

South Lake Leelanau
Leelanau County
Last surveyed in 2015

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Environment

South Lake Leelanau is located in northwest Lower Michigan, in southeast Leelanau County, about 10 miles north of Traverse City. South Lake Leelanau is hydrologically connected to North Lake Leelanau by a channel called the "Narrows". The Leland River drains these lakes, and a dam in Leland raises the natural water level and inhibits upstream migration of fish from Lake Michigan into the lakes. The elevation of Lake Leelanau (South and North Lakes) must be maintained at 589.21 feet above sea level from April 15-November 15, and lowered 12 inches from November 15-April 15. These elevations were established by a Leelanau County Circuit Court Order in 1978. South Lake Leelanau has 5,370 surface acres, a maximum depth of 62 feet, and an average depth of 23 feet. The lake is eight miles long and has 25 miles of shoreline. South Lake Leelanau has several feeder tributaries, including the Cedar River and Cedar Run Creek which account for approximately 75% of the total surface runoff.

South Lake Leelanau has three public access sites with boat launches, including Department of Natural Resources (DNR) boating access sites at the Narrows, Bingham (County Road 641) and Leelanau West on the west side of the lake, south of Hohnke Road (Figure 1). There are also several public campgrounds near or on South Lake Leelanau, and two marinas on the lake.

South Lake Leelanau is characterized as an oligotrophic lake by the Michigan Department of Environmental Quality (DEQ). However, it exhibits both eutrophic and oligotrophic characteristics, and may best be described as a mesotrophic lake. Its eutrophic characteristics are: 1) the lake has relatively low oxygen concentrations in the hypolimnion (1.8 ppm at 52 feet in 1994), and 2) the epilimnion (water above the thermocline) occupies over half of the water column in the summer. Its oligotrophic characteristics are: 1) deep, clear water and 2) limited plant and algal density. South Lake Leelanau is a two-story lake, and a thermocline develops from 35-40 ft. deep during most summers. The topography of the Lake Leelanau watershed is gently sloping hills with soils that range from mucky to well drained. Surrounding land use was estimated at 60% undeveloped, 25% agriculture, and 15% urban in 1993. Shoreline composition was estimated at 80% upland and 20% wetland. Shoal substrates were composed of 80% sand, 10% gravel, and 10% muck. The upland areas consisted of hemlock, red pine, maple, aspen, and orchard trees. Five-hundred and sixty-three houses, seven resorts, and two boat liveries were also counted along the shoreline of South Lake Leelanau in 1996 (Northwest Michigan Council of Governments 1996).

History

Stocking History

South Lake Leelanau has a long and diverse stocking history. Lake Trout were the first species stocked in 1947 and were discontinued because a subsequent survey indicated poor survival and growth. South Lake Leelanau lacks optimal Lake Trout habitat primarily due to low oxygen

concentrations below the thermocline. Rainbow Trout were stocked in 1950-1951 (2,500 and 5,000 yearlings), 1965 (25,000 fingerlings), and in 1970 (355 adults). The Rainbow Trout stocking program was discontinued due to poor return to creel rates and numerous observations of fish swimming over the dam in Leland. Brown Trout were stocked annually from 1955-1964 (2,000-5,000 legal sized adults), and from 1968-1991 (7,000-20,000 yearlings). The Brown Trout stocking program was discontinued in 1991 due to poor survival and likely competition with walleye. In 1991, Department of Natural Resources (DNR) Fisheries Division began to focus primarily on walleye stocking in South Lake Leelanau. Historically, Walleye were stocked into South Lake Leelanau in 1975 (8,439 fingerlings), 1986 (50 fingerlings), 1989 (6.1 million fry), 1992 (6.5 million fry), 1995 (6.5 million fry), 1998 (5.0 million fry), and 2001 (5.5 million fry). Fisheries Division's objective starting in 1991 was to establish a self-sustaining population of Walleye in South Lake Leelanau by stocking 1,000 fry per acre every 3 years. Based on targeted walleye surveys (Table 1) it was determined that this objective had been met, and stocking was discontinued. Bluegills were also stocked through a private permit into South Lake Leelanau in response to numerous complaints that the panfish fishing had been on the decline. The Lake Leelanau Lake Association stocked Bluegills into the lake in 1996 (5,050), 1999 (5,600), and 2001 (3,845).

