Lakes TSA
Type 4
Silviculture Strategy

Issues and Preliminary Strategies

Initial Workshop

September 11, 2012

Sean Curry, RPF
Jim Burbee, RPF
Agenda for September 11

• Introductions
• Provincial overview
• Species targets and trends
• Silviculture Strategies Overview
• Type 4 Outcomes
• Review current situation in the Lakes TSA
• Identify working targets
• Review possible strategies to address issues, discuss and decide on strategies to be modeled
Why do we need them?

A response to

• Special Committee on Timber Supply
• Auditor General Audit
• Forest Practices Board Reports
• Chief Forester Guidance
Type IV Strategies – What are they?

A comprehensive TSA level plan that
• identifies key objectives that pertain to an area,
• identifies key harvesting and silviculture strategies to achieve timber and non-timber objectives,
• provides direction regarding species selection, landscape level retention, harvesting priorities, climate change and other key local concerns.
• provides key priority treatments and a 5-year tactical plan for FFT activities.
Strategic Considerations

- **Timber Supply**
  - How can silviculture investment decisions impact future timber supply?

- **Timber Quality Outputs**
  - How can silviculture investments impact future timber quality?

- **Habitat / Non Timber Issues**
  - How can silviculture investments impact habitat quality, hydrology, etc.
Type 4 Outcomes

• Strategic and tactical guidance for the expenditure of LBIS funds to address forest management issues within the unit.

• Clarity on whether harvesting is occurring where it is assumed to occur based on TSR or other direction.

• A clear description of landscape retention strategies, where they are located spatially, how they are being tracked when new areas are added and whether they are being monitored for the desired attributes they were retained for.
Type 4 Outcomes

• To address growing concern over species deployment within the environment of climate change, species targets by BEC unit are to be created and monitored.

• To integrate existing direction to address risks from forest health, fire, and climate change, where this direction influences decisions for species selection, harvesting and incremental silviculture.

• To provide a foundation for building an operational strategic forest management planning process within Districts at some future date, in response to the Auditor General’s report, numerous Forest Practices Board reports and FFESC climate change research reports.
Silviculture Strategy Type 4

- Lakes TSA
- September 2012

Silviculture Type 4 strategy
Species targets / Trends by BEC subzone

- Lakes TSA
- Preliminary discussions
- September 2012

Silviculture Type 4 strategy
Species deployment on the landscape

How much of each species where and when?
Direction

- Based on ecology
- Feasible
- Reliable
- Productive
- Resilient
- Redundant
- Data that can be readily accessed
- Risks can be ascribed to the unit
- Trends can be discussed
- Targets or trends can be identified and measured against
FIRST...

It is not simple

What is it that we desire or not?

Species selection working group created ecological ranges for Quesnel TSA by Subzone

BEC subzone and variant tree species descriptions developed by species selection working group

Pilot study in the ICHmc2 by LePage, Coates, Heemkerk, Banner and Hall Technical report 67

Looks at density and diversity
What is it that we desire (or not)?

Guidance from the Chief Forester
To understand what we want we will want to know what we had:

Reports that are available

Billed Volume and Previous leading species
Steps...

1) Get Organized – What is desired? Or put another way, what is not desired?

• Quesnel used regional ecologists, silviculturists, wildlife, and soils specialists, and district staff.

• Went from chaos to consensus.
2) Understand the management expectations, risks and ecological realities.

- Clear Provincial goals and direction.
- Regional and local goals and priorities.
- Local expertise.
3) Understand the context at the TSA level to begin with.
3) Understand the context (BEC) and identify issues and opportunities – can begin with primary secondary tertiary
### 4) Create the Vision for the Future Forest Species mix

<table>
<thead>
<tr>
<th>ZONE</th>
<th>SUBZONE</th>
<th>TREE_SPECIES_CODE</th>
<th>Ranges</th>
<th>Spp % Billed - Long Term (11 year avg)</th>
<th>Spp % Billed - Short Term (2 year avg)</th>
<th>% Previous Leading Spp - Long Term (11 yr avg)</th>
<th>% Previous Leading Spp - Short Term (2 yr avg)</th>
<th>Spp % Planted - Long Term (11 yr avg)</th>
<th>Spp % Planted - Short Term (2 yr avg)</th>
<th>Spp % Inventory - Long Term (9 year avg)</th>
<th>% Spp Inventory - Short Term (2 year avg)</th>
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<tr>
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<td>dk</td>
<td>Lw</td>
<td></td>
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<td>86</td>
<td>73</td>
<td>93</td>
<td>60</td>
<td>49</td>
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<td>64</td>
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<tr>
<td>SBS</td>
<td>dk</td>
<td>Pl total</td>
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<td>dk</td>
<td>S total</td>
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<td></td>
<td></td>
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<td>Fdi</td>
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<td></td>
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</tr>
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</table>

- Strategic objectives and a vision for the future species mix
- Targets and or desired trends.
- Are we on track?
Steps...

