MINNESOTA natural heritage program

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M E M O R A N D U M

TO: R.D. Cupit, Project Manager
Power Plant Siting Project

FROM: Barbara Coffin, Program Coordinator

SUBJECT: NSP-TR-2 Project

DATE: June 16, 1980

Enclosed please find the "Report on the Occurrence of Rare, Threatened and/or Exemplary Elements of Natural Diversity in the Project NSP-TR-2 Study Area" and an invoice for the costs of the work completed.

BC:jlm
Enc.

Report on the Occurrence of Rare, Threatened and/or Exemplary Elements of Natural Diversity In the Project NSP-TR-2 Study Area

A Report Submitted to the Power Plant Siting Program of the Minnesota Environmental Quality Board

by the

Minnesota Natural Heritage Program
Department of Natural Resources,
Research and Policy Section
Box 11, Centennial Office Building
St. Paul, Minnesota 55155

June 13, 1980

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TABLE OF CONTENTS

DESCRIPTION OF THE MINNESOTA NATURAL HERITAGE PROGRAM

The Minnesota Natural Heritage Program (MNHP) is a centralized information system that locates those natural communities, plant and animal species and geologic features most needing special attention so that decision-makers can plan responsibly for future development and economic growth. The information system makes possible a more objective evaluation of lands and ecological resources for the purpose of identifying the most important natural areas of Minnesota. Planners can use this system to evaluate alternative courses of action, especially in routing and siting decisions, before commitments are made.

In the past there has been a lack of (1) sufficiently detailed environmental information focused on natural elements, (2) a centralized location for storage and continuous up-date of this information and (3) a cost-effective approach to retrieval and analysis of this information. The Natural Heritage Program is an information system that has been designed specifically to meet these needs.

The first task of the MNHP was to identify the components, or elements, of natural diversity which are of special concern in Minnesota. An Element is a natural feature of particular interest because it is exemplary, unique, threatened or endangered on a statewide or national basis. Collection of existing information about these Elements from published data, museum collections, the scientific community, organizations and individuals began in 1979 and will continue as the data base matures. Field work, also initiated in 1979, will be continued as secondary information sources are exhausted or where gaps in information are identified.

The information gathered by the MNHP is sorted in an integrated data management system. Map files, manual files and computer files keep the information well organized and accessible for a variety of uses. In addition, the system is compatible with the Minnesota Land Management Information System (MLMIS) so that data can be analyzed in combination with MLMIS variables.

Zoological and botanical Elements in the MNHP system include animals and plants whose biological requirements merit special consideration by land developers, conservationists and biologists. Among the criteria used to identify special animals and plants are:

1. Endemic species. Known only from Minnesota, Erythronium propullans, the Minnesota Trout Lily, is restricted to the floodplains of Rice and Goodhue Counties.

2. Disjunct or relic populations. In Minnesota the Eumeces fasciatus (Five-Lined Skink) population near Granite Falls is a disjunct population. Its nearest neighbor is a population located approximately 100 miles to the south in Iowa.

3. Species restricted to a specialized or limited habitat. During the breeding season colonial nesting birds, such as the great blue heron and great egret, are restricted to a habitat that is limited in availability and vulnerable to disturbance.

4. Peripheral species that reach the limit of their natural range in Minnesota. Northeastern Minnesota is on the extreme western periphery of the range of Tsuga canadensis (Hemlock). At present it is known from only two sites, one in St. Louis County and one in Carlton County.

5. Species that are widely dispersed but rare throughout their range in Minnesota. An example is Cypripedium arietinum (Ram's-Head Lady's-Slipper), which occurs in cool swamps and pine forests. These habitats are well represented in Minnesota and yet the Lady's-Slipper has been recorded from only eight sites scattered throughout the state.

6. Species for whom the data available are so scarce that their status is poorly understood. Phenacomys intermedius (Mountain Phenacomys) was collected only once in the state in 1940 at Ely, Minnesota. Although some collecting work has been conducted in the area since then. Phenacomys, which is primarily a boreal species, has never been re-collected.

The data base of the Heritage Program also includes information on unique or exemplary terrestrial communities, aquatic communities and geologic features. For example, in western Lac Qui Parle County, the plants growing in the salt flats around the periphery of Salt Lake comprise a unique plant community unknown elsewhere in the state. However, in addition to compiling information on such rare Elements as the Salt Lake plant community, information on exemplary occurrences of common communities or geologic features is also entered in the data base. For example, a particularly good occurrence of a maple-basswood community or an esker, both prevalent in many areas of Minnesota, would be included.

Status categories have been assigned to each Element by the MNHP. Zoological and botanical Elements are identified as Endangered, Threatened, Rare, Status Undetermined, or Special Concern (see Appendix A: Definition of Natural Heritage Program Status Categories). All plant communities are potentially Elements; however, those communities that are currently most threatened or rare in Minnesota are identified as Protection Priorities. The basis for classification of plant community Protection Priorities found in the Project Study Area are discussed in Appendix B.

SCOPE OF WORK

This report was compiled to meet the terms of the Project NSP-TR-2 contract between the Power Plant Siting Program of the Minnesota Environmental Quality Board and the Minnesota Natural Heritage Program of The Nature Conservancy and the Department of Natural Resources (DNR). It was agreed that the MNHP would search both the proposed transmission corridors and adjacent lands for all known occurrences of rare plants and animals, noteworthy geologic features, and proposed or designated natural areas. Discussion of those species and features found in the Study Area includes: an explanation of why the species or feature is considered rare in Minnesota; a description of species habitat preference or feature composition; distribution and status of species or feature both within the state and regionally; and an evaluation of the impact that the proposed corridors would have on each occurrence.

DEFINITION OF PROJECT NSP-TR-2 STUDY AREA

The Project Study Area (see Appendix C) includes parts of Washington, Dakota and Goodhue Counties. For the purposes of this report the study area is defined by twelve USGS topographic maps: White Bear Lake East, Stillwater, Lake Elmo, Hudson, St. Paul Park, Prescott, Hastings, Diamond Bluff West, Diamond Bluff East, Welch, Red Wing and Miesville.

The location of the species and natural features discussed in the report are mapped on the attached USGS topographic maps. The map identified as "MAP 1" covers the portion of the study area north of Hastings, Minnesota. The map identified as "MAP 2" covers the portion of the study area south and east of Hastings, Minnesota.

INTRODUCTION

Since the MNHP began in 1979, the population status of all members of the state's vertebrate fauna, as well as portions of its invertebrate fauna, has been reviewed. Included in the review were 77 species of mammals, 144 fish, 292 breeding birds, 44 reptiles and amphibians, 140 butterflies and 45 mussels. Although the review process often differed considerably among the faunal groups, three general steps have been involved: 1) a thorough review of all the pertinent literature regarding the distribution and abundance of each animal in Minnesota; 2) discussions with knowledgeable professionals both in-state and out-of-state; and 3) a review of museum and personal collections. After completing this process the MNHP was able to prepare a list of species that are rare and deserving of special recognition within Minnesota. At present the effort of compiling data on these species continues, as well as an effort to obtain official endorsement of the Program's rare species lists by public and private organizations.

Legal protection exists for those animal species designated as endangered or threatened by the federal government, according to the Endangered Species Act of 1973 (PL93-205). In Minnesota, four animal species have formal federal designation. The Higgin's Eye Pearly Mussel, one of these four species, is discussed in this report. State protection for animal species is not comprehensive; some animal groups receive greater protection than others. Migratory non-game birds receive protection from hunting according to both federal and state regulations. State hunting and trapping regulations control the harvest of game species and can be used to afford a species a certain degree of protection if population numbers become threatened. There is a need to adopt an official state protection list for animal species of Minnesota.

ELEMENT OCCURRENCES WITHIN THE NSP-TR-2 PROJECT STUDY AREA

Of the 94 animal species listed to date by the MNHP, 12 species are known to occur within the boundaries of the Study Area (Table 1). A discussion on each species found within the Study Area describing: the basis for classification as a rare animal, preferred habitat, distribution in Minnesota and United

States, pertinent references, location in the Study Area, and evaluation of impact by the proposed transmission corridors can be found in Appendix D (Status Sheets and Distribution Maps of Rare Animal Occurrences in the Project Study Area).

Element occurrences within the Study Area represent three major faunal groups: birds, reptiles and mussels (Table 1). The birds of Minnesota are well-studied by academic institutions and public agencies throughout the state as well as by a large number of well-qualified amateur bird-watchers. The information generated from all these groups has added considerably to our knowledge of the distribution and abundance of breeding birds throughout Minnesota. Reptiles and mussels, on the other hand, have received little attention by either professionals or amateurs. Our knowledge of the biology and population status of these faunal groups has consequently suffered.

Because of our northern climate, Minnesota lacks a diverse herptofauna. Long, cold winters have prevented many reptiles and amphibians from exploiting the wide variety of habitats available in the state. Of the 26 reptiles that are present in the state less than five have even been critically studied. Only one major publication has ever reviewed and summarized what is known about Minnesota herps, The Reptiles and Amphibians of Minnesota by Dr. W.J. Breckenridge. Although substantial in its content, the book was published in 1944 and is now sorely in need of updating. Few specimens have been added to the state's major repository, the Bell Museum of Natural History, since Dr. Breckenridge's work in the late thirties and the early forties. However, during the last few years, the Non-Game Program of the Minnesota DNR has been actively soliciting reports of uncommon wildlife in the state in order to update our knowledge of many of these poorly-studied species. The incoming reports are slowly adding to and, in many instances, revising our knowledge of the distribution and abundance of Minnesota's reptiles. The reptile occurrences discussed in this report have originated from two sources. The four reports of Coluber constrictor foxi originated from specimens desposited in the Bell Museum. The one report of Clemmys insculpta originated from the natural areas file of the Scientific and Natural Areas (SNA) Program.

Like the herps of Minnesota very few studies have focused upon the state's mussel fauna. The only comprehensive review was published in 1944, a Ph.D. thesis by C. Dawley, titled "Distribution and Growth Studies of the Unionidae and Aquatic Gastropoda found in Minnesota". Further research was rather limited during the next 30 years with the exception of several studies conducted in the Red River drainage by Dr. Cvancara of North Dakota State University and several studies conducted in the Blue Earth River drainage by Dr. Chelburg of the Science Museum of Minnesota. Then, in the mid-seventies, a great deal of research on the mussels of the Upper Mississippi River was begun, prompted primarily by the listing of Lampsilis higginsi as a federally endangered species. One of the more comprehensive studies was conducted by Sam Fuller of the Philadelphia Academy of Sciences. Much of the information presented in the report has been compiled from his work.

In contrast to the herps and mussels, birds are perhaps the most thoroughly studied faunal group in the state. The species discussed in this report, the great blue heron and great egret, are both colonial nesters. Together with other colonial nesting species, they have been the focus of much attention recently by the Minnesota DNR. During the past three years the Non-Game Program has been actively compiling and field checking data on the distribution, status and species composition of all colonial nest sites in Minnesota. The annual reports produced by the Program were the major sources of information for the Power Plant Siting report.

TABLE 1. Occurrences of Animal Elements in Study Area

Occurrence #	Element	MNHP Status	Date	Source	Location	Comments
Mussels						
23, Map 1	*Lampsilis higginsi*	Endangered	Oct., 1977	Stansbery, 1978	Lake St. Croix R.M. 17.2 - 17.5	one live specimen
24, Map 1	*Lampsilis higginsi*	Endangered	Aug., Sept., 1977	Fuller, 1978	St. Croix River R.M. 15.9 - 18.1	two adult specimens (one gravid female)
25, Map 1	*Elliptio crassidens*	Endangered	Aug., Sept., 1977	Fuller, 1978	St. Croix River R.M. 15.9 - 18.1	4 adults
26, Map 1	*Ellipsaria lineolata*	Threatened	Aug., Sept., 1977	Fuller, 1978	St. Croix River R.M. 15.9 - 18.1	1 adult
27, Map 1	*Lasmigona complanata*	Undetermined	Aug., Sept., 1977	Fuller, 1978	St. Croix River R.M. 15.9 - 18.1	7 adults
28, Map 1	*Actinonaias carinata*	Threatened	Aug., Sept., 1977	Fuller, 1978	St. Croix River R.M. 15.9 - 18.1	2 adults
29, Map 1	*Tritogonia verrucosa*	Endangered	Aug., Sept., 1977	Fuller, 1978	St. Croix River R.M. 15.9 - 18.1	7 adults
30, Map 1	*Quadrula metanevra*	Threatened	Aug., Sept., 1977	Fuller, 1978	St. Croix River R.M. 15.9 - 18.1	2 adults
31, Map 1	*Pleurobema cordatum*	Rare	Aug., Sept., 1977	Fuller, 1978	St. Croix River R.M. 15.9 - 18.1	9 adults
32, Map 1	*Lampsilis higginsi*	Endangered	May, 1977	Stansbery, 1978	Lake St. Croix R.M. 16.5	3 adults
34, Map 2	*Actinonaias carinata*	Threatened	July, 1978	Thiel, 1979	Mississippi River R.M. 811	1 live specimen

Table 1 (continued)

Occurrence #	Element	MNHP Status	Date	Source	Location	Comments
35, Map 2	*Lasmigona complanata*	Undetermined	July, 1978	Thiel, 1979	Mississippi River R.M. 810.5	1 live specimen
37, Map 2	*Actinonaias carinata*	Threatened	July, 1978	Thiel, 1979	Mississippi River R.M. 804.1	1 live adult
Heron Rookeries						
33, Map 1	Colonial Nest Site	Special Concern	See Comments	MDNR	Grey Cloud Island, Washington County SE¼, Sec. 31, T27N,R18W	great blue herons and great egrets; 20 nests in 1977
36, Map 2	Colonial Nest Site	Special Concern	See Comments	MDNR	Vermillion River Colony, Dakota County, R.M. 808.5 (Mississippi River) Sec. 32, T115N, R16W	great blue herons and great egrets; aerial census in 1977 found 186+ nests
38, Map 2	Colonial Nest Site	Special Concern	See Comments	MDNR	Devil's Lake Rookery, Goodhue County Sec. 13 & 14, T113N, R15W	in 1975, 95 great blue heron nests, 1 great egret nest
Snakes						
22, Map 1	*Coluber constrictor foxi*	Threatened	June, 1958	Bell Museum Collection	1 mile north of Stillwater, Washington County	Collected by J.C. Miller
39, Map 2	*Coluber constrictor foxi*	Threatened	May, 1951	Bell Museum Collection	Red Wing, Goodhue County	Catalog # 1828; collected by R.M. Hedrick (RMH 454)
40, Map 2	*Coluber constrictor foxi*	Threatened	Sept., 1933	Bell Museum Collection	first series of bluffs south of Red Wing, Goodhue County	Catalog # 61; collected by G.A. Swanson

Table 1 (continued)

Occurrence #	Element	MNHP Status	Date	Source	Location	Comments
41, Map 2	*Coluber constrictor foxi*	Threatened	Oct., 1938	Bell Museum Collection	3 miles below Red Wing, Goodhue County	Catalog # 897; collected by L.W. Babbit
Turtles						
42, Map 2	*Clemmys insculpta*	Rare		Project Proposal, MDNR (Scientific and Natural Areas Nomination	Sec. 13, 14, 15, 20 - 24, T113N, R16W, Goodhue County	contains breeding habitat of wood turtle

ANIMAL OCCURRENCES

A total of 12 animal species that are of interest to the MNHP have been recorded within the study area associated with the potential transmission line corridors. The two bird species are considered together in the colonial nest site status sheet while each of eight freshwater mussel species and two reptile species are considered in seperate status sheets (Appendix D).

Depending upon the construction design utilized for river crossings (i.e., above-ground versus underground), the proposed powerline could have the greatest impact, of the species considered here, on freshwater mussels. As a group, mussels are sensitive to substrate disturbance and water quality deterioration, both of which are potential by-products of the proposed construction. The presense of a federally endangered freshwater mussel, Lampsilis higginsi, within the study area makes it imperative to consider the effects of construction upon the mussel fauna.

Of the mussels of interest to the MNHP the greatest concentration, both in terms of numbers of species and density, occurs in a seam located in the St. Croix River along the Minnesota border, from approximately the Hudson rail bridge downstream to U.S. Highway 12 (occurrences 23-32, Map 1). Within this locale, three seperate field surveys have found individuals of Lampsilis higginsi, including a gravid female which suggests the potential of reproduction at this site. Also at this site were six species of mussels which have been assigned to statewide status categories by the MNHP as follows: two species, in addition to Lampsilis higginsi, are considered Endangered; three species are considered Threatened; and one species is Rare (see Appendix A: Definition of MNHP status categories). One additional mussel species, classified as Undetermined Status, should be carefully watched until more information about its distribution and abundance can be determined. The seam of mussels described is adjacent to and immediately upstream from a proposed river crossing site near the southern edge of Hudson,

Wisconsin. Due to the richness of the mussel fauna at this site and the nearby presence of a federally endangered species, the MNHP advises against the use of proposed corridor B1-B2 for an underground crossing of the transmission line.

Additional observations of mussel species of interest occur near a proposed river crossing near the town of Prescott, Wisconsin, on the Mississippi River. One individual of Actinonaias carinata (occurrence 34, Map 2), assigned a threatened status by MNHP, was observed immediately upstream from the proposed crossing while one specimen of Lasmigona complanata (occurrence 35, Map 2), of undetermined status, was observed immediately below the proposed crossing. Based on the evidence available, crossing the river at this site would not be advocated unless the construction design caused little or no substrate disturbance and/or deterioriation of water quality.

An additional Element of interest to MNHP, a colonial nest site, is close enough to a proposed powerline route to warrant concern. It is conceivable that construction of the powerline in early spring and summer could disrupt the breeding activities of the birds associated with the Devil's Lake Rookery (occurrence #38, Map 2) if this route were selected. Isolation apparently is an important component of the nesting locations of great blue herons and great egrets, the species nesting at this rookery.

Occurence #42 (Map 2) represents the generalized location of an area nominated for inclusion within the SNA Program of the DNR. The primary justification behind the nomination is the occurrence of the wood turtle, Clemmys insculpta, in this area. This general locality may represent the optimal breeding habitat for the wood turtle, a rare species in Minnesota. The proposed SNA designation (portions of Sec. 13, 14, 15, 20-24, T24N, R18W) is traversed by two or three potential transmission line corridors. The potential effects on the turtle population of powerline construction in the area is not understood but the presence of this rare species should be given consideration.

INTRODUCTION

Since the MNHP began in 1979, the status of all plant species native to Minnesota has been reviewed. A list, developed in collaboration with the state's leading botanists, identifies approximately 300 species as being of priority for protection, because of their rarity statewide (see page 1 of this report for criteria used to identify rare plants in Minnesota).

At present the only legal protection offered plants in Minnesota is the 1934 Department of Agriculture's MN Statute 17.23: Conservation of Certain Wild Flowers. Federal protection has been proposed for twelve species in Minnesota; however, to date none of these species have been given formal designation as a federally endangered or threatened species. There is a need on both the state and federal levels to up date protection status for Minnesota plants .

ELEMENT OCCURENCES WITHIN THE NSP-TR-2 PROJECT STUDY AREA

Of the 300 species listed by the MNHP, 17 species are known to occur within the boundaries of the Study Area (Table 2). Nearly all of these 17 species enter Minnesota from the south and east and are rare in the state because they occur here on the western or northern periphery of their range. A discussion on each species found within the Study Area describing: the basis for classification as a rare plant, preferred habitat, distribution in Minnesota and United States, pertinent references, location in Study Area, and evaluation of impact by proposed transmission corridors can be found in Appendix E (Status Sheets and Distribution Maps of Rare Plant Occurrences in the Project Study Area).

TABLE 2. Occurrences of Plant Element in Study Area

Occurrence #	Element	MNHP Status	Location
1, Map 1	*Corallorhiza odontorhiza*	Rare	SW¼ SW¼ Sec. 15, T28N, R20W; about 1 mile NW of Afton
2, Map 1	*Helianthemum canadense*	Rare	NE¼ NW¼ Sec. 35, T28N, R20W; about 2 miles south of Afton just west of river bluffs.
3, Map 1	*Linaria canadensis*	Rare	SE¼ NW¼ Sec. 14, T28N, R20W; west side of community of St. Mary's Point.
4 & 5, Map 1	*Liparis lilifolia*	Rare	SW¼ SW¼ Sec. 15, T28N, R20W; about 1 mile NW of Afton. NE¼ SE¼ Sec. 27, T28N, R20W; 1 mile south of Afton.
6 & 9, Map 1	*Baptisia leucantha*	Rare	SW¼ NW¼ Sec. 14, T28N, R20W; just west of community of St. Mary's Point. SE¼ SW¼ Sec. 35, T28N, R20W; about 2.5 miles south of Afton along St. Croix River.
7, Map 1	*Paronychia fastigiata*	Threatened	SE¼ SW¼ Sec. 14, T28N, R20W; south end of community of St. Mary's Point.
8, Map 1	*Penstemon digitalis*	Undetermined	NE¼ SE¼ Sec. 15, T28N, R20W; 0.5 miles north of Afton.
10, Map 1	*Desmodium illinoense*	Threatened	SE¼ SW¼ Sec. 2, T27N, R20W; about 3.5 miles south of Afton just west of river bluffs.
11, Map 1	*Ruellia humilis*	Undetermined	SW¼ SE¼ Sec. 34, T28N, R20W; about 2.25 miles south of Afton.

Table 2 (continued)

Occurrence #	Element	MNHP Status	Location
12 & 21, Maps 1 & 2	*Besseya bullii*	Special Concern	NW¼ SW¼ Sec. 34, T28N, R20W; about 2.25 miles south of Afton just east of Point Douglas Road. NW¼ SE¼ Sec. 28, T113N, R16W; 0.5 miles SW of Welch.
13 & 14, Map 2	*Cristatella jamesii*	Endangered	SE¼ NW¼ Sec. 11, T114N, R17W; about 2 miles SE of Hastings along Hwy 316. NW¼ NE¼ Sec. 11, T114N, R17W; about 2 miles SE of Hastings along Hwy 316.
15, Map 2	*Hieracium longipilum*	Rare	NW¼ NE¼ Sec. 11, T114N, R17W; about 2 miles SE of Hastings along Hwy 316.
16, Map 2	*Arisaema dracontium*	Rare	SE¼ NE¼ Sec. 19, T113N, R15W; junction of Hwy 61 and Cannon River west of Red Wing.
17, Map 2	*Carex grayii*	Rare	SE¼ NE¼ Sec. 19, T113N, R15W; junction of Hwy 61 and Cannon River west of Red Wing.
18, Map 2	*Lesquerella ludoviciana*	Endangered	SE¼ SW¼ Sec. 31, T113N, R14W; near Twin Bluffs Junior High School, Red Wing.
19, Map 2	*Carex muskingumensis*	Rare	SW¼ NW¼ Sec. 28, T113N, R14W; east end of Red Wing on island near Colvill Park.
20, Map 2	*Cheilanthes feei*	Rare	SW¼ NW¼ Sec. 27, T113N, R16W; 0.5 miles east of Welch.

PLANT OCCURRENCES

Seventeen species, identified as rare statewide by the MNHP, are known to occur within the boundaries of the Project Study Area. All of these 17 species are considered rare in Minnesota because they occur here at the western edge of their range. Only two of these species are likely to be affected by transmission line construction. However, it is important to be aware of the location of all rare species within the Study Area for reference in planning access routes for construction and on-going maintenance of the transmission lines.

Liparis lilifolia (occurrence #5, Map 1) is the one rare plant species known to occur within the boundaries of a proposed 1.25 mile-wide corridor. Liparis lilifolia is an orchid of very limited occurrence. Orchids in Minnesota are under jurisdiction of the Department of Agriculture's MN Statute 17.23: Conservation of Certain Wild Flowers.

The habitat of this species is uncharacteristic of Minnesota orchids. Instead of cool, wet swamps, Liparis lilifolia requires warm, dry upland sites of the type that are typical of southeastern Minnesota. However, even where this habitat is common, Liparis lilifolia is rarely seen. In fact, this species is currently known to exist at only two sites in Minnesota. It occurs as a small remnant population at a site in urban St. Paul and as a more viable colony near Afton. Historically, this species is known to have occurred in Dakota, Fillmore, Hennepin, Houston and Wabasha Counties. However, it has not been documented to occur in these counties since 1915. It is possible that Liparis lilifolia is extant in one or more of these counties, but recent searches have failed to locate it. In the absence of recent confirmation, we must assume that this species has suffered a drastic decline in numbers. Additional declines can be expected as the St. Paul site comes under increasing pressure from urban development. The site near Afton may, in fact, be the best hope for the survial of the species in Minnesota. For these reasons it is recommended that every effort be made to preserve the occurrence of Liparis lilifolia located within the boundaries of the proposed corridor C1-C2.

A second species, Carex muskingumensis (occurrence #19, Map 2) is located very near a proposed corridor and may be adversely affected by construction activity. However, if disturbance relating to construction is limited to the corridor, and the wetland habitat adjacent to this population is not disturbed, damage to this species is unlikely.

INTRODUCTION

The Study Area and immediate vicinity have been examined for recognized natural areas including nominated, recommended, or designated Scientific and Natural Areas (SNAs)* and other occurrences of notable plant communities that are known to the Heritage staff at this time. Plant communities which have been identified as being protection priorities in the Study Area are: prairie, oak savanna, mature floodplain forest and mature stands of "Big Woods" vegetation (see Appendix C: Basis for Classification of Plant Community Protection Priorities). The overall quality as well as the availability of information on the following sites varies considerably.

OCCURRENCES WITHIN THE NSP-TR-2 PROJECT STUDY AREA

Washington County

Name of Area: Sand Ridge Prairie
Location in Study Area: Occurrence #45, Map 1.
Description: This site two miles south of Bayport is reported to be a dry prairie on a "sand ridge". The present condition of this site is unknown.

Name of Area: Afton State Park
Location in Study Area: Occurrence #46, Map 1.
Description: Several "use-sensitive areas" designated as potential ecological protection zones in the park management plan (1979) lie within the powerline corridor. These sites include oak savanna, dry prairie bluffs, and a wooded ravine.

Dakota County

Name of Area: Hastings SNA
Location in Study Area: Occurrence #47, Map 2.
Description: This 70-acre tract just southeast of Hastings is one of ten designated SNAs in the state. The property includes a fine example of the "Big Woods" (specifically a sugar maple-basswood-red oak forest) as well as a less mature floodplain forest. The Hastings SNA is subject to Environmental Quality Board rules on the routing of high voltage transmission lines over designated lands (6MCAR 3.073 H2).

*A DNR program designed to "preserve and perpetuate the ecological diversity of Minnesota's natural heritage".

Name of Area: Goat Prairie on Dolomite Outcrops
Location in Study Area: Occurrence #48, Map 2.
Description: A dry, hill prairie, presumed to be of good quality, occurs on south-facing dolomite bluffs above the Cannon River east of Welch. This site was recently nominated for SNA designation.

Name of Area: Maple-Basswood-Oak Forest
Location in Study Area: Occurrence #49, Map 2.
Description: The steep, north-facing slopes of the Cannon River Valley east of Welch contain remnants of "Big Woods" vegetation. This site was recently nominated for SNA desigation.

Name of Area: Cannon River Floodplain/Towerview Area
Location in Study Area: Occurrence #50, Map 2.
Description: A good example of floodplain forest extends along the Cannon River from one mile west of the Highway 61 bridge to the Mississippi River. It includes the 337-acre Towerview Tract in Sec. 20, formerly a Nature Conservancy property that is now owned by the Red Wing School District.

Name of Area: Cannon River Flats
Location in Study Area: Occurrence #51, Map 2.
Description: An extensive floodplain forest at the confluence of the Mississippi and Cannon Rivers. The site includes breeding habitat for the wood turtle, Clemmys insculpta (see Animal Occurrences Section, occurrence #42). The site has been nominated for SNA designation.

Name of Area: Barn Bluff
Location in Study Area: Occurrence #44, Map 2.
Description: This geologic site (see Geologic Features Section, occurrence #44) has been nominated for SNA designation.

PROPOSED OR DESIGNATED NATURAL AREA

There are only two regions where proposed or designated natural areas might be impacted by construction in the proposed transmission line corridors.

Proposed corridor D_1-D_2 crosses Afton State Park (occurrence #46, Map 1). The park management plan identified several potential ecological protection zones in and near the corridor. The "use-sensitive areas" designated as potential ecological protection zones in the part management plan of 1979 should be considered prior to construction of an additional transmission line in this corridor.

Several proposed transmission line corridors traverse the Cannon River Flats area (occurrence #51, Map 2) in the Mississippi River Valley near Red Wing and the Cannon River Floodplain/Towerview area (occurrence #50, Map 2); both areas contain good quality floodplain forest. Parts of the Cannon River Floodplain/Towerview area contain particularly fine stands of floodplain forest. However, due to the relatively narrow width of the Cannon River Valley, it appears that construction within the proposed corridor crossing west of Highway 61 would have little impact on the floodplain forest.

The Cannon River Flats area (occurrence #51, Map 2) was nominated as an SNA primarily as habitat for the wood turtle (see Animal Occurrence Section). In addition, the area is noted as an extensive floodplain forest. The information available on the forest is not complete. It is recommended that more information be obtained on the floodplain forest of this area before this area is seriously considered as a final route for the transmission line.

GEOLOGIC FEATURES

INTRODUCTION

The Project Study Area has been examined for unique and/or exemplary geologic features identified as priority for protection in the State of Minnesota. Two sites within the Study Area have been identified as being of particular concern: Barn Bluff, Red Wing, and the Graptolite Fossil Site near Afton.

OCCURRENCES WITHIN THE NSP-TR-2 PROJECT STUDY AREA

Washington County

Name of Feature: Graptolite Fossil Site
Location in the Study Area: Occurrence #43, Map 1
Description: Graptolites are a primitive marine colonial organism known to be an excellent index fossil of the Paleozoic Era. This site, located just south of the town of Afton is believed to be the best occurrence of this index fossil in the state. The fossil bed of graptolites is in a soft siltstone of the St. Lawrence Formation, exposed at water level in a small creek. The site would be sensitive to any construction occurring either in the immediate vicinity or upstream of the fossil bed, however, the closest proposed corridor is approximately one mile away so that adverse impact on this site is not anticipated.

Goodhue County

Name of Feature: Barn Bluff
Location in the Study Area: Occurrence #44, Map 2
Description: Barn Bluff is significant geologically for many reasons. It was once part of an island in the glacial Mississippi River. At least three geologic formations (Cambrian, Ordovician, and Pleistocene) and their contacts are exposed here. A large high-angle fault, the only exposed example in southern Minnesota, cuts through and displaces the rocks NW/SE. In addition, the site contains excellent trilobite fossils and other fossiliferous strata.

