

100 Mile House Natural Resource District Forest Health Strategy

July 31, 2019 – March 31, 2020



Ministry of
Forests, Lands, Natural
Resource Operations
and Rural Development

Endorsed By:

A handwritten signature in black ink, appearing to read "Pat Byrne", written over a horizontal line.

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Date: Sept. 26, 2019

Executive Summary

The purpose of the 2019-20 100 Mile House Natural Resource District Forest Health Strategy is to provide operational planners, reviewing agencies, and approval authorities with information of forest health risks, issues, and best management practices.

Updates of Note 2019-20:

- Alignment with the Williams Lake TSA Forest Health Strategy.
- Priority and ranking of Forest Health factors in the 100 Mile House Natural Resource District (Table 1).
- Updating strategies for Beetle Management Units.
- New root disease guidance document [Managing Root Disease in British Columbia](#) and [website](#).
- The District will be following the June 2019 Interim Modifications to Biodiversity Update #7b, pending review by the Biodiversity Committee and RMT.

Forest Health Factors to Note for the Coming Field Season:

- The 2017 and 2018 wildfires had a large impact on the 100 Mile House TSA.
- Douglas-fir bark beetle – There are concerns about the continuing impact of the 2017 and 2018 wildfires on the already high Douglas-fir beetle population.
- Drought – 2017 was one of the driest summers on record for the Southern Interior, followed up with another very dry summer in 2018. Drought stress and mortality will likely become more apparent in 2019. There is also potential for secondary insects to cause further mortality to these already stressed trees.
- Western spruce budworm - an aerial spray program of 17,000 hectares will be conducted in the Williams Lake and 100 Mile House TSAs.

For more information on pests and diseases in the 100 Mile House Natural Resource District, please review the [2018 Overview of Forest Health Conditions in Southern British Columbia](#).

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100 Mile House Natural Resource District Forest Health Strategy 2019-20

1.0 Introduction

This District Forest Health Strategy is prepared and compiled under the guidance of the Provincial and Cariboo Regional Forest Health Strategies.

The Provincial government's three key strategic forest health objectives are to:

1. Protect forest resources from pest damage by direct actions when operationally possible and justified;
2. Implement stand establishment activities to minimize the expected impact of known forest pests; and
3. Assess pest impacts on forest values to improve estimates of timber yield from British Columbia's forests and prioritize management treatments.

The purpose of this strategy is to outline the vision for forest health stewardship in the District. It also establishes bark beetle management objectives, specific strategies and procedures, and the current status and extent of priority forest health agents in the 100 Mile House District. Its main focus is the priority forest health agents of the district, with some comments on locally important pests.

The 100 Mile House Forest District (1.24 million hectares) encompasses a land base rich in resource values which provides substantial benefits to local communities. Forestry, ranching, and tourism offer direct and indirect economic benefits to the local community. Other valuable resources include wildlife, water, and recreation which provide significant social and economic benefits.

On November 7, 2018 the AAC for the 100 Mile House TSA went from 1.948 million m³ to 967,805 m³. Roughly half of the cut will continue to be from dead timber, but as Mountain Pine Beetle salvage and fire salvage slow down, there will be an increased focus on harvesting species such as Douglas-fir and spruce heightening the need to protect those forest resources from pest damage. Douglas-fir and spruce beetles are classed as the priority forest health agents. Catastrophic infestations could potentially result in millions of dollars in reduced revenue due to timber losses, degraded lumber values, reduced stumpage values, increased fire hazard, degradation of non-timber resources (e.g. visuals quality, wildlife, recreation), disruptions in forest planning, and long-term impacts on resource sustainability.

A new Timber Supply Review is currently underway, which will consider the effects of the end of the Mountain Pine Beetle salvage and the fire events over the last two years.

