Mystonectes neomexicanus (Bonita Diving Beetle)

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Taxonomy

- **Class**: INSECTA
- **Order**: COLEOPTERA
- **Family**: DYTISCIDAE
- **Genus**: Mystonectes
- **Scientific Name**: *Mystonectes neomexicanus* (Zimmerman & A.H. Smith, 1975)
- **Common Name**: Bonita Diving Beetle
- **Synonyms**: Deronectes neomexicanus Zimmerman and Smith, 1975 Zimmerman and Smith, 1975
- **Taxonomic Name Source**:Poole, R. W., and P. Gentili (eds.). 1996. Nomina Insecta Nearctica: a checklist of the insects of North America. Volume 1 (Coleoptera, Strepsiptera). Entomological Information Services, Rockville, MD. Available online: http://www.nearctica.com/nomina/nomina.htm

Agency Status

- **NMDGF**:
- **Federal Status**:
- **BLM Sensitive**:
- **USFS**:
- **IUCN Red List**: Not Evaluated
- **Nature Serve Global**: G3
- **NHNM State**: S1
- **NM Endemic**:NO

Description

The Bonita Diving Beetle is mainly pale dorsally with dark fasciae or lines longitudinally along the surface of the elytra (Zimmerman and Smith, 1975; Zimmerman, 1982).

Habitat and Ecology

There is little to no information available on the life history, ecology, habitat requirements or population size of this species though, the larvae are presumed to be benthic (NatureServe 2024). The adults are carnivores however, no

specific study has been done on their food habits (Larson *et al.* 2020, NMDGF 2024). All known sites are creeks and rivers though, other aquatic habitats may also be utilized (NatureServe 2024, SCAN 2024). Other members of this genera seem to have a habitat preference for shallow, still and clear water with sparse vegetation and variable substrates (Larson *et al.* 2020, NatureServe 2024). The habitat for the Bonita Diving Beetle is likely similar. Currently the known habitat in New Mexico is a montane stream bordered by Willows (*Salix*), Cottonwoods (*Populus*), and other deciduous trees at around 1,825 meters in elevation. In Texas and Chihuahua the habitats are creeks and rivers, though no other descriptions have been made (NatureServe 2024).

Geographic Range:

The Bonita Diving Beetleâ€™s current known distribution consists of six sites; two sites are in Lincoln county, New Mexico, two sites are in Texas, one in Brewster county and the other in Presidio county, and the last two sites are in Mexico, with one in CuauhtÃ©moc, Chihuahua and one in Guerrero (Zimmerman 1982, NatureServe 2024). Using all known points, the estimated Extent of Occurrence (EOO) is 128,240 km^2 and the Area of Occupancy (AOO) is 16 km^2. However, the last known recording of the species was in 1976 and recent efforts to recheck historical localities in New Mexico found no individuals. As a result, it is unknown if the species still persists at these occurrences. However, this species has been very poorly inventoried and collected and as a result, the species may be present at more sites and in larger numbers than is currently known. There are between zero and four locations for this species, with one in New Mexico, two in Texas, and one in Chihuahua.

Conservation Considerations:

In 1991 the Bonita Diving Beetle was first proposed for listing under the endangered species act. However, due to a lack of knowledge on the species range and population size it was determined that more surveying was needed for the species to be federally listed as endangered. As a result, the species instead became a Category 2 federal candidate species. Category 2 denoted species, which are thought to be endangered but for which more information was needed to make a final decision, were offered some protections (USFWS 1991, USFWS 1994, NMDGF 2024). However, in February of 1996, the Fish and Wildlife Service decided to get rid of Category 2 and 3 and as a result this species was no longer provided with any federal protections (USFWS 1996). Later that same year, all former Category 2 species were designated as Federal Species of Concern and the Bonita Diving Beetle still retains this designation, although it is one which currently provides no official or legal status (Jahrsdoerfer 1996, Natural Heritage New Mexico 2024).

