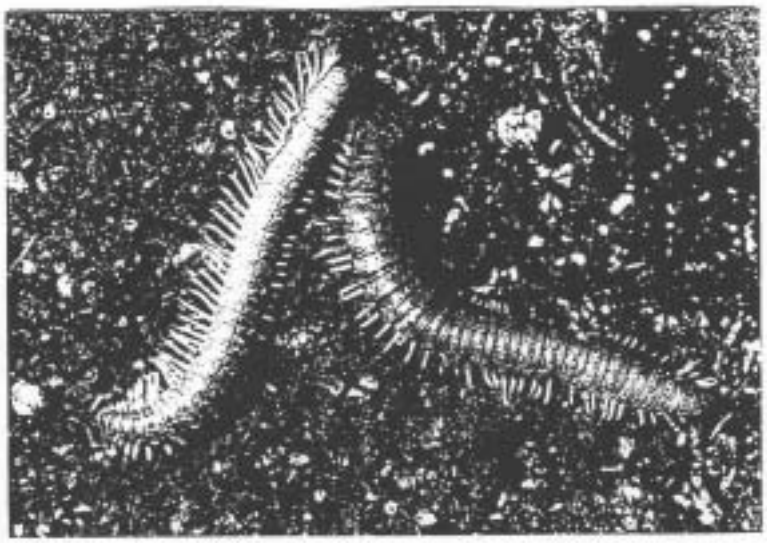
Conservation Assessment
For
Germany Valley Cave Milliped (Pseudotremia lusciosa)



(photograph by J. Lewis)

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This Conservation Assessment was prepared to compile the published and unpublished information on Pseudotremia lusciosa. 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

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. Pseudotremia lusciosa is known only from five caves in the Germany Valley in Pendleton County, West Virginia.

NOMENCLATURE AND TAXONOMY

Classification: Class Diplopoda
Order Chordeumatida
Family Cleidogonidae
Hobbsi Group

Scientific name: Pseudotremia lusciosa (Loomis)

Common name: Germany Valley cave milliped

Synonyms: Dearolfia lusciosa

This species was described as Dearolfia lusciosa by Loomis (1939). Loomis erected the genus Dearolfia for this single species due to the fusion of the bases of the gonopods. Shear (1972) synonymized the genus Dearolfia with Pseudotremia.

DESCRIPTION OF SPECIES

Pseudotremia lusciosa is an unpigmented, milliped with small eyes consisting of 5-7 unpigmented ocelli. The species reaches a length of about 17 millimeters. The fusion of the bases of the male gonopods is diagnostic. Identification of this species requires microscopic examination by a specialist familiar with milliped systematics.

LIFE HISTORY

Nothing is known of the life history of this species. It is questionable whether a female of the species has ever been seen. One was reported by Loomis (1939), but could not be found in his collection (Shear, 1972).

Shear (1971) summarized the findings of Schubart (1934), who reported some observations on the mating of 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). Nothing specific has been reported about the habitat of this species, but it presumably occurs on mudbanks or is associated with decaying organic matter in caves.

DISTRIBUTION AND ABUNDANCE

Originally described from Seneca Caverns, Pendleton County, West Virginia (Loomis, 1939), Holsinger, et al. (1976) added Hellhole, Schoolhouse, Stratosphere Balloon caves and Seneca Caverns to the list of known localities. Pseudotremia lusciosa is known only from the Germany Valley in Pendleton County, West Virginia.

RANGEWIDE STATUS

Global Rank: G1 critically imperiled; The global rank of G1 is assigned to species that are known from five or fewer localities. Pseudotremia lusciosa is known from a total of five caves.

West Virginia State Rank: S1 critically imperiled; The state rank of S1 is similarly assigned to species that are known from five or fewer localities within the state. All of the known localities of Pseudotremia lusciosa are in Pendleton County, West Virginia.

POPULATION BIOLOGY AND VIABILITY

Nothing is known of the population biology of Pseudotremia lusciosa.

POTENTIAL THREATS

Due to the presence of Pseudotremia lusciosa 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 EXISING HABITAT PROECTION

This species occurs within the Monongahela National Forest.

SUMMARY OF MANAGEMENT AND CONSERVATION ACTIVITIES

No species specific management activities are being conducted concerning Pseudotremia lusciosa.

