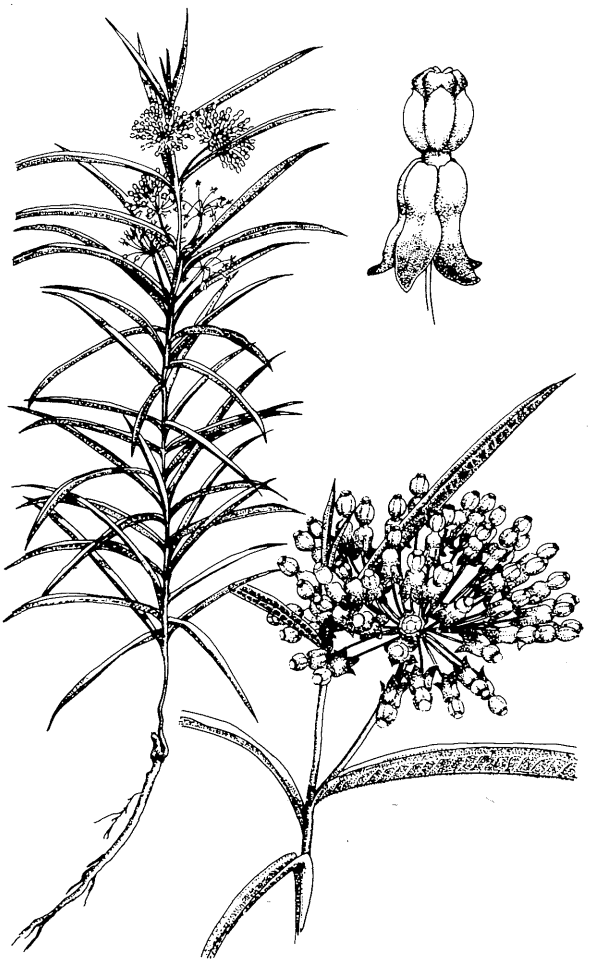


Southern Oak Barrens

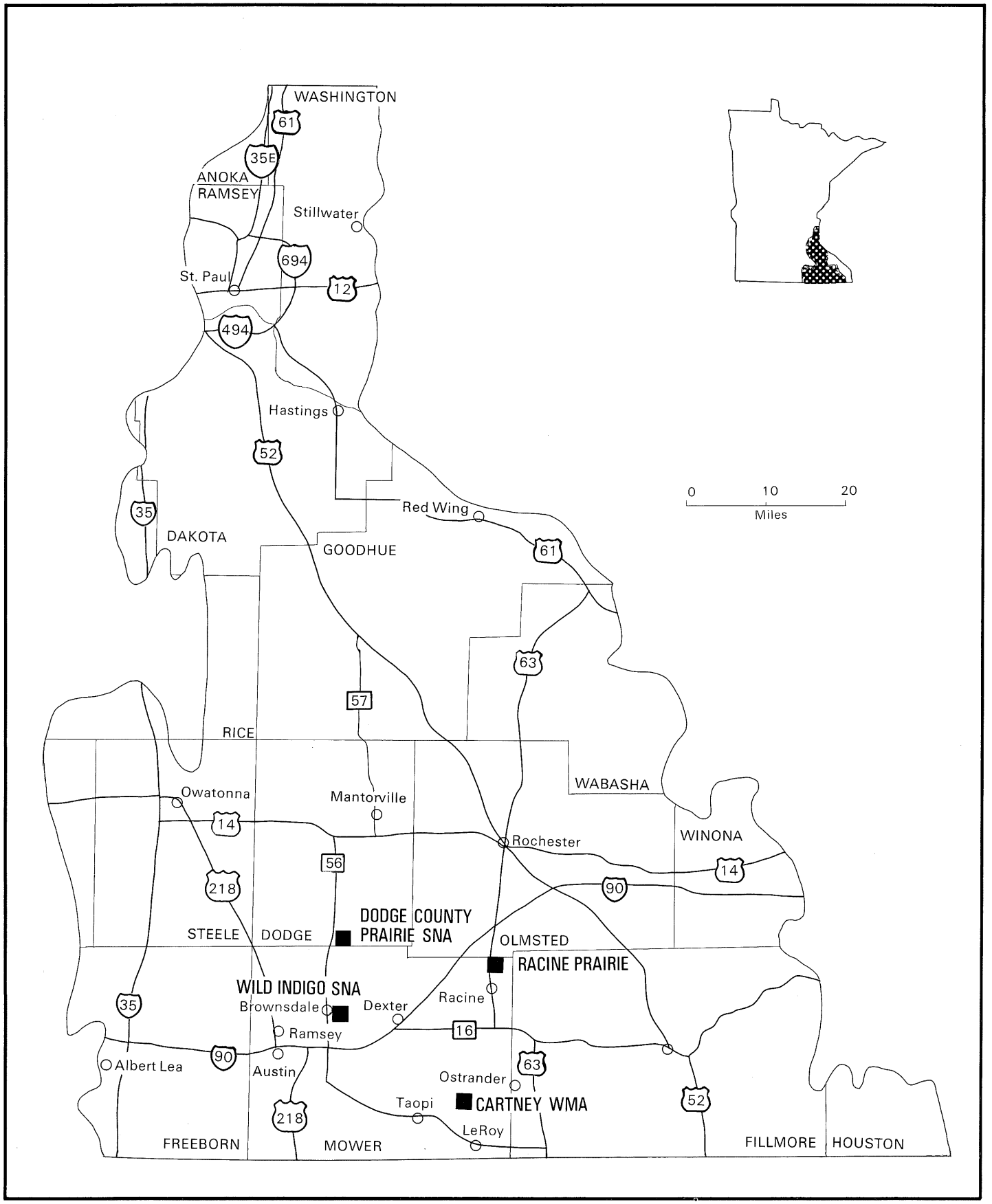
The Southern Oak Barrens natural region is a transitional zone between the prairie to the west and the deciduous forest to the north and east. A nearly level to gently sloping till plain once supported extensive tracts of blacksoil prairie interspersed with oak savanna. This region — Minnesota's most productive agricultural land — is now almost entirely under cultivation. Destruction of tallgrass prairie has been almost complete in this natural region of the state. The railroad system — the portions built before intensive cultivation of the land in the mid 1800s — has been largely responsible for preventing the total elimination of this community. Remnants of blacksoil prairie are today largely confined to railroad rights-of-way. Railroad strip prairies maintain, in near original condition, the vegetation structure and composition of the southeastern blacksoil prairie. Nevertheless, confinement to narrow 100 foot rights-of-way, typically bordered by cropland, makes this natural community especially susceptible to degradation. Herbicide drift from crop spraying, soil disturbance from maintenance of the railbed, and siltation resulting from erosion of adjacent cropland are major disturbances which can significantly alter this natural community. Unfortunately, the small and narrow strips of native prairie habitat that remain are usually no longer adequate to support many of the prairie vertebrates that once may have been typical of the area.

The southeast blacksoil prairie — due to geographic location and climatic conditions — is the most species diverse prairie community in Minnesota. Because of favorable moisture and soil conditions, the dominant grasses, big bluestem and Indian grass, reach heights of six to eight feet. The flora here shares numerous species in common with the blacksoil prairies in adjacent states to the east and south. Prairie species found in the southeast blacksoil prairie but rare or absent in the blacksoil prairies of western or central Minnesota include cream wild indigo *(Baptisia leucophaea)*, false white indigo *(Baptisia leucantha)*, rattlesnake master *(Eryngium yuccifolium)*, wild quinine *(Parthenium integrifolium)*, Indian plaintain *(Cacalia tuberosa)*, and prairie parsley *(Polytaenia nuttallii)*.

Today less than 500 acres of intact blacksoil prairie in southeast Minnesota are known to exist. The Dodge County Prairie SNA and Wild Indigo SNA are particularly fine examples of this prairie type.



A rare prairie milkweed, *Asclepias hirtella*, is found in only one location in Minnesota — an unbroken blacksoil prairie in the Southern Oak Barrens region.


WASHINGTON
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DAKOTA
Red Wing
GOODHUE
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RICE
WABASHA
Owatonna
Mantorville
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Rochester
WINONA
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DODGE COUNTY
PRAIRIE SNA
STEELE
DODGE
OLMSTED
RACINE PRAIRIE
WILD INDIGO SNA
Brownsdale
Dexter
Racine
35
Ramsey
16
Albert Lea
90
Austin
63
Ostrander
52
Taopi
CARTNEY WMA
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LeRoy
FREEBORN
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4 WILD INDIGO SNA, MOWER COUNTY

LOCATION: A 12.5 mile segment of a former railroad bed and right-of-way located between the town of Dexter on the east, and the Red Cedar River on the west.

SIZE: 155 acres.

NATURAL FEATURES: The Wild Indigo SNA occurs on deep, poorly drained to well drained silt loam soils. Along its entire 12.5 mile length are found segments of relatively undisturbed blacksoil prairie. Over 340 native plant species have been documented for the site, including four state threatened and endangered plant species. Rare plants include Indian plantain *(Cacalia tuberosa)*, wild quinine *(Parthenium integrifolium)*, prairie milkweed *(Asclepias sullivantii)* and valerian *(Valeriana edulis)*. Interspersed with undisturbed prairie are vegetation assemblages that reflect various degrees of disturbance from past railbed construction and maintenance, and adjacent agricultural practices.

PRESERVE STATUS AND MANAGEMENT: The site was designated a Scientific and Natural Area in October, 1980. A DNR unit trail will be developed in the former railbed to provide for hiking, skiing and limited bicycling. Prescribed burning is the major management activity.

INTERPRETIVE AND RESEARCH REFERENCES: MN Department of Natural Resources, 1983c, 1983d.

5 RACINE PRAIRIE SNA, MOWER COUNTY

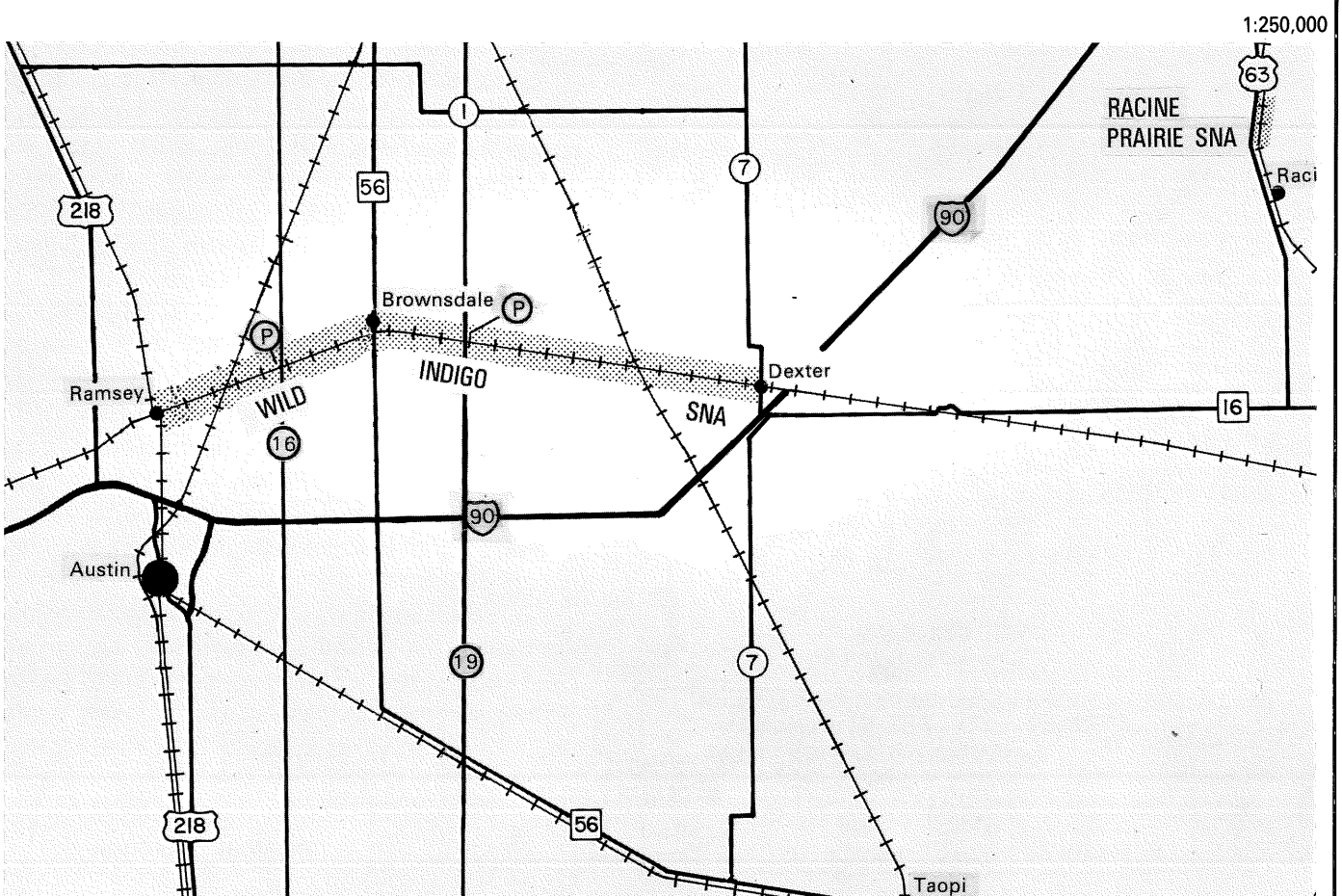
LOCATION: (T104N, R14W, W1/2 NW1/4 Section 23; E1/2 NE1/4 Section 22). A 0.5 mile segment of a former railroad bed and right-of-way located between the towns of Racine and Stewartville. U.S. Hwy 63 forms the west boundary.

SIZE: 6.5 acres, a strip 0.5 mile long by 75 feet wide.

NATURAL FEATURES: Similar to the Wild Indigo SNA, the Racine Prairie SNA is a good example of an extremely rare type of blacksoil prairie which in Minnesota is confined to the southeastern portion of the state. Undisturbed segments of the right-of-way contain very high species diversity and harbor two prairie plants of special concern in the state: cream wild indigo *(Baptisia leucophea)* and rattlesnake master *(Eryngium yuccifolium)*. Other portions of the right-of-way have been heavily disturbed and no longer reflect natural conditions.

PRESERVE STATUS AND MANAGEMENT: The Racine Prairie was designated a state Scientific and Natural Area in 1981. The site is managed with prescribed burning.

INTERPRETIVE AND RESEARCH REFERENCES: MN Department of Natural Resources, 1983a, 1983b.



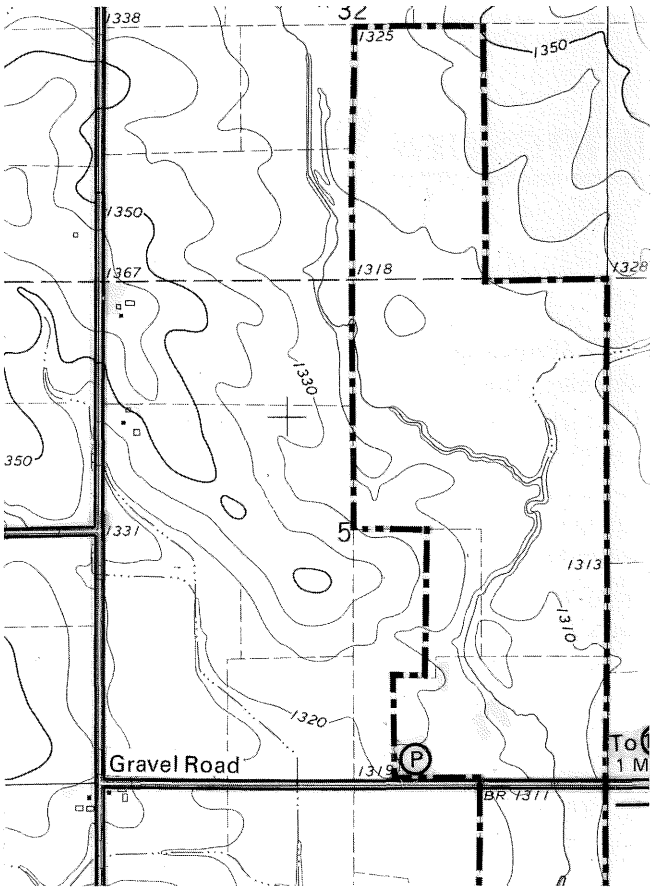
6 CARTNEY WMA, MOWER COUNTY

LOCATION: (T102N, R14W, parts of SE1/4 Section 32; T101N, R14W, parts of Sections 5 and 8). North of LeRoy 4 miles on County Rd 14, west 1 mile on gravel twp road.

SIZE: 400 acres.

NATURAL FEATURES: The Cartney Wildlife Management Area lies within a large silt mantled till plain characterized by swell and swale relief. The tract itself lies on the upper reaches of the Little Iowa River on loamy, poorly drained soils. Sedge meadow dominates the lowest areas with blacksoil prairie found on the better drained sites. Prior to purchase by the state in 1965, the tract was heavily grazed. The original vegetation had been significantly altered, but is slowly recovering its natural character. Less disturbed areas within the tract contain diverse assemblages of prairie species, including a number of southern and eastern prairie plants that have very limited distributions in Minnesota. These are: valerian *(Valeriana edulis),* a milkweed *(Asclepias hirtella),* cowbane *(Oxypolis rigidior),* compass plant *(Silphium laciniatum),* and rattlesnake master *(Eryngium yuccifolium).* In addition, the tract harbors two rare wildlife species — upland sandpiper and Blanding's turtle.

PRESERVE STATUS AND MANAGEMENT: The tract is owned and managed by MN DNR-Wildlife. In recent years prescribed burning has been used to enhance recovery of the prairie vegetation.



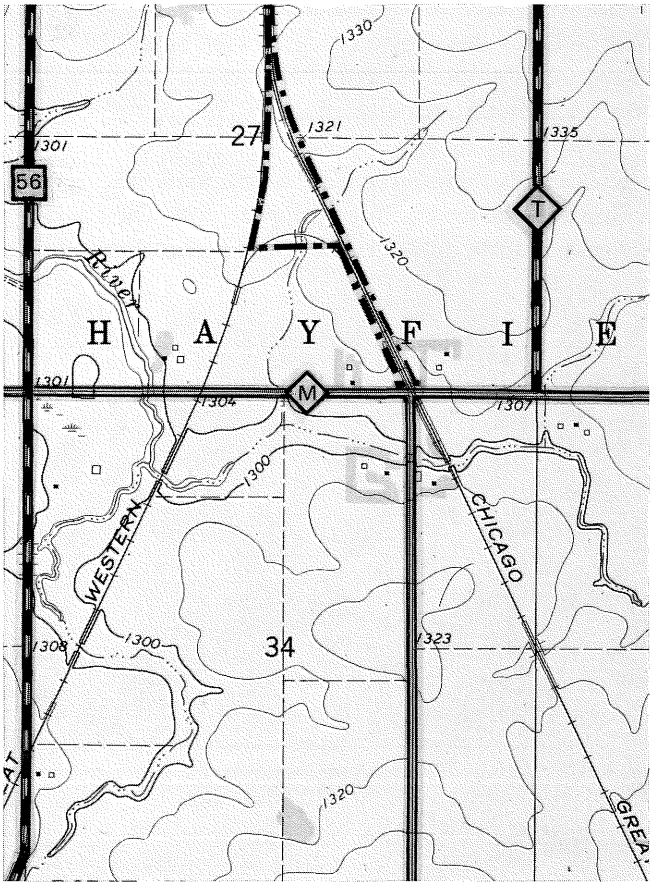
7 DODGE COUNTY PRAIRIE SNA, DODGE COUNTY

LOCATION: (T105N, R17W, parts of NE1/4 SW1/4 and parts of NW1/4 SE1/4 Section 27). Located about 2 miles south of the town of Hayfield. From Hayfield take Trunk Hwy 56 south for 2 miles, go east on County Rd M for 0.5 mile. The site is on the north side of road, between two railroad spurs.

SIZE: 34 acres.

NATURAL FEATURES: The Dodge County Prairie SNA is the finest known example of blacksoil prairie in southeastern Minnesota. Triangular in shape, this virgin prairie is bounded by two railroad spurs. The site contains an unusually high diversity of prairie species, including five species of special concern or threatened status in the state. These are Sullivant's milkweed *(Asclepias sullivantii),* Indian plantain *(Cacalia tuberosa),* wild quinine *(Parthenium integrifolium),* valerian *(Valeriana edulis),* and white-fringed prairie orchid *(Habenaria leucophea).*

PRESERVE STATUS AND MANAGEMENT: The site is owned and managed by the MN DNR-Scientific and Natural Area Program. It was acquired in 1984.

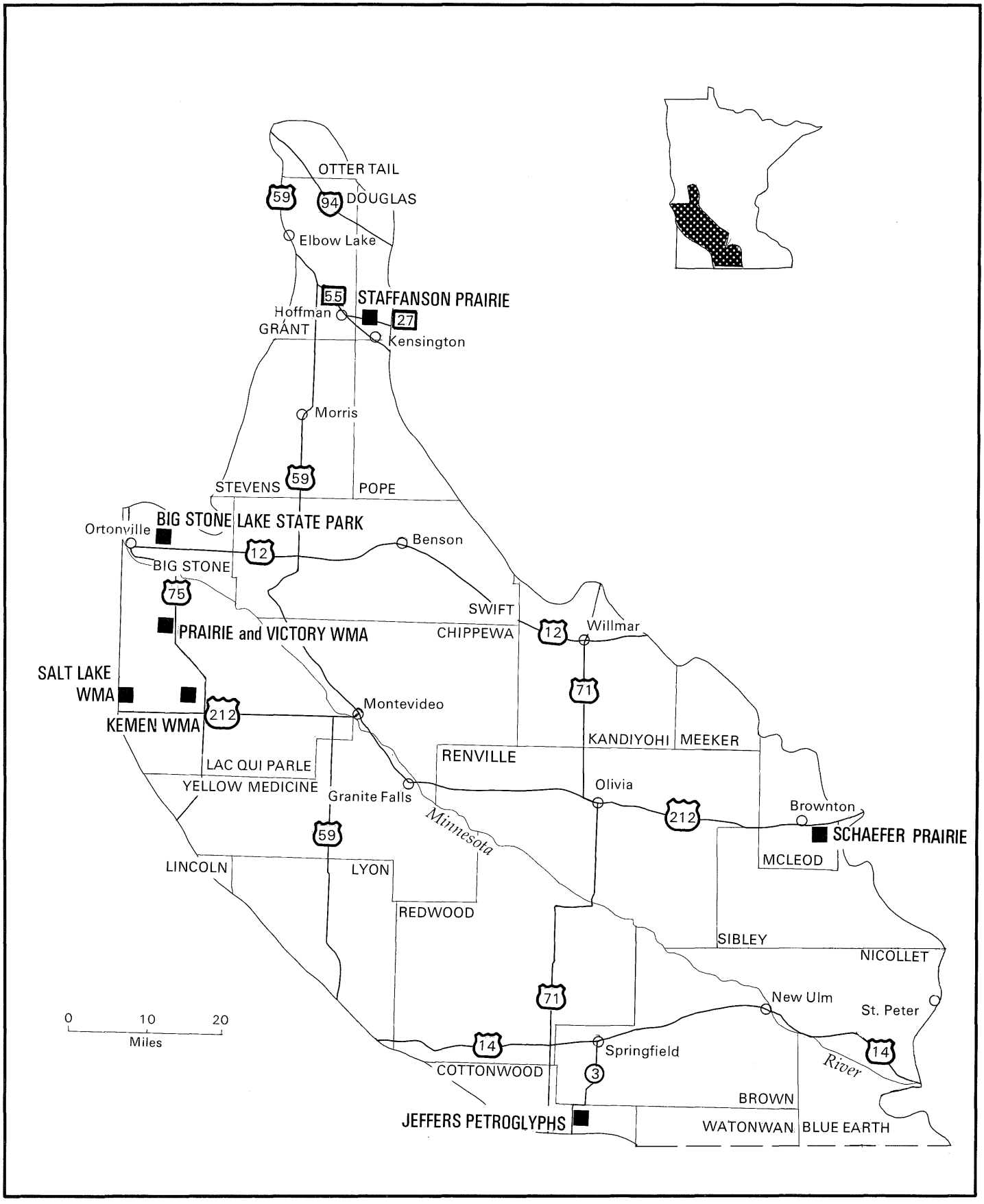


Minnesota River Valley

The Minnesota River Valley region straddles the Minnesota River covering approximately 30 miles on either side of its valley. Most of the region is characterized by a generally featureless till plain consisting of undulating to rolling topography dotted with marshy depressions. This gentle landform is broken by the scenic Minnesota River Valley. The valley itself ranges from one to five miles wide and from 75 to 200 feet deep. This deep, broad valley was carved out by Glacial River Warren when this glacial stream drained tremendous volumes of water from Glacial Lake Agassiz through south central Minnesota. Today, the large valley channels the much smaller Minnesota River.

On the presettlement landscape, the rich soils of this natural region supported extensive tracts of blacksoil prairie with numerous small islands of marsh. Narrow bands of forest were restricted to the slopes of the Minnesota River Valley and along the slopes of lake basins. Today this region comprises the heart of Minnesota's productive corn belt; the vast till plain is now under intensive cultivation.

Remnants of virgin prairie are extremely rare within the Minnesota River Valley region. The Schaefer Prairie in McLeod County is one of the few intact pieces of blacksoil prairie existing on the rich, loamy soils of the till plain. Prairie remnants are now primarily confined to sites near the boundaries of the till plain that pose limitations to agricultural use. These areas include the abandoned channels of Glacial River Warren with their boulder-covered surfaces; the coarser morainic soils found within the Big Stone Moraine and the area bordering the Alexandria Moraine; and the steep slopes along Big Stone Lake. Of particular interest is the prairie associated with the granitic outcrops exposed in the river valley between New Ulm and Ortonville. The valley here is broken by knobs of granites and gneisses that rise as much as 100 feet above the general level of the valley floor. The soils within the outcrop areas are generally too shallow for cultivation, and they still harbor native prairie species. The distinctive flora accompanying the dry rock surfaces contains plants more closely resembling the arid regions of the Great Plains. These include pincushion cactus *(Mamillaria vivipara)*, fragile cactus *(Opuntia fragilis)*, rusty woodsia *(Woodsia oregana)*, and buffalo grass *(Bouteloua gracilis)*. The granite outcrops also support the state's rarest lizard, the five-lined skink. Separated from the main portion of its range in the southeastern United States, the skink is limited to a narrow 20-mile stretch of the Minnesota River Valley.


