



Ghost Surveillance: The importance of monitoring acoustic activity of bat diversity hotspots



Martin McQueen (martin.c.mcqueen@tcu.edu), & Victoria J. Bennett (v.bennett@tcu.edu)
Department of Environmental Sciences, Texas Christian University, Fort Worth, TX, USA

Introduction

- Habitat loss, disease, and land-use change has led to a sudden decline in bat populations in the US.
- Thus, there is an immediate need to determine the extent of the impact before we can effectively implement counter measures.
- One way to assess the impacts is to monitor in areas with a high abundance and species diversity, such as Big Bend National Park, which has 25 of the US's 47 native bat species.
- The objective of our study was to assess whether 1) acoustic monitoring at the park was feasible and 2) if species recorded, abundance, and seasonal peaks in activity could contribute to national long-term monitoring.
- We placed four passive ultrasonic acoustic detectors in areas known to be suitable for bats for a year. We used Sonobat and kaliedascope software to manually identify all bat calls to species where possible.
- From 1st June 2017 to date, we have recorded xxxx calls. From history records and studies, we have identified XX species and we are already beginning to determine that there are more species than previously stated. This study therefore has the potential to substantially contribute to existing monitoring programs to establish the health and stability of bat populations in the United States.

Methods

- BBNP is located in Brewster County, Texas. It is the 15th largest National Park in the United States, encompassing just over 800,000 acres.
- We conducted passive acoustic monitoring surveys at four locations in the park. At each location, we deployed a Song Meter SM4BAT detector (Wildlife Acoustics, MA).
- Each detector was equipped with an SMM-U2 External ultrasonic microphone and we preset each detector to trigger at frequencies between 5 kHz and 192 kHz. Each sound file was recorded as a 3 sec standard wav file (.wav) onto a 64 GB SD card. The detectors were set to run from 6 pm to 6 am (Central Time Zone) throughout the survey period. ---pic of detector set up---

Video processing and analysis

Data Processing

- All sound files were downloaded from the SD cards and placed in folders organized by site and date. In these folders, sound files were scrubbed at a medium setting using Sonobat Batch Scrubber (version 4) to filter out noise. We then used a key to manually sort the remaining calls to species, where possible.
- To create a key, we used published data, and call analysis guides to compile a portfolio of call characteristics that could be used to identify each species. These call characteristics included average lowest apparent frequency, average highest apparent frequency, the frequency of greatest power, call duration, and a description of call shape.

Bat Species	Distribution	High Frequency	Low Frequency
Chous Bat (Chondestes nigropunctatus)	BB Ammerman		
VJROW			
Mexican long-legged bat (Chondestes mexicanus)	rare in southern Texas		
Mexican Long-nosed Bat (Leptonycteris curvirostris)	BB Ammerman		
California Myotis (Myotis californicus)	BB Ammerman		
Western Small-footed Myotis (Myotis chiroblunus)	BB Ammerman		
Fringed Myotis (Myotis thysanodes)	BB Ammerman		
Cave Myotis (Myotis velifer heselous)	BB Ammerman		
Long-legged Myotis (Myotis velox)	BB Ammerman		
Yuma Myotis (Myotis yumanensis)	BB Ammerman		
South-western little brown myotis (Myotis occultus)			
Western Red bat (Lasiurus borealis)	1 indiv. - presence only		
Eastern Red bat (Lasiurus borealis)	1 indiv. - presence unlikely		
Hairy Bat (Lasiurus cinereus)	BB Ammerman		
Western Yellow Bat (Lasiurus xanthinus)	BB Ammerman		
Silver-haired Bat (Lasiurus noctivagus)	7/8/17		
Canyon Bat (Parastellus hesperus)	BB Ammerman		
Tri-colored Bat (Perimyotis subflavus)	Brewster County		
Big Brown Bat (Eptesicus fuscus)	BB Ammerman		
Spotted Bat (Euderma maculatum)	BB Ammerman		
Townsend's Big-eared Bat (Corynorhinus townsendii)	BB Big Bend Natural History Association/BBNP Park Ammerman		
Pallid Bat (Antrozous pallidus)	BB Ammerman		
Mexican Free-tailed Bat (Frdobabrosalensis mexicana)	BB Charles		
Packaged Free-tailed Bat (Nyctinomops laticaudatus)	BB Ammerman		
Big Free-tailed Bat (Nyctinomops macrotis)	BB Ammerman		
Western Mastiff Bat (Eumops perotis)	BB Ammerman		
Southwestern myotis (Myotis auricularis)	<50 km from Chisos mts.		
Western Pipistrelle (Pipistrellus hesperus)	BB Ammerman (2004)		

Conclusions

Citations

Acknowledgements

