LAKE MAXINKUCKEE

Marshall County

2007 Fish Management Report

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EXECUTIVE SUMMARY

- Lake Maxinkuckee is a 1,864 acre natural lake located in Marshall County in North West Indiana. It is the second largest natural lake in the state.

- The current fishery survey was conducted on June 19 through 25, 2007, as part of DFW Work Plan 204755 that covers management of fish populations in natural lakes.

- Sufficient dissolved oxygen for warm water fish (>5.0 ppm) was present to a depth of 50 ft. Submersed vegetation was found to a depth of 24.0 ft. Fourteen types of submersed plants were identified including Chara sp. which was the most abundant submersed plant recorded. Chara was present at 43 of the 100 points sampled.

- We collected 427 fish representing 22 species. Total weight of the sample was 346.4 lbs. Twelve species (including one hybrid) were found in the previous four general surveys that were not recorded in the present survey. Relative abundance of the major species by number was: rock bass (19.7%), bluegill (18.7%), smallmouth bass (10.3%), largemouth bass (10.1%), walleye (8.2%), and yellow perch (8.0%).

- Relative abundance of the major species by weight was: spotted gar (21.4%), smallmouth bass (15.4%), largemouth bass (10.7%), rock bass (7.6%), walleye (7.4%), channel catfish (7.1%), and bluegill (6.1%).

- Lake Maxinkuckee is currently offering excellent angling opportunities to area fishermen. Major sport fish made up an impressive 55.4% and 56.2 % of the collection by number and weight respectively. Good numbers of harvestable size rock bass, bluegill, smallmouth bass, largemouth bass, walleye, and yellow perch are available to anglers with many quality size fish from each of these species present.

- The DFW's walleye stocking program remains successful, with walleye currently ranking fourth in relative abundance by number.

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INTRODUCTION

Lake Maxinkuckee is a 1,864 acre natural lake located in Marshall County in Northwest Indiana. It is the second largest natural lake in the state. The lake is a glacial kettle formed by the Wisconsin glaciation, and considered to be one of the few oligotrophic lakes in the state. It has a maximum depth of 88 feet and a mean depth of 24 feet. The town of Culver lies on the northwest shore and the nationally recognized Culver Military Academy lies on the northeast shore.

The Indiana Department of Natural Resources (IDNR) maintains a public access site (PAS) on the southwest shore. A public park maintained by the Culver Park Department is located on the north shore. The park includes a beach, picnic areas, fishing pier, playground, and boat piers. The park is the site of the Culver Lake Fest, held each July.

Lake Maxinkuckee and the surrounding area were once home to Potawatomi and Miami-Illinois Native Americans. The early French explorers, who passed through the area on their travels between the St. Joseph River and the Tippecanoe River, referred to the lake as "Le Grand Lac" (The Big Lake). In the 1835 survey report for the Michigan Road, the lake is called "Meksinkakeek", from the Algonquin meaning "rocky".

Lake Maxinkuckee occupies a unique position in fishery history. A survey of the flora and fauna of the lake and its surroundings was conducted from 1899-1913. The survey spanned a fourteen year period and was sponsored by the US Commission of Fish and Fisheries. In 1920 the Indiana Department of Conservation published the results of that survey as "Lake Maxinkuckee a Physical and Biological Survey", in a two volume set of books authored by the survey's chief scientists Barton W. Everman and Howard W. Clark (Everman and Clark 1920). Another notable participant in this survey was Chancey Juday, who at that time, was a high school biology teacher in Evansville. Juday later became an internationally known limnologist who taught at Indiana University.

The Indiana Division of Fish and Wildlife (DFW) has conducted numerous fishery studies at Lake Maxinkuckee including five general fishery surveys (Table 1, Table 2) beginning in 1965 (Turner, 1966). Additional general fishery surveys were conducted in 1975, 1983, and 1995 (Robertson, 1976; Robertson, 1984; and Cwalinski, 1997). Nine fish harvest surveys were also conducted between 1985 and 2000 including two winter harvest surveys.

Although some walleye stocking occurred at Maxinkuckee during the late 1800's and early 1900's, the DFW started its present walleye stocking program in 1980 (Table 3). Fry were stocked at the rate of approximately 3,000 per acre for 10 years, until poor survival indicated a need to switch to fingerling stockings. In 1991, June fingerling stocking at approximately 100 fish per acre began. Electrofishing was conducted each fall between 1980 and 2000 (with the exception of 1993 and 1994) to evaluate the success of the spring stocking by collecting young of the year (yoy) walleye (Figure 1). A 14" minimum size limit was imposed on walleye in 1996. Eight fall samples conducted between 1991 and 2000 averaged 14.3 yoy/hr, nearly twice the 7.0 yoy/ hr considered to represent stocking successful.

The Lake Maxinkuckee Property Owners Association (POA) has been a well supported organization that has contributed much to maintaining the lakes excellent water quality. In 1983 the Lake Maxinkuckee Environmental Council (LMEC) was formed to assist the POA in their lake management efforts. The DFW's Lake and River Enhancement Program (LARE) has worked cooperatively with these local organizations to help maintain and improve water quality in Lake Maxinkuckee.

The 1995 survey collected 621 fish weighing 321.2 lbs (Cwalinski, 1997). Twenty-five species were represented in the sample. Largemouth bass were the most numerous fish collected accounting for 23% and 13% of the sample by number and weight respectively. Bluegills were the second most abundant fish collected by number (17%), followed by brook silversides (15%), and walleye (13%). Zebra mussels were found in Lake Maxinkuckee in the mid-1990's.

METHODS

The current fishery survey was conducted on June 19 through 25 2007, as part of DFW Work Plan 204755 that covers management of fish populations in natural lakes. Some physical and chemical characteristics of the water were measured in the deepest area of the lake (DFW Guidelines 2001). Submersed aquatic vegetation was sampled at 100 locations on two dates; August 13 and 15, 2007 using guidelines written by Pearson (2004). A global positioning system (GPS) device was used to record the location of the limnological data collection site, aquatic vegetation sample sites, and fish collection sites.

Fish were collected by pulsed D.C. electrofishing the shoreline at night with two dippers for 2.25 h. Six trap nets and 12 experimental-mesh gill nets were also used to collect fish over

two consecutive days. All fish collected were measured to the nearest 0.1 in TL. Average weights for fish by half-inch groups for Fish Management District 1 were used to estimate the weight of fish collected in the sample. Fish scale samples were taken from selected species for age and growth analysis. Proportional stock density (PSD) was calculated for bluegills, smallmouth bass and largemouth bass (Anderson and Neumann 1996).

