

Growth of Fishes in Cutoff Lakes and Streams of the Little River System, McCurtain County, Oklahoma¹

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An investigation of the fishery resources of the Little River System in southeastern Oklahoma was conducted by a five-man survey party of the fisheries laboratory during June and July, 1955. Primary objectives of the survey were to learn the species composition and standing crop of the fish population in the Little, Glover, and Mountain Fork Rivers, and their major tributaries, and to gather data upon which to base predictions concerning the ultimate fishery resource which will be produced in proposed flood-control reservoirs on those streams. Several cutoff pools in the lower reaches of the rivers were sampled with rotenone in order to obtain information from these unique habitats which more nearly resemble lake conditions.

The Little River System drains the rugged south-central portion of the Ouachita Mountains in McCurtain County, which is characterized by oak-pine forests on the boulder-littered sandstone and shale slopes, and loblolly pine-hardwood forests on the thin, poorly-drained soils of the bottomland. Crests of the ridges bordering the southward-flowing streams rise from 400 to 1000 feet above the principal valleys to a maximum of 2,900 feet above sea level. Each spring, intermittent heavy rains swell all of the rivers to flood stage, and inundate the bottomlands and cutoff lakes for extended periods. Lumbering is the principal land-use activity, and only about 10 percent of the area is in actual farm crop production.

The streams studied are locally renowned for smallmouth bass, largemouth bass, and green sunfish angling. According to long-time residents of the area, fishing success has steadily declined since lumbering activities were begun in 1912, and most of the small tributaries have ceased flowing during the summer months for the past 30 years. Applications to stock the rivers and cutoff lakes are received each year by the Fisheries Division of the Oklahoma Game and Fish Department, but the need for such stocking has long been questioned. The natural species composition of the streams, and a comparison of growth-rates of each species between the streams and cutoff lakes to ascertain if the latter contain distinct populations, should determine the advisability of an annual stocking of hatchery-reared fish. The purpose of this paper is to present the principal species found in the tributaries, the main streams, and the cutoffs, and to compare their growth-rates, in order to establish a guide for future management procedures.

All of the tributaries have fairly steep gradients. The channels have bedrock bottoms with many large boulders and very little bottom rubble or gravel in the pools or riffles. The lower Little River has a moderate gradient and somewhat finer bottom materials. The cutoff lakes are 6 to 12 feet deep, steep-sided, with gravel and silt bottoms, and are surrounded by heavy growths of button-bush (*Cephalanthus*) and cutgrass (*Zizaniopsis*). Chemical analysis of various tributaries indicated that the water is slightly acid (pH 6.2-6.8) and soft (total alkalinity 16-45 ppm.) The principal rivers

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have a slightly higher pH (6.6—7.2) and alkalinity (6-56 ppm.). Eight cutoff lakes sampled had an average pH of 7.1 and an alkalinity of 34 ppm., both determinations being slightly higher than in the flowing streams.

MATERIALS AND METHODS

Fishes were collected by means of rotenone, small-mesh seines, and experimental gill nets. Scale and spine samples were taken from representative numbers of each species, and length-weight measurements recorded for the remainder. Small specimens were preserved in 10 percent formalin prior to examination. An account of collecting sites, species taken, standing crop estimates, and other pertinent data is presented in Okla. Fish. Res. Lab. Rep. Number 55 (1).

Age and growth-rate determinations were made by counting and measuring the distance between annuli on the magnified ($\times 45$) scale image. Lengths at the end of each year of life were calculated by the use of a nomograph with an assumed zero intercept. Growth-rates presented in the following tables are based on grand average calculated total lengths, and do not include lengths of age-groups at capture.

DISTRIBUTION OF FISHES

The Little River System was arbitrarily divided into three habitat types which were represented by main rivers, tributaries, and cutoff lakes. A list of the principal fishes, and the percent of the total sample which each species represents within each habitat division, is presented in Table I. The totals include only those individuals which were measured, and excludes all the minnows, darters, and other small fishes.

