

Age, Growth, and Utilization of Landlocked Alewives in Claytor Lake, Virginia

John L. Boaze and Robert T. Lackey*

**Department of Fisheries and Wildlife
Oregon State University
Corvallis, Oregon 97331*

Citation: Boaze, John L., and Robert T. Lackey. 1974. Age, growth, and utilization of landlocked alewives in Claytor Lake, Virginia. *Progressive Fish-Culturist*. 36(3): 163-164.

Email: Robert.Lackey@oregonstate.edu

Phone: (541) 737-0569

AGE, GROWTH, AND UTILIZATION OF LANDLOCKED ALEWIVES IN CLAYTOR LAKE VIRGINIA

JOHN L. BOAZE and ROBERT T. LACKEY

*Department of Fisheries and Wildlife Sciences
Virginia Polytechnic Institute and State University
Blacksburg, Virginia 24061*

THE LANDLOCKED ALEWIFE (*Alosa pseudoharengus*), now being widely considered as a forage species in both warmwater and coldwater fisheries, originally was confined in anadromous form to the northern Atlantic coast of the United States [6]. Landlocked alewife populations have been established in the northeastern United States and eastern Canada through intentional introductions and by natural spread, particularly through canal systems. The oldest confirmed population of landlocked alewives is found in Lake Hopatcong, New Jersey [2]. Invasion of the Great Lakes by alewives has occurred since 1930 [4].

There are many indications that alewives provide good forage for at least some game fishes. Wagner [8] found that alewives serve as food, especially in summer months, for piscivorous fishes such as walleye, northern pike, and smallmouth bass. Absence of yellow perch, an abundant forage fish, in the stomachs of northern pike and walleyes indicated that the alewife could be buffering predation of walleyes on yellow perch. Other fishes found to prey on landlocked alewives include lake trout [9], landlocked Atlantic salmon [3], brook trout [3], and brown trout [2].

The purpose of this paper is to report on: (1) Alewife age and growth in a newly established population; and (2) initial alewife utilization by game fishes.

NOTE.—This research was supported by the Virginia Commission of Game and Inland Fisheries.

Mr. Boaze's present address is U.S. Fish and Wildlife Service, Norris, Tenn. 37828.

STUDY AREA

Claytor Lake, a marginally oligotrophic reservoir, is located on the New River, Pulaski County, Virginia. The lake was formed in 1939 as a result of the construction of a hydroelectric dam by Appalachian Power Company. The lake surface covers 1,820 hectares at a normal pool elevation of 663 meters above mean sea level.

Lack of a planktivorous forage fish base has often been advanced as a fisheries management problem in Claytor Lake. In an attempt to establish a more satisfactory forage fish population, about 110,000 alewives were introduced in 1968 and 1969 by Virginia Commission of Game and Inland Fisheries personnel.

MATERIALS AND METHODS

Scale samples (244) were taken from alewives collected by gillnets, rotenone, and annual die-offs. Die-offs occurred in winter and alewives were siphoned through penstock tubes in the dam [1]. Scales were taken from the midline just above the insert of the anal fin [5]. Three scales from each fish were cleaned, mounted between two microscope slides, and projected on an Eberback Model 2700 Microprojector at 40 × magnification. Fish collected during early spring (March 1) were assumed to have completed their growth for the previous year and an annulus mark was arbitrarily placed at the anterior scale margin. Data were analyzed by regression analysis using the model $W = aI\beta$ [7].

Stomachs from game fish were collected throughout the study. Contents were examined to identify frequency of occurrence of alewives.

RESULTS AND DISCUSSION

The relation between length and weight for alewives from Claytor Lake was found to be: $\log_{10} W = -5.28911 + 3.06370 \log_{10} L$. Length was measured as total length. Collection of mature age I fish during June 1971, and subsequent collections of age 0 fish the same year indicated establishment of a reproducing landlocked alewife population in Claytor Lake.

To a large extent rapid growth of Claytor Lake alewives can be attributed to existence of a vacant or near vacant niche (see table). Growth rates of alewives in Claytor Lake are still undergoing changes due to the newness of the population. Although a large number of small fish would be an advantage to predatory

game fishes, it appears that young of the year alewives will provide most of the available forage. Other research has shown that landlocked alewife growth slows substantially several years after introduction and alewife utilization increases accordingly (G. Spiers, personal communication).

From field observations, alewives were found on one or more occasions in the following (number of stomachs examined): walleye (64), white bass (43), smallmouth bass (8), channel catfish (70), flathead catfish (18), black crappie (13), white crappie (11), and yellow perch (9). Alewives were the only fish found in the 16 walleye stomachs containing food. Alewives found in walleye stomachs ranged from 76 to 186 millimeters in total length. Thirty-four white bass stomachs contained food; alewives only were found in 27, alewives and crayfish in 3, and crayfish only in 4.

Average calculated total length by age groups of 244 landlocked alewives collected from Claytor Lake in 1971

Age class	Number of fish (percent)	Mean length at capture (millimeters)	Mean calculated total length (mm) at annulus		
			I	II	III
0	77 (32)	81	—	—	—
I	122 (5)	154	133	—	—
II	43 (18)	187	150	170	—
III	2 (1)	225	120	184	228
Weighted mean total length			145	179	222
Mean annual increment of total length			145	34	43
Percent growth per year of life			65	16	19

REFERENCES

- BOAZE, J. L., and R. T. LACKEY. 1972. Winter mortality of the landlocked alewife, *Alosa pseudoharengus*, in Claytor Lake, Virginia. Virginia Journal of Science, vol. 23, p. 109.
- GROSS, R. W. 1953. Some observations of the landlocked alewife, *Pomolobus pseudoharengus* (Wilson), in New Jersey. New Jersey Fisheries Survey Report, vol. 2, p. 157-164.
- LACKEY, R. T. 1969. Food interrelationships of salmon, trout, alewives, and smelt in a Maine lake. Transactions of the American Fisheries Society, vol. 98, no. 4, p. 641-646.
- MILLER, R. R. 1957. Origin and dispersal of the alewife, *Alosa pseudoharengus*, and the gizzard shad, *Dorosoma cepedianum*, in the Great Lakes. Transactions of the American Fisheries Society, vol. 86, p. 97-111.
- ROTHSCHILD, B. J. 1963. A critique of the scale method for determining the age of the alewife, *Alosa pseudoharengus* (Wilson). Transactions of the American Fisheries Society, vol. 92, no. 4, p. 409-413.
- THREINEN, C. W. 1958. Life history, ecology, and management of the alewife (*Pomolobus pseudoharengus* (Wilson)). Wisconsin Conservation Department, Publication No. 223. 8 p.
- VAN OOSTEN, J. 1929. Life history of the lake herring (*Leucichthys artedi* Le Sueur) of Lake Huron as revealed by its scales, with a critique of the scale method. Bulletin of the U.S. Bureau of Fisheries, vol. 44, p. 265-428.
- WAGNER, W. C. 1972. Utilization of alewives by inshore piscivorous fishes in Lake Michigan. Transactions of the American Fisheries Society, vol. 101, no. 1, p. 55-63.
- WEBSTER, D. A., W. G. BENTLEY, and J. P. GALLIGAN. 1959. Management of the lake trout fishery of Cayuga Lake, New York, with special reference to the role of hatchery fish. Cornell University, Experiment Station Memorandum 357. 83 p.