

## **Lime Lake**

Leelanau County , T29N/R13W/Sec.23  
Last surveyed May 2010

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### **Environment**

Lime Lake is a 670-acre lake located in Leelanau County, Michigan, approximately two miles north of the Village of Maple City. Lime Lake has a maximum depth of 65 feet, and extensive shoal areas with depths less than 15 feet (Figure 1). Substrate in Lime Lake is predominately sand and marl, with some areas of cobble and gravel present. Vegetation in Lime Lake is sparse, though there is some emergent vegetation near the shoreline and some small submerged weed beds in water from 5 to 20 feet deep.

Approximately 50-60% of the shoreline is developed with homes and cottages, and the surrounding land is predominately forested and residential. Lowland swamps dominated by cedar, hemlock, and birch trees surround the lake, while rolling hillsides with upland hardwoods and conifers round out the nearby landscape. The northeastern corner of the lake has some slabwood on the bottom, remnant from the Lime Lake Lumber Company mill that was constructed around 1880 (NPS 2011). Timber was harvested from the land surrounding Lime and Little Traverse Lakes, cut at the mill, and then hauled down a 3-mile plank road to Good Harbor Bay for shipping (NPS 2011).

The land in the Lime Lake watershed is characterized by a variety of soil types including Kalkaska series sands along the west and south sides of the lake, Leelanau-East Lake loamy sands along the east side of the lake, Eastport sands between Lime Lake and Little Traverse Lake, and Lupton-Markey muck soils along Lime Creek and Shetland Creek.

Lime Lake is fed by several hillside seeps, springs, and small creeks, with the largest being Lime Creek which flows in at the southern end of the lake. Shetland Creek flows out of the north end of Lime Lake and into Little Traverse Lake, and from there Shalda Creek flows out of Little Traverse Lake and into Good Harbor Bay on Lake Michigan (Figure 2). Migratory fish from Lake Michigan have access to Lime Lake through this connection in years of high water or when there are no natural obstructions (beaver dams); Fisheries Division staff have historically observed Chinook salmon spawning in Lime Creek. The four tributaries that feed Lime Lake on the southern end (including Lime Creek) are all Type 1 designated trout streams, Shetland Creek from Lime Lake to Little Traverse Lake is a non-designated stream, and Shalda Creek from Little Traverse Lake to Lake Michigan is a Type 4 designated trout stream.

Type 1 designated trout streams are open to fishing from the last Saturday in April to September 30th. Any tackle type may be used and the streams have a possession limit of 5 fish per day, with no more than 3 fish 15" or greater. Brook trout must be 7" or more, brown trout must be 8" or more, and Chinook salmon, coho salmon, rainbow trout, and lake trout must be 10" or more in order to harvest. Non-designated streams are open all year with an 8" minimum size limit and a 5 fish possession limit, with no more than 3 fish 15" or greater (with the exception that up to 5 Chinook or coho salmon 15" or greater may be harvested). Type 4 designated trout stream are open to fishing for the entire year. Any tackle type may be used and the streams have a possession limit of 5 fish per day, with no more than 3

fish 15" or greater. Brook trout must be 8" or more, brown trout must be 10" or more, and Chinook salmon, coho salmon, rainbow trout, and lake trout must be 10" or more in order to harvest.

Lime Lake is a Type C designated trout lake that is open to trout fishing for the entire year. In Type C lakes all tackle types may be used and the lake has a possession limit of 5 trout per day, with no more than 3 trout 15" or greater. The lake is accessible via a Michigan Department of Natural Resources (MDNR) public boat launch. This launch is located on the southwestern shore of the lake and has one dock, two slips to launch and retrieve boats, vault toilet facilities, and approximately six gravel parking spaces.

The Lime Lake Association is the only riparian association that is currently active on Lime Lake. The Cedar Rod and Gun Club in nearby Cedar, MI is a local sportsman's group that has historically been interested in the management of Lime Lake. MDNR Fisheries Division often receives fishing reports from both local and out-of-town anglers.

