



CWFC Facts 018

Canadian Wood Fibre Centre

Fibre Facts

Sustainable Forest Biomass Harvesting within the Great Lakes–St. Lawrence Forest

The Sustainable Forest Biomass Harvesting research project is a set of harvesting trials being conducted in cooperation between researchers from Natural Resources Canada's Canadian Wood Fibre Centre and Ontario's Ministry of Natural Resources and Forestry with assistance from FPInnovations and the University of Toronto to better understand the potential of forest biomass as a source of raw material for new forest products. These trials seek to understand and resolve some of the environmental and economic questions associated with these new market opportunities. Researchers aim to rehabilitate second-growth forests using the increased proceeds from biomass harvests in Canada's Great Lakes–St. Lawrence forest region through the use of full-tree high-utilization biomass harvesting.

Canada's Great Lakes–St. Lawrence forest is a region of mixed wood forests with a long history of forestry and other human activities. Among these activities, fire suppression and failed attempts at forest renewal after harvesting have contributed to a decline in forest stand health and productivity. This decline has led to areas of the forest that are economically difficult to harvest and properly renew. On top of that, the forest economy is rapidly changing. Demand for traditional forest products such as pulp and paper is declining while technological advances in a variety of fields are opening new possibilities for the use of wood products. Natural Resources Canada's Canadian Wood Fibre Centre is working to better understand

the potential of forest biomass as a source of raw material for new forest products. Forest biomass includes less-desirable tree species and portions of trees that are not normally used in conventional forest products and are traditionally treated as waste.

Demand for emergent bio-products as well as renewable and clean sources of energy are leading to a market for the utilization of forest biomass. However, sustainable forest management practices must be maintained. Therefore, researchers are working to establish the operational feasibility of a harvesting strategy to provide forest biomass while allowing for the proper renewal of these lands into healthy, productive forests. This work will develop techniques that will improve the efficiency of forest biomass harvesting while maintaining its environmental sustainability.

Approach

The Sustainable Forest Biomass Harvesting research project includes harvesting trials at four sites across central and eastern Ontario where different forest management strategies and different forest types exist. At each location two harvesting methods were compared within the constraints of a shelterwood harvest prescription. The methods analyzed were the traditional Ontario practice of tree-length harvesting, where tree trunks are collected but tops and branches are left in the forest, and full-tree high-utilization biomass harvesting, where the entire tree is harvested before the trunk is separated from the parts of the tree bearing the biomass. Within each harvested area,



environmental, operational and economic data were collected. These methods are also being compared with unharvested areas within the same forests.

At each plot, ecological data were collected prior to and after each silvicultural activity. The data collected included the assessment of soils, saplings, seedlings, light and canopy openness, number of live and dead trees, coarse and fine woody debris, forest floor disturbance and vegetation regeneration. Results from these data will show if there are any immediate ecological response differences between the treatments. These data will continue to be collected on a 5-year basis in order to detect any long-term trends.

Benefits

Researchers are looking at the two harvesting methods in order to improve operational harvesting activities and to understand ecological differences. Intuitively, it seems that the traditional method, which involves a more selective approach focusing on the return of larger stems and leaving smaller pieces behind, should be more efficient. However, in-forest research on this project has determined that the biomass harvesting method of removing all smaller stems makes forestry operations more efficient by harvesting more wood volume traditionally passed over by harvest operators; therefore, generating more revenue. Similarly, the two harvesting treatments are proving to be ecologically comparable as well. The amount of small and large wood left behind in the forest is very alike and fall within Ontario's provincial guidelines. To this end, much of the data from this research are being shared with FPInnovations in order to augment its Biomass Opportunity and Supply model (BIOS), which helps companies optimize their harvesting operations.

The long-term observation of the forest will help to determine the effects of biomass harvesting in the Great Lakes–St. Lawrence forest since most biomass sustainability research in Canada has focused on the boreal ecosystem. This surveillance is important because of the proximity of the Great Lakes–St. Lawrence forest region to the densely populated core of central Canada and the transportation links that could provide the key to unlocking the potential for the use of biomass on an industrial scale.

Competition

Before the development of full-tree high-utilization biomass harvesting, the cost of renewing eastern Ontario's second-

generation forests would have to have been taken up by the provincial government or by forest tenure-holders. Biomass harvesting provides a revenue tool to help pay the costs of the silvicultural work to restore these forests and add value in the long run. In addition, biomass could be used regionally as an energy source in the near term, creating new employment and greening the regional economy. In the longer term, the existence of a biomass industry would enable the development of higher-value uses including the development of green feedstock for the chemical industry.

Why this matters

Many forests in Ontario's Great Lakes–St. Lawrence region have decreased in commercial value because of unsuccessful attempts at forest regeneration. For managers of mixed wood forests suffering from a lack of high-value native species, this study offers insights to guide investment in silviculture practices meant to restore forest value. In addition, the results from this study will help support biomass policy development in the Great Lakes–St. Lawrence forest region by providing a scientifically sound basis for guidelines for the safe removal of forest biomass.

This work will also be supplemented by knowledge transfer to the forest industry and public through the publication of results to the scientific community and demonstrations of best practices in regionally accessible forests. An article on the sustainability of biomass harvests in the Great Lakes–St. Lawrence forest region is forthcoming in 2016. A subsequent report will examine in detail the economic feasibility of the types of harvesting undertaken in this study.

For more information please contact:

Jeff Fera

Forest Research Officer
Canadian Wood Fibre Centre
Canadian Forest Service
Natural Resources Canada
1219 Queen Street East
Sault Ste. Marie, ON P6A 2E5
jeff.fera@canada.ca

Photos on front page, from left to right: forest, post-biomass harvest; white pine seedling.