

A STUDY OF BALD EAGLES
WINTERING ALONG THE MISSISSIPPI RIVER BETWEEN
ST. PAUL AND RED WING, MIN., AND THE ST. CROIX RIVER
SOUTH OF HUDSON, WIS.
1987 - 1990

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EXECUTIVE SUMMARY

Bald Eagles (Haliaeetus leucocephalus) were studied during winter along portions of the St. Croix River, from Hudson Wis. to its confluence with the Mississippi River at Prescott Wis., and along the Mississippi River from Prescott Wis. to the north end of Lake Pepin. Literature searches, interviews with wildlife managers, biologists, and local residents were used along with ground searches to locate winter use areas. At these areas counts were made of eagle foraging and night roosting. The study encompassed three field seasons; the winters of 1987-88, 1988-89, and 1989-90.

Nine winter use loactions were identified and monitored. Pigs Eye Island (PEI) (river mile (rm) 836 - 832) was the northernmost area studied. PEI was used during this study for feeding (high of 13 birds), and nesting. No roosting was observed although other studies have documented this behavior at PEI. Grey Cloud Island (rm 828 - 817) was used only during spring and fall for both feeding and roosting. Prescott, Wis. (rm 812 - 808) was used on a regular basis during the study as a feeding site by up to 19 eagles. Eagle Point/Big River Coulee (rm 807 - 805) and North Lake (rm 804 - 802) were used as roosts with feeding occuring nearby along the Mississippi River. Both of these areas had fluctuating use with numbers at the Eagle Point area declinig during the study, possibly due to residential development in the area. Two other areas along the Mississippi

River were also studied; Diamond Bluff (rm 801 - 800) and Prairie Island Lock and Dam #3 (rm 797). Both of these areas were used for feeding, but accurate counts were difficult to obtain from the ground.

Eagles congregated along the St. Croix River before it froze at Lake Mallalieu in Hudson, Wis. in large numbers (up to 77 birds) when fish die-offs occurred. A few birds were seen all winter at the Kinnickinic delta.

The availability of a food source and open water seemed to be the most important factors in determining where eagles congregated. Adults typically outnumbered immatures during the winter. Large movements of eagle did not take place except during migration. Night roosting seems to occur in trees along the river as well as at comunal sites in more protected areas away from the river. Protection of feeding and roosting sites is important in maintaining healthy Bald Eagle populations in the North-Central United States.

ACKNOWLEDGEMENTS

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INTRODUCTION

Bald Eagles (Haliaeetus leucocephalus) use the Mississippi River and its associated tributaries during the winter for foraging, daytime resting, and evening roosting (Milsap 1986, Dunstan 1987). Foraging eagles congregate near open water in search of food which includes fish, waterfowl and carrion (Stalmaster 1987). Eagles also use inland sites where farming operations provide a source of food in the form of dead domestic animals left in fields (Harper et al. 1988). Bald Eagles spend up to 90% of the day resting (Stalmaster 1987), usually preferring dead snags or limbs near their foraging area (Steenhof et al. 1980, Stalmaster and Newman 1979).

During the winter Bald Eagles often congregate in protected areas during the night where they rest and sleep (Stalmaster 1987). Studies have shown that these evening roosts provide protection from winds and storms, are usually located near foraging areas, contain large trees, and sometimes are used by large numbers of birds (Keister and Anthony 1983, Steenhof 1978). Identification and protection of roosts is important to successful management of Bald Eagle populations, especially in the coldest, northern parts of their range (Grier et al. 1983).

Analysis of National Wildlife Federation winter count data by Milsap (1986) revealed that 30% of the Bald Eagles wintering in the lower 48 states from 1979 to 1981 were located on the Mississippi, Illinois, or Missouri River systems. Dunstan (1987)

STUDY AREA AND METHODS AND MATERIALS

The study area included the Mississippi River from St. Paul, Minn., river mile (rm) 836, to the north end of Lake Pepin (rm 784), and the St. Croix River from Hudson, Wis. (rm 17) to its confluence with the Mississippi River at Prescott, Wis. (Fig. 1). In all, nine sites were used for counts and observations (Table 1). Seven sites were along the Mississippi River, and two were on the St. Croix River. Three sites, Pigs Eye Island (PEI), Prscott, Wis. (PRE), and Prairie Island/Lock and Dam #3 (LD3), had been identified prior to the begining of this study in the literature or by local sources. An additional six sites were identified during the course of the study by ground searches or in conjunction with aerial surveys conducted by MDNR (J. Galli, pers. com.). These areas were; Grey Cloud Island (GCI), Eagle Point/Big River Coulee (EPB), North Lake (NLA), and Diamond Bluff (DIA) on the Mississippi River and Lake Mallalieu (MAL), and the Kinnikinic area (KNC) on the St. Croix River. Exact locations and descriptions of each area is given in the individual sites section and Table 1.

Volunteers (listed in the acknowledgements) were recruited to assist with the ground searches and counts. We counted Bald Eagles along both the Minnesota and Wisconsin sides of the river at each use area. At each site, an observer or observers were placed so as to monitor as much of the site as possible. Observations at roost/feeding sites in 1988-89 began 1/2 hour

