

STATUS OF THE KARNER BLUE BUTTERFLY,
LYCAEIDES MELISSA SAMUELIS NABOKOV,
IN MINNESOTA 1990

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Abstract: A status survey for the Karner Blue butterfly (Lycaeides melissa samuelis) was conducted during the late spring and summer of 1990. This butterfly, which appears to be declining across much of it's range, is proposed for federal listing and status reports in the midwest are lacking.

The Karner Blue overwinters as ova laid on or very near wild lupine (Lupinus perennis) by second brood females (Dirig and Cryan, 1975; Lawrence and Cook 1989). The eggs hatch in early spring and the larvae feed on the lupine leaves for about three weeks (Dirig, 1988; Schweitzer 1989). Just before pupating the larvae moves off the plant among the litter (Dirig, 1988). Typically the first brood adult flight period is from late May to mid-June (Schweitzer, 1989). In Minnesota the second adult flight period is from late July to mid-August (personal observation; Minnesota DNR Natural Heritage Database, 1990). Adults on the average live for only 5 days (Schweitzer, 1989; Fried, 1987). Adult females usually oviposit on the lupine plant itself or very near the plant on grass or sedge blades, or in the duff (Cryan and Dirig, 1978; Schweitzer, 1989). Thus, no stage in the butterflies life cycle would be highly resistant to fire.

The goals of this survey were to: (1) identify known locations or probable locations of large populations of wild lupine (Lupinus perennis), the Karner Blue butterfly's exclusive host plant, (2) survey these identified sites to confirm the presence of the host plant and to search the site for the Karner Blue butterfly, and (3) to provide baseline data on the status of the butterfly and it's host plant in Minnesota.

The survey was conducted in two phases. The first phase consisted of analyzing aerial photos, soil maps, and topographical maps to identify habitat suitable for lupine, and conducting field work in search of the plant and possible first brood butterflies. The second phase included rechecking sites that contained lupine for second brood adult Karner Blue butterflies.

Although this survey found populations of lupine in each study area, it was less common in Minnesota than had been believed. Large populations of the plant were found within the Whitewater Wildlife Management Area, (WMA) in Winona County, the Himlie Sand Barrens site in Fillmore County, Sherburne National Wildlife Refuge in Sherburne County, and within the St. Croix Wild River State Park in Chisago County.

Fourteen sites out of 50 contained lupine; of those sites many populations are in a precarious state. Fire supression appears to be the main reason that suitable habitat is limited in the oak barrens region. It is the author's opinion that wild lupine should be listed as a species of "special concern" in Minnesota.

There were two historical records of the Karner Blue butterfly in Minnesota. The insect had not been found at either of these sites since 1984 and was believed to be extirpated from the state. However, a population was found within the Whitewater WMA in Winona County during this 1990 survey. Because the Karner Blue butterfly was found at only two locations, both within one WMA, it should be listed as an "endangered" species in Minnesota. An estimate of the population size was beyond the scope of this study. This should, however, be a top priority in future Minnesota studies on the Karner Blue. It is essential to understand the total habitat requirements of the butterfly in order to manage the area in such a way as to insure the survival of the species.

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INTRODUCTION

This report is intended to provide baseline information on the status of the Karner Blue butterfly (KB), Lycaeides melissa samuelis (Nabokov), in Minnesota. This butterfly, which appears to be declining across much of it's range (Lawrence and Cook, 1989; Stewart and Ricci, 1988), is also proposed for federal listing and status reports in the Midwest are lacking (Zaremba unpublished, 1990). Although the KB was probably never common throughout Minnesota, fire suppression, development, and other human disturbances have destroyed much of the butterfly's natural habitat. In Minnesota the historic habitat was sandy barrens and oak sand savannas in close association to it's foodplant, wild blue lupine, Lupinus perennis, (Coffin and Pfannmuller, 1988). There are two sites that contain lupine and at one time supported a KB population. One site is found within Whitewater Wildlife Management Area in Winona County and the other is in Anoka County within the Cedar Creek Natural History Area. The last reported sightings of the butterfly at these sites, prior to this year's survey, were 2 June 1983, and 12 August, 1984 respectively.

The following life cycle information is gathered from a variety of sources and is augmented with my own observations during 1990. Table 1 is a diagrammatic representation of the Karner Blue's life cycle derived by the author. It is intended to give you a general picture of the butterfly's life cycle.

The Karner Blue overwinters as ova laid on or very near wild lupine (Lupinus perennis) by second brood females (Dirig and Cryan, 1975; Lawrence and Cook 1989). The eggs hatch in early spring and the larvae feed on the lupine leaves for about three weeks (Dirig, 1988; Schweitzer 1989). Just before pupating the larvae moves off the plant among the litter (Dirig, 1988). Typically the first brood adult flight period is from late May to mid-June (Schweitzer, 1989). In Minnesota the second adult flight period is from late July to mid-August (personal observation; Minnesota DNR Natural Heritage Database, 1990). Adults on the average live for only 5 days (Schweitzer, 1989; Fried, 1987). Adult females usually oviposit on the lupine plant itself or very near the plant on grass or sedge blades, or in the duff (Cryan and Dirig, 1978; Schweitzer, 1989; authors personal observation). Thus, no stage in the butterfly's life cycle would be highly resistant to fire.

Table 1. The general life cycle of the Karner Blue Butterfly in Minnesota.

	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.
Eggs								
Larvae/Pupae								
Adults								

(The Karner blue overwinters in the egg stage, Nov.- Feb.)

METHODS

An intensive survey for the Karner blue butterfly in Minnesota was conducted by the principal surveyor, David L. Cuthrell, during the spring and summer of 1990. The survey consisted of two phases:

Phase One:

The first phase of the survey consisted of identifying locations or probable locations of the KB's host plant, wild blue lupine (Lupinus perennis). Three study regions (Figure 2) were chosen based on the following criteria: 1.) historical KB records in Minnesota and Wisconsin; 2.) historic lupine records (see Appendix I); and 3.) consultation with DNR staff.

Southeast: This study area was limited to Wabasha, Olmsted, Winona, Fillmore, and Houston counties in the extreme southeast corner of the state. The area is found within the Paleozoic Plateau region and contains many scattered pockets of sandy, river terrace sites which are potential habitats of the lupine. A total of 27 sites were identified from aerial photo interpretation, soil surveys, historic plant and KB records, and discussions with DNR staff, including the Heritage Program Botanist, Parks Regional Resource Managers, and Area Wildlife Managers.

Anoka Sand Plain: This study area included the four counties (Anoka, Sherburne, Isanti, Chisago) which were thought to contain a number of lupine populations. A total of 20 sites were selected for field survey work. These sites were based on herbarium collection records, interviews with members of Minnesota DNR's County Biological Survey staff, and the one historic KB record.

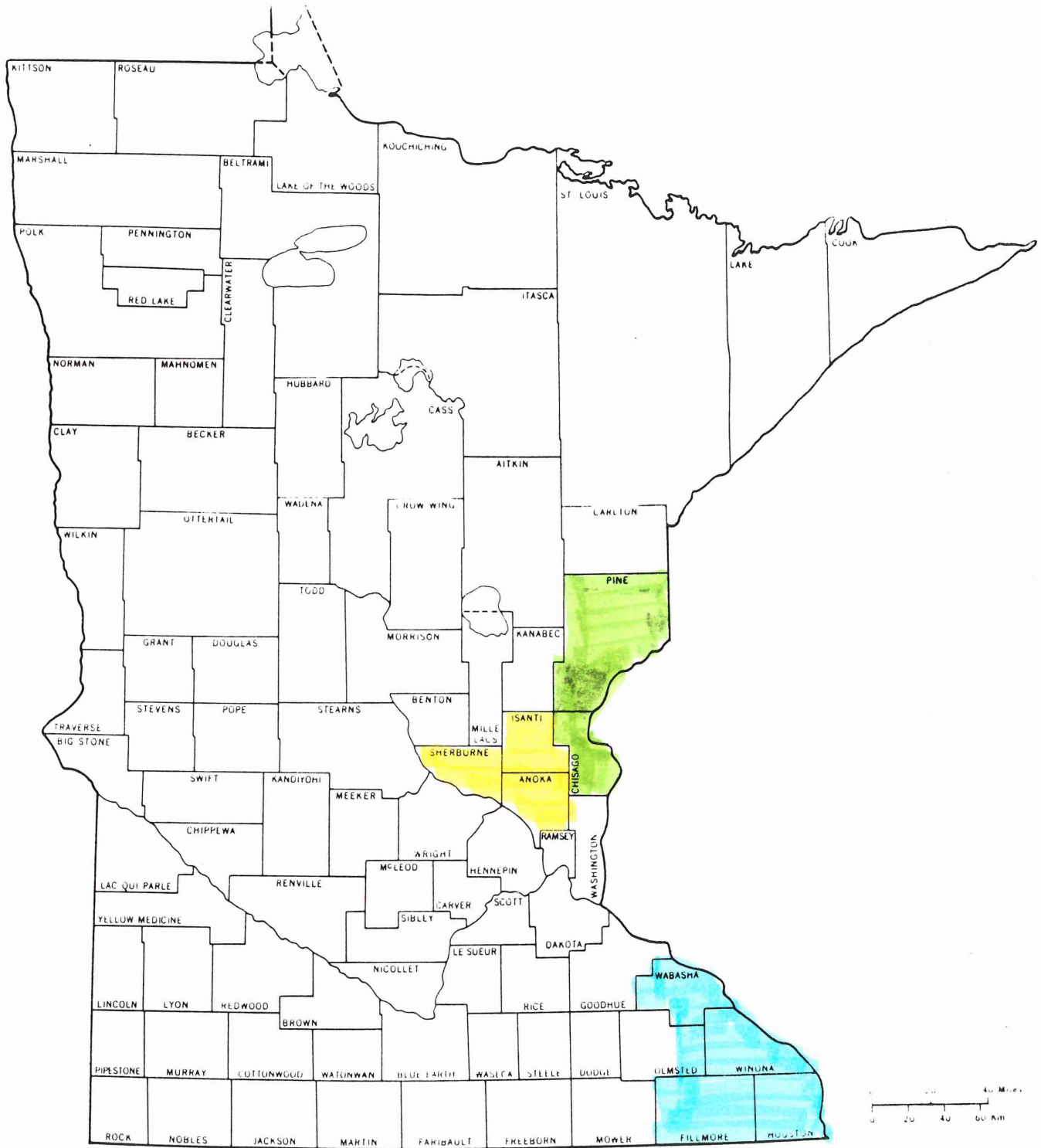
St. Croix River Valley: The survey of this area included Wild River State Park and St. Croix State Park, two parks located along the St. Croix river. It was hoped that a large population of the KB be found in these areas owing to their close proximity to the Wisconsin KB populations. Four additional sites were identified in this study area.

Field Survey for Lupine/First Brood KB

From 22 May to 19 June 1990, fifty sites were field surveyed for the presence of Lupine. Field notes were taken and included such information as: date, weather, approximate numbers of clumps, stems, and flowering stems, acreage with lupine, associated plant species, and management concerns (Fig. 3). All sites surveyed were marked on topographic maps, with the presence of lupine noted. Sites that contained lupine were then resurveyed during phase two for KBs.

Plant species that made up the majority of the plants at the site were listed to help one get a feel for habitat type. No attempt was made to systematically survey the vegetation of the sites. The botanical nomenclature follows Mohlenbrock (1986).

Figure 2. The three study regions chosen: The Southeast, the Anoka Sand Plain, and the St. Croix River Valley.



- SOUTHEAST
- ANOKA SAND PLAIN
- ST. CROIX RIVER VALLEY

Figure 3. Field Form used during phase one.

MINNESOTA KARNER BLUE SURVEY FORM 1990

Site Name _____
Date _____ Time _____ to _____
Observer _____ County _____
Quad _____ T\R\S 1/4 _____
Weather _____

Karner Blues

Brood 1 2 Present: Yes _____ No _____
Number of individuals _____

Lupine

Approx. no. of clumps _____
Approx. no. of stems _____
Approx. no. of flowering stalks _____
Acreage with lupine _____
Comments on lupine _____

Associate species:

Little bluestem _____	Big bluestem _____
NJ tea _____	Jack pine _____
Bur oak _____	Poplar _____
Black oak _____	White oak _____

Nectaring plants:

(P= present; F= flowering, U= b-flies seen using)

Canopy _____

Management concerns:

Succession _____	Road maintenance _____
Agriculture _____	Insecticide use _____
Development _____	Herbicide use _____
ORV use _____	Browsing _____

Notes:

Numerous other butterfly and skipper species were also noted at each site. The author attempted to net and identify every "different" butterfly seen at each site. Again the searches were at random. All butterflies listed were netted and field identified. The more difficult species to identify, and some of the unusual species were retained by the author and keyed out using a variety of sources (Scott, 1986; Shull, 1987; Pyle, 1981; McCabe and Post, 1977). The voucher specimens are currently in the author's private collection and will eventually be deposited in the University of Minnesota entomology collection. The butterfly nomenclature follows that of Miller and Brown (1981).

During this part of the survey, records were also kept on observations of two other butterfly species of concern that use lupine as a larval host: the Dusky Wing (Erynnis persius) and the Frosted Elfin (Incisalia irus).

Phase Two:

The second phase consisted of resurveying, at various times in the butterfly's second brood flight period, areas where lupine populations were found during phase one. Owing to lack of information on the exact flight times of the KB in Minnesota, however, the second phase was started in mid-July and ended on 20 August 1990. In order to insure that the KB would be encountered on one of the visits to the area, these dates were selected so as to encompass the actual flight period.

Field Survey for Karner Blue Butterflies

From 9 July to 20 August 1990, thirteen sites were resurveyed for populations of the Karner Blue butterfly. Two techniques were used to search for the KB and other associated butterflies. One involved a random search of the entire area for butterflies, with stops at nectar sources and sunny areas where the author felt the insects would most likely be found. The second technique used transects spaced approximately 1-2 meters apart, through areas of lupine. In both techniques the presence of the Karner Blues were noted on topographic maps and associated butterflies noted. The date, time, number, and sex of the Karner Blues were also noted.

RESULTS and DISCUSSION

I. Lupine

Of the 50 sites surveyed for wild blue lupine (L. perennis) only 14 were found to contain the plant. Furthermore, most of these populations are in a precarious state due to fire suppression, development, agriculture, silviculture, or other reasons. Because of these findings, it is the author's opinion that L. perennis should be designated as a listed species in the state of Minnesota. At the very least, it should be considered a candidate for "special concern" status. However, the author feels it could be listed as "threatened" in Minnesota following further survey work.

II. The Dusky Wing and the Frosted Elfin.

The Frosted Elfin was not seen during the entire survey. It should be noted, however, that the adult flight period for the butterfly is from mid-March to May (Scott, 1986) and as field work did not begin until 22 May 1990, it is likely the flight period was over. In any case further field work at the appropriate time of the year is needed.

The adult Dusky Wing (Erynnis persius) is known to fly from May to mid-June in the eastern U.S. (Scott, 1986). One adult was found at the Whitewater WMA in Winona County on 1 June 1990. Further survey work for this species within the Whitewater WMA is needed.

III. The Karner Blue

No first brood adult butterflies were seen in any of the sites that contained lupine. During the second brood flight period, two sites were found to contain the Karner Blue. However, both of these sites are within the Whitewater Wildlife Management Area in Winona County. A total of 38 KB butterflies were observed in the area from late July to mid-August. Since the main focus of this study was to survey for the presence or absence of the butterfly, actual sightings were recorded but there were no attempts to estimate the actual population size. The distribution and dates observed are listed in Appendix III. It is the author's opinion that the Karner blue butterfly be listed as Endangered in Minnesota based on these findings.

In May, two males of either the KB or the Melissa Blue Lycaeides melissa melissa (the males of the two taxa are next to impossible to tell apart), were seen at the Tuohy Sand Savanna in Fillmore County. Although no lupine was found in the area, further survey work was needed to confirm which butterfly subspecies was present. On 10 July, approximately 15-20 Melissa blues were seen at the savanna. A female and male voucher specimen were collected. This is a significant find due to the butterfly's new range extension in eastern Minnesota, and it's possible range overlap with the KB. Tuohy Sand Savanna is located approximately 30 miles to the southwest of the Whitewater WMA sites that contain the KB.

Results by County:

An overview of the survey is presented below. The site name is followed by Township, Range and Section information, Appendix II Map number, and ownership information. A single asterisk (*) before the site name indicates the presence of wild lupine at the site, two asterisks (**) indicate an historic KB site, and three asterisks (***) indicate an existing KB site.

Also included for each site is a list of associated butterfly species, a list of associated plant species, and field notes. The abbreviations under associated plant species include "P" for plant species present, "F" for plant flowering, and "U" for butterflies seen using plant as a nectar source.

HOUSTON COUNTY

This county in the extreme SE corner of the state contains several pockets of sandy soils along the Root River. Many of these areas have become quite forested due to fire suppression in recent years. There are two plant records for this county, however, only one population of lupine was found (the Hokah site), as the other site is presently being used to raise turkeys and from the road it looks as if they have destroyed the natural habitat of the area (the historic plant site 7 miles west of Houston).

HOUSTON # 1: 104N 06W NWNE32

(Map I)

Owner: Paul and Sharon Wheaton

Date: 22 May 1990

Time: 10:50 - 11:50am

Weather: Mostly sunny, 63 degrees F, no winds

Butterfly Species Observed:

- | | |
|--------------------------------|----------------------|
| 1. <u>Polites themistocles</u> | Tawny-edged skipper |
| 2. <u>Colias philodice</u> | Common sulphur |
| 3. <u>Lycaena phlaeas</u> | American copper |
| 4. <u>Everes comyntas</u> | Eastern tailed blue |
| 5. <u>Charidryas gorgone</u> | Gorgone crescentspot |

Notes: This old field, with some native species returning, contains no lupine and is presently being used as pastureland.

HOUSTON # 2: 104N 07W NE28; NW27

(Map II)

Owner: State Forest

Date: 22 May 1990

Time: 12:30 - 2:35pm

Weather: Sunny, 65 degrees F, light N breeze

Butterfly Species Observed:

- | | |
|-------------------------------|----------------------|
| 1. <u>Erynnis brizo</u> | Sleepy duskywing |
| 2. <u>E. juvenalis</u> | Juvenal's duskywing |
| 3. <u>Amblyscirtes vialis</u> | Roadside skipper |
| 4. <u>Colias philodice</u> | Common sulphur |
| 5. <u>C. eurytheme</u> | Orange sulphur |
| 6. <u>Lycaena phlaeas</u> | American copper |
| 7. <u>Charidryas gorgone</u> | Gorgone crescentspot |
| 8. <u>Polygonia comma</u> | Comma |
| 9. <u>Vanessa cardui</u> | Painted Lady |

Date: 24 May 1990

Time: 2:00 - 4:30pm

Weather: Partly cloudy, 70 degrees F, light N breeze.

Butterfly Species Observed:

- | | |
|------------------------------|----------------------|
| 1. <u>Erynnis icelus</u> | Dreamy duskywing |
| 2. <u>Euchloe olympia</u> | Olympia white |
| 3. <u>Lycaeana phlaeas</u> | American copper |
| 4. <u>Everes comyntas</u> | Eastern tailed blue |
| 5. <u>Charidryas gorgone</u> | Gorgone crescentspot |
| 6. <u>Vanessa cardui</u> | Painted lady |
| 7. <u>V. atalanta</u> | Red admiral |

Date: 09 July 1990 Time: 10:30 - 12:30pm
Weather: M. cloudy, 75 degrees F, NW winds 5 mph.
Butterfly Species Observed:

- | | |
|--------------------------------------|---------------------------|
| 1. <u>Epargyreus clarus</u> | Silver-spotted skipper |
| 2. <u>Erynnis baptisiae</u> | Wild indigo duskywing |
| 3. <u>Wallengrenia egeremet</u> | Northern broken dash |
| 4. <u>Atrytone delaware</u> | Delaware skipper |
| 5. <u>Euphyes ruricola</u> | Dun skipper |
| 6. <u>Pyrisitia lisa</u> | Little yellow |
| 7. <u>Harkenclenus titus</u> | Coral hairstreak |
| 8. <u>Everes comyntas</u> | Eastern tailed blue |
| 9. <u>Leptotes marina</u> | Marine blue |
| 10. <u>Speyeria cybele</u> | Great spangled fritillary |
| 11. <u>Phycoides tharos/morpheus</u> | Pearly crescent spot |
| 12. <u>Polygonia comma</u> | Comma |
| 13. <u>Nymphalis antiopa</u> | Mourning cloak |
| 14. <u>Vanessa cardui</u> | Painted lady |
| 15. <u>V. atalanta</u> | Red admiral |
| 16. <u>Asterocampa celtis</u> | Hackberry butterfly |
| 17. <u>Enodia anthedon</u> | Pearly eye |
| 18. <u>Cercyonis pegala</u> | Wood nymph |
| 19. <u>Danaus plexippus</u> | Monarch |

Notes: This area contains a good quality sand barrens that contains many native plant species, but not lupine. Many tiger beetles (Cicindelidae) were seen here also, during both visits.

ANDERSON BARRENS & BLUFF PRAIRIE: 103N 06W NWNW9 (Map III)
Owner: Sherman and Judith Anderson

Date: 23 May 1990 Time: 9:00 - 10:15am
Weather: Mostly cloudy, 59 degrees F, slight breeze, rain later.
Butterfly Species Observed:

- | | |
|--------------------------|--------------|
| 1. <u>Vanessa cardui</u> | Painted lady |
| 2. <u>V. atalanta</u> | Red admiral |

Notes: This sand barrens area is quite small and is thick with various grasses but has a low forb diversity. It also had a low diversity of butterflies, but this could have been due more to the cool, cloudy weather. No lupine was seen.

* HOKAH: 103N 05W SWNE2 (Map IV)
Owner: Arnet Farms, Phone: 894-4441

Date: 31 May 1990 Time: 3:30-4:18pm
Weather: Sunny, 78 degrees F, winds SE 10-20mph.
Lupine:
Approximate number of clumps: 2000
Approximate number of stems: 20,000
Approximate number of flowering stalks: 15,000
Acreage with lupine: approx. 1

Associated plant species:

Yellow hawkweed (Hieracium pratense)(P), Frostweed (Helianthemum canadense)(P), Columbine (Aquilegia canadensis)(F), False Indigo (Amorpha sp.)(F), Wild blue phlox (Phlox sp.)(F), Pin Oak (Quercus ellipsoidalis)(P), Black-eyed susan (Redbeckia hirta)(P), Lead plant (Amorpha canescens)(P), Daisy fleabane (Erigeron annuus)(P), Dotted horsemint (Monarda punctata)(P), White sweet clover (Melilotus alba)(P), Big bluestem (Andropogon gerardii)(P), Blazingstar (Liatris aspera)(P).

Butterfly Species Observed:

- | | |
|------------------------------|-----------------------|
| 1. <u>Everes comyntas</u> | Eastern tailed blue |
| 2. <u>Charidryas gorgone</u> | Gorgone crescent spot |

Date: 09 July 1990

Time: 8:53 - 10:03am

Weather: Scattered clouds, 68 degrees F, no winds.

Butterfly Species Observed:

- | | |
|---------------------------------|---------------------------|
| 1. <u>Epargyreus clarus</u> | Silver-spotted skipper |
| 2. <u>Polites themistocles</u> | Tawny-edged skipper |
| 3. <u>Wallengrenia egeremet</u> | Northern broken dash |
| 4. <u>Pyristia lisa</u> | Little yellow |
| 5. <u>Satyrrium edwardsii</u> | Edward's hairstreak |
| 6. <u>Speyeria cybele</u> | Great spangled fritillary |
| 7. <u>Euphydryas phaeton</u> | Baltimore checkerspot |
| 8. <u>Vanessa cardui</u> | Painted lady |
| 9. <u>V. atalanta</u> | Red admiral |
| 10. <u>Asterocampa celtis</u> | Hackberry butterfly |
| 11. <u>Enodia anthedon</u> | Pearly eye |

Date: 01 August 1990

Time: 9:30 - 11:15am

Weather: Mostly sunny, 63 degrees F, no wind.

Butterfly Species Observed:

- | | |
|--------------------------------|---------------------------|
| 1. <u>Epargyreus clarus</u> | Silver-spotted skipper |
| 2. <u>Amblyscirtes vialis</u> | Roadside skipper |
| 3. <u>Artogeia rapae</u> | Cabbage white |
| 4. <u>Everes comyntas</u> | Eastern tailed blue |
| 5. <u>Celastrina ladon</u> | Spring azure |
| 6. <u>Speyeria cybele</u> | Great spangled fritillary |
| 7. <u>Polygonia comma</u> | Comma |
| 8. <u>Basilarchia arthemis</u> | Red-spotted purple |
| 9. <u>Cercyonis pegala</u> | Wood nymph |
| 10. <u>Danaus plexippus</u> | Monarch |

Date: 05 August 1990

Time: 4:15 - 5:15pm

Weather: M. sunny, 69 degrees F, NE winds 10-20 mph.

Butterfly Species Observed:

- | | |
|-------------------------------|------------------------|
| 1. <u>Epargyreus clarus</u> | Silver-spotted skipper |
| 2. <u>Amblyscirtes vialis</u> | Roadside skipper |
| 3. <u>Artogeia rapae</u> | Cabbage white |

4. Celastrina ladon Spring azure
5. Danaus plexippus Monarch

Notes: A nice population of lupine was found at this site on a SE facing slope and scattered throughout openings in this mixed woods. To the S, W, and E of the site is a mixed forest. To the N are some planted pines and the highway 16 road ditch.

The main threat to this area is succession. It appears that it has been several years since the last fire in the area. This is private land, thus contact with the landowner and some sort of management plan should be implemented to protect the lupine population.

FILLMORE COUNTY

This county is very similar to Houston County. The Root River Valley contains many terraces with the right soil types for lupine. Here again, however, many of these areas are overgrown with various tree species. One site, the Himlie Sand Barrens, did contain a fairly large population of lupine (site discovered in July so it was hard to estimate size). This site is on private land and needs protecting. There are three herbarium records for lupine in Fillmore County (Appendix IV), but all three are probably describing the same locality - the Himlie Sand Barrens site described below.

RUSHFORD EAST 1: 104N 08W NWSE24

(Map V)

Owner: Stanley Hoiland

Date: 23 May 1990

Time: 11:52 - 12:30pm

Weather: Partly cloudy, 68 degrees F, slight W breeze.

Butterfly Species Observed:

1. Everes comyntas Eastern tailed blue
2. Vanessa virginiensis American painted lady

Notes: This site is an area of open and brushy sand barrens that has been disturbed. The open area is an old field and the brushy area has probably been used as pasture, although it appears to be in a more natural condition. The area just east and north of the house is of highest quality. No lupine was found here and few butterflies were noted. Some junk has also been dumped in the area.

RUSHFORD EAST 2: 104N 08W S 1/2 NW24

(Map V)

Owner: State Forest Land

Date: 23 May 1990

Time: 11:00 - 11:30am

Weather: Mostly cloudy, 66 degrees F, light W breeze.

Butterfly Species Observed:

1. Charidryas gorgone Gorgone crescent spot
2. Vanessa atalanta Red admiral

Notes: This sandy hillside along highway 16 east of Rushford has become overgrown with eastern red cedar. The site is state forest land and contained no lupine and few butterflies.

* HIMLIE SAND BARRENS: 104N 08W SW21 (Map VI)
Owner: Wally Himlie, Phone: 864-7483 (Himlie Construction)

Date: 09 July 1990 Time: 3:10 - 5:00pm
Weather: Mostly cloudy, 81 degrees F, light sprinkles.
Lupine:

Approximate number of clumps: 4,000
Approximate number of stems: 40,000
Approximate number of flowering stalks: past prime flowering
Acreage with lupine: approximately 4 or 5
Associated plant species:

Goat's rue (Tephrosia virginiana)(F), Big bluestem (Andropogon gerardii)(P), Blazingstar (Liatris aspera)(P), Pin oak (Quercus ellipsoidalis)(P), Spiderwort (Tradescantia sp.)(F), Dotted mint (Monarda punctata)(F).

Butterfly Species Observed:

1. <u>Thorybes bathyllus</u>	Southern cloudywing
2. <u>Colias philodice</u>	Common sulfur
3. <u>Everes comyntas</u>	Eastern tailed blue
4. <u>Speyeria cybele</u>	Great spangled fritillary
5. <u>Phyciodes tharos/morpheus</u>	Pearly crescent spot
6. <u>Polygonia comma</u>	Comma
7. <u>Nymphalis antiopa</u>	Mourning cloak
8. <u>Vanessa cardui</u>	Painted lady
9. <u>V. atalanta</u>	Red admiral
10. <u>Asterocampa celtis</u>	Hackberry butterfly
11. <u>Cercyonis pegala</u>	Wood nymph

Date: 01 August 1990 Time: 12:20 - 4:00pm
Weather: Partly cloudy, 75 degrees F, SW winds 5-15 mph.
Butterfly Species Observed:

1. <u>Epargyreus clarus</u>	Silver-spotted skipper
2. <u>Amblyscirtes vialis</u>	Roadside skipper
3. <u>Artogeia rapae</u>	Cabbage white
4. <u>Colias eurytheme</u>	Orange sulphur
5. <u>Lycaena phlaeas</u>	American copper
6. <u>Satyrium caryaevorum</u>	Hickory hairstreak
7. <u>Everes comyntas</u>	Eastern tailed blue
8. <u>Speyeria cybele</u>	Great spangled fritillary
9. <u>Phyciodes tharos/morpheus</u>	Pearly crescent spot
10. <u>Polygonia progne</u>	Gray comma
11. <u>Vanessa atalanta</u>	Red admiral
12. <u>Basilarchia arthemis</u>	Red-spotted purple
13. <u>Asterocampa celtis</u>	Hackberry butterfly
14. <u>Cercyonis pegala</u>	Wood nymph
15. <u>Danaus plexippus</u>	Monarch

Date: 05 August 1990 Time: 1:55 - 3:55pm
Weather: Partly cloudy, 66 degrees F, NE winds 10-20 mph.

Butterfly Species Observed:

- | | |
|--------------------------------|------------------------|
| 1. <u>Epargyreus clarus</u> | Silver-spotted skipper |
| 2. <u>Amblyscirtes vialis</u> | Roadside skipper |
| 3. <u>Artogeia rapae</u> | Cabbage white |
| 4. <u>Colias philodice</u> | Common sulphur |
| 5. <u>Everes comyntas</u> | Eastern tailed blue |
| 6. <u>Polygonia progne</u> | Gray comma |
| 7. <u>Vanessa atalanta</u> | Red admiral |
| 8. <u>Basilarchia arthemis</u> | Red-spotted purple |
| 9. <u>Danaus plexippus</u> | Monarch |

Notes: This area was first surveyed in July, so it is hard to estimate the size of the lupine population. Many plants were found; enough, in fact, that the author believes they would be capable of supporting a KB population. Lupine is found in the open sand barrens and is also scattered throughout the brushy sand barrens. The largest concentration of lupine is on a south to southwest facing slope in association with big bluestem (Andropogon gerardii), goat's rue (Tephrosia virginiana), and blazingstar (Liatris aspera). Again, the greatest threat to the area is succession to woody species. The site is privately owned and landowner contact is recommended. The site is also next to state forest land and could possibly be acquired as an extension to the state forest.

PETERSON NORTH: 104N 08W NWSE18

(Map VI)

Owner: State Forest Land

Date: 23 May 1990

Time: 2:44 - 3:40pm

Weather: Partly cloudy, 72 degrees F, light west breeze.

Butterfly Species Observed:

- | | |
|-----------------------------|-------------------|
| 1. <u>Erynnis martialis</u> | Mottled duskywing |
| 2. <u>Vanessa cardui</u> | Painted lady |
| 3. <u>V. atalanta</u> | Red admiral |

Notes: Again no lupine was found at this site as the woody vegetation is quite thick. Cedar (Juniperus virginiana) and sumac (Rhus sp.) have choked out most of the herbaceous vegetation. The site is found within state forest land.

MATTSON SAND BARRENS AND PRAIRIE: 104N 11W NESW9

(Map VI)

Owner: O. & C. Mattson

Date: 24 May 1990

Time: 11:56 - 1:15pm

Weather: Partly cloudy, 70 degrees F, W winds 5-10 mph.

Butterfly Species Observed:

- | | |
|--------------------------------|-----------------------|
| 1. <u>Polites themistocles</u> | Tawny-edged skipper |
| 2. <u>Atrytonopsis hianna</u> | Dusted skipper |
| 3. <u>Amblyscirtes vialis</u> | Roadside skipper |
| 4. <u>Charidryas gorgone</u> | Gorgone crescent spot |

Date: 10 July 1990 Time: 9:23 - 10:34am
Weather: Some clouds, 75 degrees F, no wind.
Butterfly Species Observed:

- | | |
|------------------------------|-----------------------|
| 1. <u>Thorybes bathyllus</u> | Southern cloudywing |
| 2. <u>Polites origines</u> | Crossline skipper |
| 3. <u>Euphyes ruricola</u> | Dun skipper |
| 4. <u>Colias eurytheme</u> | Orange sulphur |
| 5. <u>Pyrisitia lisa</u> | Little yellow |
| 6. <u>Harkenclenus titus</u> | Coral hairstreak |
| 7. <u>Euptoieta claudia</u> | Variegated fritillary |
| 8. <u>Cercyonis pegala</u> | Wood nymph |
| 9. <u>Danaus plexippus</u> | Monarch |

Notes: This site contains a nice goat prairie with such plants as little bluestem (Schizachyrium scoparium), purple prairie clover (Petalostemum pupureum), compass plant (Silphium laciniatum), lead plant (Amorpha canescens), puccoon (Lithospermum sp.), and porcupine grass (Stipa spartea). The prairie supports healthy skipper populations of Polites themistocles, P. origenes, Atrytonopsis hianna, Amblyscirtes vialis and Euphyes ruricola, and should be checked for Hesperia ottoe. The actual sand barrens area is quite small. A powerline runs east-west just to the north of the barrens. No lupine was found here. No fire or grazing evidence was seen on the prairie or barrens.

TUOHY SAND SAVANNA: 104N 11W NE9
Owner: F. Tuohy

(Map VII)

Date: 30 May 1990 Time: 3:00 - 5:00pm
Weather: Sunny, 72 degrees F, no breeze.
Butterfly Species Observed:

- | | |
|-------------------------------------|---------------------------------|
| 1. <u>Pholisora catullus</u> | Common sootywing |
| 2. <u>Glaucopsyche lygdamus</u> | Silvery blue |
| 3. <u>Lycaeides melissa melissa</u> | Melissa or Orange-bordered blue |
| 4. <u>Danaus plexippus</u> | Monarch |

Date: 10 July 1990 Time: 11:20 - 1:00pm
Weather: Sunny to partly cloudy, 75 degrees F, no wind.
Butterfly Species Observed:

- | | |
|-------------------------------------|---------------------------------|
| 1. <u>Polites origenes</u> | Crossline skipper |
| 2. <u>Atrytone delaware</u> | Delaware skipper |
| 3. <u>Euphyes ruricola</u> | Dun skipper |
| 4. <u>Pyrisitia lisa</u> | Little yellow |
| 5. <u>Gaeides xanthoides</u> | Great grey copper |
| 6. <u>Harkenclenus titus</u> | Coral hairstreak |
| 7. <u>Satyrrium edwardsii</u> | Edward's hairstreak |
| 8. <u>Everes comyntas</u> | Eastern tailed blue |
| 9. <u>Lycaeides melissa melissa</u> | Melissa or Orange-bordered blue |
| 10. <u>Speyeria cybele</u> | Great spangled fritillary |
| 11. <u>S. aphrodite</u> | Aphrodite |
| 12. <u>Vanessa atalanta</u> | Red admiral |

- | | |
|-----------------------------|------------|
| 13. <u>Junonia coenia</u> | Buckeye |
| 14. <u>Enodia anthedon</u> | Pearly eye |
| 15. <u>Ceryconis pegala</u> | Wood nymph |
| 16. <u>Danaus plexippus</u> | Monarch |

Notes: The Tuohy Sand Savanna contains a dry oak savanna area with some old field and prairie areas. Some plants found here include: leadplant (Amorpha canescens), coneflower (Ratibida pinnata), purple prairie clover (Petalostemum purpureum), goat's rue (Tephrosia virginiana), and spiderwort (Tradescantia sp.). This site in northern Fillmore county contains a population of the KB's subspecies, the Melissa Blue, Lycaeides melissa melissa. This find is significant as it represents an eastern range extension in Minnesota for the species. Two males were observed on 30 May 1990 and 15-20 adults were seen on 10 July 1990. Voucher specimens were taken from each trip.

OLMSTED COUNTY:

RAILROAD EAST OF ROCHESTER: 106N 13W N1/2 13 (Map VIII)
Owner: Undetermined

Date: 30 May 1990 Time: 11:30 - 12:30pm
Weather: Sunny, 68 degrees F, SE winds 10-15 mph.
Butterfly Species Observed:

- | | |
|----------------------------|---------------------|
| 1. <u>Colias eurytheme</u> | Orange sulphur |
| 2. <u>Everes comyntas</u> | Eastern tailed blue |
| 3. <u>Danaus plexippus</u> | Monarch |

Notes: This area was checked following a tip on a potential site for lupine. No lupine was found along the railroad in this sand-prairie-like habitat. The author searched along the railroad track from county road 11 to the motorcycle shop. Some damage from motorcycles and other off-road vehicles was noted. Weeds have invaded many areas along the tracks.