4) Create the Vision for the Future Forest Species mix

Reassess with a Climate Change Lens
Harvest tracking – is it being done locally?

If so how? – Are we on the track we think we are on?
Landscape level Retention
Is it being modified by the Chief Forester’s guidance?
How is it being implemented? Tracked?
Silviculture Strategies Overview

Silviculture Strategies are meant to provide strategic direction for optional silviculture investments and can help to inform practitioners of the implications of choices for required silviculture.

- Required silviculture (planting, brushing, etc after harvesting)
- Optional silviculture (fire rehab, fertilization, pruning, etc)

Considered strategic because they take silviculture planning beyond stand level objectives to consider forest level objectives:

- timber supply,
- timber quality outputs,
- and habitat/non timber issues

Important because management units need a comprehensive, locally driven, strategic investment plan for silviculture expenditures.
Relevant Lakes TSA analyses

- **TSR4**
  - Focused on current practice and was used to assist in setting AAC

- **Moricé & Lakes IFPA**
  - Based on TSR2 data, which was similar to expedited TSR3
  - Provided valuable insight into key timber supply levers such as operable landbase and policy assumptions, legislative requirements and silviculture strategies

- **Silviculture Type II Strategy**
  - Based on TSR4 data
  - Provided in-depth assessment of the impact of several silviculture strategies on timber supply

- **Mid-term Timber Supply Technical Report**
  - Provided valuable insight into timber supply levers such as operable landbase and policy assumptions, legislative requirements
  - A high-level overview of silviculture strategies was included
Harvest Forecasts from previous analyses

(m³)
Harvest Forecasts from previous analyses (m³)
Lakes TSA Overview
AAC history
(million m³)

<table>
<thead>
<tr>
<th>Year</th>
<th>AAC</th>
</tr>
</thead>
<tbody>
<tr>
<td>'82</td>
<td>1.5</td>
</tr>
<tr>
<td>'87</td>
<td>1.5</td>
</tr>
<tr>
<td>'96</td>
<td>1.5</td>
</tr>
<tr>
<td>'01</td>
<td>2.96</td>
</tr>
<tr>
<td>'04</td>
<td>3.16</td>
</tr>
<tr>
<td>'11</td>
<td>2.0</td>
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Lakes TSA AAC history
### Land Base Classification

