Malacological Review, 1971, 4: 127-130

Isom 1971

MUSSEL FAUNA FOUND IN FORT LOUDOUN RESERVOIR TENNESSEE RIVER, KNOX COUNTY, TENNESSEE, IN DECEMBER, 1970

Billy G. Isom

ABSTRACT

A survey in December 1970 of an 11-mile stretch in the 55-mile-long Fort Loudoun Reservoir on the upper Tennessee River revealed 2 new mussel records for this area: *Anodonta corpulenta* and *A. imbecillis* have extended their range into the post-impoundment shallows of this reservoir. These 2 *Anodonta* species were from habitats similar to those from which they were previously reported in Chickamauga Reservoir in association with *A. suborbiculata* and *Lasmigona complanata*.

Unionidae were restricted essentially to shallow shorelines and sloughs of impoundment origin. Periodic insufficiency of dissolved oxygen (DO) as a result of biochemical oxygen demand (BOD) is probably a principal factor in depletion of native endemic mussel populations in the old river channel in this area.

Ortmann (1918), in his classic study of the mussels (Nayades) of the upper Tennessee River, reported 64 species from the Tennessee River in the general area considered in this paper.

Recent collections from post-impoundment habitats in Fort Loudoun Reservoir, upper Tennessee River, revealed established populations of *Anodonta corpulenta*, *A. imbecillis*, *Proptera alata* and *Corbicula manilensis* (Table 1). Only 1 specimen of *Truncilla truncata* was taken. *P. alata* and *T. truncata* were present prior to impoundment.

Fort Loudoun Dam, which was closed on 2 August, 1943, is located 602.3 miles above the confluence of the Tennessee and Ohio Rivers. The 11-mile area sampled was between Tennessee River Mile (TRM) 624.5 and TRM 635.3, southwest of Knoxville, Knox County, Tennessee. Total length of the reservoir is 55 miles with a drainage area of 9,550 square miles. Ordinary minimum lake level is 807 feet and full pool is 813 feet above sea level. The water level was 807.97 feet above sea level on 2 December, 1970, the date of collection.

Although samples were taken both in the old river channel and in shallower areas, mussel specimens were found only in very shallow water or in areas recently exposed as a result of water level fluctuation. Extensive sampling was conducted on the shoreline in this area. Typical substrate, from which specimens were collected, was, for the most part, soft erosion sediment over hard clay.

Collection sites, species, and representative specimens collected are recorded in Table 1. *Proptera alata* was reported by Ortmann (1918). He reported *Truncilla truncata* below Knoxville in the general area of the present study. Ortmann (1925) indicated that *T. truncata* was present but rare in the upper Tennessee River. He reported complete absence of *Anodonta* in his compilation of the historical fauna of this drainage. However, he did note that there were 2 large specimens of *A. grandis* Say in the Bryant Walker collection from a small pond near the French Broad River, 8 miles above Knoxville.

Ortmann (1925) reported the absence of *Anodonta* in the lower Tennessee River. He noted records of *A. imbecillis* Say and *A. grandis* in some tributaries to the

TABLE 1. Mussels collected from Fort Loudoun Reservoir, Tennessee River, December 1970

Tennessee River Mile (TRM)	Species	No. Specimens Collected
624.5 (right shoreline)	*Anodonta corpulenta* Cooper, 1834	14
	A. imbecillis Say, 1829	3
	Proptera alata (Say, 1817)	9
	Corbicula manilensis Philippi, 1844	7
627.3 (left shoreline, slough)	*A. corpulenta*	8
	P. alata	8
	C. manilensis	3
629.5 (right shoreline, slough)	*A. corpulenta*	14
	P. alata	5
	C. manilensis	3
630.7 (right overbank)	*A. corpulenta*	3
631.1 (margin of island)	*A. corpulenta*	1
	P. alata	1
631.6 (left shoreline, slough)	*A. corpulenta*	15
	A. imbecillis	1
	Truncilla truncata Rafinesque, 1820	1
	P. alata	3
	C. manilensis	2
632.7 (right shoreline, slough)	*A. corpulenta*	6
	A. imbecillis	3
	P. alata	1
	C. manilensis	1
635.3 (right overbank, mud flat)	*A. corpulenta*	5
	P. alata	2
	C. manilensis	12

lower Tennessee River.

Van der Schalie (1939) reported the absence of *Anodonta* in the lower Tennessee River to that date; however, he recorded one specimen of *A. imbecillis* collected at Savannah, Tennessee.

Scruggs (1960) did not report any *Anodonta* from the upper and lower portions of the Tennessee River which he studied.

