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David A. Saugey
US Forest Service, dasnightwing@gmail.com

V. Rick McDaniel
Arkansas State University

Daniel R. England
Additional works at: <https://scholarworks.uark.edu/jaas>

 Southern Arkansas University
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Marsha C. Rowe

Stamps High School
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Arkansas Range Extensions of the Eastern Small-Footed Bat (*Myotis leibii*) and Northern Long-Eared Bat (*Myotis septentrionalis*) and Additional County Records for the Silver-Haired Bat (*Lasionycteris noctivagans*), Hoary Bat (*Lasiurus cinereus*), Southeastern Bat (*Myotis austroriparius*), and Rafinesque's Big-Eared Bat (*Plecotus rafinesquii*)

Authors

David A. Saugey, V. Rick McDaniel, Daniel R. England, Marsha C. Rowe, Laura R. Chandler-Mozisek, and Betty G. Cochran

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David A. Saugey

United States Forest Service

Jessieville, AR 71949

Daniel R. England

Department of Biology

Southern Arkansas University

Magnolia, AR 71753

Laura R. Chandler-Mozisek

Department of Biology

University of Arkansas at Little Rock

Little Rock, AR 72204

V. Rick McDaniel

Department of Biology

Arkansas State University

State University, AR 72467

Marsha C. Rowe

Stamps High School

Stamps, AR 71860

Betty G. Cochran

United States Forest Service

Glenwood, AR 71943

Abstract

We continued field studies of bats in non-cave regions of Arkansas from 1989 to present and utilized specimens submitted to the Arkansas Department of Health Rabies Laboratory to establish Arkansas range extensions for the eastern small-footed bat (*Myotis leibii*) and northern long-eared bat (*Myotis septentrionalis*). In addition, we documented additional county records for the silver-haired bat (*Lasionycteris noctivagans*), hoary bat (*Lasiurus cinereus*), southeastern bat (*Myotis austroriparius*), and Rafinesque's big-eared bat (*Plecotus rafinesquii*).

Introduction

State range extensions and county records for plants and animals represent data that are vital in making informed decisions concerning land stewardship and are important in answering the questions of occurrence. In 1983 Heath et al., summarized a significant portion of the literature regarding bats in Arkansas and discussed state range extensions and county records for five species of vespertilionid bats. Since 1983 several additional studies (Fletcher et al., 1991; Heath et al., 1986; Heidt et al., 1987; Nelson et al., 1991; Saugey et al., 1988a; Saugey et al., 1988b; Saugey et al., 1989; Steward et al., 1986; Steward, 1988; Tumilson et al., 1992) have expanded our knowledge of the status, distribution, and occurrence of bats in Arkansas, particularly in the southern and south-western areas of the state. A majority of these and previously published data were incorporated into *Arkansas Mammals* by Sealander and Heidt (1990). Records from all of these publications are included here.

Methods

Since 1989 our field research efforts were primarily concentrated in the non-cave regions of Arkansas.

Double-framed harp traps and mist nets were employed at the entrances of abandoned mines and along closed roads and stream courses as described by Kunz (1988). Continued identification of specimens submitted to the Rabies Lab of the Arkansas Department of Health (ADHRL), begun in 1982, has proven to be an important resource and mechanism by which specimens are acquired statewide throughout the year. The ADHRL is especially important because many areas of Arkansas have not been adequately surveyed due to topography, land use patterns, and difficulty of using conventional capture equipment such as mist-nets and double-framed harp traps. In most cases vouchers were not retained for specimens submitted to the ADHRL due to the advanced state of deterioration of carcasses. In addition, voucher specimens for *Plecotus rafinesquii* were not retained for the Pope County record. Individuals captured were banded and released as part of a long term study of this species.

