Age And Growth Of Walleye In Alabama

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Abstract: Walleye, *Stizostedion vitreum,* were collected from 14 sample sites in Alabama from January through March 1977–1982 to obtain information on age and growth. Walleye Age III and older from 2 state-owned public fishing lakes had significantly greater growth rates than 173 walleye collected from Mitchell Reservoir. Alabama walleye generally had slower growth rates than those reported from other southeastern reservoirs and rivers.

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The walleye is a coolwater species which can inhabit warmwater habitats and is more abundant in northern and midsouth areas of the country. Hackney and Holbrook (1978) described 3 naturally occurring populations of walleye in the United States: The Mississippi River strain, the mid-Atlantic strain and the Gulf Coast strain. In Alabama, 2 of these populations are present: the Mississippi River strain in the Tennessee River system and the Gulf Coast strain in the Mobile Bay and Escambia River drainages (Smith-Vaniz 1968). Although Brown (1962) discussed the distribution of walleye in Alabama south of the Tennessee Valley, published information about walleye populations in Alabama and other southeastern states is rare.

The Tennessee, Coosa, and Tallapoosa rivers provide the best walleye sport fishery in Alabama waters. The Gulf Coast walleye is unable to become established in reservoirs (Hackney and Holbrook 1978). Lack of unimpounded waters in the Mobile Bay drainage is a possible factor in the scarcity of Gulf Coast walleye in Alabama.

The Alabama Game and Fish Division investigated the life history of native walleye populations because of the desirable qualities of the walleye. Walleye have been introduced into selected public waters to establish walleye populations and/or

enhance existing ones. This paper presents a summary of age and growth studies of natural and introduced walleye populations in Alabama.

Methods

We collected walleye from 14 different locations in Alabama from January through March 1977–1982. Included in the collections were reservoirs, creeks, and rivers known to support walleye populations. Two state-owned public fishing lakes were also sampled. Fish were collected by angling, electrofishing, and gill netting. Gill netting was the most time efficient collection method. Three bar mesh sizes, 1.9 cm, 3.1 cm, and 5.0 cm, were used.

Most sampling was performed on the Hatchett Creek arm of Mitchell Reservoir, a 2,395-ha Coosa River impoundment. This area was chosen because of the concentration of fish during the spawning run. Other collection sites included Noneless and Oakmulgee creeks; North and Tallapoosa rivers; Lee and Madison County public fishing lakes; and Jones Bluff, Jordan, Logan Martin, Miller's Ferry, Warrior, Weiss, and Wheeler reservoirs.

Fish were sexed and weighed to the nearest gram. Total length was measured to the nearest millimeter. Scales were removed from the area posterior to the pectoral fin and read with a microfiche projector at 48X.

The direct proportion method was used to back calculate growth (Van Oosten 1929). The length at scalation (18mm) suggested by Carlander (1977) was used. Statistical differences in growth rates were determined using ANOVA.

Results and Discussion

Two hundred seventy-one walleye were collected from 1977 to 1982; 173 (63%) were from Hatchett Creek. Madison and Lee County public fishing lakes provided 56 (21%) specimens. The remaining 42 (16%) were collected from 11 other sample sites.

Growth of Hatchett Creek walleye (introduced and native stocks) were compared to growth of walleye (introduced stocks) from Madison and Lee County public fishing lakes. No significant differences ($P > 0.05$) in growth were found in walleye up to 2 years of age. However growth of walleye from the public fishing lakes was significantly greater ($P \leq 0.05$) at Age III and above (Table 1). This difference may be attributed to the greater biomass of available forage in public fishing lakes than is typically found in most Alabama reservoirs and streams. Applied management of public fishing lakes includes an intensive fertilization program to enhance forage fish production.

Back-calculated lengths of 271 walleye from various Alabama waters are shown in Table 2. Samples were pooled to obtain a state wide average of calculated lengths at each annulus. Seven age classes were established for Alabama walleye but most walleye (82%) were in age classes II to IV. No young-of-the-year (YOY) wall-

Table 1. Average back-calculated lengths (mm) of walleye from Hatchett Creek and Madison and Lee County Public Fishing Lakes, Alabama (1977–1982).

Year Class	Hatchett Creek	Madison and Lee County Public Fishing Lakes
I	167	174
II	288	291
III	361	437
IV	424	485
V	451	539
VI	493	583
VII	525	641

Table 2. Growth of walleye collected from various Alabama waters (1977–1982).

