ARIZONA GAME AND FISH DEPARTMENT
HERITAGE DATA MANAGEMENT SYSTEM

Invertebrate Abstract **Element Code:** IMGASC9280
Data Sensitivity: No

CLASSIFICATION, NOMENCLATURE, DESCRIPTION, RANGE

NAME: *Sonorella grahamensis*
COMMON NAME: Pinaleño Talussnail
SYNONYMS:
FAMILY: Helminthoglyptidae

AUTHOR, PLACE OF PUBLICATION: H.A. Pilsbry and J.A. Ferriss. 1919. Mollusca of the southwestern states. IX. The Santa Catalina, Rincon, Tortillita and Galiuro mountains. X. the Mountains of the Gila headwaters. Proc. Acad. Nat. Sci. Philad. 70 (for 1918): 282-333.

TYPE LOCALITY: Mud Spring (?) on the summit of Mt. Graham, Graham Co., Arizona. (See "Additional Information"). Recent genetic work indicates the Pinaleño talussnail is currently known only from one location near Heliograph Peak, where it is sympatric with the Mimic talussnail (Weaver *et al.* 2010).

TYPE SPECIMEN: Holotype: Academy of Natural Sciences of Philadelphia 109101. H.A. Pilsbry and J.A. Ferriss, 1919.

TAXONOMIC UNIQUENESS: The Pinaleño talussnail was originally described by Pilsbry and Ferris (1919) from specimens collected from the Pinaleño Mountains, Graham County, Arizona. This species is considered valid by the Integrated Taxonomic Information System, Turgeon et al. (1998), and more recently confirmed to be genetically distinct from its congeners by Weaver *et al.* (2010).

DESCRIPTION: A land snail with a globose shell with about 4.5 whorls. This shell has a tan to olive tint and a chestnut-brown shoulder band, which has indistinctly pallid borders. It is approximately 19 mm in diameter. The five species of *Sonorella* in the Pinaleños cannot be distinguished from one another without dissection.

For helminthoglyptidae, the buccal mass is small and spheroidal. The gastric caecum and the rectal caecum are absent. The radular teeth are endocones and ectocones retained in marginal teeth but these are serrated, on quadrate or rectangular basal plates or the central and lateral teeth may be lacking endocones and ectocones but with a broad mesocone. The prolonged cuspid head on radular teeth may or may not be present. The cephalic shield is reduced, defined only by vestigial grooves. The hyponotum is absent. Inferior tentacles are present. The eye position is at the tip of more or less elongate cephalic tentacle. The tentacular nerve is bifurcated (Barker 2001).

AIDS TO IDENTIFICATION: Location as well as physical characteristics. "Differentiated from *S. christenseni* by shell characteristics. However, the two are still

difficult to separate with casual examination. Comparisons of the genitalia of these two species will separate them easily." (Fairbanks and Reeder, 1980).

ILLUSTRATIONS: Photo of shell (Hoffman, undated: P. 15).
Photo of reproductive tract (Hoffman, undated: P. 23).

TOTAL RANGE: Pinaleño Mountains, Graham County, Arizona. Previously believed to be restricted to rockslides from the northeast slope of Mount Graham south to the vicinity of the Arcadia Campground, Pinaleño Mountains, recent genetic work indicates the Pinaleño Talussnail is currently known from only one location near Heliograph Peak, where it is sympatric with the Mimic Talussnail (Weaver *et al.* 2010).

RANGE WITHIN ARIZONA: See "**Total Range.**"

SPECIES BIOLOGY AND POPULATION TRENDS

BIOLOGY: Adapted to fairly wet conditions. Weather conditions greatly affect activity of *Sonorella*, with live talus snails only becoming active above ground during or after monsoon rains. (Jontz *et al.* 2002, Weaver *et al.* 2010). Although suitable moisture conditions are likely for this snail during most summers, it spends a large part of year in estivation; it may have limited activity in some summers. Calcium carbonate from the limestone aids in shell deposition and buffers carbonic acid produced by the buildup of respiratory carbon dioxide during estivation. It is believed that most Pinaleño land snails mature in 2-3 years with a lifespan of approximately 6 years.

REPRODUCTION: Reproduction in *Sonorella* of the Pinaleño Mountains has not been studied. Hoffman believes that they are probably similar to other *Sonorella* species, which are hermaphroditic. "Each *Sonorella* lays a clutch of thirty to forty eggs once or, in particularly good years, twice during each summer" (Hoffman undated). For helminthoglyptidae, embryonic brooding may or may not be present and they can be oviviparous or viviparous. The eggs are single, not embedded in a jelloid/mucoid mass. The egg capsule could be partially calcified, with calcite crystals embedded in jelly layers but not forming a distinct shell or it could be calcified forming a distinct shell. The larval development has no trochophore or veliger stages, there is direct development in the egg. The larval operculum is absent. The genital orifices in the male and female are fused or nearly so in cephalic region, near right ocular tentacle. The extrapallial sperm duct is a closed duct, free in the body cavity. The lumen of the penis is lacking of spines. (Barker 2001).