RESULTS

The Secchi disk was 5.0 ft. on 6/19 when water chemistry was taken (N 41.20963, W 86.40334). Sufficient dissolved oxygen for warm water fish (>5.0 ppm) was present to a depth of 50 ft. Due to the volume and depth of Lake Maxinkuckee, the lack of an established thermocline (layer of water where temperature declines 1°C / meter) was evident from the depth/dissolved oxygen profile. Submersed vegetation was found to a depth of 24.0 ft. Fourteen types of submersed plants were identified including chara which was the most abundant submersed plant recorded. Chara was present at 43 of the 100 points sampled. Eel grass, southern naiad, and spiny naiad were nearly as abundant as chara. Eurasian water milfoil (EWM) was found at 13 of the sample sites.

We collected 427 fish representing 22 species. Total weight of the sample was 346.4 lbs. Twelve species (including one hybrid) were found in the previous four general surveys that were not recorded in the present survey. Relative abundance of the major species by number was: rock bass (20%), bluegill (19%), smallmouth bass (10%), largemouth bass (10%), walleye (8%), and yellow perch (8%). Relative abundance of the major species by weight was: spotted gar (21%), smallmouth bass (15%), largemouth bass (11%), rock bass (8%), walleye (7%), channel catfish (7%), and bluegill (6%).

Rock bass were the most abundant fish collected in the present survey accounting for nearly 20% of the collection by number and 8% of the total weight. We collected 84 rock bass ranging in length from 2.6 to 11.1 in TL. Although some rock bass were collected in gillnets (3.2/hr) and fish traps (0.5/hr), most were collected, at the rate of 19.1/hr, electrofishing. Age 1 through 7 fish were identified. Accurate ages could not be determined for seven fish > 10.0 in TL due to scale regeneration. Thirty-four fish (41%) were 8.0 in or larger. Rock bass reached 7.0 inches long (quality size) by age 4.

Bluegills were the second most abundant fish in the collection (19%) and ranked seventh (6%) by weight. Eighty bluegills were collected ranging in length from 2.2 to 9.2 in. Fifty of these fish were 6.0 in or larger TL (63%). More than a third of the bluegills collected (34%) were 8.0 in or larger. Age 1 through 6 fish were present in the sample. Bluegill 6.0 in long were identified as age 3 and 4. Mean TL for age for age 5 bluegills was 8.3 in. Bluegills were collected at the rate of 21.0/hr electrofishing and 2.6/ gill-net lift. None were collected in fish traps. Bluegill PSD was 53. Bluegill PSD in a balanced population should be 20 to 40. A PSD of 53 indicates the population is composed of more large fish than considered normal.

Smallmouth bass were the third most abundant fish collected comprising 10% and 15% of the sample by number and weight respectively. The 41 smallmouth collected ranged from 1.8 to 18.4 in TL. Smallmouth were collected at the rate of 3.1/hr from electrofishing, 2.9/ gillnet lift, and 0.3/ lift from trap nets. Age 0 through 5 fish were identified. Nearly a third of the smallmouth collected (32%) were legal size fish (14 in or larger). Some age 4 fish had reached legal size. Growth was considered good with mean length of age 4 at 13.6 in. Smallmouth PSD was 60. Ideally, smallmouth PSD should range from 30 to 60, indicating the smallmouth population of this lake consists of more large fish than expected.

The fourth most abundant fish collected by number was largemouth bass. We collected 43 largemouth bass that accounted for 10% and 11% of the sample's number and weight, respectively. These fish ranged in length from 1.9 to 15.8 in in length. Largemouth bass were collected at the rate of 14.7/hr electrofishing and 0.8/gillnet lift. None were collected in fish traps. Age 0, and 2 through 5 fish were observed in the catch. No age 1 fish from the 2006 year class were collected. Some age 4 fish were as large as 14.5 in long. Mean length of age 4 fish was 12.8 in.

We collected 35 walleye estimated to weigh 25.5 lbs. Walleye collected ranged from 3.4 to 20.5 in TL. Age 0 through 5 fish were identified in the collection. Nearly one-third (31%) of the walleye were harvestable size (14.0 in or larger). Growth appears to be excellent with some walleye reaching legal size at age 2. Mean length at age 2 was 13.8 in. Walleye were collected at the rate of 5.8/hr of electrofishing and 1.8/gill-net lift. None were collected in the traps.

Yellow perch were also found at Lake Maxinkuckee. Perch made up 8% and 2% of the sample by number and weight, respectively. Perch ranged in length from 2.7 to 12.3 in TL. Age

1 through 6 fish were present, with fish reaching 8.0 in (preferred size) at age 4. Mean length of age 4 perch was 8.2 in. Over 41% of the perch collected were 8 in or larger.

Other sport fish collected included four channel catfish ranging from 21.0 to 35.0 in TL, and one, 16.1 in white bass.

DISCUSSION

Water quality in Lake Maxinkuckee remains good, with sufficient dissolved oxygen for its fish population to a depth of at least 50 ft at the time of this survey. Our August 2007, plant survey found the plant community dominated by chara, eel grass, southern naiad and spiny naiad, with some EWM found at 13 out of the 100 sites sampled. The LARE funded "Lake Maxinkuckee Aquatic Plant Management Plan Update, 2006", found spiny naiad was the dominant submersed plant in the lake in 2006 (V3, 2007). The V3 survey also reported their August 2006 survey had found that the approximately nine acres of EWM found in the southeast portion of the lake in early 2006 had been nearly eliminated by chemical treatments. V3 also found only a few scattered EWM plants in their August 2007 surveys. Also mentioned in the V3 report was the apparent loss of a number of emergent and floating plant beds that were present in earlier plant surveys conducted in 1991 and 1999.

Lake Maxinkuckee is currently offering excellent angling opportunities to area fishermen. Major sport fish made up an impressive 55% and 56 % of the collection by number and weight, respectively. Good numbers of harvestable size rock bass, bluegill, smallmouth bass, largemouth bass, walleye, and yellow perch are available to anglers with many quality size fish from each of these species present. Brown bullhead, channel catfish, yellow bullhead, white bass, pumpkinseed, and warmouth were also present. The biggest obstacle to this fine fishery is the limited parking available at the DFW's PAS. The need to improve public access to Lake Maxinkuckee has been the most often voiced angler concern for many years (Robertson, 1987).

