Michigan Department of Natural Resources
Status of the Fishery Resource Report 93-9, 1993.

WHITMORE LAKE

Livingston and Washtenaw counties (T1N and 1S, R6E, Sections 32 and 5)
Surveyed June 9 and 10, 1992

Gary L. Towns

Environment

Whitmore Lake lies along the border of two counties in Michigan's Lower Peninsula. The northern half of this 667-acre lake is in the southeast corner of Livingston County and the southern half of the lake is in northern Washtenaw County. Located close to US Highway 23, this lake is easily accessible to several communities. The Village of Whitmore Lake abuts the southwestern shore of the lake. The closest city is Brighton (6 miles to the north). Two large metropolitan areas are also close to Whitmore Lake: Ann Arbor is only 9 miles south and Flint is approximately 40 miles north of the lake. A state-owned access site, located on the northwestern shore, with skid pier and concrete boat launching ramp, allows year-around public access.

The lake basin has a rather deep north-south trench with the deepest point in the northern end (69 feet). There are extensive shoals on either side of this trench; as a result, over half of the lake is less than 10 feet deep (see map of Whitmore Lake). Development in the form of cottages, permanent homes, beaches, and roads is very extensive. Very little "natural" shoreline remains intact.

Basin substrates consist primarily of sand from the shoreline to a depth of 5 feet. Fibrous peat makes up the lake bottom in the 5 to 20 foot depth range, and the deep basin areas consist mostly of pulpy peat. Aquatic vascular plants cover most of the shoal areas, but interfere with boating or fishing in only small areas of the lake.

Whitmore Lake has no outlet and no natural inlet. However, the Washtenaw County Drain Commission pumps water into the lake from the nearby Horseshoe Lake outlet. The legal lake level set for Whitmore Lake is 895.8 feet (Marcum 1992).

Many different forms of water sports including fishing, swimming, high-speed boating, water skiing, sailing and, most recently, jet skiing all compete for space on this large inland lake.

Undoubtedly, boating traffic interferes with fishing during the summer months-especially during the mid-morning to early evening period.

History

As with many lakes in Michigan, Whitmore was stocked with large numbers of bluegills, largemouth bass, and yellow perch in the late 1930s and early 1940s. Large numbers of smallmouth bass fingerlings were stocked in 1946, 1947, and 1948. In these earlier years it was thought that stocking these common species was needed to maintain fish populations which were being harvested by anglers. This practice was discontinued when research showed that it was not necessary or economical.

The first fishery survey of Whitmore Lake on record in Fisheries Division files occured in 1927. The game fish species noted at that time were similar to those present today (1992). Similar findings were made in 1940 during an intensive survey using several types of gear to capture fish.

Trap and fyke nets in 1970 produced a catch of over 1,200 fish. Bluegills and pumpkinseeds were the predominant species in the catch and averaged 6.5 inches and 6.2 inches, respectively. But, growth rates of bluegills and large-mouth bass were very poor (this is discussed later in this report). Even so, these fish, along with the rest of the catch, indicated that Whitmore Lake held a diverse warmwater fish population comprised primarily of panfish and predators. Forty-one largemouth bass, one pike and four tiger muskys were collected. However, 21 carp were also captured. Carp are generally considered a nuisance species.

In 1986 an intensive survey employing four gear types and 3 days of collection resulted in the capture of 1300 fish. Bluegill again predominated, comprising 79% by number and nearly 41% by weight. Many other aspects of this survey catch will be discussed later in this report.

There has been a great deal of research on both the fish population and the fishery of Whitmore Lake over the past several decades. Schneider and Lockwood (1979) listed several of these studies, some of which dated back to 1938. They used some of this past information when reporting the effects of regulations on Whitmore Lake's fishery from 1946 through 1965. This report holds a great deal of data regarding many aspects of the fishery during that period of time.