OTTER TAIL
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DOUGLAS
Elbow Lake
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STAFFANSON PRAIRIE
Hoffman
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GRANT
Kensington
Morris
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STEVENS
POPE
BIG STONE LAKE STATE PARK
Ortonville
12
Benson
BIG STONE
75
SWIFT
CHIPPEWA
12
Willmar
PRAIRIE and VICTORY WMA
71
SALT LAKE WMA
212
Montevideo
KEMEN WMA
KANDIYOHI
MEEKER
RENVILLE
LAC QUI PARLE
YELLOW MEDICINE
Granite Falls
Olivia
212
Brownton
SCHAEFER PRAIRIE
59
Minnesota
MCLEOD
LINCOLN
LYON
REDWOOD
SIBLEY
NICOLLET
71
New Ulm
St. Peter
0
10
20
Miles
14
Springfield
14
River
COTTONWOOD
3
BROWN
JEFFERS PETROGLYPHS
WATONWAN
BLUE EARTH

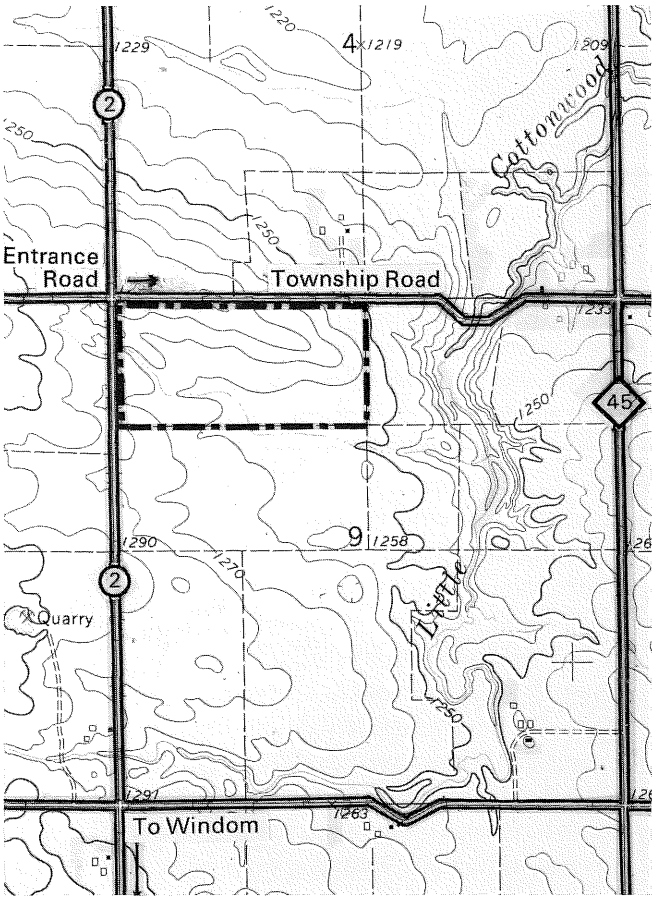
8 JEFFERS PETROGLYPHS HISTORIC SITE, COTTONWOOD COUNTY

LOCATION: (T107N, R35W, N1/2, NW1/4 Section 9). Located about 17 miles northeast of Windom, MN, via U.S. Trunk Hwy 71. At intersection of Hwy 71 and County Rd 10 proceed east on Co. 10 for 3 miles; turn south on County Rd 2 and go 1 mile to northwest corner of tract.

SIZE: 80 acres.

NATURAL FEATURES: The Jeffers Petroglyphs site is located on the Blue Earth Till Plain in an area where Sioux Quartzite bedrock is exposed along an east-west trending belt 3 miles wide and 20 miles long. The quartzite outcrops at the Jeffers tract are hundreds of feet wide and contain more than 2000 Indian rock carvings. Blacksoil prairie occurs on the clay loam soils found adjacent to the outcrops. Approximately 25 acres of relatively undisturbed prairie is found in the northern portion of the site. This area harbors a population of prairie bush clover *(Lespedeza leptostachya)*, a rare plant endemic to the Upper Midwest. The southern portion of the site, formerly old field vegetation, has been re-planted with native prairie seed.

PRESERVE STATUS AND MANAGEMENT: The Jeffers Petroglyphs site is owned and managed by the Minnesota Historical Society. The prairie vegetation is managed with a prescribed burning program. Information is available at the interpretive center found on the site. The tract was included on the Minnesota Natural Heritage Register in 1983.



9 SCHAEFER PRAIRIE, MCLEOD COUNTY

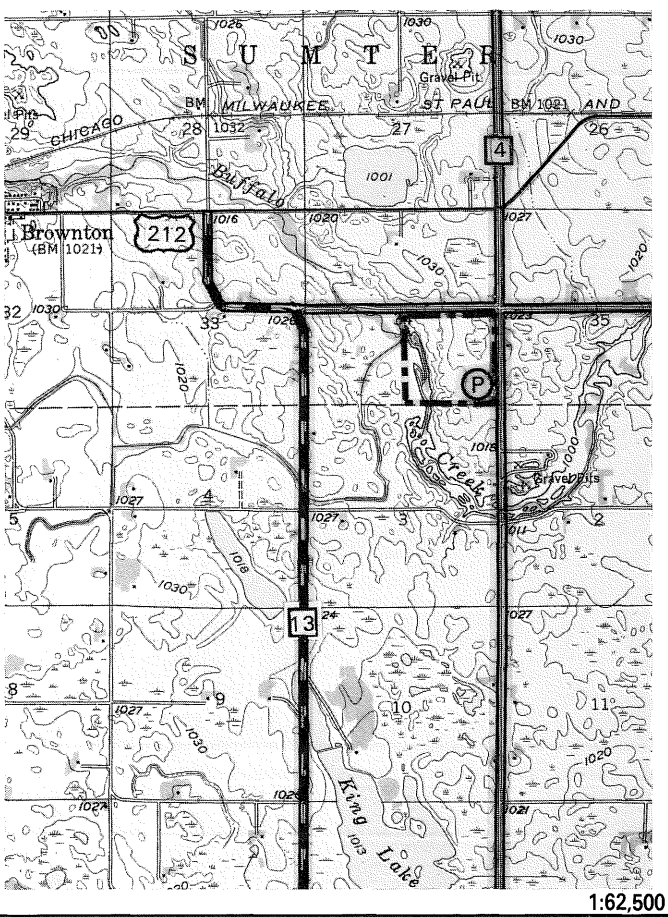
LOCATION: (T115N, R29W, SE1/4 Section 34). From Glencoe, go 7 miles west on US Hwy 212 to unnumbered gravel road; proceed south 0.5 mile to the first intersection; the prairie is at the southwest corner of intersection.

SIZE: 160 acres.

NATURAL FEATURES: The Schaefer Prairie occurs on a loamy till plain of gently rolling topography. Blacksoil prairie occurs on 75 acres of the site ranging from wet to dry-mesic. The remainder of the tract contains pothole marshes, several ponds, flood plain and creek, and small areas of old field. This varied habitat contains over 245 native plant species. The prairie is especially significant as one of the only undisturbed sites known to occur on the Clarion-Nicollet-Webster soil association. These rich soils, common in south central Minnesota, are now almost entirely under cultivation. Schaefer Prairie was mowed annually for hay from 1910 to 1941.

PRESERVE STATUS AND MANAGEMENT: The Nature Conservancy purchased the site in 1967, and has managed it with prescribed burning since that time.

INTERPRETIVE AND RESEARCH REFERENCES: Heitlinger, 1976.



10 SALT LAKE WMA, LAC QUI PARLE COUNTY

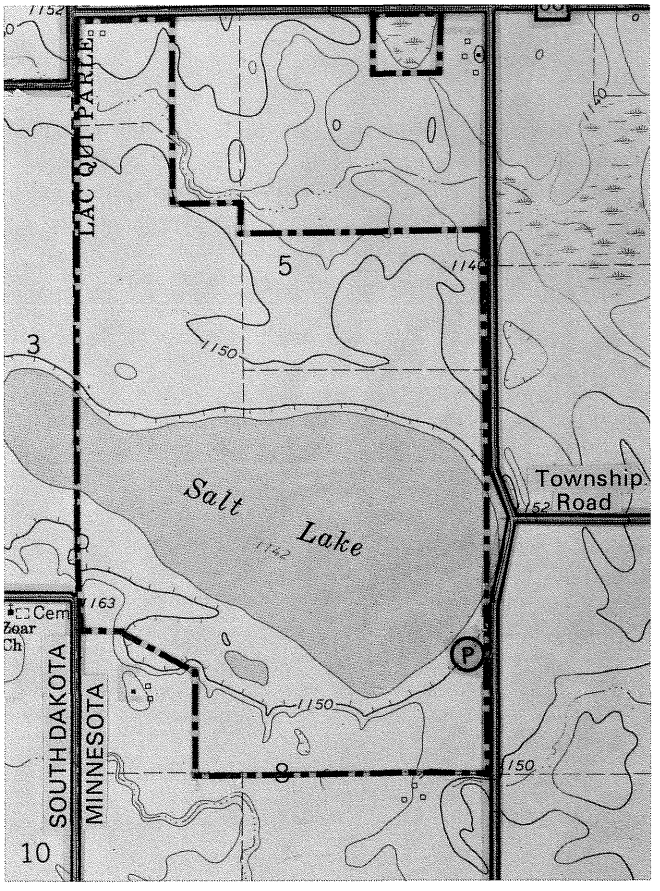
LOCATION: (T117N, R46W, Sections 5 and 8). Located 3 miles southwest of Marietta, MN on the MN/SD border. Proceed south from Marietta on County Hwy 7 for 3 miles. The WMA is 1 mile west on the township road. A parking area is found on the southeast end of the lake.

SIZE: 379 acres.

NATURAL FEATURES: The Salt Lake WMA contains a distinctive natural community type — saline prairie. This community forms on the lake's margins which are exposed to alternate periods of flood and drought. The soils, heavily impregnated with salts, support a unique flora adapted to saline-alkaline conditions. Two salt-loving plants, glasswort *(Salicornia rubra)* and alkali-grass *(Puccinellia nuttalliana)* are especially common. Both plants are western species and occur no farther east than western Minnesota. The lake is heavily utilized by migrating waterfowl and shorebirds. On an irregular basis, the site harbors breeding populations of eared grebes, Wilson's phalaropes, and American avocets.

PRESERVE STATUS AND MANAGEMENT: The tract is owned and managed by MN DNR-Wildlife. The site was placed on the Minnesota Natural Heritage Register in 1982.

INTERPRETIVE AND RESEARCH REFERENCES: Breckenridge, 1963.



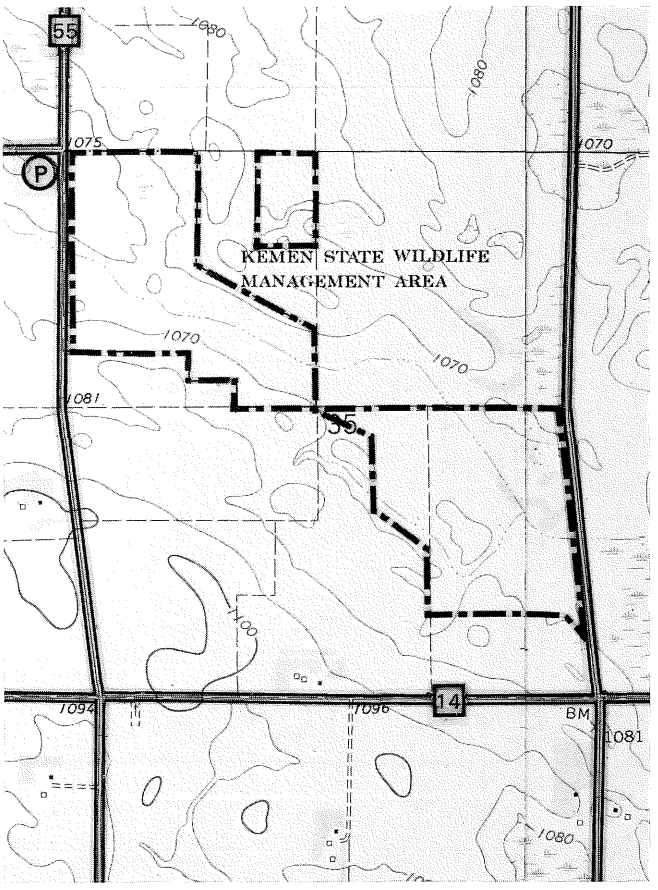
11 KEMEN WMA, LAC QUI PARLE COUNTY

LOCATION: (T118N, R45W, NW1/4 Section 35). Located SW of Madison, MN. Travel west on Trunk Hwy 40 approximately 3.5 miles. Proceed south on County Rd 55 1 mile. Parking is permitted along the gravel road at the northwest corner of the unit.

SIZE: 99 acres of prairie; 208 acres total.

NATURAL FEATURES: The Kemen WMA is located on loamy poorly drained soils. Shallow depressions occupied by emergent wetlands are scattered throughout the tract. Blacksoil prairie is found on 99 acres of the unit. The 14 acre prairie, in the northeastern part of the unit, is of excellent quality exhibiting a high native species diversity. The western portion of Kemen WMA has been disturbed by past grazing and parts of the prairie have been invaded by exotic plants. Two rare species indicative of undisturbed blacksoil prairies are found on the site — slender milkvetch *(Astragalus flexuosus)* and white lady's-slipper *(Cypripedium candidum)*.

PRESERVE STATUS AND MANAGEMENT: The tract is owned and managed by DNR-Wildlife. The site was placed on the Minnesota Natural Heritage Register in 1983. Prescribed burning is recommended for the site.



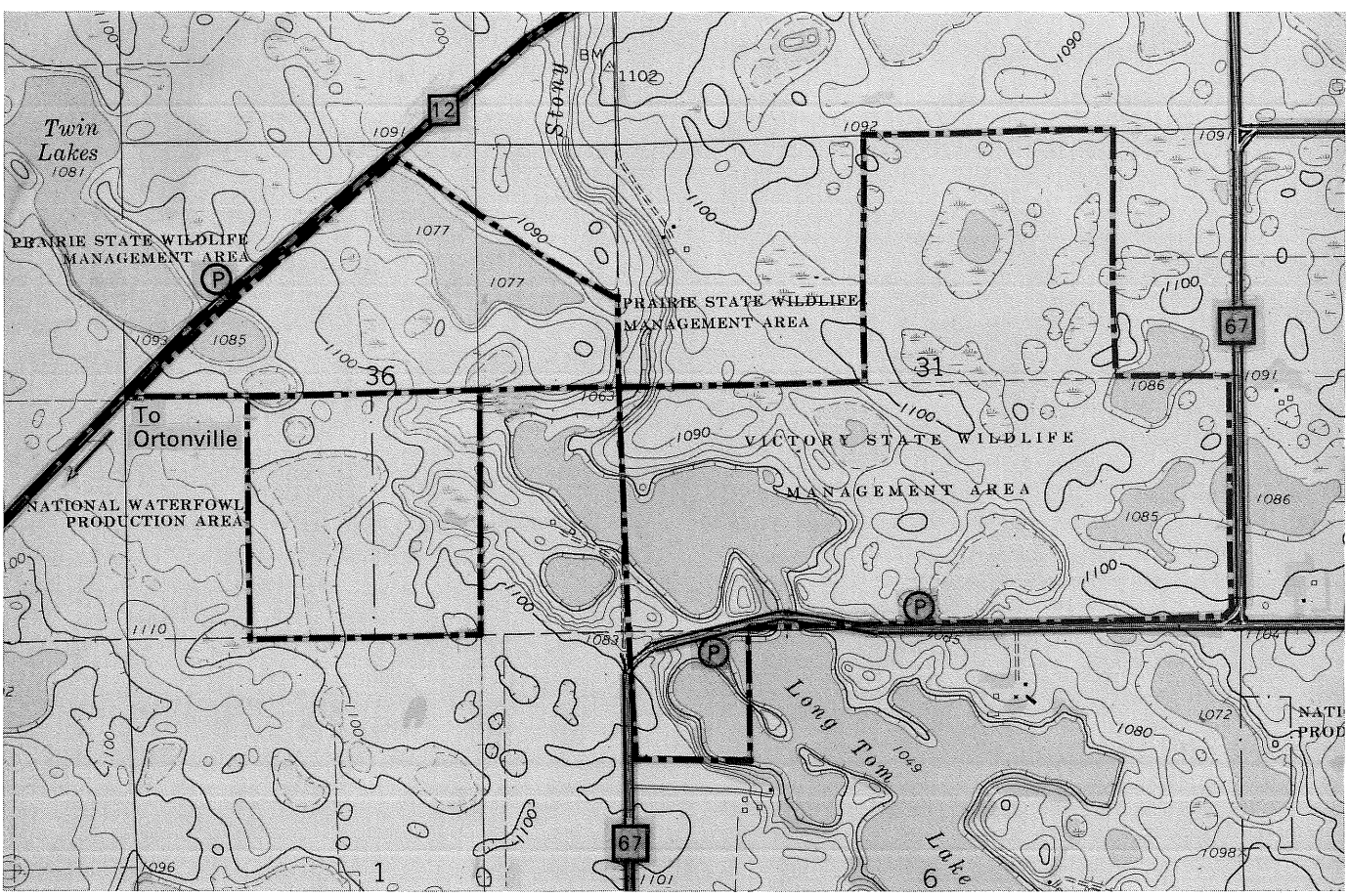
12 PRAIRIE WMA and VICTORY WMA, BIG STONE COUNTY

LOCATION: (T122N, R45W, parts of Section 31; T122N, R46W, parts of N1/2 Section 36). Located approximately 4 miles northeast of Ortonville, MN. Travel north from Ortonville on Trunk Hwy 75 for 1 mile to County Hwy 12, proceed on Hwy 12 for 2 miles. The WMAs are located on the east side of Hwy 12.

SIZE: Prairie WMA, 175 acres; Victory WMA, 500 acres.

NATURAL FEATURES: Prairie and Victory WMAs are located in the prairie pothole landscape of the Big Stone Moraine. This area consists of undulating glacial till characterized by numerous small lakes, marshes and potholes. Blacksoil prairie was the original vegetation over much of this area and still occurs on both WMAs. The vegetation varies with the topography, ranging from dry-mesic to wet prairie grading into potholes and emergent wetlands. About 84 acres of blacksoil prairie occur on Prairie WMA, and 97 acres occur within the Victory unit. The native prairie on both sites has been disturbed by years of pasturing and mowing. The vegetation is recovering with management aimed at prairie restoration. The numerous potholes on both sites makes these sites excellent waterfowl areas.

PRESERVE STATUS AND MANAGEMENT: Both tracts are owned and managed by MN DNR-Wildlife. The sites were placed on the Minnesota Natural Heritage Register in 1983 and now are being managed with prescribed burning.



13 BIG STONE LAKE STATE PARK (BONANZA UNIT), BIG STONE COUNTY

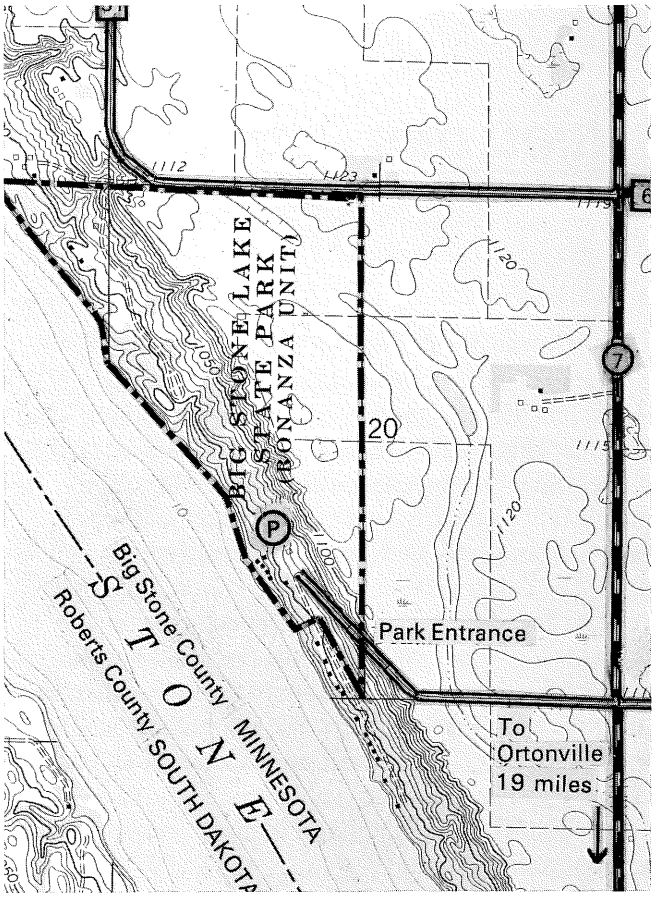
LOCATION: (T123N, R48W parts of NE1/4 Section 19 and W1/2 Section 20). Located about 19 miles northwest of Ortonville on Trunk Hwy 7.

SIZE: 30 acres.

NATURAL FEATURES: The park contains fine examples of a distinctive prairie type — glacial till hill prairie. These are found on the steep (25-30°) west-facing slopes in the bluffs along the east side of Big Stone Lake. The vegetation is a mosaic of dry to dry-mesic prairie on the steeper slopes with bur oak savanna on the lower slopes and in the draws. The level areas above the prairie slopes are old field vegetation. Although the tract had been grazed in the past, the hill prairies now appear close to presettlement condition. The oak savanna on the lower slopes have been significantly altered by heavy grazing and have not recovered to the same degree.

PRESERVE STATUS AND MANAGEMENT: Big Stone Lake State Park is owned and managed by MN DNR-Parks. The hill prairies are to be designated as a Scientific and Natural Area.

INTERPRETIVE AND RESEARCH REFERENCES: MN Department of Natural Resources, 1984.



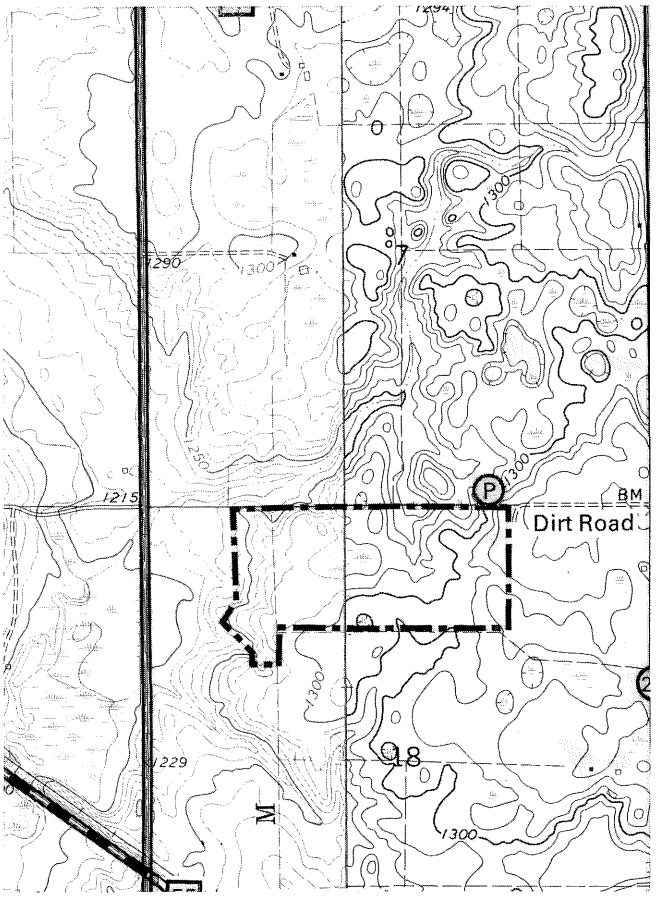
14 STAFFANSON PRAIRIE, DOUGLAS COUNTY

LOCATION: (T127N, R40W, NW1/4, NE1/4 Section 18; NE1/4, NW1/4 Section 18, and 17 acres in the W1/2 Section 18). Staffanson Prairie is located approximately 3 miles northwest of Kensington. From Kensington go north on County Rd 1 for approximately 1.5 miles, turn left on gravel road and proceed west 2 miles and turn right on County Rd 25. Go 1 mile north and turn left onto field road.

SIZE: 97 acres.

NATURAL FEATURES: Staffanson Prairie lies on the western flank of the Alexandria Moraine — a prominent land form characterized by its hilly knob and kettle topography. The preserve contains 60 acres of excellent quality prairie surrounding an open pothole ringed with wetland vegetation. The entire continuum from open water through mesic prairie to dry prairie can be found at this site. Undisturbed prairie pothole ecosystems of this quality are now a rare phenomenon in this region where much of the prairie has been plowed and the marshes drained. Staffanson Prairie was mowed for hay prior to preservation.

PRESERVE STATUS AND MANAGEMENT: The preserve was acquired by The Nature Conservancy in 1972; it is managed with prescribed burning.



Coteau des Prairies

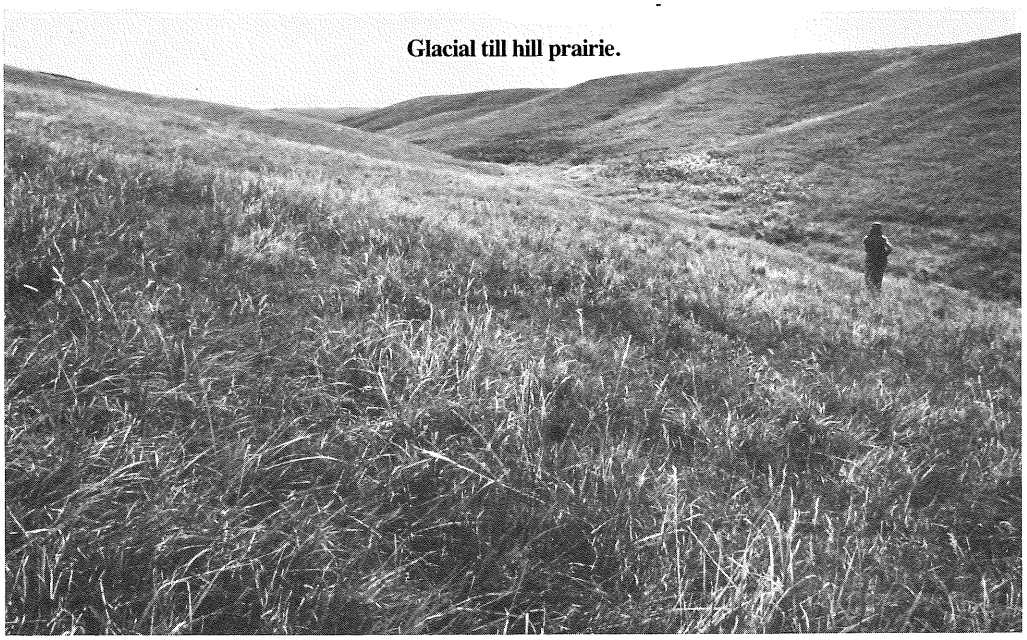
The Coteau des Prairies or "highland of the prairies" is the dominant physiographic feature of southwest Minnesota and adjacent eastern South Dakota. This massive plateau contains some of the highest land in Minnesota with crest elevations of over 2,000 feet above sea level. The topography ranges from gently undulating to steeply rolling and hilly. The eastern edge of the plateau is marked by a straight and steep escarpment. The escarpment is formed by two prominent terminal moraines — the Bemis Moraine and the Altamont Moraine — that are irregularly broken by steep hills, ridges, and deeply incised ravines. The inner edge or western part of the coteau consists of loess-mantled ground moraine. The area is lake-free, and the relief is characterized by smooth gentle slopes.

