Modeling and Prediction of Tree Height–Diameter Relationships Using Spatial Autoregressive Models
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Three spatial autoregressive models were compared to ordinary least squares (OLS) to model the tree height–diameter relationship, including spatial lag model (SLM), spatial error model (SEM), and spatial Durbin model (SDM). Five spatial weight matrices were used to evaluate the impacts of different weighting schemes on model fitting. The variogram or geostatistical weight matrix was superior to other spatial weight matrices. Further, the spatial autoregressive models were used to predict tree heights at unsampled locations. The three spatial autoregressive models outperformed the OLS model in model fitting, model predictions, and reducing spatial dependence. Regarding performance, SDM was superior in each aspect of model fitting and prediction. In terms of model complexity, SEM with a geostatistical weight matrix is a better choice than SDM because SEM offers the model coefficient estimates close to those of the OLS model, which makes the interpretation and understanding of the model much easier.

Deep Planting Has No Short- or Long-Term Effect on the Survival and Growth of White Spruce, Black Spruce, and Jack Pine
Alain Paquette, Jean-Pierre Girard, and Denis Walsh
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Although boreal tree species are planted by the hundreds of millions every year, information regarding the importance of planting depth is largely anecdotal or based on short-term studies. Most guidelines recommend that conifer seedlings be planted to the root collar. The present study reports on the short- (1 year) and long-term (15- to 19-year) survival, height growth, and diameter growth of black spruce, white spruce, and jack pine in three large, replicated experiments in eastern and northern Quebec. Four different depth treatments were compared, from manual planting at the root collar to mechanical planting at 10 cm or more. All three species showed no statistically detectable negative effect of deep planting. This result can be attributed in part to an almost perfect control of frost heaving in the deepest two planting treatments.

Snags and Cavity-Nesting Birds within Intensively Managed Pine Stands in Eastern North Carolina, USA
Jessica A. Homyack, Barton J. Paxton, Michael D. Wilson, and Darren A. Miller
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Although snags may be a limiting factor for cavity-nesting birds within intensively managed pine (Pinus spp.) stands, there is little information regarding occurrences of snags and cavity-nesting birds for such stands in the southeastern United States. During 2002–2003, the authors measured characteristics of individual snags and quantified the relative abundance of cavity-nesting birds in intensively managed pine stands in eastern North Carolina. Snag populations were dynamic, with 649 snags falling and 75 new snags recruited between years. Neither density of snags nor relative abundance of cavity-nesting birds differed strongly among thinning classes. Low recruitment coupled with the high loss rates could lead to low snag densities in older managed stands. Therefore, forest managers should consider retaining large-diameter dead or live trees to increase or maintain snags in managed stands.

A Modeling Approach to Estimating Skidding Costs of Individual Trees for Thinning Operations
Marco A. Contreras and Woodam Chung
now appearing in the Western Journal of Applied Forestry, July 2011

Traditionally, thinning prescriptions are derived from sample plots and applied to stands with various vegetation conditions. A few studies have optimized cut-tree selection to create site-specific thinning prescriptions. However, these studies greatly simplify the estimation of harvesting costs by ignoring the location of the cut trees relative to the extraction point. We developed a model to estimate the skidding costs of individual cut trees based on size, location, and spatial distribution. We applied the model to a treatment unit, where LiDAR data was used to obtain terrain and tree data. Comparison of the model results with those obtained from the existing cost models indicates that our model results are within the reasonable range for skidding costs. The model can also be used to automatically generate optimal skid-trail networks connecting multiple log piles to the exit point.