Whitmore Lake has a long history of intensive human use. Brown (1941) reported that in 1940 there were approximately 230 cottages, one hotel, two resorts, and eight boat liveries on this lake. In addition there were many permanent homes in the Village of Whitmore Lake. Christensen (1953) reported on creel census data collected on Whitmore Lake from 1946 through 1952. The 7-year averages he found were: 18,200 anglers/year; 63,020 hours of fishing/year; 54,160 fish taken/year; and 0.86 fish/hour/year. By 1980 total fishing pressure for the May-through-October period had increased only 2% (Goudy 1981), but fishing pressure on bass had increased 200%. Schneider and Lockwood (1979) noted that Whitmore Lake, like many other lakes in Michigan, experienced a large increase (about four times) in fishing pressure on bass in all the open-water seasons during the late 1950s. In the early 1950s, this lake was fished almost exclusively by the residents of Livingston and Washtenaw Counties. By 1959, the percentage of anglers from elsewhere in Michigan had increased from 4 to 30% and out-of-state anglers had increased from 0 to 2%. Shanty users sought only northern pike in the early 1950's, but the pike population dwindled and by the early 1960s only about 20% were seeking pike exclusively, 50% were after panfish exclusively, and 30% were fishing for both types of fish (Schneider and Lockwood 1979).

During the early 1950s there was a good deal of concern by local residents regarding the protection of a shallow marsh along the large peninsula in the southern end of the lake. They argued this was the only remaining pike spawning habitat in the lake. During the springs of 1952 and 1953 Williams (1953) made observations of pike spawning activity. He concluded that if this peninsula were destroyed, probably few, if any, pike would be raised in the lake. Finally, a local court ruled (Millard et al. 1953) to protect the bottom lands and adjacent upland along the east half of this peninsula from "filling, changing or in any way disturbing the submerged lake bottom or raising, filling, or otherwise altering the natural condition of the adjacent upland".

Apparently, water levels fluctuated a great deal prior to the establishment of a legal lake limit and the installation of the pump to keep the lake filled. Brown (1941) reported that the dredged canal from Horseshoe Lake more than doubled the original drainage basin of Whitmore Lake which was 3 to 4 square miles. He also stated that Whitmore Lake's water level was considerably higher than in the years immediately preceding the construction of the canal in 1937, but not greatly different from the high-water periods of normal cycles.

Since 1969 Fisheries Division has been stocking tiger muskellunge in Whitmore Lake (usually every-other-year). At one time this was regarded as one of the more successful inland tiger musky fisheries in southcentral Lower Michigan. In 1986, a local conservation officer estimated that approximately 10% of the anglers that visited the lake fished specifically for muskys. Records indicate that angling success for tiger muskys was fair to good from the early 1970s through the mid-1980s. The largest reported, 47 inches long and 24 pounds was caught in July, 1974. But, for the most part, musky survival in this lake to old age and large size has apparently been poor based on the lack of large muskys in angler catches or netting surveys. In 1980, Goudy (1981) conducted a creel census and estimated that 40 tiger muskys were harvested by anglers from May 15 through October 31. Some of these fish were measured, scale sampled and aged, and none were found to be longer than 32 inches or over 3 years old.

Tiger muskellunge rearing techniques in Michigan significantly changed in the mid-1970s. Extensive culture of fingerlings (in ponds fed with minnows) was replaced by intensive culture (in raceways fed with pellets). This resulted in a five-fold increase in annual fingerling production and a considerable decrease in fingerling survival and angling quality (Beyerle 1984b). Beyerle (1984a) found a strong negative correlation between survival of musky fingerlings and abundance of largemouth bass. The low survival of pellet-reared fingerlings along with high predation by bass has undoubtedly contributed to the low survival of tiger muskellunge in Whitmore Lake.

Fishery Resource

The 1992 fish survey catch indicated that Whitmore Lake continues to support a diverse warm water fish population; however, some species appear to be greatly influenced by angling. Trap nets, gill nets, and a 220-Volt pulsed DC boomshocker were used to collect fish during this survey. The trap net catch indicated the presence of a healthy gamefish population (Table 1). Gamefish comprised 97% of the trap net catch by number and over 64% of the catch by weight. Carp comprised much of the remaining catch biomass (26%). Bowfin, also referred to as dogfish, made up most of the remainder of the weight in the trap net catch (9%). Gill nets captured very few fish, but captured the only three northern pike taken during the survey. The boomshocker was used primarily to investigate species diversity, capture small gamefish for scale samples, and capture bass and carp for contaminant analysis. Also, to obtain a good sample of large-and smallmouth bass. Fifteen species were captured with the boomshocker. These include most of those taken with trap nets (Table 1) plus tiger musky, mud pickerel, spotfin shiner, and bluntnose minnow.

