A RESOURCE INVENTORY
of the
WILD INDIGO SCIENTIFIC AND NATURAL AREA

"A portion of the former railroad bed and right-of-way
of the Chicago Milwaukee St. Paul and Pacific Railroad
between the Red Cedar River and Dexter in Mower County."

Prepared by
The Minnesota Natural Heritage Program
Division of Fish and Wildlife
Minnesota Department of Natural Resources

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Scientific and Natural Areas

Scientific and Natural Areas serve:

Education - elementary through high school groups use such areas as outdoor classrooms.

Nature Observation - the public uses these areas to observe Minnesota's most unique or rare natural resources.

Protection Functions - Minnesota's rarest species or most unique features are protected for the citizens of today and tomorrow.

Recreation - the public uses such areas for informal, dispersed recreation.

Research - colleges are able to establish long term research projects secure in knowing the area will not be influenced by other management activities.

Genetic Storehouse - potentially valuable plants and animals are retained thereby offering potential for new medicines, resistance to plant diseases, and other unknown secrets.

Currently there are 29 Scientific and Natural Areas protecting undisturbed remnants of Minnesota's plant communities and plant and animal species. These areas encompass maple basswood forests, virgin prairies, orchid bogs, heron rookeries, sand dunes, and virgin pine stands, as well as many rare plant and animal species.

This SCIENTIFIC and NATURAL AREA was established to protect and perpetuate Minnesota's rare and unique natural resources for nature observation, education and research purposes.

Principal activities which are UNLAWFUL in the use of this area are listed below: Further information is available at Department of Natural Resources Offices.

- *Collecting plants, animals, rocks or fossils.*
- *Camping, picnicking and swimming.*
- *Horses, dogs and other pets.*
- *Snowmobiles and other motorized vehicles.*
- *Hunting, trapping, fishing and boating.*
- *Entry into restricted areas and sanctuaries.*

Preface

This report documents biological information collected on the Wild Indigo Scientific and Natural Area (SNA) during 1981 and 1982. It also summarizes information from a variety of sources regarding the site's physical resources. The land use history of this SNA was also investigated in an attempt to understand how such practices may have altered the resources. This document will facilitate the preparation of a management plan for the Wild Indigo SNA. The report will also be a valuable aid for scientists, educators and others interested in the site.

Special credit should be given to Bonnie Williams for preparing the land use history section of this report. Support for this project was provided by the Legislative Commission for Minnesota Resources.

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DESCRIPTION OF STUDY AREA

The Wild Indigo Scientific and Natural Area (SNA) is a 12½ mile segment of the former railroad bed and right-of-way of the Chicago Milwaukee St. Paul and Pacific Railroad (CMSt.P & P). It is located in Mower County between the town of Dexter on the east, and the Red Cedar River on the west. This abandoned right-of-way contains prairie segments of high natural quality along its entire length.

The prairie community at Wild Indigo SNA is an excellent example of a distinctive type of mesic tall grass prairie which in Minnesota is confined to the southeastern part of the state. This (SE MN) Tall Grass Prairie harbors upwards of 300 species of native plants and is the most diverse prairie community type in Minnesota. The conversion of this prairie type to agricultural production has nearly eliminated its occurrence in the present day landscape.

Several state threatened and endangered plant species occur on the SNA. These include Indian Plantain (Cacalia tuberosa), Wild Quinine (Parthineum integrifolium), Sullivans Milkweed (Asclepias sullivantii) and Valerian (Valeriana edulis).

This segment of railroad right-of-way was designated the Wild Indigo Scientific and Natural Area in October, 1980.

LAND USE HISTORY

Introduction

The Wild Indigo SNA is the former railroad ben and right of way of the Chicago Milwaukee St. Paul and Pacific Railroad (CMSt.P & P), which was abandoned in 1979 and purchased by the state on April 11, 1980. Located between the town of Dexter on the east and the Red Cedar River on the west, this area in southeastern Minnesota was designated a Scientific and Natural Area (SNA) on October 7, 1980.

Even though this area has been designated an SNA, this "natural" area has been affected by the actions of many people. The railroad management of the right-of-way has had the greatest impact, followed closely by the husbandry of adjacent landowners.

Methods

The land use history information presented here was arrived at through many sources. Some of it was discovered in the book Mower County History (1911 & 1884); other information was gleaned from the original survey notes of Mower County. Mapping each section of abandoned railroad and talking to the adjacent landowners also provided much needed information. Finally, talks with some of the railroad section crew men revealed railroad management practices of the CMSt.P & P railway. By looking at or taling to these sources, the reasons for the SNA's present condition was pieced together.

To determine the effects of man on this stretch of land, three time periods were researched: (1) before 1870 (before the railroad), (2) from 1870 to railroad abandonment, and (3) after railroad abandonment and state purchase.

Before 1870 - Before the Railroad Was Built

Very little is written about this area prior to its settlement. We do know, however, that Mower County was traversed by hunting parties of both the Sioux and Iowa Indians, and that there were apparently no permanent Indian villages in the Mower County area.[1]

The first record of "white men" having visited the Mower County area is contained in a manuscript entitled "A Journal of Marches by the First United States Dragoons, 1834-45." The first dragoons were created to defend the frontier. On June 29, 1835, settlers

[1]Curtis-Wedge, Franklin ed., History of Mower County, Minnesota, (Chicago: H. C. Cooper, Jr. and Co., 1911), p. 37.

the distance of the bearing trees to the corner post, which was marked. Then by multiplying the average distance of the trees from the surveying point by a correction factor of 1.6 when four bearing trees were given, by 1.7 with three bearing trees, and by 2 when two trees were given, an average distance between the trees surrounding the survey point was determined (corners with only one bearing tree were discounted)* Hence, an average distance of 290 feet between the trees, almost an entire football field's length between any given tree and its nearest neighbor. One can understand why the surveyors made a point of stating "scattered timber," for the area west of Brownsdale.

Scattered timber was not the only way to describe the area. In some cases, the surveyor traveled 300 feet and more to mark a bearing tree with a diameter of at least 15 inches. Surveyors were to mark the closest tree of at least 5 inches in diameter, which indicates that no smaller diameter trees existed between the survey point and the bearing tree used. Thus, the tree must also be fairly mature.

The original land surveyors described some of the sections west of Brownsdale as being not only wooded (scattered timber), but also "grubby or brushy," which could mean that these areas were covered with low woody vegetation. Other than these comments, very little was said about the vegetation in the woodland areas.

Since the right-of-way is presently prairie and survey records from 1853 indicated scattered timber, one can only guess that prior to the railroad's coming (1870), vegetation in this area existed as prairie and scattered timber together, perhaps as an oak savanna.

East of Brownsdale surveyors repeatedly described the land first-rate prairie. There is some mention of second-rate prairie; however, the dividing line between first- and second-rate prairie is difficult to ascertain. Both degrees of prairie were claimed to be good for farming purposes.

In fact, the land was so good for farming purposes that every parcel of land along what was later to be the Milwaukee Railroad, was homesteaded between January 21, 1856, and August 24, 1860. The only exception was section 16 in Dexter township, which was set aside as a school district and later sold in two parcels in 1868 and 1875.

The smallest acreage of the 26 owners along the railroad (1870) was 40 acres, the largest was 320 acres. However, it is very hard to say whether much of the SNA was at one time "under the plow," especially given the crude methods of farming during the 1850-60s.

*For further discussion of correction factors and methodology see: Fedkenheuer, A. W. 1975 Past and Present Forest Communities of St. Croix State Park, Minnesota and their use in determining Eco-management Direction. PhD. Thesis, Univ. of Minn., St. Paul (Forestry) 86-214.

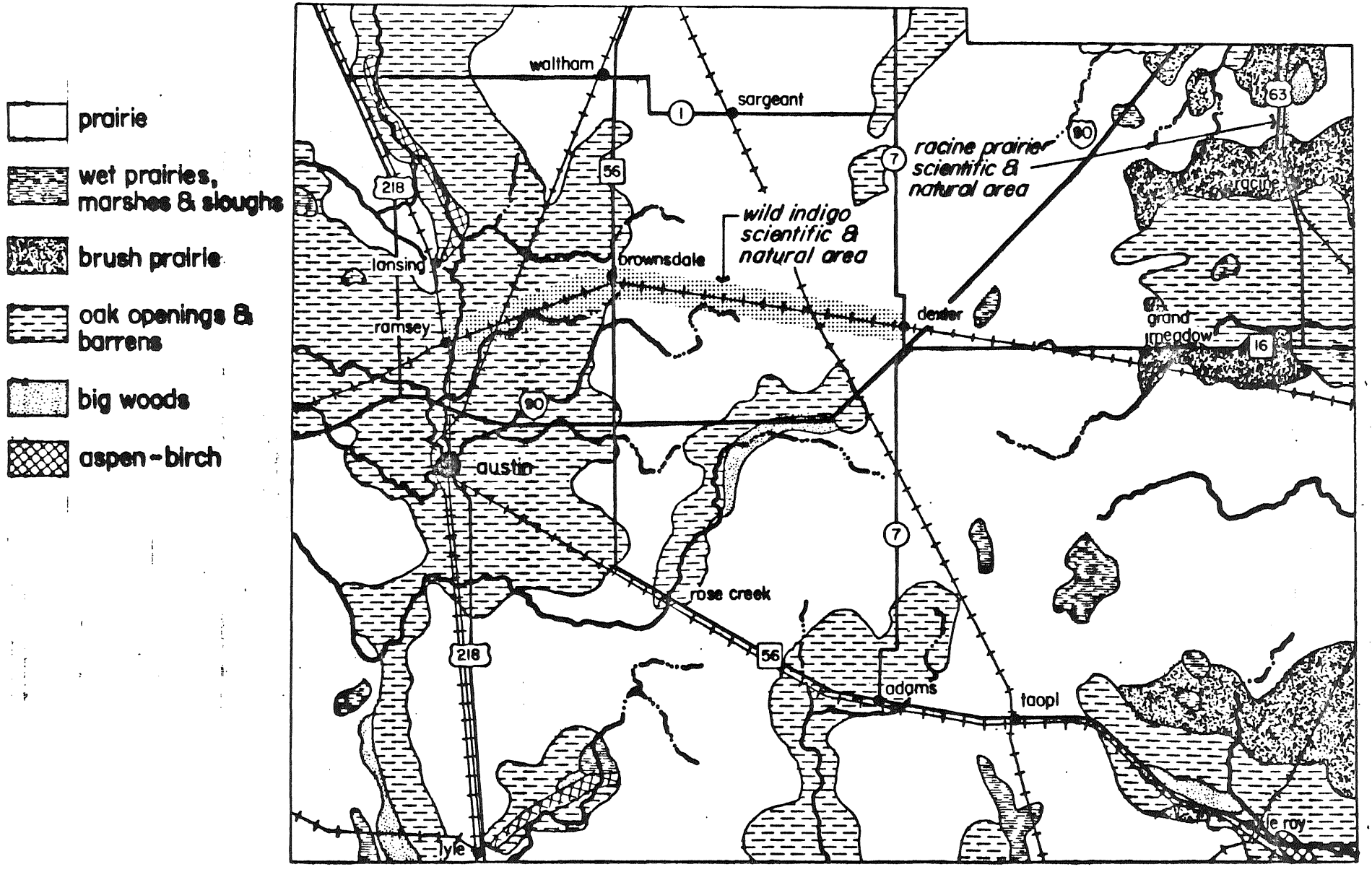


Figure 1

Presettlement Vegetation of Mower County adapted from F.J. Marshner, The Original Vegetation of Minnesota

It is quite likely that the wooded sections west of Brownsdale were logged sometime during the 1850s-1860s, including any timber that might have been adjacent to the SNA. Although there is no concrete evidence of logging done in specific sections, the Mower County history book of 1911 points out that one of the first buildings erected in Brownsdale was a steam sawmill which was "soon in running order, and furnished the people for miles around with lumber to commence building their homes. It was run for several years, until timber began to grow scarce...."[1] Nearly all the first buildings in town were built of hardwood lumber sawed in that mill, "This included the first hotel which was built from the lumber being sawed at the mill...it was mostly built of hardwood, oak, ash and walnut."[2]

Coming of the Railroad (1870-1979)

Since the Wild Indigo SNA is the abandoned railway bed and right-of-way of the Milwaukee railroad, a land use history of the area would be incomplete without the history of the railroad.

This railroad was one of the oldest in the State of Minnesota, and was one of its original land grant roads. It was first chartered by the Territory of Minnesota on March 2, 1855, under the name of the Root River Valley and Southern Minnesota Railroad. After a series of starts, defaults, name changes and a civil war, the railroad was built from LaCrosse, Wisconsin to Winnebago City in south central Minnesota by 1870. The section of railroad which has become the Wild Indigo SNA was built during 1870. The building methods used in making the railway bed were much the same as those used in making present day roads, the only exception being the use of horse drawn graders and manpower in place of heavy machinery. The area adjacent to the railway bed was scooped out leaving a ditch; the material from this ditch was piled up to form a raised railway bed. Much of this work had to be done by hand, as evidenced by an article in the Austin Democrat on June 8, 1869, stating that the Southern Minnesota Railroad was putting on a large force of 500-600 men.[3] Many of these men were said to be local farmers picking up off-season work.

Building a railroad involves putting up fencing along the entire length of the right-of-way. In most cases the posts were shipped in on the railroad and a 5-strand barbed wire was installed.

[1] Curtis-Wedge, Franklin, ed., History of Mower County, Minnesota (Chicago: H.C. Cooper, Jr. and Co., 1911) p. 525.

[2] Ibid.

[3] The 1869 date signifies that this manpower was used for building the section from Ramsey to Albert Lea which took place during 1869. However, the building methods would be similar for SNA section.

If the adjacent landowner wanted to graze either sheep or hogs, a 3-strand barbed wire with woven fencing below was used; the 5-strand barbed wire was used for cattle.

Because of this fencing style, it is possible to determine whether land adjacent to the right-of-way has been grazed by either sheep or pigs within the last several years.

The only other type of fencing that exists along the railway is snow fencing. There were two types of snow fencing used in this area. One was a permanent board fence, and the other was a seasonal crib style.

Both of these fencing styles were used in areas where the railroad bed was lower than the right-of-way on either side of it. The permanent fencing was used throughout the 1900s and more than likely in the 1800s also. It was maintained yearly and during the 1950s - 70s, due to a lack of men, the fences were even rebuilt and repaired in the winter. This enabled the railroad to hang on to a few full-time, year-round men.

The cribbing snow fence was placed behind the permanent snow-fence in the adjacent landowner's field. In some cases, only the cribbing snow fence was used. When the crib snow fence was taken down in the spring, the section crewmen would roll it up and place it on pipe supports about two feet off the ground. These supports can still be found with their fence rolls intact all along the railroad right-of-way. The location of both types of snow fencing as well as the snow fence supports is shown in figure .

Before leaving the matter of fencing, it should be noted that nearly all the fences along this 8.5 mile stretch are in very bad repair. Apparently when the railroad began running into financial difficulty, the repair of fences was a low priority. Only in a few spots was the fencing in good repair. These spots were generally areas which were recently grazed, such as pastures adjacent to the right-of-way. According to some of the landowners, the section crewmen would put up fencing if it was absolutely needed. In a few cases, local farmers gave up and did their own fence repairing.

For a key to the different kinds of fences still remaining along the abandoned right-of-way, see figure . Several structures occur in the SNA, some dating to the railroad's origin. These are noted in figure also.

Probably the most obvious structures in the SNA are trestle bridges. Apparently many of these bridges have been repaired or rebuilt since the time of the railroad's origin. In some cases

the base of the creek or ditch over which the trestle passes, is riddled with the remnants of former log supports. One trestle bridge located in section 18 of Dexter township (most probably on the Reiser land) was the cause of a railroad mishap. Reports state that the area received 15 inches of rain on June 20, 1874, resulting in the bridge partially washing out. A passenger train crossed the bridge successfully but a freight train was not as lucky. The bridge collapsed derailing the train, injuring the engineer and killing the fireman.[1]

Other structures occurring in the SNA are culverts. Many of these culverts date back to the origin of the railroad. Culverts made of iron have been along this railroad since its building in 1870. More recent culverts were made of concrete and, in several spots small 3-4 feet trestle bridges take the place of cement or iron culverts.

One spot in section 18 contains a very large, 6-foot wide concrete culvert. According to one railroad man, this large a culvert was used by cattle crossing from one side of the track to another.

Another type of structure occurring along the railway is the telegraph and, later, the telephone lines which ran along the north side of the right-of-way. This line service was used specifically the by railroad and is evidenced by the downed electrical posts found along the entire length of the SNA. These lines were in service until approximately 1975, at which time the railroad switched to the public telephone system. All of the electrical posts were sawed down at this time, the better posts being salvaged and shipped to other locations. The posts of less value were left lying in the right-of-way; T-bars can still be found with glass insulators from 1945 and a few rare ones even dating back to the 1870s. Here and there telegraph wire can still be found draped over young oak trees 20 feet high.

In spots adjacent to the railway bed, round or square cement boxes or tubs can be found. These tubs used to house the batteries which ran the railway signs. Curiously, in later years, public electricity was used as a back-up system in case of battery failure.

The last structures in great evidence along this 8.5 mile-long SNA are fieldroads. Because the railway in many cases divided a farmer's land, it was the responsibility of the railroad to maintain fieldroads that would enable the farmer to cross the railroad to his land on the opposite side. Many of these fieldroads have been in existence for years, while others are more recent. The fieldroads are noted on Fig.

Today most of the fieldroads are merely grass lanes or dirt roads reinforced with a little gravel. In the past, however, each field-

[1] Interstate Historical Company, History of Mower County, Minnesota (Mankato, Minnesota: The Free Press Publishing House, 1884) p. 381.

road was reinforced with wooden rails placed in the ground, much like railway crossings over gravel roads.

Railroad Management of Right-of-Way

The land use history of the Wild Indigo would be incomplete without looking at the railroad management of the area. Since the railroad was built in 1870, only 14 years after most of this area was populated, it has been by far the largest reason for the SNA's present condition.

One of the management practices on this entire length of SNA was burning. This was carried on during the 1800s and well into the 1900s until approximately 1969 at which time burning of the right-of-way was banned. Generally, the burns would take place in the fall, after farmers had removed their crops. The primary function of burning was to remove dead grasses and brush so that snow wouldn't get caught in them during the winter.

Much of the right-of-way was also mowed on occasion. Some areas of weed infestations were handmowed with scythes even in the 1950s. Otherwise, during the 1950s - 1960s the Milwaukee Road used track mowers, which would cut a swath 4 feet wide on each side of the track. On the return trip the mower would use extensions which would cut from 4 to 8 feet out from the track. In other words, during the time period mentioned, 8 feet on each side of the track was mowed.

The railroad bed was given special attention. It was usually necessary to get rid of any plants that would fall over onto the tracks and cause the train wheels to slip or spin. As a result, a number of weed removal methods were tried. During the early 1950s, the railroad bed was mowed, then in the latter part of the 1950s the engines would steam the track bed. Apparently, this would wilt the weeds for a number of days and then they would re-steam the area. In the early 1960s the section crewmen used fuel oil mixed with creosote on the track bed. This worked quite well for them, but because of its flamability, accidental fire incidence increased, and the railroad quit using it.

From approximately 1957-1972 herbicides were used to help control noxious weeds. The chemicals 2, 4, 5-DT and 2,4-D were mentioned. Noxious weeds were those listed by the state, including leafy spurge and thistle. For a few years during the 1960s, 2,4-D was mixed with diesel fuel and applied to broadleaves.

Railroad section crewmen would also cut a lot of brush and trees, which is evidenced by the large amount of secondary tree growth (sprouting) found along the entire length of the SNA. In the latter years (1970s), this tree trimming was done during the winter months. Hence, many were sawed off at least 1' to 2' above ground. In all cases, timber was left to rot along the right-of-way.