The Leelanau Conservancy actively manages the Teichner Preserve, which is a 41-acre parcel of property located on the northeast shore of Lime Lake. This property was gifted to the conservancy in 1996, and includes 200-feet of lake frontage, uniquely forested lowland, and extensive wetlands (Leelanau Conservancy 2011). The property is open to the public for guided tours and hiking.

## **History**

### **STOCKING**

According to Fisheries Division records, Lime Lake was first stocked with walleye fry in 1910 (Table 1). A mixture of cold and coolwater species such as lake trout, walleye, bluegill, smallmouth bass, largemouth bass, yellow perch, and northern pike were stocked from 1920 until 1949. At this time the Michigan Department of Conservation (MDOC, precursor to today's MDNR) switched the focus of Lime Lake to the management of trout and began stocking rainbow trout. During the 1960's the trout fishery declined and the MDOC stocked a mix of brown trout and rainbow trout in order to determine which species would create a better fishery. In 1968 the MDOC decided to stock brown trout exclusively. With the exception of 1987 when both brown trout and rainbow trout were stocked, and 1969 and 1991 when no fish were stocked, Lime Lake has been stocked with brown trout annually from 1968 to 2011 (Fisheries Division files, Cadillac).

Lime Creek was also stocked by the MDOC for a number of years (Table 2). Brook trout were first stocked in 1933, annually from 1935 to 1944, and for one final year in 1949 before this stocking was discontinued.

### **TRIBUTARY SURVEYS**

One un-named tributary (T29N/R13W/Sec.35) to Lime Lake was sampled by the Michigan Department of Conservation (MDOC) in September of 1960. The crew sampled from the South Lime Lake Road crossing to a point 200 feet upstream using a backpack electroshocking unit. The stream was described as rapid, averaging 3.5 feet in width, and approximately 6 inches deep. A total of 7 brook trout, 16 rainbow trout, and 4 slimy sculpin were collected.

Shetland Creek, the outlet to Lime Lake, was first sampled by the MDOC in September of 1960. Seventy-five yards of stream heading upstream from the M-22 bridge near Little Traverse Lake were

sampled using a backpack electroshocking unit. The stream was described as rapid, with an average width of 22 feet, and approximately 14 inches deep. A total of 25 common shiners, 25 bluntnose minnows, 14 creek chubs, 9 rock bass, 8 hornyhead chubs, 7 white suckers, 6 Iowa darters, 4 Johnny darters, 1 rosyface shiner, 1 logperch, and 1 mottled sculpin were collected.

Shetland Creek was again sampled by the MDOC in June of 1965, this time sampling 100 yards upstream from the M-22 bridge with a backpack electroshocking unit. A total of 8 rock bass, 6 common shiners, 5 spotted shiners (more than likely spottail shiners), 5 black-chin shiners, 2 log perch, 1 white sucker, and 1 darter were collected.

### **LIME LAKE SURVEYS**

Lime Lake was first surveyed by the Michigan Department of Conservation (MDOC) in August 1947. A limnological profile including water temperature, carbon dioxide, and dissolved oxygen was collected. This limnological profile was completed again in August 1949 and also included pH. In January 1948 the lake was mapped and a few anglers were contacted to discuss fishing on the lake. In July 1948 the first fisheries survey was completed using two 125-foot experimental gill nets, one 275-foot 2¼ inch bar mesh gill net, and one 125-foot 1¼ inch bar mesh gill net all set for one night. MDOC personnel also speared with an underwater light for three hours to collect fish. This initial survey collected yellow perch, smallmouth bass, rock bass, cisco, white sucker, bluegill, and walleye.

