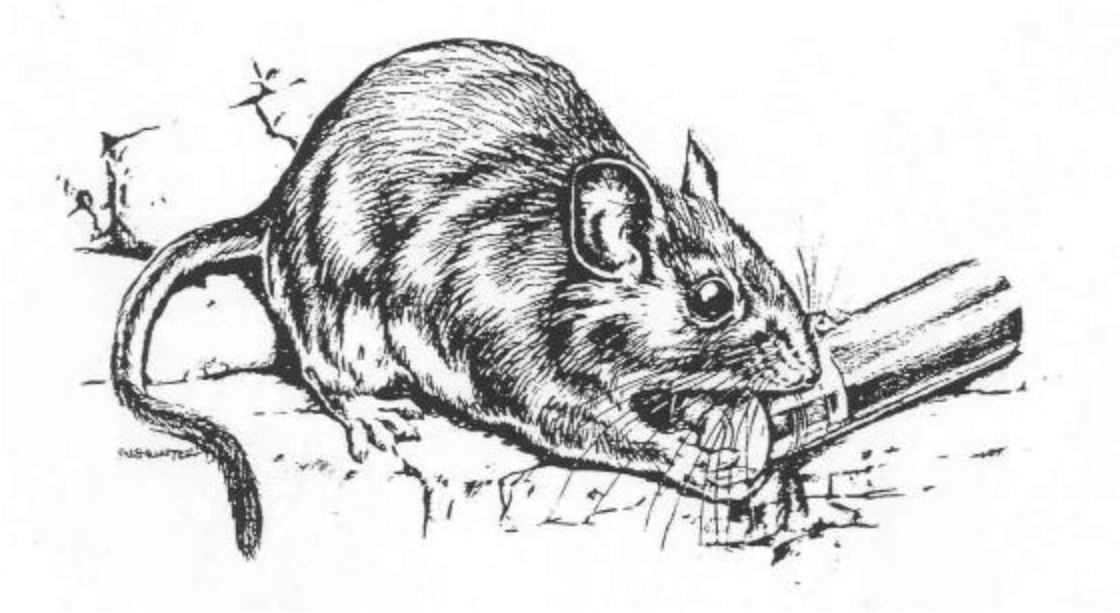
Community Conservation Assessment for Cave Guano Habitats and Associated Rare Animal Species



Woodrat (Johnson and Madej, 1993)

USDA Forest Service, Eastern Region

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HOOSIER NATIONAL FOREST

This Conservation Assessment was prepared to compile the published and unpublished information on cave guano habitats and associated rare animals species in the Hoosier National Forest. 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 purpose of this document is to provide the background information necessary to prepare a Conservation Strategy, which will include management actions to conserve cave guano habitats and guano communities. Presently listed as Regional Forester Sensitive Species that occur in cave guano communities on the Hoosier National Forest are the pseudoscorpion Hesperochernes mirabilis, the staphylinid beetle Aleochara lucifuga, the collembolans Sinella alata and Sinella cavernarum.

DESCRIPTION OF HABITAT AND COMMUNITY

Guano refers to an accumulation of animal dung. Since cave animals are dependent upon the importation of food, the excrement of trogloxenic animals (i.e., certain species that feed outside of caves then enter caves) is an important source of food and the basis of certain cave ecosystems:

Cave cricket guano communities-- Cave crickets of the genus Hadenoecus are important guano contributors in Kentucky caves, but the Ceuthophilus cave crickets present in Indiana do not produce significant quantities of droppings.

Raccoon guano communities—In Indiana the droppings of the raccoon Procyon lotor are nearly ubiquitous in caves. In some caves the scats are sporadic, but in others it is obvious that certain areas are raccoon latrines. Poulson (1979) characterized raccoon fecal material as being a rich source of nutrients that in warm/moist situations is dominated by dung flies Spelobia tenebrarum, but in cold/dry winter environments is dominated by fungal succession. In caves of the Hoosier National Forest raccoon guano appears to first be colonized by Spelobia and staphylinid beetles, frequently Quedius spelaeus. Thereafter, several troglobites typically occur, e.g., springtails Sinella cavernarum and Sinella alata, the milliped Pseudotremia salisae, and the spider Phanetta subterranea.

Bat guano communities—This is a rare community in Indiana, since large assemblages of bats are unusual in caves of the state. The best example of a bat guano community in Indiana is that of Twin Domes Cave, which is inhabited by several tens of thousands of Indiana bats Myotis sodalis. A rich coating of bat guano is present on many areas of the hibernaculum area of the cave, and an active area in an adjacent room is covered with a particularly thick guano layer. The guano is inhabited by the flies Spelobia tenebrarum and Megaselia cavernicola, milliped Pseudotremia indianae, beetles Catops gratious, Aleochara lucifuga, Atheta troglophila, collembolans Sinella alata, and several species of mites. The largest assemblage of bats known in a single site on the Hoosier National Forest, Gypsy Bill Allen Cave with over 100 Indiana bats present during hiberbation, has produced no significant accumulation of guano or guano community.

