

Bat species using water sources in pinyon-juniper woodlands

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Abstract.—Much is yet to be learned about the importance of bats in Southwestern ecosystems, their ecological requirements, and how habitats should be managed to sustain these important species. A first step towards these goals is to determine what species exist in different habitats and across what geographic ranges. The objective of this study was to identify the bat species which use pinyon-juniper habitats of the Middle Rio Grande Basin. Ten pinyon-juniper sites with permanent water on the Cibola National Forest were mist netted four times from May to September 1995. Sixteen bat species were captured from the 10 sites. The number of sites a species was captured at and frequency of capture varied according to species.

INTRODUCTION

Most North American bats are primarily insectivorous. Their roles in Southwestern ecosystems include regulation of insect populations, subsequent effects on insect-related ecological processes (such as herbivory, pollination, and disease transmission), and nutrient cycling and distribution. Despite their importance to many ecosystem processes, bats have largely been ignored, most likely due to their lack of public appeal and the difficulty with which they are studied. Much of the information needed to manage habitats for bats, such as foraging and roost requirements, is unknown. Without greater attention to bats and their ecological requirements, we cannot assure that their roles and contributions in Southwestern ecosystems will be sustained. The first step in investigating bats and their requirements is to

determine species distributions and habitat use. The objective of this study was to determine which bat species use pinyon-juniper habitats along the Middle Rio Grande. Based on this research, further studies may be designed to focus on structures and specific areas within habitats that different species use for roosting, foraging, and reproduction.

METHODS

Bats were captured by placing mist nets over permanent bodies of water at 10 different pinyon-juniper sites throughout 5 mountain ranges (the Sandias, Manzanos, Magdalenas, Gallinas, and San Mateos) of the Cibola National Forest (fig. 1). Water sources were either dirt stock tanks, open-topped steel water tanks, or stream sites. Each site was netted 4 times between May and September 1995. Nets were typically open from sunset to 1:00 a.m.. After species, sex, age, reproductive status, and body measurements were recorded, bats were weighed and released (fig. 2).

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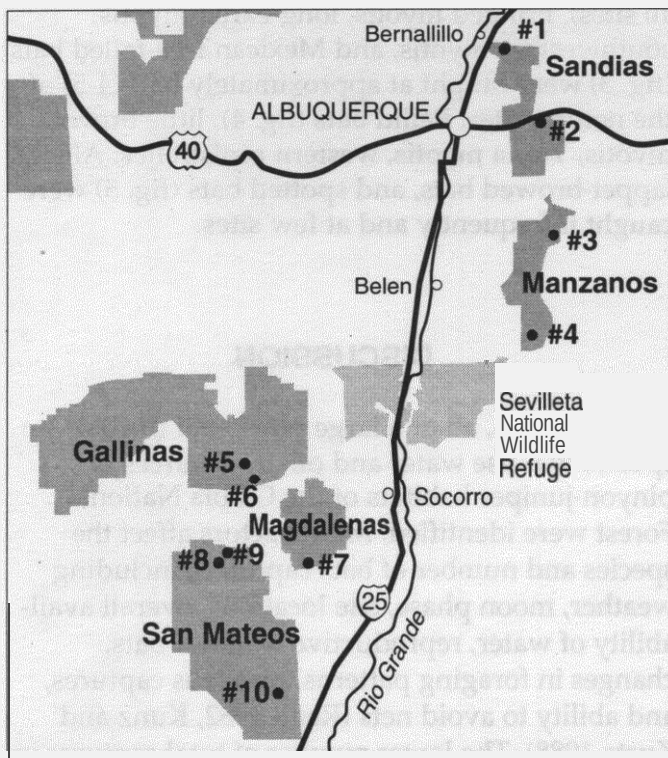


Figure 1. Ten sites on the Cibola National Forest with permanent water were mist netted to examine bat species composition in pinyon-juniper woodlands.



Figure 2. Captured bats were identified to species. Age was determined by examining wing bones.

RESULTS

A total of 16 species were captured from the 10 pinyon-juniper sites (Table 1). Captures in a single night ranged from 0-134 bats ($\bar{x} = 27 \pm 30$). Total captures were generally lower in the Sandia and Manzano mountains. The maximum number of captures in a single night occurred at a spring-fed pond and riparian area amongst steep pinyon-juniper in the Magdalenas.

California myotis, small-footed myotis, long-legged myotis, big brown bats, silver-haired bats, and hoary bats were caught at most of the sites (7-

Table 1. Sixteen bat species were captured in pinyon-juniper habitat. The number of sites each species was captured at and current federal status of each species are reported.

Species	Number of sites	Federal status
California & small-footed myotis ^a (<i>Myotis californicus</i> & <i>ciliolabrum</i>)	10	Category 2 Candidate ^b
Long-legged myotis (<i>M. volans</i>)	8	Category 2 Candidate
Big brown bat (<i>Eptesicus fuscus</i>)	8	
Silver-haired bat (<i>Lasionycteris noctivagans</i>)	8	
Hoary bat (<i>Lasiurus cinereus</i>)	7	
Fringed myotis (<i>M. thysanodes</i>)	5	Category 2 Candidate
Mexican free-tailed bat (<i>Tadarida brasiliensis</i>)	5	
Long-eared myotis (<i>M. evotis</i>)	4	Category 2 Candidate
Southwestern myotis (<i>M. auriculus</i>)	4	
Yuma myotis (<i>M. yumanensis</i>)	3	Category 2 Candidate
Pallid bat (<i>Antrozous pallidus</i>)	2	
Little brown myotis (<i>M. lucifugus</i>)	1	Category 2 Candidate
Western pipistrelle (<i>Pipistrellus hesperus</i>)	1	
Allen's lappet-browed bat (<i>Idionycteris phyllotis</i>)	1	Category 2 Candidate
Spotted bat (<i>Euderma maculatum</i>)	1	Category 2 Candidate

^a These species cannot be reliably distinguished in the field and are thus reported together.

^b Only *M. ciliolabrum* is a Category 2 Candidate species.



Figure 3. A tail that extends well beyond the tail membrane distinguishes the Mexican free-tailed bat from other species.



Figure 4. The pallid bat. This species feeds on terrestrial insects such as crickets, centipedes, and scorpions.



Figure 5. The spotted bat. A single individual of this distinctive species was captured in the San Mateo Mountains.

10 sites). Fringed *myotis*, long-eared *myotis*, southwestern *myotis*, and Mexican free-tailed bats (fig. 3) were caught at approximately half (4-5) of the netting sites. Pallid bats (fig. 4), little brown *myotis*, Yuma *myotis*, western pipistrelles, Allen's lappet-browed bats, and spotted bats (fig. 5) were caught infrequently and at few sites.

DISCUSSION

This season, all or a large portion of the bat species that use water and other resources of pinyon-juniper habitats of the Cibola National Forest were identified. Many factors affect the species and number of bats captured, including weather, moon phase, site locations, overall availability of water, reproductive status of bats, changes in foraging patterns, previous captures, and ability to avoid nets (Reith 1982, Kunz and Kurta 1988). The lower number of total captures in the Sandia and Manzano mountains was likely due to the fewer number of suitable watering sites in pinyon-juniper habitats of these mountains (pers. obs.). Although many factors may affect netting results, mist netting provides information such as species composition, relative abundance, and timing of activities. Information from this study such as geographic distribution and habitat use by different bat species may be used by managers for making future status determinations of Federal Category 2 candidate species, managing bat habitat, and evaluating land management practices, and by researchers for designing future roost, foraging, and reproductive studies.

LITERATURE CITED

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