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FISH DIVISION FISH POPULATION RECONNAISSANCE OF HAMLIN LAKE, MASON COUNTY, MICHIGAN

By Walter R. Crowe

Hamlin Lake, Mason County, is one of the larger inland lakes of the state. Real estate developments on its shores are extensive. The Hamlin Lake Association, an organization composed of riparian owners, has been in existence for a number of years. This organization and the extensive resort development on the lake, coupled with its importance as one of the larger lakes and the presence of a state park on the shore have resulted in the lake being the subject of a considerable amount of investigation by the Fish Division, Michigan Department of Conservation.

The initial fisheries survey was made in 1932 and 10 years later the lake was again examined by a crew from the research organization of the Fish Division. Reports on these earlier surveys¹ have been examined in preparation of the following report.

During the period of July 31 to August 13, 1956, trap nets were operated in Hamlin Lake for the purpose of assessing the composition, abundance, and general condition of the fish population of the lake.²

¹I.F.R. Report No. 160 "Survey of Hamlin Lake, Mason County, with Recommendations for Improving Fishing" by Carl L. Hubbs and E. W. Eschmeyer. Sept. 13, 1932.

I.F.R. Report No. 160a "A Second Fisheries Survey of Hamlin Lake, Mason County" by C. J. D. Brown and Hugo Kilpela. Nov. 23, 1942.

²The party making the investigation consisted of the following employees of the Fish Division, Michigan Department of Conservation: Walter R. Crowe, K. G. Fukano, J. R. Hammond, W. C. Wagner.

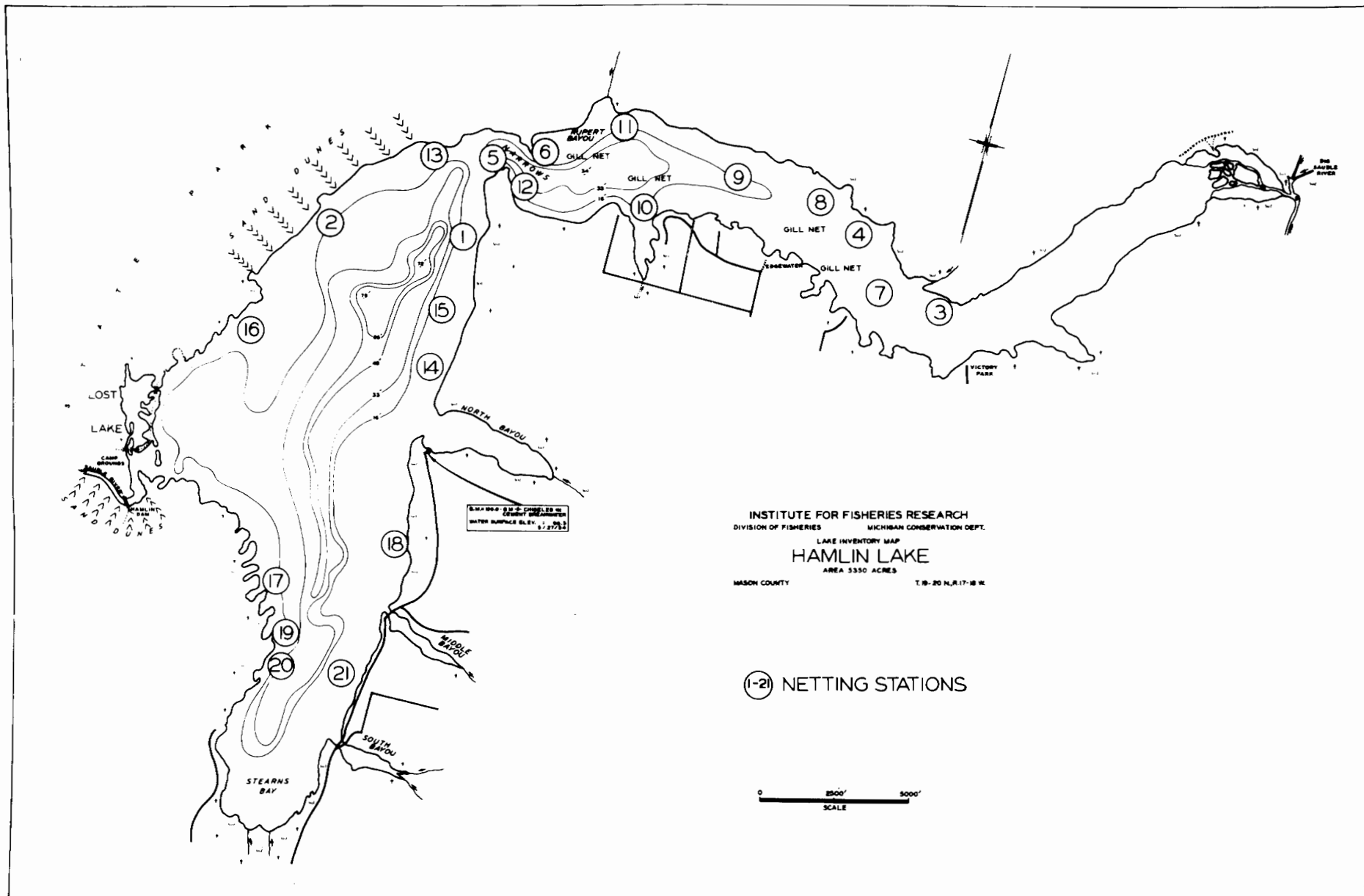
Fish collections were made with trap nets of the type now being used by the Fish Division, Michigan Department of Conservation, for test netting in various lakes. The pot or impounding section of the net is 5 feet wide, 3 feet deep, and 8 feet long. Mesh in the pot is 2-inch, extension measure. The nets have hearts or wings and a 150-foot leader.