2.0 Major Forest Health Agents

Bark Beetles

- Douglas-fir Beetle (*Dendroctonus pseudotsugae*)
- Spruce Beetle (*Dendroctonus rufipennis*)
- Western Balsam Bark Beetle (*Dryocoetes confuses*)

Defoliators

- Western spruce budworm (*Choristoneura occidentalis*)
- Two-Year cycle budworm (*Choristoneura biennis*)
- Aspen Serpentine leafminer (*Phyllocnistis populiella*)

Root Disease

- Armillaria root disease (*Armillaria oystoyae*)
- Tomentosus root disease (*Inonotus tomentosus*)
- Laminated root disease (*Phellinus weirii*)

Stem and Branch Diseases

- Lodgepole pine dwarf mistletoe (*Arceuthobium americanum*)
- Western gall rust (*Endocronartium harknessii*)
- Stalactiform blister rust (*Cronartium coleosporioides*)
- Atropellis canker (*Atropellis piniphila*)
- Commandra blister rust (*Cronartium comandrae*)

Weevils

- White pine weevil (*Pissodes strobi*)
- Lodgepole pine terminal weevil (*Pissodes terminalis*)
- Warren's root collar weevil (*Hylobius warreni*)

Foliage Diseases

- Dothistroma needle blight (*Dothistroma septosporum*)
- Elytroderma needle cast (*Elytroderma deformans*)
- Lophodermella needle cast (*Lophodermella concolor*)
- Aspen Poplar leaf and twig blight (*Venturia macularis*)

Abiotic Injuries

- Wildfire
- Aspen decline
- Drought
- Animal damage
- Windthrow
- Flooding

3.0 Ranking of Forest Health Factors by Importance

Pest species are ranked according to:

- The collective knowledge of the Regional/District forest health specialists.
- Known or suspected impacts to forest resource values.
- Availability of operational detection and treatment methods.
- Costs and benefits of applying detailed detection and treatment activities.
- Distribution of pests and current incidence levels.
- Resources and funding required to implement the necessary management for the pests.

Note: abiotic injuries (i.e. drought, windthrow and animal damage) are not ranked, as the severity can change with each event. Also note that not all forest health factors are ranked, only the more significant pests within the 100 Mile House Natural Resource District.

Table 1: Ranking of Pest Species by Priority for Forest Management Activities

Very High	High	Medium	Low	Very Low
Douglas-fir beetle	Western spruce budworm	Western Balsam Bark beetle	Two-Year cycle budworm	Atropellis canker
		Spruce Beetle	Forest tent caterpillar	
		Dwarf mistletoe	Elytroderma needle cast	
		Tomentosus root disease	Lophodermella needle cast	
		Armillaria root disease	Commandra blister rust	
		Laminated root disease	Stalactiform blister rust	
		Lodgepole pine terminal weevil	Western gall rust	
		White pine weevil	Warren's root collar weevil	

Forest health treatment planning should target highest priority stands first.

4.0 Status of Priority Forest Health Agents

Priority Ranking for Bark Beetles

- Douglas Fir Bark Beetle (IBD) – very high
- Spruce Bark Beetle (IBS) – medium
- Balsam Bark Beetle (IBB) – medium

Douglas-fir Beetle (very high priority)

Douglas-fir Bark Beetle throughout the district has been identified as *suppression* for all BMU's. (refer to pages 11-12 for definitions of BMU strategies)

After increasing in 2015 and 2016, numbers dropped off significantly in 2017 presumably due to the cyclical nature of the pest, as well as active beetle populations being consumed within the Elephant Hill fire boundary. In 2018, populations continued to decline; however, in the Fraser River, Dog Creek, Lac la Hache, Clinton, Kelly Lake, Young Lake, and Canim Lake areas attack was still widespread.

(2018 Overview of Forest Health Conditions in Southern British Columbia)

There was an unprecedented level of wildfire activity in 2017 and 2018 within the 100 Mile House Natural Resource District. A significant amount of the areas burned were mature Douglas-fir or lodgepole pine leading stands. Post-wildfire mortality is expected to increase in the coming years in areas with damaged Fdi stands, largely due to the buildup of Douglas-fir beetle populations.

