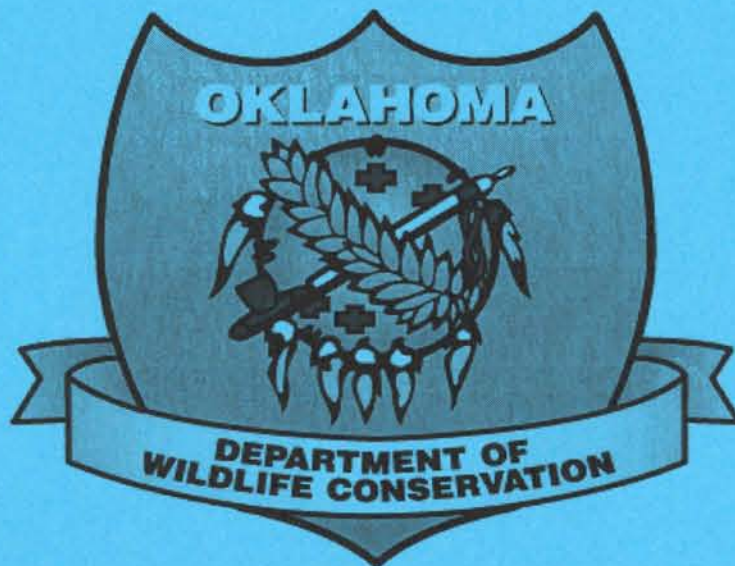


FINAL PERFORMANCE REPORT



FEDERAL AID GRANT NO. E-22-15

**MANAGEMENT AND CAVE PROTECTION FOR THE OZARK
BIG-EARED BAT (*CORYNORHINUS TOWNSENDII* INGENS)
AND GRAY BAT (*MYOTIS GRISESCENS*) IN OKLAHOMA**

OKLAHOMA DEPARTMENT OF WILDLIFE CONSERVATION

OCTOBER 22, 2008 through SEPTEMBER 30, 2009

ANNUAL PERFORMANCE REPORT

STATE: Oklahoma

GRANT NUMBER: E-22-15

GRANT PERIOD: 22 October 2008 – 30 September 2009

GRANT TITLE: Management and Cave Protection for the Ozark Big-eared Bat (*Corynorhinus townsendii ingens*) and Gray Bat (*Myotis grisescens*) in Oklahoma

Project Leader: Dr. Keith Martin

A. INTRODUCTION:

Cave ecosystems harbor a variety of unique and sensitive organisms, many of which are cave obligates. Human disturbance at caves is a persistent problem internationally and has been implicated as a major cause of decline of cave-dependent bats (Barbour and Davis, 1969; Humphrey and Kunz, 1976; Tuttle, 1979; American Society of Mammalogists, 1992). About 18 of the 45 species of North American bats rely substantially on caves throughout the year, and 13 use caves year-round (McCracken, 1989). As a result, cave gating has been used widely by governmental and private organizations to protect these sensitive ecosystems from pernicious impacts.

All North American bats that are listed as endangered or threatened by the United States Fish and Wildlife Service are cave-dwelling species or subspecies (McCracken, 1989; Harvey et al., 1999; Pierson, 1999). In the central United States, two species, the gray bat (*Myotis grisescens*) and Indiana bat (*Myotis sodalis*), and one subspecies, the Ozark big-eared bat (*Corynorhinus townsendii ingens*), are of particular concern to recovery biologists because each is federally listed as endangered (United States Fish and Wildlife Service 1982, 1983, 1995).

Populations of bats presently are protected with internal gate systems throughout the United States including > 32 entrances to caves in eastern Oklahoma (Martin et al. 2006). Seven of those caves have been inhabited historically by colonies of endangered gray bats (Martin et al. 2003). The remaining caves are inhabited by populations of endangered Ozark big-eared bats, big brown bats (*Eptesicus fuscus*), eastern pipistrelles (*Pipistrellus subflavus*), northern long-eared bats (*Myotis septentrionalis*), and a single hibernaculum of endangered Indiana bats. Four caves that contain populations of either Ozark cavefish (*Amblyopsis rosae*) and/or Ozark cave crayfish (*Cambarus tartarus*) also are protected from human entry by internal gates. Population estimates of bats at each of these caves prior to installation of gates beginning in 1981 and post-installation estimates show that each cave continues to be used by stable populations of resident bats (Grigsby et al. 1993, Martin et al. 2000, 2003, 2006; Puckette 2000).