Land Husbandry Practices

Second only to the railroad management practices in its effect on the right-of-way, was the husbandry practices carried on by the adjacent landowners. Because all of the land next to the railroad right-of-way is farm land (except where the track runs through towns), farmland practices also affected the right-of-way. Four of these farmland practices will be examined: mowing, ditching, crop spraying, and tiling.

Mowing - Very little mowing by local farmers was done on the actual right-of-way. However, two landowners did mention this being done. Howard Riles noted that his father during 1920-22 would use a horse-drawn sickle bar to cut hay off the right-of-way in areas where it was level enough (see Fig.). Another adjacent landowner, Arthur Pater, noted that his neighbor would mow the right-of-way east of the county road, cross over the tracks on his fieldroad, and then mow the opposite side of the tracks going west. (E½ Sec 15 T103N R16W). This was done during the years of 1946-51 using a horse-drawn sickle bar also.

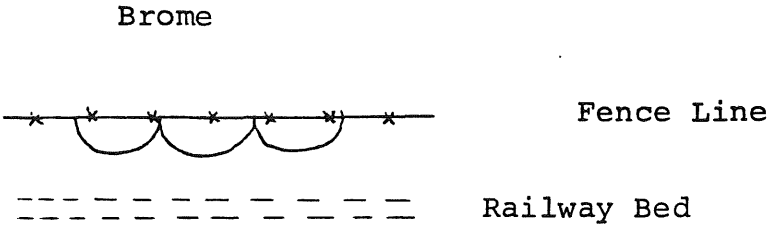
Ditching - As a method of crop land drainage, some of the areas next to or running through the SNA have had ditches dug through them. In most cases the ditches were originally creeks that were dug to increase their runoff capacity. The ditch most recently dug, follows Wolf Creek and was backhoed in the fall of 1981. It runs through the lands of five different owners found primarily in section 18 and 17 of Red Rock township (T103N R17W). The ditch running through section 11 of Red Rock township was dug approximately 15-20 years ago and was "cleaned" out again in 1980.

Spraying - Since the Wild Indigo SNA runs through crop land, it would seem improbable that this land has not seen herbicide or insecticide spraying. In fact, only one person along this 8.5 mile area stated that he did not use herbicide. All the rest indicated the use of a number of chemicals: Lasso, Treflan, Bassagran, Sutan, Atrazine, 2,4-D, Lourox, Amiben, Dual, and Atrex. Very few indicated use of insecticides, except if they were forced to plant corn on corn two years in a row, or in the case of an insect infestation such as corn root worm.

Most chemicals are applied via tractor and sprayer, but in wet years use of airplane-applied chemicals is stepped up. This is also the case with the larger landowners who rely on airplane-applied chemicals much more so than the smaller farmer who has less acreage.

Spraying both ground-applied or air-applied may be the single most threatening factor to this SNA's existence. Because the whole width of this railroad is only 100 feet, a small amount of herbicide drift could easily wipe out a whole cross section of the abandoned right-of-way. Moreover, because this area also does quite a bit of crop production for canning factories (peas and sweet corn mainly), the threat of drift from aerial spraying poses even more of a problem.

Even though it is hard to determine where spray drift has caused problems it does seem highly likely that in some areas, edges of the right-of-way seem disturbed, while immediately adjacent to these areas is good prairie. In certain places the edges of the right-of-way have brome growing in a scalloped-edge manner:



Such a pattern frequently indicates a herbicide drift caused when the tractor and sprayer makes a turn at the end of a field.

Several adjacent landowners also stated that they would purposely spray the fence line bordering the right-of-way in an attempt to get rid of ragweed and so forth. They felt that this kept the weed problem farther from their cropfields.

Tiling - Much of the area adjacent to the right-of-way has either been tiled already or, as many landowners have indicated, will be tiled within the next few years. Tile begins taking effect immediately, but its full potential is not felt for two years. As a result, any vegetation in areas which have been tiled in an excess of 2 - 5 years should already have adjusted to the lower soil moisture. Areas where the adjacent land has been quite recently tiled should be monitored to see if there is a loss of some prairie species.

Railroad Abandonment to Present

The Milwaukee Road between LaCrosse, Wisconsin, and Austin, Minnesota was barely used during its final years. As a result, this line was abandoned in 1979, and the state purchased it the following year. On October 7, 1980, it was designated as a Scientific and Natural Area.

During the summer of 1981 salvage crews in the process of removing railroad ties from the railbed destroyed twelve acres of the SNA by bulldozing a road on the south side of the right-of-way from Austin to just east of Brownsdale. Even though the DNR began restoring this area almost immediately, the scar will be seen for many years to come.

During the spring and summer of 1982 the DNR did some mowing of sweet clover and ragweed, especially along the scarred area. Early

attempts at spring burning were destroyed by the monsoon weather that prevailed during the spring of 1982.

BIBLIOGRAPHY

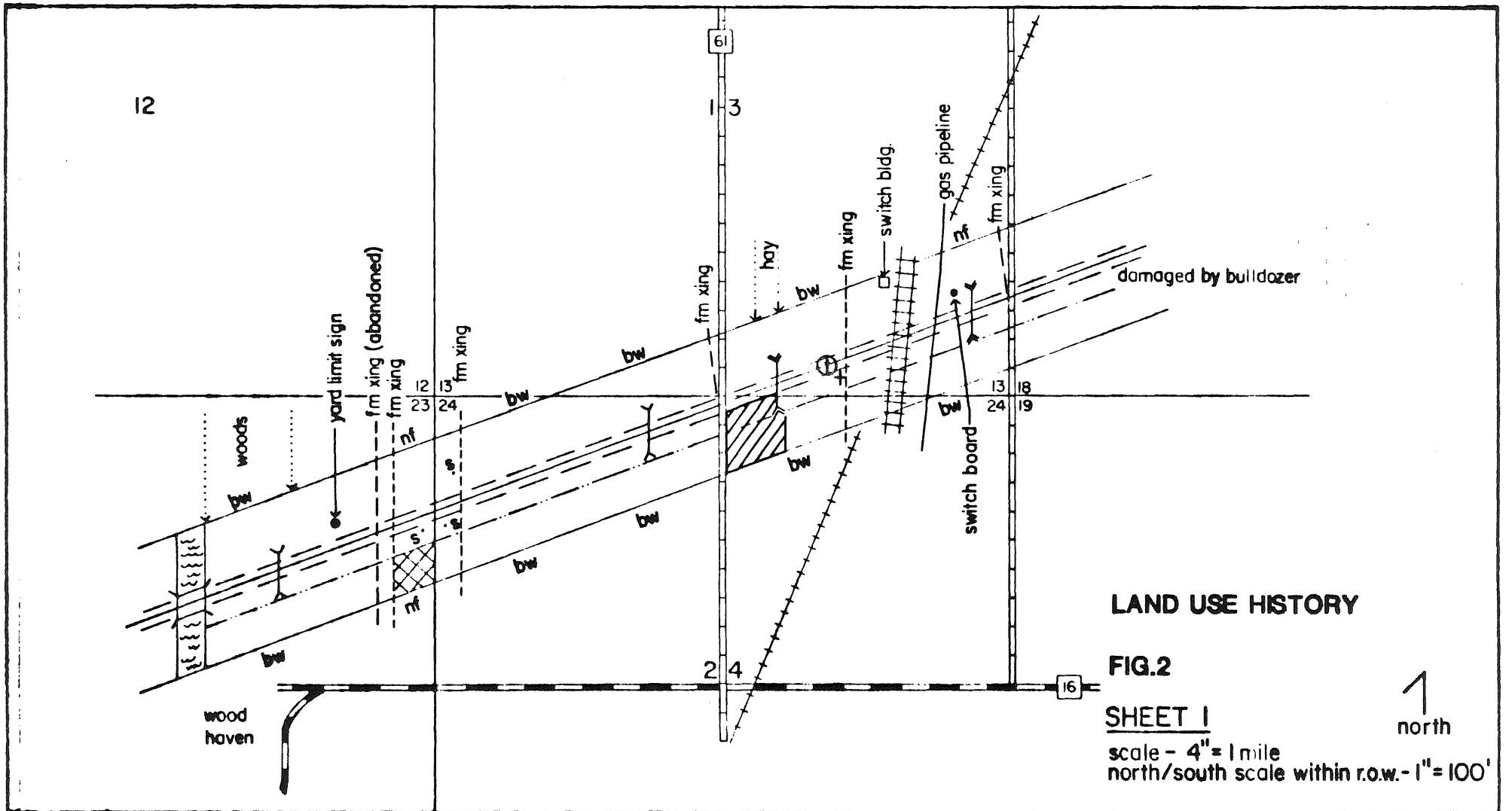
Curtis-Wedge, Franklin, ed., History of Mower County, Minnesota, Chicago: H.C. Cooper, Jr. and Co., 1911.

Fedkenheuer, A.W. 1975. Past and present forest communities of St. Croix State Park, MN and their use in determining ecomanagement direction. Ph.D. thesis, Univ. of Minn., St. Paul (Forestry)

Interstate Historical Co., History of Mower County, Minnesota, Mankato, Minnesota: The Free Press Publishing House, 1884.

Original government survey data and maps, Secretary of State's Office, St. Paul, Minnesota.

Prosser, Richard, Rails to the Northstar, Minneapolis, Minnesota: Dillion Press, 1966.



LAND USE HISTORY

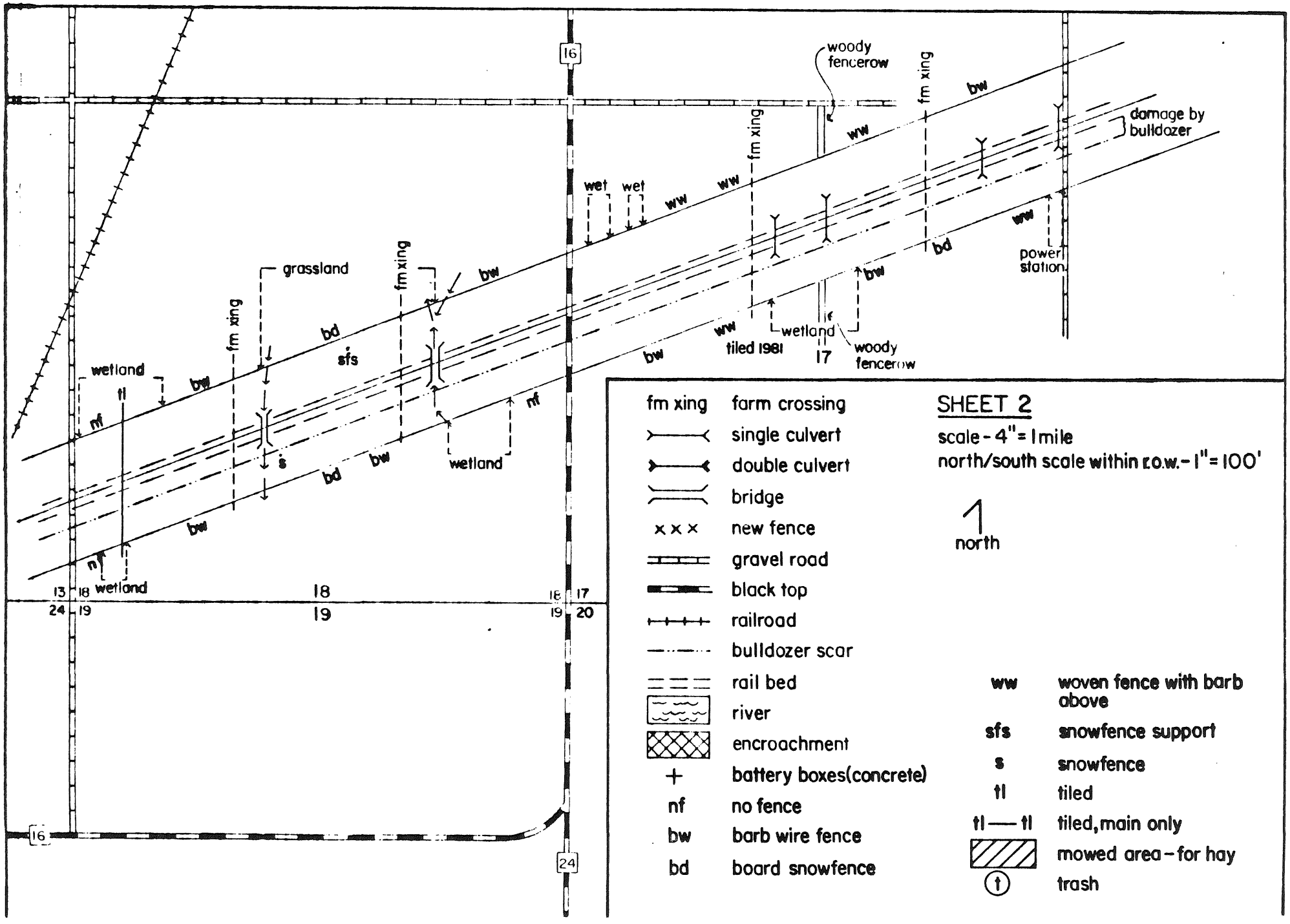
FIG.2

SHEET 1

north

scale - 4" = 1 mile
north/south scale within r.o.w. - 1" = 100'

fm xing	farm crossing		black top	+	battery boxes (concrete)	s	snowfence
	single culvert		railroad	nf	no fence	tl	tiled
	double culvert		bulldozed scar	bw	barb wire fence	tl—tl	tiled, main only
	bridge		rail bed	bd	board snowfence		mowed area-for hay
xxx	new fence		river	ww	woven fence with barb above		trash
	gravel road		encroachment	sfs	snowfence support		



fm xing	farm crossing
	single culvert
	double culvert
	bridge
xxx	new fence
	gravel road
	black top
	railroad
	bulldozer scar
	rail bed
	river
	encroachment
+	battery boxes(concrete)
nf	no fence
bw	barb wire fence
bd	board snowfence

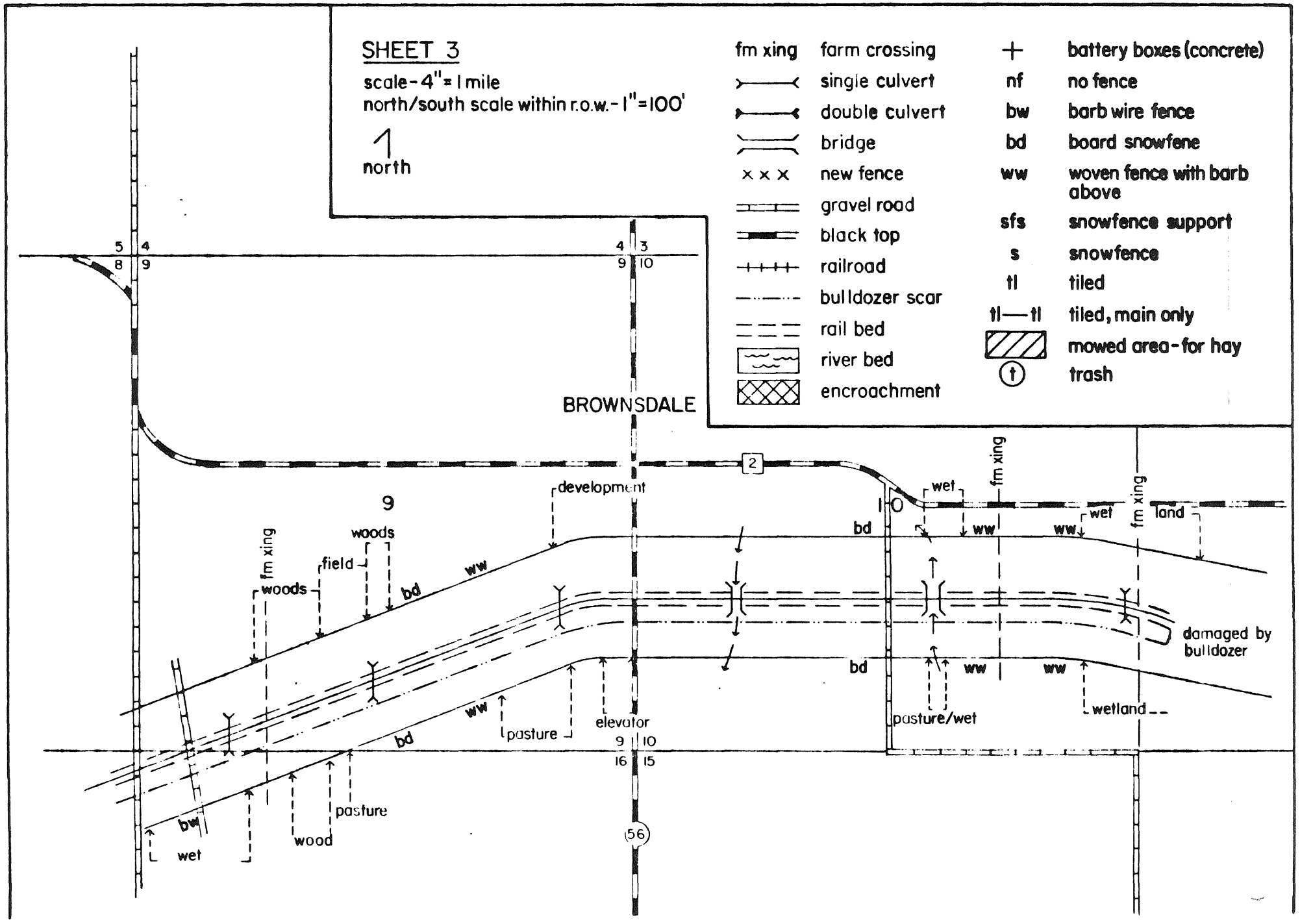
SHEET 2

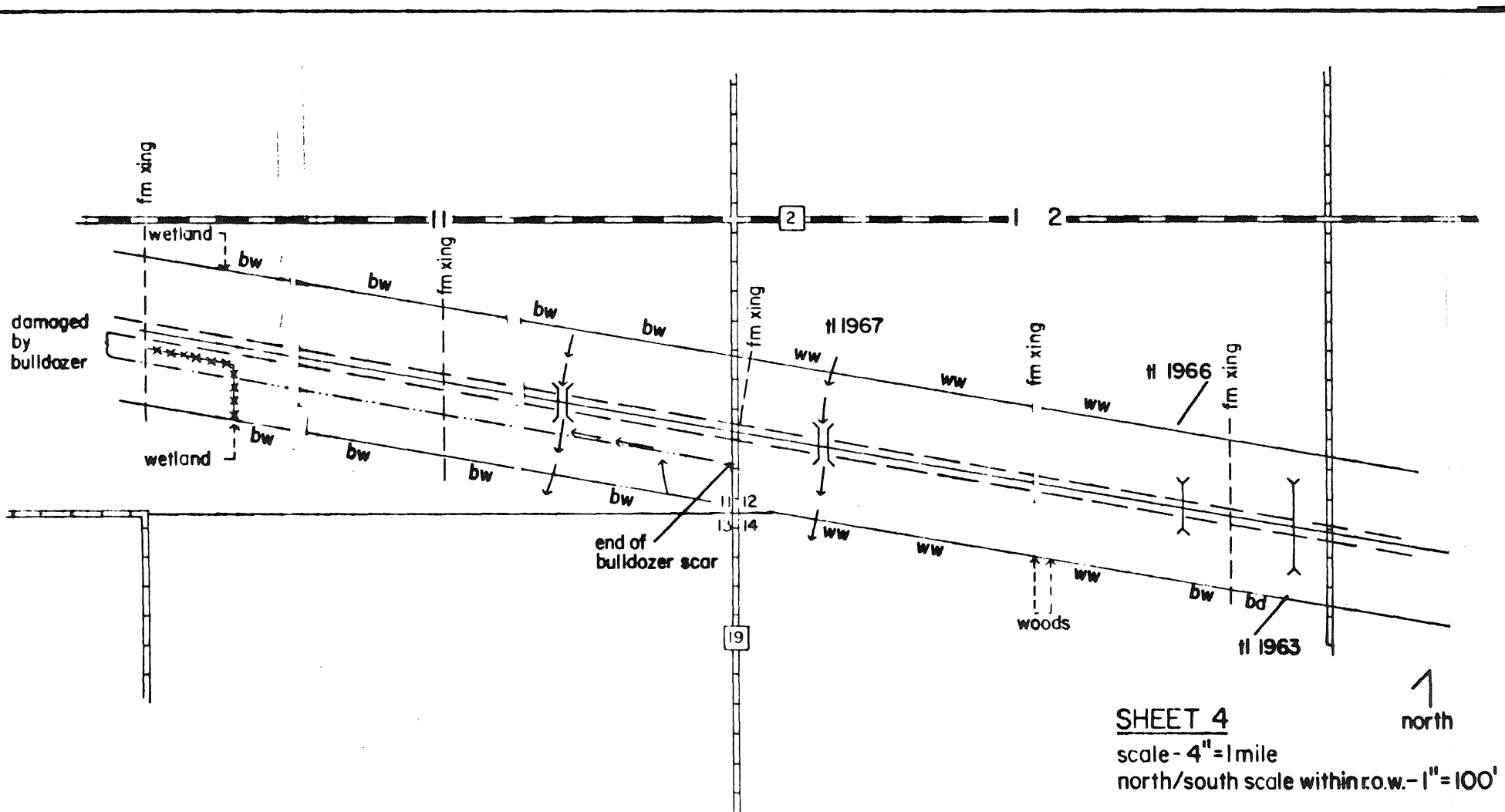
scale - 4" = 1 mile

north/south scale within r.o.w. - 1" = 100'

