Is it possible to harvest balsam fir tips, while pursuing an objective of timber production?

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Research and Knowledge Transfer Officer
Introduction
Tip harvesting

- 6.5 – 7.0 millions pounds = 3 100 tons
- PCT + Forest roads
- Crown tipping
- Guidelines
Balsam fir tip harvesting and timber production: are they compatible?
Objectives

• Socio-economic impacts
• Potential biological responses
• Relevance and applicability of some specifications of management guidelines
• Compatibility of tip harvesting with timber production
Hypothesis 1

• Harvesting practices: intense and severe = productive and efficient in the short run, BUT at the expense of tree survival and growth
Hypothesis 2

• Guidelines = decrease in:
  – removal amount – tree level → no significant impacts on tree and timber/wood production

• BUT decrease in:
  – tip production – tree level
  – harvesters’ production and productivity
Study sites and experimental design

• 5 PCT + 2 years
• 15 BF/plot; \( h \geq 3.0 \text{ m} \)
• Tipping
• Factorial:
  – Severity – limb level (2):
    • \( \geq \frac{2}{3} = \text{less severe} \)
    • Variable = more severe
  – Intensity – tree level (2):
    • partial (1/3) = less intense
    • total = more intense
4 harvesting practices

S-2/3_I-1/3
- Severe
- Intense

S-2/3_I-t
- Severe
+ Intense

S-v_I-1/3
+ Severe
- Intense

S-v_I-t
+ Severe
+ Intense
Tip production at the tree level - Biomass

- Severe
- Intense
+ Intense
+ Severe
+ Intense

2 185 kg ha$^{-1}$
2.5 millions BF
1 400 ha PCT

203 kg ha$^{-1}$
27 millions BF
15 100 ha PCT
Harvesters’ productivity - Biomass

- Severe
- Intense
+ Intense
+ Severe
- Intense
+ Severe
+ Intense

<table>
<thead>
<tr>
<th>Harvesting practices</th>
<th>Fresh total mass of tips/harvester/hour (g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>$S_{2/3} - I_{1/3}$</td>
<td>$0.37 $/H/h</td>
</tr>
<tr>
<td>$S_{2/3} - I_{T}$</td>
<td></td>
</tr>
<tr>
<td>$S_{V} - I_{1/3}$</td>
<td>$6.10 $/H/h</td>
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<td>$S_{V} - I_{T}$</td>
<td></td>
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</table>
Removal amount at the tree level
## Likelihood of significant effects for greatest removal amount ($\approx 20\%$)

<table>
<thead>
<tr>
<th>Effects</th>
<th>unlikely</th>
<th>Likely</th>
<th>Very likely</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increase in mortality</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Decrease in growth – height</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>– diameter</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>– volume</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Decrease in knots size</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Decrease in bole taper</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Accelerate the transition juvenile – mature wood</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Tip production</td>
<td></td>
<td></td>
<td>X</td>
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</tbody>
</table>
Conclusion and implications – Guidelines on BF ≥ 3.0 m

- Biologically sound, socially acceptable, and financially viable ».
- Easy to communicate
- Operationally feasible on the ground
- Easy to monitor
- Revision
- + severe - + intense
Conclusion

• Balsam fir tip harvesting and timber production seem to be compatible
Bibliography

• Conifer bough harvesting on the Gaspé Peninsula: Perspectives of harvesters, buyers and processors. 2010. With C-A Léveillé.

• Testing four tip harvesting practices for their potential socio-economic and biological impacts. in preparation. With E. Swift.

• Récolte de branches de conifères (sapin baumier) pour la fabrication de couronnes de Noël et d'autres produits ornementaux : cahier du participant.

• Available at: www.mieuxconnaitrelaforet.ca
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• H. Varady-Szabo
• B. Lafleur
• MAPAQ : S. Thibault et M. Desbiens
• R. Campbell, A & R Decorations
• S. Nadeau, SCF-CFA
Effets de la sévérité, de l’intensité et de l’interaction S x I (n= 5)

<table>
<thead>
<tr>
<th>Réponses</th>
<th>S</th>
<th>I</th>
<th>S x I</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intensité de la récolte - peuplement</td>
<td>&lt;0.001</td>
<td>0.019</td>
<td>0.002</td>
</tr>
<tr>
<td>Production de « pointes » - arbre</td>
<td>&lt;0.001</td>
<td>&lt;0.001</td>
<td>0.003</td>
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<tr>
<td>Productivité des cueilleurs</td>
<td>&lt;0.001</td>
<td>&lt;0.001</td>
<td>0.740</td>
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<tr>
<td>Degré de prélèvement - arbre</td>
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<tr>
<td>Biomasse de « pointes »</td>
<td>&lt;0.001</td>
<td>&lt;0.001</td>
<td>0.001</td>
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<tr>
<td>Biomasse foliaire</td>
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<td>&lt;0.001</td>
<td>0.001</td>
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<tr>
<td>Surface foliaire</td>
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<td>&lt;0.001</td>
<td>&lt;0.001</td>
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</tbody>
</table>
Tip harvesting intensity at the stand level - % harvested BF

- Severe
- Intense
+ Severe
+ Intense
Production des cueilleurs - biomasse

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<td>$b$</td>
</tr>
<tr>
<td>$S_V - I_{1/3}$</td>
<td>$c$</td>
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<tr>
<td>$S_V - I_T$</td>
<td>$d$</td>
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