Results

Arkansas Range Extensions.--*Myotis leibii*. In Arkansas little is known of the natural history of the small-footed bat. This species has always been considered rare throughout the eastern portion of its range (Barbour and

Davis, 1969; Sealander and Heidt, 1990). Generally considered to be a cave bat, LaVal and LaVal (1980) believed this bat to be very rare in Missouri because the species was commonly captured in the western portion of its range but was virtually absent from Missouri caves and mines, and Caire (1986) observed the species was probably restricted to cave areas in southeastern Oklahoma. Caire (1986) and Stevenson (1986), and Saugey et al. (1989) examined a total of eleven specimens from Bear Den Caves in the Ouachita Mountains of LeFlore County, Oklahoma.

McDaniel et al. (1982) summarized the status of this species and its known occurrence within the Ozarks of southern Missouri and Arkansas listing 26 specimens. Twenty-three of these specimens were from four Arkansas counties: Independence (1), Newton (19), Searcy (1), and Stone (2). Sealander and Heidt (1990) reiterated the status of the species as described by McDaniel et al. (1982), and enlarged the area of distribution previously depicted by Sealander (1979) to reflect occurrence in the Springfield Plateau and Boston Mountain subdivisions of the Ozark Mountains. No additional information regarding distribution or habitat use in Arkansas has been published in the ensuing eleven years.

On 14 September 1992, a small-footed bat was collected in the city of Mena, Polk County. The specimen had been collected by a family's cat and was subsequently taken to a veterinary clinic and forwarded to the ADHRL where it was assigned ADHRL No. 358. The specimen tested negative for rabies and the carcass was frozen and retained for positive identification. The specimen was positively identified (DAS) and retained for deposition in the Collection of Recent Mammals at Arkansas State University. The male specimen was reproductively active as indicated by epididymides which extended into the uropatagium. Measurements were (millimeters): Total length = 85 mm; tail = 32 mm; foot = 7 mm; ear = 14 mm; tragus = 7.5 mm; left forearm (LFA) = 31 mm. The Mena location lies approximately 180 km southwest of the Newton County site and 55 km southeast of the Bear Den Cave site in LeFlore County, Oklahoma, and represents a significant range extension in Arkansas.

The occurrence of the small-footed bat in the Ouachita Mountains of Arkansas was unexpected because of distances to the nearest known caves. This bat is known to utilize caves, man-made structures, and trees during active periods of the year, but caves and mines are the only known winter habitat. Here they may be found in low ceiling passages, beneath stones, and within cracks in the cave floor. In portions of this bat's range, it is found to hibernate in drafty open mines and caves and hang very near entrances where the temperature drops below freezing and the humidity is very low. This species has a tolerance for cold, relatively dry places for hibernation

(Krutzsch, 1966; Barbour and Davis, 1969; McDaniel et al., 1982). Interestingly, a specimen was discovered beneath a stone on a hillside while hunting for snakes in October, 1949, in Missouri (Barbour and Davis, 1969).

Considering the variety of unusual locations where this species has been encountered, it is possible this bat may utilize rock glaciers, also known as rock rivers, found on mountains composed of Jackfork Sandstone. Rich Mountain and Blackfork Mountain near Mena in Polk County, Arkansas, and in LeFlore County, Oklahoma, are composed of sandstone and harbor numerous rock glaciers (Foti, 1974). According to Charles Stone of the Arkansas Geological Commission (pers. comm.), these rock glaciers were probably formed in peri-glacial conditions (permanent snow fields during glacial epics). Some of these rock glaciers are 8-16 ha in size and are thought to attain depths of 15 m to bedrock. The insulating effect of these massive structures and the numerous openings which may lead to talus caves could provide suitable hibernating habitat for this bat in an area devoid of fracture or solutional caves. The small-footed bat is listed as a Category II federal candidate species by the U.S. Fish and Wildlife Service (USDI, 1991).

Myotis septentrionalis. The recent distribution of the northern long-eared bat suggested it was restricted to the Interior Highlands where it has been recorded in 14 counties: Baxter, Benton, Garland, Independence, Jackson, Marion, Montgomery, Newton, Pike, Polk, Scott, Stone, Washington, and Yell. However, two specimens received by the ADHRL suggest the range of this species may be more extensive than previously suspected.