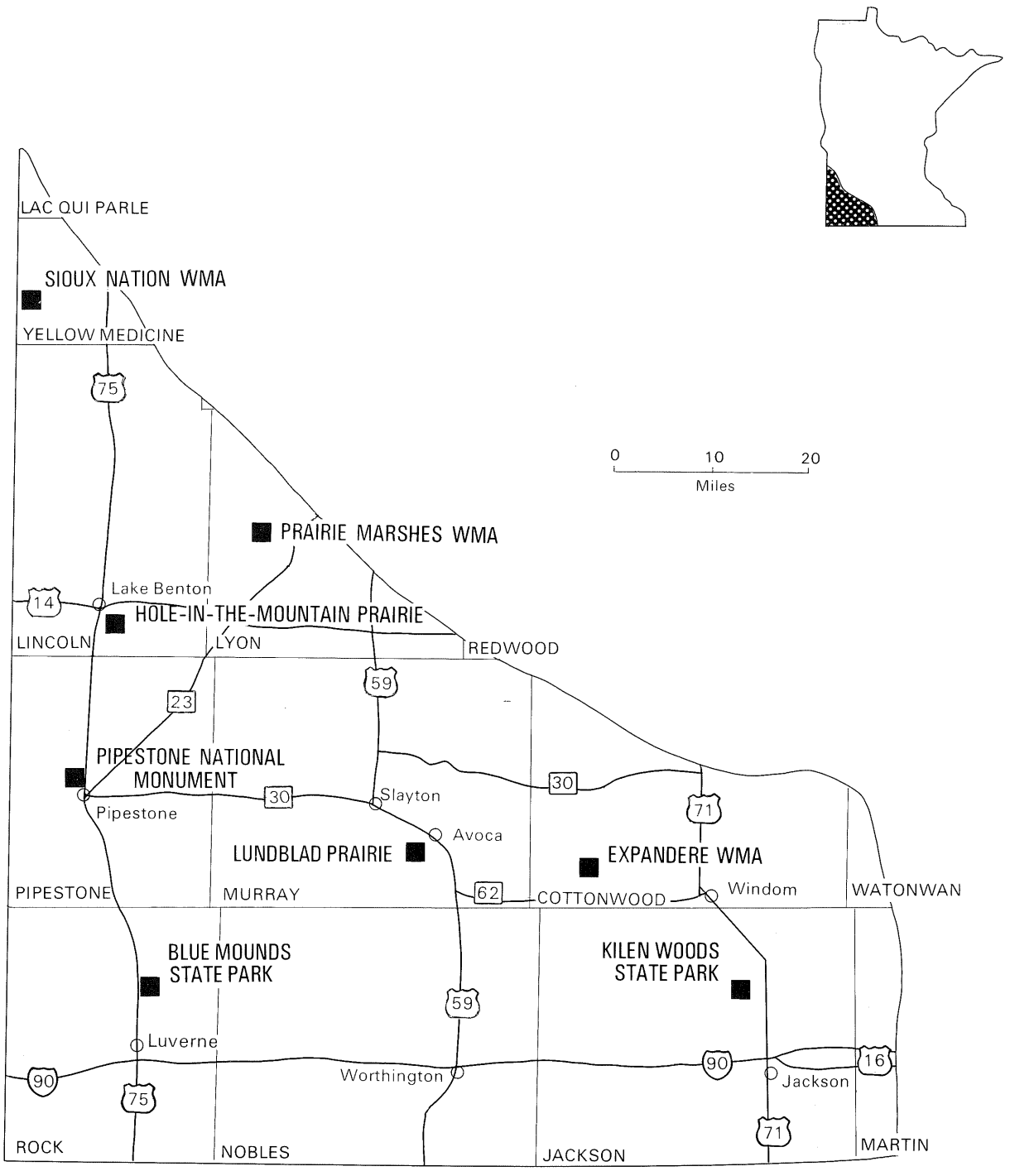
The greater part of this region once consisted of rolling native prairie. The region now is predominantly under cultivation. Mesic blacksoil prairie dominated most of the region on the well-drained soils with wet blacksoil prairie grading into marsh on poorly drained soils of low depressions. The blacksoil prairies, characterized by the tall prairie grasses, have been nearly eliminated from the coteau landscape.

A different prairie vegetation was found on the steep hills found along the river valleys of the Coteau des Prairies. The droughty soils on these sites were occupied by the mid-grasses. In general, the vegetation was short in stature and contained a large number of plants with a western distribution. These prairies — named glacial till hill prairies — are typically unsuitable for cropping, and today are used primarily for pasture. Much of the original prairie has been badly degraded or destroyed by intensive grazing of the slopes and plowing of the hill crests. These prairies, however, are resilient to moderate grazing and recover much of their original structure and composition with removal of disturbance. The Hole-in-the-Mountain Prairie and Kilen Woods State Park are examples of hill prairies recovering to natural conditions following years of grazing.

Unlike the blacksoil prairies of this region, which have been almost entirely converted to cropland, there is still opportunity to protect large examples of the glacial till hill prairie within the Coteau des Prairies.

Glacial till hill prairie.




LAC QUI PARLE
SIOUX NATION WMA
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PRAIRIE MARSHES WMA
14
Lake Benton
HOLE-IN-THE-MOUNTAIN PRAIRIE
LINCOLN
LYON
REDWOOD
59
23
PIPESTONE NATIONAL MONUMENT
30
Slayton
30
71
Pipestone
Avoca
LUNDBLAD PRAIRIE
EXPANDERE WMA
PIPESTONE
MURRAY
62
COTTONWOOD
Windom
WATONWAN
BLUE MOUNDS STATE PARK
KILEN WOODS STATE PARK
59
Luverne
90
16
Worthington
Jackson
90
75
71
ROCK
NOBLES
JACKSON
MARTIN

15 KILEN WOODS STATE PARK, JACKSON COUNTY

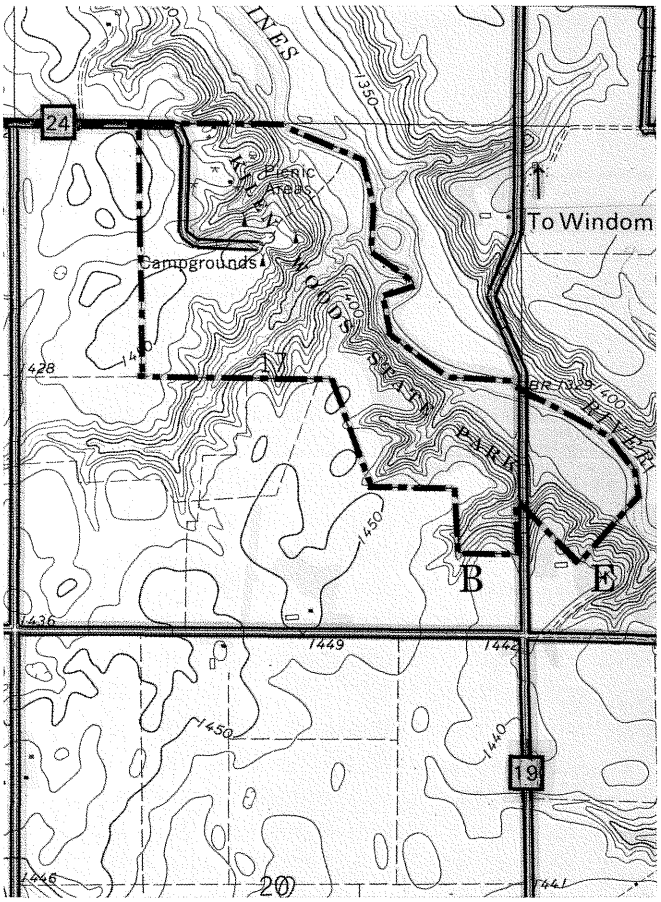
LOCATION: (T103N, R35W parts of Section 17). Located 11 miles south of Windom. The park can be reached from three major highways: 71, 60 and 86. Access to the park is from County Rd 24.

SIZE: 200 acres, with 60 acres of prairie.

NATURAL FEATURES: Kilen Woods State Park lies along the deep narrow valley of the Des Moines River. Approximately 60 percent of the park is forested. Prairie is found on the ridge tops and steep side slopes. Where prairie meets forest, often along the ravines and lower bluff lines, there are narrow bands of oak savanna. The hill prairies harbor one of the state's largest populations of *Lespedeza leptostachya* (prairie wild bush clover) — one of the rarest prairie species in the Midwest. The presence of an uncommon small mammal of Minnesota's western grasslands, *Onychomys leucogaster* (grasshopper mouse) also has been documented. The prairie vegetation at Kilen Woods State Park was subjected to years of grazing prior to preservation, but under management it is now beginning to recover much of its original natural character.

PRESERVE STATUS AND MANAGEMENT: The park was established in 1945. Management, by MN DNR-Parks, includes the use of prescribed burning to encourage the return of native prairie, and to re-establish oak savanna. Portions of the park that contain *Lespedeza leptostachya* were designated a Scientific and Natural Area in 1984.

INTERPRETIVE AND RESEARCH REFERENCES: MN Department of Natural Resources, 1980.



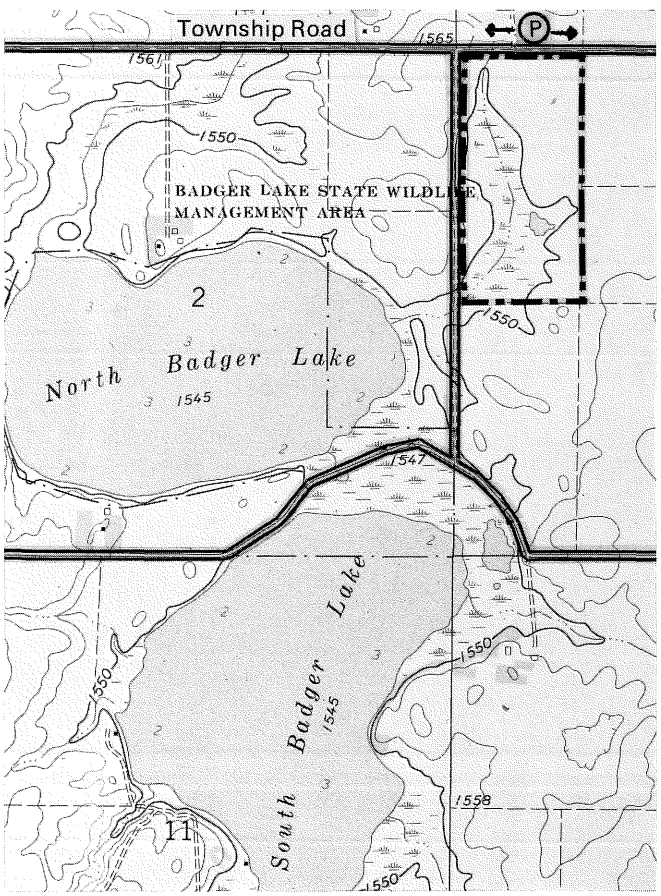
16 LUNDBLAD PRAIRIE, MURRAY COUNTY

LOCATION: (T105N, R41W, W1/2 NW1/4 Section 1). Located approximately 5 miles southeast of Slayton. From Slayton go south on County Hwy 33 for 3 miles; turn east on township road, going past Badger Lake for 1 mile. The site is on the south side of road.

SIZE: 80 acres.

NATURAL FEATURES: The Lundblad Prairie exemplifies the natural diversity of a prairie-pothole complex. The tract, found on gently rolling land, is a mosaic of mesic blacksoil prairie and wet blacksoil prairie surrounding a cattail marsh. The mesic prairie is dominated by big bluestem, switchgrass and prairie dropseed. Prairie cordgrass is the dominant plant of the wet prairie. The blacksoil prairies here display all the characteristics of presettlement quality prairie. The only disturbance known has been the annual mowing of the tract for hay. Blacksoil prairies of this type are rare within the Prairie Coteau region. This site is an outstanding natural area.

PRESERVE STATUS AND MANAGEMENT: The Nature Conservancy acquired the tract in 1983.



Pasque flower *(Anemone patens).*

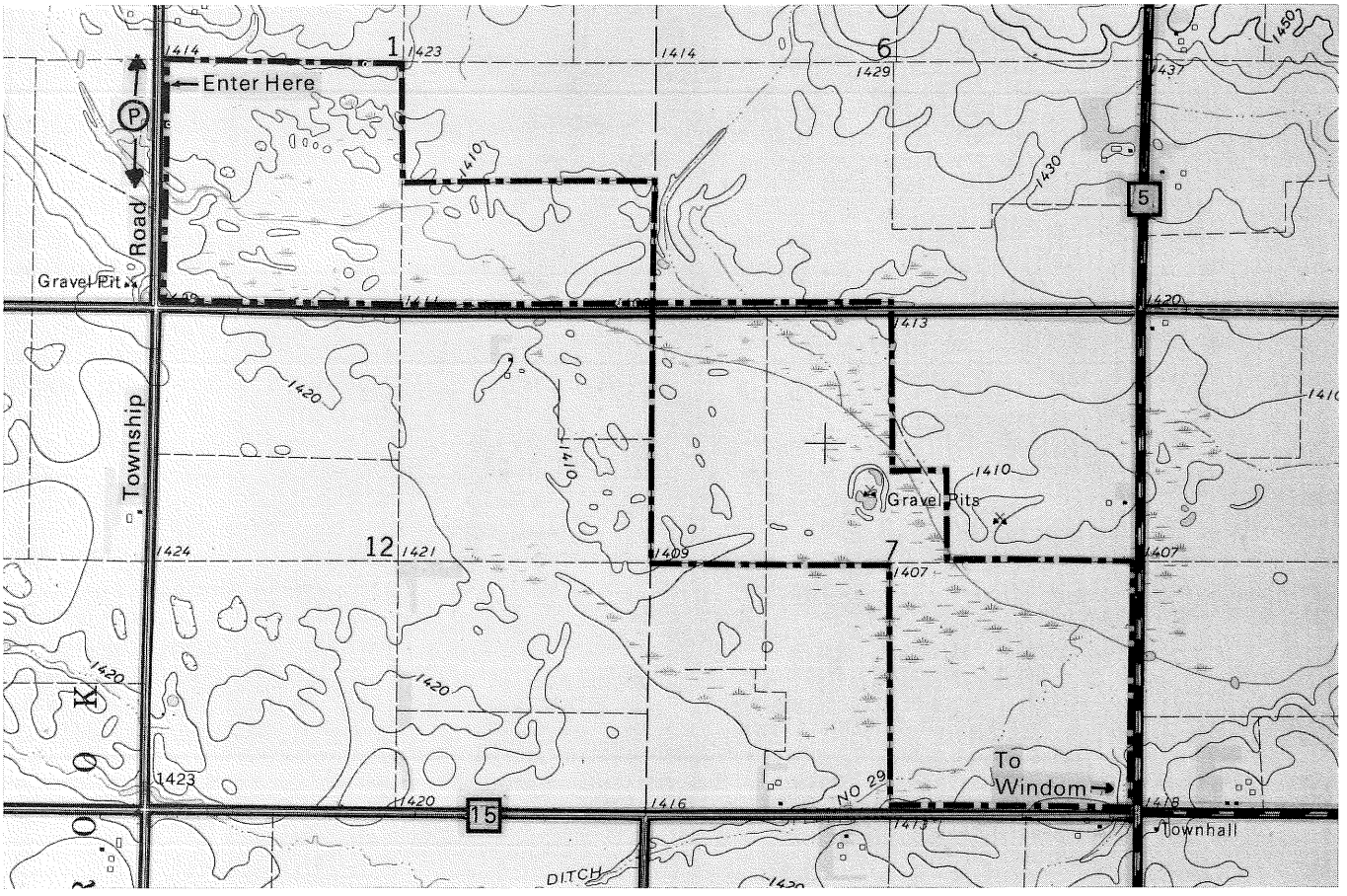
17 EXPANDERE WMA, COTTONWOOD COUNTY

LOCATION: (T105N, R38W, parts of S1/2 Section 1; T105N, R37W, NW1/4 Section 7, SE1/4 Section 7). Located approximately 14 miles northwest of Windom. From Windom take County Rd 13 for 2 miles, turn west on County Rd 15 for 11 miles then go north on a township road 1.5 miles to the northwest corner of site. Park along the township road.

SIZE: 560 acres.

NATURAL FEATURES: Expandere WMA is located on a nearly level till plain with numerous depressions. The calcareous loam soils range from poorly drained to very poorly drained. Mesic blacksoil prairie and wet blacksoil prairie are the predominant community types. Big bluestem, Indian grass, and prairie dropseed dominate the mesic sites with bluejoint grass, and prairie cordgrass dominating the wet swales and depressions. Past grazing and haying activities have degraded portions of the tract; however, the prairie in Section 1 is in excellent condition. Because of the impact of agricultural activities on blacksoil prairies, a site the size and quality of the Expandere WMA is extremely rare to non-existent in the Prairie Coteau region today.

PRESERVE STATUS AND MANAGEMENT: The tract is owned and managed by MN DNR-Wildlife. A prescribed burning program was initiated in the spring of 1983.



18 BLUE MOUNDS STATE PARK, ROCK COUNTY

LOCATION: (T103N, R45W, portions of Sections 13, 24, 25 and 26). Located just off Interstate 90 four miles north of Luverne, Minnesota. Entrance to the park is off County 18.

SIZE: 1995 acres (800 acres prairie).

NATURAL FEATURES: The park is situated on one of the outstanding physiographic features of the Couteau des Prairie — the precipitous escarpment of Sioux Quartzite known as the Blue Mounds. This outcrop of bedrock forms a cliff over a mile long and up to 100 feet high. The top of the ridge consists of 800 acres of native prairie. Although the exposed bedrock prevented plowing of the prairie here, years of heavy grazing has severely degraded the original native prairie and allowed non-native plants to invade the area. A prescribed burning plan has been initiated to perpetuate and re-establish the native prairie vegetation. The exposed rock areas are covered with lichens, and where a thin layer of soil exists two species of prickly pear cactus are found, *Opuntia humifusa* and *Opuntia fragilis*. Depression pools in the rock also harbor four rare plant species. The entire park is considered one of the prime birding spots in southern Minnesota for a wide variety of species.

PRESERVE STATUS AND MANAGEMENT: The park was established in 1935 and is managed by the MN DNR, Division of Parks. A portion of the park has been recommended for designation as a Scientific and Natural Area. Campsites, an interpretive center and ten miles of foot trails are found in the park. Management includes prescribed burning and protection from visitor overuse.

INTERPRETIVE AND RESEARCH REFERENCES: MN Department of Natural Resources, 1979b.

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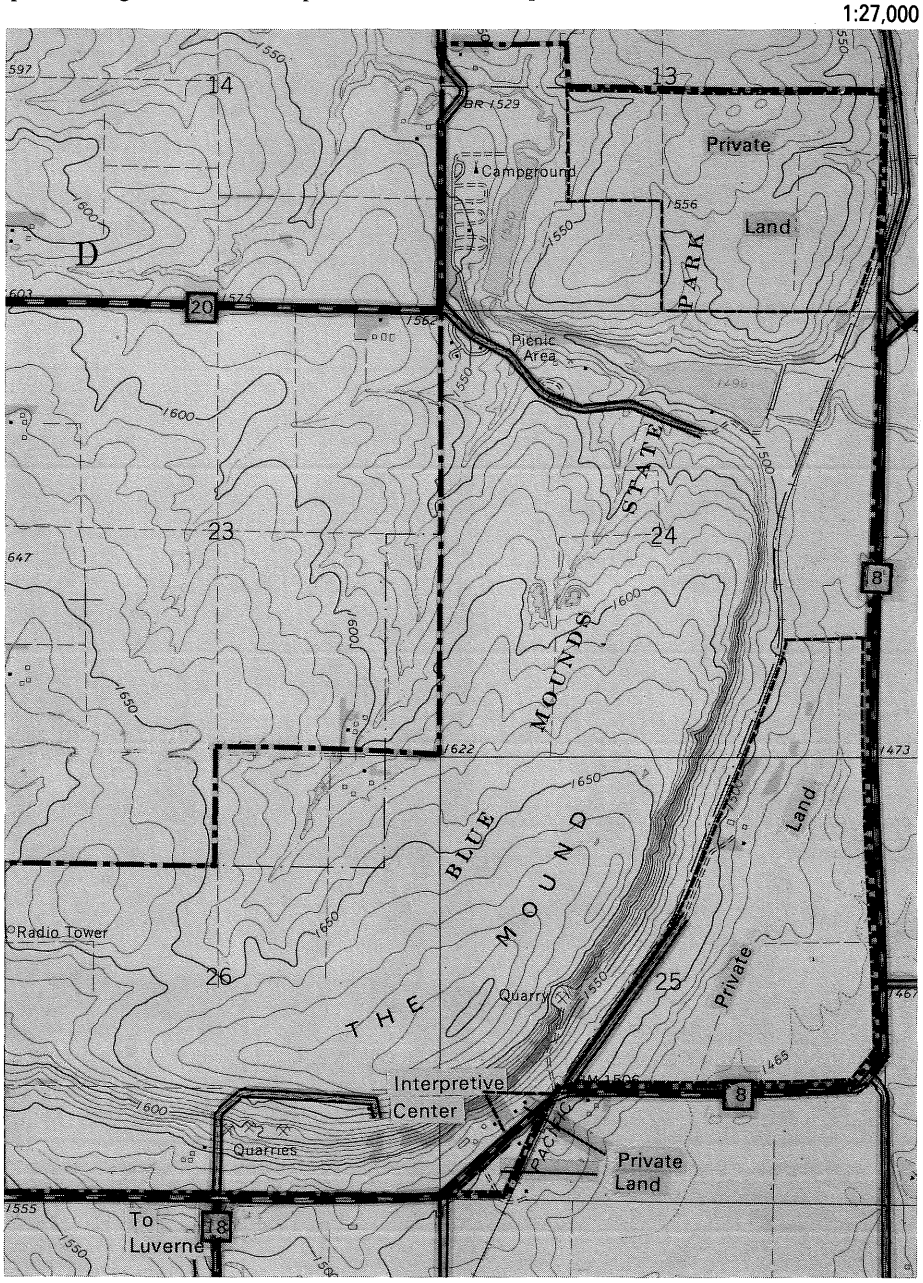
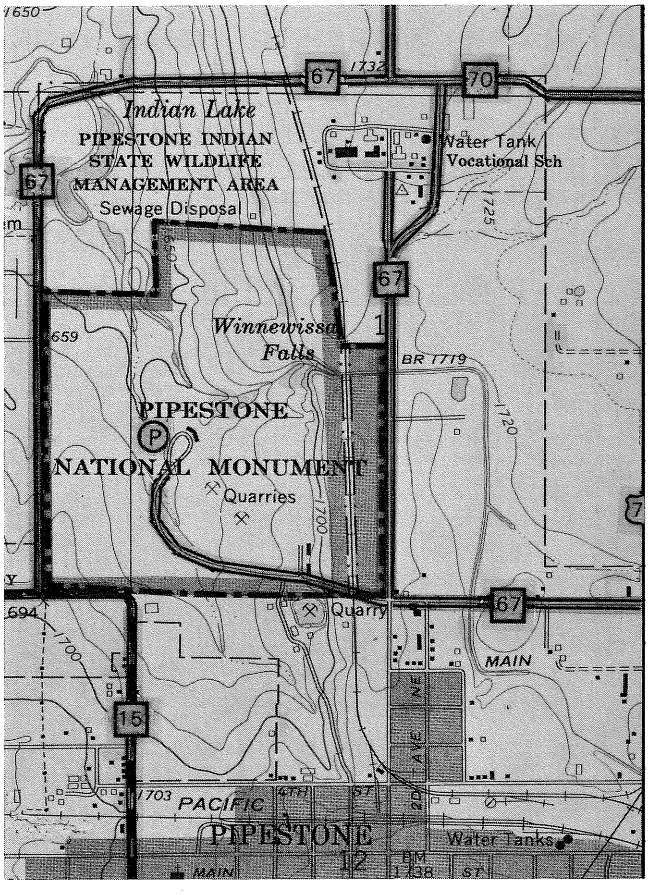


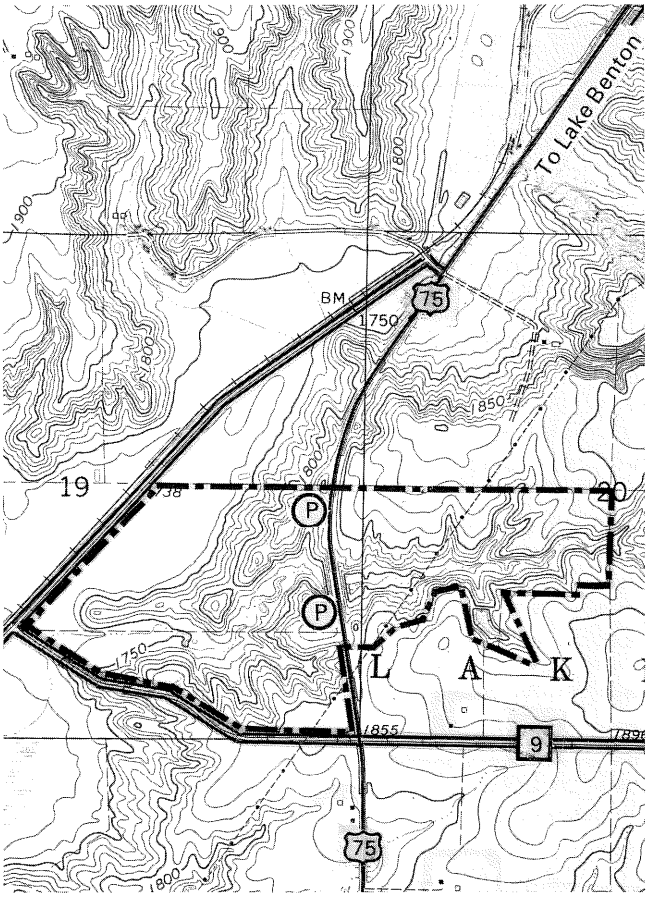
19 PIPESTONE NATIONAL MONUMENT, PIPESTONE COUNTY

LOCATION: (T106N, R46W, portions of the W1/2 Section 1; and E1/2 SE1/4 Section 2). Located adjacent to the north side of the City of Pipestone.
SIZE: 283 acres.
NATURAL FEATURES: The site contains an excellent example of a distinctive prairie landform type where blacksoil prairie is found in association with exposures of Sioux Quartzite bedrock. Exposed Sioux Quartzite forms prominent linear ridges throughout the tract, with blacksoil prairie found in areas of deep loam soils between these bedrock ridges. Undisturbed prairie is confined to the SW1/4 of Section 1. The remaining prairie on the site has been disturbed to various degrees by cultivation and grazing. On the quartzite outcrops where soil material is thin or absent, a distinctive assemblege of plants species are found. Plants range from crustose lichens on bare rock, to cactus and fame flower on the shallowest soil, to aquatic plants such as water hyssop and mudwort occupying ephemeral pools that form in rock depressions. Eleven species of plants rare in Minnesota occur on these outcrops.
PRESERVE STATUS AND MANAGEMENT: The park is administered by the National Park Service. A visitor center on the site is open daily. Prairie management includes a prescribed burning and tree cutting program. The site was included on the Minnesota Natural Heritage Register in 1984.
INTERPRETIVE AND RESEARCH REFERENCES: Landers, 1979; Becker, et al, 1982.



