

FINAL REPORT

SECTION 6

ENDANGERED SPECIES ACT



FEDERAL AID PROJECT E-30-3

Mist-net Survey for Endangered and Candidate Bat  
Species on Public Lands in Eastern Oklahoma

MAY 1, 1994 - SEPTEMBER 30, 1997

## JOB COMPLETION REPORT

STATE: **Oklahoma**

PROJECT NUMBER: **E-30-3**

PROJECT TYPE: **Research**

PROJECT TITLE: **Endangered/Candidate Bat Species Survey**

SEGMENT DATES: **May 1, 1994 - April 30, 1996 and 1 June - 15 September 1997**

JOB TITLE: **Mist-net Survey for Endangered and Candidate Bat Species on Public Lands in Eastern Oklahoma**

### ABSTRACT

Bats were mist-netted from sunset to sunrise during 75 nights in the summers of 1994, 1995, and 1997 at 18 sites in 9 counties of eastern Oklahoma. We captured 1539 individuals representing 12 species during the three summers. Two endangered taxa of bats, the gray bat (*Myotis grisescens*) and Ozark big-eared bat (*Corynorhinus townsendii ingens*), were captured at Lee's Creek Woodland, a preserve of The Nature Conservancy in Adair County; neither were found at any other site. Although both have been taken previously in Adair County, we were surprised when we captured Ozark big-eared bats in 1994 but not 1995 and gray bats in 1995 but not 1994; this site was not surveyed in 1997.

Other notable captures occurred in McCurtain County. We documented the third record of the Seminole bat (*Lasiurus seminolus*) in Oklahoma at North Cedar Creek. We also captured the third state record of the Rafinesque's big-eared bat (*Corynorhinus rafinesquii*) at Little River National Wildlife Refuge.

Red bats (*Lasiurus borealis*) were most numerous and comprised over 45.7% of all captures. The next three most abundant species comprised another 49% of all captures and included the eastern pipistrel (*Pipistrellus subflavus*; 34.5%), northern myotis (*Myotis septentrionalis*; 7.5%), and evening bat (*Nycticeius humeralis*; 7.0%). No other species represented more than 2% of all captures.

Species richness of bats ranged from nine at Lee's Creek Woodland, Adair County to none at Winding Stair, Ouachita National Forest, LeFlore County. Diversity in the tree community seemed to be correlated to species richness of bats. Point-quarter analysis revealed 12 tree species in close proximity to the net site at Lee's Creek Woodland and only three at Winding Stair where plantations of shortleaf pine (*Pinus echinata*) surrounded it.

## I. JOB OBJECTIVE

To survey counties throughout southeastern and eastern Oklahoma for the presence and relative abundance of bat species, with special emphasis on endangered and candidate species for which little current information is available.

## II. INTRODUCTION

Twenty-one species of bats representing two families have been reported for Oklahoma (Caire et al., 1989). Of these, 16 species occur in the eastern one-third of the state. Three federally endangered taxa, the gray bat (*Myotis grisescens*), Indiana bat (*Myotis sodalis*), and Ozark big-eared bat (*Corynorhinus townsendii ingens*) and three candidate species, Rafinesque's big-eared bat (*Corynorhinus rafinesquii*), eastern small-footed myotis (*Myotis leibii*), and southeastern myotis (*Myotis austroriparius*), have been previously reported for eastern Oklahoma. Additional information is needed to develop and implement strategies for recovery of these six species of rare bats.

During the 1980s and 1990s, many studies were conducted on the Ozark big-eared bat (B.K. Clark et al., 1996, 1997; B.S. Clark, 1991; B.S. Clark et al., 1993, 1997; Wethington, 1994; Wethington et al., 1996). These efforts culminated in the revision of the recovery plan for the Ozark big-eared bat (U.S. Fish and Wildlife Service, 1995). To a lesser extent, populations of the gray bat have been monitored in Oklahoma (Grigsby et al., 1993). The most recent record of the Indiana bat in Oklahoma was reported by Saugey et al. (1990) when several were found hibernating in Bear Den Cave, Ouachita National Forest, LeFlore County. Except for Ozark big-eared bats and gray bats, little attention has been given to the other four species of special concern in Oklahoma. Although historic records provide some indication of the distribution of these bats, their current ranges in eastern Oklahoma needed to be examined. By returning to historic sites and surveying surrounding counties for bats, we could better assess the current distribution and abundance of species of special concern in eastern Oklahoma. This would facilitate setting priorities for funding, listing, and habitat protection/acquisition.

