ARIZONA GAME AND FISH DEPARTMENT
HERITAGE DATA MANAGEMENT SYSTEM

Invertebrate Abstract **Element Code:** IMGASC9360
Data Sensitivity: No

CLASSIFICATION, NOMENCLATURE, DESCRIPTION, RANGE

NAME: *Sonorella macrophallus*
COMMON NAME: Wet Canyon Talussnail
SYNONYMS: None
FAMILY: Helminthoglyptidae

AUTHOR, PLACE OF PUBLICATION: Fairbanks, H.L and R.L. Reeder. 1980. Two new species of *Sonorella* (Gastropoda: Pulmonata: Helminthoglyptidae) from the Pinaleño Mountains, Arizona. Proceedings of the Biological Society, Washington. 93(2): 395-404.

TYPE LOCALITY: South side of Wet Canyon about 300 feet from State Route 366, Pinaleño Mountains, Graham County, Arizona.

TYPE SPECIMEN: Holotype: USNM 783324. H.L. Fairbanks. Paratype: USNM 783325. W.B. Miller #4832.

TAXONOMIC UNIQUENESS: Location as well as physical characteristics. "The genitalia, in particular the verge, will immediately identify this species" (Fairbanks and Reeder 1980).

DESCRIPTION: Shell depressed, heliciform, convex above and below, thin, light brown in color, with chestnut-brown band just above midline of rounded shoulder of body whorl. Diameter 17.7 mm (0.71 in.); height 10.6 mm (0.42 in.), umbilicus diameter 2.5 mm (0.1 in.); whorls 4 ½; embryonic whorls 1 1/3.

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. Found in Wet Canyon, Twilight Canyon, and vicinity of Turkey Flat in the Pinaleño Mountains of southeastern Arizona. Described as a land snail with globose shell having about 4.5 whorls. Shell has tan to olive tint and chestnut-brown shoulder band which has indistinctly pallid borders. Shell is approximately 18.0 mm (0.72 in.) in diameter. *S. macrophallus* has shell

essentially identical to that of *S. grahamensis* and cannot be reliably distinguished from shells of other *Sonorella* species in the Pinaleño Mountains.

ILLUSTRATIONS: B&W photos of holotype (Fairbanks and Reeder 1980:396)
Cutaway camera lucida drawings of genitalia (Fairbanks and Reeder, 1980:398).
Color photo (J. Sorensen, AGFD)
B&W photo of dorsal view of shell (J.E. Hoffman unpublished:17).

TOTAL RANGE: Pinaleño Mountains, Graham County, Arizona. Previously believed to be restricted to only a one mile reach within Wet Canyon, genetic analysis revealed that the Wet Canyon Talussnail is widespread in the southern part of the Pinaleño Mountains and appears to be sympatric with *S. imitator*, though there is no evidence of resource partitioning between the two species (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 hibernation. It is believed that most Pinaleño land snails mature in 2-3 years with a lifespan of approximately 6 years.

REPRODUCTION: Hermaphroditic but usually mates. Eggs laid during favorable moisture conditions, in clutches of 30 to 40. 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 tha*t Sonorella* in the Pinaleño Mountains feed primarily on fungus and decaying plant matter 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: Hoffman observed that "this snail appears to require a somewhat wetter and possibly a lower elevation habitat than the other snails in this study." As identified in the draft 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: 6,200-9,185 ft. (1,890-2,800 m) According to Weaver *et al*. (2010).

PLANT COMMUNITY: Flora found in close association so *S. macrophallus* habitat includes: ponderosa pine (*Pinus ponderosa*), Gamble's Oak (*Quercus gambelii*), deer grass (*Muhlenbergia rigens*), monkeyflower (*Mimulus* sp.), nettle (*Urtica gracilis*), velvet ash (*Fraxinus velutina*), Arizona walnut (*Juglans major*), and spruce (*Picea* sp.) (Jontz *et al*. 2002).

POPULATION TRENDS: Locally abundant with fluctuations dependent upon moisture conditions. Arizona Game and Fish Department biologists observed over 120 live talussnails in the Wet Canyon drainage in August 2001, and over 25 live talussnails in Twilight Canyon and the nearby unnamed drainage during that survey (Jontz *et al*. 2002). In September 2002, Department and Forest Service biologists observed 35 live talussnails in Wet Canyon and another 6 live talussnails in Twilight Canyon. These surveys were not compatible or exhaustive in effort from year to year; search time was not estimated.

