

# **SIMULATING REHABILITATION TREATMENTS IN NORTHERN HARDWOOD STANDS FOLLOWING DIAMETER-LIMIT CUTTING**

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Exploitive cutting practices, such as high-grading and diameter-limit cutting, are common throughout the Northeast. The primary focus of such practices is timber extraction. Unlike silvicultural treatments, they do not attempt to deliberately regenerate or tend residual trees. These practices are popular because, by removing the largest and most valuable trees, landowners and/or loggers generate immediate and relatively high financial returns. However, studies have shown that the benefits of repeated diameter-limit cutting are limited to the initial harvests. Short-term benefits are offset by long-term ecological and economical costs. Adverse effects may include residual stands with poor quality and low vigor trees, less commercially valuable species, and variable stocking and crown cover. Although the negative effects of diameter-limit cutting have been documented, research addressing rehabilitation options is scant.

The purpose of this study is to identify silvicultural strategies for managing northern hardwood stands, with a focus on overstory dynamics, following diameter-limit cuttings. Data were obtained from well-stocked, even-aged northern hardwood stands in Maine. Exploitive and silvicultural treatments were simulated over a 50-year period using a USDA Forest Service growth and yield model (NE-TWIGS variant of the Forest Vegetation Simulator). Six scenarios were explored including moderate and intensive rehabilitation treatments as well as no treatments, followed by one and two 12-inch diameter-limit cuttings. Moderate and intensive treatments differed in terms of the amount of basal area retained in each stand following rehabilitation treatments. Stand data were evaluated using the Stand Product Optimization Tool which attempts to determine an optimal mix of products for a stand based on user-provided merchantability standards, product values and sampling data (McConville and Svitak 2004). Species composition, merchantable volume by product class, and net present value were evaluated and compared across scenarios and between stands. Net growth will also be evaluated.

Preliminary results suggest that intensive rehabilitation treatments were most successful in improving species composition compared to moderate rehabilitation treatments and no treatments. Net present values were also generally highest for the intensive treatments and lowest for no treatments, when evaluated at the end of the 50-year modeling period. Moderate rehabilitation treatments were typically constrained by the species composition and density.

## **Literature Cited**

McConville, Daniel J.; Svitak, Joseph T. 2004. Cooperative Forestry Research Unit. University of Maine, Orono. Unpublished report.