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SUMMARY OF FISHING FOR FOUR SEASONS

ON FIFE LAKE, MICHIGAN^{*}

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(Abstract)

A creel census has been taken on Fife Lake for four successive fishing seasons. Examination of the data indicates a constant decline in the catch of some species and a corresponding increase in the catch of other species. The total take remained relatively constant from year to year; an increase of 92 per cent in fishing resulted in an increase in the take of only 16 per cent. In the catch a close correlation was found between the percentage of larger piscivorous fish and the size of pan fish.

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The analysis of fishing on Fife Lake, discussed in several previous papers published in the Transactions, has been terminated after four successive seasons. This paper is intended primarily to show trends which could not be determined from a creel census for one or two seasons.

The methods used in the Fife Lake creel census during the last several years were similar to those employed in the first two years and are discussed in an earlier publication (Eschmeyer, 1934).

* Contribution from the Institute for Fisheries Research.

For the entire period the census was taken by crews of specially selected enrollees from the Fife Lake C.C.C. Camp. These men patrolled the shore and interviewed the anglers after they had concluded their day's fishing. The census was taken from daylight to dark. Reports were obtained the next morning for most of the anglers who fished until after the crew had left. Fishing is summarized for the summer seasons only. During the final season the enrollees appeared to be less capable than during previous years and supervisory personnel trained in fish work was no longer available; data for the last summer are therefore probably not as reliable as was the information gathered during the earlier years of the census.

The fishing discussed below covers the period from June 25th to September 30th each year except for the last season, when the census was taken from June 25th to September 7th.

The number of anglers reported seen but not interviewed represent the following percentages of the total in chronological order: 7, 2, 1 and 5. Anglers seen but not contacted are not included in the discussion below except where specified and where they are considered, it is assumed that their fishing was average in every respect.

General Data on the Fishing

The number of anglers contacted varied from 2,399 in 1934 to 4,821 in 1936. Including those seen but not contacted, the number of fisherman-days for each of the four years was, respectively: 2,580, 3,685, 4,875 and 4,751. This number represents 3.5, 5.0, 6.6 and 6.4 fisherman-days per acre. The increase in the number of anglers in 1935 and 1936 was undoubtedly due largely to an improvement in economic conditions and the slight decrease in 1937 may be attributed to the

numerous strikes and general labor uncertainties of the year. The fishing intensity on this resort lake is undoubtedly determined in a large measure by general economic conditions.

The actual recorded catch of fish varied from 10,656 in 1934 to 13,183 in 1936. The catch per hour declined from 1.7 in 1934 to 1.0 in 1936 and 1937. Average size of fish decreased each year until in 1937, when it was decidedly higher than for the previous year. General data on the fishing are included in Table 1.

Insert Table 1

Trends in the Catch

A comparison of the fish caught for the four years shows a decided change in the composition of the catch (see Table 2). The number of large mouth bass increased each year and the number of small mouth bass consistently decreased. Bluegills were decidedly more abundant each year until 1937; in that year there was probably a slight increase when the records for the anglers seen but not contacted are considered. Sunfish also increased in the catch each year. Perch and rock bass showed an irregular decline; walleyes increased irregularly and northern pike were better represented each season. In 1936 the northern pike catch increased over the previous year's catch by several hundred per cent and there was a further decided increase in 1937. The decided change in the take is indicated below, where the percentage of the catch represented by each species in 1934 and 1937 is listed (to the nearest per cent):

<u>Species</u>	<u>1934</u>	<u>1937</u>
Largemouth Bass	3	5
Smallmouth Bass	9	5
Bluegills	18	43
Sunfish	10	17
Yellow Perch	35	12
Rock Bass	20	11
Walleye	1	1
Northern Pike	1	4
Bullheads	3	trace
Miscellaneous	trace	1
	<u>100</u>	<u>99</u>

TABLE 1

GENERAL DATA ON FISHING FOR FOUR SEASONS, ON FIFE LAKE, MICHIGAN

Season	Number of fisherman-days			Number of hours fished	Hours per fisherman- day	Number of fish caught	Catch per fisherman- day	Catch per hour	Average size of fish
	Male	Female	Total						
1934	1,835	564	2,399	6,187.75	2.6	10,656	4.44	1.7	8.3
1935	2,831	763	3,594	8,971.50	2.5	11,375	3.2	1.3	8.1
1936	3,832	989	4,821	12,669.00	2.6	13,183	2.7	1.0	7.8
1937	3,655	846	4,501	11,843.25	2.6	11,495	2.6	1.0	8.7

The number of fish of each species reported caught each year (except those constituting an insignificant portion of the catch) is recorded in Table 2; average size of the fish is recorded in the same table.

