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Age and Growth of the Blue Catfish, Ictalurus furcatus, in the Arkansas River

D. Leroy Gray

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D. Leroy Gray[2]
Richard A. Collins[3]

The Arkansas River has in the past been a fast-flowing, muddy river which fluctuated markedly in depth, but it is now in the process of being stabilized and cleared by jetties and navigation dams. The blue catfish has been one of the dominant species in the river for many years, to the extent that it has supported commercial fishing. The dominance of the species in this environment was demonstrated several years ago when personnel of the Arkansas Game and Fish Commission sampled the population by the use of rotenone and recovered over 900 pounds of blue catfish and not more than 100 pounds of all other species combined. Since the Arkansas River was well suited for the blue catfish, knowledge of the distribution and growth of this species in this passing natural environment is of significance.

The Arkansas Game and Fish Commission biologist, interested in the blue catfish as a commercial species, provided material, equipment, and personnel necessary to obtain samples of this fish population for study. Four samples of blue catfish were taken by the use of rotenone from the Arkansas River during the perlod September 15 to October 22, 1964. An average of 275 pounds of 5 percent powdered rotenone was used for each sampling. The rotenone was mixed with water in tubs and spread across the river at points where the channel was narrow and the water somewhat turbulent. The turbulence resulted in further distribution of the rotenone before it flowed into deeper and wider parts of the river.

As the rotenone moved with the current, it was followed by men in 6 boats and the fish were dipnetted as they came to the surface. Fish continued surfacing and were captured for a period of 5 to 6 hours after application of rotenone and this time represented approximately 4 miles of river for each sampling.

Minnows, shad, and suckers were affected almost immediately after the rotenone was applied but about 15 minutes was required before catfish began to surface. Blue catfish and channel catfish were readily affected but flathead catfish did not come to the surface and none were collected, although they were known to be relatively abundant in the river.

After each fish had been weighed and the total length measured, the left pectoral spine was removed as described by Sneed (1951) and Schoffman (1954). The spines were placed in scale envelopes and later dried and stored until sectioned.

The spines were sectioned by a modification of the equipment and methods described by Sneed (1951), Leonard and Sneed (1951), and Schoffman (1954). A Dremel Moto-Tool No. 2[4] was mounted as illustrated in Figure 1. By the use of practice spines, the stop pin was set to determine the thickness of the sections. The lever was used to hold the spine in position while sectioning. Spines could be sectioned by free-hand use of the Moto-Tool, but it was found that the sections could be made more rapidly and uniformly by mounting as in Figure 1. As illustrated in Figure 2, the articulating end of the spine (part A) was cut off and three sections were cut from the adjoining portion (part B-C). These sections were stored in numbered vials for use in age determinations.

The spine sections were placed in a petri dish containing ethyl alcohol and examined through a variable magnification dissecting microscope using transmitted light. Spine sections from hatchery-reared fish of known age, age groups I and II, were examined and compared with sections of spines from fish of the Arkansas River population. Narrow, more transparent bands were distinct and were interpreted as winter growth rings.

Among most spines from fish of age group IV and older, the first annulus was not present as a result of the enlarged lumen. At best, only the tip of the first winter growth ring was present. Since sections from spines of 1 or 2-year-old fish always contained the first annulus and had practically no lumen, these were compared with the spine sections from older fish to verify the presence or absence of the first annulus.

In Tables I and II and Figure 3, the length and weight of the fish collected is given by age groups. The absence of fish in age group V and the presence of only one in age group IV may indicate years of poor conditions for spawning or survival, since 16 fish were taken in the subsequent age groups VI, VII, and VIII. The overlap of total lengths between age groups 0 and I was carefully

(1) In partial fulfillment for master's degree.
(2) Extension Fish and Wildlife Biologist, Agricultural Extension Service, Little Rock.
(3) Associate Professor of Biology, State College of Arkansas, Conway, Arkansas 72032.
(4) Dremel Manufacturing Company, 2429 18th Street, Racine, Wisconsin.

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checked and found to be correct. This overlap was probably a result of the fact that blue catfish may spawn over a period of three months and thereby produce a wide variation in size during the first year.

The results of this study were compared with the results of similar studies using blue catfish from lakes (Table 3). Blue catfish from the Arkansas River exhibited a more rapid growth for the first 5 years than did those from either Lake Texoma (Jenkins, 1956) or Kentucky Lake (Conder and Hoffarth, 1962). After the 5th year, the fish from Lake Texoma showed a greater growth rate than those from either Kentucky Lake or the Arkansas River.