During the investigation trap nets were set at various locations (Fig. 1). On most days 6 trap nets were lifted. Nets were raised each day, and the fish counted and marked by the removal of a fin. All fish were released near the net where captured. Four 125-foot experimental gill nets were also fished for a 24-hour period (localities shown in Fig. 1).

During the netting period trap nets were lifted 68 times, and 1,323 fish were caught. It would have been desirable to determine the numerical abundance of the fish population by a mark-and-recapture technique but limitations imposed by time, available personnel, and available equipment in relation to the size of the lake made such a program impossible. Consequently, a different approach to the question of fish abundance in Hamlin Lake was made. It was assumed that the density of the fish population would be reflected in the catch per unit of netting effort. In lakes with a meager fish population the nets should catch few fish, and in lakes with a dense population they would be expected to catch greater numbers. Average catch per unit of netting effort, if based on a sizeable number of lifts, can be expected to provide a rough index of abundance, and a general basis for the comparison

³Gill nets were set to see if they would catch different species than the trap nets. They were more effective in capturing perch, but took few other fish. The catch by the 4 gill nets was: 16 perch, 3 black crappies, 2 white suckers, 2 rock bass, 1 pumpkinseed, 1 longnose gar, 1 brown bullhead, and 1 bluegill.

Figure 1.--Netting locations in Hamlin Lake,
Mason County, Michigan



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 DIVISION OF FISHERIES MICHIGAN CONSERVATION DEPT.

LAKE INVENTORY MAP
HAMLIN LAKE
 AREA 3350 ACRES

MASON COUNTY T. 19-20 N. R. 17-18 W.

①-②① NETTING STATIONS

0 1500' 3000'
 SCALE

of one lake with another. As such information is gathered from other lakes comparisons become more valid. The unit of effort used here is one trap net set for 24 hours.

A number of factors other than differences in abundance of fish may cause variation in average catch per unit of effort in different lakes. Among these are the type, size, and mesh of nets, season of collection, choice of net locations (in relation to water depth and other ecological conditions), species composition of the fish population in the lakes to be compared, interval between lifts of the nets, and others. Consequently only qualified comparisons can be made when closely similar netting records are not available. Nevertheless, such comparisons unquestionably have some value in identifying similarities or differences in the abundance of fish in different waters.

At Hamlin Lake the catch per unit of effort (catch per net-day) was 19 fish, of which 15 were pan and game fish, and 4 were coarse or undesirable fish. In Table 1 results at Hamlin Lake are compared with those at other lakes where similar evaluations of the fish population were conducted.

