

INFLUENCE OF SILVICULTURAL INTENSITY AND COMPOSITIONAL OBJECTIVES ON THE PRODUCTIVITY OF REGENERATING FOREST STANDS IN MAINE

**Robert G. Wagner¹, Mike R. Saunders¹, Keith Kanoti¹, John C. Brissette²,
and Richard J. Dionne²**

¹University of Maine, Department of Forest Ecosystem Science, 5755 Nutting Hall, Orono, ME 04469
bob_wagner@umenfa.maine.edu

²USDA Forest Service, Northeastern Research Station, Durham, NH

Millions of acres of northern Maine's Acadian forest are in a relatively young condition following clearcut harvesting. Although natural hardwood and softwood regeneration can be abundant, the species composition of this regeneration is often not what landowner's desire. Tremendous opportunity exists to improve the composition, quality, and growth rates of these stands while they are in an early successional stage. Many landowners question whether it is better to start over, or to work with what is there and make the best of it?

The intensity of silvicultural treatments and compositional objectives set by forest managers largely determine the long-term outcome of stand development. Silvicultural intensity is determined by the degree of investment in vegetation management, artificial regeneration, and thinning. Compositional objectives determine whether particular species of conifers, hardwoods, or a mixture of conifer and hardwood species are desired in the final stand.

In 2004, we established a long-term study on the Penobscot Experimental Forest near Bradley, Maine that seeks to: (1) quantify the growth and development of early successional stands to varying intensities of silvicultural intervention and compositional objectives, (2) document ecophysiological mechanisms affecting the dynamics and productivity of young forest stands, and (3) compare the energy requirements and financial returns associated with early intervention in young stands.

The study site is an 8-yr-old naturally regenerated stand of aspen and red maple with an understory of balsam fir and red spruce. A 3 x 3 factorial design plus an untreated control (10 treatments) is being used. The treatments include three levels of silvicultural intensity (low, medium, high) and three compositional objectives (conifer, mixedwood, hardwood). Levels of silvicultural intensity are defined by the degree of control over (1) species colonization (tree planting), (2) relative species performance (control of competing vegetation), and (3) spacing among desired trees (thinning). A stratified, random experimental design with 4 replications is being used. Treatment plots are 30 m x 30 m (0.09 ha) in size and include a nested 20 m x 20 m (0.04 ha) measurement plot. Tree species planted in the medium and high intensity treatments include improved white spruce and four clones of hybrid poplar (D51, DN10, DN71, and NM4).

All crop trees (natural and planted) were selected or planted in summer 2004. The initial height, diameter, crown length and radius, and health condition of all trees also were measured. The amount of energy input from human labor, petroleum, and herbicides needed to establish the 10 treatments also were recorded.