

**ARIZONA GAME AND FISH DEPARTMENT  
HERITAGE DATA MANAGEMENT SYSTEM****Invertebrate Abstract****Element Code:** IICOL63020**Data Sensitivity:** No**CLASSIFICATION, NOMENCLATURE, DESCRIPTION, RANGE**

**NAME:** *Psephenus montanus*  
**COMMON NAME:** White Mountains Water Penny Beetle  
**SYNONYMS:** None  
**FAMILY:** Psephenidae

**AUTHOR, PLACE OF PUBLICATION:** Brown and Murvosh. 1974. Trans. Amer. Ent. Soc., Vol. 100.

**TYPE LOCALITY:** East Fork of the Black River in the White Mountains, Apache County, Arizona at an elevation of about 8,000 feet, 6 July 1971.

**TYPE SPECIMEN:** Holotype male at U.S. National Museum of Natural History, Smithsonian Institution, Washington D.C. No collection number given.

**TAXONOMIC UNIQUENESS:** Taxonomic status of *P. montanus* and closely related *P. arizonensis* is uncertain. Individuals from these two populations were originally assigned as separate species based on differences in ecology and ethology. There is some discussion that these two species might be combined. Both of these species are endemic to Arizona. There is a third species of *Psephenus* in the U.S., *herricki*, but it is only reported from distant Rhode Island.

**DESCRIPTION:** Adult bodies are oval, flattened, brownish or black. The forewing is broadest posteriorly loosely covering abdomen. Dorsal surface is sparsely pubescent, while the ventral surface is densely pubescent. The abdomen has 5-7 ventral segments, 4.0-6.0 mm (0.16-0.24 in.) in length. Larvae are brownish, greatly flattened and nearly circular, therefore earning name "water-penny" (Borror and White 1970). For a detailed description of males and females see Brown and Murvosh 1976.

**AIDS TO IDENTIFICATION:** Compared to *P. oresbius* (a species found in Durango, Mexico), *P. montanus* differs in having a narrower second palpal segment, male genitalia with parameres tapering from base as seen in lateral aspect, and ventral sclerite of penis basally enlarged and somewhat campanulate. As seen from above, the legs of *P. arizonensis* are about the same color as the elytra, while the legs of *P. montanus* are usually lighter than the elytra.

**ILLUSTRATIONS:** Drawing (Borror and White 1970)  
Black and White Drawing (D. Moore)

Color drawing (Voshell 2002)

Photos of Larvae: <https://thedragonflywoman.com/2009/06/16/water-pennies/>

**TOTAL RANGE:** The distribution is centered around Three Forks and several nearby locales in the West and East Forks of the Black River in Apache and Greenlee Counties, Arizona. It also occurs as far north as the South Fork of the Little Colorado River just south of the Little Colorado, and northeast of Escudilla Mountain near the New Mexico boundary, and east to Coleman Creek (tributary to the Blue River). Historic and present distribution of *P. montanus* are likely identical.

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

### **SPECIES BIOLOGY AND POPULATION TRENDS**

**BIOLOGY:** All life stages except larvae, are restricted to distinct microhabitats, typically in riffles within one meter of shoreline. Peak emergence of adults occurs from about late June to early July. Adults of both sexes are short-lived, females for several days, males 1-2 weeks. Therefore, adults only present from late June through early August.

Adult females occur on partly submerged rocks near shoreline. Males occur on same rocks but are often in moist or slightly wet depressions or pits, and tend to be very inactive. Larval stage includes several instars and lasts one to two years. Larval collections have included two distinct size classes (small and mature), which indicate a semi-voltine life cycle. During this stage, larvae disperse to all parts of the stream, but move back close to shoreline shortly before pupation. Pupation occurs beneath rocks or in other protected sites near the stream. Adults usually emerge from the pupal stage in 10-12 days.

The larvae are clingers. Water pennies are very effective at holding on to rocks, because the thin, flat plates extending away from their body are flexible and collectively assume the shape of whatever surface they are on. In addition, their grip on rock surfaces is made tighter by a dense fringe of short, fine hairs around the outer edge of the extended plates. Water pennies are seldom dislodged into a net merely by moving rocks. They have to be picked from the rocks with forceps or fingernails, and even then they are sometimes hard to remove.