Timber Area (Ha) affected by Douglas-fir Beetle

Year	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Area (ha)	22,600	2,804	184	184	291	2,587	5,390	14,350	8,733	6,417

(Provincial Overview Report): These areas, in hectares, are all estimates of recorded trace, low, mod and high infestations collected during the provincial aerial overview survey. The survey records all red trees not new infestations. So as the reds turn into greys the infestation area decreases.

Spruce Bark Beetle (medium priority)

Spruce Bark Beetle throughout the district has been identified as *monitor* for all BMU's. (refer to pages 11-12 for definitions of BMU strategies)

Spruce beetle activity has continued to remain at low levels in the 100 Mile TSA. The affected area decreased from 275 ha in 2017, to only a single spot infestation north of Canim Lake in 2018. Licensees have focused harvesting in areas of higher incidence of IBS which has helped reduce populations.

(2018 Overview of Forest Health Conditions in Southern British Columbia)

Timber Area (Ha) affected by Spruce Beetle

Year	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Area (ha)	2,984	9,194	1,706	10,899	416	652	205	130	275	0

(Provincial Overview Report): These areas, in hectares, are all estimates of recorded trace, low, mod and high infestations collected during the provincial aerial overview survey. The survey records all red trees not new infestations. So as the reds turn into greys the infestation area decreases.

Western Balsam Bark Beetle (medium priority)

Western Balsam Bark Beetle throughout the district has been identified as *monitor* for all BMU's. (refer to pages 11-12 for definitions of BMU strategies)

Infestations from Western Balsam Bark Beetle were stable in 2018 and remained largely confined to the eastern and northeast portions of the TSA. A total of 5,506 hectares was mapped near Windy Creek, Deception Creek, and Spanish Lake.

(2018 Overview of Forest Health Conditions in Southern British Columbia)

The only effective control method for the extent of the balsam bark beetle infestation is large harvesting cutting permits. The majority of the balsam bark beetle infestations are located in spruce/balsam mixed stands. For this reason, balsam bark beetle will not be treated unless in conjunction with spruce bark beetle treatment. These stands are very susceptible to blowdown if single tree extraction is conducted. Trap trees can be utilized to contain/concentrate balsam bark beetle.

Timber Area (Ha) affected by Western Balsam Bark Beetle

Year	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Area (ha)	5,422	3,557	5,278	1,567	1,915	4,936	3,695	8,530	5,665	5,506

(Provincial Overview Report): These areas, in hectares, are all estimates of recorded trace, low, mod and high infestations collected during the provincial aerial overview survey. The survey records all red trees not new infestations. So as the reds turn into greys the infestation area decreases.

5.0 Status of Locally Important Pests

Defoliators

Western spruce budworm

In 2018, the area of infestation from budworm was 4,358 hectares of light-severity defoliation. The majority of the infestation areas occurred near Dog Creek and 108 Mile Ranch. Egg mass sampling results indicated rising populations, and that defoliation will likely expand in these areas, as well as near Green Lake, Eightythree Lake, and Big Bar Creek. In 2019 an aerial spray program of 17,000 hectares will be conducted in the Williams Lake and 100 Mile House TSAs, including an area north of Canoe Creek.

(2018 Overview of Forest Health Conditions in Southern British Columbia)

Miners

Pine needle sheathminer decreased from 301 ha in 2017 to 18 ha in 2018 causing some light damage. Aspen serpentine leafminer damage was extensive across the central areas of the TSA, causing 63,815 ha of light to severe damage.

Drought

In 2017, the Southern Interior experienced one of the driest summers on record. The signs were more evident in 2018, with several small, scattered pockets of drought mortality observed in Douglas-fir and lodgepole pine. The total mapped area was 323 hectares. However, it is anticipated that the drought mortality was likely more extensive than mapped, because damage in young stands (less than 10-12 years of age) is generally not visible during overview surveys.

Other

Aspen decline was noted in several scattered areas around Lac la Hache, Forest Grove, Bridge Lake, and the Marble Range. Minimal amounts of two-year cycle budworm, *Dothistroma* needle blight, birch leafminer, and aspen poplar leaf and twig blight were also recorded. No mountain pine beetle was recorded in the TSA.