Fig. 1

Study Area

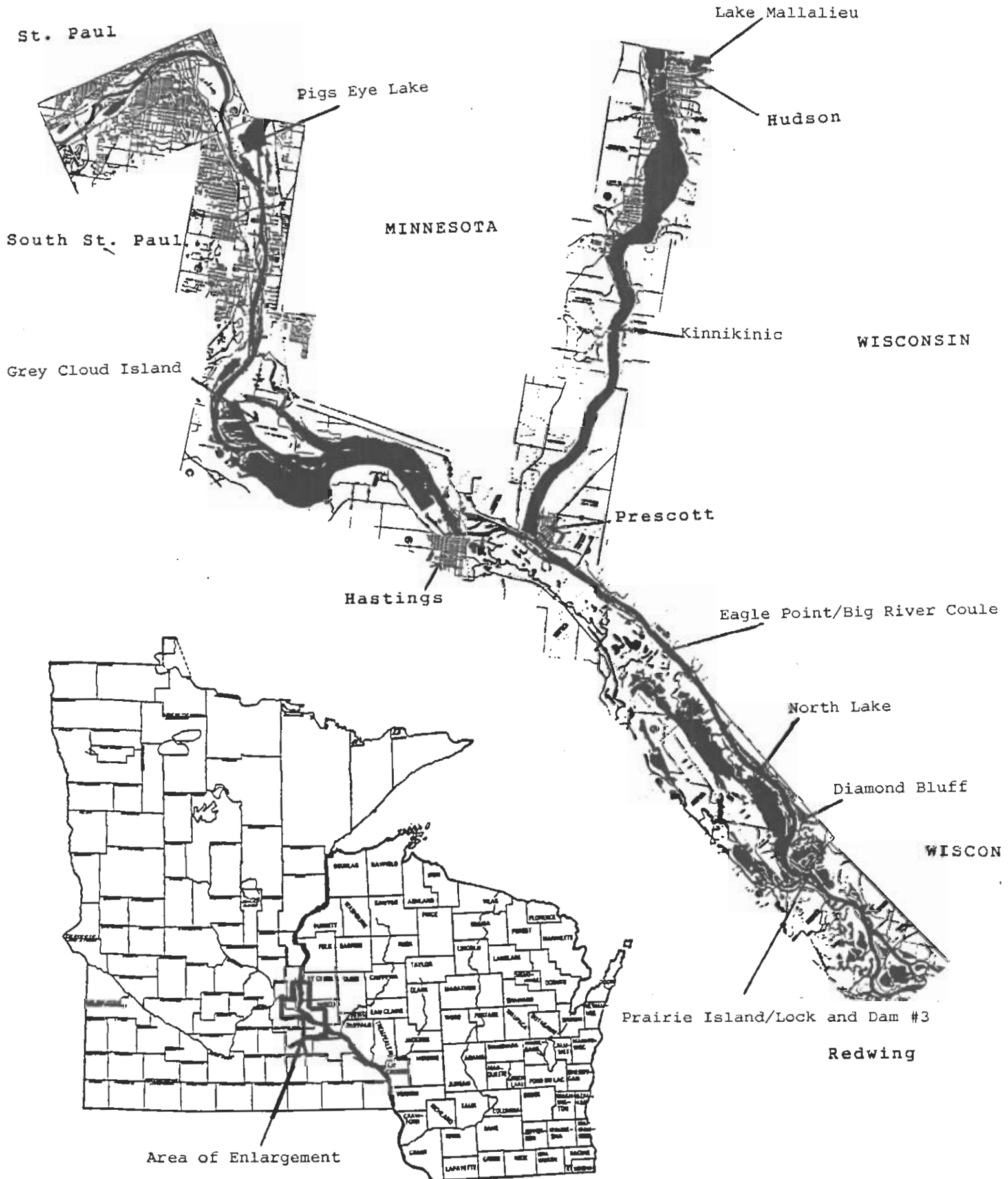


Table 2

LOCATIONS, DATES, TYPES, AND NUMBER OF DAYS
OF BALD EAGLE OBSERVATIONS

| Location | Dates Observed | Type of Observations | Total # Days Observed |
|----------|-----------------------|-------------------------|--------------------------|
| PEI | 12/07/87- 03/29/88 | weekly | 33 |
| | 11/07/88- 03/28/89 | weekly | 61 |
| | 11/01/89- 03/21/90 | weekly | 54 |
| GCI | 12/07/87- 03/29/88 | non - systematically | 31 |
| | 11/10/88- 03/29/89 | non - systematically | 24 |
| | 02/18/90- 04/01/90 | non - systematically | 5 |
| PRE | 11/13/88- 03/31/89 | weekly | 58 |
| | 11/05/89- 04/11/90 | bi-weekly | 93 |
| EPB | 01/04/89- 04/04/89 | weekly | 24 |
| | 11/01/89- 03/07/90 | weekly | 27 |
| NLA | 02/26/90- 04/11/90 | weekly | 8 |

Table 2 (Cont.)

LOCATIONS, DATES, TYPES, AND NUMBER OF DAYS
OF BALD EAGLE OBSERVATIONS

| Location | Dates Observed | Types of Observation | Total # Days Observed |
|----------|-----------------------|-------------------------|--------------------------|
| LD3 | 11/24/88- 03/18/89 | non- systematically | 19 |
| | 11/21/89- 04/11/90 | weekly | 35 |
| DIA | 11/19/89- 02/16/90 | non - systematically | 56 |
| MAL | 11/19/88- 04/01/89 | non - systematically | 17 |
| | 11/19/89- 04/01/90 | non - systematically | 5 |
| KNC | 11/08/89- 03/12/89 | weekly | 38 |
| | 11/20/89- 04/10/90 | non - systematically | 28 |

RESULTS AND DISCUSSION

The highest concentrations of eagles seen during this study were at MAL where 77 were seen on 29 November 1988, and 63 were seen on 25 November 1988. We recorded eagles feeding and roosting at this area only between 19 November and 9 December of 1988, 10 March to 1 April 1989, and again on 11 November 1989. We believe that this area is not a winter use area and these sporadic concentrations were due to a sudden rough fish die-offs in the Willow River or Lake Mallalieu.

The second highest concentrations occurred at NLA where 45 eagles roosted on 4 April 1990. Eagles were seen in the roost each day we counted between 26 February and 11 April 1990 for an average of 31.4 (n=8) birds. This area appears to be an important roost site for Bald Eagles feeding on the Mississippi River between Prairie Island, Minn. and Prescott, Wis.

Thirty-six birds were seen at LD3 on 19 November 1989. The average number of eagles seen daily at LD3 during 1989-1990 was 7.3 (n=21) (Table 3). Our results probably underestimate the actual number of eagles in this area because we could not observe all potential roost and feeding areas from the ground.

Other sites in the study area were not as heavily used; high counts ranged between 19 at EPB, GCI and PRE, and 2 at KNC. The daily average number of eagles seen ranged between 6.4 at GCI (n=10), and 1.5 at KNC (n=8) (Table 3). During the winter of 1988-89 EPB was used on 83.3% of the nights observed with an

average of 8.25 eagles (n=20) per active night. This dropped in 1989-90 to use on 59% of the nights observed and 5.3 birds (n=16) per active night. The drop in the average number of birds using this roost is significant at the $p>0.1$ level ($t=1.83$, $df=33.5$). We believe that houses built at the entrance to Eagle Point Coulee and on the bluff tops between Eagle Point and Big River Coulee may have been a factor in reducing eagle numbers at this roost.

Bald Eagles did not use all sites during all months of the study. Sites that were consistently used by eagles included: PEI, PRE, KNC, EPB, LD3, and DIA. GCI and MAL were used as migratory stopovers during spring and fall of some years. Food availability (ie. fish die-offs), and possibly weather patterns, probably determine the extent of use of these areas. GCI was used most intensively in March 1988, with sporadic sightings in December 1987, November and December 1988, and February and March of 1990.

Eagle use of the sites was varied, with some areas used for feeding and daytime resting, roosting, or a combination. Sites which were used exclusively for feeding included PEI, PRE, KNC, LD3, and DIA. Of these four areas, Prescott and Prairie Island had the highest concentrations of eagle use. Both of these areas have open water all winter. We observed feeding but not roosting at PEI, although other studies report that it was an evening roost location (Lane et al. 1986). Our count of 13 birds at PEI during 1990 is the highest recorded for that area. High counts

dating back to 1986 have been steadily increasing. The differences in study designs make direct comparisons difficult however.

EPB was used exclusively as a roost area, although during times of open water eagles were seen resting and foraging along the river adjacent to these coulees. NLA seems to be used primarily as a roost site, although feeding was observed on North Lake and adjacent areas of the Mississippi River during periods of open water. Because this area is an island, the lack of human disturbance and access may attract the high number of roosting birds seen here. This contrasts with the Eagle Point/Big River Coulee area which is easily accessed by humans and undergoing development.

Management of this part of the Mississippi and St. Croix rivers for wintering eagles should recognize that both feeding and roosting areas are needed, and that some areas are used on an irregular basis. The roosts which were the most heavily used during this study included North Lake, which is a wildlife management area administered by MNDNR, and Wacouta Bay, which is privately owned. Management recommendations for Wacouta Bay were drawn up separately (Martell et al. 1990). Both Pigs Eye Island and Lock and Dam #3 have importance as roosting, feeding, and nesting areas to Bald Eagles. These areas are both currently under public ownership (PEI by St. Paul Park and Rec., LD3 by U.S. Army Corp. of Engineers). Currently, management of these

areas is not directed towards eagles. However, in the future, eagle management should be given a high priority.

Increasing Bald Eagle populations (U.S.F.W.S. 1990) will probably result in more use of the Upper Mississippi River as a migratory corridor and wintering area in the future. Continued monitoring of known roosts and protection of important congregating areas is necessary. Individuals, and both public and private agencies, have a role to play in assuring that roosting habitat is protected, and managed to benefit eagles during the winter months.

Table 3

BALD EAGLES COUNTED AT 9 LOCATIONS
ON THE MISSISSIPPI AND ST. CROIX RIVERS

| Location | 1987-1988 | 1988-1989 | 1989-1990 |
|----------|--|---|--|
| PEI | $\bar{x}= 4.0$ h=10 l= 1 n=33 | $\bar{x}= 2.8$ h= 9 l= 1 n=46 | $\bar{x}= 2.9$ h=13 l= 1 n=44 |
| GCI | $\bar{x}= 6.4$ h=19 l= 1 n=10 | $\bar{x}= 1.9$ h= 5 l= 1 n= 7 | $\bar{x}= 4.5$ h= 7 l= 2 n= 2 |
| PRE | | $\bar{x}= 6$ h=19 l= 1 n=45 | $\bar{x}= 4.9$ h=16 l= 1 n=76 |
| EPB | | $\bar{x}= 8.68$ h=19 l= 1 n=19 | $\bar{x}= 5.3$ h=12 l= 1 n=16 |
| NLA | | | $\bar{x}=31.4$ h=45 l=10 n= 8 |
| LD3 | | $\bar{x}= 3.7$ h=10 l= 1 n=16 | $\bar{x}= 7.3$ h=36 l= 1 n=21 |
| DIA | | | x= 3 h=15 l= 1 n=20 |

Table 3 (Cont.)

