PRAIRIE ISLAND NUCLEAR GENERATING PLANT

ENVIRONMENTAL MONITORING PROGRAM

1978 ANNUAL REPORT

ECOLOGICAL STUDIES

1978 PROGRESS REPORT ON THE PRAIRIE ISLAND

FISH POPULATION STUDY

(2.4)

Prepared for

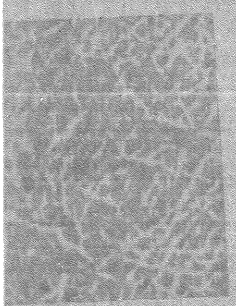
Northern States Power Company
Minneapolis, Minnesota

by

Scott P. Gustafson
Joseph L. Geis
Carl J. Bublitz

Minnesota Department of Natural Resources
Division of Fish and Wildlife
Ecological Services Section

April, 1979



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2.4.1 INTRODUCTION

This study is part of a continuing comprehensive investigation to determine environmental effects of the Prairie Island Nuclear Generating Plant (PINGP) on fish populations in the Mississippi River and its backwaters near Red Wing, Minnesota.

Several parameters were used to measure changes in the population which might be related to plant operation. These parameters include population structure (e.g., abundance and species composition), fish distribution, and condition. Changes in environmental conditions should be reflected in these parameters.

2.4.1.1 Scope

The total study includes a fish population study and a creel survey; this progress report deals only with the fish population study. The creel survey was not conducted in 1978, but will be resumed in 1979. The report describes field work carried out in 1978 and analyzes data collected. Dates of the regular sampling seasons in 1978 were: "spring", May 31 - July 12; "summer", August 1 - September 6; and "fall", September 12 - October 27.

2.4.1.2 Study Area

The five sections of the study area (Figure 2.4-1) are described by Hawkinson (1974). Each section or area consists of 10 numbered stations beginning with zero at the upstream end and ending with nine at the downstream station. Sampling is done at designated sites within stations to eliminate any sampling bias which might result if different sites within a station were sampled each season or year.

However, water stage influences distribution of fishes and may result in some differences in catch between seasons or during the same season in different years. Figures 2.4-2 through 2.4-5 indicate all original sampling sites for each type of gear. Some of these sampling sites are no longer used (see Materials and Methods section).

2.4.2 MATERIALS AND METHODS

2.4.2.1 Gear

To monitor the abundance of fish near PINGP, fish were collected using five types of sampling gear: trap net, gill net, boom shocker, trawl, and seine. An illustration of each type of gear can be found in Naplin and Geis (1975). A list of common and scientific names and methods of capture of fishes in the area of PINGP in 1978 is presented in Table 2.4-1. This table also lists previous years in which each species was captured. The sampling schedule is designed so that each type of gear is used during similar calendar periods every year.

2.4.2.1.1 Trap Netting

Since 1975, river trap nets, described by Krosch (1967), were set for four nominal 24-hour periods at each of four stations in Section 0 and 4 and at each of five stations in Sections 1 and 3 (Table 2.4-2),as described by Gustafson and Geis (1977). As in previous years, no trap nets were set in Section 2 because of swift currents and heavy barge traffic. Some of the trap nets set in the main channel in Sections 3 and 4 occasionally rolled because of river currents and waves from river traffic. To prevent rolling, nets were held in place by stakes pounded into the bottom alongside the front frame. Catch data from sets in which the net did not fish properly were not used in calculations.

2.4.2.1.2 Gill Netting

Standard 250- X 6-foot experimental gill nets were used in Sections 0, 1, and 3 (Table 2.4-2). Eight nominal 24-hour sets were made in each section by making two nominal 24-hour sets at four stations. Sampling with gill nets was done only during the spring and fall sampling seasons. The stations netted were the same stations used since 1975 (Gustafson and Geis 1977).

2.4.2.1.3 Electrofishing

One 15-minute electrofishing run was made in each station in each section during summer and fall sampling seasons. During the spring sampling season Stations 0-0 through 3-4 (35 stations) were sampled. Stations 3-5 through 4-9 were not sampled because of equipment problems. All runs were conducted during daylight hours. The electrofishing unit was the same used in previous years. Electrical output was regulated by adjusting engine rpm. An output range of 5.5 to 7.0 amperes was most productive; an attempt was made to maintain an output of 6.5 amperes or less.

2.4.2.1.4 Trawling

Trawling was done in the plant intake area, discharge canal, and two stations in North Lake as in 1974 through 1977. A minimum of 15 minutes of trawling in two or more runs was completed in each station with the same trawl used in previous years.

2.4.2.1.5 Seining

Shoreline seining was done in all five sections and was generally restricted to areas with water depth less than 2 m. The seine is 1/4-inch knotless nylon, 50 feet long by

4 feet deep, with a 4- X 4- X 4-foot bag. This is the same seine used since 1974. The mean area covered in each seine haul in 1978 was approximately 298 m^2.

2.4.2.2 Tagging

The tagging program initiated in 1974 was continued on a limited scale in 1978. Fish were tagged with model FD-68D Floy spaghetti tags. Each tag consists of a length of yellow vinyl tubing approximately 1/16-inch in diameter with a molded "T" shaped nylon anchor which extends entirely through the tube. Tags were imprinted with the legend, MINN DNR ST PAUL F_____, and serially numbered. Tags were applied with a tagging gun described by Naplin and Geis (1975).

In May and June, 124 fish were tagged in the discharge areas as part of the population estimate described later in this report. During the second attempt at a population estimate in July 1978, 28 fish were tagged.

2.4.2.3 Scale Samples

Scale samples were taken during summer and fall sampling periods in 1978. It was estimated that a sample size of about 150 fish would be sufficient for determining population structure (Arthur Peterson 1976, personal communication). Previous sampling data indicated that for some species this sample size could be collected with a single type of gear. For other species a combination of all gear types was needed to get a large enough sample. Aging of the 1978 scale samples was not completed in time to include the age structure data in this report.

2.4.2.4 Population Estimate

Two mark-recapture experiments were performed to estimate the number of fish present in the heated discharge of PINGP during late spring and midsummer 1978. Fish from Station 3-2 (Figure 2.4-6), the discharge area, were collected during the two experiments. The first attempt was started May 23 and continued nine days through June 6, 1978. The second attempt was started July 18 and fish were collected five days through July 26, 1978.

Before sampling for the first population estimate began, an attempt was made to block off part of the heated discharge area with a 16-foot (4.9 m) deep,1 1/2 inch (3.8 cm) bar measure mesh seine. About 1.4 ha were enclosed by the seine (Figure 2.4-6). The portion of the discharge area where the seine was placed is about 3 m maximum depth. The lead line was a rope with approximately 18 kg concrete anchors attached at 1.5 to 3 m intervals. In areas with swift current, the anchors were spaced at narrow intervals, while wider intervals were used in areas with little current. Scuba divers inspected the seine the same day it was set and found the bottom of the seine as much as 15 cm above the bottom of the discharge canal. The seine was removed after the last sampling day of this experiment (June 6).

Starting on May 23, fish were collected by AC electrofishing and trap netting, and on the last sampling day by gill netting. The boom shocker, trap nets, and gill nets were the same ones used for the regular population study. Sampling was done throughout the enclosed area. Most electrofishing runs were along shorelines, because the electrofishing gear is only effective to a depth of approximately 2 m.

A second population estimate was attempted during July 1978. No attempt was made to block off the discharge canal with a seine. We felt the seine may have been unsuccessful in preventing movement into or out of the enclosed area during the previous estimate because of the open space between the seine and the bottom of the discharge canal. Trap nets were set on July 17 and lifted on July 18. A pulse DC boom shocker was used to collect fishes on July 19, 20, 24, 25, and 26. The sampling was terminated because few fish were collected and no marked fish were recaptured.

More than one type of gear was used during the population estimates to maximize the number of fishes sampled. One advantage of using more than one type of gear in a population estimate is that each gear has a slightly different selectivity for size and species. A wider range of sizes and species is likely to be collected as the number of different gears increases. A second advantage is that there is less likely to be selection for or against fish which have already been collected and released. Ricker (1975) recommends using a different gear to capture fish for marking than is used for recapturing fish. Since this was a multiple mark-recapture experiment, it was not possible to follow this recommendation completely.

As fish were collected they were placed in a holding tank in the boat until they were measured and marked. The following eight species were marked with Floy tags or fin-clips: carp, channel catfish, flathead catfish, white bass, smallmouth bass, sauger, walleye, and freshwater drum. No fish less than 190 mm total length were marked. All carp and freshwater drum 190 mm or greater were fin-clipped. Channel catfish 190 mm through 299 mm were fin-clipped, while those 300 mm and over were tagged. For the other species, individuals from 190 mm through 249 mm were fin-clipped, while those 250 mm or greater were tagged. Fish

which were severely deformed, diseased, or which appeared to be highly stressed were not marked. All recaptures during sampling were recorded.

A population estimate by species was made using the method of Schnabel (1938) as modified by Chapman (1952, 1954), and cited by Ricker (1975) using the following equation:

$$N = \frac{\sum(c_t \, M_t)}{R + 1} \quad .$$

Ricker (1975) defines these symbols as follows:

N = size of population at time of marking

M_t = total number of marked fish at large at the start of the t^{th} day (or other interval), i.e., the number previously marked less any accidentally killed at previous recapture.

C_t = total sample taken on day t

R_t = number of recaptures in the sample C_t

$R = \sum R_t$ = total recaptures during the experiment.

A symbol not mentioned specifically by Ricker, but which is useful in tabulations, is M_i, where

M_i = number of fish tagged on day i.

Ricker (1975) suggests dividing the fish into two or more length groups to make a more accurate population estimate. However, because of the low numbers of returns during the May-June 1978 population estimate, it was not statistically advantageous to use more than one length group.

Population estimates were calculated only for carp, white bass, walleye, and freshwater drum, because few individuals of the other species were marked and/or recaptured. Ninety-five percent confidence intervals were calculated for these four species. Confidence intervals were calculated using Appendix II in Ricker (1975).

Weights for carp, white bass, walleye, and freshwater drum were calculated using respective 1978 summer length-weight equations and lengths measured at the time fish were tagged. These weights were used to calculate an average weight per fish of each species. The average weights were used to calculate standing crops for respective species.

2.4.3 RESULTS

2.4.3.1 Gear

2.4.3.1.1 Trap Netting

During 1978 a total of 6,322 fish representing 36 species were caught in 201 nominal 24-hour trap net sets. Tables 2.4-3 through 2.4-5 summarize trap net catches by area and season. Table 2.4-6 is a length-frequency of fishes caught with trap nets during 1978.

The following six species comprised 83.5 percent of the total trap net catch: black crappie (24.5 percent), white bass (19.1 percent), freshwater drum (16.5 percent), carp (9.1 percent) white crappie (8.1 percent), and bluegill (6.2 percent).

The total catch of black crappie was higher during summer (467) and fall (890) than during spring (195). The catch rate (number of fish per lift) for summer and fall was highest below Lock and Dam 3, 7.79/lift and 25.40/lift,

respectively, but in spring was lowest below Lock and Dam 3 (1.09/lift). During summer and fall, the lowest black crappie catch rate was obtained in the plant area, 6.60/lift and 3.70/lift, respectively. The highest spring catch rate occurred above PINGP (4.33/lift).

The total catch of white bass increased from 262 in spring, to 360 in summer, and to 584 in fall. The catch rate for summer and fall was highest in the plant area, 8.05/lift and 9.35/lift, respectively, but in spring was lowest in the plant area (1.95/lift). During summer and fall, the lowest white bass catch rate was obtained below Lock and Dam 3, 2.07/lift and 7.40/lift, respectively. The highest spring catch rate for white bass occurred above PINGP (6.06/lift).

The total catch of freshwater drum for spring (535) was more than double either summer (263) or fall (246) catches. The catch rate for spring and fall was highest below Lock and Dam 3, 16.64/lift and 6.13/lift, respectively. The highest summer catch rate occurred in the plant area (6.35/ lift). During each season the catch rate was lowest above PINGP (1.79/lift to 2.44/lift).

The total catch of white crappie increased from 147 in spring to 200 in fall. The catch rate for spring and fall was highest in the plant area, while during summer the catch rate was highest below Lock and Dam 3. The catch rates for white crappie ranged from 0.82/lift to 5.30/lift.

The total catch for carp was higher during spring (262) and summer (184) than during fall (132). During spring the highest catch rate for carp was above PINGP, and during summer and fall it was highest below Lock and Dam 3. Catch rates for carp ranged from 0.30/lift to 5.39/lift.

Total catch for bluegill ranged from 101 in spring to 178 in summer. Catch rates ranged from 0/lift to 6.71/lift.

Catch rates of both sauger and walleye were low in all areas during 1978 trap netting. Catch rates for sauger ranged from 0.09/lift to 0.65/lift and for walleye from 0.14/lift to 1.09/lift.

2.4.3.1.2 Gill Netting

A total of 2,505 fish of 28 species were captured in 48 nominal 24-hour gill net sets during 1978. Spring gill netting accounted for 64.9 percent of the total number of fish caught by gill nets in 1978. Gizzard shad were the most commonly caught fish, totaling 33.9 percent of the combined spring and fall catch. Gizzard shad were more than twice as abundant as the second most abundant species (white bass), which comprised 13.6 percent of the total catch. Other important species were sauger (8.3 percent), freshwater drum (6.1 percent), carp (5.9 percent), and shorthead redhorse (5.7 percent). Table 2.4-7 summarizes gill net catches by area and season and Table 2.4-8 lists length-frequencies of gill net-caught fishes.

The highest catch rate for gizzard shad was in the plant area during fall, 40.25 fish per 24-hour gill net set (40.25/lift). Spring catch rates were 15.06/lift above PINGP and 12.63/lift in the plant area. The lowest catch rate was 11.56/lift during fall above PINGP. The majority of gizzard shad caught in gill nets in spring were yearlings and adults, whereas most of those caught during fall were from the 1978 year class.

White bass catch rates were higher during spring than during fall. During spring 14.69/lift were caught above PINGP,

while 6.25/lift were caught in the plant area. Fall catch rates declined to 2.31/lift and 2.38/lift, respectively.

Carp were most abundant during spring above PINGP where the catch rate was 6.50/lift. In the plant area 3.38/lift were caught during spring. The lowest catch rate was 0.50/lift in the plant area during fall.

Sauger was the third most abundant species in the 1978 gill net catch. Catch rates both above and in the plant area were similar ranging from 3.88/lift to 5.38/lift for spring and 4.50/lift to 4.00/lift for fall, respectively.

Most freshwater drum collected in gill nets in 1978 were taken during spring; the catch rates were 5.00/lift above PINGP and 4.38/lift in the plant area. Lowest catch rates for freshwater drum were found above PINGP, 0.88/lift during fall.

Highest shorthead redhorse gill net catches were in spring, 5.00/lift above PINGP and 6.00/lift in the plant area. The lowest catch rate for shorthead redhorse was 0.63/lift above PINGP during fall.

2.4.3.1.3 Electrofishing

In 1978, 5,500 fish of 39 species were collected during 33.75 hours of day electrofishing. The 1978 catch represented a decrease of 4,402 fish from the corresponding 1977 catch. Part of this decline resulted from electrical generator problems which prevented spring sampling in part of the plant area and below Lock and Dam 3. Five species accounted for 73.4 percent of the total 1978 electrofishing catch: gizzard shad (23.3 percent), freshwater drum (17.3 percent), bluegill (12.6 percent), carp (10.9 percent), and emerald shiner (9.3 percent). Four other species totaled

14.5 percent of the catch: white bass (6.3 percent), small mouth bass (3.6 percent), sauger (2.6 percent), and shorthead redhorse (2.0 percent). Tables 2.4-9 through 2.4-11 summarize day electrofishing catches by season and area. Length-frequencies of all fishes caught by electrofishing during 1978 are listed in Table 2.4-12.

Total electrofishing catch of gizzard shad in 1978 (1,280) represented a substantial drop from the corresponding 1977 catch (4,782). This decline resulted partially from a reduction in the catch of young-of-the-year fish in 1978. Catch rates for gizzard shad generally increased as the sampling year progressed, probably because young-of-the-year gizzard shad became more vulnerable to electrofishing. Catch rates of gizzard shad ranged from 3.20 fish per hour (3.20/hour) in the plant area during spring to 88.40/hour below Lock and Dam 3 during fall.

Freshwater drum ranked second among the species most commonly caught by electrofishing. Except during fall, catch rates for freshwater drum were higher in above-plant areas than in other sections. Catch rates ranged from 2.40/hour in the plant area during both spring and fall to 58.67/hour above the plant during summer.

Highest catch rates for bluegills occurred in the plant area (62.80/hour) and below Lock and Dam 3 (64.80/hour) in the fall. The lowest catch rate occurred in fall above PINGP (5.33/hour). Spring and summer catch rates for bluegill ranged from 7.20/hour to 38.00/hour.

Catch rates for carp ranged from 9.60/hour in the plant area during spring to 44.00/hour below Lock and Dam 3 during fall.

Emerald shiners were caught least frequently in spring above the plant and most frequently in summer below Lock and Dam 3. Catch rates ranged from 2.40/hour to 69.60/hour, respectively.

2.4.3.1.4 Trawling

During 1978, 427 fish representing 19 species were collected during 3.00 hours of trawling. The 1978 catch represented a sharp decline from the corresponding 1977 trawling catch (5,944). Most of this decline was due to an unusually large catch of young-of-the-year gizzard shad in 1977 (4,486) followed by a small catch (42) in 1978. The following five species accounted for 85.7 percent of the 1978 trawling catch: white crappie (26.9 percent), freshwater drum (21.3 percent), black crappie (19.7 percent), gizzard shad (10.1 percent), and bluegill (7.7 percent). Tables 2.4-13 through 2.4-15 summarize trawling catches by season. Length-frequencies of fishes collected by trawling in 1978 are listed in Table 2.4-16.

Of 115 white crappie caught by trawling during 1978, 79 (68.7 percent) were young-of-the-year. White crappie were most abundant in summer (79) and fall (27) trawl catches. For both seasons the catch came exclusively from North Lake. The only plant area catch of white crappie occurred in spring, accounting for four of the nine white crappie caught during that season.

Freshwater drum were most abundant in summer trawl catches (63). For all seasons combined, 53 freshwater drum were caught in North Lake and 38 in the plant area.

Of 84 black crappie caught trawling during 1978, 81 were caught above PINGP. All but one of the 43 gizzard shad caught by trawling were young-of-the-year. Trawling catches

of bluegill (33) were limited to summer and fall seasons above PINGP.

2.4.3.1.5 Seining

In 1978, 2,093 fishes were collected by 47 seine hauls, which covered an estimated total surface area of 1.40 ha. Twenty-nine species were collected. Four species comprised 76.9 percent of the total catch: emerald shiner (36.0 percent), gizzard shad (21.5 percent), white bass (10.3 percent), and spottail shiner (9.1 percent). Tables 2.4-17 through 2.4-19 summarize seine catches by area and season. Length-frequencies of all fishes collected by seining in 1978 are listed in Table 2.4-20.

High catches of emerald shiner below Lock and Dam 3 in spring caused that species to be most abundant in the total 1978 catch. In spring the emerald shiner catch rate was 4,225.00 fish per hectare (4,225.00/ha) below Lock and Dam 3. For each season, catch rates of emerald shiner were highest below Lock and Dam 3 (ranging from 350.00/ha to 4,225.00/ha). The lowest spring catch rate occurred in the plant area (137.50/ha), while lowest summer and fall catch rates occurred above PINGP (36.00/ha and 144.83/ha).

Gizzard shad was the second most abundant species in the 1978 total seining catch. Most of these gizzard shad were young-of-the-year. The highest catch of gizzard shad was 2,475.00/ha during spring in the plant area. The lowest spring catch rate for gizzard shad was 300.00/ha below Lock and Dam 3. Seining during summer and fall above PINGP yielded lower numbers of gizzard shad per hectare than the other two areas. Catches of gizzard shad above the plant declined from 374.07/ha during spring to 27.59/ha during fall. In the plant area the gizzard shad catch increased from 116.67/ha during summer to 400.00/ha during fall. The

catch below Lock and Dam 3 decreased from 458.33/ha during summer to 42.86/ha during fall.

White bass young-of-the-year were readily caught by seining during the spring sampling season, but became less abundant in seine hauls as the year progressed. White bass was the third most abundant species in spring seine hauls, comprising 12.9 percent of the total spring seine catch. The highest white bass catch rate by seining was 687.50/ha in the plant area during spring. In the same area the catch rate of white bass was 50.00/ha during summer and 14.29/ha in fall.

The total catch of spottail shiners was highest during spring (88), followed by summer (77) and fall (26). For each season, catch rates for spottail shiner were lowest below Lock and Dam 3 (ranging from 0/ha to 8.33/ha) and highest in the plant area (ranging from 100.00/ha to 837.50/ha).

2.4.3.2 Tagging Study

A total of 150 fish were tagged during 1978 as part of the Prairie Island fish study. July 26 was the last date fish were tagged in 1978. Channel catfish was the most commonly tagged species (66), and white bass (35) the second most commonly tagged species. Tags returned in 1978 included fish tagged in 1978 as well as fish tagged in previous years.

A total of 5,940 fishes were tagged from April 9, 1974 through December 31, 1978. During this period, 676 tags were returned, an overall tag return rate of 11.4 percent. Species with the highest number of tags returned were white bass (347), sauger (131), and walleye (122).

Table 2.4-21 summarizes the number of each species tagged and the number of tags returned for the period April 9, 1974 through December 31, 1978. Largemouth bass had the highest tag return rate (22.73 percent), but the total number tagged was small (22). Northern pike had the second highest tag return rate (21.00 percent). Approximately one-half of northern pike recaptured were caught in sampling gear while conducting the fish population study. For other species the majority of tags returned were reported by anglers.

Table 2.4-22 summarizes movements of fish tagged and recaptured from 1974 through 1978. Of eight species of fishes recaptured, northern pike, channel catfish, white bass, largemouth bass, sauger, and walleye showed a net downstream movement; flathead catfish showed no net movement; and smallmouth bass exhibited a net upstream movement. Channel catfish exhibited the greatest mean net downstream movement (24.4 miles per fish). During 1978, however, an angler-caught channel catfish was reported from the Minnesota River 128 miles upstream from the location where it was tagged. Sauger had the second largest mean net downstream movement (11.6 miles). Mean net downstream movement of walleye, northern pike, white bass, and largemouth bass ranged from 0.2 to 4.6 miles.

The mean net downstream movement displayed by these fish may, at least partly, be an artifact of the data. The primary source of tag return data has been anglers. Since angling pressure is not randomly distributed (Gustafson et al. 1978b), the recapture locations of tagged fish may not be representative of actual tagged fish distribution. For example, there is little fishing pressure between Lock and Dam 3 and Prescott, Wisconsin. Tagged fish may be present in this area, but they are not likely to be recaptured because of low fishing pressure there.

2.4.3.3 Length-Weight Relationships

Separate length-weight relationships of 14 species were calculated for summer and fall. Data from all sections and gears were combined to calculate length-weight relationships (Table 2.4-23).

Expected weights for 14 species at specific lengths were calculated using the length-weight equations from 1978. Table 2.4-24 lists the 1978 expected weights plus expected weights based on length-weight equations from one or more previous years. Analysis indicates that expected weights at a given length may vary as much as 24.0 percent from year to year. However, there is no apparent trend in expected weights for any of these species.

2.4.3.4 Population Estimate

During the May-June multiple mark-recapture sampling, 13 freshwater drum, 3 carp, 2 white bass, 2 walleye, and 1 sauger were recaptured. Population estimates were made for carp, white bass, walleye, and freshwater drum. The estimates for the last sampling date (June 6) were used as the final estimates because they were considered the most accurate. The maximum number of marked fish were at large on the last sampling day. Ninety-five percent confidence intervals are used in this section. Table 2.4-25 lists details of the estimate calculations.

The estimated number of carp in the enclosed area was 2,587, with confidence limits of 1,057 to 6,463. The area enclosed by the blocking seine, as determined by planimeter, was 1.4 ha. The density of carp in the enclosed area was 1,848 fish/ha with confidence limits of 755 fish/ha to 4,616 fish/ha. The mean weight of carp collected in the enclosed

area was 1.60 kg. The estimated standing crop of carp in the enclosed area was 2,957 kg/ha.

There were an estimated 54 white bass (38.6 fish/ha) with a confidence interval of 23 to 127 (16.4 to 90.7 fish/ha) in the enclosed area during the May-June study. The mean weight of the 17 white bass marked during the study was 0.30 kg. The estimated standing crop of white bass in the enclosed area was 12 kg/ha.

An estimated 81 walleye with a confidence interval of 34 to 216 fish were present in the enclosed area of discharge canal during the study. The mean weight of the 21 marked walleye was 1.20 kg, which resulted in an estimated standing crop of 70 kg/ha.

The estimated number of freshwater drum in the enclosed area was 3,682 (2,630 fish/ha) with confidence limits of 2,202 to 6,483 (1,573 to 4,631 fish/ha). The mean weight of the 317 marked drum was 0.26 kg, which resulted in an estimated standing crop of 684 kg/ha.

No estimate was made for sauger, because just three sauger were marked and only one was recaptured. Five smallmouth bass, 18 flathead catfish, and 77 channel catfish were marked during the May-June study, but none were recaptured.

During the July estimate there were more carp marked (55) than any other species. Freshwater drum was the second most commonly marked species (34). In addition, 32 white bass, 5 sauger, 4 smallmouth bass, 2 channel catfish, and 1 flathead catfish were marked. Population estimates were not made for the July mark-recapture attempt, because none of the fish marked during the July study were recaptured during that study.

2.4.4 DISCUSSION

2.4.4.1 Abundance Indices

Abundance indices measure abundance of major fish species in each year relative to a base period. This method of handling catch data was devised by Hile (1962); calculations and applications to the Prairie Island fish study were explained by Naplin and Geis (1975).

In 1978 data from all seasons and sections and all gears except seining were used in calculating abundance indices. The four-year period, 1973 through 1976, was used as the base period. Mean catch rates from this base period were used to calculate expected catches for 1978. Twelve species, important in the catch during previous years, were selected for abundance comparisons: shortnose gar, gizzard shad, northern pike, carp, shorthead redhorse, white bass, bluegill, white crappie, black crappie, sauger, walleye, and freshwater drum.

Abundance indices for most species varied considerably from year to year. Table 2.4-26 lists the abundance indices for 12 species from 1973 through 1978.

For each of the above 12 species, the abundance index for each year was plotted against time. The equation for the linear regression of abundance indices versus time was calculated using the least squares method and the correlation coefficient (r) was computed for each regression equation (Figure 2.4-7). These calculations were made to determine whether trends in abundance could be noted.

Abundance indices for northern pike and sauger showed statistically significant declines at the 95 percent level.

With six years of data (four degrees of freedom) a correlation coefficient (r) must have an absolute value of 0.811 or greater to be significant at the 95 percent level. Northern pike has shown the most consistent decline of any of the 12 species (r = -0.941), even though the 1978 abundance index for this species was up slightly from 1977.

Sauger have also declined significantly since 1973. The correlation coefficient for this species was -0.828. The abundance index increased from 0.40 in 1977 to 0.78 in 1978. Additional data will be needed to determine whether or not this increase signals a real change from the downward trend of previous years.

Black crappie is the only species that has shown a statistically significant increasing trend in abundance indices since 1973. Abundance indices for black crappie were relatively constant from 1973 through 1976 (0.91-1.11); they then increased by a factor of three to 1977 and 1978 levels of 3.31 and 3.39. The 1977 and 1978 abundance indices increases were due to a great increase in trap net catches. Although the data indicate a signficant change in abundance, it appears that the change was not linear, and the data points could be better fit by a sigmoid curve.

Of the remaining nine species, white crappie was closest to having a significant trend with a correlation coefficient of 0.695. The decline in abundance indices from 1977 to 1978 resulted in a decrease from the correlation coefficient of 0.801 reported by Gustafson et al. (1978a).

