

ligament hardens, but while this time may be very short in air, it can be very long for animals continuously submerged.

Shell condition data are useful to assess species presence in a stream, but within lentic systems, and especially shells rapidly buried in mud or sand, shells may remain sufficiently protected that condition becomes a poor indicator of population presence. Understanding how quickly mineralization/fossilization occurs is another question requiring future investigation.

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## **Distribution of Extant Populations of *Quadrula mitchelli* (false spike)**

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The False Spike, *Quadrula mitchelli* (Simpson 1896), is a rare species of mussel endemic to Central Texas and the Rio Grande drainage (Howells 2010). This species was thought to have been extinct until the discovery of several live individuals in the Guadalupe River and a fresh dead individual in the San Saba River in 2011 (Randklev et al. 2012; Randklev et al. in press). Since then, this species has been reported at several other locations within its historic range (Sowards et al. in press; Tsakiris and Randklev 2013; Mabe and Kennedy 2013). Here, we report on the current known distribution of this species.

**Brazos River basin:**

In 2012 and 2013, three live individuals were collected from the lower portion of the San Gabriel River, Milam County, during efforts to relocate mussels from two bridge construction projects (Figures 1A & 2). A single large individual (85 mm shell length) was collected at the first site and two smaller individuals

(26 mm, 33 mm shell length) were collected at the second site. At both locations, live individuals were found in run habitats (0.25 – 0.5 m depth) in substrate that consisted of a thin (~5 cm) layer of cobble/course gravel underlain by firm silty clay loam.

**Colorado River basin:**

In 2012, three live individuals (Figures 1B & 2) were collected from two localities on the lower San Saba River, San Saba County (Tsakiris and Randklev 2013; Sowards et al. in press). Gonadal fluid sampled from each specimen revealed developing oocytes, indicating that these females were capable of reproducing. All individuals were collected in coarse gravel from run habitats; water velocity at both sites was slow but not stagnant. Adjacent land use was rangeland and pecan orchards.

Near Mason, Mason County Texas, one live individual (44 mm shell length) was collected from the Llano River in August 2013 during reconnaissance surveys (Figure 1C & 2). The individual was found in a small pool in gravel/mud substrate that was protected by several large pieces of cobble. Also found was a single fresh-dead individual that appeared to have been recently stranded during a high-water flow event.

**Guadalupe River basin:**

Approximately 0.8 km downstream from where the original population of *Q. mitchelli* was rediscovered in the Guadalupe River (Randklev et al. 2012), additional live specimens were observed during limited timed search efforts in May 2013. Two live individuals were collected (Figures 1D & 2), one each, from riffle and run habitats in a mix of gravel and cobble substrates.

From October 2012 through May 2013, 11 live *Q. mitchelli* have been collected from a site approximately 23 river km from the original collection site (Figures 1E, F & 2). These individuals were found using timed searches with SCUBA gear during three separate sampling efforts [October 2012 (2 individuals), January 2013 (4 individuals), May 2013 (5 individuals)]. *Quadrula mitchelli* were observed in run and pool habitats over gravel/cobble and sand substrates. Total lengths ranged from 35 – 60 mm. The primary land use in the area was rangeland.

Near Victoria, Texas, Mabe and Kennedy (2013) reported live individuals of *Q. mitchelli*, including presumptive juvenile specimens. While the adult specimen illustrated in their article is consistent with live individuals collected by Randklev et al. (2012), the sub-adult specimen appears to be a misidentified Guadalupe morph of *Quadrula petrina* (Texas pimpleback). However, given the recent collection of sub-adult *Q. mitchelli* from the Guadalupe River near Gonzales, Texas, it is plausible that reproducing populations may exist near this locality, but additional surveys are needed to determine whether this is the case.

**Rio Grande River basin:**

Currently, no locations of living populations are known for this species in the Rio Grande river basin. Existing specimen records are subfossil or fossil material, much of it from the Pleistocene (Metcalf 1982).

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Any use of trade, product, or firm names is for descriptive purposes only and does not imply endorsement by the U.S. Government.

