

BATS OF PRAIRIE CREEK, VIGO COUNTY, INDIANA

John O. Whitaker, Jr.
Department of Life Sciences
Indiana State University
Terre Haute, Indiana 47809

ABSTRACT: Prairie Creek flows through about 650 ha of contiguous woods in the Wabash River bottoms of southern Vigo County, Indiana, before it enters the Wabash River in Sullivan County. Cultivated land (corn and soybeans) surrounds the woods. The bat community in these woods may be the most abundant and diverse bat community in Indiana and may approximate bat communities in southern bottomland forests before the advent of Europeans. The area contains at least eight and probably nine of the ten species of bats currently existing in Indiana. In order of decreasing abundance (approximate), these species are the evening bat (*Nycticeius humeralis*), the big brown bat (*Eptesicus fuscus*), the northern myotis (*Myotis septentrionalis*), the red bat (*Lasiurus borealis*), the little brown bat (*Myotis lucifugus*), the eastern pipistrelle (*Pipistrellus subflavus*), the Indiana myotis (*Myotis sodalis*), and the silver-haired bat (*Lasionycteris noctivagans*). The Indiana bat is federally endangered, and the evening bat is state endangered. A maternity colony of at least 350 evening bats was located in a pileated woodpecker hole (*Coephaloeus pileatus*) about 13 m up a silver maple tree (*Acer saccharinum*). A colony of big brown bats was found about 15 m up a dead cottonwood (*Populus deltoides*), but this colony was a post-lactation rather than a maternity colony. Maternity colonies of northern myotis and eastern pipistrelles are probably present; maternity colonies of little brown myotis and Indiana myotis are probably nearby but not on the study area.

KEYWORDS: Bat community, bats, Chiroptera.

INTRODUCTION

Starting in 1993, a survey for bats was initiated in the bottomland forests along the Wabash and Ohio Rivers in southwestern Indiana. Prairie Creek is at the northern edge of the Wabash Lowlands Physiographic Region and is the northernmost site to be netted as part of this project. Prairie Creek was first netted on 25 July 1994 (Site 1, Figure 1), when 15 bats representing six species were captured, including one Indiana bat, a federally endangered species, and six evening bats, a state endangered species. Twelve colonies of the evening bat were known to exist in Indiana and adjacent Illinois 20 to 30 years ago. Those colonies were all in buildings, and all of the colonies and some of the buildings are now gone (Whitaker and Gummer, 1994). The only colony of evening bats definitely known to exist in the State as of 1993 was in a church, Briley Chapel, located in Clay County. This colony also appears to be gone. The capture of six evening bats, one Indiana bat, and six of the 10 bat species existing in the State in one night indicated that the bat community of Prairie Creek was worthy of further study. This study was undertaken to determine the species of bats present at Prairie Creek, their relative abundance, and their distribution on the study area.

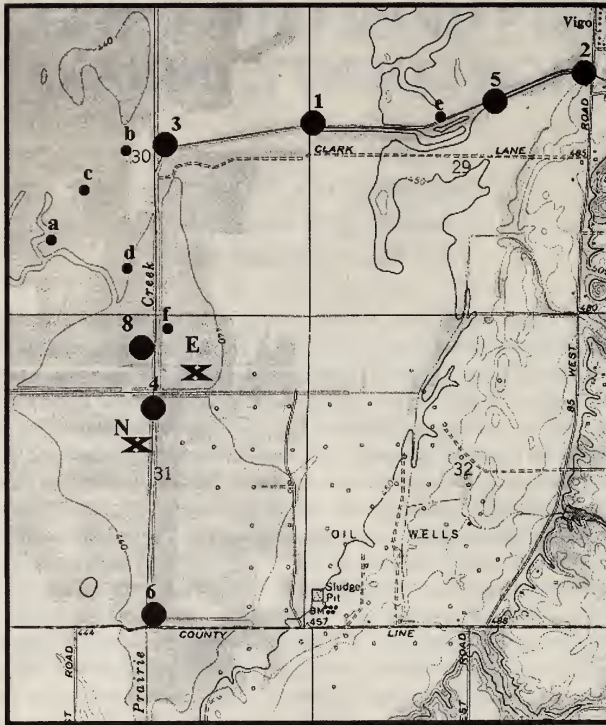


Figure 1. The Prairie Creek area in Vigo County showing net sites 1-8 and the locations of trees where radio-tagged bats roosted (a-f). Colonial roost trees are marked by E (*Eptesicus*) and N (*Nycticeius*). Site 7 is located off the map about 0.4 km east of site 1.

