Ecosystem Recovery Following MPB Attack: A Case of Shifting Values

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Massive outbreak of MPB impacting lodgepole pine (*Pinus contorta*) stands over most of central and southern BC.
Wanted to examine changes to the ecosystem in response to MPB as a novel disturbance agent at this scale
50 Plots established in 2005 to determine effects of MPB on ecosystem/tree properties over time

- 10 mesic sites > 70% pine and >80 yrs old in each of 3 different climatic regions (biogeoclimatic subzones);
- 10 sites impacted by MPB then burned by wildfire;
- 10 sites on dry pine lichen sites
Research examining

- tree fall down rates (timber value loss, fire risk);
- advanced regeneration release and natural regeneration establishment and growth (unmanaged stand yield - AAC effects, species composition prediction);
- changes in stand structure and habitat features (maintenance of biodiversity values);
- lichen survival and growth (maintenance of caribou forage value).
Focus of this presentation

- Mesic (average moisture regime) unburned sites
- Changing timber and habitat values
General View

- Dead forest
- Focus on recovery of timber value
- More recent concerns over effects on water supply
Very high mortality of larger stems
Value of live understory

24 of 30 sites largest 500 sph pole size (> 7.5cm dbh), rest of sites sapling size (1.3m ht to 7.4cm dbh)
Clearcut equivalency

Examined median diameter of largest 500 sph and compared it to regeneration performance data from plantations established after clearcutting.

10 of 30 equivalent to 25+ year old plantation, 14 ~15 – 20 year old plantation and 6 ~10 year old plantation.
Clearcut equivalency

Basal area of 20, 30, 40 year old spruce plantation estimated to be 1 – 3 m²/ha, 7 – 14, 18 - 30 m²/ha respectively
Release response of understory

- Examined height and radial release response of poles, saplings and seedlings for hybrid white spruce (Picea glauca x engelmannii), black spruce (Picea mariana) and subalpine fir (Abies lasiocarpa)
Release of spruce poles (>7.5cm DBH)

Years since MPB attack

Radial increment (mm)

- Sb (n=32)
- Sx (n=55)
Release of spruce saplings (> 1.3 ht < 7.5cm dbh)

Years since MPB attack

Radial increment (mm)

- Sb (n=11)
- Sx (n=24)
Subalpine fir height response

<table>
<thead>
<tr>
<th>Height increment (m)</th>
<th>Pre MPB</th>
<th>Post MPB</th>
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<tbody>
<tr>
<td>&lt;1.3m Ht</td>
<td>0.04</td>
<td>0.116</td>
</tr>
<tr>
<td>&gt;=1.3m Ht, &lt;7.5cm DBH</td>
<td>0.08</td>
<td>0.28</td>
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</tbody>
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- Pre MPB: 118 individuals
- Post MPB: 116 individuals
Black spruce height response

Height increment (m)

- <1.3 m Height
- >=1.3m Ht, <7.5cm DBH
- >=7.5cm DBH

Before MPB:
- 98 individuals

After MPB:
- 16 individuals
- 19 individuals

Pre MPB | Post MPB
Hybrid spruce height response

- <1.3 m Height
- >=1.3m Ht, <7.5cm DBH
- >=7.5cm DBH
Hybrid spruce annual height increments

- Plantation (n=40)
- Understory (n=15)
Larger live trees

- lack of large live trees on the landscape due to level of clearcut salvage
- median of 190 sph live trees >15cm dbh from 30 plots
Snag fall down

- Average of 20% of dead pine down over 5 years
- Liberal estimate that maximum of $\frac{1}{2}$ of this would be utilized = loss of current timber value
- Fall down rate expected to increase due to prevalence of butt rot
Increase in habitat values

Concealed Spaces

Elevated Runways
Habitats formed by snag fall down

- Average of 50% forming concealed spaces and 60% forming elevated runways

Concealed spaces

Elevated runways
Summary

- almost complete mortality of larger diameter Pl leading to focus on salvage harvest to recover timber value;
- advanced regeneration is generally abundant and often equivalent to 20+ yr old clearcut and release is substantial and should help reduce mid-term timber supply problems;
- large live trees will be rare on landscape and generally over 100 sph of potential in unsalvaged stands;
- dead pine is falling to the ground reducing timber value while these same trees are increasing habitat value of the stand.
Management Implications

- focus needs to shift from focus on recovery of timber value to protection of future timber and habitat value;

- unmanaged stands must be assigned a high value even if they are not “old growth” forest since they contain habitat values (large trees, snags and CWD) that will be hard to replicate in managed stands

- how these stands respond to climate change compared to salvaged MPB stands will provide an interesting future comparison
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