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MICHIGAN'S "KINGFISH"

by

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The bluegill is the number one fish of the state. It makes up 36.4 per cent of the total catch as shown by general creel census figures for the years 1933 to 1939, inclusive. The bluegill outnumbers its nearest rival, the yellow perch, for top honors by 2 to 1, the perch making up 17.7 per cent of the total catch in Michigan.

As a result of being the "kingfish" of Michigan fishes, the bluegill has received considerable attention from the fish culturists and fishery biologists. The Institute for Fisheries Research has conducted several investigations into the various phases of the life of the bluegill.

The spawning habits and production of young of the bluegill have been studied by W. F. Carbine[1] and most of the information given here has been taken from the publication referred to in the footnote.

After the ice leaves the lakes, the water gradually becomes warmer and fish again commence greater activity. Growth, which was greatly retarded or stopped entirely, is resumed. The mature males and females

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[1] Carbine, W. F. Observations on the spawning habits of centrarchid fishes in Deep Lake, Oakland County, Michigan. Trans. 4th N. Am. Wildlife Conf., 1939.

begin the production of milt and eggs. During this period of maturing of the sex products, the males build the nests. Bluegills usually nest in colonies as shown in the illustration. All the common bottom soil types on shoal areas are used. The shape of the nests varies considerably, depending upon the nature of the bottom. On sand and (or) gravel, the nests are approximately circular in outline, as in the picture referred to, and are generally 18 to 24 inches in diameter. On other bottom soils, the outline is irregular and the size varies greatly.

The males build nests by fanning away any overlying sand and gravel, or over mucky bottom until submerged sticks or roots of water plants are exposed. In some cases males have been known to pick up pieces of gravel with their mouths and carry them outside the nest.

In Michigan the period of spawning varies from south to north. The bluegills in the lakes of the southern part of the Lower Peninsula spawn several weeks earlier than bluegills in the Upper Peninsula. In Deep Lake, Oakland County, spawning activities were observed by Mr. Carbine from June 18 to August 1 in 1938. In the Upper Peninsula spawning may continue into September. The season is prolonged because all the females do not ripen at the same time and probably not all eggs are shed at one mating. This may be a provision of nature to insure that some eggs are deposited at a favorable time.

The females when ripe enter the nesting area and are attracted to the nest by a male, the spawning act of shedding the eggs and milt is completed, and the female immediately leaves the nest, the male remaining on guard. He stays hovering over the nest fanning the eggs with his fins to keep them free from silt and to keep aerated water circulating about them. He also guards the eggs and fry against predators until the fry have absorbed their yolk sacs at which time they scatter.

Cut of bluegill in the Lansing
Office files

The bluegill (Lepomis macrochirus), Michigan's number one fish in the fisherman's creel. The bluegill outnumbers its nearest rival two to one.

A colony of bluegill nests. Note fish among nests.

Photo taken at night by F. W. Ouradnik.

In Deep Lake, bluegill fry per nest varied from 4,670 to 61,815, with an average for 17 nests examined of 17,914. Deep Lake is about 15 acres in area and is probably quite representative of southern Michigan lakes. The estimated number of fry produced per acre in 1938 was 443,600, and for the entire lake 6,610,000 young bluegills. Obviously there must be a tremendous mortality among the offspring, otherwise the lake would soon be overpopulated. The same probably holds true for bluegills in other Michigan lakes.

The growth rate of Michigan fishes has been the object of investigation by the writer during the past three years and the following observations on the bluegill were made by him.

The rate of growth of the bluegill varies from lake to lake. The state average, based on 4,184 bluegills from lakes distributed over the state, shows that bluegills reach legal size (6 inches) in their fourth summer of life. The average size at the various ages is given in the accompanying graph.

(Insert growth curve here if convenient)

The age of most fish can be determined from the scales. A number of scales are removed from the middle of the side, below the spinous dorsal fin. These scales are placed in envelopes on which is recorded the length, weight, sex, and other data needed for various investigations under way. The scales on arrival at the Ann Arbor laboratory are catalogued for the permanent files and are then prepared for study. Several scales are cleaned under a microscope, using fine camels hair or bristle brushes to remove particles of skin and slime which stuck to the scales when they were removed from the fish. The cleaned scales are put on glass slides and covered with a compound of glycerin-jelly, and a small glass coverslip

is placed on top. The scales are then labeled with the data from the envelope, and are ready for study under the scale projection machine. This machine is an apparatus for magnifying the scale. By changing lenses, magnifications from 29 to 90 times may be obtained. The scale-reading machine referred to was designed upon the principle of that first described by Dr. John Van Oosten et al.[2]

The age of fish is determined by locating and counting the number of year-marks (annuli) on the scale. As the scale grows, rings (circuli) are laid down on the scale first on the anterior, imbedded portion, and gradually they grow around to the posterior end (see illustration). A close examination of the scale photograph will show several incomplete rings along the sides of the scale. During the winter, growth is retarded or ceases entirely, and the rings do not grow to completion. With resumption of rapid growth in the spring, a new ring or circulus is laid down which soon is completed around the entire scale margin, justoutside the incomplete rings of the previous growing season which remain as they were during the winter. The new ring therefore cuts across these incomplete rings and this "cutting over" is one of the most conspicuous and trustworthy characteristics of the annulus or year-mark.

As the scale and body of the fish grow at a definite ratio, which can be determined, it is possible to calculate the length of the fish at any year of its life if the distance from the center of the scale to the various year-marks, and the length of the fish at the time of capture are known.

