A NOTE ON THE ACCURACY OF THE SCALE METHOD IN DETERMINING THE AGES OF LARGEMOUTH BASS AND BLUEGILL FROM ALABAMA WATERS

E. E. PRATHER
Auburn University Agricultural Experiment Station
Auburn, Alabama

ABSTRACT

Photographic prints were made of scales taken from largemouth bass (*Micropterus salmoides* Lacepede) and bluegill (*Lepomis macrochirus* Rafinesque) of known ages by the use of a micro-projection machine. The image of each scale was projected directly upon photographic paper to produce, upon development, a permanent negative print.

In an examination of the prints of 272 largemouth bass scales, 80.1 percent were aged correctly when the ages were unknown to the technician. When the scales first aged incorrectly were re-examined after the technician knew the actual ages, an additional 3.7 percent was found to have the correct number of annuli although many were indistinct. A total of 16.2 percent of the bass scales did not possess annuli corresponding to the known ages.

In an examination of 264 prints of the scales of bluegill, 76.1 percent were aged correctly when the ages were unknown. When the scales first aged incorrectly were re-examined after the technician knew the actual ages, an additional 4.9 percent was found to have the correct number of annuli; however, many were not distinct. Of the total number of bluegill scales studied, 18.9 percent did not possess annuli corresponding to the known ages.

INTRODUCTION

Age determinations by the scale method have been used extensively in obtaining the rate of growth of fishes in natural waters. The method has been described in detail by Van Oosten (1928). Considerable doubt has been expressed concerning the accuracy of age determinations, especially of fish from southern waters.

A study of the scales of largemouth black bass (*Micropterus salmoides* Lacepede) and bluegill (*Lepomis macrochirus* Rafinesque) of known ages was made to test the accuracy of the scale method in determining the ages of these species of fish in Alabama.

Fish for study were taken from four fertilized ponds stocked at the rate of 1,500 bluegill and 100 largemouth bass per acre, and from one unfertilized pond stocked at the rate of 400 bluegill and 30 largemouth bass per acre. Records were kept on the dates of hatching, dates of stocking, dates when the scale samples were taken, and on lengths, weights, and ages of the fish. Thirty of the bass were taken from feeding experiments where they were fed different amounts and kinds of food from June to October. Scales, weights, and lengths were taken from these fish at monthly intervals. In both species the scales were removed from the area between the dorsal and pectoral fins, immediately above or below the lateral line. Usually a dozen or more scales were removed with a forceps from each fish and placed in an envelope.

Two or three of the dried scales from each fish were selected with the use of a binocular microscope for mounting. Care was exercised in the selection of the scales in order to obtain only typical, clear, non-regenerated specimens. The selected scales were cleaned by rubbing between moistened layers of cheese cloth. They were then mounted on a glass slide in a solution of water-glass and glycerin. This solution was used because it gave a sharper projected image than other mounting fluids. The water-glass-glycerin solution was prepared by dissolving 60 g. of sodium silicate in 100 ml. of water that had been brought to the boiling point. This solution was filtered through coarse filter paper. Ten

ml. of glycerin was mixed thoroughly with 40 ml. of the above water-glass solution and kept in a stoppered pipette bottle.

Negative prints were made by projecting the scale image directly upon photographic printing paper, using a microprojection machine. The smaller scales were enlarged to the extent that the complete image covered the major portion of a five- by seven-inch print, while each half of the larger scales was enlarged to cover a five-by-seven print.

SCALE EXAMINATIONS

Hundreds of bass and bluegill of known ages have been taken from experimental ponds at Auburn each year, and the author had gained a considerable amount of experience by studying scales from fish of known ages before these examinations were made.

The photograph of each scale was examined, and the age determined without any previous knowledge of the age of the fish. If any doubt existed, because of incomplete or indefinite annuli, this fact was also recorded. When the total number of scales for each species had been examined in this manner, the known ages were recorded from the data that were kept on the history of the pond from which each fish had been taken. Then, with the ages known, each scale was re-examined in an attempt to determine the percentage of scales that indicated the correct ages of the fish.

ACCURACY OF AGE DETERMINATIONS

Largemouth bass — Scales from each of 144 different largemouth bass taken directly from experimental ponds were examined. In addition, scales were taken at monthly intervals from the 30 bass used in feeding experiments, providing 128 additional samples. The age distribution was as follows: age-group 0—13, age-group I—238, age-group II —21. The Roman numeral indicated the number of annuli completed when the scale sample was taken. A fish in age-group II, therefore, had two complete annuli, and was in its third year of growth.

