Habitat Connectivity for Multiple Rare, Threatened and Endangered Species On and Around Military Installations

Sustainable Infrastructure
SI-1471

Background:

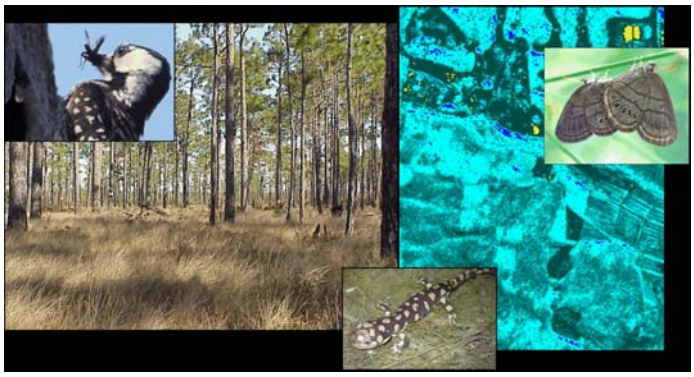
Habitat fragmentation and land development outside military installations has serious impacts on training goals and on the conservation of threatened and endangered species (TES) found on installations. The military has adopted the strategy of obtaining conservation easements on undeveloped lands adjacent to installations with critical TES management needs. However, the conservation value of such lands depends on how well target species disperse through them and the degree to which these lands protect habitat and promote habitat connectivity for other rare species of management concern. By identifying those land parcels adjacent to installations that best maintain the habitat connectivity for multiple TES, Department of Defense (DoD) land managers can reduce local extirpation of isolated populations, increase the utility of the dollars they spend on such land acquisitions, and resolve the overall management problems caused by habitat fragmentation.

Objective:

The objective of this project is to develop methods that integrate landscape and animal behavioral approaches to identify lands on and around DoD installations that provide high connectivity value for suites of rare, threatened, and endangered species. This project also seeks to determine whether conservation of the red-cockaded woodpecker (RCW) protects habitat connectivity for other species of management concern in the same geographic region.

Process/Technology Description:

This project relies on spatial integration of the following data sets: (1) environmental data derived in the field at specific sites and extended over the study area using remote sensing models and analysis of light detection and ranging (LiDAR) data; (2) animal movement data in dominant habitat types collected using in situ observation, experimental release studies, and radio telemetry; and (3) data on actual dispersal events determined from mark-recapture and radio telemetry. Movement data will be collected for four study organisms-RCW, St. Francis' satyr (butterfly), eastern tiger salamander, and Carolina gopher frog. The three data sets will be combined to model animal dispersal using simple analytical models and computer simulation models that incorporate data on habitat-specific movement behavior of animals with a spatially explicit representation of the landscape. Software will be developed that uses parameters derived from the dispersal models to estimate and map dispersal resistance over the landscape. A graph-theoretic approach will be used to quantify and map habitat connectivity for all land units and to evaluate the changes in connectivity resulting from the change in management of any parcel of land.



This project will combine species movement data, environmental data, and dispersal models to quantify and map dispersal resistance and habitat connectivity. Three of the four study species are shown here. The red-cockaded woodpecker is a long-leaf pine woodland specialist. The eastern tiger salamander uses ephemeral pools to breed, but disperses seasonally to upland forests.
St. Francis' satyr (butterfly) is endemic to wetland meadows on Fort Bragg, North Carolina.

Expected Benefits:

This project will help DoD land managers quantify and rank the value of land adjacent to installations in preserving habitat connectivity for one or more at-risk animal species. By integrating behavioral data on animals and spatial data on landscape characteristics, this project also will produce methods for assessing the consequences of different land management decisions on habitat connectivity. Finally, this project will improve knowledge on the habitat dependence of animal dispersal as well as the effectiveness of the umbrella species concept as applied to habitat connectivity. (Anticipated Project Completion - 2011)

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