Michigan Department of Natural Resources
Status of the Fisheries Resource Report
No. 2004-5, 2004

Crooked Lake

Washtenaw County (T2S, R3E, Sections 5,6,7,8)
Surveyed June 2002

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Environment

Crooked Lake, Lyndon Township (so designated to differentiate it from another Crooked Lake in Washtenaw County in Dexter Township) is located near the western edge of Washtenaw County four miles west of the Village of Chelsea. This is a natural lake with two basins that covers approximately 113 surface acres. It was hydrologically mapped in 1942 and a copy of the map is available through the MDNR web site. Although this lake is contained within the Huron River Watershed, there are no inlets or outlets. A large wetland bordering the south end of the lake likely supplies water through seasonal groundwater movements.

The northern basin of this lake, accounting for about 75% of the lake's surface area, reaches a maximum depth of 20 feet with approximately 65% of the basin less than 10 feet deep. Almost the entire southern basin is less than 5 feet deep. While there are extensive beds of submergent vegetation scattered throughout the littoral zone of this lake, there are also several shallow areas with marl or gravel substrates where vegetation is sparse or absent. The water is usually quite clear with secchi readings historically ranging from 11 to 16 feet (13 feet recorded in September of 2002). Dissolved oxygen is fairly constant throughout most of the water column with summer values of 7-9 ppm from the surface to just above the bottom recorded for this survey as well as in historical samplings. Nutrient levels from the early September, 2002 limnology sampling were low compared to many lakes in the area (total nitrogen 0.768 mg/l, total phosphorus 0.009 mg/l). The lack of an inlet stream or significant runoff from developed areas is most likely the reason for these low nutrient levels.

Most of the western and southern shoreline is State-owned property and is relatively undeveloped with many trees and other natural vegetation. Private residences are scattered thinly along the northwest, north, and eastern shore with docks, lawns, and isolated trees present in these areas. On the western shore there is a State-operated public boat launch that was upgraded with a concrete ramp in 1988 and a floating fishing pier was installed in the same year. There are no boating restrictions on the lake, but high-speed boating does not become an excessive problem even on the weekends. This lake is popular with anglers due to the good fishing and light boating pressure.

History

The fish population of Crooked Lake was initially inventoried in 1944 using seines and an experimental gillnet. Gamefish collected during that survey included over 200 bluegill, 16 pumpkinseed sunfish, 53 largemouth bass, several black crappie, and a few yellow perch and northern pike. Forage fish captured included blacknose and blackchin shiner, bluntnose minnow, brook silverside, and golden shiner. Other species found were rock bass, yellow bullhead, warmouth, and grass pickerel. Overall the fish appeared healthy with good size distributions.

In an effort to provide more diverse fishing opportunities in the area, redear sunfish were stocked in the lake in 1954 and 1956. A

subsequent fish survey in 1971 using trap nets, fyke nets and gill nets determined the fishery to be in excellent condition. Bluegill were found up to 10 inches long with many redear sunfish in the 9 and 10-inch size range and significant numbers of yellow perch from 10-12 inches. Angling reports from 1972 noted redear sunfish up to 12 inches being caught from Crooked Lake with weights well over a pound. Another fish survey conducted with trap nets and gill nets in 1988 also found the bluegill and redear sunfish to be of excellent size and abundance. In addition, several northern pike over 20 inches were caught along with bullheads averaging over 11 inches and many sub-legal largemouth bass (<12 inches).

Fishery Resource

The most recent fisheries survey was conducted on Crooked Lake in June of 2002 in an effort to evaluate the current fish population and determine future management needs of the fishery. Fish were collected using three trap nets over two nights, one fyke net for two nights, and one 125-foot experimental gill net for two nights set in two different locations. The survey also included sampling three sites with a 25-foot seine and three stations were each sampled for 10-minutes with a boom shocker. Three staff members also conducted angling with live bait for a two hour period.

A total of 20 fish species and over 1,100 individuals were collected during the present survey (Table 1a). Panfish such as black and white crappie, bluegill, pumpkinseed sunfish, rock bass, redear sunfish, warmouth, and yellow perch comprised over 47% of the total catch by number and almost 38% by weight. Larger gamefish, represented by largemouth bass and northern pike, made up almost 15% of the catch by number and 35% by weight. Rough fish species such as bowfin and grass pickerel only made up about 1% of the catch by number and 12% by weight while black and brown bullheads comprised over 6% of the total catch by number and 15% by weight. Carp, one of the most common and widespread rough fish species, have not been reported from any previous survey in this lake and were not seen during this survey either. Several forage species were also caught, with bluntnose minnow being the most common.