**Table 1. Identification of the timber harvesting land base for the Lakes TSA**

<table>
<thead>
<tr>
<th>Classification</th>
<th>Productive forest area by classification (hectares)</th>
<th>Area (hectares)</th>
<th>Percent (%) of total TSA area</th>
<th>Percent (%) of Crown forest land</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total TSA area (excluding Tweedsmuir Park)</td>
<td>1,121,609</td>
<td></td>
<td>100</td>
<td>100</td>
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<tr>
<td>Not managed by the B.C. Forest Service</td>
<td>157,020</td>
<td></td>
<td>14</td>
<td>1,4</td>
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<tr>
<td>Non-forest</td>
<td>154,014</td>
<td></td>
<td>13.7</td>
<td>13.7</td>
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<tr>
<td><strong>Total productive forest managed by the Forest Service</strong> (Crown forest)</td>
<td></td>
<td>810,675</td>
<td><strong>72.3</strong></td>
<td><strong>100</strong></td>
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<tr>
<td>Reductions to Crown forest.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Existing roads, trails and landings</td>
<td>10,028</td>
<td></td>
<td>0.9</td>
<td>1.2</td>
</tr>
<tr>
<td>Riparian management areas</td>
<td>12,972</td>
<td></td>
<td>1.2</td>
<td>1.6</td>
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<tr>
<td>Protected areas</td>
<td>95,138</td>
<td></td>
<td>8.5</td>
<td>11.7</td>
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<tr>
<td>Wildlife areas</td>
<td>264</td>
<td></td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Old growth management areas</td>
<td>70,204</td>
<td></td>
<td>6.3</td>
<td>8.7</td>
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<tr>
<td>Sites with low productivity</td>
<td>32,537</td>
<td></td>
<td>2.4</td>
<td>3.3</td>
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<tr>
<td>Deciduous-leading stands</td>
<td>69,505</td>
<td></td>
<td>4</td>
<td>5.5</td>
</tr>
<tr>
<td>Balsam &gt; 250 year old</td>
<td>3,993</td>
<td></td>
<td>0.1</td>
<td>0.2</td>
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<tr>
<td>Wildlife tree retention</td>
<td>24,759</td>
<td></td>
<td>2.2</td>
<td>3.1</td>
</tr>
<tr>
<td><strong>Total current reductions</strong></td>
<td></td>
<td>286,668</td>
<td><strong>25.6</strong></td>
<td><strong>35.4</strong></td>
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<tr>
<td><strong>Current timber harvesting land base</strong></td>
<td></td>
<td>523,909</td>
<td>46.7</td>
<td>64.6</td>
</tr>
<tr>
<td><strong>Future reductions</strong></td>
<td></td>
<td>11,342</td>
<td>1</td>
<td>1.4</td>
</tr>
<tr>
<td><strong>Long-term timber harvesting land base</strong></td>
<td></td>
<td>512,567</td>
<td>45.7</td>
<td>63.2</td>
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</table>

64% of Forested Area is THLB. Current THLB = 523,909 ha.
Inventory site index

Poor $\leq 11.9$
Medium $12 - 17.9$
Good $\geq 18$
Balsam/fir all sites

Figure 5. Distribution of site productivity for the timber harvesting land base.
Age Class Profile

- Large area of the THLB is older than 80 yrs and large area less than 10. Of concern is the lack of THLB area between 40 and 60 years of age.

*Figure 7. Age class distribution of the Crown forested land base and THLB.*
Existing regeneration and assumed plantation performance

**Table 17. Regeneration assumptions by analysis unit**

<table>
<thead>
<tr>
<th>Composition</th>
<th>Site index</th>
<th>Regen delay</th>
<th>OAFs</th>
<th>Type</th>
<th>%</th>
<th>Species code</th>
<th>%</th>
<th>Density initial</th>
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<tbody>
<tr>
<td>Balsam leading</td>
<td>2 yrs</td>
<td>20  5</td>
<td>Plant</td>
<td>100</td>
<td>P6S4</td>
<td>80</td>
<td>1500</td>
<td></td>
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<tr>
<td>Balsam leading</td>
<td>2 yrs</td>
<td>15  5</td>
<td>Plant</td>
<td>100</td>
<td>S7P3</td>
<td>15</td>
<td>1500</td>
<td></td>
</tr>
<tr>
<td>Balsam leading</td>
<td>2 yrs</td>
<td>15  5</td>
<td>Plant</td>
<td>100</td>
<td>S4P4 B2</td>
<td>5</td>
<td>1500</td>
<td></td>
</tr>
<tr>
<td>Spruce leading</td>
<td>2 yrs</td>
<td>20  5</td>
<td>Plant</td>
<td>100</td>
<td>P6S4</td>
<td>80</td>
<td>1500</td>
<td></td>
</tr>
<tr>
<td>Spruce leading</td>
<td>2 yrs</td>
<td>15  5</td>
<td>Plant</td>
<td>100</td>
<td>S10</td>
<td>10</td>
<td>1500</td>
<td></td>
</tr>
<tr>
<td>Spruce leading</td>
<td>2 yrs</td>
<td>15  5</td>
<td>Plant</td>
<td>100</td>
<td>S7P3</td>
<td>10</td>
<td>1500</td>
<td></td>
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<tr>
<td>Pine leading</td>
<td>2 yrs</td>
<td>20  5</td>
<td>Plant</td>
<td>100</td>
<td>P6S4</td>
<td>95</td>
<td>1500</td>
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<tr>
<td>Pine leading</td>
<td>2 yrs</td>
<td>20  5</td>
<td>Plant</td>
<td>100</td>
<td>P10</td>
<td>5</td>
<td>1500</td>
<td></td>
</tr>
</tbody>
</table>