Fairly reliable numerical estimates were secured for the fish populations of Whitmore and Big Bear lakes in the spring of 1955. From these estimates it was possible to compute the average number of fish per acre. Since the catch per unit of effort at Hamlin Lake was similar to that in Whitmore and Big Bear lakes the density of the fish populations may be similar. On this basis, and disregarding the fact that the estimates for Big Bear and Whitmore were made in the spring (no midsummer records available), Hamlin Lake would have about 250,000 catchable fish, or about 50 per acre. It might be more meaningful to compare the catch per net-day at Hamlin Lake with that at other large lakes. Results at other large lakes have not been included in Table 1 because in many instances procedures were not identical—

Table 1.—Comparison of trap net catches on Hamlin Lake, Mason County,
Houghton Lake, Roscommon County, Big Bear Lake, Otsego County,
and Whitmore Lake, Washtenaw County

Lake	Number of net-days	Date	Mean catch per unit of effort				Total fish catch
			Pan fish	Game fish	Other fish	*All fish	
Hamlin	68	August 1-12, 1956	14	1	4	19	1,323
Houghton	133	May 17-June 18, 1955	38	11	11	61	8,108
Big Bear	182	May 17-June 13, 1955	10	2	14	27	4,916
Whitmore	258	April 19-May 31, 1955	11	2	6	19	4,838

*Includes bullheads, freshwater drum, channel catfish, white suckers, redhorse, bowfin, carp, gar.

slightly larger nets may have been used, netting may have been done at a different season of the year, nets may have remained in place for a longer period than 24 hours, or some other variable may have been present. In spite of the considerable differences in procedures, comparisons are of some value. Over-all, in the Inland Waterway (Burt, Mullett, Black, and Crooked lakes, in Cheboygan and Presque Isle counties) between 1939 and 1955, usually during the spring season, 136,660 fish were caught in 4,200 net days, for a catch of 33 fish per net-day. In a more strictly comparable operation (identical nets, lifted at 48 hour intervals) at Black Lake (Cheboygan and Presque Isle counties) during April of 1956, the mean catch per net-day was 25 fish, of which 19 were game and pan fish. At Gogebic Lake, Gogebic County, in August of 1955, the mean catch per net-day was 43 fish (mostly walleyes), and at Big Manistique Lake, Mackinac and Luce counties, in September of 1955, the mean catch per net-day was 58 fish, mostly walleyes. At Hamlin Lake, in 1953, between November 25 and December 7, a commercial fisherman raised trap nets (larger than used in August, 1956) for a catch per net-day of about 25 fish, mostly game and pan fish. Netting results at Hamlin Lake, when compared with results at other large lakes, suggest that the fish population is somewhat less dense than in some of the other large lakes of the state. The ratio between desirable and undesirable fish is favorable. The trap net catch in Hamlin Lake during 1956 was as follows:

Bluegill	499
Black crappie	233
Pumpkinseed	114
Bullhead	94
Redhorse	90
Rock bass	77
Walleye	49
White sucker	40
Freshwater drum	28
Northern pike	19
Smallmouth bass	17
Bowfin	12
Catfish	9
Largemouth bass	4
Carp	4
Chestnut lamprey	2
Perch	1
Longnose gar	1
	<hr/>
Total	1,323

Effectiveness of the trap nets at Hamlin Lake was hampered by the abundance of aquatic vegetation, particularly in Upper Hamlin Lake (east of the "Narrows"). Effort per unit of area was about equal in the two parts of the lake. Catch per net-day averaged 23 in Lower Hamlin Lake (12 stations, 45 lifts) and 13 in Upper Hamlin Lake (9 stations, 23 lifts). All fish were marked by the removal of a fin before being released near the point of capture. Only 7 recaptures were noted (2 black crappies, 1 bluegill, 1 smallmouth bass, 1 redhorse, 1 bullhead, and 1 walleye). Thus, nearly all

fish caught in different lifts of the trap nets were different individuals. Although too few recaptures were recorded, and the sample of marked fish was too small to give much credence to the estimate, it is of some interest to note that the direct proportion estimate based on the ratio of marked to unmarked fish in the catch is 250,000 fish. This number is identical to the estimate based on numbers of fish per unit of area.

