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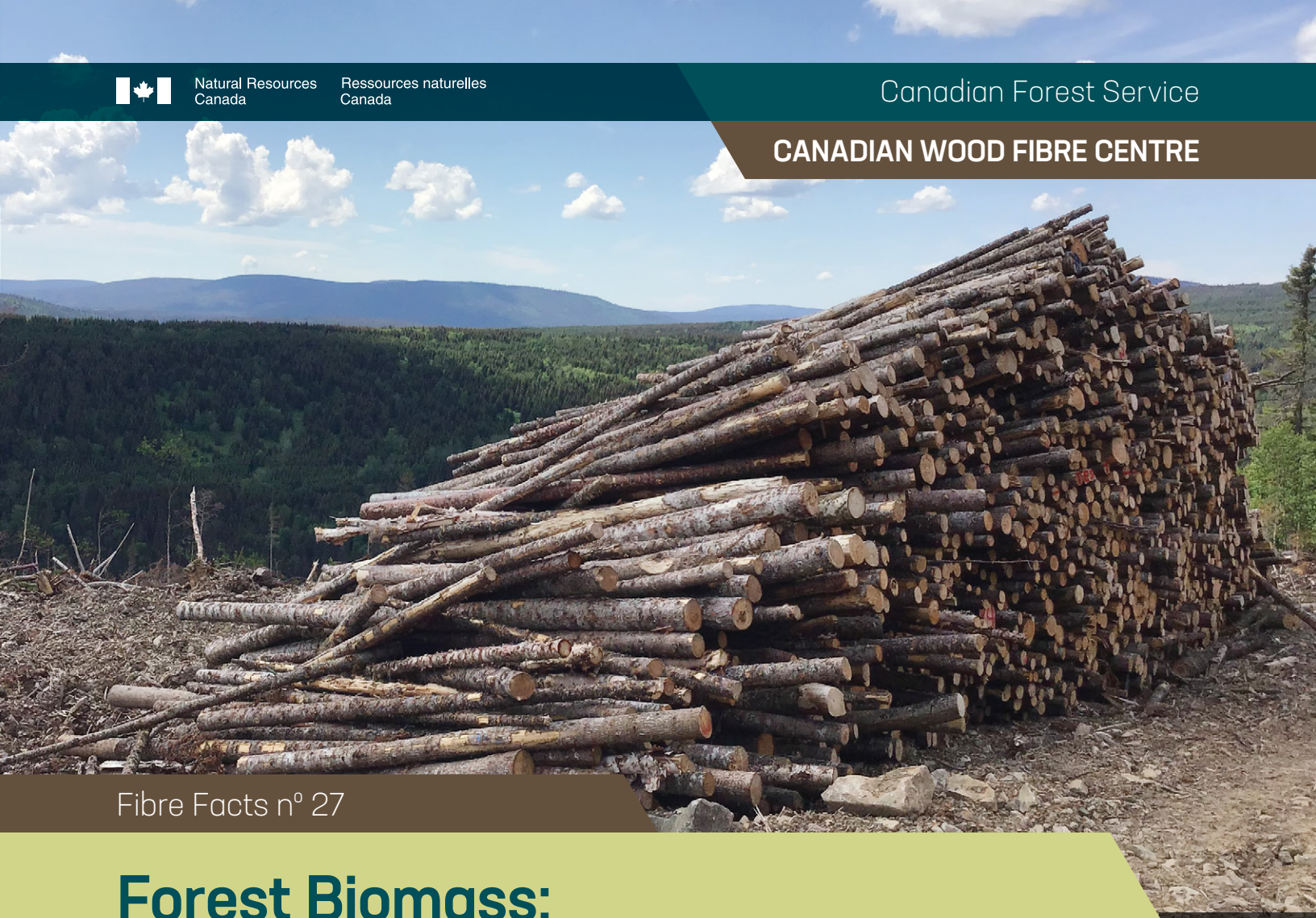
Canadian Forest Service

CANADIAN WOOD FIBRE CENTRE



Fibre Facts nº 27

# Forest Biomass:
## Integrating biomass procurement in sawtimber and pulpwood harvesting.

Photo by C.-M. Canuel

Canada's forest industry is poised to supply the global bioeconomy sector with renewable wood fibre. In concert with conventional wood products, sawtimber and pulpwood, forest biomass is a renewable resource that can help meet this increasing demand. However, due to the high costs associated with procuring forest biomass and its low market value, many forest practitioners wonder how they can capitalize on this new product stream. To better understand this financial barrier, researchers from Natural Resources Canada (NRCan) and Université Laval established a research study to investigate the integration of forest biomass within the conventional wood product procurement process.

Canada

**Figure 1. A member from the Natural Resources Canada and Université Laval research team at the St-Jogue, Quebec study site collecting coarse woody debris data (Photo by C.-M. Canuel).**

Within the mixedwood and conifer forests of Quebec's Gaspésie Peninsula, researchers established three study sites to evaluate the cost-effectiveness of an integrated forest biomass supply chain. The sites were harvested using a cut-to-length harvesting method under a clear-cut silviculture prescription. Researchers used four different harvest intensities to determine the costs associated with various levels of sawtimber, pulpwood and forest biomass recovery and the silvicultural costs for site regeneration.

Harvest intensities:

1. Procurement of sawtimber with a minimal amount of pulpwood;
2. Procurement of sawtimber and pulpwood;
3. Procurement of sawtimber, pulpwood and forest biomass (low quality logs at fixed length, 254 centimetres); and
4. Procurement of sawtimber, pulpwood and forest biomass (low quality logs of varying length).

