# DYNAMICS OF TREE GROWTH AND COMPOSITION FOLLOWING PARTIAL CUTTING IN AN OAK – PINE FOREST IN MAINE

**Laura S. Kenefic[1], Susan P. Elias[2], Alan J. Kimball[3], and Jack W. Witham[2]**

[1]USDA Forest Service, Northeastern Research Station, 686 Government Road, Bradley, ME 04411
lkenefic@fs.fed.us

[2]University of Maine, Holt Research Forest, Arrowsic, ME

[3]University of Maine, Department of Forest Management, Orono, ME

The Holt Research Forest in Maine is an early 1900s origin even-aged second-growth forest. Common tree species include eastern white pine, red maple, and red oak in mixture with other softwoods and hardwoods. In 1987 ten 1-ha blocks on the forest were partially harvested to initiate a long-term study of ecosystem response to silvicultural treatment. Since that time, data from treated blocks and untreated controls have been used to assess changes in stand structure (density and volume), species composition, growth, mortality, and snag dynamics.

Objectives of the treatment were to increase structural diversity, regenerate a new cohort, and improve stand quality, growth, and composition. White pine and red oak were favored, as were good form yellow and paper birch, red spruce, and eastern hemlock. Grey birch, mature balsam fir, poor vigor red spruce, and trees > 50 cm dbh (primarily white pine "wolf" trees) were removed. These objectives, and the low-impact partial harvesting applied, are consistent with the objectives and forest management preferences of small landowners in the region.

There were no pre-treatment structural or compositional differences between harvest and control blocks (for species > 5% of BA). Inventory data collected post-treatment indicated fewer trees and less volume in the harvest blocks, as would be expected. Total stem density no longer differed between treatments nine years after harvest, apparently due to the combined effects of higher ingrowth in the harvest blocks and higher mortality in the control. Volume remained lower in the harvest than control blocks. Species composition did not differ between treatments, either immediately or one decade after harvest, despite attempts to improve composition. Net growth was also not differentiated by treatment, with the exception of higher medium-large sawtimber growth in the control due to greater stocking in those classes.

Post-harvest inventory revealed that the harvest blocks had fewer snags, despite no pre-harvest difference in snag density between treatment areas. Though the number of snags increased in both the harvest and control blocks over the next decade, greater snag recruitment (a function of mortality) occurred in the control. Partial cutting thus decreased both the number of snags in the residual stand and the rate of snag formation, resulting in increasing between-treatment differences in snag density over time.