*Michigan Department of Natural Resources*
*Status of the Fishery Resource Report 2000-14, 2000.*

# THORNAPPLE LAKE

*Barry County (T3N, R7W, Sec. 19, 24, 25, 30)*

**Surveyed May 1995**

**Jay K. Wesley**

## Environment

Thornapple Lake lies in eastern Barry County, southwestern Michigan, about 5 miles west of the Village of Nashville. The lake is natural, having been formed during the Wisconsonian glacial stage (10,000 to 75,000 years ago). The 345 square-mile watershed contains the Thornapple River, Highbanks Creek, and Mud Creek. The Thornapple River flows through the lake from east to west and eventually joins the Grand River and Lake Michigan.

The topography of the watershed is that of gently rolling hills made up of moderately well drained ground moraines and sandy outwash plains. The soils are classified as Marlette-Capac associations, which are well to somewhat poorly drained loamy soils. The watershed is primarily used for agriculture, but contains scattered woodlots and residential homes.

Thornapple Lake is 409 acres in size and up to 30 feet deep (Figure 1). It has a flushing rate of 0.3 years based on the mean annual flow (334 cfs) of the Thornapple River near Hastings (Blumer et al. 1996). Shoal areas (less than 20 feet deep) account for about 76% of the surface area of the lake. Aquatic vegetation is abundant to a depth of 4 feet and primarily consists of coontail and various pondweeds. The substrate is mostly made up of sand, marl, and organic material.

Water quality conditions were surveyed July 6, 1995. The water was light brown in color with a Secchi disc reading of only 4.0 feet. Within the water column, alkalinity ranged from 198 to 242, and pH was 8.7. Water temperature varied from 73ºF at the surface to 53ºF at the bottom (30 feet), with a thermocline occurring between 11 and 17 feet. Oxygen levels dropped below 3 ppm between 12-13 feet, effectively prohibiting most fish from using the water column deeper than 13 feet.

There are historical water quality data from September 30, 1974 (EPA 1974). Results were similar except alkalinity ranged higher in 1974 (215-280). Michigan Department of Environmental Quality, Surface Water Quality Division analyzed the lake in 1993 and found elevated chlorophyll a (75 mg/L), nitrate/nitrite (0.093 mg/L), total ammonia (0.115 mg/L), and total phosphorus (0.088 mg/L) compared to past surveys (MDEQ 1998). These data collectively indicate that the water is very hard and well buffered, has high nutrient loading, and is turbid and very eutrophic.

Thornapple Lake is a popular recreation lake. Only about 45% of the shoreline is lined with cottages and homes, while wetlands and wooded areas make up the rest. There is a Michigan Department of Natural Resources operated public boat launch on the southeast side of the lake that can accommodate 15 vehicles with trailers. Charlton Township Park at the northwest side of the lake offers shore fishing and a public boat launch that can accommodate up to 30 vehicles with trailers.

## Fishery Resource

The first fishery survey of Thornapple Lake was conducted in 1890. Gill nets were used for 1 night. The lake bottom at that time had sand and gravel substrate, and the shore was described as marshy with wooded areas. Bluegill, yellow perch, warmouth, black crappie, bowfin, bullhead, and sucker were noted as present. An abundance of crustacean shrimp and minnows were also noted. Bluegills and yellow perch appeared to be very small.

Fish stocking occurred there as early as 1934 according to Michigan Fish Commission reports, but Thornapple Lake may have been stocked in the late 1800s along with many other Michigan lakes. Between 1934 and 1945 various combinations of bluegill, largemouth bass, and yellow perch were stocked (Appendix 1). The lake was mapped by the Institute for Fisheries Research in 1949. In the late 1940s, hook and line fishing was popular for bluegills, black crappies, largemouth bass, smallmouth bass, northern pike, muskellunge, and yellow perch. Spearing was popular for northern pike and muskellunge.