Systematic surveys of habitats have been used to gain valuable information concerning the biology of endangered species in other states. For example, numerous sites were surveyed for Indiana bats in Iowa (B. K. Clark et al., 1987; B. S. Clark et al., 1987) and Illinois (Clark and Clark, 1987). These studies revealed that Indiana bats were more widely distributed in both states than previously thought, especially females in summer when they establish maternity colonies. Our work indicated that the Indiana bat was a common summer resident in upland and riparian wooded habitats of west-central Illinois. This prompted more intensive surveys and ultimately resulted in a study of the distribution, abundance, habitat use, and status of the Indiana bat in Illinois (Gardner et al., 1989).

### III. STUDY AREA

This study was conducted in four physiognomic regions of eastern and southern Oklahoma (see Caire et al., 1989). Sites in Adair and Sequoyah counties occurred in the Oak (*Quercus*)-Hickory (*Carya*) Ozark Plateau. The Adair County sites were upland sites in the Boston Mountains on the western face of the Ozarkian Uplift. The Sequoyah County site was in the floodplain of the Arkansas River near Robert S. Kerr Lake. All sites in Choctaw, LeFlore, Latimer, and Pushmataha counties, as well as all but the southern most sites in McCurtain County, occurred in the Oak-Hickory-Pine (*Pinus*) Ouachita Highlands. Sites in southern McCurtain County were in the Cypress (*Taxodium*)-Oak Floodplains. Sites in Bryan and Johnston counties occurred in the Post Oak (*Q. stellata*)-Blackjack Oak (*Q. marilandica*) Uplands.

### IV. METHODS

We conducted this study at 18 sites in 9 counties of eastern Oklahoma during June through August 1994 and 1995, and July through September 1997 (Table 1). These sites were selected because of their potential for endangered taxa of bats and bats that may be candidates for listing as threatened or endangered. All sites were on lands that could be managed for bats in the future, should the need arise.

Two 3-tiered nets and 3 or 4 single-tiered nets were set at the 16 noncave sites and operated from sunset to sunrise for three consecutive nights. Typically, nets were set across streams, creeks, lake inlets, roads, or trails to maximize capture success. For the two cave sites, we placed a single mist net across the cave entrance. Bats were removed from the nets immediately after capture. Reproductive status was recorded for each along with forearm, third, and fifth metacarpal lengths. Bats were weighed, banded (plastic color-coded bands in 1994; numbered aluminum bands in 1995 and 1997) and released as quickly as possible.

We counted the number of potential roost trees in 10,000 m<sup>2</sup> area (either 20 m x 500 m or 50 m x 200 m transects) at each site. Transects paralleled the main flyway that nets were set across and the configuration that best fit the available habitat was used. Roost trees were defined as large ( $\geq 50$  cm dbh) live or dead trees with large cavities, cracks, or exfoliated bark (B. K. Clark et al., 1987).

We also completed a point-quarter analysis of woody vegetation to assess the most abundant trees ( $\geq 15$  cm dbh) at each site. We recorded the distance to the nearest tree (and its dbh) in four quadrants at 10 points separated by 20 m. The 180-m transect paralleled the main flyway that nets were set across.

### V. RESULTS AND DISCUSSION

Twelve species of bats were represented in 1539 captures at the 18 sites (Tables 1 and 2). The four most abundant species represented over 94% of all captures and included the red

bat (Lasiurus borealis;  $n = 704$ , 45.7% of all captures), eastern pipistrel (Pipistrellus subflavus; 531, 34.5%), northern myotis (Myotis septentrionalis; 115; 7.5%), and evening bat (Nycticeius humeralis; 107, 7.0%).

We recaptured 19 bats during the three years of this study; however, only 5 of these were captured during a different sampling period than when they were originally marked. The most notable recapture was a male northern myotis taken at Bear Den Cave on 12 July 1997. This bat had been tagged with two bands, an orange 808 and a yellow Ouachita National Forest on the right and left wing, respectively. We have, as of yet, been unable to obtain the original capture data. One red bat (female SEO 016) was first captured at Hodge Creek, Ouachita National Forest, on 9 June 1995 and subsequently recaptured on 12 July 1997 at the same location. During 13-15 June 1994, we tagged five male evening bats with pink bands at Little River National Wildlife Refuge. In 1995, we recaptured two male evening bats at the same location (one on 15 June and the other on 16 June). We captured a female red bat banded with a pink band on 21 July 1995 at Lee's Creek; this bat probably was originally captured at that site during 28-30 June 1994. Of the 14 bats recaptured during the same sampling period in which they were originally banded, 10 were red bats, 2 were evening bats, 1 was a hoary bat (Lasiurus cinereus), and 1 was a northern myotis.