Bluegill and redear sunfish were by far the most abundant panfish found during this survey. Together they comprised over 43% of the total catch by number (344 bluegill, 145 redear sunfish) and 33% by weight (Table 1a). The bluegill averaged an impressive 7.0 inches in the trap net catch with 85% exceeding the minimum size acceptable to anglers (6 inches) and several individuals over 8 inches in length. Redear sunfish averaged 7.8 inches in the trap net catch with 95% over the 6-inch minimum acceptable length and 15 individuals exceeding 9 inches (Table 1b and Table 3). Growth rates for both species were below state average with mean growth indices of -0.7 for the bluegill and -1.1 for the redear sunfish (Table 2). Zooplankton sampling in September of 2002 found the 90th percentile body length for zooplankton to be 1.39mm for Crooked Lake. This is just below the 1.4mm found to correlate with good bluegill growth in southern Michigan lakes (Theiling 1990). It suggests the slightly below average growth found in this survey may be a result of limited numbers of larger zooplankters to support better growth in young bluegills.

The quality of the bluegill population in Crooked Lake was evaluated using Schneider's Index based only on trap net catch. This index provides a ranking system that describes the quality of a bluegill population in a lake using a scale of 1 to 7 with 7 being the highest quality (Schneider 1990). The index calculated for Crooked Lake based on this survey is 4.8 which corresponds with a "Good" rating for the bluegill fishery. This lake is presently one of only about 50 lakes in Michigan that have self-sustaining redear populations. Further information about this species and how the redear population in Crooked Lake compares with other lakes is available in a recent Fish Division publication entitled "Redear Sunfish Management in Michigan" (Towns 2003).

Other panfish collected in rather low numbers during this survey included 15 yellow perch (6-10.5 inches), 11 warmouth (4-8 inches), 9 black and 1 white crappie (4-11.6 inches and 10.7 inches respectively), 6 rock bass (2-8 inches),

and 5 pumpkinseed sunfish (2-7.7 inches) (Table 1a).

Largemouth bass were by far the most abundant large gamefish found during this survey. They comprised over 14% of the total catch by number and 26% by weight (Table 1a). Although numerous (165 fish total), their average length in the trap net catch was a rather poor 9.4 inches with only 2 individuals exceeding the minimum legal size limit of 14 inches. Every age class from one through ten was represented in the survey catch, but growth rates were poor with a mean growth index 2.8 inches below state average (Table 2).

Northern pike were the other large gamefish collected during the survey. Although only 4 were caught, 3 exceeded the minimum legal size limit of 24 inches with the largest measuring a respectable 36 inches.

The only other large predatory fish species caught during this survey was bowfin (often called dogfish). A total of 13 bowfin ranging in size from 15 to 29 inches were collected from all sampling gears combined (Table 1a). This species is usually considered a non-game fish due to its poor edibility, but it does play a role in balancing the fish community and provides anglers an exciting battle when hooked.

Significant numbers of bullhead and small, forage species were also collected. The total of 76 black and brown bullheads ranged in size from 7 to 12 inches with 66% exceeding the 10-inch minimum size acceptable to anglers (Table 1a). Bullheads are excellent table fare, but are usually under-utilized. Forage species were dominated by bluntnose minnow, but other species such as blacknose shiner, brook silverside, blackstripe topminnow, and spotfin shiner were found as well (Table 1a).

Analysis and Discussion

Comparing this survey with the one conducted at Crooked Lake in 1988 indicates that most aspects of the fish community have remained relatively stable. Bluegill and redear sunfish still exhibit good size distributions with significant numbers of larger individuals and growth rates slightly below state average. Several master angler redear sunfish (over 10 inches) are reported from this lake by anglers every year. Largemouth bass remain very plentiful, but with few legal fish present and poor growth rates. Good-sized northern pike are still present in modest numbers and bowfin remain a significant factor in maintaining balance in the fish community. The bullhead population is still acceptable and the forage fish species present also remain similar to those found in earlier surveys.