It should be noted that the sampling from Lake Texoma covered a period of 9 months. Sampling from Kentucky Lake covered a period of 4 months and was conducted at a different time of the year than the present study. The difference in length of the sampling period and time of year during which samples were taken would influence the size of the fish representing a given age group.

TABLE I

Number, weight and length of blue catfish from the Arkansas River, by age group and year class

Age group	Year class	Number of fish	Weight (pounds)[1/]	Length (inches)[1/]
0	1964	28	.1	7.2
I	1963	55	.5	11.5
II	1962	19	1.4	16.7
III	1961	6	2.1	19.0
IV	1960	1	3.5	20.0
V	1959	0	—	—
VI	1958	2	6.3	24.4
VII	1957	6	9.2	27.9
VIII	1956	8	10.1	29.1
IX	1955	0	—	—
X	1954	0	—	—
XI	1953	1	25.0	37.2

[1/] Weighted means.

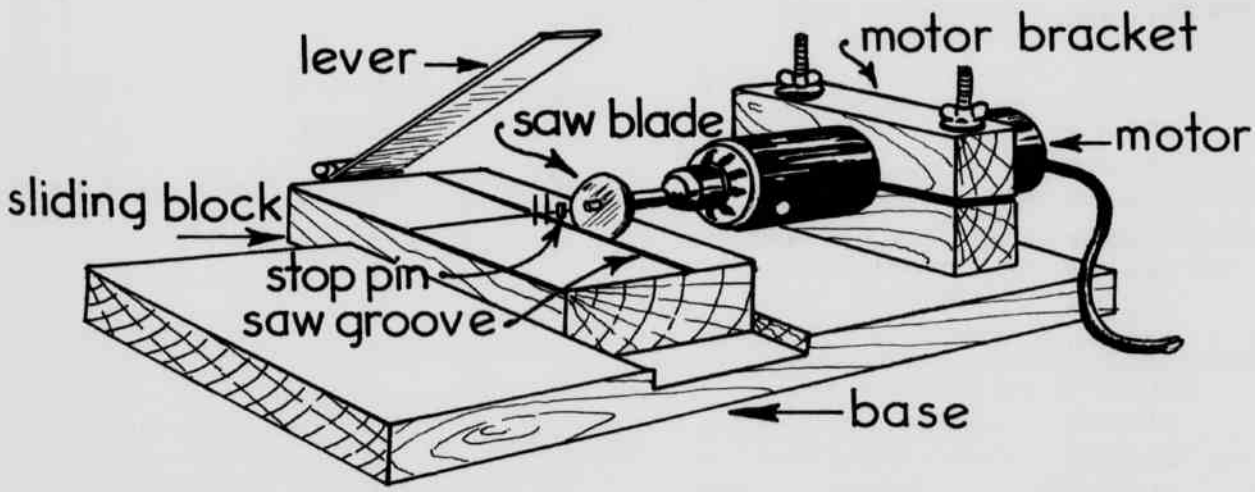

Figure 1. Apparatus designed to section catfish spines rapidly and uniformly.

