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FISH DIVISION

AN EVALUATION OF THE FISH POPULATION OF  
HOUGHTON LAKE, ROSCOMMON COUNTY, MICHIGAN

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In 1955, during the period of May 17 to June 18, trap nets were operated in Houghton Lake by a crew<sup>v</sup> from the Institute for Fisheries Research, Fish Division, Michigan Department of Conservation.

The purpose of the investigation was to make an evaluation of the fish population in Houghton Lake.

Houghton Lake, as the largest inland lake in Michigan, constitutes one of the state's major fishing areas, and has been the subject of several investigations by Fish Division personnel. Prior investigations have been reported in Institute for Fisheries Research Reports No. 363, 368, 387, 417, 583, 811, 1038, 1039, 1220. These earlier investigations concerned themselves for the most part with angling in Houghton Lake or with some particular species. The present investigation was undertaken for the purpose of learning something about the total fish population of the lake.

So that sampling by the trap nets would be as representative as possible, the lake was arbitrarily divided into 30 sections of about 1 square mile in area. Houghton Lake has a surface area of 31 square

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<sup>v</sup>B. V. Hughes and R. L. Sides.

miles. Trap nets were set in each of the 30 sections, so samples were secured from most parts of the lake. The map shows locations of different netting stations.

At the outset of the investigation it was hoped that it would be possible to mark and recapture a sufficient number of fish to permit a reliable numerical estimate based upon the ratio of marked to unmarked fish in the daily net catches. However, a two-man crew was unable to operate a sufficient number of nets over a long enough period of time and over a large enough area of the lake to secure realistic estimates. Computed estimates of the numerical abundance of certain species were not realistic so they have not been included in this report. Since numerical estimates could not be made, the problem of fish abundance in Houghton Lake was approached from another angle.

It may safely be assumed that the catch by trap nets will be influenced by the density of the fish population--if there are a lot of fish in any body of water, nets will catch a greater number, on the average, than they will when the fish population is small. Therefore, in trying to assess the density of the fish population in Houghton Lake the catch per unit of effort has been compared with the catch per unit of effort in other lakes. So that this comparison would be strictly valid, the unit of effort was taken to be one trap net set for a 24-hour period. This is termed a net-day. Catch by nets which were lifted after a period of more than 24 hours were not considered. Each netting station was fished for from 2 to 7 net-days (average 4.4 net-days). During the period, results were obtained from 133 net-days. Total catch for the period (133 net-days) is shown in Table 1. From this table it may be seen that numerous fish were captured, that several species are represented, and that the bulk of

Field map used for trap netting on Houghton Lake.

