

### **Clear Lake**

Montmorency County, T32N, R2E, Sections 27, 33, 34  
Cheboygan River watershed, last surveyed fall 2014

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### **Environment**

Clear Lake is located in northern Montmorency County about nine miles north of the town of Atlanta (Figure 1). The natural lake of glacial origin is 133 acres in size and has no inlets or outlets. Its water supply is derived from limited surface runoff from the surrounding terrain and underground seepage. The lake lies within the Cheboygan River watershed, and the Canada Creek/Black River sub-watersheds.

Sand, marl, and some gravel are the dominant substrate with some pulpy peat in the deeper sections of Clear Lake. The deepest part of the lake is over 90 feet with a large percentage of the lake deeper than 30 feet (Figure 2). Water clarity is very good, with a secchi disk reading of 28 feet in summer of 2004. Alkalinity was also measured at 114 ppm that same year. Aquatic vegetation in this rather sterile lake is very limited. Zebra mussels are present in Clear Lake and compete for food with the native fish and plankton community. About half of the shoreline is private, while the other half is public. Thirty five dwellings were present on the lake as of 2004. Clear Lake State Park encompasses the northeast shore of the lake and provides camping facilities. There is also a gravel surface boat launch at this location with ample parking. A day use area which is managed by the state park exists along the southwest shore off County Road 622. In addition, another hard surfaced boat launch exists on the west shore of the lake and provides parking for more than 20 boat trailers. This launch is also managed by the Michigan Department of Natural Resources (MDNR) Parks and Recreation Division.

Clear Lake is classified as a designated trout lake by the MDNR. It is currently managed as a Type B trout lake which is open to fishing all year, all tackle types may be used, and anglers may possess five trout daily of which no more than three can be 15 inches or greater. The minimum size limit is 12 inches for splake, brown trout, and rainbow trout.

### **History**

Pre-1950 fish community and survey data is limited for Clear Lake, but angler surveys are available from the 1930s. A limited survey of anglers was made in the winter of 1933-1934. A more extensive creel census was made by the Michigan Department of Conservation (MDOC) from early July 1934 through July 9, 1935 (Institute for Fisheries Research 1935). Fishing was considered poor in previous years and this census documented limited catches of smallmouth bass, yellow perch, rock bass, white suckers, brook trout, and sunfish. Notes from the survey include: "a relatively large number of undersized fish" were caught, and "food in this lake was a limiting factor." It was from this survey that the lake was considered marginal for warmwater species, but did have potential for trout survival if stocking efforts for cold water species were intensified.

Additional creel surveys were conducted in 1936 and 1937 (Institute for Fisheries Research 1938). Yellow perch again dominated the catch in both years, followed by smallmouth bass and rock bass.

Very few trout were caught by anglers. Brush shelters were added to the lake by MDOC in previous years, and it was believed these were aiding anglers in finding fish more consistently.

Clear Lake was designated as a trout lake in 1940. Trout were typically stocked every year since then. Most trout stocked from this time through 1978 were fingerling rainbow trout, but fingerling splake (hybrid of a brook trout and lake trout) were also stocked from 1964 through 1969. Brook trout fingerlings were stocked on occasion in the 1930s and in 1972. Survival of all fingerling trout stocked during these periods was considered poor from 1940 through 1962. More recent stocking efforts, particularly of yearling trout, can be found in Table 1. The primary fish stocked from 1979 through 2014 was splake at rates ranging from 46-80 per acre. Typical stocking rates of yearling splake have been approximately 50/acre.

Fish community data for Clear Lake in the 1950s is sparse, but it was believed to be an unacceptable fishery and limited by lake productivity. A contract was made between the MDOC and the Atlanta Sportsmans Club to install 25 units of fish shelters into the lake, which was accomplished in 1959. The purpose of this activity was to concentrate fish and increase catch rates by anglers.

