



BAT INVENTORY OF SEQUOIA NATIONAL PARK

BACKGROUND — Sierra Nevada bats feed almost exclusively on insects and are the only major predators of night-flying insects. The guano they deposit in caves and other roost areas adds significant nutrient inputs to these sites. Bats represent more than 20 percent of the mammalian diversity in Sequoia and Kings Canyon National Parks, and 74% of the bat species (17 of 23) in California use Sierra Nevada habitats. Five bat species occurring in the Sierra Nevada and surrounding areas are Federal and/or State Species of Concern. Known threats to bats include habitat loss and non-native disease (white nose fungus in particular). Other factors that may affect bats include altered fire regimes, climate change, and pollutants. Bat inventories were done for Sequoia & Kings Canyon to fill in information gaps on bat distribution and relative abundance. Baseline data enable detection of future changes, and give park managers information for assessing impacts of management actions on bats.



Yuma myotis (*Myotis yumanensis*), the most commonly captured bat in Sequoia National Park. Photo: William E. Rainey.



Townsend's big-eared bats (*Corynorhinus townsendii*) are cave-roosting bats documented in the Kaweah drainage. Photo: William E. Rainey.



Western mastiff bat (*Eumops perotis*), one of two bat species found to be roosting in cliffs above the Mineral King Entrance Station. Photo: W. E. Rainey.

OBJECTIVES AND METHODS

Project objectives for Sequoia included:

1. Characterize the distribution and relative abundance of bat species along elevation gradients in the Kern and Kaweah drainages.
2. Characterize habitats, identify the bats found and document their specific uses of those habitats.
3. Identify species sensitive to disturbance through literature review and/or field data.
4. Make recommendations for long-term monitoring of bat species.

This inventory mainly targeted areas with little to no previous data: the Kern drainage, Ash Mountain, the Middle Fork of the Kaweah below Bearpaw, and Mineral King. Limited sampling was also done in the North and South Forks of the Kaweah. A prior bat inventory was done for Giant Forest in 1995. These bat inventories were conducted by bat specialists Elizabeth Pierson and William Rainey in July and August from 2002-2006.

Bat Field Methods: Acoustic and Capture

Two approaches are often used to survey bats, as neither one alone is effective with all bat species. The approaches are as follows:

Acoustic sampling involves the use of an Anabat Detector System to record the ultrasonic echolocation calls of bats flying overhead. Each species has unique call characteristics (e.g. call frequency, shape, duration, and pulse intervals) which can often be used to identify the species of bats in recorded calls. This method can be used to identify 7 of the 16 species documented by this inventory.

Mist-net capture involves setting fine-meshed nets over water, meadows, or other known flyways. After capture in the mist-net, the bats are handled to collect data on the reproductive condition, sex, age, and body measurements, then are released.

What is the Sierra Nevada Network?

The Sierra Nevada Network (SIEN) is a collaborative Inventory & Monitoring program among Devils Postpile National Monument (DEPO), Sequoia and Kings Canyon National Parks (SEKI), and Yosemite National Park (YOSE).

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(continued)

RESULTS

Sixteen species of bats were detected: Fourteen were captured in mist-nets and two were detected only acoustically. Two species were newly documented for Sequoia, and five species have state or federal special status (see Table 1). One additional species may have been detected acoustically (silver-haired bat, or *Lasionycteris noctivagans*), but since it was a new record for Sequoia, additional data are needed for verification. The presence of lactating females or juveniles documented by this survey or previous studies suggests that at least eleven species have reproductive populations in the park. The three most frequently captured species, accounting for 77% of all captures, were yuma, big brown, and long-eared bats. Roost sites were documented at the cliffs above the Mineral King Entrance Station (long-eared myotis and western pipistrelle) and at Moro Rock in Giant Forest (western pipistrelle). Park caves can also be important roost sites for some species - Townsend's big-eared bat is known to roost in some of the low-elevation park caves.

Table 1. Bat species documented in Sequoia National Park.

Scientific Name	Common Name	Special Status	Method of Detection
<i>Antrozous pallidus</i>	Pallid bat	CDFG, USFS, WBWG	Mist net, Acoustic
<i>Corynorhinus townsendii</i>	Townsend's big-eared bat	CDFG, USFS, WBWG	Mist net
<i>Eptesicus fuscus</i>	Big brown bat	--	Mist net
<i>Euderma maculatum</i>	Spotted bat	CDFG, WBWG	Acoustic
<i>Eumops perotis</i>	Western mastiff bat	CDFG, WBWG	Acoustic
<i>Lasiurus blossevillei</i>	Western red bat	CDFG, USFS, WBWG	Mist net, Acoustic
<i>Lasiurus cinereus</i> *	Hoary bat	--	Mist net, Acoustic
<i>Myotis californicus</i>	California myotis	--	Mist net
<i>Myotis ciliolabrum</i> *	Small-footed myotis	--	Mist net
<i>Myotis evotis</i>	Long-eared myotis	--	Mist net
<i>Myotis lucifugus</i>	Little brown bat	--	Mist net
<i>Myotis thysanodes</i>	Fringed myotis	WBWG	Mist net
<i>Myotis volans</i>	Long-legged myotis	WBWG	Mist net
<i>Myotis yumanensis</i>	Yuma myotis	--	Mist net
<i>Pipistrellus hesperus</i>	Western pipistrelle	--	Mist net
<i>Tadarida brasiliensis</i>	Mexican free-tailed bat	--	Mist net

* = first record for the park. Special status codes: CDFG = California Department of Fish and Game's California Special Concern species; USFS = USDA Forest Service Sensitive species; WBWG = Western Bat Working Group High Priority species. (WBWG is a professional working group of bat biologists and land managers.)

DISCUSSION

Sequoia National Park provides a diversity of habitats for bats. National parks will likely play an increasingly important role in sustaining bat populations as pressures on lands outside of parks (such as urban expansion) reduce habitat or increase mortality. This study used geographic range, habitat specificity, and population size to assess species status (Pierson and Rainey, in review). Species with narrow ranges and low population sizes are likely to be at highest risk from local or regional stressors. Understanding the habitat needs of bats in parks will assist managers in mitigating potential effects of climate change, altered fire regimes, habitat fragmentation, and non-native disease on bat populations. This study focused primarily on documenting the distribution of bats using methods that detect bats as they are feeding, drinking, or commuting. More information is needed on bat roost preferences and important roost sites, especially related to caves. Because bats' roosting and foraging areas are often far apart, it's important to consider both these aspects of their habitat when evaluating potential impacts to bat populations.



Bill Rainey setting up a bat detector to record bat calls in the Shepherd Saddle area. A solar panel charges the battery that powers the AnaBat detector, and bat calls are stored on a small memory card. Photo: Elizabeth Pierson.

For more information about bats, visit this web site:
<http://www.batcon.org/>.

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