Spruce Budworm – Why Do We Care and Management Alternatives

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Outline

1. Spruce budworm defoliation & impacts

2. Early Intervention research program against SBW
What is the Early Intervention Strategy (EIS)?

A strategy to combat a large-scale spruce budworm outbreak in Atlantic Canada
R&D led by NRCan-CFS and 5 universities
Supported by ACOA 2014-2018 $18M; new Phase 2 2018-2023 NRCan $75M + matching $50M from 4 Atlantic provinces & industry

Includes:
• Monitoring populations to detect ‘hot spots’
• Targeted insecticide treatment to prevent spread
• Proactive public communications and engagement on project activities and results

First attempt of area-wide mgmt. of a native forest insect population
About Healthy Forest Partnership

• A **research initiative** dedicated to protecting Atlantic Canadian forests from spruce budworm

• A **unique collaboration** among scientists, industry, citizens and all levels of government

• Pursuing an innovative **Early Intervention Strategy**

www.healthyforestpartnership.ca
Healthy Forest Partnership

Quebec 2016

Cape Breton 1985
The Situation

Spruce budworm has reached New Brunswick and poses a significant threat to Atlantic Canada’s forests.

The last outbreak destroyed hundreds of millions of cubic metres of forest.

Atlantic Canada must be protected from significant economic, environmental and community impacts.
Spruce budworm defoliation in Quebec - 2018

<table>
<thead>
<tr>
<th>Year</th>
<th>Light</th>
<th>Moderate</th>
<th>Severe</th>
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</thead>
<tbody>
<tr>
<td>8.2 million ha</td>
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</table>
Serious Damage to Forest Inventory
Spruce budworm defoliation north of Baie Comeau, Quebec, July 2014
Stand condition north of Baie Comeau, Quebec, July 2016
The Impact of an Outbreak

**ENVIRONMENTAL**
- Increased forest fires
- Water impacts
- Loss of wildlife habitat
- Increased carbon emissions

**SOCIAL**
- Loss of recreational uses
- Mill closures
- Job losses
- Aesthetic impacts

**Economic**
NB area defoliated by Spruce Budworm (1949-1995)
Cape Breton plot in a mature balsam fir stand
Growth loss during a budworm outbreak

Stem analysis of 89 trees from Cape Breton Island

~90% reduction

Volume increment, cm³/yr

Years moderate to severe defol.
1975-77
1975-77, 1980-81
1974-80

(OSTAFF & MACLEAN 1995)
Sensitivity of AAC in NB to SBW, salvage, & protection?

Spruce-fir harvest millions m³/year

Severe Outbreak Effect

40% area protected

Salvaged volume

% susceptible area protected

max % harvest reduction

+ Foliage protection

+ Salvage benefits

Severe Outbreak Effect

(Hennigar et al. 2013)
Socio-economic Impact of the Next Outbreak

Uncontrolled Outbreak

- 3.6M hectares of defoliation in 1975 outbreak
- up to $6.7B potential losses to the NB economy over 40 years
- up to 1,900 person year decrease in jobs, yearly for 30 years
- up to 1.4 M m^3 yearly decrease in NB wood supply for 40 years
Spruce Budworm Infestation Options

1. Do Nothing
2. Silviculture (Pre-outbreak)
3. Salvage (Post-outbreak)
4. Foliage Protection (Insecticide application)
5. Early Intervention (Insecticide application)
## A Comparison of the Options

<table>
<thead>
<tr>
<th></th>
<th>Do Nothing</th>
<th>Reactive Strategy</th>
<th>Early Intervention Strategy</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Wood Supply Impact</strong></td>
<td>96 million m³</td>
<td>43 million m³</td>
<td>minimal</td>
</tr>
<tr>
<td><strong>Treatment Cost</strong></td>
<td>N/A</td>
<td>$2 billion</td>
<td>$300 million</td>
</tr>
<tr>
<td><strong>Economic Cost</strong></td>
<td>$15 billion</td>
<td>$5 billion</td>
<td>minimal</td>
</tr>
<tr>
<td><strong>GHG Emissions</strong></td>
<td>63 Mt CO₂e</td>
<td>28 Mt CO₂e</td>
<td>minimal</td>
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</table>
EIS results to date: ‘hot spot’ detection

Intensive monitoring overwintering larvae is the 1st step in determining treatment areas.