20 HOLE-IN-THE-MOUNTAIN PRAIRIE, LINCOLN COUNTY

LOCATION: (T109N, R45W, portions of Sections 19 and 20). From the town of Lake Benton, go south on US 75 for 1.5 miles. US 75 bisects the preserve. Park at the turn-in on US 75.
SIZE: 246 acres.
NATURAL FEATURES: The Hole-in-the-Mountain preserve is situated on a steep valley along the edge of the Bemis Moraine. The steep slopes, indented by minor drainage ravines, contain fine examples of glacial till hill prairie. The prairie, dominated by the midgrasses, little bluestem and side oats grama, harbors numerous western plants including three species rare in Minnesota. Of special significance at this site are the populations of rare butterflies. The Dakota skipper, ottoe skipper, and pawnee skipper are all found at Hole-in-the Mountain Prairie. Prior to TNC acquisition, the hill slopes were grazed by sheep and cattle, and parts of the floodplain and upland flats were cultivated. The native prairie vegetation on the steeper slopes has recovered well with removal of grazing and subsequent prairie management.
PRESERVE STATUS AND MANAGEMENT: The tract is owned and managed by The Nature Conservancy. Research has been conducted on the effects of prescribed burning on the rare butterfly species.
INTERPRETIVE AND RESEARCH REFERENCES: The Nature Conservancy, 1978.



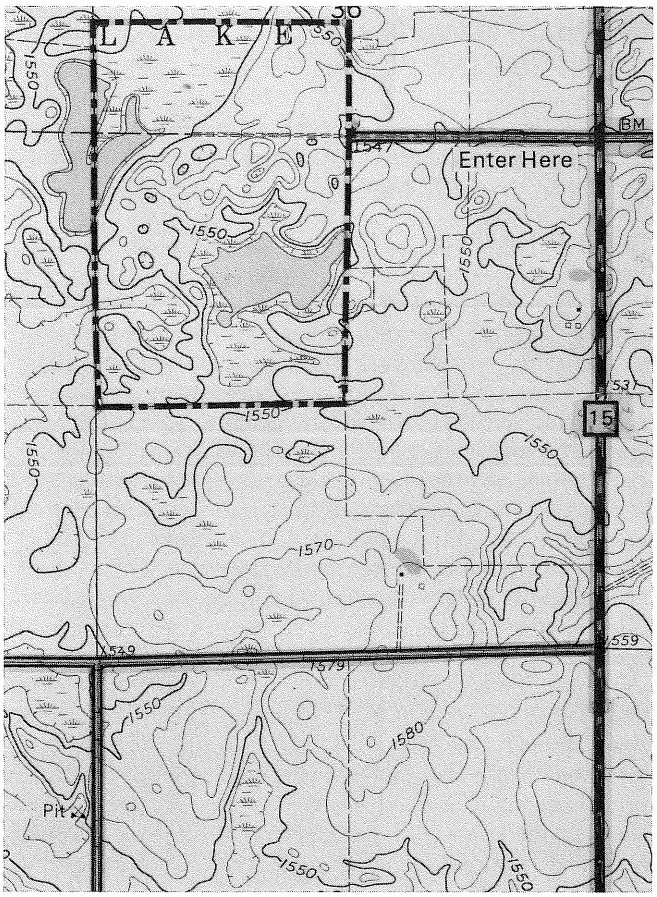
21 PRAIRIE MARSHES WMA, LYON COUNTY

LOCATION: (T111N, R43W, S1/2 SW1/4 Section 36; NW1/4 Section 1). From the town of Lynd, MN, travel west on County Hwy 4 for approximately 3 miles. Turn south on County Hwy 15 for 1.5 miles. The WMA is on the west side of road.

SIZE: 240 acres.

NATURAL FEATURES: The Prairie Marshes WMA occurs within the outer edge of the Prairie Coteau in an area of rolling glacial moraine with numerous marshy depressions and potholes. The vegetation in Section 36 of the tract is of excellent quality; 50 acres of blacksoil prairie with a very high species diversity occurs on rolling topography with slopes up to 20 degrees. The remaining land in Section 36 is largely cattail-sedge marsh that adjoins High Point Lake. The adjoining 160 acres to the south, in Section 1, also contains high quality wetland communities providing excellent waterfowl habitat. The prairie vegetation, however, has been heavily disturbed by past grazing.

PRESERVE STATUS AND MANAGEMENT: The tract is owned and managed by MN DNR-Wildlife. The prairie vegetation is being managed with prescribed burning. The site was included on the Minnesota Natural Heritage Register in 1982.



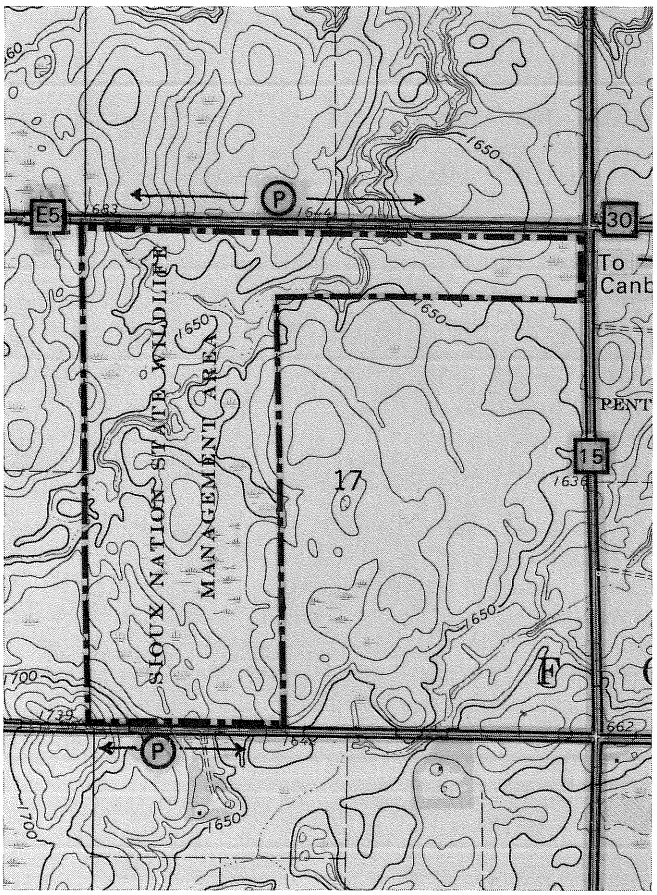
22 SIOUX NATION WMA, YELLOW MEDICINE COUNTY

LOCATION: (T114N, R46W, W1/2 Section 17). Travel west from the town of Canby on County Hwy 30 approximately 8 miles. The WMA is at the junction of County Hwy 30 and County Hwy 15.

SIZE: 250 acres.

NATURAL FEATURES: The tract is located within the Altamont Moraine on gently undulating terrain. The topography ranges from irregular hills to shallow depressions and is occupied by a diverse array of vegetation communities. Undisturbed blacksoil prairie, dominated by big bluestem and Indian grass, occurs over 186 acres of the site on loamy to clay loam soils. Emergent wetland vegetation occurs in ponded areas and shallow depressions. In addition, four distinct calcareous fens, harboring three rare plant species, are found on the tract. The best view of this area is from the top of the hill off the southwest corner of the tract.

PRESERVE STATUS AND MANAGEMENT: The site is managed by the MN DNR-Wildlife. The blacksoil prairie and calcareous fens are Minnesota Natural Heritage Register sites. Prescribed burning is the recommended management for this prairie.



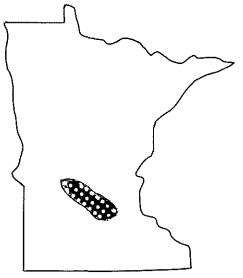
At 1,700 feet above sea level, a massive outcrop of Sioux Quartzite at Blue Mounds State Park overlooks an intensively-cultivated landscape.

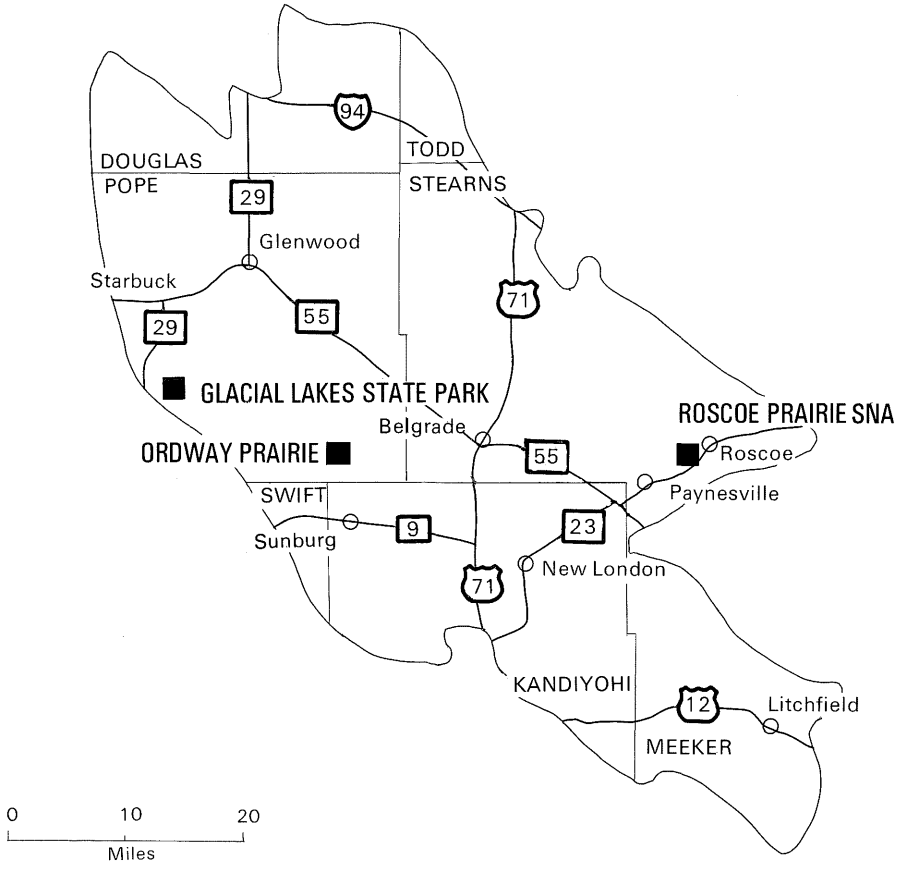
Blue Hills

The Blue Hills natural region is dominated by two distinctive physiographic features. The great Alexandria Moraine complex passes through the western half of this region. Its landform consists of steep to rolling hills interspersed with numerous small lakes, potholes, and marshes. The elevation of the moraine is upwards to 100 feet above the outwash plain found on its eastern border. Prior to European settlement, this rugged, hilly landform within the Blue Hills was largely covered by upland prairie and oak savanna, with wet prairie and marsh occupying the poorly drained lowlands. Although much of the original prairie ecosystem has been altered since settlement, there are still islands of prairie habitat throughout this landscape. This is largely because the land within the Alexandria Moraine has limited agricultural potential due to its coarse soils, steep slopes, and poor drainage. The land is not as intensively cultivated as the other prairie natural regions to the west and south. In fact, only 50 percent of the region is under cultivation. A large amount, up to 25 percent, remains under grass cover and is used as pasture; the rest is in woodland.

Nearly all the land now under cultivation was once blacksoil prairie. The mesic blacksoil prairies, found on the gently rolling, loamy soils, were the first to be plowed. This was followed by the drainage and cultivation of the low, wet areas once supporting wet blacksoil prairie. Today, the remaining prairie remnants are predominately gravel prairies characterized by shallow, excessively drained, gravelly soils occupied by dry prairie plants. Gravel prairies are found on the crests and side slopes of morainic hills; such sites are unsuitable for cultivation, and are used largely for pasture. The Ordway Prairie and Glacial Lakes State Park contain fine examples of this prairie type.

To the northeast of the Alexandria Moraine lies sandy outwash plain. This outwash plain, composed of sandy material washed away from the Alexandria Moraine by glacial meltwater, is the other major physiographic feature within the Blue Hills region. The plain ranges from level to slightly rolling with numerous small potholes and shallow depressional areas. The original vegetation was largely an unbroken expanse of prairie. Today nearly 80 percent of this area is under cultivation; Roscoe Prairie SNA is one of the only prairie remnants now existing within this intensively farmed landscape.




94
TODD
DOUGLAS
POPE
29
STEARNS
Glenwood
Starbuck
71
29
55
GLACIAL LAKES STATE PARK
ROSCOE PRAIRIE SNA
Belgrade
ORDWAY PRAIRIE
55
Roscoe
SWIFT
Paynesville
9
23
Sunburg
New London
71
KANDIYOHI
12
Litchfield
MEEKER
0
10
20
Miles

23 ROSCOE PRAIRIE SNA, STEARNS COUNTY

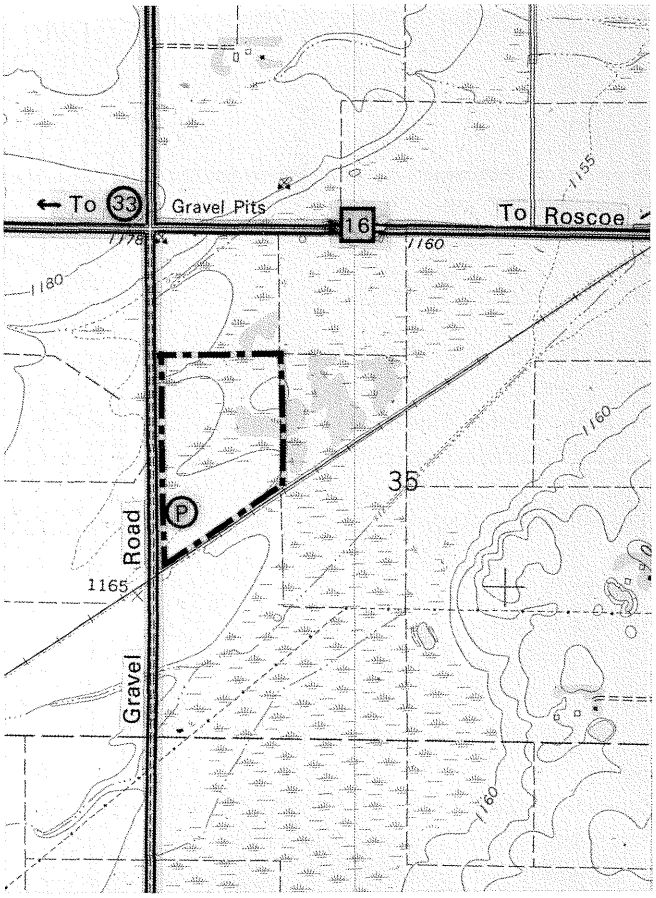
LOCATION: (T123N, R32W, SW1/4 NW1/4 and part of the NW1/4 SW1/4 Section 35). Located about 3.5 miles northeast of Paynesville. Travel north on County Hwy 33 for 2.5 miles where it intersects with County Hwy 16. Proceed east 1 mile; at intersection with gravel road go south for 0.5 mile; pull off and park near the nature conservancy sign. Railroad tracts mark the southern boundary.

SIZE: 57 acres.

NATURAL FEATURES: Roscoe Prairie SNA lies within a sandy outwash plain on flat to slightly rolling topography. The soils are loamy over sandy and are generally poorly drained. Despite minimal topographic variation, the site supports dry-mesic, mesic, and wet prairie vegetation. Undisturbed blacksoil prairie covers almost 25 acres in the southern portion of the tract; it is dominated by prairie dropseed, Indian grass, and big bluestem. The remainder of the tract is predominantly sedge meadow and shrub swamp. Roscoe Prairie SNA supports a number of rare animals, including upland sandpiper, marbled godwit, and two rare butterflies — the Dakota skipper and the powesheik skipper. The site was used as a hay meadow prior to preservation.

PRESERVE STATUS AND MANAGEMENT: Roscoe Prairie was acquired by The Nature Conservancy in 1969; it was designated a state Scientific and Natural Area in 1981.

INTERPRETIVE AND RESEARCH REFERENCES: MN DNR and The Nature Conservancy, 1979; The Nature Conservancy, 1979b.



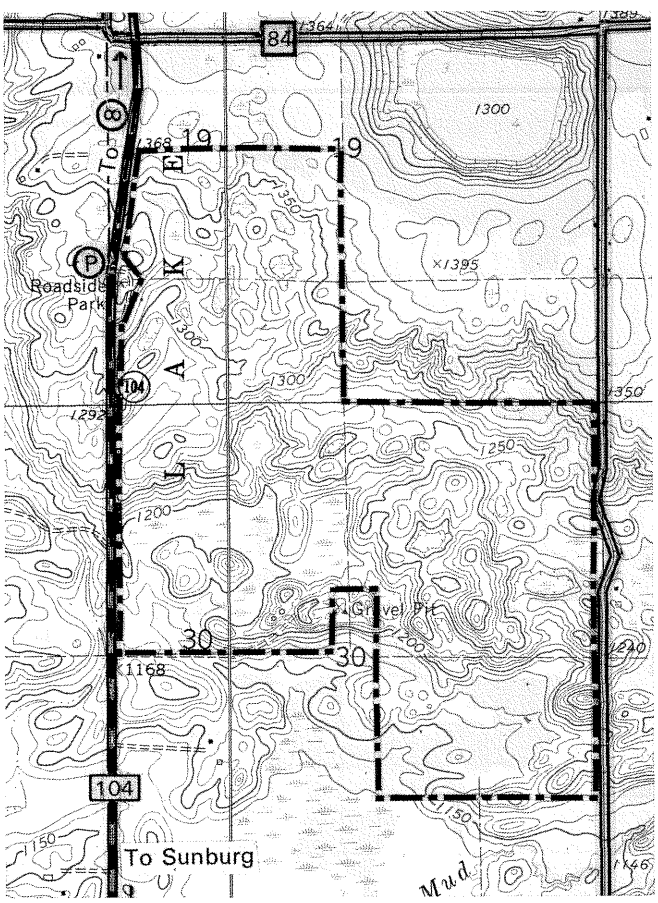
24 ORDWAY PRAIRIE, POPE COUNTY

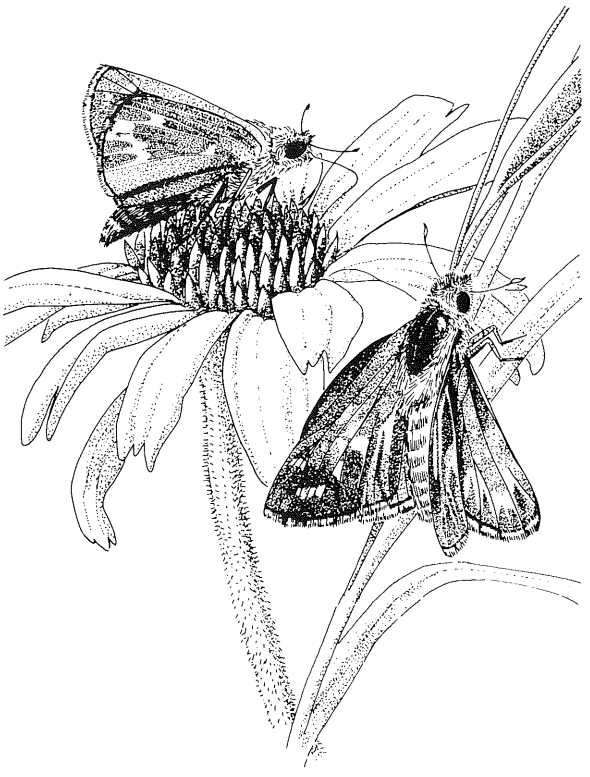
LOCATION: (T123N, R36W portions of Sections 19 and 30). Located approximately 7 miles southwest of Brooten. From Brooten take County Hwy 8 for about 7 miles, turn left onto State Hwy 104 and travel south 3 miles to the northwest corner of the preserve. Park in the pull-off for a historical marker.

SIZE: 582 acres.

NATURAL FEATURES: The preserve consists of sharply rolling hills with numerous wet depressions. The end moraine topography supports a diversity of natural communities, including dry gravel prairie, calcareous fen, and marsh. Gravel prairie dominates the preserve and is found throughout the tract on the coarse, gravelly soils of the many hills. Though these prairies were grazed prior to preservation, evidence of such disturbance is now disappearing. Three small calcareous fens are found on the side slopes of the gravel hills where groundwater is discharged. Old field vegetation occupies the mesic lower slopes and saddles between the hills. These sites have been cultivated in the past; reinvasion by prairie plants has been slow.

PRESERVE STATUS AND MANAGEMENT: The Nature Conservancy owns and manages the site. The prairie is managed with a prescribed burn program.





The Dakota skipper, a rare butterfly, is dependent upon virgin prairie and is found on the Roscoe Prairie SNA.

25 GLACIAL LAKES STATE PARK, POPE COUNTY

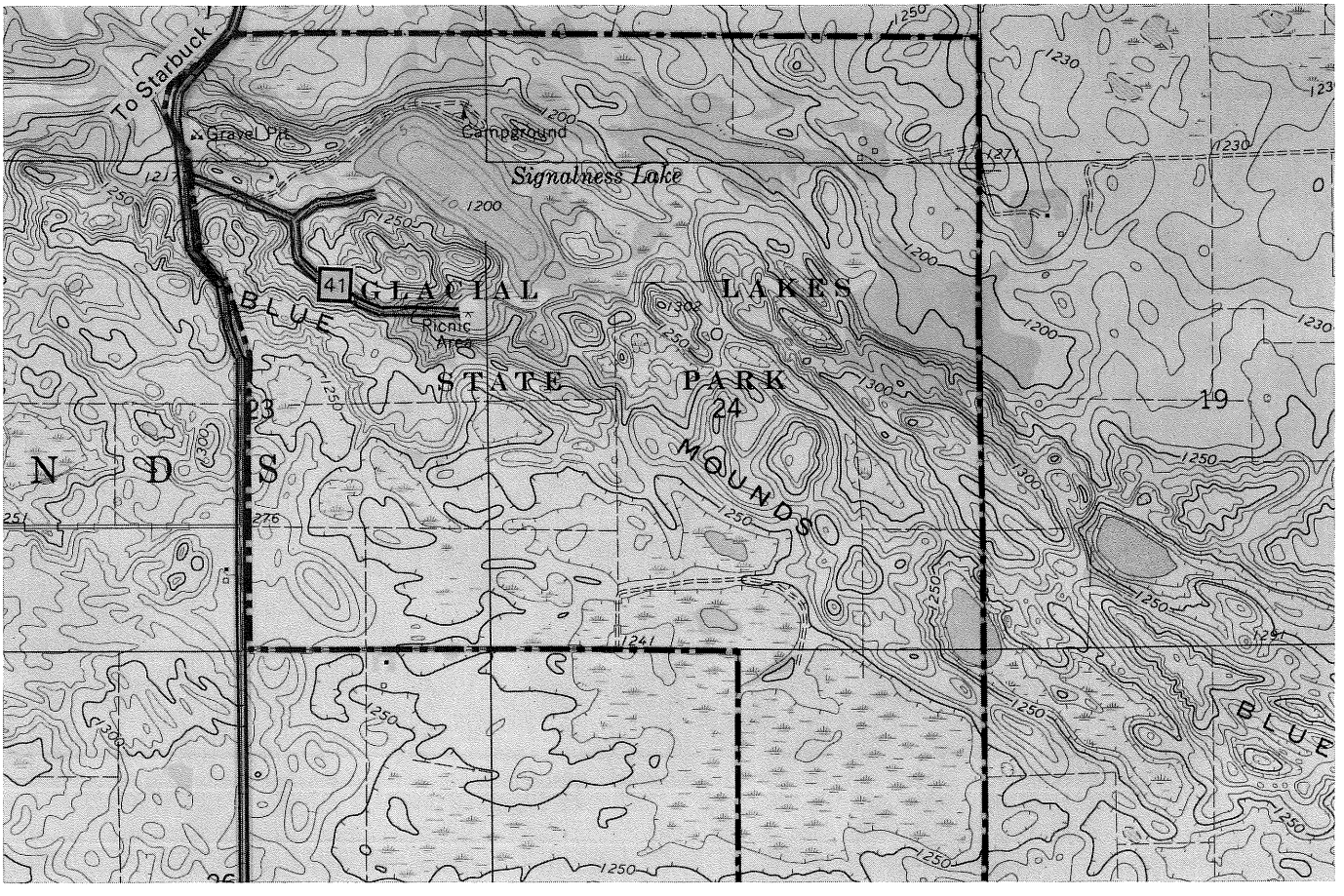
LOCATION: (T124N, R39W, portions of Sections 13, 14, 23, 24, and 25). Located 5 miles south of Starbuck, MN. Access to the park is from County Hwy 41.

SIZE: 1345 acres (400 acres of prairie).

NATURAL FEATURES: The park, located within the Alexandria Moraine complex, encompasses rolling prairie hills interspersed with several lakes, ponds, and marshes. Gravel prairie dominated by midgrasses, little bluestem, and side oats grama, occurs on 400 acres of the park's high, dry, gravelly hills. These hills have retained much of their original vegetation and have recovered well from years of grazing prior to state ownership. The mesic lower slopes and level areas, once occupied by blacksoil prairie, have been largely destroyed by cultivation. These areas, found predominately in the southern half of the park, now consist of old field vegetation.