TABLE 2

Range of length frequencies by age group of blue catfish from the Arkansas River

interval Length	Age group											
	0	I	II	III	IV	V	VI	VII	VIII	IX	X	XI
3.0- 3.9	1	-	-	-	-	-	-	-	-	-	-	-
4.0- 4.9	4	-	-	-	-	-	-	-	-	-	-	-
5.0- 5.9	6	-	-	-	-	-	-	-	-	-	-	-
6.0- 6.9	6	-	-	-	-	-	-	-	-	-	-	-
7.0- 7.9	2	1	-	-	-	-	-	-	-	-	-	-
8.0- 8.9	-	1	-	-	-	-	-	-	-	-	-	-
9.0- 9.9	1	5	-	-	-	-	-	-	-	-	-	-
10.0-10.9	5	8	-	-	-	-	-	-	-	-	-	-
11.0-11.9	3	21	-	-	-	-	-	-	-	-	-	-
12.0-12.0	-	12	-	-	-	-	-	-	-	-	-	-
13.0-13.9	-	3	-	-	-	-	-	-	-	-	-	-
14.0-14.9	-	4	3	-	-	-	-	-	-	-	-	-
15.0-15.9	-	-	1	-	-	-	-	-	-	-	-	-
16.0-16.9	-	-	6	-	-	-	-	-	-	-	-	-
17.0-17.9	-	-	4	1	-	-	-	-	-	-	-	-
18.0-18.9	-	-	4	-	-	-	-	-	-	-	-	-
19.0-19.9	-	-	1	5	-	-	-	-	-	-	-	-
20.0-20.9	-	-	-	-	1	-	-	-	-	-	-	-
21.0-21.9	-	-	-	-	-	-	-	-	-	-	-	-
22.0-22.9	-	-	-	-	-	-	-	-	-	-	-	-
23.0-23.9	-	-	-	-	-	-	1	-	-	-	-	-
24.0-24.9	-	-	-	-	-	-	-	-	-	-	-	-
25.0-25.9	-	-	-	-	-	-	1	-	-	-	-	-
26.0-26.9	-	-	-	-	-	-	-	2	1	-	-	-
27.0-27.9	-	-	-	-	-	-	-	2	2	-	-	-
28.0-28.9	-	-	1	-	-	-	-	-	1	-	-	-
29.0-29.9	-	-	-	-	-	-	-	1	1	-	-	-
30.0-30.9	-	-	-	-	-	-	-	1	2	-	-	-
31.0-31.9	-	-	-	-	-	-	-	-	-	-	-	-
32.0-32.9	-	-	-	-	-	-	-	-	-	-	-	-
33.0-33.9	-	-	-	-	-	-	-	-	-	-	-	-
34.0-34.9	-	-	-	-	-	-	-	-	1	-	-	-
35.0-35.9	-	-	-	-	-	-	-	-	-	-	-	-
36.0-36.9	-	-	-	-	-	-	-	-	-	-	-	-
37.0-37.9	-	-	-	-	-	-	-	-	-	-	-	1

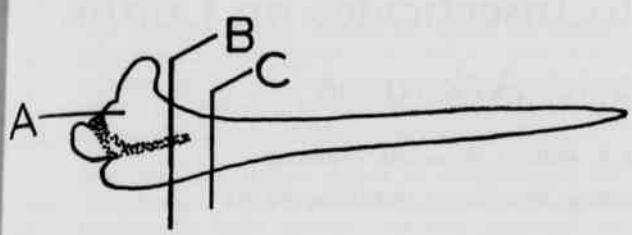

Figure 2. Catfish spine showing area of sectioning (B-C).

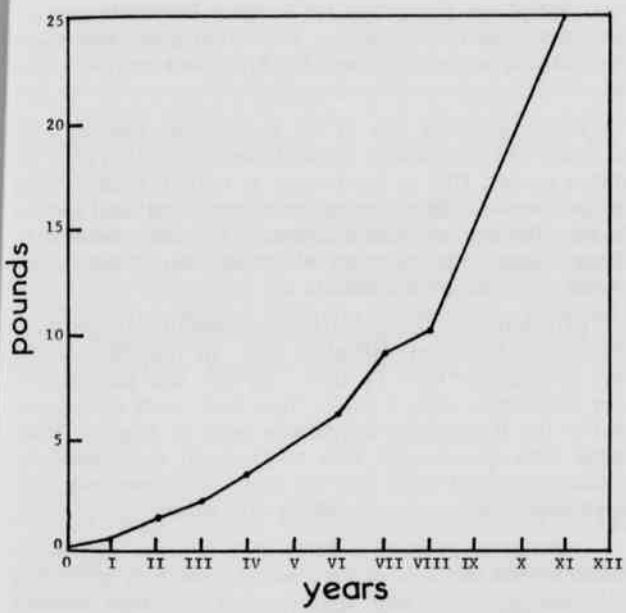

Figure 3. Growth curve of blue catfish from the Arkansas River.

TABLE 3

Comparison of the average total lengths by age groups of blue catfish from Lake Texoma, Kentucky Lake and the Arkansas River

Age group	Lake Texoma[1]/	Kentucky Lake[2]/	Arkansas River[2]/
0	—	—	7.2
I	5.7	—	11.5
II	10.0	9.0	16.7
III	13.8	10.6	19.0
IV	17.4	12.2	20.0
V	21.0	14.4	—
VI	25.8	17.1	24.4
VII	30.3	19.6	27.9
VIII	34.3	24.3	29.1
IX	40.4	27.5	—
X	42.1	33.9	—
XI	44.0	—	37.2

[1]/ Average length.

[2]/ Weighted average length.

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