Anglers and MDOC personnel were still unsatisfied with the fish community of Clear Lake in the early 1960s. It was too unproductive to produce a good warmwater fish community (smallmouth bass, yellow perch) and growth rates of such desirable species were poor. The potential existed to produce a good coldwater fishery (trout) through stocking efforts, but in order to do so, it was thought the warm water species present in the lake would need to be eliminated or reduced. MDOC personnel again worked with the Atlanta Sportsmans Club to operate trap nets on the lake in the spring of 1960 and 1961. The goal was to remove all white suckers (competing species) that were collected and return all captured game fish back to the lake. Intermittent netting during the spring of both years resulted in the removal of 1,475 white suckers.

Public sentiment in 1963 was highly in favor of chemical reclamation of the lake for trout. Twenty-two out of 26 property owners on the lake were in favor of such a removal and reclamation project, and only one owner voiced opposition. Clear Lake was treated with the chemical rotenone on September 17, 1963 in an attempt to eliminate the unacceptable fish community. It is not known how many fish were killed during the treatment, but angler reports were good for trout following stocking events in the next few years.

By the 1970s, the warm water fish community was again building in Clear Lake to undesirable levels. A fish community survey by MDNR in spring of 1970 indicated fair numbers of rainbow trout and splake were present, as well as white suckers and abundant small yellow perch. The lake was again treated chemically in 1972 and 1973 to remove the undesirable fish community and stocked with trout (and even smallmouth bass) in subsequent years. Fish evaluations by MDNR with gill nets in 1974 and 1978 found rainbow trout were doing well, as were white suckers. Also collected in these nets were smallmouth bass and one rainbow smelt. It appeared at this time that the battle between fisheries managers and the warmwater fish community was being won by the latter. More fish removals were recommended by managers in the late 1970s, but these efforts apparently were never accomplished (possibly due to a changing public sentiment and management perspective).

An on-site creel survey documenting fishing pressure was made by MDNR in 1982 at Clear Lake (Ryckman and Lockwood 1985). Based on aerial counts, Clear Lake was estimated to have 2,040 boat angler hours that summer from May through September. This was low compared to nearby lakes with warmwater fish communities (e.g. Grass Lake 15,895 hours; Avery Lake 19,400 hours; Rush Lake 13,189 hours).

Rainbow trout stocking efforts gave way to splake stocking efforts at Clear Lake by 1990. Splake were known to be a better biological control on stunted yellow perch than rainbow trout which are predominantly insectivores and planktivores. Prior to this change through, MDNR personnel used an unknown number of gill nets to assess the trout community on one day in early November of 1987. Four brown trout and four rainbow trout were collected during the brief survey. This effort was followed up with another survey in mid-October of 1992. Species collected in the gill nets were splake, smallmouth bass, yellow perch, white sucker, rock bass, and one northern pike. The ten splake collected ranged in length from 9-24 inches.

### **Current Status**

A fairly recent fish community survey was conducted at Clear Lake by MDNR Fisheries Division in 2004. Sampling design was based on Fisheries Division's Status and Trends lake survey protocol where effort is a product of lake size. Effort consisted of 10 experimental gill-net lifts, 9 large mesh trap-net lifts, 4 large mesh fyke-net lifts, 3 small mesh fyke-net lifts, 3 maxi-mini fyke-net lifts, and one seine haul. The survey effort was done from May 17-20. Water temperature during the survey was 57F. A limnological lake profile (Table 2) was collected on August 9 of the same year. This profile demonstrated that Clear Lake still had thermal stratification and a high quality coldwater niche. Dissolved oxygen levels suitable for game fish survival and growth (6ppm or more) were found nearly throughout the entire water column when measured in 84 feet of water. Temperature ranged from 72F at the surface to 45F at the bottom. A supersaturation of dissolved oxygen was found between 33 and 60 feet. A secchi-disk (water clarity) reading of 28 feet was measured (indicating extremely high clarity).

A total of 2,639 fish were caught during the 2004 survey (Table 3) and represented by five fish species. The low diversity of the catch was predictable, as this is normal for an oligotrophic lake which is low in natural productivity. The catch was dominated by yellow perch, followed by white sucker, smallmouth bass, rock bass, and then splake. Yellow perch were slightly slow growing and very few fish collected were 8 inches and larger (Table 4). Yellow perch in the 1-3 inch size range were rather abundant. The other panfish, rock bass, were common, and also slightly slow growing. No other sunfish species were collected.

