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BAT COLONIES IN INDIANA, WITH EMPHASIS ON THE EVENING BAT, *NYCTICEIUS HUMERALIS*

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The evening bat, *Nycticeius humeralis*, is currently on the endangered species list of Indiana. The first individual of this species from Indiana was taken by C.H. Conaway in Dearborn County in 1942 (Kirkpatrick, 1943). Kirkpatrick and Conaway (1948) reported an additional specimen taken in 1947 in Tippecanoe County. Mumford (1953) recorded an additional eight individuals, five from Tippecanoe County and three from Clay County, two of the latter as they emerged from a house in Brazil and a third from a different location in the same city. Lindsay (1956) shot another eight individuals near farm ponds near Rexville in Ripley County, three of whom had embryos. Records of bats of this species from 29 counties were reported by Mumford and Whitaker (1982), but there are substantially fewer records in recent years (Whitaker and Gammon, 1988).

Cope, *et. al.* (1961) initiated an extensive study to locate bat colonies in Indiana. They advertised in newspapers and elsewhere for leads and located 188 colonies: 142 of the big brown bat, *Eptesicus fuscus*, 41 of the little brown bat, *Myotis lucifugus*, 1 of the pipistrelle, *Pipistrellus subflavus*, and 4 active colonies of the evening bat, *Nycticeius humeralis*. The four colonies of the evening bat were in Clark, Clay, Orange, and Washington Counties, respectively, with an estimated total of 460 bats. Including these colonies, Mumford and Whitaker (1982) reported maternity colonies from 10 counties: Carroll, Cass, Clark, Clay, Clinton, Montgomery, Orange, Tippecanoe, Washington, and White. All of the colonies were from attics in houses. Six of these were known to be active in the early 1960's, but all were apparently inactive as of 1985.

The main purpose of the present study was to locate maternity colonies of the evening bat for study of habitat requirements, food habits, ectoparasites, reproduction, and other aspects of the ecology of this species. Such data should help us determine means of helping them survive as a component of the fauna of Indiana. A secondary purpose was to locate maternity colonies of all species of bats in buildings for comparison with the data collected by Cope, *et. al.* (1961).

MATERIALS AND METHODS

To locate colonies, over 2000 "Bats Wanted" posters were distributed, and publicity appeared in several papers and on television. These efforts produced 499 leads, nearly all of which were explored as of 1 November 1988.

This study was originally centered in west-central Indiana, but it was soon expanded to cover the entire State. As leads were obtained, they were given consecutive numbers and entered on keysort cards. Additional data (type of building and roof, mode of entry, locations of bats, etc.) were entered on the cards, when the sites were visited.

DISCUSSION

A total of 231 maternity colonies of four species of bats was found:

Evening bat, *Nycticeius humeralis*	1
Eastern pipistrelle, *Pipistrellus subflavus*	7
Little brown myotis, *Myotis lucifugus*	34
Big brown bat, *Eptesicus fuscus*	189

The most important objective was partially fulfilled as one maternity colony of the evening bat was found. It is in Briley Chapel, a church about five miles west of Clay City, Clay County, Indiana. The colony is in a very protected area at the top of the bell tower. The only access for humans to where the bats occur is through a 65 x 65 mm opening through the ceiling over the bell. This opening is covered by a 260 x 260 mm section of plywood nailed to the ceiling. Since over 20 cm of guano covered the opening, the authors assumed it had not been opened in several years. Two bats were collected from the colony for identification and were preserved as voucher speciments.

At dusk on 27 July 1987, 358 bats were counted exiting from the colony. In 1988, there were still 31 bats present on 16 October, although all had left a week later. Fortunately, church personnel have been inclined to help protect the bats and to assist in our studies. The colony is being studied further.

Relatively few eastern pipistrelle colonies have been found. Most have been in buildings and other man-made structures, but two were in caves in Missouri (Humphrey, *et al.*, 1976). It is likely that they also use hollow trees. Six small colonies of pipistrelles were located during these studies. Numbers of females per colony were 2, 10, 11, 11, 13, and 13. Most could be reached by standing on the ground or from a short stepladder. Most were in relatively new rather than old buildings. One was on the outside of a house in full sunlight, two were in small sheds, two were in garages, and one was in a pavillion. One colony apparently moved, because in 1986, one of the colonies was found in a small shed. It was composed of 11 adult females. The shed was converted to a chicken house, and in 1988, four females were found in the nearby garage. All colonies contained babies, and all had been vacated by early August.

