Migratory Bird Monitoring Using Automated Acoustic and Internet Technologies

05-245

Background:

Cornell Laboratory of Ornithology (CLO) developed digital autonomous recording units (ARUs) that record mp3 and binary (BIN) sound files for periods of up to 6 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 accomplish the following tasks: 1) to test and evaluate protocols for using 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 as three-unit arrays designed to examine the feasibility of localizing flying birds. We positioned the three units in a triangular configuration at each site. This was done, in part, to provide redundancy for recording flight-calls of migrating songbirds and to enable us to estimate altitude of night flight-calls and bearings to them, to better document morning flight, and use of DoD lands for stopovers during migration. Each ARU consisted of a stereo pair of sensitive, horn-loaded, pre-amplified dynamic microphones feeding a recording unit that stored the sounds digitally. In spring 2006 we also deployed ARUs that record binary files uncompressed sound files. Each ARU recorded 24 hours/day, 7 days/wk for approximately 70 days, generating approximately 100 GB of compressed sound data. 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 27,000 hours of data in fall 2005 and spring 2006, and we have successfully stored, processed, and initiated analysis of this information. We have outlined problems and constraints that we encountered in developing and applying hardware and software technologies. We indicated future areas to improve our data collection and analysis, to expand our research, and to form partnership that will further bolster the use of this technology.

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