Michigan Department of Natural Resources
Status of the Fishery Resource Report 2000-12, 2000.
Renumbered in 2024, Status of the Fishery Resource Report 0069

LONG LAKE

Kalamazoo County (T3S, R11W, Sec. 24, 25) and (T3S, R10W, Sections 17, 18, 19, 30)

Surveyed May 1997

James L. Dexter, Jr.

Environment

Long Lake is a large natural lake located in central Kalamazoo County. It lies within the boundaries of the City of Portage. The surrounding lake area is well developed.

Long Lake is located in a glacial outwash plain that contains mostly loamy sands that are well drained. Drainage area at the outlet is 6.59 square miles (Miller and Thompson 1970). The watershed is composed of agricultural land (60%), forest (21%), wetland (6%), urban area (5%), and open land and other water bodies (8%). The topography is mostly level to slightly rolling hills.

At 575 acres in size, Long Lake is the fourth largest lake in the county. There are no direct inlets into the lake, but there is an outlet at the southwestern corner that drains directly to Austin Lake. These waters eventually drain to the St. Joseph River of Lake Michigan. According to the 1953 map by the Institute for Fisheries Research, there is a single basin, 57-feet deep (Figure 1). Structure in the basin is good, with several point bars, drop offs, and flats present to concentrate fish. The shoal areas of Long Lake cover over 85% of the total surface area. As of May 2000 the water level in Long Lake had dropped to perhaps its lowest recorded level. The lake has lost approximately one-quarter to one-half of its surface area.

The south half of the lake bottom is composed primarily of sand and marl interspersed with gravel. Organic deposits characterize the north half of the lake bottom. Almost the entire north end is normally less than 5-feet deep and can be characterized as an emergent marsh. Aquatic vegetation is sparse in the south half of the lake and abundant in the north half.

Long Lake is eutrophic in nature, and water quality can be classified as fair. Based on water quality parameters measured in 1953, 1960, 1991 and 1997, there is a trend toward poorer quality (Table 1). Dissolved oxygen levels decreased up through the 1990s. Secchi disk readings are also generally lower. This may be due to increased levels of blue-green algae (Cronk et al. 1978). In 1997, water temperatures in early August ranged from 77F at the surface to 52F at 57 feet. A thermocline was present from 20 to 28 feet; most of it was devoid of dissolved oxygen. Alkalinities ranged from 82 (moderate) on the surface to 124 (hard) on the bottom and pH readings were alkaline (8.6). These values are similar to values in past surveys.

Residential development surrounds all but the north end of Long Lake. A public access site owned by the State of Michigan exists at the south end, with enough parking for 24 vehicles with trailers.

Fishery Resource

Long Lake has been managed by the State since 1888. The newly organized Michigan Fish Commission conducted a gill net survey in Long Lake that year and collected 735 fish, of which 85% were yellow perch. Almost 50 years passed before further work was done on the lake. Between 1933 and 1945 largemouth bass were stocked 6 different years, and yellow perch were

stocked 2 years. The next survey of the lake was conducted in 1943 using a 25-foot straight seine. A typical warmwater fish community was noted in the catch record.

The most complete historical survey occurred in 1953 (Taube 1953). Using experimental gill nets, and common sense and bag seines, this survey also showed a typical warmwater fish community that included yellow perch, northern pike, bluegill, largemouth bass, rock bass, bullheads, and sunfish. Various species of minnows and darters were also collected. Growth of game fish at that time was considered average, and most residents of the lake were satisfied with the fishery. The 1953 survey may have been conducted due to a controversy over lake water level and some proposed drainage ditches. Apparently, the previous 4 years were rather dry and the lake level had fallen considerably. By 1953, however, it had risen to normal levels. A legal lake level of 856 feet (elevation above sea level) was established in 1939. Taube concluded from the 1953 survey that the makeup of the fish population was the same as in 1888, and that "no new management practices seem necessary for Long Lake".