BALD EAGLES COUNTED AT 9 LOCATIONS
ON THE MISSISSIPPI AND ST. CROIX RIVERS

| Location | 1987-1988 | 1988-1989 | 1989-1990 |
|----------|-----------|--|--|
| MAL | | $\bar{x}=18.5$ h=77 l= 2 n=14 | $\bar{x}=39$ h=39 l= - n= 1 |
| KNC | | $\bar{x}= 5.5$ h=21 l= 1 n=28 | $\bar{x}= 1.5$ h= 2 l= 1 n= 8 |

x= Average number of eagles seen, n= Number of observations

h= High count, l= Low count

INDIVIDUAL SITES

PIGS EYE ISLAND

Site Description

Located south of Holman Airfield in St. Paul, Minn., on the east side of the channel of the Mississippi River, rm 836 - 832 (Fig. 2).

Bald Eagle Use of the Area

The Pigs Eye Island (PEI) area was consistently used by Bald Eagles during the course of the study. Monthly high counts ranged from 3 (December 1988 and November 1989) to 13 birds (February and March 1990). Monthly high counts during the winter of 1988-89 were lower than those from the winters of 1987-88 and 1989-90. During the 1987-1988 field season, Bald Eagles were seen on all 22 of the observation days (100%). During the 1988-1989 field season, eagles were seen on 46 of the 61 days of observation (76%). During the 1989-1990 field season, eagles were seen on 44 of the 54 days of observation (82%).

In the spring of 1988 a pair of eagles, which included a released rehabilitated female wearing a wing marker, nested on the shore of Pigs Eye Lake. This nest was blown down about 10 days after the start of incubation (Martell et al. 1990b). The eagles did not attempt to renest that year but they were

Occasionally seen in the PEI area throughout the summer, and nest rebuilding occurred in the fall of 1988. In 1989, the pair built a new nest in the middle of the island and successfully nested and fledged one chick. In 1990, this female nested again and hatched at least one chick. Two weeks after the eggs hatched, the female disappeared and was not seen again. A new female in transitional plumage was seen at the nest two days later. She remained in the territory and was seen feeding the chick. One chick was successfully fledged from this nest in 1990.

Night Roost Area

Lane et al. (1986) using radio telemetry reported roosting on the southern end of Pigs Eye Island #1 from 21 December 1985 through 21 January 1986.

During February 1988, we observed the resident pair as well as other eagles flying downriver away from PEI just before dark and flying upriver to PEI in the morning. This leads us to believe that the eagles using Pigs Eye Island had alternate roosting spots downriver of the Hwy 494 bridge. Our attempts to locate the roost(s) during this study were not successful.

Foraging Area

Eagles at PEI have been seen chasing ducks, and catching fish (Lane et al. 1986). We observed them feeding on fish and unidentifiable carcasses on the ice, and on one occasion apparently take something directly below the nest tree.

We noted five areas used by the eagles at PEI: 1) The nest and various perching trees in its vicinity (area 1, Fig. 2), was the area at which eagles were seen most often. 2) Trees located on the west bank of the Mississippi River (area 2 Fig. 2) were used as perches during the study. Immature eagles and the nesting pair were seen hunting from these perches. These perches seemed to be important hunting spots overlooking the open water of the Metropolitan Sewage Treatment plant during times that other portions of the river were frozen. 3) Eagles were also seen perched at the treatment plant channel mouth (area 3, Fig. 2). 4) Eagles were seen on the southern tip of the island (area 4, Fig 2). 5) The west shore of Pigs Eye Lake (area 5, Fig 2) was used by the nesting birds during days of high winds or inclement weather. The trees there most likely provided good protection from the prevailing westerly winds. Eagles were also seen diving below the tree line in the Pigs Eye Lake area from the Concord Road observation point. Although the lake remained frozen all winter, a barge channel servicing Terminal Road was kept open making fish and waterfowl available to the eagles.

Artificial perches, erected in Spring of 1989 to replace trees removed or cut on the north end of the island, were not observed being used during our study. These poles were checked regularly on visits to PEI.

Vegetation and Environmental Components

Pigs Eye Lake is situated in the Mississippi River flood plain of south-eastern Ramsey county. The vegetation on the two islands is composed mainly of box elders (Acer negundo), red maples (Acer rubrum), eastern cottonwood (Populus deltoides), and willow (Salix nigra) (Adams et al 1973).

Special Hazards to Eagles

Barge traffic is common in this area, which may not pose a direct physical danger to eagles, but does create a human presence in the area which could potentially disturb some birds. Parking of barges can damage trees which the eagles use to rest and hunt from. Air traffic from Holman Airfield flies over this site and poses the threat of collisions with birds. PEI is surrounded on all sides by city roads and major highways. These pose the threat of collision and mortality to eagles. The possible contamination of the prey base by heavy metals and polychlorinated biphenyls (PCBs) (Hora 1984) could also have a negative effect on eagles wintering and nesting here.

Site Use History

Adams et al. (1973) conducted an extensive study on the Pigs Eye Lake heron colony and made no mention of Bald Eagle use of the area. They reported that PEI was heavily disturbed by humans, pollution levels were high, and leeching from the city

dump added to the pollution problems. Logging roads transected the islands, leaving little vegetation. Logjams and flooding added to the sparse vegetation and pollution. In 1979, Hoyle, Tanner and Associates prepared an Environmental Assessment for improvements to the St. Paul downtown airport. They, also, did not recognize any eagle use of the area (Barton-Aschman 1987).

Lane et al. (1986) reported on Bald Eagle use of the PEI area during February and March of 1986. They documented up to 5 eagles using this area for foraging, which was higher than anything previously reported. They documented roosting at PEI during December of 1985 and January 1986, and they believed that roosting did occur at River Lake, 8 km south of PEI.

A study conducted in 1987 using radio-tagged rehabilitated eagles and visual observations documented roosting and foraging by up to 6 eagles (Barton-Aschman 1987). The authors noted that weather patterns and numbers of waterfowl probably affected Bald Eagle use of the area, but offered no data in support of this. In the spring of 1989, artificial perches were erected to compensate for trees cut down during a runway expansion at Holman field. As stated earlier, use of these perches by the eagles was not observed during our study.

GREY CLOUD ISLAND

Site Description

This area is located approximately 16 km south of PEI in Spring Lake (Mississippi River) rm 828 - 817 (Fig. 3).

Bald Eagle Use of the Area

Bald Eagles made limited use of GCI during all three field seasons (1987-1990). The highest concentrations of eagles seen was during March 1988 when the average number was 8.7/day (n=6). During the 1988-1989 field season, eagles were observed at GCI seven times between 10 November 1988 and 29 March 1989. The most seen during this time was 5 on 24 November 1988. No birds were observed between mid-December and mid-March. During the 1989-1990 field season only five observations were made between 18 February 1990 and 1 April 1990. Seven eagles were seen on 18 February, and 2 were seen on 2 March 1990.

Night Roost Area

Eagles roosted in trees on the edge of the downriver side of the small islands. Roosting was observed at GCI on four occasions: 17, 18, 21, 22 March 1988. No birds were documented roosting here during the 1988-1989, or 1989-1990 field seasons.

Foraging

Bald Eagles were seen successfully hunting and fishing in this area. No prey items were identified.

Vegetation and Environmental Components

Grey Cloud Island is a mixture of american elm (Ulmus americana), black ash (Fraxinus nigra), and eastern cottonwoods (Populus deltoides).

Special Hazards to Eagles

We do not currently recognize any special hazards to eagles in this area.

Site Use History

No information on eagle use of this area was available.

