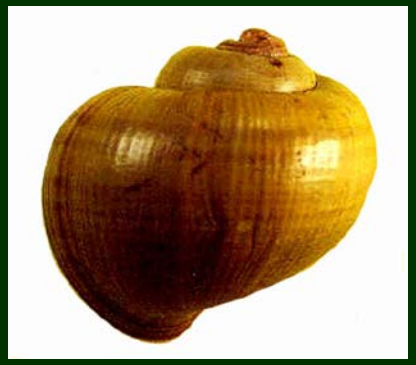
APPLESNAILS AND OTHER EXOTIC FRESHWATER MOLLUSKS:
Status in Texas and the Gulf Coast



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EXOTIC MOLLUSKS IN TEXAS

- **Cheatum collected applesnails (*Pomacea*) of at least two species in Texas waters early in the 20th century.**
- **By the 1950s and 60s, an array of aquatic and terrestrial gastropods began to appear in Texas, as did Asian clam.**
- **More recently, populations of *Pomacea insularum* have been documented at numerous sites, *Perna perna* invaded, and a report of giant African snail (*Achatina* sp.) remains unconfirmed in the Houston area.**
- **This presentation summarizes the status of *Pomacea* and *Marisa* in North America and other selected species in Texas.**

Giant African Snail

APPLESNAILS – GENUS *POMACEA*

In the 1950s, heat tolerant *Pomacea* began to replace heat and low DO intolerant *Cipangopaludina* (*Bellamya-Viviparus*) in the aquarium trade. Note: the name mysterysnail (from viviparids) was retained for *Pomacea* in the aquarium industry.

Ultimately, native Florida applesnail and several channeled applesnails were rejected due to damage to aquarium plants and spiketop applesnail became the primary gastropod in aquarium culture (periphyton feeder).

Channeled species (3) and spiketop applesnails were released or escaped captivity and Florida applesnail was introduced outside its native range.

Genetic studies (2005-present) helped clarify the species involved in U.S. waters and around the world.

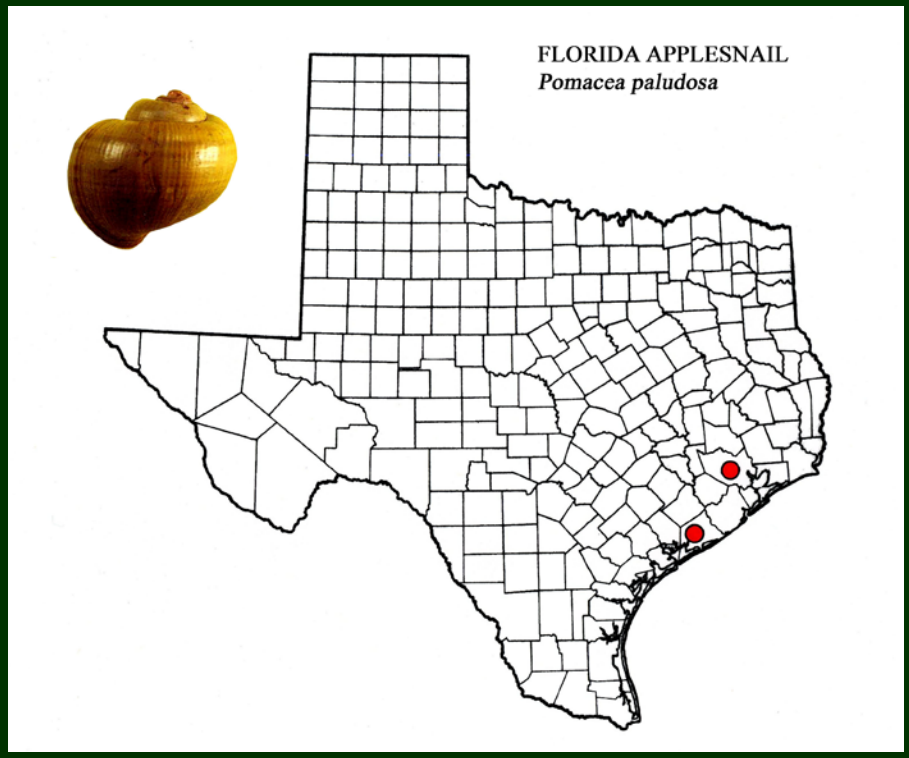
FLORIDA APPLESNAIL
Pomacea paludosa - Texas

Reported by Fullington (1978) based on collections earlier in the century.

Neck (1984a, 1986) confirmed the identifications.

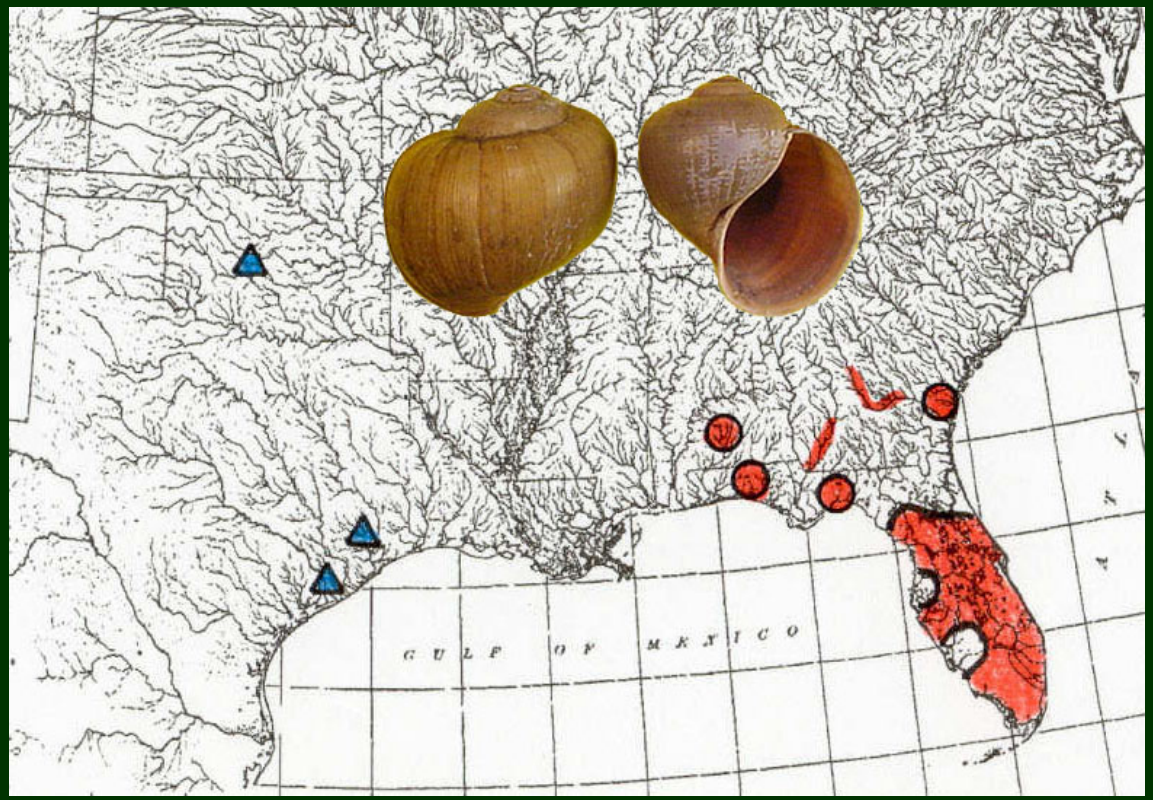
No evidence of existing populations in the past.
- **Were these shells aquarium introductions?**

