

BAT SPECIES PRESENCE IN SOUTHWESTERN MONTANA

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ABSTRACT

Published information on bat species presence in many parts of Montana is limited. Our study was initiated to gather data on the distribution of bat species found in the southwestern part of the state. We captured 106 individuals of eight bat species in mist-nets at 15 water sources in southwestern Montana during July through August 2003-2006. The western long-eared myotis (*Myotis evotis*) was the most frequently captured species and detected at over half the sites surveyed. Other common species captured across numerous sites included little brown myotis (*M. lucifugus*), hoary bats (*Lasiurus cinereus*), and big brown bats (*Eptesicus fuscus*). These species are apparently broadly distributed throughout southwestern Montana, occurring in a variety of habitat types. Our study provides some much needed baseline data on bat distribution in southwestern Montana.

Key words: bats, Chiroptera, distribution, Montana

INTRODUCTION

Bats are important components of terrestrial ecosystems (Fenton 1997). They have low reproductive rates for mammals their size (Hill and Smith 1984), which makes their populations slow to recover from high levels of mortality. Thus, potential for factors such as habitat alteration, environmental change, and more recently white nose syndrome (Blehert et al. 2009) to cause declines in bat abundance has led to a focus on bats by many natural resource agencies. However, data necessary to develop effective conservation plans for bat species are often lacking. Even such basic information as species distribution is not available for many locations (Saughey 1991, Pierson 1998).

In Montana, published records on bat species distribution and abundance are limited and cover only parts of the state. Nicholson (1950) provided the first record of a spotted bat (*Euderma maculatum*) found in a home in Billings. Swenson (1970) published data on distribution of the western small-footed myotis (*Myotis ciliolabrum*) in eastern Montana. Hoffman et al. (1969) made the first attempt to summarize distribution of numerous bat species in the state based on specimens collected by

the Public Health Service for rabies work in the late 1950s through the 1960s. The majority of these collected bats came from Missoula and Ravalli counties in western Montana. The work of Jones et al. (1973), Lampe et al. (1974), and Shryer and Flath (1980) added information on bats present in Carbon County in southeastern Montana. Swenson and Bent (1977) provided a list of species present in Yellowstone County in south-central Montana while Swenson and Shanks (1979) documented bats at three sites in northeastern Montana. Most recently Hendricks et al. (2000) documented species present in the Little Rocky Mountains of the north-central part of the state. Published data on presence of bat species in other parts of Montana is still limited. Our study was initiated to gather preliminary data on the distribution of bat species found in the southwestern part of the state.

STUDY AREA

This study was conducted in southwestern Montana on USDI Bureau of Land Management (BLM) holdings of the Butte Field Office. These holdings are located in Jefferson, Broadwater, Lewis and Clark, and Silver Bow Counties. Bats were surveyed at 15 different sites located

across these holdings. Sites were selected based on their accessibility and the presence of permanent water sources. Elevations at these sites ranged from ~ 1300 m to 2100 m.

To examine patterns of distribution by different bat species, we classified each survey site into 4 habitat types: S = water sources surrounded by sagebrush (*Artemisia* spp.), D = water sources surrounded by Douglas- fir (*Pseudotsuga menziesii*), C = streams lined with large deciduous trees such as cottonwood (*Populus* spp.), or quaking aspen (*Populus tremuloides*), W = streams lined with riparian shrubs (predominately *Salix* spp.).

METHODS

This study was conducted during mid July-early August, 2003-2006. At each site, we captured bats using 36-mm mesh, 50 denier, 2.1-m x 5.4-m mist-nets placed in locations considered to be suitable flyways for bats, such as open pools of water or clearings in stands of trees. The number of nets used per site varied but ranged from two to four. Nets were opened ~ 1 hr before sunset and kept open for 3-5 hrs depending on activity. Captured bats were identified to species and data on body measurements, sex, reproductive condition of females, and age (juvenile vs. adult) were recorded. We assessed reproductive condition by examination of the lower abdomen and mammary glands (Racey 1988). We aged