In August 1959 Lime Lake was treated with the chemical toxaphene at the rate of 2.3 ppm. This chemical reclamation was intended to be a partial kill, aimed at reducing the number of undersized perch in the lake. Following this treatment the lake was sampled in May 1960. In this survey two gill net gangs were set using 125-foot experimental gill nets and a 2 inch bar mesh gill net, for one net night each. This survey only caught rock bass and white suckers. The survey was repeated again in July 1960 using two gangs of 125-foot experimental gill nets and collected rainbow trout and common shiners, along with more rock bass and white suckers.

Lime Lake was scheduled to be treated with toxaphene again in 1964; however negative public reaction to this management action led MDOC biologists to cancel the treatment and remove the lake from the chemical rehabilitation program.

The next fisheries survey on Lime Lake occurred in June 1965. Twelve trap nets, two gill nets, and two fyke nets were set for two net nights. Smallmouth bass, brown trout, largemouth bass, white sucker, yellow perch, and rock bass were all collected. This survey also marked the first time that MDOC personnel collected alewife from Lime Lake. Fisheries managers had originally thought the alewife could present a problem in Lime Lake; however they have turned out to be a valuable forage species.

A limnological profile including water temperature, dissolved oxygen, hardness, and alkalinity was collected in August 1973, and provided comparable results to earlier limnological profiles. In September of 1973, six 125-foot experimental gill nets were set four consecutive net nights. White suckers, rock bass, and smallmouth bass made up the majority of the catch, while brown trout, alewife, largemouth bass, common shiners, bluegill, and northern pike were also collected. Despite only collecting four brown trout in this survey, those four fish were all over 20 inches in length and averaged 6 pounds each.

An electrofishing survey was conducted in July 1976 with the goal of determining the relative abundance of minnows in Lime Lake. Approximately 90% of the shoreline was sampled over 2.5 hours, and very few fish were observed. Smallmouth bass, shiners, yellow perch, bluegill, rock bass, and white sucker were all observed, but not in large numbers. Surveyors also noted a lack of nearshore structure and vegetation, which may explain why the electroshocking was less effective.

In May 1985 small mesh fyke nets, large mesh fyke nets, and experimental gill nets were used to survey Lime Lake. Rock bass dominated the catch, along with yellow perch and common white suckers. Good numbers of brown trout, smallmouth bass, common shiners, and bluegill were also collected. A limnological profile was again conducted in July 1985.

Another survey was conducted in July 1993 in order to evaluate the success of the brown trout stocking, and included both a limnological profile and a netting survey. One small mesh fyke net, four large mesh fyke nets, and ten 125-foot experimental gill nets were set for a total of three net nights. Species collected in this survey included brown trout, smallmouth bass, alewife, white sucker, rock bass, yellow perch, bluegill, bullhead, green sunfish, and pumpkinseed sunfish. A total of 51 brown trout were collected, with nearly 75% of these being fish that had been stocked earlier in the year. The brown trout collected from other year classes (ages 2- 5) ranged in size from 12 to 25 inches in length. Brown trout growth rates were slightly better than state average, while rock bass growth rates were significantly better than state average. Bluegill, yellow perch, and smallmouth bass were all growing slightly below state average.

In June 1999, one small mesh fyke net, three large mesh fyke nets, and six 125-foot experimental gill nets were set for four nights in order to evaluate the success of the brown trout stocking efforts (Tonello 2002). Only six brown trout were collected, which was significantly less than the 51 brown trout collected in the 1993 survey. Alewife, brown bullhead, bluegill, fathead minnow, pumpkinseed sunfish, rock bass, spottail shiner, white sucker, yellow perch, and smallmouth bass were also collected. Seventy-two smallmouth bass were caught ranging from 2 to 19 inches, and representing ten different age classes.

The MDNR Fisheries Division Master Angler program has had ten entries from Lime Lake since 1992. These entries have included five bluegill, four rock bass, and one 22-inch, 5.12-pound smallmouth bass.