Abundance indices for shortnose gar, gizzard shad, carp, shorthead redhorse, white bass, bluegill, white crappie, walleye, and freshwater drum showed no significant trends from 1973 through 1978. Eight of these species had correlation coefficients having absolute values of 0.485 or less.

Abundance indices for these eight species varied considerably during the six years. Abundance indices for shortnose gar, gizzard shad, bluegill, and white crappie showed a considerable decline from 1977 to 1978, while abundance indices for carp, shorthead redhorse, white bass, and freshwater drum declined slightly between 1977 and 1978.

2.4.4.2 Population Estimates

Population estimates for carp, white bass, and walleye in the discharge canal from the May-June 1978 mark-recapture study were lower than estimates for these species in previous mark-recapture studies. For example, the December 1976 estimate for carp was about 9,100 compared with about 2,600 for the June 1978 estimate. Numbers of carp marked in these two years were similar. The confidence interval for the 1976 estimate was extremely wide, because only one marked carp was recaptured. Three marked carp were recaptured during the 1978 estimate resulting in a narrower confidence interval. Confidence intervals for these two estimates overlap, so it is possible that there is no real difference between the estimates (Table 2.4-27). The 1976 estimates may be overestimated or underestimated, because there was no physical barrier to restrict movement into or out of the discharge canal. We feel, however, temperature differences between the thermal discharge and ambient river water tended to restrict movement into or out of the discharge canal. It is also possible that carp and other species involved in the May-June 1978 estimate were able to move into or out of the enclosed area by swimming under the blocking seine.

The estimate of white bass in the May-June 1978 study was 54, compared with 4,632 in December 1977 and 7,051 in December 1976 (Table 2.4-27). During the 1978 mark-recapture study, only 17 white bass were marked compared with

727 in the 1977 study and 508 in the 1976 study. It is apparent that there were many more white bass in the discharge area during December 1976 and December 1977 than were there during May-June 1978.

Christenson and Smith (1965), as cited by Peterson (1975), report an average standing crop of 68 pounds/acre (76.4 kg/ha) of game fishes in Mississippi River backwaters. The December 1976 standing crop estimate of white bass in the discharge canal, a portion of which is a flowing slough, was 345.5 kg/ha (Gustafson and Geis 1977). The December 1977 estimate was 228.3 kg/ha (Gustafson et al. 1978). The December 1977 standing crop estimate for white bass is over 3.3 times higher and the December 1976 estimate is over 5 times higher than the average standing crop of all game fishes (76.4 kg/ha) reported above. Since white bass make up only a portion of the average standing crop of game fishes in Mississippi River backwaters, the 1976 and 1977 values are considerably more than 5 and 3.3 times the average standing crop of white bass. These data indicate that white bass are attracted to the warm water discharge of the Prairie Island Plant during at least December. Observed angling success during January, February, and March in the discharge canal indicates that white bass are also attracted to the warm water during these months.

The June 1978 estimated standing crop of 12 kg/ha of white bass in the discharge canal is probably within the range that might be expected for Mississippi River backwaters. Catch data from trap netting, gill netting, and electrofishing above the plant during all three sampling seasons in 1978 indicate that white bass are about one-third of the game fish by numbers.

Dennis Heisey, Minnesota Department of Natural Resources (personal communication 1979), indicated he felt we should

make population estimates from the 1978 mark-recapture data even though the sample sizes are small. Mr. Heisey felt we should present the estimates and include our evaluation of the estimates, and readers could then make their own evaluations of the estimates to determine if the data suit their needs.

Gustafson et al. (1978) reported that no population estimate was calculated for walleye from the December 1977 data, because the authors believed the number marked and/or returned was insufficient to make a reliable estimate. Since the 1977 data have larger sample sizes than the 1978 data, we decided to calculate a population estimate for walleye using unpublished data from December 1977. The December 30, 1977 estimate of walleye in the discharge canal is 306 with 95 percent confidence limits of 137 and 766 fish. The total number of marked walleye was 50 and the number recaptured was four (Table 2.4-27).

We feel that the sampling methods used, electrofishing and angling, were not selective toward marked or unmarked fish. Movement of fish into or out of the discharge canal should have been somewhat restricted by temperature. The small sample size and variability in catch from day to day resulted in the wide confidence limits.

The June 6, 1978 mark-recapture estimate of 81 walleye was considerably less than the December 8, 1976 estimate of 1,053 walleye and was also less than the December 30, 1977 estimate of 306 (Table 2.4-27). It is our opinion that the low number of walleye present in the discharge during the May-June mark-recapture study was at least partially attributable to high temperatures.

For May 22, 1978, the date the blocking seine was installed, the plant log indicated a temperature of 82.8°F (28.2°C) at

the discharge gates and 74.2°F (23.4°C) at a resistance thermal device (RTD) about 40 m from the gates. These temperatures are above those preferred by walleye, according to several authors. Koenst and Smith (1976) estimated the preferred temperature for walleye and sauger juveniles to be 22°C. They cite Hile and Juday (1941) as saying that the preferred temperature of adult walleye in summer is 20.6°C. Eddy and Underhill (1974) state that when surface water warms above 22.2°C, walleye seek cooler water. Dendy (1948) reported that in Norris Reservoir during July, walleye would be in 25°C water when oxygen concentration was sufficient. Temperatures in the discharge area were higher than the preferred temperatures for walleye stated by most of these authors. We believe most walleye had probably sought cooler temperatures most those in the discharge, and few walleye were in the discharge area when it was enclosed by the blocking seine.

During the May-June mark-recapture study, 317 freshwater drum were marked and 13 were recaptured. The estimate of 3,682 freshwater drum for the 1978 study (Table 2.4-27) indicates this species was abundant in the enclosed area. No attempt had been made to mark freshwater drum during the 1976 or 1977 studies, so there are no data for comparison with the 1978 estimates.

The authors anticipated that few fish would be present in the discharge canal during the summer because of high water temperatures. To verify this hypothesis, a mark-recapture study was attempted in the discharge canal from July 17 through July 26, 1978. The study was terminated because low numbers of fish were being collected. No population estimates could be made because no marked fish were recaptured. However, the low numbers of fish collected during sampling with trap nets and electrofishing indicate that low numbers of fish were present in the discharge area.

Temperature information from the plant log indicates that from July 18 through July 26, 1978 the temperature at the discharge gates ranged from 79.4° to 89.9°F (26.3° to 32.2°C). Temperatures at the close in RTD ranged from 76.2° to 86.2°F (24.6° to 30.1°C). Most warm water fishes would be expected to avoid these temperatures and seek cooler water.

2.4.4.3 Impingement

From 1974 through 1977, six species, gizzard shad, channel catfish, white bass, black and white crappie, and freshwater drum have comprised over 91 percent of the fish impinged each year on the traveling screens at PINGP. During 1978 these six species comprised over 97 percent of the fish impinged. Overall catch rates and abundance indices for these six species were compared with impingement data.

A total of 105,983 fishes were impinged on the traveling screens at PINGP during 1978. This is slightly higher than the number impinged in 1975 (93,466), but considerably lower than the number impinged in 1974 (146,063), 1976 (261,294), and 1977 (554,590). Impingement information in this section is from Andersen (1975), Mayhew and Hess (1976), Eberley (1977), Eberley (1978), and Section 2.3 of this report.

The total number of gizzard shad impinged each year was 136,667 in 1974; 70,506 in 1975; 152,878 in 1976; 456,949 in 1977; and 93,895 in 1978. The number impinged and electrofishing and trawling catch rates were higher in 1977 than any other year. There does not appear to be any consistent relationship between electrofishing and trawling catch rates for other years and the number of gizzard shad impinged that year.

There is no apparent relationship between abundance indices and number of gizzard shad impinged from 1974 to 1976. However, from 1976 to 1977, both the abundance index and the number of impinged gizzard shad increased sharply. During 1977 large numbers of young-of-the-year gizzard shad were collected during the population study and by impingement. From 1977 to 1978 both impingement and the abundance indices for gizzard declined markedly. Only about nine percent of the gizzard shad impinged in 1978 were from the 1978 year class; most of the remainder were from the 1977 year class. These data do not indicate any consistent trends between gear catches or abundance indices and the number of gizzard shad impinged at Prairie Island.

Freshwater drum (3,463) comprised 3.3 percent of the fish impinged in 1978. This is one-tenth the number impinged in 1976 (34,380), and less than one-twentieth the number impinged in 1977 (74,422). Electrofishing catch rates above the plant during spring were higher in 1978 than they were from 1974 through 1977. Incomplete 1978 spring electrofishing in the other two sampling areas precluded further comparisons. For all areas, summer 1978 electrofishing catches of freshwater drum were lower than in 1977, while fall catches in 1978 were higher than in 1977. Trawling catches of freshwater drum in the plant area were lower in 1978 than in all other years. There is no consistent relationship between gear catch rates and impingement of freshwater drum at PINGP.

A total of 2,096 white bass (2.0 percent of the total impingement) were impinged at PINGP in 1978. Over twenty-one times as many white bass were impinged in 1976 (44,638). The 1976 catch rates in the plant area during the three seasons ranged from one and one-half to over four and one-half times as high as in 1978.

The abundance index for white bass in 1974 was higher than the 1976 abundance index, but 1,367 white bass were impinged in 1974 compared with 44,638 in 1976. In 1975, 2,712 white bass were impinged, but the 1975 abundance index was lower than either the 1974 or 1976 indices. The abundance index for 1977 was similar to 1976, but over four and one-half times as many white bass were impinged in 1976 as in 1977. There is no apparent relationship between abundance indices and the number impinged.

A total of 2,032 channel catfish were impinged in 1978 compared with 3,977 in 1977; 8,457 in 1976; 6,223 in 1975; and 637 in 1974. Trawling catches of channel catfish in the plant area were 3 in 1978, 61 in 1977, 465 in 1976, 3 in 1975, and 23 in 1974. Comparison of impingement and trawling catch rates in the plant area indicates no consistent relationship.

A total of 1,551 white and black crappies were impinged in 1978 compared with 5,530 in 1977; 6,852 in 1976; 2,030 in 1975; and 1,704 in 1974. Abundance indices for each year for both white and black crappies showed no consistent relationship with the numbers impinged. Abundance indices showed a considerable increase from 1976 to 1977 for both white and black crappies, but the number impinged declined. From 1977 to 1978, the abundance index for white crappie declined and for black crappie rose slightly, while impingement of crappies declined by 72 percent.

Some of the dissimilarity between numbers of fish impinged and abundance indices might result from size selectivity of the sampling gear. It has been observed (Eberley 1977) that impingement affects primarily the smaller size classes of fishes at PINGP. Trap nets, gill nets, and electrofishing gear do not sample small fish as efficiently as larger fish. Density and distribution of fish near a plant intake

also have a great influence on the number of fish impinged (Sharma 1978). Abundance indices presented in this report indicate the density of organisms in the study area in a given year. However, abundance indices may not be representative of the density and distribution of fish near the intake. Also, distribution of fish changes throughout the year. There appears to be no consistent relationship between gross impingement in a given year and overall gear catch rates or abundance indices from that year.

2.4.5 SUMMARY

A sixth season of sampling was conducted in 1978 to determine the effects of the Prairie Island Nuclear Generating Plant (PINGP) near Red Wing, Minnesota on the fish population of the Mississippi River in the vicinity of the plant. Five types of sampling gear, trap nets, gill nets, boom shocker, trawl, and minnow seine, were used to collect fishes to monitor changes in the population. Using these five gears, 16,846 fish were collected during the regular sampling season. This is slightly less than one-half the number of fish collected during similar sampling in 1977. Additional fish were collected during two multiple mark-recapture studies in 1978.

From April 9, 1974 through December 31, 1978 a total of 5,940 fish were tagged with Floy spaghetti tags. During this period, information on 676 tag returns was received -- an overall tag return rate of 11.4 percent. Tag return information for northern pike, channel catfish, white bass, largemouth bass, sauger, and walleye showed a net downstream movement; flathead catfish showed no net movement; and smallmouth bass showed a net upstream movement.

Data from 1973 through 1978 were used to calculate abundance indices for 12 species of fishes. Data from trap nets, gill

nets, trawling, and electrofishing from all seasons and all stations were used in these calculations. Abundance indices for northern pike and sauger showed statistically significant declines at the 95 percent level for the six-year period. Black crappie is the only species showing a statistically significant increasing trend for the six-year period. Abundance indices for shortnose gar, gizzard shad, carp, shorthead redhorse, white bass, bluegill, white crappie, walleye, and freshwater drum varied considerably during the six years. Correlation coefficients for these nine species indicated no significant trends in abundances from 1973 through 1978.

Population estimates for carp, white bass, and walleye in the discharge canal from a multiple mark-recapture study from May 22 through June 6, 1978 were lower than estimates for these species from December 1976 or December 1977. Data from an attempted multiple mark-recapture study in the discharge canal from July 17 through July 26, 1978 indicated that few fish were present in the discharge canal during that period.

Six species, gizzard shad, channel catfish, white bass, black and white crappie, and freshwater drum, have comprised over 91 percent of the fishes impinged each year on the traveling screens at PINGP. Catch rate data and abundance indices for these six species from 1974 through 1978 were compared with impingement rates for the respective years. These comparisons indicated no consistent relationships between catch rates and/or abundance indices and the number of fishes impinged at PINGP during respective years.

2.4.6 ACKNOWLEDGMENTS

We wish to thank the following people for their help in preparing this report. George Clymer and Harlan Fierstine

helped collect, compile, and summarize data for this report. Chris Tomford helped with field work. Dennis Heisey assisted with statistical treatments and computer data processing. Howard Krosch helped with data analysis and experimental design as well as reviewing early drafts of this manuscript. Arthur Peterson provided advice on data analysis. Data entry operators of Minnesota Department of Natural Resources, Bureau of Management Systems, keypunched most of the raw data collected in 1978. Sharon Flynn, Jeanne Somero, Betty Thill, Jane Uphus, and Laurie Zitzman typed tables and early drafts of this report.

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FIGURE 2.4-1 AREA INCLUDED IN PRAIRIE ISLAND FISH POPULATION STUDY AND CREEL SURVEY

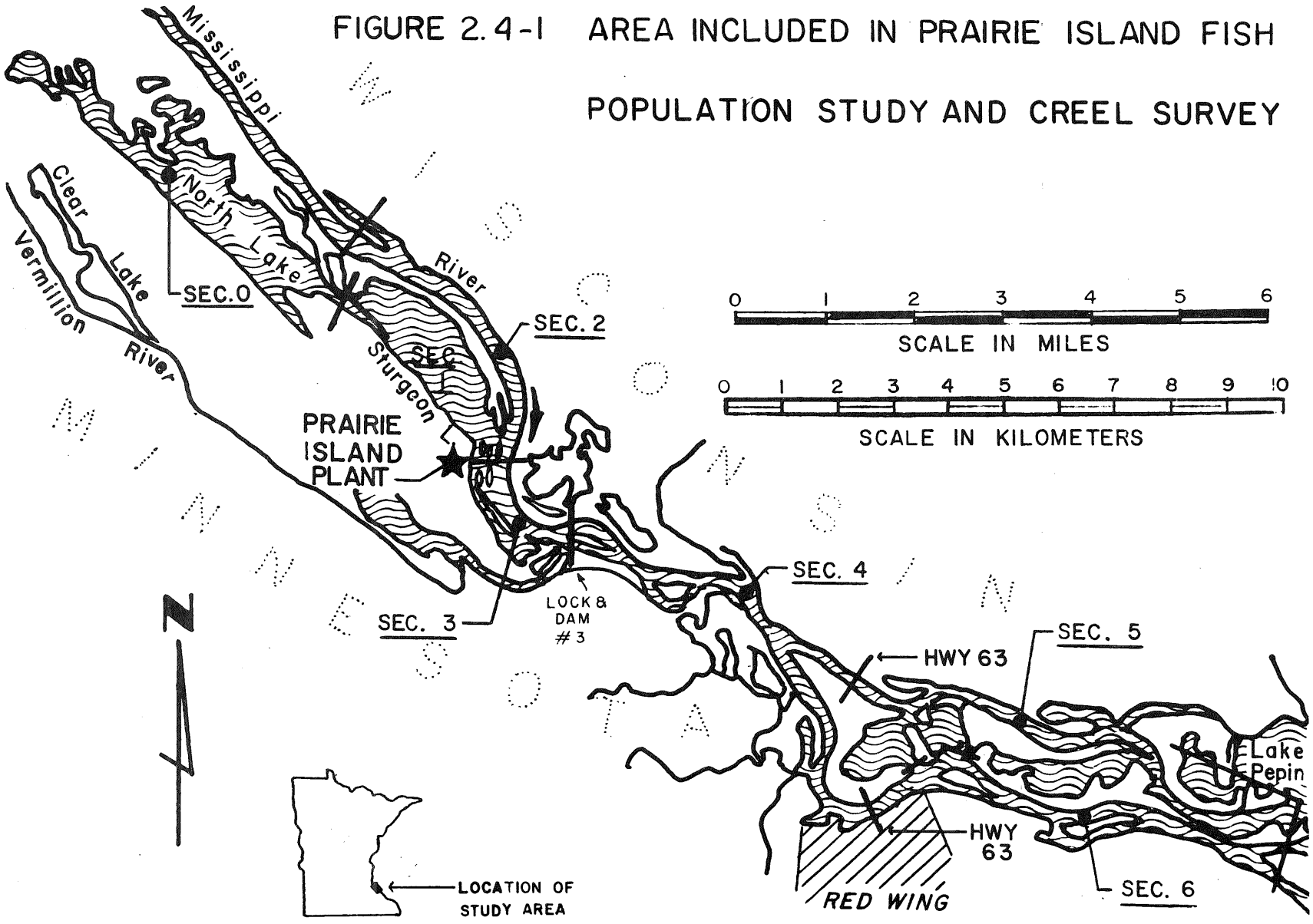

Figure 2.4-2 Sampling stations in North Lake (Section 0)

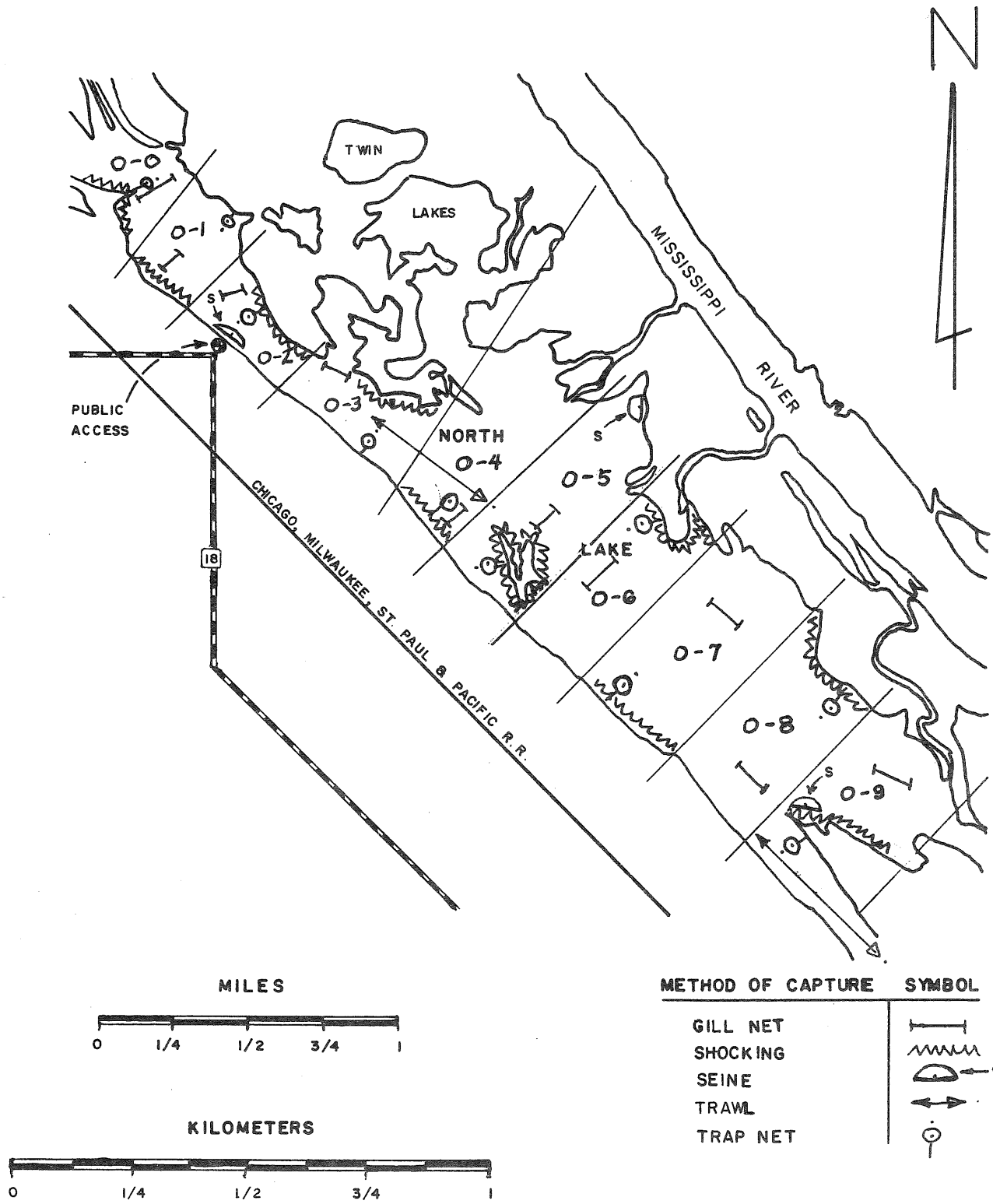

Figure 2.4-3 Sampling stations in Sturgeon Lake (Section 1) and in the navigation channel above the Prairie Island Plant (Section 2)

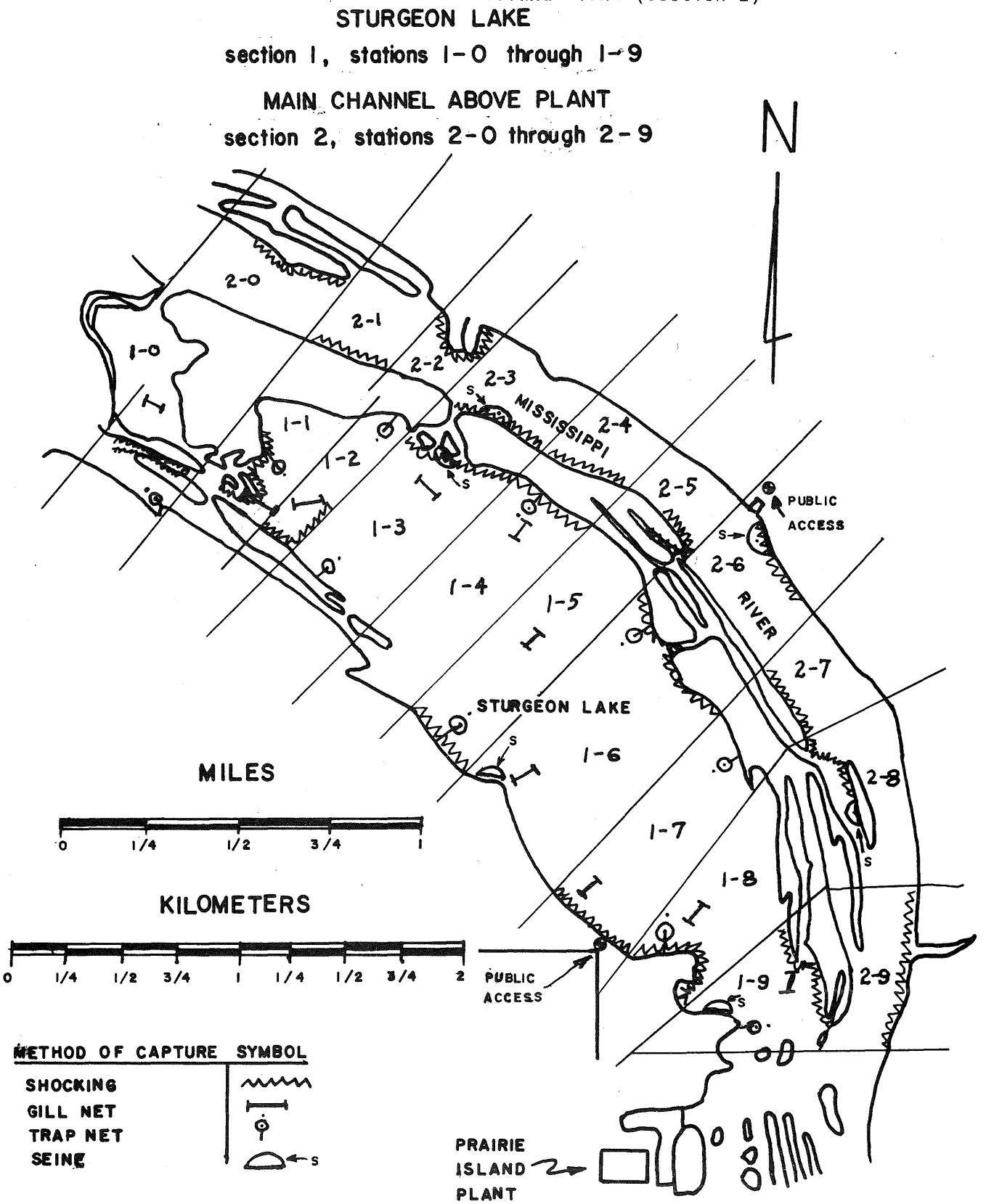

Figure 2.4-4 Sampling stations in the plant area (Section 3)

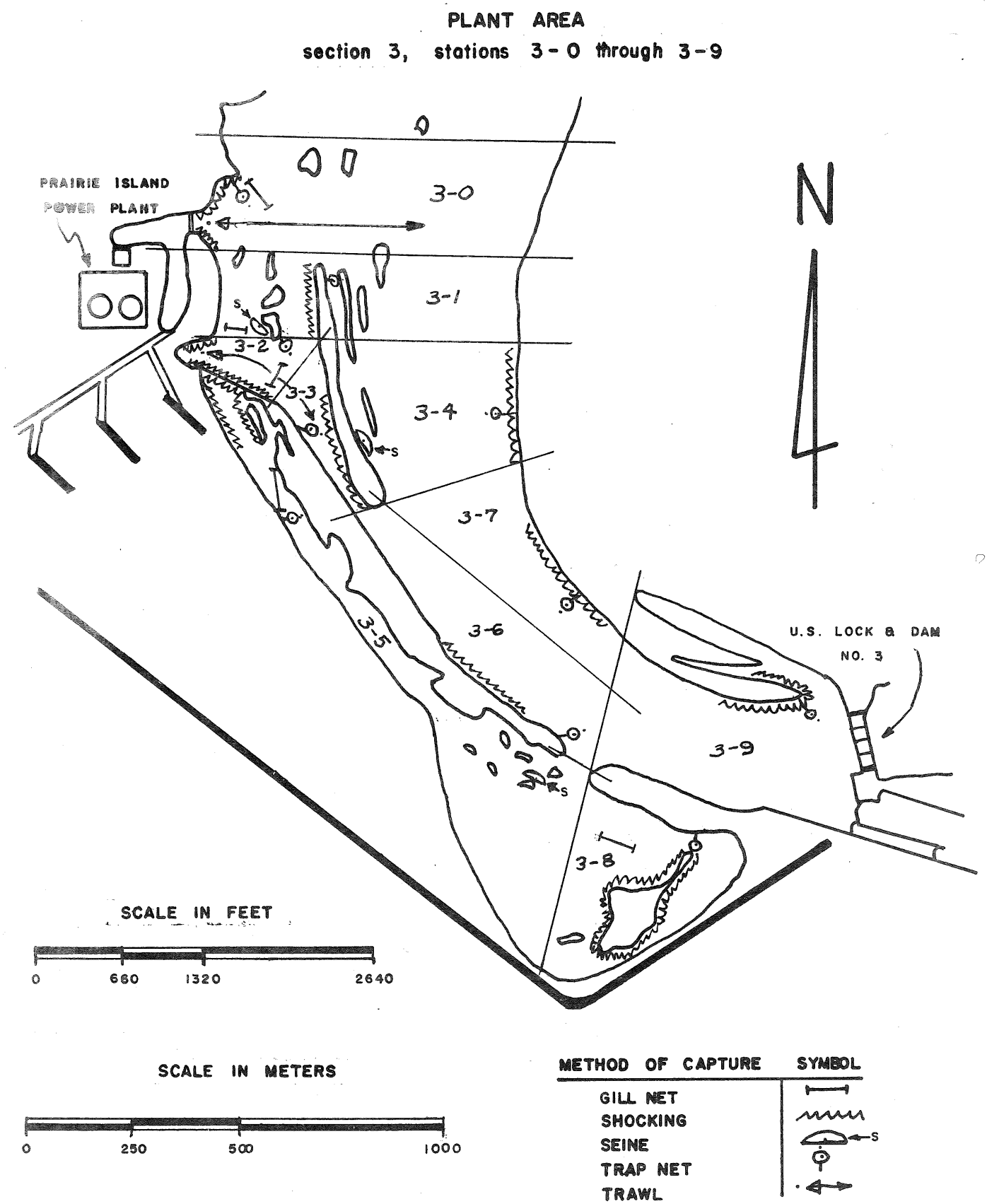

Figure 2.4-5 Sampling stations below Lock and Dam 3 (Section 4)