Species composition and number of bats captured at noncave ( $n = 16$ ) and cave ( $n = 2$ ) sites varied markedly. We captured 12 species and 1036 individuals at the 16 noncave sites (Tables 1 and 2). The four most abundant species represented over 94% of all captures and included the red bat ( $n = 704$ , 68.0% of all captures), eastern pipistrel (125, 12.1%), evening bat (107, 10.3%), and northern myotis (29; 2.8%).

We captured 4 species and 503 individuals at the 2 caves (Tables 1 and 2). The two most abundant species, the eastern pipistrel ( $n = 406$ , 80.7% of all captures) and northern myotis (86, 17.1%), represented over 97% of all captures; the other two species were the Ozark big-eared bat (10; 2.0%) and big brown bat (Eptesicus fuscus; 1, 0.2%).

Species richness of bats ranged from nine at Lee's Creek Woodland to none at Winding Stair National Recreation Area, Ouachita National Forest. Winding Stair was less than 5 km from our net site at Hodge Creek where we captured 489 individuals during the three summers (Table 2). Our failure to capture bats at Winding Stair may have been due to the lack of a diverse tree community near the net site; three species of trees were identified during our point-quarter analysis of woody vegetation (Table 3). Furthermore, our net site was surrounded by plantations of shortleaf pine. In contrast, we found 11 species of trees and 6 species of bats at Hodge Creek. We captured one species of bat (red bat) at Robber's Cave State Park; five species of trees were identified in the point-quarter sample.

Species richness of the tree communities ranged from 14 at Washita Arm Wildlife Management Area to 3 at Winding Stair, Pushmataha Wildlife Management Area and Sequoyah National Wildlife Refuge (Table 3). We found a significant positive

correlation ( $r = 0.66$ ,  $P < 0.01$ ) between species richness of bats and trees. For example, we did not capture any bats at Winding Stair, one of the least speciose tree communities surveyed. Furthermore, 34 of 40 trees identified in the point-quarter analysis were shortleaf pine. In contrast, 9 species of bats and 12 species of trees were identified at Lee's Creek Woodland.

Number of potential roost trees ranged from 6 at Hodge Creek to 68 at McCurtain County Wilderness Area (Table 3). No significant correlation was found between number of roost trees and species richness of bats ( $r = 0.15$ ;  $P > 0.10$ ).

We captured two endangered taxa of bats, the Ozark big-eared bat (*Corynorhinus townsendii ingens*) and gray bat (*Myotis grisescens*), at Lee's Creek Woodland, Adair County. Both use limestone caves for maternity roosts and hibernacula. We captured the Ozark big-eared bat at this site in 1994 but not 1995, whereas we captured the gray bat 1995 but not 1994. However, we did not find them in Sequoyah County to the south; thus, we report no range extensions for either taxa.

One other endangered species of bat, the Indiana bat (*Myotis sodalis*), occurs in Oklahoma. Although Saugey et al. (1990) found Indiana bats and eastern small-footed myotis hibernating in Bear Den Cave, we were unable to verify their occurrence during three nights of sampling at the cave entrance. Furthermore, we did not capture either species in 15 nights of netting at Hodge Creek and 3 nights of netting at Winding Stair; both sites were less than 5 km from Bear Den Cave. This difference probably was due to our study being restricted to summer months, whereas Saugey et al. (1990) surveyed the cave for bats in winter.

We recorded 10 new county records for bats during this study (see Caire et al., 1989). These records were: Adair County, hoary bat and little brown bat (*Myotis lucifugus*); Bryan County, eastern pipistrel; Choctaw County, northern myotis, eastern pipistrel, evening bat, and hoary bat; and Johnston County, eastern pipistrel and evening bat.