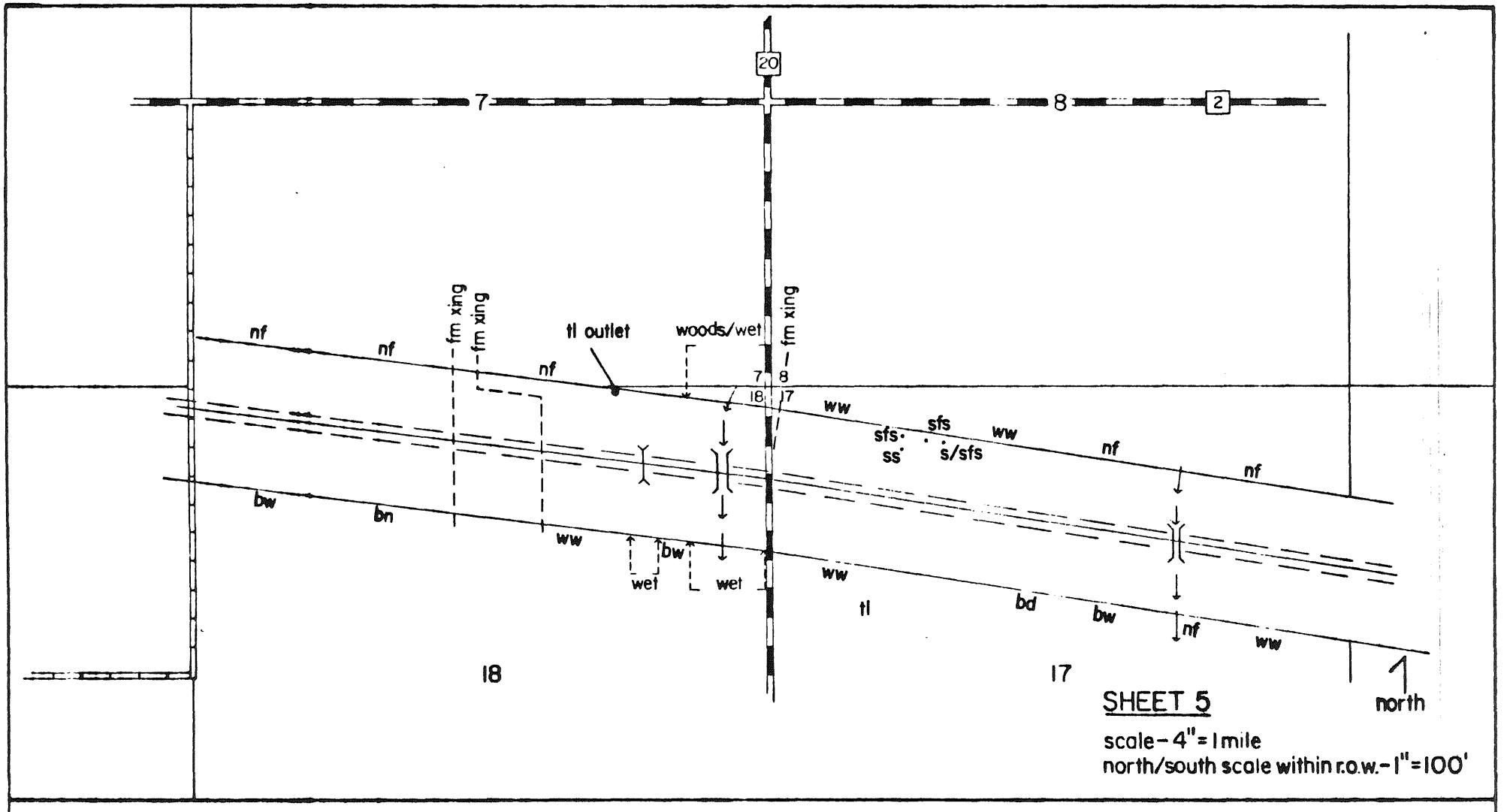
north

ww	woven fence with barb above
sfs	snowfence support
s	snowfence
tl	tiled
tl — tl	tiled, main only
	mowed area - for hay
(t)	trash


SHEET 3
scale-4"=1 mile
north/south scale within r.o.w.-1"=100'
north
fm xing farm crossing
single culvert
double culvert
bridge
xxx new fence
gravel road
black top
railroad
bulldozer scar
rail bed
river bed
encroachment
+ battery boxes (concrete)
nf no fence
bw barb wire fence
bd board snowfene
ww woven fence with barb above
sfs snowfence support
s snowfence
tl tiled
tl—tl tiled, main only
mowed area-for hay
(t) trash
BROWNSDALE
development
woods
field
fm xing
bd
ww
wet
land
damaged by bulldozer
pasture
elevator
pasture/wet
wetland
bw
wood
2
56



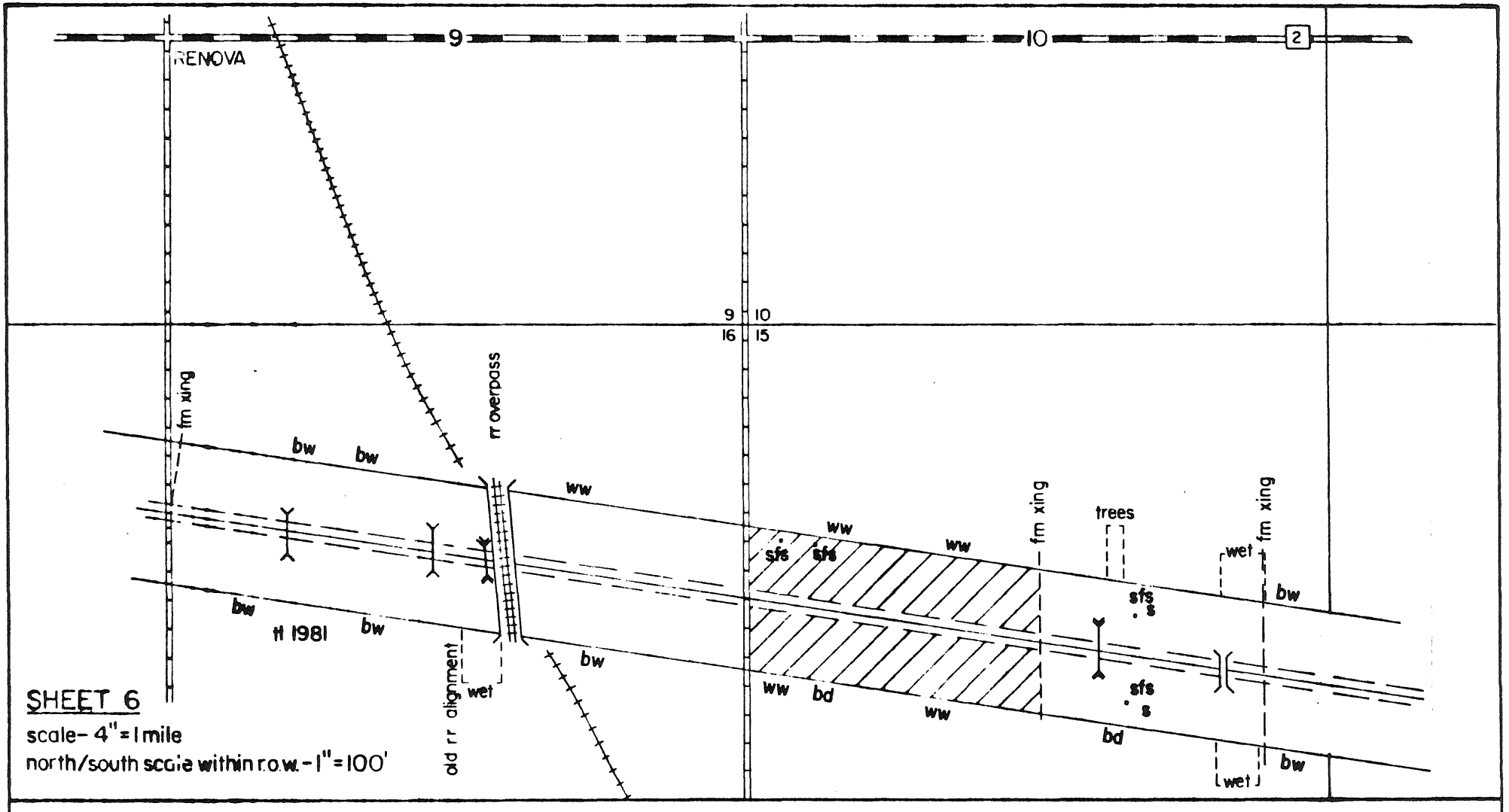
fm xing	farm crossing		black top	+	battery boxes(concrete)	s	snowfence
	single culvert		railroad	nf	no fence	tl	tiled
	double culvert		bulldozer scar	bw	barb wire fence	tl — tl	tiled, main only
	bridge		rail bed	bd	board snowfence		mowed area - for hay
	new fence		river	ww	woven fence with barb above	(t)	trash
	gravel road		encroachment	sfs	snowfence support		



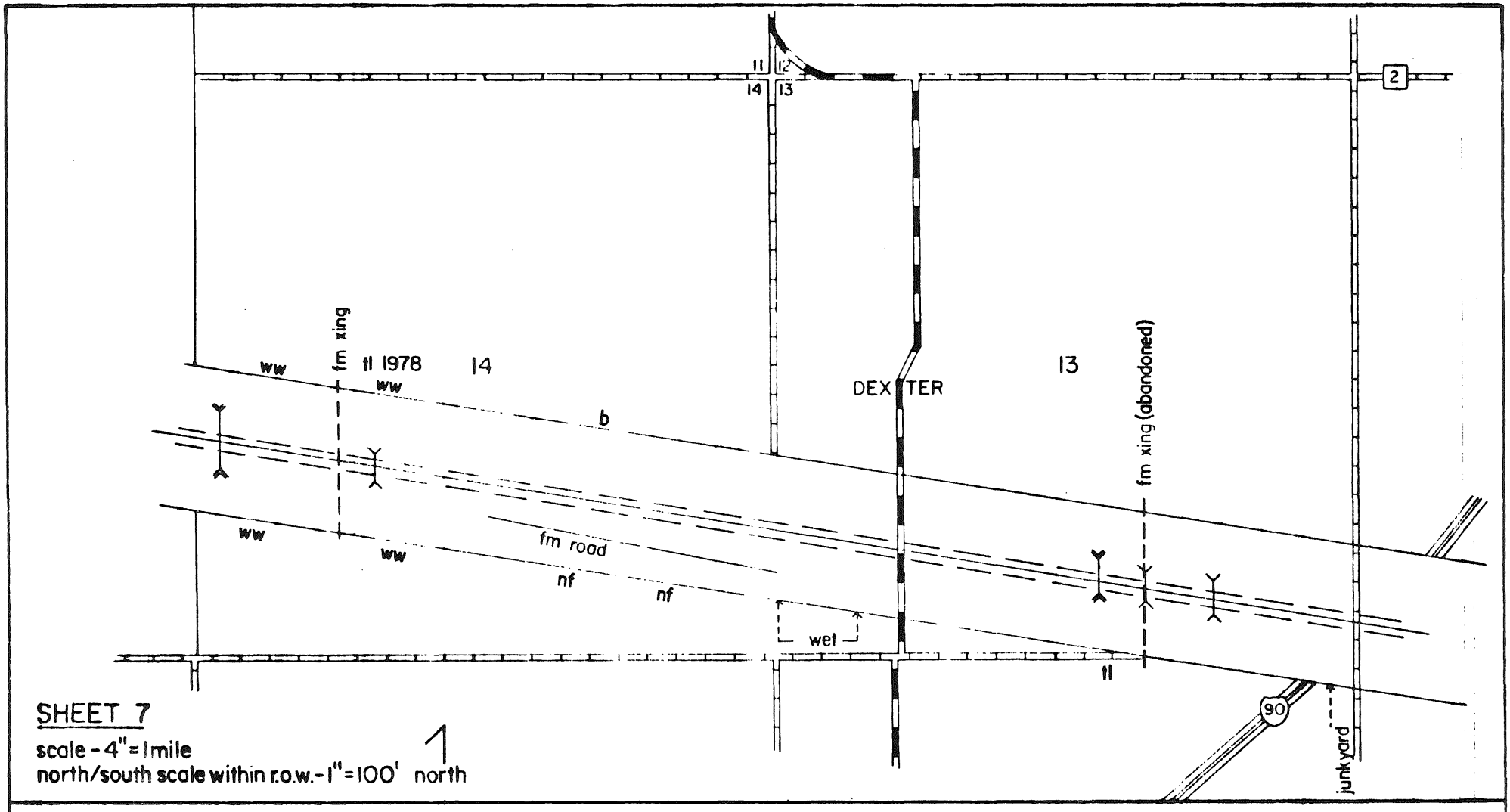
SHEET 5

scale – 4" = 1 mile
north/south scale within r.o.w. – 1" = 100'

fm xing	farm crossing		black top	+	battery boxes (concrete)	s	snowfence
	single culvert		railroad	nf	no fence	tl	tiled
	double culvert		bulldozer scar	bw	barb wire fence	tl—tl	tiled, main only
	bridge		rail bed	bd	board snowfence		mowed area – for hay
	new fence		river	ww	woven fence with barb above	(t)	trash
	gravel road		encroachment	sfs	snowfence support		



fm xing	farm crossing		black top	+	battery boxes (concrete)	s	snowfence
	single culvert		railroad	nf	no fence	tl	tiled
	double culvert		bulldozer scar	bw	barb wire fence	tl—tl	tiled, main only
	bridge		rail bed	bd	board snowfence		mowed area - for hay
	new fence		river	ww	woven fence with barb above	(t)	trash
	gravel road		encroachment	sfs	snowfence support		



fm xing	farm crossing		black top	+	battery boxes (concrete)	s	snowfence
	single culvert		railroad	nf	no fence	tl	tiled
	double culvert		bulldozer scar	bw	barb wire fence	tl—tl	tiled, main only
	bridge		rail bed	bd	board snowfence		mowed area - for hay
	new fence		river	ww	woven fence with barb above	(t)	trash
	gravel road		encroachment	sfs	snowfence support		

GEOMORPHOLOGY AND SOILS*

The landforms of this part of the state may conveniently be subdivided into two major regions:

1) An area of younger glacial drift of probaly mid-Wisconsin age, and

2) An area of older glacial drift.

The younger drift area for the most part was covered by ice of the Des Moines lobe, which advanced through Minnesota from the northwest into Iowa over 14,000 years ago. This area consists largely of constructional glacial landforms, many of which have been scarcely eroded, or even mildly gullied.

A greater variety of landforms exists within the area covered by the Des Moines lobe than in the old drift area where the surface has been lowered and dissected by streams and mass-wasting processes and smoothed out by the deposition of wind-borne loess. The extreme southeastern part of the older drift area in parts of Houston and Winona Counties seems to be largely free of glacial drift. It is considered part of the Driftless Area which extends into southwestern Wisconsin, northwestern Illinois, and northeastern Iowa.

Possibly an almost universal feature of the nearly level surfaces of the old drift area is the cover of windblown silt or loess, which thickens towards the east. It is probably not older than the Wisconsin, and it was derived from the Mississippi Valley train deposits as well as from local tributary outwash and valley train deposits.

The age of the glacial drift in this older drift area has been disputed, and probably drift of at least two ages is present. Most of the surface has been developed on Kansan till from which the original soil was removed and the newly eroded surface covered with loess. The lowering of the Kansan till surface so that it maintained long gently sloping surfaces without excessive dissection has been explained by an appeal to pedimentation, a process of landscape modification now largely restricted to arid and semi-arid regions. During pedimentation coarse sediments were deposited along the major drainageways leading off the eroded Kansan surface. These deposits are mostly covered with a loess. Present-day soils are formed in the loess but their properties are frequently greatly influenced by the underlying material.

Fig. 3 delineates the geomorphic areas within Mower County as identified in the Minnesota Soil Atlas, St. Paul sheet. Geomorphic areas illustrate broad physiographic features and provide some identification as to the nature of parent materials on which the soils have developed. The geomorphic areas that Wild Indigo SNA transects are described in the following paragraphs.

*Summarized from Misc. Report 120-1973 Minnesota Soil Atlas, St. Paul sheet, Agricultural Experiment Stn., Univ. of Minn.