Survey History

South Lake Leelanau has a long and diverse survey history. The most recent surveys conducted by Fisheries Division were in 1966, 1978, 1988, 1992, 1993, 1994, 2002, 2005, and 2008. The 1966 survey was conducted to evaluate the Brown Trout stocking. In this survey Fisheries Division used gill nets to collect Brown Trout, Cisco (Lake Herring), Northern Pike, Yellow Perch, Rock Bass, and White Sucker. Fish collected included five Brown Trout (18.5 inch average length), 119 Yellow Perch (7.4 inch average length), two Northern Pike (20.5 inch average length), three Rock Bass, and three White Suckers. All the Brown Trout collected were over 12 inches long, and 27% of the Yellow Perch collected were over 8 inches.

The 1978 survey was again conducted to evaluate the Brown Trout stocking. During this survey Great Lakes gill nets were used. Fish collected included eighteen Brown Trout (20.1 inch average length), thirty-two Walleye (18.7 inch average length), ninety-four Yellow Perch (7.0 inch average length), and minimal numbers of Smallmouth Bass, Northern Pike, Cisco, Smelt, Rock Bass, and White Suckers. Brown Trout and Walleye growth was very good, compared with State average growth rates; the mean growth index value for Brown Trout was +5.6 inches and +2.5 inches for Walleye. Approximately 87 % of the Walleye collected were determined to be Age 3, and indicated that these fish were likely from the 1975 plant of 8,439 fingerlings. The growth rates for Yellow Perch, Cisco, and Northern Pike were slightly below State average, and Smallmouth Bass, Rock Bass, and Smelt were growing at or near State averages.

Fisheries Division also conducted a water analysis of South Lake Leelanau in July 1978. The analysis plotted water temperature and oxygen concentration by depth to create an oxygen profile. South Lake Leelanau was found to be stratified at this time. The thermocline was at 43 feet, with an oxygen concentration of 5 ppm. At 56 feet, the oxygen concentration was 2 ppm.

The 1988 survey was conducted to assess the general fisheries population of South Lake Leelanau. Great Lakes gill nets, as well as large and small mesh fyke nets were used to collect Smallmouth Bass, Brown Trout, Northern Pike, Bluegill, Walleye, Largemouth Bass, Pumpkinseed (Sunfish), White

Sucker, Longnose Gar, and Bowfin. Walleye, Largemouth Bass, Bluegill, and Pumpkinseed were all growing above State average. Northern Pike and Rock Bass were growing close to or slightly slower than State averages, and Yellow Perch and Smallmouth Bass were growing significantly slower than State average. The eighteen Brown Trout collected ranged in size from 14 to 29 inches (5 age groups) and averaged 21.9 inches. The twenty-five Walleye collected averaged 22.5 inches and ranged in size from 14-26 inches (6 age groups). A total of sixty-six Smallmouth Bass were collected in the fyke nets, and they averaged 9.6 inches. Twenty-five percent of the Smallmouth Bass were 12 inches or longer. The Yellow Perch collected in the gill nets averaged 7.0 inches with 42% greater than 7 inches. Of the 125 Bluegills collected during this survey, 91% were larger than 6 inches. It was noted that Bluegill were spawning during the time of this survey, they averaged 7.6 inches, and they were growing very well. Rock Bass were abundant and ranged in size up to 13 inches. Cisco were also common in this survey.

The 1992 survey was conducted to evaluate the survival and growth rates of Walleye fry that were stocked into South Lake Leelanau in 1989 and 1992. Only Walleye were targeted in the survey, and only data on Walleye and Yellow Perch were recorded. Thirty-three Walleye were collected, ranging in length from 12-23 inches with an average length of 16.4 inches. Nearly 58% were legal size. Age-3 (1989 year class) fish were growing slightly below State average. The Age-4 Walleye were growing significantly better than the State average. Observations from the survey indicate Walleye were feeding on small Yellow Perch and had sufficient body fat. They appeared to be in good physical condition with some individuals exhibiting blackspot. Yellow Perch were not described in detail due to the low number of perch collected.

