

September 30, 2015

Final Report

Project Title

Assessment of Landscape Changes in the North Atlantic Landscape Conservation Cooperative: Decision-Support Tools for Conservation (**Phase 2**)

Project Sponsor: US Fish and Wildlife Service, Region 5

Principal Investigator:

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Project Scope and Objectives

The specific objectives of this scope of work are as follows:

1. Extend the geographic scope of the LCAD model developed in phase 1 to the extent of the USFWS/NEAFWA Northeast Region (13 states + D.C.).
2. Develop climate-habitat capability models for an additional suite of representative species.
3. Develop the landscape design and decision-support portion of the LCAD model; specifically, to prioritize conservation actions for land protection, management and restoration.
4. Modify the succession model to incorporate spatial variability within ecological systems and multivariate trajectories in vegetation growth.

Accomplishments

As you are aware, my team has worked diligently since the onset of this project to meet the expectations outlined in the project scope of work. However, developing a model of this complexity comes with all sorts of unknown and unforeseen conceptual and technical challenges. My team is committed to delivering products that are credible and the very best that they can be given available data. This required us to redevelop several components of the LCAD model to meet these credibility standard as we expanded the model to the Northeast extent as part of phase 2. More importantly, none of this extra effort was forecast in the original phase 2 scope of work and associated timeline and budget. In particular, the ecological systems map (ESM) required numerous algorithmic "fixes" to address various problems that we encountered as we expanded the geographic scope of the work and encountered new and different landscape contexts and as we attempted to combine the original TNC ESM map with newer and better sources of data for certain systems (e.g., NWI and NHD). Second, the urban growth model met with numerous technical challenges that required considerable extra effort to resolve. Lastly, the Connecticut River Landscape Conservation Design (CTR LCD) pilot project consumed a great deal of my team's time that far exceeded what we originally had planned on for this component of the work. This extra effort resulted in part from the unknown and unforeseen expectations of the core team that required additional algorithm development and additional analyses.

Please note that all of the extra effort to ensure credibility of the LCAD model and meet the expectations of our partners in the CTR LCD pilot was both appropriate and necessary. A project of this scope and complexity simply can't foresee all of the unknown conceptual and technical challenges that might arise to meet everyone's expectations, despite what is described in the initial scope of work.

Consequently, we have not yet fully accomplished the original set of tasks associated with Phase 2 of this project (see below), although all of these tasks will be completed before the end of Phase 3. Nevertheless, due to the considerable extra effort to address the unforeseen challenges and meet the ongoing needs of our partners, we contend that our obligations under Phase 2 have been met.

Here is description of accomplishments for each of the designated objectives:

- 1) *Extend the geographic scope of the LCAD model to the extent of the USFWS/NEAFWA Northeast Region (13 states + D.C.).* As part of the expansion of the LCAD model to the Northeast, we completed a major update of the urban growth model, which was deemed necessary to realistically model urban growth across the Northeast, and revised the generic vegetation disturbance model. We are now poised to run the complete landscape change model and conduct the ecological assessment of the future landscape conditions. In addition, we have continued to improved our computing software to accommodate running the LCAD model on our computer cluster at the regional extent. I anticipate completion of the landscape change simulations and the corresponding ecological assessments and accompanying documentation by December 31, 2015.
- 2) *Develop climate-habitat capability models for an additional suite of representative species.* We completed development of 22 of 30 species models. The remaining 8 species models are in various stages of development from being validated to having the conceptual model designed but not implemented or tested. I anticipate completion of the species' modeling and accompanying documentation by December 31, 2015.
- 3) *Develop the landscape design and decision-support portion of the LCAD model; specifically, to prioritize conservation actions for land protection, management and restoration.* We completed the development of the landscape design portion of the LCAD model and worked closely with the CRT LCD partners to complete the pilot project and all associated documentation.
- 4) *Modify the succession model to incorporate spatial variability within ecological systems and multivariate trajectories in vegetation growth.* We completed the revisions of the succession model to incorporate spatial variability in the environment and, as noted above, are poised to include the revised succession model in the landscape change simulations in connection with #1 above.