Little Traverse Lake
Leelanau County (T29N,R13W,Secs.10-15)
Good Harbor Bay Watershed

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Environment

Little Traverse Lake is a 640 acre lake located in north central Leelanau County, just south of Good Harbor Bay, Lake Michigan. Little Traverse Lake and Lime Lake, along with their tributaries, make up the Good Harbor Bay watershed (Figure 1). The surrounding topography is wooded, with adjacent sand dunes, rolling hillsides, and lowland cedar swamps. The land around Little Traverse Lake is characterized by an association of soils comprised of East Lake-Eastport-Lupton types, which are typically well drained and gently sloping sandy soils in upland areas, turning into poorly drained, level, mucky soils on lake terraces and beach ridges. While Little Traverse Lake is moderately developed with homes and cottages, much of the surrounding shoreline has been left unarmored.

Numerous small seeps and creeks drain the surrounding hillsides and feed Little Traverse Lake. Shetland Creek flows into the lake near the south eastern corner, while Shalda Creek flows out of the north west end of the lake and into Lake Michigan at Good Harbor Bay. Where Shalda Creek flows out of the lake and crosses Traverse Lake Road, an undersized culvert and low profile stream crossing have caused riparian flooding and water level concerns in recent years. The culvert cannot process the high volume of water discharging from the lake during the springtime runoff season and acts as a small dam, backing lake water up onto riparian property and damaging septic systems in this low lying area.

Much of the shoreline is wooded or wetland area, with some areas of shore being sandy beaches or lightly armored with rock rip rap. Shallow near shore areas are predominately sand and marl, with water depths of 1-5 feet (Figure 2). The remaining deep water areas are marl or a pulpy peat and marl combination. The lake has an average depth of 5-10 feet and reaches a maximum depth of about 50 feet. Around Little Traverse Lake, a 2013 Department of Natural Resources Fisheries Division (Fisheries Division) survey identified 141 dwellings within sight of the water (up from 107 dwellings observed in 1995), 97 small docks (capable of holding two boats or less), and 14 large docks (capable of holding more than two boats).

There are two public access sites that provide boat launching facilities on Little Traverse Lake. The most accessible is a Cleveland Township Park located in the northwest corner of the lake. This facility is a dirt/concrete launch, with a vault toilet, picnic pavilion, and parking for approximately 6-8 vehicles with trailers. The second site is a Leelanau County parcel on the north east corner of the lake. The facility is very small with a sand launch and provides for either carry down access or launching a small boat. Parking here is limited to 2-4 vehicles alongside the road.

There is one lake association on Little Traverse Lake, the Little Traverse Lake Property Owners Association. This association was founded originally as the Little Traverse Lake Association, and throughout the years has very active in the watershed. Their most current projects have included shoreline surveys, water quality testing, and working with the Leelanau Conservancy to draft the Good Harbor Bay Watershed protection plan. Watershed protection plans are written to meet both the

Michigan Department of Environmental Quality (DEQ) and Environmental Protection Agency (EPA) criteria in order to be eligible for various grants and funding resources related to water quality and watershed protection.

There is one nature preserve managed by the Leelanau Conservancy that is found along the shore of Little Traverse Lake; the Swanson Nature Preserve. The preserve comprises 90 acres of historic farmland between the lake and highway M-22, including 2,000 feet of Little Traverse Lake shoreline and adjacent wetlands. On this land 15 acres are leased farmstead, while the remaining 75 acres are open to the public. In 2013 a Michigan threatened species, the cut-leaved water parsnip, was discovered on the preserve. This plant typically grows in cold, spring-fed streams, such as the tributaries and seeps found on the Swanson property. Leelanau County is the northern-most limit of this plant's range, and according to the Leelanau Conservancy (2014) it was last collected in Leelanau County in 1952.

