Silviculture Strategy Workshop
Prince George, B.C.
January 17th and 18th, 2012
Past and Existing Silviculture Strategies

- A Type 1 Strategy in March 2000.

- An update in March 2003 to incorporate the changes resulting from TSR II and the MPB epidemic.

- Another update in March 2006 to further address the MPB epidemic.

- Type 2 Strategy completed in March 2008.
Methodology

1. Key issues

2. Review and revise (?) objectives relative to the key issues.

3. Review key silviculture strategies and, where necessary, revise or delete regimes or develop new regimes.

4. Research and development of additional potential strategies and treatment regimes.
Methodology Cont’d

5. Evaluation and Analysis of the key scenarios and selection of a preferred strategy.

6. Development of an updated 5-year silviculture program.

7. Compilation of a draft report to be reviewed by selected constituents.

Methodology Cont’d

- Analysis
  - Forest estate modeling.
  - Forest-level models input.
  - Stand level economics needs discussion (NPV).
Methodology Cont’d

- Stand level economics may not work for mid term mitigation.

- Discount rate.

- Differences in NPVs more relevant than details.

- Financial rotation?
Prince George TSA Overview

Previous Analysis and Identification of Key Issues
Large TSA with a total area of almost 8 million ha

THLB around 3 million ha depending on the analysis;
  - land withdrawals;
  - economic operability definition
<table>
<thead>
<tr>
<th>Analysis</th>
<th>Ft. St. James</th>
<th>Vanderhoof</th>
<th>Prince George</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>TSR 2</td>
<td>1,326,164 ha</td>
<td>784,670 ha</td>
<td>1,277,341 ha</td>
<td>3,388,145 ha</td>
</tr>
<tr>
<td>Expedited</td>
<td></td>
<td></td>
<td></td>
<td>3,325,683 ha</td>
</tr>
<tr>
<td>FESL 2008</td>
<td>1,228,777 ha</td>
<td>751,205 ha</td>
<td>1,323,259 ha</td>
<td>3,303,241 ha</td>
</tr>
<tr>
<td>TSR 4</td>
<td>978,917 ha</td>
<td>739,757 ha</td>
<td>1,377,451 ha</td>
<td>3,096,125 ha</td>
</tr>
</tbody>
</table>
THLB 3,096,125 ha

Most significant netdown factors reducing THLB after non-forest etc:

- not economical (939,390 ha), problem forest types (143,945 ha)
- ungulates (127,941 ha), riparian and WTP (353,759 ha), terrain (162,149 ha)
- parks
TSA Overview

History of the AAC
## TSA Overview

<table>
<thead>
<tr>
<th>Year</th>
<th>AAC m$^3$</th>
<th>MPB Uplift</th>
<th>Partitions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1996</td>
<td>9,363,661</td>
<td></td>
<td>C/H 290,000</td>
</tr>
<tr>
<td>2002</td>
<td>12,244,000</td>
<td>3,000,000</td>
<td>C/H 110,000 deciduous 160,000 Supply Block A 400,000</td>
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<td>2004</td>
<td>14,944,000</td>
<td>5,700,000</td>
<td>C/H 110,000 deciduous 160,000 Supply Block A 400,000</td>
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<tr>
<td>2011</td>
<td>12,500,000</td>
<td>3,256,000</td>
<td>C/H 23,000 deciduous 160,000 Non pine etc 3.5 million</td>
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</tbody>
</table>
TSA Overview

Leading Species in the THLB

- Balsam: 17%
- Spruce: 29%
- Pine: 45%
- Other: 9%
TSA Overview
TSA Overview

Timber Supply
TSA Overview

Statements from 2008:

- Prince George TSA does not have a big mid-term timber supply problem. Large growing stock in Fort St. James.
- Social and economic problem.
- Constraints: no growing stock locally, old growth, economically available timber (Ministry analysis, large impact).
- Harvest attacked pine stands, immediate rehab 😊
Antti’s dogma:

• The timber in Vanderhoof will run out due to the accelerated harvesting of the infested pine stands, or the decaying of those stands that will not get harvested.