The redear sunfish stocking that occurred in the 1950's has established a self-sustaining, well-balanced population of this species in Crooked Lake. It has resulted in a significant improvement to the overall fishery by providing anglers with a potential trophy panfish without negatively impacting the good bluegill fishery present in the lake.

Management Direction

The fish community in Crooked Lake appears well-balanced with most of the major fish populations having adequate size distributions and levels of reproduction sufficient to maintain themselves without additional stocking. Growth rates are generally below the state average, but this is not unusual for natural lakes with small watersheds and little or no inputs from streams or other outside sources. Largemouth bass growth rates are especially poor with few larger individuals present. The large number of small bass however, seem to be doing an adequate job of controlling the panfish numbers and thus maintaining a good supply of larger bluegill and redear sunfish. No management actions are recommended at this time beyond occasionally surveying the lake to monitor the condition of the fish community.

Report completed: February, 2004.

References

Schneider, J.C. 1990. Classifying bluegill populations from lake survey data. Michigan Department of Natural Resources, Fisheries Technical Report 90-10, Ann Arbor.

Towns, Gary L. 2003. Redear sunfish management in Michigan. Michigan Department of Natural Resources, Fisheries Technical Report 2003-3, Ann Arbor.

Theiling, C.H. 1990. The relationships between several limnological factors and bluegill growth in Michigan lakes. Michigan Department of Natural Resources, Fisheries Research Report 1970.

Table 1a-Number, weight and length indices of fish collected from Crooked Lake with all gear types, June 4-6, 2002.

Species	Number	Percent by number	Weight (pounds)	Percent by weight	Length range (inches)[1]	Average length	Percent legal size[2]
Black bullhead	5	0.4	3.2	1.2	10-11	11.1	100
Blackchin shiner	9	0.8	0	0	1-2	2.0	---
Black crappie	9	0.8	2.6	0.9	4-11	7.1	56
Bluegill	344	30.3	43.5	15.8	1-8	5.7	42
Bluntnose minnow	301	26.5	0.3	0.1	1-2	2.0	---
Blacknose shiner	24	2.1	0.1	0	1-2	2.0	---
Bowfin	13	1.1	33.7	12.3	15-29	18.7	---
Brown bullhead	71	6.2	37.1	13.5	7-12	10.3	100
Brook silverside	2	0.2	0	0	2-2	2.5	---
Blackstripe topminnow	1	0.1	0	0	1-1	1.5	---
Grass pickerel	2	0.2	0.3	0.1	8-10	9.5	---
Largemouth bass	165	14.5	71.5	26.0	2-18	9.1	1
Northern pike	4	0.4	25.0	9.1	13-36	27.5	75
Pumpkinseed sunfish	5	0.4	1.0	0.4	2-7	5.7	40
Redear sunfish	145	12.8	47.7	17.4	2-9	7.4	83
Rock bass	6	0.5	1.0	0.4	2-7	5.5	67
Spotfin shiner	4	0.4	0	0	2-3	3.3	---
Warmouth	11	1.0	2.4	0.9	4-7	6.4	73
White crappie	1	0.1	0.5	0.2	10-10	10.5	100
Yellow perch	15	1.3	4.7	1.7	6-10	8.9	93
Total	1,137	100	274.8	100			

Table 1b-Number, weight and length indices of fish collected from Crooked Lake with trap nets, June 4-6, 2002.

Species	Number	Percent by number	Weight (pounds)	Percent by weight	Length range (inches)[1]	Average length	Percent legal size[2]
Black bullhead	2	.5	1.26	.7	10-11	11.0	100
Black crappie	2	.5	.4	.2	7-7	7.5	100
Bluegill	123	32.4	31.0	17.2	4-8	7.0	85
Bowfin	12	3.2	31.0	17.2	15-29	18.7	---
Brown bullhead	49	12.9	27.0	15.0	8-12	10.5	100
Largemouth bass	77	20.3	36.7	20.4	6-18	9.4	2.6
Northern pike	1	.3	11.4	6.3	36	36.5	100
Pumpkinseed	2	.5	.5	.3	5-7	6.5	50
Redear sunfish	106	27.8	38.9	21.4	5-9	7.8	95
Rock bass	2	.5	.5	.3	6-7	7.0	100
Warmouth	1	.3	.3	.2	7-7	7.5	---
White crappie	1	.3	.5	.3	10-10	10.5	100
Yellow perch	2	.5	.9	.5	9-10	10.0	100
Total	380	100.0	180.4	100.0			

[1]Note: some fish were measured to 0.1 inch, others to inch group: eg, “5”=5.0 to 5.9 inches, “12”=12.0 to 12.9 inches, etc.
[2]Percent legal size or acceptable to anglers.