Barn Bluff has been nominated as an SNA (see Natural Areas Section). The proposed transmission corridors do not cross Barn Bluff so destruction or degradation of the feature is not anticipated.

GEOLOGIC FEATURES

The two geologic sites that occur within the boundaries of the Project Study Area are not in danger of detrimental impact related to the proposed transmission line corridors.

The Minnesota Natural Heritage Program (MNHP) is a centralized, computer-based information system that locates those natural communties, plant and animal species, and geologic features most needing protection throughout the state of Minnesota. The information system makes possible a more objective evaluation of lands and ecological resources so that decision-makers can use this system to evaluate alternative courses of action, especially in routing decisions, before commitments are made. The MNHP system has been searched for all records of rare, threatened and/or exemplary Elements of natural diversity in the Project NSP-TR-2 Study Area.

In the Study Area north of Hastings (MAP 1) rare, threatened and/or exemplary Elements are found either within or immediately adjacent to corridor crossings B1-B2, C1-C2, and D1-D2.

Corridor B1-B2: A mussel bed, the location of the federally endangered Higgin's Eye Mussel and six other mussels considered by the MNHP to be of statewide significance (occurrences 23-32, Map 1), occurs just to the north of this proposed corridor crossing. Due to the richness of the mussel fauna at this site and the nearby presence of a federally endangered species, the MNHP advises against the use of proposed corridor B1-B2 for an underground crossing of the transmission line.

Corridor C1-C2: A rare orchid Liparis lilifolla (occurrence #5, Map 1) occurs within the boundaries of this proposed corridor. This occurrence, one of two sites known in the state, is believed to be the most viable population of the species in the state. Liparis lilifolia, as an orchid species, is under jurisdiction of the Department of Agriculture's MN Statute 17.23: Conservation of Certain Wild Flowers. For these reasons it is recommended that every effort be made to preserve the occurrence of this species located within the boundaries of the proposed corridor C1-C2.

Corridor D1-D2: Proposed corridor D1-D2 crosses Afton State Park (occurrence #46, Map 1). The park management plan identified several potential ecological protection zones in and near the corridor. The "use-sensitive areas" designated as potential ecological protection zones in the park management plan of 1979 should be considered prior to construction of an additional transmission line in this corridor.

In the Study Area south of Hastings (Map 2) rare, threatened and/or exemplary Elements are found either within or immediately adjacent to the Prescott, "Floodplain", and "East of Red Wing" corridors.

Prescott Corridor: Two mussel species, one considered Threatened by the MNHP (occurrence #34, Map 2) and one designated as Status Undetermined (occurrence #35, Map 2), have been observed immediately upstream and downstream of the proposed corridor that crosses the river near Prescott, Wisconsin. Based on the evidence available, crossing the river at this site would not be advocated unless the construction design caused little or no substrate disturbance and/or deterioration of water quality.

"Floodplain" Corridors: The "Floodplain" corridors refer to those proposed routes that cross the floodplain forests to the north and west of the town of Red Wing. The parts of these corridors that are of concern from an ecological point-of-view are best identified by occurrences #38, #42, #50 and #51 on Map 2.

Construction of a transmission line in early Spring and Summer could disrupt the breeding activities of the birds associated with the Devil's Lake Rookery (occurrence #38, Map 2) if this route were selected. Isolation is believed to be an important component of the nesting habits of great blue herons and great egrets, the two species nesting at this rookery.

Occurrence #42 (Map 2) and occurrence #51 (Map 2) represent the optimal breeding habitat for the wood turtle, a rare species in Minnesota, and an example of a mature floodplain forest, a Protection Priority of MNHP. This area has been nominated for inclusion within the Scientific and

Natural Areas Program of the DNR. The potential effects on the turtle population and the floodplain forest are not understood, but the recognition this area has received as a potential natural area should be given consideration.

Occurrence #50 (Map 2) indicates the location of a mature floodplain forest. This area has been recognized as a "good example" of a mature floodplain forest. As a MNHP Protection Priority, this area should be noted in the planning process. However, it appears that the impact of the two corridor crossings in this vicinity would be reduced due to the relative narrowness of the valley.

"East of Red Wing" Corridor: This corridor crosses a wetland area east of Red Wing near Colvill Bay. Carex muskingumensis (Muskingumensis Sedge) (occurrence #19, Map 2) is located very near this proposed corridor. The wetland habitat of this species could be adversely affected by construction activity. However, if disturbance relating to construction is limited to the corridor boundaries, damage to this species is unlikely.

This discussion summarizes the information available at this time from the Minnesota Natural Heritage Program data-base. Proposed corridor routes not discussed in this final summary have no known occurrences located either within or adjacent to the proposed corridor boundaries. For more detailed information about the Elements that may potentially be adversally affected by the construction of a transmission line, see the appropriate section in this report or refer to the detailed status sheet in the appendices.

DEFINITION OF NATURAL HERITAGE PROGRAM STATUS CATEGORIES

ENDANGERED

Species that face extirpation in Minnesota in the forseeable future if efforts are not made to preserve their remaining populations. This category includes species that have been listed as federally endangered.

THREATENED

Species that may become endangered if their populations are significantly reduced. Species assigned to this category might be characterized by:

1. Populations that have always been small and any decline in their numbers would be significant, and/or

2. Populations that have already undergone an apparent decline and for whom any further decline would be detrimental.

This category includes species that have been listed as federally threatened.

RARE

Species that are not currently endangered or threatened but by virtue of their limited occurrence warrant close scrutiny. This category includes species for which there is currently no evidence of a decline in species population or for which the decline is not yet considered significant.

STATUS UNDETERMINED

Species that may belong in one of the preceeding categories but for which there is too little current information to make a judgment.

SPECIAL CONCERN

Species that do not belong in one of the preceeding categories but do require special attention. Included are:

1. Species subjected to species-specific exploitation, and

2. Species whose habits and habitats lend them to being particularly vulnerable to disturbance.

RECENTLY EXTIRPATED

Species that have disappeared from Minnesota since 1800. Some of the species could perhaps reestablish populations in the state should environmental conditions become more favorable.

APPENDIX B

BASIS FOR CLASSIFICATION OF PLANT COMMUNITY PROTECTION PRIORITIES

The following plant communities are among the plant community protection priorities for the state based on the reasons cited below:

Prairie: Dry, mesic, and wet prairie once covered approximately one third of the State. Now a disproportionately small percentage of these plant communities remain and many of the remnants are threatened by agricultural development. In southeastern Minnesota, "Goat" or hill prairies occurring on steep south-or west-facing bluffs are of particular concern.

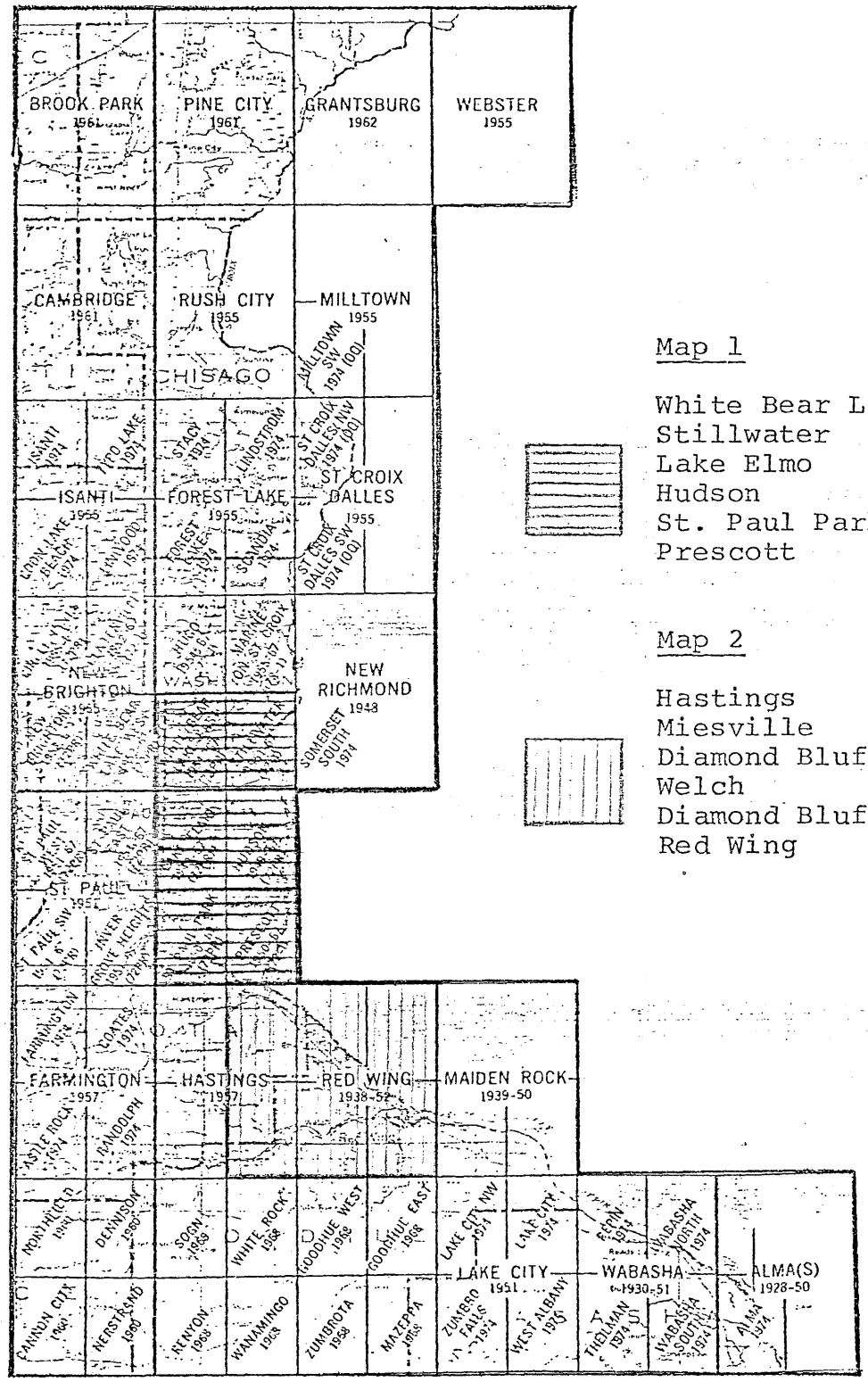
Oak Savanna: True oak savannas, plant communities that consist of native prairie vegetation interspersed with occassional oaks - typically bur oak (Quercus macrocarpa), are presently infrequent in Minnesota. Savannas are maintained by fire but with the advent of fire suppression many oak savannas developed into oak woodlots. (Savanna-like areas are sometimes maintained by grazing.)

Floodplain Forest: Mature floodplain forests containing a diverse herbaceous layer are presumed to have been more common in the past. Because of their relative rarity and vulnerability to disturbance this community is considered a protection priority.

"Big Woods": The deciduous woods of central and southeastern Minnesota that are dominated by sugar maple, basswood, red oak, and American elm have historically been called the "Big Woods". Remnant woodlots of this once frequent plant community, that have been relatively undisturbed by grazing or logging, are a protection priority.

APPENDIX C

PROJECT NSP-TR-2 STUDY AREA



Map 1

White Bear Lake East
Stillwater
Lake Elmo
Hudson
St. Paul Park
Prescott

Map 2

Hastings
Miesville
Diamond Bluff West
Welch
Diamond Bluff East
Red Wing

STATUS SHEET

ELEMENT NAME: Lampsilis higginsi (Higgin's Eye Pearly Mussel); freshwater mussel

FEDERAL STATUS: Endangered.

STATE STATUS: None.

NATURAL HERITAGE PROGRAM STATUS: Endangered

BASIS FOR STATUS CLASSIFICATION: While the literature includes no statement that Lampsilis higginsi was ever abundant anywhere, it was formerly considered a valuable commercial species in Lake Pepin, of the Mississippi River, because of its porcelain colored thick shell. Once widely distributed, it is today rare and is an imminent danger of extinction. The species has been assigned endangered status by the U.S. Department of the Interior. In contrast to the many records early in this century of this species from Red Wing, Mn., to Busch, Mo., the National Museum in Washington, D.C. has no live specimens collected since 1932.

PREFERRED HABITAT: Lampsilis higginsi is generally considered to be a species of the larger rivers. Recent observations of this species in the St. Croix River and the Mississippi River described the substrate as mud with an admixture of gravel and stones. Specific habitat requirements, such as degree of oxygenation of the water, are largely unknown although the "critical habitat" of Lampsilis higginsi probably requires few or no factors that are not among those required by almost any Upper Mississippi mussel (Fuller 1978).

DISTRIBUTION: Historically Lampsilis higginsi was reported in the Mississippi River from just above the mouth of the Missouri River, north to Red Wing, Mn. It was also found extensively in the Illinois and Iowa Rivers, and to some extent in the Elkhorn River, Nebraska; the Ohio River; the Black and White Rivers, Arkansas; and St. Croix and Minnesota Rivers, Mn. Currently it is believed to be largely restricted to the states of Minnesota and Illinois, as well as the Meramec River in Misscuri. Above Cairo, Illinois, it is associated only with the Mississippi River System including the St. Croix River and possibly the Minnesota River. Since 1966, approximately 30 live specimens have been reported from 15 different sites in the Upper Mississippi River.

See attached distribution maps.

OCCURRENCES IN MINNESOTA:

Six recent (1965 - present) observations of Lampsilis higginsi have been recorded for the St. Croix River in the vicinity of the Hudson railroad bridge (River Miles 16.5-18.1). This site is also noteworthy due to the presence of a gravid female of this species in 1977 (Fuller 1978), suggesting potential reproduction. Other observation sites within the state include the Mississippi River just above the Iowa border (River mile 888.5) and a potential record above New Ulm in the Minnesota River.

OF OCCURRENCES IN MANAGED AREAS:

One observation site on the Mississippi River (River Mile 888.5) is within the boundaries of a national wildlife refuge. All other occurrences are in unmanaged areas.

POTENTIAL THREATS TO SPECIES:

Sedimentation, or substrate destruction, and chemical pollution are the factors most commonly associated with the population decline of Lampsilis higginsi. Another factor of possible importance might have been excessive commercial harvest on a species which might never have been truly abundant.

REFERENCES:

Imlay, M. 1971. Bioassay tests with naiads. Pp 38-41. In: Rare and endangered mollusks of the U.S.; A Symposium; S. Jorgensen and R. W. Sharp, Editors. Bureau of Sport Fisheries and Wildlife, U.S. Dept. of the Interior, Twin Cities, Mn. August 1971.

Fuller, S. L. H. 1978. Final Report. Fresh water mussels (Mollusca; Bivalvia; Unionidae) of the Upper Mississippi River: Observations at selected sites within the 9-foot channel navigation project on behalf of the United States Army Corps of Engineers. The Academy of Natural Sciences of Philadelphia, Division of Limnology and Ecology. Philadelphia, Pa. 401 pp.

Nelson, D. A. and T. M. Freitag. 1979. Ecology, identification, and recent discoveries of Higgin's eye, spectacle case, and fat pocketbook. U.S. Army Corp. of Engineers, Rock Island District, Rock Island, Ill.

Endangered Species, Great Lakes Region, U.S. Dept. of the Interior, Fish and Wildlife Service. 1979 with supplements.

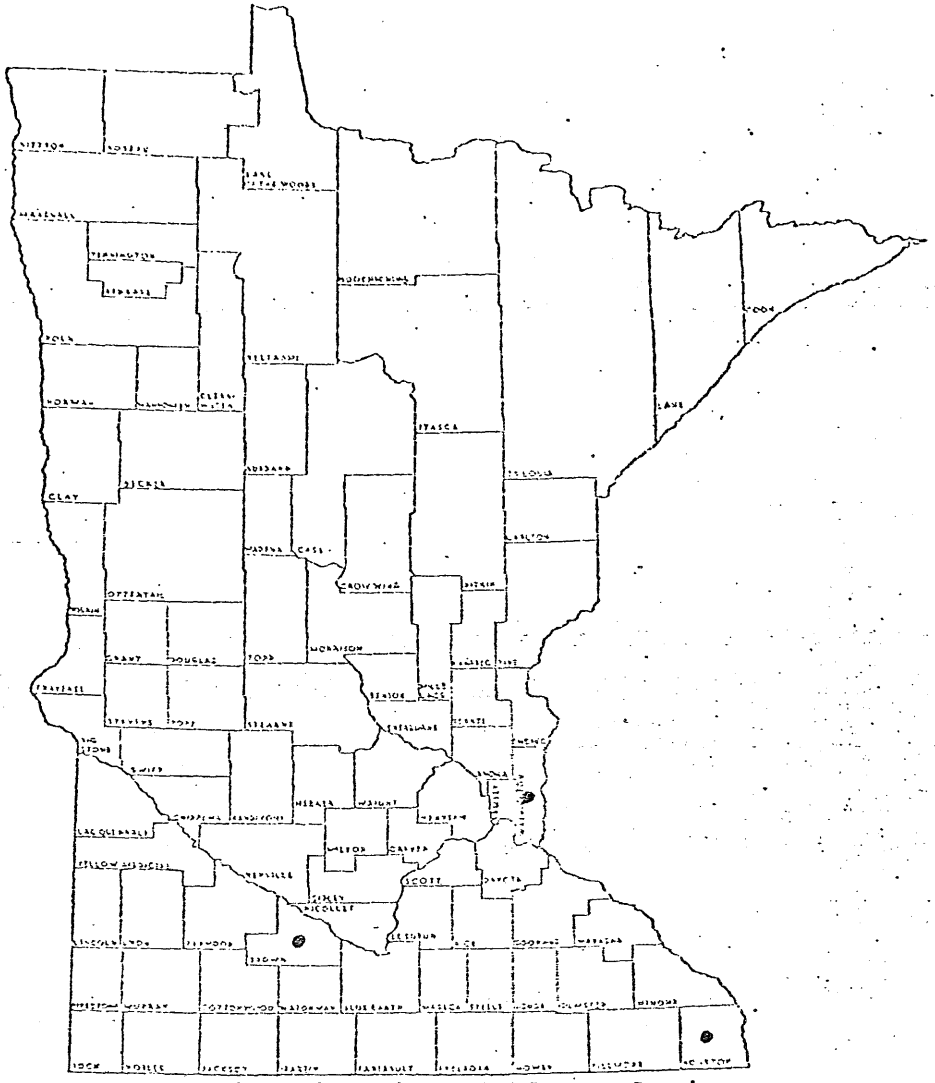
LOCATION IN STUDY AREA:

Occurrence # 23, 24 and 32, Map 1.

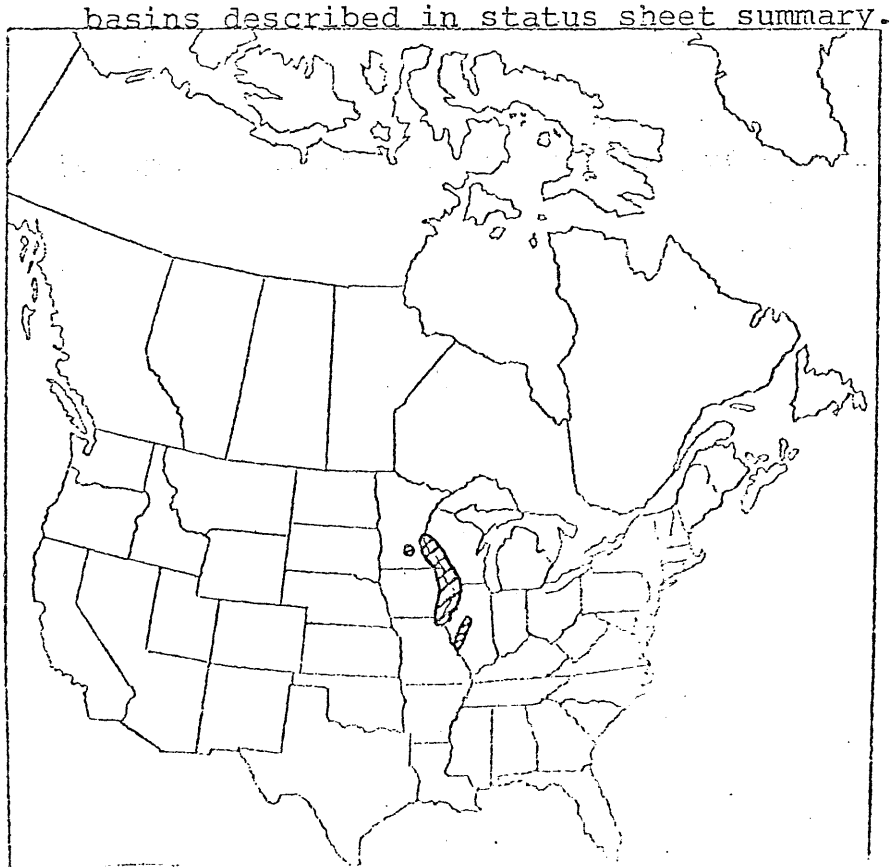
EVALUATION:

It is reasonable to assume that any form of substrate disturbance at or immediately above locations of Lampsilis higginsii would be detrimental to those populations. For this reason underwater crossings should be avoided near known occurrences of this species.

Distribution of Lampsilis higginsi
(Higgin's Pearly Eye; freshwater mussel)



National distribution follows drainage basins described in status sheet summary.



0706A

STATUS SHEET

ELEMENT NAME: Elliptio crassidens (Elephant Ear); freshwater mussels

FEDERAL STATUS: None

STATE STATUS: None

NATURAL HERITAGE PROGRAM STATUS: Endangered

BASIS FOR STATUS CLASSIFICATION: There is no firm evidence that suggests that Elliptio crassidens was ever relatively common in the Upper Mississippi River. Today, however, this species faces almost certain extinction in the Upper Mississippi basin due primarily to the completion of the Koekuk Dam during 1913. The construction of this dam disrupted the upstream migration of the skipjack herring, Alosa chrysochloris, the only recorded glochidial host of Elliptio crassidens (Fuller 1978). The elimination of the host for this essential stage in the life history of the Elephant Ear has resulted in its gradual and steady decline.

PREFERRED HABITAT: Due to the scarcity of this species since at least the time of the Ellis survey during 1930 and 1931, it is no longer possible to define the optimal habitat. Dawley (1947) classifies this species as primarily occupying large rivers within Minnesota.

DISTRIBUTION: Elliptio crassidens, although declining rapidly in the Upper Mississipi River basin, is still established in portions of the Ohio, Green and Tennessee Rivers (Williams 1969).

OCCURRENCES IN MINNESOTA: Apparently the only recent record of live specimens is from the St. Croix River adjacent to Washington County (Fuller 1978). Havlik (1977) includes this species as part of the fauna of the Minnesota River, based on occurrences of shells only. Dawley (1947) notes past occurrences in the Mississippi River from Red Wing and points south, and also in the Minnesota River.

OF OCCURENCES IN MANAGED AREAS: None of the recent observations of this species are known to occur in managed areas.

POTENTIAL THREATS TO SPECIES:

The disruption of the migration of the skipjack herring can largely explain the decline of Elliptio crassidens (Fuller 1978). It should be recognized, however, that sources of harm to other mussel species, such as water quality deterioration may also affect Elliptio crassidens.

REFERENCES:

Dawley, C. 1947. Distribution of aquatic mollusks in Minnesota. The American Midland Naturalist 38:671-697.

Fuller, S.L.H. 1978. Final Report. Fresh water mussels (Mollusca: Bivalvia: Unionidae) of the Upper Mississippi River: observations at selected sites within the 9-foot channel navigation project on behalf of the United States Army Corps of Engineers. The Academy of Natural Sciences of Philadelphia, Division of Limnology and Ecology. Philadelphia, Pa. 19103.

Havlik, M.E. 1977. Naiad mollusks of the Minnesota River at Savage, Minnesota, March 1977. Progress Report submitted to St. Paul District, U.S. Army Corps of Engineers.

Williams, J.C. 1969. Mussel fishery investigations, Tennessee, Ohio and Green Rivers. Murray State University Biological Station, Murray, Kentucky. Pp. 1-107.

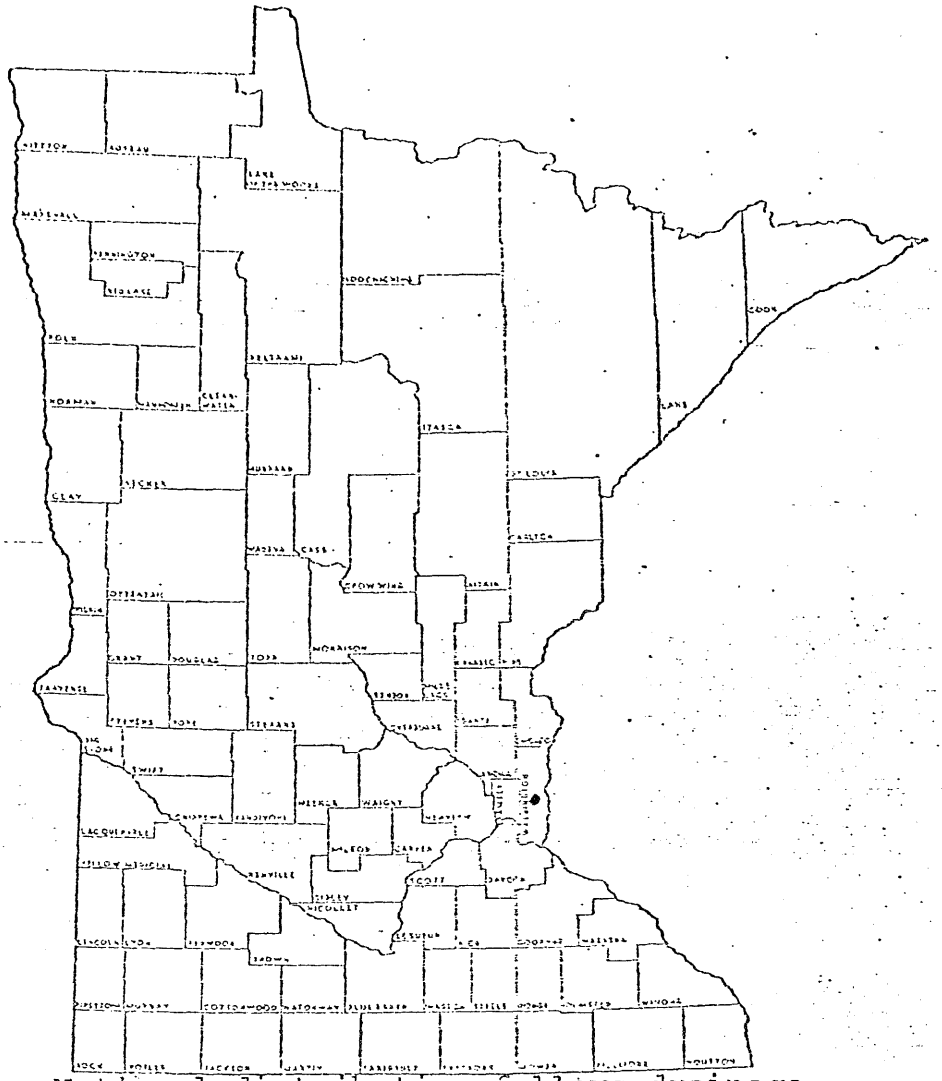
LOCATION IN STUDY AREA:

Occurence # 25, Map 1.

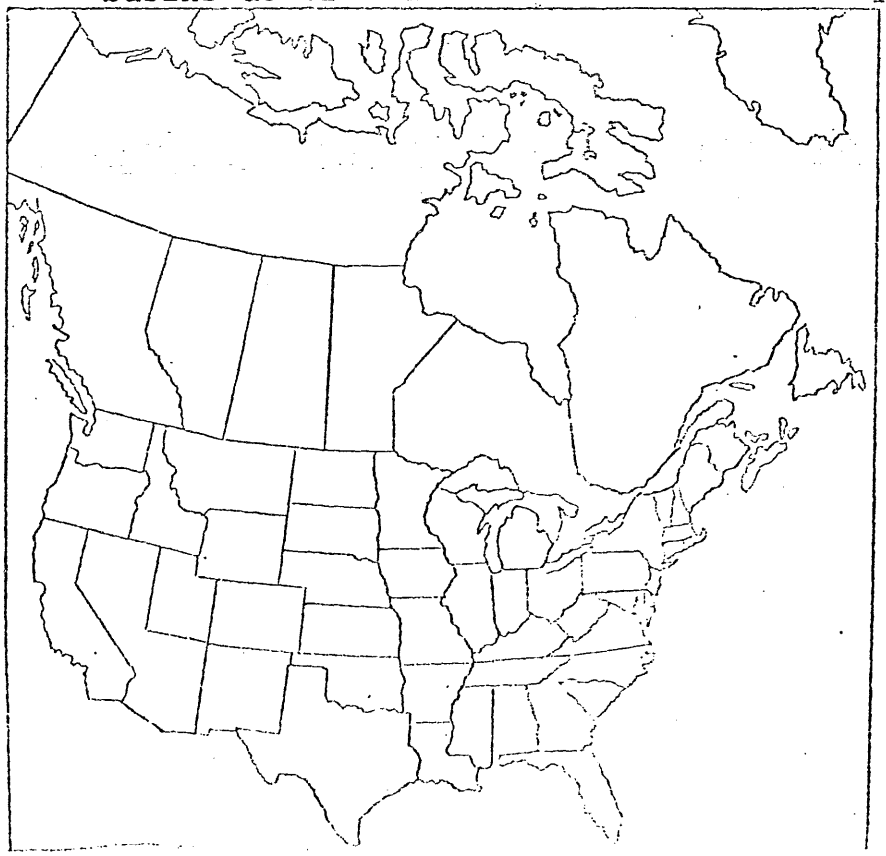
EVALUATION:

Known occurrences of this species should be afforded all possible protection from disturbance. As there is only one recent observation site, construction in this site which might disturb the stream should be avoided.

Distribution in Minnesota of Elliptio crassidens
(Elephant's Ear Mussel; freshwater mussel)



National distribution follows drainage basins described in status sheet summary.



STATUS SHEET

ELEMENT NAME: Ellipsaria lineolata (Butterfly); freshwater mussel

FEDERAL STATUS: None

STATE STATUS: None

NATURAL HERITAGE PROGRAM STATUS: Threatened

BASIS FOR STATUS CLASSIFICATION: Ellipsaria lineolata was considered a comparatively rare species even in the early 1900's (Coker 1919). Since that time this species has suffered a dramatic decline in its range in the Upper Mississippi River and has been extirpated from much of its former range (Fuller 1978).