Our capture of a Seminole bat (*Lasiurus seminolus*) bat at Cedar Creek in McCurtain County was only the third record for this species in Oklahoma. The first state record was reported by Glass (1958); it was taken in August 1954 on the Little River 6 miles south of Eagletown, McCurtain County. Caire and Thies (1987) collected the second Seminole bat at Turner Falls, Murray County, in September 1984.

Prior to our study, Rafinesque's big-eared bat (*Corynorhinus rafinesquii*) had only been taken twice in Oklahoma (Blair, 1939). One specimen was collected at Houston, which is now located beneath Wister Lake, LeFlore County; the other was taken from a well west of Smithville, McCurtain County. We captured the third Rafinesque recorded for Oklahoma at the Little River National Wildlife Refuge, McCurtain County.

The last notable capture was a Brazilian free-tailed bat (*Tadarida brasiliensis*) at Big Hudson Creek, McCurtain County. Although large numbers of this species have been

recorded at several caves in western Oklahoma, captures in eastern Oklahoma during summer are not as common (see Caire et al., 1989).

In addition to Indiana bats and the eastern small-footed myotis, we failed to capture two other species, the southeastern myotis (Myotis austroriparius) and silver-haired bat (Lasionycteris noctivagans), previously found in eastern Oklahoma (see Caire et al., 1989). The capture of the southeastern myotis was unlikely due to its rarity. Silver-haired bats are more numerous farther to the north and only a few scattered individuals have been taken in the state; therefore, we did not expect to capture silver-haired bats.


## VI. RECOMMENDATIONS

We encourage the continued search for endangered and threatened species of bats in Oklahoma. Although we did not find any endangered taxa outside of its known range, this study has resulted in a greater understanding of bat distributions and abundances in eastern Oklahoma. We believe that additional sites should be surveyed throughout Oklahoma because of the paucity of information concerning bats. Because of recent declines in populations of western big-eared bats (Corynorhinus townsendii pallescens) in other states, the systematic survey of sites in western Oklahoma is especially warranted.

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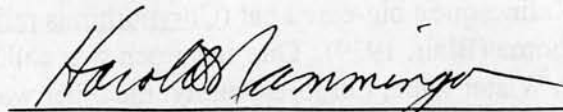
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**Table 1. Summary of bat captures in eastern Oklahoma during summers of 1994, 1995, and 1997 by site and date.**

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**Adair County, Lee's Creek Woodland, TNC (T15N, R26E, Sec. 34, NW 1/4)**

**28 June - 1 July 1994**

<u>Lasiurus borealis</u>	7 females, 8 males, 2 unidentified
<u>Myotis septentrionalis</u>	2 females, 8 males, 1 unidentified
<u>Myotis lucifugus</u>	8 males, 2 unidentified
<u>Pipistrellus subflavus</u>	2 males
<u>Corynorhinus townsendii</u>	5 females, 3 males

**20-23 July 1995**

<u>Eptesicus fuscus</u>	3 males
<u>Lasiurus borealis</u>	65 females, 36 males
<u>Lasiurus cinereus</u>	1 female
<u>Myotis grisescens</u>	1 female, 2 males
<u>Myotis septentrionalis</u>	7 males
<u>Myotis lucifugus</u>	1 female
<u>Nycticeius humeralis</u>	10 males
<u>Pipistrellus subflavus</u>	2 females, 18 males, 1 unidentified

**Adair County, AD-125, Lee's Creek Woodland, TNC (T15N, R26E, Sec. 27, SE 1/4)**

**29 June 29 1994**

<u>Eptesicus fuscus</u>	1 male
<u>Myotis septentrionalis</u>	1 male
<u>Pipistrellus subflavus</u>	2 males
<u>Corynorhinus townsendii</u>	6 females, 4 unidentified

**Bryan County, Newberry Creek, U.S. Army Corps of Engineers (T6S, R7E, Sec. 26, NE1/4)**

**27-30 July 1995**

<u>Lasiurus borealis</u>	13 females, 11 males, 2 unidentified
<u>Nycticeius humeralis</u>	2 females, 5 males
<u>Pipistrellus subflavus</u>	1 female

**Choctaw County, Messer Bottoms, Hugo WMA (T5S, R18E, Sec. 5, NW 1/4)**

**5-8 July 1994**

<u>Lasiurus borealis</u>	4 females, 7 males, 4 unidentified
<u>Lasiurus cinereus</u>	1 female
<u>Myotis septentrionalis</u>	1 male
<u>Nycticeius humeralis</u>	2 females, 3 males, 1 unidentified
<u>Pipistrellus subflavus</u>	1 female, 1 male

