



3 0318 00018 5108

Minnesota Department of Natural Resources  
Division of Fish and Wildlife  
Environment Section

This document is made available electronically by the Minnesota Legislative Reference Library as part of an ongoing digital archiving project. <http://www.leg.state.mn.us/lrl/lrl.asp>  
(Funding for document digitization was provided, in part, by a grant from the Minnesota Historical & Cultural Heritage Program.)

PROGRESS REPORT ON THE ABBREVIATED  
LAKE ST CROIX FISH POPULATION STUDY  
AUGUST 18, 1975 TO SEPTEMBER 29, 1975

Joseph L Geis  
and  
Scott P Gustafson  
Aquatic Biologists

February, 1976

LIBRARY  
Dept of Natural Resources  
500 Lafayette Road  
St. Paul, MN 55155-4021

1942

1. The first part of the report is devoted to a general survey of the situation in the country.

2. The second part is devoted to a detailed analysis of the economic situation.

3. The third part is devoted to a detailed analysis of the social situation.

4. The fourth part is devoted to a detailed analysis of the political situation.

5. The fifth part is devoted to a detailed analysis of the cultural situation.

6. The sixth part is devoted to a detailed analysis of the international situation.

7. The seventh part is devoted to a detailed analysis of the future prospects.

Minnesota Department of Natural Resources  
Division of Fish and Wildlife  
Environment Section

LIBRARY  
Dept of Natural Resources  
500 Lafayette Road  
St. Paul, MN 55155-4021

PROGRESS REPORT ON THE ABBREVIATED  
LAKE ST CROIX FISH POPULATION STUDY  
AUGUST 18, 1975 TO SEPTEMBER 29, 1975

Joseph L Geis  
and  
Scott P Gustafson  
Aquatic Biologists

February, 1976



## TABLE OF CONTENTS

	<u>Page</u>
INTRODUCTION.....	3.2-9
MATERIAL AND METHODS.....	3.2-9
Trap nets .....	3.2-9
Electro-fishing .....	3.2-10
Gill nets .....	3.2-10
Shoreline Seine .....	3.2-11
Scale Samples .....	3.2-11
Length-weight Data .....	3.2-11
RESULTS .....	3.2-12
Composite Catch .....	3.2-12
Trap netting .....	3.2-12
Gill netting .....	3.2-13
Electro-fishing .....	3.2-14
Shoreline Seining .....	3.2-15
Tag Returns .....	3.2-15
DISCUSSION .....	3.2-16
Muskellunge .....	3.2-16
Northern Pike .....	3.2-18
Walleye .....	3.2-19
Sauger .....	3.2-20
Smallmouth Bass .....	3.2-21
Crappies .....	3.2-22
White Bass .....	3.2-24
Abundance Index .....	3.2-25
New Species .....	3.2-28
SUMMARY .....	3.2-30
LITERATURE CITED .....	3.2-31
APPENDIX A 3.2 .....	3.2-33
APPENDIX B 3.2 .....	3.2-45
APPENDIX C 3.2 .....	3.2-51
APPENDIX D 3.2 .....	3.2-57
APPENDIX E 3.2 .....	3.2-63
APPENDIX F 3.2 .....	3.2-69



## TABLES

- Table 3.2-1 Summary of age and growth data and stocking data for muskellunge collected in Lake St Croix in 1975
- Table 3.2-2 Summary of age and growth data from northern pike collected in Lake St Croix in 1975
- Table 3.2-3 Summary of the age and growth data from walleyes collected in Lake St Croix in 1975
- Table 3.2-4 Summary of age and growth data from saugers collected in Lake St Croix in 1975
- Table 3.2-5 Summary of age and growth data of smallmouth bass collected in Lake St Croix in 1975
- Table 3.2-6 A summary of age and growth data of black crappies collected in Lake St Croix in 1975
- Table 3.2-7 Summary of age and growth data of white crappies collected in Lake St Croix in 1975
- Table 3.2-8 Summary of age and growth data of white bass collected in Lake St Croix in 1975





## APPENDIX

### APPENDIX A 3.2

- Table A 3.2-1 Composite catch of all methods of sampling, Lake St Croix, August 18 to September 29, 1975
- Table A 3.2-2 Length-frequency distribution of fish caught by all methods in Lake St Croix August 18 to September 29, 1975
- Table A 3.2-3 Common and scientific names, methods, and years of capture of fish in Lake St Croix

### APPENDIX B 3.2

- Table B 3.2-1 Numbers of successful trap net sets at each sampling station in Lake St Croix, 1975
- Table B 3.2-2 Summary of Lake St Croix trap netting, August 18-19, 1975 (93 lifts)
- Table B 3.2-3 Length-frequency distribution of fish caught by trap netting in Lake St Croix August 18-29, 1975 (93 lifts)

### APPENDIX C 3.2

- Table C 3.2-1 Numbers of successful gill net sets in each sampling station in Lake St Croix, 1975
- Table C 3.2-2 Summary of Lake St Croix gill netting, September 11-26, 1975 (43 lifts)
- Table C 3.2-3 Length-frequency distribution of fish caught by gill netting Lake St Croix, September 11-26, 1975 (43 lifts)

### APPENDIX D 3.2

- Table D 3.2-1 Summary of Lake St Croix day electro-fishing, September 4-9, 1975 (5.38 hours)
- Table D 3.2-2 Length-frequency distribution of fishes caught by day electro-fishing in Lake St Croix, September 4-9, 1975

APPENDIX E 3.2

- Table E 3.2-1 Shoreline seining stations in Lake St Croix, 1975
- Table E 3.2-2 Summary of Lake St Croix shoreline seining September 15, 22, and 29, 1975 (11 seine hauls)
- Table E 3.2-3 Length-frequency distribution of fishes caught in minnow seines, Lake St Croix September 15, 22, and 29, 1975

APPENDIX F 3.2

- Table F 3.2-1 Abundance indices (Ab) from Lake St Croix trap net and gill net catches, 1966-1975
- Table F 3.2-2 Abundance indices (Ab) of several species groups in Lake St Croix from combined trap net and gill net catches, 1967-1975
- Table F 3.2-3 Equations of the lines and correlation coefficients for the abundance index calculations

## 3.2 FISH POPULATION STUDY

### 3.2.1 INTRODUCTION

A comprehensive fish population study of Lake St Croix in the vicinity of the Allen S King Plant was initiated by the Minnesota Department of Natural Resources in 1966 and completed in 1971. Although fish populations appeared stable during the study and year class strengths appeared to be within normal fluctuations during the six years, continued sampling was necessary because not enough data were collected to determine long-term trends in the fishery. Sampling in alternate years was deemed acceptable, because it may take a number of years before long-term trends in the fishery become apparent. Declining populations of fish might be present in the fishery for a number of years after an additional amount of environmental stress has been added to the fishery.

This report covers the sampling done on Lake St Croix in 1975, the second year of assessment sampling. The report describes the sampling and analyzes the data. It includes some comparisons with the 1973 assessment sampling and the comprehensive fish population study (1966-1971).

### 3.2.2 MATERIALS AND METHODS

Four types of sampling gear were utilized during the 1975 assessment sampling: trap nets, gill nets, electro-fishing, and minnow seine. Trap nets and gill nets were used during 1973 only.

#### 3.2.2.1 Trap nets

A total of 93 trap net sets were completed successfully in 97 attempts. The other sets were not counted because the nets were vandalized or mis-set.

Trap netting was initiated on August 18 and continued through August 29, 1975 using river trap nets at stations described by Krosch (1968). Nets were set at a minimum of two of the three substations in each station. Table 3.2-1 shows the substations netted successfully. Stations 10, 1, 2, and 3 are the stations closest to the plant. In addition, a set was made on the north side of the canal where it enters the river. Four overnight sets were attempted at each of these substations, except 1-B, Tower Point, where only one overnight set was made because of vandalism.

#### 3.2.2.2 Electro-fishing

A total of 5.38 hours of day-shocking was done between September 3 and September 9, 1975. Two fifteen-minute runs in each of the 10 stations plus an extra eight-minute run in Station 6 and one fifteen-minute run in the discharge canal.

The electro-fishing gear consisted of a 230 volt Onan gas-powered DC generator mounted in a fourteen-foot Monarck boat. A Smith-Root type VI pulse DC unit was used to regulate the electric field. The electrode arrangement consisted of a bow-mounted anode, two concentric rings of one-half inch stainless steel, and two stern cathodes trailing the boat. Each cathode consisted of a five- and a seven-foot length of flexible conduit tubing with lead in the bottom. The Smith-Root control unit was operated at a 60 pulse per second DC setting using a maximum pulse width and about five amperes.

#### 3.2.2.3 Gill nets

A total of 43 gill net sets were completed successfully in 44 attempted sets from September 11-26, 1975 using experimental gill nets as described by Krosch (1968).

Nets were set at two of three substations in each station with two overnight sets attempted at each substation except 5-A and 8-C. The gill net set at Substation 5-A disappeared the second night, so an additional overnight set was made. Only one overnight set was attempted at Substation 8-C. One of the other gill nets was tampered with; the marker buoy and anchor were stolen; but the net contained a large number of fish, so data from that set are included in the results.

#### 3.2.2.4 Shoreline Seine

A total of eleven seine hauls for young-of-the-year (yy) fish were made on three days: September 15, 22, and 29, 1975.

Nine of the seine hauls were made at locations described by Krosch (1971). The shoreline seining stations are listed in Table E-3.2-1.

#### 3.2.2.5 Scale Samples

Scale samples were taken from eight species of fish including walleye, sauger, northern pike, muskellunge, white bass, small-mouth bass, black crappie, and white crappie. Scale impressions were aged independently by two workers and then verified by one of them.

#### 3.2.2.6 Length-Weight Data

Length-weight data were collected on thirteen species of fish: walleye, sauger, northern pike, muskellunge, white bass, small-mouth bass, black crappie, white crappie, carp, silver redhorse, golden redhorse, and shorthead redhorse. The length-weight data and analysis will be presented in a later report because of problems in getting computer time for analysis of these data.

### 3.2.3 RESULTS

#### 3.2.3.1 Composite Catch

A total of 48 species (5,786 fish) were collected during 1975 sampling. Seven species each comprised more than 5 percent of the total catch: carp (15.3 percent), gizzard shad (13.3 percent), black crappie (10.2 percent), white bass (9.0 percent), emerald shiner (8.5 percent), log perch (7.0 percent), and smallmouth bass (5.3 percent). An additional eight species each comprised more than one percent of the total catch: sauger (4.9 percent), shorthead redhorse (4.1 percent), white crappie (4.1 percent), silver redhorse (3.9 percent), drum (3.9 percent), bluegill (1.5 percent), yellow perch (1.4 percent), and channel catfish (1.3 percent). These fifteen species comprised 93.7 percent of all fish collected in the 1975 sampling.

Table A-3.2-1 is a composite of all fish caught by all methods during 1975 sampling. It lists the total number of each species caught and percent of total catch comprised by each species. Table A-3.2-2 is a composite length-frequency for all fish collected in the 1975 sampling.

A list of common and scientific names according to the American Fisheries Society (1970) and methods of capture of each species is found in Table A-3.2-3. This list also includes the years each species was captured during previous sampling.