History

The earliest recorded fish stocking in Little Traverse Lake was in 1933 (Table 1). Fish were stocked annually by the Michigan Department of Conservation (MDOC, pre-cursor to the present Michigan Department of Natural Resources) from 1933 to 1944. A variety of species such as yellow perch, bluegill, largemouth bass, walleye, and northern pike were stocked during this time frame. Once the Department of Conservation stopped raising coolwater species in the hatchery system, Little Traverse Lake was no longer stocked with fish. Adult panfish were transferred to the lake on three occasions in 1991, 1992, and 1993, when fish were available. These fish came from nearby Turtle Lake in Benzie County. No fish have been stocked in Little Traverse Lake since the last panfish transfer in 1993.

The first known work completed by the MDOC on Little Traverse Lake, aside from stocking, started in 1949. In January and February of 1949 staff from the Institute of Fisheries Research mapped and described Little Traverse Lake. At this time the lake was calculated at approximately 650 acres, with a maximum depth of 54 feet. A note in the file from August of that year reports that rainbow trout had been caught in the summer of 1948, and were also present in Lime Lake. This note also describes a culvert across the outlet to Lake Michigan, across which boards were placed to raise the water levels.

Limnology surveys were also conducted throughout the years, with the first being in August of 1949 (Table 2). Subsequent limnology samples were taken in 1970, 1978, 1989, and 2013.

The first fisheries survey on Little Traverse Lake took place in 1965. Twelve trap nets and four fyke nets were set overnight. Fish collected included 149 bluegill, 66 rock bass, 19 pumpkinseed sunfish, 12 smallmouth bass, nine largemouth bass, four northern pike, one sucker, and one yellow perch. At this time the fishing was described as good, with the catches being predominately bluegill.

Nets were set again in August of 1970, when a combination of experimental gill nets, trap nets, fyke nets, and electroshocking was used to assess the fish community. Species collected included bluegill, largemouth bass, smallmouth bass, northern pike, yellow perch, brown bullhead, white sucker, rockbass, pumpkinseed sunfish, black crappie, alewife, and cisco. This was the only survey where cisco were ever collected in Little Traverse Lake. These fish may have had free movement out to Good

Harbor Bay in many years of high water, but once water levels declined and fish passage began to become obstructed via undersized culverts, the movement of cisco most likely was inhibited, thus preventing new stocks from migrating into the lake.

A request was made by the Little Traverse Lake Association in 1989 for a lake survey to be conducted after angling success reportedly declined (Hay 1989). Therefore, in June of that year the Michigan Department of Natural Resource Fisheries Division surveyed the lake using a combination of experimental gill nets and large mesh fyke nets set for three net nights. Fish collected included 1,408 alewife, 501 rock bass, 170 yellow perch, 58 smallmouth bass, 35 bluegill, 17 white sucker, 15 pumpkinseed sunfish, 13 bluntnose minnow, 13 black bullhead, 10 northern pike, eight brown bullhead, eight largemouth bass, and two logperch.

In the summer of 1990 Fisheries Division worked with the Little Traverse Lake Association to place bundles of 12 Christmas trees at three locations in the lake; one on the west end of the lake near the boat launch, one on the south shore of the lake near the end of County Road 667, and one on the east end near the current Swanson Preserve. These structures were placed in 15-20 feet of water with riparian permission in order to improve fish habitat.

Little Traverse Lake was surveyed again in June of 1995, using experimental gill nets, large mesh fyke nets, and small mesh fyke nets set for three net nights. The purpose of this survey was to evaluate the stocking of panfish that occurred in the early 1990's. Fish collected in this survey included 173 yellow perch, 87 rock bass, 51 bluntnose minnow, 34 smallmouth bass, 34 bullhead, 26 common shiner, 19 white sucker, 11 alewife, nine northern pike, four pumpkinseed sunfish, two rainbow trout, and one bowfin (Hay 1995). Despite the transfer of adult panfish into Little Traverse Lake, at the time of this survey it did not appear as though those fish were contributing to the fishery.

Current Status

In 2013, Fisheries Division conducted a Discretionary Survey in Little Traverse Lake which followed Status & Trends protocol (Wehrly et al 2009). This protocol uses the same types of collection gear and protocols in lakes of similar sizes, and allows the data collected in Little Traverse Lake to be compared with data collected from similar lakes across the state. One small mesh fyke net, two trap nets, two gill nets, and two large mesh fyke nets were used during the netting portion of the survey from June 24 to June 27, 2013. Three sections of shoreline were electrofished using a boom electroshocking boat, and four beach locations were sampled with a seine net on July 23, 2013.