Water pennies obtain dissolved oxygen through gills on the underside of the abdomen as well as through the general body surface.

**REPRODUCTION:** Mating ensues soon after adults emerge, probably beneath the same rocks from which the individuals emerged. Mating probably lasts less than a minute but does not appear to include “play” behavior. However, according to Murvosh and Brown (1976) there is play behavior during mating (for a detailed description see their 1976 report). After mating, females crawl beneath partly submerged stones near shoreline in riffle habitats where they spend the rest of their life (a few days) laying eggs in small patches. Each patch contains 400-600 bright yellow eggs in a single layer. First instar larvae develop in about 2 weeks.

**FOOD HABITS:** Largely herbivores/detritivores. Adults probably do little, if any, feeding. Larvae graze on diatoms and other algae that occur on rocks and pebbles in stream riffles. The larvae are scrapers. Water pennies are highly adapted for removing the thin layer of algae, especially diatoms, that occurs on stones in swift current. Their jaws have a thin, sharp inner edge, much like a paint scraper. The cupped shape of the jaws, along with hairs at the bases help push the dislodged material in their mouths. Water pennies feed under the protection of the extended body plates, so the current does not wash their food away.

**HABITAT:** Probably restricted to cold, fast-flowing high elevation streams in the White Mountains in Apache and Greenlee counties, Arizona. This restricted distribution may be caused by poor dispersal ability, dispersal appearing to occur only during larval stages. July water temperature [1992] was about 20° to 25°C.

**ELEVATION:** 6,720 - 8,830 ft (2048-2691 m) according to AGFD HDMS unpublished records (accessed 2019). These are the highest elevations that psephenids have been found in North America.

**PLANT COMMUNITY:** Not specified.

**POPULATION TRENDS:** Unknown. Collections for this endemic species in Arizona date from the early 1970's to the mid 1990's. There is no more current information available. Although the 21 occurrences of *P. montanus* have a fairly wide distribution in the high mountain rivers of Arizona, and even a few locations more distant from this population center (near the Little Colorado River to the north and northeast of Escudilla Mountain), there is no data with which to evaluate population levels or their trends. NatureServe ranks the species as imperiled.

## **SPECIES PROTECTION AND CONSERVATION**

**ENDANGERED SPECIES ACT STATUS:** None (USDI, FWS 1996)  
[C2 USDI, FWS 1994]  
[C2 USDI, FWS 1991]  
[C2 USDI, FWS 1989]

**STATE STATUS:**

**OTHER STATUS:** None (USDA FS Region 3 2013)  
[None USDA FS Region 3 2007]  
[Forest Service Sensitive USDA, FS Region 3 1999]  
[Forest Service Sensitive USDA, FS Region 3 1988]

**MANAGEMENT FACTORS:** Measures should be employed to mitigate all impacts to running waters including erosion and siltation. Threats are restricted to those that affect aquatic areas and include grazing, logging, development of campgrounds and other

recreational facilities, various recreational impacts, pollution by recreationists, and any other impacts that affect water quality and or quantity in the Black River and its tributaries.

**PROTECTIVE MEASURES TAKEN:** None. During the 1980's and 1990's, *P. montanus* was listed as an USDI FWS ESA candidate and a USDA Forest Service Sensitive species. The ESA candidate status was removed in 1996 and the Forest Service Sensitive Species status was removed in 2007.

**SUGGESTED PROJECTS:** Since the latest collections were made more than 25 years ago, it is important that an adequate number of the known localities be revisited to ascertain if the species is still extant throughout its documented range. These surveys should be undertaken by persons experienced with riffle beetles, as members of this family are typically distributed patchily in various microhabitats and are difficult to find.

**LAND MANAGEMENT/OWNERSHIP:** USFS - Apache-Sitgreaves National Forest.

## SOURCES OF FURTHER INFORMATION

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**AGFD Invertebrate Abstract**

**-5-**

*Psephenus montanus*

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**MAJOR KNOWLEDGEABLE INDIVIDUALS:**

Chad M. Murvosh. Professor of Biology, Emeritus. University of Las Vegas, Nevada.

**ADDITIONAL INFORMATION:**

**Revised:** 1995-06-19 (DBI)  
1997-03-03 (SMS)  
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