The main predator, smallmouth bass, were abundant and represented by a variety of sizes (Table 4) and ages (Table 5). This species grows well in Clear Lake based on the recent age and growth results. Smallmouth bass reach legal size (14 inches and greater) by about age 4 and good numbers in the 14-16 inch size range can be found.

Splake, the game fish of interest for most Clear Lake anglers, were also captured during the 2004 survey in moderate numbers (Table 3). Most splake captured were recently stocked yearlings, but a few in the 14-15 inch range were also collected (age 2 and 3 year old fish). There continues to be carry over, or survival, of splake in Clear Lake past age-1.

White suckers continue to be a common component of the Clear Lake fish community. They were captured in high numbers (Table 3) and most tended to be very large in size (17-22 inches). Despite the removal efforts of past decades, this species continues to be a prolific competing species in Clear Lake.

Some species captured in past Clear Lake surveys that were not captured during this survey include: rainbow smelt, cisco, largemouth bass, and sunfish (species unknown). Some of these species may still inhabit Clear Lake, but probably in very low numbers and simply were not captured during the 2004 fish community survey.

The next species evaluation to occur at Clear Lake occurred in the fall of 2014. Prior to this however, MDNR received a good number of angler reports at Clear Lake from 2004 through 2014. Nearly all reports have been very positive, with most anglers targeting splake through the winter fishery. Catch reports have indicated that anglers are catching good numbers of both young (yearling) and older splake. One angler report from the 2010-11 winter indicated that splake were so aggressive that they were "catching them on bare hooks". This type of report was verified by multiple anglers and that the fish were mostly skinny or "pencil-like". That was a year which fisheries managers increased stocking rates to 80/acre. High survival of the yearlings and competition for food resources may have contributed to the poor condition and appearance of stocked trout. These stocking rates were quickly reduced to the original 56/acre where they stand today.

In late October 2014 MDNR Fisheries Division personnel assessed the current splake population in Clear Lake with six gill nets set overnight. Four of the gill nets were "straight run" nets with either 2 1/2 or 3 inch mesh across the length of the net. The additional two were experimental gill nets with varied mesh sizes. All nets were 125 feet in length.

Forty-six splake ranging in length from 10-21 inches were collected with the gill nets. Four year classes of splake were observed, from age 1 through age four (Table 6) demonstrating continued carry over or survival from year to year. Mean growth rates at each age observed were greater than the state average length for splake at those ages. Splake collected looked very healthy (see Photos). Also collected in the nets were 36 white suckers, 19 yellow perch, 12 rock bass, and 7 smallmouth bass. Most of the yellow perch were 5-6 inches, although some large yellow perch from 10-13 inches were caught (see Photos).

### **Analysis and Discussion**

The current fish community and environment of Clear Lake can be generally characterized as: 1) an unproductive, oligotrophic community with good water clarity, a strong summer thermocline, and good dissolved oxygen levels throughout most of the water column including in the colder, deeper water, 2) a panfish community with very limited diversity and dominated by small yellow perch with occasional large perch observed, 3) a limited native predator population not dependent on stocking and dominated by smallmouth bass, 4) a cold water species community dominated by stocked splake which continue to survive well, 5) a non-game fish community dominated by white suckers.

The Clear Lake panfish community is low in both diversity and quality. Species available to anglers include only yellow perch and rock bass. Despite the general lack of aquatic vegetation in the lake, perch thrive in Clear Lake and have done so for years. Based on 2004 age and growth information,

perch continue to exhibit slower growth rates when compared to yellow perch growth statewide. Having an efficient predator in the lake that can control juvenile yellow perch (such as splake) is essential in managing perch.

The main predators of Clear Lake are wild smallmouth bass and stocked splake. Smallmouth bass are probably not efficient predators on yellow perch and may target other species such as crayfish and macro-invertebrates. Splake were stocked with the intentions that they would provide a fishery while reducing the abundant small perch population. Both of these intentions are being accomplished, except perch sizes and growth rates have likely not changed. It is highly probable that some perch are being preyed on by larger splake (legal size and larger, or 12 inches and larger).

