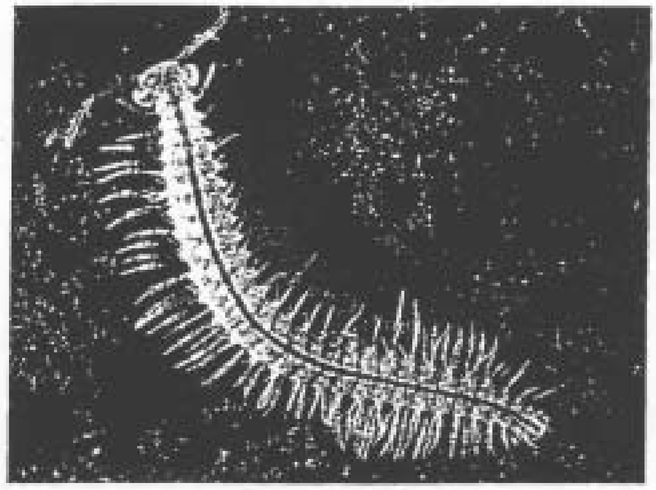
Conservation Assessment
for
Luray Caverns Blind Cave Milliped (Trichopetalum whitei)



(From Barr, 1973)

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This Conservation Assessment was prepared to compile the published and unpublished information on the Trichopetalum whitei (Luray Caverns Blind Cave Milliped). 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 Luray Caverns blind cave milliped (Trichopetalum whitei) 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.

Trichopetalum whitei is a rare troglobitic (obligate cavernicolous) milliped that occurs in an area of the upper Potomac River drainage in four Virginia counties and three West Virginia counties. It has been recorded from 12 caves across this range.

NOMENCLATURE AND TAXONOMY

Classification:	Class Diplopoda Order Chordeumatida Family Trichopetalidae
Scientific name:	Trichopetalum whitei (Ryder)
Common name:	Luray Caverns blind cave milliped
Synonyms:	Zygonopus whitei

This species was described as Zygonopus whitei by Ryder (1881). It became Trichopetalum whitei with the synonymy of Zygonopus with Trichopetalum by Shear (1972).

Causey (in. litt., reported in Holsinger, et al. 1976) has raised the possibility that Trichopetalum weyeriensis may be a subspecies of Trichopetalum whitei rather than a distinct species. Shear (personal communication, 2001) is preparing a revision of this genus and reported that the species are easily separated based on their anatomy, although the populations in Pendleton County, West Virginia (where possible intergrades occur) remain to be dealt with.

DESCRIPTION OF SPECIES

Trichopetalum whitei is an eyeless, unpigmented (white) milliped. Typical of all trichopetalids this species has rows of very elongate segmental setae extending in rows along the dorsal side. Identification of this species requires microscopic examination and dissection of the gonopods (copulatory apparatus) by a specialist familiar with the identification of millipeds. This species can be recognized in the field only at sites from which it has been previously identified by a taxonomist.

LIFE HISTORY

Essentially nothing is known of the life history of this species. 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. It is presumably omnivorous although, again, nothing is known of the specifics about its feeding preferences.

HABITAT

Trichopetalum whitei is a troglobite and occurs only in caves. The species was reported by Holsinger, et al. (1976) as usually occurring on damp, rotting wood.

DISTRIBUTION AND ABUNDANCE

As currently understood, Trichopetalum whitei is recorded from caves in the upper Potomac River drainage in Virginia and West Virginia. Specifically, it has been recorded from Augusta, Page, Rockingham, and Shenandoah counties in Virginia (Holsinger and Culver, 1988). It is also known from caves in Page, Grant and Pendleton counties, West Virginia (Holsinger, et al., 1976). However, Causey (in. litt., reported in Holsinger, et al. 1976) believed that Trichopetalum weyeriensis intergraded with Trichopetalum whitei in Pendleton County, West Virginia. If these two species proved to be synonymous, then the range of Trichopetalum whitei would also extend into Greenbrier, Monroe and Pocahontas counties in West Virginia.

RANGEWIDE STATUS

Global Rank: G2, imperiled; The global rank of G2 is typically assigned to a species that is known from between 6-20 known populations. As presently understood, Holsinger and Culver (1988) and Holsinger, et al. (1976) recorded this species from a total of 12 caves across its range.

West Virginia State Rank: S1 critically imperiled; The state rank of S1 is typically assigned to species with 5 or fewer known populations within the state. Holsinger and Culver (1988) recorded this species from 5 localities in West Virginia. The range of Trichopetalum whitei straddles the West Virginia/Virginia state lines, thus dividing the 12 known populations and affording a lower state rank than global rank.

POPULATION BIOLOGY AND VIABILITY

Nothing is known of the population biology of Trichopetalum whitei.

POTENTIAL THREATS

Due to the presence of Trichopetalum whitei solely 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 range of this species occurs within the Monongahela National Forest.

SUMMARY OF MANAGEMENT AND CONSERVATION ACTIVITIES

There are no species-specific management activities for Trichopetalum whitei.

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

Holsinger, et al. (1976) reported on a bioinventory of West Virginia cave fauna that encompassed collections from 190 caves in 14 counties. Most of what is known about Trichopetalum whitei in the area of the Monongahela National Forest was gathered during that project. A similar bioinventory was conducted in Virginia caves by Holsinger and Culver (1988).

RECOMMENDATIONS

Retain on list of Regional Forester Sensitive Species.

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