

Savannah Lilliput

Toxolasma pullus

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DESCRIPTION



Taxonomy and Basic Description

The Savannah Lilliput is a small mussel with an oval or elliptical shell and a double posterior ridge. This ridge is usually angular but is sometimes broadly rounded. Females have a broader, more truncated posterior end; males have a narrower, rounded posterior end. The outer surface of the shell is usually blackish, but sometimes brownish, greenish, or olive with very fine, obscure green rays. The inner surface of the shell is bluish-white with pink to purplish iridescence at the posterior end. Large specimens range from 30 to 35 mm (1.2 to 1.4 in.) in length (Bogan and Alderman 2004, 2008).

Savannah Lilliput from the lower Savannah River exhibit slightly different shell morphology: they have a more extensive beak sculpture than members of this species found elsewhere. They were once described as a separate species, *Carunculina patrickae* (Bates 1966), but *C. patrickae* was synonymized with *C. pulla* by Johnson (1970) and is now known as *Toxolasma pullus*.

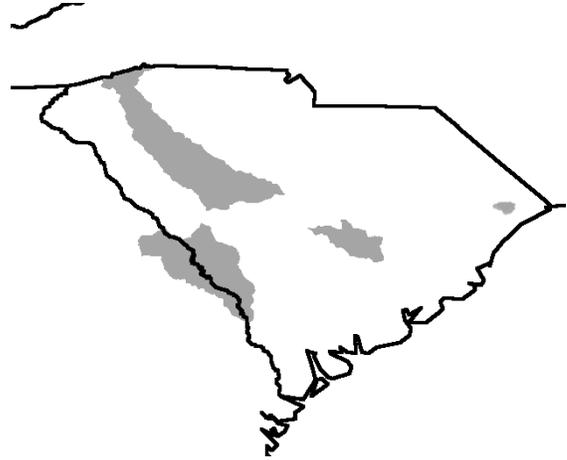
Status

The Savannah Lilliput is a federal species of concern and a species of special concern in South Carolina. NatureServe (2011) currently identifies the Savannah Lilliput as having a global status of vulnerable (G3). This mussel is ranked as critically imperiled to vulnerable (S1/S3) in South Carolina, critically imperiled (S1) in North Carolina, and secure (S5) in Georgia. However, only a few populations are known to exist in Georgia. Although NatureServe identifies the status of Savannah Lilliput in Georgia as secure, representatives of the Georgia Department of Natural Resources (GADNR) indicated that the State currently considers the Savannah Lilliput to have a status of imperiled (S2) (J. Wisniewski, GADNR, pers. comm., e-mail message, April 1, 2005). Recently, the Savannah Lilliput was included on a large list of 404 species being petitioned for consideration as candidates for federal protection (USFWS 2011).

POPULATION SIZE AND DISTRIBUTION

The Savannah Lilliput once ranged from the Neuse River Basin in North Carolina to the Altamaha basin in Georgia (Bogan and Alderman 2004). It has been lost from the Neuse Basin and is declining rapidly throughout its range. In South Carolina, it has been found in Lake Greenwood and Cloud's Creek—which are both in the Saluda River Basin—and in the Savannah River. The species was originally described from the Wateree River in South Carolina, but an extensive survey of this drainage in 2004 failed to find any surviving individuals (J. Alderman, pers. comm.). Recently, 7 individuals were found in Lake Marion in South Carolina, and 3 were

found in the Ogeechee River in Georgia. The most viable surviving population of Savannah Lilliput may be at University Lake in North Carolina; however, this population also appears to have exhibited recent declines (Taxonomic Expertise Committee 2004). Two specimens were found in Crab Tree Swamp (Waccamaw River drainage) in 2007, and many also have been found in recent years in the lower Congaree River and Savannah River as well as the upper Santee River and upper Lake Marion (E. Krueger, SC Nature Conservancy pers. comm. 2012, SCDNR stream data 2007).



