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Crooked Lake

Oakland County (T4N, R9E, Sections 3, 4, 9)
Surveyed May 2002

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Environment

Crooked Lake (previously known as Lower Bushman Lake) is a natural lake located in north-central Oakland County, approximately 2 miles north of Clarkston. The entire lake lies within Independence Oaks County Park (Oakland County), so the shoreline is relatively undeveloped. Other than a boat rental facility and public boat launch on the eastern side of the lake, much of the lake is surrounded by forested land. The boat rental facility provides only paddle boats and row boats, and there is an "electric motors only" regulation on the lake. Shore access is facilitated by a trail that encircles the lake, providing access to fishing piers at several locations around the lake.

Crooked Lake is 68 acres in size and has a somewhat linear shape (Figure 1). The deepest point in the lake is in the center where it reaches 65 feet deep. Generally speaking, the lake is characterized as having a steep drop off close to shore. Because the shoal area is relatively small, there is not an abundance of vegetation. As can be seen on the lake map, dredging was done at the northeast end of the lake to create a canal and island (Figure 1). It is unclear when this dredging occurred or the intended purpose. The bottom is made up of sand, marl, and organic matter on the shoals and marl and organic matter in the deeper water. The water has a slight brown color and a Secchi disk reading (test of water clarity) of 8 feet. Within the water column, alkalinity ranged from 149 ppm and 161 ppm and pH ranged from 7.25 to 8.59. Crooked Lake is deep enough that the water column stratifies annually. During the summer, there are three distinct water layers; the upper most layer, the epilimnion, is warm and well oxygenated; the middle layer or thermocline is intermediate in temperature and the amount of dissolved oxygen varies; the bottom layer, the hypolimnion, is cold and lacks oxygen. In August 2002, the thermocline was from 18 to 27 feet and was well oxygenated.

Crooked Lake is located in the headwaters area of the Clinton River. The surface geology is characterized by sand and gravel glacial outwash and end moraines of medium and course textured till. These areas are well drained and allow good infiltration to the ground water. There is an inlet that enters the lake from a wet area and springs west of the lake. There is one outlet on the lake, on the southeast side, which drains to the Clinton River.

The first records in the Crooked Lake file are notes taken during lake mapping in the winter of 1943. At that time the lake was in private ownership. Fishing was light, restricted to friends and neighbors of the owners, but fishing was reported good for bass and bluegill. Around 1960, a hunt club was started on 2,500 acres, which included Crooked Lake and much of what is currently Independence Oaks Park property. There were 250 members in the club, many of whom were prominent people; executives from General Motors, Ford Motor Company, and others. Members were required to pay $10,000 to $20,000 annually for membership, and came there to hunt and fish. Crooked Lake offered fishing opportunities for members, and the hunting lodge overlooked Crooked Lake. The Independence Oaks Park property was acquired by Oakland County Parks in 1967, construction of public park facilities began in 1974, and the park opened on Memorial Day 1976. The lake was open to fishing to the public beginning in

the late 1960's, but the boat launch was not built until 1975.

Fishery Resource

The fish community was surveyed 9 times from 1968 to 1996. A variety of gear was used in the surveys including fyke nets, trap nets, gill nets, and electrofishing, depending on the goal of the particular survey. There were some consistent trends among surveys, such as low species diversity in the lake and low catch rates. The low catches are likely the result of difficulty in netting the lake based on its shape and depth contours, as opposed to low production in the lake. It is unlikely that excessive effort and harvest are to blame for the low catches, as similar catch rates were obtained in the survey prior to the lake coming into public ownership.

The fish community is composed of panfish, such as bluegill, pumpkinseed, rock bass, green sunfish, and yellow perch and the dominant predators are largemouth bass, bullhead, and some northern pike. The growth rates of both bluegill and pumpkinseeds are below the state average at younger ages (up to age 4 or 5 for bluegill and age 3 for pumpkinseeds), but above average for older fish. In earlier surveys, the oldest recorded bluegill was 7 years old. But in the most recent survey in 1996, 10% of the bluegill caught and aged were older than age 7, with one individual that was 12 years old (9.5 inches). The presence of these older fish provides further evidence that over harvest is not a problem. There was some variability in the growth of largemouth bass among historical surveys, but most recently, the growth rates were almost 2 inches below the state average.

A 22 acre marsh on Crooked Lake was operated as a pike spawning marsh to produce pike to stock in Crooked Lake, as well as other local lakes. Northern pike from the marsh were stocked in 1973-74, and 1976-80. Following the pike stockings, rainbow trout were stocked from 1981 to 1982. This stocking program ended because it failed to produce a fishery.

The most recent fisheries survey was conducted on Crooked Lake in May 2002. A variety of gear was used in attempts to accurately survey the entire fish community. Two standard trap nets, two large mesh fyke nets, and one 125 foot experimental gill net were each fished for three nights. In addition, three seine hauls were made using a 25 foot seine and three ten-minute transects were electrofished at night. The goal of the survey was to evaluate the current fish population and determine future management needs of the fishery.

