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## Age and Growth of Sauger in Pool 19 of the Mississippi River<sup>1</sup>

NEIL E. CARTER<sup>2</sup>

*Abstract.* Saugers, *Stizostedion canadense* (Smith), were collected in the Mississippi River (Pool 19) in 1966 and 1967 as part of a study of fish ecology and food habits. The length-weight relationship was described as

$$\text{Log } W = -5.552 + 3.184 \text{ Log } L$$

where  $W$  = weight in grams and  $L$  = total length in millimeters. In August, 1966, and June and July, 1967, condition did not increase with increase in length as expected from the slope of 3.184, but in the other seasons there was such an increase.

The average growth was similar to that reported for other sections of the Mississippi River. Growth was more rapid than that from Lake of the Woods, but slower than in new impoundments. Little difference in abundance of 1963 to 1966 year classes was evident.

The Iowa Cooperative Fishery Unit undertook a study, from 1966 to 1968, of the bottom fauna of Pool 19 of the Mississippi River to evaluate possible effects of dredging planned for a harbor at Fort Madison. Several species of fish also were collected to determine the extent to which they utilized bottom organisms as food. The present paper reports the age, growth and length-weight relationships of saugers, *Stizostedion canadense* (Smith), collected during these investigations.

### METHODS AND MATERIALS

Fish were collected by gill nets and electrofishing from July to December in 1966 and from May to July in 1967. The field collections were by David Jude and Richard Ranthum.

Scale samples from 304 sauger were used to determine rate of growth. Each sample was taken behind the pectoral fin and below the lateral line.

Smith's (1954) procedure for making scale impressions on clear, plastic strips by a roller press was used in the scale analysis. These impressions were examined under 44 $\times$  magnification with a projector similar to that described by Van Oosten, Deason, and Jobes (1934).

Age and growth rate determination follow the method similar to that discussed by Carlander (1961). Scales of the sample were read repeatedly until agreement between two readings was obtained for each individual. Many of these scales were read more than two times before agreement was obtained. The more difficult scales may have introduced some bias into the analysis.

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**Table 1**

Length-Weight Relationship of Sauger in the Mississippi River (Pool 19), 1966-67

Length Range (inches)	Number of Fish	Mean Total Length		Weight in Grams			k Computed from the Means
		Inches	Millimeters	Range	Mean	Calculated <sup>1</sup>	
6.0- 6.9	2	6.8	173	28- 40	34	34	0.66
7.0- 7.9	5	7.4	188	40- 85	62	49	0.94
8.0- 8.9	11	8.4	213	57-113	74	73	0.76
9.0- 9.9	8	9.4	239	79-113	102	105	0.75
10.0-10.9	46	10.6	269	119-199	150	153	0.77
11.0-11.9	55	11.4	290	145-284	193	193	0.79
12.0-12.9	50	12.5	318	187-312	255	259	0.79
13.0-13.9	39	13.4	340	255-397	323	324	0.82
14.0-14.9	37	14.4	366	329-539	411	407	0.84
15.0-15.9	29	15.3	389	374-652	482	493	0.82
16.0-16.9	15	16.3	414	442-737	590	604	0.83
17.0-17.9	4	17.4	442	680-822	780	743	0.90
18.0-18.9	2	18.4	467	909-994	950	887	0.93

<sup>1</sup>Log W = -5.552 + 3.184 Log L.

## LENGTH-WEIGHT RELATIONSHIP AND CONDITION

The length-weight relationship computed from the 1966-68 data (Table 1) was:

$$\text{Log } W = -5.552 + 3.184 \text{ Log } L$$

where  $W$  = weight in grams and  $L$  = total length in millimeters. The slope, 3.184, is significantly greater than 3.0, as indicated by a  $t$  of 3.91 with 301 degrees of freedom. Since the weight increases more rapidly than the cube of the length, the fish increase in condition with increase in length. This also is shown in the increase in average coefficients of condition,  $k$  (Table 1), where  $k = \frac{W}{L^3} 10^5$ .

The increase in condition with increase in length was evident in July and October-December, 1966, and May 1967, samples, but not in August, 1966, and June and July, 1967, samples (Table 2). Condition was better in 1966 than in June and July, 1967.

