ARIZONA GAME AND FISH DEPARTMENT
HERITAGE DATA MANAGEMENT SYSTEM

Invertebrate Abstract **Element Code:** IICOL5B010
Data Sensitivity: No

CLASSIFICATION, NOMENCLATURE, DESCRIPTION, RANGE

NAME: *Heterelmis stephani* Brown
COMMON NAME: Stephan's Heterelmis Riffle Beetle

SYNONYMS:
FAMILY: Elmidae

AUTHOR, PLACE OF PUBLICATION: Brown, H.P. 1972. Entomological News, 83:229-238.

TYPE LOCALITY: Bog Springs, Pima County, Arizona

TYPE SPECIMEN: CNC942742. K. Stephan. 1970-05-16.

TAXONOMIC UNIQUENESS: The Integrated Taxonomic Information System (ITIS 2025) identifies 20 valid species in the genus, but BugGuide (VanDyk 2023) lists the number of species in *Heterelmis* as 23, and Khramov (2025) identifies ten species in the genus. One of five species of *Heterelmis* found in the U.S. (Arnett et al. 2002, United States Fish and Wildlife Service (USFWS) 2016)).

DESCRIPTION:

Male - Length 2.3–2.6 mm (0.09–0.10 in); breadth 1.05–1.20 mm (0.04–0.05 in). Body elongate ovid, sides subparallel (Brown 1972). Elytra barely wider than prothorax; moderately strongly convex. Surface inconspicuously pubescent clothed with fine, golden, recumbent hairs. Cuticle moderately shining, ranging in color from light brown to dark brown, elytra often lighter than pronotum, legs light brown to reddish brown, basal segment of each tarsus with 3 short stout spines; antennae and mouthparts testaceous to reddish brown (Brock & Prchal 2001). Body elongate, sides subparallel; elytra barely wider than thorax, 2.3-2.6 mm (0.09-0.1 in.) long, 1.04-1.2 mm (0.04-0.05 in.) wide (Brown 1972).

Female - Generally similar to male externally except for proportions; e.g. pronotum 0.93 mm (0.37 in.) broad and 0.875 mm (0.04 in.) long; 0.90 mm (0.04 in.) broad at base and 0.65 mm (0.03 in.) at apex; elytra more than twice as long as pronotum, being 1.85 mm (0.07 in.) long; prosternum proportionately broader, being 0.88 mm (.04 in.) wide and 0.62 mm (0.25 in.) long (Brown 1972). Transverse sutural ridge between mesosternum and metasternum raised medially. Genitalia relatively elongate (Brown 1972).

AIDS TO IDENTIFICATION: *H. stephani* considerably smaller than *H. longula* with which it could be confused (Brock & Prchal 2001). *H. stephani* is 2.3-2.6 mm (0.09-0.10 in) long compared with 3.5-4.0 mm(0.14-0.16 in.) for *H. longula* (Brock & Prchal 2001). *H. stephani* also lacks distinct transverse and longitudinal pronotal impressions. (Brock & Prchal 2001)

ILLUSTRATIONS:
Black & white drawings (Brown 1972:232)
Black & white drawing (Brock and Prchal 2001)

TOTAL RANGE: *H stephani* is believed to be extinct (USFWS 2016, Canonanti 2020). Historically, it was found in Bog and Sylvester Springs, both in Madera Canyon, in the Santa Rita Mountains, Pima and Santa Cruz counties, Arizona (USFWS 2014a, 2016).

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

SPECIES BIOLOGY AND POPULATION TRENDS

BIOLOGY:

Adults: Elmid adults commonly fly after emergence and may be taken at lights shortly after emergence during their sole dispersal flight (Brown 1987). Once submerged, adults may never return to the surface and may live for more than one year (Brock and Prchal 2001). Adults use a plastron (a semi-permanent bubble of air for exchanging respiratory gases) for respiration (Brown 1972). Adults probably survive by receding up to several centimeters into moist pockets of soil when water flow decreases (Johnson 1992). Consequently population dynamics of *H. stephani* are probably closely linked to spring flow (Brock and Prchal 2001).

