

The Occurrence and Relative Abundance of Planktonic Fish Larvae in Anderson Creek Embayment, Kentucky Lake, Kentucky

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ABSTRACT

Larval fishes were collected from Anderson Creek embayment of Kentucky Lake with a 0.8-mm mesh plankton net and habitat seine to document the species of fishes utilizing the area as a spawning ground. The Clupeidae constituted 99.6 percent of the total catch while other species made up the remaining 0.4 percent. As the water temperature rose above 19.0 C, a sharp increase occurred in the total number of Clupeidae. The nonclupeid fishes were represented by *Morone* sp. (above 17.0 C) and by *Pomoxis* sp. (between 19.0 and 22.0 C).

INTRODUCTION

The Anderson Creek embayment of Kentucky Lake has been a center of considerable interest since 1973 due to the impending industrialization of a portion of its shoreline. To determine the impact of such a development on the aquatic environment, 2 studies were conducted on the physical, chemical, and biological parameters of the embayment by Crowell (1974, unpublished master's thesis, Murray State University, Murray, Kentucky) and Kinman (1976, unpublished master's thesis, Murray State University, Murray, Kentucky). A parallel study was conducted on the Vickers Creek embayment of Kentucky Lake by Prather (1977, unpublished master's thesis, Murray State University, Murray, Kentucky) to serve as a comparison for the industrialization on Anderson Creek embayment.

To supplement the findings of those investigations on water quality, plankton, and benthic macroinvertebrates, the present study was initiated to determine which fishes utilized Anderson Creek embayment as a spawning ground. According to Marcy (1976), larval fishes usually are planktonic or free floating at various stages of their development and must depend upon current for dispersal. Thus, they are poorly adapted for avoiding hazardous environmental conditions that might arise from intense constructional practices or industrial accidents. If such hazardous environmental conditions should occur, it is ex-

tremely important to be able to assess not only the immediate but the long-range effects upon the ecosystem. The data gathered during this investigation can serve as an important reference should the need arise for such an assessment of Anderson Creek embayment.

DESCRIPTION OF AREA

Anderson Creek embayment is on the western side of Kentucky Lake at Tennessee River Mile (TRM) 45.5. The embayment is formed by Anderson Creek, a third order stream according to the classification of Kuehne (1962). Anderson Creek and its headwaters drain primarily woodlands with very little agricultural activity in the area. The embayment itself is 109.4 m (359.0 feet) above the sea level; has a mean depth of 4.8 m (15.6 feet); a shoreline of 3.9 km (2.4 miles); and a surface area of 0.71 km² (177 acres) according to Crowell (unpublished thesis). Extensive shallow areas are present at the upper end of the bay.

MATERIALS AND METHODS

Air and surface water temperatures were taken during each sampling trip with a standard mercury thermometer. Secchi disk readings were recorded following the procedure outlined by Hutchinson (1956).

Larval fishes were collected with a cone-shaped, 0.5-m diameter net equipped with 0.8-mm netting and a 354.5-ml (12 oz)

collection cup attached to the cod end of the net. The net was towed with a 15-m braided nylon rope attached to the back of a boat powered by an outboard motor.

Weekly sampling, beginning in May and ending in August 1976, was conducted at 2 stations in the study area. The first station was parallel to and approximately 5 m from the north shore and the second station was in the middle of the embayment. Each sample consisted of a 5-min trawl at a speed sufficient to keep the net just below the surface of the water. After each trawl, all organisms were preserved in 10 percent formalin.

During the last week of the survey, 2 shoreline seine hauls were made with a 0.8-mm mesh habitat seine at the back of the embayment in an attempt to capture fish that remained near shore after hatching.

All samples were returned to the laboratory and identified to the lowest taxon possible utilizing an unpublished key developed by Tennessee Valley Authority biologists in 1975. References by May and Gasaway (1967), Nelson (unpublished), and Siefert (1969) were helpful in identification. Total numbers and mean lengths for each identified taxon were recorded.

