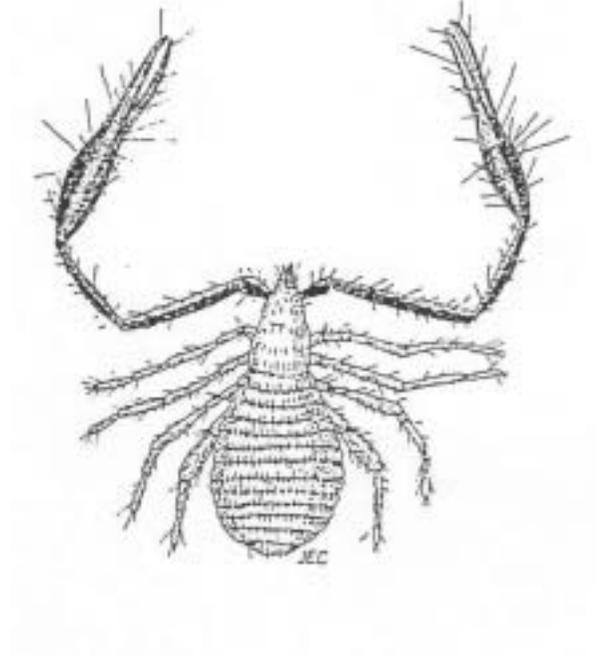


***Conservation Assessment
for
Southeastern Cave Pseudoscorpion (*Hesperochnes mirabilis*)***



(Franz and Slifer, 1971)

USDA Forest Service, Eastern Region

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This Conservation Assessment was prepared to compile the published and unpublished information on Hesperochernes mirabilis. 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 Southeastern cave pseudoscorpion 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.

Hesperochnes mirabilis is a pseudoscorpion found only in caves of the southeastern U.S., where it is usually associated with mammal nests or roosts.

NOMENCLATURE AND TAXONOMY

Classification:	Class Arachnida Order Pseudoscorpiones Family Chernetidae
Scientific name:	<u>Hesperochnes mirabilis</u>
Common name:	Southeastern cave pseudoscorpion
Synonyms:	<u>Chelifer mirabilis</u> <u>Pseudozaona mirabilis</u>

This species was first described as Chelifer mirabilis (Banks, 1895). Hoff (1946) placed the species in the genus Pseudozaona. Muchmore (1974) redescribed the genus Hesperochnes. Muchmore examined the type material and other collections of H. mirabilis and concluded that the species should be moved to the genus Hesperochnes.

DESCRIPTION OF SPECIES

Hesperochnes mirabilis is a robust, pigmented pseudoscorpion with a body length ranging from about 2.6 to 3.9mm (Muchmore, 1994). Identification of this animal requires microscopic examination and dissection of appendages by a specialist in pseudoscorpion taxonomy.

LIFE HISTORY

Nothing is known of the life history of this species. General information on the life history of pseudoscorpions was provided as follows by Muchmore (1990). Pseudoscorpions are predators and in caves are presumed to feed on springtail insects and mites. The life cycle of pseudoscorpions consists of adults mating, often preceded by courtship of the female by the male. Various dancing steps, posturing and grasping with the palps. The male produces a complex stalked spermatophore, which is attached to the substrate. The female takes up the sperm from the spermatophore. The fertilized eggs are passed from the female's body, but retained in a secreted pouch attached to the genital opercula. The eggs develop, nourished by their own yolk and by secretions of the female. The young are retained in the brood pouch until they reach the protonymphal stage, in which they are quite recognizable as pseudoscorpions. Three molts produce deutonymphs, tritonymphs and then adults. In

some pseudoscorpions females protect themselves during brooding by spinning a silken chamber with the spinnerets on the chelicerae. Nymphs also sometimes produce silken chambers during molting.

HABITAT

This species is known only from caves (Muchmore, 1974; 1994) and was classified as a troglobite by Barr (1967). Muchmore (1994) reported that the pseudoscorpion was usually associated with bat guano on the floors of caves, or sometimes in woodrat latrines or nests. Lewis (1993; 1998) reported that in all collections from caves of the Blue River area of southern Indiana Hesperochernes mirabilis were associated with woodrat or mouse nests. Muchmore (personal communication 2001) believes that the pseudoscorpion may be capable of phoretic dispersal considering its relatively wide range and association with mammals.

DISTRIBUTION AND ABUNDANCE

Muchmore (1974) gave the range of Hesperochernes mirabilis as comprising the southeastern United States. The species was originally described from specimens taken from caves in Kentucky and Virginia (Banks, 1895). No additional state records were known until Muchmore (1994) reported collections from caves in Indiana and Ohio. At that time the species was also reported from Georgia, Alabama and Tennessee, but no specific localities were given.