The muskellunge population in Thornapple Lake is presumed to be natural and of the Great Lakes "form" (Seelbach 1988). Early records show that the Great Lakes muskellunge was well know along the coast of Lake Michigan and some inland connecting waters including Thornapple River and Thornapple Lake.

By the 1950s, there was concern that the musky population had been depleted. A northern muskellunge stocking program began in 1964 with annual stockings of 2-10 fall fingerlings per acre. An electrofishing (230-V AC) survey was conducted in April 1966 to evaluate the fishery. In a 3.3-hour period, 407 fish were sampled, including 27 northern muskellunge. Fishing reports were good for bluegill, yellow perch, and black crappie. In 1971, a boomshocker was used for 3.5 hours to collect northern muskellunge for brood stock. Only 6 northern muskellunge were boated ranging in size from 18 to 36 inches. Many muskie darted away from the boat, indicating electrofishing was not an effective gear. Brood stock collections resumed in 1977 using standard trap nets (6' x 3' x 1.5" mesh size).

From 1981 to 1984, Thornapple Lake was also stocked annually with fall fingerling walleye at a rate of 3-30 per acre. Spring fingerling walleye were used at a rate of 20-65 per acre intermixed with about 4 fall fingerlings per acre from 1985 to 1995 (Appendix 1). The northern muskellunge target stocking rate has been approximately 3 per acre every other year, but stockings have been erratic depending on rearing success.

A general survey was conducted April 1987 using three standard trap nets and five fyke. Good numbers of acceptable size game fish were collected. Twenty-five percent of the northern muskellunge exceeded 38 inches (legal size then), and 86% of the walleye were legal size (15 inches). Most fish were growing at the state average rates except black crappie which were growing 1 inch below the State of Michigan average.

Thornapple Lake was surveyed in 1990 and 1994 with electrofishing (250-V DC) gear to evaluate walleye stocking using index methods developed by Serns (Serns 1982). The corresponding population estimates were 0.3 young-of-the-year walleye per acre and 0.03 yearlings per acre. In 1994, the estimates were 2.10 per acre for young-of-the-year and 2.72 per acre for yearlings, which is considered very good. Six-year classes (1-6) of walleye were collected, and mean growth was 1.3 inches above state average.

A voluntary post card survey was conducted at Thornapple Lake in 1994 and 1995 along with several other lakes in southern Michigan. From Thornapple Lake anglers, 25 cards were returned listing a catch of 63 walleye. Catch per acre was 0.07 and harvest per acre was 0.04, which rates as good. By comparison, Cedar Lake in Van Buren County was rated as excellent with a catch per acre of 0.17 and a harvest per acre of 0.12 (Michigan Department of Natural Resources, Plainwell Office, unpublished data).

## The 1995 Fishery Survey

The most recent fish survey was conducted in May, 1995 using four 6'x3'x1.5" mesh standard trap nets (12 net lifts), four 125' experimental gill nets (10 net lifts), and 1.0 hr of night-time 250-V DC electrofishing. Netting was conducted for 3 nights.

The fish community found in 1995 did not differ significantly from any previous survey except for the absence of green sunfish, smallmouth bass, and hogsucker (Table 1). Smallmouth bass were relatively rare before and a few are probably still present. Black crappie, bluegill, walleye, yellow perch, northern pike, and northern muskellunge remain the mainstay of the fishery. Overall, sport fish populations were in great shape.

The black crappie was the most abundant species collected by number. Over 53% of those collected were of acceptable size. Growth rates were 1.1 inches below the state average (Table 2), which is similar to past surveys. Seven year classes were present in the survey, but most (49%) of the black crappie collected were age 1 (Table 3). The 1991 year class was very large also, similar to 1994. Irregular recruitment is not uncommon for black crappie populations in turbid waters. Overpopulation has been a problem in the past and may have led to a massive die-off. In June of 1995, thousands of 3-8 inch black crappies (primarily 7 inches long and age 4) were found dead. The fish that were diagnosed had bacterial columnaris infections of the gills, which was probably triggered by stressors such as high population density and rapid temperature change.