• In the Prince George Forest District, the future harvest is heavily constrained by the PG TSA old growth order.

• This leaves only one option: if the TSA is to maintain its timber supply at reasonable levels a large portion of the harvest in the late short term and medium term must come from the Fort St. James Forest District. Also, a significant portion of this harvest is going to be balsam.
MPB is most important issue affecting timber supply.

Several past analyses have predicted the impact.

In spite of differences in analyses, similar trends.

Depending on the analysis the mid term is predicted to be between 6.4 million and 7.3 million and the long term between 8.7 million and 9.2 million.

Differences caused by G&Y, THLB, shelf life assumptions.
Latest TSR predicted a drop down to 5 million.
Key Issues

MPB Implications
“Shelf Life”
Mountain Pine Beetle Cumulative Kill, 2026 (projected)
MPB Implications, shelf life

- Varies depending on area and end use.
- Harvesting of stands that have been dead up to 10 years occurs.
- Stands tend to blow down before end of shelf life.
- After 10 years, harvest opportunities diminish.
- Timber supply projections rely on continued harvest of pine leading stands.
- Silviculture cost may limit salvage, not logging cost.
MPB Implications

- Unsalvaged pine stands; the less the better.
- Focus on pine has been generally successful.
- AAC vs. Harvest

<table>
<thead>
<tr>
<th>Category</th>
<th>2006</th>
<th>2,007</th>
<th>2,008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
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<tr>
<td>AAC</td>
<td>14,944,000</td>
<td>14,944,000</td>
<td>14,944,000</td>
<td>14,944,000</td>
<td>12,500,000</td>
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<td>Harvest</td>
<td>12,664,212</td>
<td>11,483,426</td>
<td>10,941,650</td>
<td>11,245,628</td>
<td>10,804,670</td>
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</tr>
<tr>
<td>Surplus</td>
<td>2,279,788</td>
<td>3,460,574</td>
<td>4,002,350</td>
<td>3,698,372</td>
<td>1,695,330</td>
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</tr>
<tr>
<td>% of AAC</td>
<td>85%</td>
<td>77%</td>
<td>73%</td>
<td>75%</td>
<td>86%</td>
<td></td>
</tr>
<tr>
<td>% Pine</td>
<td>72%</td>
<td>72%</td>
<td>76%</td>
<td>77%</td>
<td>74%</td>
<td></td>
</tr>
</tbody>
</table>
MPB Implications

- Ministry predicts that that 160 million m\(^3\) will still come from salvaging pine stands. Reasonable assumption?

- Fort St. James pine.

- This would leave approximately 70 million m\(^3\) (200,000 ha, representing 500,000 m\(^3\) in annual cut in the long and medium term) unsalvaged.

- Harvesting attacked pine stands and immediately rehabbing them would have a positive impact on timber supply. 7% mid-term impact in FESL 2008 analysis.

- Biofuel pipedream.

- Fire threat.
Land Base Constraints

- No growing stock locally (mostly Vanderhoof, to some extent PG).

- Old growth targets over the TSA.

- Old growth targets locally. At the TSA level, the PG OGO has a small impact, locally its impact is significant.
  - In the Prince George Forest District the mid term timber supply is dependent on older non-pine leading conifer stands.