Austin and West lakes were also surveyed with Long Lake in 1953 because the lakes connect. Taube (1953) concluded that Austin and West had poor fisheries (characterized by below average growth) while Long was good. No alternatives for management of Austin and West lakes were offered in 1953.

Sometime between 1953 and 1960 it was determined that the fisheries on Austin and West lakes should be renovated. It appears from sketchy records that Long Lake was included in this proposal by default because of its connection to Austin Lake. The proposal was approved at a public meeting with only minor objection from property owners on Long Lake. In the early winter of 1960, Austin and West lakes were treated with toxaphene, while Long Lake was treated with rotenone. It appears that rotenone was used at Long Lake so that desirable fish could be picked up and eaten, since the fish population there was in good shape. Restocking of Long Lake occurred in 1960 and 1961 and included northern pike, rainbow trout, largemouth bass, bluegill, and yellow perch.

Follow-up surveys of Long Lake were conducted in 1961, 1962, and 1964. The rainbow trout, planted to provide an interim fishery, did very poorly, and few were reported. Stocked warmwater species exhibited good growth and survival. By 1963, fishing was very good for pike, perch, and largemouth bass. By 1964, eight additional species of fish that had not stocked in the lake were present.

A 1977 electrofishing survey of Long Lake showed the same species composition as the 1964 survey. No carp were observed, but it was noted that they did inhabit the lake. The fishery at that time was described as generally good. Yellow perch exhibited very good growth, and bluegills and bass had slightly depressed growth rates compared to the State of Michigan average.

In 1989, a petition was received from the Long Lake Association asking for a spearing ban on pike. Presumably, this was requested because of over-harvest concerns. A spearing ban on pike, plus a 30-inch minimum size limit, had been instituted starting in 1984. However in 1985, for some undocumented reason, the ban was taken off and the size limit was returned to 20 inches. There must have been some type of public outcry over the closure to force such a quick reversal. There has not been any recent consideration of resuming a spearing ban on pike.

A full general survey was conducted in 1991 that used 125-foot experimental gill nets, 6' x 3' x 1.5" mesh standard trap nets, mini fyke nets, and a 250-V DC electroshocking boat. Bluegill were the most abundant fish collected by number, and were the fourth most abundant by weight. Mirror carp, bowfin, and bullheads were the most abundant species by weight in that order. Schneider (1990) developed five criteria for ranking bluegill populations from survey catches in Michigan. Using those criteria, Long Lake bluegills in 1991 ranked 4.5 (good) on a scale of 1-7, using trap net

data.

Good numbers of acceptable sized largemouth bass, northern pike, yellow perch and black crappie were also collected in that survey. Most gamefish were in very good condition and heavy bodied.

The most recent survey was conducted in May 1997 using the same types of gear deployed in 1991. The survey was included in a statewide study to examine the effects of the size limit changes on pike and largemouth bass that were instituted statewide in 1993.

Catch rates of some gamefish species were less than in the 1991 survey. Bluegill were the most prominent fish collected by number and weight (Table 2), although total trap net catch was very low. Bluegills up to 9 inches long were captured. Their growth rates were at the Michigan average (Table 3), unchanged from the 1991 survey. Using Schneider's index (1990) with trap net data, the population size structure ranked 5 (good). Index values based on electrofishing catch (from 1991 and 1997) were also not significantly different. As is common with waters in this area, the 1992 year class was just about missing (Table 4), due to the cold year apparently caused by the Mt. Pinatubo eruption in the Philippines.

Black crappie were the second most abundant species collected (Table 2). Over 80% were of acceptable size. Their growth rates were well above State average, and have increased an inch compared to 1991. Crappies up to 13 inches are available to the anglers.

