

## Comparative Numbers of Gray Bats (*Myotis grisescens*) at Four Maternity Caves in Northeastern Oklahoma in 1981 and 1991

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The endangered status of the gray bat (*Myotis grisescens*) was established by the U.S. Fish and Wildlife Service in 1976 (1). In 1982, the total population of gray bats in the southeastern United States exceeded 1.5 million (2). However, 95% of them hibernated in eight large caves: two in Tennessee, three in Missouri and one each in Alabama, Arkansas and Kentucky.

The Oklahoma population of gray bats is mostly migratory, but may winter in isolated caves (3). This population inhabits the extreme southwestern portion of the species' range (the southwestern Ozark Plateau, where geologic and topographic features are conducive to deep cave formation). In other parts of its range, only five percent of available caves are suitable for habitation by gray bats (4). Oklahoma contains only a few sites suitable for gray bat occupancy. Because caves are utilized in all phases of this bat's life cycle (5), its distribution in Oklahoma is closely correlated to cave availability (6). The first documentation of the gray bat in Oklahoma was by Blair (7) from Adair and Cherokee Counties. Glass (8) also noted its occurrence at these same two sites. Additional locations were listed by Glass and Ward (9). They designated eight different caves that the gray bat occupied in Oklahoma. This bat is the only cave-dwelling species in eastern Oklahoma that roosts in large colonies, producing large guano piles on the cave floor. On the basis of individual sightings and observations of such guano accumulations, Looney (10) listed 13 caverns within the Oklahoma range that were either inhabited or formerly occupied by this bat.

Glass (11) suggested that Mayes and Sequoyah counties might contain additional gray bat colonies. Grigsby (12) noted four caves of northeastern Oklahoma that housed maternity colonies (congregations of female bats formed during May and remained until young become volant in mid-July) (12,13).

Grigsby and Puckette (6) found 17 sites with gray bat colonies. Maternity colonies were discovered in six, or possibly seven, of these. Three of the non-maternity caves may have contained maternity colonies in the past. In other parts of the gray bat's range 34% of the former maternity colonies are now abandoned (14). Since the initiation of a cave protection project in 1989, six caves have been identified that contain maternity colonies (15).

Estimations of gray bat populations are obtained through measurements of guano deposits and ceiling stains left in caves by the roosting bats (5,16). Estimates based on these techniques revealed declines in gray bat populations throughout its range (4). Grigsby and Puckette (6) indicated a reduction of 39% in Oklahoma gray bat numbers from their past population estimates prior to 1982. Monitoring and population surveys of the four maternity colonies in Oklahoma were conducted in 1981 and 1991.

Figure 1 compares the populations for these four maternity colonies in 1981 and 1991. Guano measurements were made after the maternity colony had vacated each cave.

Roost sites in each cave are historically located in the same location in the cave from year to year and are identified by guano accumulations on the cave floor or by

ceiling stains caused by roosting gray bats. The area covered by the guano or stain is used to determine the population estimate (5,16). Harvey et al. (16) designated the standard of 1,828 bats per square meter. The roost sites that were used to estimate gray bat populations in 1981 were the same as the sites used to estimate the gray bat populations in 1991.

Increases in colony size during this period were evident at three of the four caves. Colony #4 located in Delaware County was stable. In Figure 1 the population estimate for Colony #2 in Adair County was made following the 1989 maternity season. High water levels and erosion of the guano within the roost area at this site prevented estimation after the 1991 maternity season.

The population of the four gray bat maternity colonies in Oklahoma for 1981 was  $36.2 \times 10^3$  bats. The population of the same four colonies in 1991 was  $54.2 \times 10^3$ , a 33.3% increase.

Efforts to protect the gray bat population in northeastern Oklahoma have focused on these four maternity colonies. Protection measures are now being expanded to secondary sites to improve environmental conditions conducive to habitation by gray bats. Hopefully these actions will perpetuate the return and expansion of both current and former maternity colonies to their optimum population sizes in northeastern Oklahoma.

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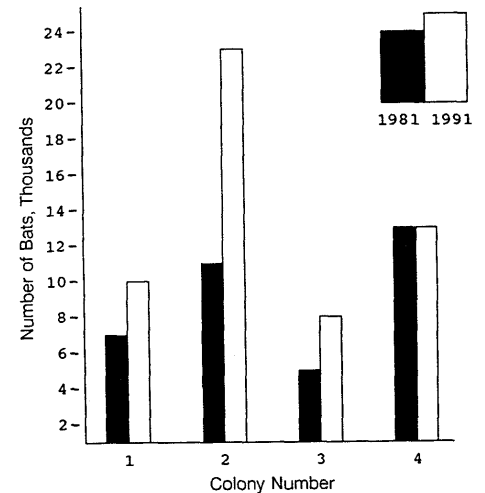


Figure 1. Comparative numbers of gray bats at four maternity caves in northeastern Oklahoma in 1981 and in 1991.

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