

Observations on the Life History History of the Alabama Pearl Shell, *Margaritifera marrianae* R.I. Johnson, 1983

Douglas N. Shelton

Barry A. Vittor and Associates, Inc., Mobile, Alabama

Abstract. The range of the Alabama pearl shell, *Margaritifera marrianae* R.I. Johnson, 1983, is limited to headwater streams in the Conecuh and Alabama River drainages in south-central Alabama. Within its range, population densities are generally low, although certain streams show higher abundance relative to other areas. *Margaritifera marrianae* is a candidate species currently under status review by the U.S. Fish and Wildlife Service. Aspects of the life history and behavior patterns of this species may prove valuable in evaluating its current status. The low frequency of occurrence within a stream indicated the rarity of *Margaritifera marrianae* relative to other resident species. Field observations of *M. marrianae* revealed that population density and sex distribution often showed unusual patterns. Typically, individuals were found in male-female pairs at irregular intervals within the streambed. This phenomenon has not been observed among other Unionacean clams. Earlier workers had considered *M. marrianae* synonymous with its Louisiana analog, *Margaritifera hembeli* (Conrad, 1838), a federally endangered species. Behavior patterns of *M. marrianae* vary considerably from those of *M. hembeli* in that *M. hembeli* is a gregarious species, showing much higher population densities. The unique behavior patterns of *M. marrianae* further reinforce the taxonomic split from *M. hembeli* and may illustrate the need for similar federal protection.

Introduction

Margaritifera marrianae R.I. Johnson, 1983, is a medium-size (average adult = 8.5 cm) unionid clam (Mollusca: Bivalvia: Unionacea: Margaritiferidae) endemic to a four-county area in south-central Alabama. The greatest concentration of this rare species is found in the headwaters of the Conecuh-Escambia River drainage. Disjunct populations are found in tributaries to the Alabama River in the Mobile River system.

Margaritifera marrianae was originally assigned to *Margaritifera hembeli*, a related species endemic to central Louisiana (Clench and Turner, 1956). R.I. Johnson (1983) recognized the specific differences and described the species as new. The apparent decline of the *M. marrianae* throughout its historical range has prompted consideration of this species for federal protection under the Endangered Species Act (U.S. Fish and Wildlife Service 1994; Mott and Hartfield 1994). Little has been reported in regard to its ecology, life history, and behavior.

Description of the Study Area

The known habitat for *Margaritifera marrianae* is headwater streams in the Conecuh and Alabama River drainages. Included in this study are tributaries to the Conecuh River in Butler, Conecuh, and

Crenshaw counties and tributaries to the Alabama River in Monroe County (Figure 1). These streams are headwater streams of slow to moderate current velocities with substrates consisting of sand, sandy mud, gravel, or a sand/gravel mixture. The average depth for many of these streams was less than 0.5 m.

Aquatic vegetation was dominated by *Ludwigia* spp. and *Justicia* spp. The majority of these streams have a natural riparian canopy. The others are bordered by areas of grazing land. Most of the land is under private ownership of single individuals or families. Some large plots bordering the streams are owned by trust companies or other companies holding the land for silviculture. Some of the smaller streams that have historically supported populations of *Margaritifera marrianae* have experienced heavy siltation that has affected the mollusks that inhabit them.

Materials and Methods

Each stream was searched using a glass-bottom bucket while wading. As *Margaritifera marrianae* was encountered, the specimen was removed from the substrate and measured using dial calipers. The sex was determined by shell morphology, and live specimens were returned to the substrate. Voucher