- How long is old dead pine considered old?
Land Base Constraints

Old Forest over the Planning Horizon

- Contribution from THLB
- Contribution from NHLB
- Target
- NDU_D2

% of Forest Area vs Years from today

Legend:
- % of Forest Area:
  - 0%
  - 20%
  - 40%
  - 60%
  - 80%
  - 100%

- Years from today:
  - 0
  - 25
  - 50
  - 75
  - 100
  - 125
  - 150
  - 175
  - 200
  - 225
  - 250
## Land Base Constraints

- **Highlighted units predicted to constrain timber supply**

<table>
<thead>
<tr>
<th>NDU/Merged Biogeoclimatic Units</th>
<th>Unit Label</th>
<th>CFLB (ha)</th>
<th>THLB (ha)</th>
<th>Target Area (ha)</th>
<th>Old Area (ha)</th>
<th>Surplus/Deficit (ha)</th>
<th>Old (ha), Dead Pine not old</th>
<th>Surplus/Deficit</th>
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</thead>
<tbody>
<tr>
<td>Boreal Foothills - Mountain ESSFmv 2</td>
<td>A1</td>
<td>7,031</td>
<td>0</td>
<td>2,320</td>
<td>5,484</td>
<td>3,163</td>
<td>4,745</td>
<td>2,425</td>
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<tr>
<td>McGregor Plateau ESSFwk 2</td>
<td>A2</td>
<td>15,782</td>
<td>8,472</td>
<td>4,103</td>
<td>7,109</td>
<td>3,005</td>
<td>7,108</td>
<td>3,004</td>
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<tr>
<td>McGregor Plateau SBS mk 1</td>
<td>A3</td>
<td>69,757</td>
<td>55,520</td>
<td>8,371</td>
<td>28,076</td>
<td>19,705</td>
<td>23,063</td>
<td>14,692</td>
</tr>
<tr>
<td>McGregor Plateau SBS wk 1</td>
<td>A4</td>
<td>227,722</td>
<td>180,609</td>
<td>59,208</td>
<td>58,141</td>
<td>(1,067)</td>
<td>54,949 (4,714)</td>
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<tr>
<td>Moist Interior - Mountain ESSFmv 3</td>
<td>A5</td>
<td>14,085</td>
<td>10,106</td>
<td>4,085</td>
<td>4,019</td>
<td>(66)</td>
<td>2,048 (2,037)</td>
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<td>Moist Interior - Mountain ESSFwk 1</td>
<td>A6</td>
<td>16,388</td>
<td>12,203</td>
<td>4,752</td>
<td>7,365</td>
<td>2,613</td>
<td>7,266</td>
<td>2,513</td>
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<tr>
<td>Moist Interior - Plateau SBS mh</td>
<td>A7</td>
<td>4,268</td>
<td>2,091</td>
<td>726</td>
<td>1,246</td>
<td>521</td>
<td>1,246</td>
<td>521</td>
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<tr>
<td>Moist Interior - Plateau SBS mc 2</td>
<td>A8</td>
<td>9,306</td>
<td>6,902</td>
<td>1,117</td>
<td>2,198</td>
<td>1,081</td>
<td>476 (641)</td>
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<tr>
<td>Moist Interior - Plateau SBS mw</td>
<td>A9</td>
<td>34,157</td>
<td>26,384</td>
<td>4,099</td>
<td>5,208</td>
<td>1,109</td>
<td>2,710 (1,388)</td>
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<tr>
<td>Moist Interior - Plateau SBS wk 1</td>
<td>A10</td>
<td>40,565</td>
<td>31,567</td>
<td>6,986</td>
<td>14,741</td>
<td>7,845</td>
<td>12,907 (6,011)</td>