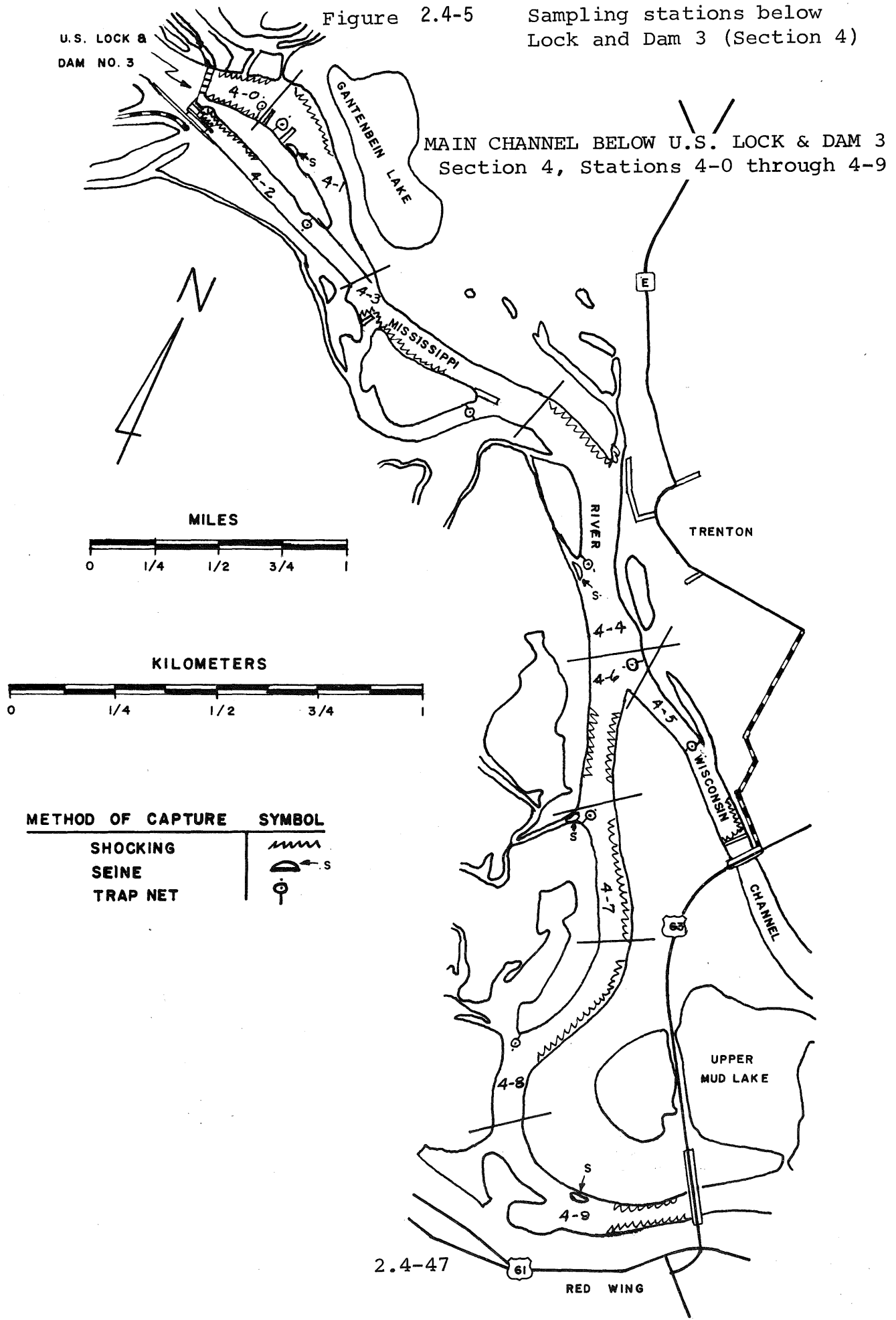

Figure 2.4-6 Area enclosed by blocking seine during May-June 1978 population estimate in discharge area of Prairie Island Nuclear Generating Plant, Red Wing, Minnesota.

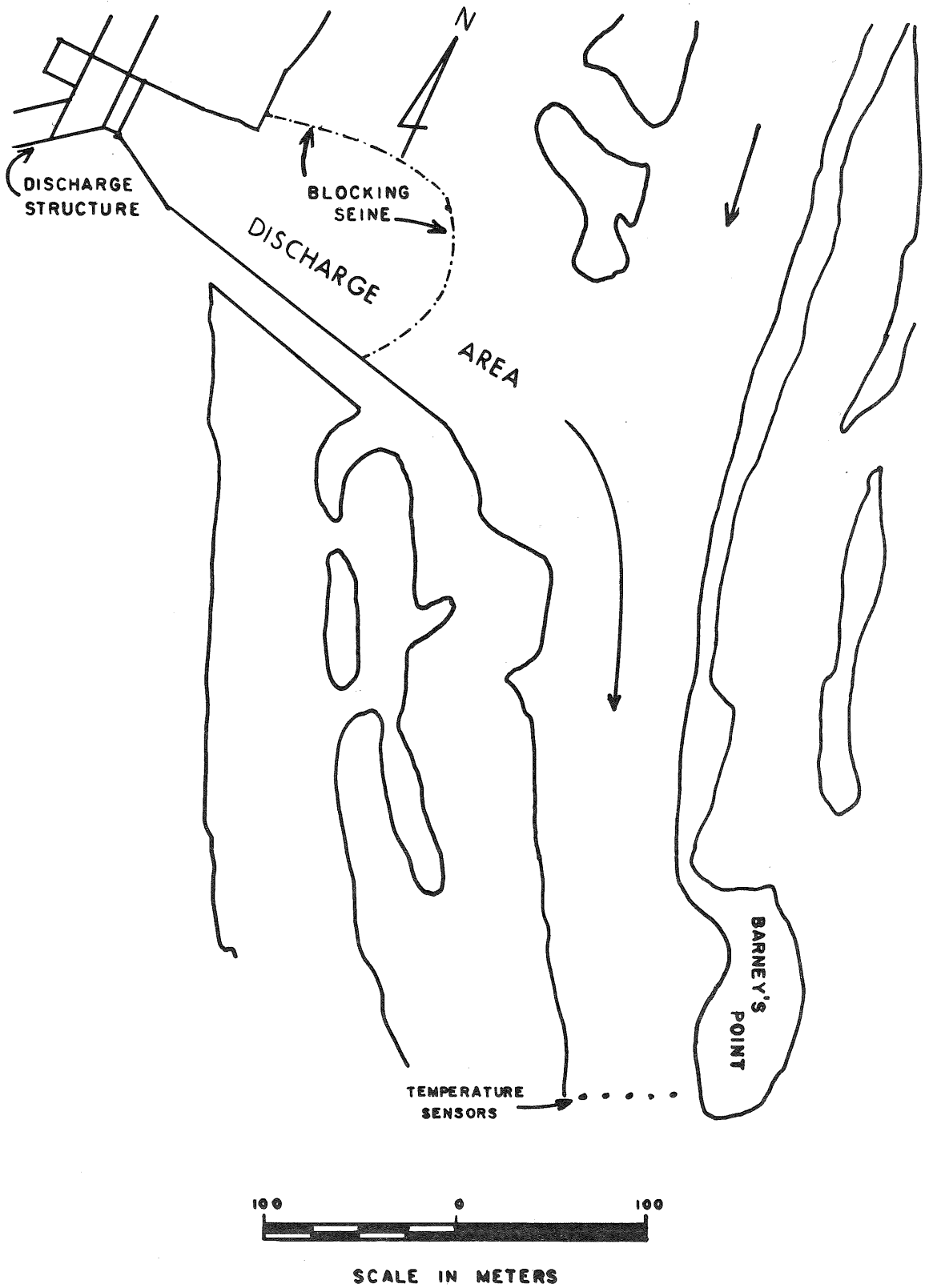

Figure 2.4-7 Abundance indices calculated from spring, summer, and fall trap netting, gill netting, electrofishing, and trawling data for 12 major species in the Mississippi River and connecting waters near the Prairie Island Nuclear Generating Plant, Red Wing, Minnesota, 1973-1978.

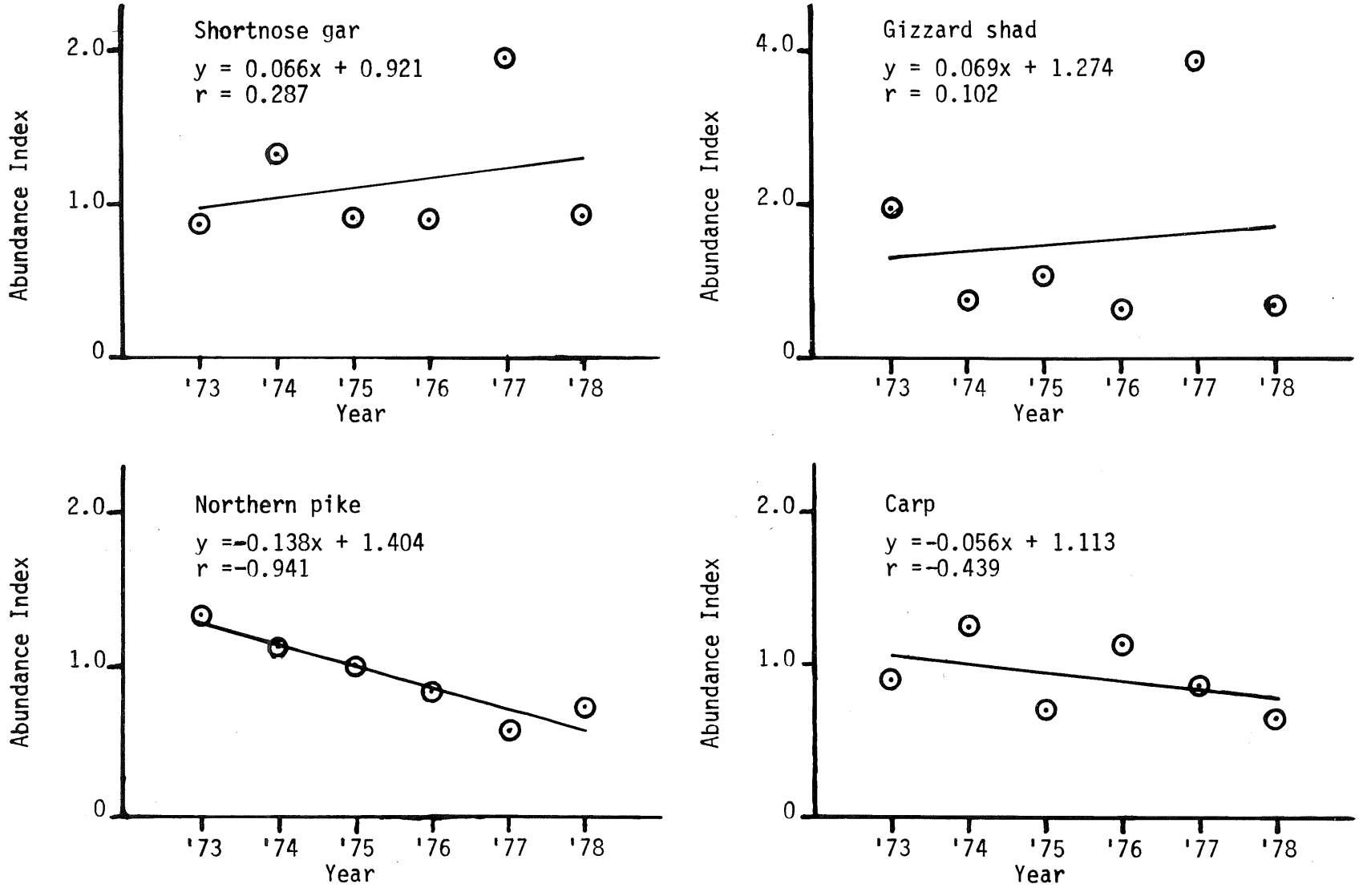

Figure 2.4-7 Abundance indices calculated from spring, summer, and fall trap netting, gill netting, electrofishing, and trawling data for 12 major species in the Mississippi River and connecting waters near the Prairie Island Nuclear Generating Plant, Red Wing, Minnesota 1973-1978 (cont.).

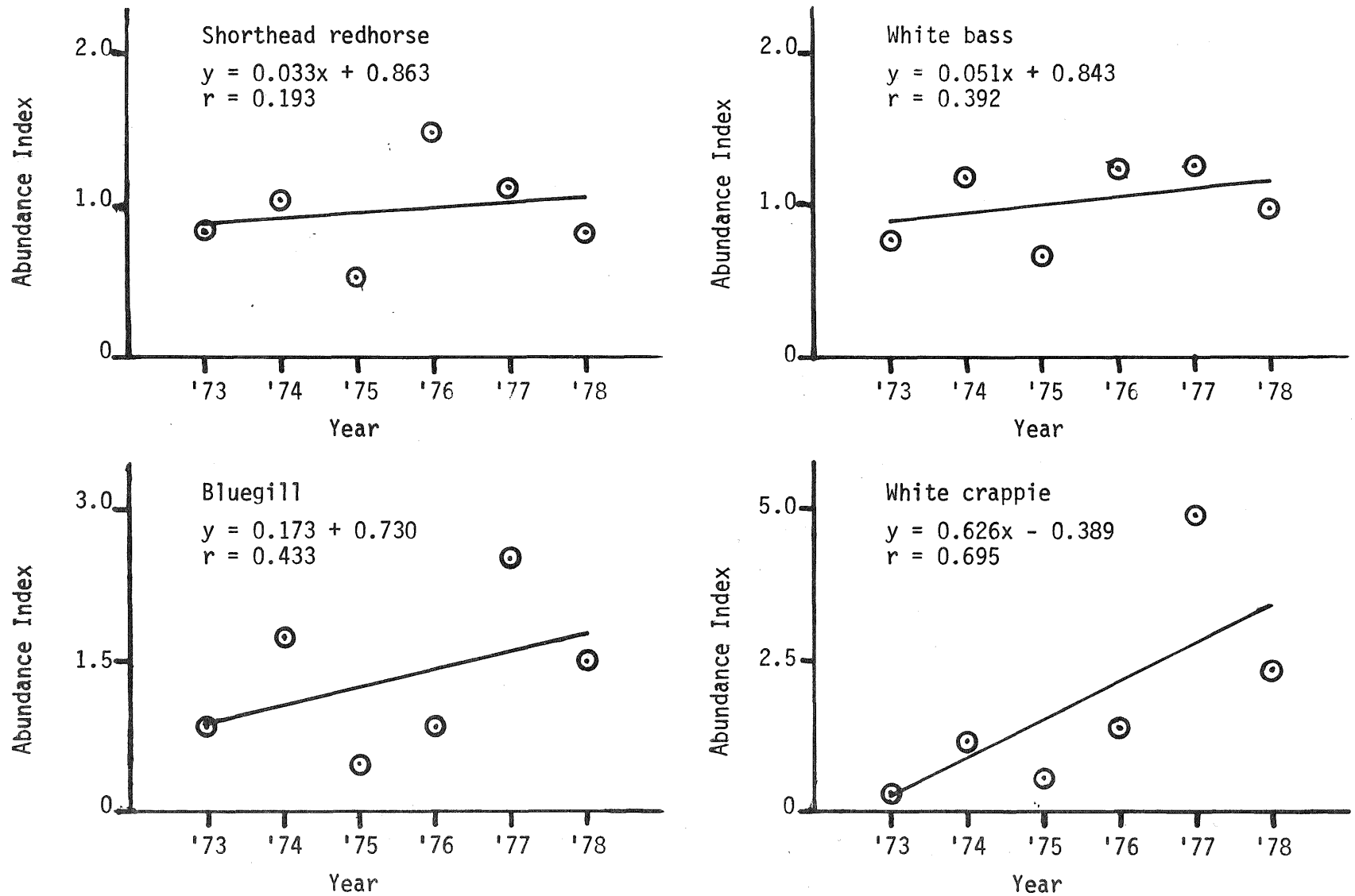

Figure 2.4-7 Abundance indices calculated from spring, summer, and fall trap netting, gill netting, electrofishing, and trawling data for 12 major species in the Mississippi River and connecting waters near the Prairie Island Nuclear Generating Plant, Red Wing, Minnesota, 1973-1978 (cont.).

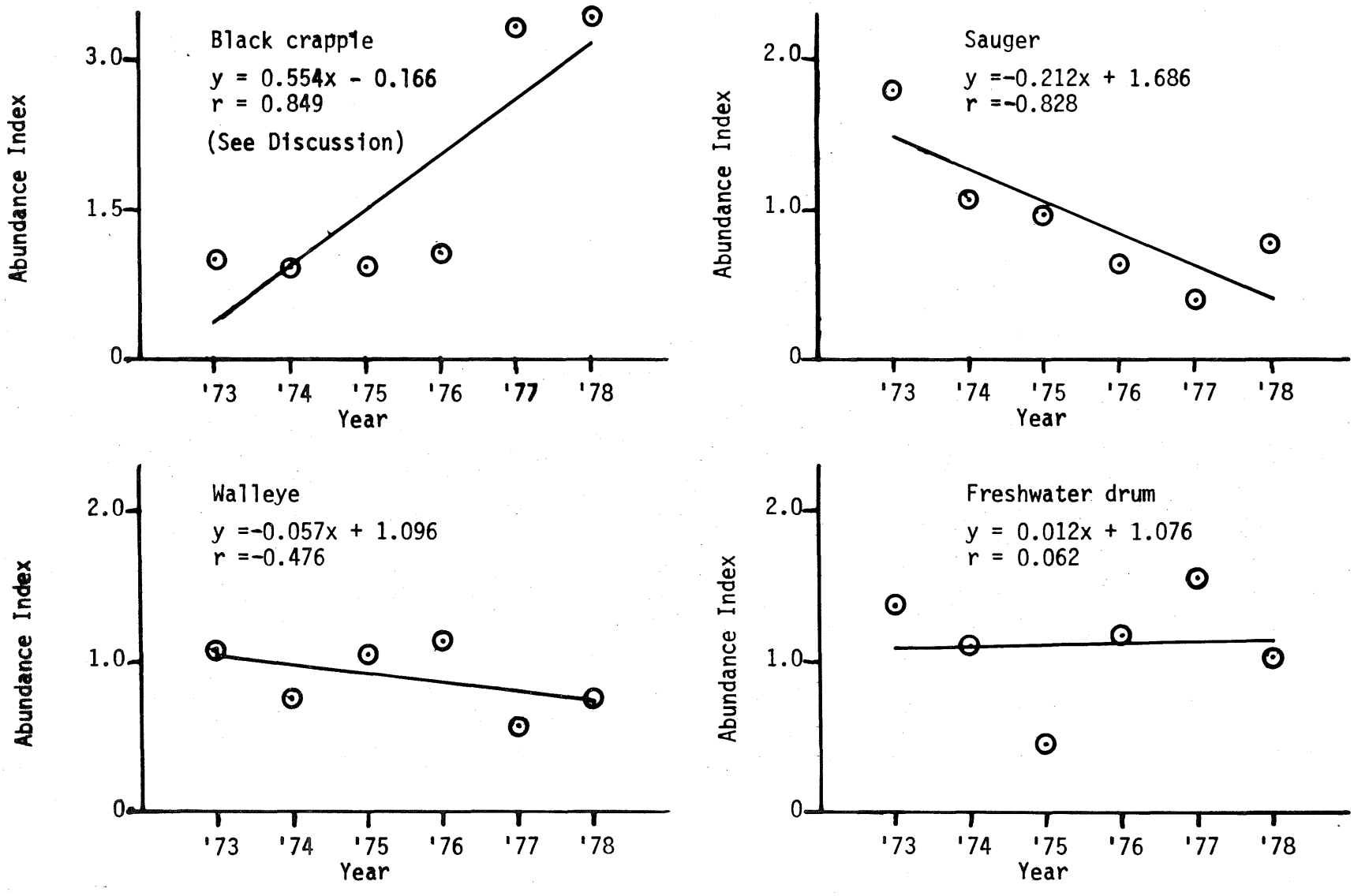

Table 2.4-1 Common and scientific names and methods of capture of fish in the Mississippi River and connecting waters near the Prairie Island Nuclear Generating Plant, Red Wing, Minnesota, 1973-1978. (Sheet 1 of 3)

Common Name	Scientific Name	Method of Capture 1978					1973	1974	1975	1976	1977
		Gill Net	Trap Net	Electro-fishing	Trawl	Seine					
Chestnut lamprey	*Icthyomyzon castaneus*		X	X				X		X	
Silver lamprey	*Icthyomyzon unicuspis*			X				X	X	X	X
Lake sturgeon	*Acipenser fulvescens*									X	X
Longnose gar	*Lepisosteus osseus*	X	X				X	X	X	X	X
Shortnose gar	*Lepisosteus platostomus*	X	X	X	X	X	X	X	X	X	X
Bowfin	*Amia calva*	X	X	X	X		X	X	X	X	X
American eel	*Anguilla rostrata*		X				X	X		X	X
Gizzard shad	*Dorosoma cepedianum*	X	X	X	X	X	X	X	X	X	X
Goldeye	*Hiodon alosoides*	X	X				X	X	X	X	X
Mooneye	*Hiodon tergisus*	X	X	X			X	X	X	X	X
Northern pike	*Esox lucius*	X	X	X		X	X	X	X	X	X
Carp	*Cyprinus carpio*	X	X	X	X	X	X	X	X	X	X
Brassy minnow	*Hybonathus hawkinsoni*							X	X		
Silvery minnow	*Hybonathus nuchalis*							X			
Speckled chub	*Hybopsis aestivalis*									X	
Silver shub	*Hybopsis storeriana*			X		X		X	X	X	X
Golden shiner	*Notemigonus crysoleucas*							X			X
Emerald shiner	*Notropis atherinoides*			X		X		X	X	X	X
River shiner	*Notropis blennius*					X		X	X		X
Common shiner	*Notropis cornutus*							X	X	X	
Pugnose minnow	*Notropis emiliae*			X		X		X	X	X	
Blacknose shiner	*Notropis heterolepis*							X			
Spottail shiner	*Notropis hudsonius*			X	X	X		X	X	X	X
Red shiner*	*Notropis lutrensis*								X		
Rosyface shiner	*Notropis rubellus*							X	X		
Spotfin shiner	*Notropis spilopterus*			X		X		X	X	X	X
Redfin shiner	*Notropis umbratilis*								X	X	
Mimic shiner	*Notropis volucellus*							X	X		
Bluntnose minnow	*Pimephales notatus*							X	X		X
Fathead minnow	*Pimephales promelas*							X			X
Bullhead minnow	*Pimephales vigilax*			X		X		X	X	X	X
Carpsucker species**	*Carpoides species*			X		X	X	X	X	X	X

*Red shiner probably misidentified breeding male spotfin shiner (1975).
**Prior to 1978 carpsuckers were identified to genus only.

Table 2.4-1 Common and scientific names and methods of capture of fish in the Mississippi River and connecting waters near the Prairie Island Nuclear Generating Plant, Red Wing, Minnesota, 1973-1978. (Sheet 2 of 3)

Common Name	Scientific Name	Method of Capture 1978					1973	1974	1975	1976	1977
		Gill Net	Trap Net	Electro-fishing	Trawl	Seine					
River carpsucker	*Carpoides carpio*		X	X							
Quillback carpsucker	*Carpoides cyprinus*	X	X	X	X	X					
Highfin carpsucker	*Carpoides velifer*	X									
White sucker	*Catostomus commersoni*		X	X		X		X	X	X	X
Northern hogsucker	*Hypentelium nigricans*		X								
Smallmouth buffalo	*Ictiobus bubalus*	X	X	X	X	X	X	X	X	X	X
Bigmouth buffalo	*Ictiobus cyprinellus*	X	X	X	X	X	X	X	X	X	X
Spotted sucker	*Minytrema melanops*		X					X		X	
Silver redhorse	*Moxostoma anisurum*		X	X			X	X	X	X	X
River redhorse	*Moxostoma carinatum*							X			
Golden redhorse	*Moxostoma erythrurum*										X
Shorthead redhorse	*Moxostoma macrolepidotum*	X	X	X	X	X	X	X	X	X	X
Black bullhead	*Ictalurus melas*	X	X					X	X	X	X
Yellow bullhead	*Ictalurus natalis*	X	X		X		X	X		X	X
Brown bullhead	*Ictalurus nebulosus*		X				X	X	X	X	X
Channel catfish	*Ictalurus punctatus*	X	X	X	X	X	X	X	X	X	X
Tadpole madtom	*Noturus gyrinus*					X			X	X	X
Flathead catfish	*Pylodictis olivaris*	X	X	X			X	X	X	X	X
Trout perch	*Percopsis omiscomaycus*							X	X	X	X
Burbot	*Lota lota*							X	X	X	X
Brook silverside	*Labidesthes sicculus*										X
White bass	*Morone chrysops*	X	X	X	X	X	X	X	X	X	X
Rock bass	*Ambloplites rupestris*	X	X	X			X	X	X	X	X
Hybrid sunfish***	*Lepomis X*		X	X				X			X
Green sunfish	*Lepomis cyanellus*	X		X			X	X	X	X	X
Pumpkinseed	*Lepomis gibbosus*		X				X	X	X		
Orangespotted sunfish	*Lepomis humilis*			X							X
Bluegill	*Lepomis macrochirus*	X	X	X	X	X	X	X	X	X	X
Smallmouth bass	*Micropterus dolomieui*		X	X		X	X	X	X	X	X
Largemouth bass	*Micropterus salmoides*	X	X	X			X	X		X	X
White crappie	*Pomoxis annularis*	X	X	X	X	X	X	X	X	X	X
Black crappie	*Pomoxis nigromaculatus*	X	X	X	X	X	X	X	X	X	X
Johnny darter	*Etheostoma nigrum*			X		X		X	X	X	X
Yellow perch	*Perca flavescens*	X	X	X		X	X	X	X	X	X
Log perch	*Percina caprodes*			X		X		X	X	X	X

***Most hybrid sunfish were likely Lepomis cyanellus X Lepomis macrochirus.

Table 2.4-1 Common and scientific names and methods of capture of fish in the Mississippi River and connecting waters near the Prairie Island Nuclear Generating Plant, Red Wing, Minnesota, 1973-1978. (Sheet 3 of 3)

Common Name	Scientific Name	Method of Capture 1978					1973	1974	1975	1976	1977
		Gill Net	Trap Net	Electro-fishing	Trawl	Seine					
Sauger	*Stizostedion canadense*	X	X	X	X	X	X	X	X	X	X
Walleye	*Stizostedion vitreum vitreum*	X	X	X	X	X	X	X	X	X	X
Freshwater drum	*Aplodinotus grunniens*	X	X	X	X	X	X	X	X	X	X

Table 2.4-2 Trap net and gill net stations used from 1975 through 1978 in the Mississippi River and connecting waters near the Prairie Island Nuclear Generating Plant, Red Wing, Minnesota.