Fish were collected from the lower part of Mountain Fork and Little Rivers by means of experimental gill nets. The catch in the main rivers was composed of 10 percent sport fishes, 30 percent pan fishes, and 60 percent coarse fishes. Samples from sixteen tributaries were collected by means of rotenone and seining. These revealed a population made up of 12 percent sport fishes, 85 percent pan fishes, and 3 percent coarse fishes. Ten cutoff lakes, from one to eighteen surface acres, of the Mountain Fork and Little Rivers were completely or partially rotenoned. In these bodies of water, the sport fishes constituted 20 percent, the pan fishes 30 percent, and the coarse fishes 50 percent of the population. These percentages indicate a predominance of pan fishes and coarse and forage fishes over sport fishes throughout the Little River System. The number of sport fishes was highest in the cutoff lakes, and the tributary streams revealed a high population of pan fishes and very few coarse fish. The percentage of coarse fish is highest in the main rivers, which may be unrealistic because of the use of gill nets as the exclusive method of collection. If similar sampling methods had been possible in all habitat types, the relative percentages of the sport and coarse fishes would probably have been more nearly equal in the main rivers and cutoff lakes.

Numbers of largemouth bass, smallmouth bass, bluegill, and green sunfish were significantly different within the three habitat types. Largemouth bass were most numerous in the cutoff lakes, and smallmouth bass were more abundant in the tributary streams. Bluegills were more numerous in the cutoff lakes, and green sunfish in the tributaries.

AGE AND GROWTH

Comparison of the average calculated growth of eight species of fish within each habitat division, along with the number of fish used in the calculations, are presented in Tables II and III. The rates of growth of all species within the three categories were similar, with the main streams showing a slightly faster rate of growth, and the tributaries the slowest growth. The only marked difference was shown by channel catfish,

which grew faster in the cutoff lakes than in the rivers. After retarded first and second-year growth, the game fishes of the Little River System closely parallel or surpass the state average growth of stream fishes in Oklahoma. Largemouth bass, after a slow first-year growth of 3.5 to 4.5 inches, increase in growth rate and attain legal length (10 inches) during their third summer in the Little River System. Both spotted bass and smallmouth bass require four summers to reach 10 inches. Channel catfish, the fastest-growing game species present, reach legal length of 10 inches during their third summer. Some striking differences were noted in individual rate of growth of this species in both the main river and cutoff lake habitats. Black and white crappie exhibited very slow growth during their first year, and reached 8 inches in length late in the third summer, or early in the fourth summer of life. Very few bluegill specimens were taken which measured more than 5.0 inches, and they were 3 years or more of age. Green sunfish over 5 inches were much more abundant, and averaged 6.4 to 7.3 inches at the end of their third year of life—which accounts for the predominance of this sunfish in the angler's creel.

The close similarity between the rate of growth of fishes in the cutoff lakes and that of the main rivers (Table II and III) is most probably explained by the occurrence of frequent flooding which flushes out the cutoffs and leaves a different population of stream fishes annually. Consequently a program of stocking and re-stocking of the cutoff lakes appears unnecessary and futile. The dominance of green sunfish and smallmouth bass in the tributaries and upper reaches of the Little, Glover, and Mountain Fork Rivers, suggests that hatchery-reared species have different habitat requirements than those provided by the streams. Collections throughout the river system revealed ample natural reproduction of all sport fishes. The decline in fishing success in the past quarter century is more probably attributable to land usage practices on the watershed, which have altered stream environments, than to an increased fishing pressure, or a lack of adequate natural reproduction of the desirable species.

LITERATURE CITED

1. Finnell, Joe C., and Robert M. Jenkins. 1955. The fishery resources of the Little River System, McCurtain County, Oklahoma. Okla. Fish. Res. Lab. Rep. Number 55: 40 pp. Multilith.

TABLE I.

Principal fishes of the Little River System and the percent of the total sample which each species represents within each habitat division.

