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J. D. Wilhide  
*Arkansas State University*

Michael J. Harvey  
*Tennessee Technological University*

V. Rick McDaniel  
*Arkansas State University*

Vernon E. Hoffman  
*Arkansas State University*

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## Highland Pond Utilization by Bats in the Ozark National Forest, Arkansas

J. D. Wilhide\*, Michael J. Harvey, V. Rick McDaniel, and Vernon E. Hoffman

Department of Biological Sciences, Arkansas State University  
Department of Biology, Tennessee Technological University (MJH)

### \*Corresponding Author

### Abstract

During May through August 1996, wildlife ponds (man-made and/or naturally occurring) and road ruts on the Sylamore Ranger District, Ozark National Forest, Arkansas, were mist netted to determine extent of utilization by bats. Thirty-nine ponds and road ruts were netted one or more times during 53 nights. These water sources were originally constructed to support wildlife species such as deer, turkey, etc.. This study demonstrates that taxonomically and numerically diverse bat populations use these water sources. Seven hundred and seventy bats of nine species, including two endangered species, were netted. Bats were identified, and sex, reproductive status, forearm length, and weight were recorded. All bats were banded and released at the site of capture.

### Introduction

Three endangered bat taxa occur in Arkansas: Indiana bat (*Myotis sodalis*), Gray bat (*Myotis grisescens*), and Ozark big-eared bat (*Corynorhinus townsendii ingens*) (Harvey, 1975; Harvey, 1976). Studies on distribution, status, and ecology of endangered Arkansas bats have been conducted annually since 1978 (Harvey, 1978; Harvey et al., 1978; Harvey et al., 1979; Harvey, 1984; Harvey and McDaniel, 1986; Harvey and Barkley, 1990; Harvey, 1994). Although considerable information has been obtained during the past 18 years on distribution and abundance of endangered bats in Arkansas (Harvey, 1986), relatively little is known about many important aspects of their ecology, especially their summer ecology (Cope and Humphrey, 1977). Additional information concerning summer ecology of endangered Arkansas bats is essential in formulating management plans for protection and recovery of these species (Gardner et al., 1991a b).

The primary objectives of this study were to determine to what extent endangered Indiana bats remain in the vicinity of their hibernation caves during summer and to obtain information concerning their summer roosting behavior and habitat, particularly for reproductive females, if present. Approximately 3000 Indiana bats are known to hibernate in six Arkansas caves (Harvey and McDaniel, 1986). The Arkansas hibernating population has declined by 66% during the past 13 years (Harvey and McDaniel, 1986). It was previously known that a few male Indiana bats inhabit Arkansas caves during summer; however, where female Indiana bats that hibernate in Arkansas caves spend the summer was not known. Thus, this study focused on an

attempt to capture Indiana bats during summer in the vicinity of known hibernation caves and to study summer roosting behavior and other aspects of Indiana bat summer ecology.

### Materials and Methods

The study was conducted in the Sylamore Ranger District of the Ozark National Forest in northcentral Arkansas (Fig. 1). Two of only six known remaining Arkansas Indiana bat hibernating colonies occur in the district, and they are only a few kilometers apart. During the winter of 1995-96 these colonies contained 750 hibernating Indiana bats. Because most previous mist-netting in the area was done over flowing streams and resulted in only a few male Indiana bats being captured, it was decided to net in more upland situations, primarily over small wildlife ponds and road ruts which are the only drinking water sources available for bats along ridge tops.

Netting was conducted from 19 May through 31 August 1996. Netting was done on 53 nights at 39 sites, 33 ponds and six road ruts, for a total of 61 net nights. An attempt was made to select netting sites that were 2 km or more from streams, lakes, or other conventional water sources. Nets were set up before sunset and checked every 15 minutes until approximately 5 hours after sunset. Mist nets (3 x 6 m or 3 x 9 m) were placed across small wildlife ponds and road ruts and positioned a few inches above the water's surface.

All captured bats were retained in cloth bags until conclusion of a night's netting. Each bat was then identified,

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Fig. 1. Location of the Sylamore Ranger District, a disjunct part of the Ozark National Forest in Arkansas.

sexed, reproductive condition noted, weighed, measured for forearm length, banded on a wing with a numbered plastic band, and released at the point of capture. Small 0.7 g radio transmitters were attached to 12 bats, one Indiana bat, one evening bat, and 10 northern long-eared bats. Transmitters were not used until near the end of June since they were intended for use on female Indiana bats. In the absence of female Indiana bats, transmitters were placed on other species in an attempt to learn more concerning their summer ecology.

## Results and Discussion

A total of 770 bats was captured during 53 nights of netting (Table 1). Less than 2% were recaptured after their initial capture. Only six endangered Indiana bats were captured and these were all males. Thus, we confirmed that at least some male Indiana bats remain in the vicinity of their hibernation caves during summer. Failure to capture female Indiana bats suggests that reproductive females were not present in the area. However, the possibility exists that they were present but not captured. The single male Indiana bat fitted with a transmitter on 4 July was not located subsequent to release.

Other bats captured during the study included three endangered gray bats, all males. The capture of gray bats was interesting since, although summer colonies inhabit several caves in the vicinity, especially Blanchard Springs Caverns which houses a large summer bachelor colony, gray bats normally forage over larger streams and bodies of water and apparently only rarely forage on ridge tops (LaVal et al., 1977). One eastern small-footed bat (*Myotis leibii*) was netted. This species has been under review for possible listing as endangered or threatened. The species is apparently relatively rare in Arkansas and is infrequently netted (McDaniel et al., 1982).

Of major interest was the fact that 59% (455 of 770) of all bats captured were northern long-eared bats (*Myotis septentrionalis*). Previously this species was thought to be relatively rare in Arkansas (Harvey and McDaniel, 1983). Only a few are usually observed hibernating in Arkansas caves, and they are seldom netted over streams. Of 10 northern long-eared bats fitted with transmitters, most were located under the exfoliating bark of dead trees in the vicinity of their capture and release points.

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Table 1. Bat species captured in the Sylamore Ranger District, Ozark National Forest, Arkansas from 19 May through 31 August 1996.

	Male	Female	Total
<i>Myotis septentrionalis</i>	209	246	455
<i>Myotis sodalis</i>	6		6
<i>Myotis grisescens</i>	3		3
<i>Myotis leibii</i>	1		1
<i>Nycticeius humeralis</i>	24	17	41
<i>Pipistrellus subflavus</i>	93	3	96
<i>Eptesicus fuscus</i>	4	2	6
<i>Lasiurus borealis</i>	64	96	160
<i>Lasiurus cinereus</i>	2		2
Total	406	364	770

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