The DFW's walleye stocking program remains successful, with walleye currently ranking fourth in relative abundance by number. DFW walleye research projects have monitored the development of this important fishery (Shipman, 1993; Cwalinski, 2001). Although harvest surveys have not been conducted since the winter of 2004, walleye harvest from April through September surveys conducted in 1996 and 1999 averaged an impressive 2,275 fish. Eight fall electrofishing samples for walleye conducted between 1991, and 2000 averaged 14.3 yoy/hr, nearly twice the target of 7.0 yoy/ hr representive of a successful stocking. Only in one sample

(fall 1997) were fewer than 7 yoy/hr collected, indicating less than desirable survival of walleye fingerlings stocked in June (Figure 1). Poor survival of the 1997 stocking may have been due to the size of the fingerlings. The 1997 walleye averaged only 0.9 in TL at the time of stocking, considerably smaller than usual.

Eleven species that were present in at least one of the previous four surveys were not collected during the 2007 survey. Five of these species were collected only in 1965, possibly because of wire fish traps only used in the 1965 survey. Therefore, the change in sampling gear between 1965 and 2007 could account for the absence of some of these species.

Between 1983 and 1995, there was a noticeable decline in the abundance of yellow perch. This decline corresponded to the introduction of walleye in 1980. On average, yellow perch accounted for 73% of the total catch during two surveys conducted prior to the beginning of the walleye stocking program. The average number of yellow perch collected in the three post-stocking surveys represented only 7% of the total catch. Despite a decline in overall abundance since the introduction of walleye, harvestable-sized yellow perch continue to be available in good numbers for anglers to target.

RECOMMENDATIONS

- The present chemical program to control EWM should continue to prevent this exotic and invasive plant from spreading.

- Efforts should continue to find a way to provide additional public access.

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Table 1. Relative abundance of species by number and weight (lbs) collected at Lake Maxinkuckee from 1965 to 2007. Blank spaces indicate species was not collected during corresponding year.

	2007				1995				1983				1975				1965	
Species	No.	%	Wt.	%	No.	%	Wt.	%	No.	%	Wt.	%	No.	%	Wt.	%	No.	%
Rock bass	84	19.7	26.3	7.6	12	1.9	2.29	0.7	12	2.5	4.2	0.8	26	2.8	10.9	1.3	195	13.0
Bluegill	80	18.7	21.1	6.1	106	16.8	11.46	3.6	42	8.7	8.4	1.7	27	2.9	9.4	1.1	188	12.5
Smallmouth bass	44	10.3	53.2	15.4	38	6	26.41	8.2	32	6.6	31.3	6.1	18	1.9	20.0	2.4	10	0.7
Largemouth bass	43	10.1	37.2	10.7	145	22.9	40.74	12.7	77	15.9	62.8	12.3	26	2.8	27.2	3.3	65	4.3
Walleye	35	8.2	25.5	7.4	82	13	61.10	19.0	65	13.4	74.0	14.5	2	< 1.0	7.6	< 1.0	2	0.1
Yellow perch	34	8.0	6.2	1.8	18	2.8	1.95	0.6	50	10.3	8.0	1.6	405	43.1	51.4	6.2	451	30.1
Spotted gar	26	6.1	74.2	21.4	4	0.6	4.57	1.4	5	1.0	10.2	2.0	14	1.5	35.8	4.3	8	0.5
Logperch	14	3.3	0.3	0.1	6	0.9	0.05	<0.1										
Brook silverside	12	2.8	0.2	0.1	95	15	0.19	0.1					32	3.4	0.3	< 0.1	1	< 0.1
Gizzard shad	11	2.6	18.1	5.2	24	3.8	26.41	8.2	16	3.3	18.1	3.5	95	10.1	84.6	10.1	75	5.0
Brown bullhead	10	2.3	8.2	2.4	3	0.5	3.34	1.0	7	1.4	9.0	1.8	4	< 1.0	3.3	< 1.0		
Bowfin	8	1.9	23.4	6.8	5	0.8	8.65	2.7	10	2.1	18.8	3.7	1	< 1.0	2.4	< 1.0	3	0.2
Shortnose gar	8	1.9	6.8	2.0														
Common carp	5	1.2	12.0	3.5	13	2.1	47.46	14.8	4	0.8	9.0	1.8	9	< 1.0	48.4	5.8	34	2.3
Channel catfish	4	0.9	24.7	7.1	1	0.2	4.52	1.4	16	3.3	45.2	8.8	10	1.1	20.9	2.5	1	< 0.1
Yellow bullhead	3	0.7	5.4	1.6	3	0.5	2.71	0.8	3	0.6	2.4	0.5	1	< 1.0	0.4	< 1.0	7	0.5
White bass	1	0.2	2.1	0.6					17	3.5	22.7	4.4	49	5.2	48.5	5.8	117	7.8
White sucker	1	0.2	0.5	0.1	3	0.5	4.54	1.4	5	1.0	11.0	2.2	48	5.1	82.3	9.9	60	4.0
Pumpkinseed	1	0.2	0.5	0.1	6	0.9	1.28	0.4	14	2.9	2.9	5.6					12	0.8
Warmouth	1	0.2	0.4	0.1	10	1.6	4.15	1.3	10	2.1	3.1	0.6	3	< 1.0	1.0	< 1.0	8	0.5
Golden shiner	1	0.2	0.1	< 0.1	1	0.2	0.01	<0.1									3	0.2
Spotfin shiner	1	0.2	0.0	< 0.1														
Longnose gar					17	2.7	48.00	14.9	33	6.8	108.1	21.1	115	12.2	332.5	39.8	160	10.7
Spotted sucker					3	0.5	3.12	1.0	27	5.6	54.5	10.6	31	3.3	41.3	4.9	13	0.9
Black crappie					11	1.7	2.55	0.8	40	8.3	8.4	1.6	3	< 1.0	2.2	< 1.0	23	1.5
Lake chubsucker					2	0.3	0.17	0.1					11	1.2	3.6	< 1.0	5	0.3
Longear sunfish					3	0.5	0.25	0.1					6	< 1.0	1.0	< 1.0	43	2.9
Emerald shiner					20	3.2	0.19	0.1										
Black bullhead																	10	0.7
Grass pickerel																	2	0.1
Northern hogsucker																	1	< 0.1
Green sunfish																	1	< 0.1
Central mudminnow																	1	< 0.1
Hybrid sunfish					1	0.2	0.02	< 0.1										
TOTAL	427		346.4		632		321.2		485		512.1		936		835.0		1,499	

Table 2. Sampling effort, by gear type, on Lake Maxinkuckee from 1965 to 2007. (GN – gillnet, TN – trapnet, WT-wire trap = effort in net-nights; EF – electrofishing = effort in hours.)

