



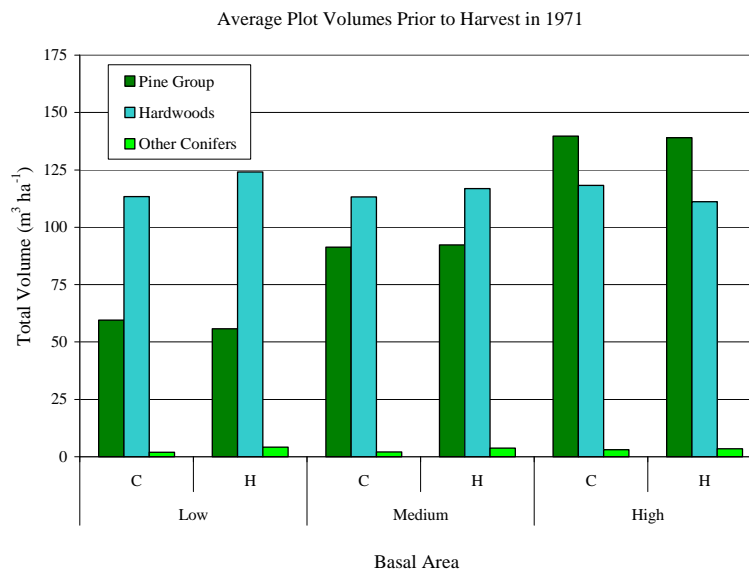
### Release of Mid-rotation Pine in Pine-Mixedwoods Significantly Accelerates Growth

#### The Aim

The main objective of this field study was to increase growth, yield and quality of white pine (*Pinus strobus*) in two-storied, pine-mixedwood stands. Mixed stands of eastern white pine with a minor component of red pine (*Pinus resinosa*) and white spruce (*Picea glauca*) and a significant component of intolerant hardwoods, such as trembling aspen (*Populus tremuloides*), largetooth aspen (*P. grandidentata*), and white birch (*Betula papyrifera*) have developed throughout the commercial range of white pine in Canada. White pine trees that develop under the partial shade of intolerant hardwoods are typically of better quality because they are protected from attack by the white pine weevil (*Pissodes strobi*), which feed on and kill terminal shoots in open-grown conditions and can cause major deformities. Pine is the most economical component of these stands.

#### The Approach

The 110 ha study site is within the Petawawa Research Forest near Chalk River, Ontario. In 1971, the 80-year-old overstorey consisted of white birch (23.4%), aspen (29.4%), and scattered large white and red pine and white spruce up to 90 years old. Prior to harvest, total stand volume averaged 210 m<sup>3</sup> ha<sup>-1</sup>. After a preliminary survey, 30 permanent sample plots were distributed throughout the study area to represent three levels of initial pine group basal area (Low, 7, Medium, 11.5 and High, 16 m<sup>2</sup> ha<sup>-1</sup>). Half of each of the 10 plots representing the three residual basal area densities were harvested (H) and half were left as controls (C).



# TREE TIPS



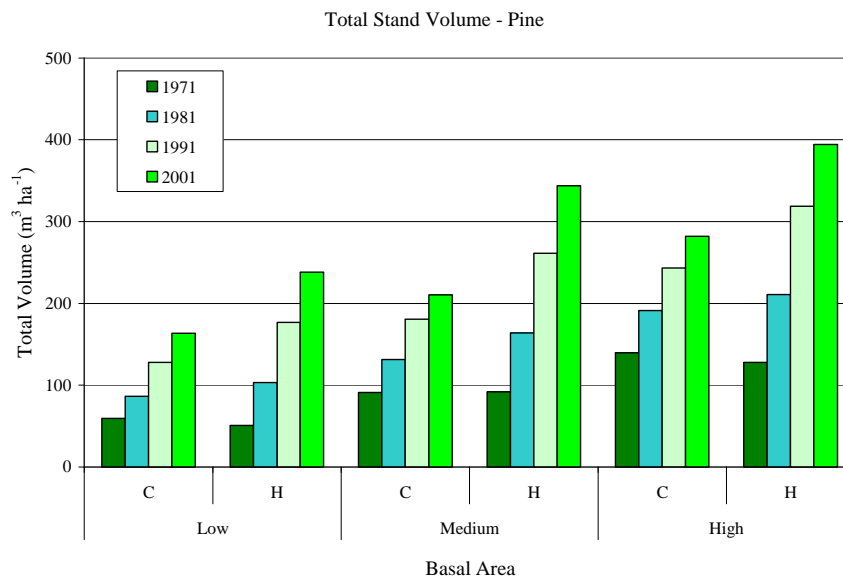
## RESEARCH SUMMARIES

Understorey conifers in the two-storied pine mixedwood stand were released by partial harvesting in 1971. The harvesting consisted of cutting all species of merchantable size (9 cm diameter at breast height (DBH) and larger) except healthy pine and spruce. The harvest operation was done using chainsaws and wheeled skidders. The released understorey was primarily white pine averaging 55 years of age with a lesser component of red pine and white spruce, and a few jack pine (*Pinus banksiana* Lamb.), balsam fir (*Abies balsamea* (L.) Mill.), eastern white cedar (*Thuja occidentalis* L.) and tolerant hardwoods.

Diameters of all trees greater than 9.1 cm DBH were measured on all plots in 1971, 1981, 1991, and 2001. Tree mortality was also recorded during each measurement. In 2001, total merchantable and sawlog volumes were calculated.

### The Tree Tip

Release cutting essentially doubled the pine growth rate and accelerated the overall rate of stand development by removing and using the shorter-lived, aspen/birch overstorey. The logging had been well planned and supervised, and this contributed to its overall success. The release provided a commercial harvest of hardwood pulp and reduced hardwood competition, and significantly increased the growth of the white pine group. At higher initial pine densities, the volume growth was greater during the 30-year period after harvest. After 30 years, the highest basal area plots have about the same total volume, but the harvested plots contributed to a pulpwood harvest earlier, and they now have a greater volume of standing pine.



# TREE TIPS

Aspen's competitive pressures on white pine growth and survival were significant and demonstrated by the decrease of height-diameter ratios of white pine after release. This signifies that tree stability and growth were influenced by release resulting in more economically valuable white pine. In addition, many of the intolerant hardwoods (aspen) that would have been lost to natural mortality over the last 30 years were salvaged and utilized. In this study all aspen of merchantable size were removed, but in practice a few aspen and birch could be left to provide wildlife habitat and coarse woody debris.

When white pine does occur in the understorey in conditions such as those described here, its release is recommended. Regeneration of pine on this site is now inadequate. Without further management activities or wildfire, the study area will probably return to a higher proportion of the lower-valued hardwoods. White pine is a fire-adapted species and with the successful fire suppression programs today, a variety of silvicultural approaches are required to preserve, enhance or in some cases re-establish white pine and pine-mixedwood forests.



Photo 1. Released pine in a high basal area plot as it appears today.

## Further Reading:

Brace, L.G., Stewart, D.J. 1974. Careful thinning can preserve amenities and increase yield. *Pulp Pap. Mag. Can.* 1-7.

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