

AN ANALYSIS OF FISHING EFFORT AT INDIAN LAKE

LOWELL E. BINKLEY,¹

Section of Fish Management and Propagation,
Ohio Division of Conservation and Natural Resources,
Columbus, Ohio

Although the study of natural sciences dates back many centuries, the science of the management of fish populations is very young. Students of fish management have always been confronted with the major problem of estimating, within reasonable limits, the value of their efforts. Unlike the farmer, who may determine exactly the production of his lands, the biologist is still unable to determine the production of fish in any large body of water under natural conditions.

Numerous plans for the practical management of fish populations have been offered. As yet, no satisfactory method has been developed for testing the relative values of these plans. Thompson and Bennett (1938) in Illinois and Swingle and Smith (1942) in Alabama and others have supplied excellent data on the production of fish in ponds and lakes under more or less controlled conditions.

In newly constructed lakes it would be possible to keep a careful check on the number and weight of fish introduced. A check of all of the fish taken out of the lake over a period of years would produce some pertinent information. It is, however, impossible to contact all fishermen around most of our lakes.

The use of special chemicals, electrical devices and nets promises to supply valuable data when we arrive at the point where it is possible to standardize this information. For the present, we must rely upon random samples obtained by a creel census. This census may be conducted by the personal contact method or on a voluntary basis. The personal contact method has proven to be the more satisfactory of the two methods. At Indian Lake we combined the two methods by placing twenty creel census boxes at popular fishing landings. The individuals operating these landings assisted the fishermen in making out their reports of catch.

We should plan, however, to operate the creel census at Indian Lake over a period of years. Sufficient data may be acquired during this period to enable us to arrive at some definite conclusions as to the productive capacity of Indian Lake.

THE TOTAL CATCH

As previously suggested, the ideal method for the operation of a creel census is to check the creels of all fishermen as they leave the lake. With the means we had available, it was impossible to check the fifty miles of shore line and the approximately 7200 acres of water (Roach, 1935). The information obtained at this lake over a period of six months represents only a sample of the adult fish populations and provides no basis for computing the total production of fish. The total catch of 13,938 legal-sized fish by 1,104 fishermen results in an average daily catch of 12 legal-sized fish per fisherman. Only 611 undersized fish were reported as being caught and returned to the water. Approximately four fish in every hundred caught were undersized.

Throughout the period of the survey fifteen species of fish were caught. During April fourteen species of fish were caught and this number became less until, in August, only seven species were caught. Among the fifteen species of fish caught

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were six representatives of the sunfishes (*Centrarchidae*) and three of the catfishes (*Ameiuridae*). This report should probably show five species of catfish but, due to the inability of the layman to separate the bullheads, it was necessary to consider them as one species. Nearly eight sunfish were caught to two of all other species of fish. And of this two, approximately one and a half were catfish. Table I lists the number of each species taken each month as well as the total number taken throughout the period of the survey.

In considering only the sunfish and catfish it is interesting to observe that nine out of every ten of these two families of fishes caught in April were sunfish. This ratio became systematically reduced until, in August, the ratio of six sunfish to four catfish resulted. In other words, the spring season is the best period to fish

TABLE I
TOTAL CATCH OF FISH
(Indian Lake Creel Census)

Species	April	May	June	July	Aug.	Sept.	Totals
Crappie.....	4,460	2,083	222	161	274	67	7,467
Bluegill.....	810	564	308	457	194	79	2,412
Channel Cat.....	529	423	190	360	265	100	1,867
L. M. Bass.....	606	17	65	56	55	0	799
Perch.....	63	58	50	302	130	102	705
Bullheads.....	231	25	34	44	86	10	403
Sunfish.....	29	26	16	36	10	23	140
Carp.....	7	3	10	9	5	0	34
Rock Bass.....	2	22	1	0	0	0	25
R. Trout.....	10	8	0	0	0	0	18
S. M. Bass.....	9	2	3	0	3	0	17
White Bass.....	9	3	0	0	0	0	12
Wall-eye Pike.....	4	0	0	2	0	0	6
Blue Cat.....	0	0	1	1	1	1	4
Goldfish.....	2	0	0	0	0	0	2
Totals.....	6,971	3,234	900	1,428	1,023	382	13,938

for sunfish and the late summer is the best period to obtain catfish. Table II indicates the percentage of the total catch per month for each species as well as the percentage of the total catch for each species.

Wickliff (1935) conducted a state-wide creel census from seven Ohio lakes. From the data supplied in this report an average daily catch of eleven legal-sized fish per fisherman was obtained. This survey, covering the same period of the year as the Indian Lake survey, further reveals that an average of 2.6 legal-sized fish were caught per hour. At Indian Lake an average of 12 legal-sized fish were caught at the rate of slightly more than two legal-sized fish per hour. This information is summarized for each month of the survey in Table III.