	2007			1995			1983			1975			1965		
Gear type	GN	TN	EF	GN	TN	EF	GN	TN	EF	GN	TN	EF	GN	WT	EF
Effort	12	6	2.25	16	16	3	16	16	30	24		3.0	13	140	11.5

Table 3. Walleye stocking, young-of-the-year collections, and walleye harvest at Lake Maxinkuckee 1980 – 2008.

Year	Egg source	Average length (in)	Number stocked	Number / ac	YOY CPH	Harvest
1980	-	0.4	5,600,000	3,020	4.0	
1982	-	0.4	5,600,000	3,020	0.3	
1983	-	0.4	5,000,000	2,697	0	
1984	-	0.4	5,100,000	2,751	0	
1985	-	0.4	5,700,000	3,074	0	2,055
1986	-	0.4	5,560,000	2,999	1.0	
1987	NY & MI	0.4	2,630,000	1,419	6.2	
1988	NY	0.4	6,222,800	3,356	10.0	1,441
1989	PA	0.4	6,193,425	3,341	0.9	1,457
1990	PA	0.4	5,447,300	2,938	0.8	849
1991	MI	1.9	166,634	90	22.5	631
1992	IN	1.6	187,517	101	10.4	
1993	IN	1.6	184,490	100	-	
1994	IN	1.6	185,347	100	-	
1995	IN	1.6	182,794	99	11.0	
1996	IN	1.1	187,055	101	10.3	
1997	IN	0.9	278,960	150	4.4	3,198
1998	IN	1.5	282,770	151	31.0	
1999	IN	1.5	247,660	133	12.9	1,352
2000	IN	1.5	184,120	99	12.0	
2001	IN	1.5	186,100	100	-	
2002	IN	1.1	192,265	103	-	
2003	IN	1.1	192,228	103	-	
2004	IN	1.5	201,512	108	-	
2005	IN	1.7	39,500	21	-	
2006	IN	1.4	186,168	100	-	
2007	IN	1.2	189,235	102	-	
2008	IN	1.3	110,392	59	-	

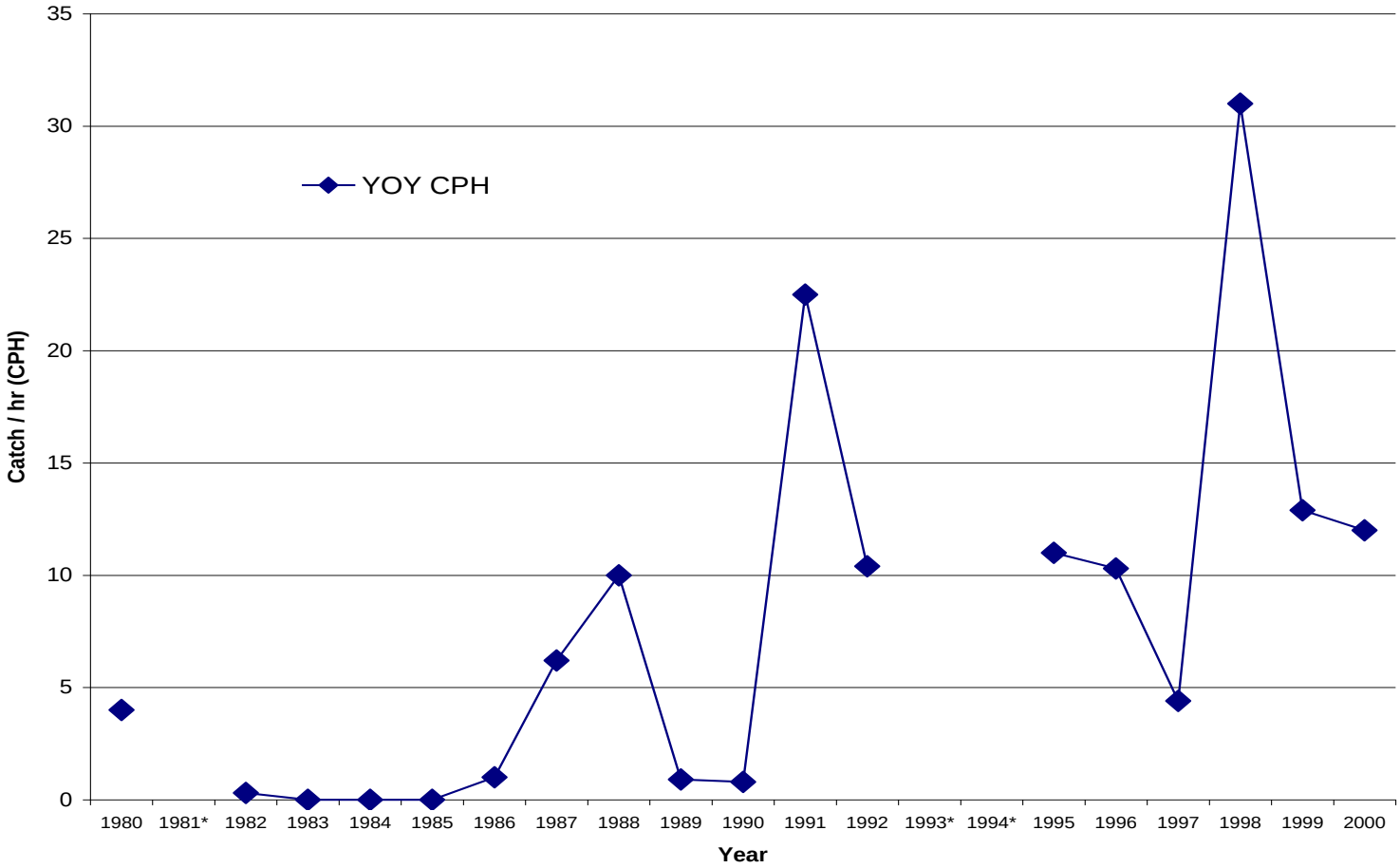

Figure 1. Catch per hour (CPH) of young-of-the-year (YOY) walleye at Lake Maxinkuckee 1980-2000. "*" indicates no sampling conducted during that year.