ER GROVE
HEIGHTS

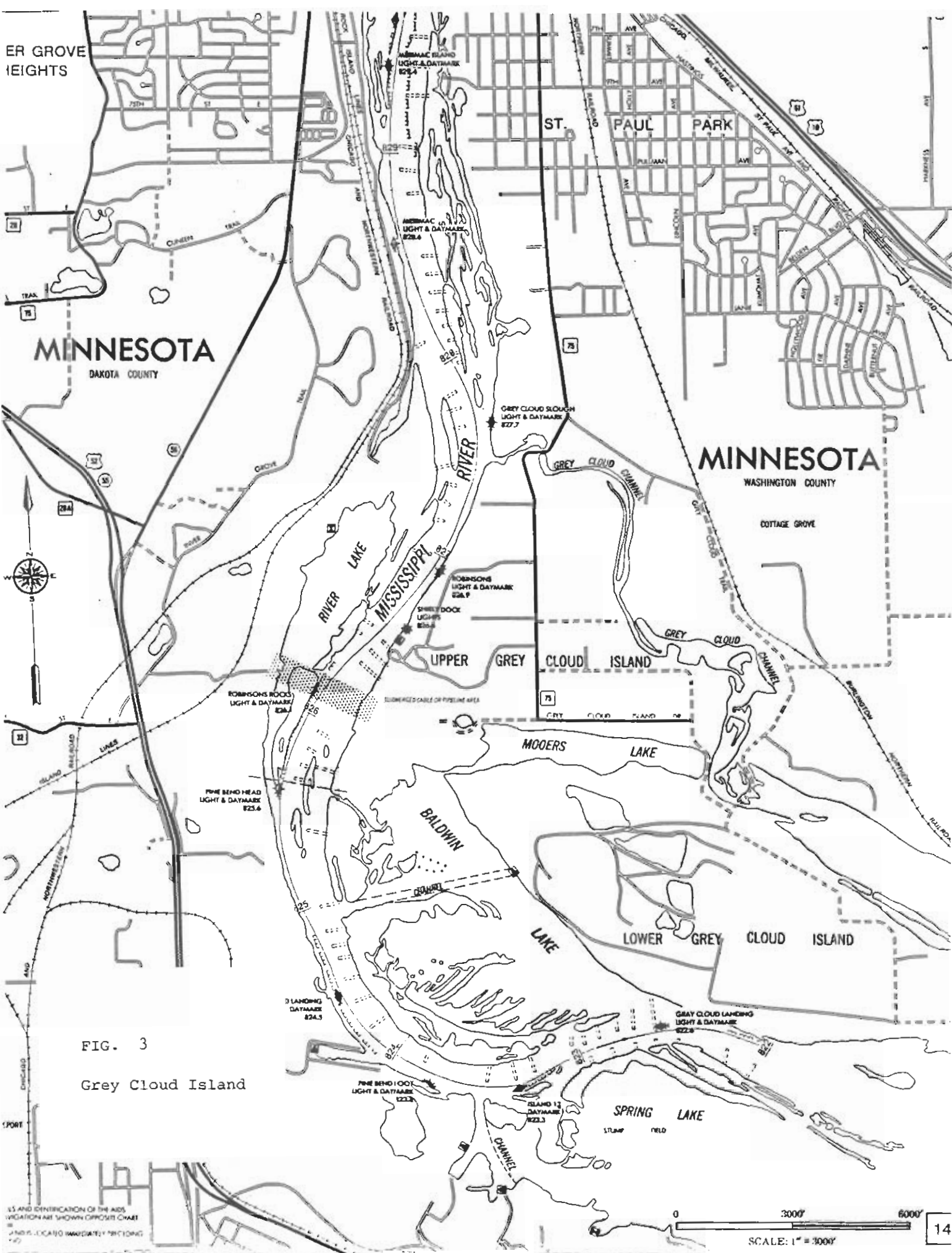


FIG. 3

Grey Cloud Island

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INDICATED ARE SHOWN OPPOSITE CHART
AND IS LOCATED IMMEDIATELY PRECEDING
THE

SCALE: 1" = 3000'

PRESCOTT

Site Description

The Prescott, Wis. site (PRE) is located south of Prescott, Wis., rm 812 - 808. The area frequented by eagles consists of Prescott Island, and the river banks downriver to rm 808 (the tip of Gores Wildlife - Management area) (Fig. 4).

Bald Eagle Use of the Area

Eagles were seen on 45 of 58 days (78%) we observed in 1988-89, and on 76 of the 93 days (82%) we observed in 1989-90. Nineteen birds were observed on 30 December 1988, the highest number observed during the 1988-1989 field season. This compares with 16 on 20 February 1990, the highest number recorded in 1989-1990. The average number of eagles seen per visit in 1988-1989 was 6 ($n=45$, $s.d.=23$), while the average number of eagles observed in 1989-1990 was 4.9/visit ($n=76$, $s.d.=11.95$) (Table 3). The difference between these years was not significant ($p=0.21$, $df=119$).

Night Roost Area

Roosting was not observed at PRE during this study.

Foraging

Eagles were regularly observed fishing and hunting in this area. Large concentrations of waterfowl migrate along the Mississippi during fall and spring, providing an abundant food source for eagles.

Vegetation and Environmental Components

This area is a mixture of elm (Ulmus americana), ash (Fraxinus), and cottonwood (Populus deltoides) (Major Forest Types-1977 Inventory).

Special Hazards to Eagles

Powerlines crossing the river, and the heavily used Hwy. 10 bridge, pose the danger of collision related mortality to eagles in this area. A marina and recreational boat traffic may cause disturbances to the birds, particularly in spring and fall.

Site Use History

During the winter of 1975-1976, Craig Faanes studied wintering Bald Eagles along the Mississippi River in the vicinity of Prairie Island Nuclear Generating Plant, Minn.. The study area was 22 miles long, between Prescott, Wis. and Colville Park at Red Wing, Minn.. Twenty-nine percent of the eagles he observed were in the Prescott area. The peak number of eagles seen was 18 at Prescott on 22 January 1976. This was after a week of temperatures below -13 C (Faanes, 1976). During his study, Prescott had very little human development along the river.

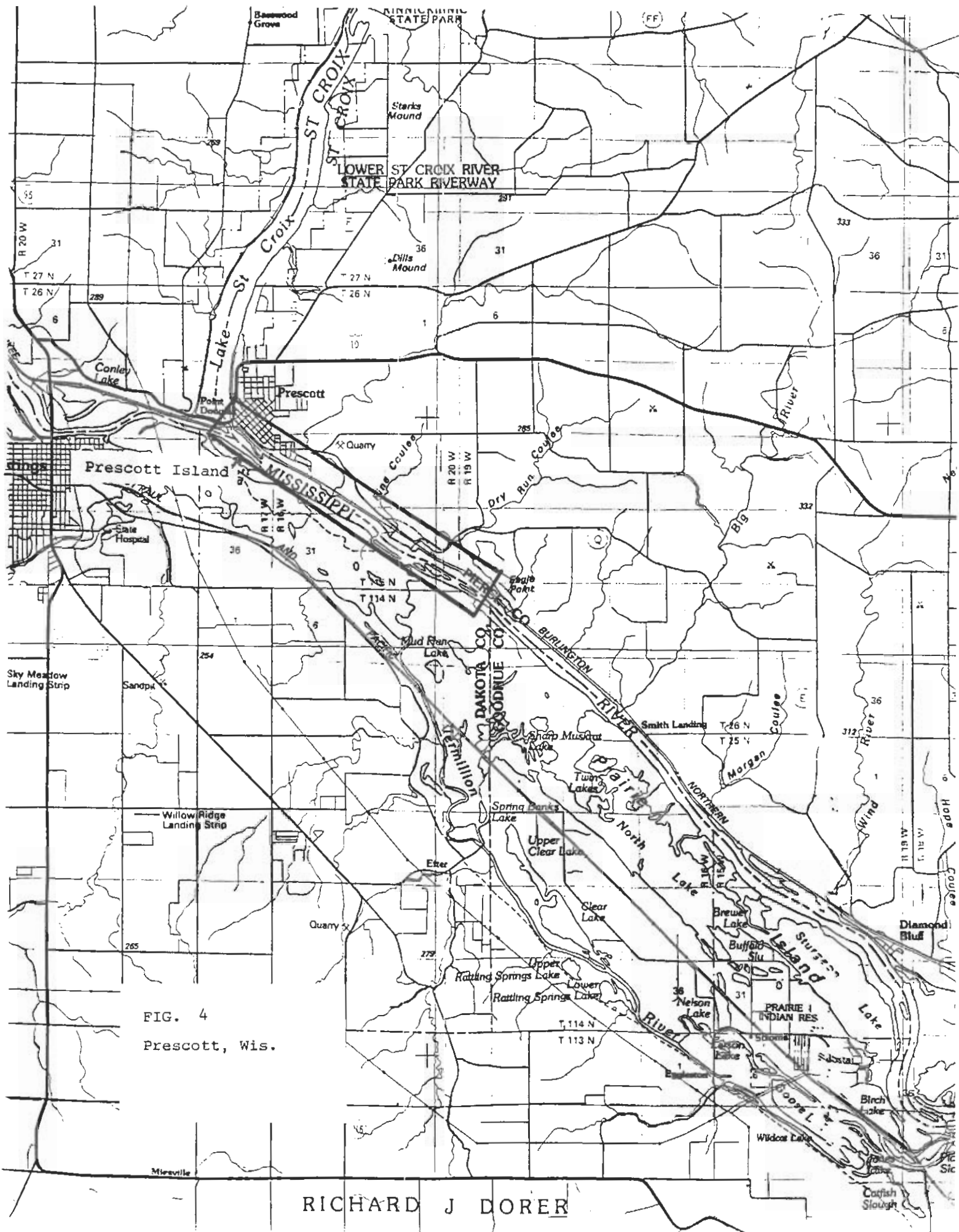


FIG. 4
Prescott, Wis.