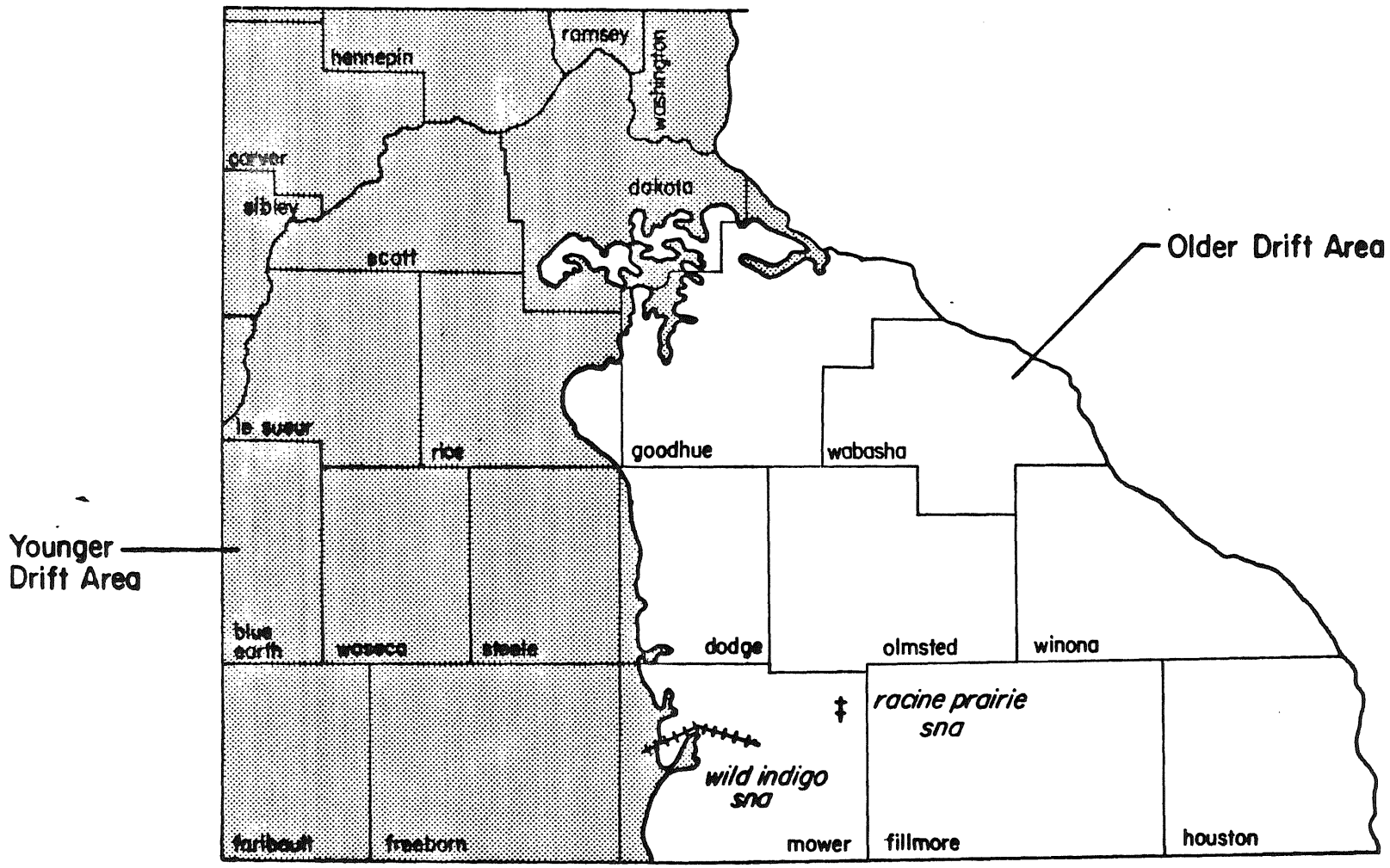


Figure 3

Major Landform Regions of Southeastern Minnesota
(adapted from misc. report 120-1973, minnesota soil atlas, st. paul sheet, agriculture experiment station university of minnesota)

Legend of Geomorphic Areas

31 cedar valley outwash

36 northfield/myrtle moraine, silty, gently rolling

37 claremont/lyle, plain, silty, level

38 kenyon/taopi plain, silty, undulating

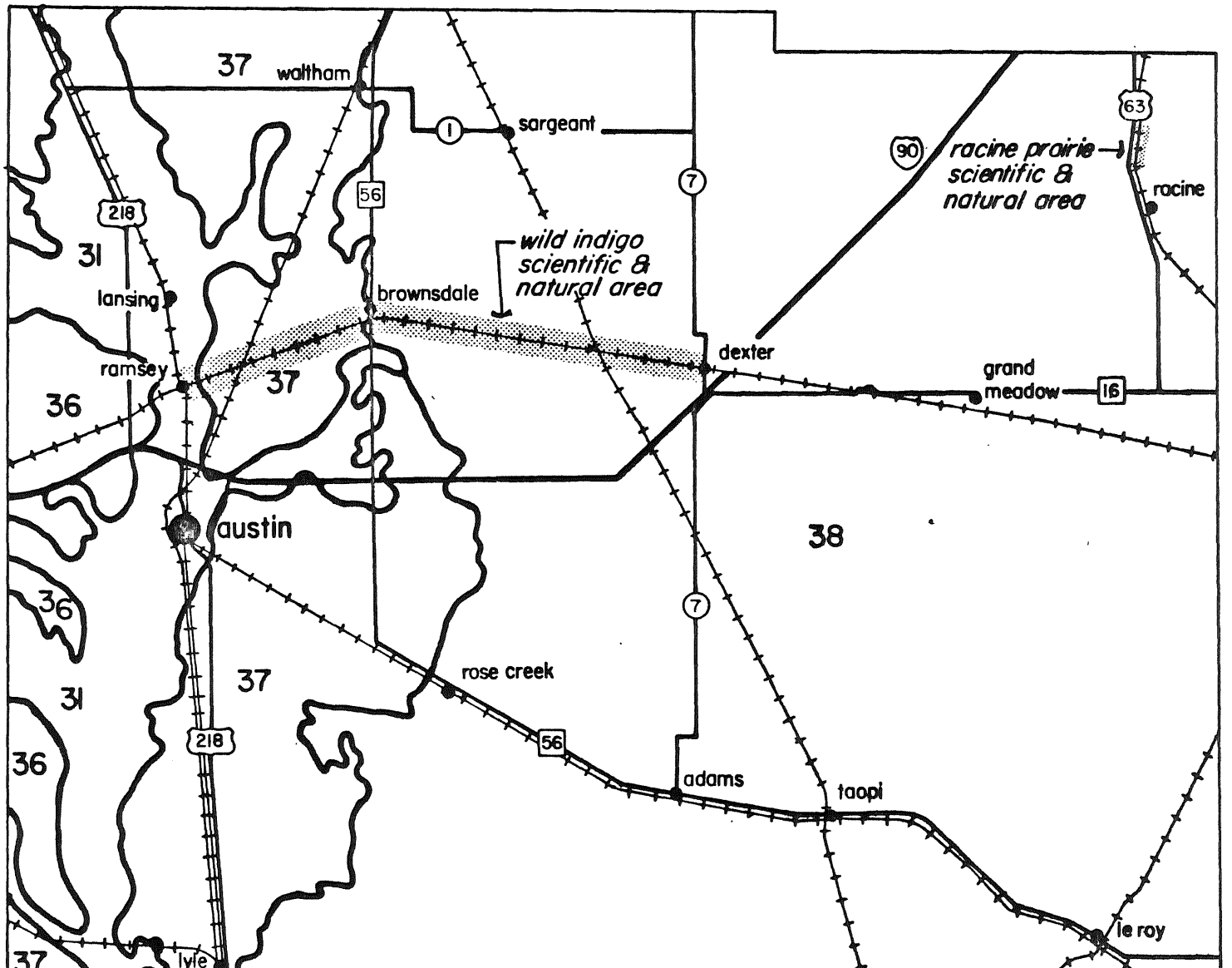


Figure 4

Geomorphic Regions of Mower County

Cedar Valley Outwash (31)

The Cedar Valley Outwash consists of nearly level outwash plains, terraces, and bottomlands along the headwater tributaries of the Cedar River. The water table is normally deeper than 10 feet on the outwash and terraces, but is less than 3 feet from the surface over one-third of the area. The bottomland water table occurs between the surface and a depth of 6 feet.

Most of the soils on the terraces and outwash range from loamy sand to loam or silt loam less than 36 inches thick over sand and gravel. The water-holding capacity ranges from low to moderate. Bottomland soils are subject to frequent flooding. Most are loam or silt loam in texture.

The original vegetation on the terraces and outwash was dominantly prairie grass with occasional oak clumps. Bottomland hardwoods consisting of elm, ash, cottonwood, boxelder, basswood, soft maple, willow, and hackberry were the original cover. The terraces and outwash are cropped with corn, soybeans, oats, and alfalfa-brome hay. Peat areas are cropped to potatoes. Bottomlands have about 25% corn and the rest, pasture of woodland.

Northfield-Myrtle Moraine: Silty, Gently Rolling (36)

The Northfield-Myrtle Moraine consists of a gently rolling silt-mantled and moraine. The dominant landform is a complex of knolls irregularly emplaced on a regional slope. Slope irregularity has been subdued by a silt mantle. Closed depressions are common. Contour lines have a very erratic pattern.

Water tables on the knolls are more than 10 feet deep. The water tables on the lower levels are from 1 to 6 feet deep. Three small lakes occur in this region. Old lakebeds and depressions are filled with peat.

Original vegetation consisted of tall prairie grass with some aspen-oak land and oak openings scattered over the region. Wet soils and peat were covered by sedge grass. Present crops are corn, soybeans, alfalfa-brome hay, oats, and wheat. Less than 5 percent of this region is pastured and less than 5 percent, woodland.

Claremont-Lyle Plain: Silty, Level (37)

The Claremont-Lyle Plain consists of a nearly level silt mantled till plain. The dominant landform is one of very gently undulating to nearly level plain. The few highs are 5 to 15 feet above the low landforms. Bedrock is within 5 feet in a few places.

Water tables in this region range from the surface to 6 feet deep seasonally. No lakes occur in the region. Some small depressions have a thin coating of peat or muck but not large enough to record on the map.

Original vegetation consisted of tall prairie grass and sedges with an oak brush cover on the slightly elevated areas. Present crops are corn, soybeans, oats, wheat, timothy, clover, hay and alfalfa-brome hay. Approximately 10 to 15% of this region is pasture. Less than 1 percent is woodland.

Major soil series occurring on the SNA within the Claremont-Lyle Plain geomorphic region

Clyde silty clay: Dark-colored, poorly to very poorly drained silty clay loams about 40 inches thick over heavy loam till which is calcareous at about 5 feet (Typic Haplaquoll). Nearly level to depressional upland.

Sargent silt loam: Light-colored, somewhat poorly drained, strongly acid silt loam about 20 inches thick over medium acid clay loam about 26 inches thick over clay loam glacial till (Typic Glossaqualf). Nearly level to undulating upland.

Tripoli silty clay: Dark colored, poorly drained silty clay loams about 20 inches thick over loam glacial till (Typic Haplaquoll). Nearly level uplands.

Hayfield loam: Moderately dark colored, moderately well to somewhat poorly drained loams formed in glacial outwash underlain by sand and gravel (Aquollic Hapludalfs). Nearly level to depressional upland.

Udolpho silt loam: Moderately dark-colored, somewhat poorly drained, slightly to medium acid silt loam about 18 inches thick over strongly acid loam about 12 inches thick grading to slightly acid sand about 12 inches thick over calcareous sand and gravel (Mollic Ochraqualfs). Gently sloping upland.

Kenyon-Taopi Plain: Silty, Undulating (38)

The Kenyon-Taopi Plain consists of a sloping silt mantled eroded till plain. The dominant landform is one of long swell and swale relief with highs from 20 to 80 feet above the lows. Slopes are long, 250 to 1,000 feet.

Water tables vary from 1 to 10 feet deep, seasonally. Depressions are few and nonexistent over much of the area. The drainage net is a well-established dendritic type, but few streams beyond the main trunks have incised the silty mantle. No lakes occur in this region.

Original vegetation consisted of tall prairie grass on the west and south. On the east, aspen-oak land occurred, consisting of small dense stands of aspen and scattered oaks. Present crops are

corn, soybeans, alfalfa-brome hay, oats, and wheat. Approximately 10% of this region is pasture. Another 5 to 10% woodland.

Major soil series occurring on the SNA within the Kenyon-Taopi Plain geomorphic region:

Tripoli silty clay: Dark colored, poorly drained silty clay loams about 20 inches thick over loamy glacial till (Typic Haplaquoll). Nearly level uplands.

Taopi silt loam: Dark colored, moderately well drained slightly acid silty or loamy mantle 11 to 24 inches thick over a strongly acid, somewhat slowly permeable compacted loamy till extending in depth for many feet. Very gently sloping uplands.

CLIMATE*

The climate of any land area is an extremely important component of the resources. Some of the general climate characteristics of this area are given in the series of nine diagrams. The area has a typical continental climate with wide extremes in temperature from summer to winter. Total annual precipitation varies from 28 inches in the Minnesota River Valley in the northwest to 32 inches in the very southeast part (Fig. 5). About 40% of the precipitation falls during the summer (Fig. 6).

The annual snowfall averages about 40 inches. This approximates 4 inches water content. Fig 7 and 8 show that this area averages about 30 to 45 days with 6 inches or more of snow on the ground and 10 to 20 days with over 12 inches.

The average date of the last occurrence of frost in the spring ranges from May 2 to May 12 (Fig. 9), the first frost in the fall ranges from September 26 to October 11 (Fig. 10).

Summer weather is typically one of warm days and relatively cool nights. Figure 11 shows that maximum temperatures in July average 83 F. in the south central counties to 86 F. along the Mississippi River. The minimum temperatures in July average 58 F. in the south central to about 63 F. in the larger river valleys, in the metropolitan areas, and the southwest part of the area (Fig. 12).

One of the important aspects of the climate is the temperature and moisture range which occurs within the soil and within the air several feet above ground. The nature of the soil, local topography, direction of slope, and vegetation, all interact to modify long

*From: Misc. Report 120-1973, Minnesota Soil Atlas, St. Paul Sheet, Agricultural Experiment Stn., University of Minnesota.

term air temperature averages. The southcentral part of the area is the coldest; however, to date meteorologists cannot answer why. Agronomists are also aware of this cold area since early maturity soybeans are the most successful.

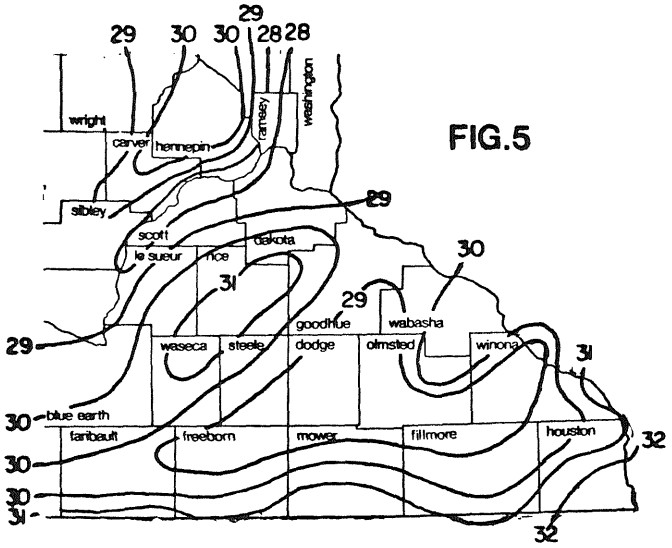


FIG.5

Annual normal precipitation in inches. 1951-1970. St. Paul Sheet. (adapted from climatography of the U.S. no. 60-21 U.S. dept. of commerce, 1972.)

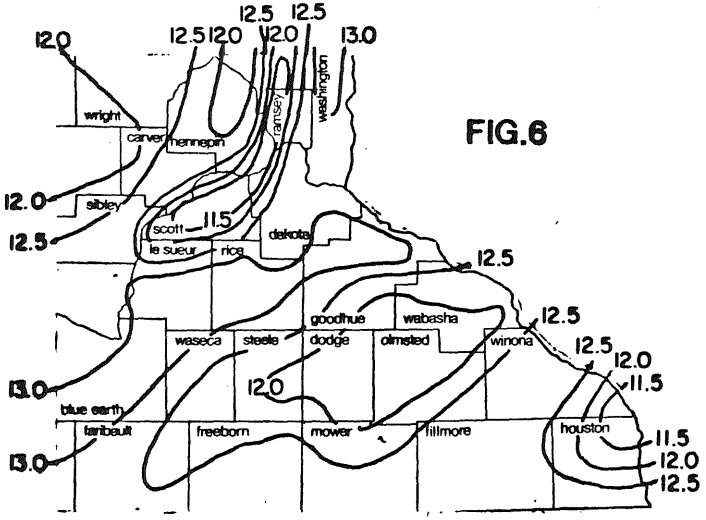


FIG.6

Summer (june, july, august) normal precipitation in inches. 1941-70. St. Paul Sheet. Prepared by earl l. kuehnast, state climatologist, 1973

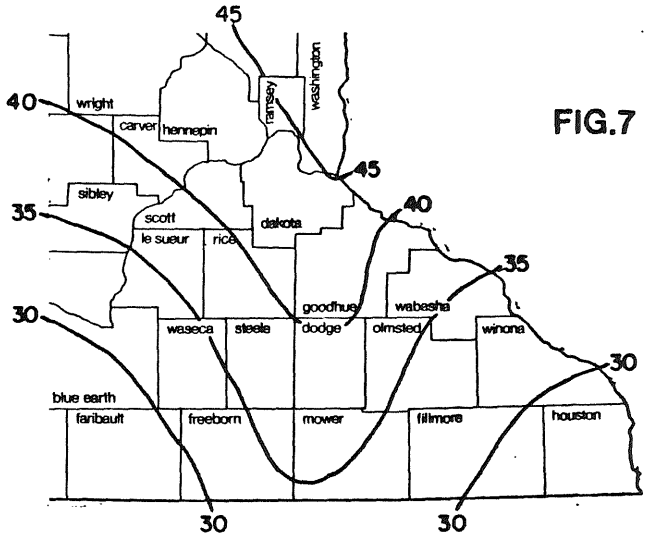


FIG.7

Average number of days per year when snow cover is more than 6 inches. 1951-1970. St. Paul Sheet. Prepared by earl l. kuehnast, state climatologist, 1973.

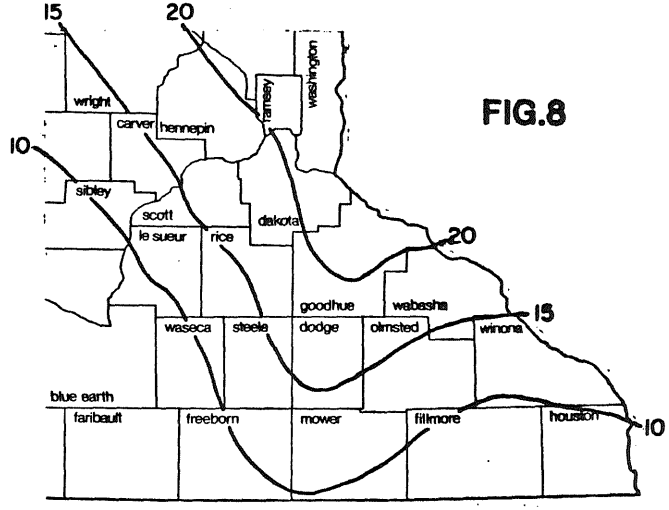


FIG.8

Average number of days per year when snow cover is more than 12 inches. 1951-1970. St. Paul Sheet. Prepared by earl l. kuehnst, state climatologist, 1973

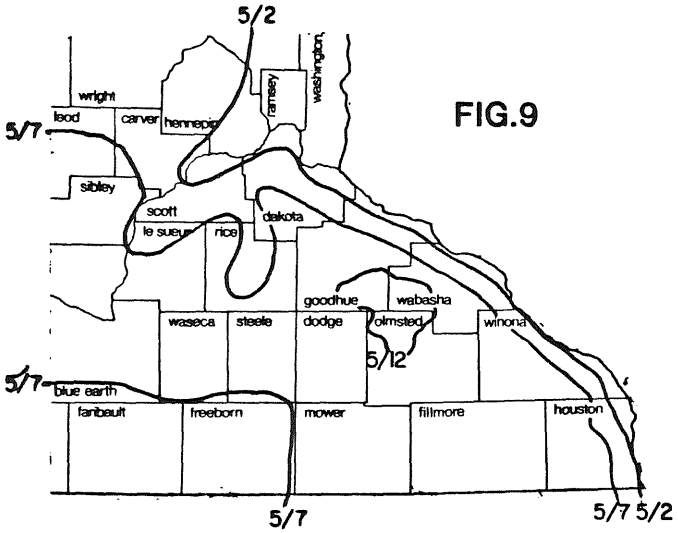


FIG.9

Average date of last occurrence of 32° F or lower in the spring. St. Paul Sheet. (adapted from minn. tech. bull. 243, 1963.)