CHESTER WOODS: 106N 13W N1/2 13 (Map VIII)
Owner: Olmsted County

Date: 30 May 1990 Time: 12:15 - 1:45pm
Weather: Mostly sunny, 75 degrees F, SE winds 10-15 mph.
Butterfly Species Observed:

- | | |
|--------------------------------|---------------------|
| 1. <u>Polites themistocles</u> | Tawny-edged skipper |
| 2. <u>Erynnis juvenalis</u> | Juvenal's duskywing |
| 3. <u>Euphyes ruricola</u> | Dun skipper |
| 4. <u>Lycaena phlaeas</u> | American copper |
| 5. <u>Everes comyntas</u> | Eastern tailed blue |
| 6. <u>Vanessa cardui</u> | Painted lady |
| 7. <u>Ceryconis pegala</u> | Wood nymph |

Notes: This undeveloped county park is being used as an illegal dumpsite and off-road vehicle track but contains some good sand

savanna habitat. Burn management in the area would greatly benefit the herbaceous understory. Few butterflies and no lupine were found in the area.

WINONA COUNTY:

O.L. KIPP STATE PARK: 106N 05W W26

(Map IX)

Owner: State Park Land

Date: 01 June 1990

Time: 10:00 - 1:45pm

Weather: Sunny, 75 degrees F, S winds 10-20 mph.

Butterfly Species Observed:

- | | |
|-------------------------------------|----------------------|
| 1. <u>Thorybes pylades</u> | Northern cloudywing |
| 2. <u>Pholisora catullus</u> | Common sootywing |
| 3. <u>Poanes hobomok</u> | Hobomok skipper |
| 4. <u>Atrytonopsis hianna</u> | Dusted skipper |
| 5. <u>Amblyscirtes vialis</u> | Roadside skipper |
| 6. <u>Pterourus glaucus</u> | Tiger swallowtail |
| 7. <u>Everes comyntas</u> | Eastern tailed blue |
| 8. <u>Charidryas gorgone</u> | Gorgone crescentspot |
| 9. <u>Phyciodes tharos/morpheus</u> | Pearly crescentspot |
| 10. <u>Vanessa cardui</u> | Painted lady |
| 11. <u>V. atalanta</u> | Red admiral |
| 12. <u>Cercyonis pegala</u> | Wood nymph |
| 13. <u>Danaus plexippus</u> | Monarch |

Notes: This site contains a goat prairie on the steep south to southwest facing slope and a small bur oak savanna occurs at the top of the bluff. No lupine was found in the survey area.

SCHUELER SAND BARRENS: 105N 08W SE33

(Map X)

Owner: Elmer Schueler, Phone: 864-2122

Date: 04 June 1990

Time: 1:00 - 4:00pm

Weather: Mostly sunny, 75 degrees F, SE winds 5-10 mph.

Butterfly Species Observed:

- | | |
|-------------------------------|----------------------|
| 1. <u>Erynnis juvenalis</u> | Juvenal's duskywing |
| 2. <u>Poanes hobomok</u> | Hobomok skipper |
| 3. <u>Euphyes ruricola</u> | Dun skipper |
| 4. <u>Amblyscirtes vialis</u> | Roadside skipper |
| 5. <u>Charidryas gorgone</u> | Gorgone crescentspot |
| 6. <u>Vanessa cardui</u> | Painted lady |
| 7. <u>Megisto cymela</u> | Little wood satyr |
| 8. <u>Danaus plexippus</u> | Monarch |

Notes: This is a top quality black oak (Quercus veluntina) and jack pine (Pinus banksiana) sand barrens area. Further survey work may be necessary in this area to confirm the absence of lupine and the KB. Protection of this site is recommended. It is privately owned and after talking to the landowner no immediate threats appear to endanger the site.

*** WHITEWATER HISTORIC SITE: 108N 10W Sec: 14 (Map XI)
Owner: State Wildlife Management Area

Date: 01 June 1990 Time: 3:00 - 4:17pm
Weather: Sunny, 81 degrees F, winds S 10-20 mph.

Lupine:

Approximate number of clumps: 25,000

Approximate number of stems: 250,000

Approximate number of flowering stalks: 100,000

Acreage with lupine: 5

Associated plant species:

Columbine (Aquilegia canadensis)(F), Phlox (Phlox sp.) (U),
Hoary puccoon (Lithospermum canescens)(F), Butterfly weed
(Asclepias tuberosa)(P), Dotted mint (Monarda punctata)(P),
Goat's rue (Tephrosia virginiana)(F), Prairie coneflower
(Ratibida pinnata)(P), Purple prairie clover (Petalostemum
pupureum)(P), White prairie clover (P. candidum)(P), Big
bluestem (Andropogon gerardii)(P), fame flower (Talinum
rugospermum)(P), Sand milkweed (Asclepias amplexicaulis)(P), Bur
oak (Quercus marocarpa)(P), Black oak (Q. velutina)(P), Jack
Pine (Pinus banksiana)(P).

Butterfly Species Observed:

- | | |
|-------------------------------|---------------------|
| 1. <u>Poanes hobomok</u> | Hobomok skipper |
| 2. <u>Erynnis juvenalis</u> | Juvenal's duskywing |
| 3. <u>Erynnis persius</u> | Persius duskywing |
| 4. <u>Amblyscirtes vialis</u> | Roadside skipper |
| 5. <u>Polygonia comma</u> | Comma |
| 6. <u>Megisto cymela</u> | Little wood satyr |
| 7. <u>Danaus plexippus</u> | Monarch |

Date: 02 June 1990 Time: 9:30 - 12:00 noon
Weather: Cloudy, 75 degrees F, SW winds 10-25 mph, some light
rain, heavy rain about 11:50am.
Butterfly Species Observed: none

Date: 11 July 1990 Time: 8:30 - 1:00pm
Weather: Cloudy with few times of full sun, 75 degrees F, light
rain later.
Butterfly Species Observed:

- | | |
|-------------------------------|---------------------------|
| 1. <u>Epargyreus clarus</u> | Silver-spotted skipper |
| 2. <u>Thorybes bathyllus</u> | Southern cloudywing |
| 3. <u>Polites origines</u> | Crossline skipper |
| 4. <u>Atrytone delaware</u> | Delaware skipper |
| 5. <u>Colias philodice</u> | Common sulphur |
| 6. <u>Pyrisitia lisa</u> | Little yellow |
| 7. <u>Lycaena phlaeas</u> | American copper |
| 8. <u>Harkenclenus titus</u> | Coral hairstreak |
| 9. <u>Satyrrium edwardsii</u> | Edward's hairstreak |
| 10. <u>Everes comyntas</u> | Eastern tailed blue |
| 11. <u>Speyeria cybele</u> | Great spangled fritillary |

12. <u>Polygonia comma</u>	Comma
13. <u>Nymphalis antiopa</u>	Mourning cloak
14. <u>Vanessa atalanta</u>	Red admiral
15. <u>Asterocampa celtis</u>	Hackberry butterfly
16. <u>A. clyton</u>	Tawny emperor
17. <u>Enodia anthedon</u>	Pearly eye
18. <u>Cercyonis pegala</u>	Wood nymph
19. <u>Danaus plexippus</u>	Monarch

Date: 30 July 1990

Time: 12:30 - 5:30pm

Weather: Partly cloudy, 78 degrees F, SW winds 5 mph.

Butterfly Species Observed:

1. <u>Epargyreus clarus</u>	Silver-spotted skipper
2. <u>Erynnis baptisiae</u>	Wild indigo duskywing
3. <u>Polites origines</u>	Crossline skipper
4. <u>Wallengrenia egeremet</u>	Northern broken dash
5. <u>Atrytone delaware</u>	Delaware skipper
6. <u>Colias eurytheme</u>	Orange sulphur
7. <u>Lycaena phlaeas</u>	American copper
8. <u>Harkenclenus titus</u>	Coral hairstreak
9. <u>Celastrina ladon</u>	Spring azure
10. <u>Lycaeides melissa samuelis</u>	KARNER BLUE
11. <u>Speyeria cybele</u>	Great spangled fritillary
12. <u>Phyciodes tharos/morpheus</u>	Pearly crescent spot
13. <u>Polygonia progne</u>	Gray comma
14. <u>Vanessa atalanta</u>	Red admiral
15. <u>Asterocampa celtis</u>	Hackberry butterfly
16. <u>Cercyonis pegala</u>	Wood nymph
17. <u>Danaus plexippus</u>	Monarch

Date: 06 August 1990

Time: 12:20 - 5:20pm

Weather: Partly cloudy, 76 degrees F, NW winds 5-15 mph.

Butterfly Species Observed:

1. <u>Epargyreus clarus</u>	Silver-spotted skipper
2. <u>Erynnis baptisiae</u>	Wild indigo duskywing
3. <u>Ancyloxypha numitor</u>	Least skipper
4. <u>Polites themistocles</u>	Tawny-edged skipper
5. <u>Amblyscirtes vialis</u>	Roadside skipper
6. <u>Heraclides cresphontes</u>	Giant swallowtail
7. <u>Artogeia rapae</u>	Cabbage white
8. <u>Colias philodice</u>	Common sulphur
9. <u>C. eurytheme</u>	Orange sulphur
10. <u>Lycaena phlaeas</u>	American copper
11. <u>Strymon melinus</u>	Gray hairstreak
12. <u>Everes comyntas</u>	Eastern tailed copper
13. <u>Lycaeides melissa samuelis</u>	KARNER BLUE
14. <u>Speyeria cybele</u>	Great spangled fritillary
15. <u>S. aphrodite</u>	Aphrodite
16. <u>Phyciodes tharos/morpheus</u>	Pearly crescent spot
17. <u>Polygonia comma</u>	Comma
18. <u>P. progne</u>	Gray comma
19. <u>Vanessa cardui</u>	Painted lady

20. <u>V. atalanta</u>	Red admiral
21. <u>Basilarchia arthemis</u>	Red-spotted purple
22. <u>Asterocampa celtis</u>	Hackberry butterfly
23. <u>Enodia anthedon</u>	Pearly eye
24. <u>Cercyonis pegala</u>	Wood nymph
25. <u>Danaus plexippus</u>	Monarch

Date: 16 August 1990 Time: 12:20 - 4:15pm
Weather: Partly cloudy, 85 degrees F, SW winds 5-20 mph.
Butterfly Species Observed:

1. <u>Ancyloxypha numitor</u>	Least skipperling
2. <u>Hesperia leonardus</u>	Leonardus skipper
3. <u>Papilio polyxenes</u>	Black swallowtail
4. <u>Heraclides cresphontes</u>	Giant swallowtail
5. <u>Artogeia rapae</u>	Cabbage white
6. <u>Colias philodice</u>	Common sulphur
7. <u>C. eurytheme</u>	Orange sulphur
8. <u>Satyrrium caryaevorum</u>	Hickory hairstreak
9. <u>Everes comyntas</u>	Eastern tailed blue
10. <u>Lycaeides melissa samuelis</u>	KARNER BLUE
11. <u>Speyeria cybele</u>	Great spangled fritillary
12. <u>Phyciodes tharos/morpheus</u>	Pearly crescent spot
13. <u>Polygonia comma</u>	Comma
14. <u>Vanessa atalanta</u>	Red admiral
15. <u>Junonia coenia</u>	Buckeye
16. <u>Basilarchia arthemis</u>	Red-spotted purple
17. <u>Danaus plexippus</u>	Monarch

Notes: Oak sand savannas and sand prairies occur on sandy terraces throughout the area, and these habitats contain several rare plants and animals. Some plants include sand milkweed (Asclepias amplexicaulis), goat's rue (Tephrosia virginiana), fame flower (Talinum rugospermum), and probably one of the largest stands of lupine (Lupinus perennis) left in the state. In addition to the Karner Blue, the site contains the state threatened Ottoe Skipper (Hesperia ottoe).

*** WHITEWATER WMA 23: 108N 10W SE23 NE26 (Map XII)
Owner: State Wildlife Management Area

Date: 05 June 1990 Time: 1:00 - 5:00pm
Weather: Cloudy, 65 degrees F, S winds 5-15 mph.
Lupine:

Approximate number of clumps: 10,000
Approximate number of stems: 60,000
Approximate number of flowering stalks: 40,000
Acreage with lupine: 5
Associated plant species:

Big bluestem (Andropogon gerardii)(P), Porcupine grass (Stipa spartea)(P), Blazingstar (Liatris aspera)(P), Butterfly weed (Asclepias tuberosa)(F), Dotted mint (Monarda punctata)(F), Goat's rue (Tephrosia virginiana)(P), Prairie coneflower

(Ratibida pinnata)(P), Purple prairie clover (Petalostemum purpureum)(F), White prairie clover (P. candidum)(F), Daisy fleabane (Erigeron annuus)(F), Puccoon (Lithospermum sp.)(P), Phlox (Phlox sp.)(P), Jack Pine (Pinus banksiana)(P), Black Oak (Quercus velutina)(P), Northern pin oak (Quercus ellipsoidalis)(P).

Butterfly Species Observed:

- | | |
|----------------------------|-------------------|
| 1. <u>Megisto cymela</u> | Little wood satyr |
| 2. <u>Danaus plexippus</u> | Monarch |

Date: 12 July 1990

Time: 9:23 - 3:15pm

Weather: Partly sunny, 65 degrees F, NW winds 10-20 mph.

Butterfly Species Observed:

- | | |
|--------------------------------------|---------------------------|
| 1. <u>Epargyreus clarus</u> | Silver-spotted skipper |
| 2. <u>Thorybes bathyllus</u> | Southern cloudywing |
| 3. <u>Atrytone delaware</u> | Delaware skipper |
| 4. <u>Pontia protodice</u> | Checkered white |
| 5. <u>Artogeia rapae</u> | Cabbage white |
| 6. <u>Colias philodice</u> | Common sulphur |
| 7. <u>C. eurytheme</u> | Orange sulphur |
| 8. <u>Lycaena phlaeas</u> | American copper |
| 9. <u>Harkenclenus titus</u> | Coral hairstreak |
| 10. <u>Satyrium edwardsii</u> | Edward's hairstreak |
| 11. <u>Everes comyntas</u> | Eastern tailed blue |
| 12. <u>Speyeria cybele</u> | Great spangled fritillary |
| 13. <u>Charidryas gorgone</u> | Gorgone crescent spot |
| 14. <u>Phyciodes tharos/morpheus</u> | Pearly crescent spot |
| 15. <u>Polygonia comma</u> | Comma |
| 16. <u>P. progne</u> | Gray comma |
| 17. <u>Vanessa cardui</u> | Painted lady |
| 18. <u>V. atalanta</u> | Red admiral |
| 19. <u>Asterocampa celtis</u> | Hackberry butterfly |
| 20. <u>A. clyton</u> | Tawny emperor |
| 21. <u>Enodia anthedon</u> | Pearly eye |
| 22. <u>Cercyonis pegala</u> | Wood nymph |
| 23. <u>Danaus plexippus</u> | Monarch |

Date: 31 July 1990

Time: 9:30 - 3:30pm

Weather: Mostly sunny, 65-77 degrees F, no breeze.

Butterfly Species Observed:

- | | |
|-----------------------------------|------------------------|
| 1. <u>Epargyreus clarus</u> | Silver-spotted skipper |
| 2. <u>Erynnis baptisiae</u> | Wild indigo duskywing |
| 3. <u>Ancyloxypha numitor</u> | Least skipperling |
| 4. <u>Polites origines</u> | Crossline skipper |
| 5. <u>Atrytone delaware</u> | Delaware skipper |
| 6. <u>Euphyes ruricola</u> | Dun skipper |
| 7. <u>Amblyscirtes vialis</u> | Roadside skipper |
| 8. <u>Papilio polyxenes</u> | Black swallowtail |
| 9. <u>Heraclides cressphontes</u> | Giant swallowtail |
| 10. <u>Pterourus glaucus</u> | Tiger swallowtail |

11. <u>Artogeia rapae</u>	Cabbage white
12. <u>Colias eurytheme</u>	Orange sulphur
13. <u>Harkenclenus titus</u>	Coral hairstreak
14. <u>Satyrrium caryaevorum</u>	Hickory hairstreak
15. <u>Everes comyntas</u>	Eastern tailed blue
16. <u>Lycaeides melissa samuelis</u>	KARNER BLUE
17. <u>Speyeria cybele</u>	Great spangled fritillary
18. <u>Phyciodes tharos/morpheus</u>	Pearly crescent spot
19. <u>Polygonia interrogantionis</u>	Question mark
20. <u>P. comma</u>	Comma
21. <u>P. progne</u>	Gray comma
22. <u>Vanessa cardui</u>	Painted lady
23. <u>Junonia coenia</u>	Buckeye
24. <u>Basilarchia arthemis</u>	Red-spotted purple
25. <u>B. archippus</u>	Viceroy
26. <u>Asterocampa celtis</u>	Hackberry butterfly
27. <u>Enodia anthedon</u>	Pearly eye
28. <u>Cercyonis pegala</u>	Wood nymph
29. <u>Danaus plexippus</u>	Monarch

Date: 07 August 1990 Time: 9:40 - 3:00pm

Weather: Sunny, 65-78 degrees F, light N breeze.

Butterfly Species Observed:

1. <u>Epargyreus clarus</u>	Silver-spotted skipper
2. <u>Ancyloxypha numitor</u>	Least skipperling
3. <u>Atrytone delaware</u>	Delaware skipper
4. <u>Amblyscirtes vialis</u>	Roadside skipper
5. <u>Heraclides crespontes</u>	Giant swallowtail
6. <u>Artogeia rapae</u>	Cabbage white
7. <u>Colias philodice</u>	Common sulphur
8. <u>Everes comyntas</u>	Eastern tailed blue
9. <u>Lycaeides melissa samuelis</u>	KARNER BLUE
10. <u>Speyeria cybele</u>	Great spangled fritillary
11. <u>Phyciodes tharos/morpheus</u>	Pearly crescent spot
12. <u>Polygonia progne</u>	Gray comma
13. <u>Vanessa cardui</u>	Painted lady
14. <u>Junonia coenia</u>	Buckeye
15. <u>Basilarchia arthemis</u>	Red-spotted purple
16. <u>Asterocampa celtis</u>	Hackberry butterfly
17. <u>Cercyonis pegala</u>	Wood nymph
18. <u>Danaus plexippus</u>	Monarch

Date: 17 August 1990 Time: 12:20 - 4:00pm

Weather: Mostly cloudy, 75 degrees F, t-storms later.

Butterfly Species Observed:

1. <u>Ancyloxypha numitor</u>	Least skipperling
2. <u>Hesperia leonardus</u>	Leonardus skipper
3. <u>Heraclides crespontes</u>	Giant swallowtail
4. <u>Artogeia rapae</u>	Cabbage white
5. <u>Colias philodice</u>	Common sulphur
6. <u>C. eurytheme</u>	Orange sulphur
7. <u>Everes comyntas</u>	Eastern tailed blue

- | | |
|--------------------------------------|---------------------------|
| 8. <u>Lycaeides melissa samuelis</u> | KARNER BLUE |
| 9. <u>Speyeria cybele</u> | Great spangled fritillary |
| 10. <u>Polygonia progne</u> | Gray comma |
| 11. <u>Vanessa atalanta</u> | Red admiral |
| 12. <u>Basilarchia arthemis</u> | Red-spotted purple |
| 13. <u>B. archippus</u> | Viceroy |
| 14. <u>Danaus plexippus</u> | Monarch |

Notes: This site south of the historic site is very similar in appearance to the historic site. This sand savanna area contains many of the same lepidoptera, and many of the same plants as mentioned before. The KB was found here along an old trail and scattered throughout the open savanna area. For more specific KB distribution data within the Whitewater WMA, see Appendix II.

WHITEWATER WMA 22: 108N 10W NENW22 (Map XIII)
 Owner: State Wildlife Management Area

Date: 02 June 1990 Time: 8:30 - 9:25am
 Weather: Cloudy, cool 60 degrees F, SW winds 10-20 mph.
 Butterfly Species Observed:

- | | |
|----------------------------|-----------------|
| 1. <u>Lycaena phlaeas</u> | American copper |
| 2. <u>Vanessa cardui</u> | Painted lady |
| 3. <u>Cercyonis pegala</u> | Wood nymph |

Notes: This sandy site southwest of the historic site, and west of Miller Pool, looked worthy of checking out. It contained no lupine however and few butterflies on 2 June 1990.

WABASHA COUNTY:

* WHITEWATER WMA 31: 109N 09W S1/2 31 (Map XIV)
 Owner: State Wildlife Management Area

Date: 05 June 1990 Time: 9:00 - 11:30am
 Weather: Cloudy, light rain, 65 degrees F, no breeze.
 Lupine:

Approximate number of clumps: 500
 Approximate number of stems: 4000
 Approximate number of flowering stalks: 1000
 Acreage with lupine: scattered throughout 5
 Associated plant species:

Jack pine (Pinus banksiana)(P), Black oak (Quercus velutina)(P),
 Big bluestem (Andropogon gerardii)(P), Puccoon (Lithospermum sp.)
 (P).

Butterfly Species Observed:

- | | |
|--------------------------|-------------------|
| 1. <u>Megisto cymela</u> | Little wood satyr |
|--------------------------|-------------------|

Date: 13 July 1990 Time: 9:00 - 3:00pm
 Weather: Mostly sunny, 75-80 degrees F, SW winds 10-20 mph.

Butterfly Species Observed:

1. <u>Epargyreus clarus</u>	Silver-spotted skipper
2. <u>Atrytone delaware</u>	Delaware skipper
3. <u>Artogeia rapae</u>	Cabbage white
4. <u>Colias philodice</u>	Common sulphur
5. <u>Harkenclenus titus</u>	Coral hairstreak
6. <u>Satyrion edwardsii</u>	Edward's hairstreak
7. <u>Everes comyntas</u>	Eastern tailed blue
8. <u>Speyeria cybele</u>	Great spangled fritillary
9. <u>Charidryas gorgone</u>	Gorgone crescent spot
10. <u>Polygonia comma</u>	Comma
11. <u>Nymphalis antiopa</u>	Mourning cloak
12. <u>Vanessa atalanta</u>	Red admiral
13. <u>Asterocampa celtis</u>	Hackberry butterfly
14. <u>A. clyton</u>	Tawny emperor
15. <u>Cercyonis pegala</u>	Wood nymph
16. <u>Danaus plexippus</u>	Monarch

Date: 18 August 1990

Time: 10:00 - 2:00pm

Weather: Partly cloudy, 92 degrees F, Heat index of 111 degrees, S breeze 5-15 mph, t-storms later.

Butterfly Species Observed:

1. <u>Hesperia leonardus</u>	Leonardus skipper
2. <u>Papilio polyxenes</u>	Black swallowtail
3. <u>Artogeia rapae</u>	Cabbage white
4. <u>Colias philodice</u>	Common sulphur
5. <u>C. eurytheme</u>	Orange sulphur
6. <u>Everes comyntas</u>	Eastern tailed blue
7. <u>Polygonia comma</u>	Comma
8. <u>P. progne</u>	Gray comma
9. <u>Basilarchia archippus</u>	Viceroy
10. <u>Cercyonis pegala</u>	Wood nymph
11. <u>Danaus plexippus</u>	Monarch

Notes: Although this site contains lupine, no KBs were seen here in 1990. This area is again very similar to the historic site except that canopy is a little more closed and the site is not as large.

KELLOGG-WEAVER DUNES: 109N 09W NE6

(Map XV)

Owner: State Scientific and Natural Area

Date: 03 June 1990

Time: 9:30 - 10:00am

Weather: Cloudy, raining and cold, 40 degrees F.

Butterfly Species Observed: none seen

Notes: This large sand dune complex along the Mississippi River was surveyed by the author, on a cool June day. No lupine was seen within the sand prairie habitat, which also includes such scattered trees as northern pin oak (Quercus ellipsoidalis), bur oak (Q. marocarpa), and jack pine (Pinus banksiana).

NORTH WEAVER: 109N 09W SW6

(Map XVI)

Owner: Undetermined

Date: 03 June 1990

Time: 11:00 - 12:00 noon

Weather: Rainy, cold, 40 degrees F, NW winds 5-15 mph.

Butterfly Species Observed: none seen

Notes: This private site south of Kellog-Weaver Dunes contained much of the same dune and sand prairie type vegetation. The search for lupine here turned up negative as well. No butterfly species were observed at the site.

ZUMBRO BOTTOMS: 110N 11W SW27 & N27

(Map XVII)

Owner: State Forest Land

Date: 06 June 1990

Time: 9:00 - 12:15pm

Weather: Partly sunny, 65 degrees F, W winds 10-20 mph.

Butterfly Species Observed:

- | | |
|----------------------------|-----------------|
| 1. <u>Poanes hobomok</u> | Hobomok skipper |
| 2. <u>Artogeia rapae</u> | Cabbage white |
| 3. <u>Lycaena phlaeas</u> | American copper |
| 4. <u>Vanessa cardui</u> | Painted lady |
| 5. <u>Cercyonis pegala</u> | Red admiral |

Notes: A small sand terrace just east of the Zumbro Bottoms State Forest main assembly area looked like potential lupine habitat. The area contained no lupine, and evidence of heavy ATV traffic was noted on the exposed sandy regions. A second sand terrace within Zumbro Bottoms S.F. (Section 27) was also surveyed. No lupine was found here either.

PETERSON LAKE WEST: 110N 10W E12 (Map XVIII)

Owner: Many small plots

Date: 06 June 1990

Time: 1:15 - 2:00pm

Weather: Partly sunny, 65 degrees F, W winds 10-25 mph.

Butterfly Species Observed:

- | | |
|----------------------------|-----------------|
| 1. <u>Artogeia rapae</u> | Cabbage white |
| 2. <u>Colias philodice</u> | Common sulphur |
| 3. <u>Lycaena phlaeas</u> | American copper |
| 4. <u>Danaus plexippus</u> | Monarch |

Notes: This sand prairie area has been degraded due to housing and development. Small sand prairie remnants remain in the area although no lupine and few lepidoptera were seen.

JARRETT EAST: 109N 13W NWNW24 (Map XIX)

Owner: Undetermined

Date: 07 June 1990

Time: 9:00 - 9:30am

Weather: Sunny, 70 degrees F, no breeze.

Butterfly Species Observed:

1. Pholisora catullus Common sootywing

Notes: This little sand terrace between highway 11 and the Zumbro River contained no lupine. The site contained porcupine grass (Stipa spartea), big bluestem (Andropogon gerardii), and little bluestem (Schizachyrium scoparium) but few forbs.

JARRETT WEST: 109N 13W NESW22

(Map XIX)

Owner: State Forest Land

Date: 07 June 1990

Time: 9:40 - 10:45am

Weather: Sunny, 70 degrees F, no wind.

Butterfly Species Observed:

- | | |
|--------------------------------|-----------------------|
| 1. <u>Pholisora catullus</u> | Common sootywing |
| 2. <u>Poanes hobomok</u> | Hobomok skipper |
| 3. <u>Everes comyntas</u> | Eastern tailed blue |
| 4. <u>Vanessa virginiensis</u> | American painted lady |
| 5. <u>Megisto cymela</u> | Little wood satyr |
| 6. <u>Danaus plexippus</u> | Monarch |

Notes: Another sandy river terrace (mostly planted to pines), contained some native vegetation. Leadplant (Amorpha canescens), compass plant (Silphium laciniatum), phlox (Phlox sp.), porcupine grass (Stipa spartea), and big bluestem (Andropogon gerardii) graced this hillside. Sandy areas contained many tiger beetles (Cicindelidae) and the 6-lined racerunner lizard (Cnemidophorus sexlineatus).

ZUMBRO FALLS: 109N 14W SWNW1 & SENE2

(Map XX)

Owner: Undetermined

Date: 07 June 1990

Time: 12:00 - 1:00pm

Weather: Sunny, 75 degrees F, light S breeze.

Butterfly Species Observed:

- | | |
|--------------------------------|---------------------|
| 1. <u>Pholisora catullus</u> | Common sootywing |
| 2. <u>Polites themistocles</u> | Tawny-edged skipper |
| 3. <u>Poanes hobomok</u> | Hobomok skipper |
| 4. <u>Artogeia rapae</u> | Cabbage white |
| 5. <u>Everes comyntas</u> | Eastern tailed blue |

Notes: This site contained a sandy river terrace north of the Zumbro River. No lupine seen. A goat or bluff prairie was found at the top of the bluff. Grazing and succession are the two main threats to this site.

ANOKA COUNTY:

HELLEN ALLISON SAVANNA: 033N 14W SWNW1 & NNE2

(Map XXI)

Owner: The Nature Conservancy

Date: 28 May 1990

Time: 10:30 - 12:00 noon

Weather: Mostly sunny, 73 degrees F, no wind.

Butterfly Species Observed:

- | | |
|-----------------------------|-------------------|
| 1. <u>Euchloe olympia</u> | Olympia white |
| 2. <u>Colias philodice</u> | Common sulphur |
| 3. <u>Clossiana bellona</u> | Meadow fritillary |

Notes: This TNC tract is an excellent example of oak sand savanna once found throughout the Anoka Sand Plains region. Sand prairie vegetation supporting scattered bur oak and northern pin oaks occurs here. Over 200 plants have been recorded here, although lupine is not one of them. The west end contains old field vegetation as it was formerly cultivated.

** CEDAR CREEK HISTORICAL SITE: 034N 23W SWNW23

(Map XXI)

Owner: University of Minnesota

Date: 28 May 1990

Time: 1:12 - 1:50pm

Weather: Sunny, 78 degrees F, no breeze.

Lupine:

Approximate number of clumps: 1,500 but widely scattered.

Approximate number of stems: 8,000

Approximate number of flowering stalks: just beginning to flower.

Acreage with lupine: 1

Associated plant species:

Big bluestem (Andropogon gerardii)(P), Puccoon (Lithospermum sp.) (F), Bird's foot violet (Viola pedata)(P), Bur oak (Quercus marocarpa)(P), Butterfly weed (Asclepias tuberosa)(P), New Jersey tea (Ceanothus americanus)(P), Hazel (Corylus sp.)(P).

Butterfly Species Observed: none noted

Date: 18 July 1990

Time: 3:35 - 4:05pm

Weather: Sunny, 88 degrees F, no wind.

Butterfly Species Observed:

- | | |
|-------------------------------------|----------------------|
| 1. <u>Arytone delaware</u> | Delaware skipper |
| 2. <u>Euphyes ruricola</u> | Dun skipper |
| 3. <u>Satyrium edwardsii</u> | Edward's hairstreak |
| 4. <u>Everes comyntas</u> | Eastern tailed blue |
| 5. <u>Speyeria aphrodite</u> | Aphrodite |
| 6. <u>Phyciodes tharos/morpheus</u> | Pearly crescent spot |
| 7. <u>Cercyonis pegala</u> | Wood nymph |
| 8. <u>Danaus plexippus</u> | Monarch |

Date: 22 July 1990 Time: 12:40 - 1:45pm
Weather: Partly cloudy, 72 degrees F, NW winds 10-20.
Butterfly Species Observed:

- | | |
|------------------------------|---------------------|
| 1. <u>Atrytone delaware</u> | Delaware skipper |
| 2. <u>Euphyes ruricola</u> | Dun skipper |
| 3. <u>Colias eurytheme</u> | Orange sulphur |
| 4. <u>Satyrium edwardsii</u> | Edward's hairstreak |
| 5. <u>Satyrium calanus</u> | Banded hairstreak |
| 6. <u>Cercyonis pegala</u> | Wood nymph |
| 7. <u>Danaus plexippus</u> | Monarch |

Date: 24 July 1990 Time: 11:30 - 1:30pm
Weather: Sunny, 78 degrees F, S winds 5-15 mph.
Butterfly Species Observed:

- | | |
|------------------------------|---------------------|
| 1. <u>Atrytone delaware</u> | Delaware skipper |
| 2. <u>Euphyes ruricola</u> | Dun skipper |
| 3. <u>Pterourus glaucus</u> | Tiger swallowtail |
| 4. <u>Harknclenus titus</u> | Coral hairstreak |
| 5. <u>Satyrium edwardsii</u> | Edward's hairstreak |
| 6. <u>S. calanus</u> | Banded hairstreak |
| 7. <u>Speyeria aphrodite</u> | Aphrodite |
| 8. <u>Cercyonis pegala</u> | Wood nymph |
| 9. <u>Danaus plexippus</u> | Monarch |

Date: 08 August 1990 Time: 12:35 - 1:45pm
Weather: Sunny, 72 degrees F, SW winds 10-25 mph.
Butterfly Species Observed:

- | | |
|-------------------------------------|----------------------|
| 1. <u>Ancyloxypha numitor</u> | Least skipperling |
| 2. <u>Artogeia rapae</u> | Cabbage white |
| 3. <u>Colias eurytheme</u> | Orange sulphur |
| 4. <u>Phyciodes tharos/morpheus</u> | Pearly crescent spot |
| 5. <u>Danaus plexippus</u> | Monarch |

Date: 13 August 1990 Time: 12:30 - 2:35pm
Weather: Mostly sunny, 75 degrees F, S breeze 5-10 mph.
Butterfly Species Observed:

- | | |
|--------------------------------|---------------------|
| 1. <u>Artogeia rapae</u> | Cabbage white |
| 2. <u>Colias eurytheme</u> | Orange sulphur |
| 3. <u>Satyrium caryaevorum</u> | Hickory hairstreak |
| 4. <u>Everes comyntas</u> | Eastern tailed blue |
| 5. <u>Polygonia comma</u> | Comma |
| 6. <u>Basilarchia arthemis</u> | White admiral |
| 7. <u>B. archippus</u> | Viceroy |
| 8. <u>Cercyonis pegala</u> | Wood nymph |
| 9. <u>Danaus plexippus</u> | Monarch |

Notes: This site is found within the 5,750 acre Cedar Creek Natural History Area, owned by the University of Minnesota. In 1975 the KB was discovered in this small area of former bur oak sand savanna, where some openings in the canopy persist. Road

maintenance during the winter of 1976-77 killed much of the lupine along the road margins. In addition, the open areas now have a strong sumac (Rhus sp.) and hazel (Corylus sp.) canopy due to long interburn intervals (Minnesota DNR Natural Heritage Database). The KB has not been seen here since R. Dana sighted one male on 12 August 1984. No KBs were seen in 1990 during the survey and most likely they have been extirpated from the site.

* CARLOS AVERY WMA: 033N 23W NENW29 (Map XXII)
Owner: State Wildlife Management Area

Date: 28 May 1990 Time: 2:00 - 2:30pm
Weather: Sunny, 78 degrees F, no breeze.
Lupine:
Approximate number of clumps: 20
Approximate number of stems: 1,600
Approximate number of flowering stalks: 500
Acreage with lupine: < 1
Associated plant species:

Hoary puccoon (Lithospermum canescens)(F), Hazel (Corylus sp.)
(P), White prairie clover (Petalostemum candidum)(P), Phlox
(Phlox sp.)(F), Daisy fleabane (Erigeron annuus)(P), White sweet
clover (Melilotus alba)(P).

Butterfly species observed:

- | | |
|----------------------------|----------------|
| 1. <u>Euchloe olympia</u> | Olympia white |
| 2. <u>Colias philodice</u> | Common sulphur |

Date: 13 June 1990 Time: 4:30 - 5:00pm
Weather: Sunny, 85 degrees F, SW winds 10-20 mph.
Butterfly Species Observed:

- | | |
|------------------------------------|--------------------|
| 1. <u>Lycaena phlaeas</u> | American copper |
| 2. <u>Carterocephalus palaemon</u> | Arctic skipperling |

Date: 18 July 1990 Time: 4:20 - 4:40pm
Weather: Sunny, 88 degrees F, no wind.
Butterfly Species Observed:

- | | |
|------------------------------|-------------------|
| 1. <u>Pterourus glaucus</u> | Tiger swallowtail |
| 2. <u>Pontia protodice</u> | Checkered white |
| 3. <u>Colias eurytheme</u> | Orange sulphur |
| 4. <u>Harkenclenus titus</u> | Coral hairstreak |
| 5. <u>Vanessa cardui</u> | Painted lady |
| 6. <u>Cercyonis pegala</u> | Wood nymph |

Date: 24 July 1990 Time: 10:25 - 10:25am
Weather: Sunny, 77 degrees F, light S breeze.
Butterfly Species Observed: none noted

Date: 08 August 1990 Time: 11:15 - 11:40am
Weather: Sunny, 72 degrees F, WSW winds 10-20 mph.

Butterfly Species Observed: none observed

Notes: A small population of lupine was discovered along a road margin in a powerline clearing. The site is very small and no KBs were seen during the flight periods.

* COON LAKE: 033N 22W NWNE30

(Map XXIII)

Owner: Undetermined

A very small patch of lupine was found in a road ditch along highway 17. Approximately 200 stems and 20 clumps were noted. Since the site was so small and isolated, it was not revisited during the KB's second flight period. Concerns include road maintenance, herbicide use, and possible mowing of ditch by landowners.

SNA NORTH OF CARLOS AVERY: 033N 22W NW19

(Map XXIII)

Owner: State Wildlife Management Area

Date: 29 May 1990

Time: 8:00 - 10:00am

Weather: Sunny, 58 degrees F, N winds 5-10 mph.

Butterfly Species Observed:

1. Poanes hobomok

Hobomok skipper

2. Lycaena phlaeas

American copper

Notes: This sand prairie and sand savanna-like habitat was surveyed for lupine and the KB on 29 May 1990. No lupine was recorded at this site.

BUNKER HILLS: 032N 24W SW36 & E35

(Map XXIV)

Owner: Anoka County Park

BUNKER HILLS PRAIRIE: 32N 24W NE36

(Map XXIV)

Owner: B. & L. Johnson

Date: 12 June 1990

Time: 9:00 - 12:00 noon

Weather: Sunny, 75-80 degrees F, SW breeze 5 mph.