Trap net				Gill net		
0-2	1-0	3-0	4-1	0-1	1-2	3-0
0-4	1-1	3-2	4-3	0-3	1-3	3-2
0-6	1-4	3-3	4-6	0-6	1-6	3-5
0-9	1-5	3-5	4-7	0-8	1-9	3-8
	1-9	3-7				

Table 2.4-3 Summary of trap net catches from the Mississippi River and connecting waters near the Prairie Island Nuclear Generating Plant, Red Wing, Minnesota, spring 1978.

Species	Above Plant		Plant Area (from plant intake to Lock and Dam 3		Below Lock and Dam 3	
	No.	No./lift (for 33 lifts)	No.	No./lift (for 20 lifts)	No.	No./lift (for 11 lifts)
Longnose gar	2	0.06	0	0	0	0
Shortnose gar	42	1.27	2	0.10	0	0
Bowfin	9	0.27	0	0	1	0.09
American eel	1	0.03	0	0	0	0
Gizzard shad	15	0.45	10	0.50	0	0
Goldeye	0	0	1	0.05	0	0
Mooneye	13	0.39	2	0.10	0	0
Northern pike	35	1.06	2	0.10	2	0.18
Carp	178	5.39	38	1.90	46	4.18
River carpsucker	8	0.24	0	0	1	0.09
Quillback carpsucker	13	0.39	1	0.05	0	0
White sucker	2	0.06	0	0	2	0.18
Smallmouth buffalo	0	0	1	0.05	0	0
Bigmouth buffalo	7	0.21	4	0.20	3	0.27
Spotted sucker	1	0.03	0	0	0	0
Silver redhorse	11	0.33	1	0.05	0	0
Shorthead redhorse	80	2.42	19	0.95	8	0.73
Black bullhead	1	0.03	2	0.10	3	0.27
Yellow bullhead	1	0.03	0	0	0	0
Brown bullhead	1	0.03	0	0	0	0
Channel catfish	3	0.09	1	0.05	0	0
Flathead catfish	1	0.03	1	0.05	2	0.18
White bass	200	6.06	39	1.95	23	2.09
Rock bass	4	0.12	0	0	0	0
Bluegill	76	2.30	25	1.25	0	0
Largemouth bass	1	0.03	0	0	0	0
White crappie	85	2.58	53	2.65	9	0.82
Black crappie	143	4.33	40	2.00	12	1.09
Yellow perch	1	0.33	0	0	0	0
Sauger	17	0.52	12	0.60	1	0.09
Walleye	29	0.88	3	0.15	12	1.09
Freshwater drum	59	1.79	293	14.65	183	16.64
Total	1039	31.48	550	27.50	308	28.00

Table 2.4-4 Summary of trap net catches from the Mississippi River and connecting waters near the Prairie Island Nuclear Generating Plant, Red Wing, Minnesota, summer 1978.

Species	Above Plant		Plant Area (from plant intake to Lock and Dam 3)		Below Lock and Dam 3	
	No.	No./lift (for 34 lifts)	No.	No./lift (for 20 lifts)	No.	No./lift (for 14 lifts)
Chestnut lamprey	1	0.03	0	0	1	0.07
Longnose gar	11	0.32	1	0.05	0	0
Shortnose gar	23	0.68	2	0.10	2	0.14
Bowfin	17	0.50	0	0	3	0.21
American eel	0	0	0	0	1	0.07
Gizzard shad	14	0.41	1	0.05	1	0.07
Mooneye	4	0.12	0	0	1	0.07
Northern pike	38	1.12	0	0	14	1.00
Carp	71	2.09	57	2.85	56	4.00
River carpsucker	2	0.06	1	0.05	2	0.14
Quillback carpsucker	3	0.09	0	0	1	0.07
White sucker	0	0	2	0.10	15	1.07
Smallmouth buffalo	4	0.12	3	0.15	1	0.07
Bigmouth buffalo	9	0.26	3	0.15	0	0
Silver redhorse	0	0	0	0	3	0.21
Shorthead redhorse	60	1.76	15	0.75	7	0.50
Black bullhead	2	0.06	15	0.75	0	0
Channel catfish	1	0.03	0	0	0	0
Flathead catfish	1	0.03	0	0	1	0.07
White bass	170	5.00	161	8.05	29	2.07
Rock bass	2	0.06	0	0	3	0.21
Hybrid sunfish	0	0	0	0	1	0.07
Pumpkinseed	0	0	0	0	1	0.07
Bluegill	27	0.79	57	2.85	94	6.71
Smallmouth bass	5	0.15	0	0	0	0
Largemouth bass	0	0	1	0.05	2	0.14
White crappie	40	1.18	71	3.55	54	3.86
Black crappie	226	6.65	132	6.60	109	7.79
Yellow perch	1	0.03	0	0	1	0.07
Sauger	7	0.21	4	0.20	2	0.14
Walleye	17	0.50	4	0.20	2	0.14
Freshwater drum	69	2.03	127	6.35	67	4.79
Total	825	24.26	657	32.85	474	33.86

Table 2.4-5 Summary of trap net catches from the Mississippi River and connecting waters near the Prairie Island Nuclear Generating Plant, Red Wing, Minnesota, fall 1978.

Species	Above Plant		Plant Area (from plant intake to Lock and Dam 3)		Below Lock and Dam 3	
	No.	No./lift (for 34 lifts)	No.	No./lift (for 20 lifts)	No.	No./lift (for 15 lifts)
Longnose gar	2	0.06	0	0	0	0
Shortnose gar	37	1.09	4	0.20	0	0
Bowfin	13	0.38	0	0	5	0.33
American eel	0	0	0	0	2	0.13
Gizzard shad	8	0.24	2	0.10	0	0
Goldeye	1	0.03	0	0	0	0
Mooneye	4	0.12	1	0.05	1	0.07
Northern pike	43	1.26	1	0.05	5	0.33
Carp	53	1.56	6	0.30	73	4.87
River carpsucker	2	0.06	0	0	0	0
Quillback carpsucker	2	0.06	0	0	2	0.13
White sucker	1	0.03	1	0.05	1	0.07
Smallmouth buffalo	1	0.03	0	0	2	0.13
Bigmouth buffalo	4	0.12	1	0.05	3	0.20
Silver redhorse	5	0.15	0	0	0	0
Shorthead redhorse	44	1.29	10	0.50	14	0.93
Black bullhead	1	0.03	1	0.05	0	0
Brown bullhead	1	0.03	0	0	0	0
Channel catfish	1	0.03	2	0.10	0	0
Flathead catfish	2	0.06	0	0	0	0
White bass	286	8.41	187	9.35	111	7.40
Rock bass	0	0	0	0	1	0.07
Hybrid sunfish	1	0.03	2	0.10	0	0
Bluegill	52	1.53	53	2.65	10	0.67
Smallmouth bass	1	0.03	0	0	0	0
Largemouth bass	0	0	0	0	2	0.13
White crappie	57	1.68	106	5.30	37	2.47
Black crappie	435	12.79	74	3.70	381	25.40
Sauger	22	0.65	7	0.35	9	0.60
Walleye	12	0.35	3	0.15	12	0.80
Freshwater drum	83	2.44	71	3.55	92	6.13
Total	1174	34.53	532	26.60	763	50.87

Table 2.4-6. Length-frequencies of all fish caught in trap nets from the Mississippi River and connecting waters near the Prairie Island Nuclear Generating Plant, Red Wing, Minnesota, 1978. Sections 0, 1, 2, 3, and 4 combined, seasons separated. (Sheet 1 of 15)

Total Length in Centimeters	Chestnut lamprey Summer*	Longnose gar Spring	Longnose gar Summer	Longnose gar Fall	Longnose gar Total	Shortnose gar Spring	Shortnose gar Summer	Shortnose gar Fall	Shortnose gar Total
Y/Y not meas.									
0.1 - 1.9									
2.0 - 3.9									
4.0 - 5.9									
6.0 - 7.9									
8.0 - 9.9									
10.0 - 11.9									
12.0 - 13.9									
14.0 - 15.9									
16.0 - 17.9									
18.0 - 19.9									
20.0 - 21.9									
22.0 - 23.9									
24.0 - 25.9									
26.0 - 27.9									
28.0 - 29.9									
30.0 - 31.9									
32.0 - 33.9									
34.0 - 35.9									
36.0 - 37.9									
38.0 - 39.9									
40.0 - 44.9									
45.0 - 49.9									
50.0 - 54.9						6	3	3	12
55.0 - 59.9						19	13	16	48
60.0 - 64.9						13	6	17	36
65.0 - 69.9			3	1	4	5	3	3	11
70.0 - 74.9			4		4	1			1
75.0 - 79.9		1	3	1	5				
80.0 - 84.9		1	2		3				
85.0 - 89.9									
90.0 - 94.9									
95.0 - 99.9									
100.0 - +									
Others not meas.	2						2	2	4
Total unmeasured	2						2	2	4
Total measured		2	12	2	16	44	25	39	108
Grand Total	2	2	12	2	16	44	27	41	112

* This species was caught during only one season.

Table 2.4-6. Length-frequencies of all fish caught in trap nets from the Mississippi River and connecting waters near the Prairie Island Nuclear Generating Plant, Red Wing, Minnesota, 1978. Sections 0, 1, 2, 3, and 4 combined, seasons separated. (Sheet 2 of 15)

Total Length in Centimeters	Bowfin Spring	Bowfin Summer	Bowfin Fall	Bowfin Total	American eel Spring	American eel Summer	American eel Fall	American eel Total	Gizzard shad Spring
Y/Y not meas.									
0.1 - 1.9									
2.0 - 3.9									
4.0 - 5.9									
6.0 - 7.9									
8.0 - 9.9									
10.0 - 11.9									
12.0 - 13.9									
14.0 - 15.9									
16.0 - 17.9									
18.0 - 19.9									
20.0 - 21.9									2
22.0 - 23.9									
24.0 - 25.9									
26.0 - 27.9									
28.0 - 29.9									1
30.0 - 31.9									4
32.0 - 33.9									9
34.0 - 35.9									4
36.0 - 37.9									2
38.0 - 39.9		2		2					
40.0 - 44.9		1	1	2					2
45.0 - 49.9		2		2					
50.0 - 54.9	2	3	3	8					
55.0 - 59.9	3	5	3	11					
60.0 - 64.9	4	2	7	13					
65.0 - 69.9	1		2	3					
70.0 - 74.9		3	1	4					
75.0 - 79.9									
80.0 - 84.9							1	1	
85.0 - 89.9									
90.0 - 94.9									
95.0 - 99.9									
100.0 - +									
Others not meas.		2	1	3	1	1	1	3	1
Total unmeasured		2	1	3	1	1	1	3	1
Total measured	10	18	17	45			1	1	24
Grand Total	10	20	18	48	1	1	2	4	25

Table 2.4-6. Length-frequencies of all fish caught in trap nets from the Mississippi River and connecting waters near the Prairie Island Nuclear Generating Plant, Red Wing, Minnesota, 1978. Sections 0, 1, 2, 3, and 4 combined, seasons separated. (Sheet 3 of 15)

Total Length in Centimeters	Gizzard shad Summer	Gizzard shad Fall	Gizzard shad Total	Goldeye Spring	Goldeye Fall	Goldeye Total	Mooneye Spring	Mooneye Summer	Mooneye Fall
Y/Y not meas.									
0.1 - 1.9									
2.0 - 3.9									
4.0 - 5.9									
6.0 - 7.9									
8.0 - 9.9									
10.0 - 11.9									
12.0 - 13.9									
14.0 - 15.9		2	2						
16.0 - 17.9		4	4						
18.0 - 19.9									
20.0 - 21.9			2						
22.0 - 23.9									
24.0 - 25.9	1		1						
26.0 - 27.9	3		3						1
28.0 - 29.9			1				1		
30.0 - 31.9	1		5				7	3	
32.0 - 33.9	2		11				7	2	3
34.0 - 35.9	3	2	9						2
36.0 - 37.9	1		3						
38.0 - 39.9		1	1						
40.0 - 44.9			2	1	1	2			
45.0 - 49.9									
50.0 - 54.9									
55.0 - 59.9									
60.0 - 64.9									
65.0 - 69.9									
70.0 - 74.9									
75.0 - 79.9									
80.0 - 84.9									
85.0 - 89.9									
90.0 - 94.9									
95.0 - 99.9									
100.0 - +									
Others not meas.	5	1	7						
Total unmeasured	5	1	7						
Total measured	11	9	44	1	1	2	15	5	6
Grand Total	16	10	51	1	1	2	15	5	6

Table 2.4-6. Length-frequencies of all fish caught in trap nets from the Mississippi River and connecting waters near the Prairie Island Nuclear Generating Plant, Red Wing, Minnesota, 1978. Sections 0, 1, 2, 3, and 4 combined, seasons separated. (Sheet 4 of 15)

Total Length in Centimeters	Mooneye Total	Northern pike Spring	Northern pike Summer	Northern pike Fall	Northern pike Total	Carp Spring	Carp Summer	Carp Fall	Carp Total
Y/Y not meas.									
0.1 - 1.9									
2.0 - 3.9									
4.0 - 5.9									
6.0 - 7.9									
8.0 - 9.9									
10.0 - 11.9									
12.0 - 13.9									
14.0 - 15.9				1	1				
16.0 - 17.9									
18.0 - 19.9							1		1
20.0 - 21.9						1			1
22.0 - 23.9							2	1	3
24.0 - 25.9						1			1
26.0 - 27.9	1						3	1	4
28.0 - 29.9	1					2	6	1	9
30.0 - 31.9	10					1	5	3	9
32.0 - 33.9	12					1	4	2	7
34.0 - 35.9	2						2	2	4
36.0 - 37.9						1	3	1	5
38.0 - 39.9						4	2		6
40.0 - 44.9		1			1	21	15	9	45
45.0 - 49.9		1	1		2	55	29	19	103
50.0 - 54.9		2	2		4	74	49	18	141
55.0 - 59.9			3	1	4	29	29	31	89
60.0 - 64.9		6		10	16	39	20	13	72
65.0 - 69.9		7	6	5	18	11	13	23	47
70.0 - 74.9		7	5	10	22	14	1	6	21
75.0 - 79.9		4	6	8	18	2			2
80.0 - 84.9		2	13	7	22				
85.0 - 89.9		2	8	5	15				
90.0 - 94.9		3	4		7				
95.0 - 99.9		4	1	2	7				
100.0 - +			2		2				
Others not meas.			1		1	6		2	8
Total unmeasured			1		1	6		2	8
Total measured	26	39	51	49	139	256	184	130	570
Grand Total	26	39	52	49	140	262	184	132	578

Table 2.4-6. Length-frequencies of all fish caught in trap nets from the Mississippi River and connecting waters near the Prairie Island Nuclear Generating Plant, Red Wing, Minnesota, 1978. Sections 0, 1, 2, 3, and 4 combined, seasons separated. (Sheet 5 of 15)

Total Length in Centimeters	River carp-sucker Spring	River carp-sucker Summer	River carp-sucker Fall	River carp-sucker Total	Quillback carp-sucker Spring	Quillback carp-sucker Summer	Quillback carp-sucker Fall	Quillback carp-sucker Total	White sucker Spring
Y/Y not meas.									
0.1 - 1.9									
2.0 - 3.9									
4.0 - 5.9									
6.0 - 7.9									
8.0 - 9.9									
10.0 - 11.9									
12.0 - 13.9									
14.0 - 15.9									
16.0 - 17.9									
18.0 - 19.9									
20.0 - 21.9					1			1	
22.0 - 23.9									
24.0 - 25.9							1	1	
26.0 - 27.9	1			1					
28.0 - 29.9									
30.0 - 31.9					3	1	1	5	1
32.0 - 33.9	1			1	3			3	
34.0 - 35.9					1	1		2	1
36.0 - 37.9					2	1		3	1
38.0 - 39.9		2		2	1	1	1	3	1
40.0 - 44.9	2		2	4	2			2	
45.0 - 49.9	2	2		4			1	1	
50.0 - 54.9	1			1	1			1	
55.0 - 59.9									
60.0 - 64.9	1			1					
65.0 - 69.9									
70.0 - 74.9									
75.0 - 79.9									
80.0 - 84.9									
85.0 - 89.9									
90.0 - 94.9									
95.0 - 99.9									
100.0 - +									
Others not meas.	1	1		2					
Total unmeasured	1	1		2					
Total measured	8	4	2	14	14	4	4	22	4
Grand Total	9	5	2	16	14	4	4	22	4

Table 2.4-6. Length-frequencies of all fish caught in trap nets from the Mississippi River and connecting waters near the Prairie Island Nuclear Generating Plant, Red Wing, Minnesota, 1978. Sections 0, 1, 2, 3, and 4 combined, seasons separated. (Sheet 6 of 15)

Total Length in Centimeters	White sucker Summer	White sucker Fall	White sucker Total	Smallmouth buffalo Spring	Smallmouth buffalo Summer	Smallmouth buffalo Fall	Smallmouth buffalo Total	Bigmouth buffalo Spring	Bigmouth buffalo Summer
Y/Y not meas.									
0.1 - 1.9									
2.0 - 3.9									
4.0 - 5.9									
6.0 - 7.9									
8.0 - 9.9									
10.0 - 11.9									
12.0 - 13.9									
14.0 - 15.9									
16.0 - 17.9				1			1	1	
18.0 - 19.9									
20.0 - 21.9								1	
22.0 - 23.9								1	
24.0 - 25.9					1		1	1	1
26.0 - 27.9					2		2		1
28.0 - 29.9					1	1	2	2	
30.0 - 31.9	1		2		1		1		1
32.0 - 33.9									3
34.0 - 35.9			1		1		1	2	1
36.0 - 37.9	1	1	3						
38.0 - 39.9	1		2			2	2		1
40.0 - 44.9	7	1	8						
45.0 - 49.9	7	1	8		2		2		1
50.0 - 54.9								2	2
55.0 - 59.9								1	1
60.0 - 64.9								2	
65.0 - 69.9								1	
70.0 - 74.9									
75.0 - 79.9									
80.0 - 84.9									
85.0 - 89.9									
90.0 - 94.9									
95.0 - 99.9									
100.0 - +									
Others not meas.									
Total unmeasured									
Total measured	17	3	24	1	8	3	12	14	12
Grand Total	17	3	24	1	8	3	12	14	12

Table 2.4-6. Length-frequencies of all fish caught in trap nets from the Mississippi River and connecting waters near the Prairie Island Nuclear Generating Plant, Red Wing, Minnesota, 1978. Sections 0, 1, 2, 3, and 4 combined, seasons separated. (Sheet 7 of 15)

Total Length in Centimeters	Bigmouth buffalo Fall	Bigmouth buffalo Total	Spotted sucker Spring*	Silver redhorse Spring	Silver redhorse Summer	Silver redhorse Fall	Silver redhorse Total	Shorthead redhorse Spring	Shorthead redhorse Summer
Y/Y not meas.									
0.1 - 1.9									
2.0 - 3.9									
4.0 - 5.9									
6.0 - 7.9									
8.0 - 9.9									
10.0 - 11.9									
12.0 - 13.9									
14.0 - 15.9									
16.0 - 17.9		1							
18.0 - 19.9									
20.0 - 21.9		1							
22.0 - 23.9		1							
24.0 - 25.9		2						1	
26.0 - 27.9		1						1	
28.0 - 29.9		2						1	
30.0 - 31.9		1						1	
32.0 - 33.9	1	4						3	3
34.0 - 35.9	2	5						3	2
36.0 - 37.9								10	10
38.0 - 39.9	1	2						22	15
40.0 - 44.9	1	1	1	2	1		3	44	39
45.0 - 49.9	1	2		2		1	3	18	12
50.0 - 54.9	2	6		5	2	1	8	3	1
55.0 - 59.9		2		1		3	4		
60.0 - 64.9		2		1			1		
65.0 - 69.9		1							
70.0 - 74.9									
75.0 - 79.9									
80.0 - 84.9									
85.0 - 89.9									
90.0 - 94.9									
95.0 - 99.9									
100.0 - +									
Others not meas.				1			1		
Total unmeasured				1			1		
Total measured	8	34	1	11	3	5	19	107	82
Grand Total	8	34	1	12	3	5	20	107	82

* This species was caught during only one season.

Table 2.4-6. Length-frequencies of all fish caught in trap nets from the Mississippi River and connecting waters near the Prairie Island Nuclear Generating Plant, Red Wing, Minnesota, 1978. Sections 0, 1, 2, 3, and 4 combined, seasons separated. (Sheet 8 of 15)

Total Length in Centimeters	Shorthead redhorse Fall	Shorthead redhorse Total	Black bullhead Spring	Black bullhead Summer	Black bullhead Fall	Black bullhead Total	Yellow bullhead Spring*	Brown bullhead Spring	Brown bullhead Fall
Y/Y not meas.									
0.1 - 1.9									
2.0 - 3.9									
4.0 - 5.9									
6.0 - 7.9									
8.0 - 9.9									
10.0 - 11.9									
12.0 - 13.9									
14.0 - 15.9									
16.0 - 17.9									
18.0 - 19.9				2		2			
20.0 - 21.9				1		1			
22.0 - 23.9			2	6		8	1		
24.0 - 25.9		1		4		4			
26.0 - 27.9		1	2	1	1	4			
28.0 - 29.9		1		2		2			
30.0 - 31.9	2	3	1		1	2		1	
32.0 - 33.9	1	7	1			1			1
34.0 - 35.9	7	12							
36.0 - 37.9	4	24							
38.0 - 39.9	11	48							
40.0 - 44.9	30	113							
45.0 - 49.9	9	39							
50.0 - 54.9	2	6							
55.0 - 59.9									
60.0 - 64.9									
65.0 - 69.9									
70.0 - 74.9									
75.0 - 79.9									
80.0 - 84.9									
85.0 - 89.9									
90.0 - 94.9									
95.0 - 99.9									
100.0 - +									
Others not meas.	2	2		1		1			
Total unmeasured	2	2		1		1			
Total measured	66	255	6	16	2	24	1	1	1
Grand Total	68	257	6	17	2	25	1	1	1

* This species was caught during only one season.

Table 2.4-6. Length-frequencies of all fish caught in trap nets from the Mississippi River and connecting waters near the Prairie Island Nuclear Generating Plant, Red Wing, Minnesota, 1978. Sections 0, 1, 2, 3, and 4 combined, seasons separated. (Sheet 9 of 15)

Total Length in Centimeters	Brown bullhead Total	Channel catfish Spring	Channel catfish Summer	Channel catfish Fall	Channel catfish Total	Flathead catfish Spring	Flathead catfish Summer	Flathead catfish Fall	Flathead catfish Total
Y/Y not meas.									
0.1 - 1.9									
2.0 - 3.9									
4.0 - 5.9									
6.0 - 7.9									
8.0 - 9.9									
10.0 - 11.9									
12.0 - 13.9									
14.0 - 15.9									
16.0 - 17.9									
18.0 - 19.9									
20.0 - 21.9									
22.0 - 23.9									
24.0 - 25.9		1			1				
26.0 - 27.9									
28.0 - 29.9									
30.0 - 31.9	1		1		1				
32.0 - 33.9	1								
34.0 - 35.9								1	1
36.0 - 37.9						1			1
38.0 - 39.9									
40.0 - 44.9				1	1			1	1
45.0 - 49.9		2		2	4				
50.0 - 54.9									
55.0 - 59.9						2	1		3
60.0 - 64.9		1			1				
65.0 - 69.9							1		1
70.0 - 74.9									
75.0 - 79.9									
80.0 - 84.9									
85.0 - 89.9									
90.0 - 94.9									
95.0 - 99.9						1			1
100.0 - +									
Others not meas.									
Total unmeasured									
Total measured	2	4	1	3	8	4	2	2	8
Grand Total	2	4	1	3	8	4	2	2	8

Table 2.4-6. Length-frequencies of all fish caught in trap nets from the Mississippi River and connecting waters near the Prairie Island Nuclear Generating Plant, Red Wing, Minnesota, 1978. Sections 0, 1, 2, 3, and 4 combined, seasons separated. (Sheet 10 of 15)

Total Length in Centimeters	White bass Spring	White bass Summer	White bass Fall	White bass Total	Rock bass Spring	Rock bass Summer	Rock bass Fall	Rock bass Total	Hybrid sunfish Summer
Y/Y not meas.									
0.1 - 1.9									
2.0 - 3.9									
4.0 - 5.9									
6.0 - 7.9									
8.0 - 9.9									
10.0 - 11.9									1
12.0 - 13.9									
14.0 - 15.9	2	1	1	4	3	3		6	
16.0 - 17.9	4	10	1	15	1	1		2	
18.0 - 19.9	3	55	19	77		1	1	2	
20.0 - 21.9	5	39	59	103					
22.0 - 23.9	43	27	34	104					
24.0 - 25.9	54	76	93	223					
26.0 - 27.9	22	52	89	163					
28.0 - 29.9	9	16	80	105					
30.0 - 31.9	8	13	25	46					
32.0 - 33.9	17	15	46	78					
34.0 - 35.9	29	25	57	111					
36.0 - 37.9	29	20	57	106					
38.0 - 39.9	32	5	15	52					
40.0 - 44.9	5	3	6	14					
45.0 - 49.9									
50.0 - 54.9									
55.0 - 59.9									
60.0 - 64.9									
65.0 - 69.9									
70.0 - 74.9									
75.0 - 79.9									
80.0 - 84.9									
85.0 - 89.9									
90.0 - 94.9									
95.0 - 99.9									
100.0 - +									
Others not meas.		3	2	5					
Total unmeasured		3	2	5					
Total measured	262	357	582	1201	4	5	1	10	1
Grand Total	262	360	584	1206	4	5	1	10	1

Table 2.4-6. Length-frequencies of all fish caught in trap nets from the Mississippi River and connecting waters near the Prairie Island Nuclear Generating Plant, Red Wing, Minnesota, 1978. Sections 0, 1, 2, 3, and 4 combined, seasons separated. (Sheet 11 of 15)

Total Length in Centimeters	Hybrid sunfish Fall	Hybrid sunfish Total	Pumpkin-seed Summer*	Bluegill Spring	Bluegill Summer	Bluegill Fall	Bluegill Total	Smallmouth bass Summer	Smallmouth bass Fall
Y/Y not meas.									
0.1 - 1.9									
2.0 - 3.9									
4.0 - 5.9									
6.0 - 7.9									
8.0 - 9.9									
10.0 - 11.9		1		1	19	4	24		
12.0 - 13.9				18	46	12	76		
14.0 - 15.9	2	2	1	29	49	30	108		
16.0 - 17.9	1	1		31	43	43	117		
18.0 - 19.9				16	18	22	56		
20.0 - 21.9				6	2	3	11	1	
22.0 - 23.9						1	1	1	
24.0 - 25.9								1	
26.0 - 27.9								1	
28.0 - 29.9									
30.0 - 31.9									
32.0 - 33.9								1	
34.0 - 35.9									
36.0 - 37.9									
38.0 - 39.9									
40.0 - 44.9									1
45.0 - 49.9									
50.0 - 54.9									
55.0 - 59.9									
60.0 - 64.9									
65.0 - 69.9									
70.0 - 74.9									
75.0 - 79.9									
80.0 - 84.9									
85.0 - 89.9									
90.0 - 94.9									
95.0 - 99.9									
100.0 - +									
Others not meas.					1		1		
Total unmeasured					1		1		
Total measured	3	4	1	101	177	115	393	5	1
Grand Total	3	4	1	101	178	115	394	5	1

* This species was caught during only one season.