During this survey a total of 861 fish representing 17 species and 18 turtles representing two species were collected; banded killifish, black bullhead, bluegill, bluntnose minnow, brown bullhead, bowfin, largemouth bass, common shiner, white sucker, longear sunfish, northern pike, pumpkinseed, rock bass, round goby, smallmouth bass, spottail shiner, yellow perch, snapping turtle, and painted turtle. Rock bass were the most abundant species by number, with 261 individuals collected (Table 3). Rock bass also had the highest percent by number making up 30.3 % of the catch, followed by pumpkinseed which comprised 13.1% of the catch by number with 113 individuals. The biomass of the catch was predominated with 68.2 lbs. of smallmouth bass and 43.6 lbs. of northern pike. Smallmouth bass represented 23.3 % of the catch by weight, while northern pike accounted for 14.9 % of the catch by

weight. Growth rates for all species aged were above the state of Michigan average length at age, with the exception of northern pike which were growing 2.2 inches below average, and yellow perch which were growing 0.1 inches below average (Table 4). While most species were only slightly above average, smallmouth bass were growing well above average with growth at 1.7 inches above the state of Michigan average length at age. Not enough largemouth bass were collected from any one year class to make statistical inferences about growth.

Analysis and Discussion

Little Traverse Lake is classified as a mesotrophic, slightly eutrophic lake. A combination of sand and marl dominates the bottom substrate. Much of the lake is less than 20 feet in depth, with good vegetative growth and areas of heavily wooded natural shoreline. Water clarity is impacted by tannic acid contribution from the watershed, as well as the marl bottom substrates. Overall the growth of most fish species found in the most recent survey of Little Traverse Lake is comparable to the State average, and is in the acceptable ranges for a lake with a slightly mesotrophic/eutrophic classification. Two particular outliers are northern pike (-2.2 inches) and smallmouth bass (+1.7 inches), though this is a similar trend seen in many lakes in the region. Good numbers of smaller forage fish such as shiners and minnows produce higher growth rates in species such as the smallmouth bass; however the low numbers of smaller panfish and a relatively short growing seasons result in below average growth for northern pike.

Throughout its management history, Little Traverse Lake has been plagued with reports of a poor panfish fishery. Despite having adult panfish transferred into the lake in the early 1990's, this issue has persisted until recent times. While numbers of bluegill still appear to be low, the numbers of longear sunfish and pumpkinseed sunfish are on the rise. One phenomenon that could be attributing to the increasing success of these panfish species is in fact the troublesome culvert located on Traverse Lake Road. Since the culvert's replacement in the late 1990's, water levels in Little Traverse Lake in the spring and the fall have been much higher than when the old culvert was in place, so high in fact that riparian owners have expressed major concerns over the flooding of their properties. However, in the spring when panfish are spawning these higher water levels and thus the increased nearshore vegetated areas may be aiding the spawning success of panfish by increasing available spawning areas and providing additional protection for newly hatched fry.

Management Direction

Little Traverse Lake has a well preserved natural shoreline across many areas of the lake. Efforts should be made to protect remaining riparian wetlands from development in order to maintain the healthy aquatic ecosystem that currently exists. Future unwise riparian development and wetland loss may result in deterioration of the water quality and aquatic habitat. Healthy biological communities on inland lakes and streams require suitable natural habitat. Generally for lakes this includes maintenance of good water quality, keeping nutrients balanced, and preservation of natural shorelines; especially shore contours and near shore vegetation, and the preservation of bottom contours and deep water vegetation and fish habitat. Human development within the watershed, along the shoreline, or within the littoral zone has a tendency to change and diminish this natural habitat. Appropriate watershed management is necessary to sustain healthy biological communities, including fish, invertebrates,

amphibians, reptiles, birds and aquatic mammals. Guidelines for protecting fisheries habitat in inland lakes can be found in Fisheries Division Special Report 38 (O'Neal and Soulliere 2006). This can be achieved by reviewing DEQ permit applications and working with the lake association. Fisheries Division should also work with the Leelanau Conservancy to continue to protect these natural areas.