The 1993 survey was the continued the evaluation of survival and growth rates of Walleye fry that were stocked into South Lake Leelanau in 1989 and 1992. Thirty-four Walleye were collected that ranged in size from 11-22.4 inches. Nearly 62% of the Walleye were Age-4 and represented the 1989 plant of 6.1 million fry. The Age-4 Walleye were growing close to the State average (within an acceptable range). The mean growth index for Walleye was -0.25 inches. The presence of other age groups indicates that some natural reproduction was beginning to occur. Thirty Smallmouth Bass were also collected, and ranged from 12-19 inches. Other species collected but not analyzed were Northern Pike, Smallmouth Bass, Largemouth Bass, Rock Bass, Yellow Perch, Longnose Gar, White Suckers, Bowfin, and bullheads.

The 1994 survey was conducted to evaluate the general fisheries population, and again to analyze Walleye growth. Thirty-six Walleye were collected that averaged 16.7 inches, and ranged from 6-23 inches. Slightly more than 70% of these Walleye were legal size (15 inches). Walleye growth was slightly below State average, but within an acceptable range. Age-5 Walleye dominated the catch and were likely the result of the 1989 fry plant. Forty-five Smallmouth Bass were collected that averaged 14.4 inches and ranged from 3-20 inches. Sixty percent were legal size (14 inches) with growth rates slightly better than the State average. Twenty-six Northern Pike that ranged from 13 - 27 inches were collected with an average of 21.8 inches. Approximately 33% were legal size (24 inches). Five hundred-eleven Rock Bass were collected, and nearly 87% were 6 inches or longer. They ranged in length from 2-11 inches, and averaged 8.3 inches. The growth of Age-7, 8, and 9 Rock Bass were significantly below State average, and all other ages were growing within acceptable ranges. Although the Rock Bass were growing slower than State average, the majority of fish collected were large. Other species of fish collected were Longnose Gar, White Sucker, Largemouth Bass, Yellow Perch,

Pumpkinseed, Bluegill, Cisco, Brown Trout, Spottail Shiners, bullheads, and Bowfin. Spottail Shiners were a very abundant forage species collected in this survey.

The 2002 survey conducted on South Lake Leelanau was part of the DNR's large lake survey program. The purpose of the survey was to evaluate the general fisheries population and in particular, Walleye growth. Fisheries Division collected 3,581 Walleye that ranged in size from 6-29 inches. The length at age frequency distribution of Walleye appeared to be slow across most of the thirteen age-classes of Walleye represented. Nine age-classes (Age-2 through Age-10) were found to be growing below State average. Age-groups 11-13 and Age-15 were captured in numbers too low to be statistically compared to State averages. Population estimates for legal-sized Walleye (15 inches) was at least three per acre, based on the lower confidence interval. Fisheries Division considers lakes that have two or more legal-sized Walleye per acre to provide good to excellent fisheries opportunities.

In addition to Walleye, the most abundant fish species collected during the 2002 survey were: White Suckers (1,530), Northern Pike (911), Rock Bass (649), Yellow Perch (515), Bowfin (366), and Smallmouth Bass (293). Fisheries Division also collected Brook Trout, Black Bullhead, Bluegill, Brown Trout, Brown Bullhead, Burbot, Longnose Gar, Largemouth Bass, Pumpkinseed, and Yellow Bullhead. Northern Pike ranged from 9-40 inches, and no growth data was calculated. Rock Bass ranged from 3-12 inches and significantly exceeded the State average growth rate. Yellow Perch ranged from 4-13 inches and their average growth rate significantly exceeded State average. Five age-classes of Yellow Perch were collected, and they were evenly distributed, by age. Smallmouth Bass ranged from 9-20 inches, and no growth data was calculated. Largemouth Bass ranged from 11-19 inches, and their average growth rate significantly exceeded State average. Bluegills ranged from 4-9 inches, and only Age-3 and Age-4 were analyzed for growth. Age-3 Bluegills were growing +1.1 inches above State average.

The 2002 survey indicated good populations of Walleye, Smallmouth Bass, Yellow Perch, Northern Pike, and Rock Bass in South Lake Leelanau based on growth rates, natural reproduction, length at age frequency, and average sizes. Bluegills and Pumpkinseeds are present in the lake, but are not common. The Bluegills and Pumpkinseeds that are in South Lake Leelanau have good growth rates, and have the potential to reach trophy size. Bluegill that qualified for MDNR's Master Angler Program (>10 inches) have been caught in South Lake Leelanau in 1991-1996, and 2000.