Table 2. – Growth analysis relative to the state average for seven species of gamefish sampled from Crooked Lake, June 4-6, 2002.

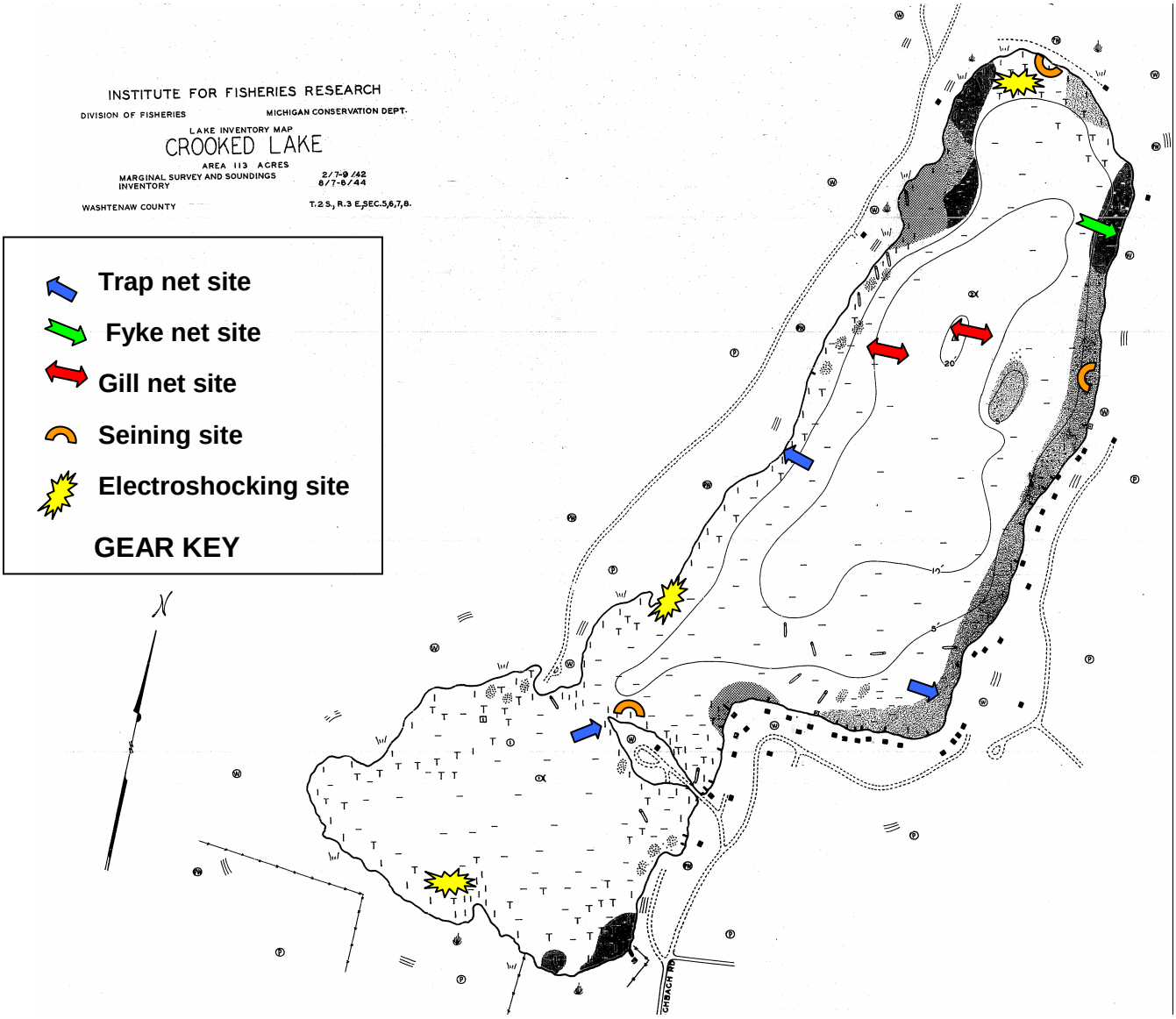
Species	Age group	Number of fish	Length range (in.)	Mean length (in.)	State average length (in.)	Growth index	Mean growth index for species
Black crappie							+1.0
	II	7	7.2-7.7	7.5	6.5	1.0	
	IV	2	11.1-11.6	11.4	8.9	--	
Bluegill							-0.7
	I	13	1.1-2.8	1.9	2.4	-0.5	
	II	12	1.6-3.7	2.8	4.2	-1.4	
	III	9	3.5-5.5	4.5	5.3	-0.8	
	IV	22	3.6-7.1	5.3	6.2	-0.9	
	V	15	5.7-8.4	7.1	6.9	0.2	
	VI	4	6.2-8.4	7.7	7.4	--	
	VII	4	8.1-8.4	8.2	8.0	--	
Largemouth bass							-2.8
	I	6	2.4-4.5	3.7	5.4	-1.7	
	II	12	5.9-7.3	6.6	8.7	-2.1	
	III	15	6.5-9.3	7.7	10.6	-2.9	
	IV	14	8.7-10.9	9.6	12.0	-2.4	
	V	8	8.6-11.3	10.1	13.7	-3.6	
	VI	10	9.4-14	11.1	15.0	-3.9	
	VII	3	12-13.2	12.5	16.7	--	
	VIII	1	12.1-12.1	12.1	17.6	--	
	IX	3	13.5-13.6	13.5	18.6	--	
	X	1	18.8-18.8	18.8	19.3	--	
Northern pike							
	I	1	13.4-13.4	13.4	14.5	--	
	VII	1	25.8-25.8	25.8	30.0	--	
	VIII	2	34.3-36.0	35.2		--	
Pumpkinseed sunfish							
	II	2	2.3-2.3	2.3	4.2	--	
	III	1	5.6-5.6	5.6	5.2	--	
	V	2	7.2-7.7	7.5	6.3	--	
Redear sunfish							-1.1
	II	5	2.6-5.1	3.5	5.0	-1.5	
	III	22	3.5-7.3	5.4	6.9	-1.5	
	IV	18	4.6-9.6	7.6	8.0	-0.4	
	V	9	6.8-8.8	8.0	9.0	-1.0	
	VI	4	7.6-9.5	8.9	9.8	--	
	VII	3	9.3-9.5	9.4	10.5	--	
Yellow perch							
	II	3	6.7-7.3	7.0	5.7	--	
	III	4	8.2-9.4	8.7	6.8	--	
	IV	3	8.4-10.0	9.3	7.8	--	
	V	4	9.2-9.5	9.3	8.7	--	
	VI	1	10.5-10.5	10.5	9.7	--	