PREFERRED HABITAT: Recent occurrences of Ellipsaria lineolata have been limited to rich seams or actual beds of mussels, on mud, and/or gravel bottoms (Fuller 1978). This species apparently is most abundant in larger rivers (Dawley 1947).

DISTRIBUTION: The distribution of Ellipsaria lineolata in the Mississippi basin is of primary interest since it apparently is the only river basin where this species has been recorded. Fuller (1978) states that this species persists in the St. Croix River and in pools within the Rock Island District of the Mississippi River, but very rare or extirpated almost everywhere else in the Upper Mississppi River.

OCCURRENCES IN MINNESOTA: During a survey of selected pools of the Mississippi River in 1965, Finke (1966) found a total of four individuals of Ellipsaria lineolata within Minnessota. The only other recent record is from the St. Croix River adjacent to Washington County. Havlik (1977) includes this species in a molluscan faunal list of the Minnesota River, based on occurrences of shells only. Dawley (1947) summarized this species' Minnesota distribution as the Mississippi River south of St. Anthony's Fall and the Minnesota River.

OF OCCURENCES IN MANAGED AREAS: Observations of this species in portions of the Mississippi River adjacent to Wabasha and Winona counties are included within a national wildlife refuge.

POTENTIAL THREATS TO SPECIES:

Declining water quality apparently is to blame for reduced populations of this species in other states and it is reasonable to suspect a similar problem for Minnesota populations. Excessive harvesting of this species, highly prized by the pearl button industry, has been a cause of decline in the past (Fuller 1978) and the population may never have recovered.

REFERENCES:

Coker, R.E. 1919. Fresh-water mussels and mussel industries of the United States. Bull. of the Bur. of Fisheries, 36; 13-89. Separately issued as Bureau of Fisheries Document No. 865.

Dawley, C. 1947. Distribution of aquatic mollusks in Minnesota. The American Midland Naturalist 38:671-697.

Finke, A.H. 1966. Report of a mussel survey in Pools 4A (Lake Pepin), 5, 6, 7 and 9 of the Mississippi River during 1965. Wisconsin Department of Natural Resources, La Crosse Pp. 1-15.

Fuller, S.L.H. 1978. Final Report. Fresh water mussels (Mollusca: Bivalvia: Unionidae) of the Upper Mississippi River: observations at selected sites within the 9-foot channel navigation project on behalf of the United States Army Corps of Engineers. The Academy of Natural Sciences of Philadelphia, Division of Limnology and Ecology. Philadelphia, Pa. 19103.

Havlik, M.E. 1977. Naiad mollusks of the Minnesota River at Savage, Minnesota, March 1977. Progress Report submitted to St. Paul District, U.S. Army Corps of Engineers.

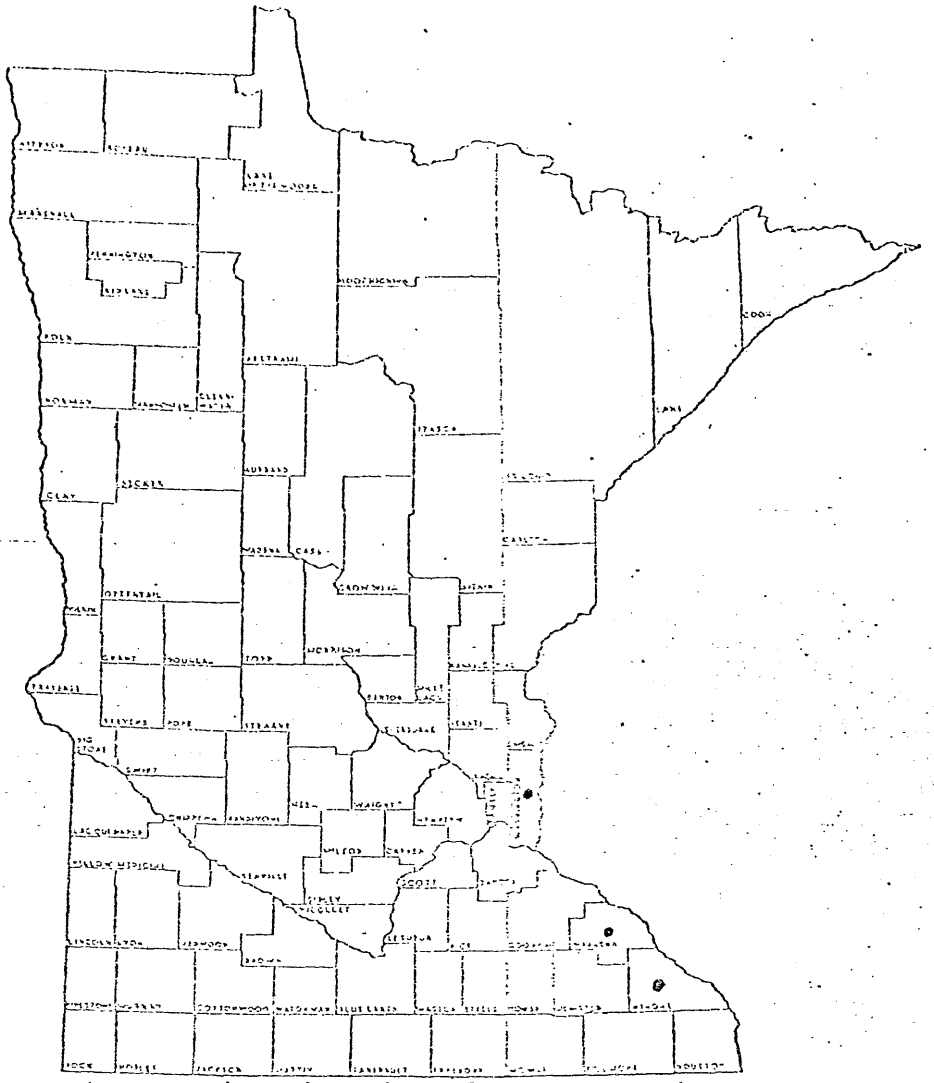
LOCATION IN STUDY AREA:

Occurrence # 26, Map 1.

EVALUATION:

Populations of this species in Minnesota should be carefully protected. Any type of construction likely to cause disturbance to the streambed habitat should be avoided.

Distribution in Minnesota of Ellipsaria lineolata
(Butterfly; freshwater mussel)



National distribution follows drainage basins described in status sheet summary.

STATUS SHEET

ELEMENT NAME: Lasmigona complanata (White Heelsplitter); freshwater mussel

FEDERAL STATUS: None

STATE STATUS: None

NATURAL HERITAGE PROGRAM STATUS: Status Undetermined

BASIS FOR STATUS CLASSIFICATION: Recent surveys have shown that this species is still relatively uncommon in the Upper Mississippi River and based on its occurrences there Lasmigona complanata would be assigned rare status. This species, however, demonstrates a wide range of habitat use. While its occurrence in smaller rivers and streams within the state has been formerly documented, recent surveys have not been conducted to evaluate the current status of Lasmigona complanata

PREFERRED HABITAT: Lasmigona complanata apparently is best adapted for slow water and sedimentary areas. As such this species would be expected to benefit from impoundment of riverine systems, although no significance increase has been observed in the Upper Mississippi River over the past 50 years (Fuller 1978).

DISTRIBUTION: The original range of this species was the Mississippi River basin but Lasmigona complanata has also invaded the St. Lawrence River basin as well as the Canadian Interior basin (Fuller 1978).

OCCURRENCES IN MINNESOTA: Recent surveys of the Upper Mississippi River have detected this species in the St. Croix River, Washington County, and in the Mississippi River adjacent to Dakota County. Dawley (1947) reports the distribution of this species to include small, medium and large rivers of the Mississippi drainage south of St. Anthony Falls; the Minnesota, St. Croix, Hudson Bay and St. Lawrence drainages; Lake of the Woods and Lake Superior.

OF OCCURENCES IN MANAGED AREAS: No recent observations are from managed areas.

POTENTIAL THREATS TO SPECIES:

There are no specific factors that have been identified that strongly influence populations of this species. It is responsible to assume, however, that important factors affecting other mussels, such as substrate disturbance and water pollution, would have some detrimental effect on Lasmigona complanata.

REFERENCES:

Dawley, C. 1947. Distribution of aquatic mollusks in Minnesota. The American Midland Naturalist 38:671-697.

Fuller, S.L.H. 1978. Final Report. Fresh water mussels (Mollusca: Bivalvia: Unionidae) of the Upper Mississippi River: observations at selected sites within the 9-foot channel navigation project on behalf of the United States Army Corps of Engineers. The Academy of Natural Sciences of Philadelphia, Division of Limnology and Ecology. Philadelphia, Pa. 19103.

van der Schalie, H. and A. van der Schalie. 1950. The mussels of the Mississippi River. American Midland Naturalist 44:448-466.

LOCATION IN STUDY AREA:

Occurrence # 27, Map 1; 35, Map 2.

EVALUATION:

While the current status of this species outside of the Mississippi River is undetermined, Lasmigona complanata is rare within the Upper Mississippi River and observation sites of this species within this system should be afforded a certain degree of protection. Occurrence #27 on the St. Croix River is immediately upstream from a potential crossing site. Stream bed disturbance should be avoided in this vicinity.

NOTE:

No state distribution map presented since there is no current information on distribution or abundance of this species in smaller streams and rivers of the state.

STATUS SHEET

ELEMENT NAME: Actinonaias carinata (Mucket); freshwater mussel

FEDERAL STATUS: None

STATE STATUS: None

NATURAL HERITAGE PROGRAM STATUS: Threatened

BASIS FOR STATUS CLASSIFICATION: The Upper Mississippi River population of A. carinata has dwindled drastically from former levels. At one point it was extremely important in pearl button manufacture. However, in the Ellis' survey of 1930-31 (van der Schalie and van der Schalie 1950) and in a more recent survey of the Upper Mississippi River by Fuller (1978) this species represented less than 1% of the living specimens observed. A. carinata may now be below recruitment level in the Upper Mississippi River (Fuller 1978).

PREFERRED HABITAT: Little is known about the specific habitat requirements of A. carinata. Parmalee (1967) reported a preference of this species for gravel streambed. Dawley (1947) reported this species to prefer medium sized and large rivers in Minnesota.

DISTRIBUTION: This species was widespread in the Mississippi basin, but has become greatly reduced in more than one portion of this basin (Fuller 1978). A. carinata formerly occurred in all parts of the Mississippi drainage and the Hudson Bay drainage (Dawley 1947).

OCCURRENCES IN MINNESOTA: Recent records of live specimens are limited to five observations in the Mississippi River bordering Goodhue, Dakota and Ramsey counties (Fuller 1978, Thiel et al 1978) and an observation of 2 adults in the St. Croix River adjacent to Washington County (Fuller 1978). Dead shells of this species have been found in the Minnesota River near Savage but the location of any surviving populations in this river are undetermined (Havlik 1977).

OF OCCURENCES IN MANAGED AREAS: None of the recent observations of this species are known to occur in areas providing suitable protection.

POTENTIAL THREATS TO SPECIES: Possible reasons for the decline of this species might include habitat (i.e. streambed) disturbance and alteration, declining water quality, and/or excessive commercial harvest (Fuller 1978).

REFERENCES:

Dawley, C. 1947. Distribution of aquatic mollusks in Minnesota. The American Midland Naturalist 38:671-697.

Havlik, M.E. 1977. Naiad mollusks of the Minnesota River at Savage, Minnesota, March 1977. Progress Report submitted to St. Paul District, U.S. Army Corps of Engineers.

Parmalee, P.W. 1967. The fresh-water mussels of Illinois. Illinois State Museum Popular Science Series 8:1-108.

Thiel, P., M. Talbot and J. Holzer, 1979. Survey of mussels in the Upper Mississippi River pools 3 through 8. Wisconsin Department of Natural Resources (3-276-R).

van der Schalie, H. and A. van der Schalie. 1950. The mussels of the Mississippi River. American Midland Naturalist 44:448-466.

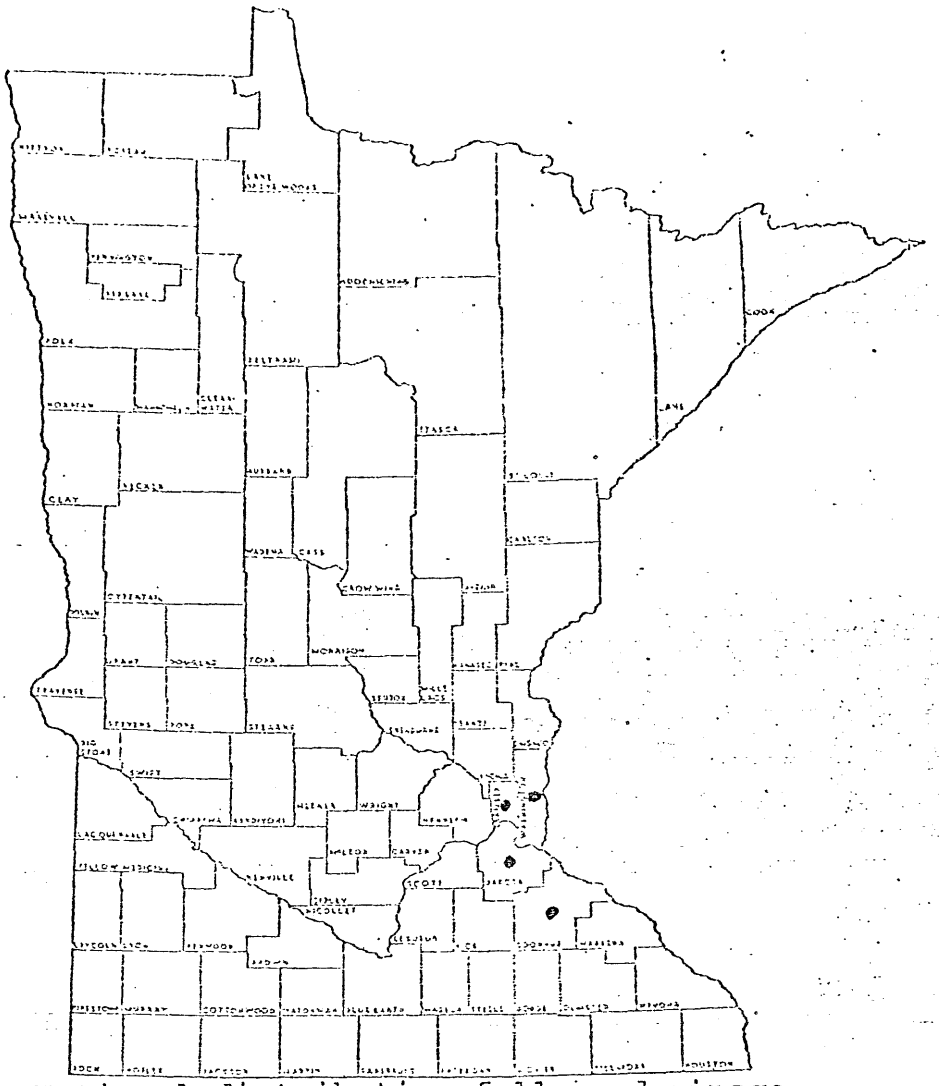
LOCATION IN STUDY AREA:

Occurrence # 28, Map 1; 34 and 37, Map 2.

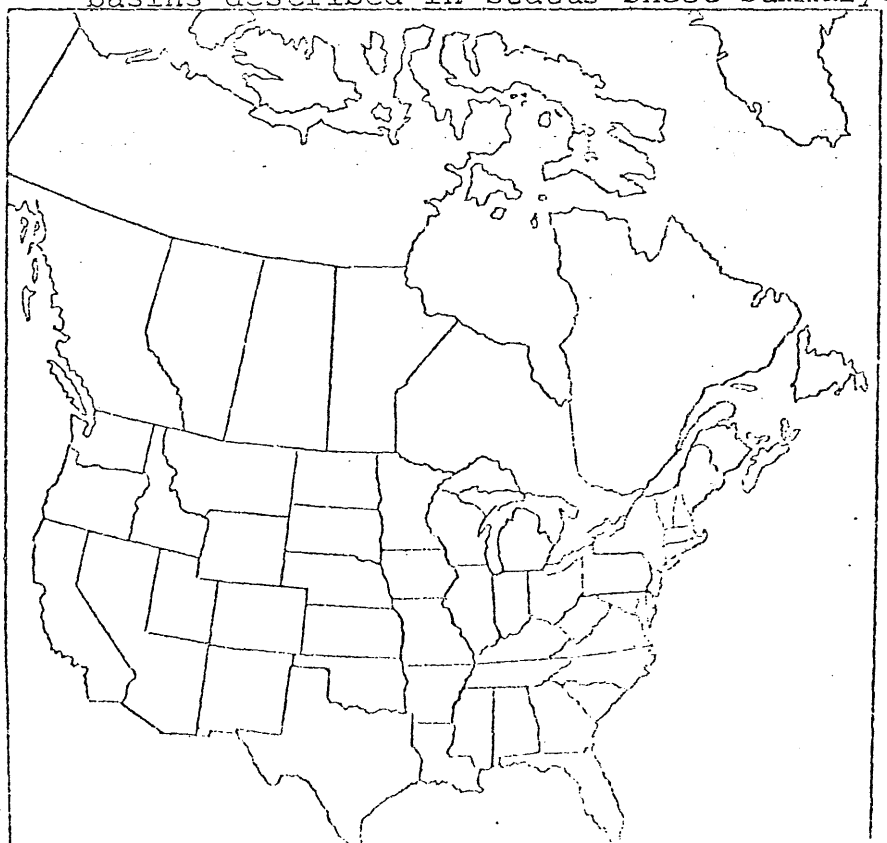
EVALUATION:

Any type of construction resulting in streambed disturbance should be viewed as potentially harmful to any nearby populations of A. carinata.

Distribution in Minnesota of Actinonaias carinata
(Mucket; freshwater mussel)



National distribution follows drainage basins described in status sheet summary.



STATUS SHEET

ELEMENT NAME: Tritogonia verrucosa (Buckhorn); freshwater mussel

FEDERAL STATUS: None

STATE STATUS: None

NATURAL HERITAGE PROGRAM STATUS: Endangered

BASIS FOR STATUS CLASSIFICATION: In a recent survey of the Upper Mississppi River, this species was encountered at only one site and would appear to be nearly extirpated in this basin (Fuller 1978). The current population status of Tritogonia verrucosa contrasts with its former widespread and common occurrence in the Upper Mississippi basin.

PREFERRED HABITAT: A species of large rivers in Minnesota (Dawley 1947), Tritogonia verrucosa prefers gravelly streambeds although a range of habitats is acceptable (Fuller 1978).

DISTRIBUTION: This species ranges widely in the Mississippi basin and the Gulf drainage (Fuller 1978). Apparently this species is maintaining healthy populations in some portions of its range in contrast to the situation in the Upper Mississippi.

OCCURRENCES IN MINNESOTA: The only two recent observations of this species occurs in the St. Croix River, adjacent to Washington County and the Mississippi River adjacent to Houston County. This species formerly occurred in the Minnestoa River and its continuance there cannot be completely ruled out (Havlik 1977).

OF OCCURENCES IN MANAGED AREAS: One recent occurrence from Houston County falls within the boundary of a national wildlife refuge.

POTENTIAL THREATS TO SPECIES: Although no factor can be completely ruled out, it would appear that suitable habitat for this species still exists within the Upper Mississippi basin. The presence of a population of Tritogonia verrucosa in the St. Croix River, a relatively clean stream, suggests that poor water quality may be limiting its distribution in the mainstream of the Mississippi River. Nearly 50 years ago, it was demonstrated that the reproduction of Upper Mississisppi mussels was being disrupted by bacteria and protozoans (Ellis 1931). It may be that Tritogonia verrucosa is particularly susceptible to this type of disturbance (Fuller 1978).

REFERENCES:

Dawley, C. 1947. Distribution of aquatic mollusks in Minnesota. The American Midland Naturalist 38:671-697.

Ellis, M.M. 1931. Some factors affecting the replacement of the commercial fresh-water mussels. United States Bureau of Fisheries. Circular No. 7:1-10.

Fuller, S.L.H. 1978. Final Report. Fresh water mussels (Mollusca: Bivalvia: Unionidae) of the Upper Mississippi River: observations at selected sites within the 9-foot channel navigation project on behalf of the United States Army Corps of Engineers. The Academy of Natural Sciences of Philadelphia, Division of Limnology and Ecology. Philadelphia, Pa. 19103.

Havlik, M.E. 1977. Naiad mollusks of the Minnesota River at Savage, Minnesota, March 1977. Progress Report submitted to St. Paul District, U.S. Army Corps of Engineers.

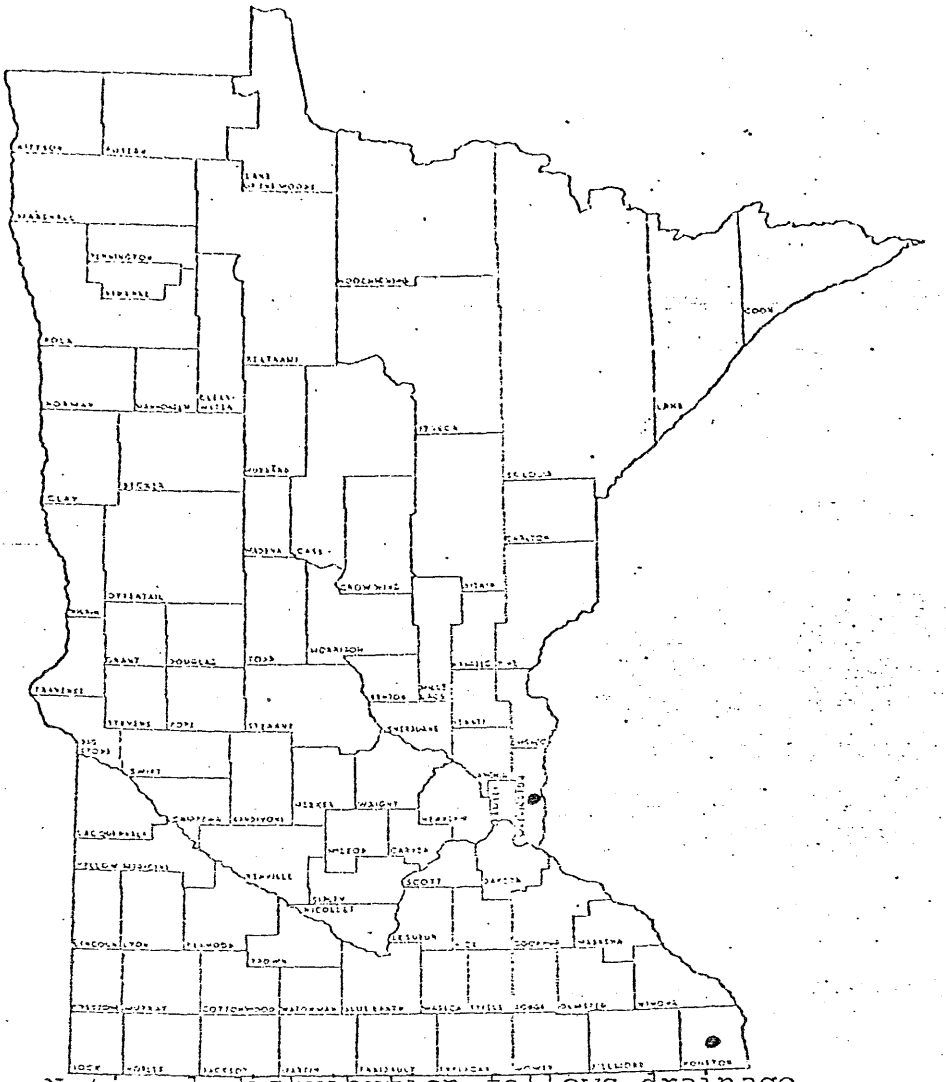
LOCATION IN STUDY AREA:

Occurence # 29, Map 1.

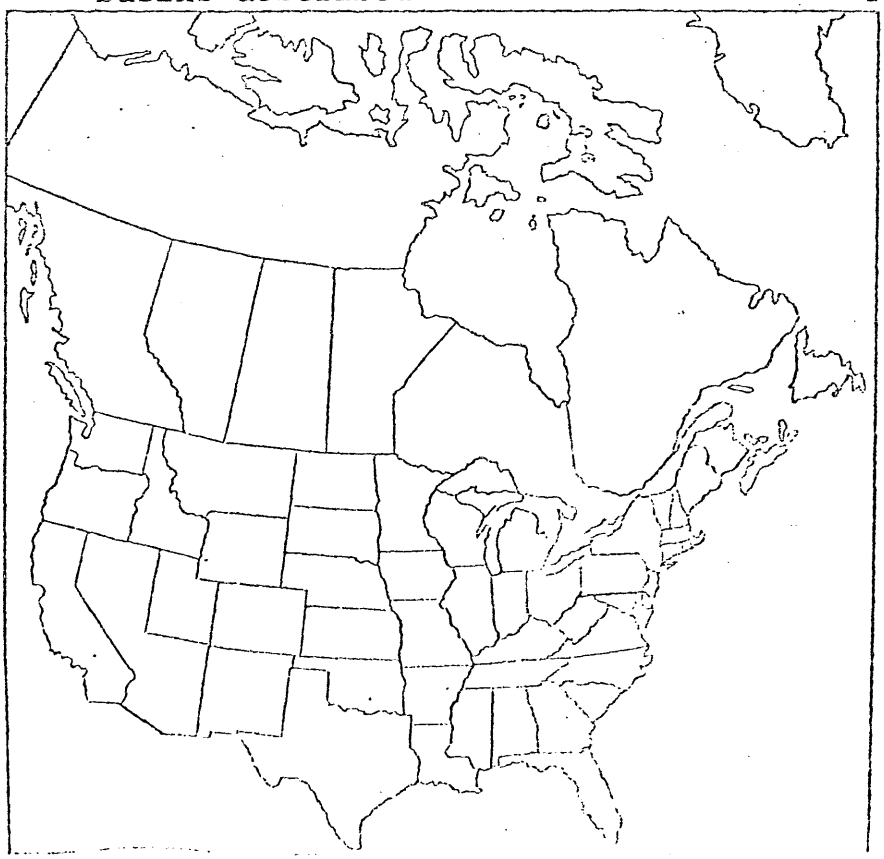
EVALUATION:

Any population of this species in Minnesota should be afforded all possible protection. Ths occurrence of this species within the study area consists of seven adult living specimens near the town of Hudson on the St. Croix River. Any construction contemplated for this area should be carefully planned to avoid disturbance to this population of Tritogonia verrucosa.

Distribution in Minnesota of Tritogonia verrucosa
(Buckhorn; freshwater mussel)



National distribution follows drainage basins described in status sheet summary.



STATUS SHEET

ELEMENT NAME: Quadrula metanevra (Monkeyface); freshwater mussel

FEDERAL STATUS: None

STATE STATUS: None

NATURAL HERITAGE PROGRAM STATUS: Threatened

BASIS FOR STATUS CLASSIFICATION: Quadrula metanevra may always have been among the less common of the mussels occuring within its range. There is evidence to suggest a decline in population since the time of the Ellis survey in 1930-31. It is considered a rarity in the Upper Mississippi River (Fuller 1978) and a further decline in its population levels would certainly be detrimental.

PREFERRED HABITAT: A species of large rivers (Dawley 1947), Quadrula metanevra is highly characteristic of dense mussel populations on gravel bars or on stable mud areas (Fuller 1978).

DISTRIBUTION: No records could be found of the occurrence of this species outside of the Mississippi River Basin.

OCCURRENCES IN MINNESOTA: Recent observations are limited to the St. Croix River adjacent to Washington County, and the Mississippi River along Winona and Houston counties. The record from the St. Croix represents a new addition to the mussel fauna of this drainage system (Fuller 1978).

OF OCCURENCES IN MANAGED AREAS: Observations of this species from Winona and Houston counties are included within the boundaries of a national wildlife refuge.

POTENTIAL THREATS TO SPECIES: The absolute reason for the decline of this species is not known. One likely factor, however, involves the decline of favored habitat following impoundment of stretches of the Mississippi River (Fuller 1978).

REFERENCES:

Dawley, C. 1947. Distribution of aquatic mollusks in Minnesota. The American Midland Naturalist 38:671-697.

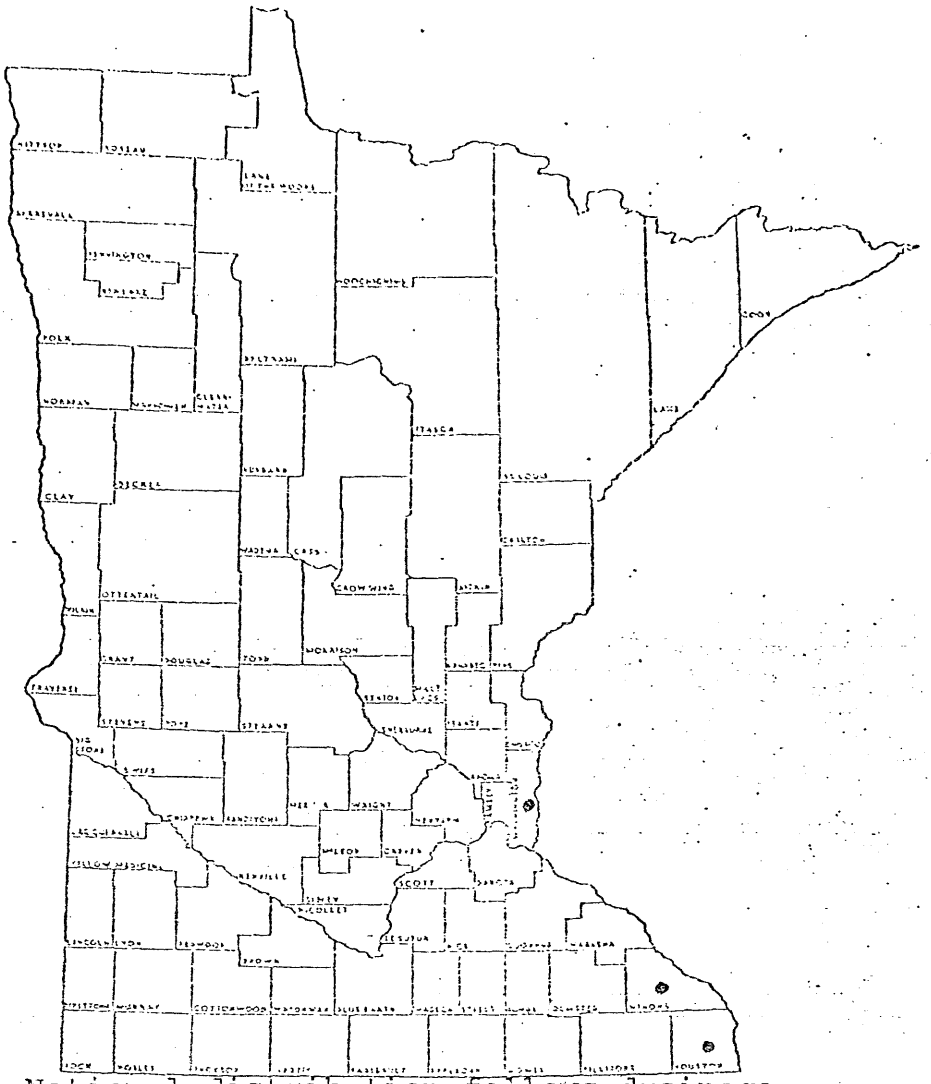
Fuller, S.L.H. 1978. Final Report. Fresh water mussels (Mollusca: Bivalvia: Unionidae) of the Upper Mississippi River: observations at selected sites within the 9-foot channel navigation project on behalf of the United States Army Corps of Engineers. The Academy of Natural Sciences of Philadelphia, Division of Limnology and Ecology. Philadelphia, Pa. 19103.

van der Schalie, H. and A. van der Schalie. 1950. The mussels of the Mississippi River. American Midland Naturalist 44:448-466.

