AGE AND GROWTH OF THE WALLEYE, *STIZOSTEDION VITREUM VITREUM*, IN HOOVER RESERVOIR, OHIO[1, 2]

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ABSTRACT

A total of 527 walleyes was studied from trap-net collections made in March-April, 1967, in Hoover Reservoir, Ohio. The age and growth-structure analysis of this population showed that age group II walleyes (1965 year class) were predominant in the catch. Few walleyes older than age group V were captured. The greatest growth increment was attained during the first year of life. In comparison with walleyes studied elsewhere, Hoover Reservoir walleyes grew rapidly until their fifth year of life, followed by a decline in growth rate. Few large walleyes were present in the Hoover Reservoir population at the time of this study.

INTRODUCTION

Considerable recent data have been collected and published on walleye fish, *Stizostedion vitreum vitreum*, in Lake Erie (Wolfert, 1963 and 1969; Manz, 1964; Hohn, 1966; Albaugh and Manz, 1964; Paulus, 1969; Regier, *et al*, 1969). However, few walleye studies have been conducted in inland Ohio waters. In some inland Ohio waters, Addis (1964) reported that walleye populations become partially self-sustaining following an original stocking. In other situations, however, walleye populations must be maintained entirely by periodic stocking.

Hoover Reservoir is one of the Ohio impoundments where walleyes have had some successful reproduction. Four million walleyes were introduced here by The Ohio Division of Wildlife in May, 1955, the first year the reservoir was completed. In September, 1966, a program was initiated to gather basic life-history and ecological data related to the Hoover Reservoir walleye population. This was a long-term study made in cooperation with the Ohio Division of Wildlife, The Ohio State University, and the U. S. Bureau of Sport Fisheries and Wildlife. The phase reported herein relates to analyses of age and growth of walleyes collected in March and April of 1967.

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STUDY AREA

Hoover Reservoir is located in Delaware and Franklin Counties, approximately 12 miles northeast of Columbus, Ohio. Two causeway bridges cross the 1,143-hectacre impoundment, dividing it into three interconnected basins. The reservoir, completed in 1955, has a mean depth of 7.3 meters and a maximum depth of 20 meters. The reservoir is fed mainly by Big Walnut Creek, which enters at the north, and is used primarily as a municipal water supply for the Columbus area. Fishing, boating, and other forms of outdoor recreation are secondary uses.

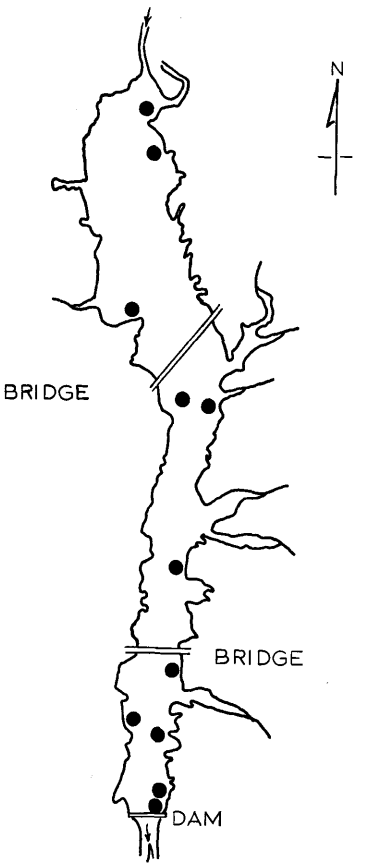

FIGURE 1. Walleye trap net locations, March-April, 1967, Hoover Reservoir, Ohio.

MATERIALS AND METHODS

The 527 walleyes used in this study were collected in 14- and six-foot trap nets. The stretch mesh-size of the leads of the trap nets was approximately 4.5 inches. The fish were taken by random sampling from a larger collection of walleyes of known sex captured between March 28 and April 29, 1967. These specimens were obtained from 11 different netting locations throughout the reservoir (fig. 1).

All walleyes were released alive after processing. Total length in millimeters was recorded by measuring from the tip of the snout to the extreme end of the caudal fin with dorsal and ventral lobes held compressed. A minimum of three scales was removed from each fish, taken just posterior to the pectoral fin and below the lateral line, and placed in scale envelopes.

Fish scales were used to determine age at capture and to back-calculate lengths. Scales were cleaned, and then impressions, made on 0.50-mm-thick cellulose-acetate strips using a roller press, were read with a scale projector at a magnification of 10×. The number of millimeters from the focus to each annulus and to the outer anterior margin of the scale was recorded.

The main criteria used for determining annuli were the cutting over and the flaring out of circuli. The crowding together of circuli, followed by a subsequent greater spacing between circuli at the resumption of growth, was also useful in determining annuli. False annuli, spawning marks, and other accessory checks, when found, were conspicuous by their proximity to an annulus. All scales were examined twice; agreement between the first and second reading was 90 percent. All growth calculations were made by the method outlined by Miller (1966).