Yellow perch was the second most abundant species collected by number, and 61% were of acceptable size. Six-year classes of yellow perch were present, and growth was equal to the state average. The 1993-year class (age 2) was poor and only made up 1% of the yellow perch caught.

Bluegills also were abundant and growing at the state average growth rate. Thirty-one percent of the bluegill collected were of acceptable size. Growth declined slightly from past surveys. Using Schneider's index of bluegill populations (1990), this population ranked average or fair at 3.6 on a scale of 1-7, using trap net length-frequency data.

A total of 48 largemouth bass ranging from 2-17 inches was collected (Table 1). Thirty-three percent were of legal size (14 inches). Six-year classes were collected, and growth rates were at the state average. Recruitment was good in 1994, but low for the 1993 (age 2) and 1992 (age 3) year classes. Age-3 largemouth bass recruitment may have been low due to the very cold spring and summer of 1992 that was apparently caused by the Mt. Pinatubo eruption in the Phillipines. Survival appears to drop after age 4 due to angling pressure once bass become legal size.

The walleye stocking program at Thornapple Lake has been successful, although only 15 walleye ranging from 7 to 23 inches were collected in this survey. Walleye were growing 1.7 inches above the state average. Age 1 and 2 fish comprised 69% of the catch. Survival drops after age 2 as walleye become legal size (15 inches), and none older than age 6 were found.

A total of 18 northern pike was collected ranging from 12 to 34 inches. Growth rates were at the state average, and 32% of the catch was over legal size. Recent recruitment appears to be low because only 6% of the catch was represented by age 1 fish, but this could also be a result of our sampling gear. Seven year classes were present. Northern pike can spawn in wetland areas at the southwest part of the lake and in wetlands along the Thornapple River.

Although only seven northern muskellunge were collected, they made up 12.3% of the catch by weight (Table 1). Size ranged from 13 to 38 inches, but no fish were over the legal size limit (42 inches). Growth was at the state average. Only age 1 and 6 fish were collected, corresponding to the most recent stocking years, 1994 and 1989. No stocking took place between 1990 and 1994.

The 1989 stocking showed good survival, making up 36.8% of the catch. These data indicate no significant amount of natural reproduction occurred from 1990 to 1993.

One 9.5-inch brown trout was collected. It was from the 1994 year class, and probably migrated into the lake from Highbanks Creek. In 1995, Highbanks Creek, which flows north into Thornapple Lake, was stocked with 405 yearling brown trout at Thornapple Lake Road.

The forage base is good and diverse. Golden and common shiner, horneyhead chub, common carp, central mudminnow, brook silverside, white sucker, and redhorse suckers were collected (Table 1). The abundance of top predators such as northern muskellunge, northern pike, walleye, largemouth bass, bowfin, and longnose gar do not appear to be harming the forage base.

Overall, the fish populations of this lake are very good. There have been very few complaints about the fishery of this lake. Anglers report great catches of 6-7 inch black crappie and bluegill. The walleye fishing has been good with consistent action from year to year. Anglers report good yellow perch fishing upriver in the spring, and great yellow perch ice fishing on the west side of the lake. Thornapple Lake produces trophy-size northern muskellunge with regularity. The walleye and northern pike fishery are one of the best in the county, second only to Gun Lake.

## Management Direction

Thornapple Lake will continue to be managed as one of Barry County's premier warmwater fisheries. Stocking of northern muskellunge and walleye should continue. Currently, northern muskellunge fall fingerlings are stocked biannually at a rate of four per acre. Walleyes are stocked annually at a rate of 50 spring fingerlings per acre. Serns indices and general surveys indicate little or no natural reproduction of walleye or northern muskellunge occurs. Continued stocking will ensure that those fisheries will continue.

