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## Notes on the Natural History of Bats from Badlands National Monument, South Dakota

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Little has been published on the mammalian fauna of Badlands National Monument, a unique ecological area that encompasses parts of Jackson and Pennington counties in South Dakota. By way of example, although five species of bats are herein recorded from the Monument, only one has been reported previously — see Jones and Choate (1978), who listed two specimens of *Myotis thysanodes pahasapensis* from the Cliff Shelf area. Jones and Genoways (1976b), however, did report several other species from badland areas not far distant from the boundary of the Monument.

In 1970, under sponsorship of the Badlands Natural History Association and with the cooperation of the National Park Service, one of us (Farney) spent two months observing and collecting vertebrates at Badlands National Monument. The area was briefly visited again in mid-August of 1972. Specimens obtained during the last visit are deposited in the vertebrate collection at Kearney State College (KSC). The others are on deposit in the Museum of National History at The University of Kansas (KU).

Bats were collected at two localities in the National Monument. Most field work was done at the Cliff Shelf, 2 mi. N and 2½ mi. E Interior, Jackson County, where specimens were netted or caught in a bat trap set at a small pond, which holds water for only part of the year. Several cottonwood trees at the pond were situated in the midst of an otherwise cedar-shrub association, below talus slopes of badlands scarps. At Close Spring, located 6 mi. S and 9½ mi. W Wall, Pennington County, nets and a bat trap were set over a pool that had been plugged with vegetation. The vegetation was pulled aside or pushed down so that a 10-foot clearing was available for nets and the trap. The spring is located in a short grass-shrub association; trees around the spring consisted mostly of elm. Although we found no daytime retreats of bats within the Monument, all species undoubtedly roost in the many deep crevices and small caves in badland outcrops. All may overwinter in such places as well.

We gratefully acknowledge the assistance of several people in carrying out field studies, especially John Stockert and Susan Sindt of the Monument staff. In the accounts that follow, all measurements listed are in millimeters and weights are recorded in grams.

*Myotis leibii ciliolabrum* (Merriam, 1886)

This small, saxicolous species is the most common bat in Badlands National Monument. Aside from several hundred that were captured and released, many banded, 36 specimens (KU 124857-92) were prepared for scientific study from Close Spring and 31 specimens (KSC 1977-84, KU 124893-915) from Cliff Shelf. Of 212 individuals captured in a 27-day period (30 June to 26 July 1970) at the latter locality, 78 percent were males.

Molting males and nonparous females, and even a few that already had completed the molt process, were taken in late June and early July of 1970, although pregnant females collected at that time were in old pelage. Among specimens taken on 26 July 1970, one male was still completing molt on the back, but other individuals were in fresh pelage as were all adults obtained on 16 August 1972. A series of 54 adults (44 males and 10 nonpregnant females) averaged 4.4 (3.5-5.0) in weight.

One of the two females taken at Cliff Shelf on 30 June was pregnant; the fetus measured 15 in crown-rump length. On 3 July, 10 of 12 females collected at Close Spring were gravid, fetuses averaging 16.0 (13-18) in crown-rump length. Males obtained in late June and early July had testes that ranged in length from 2-3, whereas those taken in late July and mid-August had testes measuring 4-6. The earliest volant young-of-the-year was obtained on 26 July and weighed 4.0.

In summer, *M. leibii* roosts in cracks and crevices in badland formations, behind loose sheets of rock, and occasionally in buildings. Tuttle and Heaney (1974) found individuals roosting "in a small crevice in a very hard, whitish-gray Oligocene sediment" near Norbeck Pass in Badlands National Monument. To the north of the Monument, in the vicinity of Cottonwood, they discovered bats in daytime roosts in crevices in the walls of vertical banks, in horizontal fractures in large, flat siltstone boulders, and even in holes in the ground.

*Myotis thysanodes pabasapensis* Jones and Genoways, 1967

As earlier indicated, two specimens (both males) of the fringed-tailed myotis (KU 124919-20), taken in July of 1970, were reported from the Cliff Shelf by Jones and Choate (1978). Eight additional specimens, seven males and a female (KSC 1989-1996), were collected at the same locality on 15 and 16 August 1972. The subspecies *pabasapensis* was originally thought (Jones and Genoways 1967a) to be limited in distribution to the Black Hills, but since has been found to occur eastward to the Badlands and southward into western Nebraska (Czaplewski et al. 1979).

An adult female taken on 16 August evinced no reproductive activity and weighed 6.0. Two adult males taken on 7 and 14 July weighed 8.5 and 8.0, respectively, and, although still mostly in old pelage, were actively molting. Four adult males taken in August (testes measuring 4, 6, 6, and 8) weighed from 5.5 to 8.5, whereas two of three volant young males weighed 4.9 and 6.4. The length of the forearm, a measurement helpful in identification of this taxon, averaged 40.7 (39.5-41.5) for the 10 specimens examined.

*Myotis volans interior* Miller, 1914

The long-legged myotis is a common Badlands inhabitant. A large series (KU 124923-47) was collected in 1970 at the Cliff Shelf and two specimens (KU 124921-22) were taken at Close Spring. Additionally, 30 individuals were banded and released at Cliff Shelf.

No pregnant females were obtained in the course of our study, but lactating animals were taken on 19 and 28 July and volant young first were captured on 20 July. The latter are easily distinguishable from adults in having unfused phalangeal epiphyses and a characteristic immature pelage. Fifteen adults weighed an average of 7.9 (6.5-8.5), whereas 12 July-taken young-of-the-year averaged 6.3 (5.5-7.6). Adult males taken on 30 June, 3 July, 4 July (2), and 28 July had testes measuring 5, 4, 2, 4, and 8 in length, respectively.

Molting individuals first were taken on 30 June and two adults (male and nonreproductive female) were completely in fresh pelage on 28 July. The July-taken lactating females mentioned above were in old, worn pelage.

*Eptesicus fuscus pallidus* Young, 1908

Big brown bats were collected only at the Cliff Shelf. Four adult males (KU 124951-54) taken on 30 June 1970 weighed an average of 15.2 (15.0-15.5) and had testes with a mean length of 6.7 (6-9). All were actively molting, although the process was almost complete on two individuals. In contrast, an adult male (KU 124955) taken on 14 July 1970 was entirely in fresh pelage, had testes 12 in length, and weighed 16.5.

More than two dozen individuals netted at the Cliff Shelf were released, some with bands, but in early summer these consisted, with one exception, of adult males. Flying young of both sexes were taken on the nights of 15 and 16 August 1972. The known maternity colony nearest Badlands National Monument was located on 5 July 1970 at a place 2 mi. E Cottonwood, Jackson County, and contained females and nursing young at the time.

This bat is the only widespread species thus far recorded from the Monument, all others being of western origin and reaching (or nearly so) in the Badlands their easternmost distribution on the Great Plains.

*Plecotus townsendii pallescens* (Miller, 1897)

This big-eared species evidently is distributed throughout the South Dakota Badlands, but does not appear to be especially common. Our only specimens are from the Cliff Shelf, where both adults and volant young-of-the-year were taken. Of the latter, a female weighing 8.0 (KU 124972) was taken on 25 July 1970 and a male (KSC 1570) on 16 August 1972.

In 1970, a lactating female weighing 12.0 was netted on 14 July, another weighing 11.5 was taken on 15 July, and an adult male weighing 10.0 and with testes 10 in length was captured on 19 July (KU 124969-71). Molt is difficult to discern on adults; the first female appeared still to be in old pelage, the second possibly was in an early stage of the molt process, and the male evidently was in fresh pelage with the exception of an area over the shoulders where molt was incomplete.

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