Table 3.–Number per inch group of selected fish species collected from Crooked Lake with trap nets, June 4-6, 2002.

Inch group	Black crappie	Bluegill	Bowfin	Brown bullhead	Largemouth bass	Redear sunfish	Yellow perch
2							
3							
4		2					
5		16				5	
6		36			1	18	1
7	2	57			9	38	1
8		12		2	30	30	
9				10	16	15	
10				25	13		
11				11	1		
12				1	2		
13					3		
14					1		
15			1				
16			3				
17			2				
18			4		1		
19							
20			1				
21							
22							
23							
24							
25							
26							
27							
28							
29			1				
30							
Totals	2	123	12	49	77	106	2

CROOKED LAKE, LYNDON TOWNSHIP

June 2002 Sampling Locations


INSTITUTE FOR FISHERIES RESEARCH
DIVISION OF FISHERIES
MICHIGAN CONSERVATION DEPT.
LAKE INVENTORY MAP
CROOKED LAKE
AREA 113 ACRES
MARGINAL SURVEY AND SOUNDINGS
INVENTORY
2/7-9/42
8/7-8/44
WASHTENAW COUNTY
T. 2 S., R. 3 E., SEC. 5,6,7,8.
Trap net site
Fyke net site
Gill net site
Seining site
Electroshocking site
GEAR KEY
N
GRIBAGH RD.