### **Current Status**

The most recent Lime Lake fisheries survey was conducted in 2010 using Status and Trends protocols (Wehrly et al. 2009), and was intended to evaluate the success of brown trout stocking. Three trap nets, one fyke net, one mini fyke net, and six inland gill nets ganged in sets of two were set from May 17 to May 20 for a total of 21 net nights of fishing. Three 600-second electrofishing transects were performed on July 1 according to protocol (Wehrly et al. 2009).

During the 2010 survey a total of 1,912 fish representing 19 species were caught (Table 3). Rock bass, yellow perch, and spottail shiners comprised the largest portion of the catch. A total of 1,203 rock bass made up 63% of the catch by number, ranging from 2 to 11 inches in length. Additionally rock bass represented 38% of the total catch by weight with 194 total pounds. Yellow perch represented 28% of the total catch by weight with 186 individuals collected.

Game fish caught in the 2010 fisheries survey included brown trout, smallmouth bass, largemouth bass, yellow perch, longear sunfish, bluegill, and northern pike. Although smallmouth bass only represented 3.7% of the catch by number, they represented 85.4% of the catch by weight with 71 individuals ranging in size from 3 to 20 inches. Twenty-eight brown trout ranging in size from 6 to 14 inches represented 6.9% of the total catch by number.

Scale samples were collected in the May netting survey from bluegill, brown trout, largemouth bass, northern pike, rock bass, smallmouth bass, and yellow perch to be aged and compared to the State average length at age. Most species caught in May had growth rates slightly below the State average length at age (Table 4). Bluegill and rock bass were the only two species with growth rates above State average. Yellow perch growth rates were significantly below State average. Not enough largemouth bass or northern pike from any one age class were collected to make statistical inferences regarding age and growth; however as individuals the northern pike were growing above State average and the largemouth were growing below State average.

Scale samples were collected in the July electrofishing survey from rock bass, yellow perch, and smallmouth bass to be aged and compared to the State average length at age (Table 5). Not enough smallmouth bass or yellow perch from any one age class were collected to make statistical inferences regarding age and growth; however rock bass were growing just slightly below State average. As individuals, both the smallmouth bass and yellow perch were growing either just below or right at the State average.

### **Analysis and Discussion**

The 2010 MDNR fisheries survey showed Lime Lake hosts a healthy fish community with abundant species diversity. Game fish species collected include brown trout, largemouth bass, northern pike, and smallmouth bass. Brown trout were represented by two year classes (ages 1 and 3), indicating that some holdover of stocked trout is occurring. Smallmouth bass were represented by 10 year classes (ages 2-9 and ages 11-12) and are growing at a fairly good (-0.1 inches) pace compared to the State average. Very few largemouth bass or northern pike were collected. It is important to note that in the time that Lime Lake has been a managed fishery, northern pike have only occurred in low densities (some reported in the 1948 creel, one collected in the 1973 survey, and two collected in the 2010 survey). In Lime Lake where maintaining a trout fishery is one of the management goals it is critical to keep northern pike densities low to reduce predation on stocked trout.

Panfish species collected in the survey include bluegill, yellow perch, longear sunfish, and rock bass. Yellow perch were represented by five year classes (ages 3-6 and age 10), and exhibited very slow growth rates compared to the State average (-1.2 inches). This supports angler comments we have received about Lime Lake, as most anglers report catching low numbers of very large perch, mostly in the winter months or early spring. Rock bass were represented by eight year classes (ages 3-10) and were growing above State average (+0.5 inches).

There are notable differences between the fish communities collected in the 2010 fisheries survey and the fish communities collected in the prior surveys. A sharp decline occurred in alewife numbers from the 1999 survey. This could partially be attributed to gear bias, as more fyke nets were used in the 1999 survey. Fyke nets could be more effective at collecting alewife than the trap nets used in the 2010

survey. It could also be due to the fact that connectivity between Lime Lake and Lake Michigan has declined over the years. Both Shalda Creek and Sheltland Creek have experienced low water, beaver activity, and other blockages which may be preventing migratory species from reaching Lime Lake as they have in the past. Species absent from the 2010 catch included pumpkinseed sunfish, green sunfish, and fathead minnows. New species collected in the 2010 survey included longear sunfish, creek chub, bowfin, Johnny darter, mimic shiner, and sand shiner. Based on the three species of sunfish that have shown up in the catch through the years, there is potential that hybridization of panfish is making identification difficult.

