Growth and Harvest of Catfish in Three Alabama Public Lakes

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Abstract: White catfish (*Ictalurus catus*) and channel catfish (*I. punctatus*) from 3 Alabama Public Fishing Lakes were sampled from 1979–1982 to obtain information on age and growth. Growth rates were found to be relatively uniform between the 2 species. Average first year growth of white and channel catfish was 118 mm and 127 mm, respectively. Creel data collected during a 1-year study period indicated that channel catfish dominated the catch. Seventy-nine percent of the catfish harvested at Chambers County Lake, 95% at Dallas County Lake, and 96% at Monroe County Lake were channel catfish. Although white catfish are apparently self-sustaining in the 3 study lakes investigated, their low harvest rate does not justify purposeful introduction.

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Catfish are a popular sport and food fish in Alabama. According to the 1971 Statewide Comprehensive Outdoor Recreation Plan on Fishing (Dep. of Rural Sociol. and Agricul. Econ. Unpubl. rep., Auburn Univ., 1973), catfish ranked third in preference behind bass and bream among Alabama fishermen. A survey of Alabama anglers in 1981–82 indicated that catfish ranked first as the favorite fish to eat (W. H. Tucker, unpubl. data).

Supplemental stocking of catfish in Alabama's 23 state-owned and operated public fishing lakes has been a standard management practice since 1972 when annual stockings were first initiated (Powell 1976). Besides creating an additional sport fishery, supplemental catfish stockings help relieve fishing pressure on overexploited largemouth bass (*Micropterus salmoides*) populations and assist in the control of overabundant forage fishes after they reach a piscivorous size (Powell 1976).

A well-established commercial and sport fishery for catfish exists in Alabama;

however, growth estimates to use in managing catfish fisheries are lacking. Wahlquist (1971) presented information on the age and growth of channel catfish in the Alabama and Tombigbee river drainages, but no information is available on catfish age and growth in Alabama's state-owned public fishing lakes.

The purpose of this 4-year study was to investigate and summarize age and growth of introduced channel catfish and white catfish in 3 Alabama public fishing lakes and to determine which species provided anglers with the best fishing success.

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Methods

Age and Growth Determination

Pectoral spines of channel and white catfish were collected at Chambers, Dallas, and Monroe County public fishing lakes from December 1979 through March 1982. Catfish were collected by gill netting, angling, and trapping using slat boxes and wire baskets. Gill netting was found to be the most time efficient collection method; therefore, greater sampling effort was expended with nets than with the other sampling methods. Three bar mesh sizes, 1.9 cm, 3.1 cm, and 5.0 cm, were used. Gill nets measured 50 m in length and 2 m in depth.

Catfish were weighed to the nearest g and measured to the nearest mm (total length). Pectoral spines were removed using procedures similar to those described by Sneed (1951) but modified according to Crumpton et al. (1984) to avoid sacrificing the fish. Pectoral spines were clipped adjacent to the body using bone cutters or surgical clippers. Spines were dried and mounted on C-clamp frames and sectioned to approximately 1.0 mm in thickness using a mounted jewelers saw. Spines were sectioned between the basal recess and the spine dentations. Sections were soaked in a 5% solution of acetic acid for 48–72 hours to accentuate annular rings (Carroll and Hall 1964). A Micron Model 780 Microfiche projector (48X) was used to project each spine section for measurement of annuli and spine radius.

The direct proportional method was used to back calculate growth (Van Oosten 1929). A zero intercept was assumed for the time of spine formation (Sneed 1951, Stevens 1959). Statistical differences in growth rates were determined using ANOVA.

Fishery Assessment

Angler surveys were conducted from May 1980 through May 1981 to compare the harvest rates of white and channel catfish at Chambers, Dallas, and Monroe County public fishing lakes. Estimates were based on a complete fisherman census. Lake concessionaires were required to interview each angler, record daily creel

data, and instructed in morphometric procedures used to differentiate the 2 species of catfish. Data was reported on weekly harvest summaries maintained at each public fishing lake. Angler trips and catfish harvest rates were calculated based on *N*/ha/year.