#### 3.2.3.2 Trap netting

A total of 25 species (1,712 fish) were caught in 93 successful trap net lifts. Two species, carp (36.0 percent) and black crappie (28.4 percent), comprised 64.4 percent of the total catch. White bass (11.9 percent) and white crappie

(7.2 percent) comprise an additional 19.1 percent of the total catch. Nine species: silver redhorse (3.3 percent), shorthead redhorse (3.0 percent), Freshwater drum (2.7 percent), bluegill (1.8 percent), sauger (1.0 percent), white sucker (0.9 percent), northern pike (0.9 percent), muskellunge (0.8 percent), and rock bass (0.8 percent) comprised an additional 15.2 percent of the total catch. These thirteen species comprised 98.7 percent of the total trap net catch. The silver lamprey was attached to the head of a northern pike caught in a trap net.

A summary of trap net catches for 1975 is shown in Table B-3.2-2. It includes the total number, percent composition, and catch per effort for each species of fish caught in 93 successful lifts. The length-frequency of fish caught trap netting is presented by species in Table B-3.2-3.

#### 3.2.3.3 Gill netting

A total of 30 species (2,168 fish) were caught in 43 successful gill net sets. Twelve species comprised 94.8 percent of the total catch.

Gizzard shad, 28.2 percent of total catch, were the most abundant fish caught, almost twice the number of the next most abundant species, white bass, 14.3 percent of total catch. Sauger (12.0 percent), gizzard shad and white bass collectively comprised over one-half of the total gill net catch, 54.5 percent. Four species: Freshwater drum (8.3 percent), carp (6.5 percent), silver redhorse (5.9 percent), and white crappie (5.3 percent) comprised an additional 26.0 percent of the total catch. The above seven species, plus black crappie (4.4 percent), shorthead redhorse (3.3 percent), channel catfish (3.3 percent), walleye (1.6 percent), and yellow perch (1.6 percent) comprised 94.7 percent of the total gill net catch for 1975.

A summary of gill net catches is presented in Table C-3.2.2. It includes total number, percent composition, and catch per effort for each species caught in 43 successful gill net sets. The length-frequency for all fish caught with gill nets is presented in Table C-3.2-3.

#### 3.2.3.4 Electro-fishing

A total of 37 species (1,344 fish) were collected in 5.38 hours of electro-fishing during 1975 sampling. Two species of darters, which had not been collected by any type of gear during the comprehensive study, were collected by electro-fishing in 1975. One individual of each species, slenderhead darter and striped fantail darter were collected.

Only twelve of 37 species collected by electro-fishing represented more than a trace, greater than 0.5 percent of the total catch. Three of these: log perch (26.6 percent), small-mouth bass (19.6 percent), and emerald shiner (14.7 percent) represented over 60 percent of the total catch. Gizzard shad (9.3 percent), carp (9.1 percent), shorthead redhorse (7.4 percent), and bluegill (4.1 percent) comprised an additional 29.9 percent of the catch for a total of over 90 percent of the total electro-fishing catch. Five other species that comprised more than a trace of the catch are: silver redhorse (2.2 percent), yellow perch (1.1 percent), largemouth bass (0.8 percent), rock bass (0.7 percent), and black crappie (0.6 percent). Chestnut and silver lampreys were attached to fish collected while electro-fishing.

Results of 5.38 hours of electro-fishing are presented in Table D-3.2-1, including the total number, percent of catch, and the catch per hour for each species. The length-frequency of all fish collected during electro-fishing is presented in Table D-3.2-2.



### 3.2.3.5 Shoreline Seining

A total of 26 species (562 fish) were collected in eleven seine hauls. Eleven species comprised 94.2 percent of the total catch. Mimic shiners and gilt darter, two species not previously collected by any method during the previous study, were collected during shoreline seining in 1975.

Emerald shiners were by far the most abundant species, comprising 51.9 percent of the total shoreline seine catch. Ten species: log perch (7.4 percent), smallmouth bass (6.4 percent), gizzard shad (5.7 percent), spottail shiner (5.5 percent), yellow perch (5.3 percent), silver redhorse (3.2 percent), shorthead redhorse (2.5 percent), western sand darter (2.3 percent), white bass (1.4 percent), and mimic shiner (1.1 percent) comprised an additional 40.8 percent of the catch.

Table E-3.2-2 is a summary of shoreline seining including the total number collected and percent composition. Length-frequency of fish from shoreline seining is presented in Table E-3.2-3.

### 3.2.3.6 Tag Returns

A total of thirteen tags from tagging done during the comprehensive study were returned since the report for the 1973 sampling was written. Tagged fish included nine white bass, two walleyes, one sauger, and one channel catfish. All were caught in Lake St Croix except one white bass, which was caught near Marine-on-St Croix and the channel catfish which was caught in Pool 7 of the Mississippi River. One walleye tagged on April 25, 1966 in Anderson Bay was caught and released by an angler on June 28, 1966 near Bayport and caught again by an angler on October 4, 1974.

### 3.2.4 DISCUSSION

#### 3.2.4.1 Muskellunge

A total of 28 muskies were collected during the 1975 sampling. Scale samples from 27 of these fish included at least one fish from each of the four year classes represented by the four stockings.

Examination of Minnesota Department of Natural Resources stocking records shows that muskies were stocked in Lake St Croix during 1972 through 1975. All were September fingerling stockings, with fish averaging ten or eleven inches in length and ranging from seven per pound in 1972 to four per pound in 1974 and 1975. The muskie stockings included 720 in 1972, 1,818 in 1973, 500 in 1974, and 700 in 1975 for a total of 3,738 muskie fingerlings during the four years.

Scale samples from 27 muskies included four fish from the 1975 year class, seven fish from the 1974 year class, fifteen fish from the 1973 year class, and one fish from the 1972 year class. A summary of the 27 aged muskies and information on the muskie stockings is presented in Table 3.2-1.

Table 3.2-1 Summary of age and growth data and stocking data for muskellunge collected in Lake St Croix in 1975

Number Aged	Age Class	Year Class	Av. Total Length (in.)	Length Range (in.)	Av. Total Length at Stocking (in.)	Av. Weight at Stocking (lb.)
4	+	1975	10.9	9.9-11.7	10.4	0.25
7	I+	1974	17.3	15.7-18.5	10.6	0.25
15	II+	1973	23.2	19.9-25.7	11.2	0.20
1	III+	1972	23.2	23.2	10.3	0.14

It appears that the stockings have been successful: fish from all stockings are present. Muskies were sampled in all six stations between Stillwater and the Hudson Railroad bridge. Only one muskie was taken in all of the sampling done below the Hudson Railroad bridge. It was a 24.6-inch muskie taken in a seine haul at Station 8-A, Canning Factory Point. Muskies appear to be well dispersed throughout the study area between Stillwater and the Hudson Railroad bridge and apparently disperse rapidly after being stocked. One of the fingerling muskies stocked on September 16, 1975 above the Stillwater bridge, was caught at Station f-C, just above the Hudson Railroad on September 29, 1975. The other three fingerling muskies collected in the 1975 sampling were collected in Station 10 near 10-A on September 22, and the other two at 10-B on September 29, 1975.

The one muskie collected from the 1972 year class was the same length as the average length of muskies from the 1973 year class. This fish could be one of the slower growing makes from the 1972 year class. Based on the growth rate of the other year classes, the larger fish from the 1972 class could be expected to be recruited into the fishery during the summer of 1976 and 1973 year class during the summer of 1977.

### 3.2.4.2 Northern Pike

A total of 31 northern pike were collected during the 1975 sampling. Scales samples from all 31 of these fish included fish from seven year classes.

As stated by Krosch (1970 and 1971), northern pike are present in Lake St Croix, but are not abundant probably due to lack of good spawning habitat. Although many individuals are of large size, the northern pike is of minor importance as gamefish in Lake St Croix.

The 1972 and 1974 year classes were the strongest year classes collected. Northern pike spawned successfully in 1975 because yy fish were collected, but they appeared to be scarce. Table 3.2-2 is a summary of the 31 northern pike that were aged.

Table 3.2-2 Summary of age and growth data from northern pike collected in Lake St Croix in 1975

No. of Fish	Age Group	Year Class	Average Total Length (in.)	Range in Total Length (in.)
2	+	1975	10.2	8.9-11.5
11	I+	1974	15.9	13.2-18.0
2	II+	1973	19.8	17.6-22.0
10	III+	1972	27.2	19.5-33.4
3	IV+	1971	32.0	30.0-34.2
1	V+	1970	34.5	34.5
1	VI+	1969	34.9	34.9

### 3.2.4.3 Walleye

A total of 42 walleyes were collected by all methods during the 1975 sampling. Scale samples from 41 of these fish included walleyes from six year classes.

The small sample size of walleyes makes it difficult to make positive statements about this species. Walleyes spawned successfully in 1975 because yy walleyes were collected, but not in large numbers. The average length and range in lengths of walleyes comprising each age group (Table 3) indicates the year class is small and probably competing with the slower growing members of the 1973 year class. It appears that the 1972 year class is overlapping and competing with the 1971 year class, which is either small or was inadequately sampled. Table 3.2-3 is a summary of the 41 walleyes that were aged.

Table 3.2-3 Summary of the age growth data from walleyes collected in Lake St Croix in 1975

<u>No. of Fish</u>	<u>Age Group</u>	<u>Year Class</u>	<u>Average Total Length (in.)</u>	<u>Range in Total Length (in.)</u>
7	+	1975	6.8	5.7- 8.1
2	I +	1974	11.1	10.2-12.0
23	II+	1973	13.2	10.8-16.4
6	III+	1972	16.1	14.6-17.9
1	IV+	1971	17.5	17.5
2	V+	1970	23.1	23.0-23.3

#### 3.2.4.4 Sauger

A total of 286 saugers were collected by all methods during 1975 sampling. Scale samples from 284 of these fish included saugers from seven year classes. Saugers collected in the 1975 sampling were from a number of strong year classes, which should be able to support a good harvest.

Saugers comprised 12 percent of total gill net catch in 1975 compared to 50 percent of gill net catch in 1973 (Hawkinson, 1974). Krosch (1972) reported saugers as 11.5 percent of the fall gill net catch. Gill netting in 1973 started a month later than in either the 1971 or 1975 sampling periods. The water temperature would have been cooler during the 1973 sampling, because it was done later in fall. Consequently, saugers were probably in shallower water, which made them more susceptible to gill nets. This could account, at least in part, for the considerably higher catches of saugers in 1973.

Saugers appear to have had poor spawning success in 1975 because only two yy fish were collected. The 1974 year class of saugers also appears somewhat weak compared to the other year classes. The 1973 year class is strong with some of the larger members of the 1973 year class probably recruited into the fishery in the fall of 1975. The other will be recruited into the fishery during 1976. The 1972 and 1971 year classes still appear to be present in fairly large numbers and should be capable of supplying some good catches to anglers. Table 3.2-4 is a summary of the age and growth data from saugers collected in 1975.

Table 3.2-4 Summary of age and growth data from saugers collected in Lake St Croix in 1975

No. of Fish	Age Group	Year Class	Average Total Length (in.)	Range in Total Length (in.)
2	+	1975	5.1	5.1- 5.2
30	I+	1974	10.2	8.2-11.3
120	II+	1973	12.8	11.0-15.1
59	III+	1972	14.7	13.2-16.4
50	IV+	1971	16.1	14.1-18.8
21	V+	1970	17.5	16.0-20.4
2	VI+	1969	19.5	19.0-19.9

#### 3.2.4.5 Smallmouth Bass

A total of 304 smallmouth bass were collected during 1975 sampling. Scale samples from 76 of these fish included smallmouth bass from five year classes.

