

CURRENT STATUS OF THE EVENING BAT, *NYCTICEIUS HUMERALIS*, IN INDIANA

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ABSTRACT. As of 1993, we were not aware of any evening bat colonies still existing in Indiana. In 1994, evening bats were located in the Wabash River bottomlands of lower Prairie Creek, Vigo County, and later other colonies were located in the lower Wabash River Basin from Vigo to Posey Counties. Three additional colonies have also been discovered: one near Plainfield in Hendricks County, one near Zenas in Jennings County, and one in Bartholomew County at Camp Atterbury. Whereas all earlier colonies were in buildings, all known presently existing colonies are in trees. Evening bats probably lived in the bottomlands for many years and probably spread to upland buildings from there. The disappearance of evening bats from upland buildings may have been due to adverse pressure from the larger big brown bat, which has been increasing in the state. Eleven maternity colonies of evening bats had been known from Indiana and adjacent Illinois 30-40 years ago. All of these colonies were in buildings, and none of them exist today. One additional colony in a building was found in 1987 among 401 bat colonies in buildings in Indiana, but it too is now inactive. Data on bats from the Indiana State Department of Health for rabies examination also indicate a decline in this species in Indiana.

Keywords: Chiroptera, evening bat, bat, *Nycticeius humeralis*, status, Indiana

The evening bat, *Nycticeius humeralis*, is common in the southeastern United States, but relatively uncommon to the north. Seven records are included without comment from central and southwestern Ohio (Gottschang 1981), and Hoffmeister (1989) gives 31 specific records but lists it as rare throughout Ohio. The evening bat usually forms maternity colonies in buildings or in hollows in trees. It puts on a layer of fat and presumably hibernates, but almost nothing is known of this species in winter.

The evening bat was first recorded in Indiana by Charles M. Kirkpatrick in 1942 (Kirkpatrick 1943). Cope et al. (1961) collected information on 188 colonies of bats in buildings in Indiana by receiving calls in response to a widely-distributed poster asking for information. Four evening bat colonies in Clark, Clay, Orange, and Washington counties were located as a result of this survey (2.1% of the total), and information on distribution of bats of Indiana was summarized by Mumford & Cope (1964). They were then aware of six maternity colonies of this species in Indiana. In 1989 Whitaker and Gummer used the same survey procedure used by Cope et al.

(1961) to locate bat colonies in buildings, but found only one evening bat colony among 401 bat colonies located (0.2%). This suggests that evening bats are decreasing in buildings in relation to other species. Humphrey & Cope (1970) reported on an additional colony in Montgomery County (from field notes of R.E. Mumford and J.B. Cope). Colonies were also known from Carroll, Cass, Clinton, Tippecanoe, and White counties in Indiana and Edgar County in Illinois, just west of the Indiana state line (Whitaker & Gummer 1993). Thus, colonies have been recorded in 11 counties in Indiana (Fig. 1) and adjacent Illinois as of 1993. Although all of these colonies were in buildings, all were close to larger streams flowing into the Wabash River in Indiana.

In addition to the 11 known colonies, there were five sites where earlier data (pregnant/lactating females or young taken) suggested nearby colonies. Information on the old sites is given by Whitaker & Gummer (1993). Whitaker & Gummer (1993) examined the roost sites and mist-netted in the vicinity of all the previous sites. Also James Mills, in 1986, mist-netted at some of these sites. No evidence of evening bats was found at any of the old sites.

