

**ARIZONA GAME AND FISH DEPARTMENT
HERITAGE DATA MANAGEMENT SYSTEM**

Invertebrate Abstract

Element Code: IMGASJ0230Data Sensitivity: Yes**CLASSIFICATION, NOMENCLATURE, DESCRIPTION, RANGE****NAME:** *Pyrgulopsis thompsoni* Hershler and Landye**COMMON NAME:** Huachuca Springsnail**SYNONYMS:****FAMILY:** Hydrobiidae**AUTHOR, PLACE OF PUBLICATION:** R. Hershler, and J.J. Landye. 1988. Arizona Hydrobiidae (Prosobranchia: Rissoacea). Smithsonian Contributions to Zoology. Number 459: 41-43.**TYPE LOCALITY:** Peterson Ranch Spring (a.k.a Sylvania Spring, Scotia Canyon), Santa Cruz County, Arizona.**TYPE SPECIMEN:** Holotype: USNM 859057. J.J. Landye, 19 August 1973.**TAXONOMIC UNIQUENESS:** This genus comprises 137 recognized species (Hershler *et al.* 2014), 13 of which are present in Arizona.**DESCRIPTION:** Shell with 3.25 to 5.0 moderately convex, slightly shouldered whorls. Adult shell height (height from top of shell to bottom of shell) 1.7-3.2 mm. Snout and anterior portion of foot (dorsal surface) with light to fairly dark pigment. Remainder of head/foot usually unpigmented. All hydrobioids have a foot with a rounded posterior end. Penis moderate size, with elongate filament and single, small glandular ridge on ventral surface of penial lobe. Sexually dimorphism significant in two of four populations studied, with males larger in one of these and females larger in the other.**AIDS TO IDENTIFICATION:** Due to the small size of this animal, it cannot be identified to species in the field but must be identified in a laboratory by a qualified authority or by genetic testing. The rule of thumb that springsnail species are specific to a particular location (i.e. a single spring or group of springs connected or close to each other), may be used as a means of preliminary identification.**ILLUSTRATIONS:**

Line drawing of pallial oviduct (Hershler and Landye 1988)

Photographs of shell (Hershler and Landye 1988)

Scanning electron microscope micrographs of radula (Hershler and Landye 1988)

Line drawings (Hershler and Ponder 1998)

Color photo (Sorensen 2017)

TOTAL RANGE: Springs within the drainages of the Santa Cruz River basin, San Pedro River basin, and Rio Bambuto basin. These basins are located in southern Santa Cruz and Cochise counties, Arizona, and northern Sonora, Mexico.

RANGE WITHIN ARIZONA: Present sites with extant populations within the San Pedro River drainage are located in: one site in Ramsey Canyon, Sawmill Canyon Spring, Canelo Hills Cienega, two sites along Bear Creek, four sites in Garden Canyon, three sites in McClure Canyon including Cave Spring, one site in Huachuca Canyon, and one site in Miller Canyon (formerly believed to be extirpated, but a few snails were found in 2018). Sites within the Santa Cruz River drainage are located in: Sheehy Spring, two sites within the Sonoita Creek drainage (Cottonwood Spring and Monkey Spring), and four sites within the vicinity of Scotia Canyon (three at Peterson Ranch and Neighbor Spring). Some presumed, but not verified, historical sites were investigated in 2015: Upper Santa Cruz River near the international border, Sharp Spring, and Finley Tank in O'Donnell Canyon, but no springsnails were found at those locations. None of those sites had suitable springsnail habitat. Blacktail Spring was dry in 2017, and that population is believed extirpated.

SPECIES BIOLOGY AND POPULATION TRENDS

BIOLOGY: The hydrobioid digestive system is typical of style-bearing neotaenioglossans. The mouth opens to a short oral area containing a pair of dorsolateral chitinous jaws composed of small, simple rodlets, immediately behind which is a well-developed buccal mass (situated within the snout). A pair of simple, unbranched, tubular salivary glands opens anterodorsally to the buccal cavity and (almost always) pass posteriorly over the nerve ring, rarely stopping short of the ring, but never passing through it in hydrobioids. Hydrobioids have a taenioglossate radula (i.e., seven teeth per row) comprising numerous rows of cusped teeth, each of which includes a typically squarish or trapezoidal central tooth flanked on each side by lateral, inner marginal, and outer marginal teeth. Teeth near the anterior end of the radula are often worn or broken, whereas the proximal portion of the ribbon has several to many rows of poorly differentiated or incompletely formed teeth (Hershler and Ponder 1998).