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 monitoring activities are being conducted concerning Pseudotremia lusciosa.

RECOMMENDATIONS

Retain on list of Regional Forester Sensitive Species.

REFERENCES

Duchon, K. and E.A. Lisowski. 1980. Environmental assessment of Lock and Dam Six, Green River navigation project, on Mammoth Cave National Park. Cave Research Foundation, Dallas, Texas, 58 pages.

Elliott, William R. 1998. Conservation of the North American cave and karst biota. Subterranean Biota (Ecosystems of the World). Elsevier Science. Electronic preprint at www.utexas.edu/depts/tnhc/.www/biospeleology/preprint.htm. 29 pages.

Harvey, S.J. and J. Skeleton. 1968. Hydrogeologic study of a waste-disposal problem in a karst area at Springfield, Missouri. U.S. Geological Survey Professional Paper 600-C: C217-C220.

Holsinger, John R., Baroody, Roger A. and David C. Culver. 1976. The invertebrate cave fauna of West Virginia. West Virginia Speleological Survey Bulletin 7, 82 pages.

Keith, J.H. 1988. Distribution of Northern cavefish, Amblyopsis spelaea DeKay, in Indiana and Kentucky and recommendations for its protection. Natural Areas Journal, 8 (2): 69-79.

Keith, J.H. and T.L. Poulson. 1981. Broken-back syndrome in Amblyopsis spelaea, Donaldson-Twin Caves, Indiana. Cave Research Foundation 1979 Annual Report, 45-48.

Lewis, Julian J. 1993. Life returns to Hidden River Cave: The rebirth of a destroyed cave system. National Speleological Society News, (June) 208-213.

Lewis, Julian J. 1996. The devastation and recovery of caves affected by industrialization. Proceedings of the 1995 National Cave Management Symposium, October 25-28, 1995, Spring Mill State Park, Indiana: 214-227.

Loomis, Harold F. 1939. The millipeds collected in Appalachian caves by Mr. Kenneth Dearolf. Bulletin of the Museum of Comparative Zoology, 86: 165-193.

Panno, S. V., I.G. Krapac, C.P. Weibel and J.D. Bade. 1996. Groundwater contamination in karst terrain of southwestern Illinois. Illinois Environmental Geology Series EG 151, Illinois State Geological Survey, 43 pages.

Panno, S.V., C.P. Weibel, I.G. Krapac and E.C. Storment. 1997. Bacterial contamination of groundwater from private septic systems in Illinois' sinkhole plain: regulatory considerations. Pages 443-447 In B.F. Beck and J.B. Stephenson (eds.). The engineering geology and hydrology of karst terranes. Proceedings of the sixth multidisciplinary conference on sinkholes and the engineering and environmental impacts on karst. Spring, Missouri.

Panno, S.V., W.R. Kelly, C.P. Weibel, I.G. Krapac, and S.L. Sargent. 1998. The effects of land use on water quality and agrichemical loading in the Fogelpole Cave groundwater basin, southwestern Illinois. Proceedings of the Illinois Groundwater Consortium Eighth Annual Conference, Research on agriculture chemicals in Illinois groundwater, 215-233.

Quinlan, J.F. and D.R. Rowe. 1977. Hydrology and water quality in the central Kentucky karst. University of Kentucky Water Resources Research Institute, Research Report 101, 93 pages.

Quinlan, J.F. and D.R. Rowe. 1978. Hydrology and water quality in the central Kentucky karst: Phase II, Part A. Preliminary summary of the hydrogeology of the Mill Hole sub-basin of the Turnhole Spring groundwater basin. University of Kentucky Water Resources Research Institute, Research Report 109, 42 pages.

Schubart, O. 1934. Tausendfussler oder Myriapoda. 1: Diplopoda: In Die Tierwelt Deutschlands, 28 Teil. Jena: Gustav Fischer, 318 pages.

Shear, William A. 1971. The milliped Family Conotylidae in North America, with a description of the new Family Adritylidae (Diplopoda: Chordeumida). Bulletin of the Museum of Comparative Zoology, 141(2): 55-97.

Shear, William 1972. Studies in the milliped Order Chordeumida (Diplopoda): A revision of the Family Cleidogonidae and reclassification of the Order Chordeumida in the New World. Bulletin of the Museum of Comparative Zoology, 144: 151-352.