On 4 September 1986 a male specimen (ADHRL #1228) was submitted for rabies examination from the city of Stuttgart, Arkansas County. Arkansas County lies within the Mississippi Alluvial Plain Natural Division (Shepherd, 1984). This locality represents a significant range extension of approximately 100 km from the nearest location in Jackson and Saline counties.

Another specimen submitted to the ADHRL (#1118) was a male captured on 24 June 1991 from the city of Benton, Saline County. The city of Benton lies within a transition zone between the Ouachita Mountain and West Gulf Coastal Plain natural divisions.

Several factors may have played roles in suggesting a restricted distribution in Arkansas. The absence of caves and mines in the West Gulf Coastal Plain and Mississippi Alluvial Plain natural divisions would have made capture of this gleaning species difficult. This bat is known to concentrate at such structures, particularly during fall breeding activities and hibernation. Lack of sampling and sparsely inhabited areas due to extensive agricultural, commercial and National Forest land-holdings, lessens the likelihood of human encounters. Also, the difficulty of netting or trapping this species, which is not highly

tied to riparian habitats for foraging where most mist-netting activities occur, may give a sense of scarcity or rarity. Saugey et al. (1989) encountered only 13 specimens in situations not associated with abandoned mines even though they extensively mist-netted streams and ponds during their study. Recently, harp-trapping and mist-netting at the entrances of abandoned mines during fall swarming activities have revealed this species rather common in the Ouachita Mountains (Saugey and Cochran, unpubl. data). Further investigations of areas currently not considered suitable habitat may indicate Hall's (1981) suggested statewide range for this species to be correct.

Additional County Records.—*Lasiorycteris noctivagans*. The silver-haired bat has now been collected from all physiographic regions of the state and reported from the following eighteen counties; Baxter, Bradley, Columbia, Craighead, Garland, Greene, Howard, Independence, Jefferson, Little River, Pike, Polk, Pulaski, Saline, Scott, Sevier, Stone, and Washington. The "reliable sighting record" for Marion County, previously reported by Sealander (1979), was deleted by Sealander and Heidt (1990).

To this list we add Cleburne and Sharp counties from five specimens submitted to the ADHRL. All specimens from Cleburne County were males and reported from the city of Heber Springs. Their dates of capture and ADHRL Numbers are: 2 December 1983 (#1975); 8 November 1985 (#1465); 5 January 1990 (#570). Two specimens reported from Sharp County were a female captured on 30 December 1986 (#1653), and a male captured on 9 March 1987 (#196).

Lasiurus cinereus. The hoary bat had previously been reported from 23 counties: Ashley, Bradley, Craighead, Drew, Garland, Greene, Jefferson, Lawrence, Logan, Marion, Montgomery, Nevada, Newton, Polk, Pulaski, Saline, Scott, Sebastian, Stone, Washington, White, Woodruff, and Yell.

We have recorded two new county records as the result of specimens submitted to the ADHRL. A female (#1198) was captured on 29 April 1992 in Harrison, Boone County, and a male (#315) was captured in Texarkana, Miller County, on 22 September 1990. Distribution of these 25 records indicate state-wide occurrence as suggested by Sealander (1979) and Sealander and Heidt (1990).

Myotis austroriparius. The southeastern bat, a Category II federal candidate species, appears to be most abundant in the West Gulf Coastal Plain and Mississippi Alluvial Plain natural divisions. However, records in Garland (Davis et al., 1955) and Montgomery counties also place this species in the Central Ouachita Mountains subdivision in areas adjacent to major streams or impoundments. This species has been reported from the following

fifteen counties: Bradley, Calhoun, Cleveland, Columbia, Drew, Garland, Grant, Howard, Independence, Little River, Miller, Ouachita, Pike, Sevier, and Woodruff. We have recorded this species from four additional counties: Lafayette, Mississippi, Montgomery, and Nevada.