PRESERVE STATUS AND MANAGEMENT: The park is owned and managed by the MN DNR-Division of Parks. There are several miles of trail which transverse the prairie hills. Management includes a prescribed burning program.

INTERPRETIVE AND RESEARCH REFERENCES: MN Department of Natural Resources, 1982a.

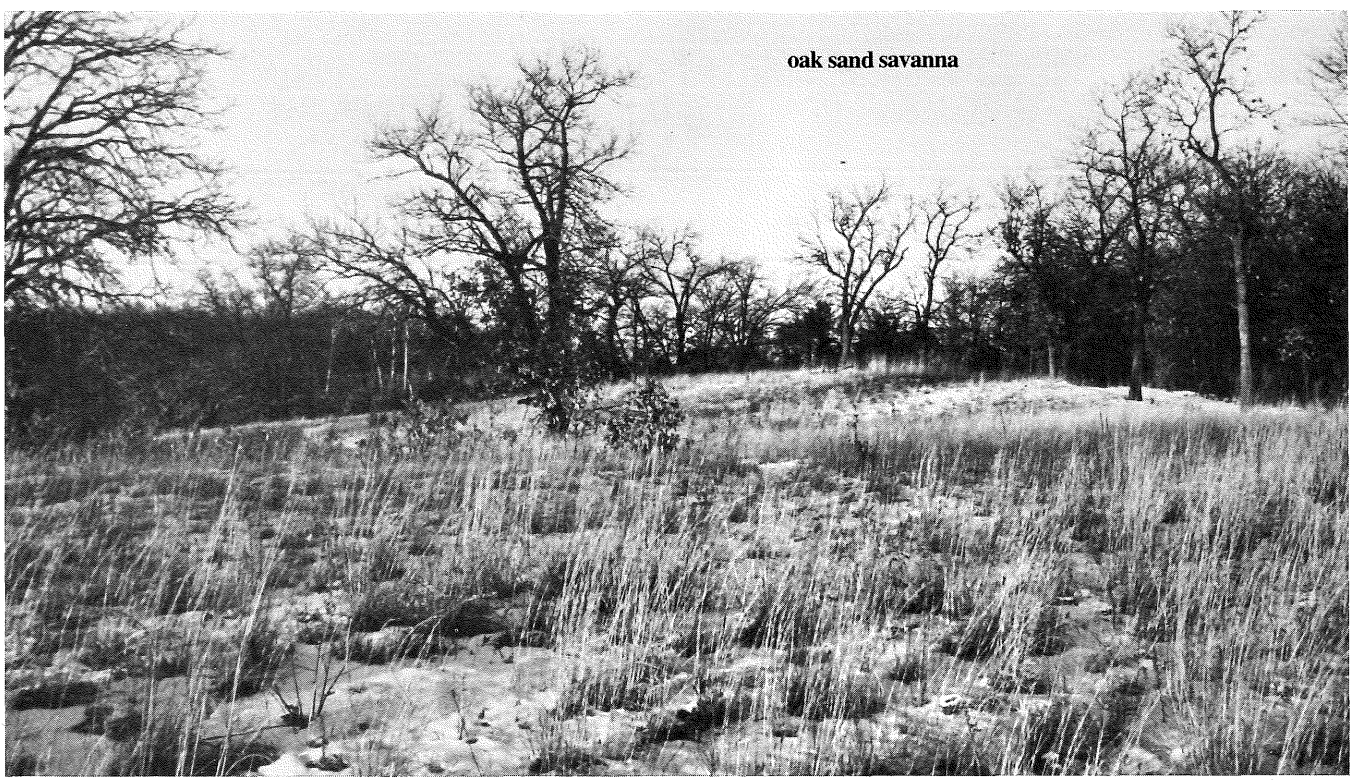


Mississippi River Sand Plains

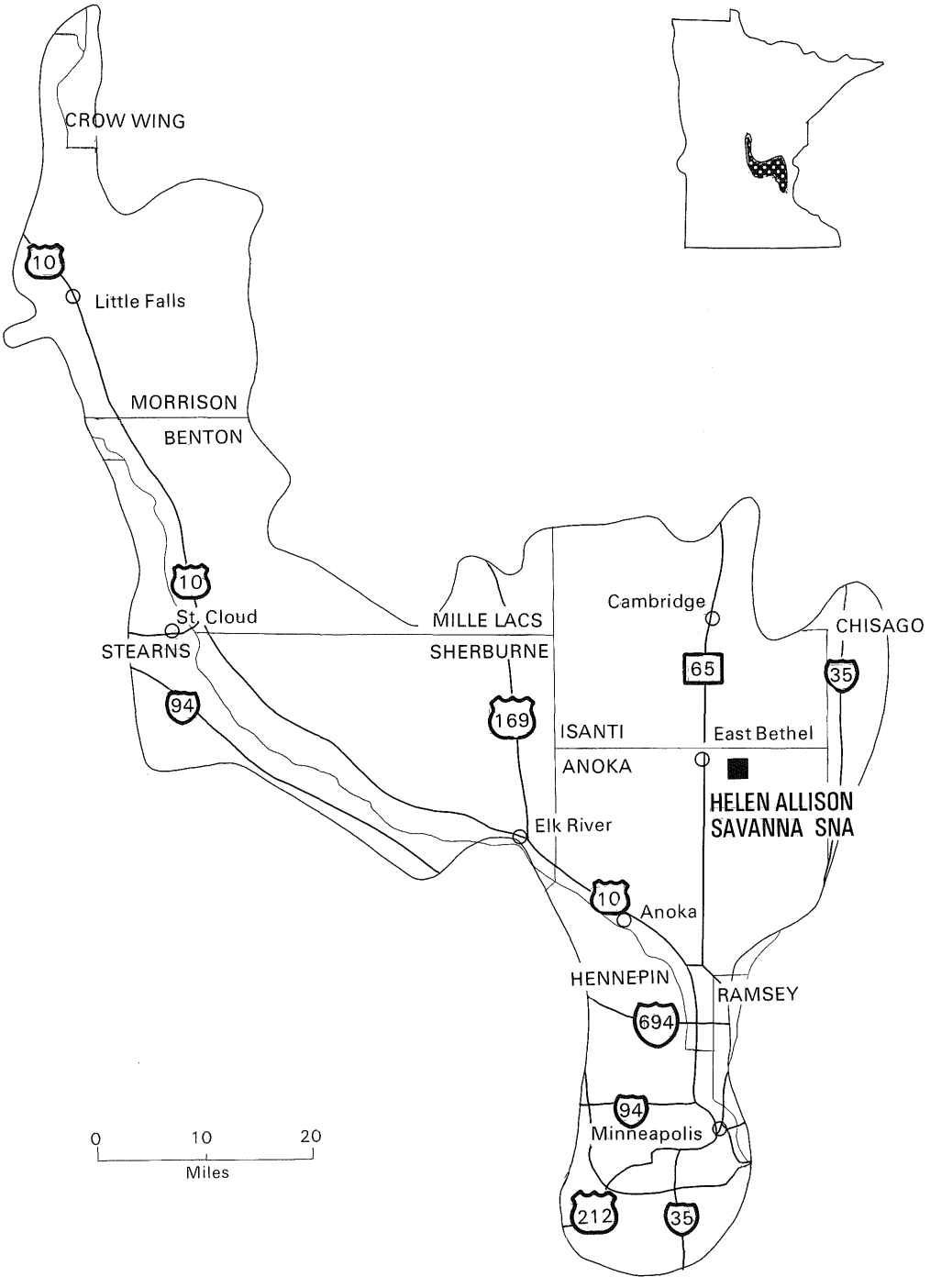
The Mississippi River Sand Plains region covers an extensive area of sandy outwash plains; the region includes all of the Anoka Sand Plain. This broad plain was formed by glacial meltwaters that deposited sandy material in their wake at the retreat of the last glaciers. The Anoka Sand Plain is generally flat but contains numerous poorly drained depressions mixed with gently rolling sand deposits and fairly steep sand dunes. The lakes and marshes formed in this region are the result of stranded ice blocks buried in the outwash sands as the main body of the glacier retreated. The patches of sand dunes were formed as strong southwesterly winds blew across the outwash sands after the meltwater streams ran dry.

The presettlement vegetation of the sand plains region was predominately oak sand savanna. This community was found on the sandy upland soils and was interspersed with wet blacksoil prairie and conifer bogs that occupied the numerous low depressions found throughout the area. The oak savanna was dominated by bur oak and northern pin oak. These trees were scattered singly or found in small patches in a groveland mosaic. The understory vegetation ranged from dry-mesic prairie on stabilized sites to a sand binding pioneer community found on the crests of dunes and in blowout areas.

Although much of the original oak savanna vegetation has been converted for agricultural use, examples of the original vegetation can still be found in this region. Intact sand savanna remnants remain today in large part because of the droughty, infertile nature of their soils which make them unsuitable for cultivation and also hinder the establishment of shrubs and saplings. Sand savanna sites not suitable for cultivation have been modified by grazing and tree planting (notably the establishment of red and jack pine plantations). Fire suppression during the last hundred years also has caused savannas to revert to closed forest. Most of the highest quality sand savannas that occur today are located on hills and dune slopes where woody colonization has been slowest.



oak sand savanna


CROW WING
10
Little Falls
MORRISON
BENTON
10
St. Cloud
STEARNS
94
MILLE LACS
SHERBURNE
169
Cambridge
65
CHISAGO
35
ISANTI
East Bethel
ANOKA
HELEN ALLISON
SAVANNA SNA
Elk River
10
Anoka
HENNEPIN
RAMSEY
694
94
Minneapolis
212
35
0
10
20
Miles

26 HELEN ALLISON SAVANNA SNA, ANOKA COUNTY

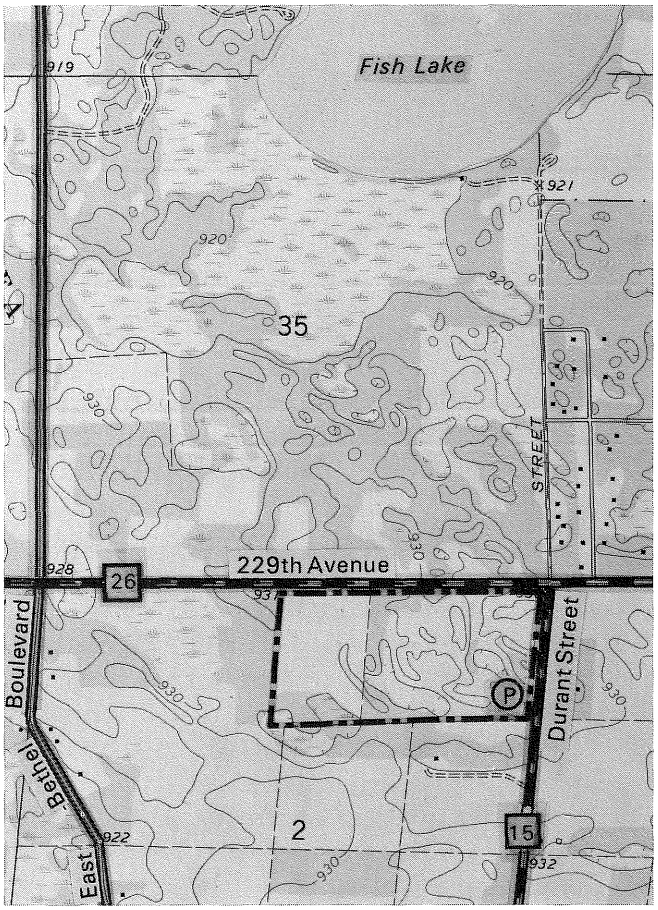
LOCATION: (T33N, R23W, N1/2 NE1/4 Section 2). Located approximately 35 miles north of Minneapolis/St. Paul. The tract lies southwest of the intersection of Anoka County Roads 26 and 15, about 5 miles southeast of East Bethel. Park at the pull-in found on County Road 15 at the southeast corner of the tract.

SIZE: 86 acres.

NATURAL FEATURES: This preserve is an excellent example of the presettlement vegetation types that were found on the sand dunes formed on the Anoka Sand Plain. The tract consists of gently rolling sand deposits, fairly steep sand dunes, and small marshy depressions. The predominant vegetation is an oak sand savanna: native prairie supporting scattered bur oak and northern pin oak. Interspersed with savanna are scattered sand blowouts colonized by pioneer sand plants: sea-beach triple-awn grass *(Aristida tuberculosa)* and hairy panic grass *(Panicum languinasum)*. In the low, wet depressions, sedge meadow dominated by Hayden's sedge *(Carex haydenii)* is found. About 20 acres of the site — on the western end — were formerly cultivated and now support old field vegetation. Over 200 vascular plants have been documented for the site, including three species rare in Minnesota. The uncommon lark sparrow also nests on the tract.

PRESERVE STATUS AND MANAGEMENT: The tract was acquired by The Nature Conservancy in 1961, and designated a state Scientific and Natural Area in 1981. It is managed with a prescribed burning program initiated in 1962.

INTERPRETIVE AND RESEARCH REFERENCES: MN Department of Natural Resources, 1979e, 1982b; Wetmore, 1981; Tester, 1965; Drew, 1973.



(Page 47) An aerial photograph of Helen Allison Savanna showing the orchard-like distribution of trees over dry sand prairie. The treeless area (far left), was formerly cultivated and is now old field vegetation.

Red River Valley

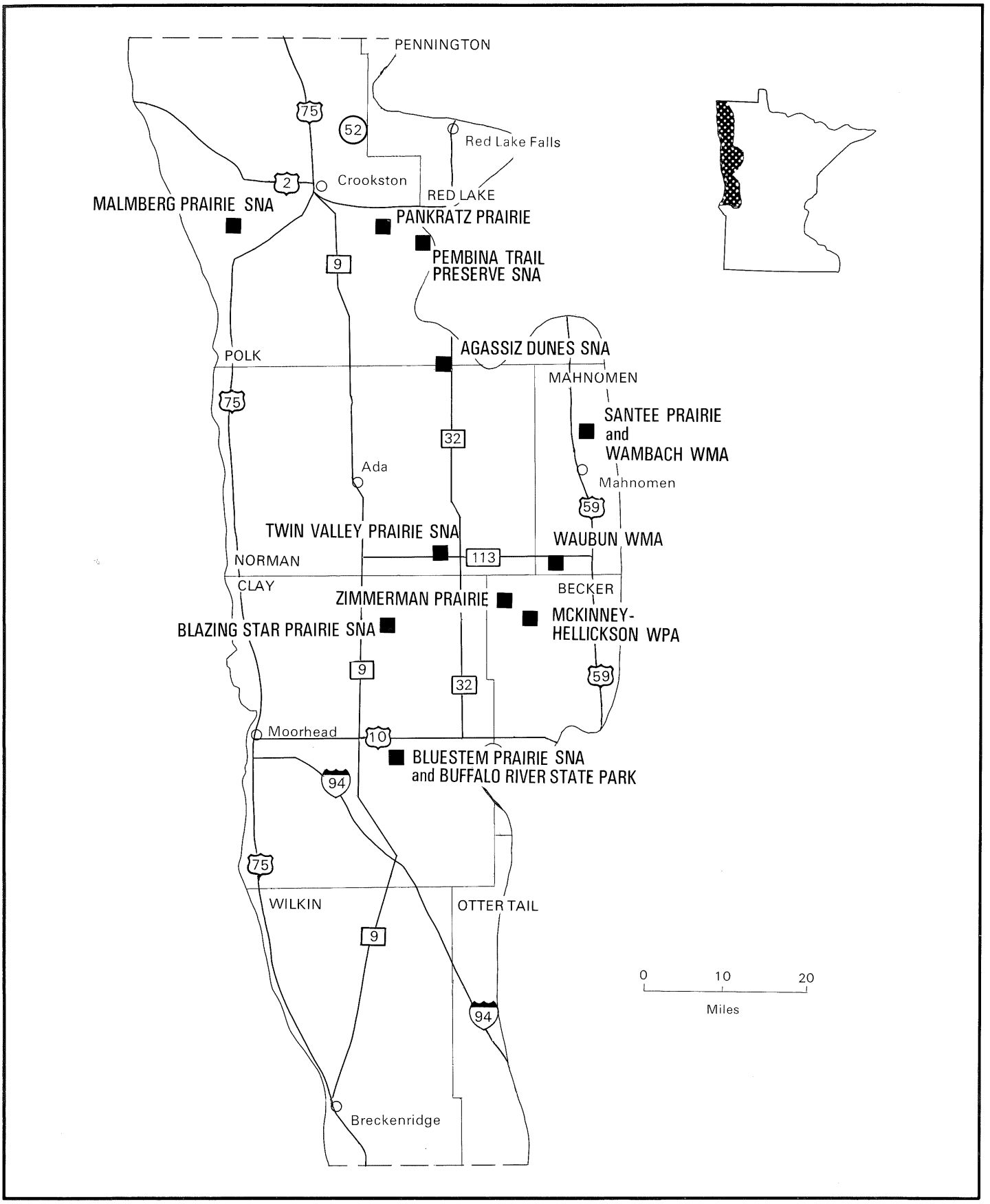
The Red River Valley region extends along the North Dakota border in a strip approximately 47 miles broad from the Canadian border to Traverse County. The area, once covered by the great expanse of Glacial Lake Agassiz, is characterized by two physiographic regions. In the central part of the Red River Valley lies the old lake plain, a nearly level lowland of poorly drained clays and silts formed in water 300 feet deep. Toward the eastern margin of Glacial Lake Agassiz is the gently undulating Interbeach Area where numerous sandy beach ridges mark the former lake shorelines.

The flat lake plain, with its rich lacustrine soils, was once a mosaic of wet and mesic blacksoil prairie dominated by the tall prairie grasses. Following a century of settlement, this entire landscape has been virtually transformed to cropland. Only one prairie remnant (Malmberg Prairie) is protected on the flat bed of Glacial Lake Agassiz in Minnesota.

The original vegetation of the Interbeach Area was a more complex mosaic of vegetation, ranging from marsh through wet and mesic blacksoil prairies to dry sand and gravel prairies. The excessively drained gravelly and sandy crests of the beach ridges supported sand and gravel prairie dominated by the mid to short grasses. The lower slopes of beach ridges supported blacksoil prairie with marsh found in the poorly drained depressions between the beach lines. Although many of the Agassiz beach ridges have been cultivated or destroyed by gravel operations, thousands of acres of prairie are now protected on managed sites within the Interbeach Area. In no other geomorphic region in the state has the variation in the tallgrass prairie been better protected.

Although the herds of buffalo and elk had vanished from the Red River Valley by the early 1900s, the area still supports a wide range of wildlife species. The mixture of grassland and wetland areas provides an excellent interspersion of habitat types especially suited for breeding waterfowl, prairie nesting birds, and grassland animals. The protected prairies in this region are important staging areas for migrating sandhill cranes, and critical breeding areas for some of the largest prairie chicken populations in Minnesota. The protected preserves harbor a number of species dependent upon native prairie, including some of Minnesota's rare species such as the Baird's sparrow, Sprague's pipit, Assiniboia skipper *(Hesperia assiniboia),* and prairie vole *(Microtus ochrogaster).*

Sprague's pipit


PENNINGTON
75
52
Red Lake Falls
2
Crookston
RED LAKE
MALMBERG PRAIRIE SNA
PANKRATZ PRAIRIE
PEMBINA TRAIL
PRESERVE SNA
9
AGASSIZ DUNES SNA
POLK
MAHNOMEN
75
SANTEE PRAIRIE
and
WAMBACH WMA
32
Ada
Mahnomen
59
TWIN VALLEY PRAIRIE SNA
WAUBUN WMA
NORMAN
113
CLAY
BECKER
ZIMMERMAN PRAIRIE
MCKINNEY-
HELLICKSON WPA
BLAZING STAR PRAIRIE SNA
9
32
59
Moorhead
10
BLUESTEM PRAIRIE SNA
and BUFFALO RIVER STATE PARK
94
75
WILKIN
OTTER TAIL
9
94
0
10
20
Miles
Breckenridge

27 BLUESTEM PRAIRIE SNA and BUFFALO RIVER STATE PARK, CLAY COUNTY

LOCATION: (T139N, R46W portions of Sections 10, 11, 14, 15, 22, and 23). Located 5 miles east of Glyndon. Trunk Hwy 10 is the principal access road to the state park. Bluestem Prairie SNA is contiguous with Buffalo River S.P.
SIZE: Buffalo River State Park, 1240 acres; Bluestem Prairie SNA, 1360 acres.
NATURAL FEATURES: Buffalo River State Park is situated on a Glacial Lake Agassiz beach ridge, named the Campbell Beach ridge. Southeast of the park, within the Bluestem Prairie SNA, is the Norcross Beach ridge. The slightly undulating topography is dominated by mesic blacksoil prairie on the uplands and wet blacksoil prairie on the poorly drained swales. The greater prairie chicken uses the area for nesting and booming grounds. In addition, the site harbors numerous other rare species — Henslow's sparrow, marbled godwit, upland sandpiper and prairie vole. Before preservation, the area was used extensively for grazing and haying.
PRESERVE STATUS AND MANAGEMENT: The Nature Conservancy acquired Bluestem Prairie in 1975, and it was dedicated a Scientific and Natural Area in 1982. The Buffalo River State Park is managed by MN DNR-Parks. Management for both units emphasizes controlled burn programs.
INTERPRETIVE AND RESEARCH REFERENCES: Dziadyk and Clambey, 1983; MN Department of Natural Resources, 1979a, 1981a; MN DNR and The Nature Conservancy, 1981b.

28 BLAZING STAR PRAIRIE SNA, CLAY COUNTY

LOCATION: (T141N, R45W, NE1/4 Section 5). Located approximately 20 miles northeast of Moorhead and 4 miles southeast of Felton. From Felton proceed 4.3 miles east on County Rd 34. Turn south onto a township road and go 1 mile to the north boundary of preserve.

SIZE: 160 acres.

NATURAL FEATURES: Blazing Star Prairie SNA lies in the midst of a wave deposited beach ridge of Glacial Lake Agassiz. The soils range from poorly drained to excessively drained. Mesic blacksoil prairie covers most of the site with small inclusions of gravel prairie on the crest of the beach ridge and wet blacksoil prairie on the low swales. Nine species of plants and animals considered of state significance have been documented here and/or adjacent prairies and pastures. These include three endangered prairie bird species — Sprague's pipit, Baird's sparrow, and chestnut-collared longspur. Except for 28 acres of old field, Blazing Star Prairie SNA has never been plowed or grazed; it was, however, hayed annually prior to preservation.

PRESERVE STATUS AND MANAGEMENT: The Nature Conservancy purchased the site in 1975; it was designated a state Scientific and Natural Area in 1981.

INTERPRETIVE AND RESEARCH REFERENCES: MN Department of Natural Resources, 1979f; MN Department of Natural Resources, 1982c.

29 TWIN VALLEY PRAIRIE SNA, NORMAN COUNTY

LOCATION: (T143N, R45W, NW1/4 and E1/2 SW1/4 Section 23). Located approximately 29 miles northeast of Moorhead and 4.5 miles west of Syre, MN. From Syre, go 4.5 miles west on County Hwy 39. Twin Valley Prairie is on the north side of the road.

SIZE: 259 acres.

NATURAL FEATURES: This site lies within the Glacial Lake Agassiz interbeach area; a prominent beach ridge runs across the site. The soils range from poorly drained to well drained and support a varied vegetation. Mesic blacksoil prairie, dominated by big bluestem and prairie cordgrass, occupies 150 acres of the site. The remainder of the preserve is sedge meadow and marsh that occupy the poorly drained swales adjacent to the beach ridge. Four animal species of state significance are found here: prairie vole, marbled godwit, sandhill crane and the Dakota skipper butterfly. A small portion of the natural area has been plowed, and larger areas were hayed prior to preservation.

PRESERVE STATUS AND MANAGEMENT: The Nature Conservancy acquired Twin Valley Prairie in 1976; it was designated a Scientific and Natural Area in 1981. Management includes prescribed burning of segments of the tract.

INTERPRETIVE AND RESEARCH REFERENCES: MN Department of Natural Resources, 1979i; The Nature Conservancy, 1980d.

30 ZIMMERMAN PRAIRIE, BECKER COUNTY

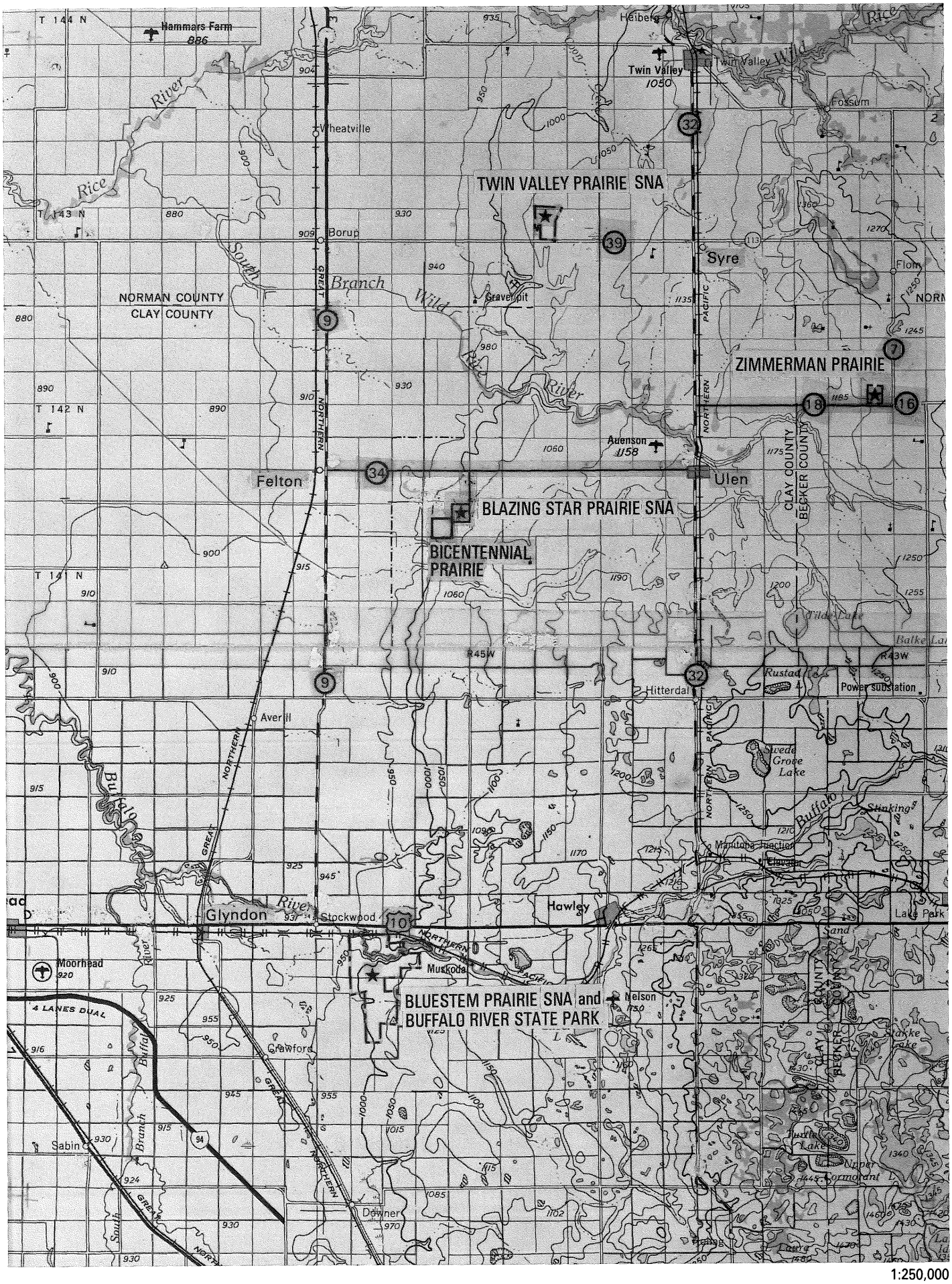
LOCATION: (T142N, R43W, E1/2 SW1/4 Section 16). Located approximately 30 miles northeast of Moorhead and about 5.5 miles northeast of Ulen. Enter from the south boundary of the tract off County Rd 16.