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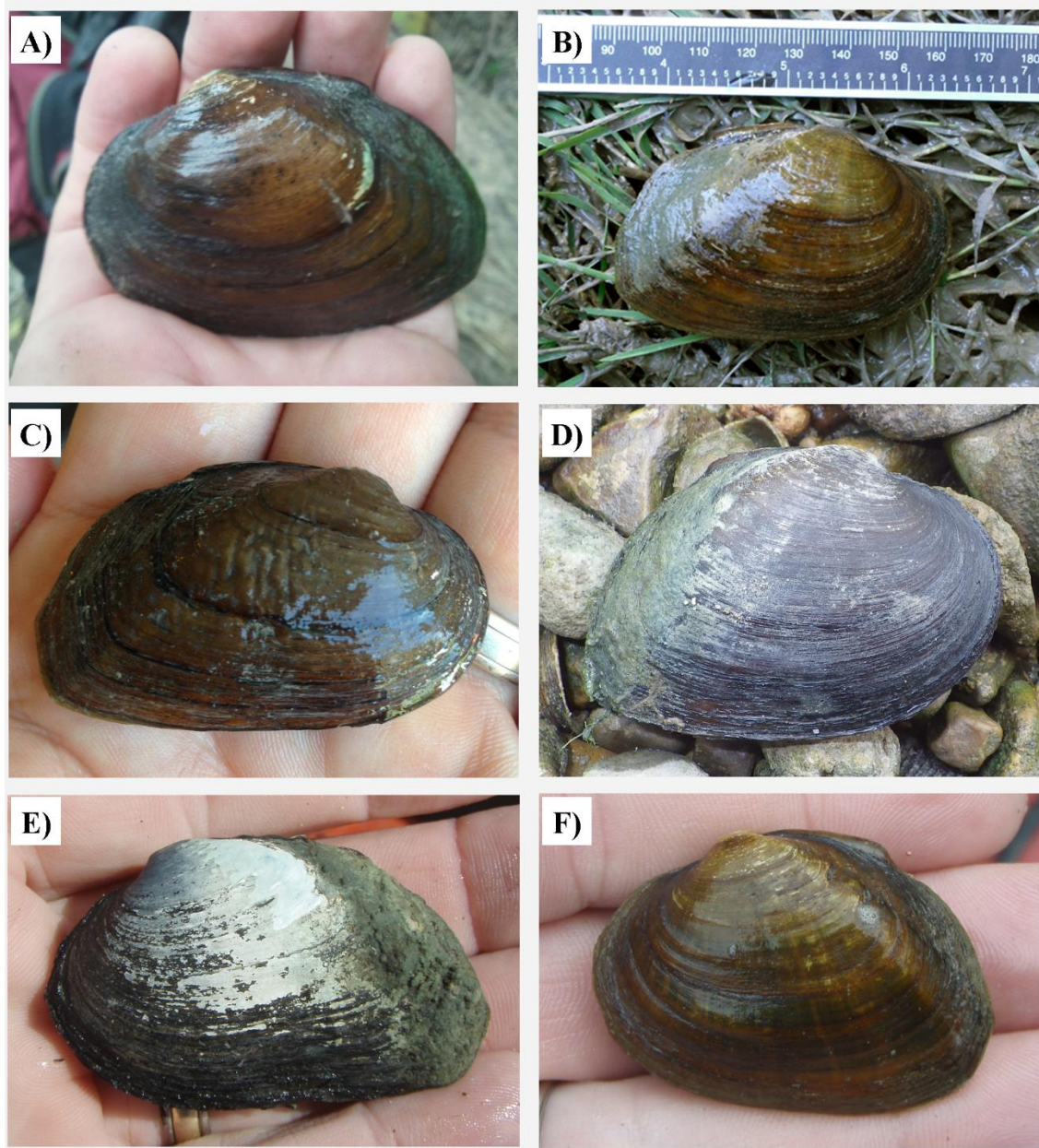


Figure 1. Live individuals of *Quadrula mitchelli* collected from the: A) San Gabriel River, Brazos River basin; B) San Saba River, Colorado River basin; C) Llano River, Colorado River basin; D) Guadalupe River, near Gonzales, Texas; and E) & F) Guadalupe River, downstream of Gonzales, Texas.

