Advanced Monitoring of Migratory Birds on Military Lands

Conservation
CS-1438

Background:

Accurate forecasts and visual indicators represent important components of migratory bird monitoring for the military, as they aid in planning training exercises, conserving threatened and endangered species and habitats, and reducing bird aircraft strike hazard (BASH) levels. Previous research has identified multiple predictors of migratory bird density, distribution, and abundance, including habitat structure and availability, vegetation structure and density, and competition levels. As predictors are identified and fine-tuned, the potential for improved migratory bird distribution forecasts is increased. Applying this knowledge to the development of cost-effective tools for monitoring migratory birds would be of great use to the military.

Objective:

The objectives of this project are to (1) identify the fundamental relationships between elements that define migratory bird habitat and (2) develop texture-based image processing methods for high-resolution satellite data to forecast migratory bird distribution and abundance.

Process/Technology Description:

The project will begin by integrating existing bird data from the McGregor Range at Fort Bliss, New Mexico with a full set of image texture measures representing varying spatial scales and based on aerial photographs and Landsat Thematic Mapper (TM) imagery. This step will identify the most powerful texture measures and data resolution requirements for accurate forecasts of migratory bird distribution and abundance. Simultaneously, landscape indices will be calculated for the study area from an existing classified landcover map and then applied to the existing bird data set. The same analysis will be conducted at Fort McCoy, Wisconsin. The second step involves testing the reliability and accuracy of the image texture measures. Using an additional set of migratory bird presence and abundance data gathered during three breeding seasons (2006-2008) on a random sample of plots across McGregor Range and Fort McCoy, bird measures based on texture measures (or landscape indices) will be predicted. Those predictions then will be compared with texture measures derived from current high-resolution (e.g., IKONOS) and medium-resolution (e.g., ASTER) satellite sensors to determine the reliability and accuracy of bird richness values from the two sources of image texture. The final step will be to create fine-scale, landscape-level maps of migratory bird presence and abundance across both study areas. Cartographic techniques will be used to depict spatial patterns as well as the certainty of these estimates.

Photo by Robert Benson, Texas A&M University-Corpus Christi.

The Loggerhead Shrike, which breeds in habitats found on McGregor Range at Fort Bliss, is one of the few North American passerines whose populations have declined continent-wide in recent decades.

Expected Benefits:

This project will develop a protocol that makes use of recently available, high-resolution, remotely sensed data and identifies the image correlation of environmental features that predict bird presence and abundance. Should these image texture measures yield accurate forecasts of migratory bird distribution and abundance, implementation of this protocol would save installations much of the time and money currently devoted to such efforts. Such a protocol could be easily modified and applied to other habitats with minimal investment. Additional products include bird species lists, bird species distributions, and spatially explicit bird abundance. (Anticipated Project Completion - 2010)

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