A total of 15 fish species were collected during this survey with over 829 fish handled in total (Table 1). Panfish such as bluegill, pumpkinseed, rock bass, green sunfish, and yellow perch comprised almost 80% of the total catch by number and over 60% by weight. Predators such as largemouth bass, northern pike, and bullheads made up 10% of the catch by number and 37% by weight. No rough fishes such as carp and suckers were caught during the survey.

Bluegill were the most abundant fish caught during this survey. They represented 57% of the total catch by number and 42% by weight. The bluegill in the trap net catch averaged a very good 7.3 inches, with one-third of the catch eight inches and larger. As seen in previous surveys, the growth rates of bluegill were below the state average through age 3, but above the state average for bluegill age 4 and above (Table 2). The quality of the bluegill population in Crooked Lake was evaluated using Schneider's Index. This index provides a relative measure of the quality of the bluegill fishery in a lake based on a scale of 1 to 7, with 7 being the best (Schneider 1990). Based on the trap net catch, the bluegill in Crooked Lake received a good to excellent rating (score 5.4).

Rock bass were the next most abundant fish, making up 14% of the total catch by number. The rock bass caught in all gear types averaged 5.1 inches, but 13% were larger than 8 inches. A total of 37 yellow perch were caught in the current survey. The fish ranged from 2-6 inches long and represented ages 1 to 3 years old (Table 2). The perch averaged almost ½ inch below the state average for growth rates. Other panfish caught during the survey included pumpkinseed and green sunfish. As noted earlier, the

pumpkinseed had below average growth rates to age 3, but above average growth for age 4 and above (Table 2).

The divergence in growth rates between younger and older bluegill and pumpkinseeds is interesting. The fish have below average growth for the first few years of life, and then growth rates shift to above average at older ages. A couple of different reasons could account for these differences. First, it could be attributed to lack of habitat for juvenile fishes because of the limited vegetated, shallow areas present in Crooked Lake. The limited habitat for young panfish may be causing crowding and increased competition for available resources, resulting in below average growth rates. While growth rates of smaller fish are affected, this does not appear to be limiting overall production or spawning success in the lake. A second explanation may be the fact that a new food source becomes available to these panfish at a larger size. For example, mayfly larvae that are too large for the smaller panfish to consume.

Largemouth bass dominated the catch of larger gamefish during the survey making up 8% of the total catch by number and 28% by weight. The bass averaged 12.6 inches long, but one third of the catch was larger than the minimum size limit of 14 inches. Growth rates averaged about 1 inch below the statewide average (Table 2). Overall, the catch rate and growth rates of largemouth bass in Crooked Lake were consistent with that of other area lakes in southeast Michigan.

Only two northern pike were caught in the current survey and growth rates were above the state average. This catch rate is similar to earlier surveys, although pike numbers did temporarily increase following the stocking from the pike marsh. In addition, ten bullhead were caught that ranged in size from 8 to 14 inches.

The fish community in Crooked Lake benefits from the lack of rough fishes such as suckers and carp. These species often compete with game fishes and can have negative impacts on the environment. Carp feed in the sediments, often uprooting aquatic vegetation that is important habitat and increasing turbidity in the lake. The disturbance to vegetation would be especially important in Crooked Lake due to the limited shallow, vegetated habitat.

Other fishes caught in this survey include blacknose and golden shiners, brook silverside, central mudminnow, least darter, and grass pickerel. Three species, including lake chubsucker, white sucker, and longear sunfish, were caught in earlier surveys but were not caught during this current survey.

Management Direction

Crooked Lake supports a balanced fish community and provides a good fishery for panfish and largemouth bass. The fishing experience on Crooked Lake is enhanced by the undeveloped shoreline and motor restriction (electric motors only). Fishing on other area lakes in Oakland County can be difficult due to high speed recreational boating and traffic. Crooked Lake provides an opportunity were anglers can fish in solitude.

Redear sunfish would be a good addition to the fishery and appear to be a good candidate for Crooked Lake. Redears have been established successfully in southern Michigan to provide a trophy panfish opportunity for anglers (Towns 2003). Redear sunfish grow faster than either bluegill or pumpkinseeds, and attain a larger size. Redears reach a length of almost 9 inches by age 5, where a bluegill takes about 10 years to reach a similar size. Most lakes where redears have been established produce redear sunfish greater than 10 inches long (Towns 2003). Redears are similar to pumpkinseeds and do well in lakes that have large areas of marl. Stocking is recommended for a three year period, at which point redears are usually self sustaining.

Northern pike is another fish that would benefit from a stocking program. Northern pike are already present in Crooked Lake and are self sustaining at low levels. Although current growth data on pike is limited, they appear to be growing above the state average. However, following northern pike stocking in the 1970's ranging from 20-35 spring fingerlings per acre,

growth rates of northern pike were below the state average. Therefore, stocking is recommended, but at a reduced rate. A low level stocking on alternate years would benefit the pike population and enhance this popular fishery (5-10 spring fingerlings per acre).