The smallmouth bass had another excellent hatch in 1975. Not many scale samples were taken from yy smallmouths, but comparison of average length of yy smallmouth bass with the composite length-frequency table (Appendix A-2) indicates they were present in large numbers. Smallmouth bass yy were sampled in most areas; they were collected in 8 of 12 seine hauls and in all electro-fishing runs. Krosch (1972) collected yy smallmouth bass at all seine stations and collected fair numbers during fall night shocking.

Examination of the composite length-frequency table seems to indicate three year classes were collected, but Table 5 shows that five year classes were sampled. The 1974 year class appears to overlap with the smaller members of the 1973 year class. The larger members of the 1973 year class overlap the 1972 and 1971 year classes, which appear to be weak or

were poorly represented in our sampling.

Krosch (1971 and 1972) reported low numbers of smallmouth bass 11 inches or larger, which was also true during 1975. Table 3.2-5 is a summary of the age and growth data of smallmouth bass collected in 1975 sampling.

Table 3.2-5 Summary of age and growth data of smallmouth bass collected in Lake St Croix in 1975

No. of Fish	Age Group	Year Class	Average Total Length (in.)	Range in Total Length (in.)
7	+	1975	3.9	2.8- 6.0
34	I+	1974	7.0	6.1- 8.0
30	II+	1973	9.2	6.8-10.4
3	III+	1972	10.4	10.2-10.6
2	IV+	1971	10.7	10.4-11.0

#### 3.2.4.6 Crappies

Black and white crappies should be able to produce some excellent catches for sport fishermen in the next two or three years, with black crappies probably dominating the catch. Both species of crappies were abundant, but more than twice as many black crappies were sampled as were white crappies. Scale samples from 143 black crappies included fish from six year classes, and scale samples from 78 white crappies included fish from seven year classes.



A total of 591 black crappies were collected during 1975 sampling. The 143 fish that were aged (Table 6) included 10 yy black crappies but only two I+ fish. The black crappies appear to have spawned successfully in 1975, but may have had poor spawning success in 1974. Fish from the 1974 year class appear to have grown fast, probably due to a lack of competition because of low numbers and are competing with the smaller members of the 1973 year class. The 1973 year class appeared to be strong and overlapped most of the 1972 year class. The 1971 and 1970 year classes completely overlap and probably compete with each other. Table 3.2-6 is a summary of the age and growth data for black crappies collected in 1975.

Table 3.2-6 Summary of age and growth data of black crappies collected in Lake St Croix in 1975

No. of Fish	Age Group	Year Class	Average Total Length (in.)	Range in Total Length (in.)
10	+	1975	4.1	3.9- 4.4
2	I+	1974	6.0	6.0- 6.1
62	II+	1973	7.4	5.7- 9.0
22	III+	1972	8.8	6.7-11.0
23	IV+	1971	10.5	9.2-11.5
24	V+	1970	10.7	9.8-11.6

A total of 239 white crappies were collected during the 1975 sampling. White crappies appear to have spawned successfully in 1975, but were present in low numbers. The 1974 year class of white crappies appears to be poor as did that year class of black crappies. The 1973 year class of white crappies is present, but weak compared to the 1973 year class of black crappies. The 1972 year class of white crappies is strong and

appears to be competing with the 1971 year class which is weak. The 1970, 1969, and 1968 year classes are all present, but in low numbers. All three of these year classes are probably competing with each other. Table 3.2-7 is a summary of the age and growth data of white crappies collected in 1975.

Table 3.2-7 Summary of age and growth data of white crappies collected in Lake St Croix in 1975

<u>No. of Fish</u>	<u>Age Group</u>	<u>Year Class</u>	<u>Average Total Length (in.)</u>	<u>Range in Total Length (in.)</u>
2	+	1975	4.7	4.5- 4.9
3	I+	1974	6.1	5.9- 6.3
12	II+	1973	6.9	6.2- 8.6
49	III+	1972	8.6	7.2- 9.6
4	IV+	1971	9.3	8.4-10.0
3	V+	1970	11.1	10.3-11.6
4	VI+	1969	12.0	10.1-13.2
1	VII+	1968	12.0	12.0

#### 3.2.4.7 White Bass

White bass are abundant and should support a heavy harvest for the next few years. A total of 521 white bass were collected by all methods during the 1975 sampling. Scale samples from 185 of these white bass included fish from seven year classes.

Spawning success appeared good in 1975 because yy white bass were abundant. They appear to have grown fast possibly because the 1974 year class is variable and overlapped by 1975 and 1973 year classes. The 1973 year class is strong and should support some good fishing in the next few years. The larger members of the 1972 year class appear to be competing with the smaller members of the 1971 year class and the larger members of the 1971 year class appear to be competing with the 1970 year class. The 1972, 1971, and 1970 year class should be producing some good catches for anglers. The 1969 year class is present but numbers are low. Table 3.2-8 is a summary of the age and growth data from white bass collected in 1975.

Table 3.2-8 Summary of age and growth data of white bass collected in Lake St Croix in 1975

No. of Fish	Age Group	Year Class	Average Total Length (in.)	Range in Total Length (in.)
18	+	1975	5.4	5.0- 5.9
7	I+	1974	8.1	5.5- 9.1
84	II+	1973	10.1	8.1-12.0
25	III+	1972	13.0	12.0-13.9
26	IV+	1971	13.8	12.7-14.5
21	V+	1970	14.5	13.1-15.3
4	VI+	1969	15.2	14.6-15.7

#### 3.2.4.8 Abundance Index

Any increases or decreases in abundance may indicate a change in the aquatic environment which could be caused by operation of the Allen S King Plant. Since the purpose of this study is

to monitor the effects of the King Plant upon Lake St Croix, abundance trends are an important result of this study. Comparable catch data covering a nine-year period are available for Lake St Croix, so it is possible to look for any overall trends in abundance of fish in Lake St Croix.

In an effort to determine trends in abundance of fish in Lake St Croix, abundance indices (Hile, 1962) were calculated from gill net and trap net data. Catch data from fall gill netting and late summer trap netting were used to establish average catch rates for the period 1966-1975. Data from this period were used to coincide with the period of the biennial maintenance sampling of 1973 and 1975. This average catch rate for each year was used to calculate an expected catch for each species, each gear, and each year of sampling. The observed catch was divided by expected catch to yield the abundance index. Abundance indices for gill net catches, trap net catches, and combined gill net and trap net catches were calculated and are listed in Table F-3.2-1.

The number of fish present in Lake St Croix, as measured by gill net and trap net catches, vary widely from year to year. For example, abundance indices for all species in the trap nets varied from 0.47 to 1.40, and in gill nets the indices varied from 0.52 to 1.49. Such fluctuations are common in fish populations in Minnesota lakes (Peterson, 1973). Fluctuations of a similar magnitude were reported from Lake of the Woods by Heyerdahl and Smith (1972).

Regression lines were calculated from gill net, trap net, and combined abundance indices to determine if any long-term changes in abundance were present. A correlation coefficient was calculated for each regression line to determine if the lines indicated any real trends. The correlation coefficients

for the regression lines for all species indicate that in each case (gill net, trap net, and combined catches) one can be confident (95 times in 100) that for all species there was no overall trend in abundance between 1966 and 1975.

By adding the observed and expected gill net and trap net catches for each species and then combining these figures for a group of species, abundance indices for four groups of species were calculated (Table F-3.2-2). These four groups were as follows:

Gamefish

northern pike  
channel catfish  
white bass  
saugers  
walleye

Panfish

rock bass  
bluegill  
white crappie  
black crappie

Large rough fish

carp  
white sucker  
silver redhorse  
shorthead redhorse

Other Fish

longnose gar  
shortnose gar  
gizzard shad  
mooneye  
yellow perch  
freshwater drum

Regression lines and correlation coefficients were calculated for each species group. Again, there was no significant trend in abundance at the five-percent level. Thus, for the period 1966-1975, there was no significant overall trend in numbers of fish in Lake St Croix. Table F-3.2-3 is a summary of the equations of the lines and correlation coefficients for abundance index calculations.

Considering all stations, there is no indication at this time of any overall changes in fish abundance, but it is known that locally the plant affects fish concentrations. Fish are known to concentrate in water discharge from the plant at various times of the year and species may vary from time to time. Since one of the correlation coefficients was high enough to be significant at the five-percent level with two or three years more data, it should be determined by further sampling whether this correlation coefficient is actually that high. Efforts should be made to quantify the effect of the plant on local distribution of fish.

The abundance index for some species is highly variable from year to year, so an effort was made to determine the cause of these fluctuations. Often the size of an adult fish population is directly related to abundance of young fish of that species a few years earlier. In other populations, some environmental stress may cause high mortality among adult fish.

Preliminary calculations using length-frequency distributions from the entire period of the Lake St Croix fish study, in conjunction with available age and growth data from the study, indicate a relationship between the number of yy, recruits, and adult fish of that species. This may help to explain that variation in abundance indices.

The preliminary calculations show promise, so this approach will be pursued and findings presented in a later report.

#### 3.2.4.9 New Species

The mimic shiner (*Notropis volucellus*), striped fantail darter (*Etheostoma flabellare lineolatum*), gilt darter (*Percina evides*), and slenderhead darter (*Percina phoxocephala*) are four species not previously collected by any method during the King Plant study.

Six mimic shiners were collected in a seine haul east of sampling Station 1-B on September 22, 1975. Eddy and Underhill (1974) report that the mimic shiner "is locally abundant in the St Croix River just below Taylors Falls. Mimic shiners are usually pelagic during the day and move into the littoral region at night, avoiding areas with heavy vegetation."

A single striped fantail darter was collected on September 3, 1975 during a shocking run in Station 6 along the Minnesota shore just below the Hudson Railroad bridge. Eddy and Underhill (1974) report the striped fantail darter as rare in the St Croix River below Taylors Falls. It prefers cold, swift water. This fish may have been in transit because the habitat this species prefers was not present where it was collected.

A single gilt darter was collected on September 9, 1975 in a seine haul north of sampling Station 5-A. Eddy and Underhill report that the gilt darter is common in the St Croix River between Taylors Falls and Lake St Croix preferring a clear water habitat.

A single slenderhead darter was collected on September 8, 1975 during a shocking run in Anderson Bay. Eddy and Underhill (1974) report that considerable numbers of this species have been collected in the St Croix River and its tributaries.