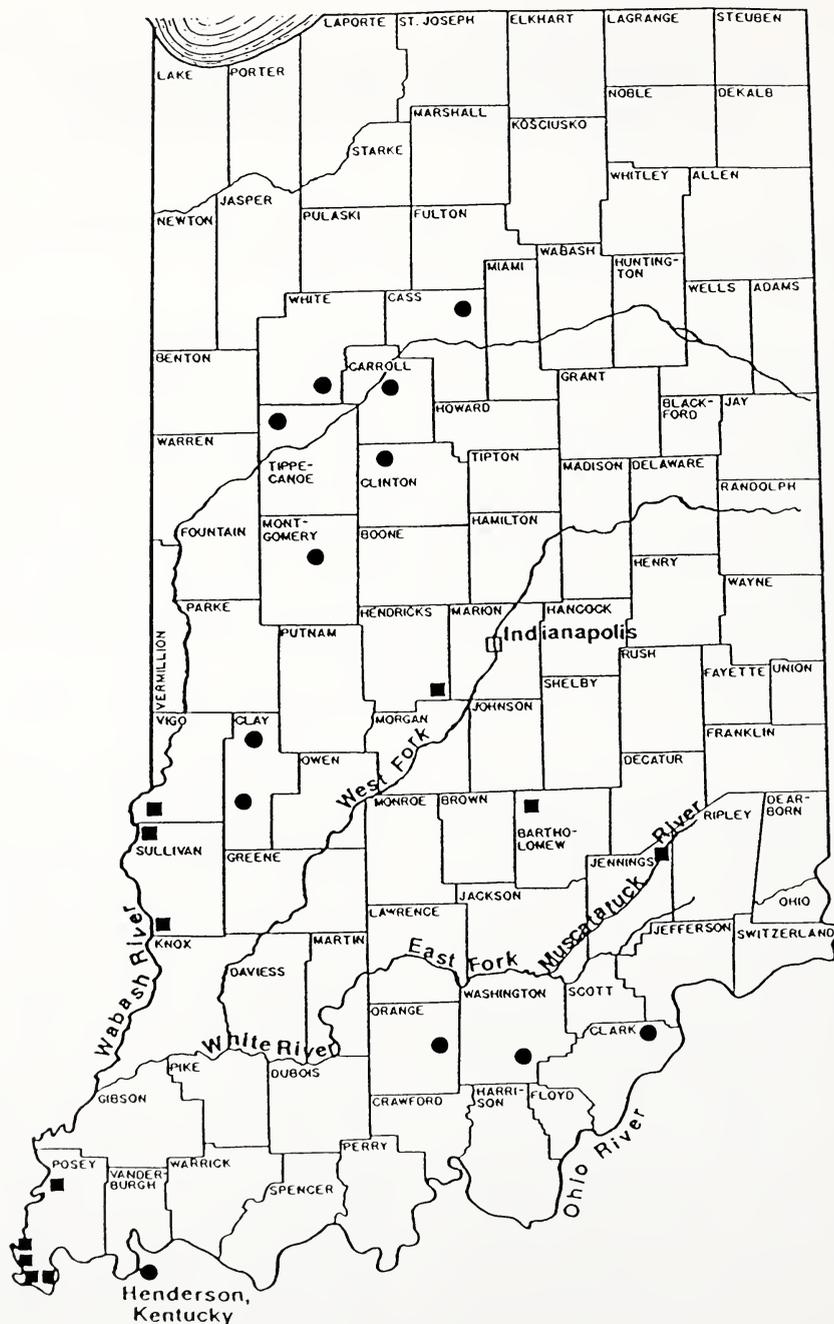


Figure 1.—Former and presently known colonies of the evening bat, *Nycticeius humeralis*, in Indiana. Circles (●) represent previously known, but now defunct, colonies. Squares (■) represent colonies known or presumed to be active in 2002.

Whitaker and Gummer distributed numerous posters in Indiana in order to locate evening bats. Of 401 colonies located during their studies, only one evening bat colony was

found. It was located in a church, Briley Chapel, near Clay City, Clay County, Indiana, on 24 July 1987. However, this colony was evicted by church personnel in 1993. Much

information on evening bats from this colony was published by Clem (1992, 1993; Whitaker & Clem 1992; Whitaker et al. 1991). Thus we knew of no evening bats currently existing in Indiana as of 1993.

More recently we have learned much more about the distribution and behavior of evening bats in Indiana; the purpose of this paper is to provide an update on the current status of the evening bat in Indiana.