References

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

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

Table 1a.-Number, weight, and length indices of fish collected from Crooked Lake with trap nets, large mesh fyke nets, and gill nets May 14-17, 2002.

Species	Number	Percent by Number	Weight (pounds)	Percent by Weight	Length range (inches)[1]	Average length	Percent legal size[2]
Bluegill	202	66.2	51.0	44.2	1-9	6.7	71
Rock bass	54	17.7	18.1	15.6	4-10	7.3	76
Largemouth bass	31	10.2	31.2	27.0	3-19	10.7	26
Yellow bullhead	7	2.3	6.7	5.8	7-14	12.4	100
Brown bullhead	3	1.0	2.6	2.2	8-14	11.8	100
Yellow perch	3	1.0	0.3	0.2	5-6	5.8	0
Pumpkinseed	2	0.7	0.4	0.3	2-7	5.0	50
Northern pike	2	0.7	5.3	4.6	19-25	22.5	50
Golden shiner	1	0.3	0.1	0.1	7	7	--
Total	305	100	115.7	100			

Table 1b.-Number, weight, and length indices of fish collected from Crooked Lake by electorfishing and seining May 15-22, 2002.

Species	Number	Percent by Number	Weight (pounds)	Percent by Weight	Length range (inches)[1]	Average length	Percent legal size[2]
Bluegill	273	52.1	11.6	33.2	0-8	3.4	5.5
Rock bass	62	11.8	7.9	22.6	1-10	4.4	11.8
Least darter	50	9.5	--	--	<1	<1	--
Largemouth bass	39	7.4	10.4	29.8	0-15	7.0	5.3
Yellow perch	34	6.5	1.2	3.4	2-6	4.2	0
Blacknose shiner	24	4.6	<0.1	<0.1	1	1	--
Pumpkinseed	23	4.4	2.5	7.1	0-7	4.0	34.8
Grass pickerel	9	1.7	1.0	2.8	5-10	8.1	--
Green sunfish	5	1.0	0.3	0.9	1-6	3.7	20
Central mudminnow	4	0.8	<0.1	<0.1	0-2	1.3	--
Brook silverside	1	0.2	<0.1	<0.1	<1	<1	--
Total	524	100	34.9	100			

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

Table 2.-Average total length (inches) at age, and growth relative to the state averages for five species of fish sampled from Crooked Lake, May 14-17, 2002.

Species	Age group	Number of fish	Length range (inches)	Mean Length	State average length	Growth index	Mean growth index[1]
Bluegill							0
	I	16	0.8-2.3	1.6	1.8	-0.2	
	II	9	2.3-3.5	2.8	3.8	-1.0	
	III	21	3.3-5.2	4.2	5.0	-0.8	
	IV	22	4.8-7.8	6.1	5.9	0.2	
	V	9	6.8-8.3	7.6	6.7	0.9	
	VI	2	8.0-8.5	8.3	7.3	--	
	VII	7	7.0-9.2	8.5	7.8	0.7	
	VIII	5	7.8-9.1	8.6	8.2	0.4	
	IX	2	7.8-9.1	8.5	8.6	--	
Largemouth bass							-1.2
	I	10	2.9-3.9	3.5	4.2	-0.8	
	II	16	5.3-6.6	6.0	7.1	-1.1	
	III	14	5.7-10.9	8.4	9.4	-1.0	
	IV	13	7.0-13.3	9.8	11.6	-1.8	
	V	1	13.3	13.3	13.2	--	
	VI	4	12.0-16.1	14.5	14.7	--	
	VII	4	12.2-15.7	14.6	16.3	--	
	VIII	2	15.6-16.8	16.2	17.4	--	
	XI	1	19.2	19.2		--	
	XII	1	19.8	19.8		--	
Northern pike							
	II	1	19.7	19.7	17.7	--	
	III	1	25.8	25.8	20.8	--	
Pumpkinseed							-0.7
	I	1	1.9	1.9	1.8	--	
	II	2	2.1-2.5	2.3	3.8	--	
	III	7	2.4-5.0	3.1	4.9	-1.8	
	IV	4	3.7-6.3	5.3	5.6	--	
	V	5	6.2-7.0	6.6	6.2	0.4	
	VI	1	7.2	7.2	6.6	--	
	VIII	1	8.4	8.4	7.5	--	
	IX	1	7.4	7.4		--	
Yellow perch							-0.4
	I	15	2.6-3.4	3.0	3.3	-0.3	
	II	16	4.5-6.1	5.0	5.2	-0.2	
	III	5	4.6-6.6	5.8	6.5	-0.7	

[1]Mean growth index is the average deviation from the state average length at age.

Figure 1.-Map of Crooked Lake.