**Johnston County, Washita Arm WMA (T4S, R5E, Sec. 22, SW 1/4)**

**1-4 June 1994**

Nycticeius humeralis 6 males  
Pipistrellus subflavus 1 male

**1-4 June 1995**

Lasiurus borealis 1 female, 1 male, 1 unidentified  
Nycticeius humeralis 3 males, 1 unidentified

**Latimer County, Robber's Cave State Park, ODTR (T6N, R18E, Sec. 12, SW 1/4)**

**13-16 July 1995**

Lasiurus borealis 2 females, 1 male, 1 unidentified

**LeFlore County, Bear Den Cave, Ouachita National Forest (T8S, R27E, Sec. 19, NE 1/4)**

**12-13 July 1997**

Myotis septentrionalis 9 males  
Pipistrellus subflavus 123 males

**30 August - 1 September 1997**

Myotis septentrionalis 23 females, 51 males, 2 unidentified  
Pipistrellus subflavus 57 females, 215 males, 9 unidentified

**LeFlore County, Cucumber Creek, TNC (T1N, R25E, Sec. 8, SW 1/4)**

**25-28 July 1994**

Eptesicus fuscus 1 male  
Lasiurus borealis 5 females, 6 males, 5 unidentified  
Myotis septentrionalis 5 males  
Nycticeius humeralis 2 males  
Pipistrellus subflavus 1 female, 3 males

**LeFlore County, Hodge Creek, Ouachita National Forest (T4N, R23E, Sec. 23, NE 1/4)**

**1-4 August 1994**

Eptesicus fuscus 1 female, 4 males  
Lasiurus borealis 50 females, 76 males, 43 unidentified  
Lasiurus cinereus 2 females, 5 males, 2 unidentified  
Myotis septentrionalis 1 male  
Nycticeius humeralis 5 males  
Pipistrellus subflavus 6 females, 11 males, 2 unidentified

**6-9 June 1995**

Lasiurus borealis 2 females, 1 male, 4 unidentified  
Nycticeius humeralis 6 males  
Pipistrellus subflavus 4 males

**LeFlore County, Hodge Creek, Ouachita National Forest (continued)**

**29 June - 2 July 1995**

<u>Eptesicus fuscus</u>	1 female
<u>Lasiurus borealis</u>	5 females, 2 males
<u>Lasiurus cinereus</u>	1 unidentified
<u>Nycticeius humeralis</u>	1 male, 1 unidentified
<u>Pipistrellus subflavus</u>	1 female, 2 males

**2-5 August 1995**

<u>Eptesicus fuscus</u>	1 female, 2 males
<u>Lasiurus borealis</u>	74 females, 76 males, 11 unidentified
<u>Lasiurus cinereus</u>	1 female, 1 male
<u>Nycticeius humeralis</u>	1 female, 6 males
<u>Pipistrellus subflavus</u>	10 females, 20 males, 2 unidentified

**10-13 July 1997**

<u>Eptesicus fuscus</u>	1 female, 3 males
<u>Lasiurus borealis</u>	14 females, 11 males
<u>Nycticeius humeralis</u>	3 females, 3 males
<u>Pipistrellus subflavus</u>	3 males

**LeFlore County, Holsom Creek, Wister WMA (T5N, R23E, Sec. 24, NW 1/4)**

**11-14 July 1994**

<u>Eptesicus fuscus</u>	1 female, 1 male
<u>Lasiurus borealis</u>	9 females, 4 males
<u>Myotis septentrionalis</u>	1 male
<u>Nycticeius humeralis</u>	5 females, 6 males
<u>Pipistrellus subflavus</u>	1 female, 1 unidentified

**6-9 July 1995**

<u>Eptesicus fuscus</u>	3 female, 3 male
<u>Lasiurus borealis</u>	2 females, 2 males, 1 unidentified
<u>Pipistrellus subflavus</u>	1 female, 2 males

**LeFlore County, Winding Stair National Recreation Area (T7N, R23E, Sec. 20, NE 1/4)**

**22-25 June 1995**

No captures

**McCurtain County, Caney Creek, Ouachita National Forest (T8S, R27E, Sec. 19, NE 1/4)**

**6-10 June 1994**

<u>Lasiurus borealis</u>	1 female, 1 male, 1 unidentified
<u>Myotis septentrionalis</u>	2 females
<u>Nycticeius humeralis</u>	5 males
<u>Pipistrellus subflavus</u>	1 female