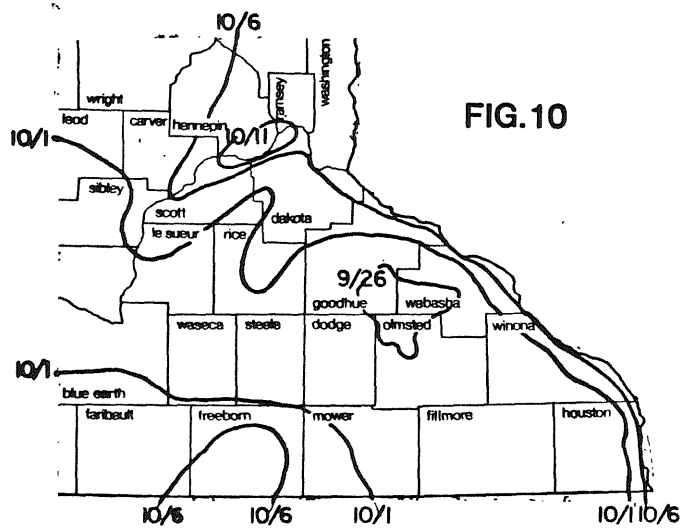


FIG.10

Average date of first occurrence of 32° F or lower in the fall. St. Paul Sheet. (adapted from minn. tech. bull. 243, 1963.)

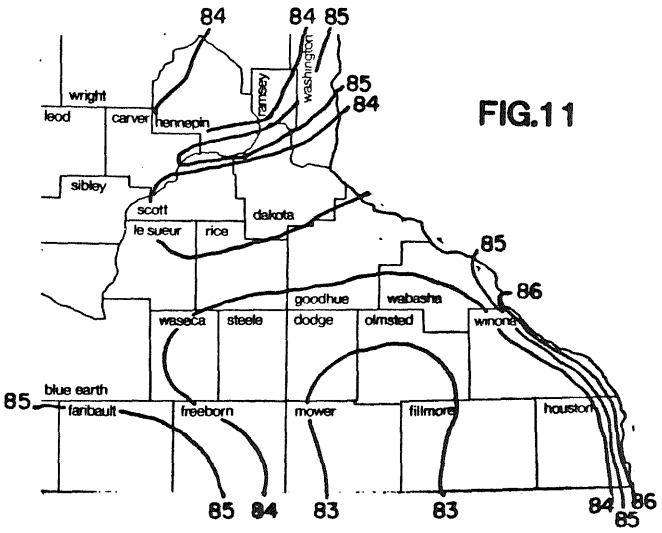


FIG.11

Average daily maximum temperature during July. 1951-1970. St. Paul Sheet. (adapted from climatography of the U.S.. no. 60-21. U.S. dept. of commerce, 1972.)

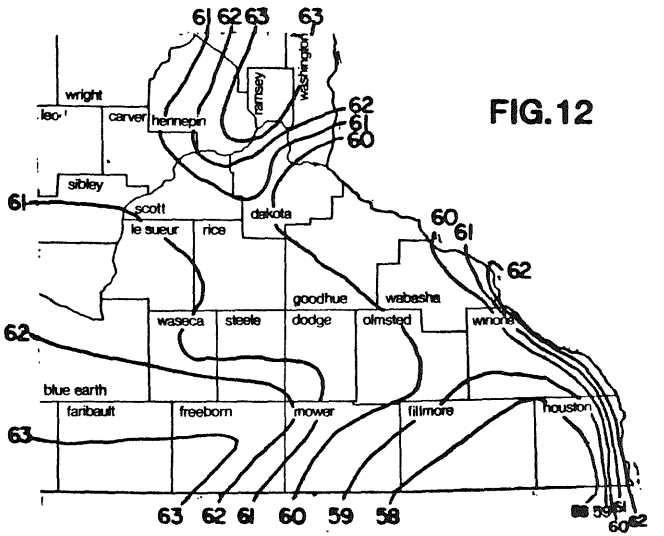


FIG.12

Average daily minimum temperature during July. 1951-1970. St. Paul Sheet. (adapted from climatography of the U.S. no. 60-21. U.S. dept. of commerce, 1972.)

VEGETATION

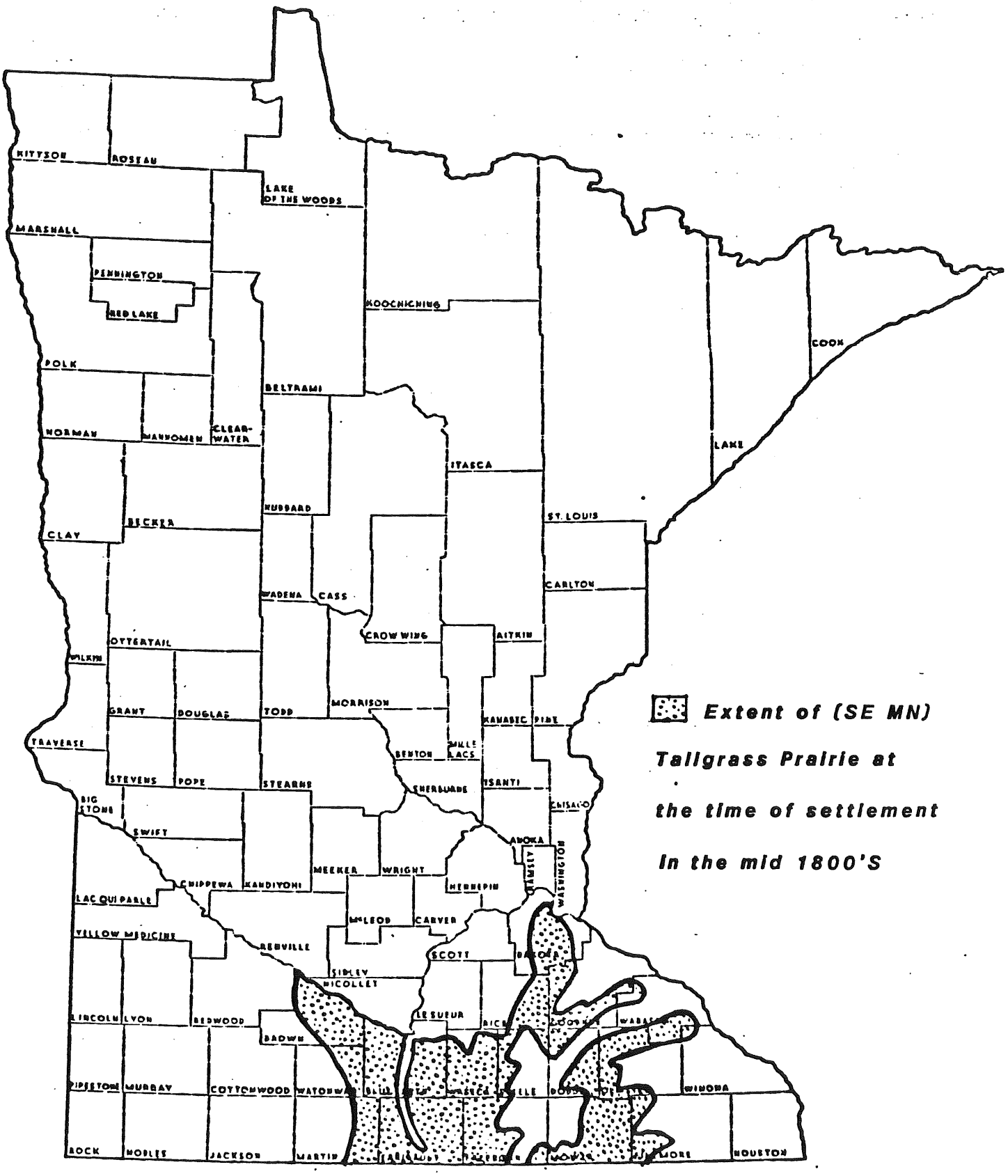
Introduction

Wild Indigo Prairie is a good example of a distinctive type of tall grass prairie which in Minnesota is confined to the southeastern portion of the state. In SE MN, at the time of settlement, the tallgrass prairie and the closely related oak savanna were the dominant vegetation features on the landscape. Tall grass prairie found on deep, nutrient rich, silt-loam soils was once continuous over thousands of square miles (see Fig.). Today, as a result of destruction of the prairie through cultivation the continuous tall grass prairie is gone. According to the Minnesota Natural Heritage Program (NHP), which maintains a comprehensive data base on sensitive biotic communities and species, less than 500 acres of intact (SE MN) Tall Grass Prairie exists in the region. Railroad right-of-ways are now the only significant areas in SE Minnesota where virgin tall grass prairie can still be found. The NHP considers this tall grass prairie type to be threatened throughout its entire range and critically endangered in Minnesota.

The (SE MN) Tall Grass Prairie exhibits greater species diversity than any other prairie community type in Minnesota. The flora shows a strong affinity to the south and east, and contains species which in Minnesota are either restricted to or modal to the southeastern portion of the state, including prairie wild indigo (Baptisia leucophaea,) wild indigo (Baptisia leucantha), Rattlesnake master (Eryngium yuccifolium), wild quinine (Parthenium integrifolium), Indian plantain (Cacalia tuberosa), Cowbane (Oxypolis rigidior), and Cream gentian (Gentiana flavida).

The Wild Indigo SNA contains several vegetation types including upland tall grass prairie (wet-mesic, mesic and dry-mesic) lowland tall grass (wet) prairie, open woodland, reed canary grass meadow, and severely disturbed old field. Along the entire 12 mile length of Wild Indigo SNA are found segments of relatively undisturbed (SE MN) Tall Grass Prairie representative of native presettlement conditions. Interspersed with undisturbed prairie are vegetational assembleges which reflect various degrees of disturbance. Drift of herbicides from crop spraying, soil disturbance from construction and maintenance of the railbed, siltation from upland erosion of adjacent cropland, and cultivation of the right-of-way are some of the disturbances which have altered the original vegetation. The degree of alteration is largely dependent upon the severity of disturbance. Severely disturbed areas may exhibit a complete replacement of the original prairie components by weedy Eurasian species. Confinement of the prairie to the narrow fifty foot right-of-way between the railroad bed and adjacent cropland makes the tract especially susceptible to degradation. Even small scale soil disturbances, such as animal burrowing, appear large relative to the size of unit. Such disturbances can significantly alter the species composition of a segment of the prairie and create conditions unfavorable for the survival and propagation of the "climax" species, especially those with narrow ecological tolerances which require more stable conditions.

FIG.13 (SE MN) TALLGRASS PRAIRIE



Extent of (SE MN) Tallgrass Prairie at the time of settlement In the mid 1800'S

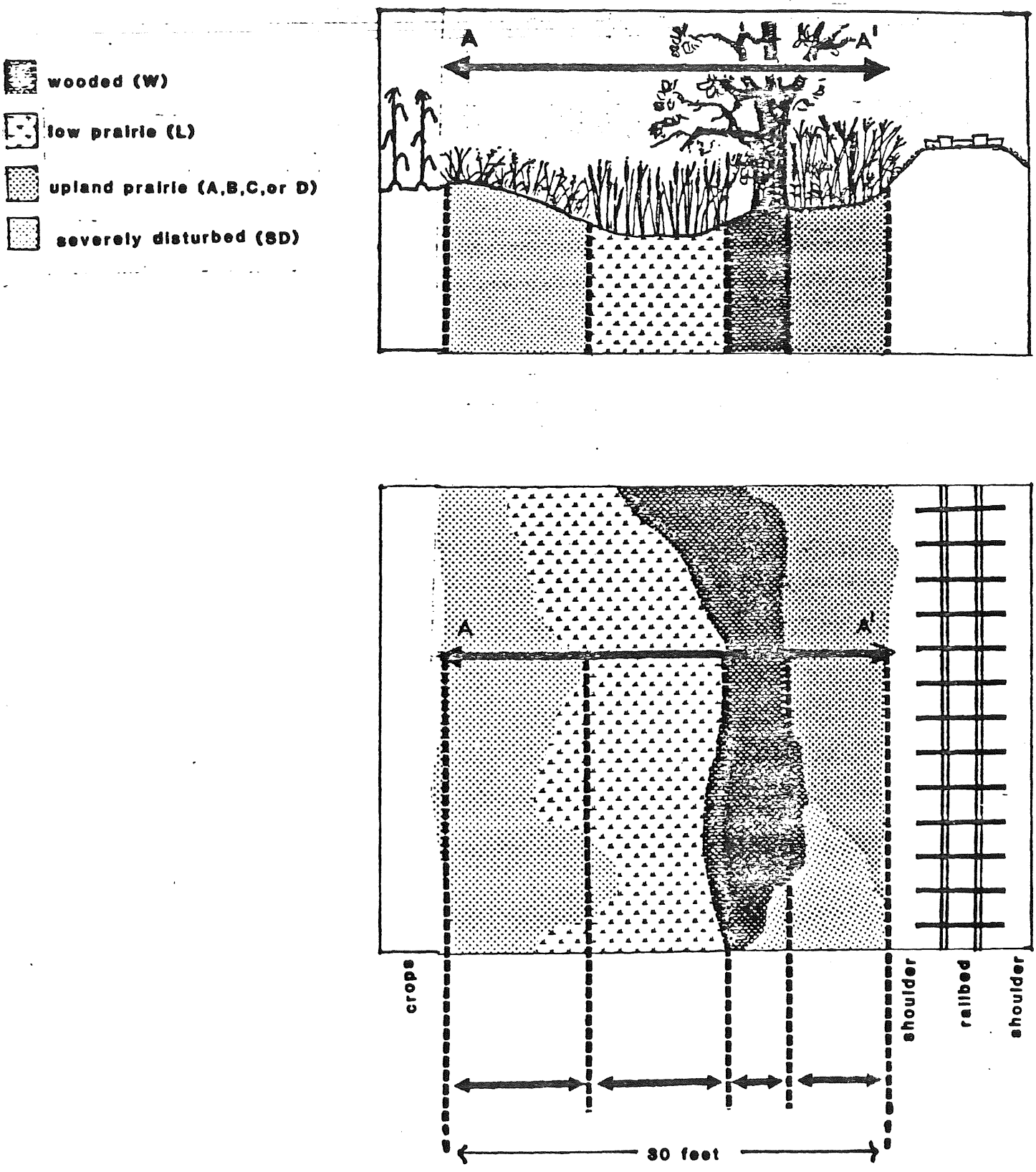


Fig.14 Vegetation types occurring at Wild Indigo SNA A mapping unit is approx. 30 feet wide (A-A) and ¼ mi long

The reintroduction of fire and implementation of appropriate management techniques is needed to mitigate disturbances and to begin restoration of the disturbed areas in the Wild Indigo SNA.

Methods

The vegetation at Wild Indigo SNA was inventoried in ¼ mile mapping units. The north and south side of the railbed were treated separately. The mapping units are in contiguous ¼ mile units unless the unit is interrupted by a physical barrier such as a bridge or a road. In this event, the physical barrier was treated as a boundary, hence some mapping units may be longer or shorter than ¼ mile. The vegetation on the ballast of the tracts and the ajacent shoulder or embankment was not mapped; however, a general description of these severely disturbed habitats is provided. Individual mapping units are approximately 30 feet in width and ¼ mile in length.

A classification system was devised to describe the vegetation of each ¼ mile mapping unit. According to this system, the vegetation at Wild Indigo SNA was stratified into 8 types (see Fig.14). The classification types were determined by soil moisture (i.e. upland or lowland), vegetation composition, and vegetation quality (as measured by degree of disturbance).

The purpose, in part, of this inventory was to document the significance of Wild Indigo SNA as an example of the (SE MN) Tall Grass Prairie type. An assessment of vegetation quality was made for each mapping unit containing upland prairie vegetation to achieve this purpose. Natural quality is defined by the degree in which the original prairie vegetation has been altered. High quality prairie assembleges are those with little or no evidence of disturbance, where species composition is intact and reflects native presettlement conditions. The following features were analyzed when evaluating prairie quality: 1) presence of characteristic prairie species; 2) presence of rare and conservative prairie species (i.e., those with narrow ecological tolerances, relatively restricted to undisturbed, stable conditions); 3) distribution and diversity of native prairie species; 4) presence of exotic species; 5) abundance and distribution of the ubiquitous native prairie species which tolerate or increase under disturbance.

At each ¼ mile, the mapping unit was classified by the dominant vegetation types which covered 25% or more of the unit. When patches of different vegetation types occurred within in the same mapping unit, a mixed classification code was used. Mixed vegetation types are separated by a slash (e.g., A/RC, with the dominant vegetation type listed first.)

The above classification system was initially developed by reviewing a variety of information sources available on the Wild Indigo area, including vegetation maps, railroad right-of-ways surveys, and species frequency data collected in summer 1982. Finally a field survey in November 1982 was conducted to refine the classification scheme and to classify the vegetation of Wild Indigo SNA in each of the ¼ mile mapping units.

In addition to the classification system a number system corresponding to more detailed map explanations was utilized. The numbers are used primarily to define areas where management problems may occur, and also to more precisely describe the vegetation. This information is on file at the Minnesota Natural Heritage Program.

Community Descriptions

High Quality Natural Prairie (Type A): dominates six mapping units, 6% of the ¼ mile units.

This prairie type reflects native presettlement conditions; a high native species diversity, a lack of exotic or weedy species, and a presence of conservative species (e.g., those which typify and are relatively restricted to stable, undisturbed conditions). This prairie type occurs in areas where the soil has not been disturbed. They are characteristically upland mesic type prairie (dry-mesic, mesic, wet-mesic) occurring on silt loam soils and are dominated by native grasses including big bluestem (Andopogon gerardi), little bluestem Andropogon scoparius), Indian grass (Sorghastrum nutans) and prairie dropseed (Sporobolus heterolepis). Characteristic prairie forbs include coreopsis (Coreopsis palmata), blazing star (Liatris pycnostachia), pucoon (Lithospermum canescens), and golden alexanders (Zizia aurea). High quality prairie sites also exhibit an abundance of conservative prairie species such as cream wild indigo (Baptisia leucophaea), wild quinine (Parthenium intregrifolium), rattlesnake master (Eryngium yuccifolium), birdsfoot violet (Viola pedatifida), leadplant (Amorpha canescens) and white prairie clover (Petalostemum candidum). Within these mesic type prairie areas there are occasionally small pockets of wet prairie vegetation. These areas are typically less than 25% of a mapping unit. The vegetation assembleges are diverse and include relatively conservative wet prairie species such as valerian (Valeriana edulis), swamp saxifrage (Saxifraga pennsylvanica), cowbane (Oxypolis rigidior), prairie lily (Lillium superbum) and prairie milkweed (Asclepias sullivantia).

Good Quality Natural Prairie (Type B): dominates 17 mapping units, 16.5% of the ¼ mile units.

Natural prairie types similar in species composition to Type A sites, except some of the more conservative species may be absent or the complement of expected prairie species is not fully represented. There may have been light soil disturbance in the past, but the vegetation now reflects relatively natural conditions. This prairie type may contain small patches of weedy or pioneer species; these are often associated with the soil mounds produced by high populations of burrowing animals. The soils mounds, which are quite frequent in many areas, are often invaded by exotic weeds from the adjacent agricultural fields, or by native pioneer plants. Suppression of fire has probably been an important factor in precluding the native "climax" species from reinvading these sites. Typical species which colonize fresh soil mounds include catchfly (Silene antirrhina), lesser ragweed (Ambrosia artemisifolium), field horsetail (Equisetum arvense) and yarrow (Achillea millefolium). Abandoned eroded mounds are often dominated by aggressive perennials such as quack grass (Agropyron repens) and bluegrass (Poa prantensis).

Disburbed Upland Prairie (Type C): dominates 31 mapping units, 30% of the ¼ mile units.

Disturbed prairie types are identified by their species composition which no longer reflects virgin conditions, but has been altered by light to moderate disturbance. The disturbed habitat has a low species diversity and is dominated by those native species which tolerate or increase with

moderate disturbance. Species composition is often incomplete, with certain characteristic species missing, and, typically, there is an absence of the more conservative prairie species. These sites are often characterized by dense stands of ubiquitous native plants which are able to persist under disturbed as well as stable conditions. The most prevalent species in this habitat include, bergamot (Monarda fistulosa), rigid goldenrod (Solidago rigida), tall sunflower (Helianthus grossessaratus), yellow coneflower (Ratibida pinnata), yarrow (Achillea millefolium), Canada wild rye (Elymus canadensis), big bluestem (Andropogon gerardi), and heath aster (Aster ericoides). Many of these sites are fairly good prairie with little influence by exotic weeds. Other sites are more degraded and Eurasian weeds are found scattered throughout these areas in patches. The more degraded areas are typically old field communities with a large component of blue grass (Poa sp.) and dense stands of asters (Aster sp.) and goldenrods (Solidago sp.).