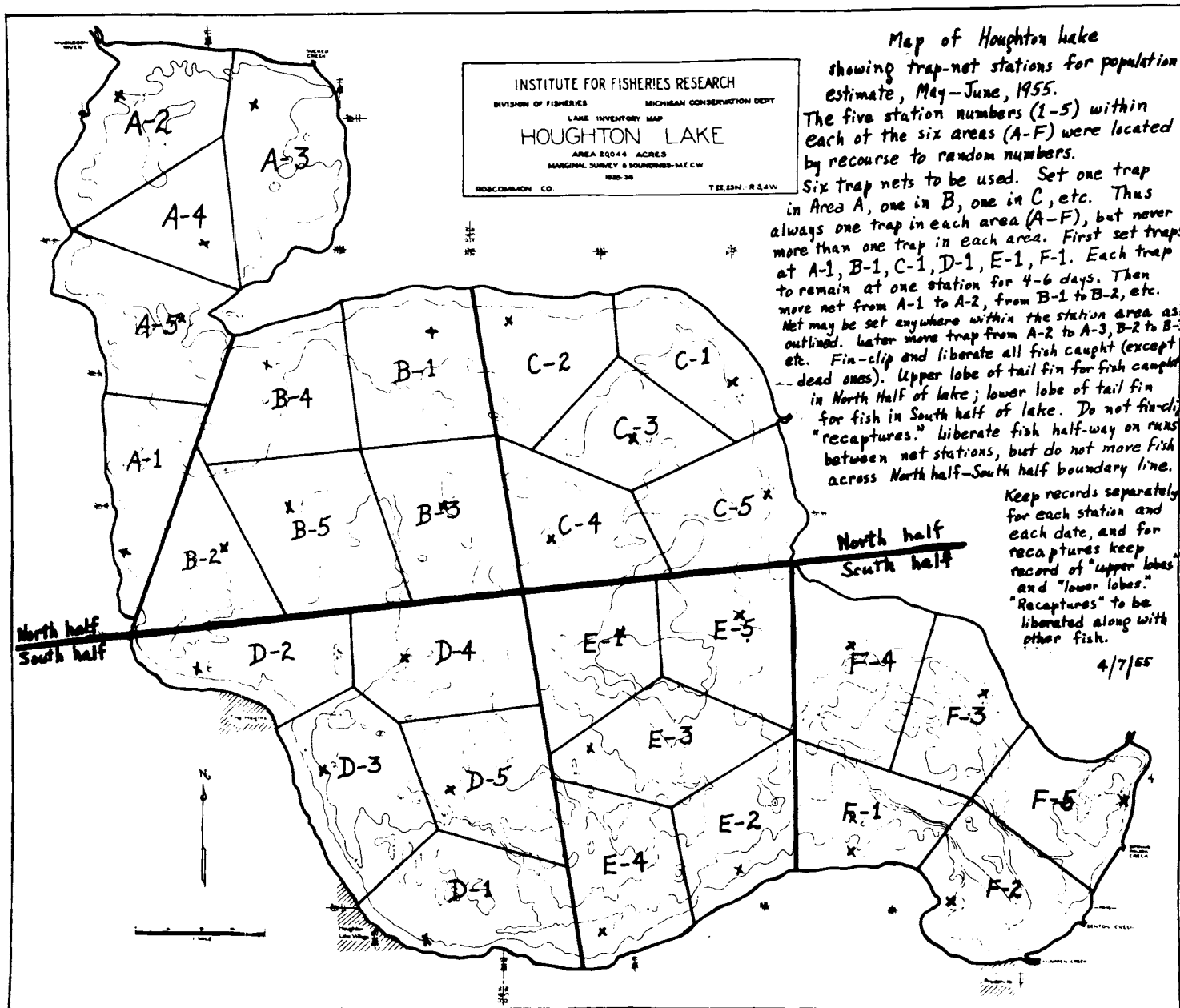


Table 1

Catch by trap nets at Houghton Lake during 133 net-days,  
May 17 to June 18, 1955

Species	Number caught
Bluegill	2,070
Pumpkinseed	1,263
Rock bass	1,316
Black crappie	417
Yellow perch	28
Walleye	1,111
Largemouth bass	167
Northern pike	107
Smallmouth bass	100
Brown bullhead	1,341
Bowfin	72
White sucker	59
Gar	39
Yellow bullhead	11
Carp	3
Catfish	2
Redhorse	2
17 species	8,108

was  
the catch<sup>^</sup> composed of game and pan fishes. While the netting was in progress, all fish were marked by fin clipping prior to release. This was done for the purpose of making a numerical estimate based on the ratio of marked to unmarked fish in the catch, but as explained previously this did not prove practical. Still, some benefit was derived from the marking program for recaptures of marked fish while the netting was in progress did show that most of the fish in the nets were different individuals each day. Among the 8,108 fish caught by the nets there were only 127 recaptures--34 rock bass, 31 bluegills, 29 brown bullheads, 21 pumpkinseeds, 4 largemouth bass, 3 smallmouth bass, 2 black crappies, 2 bowfins, and 1 walleye. The low number of recaptures indicates that the common species in Houghton Lake are represented by large numbers of individuals.

Density of the fish population in Houghton Lake may best be evaluated by comparing the catch per unit of effort in Houghton Lake with that in other lakes. Two other lakes, Whitmore Lake in Washtenaw County, and Big Bear Lake in Otsego County, were also netted in the spring of 1955. Nets of the same size were used and sampling procedures were similar, but since these are smaller lakes, it was possible to obtain numerical estimates of fish abundance. In Table 2 the catch at Houghton Lake is compared with these two lakes. Two things are apparent from an examination of this table. First, the mean catch per unit of effort at Houghton Lake was much greater than it was at either of the other lakes. Second, the ratio of pan fish to game fish to other fish was much better in Houghton than it was at Big Bear Lake or Whitmore Lake. Netting results clearly indicate that the fish population of Houghton Lake is much denser than that of Whitmore Lake or Big Bear Lake, both of which are reasonably good fishing lakes.