SIZE: 80 acres.

NATURAL FEATURES: Zimmerman Prairie is located within the bed of a small glacial lake just to the east of Glacial Lake Agassiz. The soils on the tract are deep, silty, or loamy and poorly drained. The vegetation is predominantly mesic blacksoil prairie dominated by big bluestem, Indian grass, and prairie cordgrass. There are scattered stands of aspen in a number of areas. The tract is habitat for a rare sedge, *Carex scirpiformis,* and three state significant animal species — marbled godwit, upland sandpiper and greater prairie chicken. Mowing, grazing, and minimal cultivation have been the major human activities to influence Zimmerman Prairie.

PRESERVE STATUS AND MANAGEMENT: Zimmerman Prairie was acquired by The Nature Conservancy in 1974. The prairie is managed with prescribed burns.

INTERPRETIVE AND RESEARCH REFERENCES: MN Department of Natural Resources, 1981b; The Nature Conservancy, 1981.


TWIN VALLEY PRAIRIE SNA
ZIMMERMAN PRAIRIE
BLAZING STAR PRAIRIE SNA
BICENTENNIAL PRAIRIE
BLUESTEM PRAIRIE SNA and BUFFALO RIVER STATE PARK
NORMAN COUNTY
CLAY COUNTY
BECKER COUNTY
Hammars Farm
Twin Valley
Wheatville
Borup
Syre
Fossum
Gravel pit
Felton
Auenson
Ulen
Hitterdal
Power substation
Averill
Glyndon
Stockwood
Hawley
Moorhead
Muskoda
Nelson
Crawford
Sabin
Downer
Lake Park
Manitoba Junction
Elevator
Rustad
Swede Grove Lake
Shaking
Twin Valley Wild
Rice River
South Branch Wild Rice River
Buffalo River
Buffalo River
Branch Buffalo River
Sand
4 LANES DUAL
T 144 N
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T 141 N
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GREAT NORTHERN
PACIFIC
NORTHERN

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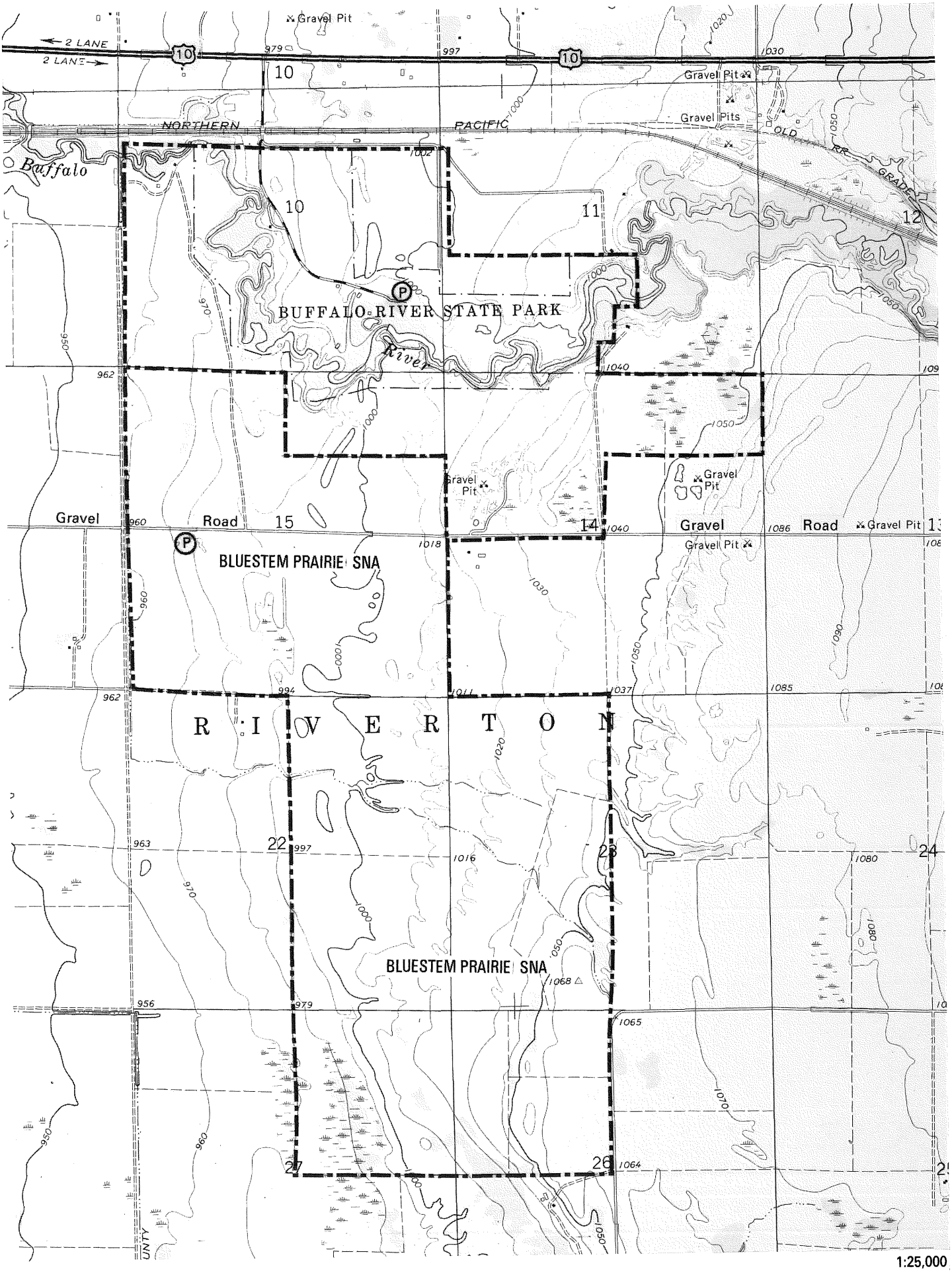
Gravel Pit
2 LANE
2 LANE
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Gravel Pit
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NORTHERN
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10
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BUFFALO RIVER STATE PARK
River
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Gravel Pit
Gravel Pit
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Gravel
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Gravel Pit
BLUESTEM PRAIRIE SNA
1018
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1016
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BLUESTEM PRAIRIE SNA
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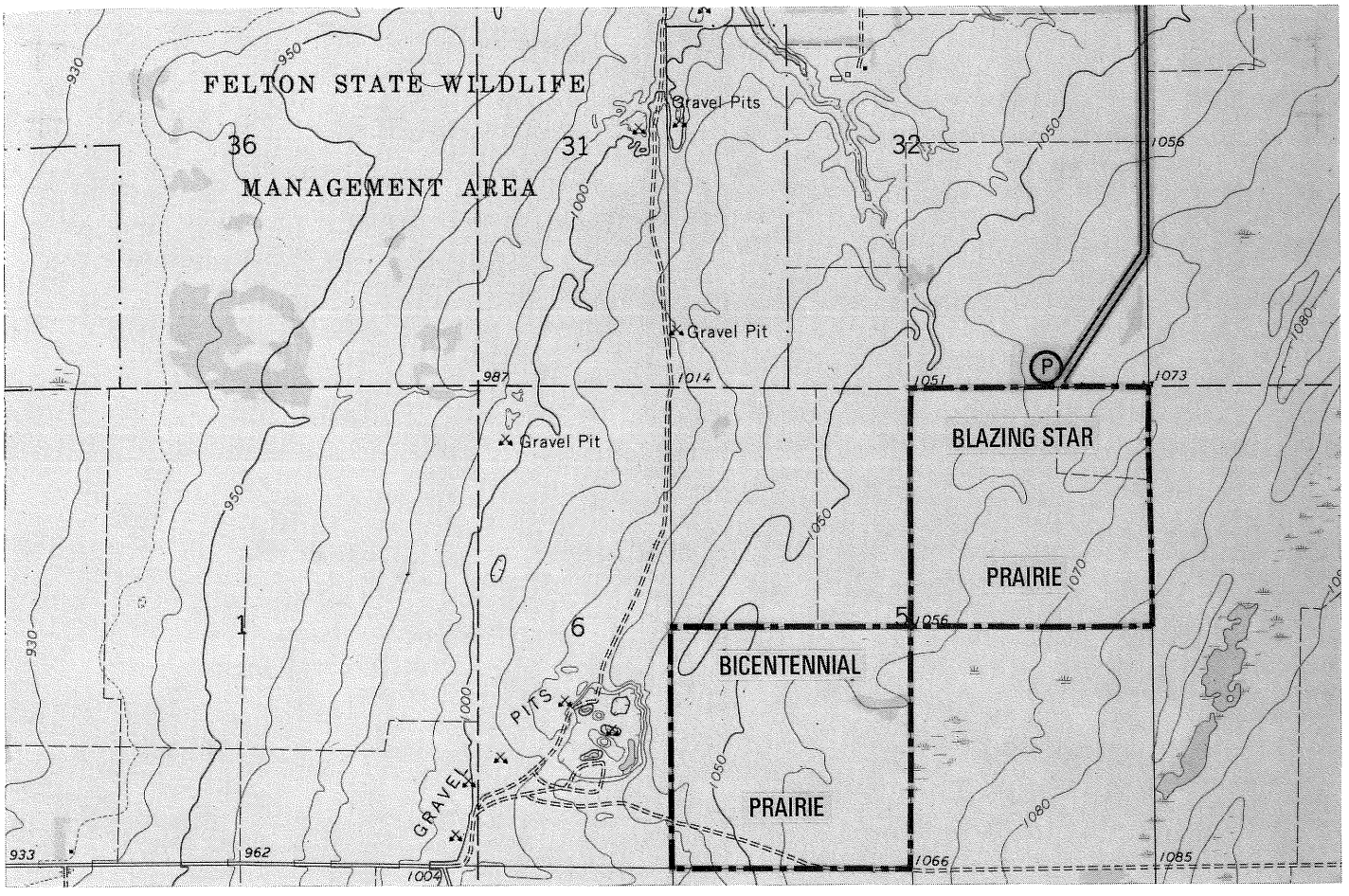
FELTON STATE WILDLIFE
MANAGEMENT AREA
36
31
32
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6
5
Gravel Pits
Gravel Pit
Gravel Pit
BLAZING STAR
PRAIRIE
BICENTENNIAL
PRAIRIE
GRAVEL PITS
P
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1004
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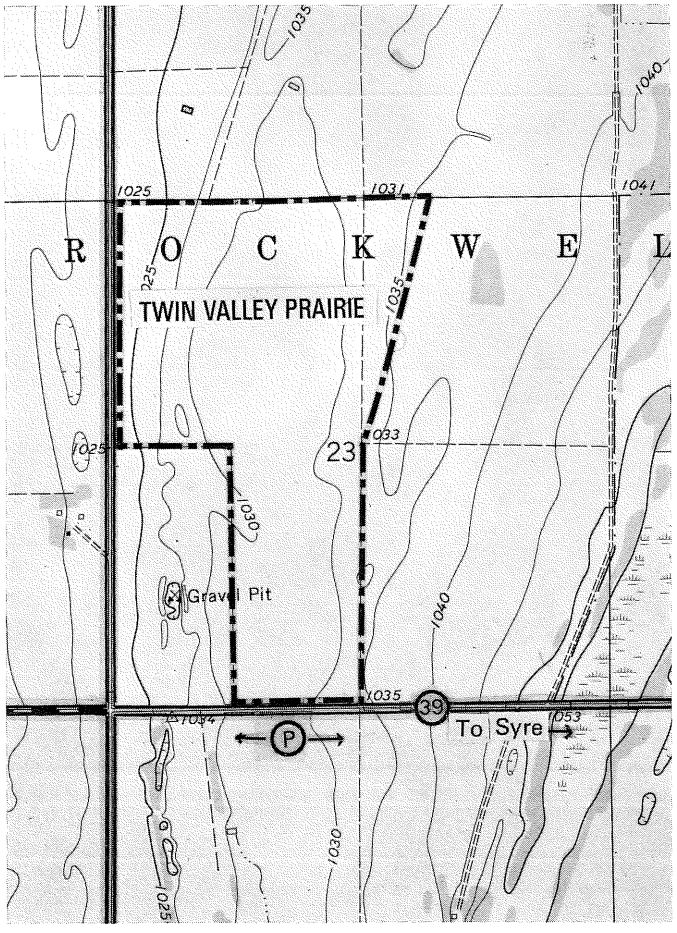
R O C K W E L L
TWIN VALLEY PRAIRIE
23
Gravel Pit
39
To Syre
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1025
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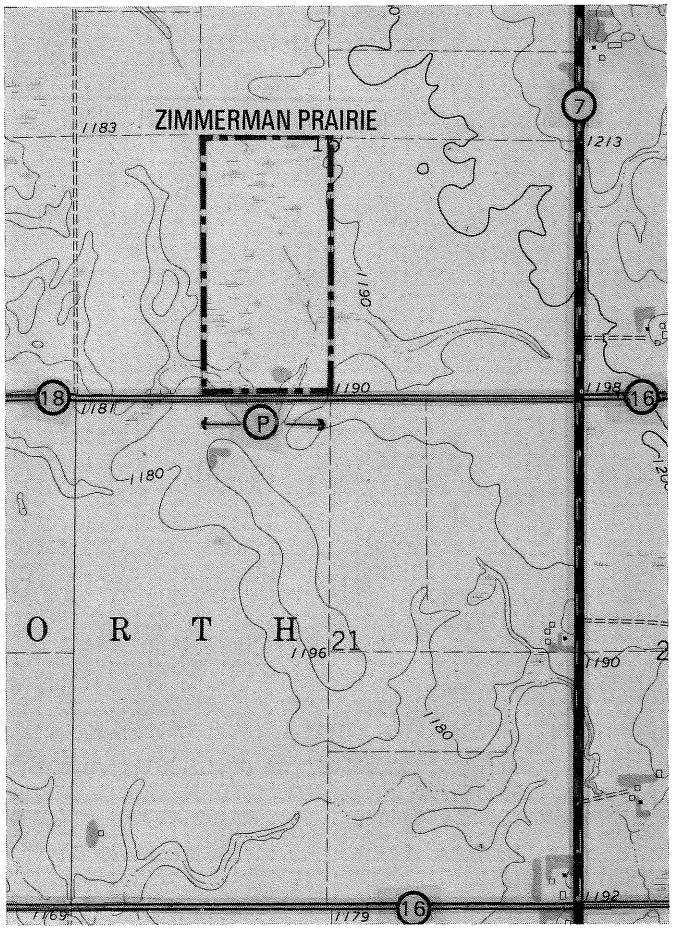
ZIMMERMAN PRAIRIE
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16
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1196
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31 WAUBUN WMA, MAHNOMEN COUNTY

LOCATION: (T143N, R42W, W1/2 SW1/4 Section 27, SE1/4 Section 28; NW1/2 and the E1/2 SW1/4 of Section 33). Located 2.5 miles southwest of Waubun, MN. Take 113 west out of Waubun; enter the tract off County Rd 42.

SIZE: 640 acres.

NATURAL FEATURES: This tract is a fine example of a prairie pothole complex along the prairie-forest border of Minnesota. The Waubun WMA displays a continuum of community types from open ponds through marsh to mesic blacksoil prairie. The pothole marshes and ponds support a varied and abundant waterfowl population, including blue-winged teal, ring-necked ducks, gadwall, redheads, canvasbacks, and lesser scaup. Pied-billed grebes, Virginia rails, marsh wrens, and various shorebirds — upland sandpiper, Wilson's phalarope and marbled godwit — are also present. On the rolling upland, undisturbed mesic blacksoil prairie is the dominant vegetation.

PRESERVE STATUS AND MANAGEMENT: The Waubun WMA is owned by MN DNR-Wildlife and is managed for wildlife production. The tract was acquired by the state in 1954 and 1956. Numerous research projects on plant succession, soils, and herpetology are being conducted here.

INTERPRETIVE AND RESEARCH REFERENCES: Breckenridge and Tester, 1961; Buel and Facey, 1960; Goodwin, 1957; Partch, 1960; Schroeder, 1955; Ross, et al, 1968.

33 SANTEE PRAIRIE and WAMBACH WMA, MAHNOMEN COUNTY

LOCATION: (T145N, R42W, NE1/4 Section 14, NW1/4 Section 13, most of Section 1, most of Section 12. T145N, R41W, most of Section 6 and 7). Located 4 miles southeast of Bejou, Minnesota. Take US 59 south out of Bejou for 3 miles, then turn east on unmarked road for 1 mile to enter the WMA unit. The Santee tract can be entered by continuing east for 1 mile through the WMA unit.

SIZE: 1281 acres (Wambach WMA), 448 acres (Santee Prairie).

NATURAL FEATURES: The two tracts are contiguous and occur within undulating to nearly level ground moraine. The preserves are a mosaic of blacksoil prairie interspersed with small pothole marshes and sedge meadow. The flora contains over 164 native plant species. The fauna is diverse and contains numerous rare species, including upland sandpiper, Wilson's phalarope, greater prairie chicken, marbled godwit, and sandhill crane. Years of haying and other agricultural practices have deteriorated parts of the prairie; weeds have invaded the numerous spoil banks created by ditching.

PRESERVE STATUS AND MANAGEMENT: The Santee Prairie was acquired by The Nature Conservancy in 1971. The Wambach WMA is owned by MN DNR-Wildlife and is used for hunting and trapping, research, nature study and waterfowl production.

INTERPRETIVE AND RESEARCH REFERENCES: MN Department of Natural Resources, 1979j; The Nature Conservancy, 1979a.

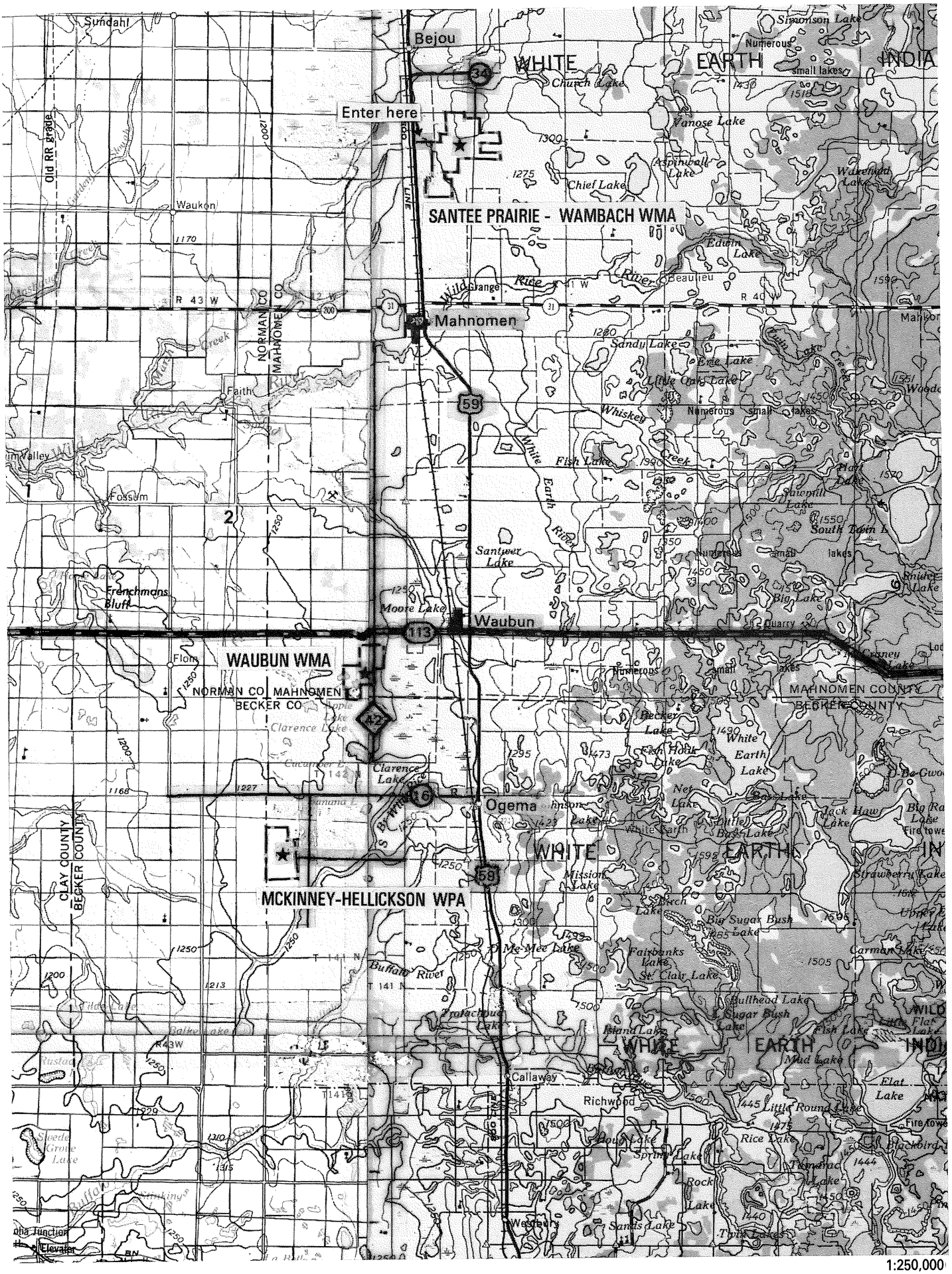
32 McKINNEY-HELLICKSON PRAIRIE WPA, BECKER COUNTY

LOCATION: (T142N, R43W, E1/2 SE1/4 Section 24, and Section 25). Located 24 miles north of Detroit Lakes via US 59 on County Rd 16. Turn west on County Rd 16 off of US 59, proceed 5.25 miles, turn south on gravel road, go 2 miles, at intersection with a gravel road, go west 0.5 mile to the east boundary of unit.

SIZE: 1365 acres.

NATURAL FEATURES: The McKinney-Hellickson Prairie occurs on the Mahnomen Lacustrine Plain, an undulating to shallow depressional land form. The tract is a fine example of the prairie pothole ecosystem in Minnesota. Over 800 acres of mesic to wet blacksoil prairie are found interspersed with numerous potholes and marshes dominated by cattail and bulrush. The site is habitat for blue winged teal, gadwall, redhead, canvasback, greater prairie chicken, upland sandpiper, marbled godwit and numerous migrating shorebirds. The prairie ranges from near pristine condition to varying degrees of degradation. Portions of the managed area were formerly used for farming, and numerous drainage ditches can be found throughout the tract. These ditches are in varying stages of being plugged.