Butterfly Species Observed:

1. Euphyes ruricola

Dun skipper

2. Colias philodice

Common sulphur

3. Lycaena phlaeas

American copper

4. Everes comyntas

Eastern tailed blue

5. Vanessa cardui

Painted lady

6. Danaus plexippus

Monarch

Notes: These two sites were surveyed for lupine on 12 June 1990. The areas consisted of sand prairie and sand savanna habitat. Some lupine has been planted within the Anoka County Recreation Area (conversation with park manager), but no naturally occurring native lupine was seen at either site. In addition few butterflies were observed. The Bunker Hills Prairie is under private ownership and was once pastured. It does however have a high forb diversity with Penstemon grandiflorus, P. gracilis, and

Penstemon grandiflorus, P. gracilis, and Liatris sp. among others. There are no obvious threats to the site as current owners are interested in regeneration of the area (Minnesota DNR Natural Heritage Database 1990).

ISANTI COUNTY:

ATHENS STATE WILDLIFE MANAGEMENT AREA: 034N 23W SW5 (Map XXV)
Owner: State Wildlife Management Area

Date: 13 June 1990 Time: 3:15 - 3:45pm
Weather: Few scattered clouds, 75 degrees, WSW winds 10-20 mph.
Butterfly Species Observed:

- | | |
|------------------------------|------------------|
| 1. <u>Pholisora catullus</u> | Common sootywing |
| 2. <u>Colias philodice</u> | Common sulphur |
| 3. <u>C. eurytheme</u> | Orange sulphur |

Notes: This old field area contains some native plants but no lupine and very few lepidopteran species were noted here.

MARGET LAKE WILDLIFE AREA: 034N 24W NE3 & SE34 (Map XXVI)
Owner: State Wildlife Management Area

Date: 14 June 1990 Time: 9:45 - 10:45am
Weather: Sunny, 77 degrees F, no wind.
Butterfly Species Observed:

- | | |
|--------------------------------|-------------------|
| 1. <u>Pterourus glaucus</u> | Tiger Swallowtail |
| 2. <u>Pontia protodice</u> | Checkered white |
| 3. <u>Megisto cymela</u> | Little wood satyr |
| 4. <u>Coenonympha inornata</u> | Prairie ringlet |
| 5. <u>Danaus plexippus</u> | Monarch |

Notes: This site contains a nice but small remnant sand prairie area in the NE corner of section 3. Big bluestem (Andropogon gerardii), porcupine grass (Stipa spartea), and some forbs still persist on the Zimmerman sands that make up the area.

SPECTACLE LAKE: 036N 25N NE35 (Map XXVII)
Owner: State Wildlife Management Area

Date: 13 June 1990 Time: 1:55 - 2:50pm
Weather: Partly cloudy, 82 degrees F, S winds 15 mph.
Butterfly Species Observed:

- | | |
|------------------------------------|---------------------|
| 1. <u>Thorybes pylades</u> | Northern cloudywing |
| 2. <u>Poanes hobomok</u> | Hobomok skipper |
| 3. <u>Carterocephalus palaemon</u> | Arctic skipperling |

Notes: Due to a 1942 record for lupine in the area, this site was surveyed. A possible overgrown savanna and adjacent old field were searched. No lupine was seen.

* CEDAR CREEK NORTH: 034N 23W SESE21

(Map XXI)

Owner: University of Minnesota

Date: 29 May 1990

Time: 10:00 - 11:00am

Weather: Sunny, 60 degrees F, N wind 5-10 mph.

Lupine:

Approximate number of clumps: 50

Approximate number of stems: 500

Approximate number of flowering stalks: Not flowering yet.

Acreage with lupine: < 1

Associated plant species:

Northern pin oak (Quercus ellipsoidalis)(P), Big bluestem
(Andropogon gerardii)(P), Puccoon (Lithospermum sp.)(F),
Butterfly weed (Asclepias tuberosa)(P).

Butterfly Species Observed: none recorded.

Date: 19 July 1990

Time: 1:30 - 2:00pm

Weather: Thin high clouds, 78 degrees F, no breeze.

Butterfly Species Observed:

- | | |
|--------------------------------|---------------------|
| 1. <u>Euphyes ruricola</u> | Dun skipper |
| 2. <u>Artogeia rapae</u> | Cabbage white |
| 3. <u>Satyrrium edwardsii</u> | Edward's hairstreak |
| 4. <u>Polygonia comma</u> | Comma |
| 5. <u>Basilarchia arthemis</u> | White admiral |
| 6. <u>Cercyonis pegala</u> | Wood nymph |
| 7. <u>Danaus plexippus</u> | Monarch |

Date: 24 July 1990

Time: 1:50 - 2:25pm

Weather: Sunny, 82 degrees F, S wind 5-10 mph.

Butterfly Species Observed:

- | | |
|----------------------------|----------------|
| 1. <u>Euphyes ruricola</u> | Dun skipper |
| 2. <u>Colias philodice</u> | Common sulphur |
| 3. <u>Cercyonis pegala</u> | Wood nymph |
| 4. <u>Danaus plexippus</u> | Monarch |

Date: 8 August 1990

Time: 12:45 - 2:00pm

Weather: Sunny, 72 degrees F, SW winds 10-20 mph.

Butterfly Species Observed:

- | | |
|----------------------------|---------------------|
| 1. <u>Colias philodice</u> | Common sulphur |
| 2. <u>Everes comyntas</u> | Eastern tailed blue |
| 3. <u>Danaus plexippus</u> | Monarch |

Notes: This is another site found within the Cedar Creek Natural History Area. A small patch of lupine (approx. 50 clumps) occurs along and grading into a mixed woods. An old field and a sand prairie also occur near the site. By 29 May, most of the healthy lupine had been browsed off, most likely by deer. No KBs were encountered during the four visits to the area. Threats to the lupine include browsing and succession.

* NORTH ROAD CORNERS: 034N 23W NESE22

(Map XXI)

Owner: University of Minnesota

Date: 28 May 1990

Time: 12:13 - 1:00pm

Weather: Sunny, 75 degrees F, no breeze.

Lupine:

Approximate number of clumps: 1,000

Approximate number of stems: 12,000

Approximate number of flowering stalks: 7,000

Acreage with lupine: < 1

Associated plant species:

Big and little bluestem (Andropogon gerardii, Schizachyrium scoparium)(P), White prairie clover (Petalostemum candidum)(P), Sweet clover (Melilotus alba)(P), Daisy fleabane (Erigeron annuus)(P), Common milkweed (Asclepias syriaca)(P), Butterfly weed (Asclepias tuberosa)(P), Puccoon (Lithospermum sp.)(F), and Raspberry (Rubus sp.)(P).

Butterfly Species Observed:

- | | |
|---------------------------------|---------------------|
| 1. <u>Colias philodice</u> | Common sulphur |
| 2. <u>Everes comyntas</u> | Eastern tailed blue |
| 3. <u>Glaucopsyche lygdamus</u> | Silvery blue |

Date: 14 June 1990

Time: 8:45 - 9:05am

Weather: Sunny, 76 degrees F, no wind.

Butterfly Species Observed: none recorded.

Date: 18 July 1990

Time: 3:05 - 3:30pm

Weather: Sunny, 88 degrees F, light S breeze.

Butterfly Species Observed:

- | | |
|------------------------------|------------------|
| 1. <u>Polites mystic</u> | Long dash |
| 2. <u>Euphyes ruricola</u> | Dun skipper |
| 3. <u>Colias eurytheme</u> | Orange sulphur |
| 4. <u>Harkenclenus titus</u> | Coral hairstreak |
| 5. <u>Junonia coenia</u> | Buckeye |
| 6. <u>Danaus plexippus</u> | Monarch |

Date: 22 July 1990

Time: 1:50 - 2:15pm

Weather: Partly sunny, 72 degrees F, WNW winds 10-20 mph.

Butterfly Species Observed:

- | | |
|----------------------------|----------------|
| 1. <u>Colias eurytheme</u> | Orange sulphur |
| 2. <u>Danaus plexippus</u> | Monarch |

Date: 24 July 1990

Time: 10:45 - 11:30am

Weather: Sunny, 78 degrees F, S winds 5-10 mph.

Butterfly Species Observed:

- | | |
|------------------------------|-------------------|
| 1. <u>Pterourus glaucus</u> | Tiger swallowtail |
| 2. <u>Artogeia rapae</u> | Cabbage white |
| 3. <u>Harkenclenus titus</u> | Coral hairstreak |

- | | |
|---------------------------------|---------------------|
| 4. <u>Everes comyntas</u> | Eastern tailed blue |
| 5. <u>Basilarchia archippus</u> | Viceroy |
| 6. <u>Enodia anthedon</u> | Pearly eye |
| 7. <u>Cercyonis pegala</u> | Wood nymph |
| 8. <u>Danaus plexippus</u> | Monarch |

Date: 08 August 1990 Time: 11:50 - 12:30pm
 Weather: Sunny, 72 degrees F, WSW winds 10-20 mph.
 Butterfly Species Observed:

- | | |
|----------------------------|----------------|
| 1. <u>Artogeia rapae</u> | Cabbage white |
| 2. <u>Colias philodice</u> | Common sulphur |
| 3. <u>Danaus plexippus</u> | Monarch |

Notes: A population of approximately 1000 clumps of lupine occurs at this site which is essentially no more than a triangular road ditch area between highway 22 and a gravel road. To the west is sand prairie habitat of the Cedar Creek Natural History Area, which contains many of the lepidopteran nectar sources for this site.

SHERBURNE COUNTY:

* SHERBURNE NATIONAL WILDLIFE REFUGE: 035N 28W NE22 (Map XXVIII)
 Owner: National Wildlife Refuge

Date: 12 June 1990 Time: 2:02 - 4:15pm
 Weather: Sunny, hot and humid, 90 degrees F, no wind.
 Lupine:

Approximate number of clumps: 25
 Approximate number of stems: 250
 Approximate number of flowering stalks: 150
 Acreage with lupine: 1
 Associated plant species:

Northern pin oak (Quercus ellipsoidalis)(P), Bur oak (Quercus marocarpa)(P), Porcupine grass (Stipa spartea)(P), Big bluestem (Andropogon gerardii)(P), Puccoon (Lithospermum sp.)(F), Spiderwort (Tradescantia sp.)(F), Purple prairie clover (Petalostemum pupureum)(P), Butterfly weed (Asclepias tuberosa)(P).

Butterfly Species Observed:

- | | |
|-------------------------------------|----------------------|
| 1. <u>Thorybes pylades</u> | Northern cloudywing |
| 2. <u>Phyciodes tharos/morpheus</u> | Pearly crescent spot |
| 3. <u>Nymphalis antiopa</u> | Mourning cloak |
| 4. <u>Vanessa cardui</u> | Painted lady |
| 5. <u>Megisto cymela</u> | Little wood satyr |
| 6. <u>Danaus plexippus</u> | Monarch |

Date: 19 July 1990 Time: 10:00 - 11:30am
 Weather: Mostly sunny, 75 degrees F, N winds 5-15 mph.

Butterfly Species Observed:

1. <u>Euphyes ruricola</u>	Dun skipper
2. <u>Pterourus glaucus</u>	Tiger swallowtail
3. <u>Colias eurytheme</u>	Orange sulphur
4. <u>Harkenclenus titus</u>	Coral hairstreak
5. <u>Satyrium edwardsii</u>	Edward's hairstreak
6. <u>Speyeria aphrodite</u>	Aphrodite
7. <u>Phyciodes tharos/morpheus</u>	Pearly crescentspot
8. <u>Basilarchia arthemis</u>	White admiral
9. <u>Enodia anthedon</u>	Pearly eye
10. <u>Cercyonis pegala</u>	Wood nymph
11. <u>Danaus plexippus</u>	Monarch

Date: 09 August 1990

Time: 3:05 - 4:45pm

Weather: Mostly sunny, 79 degrees F, light SW breeze.

Butterfly Species Observed:

1. <u>Ancyloxypha numitor</u>	Least skipperling
2. <u>Artogeia rapae</u>	Cabbage white
3. <u>Colias philodice</u>	Common sulphur
4. <u>Satyrium caryaevorum</u>	Hickory hairstreak
5. <u>Everes comyntas</u>	Eastern tailed blue
6. <u>Speyeria aphrodite</u>	Aphrodite
7. <u>Basilarchia arthemis</u>	Red-spotted purple
8. <u>B. archippus</u>	Viceroy
9. <u>Cercyonis pegala</u>	Wood nymph
10. <u>Danaus plexippus</u>	Monarch

Notes: An overgrown bur (Quercus marocarpa) and northern pin oak (Q. ellipsoidalis) sand savanna make up most of this site. Small openings occur within the savanna and it is here where lupine is found. Although the KB was not found here a total of 15 other species were seen in 1990. Burn management has been started in the area and should benefit the establishment of herbaceous plant growth.

* SANTIAGO OAK SAVANNA RNA: 035N 28W SW23 & SE24 (Map XXVIII)
Owner: National Wildlife Refuge

Date: 15 June 1990

Time: 9:20 - 11:20am

Weather: Partly cloudy, 75 degrees F, no wind.

Lupine:

Approximate number of clumps: 2,000

Approximate number of stems: 20,000

Approximate number of flowering stalks: past peak flowering.

Acreage with lupine: 2

Associated plant species:

Puccoon (Lithospermum sp.)(F), Beard's tongue (Penstemon sp.)(F), Spiderwort (Tradescantia sp.)(F), Big bluestem (Andropogon gerardii)(P), Lead plant (Amorpha canescens)(F), Butterfly weed (Asclepias tuberosa)(P), Purple prairie clover (Petalostemum purpureum)(P), White prairie clover (P. candidum)(P), Porcupine grass (Stipa spartea)(P), Bur oak (Quercus marocarpa)(P).

Butterfly Species Observed:

- | | |
|--------------------------------|---------------------|
| 1. <u>Thorybes pylades</u> | Northern cloudywing |
| 2. <u>Poanes hobomok</u> | Hobomok skipper |
| 3. <u>Basilarchia arthemis</u> | White admiral |
| 4. <u>Megisto cymela</u> | Little wood satyr |
| 5. <u>Coenonympha inornata</u> | Prairie ringlet |
| 6. <u>Danaus plexippus</u> | Monarch |

Date: 18 July 1990

Time: 9:30 - 2:45pm

Weather: Sunny, 80 degrees F, no wind.

Butterfly Species Observed:

- | | |
|-------------------------------|-----------------------|
| 1. <u>Atrytone delaware</u> | Delaware skipper |
| 2. <u>Euphyes ruricola</u> | Dun skipper |
| 3. <u>Pontia protodice</u> | Checkered white |
| 4. <u>Artogeia rapae</u> | Cabbage white |
| 5. <u>Colias philodice</u> | Common sulphur |
| 6. <u>C. eurytheme</u> | Orange sulphur |
| 7. <u>Harkenclenus titus</u> | Coral hairstreak |
| 8. <u>Satyrium edwardsii</u> | Edward's hairstreak |
| 9. <u>Speyeria aphrodite</u> | Aphrodite |
| 10. <u>Charidryas nycteis</u> | Silvery crescent spot |
| 11. <u>Enodia anthedon</u> | Pearly eye |
| 12. <u>Ceryconis pegala</u> | Wood nymph |
| 13. <u>Danaus plexippus</u> | Monarch |

Date: 25 July 1990

Time: 10:00 - 1:05pm

Weather: Rain ending about 8:45, cloudy, 68 degrees F, SE winds 5-15 mph, rain at 1:00 also.

Butterfly Species Observed:

- | | |
|---------------------------------|-----------------|
| 1. <u>Euphyes ruricola</u> | Dun skipper |
| 2. <u>Pontia protodice</u> | Checkered white |
| 3. <u>Colias philodice</u> | Common sulphur |
| 4. <u>Speyeria aphrodite</u> | Aphrodite |
| 5. <u>Basilarchia archippus</u> | Viceroy |
| 6. <u>Satyroides eurydice</u> | Eyed brown |
| 7. <u>Cercyonis pegala</u> | Wood nymph |
| 8. <u>Danaus plexippus</u> | Monarch |

Date: 09 August 1990

Time: 11:00 - 3:00pm

Weather: Mostly sunny, 79 degrees F, very light SW breeze.

Butterfly Species Observed:

- | | |
|--------------------------------|---------------------|
| 1. <u>Ancyloxypha numitor</u> | Least skipperling |
| 2. <u>Artogeia rapae</u> | Cabbage white |
| 3. <u>Colias philodice</u> | Common sulphur |
| 4. <u>C. eurytheme</u> | Orange sulphur |
| 5. <u>Satyrium caryaevorum</u> | Hickory hairstreak |
| 6. <u>Everes comyntas</u> | Eastern tailed blue |
| 7. <u>Speyeria aphrodite</u> | Aphrodite |
| 8. <u>Vanessa cardui</u> | Painted lady |

- | | |
|--------------------------------|--------------------|
| 9. <u>Basilarchia arthemis</u> | Red-spotted purple |
| 10. <u>B. archippus</u> | Viceroy |
| 11. <u>Cercyonis pegala</u> | Wood nymph |
| 12. <u>Danaus plexippus</u> | Monarch |

Notes: A large population of lupine is found within this mixed oak savanna. However, past grazing and fire suppression have degraded the site. Fire management has begun and should continue in this area. No KBs were seen in the summer of 1990. A similar survey was conducted in this area by S. Mueller (1985). A total of 23 species were observed in 1990 on four visits to the site.

 * ELK RIVER DUNES: 035N 26W E18 & SW17 (Map XXIX)
 Owner: St. Louis Park Sportsmen Club; Bob Zimmerman, President
 Phone: 612-537-3896

Date: 12 June 1990 Time: 11:45 - 12:15pm
 Weather: Rain ending 11:30, sunny, very humid 80+ degrees F.
 Lupine:
 Approximate number of clumps: 25
 Approximate number of stems: 300
 Approximate number of flowering stalks: 125
 Acreage with lupine: < 1
 Associated plant species:

Northern pin oak (Quercus ellipsoidalis)(P), Bur oak (Quercus marocarpa)(P), Needle grass (Stipa comata)(P), Prairie sunflower (Helianthus rigidus)(P).

Butterfly Species Observed: none recorded

Date: 15 June 1990 Time: 6:30 - 8:15am
 Weather: Partly sunny, 60 degrees F, calm.
 Butterfly Species Observed:

- | | |
|----------------------------|---------------------|
| 1. <u>Thorybes pylades</u> | Northern cloudywing |
| 2. <u>Megisto cymela</u> | Little wood satyr |
| 3. <u>Danaus plexippus</u> | Monarch |

Date: 22 July 1990 Time: 8:00 - 9:30am
 Weather: Mostly sunny, 65 degrees F, NW winds 5-10 mph.
 Butterfly Species Observed:

- | | |
|----------------------------|-------------------|
| 1. <u>Euphyes ruricola</u> | Dun skipper |
| 2. <u>Colias philodice</u> | Common sulphur |
| 3. <u>Satyrium calanus</u> | Banded hairstreak |
| 4. <u>Cercyonis pegala</u> | Wood nymph |
| 5. <u>Danaus plexippus</u> | Monarch |

Notes: A small population of lupine occurs in an oak savanna on a large sand dune complex known as the Elk River Sand Dunes. The site is owned by the St. Louis Park Sportsmen Club and contains excellent examples of steep dune topography of the Anoka Sand

Plain. No KBs were seen at the site. This site also contains the state endangered Uncas skipper, Hesperia uncas, although it was not seen by the author in 1990. The area should be protected.

CONKLIN SAVANNA: 035N 29W S1/2 NW11

(Map XXX)

Owner: Roger Conklin

Date: 15 June 1990

Time: 11:40 - 12:15pm

Weather: Light rain, 72 degrees F, no wind.

Butterfly Species Observed: none observed.

Notes: The Conklin Savanna contains 60 acres of dry, bur oak savanna with a good variety of native grasses (mainly porcupine (Stipa spartea) and little bluestem (Schizachyrium scoparium)). Forb diversity is fairly good but the site contains no lupine. No butterflies were observed on 15 June due to the light rain throughout the day.

BOYD LAKE SAVANNA: 035N 29W SESE13

(Map XXX)

Owner: Leonard Graning

Date: 15 June 1990

Time: 12:20 - 1:00pm

Weather: Light rain, 75 degrees F, no wind.

Butterfly Species Observed: none observed.

Notes: This private site contains a small sandy oak savanna on the west side of Boyd Lake. Porcupine grass (Stipa spartea) is the most dominant grass in the area. No lupine was seen. Due to the rain no butterflies were seen.

ORROCK 9 WEST: 030N 27W S 1/2 10

(Map XXXI)

Owner: National Wildlife Refuge

Date: 16 June 1990

Time: 12:45 - 2:15pm

Weather: Cloudy with intermittent showers, 75 degrees F, calm.

Butterfly Species Observed: none observed.

Notes: No lupine was found in this portion of the Sherburne National Wildlife Refuge. The rain also prevented any butterflies from flying on the survey date. The area consists of mixed oak sand savanna and sand prairie areas. Burn management has begun in the area but it has a long way to go to restore it's natural character.

THOMPSON LAKE SAVANNA: 033N 28W SE11 & NNE14 (Map XXXII)

Owner: Non-Profit organization

Date: 16 June 1990

Time: 1:00 - 2:30pm

Weather: Cloudy, rain, 75 degrees F, calm.

Butterfly Species Observed: none observed.

Notes: This overgrown bur (Quercus marocarpa) and pin oak (Q. ellipsoidalis) savanna contained no lupine and few native forbs. Due to the rain no butterflies were observed.

PINE COUNTY:

ST. CROIX STATE PARK: 040N 18W NW1 & 041N 17W SE31 (Map XXXIII)
Owner: State Park

Date: 17 June 1990 Time: 10:00 - 2:00pm
Weather: Cloudy, 70 degrees F, rain showers, SW winds 5-10 mph.
Butterfly Species Observed:

- | | |
|-------------------------------------|-----------------------|
| 1. <u>Thorybes pylades</u> | Northern cloudywing |
| 2. <u>Poanes hobomok</u> | Hobomok skipper |
| 3. <u>Pterourus glaucus</u> | Tiger swallowtail |
| 4. <u>Euptoieta claudia</u> | Variegated fritillary |
| 5. <u>Phyciodes tharos/morpheus</u> | Pearly crescent spot |
| 6. <u>Polygonia comma</u> | Comma |
| 7. <u>Basilarchia arthemis</u> | White admiral |
| 8. <u>Megisto cymela</u> | Little wood satyr |
| 9. <u>Cercyonis pegala</u> | Wood nymph |
| 10. <u>Danaus plexippus</u> | Monarch |

Notes: The St. Croix State Park was surveyed for lupine because of its close proximity to the Wisconsin KB populations (essentially just across the St. Croix River). Due to fire suppression, however, there are very few areas within the park that contain suitable habitat for lupine or the KB. There is a strong canopy and very little Zimmerman Sand. No lupine was found in the park, thus a second trip was not warranted.

HISTORIC PLANT SITE: 038N 20W N 1/4 23 (Map XXXIV)
Owner: Undetermined

Date: 17 June 1990 Time: 3:49 - 4:45pm
Weather: Cloudy, 70 degrees F, SW wind 10-25 mph, off and on showers.
Butterfly Species Observed: none recorded.

Notes: This area is the only historic site for lupine in Pine county and it has most likely been destroyed by a combination of road work and succession. The author searched extensively for lupine along highway 70 and in adjacent openings in the woods. No lupine was seen. Due to the rain no butterflies were seen.

ST. CROIX STATE FOREST: 041N 16W S 1/4 13 & NE7 (Map XXXV)
Owner: State Forest Land

Date: 19 June 1990 Time: 9:00 - 4:00pm
Weather: Sunny, 80 degrees F, slight N breeze.
Butterfly Species Observed:

- | | |
|-----------------------------|------------------------|
| 1. <u>Epargyreus clarus</u> | Silver-spotted skipper |
| 2. <u>Poanes hobomok</u> | Hobomok skipper |
| 3. <u>Pterourus glaucus</u> | Tiger swallowtail |
| 4. <u>Colias philodice</u> | Common sulphur |
| 5. <u>Everes comyntas</u> | Eastern tailed blue |

- | | |
|----------------------------|---------------------------|
| 6. <u>Speyeria cybele</u> | Great spangled fritillary |
| 7. <u>Polygonia comma</u> | Comma |
| 8. <u>Danaus plexippus</u> | Monarch |
-

CHENGWATANA STATE FOREST: 39N 19W SW18,SW31&20W SE36 (Map XXXVI)
Owner: State Forest Land

Date: 18 June 1990 Time: 1:00 - 5:00pm
Weather: Mostly sunny, 80 degrees F, calm.
Butterfly Species Observed:

- | | |
|-------------------------------------|---------------------------|
| 1. <u>Epargyreus clarus</u> | Silver-spotted skipper |
| 2. <u>Euphyes ruricola</u> | Dun skipper |
| 3. <u>Colias philodice</u> | Common sulphur |
| 4. <u>Everes comyntas</u> | Eastern tailed blue |
| 5. <u>Speyeria cybele</u> | Great spangled fritillary |
| 6. <u>Phyciodes tharos/morpheus</u> | Pearly crescent spot |
| 7. <u>Polygonia progne</u> | Gray comma |
| 8. <u>Basilarchia arthemis</u> | Red-spotted purple |
| 9. <u>Cercyonis pegala</u> | Wood nymph |

Notes: No lupine was found in these two state forest units, along the St. Croix River in Pine County. Fire suppression appears to be the limiting factor here. Very few sandy openings exist in the two forest areas surveyed. Since lupine was not found, no other trips to the area were warranted.

CHISAGO COUNTY:

* WILD RIVER STATE PARK: 035N 19W 17 (Map XXXVII)
Owner: State Park

Date: 13 June 1990 Time: 9:30 - 11:20am
Weather: Sunny, 75 degrees F, W winds 5-10 increasing to 15-20 mph.

Lupine:

Approximate number of clumps: 1,340

Approximate number of stems: 13,000

Approximate number of flowering stalks: 7,000

Acreage with lupine: 5

Associated plant species:

Bur oak (Quercus marocarpa)(P), Northern pin oak (Quercus ellipsoidalis)(P), Big and little bluestem (Andropogon gerardii, Schizachyrium scoparium)(P), Butterfly weed (Asclepias tuberosa)(F), Puccoon (Lithospermum sp.)(F), Yellow hawkweed (Hieracium pratense)(F), Daisy fleabane (Erigeron annuus)(F), Blue vervain (Verbena hastata)(P), Blazing star (Liatris aspera)(P).

Butterfly Species Observed:

- | | |
|-----------------------------|------------------------|
| 1. <u>Epargyreus clarus</u> | Silver-spotted skipper |
| 2. <u>Thorybes pylades</u> | Northern cloudywing |

3. <u>Hesperia sassacus</u>	Indian skipper
4. <u>Poanes hobomok</u>	Hobomok skipper
5. <u>Carterocephalus palaemon</u>	Arctic skipperling
6. <u>Pterourus glaucus</u>	Tiger swallowtail
7. <u>Phyciodes tharos/morpheus</u>	Pearly crescentspot
8. <u>Vanessa cardui</u>	Painted lady
9. <u>Megisto cymela</u>	Wood nymph
10. <u>Danaus plexippus</u>	Monarch

Date: 17 July 1990

Time: 9:00 - 2:30pm

Weather: Rain earlier, mostly sunny, 75- 80 degrees F, SW winds 10-20 mph.

Butterfly Species Observed:

1. <u>Epargyreus clarus</u>	Silver-spotted skipper
2. <u>Atrytone delaware</u>	Delaware skipper
7. <u>Euphyes ruricola</u>	Dun skipper
4. <u>Colias philodice</u>	Common sulphur
5. <u>C. eurytheme</u>	Orange sulphur
6. <u>Harkenclenus titus</u>	Coral hairstreak
7. <u>Satyrium edwardsii</u>	Edward's hairstreak
8. <u>Celastrina ladon</u>	Spring azure
9. <u>Speyeria cybele</u>	Great spangled fritillary
10. <u>S. aphrodite</u>	Aphrodite
11. <u>Charidryas gorgone</u>	Gorgone crescentspot
12. <u>Phyciodes morpheus (pascoensis)</u>	Orange crescent
13. <u>C. nycteis</u>	Silvery crescentspot
14. <u>Polygonia comma</u>	Comma
15. <u>P. progne</u>	Gray comma
16. <u>Nymphalis antiopa</u>	Mourning cloak
17. <u>Vanessa atalanta</u>	Red admiral
18. <u>Asterocampa celtis</u>	Hackberry butterfly
19. <u>A. clyton</u>	Tawny emperor
20. <u>Cercyonis pegala</u>	Wood nymph
21. <u>Danaus plexippus</u>	Monarch

Date: 23 July 1990

Time: 9:00 - 10:00am & 1:30 - 4:30 pm

Weather: Sunny 65-78 degrees F, light SW winds.

Butterfly Species Observed:

1. <u>Epargyreus clarus</u>	Silver-spotted skipper
2. <u>Atrytone delaware</u>	Delaware skipper
3. <u>Euphyes ruricola</u>	Dun skipper
4. <u>Colias philodice</u>	Common sulphur
5. <u>C. eurytheme</u>	Orange sulphur
6. <u>Lycaena phlaeas</u>	American copper
7. <u>Harkenclenus titus</u>	Coral hairstreak
8. <u>Speyeria aphrodite</u>	Aphrodite
9. <u>Charidryas nycteis</u>	Silvery crescentspot
10. <u>Polygonia progne</u>	Gray comma
11. <u>Enodia anthedon</u>	Pearly eye
12. <u>Megisto cymela</u>	Little wood satyr
13. <u>Cercyonis pegala</u>	Wood nymph
14. <u>Danaus plexippus</u>	Monarch

Date: 11 August 1990 Time: 12:45 - 3:00pm
Weather: Sunny, 75 degrees F, NW wind 5 mph.
Butterfly Species Observed:

- | | |
|--------------------------------|---------------------------|
| 1. <u>Euphyes ruricola</u> | Dun skipper |
| 2. <u>Artogeia rapae</u> | Cabbage white |
| 3. <u>Colias philodice</u> | Common sulphur |
| 4. <u>Satyrium caryaevorum</u> | Hickory hairstreak |
| 5. <u>Speyeria cybele</u> | Great spangled fritillary |
| 6. <u>Vanessa atalanta</u> | Red admiral |
| 7. <u>Junonia coenia</u> | Buckeye |
| 8. <u>Basilarchia arthemis</u> | Red-spotted purple |
| 9. <u>B. archippus</u> | Viceroy |
| 10. <u>Asterocampa celtis</u> | Hackberry butterfly |
| 11. <u>Enodia anthedon</u> | Pearly eye |
| 12. <u>Cercyonis pegala</u> | Wood nymph |
| 13. <u>Danaus plexippus</u> | Monarch |

Date: 14 August 1990 Time: 11:30 - 2:35pm
Weather: Sunny, 75-85 degrees F, SW winds 5-10 mph.
Butterfly Species Observed:

- | | |
|--------------------------------|---------------------------|
| 1. <u>Euphyes ruricola</u> | Dun skipper |
| 2. <u>Papilio polyxenes</u> | Black swallowtail |
| 3. <u>Artogeia rapae</u> | Cabbage white |
| 4. <u>Colias philodice</u> | Common sulphur |
| 5. <u>C. eurytheme</u> | Orange sulphur |
| 6. <u>Speyeria cybele</u> | Great spangled fritillary |
| 7. <u>Polygonia progne</u> | Gray comma |
| 8. <u>Vanessa atalanta</u> | Red admiral |
| 9. <u>Basilarchia arthemis</u> | Red-spotted purple |
| 10. <u>B. archippus</u> | Viceroy |
| 11. <u>Cercyonis pegala</u> | Wood nymph |
| 12. <u>Danaus plexippus</u> | Monarch |

Notes: This state park located along the St. Croix River contains a large population of lupine in section 17 along the park road, along an old railroad grade, and in openings in the woods. No KBs were seen in five visits to the site. A total of 36 other butterfly species were observed however. The park should have some sort of management plan designed specifically for the plant to ensure its survival in the area. Specific concerns include road maintenance and succession. The population of lupine along the RR grade west of the park road is in need of burn management or hand clearing as soon as possible. If management could sustain or enhance the current lupine populations, then reintroduction of the KB in this area could be a possibility. There is a good variety of nectar sources in the area for the butterfly. This and the fact that just across the river in Wisconsin a population of the KB has been found in recent years, adds to the support for reintroduction of the KB here.

WILD RIVER SUNRISE AREA: 036N 20W SESE32 & S33 (Map XXXVIII)
Owner: State Park

Date: 18 June 1990 Time: 9:00 - 12:30pm
Weather: Mostly cloudy, 70 degrees F, calm.

Butterfly Species Observed:

- | | |
|--------------------------------------|------------------------|
| 1. <u>Epargyreus</u> <u>clarus</u> | Silver-spotted skipper |
| 2. <u>Poanes</u> <u>hobomok</u> | Hobomok skipper |
| 3. <u>Feniseca</u> <u>tarquinius</u> | Harvestor butterfly |
| 4. <u>Megisto</u> <u>cymela</u> | Little wood satyr |
| 5. <u>Danaus</u> <u>plexippus</u> | Monarch |

Notes: This site contains an overgrown oak savanna in section 33 which contains some native vegetation. No lupine was seen in the area. Few lepidoptera were observed due to the weather.

Areas Needing Further Work

Although the author tried his best to survey all likely areas for lupine and the Karner Blue, there are still areas within the state that may harbor populations of the two species. Reports of lupine within Carlos Avery WMA in Chisago County, the Uncas Dunes SNA in Sherburne County, and the McKnight Prairie in Goodhue County should be checked out in the future. In addition, a population assessment, biogeographical and habitat requirement study of the KB within the Whitewater Wildlife Management Area should be top priority, and undertaken as soon as possible. The findings would then help in making management decisions to help ensure the survival of a unique species of butterfly in Minnesota.

ACKNOWLEDGEMENTS

This project was funded by the U.S. Fish and Wildlife Department, The Minnesota Nature Conservancy, and the Nongame Wildlife Program of the Minnesota Department of Natural Resources. I wish to thank Robert Dana for his help in getting me up to speed on the Karner Blue biology, Dennis Schlicht for verifying some butterfly identifications, Welby Smith for his help on lupine phenology, Robert Dirig for sending me the herbarium records of Minnesota lupine, Richard Baker for his invaluable help with this project, and the many people who gave me leads on possible habitats for the lupine and/or Karner Blue butterfly.

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Appendix I. Historic Records for Lupinus perennis, Minnesota

<u>COUNTY</u>	<u>DATE COLLECTED</u>	<u>LOCATION</u>	<u>HERBARIUM</u>
Houston*	June 17, 1966	7 mi.W. Houston	WISC, UMN
Houston*	July 7, 1981	103N 05W Sec: 2	UMN
Fillmore*	June 22, 1915	near Rushford	UMN
Fillmore*	June 23, 1982	104N 08W Sec: 21	UMN
Southern	1887	Southern counties	F
Chisago	July 1892	Chisago County	UMN
Chisago*	July 26, 1980	Wild River SP	UMN
Sherburne*	July 26, 1980	Santiago SNA	UMN
Sherburne*	July 10, 1981	Elk River Dunes	UMN
Anoka*	May 1918	Anoka County	UMN
Anoka*	Aug. 9, 1961	Cedar Creek NHA	UMN
Anoka	June 26, 1935	near Rice Lake	WISC
Anoka*	July 18, 1960	Cedar Creek bridge	UMN
Winona	June 1886	Winona County	UMN
Winona*	May 10, 1980	108N 10W Sec: 14	UMN
Winona*	June 26, 1980	108N 10W Sec: 14	UMN
Ramsey	May 1895	MacCubbin's Lake	UMN
Ramsey	May ?? 22	Roselawn	UMN
Wabasha	May ?? 30	below Wabasha	UMN
Wabasha	June 8, 1882	Lake City	UMN
Wabasha	May 20, 1883	Lake City	UMN
Wabasha	May 1, 1898	Lake City	UMN
Wabasha	May 28, 1884	Lake City	UMN
Isanti*	June 11, 1942	Spectacle Lake	WISC
Morrison	July 24, 1945	Darling	UMN
Benton	May 25, 1977	037N 31W Sec: 13	UMN
Pine*	May 24, 1941	Rock T. Sec: 23	UMN
Crow Wing	June 28, 1935	near Brainerd	UMN
Hennepin	Aug. 1890	Hennepin County	UMN
Hennepin	June 1891	Hennepin County	UMN
Hennepin	June 1890	Hennepin County	UMN
Hennepin	May 29, 1891	Hennepin County	UMN
Hennepin	Aug. 1889	Hen County	UMN
Pigeon River	Aug. 1928	Pigeon River Co.	WISC

<u>COUNTY</u>	<u>DATE COLLECTED</u>	<u>LOCATION</u>	<u>HERBARIUM</u>
Olmsted		Rochester	UMN
Mille Lacs	July 1892	Mille Lacs Co.	UMN

Other records lacking specific information:

Near Minneapolis	May 1894		WISC
Near Minneapolis	May 1878		UMN
Near Minneapolis	June 1892		UMN
Near Minneapolis	May ?? 21		UMN
Lake Vadraais	May 1895		BKL, UMN F, WISC
Roberts Lake	June 20, 1896		WISC
Minnesota	June 1890	Minnesota	US
?Tomah, MN	July 24, 1891	near Tomah, MN	US
? Marini Mills	June 1885		UMN

* = Field checked Spring and/or summer 1990, by the author.