Bates (1962) was the first to report extensive populations of mussels from post-impoundment habitats in the lower Tennessee River, Kentucky Reservoir, including *Quadrula quadrula, Leptodea (Proptera) laevissima, L. fragilis, Carunculina par-*

va, *Truncilla donaciformis*, *Anodonta corpulenta*, *A. imbecillis* and *A. suborbiculata*. Isom (1969) first reported *Anodonta* from the upper Tennessee River. Collections from Chickamauga Reservoir included specimens of *A. grandis*, *A. suborbiculata* and *Lasmigona complanata*. *A. corpulenta* from Fort Loudoun was the typical form often associated with ponds or pond-like environments. *A. imbecillis* was the form most often found elsewhere.

Isom (1969) reported *Anodonta suborbiculata* in Chickamauga Reservoir from a habitat similar to that in Fort Loudoun Reservoir. The 2 reservoirs are separated by Watts Bar Reservoir which is 72 miles long. There are no current data available on mussels in Watts Bar Reservoir. It would be very interesting to know the method of dispersal of *A. suborbiculata* and why it is not found in Fort Loudoun Reservoir.

Post-impoundment habitats have not been studied sufficiently to determine whether populations of *Anodonta* are continuous or discontinuous. The fish host necessary for *A. suborbiculata* dispersal may not be available in Fort Loudoun Reservoir or some factor needed for successful colonization may be absent (Anon., 1961).

In the December, 1970 study, mussels were restricted to areas created as a result of impoundment. This was determined with a 0.9-square-foot Petersen dredge. Nine bottom samples were taken at each of 8 stations--6 in the old river channel and 3 about midway between the old river channel and the floodplain shoreline. The samples revealed a few Asiatic clams but only 1 mussel (*Anodonta corpulenta*).

Hypolimnetic oxygen deficiencies are probably one reason for the lack of mussels in the original river habitats within Fort Loudoun Reservoir. Gianotti (1969) has shown biochemical oxygen demand (BOD) and related oxygen deficiency in the area involved in the present study. Richards (1970) recorded dissolved oxygen (DO) values in Fort Loudoun Reservoir for the period 1966-1968. Based on selected values for May-July, DO content of water near the bottom averaged about 3 mg/l with periodic lows of less than 1 mg/l.

In summary, this study of the Fort Loudoun Reservoir mussel fauna revealed only 4 species of Unionidae and the Asiatic clam (*Corbicula manilensis*) as compared with 64 species of mussels reported by Ortmann (1918). Loss of the native endemic mussel fauna is evidently due to periodic insufficient dissolved oxygen as a result of organic enrichment entering the upper reservoir. *Anodonta* are new records for this portion of the Tennessee River drainage basin. The Fort Loudoun Reservoir habitat is similar to that containing *A. suborbiculata* and *Lasmigona complanata* in Chickamauga Reservoir. These species may eventually become established in Fort Loudoun Reservoir.

LITERATURE CITED

ANONYMOUS. 1961. *Inventory of fish populations, Fort Loudoun Reservoir.* TVA, Div. Forest., Fish., Wildl. Dev., Norris, Tenn. 9 p, Appendix 20 p.

BATES, J. M. 1962. The impact of impoundment on the mussel fauna of Kentucky Reservoir, Tennessee River. *Amer. Midl. Natur.*, 68(1): 232-236.

GIANOTTI, F. B. III. 1969. *A study of self-purification under unsteady flow conditions using dye tracer techniques.* Thesis, Univ. Tenn., 63 p. [Fort Loudoun Reservoir was the study location.]

ISOM, B. G. 1969. The mussel resource of the Tennessee River. *Malacologia*, 7(2-3): 397-425.

ORTMANN, A. E. 1918. The nayades (freshwater mussels) of the upper Tennessee drainage, with notes on synonymy and distribution. *Proc. Amer. phil. Soc.*, 57: 521-626.

ORTMANN, A. E. 1925. The naiad-fauna of the Tennessee River system below Walde Gorge. *Amer. Midl. Natur.*, 9: 321-372, 1 map.

RICHARDS, K. A. 1970. *Statistical methods for determining the dissolved oxygen in For Loudoun Reservoir.* Thesis, Univ. Tenn., 69 p.

SCRUGGS, G. D., Jr. 1960. Status of fresh-water mussel stocks in the Tennessee River *U.S. Fish and Wildl. Serv., Spec. Sci. Rept., Fish.*, No. 370: 1-41.

VAN DER SCHALIE, H. 1939. Additional notes on the Naiades (fresh-water mussels) o the lower Tennessee River. *Amer. Midl. Natur.*, 22(2): 452-457.

B. G. ISOM

Environmental Biology Branch
Division of Environmental Research and Development
Tennessee Valley Authority
Muscle Shoals, Alabama 35660
U. S. A.