REPRODUCTION: Most hydrobioids are oviparous, with females depositing small egg capsules, either singly or (rarely) in strings, on the substrate. A small number of hydrobioids are ovoviviparous, in which females brood shelled young in the pallial gonoduct. Hydrobioid egg capsules are typically hemispherical to spherical. Copulation in hydrobioids is usually via an anterior opening to the glandular oviduct. The ventral channel may be traversed at least in part by the penis, but it is more likely that the penis only enters the anterior most section (Hershler and Ponder 1998).

FOOD HABITS: While the specific food habits of *Pyrgulopsis thompsoni* have yet to be identified, "hydrobiid snails primarily feed on periphyton, which is a complex mixture of

algae, bacteria, microbes, and detritus, that live upon submerged surfaces in aquatic environments” (Mladenka 1992).

HABITAT: Springs and ciénegas inhabited by the snail are typically marshy areas characterized by various aquatic and emergent plant species that occur within plains grasslands, oak and pine-oak woodlands, and coniferous forest vegetation communities. Typically occupies shallower areas within the ciénega, which are often very limited. More likely to be found in the rocky seep areas at the spring source.

ELEVATION: 4,500 to 7,000 ft. (1373 – 2134 m).

PLANT COMMUNITY: Although there seems to be no correlation between specific plant communities and the prevalence of *Pyrgulopsis thompsoni* (Myers 2012), most of the springs occupied by this species are located on or near Fort Huachuca, where riparian communities occur in canyons with perennial water flows and are dominated by tree species such as Arizona sycamore (*Plantanus wrightii*), Fremont cottonwood (*Populus fremontii*), and Arizona walnut (*Juglans major*). Further, Piorkowski and Diamond (2015) determined that there was no relationship between percent vegetation or composition of substrate as shown in other springsnail species.

POPULATION TRENDS: Of all the Arizona *Pyrgulopsis* species, *P. thompsoni* has the greatest number of known populations (Hurt and Hedrick 2005). Timed presence/absence surveys of springsnails have been conducted on all known localities (extant and historical sites) on Fort Huachuca lands, and most of the extant populations have low abundance with the exception of Bear Spring and Garden Canyon “sandbox” with densities over a hundred snails per 10-minute search; two of the three Scotia Canyon sites on the Coronado National Forest also have relatively high densities of springsnails (Piorkowski and Mulligan 2012; Piorkowski and Diamond 2015; and unpublished AGFD data) Suitable habitat within each spring is generally limited which affects its population size. Based on the synthesis of multiple studies there appear to be 21 extant populations in Arizona, with at least two or more populations in Sonora, Mexico. Because of the lack of historical naming conventions for these springs some locations have been given multiple names, making quantitative analysis difficult. While the Department and Department of Defense has surveyed all potential habitat on Fort Huachuca, there are other potentially suitable habitats under different land ownership that have not been investigated thoroughly. (USFWS 2001; Piorkowski and Diamond 2015).

SPECIES PROTECTION AND CONSERVATION

ENDANGERED SPECIES ACT STATUS: C* (USDI, FWS 2014)
[C USDI, FWS 2007]
[C USDI, FWS 1996]
[C USDI, FWS 2002, 2004-2011]
[C USDI, FWS 1997]

STATE STATUS:

[C2 USDI, FWS 1991, 1994]

[C2 USDI, FWS 1989]

1 (AZGFD, AWCS 2022)

[1A (AGFD SWAP 2012)]

OTHER STATUS:Forest Service Sensitive (USDA, FS Region
3 1999, 2007, 2013)Bureau of Land Management Sensitive
(USDI, BLM AZ 2000, 2005, 2008,
2010)

U.S. Army Species At Risk (Level 1, 2015)

MANAGEMENT FACTORS: Threats: loss or degradation of spring and cienega habitat due to water developments, drought, altered fire regimes, mining, recreation, and overgrazing. Extirpation of a population could occur as a result of a major storm, drought, fire, or other form of environmental stochasticity. Because populations are isolated and movement is minimal, once extirpated, sites are unlikely to be recolonized without active management. Small populations are also subject to genetic deterioration and demographic variability, which increases the likelihood of extinction.

