

## First Records of Freshwater Mussels on the Eastern Shore of Virginia

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The freshwater mussel fauna of eastern North America is the richest in the world (Williams et al., 1992). Among the various states in the region, Virginia ranks fifth behind Alabama (171), Tennessee (123), Kentucky (100) and Georgia (98) with a total of 80 species, all belonging to the family Unionidae (Starnes & Bogan, 1988; Lipford, 1989; Cicerello et al., 1991; Williams et al., 1992; Lydeard & Mayden, 1995). The majority of these species inhabit the upper Tennessee River system, which encompasses the Clinch, Holston, and Powell river drainages in the southwestern portion of the Commonwealth (Ortmann, 1918; Stansbery, 1973; Stansbery & Clench, 1974, 1975, 1978; Bates & Dennis, 1978; Ahlstedt & Brown, 1980; Dennis, 1981; Ahlstedt, 1982; Neves & Zale, 1982; Wolcott & Neves, 1994). Many of these species are currently listed as threatened or extirpated from Virginia (Lipford, 1989; Neves, 1991). In comparison, the Atlantic Slope freshwater mussel fauna of Virginia is less diverse, being more comparable to states further north in terms of total number of species (Johnson, 1970). This fauna includes several species listed as threatened or endangered at the state level (e.g. brook floater, *Alasmidonta varicosa* [Lamarck, 1819], and Atlantic pigtoe, *Fusconaia masoni* [Conrad, 1834] as well as two federally-endangered species, namely the dwarf wedgemussel, *Alasmidonta heterodon* (Lea, 1829) and the James spiny mussel, *Pleurobema collina* (Conrad, 1837).

Counts et al. (1991) presented the results of a detailed survey of the freshwater mussel fauna of the Delmarva Peninsula, which comprised 307 sampling stations in Delaware, Maryland, and Virginia. These

authors failed to find any freshwater mussel populations south of the Maryland-Virginia state line, despite surveying approximately 60 sites in the Virginia portion of the peninsula, including stations in both Accomack and Northampton counties (C. L. Counts, pers. comm.). The exact locations of their survey sites are unknown to us. The two southernmost sites for freshwater mussels documented on the Maryland portion support *Lampsilis radiata* (Gmelin, 1971), the eastern lampmussel, and *Ligumia nasuta* (Say), the eastern pondmussel, respectively, and are approximately 20-25 km north of the Virginia border (Counts et al. 1991). Of greater significance was the discovery of a population of *A. heterodon* on the Eastern Shore of Maryland. This prompted us to conduct further surveys of streams in the Virginia portion of the peninsula in the hope of locating additional populations of this rare species.

### METHODOLOGY

Our surveys were limited to the nontidal sections of Coastal Plain streams on Virginia's Eastern Shore. Jenkins & Burkhead (1993) noted that there are no major river systems in this area of the state. Initially, we determined the watershed size for the apparent upstream limit of an *A. heterodon* population in Stafford County, Virginia, using USGS 1:100,000 maps and a planimeter. The watershed area was calculated to be approximately 3,000 ha (7,400 acres). We proposed to limit our surveys to nontidal streams that had a watershed of approximately equal or greater area within the Eastern Shore bayside drainages. Sampling stations

visited by PHS in 1992 were selected on the basis of the watershed area upstream of the sampling station.

The fortuitous discovery in 1992 of freshwater mussels in a stream receiving input from a much smaller watershed (290 ha) enlarged the set of potential sites to examine in subsequent years. Stations surveyed by SMR during 1993 and 1994 included streams on both the Chesapeake Bay and Atlantic Ocean drainages. These surveys were initially performed by visually inspecting any potential habitat that was encountered at road crossings. Many sites were deemed unsuitable for freshwater mussels after a very brief inspection and no detailed surveys were conducted at these sites.

The most promising sites were searched visually while walking along the stream course. A waterscope was employed in the case of deeper streams. Field surveys were conducted by PHS in October of 1992, and by SMR in August, October, and December of 1993, and July of 1994. A total of 15 sites were surveyed in detail.

Common names used in this report are taken from Turgeon et al. (1988).

## RESULTS AND DISCUSSION

Freshwater mussels were found at only two survey sites, but these are apparently the first documented records of representatives of the family Unionidae on the Eastern Shore of Virginia. Most of the streams that we examined were unsuitable for unionids owing to their small size, inadequate flow, or inappropriate substrate. These streams were generally ill-defined channels in hardwood swamps. These habitats tend to be dominated by thick organic detritus and muck with generally small areas of sand substrate present, if at all.

The eastern elliptio, *Elliptio complanata* (Lightfoot, 1786), was the only unionid mussel species found during our surveys. It was documented at the following sites (located 4.8 km apart) in Accomack County. Guilford Church Branch at Cty Rte 681 in the town of Bloxom, 27 October 1992, PHS; Katy Young Branch at jct Cty Rtes 658 and 674, 1.5 km NW of Parksley, 29 October 1993, SMR. The former site was revisited on 26 July 1994 by SMR to obtain additional voucher specimens. Both of these streams drain into Chesapeake Bay. The nearest confirmed localities for *E. complanata* on the Delmarva Peninsula are from Wicomico County, Maryland (Counts et al., 1991), approximately 70 km north of the Virginia sites. We did not encounter the Asian clam, *Corbicula fluminea* (Muller, 1774), or the Zebra mussel, *Dreissena polymorpha* (Pallas, 1771), two invasive exotic species, during our surveys.

Both of the streams in which *E. complanata* was found during our surveys are very small (1-2 m wide), although they possess moderately good flow despite rather flat terrain. The elevations of the areas where mussels were found are approximately 5 m and 3 m ASL for Guilford Church Branch and Katy Young Branch, respectively. The substrates of these streams are predominantly sand and gravel. Guilford Church Branch is considerably shallower than Katy Young Branch, being only 2-5 cm deep in some stretches. The eastern elliptio was quite common in both streams considering their small size and limited watersheds. Mussels were particularly abundant in Katy Young Branch, where SMR counted forty live adults along a 100 m section of the stream (1.5-2 m wide) that paralleled Cty Rte 674. Approximately half as many individuals were observed in Guilford Church Branch.

The section of Guilford Church Branch upstream of the mussel site receives runoff laden with fertilizers from a vegetable farm, as well as runoff from State Route 316. We found mussels only in a short reach (<100 m) of this stream that flowed through the backyards of a residential neighborhood. Less than 50 m downstream of this section, the stream becomes weed-choked and sluggish. Of the two streams, Katy Young Branch appears to offer better potential habitat for *A. heterodon*, although this species was not found during our surveys and we believe that it is unlikely that this rare mussel occurs on the Eastern Shore of Virginia.

Jenkins & Burkhead (1993) reported that the ichthyofauna of the Delmarva Peninsula is depauperate. They indicated that only 22 (11.5%) of the 192 species of freshwater fishes native to Virginia (both figured include some estuarine species as well as anadromous and catadromous forms) are believed to occur naturally within the lower portion of the Peninsula. Of the six confirmed host fishes for *E. complanata* that were listed by Watters (1994), only the banded killifish, *Fundulus diaphanus* (LeSueur), is native to the Eastern Shore of Virginia. Curiously, all three of the documented Eastern Shore localities for this species plotted in Jenkins & Burkhead (1993) are from streams in Accomack County that drain toward the Atlantic Ocean.

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