No evidence of this species in Texas since.



FLORIDA APPLESNAIL
Pomacea paludosa – U.S.

In addition to native populations in the Florida peninsula, Florida applesnail is present at sites in the Florida panhandle, Georgia, and Alabama.



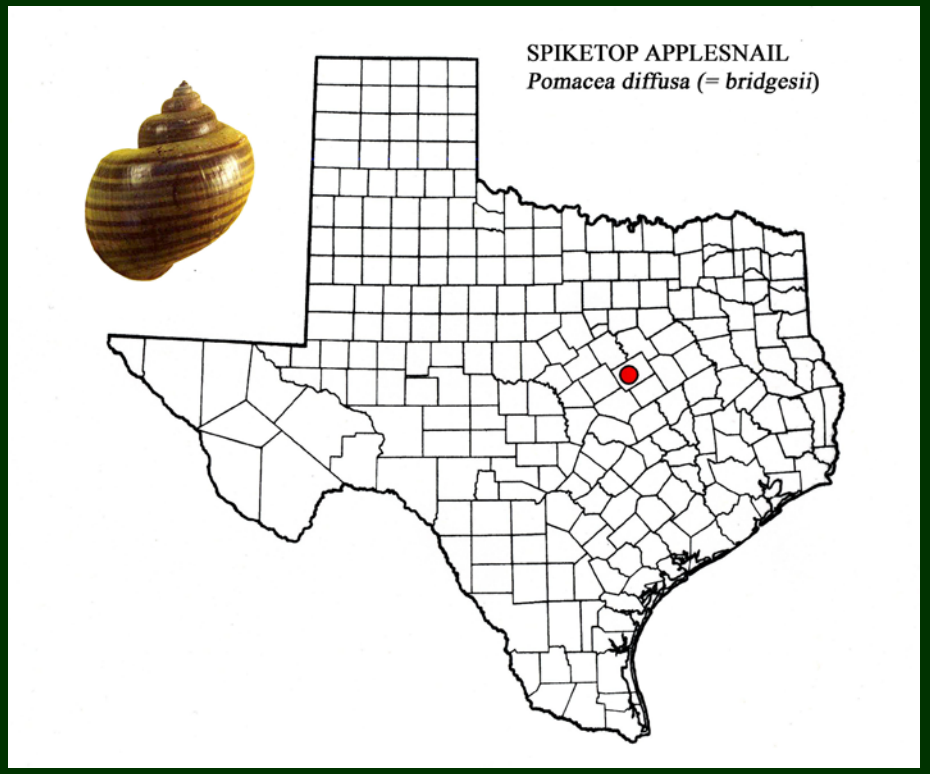
Map from Howells et al. in Sebastian and Joshi (2006). Established populations (red); records without current populations (blue).

SPIKETOP APPLESNAIL
Pomacea diffusa (*bridgesii*) - Texas

Genetic studies by Rawlings, Hayes, Cowie, and Collins in Florida and Hawaii (2007) confirmed the species involved in the U.S was *P. diffusa* and not *P. bridgesii* as long believed.

Two recently-dead specimens were found in the Brazos R., Waco, TX, in January 2004 during a cold, low-water period (Howells et al. 2007).

Not known to be established in Texas.

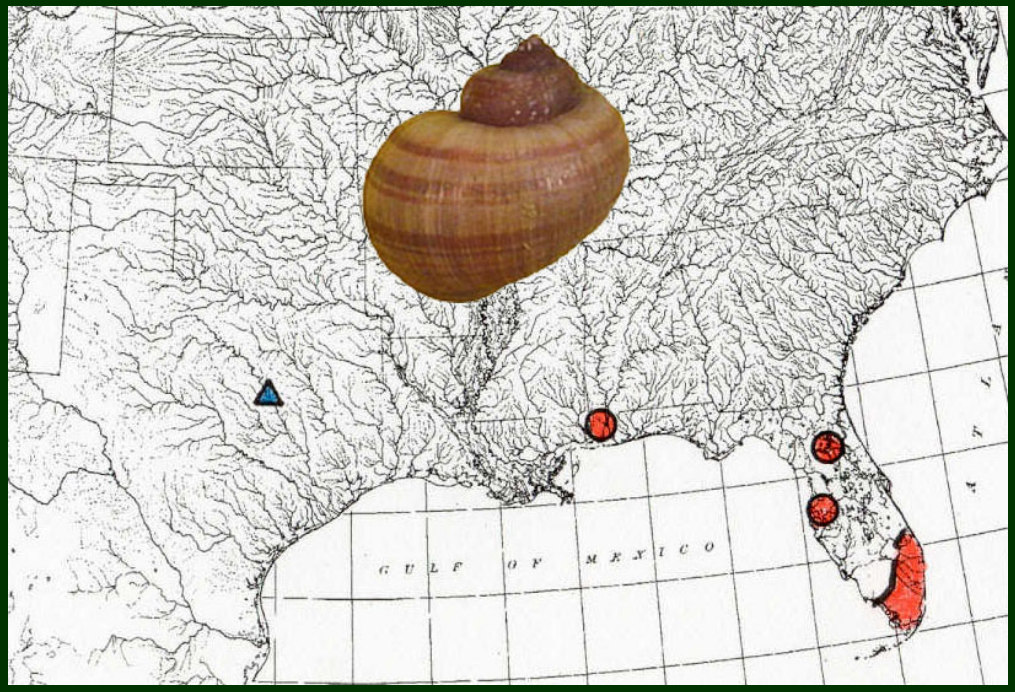


SPIKETOP APPLESNAIL
Pomacea diffusa (*bridgesii*) – U.S.

