



Southern Colorado Plateau

INVENTORY & MONITORING NETWORK

Publication Brief - Inventories

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Report Title: Determining bat presence and activity in Petroglyph National Monument to inform visitor management

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A spiral petroglyph, one of approximately 24,000 petroglyphs found throughout the monument/Chris Calvo-NPS



Inventory Program Overview: This project was funded by the [Inventory Program](#).

They facilitate the collection of new data regarding species occurrence, abundance, or distribution to inform park management decisions and planning. The [Southern Colorado Plateau Network](#) and partners have conducted numerous [inventories](#) at many of the 19 national parks and monuments we serve.

KEY FINDINGS

- 21 species of bat were acoustically identified across 10 sampling sites, and acoustic activity was highest in August (Survey period: October 2022 - September 2023).
- Mean number of calls collected at each site ranged from 19-176 calls/night and was lowest at the North Geologic Window, Piedras Marcadas, and Mesa Prieta sites in the monument.
- Acoustic detections across the monument were highest for Mexican free-tailed bat with mean nightly calls ranging between 13.22-152.37/site. Canyon (range mean nightly calls/site = 0.07-38.46) and hoary (range mean nightly calls/site = 0.95-18.86) bats also were detected at all sites. The more commonly detected Myotis species included western small-footed (range mean nightly calls/site = 0-15.22), Arizona (range mean nightly calls/site = 0.07-11.15), and little brown bats (range mean nightly calls/site = 0-12.46).
- Species diversity estimates were relatively higher in eastern portions of the monument, but species richness estimates were high across the monument.

Summary: [Petroglyph National Monument](#) (PETR), encompassing 7,212 acres, is situated on the edge of Albuquerque, New Mexico. As surrounding land is rapidly developed, there has been an increase in visitor traffic that potentially strains natural resources, including bat populations. Currently, there is insufficient data regarding the presence or absence of bats within PETR, especially concerning how visitor activities and the creation, upkeep, or closure of trails may affect these populations. Understanding seasonal bat usage will contribute to implementation of the [Visitor Use Management Plan](#).

From October 2022 to October 2023, surveys were conducted at ten locations using remote acoustic detectors (Wildlife Acoustics SM4bat), accumulating a total of 2,964 detector nights across five key resource management areas. Surveys recorded 21 bat species, including: pallid bat, Townsend's big-eared bat, big brown bat, spotted bat, western red bat, hoary bat, silver-haired bat, California myotis, western small-footed bat, long-eared myotis, little brown bat, Arizona myotis, fringed myotis, cave myotis, Yuma myotis, pocketed free-tailed bat, canyon bat, and Mexican free-tailed bat. The Mexican free-tailed bat was detected most frequently, followed by the canyon bat and hoary bat. Average nightly activity (mean number of calls per night) and a species diversity index were calculated at each sampling site, with overall bat activity peaking in August.

Spotted Bat/
Bruce Taubert,
BCI, and Minden
Pictures





Remote bat acoustic sampling site at Volcanoes Day Use Area, Petroglyph National Monument/Michael St. Germain.

Although acoustic surveys do not quantify individual bat populations or pinpoint specific roosting sites, they effectively illustrate the areas utilized by bats within PETR and their relative frequency of use. This information will serve as a valuable management resource for guiding decisions in each focal area of the monument. Targeted recommendations for the five management areas of interest were provided, emphasizing the importance of minimizing negative impacts, avoiding direct disturbances to potential roosting habitats (such as caves and lava tubes), conducting visual inspections before interventions whenever feasible, and steering clear of periods of peak bat activity.

Management Implications:

- Bat species richness is relatively high at PETR ($n=21$), and this is consistent with richness values reported elsewhere on the Colorado Plateau. Eighteen species were detected during acoustic surveys in both northern Arizona (Canyon de Chelly National Monument, Hubbell Trading Post National Historic Site, and Navajo National Monument) and southern Utah (Capitol Reef National Park), and at least 14 bat species have been detected during adjacent surveys in New Mexico (El Malpais National Monument). With the precipitous drop in North American bat populations due to white-nose syndrome, it's critical to understand the distributions of bats in PETR, an area not yet affected by the disease.
- Acoustic activity was highest in August; therefore, limiting management actions during this month will greatly lessen potential negative impacts to bats.
- 17 species were detected at two sites being considered for trail crossings of the escarpment. Relatively low nightly bat activity and diversity estimates in the Mesa Prieta area and preexisting high human activity near the Visitor Center suggest additional human activity associated with formalizing these crossings will not likely impact bats in these areas.
- 17-20 species were detected at sites in the volcanoes area of the monument where PETR is considering formalizing two new trail segments. Relatively high activity levels (range mean nightly calls/site = 133–176) and presence of suitable roosting habitat in the area indicates visual inspection searches should be undertaken if action items will potentially impact roosting habitat.
- 16–19 species were detected at sites in the Boca Negra Canyon & Rinconada Canyon areas, where mean nightly activity levels ranged from moderate to among the highest (mean nightly calls/site = 99, 145, 165) with moderate species diversity estimates. Visual inspection searches of suitable roosting habitat in these areas is recommended if action items will potentially impact habitat. Day use activities should not impact bats unless potential roosting sites (caves, lava tubes, boulder fields, rock ledges, and crevices) may be directly impacted by maintenance actions.
- 19 species were detected at the Piedras Marcadas Pueblo site near the Rio Grande River where a few large cottonwood trees may provide habitat for bats. Activity levels were moderate at this site (106 calls/night) but diversity estimates were the highest on the monument. This area likely attracts bats from across the monument because of its proximity to water.



Three Sisters Volcanoes, Petroglyph National Monument/Daniel Leifheit-NPS