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<td>Moist Interior - Plateau SBS dw 2</td>
<td>A11</td>
<td>129,857</td>
<td>100,431</td>
<td>15,583</td>
<td>31,507</td>
<td>15,924</td>
<td>12,829 (2,754)</td>
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<td>Moist Interior - Plateau SBS dw 3</td>
<td>A12</td>
<td>161,537</td>
<td>116,907</td>
<td>19,384</td>
<td>35,179</td>
<td>15,795</td>
<td>18,270 (1,115)</td>
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<tr>
<td>Moist Interior - Plateau SBS mk 1</td>
<td>A13</td>
<td>361,246</td>
<td>266,708</td>
<td>43,493</td>
<td>99,889</td>
<td>56,540</td>
<td>60,182 (16,833)</td>
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<tr>
<td>Wet Mountain ESSFwk 2</td>
<td>A14</td>
<td>124,795</td>
<td>21,405</td>
<td>62,398</td>
<td>95,354</td>
<td>32,957</td>
<td>95,342 (32,945)</td>
<td></td>
</tr>
<tr>
<td>Wet Mountain ESSFwc 2</td>
<td>A15</td>
<td>16,375</td>
<td>105</td>
<td>13,755</td>
<td>10,541</td>
<td>(3,214)</td>
<td>10,541 (3,214)</td>
<td></td>
</tr>
<tr>
<td>Wet Mountain SBS wk 1</td>
<td>A16</td>
<td>35,545</td>
<td>25,331</td>
<td>9,242</td>
<td>14,466</td>
<td>5,224</td>
<td>14,401 (5,159)</td>
<td></td>
</tr>
<tr>
<td>Wet Mountain SBS wk v</td>
<td>A17</td>
<td>120,103</td>
<td>65,750</td>
<td>60,052</td>
<td>83,409</td>
<td>23,358</td>
<td>82,763 (22,712)</td>
<td></td>
</tr>
<tr>
<td>Wet Trench - Mountain Eswcp</td>
<td>A18</td>
<td>2,212</td>
<td>57</td>
<td>1,770</td>
<td>1,643</td>
<td>(127)</td>
<td>1,640 (129)</td>
<td></td>
</tr>
<tr>
<td>Wet Trench - Mountain ESSFwk 2</td>
<td>A19</td>
<td>63,629</td>
<td>14,032</td>
<td>30,542</td>
<td>51,395</td>
<td>20,854</td>
<td>51,279 (20,737)</td>
<td></td>
</tr>
<tr>
<td>Wet Trench - Mountain ESSFwc 3</td>
<td>A20</td>
<td>97,570</td>
<td>6,582</td>
<td>78,056</td>
<td>80,457</td>
<td>2,401</td>
<td>80,334 (2,277)</td>
<td></td>
</tr>
<tr>
<td>Wet Trench - Mountain ESSFwk 1</td>
<td>A21</td>
<td>116,871</td>
<td>60,961</td>
<td>56,098</td>
<td>66,784</td>
<td>10,687</td>
<td>66,574 (10,476)</td>
<td></td>
</tr>
<tr>
<td>Wet Trench - Valley ICH wk 3</td>
<td>A22</td>
<td>28,287</td>
<td>14,221</td>
<td>14,992</td>
<td>17,361</td>
<td>2,370</td>
<td>17,177 (2,185)</td>
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<tr>
<td>Wet Trench - Valley ICH wk 2</td>
<td>A23</td>
<td>151,965</td>
<td>69,051</td>
<td>80,514</td>
<td>91,413</td>
<td>10,872</td>
<td>91,086 (10,545)</td>
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<tr>
<td>Wet Trench - Valley SBS wk 1</td>
<td>A24</td>
<td>135,470</td>
<td>104,945</td>
<td>40,641</td>
<td>35,281</td>
<td>(5,360)</td>
<td>32,509 (8,132)</td>
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<tr>
<td>Wet Trench - Valley SBS wk v</td>
<td>A25</td>
<td>159,117</td>
<td>97,637</td>
<td>73,194</td>
<td>69,302</td>
<td>(3,892)</td>
<td>66,080 (7,114)</td>
<td></td>
</tr>
</tbody>
</table>