Catches of white suckers continue to remain high in Clear Lake. This species will remain common here, despite whether sucker removal practices are used or not. Species such as cisco and smelt were occasionally noted in some historical fish surveys, but neither were collected in the recent lake surveys of 2004 and 2014. Despite this, the high quality cold water niche of Clear Lake remains intact.

### **Management Direction**

- 1) The Clear Lake aquatic community should be monitored on a consistent basis, at least every twenty years. The few predators (native smallmouth bass and stocked splake) play a vital role not only in the fishery, but also for overall ecosystem balance. Periodic evaluations of the splake population should be made to determine growth rates and year class survival following stocking. Splake stocking rates should be approximately 50/acre, as this has proven to provide a stable fishery with acceptable growth rates.
- 2) Anglers are urged to report catches of all species to the local MDNR biologist. Sampling gear is not always efficient at capturing some fish, sometimes leaving information gaps for individual species. Such reports are useful for management of the fishery. The current State of Michigan fishing regulations are appropriate for Clear Lake. Splake are managed by Type B trout regulations (where the minimum size is 12 inches, fishing is year around, all tackle types are allowed, and the daily possession limit for splake is 5 fish, of which no more than 3 can be 15 inches or larger). Most splake attain 12 inches in length by the end of their first year. Thus, when stocked as yearlings, many can reach this size by their first fall or winter in Clear Lake, allowing for some harvest.
- 3) Type B regulations are also appropriate for other trout (e.g. rainbow or brown trout) if and when stocked in Clear Lake. The occasional stocking of other trout species, particularly rainbow trout, would add diversity to the fishery and provide for a better open water angling experience. Currently, it is believed that the splake fishery is mostly relegated to a winter fishery. Infrequent stocking events of hatchery surplus rainbow or brook trout would diversify the trout fishery without damaging the rest of the fish community. Rainbow trout are predominantly planktivores and insectivores and the fishery could be monitored easily by periodic evaluations and angler reports.

### **References**

Institute for Fisheries Research. 1935. Creel census for one year on Clear Lake, Montmorency County. Report No. 327, Institute for Fisheries Research, Ann Arbor.

Institute for Fisheries Research. 1938. Creel census on Clear Lake, Montmorency County, 1936, 1937. Report No. 476, Institute for Fisheries Research, Ann Arbor.

Ryckman, J.R., and R.N. Lockwood 1985. On-site creel surveys in Michigan, 1975-82. Michigan Department of Natural Resources Fisheries Division. Fisheries Research Report 1922, Ann Arbor.

Figure 1. Clear Lake, Montmorency County.