Additionally, dredging of the littoral zone should be avoided on Little Traverse Lake, particularly where woody debris and cobble substrates are located. Most of the nearshore properties that are developed on Little Traverse Lake have sand and cobble substrates present, and many have high quality woody debris. This nearshore habitat is critical for a number of important Little Traverse Lake fish species, as cobble substrates and woody debris provide spawning habitat and also host many important aquatic invertebrates that help to sustain healthy fish populations.

Currently Little Traverse Lake has excellent fisheries for multiple species, such as smallmouth bass and pumpkinseed sunfish. These are well maintained by natural reproduction, and thus no fish stocking is required at this time. However, another Discretionary or Status & Trends fisheries netting survey should be conducted on Little Traverse Lake within the next ten years in order to continually assess the fish community.

Fisheries Division should continue to work with the Little Traverse Lake Property Owners Association, the National Park Service, the Leelanau Conservancy, and the Grand Traverse Band of Ottawa and Chippewa Indians (GTB) to help develop and implement the Good Harbor Bay Watershed Protection Plan, as well as to help develop a solution for the poor road stream crossing at Traverse Lake Road. These collaborations should also work to address additional aquatic connectivity barriers and sustain or enhance aquatic connectivity among all the basins within the Good Harbor Bay watershed, specifically Lime Creek, Shetland Creek, and Shalda Creek. Enhanced aquatic connectivity will help sustain healthy fish populations into the future.