Nearly 600 bluegills were captured with trap nets during the 1992 survey. They averaged 6.7 inches, and accounted for nearly 64% of the total catch by number and 37% by weight (Table 1). Most bluegills were 6 inches or longer (72.8%). Average growth for bluegills, based on the analysis of fish scales, was 0.6 inches below the state average. Smaller, younger bluegills were found to be growing slower than older, larger fish. One age class (age VI) was missing from the sample (Tables 2 and 3). Apparently, 6 years ago something happened to disrupt bluegill spawning or eradicate newly hatched fry. The loss of this year class, potential competitors, could explain the accelerated growth of older bluegills (ages V, VII and VIII) in the population. Water level fluctuations and extreme weather or temperature changes during spawning periods can cause poor year class survival.

Bluegills captured during the 1986 survey and the 1970 survey were also growing below state average rates (-0.6 and -1.0 inches, respectively). But, the 1992 catch had a larger average size than either of these previous surveys.

Bluegills are targeted for sampling in inland lakes because of their role in determining fish community structure and overall sportfishing quality (Schneider 1981). Recently, a ranking system has been developed that allows fish managers to determine the relative quality of a lake's fish population (Schneider 1990). On a scale of 1 to 7 (with 7 the highest rank) the quality of the

bluegill population in Whitmore Lake was calculated from the 1992 trap net survey results as 5.2 or "good".

All types of gear collectively captured 73 largemouth bass in 1992. However, none of these were larger than 13 inches. While trap and gill nets are usually not very efficient at capturing bass, the boomshocker usually provides a good sample. But even with excellent sampling conditions we could not find large bass. This strongly suggests the occurrence of high angling mortality (the current size limit for bass is 12 inches).

In 1976 the size limit for largemouth bass was increased from 10 to 12 inches. Goudy (1981) studied the effects of that change on the bass population in Whitmore Lake. Using information from 1953 through 1980 he found that despite an increase of 200% in fishing pressure, the population of bass which were 10 inches and larger had increased 22%.

In 1993 the bass size limit was increased to 14 inches. Under normal circumstances, if this new rule has good compliance by anglers, the size structure of the bass population would be expected to significantly change. However, in Whitmore Lake largemouth bass growth rates have been poor and an improvement in bass populations may not result. In 1992, the mean growth index was -1.2 inches, and, growth rates of larger bass were slower than for smaller bass. Similar trends were observed in 1986 in a sample collected with similar gear. In that sample of 90 bass, only 1 was larger than 13.9 inches, the mean growth index was also -1.2 inches, and larger bass were growing more slowly than smaller bass. In the 1980 intensive study, 408 largemouth bass were captured with trap nets and electrofishing gear. Their growth index was also negative, -0.9 inches, and their growth pattern was similar. About 6% were longer than 13.9 inches, and 4% were 16 to 20 inches. Forty bass were captured in this lake in 1970. Those bass were growing 1.8 inches below the state average, but some 16- to 18-inch bass were captured.

Goudy (1981) found the growth of young bass was faster in Kent and Pontiac lakes than Whitmore Lake. Goudy speculated that bass grew faster in Kent and Pontiac lakes because they were shallow water impoundments which probably warm earlier in the spring and receive greater amounts of nutrient input than Whitmore Lake.

Goudy (1981) also discussed the possibility of changes in the bass "gene pool" caused by anglers harvesting the fastest growing, most aggressive bass in a lake. This would leave the slower-growing fish to perpetuate the population. He tagged many bass in these three lakes. Then, he compared the growth patterns of bass caught by anglers to the growth patterns of bass not caught by anglers. Goudy found no significant difference in growth rates between the two groups of bass in any of the three lakes.

Perhaps the forage selection for optimum bass growth is deficient in Whitmore Lake. This seems unlikely since many of the preferred forage fish of largemouth bass appear to be present in adequate numbers. Kramer and Smith (1960) found that the availability of quantities of invertebrate food of appropriate size for fry rising off nests, and water temperature before mid-August of the first year, seem to determine the ultimate growth history for largemouth bass. Perhaps Whitmore Lake fails to produce an adequate amount of aquatic insects for small bass. Maybe water temperatures are adversely effected with the pumping process that maintains the water level (see the section on Environment). For whatever reason, the growth of largemouth bass in Whitmore Lake has been poor for at least the last 22 years.