THE WEATHER

Weather conditions usually provide an excellent topic for discussion among fishermen. Some fish according to wind directions, others by periods of the moon, and, more recently, according to barometer readings. Daily observations are made at the conservation office at Russell's Point as to the air temperature, wind direction, relative strength of the wind, and precipitation. Daily water temperatures, although not available, would be highly desirable.

April and May, the two coldest months of the survey, provided the best crappie fishing. During the remaining four months of the survey the crappie catches were considerably reduced. In fact, April and May are the best months for most types of fishing. During the month of April and the early part of May the average daily catch of all species of fish follows, very closely, the daily air temperatures.

TABLE II
PERCENTAGE OF CATCH PER MONTH
(Indian Lake Creel Census)

Species	April	May	June	July	Aug.	Sept.
Crappie.....	66.84	64.40	24.66	11.27	26.78	17.03
Bluegill.....	11.76	14.34	34.22	32.00	18.86	20.86
Channel Cat...	7.59	13.07	21.11	25.21	25.90	26.17
L. M. Bass.....	8.69	0.52	7.22	3.82	5.37	0.00
Perch.....	0.90	1.79	5.55	21.14	12.70	26.70
Bullheads.....	3.45	0.77	3.77	3.08	8.40	2.61
Sunfish.....	0.41	0.80	1.77	2.52	0.97	6.02
Carp.....	0.10	0.09	1.11	0.63	0.48	0.00
Rock Bass.....	0.02	0.68	0.11	0.00	0.00	0.00
R. Trout.....	0.14	0.24	0.00	0.00	0.00	0.00
S. M. Bass.....	0.12	0.06	0.33	0.00	0.29	0.00
White Bass.....	0.12	0.09	0.00	0.00	0.00	0.00
Wall-eye Pike..	0.04	0.00	0.00	0.14	0.00	0.00
Blue Cat.....	0.00	0.00	0.11	0.07	0.09	0.26
Goldfish.....	0.02	0.00	0.00	0.00	0.00	0.00

TABLE III
CATCH PER HOUR FOR ALL SPECIES
(Indian Lake Creel Census)

Month	Number of Fishermen Reporting	Legal-sized Fish Taken	Average Number of Fish Per Fisherman	Average Number of Legal-sized Fish Per Hour
April.....	574	6,971	12.14	2.65
May.....	206	3,234	15.70	2.29
June.....	80	900	11.20	3.07
July.....	128	1,428	11.10	2.26
August.....	83	1,023	12.20	1.50
September.....	33	382	11.50	1.07
Totals.....	1,104	13,938	12.60	2.14

In other words, as the days become warmer the fishermen devote more and more time to fishing and, as a result, catch more fish. Once the waters of a lake reach their normal summer temperatures daily changes in air temperature have very little immediate influence upon the temperature of the water. During this period no correlation between daily catches of fish and daily air temperature is evident.

THE CRAPPIE FISHING

The best crappie fishing is provided during the months of April and May. From Table II it is quite evident that two out of every three legal-sized fish caught during April and May are crappies. The remaining four months of the survey show decided decline in crappie catches.

Although most of the crappie fishing is done from boats, there appears to be no great advantage over fishing from the shore. The average catch of legal-sized crappies among the boat fishermen was fourteen compared with twelve for the shore fishermen. Live minnows and artificial flies proved to be the most effective baits. All other types of baits used resulted in a fifty per cent reduction in catches.

THE BLUEGILL FISHING

Based on the information presented in Table II, June and July appear to be the best months for bluegill (*Lepomis macrochirus*) fishing. This is probably true for the majority of fishermen. From this table it would also appear that April and May provided the poorest bluegill fishing. This resulted, no doubt, from the fact that most of the people fishing the lake were using live minnows for bait and this type of bait was not very acceptable to the bluegills.

Those fishermen who specialized in bluegill fishing during April and May were very successful. Their average daily catch of bluegills was nearly seventy-five per cent of the daily bag limit of twenty bluegills. Using artificial flies, these fishermen consistently caught the most bluegills. Worms, although very popular as a bluegill bait, did not provide good catches except during the early part of the season. A boat is also essential to good bluegill fishing as is evidenced by the fact that the boat fishermen consistently caught twice as many bluegills as the shore fishermen.

CHANNEL CATFISHING

Table II reveals that July, August and September are the best months for the majority of the channel cat fishermen. This table would also seem to indicate that April and May are not good months to fish for channel catfish (*Ictalurus lacustris*). However, the same conditions which held down the bluegill catches during this period also appear to have reduced the catches of channel catfish. Very few channel catfish were caught with minnows.

More channel catfish were caught per day with worms during April than at any other time during the six-month survey. Soft "craws" and shrimp also proved to be very effective baits. A boat is essential for good catches of channel catfish as is evidenced by the fact that the average daily catch of the boat fishermen was three times that of the shore fishermen.

LARGEMOUTH BASS FISHING

For many years Indian Lake has been a favorite location for largemouth bass (*Huro salmoides*) fishing. The information supplied by these fishermen indicates that the month of April provides the best largemouth bass fishing. During this period the bass fishermen took home fifty per cent of the daily bag limit of six bass per trip. In fact, fifty per cent less time was required to catch a legal-sized bass in April than at any other time during the survey. The last two weeks of June also provided excellent bass fishing.