Other animal and abiotic-caused damage in 2018 included 893 hectares of trace to moderate bear feeding damage. Also recorded was 53 ha of windthrow damage and 51 hectares of flooding damage.

6.0 Management Objectives

For priority forest health factors, the 100 Mile House Forest Health Strategy will follow the specific management objectives as per the Provincial Bark Beetle Strategy.

- Minimize the loss of timber value
- Minimize the loss of Crown revenue
- Minimize the spread of bark beetles

Bark beetles are a natural component of forest ecosystems in British Columbia, and at most times are present at low or endemic levels. Presently there are no populations of any bark beetle that have expanded into what would be considered epidemic levels in the district. If in the case of an epidemic, only prolonged cold winter conditions, or depletion of appropriate host species would collapse their expansion. With adequate resources the endemic portions of the district are still manageable. This strategic plan provides direction to apply the limited resources we have available to where it is most appropriate to help mitigate the rate of spread. Impediments to achieving bark beetle management objectives include biodiversity issues (i.e. OGMA and MDWR), and staffing resources. It will also depend on licensee willingness to focus harvesting in identified areas. This strategy proposes to address all species of priority bark beetles active in this district.

7.0 Specific Strategies

For priority forest health agents, the 100 Mile House Forest Health Strategy will follow the specific strategies and tactics outlined in the Forest Practices Code Guidebooks, Provincial Bark Beetle Strategy, Regional Bark Beetle Plans, and focus on areas identified by the 100 Mile House Natural Resource District Detailed Aerial Survey Maps, depending on resource/staff availability.

Priority Forest Health Agents:

- Douglas-fir Beetle
- Spruce Beetle

Beetle Management Units

A Beetle Management Unit (BMU) is a planning and reporting unit for operational beetle management. Its purpose is to facilitate the implementation of beetle management activities. Resource management objectives will be consistent throughout the unit. Strategies will be evaluated for compatibility with adjacent BMUs. BMUs have been created within the district for prioritising each bark beetle species.

The BMU boundaries for the district will follow the boundaries of Landscape Units. The strategy and the recommended treatment options will be selected after consideration of the status of the outbreak in the BMU, funding allocations, and Provincial direction for bark beetle control strategies.

Beetle Management Unit Strategies

The following four strategies for each or portion of the 100 Mile House BMU's will be implemented. These strategies are selected based on the level of outbreak in an area and the estimated effectiveness of selected treatments in achieving stated objectives. The BMU's will be re-evaluated, usually yearly, as new aerial survey information is received. Revised strategies for each of the BMU's will be adjusted at that time.

1. **Suppression** (Aggressive): This is the most aggressive strategy. It is selected when the infestation status is such that aggressive direct control actions are expected to keep an area at low level of infestation. Areas are lightly infested, and resources for direct control or harvesting and milling capacities equal or exceed the amount of infestation. The intent of the strategy is to reduce or keep the outbreak to a size and distribution that can be managed within "normal resource capability".
2. **Holding** (Containment): The intent of this strategy is to maintain an existing outbreak at a static level. It is a delaying strategy until adequate resources are available, or access created that allow for a more aggressive approach, or to reduce overall loss while waiting for a killing climatic event. This is appropriate in areas with chronic beetle infestations that are too large to deal with using single tree treatments or where access is poorly developed for directed harvesting.
3. **Salvage**: Applied to areas where management efforts would be ineffective in substantially reducing the beetle populations and subsequent levels of damage. Such areas have extensive outbreaks covering a large proportion of susceptible stands. The objective in this case is to salvage affected stands and minimize value loss.
4. **Monitor**: This strategy is applied to areas where management efforts would be ineffective in substantially reducing the beetle population and subsequent levels of damage, or where there is no short term (less than 5 years) possibility of salvaging dead timber. This may be due to management constraints such as wilderness area, Park or ecological reserve, or because access cannot be put in place before substantial merchantable degradation of the dead material occurs.

