

**ARIZONA GAME AND FISH DEPARTMENT
HERITAGE DATA MANAGEMENT SYSTEM****Invertebrate Abstract****Element Code:** IMGASC9010**Data Sensitivity:** No**CLASSIFICATION, NOMENCLATURE, DESCRIPTION, RANGE****NAME:** *Sonorella allynsmithi***COMMON NAME:** Phoenix Talussnail (= Squaw Peak Talussnail)**SYNONYMS:** *Maricopella allynsmithi***FAMILY:** Helminthoglyptidae**AUTHOR, PLACE OF PUBLICATION:** W.O. Gregg and W.B. Miller. 1969. A new *Sonorella* from Phoenix, Arizona. Nautilus 83 (3): 90-93.**TYPE LOCALITY:** East side of Squaw Peak Road about 0.3 miles from Lincoln Drive, Phoenix, Arizona.**TYPE SPECIMEN:** Holotype: Academy of Natural Sciences of Philadelphia 314853.**TAXONOMIC UNIQUENESS:** Genus *Sonorella* divided into four complexes by Miller. Within these complexes there are about 60 species and subspecies of *Sonorella* within Arizona. *S. allynsmithi* belongs to the *Sonorella rooseveltiana* complex, which contains two species and one subspecies (Bequaert and Miller 1973). In 1992, a new subspecies of *S. allynsmithi* found as well as a new species of *Sonorella*. Appropriate complex for this new species not known at this time (1995).**DESCRIPTION:** Land snail with small (to about 13.0 mm (0.52 in.) diameter), thin, glossy white globose shell with brownish-gray tinge. Light-brown spiral band on rounded shoulder and approximately 4 to 4 1/4 whorls. Snail has very dark gray to black body. 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). This is only land snail fitting this description in Phoenix Mountains area, though it could be confused with other *Sonorella* found in McDowell Mountains or further eastward.**AIDS TO IDENTIFICATION:** Reproductive structures must be dissected out of snail and compared to ascertain positive identification. However, Nick D. Waters is developing a photographic reference guide with notes on shell and external snail body morphology and pigmentation that may provide a preliminary means of identification by species, paired with locality (pers. comm. Jeff Sorensen, AGFD, 2015).

ILLUSTRATIONS: Color photo (N.D. Waters)

TOTAL RANGE: Squaw Peak (=Piestewa Peak) Park and Mummy Mountain, Maricopa Co. Arizona. Waters (2011) reports that the Phoenix talussnail was detected at 16 new localities, bringing the total to 20 within the greater Phoenix metropolitan area of northeastern Maricopa County. The species was detected within discontinuous ranges of central and north Phoenix, Scottsdale, Fountain Hills, Glendale, Peoria, Cave Creek, Carefree, and New River.

RANGE WITHIN ARIZONA: See “**Total Range.**”

SPECIES BIOLOGY AND POPULATION TRENDS

BIOLOGY: Development within shell takes about a month. Eggs seem to have less ability than mature snails to withstand lengthy dry spells; true for immature snails as well. It takes four or more years to reach reproductive maturity. They have very porous epidermis.

REPRODUCTION: Hermaphroditic, “each mating encounter usually results in two pregnancies” (Hoffman 1994). Fertilization and egg laying takes several days. If rains are short-lived, snails may be forced to wait for next rain to lay eggs. For helminthoglyptidae, embryonic brooding may or may not be present and they can be oviparous 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: Fungal hyphae and decomposing plant matter that filters down among rocks and soils. 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: “All suitable north facing talus slopes, a total of at least fourteen, within Squaw Peak Park. Also, two talus slopes on Mummy Mountain” (Hoffman 1994). Lower Sonoran Life-Zone under conditions of extreme aridity at low elevations (Bequaert and Miller 1973). Because of porous epidermis, snails must inhabit very deep, open, talus piles or rockslides where they can seal shell apertures to solid rock while being protected from heat and dryness by rock layers and plants above. Talussnails cannot survive where decomposing granite, sand, or mud fills the interstitial spaces of rocky slopes. Land snails require calcium carbonate from which to build shells and to buffer carbonic acid created from exhaled water and carbon dioxide. Without a source of calcium carbonate, carbonic acid would build to high levels as snails estivate within sealed shells for many months at a time. Land snails in xeric environments obtain calcium carbonate from limestone. Soils within xeric regions are rich in calcium carbonate, therefore calcium is readily available to snails in the form of gravel and sand fragments of caliche. Limestone geologic formations are not required for talussnail

habitat in the greater Phoenix metropolitan area (Waters 2011).