In late 1996, the first known conservation assessment was done on the species and it was assessed as Critically Imperiled (G1) by Nature Serve (NMNHP 1996). In 2006 the species was listed as a New Mexico Species of Greatest Conservation Need (NMDGF 2006). However, subsequently this species would be removed from this list along with all other insects at the direction of New Mexico's former Governor. In 2007 the Bonita Diving Beetle was listed as a sensitive species by the United States Forest Service, a designation it still retains (USFS 2007, 2013). In 2018 the species was designated as a Bureau of Land Management sensitive species (BLM 2018). In 2024 the Lincoln National Forest designated the Bonita Diving Beetle as a Species of Conservation Concern (USFS 2024).

Despite the designations little actual conservation has been put in place for this species. The Bureau of Land Management has designated several kilometers of the stream above the type locality as an Area of Environmental Concern and is trying to restore the riparian community (NatureServe 2024). If the species exists north of the type locality this designation may provide some protection. However, with such limited knowledge of the species range, population, ecology, or life history, its protection is very difficult. As a result, surveying is needed along historical sites and similar nearby aquatic habitats in order to provide needed information without which proper protection and stewardship cannot be carried out.

Threats:

Though little information is available on the life history, habitat, and ecology of this species, wetland habitats in arid western North America are often threatened. Water is a resource in high demand with limited supply (Hruska 2020, NatureServe 2024). More frequent, prolonged, and severe droughts due to climate change have also increased water stress in the Chihuahuan Desert (National Park Service 2018, Uribe 2022, Williams *et al.* 2022). The southwestern U.S. saw its driest 22-year period from 2000 to 2021 since at least 800 CE (the time period used in previous climatic reconstructions) (Williams *et al.* 2022) and droughts are projected to become more prolonged, severe, and common in the region under future climate change scenarios (USGCRP 2018). Drought conditions may severely affect the amount of habitat and food resources available for this species.

In the last century, 90% of New Mexico's original wetland and riparian ecosystems have been lost and now wetland and riparian ecosystems comprise less than 1% of the area of New Mexico (NMDGF 2006). As the warming continues it is predicted that New Mexico will get smaller mountain snowpacks, reduced groundwater recharge, less runoff, and greater evaporative loss (New Mexico Environment Department 2005). A reduction in snowpacks and runoff could severely decrease the amount of groundwater recharge in this species habitat and will likely result in the loss of some of the (groundwater-fed) seeps and springs in this species habitat (Cary *et al.* 2011).

Additionally, as temperature and precipitation patterns shift, there may also be changes in vegetation communities along this species habitat, vegetation cover, flood magnitudes and duration, sediment loads, and water chemistry the effects of which on the Bonita Diving Beetle are currently unknown (NPS 2018).

Wildfire may be a serious threat to this species with floods following catastrophic wildfires often clogging up aquatic systems filling them with ash, soil, and debris in studies elsewhere have shown ashes in aquatic systems to be toxic to aquatic invertebrates even at lower concentrations (MuÃ±iz GonzÃ¡lez *et al.* 2023).

Cattle grazing also occurs in many riparian areas in the southwestern United States and overgrazing has been shown to have a negative impact on many groups aquatic insects through erosion, removal of woody vegetation, change in vegetation communities, and excrement deposition (Krueper 1996, Strand and Merritt 1999). However, more research is needed on the effects of grazing on the Bonita Diving Beetle.

Population:

There have been at least eleven historical occurrences of this species across six sites; however, the current status of these historical populations is unknown as it has been nearly fifty years since any of them were documented (NatureServe 2024, SCAN 2024). Of these eleven historical occurrences, nine were collected at the type locality in 1966 and an additional two were collected in 1976, one in Chihuahua and the other in Texas (Forbes pers comm. 1998, SCAN 2024). However, the current population size and trend of this species are unknown and additional survey work is required (USFWS 1991, NatureServe 2024).

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More Information