APPENDIX I

Results of Standard Fishery Survey

LAKE SURVEY REPORT

Type of Survey: [ ] Initial Survey [x] Re-Survey

Lake Name	County	Date of survey (Month, day, year)
Lake Maxinkuckee	Marshall	6/19-25/2007
Biologist's name		Date of approval (Month, day, year)
Robert N. Robertson & Christopher C. Long		

LOCATION		
Quadrangle Name	Range	Section
Culver	32N, 1E	15, 16, 21, 22, 27, 28, 33, 34
Township Name	Nearest Town	
	Culver	

ACCESSIBILITY					
State owned public access site			Privately owned public access site		Other access site
West shore			Marina (SE shore)		Culver Military Academy
Surface acres	Maximum depth	Average depth	Acre feet	Water level	Extreme fluctuations
1,864	88 ft	24.5	45,600	733.12	1.0 ft
Location of benchmark					
At outlet on West shore					

INLETS		
Name	Location	Origin
Wilson Ditch	Northeast shore	
Curtis Ditch	East shore	
Kline Ditch	Southeast shore	

OUTLETS	
Name	Location
Lost Lake Ditch	West shore
Water level control	

POOL	ELEVATION (Feet MSL)	ACRES
TOP OF DAM	733.12	
TOP OF FLOOD CONTROL POOL		
TOP OF CONSERVATION POOL		
TOP OF MINIMUM POOL		
STREAMBED		

Bottom type

[ ]	Bolder
[x]	Gravel
[x]	Sand
[ ]	Muck
[ ]	Clay
[ ]	Marl

Watershed use

Resident, agriculture, three golf courses.

Development of shoreline

Nearly all of the shoreline is developed. Culver Military Academy on the Northeast shore and a city park on the North shore.

Previous surveys and investigations

General fisheries surveys: 1965, 1975, 1983, 1995. **Creel surveys:** 1985, 1985(ice), 1988, 1989, 1990, 1991, 1996, 1999, 2004(ice). **Walleye (fall EF):** 1980, 1982, 1983, 1984, 1985, 1986, 1987, 1988, 1989, 1990, 1991, 1992, 1995, 1996, 1997, 1998, 1999, 2002.

Walleye Reports: 1980, 1983, 1985, 1992, 1996, 1997, 1998, 1999, 2002.

SAMPLING EFFORT					
ELECTROFISHING	Day hours		Night hours 2.25		Total hours 2.25
TRAP NETS	Number of traps 6		Number of Lifts 1		Total effort 6
GILL NETS	Number of nets 12		Number of Lifts 1		Total effort 12
ROTENONE	Gallons	ppm	Acre Feet Treated	SHORELINE SEINING	Number of 100 Foot Seine Hauls

PHYSICAL AND CHEMICAL CHARACTERISTICS			
Color: Clear / Green		Turbidity: 5 Feet 0 Inches (SECCHI DISK)	
Alkalinity (ppm)* Surface:	Bottom:	pH Surface: 9.5	Bottom: 9.5
Conductivity: 422 microsiemens		Air temperature: 80 °F	
Water chemistry GPS coordinates: N 41.20963		W 86.40334	

TEMPERATURE AND DISSOLVED OXYGEN (D.O.)								
DEPTH (FEET)	Degrees (°F)	D.O. (ppm)	DEPTH (FEET)	DEGREES (°F)	D.O. (ppm)	DEPTH (FEET)	DEGREES (°F)	D.O. (ppm)
SURFACE	79.8	4.5	36	53.9	5.3	72		
2	79.8	6.3	38	53.6	5.3	74		
4	79.7	6.1	40	53.3	5.4	76		
6	79.7	5.9	42	52.2	5.8	78		
8	79.6	5.9	44	51.3	6.1	80		
10	79.5	5.9	46	51.7	6.1	82		
12	79.4	5.8	48	51.3	6.1	84		
14	79.2	5.6	50	51.2	5.6	86		
16	78.6	5.6	52	49.8	3.3	88		
18	73.5	6.1	54			90		
20	73.0	6.2	56			92		
22	72.6	6.3	58			94		
24	69.6	5.8	60			96		
26	67.5	5.6	62			98		
28	63.6	5.7	64			100		
30	61.1	5.9	66					
32	56.5	5.8	68					
34	54.4	5.3	70					

COMMENTS
TDS = 739

*ppm-parts per million

Occurrence and Abundance of Submersed Aquatic Plants - Overall

Lake:	Maxinkuckee	**Secchi (ft):**	7	**SE Mean Species / Site:**	0.14
Date:	8/13 & 15/07	**Littoral Sites w/Plants:**	87	**Mean Natives / Site:**	2.00
Littoral Depth (ft):	24.0	**Number of Species:**	13	**SE Mean Natives / Site:**	0.14
Littoral Sites:	100	**Max. Species / Site:**	5	**Species Diversity:**	0.86
Total Sites:	100	**Mean Species / Site:**	2.13	**Native Diversity:**	0.85

	Frequency of	Score Frequency				
Species	**Occurrence**	**0**	**1**	**3**	**5**	**Dominance**
Chara	43	57	43	0	0	8.6
Southern Naiad	42	58	40	1	1	9.6
Eel grass	32	68	32	0	0	6.4
Spiny Naiad	26	74	24	1	1	6.4
Richardson's Pondweed	17	83	17	0	0	3.4
Nitella	13	87	11	2	0	3.4
Sago Pondweed	13	87	9	2	2	5.0
Eurasian watermilfoil	13	87	11	2	0	3.4
Illinois Pondweed	5	95	5	0	0	1.0
Flatstem Pondweed	3	97	3	0	0	0.6
Coontail	3	97	3	0	0	0.6
Leafy Pondweed	2	98	2	0	0	0.4
Water Stargrass	1	99	1	0	0	0.2
Filamentous Algae	6					

