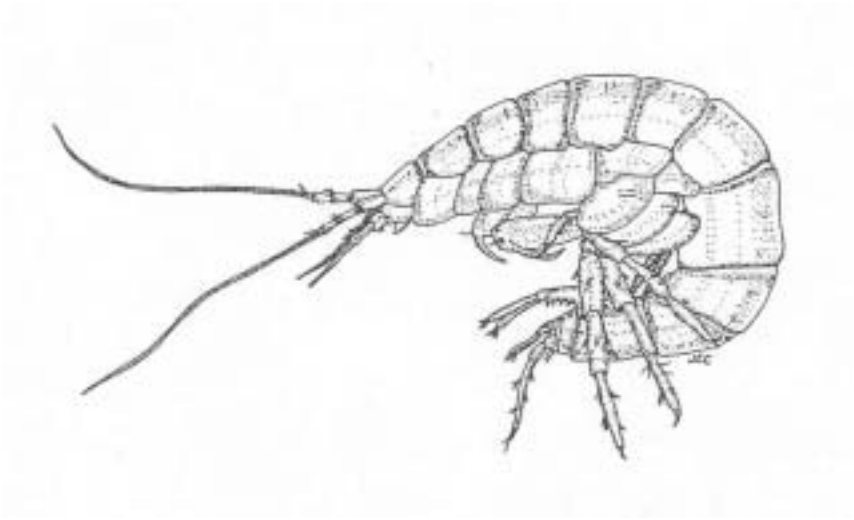
Conservation Assessment
for
Minute Cave Amphipod (Stygobromus parvus)



(From Franz and Slifer, 1971)

USDA Forest Service, Eastern Region

December 2001

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This Conservation Assessment was prepared to compile the published and unpublished information on Stygobromus parvus. It does not represent a management decision by the U.S. Forest Service. Though the best scientific information available was used and subject experts were consulted in preparation of this document, it is expected that new information will arise. In the spirit of continuous learning and adaptive management, if you have information that will assist in conserving the subject community and associated taxa, please contact the Eastern Region of the Forest Service Threatened and Endangered Species Program at 310 Wisconsin Avenue, Milwaukee, Wisconsin 53203.

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EXECUTIVE SUMMARY

The Minute cave amphipod is designated as a Regional Forester Sensitive Species on the Monongahela National Forest in the Eastern Region of the Forest Service. The purpose of this document is to provide the background information necessary to prepare a Conservation Strategy, which will include management actions to conserve the species.

The Minute cave amphipod is a rare subterranean crustacean known only from four caves in Randolph, Pocahontas and Tucker counties in West Virginia.

NOMENCLATURE AND TAXONOMY

Classification: Class Crustacea
Order Amphipoda
Family Crangonyctidae
Ephemerus Group

Scientific Name: Stygobromus parvus Holsinger

Common Name: Minute cave amphipod

Synonyms: Apocrangonyx parvus

This species was described by Holsinger (1969) as Apocrangonyx parvus. The original written description was detailed and accompanied by a page of illustrations. Holsinger (1978) placed the species in the genus Stygobromus, but otherwise made only minor additions to the description.

Concerning higher classification, the genus Apocrangonyx was placed as a synonym of Stygobromus by Karaman (1974) and Holsinger (1977), this remaining as the accepted name applied to the taxa of this group. Stygobromus was previously placed in the Family Gammaridae (Holsinger, 1972), but Bousfield (1973; 1977) and Holsinger (1977) subdivided this large, heterogeneous family into a number of smaller families. The proper placement of the genus Stygobromus is in the Family Crangonyctidae (Holsinger, 1977).

DESCRIPTION OF SPECIES

This is an eyeless, unpigmented amphipod crustacean of minute size, largest males 3.0 mm, largest females 4.2 mm in length (Holsinger, personal communication, 2001). At the time that it was described (Holsinger, 1969) it was the smallest subterranean amphipod known in North America. Identification of this species requires laboratory dissection and examination of slide-mounted appendages under a compound microscope by a specialist in amphipod taxonomy.

LIFE HISTORY

All that is suggested of the life history of this species is that the largest females from the type series had setose brood plates, indicating sexual maturity, but were not ovigerous. This collection was made on 22 August 1966.

HABITAT

Holsinger (1969) described Crawford Cave #2, the type-locality, as being a small semi-dry cave. The amphipods were taken from two small, mud-bottomed pools near the entrance that were fed by drippage and seepage waters, and contained small particles of rotting wood. A single specimen was found in the Cassell-Windy Cave System, taken from a mud-bottomed seepage pool near the Windy Cave entrance. Holsinger (1978) summarized the habitat of Stygobromus parvus as mud-bottomed, drip and seep pools in the three caves from which it was originally reported. In another locality discovered since the report of Holsinger (1978), Stygobromus parvus was taken from pools in a small stream in Bonner Pit Cave (Holsinger, personal communication, 2001).

