# ARIZONA GAME AND FISH DEPARTMENT
# HERITAGE DATA MANAGEMENT SYSTEM

**Invertebrate Abstract** **Element Code:** IICOL5C011
**Data Sensitivity:** No

## CLASSIFICATION, NOMENCLATURE, DESCRIPTION, RANGE

**NAME:** *Huleechius marroni carolus*
**COMMON NAME:** Marron's San Carlos Riffle Beetle, San Carlos Marron's Riffle Beetle
**SYNONYMS:**
**FAMILY:** Elmidae

**AUTHOR, PLACE OF PUBLICATION:** *Huleechius marroni carolus*, Brown, Pan-Pacific Entomologist, Vol. 57. No. 1. 1981.

**TYPE LOCALITY:** "San Carlos River, San Carlos Indian Reservation."

**TYPE SPECIMEN:** Brown, H.P. 3 July 1973. Holotype male and allotype female deposited at the Oklahoma Museum of Natural History, Norman, Oklahoma. No collection numbers given.

**TAXONOMIC UNIQUENESS:** "It should be noted that habitat modification ("stream improvement") apparently resulted in the extinction of *H. marroni marroni* Brown 1981 at the type locality in southern Baja California, Mexico between 1973 and 1974. This left the Arizona populations of *H. marroni carolus* as the only known surviving representatives of the species" (H.P. Brown, pers. comm. to R. Johnson as stated in Johnson's 1992 status survey report).

**DESCRIPTION:** Body is oval to cylindrical, pronotum darker than elytra, 2.15-2.7 mm long, legs long and strongly developed. Claws are large. Light to moderately dark. The antennae are short or moderate in length, clubbed or threadlike. In general for riffle beetles, the body is usually dark brown or red-brown, with color patterns or various metallic tints. There are numerous longitudinal rows of very small indentations, such as would be made by the point of a needle, on the hardened front of the wings. In general for the larvae, the body length is usually 3-8 mm and may range up to 16 mm. The body is elongate, cylindrical and hard. They are usually dark brown or red-brown. The legs have four segments (not counting the claws). There is one claw on the end of each leg. The abdomen had nine segments. Abdomen segment nine has a cavity that is covered by a hinged lid, and there is a tuft of filamentous gills that can be withdrawn into this cavity (Voshell 2002).

**AIDS TO IDENTIFICATION:**

**ILLUSTRATIONS:** Color drawing of adult and larvae (Voshell 2002)
Black & White drawing of adult (D. Morre)

**TOTAL RANGE:** San Carlos River, Gila County border with Graham County, Arizona.

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

## SPECIES BIOLOGY AND POPULATION TRENDS

**BIOLOGY:** Must be extrapolated from other Elmidae members as very little work has been done on this species. Pupation occurs in small cells in moist sand, beneath rocks, under loose bark, or in other protected sites near water. Adults commonly fly and may be taken at lights shortly after emergence. Adults occur in the same habitats and have the same food habits as larvae (Brown 1983 as cited by Johnson 1992). Riffle beetles are efficient clingers by virtue of their long, sharp claws at the end of the legs and their small, compact, hard bodies. When they do move, it is very slowly.

Riffle beetle larvae breathe dissolved oxygen with gills that are on the end of their abdomen in a pocket with a door. They protrude the gills out in the water and wave them to obtain dissolved oxygen. They withdraw the gills into the pocket in their abdomen and close the door to protect them from abrasion by sediment carried in the moving water. Adult riffle beetles breathe by means of a highly developed plastron, with microscopic length hairs as dense as several million per square millimeter of body surface. This plastron is so efficient that most riffle beetle adults never have to come to the surface for air again after they enter the water. Most riffle beetles require a lot of oxygen and are only found in waters with dissolved oxygen at or near the saturation point.

Larvae are different from most other kinds of water beetles because riffle beetle larvae shed their skin six to eight times, instead of the usual three times. Most riffle beetles spend 1 or 2 years as larvae, but some species take up to three years to complete the larval stage. Newly emerged adult riffle beetles undergo a short flight period, but after they enter the water they lose the ability to fly. The unneeded hind wings progressively waste away by some unknown process. Adult life spans are not known, but riffle beetle adults are thought to be long lived. It is speculated that some species do not reach sexual maturity until their second year of adult life, and some may live on into a third year (Voshell 2002).

**REPRODUCTION:** Unknown

**FOOD HABITS:** Larvae are herbivores/detritivores eating detritus, encrusting algae and waterlogged wood.

**HABITAT:** Larvae are completely aquatic. All 8 specimens were collected from stream rapids below a ford, less than 100 m downstream from several large warm springs; the substrate was sand, gravel and rocks of considerable size.

**ELEVATION:** Unknown

**PLANT COMMUNITY:** Unknown

**POPULATION TRENDS:** Unknown.

## SPECIES PROTECTION AND CONSERVATION

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

**STATE STATUS:**

**OTHER STATUS:** Forest Service Sensitive (USDA, FS Region 3 1999)

**MANAGEMENT FACTORS:** Threats include habitat modification, grazing, erosion, sedimentation, siltation and other factors that impact water quality/quantity in the San Carlos River. The warm springs in the area appear to have a minimal influence on the thermal regime of the river due to their low flow.

**PROTECTIVE MEASURES TAKEN:** Unknown

**SUGGESTED PROJECTS:** More studies must be done to determine the distribution, abundance, ecology, and habitat needs of this species in the San Carlos River and adjacent tributaries. It may be that a wider distribution will be documented. A cautionary note would be that these searches must be conducted by riffle beetle experts, as members of this family are patchily distributed and are very difficult to find.

**LAND MANAGEMENT/OWNERSHIP:** BIA - San Carlos Reservation.

## SOURCES OF FURTHER INFORMATION

**REFERENCES:**


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Brown, H. P. 1981. *Huleechius*, a New Genus of Riffle Beetles from Mexico and Arizona. Pan-Pacific Entomologist. Vol. 57. No. 1. Pp: 228-244.

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Voshell, J. R. 2002. A guide to Common Freshwater Invertebrates of North America. The McDonald & Woodward Publishing Company, Blacksburg, Virginia. Pp: 364-365, Pl 30,81.

**MAJOR KNOWLEDGEABLE INDIVIDUALS:**

Bob Johnson - Biologist under contract to United States Fish and Wildlife Service

**ADDITIONAL INFORMATION:**

This species is known only from eight specimens, all of which were collected in the San Carlos River, around 30 km east of San Carlos on 3 August 1973 and 20 June 1974 by H.P. Brown, 6 August 1980 by W.D. Shepard, and on 17 August 1987 by C.B. Barr. According to Johnson, "the genus *Huleechius* was not described until 1981 and the typical subspecies (from Baja California, Mexico) may be extinct."

**Revised:** 1992-07-17 (DBI)
1993-06-17 (DBI)
1997-03-02 (SMS)
2003-08-09 (AMS)