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Fish Population Analysis of North Twin Lake, Cheboygan County

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In conjunction with cooperative experiments in the fertilization of natural waters being conducted by the Institute and Michigan State College, a fish population analysis was made on North Twin Lake, Cheboygan County, (T35N, R2W, Section 21) between July 17 and August 8, 1946. It was agreed that results of fertilization could be more carefully followed and better evaluated if the composition of the fish population were known.

The method used in estimating the populations was the same as that used at Big Bear Lake, Otsego County (Institute Report No. 653A). The same type of nets were used, but with 300 foot leads. Throughout the 3 weeks 4 nets were set at 11 slightly different locations. The basin of North Twin Lake is uniform and rather shallow so that net locations were of no great importance though as always they fished better at some places than at others, hence the rather frequent changes. Population estimates are given in the following table (Table I).

Table I

Estimated populations of various species of fish in North Twin Lake, Cheboygan County, Michigan. July 17 to August 8, 1946

Species	Estimated population[1]
Total (estimated)	2,100
Pumpkinseed sunfish	2,800
Bluegill x pumpkinseed hybrid	950
Bluegill	290
Smallmouth bass	10
Sucker	2
Total (sum of specific estimates)	4,052

[1] Figures have been rounded off. Yellow bullheads and perch which are present could not be included, for few were caught and no recoveries were obtained.

The estimates (Table I) are considered to be sufficiently reliable to give a basis for later comparisons. However, the following must be taken into consideration: (1) The yellow bullhead (A. natalis) is common in the lake and, although in the past the nets used have taken bullheads with ease and consistently, this time only 27 were caught and there were no recoveries. Consequently, no estimate of their abundance could be made. (2) The trap nets used do not take perch (the same has been true in other lakes); and this species is also present in fair numbers, though it does not appear to be as common as in most of the northern inland lakes.

Two figures are given for total population (2,100 and 4,050). Of these the latter figure is the more dependable because the various species tend to be taken at different rates and cannot be considered together. Evidently, a species which is very readily captured will tend to color

the estimate of total population more than one which is difficult to capture. Consequently, the abundance of each species should be estimated separately, and the estimates combined for the total figure. In this manner we obtain 4,050 as the figure for the total population. Table II illustrates the difference in the rate at which the various species were caught.

Table II

"Netability" of 4 species of fish from North Twin Lake, summer 1946

Species	Estimated population	Number caught	Percent of estimated population caught[1]	Number recaptured	Percent recaptured[2]
Smallmouth	10	16	160	9	56
Bluegill	290	299	103	94	31
Bgill x Pseed	950	629	66	153	24
Pumpkinseed	2,800	233	8	9	4

[1] $\frac{\text{Number caught}}{\text{Estimated population}}$ [2] $\frac{\text{Number recaptured}}{\text{Number caught}}$

It can be seen (Table II) that while the pumpkinseeds and bluegills were caught in roughly the same numbers bluegills were caught from 8 to 10 times as readily. Since about 96 percent of the total catch was composed of bluegills, pumpkinseeds and hybrids it can be readily seen that bluegills and hybrids would affect the total estimate (2,100) much more than the pumpkinseeds since the reliability of the estimates depends to a large extent on the number of recoveries. However, by treating each species separately the effect of a differential "netting rate" is, at least in part, nullified.

To get a better idea of the size of the fish present most fish captured were weighed and measured before being marked and released. Results are presented in tabular form (Table III).

Table III[+]

Average lengths in inches, weights in ounces of fish from North Twin Lake, Cheboygan County. Number per acre, and pounds per acre also given.

Species	Average total length (inches)	Average weight (ounces)	Number per acre	Pounds per acre
Pumpkinseed	4.7	1.2	102	7.7
Bgill x Pseed	5.6	2.0	35	4.4
Bluegill	6.6	3.1	11	2.1
Smallmouth bass	19.0	50.6	0.4	1.3
Sucker	20.3	49.0	0.1	0.3
Bullhead	9.6	9.3	...	...
Total			148.5	15.8

[+] The fish crop per acre as given in this table must be considered as catchable fish. That is, the fish which were taken in the nets were only those fish large enough to be caught in the nets used. They could justifiably be considered as fish which could be caught with hook and line. Also, the total number of fish per acre, and the pound per acre figures are low because they do not include bullheads or perch.

The figures in Table III are based on estimates but they should be fairly reliable. The findings of the survey party (July 3-9, 1945) indicate that the productivity of the lake is low. Results of the population analysis bear out the observations of the survey. The lake probably does not support any more than 20 pounds per acre of the larger fish which is not high. Also it should be pointed out that only the bluegill whose population is small attains a respectable size, and can be expected to

furnish a limited amount of fishing. The bass population is so small as to be almost negligible. A dozen is about a maximum figure for the present bass population. The bluegill x pumpkinseed hybrids average small, though fair numbers of them do reach legal size. The pumpkinseeds run so small as to be worthless. The small average size of the fish, and the rather low population indicate that at present there is no worthwhile fishing in the lake.