First reported in Florida (as *P. bridgesii*) in Florida in 1966 (Clench 1966), but may have been present since the 1950s and other populations found in subsequent years (Thompson 1984; Strange 1998).

An introduction in Mobile, Alabama, has not been examined since Hurricane Katrina and current status is unknown there.

Apparently not sufficiently cold tolerant to allow wide-scale establishment.



Map from Howells et al. in Sebastian and Joshi (2006). Established populations in red (Mobile population not checked since Hurricane Katrina); no current populations in blue.

CHANNELED APPLESNAIL – COMPLEX

Pomacea canaliculata – complex:

Genetic studies by Rawlings, Hayes, Cowie, and Collins in Florida and Hawaii in 2005-2007 confirmed three species with channeled shells were involved in the U.S.

CHANNELED APPLESNAIL
Pomacea canaliculata
Reddish-pink eggs

Argentina

Hawaii

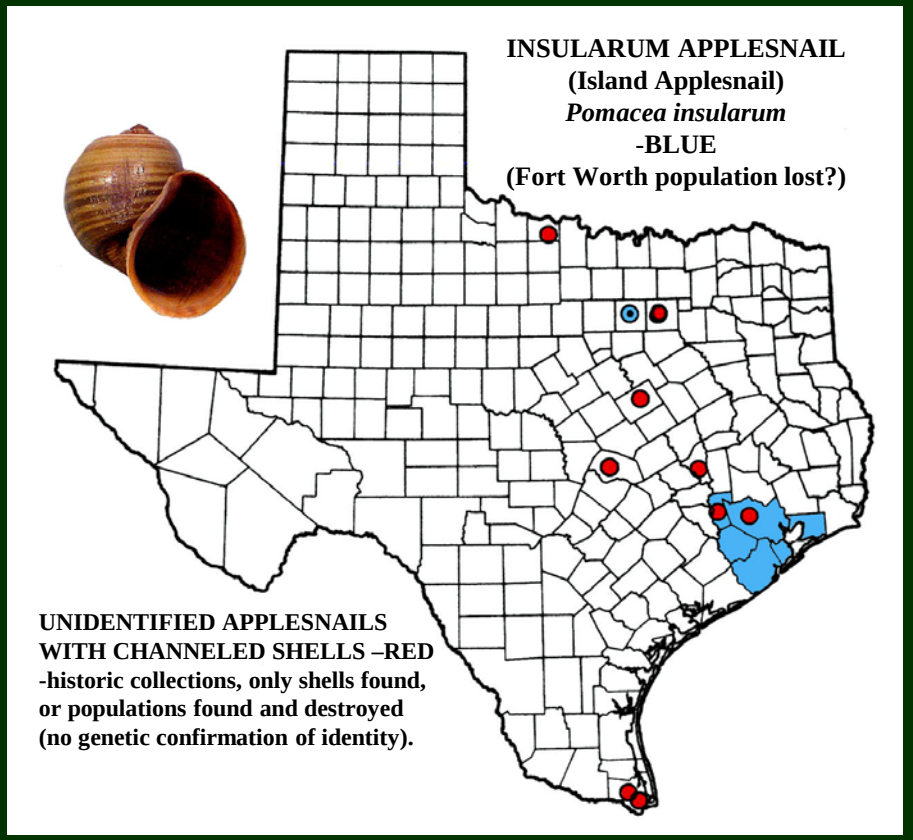
INSULARUM APPLESNAIL
P. insularum
Pink eggs

TITAN APPLESNAIL
P. haustrum
Green eggs

INSULARUM (ISLAND) APPLESNAIL
Pomacea insularum &
Others With Channeled Shells - Texas

Applesnails with channeled shells that have not been examined genetically have been reported (historically – present) at scattered sites in Texas, but none "currently" support populations.

P. insularum **(originally called *P. canaliculata* or *P. canaliculata*-complex) currently occurs in six Texas counties) and has been expanding its range for at least 10 years.**