Woodrat guano communities—The woodrat Neotoma magister (formerly N. floridana) has been extirpated from much of its former range in Indiana, now remaining in only scattered sites along the Ohio River (Johnson, 2002). Poulson (1978) noted that

specialized communities appeared in Kentucky woodrat caves, an observation that was discussed by Lewis (1993) concerning Indiana caves. Within the Hoosier National Forest at Heron Cave, Crawford County, the guano is inhabited by the pseudoscorpion Hesperochernes mirabilis and the milliped Pseudotremia salisae.

ENVIRONMENTAL CONDITIONS

Although variable among the different guano contributing species, most of the guano deposits in Indiana caves are in the twilight zone or barely inside the dark zone of the cave. Woodrats use talus piles, bedrock fissures and caves equally and in no case do these mammals penetrate much beyond the twilight zone. Likewise, due to the cold temperature preference of Indiana bats, the hibernacula are typically not terribly far into the dark zone of the cave. In Indiana caves raccoon scats can be found anywhere from the dripline to fairly far into the dark zone, although most latrine areas are not far beyond the twilight zone.

The proximity of the entrance to guano deposits makes them highly susceptible to dehydration during the winter. Bat guano deposits in Twin Domes Cave (Twin Domes Nature Preserve, IDNR) were nearly devoid of life during a mid-winter visit, but teaming with life during the summer. Thus, the presence of a guano community tends to be seasonal unless the guano is sheltered from the drying influences of winter air.

CURRENT COMMUNITY CONDITION, DISTRIBUTION AND ABUNDANCE

Of the four major guano contributors in eastern U.S. caves cited above, large bat colonies and Hadenoecus crickets are unknown from the Hoosier National Forest. Within the proclamation boundary of the forest, Heron Cave and the surrounding cliffs are actively colonized by woodrats (this site is on private property). Abandoned woodrat latrines, now overlain by raccoon latrines, have also been noted in the Hoosier National Forest in Rose Cave, Martin County, and Garlow Spring Cave, Orange County (Lewis, et al., 2002; and in progress). The woodrats have abandoned these sites.

Raccoons are nearly ubiquitous on the Hoosier National Forest and their presence in caves is similarly present. Significant raccoon latrines are present in many caves and scattered droppings are found in nearly every cave that allows entry by raccoons.

REGIONAL FORESTER SENSITIVE SPECIES

The collembolans Sinella cavernarum and Sinella alata, the pseudoscorpion Hesperochernes mirabilis, and the staphylinid beetle Aleochara lucifuga are presently listed as Regional Forester Sensitive Species that occur in guano communities on the Hoosier National Forest. Rare cavernicolous species present in guano communities to be recommended as Regional Forester Sensitive Species are the millipeds Pseudotremia indianae and Pseudotremia salisae.

POTENTIAL THREATS

The greatest potential threat to guano communities is perhaps the threat of extirpation of the guano contributing animals. In Indiana the woodrat is an endangered species that is now present in the Hoosier National Forest only in a narrow band of habitat along the Ohio River in Crawford County. Likewise, the Indiana bat, a federal endangered species, is found in significant numbers in only one cave in the Hoosier National Forest. Even there, the numbers are not great enough to create a guano deposit. The greatest threat to these animals is human interference with the animals or their habitats. This and other threats to cave faunas are summarized by Keith (1988) and Elliott (1998).

SUMMARY OF LAND OWNERSHIP AND EXISTING HABITA PROTECTION

Four caves are known on the Hoosier National Forest with significant woodrat latrines. These are Rose Cave, Martin County; Garlow Spring Cave, Orange County; and Heron Cave and Heron Annex Cave, both in Crawford County. The woodrats are no longer present in Rose and Garlow Spring caves, but Heron Cave is an active woodrat site with a significant guano community. Heron Annex Cave is a small disjunct piece of Heron Cave that contains a desiccated woodrat latrine.

The largest bat assemblage in the Hoosier National Forest occurs in Gypsy Bill Allen Cave, in the Gypsy Bill Allen Special Area.

Raccoon latrines are fairly common in Hoosier National Forest caves. Prominent examples occur in Sentinel Rock Cave, Hemlock Cliffs Special Area, Crawford County; TRAC Cave and JJ's Sister Cave in the Tincher Special Karst Area, Lawrence County; Davids Spring Cave in the Springs Valley area, Orange County.

The above cited forest service special areas were created due to the presence of significant karst features and have restrictive management (USDA Forest Service, 1991; 2000).

Elsewhere in Indiana, a significant woodrat guano community exists in Potato Run Cave, on the land of the Indiana Department of Natural Resources Harrison Crawford State Forest. The status of Neotoma magister was summarized by Johnson (2002). The largest known bat guano community in the state occurs in Twin Domes Cave, IDNR Twin Domes Nature Preserve.

SUMMARY OF MANAGEMENT AND CONSERVATION ACTIVITIES

All active woodrat sites in Indiana are being monitored by the Non-game and Endangered Wildlife Program, Indiana Department of Natural Resources. Indiana bat hibernacula are also monitored every two years. Dataloggers have been installed in Gypsy Bill Allen Cave by the Hoosier National Forest.

All 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

A bioinventory of subterranean habitats of the Hoosier National Forest is being conducted in which guano communities are being sampled (Lewis, et al., 2002; and in progress). All active woodrat sites and Indiana bat hibernacula in Indiana are monitored by the Non-game and Endangered Wildlife Program, Indiana Department of Natural Resources.

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