LOCATION IN STUDY AREA: Occurence # 30, Map 1.

EVALUATION: The observation site of this species on the St. Croix River is just upstream from a potential crossing location of the powerline under consideration. Any potential construction at this site should avoid any disturbance of the streambed sub-strate to protect the seam of mussels located nearby.

Distribution in Minnesota of Quadrula metanevra
(Monkeyface; freshwater mussel)



National distribution follows drainage basins described in status sheet summary.

STATUS SHEET

ELEMENT NAME: Pleurobema cordatum (Ohio River Pigtoe); freshwater mussel

FEDERAL STATUS: None

STATE STATUS: None

NATURAL HERITAGE PROGRAM STATUS: Rare

BASIS FOR STATUS CLASSIFICATION: The record strongly suggests that this species has never been abundant or common in the Upper Mississippi River. Only ten specimens were found during the Ellis' survey of 1930-31 and these were all located in one pool. A recent survey (Fuller 1978) of the Upper Mississippi found fewer specimens but more widespread in distribution. There is no strong evidence to show a recent population decline of Pleurobema cordatum but it deserves consideration because of the low population density and limited occurences of this species.

PREFERRED HABITAT: The few recent specimens secured by Fuller (1978) in the Upper Mississippi River were found in the company of several other mussel species in prime habitat areas of the river. Prime habitat is generally considered to be a stable substrate of mud, gravel and small stones.

DISTRIBUTION: Dawley (1947) considers this species to be characteristic of medium and large rivers. Taxonomic problems make it difficult to accurately describe the geographic range of this species. It is known that it was widespread in the Mississippi and St. Lawrence River basins (Fuller 1978). Although populations are small in the Upper Mississippi River Basin, more substantial numbers exist in the Tennessee River (Yokley 1973) and in the Ohio and the Green River (Williams 1969).

OCCURRENCES IN MINNESOTA: Recent occurrences are limited to the Mississippi River adjacent to Wabasha County and the St. Croix River, Washington County. Earlier records of this species exist for the Minnesota River and the St. Croix and Snake Rivers.

OF OCCURENCES IN MANAGED AREAS: The recent observations of this species from Wabasha County are included within the boundaries of a national wildlife refuge.

POTENTIAL THREATS TO SPECIES:

The reason(s) for the relative scarcity of this species must be considered unknown. The glochidial host of Pleurobema cordatum in the Upper Mississippi is widespread but simply may not be a competent larval host (Fuller 1978).

REFERENCES:

Dawley, C. 1947. Distribution of aquatic mollusks in Minnesota. The American Midland Naturalist 38:671-697.

Fuller, S.L.H. 1978. Final Report. Fresh water mussels (Mollusca: Bivalvia: Unionidae) of the Upper Mississippi River: observations at selected sites within the 9-foot channel navigation project on behalf of the United States Army Corps of Engineers. The Academy of Natural Sciences of Philadelphia, Division of Limnology and Ecology. Philadelphia, Pa. 19103.

van der Schalie, H. and A. van der Schalie. 1950. The mussels of the Mississippi River. American Midland Naturalist 44:448-466.

Williams, J.C. 1969. Mussel fishery investigations, Tennessee, Ohio and Green Rivers. Murray State University Biological Station, Murray, Kentucky. Pp. 1-107.

Yokley, P., Jr. 1973. Freshwater mussel ecology, Kentucky Lake, Tennessee. Tennessee Game and Fish Commission, Nashville, Pp. 1-333.

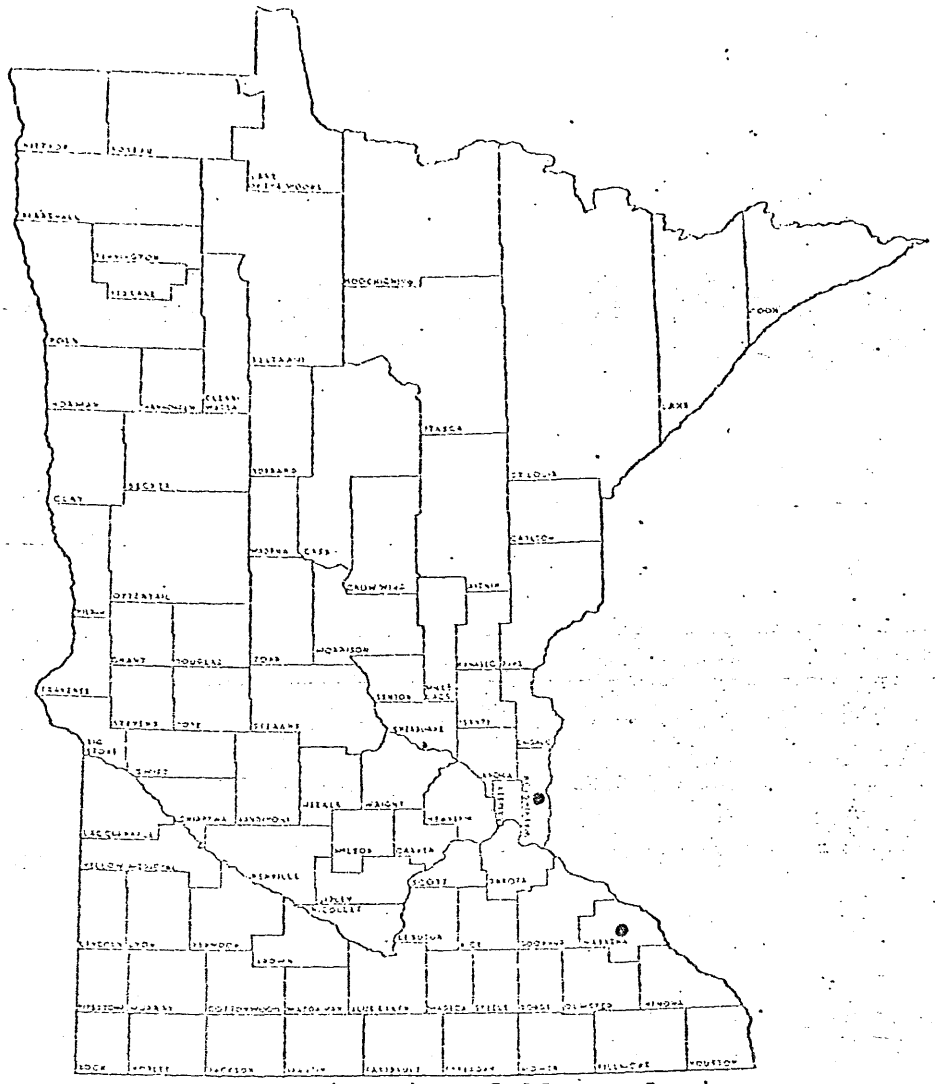
LOCATION IN STUDY AREA:

Occurrence # 31, Map 1.

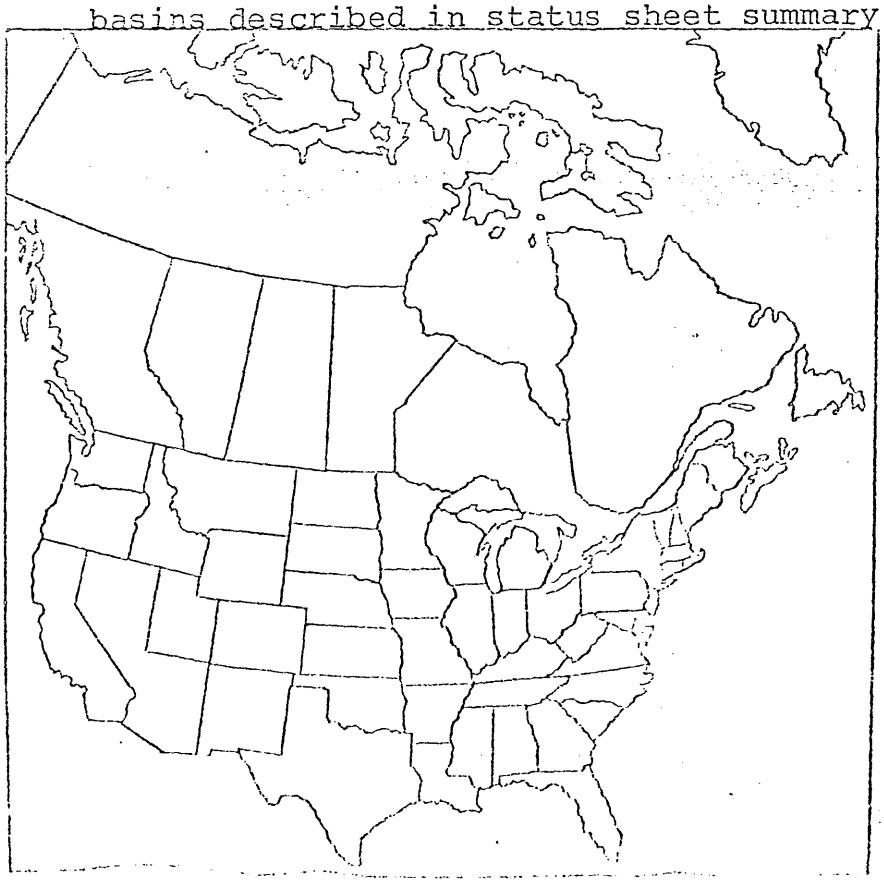
EVALUATION:

The occurrence of this species within the study area is one of the few recent observation sites within Minnesota. This site is also just upstream from a potential crossing site on the St. Croix River. Any construction in this area should be of a nature to cause minimal streambed disturbance.

(Ohio River Pigtoe; freshwater mussel)



National distribution follows drainage basins described in status sheet summary.



STATUS SHEET

ELEMENT NAME: Colonial Nest Site

The colonial nesters present in the study area include the great blue heron (Ardea herodias) and the great egret (Casmerodius albus)

FEDERAL STATUS: None.

STATE STATUS: None.

NATURAL HERITAGE PROGRAM STATUS: Both the great blue heron and great egret are species of Special Concern.

BASIS FOR STATUS CLASSIFICATION: The very nature of a colonial nest site is such that an unusually large number of birds is dependent upon a relatively small parcel of land for nesting habitat. This, coupled with the fact that the birds themselves are unusually large and conspicuous, makes the nest site vulnerable to human intrusion and habitat destruction. In addition, observations that have accumulated during the last several years indicate a growing concern regarding the status of one of our most common colonial nesters, the great blue heron.

PREFERRED HABITAT: The three colonial nest sites that have been noted in the report, the Devil's Lake Rookery, the Grey Cloud Island Rookery and the Vermillion River Rookery are all nest sites for two of the state's more common colonial nesters, the great blue heron and the great egret. In Minnesota these birds are found nesting in the tops of tall trees in a wide range of habitats. One of the more common features of their habitat is the relative isolation. In Minnesota, for example, a large number of colonies are located on remote wooded islands.

Although the colony itself provides adequate nesting habitat, colonial birds commonly feed several miles away. Feeding habitats include productive ponds, marshes and shallow lakes within approximately 25 miles of the nesting colony.

DISTRIBUTION: See attached maps for distribution of great blue heron and great egret.

OCCURRENCES IN MINNESOTA: Approximately 116 great blue heron colonies have been identified in the State of Minnesota (Carrol Henderson, MDNR). Appriximately 21 of these colonies also support populations of great egrets.

OF OCCURENCES IN MANAGED AREAS:

The land ownership for all colonial nest sites in Minnesota is not presently known. Among the nearly 70 colonies for which ownership information is available, approximately 30 are federally owned, 19 are state owned, 8 are county owned and 13 are privately owned.

POTENTIAL THREATS TO SPECIES:

The largest threat to colonial nest sites is the continued demise of wetlands for both residential and industrial development.

REFERENCES:

Roberts, T. C. 1932. The Birds of Minnesota. The University of Minnesota Press. Vol. 1.

Henderson, C. 1978. Minnesota Colonial Waterbird Nesting Site Inventory. MDNR Handout. 31p.

Green, J. C. and R. Jansen. 1975. Minnesota Birds. The University of Minnesota Press.

LOCATION IN STUDY AREA:

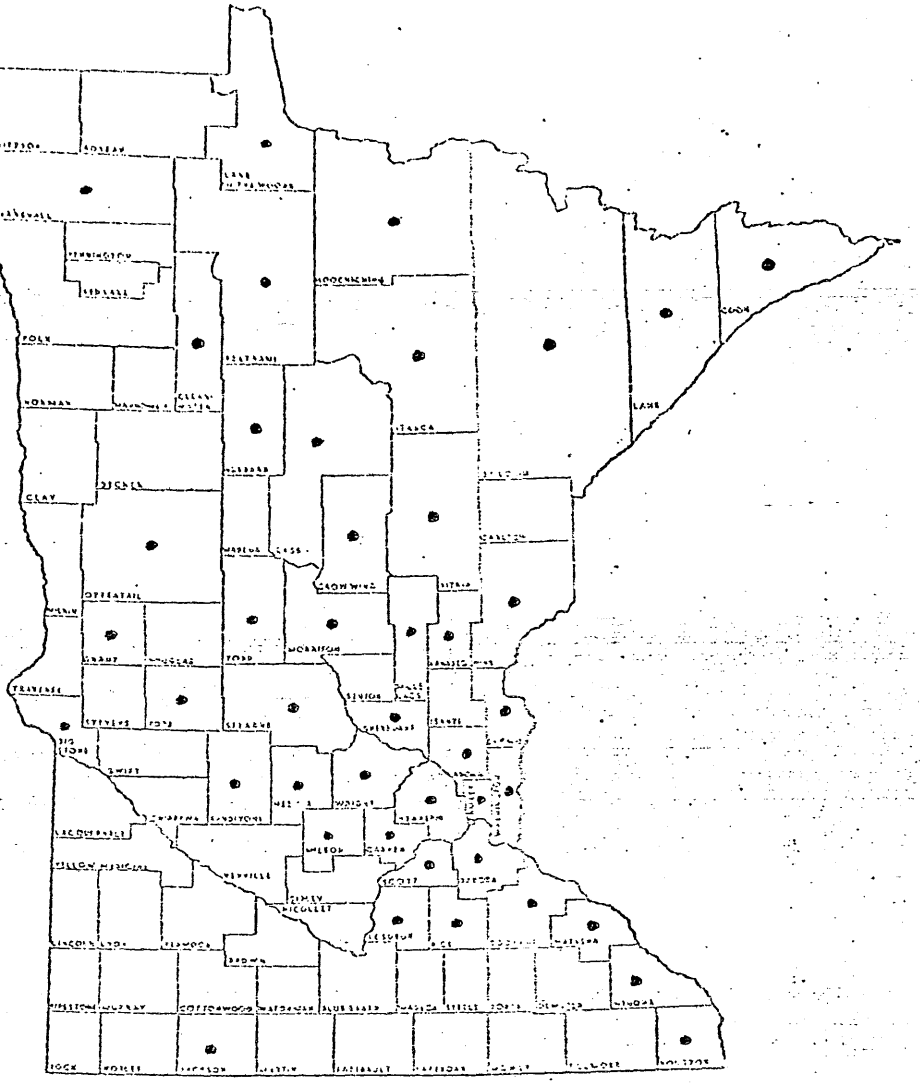
Occurence # 33, Map 1; 36, 38, Map 2.

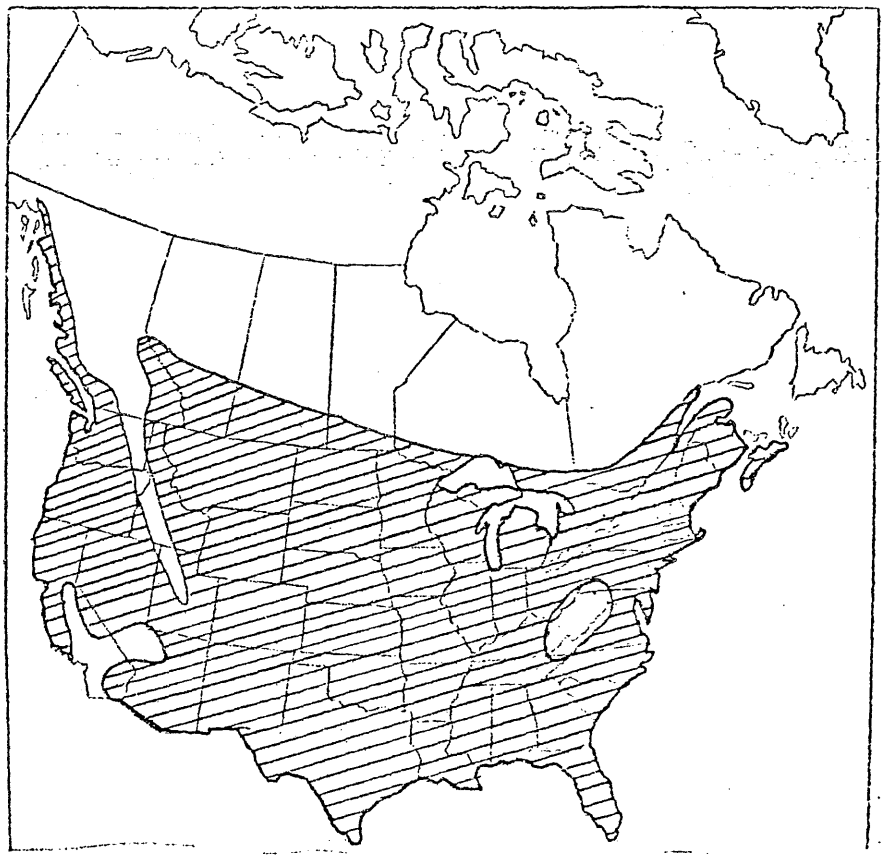
EVALUATION:

Three heron rookeries occur within the vicinity of the proposed construction routes: the Devils Lake rookery in Goodhue county, the Vermillion River rookery in Dakota county and the Grey Cloud Island rookery in Washington county. None of the three rookeries, however, are directly within the defines of a proposed corridor. Nonetheless, the Devils Lake rookery appears to be located less than one-quarter mile away from one of the proposed routes.

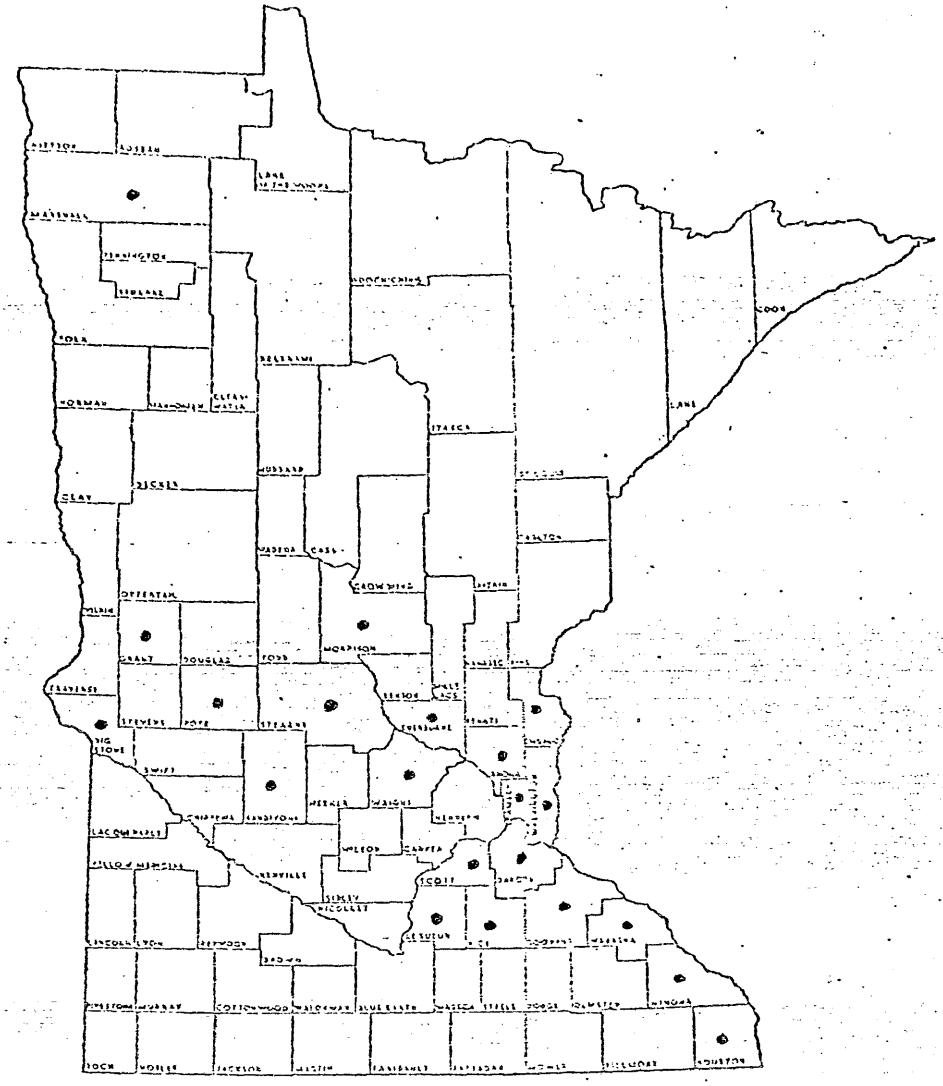
There are conflicting reports regarding the amount of disturbance and local habitat destruction that a nesting colony of herons and egrets can tolerate. One important point to keep in mind is that protection for a colony consists not only of protection of the nest site but, in addition, should include protection of the surrounding wetlands which provide important feeding habitat. In view of the close proximity of one proposed NSP transmission route, the Natural Heritage Program concludes that the Devils Lake rookery may be significantly threatened. If however, construction were to proceed at a time other than the breeding season (late spring to early summer), the potential impact would be significantly reduced.

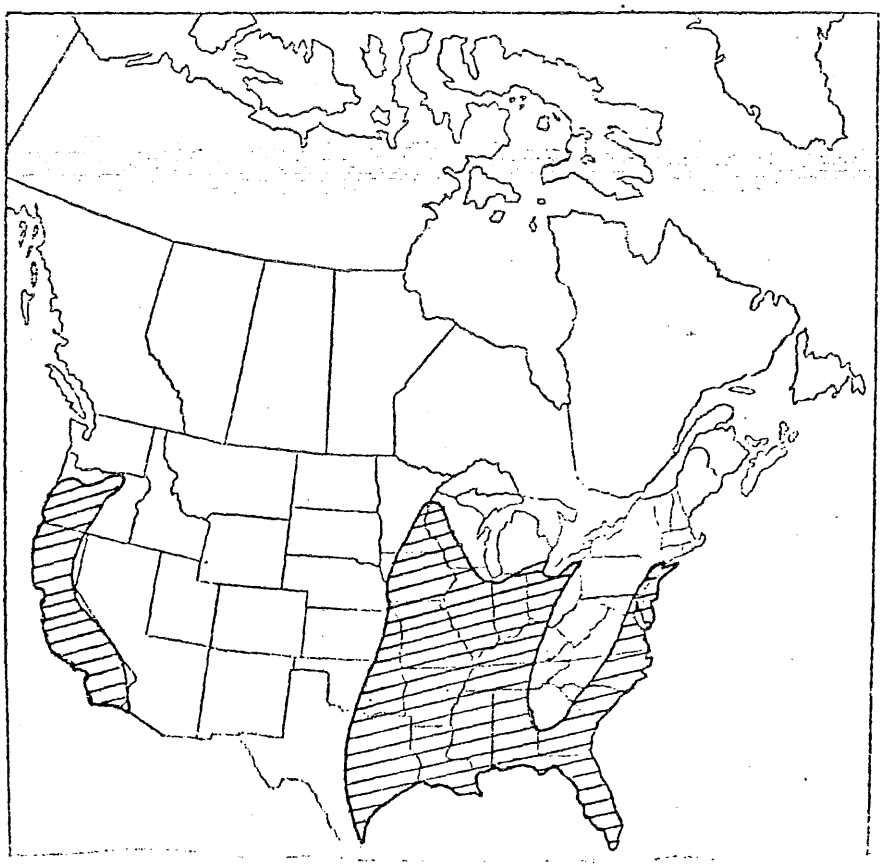
Distribution of Ardea herodias
(Great Blue Heron)





(Great Egret)





STATUS SHEET

ELEMENT NAME: Coluber constrictor foxi, (Blue Racer); Reptiles; snake

FEDERAL STATUS: None

STATE STATUS: None

NATURAL HERITAGE PROGRAM STATUS: Threatened

BASIS FOR STATUS CLASSIFICATION: Coluber constructor foxi is a peripheral species in Minnesota, limited to the southeastern quarter of the state. Although the species Coluber constrictor is widely distributed across North America, the subspecies C.c. foxi is restricted to a small number of midwestern states. The limited number of Minnesota records for the Blue Racer, particularly over the past several years, has signaled an increasing concern for the species as well as a need to more accurately asses its current status.

PREFERRED HABITAT: Literature references pertaining to the biology of the Blue Racer are sparse. What little is known indicates that the racer is an inhabitant of open territory, occurring on sandy plains or gravel hillsides. In Minnesota however, they are also known to occur in the densely wooded floodplain forests of the southeastern counties (Breckenridge, 1944).

DISTRIBUTION: See attached maps.

OCCURRENCES IN MINNESOTA: Fifteen specimens catalogued in the Bell Museum of Natural History represent occurrences from five Minnesota counties: Goodhue, Houston, Wabasha, Washington and Winona. Literature reports indicate that the species has been collected and/or sighted from three additional counties: Anoka, Dakota and LeSeur.

OF OCCURENCES IN MANAGED AREAS: None of the occurrences are known to occur in areas that provide adequate protection to the species.

POTENTIAL THREATS TO SPECIES: Because we know so little regarding the status and biological requirements of the Blue Racer in Minnesota it is difficult to assess what may potentially threaten its survival. Perhaps the largest threat that the species faces is our ignorance regarding its life history and habitat requirements.

REFERENCES:

Breckenridge, W.J. 1944. Reptiles and Amphibians of Minnesota. University of Minnesota Press. 202 pages.

Brown, W.S. and W.S. Parker. 1974. Population structure and demography of the snake, Coluber constrictor in Utah. Amer. Zool. 14(14): 1294.

Conant, R. 1975. A Field Guide to Reptiles and Amphibians of Eastern and Central North America. Houghton Mifflin Co.

Jackson, J. 1971. Intraspecific predation in Coluber constrictor. Journal of Herpetology 5(3-4): 196.

Swain, T. and H.M. Smith. 1978. Communal nesting in Coluber constrictor in Colorado (Reptilia: Serpentis). Herpetologica 34: 195-177.