References

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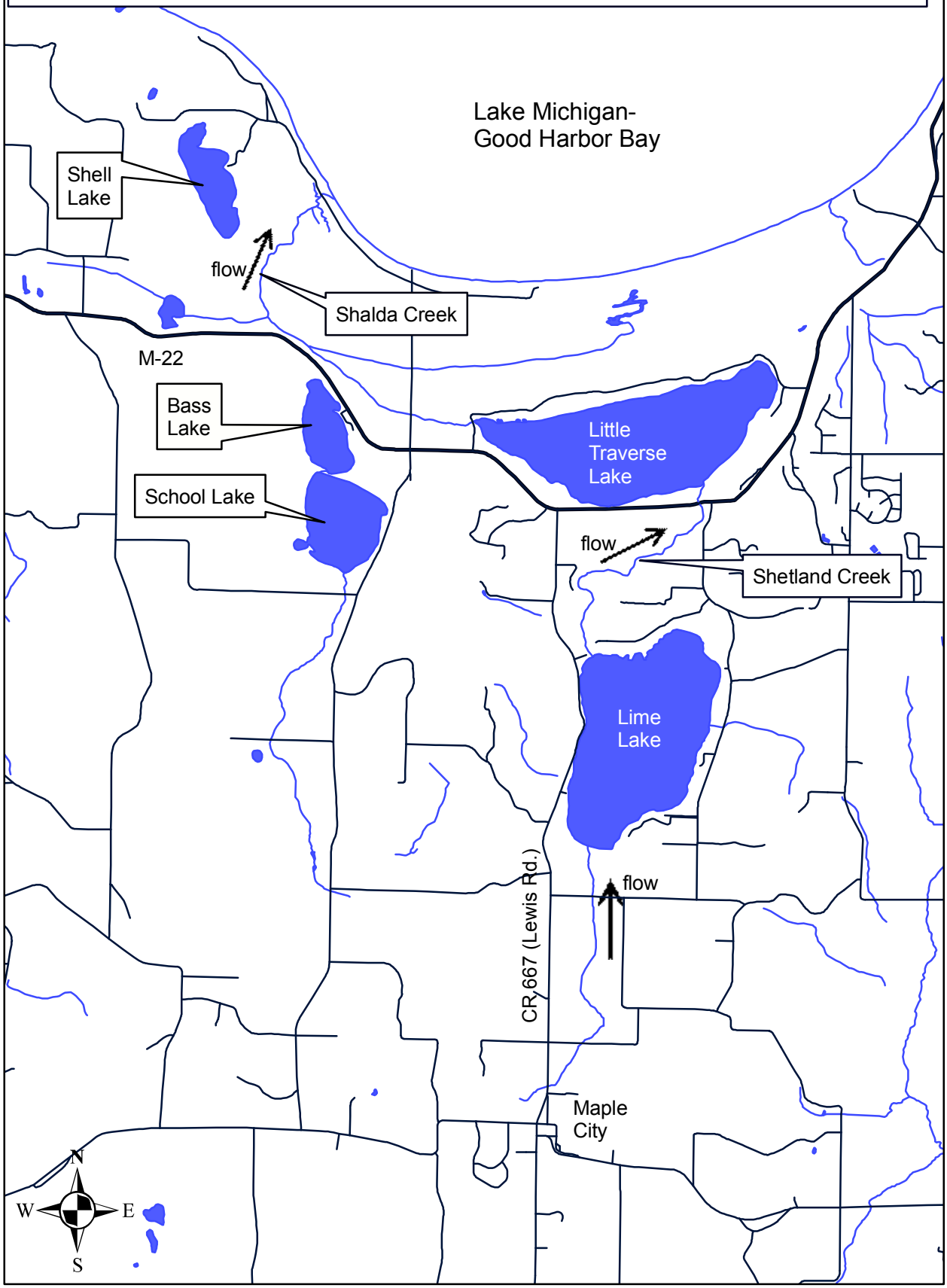
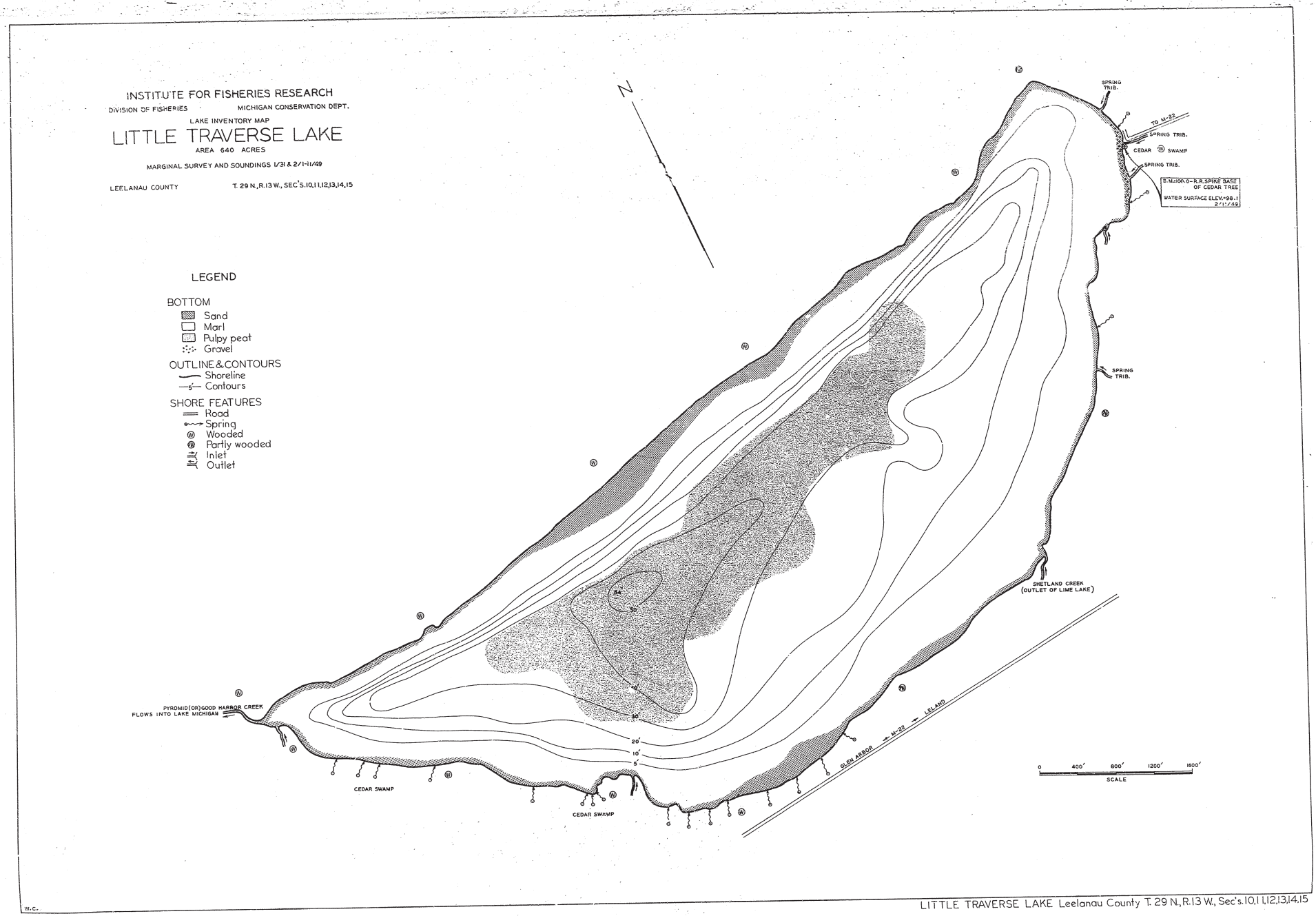
Figure 1. Shalda Creek/Little Traverse Lake watershed, Leelanau County, Michigan.