Degraded Prairie (Type D): dominates 1 mapping unit, .9% of the ¼ mile units.

These sites are artificially disturbed habitats where the natural prairie vegetation has been significantly altered. Recent disturbance of the soil by grading, scraping, and compaction have resulted in a vegetation dominated by a disproportionate mix of native prairie species and annual and biennial weeds. Pioneer weed species typically dominate, these include lesser ragweed (Ambrosia artemisifolia), bull thistle (Cirsium vulgare), field bindweed (Convulvulus sepium), foxtail Setaria glauca), sweet clover (Melilotus alba), prickly lettuce (Lactuca scariola) and red clover (Trifolium repens). Normally there are scattered clumps of native grasses still present throughout these areas, notably big bluestem (Andropogon gerardi). Native prairie forbs are rare, they include rigid goldenrod (Solidago rigida) and yellow coneflower (Ratibida pinnata).

The degraded prairie type is confined to areas of recent disturbance such as right-of-way areas encroached on by farm vehicles. Another area is a twelve acre strip of prairie which was severely disturbed in 1981 when bulldozed road along the south side of the right-of-way was put in from Austin to Brownsdale to assist in removal of railroad ties. With removal of disturbance and proper management, these areas are expected to succeed toward replacement of weedy vegetation by native prairie grasses and forbs.

Lowland Prairie (Type L): dominates 19 mapping units, 18.5% of the ¼ mile units.

The lowland prairie type occupies the somewhat poorly and very poorly drained soils found throughout the tract in low lying areas. These sites frequently have standing water after heavy rains and following spring snow melt. Lowland prairie is dominated by wet prairie grasses, bluejoint grass (Calamagrostis candensis), and cordgrass (Spartina pectinata). This prairie type has a much lower floristic richness than the adjacent high quality upland prairie sites (Type A and B). The lowland prairie is often a monotypic stand of wet prairie grasses with little forb diversity. The most prevalent prairie forbs include tall sunflower (Helianthus grossessaratus), marsh goldenrod (Solidago gigantea) and New England aster (Aster novae-argliae). These areas commonly grade into sedge meadow which are dominated by sedges including Carex sartwellii, C. bauxbaumii, C. lanuginosa, and C. haydenii.

In terms of natural vegetation quality the lowland prairie type is similar to the upland prairie Type C (Disturbed Prairie). Both these prairie types exhibit a relatively low species diversity. The lowland prairie type typically lacks the presence of exotic species; however, as the wet conditions are more favorable for invasion and dominance by native species. The low species diversity may be the result of disturbance from ditching and alteration of drainage patterns and also by herbicide damage. Severely disturbed lowland areas are often dominated by solid stands of reed canary grass (Phalaris arundinacea); this vegetation type is classified separately (see Type RC).

Wooded Areas (Type W): dominates 11 mapping units, 10.5% of the ¼ mile units.

This habitat type is dominated by woody vegetation. The low-lying areas scattered throughout Wild Indigo SNA are occasionally colonized by trees and shrubs. Thickets of willow (Salix bebbiana, S. gracilis and S. rigida) occur in low prairie areas; the understory characterized by wet prairie grasses such as Spartina pectinata, Calamagrostis canadensis, and by exotic species Phalaris arundinacea and Agrostis alba. Other low areas are colonized by trees such as trembling aspen (Populus tremuloides) with lesser amounts of box elder (Acer negundo), and bur oak (Quercus macrocarpa). The understory is typically very species poor, often dominated by uniform stands of several species. Upland areas are occasionally dominated by bur oak (Quercus macrocarpa) with grey dogwood (Cornus racemosa), American hazel (Corylus americana), wild plum (Prunus americana), smooth sumac (Rhus glabra), and blackberry (Rubus allegheniensis). The understory is most often old field dominated by Eurasian weeds such as bluegrass (Poa sp.), and quack grass (Agropyron repens), and dense stands of native old field species such as goldenrod (Solidago canadensis). Trees growing along fence rows adjacent to agricultural fields are providing the seed source for woody invasion of the right-of-way in a number of areas.

Reed Canary Grass Meadow (Type RC): dominates 6 mapping units, 6% of the ¼ mile units.

Moist degraded habitats dominated by nearly solid stands of reed canary grass (Phalaris arundinacea) can be found scattered throughout Wild Indigo SNA. Reed canary grass commonly invades severely disturbed low lying areas. This vegetation type is often found along areas which were ditched and in areas where there is heavy siltation resulting from erosion off adjacent farm fields.

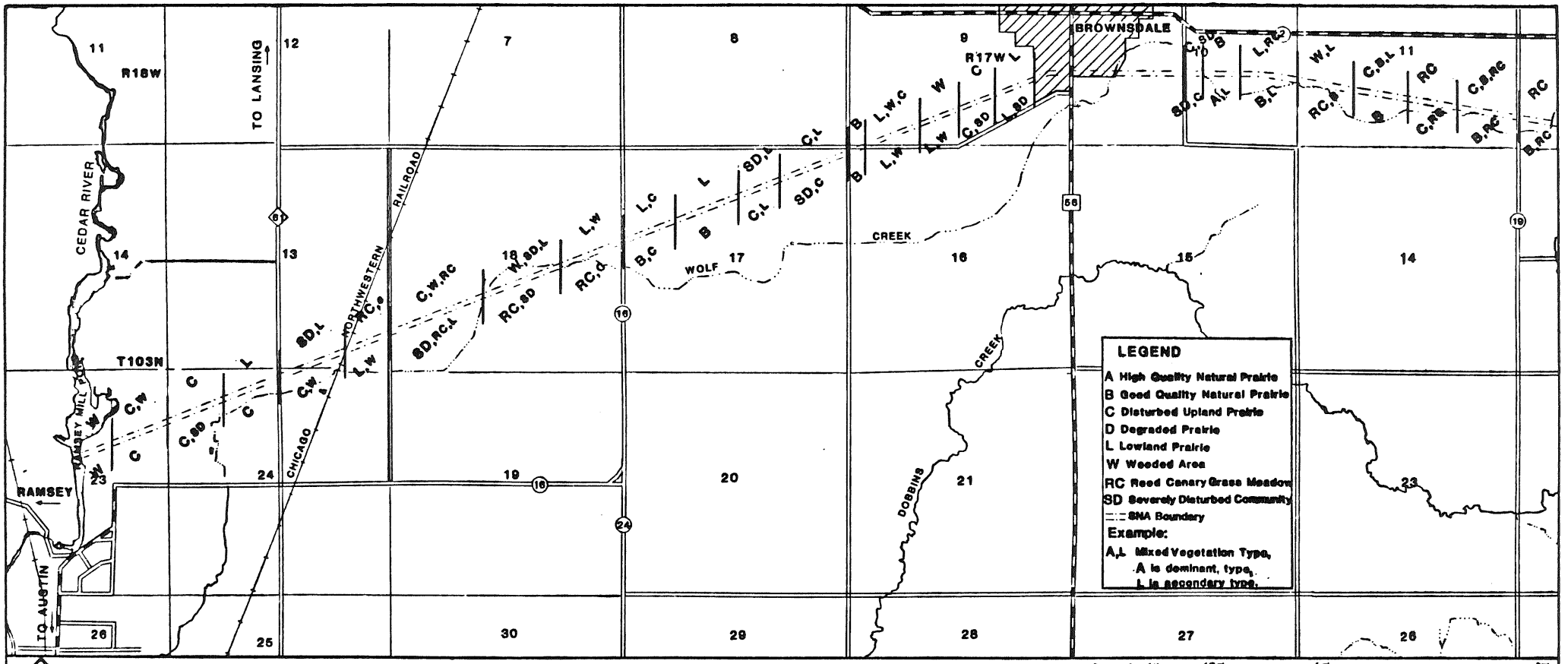
Severely Disturbed Community (Type SD): dominates 12 mapping units, 11.5% of the ¼ mile units.

This habitat type is characterized by destruction of the original vegetation and replacement by old field weeds. The vegetation is dominated by aggressive sod forming Eurasian grasses including bluegrasses (Poa sp.), timothy (Phleum pratense), quack grass (Agropyron repens), foxtail (Setaria glauca), redtop (Agrostis alba), and field brome (Bromus inermis), with old field forbs such as hoary alyssum (Berteroa incana), common milkweed (Asclepias syriaca), horse weed (Conyza canadensis), sweet clover (Melilotus alba), and wild parsnip (Pastinaca sativa).

This habitat type commonly occurs where severe soil disturbance and

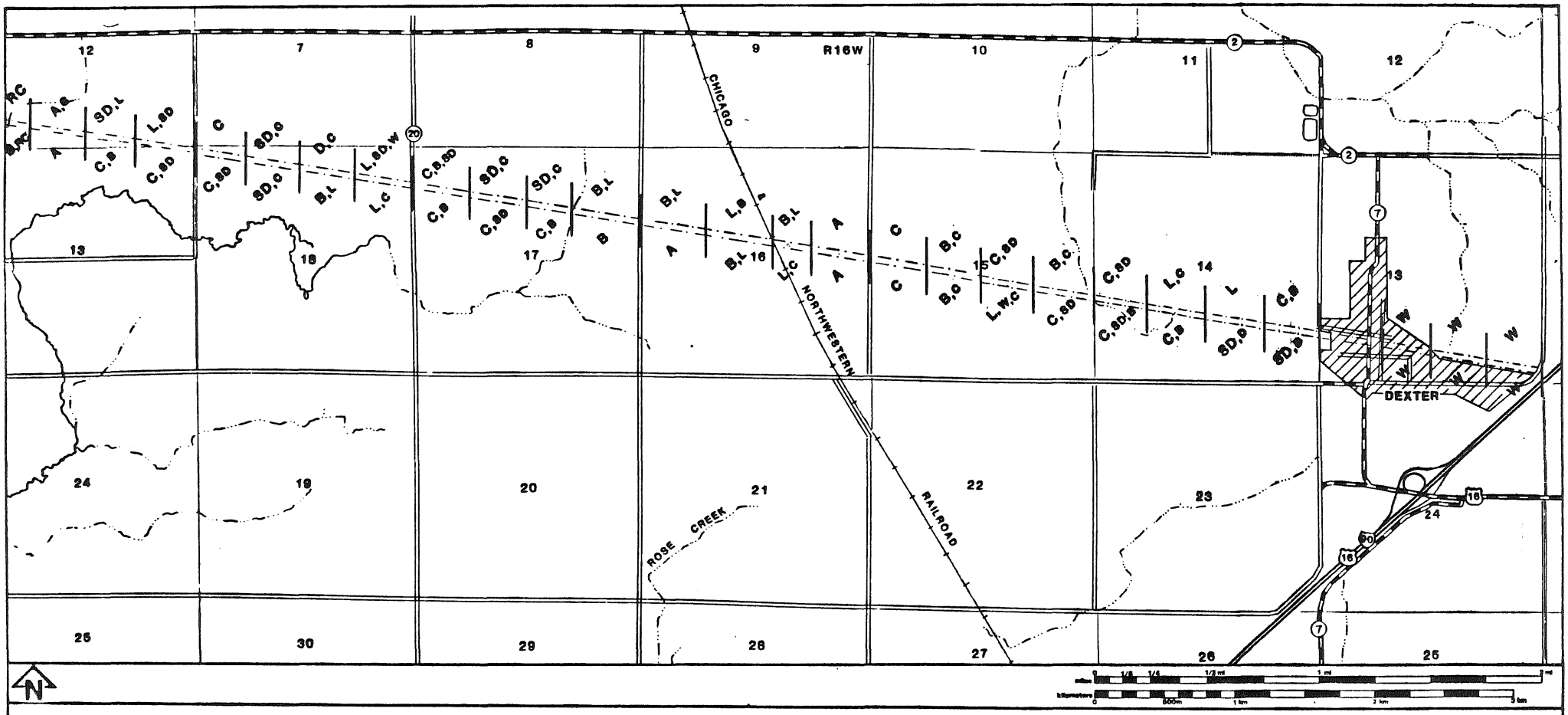
herbicide damage has taken place. Drifting of herbicide from crop spraying is often evident along cropland edges, where solid sods of field brome often occur. The severely disturbed community also applies to the shoulder area adjacent to the railbed, where cut and fill and grading during construction of the tract has significantly altered the soil. The shoulder area is typically five feet in width and borders both sides of the railbed. On a number of segments of the railroad the shoulder becomes a steep embankment. In this event the shoulder area becomes quite wide and takes up most of the rightofway; there is little or no native prairie in these areas. Perhaps the most altered environment at Wild Indigo is the old rail bed where the cinders used for ballast have created a unique soil environment. This habitat is characterized by exotic weed species and aggressive native colonizers including, small snapdragon Chaenorrhinum minus, burning bush Kochia scoparia, nussian thistle Salsola pestifer, St. John's wort Hypericum perforatum, Crabgrass Digitaria ischaemum, tumbleweed Amaranthus albus, witch grass Panicum capillare, and creeping spurge Euphorbia supina. The rail bed was not inventoried in mile mapping units.

The severely disturbed nature of this habitat and the dominance by sod forming weeds greatly inhibits succession toward native prairie species.



MAP A: VEGETATION

WILD INDIGO SNA



MAP A: VEGETATION

WILD INDIGO SNA

FLORA

The following list of plants is based on voucher specimens collected on Wild Indigo SNA in 1981. These specimens are on permanent deposit in the herbarium of the University of Minnesota in St. Paul. The list represents a comprehensive sample of the species occurring on the SNA at the time of the survey. It is likely, however, that additional species will be found on the SNA in the future. Species on the list that are believed to be non-native are marked with an asterisk.

Four species occur on the SNA which are significant statewide because of their rarity. They are Parthenium integrifolium, Asclepias sullivantii, Cacalia tuberosa, and Valeriana edulis ssp ciliata. The Parthenium, Asclepias and Valeriana are frequent in mesic prairie habitats throughout the SNA. The Cacalia occurs in the same habitat type throughout the SNA but is less common, and is best described as "infrequent." A status sheet on each of these four species is included in Appendix

Two species of special concern in Minnesota also occur in this SNA. They are Baptisia leucantha and Eryngium yuccifolium.

Platanthera leucophaea is a rare prairie species of state and national significance which may occur on the SNA. It was not found during the 1981 inventory but it could have been overlooked.

Aceraceae

Acer negundo L. Box Elder
Acer saccharum Marsh Sugar Maple

Amaranthaceae

Amaranthus albus L. Tumbleweed
*Amaranthus powellii S. Wats. Powell's Amaranth
*Amaranthus retroflexus L. Green Amaranth
Amaranthus tamariscinus Nutt. A species of Amaranth
Amaranthus tuberculatus (moq.) Sauer A species of Amaranth

Amaryllidaceae

Hypoxis hirsuta (L.) Coville Stargrass

Anacardiaceae

Rhus glabra L. Smooth Sumac
Rhus radicans L. Poison Ivy

Apiaceae

Cicuta maculata L. Spotted Cowbane
Erynguim yuccifolium Michx. Rattlesnake-master
Oxypolis rigidior (L.) C.&R. Cowbane
*Pastinaca sativa L. Wild Parsnip
Sanicula marilandica L. Maryland Black Snakeroot
Zizia aptera (Gray) Fern. No common name
Zizia aurea (L.) W.D.J. Koch Golden Alexander

Apocynaceae

Apocynum androsaemifolium L. Spreading Dogbane
Apocynum sibiricum Jacq. Siberian Dogbane

Asclepiadaceae

Asclepias incarnata L. Swamp Milkweed
Asclepias ovalifolia Dcne. Oval-leaved Milkweed
Asclepias sullivantii Englem. Prairie Milkweed
Asclepias syriaca L. Common Milkweed

Asteraceae

Achillea lanulosa Nutt. Woolly Yarrow
Ambrosia artemisiifolia L. var. elatior (L.) Descoutils Common Ragweed
Ambrosia trifida L. Great Ragweed
Artemisia ludoviciana Nutt. Western Mugwort
Artemisia serrata Nutt. A species of Wormwood
Aster drummondi Lindl. Drummond's Aster
Aster ericoides L. A species of Aster
Aster laevis L. Smooth Aster
Aster novae-angliae L. New England Aster

Asteraceae - continued -

Aster sericeus Vent. Silky Aster
Aster simplex Willd. A species of Aster
Aster umbellatus Mill. A species of Aster
Bidens cernua L. Stick-tight
Bidens frondosa L. Beggar-ticks
Cacalia tuberosa Nutt. Indian Plantain
*Cirsium arvense (L.) Scop. Canada Thistle
Cirsium discolor (Muhl.) Spreng. A species of Thistle
Conyza canadensis (L.) Cronq. Horse-weed
Coreopsis palmata Nutt. A species of Tickseed
Erigeron annuus (L.) Pers. Daisy-fleabane
Erigeron philadelphicus L. Philadelphia Fleabane
Erigeron strigosus Muhl. A species of Fleabane
Helenium autumnale L. Autumn Sneezeweed
Helianthemum bicknellii Fern. Frost-flower
Helianthus grosseserratus martens A species of Sunflower
Helianthus rigidus (Cass.) Desf. Prairie-sunflower
Helianthus tuberosus L. Jerusalem Artichoke
Heliopsis helianthoides (L.) Sweet Ox-eye
Hieracium canadensis Michx. Canadian Hawkweed
Krigia biflora (Walt.) Blake A species of Dwarf Dandelion
Lactuca canadensis L. Canadian Lettuce
*Lactuca scariola L. Prickly Lettuce
Liatris aspera Michx. Harsh Blazing-star
Liatris ligulistylis (Nels.) K. Schum. A species of Blazing-star
Liatris pycnostachya Michx. A species of Blazing-star
*Matricaria matricarioides (Less.) Porter Pineapple-weed
Parthenium integrifolium L. Wild-guinine
Prenanthes alba L. White Rattlesnake-root
Prenanthes racemosa Michx. A species of Rattlesnake-root
Ratibida pinnata (Vent.) Barnh. A species of Prairie-coneflower
Rudbeckia laciniata L. A species of Coneflower
*Rudbeckia serotina Nutt. Black-eyed Susan
Senecio pseudaureus Rydb. var. semicordatus (Mack. & Bush) Barkley
A species of Groundsel
Silphium laciniatum L. Compass-plant
Solidago canadensis L. var. gilvocanescens Rydb. Canada Goldenrod
Solidago gigantea Ait. var. leiophylla Fern. Giant Goldenrod
Solidago graminifolia (L.) Salisb. Grass-leaved Goldenrod
Solidago nemoralis Ait. Gray Goldenrod
Solidago riddellii Frank Ridell's Goldenrod
Solidago rigida L. Stiff-leaved Goldenrod
*Taraxacum officinale Weber Dandelion
*Tragopogon major Jacq. A species of Goat's-beard
Vernonia fasciculata Michx. Ironweed
Xanthium italicum Moretti A species of Cocklebur

Berberidaceae

Podophyllum peltatum L. May-apple

Betulaceae

Corylus americana Walt. American Hazel

Brassicacea

*Barbarea vulgaris R. Br. Common Winter-Cress
*Berteroa incana (L.) DC Hoary Alyssum
*Brassica kaber (DC) L.C. Wheeler Charlock
Descurainia pinnata (Walt.) Britt. var. brachycarpa (Richards.) Fern. A species of Tansy-Mustard
*Lepidium densiflorum Schrad. A species of Pepperwort
Rorippa islandica (Oeder) Borbas var. hispida (Desv.) Butt. & Abbe A species of Yellow Cress
*Thlaspi arvense L. Field-Penny-Cress