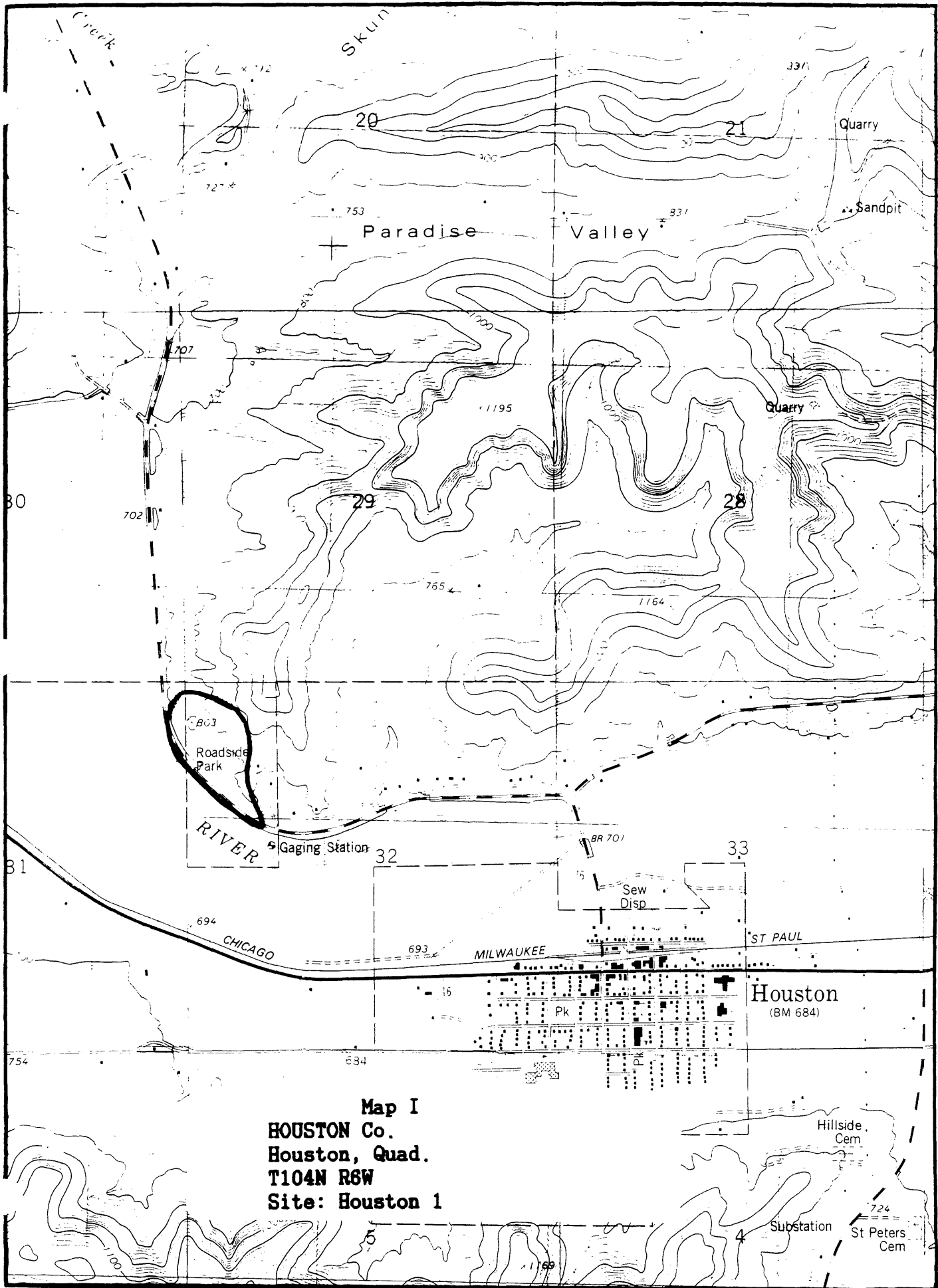
Herbarium abbreviations key:

UMN = University of Minnesota
 WISC = University of Wisconsin
 F = Field Museum, Chicago.
 US = Smithsonian, Washington D.C.
 BKL = Brooklyn Botanical Garden, New York City

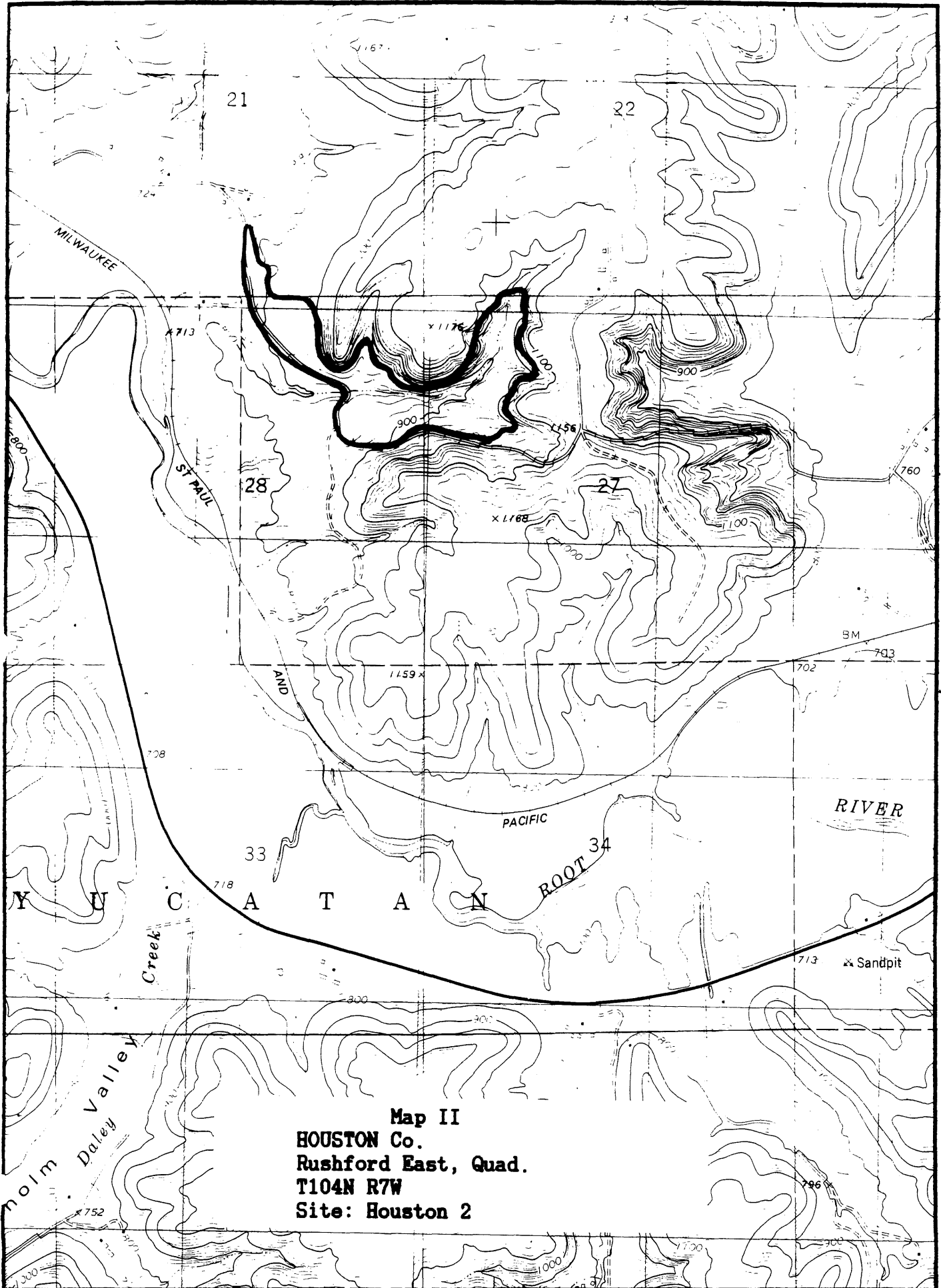
The above information was taken from photocopies of herbarium labels sent to the author by Robert Dirig, assistant curator of the L.H. Bailey Hortorium, Cornell University. Mr. Dirig is presently studying phenology of lupine with special reference to New York and the Karner Blue butterfly.

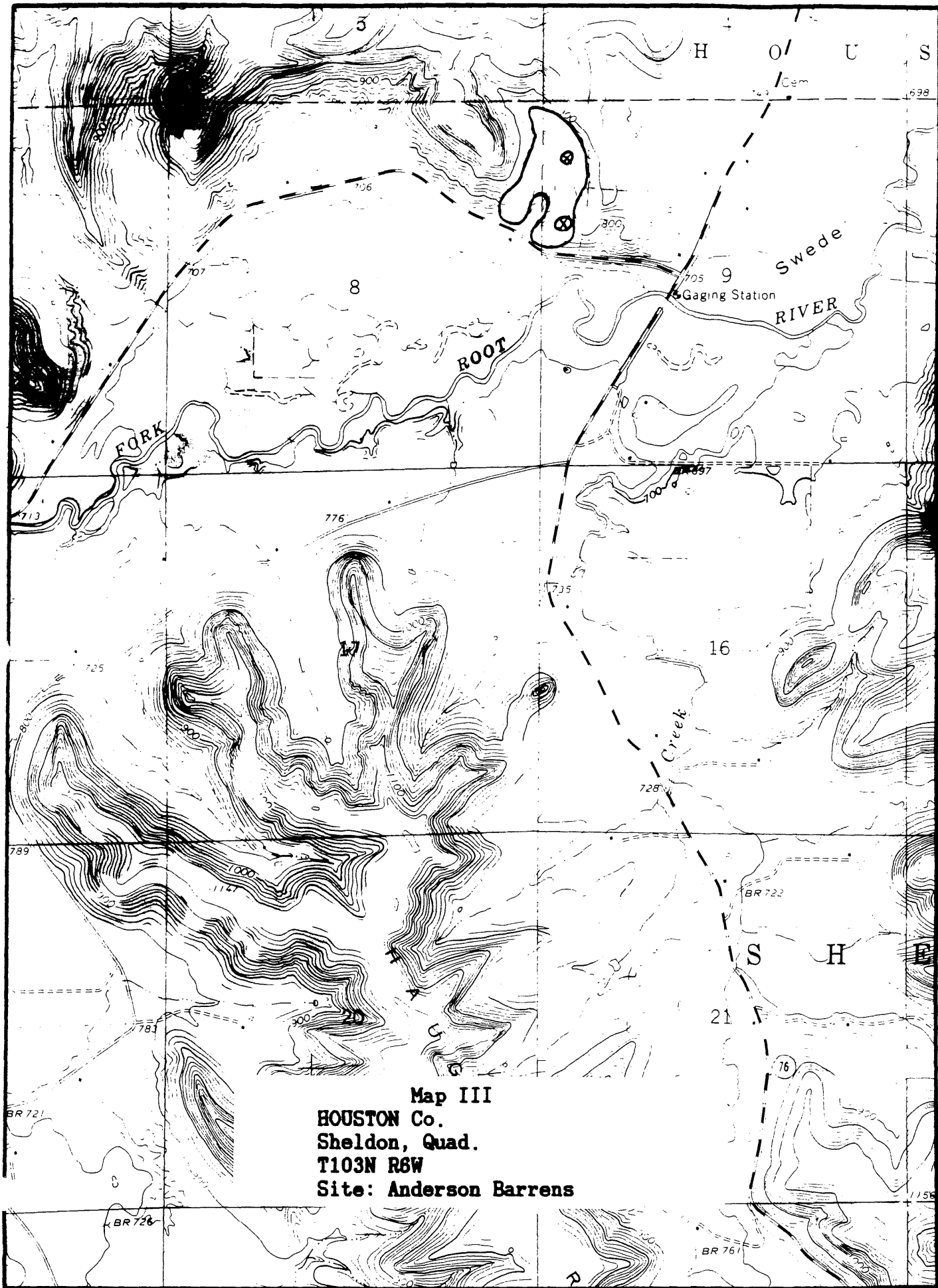
Appendix II. Topographic maps of areas surveyed in Minnesota, 1990.

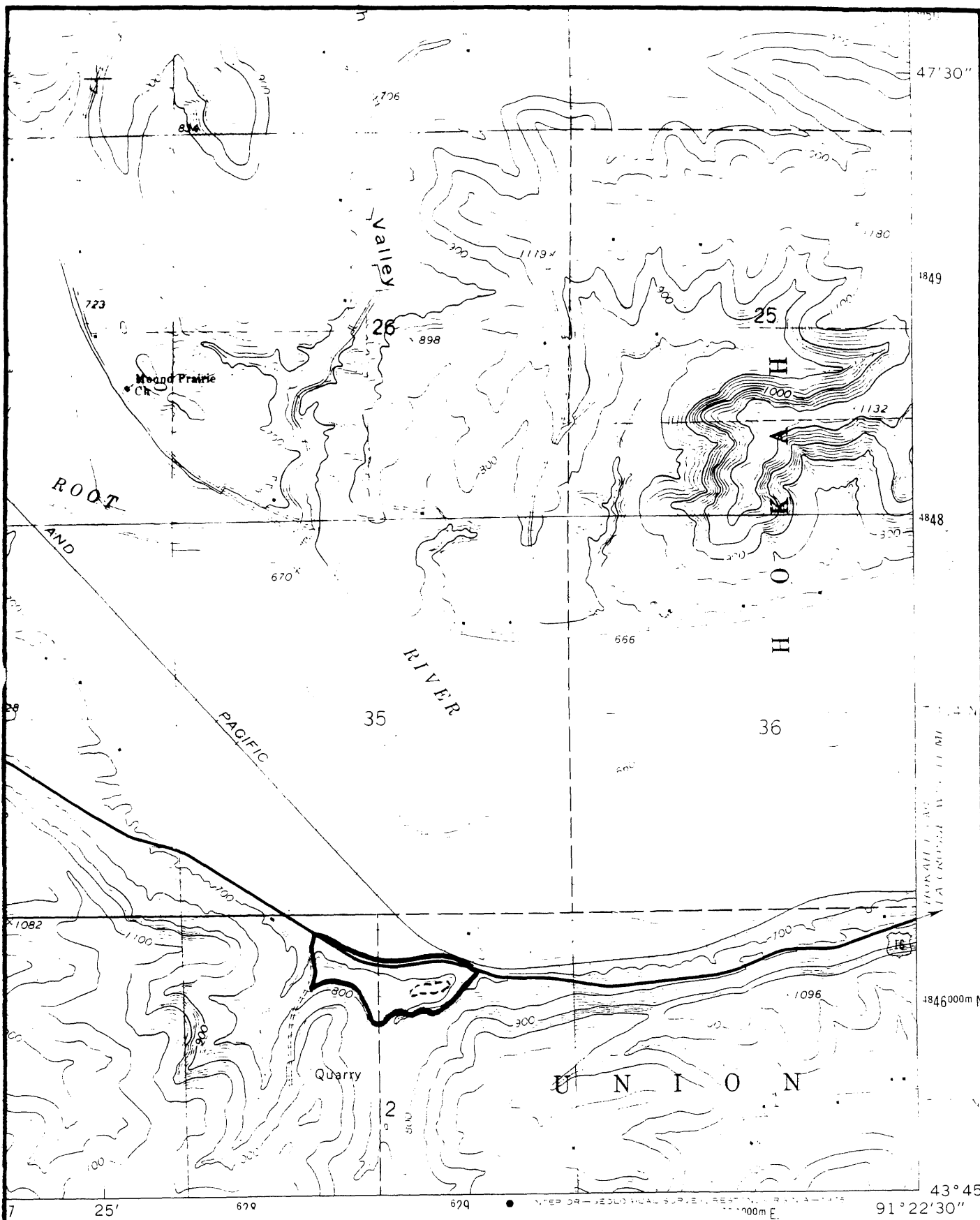
Appendix II contains maps of all sites visited during the survey this year. The map legends consist of the Map number, County name, Quad. name, Township, Range, and Site labels (A-?). Delineated areas are areas that were surveyed for lupine and the KB. Lupine populations are represented by dots or dotted lines. These dots give a general picture as to the distribution of lupine within the area, and should not be taken as representing actual numbers or clumps of lupine. The dotted lines delineate areas that contain lupine.



Map I
HOUSTON Co.
Houston, Quad.
T104N R6W
Site: Houston 1

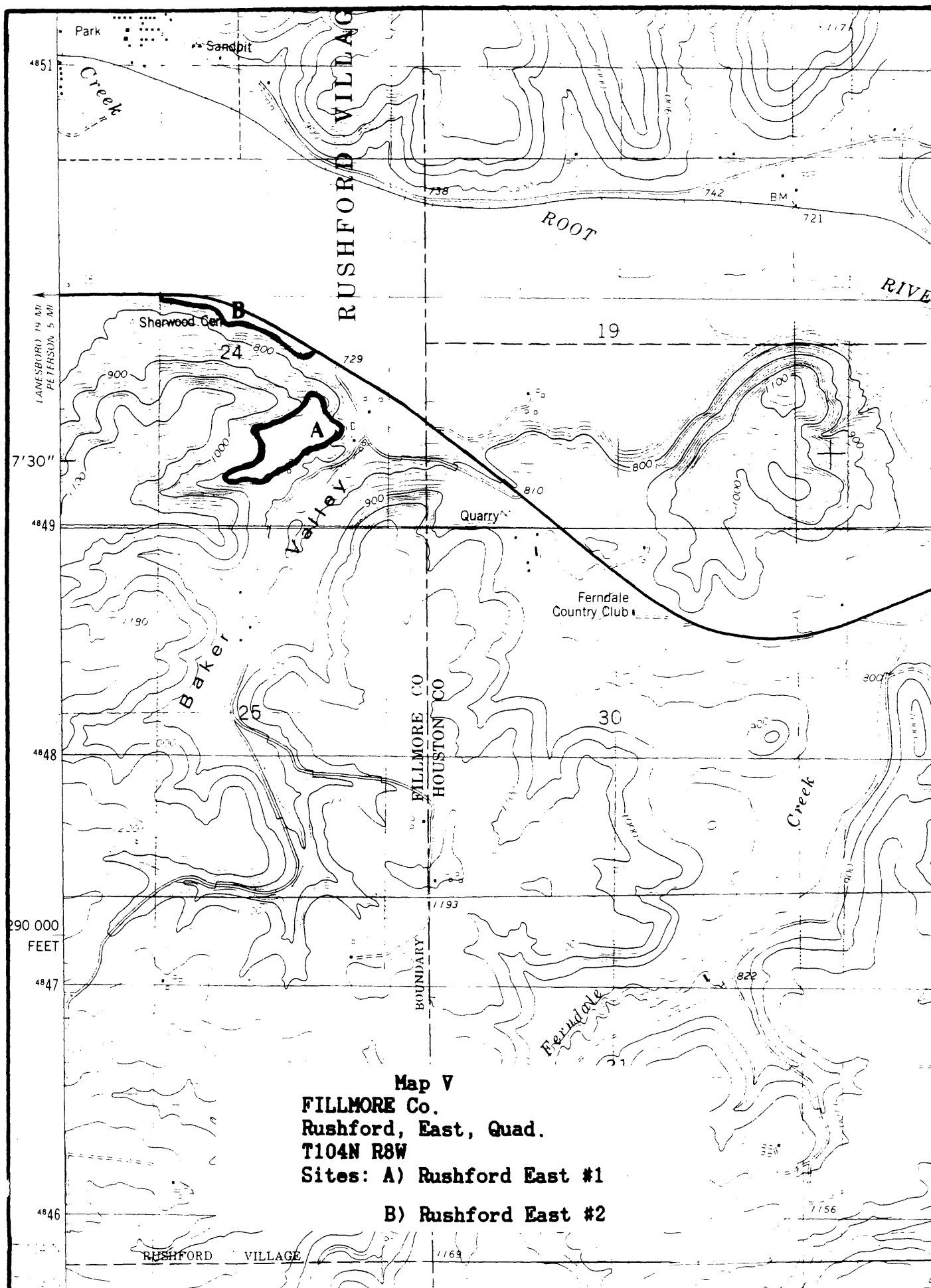




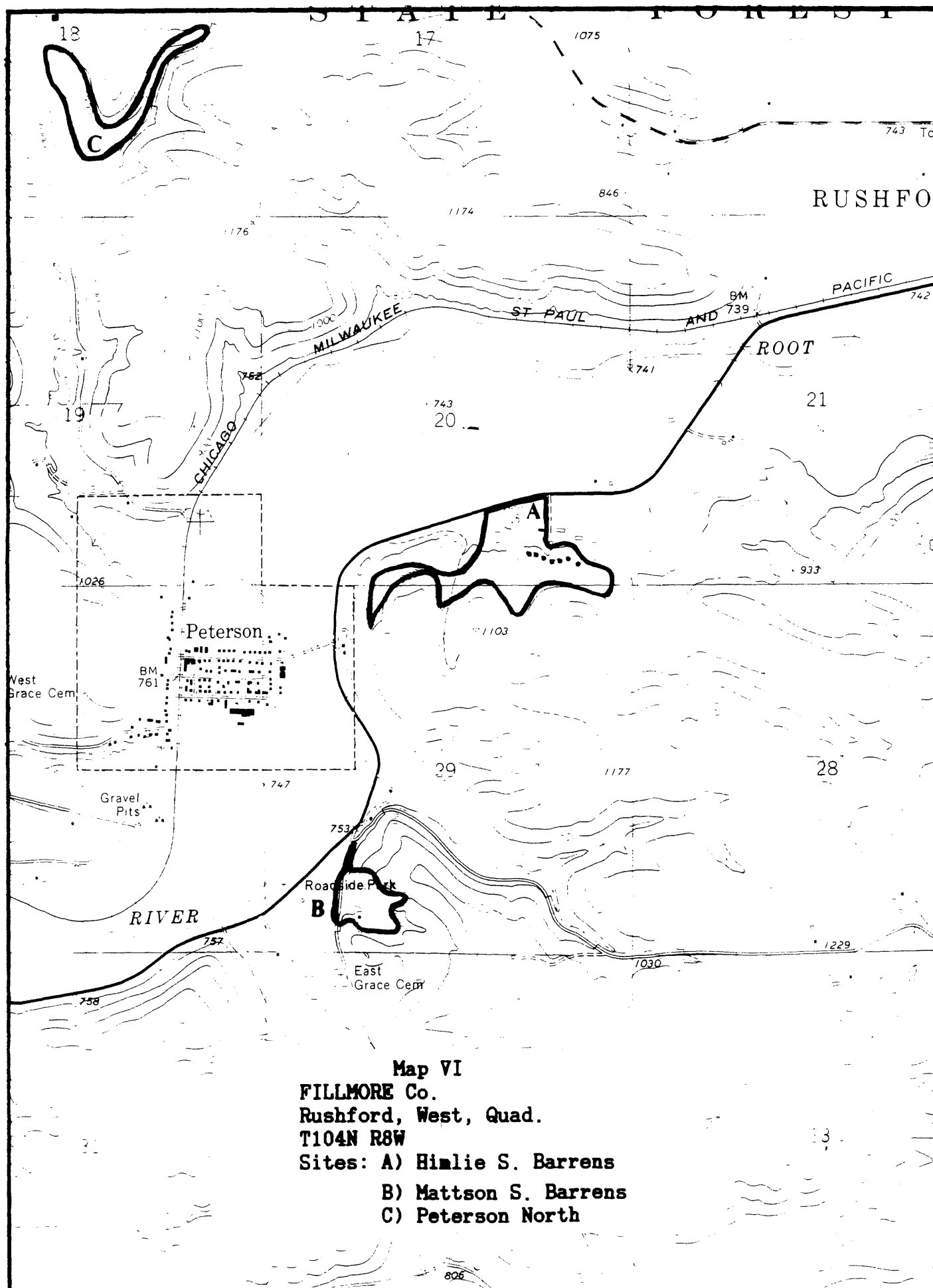


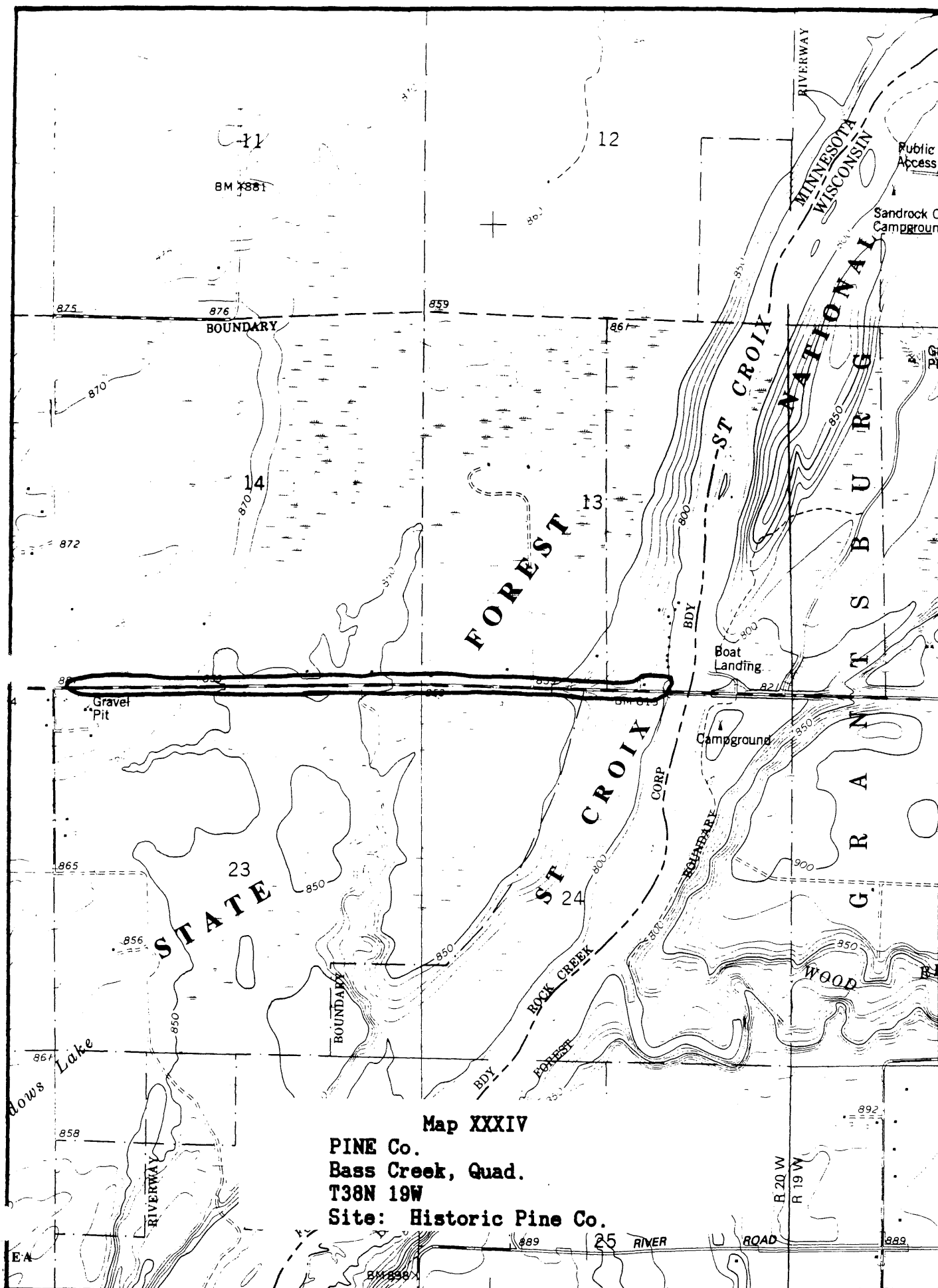
Map IV
HOUSTON Co.
Mound Prairie, Quad.
T103N R5W
Site: Hokah

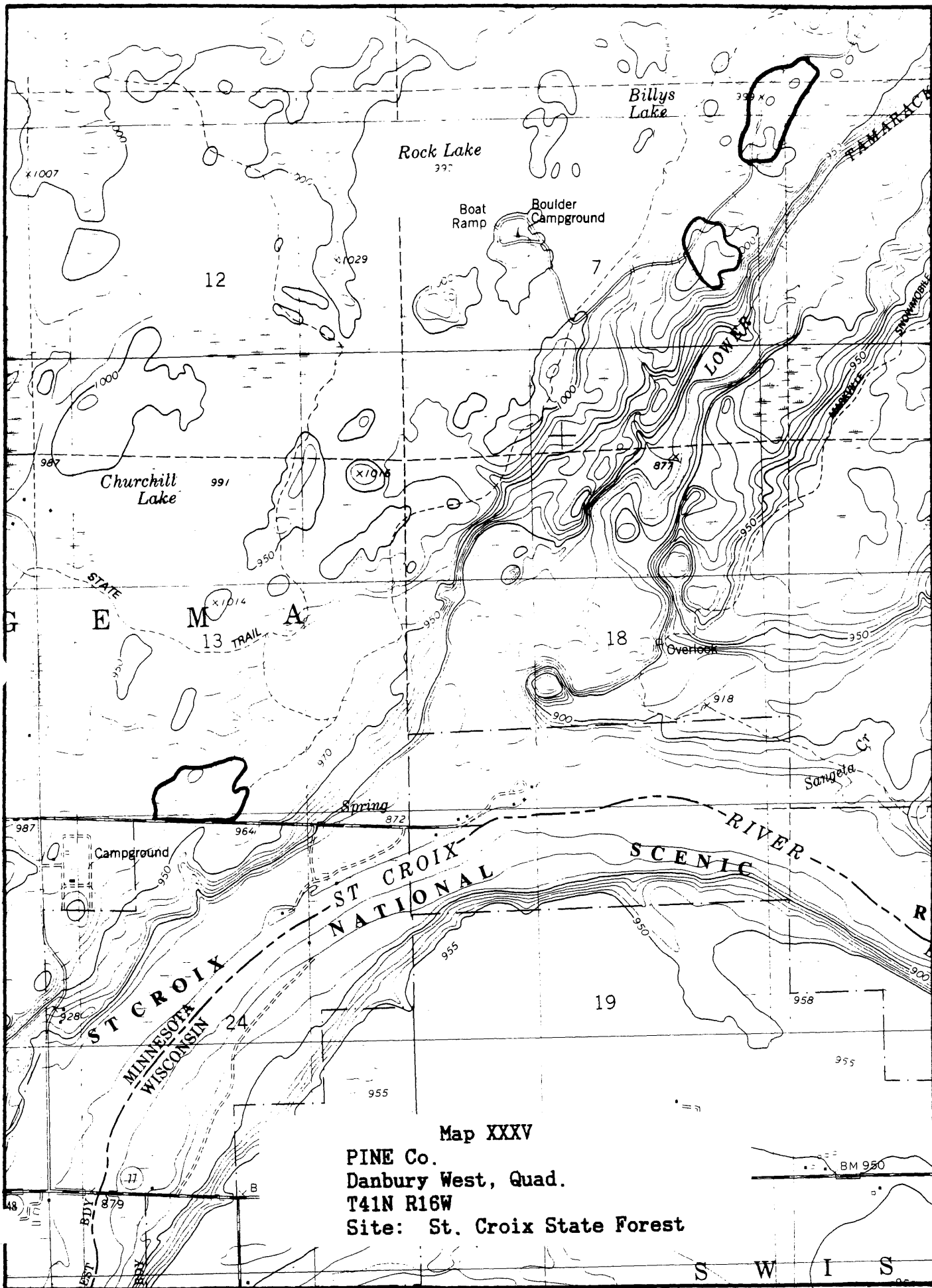
N
road, hard or surface
ed road

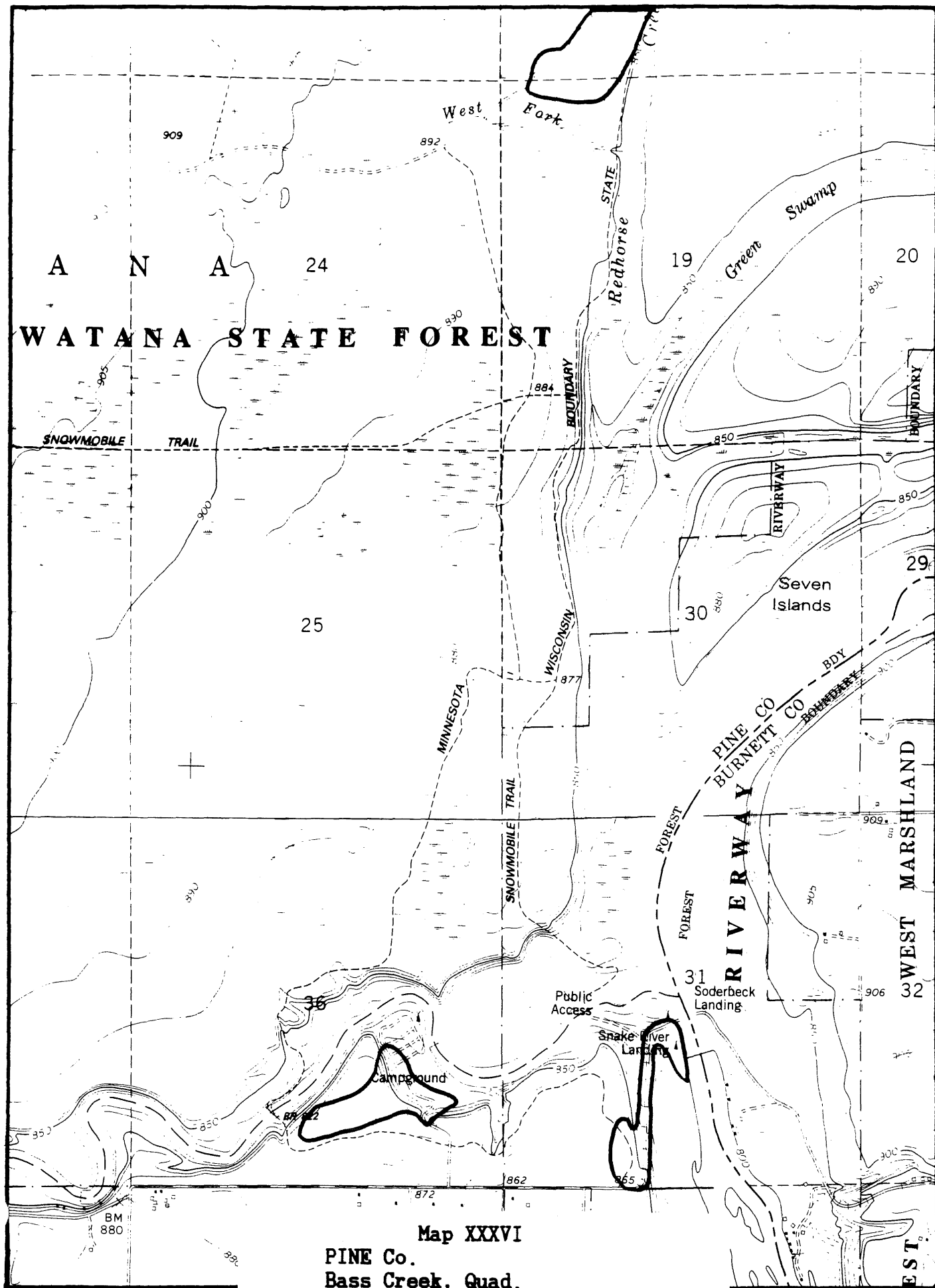


Map V
FILLMORE Co.
Rushford, East, Quad.
T104N R8W
Sites: A) Rushford East #1
B) Rushford East #2