LITTLE TRAVERSE LAKE Leelanau County T. 29 N., R. 13 W., Sec's. 10, 11, 12, 13, 14, 15

Figure 2. Topographic map of Little Traverse Lake, Leelanau County.

Table 1. Historic Little Traverse Lake fish stocking, 1933-1993

Year	Species	No. of Fish Stocked	Lifestage
1933	walleye	100,000	fry
	bluegill	1,000	fingerling
1934	bluegill	2,000	fingerling
1935	smallmouth bass	1,500	fingerling
	bluegill	2,000	fingerling
	northern pike	170,000	fry
1936	northern pike	150,000	fry
	smallmouth bass	500	fingerling
1937	northern pike	150,000	fry
	smallmouth bass	500	fingerling
	largemouth bass	1,000	fingerling
	bluegill	3,000	fingerling
1938	northern pike	200,000	fry
	largemouth bass	1,000	fingerling
	yellow perch	10,000	fingerling
	bluegill	30,000	fingerling
1939	bluegill	20,000	fingerling
	largemouth bass	400	fingerling
	northern pike	140,000	fry
1940	northern pike	60,000	fry
	largemouth bass	500	fingerling
	smallmouth bass	500	fingerling
	bluegill	100	yearlings
1941	bluegill	2,500	fingerling
	largemouth bass	900	fingerling
1942	bluegill	400	fingerling
	northern pike	100,000	fry
1943	largemouth bass	300	fingerling
	northern pike	2,400	fry
1944	bluegill	2,000	fingerling
	largemouth bass	750	fingerling
	smallmouth bass	950	fingerling
1991	bluegill	207	adult transfer
1992	bluegill	178	adult transfer
	pumpkinseed	129	adult transfer
1993	bluegill	1,962	adult transfer

Table 2. Limnological profiles for Little Traverse Lake, 1949-2013.

Date	Depth (feet)	Temp (ºC)	Oxygen (ppm)	pH
August	0	23.3	8.5	8.2
1949	20	22.8	…	…
	30	21.2	7.8	8.2
	35	19.4	4.8	7.6
	37	…	2.4	7.4
	40	16.8	2	7.4
	50	16	0.3	6.8
Sept	0	22.2	…	…
1970	5	22.2	12	9
	10	22.2	…	…
	15	21.7	…	…
	18	21.7	…	…
	20	21.7	…	…
	22	21.1	…	…
	25	21.1	10	9
	30	21.1	…	…
	35	20.6	…	…
	40	20.6	8	7.5
August	0	21.5	9	9
1978	1	21.5	…	…
	2	21.5	9	…
	3	20.5	…	…
	4	20.5	9	…
	5	20.5	…	…
	6	20.5	7	…
	7	20.5	…	…
	8	20.5	7	…
	9	19	…	…
	10	16.5	5	8.5
	11	15	…	…
	12	14.5	3	…
	13	14	…	…
	14	14	2	8
	15	14	…	…
	15.5	13	…	…