### **Management Direction**

Any remaining riparian wetlands adjacent to Lime Lake and its tributaries should be protected as they are critical to the continued health of the watershed. Future unwise riparian development and wetland loss may result in deterioration of the water quality and aquatic habitat. Healthy biological communities in inland lakes and streams require suitable natural habitat. Human development within the watershed, along the shoreline, or within the littoral zone has a tendency to change and diminish natural habitat. Appropriate watershed management is necessary to sustain healthy biological communities, including fish, invertebrates, amphibians, reptiles, birds and aquatic mammals. Generally for lakes this includes maintenance of good water quality, keeping nutrients balanced, preservation of natural shorelines; especially shore contours and vegetation, and preservation of bottom contours, vegetation, and woody structure within the lake. Guidelines for protecting fisheries habitat in inland lakes can be found in Fisheries Division Special Report 38 (O'Neal and Soulliere 2006). Additionally, dredging of the littoral zone should be avoided if possible on Lime Lake, particularly where gravel and cobble substrates are located. Most of the nearshore properties that are developed on Lime Lake have gravel and cobble substrates present. This nearshore habitat is critical for a number of important Lime Lake fish species, as gravel and cobble substrates provide spawning habitat and also host many important aquatic invertebrates that help to sustain healthy fish populations.

MDNR Fisheries Division should work collaboratively with the Lime Lake Association, MDEQ, National Park Service, and various non-profit environmental agencies (Leelanau Conservancy and the Leelanau Conservation District, etc.) to identify aquatic connectivity barriers and sustain or enhance aquatic connectivity among all the basins within the Lime Lake watershed, specifically Lime Creek, Shetland Creek, Shalda Creek, and Little Traverse Lake. Enhanced aquatic connectivity will help sustain healthy fish populations into the future.

Native species like smallmouth bass, rock bass, and yellow perch should continue to thrive in Lime Lake. During the 2010 survey the number and size range of these particular species were indicative of healthy populations. In particular, the smallmouth bass population in Lime Lake is exceptional, and Lime Lake has an excellent reputation among anglers for its smallmouth bass fishery. The brown trout stocking program for Lime Lake should continue. We receive many comments from anglers who appreciate the stocking program and pursue the stocked brown trout. The suggested brown trout stocking rate of 20 fish/acre (13,400) is well within the recommended Michigan guidelines of 46 fish/acre (Dexter and O'Neal 2004) and should continue on an annual basis.

Although the current Lime Lake northern pike densities appear low, this lake should be a candidate for a no minimum size limit classification and 5 fish per day limit for northern pike.

MDNR Fisheries Division should survey Lime Lake again within the next five to ten years in order to continually assess the fish community and evaluate our brown trout stocking efforts. Fisheries Division should also survey the major tributaries to Lime Lake to better understand their contributions to this watershed. Many of these streams have never been surveyed or have not been surveyed in many years.