DESCRIPTION OF THE STUDY AREA

The Prairie Creek study area is in southwestern Vigo County, Indiana (Secs. 29, 30, T10N, R10W; Hutton Quadrangle). Prairie Creek drains much of the southwestern portion of Vigo County. The creek flows westward from the uplands onto the Wabash River's flood plain, which is nearly 5 km wide at this point; it then turns abruptly southward for 2.4 km and passes into Sullivan County at County Line Road; after another 3.6 km, it enters the Wabash River (Figure 1). Negro Ditch enters Prairie Creek where it turns southward.

The study area was situated along a 5 km stretch of Prairie Creek. For half this distance, Prairie Creek was lined with a narrow band of woods and flowed west from Battlerow Road (85 West Road) to Negro Ditch. The other half of the study area extended south from Negro Ditch and included about 650 ha of contiguous woods to County Line Road. Water always occurs in the east-west portion of Prairie Creek. About 40 cm of water occurs in the eastern two-thirds, but the water is much deeper in the western third, mostly because of beaver (*Castor canadensis*) dams in that area. The north-south portion of Prairie Creek is usually less than 50 cm deep and is completely dry in late summer and fall,

except for a few pools. The entire north-south portion and half of the east-west portion of Prairie Creek may be flooded with up to 3 m of water when the Wabash River floods. The creek bottom is of gravel and rock in the eastern section and of sand or mud in the rest.

Forest in the study area consists primarily of silver maple (*Acer saccharinum*), cottonwood (*Populus deltoides*), sycamore (*Platanus occidentalis*), and a variety of other species. Poison ivy (*Rhus toxicodendron*), stinging nettle (*Urtica dioica*), and lizard's tail (*Saurus cernuus*) are some of the dominant ground plants. Local residents state that the area around Prairie Creek did not flood early in this century and that a few houses and commercial establishments were located there.

MATERIALS AND METHODS

Most nettings were conducted at three main sites (Sites 1, 3, and 4; Figure 1) on Prairie Creek. Site 1 is on the floodplain less than 1 km east of the junction of Prairie Creek and Negro Ditch. Water flows at this site throughout the year. Site 3 is at the junction of Negro Ditch and Prairie Creek, where Prairie Creek turns south. This site is just below a beaver dam and contains water throughout the year. Site 4 is nearly 2 km south of site 3. Except for one pool, Prairie Creek is almost completely dry in late summer and fall from site 3 to County Line Road. Sites 2, 5, 6, 7, and 8 have been sampled either once or twice to date.

Netting was generally conducted once a week throughout the active season for bats (April through early November), except when interrupted by flooding. No regular rotation was followed. Sample sites at any particular time were selected based on (1) where seasonal information was needed, (2) which species of bats were needed (for attaching radio transmitters), and (3) which areas were not flooded. Netting was normally carried out from dusk to midnight, using one set of aluminum poles with a pulley system and either 2 or 3, 2 x 10 m nets placed one above the other on the poles. Bats were identified, their sex and weight were determined, a numbered plastic tag was placed on each, and each was held in a cup until it defecated (or for 15 minutes). The guano was used for food habit research. Each bat was then released. Radio transmitters (0.7 gm; Holohil Systems Ltd., Ontario, Canada) were placed on several bats in order to track them to their roosts.

RESULTS

A total of 47 mist-net samples as taken, resulting in the capture of 410 bats representing eight species (Table 1). Three nettings contained no bats and are not included in the summarized data. Samples in which bats were taken yielded from 1 to 37 bats per sample ($\bar{X} = 9.3$; $SD = \pm 6.39$; $n = 44$).

Evening Bat. The most abundant bat at Prairie Creek was the evening bat (Tables 1 and 2). A total of 145 bats was netted between July 1994 and October 1995, including 115 females. The bats were well distributed along the bottom-

Table 1. A summary of the bats captured in 44 of the mist-nettings in which bats were taken at Prairie Creek, Vigo County, Indiana.

Species	Total Number of Bats	Frequency of Nettings (%)	Mean Number per Colony
Evening bat	145	68.2	3.3
Big brown bat	99	65.9	2.3
Northern myotis	62	59.1	1.4
Red bat	42	40.9	0.9
Little brown myotis	21	25.0	0.5
Eastern pipistrelle	19	25.0	0.4
Indiana bat	19	27.2	0.4
Silver-haired bat	3	4.5	0.4
Totals	410		9.3

lands of the creek, ranging from 43 to 50 in the upper, lower, and middle bottomlands (Table 3). Radio transmitters were placed on three different adult female evening bats in late August 1994 in an effort to locate their maternity colony. The three bats were ultimately tracked five times to four separate trees (a-d, Figure 1). If they had been in a single maternity colony, they had now spread out. Clem (1994) reported that alternate roosts were used by evening bats from a church in Clay County, Indiana.