Table 2.4-6. Length-frequencies of all fish caught in trap nets from the Mississippi River and connecting waters near the Prairie Island Nuclear Generating Plant, Red Wing, Minnesota, 1978. Sections 0, 1, 2, 3, and 4 combined, seasons separated. (Sheet 12 of 15)

Total Length in Centimeters	Smallmouth bass	Largemouth bass	Largemouth bass	Largemouth bass	Largemouth bass	White crappie	White crappie	White crappie	White crappie
Total	Total	Spring	Summer	Fall	Total	Spring	Summer	Fall	Total
Y/Y not meas.									
0.1 - 1.9									
2.0 - 3.9									
4.0 - 5.9									
6.0 - 7.9									
8.0 - 9.9									
10.0 - 11.9									
12.0 - 13.9						1		1	2
14.0 - 15.9						1	15	7	23
16.0 - 17.9							16	41	57
18.0 - 19.9			1		1	22	8	18	48
20.0 - 21.9	1		1		1	54	44	22	120
22.0 - 23.9	1					28	58	67	153
24.0 - 25.9	1					18	15	29	62
26.0 - 27.9	1					11	3	10	24
28.0 - 29.9		1	1		2	7		4	11
30.0 - 31.9						2	1		3
32.0 - 33.9	1			1	1	2	1	1	4
34.0 - 35.9				1	1				
36.0 - 37.9									
38.0 - 39.9									
40.0 - 44.9	1								
45.0 - 49.9									
50.0 - 54.9									
55.0 - 59.9									
60.0 - 64.9									
65.0 - 69.9									
70.0 - 74.9									
75.0 - 79.9									
80.0 - 84.9									
85.0 - 89.9									
90.0 - 94.9									
95.0 - 99.9									
100.0 - +									
Others not meas.						1	4		5
Total unmeasured						1	4		5
Total measured	6	1	3	2	6	146	161	200	507
Grand Total	6	1	3	2	6	147	165	200	512

Table 2.4-6. Length-frequencies of all fish caught in trap nets from the Mississippi River and connecting waters near the Prairie Island Nuclear Generating Plant, Red Wing, Minnesota, 1978. Sections 0, 1, 2, 3, and 4 combined, seasons separated. (Sheet 13 of 15)

Total Length in Centimeters	Black crappie Spring	Black crappie Summer	Black crappie Fall	Black crappie Total	Yellow perch Spring	Yellow perch Summer	Yellow perch Total	Sauger Spring	Sauger Summer
Y/Y not meas.									
0.1 - 1.9									
2.0 - 3.9									
4.0 - 5.9									
6.0 - 7.9									
8.0 - 9.9									
10.0 - 11.9	1		1	2					
12.0 - 13.9	3	74	48	125					
14.0 - 15.9		109	138	247					
16.0 - 17.9	15	27	53	95					
18.0 - 19.9	72	40	38	150					
20.0 - 21.9	33	81	162	276					
22.0 - 23.9	41	91	282	414	1	1	2		
24.0 - 25.9	20	36	118	174		1	1		
26.0 - 27.9	7	5	33	45				1	
28.0 - 29.9	1	2	4	7					2
30.0 - 31.9			2	2				2	
32.0 - 33.9			1	1				1	1
34.0 - 35.9	1			1				5	3
36.0 - 37.9								5	3
38.0 - 39.9								4	2
40.0 - 44.9								6	
45.0 - 49.9								3	2
50.0 - 54.9								3	
55.0 - 59.9									
60.0 - 64.9									
65.0 - 69.9									
70.0 - 74.9									
75.0 - 79.9									
80.0 - 84.9									
85.0 - 89.9									
90.0 - 94.9									
95.0 - 99.9									
100.0 - +									
Others not meas.	1	2	10	13					
Total unmeasured	1	2	10	13					
Total measured	194	465	880	1539	1	2	3	30	13
Grand Total	195	467	890	1552	1	2	3	30	13

Table 2.4-6. Length-frequencies of all fish caught in trap nets from the Mississippi River and connecting waters near the Prairie Island Nuclear Generating Plant, Red Wing, Minnesota, 1978. Sections 0, 1, 2, 3, and 4 combined, seasons separated. (Sheet 14 of 15)

Total Length in Centimeters	Sauger Fall	Sauger Total	Walleye Spring	Walleye Summer	Walleye Fall	Walleye Total	Fresh-water drum Spring	Fresh-water drum Summer	Fresh-water drum Fall
Y/Y not meas.									
0.1 - 1.9									
2.0 - 3.9									
4.0 - 5.9									
6.0 - 7.9									
8.0 - 9.9									
10.0 - 11.9									
12.0 - 13.9									
14.0 - 15.9							2	1	1
16.0 - 17.9							12	24	12
18.0 - 19.9							10	29	36
20.0 - 21.9							49	22	24
22.0 - 23.9	1	1					63	27	19
24.0 - 25.9							35	24	23
26.0 - 27.9	1	2					64	32	22
28.0 - 29.9	2	4	1			1	98	34	38
30.0 - 31.9	2	4					101	32	33
32.0 - 33.9	5	7	3		1	4	46	17	23
34.0 - 35.9	7	15	1	1	3	5	24	8	11
36.0 - 37.9	2	10	3			3	16	7	1
38.0 - 39.9	7	13	1	1	3	5	6	1	
40.0 - 44.9	6	12	4		4	8	5	2	
45.0 - 49.9	5	10	5	2	4	11	1		
50.0 - 54.9		3	4	6	5	15	1		
55.0 - 59.9			11	7		18		1	
60.0 - 64.9			7	4	4	15			
65.0 - 69.9			2	1	3	6			
70.0 - 74.9			1			1			
75.0 - 79.9									
80.0 - 84.9									
85.0 - 89.9									
90.0 - 94.9									
95.0 - 99.9									
100.0 - +									
Others not meas.			1	1		2	2	2	3
Total unmeasured			1	1		2	2	2	3
Total measured	38	81	43	22	27	92	533	261	243
Grand Total	38	81	44	23	27	94	535	263	246

Table 2.4-6. Length-frequencies of all fish caught in trap nets from the Mississippi River and connecting waters near the Prairie Island Nuclear Generating Plant, Red Wing, Minnesota, 1978. Sections 0, 1, 2, 3, and 4 combined, seasons separated. (Sheet 15 of 15)

Total Length in Centimeters	Freshwater drum Total
Y/Y not meas.	
0.1 - 1.9	
2.0 - 3.9	
4.0 - 5.9	
6.0 - 7.9	
8.0 - 9.9	
10.0 - 11.9	
12.0 - 13.9	
14.0 - 15.9	4
16.0 - 17.9	48
18.0 - 19.9	75
20.0 - 21.9	95
22.0 - 23.9	109
24.0 - 25.9	82
26.0 - 27.9	118
28.0 - 29.9	170
30.0 - 31.9	166
32.0 - 33.9	86
34.0 - 35.9	43
36.0 - 37.9	24
38.0 - 39.9	7
40.0 - 44.9	7
45.0 - 49.9	1
50.0 - 54.9	1
55.0 - 59.9	1
60.0 - 64.9	
65.0 - 69.9	
70.0 - 74.9	
75.0 - 79.9	
80.0 - 84.9	
85.0 - 89.9	
90.0 - 94.9	
95.0 - 99.9	
100.0 - +	
Others not meas.	7
Total unmeasured	7
Total measured	1037
Grand Total	1044

Table 2.4-7 Summary of gill net catches from the Mississippi River and connecting waters near the Prairie Island Nuclear Generating Plant, Red Wing, Minnesota, spring and fall 1978. (Sheet 1 of 2)

Species	Spring				Fall			
	Above Plant		Plant Area		Above Plant		Plant Area	
	No./lift	No. for 16 lifts	No./lift	No. for 8 lifts	No./lift	No. for 16 lifts	No./lift	No. for 8 lifts
Longnose gar	17	1.06	0	0	0	0	0	0
Shortnose gar	84	5.25	11	1.38	0	0	0	0
Bowfin	10	0.63	0	0	7	0.44	0	0
Gizzard shad	241	15.06	101	12.63	185	11.56	322	40.25
Goldeye	4	0.25	0	0	3	0.19	0	0
Mooneye	20	1.25	0	0	2	0.13	0	0
Northern pike	7	0.44	2	0.25	15	0.94	2	0.25
Carp	104	6.50	27	3.38	13	0.81	4	0.50
Quillback carpsucker	10	0.63	2	0.25	0	0	0	0
Highfin carpsucker	2	0.13	0	0	0	0	0	0
Smallmouth buffalo	14	0.88	4	0.50	0	0	7	0.88
Bigmouth buffalo	28	1.75	16	2.00	0	0	0	0
Shorthead redhorse	80	5.00	48	6.00	10	0.63	6	0.75
Black bullhead	14	0.88	12	1.50	4	0.25	9	1.13
Yellow bullhead	0	0	1	0.13	0	0	0	0
Channel catfish	17	1.06	5	0.63	15	0.94	5	0.63
Flathead catfish	0	0	1	0.13	0	0	0	0
White bass	235	14.69	50	6.25	37	2.31	19	2.38
Rock bass	6	0.38	0	0	4	0.25	0	0
Green sunfish	0	0	1	0.13	0	0	1	0.13
Bluegill	3	0.19	3	0.38	2	0.13	1	0.13
Largemouth bass	0	0	1	0.13	0	0	0	0
White crappie	43	2.69	47	5.88	8	0.50	15	1.88
Black crappie	68	4.25	14	1.75	17	1.06	2	0.25

Table 2.4-7 Summary of gill net catches from the Mississippi River and connecting waters near the Prairie Island Nuclear Generating Plant, Red Wing, Minnesota, spring and fall 1978. (Sheet 2 of 2)

Species	Spring				Fall			
	Above Plant		Plant Area		Above Plant		Plant Area	
	No./lift No. for 16 lifts		No./lift No. for 8 lifts		No./lift No. for 16 lifts		No./lift No. for 8 lifts	
Yellow perch	8	0.50	19	2.38	3	0.19	7	0.88
Sauger	62	3.88	43	5.38	72	4.50	32	4.00
Walleye	19	1.19	7	0.88	8	0.50	3	0.38
Freshwater drum	80	5.00	35	4.38	14	0.88	25	3.13
Total	1176	73.50	450	56.25	419	26.19	460	57.50

Table 2.4-8. Length-frequencies of all fish caught in gill nets from the Mississippi River and connecting waters near the Prairie Island Nuclear Generating Plant, Red Wing, Minnesota, 1978. Sections 0, 1, and 3 combined, seasons separated. (Sheet 1 of 8)

Total Length in Centimeters	Longnose gar Spring*	Shortnose gar Spring*	Bowfin Spring	Bowfin Fall	Bowfin Total	Gizzard shad Spring	Gizzard shad Fall	Gizzard shad Total	Goldeye Spring
Y/Y not meas.							262	262	
0.1 - 1.9									
2.0 - 3.9									
4.0 - 5.9									
6.0 - 7.9									
8.0 - 9.9							1	1	
10.0 - 11.9							1	1	
12.0 - 13.9							7	7	
14.0 - 15.9						2	17	19	
16.0 - 17.9						17	60	77	
18.0 - 19.9						16	9	25	
20.0 - 21.9						10	2	12	
22.0 - 23.9						2		2	
24.0 - 25.9						1	1	2	
26.0 - 27.9						2	3	5	
28.0 - 29.9						3	3	6	
30.0 - 31.9						58	31	89	
32.0 - 33.9						114	31	145	
34.0 - 35.9			1		1	78	26	104	
36.0 - 37.9				1	1	6	29	35	
38.0 - 39.9			1		1	3	17	20	
40.0 - 44.9		2		1	1	3	5	8	3
45.0 - 49.9				1	1				
50.0 - 54.9		7	3	1	4				
55.0 - 59.9	1	27	2	1	3				
60.0 - 64.9	1	34	2	1	3				
65.0 - 69.9	1	18	1	1	2				
70.0 - 74.9	5	3							
75.0 - 79.9	3	2							
80.0 - 84.9	4	1							
85.0 - 89.9									
90.0 - 94.9									
95.0 - 99.9									
100.0 - +	2	1							
Others not meas.						27	2	29	1
Total unmeasured						27	264	291	1
Total measured	17	95	10	7	17	315	243	558	3
Grand Total	17	95	10	7	17	342	507	849	4

* This species was caught during only one season.

Table 2.4-8. Length-frequencies of all fish caught in gill nets from the Mississippi River and connecting waters near the Prairie Island Nuclear Generating Plant, Red Wing, Minnesota, 1978. Sections 0, 1, and 3 combined, seasons separated. (Sheet 2 of 8)

Total Length in Centimeters	Goldeye Fall	Goldeye Total	Mooneye Spring	Mooneye Fall	Northern Total	Northern pike Spring	Northern pike Fall	Northern pike Total	Carp Spring
Y/Y not meas.									
0.1 - 1.9									
2.0 - 3.9									
4.0 - 5.9									
6.0 - 7.9									
8.0 - 9.9									
10.0 - 11.9									
12.0 - 13.9									
14.0 - 15.9									
16.0 - 17.9									
18.0 - 19.9									
20.0 - 21.9									
22.0 - 23.9			1		1				2
24.0 - 25.9									1
26.0 - 27.9									
28.0 - 29.9			3		3				1
30.0 - 31.9			4	1	5				1
32.0 - 33.9			10	1	11				1
34.0 - 35.9			1		1				
36.0 - 37.9									
38.0 - 39.9									3
40.0 - 44.9	3	6							21
45.0 - 49.9									37
50.0 - 54.9									40
55.0 - 59.9						2	1	3	12
60.0 - 64.9						3	3	6	6
65.0 - 69.9						2	4	6	4
70.0 - 74.9						1	3	4	
75.0 - 79.9							2	2	
80.0 - 84.9						1	1	2	
85.0 - 89.9									
90.0 - 94.9							3	3	
95.0 - 99.9									
100.0 - +									
Others not meas.		1	1		1				2
Total unmeasured		1	1		1				2
Total measured	3	6	19	2	21	9	17	26	129
Grand Total	3	7	20	2	22	9	17	26	131

Table 2.4-8. Length-frequencies of all fish caught in gill nets from the Mississippi River and connecting waters near the Prairie Island Nuclear Generating Plant, Red Wing, Minnesota, 1978. Sections 0, 1, and 3 combined, seasons separated. (Sheet 3 of 8)

Total Length in Centimeters	Carp Fall	Carp Total	Quillback carp-sucker Spring*	Highfin carp-sucker Spring*	Small-mouth buffalo Spring	Small-mouth buffalo Fall	Small-mouth buffalo Total	Bigmouth buffalo Spring*	Shorthead redhorse Spring
Y/Y not meas.									
0.1 - 1.9									
2.0 - 3.9									
4.0 - 5.9									
6.0 - 7.9									
8.0 - 9.9									
10.0 - 11.9									
12.0 - 13.9						1	1		
14.0 - 15.9					2	3	5	1	
16.0 - 17.9					2	2	4	1	
18.0 - 19.9					4		4	5	
20.0 - 21.9					2		2	9	
22.0 - 23.9		2			2	1	3	10	
24.0 - 25.9		1			1		1	3	
26.0 - 27.9					1		1	1	
28.0 - 29.9		1		1				8	
30.0 - 31.9		1	1						3
32.0 - 33.9	1	2	2		1		1		7
34.0 - 35.9	1	1	2						4
36.0 - 37.9	2	2	1						18
38.0 - 39.9		3							25
40.0 - 44.9		21	4	1	1		1	2	54
45.0 - 49.9	2	39	2						14
50.0 - 54.9	5	45						2	
55.0 - 59.9	4	16			1		1		
60.0 - 64.9	2	8							
65.0 - 69.9		4							
70.0 - 74.9									
75.0 - 79.9									
80.0 - 84.9									
85.0 - 89.9									
90.0 - 94.9									
95.0 - 99.9									
100.0 - +									
Others not meas.		2			1		1	2	3
Total unmeasured		2			1		1	2	3
Total measured	17	146	12	2	17	7	24	42	125
Grand total	17	148	12	2	18	7	25	44	128

* This species was caught during only one season.

Table 2.4-8. Length-frequencies of all fish caught in gill nets from the Mississippi River and connecting waters near the Prairie Island Nuclear Generating Plant, Red Wing, Minnesota, 1978. Sections 0, 1, and 3 combined, seasons separated. (Sheet 4 of 8)

Total Length in Centimeters	Shorthead redhorse Fall	Shorthead redhorse Total	Black bullhead Spring	Black bullhead Fall	Black bullhead Total	Yellow bullhead Spring*	Channel catfish Spring	Channel catfish Fall	Channel catfish Total
Y/Y not meas.									
0.1 - 1.9									
2.0 - 3.9									
4.0 - 5.9									
6.0 - 7.9									
8.0 - 9.9									
10.0 - 11.9									
12.0 - 13.9									
14.0 - 15.9									
16.0 - 17.9			5		5				
18.0 - 19.9			7		7		1		1
20.0 - 21.9			3		3		1		1
22.0 - 23.9			2	1	3	1			
24.0 - 25.9			3	4	7			1	1
26.0 - 27.9			2	4	6				
28.0 - 29.9			2	3	5		1	1	2
30.0 - 31.9		3		1	1		1		1
32.0 - 33.9		7	1		1				
34.0 - 35.9		4							
36.0 - 37.9		18						1	1
38.0 - 39.9	1	26					3	2	5
40.0 - 44.9	10	64					4	1	5
45.0 - 49.9	4	18					6	5	11
50.0 - 54.9							4	6	10
55.0 - 59.9								2	2
60.0 - 64.9									
65.0 - 69.9								1	1
70.0 - 74.9									
75.0 - 79.9									
80.0 - 84.9									
85.0 - 89.9									
90.0 - 94.9									
95.0 - 99.9									
100.0 - +									
Others not meas.	1	4	1		1		1		1
Total unmeasured	1	4	1		1		1		1
Total measured	15	140	25	13	38	1	21	20	41
Grand Total	16	144	26	13	39	1	22	20	42

* This species was caught during only one season.

Table 2.4-8. Length-frequencies of all fish caught in gill nets from the Mississippi River and connecting waters near the Prairie Island Nuclear Generating Plant, Red Wing, Minnesota, 1978. Sections 0, 1, and 3 combined, seasons separated. (Sheet 5 of 8)

Total Length in Centimeters	Flathead catfish Spring*	White bass Spring	White bass Fall	White bass Total	Rock bass Spring	Rock bass Full	Rock bass Total	Green sunfish Spring	Green sunfish Fall
Y/Y not meas.									
0.1 - 1.9									
2.0 - 3.9									
4.0 - 5.9									
6.0 - 7.9									
8.0 - 9.9									
10.0 - 11.9			1	1					
12.0 - 13.9		18	3	21	2		2	1	
14.0 - 15.9		35	1	36		1	1		1
16.0 - 17.9		3		3	4	1	5		
18.0 - 19.9		1	1	2		2	2		
20.0 - 21.9		7		7					
22.0 - 23.9		92		92					
24.0 - 25.9		52	10	62					
26.0 - 27.9		26	11	37					
28.0 - 29.9		2	7	9					
30.0 - 31.9		7	3	10					
32.0 - 33.9		8	6	14					
34.0 - 35.9		10	5	15					
36.0 - 37.9		10	3	13					
38.0 - 39.9		3	4	7					
40.0 - 44.9									
45.0 - 49.9									
50.0 - 54.9									
55.0 - 59.9									
60.0 - 64.9									
65.0 - 69.9	1								
70.0 - 74.9									
75.0 - 79.9									
80.0 - 84.9									
85.0 - 89.9									
90.0 - 94.9									
95.0 - 99.9									
100.0 - +									
Others not meas.		11	1	12					
Total unmeasured		11	1	12					
Total measured	1	274	55	329	6	4	10	1	1
Grand Total	1	285	56	341	6	4	10	1	1

* This species was caught during only one season.

Table 2.4-8. Length-frequencies of all fish caught in gill nets from the Mississippi River and connecting waters near the Prairie Island Nuclear Generating Plant, Red Wing, Minnesota, 1978. Sections 0, 1, and 3 combined, seasons separated. (Sheet 6 of 8)

Total Length in Centimeters	Green sunfish Total	Bluegill Spring	Bluegill Fall	Bluegill Total	Largemouth bass Spring*	White crappie Spring	White crappie Fall	White crappie Total	Black crappie Spring
Y/Y not meas.									
0.1 - 1.9									
2.0 - 3.9									
4.0 - 5.9									
6.0 - 7.9									
8.0 - 9.9									1
10.0 - 11.9						15		15	34
12.0 - 13.9	1					30		30	1
14.0 - 15.9	1	3		3			1	1	
16.0 - 17.9		2	1	3		2	3	5	5
18.0 - 19.9		1		1	1	14	3	17	14
20.0 - 21.9			1	1		12		12	11
22.0 - 23.9						8	9	17	9
24.0 - 25.9						1	2	3	3
26.0 - 27.9						3		3	2
28.0 - 29.9							1	1	
30.0 - 31.9							2	2	
32.0 - 33.9							2	2	
34.0 - 35.9									
36.0 - 37.9									
38.0 - 39.9									
40.0 - 44.9									
45.0 - 49.9									
50.0 - 54.9									
55.0 - 59.9									
60.0 - 64.9									
65.0 - 69.9									
70.0 - 74.9									
75.0 - 79.9									
80.0 - 84.9									
85.0 - 89.9									
90.0 - 94.9									
95.0 - 99.9									
100.0 - +									
Others not meas.			1	1		5		5	2
Total unmeasured			1	1		5		5	2
Total measured	2	6	2	8	1	85	23	108	80
Grand Total	2	6	3	9	1	90	23	113	82

* This species was caught during only one season.

Table 2.4-8. Length-frequencies of all fish caught in gill nets from the Mississippi River and connecting waters near the Prairie Island Nuclear Generating Plant, Red Wing, Minnesota, 1978. Sections 0, 1, and 3 combined, seasons separated. (Sheet 7 of 8)

Total Length in Centimeters	Black crappie Fall	Black crappie Total	Yellow perch Spring	Yellow perch Fall	Yellow perch Total	Sauger Spring	Sauger Fall	Sauger Total	Walleye Spring
Y/Y not meas.									
0.1 - 1.9									
2.0 - 3.9									
4.0 - 5.9									
6.0 - 7.9									
8.0 - 9.9		1							
10.0 - 11.9		34							
12.0 - 13.9	1	2	1		1				
14.0 - 15.9	11	11	2		2				
16.0 - 17.9	3	8	5	1	6				
18.0 - 19.9	2	16	15	4	19				
20.0 - 21.9		11	2	5	7	1		1	
22.0 - 23.9		9	1		1	11		11	
24.0 - 25.9		3	1		1	14	2	16	
26.0 - 27.9		2				4	7	11	2
28.0 - 29.9						3	9	12	1
30.0 - 31.9						6	4	10	1
32.0 - 33.9						6	10	16	5
34.0 - 35.9						10	10	20	4
36.0 - 37.9						14	12	26	2
38.0 - 39.9						5	10	15	1
40.0 - 44.9						16	13	29	2
45.0 - 49.9						10	22	32	3
50.0 - 54.9						4	3	7	3
55.0 - 59.9							2	2	2
60.0 - 64.9									
65.0 - 69.9									
70.0 - 74.9									
75.0 - 79.9									
80.0 - 84.9									
85.0 - 89.9									
90.0 - 94.9									
95.0 - 99.9									
100.0 - +									
Others not meas.	2	4				1		1	
Total unmeasured	2	4				1		1	
Total measured	17	97	27	10	37	104	104	208	26
Grand Total	19	101	27	10	37	105	104	209	26

Table 2.4-8. Length-frequencies of all fish caught in gill nets from the Mississippi River and connecting waters near the Prairie Island Nuclear Generating Plant, Red Wing, Minnesota, 1978. Sections 0, 1, and 3 combined, seasons separated. (Sheet 8 of 8)

Total Length in Centimeters	Walleye Fall	Walleye Total	Freshwater drum Spring	Freshwater drum Fall	Freshwater drum Total				
Y/Y not meas.				1	1				
0.1 - 1.9									
2.0 - 3.9									
4.0 - 5.9									
6.0 - 7.9									
8.0 - 9.9									
10.0 - 11.9									
12.0 - 13.9			7	11	18				
14.0 - 15.9			9	12	21				
16.0 - 17.9			10	1	11				
18.0 - 19.9			4	5	9				
20.0 - 21.9			16	3	19				
22.0 - 23.9			14		14				
24.0 - 25.9			10		10				
26.0 - 27.9		2	6		6				
28.0 - 29.9		1	9	2	11				
30.0 - 31.9	2	3	11	3	14				
32.0 - 33.9	1	6	9		9				
34.0 - 35.9	2	6	6	1	7				
36.0 - 37.9	2	4	1		1				
38.0 - 39.9	2	3							
40.0 - 44.9		2	1		1				
45.0 - 49.9	1	4							
50.0 - 54.9		3							
55.0 - 59.9		2							
60.0 - 64.9	1	1							
65.0 - 69.9									
70.0 - 74.9									
75.0 - 79.9									
80.0 - 84.9									
85.0 - 89.9									
90.0 - 94.9									
95.0 - 99.9									
100.0 - +									
Others not meas.			2		2				
Total unmeasured			2	1	3				
Total measured	11	37	113	38	151				
Grand Total	11	37	115	39	154				

Table 2.4-9 Summary of day electrofishing catches from the Mississippi River and connecting waters near the Prairie Island Nuclear Generating Plant, Red Wing, Minnesota, spring 1978.

Species	Above Plant		*Plant Area (from plant intake to Lock and Dam 3)		*Below Lock & Dam 3
	No.	(for 7.50 h)	No.	(for 1.25 h)	
Shortnose gar	2	0.27	1	0.80	
Bowfin	2	0.27	0	0	
Gizzard shad	55	7.33	4	3.20	
Mooneye	16	2.13	0	0	
Carp	76	10.13	12	9.60	
Silver chub	1	0.13	0	0	
Emerald shiner	18	2.40	5	4.00	
Pugnose minnow	1	0.13	0	0	
Spottail shiner	8	1.07	0	0	
Spotfin shiner	4	0.53	1	0.80	
Bullhead minnow	13	1.73	0	0	
Carpsucker spp.	6	0.80	1	0.80	
River carpsucker	3	0.40	0	0	
Quillback carpsucker	1	0.13	0	0	
White sucker	3	0.40	0	0	
Smallmouth buffalo	3	0.40	5	4.00	
Bigmouth buffalo	0	0	1	0.80	
Silver redhorse	0	0	1	0.80	
Shorthead redhorse	21	2.80	8	6.40	
Channel catfish	5	0.67	6	4.80	
Flathead catfish	0	0	2	1.60	
White bass	32	4.27	7	5.60	
Rock bass	9	1.20	1	0.80	
Hybrid sunfish	2	0.27	0	0	
Green sunfish	3	0.40	9	7.20	
Bluegill	71	9.47	9	7.20	
Smallmouth bass	51	6.80	10	8.00	
Black crappie	8	1.07	1	0.80	
Yellow perch	9	1.20	0	0	
Log perch	2	0.27	0	0	
Sauger	41	5.47	2	1.60	
Walleye	19	2.53	1	0.80	
Freshwater drum	343	45.73	3	2.40	
Total	828	110.40	90	72.00	

*Stations 3-5 to 3-9 (plant area) and Stations 4-0 to 4-9 (below dam) were not sampled during spring due to equipment problems.

Table 2.4-10 Summary of day electrofishing catches from the Mississippi River and connecting waters near the Prairie Island Nuclear Generating Plant, Red Wing, Minnesota, summer 1978.

