



Monitoring Migratory Birds Using Automated Acoustic Technologies – Continuation, Year 4

Project # 10-245

Background:

In previous years of this multi-year Legacy Resource Management Program project (Legacy 05-245, 06-245, 07-245) and Strategic Environmental Research and Development Program (SERDP) project CS-1185, the Cornell Lab of Ornithology (Lab) in Ithaca, New York, developed and expanded Department of Defense (DoD) capacities to monitor migratory birds using acoustic and Internet technologies. As a continuation of this multi-year effort, we proposed the development of acoustic technologies to monitor species of concern, as described in the DoD Coordinated Bird Monitoring Plan. Such monitoring is explicitly acknowledged as an integral element of bird management and conservation, and our proposal for using acoustic technologies provides effective means to refine DoD abilities to detect species of concern, and provide a tool for generating baseline data necessary for producing inventories on DoD installations.



Mexican Spotted Owl
(US Fish & Wildlife Service)



Eastern Whip-poor-will
(S. Ramirez)



Objective:

Two broad goals for the scope of this project were: to assess calling phenology of two target species on two DoD installations and to assess the behavior of the autonomous recording units (ARUs) and sound analysis software (Raven, XBAT) used in previous research funded under SERDP and Legacy. To achieve both of these goals, we deployed ARUs over periods of weeks or months to survey two species of concern, “Mexican” Spotted Owl (*Strix occidentalis lucida*; SPOW) at Fort Huachuca, Arizona and Eastern Whip-poor-will (*Caprimulgus vociferous*; EWPW) at Fort Drum, New York, to document vocal phenology at breeding location, with preference given to areas where local bird abundance was known and visual surveys could occur with ease, and when and where relevant in relation to environmental factors.

Summary of Approach:

We collected data for assessing and refining protocols and applied conservation planning, for understanding novel biological information about species behaviors and communication, and for reviewing future automated deployments and their benefits to the military mission. Specifically, we report details in three areas:

1. *Field Testing*: We continued evaluation of autonomous recording units (ARUs) and of detection and classification software for use with ARUs to a) conduct ground-based acoustic censusing of migratory bird species and species of concern and b) provide critical data to improve the accuracy of acoustic monitoring.

2. *Target Species Monitoring Protocol*: We devised potential protocols for data collection, processing, and analysis to aid in implementing acoustic technologies, with a specific focus on applying hardware and software to monitoring target species of concern. This was on an installation-by-installation basis.

3. *Enhanced Monitoring Capabilities*: We refined analysis capabilities for large acoustic monitoring datasets, including improved automation procedures and deployment strategies. This represents a critical step in connecting the scale of the recordings and amount of data we can collect with our abilities to process and to analyze such massive datasets.



Benefit:

We have demonstrated proven applicability for monitoring target species and for enhancing DoD ability to evaluate and monitor avian resources on and off DoD lands. This translates into better use of highly limited resources and improved readiness to address requirements of special legislation regulating threatened and endangered species. These approaches represent cost effective methods for surveying, saving valuable human and financial resources without compromising collection of data crucial for maintaining mission readiness on DoD installations. This powerful system for monitoring can target species of concern, particularly those that might be elusive, rare, or difficult to survey, to monitor these species in a cost effective way.

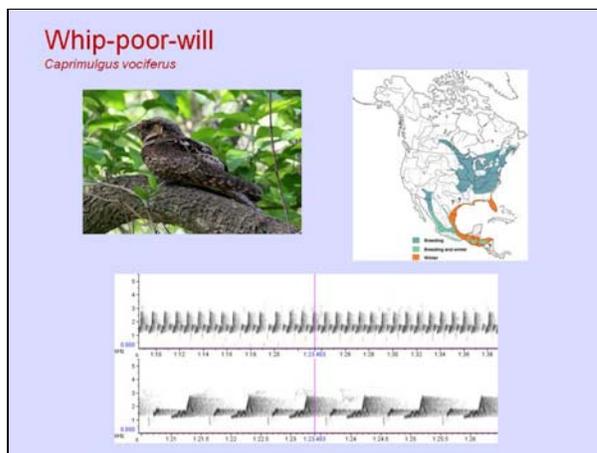


Autonomous Recording Units (ARUs) deployed at Ft. Huachuca, AZ



Accomplishments:

Temporal patterns of Mexican Spotted Owl (SPOW) seasonal and hourly calling as detected by ARUs suggest a need to broaden the seasonal window for monitoring while reducing the need for extensive nightly monitoring. We collected nearly 12,000 hours of audio recordings among 9 different locations, or almost 500 24-hour days of data. We detected over 31,000 SPOW calls representing at least 10 different types of vocalizations. Additionally, from 10,000+ hours of recordings, temporal patterns of Eastern Whip-poor-will (EWPW) seasonal and hourly calling as detected by ARUs also suggest a potential need to review monitoring protocols. Calling peaked in late May through mid to late June, in agreement with current protocols. However, we also found that EWPW vocalization continues in periods outside of typical monitoring protocols. Additional analysis of our data will likely suggest a solution for how best to approach applying new protocols that account for hours of the night and hours of the month outside of the typical lunar illumination restrictions.



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