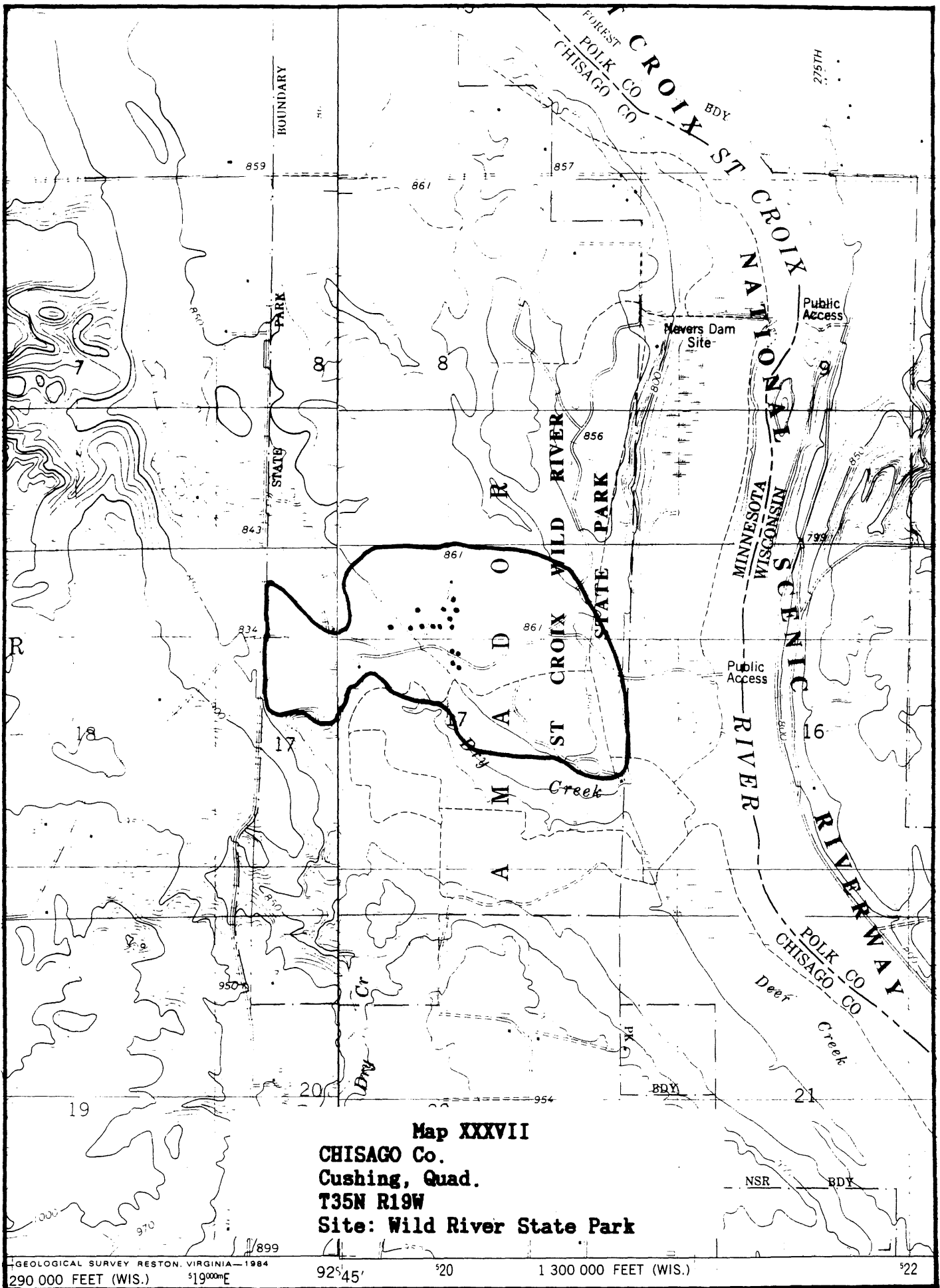




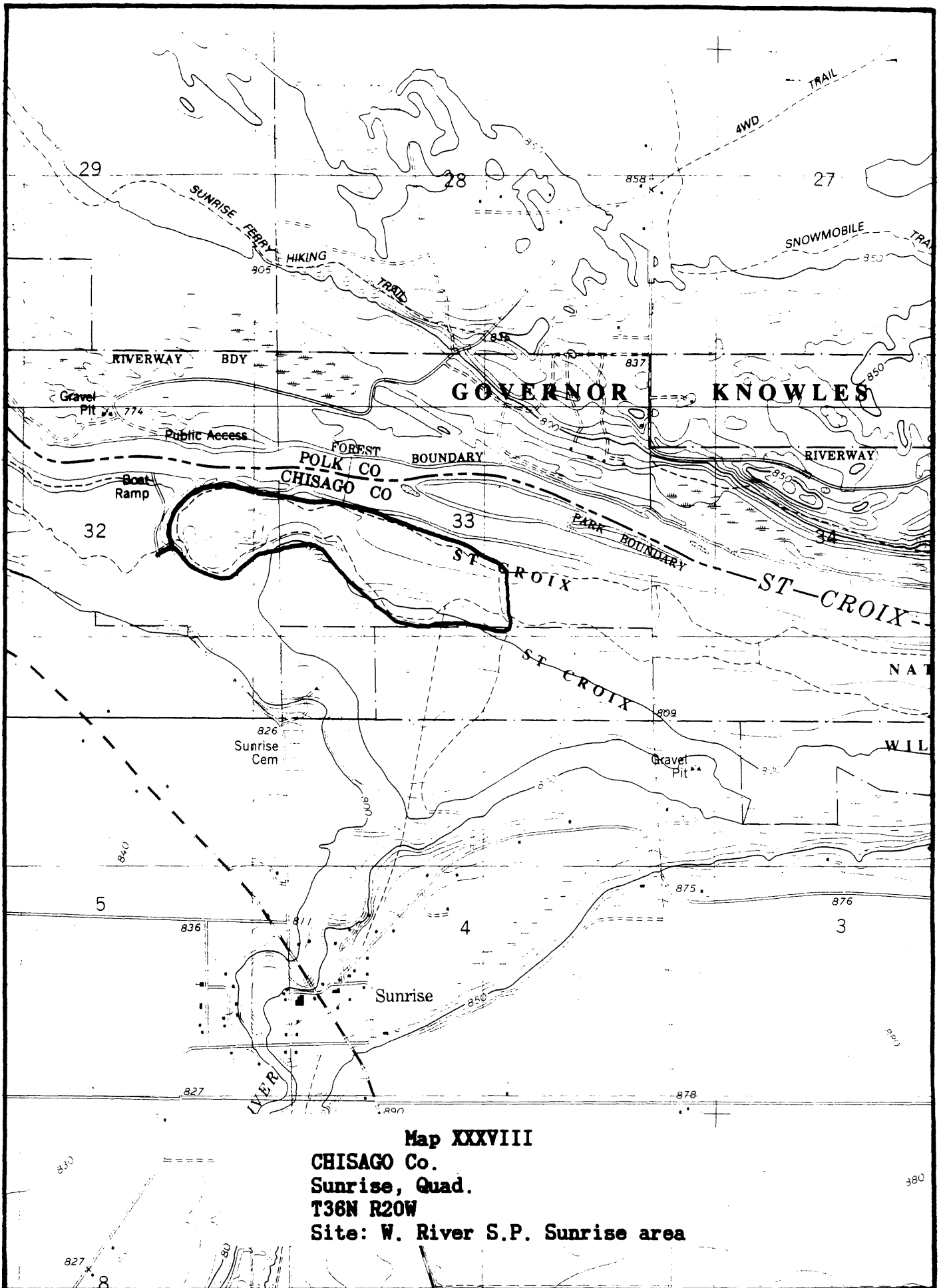


Map XXXVI

PINE Co.
Bass Creek, Quad.
T39N R19 & 20W
Site: Chengwatana State Forest



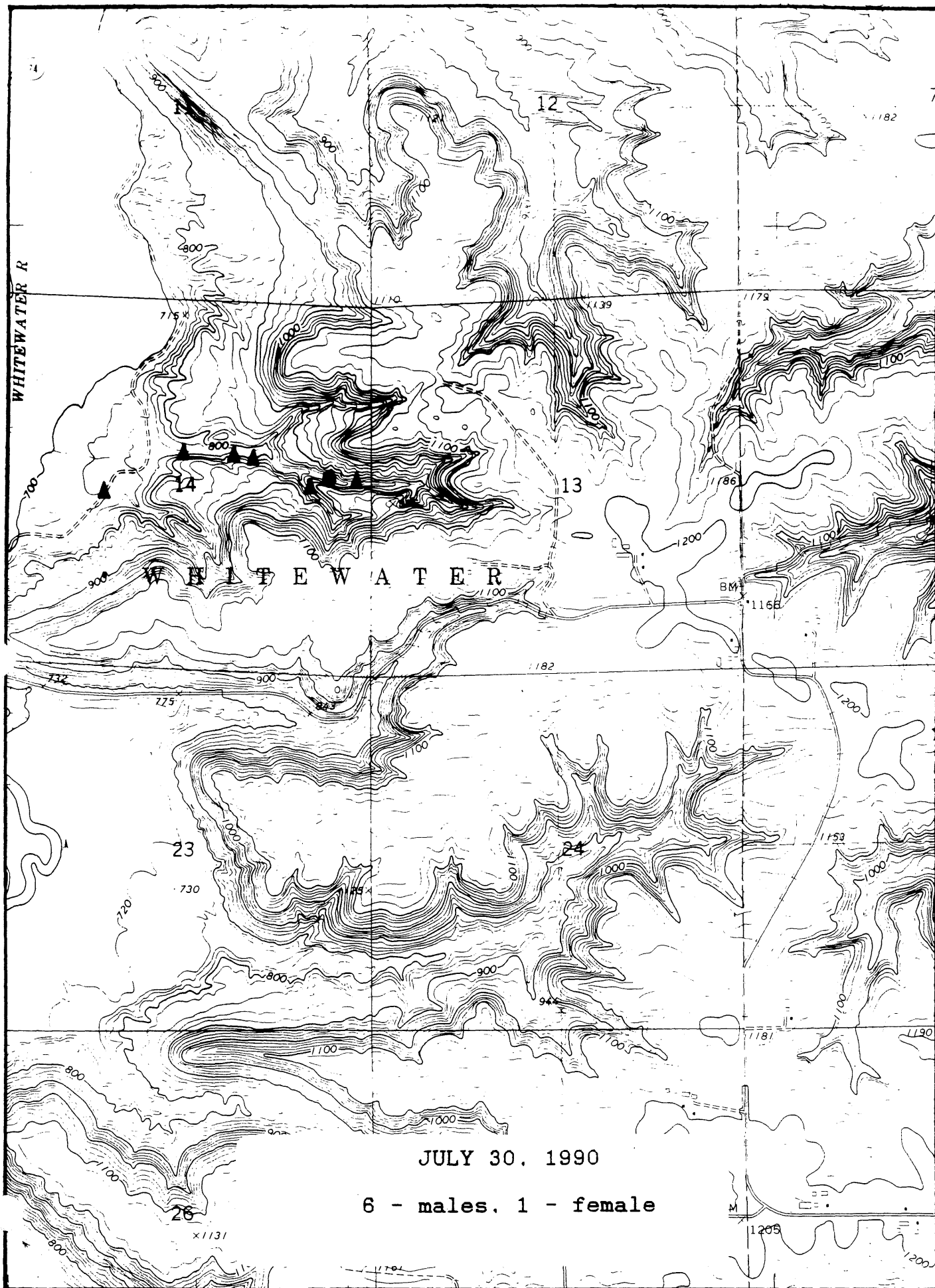
Map XXXVII
 CHISAGO Co.
 Cushing, Quad.
 T35N R19W
 Site: Wild River State Park

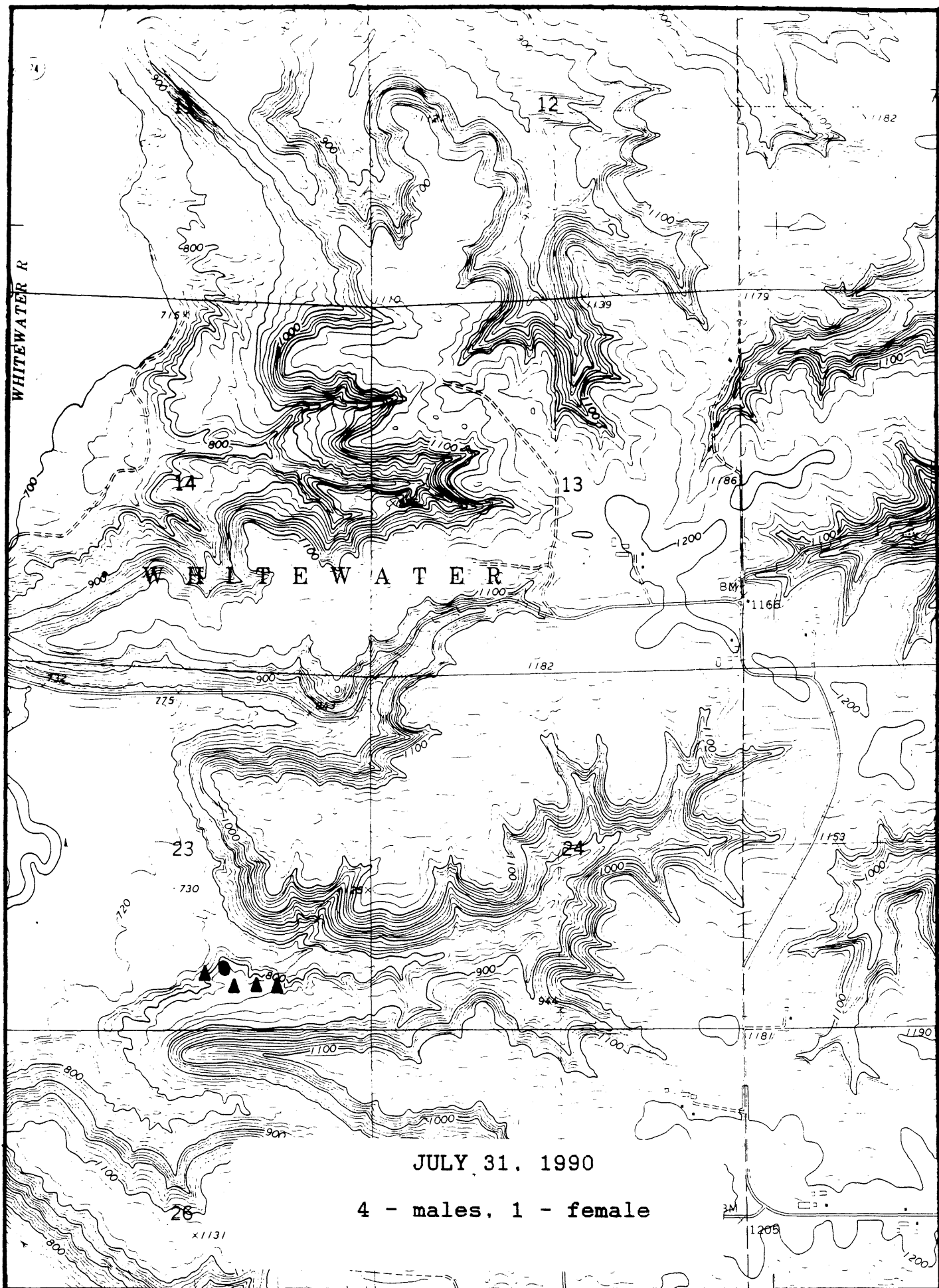


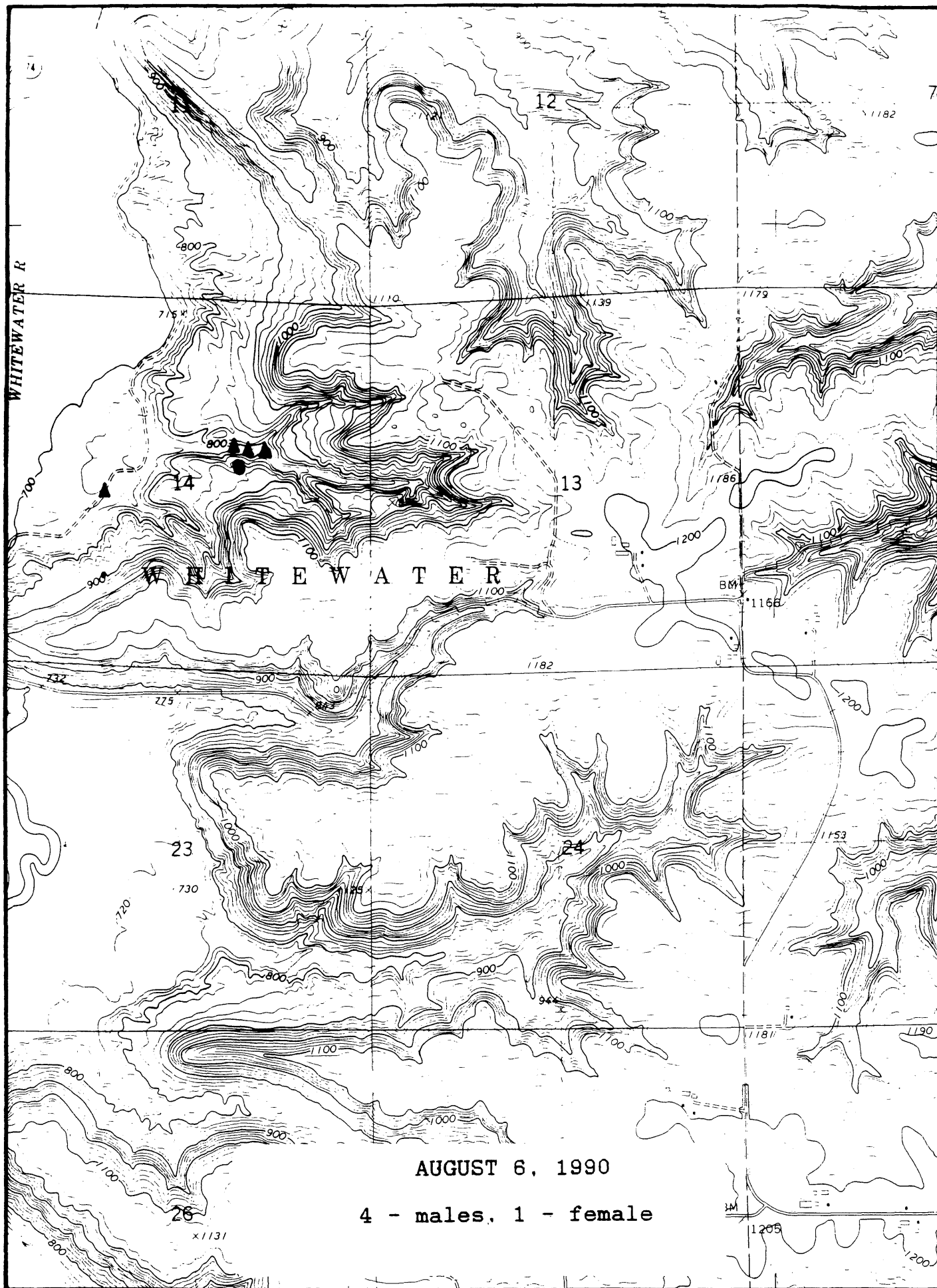
Appendix III. The Karner blue at Whitewater WMA. Winona County
Minnesota, 1990.

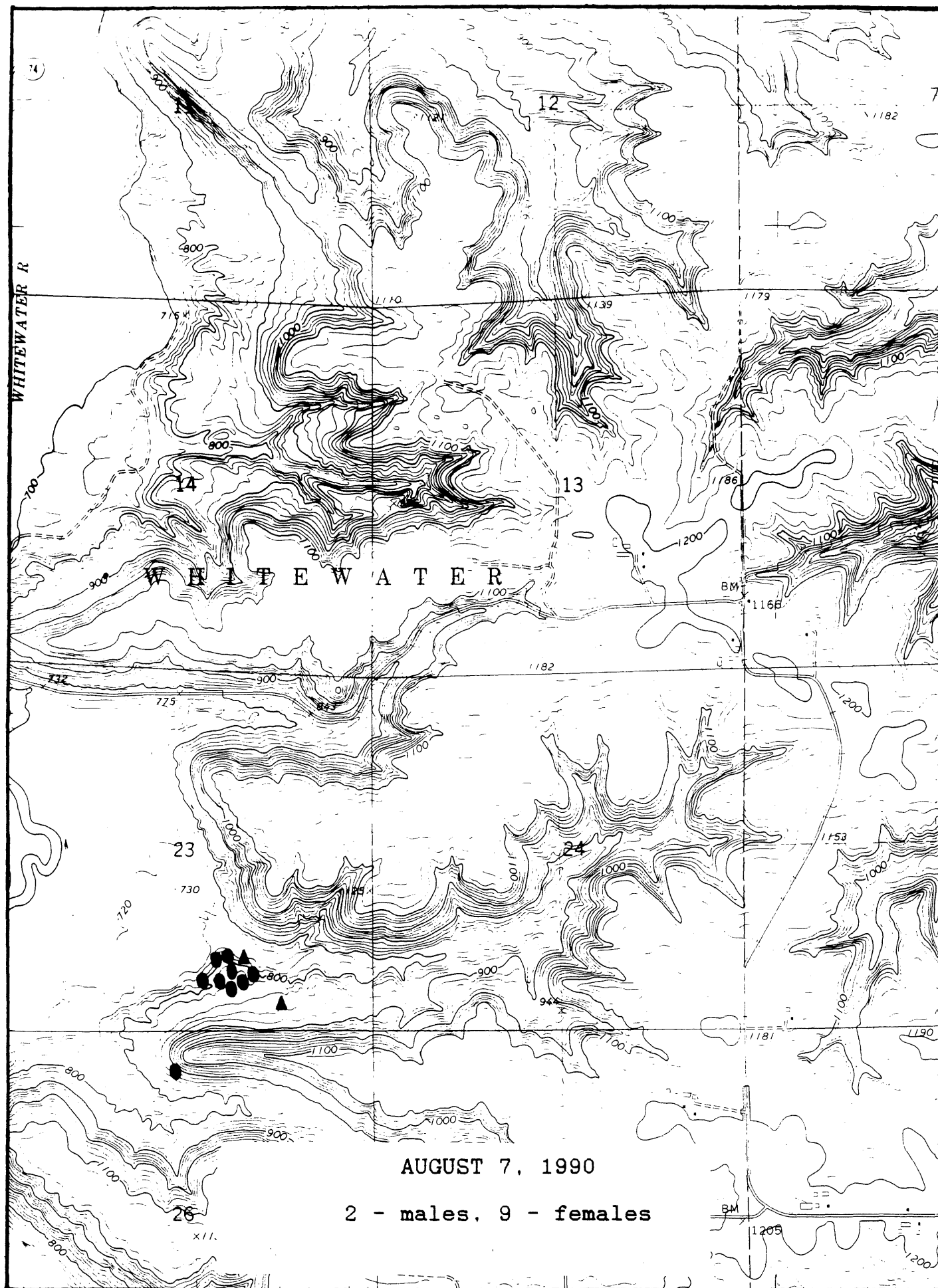
▲ = male Karner blue

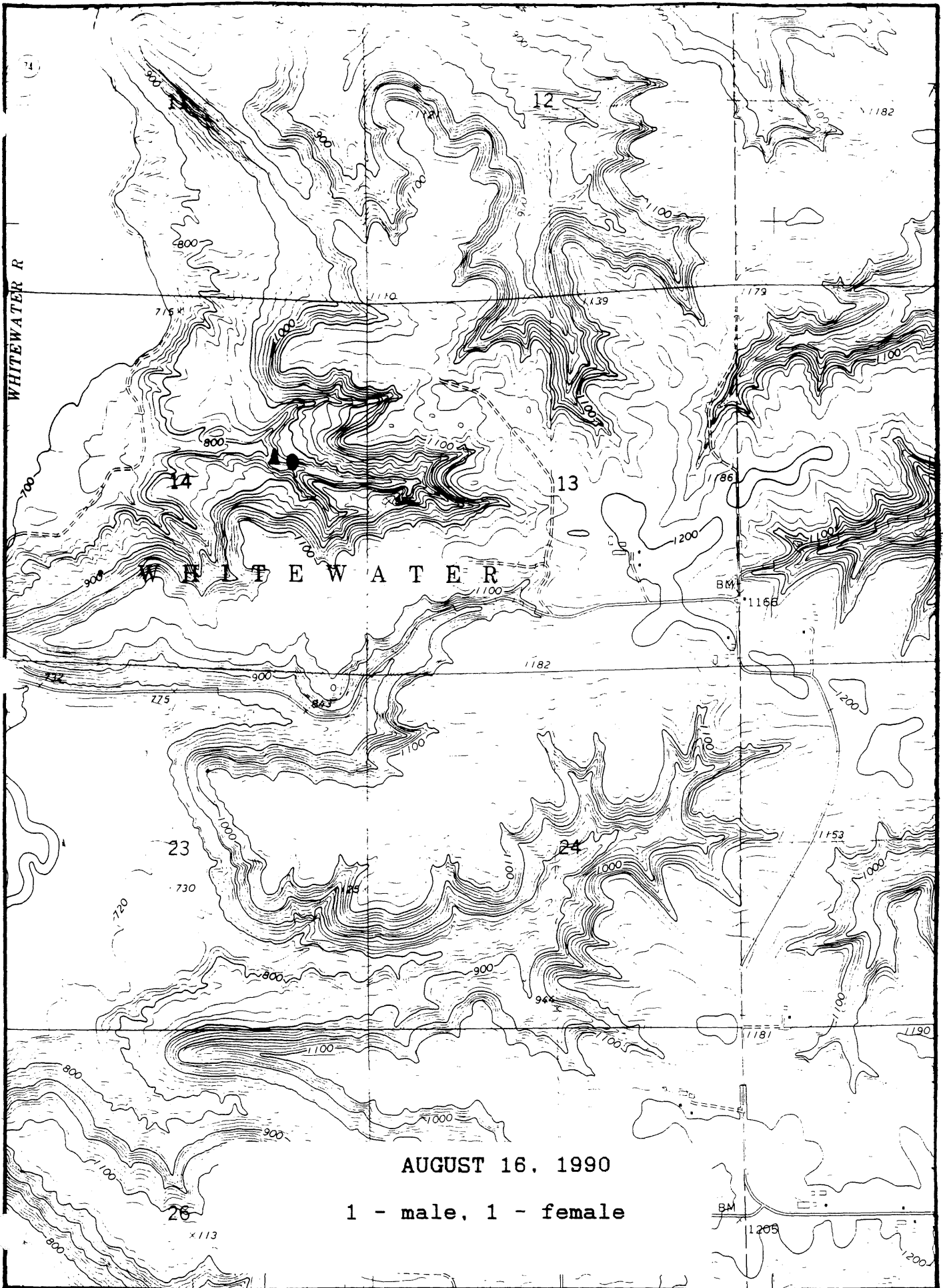
● = female Karner blue





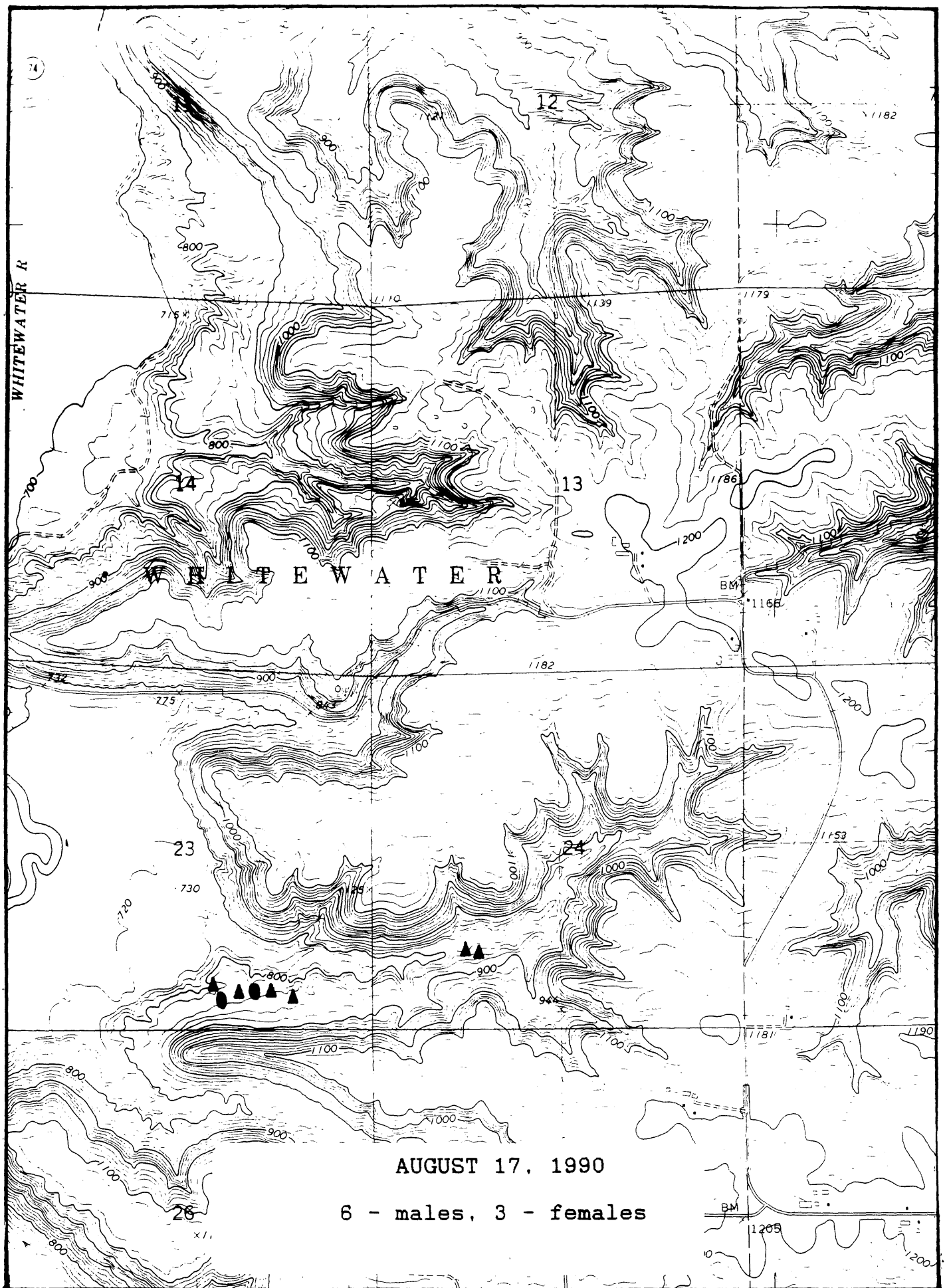






AUGUST 16, 1990

1 - male, 1 - female



Appendix IV. The following is a list of butterfly species recorded in the 10 counties included in the Karner Blue survey. The number in front of the scientific name is that of Miller and Brown, 1981.

COUNTY LIST

ANOKA COUNTY:

___	120	<i>Carterocephalus palaemon</i>	Arctic skipperling
___	142	<i>Ancyloxypha numitor</i>	Least skipperling
___	189	<i>Atrytone delaware</i>	Delaware skipper
___	197	<i>Poanes hobomok</i>	Hobomok skipper
___	217	<i>Euphyes ruricola</i>	Dun skipper
___	320	<i>Pterourus glaucus</i>	Tiger swallowtail
___	334	<i>Pontia protodice</i>	Checkered white
___	338	<i>Artogeia rapae</i>	Cabbage white
___	344	<i>Euchloe olympia</i>	Olympia white
___	351	<i>Colias philodice</i>	Common sulphur
___	352	<i>Colias eurytheme</i>	Orange sulphur
___	393	<i>Lycaena phlaeas</i>	American copper
___	417	<i>Harkenclenus titus</i>	Coral hairstreak
___	423	<i>Satyrium edwardsii</i>	Edward's hairstreak
___	424	<i>Satyrium calanus</i>	Banded hairstreak
___	425	<i>Satyrium caryaevorum</i>	Hickory hairstreak
___	503	<i>Everes comyntas</i>	Eastern tailed blue
___	566	<i>Speyeria aphrodite</i>	Aphrodite
___	580	<i>Clossiana bellona</i>	Meadow fritillary
___	623	<i>Phyciodes tharos/morpheus</i>	Pearly crescent spot
___	637	<i>Polygonia comma</i>	Comma butterfly
___	651	<i>Vanessa cardui</i>	Painted lady
___	663a	<i>Basilarchia a. arthemis</i>	White admiral
___	664	<i>Basilarchia archippus</i>	Viceroy
___	732	<i>Cercyonis pegala</i>	Wood nymph
___	760	<i>Danaus plexippus</i>	Monarch

CHISAGO COUNTY:

___	007	<i>Epargyreus clarus</i>	Silver-spotted skipper
___	048	<i>Thorybes pylades</i>	Northern cloudywing
___	171	<i>Hesperia sassacus</i>	Indian skipper
___	189	<i>Atrytone delaware</i>	Delaware skipper
___	197	<i>Poanes hobomok</i>	Hobomok skipper
___	217	<i>Euphyes ruricola</i>	Dun skipper
___	303	<i>Papilio polyxenes</i>	Black swallowtail
___	320	<i>Pterourus glaucus</i>	Tiger swallowtail
___	338	<i>Artogeia rapae</i>	Cabbage white
___	351	<i>Colias philodice</i>	Common sulphur
___	352	<i>Colias eurytheme</i>	Orange sulphur
___	393	<i>Lycaena phlaeas</i>	American copper
___	417	<i>Harkenclenus titus</i>	Coral hairstreak
___	423	<i>Satyrium edwardsii</i>	Edward's hairstreak
___	425	<i>Satyrium caryaevorum</i>	Hickory hairstreak
___	503	<i>Everes comyntas</i>	Eastern tailed blue
___	505	<i>Celastrina ladon</i>	Spring azure
___	565	<i>Speyeria cybele</i>	Great spangled fritillary
___	566	<i>Speyeria aphrodite</i>	Aphrodite

605	Charidryas gorgone	Gorgone crescentspot
606	Charidryas nycteis	Silvery crescentspot
623	Phyciodes tharos/morpheus	Pearly crescentspot
637	Polygonia comma	Comma butterfly
645	Polygonia progne	Gray comma
648	Nymphalis antiopa	Mourning cloak
651	Vanessa cardui	Painted lady
653	Vanessa atalanta	Red admiral
656	Junonia coenia	Buckeye
663b	Basilarchia a. astyanax	Red spotted purple
664	Basilarchia archippus	Viceroy
698	Asterocampa celtis	Hackberry butterfly
704	Asterocampa clyton	Tawny emperor
710	Enodia anthedon	Pearly eye
723	Megisto cymela	Little wood satyr
732	Cercyonis pegala	Wood nymph
760	Danaus plexippus	Monarch

FILLMORE COUNTY:

007	Epargyreus clarus	Silver-spotted skipper
047	Thorybes bathyllus	Southern cloudywing
085	Erynnis juvenalis	Juvenal's duskywing
092	Erynnis martialis	Mottled duskywing
115	Pholisora catullus	Common sootywing
179	Polites themistocles	Tawny-edged skipper
180	Polites origenes	Crossline skipper
189	Atrytone delaware	Delaware skipper
217	Euphyes ruricola	Dun skipper
219	Atrytonopsis hianna	Dusted skipper
245	Amblyscirtes vialis	Roadside skipper
338	Artogeia rapae	Cabbage white
351	Colias philodice	Common sulphur
352	Colias eurytheme	Orange sulphur
383	Pyristia lisa	Little yellow
393	Lycaena phlaeas	American copper
395	Gaeides xanthoides	Great grey copper
417	Harkenclenus titus	Coral hairstreak
423	Satyrium edwardsii	Edward's hairstreak
425	Satyrium caryaevorum	Hickory hairstreak
503	Everes comyntas	Eastern tailed blue
514	Glaucopsyche lygdamus	Silvery blue
517b	Lycaeides m. melissa	Orange-bordered blue
562	Euptoietta claudia	Variegated fritillary
565	Speyeria cybele	Great spangled fritillary
566	Speyeria aphrodite	Aphrodite
605	Charidryas gorgone	Gorgone crescentspot
623	Phyciodes tharos/morpheus	Pearly crescentspot
637	Polygonia comma	Comma butterfly
645	Polygonia progne	Gray comma
648	Nymphalis antiopa	Mourning cloak
650	Vanessa virginiensis	American painted lady

651	<i>Vanessa cardui</i>	Painted lady
653	<i>Vanessa atalanta</i>	Red admiral
656	<i>Junonia coenia</i>	Buckeye
663b	<i>Basilarchia a. astyanax</i>	Red spotted purple
698	<i>Asterocampa celtis</i>	Hackberry butterfly
710	<i>Enodia anthedon</i>	Pearly eye
732	<i>Cercyonis pegala</i>	Wood nymph
760	<i>Danaus plexippus</i>	Monarch

HOUSTON COUNTY:

007	<i>Epargyreus clarus</i>	Silver-spotted skipper
083	<i>Erynnis icelus</i>	Dreamy duskywing
084	<i>Erynnis brizo</i>	Sleepy duskywing
085	<i>Erynnis juvenalis</i>	Juvenal's duskywing
097	<i>Erynnis baptisiae</i>	Wild indigo duskywing
179	<i>Polites themistocles</i>	Tawny-edged skipper
185	<i>Wallengrenia egeremet</i>	Northern broken dash
189	<i>Atrytone delaware</i>	Delaware skipper
217	<i>Euphyes ruricola</i>	Dun skipper
245	<i>Amblyscirtes vialis</i>	Roadside skipper
338	<i>Artogeia rapae</i>	Cabbage white
344	<i>Euchloe olympia</i>	Olympia white
351	<i>Colias philodice</i>	Common sulphur
352	<i>Colias eurytheme</i>	Orange sulphur
383	<i>Pyristia lisa</i>	Little yellow
393	<i>Lycaena phlaeas</i>	American copper
417	<i>Harkenclenus titus</i>	Coral hairstreak
423	<i>Satyrium edwardsii</i>	Edward's hairstreak
498	<i>Leptotes marina</i>	Marine blue
503	<i>Everes comyntas</i>	Eastern tailed blue
505	<i>Celastrina ladon</i>	Spring azure
565	<i>Speyeria cybele</i>	Great spangled fritillary
605	<i>Charidryas gorgone</i>	Gorgone crescent spot
623	<i>Phyciodes tharos/morpheus</i>	Pearly crescent spot
635	<i>Euphydryas phaeton</i>	Baltimore checkerspot
637	<i>Polygonia comma</i>	Comma butterfly
648	<i>Nymphalis antiopa</i>	Mourning cloak
651	<i>Vanessa cardui</i>	Painted lady
653	<i>Vanessa atalanta</i>	Red admiral
663b	<i>Basilarchia a. astyanax</i>	Red spotted purple
698	<i>Asterocampa celtis</i>	Hackberry butterfly
710	<i>Enodia anthedon</i>	Pearly eye
732	<i>Cercyonis pegala</i>	Wood nymph
760	<i>Danaus plexippus</i>	Monarch

ISANTI COUNTY:

048	Thorybes pylades	Northern cloudywing
115	Pholisora catullus	Common sootywing
120	Carterocephalus palaemon	Arctic skipperling
181	Polites mystic	Long dash
197	Poanes hobomok	Hobomok skipper
217	Euphyes ruricola	Dun skipper
320	Pterourus glaucus	Tiger swallowtail
334	Pontia protodice	Checkered white
338	Artogeia rapae	Cabbage white
351	Colias philodice	Common sulphur
352	Colias eurytheme	Orange sulphur
417	Harkenclenus titus	Coral hairstreak
423	Satyrrium edwardsii	Edward's hairstreak
503	Everes comyntas	Eastern tailed blue
514	Glaucopsyche lygdamus	Silvery blue
637	Polygonia comma	Comma butterfly
656	Junonia coenia	Buckeye
663a	Basilarchia a. arthemis	White admiral
664	Basilarchia archippus	Viceroy
710	Enodia anthedon	Pearly eye
723	Megisto cymela	Little wood satyr
728	Coenonympha inornata	Prairie ringlet
732	Cercyonis pegala	Wood nymph
760	Danaus plexippus	Monarch