PROTECTIVE MEASURES TAKEN: Cottonwood Spring is being protected by cooperation between the private landowner and the USFWS Partners Program. Similarly, Sheehy Spring is protected and managed under a Low-Effect Habitat Conservation Plan for the San Rafael Cattle Company, with Huachuca springsnail as one of the covered species under that voluntary conservation plan. The Canelo Hills Cienega population is protected and managed by The Nature Conservancy at their Canelo Hills Cienega Preserve property. A Candidate Conservation Agreement for the species was finalized and signed by the Department, Fort Huachuca, Coronado National Forest, and USFWS in August 2016 for an initial 25-year timeframe (HSWG 2016).

SUGGESTED PROJECTS: Habitat improvement and protection of springflow could be conducted at some of the current and possibly extirpated sites. Sites with muddy substrates may benefit from the addition of rocky material which the snails use to shelter on, deposit eggs, and forage periphyton and diatoms growing on the hard surfaces. Extirpated sites should be reintroduced with appropriate haplotypes (that is: nearest neighbor preferred, or USFWS and Department-agreed on replicate of a rare haplotype) of Huachuca springsnails. Basic information on ecology, life cycle, and population dynamics for this springsnail is needed.

LAND MANAGEMENT/OWNERSHIP: DOD - Fort Huachuca Military Reservation;
Private; USFS - Coronado National Forest; TNC - Canelo Hills Cienega.

SOURCES OF FURTHER INFORMATION**REFERENCES:**

- Arizona Game and Fish Department. 2012. Arizona's State Wildlife Action Plan 2012-2022. Phoenix, AZ.
- Arizona Game and Fish Department. 2022. Arizona Wildlife Conservation Strategy: 2022-2032. Arizona Game and Fish Department, Phoenix, Arizona. 378 pages.
- Bequaert, J.C. and W.B. Miller. 1973. The mollusks of the arid southwest. The University of Arizona Press, Tucson Arizona. Pp. 220-223.
- Haas, A. 2001. Working Together for Riparian Conservation. Endangered Species Bulletin. September, volume XXVI, No. 1.
- Hershler, R. and J.J. Landye. 1988. Arizona Hydrobiidae (Prosobranchia: Rissoacea). Smithsonian Contributions to Zoology. Number 459: 41-43.
- Hershler, R. and W.F. Ponder. 1998. A Review of Morphological Characters of Hydrobioid Snails. Smithsonian Institution Press, Washington D.C.
- Hershler, R., H-P. Liu, and J. Howard. 2014. Springsnails: A New Conservation Focus in Western North America. Bioscience Advance Access. Pub. July 16, 2014.
- Huachuca Springsnail Working Group. 2016. Candidate Conservation Agreement for the Huachuca Springsnail (*Pyrgulopsis thompsoni*). July 16, 2016. Signed by partners in August 2016.
- Hurt, C. and P. Hedrick. 2005. Genetic Variation in Arizona springsnails. Arizona Heritage Fund report I02005 submitted to the Arizona Game and Fish Department. Department of Biology, Arizona State University, Tempe, Arizona.
- Mladenka, G.C. 1992. The ecological life history of the Bruneau hot springs snail (*Pyrgulopsis bruneauensis*). Unpublished M.Sc. Thesis, Idaho State University, Pocatello, Idaho.
- Myers, T.L. 2012. Summary and evaluation of distributional records and reports of Huachuca springsnails. Heritage Fund contract report to the Arizona Game and Fish Department.
- NatureServe Explorer: An online encyclopedia of life [web application]. 2003. Version 1.6. Arlington, Virginia, USA: NatureServe. Available: <https://explorer.natureserve.org/>. (Accessed: November 18, 2003).
- Piorkowski, M.D. and J.M. Diamond. 2015. Springsnails on Department of Defense Installations in the Desert Southwest: Identification, Status and Distribution of At-Risk Springsnail Communities. Final Draft Report. Arizona Game and Fish Department, Wildlife Contracts Branch, Phoenix, Arizona, USA.
- Piorkowski, M.D. and G. Mulligan. 2012. Huachuca springsnail (*Pyrgulopsis thompsoni*) summary: an investigative presence/absence survey. Arizona Game and Fish Department, Wildlife Contracts Branch, Phoenix, Arizona, USA.
- Sorensen, J. 2003. Personal Communication to Joan Scott, AGFD.
- US Army. 2015. Species At Risk list for Department of Defense properties.
- USDA, Forest Service Region 3. 1999. Regional Forester's Sensitive Species List.
- USDA, Forest Service Region 3. 2007. Regional Forester's List of Sensitive Animals.
- USDA, Forest Service Region 3. 2013. Regional Forester's List of Sensitive Animals.
- USDI, Bureau of Land Management. 2000. Arizona BLM Sensitive Species List. Instruction Memorandum No. AZ-2000-018.
- USDI, Bureau of Land Management. 2005. Arizona BLM Sensitive Species List.
- USDI, Bureau of Land Management Region 2. 2008. Arizona BLM Sensitive Species List.