Due to its close proximity to Wolf Lake State Fish Hatchery and ability to grow large northern muskellunge, Thornapple Lake should continue to be used as a backup broodstock lake to Lake Hudson in Lenawee County. The special northern pike and muskellunge season from the last Saturday in April to November 30th should remain in effect to protect muskies during the spawning season and to prevent overharvest during the ice fishery. It may be desirable in the future to apply the same special northern pike and muskellunge season on the Thornapple River as reports indicate that large musky are being speared just outside the lake.

Our goal into the next century will be to maintain the fish community and continue the walleye and northern muskellunge programs. Muskie used as brood stock should be tagged to (a) determine population density and (b) avoid inbreeding caused by striping the same individuals year after year. Serns Index surveys should be continued to monitor walleye survival. If survival becomes, too high, stocking levels should be reduced to maintain a balanced fish community and good growth of walleyes. Full surveys with standard trap nets, experimental gill nets, and night time electrofishing is recommended every 6 to 10 years to monitor the overall fish community and to make sure the forage base remains high and does not become depleted by top predators.

Report completed: September 2000.

## References

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**Table 1**.-Number, weight, and length (inches) of fish collected from Thornapple Lake with trap nets, gill nets, and DC boomshocker, May 8-31, 1995.

| Species | Number | Percent by number | Weight (Pounds) | Percent by weight | Length range (inches)[1] | Average length | Percent legal size[2] |
|---|---|---|---|---|---|---|---|
| Bluegill | 497 | 4.9 | 43.4 | 7.2 | 1-7 | 4.3 | 31 (6") |
| Pumpkinseed | 35 | 0.3 | 3.3 | 0.5 | 1-7 | 4.2 | 43 (6") |
| Black crappie | 8,620 | 85.2 | 94.3 | 15.7 | 1-10 | 6.2 | 53 (7") |
| Hybrid sunfish | 1 | 0.0 | 0.1 | 0.0 | 5-5 | 5.5 | 0 (6") |
| Rock bass | 19 | 0.2 | 3.5 | 0.6 | 4-8 | 6.2 | 39 (6") |
| Largemouth bass | 48 | 0.5 | 31.8 | 5.3 | 2-17 | 8.9 | 33 (14") |
| Brown trout | 1 | 0.0 | 0.4 | 0.1 | 9-9 | 9.5 | 0 (10") |
| Walleye | 15 | 0.1 | 16.5 | 2.8 | 7-23 | 13.2 | 56 (15") |
| Yellow perch | 677 | 6.7 | 59.5 | 9.9 | 3-8 | 5.7 | 61 (7") |
| Northern pike | 18 | 0.2 | 57.6 | 9.6 | 12-34 | 22.6 | 32 (24") |
| Northern muskellunge | 7 | 0.1 | 74 | 12.3 | 13-38 | 30.8 | 0 (42") |
| Bullhead species | 7 | 0.1 | 0.0 | 0.0 | 6-14 | 10.1 | ... |
| Bowfin | 11 | 0.1 | 63.2 | 10.5 | 18-30 | 24.9 | ... |
| Longnose gar | 36 | 0.4 | 72.9 | 12.2 | 11-39 | 27.5 | ... |
| White sucker | 20 | 0.2 | 19.1 | 3.2 | 3-17 | 12.0 | ... |
| Redhorse | 72 | 0.7 | 31.6 | 5.3 | 2-22 | 6.6 | ... |
| Shorthead redhorse | 6 | 0.1 | 27.5 | 4.6 | 21-24 | 22.7 | ... |
| Brook silverside | 2 | 0.0 | 0.0 | 0.0 | 3-3 | 3.5 | ... |
| Common carp | 1 | 0.0 | 0.0 | 0.0 | 4-4 | 4.5 | ... |
| Central mudminnow | 2 | 0.0 | 0.1 | 0.0 | 3-4 | 4.0 | ... |
| Common shiner | 8 | 0.1 | 0.4 | 0.1 | 3-7 | 4.6 | ... |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Horneyhead chub | 1 | 0.0 | 0.1 | 0.0 | 5-5 | 5.5 | ... |
| Golden shiner | 10 | 0.1 | 0.7 | 0.1 | 3-7 | 5.6 | ... |
| **Total** | 10,114 | 100.0 | 600.0 | 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 2**.-Average total weighted length (inches) at age, and growth relative to the state average, for fish sampled from Thornapple Lake with trap nets, gill nets, and DC boomshocker, May 8-31, 1995. Number of fish aged is given in parentheses.