2005 and 2008 Fall Walleye Evaluations

On November 3, 2005 and September 23, 2008 Serns Index surveys were conducted on South Lake Leelanau. Serns Index surveys are one-night boomshocking efforts directed at determining year class strength for young-of-the-year and yearling Walleye. In the 2005 survey (Tables 2 and 4) the year class strength for 2005 was estimated at 9,843 fish, and the 2004 year class was estimated at 3,473 fish. Fish from Age 0-9 were represented in the catch, with strong representation noted for Age-3 Walleye (the 2002 year class). Walleye collected in the 2005 survey were growing 1.9 inches below the state average, with all age classes exhibiting negative growth. In the 2008 survey (Tables 3 and 4) the year class strength for 2008 was estimated at 4,646.5 fish, and the 2007 year class was estimated at 6,867 fish. Fish from age groups 0-5, and 8 and 9 were represented in the catch, with strong representation noted for Age-2 (2006 year class) and Age-4 (2004 year class) Walleye. Walleye collected in the 2008 survey were growing 0.9 inches below the state average, with nearly all age classes exhibiting negative growth.

Current Status

The most recent fisheries survey of South Lake Leelanau was conducted in 2015. The survey was comprised of a netting component conducted from June 15 through June 18, seining conducted on July 1, and nighttime electrofishing conducted on July 8. A total of 16,966 fish representing 24 species were collected during all of these efforts combined (Table 5). The most abundant species collected by number was Mimic Shiner (13,369 fish collected), and the most abundant species collected by weight was Longnose Gar (474.2 pounds). The 2015 survey indicated good populations of Walleye, Smallmouth Bass, Longnose Gar, Yellow Perch, Northern Pike, and Rock Bass in South Lake Leelanau based on abundance, natural reproduction, and average sizes. Once again, Bluegill and Pumpkinseed are present in the lake, but not in robust numbers.

In this survey, only Bluegill and Rock Bass exhibited growth which was above the State average length at age (Table 6). Pumpkinseed, Smallmouth Bass, and Yellow Perch were 0.3 inches below State average. Northern Pike (-1.4 inches) and Walleye (-3.4 inches) were significantly below State average. Poor Walleye growth is likely attributed to interspecific competition. In other words, too many predators are present in South Lake Leelanau competing for food and habitat. The Northern Pike, Longnose Gar, and Walleye are all utilizing the same forage found in South Lake Leelanau, and this competition may be affecting growth rates on both Northern Pike and Walleye. Longnose Gar were not aged during this survey.

Analysis and Discussion

Mean Walleye growth rates have decreased every year we have surveyed South Lake Leelanau since 1988. The mean growth index for Walleye collected in 1988 was +3.1, and had dropped to -3.4 in 2015. Every age-class analyzed in 2002 exhibited negative growth, compared to State averages, and this trend has continued in the 2005, 2008, and 2015 surveys. Declining growth rates is indicative of a population that is at capacity of the prey base and available habitat. Data from the 2002, 2005, 2008, and 2015 surveys shows that substantial natural reproduction appears to occur in South Lake Leelanau in each year. The 2002 population estimate for legal-sized Walleye (>15 in.) was at least 3 per acre, based on the lower confidence interval. Therefore, consistent with the slower than State average growth rates, natural reproduction is fully supporting the Walleye population which should be fully adequate to provide for fishing opportunities.

In addition to Walleye, South Lake Leelanau supports good populations of Smallmouth Bass, Northern Pike, Rock Bass, White Suckers, and Yellow Perch. Surveys conducted over the last 40 years indicate that these species exhibit average to above average growth and recruitment rates. The habitat conditions that are conducive to encouraging the sustainability of these species are: 1) an abundant forage base including shiners, White Sucker, and Cisco, 2) cold-water refuge for cool-water species, 3) suitable spawning substrate, and 4) suitable cover (emergent and submergent vegetation, irregular bottom contours, etc.). Bluegill, Pumpkinseed, Brown Trout, and Largemouth Bass are present in South Lake Leelanau, but not common. Fisheries Division has never collected large numbers of Bluegill during our survey efforts, except for the 1988 survey which was conducted during the Bluegill spawning season. The primary emphases of most historical surveys was to evaluate Walleye and Brown Trout populations and were not targeted in areas of the lake you would expect to catch Bluegill. Although data is limited, the Bluegill and Pumpkinseed population in South Lake Leelanau has

exhibited mostly above average growth rates, with trophy potential. Fisheries Division has received numerous comments with concerns from local anglers and the Lake Leelanau Association that the Bluegill fishery has severely declined since Walleye were introduced into South Lake Leelanau. Although Walleye can affect the population density of Bluegill, it is unlikely that Walleye are the sole reason that the Bluegill population has potentially declined over the years. Other factors that affect Bluegill density are: availability of spawning habitat, changes in forage base (which has been affected by the infestation of zebra mussels), and overharvest by anglers, particularly during the spawning season.