METHODS

A great deal of mist-netting has been done in Indiana in recent years by Whitaker and associates, and by Brack and associates (Whitaker et al. 2002; Whitaker & Gummer 2001). Included were 1067 nettings at sites in 80 counties. The timing and type of nettings varied with the project, but they occurred throughout the state. Most were with nets 5, 9, or 13 m wide and 2, 4, or 6 m high, and most were conducted from dusk until 0100 or 0200 h. One of these nettings (at Prairie Creek, Vigo County) resulted in the capture of six evening bats, leading to extensive netting at Prairie Creek. Consequently, weekly samplings of the area were initiated in 1994. From 1994 through 1999, we made 176 mist-nettings at Prairie Creek. Also, data from bats submitted to the Indiana State Department of Health rabies lab were included as well as preliminary data from two sites, Indianapolis International Airport (Hendricks County) and Camp Atterbury (Bartholomew County). Several evening bats were radio-tracked in late summer, 1994 at Prairie Creek (T10N R10W, Section 13, Hutton Quadrangle, 7.5' USGS topographic map series).

RESULTS

During the 1067 nettings, we recorded 6445 individuals including all of the 10 species of bats currently existing in Indiana. On 25 July 1994, a site was sampled on lower Prairie Creek in Vigo County and 15 bats of six species were captured, including one Indiana myotis (federally-endangered) and six evening bats (state-endangered). These bats were taken in 650 ha of contiguous mixed bottomlands forest dominated in much of the area by silver maple, *Acer saccharinum*. The most abundant bat taken during the ensuing weekly nettings in the Prairie Creek area was the evening bat, *Nycticeius humeralis* (558 of 1439 bats taken,

3.17 bats per net-night), followed in order of decreasing abundance by the big brown bat, *Eptesicus fuscus* (254); the northern myotis, *Myotis septentrionalis* (237); the red bat, *Lasiurus borealis* (131); the little brown myotis, *Myotis lucifugus* (114); the eastern pipistrelle, *Pipistrellus subflavus* (92); the Indiana myotis, *Myotis sodalis* (49); the silver-haired bat, *Lasionycteris noctivagans* (3); and the hoary bat, *Lasiurus cinereus* (1). *Nycticeius humeralis*, and also *Eptesicus fuscus* and *Myotis septentrionalis* were taken at greater rates at Prairie Creek than in the lower Ohio or lower Wabash basin.

Several bats were radio-tagged at Prairie Creek. At first we expected to track them to buildings, as all the previously known evening bat colonies were in buildings. However, none of the radio-tagged bats roosted in buildings. Two were tracked to four separate hollow silver maple trees in the large bottomlands woods (Whitaker 1996). On 17 June 1995, a transmitter was placed on an adult female evening bat; and she was tracked to a silver maple tree. That night at least 350 bats emerged from what appeared to be a pileated woodpecker hole about 12 m up in that tree. More recently, S. Veilleux (unpubl. data) has tracked many more evening bats to a number of trees in these same woods.

Of the 6445 bats netted from throughout the state during 1811 nettings, 658 (10.2%) were evening bats (Table 1). However, although there was much netting throughout the state, most of the evening bats (558 individuals) were taken at Prairie Creek. Four other individuals from Vigo County were taken in a major tributary not far from the Wabash River. Almost all of the evening bats from Vigo County were juveniles or adult females. Some of the juvenile males in late summer had testes descended. In addition to the evening bats taken in Vigo County, 38 were taken in the lower Wabash Valley river bottom areas, 29 in Posey County, and nine in Sullivan County. Two from Sullivan County were females from Busseron Creek, thus indicating the presence of a maternity colony near there. The other seven evening bats were from just south of the Sullivan County line, undoubtedly from the Prairie Creek population. In Posey County, males were taken near Cypress Slough (Wabash Island Quad, T8S R4W, section 16), near Goose Pond (Wabash Island Quad, T7S

Table 1.—Bats caught in 1067 nettings from 80 of the 92 counties throughout Indiana (1987–1999).