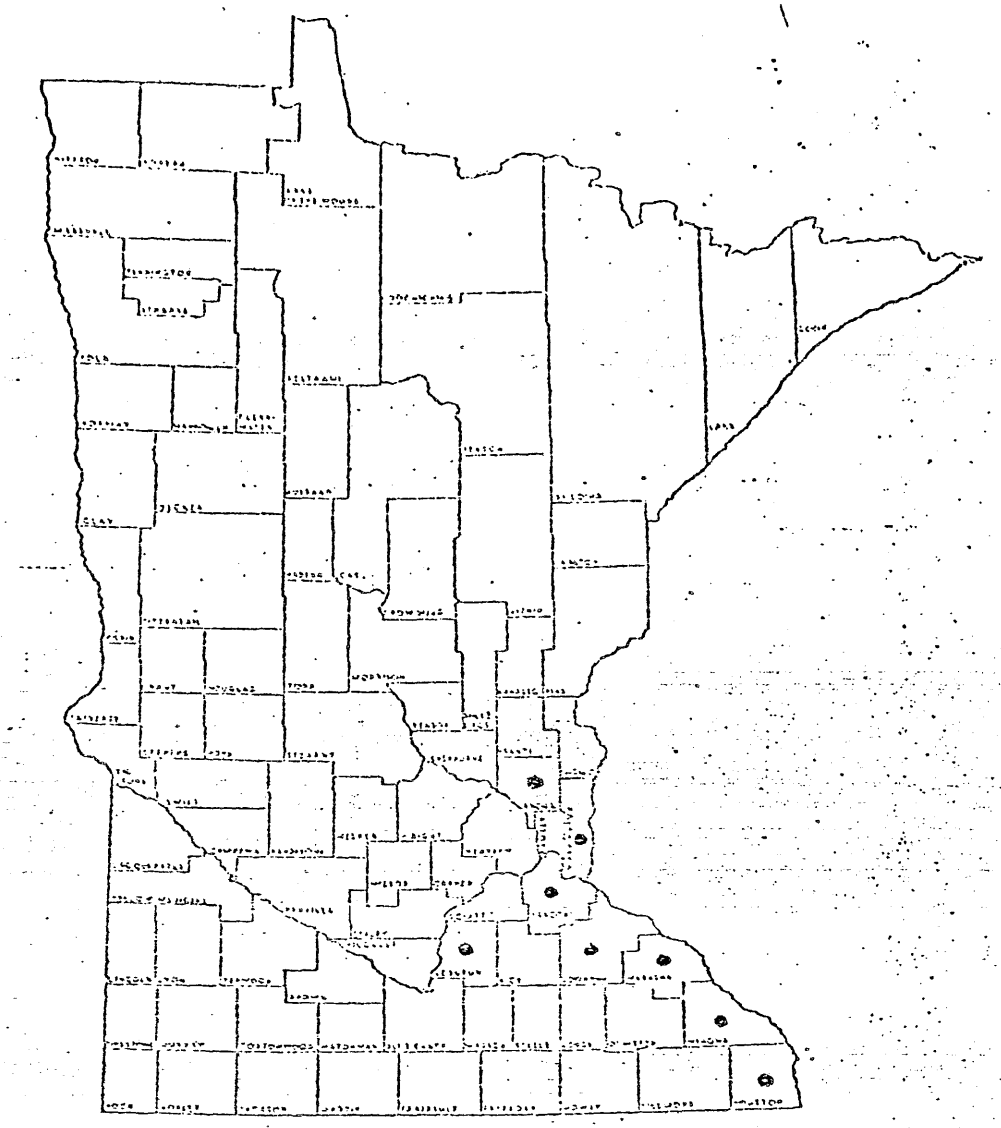
LOCATION IN STUDY AREAS:

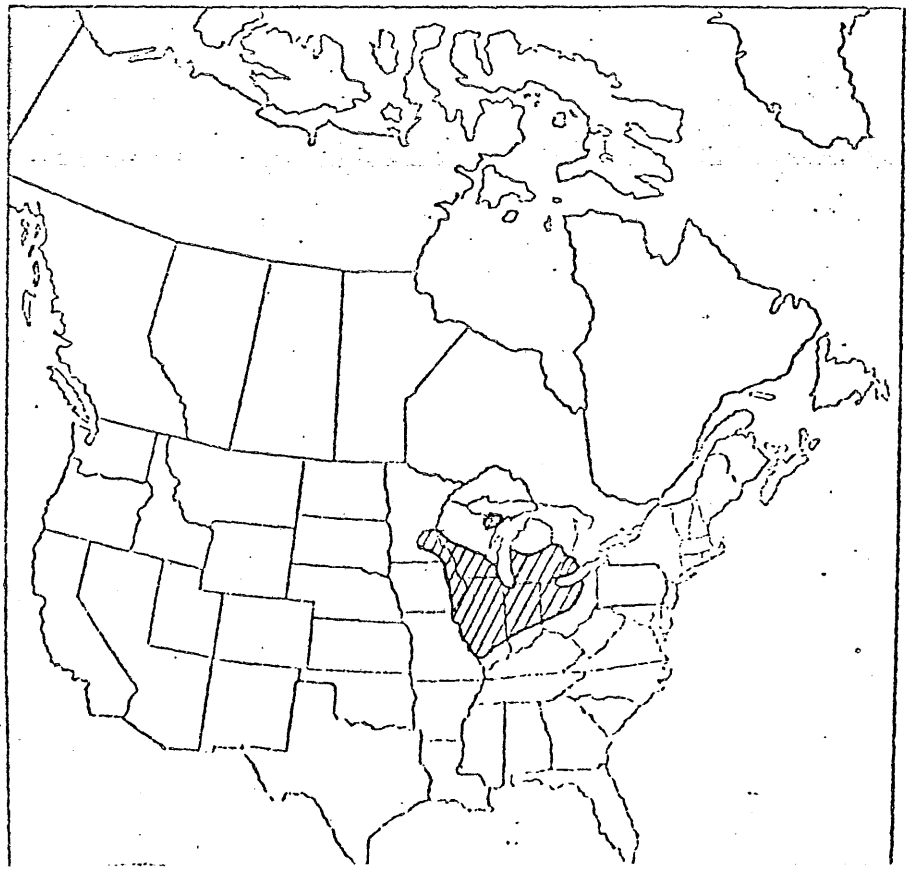
Occurence # 22, Map 1; 39, 40, 41, Map 2.

EVALUATION:

Like so many of the reptiles and amphibians found in Minnesota we know very little about the status and requirements of Coluber constrictor foxi, the Blue Racer. As a result, it is very difficult to project any potential impacts that the proposed construction might have upon the species.

Distribution of Coluber constrictor foxi; (Blue Racer)





STATUS SHEET

ELEMENT NAME: Clemmys insculpta, Wood Turtle

FEDERAL STATUS: None.

STATE STATUS: None.

NATURAL HERITAGE PROGRAM STATUS: Rare.

BASIS FOR STATUS CLASSIFICATION: Like the other members of the states herptofauna, very little is known about the distribution and status of the wood turtle. The few collection records and sightings that are available for eastern Minnesota represent the western periphery of the turtle's range. The low frequency of reports, both past and present, suggest that the species may have always been uncommon.

CLASSIFICATION: The neighboring states of Iowa and Wisconsin have also recognized the wood turtle as a species of special concern. In Wisconsin Clemmys insculpta was originally found throughout all but the southwestern quarter of the state. In recent years, however, its once extensive range has become very disrupted, with the species maintaining a low density in those areas where it is extant.

PREFERRED HABITAT: Clemmys insculpta is more terrestrial in its habits than any other turtle in Minnesota. Emerging from hibernation in late March, the species may be observed in a wide array of woodland habitats (Ernst and Barbour, 1973). A preference for sites that are either marshy or that border small streams was recently demonstrated in a study conducted in the Catskill Mountains of New York (Carroll and Ehrenfeld, 1978). Although females were found to travel a distance of 100-200 m during their search for a nest site, the turtles rarely wandered far from their home streams. It was an uncommon sight to find them traversing hilly, dry or extensive open areas - even when such apparently unsuitable habitats were located between the more suitable streamside habitats.

The wood turtle spends the winter months in hibernation. The hibernaculum may be the bottom mud of a river or pond, a stream embankment or within the debris of a forest floor. In New York the limited availability of wintering sites was cited as the principal factor responsible for the large amount of overlap in the turtle's home range (Carroll and Ehrenfeld, 1978). As many as 17 individuals were found inhabiting one hibernaculum site. Because the turtles did not disperse widely from these sites in the spring, there was considerable overlap in the individual's home range, despite the apparent availability of suitable habitat.

DISTRIBUTION: See attached maps.

OCCURRENCES IN MINNESOTA: Clemmys insculpta has either been sighted or collected from 9 counties in eastern Minnesota. Until recently the turtle was only known from scutheastern and east-central Minnesota but a recent sighting in St. Louis County raises further speculation regarding the distribution and status of the species.

OF OCCURRENCES IN MANAGED AREAS: Only one occurrence is known to originate from a managed area. This occurrence, reported in 1948, was from St. Croix State Park in Pine County.

POTENTIAL THREATS TO SPECIES: Nest predation, commercial harvesting and public sale are potential threats that are frequently listed for the wood turtle. The loss of nesting habitat as well as winter hibernaculum sites is also of primary concern.

REFERENCES:

Breckenridge, W. J. 1944. Reptiles and Amphibians of Minnesota. University of Minnesota Press, Minneapolis. 202 p.

Carroll, T. E. and D. W. Ehrenfeld. 1978. Intermediate-Range Homing in the Wood Turtle, Clemmys insculpta. Copeia 1978 No. 1:117-126.

Conant, R. 1975. A Field Guide to Reptiles and Amphibians of Easterna and Central North America. 2nd ed. Houghton Mifflin Co., Boston. 429 p.

Ernst, C. H. 1972. Clemmys insculpta (LeConte). Catalog of American Amphibians and Reptiles. No. 125.1.

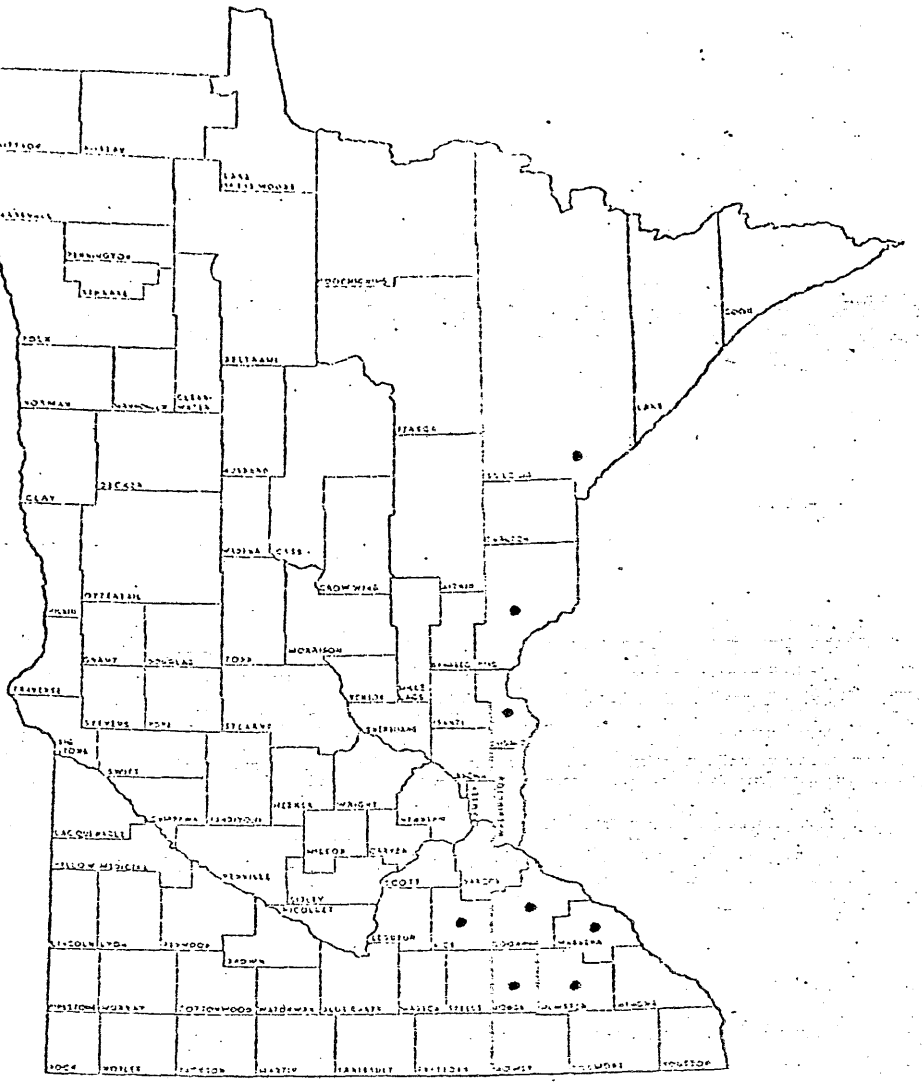
Ernst, C. H. 1973. The distribution of the turtles of Minnesota. J. Herpetol. 7:42-47.

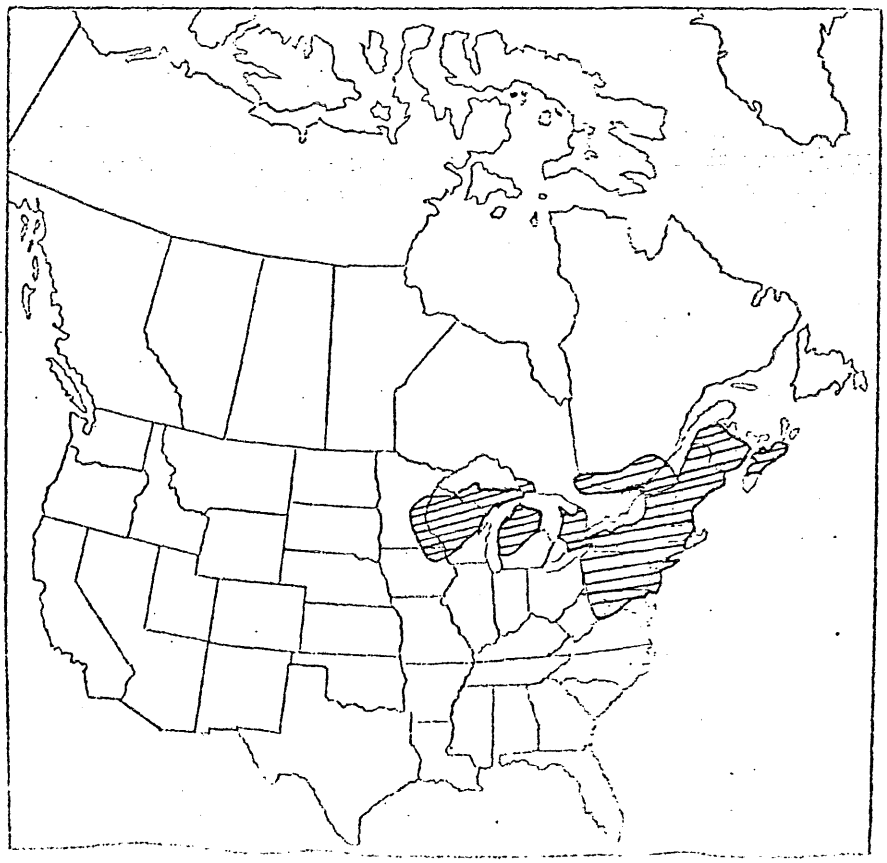
Ernst, C. H. and R. W. Barbour. 1973. Turtles of the United States. Lexington: University Press of Kentucky.

LOCATION IN STUDY AREA: Occurrence #42, Map 2.

EVALUATION: The bottomlands of the Missippi River immediately northwest of Red Wing, Minnesota provide important breeding habitat for Clemmys insculpta. Several of the proposed routes for the transmission line cut through the huge floodplain. It is difficult to assess the potential impact that the proposed construction might have upon the turtle. One might suspect however that it would be directly proportional to the amount of habitat destruction that accompanies the contstruction.

Distribution of Clemmys insculpta
(Wood Turtle)





#0652A

STATUS SHEET

ELEMENT NAME: Corallorhiza odontorhiza (Autumn coral-root)

FEDERAL STATUS: None

STATE STATUS: Protected by the Minnesota wildflower protection law.

NATURAL HERITAGE PROGRAM STATUS: Rare

BASIS FOR STATUS CLASSIFICATION: This species occurs sporatically and usually in very small numbers. It was probably always rare in Minnesota. In addition, it is a very poor colonizer of new sites.

PREFERRED HABITAT: Dry wooded hillsides.

DISTRIBUTION: See attached maps.

OCCURRENCES IN MINNESOTA: Corallorhiza odontorhiza is currently known to exist in Washington and Goodhue Counties. It is known historically from Houston County, but it has not been reported there since 1899.

OF OCCURRENCES IN MANAGED AREAS: None of the known populations of this species occur in a managed area.

POTENTIAL THREATS TO SPECIES: Because of the fragile and accessible nature of this species' preferred habitat, it is very susceptible to livestock grazing and land clearing.

REFERENCES:

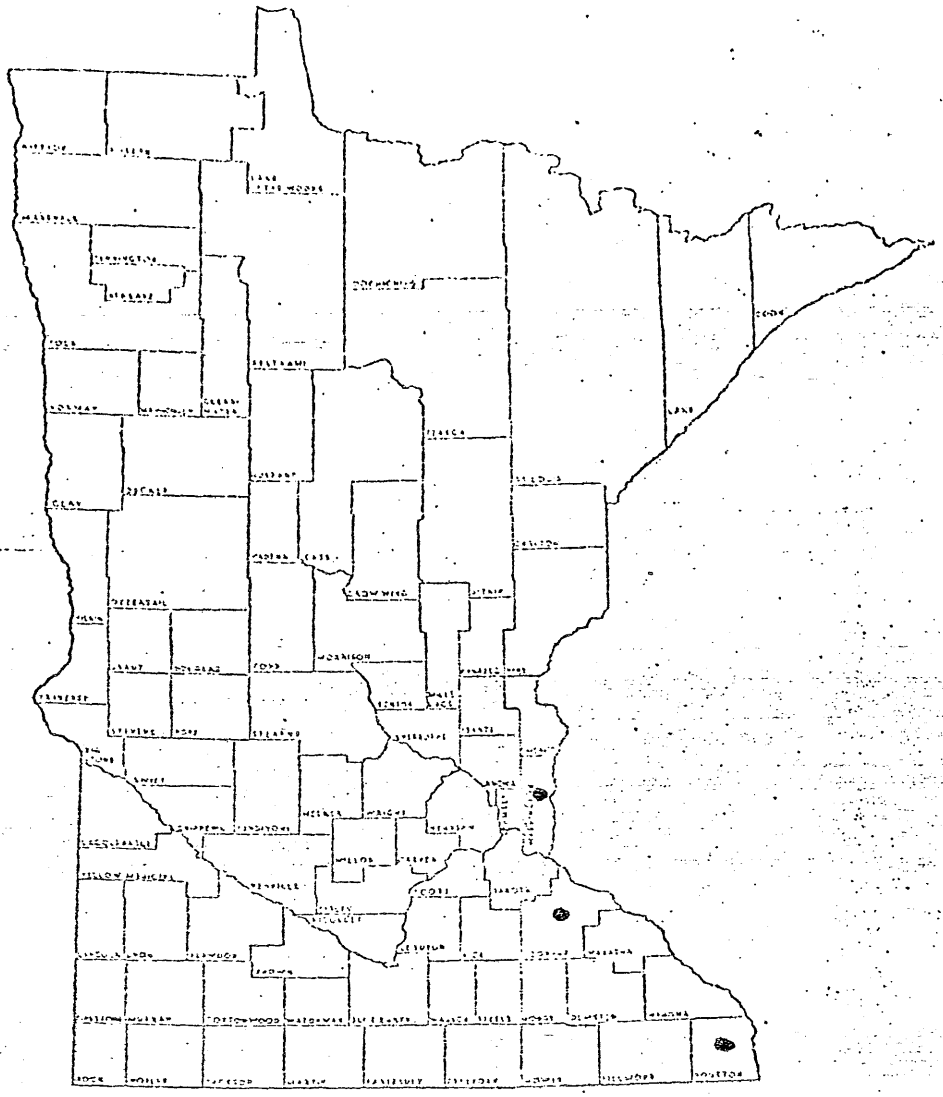
Hartley, T. G. 1962. The Flora of the "Driftless Area", State University of Iowa. Ph.D. thesis, Botany.

Fernald, M. L. 1950. Gray's Manual of Botany, 8th ed. D. Van Nostrand Company, New York.

LOCATION IN THE STUDY AREA: Occurrence #1.

EVALUATION: The location of this species in the study area does not coincide with any proposed corridors and does not appear to be threatened by related construction.

(Autumn Coral-root)



#U653A

STATUS SHEET

ELEMENT NAME: Helianthemum canadense (Frostweed)

FEDERAL STATUS: None

STATE STATUS: None

NATURAL HERITAGE PROGRAM STATUS: Rare

BASIS FOR STATUS CLASSIFICATION: Helianthemum canadense is a peripheral species in Minnesota, occurring only in the southeastern portion of the state. Within this limited range, it is limited even further by very strict habitat requirements. In this restricted range and preferred habitat it is rarely encountered.

PREFERRED HABITAT: Dry sandy hillsides.

DISTRIBUTION: See attached maps.

OCCURRENCES IN MINNESOTA: This species is known in Minnesota by two records from Houston County and one record each from Rice, Fillmore, Washington and Winona. The Winona occurrence dates to 1897 and has not been verified.

OF OCCURRENCES IN MANAGED AREAS: The Cannon River Wilderness Area is the only managed area where Helianthemum canadense is found.

POTENTIAL THREATS TO SPECIES: Although the preferred habitat of this species is not suitable for agriculture, it is often ideally suited for sand mining and industrial development.

REFERENCES:

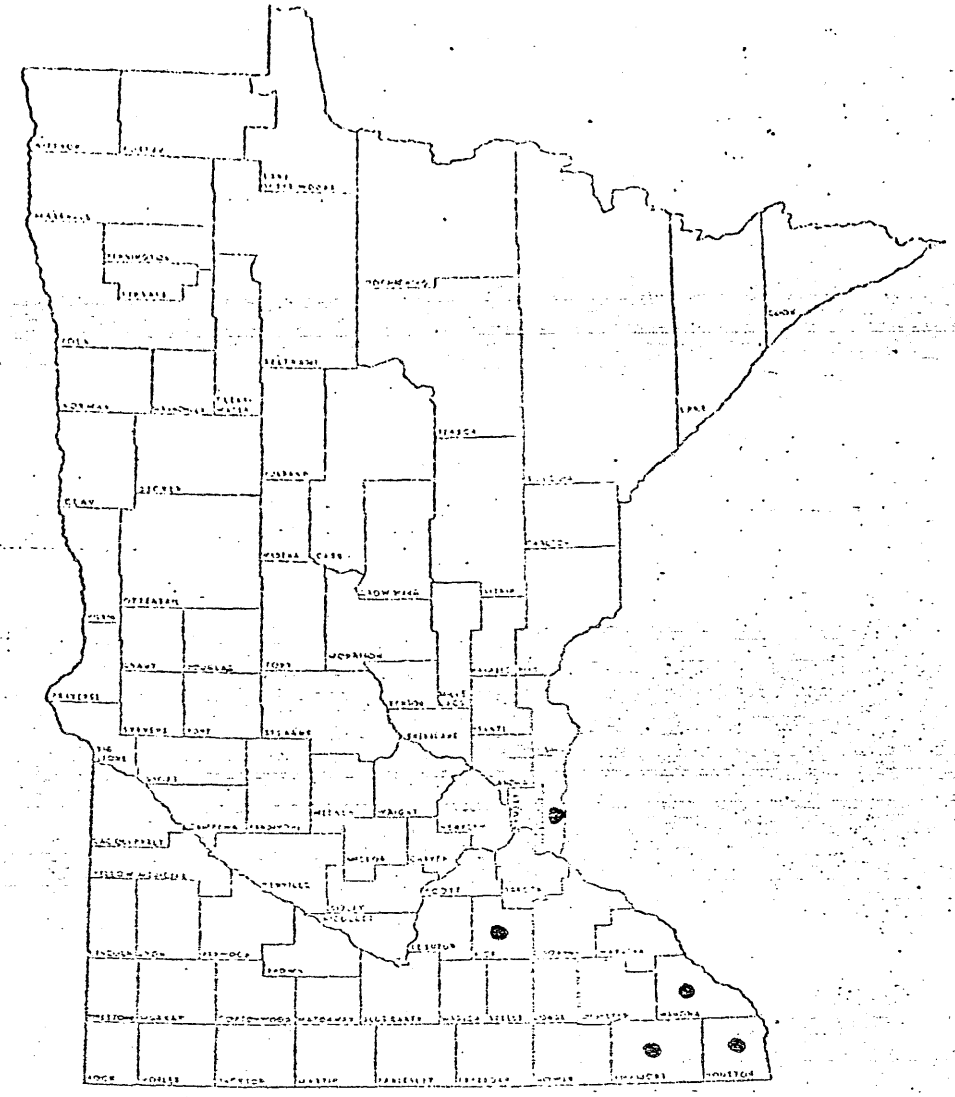
Daoud, H S. and R. L. Wilbur. 1965. A revision of the North American species of Helianthemum. Rhodora 67:63-303.

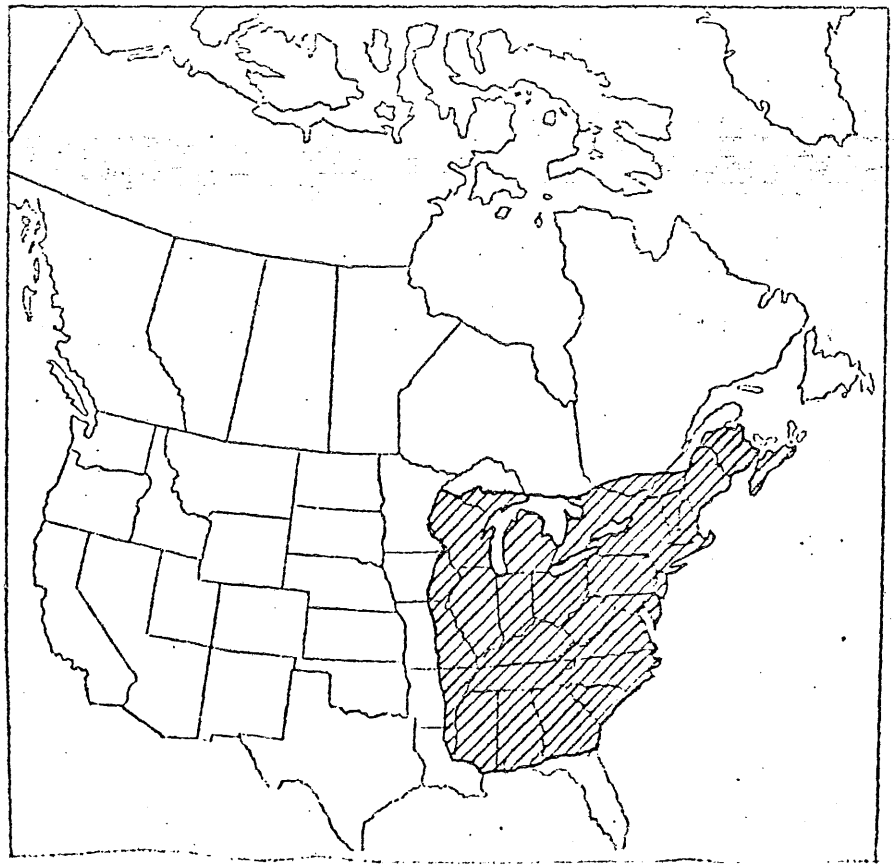
Hartley, T. G. 1962. The flora of the "Driftless Area". State Univ. of Iowa, Ph.D. thesis, Botany.

LOCATION IN STUDY AREA: Occurrence #2.

EVALUATION: The only occurrences of this species in the study area does not coincide with a proposed corridor, and should not be threatened by related construction.

(Frostweed)





#0655A

STATUS SHEET

ELEMENT NAME: Linaria canadensis (Old-field-Toadflax)

FEDERAL STATUS: None

STATE STATUS: None

NATURAL HERITAGE PROGRAM STATUS: Rare

BASIS FOR STATUS CLASSIFICATION" Linaria canadensis is considered rare because of its limited range in Minnesota and its highly specialized habitat requirements. It has probably always been rare in Minnesota. This species currently exists in small numbers at scattered locations.

PREFERRED HABITAT: Sandy hillsides, prairies and dunes.

DISTRIBUTION: See attached maps.

OCCURRENCES IN MINNESOTA: This species is known in Minnesota from a single collection each in Houston, Wabasha, Washington, Anoka and Hennepin counties.

OF OCCURRENCES IN MANAGED AREAS: None of the known locations of Linaria canadensis occur on managed lands.

POTENTIAL THREATS TO SPECIES: This species faces threats from a variety of potential development projects, and invariably suffers complete extirpation when its habitat is converted to industrial or commercial uses.

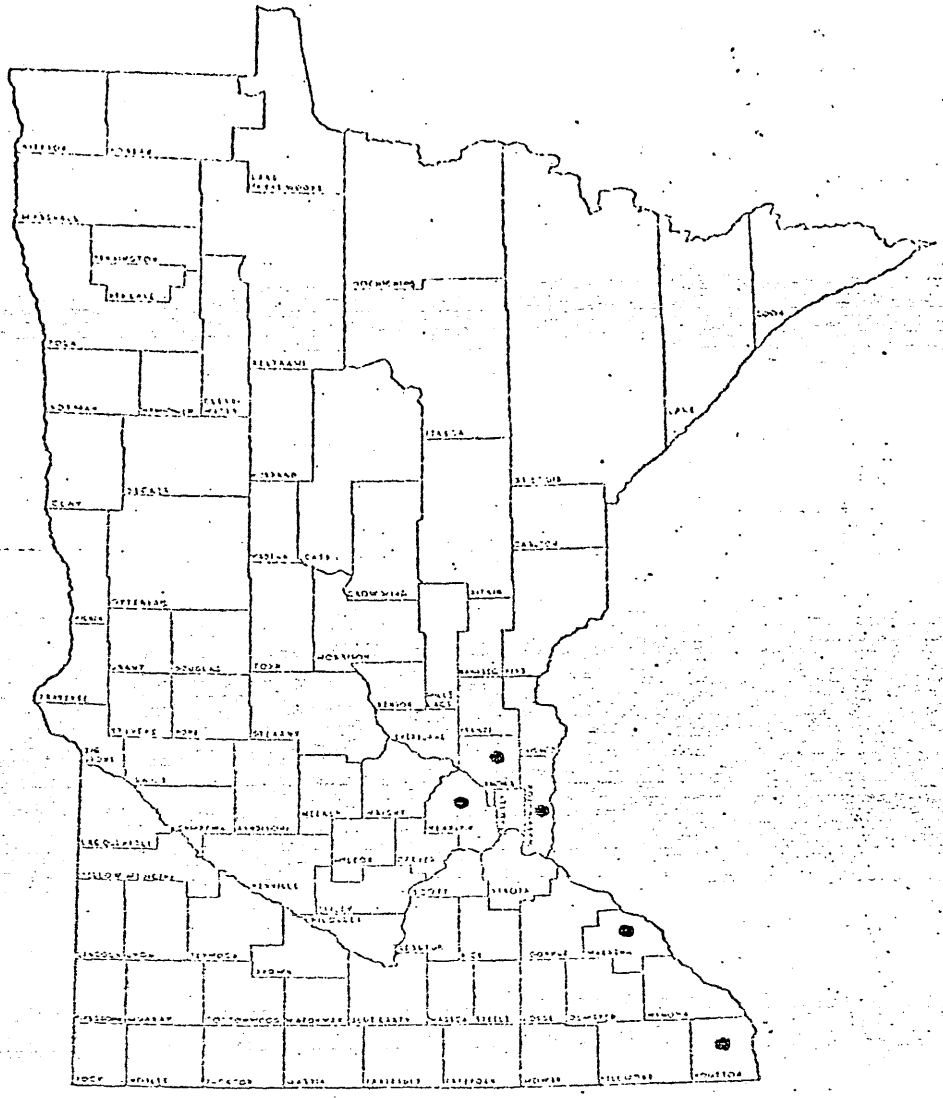
REFERENCES: Salamun, P. J. 1951. Preliminary Reports on the Flora of Wisconsin #36. Wisc. Acad. Sci., Arts and Letters 40(2):117.

