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PARTIAL SURVEY OF WALNUT LAKE, OAKLAND COUNTY

by

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During the early part of August 1943, Conservation Officer Robert McClure requested that the Institute investigate Walnut Lake to determine whether trout and whitefish were still present. On September 8 to 10 and November 8 and 9 the writers undertook a partial survey of Walnut Lake (T. 2 N., R. 9 E., Sections 24, 25), Oakland County.

We are indebted to Conservation Officer Robert McClure for giving us information regarding the lake. Mr. Claude J. Whitmer, who lives on the lake, was kind enough to let us use one of his boats for our work.

Walnut Lake is situated in the southern part of Oakland County about 4.5 miles southwest of Pontiac and about 1.5 miles southeast of Orchard Lake. It is accessible by a fair county road which skirt almost the entire lake.

All of the land surrounding the lake is privately owned. There was one boat livery on the lake until the end of the summer of 1943, when the operator took employment in a war plant. According to Mr. McClure, the only way that a person can fish the lake at the present time is by receiving special permission from a land owner. A small park is located on the east side of the south bay of the lake. This park is owned, operated and used by the landowners.

Walnut Lake has a very interesting history. Lake trout were planted in this lake in 1878 and 1879 by the Michigan Fish Commission and in 1889, 1892, 1900 and 1901 by the U. S. Fish Commission. In 1890 the Michigan Fish Commission examined Walnut Lake and set gill nets in from 70 to 80 feet of water. They took 6 lake trout, the largest weighed 1.5 pounds.

A biological survey was made of Walnut Lake from April 3 to August 30, 1906 by Mr. T. L. Hankinson and others ("A Biological Survey of Walnut Lake, Michigan" by Thomas L. Hankinson, published by the State Board of Geological Survey as a part of the report for 1907). Mr. Hankinson made the survey at the suggestion of Captain Clark of Northville in an effort to determine why whitefish flourished in the lake so that whitefish might be successfully planted and raised. This question was answered by this splendid survey, one of the first that was conducted in the United States. An excellent map was made during the winter and was used by Mr. Hankinson to plot in the various netting and bottom sampling stations. Hankinson listed 32 species of fish for Walnut Lake.

Some of the data used in this report were taken from this paper by Hankinson.

Physical and Chemical Characteristics

Walnut Lake is irregular in outline and has a number of large bays. The greatest depth found by Hankinson was 101 feet. Hankinson also lists the area as 232 acres. A brief examination of the map reveals that at least two-thirds of the lake has a depth greater than 30 feet.

The shore to the north of the lake is rather high land, sloping gradually toward the south. There is some farm land near the lake.

The lake has three inlets, all on the north side of the lake. Two of these inlets are intermittent and the only permanent stream is small. Originally the lake had no outlet stream, but in 1896 an artificial channel

was dug at the west end that joins a small tributary to the Rouge River.

This outlet stream lowered the lake by several feet.

The water of Walnut Lake is clear and the visibility probably extends to about 15 feet. A variety of bottom materials are found in the shallow water of Walnut Lake, including sand, gravel, rubble, marl, and fibrous peat (marshy bays). In the deeper water the bottom appeared to be composed of pulpy peat.

Temperature and chemical conditions are summarized in the following table.

September 8, 1943					Sept. 10, 1943		Hankinson, August 26, 1906				
					Sta- tion 1	Sta- tion 2					
Depth feet	Tempera- ture °F.	Oxygen p.p.m.	M. O. alka- linity p.p.m.	pH	Oxygen p.p.m.	Oxygen p.p.m.	Depth meters	Tempera- ture °F.	Oxygen		
									cc. per liter	p.p.m. ↓	
Sur- face	71	7.96	112.0	8.3	...	...	Sur- face	78	5.486	7.83
...	...	...	...	...	...	...	1	79	5.176	7.39
...	...	...	...	...	...	...	2	78	...	...
10	...	7.85	110.0	8.2	...	...	3	77	5.078	7.25
...	...	...	...	...	...	...	4	75	...	...
...	...	...	...	...	...	...	5	75	5.409	7.64
20	71	7.96	...	...	...	...	6	66	5.661	8.08
23	64	...	...	...	...	...	7	59	5.194	7.42
...	...	...	...	...	...	...	8	55	3.920	5.60
30	53	6.12	122.0	7.7	6.02	5.92	9	51	3.886	5.54	
...	...	...	...	...	...	...	10	49	3.160	4.51
35	49	1.53	...	...	1.38	1.33	...	...	...	...
40	48	1.78	124.0	7.4	1.73	2.14	...	...	...	...
45	...	3.57	...	...	2.96	2.86	...	...	...	...
50	46	3.47	...	...	3.47	3.47	15	46	1.782	2.54
60	45	2.45	124.0	7.4	...	...	...	...	...	...
65	...	1.53	...	...	...	...	20	44	1.000	1.42
80	45	0.92	...	...	...	...	25	44	1.445	2.05
90	...	...	...	...	...	...	28	44	.982	1.39
95	...	...	...	...	...	...	29	...	.727	1.04
100	45	0.20	130.0	7.4	...	...	...	...	...	...

↓ Transposed by George N. Washburn.