RICHARD J DORER

EAGLE POINT/BIG RIVER COULEE

Site Description

The Eagle Point/Big River Coulee site is located in Wis., along the Mississippi River, 2.5 km south of Prescott, Wis., between rm 807 and rm 805. It includes three coulees: Eagle Point, an unnamed coulee, and the Big River Coulee (Fig. 5).

Bald Eagle Use of the Area

We first became aware of this area during the winter of 1988 - 1989. The unnamed coulee was used as a roost site by eagles in 1988-89 and 1989-90. Big River Coulee was used as a roost during the 1989 - 1990 field season.

We did not observe eagle use of the roosts during the day except when winter storms struck the area. During these days, the eagles stayed in the roosts which probably served as protection from the winds and cold, behavior that has been noted elsewhere (Stalmaster 1987).

Night Roost Area

We observed roosting eagles in the Eagle Point and Unnamed coulee roosts on 19 of 23 evenings we did counts (82.6%) between 4 January 1989 and 4 April 1989. An average of 8.68 eagles used the roosts on those evenings. The highest numbers of roosting eagles occurred in late January and February with a peak of 19 birds seen on 7 February 1989. No eagles were observed in this roost after 29 March.

During the 1989-90 field season, eagles were regularly seen flying south, past Eagle Point and unnamed coulee, but few roosted. On only 4 of 16 nights we observed (25%) did eagles roost in UNC, a substantial drop from the year before. The highest number of eagles seen roosting in UNC in 89-90 was 6, on 3 January 1990, with no more than 2 birds observed on the 3 other nights they were present. No birds were seen roosting in UNC after 31 January. Residential development at the entrance to these coulees and along the tops of the bluffs may have been responsible for the drop off in eagle use at Eagle Point and UNC.

Observations at the Big River Coulee began on 31 Jan. 1990. Eagles were observed roosting on the south bluff 1 mile up from the mouth of the coulee. A high of 12 eagles was seen roosting on 21 January 1990. The average number of eagles seen in Big River Coulee was 10.75 (n=4) (Table 3).

Eagles entered these roosts, from either upriver or downriver, by flying along the river and turning into the coulee, or by cutting across the tops of the bluffs and flying directly down into the roost (Fig.5).

Foraging

Eagles, perched along both the Minnesota and Wisconsin banks of the Mississippi River, were observed foraging in the main river channel. Eagles were seen perching along the Mississippi River banks, favoring the large dead snags along the Minnesota side of the Mississippi River.

Vegetation and Environmental Components

This section of the bluffs along the Mississippi River is an elm (Ulmus americana)/ash (Fraxinus nigra)/cottonwood (Populus deltoides) community.

Special Hazards to Eagles

Both unnamed coulee and Big River Coulee are privately owned. Big River coulee is scheduled for residential development, which would include a golf course on top of the south bluff of the coulee. This is expected to be completed in 1992.

The Big River valley is not currently scheduled for development, except for a road to be put in to service a proposed marina on the Mississippi River. The marina would increase the amount of boat traffic and human contact with eagles. Boat traffic could have an impact on the eagles' flight patterns and the road might disrupt roosting. Condominiums are also planned for the tops of both the north and south bluffs. We believe this increased level of human contact will be detrimental to eagle roosting in the coulee.

Site Use History

There are no records of eagle use of this area prior to this study.

North Lake Area

Site Description

North Lake is located in Minnesota between rm 804 and 802 (Fig. 6) an area which is within the Gores Pool Wildlife Management Area managed by the MNDNR.

Bald Eagle use of the area

Two sites, Miley Run and Jackson Run (Fig. 6), are the areas of highest eagle use. These two runs, which connect the Mississippi River to North Lake, are used for roosting by eagles which feed along the river and on North Lake during the day. The birds moved freely between the runs, oftentimes sitting in one before moving off into the other for the evening.

We located this roost while radio-tracking a rehabilitated Bald Eagle (Martell et al. 1990b), and began making weekly observations from 26 February 1990 through 11 April 1990. The highest number of eagles we saw was 45 on 4 April. The average number seen was 31/visit (n= 8) (Table 3).

Night Roost Area

The birds roosted in two areas; the area surrounding Miley run, and the area surrounding Jackson run (Fig. 6). Jackson run was the area used most often for roosting. Birds seen resting in the trees near Miley run usually flew over to Jackson run for roosting. Birds fed in North Lake when it opened in the middle of March.

Foraging

Eagles were observed foraging on North Lake and the Mississippi River during periods of open water. Much of North Lake remained frozen until the middle of March, compared with the Mississippi River which opened up earlier, around the middle of February. Fish (sometimes left on the ice by ice-fishermen), and waterfowl were the most evident prey available to eagles during both winter and early spring.

Vegetation and Environmental Components

This area is a combination of elm (Ulmus americana), ash (Fraxinus), and eastern cottonwoods (Populus deltoides) (North Central Forest Exp. Sta. 1977).

Special hazards to Eagles

There is heavy barge traffic when the river is open, and during the winter ice fisherman use North Lake. Automobile and snowmobile traffic on the lake is common during the winter, giving rise to the possibility of human disturbance at the roost. The possibility of eagles suffering lead poisoning via consumption of spent lead shot in crippled waterfowl, carrion (deer, etc.), or lead sinkers from fishing should be considered high in this area.

Site Use History

No published records of Bald Eagle use of this area were found.