Varied by species composition and existing/future status.
Future regeneration and assumed plantation performance

- PL regeneration assumptions:
  - ?
- Sx, Ba regeneration assumptions:
  - ?
- Deciduous regeneration assumptions:
  - ?
- Key considerations include:
  - What is current practice?
  - What is the desired target at free-growing or later?
  - What levels of genetic gain do we use? An average gain of 17% was used, not sure of how this was modeled
  - Species mix?
  - Future/current pest incidence
- Type II provides direction
  - Genetic improvement
  - Species mix
  - Fertilization
  - Rehabilitation
  - Composite
Future regeneration and assumed plantation performance (T2)

<table>
<thead>
<tr>
<th>SPU Code</th>
<th>Seedling availability/Volume gain</th>
<th>2008</th>
<th>2018</th>
</tr>
</thead>
<tbody>
<tr>
<td>PL BV low</td>
<td></td>
<td>54%/10%</td>
<td>100%/13%</td>
</tr>
<tr>
<td>Sx BV low</td>
<td></td>
<td>80%/16%</td>
<td>100%/23%</td>
</tr>
<tr>
<td>SX PG high/SX BVP high</td>
<td></td>
<td>100%/19%</td>
<td>100%/20%</td>
</tr>
<tr>
<td>SX PG low/SX BVP</td>
<td></td>
<td>87%/28%</td>
<td>100%/31%</td>
</tr>
</tbody>
</table>

- Plant greater proportions of Sx where feasible
  - SBSmc2, SBSdk
  - mesic/subhygric (01/06/07/08) sites
  - 60% Sx 40% PI
  - Included genetic gains from above chart
  - Genetically improved stock widely available
  - Mix stands = more resilience = reduced forest health issues
47 years of Silviculture History

<table>
<thead>
<tr>
<th>Activity</th>
<th>Total</th>
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<tbody>
<tr>
<td>Planting</td>
<td>138,916</td>
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<tr>
<td>Brushing</td>
<td>22,486</td>
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<tr>
<td>Juvenile Spacing (basic &amp; incremental)</td>
<td>17,612</td>
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<td>Fertilization</td>
<td>4,961</td>
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<tr>
<td>Surveys</td>
<td>482,269</td>
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<tr>
<td>Pruning</td>
<td>513</td>
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- 1960 to 2007
Species monitoring

<table>
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<tbody>
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<td>65</td>
<td>76</td>
<td>75</td>
<td>80</td>
<td>74</td>
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<tr>
<td>HBS %sw</td>
<td>27</td>
<td>20</td>
<td>22</td>
<td>18</td>
<td>20</td>
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<tr>
<td>HBS %oth</td>
<td>8</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>6</td>
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<tr>
<td>Planted %pl</td>
<td>78</td>
<td>67</td>
<td>55</td>
<td>55</td>
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<tr>
<td>Planted %sw</td>
<td>22</td>
<td>30</td>
<td>43</td>
<td>42</td>
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<tr>
<td>Planted %oth</td>
<td>0</td>
<td>3</td>
<td>2</td>
<td>3</td>
<td>No data</td>
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<td>Regen &gt;=7 %pl</td>
<td>75</td>
<td>65</td>
<td>62</td>
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<td>No data</td>
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<tr>
<td>Regen &gt;=7 %oth</td>
<td>12</td>
<td>6</td>
<td>6</td>
<td>No data</td>
<td>No data</td>
</tr>
<tr>
<td>% mixed at regen</td>
<td>Na</td>
<td>50</td>
<td>70</td>
<td>75</td>
<td>No data</td>
</tr>
<tr>
<td>% mono at regen</td>
<td>Na</td>
<td>50</td>
<td>30</td>
<td>25</td>
<td>No data</td>
</tr>
<tr>
<td># species at regen</td>
<td>Na</td>
<td>5</td>
<td>5</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

No data
Timber Supply
Timber Supply Situation (TSR4)

- TSR4 scenario 1 is “reference forecast”
- Short-term harvest – 3.41 million m³/yr
- Mid-term – 250,000 m³/yr
- Long-term – 1.15 million m³/yr

Figure 13. Scenario 1 harvest from managed stands.
Timber Supply Situation (TSR4)

- Scenario 2 illustrates impact of reduced harvest, pine-leading only in short-term
- Fill in trough with non-pine species
- Short-term harvest – 1.6 million m³/yr
- Mid-term – 500,000 m³/yr
- Long-term – 1.15 million m³/yr