### SUMMARY

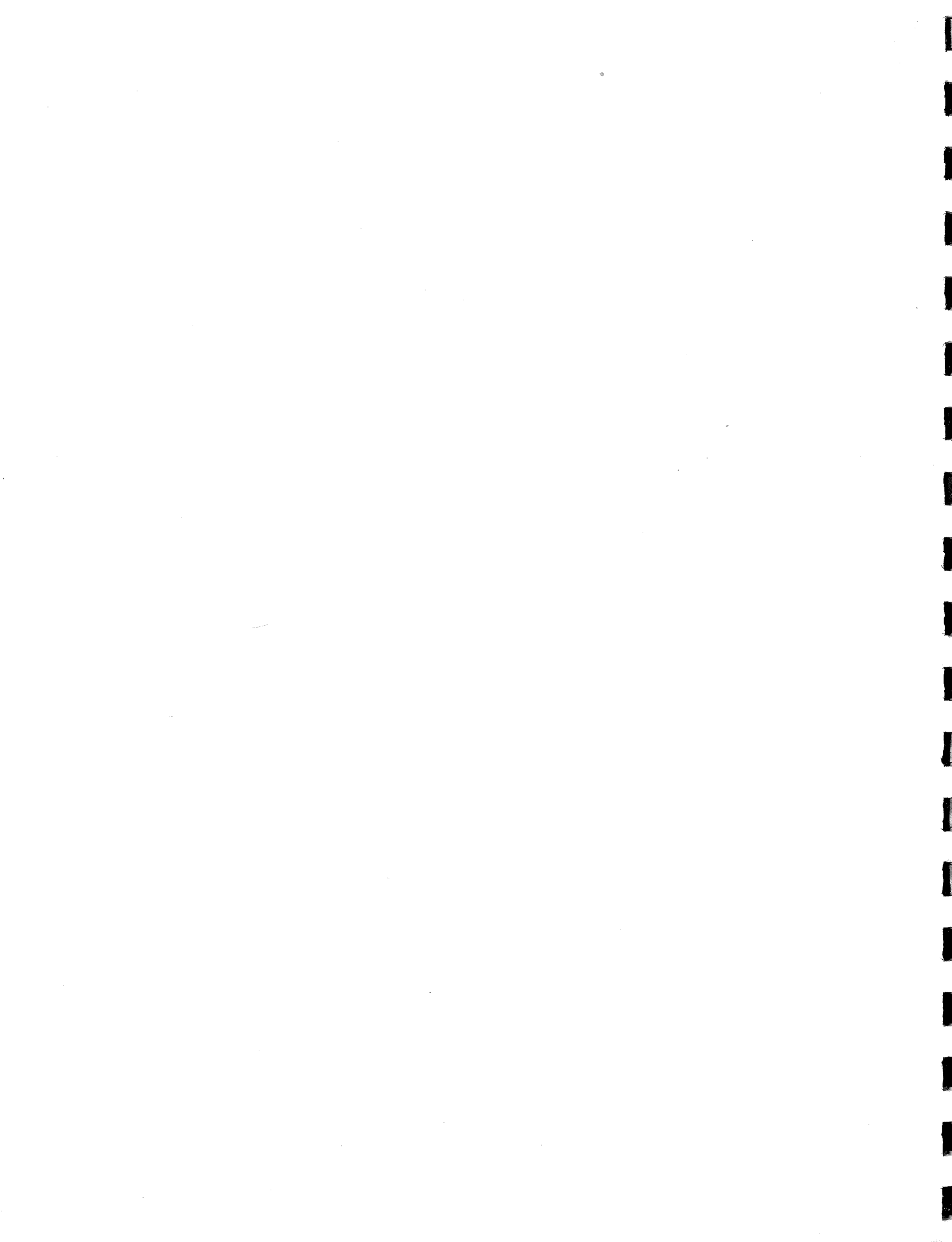
The correlation coefficient for the regression lines of abundance indices for all species caught in gill nets, trap nets, and their combined catch indicate there was no significant overall trend in abundance for all species of fish in Lake St Croix between 1966 and 1975. Additional sampling is necessary, because it may take several years before long-term trends in the fishery are apparent. To date, fluctuation in abundance indices appear to be related to variation in spawning success and recruitment.

A total of 48 species (5,786 fish) were caught by all methods from August 18 to September 29, 1975. Fifteen species: carp, gizzard shad, black crappie, white bass, emerald shiner, log perch, smallmouth bass, sauger, shorthead redhorse, white crappie, silver redhorse, drum, bluegill, yellow perch, and channel catfish (in order of abundance) comprised 93.7 percent of all fish collected in the 1975 sampling.



## LITERATURE CITED

- American Fisheries Society Committee on Names of Fishes. 1970. A List of Common and Scientific Names of Fishes From the United States and Canada, Third Edition. American Fisheries Society Special Publication No. 6, Washington, DC 150 pp.
- Eddy, S and J. C Underhill. 1974. Northern Fishes, Third Edition. University of Minnesota Press, Minneapolis, Minnesota. 414 pp.
- Hawkinson, B W. 1974. Progress report on the abbreviated Lake St Croix fish population study August 13, 1973, to November 1, 1973. NSP Allen S King Environmental Monitoring and Ecological Studies Program 1973 Annual Report.
- Heyerdahl, E G and L L Smith, Jr. 1972. Fishery Resources of Lake of the Woods, Minnesota. University of Minnesota. Ag. Exp. Stat. Techn. Bulletin 288. 145 pp.
- Hile, R. 1962. Collection and Analysis of Commercial Fishery Statistics in the Great Lakes. Great Lakes Fish. Comm. Techn. Report 5. 31 pp.
- Krosch, H F. 1968. The 1967 progress report on the Lake St Croix fish population study. NSP Allen S King Environmental Monitoring Program Annual Report 1967.
- \_\_\_\_\_ 1971. The 1970 progress report on the Lake St Croix fish population study. NSP Allen S King Environmental and Ecological Studies Program 1970 Annual Report.
- \_\_\_\_\_ 1972. The 1971 progress report on the Lake St Croix fish population study. NSP Allen S King Environmental Monitoring and Ecological Studies Program 1971 Annual Report.
- Peterson, A R. 1973. Predicting sport fishing harvests at potential reservoir sites, with special reference to the proposed reservoir on the Red Lake River near Huot, in Polk and Red Lake Counties, Minnesota. Minnesota Department of Natural Resources Special Publication No. 101. 19 pp.



## APPENDIX A-3.2

TABLE A-3.2-1

COMPOSITE CATCH OF ALL METHODS OF SAMPLING, LAKE ST CROIX  
August 18 to September 29, 1975

Species	No. Caught	% of Catch
Chestnut lamprey	1	*
Silver lamprey	6	*
Lake sturgeon	6	*
Longnose gar	8	*
Shortnose gar	14	*
Gizzard shad	767	13.3
Goldeye	5	*
Mooneye	15	*
Northern pike	31	0.5
Muskellunge	28	0.5
Carp	883	15.3
Emerald shiner	491	8.5
Pugnose minnow	6	*
Spottail shiner	34	0.6
Fathead minnow	1	*
Carp sucker	15	*
White sucker	24	*
Smallmouth buffalo	10	*
Bigmouth buffalo	3	*
Spotted sucker	6	*
Silver redhorse	228	3.9
River redhorse	7	*
Golden redhorse	18	*
Shorthead redhorse	236	4.1
Black bullhead	3	*
Yellow bullhead	1	*
Channel catfish	74	1.3
Burbot	5	*
Brook silversides	2	*
White bass	521	9.0
Rock bass	35	0.6
Green sunfish	1	*
Bluegill	88	1.5
Smallmouth bass	304	5.3
Largemouth bass	11	*
White crappie	239	4.1
Black crappie	591	10.2
W. Sand darter	14	*

TABLE A-3.2-1 (Con't)

Species	No. Caught	% of Catch
Fantail darter	1	*
Johnny darter	3	*
Yellow perch	80	1.4
Log perch	400	7.0
Gilt darter	1	*
Slenderhead darter	1	*
River darter	13	*
Sauger	281	4.9
Walleye	42	0.7
Freshwater drum	228	3.9
Total	5782	

\* &lt;0.5%

TABLE A-3.2-2

LENGTH-FREQUENCY DISTRIBUTION OF FISH CAUGHT BY  
ALL METHODS IN LAKE ST CROIX

August 18 to September 29, 1975

Total Length in Inches	Chestnut lamprey	Silver lamprey	Lake sturgeon	Long-nose gar	Short-nose gar	Gizzard shad	Goldeye	Mooneye	Northern pike
0.0 - 0.9									
1.0 - 1.9						3			
2.0 - 2.9						3			
3.0 - 3.9						1			
4.0 - 4.9						1			
5.0 - 5.9						28			
6.0 - 6.9						180			
7.0 - 7.9						60			
8.0 - 8.9		1				2			1
9.0 - 9.9	1	2							
10.0 - 10.9		2		1		1			
11.0 - 11.9						1			2
12.0 - 12.9						5		13	
13.0 - 13.9				1	1	12		1	1
14.0 - 14.9				1		24	1	1	1
15.0 - 15.9						4	3		3
16.0 - 16.9						1	1		3
17.0 - 17.9			1						3
18.0 - 18.9			1			1			
19.0 - 19.9			1		2				1
20.0 - 20.9			2		1				1
21.0 - 21.9					2				
22.0 - 22.9					3				1
23.0 - 23.9					3				
24.0 - 24.9					1				
25.0 - 25.9									1
26.0 - 26.9									1
27.0 - 27.9				1					1
28.0 - 28.9					1				2
29.0 - 29.9				1					
30.0 - 30.9									4
31.0 - 31.9									
32.0 - 32.9				1					1
33.0 - 33.9									1
34.0 - 34.9									3
35.0 - 35.9									
36.0 - 36.9									
40.0 - 40.9				1					
43.0 - 43.9			1						
Unmeasured		1				440			
TOTALS	1	6	6	8	14	767	5	15	31

TABLE A-3.2-2 (Con't)

Total Length in Inches	Muskel-lunge	Carp	Emerald shiner	Spottail shiner	Mimic shiner	Fathead minnow	Carp-sucker sp.	White sucker	Small-mouth buffalo
0.0 - 0.9									
1.0 - 1.9			6						
2.0 - 2.9			17	3					
3.0 - 3.9			23						
4.0 - 4.9									
5.0 - 5.9									
6.0 - 6.9									
7.0 - 7.9									
8.0 - 8.9									
9.0 - 9.9	1								
10.0 - 10.9	1							1	
11.0 - 11.9	2	3						1	
12.0 - 12.9		3					2	1	
13.0 - 13.9		32					2	3	1
14.0 - 14.9		141						5	
15.0 - 15.9	1	221					1	6	
16.0 - 16.9	1	207					2	5	
17.0 - 17.9	2	117					3	2	3
18.0 - 18.9	3	58					1		
19.0 - 19.9	1	37					4		3
20.0 - 20.9		25							2
21.0 - 21.9	2	21							
22.0 - 22.9	4	4							1
23.0 - 23.9	5	5							
24.0 - 24.9	2	2							
25.0 - 25.9	2	1							
26.0 - 26.9		2							
27.0 - 27.9									
28.0 - 28.9		1							
29.0 - 29.9									
30.0 - 30.9									
31.0 - 31.9									
32.0 - 32.9									
33.0 - 33.9									
34.0 - 34.9									
35.0 - 35.9									
36.0 - 36.9									
Unmeasured	1	3	445	31	6	1			
TOTALS	28	883	491	34	6	1	15	24	10

TABLE A-3.2-2 (Con't)

Total Length in Inches	Bigmouth buffalo	Spotted sucker	Silver red-horse	River red-horse	Golden red-horse	Short-red-horse	Black bullhead	Yellow bullhead	Channel catfish
0.0 - 0.9									
1.0 - 1.9									
2.0 - 2.9									
3.0 - 3.9						2			
4.0 - 4.9									
5.0 - 5.9			1			1			
6.0 - 6.9		1	2			9			
7.0 - 7.9						17			
8.0 - 8.9			6		2	12		1	
9.0 - 9.9			17		1	53	3		1
10.0 - 10.9			34			45			
11.0 - 11.9		1	7			15			
12.0 - 12.9			3		1	15			3
13.0 - 13.9		1	3		3	13			4
14.0 - 14.9		1	6		1	19			12
15.0 - 15.9		1	19		2	17			14
16.0 - 16.9	1	1	32		5	14			15
17.0 - 17.9	2		32	1	2	2			9
18.0 - 18.9			32			2			8
19.0 - 19.9			20						4
20.0 - 20.9			12						2
21.0 - 21.9			1	2	1				
22.0 - 22.9				2					1
23.0 - 23.9				2					1
24.0 - 24.9									
25.0 - 25.9									
26.0 - 26.9									
27.0 - 27.9									
28.0 - 28.9									
29.0 - 29.9									
30.0 - 30.9									
31.0 - 31.9									
32.0 - 32.9									
33.0 - 33.9									
34.0 - 34.9									
35.0 - 35.9									
36.0 - 36.9									
Unmeasured			1						
TOTALS	3	6	228	7	18	236	3	1	74