The knowledge of the age and growth rates of fish is important in attempts to improve lakes and streams for fishing. If a scale study

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[2] Van Oosten, John, H. J. Deason and Frank W. Jobes. A microprojection machine designed for the study of fish scales. Extrait Du Journal Du Conseil International Pour L'Exploration De La Mer, Vol. IX, No. 2, 1934.

Scale of a bluegill 4 3/4 inches in length and III years old. The small posterior portion of the scale which bears the small spines with a little area on either side of it is the part of the scale seen when looking at the fish.

shows the bluegills of a lake to be growing better than average, and those of another lake growing poorer than average, it is possible by conducting a lake inventory to get some clues as to why one lake is doing so well and the other so poorly by a comparison of the data collected. Lake inventories are being conducted each year by the Institute for Fisheries Research to determine existing conditions in many lakes in order to make recommendations for the future improvement and stocking policies of these lakes.

Just as there is a ratio between the growth of the body and the scale, there is a ratio between the length of the fish and the weight. This ratio has been determined for the bluegill and is presented in the weight-length curve. It will be seen that two length measurements are given, and weights in two systems of measurements also are given. The millimeter and gram systems are used to enable mathematical calculations to be made without the use of fractions. The standard length of a fish is the length from the tip of the nose to the base of the tail, and the total length is from the tip of the nose to the very tip of the tail with the lobes slightly compressed.

To use the chart the following procedure is used. Suppose you caught a fish 7 inches in total length, and you wished to know the approximate weight. At the top of the chart locate the 7 inch line, follow it down to the curve, then by placing a ruler parallel to the horizontal lines from the point where the 7 inch line intercepts the curve, you can get the weight in ounces on the left side of the chart or the weight in grams on the right side. In case of this 7 inch fish the weight in ounces would be 3 3/4 and in grams 110 . If the standard length of the fish is used in place of total length, the length is located at the bottom of the chart and followed vertically to its interception on the

curve, and the weight is found by following horizontally to either side. Thus, from this chart the weight of a fish may be determined if its length is known, or if its weight is known the length may be found by reversing the procedure assuming that the fish in question is average. The curve is based on the average of 4,969 length-weight measurements of bluegills taken in Michigan.

There has been much discussion concerning the ratio of sexes caught during winter. It has been argued that more females are taken in winter than males, and that this situation makes poorer fishing as time progresses. A study was made on the catches from six southern Michigan lakes during summer and winter for a two-year period. The ratio of males to females was found to be 1 to 1.32 in winter, and in summer the ratio was 1 to 1.21, for the combined ratios of the six lakes. The ratio for the year was therefore 1 to 1.27. For the entire state the ratio of males to females is 1 to 1.12. On a percentage basis, the ratio is 47 per cent males to 53 per cent females for the entire state. The combined total for the lakes studied intensively is 44 per cent males to 56 per cent females. The winter ratio is 43 per cent males to 57 per cent females, compared with a summer ratio of 45 per cent males to 55 per cent females. In other words, there seem to be slightly more females than males in the average adult bluegill population. The difference between the yearly ratio of these lakes and the state ratio is 3 per cent more females than males. There are 2 per cent more females caught in winter than in summer in these lakes, but this difference is of questionable significance.

The sex ratio varies greatly in different lakes and in some lakes it is true that more females than males are caught, but this is true both summer and winter, and is believed to be due to the fact that there are more females than males in the lake, and other lakes show just the opposite

with more males than females. So contrary to general opinion, it has been shown that in average waters there is no great difference between the number of males and females caught in summer and winter.

It has also been contended by some that the larger fish are caught in winter. Investigations have shown that this is not true, but that the average sizes of fish taken in summer and winter are approximately the same. According to the creel census records submitted by the Conservation Officers for the past five years, the average size of the bluegill caught in all waters of the state was 7.5 inches. The largest bluegill recorded in our files is 12 inches in length, weighing 1 1/4 pounds.

The food of the bluegill is chiefly adult insects and insect larvae. Bluegills feed at times on plankton, the microscopic and semi-microscopic plants and animals swimming freely in the water. The insect food is mainly dragonflies, mayflies, midges, damselflies, caddisflies, and their larvae. Crawfish, snails, freshwater shrimp, land-dwelling insects, and rarely a minnow or smaller fish of its own or another species may be found in the stomachs of bluegills.

The bluegill is usually fairly free from parasites. However, yellow grubs, black spots, tapeworms, and round worms have been reported in the bluegill, as well as parasitic leeches and gill lice. In some waters the infestation by certain parasites may be so great as to make the bluegills inedible, but these conditions are not numerous. None of the parasites are harmful to man even if eaten raw; cooking destroys them entirely.

Bluegills, while found in some streams, are predominantly lake fish. They are found for the most part in schools in the shallower waters in the vegetation beds. They offer the finest fishing and can be caught at any time of the year (other than during seasons closed by law), which

probably accounts for their being the number one fish in the anglers' catch. They can be taken by fly fishing with artificial flies, or still fishing with cane pole or bait rods. They will bite on worms, grubs, pieces of flesh, grasshoppers and other insects, or most any bait available. Through the ice in winter corn borers, mayfly wigglers, and other insect larvae are excellent bait.

The bluegill is choice eating; its firm white flesh is of delicious flavor and texture, and it is this along with its "catchability" that keeps the crown of "kingfish" on its head.

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