Species	Above Plant		Plant Area (from plant intake to Lock and Dam 3		Below Lock & Dam 3	
	No.	No./hour (for 7.50 h)	No.	No./hour (for 2.50 h)	No.	No./hour (for 2.50 h)
Chestnut lamprey	0	0	0	0	1	0.40
Shortnose gar	2	0.27	1	0.40	0	0
Bowfin	1	0.13	0	0	0	0
Gizzard shad	396	52.80	97	38.80	9	3.60
Mooneye	0	0	1	0.40	0	0
Northern pike	2	0.27	0	0	0	0
Carp	150	20.00	42	16.80	50	20.00
Silver chub	3	0.40	0	0	1	0.40
Emerald shiner	207	27.60	9	3.60	174	69.60
Spottail shiner	11	1.47	9	3.60	0	0
Spotfin shiner	0	0	1	0.40	0	0
Bullhead minnow	4	0.53	6	2.40	0	0
Carpsucker spp.	7	0.93	1	0.40	1	0.40
River carpsucker	1	0.13	0	0	1	0.40
Quillback carpsucker	16	2.13	4	1.60	2	0.80
White sucker	1	0.13	0	0	1	0.40
Smallmouth buffalo	2	0.27	14	5.60	1	0.40
Bigmouth buffalo	0	0	3	1.20	2	0.80
Redhorse spp.	1	0.13	0	0	0	0
Silver redhorse	1	0.13	0	0	0	0
Shorthead redhorse	23	3.07	16	6.40	11	4.40
Channel catfish	8	1.07	6	2.40	2	0.80
Flathead catfish	1	0.13	0	0	0	0
White bass	67	8.93	29	11.60	88	35.20
Rock bass	6	0.80	1	0.40	11	4.40
Hybrid sunfish	0	0	5	2.00	1	0.40
Green sunfish	16	2.13	4	1.60	1	0.40
Bluegill	105	14.00	95	38.00	56	22.40
Smallmouth bass	48	6.40	11	4.40	23	9.20
Largemouth bass	2	0.27	4	1.60	0	0
White crappie	2	0.27	1	0.40	2	0.80
Black crappie	3	0.40	12	4.80	3	1.20
Johnny darter	0	0	1	0.40	0	0
Yellow perch	12	1.60	9	3.60	0	0
Log perch	9	1.20	2	0.80	3	1.20
Sauger	53	7.07	4	1.60	5	2.00
Walleye	8	1.07	1	0.40	5	2.00
Freshwater drum	440	58.67	74	29.60	9	3.60
Total	1608	214.40	463	185.20	463	185.20

Table 2.4-11 Summary of day electrofishing catches from the Mississippi River and connecting waters near the Prairie Island Nuclear Generating Plant, Red Wing, Minnesota, fall 1978.

Species	Above Plant		Plant Area (from plant intake to Lock and Dam 3)		Below Lock & Dam 3	
	No.	No./hour (for 7.50 h)	No.	No./hour (for 2.50 h)	No.	No./hour (for 2.50 h)
Silver lamprey	0	0	2	0.80	0	0
Bowfin	2	0.27	0	0	0	0
Gizzard shad	385	51.33	113	45.20	221	88.40
Mooneye	1	0.13	0	0	7	2.80
Carp	95	12.67	62	24.80	110	44.00
Silver chub	2	0.27	0	0	1	0.40
Emerald shiner	47	6.27	30	12.00	24	9.60
Spottail shiner	7	0.93	2	0.80	0	0
Spotfin shiner	1	0.13	0	0	0	0
Bullhead minnow	4	0.53	1	0.40	0	0
Carpsucker spp.	3	0.40	0	0	5	2.00
River carpsucker	2	0.27	0	0	2	0.80
Quillback carpsucker	2	0.27	2	0.80	3	1.20
White sucker	0	0	0	0	1	0.40
Smallmouth buffalo	2	0.27	5	2.00	0	0
Bigmouth buffalo	1	0.13	0	0	5	2.00
Silver redhorse	1	0.13	0	0	0	0
Shorthead redhorse	10	1.33	7	2.80	14	5.60
Channel catfish	1	0.13	7	2.80	1	0.40
Flathead catfish	0	0	5	2.00	0	0
White bass	37	4.93	29	11.60	59	23.60
Rock bass	14	1.87	5	2.00	16	6.40
Hybrid sunfish	2	0.27	20	8.00	1	0.40
Green sunfish	11	1.47	8	3.20	2	0.80
Orangespotted sunfish	0	0	1	0.40	0	0
Bluegill	40	5.33	157	62.80	162	64.80
Smallmouth bass	33	4.40	10	4.00	13	5.20
Largemouth bass	0	0	7	2.80	3	1.20
White crappie	4	0.53	20	8.00	3	1.20
Black crappie	18	2.40	13	5.20	15	6.00
Yellow perch	3	0.40	0	0	0	0
Log perch	1	0.13	0	0	0	0
Sauger	24	3.20	2	0.80	10	4.00
Walleye	9	1.20	13	5.20	7	2.80
Freshwater drum	46	6.13	6	2.40	28	11.20
Total	808	107.73	527	210.80	713	285.20

Table 2.4-12. Length-frequencies of all fish caught by electrofishing in the Mississippi River and connecting waters near the Prairie Island Nuclear Generating Plant, Red Wing, Minnesota, 1978. Sections 0, 1, 2, 3, and 4 combined, seasons separated. (Sheet 1 of 16)

Total Length in Centimeters	Chestnut lamprey Summer *	Silver lamprey Fall*	Shortnose gar Spring	Shortnose gar Summer	Shortnose gar Total	Bowfin Spring	Bowfin Summer	Bowfin Fall	Bowfin Total
Y/Y not meas.									
0.1 - 1.9									
2.0 - 3.9									
4.0 - 5.9									
6.0 - 7.9									
8.0 - 9.9									
10.0 - 11.9									
12.0 - 13.9									
14.0 - 15.9									
16.0 - 17.9									
18.0 - 19.9									
20.0 - 21.9									
22.0 - 23.9								1	1
24.0 - 25.9									
26.0 - 27.9									
28.0 - 29.9									
30.0 - 31.9									
32.0 - 33.9									
34.0 - 35.9									
36.0 - 37.9								1	1
38.0 - 39.9									
40.0 - 44.9									
45.0 - 49.9						1			1
50.0 - 54.9			1	1	2	1	1		2
55.0 - 59.9				1	1				
60.0 - 64.9			2	1	3				
65.0 - 69.9									
70.0 - 74.9									
75.0 - 79.9									
80.0 - 84.9									
85.0 - 89.9									
90.0 - 94.9									
95.0 - 99.9									
100.0 - +									
Others not meas.	1	2							
Total unmeasured	1	2							
Total measured			3	3	6	2	1	2	5
Grand Total	1	2	3	3	6	2	1	2	5

* This species was caught during only one season.

Table 2.4-12. Length-frequencies of all fish caught by electrofishing in the Mississippi River and connecting waters near the Prairie Island Nuclear Generating Plant, Red Wing, Minnesota, 1978. Sections 0, 1, 2, 3, and 4 combined, seasons separated. (Sheet 2 of 16)

Total Length in Centimeters	Gizzard shad Spring	Gizzard shad Summer	Gizzard shad Fall	Gizzard shad Total	Mooneye Spring	Mooneye Summer	Mooneye Fall	Mooneye Total	Northern pike Summer*
Y/Y not meas.		112	270	382					
0.1 - 1.9									
2.0 - 3.9		39		39					
4.0 - 5.9		54		54					
6.0 - 7.9	6	14	3	23					
8.0 - 9.9		4	4	8					
10.0 - 11.9		17	15	32					
12.0 - 13.9		63	44	107					
14.0 - 15.9		106	185	291					
16.0 - 17.9		23	111	134					
18.0 - 19.9		2	19	21					
20.0 - 21.9	9		1	10					
22.0 - 23.9	5			5					
24.0 - 25.9	2	2		4					
26.0 - 27.9		3	5	8			1	1	
28.0 - 29.9	2	15	8	25			1	1	
30.0 - 31.9	9	3	13	25			5	5	
32.0 - 33.9	13	5	4	22	10	1		11	
34.0 - 35.9	13	9	8	30	6		1	7	
36.0 - 37.9		7	10	17					
38.0 - 39.9		1	6	7					
40.0 - 44.9			3	3					
45.0 - 49.9									
50.0 - 54.9									
55.0 - 59.9									
60.0 - 64.9									
65.0 - 69.9									
70.0 - 74.9									1
75.0 - 79.9									1
80.0 - 84.9									
85.0 - 89.9									
90.0 - 94.9									
95.0 - 99.9									
100.0 - +									
Others not meas.		23	10	33					
Total unmeasured		135	280	415					
Total measured	59	367	439	865	16	1	8	25	2
Grand Total	59	502	719	1280	16	1	8	25	2

* This species was caught during only one season.

Table 2.4-12. Length-frequencies of all fish caught by electrofishing in the Mississippi River and connecting waters near the Prairie Island Nuclear Generating Plant, Red Wing, Minnesota, 1978. Sections 0, 1, 2, 3, and 4 combined, seasons separated. (Sheet 3 of 16)

Total Length in Centimeters	Carp Spring	Carp Summer	Carp Fall	Carp Total	Silver chub Spring	Silver chub Summer	Silver chub Fall	Silver chub Total	Emerald shiner Spring
Y/Y not meas.									
0.1 - 1.9									
2.0 - 3.9		1		1					
4.0 - 5.9									
6.0 - 7.9									
8.0 - 9.9									
10.0 - 11.9									
12.0 - 13.9									
14.0 - 15.9						1		1	
16.0 - 17.9	1			1					
18.0 - 19.9	1	1		2			1	1	
20.0 - 21.9	2			2					
22.0 - 23.9	1			1					
24.0 - 25.9		1	1	2					
26.0 - 27.9									
28.0 - 29.9	1	1	2	4					
30.0 - 31.9	1	1	3	5					
32.0 - 33.9		5	3	8					
34.0 - 35.9		4	5	9					
36.0 - 37.9		3	5	8					
38.0 - 39.9	1	1	4	6					
40.0 - 44.9	3	19	16	38					
45.0 - 49.9	26	85	65	176					
50.0 - 54.9	29	67	85	181					
55.0 - 59.9	13	31	44	88					
60.0 - 64.9	6	13	22	41					
65.0 - 69.9	2	7	7	16					
70.0 - 74.9			3	3					
75.0 - 79.9			1	1					
80.0 - 84.9									
85.0 - 89.9									
90.0 - 94.9									
95.0 - 99.9									
100.0 - +									
Others not meas.	1	2	1	4	1	3	2	6	23
Total unmeasured	1	2	1	4	1	3	2	6	23
Total measured	87	240	266	593		1	1	2	
Grand Total	88	242	267	597	1	4	3	8	23

Table 2.4-12. Length-frequencies of all fish caught by electrofishing in the Mississippi River and connecting waters near the Prairie Island Nuclear Generating Plant, Red Wing, Minnesota, 1978. Sections 0, 1, 2, 3, and 4 combined, seasons separated. (Sheet 4 of 16)

Total Length in Centimeters	Emerald shiner Summer	Emerald shiner Fall	Emerald shiner Total	Spottail shiner Spring	Spottail shiner Summer	Spottail shiner Fall	Spottail shiner Total	Spotfin shiner Spring	Spotfin shiner Summer
Y/Y not meas.									
0.1 - 1.9									
2.0 - 3.9									
4.0 - 5.9									
6.0 - 7.9									
8.0 - 9.9									
10.0 - 11.9					1		1		
12.0 - 13.9									
14.0 - 15.9									
16.0 - 17.9									
18.0 - 19.9									
20.0 - 21.9									
22.0 - 23.9									
24.0 - 25.9									
26.0 - 27.9									
28.0 - 29.9									
30.0 - 31.9									
32.0 - 33.9									
34.0 - 35.9									
36.0 - 37.9									
38.0 - 39.9									
40.0 - 44.9									
45.0 - 49.9									
50.0 - 54.9									
55.0 - 59.9									
60.0 - 64.9									
65.0 - 69.9									
70.0 - 74.9									
75.0 - 79.9									
80.0 - 84.9									
85.0 - 89.9									
90.0 - 94.9									
95.0 - 99.9									
100.0 - +									
Others not meas.	390	101	514	8	19	9	36	5	1
Total unmeasured	390	101	514	8	19	9	36	5	1
Total measured					1		1		
Grand Total	390	101	514	8	20	9	37	5	1

Table 2.4-12. Length-frequencies of all fish caught by electrofishing in the Mississippi River and connecting waters near the Prairie Island Nuclear Generating Plant, Red Wing, Minnesota, 1978. Sections 0, 1, 2, 3, and 4 combined, seasons separated. (Sheet 5 of 16)

Total Length in Centimeters	Spotfin shiner Fall	Spotfin shiner Total	Pugnose minnow Spring*	Bullhead minnow Spring	Bullhead minnow Summer	Bullhead minnow Fall	Bullhead minnow Total	Carpsucker spp. Spring	Carpsucker spp. Summer
Y/Y not meas.									
0.1 - 1.9									
2.0 - 3.9									
4.0 - 5.9									
6.0 - 7.9									
8.0 - 9.9								1	1
10.0 - 11.9								1	1
12.0 - 13.9								1	4
14.0 - 15.9								1	1
16.0 - 17.9								1	1
18.0 - 19.9									
20.0 - 21.9									
22.0 - 23.9									1
24.0 - 25.9									
26.0 - 27.9									
28.0 - 29.9									
30.0 - 31.9									
32.0 - 33.9									
34.0 - 35.9									
36.0 - 37.9									
38.0 - 39.9									
40.0 - 44.9									
45.0 - 49.9									
50.0 - 54.9									
55.0 - 59.9									
60.0 - 64.9									
65.0 - 69.9									
70.0 - 74.9									
75.0 - 79.9									
80.0 - 84.9									
85.0 - 89.9									
90.0 - 94.9									
95.0 - 99.9									
100.0 - +									
Others not meas.	1	7	1	13	10	5	28		
Total unmeasured	1	7	1	13	10	5	28		
Total measured								7	9
Grand Total	1	7	1	13	10	5	28	7	9

* This species was caught during only one season.

Table 2.4-12. Length-frequencies of all fish caught by electrofishing in the Mississippi River and connecting waters near the Prairie Island Nuclear Generating Plant, Red Wing, Minnesota, 1978. Sections 0, 1, 2, 3, and 4 combined, seasons separated. (Sheet 6 of 16)

Total Length in Centimeters	Carpsucker spp. Fall	Carpsucker spp. Total	River carpsucker Spring	River carpsucker Summer	River carpsucker Fall	River carpsucker Total	Quillback carpsucker Spring	Quillback carpsucker Summer	Quillback carpsucker Fall
Y/Y not meas.									
0.1 - 1.9									
2.0 - 3.9									
4.0 - 5.9									
6.0 - 7.9									
8.0 - 9.9		2							
10.0 - 11.9		2	1			1			
12.0 - 13.9	1	6							
14.0 - 15.9	1	5							
16.0 - 17.9	2	4							
18.0 - 19.9	3	3						2	
20.0 - 21.9	1	1						1	
22.0 - 23.9		1						2	2
24.0 - 25.9								4	
26.0 - 27.9								1	
28.0 - 29.9									1
30.0 - 31.9							1		1
32.0 - 33.9								1	
34.0 - 35.9								3	
36.0 - 37.9								1	2
38.0 - 39.9								2	1
40.0 - 44.9				1	3	4		3	
45.0 - 49.9				1		1		1	
50.0 - 54.9			2		1	3		1	
55.0 - 59.9									
60.0 - 64.9									
65.0 - 69.9									
70.0 - 74.9									
75.0 - 79.9									
80.0 - 84.9									
85.0 - 89.9									
90.0 - 94.9									
95.0 - 99.9									
100.0 - +									
Others not meas.									
Total unmeasured									
Total measured	8	24	3	2	4	9	1	22	7
Grand Total	8	24	3	2	4	9	1	22	7

Table 2.4-12. Length-frequencies of all fish caught by electrofishing in the Mississippi River and connecting waters near the Prairie Island Nuclear Generating Plant, Red Wing, Minnesota, 1978. Sections 0, 1, 2, 3, and 4 combined, seasons separated. (Sheet 7 of 16)

Total Length in Centimeters	Quillback carpsucker Total	White sucker Spring	White sucker Summer	White sucker Fall	White sucker Total	Smallmouth buffalo Spring	Smallmouth buffalo Summer	Smallmouth buffalo Fall	Smallmouth buffalo Total
Y/Y not meas.									
0.1 - 1.9									
2.0 - 3.9									
4.0 - 5.9									
6.0 - 7.9									
8.0 - 9.9							1		1
10.0 - 11.9							2		2
12.0 - 13.9							3		3
14.0 - 15.9							1		1
16.0 - 17.9									
18.0 - 19.9	2					1			1
20.0 - 21.9	1					1			1
22.0 - 23.9	4								
24.0 - 25.9	4					3			3
26.0 - 27.9	1					1			1
28.0 - 29.9	1		1		1		1	2	3
30.0 - 31.9	2					1	2	1	4
32.0 - 33.9	1	2			2				
34.0 - 35.9	3						1		1
36.0 - 37.9	3					1		2	3
38.0 - 39.9	3						3		3
40.0 - 44.9	3	1		1	2		2	1	3
45.0 - 49.9	1		1		1			1	1
50.0 - 54.9	1								
55.0 - 59.9									
60.0 - 64.9							1		1
65.0 - 69.9									
70.0 - 74.9									
75.0 - 79.9									
80.0 - 84.9									
85.0 - 89.9									
90.0 - 94.9									
95.0 - 99.9									
100.0 - +									
Others not meas.									
Total unmeasured									
Total measured	30	3	2	1	6	8	17	7	32
Grand Total	30	3	2	1	6	8	17	7	32

Table 2.4-12. Length-frequencies of all fish caught by electrofishing in the Mississippi River and connecting waters near the Prairie Island Nuclear Generating Plant, Red Wing, Minnesota, 1978. Sections 0, 1, 2, 3, and 4 combined, seasons separated. (Sheet 8 of 16)

Total Length in Centimeters	Bigmouth buffalo Spring	Bigmouth buffalo Summer	Bigmouth buffalo Fall	Bigmouth buffalo Total	Redhorse spp. Summer*	Silver redhorse Spring	Silver redhorse Summer	Silver redhorse Fall	Silver redhorse Total
Y/Y not meas.									
0.1 - 1.9									
2.0 - 3.9									
4.0 - 5.9									
6.0 - 7.9									
8.0 - 9.9					1				
10.0 - 11.9									
12.0 - 13.9									
14.0 - 15.9									
16.0 - 17.9									
18.0 - 19.9									
20.0 - 21.9									
22.0 - 23.9									
24.0 - 25.9									
26.0 - 27.9									
28.0 - 29.9									
30.0 - 31.9	1			1					
32.0 - 33.9		2	1	3					
34.0 - 35.9		1	1	2			1		1
36.0 - 37.9		1	1	2					
38.0 - 39.9			1	1					
40.0 - 44.9			1	1					
45.0 - 49.9									
50.0 - 54.9									
55.0 - 59.9		1		1		1		1	2
60.0 - 64.9									
65.0 - 69.9			1	1					
70.0 - 74.9									
75.0 - 79.9									
80.0 - 84.9									
85.0 - 89.9									
90.0 - 94.9									
95.0 - 99.9									
100.0 - +									
Others not meas.									
Total unmeasured									
Total measured	1	5	6	12	1	1	1	1	3
Grand Total	1	5	6	12	1	1	1	1	3

* Caught during one season only.

Table 2.4-12. Length-frequencies of all fish caught by electrofishing in the Mississippi River and connecting waters near the Prairie Island Nuclear Generating Plant, Red Wing, Minnesota, 1978. Sections 0, 1, 2, 3, and 4 combined, seasons separated. (Sheet 9 of 16)

Total Length in Centimeters	Shorthead redhorse Spring	Shorthead redhorse Summer	Shorthead redhorse Fall	Shorthead redhorse Total	Channel catfish Spring	Channel catfish Summer	Channel catfish Fall	Channel catfish Total	Flathead catfish Spring
Y/Y not meas.									
0.1 - 1.9									
2.0 - 3.9									
4.0 - 5.9									
6.0 - 7.9									
8.0 - 9.9		5		5			1	1	
10.0 - 11.9		2	2	4					
12.0 - 13.9			1	1			1	1	
14.0 - 15.9					1			1	
16.0 - 17.9		1		1					
18.0 - 19.9			2	2			1	1	
20.0 - 21.9		2	1	3	1			1	
22.0 - 23.9			2	2					
24.0 - 25.9		1	1	2					
26.0 - 27.9		2	1	3					
28.0 - 29.9		1		1					
30.0 - 31.9	2		1	3		1		1	
32.0 - 33.9	1	1	1	3	1			1	1
34.0 - 35.9	1		3	4	1			1	
36.0 - 37.9	10	9	2	21		2		2	
38.0 - 39.9	4	9	3	16		2		2	
40.0 - 44.9	8	14	10	32	2	2	3	7	1
45.0 - 49.9	3	3		6	2	3	1	6	
50.0 - 54.9			1	1	1	3	1	5	
55.0 - 59.9					1	3		4	
60.0 - 64.9					1		1	2	
65.0 - 69.9									
70.0 - 74.9									
75.0 - 79.9									
80.0 - 84.9									
85.0 - 89.9									
90.0 - 94.9									
95.0 - 99.9									
100.0 - +									
Others not meas.									
Total unmeasured									
Total measured	29	50	31	110	11	16	9	36	2
Grand Total	29	50	31	110	11	16	9	36	2

Table 2.4-12. Length-frequencies of all fish caught by electrofishing in the Mississippi River and connecting waters near the Prairie Island Nuclear Generating Plant, Red Wing, Minnesota, 1978. Sections 0, 1, 2, 3, and 4 combined, seasons separated. (Sheet 10 of 16)

Total Length in Centimeters	Flathead catfish Summer	Flathead catfish Fall	Flathead catfish Total	White bass Spring	White bass Summer	White bass Fall	White bass Total	Rock bass Spring	Rock bass Summer
Y/Y not meas.									
0.1 - 1.9									
2.0 - 3.9				3			3		
4.0 - 5.9				1			1		
6.0 - 7.9								2	
8.0 - 9.9					17		17		1
10.0 - 11.9					28	8	36	1	2
12.0 - 13.9					8	27	35	3	2
14.0 - 15.9				9		5	14		4
16.0 - 17.9				11	2		13	4	7
18.0 - 19.9					11	6	17		
20.0 - 21.9					15	5	20		1
22.0 - 23.9				5	10	10	25		1
24.0 - 25.9				3	33	9	45		
26.0 - 27.9					23	20	43		
28.0 - 29.9					11	15	26		
30.0 - 31.9				1	4	2	7		
32.0 - 33.9			1	1	11	3	15		
34.0 - 35.9				1	4	3	8		
36.0 - 37.9					6	5	11		
38.0 - 39.9				2	1	5	8		
40.0 - 44.9		1	2	1		2	3		
45.0 - 49.9	1	1	2						
50.0 - 54.9		1	1						
55.0 - 59.9		1	1						
60.0 - 64.9									
65.0 - 69.9									
70.0 - 74.9									
75.0 - 79.9									
80.0 - 84.9		1	1						
85.0 - 89.9									
90.0 - 94.9									
95.0 - 99.9									
100.0 - +									
Others not meas.				1			1		
Total unmeasured				1			1		
Total measured	1	5	8	38	184	125	347	10	18
Grand Total	1	5	8	39	184	125	348	10	18

Table 2.4-12. Length-frequencies of all fish caught by electrofishing in the Mississippi River and connecting waters near the Prairie Island Nuclear Generating Plant, Red Wing, Minnesota, 1978. Sections 0, 1, 2, 3, and 4 combined, seasons separated. (Sheet 11 of 16)

Total Length in Centimeters	Rock bass Fall	Rock bass Total	Hybrid sunfish Spring	Hybrid sunfish Summer	Hybrid sunfish Fall	Hybrid sunfish Total	Green sunfish Spring	Green sunfish Summer	Green sunfish Fall
Y/Y not meas.									
0.1 - 1.9									
2.0 - 3.9									
4.0 - 5.9	7	7						2	
6.0 - 7.9		2						1	
8.0 - 9.9	4	5	1			1	3	5	6
10.0 - 11.9	6	9		1	3	4	5	9	8
12.0 - 13.9	4	9	1	2	13	16	1	2	6
14.0 - 15.9	8	12		2	7	9	3	2	1
16.0 - 17.9	5	16		1		1			
18.0 - 19.9	1	1							
20.0 - 21.9		1							
22.0 - 23.9		1							
24.0 - 25.9									
26.0 - 27.9									
28.0 - 29.9									
30.0 - 31.9									
32.0 - 33.9									
34.0 - 35.9									
36.0 - 37.9									
38.0 - 39.9									
40.0 - 44.9									
45.0 - 49.9									
50.0 - 54.9									
55.0 - 59.9									
60.0 - 64.9									
65.0 - 69.9									
70.0 - 74.9									
75.0 - 79.9									
80.0 - 84.9									
85.0 - 89.9									
90.0 - 94.9									
95.0 - 99.9									
100.0 - +									
Others not meas.									
Total unmeasured									
Total measured	35	63	2	6	23	31	12	21	21
Grand Total	35	63	2	6	23	31	12	21	21

Table 2.4-12. Length-frequencies of all fish caught by electrofishing in the Mississippi River and connecting waters near the Prairie Island Nuclear Generating Plant, Red Wing, Minnesota, 1978. Sections 0, 1, 2, 3, and 4 combined, seasons separated. (Sheet 12 of 16)

Total Length in Centimeters	Green sunfish Total	Orange-spotted sunfish Fall*	Bluegill Spring	Bluegill Summer	Bluegill Fall	Bluegill Total	Smallmouth bass Spring	Smallmouth bass Summer	Smallmouth bass Fall
Y/Y not meas.									
0.1 - 1.9									
2.0 - 3.9				21	9	30			
4.0 - 5.9	2			19	43	62			
6.0 - 7.9	1		5	3	13	21		2	
8.0 - 9.9	14		16	16	16	48		4	1
10.0 - 11.9	22		1	68	79	148	5	1	1
12.0 - 13.9	9		12	35	81	128	13	8	2
14.0 - 15.9	6		17	39	62	118	3	13	1
16.0 - 17.9			17	43	46	106	3	9	2
18.0 - 19.9			10	8	10	28	7	10	3
20.0 - 21.9			1	3		4	6	11	7
22.0 - 23.9							11	5	8
24.0 - 25.9							3	7	12
26.0 - 27.9			1			1	1	4	8
28.0 - 29.9							4	4	2
30.0 - 31.9							1		3
32.0 - 33.9								1	1
34.0 - 35.9							1		
36.0 - 37.9							1		1
38.0 - 39.9							1	2	
40.0 - 44.9							1	1	3
45.0 - 49.9									
50.0 - 54.9									1
55.0 - 59.9									
60.0 - 64.9									
65.0 - 69.9									
70.0 - 74.9									
75.0 - 79.9									
80.0 - 84.9									
85.0 - 89.9									
90.0 - 94.9									
95.0 - 99.9									
100.0 - +									
Others not meas.		1		1		1			
Total unmeasured		1		1		1			
Total measured	54		80	255	359	694	61	82	56
Grand Total	54	1	80	256	359	695	61	82	56

* This species was caught during only one season.