Other species noted: Cattail

SPECIES AND RELATIVE ABUNDANCE OF FISHES COLLECTED BY NUMBER AND WEIGHT					
*COMMON NAME OF FISH	NUMBER	PERCENT	LENGTH RANGE (inches)	WEIGHT (pounds)	PERCENT
Rock bass	84	19.7	2.6 - 11.1	26.26	7.6
Bluegill	80	18.7	2.2 - 9.2	21.13	6.1
Smallmouth bass	44	10.3	1.8 - 18.4	53.22	15.4
Largemouth bass	43	10.1	1.9 - 15.8	37.24	10.7
Walleye	35	8.2	3.4 - 20.5	25.54	7.4
Yellow perch	34	8.0	2.7 - 12.3	6.19	1.8
Spotted gar	26	6.1	24.5 - 48.1	74.23	21.4
Logperch	14	3.3	3.2 - 3.8	0.30	0.1
Brook silverside	12	2.8	2.8 - 3.5	0.24	0.1
Gizzard shad	11	2.6	13.2 - 21.0	18.07	5.2
Brown bullhead	10	2.3	8.0 - 14.3	8.15	2.4
Bowfin	8	1.9	21.0 - 25.0	23.42	6.8
Shortnose gar	8	1.9	17.4 - 28.0	6.80	2.0
Common carp	5	1.2	16.0 - 19.5	12.00	3.5
Channel catfish	4	0.9	21.0 - 35.0	24.69	7.1
Yellow bullhead	3	0.7	11.5 - 13.5	5.44	1.6
White bass	1	0.2	16.1	2.08	0.6
White sucker	1	0.2	10.8	0.46	0.1
Pumpkinseed	1	0.2	8.1	0.49	0.1
Warmouth	1	0.2	7.8	0.42	0.1
Golden shiner	1	0.2	5.6	0.07	< 0.1
Steelcolor shiner	1	0.2	3.3	0.01	< 0.1
Total (22 Species)	427			346.45	

*Common names of fishes recognized by the American Fisheries Society.

NUMBER, PERCENTAGE, WEIGHT, AND AGE OF Rock bass									
TOTAL LENGTH (inches)	NUMBER COLLECTED	PERCENT OF FISH COLLECTED	AVERAGE WEIGHT (pounds)	AGE OF FISH	TOTAL LENGTH (inches)	NUMBER COLLECTED	PERCENT OF FISH COLLECTED	AVERAGE WEIGHT (pounds)	AGE OF FISH
1.0					19.0				
1.5					19.5				
2.0					20.0				
2.5	2	2.4	0.01	1	20.5				
3.0	2	2.4	0.02	1	21.0				
3.5	1	1.2	0.04	2	21.5				
4.0	3	3.6	0.05	2	22.0				
4.5	6	7.1	0.07	2	22.5				
5.0	5	6.0	0.09	2, 3	23.0				
5.5	2	2.4	0.12	3	23.5				
6.0	3	3.6	0.16	3, 4	24.0				
6.5	7	8.3	0.20	3, 4	24.5				
7.0	7	8.3	0.24	4	25.0				
7.5	12	14.3	0.29	4	25.5				
8.0	5	6.0	0.35	4	26.0				
8.5	5	6.0	0.41	5	TOTAL	84			
9.0	7	8.3	0.49	5, 6					
9.5	10	11.9	0.57	6, 7					
10.0	4	4.8	0.65	not aged					
10.5	2	2.4	0.75	not aged					
11.0	1	1.2	0.86	not aged					
11.5									
12.0									
12.5									
13.0									
13.5									
14.0									
14.5									
15.0									
15.5									
16.0									
16.5									
17.0									
17.5									
18.0									
18.5									

ELECTROFISHING CATCH	19.1/h	GILL NET CATCH	3.2/lift	TRAP NET CATCH	0.5/lift

NUMBER, PERCENTAGE, WEIGHT, AND AGE OF Bluegill									
TOTAL LENGTH (inches)	NUMBER COLLECTED	PERCENT OF FISH COLLECTED	AVERAGE WEIGHT (pounds)	AGE OF FISH	TOTAL LENGTH (inches)	NUMBER COLLECTED	PERCENT OF FISH COLLECTED	AVERAGE WEIGHT (pounds)	AGE OF FISH
1.0					19.0				
1.5					19.5				
2.0	3	3.8	0.01	not aged	20.0				
2.5	6	7.5	0.02	1	20.5				
3.0	1	1.3	0.03	1	21.0				
3.5	4	5.0	0.05	2	21.5				
4.0	2	2.5	0.07	2	22.0				
4.5	7	8.8	0.09	2	22.5				
5.0	6	7.5	0.12	2, 3	23.0				
5.5	1	1.3	0.15	4	23.5				
6.0	2	2.5	0.19	3, 4	24.0				
6.5	7	8.8	0.23	3, 4, 5	24.5				
7.0	7	8.8	0.28	3, 4	25.0				
7.5	7	8.8	0.34	4	25.5				
8.0	7	8.8	0.40	4	26.0				
8.5	10	12.5	0.47	4, 5, 6	TOTAL	80			
9.0	10	12.5	0.54	6					
9.5									
10.0									
10.5									
11.0									
11.5									
12.0									
12.5									
13.0									
13.5									
14.0									
14.5									
15.0									
15.5									
16.0									
16.5									
17.0									
17.5									
18.0									
18.5									

ELECTROFISHING CATCH	21.8/h	GILL NET CATCH	2.6/lift	TRAP NET CATCH	0/lift

NUMBER, PERCENTAGE, WEIGHT, AND AGE OF Smallmouth bass									
TOTAL LENGTH (inches)	NUMBER COLLECTED	PERCENT OF FISH COLLECTED	AVERAGE WEIGHT (pounds)	AGE OF FISH	TOTAL LENGTH (inches)	NUMBER COLLECTED	PERCENT OF FISH COLLECTED	AVERAGE WEIGHT (pounds)	AGE OF FISH
1.0					19.0				
1.5	1	2.3	< 0.01	YOY	19.5				
2.0					20.0				
2.5					20.5				
3.0					21.0				
3.5					21.5				
4.0	1	2.3	0.04	not aged	22.0				
4.5					22.5				
5.0					23.0				
5.5	1	2.3	0.09	1	23.5				
6.0					24.0				
6.5	1	2.3	0.15	1	24.5				
7.0					25.0				
7.5					25.5				
8.0					26.0				
8.5					TOTAL	44			
9.0									
9.5	3	6.8	0.47	2					
10.0	2	4.5	0.54	3					
10.5	3	6.8	0.63	3					
11.0	1	2.3	0.72	4					
11.5	3	6.8	0.82	4					
12.0	4	9.1	0.94	4					
12.5	2	4.5	1.06	4					
13.0	2	4.5	1.19	4					
13.5	6	13.6	1.33	3, 4					
14.0	3	6.8	1.49	4, 5					
14.5	2	4.5	1.65	3, 4					
15.0	2	4.5	1.83	4					
15.5	1	2.3	2.02	3					
16.0	2	4.5	2.22	4, 5					
16.5	2	4.5	2.44	4					
17.0									
17.5									
18.0	2	4.5	3.17	5					
18.5									