In other parts of their ranges, populations of gray bats and endangered Virginia big-eared bats (C.

t. virginianus) do not respond favorably to gated cave passages with prolonged, stable populations like those in Oklahoma; in fact, gating cave passages often is discouraged or prohibited (Pierson 1999). Nevertheless, little empirical evidence exists to suggest that these species will not accept fully gated cave passages, and experiments elsewhere have shown that appropriately placed gates within cave passages will not impede flight (White and Seginak 1987; Martin et al. 2000, 2003) or alter internal ambient cave climate (Martin et al. 2006). Minimal effects of appropriately manipulated passages and entrances are further substantiated by the presence of stable populations of gray bats and Ozark Big-eared bats in such caves in Oklahoma (Grigsby et al. 1993, Puckette 2000, Martin et al. 2000, 2003, 2006).

Procedures during this project were conducted in eastern Oklahoma in the western limit of the Boston Mountains of the Ozark Plateau. The Plateau covers about 103,000 km² (Huffman 1959) in the central United States; elevations are 260–460 m above mean sea level. The Plateau was comprised of alternating layers of limestone, flint (= chert) and sandstone that are conducive to cave formation (Blair and Hubbell 1938). Caves in this region serve as refugia from severe winters for many cave-dwelling species (Humphrey and Kunz 1976). The vegetation on mountain slopes is comprised predominantly by blackjack oak (*Quercus marilandica*), post oak (*Quercus stellata*), black hickory (*Carya texana*), and winged elm (*Ulmus alata*). Coralberry (*Symphoricarpos orbiculatus*) and sassafras (*Sassafras albidum*) comprised the sparse shrubby understory. Riparian areas are dominated by silver maple (*Acer saccharium*), river birch (*Betula nigra*), American elm (*Ulmus americana*), cottonwood (*Populus deltoides*), sycamore (*Plantanus occidentalis*), and various oak species (*Quercus* spp.). Sporadic openings of managed grasslands have historically been used for various types of agriculture (Blair and Hubbell 1938, Harvey et al. 1981).

The objectives of this project were to identify caves that were considered critical habitat for Ozark big-eared bat and gray bat colonies in northeastern Oklahoma. Management/protection plans for these caves were developed and implemented during the project year as funding and time allowed. These management/protection plans were coordinated with landowners and included placing human restrictive structures at or within caves such as fencing around the cave entrance or a gate/grill structure within the cave's passage. A significant number of previously gated caves, and those included within the scope of this year's project, were monitored to determine the effectiveness of restrictive management plans and the impact of these protection measures implemented at each respective site. As problems were identified with the cave protection plans, they were corrected.

B. OBJECTIVE:

Develop and implement management and protection plans for caves that are important to the conservation of Ozark big-eared bat and gray bat colonies in northeastern Oklahoma. Each cave will be monitored to determine the effectiveness of the management plan and to determine the impact of the structure or other protection measures implemented at the site. As problems are identified with the cave protection plans, they will be corrected.

C. SUMMARY OF PROGRESS:

The following is a description of cave management and monitoring activities that occurred during the 2008-2009 project year.

Gate Installations:

Cave AD-17:

Cave AD-17 is located on property in Adair County and was recently acquired by the Cherokee Nation. Since the cave was first monitored in 1983 it has annually been inhabited by a maternity colony of Ozark big-eared bats. The Cherokee Nation granted permission for project personnel to install an internal gate/grill system in the passage of this cave. Initial excavation began during visits to the site in October and November 2008. The gate/grill system was completed during a final visit on 20 March, 2009. On 15 June 2009, a non-intrusive, infra-red illumination of the entrance was utilized to monitor the colony's exit using night vision optics. A total of 202 Ozark big-eared bats exited the entrance indicating considerable use and unimpeded exit through the gate/grill system.

Cave AD-18:

Cave AD-18 is located in close proximity (< 1.0 km) to the previous cave and is on private land as well. It is not utilized by a maternity colony of Ozark big-eared bats, but is consistently utilized as a summer foraging and night roost. Permission was sought and granted from the landowner by project personnel to install an internal gate/grill system in the passage of this cave. Initial excavation began during a visit to the site in on 26 June, and the first stages of construction began on 28 July, 2009. The installation of the gate/grill system is anticipated to be completed during the winter of 2009-10. On 15 June 2009, a non-intrusive, infra-red illumination of the entrance and night vision optics were utilized to monitor the colony's exit flight. A total of 8 Ozark big-eared bats exited the entrance.