OLMSTEAD COUNTY:

085	Erynnis juvenalis	Juvenal's duskywing
179	Polites themistocles	Tawny-edged skipper
217	Euphyes ruricola	Dun skipper
352	Colias eurytheme	Orange sulphur
393	Lycaena phlaeas	American copper
503	Everes comyntas	Eastern tailed blue
651	Vanessa cardui	Painted lady
732	Cercyonis pegala	Wood nymph
760	Danaus plexippus	Monarch

PINE COUNTY:

007	<i>Epargyreus clarus</i>	Silver-spotted skipper
048	<i>Thorybes pylades</i>	Northern cloudywing
197	<i>Poanes hobomok</i>	Hobomok skipper
217	<i>Euphyes ruricola</i>	Dun skipper
320	<i>Pterourus glaucus</i>	Tiger swallowtail
351	<i>Colias philodice</i>	Common sulphur
503	<i>Everes comyntas</i>	Eastern tailed blue
562	<i>Euptoieta claudia</i>	Variegated fritillary
565	<i>Speyeria cybele</i>	Great spangled fritillary
623	<i>Phyciodes tharos/morpheus</i>	Pearly crescent spot
637	<i>Polygonia comma</i>	Comma butterfly
645	<i>Polygonia progne</i>	Gray comma
663a	<i>Basilarchia a. arthemis</i>	White admiral
663b	<i>Basilarchia a. astyanax</i>	Red spotted purple
723	<i>Megisto cymela</i>	Little wood satyr
732	<i>Cercyonis pegala</i>	Wood nymph
760	<i>Danaus plexippus</i>	Monarch

SHERBURNE COUNTY:

048	<i>Thorybes pylades</i>	Northern cloudywing
142	<i>Ancyloxypha numitor</i>	Least skipperling
189	<i>Atrytone delaware</i>	Delaware skipper
197	<i>Poanes hobomok</i>	Hobomok skipper
217	<i>Euphyes ruricola</i>	Dun skipper
320	<i>Pterourus glaucus</i>	Tiger swallowtail
334	<i>Pontia protodice</i>	Checkered white
338	<i>Artogeia rapae</i>	Cabbage white
351	<i>Colias philodice</i>	Common sulphur
352	<i>Colias eurytheme</i>	Orange sulphur
417	<i>Harkenclenus titus</i>	Coral hairstreak
423	<i>Satyrium edwardsii</i>	Edward's hairstreak
424	<i>Satyrium calanus</i>	Banded hairstreak
425	<i>Satyrium caryaevorum</i>	Hickory hairstreak
503	<i>Everes comyntas</i>	Eastern tailed blue
566	<i>Speyeria aphrodite</i>	Aphrodite
606	<i>Charidryas nycteis</i>	Silvery crescent spot
623	<i>Phyciodes tharos/morpheus</i>	Pearly crescent spot
648	<i>Nymphalis antiopa</i>	Mourning cloak
651	<i>Vanessa cardui</i>	Painted lady
663a	<i>Basilarchia a. arthemis</i>	White admiral
663b	<i>Basilarchia a. astyanax</i>	Red spotted purple
664	<i>Basilarchia archippus</i>	Viceroy
710	<i>Enodia anthedon</i>	Pearly eye
713	<i>Satyroides eurydice</i>	Eyed brown
723	<i>Megisto cymela</i>	Little wood satyr
728	<i>Coenonympha inornata</i>	Prairie ringlet
732	<i>Cercyonis pegala</i>	Wood nymph
760	<i>Danaus plexippus</i>	Monarch

WABASHA COUNTY:

007	<i>Epargyreus clarus</i>	Silver-spotted skipper
115	<i>Pholisora catullus</i>	Common sootywing
161	<i>Hesperia leonardus</i>	Leonardus skipper
179	<i>Polites themistocles</i>	Tawny-edged skipper
189	<i>Atrytone delaware</i>	Delaware skipper
197	<i>Poanes hobomok</i>	Hobomok skipper
303	<i>Papilio polyxenes</i>	Black swallowtail
338	<i>Artogeia rapae</i>	Cabbage white
351	<i>Colias philodice</i>	Common sulphur
352	<i>Colias eurytheme</i>	Orange sulphur
393	<i>Lycaena phlaeas</i>	American copper
417	<i>Harkenclenus titus</i>	Coral hairstreak
423	<i>Satyrium edwardsii</i>	Edward's hairstreak
424	<i>Satyrium calanus</i>	Banded hairstreak
503	<i>Everes comyntas</i>	Eastern tailed blue
565	<i>Speyeria cybele</i>	Great spangled fritillary
605	<i>Charidryas gorgone</i>	Gorgone crescentspot
637	<i>Polygonia comma</i>	Comma butterfly
645	<i>Polygonia progne</i>	Gray comma
648	<i>Nymphalis antiopa</i>	Mourning cloak
650	<i>Vanessa virginiensis</i>	American painted lady
651	<i>Vanessa cardui</i>	Painted lady
653	<i>Vanessa atalanta</i>	Red admiral
663b	<i>Basilarchia a. astyanax</i>	Red spotted purple
664	<i>Basilarchia archippus</i>	Viceroy
698	<i>Asterocampa celtis</i>	Hackberry butterfly
704	<i>Asterocampa clyton</i>	Tawny emperor
723	<i>Megisto cymela</i>	Little wood satyr
732	<i>Cercyonis pegala</i>	Wood nymph
760	<i>Danaus plexippus</i>	Monarch

WINONA COUNTY:

007	<i>Epargyreus clarus</i>	Silver-spotted skipper
047	<i>Thorybes bathyllus</i>	Southern cloudywing
048	<i>Thorybes pylades</i>	Northern cloudywing
085	<i>Erynnis juvenalis</i>	Juvenal's duskywing
097	<i>Erynnis baptisiae</i>	Wild indigo duskywing
099	<i>Erynnis persius</i>	Persius duskywing
115	<i>Pholisora catullus</i>	Common sootywing
142	<i>Ancyloxypha numitor</i>	Least skipperling
161	<i>Hesperia leonardus</i>	Leonardus skipper
179	<i>Polites themistocles</i>	Tawny-edged skipper
180	<i>Polites origenes</i>	Crossline skipper
185	<i>Wallengrenia egeremet</i>	Northern broken dash
189	<i>Atrytone delaware</i>	Delaware skipper
197	<i>Poanes hobomok</i>	Hobomok skipper
217	<i>Euphyes ruricola</i>	Dun skipper
219	<i>Atrytonopsis hianna</i>	Dusted skipper
245	<i>Amblyscirtes vialis</i>	Roadside skipper

303	<i>Papilio polyxenes</i>	Black swallowtail
314	<i>Heraclides cresphontes</i>	Giant swallowtail
320	<i>Pterourus glaucus</i>	Tiger swallowtail
334	<i>Pontia protodice</i>	Checkered white
338	<i>Artogeia rapae</i>	Cabbage white
351	<i>Colias philodice</i>	Common sulphur
352	<i>Colias eurytheme</i>	Orange sulphur
383	<i>Pyristia lisa</i>	Little yellow
393	<i>Lycaena phlaeas</i>	American copper
417	<i>Harknclenus titus</i>	Coral hairstreak
423	<i>Satyrium edwardsii</i>	Edward's hairstreak
425	<i>Satyrium caryaevorum</i>	Hickory hairstreak
478	<i>Strymon melinus</i>	Gray hairstreak
503	<i>Everes comyntas</i>	Eastern tailed blue
505	<i>Celastrina ladon</i>	Spring azure
517a	<i>Lycaeides m. samuelis</i>	Karner blue
565	<i>Speyeria cybele</i>	Great spangled fritillary
566	<i>Speyeria aphrodite</i>	Aphrodite
605	<i>Charidryas gorgone</i>	Gorgone crescent spot
623	<i>Phyciodes tharos/morpheus</i>	Pearly crescent spot
636	<i>Polygonia interrogantionis</i>	Question mark
637	<i>Polygonia comma</i>	Comma butterfly
645	<i>Polygonia progne</i>	Gray comma
648	<i>Nymphalis antiopa</i>	Mourning cloak
651	<i>Vanessa cardui</i>	Painted lady
653	<i>Vanessa atalanta</i>	Red admiral
656	<i>Junonia coenia</i>	Buckeye
663a	<i>Basilarchia a. arthemis</i>	White admiral
663b	<i>Basilarchia a. astyanax</i>	Red spotted purple
664	<i>Basilarchia archippus</i>	Viceroy
698	<i>Asterocampa celtis</i>	Hackberry butterfly
704	<i>Asterocampa clyton</i>	Tawny emperor
710	<i>Enodia anthedon</i>	Pearly eye
723	<i>Megisto cymela</i>	Little wood satyr
732	<i>Cercyonis pegala</i>	Wood nymph
760	<i>Danaus plexippus</i>	Monarch

Appendix V. The following information is a list of all voucher specimens collected by the author during the Karner Blue survey 1990. All specimens will eventually be deposited in the University of Minnesota Entomology Collection.

age No. 1
6/12/90

Voucher Specimens in Private Collection

COMMON NAME	SCIENTIFIC NAME	LOCATION	DATE d/m/y	MEMO
NORTHERN CLOUDYWING	<i>Thorybes pylades</i>	Wild River S.P. Chisago Co.	13/06/90	
NORTHERN CLOUDYWING	<i>Thorybes pylades</i>	Sherburne NWR Sherburne Co.	12/06/90	1m, 1f
REAMY DUSKYWING	<i>Erynnis icelus</i>	Houston # 2 Houston Co.	24/05/90	
LEEPEY DUSKYWING	<i>Erynnis brizo</i>	Houston # 2 Houston Co.	22/05/90	1 female
LEEPEY DUSKYWING	<i>Erynnis brizo</i>	Houston # 2 Houston Co.	24/05/90	1 male
JUVENAL'S DUSKYWING	<i>Erynnis juvenalis</i>	Carlos Avery WMA Anoka Co.	12/05/90	
JUVENAL'S DUSKYWING	<i>Erynnis juvenalis</i>	Houston # 2 Houston Co.	22/05/90	
JUVENAL'S DUSKYWING	<i>Erynnis juvenalis</i>	Chester Woods Olmstead Co.	30/05/90	
JUVENAL'S DUSKYWING	<i>Erynnis juvenalis</i>	Whitewater WMA Winona Co.	01/06/90	
MILD INDIGO D-WING	<i>Erynnis baptisiae</i>	Houston # 2 Houston Co.	09/07/90	
MILD INDIGO D-WING	<i>Erynnis baptisiae</i>	Whitewater WMA Winona Co.	30/07/90	
MILD INDIGO D-WING	<i>Erynnis baptisiae</i>	Whitewater WMA Winona Co.	31/07/90	
MILD INDIGO D-WING	<i>Erynnis baptisiae</i>	Whitewater WMA Winona Co.	06/08/90	
COMMON SOOTYWING	<i>Pholisora catullus</i>	Houston # 2 Houston Co.	24/05/90	
ARCTIC SKIPPERLING	<i>Caterocephalus palaemon</i>	Carlos Avery WMA Anoka Co.	13/06/90	
ARCTIC SKIPPERLING	<i>Caterocephalus palaemon</i>	Wild River S.P. Chisago Co.	13/06/90	
ARCTIC SKIPPERLING	<i>Caterocephalus palaemon</i>	Wild River S.P. Chisago Co.	18/06/90	
EAST SKIPPERLING	<i>Ancyloxypha numitor</i>	Whitewater WMA Winona Co.	31/07/90	
LEONARDUS SKIPPER	<i>Hesperia leonardus</i>	Whitewater WMA Winona Co.	16/08/90	1 m, 1 f
LEONARDUS SKIPPER	<i>Hesperia leonardus</i>	Whitewater WMA 23 Winona Co.	17/08/90	
INDIAN SKIPPER	<i>Hesperia sassacus</i>	Wild River S.P. Chisago Co.	13/06/90	1 male
PAWNY-EDGED SKIPPER	<i>Polites themistocles</i>	Houston # 1 Houston Co.	22/05/90	
PAWNY-EDGED SKIPPER	<i>Polites themistocles</i>	Whitewater WMA Winona Co.	06/08/90	
PROCELLINE SKIPPER	<i>Polites origenes</i>	Tuohy Bluff Prairie Fillmore Co.	10/07/90	1 m, 1 f

Voucher Specimens in Private Collection

COMMON NAME	SCIENTIFIC NAME	LOCATION	DATE m/d/y	MEMO
CROSSLINE SKIPPER	<i>Polites origenes</i>	Mattson Bluff Pr. Fillmore Co.	10/07/90	
CROSSLINE SKIPPER	<i>Polites origenes</i>	Whitewater WMA Winona Co.	30/07/90	
LONG DASH	<i>Polites mystic</i>	North Road Corners Isanti Co.	18/07/90	
NORTHERN BROKEN DASH	<i>Wallengrenia egeremet</i>	Whitewater WMA Winona Co.	30/07/90	
NORTHERN BROKEN DASH	<i>Wallengrenia egeremet</i>	Hokah site Houston Co.	09/07/90	
DELAWARE SKIPPER	<i>Atrytone delaware</i>	Houston # 2 Houston Co.	09/07/90	
DELAWARE SKIPPER	<i>Atrytone delaware</i>	Whitewater WMA Hist. Winona Co.	11/07/90	
HOBOMOK SKIPPER	<i>Poanes Hobomok</i>	Fillmore Co.	31/05/90	
HOBOMOK SKIPPER	<i>Poanes hobomok</i>	Sherburne NWR Sherburne Co.	15/06/90	
DUN SKIPPER	<i>Euphyes ruricola</i>	Houston # 2 Houston Co.	09/07/90	II
DUN SKIPPER	<i>Euphyes ruricola</i>	Wild River S.P. Chisago Co.	17/07/90	1m, 1f
DUN SKIPPER	<i>Euphyes ruricola</i>	Cedar Creek Hist. Anoka Co.	18/07/90	
DUN SKIPPER	<i>Euphyes ruricola</i>	Cedar Creek Hist. Anoka Co.	22/07/90	
DUN SKIPPER	<i>Euphyes ruricola</i>	Whitewater WMA Winona Co.	31/07/90	
DUSTED SKIPPER	<i>Atrytonopsis hianna</i>	Mattson Bluff Pr. Fillmore Co.	24/05/90	
ROADSIDE SKIPPER	<i>Amblyscirtes vialis</i>	Houston # 2 Houston Co.	22/05/90	
ROADSIDE SKIPPER	<i>Amblyscirtes vialis</i>	Mattson Bluff Pr. Fillmore Co.	24/05/90	
ROADSIDE SKIPPER	<i>Amblyscirtes vialis</i>	Whitewater WMA Winona Co.	31/07/90	
OLYMPIA WHITE	<i>Euchloe olympia</i>	Houston # 2 Houston Co.	24/07/90	
OLYMPIA WHITE	<i>Euchloe olympia</i>	Hellen Allison Sav. Anoka Co.	28/05/90	
LITTLE YELLOW	<i>Pyrisitia lisa</i>	Hokah Houston Co.	09/07/90	
LITTLE YELLOW	<i>Pyrisitia lisa</i>	Houston # 2 Houston Co.	09/07/90	
AMERICAN COPPER	<i>Lycaena phlaeas</i>	Himlie Sand Barrens Fillmore Co.	08/05/90	

Voucher Specimens in Private Collection

COMMON NAME	SCIENTIFIC NAME	LOCATION	DATE m/d/yr	MEMO
AMERICAN COPPER	<i>Lycaena phlaeas</i>	Fillmore Co.	30/05/90	
AMERICAN COPPER	<i>Lycaena phlaeas</i>	Whitewater WMA Hist. Winona Co.	11/07/90	
GREAT GREY COPPER	<i>Gaeides xanthoides</i>	Tuohy Bluff Prairie Fillmore Co.	10/07/90	
MORAL HAIRSTREAK	<i>Harkenclenus titus</i>	Houston # 2 Houston Co.	09/07/90	
MORAL HAIRSTREAK	<i>Harkenclenus titus</i>	Sherburne MWR Sherburne Co.	18/07/90	
MORAL HAIRSTREAK	<i>Harkenclenus titus</i>	Wild River S.P. Chisago Co.	23/07/90	
EDWARD'S HAIRSTREAK	<i>Satyrrium edwardsii</i>	Tuohy Bluff Prairie Fillmore Co.	10/07/90	
EDWARD'S HAIRSTREAK	<i>Satyrrium edwardsii</i>	Wild River S.P. Chisago Co.	17/07/90	
EDWARD'S HAIRSTREAK	<i>Satyrrium edwardsii</i>	Cedar Creek Hist. Anoka Co.	22/07/90	
EDWARD'S HAIRSTREAK	<i>Satyrrium edwardsii</i>	Whitewater Sec: 26 Winona Co.	07/07/90	
HI JRY HAIRSTREAK	<i>Satyrrium caryaevorum</i>	Whitewater WMA Winona Co.	06/08/90	
GRAY HAIRSTREAK	<i>Strymon melinus</i>	Whitewater WMA Winona Co.	06/08/90	
SILVERY BLUE	<i>Glaucopsyche lygdamus</i>	Isanti Co. MN	28/05/90	
MELISSA BLUE	<i>Lycaeides m. melissa</i>	Tuohy Bluff Pr. Fillmore Co.	30/05/90	1 male
MELISSA BLUE	<i>Lycaeides m. melissa</i>	Tuohy Bluff Prairie Fillmore Co.	10/07/90	1m, 1f
KARNER BLUE	<i>Lycaeides m. samuelis</i>	Whitewater WMA 14 Winona Co.	30/07/90	1 male
KARNER BLUE	<i>Lycaeides m. samuelis</i>	Whitewater WMA 23 Winona Co.	31/07/90	1 male
KARNER BLUE	<i>Lycaeides m. samuelis</i>	Whitewater WMA 23 Winona Co.	07/08/90	1 f
MARINE BLUE	<i>Leptotes marina</i>	Houston # 2 Houston Co.	09/07/90	
GORGONE CRESCENTSPOT	<i>Charidryas gorgone</i>	Mattson Bluff Pr. Fillmore Co.	24/05/90	
SILVERY CRESCENTSPOT	<i>Charidryas nycteis</i>	Wild River S.P. Chisago Co.	17/07/90	
PEARLY CRESCENTSPOT	<i>Phyciodes tharos</i>	Whitewater WMA Winona Co.	07/08/90	
ORANGE CRESCENT	<i>Phyciodes morpheus</i>	Wild River S.P. Chisago Co.	17/07/90	
BALTIMORE CHECKERSPOT	<i>Euphydryas phaeton</i>	Hokah site Houston Co.	09/07/90	

age No. 4
6/12/90

Voucher Specimens in Private Collection

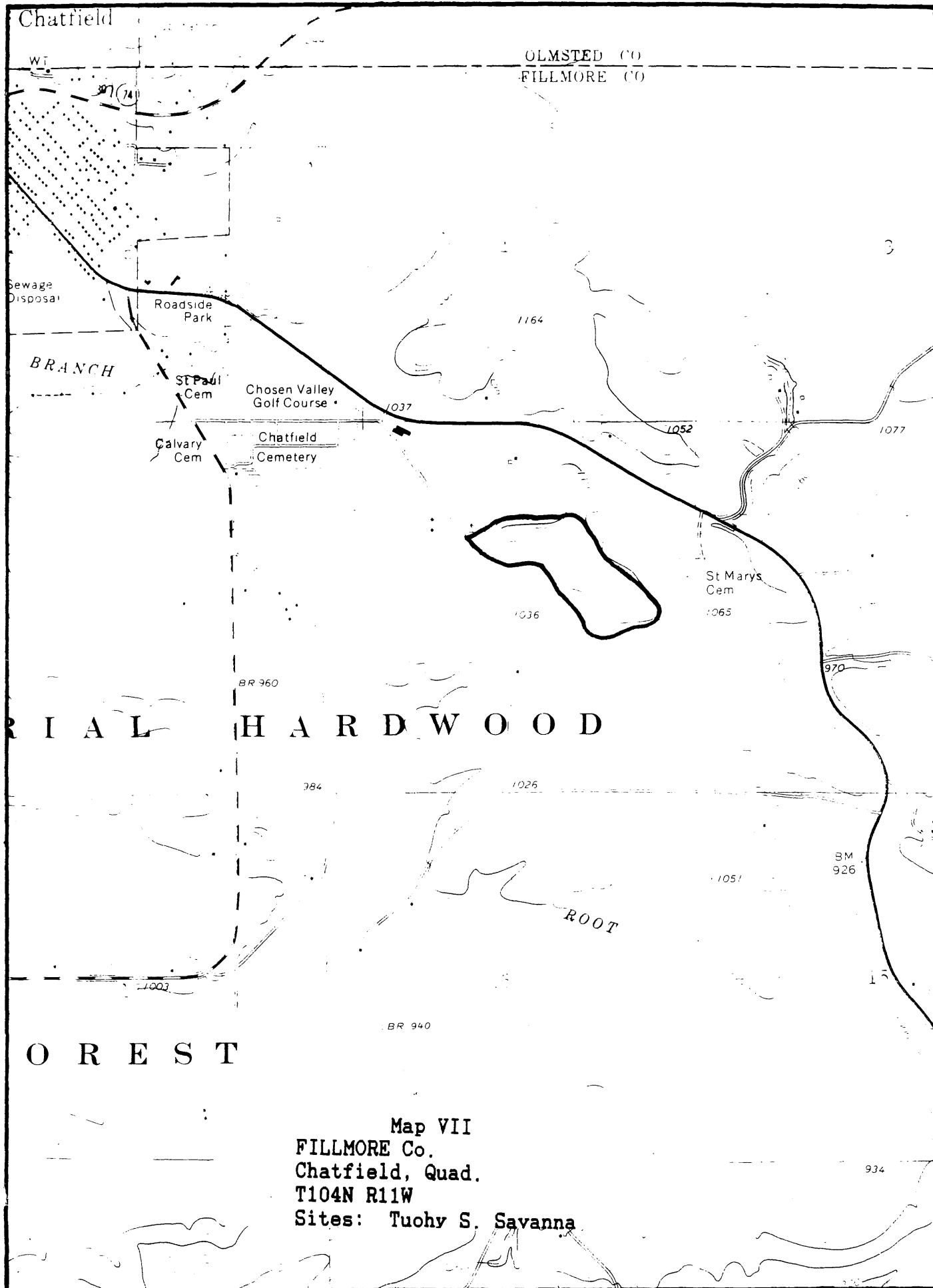
COMMON NAME	SCIENTIFIC NAME	LOCATION	DATE m/d/y	MEMO
HITE ADMIRAL	Basilarchia a. arthemis	St. Croix S.P. Pine Co.	17/06/90	
HITE ADMIRAL	Basilarchia a. arthemis	Whitewater WMA Winona Co.	31/07/90	
HITE ADMIRAL	Basilarchia a. arthemis	Santiago Sherburne Co.	09/08/90	
ITTLE WOOD SATYR	Megisto cymela	Whitewater WMA 23 Winona Co.	?	
OOD NYMPH	Cercyonis pegala	Whitewater WMA 23 Winona Co.	?	
RAIRIE RINGLET	Coenonympha inornata	Isanti 34,24,NE3 Isanti Co.	14/06/90	
RAIRIE RINGLET	Coenonympha inornata	Sherburne NWR Sherburne Co.	15/06/90	

KEY

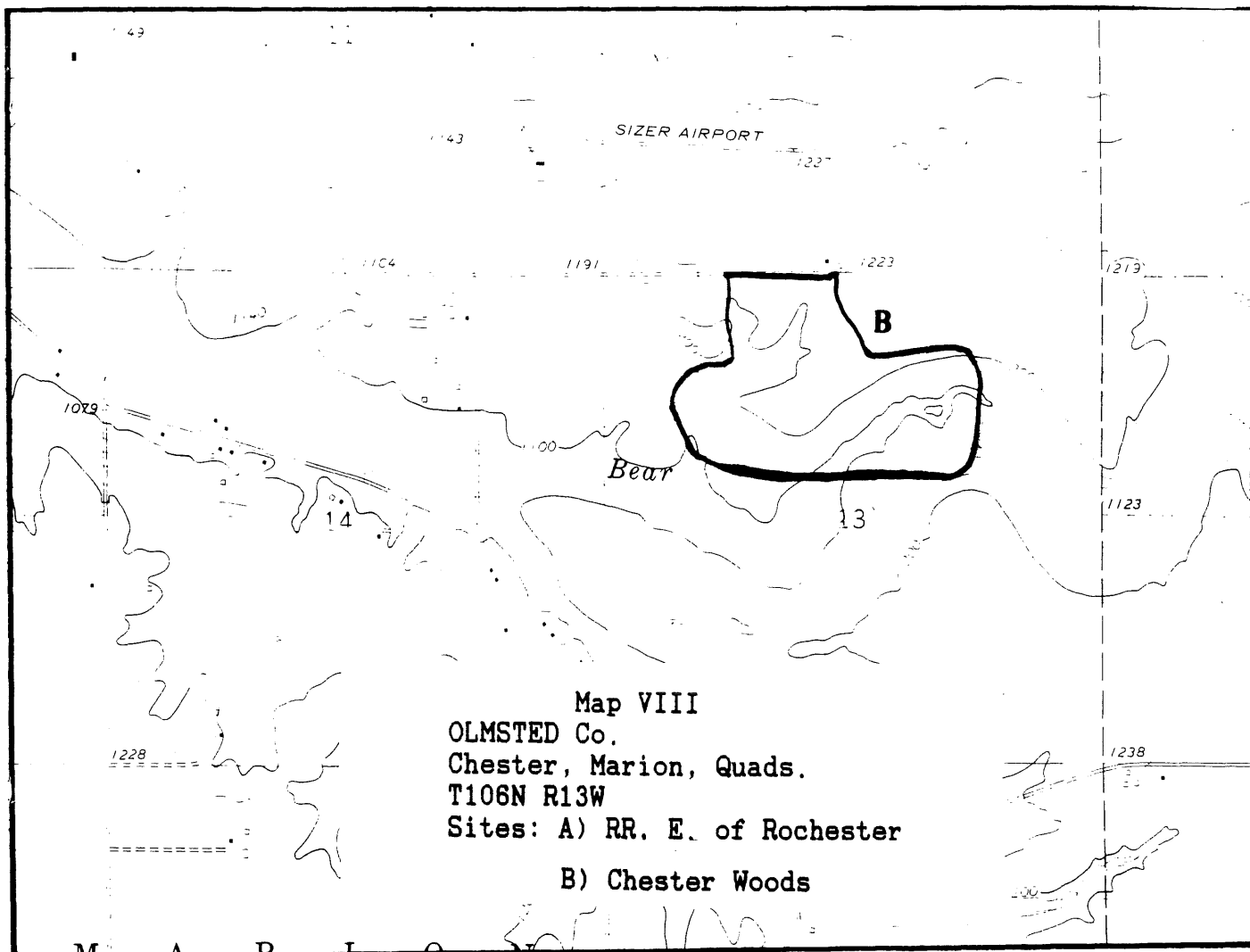
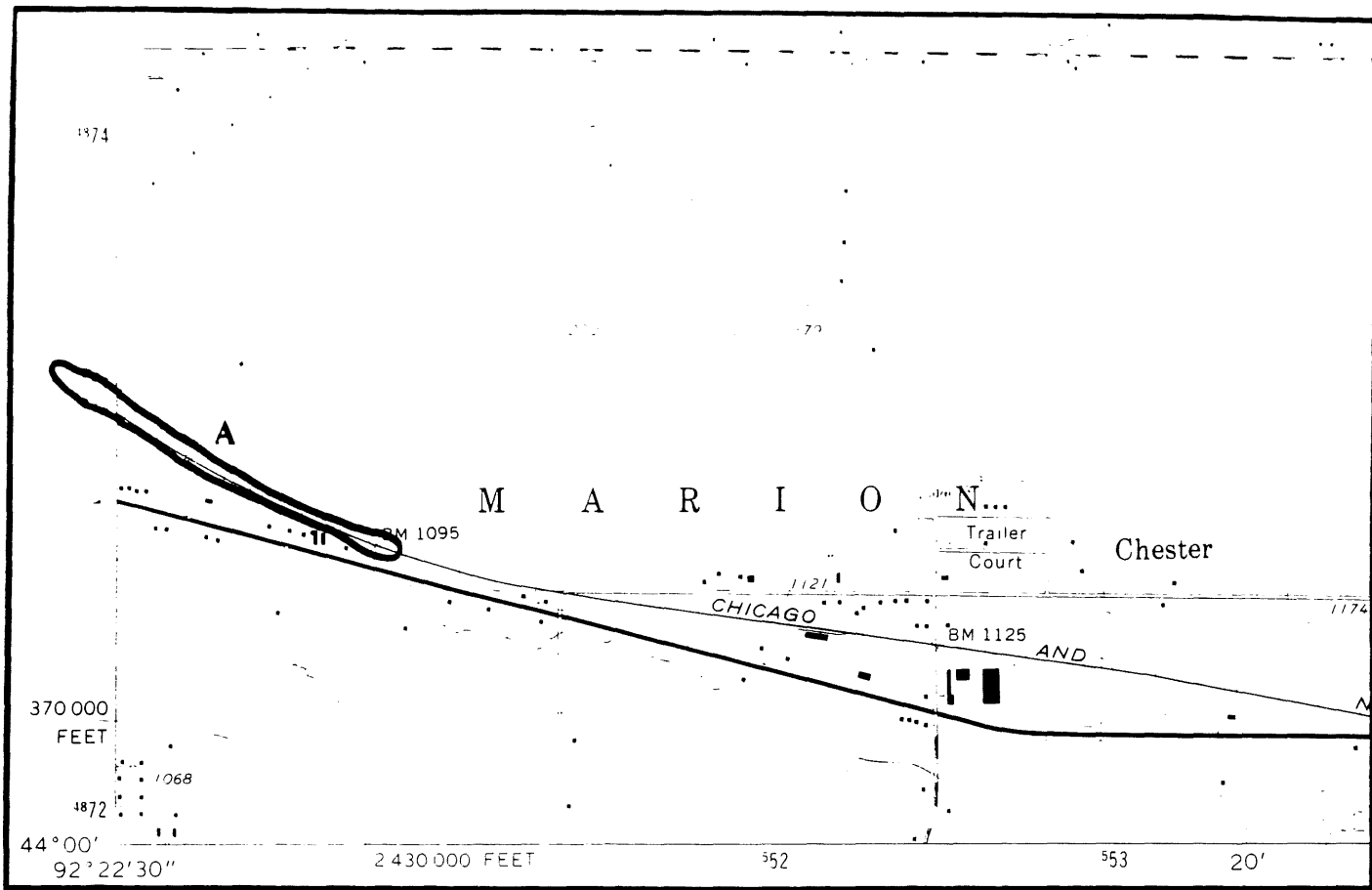
= male
= female
I = two specimens

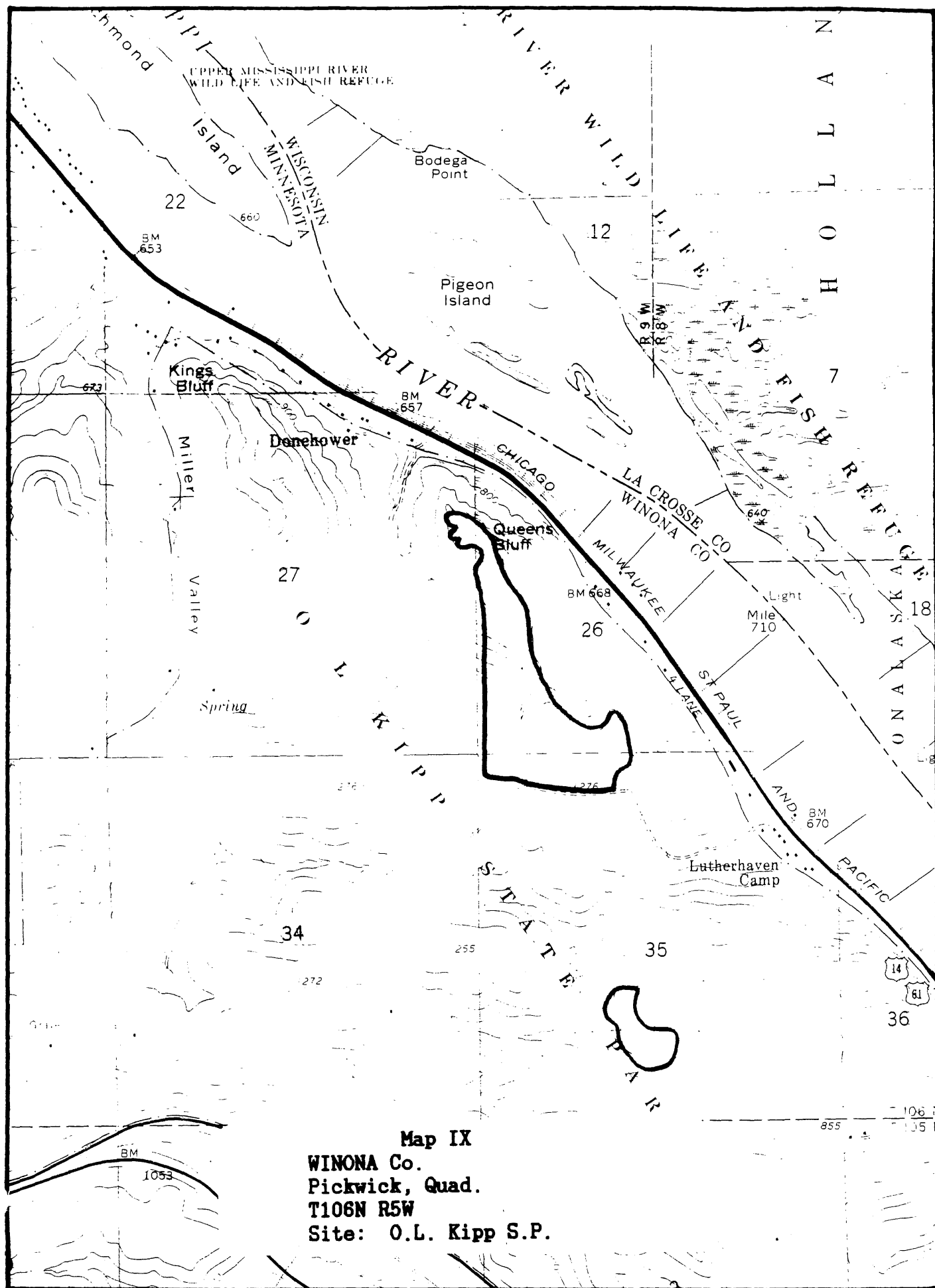
LOCATION KEY:

NWR = National Wildlife Refuge
WMA = Wildlife Management Area
SP = State Park
Co. = County
Pr. = Prairie
Sav. = Savanna

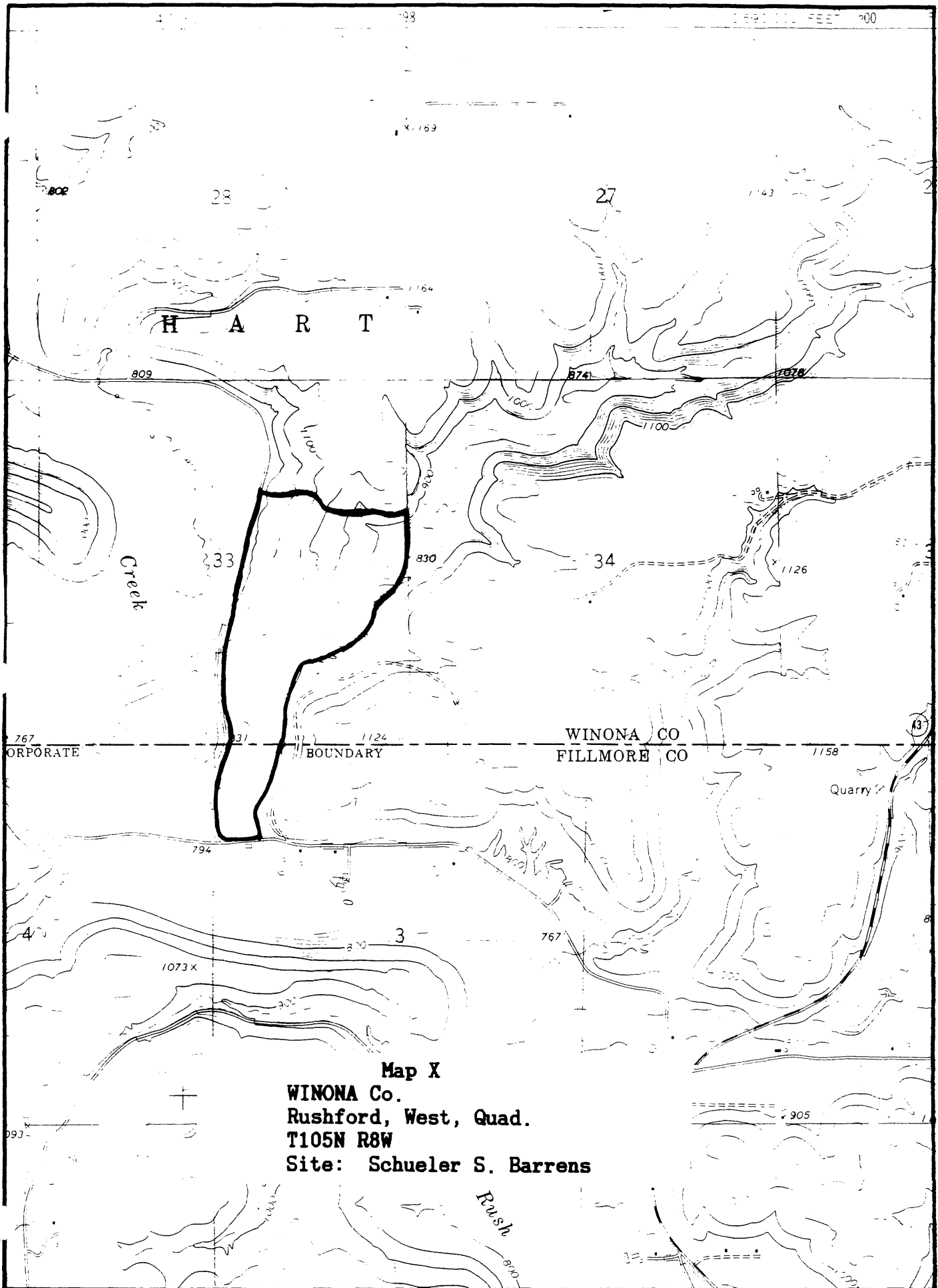


Map VII
FILLMORE Co.
Chatfield, Quad.
T104N R11W
Sites: Tuohy S. Savanna

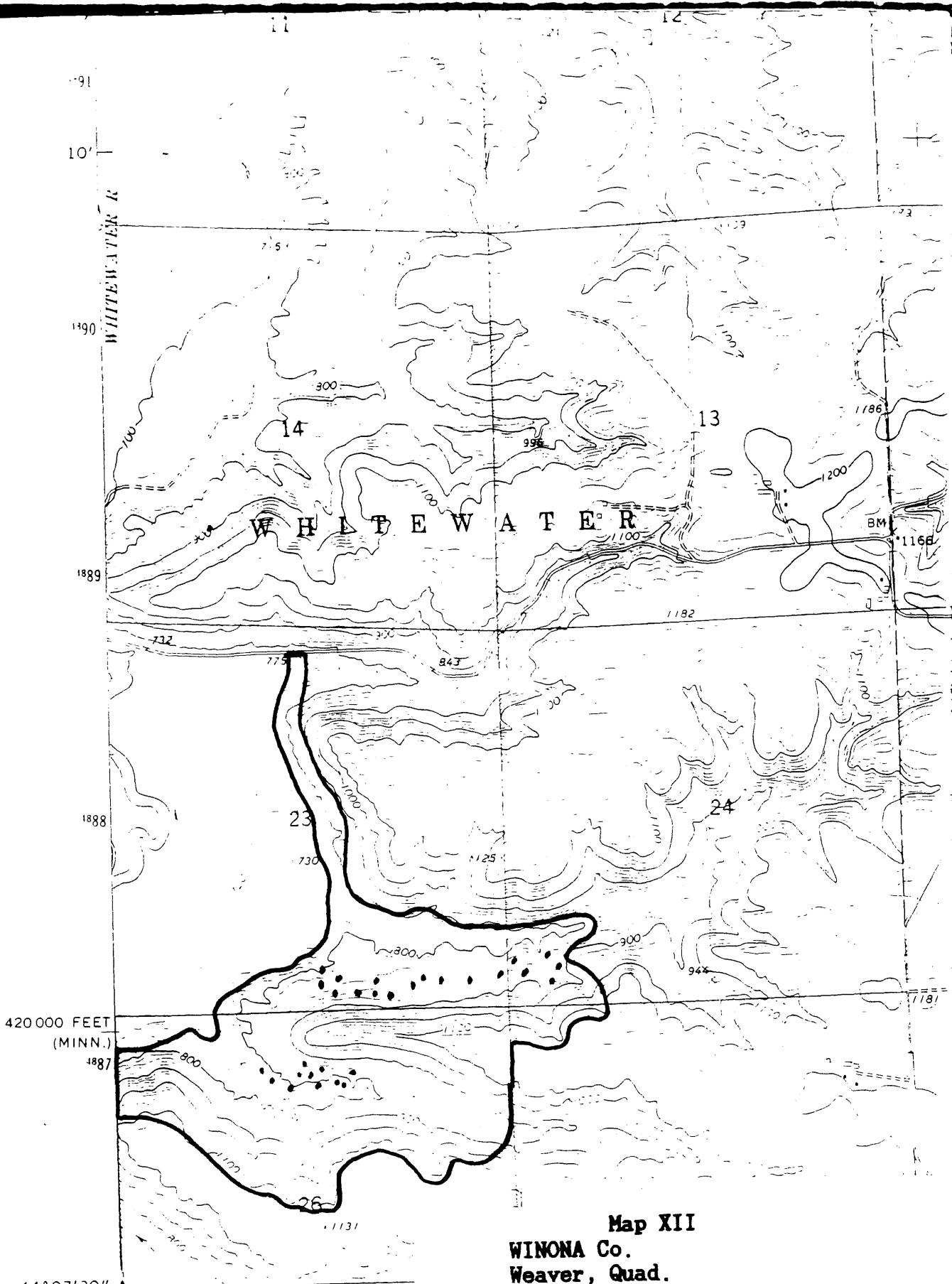




Map IX
WINONA Co.
Pickwick, Quad.
T106N R5W
Site: O.L. Kipp S.P.

