



BEAR LAKE- 2009 FISHERIES SURVEY ANALYSIS REPORT
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Introduction

Bear Lake has 1,744 surface acres, a maximum depth of 23 feet, and is located in western Manistee County in the northwest Lower Peninsula. The Bear Lake watershed encompasses about 7,543 acres within the Manistee River watershed and includes the Village of Bear Lake. Land-use in the watershed includes orchards, agriculture, and forestry. The majority of the Bear Lake shoreline is residentially developed (Tonello 2000). There are no inlets to the lake, but there is one outlet on the eastern shoreline (Little Bear Creek). Little Bear Creek is a designated trout stream, and flows into Bear Creek.

There are two public access locations on Bear Lake. A state of Michigan DNR public access site with a boat launch is located in the northwestern corner of the lake and a boat launch that is part of the Bear Lake township park is located in the town of Bear Lake on the south shore of the lake.

Management of Bear Lake has been recorded since as early as 1929 when smallmouth bass and bluegill were stocked by the former Michigan Department of Conservation (MDOC). Walleye were stocked heavily from 1933 to 1943, along with yellow perch and shiners. Walleye stocking resumed in 1960 for three years, and in 1984 walleye stocking became a consistent management practice on the lake.

The first documented fisheries survey was conducted in 1947, and in 1948 approximately 28 brush shelters were installed by the MDOC in order to concentrate fish. General surveys were also conducted in 1971 and 1976 by the Michigan Department of Natural Resources (MDNR), while walleye evaluation surveys were conducted in 1990 and 1999. The most recent survey was conducted by MDNR Fisheries Division in 2009.

Serns Index surveys (or fall boomshocking efforts) directed at determining year class strength for young-of-the-year and yearling walleye, were conducted in Bear Lake by the Little River Band of Ottawa Indians (LRBOI) in 2005 and 2007 (LRBOI 2007). In 2005 a total of five age-0 walleye were collected, resulting in a Serns Index of 0.181 walleye per surface acre and a year class strength estimate of 315.9 (Table 1). In 2007 a total of 12 age-0 walleye were collected, resulting in a Serns Index of 0.360 walleye per surface acre and a year class strength estimate of 628.5. While Sern's Indices are good ways to assess the potential size of walleye year classes in Michigan lakes, the model should be used with caution as the index may be less accurate when used with populations outside of the study sites used to create the model in Wisconsin (Serns 1982). While the Sern's model considers these numbers to be low, these numbers may be only slightly below or closer to average due to the differences in water chemistry and lake morphology between Michigan lakes and Wisconsin lakes.



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Fisheries management of Bear Lake in recent years includes a walleye stocking program that was initiated in 2000. This management program recommends stocking spring fingerling walleyes (25/acre) into Bear Lake every three years. Fisheries Division stocked Bear Lake with spring fingerling walleyes in 2000, 2003, 2006, and 2010.

Methods and Materials

The 2009 Bear Lake survey was conducted using the Fisheries Divisions Status and Trends protocol (Wehrly et al. 2009). This survey consisted of setting one fyke net, one mini-fyke net, three inland gill nets, and three trap nets on June 9, 10, and 11, 2009. The survey also consisted of six minnow seine hauls and three-600 second passes with an electrofishing boat on August 24, 2009.

Results/Discussion

Shiners were the most abundant species by number, with 500 individuals collected (Table 2). Game fish such as yellow perch, rock bass, and bluegill also were present in decent numbers. Shiners also had the highest percent by number making up 32.4% of the catch, followed by yellow perch which comprised 12.8% of the catch by number with 197 individuals. Forage species such as bluntnose minnow, Johnny darter, rainbow darter, sand shiner, spottail shiner, and shiners not identified to species dominated the percent catch by number, totaling 46.4% of the total catch. The weight of the catch was predominated with 109.6 pounds of northern pike, and 94.2 lbs of bowfin. Northern pike represented 17.2% of the catch by weight, while bowfin accounted for 14.8% of the catch by weight. Growth rates for black crappie were well above average, growing 2.3 inches above the state of Michigan average length at age (Table 3). Pumpkinseed sunfish and rock bass were also growing slightly above average. Northern pike were growing well below average, with growth at 2.5 inches below the state of Michigan average length at age. Bluegill were growing at 1.1 inches below state average, and largemouth bass were growing at 0.5 inches below state average length at age. Not enough pumpkinseed sunfish or walleye were collected from any one year class to make statistical inferences about growth.

The growth rates of the northern pike population in Bear Lake appear to be in continual decline. More northern pike were captured in this survey than in the 1999 survey (51 northern pike caught in 2009 compared to 9 northern pike caught in 1999), however average growth rates and the number of age classes represented has declined since then. Of the 51 northern pike captured in the 2009 survey, only four exceeded the minimum legal size of 24 inches. Only four year classes were represented in the catch (ages 2, 4, 5, and 6), with the majority of those (33 fish) being age 4.

Management Recommendations:

1. Angling pressure on Bear Lake is high, especially for walleye. Serns Indices have indicated some natural reproduction (LRBOI 2007), however the reproduction occurring is not sufficient to sustain the fishery and thus the stocking regime should be continued (Table 1).



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Spring fingerling walleye stocking should be increased to the rate of 50/acre or 86,000 fish, every other year.

2. The growth and size structure of the northern pike population would need to be improved in order to help maintain the fish community balance and improve fishing. The northern pike populations should continue to be closely monitored through future fisheries surveys.

2. Bear Lake is highly developed along its shoreline. Efforts should be made to protect remaining riparian wetlands from development in order to maintain the healthy aquatic ecosystem that currently exists.

