Boreal Ecosystem Recovery & Assessment
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Wildlife Team: LIDAR Improves Understanding of Habitat Selection by Birds

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Project Summary
The 3D structure of forests influences the abundance, distribution, and behavior of birds. However, species distribution models (SDM's) often rely on Forest Resource Inventories (FRI's) and land-cover maps for habitat attributes. While useful, FRI's lack detailed information on vertical structure. By measuring the 3D distribution of structure, LiDAR could dramatically increase the predictive accuracy of avian SDMs. To adequately conserve listed species like the Canada Warbler (*Cardellina canadensis*), wildlife managers need to understand the stand-level habitat conditions contributing to species declines.

We evaluated the suitability of LiDAR-derived predictor variables for modeling species-habitat relationships in a boreal forest. Objectives were to (1) use LiDAR to improve distribution models of the Canada Warbler and identify the specific structural conditions associated with their presence; (2) compare LiDAR metrics summarized at various spatial scales for modeling the abundance of songbirds grouped by nesting guild; and (3) evaluate the usefulness of LiDAR metrics against those derived from FRIs and land cover maps for modeling bird distributions. This research is currently in progress, but preliminary results suggest that models using LiDAR derived metrics for canopy height, canopy heterogeneity, and shrub density, perform considerably better than those using FRI predictors alone.

Management Implications and Lessons Learned
Results will help guide forest management by better identifying the specific structural conditions associated with the presence of managed species. It may also help improve the accuracy of bird models overall. Supplementing FRI data with LiDAR can improve the accuracy of SDM's while avoiding the costs of boots-on-the-ground vegetation surveys—particularly for birds most associated with complex forest shrub layers.

Publication(s)
A thesis is ongoing. A first publication of this work is in preparation and is anticipated by Fall 2020.