ELECTROFISHING CATCH	3.1/h	GILL NET CATCH	2.9/lift	TRAP NET CATCH	0.3/lift

NUMBER, PERCENTAGE, WEIGHT, AND AGE OF Largemouth bass									
TOTAL LENGTH (inches)	NUMBER COLLECTED	PERCENT OF FISH COLLECTED	AVERAGE WEIGHT (pounds)	AGE OF FISH	TOTAL LENGTH (inches)	NUMBER COLLECTED	PERCENT OF FISH COLLECTED	AVERAGE WEIGHT (pounds)	AGE OF FISH
1.0					19.0				
1.5	1	2.3	<0.01	YOY	19.5				
2.0					20.0				
2.5	1	2.3	0.01	YOY	20.5				
3.0					21.0				
3.5					21.5				
4.0					22.0				
4.5					22.5				
5.0					23.0				
5.5					23.5				
6.0	1	2.3	0.13	2	24.0				
6.5					24.5				
7.0	1	2.3	0.20	2	25.0				
7.5					25.5				
8.0	1	2.3	0.30	2	26.0				
8.5	1	2.3	0.36	3	TOTAL	43			
9.0	3	7.0	0.42	3					
9.5	1	2.3	0.49	3					
10.0	4	9.3	0.57	3					
10.5	3	7.0	0.65	3					
11.0	3	7.0	0.74	3					
11.5	4	9.3	0.84	3, 4					
12.0	4	9.3	0.95	4					
12.5	4	9.3	1.07	4					
13.0	4	9.3	1.20	4					
13.5	1	2.3	1.34	4					
14.0	1	2.3	1.49	4					
14.5	2	4.7	1.65	4, 5					
15.0	2	4.7	1.81	5					
15.5	1	2.3	1.99	not aged					
16.0									
16.5									
17.0									
17.5									
18.0									
18.5									

ELECTROFISHING CATCH	14.7/h	GILL NET CATCH	0.8/lift	TRAP NET CATCH	0/lift

NUMBER, PERCENTAGE, WEIGHT, AND AGE OF Walleye									
TOTAL LENGTH (inches)	NUMBER COLLECTED	PERCENT OF FISH COLLECTED	AVERAGE WEIGHT (pounds)	AGE OF FISH	TOTAL LENGTH (inches)	NUMBER COLLECTED	PERCENT OF FISH COLLECTED	AVERAGE WEIGHT (pounds)	AGE OF FISH
1.0					19.0				
1.5					19.5	1	2.9	2.61	5
2.0					20.0				
2.5					20.5	1	2.9	3.10	5
3.0	1	2.9	<0.01	YOY	21.0				
3.5					21.5				
4.0					22.0				
4.5					22.5				
5.0					23.0				
5.5					23.5				
6.0					24.0				
6.5					24.5				
7.0					25.0				
7.5					25.5				
8.0					26.0				
8.5	4	11.4	0.15	1	TOTAL	35			
9.0	3	8.6	0.19	1					
9.5	3	8.6	0.22	1, 2					
10.0	6	17.1	0.27	1					
10.5	1	2.9	0.31	1					
11.0									
11.5	1	2.9	0.43	1					
12.0									
12.5	2	5.7	0.57	1					
13.0	1	2.9	0.65	2					
13.5	2	5.7	0.74	2					
14.0									
14.5									
15.0	2	5.7	1.06	2, 3					
15.5	3	8.6	1.19	2					
16.0									
16.5	1	2.9	1.47	3					
17.0	2	5.7	1.63	3					
17.5									
18.0	1	2.9	1.98	4					
18.5									

ELECTROFISHING CATCH	5.8/h	GILL NET CATCH	1.8/lift	TRAP NET CATCH	0/lift

NUMBER, PERCENTAGE, WEIGHT, AND AGE OF Yellow perch									
TOTAL LENGTH (inches)	NUMBER COLLECTED	PERCENT OF FISH COLLECTED	AVERAGE WEIGHT (pounds)	AGE OF FISH	TOTAL LENGTH (inches)	NUMBER COLLECTED	PERCENT OF FISH COLLECTED	AVERAGE WEIGHT (pounds)	AGE OF FISH
1.0					19.0				
1.5					19.5				
2.0					20.0				
2.5	2	5.9	0.01	1	20.5				
3.0	2	5.9	0.02	1	21.0				
3.5	3	8.8	0.03	1	21.5				
4.0	1	2.9	0.04	2	22.0				
4.5	2	5.9	0.05	2	22.5				
5.0					23.0				
5.5	1	2.9	0.08	2	23.5				
6.0	4	11.8	0.11	2, 3	24.0				
6.5	3	8.8	0.13	3	24.5				
7.0	1	2.9	0.16		25.0				
7.5	1	2.9	0.20	4	25.5				
8.0	6	17.6	0.23	4, 5	26.0				
8.5					TOTAL	34			
9.0	3	8.8	0.32	5					
9.5	2	5.9	0.37	6					
10.0	2	5.9	0.43	not aged					
10.5									
11.0									
11.5									
12.0	1	2.9	0.70	not aged					
12.5									
13.0									
13.5									
14.0									
14.5									
15.0									
15.5									
16.0									
16.5									
17.0									
17.5									
18.0									
18.5									

ELECTROFISHING CATCH	5.3/h	GILL NET CATCH	1.8/lift	TRAP NET CATCH	0/lift

AGE-LENGTH KEY FOR Rock bass														
LENGTH GROUP (inches)	NUMBER COLLECTED	NUMBER AGED	AGE											
			1	2	3	4	5	6	7	8	9	10	11	12
1.0														
1.5														
2.0														
2.5	2	1	2											
3.0	2	2	2											
3.5	1	1		2										
4.0	3	3		3										
4.5	6	4		6										
5.0	5	4		4	1									
5.5	2	2			2									
6.0	3	3			1	2								
6.5	7	7			1	6								
7.0	7	6				7								
7.5	12	6				12								
8.0	5	4				5								
8.5	5	2					5							
9.0	7	4					2	5						
9.5	10	6						8	2					
10.0	4	0												
10.5	2	0												
11.0	1	0												
11.5														
12.0														
Total	84	55	4	15	5	32	7	13	2					
Mean TL			3.0	4.6	5.9	7.4	8.9	9.6	9.8					
SE			0.1	0.1	0.3	0.1	0.1	0.1	0					

