Automated Acoustic Identification of Bats

Conservation
CS-1394

Background:

The Endangered Species Act requires the Department of Defense to manage threatened and endangered (TE) species on lands under its jurisdiction. The inventorying and monitoring necessary for managing TE bat species accrues high costs because of the specialized skills required to perform this work. In addition, TE bat species are typically rare and require greater survey effort to acquire reliable data than more common species, particularly over the extensive landscapes of U.S. military installations.

Objective:

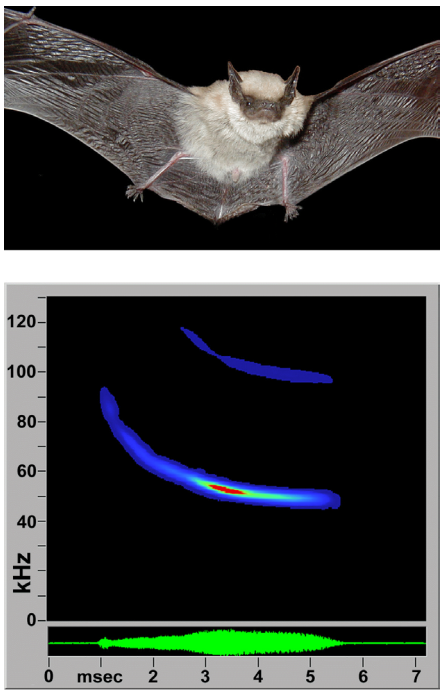
This project will develop a system to automatically and continuously monitor bats for weeks or months at a time by recording the vocalizations they produce. Processing algorithms also will be developed to automatically identify bat species from the field-collected data to assess species presence/absence, population levels, temporal movements, and acoustically gleaned demographic information.

Process/Technology Description:

This monitoring system will use full-spectrum acoustic data to facilitate automated call identification and provide information on the ambient acoustic environment, preventing misidentifications. Field recording units will use onboard controllers to automatically trigger a recording based on selectable filters and logic to reject undesired signals. The signals will be digitized onboard and stored using a cascaded approach of RAM and high-capacity hard drives that minimize power consumption to enable unattended recoding for periods of weeks or months. The automated call identification approach will simulate the decision-making capability of an expert, objective human based on an artificial neural network with redundant verification using a fuzzy logic expert system or a multivariate decision tree. Identification algorithms will be based on independently confirmed recordings of known species and calibrated in coordination with ongoing monitoring activities using standard, accepted methods.

Expected Benefits:

Automated acoustic monitoring and identification will reduce the costs of monitoring and managing rare TE bat species. Capable of operating in personnel-restricted areas, this system will provide more reliable and consistent data among surveys to reveal long-term trends of species presence/absence and abundances as compared to intermittent personnel-based surveys. The high-resolution acoustic data also will increase the accuracy and consistency of species identification for better support of environmental management and operations planning on military lands. (Anticipated Project Completion - 2008)



Western pipistrelle bat and a sonogram display of its echolocation call.

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