Campanulaceae

Campanula aparinoides Pursh Marsh Bellflower
Lobelia spicata Lam. Pale-spike Lobelia

Caprifoliaceae

*Lonicera tatarica L. Tartarian Honeysuckle
Sambucus canadensis L. Common Elder

Caryophyllaceae

Arenaria lateriflora L. Grove-Sandwort
Silene antirrhina L. Sleepy Catchfly
Silene stellata (L.) Ait. f. Starry Campion
Stellaria longifolia Muhl. Long-leaved Chickweed

Chenopodiaceae

*Chenopodium album L. Lamb's-quarters
*Kochia scoparia (L.) Roth Summer-cypress
*Salsola pestifer Nels. Russian Thistle

Commelinaceae

Tradescantia bracteata Small A species of Spiderwort

Convalvulaceae

*Convolvulus arvensis L. Field-Bindweed
Convolvulus sepium L. Hedge-Bindweed

Cornaceae

Cornus racemosa Lam. Gray Dogweed

Crassulaceae

Penthorum sedoides L. Ditch-Stonecrop

Cucurbitaceae

Echinocystis lobata (Michx.) T.&G. Wild Cucumber

Cyperaceae

Carex alopecoidea Tuckerm. A species of Sedge
Carex bicknellii Britt. A species of Sedge
Carex buxbaumii Wahlenb. A species of Sedge
Carex cristatella Britt. A species of Sedge
Carex gravida Bailey A species of Sedge
Carex haydenii Dew. A species of Sedge
Carex lanuginosa Michx. A species of Sedge
Carex molesta Mackenz. A species of Sedge
Carex sartwellii Dew. A species of Sedge
Carex tenera Dew. A species of Sedge
Carex tetanica Schkuhr. A species of Sedge
Carex vulpinoidea Michx. A species of Sedge
Cyperus inflexus Muhl. A species of Umbrella-Sedge
Cyperus schweinitzii Torr. A species of Umbrella-Sedge
Cyperus strigosus L. A species of Umbrella-Sedge
Eleocharis compressa Sulliv. A species of Spike-Rush
Eleocharis obtusa (Willd.) Schultes. A species of Spike-Rush
Luzula multiflora (Retz.) Lejeune A species of Woodrush
Scirpus atrovirens (Willd.) A species of Bulrush
Scirpus cyperinus (L.) Kunth A species of Bulrush

Equisetaceae

Equisetum arvense L. Field-Horsetail
Equisetum laevigatum A. Br. A species of Horsetail

Euphorbiaceae

Euphorbia supina Raf. Milk-purslane
Euphorbia maculata L. Eyebane

Fabaceae

Amorpha canescens Pursh Leadplant
Amorpha nana Nutt. Fragrant False Indigo
Amphicarpa bracteata (L.) Fern. Hog-Peanut
Astragalus canadensis L. Canadian Milk-Vetch
Baptisia leucantha T.&G. White False Indigo
Baptisia leucophaea Nutt. A species of False Indigo
Desmodium canadense (L.) D.C. Canadian Tick-trefoil
Lathyrus venosus Muhl. var. intonsus Butt. & St. John Vetchling
Lespedeza capitata Michx. Round-headed Bush-Clover
Lithospermum canescens (Michx.) Lehm. Hoary Puccoon
*Lotus corniculatus L. Birdsfoot-trefoil
*Medicago lupulina L. Black Medick
*Melilotus alba Desr. White Sweet Clover
*Melilotus officinalis (L.) Lam. Yellow-Sweet Clover
Petalostemum purpureum (Vent.) Rydb. Purple Prairie-Clover
Psoralea argophylla Pursh Silver-leaved Scurf-pea
*Triflorum hybridum L. Alsike Clover
*Triflorum procumbens L. Low Hop-Clover
Vicia americana Muhl. American Vetch

Fagaceae

Quercus ellipsoidalis E.J. Hill Jack Oak
Quercus macrocarpa Michx. Burr Oak

Gentianaceae

Gentiana alba Muhl. Yellowish Gentian
Gentiana andrewsii Griseb. Closed Gentian
Gentiana quinquefolia L. Stiff Gentian

Geraniaceae

Geranium maculatum L. Wild Geranium

Hydrophyllaceae

Ellisia nyctelea L. No common name

Hypericaceae

Hypericum majus (Gray) Britt. A species of St. John's-wort
*Hypericum perforatum L. Common St. John's-wort
Hypericum pyramidatum Ait. Great St. John's-wort

Iridaceae

Iris virginica L. var. shrevei (Small) E. Anders. Blue Flag
Sisyrinchium campestre Bickn. A species of Blue-eyed Grass

Juncaceoe

Juncus dudleyi Wieg. Dudley's Rush
Juncus interior Wieg. Inland Rush
Juncus tenuis Willd. Slender Rush

Liliaceae

*Asparagus officinalis L. Asparagus
Lilium michiganense Farw. Michigan Lily
Lilium philadelphicum L. Wood-Lily
Polygonatum canaliculatum (Muhl.) Pursh Solomon's-seal
Smilacina stellata (L.) Desf. False Solomon's-seal
Zigadenus elegans Pursh White Camass

Lamiaceae

Monarda fistulosa Wild Bergamot
*Nepeta cataria L. Catnip
Prunella vulgaris L. var. lanceolata (Bart.) Fern Selfheal
Pycnanthemum virginianum Durand & Jackson A species of Mountain-Mint
Stachys palustris L. Woundwort

Lythraceae

Lythrum alatum Pursh Winged Loosestrife

Nyctoginaceae

Mirabilis nyctaginea (Michx.) MacM. A species of Four-O'clock

Oleaceae

Fraxinus pensylvanica Marsh var. subintegerrima (Vahl.) Fern. Green ash

Orchidaceae

Cypripedium candidum Muhl. White Lady's-slipper

Oxalidaceae

Oxalis violacea L. Violet Wood-Sorrel
Oxalis stricta L. A species of Wood-Sorrel

Plantaginaceae

Plantago rugelii Dcne. Rugel's Plantain

Poaceae

Agropyron repens (L.) Beauv. Quack-grass
Agrostis alba L. Red top
Andropogon gerardi Vitman Big Bluestem
Andropogon scoparius Michx. Little Bluestem
Bromus inermis Leyss. Hungarian Brome-Grass
Calamogrostis canadensis (Michx.) Nutt. Blue-joint
Cenchrus longispinus (Hack.) Fern. Long-spined Sandbur
*Digitaria ischaemum (Schreb.) Muhl. Small Crab-Grass
*Echinochloa crusgalli (L.) Beauv. Barnyard-Grass
Echinochloa muricata (Michx.) Fern. No common name
Elymus canadensis L. Canadian Wild Rye
Eragrostis hypnoides (Lam.) BSP. A species of Love-Grass
Eragrostis pectinacea (Michx.) Nees. A species of Love-Grass
*Eriochloa villosa (Thunb.) Kunth. Wooly cup-grass
Hierochloe odorata (L.) Beauv. Vanilla Grass
Hordeum jubatum L. Squirrel-tail Grass
Muhlenbergia glomerata (Willd.) Trin. No common name
Muhlenbergia mexicana (L.) Trin. fambigna (Torr.) Fern. No common name
Muhlenbergia racemosa (Michx.) BSP. No common name
Panicum capillare L. Old-witch Grass
Panicum dichotomiflorum Michx. A species of Panic-Grass
Panicum lanuginosum Ell. A species of Panic-Grass
Panicum leibergii (Vasey) Scribn. A species of Panic-Grass
Panicum virgatum L. Switchgrass
Panicum xanthophysum Gray A species of Panic-Grass
Phalaris arundinacea L. Reed-Canary-Grass
Phleum pratense L. Timothy
Poa palustris L. Fowl-meadow Grass
Poa pratensis L. Bluegrass
*Setaria glauca (L.) Beauv. Foxtail
Sorghastrum nutans (L.) Nash Indian Grass
Spartina pectinata Link Cord-Grass
Sporobolus heterolepis Gray Northern Drop-seed
Stipa spartea trin. Porcupine-Grass

Polemoniaceae

Phlox maculata L. Wild Sweet William
Phlox pilosa L. var. fulgida Wherry Prairie Phlox

Polygalaceae

Polygala sanguinea L. Red Milkwort
Polygala senega L. Seneca-Snakeroot

Polygonaceae

*Polygonum aviculare L. Knotweed
Polygonum coccineum Muhl. Scarlet Smartweed
Polygonum convolvulus L. Black Bindweed
Polygonum hydropiper L. Common Smartweed
Polygonum lapathifolium L. Dock-leaved Smartweed
Polygonum pensylvanicum L. Pinkweed
Rumex crispus L. Yellow Dock
Rumex mexicanus Meisn. Mexican Dock

Polypodiaceae

Athyrium filix-femina (L.) Roth Lady Fern
Onoclea sensibilis L. Sensitive Fern

Primulaceae

Lysimachia ciliata L. A species of Loosestrife
Lysimachia quadriflora Sims. Four-flowered Loosestrife

Ranunculaceae

Anemone cylindrica Gray Thimbleweed
Delphinium virescens Nutt. Larkspur
Ranunculus septentrionalis Poir. Swamp-Buttercup
Thalictrum dasycarpum Fisch. & Lall. Purple Meadow-Rue

Rhamnaceae

*Rhamnus cathartica L. Buckthorn

Rosaceae

Fragaria vesca var. americana Woodland Strawberry
Fragaria virginiana Duchesne Virginia Strawberry
Geum aleppicum Jacq. var. strictum (Ait.) Fern. A species of Avens
Geum laciniatum Murr. var. tricocarpum Fern. A species of Avens
Geum triflorum Pursh Prairie Smoke
Potentilla arguta Pursh A species of Cinquefoil
Potentilla simplex Michx. Old-field Cinquefoil
Prunus virginiana L. Choke-Cherry
Rosa arkansana Porter A species of Rose
Rosa blanda Ait. A species of Rose
Rubus allegheniensis Porter A Species of Blackberry
Rubus idaeus L. var. strigosus (Michx.) Maxim. A Species of Blackberry
Rubus occidentalis L. A species of Blackberry
Spiraea alba Du Roi Meadow-sweet

Rubiaceae

Galium aparine L. Cleavers
Galium boreale L. Northern Bedstraw

Salicaceae

Populus deltoides Michx. Cottonwood
Populus tremuloides Michx. Aspen
Salix bebbiana Sarg. Long-beaked willow
Salix gracilis Anderss. Slender Willow
Salix rigida Muhl. Stiff Willow

Santalaceae

Comandra richardsiana Fern. Toadflax

Saxifragaceae

Heuchera richardsonii R. Br. var. hispidior Rosend., Butt. & Lak. Alumroot
Ribes americana Mill. Wild Black Current
Ribes missouriense Nutt. Missouri Gooseberry
Saxifraga pensylvanica Swamp Saxifrage

Scrophulariaceae

*Chaenorrhinum minus (L.) Lange Dwarf Snapdragon
Gerardia tenuifolia Vahl. Slender-leaved Gerardia
Gratiola neglecta torr. Hedge-hyssop
Pedicularis canadensis L. Common Lousewort
Pedicularis lanceolata Michx. Lance-leaved Lousewort
Scrophularia lanceolata Pursh. Figwort
*Verbascum thapsus L. Common Mullein
Veronicastrum virginicum (L.) Farv. Culver's-root

Solanoceae

Physalis virginiana Mill. Ground-Cherry
Solanum americanum Mill. American Nightshade

Typhaceae

Typha latifolia L. Cat-tail

Ulmaceae

Ulmus americana L. American Elm
*Ulmus pumila L. Dwarf Elm

Urticaceae

Urtica dioica L. ssp. gracilis (Ait.) Selander Stinging Nettle

Valerianaceae

Valeriana edulis nutt. ssp. ciliata (T.&G.) F.G. Mey. Valerian

Verbenaceae

Verbena hastata L. Vervain

Violaceae

Viola petatifida G. Don Birds'-foot Violet
Viola sororia Willd. Wood Violet
Viola sagittata Ait. Arrow-leaved Violet

Vitaceae

Parthenocissus inserta (Kerner) K. Fritsch. Woodbine
Vitis riparia Michx. River Grape

ADDITIONAL INVENTORY NEEDS

No systematic inventory of Wild Indigo's faunal groups has been conducted. This information is important for making sound management decisions. On other SNAs birds, mammals, butterflies, reptiles and amphibians are surveyed during the inventory of the site. Some type of stratified inventory of the fauna at Wild Indigo is necessary. Highest priority should be given to those species or groups of species that are most dependent on this piece of habitat or those species that require special management considerations.

The narrowness of the habitat, and relatively large proportion of edge accentuates influences of surrounding land use on the SNA's animal community. Small mammals and insects are most likely to sustain viable populations within the habitat encompassed by the SNA. Some insect species are host specific and may be dependent on a native plant species that occurs only on the natural area. The capacity to incorporate species restricted to the SNA into a management strategy is greater than incorporating those species whose population dynamics are influenced primarily by circumstances occurring outside the SNA.

APPENDIX

Rare Plant Status Sheets

SPECIES STATUS SHEET

SCIENTIFIC NAME: Asclepias sullivantii Engelm.

FAMILY: Asclepiadaceae

COMMON NAME: Prairie Milkweed

STATE STATUS: Threatened

FEDERAL STATUS: None

BASIS FOR MINNESOTA STATUS: The original range of this species coincided with that of the tall grass prairie. This range now serves as the major corn producing region of the country and very little of the native prairie remains. In Minnesota, most of the surviving plants occur in prairie remnants on railroad right-of-ways. These right-of-ways are rapidly being abandoned and are invariably sold to adjacent landowners who incorporate them into farms for crop production. If this process continues at it present rate, most of the extant populations will be eliminated within the decade. The anomalous collection from Cass County is dated 1890 and has never been verified.

PREFERRED HABITAT IN MINNESOTA: This species is entirely restricted to native tall grass mesic prairies and shows little ability to survive in degraded habitats. It frequently occurs with other rare prairie species such as Cacalia tuberosa and Parthenium integrifolium.

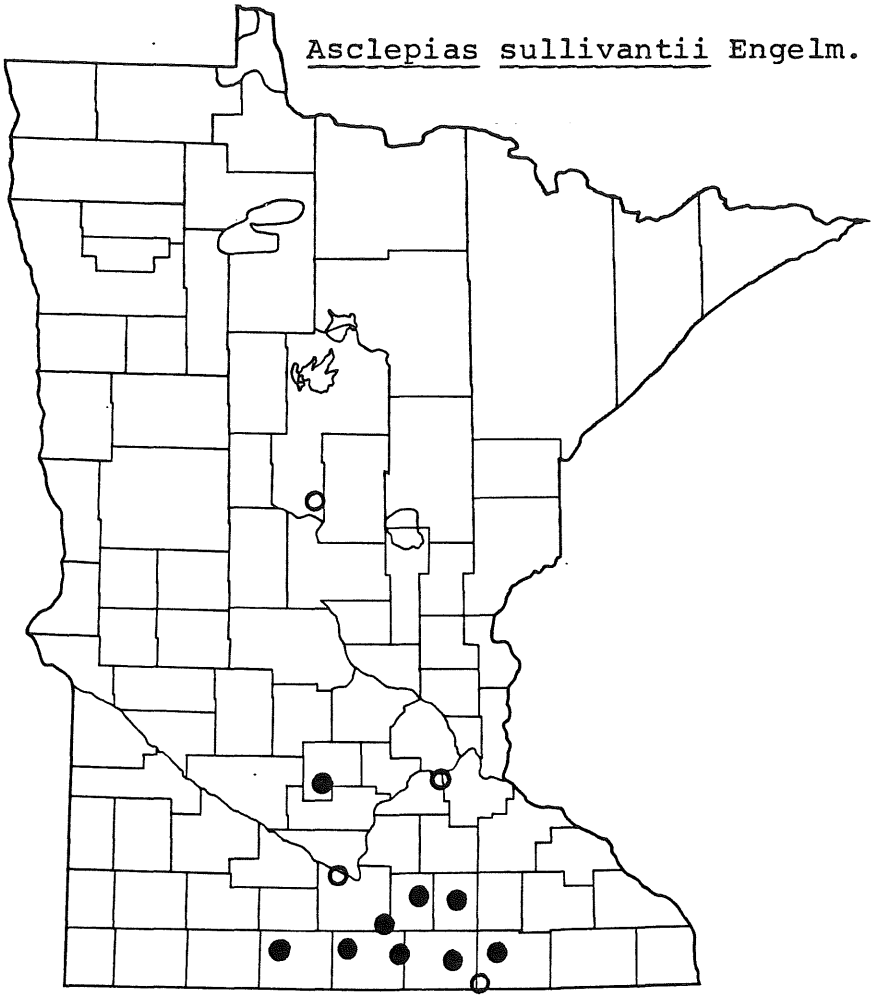
RECOMMENDATIONS: The only way to preserve this species in its native habitat in Minnesota may be to acquire remnant prairies occurring on railroad right-of-ways and manage them for the perpetuation of the native plant community.

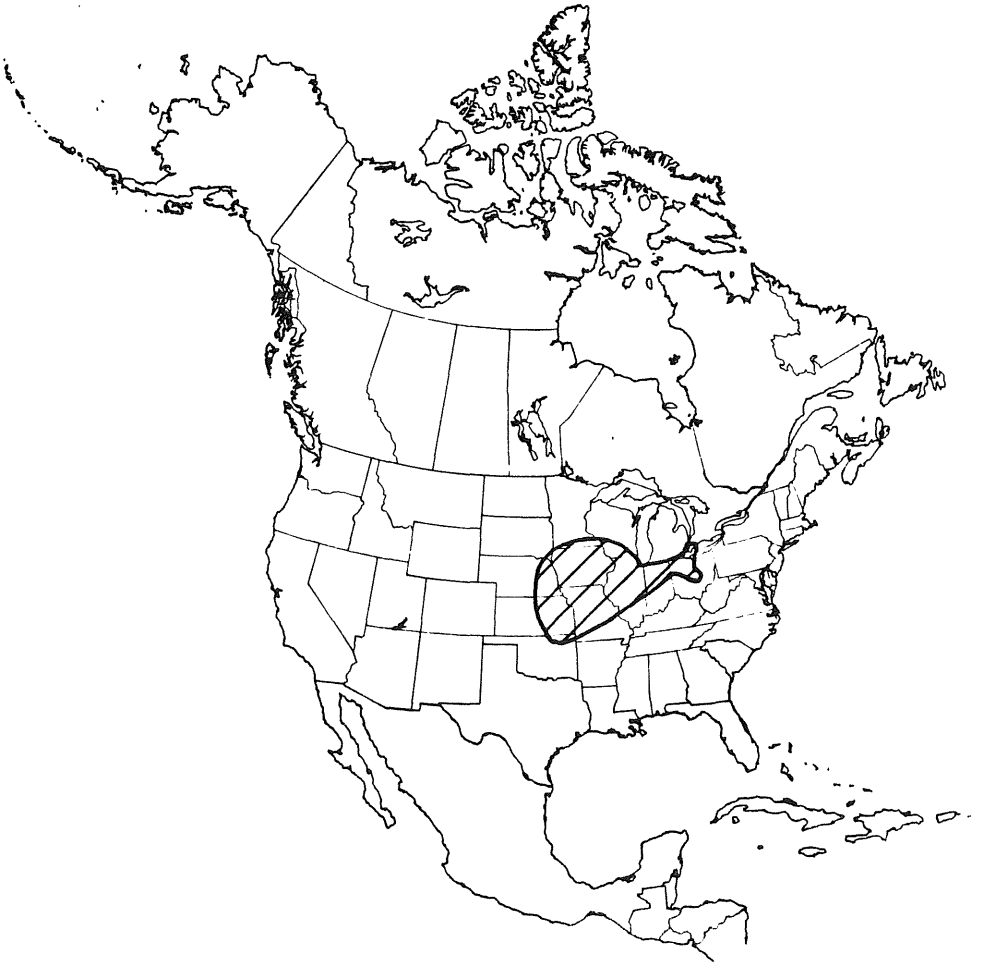
SELECTED REFERENCES:

Woodson, R. E. 1954. The North American species of Asclepias. Ann. Mo. Bot. Gard. 41:1-211.