Of the 272 bass scales examined (Table 1), 218 were aged correctly when the actual ages were unknown to the technician. Of the number aged correctly, there were 38 whose ages appeared doubtful but were aged correctly by the author. However, when the known ages were recorded and the scales re-examined, it was possible to age correctly 10 additional scales. Even with the ages known, 44 of the total number of bass scales examined did not possess annuli corresponding to the known ages. Of the 44 scales aged incorrectly, 43 were underaged (showed too few annuli) while only one was overaged. The percentages of scales not showing the correct number of annuli are given for each month in which scales were collected (Table 2).

Bluegills — Scales from 264 different bluegills were studied in the same manner as the bass scales. Their ages were distributed as follows: age-group I—1, age-group II—201, age-group III—62. In the first examination when the actual ages were unknown to the author, 201 of the scales were aged correctly. Of this number there were 86 whose ages appeared doubtful but were aged correctly by the author. When the actual ages were made known and upon a second examination of the scales, it was possible to age correctly 13 additional scales. Of the 264 bluegill scales examined there were 50 scales that did not possess annuli corresponding to the known ages. Each of these scales was underaged or had too few annuli.

CONCLUSIONS

In this study of the scales of largemouth bass and bluegill, it was apparent that the scales of each species often contained indefinite annuli. However, for each species the majority of the errors in aging was caused by the lack of the formation of distinct annuli.

LITERATURE CITED

Van Oosten, John. 1928. Life History of the Lake Herring (*Leucichthys artedi* Le Sueur) of Lake Huron as revealed by its scales, with a

critique of the scale method. Bulletin, U. S. Bureau of Fisheries, Vol. 44, 1928, pp. 265-428.

Table 1. Accuracy of Age Determination from Scale Examinations

Species	Total number scale samples examined	When ages were unknown to technician				Scales aged incorrectly which had:			
		Aged correctly		Aged incorrectly		Correct number of annuli although indistinct		Annuli not corresponding with known ages	
		Number	Percentage	Number	Percentage	Number	Percentage of total	Number	Percentage of total
Bass	272	218	80.1	54	19.9	10	3.7	44	16.2
Bluegill	264	201	76.1	63	23.9	13	4.9	50	18.9

Table 2. Scales Not Possessing Correct Number of Annuli

	BLUEGILL		BASS	
MONTH	Number collected	Percentage not having correct number of annuli	Number collected	Percentage not having correct number of annuli
MARCH	26	3.8	4	0
APRIL	10	0	4	0
MAY	22	13.6	7	0
JUNE	58	13.8	42	9.5
JULY	98	30.6	57	1.8
AUGUST	31	25.8	40	35.0
SEPTEMBER	19	0	60	16.7
OCTOBER	0	0	37	21.6
NOVEMBER	0	0	21	33.3

SUMMARY REPORT OF THE MINUTES OF THE SOUTHERN DIVISION OF THE AMERICAN FISHERIES SOCIETY

The Fifteenth Annual Meeting of the Southern Division of the American Fisheries Society was held in Asheville, North Carolina, October 23-26, 1966. Over 150 members were registered for the meeting. Attendance at the technical sessions exceeded 200 on numerous occasions. The Southern Division meeting is held in conjunction with the Southeastern Association of Game and Fish Commissioners and the Southeastern Section of the Wildlife Society. The Law Enforcement Section, Information and Education Section and the Engineering Section joined in the meeting. Over 800 people were in attendance representing these facets of fish and game conservation.

Some of the highlights of this meeting included outstanding papers on trout, esturine fisheries and freshwater fisheries. A one-half day session was devoted to the research findings and developments in the culture and implications of the striped bass in reservoirs and estuaries.

A report was presented on plans for the forthcoming Reservoir Symposium to be held in Athens, Georgia on April 5-7, 1967. The outstanding array of papers to be presented at this Symposium promises to be very rewarding to all interested reservoir scientists. The $20.00 registration fee will be used to defray cost of publication and other incidental expenses.

L. Price Wilkins, Tennessee, was presented the C. W. Watson Award in recognition of his outstanding accomplishments. His efforts to preserve and increase the trout fishery in the state have attained national attention. All society members can applaud this honor tendered to one of our deserving fishery scientist.

Officers elected were: President — James T. Davis, Louisiana;