The Brown Trout population in South Lake Leelanau has certainly declined since Fisheries Division discontinued the stocking program in 1991. The Brown Trout stocking program was discontinued based on limited use, a transition from Brown Trout to a Walleye stocking program, and unsuitable deep-water habitat. Fisheries Division generated a temperature/oxygen profile in 1978 that indicated low (2 ppm) oxygen concentrations below the thermocline, and 1.8 ppm at 52 feet in 1994. An updated version of the temperature/oxygen profile measured on August 12, 2015 indicated a thermocline at 42 feet down with an oxygen level of 4.16 ppm, and at 52 feet oxygen was 0.75 ppm. Oxygen on the bottom at 59 feet was 0.18 ppm. South Lake Leelanau provides limited deep-water refuge for cold-water species, and the deep water that is available is not suitable for cold-water species in the late summer and early fall due to low oxygen concentrations. The Brown Trout population that is present in South Lake Leelanau is the result of natural reproduction from the Cedar River and its tributaries.

Management Direction

South Lake Leelanau should continue to be managed primarily as a cool-water/warm-water fishery. South Lake Leelanau does not provide optimal summer refuge (low oxygen concentration below the thermocline) for cold water species. Fisheries Division has stocked cold water species in the past, such as Rainbow Trout, Lake Trout, and Brown Trout, with only limited success. Fisheries Division concludes that the decision made nearly sixteen years ago is still appropriate, and South Lake Leelanau should not be stocked with Walleye at this time, or anytime into the foreseeable future. Stocking Walleye on top of a good naturally reproducing population typically results in a stunted population. Given that the current growth rates are far below the State average length at age, stocking additional Walleye would certainly be more detrimental to the health of the current Walleye population. This Walleye fishery is very popular with anglers from across the State, and most anglers report harvesting multiple fish per trip. Given the popularity of this fishery and the fact that it is sustained through natural reproduction, the Walleye population should be monitored occasionally by conducting fish community surveys and through fall walleye evaluations.

DNR Fisheries Division will continue to work with the Lake Leelanau Lake Association and the Leelanau Conservancy to promote wise development in the Lake Leelanau watershed. Department of Environmental Quality permit applications that impact the water quality, habitat, and fisheries of South Lake Leelanau will continue to be reviewed and commented on as needed.

References

Northwest Michigan Council of Governments. 1996. South Lake Leelanau watershed implementation project: land owner participation.

Schneider, J. C. 2000. Manual of fisheries survey methods II: with periodic updates. Michigan Department of Natural Resources, Fisheries Special Report No. 25. Ann Arbor.

Figure 2. DNR Boating Access Sites on South Lake Leelanau.



Table 1. Walleye Survey Summaries.

Survey year	1978		1988		1992		1993		1994		2002		2005		2008	
Number collected	32		25		33		34		36		3414		150		98	
Average length	18.7		22.5		14.9		17.2		16.1		16.3		11.7		10.6	
Mean growth index	2.5		3.1		0.3		-0.25		-0.4		-1.4		-1.8		-0.9	
Age	No.	Av. Le	No.	Av. Le	No.	Av. Le	No.	Av. Le	No.	Av. Le	No.	Av. Le	No.	Av. Le	No.	Av. Le
0									1	6.9			31	7	21	7.1
1													18	10	40	9.8
2			1	14.5			1	11	2*	10.7	13	9.8	12	11.7	7	13.3
3	28	17.7	1*	18.6	13*	13.4	8	13.5	1	13.2	52	12.3	30	13.7	19	15.2
4					14	16.9	21*	15.7	10	15.3	439*	14.5	5*	15.9	3	17.2
5			4	21.6	3	20.3	1	19.4	23*	17.4	757	16.1	10	16	1	19.2
6	2	24.4	14	23.3	3	22.2	1	21.3	3	20.8	798	17.7	5	16.8		
7	1	25.4	5	23.4			2*	22.2	1	23.9	601*	19.1	2*	17.7	*	
8	1	27.8	1	26.2							358	19.7	1	18	2	22.1
9											124	20.9	2	19.9	2	22.9
10											98*	22.1			*	
11											64	23.7				
12											19	24.6				
13											15*	19.9				
14																
15											1	27.3				

*Denotes a year class in which walleye were stocked into South Lake Leelanau.