On September 8 there was a well developed thermocline between about 20 and 35 feet. Oxygen is abundant in the thermocline. The oxygen at the bottom of the thermocline (35 feet) is only one and a half parts per million and is not sufficient to maintain fish life. This condition was probably brought about by the settling of dead plankton organisms which remained at the bottom of the thermocline and in the upper layers of the hypolimnion. This condition is frequently found in lakes. It would be desirable to make chemical analyses at least once a month from June through September in 1945 to determine whether this condition is permanent or just a seasonal phenomenon. Mr. Hankinson did not find this when he made his biological survey. At 40 feet the oxygen increases slightly over that at 35 feet (from 1.53 to 1.78 p.p.m.) and at 45 feet the oxygen is up to 3.57 p.p.m. From a depth of 45 feet to the bottom the oxygen decreases gradually. Only 0.2 p.p.m. of oxygen was present at the bottom. Oxygen is present, therefore, in quantity sufficient to maintain fish life from the surface to 35 feet and from 45 to about 55 feet. The presence of a small amount of oxygen in the water at the bottom probably indicates that there is ~~probably~~ sufficient oxygen in the hypolimnion to support fish life during at least a part of the summer. There is plenty of oxygen in the thermocline during the entire year to support such species as trout and whitefish. Additional oxygen analyses were made between the 30 and 50 foot depths on September 10 to check our results of September 8. The results were comparable (see table).

The water of Walnut Lake is very alkaline (pH 8.3 to 7.4) and moderately hard (methyl orange alkalinity 112 to 130 p.p.m.). In general hard-water lakes are more productive than soft-water lakes.

Species of Fish Present

Mr. Hankinson lists 32 different species of fish that were taken in Walnut Lake in 1906. Mr. Hankinson was unable to take any lake trout during his investigation but he could see no reason why the species should not have been present in this lake. The whitefish was abundant in Walnut Lake in 1906. Mr. Hankinson reports that this species was probably native since a farmer who lived in the vicinity reported that his father had taken whitefish in Walnut Lake as early as 1840. Mr. Hankinson reports that three plantings, aggregating over 100,000 artificially propagated white fish, were planted in Walnut Lake by the Michigan Fish Commission in 1874, 1878 and 1879. Local residents spear whitefish each fall at Walnut Lake during the spawning season for this species.

Between September 8-10 we were only able to take 2 perch and one common sucker in our two experimental gill nets. (This was partially due to the fact that our gill nets were set in between 30 and 45 feet of water. The oxygen was low in this water.) We were also able to take scales and measurements from one bluegill that was caught by an angler.

On November 8-9, 1943, the following fish were taken in our gill nets:

5 northern pike (17.5 to 23.1 inches)
6 perch (9.9 to 12.8 inches)
1 walleye (20.2 inches)
6 largemouth bass (4.4 to 13.6 inches)
1 pumpkinseed sunfish (5.8 inches)
7 black crappie (5.6 to 7.4 inches)
1 whitefish (19.7 inches and 3 pounds 5.5 ounces)
3 common suckers (15.2 to 16.4 inches)

All of the fish that were taken appeared to be in excellent condition and no heavy infestation of parasites was observed.

Between 1934 and 1943 the following fish were planted in Walnut Lake:

2,525 smallmouth bass
3,850 largemouth bass
74,000 bluegills
524,000 walleyed pike
28,000 perch

We were unable to secure any samples of smallmouth bass. Black crappies appeared to be one of the dominant species now present in Walnut Lake. Neither the smallmouth bass nor the black crappie were found in Walnut Lake in 1906 when Hankinson made his survey.

Management Proposals

Since the northern pike is a dominant species and pikeperch are present, it would be proper to give it the "pike" classification. This would be especially desirable since perch are numerous and of good size and since the planting of rainbow trout is being considered.

The temperature and chemical conditions in Walnut Lake are suitable for whitefish and trout. Whitefish are able to reproduce in this lake. It is also believed that lake trout would also be able to spawn successfully in Walnut Lake.

It is proposed, therefore, that this lake be given experimental plantings of legal sized rainbow trout and of two-year-old lake trout. The planting of trout should only be carried out if and when public access is guaranteed. A public fishing site should be secured on Walnut Lake.

The number of trout (either lake or rainbow) to be planted will be decided upon after public access has been obtained.

It is recommended that no further plantings of warm-water fish be made in Walnut Lake. In 1906, Mr. Hankinson found that all of the warm water species were fairly abundant and later studies have shown that these species are well able to maintain themselves after becoming established. Since 1906 two species (black crappie and smallmouth bass) have been planted in Walnut Lake. Enough different species of warm-water game fish are present in the lake without attempting to establish more species. Another reason for stopping all planting at the present time is because the public is not permitted free access to the lake at present.

It is recommended that Walnut Lake be mapped during the winter of 1944-1945. A map made at this time would be valuable for comparison with the map that was made in 1906. It would also be desirable to make a very thorough inventory of this lake to determine what changes have taken place during the 40 year period since Mr. Hankinson made his biological survey. The results of such a survey would be extremely valuable in determining the changes that could be expected in other similar lakes.

It is recommended that a monthly check be made of oxygen conditions in Walnut Lake (see discussion of chemical conditions) in 1945 from June through September in order to determine whether the oxygen deficiency that we found just below the thermocline is permanent or just a seasonal phenomenon.

It is recommended that additional gill netting be done in the deeper waters during the summer of 1945 to obtain a better series of whitefish for age and growth studies. It would also be desirable to make a special study of the whitefish spawning in late fall in 1945 to determine if possible the number of whitefish that could be harvested by the public.

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