



**West Fraser**

**Management Strategy**

for

**Spruce Leader Weevil**

on

**Tree Farm Licence 52**

Submitted by: **Alan Hunter, RPF**  
TFL Forester



## Management Strategy for Spruce Leader Weevil

### Supplement to TFL 52 - Management Plan 2

The approval of Management Plan 2 for TFL 52 included a condition that West Fraser identify areas at risk from spruce leader weevil, propose a strategy to reduce the risk and manage the problem, and to prepare a schedule of proposed treatments.

### Areas at Risk

The *Establishment to Free Growing Guidebook - Cariboo Forest Region (Appendix 6)* lists the relative occurrence of spruce leader weevil in the various biogeoclimatic subzones. The following table shows the sub-zones present on TFL 52.

**Table 1. Relative Weevil Occurrence**

Zone subzone	Relative Pest Occurrence <sup>1</sup>	Risk Rating <sup>2</sup>
ESSF wk1	moderate	low
ESSF wc3	moderate	not given
SBS wk1	high	moderate
SBS mw	high	high
SBS mh	moderate	moderate
ICH mk3	high	high
AT	nil	nil

Variables which affect risk are stand age (positive correlation), stand density (negative correlation, and elevation (negative correlation). (Taylor, pg. 49) Spruce aged 16-25 with stand densities below 1200 stems per ha. (sph), and situated below 900 m. elevation are at greatest risk. Factors which modify this risk are increasing age (<25 years), increasing levels of shade, higher stand densities (>1200 sph), higher elevations (>900m.) and increasing slope. Life cycle development of the weevil is dependent on attaining 785 degree-days above a threshold of 7.2°C. Any factor that negatively affects temperature has potential to reduce the weevil population. Spruce stands above 900m. are not expected to be highly susceptible to significant damage from spruce weevil because of the reduced annual heat sums associated with increased elevation

As a spruce stand ages, there is an increase in weevil attacks until an equilibrium phase is reached, at which time attacks level off. This phase may be start at about 15 years and progress through 25 years of age. This age period may coincide with increased leader

<sup>1</sup> designations identify expected relative pest occurrence, but not pest hazard (Appendix 6, Free Growing Guidebook)

<sup>2</sup> taken from Cariboo Region Operational Guidelines - Procedure Statement

dimensions, which positively affect brood population and survival. Increased stand densities and over-topping vegetation (e.g. aspen, cottonwood, birch, willow) will not only tend to reduce temperature, but will tend to reduce leader length and thickness, both of which negatively affect weevil growth and survival.

Leader weevils have a visual response to spruce leader silhouettes, so overtopping vegetation interferes with the weevil's capability to select suitable hosts, thereby reducing the risk of infestation. Overtopping vegetation is a competitor, so there is a fine (and undefined) line between growth losses to vegetative competition and gains from reduced weevil attack.

A GIS query was done to identify and map plantations where spruce is the leading species(>60%) and to stratify the spruce by age, biogeoclimatic sub-zones and elevation.. The following tables show the results of the GIS query.

**Table 1. Spruce Stands by BEC Sub-Zone Below 900 m.**

	Area by Subzone				
Age (years)	SBS mw	SBS wk1	ESSFwk1	ESSFwc3	ICHmk3
1-5	96	0	0	0	0
6-15	251	0	0	0	0
16-25	218	0	0	0	0
26-35	10	0	0	0	0
<b>Total (ha.)</b>	<b>575</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

**Table 2. Spruce Stands by BEC Sub-zone Above 900 m.**

	Area by Subzone				
Age (years)	SBS mw	SBS wk1	ESSFwk1	ESSFwc3	ICHmk3
1-5	351	3113	3579	339	40
6-15	527	8988	3128	2	556
16-25	480	1205	256		147
26-35	33	298	8		
<b>Total (ha.)</b>	<b>1542</b>	<b>13604</b>	<b>6971</b>	<b>518</b>	<b>743</b>

Based on the risk ratings of each BEC sub-zone from the *Establishment to Free Growing Guidebook - Cariboo Forest Region (Appendix 6)* and the extent of spruce-leading plantations on TFL 52, approximately 2150 ha. are in the high risk areas for damage from leader weevil, and approximately 13,600 ha. are in moderate risk areas. This is tempered by some research that indicates that the risk is reduced above 900 m.