### **References**

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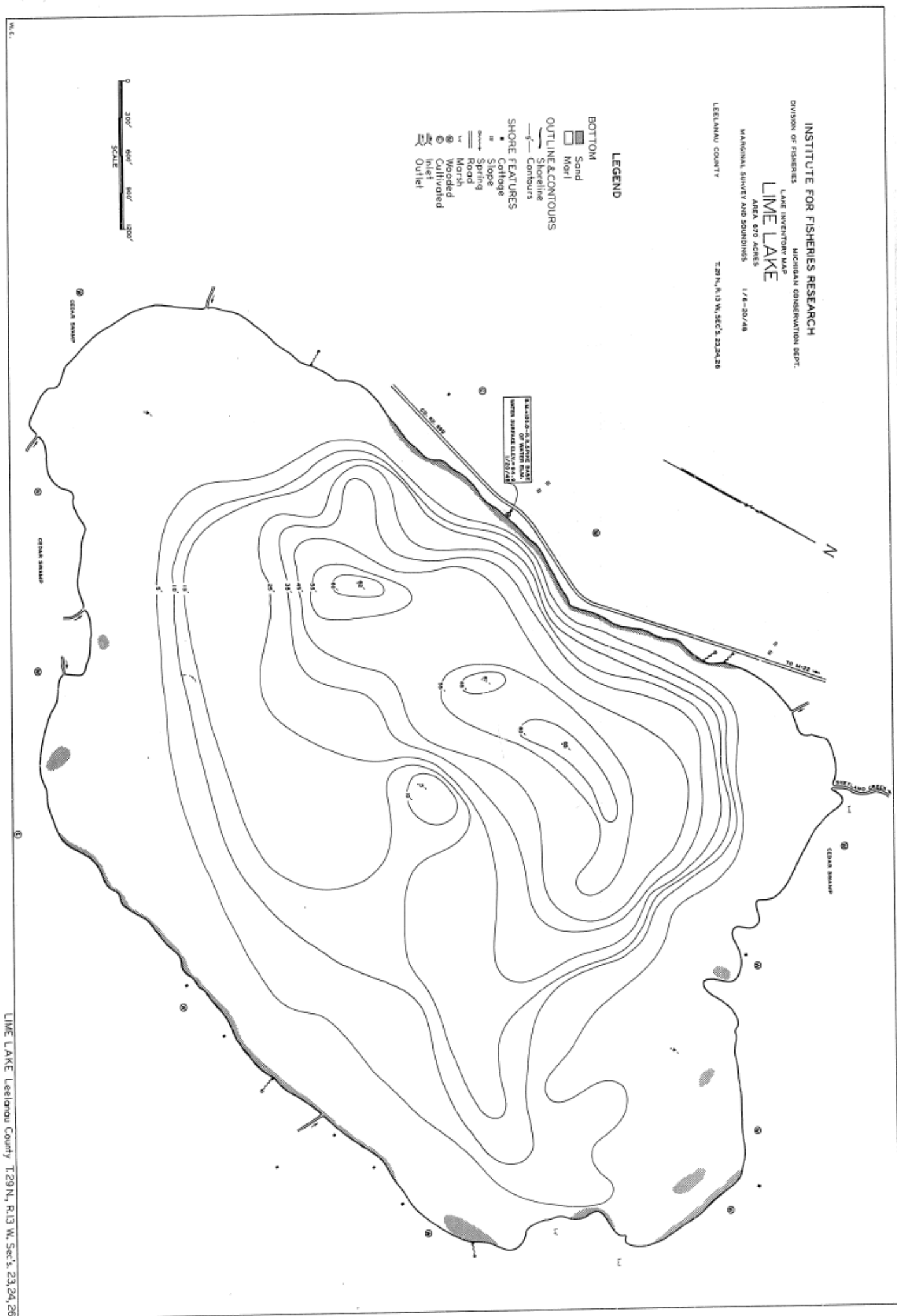


Figure 2. Lime Lake (Good Harbor Bay) Watershed.