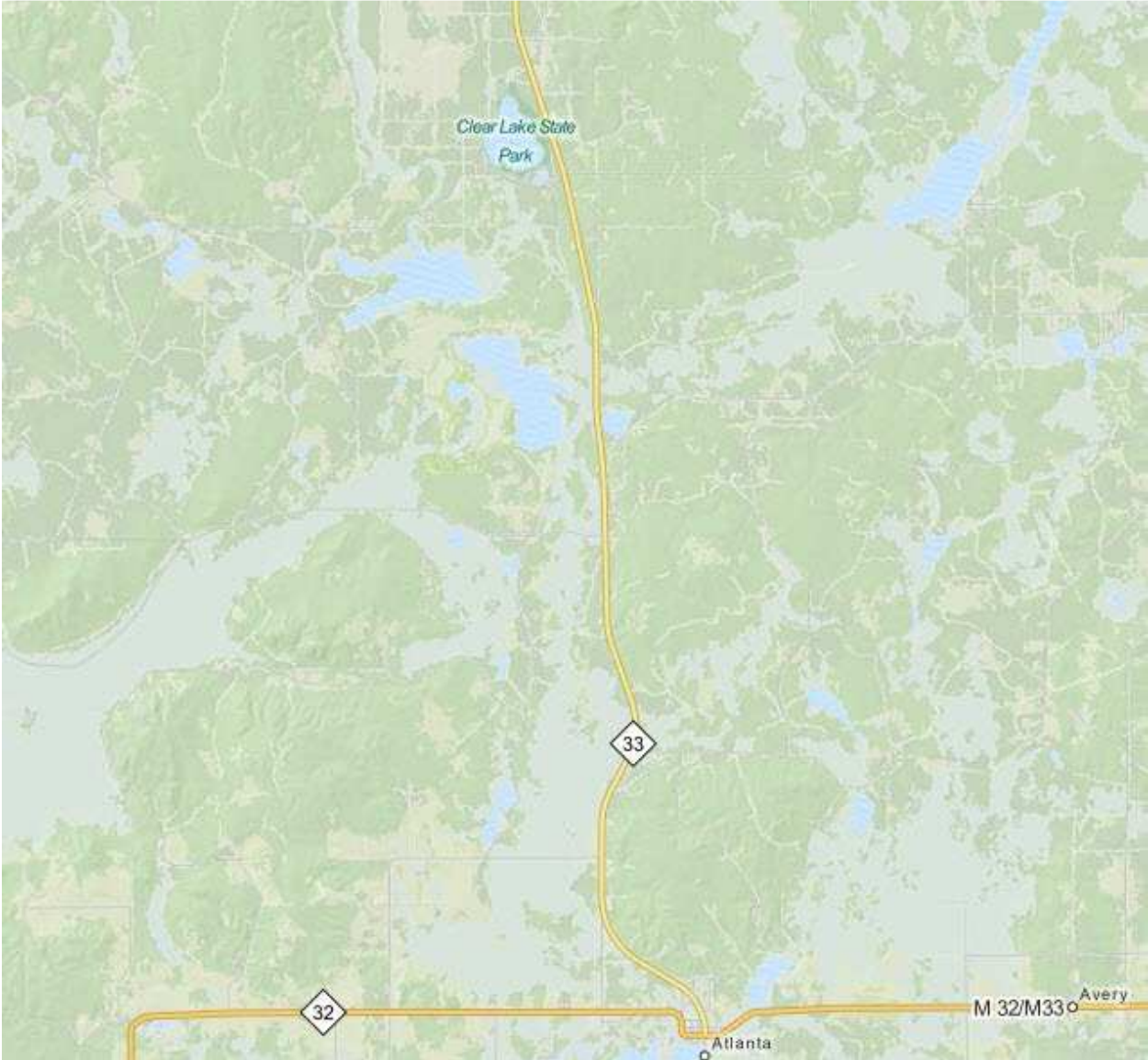


Figure 2. Clear Lake bathymetric map from the 1950s.

