

Natural Regeneration With Shelterwood Silviculture in the Acadian Forest Region

J.C. Brissette¹, D.E. Swift²

¹USDA Forest Service, Northeastern Research Station
PO Box 640, Durham, NH 03824, U.S.A.

²Natural Resources Canada, Canadian Forest Service, Atlantic Forestry Centre
P.O. Box 4000, Fredericton, NB E3B 5P7, CANADA

Two variants of uniform shelterwood are in a long-term study in Maine at the Penobscot Experimental Forest (PEF), which is in the southern part of the Acadian Forest Region. The experiment was established in the mid-1950s with replicates of two-stage shelterwood, in which the overstory was removed in two harvests 10 years apart; and three-stage shelterwood with overstory removed over a 17-year period. About the same time, four variants of shelterwood were established at the Acadia Research Forest (ARF) in New Brunswick, about central in the Acadian Forest Region. The four variants were: 3-stage uniform (similar to PEF), 4-stage uniform, 4-stage strip, and 4-stage group.

The first cuts in the shelterwood sequences were the disturbances that defined the beginning of stand initiation. The shelterwood harvests released advance regeneration and established a new cohort of seedlings. In both studies, regeneration was prolific and dominated by balsam fir and spruce seedlings. At the PEF, the number of fir and spruce seedlings ($15 < ht < 30$ cm) ranged from 2,750 to 10,500 per ha, with fir-to-spruce ratios between 6:1 and 27:1. Second- and third-stage harvesting operations destroyed < 50% of the seedlings and saplings in the PEF study. Seedlings continued to be present for up to 35 years after the first shelterwood harvests. Results from the PEF indicate that site characteristics, initial stand attributes, and treatment prescription all affect stand

initiation and development. Site factors and/or previous stand composition largely determined total seedling density and species composition of the regenerating cohort.

Results of the ARF study support those from the PEF. Natural succession had more influence on species composition than did the various treatments. However, in the ARF study, spruce was generally more abundant than at the PEF, with 40 % of the stand composition 20 to 30 years after the final harvest in all except one treatment block. At both locations, precommercial thinning that favored spruce reduced the number that were suppressed by the initially faster growing balsam fir. However, at the PEF, the rate of mortality has been markedly higher for balsam fir than for spruce, so the necessity of favoring spruce with early treatments is not clear yet.

These experiments clearly show that shelterwood silviculture is effective for regenerating desired conifers in the Acadian Forest. The various shelterwood regimes did not have much effect on stand initiation; the impact of treatment was more evident on later stages of stand development. By comparing the results of these two independent long-term studies, forest managers throughout the region can have confidence in the shelterwood silvicultural system to successfully regenerate eastern spruce - balsam fir stands.