**Note:** The table lists the predicted timber areas and old forest areas for various NDU/Merged Biogeoclimatic Units, showing the surplus or deficit in timber supply.
Land Base Constraints

- **Age Class Distribution**

- The small size of age class 3 limits forest management options to some extent. Age class 2.

- **Quality of Stands Currently AC 1, 2 and 3**

- From 30 to 35 years on 30% and later 60% of harvest predicted to come from pine leading stands. Does the quality of these plantations support this?

- 20% to 40% of mid term timber supply is predicted to come from balsam leading stands. Fort St. James.
Land Base Constraints

- Ungulates and Visuals not significant constraints.
What is Quality?
Factors

- Dead pine stands – recovery and quality in the short term
- Remaining non-pine stands – short and mid-term quality
- Existing immature pine and other – mid-term quality
- Minimum harvest criteria – mid-term quality
- Future markets for forest products- short to long term
- Forest health and fire protection affect above
Timber Quality

Current Situation

- Depends on the operation, OSB in 100-mile 70 m³/ha
- Recover going down but pine still useable in PG TSA
- Piece size down to 0.2 m² for pine, 0.13 – 0.14 in some TSAs
- Spruce pressures
- Pulp
Timber Quality

Future

- Desires depend on operations; stud vs. larger products
- No management explicitly for quality in TSA; tenure security
- Full site occupancy, healthy stands important
- Planting densities and future options
- Desired future condition?
- Fibre rather than piece size?
Future

- Is reforestation generally successful?

- Are current planting/growing densities producing the quantity and quality of timber supply that is acceptable?

- How do we “guarantee” that the timber that we depend on in the near future is resilient and protected? Fire, pests.

- Smaller piece sizes may buy timber supply, but at what cost?
Type 1 and Type 2

Mitigate the effects of the MPB epidemic on the timber supply through incremental silviculture.

- Prompt rehabilitation of NRL areas
- Increase the growth and yield of natural non-pine leading stands
- Increase the growth and yield of existing non-pine leading managed stands
- Pine likely ok now
- Assess current backlog and impeded stands and treat where necessary/beneficial
Existing Strategies

Type 1 and Type 2

Manage the fire risk to timber supply caused by the MPB epidemic.

- Prompt rehabilitation of NRL areas
- Prescribed burning
- Fire breaks, general planning considering fire risk
Existing Strategies

Type 1 and Type 2

Initiate a review of basic silviculture practices in the context of the MPB epidemic and future risks of pests and diseases.

- Planting/regeneration densities
- Species composition
Existing Strategies

Type 1 and Type 2

Keep options open for the future.

- Planting/regeneration densities
- Species composition
- Density control
- Fertilization
## Type 1 and Type 2

**Targets unreasonable given the potentially available funding.**

<table>
<thead>
<tr>
<th>Activity</th>
<th>Rank</th>
<th>Year 1 ha</th>
<th>Year 2 ha</th>
<th>Year 3 ha</th>
<th>Year 4 ha</th>
<th>Year 5 ha</th>
<th>Total ha</th>
</tr>
</thead>
<tbody>
<tr>
<td>NRL Reforestation Strategy</td>
<td>A</td>
<td>500,000</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>500,000</td>
</tr>
<tr>
<td>NRL Reforestation</td>
<td>A</td>
<td>5,000</td>
<td>10,000</td>
<td>20,000</td>
<td>20,000</td>
<td>20,000</td>
<td>75,000</td>
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<tr>
<td>Backlog Surveys-reclassification and treatment scheduling, survey of impeded strands included.</td>
<td>A</td>
<td>50,000</td>
<td>50,000</td>
<td>10,000</td>
<td></td>
<td></td>
<td>110,000</td>
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<tr>
<td>Fert. spruce leading stands</td>
<td>B</td>
<td>2,000</td>
<td>2,000</td>
<td>2,000</td>
<td>2,000</td>
<td>2,000</td>
<td>10,000</td>
</tr>
<tr>
<td>Backlog impeded stands</td>
<td>B</td>
<td>2,500</td>
<td>2,500</td>
<td>1,000</td>
<td></td>
<td></td>
<td>6,000</td>
</tr>
<tr>
<td>Backlog NSR</td>
<td>B</td>
<td>1,000</td>
<td>1,000</td>
<td>500</td>
<td></td>
<td></td>
<td>2,500</td>
</tr>
<tr>
<td>Repressed stand surveys</td>
<td>C</td>
<td>5,000</td>
<td></td>
<td>0</td>
<td>0</td>
<td></td>
<td>5,000</td>
</tr>
<tr>
<td>Repressed stand treatments</td>
<td>C</td>
<td>500</td>
<td>500</td>
<td></td>
<td></td>
<td></td>
<td>1,000</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td>566,000</td>
<td>66,000</td>
<td>33,500</td>
<td>22,000</td>
<td>22,000</td>
<td>709,500</td>
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</table>
## Existing Strategies

