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A STUDY OF THE FISH POPULATION OF CLEAR LAKE, ALCONA COUNTY

Clear Lake, in Alcona County, was poisoned with rotenone on August 26-27, 1937, by a field party of the Institute for Fisheries Research, under the supervision of R. W. Eschmeyer. About a month previous to that time, the lake had been surveyed, following the lake inventory methods of the Institute, by a party under the leadership of Horace Telford.

The poisoning crew did not attempt a complete picking up of the dead fish, but did obtain as nearly as possible a count of the total number of fish killed. A large random sample of fish was brought to the laboratory. This sample was sorted by Walter Crowe, whose identifications of sunfish hybrids were checked by Dr. C. L. Hubbs. Weights and measurements were recorded, and a number of scale samples were taken. Age determinations of some of the sunfish were made by W. C. Beckman.

Most of the data pertinent to this population were assembled by R. W. Eschmeyer, and were incorporated, in part, in a paper on fish population studies (Eschmeyer, 1938), given at the North American Wildlife Conference of 1938. However, no formal report has been made dealing specifically with the population of Clear Lake. Hence the present paper is written for the purpose of integrating and presenting the available

information concerning this population. A considerable part of the material used here is extracted from Eschmeyer's paper (referred to above), without specific reference credit. A final and complete discussion of the population of the lake will not be forthcoming until the hybrid sunfishes have been thoroughly worked over by Dr. Hubbs.

History of the Lake

Clear Lake is located in the Huron National Forest, in Township 26 N., Range 5 E. It has a surface area of 11.3 acres, and a maximum depth of 8 feet. Hence almost its entire area may be considered to be shoals. The water is light brown in color, and overlies a peat bottom. It is not the soft, acid water of the acid bog type of lake, however; since it has a methyl orange alkalinity of about 165 parts per million. Aquatic vegetation in the lake is sparse.

According to a report of the Institute for Fisheries Research (Hazzard and Eschmeyer, 1938), Clear Lake is reported to have yielded good bluegill fishing in former years. But some time following the introduction, a few years ago, of a considerable number of goldfish into the lake, the fishing became disgustingly poor. It was in the belief that the goldfish probably were the main factor in the disintegration of the fishing, and that only a fresh start could insure the return of good fishing, that the lake was poisoned. As will be pointed out below, there seems to have been ample justification for such reasoning.

Procedure

On August 26, 1937, ninety-two pounds of powdered derris root (5% rotenone) were put into the lake, and on August 27 eighty-three pounds more. The powder was mixed with water to a thin paste, and was

distributed over the surface of the lake from a row-boat. Small fish started dying within an hour after the poison was first added.

One hundred goldfish were measured, weighed, and sexed. The remainder of the goldfish were counted. A random sample, of approximately 6,000 fish, of all other fish (exclusive of young of the year sunfish) was preserved to be taken to the laboratory. Then a complete count was made of all dead fish around the entire margin of the lake, with the exception that young of the year sunfish were excluded because of their being too difficult to see and to find.

In the laboratory the random sample was sorted into species and hybrids, and tabulations were made of measurements and weights. To date, age determinations have been made on bluegills (362 specimens) and pumpkinseed sunfish (304 specimens).

Tabulations

The accompanying table gives a summary of the population of the lake. The data for goldfish are based upon an actual count. For all other fish, the figures are arithmetically derived, depending upon the assumption that numbers and average sizes of the various fishes in the entire population are in the same proportions that they are in the random sample.

Total numbers and total weights are given for each species and hybrid. Weights per acre are given, to the nearest tenth pound, based on an area of 11.3 acres. The last two columns in the table give the number of legal-sized sunfish (six inches or over in total length) for thelake and per acre.

Table 1. Summary of Fish Population of Clear Lake

Species	Total Number	Total Weight, Pounds	Pounds Per Acre	Legal Fish	Legal Fish Per Acre
Sunfish:					
Lepomis gibbosus	10,106	254.2	22.5	0	
L. macrochirus	2,695	56.1	5.0	31	2.7
L. cyanellus	344	6.3	0.6	0	
L. megalotis	28	0.5	tr.	0	
Chaenobryttus gulosus	58	2.2	0.2	0	
L. gibbosus x *L. macrochirus*	600	22.5	2.0	31	2.7
L. gibbosus x *L. cyanellus*	4,063	90.6	8.0	4	0.4
L. gibbosus x *L. megalotis*	4	0.8	0.1	0	
L. gibbosus x *C. gulosus*	16	1.0	0.1	0	
L. macrochirus x *L. cyanellus*	182	19.0	1.7	54	4.8
L. cyanellus x *L. megalotis*	30	1.2	0.1	0	
Total Sunfish	18,126	454.9	40.3	120	10.6
Coarse Fish:					
Goldfish	1,878	1718.0	152.0		
Forage Fish:					
Blunt-nosed minnow	4,054	14.7			
Golden shiner	1,059	9.6			
Black-nosed shiner	30	0.1			
Total Forage Fish	5,143	24.4	2.1		
TOTALS	25,147	2197.3	194.4		

Discussion

This lake presents an interesting example of apparent domination by a coarse and altogether worthless fish, the goldfish. The extent to which the goldfish had appropriated the lake is shown in the decline, in a very few years, of the sunfish population from one which afforded good fishing to one crowded with small fish and containing only eleven legal-sized fish per acre. Of course it is not known just what other forces may have contributed to this abrupt change, but in view of the large demands of the goldfish upon the food supply it is reasonable to assume that the goldfish offered so much competition for food that the sunfishes could not hold their own.

Thompson and Bennett (1938) contend that a lake will tend to support approximately the same total poundage of fish, no matter what the species and sizes of fish present. Thus if there are more fish in a lake they must be of a smaller average size, if there are fewer fish their average size will be larger, and finally, if there is a large weight of one species of fish in a lake there must be a proportionately smaller weight of other species. If this is the case, it may be supposed that had Clear Lake not contained its large weight of goldfish it could, and would, have supported a much larger weight of game fish (i.e., various kinds of sunfish).

Whether this additional poundage of sunfish would have displayed itself as larger fish, or as more small fish, is somewhat problematical. The situation in that regard is governed to a certain extent by an apparent population cycle, in which large numbers of smaller fish tend to alternate with smaller numbers of larger fish, even though the environment may remain relatively unchanged. It is toward a better understanding of this

cycle that the present series* of population studies is partly directed.

At any rate, as the figures show, the lake at the time it was poisoned contained little that was worth-while in the way of game fish. It is a reasonable conclusion that the poisoning of the entire population was, from a fish management standpoint, fully justified.

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* Clear Lake is only one of a number of lakes that have been poisoned by the Institute for Fisheries Research, and the populations of which have been, or are to be, tabulated and discussed.

References Cited

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