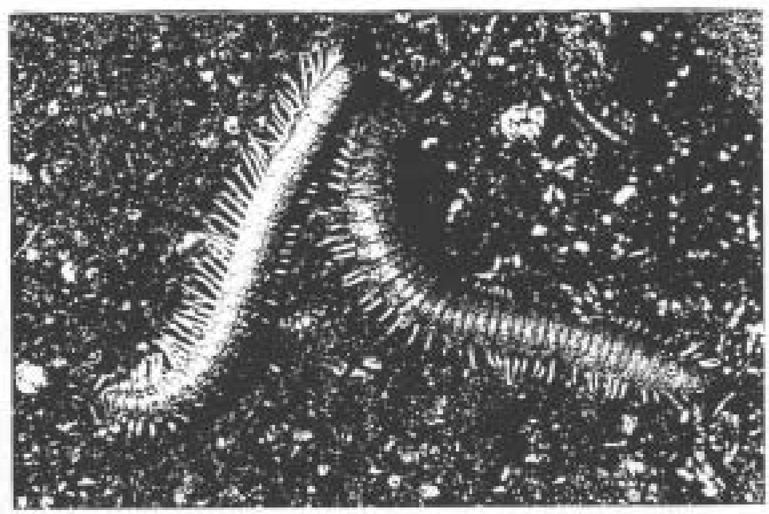
Conservation Assessment
for
Greenbrier Valley Cave Milliped (Pseudotremia fulgida)



(photograph by: J. Lewis)

USDA Forest Service, Eastern Region

December 2001

Julian J. Lewis, Ph.D.
J. Lewis & Associates, Biological Consulting
217 W. Carter Avenue
Clarksville, IN 47129
lewisbioconsult@aol.com

This Conservation Assessment was prepared to compile the published and unpublished information on Pseudotremia fulgida. 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 Greenbrier cave milliped 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 Greenbrier cave milliped is an obligate cavernicolous species known from 21 caves in the Greenbrier Valley of West Virginia.

NOMENCLATURE AND TAXONOMY

Classification:	Class Diplopoda Order Chordeumatida Family Cleidogonidae Hobbsi Group
Scientific name:	Pseudotremia fulgida Loomis
Common name:	Greenbrier cave milliped
Synonyms:	none

Pseudotremia fulgida was described by Loomis (1943). Shear (1972) redescribed the species and provided illustrations adequate for identification of the species.

DESCRIPTION OF SPECIES

The Greenbrier cave milliped is unpigmented and has reduced eyes consisting of seven irregularly arranged ocelli. Segmental shoulders are only moderately produced and are reduced to the size of the lateral striae by about segment 15-17. The species reaches a length of about 19 millimeters. The presence of a large saberlike telopodite process is diagnostic of the species. Identification of this species requires microscopic examination by a specialist familiar with milliped systematics.

LIFE HISTORY

Nothing is known of the life history of Pseudotremia fulgida. Shear (1971) summarized the findings of Schubart (1934), who reported some observations on other millipeds of the Order Chordeumatida. In those animals the male secreted sperm from the seminal pores on the coxae of the second legs into coxal sacs on the postgonopodal legs. The secretions from the coxal sacs then form the seminal fluid into a spermatophore which is then transferred to the cyphopods of the female during mating. Oviposition has not been observed, although some North American members of the order produce silk chambers for the egg laying.

Feeding is presumed to consist of picking up or scraping material from the substrate with the mouthparts then grinding it with the mandibles.

HABITAT

This species is a troglobite (obligate cavernicole). Holsinger, et al. (1976) reported that Pseudotremia fulgida is frequently found on clay banks and sometimes decaying organic debris.

DISTRIBUTION AND ABUNDANCE

Holsinger, et al. (1976) reported this species from 14 caves in Greenbrier County and 10 caves in Pocahontas County, West Virginia. They reported it to be a fairly common troglobite in the Greenbrier Valley.

RANGEWIDE STATUS

Global Rank: G3 vulnerable; The global rank of G3 is usually assigned to species that are recorded from between 21 and 100 localities. Holsinger, et al. (1976) reported Pseudotremia fulgida from a total of 21 localities.

West Virginia State Rank: S3 vulnerable; The state rank of S3 is similarly assigned to species that have been found in between 21 and 100 localities in West Virginia. All of the 21 known localities are in West Virginia.

POPULATION BIOLOGY AND VIABILITY

Holsinger, et al. (1976) noted that Pseudotremia fulgida often co-occurred in the same cave with Pseudotremia hobbsi, a pigmented troglophilic species. The two species were seldom found in proximity to one another.

POTENTIAL THREATS

Due to the presence of Pseudotremia fulgida 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 may 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

This species occurs in the Monongahela National Forest.

SUMMARY OF MANAGEMENT AND CONSERVATION ACTIVITIES

There are no species specific management activities concerning this species.

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

There are no species specific monitoring activities concerning this species.

RECOMMENDATIONS

Retain on list of Regional Forester Sensitive Species.

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