### Type 1 and Type 2

- **Targets unreasonable given the potentially available funding.**

<table>
<thead>
<tr>
<th>Activity</th>
<th>Rank</th>
<th>Year 1 $</th>
<th>Year 2 $</th>
<th>Year 3 $</th>
<th>Year 4 $</th>
<th>Year 5 $</th>
<th>Total $</th>
</tr>
</thead>
<tbody>
<tr>
<td>NRL Reforestation Strategy</td>
<td>A</td>
<td>250,000</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>250,000</td>
</tr>
<tr>
<td>NRL Reforestation</td>
<td>A</td>
<td>6,500,000</td>
<td>13,000,000</td>
<td>26,000,000</td>
<td>26,000,000</td>
<td>26,000,000</td>
<td>97,500,000</td>
</tr>
<tr>
<td>Backlog Surveys-reclassification and treatment scheduling survey of impeded strands included.</td>
<td>A</td>
<td>1,650,000</td>
<td>1,650,000</td>
<td>330,000</td>
<td>0</td>
<td>0</td>
<td>3,630,000</td>
</tr>
<tr>
<td>Fert. spruce leading stands</td>
<td>B</td>
<td>972,000</td>
<td>972,000</td>
<td>972,000</td>
<td>972,000</td>
<td>972,000</td>
<td>4,860,000</td>
</tr>
<tr>
<td>Backlog impeded stands</td>
<td>B</td>
<td>2,475,000</td>
<td>2,475,000</td>
<td>990,000</td>
<td>0</td>
<td>0</td>
<td>5,940,000</td>
</tr>
<tr>
<td>Backlog NSR</td>
<td>B</td>
<td>990,000</td>
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<td>Repressed stand surveys</td>
<td>C</td>
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<td>Repressed stand treatments</td>
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<td><strong>Total $</strong></td>
<td></td>
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<td>19,737,000</td>
<td>28,787,000</td>
<td>26,972,000</td>
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<td>116,120,000</td>
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The Minister’s Discussion Paper

- Maintain or improve forest and range health, resiliency and diversity.

- Maximize value of the diversity of forest and range products over the longer term:
  - Maintain genetic diversity.
  - Facilitate adaptation to climate change.
  - Increase the ability of BC’s forest and range ecosystems to sequester carbon.
The Minister’s Discussion Paper and the FMP Idea

Objectives for:

- Species at the landscape
- Retention at the landscape
- Timber (AAC)
- The Land Based Investment Strategy
Existing Strategies

Licensee SFM Plans
Potential Strategies

- The stands and sites targeted for treatments
- What will residual stands look like
- Costs
- Timber supply and quality impacts (timing and magnitude)
- Desired future condition
- Difficulties or uncertainties
Potential Strategies

1. Basic Reforestation
   - Planting versus natural regeneration
   - Initial densities
   - Species mixes (ecology, productivity and reliability)
   - Genetically improved seed
Potential Strategies

2. Reforestation of Unharvested MPB Stands
   - Non-starter?
   - If treated, which ones?
   - What treatments at what cost?
3. Backlog Reforestation and Treatment of Impeded Stands

- How significant?
- Protection of previous investments makes sense
Potential Strategies

3. Fertilization

- Likely the most attractive option to increase timber supply.
Potential Strategies

4. Density Management

- Juvenile spacing
- Commercial thinning
- May not be on top of list.
- Future