



Forest Health How does it affect your world?

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2 Part Story

There is budworm

and then,

There is the rest of th (information is key)





The western spruce budworm

Range of Interior Douglas-fir biogeoclimatic zone



Western spruce budworm defoliation 1909-1995



Western spruce budworm defoliation 1909-2010



Historic WSB defoliation and 2011 defoliation



1. Biology of the budworm

Summer

Fall larval dispersal

Eggs

2nd instar overwinter

Winter

Pupa

Feeding larva

Spring dispersal & budmining



Small larvae disperse on fine threads over tree canopy and to small trees below

- Fall dispersal following hatching
- Spring dispersal following emergence





Density, stand structure and budworm

higher density stands with multiple layers (L1-L4) provide more abundant food and opportunity for feeding larvae

- less budworm mortality during dispersal because larvae have a higher probability of landing on a lower canopy layer than on the ground where larvae would die
- higher quantity of foliage translates into higher numbers of moths; higher fecundity; therefore faster and more extreme population build-ups in these dense multi-layered stands

Density, stand structure and budworm

- damage is spread among more stems in these dense, multi-layered stands
- there is not necessarily higher % stem mortality but there is higher volume loss and individual tree vigour / potential is greatly reduced
- Commercial options for these stands are also reduced and fire hazard increased

Density, stand structure and budworm effects of thinning

- reduces inter-tree competition for moisture & light
- less canopy / foliage source for dispersing budworm therefore higher larval mortality at dispersal
- causes thinning shock / exposure for a time until tree produces fuller crown complement



Density, stand structure and budworm effects of thinning

- 1 to 2 years post-thinning trees are more susceptible to severe damage from budworm due to this reduced foliage complement therefore must spray if defoliation is predicted in this critical time frame
- if stand is already severely defoliated, delay thinning as trees may take longer to respond or even light levels of subsequent defoliation could cause mortality



Density, stand structure and budworm - effects of thinning

 even relatively single-layer stands can be at risk to severe damage (e.g. top-kill) if budworm larval densities are high and/or defoliation events are sustained (consecutive years of defoliation)

 intervention with *B.t.k.* is necessary in this scenario as well

Part 2 - Information is Key

- Limited \$\$ for treatment means limited area to be treated
- Avoid potential problem stands by doing some research in advance







Sources of Information



Forest Health Hazard Maps (RESULTS data) Spatially represents data collected during surveys

Provides source of information for what is known to be out there

Maps for root disease, stem rusts, terminal weevil by district.

Incidence Data - What we know is out there RESULTS survey information





Sources of Information

LBIS Planning Maps

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The maps located on the side tabs are intended to provide support for planning Land Based Investment activities. These maps focus on a variety of planning aspects that should be taken into consideration when planning treatments or on-the-ground activities.

Coastal Silviculture Opportunity Maps Current reforestation opportunities Forest Health Hazard Maps (RESULTS data) Forest Health Hazard Maps (SEDA data) Interior Silviculture opportunity Mapping Provincial 2003-2010 Major Wildfire Mapping Update

Forest Health Hazard Maps (SEDA data)

Spatially represents the potential for damage based on biophysical site conditions (i.e. BEC, elevation)

SEDA Information-What we would expect to be out there





SEDAs

- Stand Establishment Decision Aides
- Published in collaboration with FORREX
- Synthesize information on silvicultural tools and practices that can address FH issues

http://www.forrex.org/stand-establishment-decision-aids-sedas

Hard Pine Stem Rusts

Hazard Rating

BEC Zone*	Drier subzones	Wetter subzones
ESSF		
ICH		mk3 wk
IDF	 dk3+4	
MS	xv	
SBPS	xc dc	mk
SBS	dw1 dw2	mc2 mw

Hazard Rating Key



Silvicultural Considerations

Hosts: Lodgepole Pine

Lodgepole pine are very susceptible to these rusts at an early age. The diseases are most damaging on young trees, and most of the mortality occurs before the age of 20. Mature trees take much longer to kill; thus, infections that have accumulated at a low rate over many years are present, making it appear that older trees have a higher incidence.

Establishment/Regeneration

In high-hazard subzones consider:

- Planting above minimum stocking standard to compensate for disease-induced mortality.
- · Planting with non-susceptible tree species.
- Inter-tree planting with non-susceptible host to compensate for rust mortality.

Plantation Maintenance

- Consider spacing cankered trees in areas with a low to moderate hazard rating.
- Calculate expected rust mortality and incorporate into post-spacing tree density.
- If possible, space in late spring during aeciospore dispersal (most visible) to maximize disease removal. However, the existence of infection by basidiospores through wounds in the autumn is very weak, and may not happen at all. The cost of limiting spacing to certain times will likely outweigh any possible benefits.

Forest Health Website

Forest Health Strategies

- Provincial Forest Health Strategy
- Provincial Forest Health Program
- <u>Provincial Forest Health Implementation Strategy</u>
- <u>TSA Forest Health Strategy Template</u>
- <u>Regional and TSA Forest Health Strategies</u>
- Future Forest Ecosystems

District Priorities and Strategies

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Training & Program Information

- Forest Health Training Portal
- Forest Investment Account Forest Health Activity Eligibility Criteria
- Forest Health Stand Tending Decision Keys UPDATED Coastal | Interior
- Forest Health Information Management Index (links to templates for strategies and tactical plans, data standards, etc.)
- Free-growing Damage Criteria

http://www.for.gov.bc.ca/hfp/health/index.htm

Interior Field Guidelines for the Selection of Free Growing Stands to Space

DECISION KEY FOR THE PRESCRIPTION OF SPACING FREE GROWING STANDS FOR INTERIOR BRITISH COLUMBIA

- 2. What will be the average height of the crop or leave trees after spacing?
 - less than the minimum target height requirement as specified in the Silviculture Prescription (SP) or Pre-Harvest Silviculture Prescription (PHSP) to be considered to be free growing too young for treatment
- 3. What is the average functional live crown ratio for the 800 best crop or leave trees per hectare?

•	<30%	do not treat
•	≥30%	go to 4

Treatment Recommendations

Forest Health Agent: DRA (Armillaria root disease)

Location: Interior subzones

Incidence level based on: Line Transect survey method

	Tree Species	Incidence of root disease based on survey			
Host Susceptibility ¹		Low <2%	Moderate 2-5%	High >5%	
Н	S, Fd, B	A ²	I	I.	
М	Hw, Cw, Pl, Pw	М	М	А	
т	Lw, Py, A, E	м	М	м	

Minimal Disease Treatment Level Alternate Disease Treatment Level Intensive Disease Treatment Level

The Final Words

- Consult with your regional forest health specialist.
- Incremental silviculture can do a lot of good
- Incremental silviculture can do a lot of not so good if forest health is not appropriately considered
- When in doubt: Consult with your regional forest health specialist!