3. A Status & Trends survey should be conducted on Bear Lake within the next ten years in order to continually assess the fish community. A Serns Index electroshocking survey should be conducted every fall after walleye are stocked in order to evaluate the success of the stocking effort.

References:

Little River Band of Ottawa Indians. 2007. Walleye and Northern Pike Fall Recruitment Surveys 2007. Little River band of Ottawa Indians Natural Resources Report No. 2007-1.

Serns, S. L. 1982. Relationship of walleye fingerling density and electrofishing catch per effort in northern Wisconsin lakes. North American Journal of Fisheries Management 2:38-44

Tonello, M.A. 2000. Bear Lake. Michigan Department of Natural Resources, Status of the Fishery Resource Report No. 2000-6.

Wehrly, K.E., G.S. Carter, and J.E. Breck. 2009 Draft. Standardized sampling methods for the inland lakes status and trends program. Chapter 27 in Manual of Fisheries Survey Methods. Michigan Department of Natural Resources, Fisheries Division internal document, Ann Arbor.



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Table 1. Serns Index results for Bear Lake surveys conducted in 2005 and 2007.

Table 1. 2005 and 2007 Bear Lake Serns Index Survey Results**					
		Miles of shoreline sampled:	6.46		
		Bear Lake acreage:	1,744		
		Serns Age-0 constant:	0.234		
		Serns Age-1 constant:	0.194		
Year Class	Age	# walleye captured	Catch Rate (# walleye/mile of shoreline sampled)	Year Class strength estimate	Serns Index (# walleye/surface acre)
2004*	1	0	0	0	0
2005*	0	5	0.77	315.9	0.181
2006*	1	0	0	0	0
2007*	0	12	1.86	628.5	0.360
*Stocking year					
**Electroshocking conducted by the LRBOI					

Table 2. Number, weight, and length of fish collected from Bear Lake with the use of trap nets, inland gill nets, boom shocking, minnow seines, fyke nets, and mini- fyke nets in June 2009.

Species	Number	Percent by number	Weight (pounds)	Percent by weight	Length Range (inches)
Black crappie	63	4.1%	46.1	7.3%	6 to 13
Bluegill	68	4.4%	8.6	1.4%	1 to 10
Bluntnose minnow	44	2.9%	0.1	0.0%	3 to 9
Bowfin	19	1.2%	94.2	14.8%	20 to 28
Brown bullhead	15	1.0%	13.2	2.1%	10 to 13
Common carp	1	0.1%	10.4	1.6%	28
White sucker	68	4.4%	65.4	10.3%	1 to 27
Green sunfish	2	0.1%	0.5	0.1%	6 to 7
Johnny darter	11	0.7%	0.1	0.0%	1 to 2
Largemouth bass	50	3.2%	82.0	12.9%	1 to 18
Northern pike	51	3.3%	109.6	17.2%	17 to 25
Pumpkinseed	38	2.5%	13.4	2.1%	2 to 9
Rainbow darter	4	0.3%	0.0	0.0%	2
Rock bass	137	8.9%	68.8	10.8%	3 to 11
Sand shiner	52	3.4%	0.1	0.0%	1 to 2



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Shiner (non-specific)	500	32.4%	0.0	0.0%	2
Smallmouth bass	87	5.6%	67.8	10.7%	1 to 17
Spottail shiner	104	6.7%	0.5	0.2%	2
Walleye	13	0.8%	39.1	6.2%	15 to 26
Yellow perch	197	12.8%	1.1	0.2%	1 to 6
Yellow bullhead	19	1.2%	13.4	2.1%	9 to 12
Total	1543	100%	634.4	100.0%	

Table 3. Average total weighted length (inches) at age and growth relative to the state average for fish sampled from Bear Lake in June 2009.

Species	Age														Mean Growth Index
	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII	XIV	
Black crappie	...	7.0 (2)	9.8 (20)	11.5 (9)	11.9 (8)	12.7 (3)	...	...	...	...	...	...	...	...	2.3
Bluegill	2.3 (2)	2.8 (11)	3.7 (16)	5.6 (9)	8.1 (1)	8.3 (3)	9.3 (1)	9.8 (3)	...	...	...	...	...	...	-1.1
Green Sunfish	...	...	...	...	5.7 (2)	...	...	...	...	...	...	...	...	...	**
Largemouth bass	...	6.5 (1)	11.5 (2)	13.2 (9)	12.9 (7)	14.6 (10)	15.8 (11)	15.9 (5)	18.0 (2)	18.1 (1)	...	...	...	...	-0.5
Northern Pike	...	18.5 (6)	...	21.2 (33)	22.0 (9)	25.0 (3)	...	...	...	...	...	...	...	...	-2.5
Pumpkinseed	2.8 (1)	3.1 (3)	4.7 (5)	6.1 (4)	7.8 (2)	7.9 (7)	8.7 (5)	8.9 (2)	9.2 (2)	...	...	...	...	...	0.7
Rock bass	...	3.5 (3)	5.0 (8)	6.6 (14)	7.8 (12)	9.0 (4)	9.4 (8)	10.5 (8)	10.9 (8)	11.0 (9)	...	...	10.0 (2)	...	0.3
Smallmouth bass	4.5 (8)	7.4 (2)	10.3 (1)	13.0 (12)	13.5 (7)	15.0 (8)	15.8 (2)	15.9 (4)	16.8 (5)	16.9 (1)	-1
Walleye	15.3 (4)	21.2 (3)	19.5 (1)	...	23.0 (3)	23.9 (1)	26.9 (1)	**



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