Table 2

Comparison of trap net catches at Houghton Lake, Roscommon County, Big Bear Lake, Otsego County and Whitmore Lake, Washtenaw County.

Spring, 1955

Lake	Number of Net-days	Date	Total catch	Mean catch per unit of effort			
				Panfish	Game fish	Other fish	All fish
Houghton	133	5/17-6/18	8,108	38	11	11	61
Big Bear	182	5/17-6/13	4,916	10	2	14	27
Whitmore	258	4/19-5/31	4,838	11	2	6	19

Fairly reliable numerical estimates were secured for the fish populations of Whitmore Lake and Big Bear Lake in the spring of 1955. From the numerical estimates obtained at Whitmore Lake and at Big Bear Lake it was possible to compute the average number of fish per acre. With a mean catch at Houghton Lake of from 2 to 3 times as much as that at Big Bear Lake or Whitmore Lake, it means that the number of fish per acre in Houghton Lake is 2 to 3 times as great as it was in Big Bear Lake or Whitmore Lake. On this basis Houghton Lake contains from 3 to 4 million fish. The figure might be more meaningful if it were stated as from 135 to 198 legal-size fish per acre compared to 45 to 99 legal-size fish per acre in the other two lakes. At Houghton Lake about half the fish were panfish, about one-fourth game fish, and one-fourth other fish, mostly bullheads--a fish population structure which should provide satisfactory angling. This admittedly is <sup>a</sup>rough evaluation of the fish population in Houghton Lake, but the net catches, as well as the very low rate of recapture conclusively demonstrate an abundant fish population for the lake.

Since both Whitmore Lake and Big Bear Lake are relatively small lakes, an effort has been made to obtain somewhat comparable netting records from some large lakes. A considerable amount of netting has been done in the large lakes on the Inland Waterway, Emmet, Cheboygan and Presque Isle counties, including Pickerel, Crooked, Burt, Mullett, and Black lakes, as well as the lower Black River below Alverno Dam. Most of this netting was done by commercial fishermen engaged in removing suckers. As a rule the trap nets used were larger than those used at Houghton Lake. Netting was usually done either under the ice, or in early spring after the ice went out, and nets were lifted at



somewhat irregular intervals, so that each lift represented from 4 to 7 net-days. Results are not strictly comparable to those obtained at Houghton Lake because most of the netting was done primarily for the purpose of catching suckers. Over-all, in the Inland Waterway between 1939 and 1955, 136,660 fish were caught in 1,044 lifts of trap nets (about 4,200 net-days), for a catch of 131 fish per lift, or about 35 fish per net-day. Of this catch, 82,446 or 60 percent was made up of suckers. A more closely comparable operation was conducted at Black Lake in the spring of 1955 from April 14 to May 3, when nets of the same size as those used at Houghton Lake were lifted 47 times at 48 hour intervals, so that each lift represented 2 net-days. Total catch was 2,280 fish or 49 per lift (about 25 per net-day). Some other trap netting was done with the same size as those used at Houghton Lake during August 1 to 7 of 1955 at Lake Gogebic, Gogebic County. During this operation the mean catch per net-day was 43 fish, of which 35 were walleyes. A similar operation, using the same nets, was conducted at Big Manistique Lake, Luce and Mackinac counties, from September 26 to September 30, 1955. Six trap nets were lifted at 48 hour intervals (2 net-days per lift) for a total catch of 115 fish per lift, or 58 fish per net-day, of which 34 were walleyes. These rough comparisons between netting at Houghton Lake, and at other large lakes help substantiate the numerical abundance of the Houghton Lake fish population.

The fish population at Houghton Lake was further evaluated with respect to growth rate of the various fishes. A large series of scale samples was secured from game and pan fishes from all parts of the lake. Results of the growth analysis are presented in Table 3. From the table certain matters are apparent. Growth of the bluegill, pumpkinseed, black crappie, rock bass, largemouth bass, and smallmouth bass considerably

Table 3

Average growth of the common pan and game fishes of Houghton Lake, Spring, 1955,  
as compared with the average growth of Michigan fishes (all lengths in inches)

