

**First account of a living population of False Spike, *Quadrula mitchelli*
(Bivalvia: Unionidae), in the Guadalupe River, Texas.**

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Quadrula mitchelli (Simpson 1895), false spike, is a rare central- and west-Texas endemic unionid mussel species that is considered state threatened and is under review for protection under the Endangered Species Act (USFWS 2009). Until recently, the only evidence that this species was not extinct came from a recent collection of a fresh-dead individual from the San Saba River (Randklev et al. in review). The causal factors for this species' decline likely stem from human modification of streams and rivers combined with record droughts and floods in the late 1970s and early 1980s (Howells 2010). Other than locality records, basic life history, reproductive biology, ecology and habitat requirements for this species are unknown (Howells 2010). Without these basic data, it is impossible to determine what specific causal factors precipitated the decline of this species or to develop management plans to facilitate its recovery.

During a fall 2011 survey, a small population of *Q. mitchelli* was discovered in the Guadalupe River near Gonzales, Texas. In total, 7 individuals were collected during two different sampling periods. Juveniles were not observed at the site, but given our sampling methodology (timed tactile and visual searches), their presence cannot be ruled out. All of the individuals collected are consistent with taxonomic descriptions provided by Howells et al. (1996). Other rare Texas endemic species were collected at the same locality, including the Golden Orb, *Quadrula aurea* (Lea 1859), and Texas pimpleback, *Quadrula petrina* (Gould 1855). These species are listed as state threatened in Texas and are candidates for protection under the Endangered Species Act (USFWS 2011).

The site where these individuals were collected is characterized by steep banks with a small riparian buffer. The adjacent land uses are a golf course and range land. Water velocity and depth were not measured, but appeared to be lower than normal (based on water depth in relation to the tops of undercut banks) because of the ongoing drought. *Quadrula mitchelli* was collected primarily from an upstream run in gravel and mud substrate. Water depth at this locality was less than 30 cm. A single individual was found at the head of a riffle, partially buried in gravel and sand. Foot swabs were used to sample genetic material that will be analyzed at a later date by James D. Williams (Florida Museum of Natural History) and Nathan A. Johnson (USGS, Southeast Ecological Science Center); information gathered from this effort with help resolve whether this species should remain in the genus *Quadrula*.

Our finding represents the only known population for this species in Texas and the first record of live specimens in over 30 years (Howells 2010). Because of this, a more thorough study of this reach of the Guadalupe River and its tributaries,



Figure 1. Guadalupe River where live *Quadrula mitchelli* were collected.

such as the San Marcos River, by experienced surveyors is needed to determine the extent of its distribution within this drainage. Additionally, locating a surviving population of *Q. mitchelli* creates the potential to study the species' basic life history, reproductive biology, and habitat requirements. Finally, this find and others (e.g., Randklev et al. 2010; Randklev et al. in review) serve as a reminder that while the general distribution of unionids in Texas is known, the distribution for threatened species within a given drainage is poorly understood.



Figure 2. Live *Quadrula mitchelli* collected from the Guadalupe River.



Figure 3. A live individual of *Quadrula mitchelli* collected from the Guadalupe River.

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Literature Cited

- Howells, R.G. 2010. Rare mussels: Summary of selected biological and ecological data for Texas. Report submitted to U.S. Fish & Wildlife. Report on file with Save Our Springs Alliance (SOS).
- Howells, R.G., R.W. Neck, and H.D. Murray. 1996. Freshwater Mussels of Texas. Texas Parks and Wildlife Press, Austin.
- Randklev, C.R., B.J. Lundeen, R.G. Howells, and J.H. Kennedy. 2010. First account of a living population of Texas Fawnsfoot, *Truncilla macrodon* (Bivalvia: Unionidae) [I. Lea 1859] in the Brazos River, Texas. *The Southwestern Naturalist* 55:297-298.
- Randklev, C.R., E.T. Tsakiris, M.S. Johnson, J. Skorupski, L.E. Burlakova, J. Groce, and N. Wilkins. Is False Spike, *Quadrula mitchelli* (Bivalvia: Unionidae), extinct? First account of a very-recently deceased individual in over thirty years. *The Southwestern Naturalist*, in review.

U.S. Fish and Wildlife Service (USFWS). 2009. Endangered and threatened wildlife and plants: 90-day finding on petitions to list nine species of mussels from Texas as threatened or endangered with critical habitat. Federal Register 74:66260–66271.

U.S. Fish and Wildlife Service (USFWS). 2011. Endangered and threatened wildlife and plants; 12-month finding on a petition to list Texas fatmucket, golden orb, smooth pimpleback, Texas pimpleback, and Texas fawnsfoot as threatened or endangered. Federal Register 76: 62166–62212.

Additional Information Concerning the Conquest of Europe by the Invasive Chinese Pond Mussel *Sinanodonta woodiana*. 26. News from Croatia, the Czech Republic, Germany, and Romania

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The Chinese Pond mussel: *Sinanodonta woodiana* (Lea, 1834), continuous its invasion of Europe. Numerous new records have been published from Croatia and a single one from Germany. Scientists in the Czech Republic have studied the role of native and invasive fish species as hosts for the glochidia of this mussel species, while in Romania they made a study of its genetics.

Croatia

From 2007 until 2011, fieldwork was carried out by Lajtner & Crnčan (2011) in aquatic biotopes throughout Croatia. The Chinese Pond mussel turned up almost everywhere in the eastern part of the country and seemed to spread rapidly also in the western Croatia. Altogether, they recorded it from 54 localities which included both flowing and standing waters.

The Czech Republic

In the Czech Republic, native and invasive fish species were checked for their potential role as hosts for the parasitic stage (glochidium) of *Sinanodonta woodiana* (Douba et al., 2011). All eight fish species: *Pseudorasbora parva*, *Carassius gibelio*, *Cyprinus carpio*, *Leuciscus cephalus*, *Rhodeus amarus*, *Gobio gobio*, *Barbus barbus* and *Rutilus rutilus*, turned out to be highly suitable hosts. Since the Chinese Pond mussel seems to be a broad host generalist, we may expect that it may increase the speed and the range of its invasion, which of course will have possible consequences on the native freshwater mollusc fauna especially the Unionid mussels among them.

Germany

Bössneck & Klingelhöfer (2011) reported the Chinese Pond mussel for the first time from Thüringia. It was located in a small isolated fish pond near Vacha in the district Wartburgkreis.

Romania

Twenty specimens of the Chinese Pond mussel collected in the Prut River near Vădeni, Rumania, were used in a genetic study. All loci turned out to be highly polymorphic. The number of alleles per locus ranged from 7 to 14 and the observed heterozygosity from 0.650 to 0.950. According to the authors, these loci should prove useful to study the species population genetics which could help to infer important aspects of the invasion process.

References

- Bössneck, U. & Klingelhöfer, J., 2011. Erster Nachweis der Chinesischen Teichmuschel, *Sinanodonta woodiana* (Lea 1834) aus Thüringen. Mitteilungen der deutschen malakozoologischen Gesellschaft, 85: 11-16.
- Douda, K., Vrtílek, M., Slavík, O. & Reichard, M., 2011. The role of host specificity in explaining the invasion success of the freshwater mussel *Anodonta woodiana* in Europe. Biological Invasions. (Published online: 09 April 2011.)