| Species | Age 1 | 2 | 3 | 4 | 5 | 6 | 7 | Mean growth index[1] |
|---|---|---|---|---|---|---|---|---|
| Black crappie | 3.0 | 4.2 | 6.5 | 7.3 | 8.8 | 9.0 | 10.0 | -1.1 |
| | (37) | (2) | (5) | (19) | (6) | (5) | (2) | |
| Bluegill | 1.9 | 3.9 | 4.8 | 5.9 | 6.4 | 7.4 | ... | -0.2 |
| | (18) | (21) | (1) | (12) | (14) | (3) | ... | |
| Brown trout | 9.5 | ... | ... | ... | ... | ... | ... | |
| | (1) | ... | ... | ... | ... | ... | ... | |
| Largemouth bass | 4.0 | 8.7 | 10.4 | 11.8 | 14.3 | 14.4 | ... | 0.0 |
| | (19) | (3) | (2) | (14) | (2) | (2) | ... | |
| Northern muskellunge | 14.2 | ... | ... | ... | ... | 36.8 | ... | +0.4 |
| | (2) | ... | ... | ... | ... | (5) | ... | |
| Northern pike | 12.5 | 18.1 | 22.4 | 22.6 | 28.2 | 30.6 | ... | +0.4 |
| | (1) | (6) | (3) | (1) | (4) | (2) | ... | |
| Walleye | 8.6 | 12.3 | 15.5 | 17.8 | 22.8 | 23.5 | ... | +1.7 |
| | (6) | (5) | (1) | (2) | (1) | (1) | ... | |
| Yellow perch | 3.8 | 5.4 | 6.7 | 7.0 | 8.4 | ... | ... | +0.1 |
| | (19) | (1) | (18) | (17) | (1) | ... | ... | |

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

**Table 3**.-Estimated age frequency (percent) of fish caught from Thornapple Lake with trap nets, gill nets, and DC boomshocker, May 8-31, 1995.

| Species | Age 1 | 2 | 3 | 4 | 5 | 6 | 7 | Number aged |
|---|---|---|---|---|---|---|---|---|
| Black crappie | 49 | 3 | 7 | 25 | 8 | 7 | 3 | 76 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Bluegill | 26 | 30 | 1 | 17 | 20 | 4 | ... | 69 |
| Brown trout | 100 | ... | ... | ... | ... | ... | ... | 1 |
| Largemouth bass | 45 | 7 | 5 | 33 | 5 | 5 | ... | 42 |
| Northern muskellunge | 29 | ... | ... | ... | ... | 71 | ... | 7 |
| Northern pike | 6 | 35 | 18 | 6 | 24 | 12 | ... | 17 |
| Walleye | 38 | 31 | 6 | 13 | 6 | 6 | ... | 16 |
| Yellow perch | 19 | 1 | 18 | 17 | 1 | ... | ... | 56 |

