LANDFIRE Product Application Summary

Modeling Vegetation Dynamics and Habitat Availability in the Southeastern U.S.

Citation

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Application Location: Coastal Plain from Virginia to Florida. Point: 33 38 40.23 N 79 32 30.24 W [Near Williamsburg, SC]

Objectives

- Project the effects of climate change on vegetation dynamics
- Use the projected vegetation dynamics to model potential future habitat distribution for avian species

Project description

We used LANDFIRE VDDT models as the starting point for our vegetation dynamics models. We modified those models to incorporate contemporary fire probabilities, the potential future influence of climate change on fire probabilities, and added models to represent urban, agricultural, and managed forest lands.

For two climate change scenarios (B1 and A2), we modeled vegetation and land use dynamics through time through 2100, and used those projections to calculate habitat availability through for five avian species: Brown-headed Nuthatch, Cerulean Warbler, Northern Bobwhite, Bachman's Sparrow, and Red-cockaded Woodpecker. For vegetation and land use modeling, we used the spatially-explicit landscape simulation model TELSA. The inputs to TELSA were state-and-transition models that we modified from LANDFIRE VDDT models. The results were spatially-explicit projections of land cover type, vegetation structure (for example, open or closed canopy), vegetation stage (early, mid- or late-succession), and age for each polygon across our landscape. We then mapped the presence or absence of each avian species in each polygon based on known associations between each species and land cover type, vegetation structure, stage, and age. The result was a look at the potential change in habitat availability for each species over time. Available habitat for some species such as the Northern Bobwhite, declined, while other species, including the Brown-headed Nuthatch, saw increases in habitat.

We chose LANDFIRE data for this project because a database of VDDT models already existed for every vegetation type in our landscape. Therefore, we already had a good starting point for our work and could easily modify the models and add to them. If those models had not existed, we probably would have used LANDIS or some other raster-based simulation tool.

LANDFIRE products used
VDDT models

Value of the work to the natural resource management/conservation community

This work is valuable because we produced wall-to-wall spatially-explicit projections of vegetation and land use dynamics through time in response to multiple climate change scenarios.

Resource managers and conservation organizations are increasingly challenged to predict and respond to the potential effects of a changing climate and a changing landscape. Therefore, information about how these changes could affect vegetation and habitat is important. By modeling the effects of climate change on habitat, our work develops and implements tools for landscape-level strategic habitat conservation planning in the Southeast.

Online resource: http://www.basic.ncsu.edu/segap/

Longleaf pine in the Croatan National Forest, NC – Credit: Jen Costanza