

FORTY YEARS OF PARTIAL HARVESTING IN MIXED NORTHERN CONIFERS IN MAINE: RESULTS FROM THE PENOBSCOT EXPERIMENTAL FOREST

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A long-term experiment on the Penobscot Experimental Forest in east-central Maine was designed to provide information on the best silvicultural practices for managing stands of mixed northern conifers. We evaluated growth and yield and changes in species composition, quality, and structure during the first 40 years of the experiment (Sendak et al. 2003). Replicated treatments include the selection system, uniform shelterwood, unregulated harvesting, and diameter-limit cutting. We examined results of partial harvests: selection treatments at 5- (S05), 10- (S10), and 20-yr (S20) cutting cycles and fixed (FDL) and modified (MDL) diameter-limit cutting on a 20-year harvest interval.

The selection stands were managed under the *BDq* method, where *B* is residual basal area, *D* is maximum residual DBH, and *q* defines the number of trees in each diameter class. The selection stands had species composition targets and received timber stand improvement. Under FDL, all merchantable trees of desirable species exceeding the diameter limits were removed. Under MDL, trees above more conservative specified limits were sometimes left as a seed source and for wind protection, and high-risk trees of desirable species below the specified limits were harvested to capture mortality. Undesirable species, culls, and all or most desirable trees below minimum diameter limits were retained in both diameter-limit treatments.

Between-treatment differences in net and gross volume growth and treatment yields were not statistically significant, nor were net and gross volume growth for the selection versus diameter-limit cutting. For all treatments, mean annual net growth was 37.2 ft³/ac and mean volume harvested was 2,454 ft³/ac. The spruce component increased as a percentage of basal area over the 40-yr period in the selection compartments and MDL but decreased in FDL. Fir increased in FDL, remained about the same in S05 and S20, and decreased in S10 and MDL. Hemlock decreased in S20 and FDL, increased in S05 and MDL, and was unchanged in S10. Growth and regeneration of hemlock is encouraged by relatively light partial harvests and where hemlock stocking was initially high, such as in S05. Hardwoods decreased in S05, remained about the same in S10 and MDL, and increased in S20 and FDL. Volume in cull trees, used as a measure of stand quality, decreased in the selection treatments to about 1 percent of total volume but increased in MDL and FDL to about 12-13 percent of volume.

Literature Cited

Sendak, P.E.; Brissette, J.C.; Frank, R.M. 2003. **Silviculture affects composition, growth, and yield in mixed northern conifers: 40-year results from the Penobscot Experimental Forest.** Canadian Journal of Forest Research. 33: 2116-2128.