Results and Discussion

Age and Growth

Five hundred and fifty-four channel catfish and 262 white catfish were collected at Chambers, Dallas, and Monroe County public fishing lakes from 1979 to 1982 to determine age and rate of growth. Rates of catfish growth between lakes were similar; however, both channel and white catfish collected from Chambers County Public Lake had significantly ($P \leq .05$) slower rates of growth than catfish from either of the other 2 public lakes (Table 1).

The slower growth of catfish in Chambers County Lake was probably related to a combination of several factors. First, gizzard shad (*Dorosoma cepedianum*) were present in this system during the study period. Gizzard shad are undesirable and competitive in small fertile lakes and their presence often interferes with growth and reproduction of sportfishes such as bluegill sunfish (*Lepomis macrochirus*), crappie (*Pomoxis* spp.), and largemouth bass (Putnam 1983). A second factor that may have inhibited optimum catfish growth is the heavier densities of white catfish found in Chambers County Lake. Cove rotenone studies conducted at this public fishing lake in 1980 and 1981 (data pooled) indicated that white catfish (52.6 kg/ha) had a higher standing stock than channel catfish (31.4 kg/ha). Data relating to catfish densities at the 2 other study lakes is unavailable. Chambers County Public Fishing Lake was stocked with white catfish at over twice the stocking rate used at Dallas County Lake and over 3 times the rate applied at Monroe County Lake. Assuming that survival was good and that natural reproduction was similar to that found in the other 2 public lakes, then the development of a much denser white catfish population was possible. This most likely resulted in increased competition for food within the catfish community with associated reduction in growth.

Average first year growth of channel and white catfish was 127 mm and 118 mm total length, respectively (Table 2). Wahlquist (1971) found that first year growth of channel catfish from major river systems in Alabama ranged from 35 mm (Tombigbee River) to 111 mm (Mobile Delta) total length. Finnell and Jenkins (1954) found that average first year growth of channel catfish in Oklahoma was 101 mm and reported that channel catfish grew faster in small impoundments than any other type of system. They also reported that slowest growth occurred in old reservoirs and large lakes and that the slowest growing catfish populations were observed in turbid waters with high populations. Stevens (1959) compared growth of white and channel catfish from the Santee-Cooper Reservoir. He found that first year growth was 86 mm and 81 mm for channel and white catfish, respectively. Prentice

Table 1. Average growth of channel and white catfish at three Alabama public fishing lakes, 1979–1981.

Lake	Species	*N* fish	Mean back-calculated length (mm) at age: 1	2	3	4	5	6	7	8
Chambers	CCF[a]	177	113 (2.8)[b]	217 (4.9)	252 (17.1)	305 (36.3)	341 (50.7)			
	WCF[c]	115	92 (3.8)	184 (9.2)	259 (11.5)	303 (10.6)	327 (10.4)	353 (15.0)	356 (11.8)	371 (16.5)
Dallas	CCF	199	147 (5.1)	230 (6.5)	284 (17.2)	320 (28.2)	341 (42.1)			
	WCF	122	141 (10.7)	254 (13.3)	328 (11.9)	354 (11.3)	369 (16.7)	397 (25.1)		
Monroe	CCF	175	120 (4.3)	191 (7.7)	268 (11.6)	337 (13.8)	383 (28.8)	420 (50.7)		
	WCF	25	125 (10.1)	221 (28.1)	291 (32.4)	360 (26.2)	405 (25.5)	456 (20.1)	458 (31.0)	536 (16.1)

[a]Denotes channel catfish.
[b]Standard error in parentheses.
[c]Denotes white catfish.

Table 2. Back-calculated growth of channel catfish and white catfish from three Alabama public fishing lakes.

Age	*N* Fish	Mean calculated total length (mm) at annulus of channel catfish					
		1	2	3	4	5	6
1	35	148(10.2)[a]					
2	254	132(1.9)	235(2.3)				
3	106	121(2.4)	199(4.5)	284(6.4)			
4	114	118(2.5)	189(5.0)	265(8.3)	339(7.9)		
5	35	121(5.2)	178(9.4)	239(12.3)	312(17.6)	374(17.8)	
6	10	137(19.6)	188(23.5)	263(33.2)	327(40.7)	384(46.5)	428(46.0)
Sample total	554	554	519	265	159	45	10
Grand weighted mean		127	213	269	332	377	428
Annual growth increment		127	86	56	63	45	51