Table 2

Average Coefficients of Condition,  $k$ , at Different Seasons, by Size Groups

Year	Total Lengths in Inches	July		August		October- December	
		No.	No.	No.	No.	No.	No.
1966	6.0- 9.9	0.69	7	0.81	11	0.75	3
	10.0-13.9	0.82	26	0.82	62	0.83	15
	14.0-18.9	0.82	15	0.82	27	0.96	11
		May		June		July	
		No.	No.	No.	No.	No.	No.
1967	6.0- 9.9	—	—	0.80	3	0.91	2
	10.0-13.9	0.83	16	0.76	17	0.72	53
	14.0-16.9	0.90	7	0.78	3	0.78	22

## GROWTH STUDIES

Not over three annuli were found on the scales of these saugers (Table 3). The reason that older fish were not found is not evident. Marks, which might have indicated additional annuli, were noted on some scales, but were not believed to be true annuli. The average calculated growth was similar to that reported for saugers in the Mississippi River by Jergens and Childers (1959) and Vasey (1967) (Figure 1). The average growth is below that reported for Saugers in Lewis and Clark Lake, South Dakota (Vanicek, 1964), and in Cherokee Lake, Tennessee (Stroud, 1949), but more rapid than in Lake of the Woods, Minnesota (Carlander, 1950). Lewis and Clark Lake and Cherokee Lake were new reservoirs when the saugers were collected, and rapid growth is common in the expanding environments of new reservoirs.

The saugers collected represented the 1963 to 1967 year classes, indicating successful reproduction each year and no great differences

**Table 3**  
**Growth Data on Saugers in Mississippi River (Pool 19) 1966-67**

Year Class	Year Collected	Number	Mean Calculated Total Length at Each Annulus and At Capture					Weight in Ounces
			1	2	3	At Capture	Range	
1966	1967	4	5.5			7.1		1.8
1965	1966	31	6.4			9.3		3.9
	1967	83	5.7	10.4		12.1	9.1-15.6	8.0
1964	1966	115	6.3	10.3		12.3		9.2
	1967	13	6.4	10.7	14.1	15.1	13.7-16.5	15.9
1963	1966	58	6.8	10.3	13.5	15.3		18.2
Combined		304	6.2	10.4	13.6			
Average Increment		—	6.2	4.1	3.2			
Length in								
Millimeters			157	264	345			
Equivalent Weight								
in Grams			27	144	338			
in Ounces			0.95	5.1	11.9			

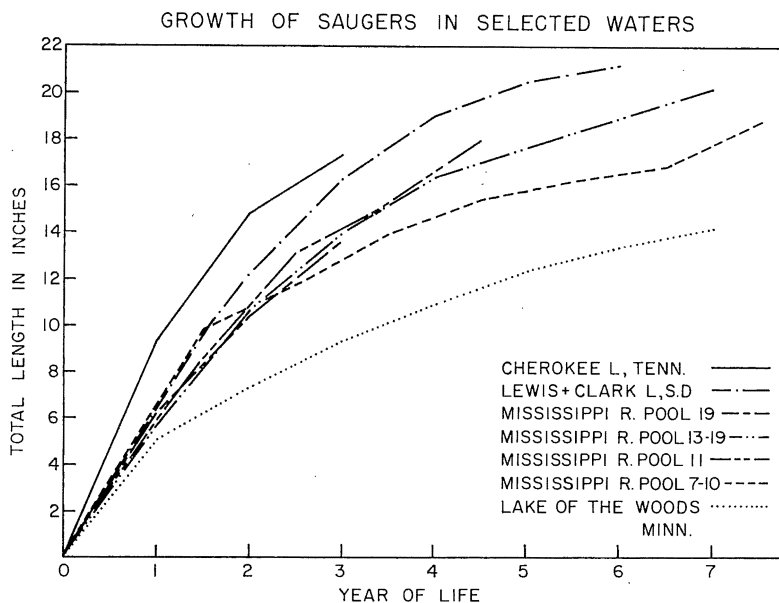


Figure 1. Growth curves for sauger in Pool 19, in Pool 11 (Vasey, 1967), in Pools 7-10 and 13-19 (Jergens and Childers, 1959) of the Mississippi River, and in Lake of the Woods, Minnesota (Carlander, 1950), Lewis and Clark Lake, South Dakota (Vanicek, 1964), and Cherokee Lake, Tennessee (Stroud, 1949).

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