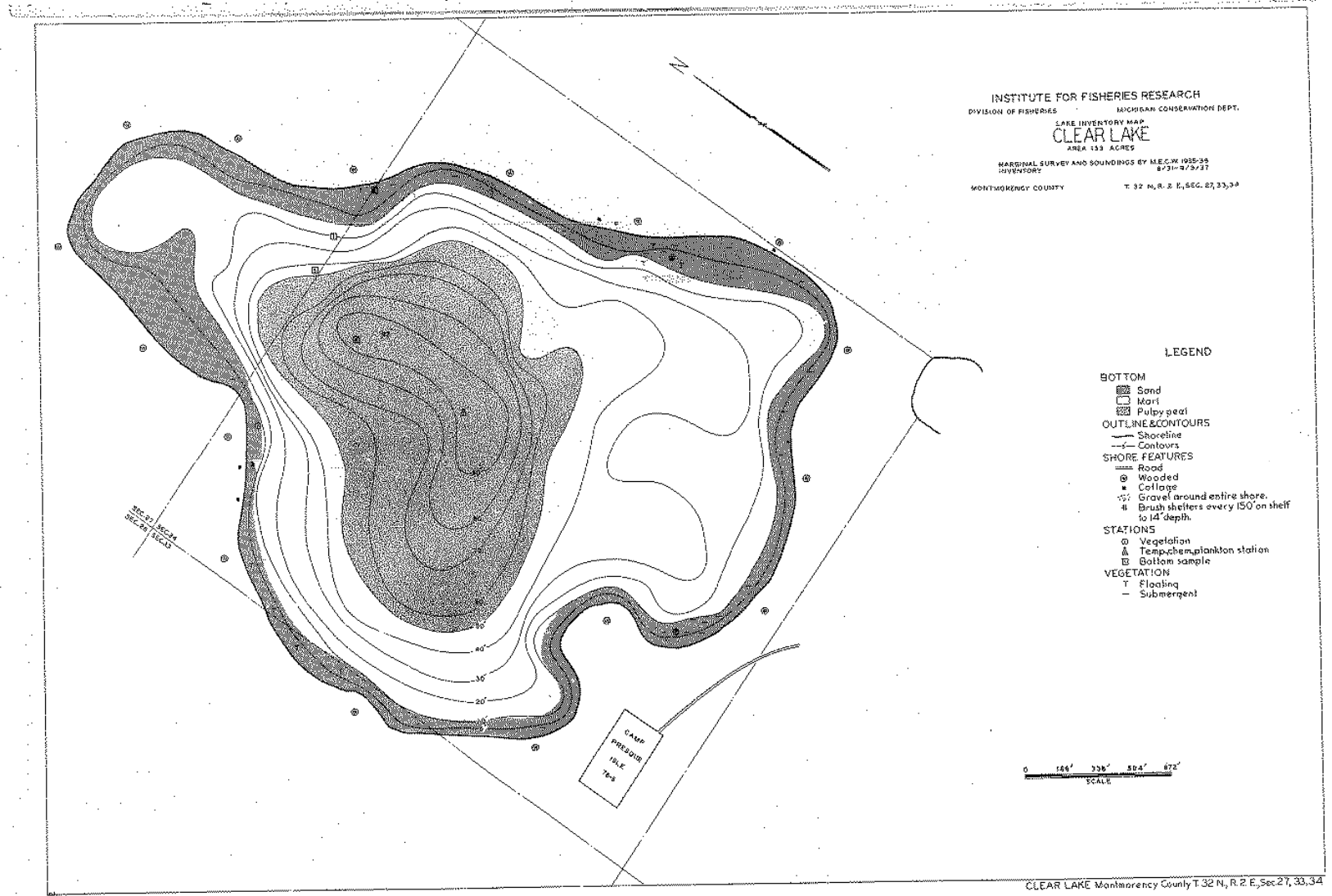




Photo 1. Clear Lake splake and yellow perch gill netted in fall 2014 by MDNR.



Photo 2. Clear Lake splake caught by angler in 2014.



Table 1. Recent trout stocking history for Clear Lake from 1979-2014.

<b>Year</b>	<b>Species</b>		<b>Number</b>	<b>Number/Acre</b>	<b>Avg. Length (in)</b>
1979	Rainbow trout	Michigan	6,500	49	3.8
1980	Rainbow trout	Michigan	6,500	49	3.9
1981	Rainbow trout	Harrietta	6,500	49	6.2
1982	Rainbow trout	Harrietta	6,500	49	7.5
1983	Rainbow trout	Harrietta	6,500	49	6.5
1984	Rainbow trout	Shasta	6,300	47	5.6
1985	Rainbow trout	Shasta	6,500	49	5.7
1986	Rainbow trout	Shasta	6,500	49	7.4
1988	Splake	--	6,000	45	6.7
1989	Rainbow trout	Shasta	7,500	56	7.0
1990	Splake	--	7,500	56	7.0
1991	Splake	--	7,500	56	6.0
1992	Splake	--	7,500	56	6.6
1993	Splake	--	6,990	53	6.3
1994	Splake	--	9,000	68	5.9
1995	Splake	--	7,960	59	6.5
1996	Splake	--	9,000	68	7.2
1997	Splake	--	7,600	57	6.9
1999	Splake	--	8,300	62	6.7
2000	Splake	--	7,200	54	7.0
2001	Splake	--	7,660	58	7.0
2002	Splake	--	7,950	60	7.7
2003	Splake	--	8,100	61	6.9
2004	Splake	--	7,200	54	6.1
2005	Splake	--	9,000	68	6.9
2006	Splake	--	9,000	68	7.3
2007	Splake	--	6,080	46	7.4
2008	Splake	--	7,500	56	7.2
2008	Brook trout	Assinica	5,000	38	5.7
2009	Splake	--	9,000	68	6.8
2010	Splake	--	10,600	80	7.1
2010	Brown trout	Wild Rose	4,551	34	6.8
2011	Splake	--	8,000	60	7.1
2012	Splake	--	7,074	53	8.0
2013	Splake	--	7,448	56	7.9
2014	Splake	--	7,448	56	7.8

Table 2. Water temperature and dissolved oxygen profile for Clear Lake, August 9, 2004.