bats based upon the degree of epiphyseal-diaphyseal fusion of wing bones (Anthony 1988). We identified species based on published keys and species accounts (van Zyll de Jong 1985, Adams 2003, Nagorsen and Brigham 1993). Western long-eared myotis (*M. evotis*) and fringed myotis (*M. thysanodes*) were distinguished from one another by ear length (van Zyll de Jong 1985). Specifically, the western long-eared myotis has an overall ear length that exceeds 50 percent of the forearm length and when the ear on the western long-eared myotis is pressed forward it extends ≥ 10 mm beyond the tip of the nose (van Zyll de Jong 1985). All captured bats were released after handling. Handling procedures were approved by Montana Fish, Wildlife, and Parks.

RESULTS

We identified a total of 106 individuals of eight species from 15 water sources in 22 trap nights from southwestern Montana (Table 1). Survey effort varied by site. The majority of sites were only surveyed once but several sites were surveyed twice and one site was surveyed five times (Appendix A).

Western long-eared myotis and fringed myotis were the most abundant species captured, each made up over 20 percent of total captures. The western long-eared myotis was the most broadly distributed species within the study region (Tables 1 and 2). This

Table 1. Number of bats captured by species from Southwestern Montana, July-August, 2003-2006.

Bat Species	Number Captured (No. males, No. females)	Percentage of total captures	Percentage of Sites where captured
Western Small-footed Myotis (<i>Myotis ciliolabrum</i>)	6 (5, 1)	5.7	26.7
Western Long-eared Myotis (<i>M. evotis</i>)	23 (17, 6)	21.7	53.3
Little Brown Myotis (<i>M. lucifugus</i>)	13 (10, 3)	12.3	26.7
Fringed Myotis (<i>M. thysanodes</i>)	22 (22, 0)	20.7	20.0
Long-legged Myotis (<i>M. volans</i>)	12 (4, 8)	11.3	20.0
Hoary Bat (<i>Lasiurus cinereus</i>)	13 (10, 3)	12.3	40.0
Silver-haired Bat (<i>Lasionycteris noctivagans</i>)	7 (6, 1)	6.6	26.7
Big Brown Bat (<i>Eptesicus fuscus</i>)	10 (8, 2)	9.4	40.0
Total	106 (82, 24)	100.0	

Table 2. Occurrence of bat species by locality (see Appendix 1) and habitat type (S = water sources surrounded by sagebrush (*Artemisia* spp.), D = water sources surrounded by Douglas-fir (*Pseudotsuga menziesii*), C= streams lined with large deciduous trees such as cottonwood (*Populus* spp.), or quaking aspen (*Populus tremuloides*), W = streams lined with riparian shrubs (predominately *Salix* spp.) for each species in southwestern Montana , July-August 2003 - 2006.

Bat Species	Localities (Appendix 1)	Habitat Type
Western Small-footed Myotis (<i>Myotis ciliolabrum</i>)	1,6,7,8	S, D, C
Western Long-eared Myotis (<i>M. evotis</i>)	1,2,4,5,6,8,9,11	W, S, D, C
Little Brown Myotis (<i>M. lucifugus</i>)	1,2,5,14	W, S, D
Fringed Myotis (<i>M. thysanodes</i>)	1,2,3	W, S, D
Long-legged Myotis (<i>M. volans</i>)	2,13,14	W, S, D
Hoary Bat (<i>Lasiurus cinereus</i>)	1,2,5,12,14,15	W, S, D, C
Silver-haired Bat (<i>Lasionycteris noctivagans</i>)	5,7,11,14	W, D
Big Brown Bat (<i>Eptesicus fuscus</i>)	1,2,5,8,10,14	W, S, D

species was captured at over 50 percent of the sites surveyed and occurred in all habitat types at elevations ranging from 1470 m to 1770 m (Appendix A). Other broadly distributed species included hoary bats (*Lasiurus cinereus*) and big brown bats (*Eptesicus fuscus*), both of which were captured at 40 percent of sites. Hoary bats were captured in all habitat types while big brown bats were captured in three of the four. While relatively high numbers of fringed myotis were captured, the majority of these individuals (73%) were all captured at one site (Appendix A). Western small-footed myotis (*M. ciliolabrum*) and silver-haired bats (*Lasionycteris noctivagans*) were the least abundant species captured, but even though few individuals of these species were captured they were captured across multiple sites, habitats, and elevations.