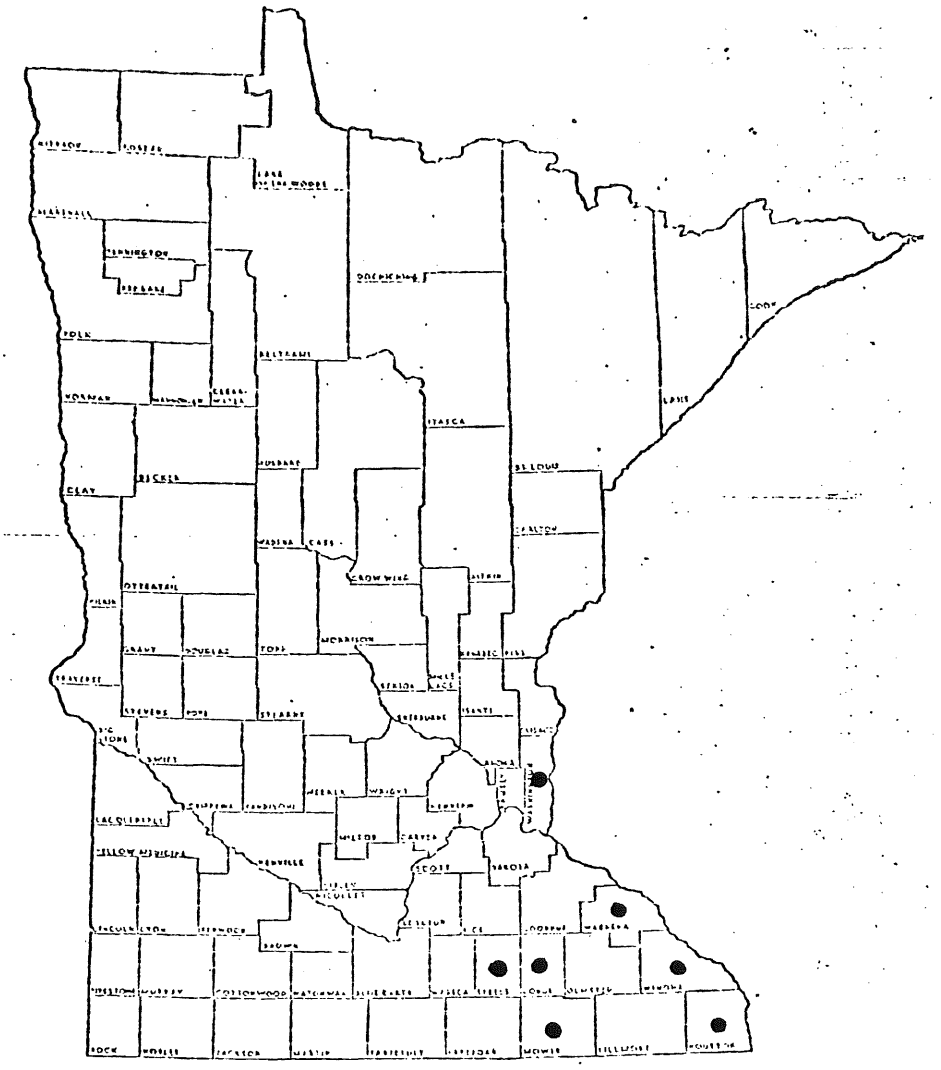
PREPARED BY: Welby Smith, Botanist, Natural Heritage Program

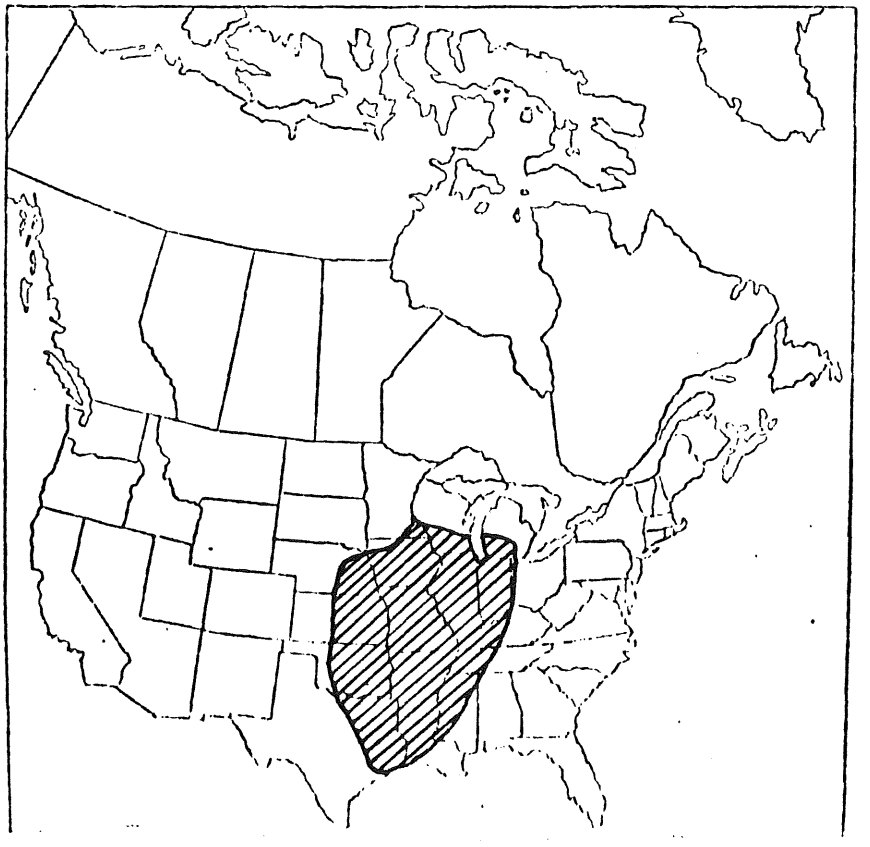
Asclepias sullivantii Engelm.





Distribution of
Baptisia Leucophaea





STATUS SHEET

ELEMENT NAME: Baptisia leucophaea Nutt.; (no common name)

FEDERAL STATUS: None

STATE STATUS: None

NATURAL HERITAGE PROGRAM STATUS: Rare

BASIS FOR STATUS CLASSIFICATION: Because of the destruction of native prairies, this species has suffered a drastic decline in population. It is currently limited to prairie remnants and various marginal habitats in the southeast corner of the state.

PREFERRED HABITAT: It is believed that this species originally preferred mesic prairies. its present occurrence is goat prairies and sand dunes probably represents the last refuge of a species nearby extirpated from its preferred habitat by the advance of agriculture

DISTRIBUTION: See map

OCCURRENCES IN MINNESOTA: This species is known by historical records to have occurred in Mower, Washington, Dodge, Houston, Winona and Wabasha counties. Many of the recent records have come from prairie remnants on railroad right-of-ways

OF OCCURENCES IN MANAGED AREAS: This species is not known to occur in any managed area.

POTENTIAL THREATS TO SPECIES: Perhaps the greatest immediate threat to the survival of this species is the abandonment of railroads in southern Minnesota. Soon after abandonment, the prairie right-of-way is usually converted to agricultural use. Threats to the populations in sand prairies and goat prairies are less well defined.

REFERENCES:

Larisey, M. M. 1940. A Monograph of the genus Baptisia. An. Miss. Bot. Gard. 27(2); 119-224.

Fox, W. B. 1940. The Leguninosae in Iowa. Am. Midl. Nat. 34(1); 207-230.

LOCATION IN STUDY AREA:

This species was first collected in Wabasha County in 1883, but the exact location is unknown. A more recent record documents the occurrence of the species near the southwest boundary of the study area in section 18 (Morley, 1961). Another site is known about 1/2 mile north of the study area (Dana, 1975) and 1/4 mile southeast (Smith, 1979).

EVALUATION:

The discovery of this species on a managed area is a high priority and it should be searched for within the study area.

SPECIES STATUS SHEET

SCIENTIFIC NAME: *Cacalia tuberosa* Nutt. [*C. plantaginea* (Raf.) Shinners]

FAMILY: Asteraceae

COMMON NAME: Tuberous Indian-plantain

STATE STATUS: Threatened

FEDERAL STATUS: None

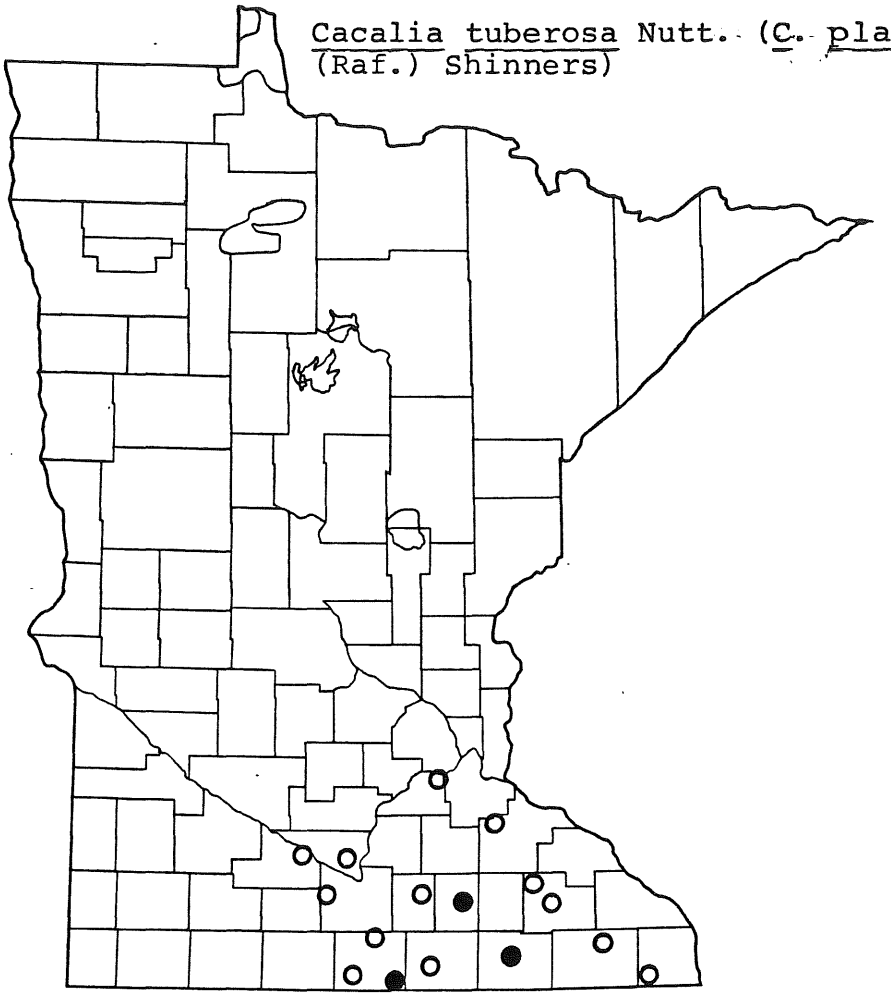
BASIS FOR MINNESOTA STATUS: Unlike the previous species, *C. tuberosa* was not formerly rare in Minnesota, but the nearly total destruction of its prairie habitat has reduced its populations to a few remnant colonies. All of these remnants are small and only one is currently protected. Most occur on railroad right-of-ways which are rapidly being abandoned and sold to adjacent landowners who invariably convert them to cropland.

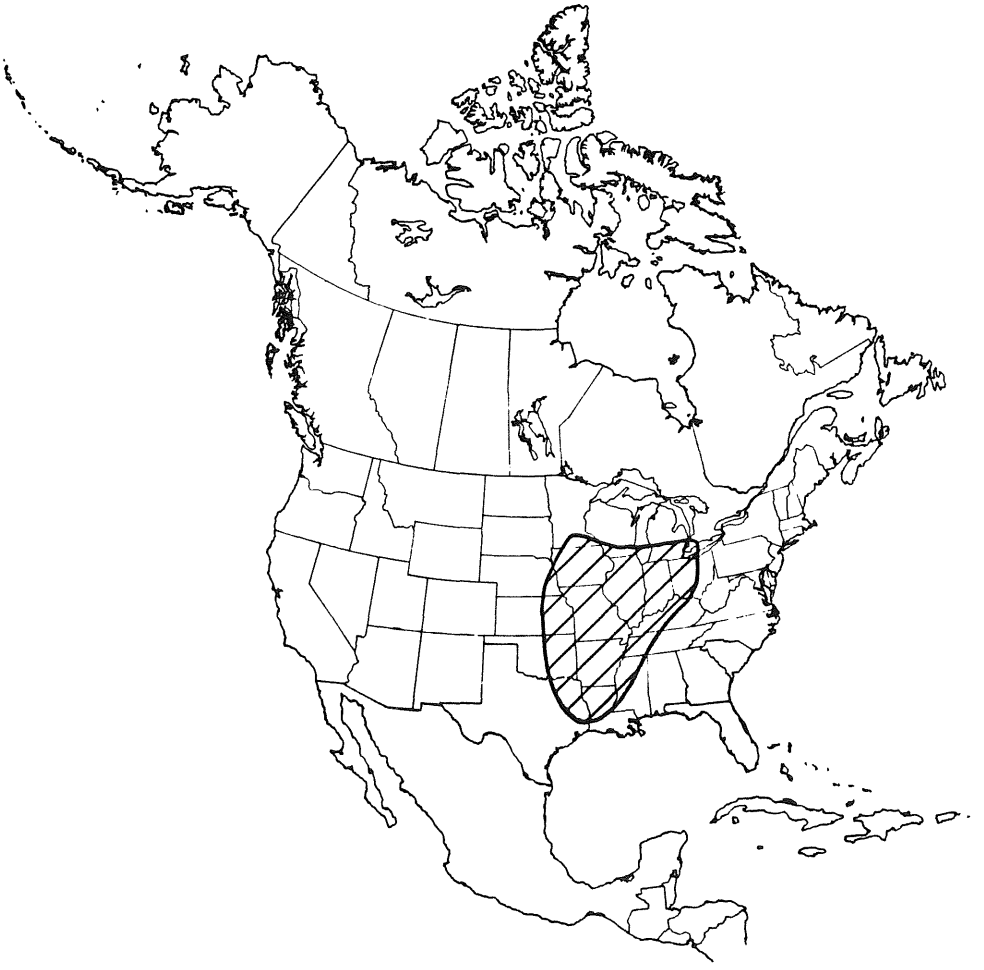
PREFERRED HABITAT IN MINNESOTA: This species is restricted to mesic prairies in southeast Minnesota. It frequently occurs with other rare prairie species such as *Asclepias sullivantii* and *Parthenium integrifolium*.

RECOMMENDATIONS: The only way to preserve this species in its native habitat in Minnesota may be to acquire remnant prairies occurring on railroad right-of-ways and manage them for the perpetuation of the native plant community.

PREPARED BY: Welby Smith, Botanist, Natural Heritage Program

Cacalia tuberosa Nutt. (C. plantaginea (Raf.) Shinners)





SPECIES STATUS SHEET

SCIENTIFIC NAME: Valeriana edulis Nutt. ssp ciliata (T. & G.) Meyer [Valeriana ciliata T. & G.]

FAMILY: Valerianaceae

COMMON NAME: Valerian

STATE STATUS: Threatened

FEDERAL STATUS: None

BASIS FOR MINNESOTA STATUS: Although this species was not formerly rare in Minnesota, the nearly total destruction of prairie and fen habitats has reduced its populations to a few isolated colonies. Most of the recent collections are from remnant prairie strips on railroad right-of-ways. These right-of-ways are rapidly being sold by the railroad companies, and are invariably bought by adjacent landowners for conversion to crop land. Two populations occurring in calcareous fens in the Minnesota Valley have recently been destroyed by road construction and commercial development. Populations of Valerian are currently protected at Wild Indigo, Queen's Bluff and Black Dog Fen Scientific and Natural Areas. The typical subspecies occurs in western United States.

PREFERRED HABITAT IN MINNESOTA: This species occurs in three distinct habitats in Minnesota: deep soil mesic prairies, calcareous fens and limestone bluffs. It seems, however, to be most widely occurring on prairies where it may be found with other rare species such as Parthenium integrifolium, Cacalia tuberosa and Asclepias sullivantii.

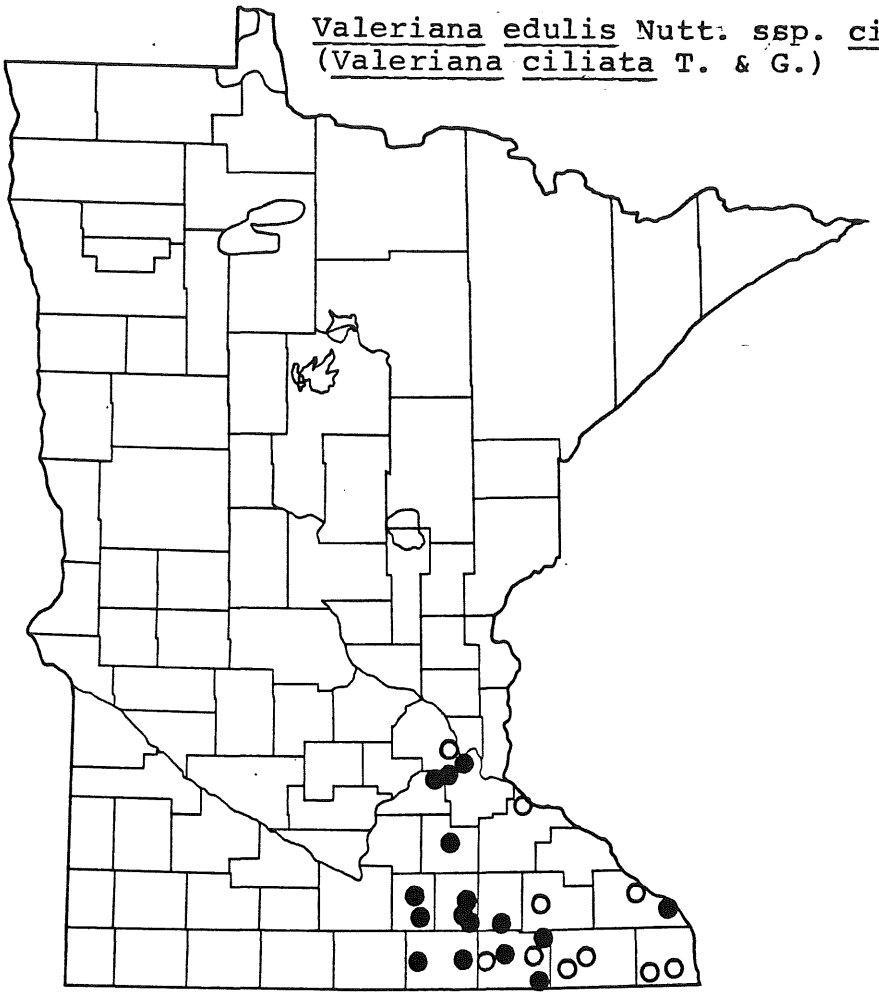
RECOMMENDATIONS: Attempts should be made to protect prairie habitats on right-of-ways from being converted to agricultural land.

SELECTED REFERENCES:

Meyer, F. G. 1951. Valeriana in North America and the West Indies (Valerianacene). Ann. Mo. Bot. Gard. 38(4):377-503.

PREPARED BY: Welby Smith, Botanist, Natural Heritage Program

Valeriana edulis Nutt. ssp. ciliata (T.&G
(Valeriana ciliata T. & G.)



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