A total of 165 largemouth bass were collected, mostly with electroshocking. With the current size limit of 14 inches, 16% were of acceptable size and 29% exceeded 12 inches (Table 2). Only 12% of the bass were acceptable size in 1991 when the size limit was 12 inches. The effect of raising the bass minimum size limit from 12 to 14 inches (in 1993) on the abundance of large bass is best determined by comparing electrofishing catches. The proportion of bass greater than or equal to 14.0 inches increased from 5% in 1991 to 16% in 1997. Growth rates for bass were at State average rates in 1997 (Table 3), similar to 1991, yet somewhat improved. There were also two additional year classes collected in this survey compared to 1991. Overall, it appears that the increase in the size limit has been beneficial to the size structure of the bass population.

Most yellow perch were collected with electroshocking. Sixty-four percent were acceptable size (Table 2). Perch were growing at State average rates (Table 3), which was somewhat slower than rates observed in 1991. Age groups 1 through 8 were present. There appeared to be considerable mortality of perch after age 3, which is exactly how it was in 1991 also. We cannot determine if this is due to angler or natural mortality, but it does seem somewhat distinctive compared to other local perch populations. We do not know if this lake providing a well-known perch fishery.

A very nice catch of northern pike was made, mostly with gill nets. A total of 80 were collected, ranging in length from 11 to 37 inches (Table 2). Fourteen percent were legal size (Table 3). Seven-year classes were present. Recruitment rates appeared good. To fairly evaluate effects of increasing the minimum size on pike from 20 to 24 inches in 1993, catches of pike in gill nets in 1991 and 1997 can be compared. In 1991, 67% of the pike catch exceeded 20 inches and 30% exceeded 24 inches. In 1997, 70% of the pike catch was over 20 inches and 26% exceeded 24 inches. Growth index was unchanged at 0.6 inches below the Michigan average. It appears that the increase in size limit has not been beneficial to pike population structure.

The sport fish community present today is no different from that of 45 or 100 years ago. Long lake is presently providing an excellent fishery. Forage species are abundant. Most game fish captured were in very good condition. Anglers commented that they were happy with the fishery. This lake compares very well with other local warmwater fisheries such as Austin, Gourdneck, Hogsett and Sugarloaf lakes. This is very fortunate as these lakes contain public access and are located within a half-hour drive of downtown Kalamazoo.

In 1999, the Long Lake Association sunk a new 12-inch diameter deep aquifer well that has the capacity to pump 1 million gallons per day into the lake. In the spring of 2000 this pump was turned on. Hydrologists at Western Michigan University believe that pumping this amount of groundwater will not impact the local aquifers, as currently there is more recharge occurring than discharge. When allowance is made for evaporation, it is estimated that more than a few years of pumping will be required to restore "normal" lake levels.

Management Direction

No management activities need to be taken at this time. Long Lake should continue to provide an excellent fishery for years. Our goals into the next century should be to maintain the present status of the fishery. Obstacles to attaining this goal include increased pressure to develop the wetland areas on the north end of the lake, decreased water quality conditions due to increased use of the lake and fertilizers used in the watershed, and the unforeseen impact of the current (2000) low water levels. At present only the state's stringent wetland laws protect the lake's wetlands. Long Lake should be surveyed again within the next 10 years to determine if the record low water levels have impacted fish communities.

Report completed: June 2000.

References

Cronk et al. (21 authors). 1978. Kalamazoo County. Geology and the environment. Western Michigan University, Kalamazoo.

Miller, J. B., and T. Thompson. 1970. Compilation of data for Michigan lakes. United States Department of Interior, Geological Survey, Lansing.

Taube, C.M. 1953. Inventory results and historical notes on Austin, West, Long and Gourdneck lakes, Kalamazoo County. Michigan Department of Natural Resources, Fisheries Research Report 1380, Ann Arbor.

Schneider, J.C. 1990. Classifying bluegill populations from lake survey data. Michigan Department of Natural Resources, Fisheries Technical Report 90-10. Ann Arbor.

Table 1.-Water quality parameters as measured by the DNR at Long Lake, Kalamazoo County.