Almost 80 percent of individual bats captured were males (Table 1). For all species, with the exception of long-legged myotis (*M. volans*) close to twice as many males compared to females were captured. No female fringed myotis were captured at any of the survey sites. Of the small number of female bats that were captured ($N = 24$), the majority (67%) were reproductive (lactating) at the time of capture. The percentage of lactating females ranged from 0% for hoary bats ($N = 3$) and western small-footed myotis ($N = 1$) to 100 percent for silver-haired bats ($N = 1$) and big

brown bats ($N = 2$). Percentage of captured females that were lactating was 83, 83, and 33 percent for long-legged myotis, western long-eared myotis, and little brown myotis, respectively. Females were captured at elevations ranging from 1340 m to 1780 m (Appendix A).

DISCUSSION

We recorded the presence of 8 bat species at 15 sites in southwestern Montana. Fifteen bat species occur in Montana with 12 of these species believed to be distributed in the western part of the state (Foresman 2001). The four species believed to be present in this part of the state that we did not capture were townsend's big-eared bat (*Corynorhinus townsendii*), spotted bat, California myotis (*M. californicus*), and Yuma myotis (*M. yumanensis*). Echolocation calls of spotted bats are audible to the human ear, allowing species recognition without direct capture (Leonard and Fenton 1983). However, we did not audibly detect this species during any of our surveys. Montana is the north-eastern-most extension of the range of both California myotis and Yuma myotis (Foresman 2001) and it may be that both species are uncommon in the western part of the state. However, others (Hoffmann et al. 1969) have found California myotis to be relatively common in the Bitterroot Valley in far western Montana. Townsend's big-eared bats have been documented in the

counties that we surveyed (Foresman 2001). This species is found in a variety of habitats but it exists in low densities throughout its range (Humphrey and Kunz 1976, Kunz and Martin 1982). Townsend's big-eared bats are also known to be highly maneuverable and agile fliers (Fellers and Pierson 2002) which make them difficult to capture in mist-nets. It is likely that they may have been present at some of the sites we surveyed but a greater survey effort would be needed to detect them (Weller and Lee 2007).

Fringed myotis were captured at three sites. This species is one of the six bat species designated as Sensitive by the Montana State Office of the BLM and one of six species listed by the state as a Species of Concern. It has previously been collected in lower elevation forest regions in the state (Foresman 2001). We captured only males of this species and only at the high end of the range of elevations we surveyed. Many studies have reported elevational differences in distribution among sexes of insectivorous bats (Fenton et al. 1980, Grindal et al. 1999, Cryan et al. 2000) with females occurring at lower elevations.

Thorough knowledge of the current distribution of any species is necessary to maintain existing populations. This study contributes some important preliminary information on bat distribution in southwestern Montana and identifies sites that may be useful for future studies. However, much work remains to be done. Activity patterns of bats have been found to vary both spatially and temporally (Hayes 1997, 2000) and it is likely that our surveys did not detect all bat species present at individual sites. More surveys and multiple surveys at individual sites are recommended as well as studies that focus on roost and foraging site selection.

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APPENDIX A.

Locations of survey sites and species examined from southwestern Montana 2003-2006.