Only one tiger musky was collected during the 1992 survey. That fish was small (11.7 inches) and, was in all probability, a yearling which had been stocked in 1991. In recent years we have received only occasional reports of musky catches; therefore, I do not believe this fishery is of great significance at present. Past management of Whitmore Lake as a musky fishery was discussed in the history section of this report.

Only two smallmouth bass were captured in 1992. This species has been listed in fisheries surveys of Whitmore Lake as early as 1927. However, despite extensive stocking of fall fingerling smallmouth in the 1940s, smallmouth continue to be sparse. In southern Michigan smallmouth bass are usually associated more with riverine systems than with seapage lakes. It is possible that a few smallmouth bass may be entering the lake from the Horseshoe Lake Drain via the lake level control pump.

Only three northern pike were captured in 1992. Two of these were 23 inches long and the largest was 27 inches. The growth rates of these fish were exceptional; however, little can be said with such a small sample size. The pike (10) captured in 1986 also grew faster than the State average rate. Lack of prime spawning habitat is probably limiting the pike population in this highly developed lake.

The 50 pumpkinseed (sunfish) captured in the trap nets displayed a large average size (6.6 inches) and a better growth rate than bluegill, largemouth bass, black crappie, or yellow perch (Table 2). Apparently, the large area of shallow shoal in Whitmore Lake provides good habitat for the snails and other aquatic invertebrates which make up the bulk of the pumpkinseed's diet.

Many black crappie were captured (108) in the trap nets, but few were large enough to be of acceptable size to anglers. The catch averaged only 6.0 inches. Growth analysis indicated a large number of two year olds which were slow growing (Tables 2 and 3). Other year classes were present in small numbers, but displayed better growth patterns. The 1986 survey produced a fair catch of black crappie which averaged 8.3 inches. According to Brown (1941) crappie were not present in Whitmore Lake before the connection was made with Horseshoe Lake (via a dredging project in 1937).

Management Direction

The fish population in Whitmore Lake is similar in composition to that of other lakes in southern Lower Michigan. However, fish growth characteristics make the population rather unique. The population seems to be "predator poor", with few large pike, muskys, or bass. This condition usually results in an over-abundance of small, slow-growing panfish and a few large, fast-growing pike and bass. The panfish are growing slowly compared to state average growth rates, but they do not seem to be over abundant based on catch rates of various equipment during past surveys. As for panfish predators, pike are few in number but are growing at fast rates. However, largemouth bass, a better panfish predator than pike, are growing at very slow rates.

Recommendations

The tiger musky stocking program was producing fair results from the mid-1970s through the early 1980s. However, in recent years few muskys have been caught and survival of stocked fingerlings has apparently been poor. Tiger musky fingerlings are very expensive to raise, and since this exercise is producing such poor results, I recommend that musky stocking be discontinued.

The few northern pike captured during this survey displayed excellent growth rates. And, since so few were caught or observed during the 1992 survey the pike population is presumed to be quite small. This lake has no inlets or other significant prime pike spawning areas. Supplemental pike stocking could increase the population significantly and provide a large predator and game fish to replace muskys. Northern pike stocking is recommended.

This large lake might support a small walleye fishery. However, recent research has indicated that clear-water inland lakes in southern Lower Michigan need to be very heavy stocked with walleye fingerlings to produce even a minor fishery. Probably well over 100,000 spring fingerlings would be needed in each of three successive years in a lake of this size. More study will be needed prior to a commitment of this magnitude.