**Appendix 1**.-History of fish stocking in Thornapple Lake, Barry County.

| Year | Species | Number | Size |
|---|---|---|---|
| 1934 | Bluegill | 2,500 | Fall fingerlings |
| 1935 | Bluegill | 12,000 | Fall fingerlings |
| | Largemouth bass | 4,000 | Spring fingerlings |
| | Yellow perch | 7,000 | Fall fingerlings |
| 1936 | Bluegill | 29,000 | Fall fingerlings |
| | Yellow perch | 7,500 | Fall fingerlings |
| 1937 | Bluegill | 8,000 | Fall fingerlings |
| | Yellow perch | 4,800 | Fall fingerlings |
| 1938 | Bluegill | 12,500 | Fall fingerlings |
| 1939 | Bluegill | 22,000 | Fall fingerlings |
| | Largemouth bass | 6,900 | Fall fingerlings |
| | Yellow perch | 4,300 | Fall fingerlings |
| 1940 | Largemouth bass | 3,600 | Fall fingerlings |
| 1941 | Bluegill | 10,000 | Fall fingerlings |
| 1942 | Bluegill | 2,000 | Fall fingerlings |
| | Largemouth bass | 300 | Fall fingerlings |
| 1943 | Bluegill | 9,000 | Fall fingerlings |
| | Largemouth bass | 400 | Fall fingerlings |
| 1944 | Bluegill | 2,000 | Fall fingerlings |
| | Bluegill | 4,000 | Yearlings |
| | Largemouth bass | 800 | Fall fingerlings |
| 1945 | Bluegill | 1,000 | Yearlings |
| | Largemouth bass | 2,000 | Fall fingerlings |
| 1964 | Northern muskellunge | 1,360 | Fall fingerlings |
| 1965 | Northern muskellunge | 2,060 | Fall fingerlings |
| 1967 | Northern muskellunge | 4,138 | Fall fingerlings |
| 1969 | Northern muskellunge | 2,256 | Fall fingerlings |
| 1970 | Northern muskellunge | 2,500 | Fall fingerlings |
| 1971 | Northern muskellunge | 2,200 | Fall fingerlings |
| 1973 | Northern muskellunge | 779 | Fall fingerlings |
| 1976 | Northern muskellunge | 1,700 | Fall fingerlings |
| 1977 | Northern muskellunge | 1,000 | Fall fingerlings |
| 1978 | Northern muskellunge | 1,085 | Fall fingerlings |
| 1979 | Northern muskellunge | 1,700 | Fall fingerlings |
| 1980 | Northern muskellunge | 1,700 | Fall fingerlings |
| 1981 | Walleye | 1,000 | Fall fingerlings |

| | | | |
|---|---|---|---|
| 1983 | Northern muskellunge | 1,700 | Fall fingerlings |
| 1984 | Northern muskellunge | 319 | Fall fingerlings |
| | Walleye | 12,000 | Fall fingerlings |
| 1985 | Northern muskellunge | 1,700 | Fall fingerlings |
| | Walleye | 8,000 | Spring fingerlings |
| 1986 | Northern muskellunge | 1,772 | Fall fingerlings |
| | Walleye | 8,032 | Spring fingerlings |
| | Walleye | 220 | Fall fingerlings |
| 1987 | Northern muskellunge | 1,800 | Fall fingerlings |
| | Walleye | 7,933 | Spring fingerlings |
| 1988 | Northern muskellunge | 1,178 | Fall fingerlings |
| | Walleye | 8,122 | Spring fingerlings |
| 1989 | Northern muskellunge | 1,115 | Fall fingerlings |
| | Walleye | 7,966 | Spring fingerlings |
| 1990 | Walleye | 20,311 | Spring fingerlings |
| 1991 | Largemouth bass | 125 | Fall fingerlings |
| | Northern muskellunge | 4 | Fall fingerlings |
| | Northern pike | 15 | Fall fingerlings |
| | Walleye | 10,025 | Spring fingerlings |
| 1992 | Walleye | 23,002 | Spring fingerlings |
| 1993 | Walleye | 12,267 | Spring fingerlings |
| 1994 | Northern muskellunge | 1,352 | Fall fingerlings |
| | Walleye | 27,132 | Spring fingerlings |
| | Walleye | 1,783 | Fall fingerlings |
| 1995 | Northern muskellunge | 1,352 | Fall fingerlings |
| | Walleye | 27,132 | Spring fingerlings |
| | Walleye | 1,783 | Fall fingerlings |

