Enhanced Monitoring of Imperiled Bat Species on DoD Installations Using Aerial Acoustic Technology

Project # 16-804

Background:

In order to adhere to the Endangered Species Act, Sikes Act, and National Environmental Policy Act, the Department of Defense (DoD) is responsible for monitoring bat populations on military installations. With current bat monitoring techniques, managers face limitations that can affect the determination of species presence and relative abundance. The Aerial Bat Detection Technology (ABDT), allows for the deployment of bat detectors in locations that are difficult to survey using traditional methods, greatly extending monitoring capabilities by collecting ultrasonic bat calls aerially. This improvement in bat monitoring will allow for improved detection of threatened, endangered, and at-risk species (TER-S) of bats.

Objective:

The goal of our project was to improve on traditional, ground-based acoustic bat monitoring plans by designing and deploying the ABDT at various altitudes above each of the sampling sites. In addition, we sought to test the ABDT's capabilities by comparing nightly recordings with a ground-based detector deployed in the same locations at the same time. We anticipated the ABDT would allow bats to be recorded at heights where monitoring has previously not taken place, increasing species detection probability.

Summary of Approach:

Three locations on 4 different military installations across the southeastern U.S. were chosen to use as our sampling sites for testing the ABDT, for a total of 12 sites. The 4 military bases used for this research were Jefferson Proving Grounds, IN; Fort Leonard Wood, MO; Camp Robinson, AR; and Arnold AFB, TN. We deployed both a tethered ABDT and a ground-based acoustic bat detector at 2 of these 12 sites each night to record bats for 4 hours. The ABDT consisted of a Pettersson D500x acoustic bat detector and data acquisition payload, which contains a GPS system for location and altitude monitoring, failsafe devices, helium valve control mechanisms, and a modem for communication with the base station control computer. The detector and payload was attached to a helium filled 300g weather balloon. During the nightly 4-hour sampling period, the ABDT was deployed at 25m, 50m, 75m, and 100m above ground, recording calls for the entire period. After each night, audio files were processed using SonoBat automated bat call identification software to determine species presence. We then compared calls collected by the ABDT with calls collected by the ground-based detector. These field-testing methods were conducted from mid-May through mid-August 2016.

Benefit:

The results of this project indicate the ABDT may offer a new monitoring technique to better assess the presence and relative abundance of bat populations. As a result it may provide military installation land managers a more effective strategy to monitor populations and determine presence of TER-S bats. This will allow them to more easily adhere to various environmental regulations governing TER-S species and help ensure military readiness and operations. Information on the ABDT will be disseminated to other installations, via factsheets and webinars.

Accomplishments:

Results from bat population monitoring using the ABDT showed that, on average, more species of bats were detected nightly when compared to ground-based acoustic monitoring alone. Species known to forage at higher altitudes were recorded more frequently on the ABDT than on the ground-based detectors. By using acoustic detectors aerially in conjunction with ground-based detectors, we were able to obtain a better sample of species presence in all sample locations. However, due to lack of funding, we were not able to complete the testing period for the ABDT.

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