Table 2.4-12. Length-frequencies of all fish caught by electrofishing in the Mississippi River and connecting waters near the Prairie Island Nuclear Generating Plant, Red Wing, Minnesota, 1978. Sections 0, 1, 2, 3, and 4 combined, seasons separated. (Sheet 13 of 16)

Total Length in Centimeters	Smallmouth bass Total	Largemouth bass Summer	Largemouth bass Fall	Largemouth bass Total	White crappie Summer	White crappie Fall	White crappie Total	Black crappie Spring	Black crappie Summer
Y/Y not meas.									
0.1 - 1.9									
2.0 - 3.9									
4.0 - 5.9									
6.0 - 7.9	2								2
8.0 - 9.9	5					1	1		
10.0 - 11.9	7							3	
12.0 - 13.9	23							5	1
14.0 - 15.9	17	1		1					4
16.0 - 17.9	14					6	6		2
18.0 - 19.9	20		1	1		2	2		2
20.0 - 21.9	24	3		3	1	6	7		4
22.0 - 23.9	24		2	2	3	4	7	1	2
24.0 - 25.9	22		5	5	1	4	5		1
26.0 - 27.9	13					2	2		
28.0 - 29.9	10		1	1		1	1		
30.0 - 31.9	4	1		1					
32.0 - 33.9	2	1		1		1	1		
34.0 - 35.9	1								
36.0 - 37.9	2								
38.0 - 39.9	3		1	1					
40.0 - 44.9	5								
45.0 - 49.9									
50.0 - 54.9	1								
55.0 - 59.9									
60.0 - 64.9									
65.0 - 69.9									
70.0 - 74.9									
75.0 - 79.9									
80.0 - 84.9									
85.0 - 89.9									
90.0 - 94.9									
95.0 - 99.9									
100.0 - +									
Others not meas.									
Total unmeasured									
Total measured	199	6	10	16	5	27	32	9	18
Grand Total	199	6	10	16	5	27	32	9	18

Table 2.4-12. Length-frequencies of all fish caught by electrofishing in the Mississippi River and connecting waters near the Prairie Island Nuclear Generating Plant, Red Wing, Minnesota, 1978. Sections 0, 1, 2, 3, and 4 combined, seasons separated. (Sheet 14 of 16)

Total Length in Centimeters	Black crappie Fall	Black crappie Total	Johnny darter Summer*	Yellow perch Spring	Yellow perch Summer	Yellow perch Fall	Yellow perch Total	Log perch Spring	Log perch Summer
Y/Y not meas.									
0.1 - 1.9									
2.0 - 3.9									
4.0 - 5.9	1	1		3			3		
6.0 - 7.9	1	3			2		2		1
8.0 - 9.9					17	1	18		6
10.0 - 11.9	1	4				2	2		
12.0 - 13.9	5	11		3			3		
14.0 - 15.9	11	15		3	1		4		
16.0 - 17.9	5	7							
18.0 - 19.9	2	4							
20.0 - 21.9	6	10			1		1		
22.0 - 23.9	9	12							
24.0 - 25.9	5	6							
26.0 - 27.9									
28.0 - 29.9									
30.0 - 31.9									
32.0 - 33.9									
34.0 - 35.9									
36.0 - 37.9									
38.0 - 39.9									
40.0 - 44.9									
45.0 - 49.9									
50.0 - 54.9									
55.0 - 59.9									
60.0 - 64.9									
65.0 - 69.9									
70.0 - 74.9									
75.0 - 79.9									
80.0 - 84.9									
85.0 - 89.9									
90.0 - 94.9									
95.0 - 99.9									
100.0 - +									
Others not meas.			1					2	7
Total unmeasured			1					2	7
Total measured	46	73		9	21	3	33		7
Grand Total	46	73	1	9	21	3	33	2	14

* This species was caught during only one season.

Table 2.4-12. Length-frequencies of all fish caught by electrofishing in the Mississippi River and connecting waters near the Prairie Island Nuclear Generating Plant, Red Wing, Minnesota, 1978. Sections 0, 1, 2, 3, and 4 combined, seasons separated. (Sheet 15 of 16)

Total Length in Centimeters	Log perch Fall	Log perch Total	Sauger Spring	Sauger Summer	Sauger Fall	Sauger Total	Walleye Spring	Walleye Summer	Walleye Fall
Y/Y not meas.									
0.1 - 1.9									
2.0 - 3.9									
4.0 - 5.9			2		1	3	1		
6.0 - 7.9		1	7			7	1		
8.0 - 9.9		6							
10.0 - 11.9				15	1	16		1	
12.0 - 13.9				20	7	27		4	1
14.0 - 15.9				1	7	8		1	2
16.0 - 17.9				2	3	5		1	
18.0 - 19.9			3			3	5		
20.0 - 21.9			9		1	10	7		1
22.0 - 23.9			6		1	7	2	1	
24.0 - 25.9			8	6	1	15		1	2
26.0 - 27.9			6	7	8	21			1
28.0 - 29.9				7	1	8	2		1
30.0 - 31.9					2	2		1	2
32.0 - 33.9			1			1		1	1
34.0 - 35.9				2		2		2	1
36.0 - 37.9			1	1		2			
38.0 - 39.9				1		1			
40.0 - 44.9					3	3			3
45.0 - 49.9							1	1	5
50.0 - 54.9							1		3
55.0 - 59.9									1
60.0 - 64.9									5
65.0 - 69.9									
70.0 - 74.9									
75.0 - 79.9									
80.0 - 84.9									
85.0 - 89.9									
90.0 - 94.9									
95.0 - 99.9									
100.0 - +									
Others not meas.	1	10							
Total unmeasured	1	10							
Total measured			43	62	36	141	20	14	29
Grand Total	1	17	43	62	36	141	20	14	29

Table 2.4-12. Length-frequencies of all fish caught by electrofishing in the Mississippi River and connecting waters near the Prairie Island Nuclear Generating Plant, Red Wing, Minnesota, 1978. Sections 0, 1, 2, 3, and 4 combined, seasons separated. (Sheet 16 of 16)

Total Length in Centimeters	Walleye Total	Freshwater drum Spring	Freshwater drum Summer	Freshwater drum Fall	Freshwater drum Total				
Y/Y not meas.			90		90				
0.1 - 1.9									
2.0 - 3.9			1		1				
4.0 - 5.9	1								
6.0 - 7.9	1								
8.0 - 9.9			20	2	22				
10.0 - 11.9	1	4	115	7	126				
12.0 - 13.9	5	43	112	28	183				
14.0 - 15.9	3	108	10	7	125				
16.0 - 17.9	1	29	36	3	68				
18.0 - 19.9	5	7	55	4	66				
20.0 - 21.9	8	14	9	1	24				
22.0 - 23.9	3	12	4	1	17				
24.0 - 25.9	3	4	2	1	7				
26.0 - 27.9	1	3		2	5				
28.0 - 29.9	3	1	1	3	5				
30.0 - 31.9	3	3	1	6	10				
32.0 - 33.9	2	2	9	4	15				
34.0 - 35.9	3		2	2	4				
36.0 - 37.9		1	1	1	3				
38.0 - 39.9		2	2	5	9				
40.0 - 44.9	3	1	2	2	5				
45.0 - 49.9	7	1		1	2				
50.0 - 54.9	4								
55.0 - 59.9	1								
60.0 - 64.9	5								
65.0 - 69.9									
70.0 - 74.9									
75.0 - 79.9									
80.0 - 84.9									
85.0 - 89.9									
90.0 - 94.9									
95.0 - 99.9									
100.0 - +									
Others not meas.		111	51		162				
Total unmeasured		111	141		252				
Total measured	63	235	382	80	697				
Grand Total	63	346	523	80	949				

Table 2.4-13 Summary of trawling catches from the Mississippi River and connecting waters near the Prairie Island Nuclear Generating Plant, Red Wing, Minnesota, spring 1978.

Species	Above Plant		Plant Area (from plant intake to Lock and Dam 3)	
	No.	No./hour (for 0.500 h)	No.	No./hour (for 0.500 h)
Gizzard shad	9	18.00	1	2.00
Carp	0	0	2	4.00
Quillback carpsucker	0	0	2	4.00
Smallmouth buffalo	1	2.00	0	0
Bigmouth buffalo	1	2.00	1	2.00
Shorthead redhorse	0	0	1	2.00
Channel catfish	0	0	1	2.00
White bass	5	10.00	8	16.00
White crappie	5	10.00	4	8.00
Black crappie	12	24.00	2	4.00
Walleye	0	0	2	4.00
Freshwater drum	4	8.00	8	16.00
Total	37	74.00	32	64.00

Table 2.4-14 Summary of trawling catches from the Mississippi River and connecting waters near Prairie Island Nuclear Generating Plant, Red Wing, Minnesota, summer 1978.

Species	Above Plant		Plant Area (from plant intake to Lock and Dam 3)	
	No.	No./hour (for 0.500 h)	No.	No./hour (for 0.500 h)
Shortnose gar	2	4.00	0	0
Gizzard shad	3	6.00	0	0
Carp	0	0	2	4.00
Emerald shiner	1	2.00	0	0
Spottail shiner	1	2.00	0	0
Quillback carpsucker	0	0	4	8.00
Smallmouth buffalo	2	4.00	4	8.00
Channel catfish	0	0	2	4.00
White bass	2	4.00	0	0
Bluegill	10	20.00	0	0
White crappie	79	158.00	0	0
Black crappie	45	90.00	0	0
Freshwater drum	36	72,00	27	54.00
Total	181	362.00	39	78.00

Table 2.4-15 Summary of trawling catches from the Mississippi River and connecting waters near Prairie Island Nuclear Generating Plant, Red Wing, Minnesota, fall 1978.

Species	Above Plant		Plant Area (from plant intake to Lock and Dam 3)	
	No.	No./hour (for 0.500 h)	No.	No./hour (for 0.500 h)
Bowfin	1	2.00	0	0
Gizzard shad	4	8.00	26	52.00
Carp	2	4.00	1	2.00
Spottail shiner	6	12.00	1	2.00
Bigmouth buffalo	2	4.00	2	4.00
Yellow bullhead	1	2.00	0	0
Bluegill	23	46.00	0	0
White crappie	27	54.00	0	0
Black crappie	24	48.00	1	2.00
Sauger	0	0	1	2.00
Freshwater drum	13	26.00	3	6.00
Total	103	206.00	35	70.00

Table 2.4-16. Length-frequencies of all fish caught by trawling in the Mississippi River and connecting waters near the Prairie Island Nuclear Generating Plant, Red Wing, Minnesota, 1978. Sections 0 and 3 combined, seasons separated. (Sheet 1 of 6)

Total Length in Centimeters	Shortnose gar Summer*	Bowfin Fall*	Gizzard shad Spring	Gizzard shad Summer	Gizzard shad Fall	Gizzard shad Total	Carp Spring	Carp Summer	Carp Fall
Y/Y not meas.									
0.1 - 1.9									
2.0 - 3.9			1			1			
4.0 - 5.9			7			7			
6.0 - 7.9			2			2			
8.0 - 9.9				1	2	3			
10.0 - 11.9				1	2	3			
12.0 - 13.9				1	2	3			
14.0 - 15.9					11	11			
16.0 - 17.9					8	8			
18.0 - 19.9					4	4			
20.0 - 21.9							1		
22.0 - 23.9									
24.0 - 25.9									
26.0 - 27.9									
28.0 - 29.9									
30.0 - 31.9									1
32.0 - 33.9									
34.0 - 35.9									
36.0 - 37.9									
38.0 - 39.9					1	1			
40.0 - 44.9									
45.0 - 49.9		1							2
50.0 - 54.9								2	
55.0 - 59.9									
60.0 - 64.9	2						1		
65.0 - 69.9									
70.0 - 74.9									
75.0 - 79.9									
80.0 - 84.9									
85.0 - 89.9									
90.0 - 94.9									
95.0 - 99.9									
100.0 - +									
Others not meas.									
Total not meas.									
Total measured	2	1	10	3	30	43	2	2	3
Grand Total	2	1	10	3	30	43	2	2	3

* This species was caught during only one season.

Table 2.4-16. Length-frequencies of all fish caught by trawling in the Mississippi River and connecting waters near the Prairie Island Nuclear Generating Plant, Red Wing, Minnesota, 1978. Sections 0 and 3 combined, seasons separated. (Sheet 2 of 6)

Total Length in Centimeters	Carp Total	Emerald shiner Summer*	Spottail shiner Summer	Spottail shiner Fall	Spottail shiner Total	Quillback carp-sucker Spring	Quillback carp-sucker Summer	Quillback carp-sucker Total	Small-mouth buffalo Spring
Y/Y not meas.									
0.1 - 1.9									
2.0 - 3.9									
4.0 - 5.9		1							
6.0 - 7.9			1		1				
8.0 - 9.9									
10.0 - 11.9									
12.0 - 13.9									
14.0 - 15.9									
16.0 - 17.9									
18.0 - 19.9									
20.0 - 21.9	1								
22.0 - 23.9									1
24.0 - 25.9							1	1	
26.0 - 27.9									
28.0 - 29.9									
30.0 - 31.9	1								
32.0 - 33.9									
34.0 - 35.9							1	1	
36.0 - 37.9							1	1	
38.0 - 39.9									
40.0 - 44.9							1	1	
45.0 - 49.9	2					2		2	
50.0 - 54.9	2								
55.0 - 59.9									
60.0 - 64.9	1								
65.0 - 69.9									
70.0 - 74.9									
75.0 - 79.9									
80.0 - 84.9									
85.0 - 89.9									
90.0 - 94.9									
95.0 - 99.9									
100.0 - +									
Others not meas.				7	7				
Total unmeasured				7	7				
Total measured	7	1	1		1	2	4	6	1
Grand Total	7	1	1	7	8	2	4	6	1

* This species was caught during only one season.

Table 2.4-16. Length-frequencies of all fish caught by trawling in the Mississippi River and connecting waters near the Prairie Island Nuclear Generating Plant, Red Wing, Minnesota, 1978. Sections 0 and 3 combined, seasons separated. (Sheet 3 of 6)

Total Length in Centimeters	Smallmouth buffalo Summer	Smallmouth buffalo Total	Bigmouth buffalo Spring	Bigmouth buffalo Fall	Bigmouth buffalo Total	Shorthead redhorse Spring*	Yellow bullhead Fall*	Channel catfish Spring	Channel catfish Summer
Y/Y not meas.									
0.1 - 1.9									
2.0 - 3.9								1	
4.0 - 5.9									1
6.0 - 7.9									
8.0 - 9.9	2	2							
10.0 - 11.9									
12.0 - 13.9									
14.0 - 15.9									
16.0 - 17.9									
18.0 - 19.9									
20.0 - 21.9									
22.0 - 23.9		1							
24.0 - 25.9									
26.0 - 27.9									
28.0 - 29.9									1
30.0 - 31.9	1	1	1	1	2				
32.0 - 33.9									
34.0 - 35.9				2	2		1		
36.0 - 37.9				1	1				
38.0 - 39.9	1	1							
40.0 - 44.9	1	1				1			
45.0 - 49.9									
50.0 - 54.9	1	1							
55.0 - 59.9									
60.0 - 64.9									
65.0 - 69.9									
70.0 - 74.9									
75.0 - 79.9			1		1				
80.0 - 84.9									
85.0 - 89.9									
90.0 - 94.9									
95.0 - 99.9									
100.0 - +									
Others not meas.									
Total unmeasured									
Total measured	6	7	2	4	6	1	1	1	2
Grand Total	6	7	2	4	6	1	1	1	2

* This species was caught during only one season.

Table 2.4-16. Length-frequencies of all fish caught by trawling in the Mississippi River and connecting waters near the Prairie Island Nuclear Generating Plant, Red Wing, Minnesota, 1978. Sections 0 and 3 combined, seasons separated. (Sheet 4 of 6)

Total Length in Centimeters	Channel catfish Total	White bass Spring	White bass Summer	White bass Total	Bluegill Summer	Bluegill Fall	Bluegill Total	White crappie Spring	White crappie Summer
Y/Y not meas.									33
0.1 - 1.9					2		2		1
2.0 - 3.9	1				5		5		7
4.0 - 5.9	1								30
6.0 - 7.9									1
8.0 - 9.9					1		1		
10.0 - 11.9									
12.0 - 13.9						1	1	1	
14.0 - 15.9					2	3	5	2	2
16.0 - 17.9		1		1		9	9		3
18.0 - 19.9		1	1	2		8	8		
20.0 - 21.9						2	2		
22.0 - 23.9		2		2				4	2
24.0 - 25.9		5	1	6					
26.0 - 27.9		2		2				1	
28.0 - 29.9	1	1		1				1	
30.0 - 31.9									
32.0 - 33.9									
34.0 - 35.9		1		1					
36.0 - 37.9									
38.0 - 39.9									
40.0 - 44.9									
45.0 - 49.9									
50.0 - 54.9									
55.0 - 59.9									
60.0 - 64.9									
65.0 - 69.9									
70.0 - 74.9									
75.0 - 79.9									
80.0 - 84.9									
85.0 - 89.9									
90.0 - 94.9									
95.0 - 99.9									
100.0 - +									
Others not meas.									
Total unmeasured									33
Total measured	3	13	2	15	10	23	33	9	46
Grand Total	3	13	2	15	10	23	33	9	79

Table 2.4-16. Length-frequencies of all fish caught by trawling in the Mississippi River and connecting waters near the Prairie Island Nuclear Generating Plant, Red Wing, Minnesota, 1978. Sections 0 and 3 combined, seasons separated. (Sheet 5 of 6)

Total Length in Centimeters	White crappie Fall	White crappie Total	Black crappie Spring	Black crappie Summer	Black crappie Fall	Black crappie Total	Sauger Fall*	Walleye Spring*	Freshwater drum Spring
Y/Y not meas.		33							
0.1 - 1.9		1							
2.0 - 3.9		7							1
4.0 - 5.9		30		1		1			1
6.0 - 7.9	3	4		2		2			
8.0 - 9.9	4	4	1		1	2			
10.0 - 11.9			7	2		9			
12.0 - 13.9		1	2	30	6	38			
14.0 - 15.9		4		4	16	20			1
16.0 - 17.9	7	10							1
18.0 - 19.9			1	1		2			1
20.0 - 21.9	1	1	2	4	1	7		1	3
22.0 - 23.9	4	10	1	1	1	3			3
24.0 - 25.9	4	4							
26.0 - 27.9	2	3					1		
28.0 - 29.9	2	3							1
30.0 - 31.9								1	
32.0 - 33.9									
34.0 - 35.9									
36.0 - 37.9									
38.0 - 39.9									
40.0 - 44.9									
45.0 - 49.9									
50.0 - 54.9									
55.0 - 59.9									
60.0 - 64.9									
65.0 - 69.9									
70.0 - 74.9									
75.0 - 79.9									
80.0 - 84.9									
85.0 - 89.9									
90.0 - 94.9									
95.0 - 99.9									
100.0 - +									
Others not meas.									
Total unmeasured		33							
Total measured	27	82	14	45	25	84	1	2	12
Grand Total	27	115	14	45	25	84	1	2	12

* This species was caught during only one season.

Table 2.4-16. Length-frequencies of all fish caught by trawling in the Mississippi River and connecting waters near the Prairie Island Nuclear Generating Plant, Red Wing, Minnesota, 1978. Sections 0 and 3 combined, seasons separated. (Sheet 6 of 6)

Total Length in Centimeters	Freshwater drum Summer	Freshwater drum Fall	Freshwater drum Total						
Y/Y not meas.									
0.1 - 1.9									
2.0 - 3.9		1	2						
4.0 - 5.9		3	4						
6.0 - 7.9	5		5						
8.0 - 9.9	4	2	6						
10.0 - 11.9	5	1	6						
12.0 - 13.9		5	5						
14.0 - 15.9		4	5						
16.0 - 17.9	10		11						
18.0 - 19.9	10		11						
20.0 - 21.9	12		15						
22.0 - 23.9	9		12						
24.0 - 25.9	4		4						
26.0 - 27.9	1		1						
28.0 - 29.9			1						
30.0 - 31.9	2		2						
32.0 - 33.9	1		1						
34.0 - 35.9									
36.0 - 37.9									
38.0 - 39.9									
40.0 - 44.9									
45.0 - 49.9									
50.0 - 54.9									
55.0 - 59.9									
60.0 - 64.9									
65.0 - 69.9									
70.0 - 74.9									
75.0 - 79.9									
80.0 - 84.9									
85.0 - 89.9									
90.0 - 94.9									
95.0 - 99.9									
100.0 - +									
Others not meas.									
Total unmeasured									
Total measured	63	16	91						
Grand Total	63	16	91						

Table 2.4-17 Summary of seining catches from the Mississippi River and connecting waters near the Prairie Island Nuclear Generating Plant, Red Wing, Minnesota, spring 1978.

Estimated area seined:	Above Plant 0.27 ha		Plant Area (from plant intake to Lock & Dam 3) 0.08 ha		Below Lock and Dam 3 0.12 ha	
	No.	No./ha	No.	No./ha	No.	No./ha
Shortnose gar	0	0	4	50.00	0	0
Gizzard shad	101	374.07	198	2475.00	36	300.00
Carp	2	7.41	2	25.00	0	0
Emerald shiner	56	207.41	11	137.50	507	4225.00
River shiner	0	0	2	25.00	0	0
Spottail shiner	20	74.07	67	837.50	1	8.33
Spotfin shiner	14	51.85	9	112.50	20	166.67
Bullhead minnow	17	62.96	15	187.50	0	0
Quillback carpsucker	2	7.41	0	0	0	0
Carpsucker spp.	7	25.93	10	125.00	0	0
Smallmouth buffalo	7	25.93	33	412.50	0	0
Bigmouth buffalo	0	0	1	12.50	0	0
Shorthead redhorse	1	3.70	0	0	0	0
White bass	126	466.67	55	687.50	0	0
Bluegill	8	29.63	9	112.50	0	0
White crappie	0	0	0	0	2	16.67
Black crappie	4	14.81	6	75.00	2	16.67
Johnny darter	2	7.41	3	37.50	0	0
Yellow perch	5	18.52	1	12.50	0	0
Log perch	2	7.41	0	0	0	0
Sauger	0	0	1	12.50	0	0
Walleye	6	22.22	0	0	0	0
Freshwater drum	9	33.33	14	175.00	1	8.33
Total	389	1440.74	441	5512.50	569	4741.67

Table 2.4-18 Summary of seining catches from the Mississippi River and connecting waters near the Prairie Island Nuclear Generating Plant, Red Wing, Minnesota, summer 1978.

Estimated area seined:	Above Plant 0.25 ha		Plant Area (from plant intake to Lock & Dam 3) 0.06 ha		Below Lock and Dam 3 0.12 ha	
	No.	No./ha	No.	No./ha	No.	No./ha
Shortnose gar	0	0	1	16.67	0	0
Gizzard shad	10	40.00	7	116.67	55	458.33
Northern pike	1	4.00	0	0	0	0
Carp	2	8.00	1	16.67	1	8.33
Silver chub	1	4.00	1	16.67	1	8.33
Emerald shiner	9	36.00	3	50.00	42	350.00
Pugnose minnow	1	4.00	0	0	0	0
Spottail shiner	58	232.00	18	300.00	1	8.33
Spotfin shiner	4	16.00	13	216.67	0	0
Bullhead minnow	0	0	2	33.33	0	0
Carpsucker spp.	0	0	2	33.33	0	0
Quillback carpsucker	0	0	1	16.67	0	0
White sucker	1	4.00	0	0	0	0
Smallmouth buffalo	2	8.00	0	0	0	0
Channel catfish	0	0	23	383.33	1	8.33
White bass	7	28.00	3	50.00	12	100.00
Bluegill	6	24.00	17	282.33	1	8.33
Smallmouth bass	3	12.00	1	16.67	0	0
White crappie	2	8.00	1	16.67	0	0
Black crappie	1	4.00	0	0	0	0
Yellow perch	1	4.00	0	0	0	0
Log perch	9	36.00	1	16.67	7	58.33
Sauger	2	8.00	1	16.67	2	16.67
Walleye	1	4.00	0	0	0	0
Freshwater drum	10	40.00	25	416.67	18	150.00
Total	131	524.00	121	2016.67	141	1175.00

Table 2.4-19 Summary of seining catches from the Mississippi River and connecting waters near the Prairie Island Nuclear Generating Plant, Red Wing, Minnesota, fall 1978.

Estimated area seined:	Above Plant 0.29 ha		Plant Area (from plant intake to Lock & Dam 3) 0.07 ha		Below Lock and Dam 3 0.14 ha	
	No.	No./ha	No.	No./ha	No.	No./ha
Gizzard shad	8	27.59	28	400.00	6	42.86
Northern pike	0	0	0	0	1	7.14
Silver chub	2	6.90	4	57.14	4	28.57
Emerald shiner	42	144.83	15	214.29	68	485.71
River shiner	0	0	0	0	1	7.14
Spottail shiner	19	65.52	7	100.00	0	0
Spotfin shiner	7	24.14	3	42.86	0	0
Bullhead minnow	27	93.10	9	128.57	0	0
Channel catfish	0	0	1	14.29	0	0
Tadpole madtom	1	3.45	0	0	0	0
White bass	2	6.90	1	14.29	9	64.29
Bluegill	4	13.79	22	314.29	0	0
Smallmouth bass	1	3.45	1	14.29	0	0
White crappie	1	3.45	0	0	0	0
Black crappie	0	0	0	0	1	7.14
Johnny darter	0	0	1	14.29	0	0
Sauger	0	0	0	0	2	14.29
Walleye	0	0	1	14.29	0	0
Freshwater drum	0	0	1	14.29	1	7.14
Total	114	393.10	94	1342.86	93	664.29

Table 2.4-20. Length-frequencies of all fish caught by seining in the Mississippi River and connecting waters near the Prairie Island Nuclear Generating Plant, Red Wing, Minnesota, 1978. Sections 0, 1, 2, 3, and 4 combined, seasons separated. (Sheet 1 of 11)

Total Length in Centimeters	Shortnose gar Spring	Shortnose gar Summer	Shortnose gar Total	Gizzard shad Spring	Gizzard shad Summer	Gizzard shad Fall	Gizzard shad Total	Northern pike Summer	Northern pike Fall
Y/Y not meas.				214			214		
0.1 - 1.9									
2.0 - 3.9				33	3	1	37		
4.0 - 5.9				57	2	3	62		
6.0 - 7.9				2		22	24		
8.0 - 9.9					1	6	7		
10.0 - 11.9					10	1	11		
12.0 - 13.9					44	1	45		
14.0 - 15.9					10	2	12		
16.0 - 17.9						4	4		
18.0 - 19.9				1		2	3		
20.0 - 21.9									
22.0 - 23.9									
24.0 - 25.9									
26.0 - 27.9					2		2		
28.0 - 29.9									
30.0 - 31.9								1	
32.0 - 33.9									
34.0 - 35.9									
36.0 - 37.9									
38.0 - 39.9									
40.0 - 44.9									
45.0 - 49.9									1
50.0 - 54.9									
55.0 - 59.9	2		2						
60.0 - 64.9	2		2						
65.0 - 69.9									
70.0 - 74.9									
75.0 - 79.9									
80.0 - 84.9									
85.0 - 89.9									
90.0 - 94.9									
95.0 - 99.9									
100.0 - +									
Others not meas.		1	1	28			28		
Total unmeasurd		1	1	242			242		
Total measured	4		4	93	72	42	207	1	1
Grand Total	4	1	5	335	72	42	449	1	1

Table 2.4-20. Length-frequencies of all fish caught by seining in the Mississippi River and connecting waters near the Prairie Island Nuclear Generating Plant, Red Wing, Minnesota, 1978. Sections 0, 1, 2, 3, and 4 combined, seasons separated. (Sheet 2 of 11)

Total Length in Centimeters	Northern pike	Carp	Carp	Carp	Silver chub	Silver chub	Silver chub	Emerald shiner	Emerald shiner
	Total	Spring	Summer	Total	Summer	Fall	Total	Spring	Summer
Y/Y not meas.									
0.1 - 1.9									
2.0 - 3.9								3	5
4.0 - 5.9					2	1	3	4	32
6.0 - 7.9					1	7	8	60	13
8.0 - 9.9						1	1		4
10.0 - 11.9						1	1		
12.0 - 13.9									
14.0 - 15.9									
16.0 - 17.9									
18.0 - 19.9		1		1					
20.0 - 21.9									
22.0 - 23.9									
24.0 - 25.9									
26.0 - 27.9									
28.0 - 29.9			1	1					
30.0 - 31.9	1								
32.0 - 33.9									
34.0 - 35.9									
36.0 - 37.9									
38.0 - 39.9									
40.0 - 44.9									
45.0 - 49.9	1	1	1	2					
50.0 - 54.9			2	2					
55.0 - 59.9		2		2					
60.0 - 64.9									
65.0 - 69.9									
70.0 - 74.9									
75.0 - 79.9									
80.0 - 84.9									
85.0 - 89.9									
90.0 - 94.9									
95.0 - 99.9									
100.0 - +									
Others not meas.								507	
Total unmeasured								507	
Total measured	2	4	4	8	3	10	13	67	54
Grand Total	2	4	4	8	3	10	13	574	54

Table 2.4-20. Length-frequencies of all fish caught by seining in the Mississippi River and connecting waters near the Prairie Island Nuclear Generating Plant, Red Wing, Minnesota, 1978. Sections 0, 1, 2, 3, and 4 combined, seasons separated. (Sheet 3 of 11)

Total Length in Centimeters	Emerald shiner Fall	Emerald shiner Total	River shiner Spring	River shiner Fall	River shiner Total	Spottail shiner Spring	Spottail shiner Summer	Spottail shiner Fall	Spottail shiner Total
Y/Y not meas.									
0.1 - 1.9									
2.0 - 3.9	10	18		1	1	72	3	3	78
4.0 - 5.9	34	70	1		1	9	34		43
6.0 - 7.9	72	145	1		1		40	18	58
8.0 - 9.9	6	10				7		4	11
10.0 - 11.9								1	1
12.0 - 13.9									
14.0 - 15.9									
16.0 - 17.9									
18.0 - 19.9									
20.0 - 21.9									
22.0 - 23.9									
24.0 - 25.9									
26.0 - 27.9									
28.0 - 29.9									
30.0 - 31.9									
32.0 - 33.9									
34.0 - 35.9									
36.0 - 37.9									
38.0 - 39.9									
40.0 - 44.9									
45.0 - 49.9									
50.0 - 54.9									
55.0 - 59.9									
60.0 - 64.9									
65.0 - 69.9									
70.0 - 74.9									
75.0 - 79.9									
80.0 - 84.9									
85.0 - 89.9									
90.0 - 94.9									
95.0 - 99.9									
100.0 - +									
Others not meas.	3	510							
Total unmeasured	3	510							
Total measured	122	243	2	1	3	88	77	26	191
Grand Total	125	753	2	1	3	88	77	26	191

Table 2.4-20. Length-frequencies of all fish caught by seining in the Mississippi River and connecting waters near the Prairie Island Nuclear Generating Plant, Red Wing, Minnesota, 1978. Sections 0, 1, 2, 3, and 4 combined, seasons separated. (Sheet 4 of 11)

Total Length in Centimeters	Spotfin shiner Spring	Spotfin shiner Summer	Spotfin shiner Fall	Spotfin shiner Total	Pugnose minnow Summer*	Bullhead minnow Spring	Bullhead minnow Summer	Bullhead minnow Fall	Bullhead minnow Total
Y/Y not meas.									
0.1 - 1.9									
2.0 - 3.9		1	7	8			1	16	17
4.0 - 5.9	33	10	3	46	1	28		19	47
6.0 - 7.9	8	6		14		4		1	5
8.0 - 9.9	2			2					
10.0 - 11.9									
12.0 - 13.9									
14.0 - 15.9									
16.0 - 17.9									
18.0 - 19.9									
20.0 - 21.9									
22.0 - 23.9									
24.0 - 25.9									
26.0 - 27.9									
28.0 - 29.9									
30.0 - 31.9									
32.0 - 33.9									
34.0 - 35.9									
36.0 - 37.9									
38.0 - 39.9									
40.0 - 44.9									
45.0 - 49.9									
50.0 - 54.9									
55.0 - 59.9									
60.0 - 64.9									
65.0 - 69.9									
70.0 - 74.9									
75.0 - 79.9									
80.0 - 84.9									
85.0 - 89.9									
90.0 - 94.9									
95.0 - 99.9									
100.0 - +									
Others not meas.							1		1
Total unmeasured							1		1
Total measured	43	17	10	70	1	32	1	36	69
Grand Total	43	17	10	70	1	32	2	36	70

* This species was caught during only one season.