TABLE A-3.2-2 (Con't)

Total Length in Inches	Burbot	Brook silver-sides	White bass	Rock bass	Green sunfish	Blue-gill	Small-mouth bass	Large-mouth bass	White crappie
0.0 - 0.9						4			
1.0 - 1.9						34			
2.0 - 2.9				1		3	45	2	1
3.0 - 3.9						4	120	3	1
4.0 - 4.9			8	3		6	62		8
5.0 - 5.9			64	6	1	4	4		1
6.0 - 6.9			3	18		19	14		30
7.0 - 7.9	1		4	4		11	21		17
8.0 - 8.9	1		71	3		2	5		108
9.0 - 9.9			29				18	1	60
10.0 - 10.9	1		66				13		4
11.0 - 11.9			84				2	1	3
12.0 - 12.9			24					3	3
13.0 - 13.9	2		99						1
14.0 - 14.9			59						
15.0 - 15.9			7						
16.0 - 16.9									
17.0 - 17.9								1	
18.0 - 18.9									
19.0 - 19.9									
20.0 - 20.9									
21.0 - 21.9									
22.0 - 22.9									
23.0 - 23.9									
24.0 - 24.9									
25.0 - 25.9									
26.0 - 26.9									
27.0 - 27.9									
28.0 - 28.9									
29.0 - 29.9									
30.0 - 30.9									
31.0 - 31.9									
32.0 - 32.9									
33.0 - 33.9									
34.0 - 34.9									
35.0 - 35.9									
36.0 - 36.9									
Unmeasured		2	3			1			2
TOTALS	5	2	521	35	1	88	304	11	239



TABLE A-3.2-2 (Con't)

Total Length in Inches	Black crappie	Western sand darter	Fantail darter	Johnny darter	Yellow perch	Log perch	Gilt darter	Slender head darter	River darter
0.0 - 0.9									
1.0 - 1.9									
2.0 - 2.9	7				9	83			
3.0 - 3.9	3				12	26			
4.0 - 4.9	18				3	3			
5.0 - 5.9	3				18				
6.0 - 6.9	47				11				
7.0 - 7.9	158				17				
8.0 - 8.9	215				5				
9.0 - 9.9	79				4				
10.0 - 10.9	35								
11.0 - 11.9	23								
12.0 - 12.9									
13.0 - 13.9									
14.0 - 14.9									
15.0 - 15.9									
16.0 - 16.9									
17.0 - 17.9									
18.0 - 18.9									
19.0 - 19.9									
20.0 - 20.9									
21.0 - 21.9									
22.0 - 22.9									
23.0 - 23.9									
24.0 - 24.9									
25.0 - 25.9									
26.0 - 26.9									
27.0 - 27.9									
28.0 - 28.9									
29.0 - 29.9									
30.0 - 30.9									
31.0 - 31.9									
32.0 - 32.9									
33.0 - 33.9									
34.0 - 34.9									
35.0 - 35.9									
36.0 - 36.9									
Unmeasured	3	14	1	3	1	288	1	1	13
TOTALS	591	14	1	3	80	400	1	1	13

TABLE A-3.2-2 (Con't)

Total Length in Inches	Sauger	Walleye	Fresh-water drum						
0.0 - 0.9									
1.0 - 1.9									
2.0 - 2.9									
3.0 - 3.9			1						
4.0 - 4.9			3						
5.0 - 5.9	2	3	22						
6.0 - 6.9		1	6						
7.0 - 7.9		3	33						
8.0 - 8.9	1	1	92						
9.0 - 9.9	6		13						
10.0 - 10.9	16	3	24						
11.0 - 11.9	15	3	16						
12.0 - 12.9	54	8	6						
13.0 - 13.9	51	2	8						
14.0 - 14.9	51	6	1						
15.0 - 15.9	24	3							
16.0 - 16.9	36	4							
17.0 - 17.9	10	3	1						
18.0 - 18.9	7								
19.0 - 19.9	3								
20.0 - 20.9	2								
21.0 - 21.9									
22.0 - 22.9									
23.0 - 23.9		2							
24.0 - 24.9									
25.0 - 25.9									
26.0 - 26.9									
27.0 - 27.9									
28.0 - 28.9									
29.0 - 29.9									
30.0 - 30.9									
31.0 - 31.9									
32.0 - 32.9									
33.0 - 33.9									
34.0 - 34.9									
35.0 - 35.9									
36.0 - 36.9									
Unmeasured	1		2						
TOTALS	279	42	228						

TABLE A-3.2-3

## COMMON AND SCIENTIFIC NAMES, METHODS AND YEARS OF CAPTURE OF FISH IN LAKE ST CROIX

Common Name	Scientific Name**	Method of Capture in 1975				Years collected in previous study*
		Trap net	Electro- fishing	Gill net	Minnow seine	
Chestnut lamprey	Ichthyomyzon castaneus		X			73
Silver lamprey	Ichthyomyzon unicuspis	X	X	X		66-71, 73
American brook lamprey	Lampetra lamottei					69
Lake sturgeon	Acipenser fulvescens			X		66-71, 73
Paddlefish	Polyodon spathula					66-70
Longnose gar	Lepisosteus osseus	X	X	X		66-71, 73
Shortnose gar	Lepisosteus platostomus	X	X	X		66-71, 73
Bowfin	Amia calva					66-70
American eel	Anguilla rostrata					66-71, 73
Gizzard shad	Dorosoma cepedianum	X	X	X	X	66-71, 73
Goldeye	Hiodon alosiodes			X		67-71, 73
Mooneye	Hiodon tergisus	X	X	X	X	66-71, 73
Lake whitefish	Coregonus clupeaformis					67
Brown trout	Salmo trutta					66, 67, 69
Brook trout	Salvelinus fontinalis					66
Northern pike	Esox lucius	X	X	X	X	66-71, 73
Muskellunge	Esox masquinongy	X	X	X	X	71, 73
Carp	Cyprinus carpio	X	X	X	X	66-71, 73
Silver chub	Hybopsis storeriana					67-71, 73
Golden shiner	Notemigonus crysoleucas					69
Emerald shiner	Notropis atherinoides		X		X	67, 68, 70, 71, 73
Blacknose shiner	Notropis heterolepis				X	67, 71
Spottail shiner	Notropis hudsonius		X		X	67-71
Mimic shiner	Notropis volucellus				X	
Flathead minnow	Pimephales promelas				X	
Carp sucker species	Carpoides sp.		X	X	X	66-71, 73
White sucker	Catostomus commersoni	X	X	X		66-71, 73
Smallmouth buffalo	Ictiobus bubalus	X		X		66-71, 73

\* Abbreviations: 66=1966; 67=1967; 68=1968; 69=1969; 70=1970; 71=1971; 73=1973.

TABLE A-3.2-3 (Con't)

Common Name	Scientific Name**	Method of Capture in 1975				Years collected in previous study*
		Trap net	Electro- fishing	Gill net	Minnow seine	
Bigmouth buffalo	<i>Ictiobus cypinellus</i>	X		X		66,67,69,70,73
Spotted sucker	<i>Minytrema melanops</i>		X	X		66-71
Silver redhorse	<i>Moxostoma anisurum</i>	X	X	X	X	66-71, 73
River redhorse	<i>Moxostoma carinatum</i>	X	X			67-71, 73
Golden redhorse	<i>Moxostoma erythrurum</i>		X	X	X	66-71, 73
Shorthead redhorse	<i>Moxostoma macrolepidotum</i>	X	X		X	66-71, 73
Black bullhead	<i>Ictalurus melis</i>	X		X		66-71, 73
Yellow bullhead	<i>Ictalurus natalis</i>		X			66-68, 70, 71
Brown bullhead	<i>Ictalurus nebulosus</i>					66
Channel catfish	<i>Ictalurus punctatus</i>	X		X		66-71, 73
Flathead catfish	<i>Pylodictis olivaris</i>					66-71, 73
Trout perch	<i>Percopsis omiscomaycus</i>					67-71
Burbot	<i>Lota lota</i>		X			66,67,70,73
Brook silverside	<i>Labidesthes sicculus</i>		X			71
White bass	<i>Morone chrysops</i>	X	X	X	X	66-71, 73
Rock bass	<i>Ambloplites rupestris</i>	X	X	X		66-71, 73
Green sunfish	<i>Lepomis cyanellus</i>		X			66,69,70,71,73
Hybrid sunfish (green x pumpkinseed)						66, 69
Pumpkinseed	<i>Lepomis gibbosus</i>					66-71
Hybrid sunfish (pumpkinseed & bluegill)						66-70
Bluegill	<i>Lepomis macrochirus</i>	X	X	X	X	66-71, 73
Smallmouth bass	<i>Micropterus dolomieu</i>	X	X	X	X	66-71, 73
Largemouth bass	<i>Micropterus salmoides</i>		X			66-71, 73
White crappie	<i>Pomoxis annularis</i>	X	X	X		66-71, 73
Black crappie	<i>Pomoxis nigromaculatus</i>	X	X	X	X	66-71, 73
Western sand darter	<i>Ammocrypta clara</i>				X	70-73
Iowa darter	<i>Etheostoma exile</i>					68, 70, 71

\* Abbreviations: 66=1966; 67=1967; 68=1968; 69=1969; 70=1970; 71=1971; 73=1973.

TABLE A-3.2-3 (Con't)

Common Name	Scientific Name**	Method of Capture in 1975				Years collected in previous study*
		Trap net	Electro- fishing	Gill net	Minnow seine	
Fantail darter	Etheostoma flabellare		X			
Johnny darter	Etheostoma nigrum		X		X	66, 70, 71
Yellow perch	Perca flavescens		X	X	X	66-71, 73
Log perch	Percina caprodes		X		X	66-71
Gilt darter	Percina evides				X	
Slenderhead darter	Percina phoxocephala		X			
River darter	Percina shumardi		X			67-70
Sauger	Stizostedion canadense	X		X	X	66-71, 73
Walleye	Stizostedion vitreum vitreum	X	X	X	X	66-71, 73
Freshwater drum	Aplodinotus grunniens	X		X	X	66-71, 73

\*Abbreviations: 66=1966; 67=1967; 68=1968; 69=1969; 70=1970; 71=1971; 73=1973.