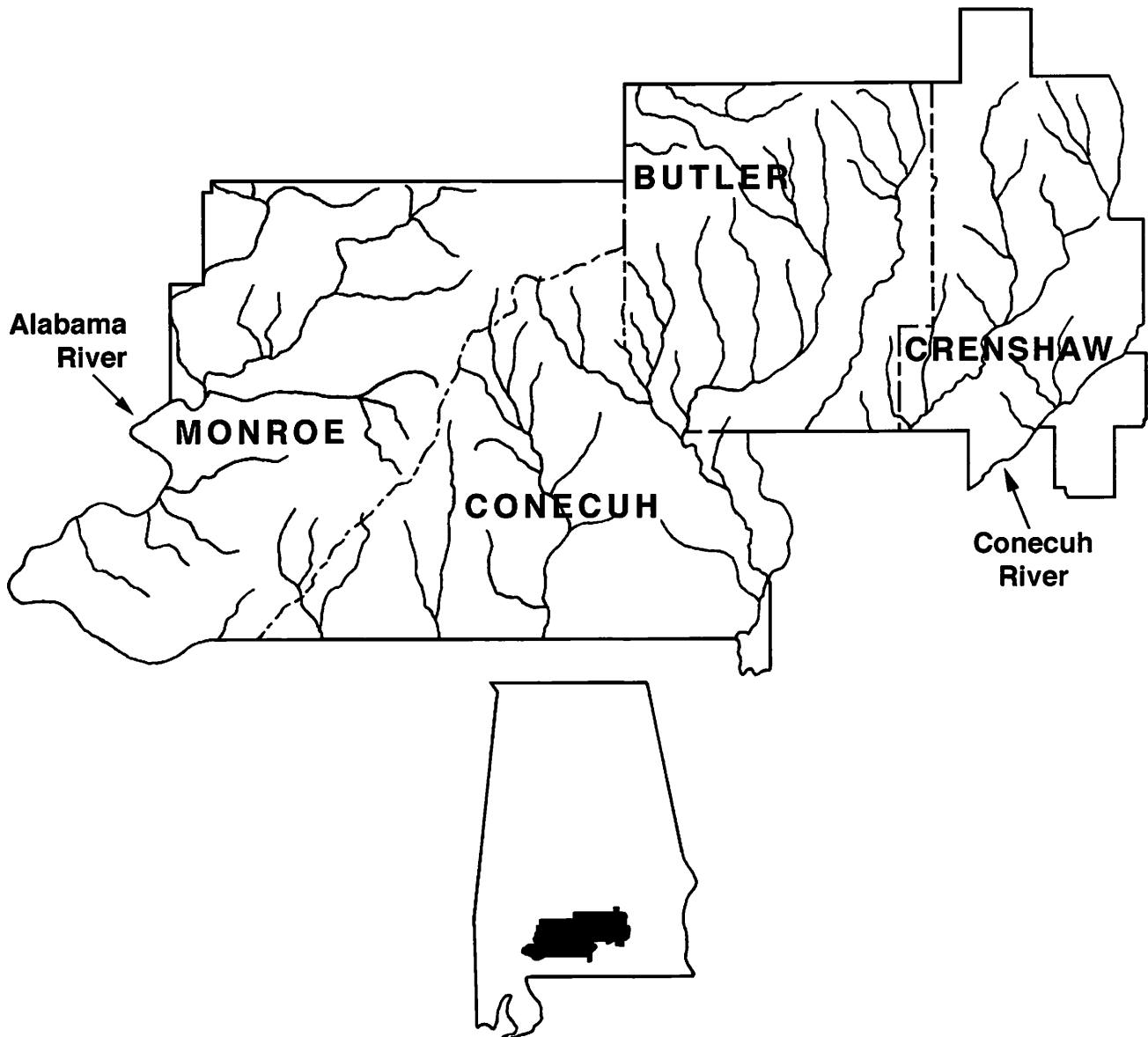


Figure 1. The known habitat for *Margaritifera marrianae* is headwater streams in the Conecuh and Alabama River drainages. Included in this study are tributaries to the Conecuh River in Butler, Conecuh, and Crenshaw counties and tributaries to the Alabama River in Monroe County.

specimens were retained from each stream where the species was encountered. Dead shells were preferred as vouchers whenever possible. Vouchers have been retained by the author and also deposited in the collections of Barry A. Vittor and Associates, Inc., Mobile, Alabama; the Mississippi Museum of Natural Science, Jackson, Mississippi; the American Museum of Natural History, New York; and the Frank H. McClung Museum, University of Tennessee, Knoxville.

Habitat was characterized according to stream size, substrate, aquatic and surrounding vegetation, current velocity, and the presence of other mollusks. Time was given to observe the behavior and certain aspects of *Margaritifera marrianae* whenever the species was encountered. Once it was suspected that *M. marrianae* was occurring in pairs, a 2-m radius around an individual was searched for another animal.

Results

A total of 14 streams was surveyed during the present study. Living *Margaritifera marrianae* were found in four of these streams (Table 1). It was found to be a cryptic and highly-mobile species. *Margaritifera marrianae* was most often found partially exposed with the posterior end usually facing upstream. During cold or otherwise inclement weather, *M. marrianae* buried itself completely in the substrate up to 10-15 cm deep and sometimes traveled a radial distance of 4-5 m in one week's time (pers. observation).

In 1994, I noted a propensity for *M. marrianae* to occur in pairs consisting of one male and one female, with the male usually being found upstream of the female (Vittor and Assoc. 1995). This observation held true for other streams surveyed during 1995 (Table 1). Occasionally, one live *Margaritifera* would be found, only to discover a shell of the opposite sex

in close proximity. The most common causes of mortality in the species were stranding by extreme low water and predation from raccoons, river otters, and herons (pers. observation). The same was true of other associated unionid species.

Whenever pairing of *M. marrianae* was observed, the distance between the animals was usually relevant to their size. Juveniles were found within 10-20 cm of each other, whereas adults were as far as 1 m apart. Additionally, the pairs were never encountered less than 10 m from the next pair. This may be more an indication of relative rarity than of behavior. Of 68 live individuals encountered during the present study, 85.2% exhibited this male-female pairing.

Unlike the Louisiana pearl shell, *Margaritifera hembeli*, which can be found in colonies of thousands (Vidrine 1993), *M. marrianae* is not gregarious, and exists in comparatively low numbers with an apparent male-female pairing within its given habitat. *Margaritifera hembeli* has been found to be gravid during the winter months (Vidrine 1993) and, more specifically, in late December (M.F. Vidrine, pers. comm.). *Margaritifera marrianae* was found to be gravid on 31 December 1993 (pers. observation).

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Table 1. The apparent male-female pairing of *Margaritifera marrianae* in 1995.

Stream	Total of Live Individuals	Total of Paired Individuals	Percentage of Pairing
Hunter Creek	4	4	100.0
Jordan Creek	42	36	95.2
Little Cedar Creek	20	16	80.0
Sandy Creek	2	2	100.0
Entire Study Area	68	58	85.2

previous collections in Alabama. Dr. Malcolm F. Vidrine, Louisiana State University at Eunice, provided information regarding the life history and behavior of *M. hembeli*. Dr. James D. Williams of the National Biological Service in Gainesville, Florida, provided information on previous collections and observations from field and laboratory work. During the course of this study, field assistance was provided by Andre Daniels, Pamela Guy, Tom Hansknecht, Rodney Harper, Howard Horne, Tony R. Martin, Angela Rangel, Ashley Shelton, Carrie Shelton, Jonathan Shelton, Matthew Shelton, Tim Thibaut, and Doug Weaver.

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