Table 2.4-20. Length-frequencies of all fish caught by seining in the Mississippi River and connecting waters near the Prairie Island Nuclear Generating Plant, Red Wing, Minnesota, 1978. Sections 0, 1, 2, 3, and 4 combined, seasons separated. (Sheet 5 of 11)

Total Length in Centimeters	Carpsucker spp. Spring	Carpsucker spp. Summer	Carpsucker spp. Total	Quillback carpsucker Spring	Quillback carpsucker Summer	Quillback carpsucker Total	White sucker Summer*	Smallmouth buffalo Spring	Smallmouth buffalo Summer
Y/Y not meas.									
0.1 - 1.9									
2.0 - 3.9	5		5					11	
4.0 - 5.9	7	1	8					25	
6.0 - 7.9	3		3					3	1
8.0 - 9.9	2	1	3						1
10.0 - 11.9									
12.0 - 13.9									
14.0 - 15.9				1		1			
16.0 - 17.9									
18.0 - 19.9									
20.0 - 21.9				1		1			
22.0 - 23.9					1	1			
24.0 - 25.9									
26.0 - 27.9									
28.0 - 29.9							1		
30.0 - 31.9									
32.0 - 33.9									
34.0 - 35.9									
36.0 - 37.9									
38.0 - 39.9									
40.0 - 44.9								1	
45.0 - 49.9									
50.0 - 54.9									
55.0 - 59.9									
60.0 - 64.9									
65.0 - 69.9									
70.0 - 74.9									
75.0 - 79.9									
80.0 - 84.9									
85.0 - 89.9									
90.0 - 94.9									
95.0 - 99.9									
100.0 - +									
Others not meas.									
Total unmeasured									
Total measured	17	2	19	2	1	3	1	40	2
Grand Total	17	2	19	2	1	3	1	40	2

* This species was caught during only one season.

Table 2.4-20. Length-frequencies of all fish caught by seining in the Mississippi River and connecting waters near the Prairie Island Nuclear Generating Plant, Red Wing, Minnesota, 1978. Sections 0, 1, 2, 3, and 4 combined, seasons separated. (Sheet 6 of 11)

Total Length in Centimeters	Smallmouth buffalo Total	Bigmouth buffalo Spring*	Shortnose redhorse Spring*	Channel catfish Summer	Channel catfish Fall	Channel catfish Total	Tadpole madtom Fall*	White bass Spring	White bass Summer
Y/Y not meas.								105	
0.1 - 1.9									
2.0 - 3.9	11		1				1	12	
4.0 - 5.9	25	1		15		15		61	
6.0 - 7.9	4			9		9		1	3
8.0 - 9.9	1				1	1			6
10.0 - 11.9									3
12.0 - 13.9									
14.0 - 15.9								1	
16.0 - 17.9								1	
18.0 - 19.9									5
20.0 - 21.9									4
22.0 - 23.9									
24.0 - 25.9									1
26.0 - 27.9									
28.0 - 29.9									
30.0 - 31.9									
32.0 - 33.9									
34.0 - 35.9									
36.0 - 37.9									
38.0 - 39.9									
40.0 - 44.9	1								
45.0 - 49.9									
50.0 - 54.9									
55.0 - 59.9									
60.0 - 64.9									
65.0 - 69.9									
70.0 - 74.9									
75.0 - 79.9									
80.0 - 84.9									
85.0 - 89.9									
90.0 - 94.9									
95.0 - 99.9									
100.0 - +									
Others not meas.									
Total unmeasured								105	
Total measured	42	1	1	24	1	25	1	76	22
Grand Total	42	1	1	24	1	25	1	181	22

* this species was caught during only one season.

Table 2.4-20. Length-frequencies of all fish caught by seining in the Mississippi River and connecting waters near the Prairie Island Nuclear Generating Plant, Red Wing, Minnesota, 1978. Sections 0, 1, 2, 3, and 4 combined, seasons separated. (Sheet 7 of 11)

Total Length in Centimeters	White bass Fall	White bass Total	Bluegill Spring	Bluegill Summer	Bluegill Fall	Bluegill Total	Smallmouth bass Summer	Smallmouth bass Fall	Smallmouth bass Total
Y/Y not meas.		105							
0.1 - 1.9									
2.0 - 3.9		12		14	8	22			
4.0 - 5.9		61	2	4	17	23			
6.0 - 7.9		4	4		1	5	1		1
8.0 - 9.9		6	8			8	2	1	3
10.0 - 11.9	1	4	1	1		2			
12.0 - 13.9	5	5		2		2	1		1
14.0 - 15.9		1	2			2		1	1
16.0 - 17.9		1		2		2			
18.0 - 19.9	1	6							
20.0 - 21.9	2	6							
22.0 - 23.9									
24.0 - 25.9	2	3							
26.0 - 27.9	1	1							
28.0 - 29.9									
30.0 - 31.9									
32.0 - 33.9									
34.0 - 35.9									
36.0 - 37.9									
38.0 - 39.9									
40.0 - 44.9									
45.0 - 49.9									
50.0 - 54.9									
55.0 - 59.9									
60.0 - 64.9									
65.0 - 69.9									
70.0 - 74.9									
75.0 - 79.9									
80.0 - 84.9									
85.0 - 89.9									
90.0 - 94.9									
95.0 - 99.9									
100.0 - +									
Others not meas.				1		1			
Total unmeasured		105		1		1			
Total measured	12	110	17	23	26	66	4	2	6
Grand Total	12	215	17	24	26	67	4	2	6

Table 2.4-20. Length-frequencies of all fish caught by seining in the Mississippi River and connecting waters near the Prairie Island Nuclear Generating Plant, Red Wing, Minnesota, 1978. Sections 0, 1, 2, 3, and 4 combined, seasons separated. (Sheet 8 of 11)

Total Length in Centimeters	White crappie Spring	White crappie Summer	White crappie Fall	White crappie Total	Black crappie Spring	Black crappie Summer	Black crappie Fall	Black crappie Total	Johnny darter Spring
Y/Y not meas.									
0.1 - 1.9									
2.0 - 3.9					3			3	4
4.0 - 5.9		3		3		1		1	1
6.0 - 7.9									
8.0 - 9.9			1	1			1	1	
10.0 - 11.9					6			6	
12.0 - 13.9	2			2	1			1	
14.0 - 15.9									
16.0 - 17.9									
18.0 - 19.9					1			1	
20.0 - 21.9					1			1	
22.0 - 23.9									
24.0 - 25.9									
26.0 - 27.9									
28.0 - 29.9									
30.0 - 31.9									
32.0 - 33.9									
34.0 - 35.9									
36.0 - 37.9									
38.0 - 39.9									
40.0 - 44.9									
45.0 - 49.9									
50.0 - 54.9									
55.0 - 59.9									
60.0 - 64.9									
65.0 - 69.9									
70.0 - 74.9									
75.0 - 79.9									
80.0 - 84.9									
85.0 - 89.9									
90.0 - 94.9									
95.0 - 99.9									
100.0 - +									
Others not meas.									
Total unmeasured									
Total measured	2	3	1	6	12	1	1	14	5
Grand total	2	3	1	6	12	1	1	14	5

Table 2.4-20. Length-frequencies of all fish caught by seining in the Mississippi River and connecting waters near the Prairie Island Nuclear Generating Plant, Red Wing, Minnesota, 1978. Sections 0, 1, 2, 3, and 4 combined, seasons separated. (Sheet 9 of 11)

Total Length in Centimeters	Johnny darter Fall	Johnny darter Total	Yellow perch Spring	Yellow perch Summer	Yellow perch Total	Log perch Spring	Log perch Summer	Log perch Total	Sauger Spring
Y/Y not meas.									
0.1 - 1.9									
2.0 - 3.9		4							
4.0 - 5.9		1	5		5	2	2	4	
6.0 - 7.9	1	1					7	7	
8.0 - 9.9				1	1		8	8	1
10.0 - 11.9									
12.0 - 13.9			1		1				
14.0 - 15.9									
16.0 - 17.9									
18.0 - 19.9									
20.0 - 21.9									
22.0 - 23.9									
24.0 - 25.9									
26.0 - 27.9									
28.0 - 29.9									
30.0 - 31.9									
32.0 - 33.9									
34.0 - 35.9									
36.0 - 37.9									
38.0 - 39.9									
40.0 - 44.9									
45.0 - 49.9									
50.0 - 54.9									
55.0 - 59.9									
60.0 - 64.9									
65.0 - 69.9									
70.0 - 74.9									
75.0 - 79.9									
80.0 - 84.9									
85.0 - 89.9									
90.0 - 94.9									
95.0 - 99.9									
100.0 - +									
Others not meas.									
Total unmeasured									
Total measured	1	6	6	1	7	2	17	19	1
Grand Total	1	6	6	1	7	2	17	19	1

Table 2.4-20. Length-frequencies of all fish caught by seining in the Mississippi River and connecting waters near the Prairie Island Nuclear Generating Plant, Red Wing, Minnesota, 1978. Sections 0, 1, 2, 3, and 4 combined, seasons separated. (Sheet 10 of 11).

Total Length in Centimeters	Sauger Summer	Sauger Fall	Sauger Total	Walleye Spring	Walleye Summer	Walleye Fall	Walleye Total	Freshwater drum Spring	Freshwater drum Summer
Y/Y not meas.									
0.0 - 1.9									
2.0 - 3.9								7	
4.0 - 5.9								4	3
6.0 - 7.9				5			5		9
8.0 - 9.9			1	1			1		13
10.0 - 11.9	3		3		1		1		13
12.0 - 13.9	2		2					5	2
14.0 - 15.9		2	2			1	1	6	4
16.0 - 17.9								2	9
18.0 - 19.9									
20.0 - 21.9									
22.0 - 23.9									
24.0 - 25.9									
26.0 - 27.9									
28.0 - 29.9									
30.0 - 31.9									
32.0 - 33.9									
34.0 - 35.9									
36.0 - 37.9									
38.0 - 39.9									
40.0 - 44.9									
45.0 - 49.9									
50.0 - 54.9									
55.0 - 59.9									
60.0 - 64.9									
65.0 - 69.9									
70.0 - 74.9									
75.0 - 79.9									
80.0 - 84.9									
85.0 - 89.9									
90.0 - 94.9									
95.0 - 99.9									
100.0 - +									
Others not meas.									
Total unmeasured									
Total measured	5	2	8	6	1	1	8	24	53
Grand Total	5	2	8	6	1	1	8	24	53

Table 2.4-20. Length-frequencies of all fish caught by seining in the Mississippi River and connecting waters near the Prairie Island Nuclear Generating Plant, Red Wing, Minnesota, 1978. Sections 0, 1, 2, 3, and 4 combined, seasons separated. (Sheet 11 of 11)

Total Length in Centimeters	Freshwater drum Fall	Freshwater drum Total							
Y/Y not meas.									
0.1 - 1.9									
2.0 - 3.9		7							
4.0 - 5.9		7							
6.0 - 7.9		9							
8.0 - 9.9	2	15							
10.0 - 11.9		13							
12.0 - 13.9		7							
14.0 - 15.9		10							
16.0 - 17.9		11							
18.0 - 19.9									
20.0 - 21.9									
22.0 - 23.9									
24.0 - 25.9									
26.0 - 27.9									
28.0 - 29.9									
30.0 - 31.9									
32.0 - 33.9									
34.0 - 35.9									
36.0 - 37.9									
38.0 - 39.9									
40.0 - 44.9									
45.0 - 49.9									
50.0 - 54.9									
55.0 - 59.9									
60.0 - 64.9									
65.0 - 69.9									
70.0 - 74.9									
75.0 - 79.9									
80.0 - 84.9									
85.0 - 89.9									
90.0 - 94.9									
95.0 - 99.9									
100.0 - +									
Others not meas.									
Total unmeasured									
Total measured	2	79							
Grand Total	2	79							

Table 2.4-21 Total numbers of fish tagged and released in the Mississippi River and connecting waters near the Prairie Island Nuclear Generating Plant, Red Wing, Minnesota, April 9, 1974 through December 31, 1978, with numbers and percentages of tagged fish returned.

Species	Total No. tagged in 1978	Total No. tagged 1974 through 1978	Total No. of tags returned Apr. 9, 1974 through Dec. 31, 1978*	% returned of total tagged for each species
Northern pike	0	238	50 (2)**	21.00
Carp	0	15	0	0
Smallmouth buffalo	0	4	0	0
Channel catfish	66	216	9	4.13
Flathead catfish	17	31	1	3.22
White bass	35	3,053	347 (10)**	11.37
Smallmouth bass	4	110	11	10.00
Largemouth bass	0	22	5 (1)**	22.73
Sauger	7	1,130	131	11.59
Walleye	21	1,121	122	10.88
Total	150	5,940	676	11.38

* Tagged fish recaptured more than once are recorded as one in this table.

** Number of returns in parenthesis indicate the number of fish recaptured more than once.

Table 2.4-22 Recapture location of tagged fish relative to location released in the Mississippi River and connecting waters near the Prairie Island Nuclear Generating Plant, Red Wing, Minnesota, 1974 through 1978.*

Species	Upstream			Downstream			Stationary	Mean net movement **	
	No.	Mean upstream movement (mi)	Range (mi)	No.	Mean downstream movement(mi)	Range (mi)	No.	Direction	Distance (mi)
Northern pike	18	2.7	0.3-16.7	29	8.8	0.3-28.5	5	Downstream	4.0
Channel catfish	2	69.5	11.0-128.0	6	59.8	2.0-120.7	1	Downstream	24.4
Flathead catfish	0	0.0	-----	0	0.0	-----	1	None	0.0
White bass	57	16.7	0.3-66.0	136	19.2	0.4-110.3	164***	Downstream	4.6
Smallmouth bass	4	9.6	1.0-17.0	2	7.4	1.0-13.7	5	Upstream	2.1
Largemouth bass	0	0.0	-----	3	3.1	0.1-5.7	3	Downstream	1.6
Sauger	15	16.9	2.7-32.3	82	20.8	0.3-40.5	28†	Downstream	11.6
Walleye	32	15.3	0.3-63.0	38	13.5	0.5-49.0	51††	Downstream	0.2

* For fish recaptured more than once, the location of the prior recapture was considered the release location for the following recapture.

** Difference between total upstream and total downstream distances divided by total number of fish (including stationary fish).

*** Location caught was not specified for one white bass, so this fish was not included in any of the calculations or figures on this table.

† Location caught was not specified for six sauger, so these fish were not included in any of the calculations or figures on this table.

†† Location caught was not specified for one walleye, so this fish was not included in any of the calculations or figures on this table.

Table 2.4-23 Length-weight relationships for selected species from the Mississippi River and connecting waters near the Prairie Island Nuclear Generating Plant, Red Wing, Minnesota, 1978. (All sampling sections combined, summer and fall data separated).

Species	Summer 1978 Equation	Correlation Coefficient	n	Fall 1978 Equation	Correlation Coefficient	n
Shortnose gar	log W = 3.2637 log L-6.1918	0.875	29	log W = 2.9789 log L-5.3816	0.922	29
Gizzard shad	log W = 3.0686 log L-5.0781	0.993	73	log W = 2.9906 log L-4.9245	0.994	230
Northern pike	log W = 3.1443 log L-5.5977	0.993	54	log W = 2.5571 log L-3.9272	0.983	48
Carp	log W = 3.0047 log L-4.8727	0.982	429	log W = 3.1149 log L-5.1766	0.987	324
Shorthead redhorse	log W = 2.9778 log L-4.9177	0.973	125	log W = 2.9558 log L-4.8598	0.986	94
Channel catfish	log W = 3.4614 log L-6.2568	0.994	18	log W = 3.3102 log L-5.8701	0.989	30
White bass	log W = 2.9566 log L-4.8130	0.991	369	log W = 3.0224 log L-4.9815	0.979	425
Bluegill	log W = 3.0316 log L-4.6607	0.955	278	log W = 3.2701 log L-5.2122	0.959	278
Smallmouth bass	log W = 2.9748 log L-4.8214	0.987	61	log W = 3.0377 log L-4.9825	0.990	49
White crappie	log W = 2.9191 log L-4.6494	0.970	159	log W = 3.0884 log L-5.0879	0.957	233
Black crappie	log W = 2.9173 log L-4.5986	0.980	295	log W = 3.1624 log L-5.1762	0.978	408
Sauger	log W = 3.1000 log L-5.3541	0.988	38	log W = 3.2298 log L-5.6764	0.991	153
Walleye	log W = 3.0562 log L-5.1974	0.996	28	log W = 3.2338 log L-5.6796	0.993	63
Freshwater drum	log W = 2.9113 log L-4.7104	0.987	422	log W = 3.1799 log L-5.3809	0.978	249

Table 2.4-24 Expected weights for fish of various lengths from the Mississippi River and connecting waters near the Prairie Island Nuclear Generating Plant, Red Wing, Minnesota, 1973-1978. Calculated from length-weight relationships for all stations combined. (Sheet 1 of 3)

Length		Weight (g)								
mm	in	1973	1974	1975	1976 Summer	1976 Fall	1977 Summer	1977 Fall	1978 Summer	1978 Fall
					Shortnose gar					
550		----	----	----	----	----	----	----	565	605
600		----	----	----	----	----	----	----	750	784
700		----	----	----	----	----	----	----	1241	1241
					Gizzard shad					
150	5.9	36	----	----	39	38	38	34	40	38
200	7.9	90	----	----	95	93	94	83	96	91
300	11.8	318	----	----	330	334	330	292	334	304
350	13.8	516	----	----	528	543	532	472	535	483
					Northern pike					
600	23.6	1424	----	----	1179	1440	1364	1400	1373	1502
700	27.6	2161	----	----	1948	2280	2123	2230	2229	2228
800	31.5	3102	----	----	3009	3418	3114	3335	3392	3135
900	35.4	4267	----	----	4415	4869	4365	4757	4913	4237
					Carp					
250	9.8	228	----	----	236	230	283	243	215	196
300	11.8	381	----	----	392	394	457	413	372	346
400	15.8	854	----	----	875	922	977	958	882	848
500	19.7	1598	----	----	1629	1783	1761	1838	1725	1700
600	23.6	2667	----	----	2708	3056	2850	3131	2984	3000
650	25.6	3339	----	----	3385	3872	3520	3956	3795	3849

Table 2.4-24 (cont'd) Expected weights for fish of various lengths from the Mississippi River and connecting waters near the Prairie Island Nuclear Generating Plant, Red Wing, Minnesota, 1973-1978. Calculated from length-weight relationships for all stations combined. (Sheet 2 of 3)

Length		Weight (g)								
mm	in	1973	1974	1975	1976 Summer	1976 Fall	1977 Summer	1977 Fall	1978 Summer	1978 Fall
					Shorthead redhorse					
300	11.8	305	----	----	343	334	315	307	208	290
400	15.8	704	----	----	688	797	725	733	677	678
450	17.7	1027	----	----	915	1138	1021	1048	962	961
					Channel catfish					
300	11.8	203	----	----	260	247	258	228	208	214
400	15.8	522	----	----	621	665	599	587	562	554
450	17.7	767	----	----	887	998	845	864	845	818
500	19.7	1084	----	----	1220	1434	1149	1221	1217	1159
					White bass					
200	7.9	131	----	110	116	99	123	99	98	94
250	9.8	240	----	211	208	200	212	200	189	185
300	11.8	394	----	359	334	353	330	355	324	320
380	15.0	747	----	714	617	742	589	747	652	654
					Bluegill					
100		----	----	----	----	----	----	----	25	21
150		----	----	----	----	----	----	----	86	80
200		----	----	----	----	----	----	----	207	205
					Smallmouth bass					
200	7.9	125	----	121	125	118	118	115	106	102
300	11.8	428	----	374	404	415	408	405	353	349

Table 2.4-24 (cont'd.) Expected weights for fish of various lengths from the Mississippi River and connecting waters near the Prairie Island Nuclear Generating Plant, Red Wing, Minnesota, 1973-1978. Calculated from length-weight relationships for all stations combined. (Sheet 3 of 3)

Length		Weight (g)								
mm	in	1973	1974	1975	1976 Summer	1976 Fall	1977 Summer	1977 Fall	1978 Summer	1978 Fall
					White crappie					
200		----	----	----	----	----	----	----	117	104
250		----	----	----	----	----	----	----	224	208
					Black crappie					
150	5.9	59	----	----	59	54	53	55	56	51
200	7.9	134	----	----	134	136	130	136	130	126
250	9.8	254	----	----	254	277	261	276	249	255
					Sauger					
300	11.8	250	----	241	208	225	252	228	211	211
400	15.8	611	----	600	544	583	595	613	516	534
500	19.7	1220	----	1220	1069	1143	1158	1319	1030	1098
					Walleye					
300	11.8	275	253	256	246	250	247	239	236	214
450	17.7	908	875	886	827	885	883	818	815	795
550	21.6	1640	1620	1640	1507	1656	1657	1505	1506	1521
					Freshwater drum					
150	5.9	41	----	----	47	45	45	38	42	35
200	7.9	98	----	----	106	107	106	91	97	86
300	11.8	333	----	----	330	358	350	314	317	313
400	15.8	793	----	----	743	846	817	758	733	782

Table 2.4-25 Summary of results from a multiple mark-recapture population estimate ending June 6, 1978 in the discharge area of the Prairie Island Nuclear Generating Plant, Red Wing, Minnesota (Station 3-2).

Species	Total Marked	Estimated Number (N)*	95% Confidence interval*@	Est. No. per hectare	Mean wt. (kg)	Est. Standing crop (kg/ha)
Carp	135	2,587	1,057-6,463	1,848	1.60	2,957
White bass	17	54	23-127	39	0.30	12
Walleye	21	81	34-216	58	1.20	70
Freshwater drum	317	3,682	2,202-6,483	2,630	0.26	684

*Unmarked mortalities have been added to N and to the confidence interval for N.

@Confidence intervals calculated using Appendix II in Ricker (1975).

Table 2.4-26 Abundance indices for 12 fish species using data from all seasons and all gears except seines, from the Mississippi River and connecting waters near the Prairie Island Nuclear Generating Plant, Red Wing, Minnesota, 1973 through 1978.

Species	1973	1974	1975	1976	1977	1978
Shortnose gar	0.87	1.32	0.91	0.90	1.96	0.95
Gizzard shad	1.99	0.78	1.10	0.63	3.89	0.70
Northern pike	1.32	1.11	0.99	0.82	0.57	0.71
Carp	0.90	1.25	0.70	1.14	0.87	0.65
Shorthead redhorse	0.84	1.05	0.54	1.48	1.12	0.84
White bass	0.79	1.18	0.68	1.24	1.26	0.99
Bluegill	0.85	1.74	0.51	0.86	2.54	1.51
White crappie	0.35	1.18	0.60	1.43	4.94	2.31
Black crappie	0.98	0.91	0.95	1.11	3.31	3.39
Sauger	1.79	1.08	0.97	0.65	0.40	0.78
Walleye	1.09	0.75	1.04	1.14	0.58	0.77
Freshwater drum	1.37	1.10	0.46	1.19	1.57	1.03

Table 2.4-27 Comparison of several population estimates made in the discharge area of the Prairie Island Nuclear Generating Plant, Red Wing, Minnesota, 1976 through 1978.

Species	Date of Estimate	Total no. of fish marked to date of estimate	Total no. of Recaptures	Estimated Number	95% Confidence interval	Source
Carp	Dec. 8, 1976	149	1	9,086	2,753-16,521	1
Carp	June 6, 1978	135	3	2,587	1,057- 6,463	3
White bass	Dec. 3, 1976	508	19	7,051	4,608-11,282	1
White bass	Dec. 30, 1977	727	49	4,632	3,370- 5,894	2
White bass	June 6, 1978	17	2	54	23- 127	3
Walleye	Dec. 8, 1976	218	23	1,053	714- 1,620	1
Walleye	Dec. 30, 1977	50	4	306	137- 766	4
Walleye	June 6, 1978	21	2	81	34- 216	3
Freshwater drum	June 6, 1978	317	13	3,682	2,202- 6,483	3

1 Gustafson and Geis, 1977

2 Gustafson, Fierstine, and Geis (1978)

3 This report

4 Calculated from unpublished 1977 data