\*\*Scientific names are taken from the American Fisheries Society, Special Publication No. 6, A List of Common and Scientific Names of Fishes from the United States and Canada, Third Edition, 1970



## APPENDIX B-3.2

TABLE B-3.2-1

NUMBERS OF SUCCESSFUL TRAP NET SETS  
AT EACH SAMPLING STATION IN LAKE ST CROIX, 1975

Sampling station	Number of sets
10-A	4
10-B	4
10-C	4
1-A	4
1-B	0
1-C	4
2-A	4
2-B	4
2-C	4
3-A	4
3-B	4
3-C	4
4-A	4
4-B	0
4-C	4
5-A	4
5-B	0
5-C	4
6-A	0
6-B	4
6-C	3
7-A	3
7-B	0
7-C	4
8-A	4
8-B	3
8-C	0
9-A	4
9-B	0
9-C	4
End of King Plant discharge canal, north side	4

TABLE B-3.2-2

SUMMARY OF LAKE ST CROIX TRAP NETTING,  
August 18-29, 1975 (93 lifts)

Species	No. Caught	% of Total Catch	CPE (catch/effort)
Silver lamprey	1	*	0.011
Longnose gar	1	*	0.011
Shortnose gar	1	*	0.011
Gizzard shad	2	*	0.022
Mooneye	3	*	0.032
Northern pike	16	0.9	0.172
Muskellunge	14	0.8	0.151
Carp	618	36.0	6.645
White sucker	15	0.9	0.161
Smallmouth buffalo	3	*	0.032
Bigmouth buffalo	2	*	0.022
Silver redhorse	54	3.3	0.581
River redhorse	2	*	0.022
Shorthead redhorse	51	3.0	0.548
Black bullhead	1	*	0.011
Channel catfish	2	*	0.022
White bass	202	11.9	2.172
Rock bass	14	0.8	0.151
Bluegill	31	1.8	0.333
Smallmouth bass	2	*	0.022
White crappie	123	7.2	1.323
Black crappie	488	28.4	5.247
Sauger	17	1.0	0.204
Walleye	2	*	0.022
Freshwater drum	47	2.7	0.505
Total	1712		

\* &lt;0.5%



TABLE B-3.2-3

LENGTH-FREQUENCY DISTRIBUTION OF FISH  
 CAUGHT BY TRAP NETTING IN LAKE ST CROIX,  
 August 18-29, 1975 (93 lifts)

Total Length in Inches	Silver lamprey	Longnose gar	Short-nose gar	Gizzard shad	Mooneye	Northern pike	Muskel-lunge	Carp	White sucker
0.0 - 0.9									
1.0 - 1.9									
2.0 - 2.9									
3.0 - 3.9									
4.0 - 4.9									
5.0 - 5.9									
6.0 - 6.9				1					
7.0 - 7.9									
8.0 - 8.9									
9.0 - 9.9									
10.0 - 10.9									
11.0 - 11.9								1	
12.0 - 12.9					2				
13.0 - 13.9				1				22	1
14.0 - 14.9					1	1		94	4
15.0 - 15.9						3	1	167	4
16.0 - 16.9						1	1	167	5
17.0 - 17.9						3	1	97	1
18.0 - 18.9								32	
19.0 - 19.9							1	17	
20.0 - 20.9			1					7	
21.0 - 21.9							2	3	
22.0 - 22.9							2	1	
23.0 - 23.9							3	3	
24.0 - 24.9							1	1	
25.0 - 25.9							1	1	
26.0 - 26.9						1		2	
27.0 - 27.9		1				1			
28.0 - 28.9						1			
29.0 - 29.9									
30.0 - 30.9						3			
31.0 - 31.9									
32.0 - 32.9									
33.0 - 33.9									
34.0 - 34.9						2			
35.0 - 35.9									
36.0 - 36.9									
Unmeasured	1						1	3	
TOTALS	1	1	1	2	3	16	14	618	15

TABLE B-3.2-3 (Con't)

Total Length in Inches	Small-mouth buffalo	Big-mouth buffalo	Silver red-horse	River red-horse	Short-head red-horse	Black bull-head	Channel catfish	White bass	Rock bass
0.0 - 0.9									
1.0 - 1.9									
2.0 - 2.9									
3.0 - 3.9									
4.0 - 4.9									
5.0 - 5.9									2
6.0 - 6.9									9
7.0 - 7.9								1	2
8.0 - 8.9					1			41	1
9.0 - 9.9			2		7	1		4	
10.0 - 10.9					6			36	
11.0 - 11.9					1			28	
12.0 - 12.9			1		6			19	
13.0 - 13.9			1		5			41	
14.0 - 14.9					7			27	
15.0 - 15.9			3		7			2	
16.0 - 16.9		1	8		8		1		
17.0 - 17.9	1	1	9		1				
18.0 - 18.9			14		2				
19.0 - 19.9	1		8				1		
20.0 - 20.9			6						
21.0 - 21.9			1	1					
22.0 - 22.9	1								
23.0 - 23.9				1					
24.0 - 24.9									
25.0 - 25.9									
26.0 - 26.9									
27.0 - 27.9									
28.0 - 28.9									
29.0 - 29.9									
30.0 - 30.9									
31.0 - 31.9									
32.0 - 32.9									
33.0 - 33.9									
34.0 - 34.9									
35.0 - 35.9									
36.0 - 36.9									
Unmeasured			1					3	
TOTALS	3	2	54	2	51	1	2	202	14

TABLE B-3.2-3 (Con't)

Total Length in Inches	Bluegill	Small-mouth bass	White crappie	Black crappie	Sauger	Walleye	Drum		
0.0 - 0.9									
1.0 - 1.9									
2.0 - 2.9									
3.0 - 3.9									
4.0 - 4.9									
5.0 - 5.9	2			3					
6.0 - 6.9	17		5	39					
7.0 - 7.9	10		8	119			4		
8.0 - 8.9	2	1	71	188			14		
9.0 - 9.9		1	30	79					
10.0 - 10.9			3	34			6		
11.0 - 11.9			2	23		1	11		
12.0 - 12.9			2		2		2		
13.0 - 13.9					3	1	6		
14.0 - 14.9					7		1		
15.0 - 15.9					2				
16.0 - 16.9									
17.0 - 17.9					1		1		
18.0 - 18.9					1				
19.0 - 19.9									
20.0 - 20.9									
21.0 - 21.9									
22.0 - 22.9									
23.0 - 23.9									
24.0 - 24.9									
25.0 - 25.9									
26.0 - 26.9									
27.0 - 27.9									
28.0 - 28.9									
29.0 - 29.9									
30.0 - 30.9									
31.0 - 31.9									
32.0 - 32.9									
33.0 - 33.9									
34.0 - 34.9									
35.0 - 35.9									
36.0 - 36.9									
Unmeasured			2	3	1		2		
TOTALS	31	2	123	488	17	2	47		



APPENDIX C-3.2

TABLE C-3.2-1

NUMBERS OF SUCCESSFUL GILL NET SETS  
IN EACH SAMPLING STATION IN LAKE ST CROIX, 1975

Sampling Station	Number of Sets
10-A	2
10-C	2
1-A	2
1-C	2
2-A	2
2-C	2
3-B	2
3-C	2
4-A	2
4-C	2
5-A	2
5-C	2
6-B	2
6-C	2
7-A	2
7-C	2
8-A	2
8-C	1
9-A	2
9-C	2
End of King plant discharge canal, north side	2
End of King plant discharge canal, south side	2
Total	43

TABLE C-3.2-2

SUMMARY OF LAKE ST CROIX GILL NETTING,  
September 11-26, 1975 (43 lifts)

Species	No. Caught	% of Total Catch	CPE (catch/effort)
Silver lamprey	3	*	.070
Lake sturgeon	6	*	.140
Longnose gar	4	*	.093
Shortnose gar	12	0.6	.279
Gizzard shad	608	28.2	14.140
Goldeye	5	*	.116
Mooneye	8	*	.186
Northern pike	11	0.5	.256
Muskellunge	8	*	.186
Carp	140	6.5	3.256
Carp sucker	11	0.5	.256
White sucker	7	*	.163
Smallmouth buffalo	7	*	.163
Bigmouth buffalo	1	*	.023
Spotted sucker	2	*	.047
Silver redhorse	127	5.9	2.953
Golden redhorse	12	0.6	.279
Shorthead redhorse	72	3.3	1.674
Black bullhead	2	*	.047
Channel catfish	72	3.3	1.674
White bass	308	14.3	7.163
Rock bass	12	0.6	.279
Bluegill	1	*	.023
Smallmouth bass	3	*	.070
White crappie	114	5.3	2.651
Black crappie	94	4.4	2.186
Yellow perch	35	1.6	.814
Sauger	260	12.0	6.047
Walleye	34	1.6	.791
Freshwater drum	180	8.3	4.186
Total	2159		

\* &lt;0.5%

TABLE C-3.2-3

LENGTH-FREQUENCY DISTRIBUTION OF FISH  
CAUGHT BY GILL NETTING, LAKE ST CROIX,

September 11-26, 1975 (43 lifts)

Total Length in Inches	Silver lamprey	Lake sturgeon	Long-nose gar	Short-nose gar	Gizzard shad	Goldeye	Mooneye	Northern pike	Muskel-lunge
0.0 - 0.9									
1.0 - 1.9									
2.0 - 2.9									
3.0 - 3.9									
4.0 - 4.9					1				
5.0 - 5.9					24				
6.0 - 6.9					102				
7.0 - 7.9					32				
8.0 - 8.9					2				
9.0 - 9.9	1								
10.0 - 10.9	2				1				
11.0 - 11.9								1	
12.0 - 12.9					5		8		
13.0 - 13.9					10				
14.0 - 14.9					22	1			
15.0 - 15.9					4	3			
16.0 - 16.9					1	1		1	
17.0 - 17.9		1							1
18.0 - 18.9		1			1				3
19.0 - 19.9		1		2				1	
20.0 - 20.9		2						1	
21.0 - 21.9				2					
22.0 - 22.9				3				1	1
23.0 - 23.9				3					2
24.0 - 24.9				1					
25.0 - 25.9								1	1
26.0 - 26.9									
27.0 - 27.9									
28.0 - 28.9				1				1	
29.0 - 29.9			1						
30.0 - 30.9								1	
31.0 - 31.9									
32.0 - 32.9			1					1	
33.0 - 33.9								1	
34.0 - 34.9								1	
35.0 - 35.9									
36.0 - 36.9			1						
40.0 - 40.9			1						
43.0 - 43.9		1							
Unmeasured					403				
TOTALS	3	6	4	12	608	5	8	11	8





TABLE C-3.2-3 (Con't)

Total Length in Inches	Black bullhead	Channel catfish	White bass	Rock bass	Blue-gill	Small-mouth bass	White crappie	Black crappie	Yellow perch
0.0 - 0.9									
1.0 - 1.9									
2.0 - 2.9									
3.0 - 3.9								3	
4.0 - 4.9				1			8	18	
5.0 - 5.9			63	2	1		1		3
6.0 - 6.9			3	6			25	8	9
7.0 - 7.9			3	2		2	9	39	15
8.0 - 8.9			29	1		1	37	26	4
9.0 - 9.9	2	1	24				30		4
10.0 - 10.9			30				1		
11.0 - 11.9			56				1		
12.0 - 12.9		3	5				1		
13.0 - 13.9		4	58				1		
14.0 - 14.9		12	32						
15.0 - 15.9		14	5						
16.0 - 16.9		14							
17.0 - 17.9		9							
18.0 - 18.9		8							
19.0 - 19.9		3							
20.0 - 20.9		2							
21.0 - 21.9									
22.0 - 22.9		1							
23.0 - 23.9		1							
24.0 - 24.9									
25.0 - 25.9									
26.0 - 26.9									
27.0 - 27.9									
28.0 - 28.9									
29.0 - 29.9									
30.0 - 30.9									
31.0 - 31.9									
32.0 - 32.9									
33.0 - 33.9									
34.0 - 34.9									
35.0 - 35.9									
36.0 - 36.9									
TOTALS	2	72	308	12	1	3	114	94	35