1. **Soap Gulch, Silver Bow Co., Montana.** G¹, E0373125 N50621362, 1830 m. 29 July 2003 (9 net hrs). Western Long-eared Myotis (1 male). 31 July 2003 (16 net hrs). Western Small-footed Myotis (2 males), Western Long-eared Myotis (1 male), Little Brown Myotis (1 male), Fringed Myotis (5 males), Hoary Bat (1 male), Big Brown Bat (1 male).
2. **Moose Creek, Silver Bow Co., Montana.** W, E0370035 N5066854, 1780 m. 1 August 2003 (16 net hrs). Little Brown Myotis (1 male), Fringed Myotis (16 males), Long-legged Myotis (2 females), Hoary Bat (2 males, 1 female), Big Brown Bat (1 male). 19 July 2004 (6 net hrs). Western Long-eared Myotis (5 males), Little Brown Myotis (5 males), Long-legged Myotis (3 males, 2 female). 23 July 2004 (9 net hrs). Little Brown Myotis (1 male). 19 July 2005 (8 net hrs). Long-legged Myotis (1 male). 26 July 2006 (6 net hrs). Long-legged Myotis (1 female), Hoary Bat (1 male).
3. **West Fork, Silver Bow Co., Montana.** D, E0348436 N5078288, 2100 m. 8 August 2003 (8 net hrs). Fringed Myotis (1 male).
4. **Cottonwood Canyon, Jefferson Co., Montana.** G, E0430659 N5080910, 1470 m. 20 July 2004 (8 net hrs). Western Long-eared Myotis (3 males).
5. **Upper Whitetail, Jefferson Co., Montana.** W, E0406504 N5097199, 1725 m. 17 July 2004 (7 net hrs). Little Brown Myotis (2 females, 1 male), Hoary Bat (4 males), Silver-haired Bat (1 male), Big Brown Bat (2 males). 24 July 2004 (6 net hrs). Western Long-eared Myotis (2 females), Little Brown Myotis (1 female), Big Brown Bat (2 males).
6. **Lower Whitetail, Jefferson Co., Montana.** C, E048619 N5093058, 1550 m. 16 July 2004 (6 net hrs). Western Small-footed Myotis (1 female), Western Long-eared Myotis (1 male, 2 females). 21 July 2005 (6 net hrs). Western Long-eared Myotis (2 males, 1 female).
7. **Big Pipestone, Jefferson Co., Montana.** D, E0399363 N5087441, 1560 m. 13 July 2004 (6 net hrs). Western Small-footed Myotis (1 male), Silver-haired Bat (1 male).
8. **Upper Halfway, Jefferson Co., Montana.** D, E0399358 N5089984, 1660 m. 14 July 2004 (8 net hrs). Western Small-footed Myotis (2 males), Western Long-eared Myotis (3 males), Big Brown Bat (1 male).
9. **Lower Halfway, Jefferson Co., Montana.** W, E0399572 N5088456, 1615 m. 15 July 2004 (7 net hrs). Western Long-eared Myotis (1 male).
10. **Lower Camp Creek, Silver Bow Co., Montana.** G, E0372520 N5056169, 1670 m. 21 July 2004 (8 net hrs). Big Brown Bat (1 male).
11. **Fish Creek, Silver Bow Co., Montana.** D, E0393478 N5073503, 1775 m. 20 July 2005 (6 net hrs). Western Long-eared Myotis (1 female), Silver-haired Bat (4 males).
12. **Crow Creek, Broadwater Co., Montana.** C, E0448048 N5122216, 1415 m. 4 August 2006 (6 net hrs). Hoary Bat (1 female).
13. **Lower Bigfoot Creek, Jefferson Co., Montana.** G, E0412510 N5106591, 1600 m. 28 July 2006 (6 net hrs). Long-legged Myotis (2 females).
14. **Lump Gulch, Jefferson Co., Montana.** D, E0419972 N5148619, 1340 m. 29 July 2006 (8 net hrs). Little Brown Myotis (1 male), Long-legged Myotis (1 female), Hoary Bat (2 males), Silver-haired Bat (1 female), Big Brown Bat (2 females).
15. **Virginia Creek, Lewis and Clark Co., Montana.** C, E0394331 N5193915, 1500 m. 1 August 2006 (7 net hrs). Hoary Bat (1 female).

¹Habitat Type (see Table 2).

²Universal Transverse Mercator (UTM) Coordinates recorded in NAD 83.

³Net effort = number of nets X hrs open.