McCurtain County, Terrapin Creek, Little River NWR (T7S, R25E, Sec. 11, NE 1/4)

13-16 June 1994

<u>Lasiurus borealis</u>	3 females, 1 male
<u>Nycticeius humeralis</u>	5 males
<u>Corynorhinus rafinesquii</u>	1 male

15-18 June 1995

<u>Lasiurus borealis</u>	1 female
<u>Nycticeius humeralis</u>	3 males, 1 unidentified

24-27 July 1997

<u>Lasiurus borealis</u>	3 females, 2 males
<u>Nycticeius humeralis</u>	1 female, 1 male
<u>Pipistrellus subflavus</u>	1 male

McCurtain County, McCurtain County Wilderness Area (T3S, R25E, Sec. 4, SW 1/4)

18-21 July 1997

<u>Lasiurus borealis</u>	3 females, 1 male
<u>Myotis septentrionalis</u>	1 female
<u>Nycticeius humeralis</u>	2 females, 4 males
<u>Pipistrellus subflavus</u>	2 females, 2 males

McCurtain County, Big Hudson Creek, Ouachita National Forest (T2S, R26E, Sec. 20, NE 1/4)

30 July - 2 August 1997

<u>Lasiurus borealis</u>	22 females, 15 males
<u>Nycticeius humeralis</u>	5 females, 10 males
<u>Pipistrellus subflavus</u>	4 females, 2 males
<u>Tadarida brasiliensis</u>	1 female

McCurtain County, North Cedar Creek, Ouachita National Forest (T4S, R23E, Sec. 29, SE 1/4)

2-5 August 1997

<u>Eptesicus fuscus</u>	1 female, 2 males
<u>Lasiurus borealis</u>	27 females, 34 males
<u>Lasiurus cinereus</u>	1 female, 2 males, 1 unidentified
<u>Lasiurus seminolus</u>	1 male
<u>Nycticeius humeralis</u>	4 males
<u>Pipistrellus subflavus</u>	3 females, 3 males

Pushmataha County, Caney Creek, Pushmataha WMA (T1S, R18E, Sec. 2, SW 1/4)

20-23 June 1994

<u>Lasiurus borealis</u>	6 females, 1 unidentified
<u>Nycticeius humeralis</u>	3 females

Sequoyah County, Sequoyah NWR (T11N, R22E, Sec. 17, NE 1/4)

18-21 July 1994

<u>Lasiurus borealis</u>	7 females, 4 males, 2 unidentified
<u>Pipistrellus subflavus</u>	1 male

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Table 2. Numbers of bats captured during summers 1994, 1995, and 1997 in eastern Oklahoma by county and site.

County	Site	LABO	PISU	MYSE	NYHU	EPFU	LACI	COTO	MYLU	MYGR	CORA	LASE	TABR	Total
Adair	Lee's Creek	118	23	18	10	3	1	8	11	3	0	0	0	195
	AD-125	0	2	1	0	1	0	10	0	0	0	0	0	14
Bryan	Newberry	26	1	0	7	0	0	0	0	0	0	0	0	34
Choctaw	Messer	15	2	1	6	1	0	0	0	0	0	0	0	25
Johnston	Washita	3	10	0	1	0	0	0	0	0	0	0	0	14
Latimer	Robber's	4	0	0	0	0	0	0	0	0	0	0	0	4
LeFlore	Cucumber	16	4	5	2	1	0	0	0	0	0	0	0	28
	Hodge	369	61	1	26	13	12	0	0	0	0	0	0	482
	Wister	18	5	1	11	8	0	0	0	0	0	0	0	43
	Winding St.	0	0	0	0	0	0	0	0	0	0	0	0	0
	Bear Den	0	404	85	0	0	0	0	0	0	0	0	0	489
McCurtain	Caney	3	1	2	5	0	0	0	0	0	0	0	0	11
	Little River	10	1	0	11	0	0	0	0	0	1	0	0	23
	MCWA	4	4	1	6	0	0	0	0	0	0	0	0	15
	Big Hudson	37	6	0	15	0	0	0	0	0	0	0	1	59
	Cedar Cr.	61	6	0	4	3	4	0	0	0	0	1	0	79
Pushmataha	Push. WMA	7	0	0	3	0	0	0	0	0	0	0	0	10
Sequoyah	Seq. NWR	13	1	0	0	0	0	0	0	0	0	0	0	14
	All	704	531	115	107	29	18	18	11	3	1	1	1	1539