Date	Depth (feet)	Temp (ºC)	Oxygen (ppm)	pH
June	0	23.9	9	…
1989	7	17.2	9.6	…
	8	16.1	8.8	…
	10	14.4	…	…
	13	14.4	4.4	…
July	0	23.8	6	…
1995	5	23.3	…	…
	10	23.3	…	…
	12	22.2	…	…
	14	22.2	…	…
	15	21.6	6.5	…
	20	20.5	…	…
	25	18.3	…	…
	30	15	…	…
	35	13.3	…	…
	40	13.3	…	…
	45	13.3	…	…
	50	12.7	2	…
July 2013	0	24	8.37	8.72
	3	24.4	8.11	8.75
	6	24.4	7.84	8.74
	9	24.5	7.6	8.74
	12	24.5	7.4	8.74
	15	24.5	7.22	8.72
	18	24.5	7.14	8.72
	21	24.2	7.36	8.7
	24	23.4	7.89	8.69
	27	17.2	8.63	8.41
	30	15.2	7.85	8.25
	33	14.5	7.16	8.2

Table 3. Number, weight, and length of fish and herpetofauna collected from Little Traverse Lake with all gear types in June and July 2013.

Species	Number	Percent by number	Weight (lbs)	Percent by weight	Length Range (inches)
Banded killifish	2	0.20%	0	0.00%	2-3
Black bullhead	22	2.60%	7.5	2.60%	5-12
Bluegill	11	1.30%	0.9	0.30%	2-6
Bluntnose minnow	33	3.80%	0.9	0.30%	2-6
Bowfin	9	1.00%	35.8	12.20%	19-25
Brown bullhead	101	11.70%	28	9.60%	4-11
Common shiner	107	12.40%	1	0.30%	1-5
White sucker	21	2.40%	34	11.60%	1-19
Largemouth bass	5	0.60%	8.2	2.80%	11-15
Longear sunfish	42	4.90%	1.4	0.50%	2-6
Northern pike	18	2.10%	43.6	14.90%	2-30
Pumpkinseed	113	13.10%	12.7	4.30%	1-8
Round goby	8	0.90%	0	0.00%	2-3
Rock bass	261	30.30%	39.1	13.40%	1-10
Smallmouth bass	54	6.30%	68.2	23.20%	1-20
Spottail shiner	5	0.60%	0.1	0.00%	3-3
Yellow perch	49	5.70%	11.5	3.90%	6-12
Snapping turtle	12				6-14
Painted turtle	6				4-6
Total	879	100%	292.9	100%	

Table 4. Average total weighted length (inches) at age and growth relative to the state average for fish sampled from Little Traverse Lake with large mesh fyke nets, trap nets, inland gill nets, and experimental gill nets June 24-27 , 2013.

	Age										Mean Growth
Species	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	Index
Bluegill	…	…	5.65 (6)	…	…	…	…	…	…	…	…	+ 0.4
Largemouth bass	…	11.40 (1)	14.60 (1)	15.25 (2)	15.20 (1)	…	…	…	…	…	…	**
Longear sunfish	…	…	…	4.50 (5)	…	…	…	…	…	…	…	+ 0.5
Northern pike	…	16.58 (2)	18.35 (3)	20.60 (1)	20.14 (2)	24.10 (7)	29.10 (1)	…	…	…	…	-2.2
Pumpkinseed	…	…	5.06 (11)	7.22 (3)	6.89 (7)	7.67 (6)	7.99 (6)	8.40 (1)	…	…	…	+ 0.6
Rock bass	…	4.50 (2)	4.99 (27)	6.28 (15)	7.79 (14)	8.48 915)	9.60 (12)	9.80 (1)	…	…	…	+ 0.3
Smallmouth bass	…	9.89 (7)	12.99 (22)	14.81 (15)	16.71 (5)	…	…	20.30 (1)	…	…	…	+ 1.7
Yellow perch	…	…	6.53 (3)	6.88 (14)	9.48 (16)	11.37 (4)	…	…	…	…	…	- 0.1

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