- USDI, Bureau of Land Management Region 2. 2010. Arizona BLM Sensitive Species List.
- USDI, Fish and Wildlife Service. 1989. Endangered and Threatened Wildlife and Plants; Animal Notice of Review. Federal Register 54(4): 554-579.
- USDI, Fish and Wildlife Service. 1991. Endangered and Threatened Wildlife and Plants; Animal Candidate Review for Listing as Endangered or Threatened Species, Proposed Rule. Federal Register 56(225): 58822.
- 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): 59006.
- 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.
- USDI, Fish and Wildlife Service. 1997. Endangered and Threatened Wildlife and Plants; Review of Plant and Animal Taxa that are Candidates or Proposed for Listing as Endangered or Threatened, Annual Notice of Findings on Recycled Petitions, and Annual Description of Progress on Listing Actions; Notice of Review; Proposed Rule. Federal Register 62(182): 49404.
- USDI, Fish and Wildlife Service. 2002. Endangered and Threatened Wildlife and Plants; Review of Plant and Animal Taxa that are Candidates or Proposed for Listing as Endangered or Threatened, Annual Notice of Findings on Recycled Petitions, and Annual Description of Progress on Listing Actions; Notice of Review; Proposed Rule. Federal Register 67(114): 40657.
- USDI, Fish and Wildlife Service. 2004. Endangered and Threatened Wildlife and Plants; Review of Species that are Candidates or Proposed for Listing as Endangered or Threatened; Annual Notice of Findings on Resubmitted Petitions; Annual Description of Progress on Listing Actions; Notice of Review. Federal Register 69(86):24898.
- USDI, Fish and Wildlife Service. 2005. Endangered and Threatened Wildlife and Plants; Review of Native Species that are Candidates or Proposed for Listing as Endangered or Threatened; Annual Notice of Findings on Resubmitted Petitions; Annual Description of Progress on Listing Actions; Notice of Review. Federal Register 70(90):24930.
- USDI, Fish and Wildlife Service. 2006. Endangered and Threatened Wildlife and Plants; Review of Native Species that are Candidates or Proposed for Listing as Endangered or Threatened; Annual Notice of Findings on Resubmitted Petitions; Annual Description of Progress on Listing Actions; Notice of Review. Federal Register 71(176): 53756-53835.
- USDI, Fish and Wildlife Service. 2007. Endangered and Threatened Wildlife and Plants; Review of Native Species That Are Candidates for Listing as Endangered or Threatened; Annual Notice of Findings on Resubmitted Petitions; Annual Description of Progress on Listing Actions; Notice of Review. Federal Register 72(234): 69034-69106.
- USDI, Fish and Wildlife Service. 2008. Endangered and Threatened Wildlife and Plants; Review of Native Species That Are Candidates for Listing as Endangered or Threatened; Annual Notice of Findings on Resubmitted Petitions; Annual Description of Progress on Listing Actions; Notice of Review. Federal Register 73(238): 75176-75244.
- USDI, Fish and Wildlife Service. 2009. Endangered and Threatened Wildlife and Plants; Review of Native Species That Are Candidates for Listing as Endangered or Threatened;

Annual Notice of Findings on Resubmitted Petitions; Annual Description of Progress on Listing Actions; Notice of Review. Federal Register 74(215): 57804-57878.

USDI, Fish and Wildlife Service. 2010. Endangered and Threatened Wildlife and Plants; Review of Native Species that are Candidates or Proposed for Listing as Endangered or Threatened; Annual Notice of Findings on Resubmitted Petitions; Annual Description of Progress on Listing Actions; Notice of Review. Federal Register 75(217):69288.

USDI, Fish and Wildlife Service. 2011. Endangered and Threatened Wildlife and Plants; Review of Native Species that are Candidates or Proposed for Listing as Endangered or Threatened; Annual Notice of Findings on Resubmitted Petitions; Annual Description of Progress on Listing Actions; Notice of Review. Federal Register 76(207):66434.

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ADDITIONAL INFORMATION:

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	1993-07-27 (DBI)
	1997-11-14 (SMS)
	2003-12-02 (AMS)
	2015-12-07 (RMF)
	2019-05-03 (JAS)
	2023-01-12 (MBL)

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