Timed presence / absence counts were conducted in 2008, 2011, 2013, and 2015, within Wet Canyon, Twilight Canyon, and other locations in the Pinaleno Mountains. In 2008, a total of 31 talussnails and 2 mountainsnails were observed in Wet Canyon (search effort = 975 minutes; Catch Per Unit Effort=0.34 snails/10 min). In 2011, a total of 42 talussnails were observed in Wet Canyon (search effort = 680 min; CPUE=0.62 snails/10 min) and 59 talussnails in Twilight Canyon (search effort = 240 min; CPUE=2.46 snails/10 min). In 2013, a total of 26 talussnails were observed in Wet Canyon (search effort = 430 minutes; CPUE=0.60 snails/10 min), 53 talussnails in Twilight Canyon (search effort = 150 min; CPUE=3.53 snails/10 min), and 6 talussnails in the east end of Turkey Flat (search effort = 60 min; CPUE=1.00 snails/10 min). In 2015, a total of 25 talussnails were observed in Wet Canyon (search effort = 390 min; CPUE=0.64 snails/10 min), 4 mountainsnails and 1 talussnail in Twilight Canyon (search effort = 240 min; CPUE=0.21 snails/10 min), and only three shells found in the east end of Turkey Flat (search effort = 60 min). Based on CPUE estimates, talussnail abundance in Wet Canyon appears the same between 2011 and 2015, and talussnail abundance in Twilight Canyon was much higher and also fairly stable in numbers in 2011 and 2013. The 2011 and 2013 surveys were conducted in ideal weather conditions, during and following prolonged monsoon rains; the 2008 and 2015 surveys had drier weather, both two days post-rain.

SPECIES PROTECTION AND CONSERVATION

ENDANGERED SPECIES ACT STATUS: CCA (USDI FWS 1999)
[None USDI, FWS 2001]
[C USDI, FWS 1996]
[C1 USDI, FWS 1991]

STATE STATUS: 1 (AZGFD, AWCS 2022)
[1A (AGFD SWAP 2012)]

OTHER STATUS: Forest Service Sensitive (USDA, FS Region 3 2013)

MANAGEMENT FACTORS: **Threats:** limited distribution with associated potential for extinction due to chance events; potentially intense fires and post-fire ash flows from increasing fuel loads. **Management needs:** evaluation of fuel loads in area adjacent to and occupied by the species; manual removal of woody debris and potential fire fuels from the canyon drainage recommended; periodic monitoring of snail population and its habitat.

PROTECTIVE MEASURES TAKEN: In December of 1999, the USDA Forest Service, the State of Arizona, and the U.S. Fish and Wildlife Service entered into a conservation agreement to work together for the conservation of the Wet Canyon Talussnail and its habitat. That agreement has now expired, but a revised agreement was drafted in 2011 that includes this species and other land snails in the Pinaleño Mountains. The Arizona Game and Fish Commission Order 42 (Crustaceans and Mollusks) prohibits collection and harvest of the Wet Canyon Talussnail. The Coronado Land and Resource Management Plan incorporates a special management area for protection of the Wet Canyon Talussnail. Standards and guidelines for Forest activities that may affect USFS sensitive species are also being incorporated into the Forest Plan revision.

SUGGESTED PROJECTS: Research about the life history, diet, reproduction, activity patterns, home range size, survivorship and basic biology of the Wet Canyon Talussnail. Finalize the 2011 draft multi-species conservation agreement for Pinaleño land snails, including the Wet Canyon 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

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MAJOR KNOWLEDGEABLE INDIVIDUALS:

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ADDITIONAL INFORMATION:

Sonorella macrophallus: Sonorella refers to the Sonoran Desert region from which this landsnail was first described. The specific epithet describes the anatomical features that distinguish this species from other talussnails in this genus.

Revised: 1992-04-23 (DBI)
1995-07-24 (DBI)
1997-03-01 (SMS)
1997-11-14 (SMS)
2001-11-02 (SMS)
2003-07-31 (JS)
2003-07-31 (AMS)
2004-01-13 (AMS)
2015-08-14 (AJM)
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