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W. C. Beckman

INSTITUTE FOR FISHERIES RESEARCH
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UNIVERSITY OF MICHIGAN

ALBERT S. HAZZARD, PH.D.
DIRECTOR

ADDRESS
UNIVERSITY MUSEUMS ANNEX
ANN ARBOR, MICHIGAN

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The Age and Growth of Fishes

by

William C. Beckman

Institute for Fisheries Research

Fish and Fisheries Division

How long does it take a bluegill to reach legal length?

Based upon researches recently completed, a bluegill under average conditions will reach legal length of six inches during its fourth summer of life. The table presents similar data for six other species of Michigan fishes.

The age of a fish is determined by locating and counting the number of yearmarks on its scales. Figures 1 and 2 show two kinds of scales. If a close examination is made of these scales it will be seen that one scale has little spines on it while the other does not. These spines are the reason why perch, bass, yellow pikeperch, and other similar fishes feel rough to the touch, and why trout, suckers and some other fishes do not. Contrary to general opinion from casual glances, the toothed area is the exposed section, the remainder of the scale being imbedded in the skin and covered by the next scale, like shingles

Summer of Life During Which Fish Reach Legal Length

3rd Summer	4th Summer	5th Summer
Yellow perch	Bluegill	Pumpkinseed
Black crappie	Rock bass	
Smallmouth black bass	Largemouth black bass	

on a roof. The black rings around the scale are actually little ridges on the scale surface, like bars on a washboard. These ridges represent stages in growth.

As the scale grows the ridge is first laid down along the edge of the scale towards the head. It gradually grows around the scale, so that at any time of the year we can find several ridges in the process of growing and ending at various parts of the top and bottom edge of the scale. During the winter growth is greatly retarded or stops entirely, and the ridges do not grow to completion. In the spring growth begins again but instead of each ridge of the previous season growing to completion a new ridge begins and soon encircles the scale, with others following suit. It is by locating and counting the number of places on the scale where a ridge cuts across several other ridges that we get the age of the fish. The cutting across the incomplete ridges by another complete one is the most reliable characteristic of the year mark. Considerable experience and training are required to correctly interpret scale samples because injury, disease, starvation, spawning and some other factors may cause accessory or partial checks on the scale which look like the true year mark and can be eliminated only by the most careful study.

The scale sample is removed from the side of the fish and placed in an envelope upon which is recorded information on the length, weight, sex, date of collection, etc. In the laboratory the samples are catalogued and filed until such a time as they are to be studied. When age determinations are to be made the scales are removed from the envelopes, are cleaned and mounted on glass slides. These mounts are studied on a

special microprojection apparatus, commonly called a "scale machine," at magnifications from 29 to 90 times. The ages are assessed as earlier explained and the data tabulated.

A special study just recently completed has given Michigan for the first time a reasonably accurate basis for judging how the fishes in our lakes are growing. In the past only the most obvious cases of stunting could be detected. With the present information, lakes where stunting may be just starting can be determined and possible corrective measures begun before the problem reaches a serious state. In addition to the study on the relationship of size to age the research included an evaluation of the weight to the length and the sex ratio for the seven species investigated. Experiments now are being conducted to find out the most efficient way to correct "stunted populations." One experiment was carried out on a "stunted population" by chemically treating the lake to remove a part of the existing population.[1]

The south basin of Booth Lake, Charlevoix and Otsego counties, was treated and the fishes were picked up and counted. The channel between the south and north basins (Figure 3) had been sand bagged to prevent

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[1] The details and results of this experiment are contained in the following papers:

Beckman, William C.

1941. Increased growth rate of rock bass, Ambloplites rupestris (Rafinesque), following reduction in the density of the population. Trans. Am. Fish. Soc., 1940, Vol. 70, pp. 143-148

1943. Further studies on the increased growth rate of the rock bass, Ambloplites rupestris (Rafinesque), following the reduction in density of the population. Trans. Am. Fish. Soc., 1942, Vol. 72, pp. 72-78.

the fish from the north basin getting into the treated water. When the chemicals had disappeared the sand bags were removed and the fish of the north basin had free access to the entire lake. A total of 20,192 fish were recovered of which 6,060 were panfish, perch and rock bass. Only 42 were of legal length, 37 perch and 5 rock bass. Collections made since the reduction in numbers have shown an increase in the rate of growth of all age-groups of rock bass. The perch have not beed studied yet. Figure 1 shows a scale on which the increased growth is reflected. This fish spent three years in the lake prior to the treatment. Notice the width of the growth zones for these three years. Now look at the growth made in the year following the reduction. It is almost as much as the first three years combined. The fish was 5.1 inches in length and just beginning its 5th summer of life, whereas at the time of treatment the fish at the end of their 5th summer averaged just 4.3 inches. In addition to growth in length the fish also increased in weight and condition.

Further use of the knowledge of how fast or slow the fish are growing is made in the stocking recommendations for lakes. Generally speaking the cause of slow growth is an overabundance of fish for the available food supply. A lake, similar to a garden plot, can produce just so many pounds per acre. If one wishes to increase the production of corn the hills are not planted twice as close. The same idea holds true for a lake. More and bigger fish cannot be gained by planting more fish in a lake already showing slow growth. In fact, it would seem more sensible to remove a part of the existing crop just as a gardener thins his carrots or beets. The experiments mentioned earlier include ways and

means of improving the lake in order to increase the production. Progress is being made, but the results are far from complete.

The needs of each lake have to be determined and then the corrective measure applied. Farm land needs a variety of treatment, some require lime, others phosphates, others nitrates. Our lakes have their counterparts in shelter, spawning areas, increased food supply, stable water levels, etc.

Some lakes are found where fish are growing at an above average rate. This might indicate that stocking would help the fishing quality of the lake if it is found that spawning areas are limited, small brood stocks present or some other controllable factor is keeping down the optimum number of fishes. The present Department policy with regards to stocking of warm-water fishes is directed towards this end. Instead of the general planting of as many fish in as many waters as possible, the fish are now being stocked in waters shown to have an insufficient population, to establish species or groups of species in lakes suitable for them, or to rebuild populations in lakes where a major catastrophe such as a winterkill has occurred completely or severely reducing the fish population.

The knowledge of the age and growth rates of the fishes is just one of the tools which aid fishery managers in judging the needs of waters. It is a step in getting the facts upon which a program can be built which will lead to better fishing for everyone.

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William C. Beckman
Assistant Fisheries Biologist

Approved by: A. S. Hazzard

Typed by: S. E. Putman