Scale samples were secured from numerous bluegills, pumpkinseeds and bluegill x pumpkinseed hybrids. A few scales were also obtained from smallmouth bass. Single samples were obtained from perch, largemouth bass and suckers. These scales have been examined and the age tentatively determined (Table IV).

Table IV

Ages, lengths, and weights of fish from North Twin Lake, Cheboygan County, Michigan. July 26 - August 6, 1946.

Species	Number specimens	Age	Average total length (inches)	Average weight (ounces)	Year class
Bluegill	150	0	1.3	0.03	1946
"	1	II	5.5	1.8	1944
"	16	III	6.7	3.2	1943
"	16	IV	6.8	3.4	1942
"	1	VII	10.0	11.0	1939
Pumpkinseed	100	0	1.3	0.03	1946
"	2	I	3.4	0.5	1945
"	4	II	4.5	1.1	1944
"	16	III	4.9	1.4	1943
"	18	IV	5.1	1.6	1942
"	3	V	5.4	1.9	1941
"	4	VI	6.4	3.5	1940
Bgill x Pseed	13	0	1.2	0.03	1946
"	2	II	4.4	0.9	1944
"	50	III	6.1	2.7	1943
"	2	IV	6.4	3.8	1942
Smallmouth bass	1	V	17.5	42.0	1941
"	3	VI	18.5	46.0	1940
"	2	VII	19.3	50.0	1939
Largemouth bass	1	VII	15.6	35.0	1939
Perch	1	III	7.6	4.0	1943
Sucker	1	III	20.3	46.0	1942

Young-of-the-year bluegills, pumpkinseeds, and hybrids were collected by seining on November 5, 1946 in the hope of obtaining yearlings, and also to determine if the relative abundance of the young fish agreed with that of the older fish caught during the summer in the nets. In the sample

collected by seine only young-of-the-year fish were captured. The fish from which scale samples were secured represented a good cross section of the fish caught in the nets although those individuals scale sampled averaged slightly larger than those taken as a whole.

Only the pumpkinseed is very stunted; bluegills appear to be growing at an average or perhaps somewhat better than average rate. The bluegills of 1943 (III) and 1942 (IV) are the most important groups in the lake. Note that there is little difference in size between the III and IV year old fish which perhaps indicates retarded growth. The bluegills being the smallest part of the population have been able to grow fairly well in the face of severe competition, but the pumpkinseeds, the most numerous, are so small as to be worthless. The hybrids, though they do reach legal size cannot be considered as growing well. Considering the pan fish population as a whole it appears that competition is most severe after the fish reach maturity. The few smallmouth bass present have grown well. Presumably they represent limited reproduction of earlier plantings. Stocking records for the lake are as follows:

1936 - 66 adult smallmouth bass
1937 - none
1938 - 51 adult smallmouth bass,
500 5-month bluegills
1939 - '46 - none

Whether or not the smallmouth bass present represent remnants of the 1936 and 1938 plantings it is evident that the bass have not been very successful. Possibly, a few fish spawned successfully in the seasons following the plantings, but they have been unable to maintain their numbers because of removal by anglers immediately following the plantings, and possibly predation of eggs and fry by sunfish while attempting to

spawn. On June 13, 1946 at least one of the adult smallmouth bass was observed guarding a bed, but young-of-the-year bass have never been collected or observed. Probably the bass are unable to hatch their young because sunfish get all the eggs in a nest, or get the fry immediately after they hatch. However, it is suggested that the very low population level of the bass is the limiting factor at present. A few more spawners in the lake could perhaps increase the bass population to the point where they could compete successfully with the pan fish.

The results of the survey in 1945 (I.F.R. Report No. 1044) indicated that young of game species, and forage fish were extremely rare or lacking. Subsequent investigation (observations of June 13, 1946 and seining on November 5, 1946) has revealed that forage minnows are present in fair numbers. The blacknose shiner (Notropis heterolepis) and the bluntnose minnow (Hyborhynchus notatus) are fairly common; also the Iowa darter (Poecilichthys exilis) was found to be present in fair numbers. Either because the fertilization permitted a high survival of centrarchid fry, or because 1946 was a very good spawning year, the seining in November showed that young-of-the-year bluegills, pumpkinseeds, and hybrids were very numerous, with bluegills the most abundant. About 10 hauls with a 10-foot common sense seine were made over 150 - 200 feet of shore line; 737 bluegills, 387 pumpkinseeds, and 13 hybrids were caught. Minnows and Iowa darters were also collected at this time. A single young-of-the-year perch was also captured. All game species caught in the seine were found to be young-of-the-year.

Fertilization experiments are being conducted, and no conclusions as to the effect of fertilization are drawn at this time. The lake is

not very productive, and the population is rather small. It was necessary to omit two species in the population study. Smallmouth bass introduced in earlier years have not been overly successful. The district fisheries biologist is located close to the lake, and results in the future can be carefully checked.

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