## APPENDIX D-3.2

TABLE D-3.2-1

SUMMARY OF LAKE ST CROIX DAY ELECTRO-FISHING,  
September 4-9, 1975 (5.38 hours)

Species	Number Caught	% of Total Catch	CPE (catch/effort)
Chestnut lamprey	1	x	0.19
Silver lamprey	2	x	0.37
Longnose gar	3	x	0.56
Shortnose gar	1	x	0.19
Gizzard shad	125	9.3	23.23
Mooneye	1	x	0.19
Northern pike	3	x	0.56
Muskellunge	1	x	0.19
Carp	123	9.1	22.86
Emerald shiner	198	14.7	36.80
Spottail shiner	3	x	0.56
Carp sucker spp.	2	x	0.37
White sucker	2	x	0.37
Spotted sucker	4	x	0.74
Silver redhorse	29	2.2	5.39
River redhorse	5	x	0.93
Golden redhorse	1	x	0.19
Shorthead redhorse	99	7.4	18.40
Yellow bullhead	1	x	0.19
Burbot	5	x	0.93
Brook silversides	2	x	0.19
White bass	3	x	0.56
Rock bass	9	0.7	1.67
Green sunfish	1	x	0.19
Bluegill	55	4.1	10.22
Smallmouth bass	263	19.6	48.88
Largemouth bass	11	0.8	2.04
White crappie	2	x	0.37
Black crappie	8	0.6	1.49
Western sand darter	1	x	0.19
Fantail darter	1	x	0.19
Johnny darter	2	x	0.37
Yellow perch	15	1.1	2.79
Log perch	358	26.6	66.54
Slenderhead darter	1	x	0.19
River darter	1	x	0.19
Sauger	2	x	0.37
Walleye	2	x	0.37
Total	1346		

x &lt;0.5%

TABLE D-3.2-2

LENGHT-FREQUENCY DISTRIBUTION OF FISHES  
CAUGHT BY DAY ELECTRO-FISHING IN LAKE ST CROIX

September 4-9, 1975

Total Length in Inches	Chestnut lamprey	Silver lamprey	Longnose gar	Short-nose gar	Gizzard shad	Mooneye	Northern pike	Muskel-lunge	Carp
0.0 - 0.9									
1.0 - 1.9					2				
2.0 - 2.9					3				
3.0 - 3.9									
4.0 - 4.9									
5.0 - 5.9					3				
6.0 - 6.9					59				
7.0 - 7.9					19				
8.0 - 8.9		1					1		
9.0 - 9.9	1	1							
10.0 - 10.9			1						
11.0 - 11.9									2
12.0 - 12.9						1			3
13.0 - 13.9			1	1			1		8
14.0 - 14.9			1		2				21
15.0 - 15.9									18
16.0 - 16.9							1		17
17.0 - 17.9									10
18.0 - 18.9									11
19.0 - 19.9									10
20.0 - 20.9									11
21.0 - 21.9									9
22.0 - 22.9								1	2
23.0 - 23.9									1
24.0 - 24.9									
25.0 - 25.9									
26.0 - 26.9									
27.0 - 27.9									
28.0 - 28.9									
29.0 - 29.9									
30.0 - 30.9									
31.0 - 31.9									
32.0 - 32.9									
33.0 - 33.9									
34.0 - 34.9									
35.0 - 35.9									
36.0 - 36.9									
Unmeasured					37				
TOTALS	1	2	3	1	125	1	3	1	123

TABLE D-3.2-2 (Con't)

Total Length in Inches	Emerald shiner	Spot-tail shiner	Carp-sucker spp.	White sucker	Spotted sucker	Silver red-horse	River red-horse	Golden red-horse	Shorthead redhorse
0.0 - 0.9									
1.0 - 1.9	6								
2.0 - 2.9	17	3							
3.0 - 3.9	23								2
4.0 - 4.9									
5.0 - 5.9									
6.0 - 6.9					1				7
7.0 - 7.9									13
8.0 - 8.9						4			10
9.0 - 9.9						3			28
10.0 - 10.9						8			23
11.0 - 11.9						1			5
12.0 - 12.9									1
13.0 - 13.9				1	1	1			1
14.0 - 14.9					1	2			1
15.0 - 15.9				1	1				3
16.0 - 16.9						3			5
17.0 - 17.9			1				1		
18.0 - 18.9						3			
19.0 - 19.9			1			3			
20.0 - 20.9						1			
21.0 - 21.9							1	1	
22.0 - 22.9							2		
23.0 - 23.9							1		
24.0 - 24.9									
25.0 - 25.9									
26.0 - 26.9									
27.0 - 27.9									
28.0 - 28.9									
29.0 - 29.9									
30.0 - 30.9									
31.0 - 31.9									
32.0 - 32.9									
33.0 - 33.9									
34.0 - 34.9									
35.0 - 35.9									
36.0 - 36.9									
Unmeasured	152								
TOTALS	198	3	2	2	4	29	5	1	99

TABLE D-3.2-2 (Con't)

Total Length in Inches	Yellow bullhead	Burbot	Brook silver-side	White bass	Rock bass	Green sunfish	Bluegill	Small-mouth bass	Large-mouth bass
0.0 - 0.9							4		
1.0 - 1.9							33		
2.0 - 2.9					1		3	45	2
3.0 - 3.9							4	118	3
4.0 - 4.9				1	2		6	33	
5.0 - 5.9					2	1	1	1	
6.0 - 6.9					3		2	14	
7.0 - 7.9		1					1	18	
8.0 - 8.9	1	1		1	1			2	
9.0 - 9.9				1				17	1
10.0 - 10.9		1						13	
11.0 - 11.9								2	1
12.0 - 12.9									3
13.0 - 13.9		2							
14.0 - 14.9									
15.0 - 15.9									
16.0 - 16.9									
17.0 - 17.9									1
18.0 - 18.9									
19.0 - 19.9									
20.0 - 20.9									
21.0 - 21.9									
22.0 - 22.9									
23.0 - 23.9									
24.0 - 24.9									
25.0 - 25.9									
26.0 - 26.9									
27.0 - 27.9									
28.0 - 28.9									
29.0 - 29.9									
30.0 - 30.9									
31.0 - 31.9									
32.0 - 32.9									
33.0 - 33.9									
34.0 - 34.9									
35.0 - 35.9									
36.0 - 36.9									
Unmeasured			2				1		
TOTALS	1	5	2	3	9	1	55	263	11

TABLE D-3.2-2 (Con't)

Total Length in Inches	White crappie	Black crappie	Western sand-darter	Fantail darter	Johnny darter	Yellow perch	Log perch	Slender-head darter	River darter
0.0 - 0.9									
1.0 - 1.9									
2.0 - 2.9	1	7				8	72		
3.0 - 3.9	1					3	24		
4.0 - 4.9							3		
5.0 - 5.9									
6.0 - 6.9						1			
7.0 - 7.9						1			
8.0 - 8.9						1			
9.0 - 9.9									
10.0 - 10.9		1							
11.0 - 11.9									
12.0 - 12.9									
13.0 - 13.9									
14.0 - 14.9									
15.0 - 15.9									
16.0 - 16.9									
17.0 - 17.9									
18.0 - 18.9									
19.0 - 19.9									
20.0 - 20.9									
21.0 - 21.9									
22.0 - 22.9									
23.0 - 23.9									
24.0 - 24.9									
25.0 - 25.9									
26.0 - 26.9									
27.0 - 27.9									
28.0 - 28.9									
29.0 - 29.9									
30.0 - 30.9									
31.0 - 31.9									
32.0 - 32.9									
33.0 - 33.9									
34.0 - 34.9									
35.0 - 35.9									
36.0 - 36.9									
Unmeasured			1	1	2	1	259	1	1
TOTALS	2	8	1	1	2	15	358	1	1

TABLE D-3.2-2 (Con't)

Total Length in Inches	Sauger	Walleye							
0.0 - 0.9									
1.0 - 1.9									
2.0 - 2.9									
3.0 - 3.9									
4.0 - 4.9									
5.0 - 5.9									
6.0 - 6.9									
7.0 - 7.9									
8.0 - 8.9									
9.0 - 9.9	1								
10.0 - 10.9									
11.0 - 11.9									
12.0 - 12.9		1							
13.0 - 13.9									
14.0 - 14.9									
15.0 - 15.9									
16.0 - 16.9									
17.0 - 17.9	1								
18.0 - 18.9									
19.0 - 19.9									
20.0 - 20.9									
21.0 - 21.9									
22.0 - 22.9									
23.0 - 23.9		1							
24.0 - 24.9									
25.0 - 25.9									
26.0 - 26.9									
27.0 - 27.9									
28.0 - 28.9									
29.0 - 29.9									
30.0 - 30.9									
31.0 - 31.9									
32.0 - 32.9									
33.0 - 33.9									
34.0 - 34.9									
35.0 - 35.9									
36.0 - 36.9									
Unmeasured									
TOTALS	2	2							



## APPENDIX E-3.2

TABLE E-3.2-1

## SHORELINE SEINING STATIONS IN LAKE ST CROIX, 1975

Station No.	Description	Location number used by Krosch (1970)
1	Sampling station 10-B	1
2	Wisconsin side just below Highway 64 at Stillwater (east of samp- ling Station 10-A)	11
3	Sampling Station 1--east of samp- ling Station 1-B	--
4	North of sampling Station 5-A	2
5	Minnesota side north of Hudson railroad bridge	3
6	East of sand island in sampling Station 6	4
7	NE of dredge spoil bank at end of old toll bridge at Hudson	9 & 10
8	Sampling Station 6, south shore of sand island	4
9	Sampling Station 7-B	5
10	Sampling Station 8-A	6
11	Minnesota side about three blocks below discharge canal	--

TABLE E-3.2-2

SUMMARY OF LAKE ST CROIX SHORELINE SEINING  
September 15, 22 and 29, 1975 (11 seine hauls)

