Migratory Bird Monitoring Using Automated Acoustic and Internet Technologies

06-245

Background:

Cornell Laboratory of Ornithology (CLO) developed digital autonomous recording units (ARUs) that record for periods of up to 7 weeks in duration. Acoustical methods play a prominent role in avian monitoring efforts because many birds can be heard more reliably and at much greater ranges than they can be seen; however several limiting factors may reduce the effectiveness of acoustic techniques. We address the limiting factors of observers monitoring birds acoustically and of protocols monitoring birds that may be missed by traditional observation methods and provide solutions and sample data that enhance DoD's capacity to monitor avian resources on and around DoD lands and analysis and summary of these data.

Objective:

We proposed to continue work on the following tasks: 1) to test and to evaluate protocols for using digital autonomous recording units (ARUs) to a) enable ground-based acoustic censusing of species that vocalize infrequently, b) provide critical data to improve the accuracy of any acoustic census, and c) produce acoustic datasets for observer training; 2) to implement and ground-truth a network of acoustic detectors to monitor flight-calls (FCs) of migrating species, to predict species-specific stopover use on and around DoD installations; and 3) to customize the Internet-based eBird application to allow DoD to collect, store, and manage sighting data on all bird species throughout the year.

The first two components address directly the limiting factors of observers monitoring birds acoustically and monitoring birds that may otherwise be missed by traditional observation methods and provide solutions that will enhance DoD's capacity to monitor avian resources on and around DoD lands. The third component facilitates the analysis and summary of these data as well as their presentation in a convenient and accessible format.

Summary of Approach:

We deployed ARUs to record passing nocturnal migrants' flight-calls and to evaluate recording methods for monitoring target species of concerns (such as Whip-poor-will). Each ARU consists of a sensitive, pre-amplified dynamic microphone feeding a recording unit that stored the sounds digitally on a 120 GB hard drive as binary files (BIN), uncompressed sound files. Each ARU recorded on a pre-programmed schedule from civil twilight to civil twilight, 7 days/wk for approximately 70 days, generating approximately 120 GB of sound data when units functioned at full capacity without failure. The installations occurred in the following order: Mt. Pleasant, Ithaca, NY, Picatinny Arsenal, Mt. Hope, NJ , Naval Air Engineering Station, Lakehurst, NJ, Naval Air Station at Patuxent River, MD, West Point Military Academy, West Point, NY, Dover Air Force Base, Dover, DE, and Fort Drum Military Reservation, Fort Drum, NY.

Benefit:

This project has direct benefits to the military missions and conservation objectives by 1) improving DoD capacity to monitor avian resources on and around DoD lands and 2) identifying patterns of migration and migratory usage on and around DoD facilities that may impact DoD activities.

Accomplishments:

We collected over 30,000 hours of data in 2005 and 2006, and we have successfully stored, processed, and initiated analysis of this information. Our preliminary results indicate that this method is an invaluable source of information about species passing over and stopping on DoD lands and that this method is widely applicable to monitoring target species of concern.

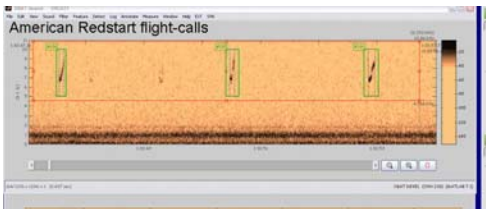

Diagram shows mp3 sound file spectrogram with American Redstart flight-calls highlighted as green selections indicating visually detected calls.

We have outlined problems and constraints that we encountered in developing and applying hardware and software technologies, including the needs for data storage and the need for equity in the resources required for collection and analysis processes. We suggest several areas to improve our data acquisition, collection and analysis, to expand our research, and to form partnership that will further bolster the use of this technology - these include refining criteria for local attributes at deployment sites to minimize noise contamination, adjusting software parameters for detection of signals of interest, expanding the range of studies that apply acoustic monitoring, and transferring information among interested DoD users.

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