Insert Table 2

Examination of the data indicates that a decrease in one species is accompanied by an increase in some other, perhaps competing, species. Bluegills and sunfish together comprised only 28 per cent of the catch in 1934, but included 60 per cent of the fish in 1937; for the same periods rock bass and perch collectively comprised 55 per cent and 23 per cent respectively. Whether or not a close relationship exists between the trends in the catch and trends in the population is not known, but such relationship seems probable. It appears that populations tend to change in composition much more rapidly than is generally appreciated.

The data suggest a close correlation between the abundance of the larger piscivorous fish and the size of the panfish (see Tables 2 and 3). The average size of pan fish decreased slightly each year until 1937, when a decided increase

Insert Table 3

in length was noted. The percentage of larger piscivorous fish in the catch also decreased each year until 1937, when they rather decidedly increased (especially the northern pike).

Fish Per Acre

The area of Fife Lake was regarded as 800 acres in the computations for the first two years. To get a reliable figure of the area, O. H. Clark and Dr. D. S. Shetter of the Institute staff made a marginal survey in April, 1938. This

TABLE 2

NUMBER AND AVERAGE SIZE OF FISH TAKEN IN FOUR SEASONS IN FIFE LAKE

	1934		1935		1936		1937	
	Number	Size	Number	Size	Number	Size	Number	Size
Largemouth Bass	294	13.5	470	13.6	480	13.8	558	13.8
Smallmouth Bass	992	12.3	782	13.1	673	12.6	619	13.1
Bluegills	1,970	7.2	3,696	7.0	5,189	6.7	4,966	7.2
Sunfish	1,016	6.8	1,418	6.7	1,611	6.5	1,945	6.9
Yellow Perch	3,757	7.4	2,340	7.3	2,773	7.3	1,357	7.6
Rock Bass	2,129	7.9	2,384	7.5	2,037	7.3	1,267	7.7
Walleye	119	20.1	154	21.3	126	22.8	168	20.6
Northern Pike	48	21.8	53	21.5	172	21.8	477	20.9
Bullheads	303	10.5	72	10.0	81	11.2	26	12.3
Miscellaneous	28	...	6	...	41	...	112	...
Total	10,656		11,375		13,183		11,495	

*Average length in inches

TABLE 3

PERCENTAGE OF THE LARGER PISCIVOROUS FISH IN THE CATCH IN FIVE LAKE

	1934	1935	1936	1937
Largemouth Bass	2.8	4.1	3.6	4.9
Smallmouth Bass	9.3	6.9	5.1	5.4
Walleye	1.1	1.4	1.0	1.5
Northern Pike	0.5	0.5	1.3	4.1
Total	13.7	12.9	11.0	15.9

final survey indicates the current area to be 739 acres. On this acreage the catch of fish per acre, assuming that the fishermen not contacted had average catches, was respectively for the four summer seasons: 15.5, 15.8, 18.0 and 16.4. The fish were not weighed and therefore the catch in pounds per acre cannot be determined.

The Season's Catch

The data suggest that the total number of fish taken annually is rather constant regardless of the fishing intensity. The amount of fishing varied decidedly over the four year period, but the catch fluctuated relatively little. For 1936, the fishing had increased over the 1934 fishing by 92 per cent (hours fished, including hours for those seen but not contacted) but the take increased only 16 per cent.

It seems probable that only a limited portion of the population is taken annually regardless of the amount of angling and that "fishing out" a lake to the point where an inadequate brood stock remains is an improbability. Increased fishing seems to be correlated with a lower catch per hour rather than with a decided decrease in the total population. In Fife Lake there was no appreciable decline in the catch each season in 1937 even though the fishing intensity in 1936 was decidedly greater than in 1934 and 1935. The average size of fish caught in 1937 was greater than in 1934 even though fishing was heavy in the intervening period and the number of pounds caught in 1937 was undoubtedly as great or greater than in any preceding season.

If the annual take remains relatively constant regardless of fishing intensity, as the experience on Fife Lake suggests, the amount of fishing on a lake needs to be limited so that the average angler makes a satisfactory catch.