Species	AGE GROUP								
	II	III	IV	V	VI	VII	VIII	IX	X
<b>BLUEGILL</b>									
Total length	4.5	5.3	6.4	7.2	7.7	9.1	9.2		
Range	...	4.9-6.2	5.6-7.1	...	6.5-9.1	8.7-9.7	9.1-9.3		
Number	1	12	8	1	53	4	5		
State average <sup>√</sup>	3.1	4.3	5.4	6.6	7.3	7.7	8.2		
<b>PUMPKINSEED</b>									
Total length		6.3	6.3	7.7	7.5	8.4			
Range		5.8-6.8	4.9-7.0	...	6.2-8.6	7.9-8.8			
Number		5	7	1	54	14			
State average		4.1	4.9	5.7	6.2	6.8			
<b>BLACK CRAPPIE</b>									
Total length	5.9	8.4	9.6	10.6	11.4	11.8			
Range	...	8.0-9.3	9.0-10.1	10.0-11.2	10.7-12.0	11.2-12.7			
Number	2	9	12	7	12	3			
State average	...	5.9	8.0	9.0	9.9	10.7			
<b>ROCK BASS</b>									
Total length		5.9	6.8	7.4	8.8	10.2	10.7		
Range		4.6-7.4	6.1-7.2	6.6-8.7	7.5-10.4	9.5-10.5	10.0-11.3		
Number		12	7	5	30	6	12		
State average		4.3	5.2	6.2	7.3	7.9	8.8		
<b>LARGEMOUTH BASS</b>									
Total length	8.6	10.3	12.6	14.5	14.9	16.1	16.9	18.4	
Range	7.6-9.8	9.9-11.0	12.2-13.3	13.7-15.7	14.0-16.2	15.5-17.0	16.1-17.7	18.2-18.7	
Number	3	6	4	6	17	8	2	2	
State Average	6.1	8.7	10.0	12.1	13.7	15.1	16.1	17.7	
<b>SMALLMOUTH BASS</b>									
Total length	9.1	11.4	14.1	14.7	15.9	17.1	16.7	18.1	19.3
Range	8.9-9.3	10.1-12.9	13.3-14.7	13.0-15.8	14.6-16.6	16.8-17.3	...	...	18.8-19.8
Number	2	13	4	4	9	5	1	1	2
State average	5.9	9.0	11.2	13.3	15.0	15.3	16.4	16.8	...
<b>WALLEYE</b>									
Total length	10.4	12.4	14.3	15.0	15.9	16.6	19.7	19.8	
Range	10.0-11.2	11.1-13.6	13.0-15.3	13.9-16.1	14.8-17.8	15.8-17.5	17.6-21.3	19.7-19.9	
Number	3	26	9	6	11	4	5	2	
Average <sup>√</sup>	10.0	13.0	15.1	16.9	18.4	19.5	21.4	22.2	

<sup>√</sup> State averages taken from Beckman, 1949.

<sup>√</sup> Average total lengths of walleyes from many waters of North America, from Eschmeyer, 1950.

exceeds the state average (Beckman, 1949) for the species.<sup>2/</sup> For the walleye no state-wide average is available, but the growth of Houghton Lake walleyes is less than average when compared with the growth of walleyes from other North American waters (Eschmeyer, 1950).<sup>3/</sup> A second feature of the growth of fishes in Houghton Lake is the predominance of the 1949 year-class. All fish considered were too large to be affected by gear selectivity, so the dominance of the 1949 year-class (age-group VI) among pumpkinseeds, bluegills, and rock bass is doubtless a true picture of the age distribution in the populations of these species. The dominance of the 1949 year class among other species is less pronounced, and is not apparent among the walleyes. The apparent dominance of the III-year-old walleyes in the collection probably was influenced by gear selectivity--quite possibly the II-year-olds were just as numerous but were mostly too small to be retained by the trap nets.

The good growth rate of Houghton Lake fishes and the abundance of individuals of large size attest to the productive capacity of Houghton Lake.

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<sup>2/</sup> The state averages compiled by Beckman (1949) are based on collections of fishes made throughout the year. This empirical average growth is the length of fish about midsummer. It would seem that at Houghton Lake the best growth comparison that could be made with fish collected at the time of annulus formation is with fish collected during the previous year. Therefore in Table 3, fish in age-group III, in which the annulus is just forming, are compared with fish in age-group II from the state average, which is the length of fish at midsummer. The difference in growth between the two collecting times is presumed negligible.

<sup>3/</sup> Eschmeyer's data is in terms of average total lengths attained at the end of a year, or at time of annulus formation, so the average growth figures for Houghton Lake walleyes are directly comparable.

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