	No. netted	No. bats/netting	No. counties	% of counties
<i>Eptesicus fuscus</i>	1748	1.63	68	85.0
<i>Lasiurus borealis</i>	1268	1.18	62	77.5
<i>Myotis lucifugus</i>	883	0.82	56	70.0
<i>Pipistrellus subflavus</i>	742	0.70	37	46.3
<i>Myotis septentrionalis</i>	741	0.69	36	45.0
<i>Myotis sodalis</i>	246	0.23	37	46.3
<i>Nycticeius humeralis</i>	658	0.62	12	15.0
<i>Lasiurus cinereus</i>	70	0.07	23	28.0
<i>Lasionycteris noctivagans</i>	16	0.01	11	13.8
<i>Myotis grisescens</i>	74	0.07	6	7.5
Total	6445			

R15W, Section 35), and at Hovey Lake (Uniontown Quad, T8S R14W, Section 14). Six of the 12 Posey County sites yielded a total of 29 evening bats. At one site an evening bat was radio-tagged and tracked to a silver maple tree across the Wabash River to the south in Illinois. Evening bats were also netted west of the Wabash River on the southern edge of Greathouse Island in a former bed of the Wabash River, on the Indiana/Illinois state line. Eighteen evening bats were netted there on 17 July 1996, including at least 13 females indicating that a maternity colony was very close to this site. It is clear that the evening bat is relatively common in the floodplain of

the lower Wabash River in southwestern Indiana. We suspect that this species occurs commonly in the extensive bottomland woods in Gibson County, but this area has not been adequately netted. We have been unable to net it in Knox County, and suspect it is not common there because of a lack of bottomland woods.

An even 600 of the 658 evening bats taken by recent mist-nettings by Brack and Whitaker (unpubl. data) were in the rather extensive river bottom woods of the southern Wabash River. Of the remaining evening bats taken, 36 were in Hendricks County, 11 were in Bartholomew County, 5 were in Jennings County, and 1 each were in Vermillion, Parke, Orange, Crawford, Fayette, and White counties (Table 2). Except for Fayette County, where one evening bat was taken, all of the records, new and old, are relatively near the Wabash or White rivers. Also, more recently many more evening bats have been netted at the Bartholomew County site (Camp Atterbury) and Hendricks County site (Indianapolis International Airport).

Bats submitted to the rabies laboratory of the Indiana Department of Health indicate the scarcity of this species. Only 38 of 7404 bats submitted to the lab between 1966–2000 were evening bats. These included 10 from 1966–1969, 12 from 1970–1979, 7 from 1980–1989, 8 from 1990–2000, and 4 in 2001. Three of these were from Posey County and 5 were from Vanderburgh County, in the lower Wabash area (Table 2). One from Marion County was in the White River drainage. The last was from Floyd County in the Ohio River basin.

Table 2.—Numbers of evening bats taken in various counties in Indiana since 1994, by mist-netting and by specimens submitted to the rabies laboratory, Indiana State Department of Health.

County	Mist-netting	Rabies laboratory
Vigo	562	—
Posey	29	3
Sullivan	29	—
Hendricks	36	—
Bartholomew	11	—
Vanderburgh	—	5
Jennings	5	—
Fayette	1	—
Floyd	—	1
Marion	—	1
Orange	1	—
Parke	1	—
Vermillion	1	—
White	1	—
	677	10

DISCUSSION

Evening bat maternity colonies are presently known in at least five counties (Fig. 1). Evening bats have been netted in 11 counties since 1994 and 10 evening bats have been submitted to the Indiana state rabies laboratory from 1994–2001 (Table 2).

From the first netting, it was obvious that the Prairie Creek site contained an abundant and biologically diverse bat community and deserved intensive study. All of the pre-1993 *Nycticeius* maternity colonies in Indiana were associated with buildings (Mumford & Whitaker 1982), hence for some years we had been searching for this species in buildings. Therefore, the occurrence of relatively large numbers of evening bats in the bottomlands was of great interest. Whitaker & Gummer (1993) had previously noted that the colonies in Indiana were generally near the Wabash and White rivers, which is consistent with this idea. Numerous evening bats were netted in the Wabash River bottoms of Vigo to Posey counties. Prairie Creek and the Posey County sites, and to some extent the Sullivan County (Busseron Creek) site are large, flat, wooded bottomlands that are not developed or inhabited because they often flood. The abundance of evening bats in bottomland woods, where no netting had previously occurred, leads us to conclude that evening bats had been there historically and that the southern Wabash River bottomland woods are probably the ancestral habitat of this species.

