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CWFC Facts 002

Canadian Wood Fibre Centre

Fibre Facts

Green River Precommercial Thinning Research

Natural Resources Canada is continuing to measure, monitor, and maintain the oldest established precommercial thinning trials in eastern North America, located at Green River, N.B. Forest managers are using the information from these trials to enhance sustainable forest management. Natural Resources Canada's Canadian Wood Fibre Centre and FP Innovations are also using the area to determine the effects of PCT on long-term wood supply, forest economics, fibre quality and quantity and natural forest succession resulting from this silviculture treatment.

Precommercial Thinning—Approximately 2 million hectares of young forests have been precommercially thinned (PCT) in eastern Canada over the past 15 years; thinning continues at a rate approaching 200 000 ha annually. The objectives of PCT can include: controlling stand composition, improving stand vigor and health, reducing time to merchantability, increasing product yield per tree, and decreasing harvesting and processing costs. These PCT stands increasingly contribute to our wood supply, thus forest managers need long-term growth and yield data to accurately forecast average tree size and volume per hectare to refine allowable harvest levels.

The Green River PCT Trials: 1959–1961—The Green River PCT trials were established by Dr. Gordon Baskerville in 1959–1961 to study the long-term growth and developmental response of balsam fir (*Abies balsamea* (L) Mill.) and red spruce (*Picea rubens* Sarg.) to PCT. The site has been carefully protected and remains relatively undisturbed for the benefit of the forestry sector thanks to a collaborative effort over many years between Nexfor Fraser Papers Inc. , Acadian Timber, the New Brunswick Department of Natural Resources, and Natural Resources Canada – Canadian Forest Service. The Green River PCT trials are particularly valuable because they are near rotation age and were established using typical operational thinning intensities and intervention times that are still used today.

Recent PCT Results—In 2004, Almost 45 years after these trials were established, Doug Pitt and Len Lanteigne of Natural Resources Canada's Canadian Wood Fibre Centre conducted a full measurement of the study's 48 permanent sample plots. The empirical data from these long-term PCT trials are invaluable to forest managers in supporting and enhancing their silvicultural applications. Three nominal spacings of 4 ft (1.2 m), 6 ft (1.8 m), and 8 ft (2.4 m) were compared with an unthinned control in a randomized complete block design with five replicates. At the time of thinning, natural regeneration averaged 16 years of age, 8 years after harvest. Although thinning had minimal effect on gross total volume production over a 42- to 44-year observation period, actual spacings between 2.1 and 2.5 m produced an average of 360 m^3 ha^{-1} gross merchantable volume (GMV), representing a

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21% gain over unthinned stands. The same spacings produced quadratic mean diameters of 21 and 23 cm, respectively, compared with 18 cm in the unthinned stands. These size increases translated to individual stem volume gains of 33% and 62%, significantly reducing the age at which thinned stands would meet a specified minimum requirement for merchantability or habitat. The mean annual increment of GMV ranged from 6 m^3 ha^{-1} $year^{-1}$ in unthinned stands, to more than 7 m^3 ha^{-1} $year^{-1}$ in the thinned stands, and had not yet culminated an average of 50 years following harvest.

Future research plans: Conduct economic optimization through the full forest value chain— The literature holds plenty of theories about the effects of thinning on wood properties and qualities, but relatively few studies offer comprehensive empirical data and none have addressed the effects of PCT on the full fibre supply and value chain. This 2-year study will determine the direct impact of PCT on specific fibre properties, such as fibre length and wall dimensions, as well as density and other wood-quality attributes that directly affect product quality and performance.

With stand ages currently averaging 60 years, harvesting is re-commended to prevent imminent age-related volume losses on these plots. As such, the Green River PCT trials represent a unique opportunity to study, at full rotation, the effects of PCT on end-point fibre quality and product values. Half of the PCT study (three blocks)will be clearcut harvested. On these blocks, Natural Resouces Canada's Canadian Wood Fibre Centre will employ an integrated, multidisciplinary approach that will, over the 2-year duration of this project, provide the data necessary to conduct long-term PCT treatment comparisons of:

- growth and yield
- harvesting productivity
- decay and associated losses
- solid wood product quality and value, and
- fibre quality and paper.

This study will include the partnership of FPInnovations, Acadian Timber, Canadian Ecology Centre Forestry Research Parternership, Fraser Paper Inc. and New Brunswick's Department of Natural Resources.

The remaining half of the study (three blocks) will be left undisturbed to monitor long-term succession. On the harvested blocks, the same suite of treatments will be re-established to verify the long-term sustainability of the PCT treatments. The combination of harvest and leave blocks will continue the long-term legacy of the Green River PCT Research Trial, providing a link to the "Long-term Research Installations" initiative.

Long-term Outcomes of PCT—Researchers are also using the area at Green River, N.B. to determine the effects of PCT on long-term wood supply, forest economics, climate change, fibre quality, pulp quality, wood decay, biodiversity, and succession. As forest managers and researchers continue to use the information gathered at Green River in a variety of ways, this study underscores the importance and value of long-term research in our forests.

Reference

Pitt, D.G., and Lanteigne, L.J. 2008. Long-term outcome of precommercial thinning in northwestern New Brunswick: growth and yield of balsam fir and red spruce. *Canadian Journal of Forest Research* **38**:592–610. doi:10.1139/X07-132.

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