ELEVATION: 1,100 - 3,900 ft (336 - 1,190 m) according to Bequaert and Miller (1973).

PLANT COMMUNITY: They may be found associated with the following plant species: *Carnegia gigantea* (saguaro), *Parkinsonia microphylla* (little-leaf paloverde), *Encelia farinosa* (white brittle-bush), *Bromus rubens* (foxtail brome), *Rhynchityrum roseum*, *Larrea tridentata* (creosote bush), *Lupinus sparsiflorus* (Mohave lupine), and *Sphaeralcea* sp. (globe-mallow). (Hoffman 1994).

POPULATION TRENDS: Unknown.

SPECIES PROTECTION AND CONSERVATION

ENDANGERED SPECIES ACT STATUS: None (USDI, FWS 1996)
[C2 USDI, FWS 1994]

STATE STATUS: SGCN Tier 1b (AGFD 2012)

OTHER STATUS: Forest Service Sensitive (USDA, FS Region 3 1999)
None (USDA, FS Region 3 2013)

MANAGEMENT FACTORS: Waters (2011) reports that buffelgrass (*Pennisetum ciliare*) and fountaingrass (*Pennisetum setaceum*) have become widespread throughout mountains occupied by the Phoenix talussnail, particularly adjacent to heavily landscaped developments at the type locality, Piestewa Peak, and at Hedgpeth Hills, Deem Hills, and Ludden Mountain. Wildfires fueled from dense stands of these invasive grasses and weeds burn rapidly and at high temperature. While rocky soils and talus mitigate temperature extremes caused by fire (Stoof and others 2010), high temperatures rapidly shatter and break down rock into smaller particles, reducing shade and forming soil which subsequently reduce interstitial space (Blackwater 1927; Dorn 2003; Dragovich 1993). Urban development and materials mining are also primary threats to the species, although most occupied habitats are either on city and county park preserves, or on hillsides that are unsuitable for residential development or commercial rock and mineral excavation.

Threats: wildfire fueled by invasive weeds and grasses; housing development; rock and mineral mining; and as a lesser impact, the disturbance of habitat from off-trail hikers.

Management needs: invasive weed management; educational outreach in parks to alert hikers of activities that may be detrimental to the talussnail; periodic monitoring of snail populations and their habitat.

PROTECTIVE MEASURES TAKEN: City and county park preserves already have habitat protections in place and manage recreation use with designated trails, law enforcement patrols, prohibit off-trail hiking, collecting, and disturbance of natural resources including the snails and their habitat.

SUGGESTED PROJECTS: Population surveys to determine snail status among occupied sites, along with *in situ* and laboratory studies of their life history, reproduction and habitat

preferences, including temperature and humidity tolerances to model impacts of future climate change.

LAND MANAGEMENT/OWNERSHIP: City of Phoenix (Phoenix Mountains Preserve); City of Paradise Valley; Maricopa County Parks; Town of Cave Creek; and private land.