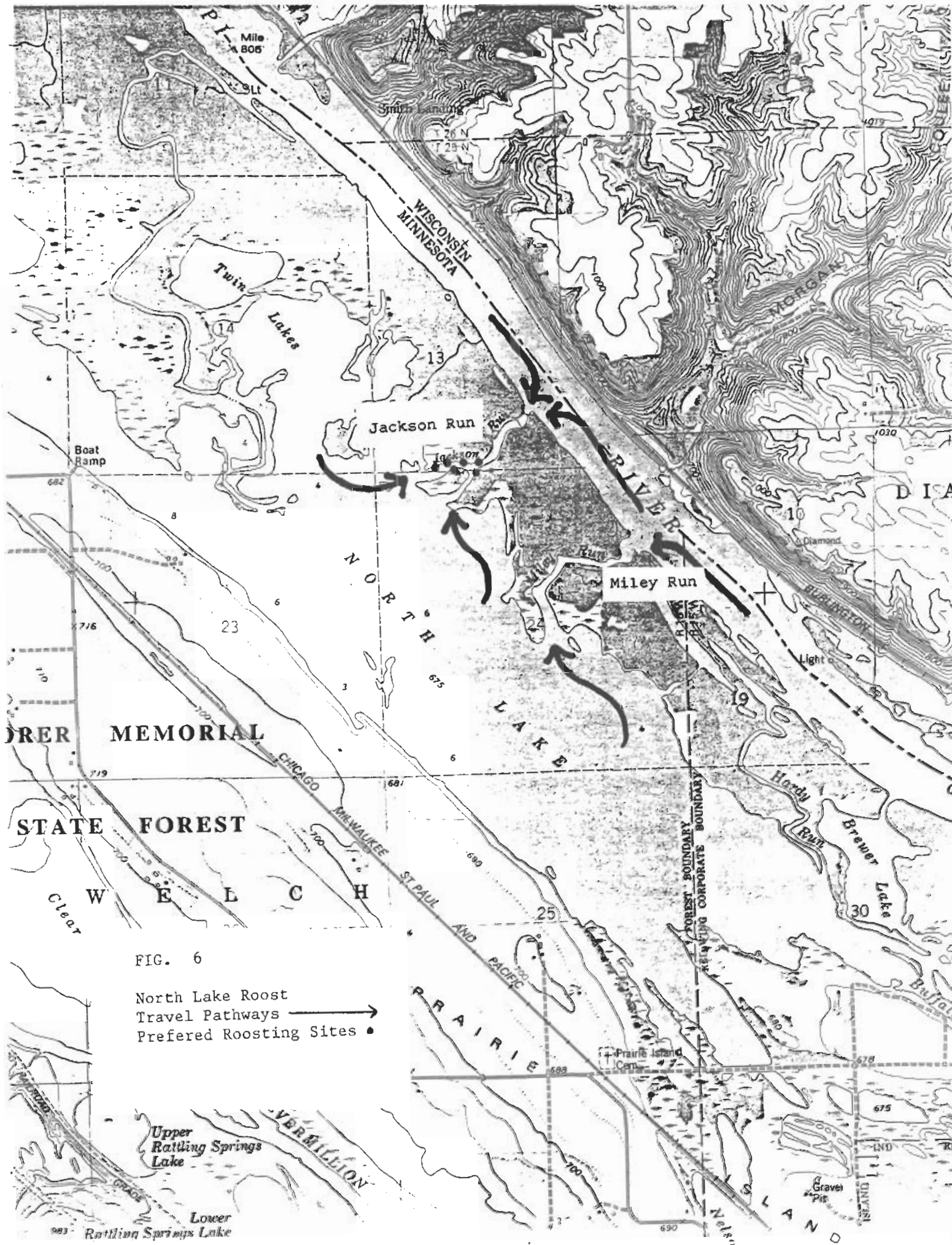


FIG. 6

North Lake Roost
Travel Pathways →
Preferred Roosting Sites •

DIAMOND BLUFF

Site Location

Diamond Bluff, a small town in Wisconsin is located at rm 801 to 800 (Fig. 7).

Bald Eagle use of the area

This area was not systematically observed during the study, but eagles were observed on 20 of the 56 days (36%) we counted at this site. The highest number of eagles seen was 15 on 13 March 1990. Eagles were seen foraging in the river. No roosting was observed.

Night Roost Area

Specific observations for roost counts were not made here. Through radio tracking (Martell et al. 1990b), it was known that during the 1989-1990 field season, eagles did roost in the general vicinity, but no specific roost location was ever located.

Foraging

When the river is open, eagles were observed fishing and hunting and on one occasion, an immature Bald Eagle was seen eating an unidentifiable fish carcass on the ice.

Vegetation and Environmental Components

This area is a mixture of red oak (Quercus rubra), white oak (Quercus alba), and burr oak (Quercus macrocarpa). (North Central Forest Exp. Sta. 1977)

Special Hazards to Eagles

We do not currently recognize any special hazards to eagles at this site.

Site Use History

During the winter of 1975-1976, Craig Faanes studied wintering eagles around the Prairie Island Nuclear Generating Plant and used Diamond Bluff as a observation point. He reported a high of 4 eagles there on 14 February 1976, and saw them on 6 of the 15 days he counted (40%), although only 1 was seen on each of these days (Faanes, 1976).

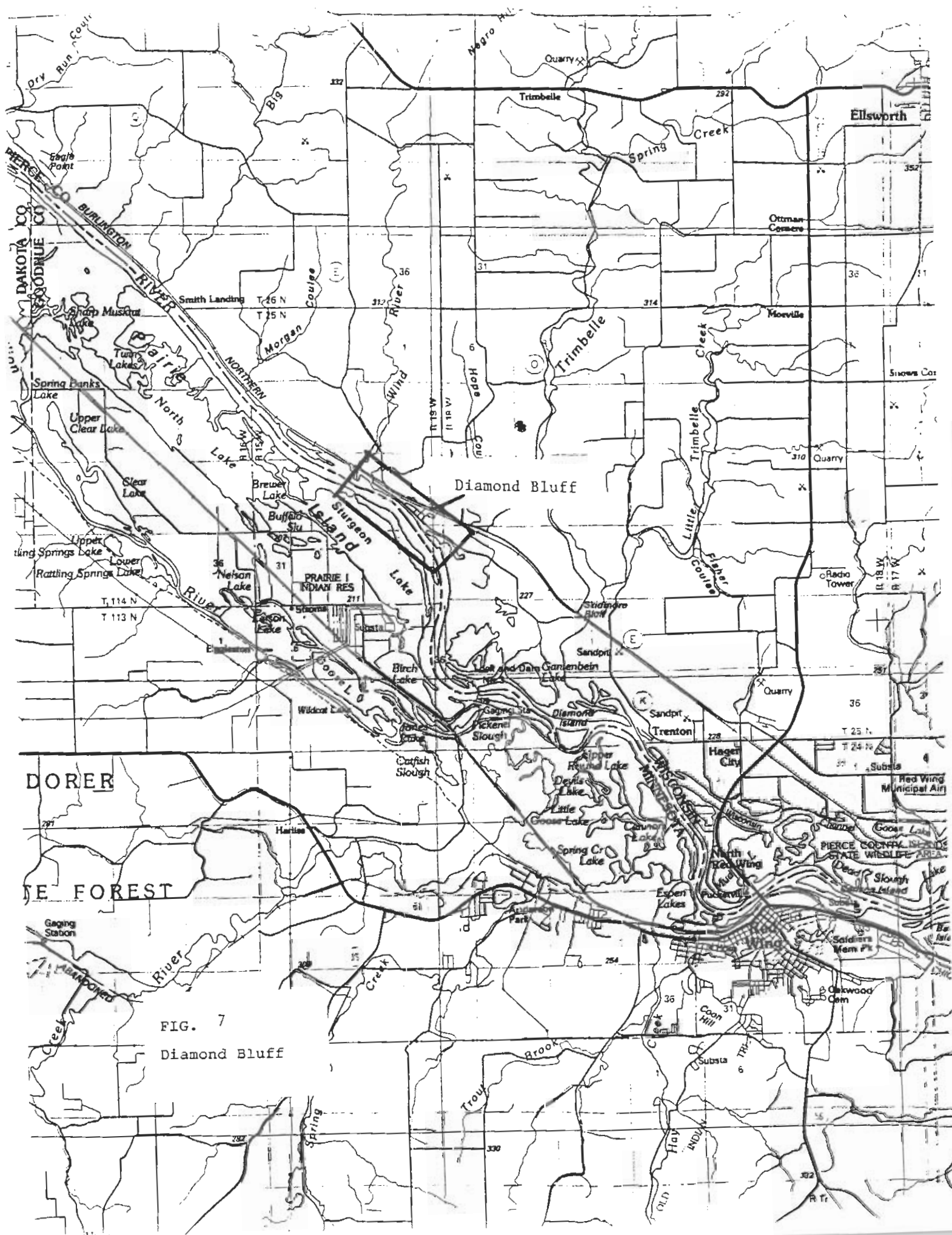


FIG. 7

Diamond Bluff

PRAIRIE ISLAND

Site Discription

This area is located immediately downriver from the Prairie Island Nuclear Plant and Lock and Dam #3, rm 797 (Fig. 8).

Bald Eagle Use of the Area

During the 1988-89 field season observations were made at least once a week, usually in the morning or associated with radio tracking. Prairie Island/Lock and Dam #3 had a high count of 10 eagles on 3 January 1989. Counts during other weeks were not as high, usually around 2-4 birds. Eagles, during the 1988-1989 field season, were seen on 16 of the 19 days (85%) we observed there. A nest was occupied across from the power plant in the summer of 1989 and at least one adult was seen in its vicinity on most observation days. As with the Pigs Eye site, the presence of a territorial pair may have kept other eagles from the immediate area.

During the 1989-90 field season, observations were made at least once a week from 2 November 1989 through 19 February 1990 (Table 2). Two observations were made in March, and one in April. During November 1989, a large number of eagles were seen. The average was 15.8 (n=5), with a high of 36 and a low of 3. The average observed in December was 9.2 (n=5) (Table 3). During this field season, eagles were seen on 21 of the 35 days observed (60%). The breeding pair from the summer of 1988 did not nest in 1990. Ground observations at this site were hampered by limited

access to many areas. Thus, our counts at this site, more than any other, should be taken as a very conservative indicator of Bald Eagle use of the area.

Night Roost Area

Roosting in this area was not observed during our study, however, restrictions on access limited our movements in the area.