RESULTS AND DISCUSSION

The skipjack herring *Alosa chrysochloris*, gizzard shad *Dorosoma cepedianum*, and threadfin shad *D. petenense* were the most numerous larval Clupeidae in the tow net samples. Postlarvae of that family cannot be identified readily to genus until they have developed median fins and entered the juvenile stage (May and Gasaway 1967). Those clupeids constituted 99.6 percent of the total catch while all other species made up the remaining 0.4 percent (Table 1).

The first clupeid to reach a size large enough for identification was the skipjack herring which indicates either that it spawned earlier than either species of *Dorosoma* or grew faster.

The numbers of clupeids taken in the tow net increased as the water temperature

TABLE 1.—DISTRIBUTION OF PLANKTONIC LARVAL FISHES COLLECTED BY TOWNET FROM ANDERSON CREEK EMBAYMENT, KENTUCKY LAKE, KENTUCKY, MAY–AUGUST 1976

	April				May				June				July			Aug		
	9	17	25	30	9	18	26	30	5	11	20	27	7	19	31	13		
Unidentified clupeids	1	74	14	1,155	2,292	37	27	200	14	15	-	1	1	-	2	-	3,833	99.40
<i>Dorosoma cepedianum</i>	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	1	0.03
<i>Dorosoma petenense</i>	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	2	0.05
<i>Alosa chrysochloris</i>	-	-	1	1	1	-	-	-	-	-	-	-	-	-	-	-	3	0.08
Unidentified minnows	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	1	0.03
Unidentified suckers	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	0.03
<i>Morone</i> sp.	2	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	0.11
<i>Morone chrysops</i>	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	2	0.05
<i>Pomoxis</i> sp.	-	-	-	1	-	-	-	2	-	-	-	-	-	-	-	-	3	0.08
<i>Pomoxis nigromaculatus</i>	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	1	0.03
<i>Pomoxis annularis</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	0.11
All clupeids	1	74	15	1,156	2,293	37	27	200	14	15	-	3	2	-	2	-	3,839	99.56
All nonclupeids	3	2	2	2	-	-	1	6	-	-	-	-	-	-	-	-	16	0.44
Totals	4	76	17	1,158	2,293	37	28	206	14	15	-	3	2	-	2	-	3,855	100.00

increased above 19.0 C for the first time that spring on 30 April and later on 30 May 1976. A period in which the water temperatures remained below 19.0 C separated those 2 dates. Hess (1976, unpublished master's thesis, Tennessee Technological University, Cookeville, Tennessee), Rawson (1945), and Colby and Brooke (1973) also showed similar increases in the number of larval fishes with increased water temperature. A decrease in the Secchi disk readings occurred prior to the increase in the number of larvae per sample. While the increased numbers are believed to be due to temperature related spawns (Hess unpublished thesis), the increased turbidity and resultant decreased visibility tended to increase the efficiency of the townet. Noble (1970) and Scotton et al. (1973) indicated that lower light intensities helped reduce net avoidance by larval fishes with a resultant increase in catch.

So few fish were captured that little can be said concerning the temporal distribution of nonclupeid fishes. Generally, the fishes were represented by the temperate basses *Morone* sp. when the water temperature was below 17.0 C and by the crappies *Pomoxis* spp. when the water temperature was between 19.0 and 22.0 C. The differences in occurrence of those species is also believed to be due to temperature related spawns. Larval black crappies *Pomoxis nigromaculatus* were caught before white crappies *P. annularis* (Table 1) indicating that *P. nigromaculatus* probably spawned earlier than *P. annularis*.

The shoreline seine hauls resulted in the capture of juveniles of several species of fishes not captured in the townet. Those fishes, that probably spawned in Anderson Creek embayment, are: *Lepisosteus* spp., *Notemigonus crysoleucas*, *Pimephales notatus*, *Notropis atherinoides*, *Fundulus olivaceus*, *Labidesthes sicculus*, *Micropetrus salmoides*, and *Lepomis* spp. The

above fishes usually inhabit the littoral zone of the embayment or have demersal eggs and/or larvae that would account for their absence from the surface townet samples.

We believe that more intensive sampling at various times and depths would result in the addition of several species not encountered in the present survey.

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