Figure 14. Scenario 2 — projected harvest if pine-leading stands continue to be salvaged at the past five average harvest level and non-pine leading stands are harvested at highest level in decades two.
Timber Supply Situation (TSR4)

- Regenerated stands still a major factor in this scenario
- High level of harvest is supported by regenerated stands coming on stream

*Figure 19. Scenario 2 harvest from managed stands.*
Timber Supply Situation (Mid-term report)

- Appears to be based on assumptions in TSR4 Scenario 2

**Figure 6** Timber Supply Forecast Based on Option 3 (in blue) Compared to the Reference Forecast (in Black)
Harvest profile relative to AAC (Mid-term report)

- Surplus dead volume across TSA that can be used to extend time to drop
- Pine was an increasingly larger component of overall harvest

Figure 4. Lakes AAC and Volume Harvested over the Years
Timber Supply Situation

- Key points:
  - Lower harvest levels help mid-term
  - Harvest priority helps mid-term
  - Non-pine harvest focus helps mid-term
  - Decade 2 appears to be a pinch point as regenerated stands come on stream
  - AAC has not been harvested = harvestable growing stock surplus
  - Focus on Pine % is high

- What harvest priorities do we use as the base case for our work?
Mountain Pine Beetle Implications

TSR4 used the MPB version 5 model, 2012 results shown for comparison.
Mountain Pine Beetle Implications

TSR4 used the MPB version 5 model, 2012 results shown for comparison

• TSR forecasted 3 million more dead than what latest overview flights indicate
Timber Supply Questions

- Mature Inventory
  - Reconciling Phase II, log grade changes and MPB mortality.
- MPB impacts on young stands
  - Provincial reports
- Secondary structure
  - What is it?
  - Where is it?
  - How much of it is there?
  - Can the data be used to infer natural regeneration success when no salvage occurs?
- Minimum operability
  - Currently 140m$^3$/ha
  - Several analyses looked at 100m$^3$/ha
  - Mature stands versus second growth
- Others??
Mature Inventory

- The current inventory defines the initial growing stock.
- This volume must be metered out until managed stands come online. Changes to this volume can have significant impacts on short-midterm harvest levels.
- 2008 NVAF Inventory audit of VDYP7 volume indicated an underestimate of 10% overall, +/- 9.1%
- Not accounting for the inclusion of logs that were previously Grade 3 endemic and Grade 5 underestimates short-term timber supply by 7% (CF determination)
- FAIB currently in the field measuring phase II plots again, and these should be compiled before end of fiscal 12/13
MPB in stands < 60 yrs

- TSR4 didn’t include any mortality estimates for regenerated Pine

<table>
<thead>
<tr>
<th>Age</th>
<th>% of stands sampled with MPB</th>
<th>Avg % MPB attack</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 - 25</td>
<td>12</td>
<td>3</td>
</tr>
<tr>
<td>25 - 30</td>
<td>33</td>
<td>6</td>
</tr>
<tr>
<td>31 - 40</td>
<td>40</td>
<td>19</td>
</tr>
<tr>
<td>41 - 50</td>
<td>33</td>
<td>30</td>
</tr>
<tr>
<td>51 - 60</td>
<td>97</td>
<td>34</td>
</tr>
</tbody>
</table>

- In 2005, 290 field plots in 29 polygons showed green attack 10%, red attack of 0.7%
- In 2007 37 stands were surveyed, 30% had MPB, and of those that were attacked attack levels were 3.3% green 4% red
Secondary structure

- SBSmk2
- 20% less than 500 sph, therefore no natural regen?
Secondary structure

- SBSdk
- 22% less than 500 sph, therefore no natural regen?
Secondary structure

- ESSFmc
Minimum operability

- How is operability determined today?
  - Years dead? Distance from mill? Pulp component?
  - Actual vs nominal sawlog volume per hectare?

- How will operability be determined tomorrow?
  - Years dead? Distance from mill? Pulp component?
  - Actual vs nominal sawlog volume per hectare
  - Fibre-based opportunities?