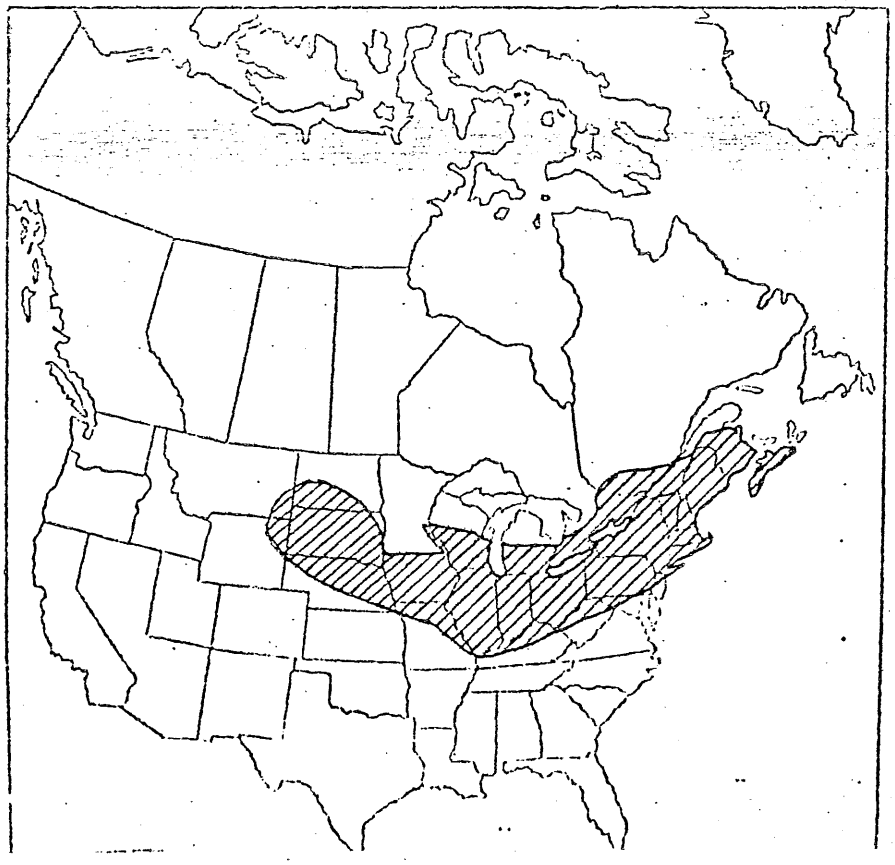
Fernald, M. L. 1950. Gray's Manual of Botany. 8th ed., Van Nostrand Co., New York.

LOCATION IN THE STUDY AREA: Occurrence #3.

EVALUATION: The only occurrence of this species in the study area is not in the immediate vicinity of a proposed corridor and should not be affected by any resultant construction activities.

Distribution of Linaria canadensis
(Old-field Toadflax)





#0656A

STATUS SHEET

ELEMENT NAME: Liparis lilifolia (Lilia-leaved Twayblack)

FEDERAL STATUS: None.

STATE STATUS: Protected by the Minnesota wildflower protection law.

NATURAL HERITAGE PROGRAM STATUS: Rare.

BASIS FOR STATUS CLASSIFICATION:: Liparis lilifolia occupies a very limited range in Minnesota. Within that range it has recently experienced a dramatic decline in population. It now occupies less than 30% of the range it occupied in the early part of this century. This decline is largely the result of agricultural and urban development.

PREFERRED HABITAT: Deciduous woodlands and openings.

DISTRIBUTION: See attached maps.

OCCURRENCES IN MINNESOTA: Liparis lilifolia is currently known by one record from Ramsey county and two records from Washington county. It is known historically from Houston county where it was at one time abundant, but now unreported since 1914. It was last reported in Hennepin county in 1877, Dakota county in 1913, Wabasha county in 1904 and Fillmore county in 1895.

OF OCCURRENCES IN MANAGED AREAS: There are no known sites of this species in managed areas.

POTENTIAL THREATS TO SPECIES: The only currently known site of this species outside of Washington county is a remnant population in metropolitan St. Paul, where it faces the imminant threat of urban expansion.

REFERENCES:

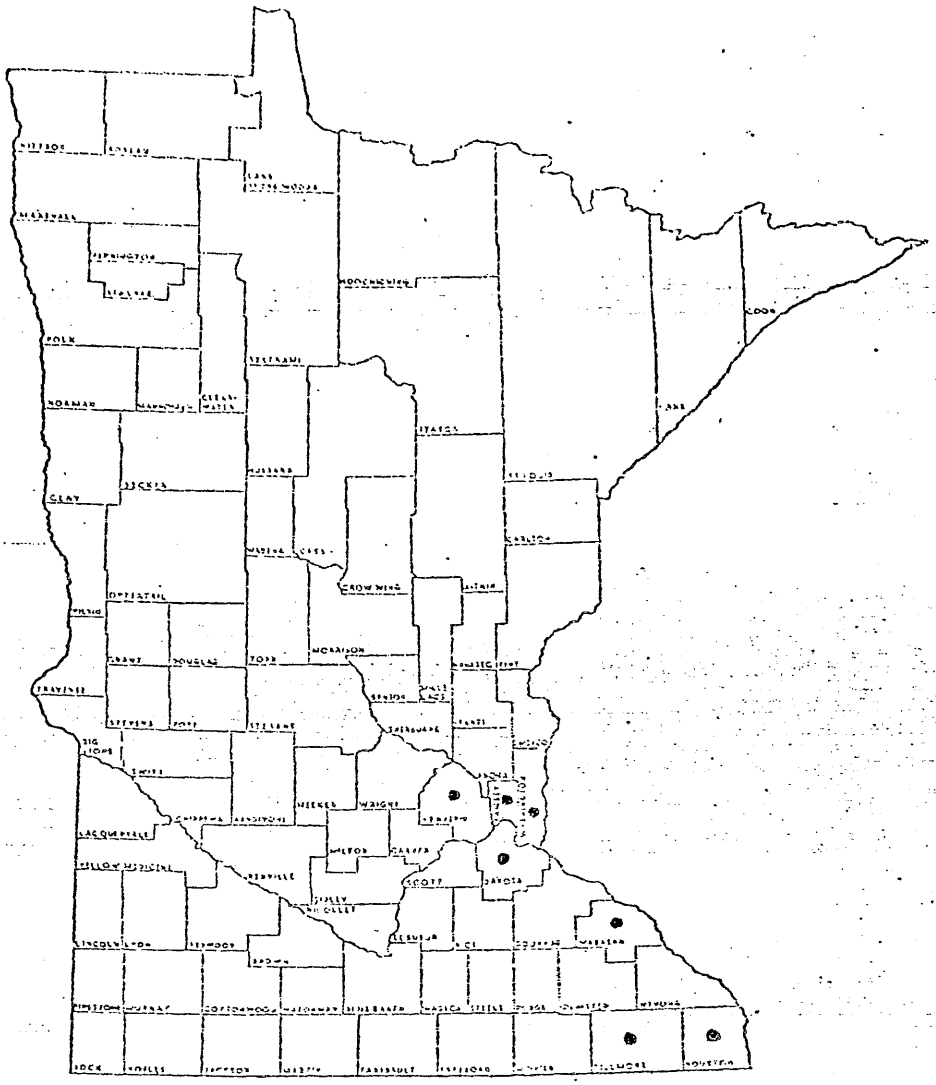
Hartley, T. G. 1962. The Flora of the "Driftless Area", State Univ. of Iowa. Ph.D. thesis, Botany.

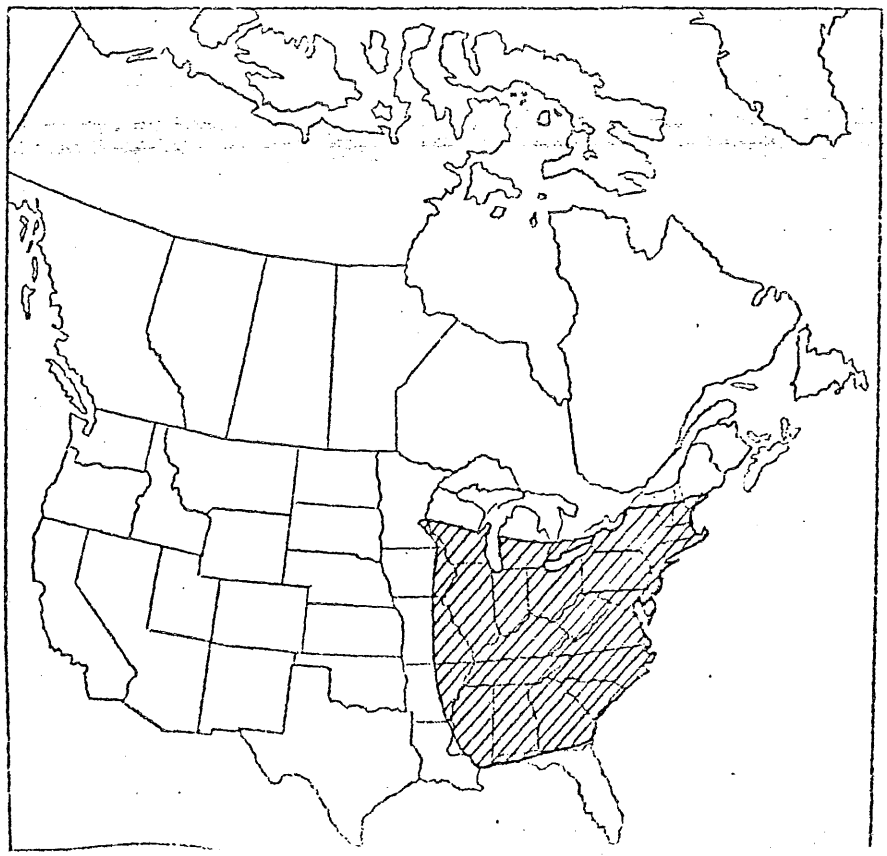
Morley, T. 1969. Spring Flora of Minnesota. Univ. of Mn. Press, Minneapolis.

LOCATION IN THE STUDY AREA: Occurrence #4 and #5.

EVALUATION: Of the two sites of this species occurring in the study area, one (#5) borders the south end of corridor C2 south of Afton. This is the only occurrence of any rare plant species in any of the proposed corridors. Because of this occurrence, selection of this corridor for routing of the transmission line should be avoided.

Distribution of Liparis lilifolia
(Lilia-leaved Twayblade)





#0667A

STATUS SHEET

ELEMENT NAME: Baptisia leucantha (White False-Indigo)

FEDERAL STATUS: None.

STATE STATUS: None.

NATURAL HERITAGE PROGRAM STATUS: Rare.

BASIS FOR STATUS CLASSIFICATION: Baptisia leucantha is typical of native prairies that were once common in southeastern Minnesota. The decline of this species is directly related to the destruction of its habitat. It is currently restricted to a few prairie remnants that are too sandy or rocky for agriculture.

PREFERRED HABITAT: Originally preferring dry to mesic prairies, it has now found refuge in sandy hillsides, dunes and occasionally beaches.

DISTRIBUTION: See attached maps.

OCCURRENCES IN MINNESOTA: Baptisia leucantha is currently known from two sites in Washington county and one site each in Houston, Olmsted, Ramsey, Faribault, Wabasha, and Anoka counties. At one time it was known to occur in Fillmore, Goodhue and Hennepin counties, but it has not been reported from these counties in this century.

OF OCCURRENCES IN MANAGED AREAS: The species is currently known to exist in Cedar Creek Natural History Area and Afton State Park.

POTENTIAL THREATS TO SPECIES: The population in Wabasha county faces imminent destruction from a housing project, and the site in Ramsey faces pressure from urban expansion of the city of White Bear.

REFERENCES:

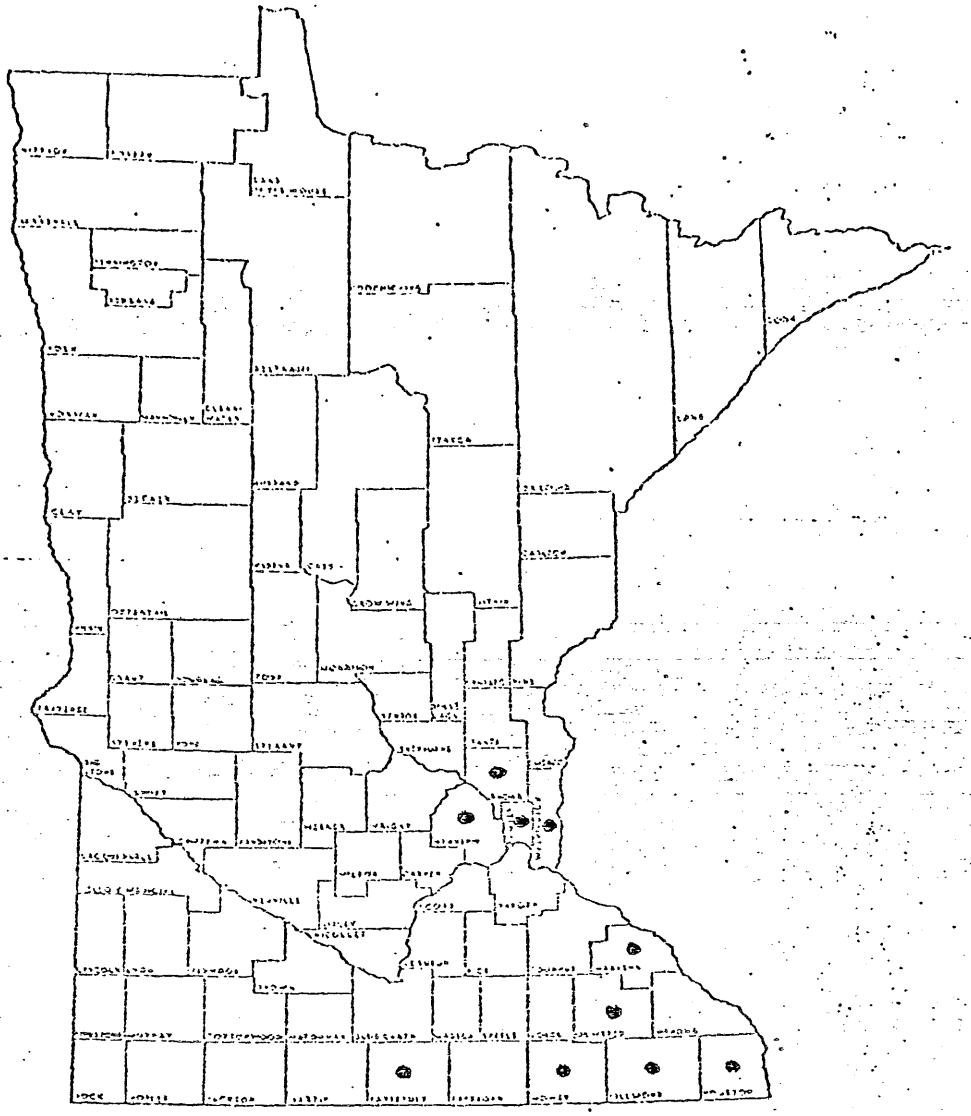
Fox, W. B. 1945. The Leguminosae in Iowa. Am. Midl. Nat. 34(1):207-230.

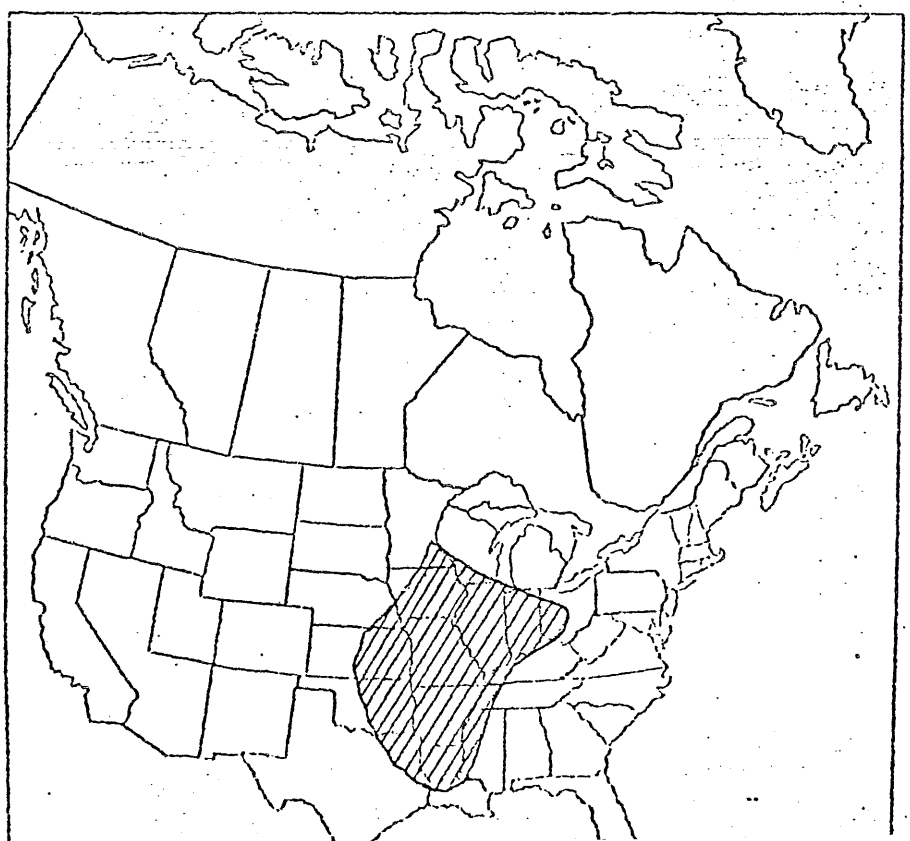
Larisey, M. M. 1940. A monograph of the genus Baptisia. Ann. Mo. Bot. Gard. 27(2):119-224.

LOCATION IN STUDY AREA: Occurrence #6 and #9.

EVALUATION: The known occurrence of Baptisia leucantha in the study area are not within the proposed corridors and are apparently not threatened by the proposed construction.

Distribution of Baptisia leucantha; (White False Indigo)





#0071A

STATUS SHEET

ELEMENT NAME: Paronychia fastigiata (Forked Chickweed)

FEDERAL STATUS: None.

STATE STATUS: None.

NATURAL HERITAGE PROGRAM STATUS: Threatened.

BASIS FOR STATUS CLASSIFICATION: Before the discovery of Paronychia fastigiata in Washington county in 1976, it was known in Minnesota only by a single record from Winona county in 1897. This species is also considered rare in Wisconsin and Iowa and is unreported from the Dakotas.

PREFERRED HABITAT: The very limited occurrence of this species makes its preferred habitat difficult to determine. However, characteristically it has been found on dry sandy soil or rocky hillsides.

DISTRIBUTION: See attached maps.

OCCURRENCES IN MINNESOTA: Paronychia fastigiata is currently known to occur only in Washington county. Historical records show an additional occurrence in Winona county although the site has never been relocated.

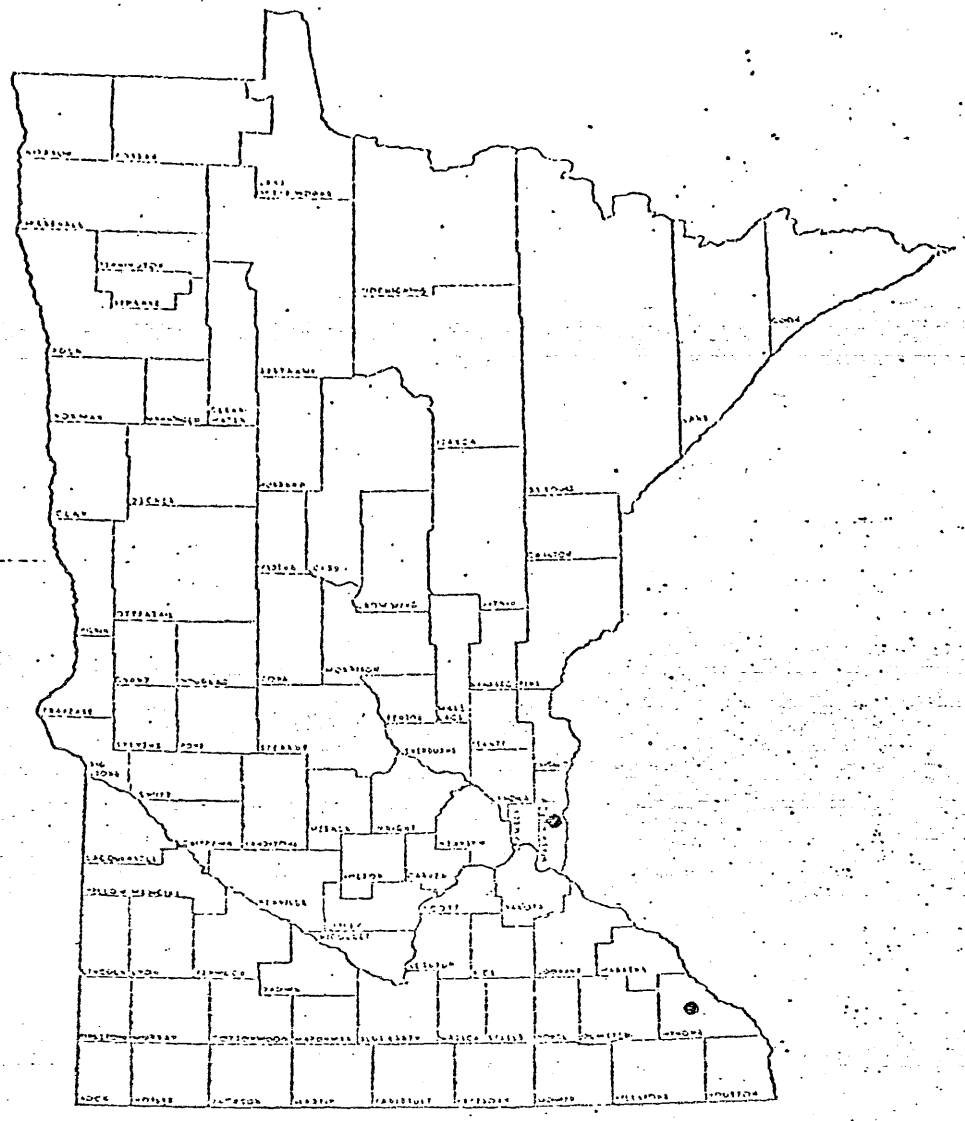
OF OCCURRENCES IN MANAGED AREAS: This species is not known to occur in any managed area.

POTENTIAL THREATS TO SPECIES: The single known site of this species in Minnesota is not known to face any immediate threats. However, its small numbers and accessible location make it susceptible to any potential threat that would cause alteration of the habitat.

REFERENCES: Core, Earl C. 1941. The North American species of Paronychia. Am. Midl. Nat. 26:366-397.

LOCATION IN STUDY AREA: Occurrence #7.

EVALUATION: The location of this species in the study area does not coincide with any proposed corridors and does not appear to be threatened by related construction.



#0673A

STATUS SHEET

ELEMENT NAME: Penstemon digitalis (Beard-tongue)

FEDERAL STATUS: None.

STATE STATUS: None.

NATURAL HERITAGE PROGRAM STATUS: Undetermined.

BASIS FOR STATUS CLASSIFICATION: Because of its limited occurrence in Minnesota, Penstemon digitalis appears to deserve special status. However, there is some uncertainty as to its natural range in Minnesota. Some or perhaps all of its occurrences in the state may be the result of artificial introductions.

PREFERRED HABITAT: Open woods, meadows and prairies. Perhaps adventive in pastures and roadsides.

DISTRIBUTION: See reference maps.

OCCURRENCES IN MINNESOTA: Penstemon digitalis is known in Minnesota by three recorded collections, one each in Houston, Pine and Washington counties. All these records are since 1939, which may indicate that this species is a recent arrival in the state.

OF OCCURRENCES IN MANAGED AREAS: None of the known sites of this species occurs in a managed area.

POTENTIAL THREATS TO SPECIES: Because of this species apparent ability to occur adventively in recently disturbed habitats, it is difficult to assess threats to its survival.

REFERENCES:

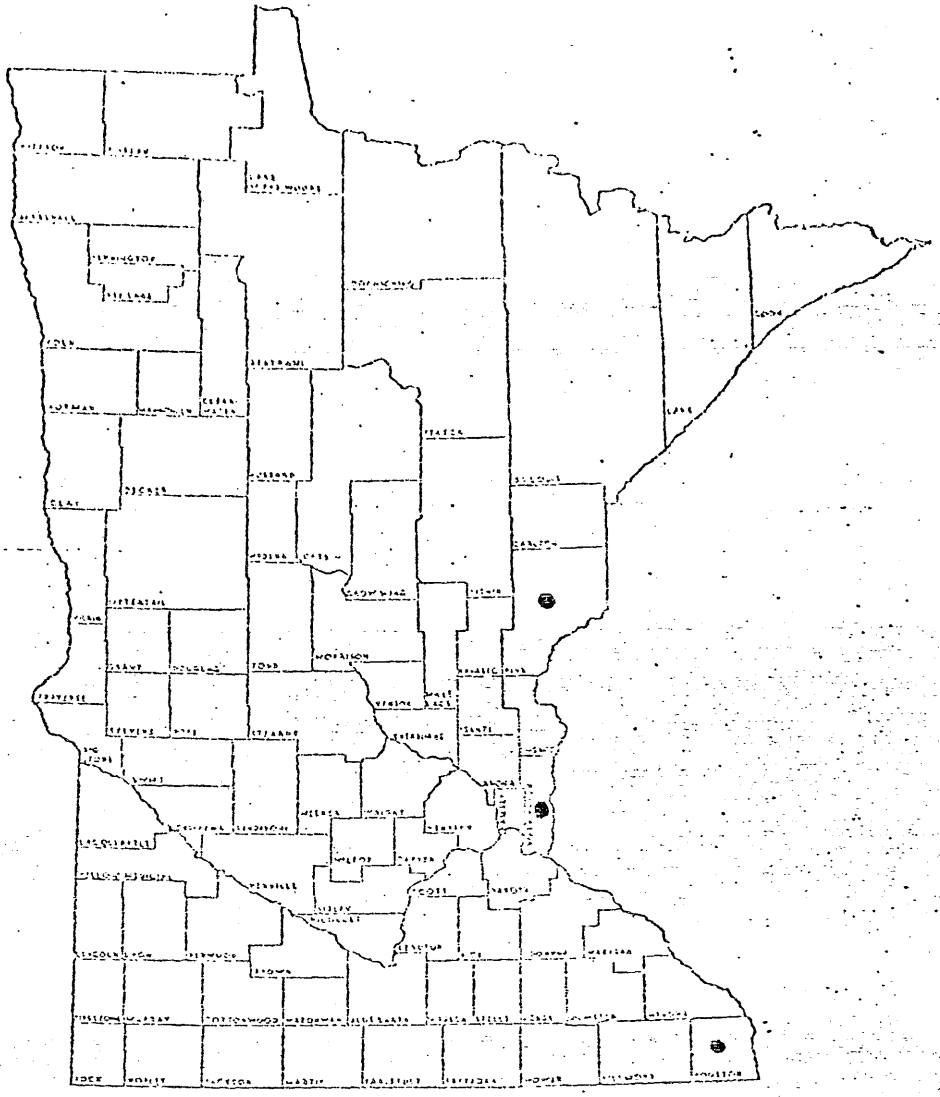
Moore, J. W. 1957. Notes on flowering plants in Minnesota. Rhodora 59:6-7.

Salamun, P. J. 1951. Flora of Wisconsin XXXVI. Wisconsin Academy of Sciences, Arts and Letters 40(2):118-119.

LOCATION IN STUDY AREA: Occurrence #8.

EVALUATION: The only occurrence of this species in the study area is not in the vicinity of a proposed corridor and would not be threatened by related construction.

5/80



#0665A

STATUS SHEET

ELEMENT NAME: Desmodium illinoiense (No common name)

FEDERAL STATUS: None.

STATE STATUS: None.

NATURAL HERITAGE PROGRAM STATUS: Threatened.

BASIS FOR STATUS CLASSIFICATION: This species was probably never very common in Minnesota, but with the conversion of native prairies in southeastern Minnesota, it was believed extirpated in Minnesota. Its rediscovery in Afton State Park in 1975 represents the only document occurrence in the state since 1899.

PREFERRED HABITAT: Prairies and occasionally dry open woods.

DISTRIBUTION: See attached maps.

OCCURRENCES IN MINNESOTA: Desmodium illinoense is known to exist only at one site in Washington Co. It was known historically to have occurred in Goodhue and Houston counties, but it has not been seen in these counties in this century.

OF OCCURRENCES IN MANAGED AREAS: The Washington county site occurs in Afton State Park.

POTENTIAL THREATS TO SPECIES: The only known occurrence of Desmodium illinoense in Minnesota is not known to face any specific threats. It is presumed that the sites in Goodhue and Houston county were destroyed by some type of land development.

