DRAFT

Rust Management Strategy for the Mackenzie Timber Supply Area

Version 1.1

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The purpose of this strategy is not to relieve the licensee of free growing obligations. However, the use of this strategy *MAY* support a due diligence defence at an Opportunity to be Heard if obligations cannot be met due to rust.

The purpose of this Rust Management Strategy is to provide a starting point to best manage stands with rust incidence (comandra blister rust, stalactiform blister rust and western gall rust) in the Mackenzie Timber Supply Area (TSA). The Management Strategy will evolve over time as better information becomes available, and continuous improvement takes place. Licensees and the Ministry of Forests and Range will work collaboratively to further enhance knowledge and management of pine rusts through operational and informal trials.

Management of stands with rust incidence have been broadly categorized into three stages:

1. Blocks in the planning stage or just logged
2. Blocks at the regen delay stage
3. Blocks at the free growing stage

Management for stages 1 and 2 will have more "aggressive" treatment strategies than stands at stage 3. This strategy will assist in the assessment of due diligence at the free growing stage for rust infested blocks. The following flow chart has been developed to illustrate the treatment decisions for rust management.

Assumptions:

1. Managing to target stocking standards ±50 stems per hectare – except the xeric >50% rust category at the time of regeneration delay based on biogeoclimatic zone and site series.
2. Locally suitable rust resistant seed will be used on sites once it becomes available.
3. Conifer densities are determined by using the highest level of rust in the category except in the >50% category (an 80% rust level was used) to net down the pine component of each prescription.

4. Various options for surveying rust prone areas will be detailed in a separate document.

Projecting Stand Level Rust Incidence

The projected rust level can be estimated for proposed stands using a two step approach. The first step involves determining if the stand is below 800m elevation. This automatically puts the risk over 20%. The second step involves evaluating the local rust incidence in adjacent plantations. This step is more complex since it requires interpretation of a series of factors. Proximity of adjacent stands, age of adjacent stands, and presence of the alternate host all affect the ability to evaluate risk. The extent and abundance of bastard toad flax is potentially the most important factor, yet the most difficult to ascertain. Bastard toad flax abundance should be reflected in the ecological plots and guides, but still needs a site level assessment for reliable risk assessment. The effect of stand age can be roughly quantified using the rust expression equation and chart.

Overriding Objectives

Caribou terrestrial lichen habitat on xeric sites need to be considered while implementing this management strategy. Caribou habitat requirements may supersede the strategy within areas identified as Caribou Management Areas, as per the Land and Resource Management Plan (Akie/Ospika, Wolverine, Chase, Graham, Scott/Blackwater, Misinchinka & Upper Finlay). It is important to remember that all legislative requirements take precedence over this strategy.

Fill Planting

If there is a significant level of rust present, fill planting may not be an option on xeric sites, due to high possibilities of annual rust infection. On blocks where fill planting is not an option due to existing rust levels and the block does not meet the prescribed conifer densities, Licensees will commit to complete a small trial on the block to test and possibly develop alternative treatment methods for the specific block, and rust blocks in general. These trials need to be communicated to all Licensees on the TSA so duplicate trials are kept at a minimum.

Maximum Density

Specific guidance for stands that exceed the maximum density threshold of 10,000 sph comes from the Standard Operating Procedure (SOP) number 7.1-1, “Ground detection and assessment procedures for lodgepole pine stem rusts, (western gall rust, comandra blister rust and stalactiform blister rust) in the Prince George Forest Region.”, May 2000. Within Table 1, it is identified that the requirement to juvenile space stands that exceed maximum density can be

waived if the rust incidence exceeds 20%. The minimum survey standard used to establish whether the rust incidence exceeds 20% is specified in the SOP.

Brushing

Maintaining deciduous cover will enhance site productivity, and reduce voids, thereby hastening crown closure. Crown closure results in natural pruning of the lower live crown, which may prevent some branch infections from reaching the stem. Where rust incidence is anticipated to be very high, retaining deciduous species will ensure that voids are minimized.