Besides being along rivers, all evening bats radio-tracked since 1993 have roosted in trees, whereas all earlier known roosts in Indiana were in buildings. Roosts previously known from buildings may have been spillover from times when there were large populations in bottomland woods. Another possibility is that building roosts indicate that this species had adapted well to humans and their structures, similar to big brown bats and little brown myotis. However, the fact that the previously known populations in buildings are now all gone seems to indicate that this adaptation was not very successful, and perhaps that *Nycticeius* does not successfully compete with big brown bats for roosts in buildings, especially since the big brown bat has been increasing in Indiana (Whitaker, Brack & Cope 2002).

It is not known where evening bats hiber-

nate. We have surmised that it could be in hollow trees near larger rivers to the south of Indiana or at least far enough south so that the temperature inside of the trees does not fall below freezing. Males are seldom associated with maternity colonies. All of the adult evening bats taken at Prairie Creek in 1999 ($n = 145$) and 2000 ($n = 107$) were females (total = 252), whereas 12 of 28 (42.9%) of the adult evening bats from Posey County were males. What is the reason then for the large number of males in Posey County? Perhaps the males remain to the south of the female range during the maternity season, and then migrate south with females. Another possibility is that southern Indiana is the northern edge of the hibernating range, and the males stay there all year. Additional data are needed on sex, age and temporal distribution of evening bats in Posey County to determine if the northern edge of the hibernating range for this species might be in southwestern Indiana.

It is clear that there are major populations of evening bats—at least in Vigo and Posey counties—where they roost in tree hollows (Fig. 1). Contrary to the situation in the lower Wabash Valley, no evening bats were netted in the Ohio River Valley east of Posey County (although one was taken in northern Kentucky, just east of Henderson, in 2002). This may be because there is relatively little bottomland forest in the Ohio Valley, at least on the Indiana side.

Earlier, there were colonies of evening bats in buildings north of Vigo County in north central Indiana, from Montgomery to Cass County (Fig. 1). We have netted very little in the bottomland woods of that area. It would be of interest to determine how far north the species extends in the Wabash River bottomlands.

In the Wabash River bottoms, this species lives in hollows in trees, where the bats commonly move between several trees, even when pups are present (unpubl. data). There is much movement between trees used as roosts by this species. Fairly large numbers of bats occur in some trees at times; at other times they are in smaller numbers. After the young become volant, movement between trees becomes greater. Since more trees are used, individual dusk counts are smaller.

We currently know of at least four other populations of evening bats in Indiana: (1)

near Zenas, in Jennings County, on the Muscatatuck River (Fig. 1). We radio-tracked a bat from this colony, but were unable to find the roost. We suspect that it was in a tree in a deep ravine there. (2) one on Honey Creek, south and east of Terre Haute in Vigo County. We tracked one bat from this colony to a tree in a yard, but a dusk count did not indicate that more bats were there. (3) southwestern Hendricks County, just south of the Indianapolis International Airport. Bats there were roosting in trees north of Interstate-70, but that woods was cut, and the evening bats moved south into a woodlot where a population of Indiana bats, *Myotis sodalis*, had resided for several years. The evening bats used several trees in this lot, possibly some of the same trees used by the Indiana myotis. (4) a population at Camp Atterbury in Bartholomew County. Many additional evening bats have been netted (and tracked) there.

Although evening bats commonly used buildings as roosts earlier, most now roost in trees. We know of none roosting in buildings at this time. It is possible that evening bats are being displaced in buildings by big brown bats, and are relatively successful in bottomland woods there are where few big brown bats. We suspect that trees in bottomland woods are the natural habitat for evening bats, and that they moved out from there into buildings, perhaps in good years when their population expanded.

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