Ten of the 34 little brown bat colonies were in houses, 8 were in barns, 7 were in churches, 5 were in stores, and 1 each were on a porch, in a trailer breezeway, in a garage, and in expansion joints under a bridge.

One of the little brown bat colonies is particularly interesting because of its size. It is in a barn south of Brazil in Clay County. The authors counted over 6,700 bats emerging from this barn in August 1987 and feel that that count may underrepresent actual size. This could be the largest extant maternity colony of this species. There was a colony of 9,640 "bats" in a brick building in Maryland with about 2,000 bats in an adjacent building (Morano, 1864). The species was not indicated, but the authors suspect that those bats were *Myotis lucifugus*. The colony at Brazil is presently being protected. The barn is owned by a church, and church personnel are sympathetic both to preserving the bats and to the long-term banding and other studies that the authors have initiated.

The second largest colony found was in a church and contained about 4,000 bats. The third largest was in the expansion joints under a bridge near Hymera in Sullivan County. That colony probably contains at least 3,600 bats. Other than

in the colonies indicated above, the estimates (probably low) of numbers in 27 little brown bat maternity colonies ranged from 20+ to 1,640 ($\bar{x}$ = 449, SE = 91.5). Including the two large colonies, the mean colony size was 752.8 (SE = 245.1).

A total of 189 colonies of the big brown bat was located, the largest being 560 adults in a house in Needham, Johnson County, Indiana. Colonies were located as follows: 62 in barns, 43 in churches, 40 in houses, 20 in stores, factories, and the like, 10 in schools, 8 in garages, sheds, and cabins, and 6 in miscellaneous locations.

Little is known of the winter habits of big brown bats. They hibernate in caves and mines, but not nearly enough winter in these situations to account for the large numbers in maternity colonies. Also, big brown bats continually appear in winter in buildings not in cave areas. Barbour and Davis (1969) state, "We need to learn more of the whereabouts of these bats (*Eptesicus*) in winter. It is reasonable to suppose that in regions with cold winters most of them hibernate in buildings where they are not often encountered." We have hypothesized that some of these spots may be in the summer quarters, if warm enough, but many of them are likely to be in nearby buildings. To test this hypothesis, the authors revisited in winter 24 buildings containing summer colonies that would appear to serve as possible hibernacula in winter and found 2 to 72 big brown bats hibernating in 10 of these. The authors also examined the attics of houses where big brown bats were found downstairs in the winter of 1987-88. There were 14 such cases, and the authors found from 1 to 7 bats hibernating in each of 7 locations.

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LITERATURE CITED

Barbour, R.W. and W.H. Davis. 1969. Bats of America. Univ. Press Kentucky, Lexington, 286 pp.

Cope, J.B., W.W. Baker, and J. Confer. 1961. Breeding colonies of four species of bats of Indiana. Proc. Indiana Acad. Sci. 70: 262-266.

Humphrey, S.R., R.K. LaVal, and R.L. Clawson. 1976. Nursery populations of *Pipistrellus subflavus* (Chiroptera, Vespertilionidae) in Missouri. Trans. Illinois State Acad. Sci. 69: 367.

Kirkpatrick, C.M. 1943. Rafinesque's bat in Indiana. Amer. Midl. Natur. 29: 797.

_____ and C.H. Conaway. 1948. Some notes on Indiana mammals. Amer. Midl. Natur. 39: 128-136.

Lindsay, D.M. 1956. Additional records of *Nycticeius* in Indiana. J. Mammal. 37: 282.

Morano, M.F. 1864. An account of a remarkable accumulation of bats. Smithsonian Annu. Rep. 1863: 407-409.

Mumford, R.E. 1953. Status of *Nycticeius humeralis* in Indiana. J. Mammal. 34: 121-122.

_____ and J.O. Whitaker, Jr. 1982. Mammals of Indiana. Indiana Univ. Press, Bloomington, Indiana, 537 pp.

Whitaker, J.O., Jr. and J.R. Gammon. 1988. Endangered and threatened vertebrate animals of Indiana. Indiana Acad. Sci. Monogr. 5, 122 pp.