DISTRIBUTION AND ABUNDANCE

Stygobromus parvus is known from four caves in Randolph, Pocahontas and Tucker counties, West Virginia (Holsinger, 1969, 1978). Holsinger (1978) reported that Piddling Pit and Cassell caves were developed along the eastern flanks of Cloverlick and Allegheny mountains, respectively, in the upper Greenbrier River drainage. Crawford Cave #2 lies west of Cheat Mountain in the upper Tygart River drainage (upper Monongahela Basin). An unpublished record provided by J.R. Holsinger (personal communication, 2001) of this species is from Banner Pit Cave, ca. 5 miles SE of Parsons, Tucker County, West Virginia.

RANGEWIDE STATUS

G1 critically imperiled; The global rank of G1 typically includes species that are known globally from five or fewer localities. Stygobromus parvus is known from only four caves.

West Virginia State Rank: S1 critically imperiled; Similarly, the state rank of S1 typically includes species that are known from five or fewer localities in the state. The four localities from which Stygobromus parvus are known all occur in West Virginia.

POPULATION BIOLOGY AND VIABILITY

This species co-occurs with Stygobromus emarginatus and Stygobromus nanus in Piddling Pit Cave, although none of these species have been found together in the same place within this cave.

POTENTIAL THREATS

Due to the presence Stygobromus parvus in the restricted cave environment, it is susceptible to a wide variety of disturbances (Elliott, 1998). Caves are underground drainage conduits for surface runoff, bringing in significant quantities of nutrients for cave communities. Unfortunately, contaminants may be introduced with equal ease, with devastating effects on cave animals. Potential contaminants include (1) sewage or fecal contamination, including sewage plant effluent, septic field waste, campground outhouses, feedlots, grazing pastures or any other source of human or animal waste (Harvey and Skeleton, 1968; Quinlan and Rowe, 1977, 1978; Lewis, 1993; Panno, et al 1996, 1997, 1998); (2) pesticides or herbicides used for crops, livestock, trails, roads or other applications; fertilizers used for crops or lawns (Keith and Poulson, 1981; Panno, et al. 1998); (3) hazardous material introductions via accidental spills or deliberate dumping, including road salting (Quinlan and Rowe, 1977, 1978; Lewis, 1993, 1996).

Habitat alteration due to sedimentation is a pervasive threat potentially caused by logging, road or other construction, trail building, farming, or any other kind of development that disturbs groundcover. Sedimentation potentially changes cave habitat, blocks recharge sites, or alters flow volume and velocity. Keith (1988) reported that pesticides and other harmful compounds like PCB's can adhere to clay and silt particles and be transported via sedimentation.

Impoundments may detrimentally affect cave species. Flooding makes terrestrial habitats unusable and creates changes in stream flow that in turn causes siltation and drastic modification of gravel riffle and pool habitats. Stream back-flooding is also another potential source of introduction of contaminants to cave ecosystems (Duchon and Lisowski, 1980; Keith, 1988).

Smoke is another potential source of airborne particulate contamination and hazardous material introduction to the cave environment. Many caves have active air currents that serve to inhale surface air from one entrance and exhale it from another. Potential smoke sources include campfires built in cave entrances, prescribed burns or trash disposal. Concerning the latter, not only may hazardous chemicals be carried into the cave environment, but the residue serves as another source of groundwater contamination.

Numerous caves have been affected by quarry activities prior to acquisition. Roadcut construction for highways passing through national forest land is a similar blasting activity and has the potential to destroy or seriously modify cave ecosystems. Indirect effects of blasting include potential destabilization of passages, collapse and destruction of stream passages, changes in water table levels and sediment transport (Keith, 1988).

Oil, gas or water exploration and development might encounter cave passages and introduce drilling mud and fluids into cave passages and streams. Brine produced by wells is extremely toxic, containing high concentrations of dissolved heavy metals, halides or hydrogen sulfide. These substances can enter cave ecosystems through breach

of drilling pits, corrosion of inactive well casings, or during injection to increase production of adjacent wells (Quinlan and Rowe, 1978).

Cave ecosystems are unfortunately not immune to the introduction of exotic species. Out-competition of native cavernicoles by exotic facultative cavernicoles is becoming more common, with species such as the exotic milliped Oxidus gracilis affecting both terrestrial and aquatic habitats.

With the presence of humans in caves comes an increased risk of vandalism or littering of the habitat, disruption of habitat and trampling of fauna, introduction of microbial flora non-native to the cave or introduction of hazardous materials (e.g., spent carbide, batteries). The construction of roads or trails near cave entrances encourages entry.

SUMMARY OF LAND OWNERSHIP AND EXISTING HABITAT PROTECTION

The caves inhabited by Stygobromus parvus occur in the Monongahela National Forest.

SUMMARY OF MANAGEMENT AND CONSERVATION ACTIVITIES

No species specific management activities are being conducted concerning Stygobromus parvus.

The existing (1985) Monongahela Land and Resource Management Plan does not provide management direction for caves although they are being considered in the Forest Plan revision currently underway. A Forest Plan Amendment in progress for Threatened and Endangered Species will include management for the caves on the forest.

RESEARCH AND MONITORING

No species specific research or monitoring activities are being conducted concerning Stygobromus parvus.

RECOMMENDATIONS

Retain on list of Regional Forester Sensitive Species.

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