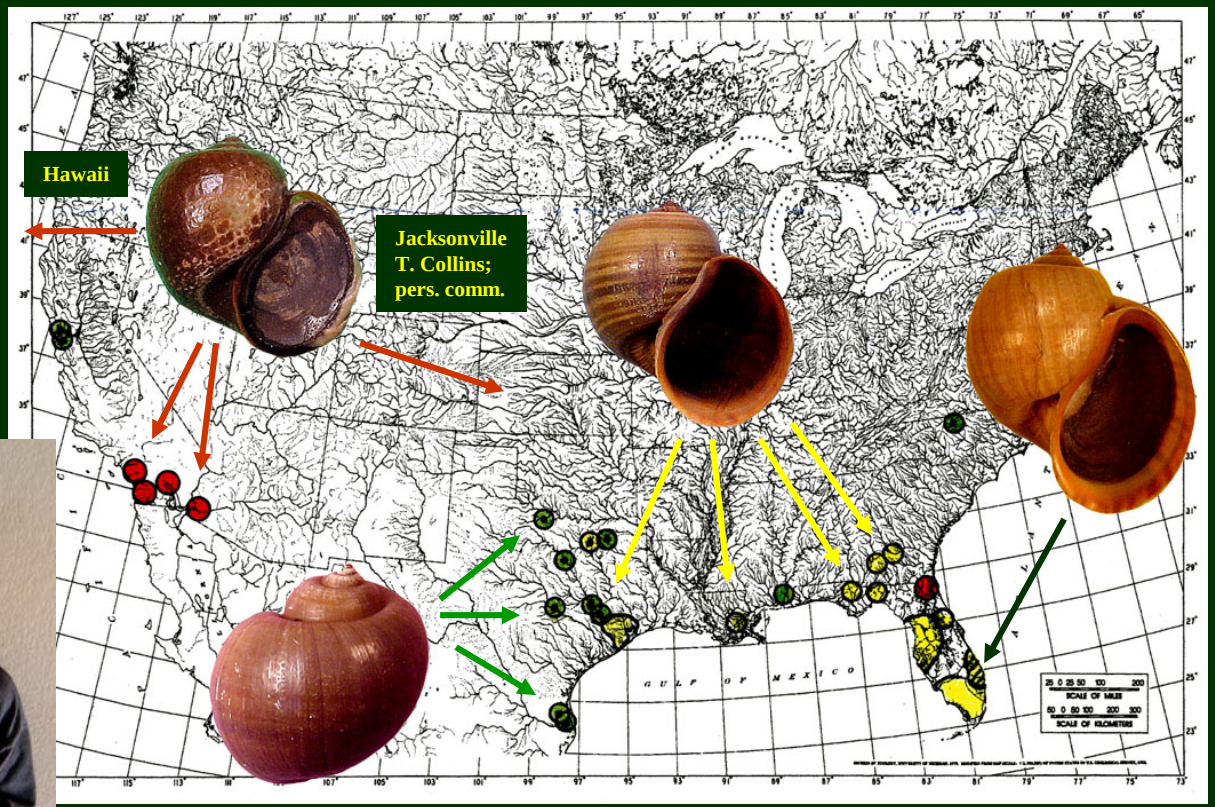
CHANNELED APPLESNAIL – COMPLEX
Pomacea canaliculata – complex -- U.S.

CHANNELED APPLESNAIL
Pomacea canaliculata
Red – known or presumptive

INSULARUM (ISLAND) APPLESNAIL
Pomacea insularum
Yellow – known or presumptive

TITAN APPLESNAIL
Pomacea haustrum
Shaded - known

CHANNELED-SHELL APPLESNAILS (shells, eliminated, or no longer present)
Green – no genetic confirmation



Sites with dots do not have populations, Mobile site has not been seen since Katrina, recent LA record is presumed to be *P. insularum*.

Not all North American populations have been examined genetically

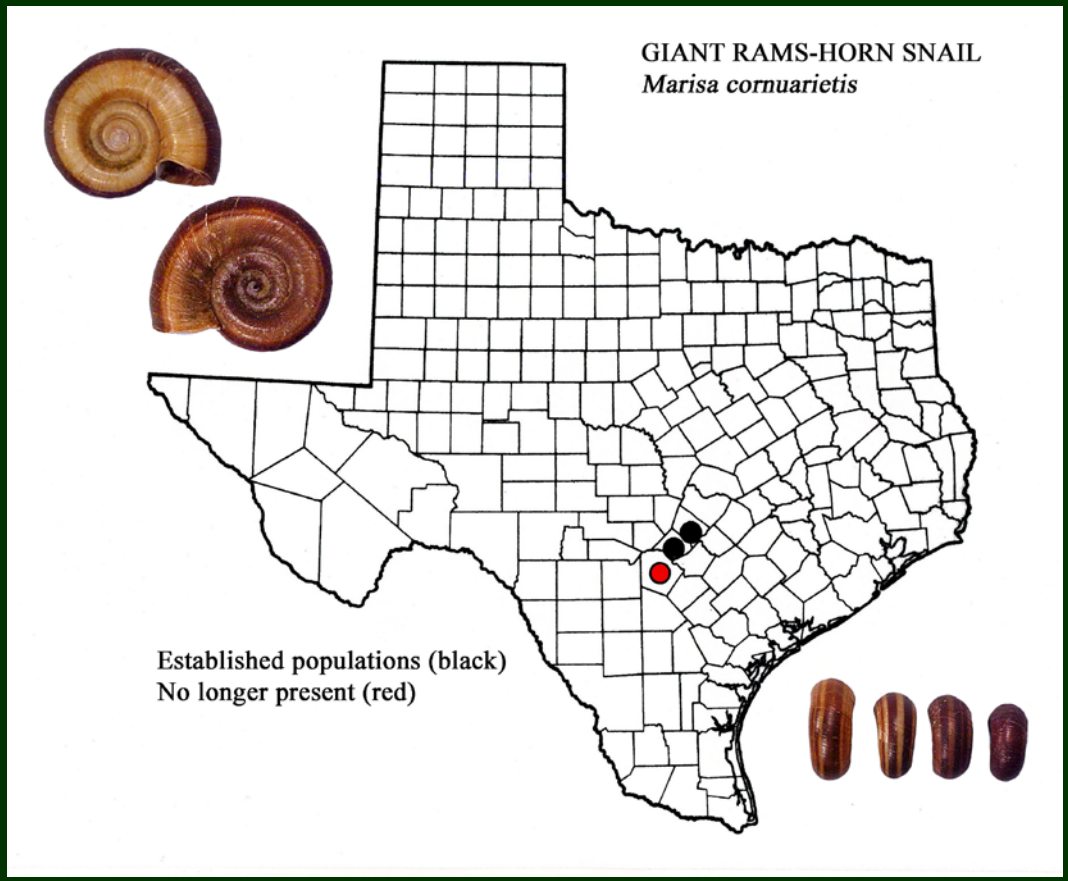
GIANT RAMS-HORN SNAIL
Marisa cornuarietis - Texas

First observed in Texas in the headwaters of the San Marcos River in 1981; then reported in 1983 (Neck 1984b; Horne et al. 1992).

Found in the headwaters of the Comal River in 1984 (Horne et al. 1992)

Found headwaters of the San Antonio River in 2000 (Howells 2001).

Reported present in the San Marcos and Comal rivers, but not in the San Antonio (Karatayev and Burlakova 2007).