RESULTS AND DISCUSSION

Results of the age-structure analysis of the walleyes are presented in Table 1. Age group II (1965 year class) was predominant in the net catches for both sexes, followed by age groups III, IV, V, and VI, in order of abundance. The reservoir was 12 years old at the time of this study; indications are that more older and larger walleyes will be found in the reservoir in the future. State biologists found a greater percentage of large (600 mm T. L. plus) walleyes in their 1968 and 1969 Hoover Reservoir trap-net collections than in the 1967 collections.

TABLE 1

Age distribution of male and female walleyes collected March-April, 1967 from Hoover Reservoir, Ohio

Year Class	Age Group	Males		Females	
		No.	%	No.	%
1967	0	—	—	—	—
1966	I	—	—	—	—
1965	II	113	42	107	42
1964	III	83	31	68	26
1963	IV	44	16	42	17
1962	V	24	9	23	9
1961	VI	2	0.8	9	3
1960	VII	3	1.2	6	2
1959	VIII	—	—	1	0.3
1958	IX	—	—	1	0.3
1957	X	—	—	1	0.3
Totals		269		258	

A comparison of mean total length, by sex, at annulus formation of all available age groups (Tables 2 and 3) showed that females had a slightly greater mean total length than did males in each age group throughout life. There was general agreement on a sex differential rate of growth for walleyes in the literature (Stroud, 1949; Eschmeyer, 1950; Carlander and Whitney, 1961). In our study, these differences were slight throughout life.

Fish length at time of scale formation ("a" value) was calculated and was used in determining back-calculated lengths in Tables 2 and 3. The "a" value calculated in this study was 97.5 mm T. L. This figure closely agrees with Carlander and Whitney's (1961) result of 82.8 mm T. L.

The largest annual length-increment occurred during the first year of life. Growth was rapid through age group IV for both sexes. A progressive decrease in

length increments as both sexes became older took place (Tables 2 and 3). A slight deviation from the diminishing decline in growth increments of older fish near the end of life could not be evaluated because of the small sample of older fish. Carlander and Whitney (1961) also found the greatest growth of walleyes in Clear Lake, Iowa, was during their first year of life, with a gradual decline in subsequent years.

Growth records for three age groups of Ohio walleyes, sexes combined, reported by Carlander (1948) are 343 mm, 505 mm, and 622 mm mean total length for age groups III, V, and VII, respectively. Our study resulted in calculated lengths of 426 mm, 479 mm, and 506 mm T. L. for the same age groups.

TABLE 2

Mean calculated total length at annulus formation of male walleyes collected March-April, 1967 from Hoover Reservoir, Ohio

	Annulus						
	1	2	3	4	5	6	7
Mean calculated length (weighted) mm	254	369	424	451	464	487	502
Number	(269)	(269)	(156)	(73)	(29)	(5)	(3)
Growth increment	254	115	55	27	13	23	15

TABLE 3

Mean calculated total length at annulus formation of female walleyes collected March-April, 1967 from Hoover Reservoir, Ohio

	Annulus									
	1	2	3	4	5	6	7	8	9	10
Mean calculated length (weighted) mm	259	372	429	460	489	497	508	515	535	570
Number	(258)	(258)	(151)	(83)	(41)	(18)	(9)	(3)	(2)	(1)
Growth increment	259	113	57	31	31	8	11	8	20	33

A survey of walleye growth compared at each year of life from published reports for 16 lakes in the United States and Canada by Eschmeyer (1950) revealed that in only one other walleye study (Stroud, 1949) did growth surpass the Hoover population at age groups I, II, III, and IV. However, when the Hoover walleye population reached its fifth year of life, rapid growth declined. Growth rates of four walleye populations in Eschmeyer's (1950) compilation were greater than were those of Hoover Reservoir beyond age group V. Unfortunately we cannot compare Eschmeyer's (1950) compilation with Hoover walleyes beyond age group V, because of the small sample size of older Hoover walleyes.

Our data reveal that few walleyes older than age group V were captured. This may be attributed to a high rate of angler exploitation, 29.4% as revealed by tag returns of the Ohio Division of Wildlife during 1967. The trap nets used in our study were not selective for younger fish. Clarence F. Clark (personal communication, 1969) suggests that there may be a direct correlation between the ability of a walleye population to be naturally self-sustaining and the numbers of large-size fish.

SUMMARY

Growth rates were determined for male and female walleyes in Hoover Reservoir during March and April, 1967, and compared with similar data from other studies. Female walleyes in all recognizable age groups grew slightly faster than did males of reciprocal ages. The greatest growth increment was attained during the first year of life. Few walleyes greater than age group V were captured in this 12-year-old reservoir. The relative lack of abundance of older, larger walleyes suggests the possibility of intensive harvest. However, we do not have supporting data to substantiate this possibility.

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