

Bat Distribution and Abundance in the East Bay Regional Park District

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Abstract

Worldwide, bats perform many significant ecological roles, including insect consumption, pollination, seed dispersal, and nutrient cycling. Their low rates of reproduction, tendency of many species to roost in large numbers, and extreme sensitivity to disturbance make bat populations especially vulnerable to a variety of threats: habitat loss and fragmentation, climate change, pesticides, toxic wastewater, persecution by humans, wind farm development, and the fungal disease white-nose syndrome. The East Bay Regional Park District (EBRPD) conducted a study of bat distribution and abundance between 2004 and 2017. A total of 19 visual and acoustic bat surveys were conducted periodically between April and November at 10 locations. The study confirmed the presence of 7 genera and 8 species of bats, including 2 California Species of Special Concern, the Pallid Bat (*Antrozous pallidus*) and Townsend's Big-Eared Bat (*Corynorhinus townsendii*).

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Introduction

Bats provide several important ecosystem services. They consume vast quantities of insects and help control diseases, regulate crop damage, and decrease pesticide use by reducing mosquitoes and agricultural pests (Boyles et al. 2011, Western Working Bat Group 2017). Many native plants and agricultural crops rely on pollination by bats (Loeb et al. 2015). Bats also play a crucial role in rainforest regeneration through seed dispersal and nutrient cycling through guano (de la Peña-Domene et al. 2014, Duchamp et al. 2010).

Despite their benefits, bats have frequently been persecuted by humans. Fear and ignorance of bats has caused vandalism of roost sites and destruction of bat colonies (Loeb et al. 2015, Western Working Bat Group 2017). Many bat species roost in large numbers, have low reproductive rates, and are extremely sensitive to disturbance, making them vulnerable to extinction (Loeb et al. 2015). Bats are threatened by climate change, habitat loss and fragmentation, toxic wastewater, and pesticides. Development of wind farms has increased bat mortality from barotrauma and collisions with turbines (Loeb et al. 2015). In eastern North America, bat populations have been devastated by white-nose syndrome (WNS), a fungal disease that affects hibernating bats. This rapidly spreading disease has made its way to Washington state but has not been detected in California.

Over 1,300 species of bats have been documented worldwide, but populations are currently declining (Bat Conservation International 2017, Loeb et al. 2015). Almost 40% of all bat species in North America are on state or federal endangered, threatened, or sensitive species lists (Western Working Bat Group 2017). Up to 15 bat species are known to occur in the San Francisco Bay Area, and 4 are California Species of Special Concern (Taylor 2015, California Department of Fish and Wildlife 2017).

Study Area

The East Bay Regional Park District (EBRPD), the largest urban park district in the nation, manages over 120,930 acres of parklands in Alameda and Contra Costa counties in the San Francisco Bay Area. From 2004 to 2017, EBRPD staff conducted 21 bat surveys at the following 10 locations: Anthony Chabot Regional Park, Ardenwood Historic Farm, Black Diamond Mines Regional Preserve, Camp Arroyo, Cull Canyon Regional Recreation Area, Del Valle Regional Park, Redwood Regional Park, Sibley Volcanic Regional Preserve, Sunol Regional Wilderness, and Tilden Regional Park.

Methods

Visual and acoustic surveys were conducted between April and November from 2004 to 2017 by district staff and volunteers. Nighttime emergence surveys were conducted using night vision monoculars and Pettersson bat detectors. Surveyors stationed near the buildings determined if any bats exited or entered the structures or nearby vegetation. Bat detectors were used for echolocation signals. Visual surveys of daytime roosts were conducted using binoculars and flashlights. Surveyors inspected buildings and structures for guano and other signs of bats occupancy. Bats that were observed during surveys but could not be identified to genus or species were excluded from the results.

Results

Bats were found to be present at 10 EBRPD locations (Figure 1). Of the 15 bat species known to occur in the San Francisco Bay Area, 7 genera and 8 species are present in the District, including two California Species of Special Concern, the Pallid Bat (*Antrozous pallidus*) and Townsend's Big-Eared Bat (*Corynorhinus townsendii*) (Figures 3 and 4) (Taylor 2015). Both species were observed at the Sunol Regional Wilderness, and the Pallid Bat was also observed at Black Diamond Mines Regional Preserve.