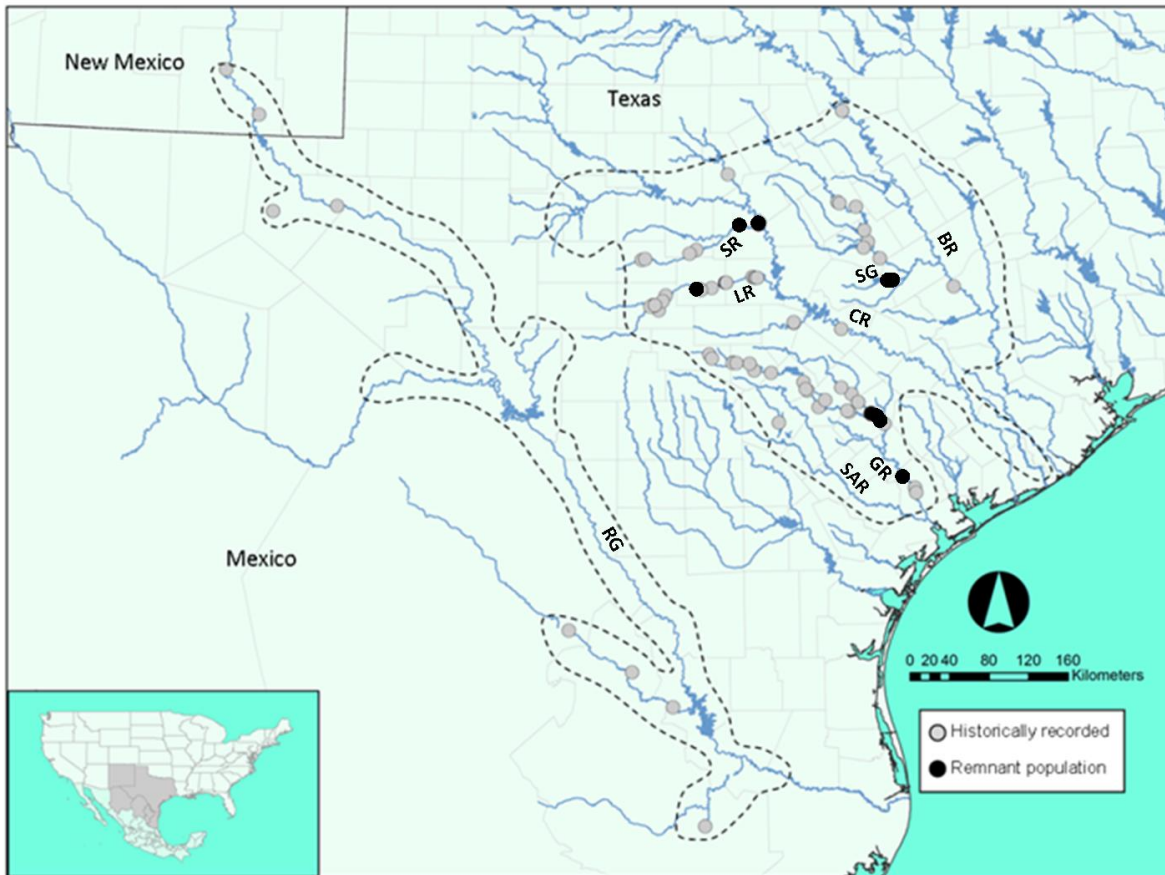


Figure 2. The distribution of remnant populations (black circles), historical localities (gray circles), and presumptive range (dashed line) of false spike (*Quadrula mitchelli*) in Texas, New Mexico, and Mexico, including the Rio Grande, Guadalupe-San Marcos, San Antonio, Colorado, and Brazos River drainages. Abbreviations: CR, Colorado River; BR, Brazos River; LR, Llano River; GR, Guadalupe River; RG, Rio Grande; SAR, San Antonio River; SG, San Gabriel River; and SR, San Saba River.

### **An Early Record of *Ferrissia clessiniana* from the Yarqon River near Tel Aviv, Israel**

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The "Seven Mills" on the south bank of the Yarqon River near Tel Aviv, Israel, is the name of a site where flour mills driven by the water of the Yarqon River were operating until 1936. The last remaining mills were built in the 19<sup>th</sup> Century. The mills were operated by the force of the water which at that point was raised by an artificial dam in the river.

In 2001, the remains of the "Seven Mills" were excavated by Dr. Eytan Ayalon. Among others, the sediments accumulated during some 150 years present in the old water reservoir were completely removed. This opened a unique opportunity to sample some of the layers containing shells at certain points in that basin on 4 September 2001. Relatively few complete mollusc specimens were collected because of the bad preservation of the shells.