LABO = *Lasiurus borealis*; PISU = *Pipistrellus subflavus*; MYSE = *Myotis septentrionalis*; NYHU = *Nycticeius humeralis*; EPFU = *Eptesicus fuscus*; LACI = *L. cinereus*;

COTO = *Corynorhinus townsendii ingens*; MYLU = *M. lucifugus*; MYGR = *M. grisescens*; CORA = *C. rafinesquii*; LASE = *L. seminolus*; and TABR = *Tadarida brasiliensis*.

**Table 3. Habitat type, number of roost trees, three most abundant species of trees, and total number of tree species found by study site.**

County	Site	Habitat Type	Number of Roost Trees	Most Abundant Tree and Number	Second Most Abundant Tree and Number	Third Most Abundant Tree and Number	Number of Tree Species
Adair	Lee's Creek	Riparian	13	<u>Gleditsia triacanthos</u> , 8	<u>Carya tomentosa</u> , 5	4 species <sup>1</sup> , 4	12
	AD-125	Cave	Not estimated	Not counted	Not counted	Not counted <sup>1</sup>	Not counted
Bryan	Newberry	Riparian	10	<u>Quercus stellata</u> , 15	<u>Quercus shumardii</u> , 7	<u>Maclura pomifera</u> , 5	10
Choctaw	Messer	Riparian	63	<u>Ulmus americana</u> , 11	<u>Liquidambar styraciflua</u> , 2	<u>Betula nigra</u> , 6	10
Johnston	Washita	Floodplain	26	<u>Celtis laevigata</u> , 9	<u>Maclura pomifera</u> , 6	<u>Ulmus alata</u> , 4	14
Latimer	Robber's	Forest	6	<u>Quercus stellata</u> , 19	<u>Carya texana</u> , 9	<u>Pinus echinata</u> , 7	5
LeFlore	Cucumber	Riparian	26	<u>Pinus echinata</u> , 7	<u>Quercus alba</u> , 6	3 species <sup>2</sup> , 4	13
	Hodge	Riparian	6	<u>Pinus echinata</u> , 11	<u>Quercus stellata</u> , 8	<u>Juglans nigra</u> , 5	11
	Wister	Riparian	31	<u>Quercus nigra</u> , 26	<u>Liquidambar styraciflua</u> , 5	<u>Ulmus alata</u> , 3	6
	Winding St.	Forest	Not estimated	<u>Pinus echinata</u> , 34	<u>Quercus stellata</u> , 5	<u>Ulmus alata</u> , 1	3
	Bear Den	Cave	Not estimated	Not counted	Not counted	Not counted	Not counted
McCurtain	Caney	Riparian	17	<u>Pinus echinata</u> , 14	<u>Quercus alba</u> , 10	<u>Carya tomentosa</u> , 4	10
	Little River	Floodplain	19	<u>Quercus phellos</u> , 11	<u>Liquidambar styraciflua</u> , 9	<u>Quercus shumardii</u> , 7	9
	MCWA	Riparian	68	<u>Pinus echinata</u> , 13	<u>Carya texana</u> , 9	<u>Ulmus alata</u> , 8	7
	Big Hudson	Riparian	50	<u>Quercus shumardii</u> , 7	<u>Ulmus alata</u> , 6	<u>Ulmus americana</u> , 6	13
	Cedar Cr.	Riparian	31	<u>Acer saccharinum</u> , 16	<u>Ulmus americana</u> , 9	<u>Quercus muhlenbergii</u> , 2	13
Pushmataha	Push. WMA	Riparian	9	<u>Pinus echinata</u> , 23	<u>Quercus stellata</u> , 16	<u>Carya texana</u> , 1	3
Sequoyah	Seq. NWR	Floodplain	11	<u>Salix nigra</u> , 22	<u>Populus deltoides</u> , 17	<u>Plantanus occidentalis</u> , 1	3

<sup>1</sup>Acer negundo, Juglans nigra, Quercus falcata, and Ulmus americana

<sup>2</sup>Carya cordiformis, Carya tomentosa, and Liquidambar styraciflua.

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