On 12 June 1995, a radio transmitter was placed on another female, and on 13 June, she was tracked to a silver maple (N, Figure 1). That night a minimum of 350 bats emerged from a pileated woodpecker hole about 15 m up the tree. More than 350 bats were probably present, but it was too dark to count further. To date, 114 different evening bats have been banded in the study area, but only two have been recaptured. The low recapture rate would appear to indicate that the Prairie Creek population of evening bats is very large. Whether the entire population of evening bats uses the same tree during the maternity season needs to be determined, but the bats apparently did disperse to other roost trees after the maternity season ended. Bowles, *et al.* (in press) found that the evening bats at a study area in Iowa were using alternate roost sites by late June.

Evening bats have been found in Indiana as early as 8 April (Mumford and Cope, 1964) and at a maternity roost in Montgomery County by 1 May (Humphrey and Cope, 1970). Clem (1993) reported that the first evening bats

Table 2. The number of bats captured during monthly nettings at Prairie Creek. The number of females is given in parentheses.

Species	April 2	May 3	June 4	July 10	August 8	Sept. 11	Oct. 6	Nov. 3	Totals
Evening bat	0	11 (11)	22 (20)	46 (29)	27 (22)	32 (29)	7 (4)	0	145 (115)
Big brown bat	2 (1)	3 (2)	2 (2)	9 (3)	38 (25)	17 (5)	27 (14)	1 (0)	99 (52)
Northern myotis	8 (7)	13 (10)	2 (1)	5 (1)	16 (11)	11 (6)	7 (1)	0	62 (37)
Red bat	1 (0)	0	0	5 (4)	15 (11)	18 (7)	2 (1)	1 (0)	42 (23)
Little brown myotis	6 (4)	6 (5)	2 (1)	2 (1)	2 (2)	2 (1)	1 (0)	0	21 (14)
Indiana bat	4 (2)	0	0	1 (1)	3 (2)	5 (4)	6 (0)	0	19 (9)
Eastern pipistrelle	0	5 (4)	0	4 (1)	8 (5)	2 (0)	0	0	19 (10)
Silver-haired bat	0	0	0	0	0	0	3 (2)	0	3 (2)
Totals	21 (14)	38 (32)	28 (24)	72 (40)	109 (78)	87 (52)	53 (22)	2 (0)	410 (262)

returned to Briley Chapel in Clay County, Indiana, on 1 May 1989 and 27 April 1990. No evening bats were taken in nettings at Prairie Creek on 10 April at site 4, which is about 350 m from the maternity roost. Unfortunately, flood waters prevented additional sampling at that site until 15 May, when 11 evening bats were taken. Clem (1993) found that the number of bats at Briley Chapel slowly declined following the July population peak. The last dates on which bats were seen at Briley Chapel were 15 October 1988 ($n = 31$), 3 November 1989 ($n = 2$), and 18 October 1990 ($n = 4$). The last evening bats ($n = 4$) were taken at Prairie Creek on 3 October 1994; none were taken on 7 October 1994. In 1995, the last evening bat ($n = 1$) was taken on 12 October.

Big Brown Bat. The big brown bat was the second most abundant species present at Prairie Creek. The species was taken in every month from April to November. Big brown bats were most abundant in the middle section of the study area and least abundant in the upper section. Very few individuals were taken in April, May, and June (a total of 7, including 5 females) as well as in early July. In contrast, large numbers of big brown bats were taken in August, September, and October (ranging from 17 to 38 per month). The conclusion drawn from these data suggests that although no maternity colony was present on the study area, post-maternity colonies formed at Prairie Creek after the young became volant. Radio transmitters were placed on two big brown bats, and these bats were tracked to a dead cottonwood tree (E, Figure 1). Fifteen and 16 bats exited from a crack in this tree about 15 m above the ground on 2 and 12 October 1995, respectively.

Northern Myotis. The northern myotis was the third most abundant bat at Prairie Creek. Sixty-two individuals were netted. The majority of these indi-

Table 3. The sites at Prairie Creek where bats were captured. The numbers in parentheses are the number of females, males, and undetermined (reading from left to right). No bats were taken at sites 2 and 5.

