NSC 2021 Winter Webinar: Innovations in Northern BC Reforestation

March 25, 2021

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Operational Implementation of Landscape Level Silviculture Strategies

TIM PENNINGA, RPF
Are we growing sawlogs or pulp in our managed stands?

Do we know?

Why does it matter?

Can we do anything about it?
BC Interior lumber is world renowned for its high quality – primarily sourced from natural stands.

What component of structural grade lumber will our managed stands produce?
Factors that downgrade lumber

- Mature Wood:
  - Ring shake
  - Pocket rot
  - Heart rot
  - Wane

- Managed Stands:
  - Wane
  - Knot size

Examples of sawing of pine classified according to the norm NF EN 1611-1

Choice G2 – 0  Choice G2 – 1  Choice G2 – 2  Choice G2 – 3

#2 (structural grades)  #3/Econ
Off-grade lumber is a reality in mature stands and typically represents 1/3 of production. In most markets, Economy/Utility is subsidized by the #2 and better lumber. In other words, it does not have sufficient value to pay for roads/bridges/silviculture/admin.

Pulp/bioenergy logs need the sawlog to pay for infrastructure and overhead.
Stem Defects

- CGNF assumes lumber can only be cut from straight logs that are >3m long
- 50% of tree volume is in bottom third
- Defects that affect merchantability in managed stands:
  - Crooks
  - Forks
  - Cat face
Log quality concerns are primarily limited to pine
Pine will not be planted in areas of high retention

- Pine silvics:
  - Low shade tolerance
  - High frost tolerance
  - High drought tolerance
  - High nutrient deficiency tolerance

- Low angle of sun as you move further north → long shadows
Pine will not be planted at higher elevations.

578-1: SU1: ESSFmc Fresh: 51.2 ha: n=26
Pine will not be planted in small openings

- Shade and lack of wind (snow accumulation) → spindly pine → creates high risk of snow breakage
Avoid pine in areas of high rust

- Spatially define areas of high rust risk
  - Perched water table
  - Prevalence of alternate host
  - Low slope
  - Near water body (lake or large wetland)
- High rust areas are often also highly susceptible to frost damage → black spruce??
- Will pine be at lower risk to rust after a large fire?
- Mixed bag is often the prescription
Pine will be avoided in rich/hygric sites

- Sx can handle a little shade if overtopped by competing brush
- Higher SI $\rightarrow$ increasing annual growth $\rightarrow$ increasing susceptibility to snow damage
- Forks/crooks create a saddle for snow to accumulate $\rightarrow$ repeat the cycle

“Pines in mixtures with spruce grow like pines at low density”

Example planting prescription of unmix-the-mix

- Requires a field visit to make the correct decision
- Needs to be practical:
  - Planter needs to implement it so consider bag-ups and direction of travel
  - Use obvious biophysical features where possible
- Ingress and on-block retention will diversify species on-site
Reforestation decisions & volume at rotation

**EXAMPLE:** Bulkley TSR Analysis Unit 8 – ESSFmc 06, 07 (oak fern, devil’s club)
- Bl, Sx preferred, Pl acceptable. TSS = 1200 and MSS = 700
- TSR yield curve assumes:

<table>
<thead>
<tr>
<th>Species</th>
<th>Planted</th>
<th>Plant %</th>
<th>SI</th>
<th>GW</th>
<th>Naturals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Se</td>
<td>495</td>
<td>45%</td>
<td>18.8</td>
<td>8</td>
<td>0</td>
</tr>
<tr>
<td>Bl</td>
<td>385</td>
<td>35%</td>
<td>14.9</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Pl</td>
<td>220</td>
<td>20%</td>
<td>18.3</td>
<td>7</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>1100</td>
<td></td>
<td></td>
<td></td>
<td>0</td>
</tr>
</tbody>
</table>

- Minimum yield modelled by substituting 1100 planted with 700 planted.
- Possible yield modelled by substituting 1100 planted with 1200 planted.
- Actual yield modelled by substituting 1100 planted and 0 naturals with survey data.

Note the different SI and GW values. These have big impacts on projected yields.

Source: Eleanor McWilliams
Survey Data

<table>
<thead>
<tr>
<th>Species</th>
<th>Planted</th>
<th>Naturals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Se</td>
<td>567</td>
<td>167</td>
</tr>
<tr>
<td>Bl</td>
<td>457</td>
<td>1163</td>
</tr>
<tr>
<td>Pl</td>
<td>133</td>
<td>59</td>
</tr>
<tr>
<td>Total</td>
<td>1157</td>
<td>1389</td>
</tr>
</tbody>
</table>

Source: Eleanor McWilliams

Minimal volume projected for naturals, but provide buffer
Why enhanced densities?

- Increases value (but not volume)
- Creates opportunity for commercial thinning
- Hedge against climate change/forest health
- More closely mimics natural pine succession → faster crown closure and crown lift → smaller branches/knots
Opportunities for Improvement; The Big Picture

• Silviculture is the art and science of harvesting, regenerating and tending forests to achieve desired objectives for timber and non-timber products and services.

• Silviculture must be integrated into and better supported by the Forest Management Framework
Opportunities for Improvement; The Big Picture

• Regulations are best used to prevent disaster
  while on the other hand
• Incentives are best way to achieve preferred outcomes
• We need long term objectives and short, medium and long-term approaches to achieve these objectives
Opportunities for Improvement; Short Term

- Forest Level Planning
- Silviculture zoning
- Develop silviculture regimes for likely timber sites
- Implementation to focus on site preparation and reforestation on timber sites to be harvested by licensees;
  - Need to find a better way for gov’t to be able to invest in “enhanced reforestation” on areas logged by licensees;
  - Also need mechanisms to share risk between licensees and gov’t to foster innovative plans and practices
Barriers to implementation of landscape strategies

- Higher level plan with spatially explicit zonations
- FN involvement
- Appropriate cost recognition
  - Approved FSP or ISS with enhanced stocking standard
  - Stumpage recognition
- Security of operating areas (eg area based tenure) or security of
- Broad implementation by all operators
- Silviculture specialists
- Stocking standards for other values: grizzly bear, caribou, high bio emphasis, etc