The boat fishermen consistently caught more bass than the shore fishermen and this indicates the importance of a boat for more successful bass fishing. During the early part of the season artificial baits were very effective. By the middle of July, soft "craws" appeared to be the best bait.

THE PERCH FISHING

Although the perch (*Perca flavescens*) ranked among the five most important game fishes during the period of the survey, this species appears to be finding it increasingly more difficult to maintain itself. September provided the best perch fishing. The perch caught during the summer months are small while the larger perch are caught during the winter months.

In view of the fact that the boat and shore fishermen caught, on the average, the same number of perch, there appears to be no advantage in fishing for perch from a boat. During April and May most of the perch were caught with live minnows while worms provided the best bait during the remainder of the season.

THE FISHING PRESSURE

During the early part of the season most of the fishermen come from communities near and around the lake. This is, no doubt, due to the fact that poor weather conditions discourage fishermen from driving long distances for a few hours of fishing. Lima supplies a higher percentage of the fishermen during this period than any other city. With the closing of the bass season throughout May and the first two weeks of June, most of the fishermen come from nearby communities.

It is interesting also to observe that by the first of July local interest in angling reaches a very low level. This condition continues throughout the remainder of the season. Among the cities supplying most of the fishermen during this period were Columbus, Dayton and Springfield. The Miami Valley supplies about one-half of the fishermen visiting the lake while the remainder come from all over Ohio as well as neighboring states.

THE CREEL CENSUS AND LAKE MANAGEMENT

The first step in planning an improvement project for a selected area is to complete an inventory. The creel census supplies information as to the size and relative abundance of the various species of fish inhabiting the lake. The program may then be directed toward improving habitat for the desired species of fish. Included in the inventory should be an evaluation of spawning facilities, cover and food supply.

From the study of lakes it becomes quite evident that each lake presents a new series of fish management problems. The size of the lake is also important due to the fact that the larger lakes are, as a general rule, more difficult to manage. Fortunately, however, the numerous islands of Indian Lake more or less divide the lake into a number of smaller lakes. Each of these smaller lakes may be treated as individual cases.

The major problem at Indian Lake is to reclaim the once productive bays of the east and west ends of the lake. Natural forces operating on a lake constantly move in the direction of destroying the lake. This movement can best be summarized as an ecological succession. As new soils are formed by the decomposition of aquatic vegetation some areas become isolated ponds. In time these ponds become swamps and, eventually, dry land.

Our first problem is to gain control of the aquatic vegetation dominating these bays. A certain amount of aquatic vegetation is required by fish but when these bays become "solid" with vegetation they no longer provide suitable habitat for the desirable species of fish. The submerged aquatic vegetation of Dunn's Pond, Cranberry, Long Island, Turkeyfoot and Sassafras areas require special attention. Waterweed (*Elodea*) and coontail (*Ceratophyllum*) constitute the vegetation problem

of the above mentioned areas. Both of these plants still dominate bays after several years of cutting with machines. Small pieces of the plants drift away during the cutting operation and supply many new areas with this type of vegetation.

The emergent aquatic vegetation of North Fork, Bear Wallow and Lucy's Pond present another type of vegetation problem. Cattails (*Typha*) constitute a major problem in these areas. This type of vegetation may be controlled by proper cutting. In Bear Wallow and Lucy's Pond channels and ponds should be cut out by dredge operation. This action will provide for the maximum circulation of water.

In areas where suitable gravel for spawning beds is not provided by dredging, additional gravel may be supplied. This can best be done by moving the gravel out on the ice. When the ice melts the gravel falls to the bottom to provide excellent spawning beds for game fish. Logs and stumps should be left in these areas to provide the necessary amount of cover. Some areas may require additional cover and logs and stumps may be supplied.

The improved areas should be set aside as sanctuaries throughout the spawning season. Such areas should be opened to fishing throughout the remainder of the year. The control of motor boats in fishing areas, proper bag limits, legal lengths and closed seasons complete the program.

CONCLUSIONS

1. The spring provides the best season for the greatest number and type of fishermen at Indian Lake.
2. The crappie is the dominant fish of Indian Lake and will continue as the dominant game fish as long as the conditions within the lake remain as they are at the present time.
3. The average daily catch of twelve legal-sized fish per fisherman compares favorably with other Ohio lakes.
4. Boat fishermen usually catch more fish than shore fishermen. Boat fishermen caught twice as many bluegills as the shore fishermen. Three times as many channel catfish were caught per unit of time from a boat as compared with the shore fishermen. Very few largemouth bass are caught from the shore.
5. Those fishermen who specialize in certain types of fishing consistently catch more fish than the "general" fishermen.
6. The fishing pressure is supplied locally during the early part of the season while the more distant communities supply most of the fishing pressure during the latter part of the season.

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