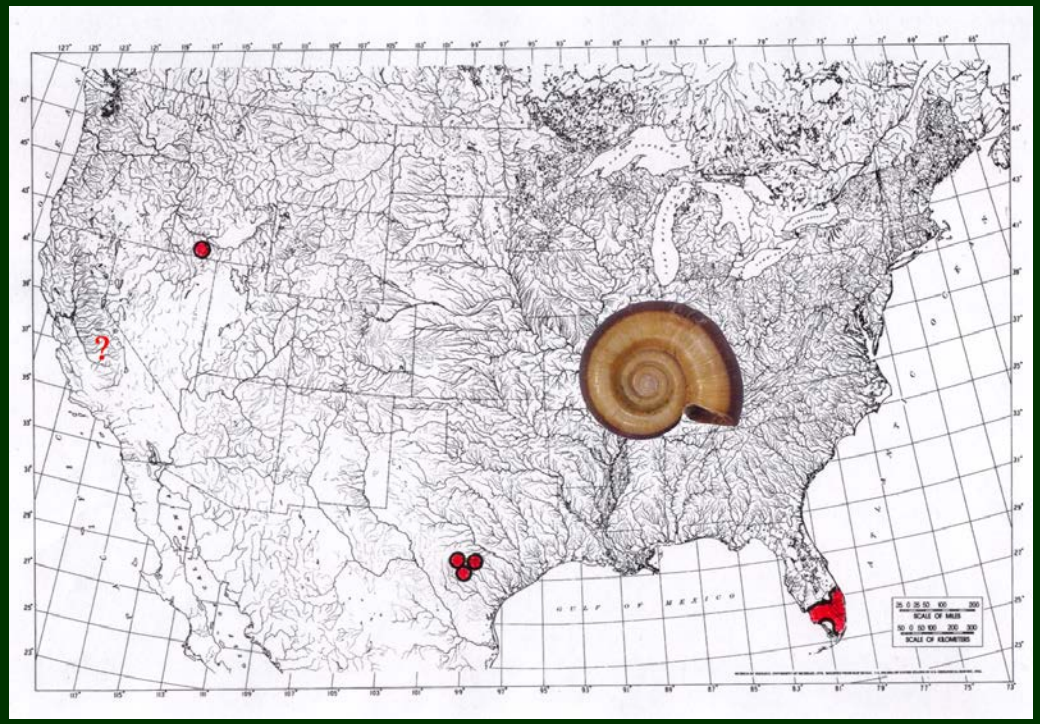
GIANT RAMS-HORN SNAIL
Marisa cornuarietis – U.S.

First reported in southern Florida in 1957 (Hunt 1958); now established.

Reported at two sites in Texas 1980s and at a third in 2000; established in the headwaters of the San Marcos and Comal rivers, but apparently no longer in the San Antonio River headwaters.

Reported in a heated spring in Idaho in 1992 (Frest and Bowler 1992); current status uncertain.

Listed by California Dept. of Fish and Game (2003), but without details.



Map from Howells et al. in Sebastian and Joshi 2006.

CHINESE MYSTERYSNAIL
Cipangopaludina chinensis - Texas

Early reports in Texas from Waco (two sites) and Kidd Spring, Dallas (Clench and Fuller 1965; Dundee 1974; Fullington 1978).

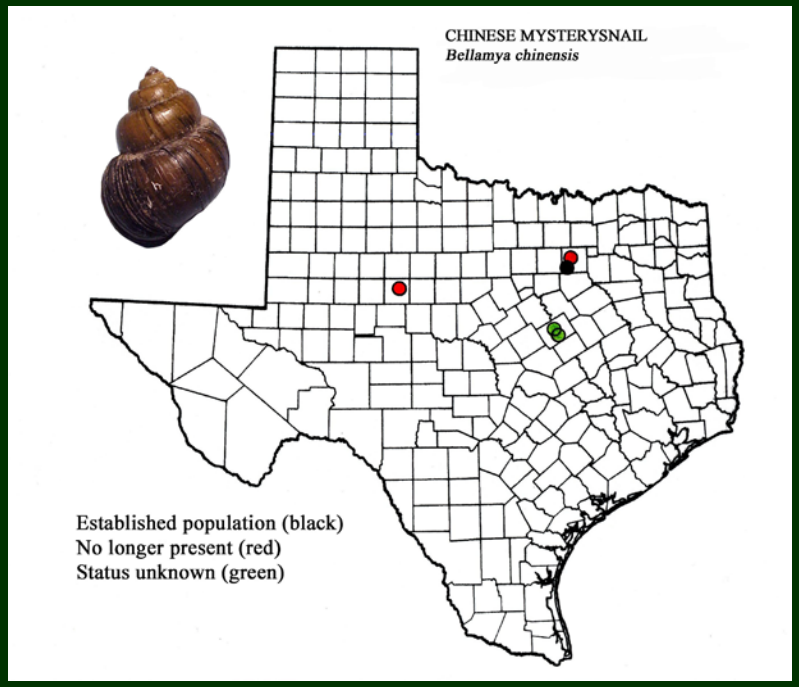
Another population found in Bachman Lake, Dallas, and a shell in Lake Sweetwater, Nolan County (Howells 2001).

Bachman L. population apparently lost by 2000-2001 (Howells 2001); none reported alive by Karatayev and Burlakova (2007).

Kidd Spring population still present (Karatayev and Burlakova 2007).

Status in Waco undetermined, but none reported in recent years.

Other undocumented records likely.