If the average angler on Fife Lake is content to take one legal fish per hour the fishing on this lake should be limited to about 12,000 hours per season;

if he is to average two fish per hour there should be not more than about 5,500 hours of fishing per season.

Fishing is generally much better during the first few weeks than during the peak of the tourist season in late July and early August. The poorer fishing in mid season is generally attributed to changes in water temperature, changes in the feeding habits of the fish or to some other cause. The fact that a considerable percentage of the annual take has been removed by mid-season and that presumably more food is present for the remaining fish may be a very significant factor.

Does the very intensive winter bluegill fishing on some southern Michigan lakes adversely affect the next summer's angling? The question seems to depend largely on the time needed for the population to become built up to its normal level. Dr. David Thompson (unpublished) expresses the belief that this "building up" of a population (in Illinois) is a matter of weeks rather than months or years. Perhaps the heavy winter fishing is not especially injurious to summer fishing. The Institute is now taking winter and summer creel census on one of the southern Michigan "bluegill" lakes.

Relation Between Stocking and the Catch

Definite information on the relation between stocking and the subsequent catch is not available because the fish lengths were not recorded individually. For bluegills and perch no correlation was found between the stocking and the catch of fish of average size. There is a possibility that several age groups were prominent in the catch however and that some correlation existed even though this was not evident when average size of the species in the catch was considered. It might be pointed out that species which were not stocked (northern pike, sunfish and rock bass) fluctuated widely in numbers in the catch. The number of northern pike, for instance, increased in the catch

from 48 in 1934 to 477 in 1937.

Outline of a Suggested Study in
Lake Fish Management

As a result of the study on Fife Lake, and of investigations elsewhere, a worthwhile line of investigation is suggested. Dr. David Thompson (unpublished) has perfected a method of determining fish populations, Hile (1937) has indicated how stocking and the subsequent catch may be compared, and the Institute has developed adequate methods of determining the catch. A combination of these several factors should provide basic information on a number of pertinent problems in fish management.

An experiment contemplated by the Institute is briefly outlined:

1. Select a test lake (preferably several of them) on which the fishing can be entirely controlled by the investigating agency. The study on the lake should be for a minimum of ten years.
2. Determine the total population at intervals during each fishing season.
3. Stock with fish of suitable species but decidedly vary the stocking intensity. It should range from no planting to very heavy planting. To eliminate one variable all fish of any species should be of about similar age or size when planted, for the entire period of the study.
4. Keep complete record of all fishing and of all fish caught, each fish to be individually measured and weighed.
5. Determine, each year, for each species the age of fish of different sizes so that the season's catch may be accurately divided into the proper age groups.

6. Vary the fishing intensity with a difference of fully several hundred per cent in total hours fished between the "lightest" fishing seasons and the seasons when angling is most intensive.

7. Have intensive winter fishing at some seasons, and no fishing on other winters.

8. For several years have very intensive fishing for one species and have a closed season on some competing fish.

9. Vary the closed seasons and the size limits.

Such study should give some information on the following questions:

1. The actual value of stocking.

2. The percentage of the total population represented by the annual take.

How much of the crop is harvested?

3. The consistency of the annual catch. Is it a relatively similar amount each year regardless of fishing intensity (above a certain minimum, of course)?

4. The consistency of the total population. Does it remain relatively constant throughout the year regardless of fishing intensity? How much time is required for the population to return to its normal level of abundance (pounds per acre).

5. The relation between winter fishing and fishing during the following summer.

6. The relation of growth to population density. Is there a close correlation between the increase in growth and the number and pounds of fish removed?

7. The desirability (biologically) of having certain closed seasons and certain size and bag limits.

As investigation proceeds it becomes increasingly evident that some fish management practices are of questionable value. Very little is known about many

of the important problems and little is being done to obtain really adequate information on these basic problems. It seems that a series of investigations similar to the one briefly proposed above, in various kinds of water and in different localities, would help to supply some of the much needed answers.

Literature Cited

Eschmayer, R. W.

1936. Analysis of the game-fish catch in a Michigan lake. Trans. Am. Fish. Soc., Vol. 65, pp. 207-223.

1937. A second season of creel census on Fife Lake. Ibid., Vol. 66, pp. 324-334.

Hile, Ralph

1937. The increase in the abundance of the yellow pike perch, Stizostedion vitreum (Mitchill), in Lakes Huron and Michigan, in relation to the artificial propagation of the species. Trans. Am. Fish. Soc., Vol. 66, pp. 143-159.