Year and month	Depth where dissolved oxygen <2 ppm (ft)	Secchi disk transparency (ft)	Bottom alkalinity (ppm)	pH
1997, August	20	10	124	8.6
1991, August	20	6	134	9.0
1960, August	25	12	128	-
1953, July	30	14	145	8.7

Table 2.-Number, weight, and length (inches) of fish collected from Long Lake with trap nets, gill nets, and DC boomshocker, May 12-15, 1997.

Species	Number	Percent by number	Weight (pounds)	Percent by weight	Length range (inches)[1]	Average length	Percent legal size[2]
Bluegill	363	30.8	33.3	5.1	1-9	4.4	46 (6")
Pumpkinseed	42	3.6	5.8	0.9	1-7	5.1	62 (6")
Black crappie	229	19.4	111.8	17.2	3-13	9.3	81 (7")
Bowfin	22	1.9	143.3	22.1	16-30	26.2	...
Rock bass	22	1.9	6.6	1.0	4-9	7.0	65 (6")
Warmouth	21	1.8	5.0	0.8	3.8	6.4	74 (6")
Largemouth bass	165	14.0	109.6	16.9	4-20	9.8	16 (14")
Northern pike	80	6.8	187.3	28.8	11-37	21.4	24 (24")
Yellow perch	146	12.4	10.2	1.6	2-12	4.5	64 (7")
Bullhead species	36	3.1	0.0	0.0	9-13	12.3	...
Lake chubsucker	5	0.4	0.5	0.1	2-7	5.1	...
Common carp	1	0.1	16.5	2.5	33-33	3.3	...
Sand shiner	10	0.8	0.1	0.0	3-3	3.5	...
Smallmouth bass	4	0.3	2.7	0.4	9-13	10.8	0 (14)
Spotted gar	11	0.9	16.4	2.5	16-28	22.3	...
Blacknose shiner	1	0.1	0.0	0.0	2-2	2.5	...
Bluntnose minnow	20	1.7	0.1	0.0	1-2	2.0	...
Golden shiner	2	0.2	0.2	0.0	4-7	6.0	...
Total	1,180	100.0	649.2	100.0			

1 Note 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.

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

Table 3.-Average total weighted length (inches) at age, and growth relative to the state average, for fish sampled from Maple Lake with trap nets, gill nets, and 250-V DC electroshocker, May 12-15, 1997. Number of fish aged is given in parentheses.

Species	Age 0	1	2	3	4	5	6	7	8	Mean growth index[1]
Black crappie	...	3.2 (1)	6.7 (12)	8.4 (23)	10.2 (23)	11.5 (7)	12.5 (3)	...	13.2 (1)	+1.3
Bluegill	...	1.8 (15)	2.9 (11)	4.3 (15)	6.4 (18)	8.1 (1)	8.7 (7)	8.2 (2)	...	-0.1

Largemouth bass	...	4.3 (1)	6.4 (25)	9.2 (26)	11.3 (11)	13.1 (18)	13.5 (2)	...	14.0 (1)	-0.3
Northern pike	...	11.6 (1)	17.1 (26)	20.5 (3)	22.5 (3)	24.8 (5)	24.6 (11)	37.0 (18)	...	-0.6
Yellow perch	...	3.0 (19)	4.8 (19)	6.6 (10)	9.0 (3)	9.6 (2)	10.1 (5)	11.9 (1)	12.1 (2)	0.0

[1] Mean growth index is the average deviation from the state average length at age.

Table 4.-Estimated age frequency (percent) of fish caught from Long Lake with trap nets, gill nets, and 250-V DC electroshocker, May 12-15, 1997.