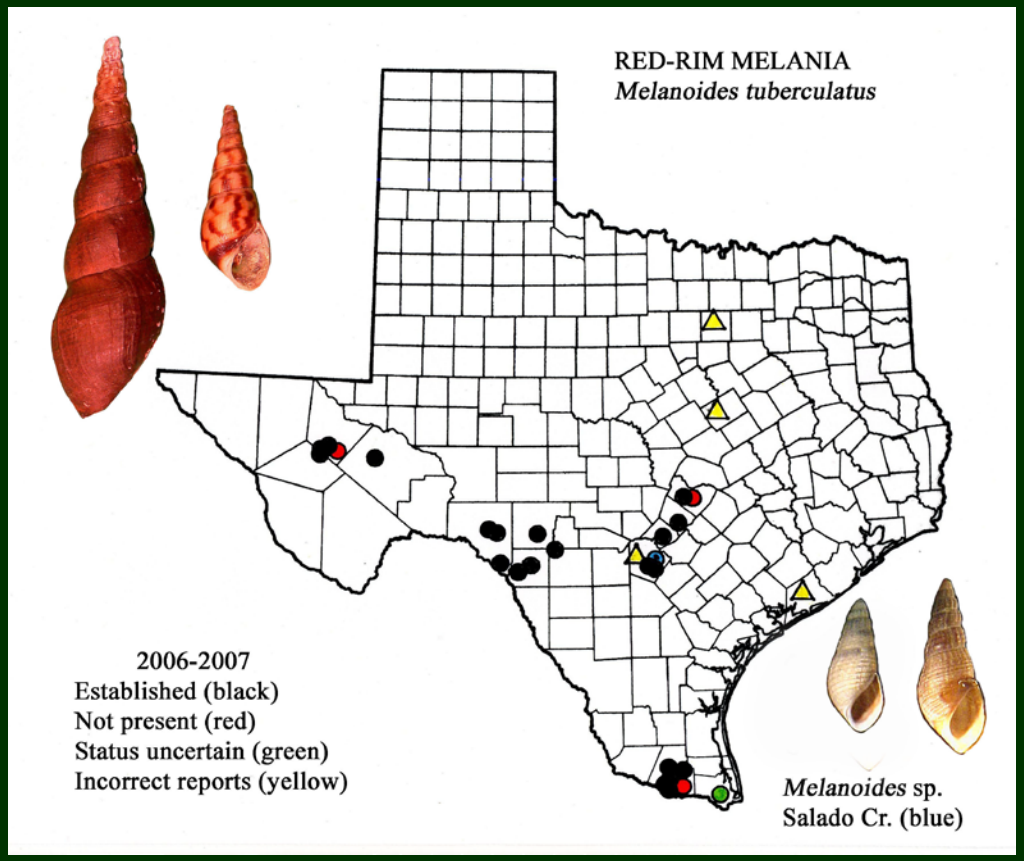
RED-RIM MELANIA
Melanoides tuberculatus - Texas

First found in Texas in the headwaters of the San Antonio and Comal river in 1963 (Murray 1964), but may have invaded earlier.

Additional waters invaded since (summaries in Howells 2001; Karatayev and Burlakova 2007).

Present at most invaded sites in 2007 (Karatayev and Burlakova 2007), including Diamond-Y Spring (J. Karges, TNC, March 2008; pers. comm.).

Taxonomic status of an odd morph in Salado Creek, Bexar Co. remains unclear.



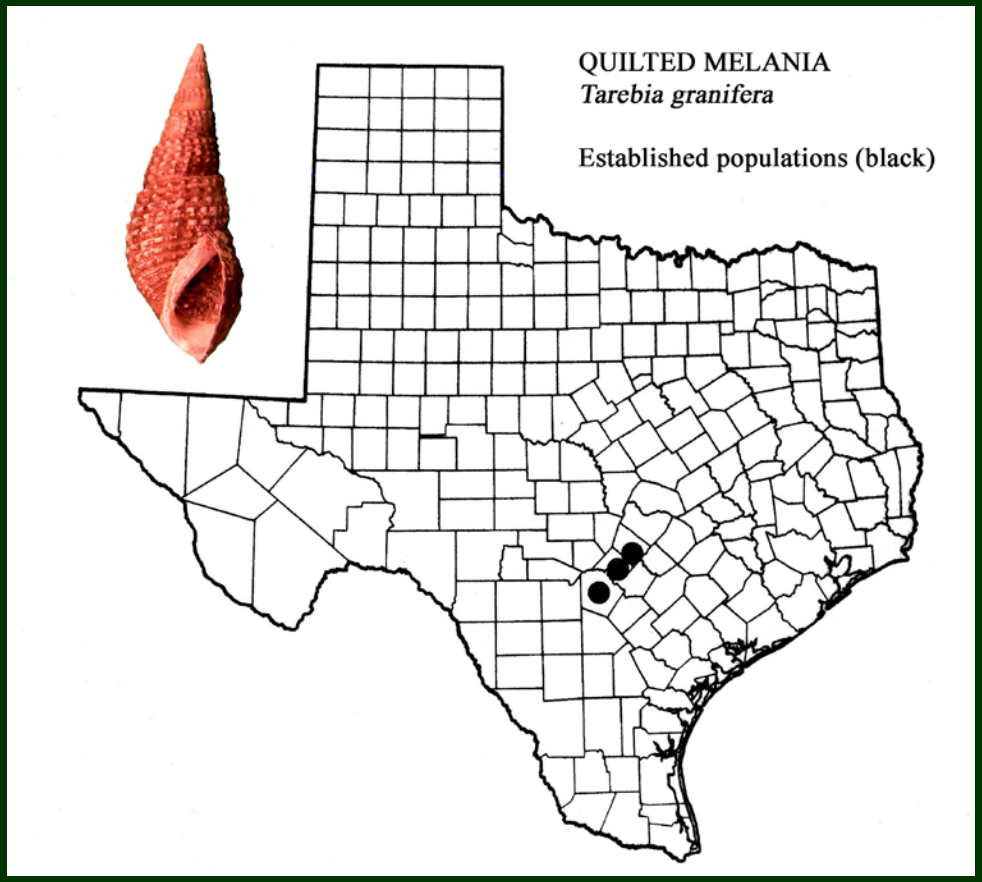
QUILTED MELANIA
Tarebia granifera - Texas

Introduced upper San Antonio and Comal rivers in 1963-64 (Murray 1971); possibly much earlier (Murray and Wopschall 1965).

Found in the upper San Marcos River 1977-78 (Lindholm and Huffman 1979).

No additional populations found in Texas since (Howells 2001; Karatayev and Burlakova 2007).

Still present at all three original introduction sites (Karatayev and Burlakova 2007).