Table 2: Objectives for Beetle Population Removal for BMU Strategies

Strategy	% of Current Infestation to Treat.	Comments
Suppression (Aggressive)	>80%	Address all current attack within two years. The intent is to “control” the outbreak in that area and stop spread
Holding (Containment)	50-79%	Address the largest proportion of the new infested material, at least close to the rate of expansion. The intent is to maintain beetle populations at a level that can be dealt with annually without huge expansion
Salvage	<50%	The priority is to salvage timber previously attacked to minimise value loss. Relevant in areas where suppression or holding actions are no longer appropriate or feasible.
Monitor	0	No action is required beyond monitoring and recording. This is most appropriate in Parks and Ecological Reserves and in inoperable areas where the outbreak has peaked, salvage is not possible, and there is no chance for any mitigation of further loss.

8.0 Controls and Tactics

A number of tactics are available to achieve the forest health management strategies; these are described as follows:

Douglas-fir Bark Beetle Control Tactics

The following control techniques will be deployed by the ministry's district or regional forest health program when adequate resources are available and possibly in conjunction with the major licensee, BCTS or SSS.

1. Use UTM coordinates from detailed aerial survey, locate red attack and perform detailed ground surveys collecting data on amount of current attack.
2. Prioritize control techniques by amount of current attack and location to access.

General Guidelines:

- a. 1-10 current attack trees:
 - deploy MCH,
 - if access is good harvesting may be considered.
- b. >10 current attack trees:
 - harvest current attack and access trees only,
 - or MCH deployment in remote locations
- c. >100 concentrated current attack (i.e. in 1-2 ha area)
 - cutblock encompassing current attack trees.
 - follow up with trap trees, outside boundary.
3. Harvested bark beetle areas, should have a follow-up treatment such as MCH or trap trees before the next beetle flight to control residual beetles in stumps and slash.
4. Control efforts, in OGMA's, must be done in accordance with the Regional Biodiversity Conservation Strategy (Update #7b) and Land Use Order.
5. Control efforts, in MDWR, must be done in accordance to the Ministry of environment, General Wildlife Measures (GAR).
6. Cutting authorities being planned by major licensees and BCTS in Douglas-fir beetle infested areas should incorporate pre-felling trees on roads and landings prior to beetle flight to concentrate beetle populations into harvest area.
7. Additional post-harvest treatments are described in the post-harvest Mop-Up, and Trap Trees sections.

Spruce Bark Beetle Control Tactics

The following control techniques will be deployed by the ministry's district or regional forest health program when adequate resources are available and possibility in conjunction with the major licensee, BCTS or SSS.

1. Use information from detailed aerial survey to locate infestation centres and outer boundaries of infestations.
2. Where the BMU strategies are aggressive and containment the following control techniques can be utilized:

General Guidelines:

- a. Small infestation site, less than 1 hectare in size and isolated:
 - The infested trees are to be removed by harvesting.
 - If infested trees cannot be removed before the beetle flight the following year because of harvesting conditions, a trap tree program is to be utilized.

The above-mentioned control techniques will be deployed by the ministry's district forest health program and possibility in conjunction with the major licensee BCTS or SSS.

- b. Larger infestation areas, greater than 1 hectare in size:
 - Harvested under a Forest Stewardship plan.
 - Cutting authorities being planned by major licensees and BCTS in spruce bark beetle infestation areas should incorporate the use trap trees, by pre-felling roads and landings.
 - Or bait with attractant semiochemicals in a grid pattern to concentrate beetle populations. Areas grid baited must be assured of harvest within one year. Under the Forest and Range Practices Act (FRPA), FPPR Sec 41, it states that an agreement holder or a timber sales manager who uses trap trees or pheromones to concentrate insect populations must ensure that the insect brood is destroyed before the insects emerge.
 - It is very important to follow up post-harvest with a trap tree program for one or two years to contain beetles coming out of stumps.