Species	Age 0	1	2	3	4	5	6	7	8	Number aged
Black crappie	...	1	17	33	33	10	4	...	1	70
Bluegill	...	22	16	22	26	1	10	3	...	69
Largemouth bass	...	1	30	31	13	21	2	...	1	84
Northern pike	...	1	17	34	31	12	4	1	...	77
Yellow perch	...	31	31	16	5	3	8	2	3	61

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Questions, comments and suggestions are always welcome! Send them to tinchert@michigan.gov

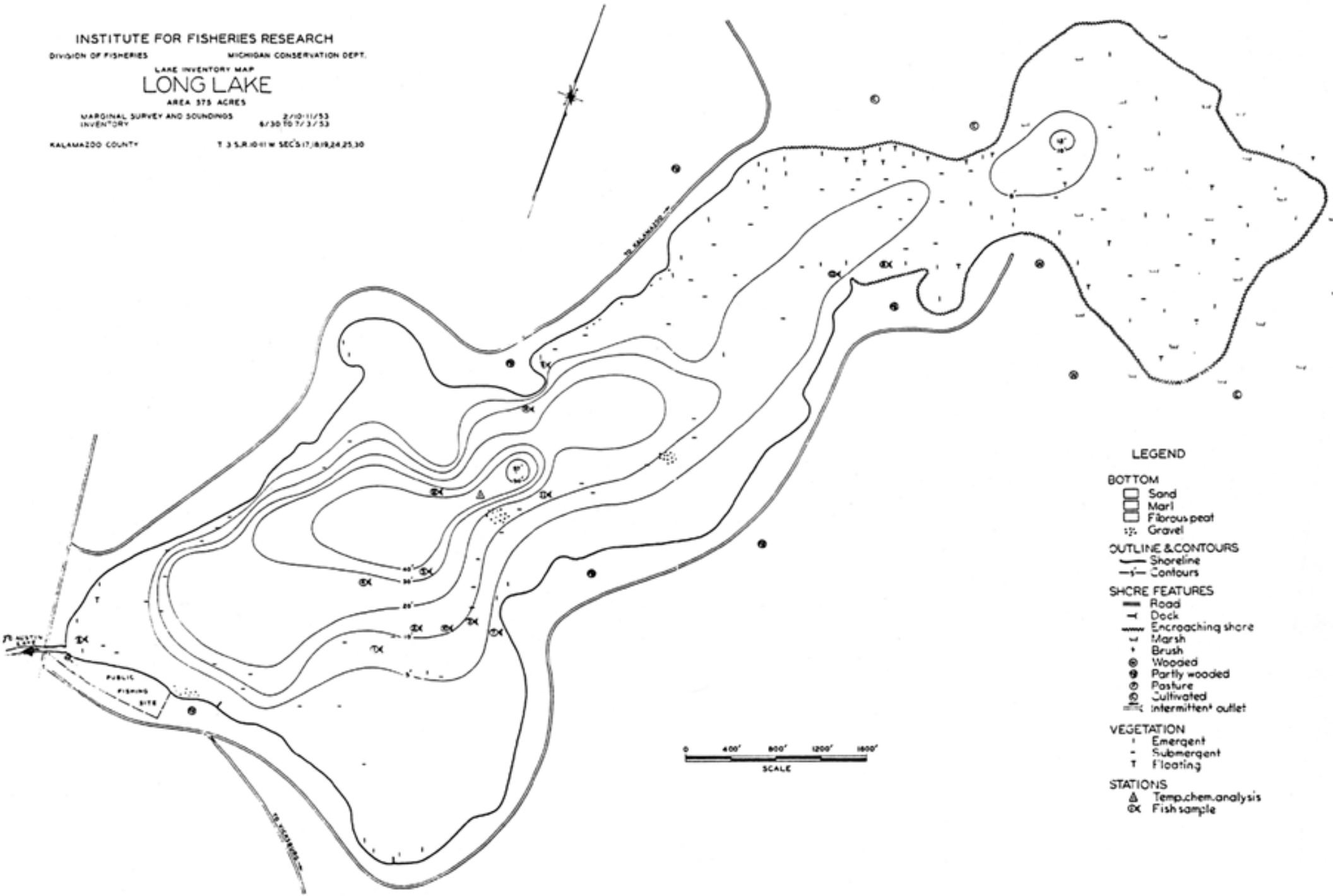

Figure 1.—Map of Long Lake showing depth contours and other features.