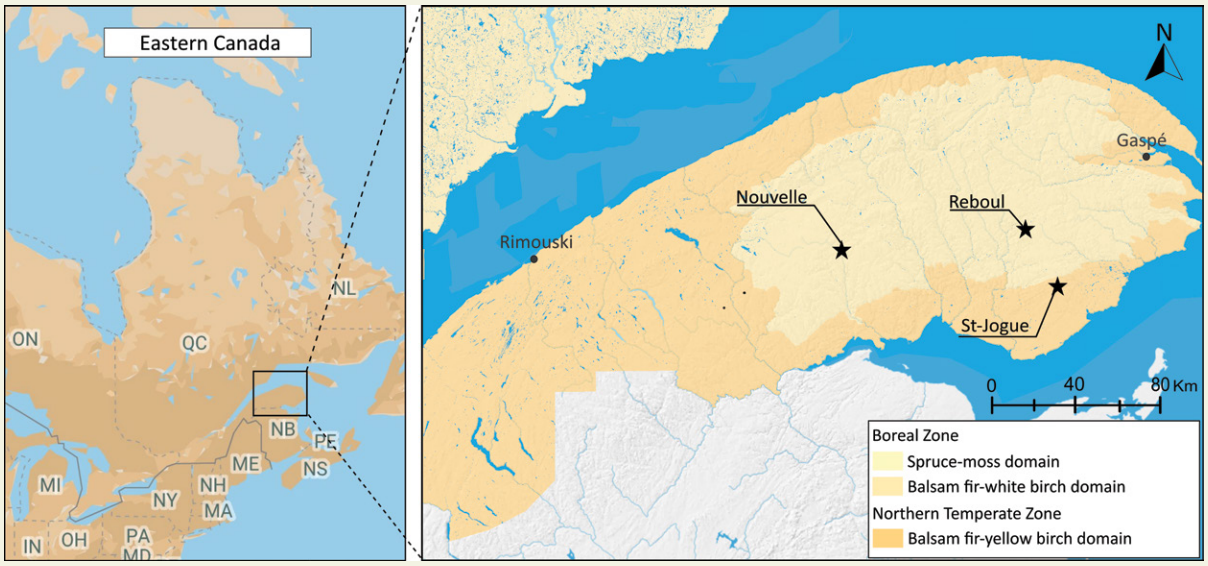



**Figure 2. The three research site locations (Nouvelle, Reboul and St-Jogue, Quebec) on the Gaspésie Peninsula of Quebec, Canada, and their associated bio-climatic domains (Saucier et al., 2009, Map data © 2019 Google).**

Figure 3. A harvester felling and processing trees into logs at the Nouvelle site (Photo by C.-M. Canuel).

## Economic Considerations

To better understand the economics of procuring forest biomass, researchers studied the revenues generated from the processing and sale of wood products. They also analysed the costs generated throughout the value chain, including the harvest, transportation, building and maintaining forest roads and stumpage fees. The harvested forest biomass was assumed to be used to produce wood pellets for the bioenergy market.

Results from the study indicate that stand characteristics are important considerations when deciding to include the procurement of forest biomass into a harvest prescription. In low-density mixedwood stands with a large average tree size, harvest operations that included the procurement of forest biomass had limited impacts on the average harvest costs and did not affect the cost-effectiveness of the entire supply chain. This result remained true when stand renewal costs were also included in the analysis. Conversely, when similar harvest operations occurred in high-density conifer stands with a small average tree size, the average harvest costs increased, and the cost-effectiveness of the ensuing supply chain was negatively impacted. These results are partly due to the felling equipment spending additional time handling large volumes of material of a lesser economic value. Researchers determined that the selling price of wood pellets would need to improve 1.56 times (average price from 2009 to 2019 for exportation to Northwest Europe) before the supply chain of a forest biomass procurement harvest will match a business-as-usual sawtimber and pulpwood only harvest. However, when the stand renewal costs were combined with the harvest operation costs, the cost-effectiveness of the forest biomass supply chain improved.

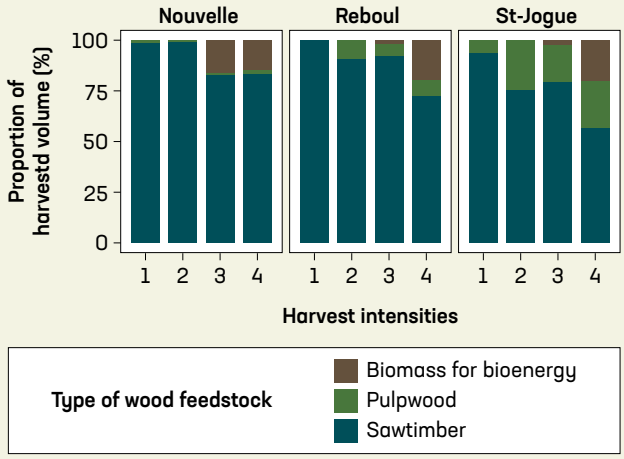



Figure 4. Feedstock harvest breakdown for each study location by harvest intensity.

## Management Implications

Forest biomass procurement can be done cost-effectively. Integration of forest biomass procurement with the harvest of conventional wood products and the inclusion of stand renewal activities provides an opportunity to supply the bioeconomy with forest biomass. However, the cost-effectiveness varies based on stand characteristics and specifications used for forest biomass. As a result, foresters should consider these factors in silvicultural planning.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## For more information (reference):


Canuel, C.-M., Thiffault, E., & Thiffault, N. 2022. An empirical financial analysis of integrating biomass procurement in sawtimber and pulpwood harvesting in eastern Canada. Canadian Journal of Forest Research. 52(6): 920-939. doi: 10.1139/cjfr-2021-0327.

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