**Table 1. History of fish stocking in Lime Lake, Leelanau County, 1910-2010.**

Year	Species	Number of Fish	Size	Year	Species	Number of Fish	Size
1910	Walleye	80,000	Fry	1971	Brown trout	3,000	Yearlings
1933	Lake trout	1,000	Yearlings	1972	Brown trout	10,000	Yearlings
1935	Lake trout	3,000	Yearlings	1973	Brown trout	6,700	Yearlings
	Smallmouth bass	2,000	Fingerlings	1974	Brown trout	6,700	Yearlings
	Bluegill	5,000	Fingerlings	1975	Brown trout	6,700	Yearlings
1936	Northern pike	90,000	Fry	1976	Brown trout	6,700	Yearlings
	Smallmouth bass	700	Fingerlings	1977	Brown trout	6,700	Yearlings
1937	Northern pike	90,000	Fry	1978	Brown trout	6,700	Yearlings
	Smallmouth bass	500/500	Fingerlings	1979	Brown trout	3,200	Yearlings
	Largemouth bass	500	Fingerlings	1980	Brown trout	3,000	Yearlings
	Bluegill	5,000	Fingerlings	1981	Brown trout	3,000	Yearlings
1938	Northern pike	100,000	Fry	1982	Brown trout	3,000	Yearlings
	Yellow perch	10,000	Fingerlings	1983	Brown trout	3,000	Yearlings
	Largemouth bass	1,000	Fingerlings	1984	Brown trout	4,000	Yearlings
	Bluegill	30,000	Fingerlings	1985	Brown trout	4,130	Yearlings
1939	Northern pike	100,000	Fry	1986	Brown trout	5,500	Yearlings
	Largemouth bass	500	Fingerlings	1987	Brown trout	5,800	Yearlings
	Bluegill	20,000	Fingerlings		Rainbow trout	7,600	Yearlings
1940	Northern pike	60,000	Fry	1988	Brown trout	7,000	Yearlings
	Largemouth bass	1,000	Fingerlings	1989	Brown trout	6,000	Yearlings
	Smallmouth bass	500	Fingerlings	1990	Brown trout	7,125	Yearlings
	Bluegill	100	Yearlings	1992	Brown trout	5,900	Yearlings
1941	Smallmouth bass	300	Fingerlings	1993	Brown trout	8,000	Yearlings
	Bluegill	2,000	Fingerlings	1994	Brown trout	6,700	Yearlings
1942	Smallmouth bass	300	Fingerlings	1995	Brown trout	5,394	Yearlings
	Largemouth bass	100	Fingerlings	1996	Brown trout	5,698	Yearlings
1943	Bluegill	5,200	Yearlings	1997	Brown trout	7,050	Yearlings
1944	Smallmouth bass	450	Fingerlings	1998	Brown trout	5,800	Yearlings
	Largemouth bass	500	Fingerlings	1999	Brown trout	6,000	Yearlings
	Bluegill	1,000	Fingerlings	2000	Brown trout	8,000	Yearlings
1949	Rainbow trout	5,000	Yearlings	2001	Brown trout	6,300	Yearlings
1950	Rainbow trout	5,000	Yearlings	2002	Brown trout	6,330	Yearlings
1951	Rainbow trout	5,000	Yearlings	2003	Brown trout	13,700	Yearlings
1952	Rainbow trout	5,000	Yearlings	2004	Brown trout	13,500	Yearlings
1959	Rainbow trout	5,000	Yearlings	2005	Brown trout	13,400	Yearlings
1960	Rainbow trout	11,000	Fingerlings	2006	Brown trout	14,300	Yearlings
1961	Rainbow trout	3,000	Yearlings	2007	Brown trout	12,300	Yearlings
1964	Brown trout	7,000	Yearlings	2008	Brown trout	13,500	Yearlings
1965	Brown trout	10,000	Fingerlings	2009	Brown trout	15,800	Yearlings
1966	Rainbow trout	5,000	Yearlings	2010	Brown trout	16,275	Yearlings
1968	Brown trout	5,000	Yearlings	2011	Brown trout	13,400	Yearlings
1970	Brown trout	5,000	Yearlings				

