

***Conservation Assessment  
for  
Undescribed Species Campground Cave Copepod  
(Megacyclops)***



*Typical female cyclopoid copepod with eggs (from Pennak, 1978)*

***USDA Forest Service, Eastern Region***

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*This Conservation Assessment was prepared to compile the published and unpublished information on Megacyclops undescribed species. 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 Campground cave copepod is designated as a Regional Forester Sensitive Species on the Hoosier 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 Campground Cave Copepod is a groundwater microcrustacean that is known from drip pools in two caves in the Hoosier National Forest.

## NOMENCLATURE AND TAXONOMY

<b>Classification:</b>	Class Crustacea Order Eucopepoda Suborder Cyclopoida Family Cyclopidae
<b>Scientific name:</b>	<u>Megacyclops</u> undescribed species
<b>Common name:</b>	Campground cave copepod
<b>Synonyms:</b>	none

This species is undescribed and its taxonomy remains to be determined.

## DESCRIPTION OF SPECIES

The Campground cave copepod is a white microcrustacean (less than one millimeter in length). Identification of this species requires slide-mounting for examination with high power microscopy by a specialist in cyclopoid copepod crustaceans.

## LIFE HISTORY

Nothing is known of the life history of this species.

## HABITAT

Megacyclops undescribed species was taken in Campground Cave by dipping water from a shallow cave drip pool (approximately 2-3cm deep) and pouring it through a plankton net. There is no stream in the cave. In Bluff House Cave this species was found by dipping water from a pool fed from above by formations, again extracting the copepod by pouring the water through a plankton net (Lewis, et al., 2002). Aquatic fauna found in this situation probably comes into the cave from a perched epikarstic aquifer lying above the cave (Lewis, 1998). This

groundwater species is to be expected in caves only in drip pools - it is unlikely to be found in cave streams.

## **DISTRIBUTION AND ABUNDANCE**

This species is known only from Campground Cave, in the Springs Valley Recreation Area, Orange County, Indiana; and Bluff House Cave, Martin County, Indiana. It resembles another undescribed species from Virginia, but the exact relationship remains to be seen when description of the species occurs. The members of this group of copepods all occur in fish-free waters and are in general very rare (J. Reid, personal communication).

## **RANGEWIDE STATUS**

**Global Rank:** G1 critically imperiled; The global rank of G1 is assigned to species that are known from five or fewer localities globally. The Campground cave copepod as presently known has been found in two localities.

**Indiana State Rank:** S1 critically imperiled; Similarly, the state rank of S1 is assigned to species that are known from five or fewer localities in Indiana. The Campground cave copepod as presently known has been found only in two localities, Campground and Bluff House caves in the Hoosier National Forest.

## **POPULATION BIOLOGY AND VIABILITY**

In Campground Cave Megacyclops undescribed species occurred in a pool with the subterranean isopod Caecidotea stygia, groundwater amphipod Crangonyx packardii and troglomorphic crayfish Cambarus laevis (Lewis, 1998). In Bluff House Cave the pool from which the copepod was taken was also inhabited by the isopod Caecidotea stygia (Lewis, et al., 2002).

## **POTENTIAL THREATS**

This species is exceedingly vulnerable to any threat to the groundwater quality in the two locations from which it is known. Contaminants may be introduced with ease via sinkholes or from septic fields. Potential contaminants include sewage or fecal contamination from campground outhouses like the one that lies near Campground Cave (Harvey and Skeleton, 1968; Quinlan and Rowe, 1977, 1978; Lewis, 1993).

Impoundments may detrimentally affect cave species (Duchon and Lisowski, 1980; Keith, 1988). The pool habitat of Megacyclops in Campground Cave lies in close proximity to the pool level of the adjacent Tucker Lake.

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 like spent carbide or batteries (Keith, 1988; Elliott, 1998, Peck, 1969). Both of the caves where Megacyclops undescribed species occurs

are well known to cavers, although Bluff House Cave is rarely visited. Campground Cave has an obvious path to the entrance and probably receives occasional visitation.

## **SUMMARY OF LAND OWNERSHIP AND EXISTING HABITAT PROTECTION**

Located on forest service land within the Hoosier National Forest as part of the Springs Valley recreation area. Many activities are restricted in this recreation area and the campground is no longer operated, thus use of the area is relatively light. Bluff House Cave is also on national forest service land in the Sam's Creek Valley of Martin County within the Hoosier National Forest. Reaching this cave requires a significant hike in an area without trails, thus visitation is sparse.

## **SUMMARY OF EXISTING MANAGEMENT AND CONSERVATION ACTIVITIES**

No species specific management activities are being conducted for the Campground cave copepod. Cave and karst habitat located on the Hoosier National Forest are, however, subject to standards and guidelines for caves and karst protection and management as outlined in the Hoosier National Forest Land and Resource Management Plan (Forest Plan) (USDA Forest Service, 1991). These standards and guidelines include the following:

- \*Caves are protected and managed in accordance with the Federal Cave and Karst Resources Protection Act of 1988, Forest Service Manual 2353, Memorandums of Understanding between the forest service and the National Speleological Society, the Indiana Karst Conservancy, Inc., the Forest Cave Management Implementation Plan, and individual specific cave management plans.

- \*Except where modified by an existing cave management prescription, vegetation within a 150-200 foot radius of cave entrances and in-feeder drainages with slopes greater than 30 percent will generally not be cut. No surface disturbing activities will be conducted on any slopes steeper than 30 percent adjacent to cave entrances. Similar protection areas will be maintained around direct drainage inputs such as sinkholes and swallow holes known to open into a cave's drainage system of any streams flowing into a known cave.

- \*Allow no sediment from erosion of access roads and drilling sites to wash into caves or karst features.

- \*Seismic surveys requiring explosives shall not be conducted directly over known cave passages or conduits.

- \*All caves will be managed as significant.

(USDA Forest Service, 1991)

The forest plan includes a cave and karst management implementation plan. This management plan places an emphasis on cave resource protection and mitigation. Understanding of the caves is established through mapping, bioinventory, cataloging of resources (e.g., archaeological, paleontological, speleothems, etc.), and estimating use levels and trends. Protection zones or other mitigation measures recommended by a management prescription will be established around caves entrances, sinkholes and swallowholes. Specific criteria will include consideration for protection of entrance and cave passage microclimate, animals inhabiting the cave, physical and chemical parameters and aesthetic values associated with the cave.

## **RESEARCH AND MONITORING**

The Campground cave copepod was discovered during a biological reconnaissance of the caves in Springs Valley by Lewis (1998). During a bioinventory of caves on the Hoosier National Forest the copepod was found to be present in the same pool in Campground Cave and the new locality in Bluff House Cave was discovered (Lewis, et al., 2002).

## **RECOMMENDATIONS**

This is a rare and unique species that should remain on the list of Regional Foresters Sensitive Species. Formal description of the species should be pursued.

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