HABITAT AND NATURAL COMMUNITY REQUIREMENTS

The Savannah Lilliput tends to inhabit shallow water, usually at the edges of streams, rivers and lakes; it may also be found in backwaters. This mussel is rarely found in deeper lake waters and tends to be found in mud or silty sand (Taxonomic Expertise Committee 2004). Hybrid bluegill-green sunfish (*Lepomis macrochirus* x *L. cyanellus*) served as suitable host for glochidia of Savannah Lilliput from University Lake in North Carolina, suggesting that other *Lepomis* spp. might also be hosts (Hanlon and Levine 2004).

CHALLENGES

The Savannah Lilliput's primarily shallow water distribution makes it particularly susceptible to off-road motor vehicle traffic, droughts, and water draw-downs. In January of 2005, when water levels were extremely low at Lake Marion, numerous mussels were found stranded on the banks attempting to retreat to the lower water levels; many had dried up on the exposed banks (T. Savidge, the Catena Group, pers. comm.). Similarly, water level fluctuations in the Savannah River appear to affect this species, making water flow issues a renewed concern (E. Krueger, SC Nature Conservancy, pers. comm.). The extremely low numbers of this species at so few sites make it particularly vulnerable; entire populations may be lost due to one small-scale event. The dispersal of this species appears to be limited by dams and old navigational structures in some locations. Pollution also appears to be a threat to the Savannah Lilliput (Taxonomic Expertise Committee 2004).

The US Fish and Wildlife Service is particularly concerned about the status of this species and may soon pursue listing it as an Endangered species (L. Zimmerman, USFWS, pers. comm., e-mail message, February 2, 2005).

CONSERVATION ACCOMPLISHMENTS

Reproductive period, population demographics, and fish hosts of a North Carolina population were studied by Hanlon and Levine (2004).

CONSERVATION RECOMMENDATIONS

- Conduct additional surveys for the Savannah Lilliput, especially in Lake Greenwood and Lake Marion, where the species has been reported but population numbers not assessed. Additional surveys are needed in areas where the Savannah Lilliput was historically found to determine if populations are extant.
- Conduct genetic analyses across the range of the Savannah Lilliput to determine if populations in the Savannah River described as *Carunculina patrickae* (Bates 1966), are genetically distinct from other populations and if they warrant classification as a separate species.
- Investigate the need to list the Savannah Lilliput as Endangered in South Carolina, based on surveys and genetic investigations.
- Closely monitor water levels and discourage shallow water activities at sites where the Savannah Lilliput is found.
- Study the effects of water draw-downs and low flows and propose new flow regimes if needed to protect the species from stranding, predation, or isolation from suitable habitats in both lotic and lentic habitats.
- Investigate the potential for removing dams and old navigation structures that limit the dispersal of the Savannah Lilliput. Alternatively, provide fish ladders (identity of fish host still unknown) or other methods allowing the potential dispersal of the mussel.
- Work with other state agencies (DHEC) to determine appropriate minimum flows to protect the Savannah Lilliput. Also, recommend minimum flows during the FERC relicensing process.
- Protect critical habitats for the Savannah Lilliput from future development and further habitat degradation by following Best Management Practices and protecting and purchasing riparian areas.
- Promote land stewardship practices through educational programs both within critical habitats with healthy populations and in other areas that contain available habitat for the Savannah Lilliput.
- Encourage responsible land use planning.
- Consider this species' needs when participating in the environmental permit review process.
- Educate off-road motor vehicle operators of the negative effects of crossing streams at multiple locations and using stream bottoms as trails.
- Conduct further research to determine the degree of sensitivity of the Savannah Lilliput to various point and non-point sources of pollution and land use impacts.

MEASURES OF SUCCESS

Determining the genetic relationship between populations will be a measure of success. Persistence of known populations and an increase in very small populations will indicate success of management activities. Achieving minimum flows from dams that are effective in reducing or eliminating mussel strandings will be an additional measure of success.

Recent survey efforts by the SC office of The Nature Conservancy, South Carolina Aquarium, and others have contributed new distribution records for SC, indicating there are at least

moderate populations present in the Savannah, Congaree, and Santee Rivers and at least the presence of a population remaining in the Waccamaw River drainage (Crab Tree Swamp).

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