Table 2. 2005 Lake Leelanau Serns Index Survey Results

Miles of shoreline sampled: 6.0
 Lake Leelanau acreage: 5,370
 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)
2005	0	47	7.83	9843.2	1.833
2004	1	20	3.33	3472.6	0.647
2003	2	14	2.33		
2002	3	44	7.33		
2001	4	5	0.83		
2000	5	10	1.67		
1999	6	5	0.83		
1998	7	2	0.33		
1997	8	1	0.17		
1996	9	2	0.33		

No Serns constant exists for ages older than 1.

Table 3. 2008 Lake Leelanau Serns Index Survey Results

Miles of shoreline sampled: 6.22
 Lake Leelanau acreage: 5,370
 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)
2008	0	23	3.70	4646.5	0.865
2007	1	41	6.59	6867.0	1.279
2006	2	7	1.13		
2005	3	19	3.05		
2004	4	3	0.48		
2003	5	1	0.16		
2000	8	2	0.32		
1999	9	2	0.32		

No Serns constant exists for ages older than 1.

Table 4. Comparison of Lake Leelanau Serns Index Survey Data				
	# walleye captured	Catch Rate (# walleye/mile of shoreline sampled)	Year Class strength estimate	Serns Index (# walleye/surface acre)
2005				
Age 0	47	7.83	9483.2	1.833
Age1	20	3.33	3472.6	0.647
2008				
Age 0	23	3.70	4646.5	0.865
Age1	41	6.59	6867.0	1.279

Table 5. Number, weight, and length of fish collected from South Lake Leelanau with large mesh fyke nets, seines, small mesh fyke nets, trap nets, and inland gillnets June 15- 18, 2015.

Species	Number	Percent by number	Weight (Pounds)	Percent by weight	Length range (inches) ¹	Percent legal size ²
Bluegill	21	0.1%	2.5	0.2%	1-7	29 (6")
Bluntnose Minnow	518	3.1%	0.9	0.1%	1-3	
Brown Trout	4	0.0%	24.7	1.9%	15-28	100 (8")
Bowfin	17	0.1%	74.3	5.8%	19-26	
Brown Bullhead	11	0.1%	5.7	0.4%	6-13	94 (7")
Cisco	5	0.0%	1.4	0.1%	7-13	100 (7")
Creek Chub	1	0.0%	0.0	0.0%	3	
Common Shiner	17	0.1%	0.1	0.0%	2-3	
White Sucker	911	5.4%	57.6	4.5%	1-21	
Hybrid Sunfish	1	0.0%	0.0	0.0%	3	
Iowa Darter	3	0.0%	0.0	0.0%	1-2	
Johnny Darter	8	0.0%	0.0	0.0%	1-2	
Largemouth Bass	3	0.0%	2.9	0.2%	1-17	33 (14")
Longnose Gar	270	1.6%	474.2	36.8%	17-36	
Logperch	14	0.1%	0.2	0.0%	2-3	
Longear Sunfish	27	0.2%	1.0	0.1%	3-4	0 (6")
Mimic Shiner	13,369	78.7%	4.0	0.3%	1-3	
Northern Pike	17	0.1%	48.3	3.7%	13-28	41 (24")
Pumpkinseed	63	0.4%	3.9	0.3%	1-7	3 (6")
Rock Bass	1,142	6.7%	355.3	27.5%	1-11	57 (6")
Sand Shiner	2	0.0%	0.0	0.0%	2-3	
Smallmouth Bass	78	0.5%	56.0	4.3%	1-20	19 (14")
Walleye	174	1.0%	162.4	12.6%	6-20	34 (15")
Yellow Perch	289	1.7%	14.0	1.1%	1-12	11 (7")
Yellow Bullhead	1	0.0%	0.6	0.0%	10	100 (7")
Total	16,966	100.0%	1290.0	100%		

¹Note some fish were measured to 0.1 inch, others to inch group: e.g., "5"=5.0 to 5.9 inch, 12=12.0 to 12.9 inches; etc.

²Percent legal size or acceptable size for angling. Legal size or acceptable size for angling is given in parentheses.