Age	*N* Fish	Mean calculated total length (mm) at annulus of white catfish							
		1	2	3	4	5	6	7	8
1	12	187(25.9)[a]							
2	72	119(7.9)	218(10.3)						
3	33	121(6.1)	249(14.1)	327(13.7)					
4	43	116(4.7)	232(8.5)	307(7.7)	352(7.8)				
5	46	105(4.8)	207(7.7)	278(7.4)	319(7.0)	344(7.3)			
6	32	113(4.5)	209(9.0)	277(10.2)	332(11.0)	368(12.7)	400(14.8)		
7	13	105(4.4)	185(12.7)	231(16.0)	265(16.6)	315(16.9)	349(16.7)	377(17.8)	
8	11	127(10.9)	198(17.3)	251(17.9)	296(17.5)	343(17.3)	387(21.0)	415(23.0)	446(28.3)
Sample total	262	262	250	178	145	102	56	24	11
Grand weighted mean		118	219	289	325	348	386	394	446
Annual growth increment		118	101	70	36	23	38	8	52

[a]Standard error in parentheses.

and Whiteside (1975) reported that 1-year-old channel catfish collected from farm ponds in Central Texas grew to an average of 178 mm total length.

Growth patterns for both species of catfish in our study were similar through Age 4. Channel catfish Age 5 and older grew more rapidly than white catfish at comparable ages. Six age classes of channel catfish and 8 age classes of white catfish were represented. Incremental growth rates were similar; however, incremental growth was greater for channel catfish Age 4 and older.

Body Length-Spine Relationship

The relationships between the body length and the pectoral spine radius of 554 channel catfish and 262 white catfish collected from Chambers, Dallas, and Monroe County public fishing lakes were best fit using the following equations:

$$L = 139.3 + 187.3(S) \; [r^2 = .51] \text{ for channel catfish}$$

and

$$L = 65.8 + 196.2(S) \; [r^2 = .53] \text{ for white catfish,}$$

where L represents the total body length in mm and S is the spine radius ($\times$ 100) in mm. Although correlation coefficients (r) were relatively low, curvilinear models did not improve the body length-spine radius relationship.

Harvest of White and Channel Catfish

The purpose of examining harvest of white catfish in state-owned public fishing lakes was to evaluate their value as a self-sustaining component of the sport fishery. Harvest data are the best measures of the magnitude of the fishery. Results of the 1-year creel survey in which lake concessionaires separated the catfish harvest data by species indicated that white catfish made up a small percentage of the total catfish harvest in the 3 lakes investigated (Table 3). Seventy-nine percent of the catfish harvested at Chambers County Lake, 95% at Dallas County Lake, and 96% at Monroe County Lake were channel catfish.

In studies comparing channel and white catfish in ponds at various stocking rates, Prather (1970) reported that fishing success was considerably better for channel than white catfish when stocked at both 2:1 and 1:1 ratios. In a related study, Prather (1964) found that while anglers agreed that white catfish tasted as good as channel catfish, a majority preferred the latter since it was easier to catch, fought harder, and gave approximately 5% higher dressed weight. Anglers interviewed at the 3 public lakes in our study generally had opinions similar to those of Prather (1964). Powell (1976) reported that white catfish stocked in Alabama's Public Fishing Lakes did not appear to be as beneficial to the harvest as were channel catfish. Because white catfish are more difficult to catch, catch per unit effort is lower.

In conclusion, the results of our study indicated that while growth of channel

Table 3. Total number of channel and white catfish harvested from three Alabama public fishing lakes, May 1980–May 1981.

Lake	Total *N* fishermen/ha	Total *N* channel catfish harvested/ha	Total *N* white catfish harvested/ha	White catfish % of catfish harvest
Chambers	149	66.8	18.0	21%
Dallas	299	94.0	4.9	5
Monroe	132	36.9	1.6	4

and white catfish in 3 Alabama public fishing lakes was similar, their overall performance in the fisheries was not. During a 1-year creel study at Chambers, Dallas, and Monroe County public fishing lakes, there was an overall average of 9 channel catfish harvested for every 1 white catfish harvested. Channel catfish are stocked annually; however, white catfish have not been stocked into these systems since their original introductions (1971–1973). Although white catfish are apparently self-sustaining in the 3 study lakes investigated, their low harvest rate does not justify purposeful introduction.

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