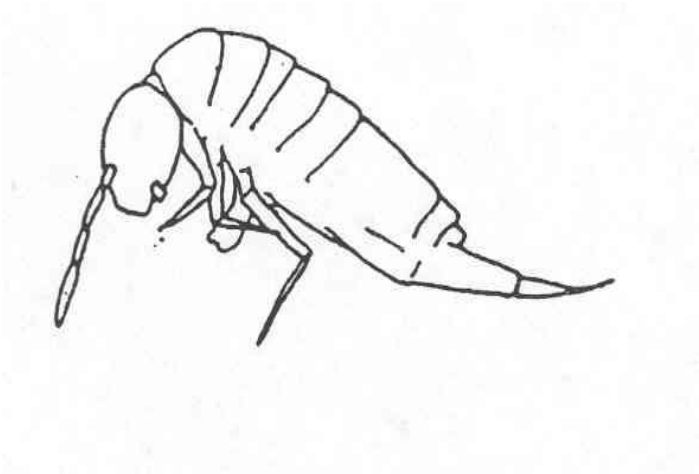
Conservation Assessment
for
Gandy Creek Cave Springtail (Pseudosinella Certa)



(From Christiansen & Bellinger, 1998)

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This Conservation Assessment was prepared to compile the published and unpublished information on Pseudosinella certa. 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.

Table Of Contents

EXECUTIVE SUMMARY

The Gandy Creek cave springtail 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.

Pseudosinella certa is a very rare springtail insect known only from Stillhouse Cave, Randolph County, West Virginia.

NOMENCLATURE AND TAXONOMY

Classification: Class Insecta
Order Collembola
Family Entomobryidae

Scientific name: Pseudosinella certa

Common name: Gandy Creek cave springtail

Synonyms: none

This species was described by Christiansen and Bellinger (1980). The nomenclature of species has been stable since that time.

DESCRIPTION OF SPECIES

Pseudosinella certa, typical of other springtails, is a tiny insect, reaching a length of about 1.2mm. The species is unpigmented and white in appearance. Identification of this species requires a specialist knowledgeable in the taxonomy of springtails.

LIFE HISTORY

Nothing is known specifically about the life history of Pseudosinella certa. In general springtails lay their eggs on the substrate in a concealed location. Several molts occur prior to the insect reaching its adult size, but in springtails no metamorphosis occurs and the juveniles and adults are similar except in size (Borror and DeLong, 1971).

HABITAT

This species is a troglobite known only from a single cave, where it is presumably found in moist organic litter or similar nutrient rich microhabitats.

DISTRIBUTION AND ABUNDANCE

Pseudosinella certa was reported by Christiansen and Bellinger (1998) only from the type-locality, Stillhouse Cave, Randolph County, West Virginia.

RANGEWIDE STATUS

Global Rank: G1 critically imperiled; The global rank of G1 is assigned to species that are known from between 1-5 localities. This species is known from a single cave

West Virginia State Rank: S1 critically imperiled; The state rank of S1 is similarly assigned to species that are known from between 1-5 localities. The only known locality for Pseudosinella certa is in West Virginia.

POPULATION BIOLOGY AND VIABILITY

Nothing is known specifically about Pseudosinella certa. In general springtails feed on decaying plant material, fungi, bacteria or arthropod feces (Borror and Delong, 1971).

POTENTIAL THREATS

Due to the presence of Pseudosinella certa 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

The only known locality for Pseudosinella certa lies within the Monongahela National Forest.

SUMMARY OF MANAGEMENT AND CONSERVATION ACTIVITIES

No species specific management or conservation activities are being conducted Pseudosinella certa.

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 is being conducted concerning Pseudosinella certa.

RECOMMENDATIONS

Retain on list of Regional Forester Sensitive Species.

REFERENCES

Borror, Donald J. and Dwight M. Delong. 1971. An Introduction to the study of insects. Holt, Rinehart and Winston, New York, 812 pages.

Christiansen, Kenneth and Peter Bellinger. 1980. The Collembola of North America north of the Rio Grande. Grinnell College Press, Grinnell, Iowa.

Christiansen, Kenneth and Peter Bellinger. 1998. The Collembola of North America. Part 3. Families Entomobryidae, Cyphoderidae, Paronellidae, Oncopoduridae, Tomoceridae. Grinnell College Press, Grinnell, Iowa, 877-1174.

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.

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. 1983. The obligatory subterranean invertebrates of glaciated southeastern Indiana. N.S.S. Bulletin, 45: 34-40.

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. 1994. Lost River cave and karst biological survey. Final Report, U.S. Army Corps of Engineers, Louisville District, Contract No. DACW27-94-M-0110, 63 pages.

Lewis, Julian J. 1995. Inventory of the troglobitic fauna of the Crosley State Fish and Wildlife Area, Jennings County, Indiana. Final Report, Non-game and Endangered Wildlife Program, Indiana Department of Natural Resources, 71 pages.

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.

Lewis, Julian J. 1998. The subterranean fauna of the Blue River area. Final Report, The Nature Conservancy, 266 pages.

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.