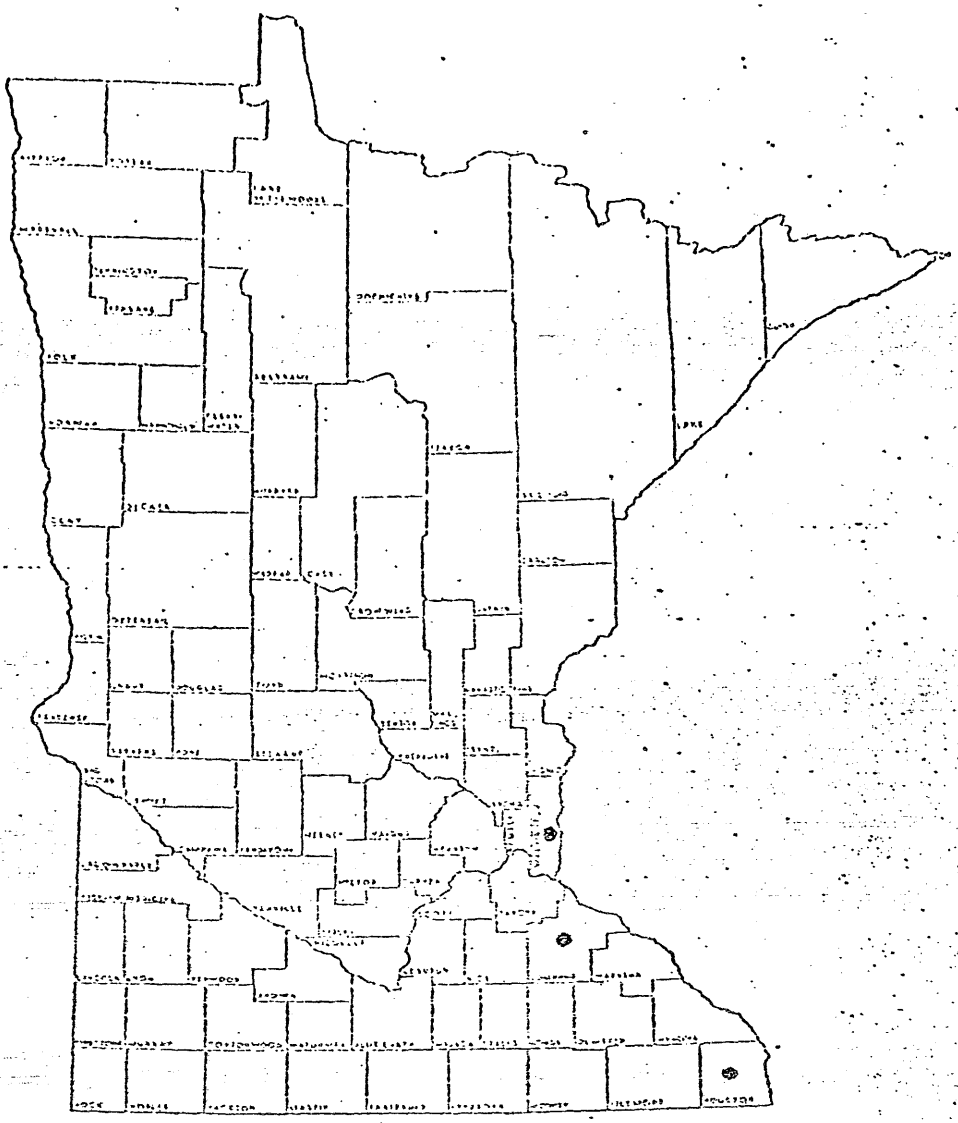
REFERENCES:

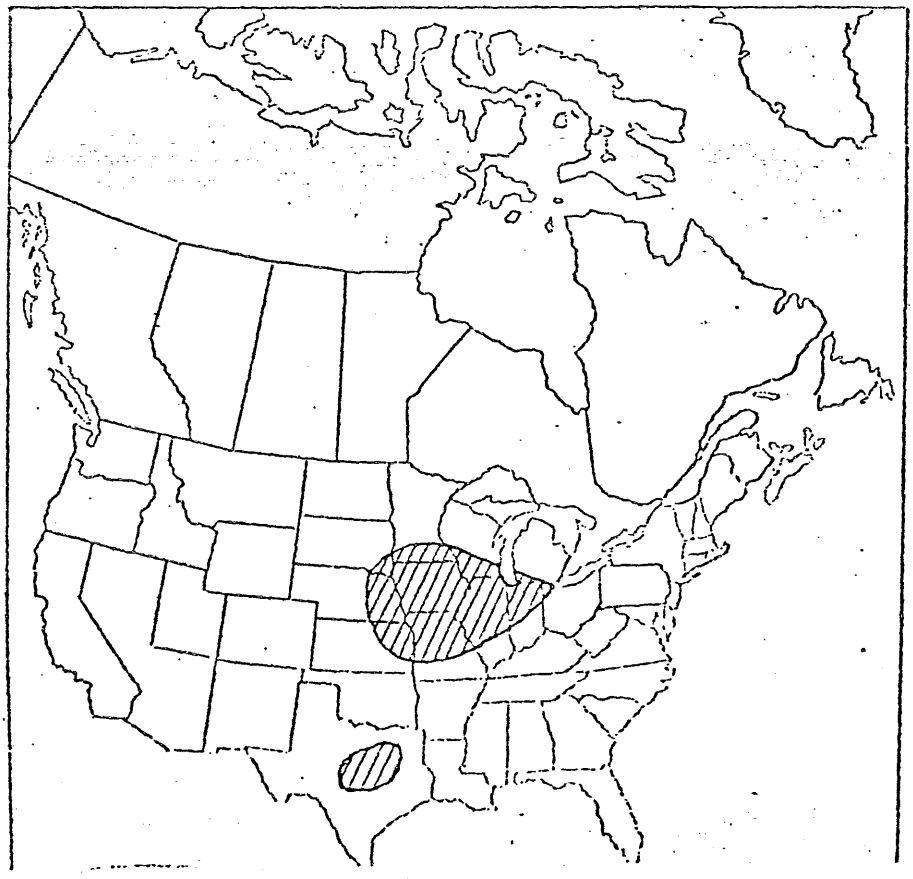
Fox, W. B. 1945. Leguminosae in Iowa. Am. Midl. Nat. 34(1):207-230.

Isely, D. 1955. The Leguminosae of the North-Central United States, II Hedysareae. Ia. St. Coll. Jour. Sci. 30(1):33-118.

LOCATION IN STUDY AREA: Occurrence #10.

EVALUATION: The single occurrence of this species in the study area does not occur in a proposed corridor, and should not be affected by construction activity.





#0660A

STATUS SHEET

ELEMENT NAME: Ruellia humilis (No common name)

FEDERAL STATUS: None.

STATE STATUS: None.

NATURAL HERITAGE PROGRAM STATUS: Undetermined.

BASIS FOR STATUS CLASSIFICATION: This species was first recorded in Minnesota at Afton State Park in 1979. Its recent discovery here may indicate that it is a recent arrival; however, the data available is too scanty to make a final judgment.

PREFERRED HABITAT: Dry prairies, rocky slopes and open woods.

DISTRIBUTION: See attached maps.

OCCURRENCES IN MINNESOTA: Ruellia humilis is known only from one site in Washington county.

OF OCCURRENCES IN MANAGED AREAS: The only occurrence of this species in the state is in Afton State Park.

POTENTIAL THREATS TO SPECIES: At this time, we do not have enough data to accurately predict any potential threats to the species.

REFERENCES:

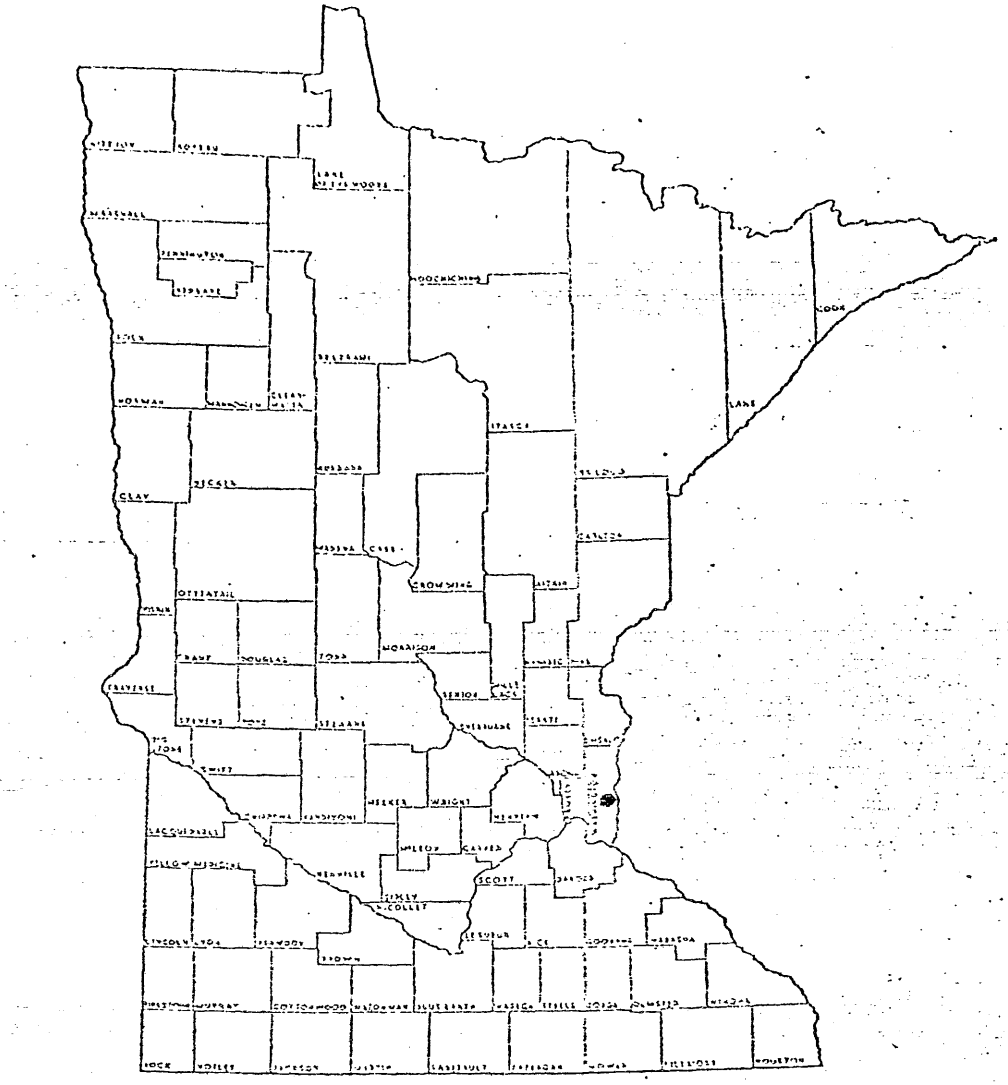
Fernald, M. L. 1945. Ruellia in the Eastern United States. Rhodora 47:51-182.

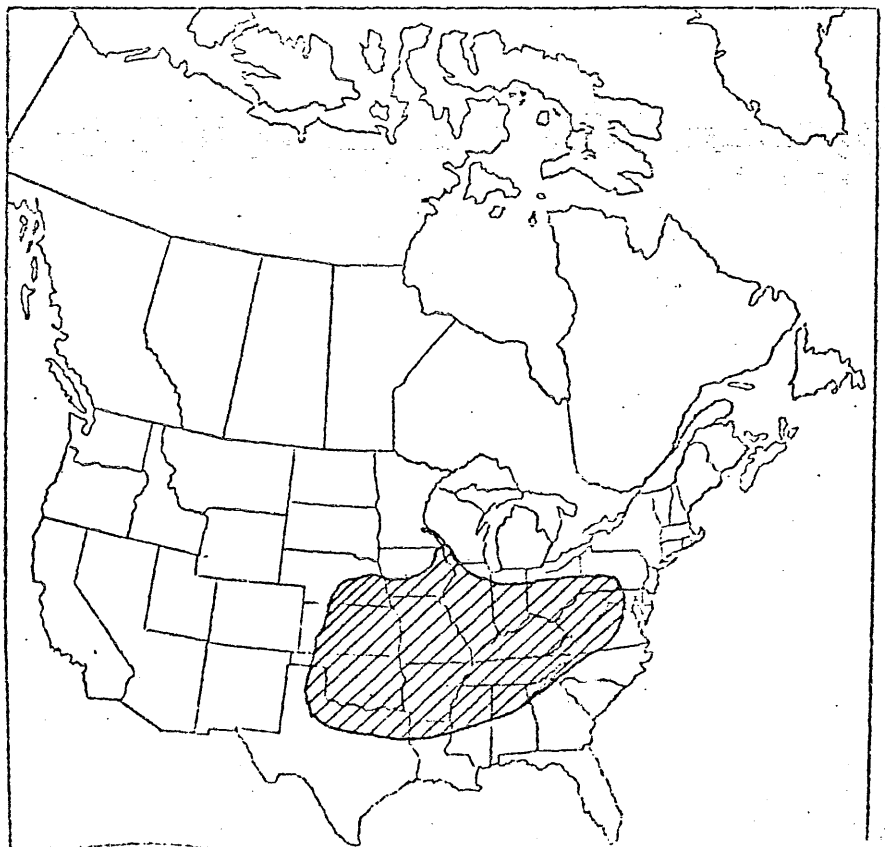
Fernald, M. L. 1950. Grays' Manual of Botany. 8th ed. D. Van Nostrand Company, New York.

LOCATION IN STUDY AREA: Occurrence #11.

EVALUATION: The occurrence of this species in the study area does not coincide with a proposed corridor and should not be adversely affected by construction activity.

Distribution of Ruellia humilis
(No Common Name)





#0670A

STATUS SHEET

ELEMENT NAME: Besseya bullii (No common name)

FEDERAL STATUS: None.

STATE STATUS: None.

NATURAL HERITAGE PROGRAM STATUS: Special concern.

BASIS FOR STATUS CLASSIFICATION: The habitat upon which Besseya bullii depends is rapidly being developed for commercial, residential and other urban uses. This is reflected in the drastic decline in its population levels since 1945. Because the distribution of this species is centered around the Twin Cities Metro area, it is expected that land conversion will have a continued and deleterious effect on its population levels.

PREFERRED HABITAT: Sandy, gravelly bluffs and prairies and occasionally dry open woods.

DISTRIBUTION: See attached maps.

OCCURRENCES IN MINNESOTA: There are recent records from Scott, Goodhue, Dakota, Washington and Carver counties. It is historically known from Hennepin and Ramsey counties but it has not been seen in either county since 1903 and is presumed extirpated.

OF OCCURRENCES IN MANAGED AREAS: The occurrence of site #12 in Afton State Park is the only known occurrence of Besseya bullii in a managed area.

POTENTIAL THREATS TO SPECIES: This species is directly threatened by large scale construction projects that characterize the expanding metro area. It is indirectly threatened by erosion and competition from alien species resulting from disturbance of its delicate habitat.

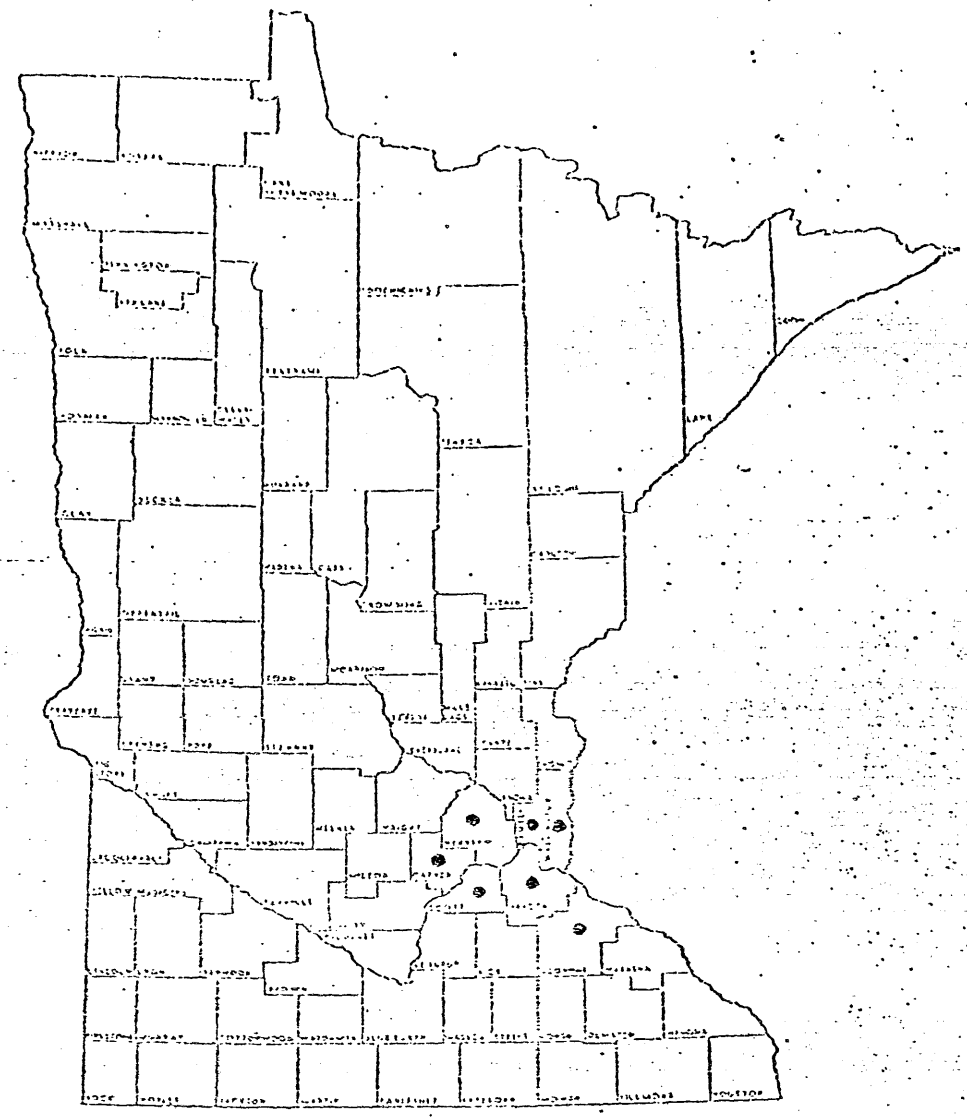
REFERENCES:

Mikelson, S. and H. H. Iltis. 1966. Preliminary reports on the flora of Wisconsin. Wisc. Acad. Sci., Arts and Letters 55:216-217.

Rittenhouse, J. L. and E. G. Voss. 1962. Douglas Houghton's Botanical Collections in Michigan, Wisconsin and Minnesota of the Schoolcraft expedition of 1832. Mich. Bot. 1:61-70.

LOCATION IN STUDY AREA: Occurrence #12 and #21.

EVALUATION: Of the two sites of Besseya bullii in the general area, one (#21) is just outside the study area and the other (#12) is within the study area but not within a corridor. Neither site is threatened by the proposed construction.



#0657A

STATUS SHEET

ELEMENT NAME: Cristatella Jamesii (No common name)

FEDERAL STATUS: None

STATE STATUS: None

NATURAL HERITAGE PROGRAM STATUS: Endangered.

BASIS FOR STATUS CLASSIFICATION: The occurrence of Cristatella Jamesii in the study area represents its only known station in Minnesota. It is a more southerly species not recorded this far north before its discovery here in 1978.

PREFERRED HABITAT: Sandy prairies and dunes.

DISTRIBUTION: See attached maps.

OCCURRENCES IN MINNESOTA: Cristatella Jamesii is known only from one site in Dakota county.

OF OCCURRENCES IN MANAGED AREAS: The only known occurrence of this species is in a non-managed area.

POTENTIAL THREATS TO SPECIES: The accessibility and vulnerability of this species' habitat makes its survival very tenuous. Its only known site is currently threatened by gravel mining and off-the-road motorized vehicles. In addition, its survival is threatened by urban expansion from the city of Hastings.

REFERENCES:

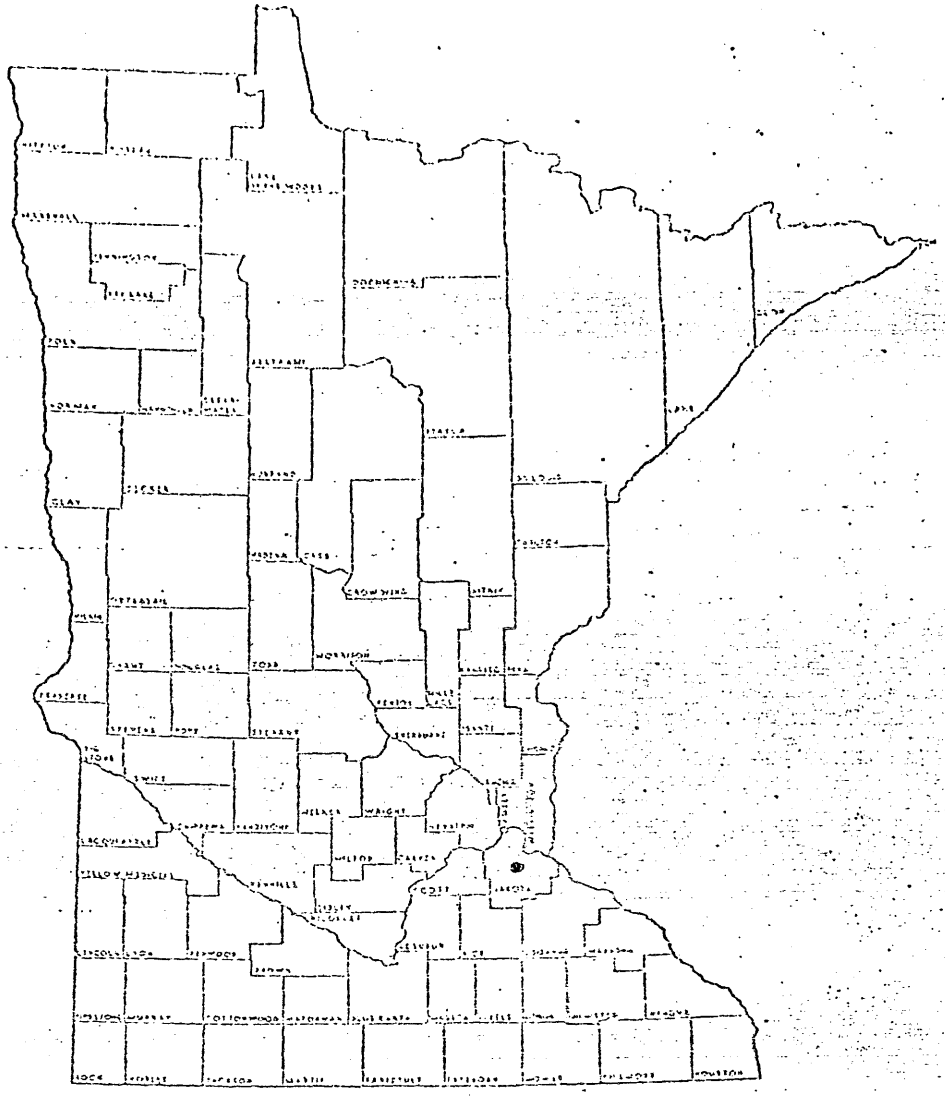
Hartley, T. G. 1962. The Flora of the "Driftless Area". State Univ. of Iowa, Ph.D. thesis, Botany.

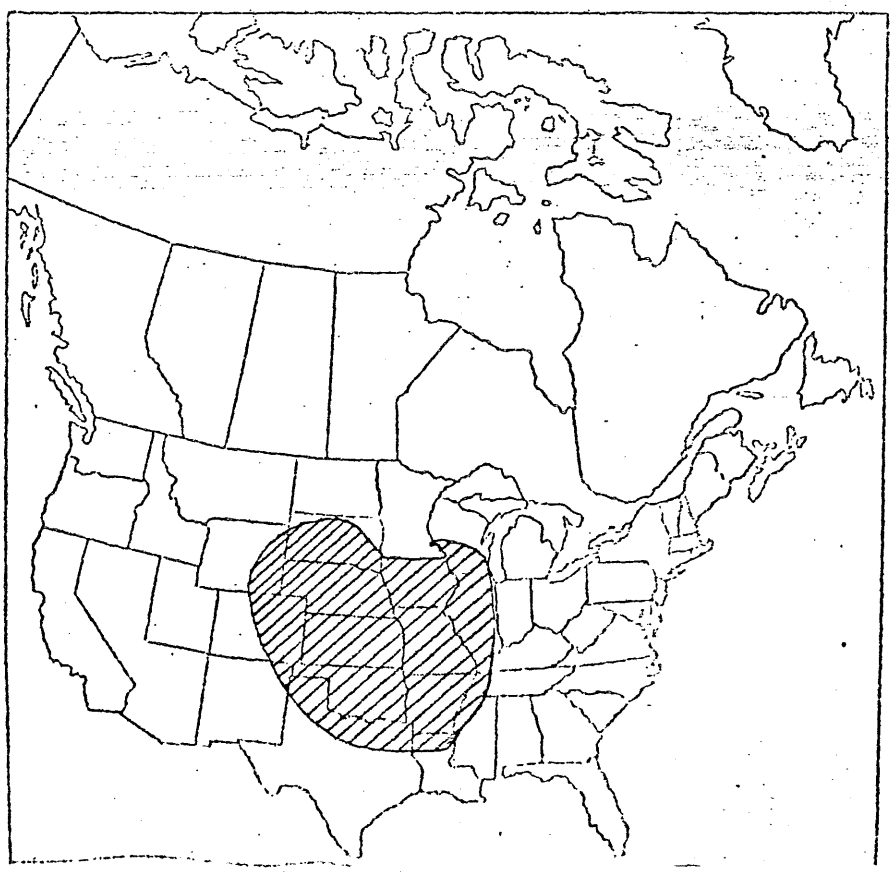
Fernald, M. L. 1950. Gray's Manual of Botany. 8th ed. D. Van Nostrand Company, New York.

LOCATION IN THE STUDY AREA: Occurrence #13 and #14.

EVALUATION: Although the occurrence of this species within the study area is currently threatened by a number of human activities, it does not appear that construction in any of the proposed corridors would directly affect the site.

Distribution of Cristatella jamesii
(No Common Name)





#0658A

STATUS SHEET

ELEMENT NAME: Hieracium longipilum (Long-bearded Hawkweed)

FEDERAL STATUS: None

STATE STATUS: None

NATURAL HERITAGE PROGRAM STATUS: Rare

BASIS FOR STATUS CLASSIFICATION: Most of the occurrences of Hieracium longipilum in Minnesota were recorded before 1910. The few records since then are from small scattered remnant populations.

PREFERRED HABITAT: The original habitat of this species may have been mesic prairies, but most of this habitat was destroyed before its floristic composition could be documented. Hieracium longipilum is found today on sandy hillsides and dunes.

DISTRIBUTION: See attached maps.

OCCURRENCES IN MINNESOTA: Hieracium longipilum is known from one site each in Isanti, Anoka, Wabasha, Pope, Dakota and Rice counties. It is possible that the species has already been extirpated from Goodhue, Winona, Ramsey and Ottertail counties.

OF OCCURRENCES IN MANAGED AREAS: One site occurs in the Cedar Creek Natural History Area, and a small population is present in Strandness Prairie in Pope county.

POTENTIAL THREATS TO SPECIES: One site was recently destroyed by gravel mining and another faces imminent destruction from land conversion. Because of the fragile habitat of this species, several sites are threatened by overuse by recreational activities, in particular, off-the-road motorized vehicles.

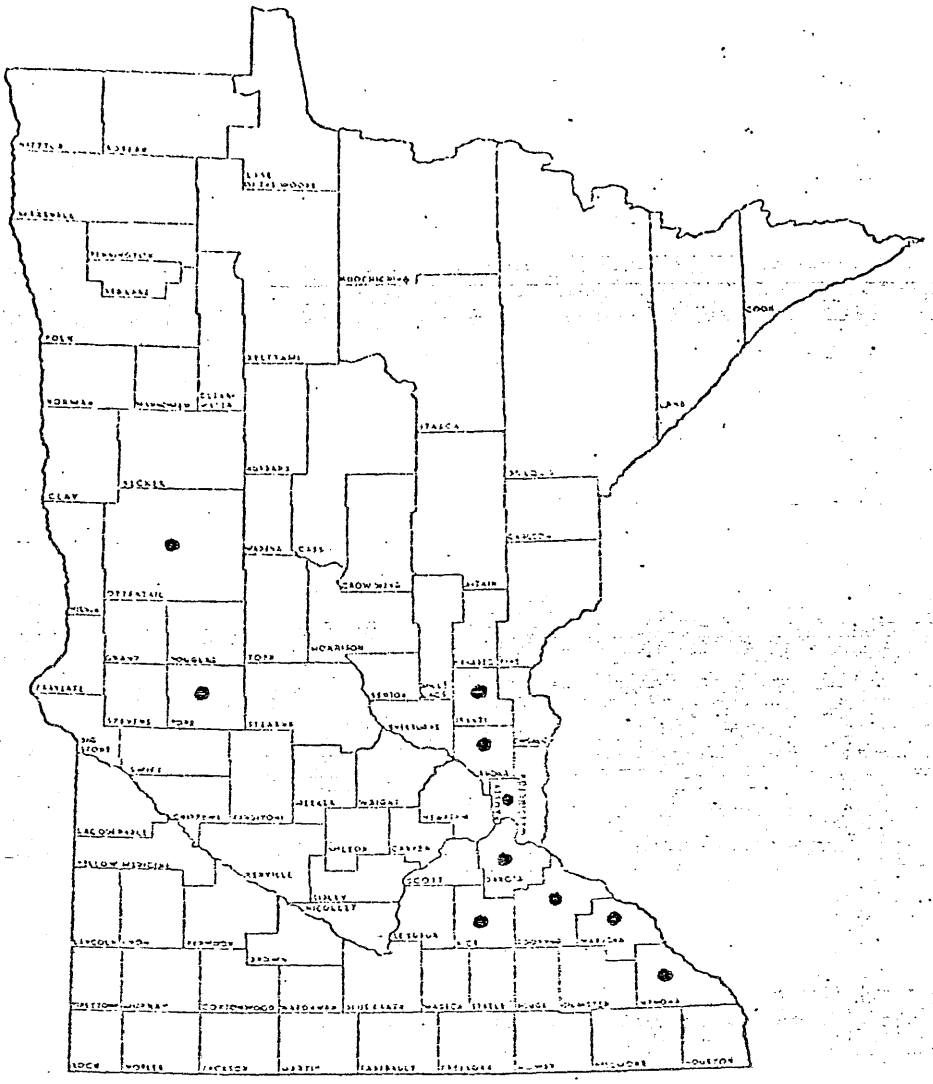
REFERENCES: Johnson and Iltis. 1963. Preliminary Reports on the Flora of Wiscosin #48.

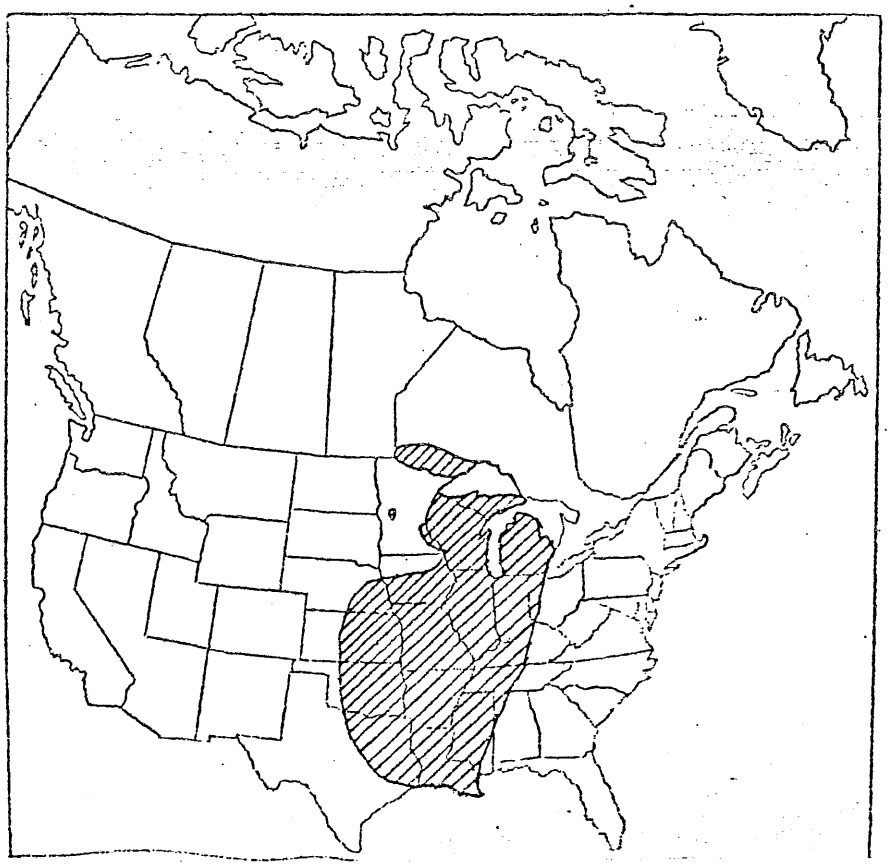
Hartley, T. G. 1962. The Flora of the "Driftless Area", State Univ. of Iowa, Ph.D. thesis, Botany.

