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ANALYSIS OF THE GIZZARD SHAD POPULATION OF CRAB ORCHARD LAKE, ILLINOIS

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Crab Orchard Lake has a surface area of 6,500 acres with an average maximum depth of 15 to 20 feet. Its shore line is extremely irregular. The principal fishes in order of their probable abundance are: gizzard shad, *Dorosoma cepedianum* (Le Sueur); carp, *Cyprinus carpio* (Linnaeus); white crappie, *Pomoxis annularis* (Rafinesque); largemouth black bass, *Micropterus salmoides* (Lacepede); and yellow bass, *Morone interrupta* (Gill). Details on this fish population have been published by Whitacre (1952).

The present study* deals with the age-composition and rate-of-growth of a sample of 888 gizzard shad taken from Crab Orchard by use of an electric shocker. The shocker used consisted of a 230 volt A. C., 5000 watt, 180 cycle generator carried in a boat and connected to electrodes mounted on a boom extending forward from the bow of the boat. The total sample was taken at one time and the sample is thought to be representative of the population. Comments based on other observations of this population are also made.

The gizzard shad is generally accepted as important both in abundance and as a forage species (Lagler and Ricker, 1943; Swingle, 1949; and Stroud, 1949). It is found in all the larger streams and many of the lakes, and is particularly abundant in Crab Orchard Lake. Of the several abundant species of fishes in the lake, the largemouth feeds most heavily on the shad. As we come to understand more about vulnerability and palatability of forage species, there is little doubt but that the gizzard shad will be recognized as one of the most important of forage fishes for the largemouth bass and yellow pike perch.

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Results

The length-frequency distribution of this fish as shown in figure 1 brings out several points of interest. There is a mode at approximately 70 millimeters of standard length, one at about 115 millimeters, and a third at 145. Assuming that all size

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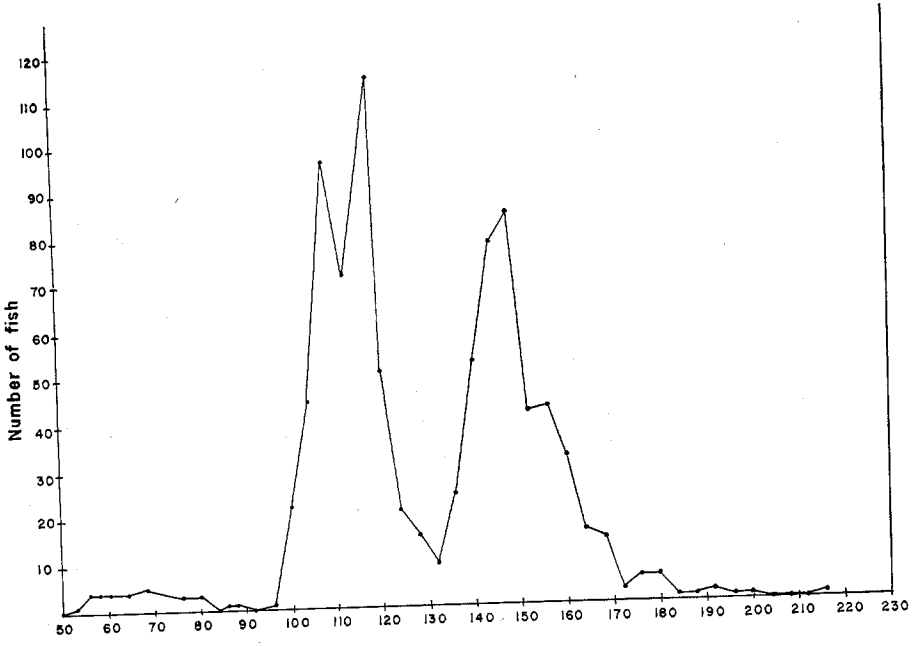

FIG. 1.—Length-frequency distribution of 888 gizzard shads taken from Crab Orchard Lake.

fishes were equally vulnerable to the collecting device, the first mode would be age group 0. The second mode is, of course, age group I and the third is age group II. These modes, in general, corroborate the ages determined by the scale method (table 1).

The sample was composed primarily of fish small enough to be utilized by adult bass. For example, it would not be out of order to assume that a two-pound bass could swallow a six-inch shad. The great majority of the shad were below six inches in length.

Table 1, which gives the ages and rate of growth based upon the scale method, shows only a few specimens older than three years. The maximum age attained was five years. The average length was 4.0, 5.4, and 6.6 inches at the end of the first, second and third years of life respectively.

The coefficient of condition, K, based on 888 specimens of the shad, length range 51 to 216 millimeters, was 1.82. Calculations were made according to length groups and no variation of K with length was detectable.

SUMMARY

Crab Orchard Lake is a 6,500 acre artificial impoundment in southern Illinois. The fishes present in the lake in order of their abundance are: gizzard shad, carp, white crappie, largemouth black bass, and yellow bass.

TABLE 1.—AGE COMPOSITION AND SIZE OF 888 GIZZARD SHAD TAKEN FROM CRAB ORCHARD LAKE, AUGUST, 1952

Age group	Number examined	Standard length in mm. at capture	Aver. calculated length at each annulus				
			1	2	3	4	5
0	17	70	.....	.....	.....	.....	.....
I	377	114	78	.....	.....	.....	.....
II	340	143	80	107	.....	.....	.....
III	80	154	88	115	134	.....	.....
IV	5	171	84	94	125	139	.....
V	1	150	74	86	106	117	129
Mean standard lengths, millimeters	.....	.....	80	108	133	135	129
Equivalent total length, inches[1]	.....	.....	4.0	5.4	6.6	6.7	6.4
Annual increment, standard length, millimeters	.....	.....	80	26	19	13	12
Corresponding weight in grams[2]	.....	.....	10	23	40	41	36

[1] Total length equals 1.26 standard lengths (Whitacre, 1952).
[2] Log weight = —4.13655 + 2.71106 × Log length. This formula is based on 888 specimens in the length range 51 to 216 millimeters of standard length.

In October, 1952, by counting sample strips of shore line, it was estimated that 10,250,000 shad were dead along the shore line. All size fishes were affected, but an electrical sampling in October showed three-inch shad to be very abundant, but larger sizes scarce. Since similar die-offs have occurred in this lake, it will be of interest to take additional samples in subsequent years and analyze their length-frequency distribution. Such die-offs may control the age and size composition of the population.

A sample of 888 gizzard shad was taken by electrical shocking in August, 1952. A length-frequency distribution was made of this sample of fish. Ages were determined by the scale method. It was found that the majority of fish making up the gizzard shad population were less than four years of age and small enough to be eaten by adult bass.

The shad were 4.0, 5.4, and 6.6 inches long at the end of their first, second, and third years of life respectively.

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