On xeric and submesic sites, where the rust incidence exceeds 20%, unless deciduous and shrub species are vigorously competing (e.g. >2 quadrants) with the crop trees, no broad scale brushing is recommended. On mesic sites, where the rust incidence exceeds 20%, only brush deciduous and shrub species that are vigorously competing (e.g. >2 quadrants) with the potential crop trees. Where localized brushing is required to release healthy conifers, At/Ep should be left where possible.

Surveys

All blocks that are affected, or potentially affected by rust, should be surveyed in the interim to determine rust incidence and appropriate management practices. All surveys are to be conducted during the rust window to ensure accurate rust levels. The recommended timing for free growing declarations on blocks with rust incidence is as follows:

Table 1.0 – Rust Incidence

Rust Incidence	FG Declaration
20% Rust Level	Five years prior to LFG date
20-30% Rust Level	Two years prior to LFG date
> 30% Rust Level	One year prior to LFG date

Table 1.0 indicates the earliest recommended time to declare a block free growing with rust incidence. The earlier a block is declared free growing, the higher the risk to the Crown. This will reduce uncertainty as to whether the block will remain free growing after it is declared, and will help satisfy FPPR S.97(6).

Plantation Establishment

Plantation establishment refers to planting, site preparation (i.e. drag scarification), advanced regeneration and/or seeding.

Stocking Formula

The formula to calculate the plantation establishment on mesic sites is as follows:

Target stocking = (pine density X survival rate) + other species planting density

$$1200 = xy+z$$

x = pine density

y = survival rate

z = other species planting density

For example (20-30% rust level):

$$1200 = xy+z$$

$$1200=x(0.7)+750$$

$$450=x(0.7)$$

$$x=643$$

643 stems of pine per hectare plus 750 stems of other species = planting density of 1393 per hectare

Hazard Map

The hazard map is based on average rust incidence by elevation. The working group plans to conduct a multi-variant analysis, as other variables have been collected (i.e. field observations, BEC zones, slope, aspect) but have not yet been statistically analyzed.

Appendix 1.0

Rust Alternate Hosts within the Mackenzie District

Comandra Blister Rust *(Cronartium comandrae)*	**Stalactiform Blister Rust** *(Cronartium coleosporioides)*	**Western Gall Rust** *(Endocronartium harknessii)*	**Sweet Fern Blister Rust** *(Cronartium comptoniae)*
Bastard Toad-Flax *(Geocaulon lividum)*	**Cow-Wheat** *(Melampyrum lineare)* **Common Red Paintbrush** *(Castilleja miniata)* **Bracted Lousewort** *(Pedicularis bracteosa)* **Figwort Species** *(Scrophulareacea)*	No alternative host. Infections occur directly from Pine to Pine.	**Sweet Gale** *(Myrica gale)* **Sweet Fern** *(Comptonia peregrina)*

Reference:

Allen, Morrison, Wallis. 1996. *Common Tree Diseases of British Columbia.* Canadian Forest Service.

Mackinnon, Pojar, Coupe. 1992. *Plants of Northern British Columbia.* BC Ministry of Forests & Lone Pine Publishing.

Appendix 2.0

Achieving a free growing stand is ultimately up to the Forester responsible for the block. In order to effectively address rust issues, there are many other factors that should be considered when making decisions. This appendix includes some of the things that the working group thought could be considered by a forester who is managing a rust block.

Considerations

- Consider using alternate species on rust blocks; however, the forester should not rely on those alternate species, as there is uncertainty as to how well they will do on the site. It is recommended that a certain percentage be planted additionally to the target stocking density, and monitored.

- Consider rust incidence at the recce stage (pre-harvest). Take into account rust incidence on adjacent cut blocks. These blocks are a good indicator/ prediction of what the rust incidence will be on the recce'd stand at post-harvest (if planted with pine). Foresters need to decide if an area with high risk rust incidence should even be harvested.

- Consider natural regeneration options, such as dragging or prescribed burning. These methods may produce high densities at lower costs (than planting alone, fill-planting, and/ or other).

- Consider looking at landscape or multi-block management (at the FSP stage), where loss of productivity on some sites (poor sites) may be offset by managing and concentrating more on the high productivity sites. This may be rationalized and accepted based on various factors (i.e. contributes to habitat biodiversity, low site and low productivity from the start).

The Rust Management Strategy was developed by the following persons on the Mackenzie Pine Rust Technical Committee:

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