LOCATION IN STUDY AREA: Occurrence #15

EVALUATION: The only occurrence of this species in the study area does not coincide with a proposed corridor and should not be adversely affected by the proposed construction.

Distribution of Hieracium longipilum
(Long-bearded Hawkweed)





#0666A

STATUS SHEET

ELEMENT NAME: Arisaema dracontium (Green Dragon)

FEDERAL STATUS: None.

STATE STATUS: None.

NATURAL HERITAGE PROGRAM STATUS: Rare.

BASIS FOR STATUS CLASSIFICATION: This species is limited in Minnesota to the floodplain of the Mississippi River below the Twin Cities. A recent intensive search of such habitats showed Arisaema dracontium to be present only in small scattered populations.

PREFERRED HABITAT: Wet, swampy soil in floodplain woods.

DISTRIBUTION: See attached maps.

OCCURRENCES IN MINNESOTA: Arisaema dracontium is currently known at 2 sites in Houston Co., one in Goodhue, one in Wabasha and one in Rice. It is also known by records from the 1800's in Dakota and Winona counties which have likely been destroyed by river water management activities.

OF OCCURRENCES IN MANAGED AREAS: The only population of the species known to occur in a managed area is a rather vigorous colony in the Cannon River Wilderness Area.

POTENTIAL THREATS TO SPECIES: Like most floodplain species, Arisaema dracontium is especially vulnerable to abnormal fluctuations in water levels. Hydraulic manipulation that would result in extended inundation or desication would severely threaten its existence. Additional threats include nutrient enrichment and other forms of water pollution as well as destruction of the overstory.

REFERENCES:

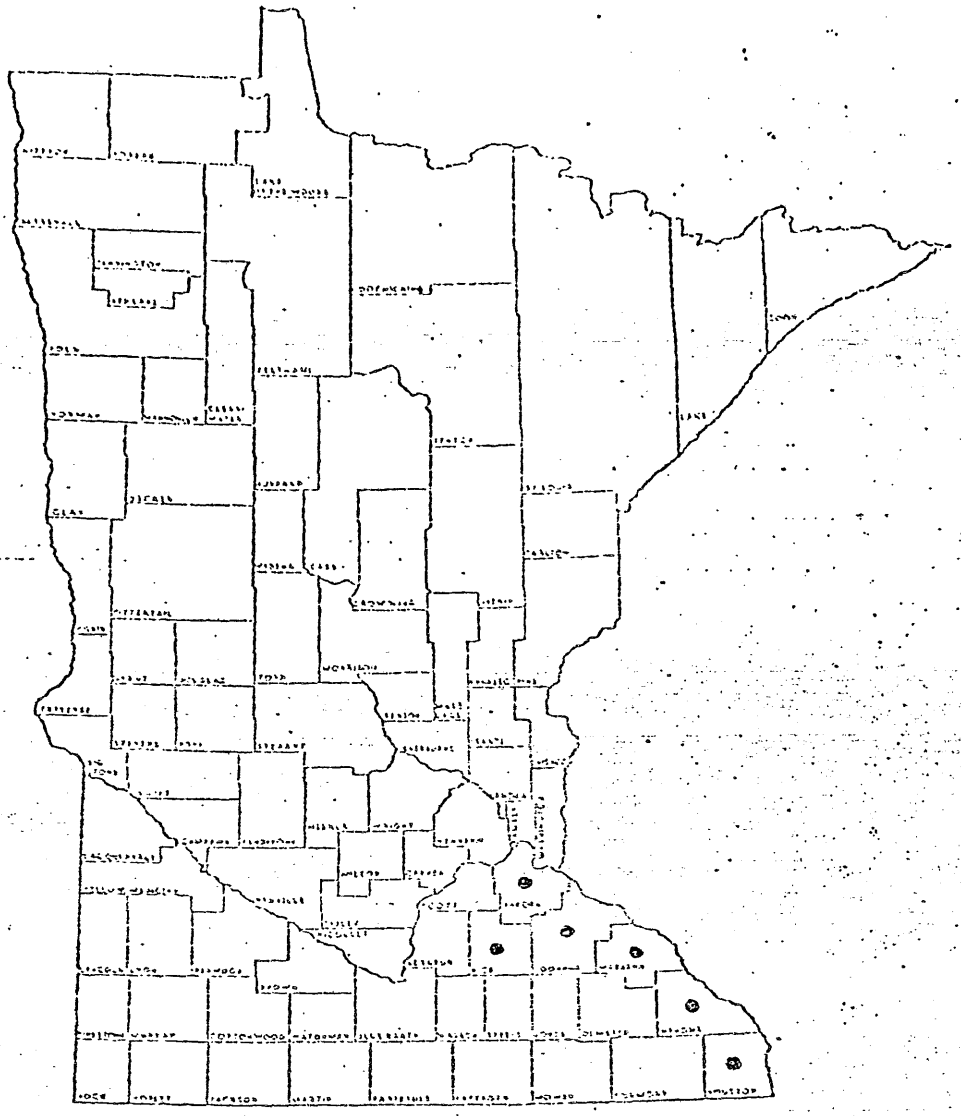
Morley, T. 1969. Spring flora of Minnesota. Univ. of MN. Press., Minneapolis.

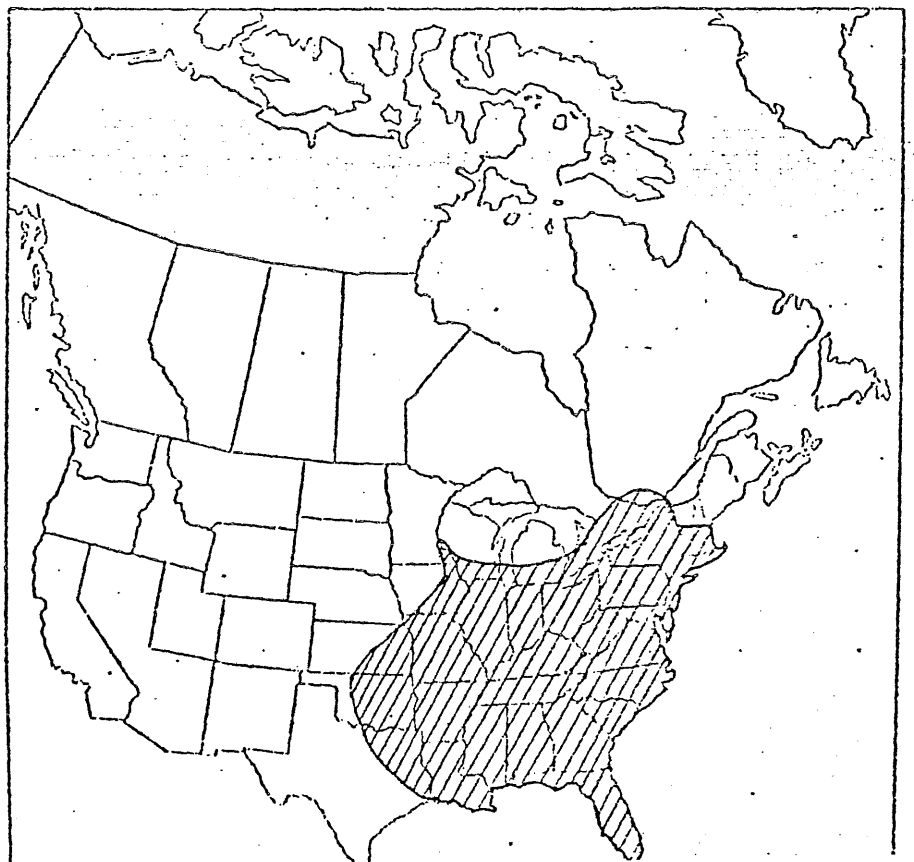
Hartley, T. G. 1962. The flora of the "Driftless Area". State Univ. of Iowa. Ph.D. thesis, Botany.

LOCATION IN STUDY AREA: Occurrence #16.

EVALUATION: The single site of this species does not coincide with a proposed corridor and should not be adversely affected by construction activity.

Distribution of Arisaema dracontium; (Green Dragon)





#0663A

STATUS SHEET

ELEMENT NAME: Carex grayi (No common name)

FEDERAL STATUS: None.

STATE STATUS: None.

NATURAL HERITAGE PROGRAM STATUS: Rare.

BASIS FOR STATUS CLASSIFICATION: This species was searched for intensively following its initial discovery in the state in 1975. The results show it to be a very local species occurring in small numbers in widely dispersed sites.

PREFERRED HABITAT: Wet floodplain woods.

DISTRIBUTION: See attached maps.

OCCURRENCES IN MINNESOTA: It is known from three sites in Houston county and one site each in Rice, Mille Lacs, Goodhue and Winona counties.

OF OCCURRENCES IN MANAGED AREAS: The only occurrence of this species in a managed area is in the Cannon River Wilderness Area.

POTENTIAL THREATS TO SPECIES: Like all floodplain species, Carex grayi is very susceptable to water manipulation and nutrient enrichment. Several sites in which this species was thought likely to have occurred have been innundated or desicated by the construction of locks, dams, and levees.

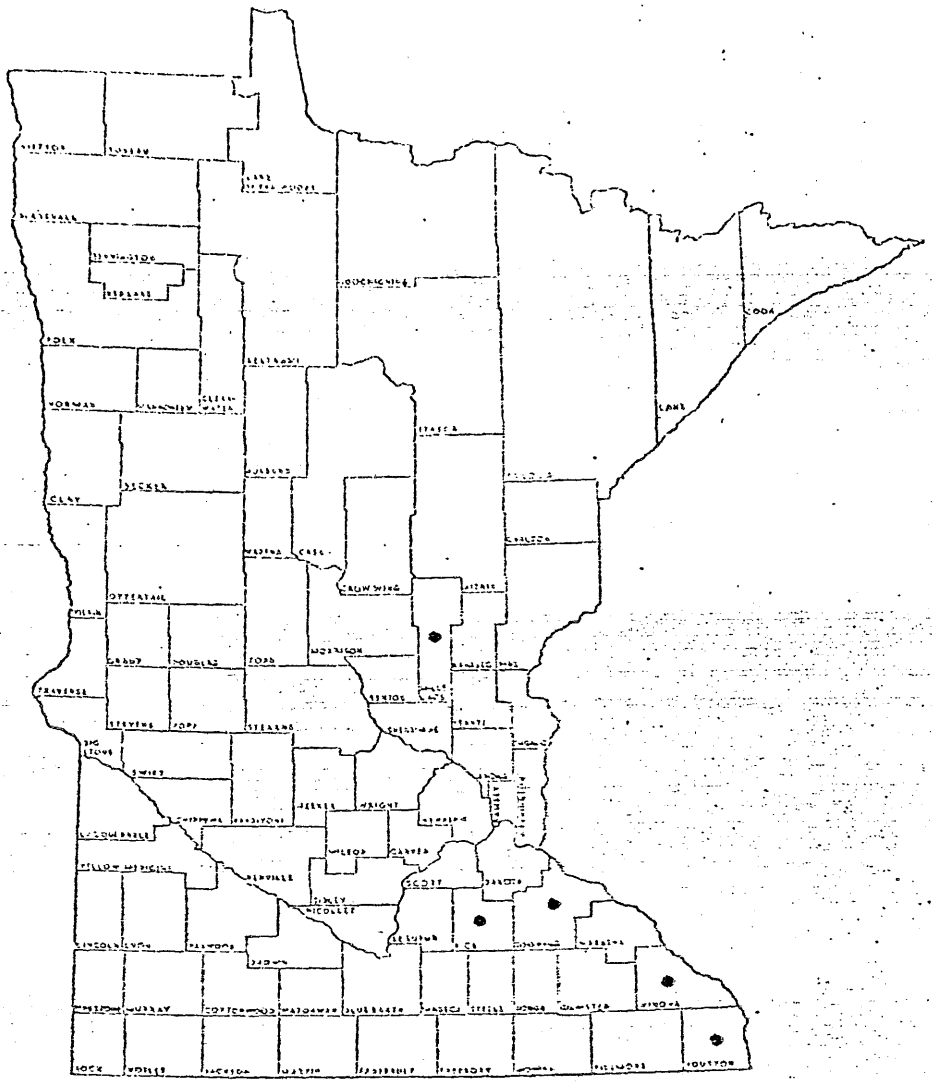
REFERENCES: Gilly, C. L. 1946. The Cyperaceae of Iowa. Ia. St. Coll. Jour. Sci. 21:55-151.

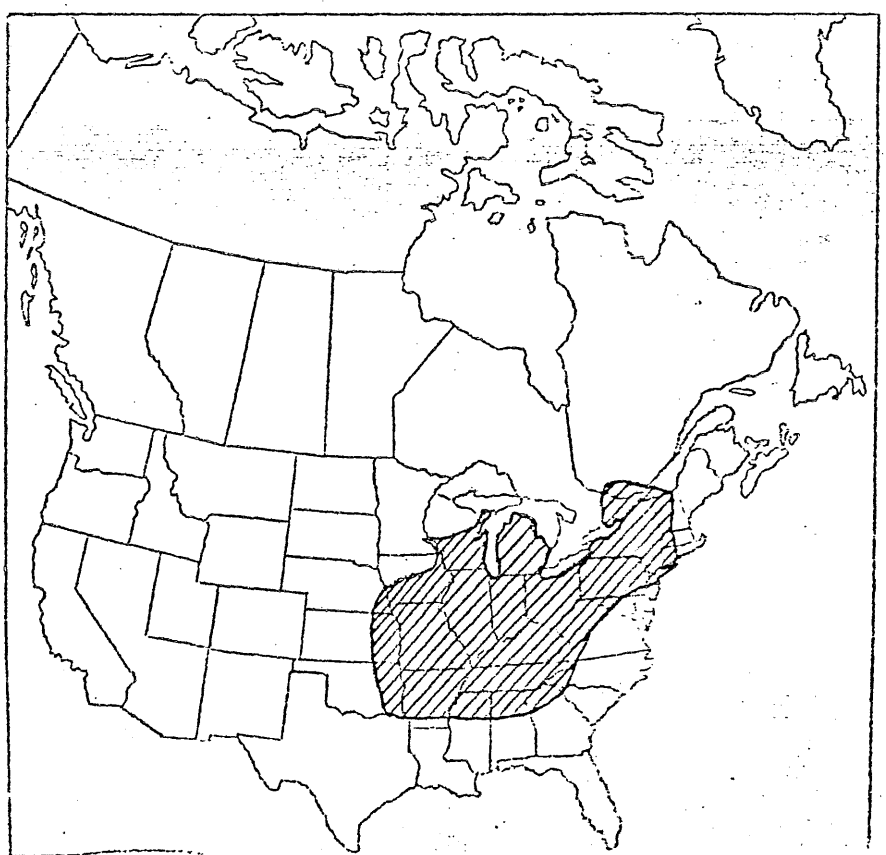
Wheeler, G. A. 1979. Range Extensions of Carex in Minnesota. Rhodora 81:131-135.

LOCATION IN STUDY AREA: Occurrence #17.

EVALUATION: The only site of this species in the study area does not occur in a proposed corridor and would not be threatened by construction.

Distribution of Carex grayii
(No Common Name)





#0664A

STATUS SHEET

ELEMENT NAME: *Lesquerella ludoviciana* (No common name)

FEDERAL STATUS: None.

STATE STATUS: None.

NATURAL HERITAGE PROGRAM STATUS: Endangered.

BASIS FOR STATUS CLASSIFICATION: *Lesquerella ludoviciana* is known in Minnesota only from Red Wing. It was recorded there three times between 1886 and 1893, but was not seen again until 1977 when it was collected from the base of Twin Bluffs.

PREFERRED HABITAT: Open sandy soil on prairies and bluffs.

DISTRIBUTION: See attached maps.

OCCURRENCES IN MINNESOTA: A single site in Red Wing, Goochue County.

OF OCCURRENCES IN MANAGED AREAS: The only known population of this species in Minnesota does not occur in a managed area.

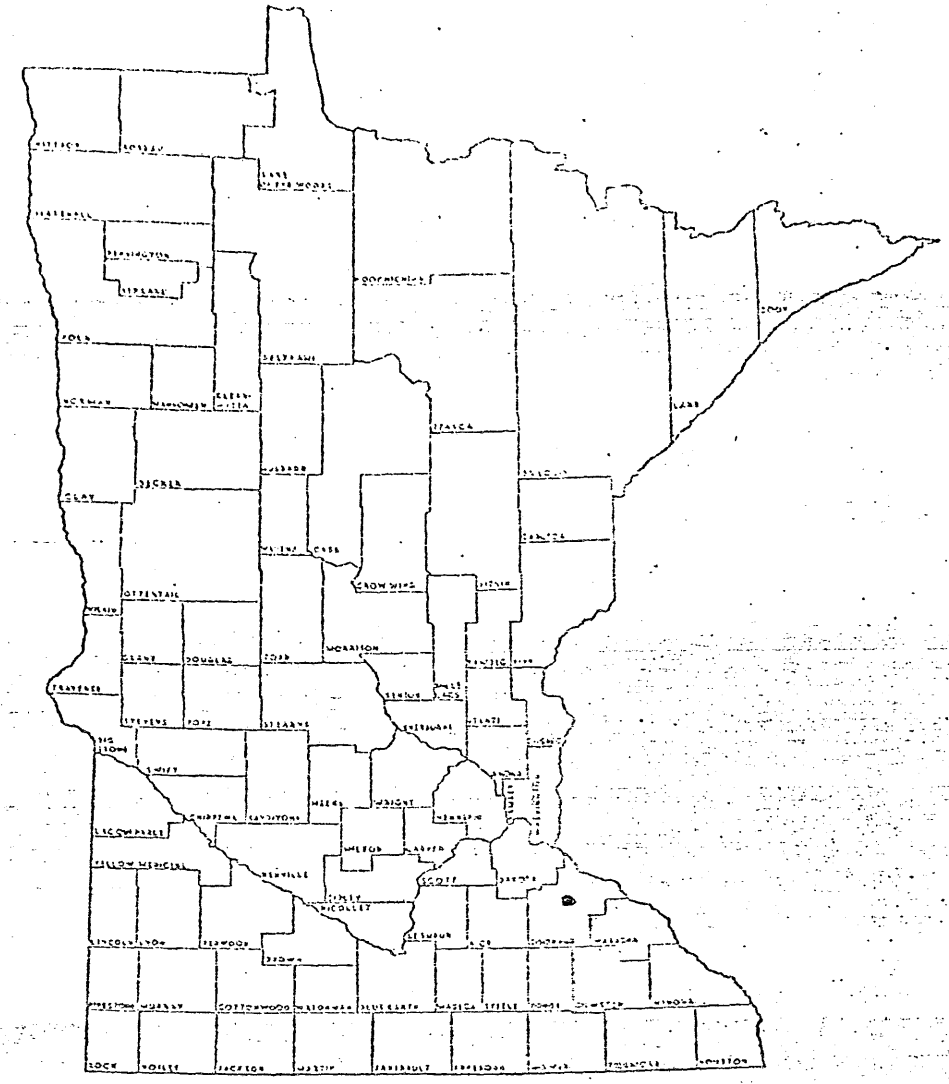
POTENTIAL THREATS TO SPECIES: Because this species is limited to a single site, any event that would alter the soil or topography of the area would severely threaten this species.

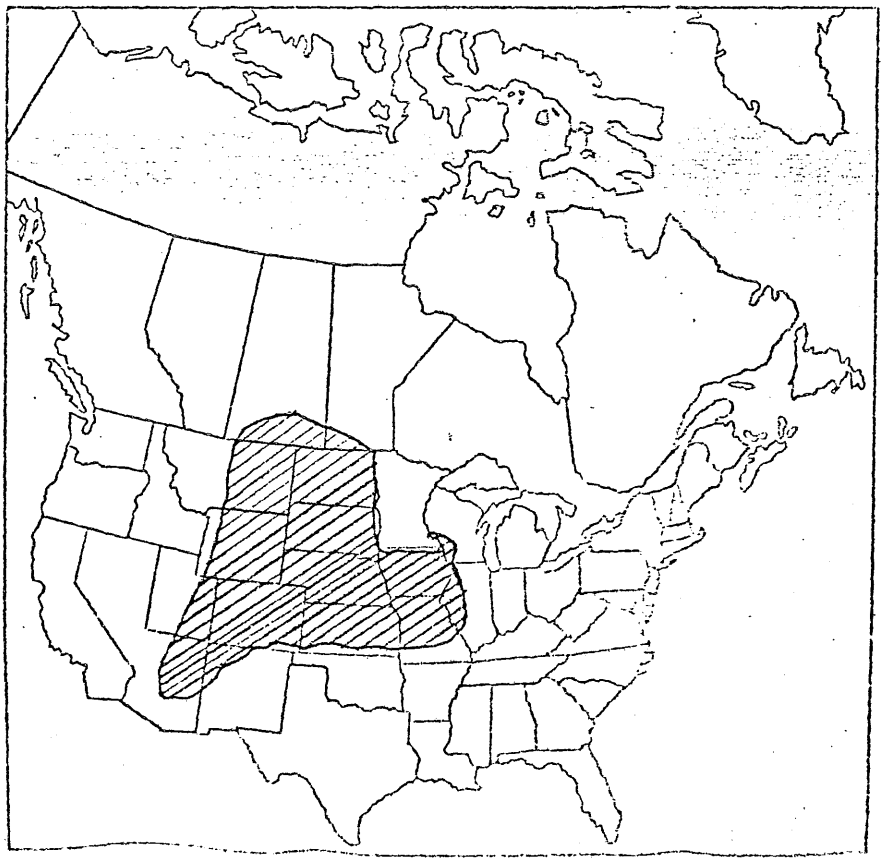
REFERENCES: Fernald, M. L. 1950. Grays' Manual of Botany. 8th ed. D. Van Nostrand Co., New York.

LOCATION IN STUDY AREA: Occurrence #18.

EVALUATION: The site of *Lesquerella ludoviciana* is in the study area and near a proposed corridor, but should not be affected by normal construction activity.

Distribution of Lesquerella ludoviciana
(No Common Name)





#0662A

STATUS SHEET

ELEMENT NAME: Carex muskingumensis (No common name)

FEDERAL STATUS: None.

STATE STATUS: None.

NATURAL HERITAGE PROGRAM STATUS: Rare.

BASIS FOR STATUS CLASSIFICATION: Prior to 1976, Carex muskingumensis was known in Minnesota by a single archaic record from Chisago county. However, after an exhaustive field search in 1976, it was found to be extant in very limited numbers in several counties of southeastern Minnesota.

PREFERRED HABITAT: Wet soil in floodplain woods.

DISTRIBUTION: See attached maps.

OCCURRENCES IN MINNESOTA: Carex muskingumensis is currently known from 5 sites in Houston Co., one site in Winona Co., one in Wabasha Co., and one in Goodhue Co. The occurrence dated 1885 from Chisago Co. has not been re-verified.

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

POTENTIAL THREATS TO SPECIES: The major threat to this species is the manipulation of water levels through the management of dams, locks and levees, nutrient enrichment and other forms of water pollution, and alteration of the canopy layer.

REFERENCES:

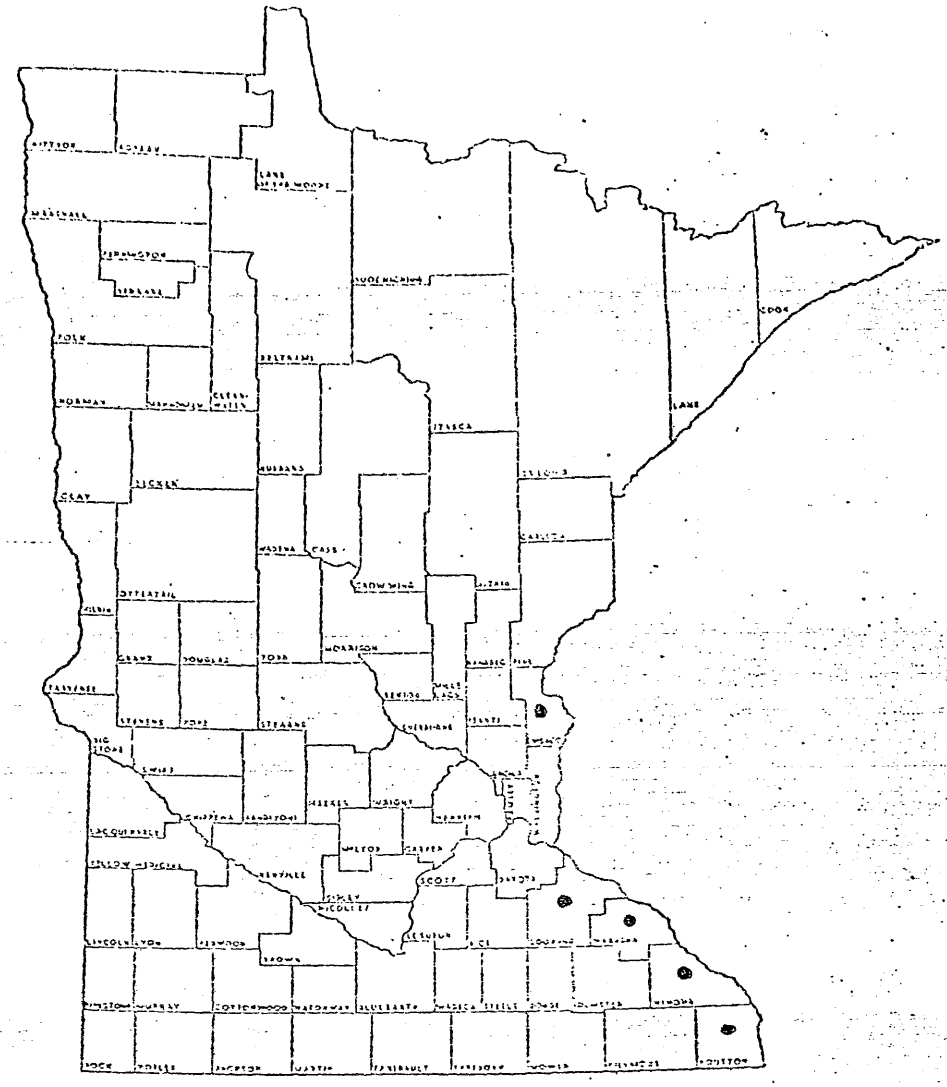
Gilly, C. L. 1946. The Cyperaceae of Iowa. Ia. St. Coll. Jour. Sci. 21:55-151.

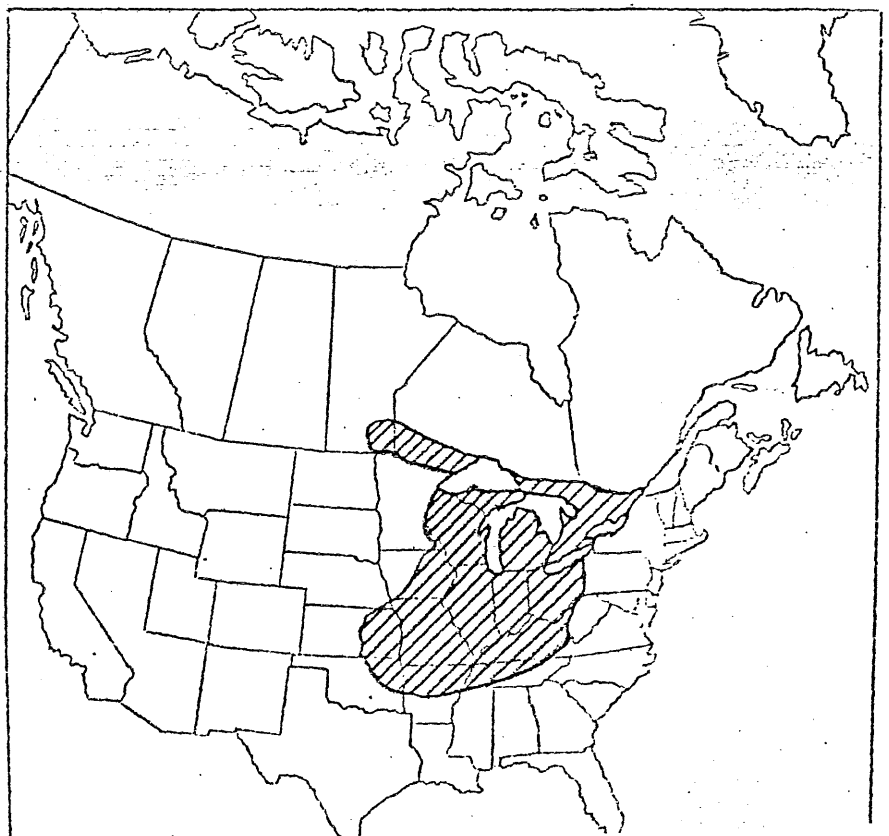
Wheeler, G. A. 1979. Range Extensions of Carex in Minnesota. Rhodora 81:131-135.

LOCATION IN STUDY AREA: Occurrence #19.

EVALUATION: The only site of this species in the study area occurs at the edge of a proposed corridor. It is suggested that this population of Carex muskingumensis be carefully monitored if construction were to take place in this corridor.

Distribution of Carex muskingumensis
(No Common Name)





#0661A

STATUS SHEET

ELEMENT NAME: Cheilanthes feei (Slender Lip-fern)

FEDERAL STATUS: None.

STATE STATUS: None.

NATURAL HERITAGE PROGRAM STATUS: Rare.

BASIS FOR STATUS CLASSIFICATION: Cheilanthes feei is limited in Minnesota to the Mississippi River Valley below the Twin Cities. It occurs in this area locally and sporatically and shows little ability to colonize new sites.

PREFERRED HABITAT: Crevices in limestone cliffs and ledges.

DISTRIBUTION: See attached maps.

OCCURRENCES IN MINNESOTA: This species has been confirmed to occur in Goodhue, Winona and Houston counties.

OF OCCURRENCES IN MANAGED AREAS: The only occurrence of this species in a managed area is in the John A. Latsch State Park.

POTENTIAL THREAT TO SPECIES: Because the preferred habitat of Cheilanthes feei is limestone rock crevices, the only likely threat it could face would be the destruction or disturbance of the rock substrate on which it occurs. This could result from quarrying, road building or other major construction projects.

REFERENCES:

Tryon, R. 1980. The Ferns of Minnesota. Univ. of MN. Press, Minnneapolis.

Fernald, M. L. 1950. Grays' Manual of Botany. 8th ed. Van Nostrand Company, New York.

LOCATION IN STUDY AREA: Occurrence #20.

EVALUATION: The closest occurrence of this species is 2 miles west of the study area and far removed from any proposed corridor. There appears to be little likelihood of the site being disturbed.

Distribution of Cheilanthes feei
(Slender Lip-fern)