Species	Upper Bottomland Sites 1, 7	Middle Bottomland Sites 3, 8	Lower Bottomland Sites 4, 6	Total
Evening Bat	43 (31, 10, 2)	52 (42, 8, 2)	50 (42, 4, 4)	145 (115, 22, 8)
Big brown bat	17 (8, 7, 2)	50 (28, 15, 7)	32 (16, 13, 3)	99 (52, 35, 12)
Northern myotis	36 (25, 11, 0)	14 (9, 5, 0)	12 (3, 8, 1)	62 (37, 24, 1)
Red bat	12 (7, 3, 2)	20 (12, 4, 4)	10 (4, 6, 0)	42 (23, 13, 6)
Little brown myotis	14 (9, 5, 0)	3 (2, 1, 0)	4 (3, 1, 0)	21 (14, 7, 0)
Eastern pipistrelle	14 (6, 7, 1)	1 (1, 0, 0)	4 (3, 1, 0)	19 (10, 8, 1)
Indiana myotis	9 (5, 4, 0)	7 (4, 3, 0)	3 (3, 0, 0)	19 (9, 10, 0)
Silver-haired bat	2 (1, 1, 0)	0	1 (1, 0, 0)	3 (2, 1, 0)
Totals	147 (92, 48, 7)	147 (98, 36, 13)	116 (75, 33, 8)	410 (262, 120, 28)

viduals (36) were captured in the upstream section of the study area. A radio transmitter was placed on one adult female, and she was tracked to upper Prairie Creek (area e). The radio transmitter failed before she could be tracked to a specific tree. A maternity colony of this species probably exists in the uplands section of Prairie Creek to the east of the study area.

Little Brown Myotis. Only 21 little brown myotis were taken at Prairie Creek. Twelve were netted in April and May (presumably mostly migrating individuals), but only 4 (including 2 females) were taken in June and July, when females and volant young should have been present. A maternity colony probably does not exist on the study area. The two adult females taken in June and July were taken downstream, suggesting that a maternity colony might occur south of the study area.

Indiana Myotis. The Indiana myotis is a federally endangered species. A total of 12 individuals was taken — 4 in April, and 1, 3, 5, and 6 in July through October, respectively. Of these, 10 were males, and 9 were females. Indiana myotis forms maternity colonies under the loose bark of trees. Except for one lactating female taken in July, all of the bats of this species could have been either migrating or dispersing, as members of this species begin dispersing about the middle of August. The one lactating female was taken in the upper portion of the study area. She presumably was from a maternity colony within 2-3 km of the study area, but probably not within it, since more individuals of this species were not captured.

Other Species. A total of 42 red bats (including 23 females) was netted from throughout the study area. Red bats are solitary and hang among the leaves of trees. Whether the red bats produced young in the study area is not known. Hopefully, reproduction did occur, but the lack of red bats in May and June would suggest not. Four adult females were taken on 19 July and 24 July, which seems too early for migration, but the fact that a large number of red bats were present in August and September suggests that red bats do migrate through this area.

Nineteen eastern pipistrelles were taken. Fourteen came from the upstream portion of the study area, indicating that a maternity colony might occur there.

Most silver-haired bats in Indiana are seen during their northward spring or southward fall migrations. Three individuals were taken in October during their normal fall migration.

The hoary bat has not been captured on the study area, but the species should occur there. One individual was netted on 11 June 1994 along Prairie Creek in Sullivan County about 2 km south of the study area on a wooded floodplain that is essentially an extension of the habitat of the study area.

DISCUSSION

At least eight of the ten species of bats still occurring in Indiana are present in the Prairie Creek area, and one more, the hoary bat, probably occurs there as well. If so, only the gray myotis (*Myotis grisescens*) of the bat species currently present in Indiana does not occur on the study area. The single known gray bat colony in Indiana is in a quarry in Clark County.

Big brown bats, little brown myotis, evening bats, and pipistrelles have adapted to humans, often living in buildings and other man-made structures, and, in the case of the big brown and evening bats, often feeding on food items associated with crops. Evidence is available that suggests that the evening and big brown bats are feeding over the croplands surrounding the woods at Prairie Creek.

Other than feeding on foods associated with croplands, the Prairie Creek bat community is probably behaving much like the original bat communities present before the advent of Europeans. The nature of the study area supports this hypothesis. The amount of woodland is large (about 650 ha), the main part

of the study area is at least 2.4 km away from any buildings, and human penetration into the area is minimal. Evening and big brown bats currently form colonies in buildings, but they probably formed them in trees originally, as evening bats currently do at Prairie Creek.

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