Age and Year Class	*N* Fish	Calculated Total Length (mm) at Annulus						
		I	II	III	IV	V	VI	VII
I	1	250						
II	61	179	317					
III	85	174	283	382				
IV	77	173	288	389	441			
V	23	156	256	323	417	450		
VI	18	186	307	428	477	507	532	
VII	6	168	298	369	452	514	547	566
Sample Total	271	271	270	209	124	47	24	6
Annual Growth Increment		174	118	90	60	38	56	30
Grand Weighted Mean		174	292	382	442	480	536	566

eye were collected during this study. Carlander (1950) reported that walleye can live as long as 18 years; however, individuals older than 8 years are rare (Davis 1978). The Alabama state record walleye caught in 1980 was 10 years old and weighed 4.9 kg; however, most walleye harvested in Alabama rarely exceed 1.3 kg. Greatest growth was found during the first year followed by a gradual decline in subsequent years. Carlander and Whitney (1961) and Lewis (1970) also found incremental growth of walleye decreased with age. Age VII walleye had the lowest incremental growth rate. Age V walleye were found to have slower incremental growth than age VI individuals. Brown (1962) determined that walleye in Alabama streams reach an average total length of 239 mm by Age I. Average incremental growth for 1-year-old walleye in this study was 174 mm. This is lower than the national average growth rate of 1-year-old walleye (206 mm) reported by Vidal (1965) and less than average first year growth in southern reservoirs (Schultz 1971).

Average growth of Alabama walleye was compared to growth of walleye from

other southeastern reservoirs and rivers (Table 3). Alabama walleye had growth rates similar to those from the Tombigbee River in Mississippi (Wingo 1982), Deep Creek Lake in Maryland (Davis 1978) and Fontana Reservoir in North Carolina (Louder 1965). However, several other southeastern reservoirs had faster growth rates.

Walleye ranged in total length from 200 to 749 mm and in weight from 0.18 to 4.93 kg. A general length-weight relationship was calculated from a pooled sample of 271 walleye as recommended by Hile (1954). The following length-weight equation was obtained.

$$\log_{10} W_g = -5.3242 + 3.1153 * \log_{10} TL_{mm}$$

Scale examination indicated that walleye collected in this study begin forming annuli in late February or March; a period roughly corresponding with spawning or post-spawning migrations. Annulus formation is completed by April. Schultz (1971) reported that walleye collected from the Tombigbee River, Mississippi, formed annuli in March and April.

This study generally agreed with the findings of Libby (1969) and Scott (1976) who reported that walleye in the southeastern United States grow faster and mature earlier than those in more northern latitudes. Male walleye were usually sexually mature at Age II while females matured at Age III or IV. In Mississippi, Schultz (1971) found male walleye reached sexual maturity at Age II and females at Age III depending upon body length. Maryland walleye were mature at Age III and IV for

Table 3. Comparison of walleye growth in southeastern reservoirs and rivers.

Location and Citation	Total Calculated Lengths (mm) at Each Annulus									
	I	II	III	IV	V	VI	VII	VIII	IX	X
Various Alabama Waters (Present Study 1977–82)	174	292	382	442	480	536	566			
Deep Creek Lake, Md. (Davis 1978)	160	315	422	478	523	572	620	671		
Tombigbee River, Miss. (Schultz 1971)	236	376	462	518	587	617				
Tombigbee River, Miss. (Wingo 1982)	210	301	376	432	475					
Fontana Reservoir, N.C. (Louder 1965)	167	287	388	452	513	568				
Clanton Reservoir, Okla. (Lewis 1970)	309	426	495	553	607	650	704			
Dale Hollow Reservoir, Tenn. (Libbey 1969)	264	409	488	546	602	638	645			
Center Hill Reservoir, Tenn. (Scott 1976)	267	421	480	580	533	559	592	664	709	716
Center Hill Reservoir, Tenn. (Muench 1966)	248	415	497	512	583	610	683	715		
Norris Reservoir, Tenn. (Stroud 1949)	264	416	474	505	528	533	558	632		
Claytor Lake, Tenn. (Roseberry 1950)	251	386	503	580	663	701	759	818		

males and females, respectively (Davis 1978). Lagler (1956) reported that male walleye in Lake Erie mature at 4 years of age and females at 5.

Growth of 1-year-old walleye collected during this study was 15% lower than the national average and is lower than that reported in many southeastern reservoirs. Walleye 3 years and older which were collected from 2 state-owned public fishing lakes grew faster than walleye from Hatchett Creek, an infertile tributary of Lake Mitchell.

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