Bats recorded, in order of decreasing abundance, are as follows: Mouse-Eared Bats (*Myotis* sp.), Pallid Bat, Brazilian Free-Tailed Bat (*Tadarida brasiliensis*), Big Brown Bat (*Eptesicus fuscus*), Canyon Bat (*Parastrellus hesperus*), Townsend's Big-Eared Bat, and Hoary Bat (*Lasiurus cinereus*) (Figure 2). Mouse-Eared Bats are difficult to distinguish, and two species in this genus were identified during the study, the California Myotis (*M. californicus*) and the Yuma Myotis (*M. yumanensis*) (Figure 5).

Management Implications

Because of their longevity and sensitivity to disturbances, bats are important indicators of ecological health (Loeb et al. 2015). District staff and volunteers will continue monitoring bat distribution and abundance within its land holdings.



Figure 3. Pallid Bat, *Antrozous pallidus*, one of the two California Species of Special Concern present in the East Bay Regional Park District. Photo: National Park Service



Figure 4. Townsend's Big-Eared Bat, *Corynorhinus townsendii*, a California Species of Special Concern found at one location in the study. Photo: National Park Service



Figure 5. Yuma Myotis, *Myotis yumanensis*. The Mouse-Eared Bats, *Myotis* spp., are the most abundant genus of bats in EBRPD. *Myotis* species are difficult to distinguish; the Yuma Myotis and the California Myotis, *M. californicus*, are the two species identified in the study. Photo: National Park Service

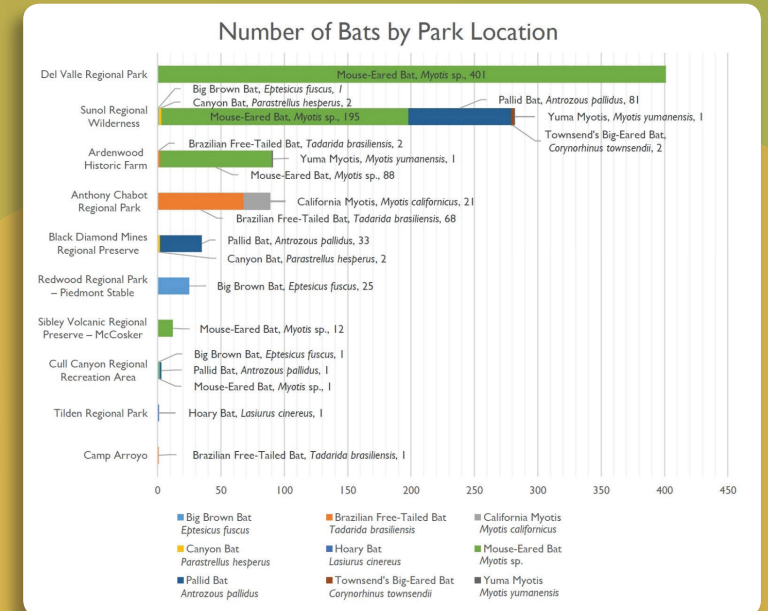


Figure 1. Number of bats present in the East Bay Regional Park District by location and species. Bats that could not be identified to genus or species were excluded from the results.

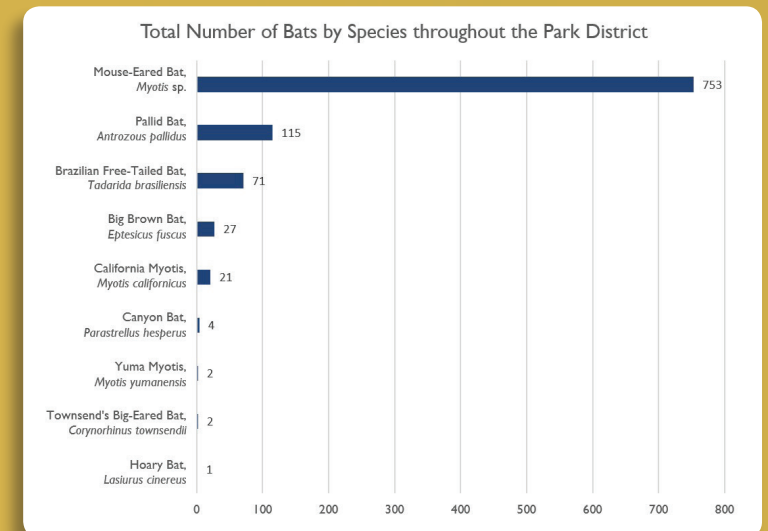


Figure 2. Total number of bats per species throughout the East Bay Regional Park District.