Species	Percent of total sample			
	Tributaries	Main Rivers	Cutoff Lakes	
Sport Fishes	Channel catfish	....	5.2	2.2
	White bass	....	0.6	....
	Spotted bass	0.5	1.8	1.5
	Smallmouth bass	2.8	1.1	0.2
	Largemouth bass	0.7	0.4	5.3
	White crappie	0.1	0.8	8.6
	Black crappie	....	0.1	1.6
	Pickereel	8.1	....	0.4
	Pan Fishes	Black bullhead	0.3	....	0.2
Yellow bullhead		3.2	....	1.4
Brown bullhead		....	....	1.3
Warmouth		0.2	0.6	2.6
Green sunfish		29.6	16.4	1.7
Spotted sunfish		....	....	0.1
Redear sunfish		0.1	....	1.4
Longear sunfish		48.1	1.1	4.1
Orangespotted sunfish		0.2	....	....
Bluegill		3.2	11.4	17.8
Coarse and Forage Fishes	Spotted gar	....	0.6	2.9
	Longnose gar	....	1.7	0.3
	Bowfin	....	....	0.3
	Skipjack	....	1.5	....
	Gizzard shad	....	22.2	23.5
	Mooneye	....	4.9	....
	Bigmouth buffalo	....	....	0.7
	Black buffalo	....	0.7	3.5
	Smallmouth buffalo	....	0.1	1.4
	River carpsucker	....	10.4	6.2
	Golden redhorse	2.5	8.7	4.8
	River redhorse	....	3.7	....
	Spotted sucker	0.3	0.1	4.0
	Carp	....	....	0.1
	Flathead catfish	0.1	2.5	0.3
Drum	....	3.4	1.6	
Total Number of Fish	3,992	713	3,201	

TABLE II.
Comparison of the growth rates of largemouth bass, spotted bass, smallmouth bass, and channel catfish in three habitat divisions of the Little River System, McCurtain County, 1955.

YEAR OF LIFE	Average calculated total length in inches at the end of each year of life											
	LARGEMOUTH BASS			SPOTTED BASS			SMALLMOUTH BASS			CHANNEL CATFISH		
	Tribu- taries	Main Rivers	Cutoff Lakes	Tribu- taries	Main Rivers	Cutoff Lakes	Tribu- taries	Main Rivers	Cutoff Lakes	Tribu- taries	Main Rivers	Cutoff Lakes
1	3.7	4.6	4.3	3.3	3.5	3.2	3.9	4.0	2.5	....	8.7	4.3
2	8.1	9.5	8.5	6.4	6.9	6.3	7.4	8.1	....	....	7.8	8.7
3	10.6	12.3	11.5	8.3	9.3	8.8	9.5	10.8	....	....	10.9	12.4
4	13.8	15.3	14.2	10.8	....	11.0	11.4	....	....	....	13.0	15.0
5	....	17.8	16.5	....	....	12.6	13.3	....	....	....	17.8	19.0
6	....	19.3	18.3	....	....	....	14.6	....	....	....	....	20.7
7	....	20.2	19.4	....	....	....	....	....	....	....	....	24.0
Number of Fish	13	3	135	16	34	18	107	9	1	0	58	47

TABLE III.

Comparison of the Growth Rates of White crappie, Black crappie, Bluegill, and Green sunfish in three habitat divisions of the Little River System, McCurtain County, 1955.

YEAR OF LIFE	Average calculated total length in inches at the end of each year of life											
	WHITE CRAPPIE			BLACK CRAPPIE			BLUEGILL			GREEN SUNFISH		
	Tribu- taries	Main Rivers	Cutoff Lakes	Tribu- taries	Main Rivers	Cutoff Lakes	Tribu- taries	Main Rivers	Cutoff Lakes	Tribu- taries	Main Rivers	Cutoff Lakes
1	1.5	2.0	1.7	...	1.5	2.0	1.8	2.2	1.9	2.2	2.7	2.0
2	4.4	5.4	4.5	...	4.1	5.0	3.9	4.7	3.9	4.5	5.2	4.6
3	...	7.2	7.0	...	8.5	7.2	5.4	6.6	5.5	6.4	7.3	6.6
4	...	9.0	9.6	...	...	9.1	...	7.1	6.6	7.8	9.0	7.7
5	...	...	11.8	...	...	11.4	...	...	7.8	8.6	9.8	...
6	...	...	13.8	...	...	...	...	...	...	...	...	...
Number of Fish	2	18	252	0	1	47	87	98	402	743	119	49