Depth (ft)	Temperature (F)	Dissolved Oxygen (ppm)
1	72.5	8.8
3	72.5	8.9
6	72.5	9.0
9	72.5	9.0
12	72.5	9.0
15	72.5	9.0
18	72.5	9.0
21	72.5	9.0
24	72.5	9.0
27	72.4	8.9
30	72.1	8.9
33	68.0	12.0
36	64.4	13.7
39	60.8	14.0
42	58.6	13.7
45	56.0	13.7
48	54.3	13.1
51	52.8	12.4
54	51.5	12.1
57	50.3	11.6
60	49.6	10.9
63	48.6	9.9
66	47.7	9.5
69	46.6	8.0
72	45.9	5.5
75	45.7	2.9
78	45.5	1.2
81	45.4	0.6
84	45.4	0.3

Table 3. Species and relative abundance of fishes collected with survey gear at Clear Lake, May 17-20, 2004.

Common Name	Number	Length Range (inches)	Weight (lbs)*	Growth**
Yellow perch	2,139	1 - 8	19.5	-0.4
White sucker	326	13 - 23	739.9	
Smallmouth bass	73	3 - 20	113.0	+1.0
Rock bass	67	1 - 10	15.0	-0.4
Splake	34	7 - 15	13.6	+0.4
<b>TOTAL</b>	<b>2,639</b>		<b>901.1</b>	

\*weight was not measured, but calculated from length-weight relationships for each species

\*\*represents the deviation from statewide average length in inches

Table 4. Length-frequency distribution of fishes collected during the spring 2004 netting survey at Clear Lake.

<b>Length (in)</b>	<b>S. Bass</b>	<b>Splake</b>	<b>Rock Bass</b>	<b>Y. Perch</b>	<b>White sucker</b>
1			3	350	
2				1,079	
3	1		2	675	
4	1		5	10	
5	2		21	12	
6	5		13	11	
7	4	8	12	1	
8		15	9	1	
9	3	2	1		
10	7		1		
11	5				
12	2				
13	6				1
14	10	6			3
15	7	3			10
16	6				6
17	5				21
18	3				34
19	2				25
20	4				54
21					57
22					20
23					3

Table 5. Comparison of mean length (inches) at age for various game fishes of Clear Lake from 2004 to 2014. Number in parentheses represents number aged.

Species	Age group	2004 May	2014 Oct
Yellow perch	I	3.0 (10)	--
	II	4.8 (17)	--
	III	6.5 (13)	--
	IV	7.9 (1)	--
	V	8.5 (1)	--
	VI	--	12.8 (2)
	VII	--	13.3 (4)
	VIII	--	10.4 (1)
Splake	I	8.0 (16)	12.2 (16)
	II	14.6 (8)	15.9 (5)
	III	15.5 (1)	17.2 (7)
	IV	--	21.5 (1)
Smallmouth bass	I	5.7 (4)	--
	II	9.1 (18)	--
	III	11.5 (4)	--
	IV	14.0 (6)	--
	V	14.2 (14)	--
	VI	16.4 (13)	--
	VII	17.8 (3)	--
	VIII	19.4 (3)	--
	IX	20.0 (3)	--
	X	20.6 (2)	--

Table 6. Age and growth subsample of splake collected from six gill net lifts at Clear Lake on October 23, 2014.

<b>Age Group</b>	<b>Number of Fish</b>	<b>Length Range (in)</b>	<b>Mean Length (in)</b>
I	16	10.1 – 13.5	12.2
II	5	15.2 – 16.6	15.9
III	7	16.7 – 17.5	17.2
IV	1	21.5	21.5