At present, the areas perceived to have a high incidence of spruce leader weevil are in the Umiti Creek (SBSmw / wk1) area north of Highway 26 and the Deacon Creek (SBSmw)

area south of Highway 26. Cariboo Forest Region Operational Guidelines state that, within 10 km. of a given site, an area is classified as having a moderate to high incidence level where 70% of the spruce plantations 15 years of age or over have a current attack level of 4% or greater.

## **Management Strategy**

Spruce is a significant component of West Fraser's annual planting program. The Company is relying on the long-term health of spruce plantations in order to provide high quality forests for the future. Spruce leader weevil is recognized as a major cause of stem deformity and impaired growth. Management regimes have been modified to reduce the risk of losses to this pest. The following points outline West Fraser's management strategy for leader weevil on TFL 52:

1. Plant a mix of ecologically appropriate species on sites favourable for spruce. (there are few strata where spruce is the only tree species being planted) Plant to a target density of 1800 stems per hectare, except where there are specific management reasons not to. Where spruce is used in a stratum, plant in an (approximately) evenly distributed 60% split with lodgepole pine. The exception to this may be where planting is done in BEC sub-zones having a low risk rating.
2. Retain deciduous species as a component on plantations by avoiding brushing and weeding treatments that release over-topped spruce. (especially in the SBSmw sub-zone).
3. Avoid spacing treatments until trees are approximately 8m. tall in stands where moderate or high incidence levels could be expected.
4. Include pest information in all silviculture surveys.
5. Continue using seed from the Vernon Seed Orchard. Some progeny have been identified which have apparent resistance to leader weevil, and some seed may be available for testing in 2-3 years.
6. Consult with Regional specialists when necessary to help determine the degree to which stand tending treatments must be modified or avoided entirely in order to reduce incidence of spruce weevil damage. The decision to seek advice will be based on survey data, stand condition, infestation levels in the vicinity of candidate treatment units, and professional judgement.

There are, at present, no effective direct treatments to control leader weevil. The best opportunities for reducing the incidence of, and damage from leader weevils is through appropriate applications of silviculture treatments.

## Treatment Schedule

1. Summer 1999 – sample spruce plantations as part of a site index adjustment project so that growth reductions (if encountered) are reflected in growth and yield data that will be used in the timber supply analysis for Management Plan 3. This project was completed and the final reports Potential Site Index Indices for Major Commercial Tree Species on TFL 52 (J.S.Thrower and Associates, March 2000) and Yield Table Summary Report , West Fraser Mills TFL 52 (J.S.Thrower, May 2000) were submitted to and approved by the Ministry of Forests.
2. Winter 1999-2000 – use the new forest inventory data for TFL 52 to determine the area and location (by age groupings) of spruce-leading plantations within the various BEC sub-zones. (information is given in this report)
3. Summer 2000 – conduct sampling across TFL 52 to determine reliable information on incidence of leader weevil in stands regenerated with spruce. Initial surveys were done on ten blocks, but the results from a growth and yield perspective were inconclusive. More surveys are needed.
4. Ongoing
  - monitor brushing and weeding program to minimize risk of exposing established spruce stands to a higher risk of weevil infestation.
  - Continue use of VSOC orchard seed in planting programs, and participate in selection and trials of resistant spruce progeny.
  - Continue monitoring leader weevil incidence, and modify silvicultural treatments as necessary.
  - Establish permanent sample plots in stands identified as having a high incidence of weevil in order to study the form of attacked trees and the capacity to outgrow attacks.

## **Bibliography**

The White Pine Weevil: Biology Damage and Management. Symposium Proceedings, 1994. Edited Rene I. Alfaro, Gyula Kiss and R. Gerry Fraser

Taylor, Stuart P. 1997. Relationships Between White Spruce Vulnerability to the White Pine Weevil and Ecological Site Conditions in the Interior of British Columbia. University of Northern BC. Prince George, BC.