

# Use of Dead Trees by the Endangered Indiana Bat<sup>1</sup>

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**Abstract.**--Four Indiana bat nursery colonies have been found in riparian habitat. Three used recently dead trees with exfoliating bark and one used a hollow branch. Threats include deforestation and stream channelization. Management recommendations include maintaining riparian forest especially large, recently dead trees; restore riparian forest and implement research on Indiana bat summer habitat.

## INTRODUCTION

The Indiana bat is a medium sized member of the genus and closely resembles the little brown bat (Myotis lucifugus). It is a monotypic species that occupies the eastern half of the United States. They hibernate in caves and mines from October to April with large hibernating populations occurring in Indiana, Missouri and Kentucky (Brady et al., In Press). Recent studies indicate that maternity colonies are formed mostly in riparian and floodplain habitat of small to medium-sized streams (Humphrey et al., 1977; Cope et al., 1978; Sparling et al., 1979; Gardner and Gardner, 1980). The maternity colonies that have been found have used dead trees (Humphrey et al., 1977; Cope et al., 1978).

## CAUSES FOR ENDANGERED STATUS

The Indiana bat has been designated an endangered species by the U.S. Fish and Wildlife Service and is protected under the Endangered Species Act of 1973, as amended (U.S. Fish and Wildlife Service, 1978). A recovery plan has been prepared and should be available in late 1983 from the U.S. Fish and Wildlife Service.

The most important reasons for the decline of this species is human disturbance of hibernating bats causing the bats to arouse and use their stored fat supply. Vandalism and alteration of cave entrances, thus changing the cave microclimate, are also important. (Brady et al., In Press)

## SUMMER HABITAT

Three of the known nursery colonies occurred in riparian habitat in east central Indiana. The habitats of the two that occurred along the Big Blue River were described by Cope et al. (1978). Thirty-eight percent of the floodplain was forested including bottomland forest stands as well as strip woods adjacent to the river and pastured woodlots. The following species listed in order of importance made up 90 percent of the riparian trees: Acer negundo, A. saccharinum, Fraxinus sp., Plantanus occidentalis, dead tree, Celtis occidentalis, Ulmus americana, Salix sp., Populus deltoides, Juglans nigra, Gleditsia triacanthos, Aesculus glabra, and Ulmus rubra. Fifty-four percent was cropland with mostly corn and some soybeans, 7 percent was pasture and fallow fields, and 1 percent was ponds. The third maternity colony that was studied and described by Humphrey et al. (1977) was located in similar riparian habitat (Cope et al., 1978).

Cope et al., (1978) believed that the best foraging habitat is mature riparian forest at least 30 meters wide on both sides of the stream. Indiana bats would not fly over open spaces. The summer habitat was occupied from mid-May to mid-September (Humphrey et al., 1977)

The roost trees of three nursery colonies in east central Indiana have been described (Humphrey et al., 1977; Cope et al., 1978; Brack, Personal Communication). Another nursery colony was reported to have been in the hollow branch of a riparian tree in northwest Missouri (Humphrey et al., 1977).

The nursery colony reported on by Humphrey et al. (1977) first used a dead American elm (Ulmus americana) and moved to a dead bitternut hickory (Carya cordiformis) after the elm was destroyed by land clearing. The colony also used a nearby live shagbark hickory (C.ovata) as an alternate roost. The bats roosted under loose bark on the dead bitternut. Humphrey et al. (1977) believed that alternating between the dead bitternut and live shagbark gave the bats a thermal advantage under different

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weather conditions. He believed that the dead trees were selected because they were more effective in trapping solar radiation since they did not have foliage to block sunlight and had little water to stabilize temperature.

Two other nursery colonies were discovered by Cope et al. (1978) and both occurred in dead cottonwood trees (Populus deltoides) (Cope, Personal Communication). Brack (Personal Communication) described one of these trees as follows:

"The roost tree had several large slabs of loose bark on the major limbs, while the remainder of the bark, both on the limbs and the tree bole, had fallen away. Only six or seven large branches remained on the tree; all the smaller branches were gone. The tree leaned over the river at an angle of about 15° from perpendicular. A typical component of riparian woody species was found on the floodplain near the roost..."

Another important characteristic of summer habitat was the size needed to support a colony. Individual nursery colonies have ranged from 50 bats occupying 0.8 kilometer of stream (Humphrey et al., 1977) to 100 bats occupying 1.2 kilometer (Cope et al., 1978). An average population density for suitable riparian habitat of 75 bats per kilometer has been suggested (Cope et al., 1978).

#### THREATS TO SUMMER HABITAT

Threats to summer habitat include deforestation and stream channelization for agricultural drainage and surface mining (Brady et al., In Press). In Illinois, Conlin (1976) reported that 30 percent of the stream were channelized and, if future plans were implemented, the total would rise to 45.5 percent. Some channelized streams support Indiana bat populations (Brack, 1979; Humphrey et al., 1977) after riparian vegetation has become established. LaVal and LaVal (1980) believed that summer habitat is not presently limiting Indiana bat populations, however, Bowles (1981) warns that clearing can lead to the fragmentation of wooded habitat along streams.

One direct threat to potential roost trees is the increased demand for wood as fuel. Firewood collections on national forests remove snags (Conner, 1978).

#### RECOMMENDATIONS

Riparian forest should be maintained throughout the range of the Indiana bat to the greatest extent practicable. In addition, a number of recommendations have been made in the Indiana Bat Recovery Plan (Brady et al., In Press):

1. Maintain large dead trees. Since a given roost site is believed to be suitable for only

- 2-8 years (Humphrey et al., 1977; Brack et al., 1982) a constant supply is needed.

2. Restore forest cover to channelized streams and ditches to a width of at least 30 meters on both sides. If possible a stream that is widened should be widened from one side only, leaving the opposite bank natural. Any clearing should be done between 15 September and 1 April to avoid nursery colonies.

3. Maintain water quality, since one of the main food items of Indiana bats is aquatic insects.

4. Locate and investigate more nursery colonies, since only three nursery colonies have been studied.

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