RANGEWIDE STATUS

Global Rank: G2/G3 imperiled/vulnerable; The global rank of G2 is usually assigned to species known from between 6-20 localities; G3 is assigned to species that are known from between 21 to 100 localities. Although specific records of localities for Hesperochernes mirabilis remain unpublished, the summary by Muchmore (1994) suggests a global rank of rarity in the G2-G3 range.

Indiana State Rank: S2 imperiled; The state rank of S2 is assigned to a species that is known from between six and 20 localities in the state. The record of Muchmore (1994) was the first published account of the species in Indiana. Lewis (1998) reported six cave localities in Crawford, Harrison and Washington counties. Lewis, et al.(2002) found another five localities on the Hoosier National Forest (see below). This indicates a state rank of S2 for Hesperochernes mirabilis.

POPULATION BIOLOGY AND VIABILITY

As noted by Barr (1967), Muchmore (1974; 1994) and Lewis (1993; 1998) this species shows a strong affinity for caves that are nesting or roosting sites of mammals. Lewis (1993) reported the latrines of the woodrat Neotoma floridana were inhabited by Hesperochernes mirabilis and a variety of collembolans, e.g., Sinella alata, Sinella cavernarum, Folsomia candida, that are presumably the prey of Hesperochernes.

POTENTIAL THREATS AND MONITORING

General threats to cave animals were listed by Keith (1988). The caves where the Southeastern cave pseudoscorpion occurs are in areas of low development and are little visited, thus there appears to be little threat to the species in the Hoosier National Forest. Hesperochernes mirabilis may be particularly vulnerable because it displays an association, if not a dependence, on mammals. This relationship is particularly alarming since some of the mammal species it associates with are seriously declining, in particular the woodrat Neotoma in Indiana.

SUMMARY OF LAND OWNERSHIP AND EXISTING HABITAT PROTECTION

Several of the Indiana records for Hesperochernes mirabilis are on state or federal lands. In the Hoosier National Forest this species is found in Diggers Delight, Not Our Area and Chris' Continuous Crevice caves at Springs Valley, Orange County; Heron Cave, Crawford County; Redberry and Dave's Dig caves, Sam's Creek Valley, Martin County (Lewis, et al., 2002; and in progress).

This species is also known from Potato Run Cave in the Crawford Harrison State Forest (Lewis, 1998; Muchmore, 1994).

SUMMARY OF EXISTING MANAGEMENT AND CONSERVATION ACTIVITIES

There are no species specific management activities being conducted concerning Hesperochernes mirabilis, however cave and karst habitat located on the Hoosier National Forest are 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 infeeder 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

New populations of Hesperochernes mirabilis are being found during the bioinventory of caves of the Hoosier National Forest (Lewis, et al., 2002; and in progress).

RECOMMENDATIONS

Retain on list of Regional Forester Sensitive Species.

REFERENCES

Banks, Nathan. 1895. Notes on the pseudoscorpionida. Journal of the New York Entomological Society, 3: 1-13.

Barr, Thomas C. 1967. Ecological studies in the Mammoth Cave System of Kentucky. I. The Biota. International Journal of Speleology, 3: 147-204.

Franz, Richard and Dennis Slifer. 1971. Caves of Maryland. Maryland Geological Survey, Education Series 3, 120 pages.

Hoff, C.C. 1946. A study of the type collections of some pseudoscorpions originally described by Nathan Banks. Journal of the Washington Academy of Science, 36: 195-205.

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.

Lewis, Julian J. 1993. Arthropod communities associated with Indiana woodrat caves. Cave Research Foundation 1992 Annual Report: 37-38.

- Lewis, Julian J. 1998. The subterranean fauna of the Blue River Area. Final Report, The Nature Conservancy, 267 pages.
- Lewis, Julian J., Ronnie Burns and Salisa Rafail. 2002. The subterranean fauna of the National Forest. Unpublished report, Hoosier National Forest, 115 pages.
- Muchmore, William B. 1974. Clarification of the genera Hesperochnes and Dinocheirus (Pseudoscorpionida, Chernetidae). *Journal of Arachnology*, 2: 25-36.
- Muchmore, William B. 1990. Chapter 18: Pseudoscorpionida. In Dindal, Daniel L., editor. *Soil Biology Guide*, John Wiley and Sons, Inc., pages 503-527.
- Muchmore, William B. 1994. Some pseudoscorpions (Arachnida: Pseudoscorpionida) from caves in Ohio and Indiana, U.S.A. *Transactions of the American Microscopical Society*, 113 (3): 316-324.
- USDA Forest Service. 1991. Land and Resource Management Plan Amendment for the Hoosier National Forest.