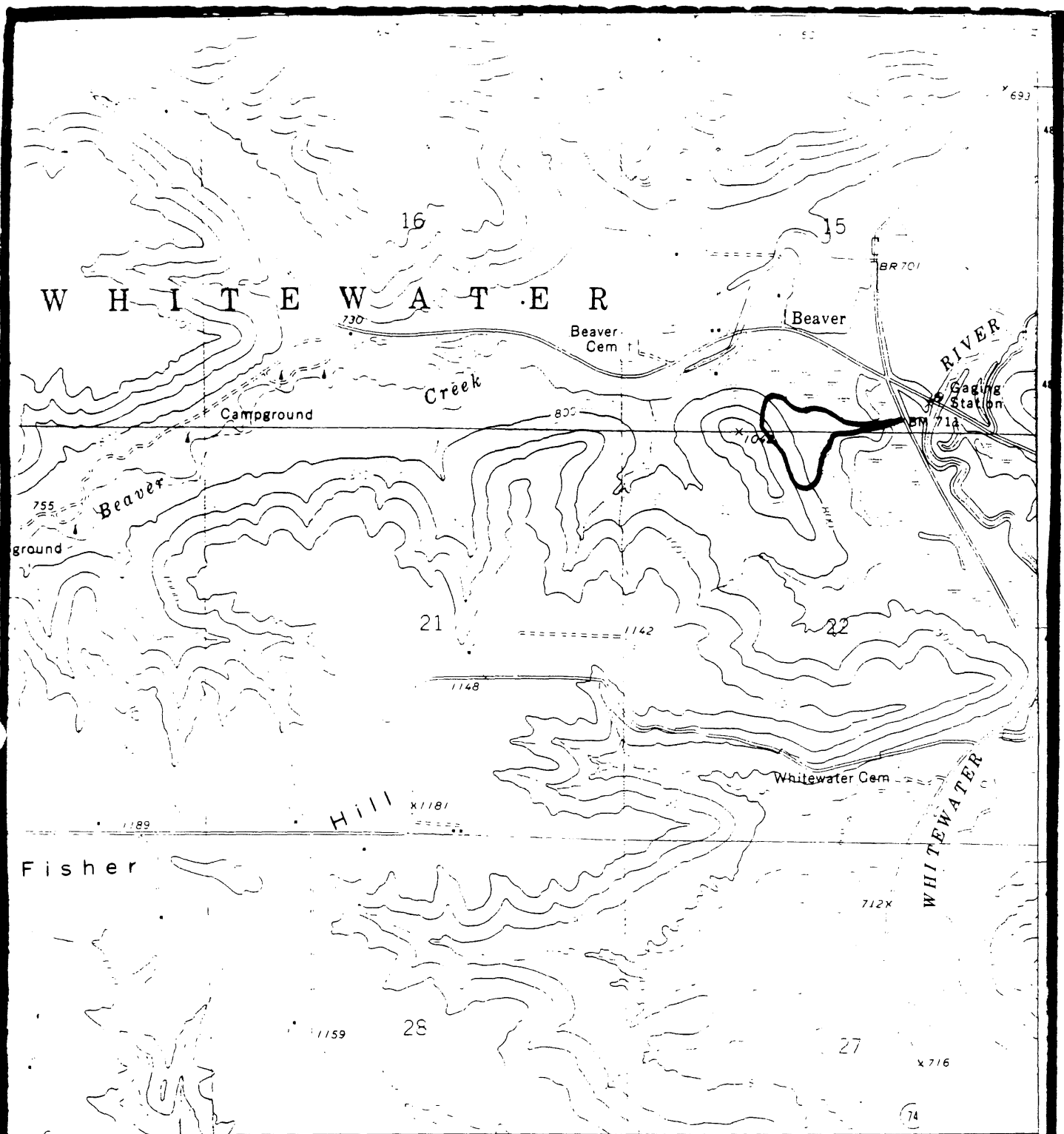


Map X
WINONA Co.
Rushford, West, Quad.
T105N R8W
Site: Schueler S. Barrens



Map XII
WINONA Co.
Weaver, Quad.
T108N R10W
Site: Whitewater 23

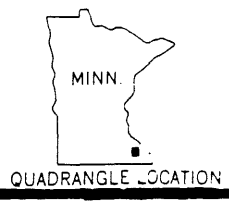
Mapped, edited, and published
Control by USGS and NOS/NOAA



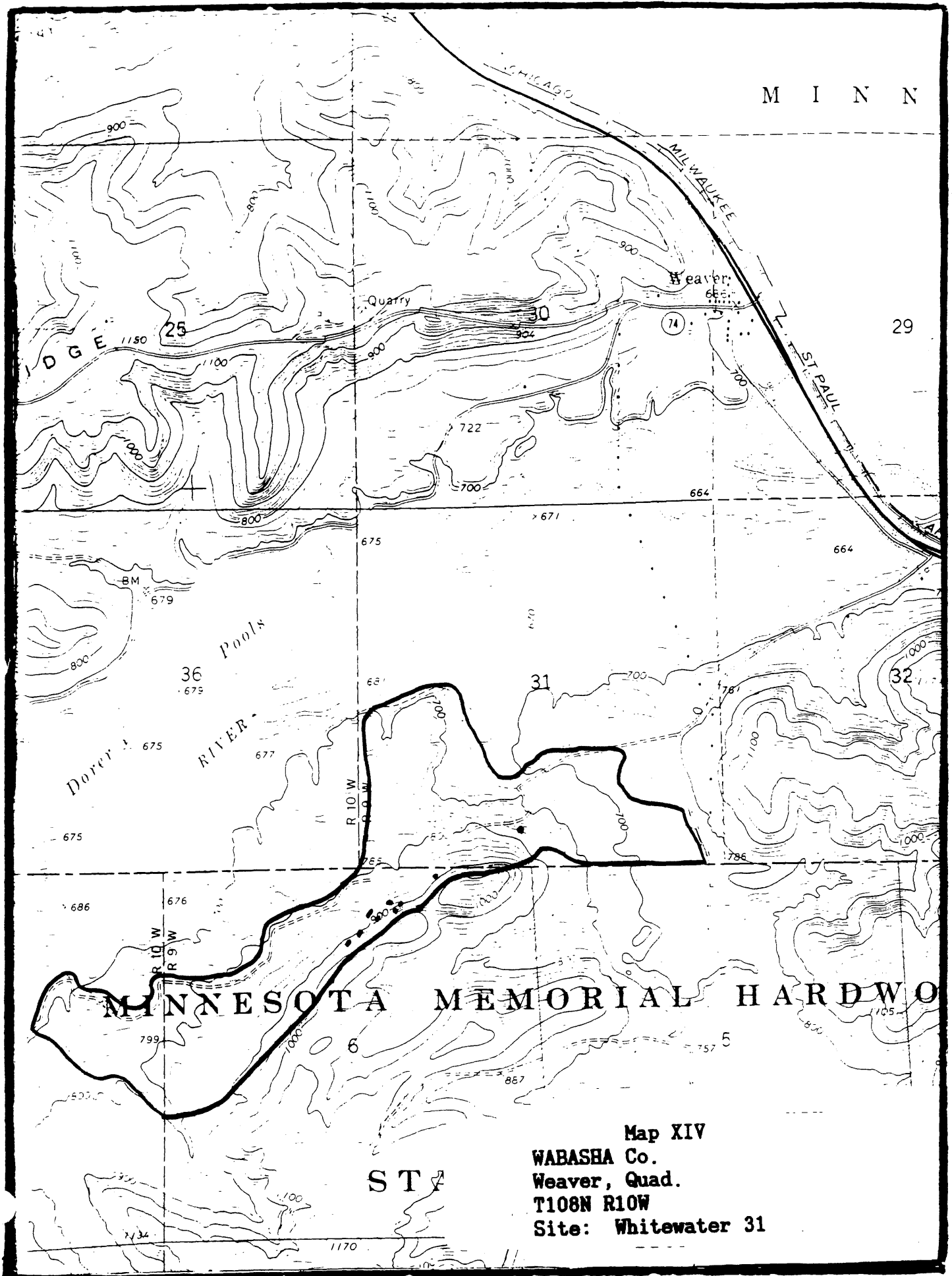
576 2'30" 577 578000m.E. INTERIOR-DEOLOGICAL SURVEY, RESTON, VIRGINIA-1975 ELEV 27 M ST CHARLES MISSOURI 92°0

1 MILE
7000 FEET
KILOMETER

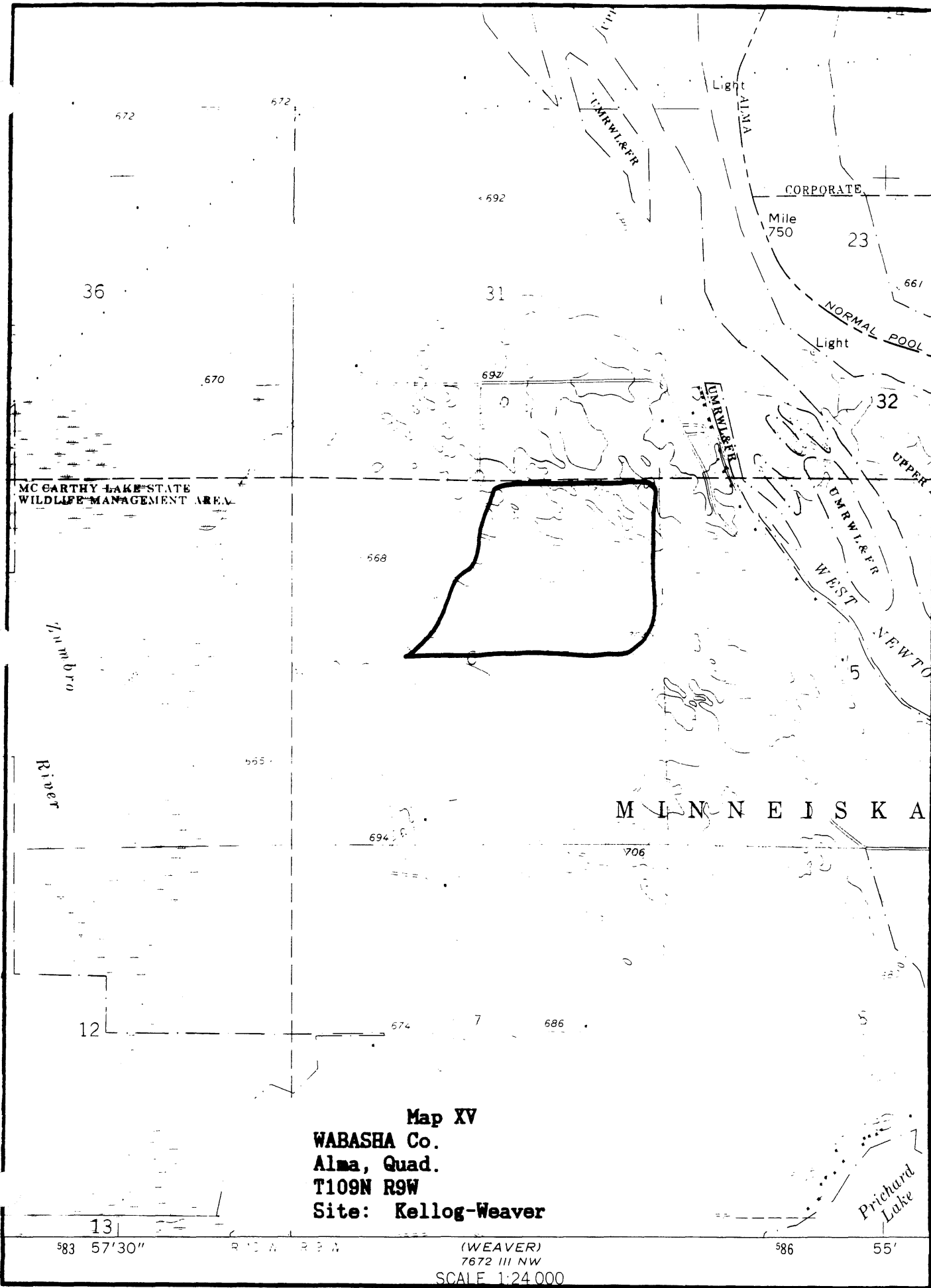
Primary highway hard surface
Secondary
Light-duty road, hard or improved surface



Map XIII
WINONA Co.
Beaver, Quad.
T108N R10W
Site: Whitewater 22

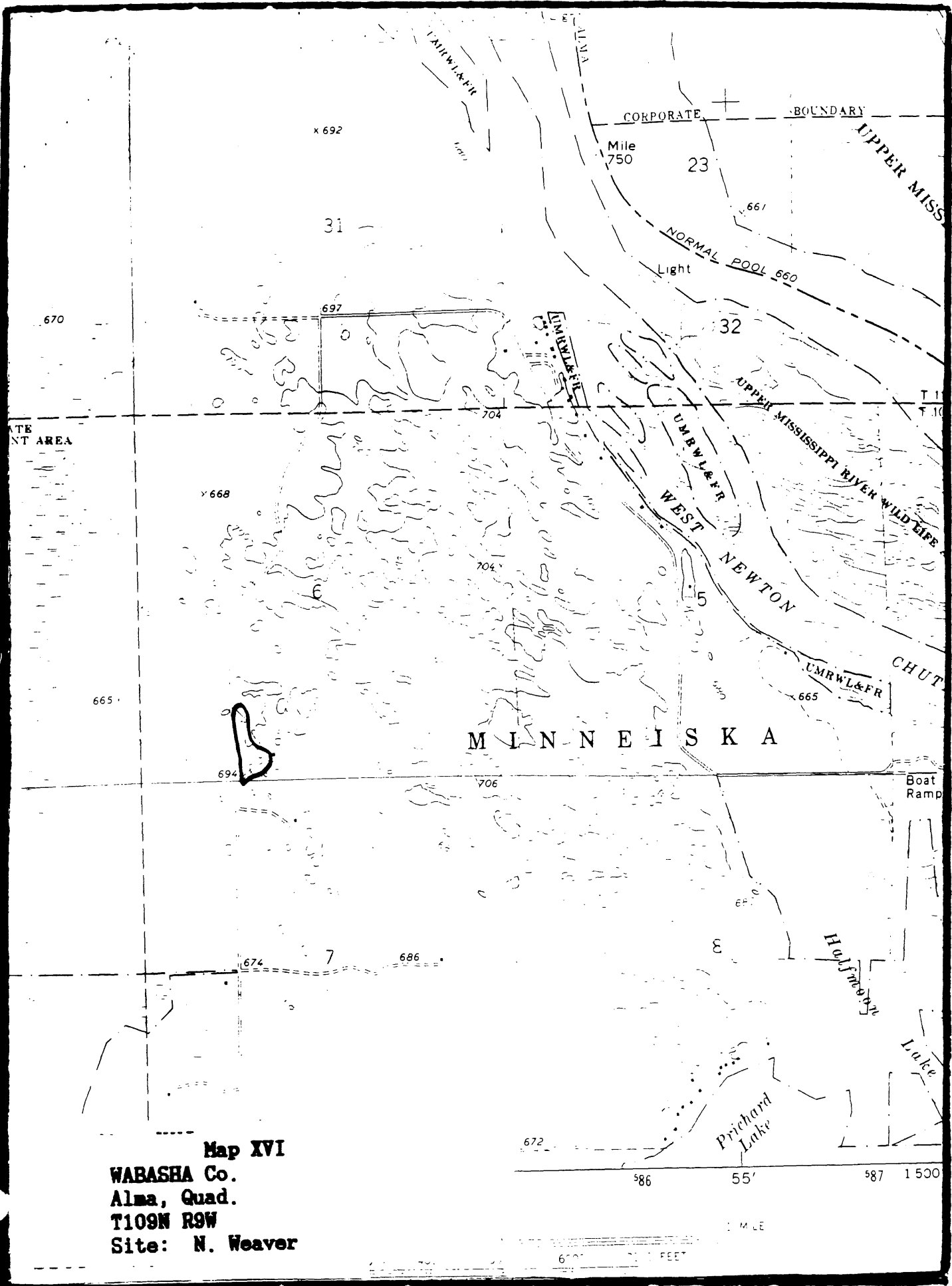


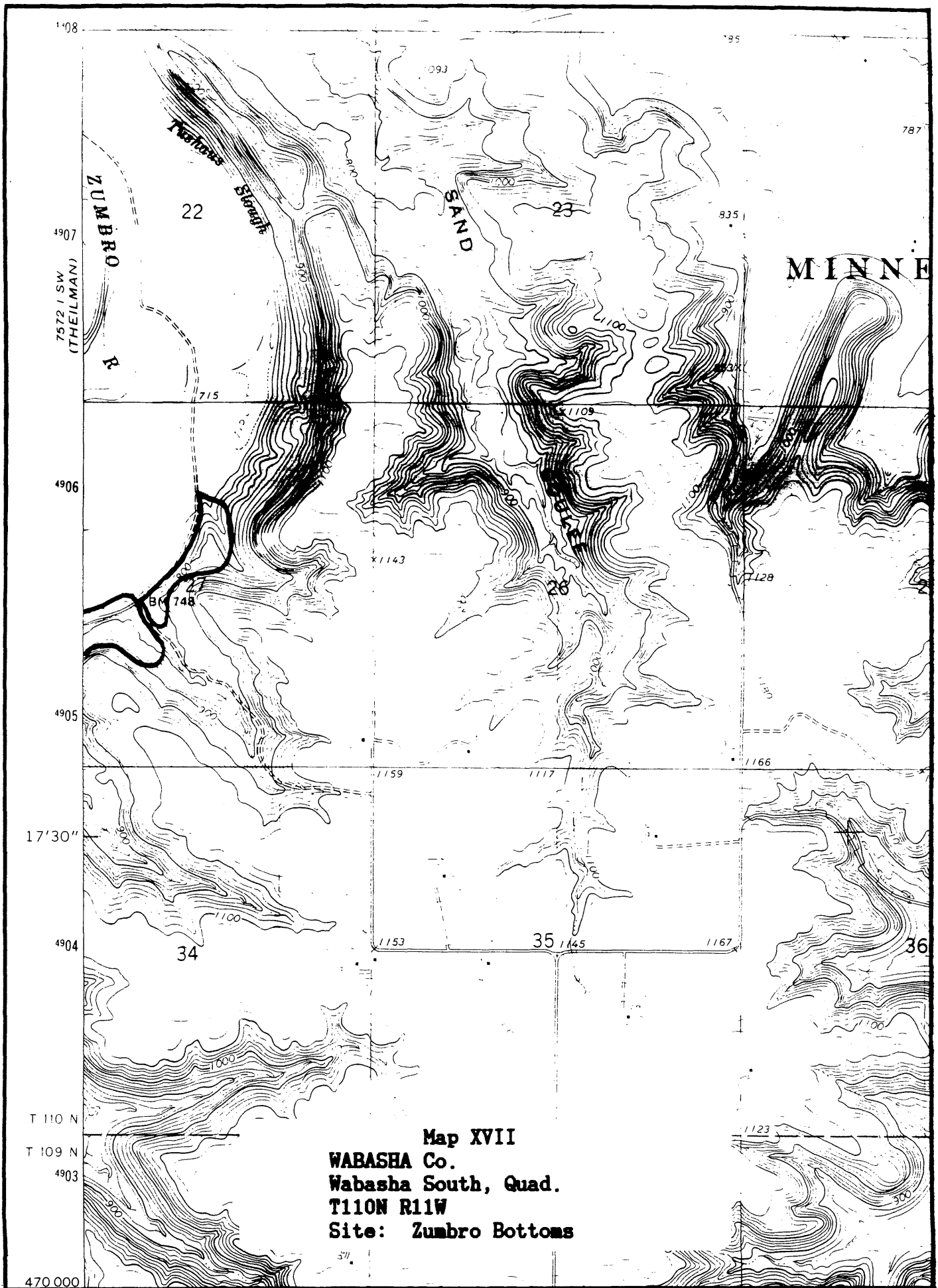
Map XIV
WABASHA Co.
Weaver, Quad.
T108N R10W
Site: Whitewater 31

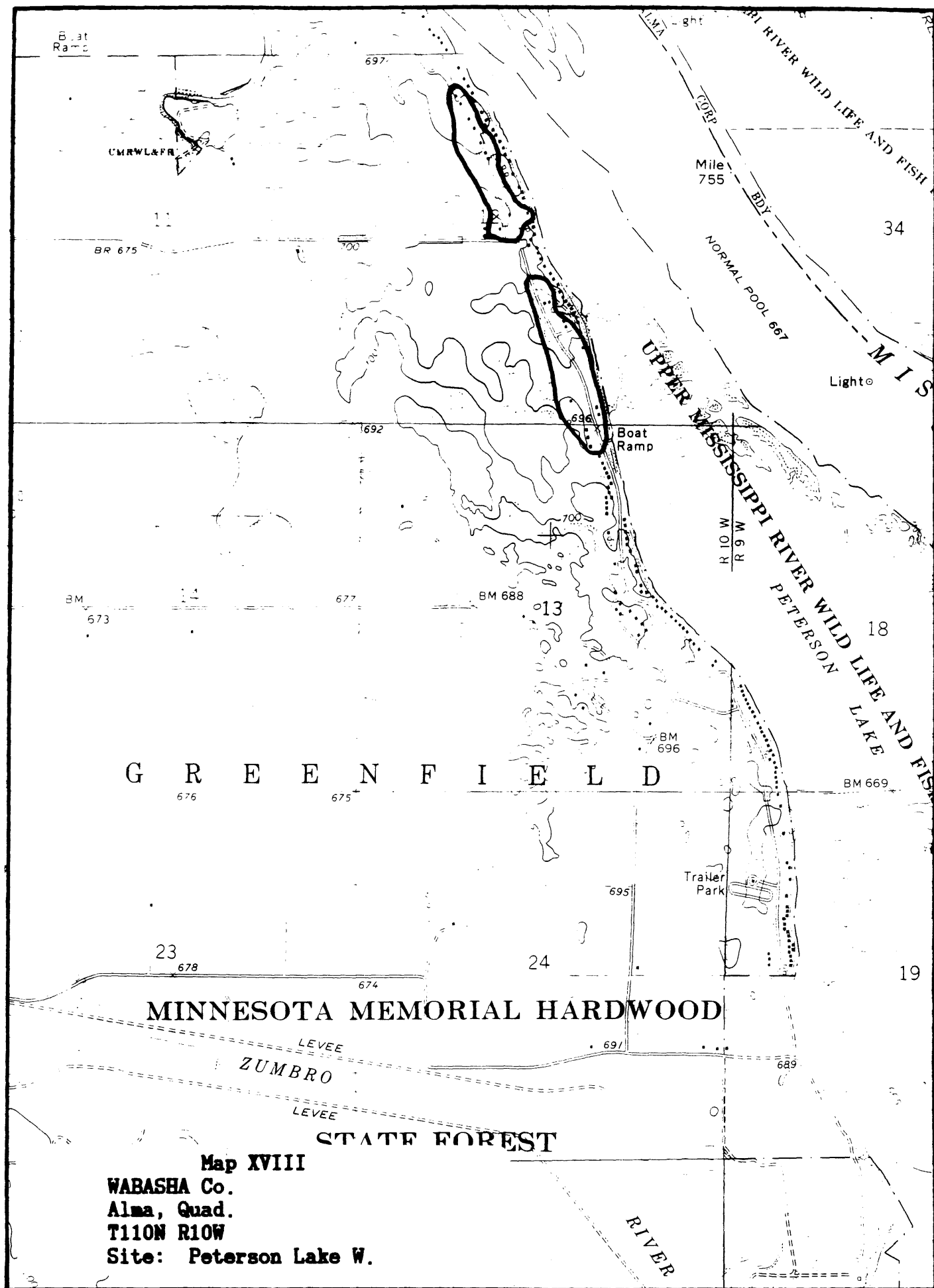


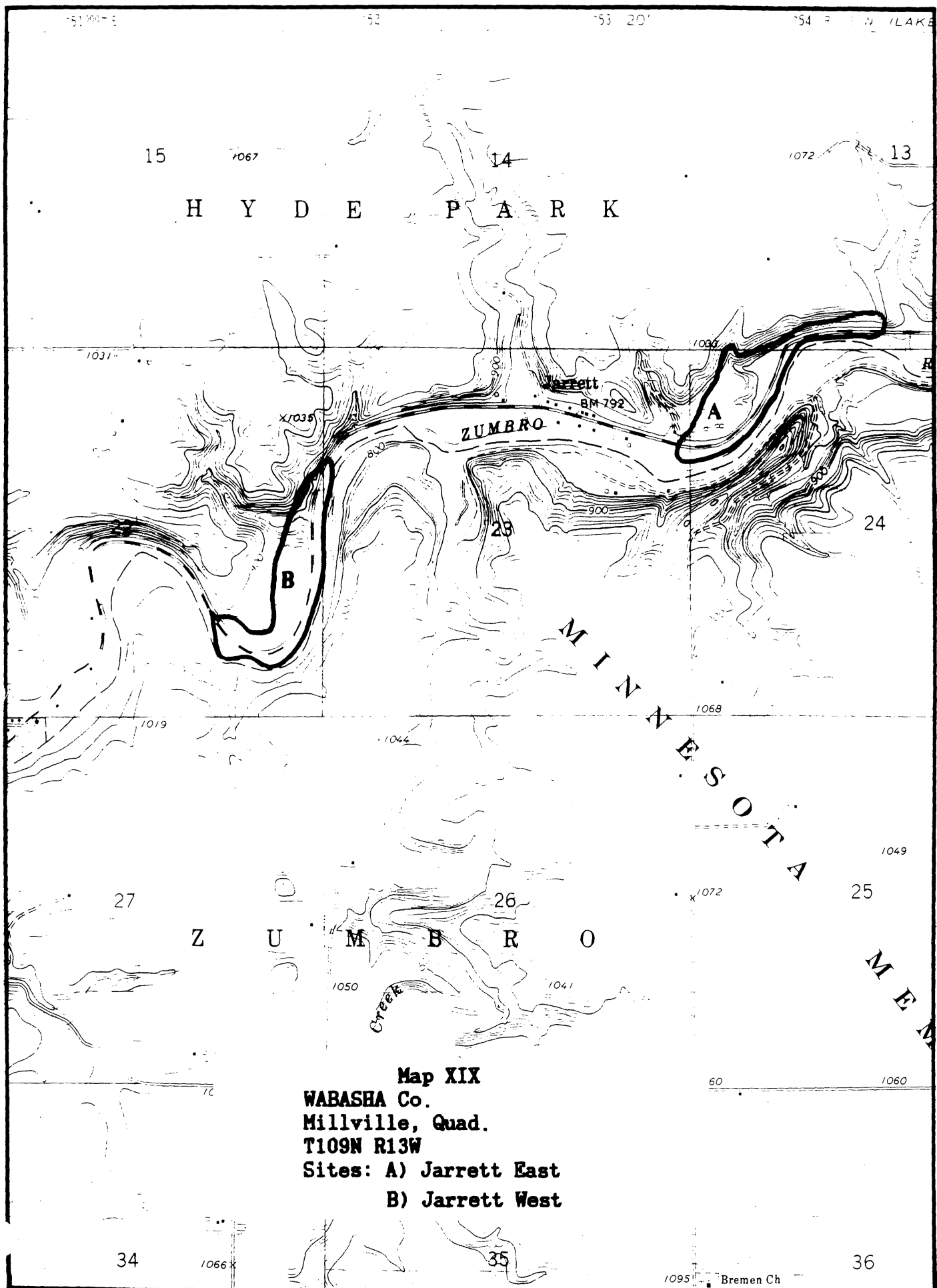
Map XV
WABASHA Co.
Alma, Quad.
T109N R9W
Site: Kellog-Weaver

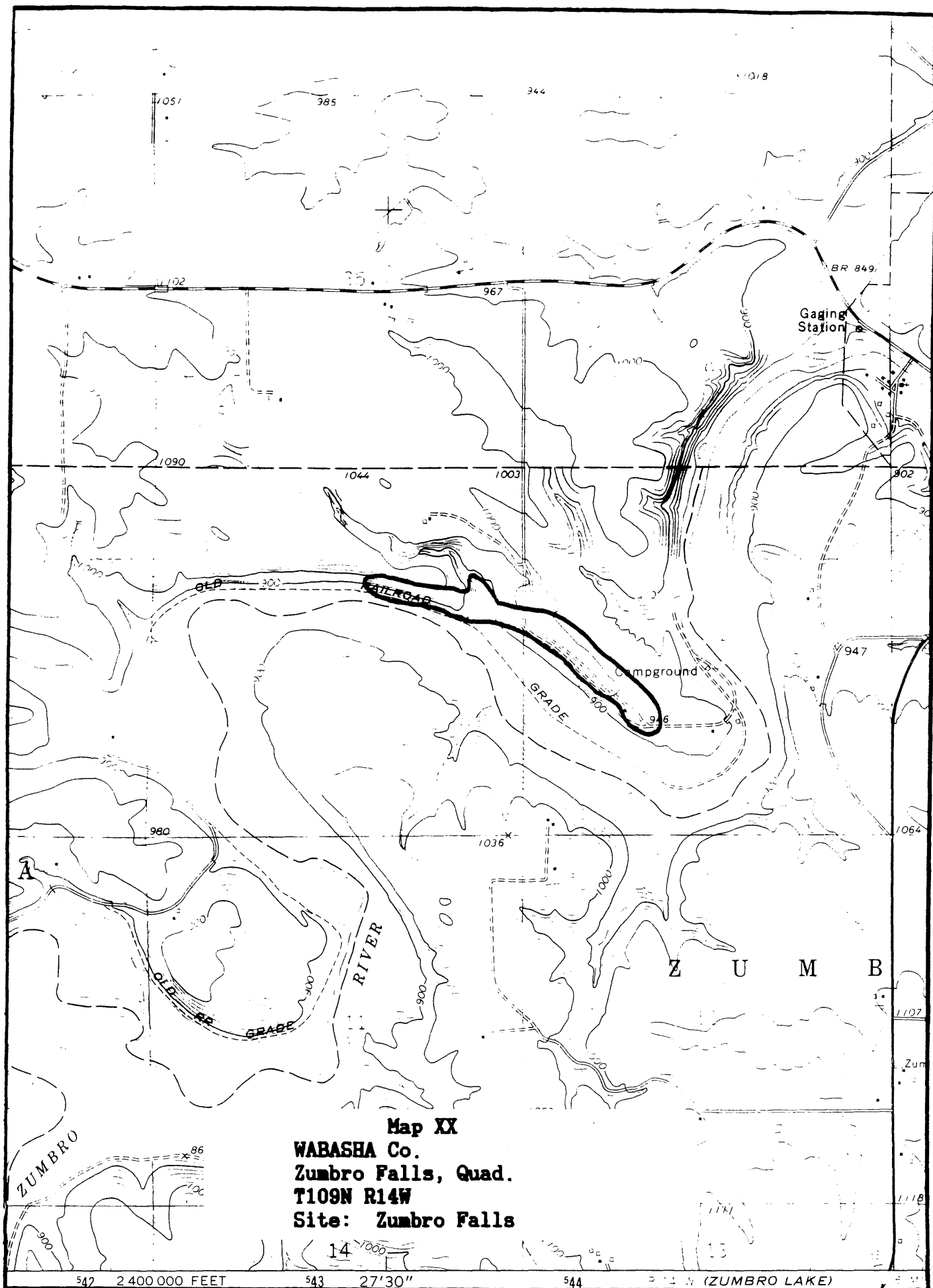
(WEAVER)
7672 III NW
SCALE 1:24,000











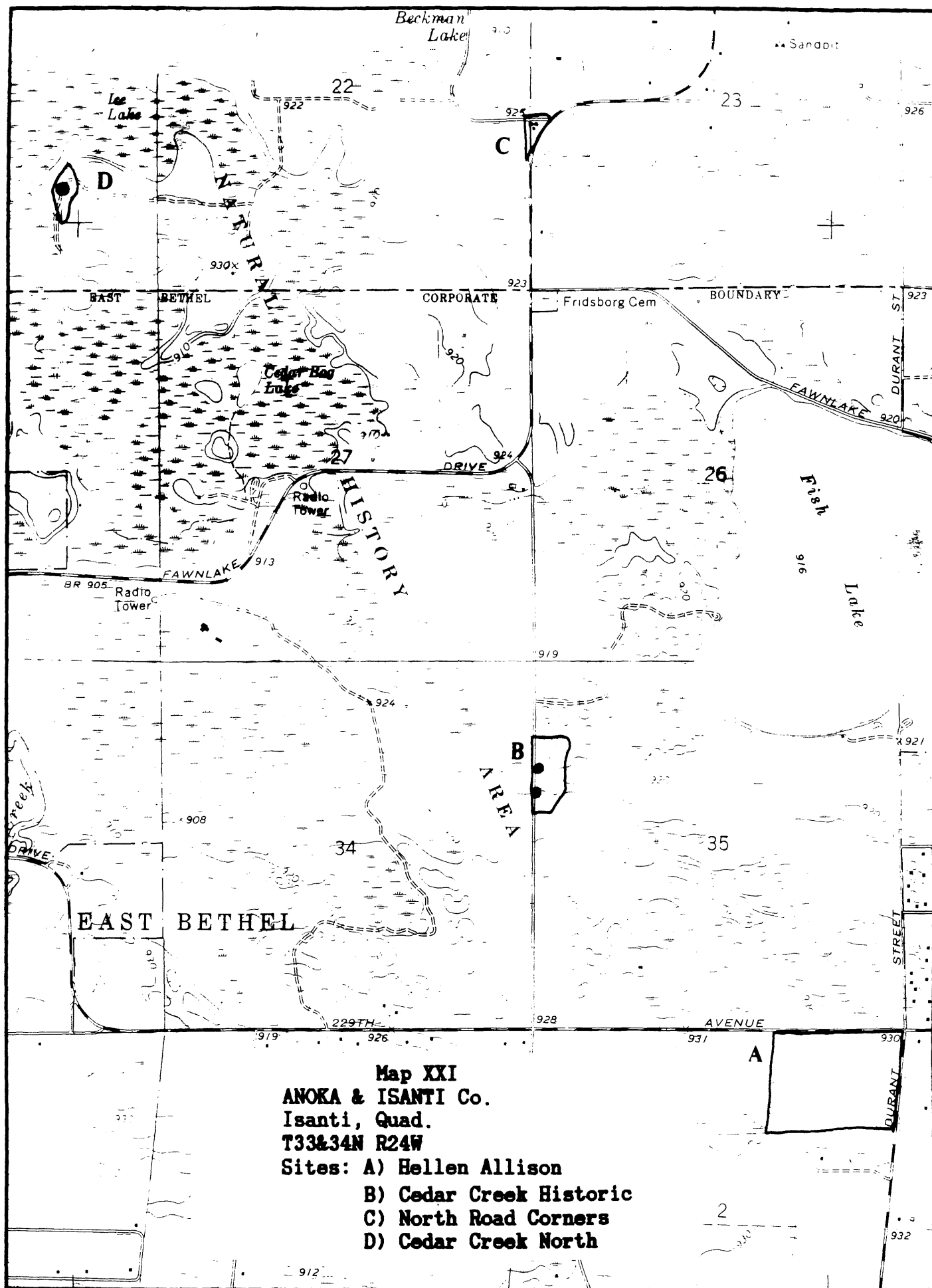
Map XX
WABASHA Co.
Zumbro Falls, Quad.
T109N R14W
Site: Zumbro Falls