PRESERVE STATUS AND MANAGEMENT: The McKinney-Hellickson unit is owned by the U.S. Fish and Wildlife Service, Tamarack National Wildlife Refuge, Detroit Lakes, MN 56501. The area is managed for the preservation of the greater prairie chicken, for hunting, and for waterfowl production.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BECKER CO
Ogema
MCKINNEY-HELLICKSON WPA
CLAY COUNTY
BECKER COUNTY
MAHNOMEN COUNTY
WHITE EARTH
Callaway
Richwood
Rice River
Wild Rice River
White Earth River
Buffalo River
Whiskey Creek
Fish Lake
Sandy Lake
Church Lake
Chief Lake
Vanose Lake
Aspinwall Lake
Edwin Lake
Beaulieu
Sawmill Lake
Santwer Lake
Moore Lake
Becker Lake
Clarence Lake
Mission Lake
Me-Mee Lake
Fairbanks Lake
St. Clair Lake
Mud Lake
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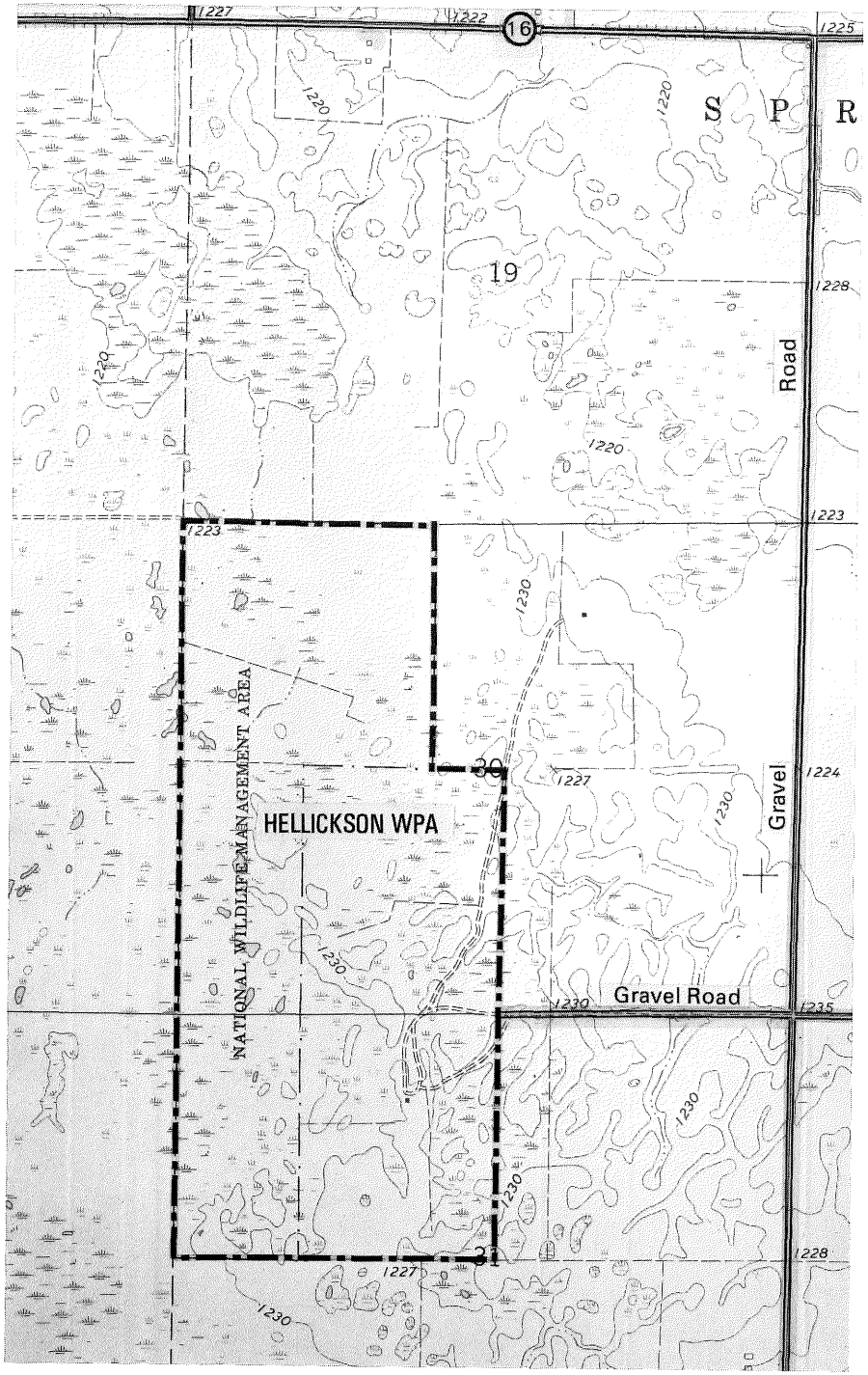
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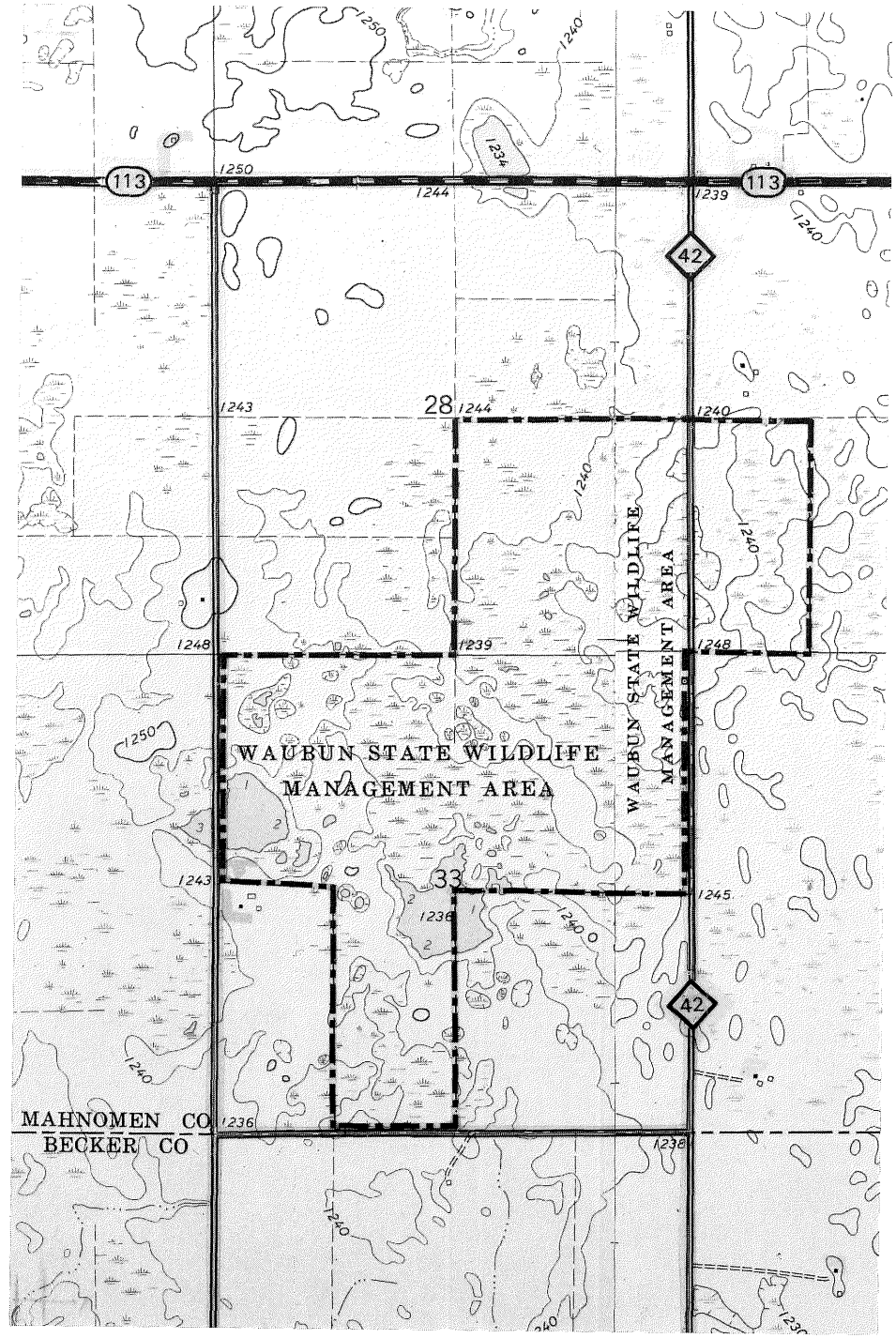
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WAUBUN STATE WILDLIFE MANAGEMENT AREA
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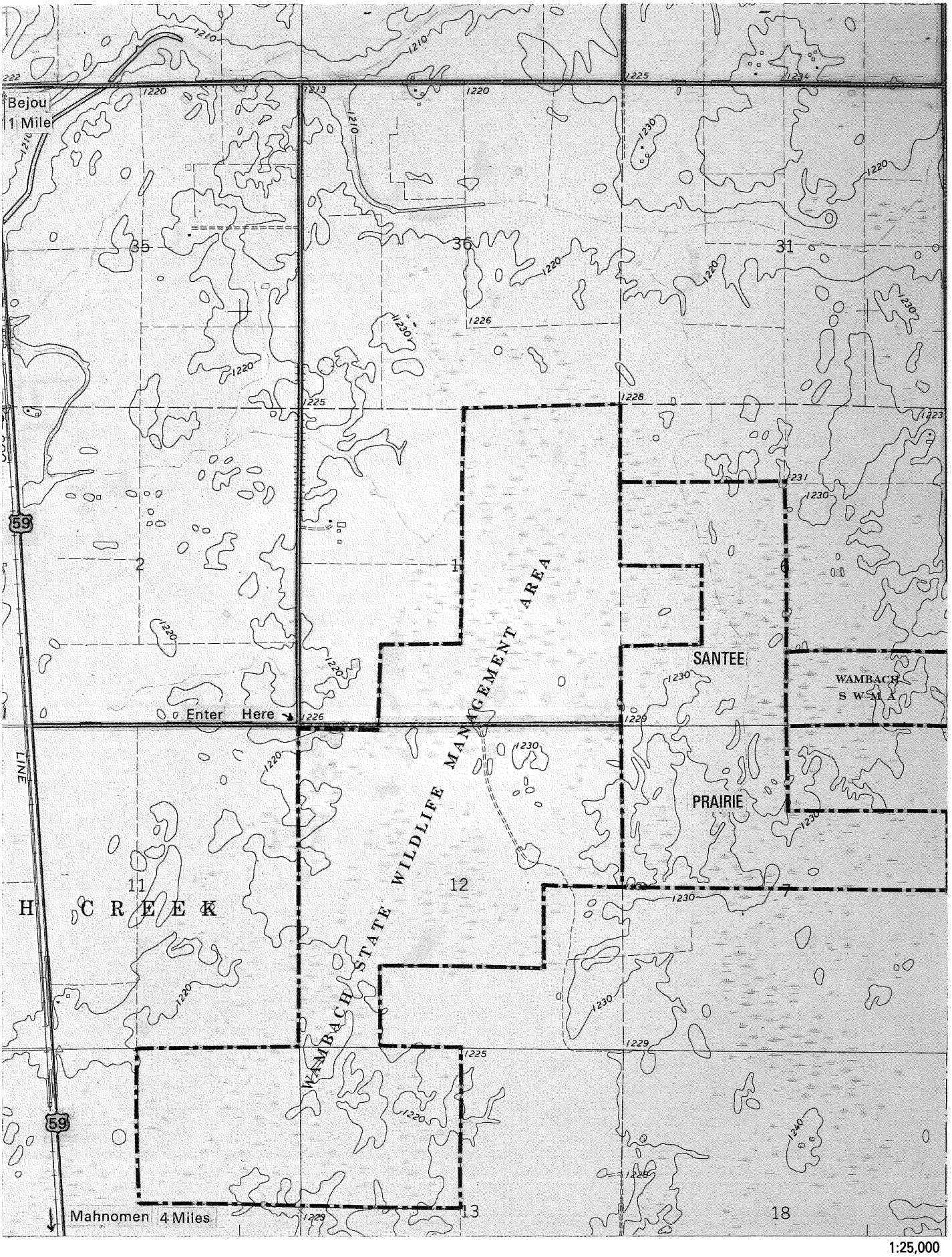
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34 AGASSIZ DUNES SNA, POLK AND NORMAN COUNTIES

LOCATION: (T147N, R44W, parts of Section 31, 32; T146N, R44W, Section 5, 6). Located approximately 2 miles southwest of Fertile, MN. From Fertile, go south on State Hwy 32. After crossing the Sand Hill River, go 0.6 mile and turn right onto a gravel road. Continue 0.5 mile and turn left onto dirt road leading into parking area.

SIZE: 417 acres.

NATURAL FEATURES: This natural area occurs in a large dune field associated with Glacial Lake Agassiz. The sand dunes support a mosaic of the following vegetation types: oak sand savanna dominated by bur oak, sand prairie dominated by big bluestem and little bluestem, aspen woods, and sand blowouts colonized by characteristic barren species, including sand reed grass, creeping juniper, and silky prairie clover. Agassiz Dunes was lightly grazed for many years, but was never mowed or plowed.

PRESERVE STATUS AND MANAGEMENT: The tract was acquired in 1965 by The Nature Conservancy and designated a state Scientific and Natural Area in 1981. The area is periodically burned to maintain the characteristic savanna structure.

INTERPRETIVE AND RESEARCH REFERENCES: MN Department of Natural Resources, 1979d; The Nature Conservancy, 1980a.

35 PEMBINA TRAIL PRESERVE SNA, POLK COUNTY

LOCATION: (T149N, R45W, Section 36 and E1/2 Section 25; T149N, R44W, parts of Sections 30, 31, and W1/2 Section 19, W1/2 SW1/4 Section 18; T148N, R45W, parts of NE1/4 Section 2 and NW1/4 Section 1). Located about 12 miles southeast of Crookston, MN. The site is reached by County Rd 45.

SIZE: 2044 acres.

NATURAL FEATURES: Wave deposited beach ridges of Glacial Lake Agassiz cross this preserve. The vegetation is primarily mesic blacksoil prairie with large areas of sedge meadow, marsh, and shrub swamp. Small calcareous fens occur at the base of low, sandy ridges. There are 196 native plant species documented for this site, including seven rare species. The area supports a number of state significant animal species — sandhill crane, marbled godwit, yellow rail, greater prairie chicken, Wilson's phalarope, and short-eared owl. Portions of this tract have been plowed, grazed, or hayed prior to preservation.

PRESERVE STATUS AND MANAGEMENT: The Nature Conservancy acquired 1660 acres of the site in 1974. The DNR-Scientific and Natural Areas Program designated the tract in 1981 and acquired an additional 384 acres in 1984. Management includes prescribed burning and cutting of noxious weeds.

INTERPRETIVE AND RESEARCH REFERENCES: MN Department of Natural Resources, 1979h; The Nature Conservancy, 1980c.

36 PANKRATZ PRAIRIE, POLK COUNTY

LOCATION: Pankratz Prairie North (T149N, R45W, S1/2 Section 8); Pankratz Prairie South (T149N, R45W, parts of Section 17, NE1/4 Section 20). Located approximately 7 miles southeast of Crookston, MN. From Crookston go east on U.S. 2 for 6 miles. Turn right onto County Rd 46 and travel south about 1.5 miles to reach the northwest corner of the preserve.

SIZE: 775 acres.

NATURAL FEATURES: The Pankratz Prairie lies within the Interbeach Area of Glacial Lake Agassiz. Wave deposited beach ridges are found on and adjacent to the tracts. The soils are primarily silty or loamy and poorly drained. The vegetation is predominantly mesic and wet blacksoil prairie. In addition, Pankratz Prairie South contains sedge meadow and a 15 acre calcareous fen. Greater prairie chickens and marbled godwits are both known to occur here. Both the north and south tracts were hayed prior to preservation.

PRESERVE STATUS AND MANAGEMENT: The Nature Conservancy acquired most of both tracts in 1974; a 135 acre addition to the south unit was purchased in 1983. Management includes prescribed burning.

INTERPRETIVE AND RESEARCH REFERENCES: MN Department of Natural Resources, 1979k.

37 MALMBERG PRAIRIE SNA, POLK COUNTY

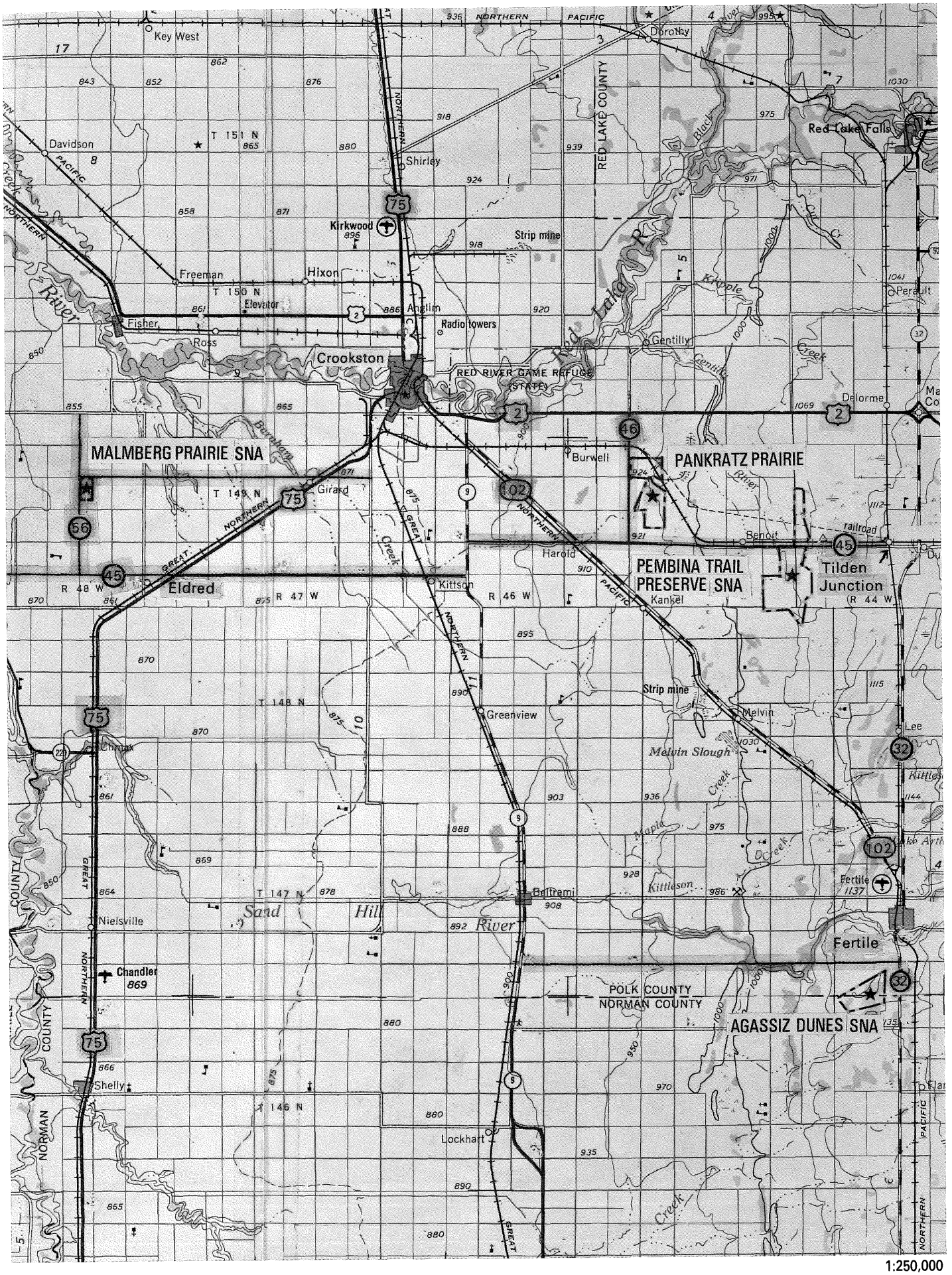
LOCATION: (T149N, R48W, W1/2, NW1/4 Section 16). Located approximately 10 miles southwest of Crookston, MN. The site should be entered from its southwest corner off County Rd 56.

SIZE: 80 acres.

NATURAL FEATURES: Malmberg Prairie SNA lies in the former basin of Glacial Lake Agassiz on silty to clayey, poorly drained soils. The vegetation is primarily mesic and wet blacksoil prairie; 104 native plant species have been documented for the site. A number of rare animal species occur here, including short-eared owl and prairie vole. Malmberg Prairie SNA has never been plowed or grazed, but was hayed yearly prior to preservation. It is the only intact prairie remnant in Minnesota protected on the flat basin of Glacial Lake Agassiz.

PRESERVE STATUS AND MANAGEMENT: The Nature Conservancy acquired Malmberg Prairie in 1961, and it was designated a Scientific and Natural Area in May, 1981. Management includes prescribed burning of the prairie, and monitoring rare plants and animals.

INTERPRETIVE AND RESEARCH REFERENCES: MN Department of Natural Resources, 1979g; The Nature Conservancy, 1980b.


MALMBERG PRAIRIE SNA
PANKRATZ PRAIRIE
PEMBINA TRAIL PRESERVE SNA
AGASSIZ DUNES SNA
RED RIVER GAME REFUGE STATE
POLK COUNTY
NORMAN COUNTY
Crookston
Eldred
Fertile
Tilden Junction
Red Lake Falls
Key West
Dorothy
Davidson
Shirley
Kirkwood
Strip mine
Freeman
Hixon
Elevator
Anglim
Radio towers
Fisher
Ross
Gentilly
Perault
Delorme
Burwell
Benoit
Harold
Kankel
Girard
Kittson
Greenview
Melvin
Lee
Chrisak
Nielsville
Chandler
Shelly
Lockhart
Bellrami
Kittleson
Melvin Slough
Maple Creek
Sand Hill River
Red Lake River
Black River
Burnham Creek
Gentilly Creek
Knipple Creek
Great Northern Railroad
Pacific Railroad
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POLK COUNTY

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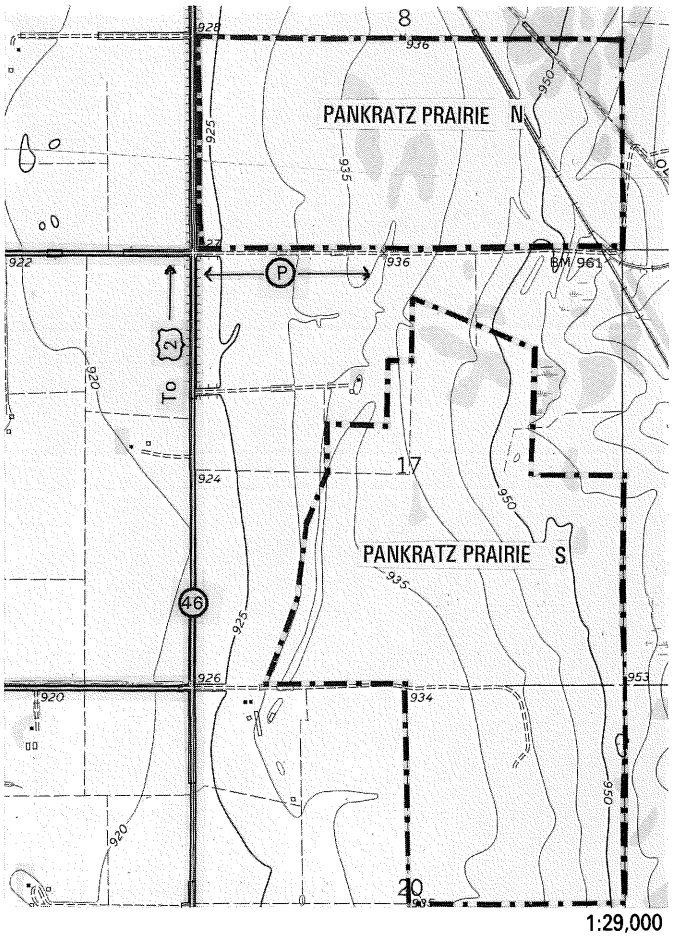
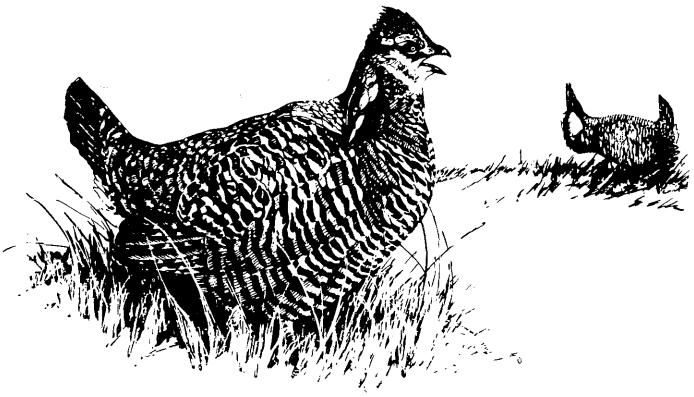
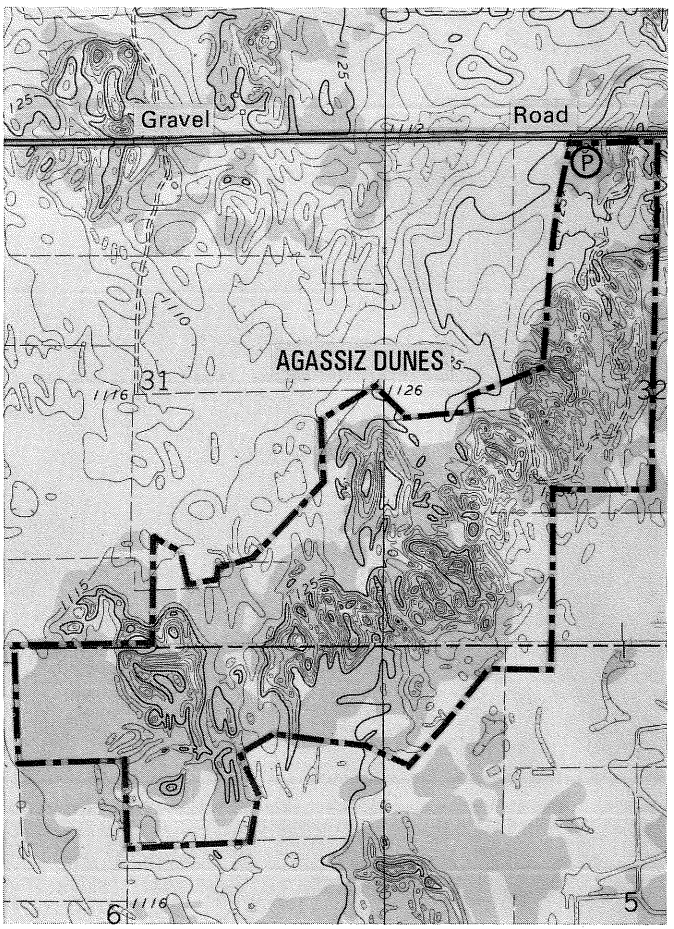
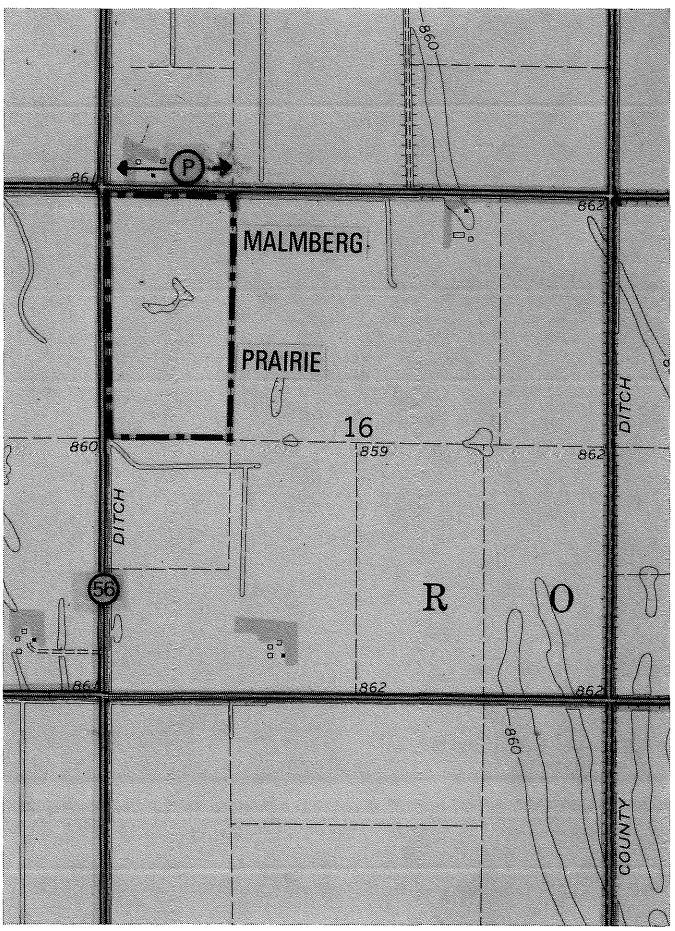
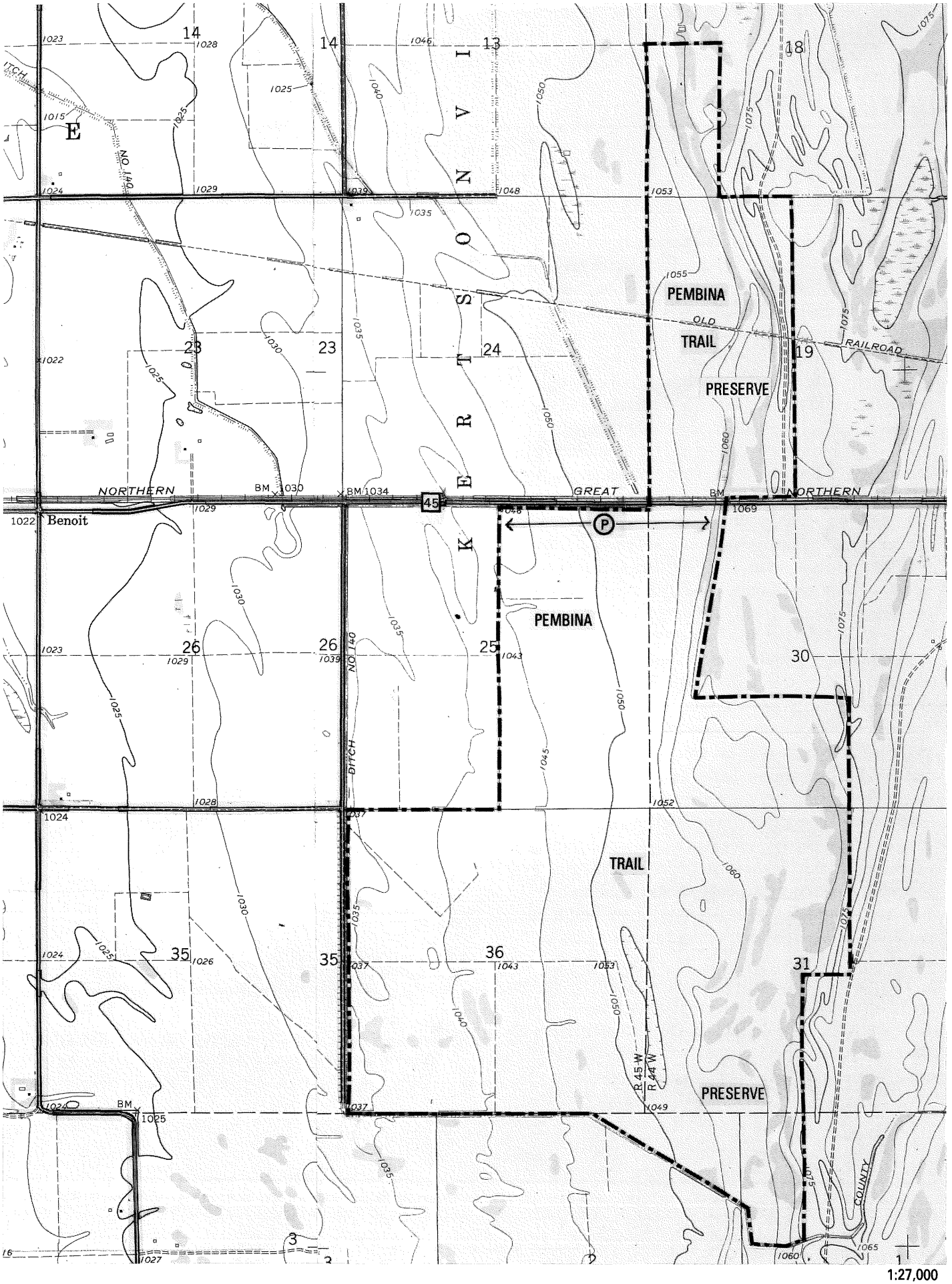




The Pankratz Prairie and Pembina Trail Preserve are refuges for the greater prairie chicken. Destruction of native prairie has reduced the range of this species to a strip of grasslands in northern Minnesota.