2014-2018

• 1503-1964 L2 sites sampled per year

• Collaboration between NB ERD, FPL & Crown Licensees
SBW L2 Progression in NB – 2013-2018

2013
- 14% positive
- 0 plots >7 L2/branch

2014
- 16% positive
- 5 plots >7 L2/branch
- 1st defol. forecast for 2015

2015
- 46% positive
- 44 plots >7 L2/branch
  (all treated in 2016)

(1500-2000 L2 points per year)

2016
- 51% positive
- 86 plots ≥ 7 L2/branch
- 10 high, 1 extreme

2017
- 57% positive
- 109 plots ≥ 7 L2/branch
- 14 high, 2 extreme

2018
- 25% positive
- 10 plots ≥ 7 L2/branch
- 2 points overlap with 2016
  treatment area, none with 2017
2016 Spruce Budworm Population Forecast Survey (Final)

- Nil:
- Trace (<4):
- Low (4-6):
- Moderate (7-20):
- High (21-40):
- Extreme (>40):
L2 results – moderate & higher only

N = 112

L2 Results NB 2017
- Moderate: Modéré (8.51 - 20.5)
- High: Élevé (20.51 - 40.5)
- Extreme: Extrême (> 40.5)
2018 Spruce Budworm Population Forecast

L2_2018
Average L2

- 0
- 0.1-2.9
- 3.0-6.9
- 7.0-19.9
- >20.0

Kilometers

Elo, HERB, DeLorme, MapmyIndia, & OpenStreetMap contributors, and the GIS user community.
Log L2 Interpolated (rescaled 1-100) + % Spruce-fir (rescaled 1-10) = Spray Priority
2016-17 L2 Interpolation
2017 Treatment Areas (150,000 ha)
EIS treatments 2014-2018:

2014
4500ha
2015
15,300ha
1st defoliation forecasted
2018
199,000ha
2018 L2

2019 spray treatment

- Nil: 0
- Trace: <4
- Low: 4-6
- Moderate: 7-20
- High: 21-40
- Extreme: >40
Results 2014-2018

- In general, areas are not being treated in successive years.

<table>
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<tr>
<th>Year</th>
<th>Areas treated</th>
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<tbody>
<tr>
<td>2014</td>
<td>4500 ha</td>
</tr>
<tr>
<td>2015</td>
<td>15,300</td>
</tr>
<tr>
<td>2016</td>
<td>56,600</td>
</tr>
<tr>
<td>2017</td>
<td>147,200</td>
</tr>
<tr>
<td>2018</td>
<td>199,000</td>
</tr>
<tr>
<td>Total</td>
<td>422,600</td>
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2015 Population Results
Results 2014-2018

• After 4 years of treatments, L2 populations are much higher in adjacent QC than in NB.

2017

1973 plots in N.B.
57% positive
109 plots ≥ 7 / branch
14 high & 2 extreme
Progression of SBW defoliation in adjacent QC

Light
Moderate
Severe
2017 Aerial survey defol. in N.B.
2017: 2,500 ha

Bas St. Laurent + Gaspésie
2,257,000 ha

Light
Moderate
Severe
Aerial survey defol. in N.B.
2018:  550 ha

Bas St. Laurent +71,000ha
Gaspésie      +400,000ha
Phase II: Government of Canada NRCan

In Budget 2018: funding approved to continue research on a SBW Early Intervention Program in Atlantic Canada

$74.75 million over 4 years (2018–2022)

Based on a 60:40 federal : provinces + industry cost sharing

Federal contributions from Natural Resources Canada
Phase II EIS research

Questions being addressed:

1. What are the early indicators of an infestation?
2. When should treatment be initiated?
3. What new tools and technology need to be developed?
4. What are the ecological impacts of outbreaks?

Ten research projects to continue intensive monitoring of SBW & treatment of hotspots with registered insecticides
In summary

The Early Intervention Strategy is a $300 million solution to a $15 billion problem.

Natural Resources Canada, all four Atlantic provinces, and industry are supportive and contributing to the required investment.

A strong coalition of researchers, landowners, forestry companies, governments, forest protection experts, communities, and citizens are committed to this strategy.

Progress is on track after year 5 (year 1 of Phase II); major SBW collapse in NB in 2018 (but temporary?), and accumulating evidence that so far, EIS appears to be working.

www.healthyforestpartnership.ca
Questions?