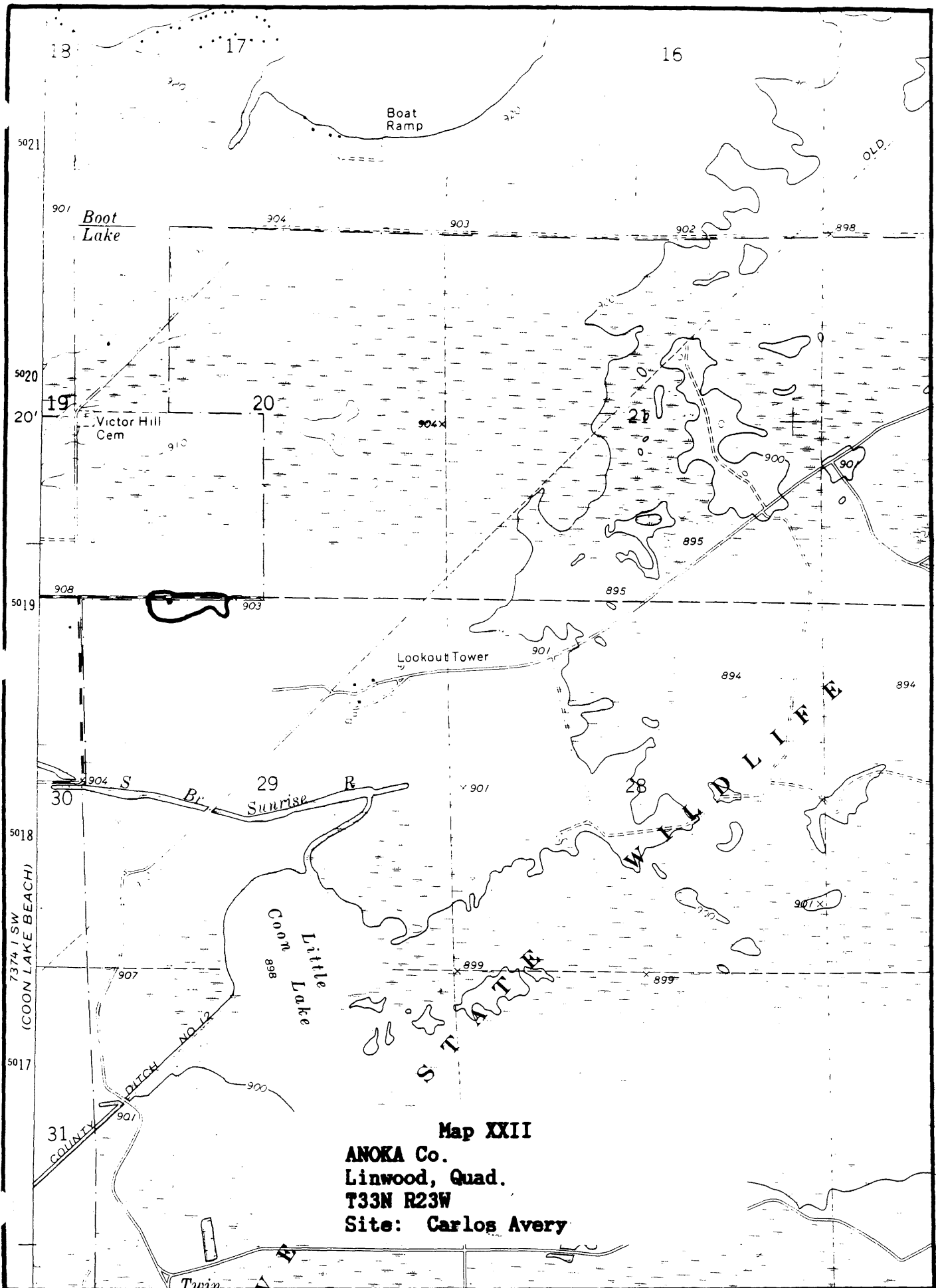
542 2400 FEET

543 27'30"

544

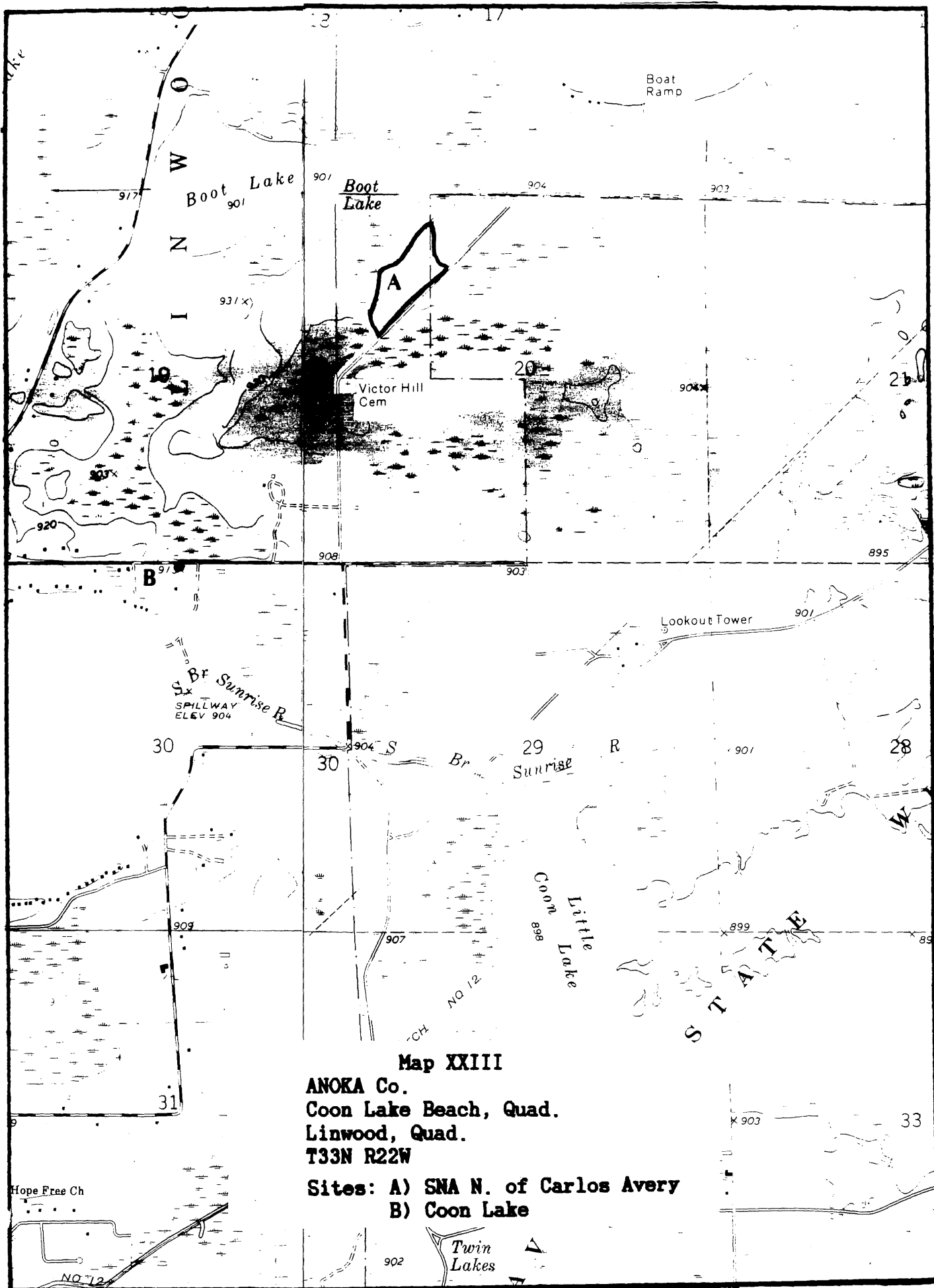
27'30" (ZUMBRO LAKE)

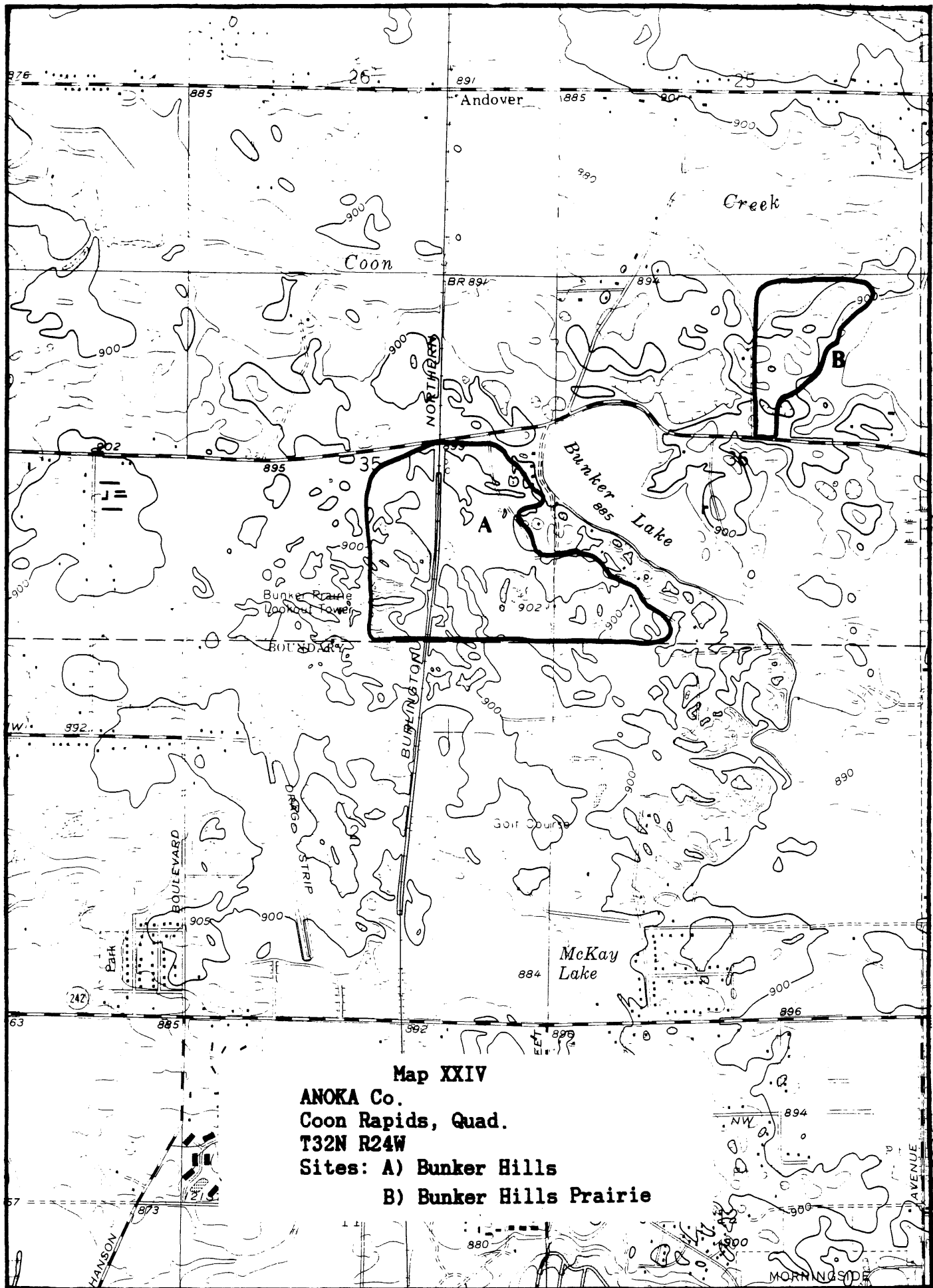


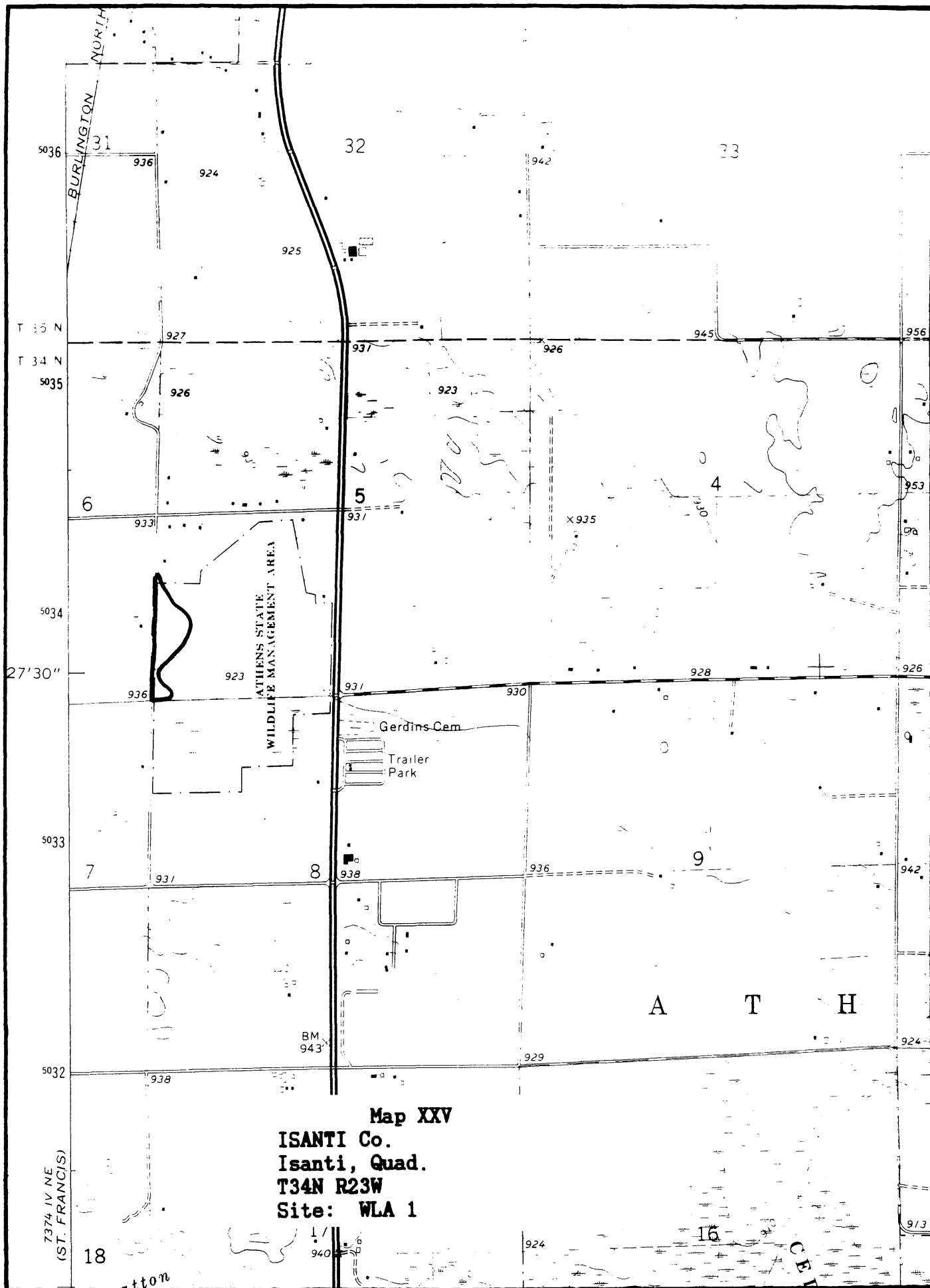


Map XXII

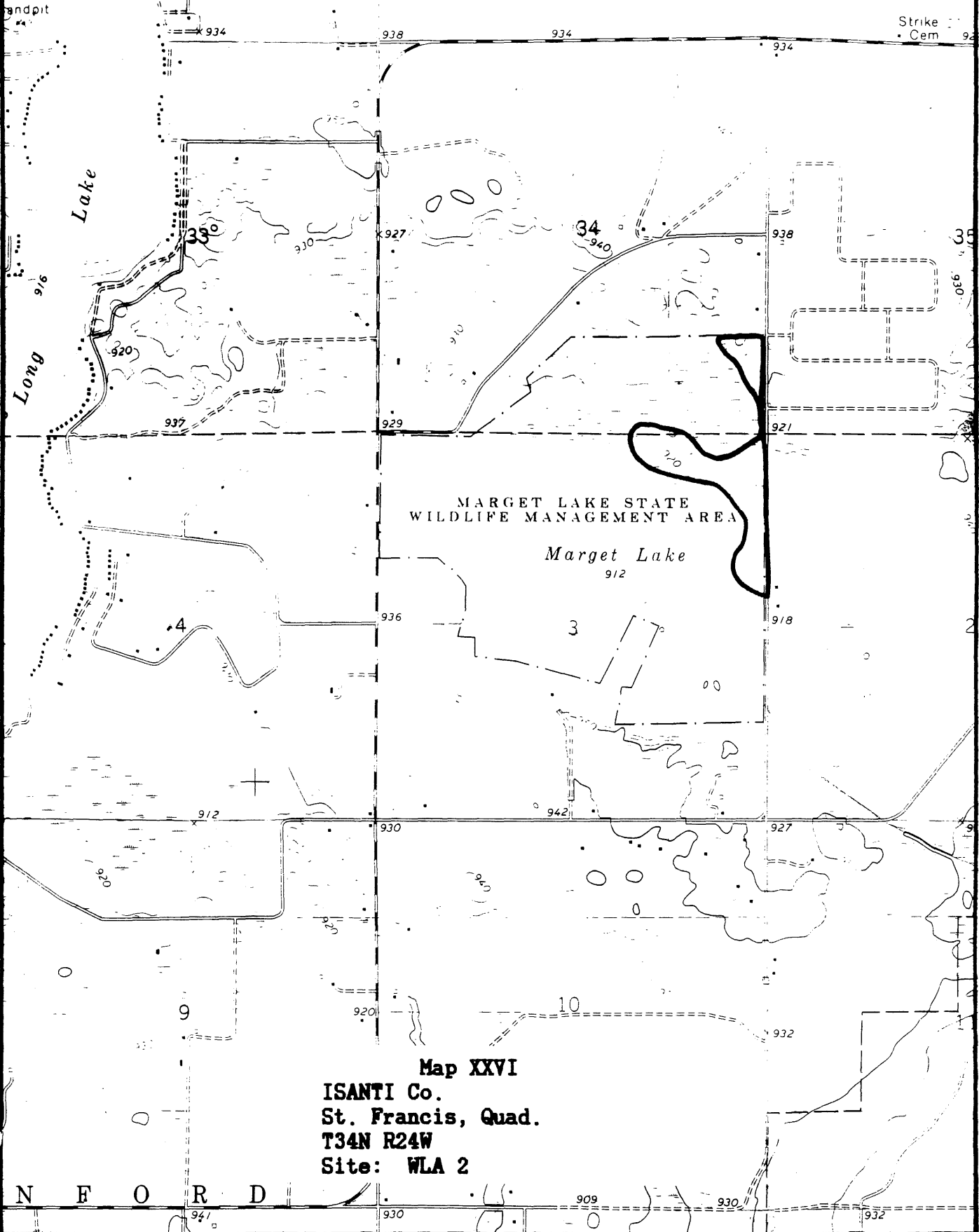
ANOKA Co.
Linwood, Quad.
T33N R23W
Site: Carlos Avery

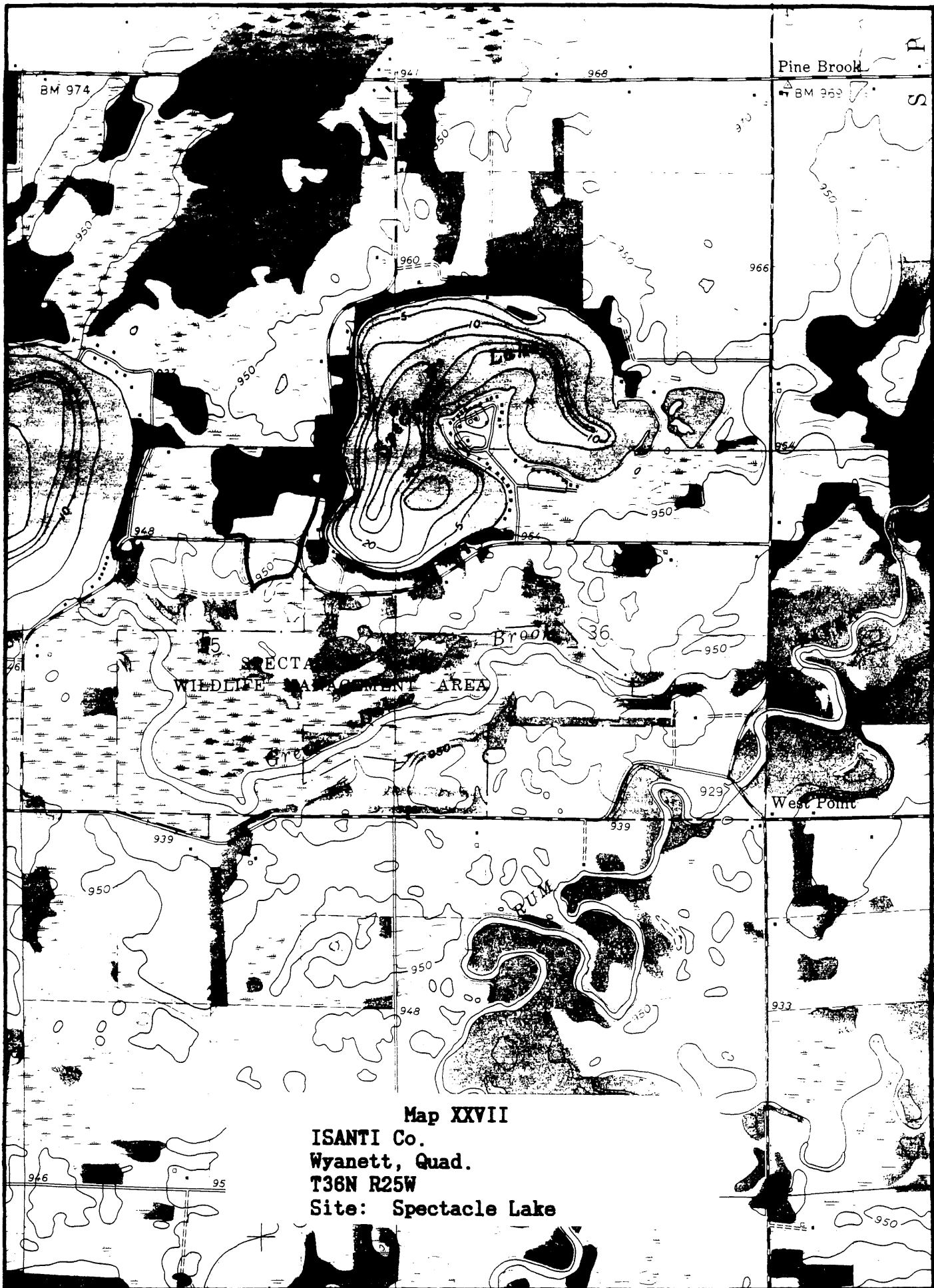






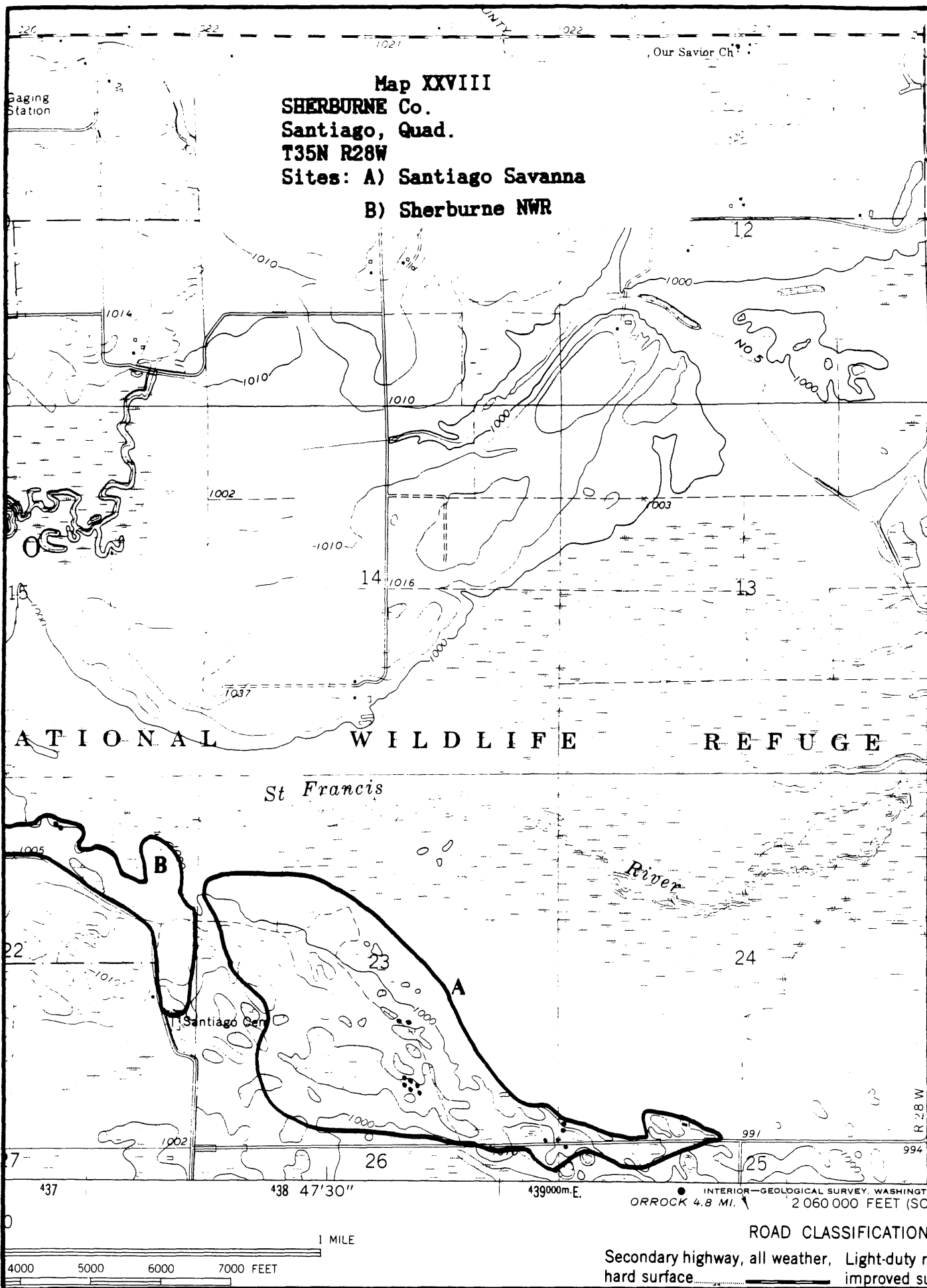
B R A D F O R D



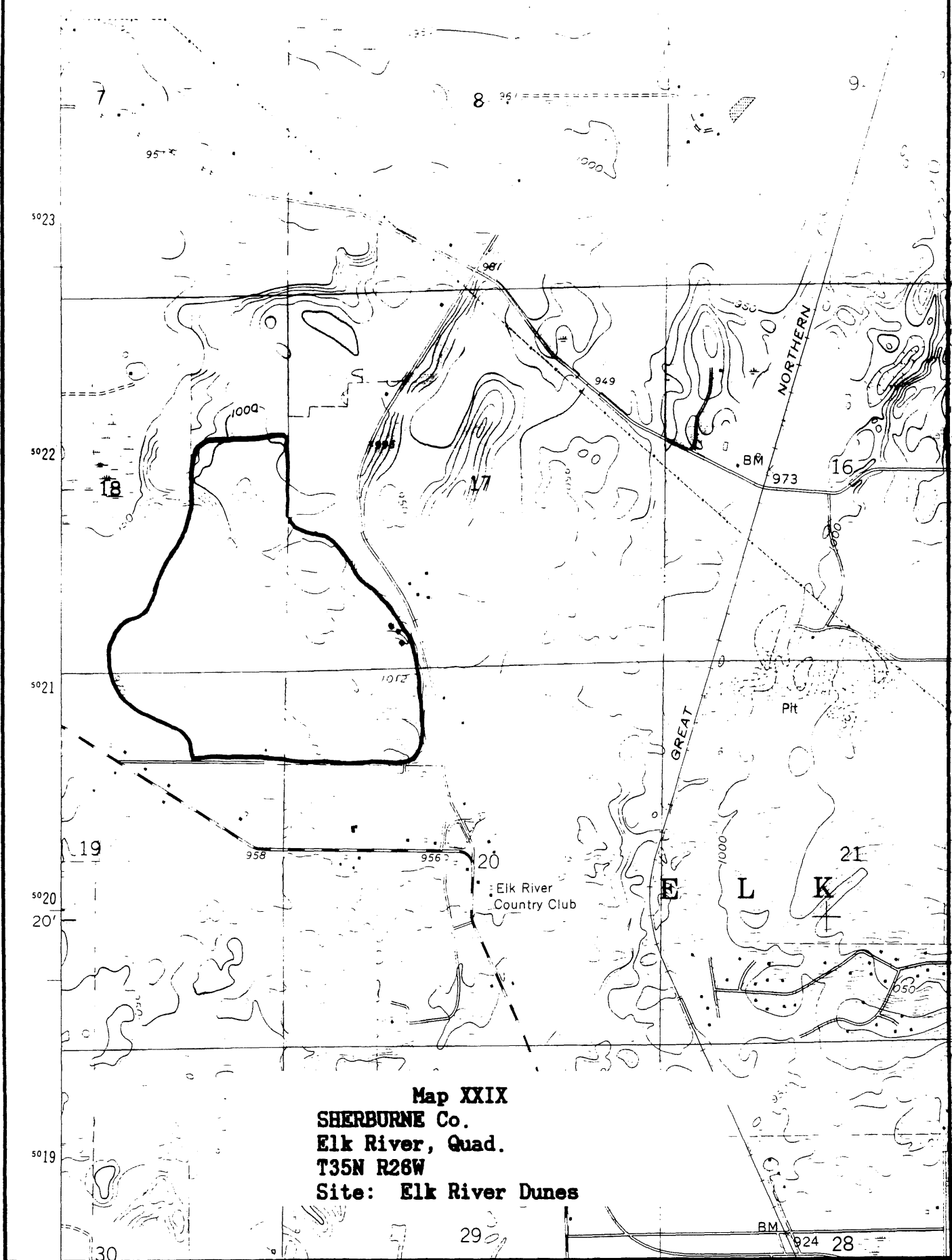


Map XXVII

ISANTI Co.
Wyanett, Quad.
T36N R25W
Site: Spectacle Lake

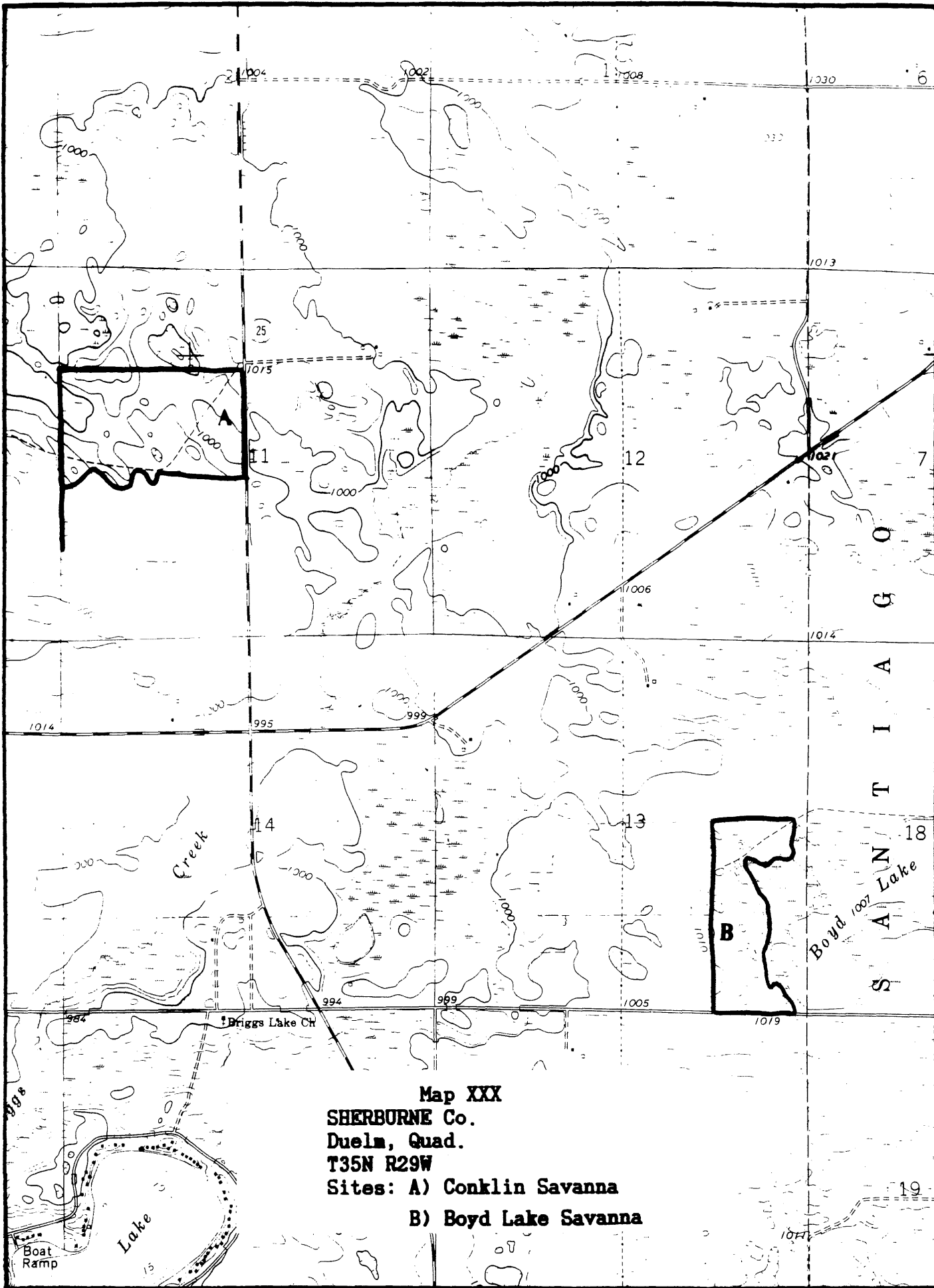


201 17N



Map XXIX
SHERBURNE Co.
Elk River, Quad.
T35N R26W
Site: Elk River Dunes

BM 824 28



Map XXX
SHERBURNE Co.
Duelm, Quad.
T35N R29W
Sites: A) Conklin Savanna
B) Boyd Lake Savanna



Map XXXI
SHERBURNE Co.
Orrock, Quad.
T30N R27W
Site: Orrock 9 West