The Montgomery County specimen was an adult male found hibernating in a small crevice in the ceiling of an abandoned mine near the Little Missouri River (T4S-R27W-S31) in February, 1991. The specimen weighed 7.5 g, had a LFA measurement of 37.5 mm, and was gray in color. This bat was retained as a voucher specimen for deposit in the Collection of Recent Mammals at Arkansas State University.

Specimens from Lafayette (T17S-R22W-S15; T17S-R22W-S10) and Nevada (T14S-R22W-S12) counties were captured from old water wells which had been hand-dug at the turn of the century. These wells measured, on average, 1 m in diameter and varied in depth up to 15 m. All wells in which this species was found were lined with concrete tiles or brick which provided a suitable roost substrate. When two or more bats occurred within a well they typically formed a cluster. This was especially true with females but also occurred when both sexes were present. When one bat roosted individually, even though a cluster was present, that bat typically was a male. This species has been found in wells at various times between September and March and apparently uses them primarily during the hibernation period. The largest number found at one time was 11 females. The well located in Nevada County has yielded southeastern bats on nine separate occasions over a 2-year period with a number of banded individuals recaptured. Numbers of bats observed have ranged from solitary individuals to a cluster of 11. Two wells in Lafayette County have yielded individual southeastern bats on a total of three occasions. Southeastern bats utilizing wells often share these refugia with *P. rafinesquii*. All specimens were banded and released.

The Mississippi County record was a female (#1028) submitted to the ADHRL on 5 June 1990.

Plecotus rafinesquii. Rafinesque's big-eared bat has previously been reported from Bradley, Calhoun, Clark, Cleveland, Columbia, Craighead, Crawford, Corss, Dallas, Drew, Faulkner, Grant, Greene, Jackson, Lafayette, Lawrence, Little River, Nevada, Ouachita, Pulaski, Sevier, and Union. We have recorded this species from Arkansas and Pope counties.

The Arkansas County site (T4S-R6W-S36) was located on Bayou Meto approximately 20 km south of the community of Humnoke. A maternity colony sporadically inhabited a 50-year old cypress barn that was entered daily in support of farm operations. According to local residents, Rafinesque's bats have used this barn since its completion (Monroe Williams, landowner, *pers. comm.*) The numbers of bats that used the roost varied dramati-

cally each time it was inspected with a single bat the least observed and the largest number having been approximately 175 individuals (females and nursing pups) present during the maternity period in June and July. Several hundred Rafinesque's bats have been banded and released as part of an ongoing life history investigation. Juvenile and adult voucher specimens have been deposited in the Collection of Recent Mammals at Arkansas State University.

The location for two Pope County records was an area of fractured sandstone containing fracture caves, substantial crevice openings, and talus caves in the bluffline above the Arkansas River at Russellville. The area is located just south of the Boston Mountains in the Arkansas Valley Natural Division which forms a transitional zone between the Ouachita and Ozark mountains (Shepherd, 1984).

On 27 January 1991, a non-scrotal, yearling Rafinesque's bat (born the previous spring) was found in torpor on an interior side-passage wall of Lands End Cave (T7N-R21W-S13). The specimen weighed 8.5 g, and had a LFA length of 43.4 mm. A yellow, split-ring plastic identification band (No. 824) was attached to the right forearm and the animal returned to the wall. The air temperature was 8.3° C and the relative humidity 95%. Twenty days later on 16 February 1991, Lands End Cave was examined but harbored no bats. Large cracks, crevices, and talus shelters within the sandstone bluff containing Lands End Cave were also examined. A solitary, adult, scrotal, Rafinesque's bat in deep torpor was observed roosting 2.5 m above the floor of a partially lighted talus cave. The specimen weighed 8.75 g and had a LFA length of 43.4 mm. A white, split-ring plastic identification band (No. 434) was placed on the right forearm and the bat returned to the original roosting site. The temperature at this location was 5° C and the relative humidity 45%.

Based on information garnered from research on this species in southern and eastern Arkansas, the presence of these bats, particularly the yearling, indicates a breeding population exists in the area (England and Saugey, unpubl. data).

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