Since the mid-1980s, we have had very good success developing redear sunfish fisheries. This species (*Lepomis microlophus*) is commonly referred to as "the shellcracker" due to their preference for snails as food. Redear are not native to Michigan, but are closely related to native pumpkinseed sunfish (*Lepomis gibbosus*). These two species have similar diets and behavior. A major difference is that redear grow much faster and larger than pumpkinseed. For example, in trap net surveys redear usually average about 9 inches and pumpkinseed average about 6 inches. The pumpkinseed sample in the 1992 survey averaged 6.6 inches and displayed better growth rates than the other panfish in Whitmore Lake. These facts indicate that redear would also do well in this lake. If stocked these large panfish would offer the angler the opportunity of a trophy-sized panfish. I recommend stocking redear sunfish at 75 per acre for 3 successive years in hopes of developing a reproducing population in accordance with the Redear Sunfish Management Plan (Towns 1991).

The historical poor growth of largemouth bass in Whitmore Lake, also observed during the 1992 survey, could be the subject of an extensive research study. This problem should be suggested to university students as a potential thesis topic.

Periodic monitoring of the fish population is strongly suggested, especially to track the results of the recommended stocking programs.

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Table 1.-Number, weight, and length indices of fish collected from Whitmore Lake with trap nets, June 9, 1992.

Species	Number	Percent by number	Weight (pounds)	Percent by weight	Length range (inches)[1]	Average length	Percent legal size[2]
Bluegill	596	63.9	123.3	36.9	4-8	6.7	73 (6)
Largemouth bass	23	2.5	10.2	3.1	7-12	9.8	9 (12)
Black crappie	108	11.6	13.6	4.1	4-11	6.0	8 (7)
Rock bass	45	4.8	7.1	2.1	4-8	6.2	53 (6)
Bullhead	72	7.7	48.2	14.4	8-12	10.8	100 (7)
Pumpkinseed	50	5.4	10.2	3.1	4-7	6.6	84 (6)
Yellow perch	3	0.3	0.8	0.2	8-9	8.8	100 (7)
Warmouth	7	0.8	1.2	0.4	5-7	6.6	71 (6)
Green sunfish	1	0.1	0.2	0.1	5	5.5	0 (6)
Bowfin	9	1.0	30.1	9.0	13-25	20.9	---
Carp	10	1.1	86.8	26.0	20-29	26.2	---
Golden shiner	7	0.8	1.2	0.4	7-8	8.1	---
White sucker	1	0.1	1.5	0.4	14	14.5	---
Total	932	100.0	334.4	100.0			

[1]Note some fish were measured to 0.1 inch, others to inch group: e.g. "5" = 5.0 to 5.9 inches, "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 length (inches) at age, and growth relative to the state average, for five species of fish sampled from Whitmore Lake with trap nets, gill nets, and boomshocker on June 9, 1992. Number of fish aged is given in parentheses.

Species	Age								Mean growth
	I	II	III	IV	V	VI	VII	VIII	index[1]
Bluegill	1.9	2.9	4.2	6.0	7.3	---	8.0	8.1	-0.6
	(6)	(15)	(16)	(18)	(12)	---	(7)	(5)	
Largemouth bass	4.4	7.8	9.8	10.9	12.3	12.8	---	---	-1.2
	(3)	(12)	(8)	(17)	(12)	(5)	---	---	
Black crappie	4.0	5.9	7.7	9.4	10.1	11.1	---	---	-0.6
	(3)	(20)	(3)	(4)	(1)	(1)	---	---	
Pumpkinseed	---	3.1	4.5	5.9	6.5	7.0	7.4	7.8	-0.2
	---	(8)	(3)	(12)	(8)	(6)	(3)	(1)	
Yellow perch	2.9	5.5	6.4	8.3	8.5	---	---	---	-0.7
	(5)	(2)	(3)	(4)	(6)	---	---	---	

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

Table 3.-Estimated age frequency (percent) of four species of fish caught from Whitmore Lake with trap nets and boomshocker on June 9, 1992.

	Age								Number
Species	I	II	III	IV	V	VI	VII	VIII	caught
Bluegill	1.2	3.6	7.9	35.7	31.1	---	15.0	6.0	638
Largemouth bass	4.2	16.6	12.3	32.2	24.2	11.0	---	---	71
Pumpkinseed	---	21.3	5.3	29.3	20.4	17.0	5.0	2.0	75
Black crappie	2.8	91.6	2.8	2.8	---	---	---	---	107

Note: Fish caught with both trap nets and boomshocker were used for this table. Calculations from samples caught with specific gear types varied little from the above information.