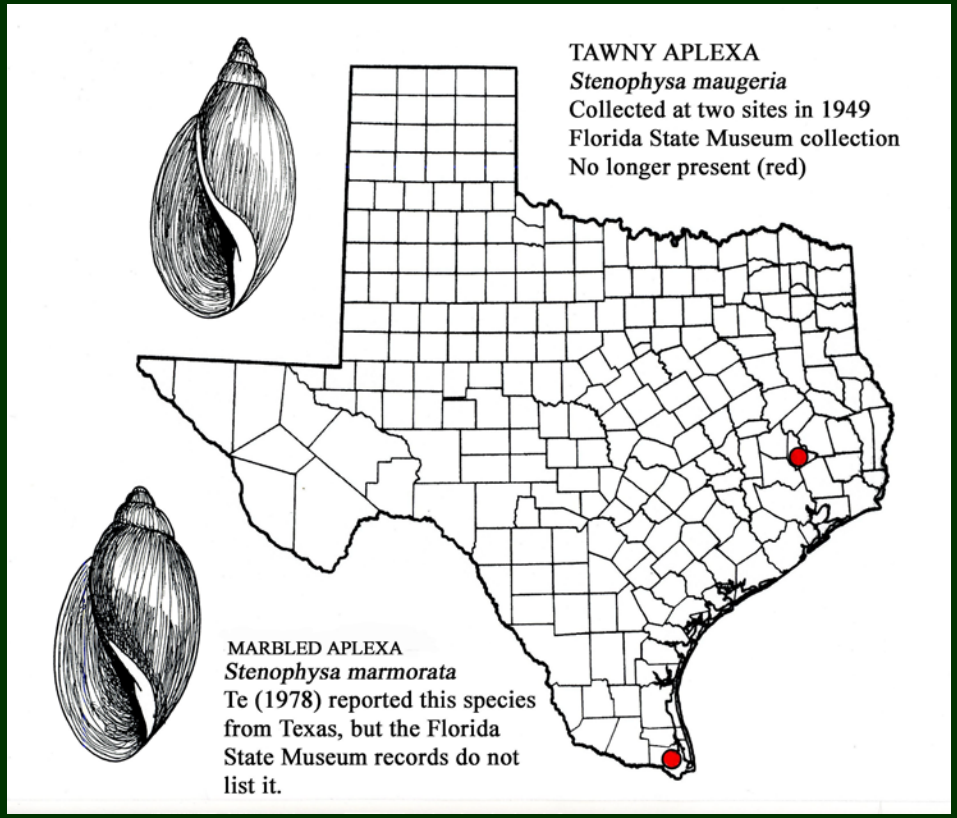
APLEXA SNAILS
Stenophysa spp. - Texas

Tawny and Marbled aplexa were reported by Te (1978) as collected in Texas, but without details (Burch 1989; Howells 2001 and others).

Tawny aplexa specimens taken in 1949 in Cameron and San Jacinto counties are listed among the Florida State Museum collection.

Marbled aplexa is not currently listed by FSM.

Neither species has been found in Texas since despite collection efforts in these areas.



ASIAN CLAM
Corbicula fluminea - Texas

First reported in Texas near El Paso in 1964 (Murray 1966); but with specimens in the Houston Museum of Natural Sciences taken there several months earlier and another from the Neches River in 1958 (Howells et al. 2004).

Texas distribution summarized by Karatayev et al. (2005). But, since then, one report from Chambers County was found to actually refer to Harris County (map left modified to indicate this correction).

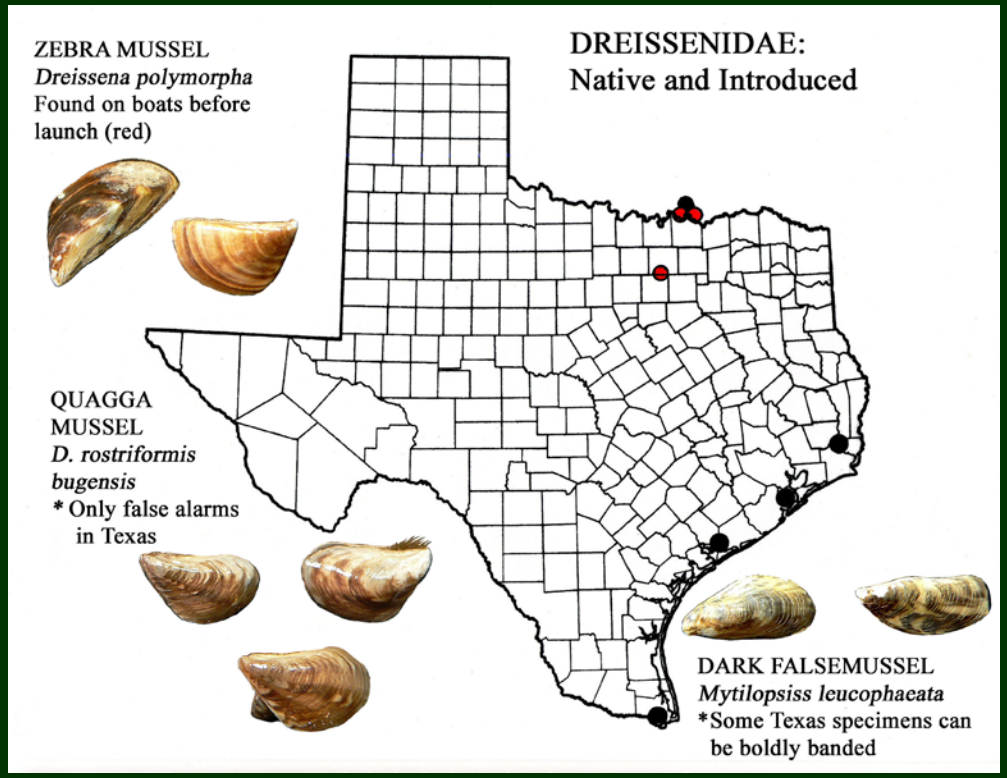
Note: Lack of collection records often reflects only lack of records for specific counties rather than absence of the species, except where there is no water.

DREISSENID MUSSELS
Native and Exotic - Texas

Zebra mussel has been found on boats brought to Texas on three occasions:
Once at L. Grapevine (1999) and twice at L. Texoma (2006-07).
All were detected before launch; none are known from Texas waters.

Reports of quagga mussel in Texas are based on native dark falsemussels.