Foraging

Because the Lock and Dam #3 generates constantly flowing water and the Prairie Island Nuclear Generating Plant continuously circulates warm water, portions of the river around these areas stay open all winter. Foraging was also observed in these spots during the 1988-1989 and 1989-1990 field seasons. Two adults and one immature were observed feeding on dead shad near the power plant. Foraging was also observed by Faanes in this area during the winter of 1975-1976 (Faanes, 1976).

Vegetation and Environmental Components

This area is a combination of red oak (Quercus rubra), white oak (Quercus alba), burr oak (Quercus lyrata), and a elm-ash community (Ulmus and Fraxinus) (North Central Forest Exp. Sta. 1977).

Special Hazards to Eagles

The high human activity at both the power plant and at the dam could disrupt the nesting and feeding activities of eagles. High concentrations of fishing boats during both the summer and winter could also negatively affect eagles. However, eagles seem to have adapted and have chosen to use these areas.

Site Use History

During the winter of 1975-1976, Craig Faanes studied wintering Bald Eagles near the Prairie Island/Lock and Dam#3 area. During his study, only 4% of the eagles seen were in this area, all near the heated water discharge channel. The nuclear power plant had a peak population of 5 eagles on 22 January 1976. Faanes stated that the birds were usually in the area for short periods of time and concluded that this area was not important as a wintering area. Our observations lead us to believe that this area has become an important foraging and roosting area for Bald Eagles wintering and migrating on this portion of the Mississippi River.

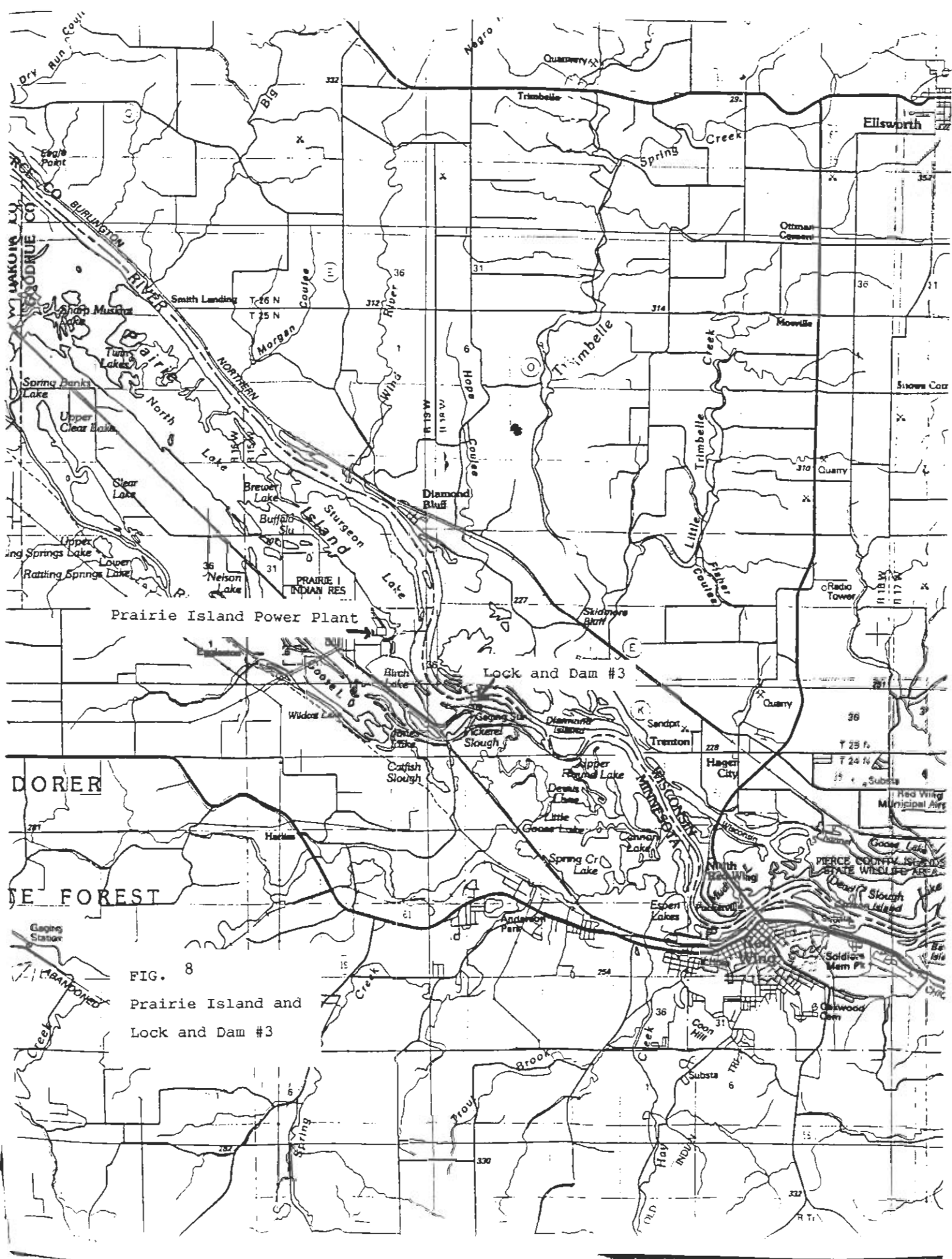


FIG. 8

Prairie Island and
Lock and Dam #3

LAKE MALLALIEU

Site Description

Lake Mallalieu is located in Hudson, Wis., 1.5 km east of the St. Croix River, rm 17 (Fig. 9). Lake Mallalieu is fed by the Willow River and drains into the St. Croix River.

Bald Eagle Use of the Area

We first observed use of this roost on 19 November 1988, when 38 birds were seen, and last recorded use on 9 December 1988, when 4 birds were seen. Observations were also made on 25 November (63 birds), 29 November (77 birds), and 8 December (42 birds) 1988. After 9 December Lake Mallalieu froze over and eagles were no longer seen.

Between 19 November 1989 and 4 April 1990, 11 additional observations were made. The highest number of eagles seen was 39 on 19 November, 1989 (Table 3). After this the numbers were much lower. Area residents told us that the fall 1988 congregation was the largest they had seen. It was believed that a rough fish die off provided the food source that attracted the eagles to the area.

Night Roost Area

From 19 November 1988 to 9 December 1988, eagles were observed roosting in trees on the east and south sides of the lake. It is assumed that because the weather was warm, there was no need for the eagles to seek out a more sheltered roost. Also,

the close proximity of a food source (fish kill) provided a reason to roost close by.

Foraging

Eagles were seen successfully fishing on the lake. Because of a rough fish die off, food was abundant and attracted high concentrations of eagles.