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Questions, comments and suggestions are always welcome! Send them to
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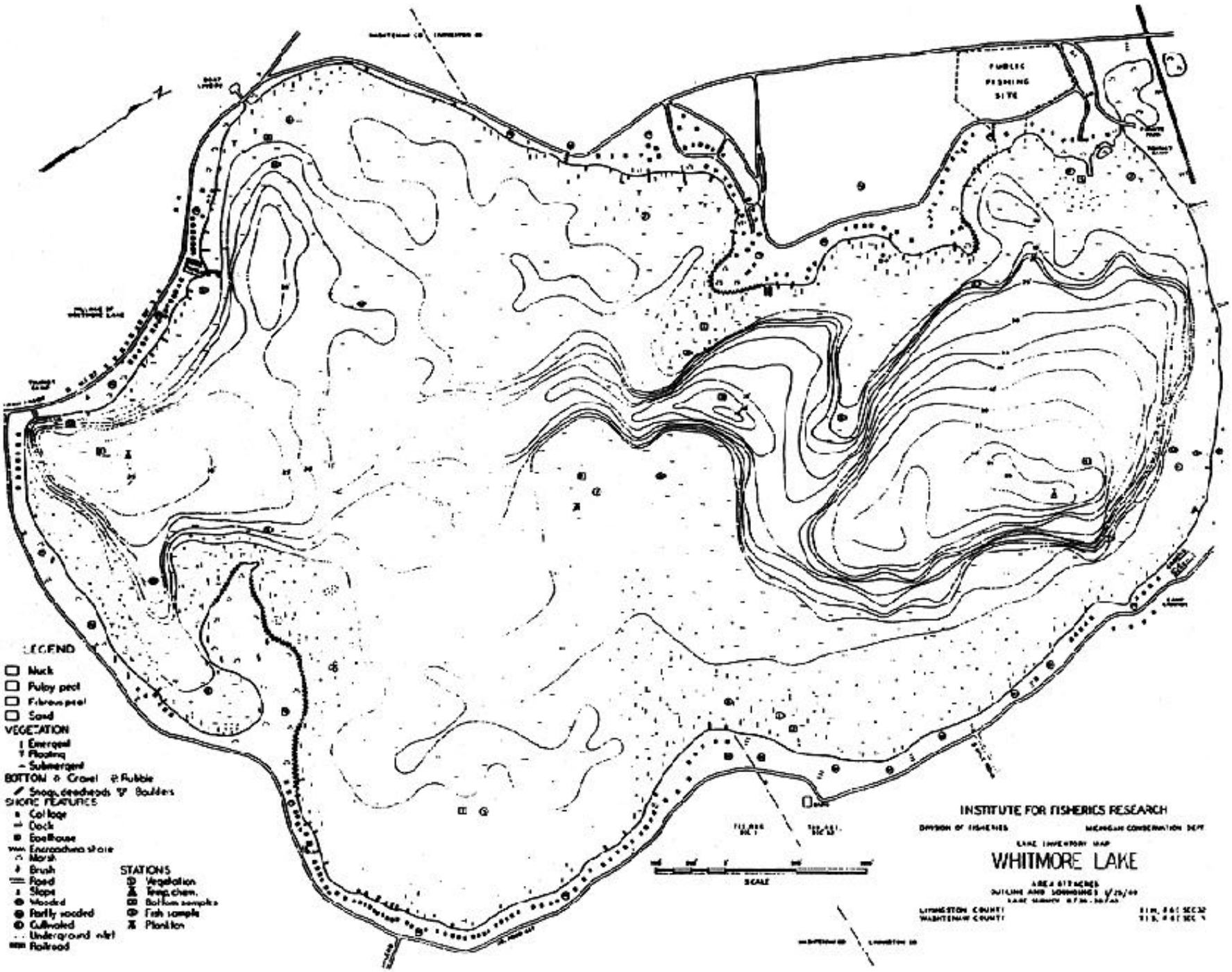
PUBLIC FISHING SITE
LEGEND
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Pulpy peat
Fibrous peat
Sand
VEGETATION
Emergent
Floating
Submergent
BOTTOM G Gravel R Rubble
Snags, deadheads B Boulders
SHORE FEATURES
Cottage
Dock
Boathouse
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