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**Questions, comments and suggestions are always welcome! Send them to**
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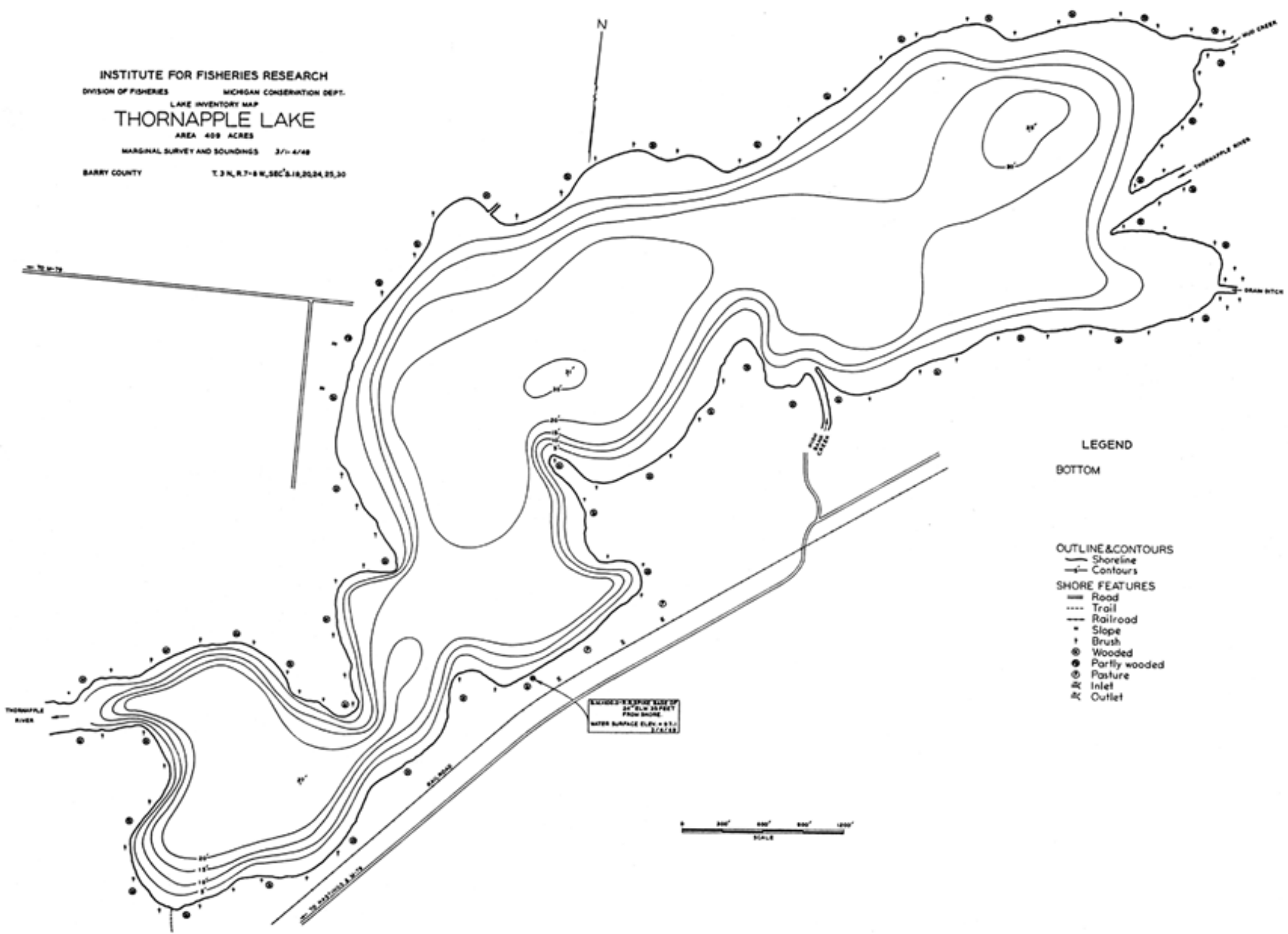


**Figure 1.—Map of Thornapple Lake showing depth contours (feet) and other features.**