- How are our young stands actually growing, compared to what we predict?
  - More volume/less?
  - Species composition, size, quality?
  - Products?
## Regenerated Stand Merchantability

### Volume

<table>
<thead>
<tr>
<th>Age</th>
<th>mai</th>
<th>vol 12.5+</th>
<th>top ht</th>
<th>trees/ha</th>
<th>dbh</th>
</tr>
</thead>
<tbody>
<tr>
<td>cmai</td>
<td>80</td>
<td>4.35</td>
<td>348</td>
<td>24</td>
<td>1,019</td>
</tr>
<tr>
<td>Minimum op 1</td>
<td>45</td>
<td>4.01</td>
<td>160.2</td>
<td>16</td>
<td>1,174</td>
</tr>
<tr>
<td>% of 80</td>
<td></td>
<td>92%</td>
<td>46%</td>
<td>67%</td>
<td>115%</td>
</tr>
<tr>
<td>Minimum op 2</td>
<td>35</td>
<td>3.33</td>
<td>116.5</td>
<td>14.4</td>
<td>1,179</td>
</tr>
<tr>
<td>% of 80</td>
<td></td>
<td>77%</td>
<td>33%</td>
<td>60%</td>
<td>116%</td>
</tr>
</tbody>
</table>

### DBH Distribution

- **35**
- **40**
- **80**
## Regenerated Stand Merchantability

### Quality

<table>
<thead>
<tr>
<th>Age</th>
<th>vol/tree 12.5+</th>
<th>mai</th>
<th>vol 12.5+</th>
<th>top ht</th>
<th>trees/ha</th>
<th>dbh</th>
</tr>
</thead>
<tbody>
<tr>
<td>cmai</td>
<td>80</td>
<td>0.343</td>
<td>4.35</td>
<td>348</td>
<td>24</td>
<td>1,019</td>
</tr>
<tr>
<td>Minimum op 1</td>
<td>45</td>
<td>0.146</td>
<td>4.01</td>
<td>160.2</td>
<td>16</td>
<td>1,174</td>
</tr>
<tr>
<td>% of 80</td>
<td></td>
<td>43%</td>
<td>92%</td>
<td>46%</td>
<td>67%</td>
<td>115%</td>
</tr>
<tr>
<td>Minimum op 2</td>
<td>35</td>
<td>0.109</td>
<td>3.33</td>
<td>116.5</td>
<td>14.4</td>
<td>1,179</td>
</tr>
<tr>
<td>% of 80</td>
<td></td>
<td>32%</td>
<td>77%</td>
<td>33%</td>
<td>60%</td>
<td>116%</td>
</tr>
</tbody>
</table>

### 12.5+ tree size

![Graph showing tree size distribution](chart)
# Regenerated Stand Merchantability

## Quality

<table>
<thead>
<tr>
<th>Age</th>
<th>LRF</th>
<th>fbm/ha</th>
<th>chips</th>
<th>vol/tree 12.5+</th>
<th>mai</th>
<th>vol 12.5+</th>
<th>top ht</th>
<th>trees/ha</th>
<th>dbh</th>
</tr>
</thead>
<tbody>
<tr>
<td>cmai</td>
<td>80</td>
<td>230</td>
<td>80,234</td>
<td>62</td>
<td>0.343</td>
<td>4.35</td>
<td>348</td>
<td>24</td>
<td>1,019</td>
</tr>
<tr>
<td>Minimum op 1</td>
<td>45</td>
<td>190</td>
<td>30,349</td>
<td>32</td>
<td>0.146</td>
<td>4.01</td>
<td>160.2</td>
<td>16</td>
<td>1,174</td>
</tr>
<tr>
<td>% of 80</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>43%</td>
<td>92%</td>
<td>46%</td>
<td>67%</td>
<td>115%</td>
</tr>
<tr>
<td>Minimum op 2</td>
<td>35</td>
<td>181</td>
<td>21,040</td>
<td>24</td>
<td>0.109</td>
<td>3.33</td>
<td>116.5</td>
<td>14.4</td>
<td>1,179</td>
</tr>
<tr>
<td>% of 80</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>32%</td>
<td>77%</td>
<td>33%</td>
<td>60%</td>
<td>116%</td>
</tr>
</tbody>
</table>

### 12.5+ vol

![Graph showing the distribution of DBH for different ages and minimum operations](image-url)
## Regenerated Stand Merchantability Implications