FOOD HABITS: Hoffman (undated) states that *Sonorella* in the Pinaleño Mountains feed primarily on fungus and decaying plant matter, which is supplemented with young green shoots when available. For helminthoglyptidae, the openings of the digestive gland lobes are more or less adjacent, openings are intestinal. The stomach is greatly simplified, with very poorly developed musculature. The diagonal intestinal folds are absent. The intestinal valve is absent (Barker 2001).

HABITAT: As stated in the 2011 Conservation Agreement for Pinaleño Land Snails, "habitat for *Sonorella* and *Oreohelix* includes pine-oak and conifer forests with: (1) talus slopes (e.g., scree, natural rockslides, boulder fields); (2) streamside colluvial rock; or (3) mesic areas on hillsides with partial shade, rock, and leaf litter."

ELEVATION: 6,000 - 10,000 ft. (1,830 - 3,050 m).

PLANT COMMUNITY: Hoffman (undated) states that "the plants associated with the land snails in the Pinaleño Mountains vary with elevation." He lists various plant species associated with these snails for "higher" and "lower" elevations, but does not define "higher" and "lower" by giving specific elevations or exact species of snails associated with various plant species.

POPULATION TRENDS: According to Hoffman (undated), it has been observed since 1954 that *S. imitator* is becoming more common over the range previously inhabited by *S. grahamensis*. Reasons for this are unknown at this time. *S. grahamensis* habitat does not appear to be degraded. Because so little is known of the habitat requirements of this snail, changes in the environment could be detrimental as well as beneficial. Therefore, more research is required. Weaver *et al.* (2010) believe the species has declined and its current population may be limited to about a 10 km^2 area.

SPECIES PROTECTION AND CONSERVATION

ENDANGERED SPECIES ACT STATUS:	SC (USDI, FWS 1996) [C2 USDI, FWS 1994] [C2 USDI, FWS 1991]
STATE STATUS:	1 (AZGFD, AWCS 2022) [1B (AGFD SWAP 2012)]
OTHER STATUS:	Forest Service Sensitive (USDA, FS Region 3 1999, 2013)

MANAGEMENT FACTORS: Land managed as a multiple use forest and is primarily used for recreation. The telescope complex on Mt. Graham and an increase of camping and recreational sites are not expected to impact these snails to a great extent. However, the phasing out by the Forest Service of the fire suppression policy, may have a greater impact. Because fires have been suppressed for a period of time, dead brush and decayed plant matter has built up on top of the talus slopes so that the heat of a large fire may be intense enough to kill the snails in the talus below.

Threats: restricted and declining distribution with associated potential for extinction due to chance events; replacement by Mimic Talussnail (*S. imitator*); potentially intense fires resulting from increased furl loads. **Management needs:** research on effects of controlled burns; modification of fire suppression policy; periodic monitoring of snail populations and their habitats; research on ecology and systematics.

PROTECTIVE MEASURES TAKEN: The USFS has ongoing fuel load evaluations and fuel reduction efforts ongoing within the Pinaleño Mountains, to reduce the risk of future catastrophic wildfires. Standards and guidelines for Forest activities that may affect USFS sensitive species are also being incorporated into the Forest Plan revision.

SUGGESTED PROJECTS: Finalize the 2011 draft multi-species conservation agreement for Pinaleño land snails, including the Pinaleño Talussnail. Conservation activities under that agreement include: continuing a monitoring program for land snails within the Pinaleño Mountains, conducting evaluations of fuel load conditions and fuel reductions in areas occupied and adjacent to land snails, and maintaining talus habitat and other habitat components used by Pinaleño land snails.

LAND MANAGEMENT/OWNERSHIP: USFS - Coronado National Forest.

SOURCES OF FURTHER INFORMATION

REFERENCES:

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MAJOR KNOWLEDGEABLE INDIVIDUALS:

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Kathleen Weaver – University of University of La Verne, La Verne, California

ADDITIONAL INFORMATION:

"There is no "Mud Spring" on modern maps of the Pinaleño Mountains. Pilsbry writes that camp was in Stockton Pass and they walked up to the summit of Mount Graham for a couple of hours of collecting, then; presumably, because no other camp was mentioned; returned to camp for the night (Pilsbry 1939). This is a round trip distance of something more than 24 miles with more than 4500 feet of elevation change. Because of this, though the type locality is considered to be the summit of Mt. Graham, I feel that it is actually more likely to be at Heliograph Peak or somewhere between Ladybug Saddle and Heliograph Peak." (Hoffman undated).

"*S. grahamensis* has been collected by W.B. Miller, W.O. Gregg, M.L. Walton, R.L. Reeder, H.L. Fairbanks, and C.C. Cristensen at rockslides near Plain View Peak, Heliograph Peak, Wet Canyon, and above Swift Trail (Hwy 366) above Ladybug Saddle. The species has been found most consistently on Heliograph Peak. During this study all areas above were searched for *S. grahamensis* without success. During the summer of 1989, likely *Sonorella* habitats were searched within the Pinaleño Range as well as those in all of the immediately surrounding mountain ranges. These mountain ranges include the Santa Teresa, Dos Cabezas, Galiuro, Winchester, and Peloncillo Mountains." (Hoffman undated).

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2015-08-14 (AJM)
2023-02-08 (MBL)