Dark falsemussel has caused alarm at several sites in lower drainage basins around the state and at Lake Texoma.
**** NOTE ****
DFM in Texas are sometimes boldly banded.



DARK FALSEMUSSEL IN TEXAS

Mytilopsis leucophaeata

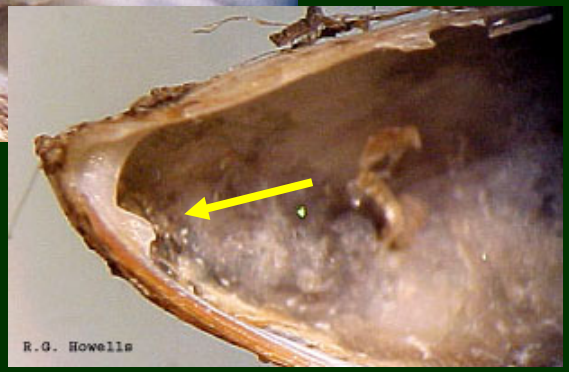
DFM: Texas (top), NJ (center)

Most dark falsemussels are overall brown in color, but some can be boldly banded…causing confusion about identity.

The *Mytilopsis* left is atypically deep-bodied. May be *M. sallei* Santo Domingo falsemussel? Collected in the Lower Rio Grande Valley.

DFM: Texas (banded type)

MUSSEL BEAK CAVITIES



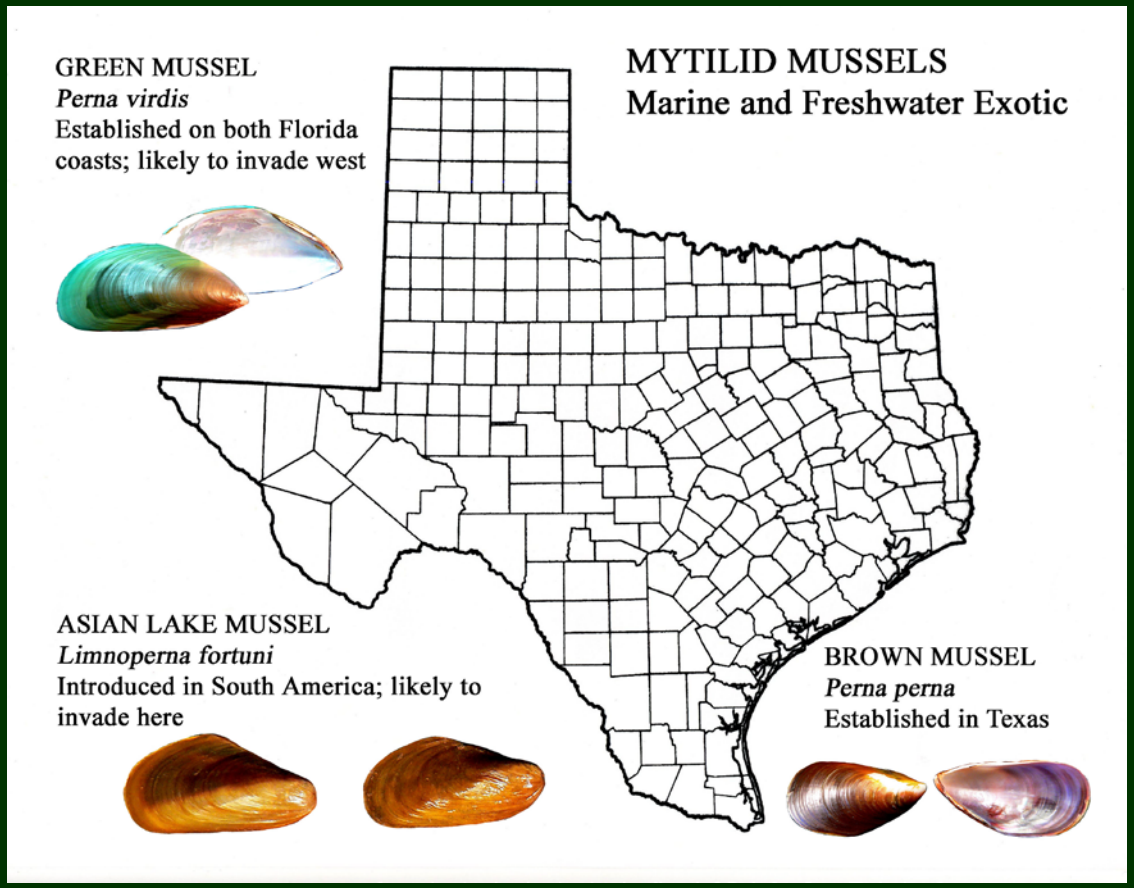
Zebra mussel (above) DFM (right)

MYTILID MUSSELS
Marine and Freshwater - Texas

Brown mussel was found in Texas waters in 1990 and spread from the central coast south (Hicks and Tunnell 1994).

Green mussel has become established in Florida and is likely to expand its range westward.

Asian lake mussel (also golden mussel) has invaded South America and may well appear in Texas in the future.



EXOTIC LAND SNAILS

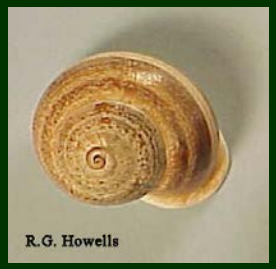
A variety of terrestrial Old World gastropods are well established in Texas including Asian tramp snail, several helicids, and several slugs. All are agricultural and horticultural pests.

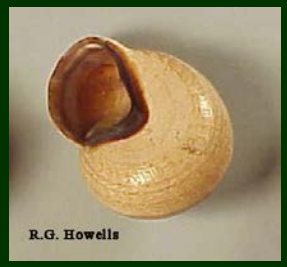
Mediterranean decollate snail is particularly problematic because it is sold to control garden snails and slugs. However, it also consumes native gastropods and garden plants themselves.

Decollate Snail (*Rumina decollata*)

Asian Tramp Snail (*Bradybaena similis*)

Milk Snail (*Otala lactea*)





Chocolate-band Snail (*Eobania vermiculata*)

Brown Garden Snail (*Cornu aspersum*)

Questions?