Vegetation and Environmental Components

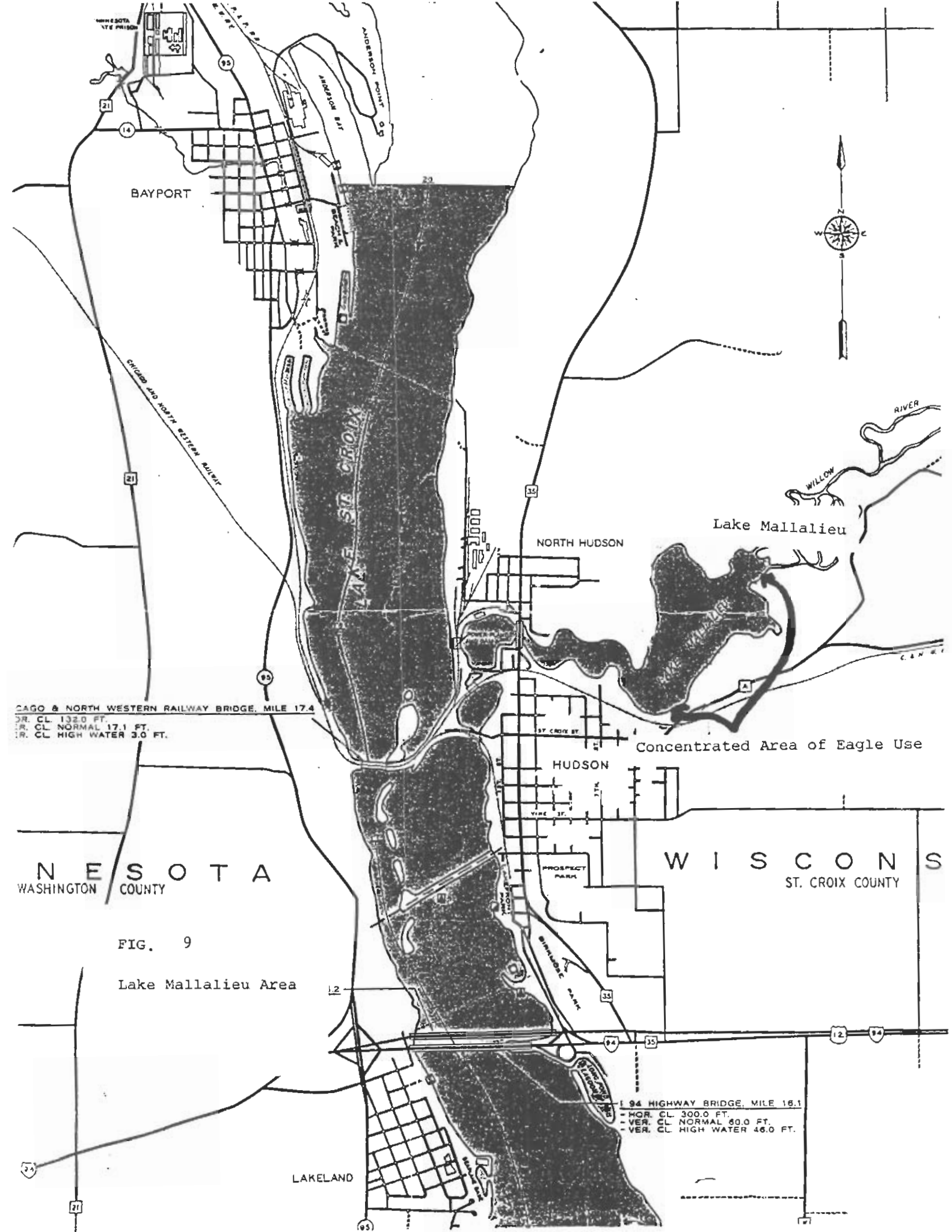
This area is a mixture of elm (Ulmus americana), ash (Fraxinus), and cottonwoods (Populus) (North Central Forest Exp. Sta. 1977).

Special Hazards to Eagles

We currently recognize no special hazards to eagles at this site.

Site Use History

No published reports were available which indicated previous eagle use of this area.



CHICAGO & NORTH WESTERN RAILWAY BRIDGE, MILE 17.4
- HGR. CL. 132.0 FT.
- V.R. CL. NORMAL 17.1 FT.
- V.R. CL. HIGH WATER 3.0 FT.

Concentrated Area of Eagle Use

MINNESOTA
WASHINGTON COUNTY

WISCONSIN
ST. CROIX COUNTY

FIG. 9
Lake Mallalieu Area

I-94 HIGHWAY BRIDGE, MILE 16.1
- HGR. CL. 300.0 FT.
- V.R. CL. NORMAL 80.0 FT.
- V.R. CL. HIGH WATER 46.0 FT.

LAKELAND

KINNIKINIC AREA

Site Description

This site includes all of the area from the confluence of the Mississippi and the St. Croix rivers north to Kinnikinic Delta State Park on the St. Croix River, rm 6.5, and along the Kinnikinic River to River Falls, Wis. (Fig. 10).

Bald Eagle Use of the Area

Observations were made from 8 November 1988 to 12 March 1989 and again from 20 November 1989 through 20 March 1990 (Table 2). The highest number of eagles seen was 21 on 30 November 1988. Observations for the 1988-1989 field season were discontinued 12 March 1989, at which time two birds were seen. Eagles were seen on 28 (74%) of the 38 days observed.

During the 1988-89 field season, the eagles in these areas were seen congregating and feeding. Numerous foraging attempts, both successful and unsuccessful, were observed. During the 1989-1990 field season, fewer eagles were seen than in the 1988-1989 field season. Of the 28 days observed in 1989-1990, eagles were seen on only 8 (29%).

Night Roost Area

Roosting in this area was not observed during our study.

Foraging

Eagles were observed successfully fishing and hunting in this area.

Vegetation and Environmental Components

This area is a mixture of elm (Ulmus americana), ash (Fraxinus), and cottonwoods (Populus) (North Central Forest Experiment Station 1977).

Special Hazards to Eagles

We currently recognize no special hazards to eagles at this site.

Site Use History

No information available.

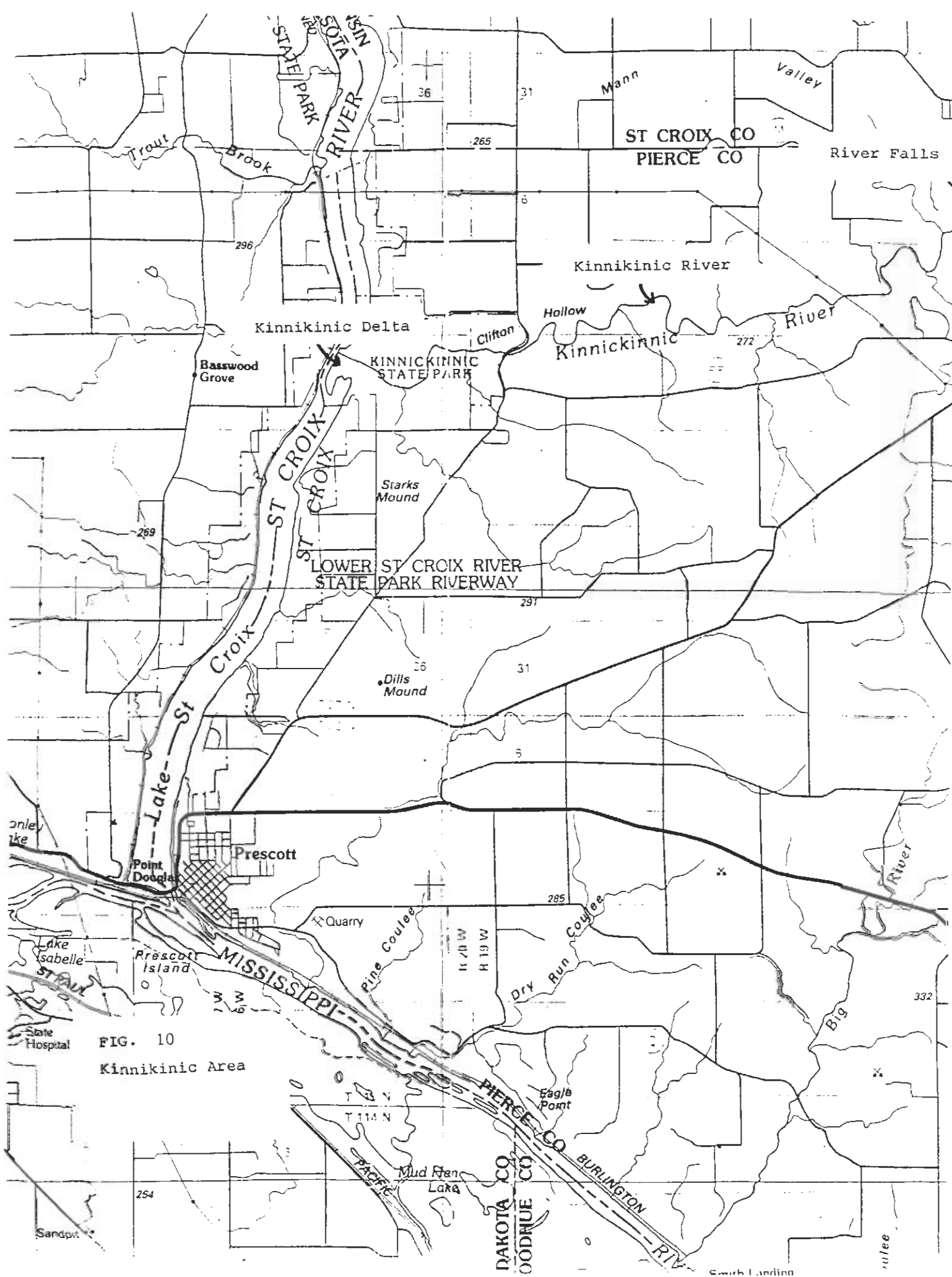


FIG. 10
Kinnikinnic Area

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