AGE-LENGTH KEY FOR Bluegill														
LENGTH GROUP (inches)	NUMBER COLLECTED	NUMBER AGED	AGE											
			1	2	3	4	5	6	7	8	9	10	11	12
1.0														
1.5														
2.0	3	0												
2.5	6	2	6											
3.0	1	1	1											
3.5	4	4		4										
4.0	2	2		2										
4.5	7	7		7										
5.0	6	5		2	4									
5.5	1	1				1								
6.0	2	2			1	1								
6.5	7	6			1	5	1							
7.0	7	6			1	6								
7.5	7	5				7								
8.0	7	4				7								
8.5	10	7				3	4	3						
9.0	10	5						10						
9.5														
10.0														
Total	80	57	7	15	7	30	5	13						
Mean TL			2.8	4.5	6.0	7.6	8.3	9.1						
SE			0.1	0.1	0.3	0.1	0.4	0.1						

AGE-LENGTH KEY FOR Smallmouth bass														
LENGTH GROUP (inches)	NUMBER COLLECTED	NUMBER AGED	AGE											
			1	2	3	4	5	6	7	8	9	10	11	12
1.5	1	0												
2.0														
2.5														
3.0														
3.5														
4.0	1	0												
4.5														
5.0														
5.5	1	1	1											
6.0														
6.5	1	1	1											
7.0														
7.5														
8.0														
8.5														
9.0														
9.5	3	3		3										
10.0	2	1			2									
10.5	3	3			3									
11.0	1	1				1								
11.5	3	2				3								
12.0	4	2				4								
12.5	2	2				2								
13.0	2	2				2								
13.5	6	5			1	5								
14.0	3	3				1	2							
14.5	3	3			2	1								
15.0	2	2				2								
15.5	1	1			1									
16.0	2	2				1	1							
16.5	2	2				2								
17.0														
17.5														
18.0	2	2					2							
18.5														
19.0														
Total	45	38	2	3	9	24	5							
Mean TL			6.3	9.8	12.4	13.6	16.3							
SE			0.5	0	0.7	0.3	0.9							

AGE-LENGTH KEY FOR Largemouth bass														
LENGTH GROUP (inches)	NUMBER COLLECTED	NUMBER AGED	AGE											
			1	2	3	4	5	6	7	8	9	10	11	12
1.0														
1.5	1	0												
2.0														
2.5	1	0												
3.0														
3.5														
4.0														
4.5														
5.0														
5.5														
6.0	1	1		1										
6.5														
7.0	1	1		1										
7.5														
8.0	1	1		1										
8.5	1	1			1									
9.0	3	3			3									
9.5	1	1			1									
10.0	4	4			4									
10.5	3	2			3									
11.0	3	3			3									
11.5	4	4			1	3								
12.0	4	4				4								
12.5	4	4				4								
13.0	4	3				4								
13.5	1	1				1								
14.0	1	1				1								
14.5	2	2				1	1							
15.0	2	1					2							
15.5	1													
16.0														
16.5														
Total	43	37	0	3	16	18	3							
Mean TL				7.3	10.3	12.8	15.1							
SE				0.6	0.2	0.2	0.2							

AGE-LENGTH KEY FOR Walleye														
LENGTH GROUP (inches)	NUMBER COLLECTED	NUMBER AGED	AGE											
			1	2	3	4	5	6	7	8	9	10	11	12
3.0	1	0												
3.5														
4.0														
4.5														
5.0														
5.5														
6.0														
6.5														
7.0														
7.5														
8.0														
8.5	4	3	4											
9.0	3	3	3											
9.5	3	3	1	2										
10.0	6	4	6											
10.5	1	1	1											
11.0														
11.5	1	1	1											
12.0														
12.5	2	2	2											
13.0	1	1		1										
13.5	2	2		2										
14.0														
14.5														
15.0	2	2		1	1									
15.5	3	3		3										
16.0														
16.5	1	1			1									
17.0	2	2			2									
17.5														
18.0	1	0				1								
18.5														
19.0														
19.5	1	1					1							
20.0														
20.5	1	1					1							
Total	35	30	18	9	4	1	2							
Mean TL			10.1	13.6	16.6	18.3	20.3							
SE			0.3	0.8	0.5	0	0.5							

AGE-LENGTH KEY FOR Yellow perch														
LENGTH GROUP (inches)	NUMBER COLLECTED	NUMBER AGED	AGE											
			1	2	3	4	5	6	7	8	9	10	11	12
1.0														
1.5														
2.0														
2.5	2	2	2											
3.0	2	1	2											
3.5	3	3	3											
4.0	1	1		1										
4.5	2	2		2										
5.0														
5.5	1	1		1										
6.0	4	4		2	2									
6.5	3	3			3									
7.0	1													
7.5	1	1				1								
8.0	6	6				5	1							
8.5														
9.0	3	2					3							
9.5	2	2						2						
10.0	2	0												
10.5														
11.0														
11.5														
12.0	1	0												
12.5														
13.0														
Total	34	28	7	6	5	6	4	2						
Mean TL			3.3	5.3	6.6	8.2	9.0	9.8						
SE			0.2	0.4	0.1	0.1	0.3	0						

GILL NETS				TRAP NETS				ELECTROFISHING		
1	N	41.19812	W 86.41335	1	N 41.21357	W 86.42001		1	N	W
	N	41.19835	W 86.41337	2	N 41.19785	W 86.41664			N	W
2	N	41.20613	W 86.41196	3	N 41.19785	W 86.41664		2	N	W
	N	41.20646	W 86.41122	4	N 41.20848	W 86.42014			N	W
3	N	41.20882	W 86.41625	5	N 41.21836	W 86.39709		3	N	W
	N	41.20843	W 86.41673	6	N 41.21925	W 86.41176			N	W
4	N	41.21803	W 86.41590					4	N	W
	N	41.21827	W 86.41550						N	W
5	N	41.21808	W 86.41160					5	N	W
	N	41.21813	W 86.41070						N	W
6	N	41.21824	W 86.40336					6	N	W
	N	41.21832	W 86.40916						N	W
7	N	41.21729	W 86.39687					7	N	W
	N	41.21349	W 86.39712						N	W
8	N	41.20984	W 86.39333					8	N	W
	N	41.21051	W 86.39386						N	W
9	N	41.20060	W 86.39375					9	N	W
	N	41.20134	W 86.39384						N	W
10	N	41.19649	W 86.39625							
	N	41.19704	W 86.39642							
11	N	41.19345	W 86.39958							
	N	41.19411	W 86.39736							
12	N	41.19004	W 86.40290							
	N	41.18999	W 86.40363							