PEMBINA
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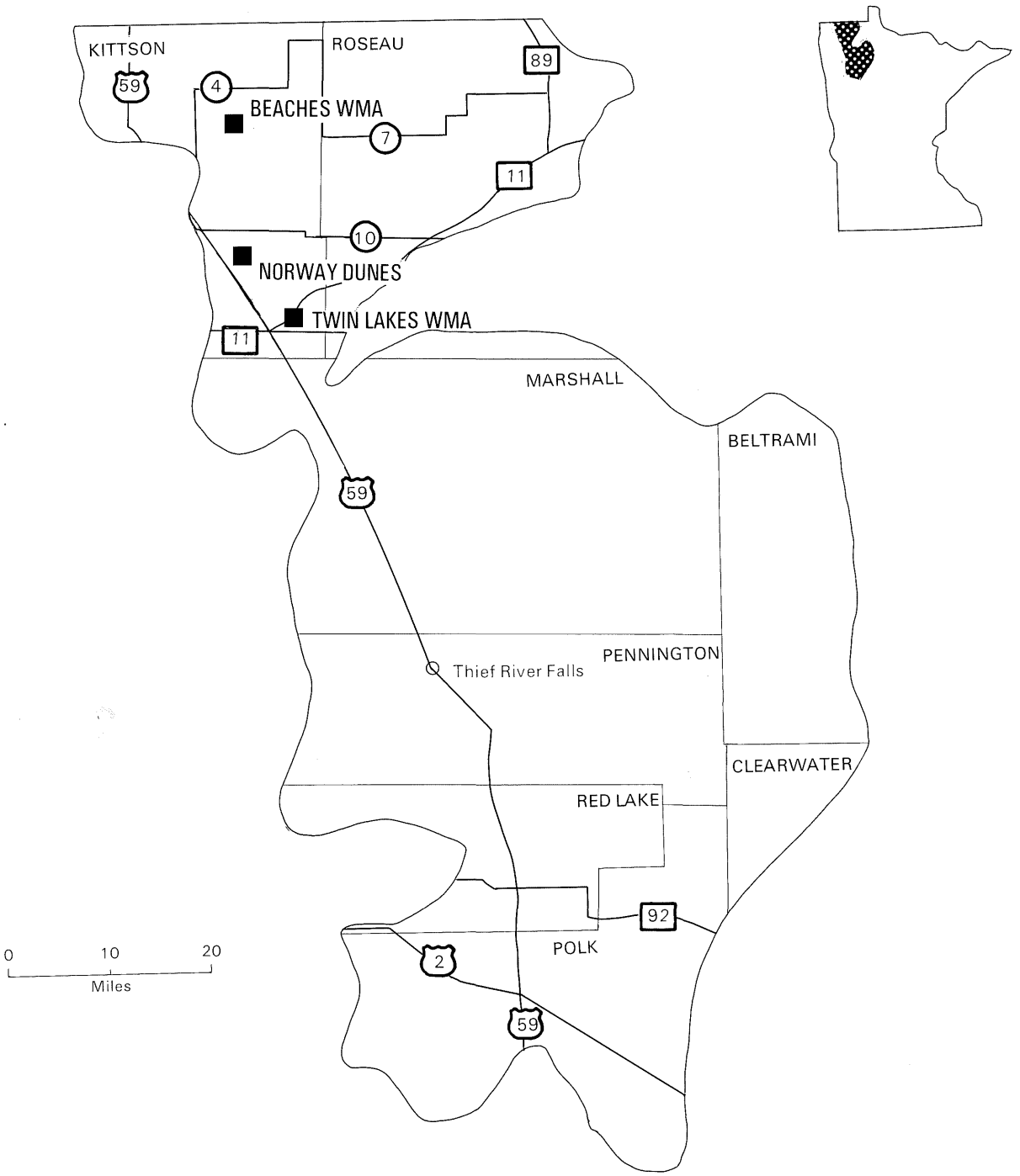
Aspen Parkland

The Aspen Parkland region, located in extreme northwest Minnesota, is a transition zone between the prairie to the west and the coniferous forest and peatlands to the east. The region is a large, nearly level to slightly depressional lake plain formerly occupied by Glacial Lake Agassiz. The flat topography is broken only by the long, undulating beach ridges that extend into the western part of the region. The flat lake plain is occupied by poorly drained soils formed in calcareous lacustrine silts and clays. Originally large areas were covered by shallow and deep peat, much of which has been removed by burning. The linear beach ridges, forming the western border of the region, are composed of excessively drained gravels and sands. In addition, this area, notably in Kittson County, has small areas where blowing sand has formed sand dunes and blowouts.

Its unique geographic position and the pronounced climatic gradient within the Aspen Parkland region is reflected by the dynamic mosaic of vegetation types found here. Oak sand savanna and sand prairie occur in the western portion of the area on sand dune and beach ridge formations. To the east, an aspen parkland community dominates the poorly drained lake plain. This extensive vegetation type is a fire-maintained mosaic of wet prairie, sedge meadow, shrub thicket, and aspen grove. On the presettlement landscape, the aspen parkland formed a contiguous transition belt between the prairie and coniferous formations of extreme northwest Minnesota and adjacent Canada.

The poorly drained soils and the droughty sands that make up the Aspen Parkland region have posed severe limitations for agricultural use. Only 15-30 percent of the region is under cultivation, with smaller areas used for pasture. Vast, continuous acres of aspen parkland still remain on the landscape. As extensive agricultural clearing continues in this region, however, the continuous nature of this vegetation type is rapidly disappearing. The suppression of natural fires is also altering the character of this ecosystem. In the absence of fire, the aspen parkland becomes more homogeneous as aspen-oak forest spreads to form a continuous cover. The Beaches Wildlife Management Area in Kittson County is a superb example of the presettlement aspen parkland vegetation type — all its natural features can be seen here.

Extensive areas of shallow wetland and open prairie within the Aspen Parkland region are major breeding grounds for sandhill cranes.


KITTSON
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ROSEAU
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PENNINGTON
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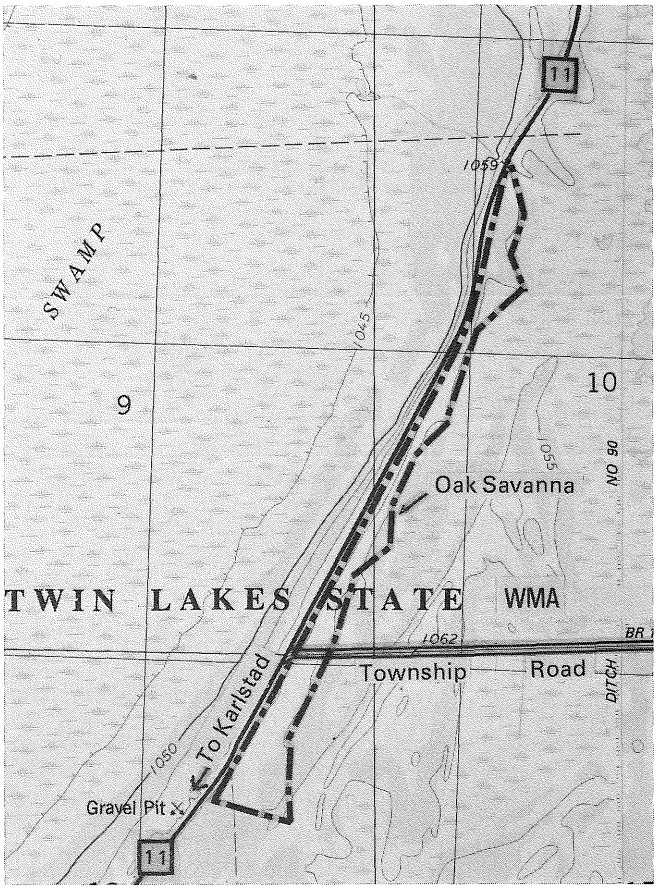
38 TWIN LAKES WMA, KITTSON COUNTY

LOCATION: (T159N, R45W, parts of Section 10 and 16). To reach the oak savanna area, travel east on Trunk Hwy 11 from Karlstad, MN for 2 miles. The site is about 0.75 mile inside the WMA boundary.

SIZE: 80 acres of oak sand savanna.

NATURAL FEATURES: The oak sand savanna within the Twin Lakes WMA occurs on the droughty sands of a nearly level beach ridge which is bordered on both sides by extensive wetlands. The savanna vegetation appears undisturbed and close to presettlement conditions. The lack of recent fires, however, has resulted in succession toward closed forest. The area is characterized by scattered, stunted bur oaks with a dense understory of scrub oak, hazel, and small patches of open prairie. The prairie is dominated by little bluestem, big bluestem, and needle grass.

PRESERVE STATUS AND MANAGEMENT: The site is owned and managed by MN DNR-Wildlife. Prescribed burning has been recommended to recover and maintain the savanna character.



39 NORWAY DUNES, KITTSON COUNTY

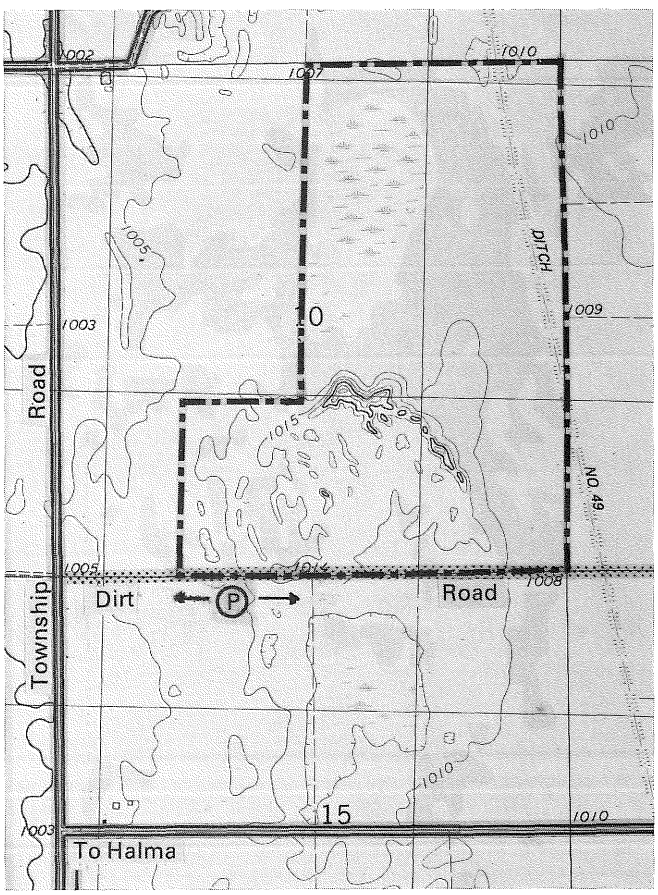
LOCATION: (T160N, R46W, E1/2 Section 10). Located approximately 2 miles northeast of the town of Halma. Travel east on County Hwy 7 from Halma for 0.5 mile, turn north on a township road and proceed 2 miles. Enter Norway Dunes by going 0.25 mile east on a field road to the southwest corner of the preserve.

SIZE: 320 acres.

NATURAL FEATURES: The Norway Dunes site is an excellent example of the presettlement vegetation types found on the sand dunes which accumulated on the eastern side of Glacial Lake Agassiz. The dunes, occupying approximately 100 acres of the tract, are dominated by oak sand savanna displaying the classic savanna physiognomy. Stunted and gnarled bur oak are the dominant woody plants while dry to dry-mesic prairie grasses — little bluestem, june grass, and needle grass — dominate the understory. Two state rare plants, the clustered broomrapes *(Orobanche fasiculata* and *O. ludoviciana),* occur on the site. Although past grazing practices are evident in some areas, most of the dune area maintains its original structure and composition. The site also includes 160 acres of shrub swamp and marsh. Both sandhill cranes and upland sandpipers use the tract.

PRESERVE STATUS AND MANAGEMENT: The site was purchased by The Nature Conservancy in 1983. Prescribed burns are planned to maintain the oak savanna character.

INTERPRETIVE AND RESEARCH REFERENCES: Steva, 1983.



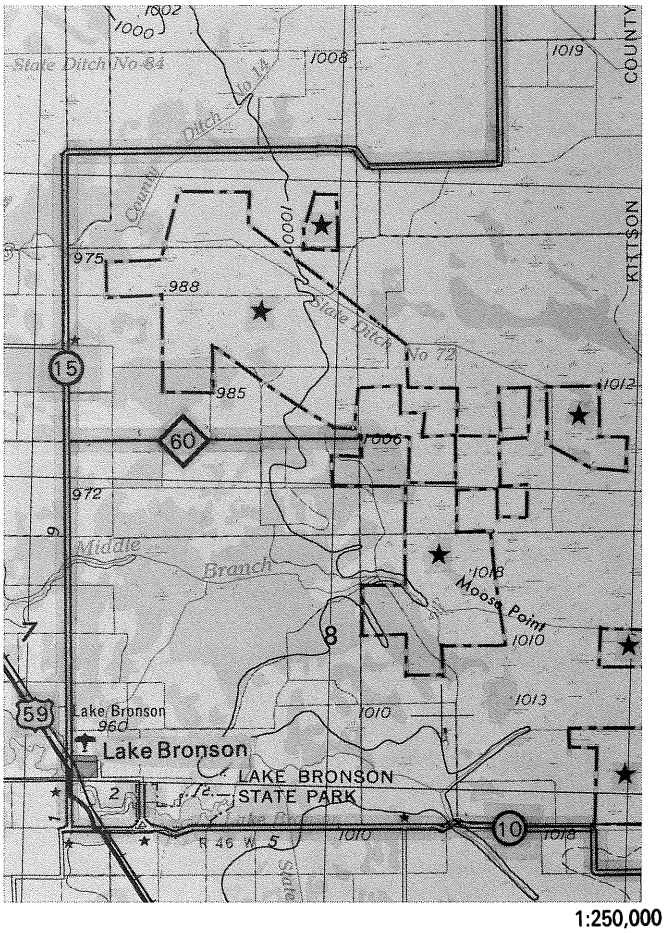
40 BEACHES WMA, KITTSON COUNTY

LOCATION: (All or part of 38 Sections located within T161N, R45W/ T162N, R46W; and T162N, R45W). Located just north of Lake Bronson. Take County Hwy 15 north out of Lake Bronson for 7 miles. Turn east on County Rd 60. The unit can be accessed from numerous dirt roads crossing County Rd 60.

SIZE: 17,914 acres.

NATURAL FEATURES: The Beaches WMA is a superb example of the aspen parkland community type. The large size of the managed area allows a representation of all the major vegetation features characteristic of presettlement aspen parkland. The Beaches WMA is a fire-maintained mosaic of aspen groves, shrub thickets, wet prairie, and sedge meadow occurring over vast acreages of level to depressional, poorly drained soils. The level soils are typically occupied by wet blacksoil prairie. The characteristic prairie species are prairie cordgrass, big bluestem, shrubby cinquefoil *(Potentilla fruiticosa)*, death camass *(Zygadenus elegans)* and grass-leaved goldenrod *(Solidago graminifolia)*. Quaking aspen is the most common tree species and the dominant shrubs are *Corylus americana* and *Salix discolor*.

PRESERVE STATUS AND MANAGEMENT: The site is owned and managed by MN DNR-Section of Wildlife.



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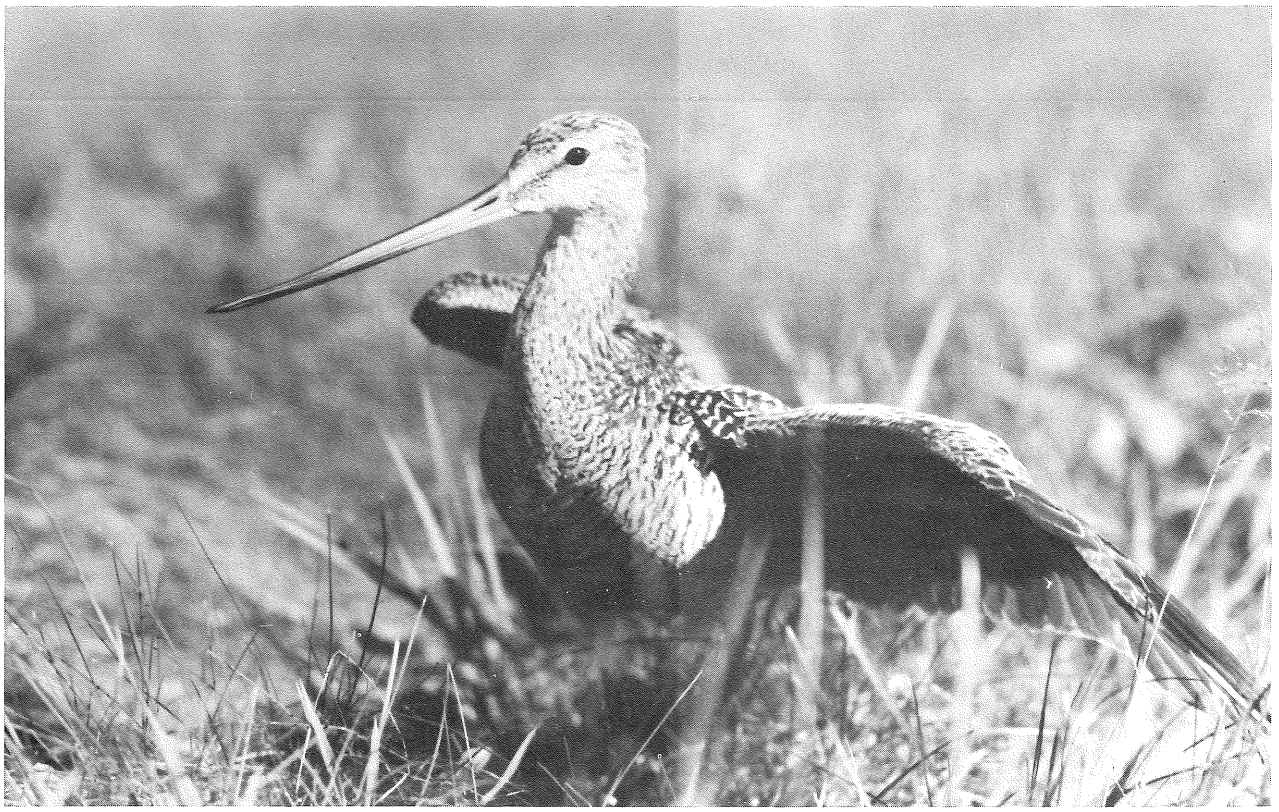

The marbled godwit has declined rapidly across its range due to the plowing of native prairie. The species prefers large habitat expanses and is now most common on the large prairie tracts of northwest Minnesota.

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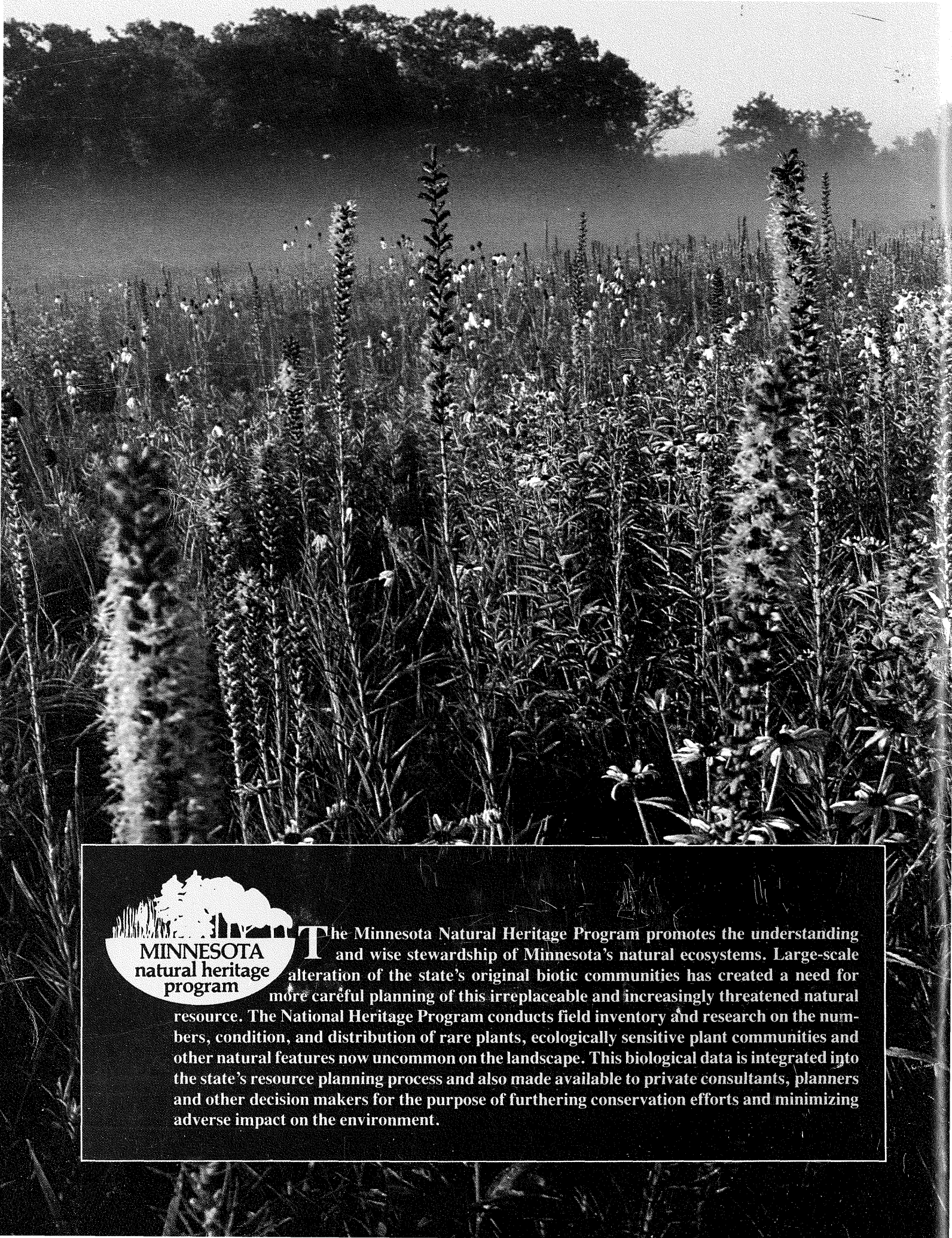

MINNESOTA
natural heritage
program

The Minnesota Natural Heritage Program promotes the understanding and wise stewardship of Minnesota's natural ecosystems. Large-scale alteration of the state's original biotic communities has created a need for more careful planning of this irreplaceable and increasingly threatened natural resource. The National Heritage Program conducts field inventory and research on the numbers, condition, and distribution of rare plants, ecologically sensitive plant communities and other natural features now uncommon on the landscape. This biological data is integrated into the state's resource planning process and also made available to private consultants, planners and other decision makers for the purpose of furthering conservation efforts and minimizing adverse impact on the environment.