Gate Repair Project:

Cave AD-221:

The installation of an internal gating system inside the entrance to cave AD 221 was completed in December 2007. A monitoring visit by project personnel to this cave in December 2008 indicated that the gate/grill system had been vandalized and was allowing human entry. Project personnel visited the cave on 28 February 2009 and repaired the gate/grill system so that human entry was again restricted.

Colony/Species Monitoring:

An important aspect of the long-term E-22 project is monitoring caves that have received past management and protection efforts. These monitoring visits establish continued use by target species, verify the integrity of installed structures intended to eliminate human entry, and are conducted at non-gated caves to determine a ranking hierarchy for need of future consideration of management procedures. Monitoring at hibernacula was conducted in between December 2008 and February 2009. Summer roost monitoring visits were conducted from May through July 2009 to selected caves to determine use patterns and if possible, population estimates (Table 1).

D. SIGNIFICANT DEVIATIONS:

None

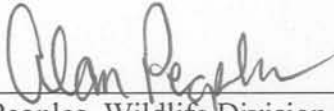
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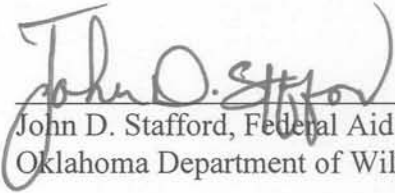
F. DATE:

19 October 2009

G. APPROVED BY:



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Oklahoma Department of Wildlife Conservation

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Table 1. Results of site monitoring visits to selected entrances to caves in eastern Oklahoma during the 2008-2009 project year.

Key to species: COTO: *Corynorhinus townsendii ingens* PESU: *Perimyotis subflavus*
 MYGR: *Myotis grisescens* MYSE: *Myotis septentrionalis*
 EPFU: *Eptesicus fuscus*

Date	County	Cave Number	Historical Bat Use	Gated	Results
29-Dec-08	Adair	AD-14 (Sawney)	Ozark Big-eared Bat	Yes	16 PESU.; 6 MYSE; 5 COTO
29-Dec-08	Adair	AD-14 (Backdoor)	Ozark Big-eared Bat	Yes	5 PESU; 1 COTO
29-Dec-08	Adair	AD-14 (Cable Ladder)	Ozark Big-eared Bat	Yes	No bats encountered
29-Dec-08	Adair	AD-14 (Sam's Pit-1)	Ozark Big-eared Bat	Yes	No bats encountered
29-Dec-08	Adair	AD-125	Ozark Big-eared Bat	No	5 PESU; 140 COTO
31-Dec-08	Adair	AD-10	Ozark Big-eared Bat	Yes	300 COTO
2-Jan-09	Adair	AD-15	Multiple Species	Yes	41 PESU; 1 EPFU; 4 COTO
2-Jan-09	Adair	AD-13	Ozark Big-eared Bat	Yes	13 PESU
2-Jan-09	Adair	AD-3	Ozark Big-eared Bat	No	420 COTO
2-Jan-09	Adair	AD-7	Gray Bat	No	3 EPFU; 2 MYGR; 96 PESU
3-Jan-09	Adair	AD-29	Multiple Species	Yes	3 PESU
3-Jan-09	Adair	AD-30	Multiple Species	Yes	3 PESU
3-Jan-09	Adair	AD-54	Multiple Species	Yes	25 PESU
3-Jan-09	Adair	AD-221	Multiple Species	Yes	46 PESU
6-Feb-09	Delaware	DL-91	Gray Bat	Yes	38,845 MYGR; Guano
29-May-09	Adair	AD-13	Ozark Big-eared Bat	Yes	2 COTO; Emergence count
2-Jun-09	Adair	AD-10	Ozark Big-eared Bat	Yes	177 COTO; Emergence count
3-Jun-09	Adair	AD-12	Ozark Big-eared Bat	No	56 COTO; Emergence count
4-Jun-09	Adair	AD-125	Ozark Big-eared Bat	No	31 COTO; Emergence count
9-Jun-09	Adair	AD-10	Ozark Big-eared Bat	Yes	252 COTO; Emergence count
15-Jun-09	Adair	AD-17	Ozark Big-eared Bat	Yes	202 COTO; Emergence count
15-Jun-09	Adair	AD-18	Ozark Big-eared Bat	No	8 COTO; Emergence count
25-Jun-09	Delaware	DL-2	Gray Bat	No	15,670 MYGR; Emergence count
23-Jul-09	Cherokee	CZ-9	Gray Bat	Yes	3,000 MYGR; Emergence count
20-Aug-09	Delaware	DL-91	Gray Bat	Yes	31,962 MYGR; Emergence count