Elmid beetles are suspected of possessing some sort of chemical defense to repel predators (Brown 1987).

Larvae: Elmid larvae are completely aquatic with gills used for respiration (Brown 1987). They are generally detritivores (Brock and Prchal 2001).

REPRODUCTION: Elmid beetles attach their eggs in the crevices on the underside of woody debris, submerged rocks, and aquatic plants. Elmid larvae crawl out of the water to pupate upon reaching maturity (Brown 1987). Pupation occurs in small cells in moist sand, beneath rocks, under loose bark, or in other protected sites near water (Brock and Prchal 2001). The larval stage for Emlids varies between 6 to 36 months (USFWS 2016).

FOOD HABITS: Elmid larvae are generally detritivores, eating detritus, encrusting algae, and waterlogged wood. Adults have the same food habits as larvae (Brock and Prchal 2001).

HABITAT: Submerged wood; larvae are completely aquatic. Adult *H. stephani* have been collected from waterlogged, decomposing wood, leaf litter and detritus in small seeps and

springs (Brock and Prchal 2001). They like places that are shallow, clean, and permanently flowing spring systems along with the presence of native aquatic vegetation (USFWS 2016).

ELEVATION: 5,000–7,000 ft. (1,525–2,135 m) (Brock & Prchal 2001)

PLANT COMMUNITY: Oak Woodland (Brock and Prchal 2001)

POPULATION TRENDS: *H. stephani* was once very common, but declined at a rapid rate due to habitat loss. The species is now considered extinct (USFWS 2016).

SPECIES PROTECTION AND CONSERVATION

ENDANGERED SPECIES ACT STATUS: None (USDI, FWS 2016)
STATE STATUS:
OTHER STATUS: Forest Service Sensitive (USDA, FS Region 3 1988, 1999, 2007, 2013)

PREVIOUS STATUS
ENDANGERED SPECIES ACT STATUS: C* (USDI, FWS 2005-2015)
C (USDI, FWS 2002, 2004)
PTN (Center for Biological Diversity 2004)
None (USDI, FWS 1996)
C2 (USDI, FWS 1984, 1989, 1991, 1994)

MANAGEMENT FACTORS: Any development concerning Bog Springs or the water flow in surrounding areas should employ measures to mitigate all impacts to running water including erosion, siltation, pollution, and groundwater drawdown (Brock & Prchal 2001). Additionally, recreationists that visit Bog Springs Campground and surrounding areas should be required to bring in water rather than rely on Bog Springs flow (Brock & Prchal 2001). Consequently, the amount of water captured for domestic use could be decreased and runoff to local habitats and the amount of habitat suitable for *H. stephani* could be increased. These springs should be returned to a natural free-flowing state (Brock & Prchal 2001).

The decline and probable extinction of the species was most likely due to habitat loss and degradation and water flow modifications. Habitat for *H. stephani* no longer exists at Bog Springs Campground, and all described springs in Madera Canyon have flow piped outside to a spring box, with Sylvester Spring also being fenced (USFWS 2014a, 2016).

PROTECTIVE MEASURES TAKEN:

SUGGESTED PROJECTS:

LAND MANAGEMENT/OWNERSHIP:
USFS - Coronado National Forest

SOURCES OF FURTHER INFORMATION

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ADDITIONAL INFORMATION:

The common name of riffle beetle for beetles of the family Elmidae comes from their propensity to be found living in shallow streams, rapids, or other comparable flowing waters (USFWS 2014a).

The species appears to have existed in very low numbers at Sylvester Spring, and was last collected there in 1993. The Fish and Wildlife Service began surveys for *H. stephani* in 2012, but no beetles were found leading to the belief that the species is extinct (USFWS 2016).

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1997-03-02 (SMS)
2001-02 (SP)
2002-08-28 (AMS)
2025-05-03 (GJM)

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