<table>
<thead>
<tr>
<th></th>
<th>LRF</th>
<th>fbm/ha</th>
<th>vol 12.5+</th>
<th>$/m³</th>
<th>$/Mfbm</th>
<th>% selling price $298/Mfbm</th>
</tr>
</thead>
<tbody>
<tr>
<td>cmai</td>
<td>80</td>
<td>230</td>
<td>80,234</td>
<td>348</td>
<td>2.30</td>
<td>9.98</td>
</tr>
<tr>
<td>Minimum op 1</td>
<td>45</td>
<td>190</td>
<td>30,349</td>
<td>160.2</td>
<td>5.01</td>
<td>26.39</td>
</tr>
<tr>
<td>% of 80</td>
<td>83%</td>
<td>38%</td>
<td>46%</td>
<td></td>
<td>218%</td>
<td>46%</td>
</tr>
<tr>
<td>Minimum op 2</td>
<td>35</td>
<td>181</td>
<td>21,040</td>
<td>116.5</td>
<td>6.91</td>
<td>38.07</td>
</tr>
<tr>
<td>% of 80</td>
<td>79%</td>
<td>26%</td>
<td>33%</td>
<td></td>
<td>300%</td>
<td>33%</td>
</tr>
</tbody>
</table>

- 2012 IAM MSxk silviculture costs $801/ha
- March 30, Random Length composite $298/Mfbm
- Factors not incorporated:
  - Changes in grade distribution due to increased wane (higher tapered logs)
  - Changes in grade distribution due to larger knots (low density stands)
Impact of minimum operability

- So what does this mean?

<table>
<thead>
<tr>
<th>Volume (m$^3$/yr)</th>
<th>Short term</th>
<th>Mid term</th>
<th>Long term</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standing mature timber</td>
<td></td>
<td></td>
<td>LTHL</td>
</tr>
<tr>
<td>Regenerated stands</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Years from now
Impact of minimum operability

• Earlier operability

volume (m$^3$/yr)

short term

mid term

long term

standing mature timber

regenerated stands

LTHL

years from now
Impact of minimum operability

- Later operability

<table>
<thead>
<tr>
<th>Volume (m$^3$/yr)</th>
<th>Short term</th>
<th>Mid term</th>
<th>Long term</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standing mature timber</td>
<td></td>
<td></td>
<td>LTHL</td>
</tr>
<tr>
<td>Regenerated stands</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

years from now
Timber Quality Situation

- Provincial target of 10% of AAC consists of premium logs.
- Current projection is for quality (piece size) to decline because of shorter rotation ages.
- Long rotation management plus incremental silviculture can have an upwards effect on trend.

<table>
<thead>
<tr>
<th>Quality Class</th>
<th>Products</th>
<th>Species</th>
<th>Min Stand DBH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Premium Sawlog</td>
<td>Peelers, poles, house-logs and high grade sawlogs</td>
<td>All except deciduous</td>
<td>&gt;32.5</td>
</tr>
<tr>
<td>Standard Sawlog</td>
<td>Sawlogs</td>
<td></td>
<td>27.5-32.5</td>
</tr>
<tr>
<td>Merchantable</td>
<td></td>
<td></td>
<td>&gt;12.5, 15 or 17.5 (depending on initial DBH utilization spec.)</td>
</tr>
</tbody>
</table>
Habitat Quality / Non-Timber

- Information over and above what is in legislation/policy?
- Climate change will alter ecosystems, species selection?
- Interaction with fire management?
Working Targets

• **Timber Supply**
  – Short term (0-20)
    • Minimize non recoverable losses where practical
  – Mid Term (20-100 yrs)
    • Minimize the depth and duration of trough
  – Long term (100yrs+)
    • ???????????

• **Timber Quality**
  – Maintain diversity of stand types and ages across the land base – range of products (house logs/peelers, MSR)

• **Habitat / Non Timber**
  – Minimize negative impacts on ecosystems and species
  – Manage consistently with LRMP guidelines/policy
Major Silviculture Strategies – Timber Supply

• Fertilization
• Genetic improvement
• Species mix
• Rehabilitation
• Secondary structure and management
• Harvest priorities
• Economic constraints? Haul distances?
• What are the current strategies?
Major Silviculture Strategies – Timber Quality

• ?
Major Silviculture Strategies – Habitat Quality/non-timber

- Habitat Supply beyond regulations/legal/policy
  - ?
- Climate change
  - ?
- Fire management
  - ?