Aerial and Ground Surveys

The provincial overview survey is carried out each year to determine the spread of the bark beetles within the district. In 2018 a detailed aerial survey was administered by the Cariboo Region. This flight covered Douglas-fir beetle in the district and the outer edges of the spruce bark beetle attack in the northeast. The 2019 detailed aerial survey is currently underway and is expected to be delivered mid-summer.

Prioritizing BMU's

A priority rating will be given to all beetle management units based on timber types, resource values, adjacent infestations, and past investments. This priority rating then needs to be further evaluated, to consider shelf life, species composition and amount of infestation to better prioritize harvesting.

Beetle Attack Analysis/Susceptibility Maps

This analysis reflects the susceptibility of forest stands to beetle infestation, based on factors such as tree age, elevation, species composition, landscape constraints, current infestation levels, and is calculated from information in the Ministry of Forests' digital inventory ("FIP") files

Small Patch Harvesting

Small patch harvesting is a viable control option for small scattered patch infestations of Douglas-fir and Spruce bark beetle. All harvesting should be followed by a mop-up procedure. Small patch harvesting, utilizing Small Scale Salvage is no longer an effective tool in controlling the mountain pine beetle in this district because of the extent of the infestation.

Harvesting: Clearcutting

Harvesting is the main control for bark beetles, and wherever possible should be completed prior the next beetle flight.

Minimizing Windthrow:

Where Douglas-fir and Spruce are reserved in cutblocks or as wildlife tree patches, cutblocks should be laid out to ensure wind firmness. Reserve areas should have post-harvest inspections conducted to ensure the wind firmness goals were met, and if there is blowdown these trees should be salvaged to prevent the concentration of bark beetles.

Post-Harvest Mop-Up

For Douglas-fir and Spruce bark beetle control, slash and felled trees which may be present after harvesting should be minimized, piled and burned or cut into lengths less than 1m, to prevent population build-up or survival in that material.

Conventional Trap Trees

This tactic is used against Douglas-fir and Spruce bark beetle and takes advantage of the fact that this pest prefers downed material over standing trees; trees are removed between September and before beetle emergence. (For Spruce bark beetle (IBS) this emergence date is just beyond May 15th and Douglas-fir beetle (IBD) Apr 15th.)

Access

Road deactivation should be delayed if future forest health activities are anticipated in an area.

Delivery and Milling Restrictions

All timber infested with bark beetles must be delivered to the mill and debarked between the following time periods:

Douglas-fir	Aug 15 th to April 15 th .
Spruce	Aug 15 th to May 15 th
Lodgepole Pine	no restrictions apply

The mill must be advised of the beetle infested wood. Exemption maybe given to these restrictions if it is determined that these beetles have entered the tree in the present year and will not emerge until the following spring.

Root disease control Tactics

The previous FPC Root Disease Guidebook (1996) has been updated to a new guidance document [Managing Root Disease in British Columbia](#). It is intended to help forest professionals and practitioners navigate the challenges of operating in areas impacted by root disease by providing science-based survey and treatment options that are applied consistently across the province.

(Managing Root Disease in British Columbia April 2018)

Additionally, an updated and revised root disease [website](#) is also now available.

9.0 Reporting to the Chief Forester:

In the 100 Mile House TSA, Rationale for Allowable Annual Cut (AAC) determination (page 37), the Chief Forester states: "I encourage FLNR staff to monitor whether young stands are meeting minimum stocking standards given the impact of the various forest health issues."

To fulfil the requirements of this request, the District will continue to carry out Stand Development Monitoring surveys on young stands in the TSA to determine impacts of forest health agents.

Appendix 1: 100 Mile House Natural Resource District Beetle Management Units

**Douglas-fir Beetle
(IBD)**

BMU	STRATEGY
All	Suppression

**Spruce Beetle
(IBS)**

BMU	STRATEGY
All	Monitor

**Western Balsam Bark Beetle
(IBB)**

BMU	STRATEGY
All	Monitor

100 Mile House Natural Resource District Beetle Management Units 2019