One of the best criteria for judging the general condition of a fish population is to compare the growth rate of the fishes with some standard. Reliable state-wide growth rate averages are available and in Table 2 the growth rate of Hamlin Lake fishes is compared with the state average for the species. An examination of Table 2 reveals that the growth rate of the fish in Hamlin Lake is good. Most species are growing at a rate exceeding the state averages. Perch of the younger age groups are a possible exception. Rapid growth is particularly evident among the bluegills, black crappies, pumpkinseeds, and northern pike. Examination of the growth rates of the various species of fish in a population provides a reliable indirect index to food conditions, abundance, and general health of that fish population. When fishes are making good growth the food supply is adequate, the number of fish is in balance with the available food supply, and disease is not usually prevalent. The rapid growth of fish at Hamlin Lake appears to reflect good living conditions in the lake.

All walleyes captured during the netting operation were tagged with a serially numbered jaw tag before they were released. Also tagged were 360 walleyes purchased from a commercial fisherman by the Hamlin Lake Improvement Association. These walleyes were caught in Lake Michigan and transferred to Hamlin Lake during the period August 12-September 8, 1956 (after the

District Fisheries Supervisor Edward Andersen supervised the tagging of walleyes purchased by the Association.

Table 2.—Average total length (inches) at different ages of game and pan fish from Hamlin Lake,
 compared with averages for fish from other Michigan waters

Dates of collection ✓	I	II	III	IV	V	VI	VII	VIII	IX	X
Walleye										
1942	9.0(2)			18.3(1)	17.6(2)	18.1(6)	18.7(13)	19.0(4)		22.6(1)
1956			13.1(1)	15.9(2)						
Other ✓				17.9(4)	20.0(5)	20.7(3)				
Average ✓	6.1	10.0	13.0	15.1	16.9	18.4	19.5	21.4	22.2	22.5
Northern pike										
1942	14.1(1)	20.9(17)	24.6(10)	28.5(2)						
1956		20.2(8)	22.2(9)	25.0(1)				36.5(1)		
Other ✓		19.1(8)	20.4(11)	22.6(8)	25.3(3)					
Average ✓	7.3	12.6	16.7	20.3	23.2	26.4		29.1		
Largemouth bass										
1932			10.8(1)							
1942	5.0(1)	7.7(7)	11.5(1)	13.7(2)	15.0(7)	15.6(2)				
1956			9.9(2)	13.5(3)						
Other ✓					16.3(2)	15.5(1)				
State av.	6.1	8.7	10.0	12.1	13.7	15.1				
Smallmouth bass										
1942			12.2(3)	12.8(5)	13.9(2)	15.5(2)	17.6(2)			
1956		9.4(8)	13.3(6)				17.5(1)	18.0(1)		
State av.		9.0	11.2	13.3	15.0	15.3	16.4	16.8		

✓Other" refers to miscellaneous scale samples collected in other years: bluegills - 1940; black crappie - 1953; pumpkinseed - 1948; walleye - 1953; northern pike - 1954; largemouth bass - 1953.

✓State-wide averages are not available for walleyes and northern pike. Averages given are for North America, (Eschmeyer, 1950 and Carlander, 1951).

Table 2 (Continued)

Date of collection ✓	I	II	III	IV	V	VI	VII	VIII	IX	X
Bluegill										
1942		4.1(2)	5.9(9)	6.5(1)	7.4(7)	8.0(10)	8.3(38)	8.5(30)	8.8(6)	8.9(1)
1956		4.5(16)	6.2(122)	7.8(87)	8.2(5)	8.9(16)	9.1(7)	9.1(1)		
Other ✓				8.1(2)	8.7(1)	8.7(1)	8.2(13)	8.4(59)	8.5(25)	8.8(2)
State av.		4.3	5.4	6.6	7.3	7.7	8.2	8.4	8.7	8.9
Black crappie										
1942	4.2(5)	6.7(22)	7.6(12)	9.9(9)	10.9(6)	11.1(5)	11.8(2)			
1956	4.7(4)	7.0(46)	9.0(56)	10.1(22)	11.0(4)	11.4(5)	10.7(1)			
Other ✓	5.4(1)	8.6(1)	9.0(2)	10.4(4)	11.2(5)	13.3(1)				
State av.		5.9	8.0	9.0	9.9	10.7	11.3			
Pumpkinseed										
1942	2.1(1)	5.2(19)	5.9(20)	6.6(15)	6.7(2)	7.3(2)	8.9(1)			
1956		4.6(16)	6.2(68)	6.9(35)	7.6(10)	8.2(1)				
Other ✓		4.6(2)	5.6(2)							
State av.	2.9	4.1	4.9	5.7	6.2	6.8	7.3			
Rock bass										
1932				6.7(1)		9.4(1)	8.8(1)			
1942	3.7(1)	4.0(2)	5.4(23)	6.6(27)	7.6(18)	7.8(10)	8.4(3)	8.6(1)	8.9(2)	9.0(1)
1956			5.6(24)	6.8(26)	7.2(9)	8.1(4)	8.7(7)	9.2(4)	9.6(1)	
State av.	3.2	4.3	5.2	6.2	7.3	7.9	8.8	9.0	9.9	10.5
Yellow perch										
1932		4.3(4)	5.1(22)	7.4(15)	8.3(15)	9.9(22)	9.5(1)	10.5(2)	10.3(1)	
1942	2.8(2)	4.2(7)	5.4(11)	6.0(9)	7.3(14)	8.3(12)	8.3(14)	10.4(2)		
1956			5.6(14)	6.2(2)						
State av.	4.1	5.8	6.4	7.5	8.5	9.5	10.4	10.8	11.3	