SOURCES OF FURTHER INFORMATION

REFERENCES:

- Barker, G.M. 2001. The Biology of Terrestrial Molluscs. CABI Publishing UK. Pp: 139-144.
- Bequaert, J.C. and W.B. Miller. 1973. The mollusks of the arid southwest. The University of Arizona Press. Tucson, Arizona. Pp. 23, 125.
- Blackwater, E. 1927. Fire as an Agent in Rock Weathering. The Journal of Geology 35(2):134-140.
- Dorn, R.I. 2003. Boulder Weathering and Erosion Associated with a Wildfire, Sierra Ancha Mountains, Arizona. Geomorphology 55:155-171.
- Dragovich, D. 1993. Fire-Accelerated Boulder Weathering in the Pilbara, Western-Australia. Zeitschrift Fure Geomorphologie 37(3):295-307.
- Hoffman, J.E. 1994. Status survey for the Squaw Park Talussnail *Sonorella allynsmithi*. Prepared for U.S.Fish and Wildlife Service, Ecological Services, Contract Number 20181-1-1422.
- Hoffman, J. 2000. In Personal communication from S. Schuetze (AGFD) to Nicole Capuano (NatureServe).
- Hoffman, J. Obtained 2003. Printout from personal database on type localities of snails.
- NatureServe Explorer: An online encyclopedia of life [web application]. 2003. Version 1.6. Arlington, Virginia, USA: NatureServe. Available: <http://www.natureserve.org/explorer>. (Accessed: November 19, 2003).
- Roth, B. 1996. Homoplastic Loss of Dart Apparatus, Phylogeny of the Genera, and a Phylogenetic Taxonomy of the Helminthoglyptidae (Gastropoda: Pulmonata). The Veliger 39(1):18-42.
- Stoof, C.R., De Kort, A., Bishop, T.F.A, Moore, D., Wesseling, J.G., and C.J. Ritsema. 2010. How Rock Fragments and Moisture Affect Soil Temperatures During Fire. Soil Science Society of America 75(3):1133-1143.
- Turgeon, D.D. et al. 1998. Common and Scientific names of aquatic invertebrates from the United States and Canada: Mollusks. Second Edition. American Fisheries Society Special Publication 26, Bethesda, Maryland. P. 526.
- USDA, Forest Service Region 3. 1999. Regional Forester's Sensitive Species List.
- USDI, Fish and Wildlife Service. 1994. Endangered and Threatened Wildlife and Plants; Animal Candidate Review for Listing as Endangered or Threatened Species; Proposed Rule. Federal Register 59(219): 59007.
- USDI, Fish and Wildlife Service. 1996. Endangered and Threatened Wildlife and Plants: Review of Plant and Animal Taxa that are Candidates for Listing as Endangered or Threatened Species. Federal Register 61(40): 7596-7613.
- Waters, N.D. 2011. Distribution and Ecology of the Phoenix Talussnail, *Sonorella allynsmithi*. Nongame and Endangered Wildlife Program Technical Report 264. Arizona Game and Fish Department, Phoenix, Arizona

MAJOR KNOWLEDGEABLE INDIVIDUALS:

James Hoffman - Tucson, Arizona

Walt Miller - University of Arizona (Retired), Tucson, Arizona

Nick D. Waters – Arizona State University, Tempe, Arizona (and AGFD contractor)

ADDITIONAL INFORMATION:

According to Jim Hoffman, the name *Maricopella allynsmithi* is not widely accepted in Arizona. He questions the genetic work that split out several of the *Sonorella*'s to *Maricopella*'s. (Hoffman 2000). Roth (1996) recommended the Phoenix talussnail be placed in the monotypic genus *Maricopella*, which he considered sister to *Sonorella*, with *Eremarionta* likely ancestral to both genera. However, recent molecular analysis (Waters and others, in preparation) does not support separation as the species is nested within *Sonorella* (Waters 2011).

Revised: 1995-01-09 (DBI)
1997-03-03 (SMS)
2003-12-04 (AMS)
2015-09-11 (JAS)

To the user of this abstract: you may use the entire abstract or any part of it. We do request, however, that if you make use of this abstract in plans, reports, publications, etc. that you credit the Arizona Game and Fish Department. Please use the following citation:

Arizona Game and Fish Department. 20XX (= **year of last revision as indicated at end of abstract**). X...X (= **taxon of animal or plant**). Unpublished abstract compiled and edited by the Heritage Data Management System, Arizona Game and Fish Department, Phoenix, AZ. X pp.