**Table 2. Historic fish stocking in Lime Creek, 1933-1949.**

Year	Species	Number of	
		Fish	Size
1933	Brook trout	5,000	Fingerling
1935	Brook trout	5,000	Fingerling
1936	Brook trout	2,000	Fingerling
1937	Brook trout	5,000	Fingerling
1938	Brook trout	2,000	Fingerling
1939	Brook trout	1,500	Fingerling
1940	Brook trout	1,500	Fingerling
1941	Brook trout	2,000	Fingerling
1942	Brook trout	50	Yearlings
1943	Brook trout	250	Yearlings
1944	Brook trout	2,000	Fingerling
1949	Brook trout	2,000	Fingerling

**Table 3. Number, weight, and length of fish collected from Lime Lake with the use of trap nets, inland gill nets, boom shocking, and minnow seines in May and July 2010.**

Species	Number	Percent by number	Weight (lbs)	Percent by weight	Length Range (inches)
Alewife	5	0.3	0.2	0.0%	4 to 5
Bluegill	45	2.4	4.7	0.9%	2 to 6
Bluntnose minnow	7	0.4	0.1	0.0%	1 to 3
Brown trout	28	1.5	6.9	1.3%	6 to 14
Bowfin	1	0.1	4.6	0.9%	23
Brown bullhead	3	0.2	2	0.4%	10 to 11
Creek chub	1	0.1	0	0.0%	3
Common shiner	50	2.6	1	0.2%	2 to 6
White sucker	103	5.4	170.8	33.1%	3 to 19
Johnny darter	1	0.1	0	0.0%	2
Largemouth bass	1	0.1	2	0.4%	15
Longear sunfish	29	1.5	1.2	0.2%	2 to 4
Mimic shiner	7	0.4	0	0.0%	1 to 2
Northern pike	2	0.1	11.8	2.3%	27 to 31
Rock bass	1,203	62.9	194.7	37.8%	2 to 11
Sand shiner	7	0.4	0	0.0%	2
Smallmouth bass	71	3.7	85.4	16.6%	3 to 20
Spottail shiner	162	8.5	2.4	0.5%	2 to 5
Yellow perch	186	9.7	28.1	5.5%	3 to 13
Total	1912	100	515.9	100%	

**Table 4. Average total weighted length (inches) at age and growth relative to the state average for fish sampled from Lime Lake with large mesh fyke nets, trap nets, inland gill nets, and experimental gill nets May 17-20, 2010.**

Species	I	II	III	IV	Age V	VI	VII	VIII	IX	X	XI	XII	Mean Growth Index
Bluegill	...	4.80 (2)	5.34 (22)	...	...	...	...	...	...	...	...	...	+0.3
Brown trout	7.80 (22)	...	14.30 (1)	...	...	...	...	...	...	...	...	...	-0.6
Largemouth bass	...	...	...	...	...	...	...	...	15.8 (1)	...	...	...	**
Northern pike	...	...	27.20 (1)	...	...	...	...	...	31.80 (1)	...	...	...	**
Rock bass	...	...	4.34 (23)	6.38 (19)	7.89 (17)	8.74 (9)	9.75 (3)	10.28 (8)	10.85 (3)	11.08 (4)	...	...	+0.5
Smallmouth bass	...	7.26 (13)	9.76 (23)	11.40 (2)	14.40 (3)	16.05 (2)	17.25 (6)	18.00 (3)	18.83 (4)	...	19.73 (3)	20.9 (1)	-0.1
Yellow perch	...	...	6.37 (4)	6.62 (16)	7.09 (17)	10.13 (3)	...	...	...	13.50 (1)	...	...	-1.2

\*\* Mean growth index can only be calculated for age groups with five or more individuals.

**Table 5. Average total weighted length (inches) at age and growth relative to the state average for fish sampled from Lime Lake with electroshocking equipment on July 13, 2010**

Species	Age						Mean Growth Index
	I	II	III	IV	V	VI	
Rock bass	2.27 (6)	...	...	...	...	...	-0.1
Smallmouth bass	4.18 (4)	...	...	...	...	...	**
Yellow perch	3.10 (1)	...	5.50 (2)	...	...	...	**

\*\* Mean growth index can only be calculated for age groups with five or more individuals.