✓"Other" refers to miscellaneous scale samples collected in other years: bluegills - 1940; black crappie - 1953; pumpkinseed - 1948; walleye - 1953; northern pike - 1954; largemouth bass - 1953.

present survey had been completed). The tagging program should provide information on the rate of recapture of transferred and of native walleyes and on loss of walleyes over the dam in the outlet. These data will provide an insight into the value of the transfer operation.

From the fish population reconnaissance conducted at Hamlin Lake in 1956 the following statements can be made:

1. Hamlin Lake contains a wide variety of warm-water fishes. The composition of the fish population has shown no marked change since the first investigation in 1932. The complex structure of the fish population should provide fishing according to the individual angler's preference, but on the other hand proper management of such a complex population is more difficult than it would be for a population containing fewer kinds of fish.

2. At Hamlin Lake the numerical abundance of fish per unit of area is probably less than it is in some of the other large lakes of the state. The ratio of desirable to undesirable fish is a satisfactory one.

3. Growth rate of the fish in Hamlin Lake is good (perch possibly excepted) and it has not declined over the years. In fact, since 1942 there has probably been an improvement in the rate of growth of bluegills, black crappies, and rock bass, although the differences may easily be attributed to differences in the samples in the different years. The good growth rate reflects an adequate food supply, and indicates that the fishes of Hamlin Lake are in a generally healthy condition.

The following management recommendations should be considered but not necessarily put into effect at once.

From the tagging experiment involving walleyes we hope to gain a good deal of information and the Hamlin Lake Improvement Association should encourage fishermen to report all tag recoveries.

At Hamlin Lake major issues involve water levels and weed control rather than the quality of the fishing. There is no question but that the weed filled condition of Upper Hamlin Lake is a detriment to fishing, boating, and swimming, and if practical, inexpensive methods of reducing weeds become available, the weed-choked condition in Upper Hamlin Lake should be alleviated. For a weed control program to be justifiable, costs should not be prohibitive, for benefits may come through greater ease in fishing, boating, and swimming, rather than in an increased catch of fish; therefore, before embarking on an extensive weed control program the economics of the situation should be given very careful consideration.

At Hamlin Lake the most suitable water level should be decided on the basis of the majority opinion of riparian owners, and in the light of sound conservation principles. From a fisheries point of view we are not certain as to what level would be most desirable. An annual drawdown of several feet between late fall and midsummer might have some effect on weed abundance, but it might result also in a plankton bloom, and cloudy water. If levels were kept low until midsummer, great inconvenience would result to riparian owners. If the drawdown were to have any effect on plant growth, low water levels would have to be maintained beyond the period of most rapid plant growth, perhaps to about July 1. Even then we are not sure that an annual drawdown would have the desired effect on the growth of aquatic vegetation. Fish loss resulting from the drawdown would probably be insignificant, and fish production might actually be increased through the release of nutrients into the water as levels were raised. There would still be sufficient shoal areas for spawning.

The questions of weed control and water level adjustment must be settled through a careful examination of the economics of the situation

and the desires of the riparian owners. As had already been stated, the fish population at Hamlin Lake would probably thrive with either a stable water level, or with one which fluctuated annually, assuming that fluctuations were not extreme or sudden.

INSTITUTE FOR FISHERIES RESEARCH

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