Species	Number Caught	% of Catch
Gizzard shad	32	5.7
Mooneye	3	0.5
Northern pike	1	x
Muskellunge	5	0.9
Carp	2	x
Emerald shiner	293	51.9
Spottail shiner	31	5.5
Mimic shiner	6	1.1
Fathead minnow	1	x
Carp sucker spp.	2	x
Silver redhorse	18	3.2
Golden redhorse	5	0.9
Shorthead redhorse	14	2.5
White bass	8	1.4
Bluegill	1	x
Smallmouth bass	36	6.4
Black crappie	1	x
Western sand darter	13	2.3
Johnny darter	1	x
Yellow perch	30	5.3
Log perch	42	7.4
Gilt darter	1	x
River darter	12	2.1
Sauger	2	x
Walleye	4	0.7
Freshwater drum	1	x
Total	565	

x < 0.5%

TABLE E-3.2-3

LENGTH-FREQUENCY DISTRIBUTION OF FISHES  
CAUGHT IN MINNOW SEINES, LAKE ST CROIX,

September 15, 22 and 29, 1975

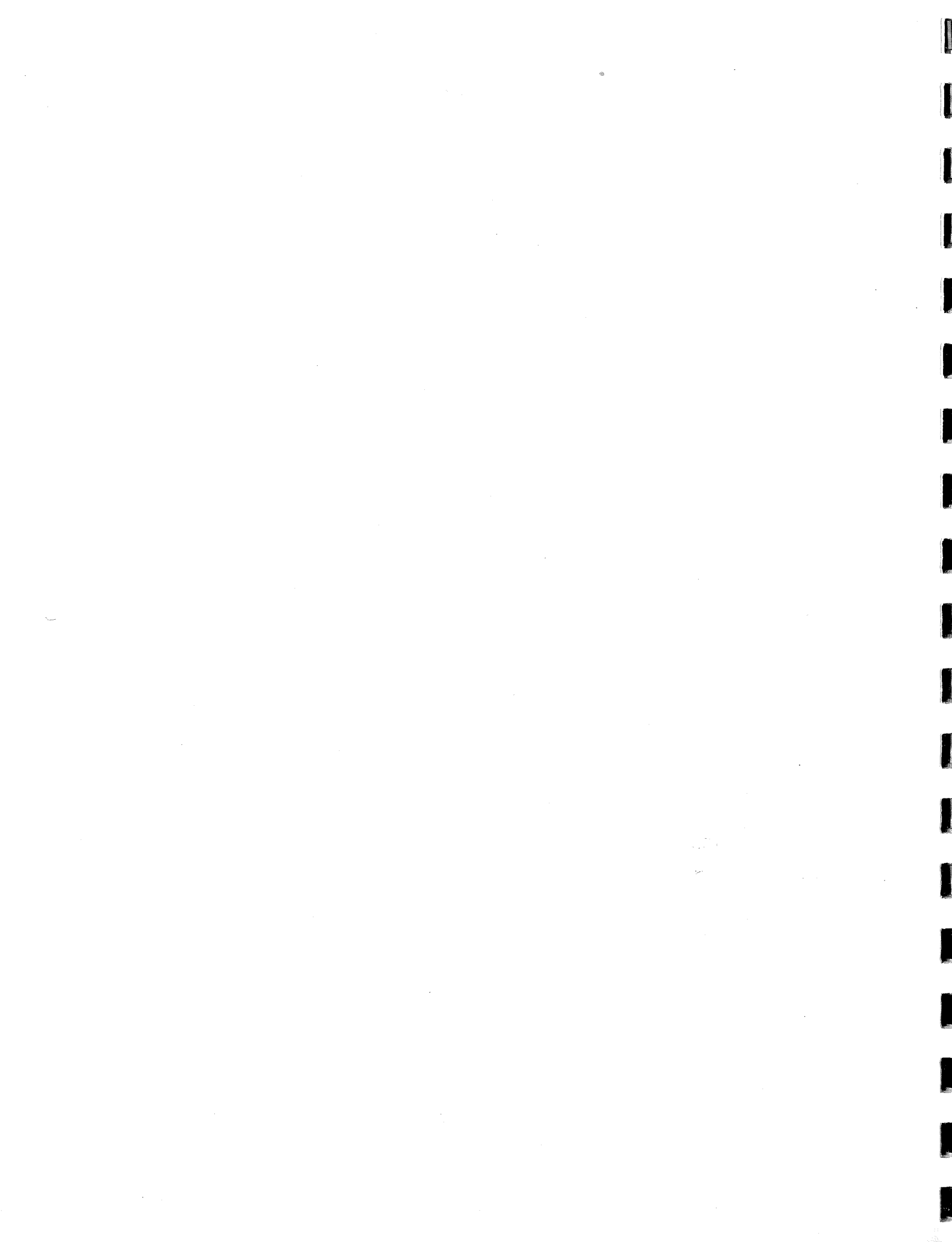
Total Length in Inches	Gizzard shad	Mooneye	Northern pike	Muskel-lunge	Carp	Emerald shiner	Spottail shiner	Mimic shiner	Fathead minnow
0.0 - 0.9									
1.0 - 1.9	1								
2.0 - 2.9									
3.0 - 3.9	1								
4.0 - 4.9									
5.0 - 5.9	1								
6.0 - 6.9	18								
7.0 - 7.9	9								
8.0 - 8.9									
9.0 - 9.9				1					
10.0 - 10.9				1					
11.0 - 11.9	1		1	2					
12.0 - 12.9		2							
13.0 - 13.9	1	1							
14.0 - 14.9									
15.0 - 15.9									
16.0 - 16.9									
17.0 - 17.9									
18.0 - 18.9					2				
19.0 - 19.9									
20.0 - 20.9									
21.0 - 21.9									
22.0 - 22.9									
23.0 - 23.9									
24.0 - 24.9				1					
25.0 - 25.9									
26.0 - 26.9									
27.0 - 27.9									
28.0 - 28.9									
29.0 - 29.9									
30.0 - 30.9									
31.0 - 31.9									
32.0 - 32.9									
33.0 - 33.9									
34.0 - 34.9									
35.0 - 35.9									
36.0 - 36.9									
Unmeasured						293	31	6	1
TOTALS	32	3	1	5	2	293	31	6	1

TABLE E-3.2-3 (Con't)

Total Length in Inches	Carp-sucker	Silver redhorse	Golden redhorse	Short-head redhorse	White bass	Blue-gill	Small-mouth bass	Black Crappie	Western sand-darter
0.0 - 0.9									
1.0 - 1.9						1			
2.0 - 2.9									
3.0 - 3.9							2		
4.0 - 4.9					7		29		
5.0 - 5.9		1		1	1		3		
6.0 - 6.9		2		1					
7.0 - 7.9				1			1		
8.0 - 8.9		1	1				1	1	
9.0 - 9.9		1	1	3					
10.0 - 10.9		1		3					
11.0 - 11.9		1		2					
12.0 - 12.9									
13.0 - 13.9			1						
14.0 - 14.9		1	1	2					
15.0 - 15.9	1	1							
16.0 - 16.9		3	1	1					
17.0 - 17.9		1							
18.0 - 18.9	1	1							
19.0 - 19.9		2							
20.0 - 20.9		2							
21.0 - 21.9									
22.0 - 22.9									
23.0 - 23.9									
24.0 - 24.9									
25.0 - 25.9									
26.0 - 26.9									
27.0 - 27.9									
28.0 - 28.9									
29.0 - 29.9									
30.0 - 30.9									
31.0 - 31.9									
32.0 - 32.9									
33.0 - 33.9									
34.0 - 34.9									
35.0 - 35.9									
36.0 - 36.9									
Unmeasured									13
<b>TOTALS</b>	<b>2</b>	<b>18</b>	<b>5</b>	<b>14</b>	<b>8</b>	<b>1</b>	<b>36</b>	<b>1</b>	<b>13</b>

TABLE E-3.2-3 (Con't)

Total Length in Inches	Johnny darter	Yellow perch	Log-perch	Gilt darter	River darter	Sauger	Walleye	Drum	
0.0 - 0.9									
1.0 - 1.9									
2.0 - 2.9		1	11						
3.0 - 3.9		9	2						
4.0 - 4.9		3							
5.0 - 5.9		15				2	3		
6.0 - 6.9		1					1		
7.0 - 7.9		1							
8.0 - 8.9									
9.0 - 9.9									
10.0 - 10.9									
11.0 - 11.9								1	
12.0 - 12.9									
13.0 - 13.9									
14.0 - 14.9									
15.0 - 15.9									
16.0 - 16.9									
17.0 - 17.9									
18.0 - 18.9									
19.0 - 19.9									
20.0 - 20.9									
21.0 - 21.9									
22.0 - 22.9									
23.0 - 23.9									
24.0 - 24.9									
25.0 - 25.9									
26.0 - 26.9									
27.0 - 27.9									
28.0 - 28.9									
29.0 - 29.9									
30.0 - 30.9									
31.0 - 31.9									
32.0 - 32.9									
33.0 - 33.9									
34.0 - 34.9									
35.0 - 35.9									
36.0 - 36.9									
Unmeasured	1		29	1	12				
TOTALS	1	30	42	1	12	2	4	1	



APPENDIX F-3.2

TABLE F-3.2-1

ABUNDANCE INDICES (Ab) FROM LAKE ST CROIX  
Trap net and Gill net Catches 1966-1975

Year	<u>Trap net Catches</u>			<u>Gill net Catches</u>			<u>Combined Trap nets &amp; Gill net Catches</u>		
	Obs.*	Expec.*	Ab	Obs.	Expec.	Ab	Obs.	Expec.	Ab
1966	2593	1853.00	1.40	--	--	--	2593	1853.00	1.40
1967	1920	2786.67	0.69	605	936.88	0.65	2525	3723.55	0.68
1968	2265	2962.50	0.76	134	255.59	0.52	2399	3218.09	0.75
1969	4222	3016.50	1.40	898	1022.38	0.88	5120	4038.88	1.27
1970	3952	2962.50	1.33	1455	979.78	1.49	5407	3942.28	1.37
1971	3441	2995.84	1.15	1594	1874.36	0.85	5035	4870.20	1.03
1973	1146	2420.48	0.47	1018	851.98	1.19	2164	3272.46	0.66
1975	1636	1845.12	0.89	1994	1931.49	1.09	3630	3676.88	0.99
Total	21175	20788.61	1.02	7968	7752.46	0.99	28873	28595.34	1.01

\*Obs. = Observed Catch

\*Expec. = Expected Catch

3.2-69

TABLE F-3.2-2

ABUNDANCE INDICES (Ab) OF SEVERAL SPECIES GROUPS IN LAKE ST CROIX  
From Combined Trap net and Gill net Catches, 1967-1975

Year	<u>Game fish</u>			<u>Pan fish</u>			<u>Large rough fish</u>			<u>Other fish</u>		
	Obs.*	Expec.*	Ab	Obs.	Expec.	Ab	Obs.	Expec.	Ab	Obs.	Expec.	Ab
1966	268	276.00	0.97	938	797.00	1.18	1387	713.00	1.95	0	67.00	0
1967	345	712.63	0.48	1304	1431.56	0.91	662	1123.44	0.59	214	455.92	0.47
1968	292	537.36	0.54	1069	1394.75	0.77	951	1088.10	0.87	87	197.88	0.44
1969	545	907.44	0.60	2972	1443.52	2.06	1130	1197.90	0.94	473	490.02	0.97
1970	2015	886.38	2.27	1307	1441.31	0.91	1097	1140.80	0.94	988	473.79	2.09
1971	1332	1321.40	1.00	1232	1520.48	0.81	1637	1213.03	1.35	834	815.29	1.02
1973	985	747.92	1.32	698	1186.34	0.59	277	931.86	0.30	204	406.34	0.50
1975	895	1140.76	0.78	850	979.53	0.87	1015	796.39	1.27	870	760.20	1.14
Total	6677	6529.89	1.10	10370	10194.49	1.02	8156	8204.52	0.99	3670	3666.44	1.00

\*Obs. = Observed Catch

\*Expec. = Expected Catch



TABLE F-3.2-3

EQUATIONS OF THE LINES AND CORRELATION COEFFICIENTS  
For the Abundance Index Calculations

Item	Correlation Coefficient	Gear*	Equation of Line
All fish	0.53	G	$y' = -3.90 + 0.07(x)$
Other fish	0.43	G & T	$y' = -5.48 + 0.09(x)$
Game fish	0.36	G & T	$y' = -3.87 + 0.07(x)$
Sportfish	0.27	G & T	$y' = 3.81 + 0.04(x)$
Large rough fish	-0.20	G & T	$y' = 3.03 - 0.03(x)$
All fish	-0.25	G & T	$y' = 2.42 - 0.02(x)$
All fish	-0.33	T	$y' = 3.81 - 0.04(x)$

\*G (gill net) based on 7 years' data. G & T (gill net and trap net) and T (trap net) based on 8 years' data.

