



BCTS Peace-Liard Business Area

Pest Management Plan No. 402-557-2016/2021

2016 to 2021

2016

BC Timber Sales Peace-Liard Business Area is committed to following Integrated Pest Management Strategies described herein for vegetation management for the five-year term of this plan.

Prepared for:
BC Timber Sales Peace-Liard Business Area

Prepared by:
Theo Knevel, RPF
Jason Smith, RPF
Anita Thomson, RPF

This Pest Management Plan has been produced to comply with the *Integrated Pest Management Act* and Regulations, and other applicable regulations. Anyone having questions, comments, or concerns about the content of this document, or requires information about proposed activities may contact the following people:

Jason Smith, RPF
Woodlands Supervisor
BCTS Peace-Liard Business Area
Fort Nelson Field Team
(250) 774-5527 OR by Email to:
Jason.V.Smith@gov.bc.ca

Anita Thomson, RPF
Practices Forester
BCTS Peace-Liard Business Area
Fort St. John Field Team
(250) 262-3325 OR by Email to:
Anita.Thomson@gov.bc.ca

Theo Knevel, RPF
Practices Forester
BCTS Peace-Liard Business Area
Dawson Creek Field Team
(250) 784-1248 OR by Email to:
Theo.Knevel@gov.bc.ca

Executive Summary

BC Timber Sales (BCTS) Peace-Liard Business Area (PLBA) submits the following Pest Management Plan (PMP) for the management of competing vegetation on managed openings. The effective period of this PMP is expected to be May 1, 2016 through April 30, 2021.

This PMP applies to the various Timber Sale License opening areas that BCTS PLBA manages within the Northeast Region of British Columbia including the Peace and Fort Nelson Natural Resource Districts, formerly the Peace and Fort Nelson Forest Districts.

The purpose of this PMP is to implement a proactive program of identification, prevention, and monitoring of pests (herbs, shrubs and deciduous tree competition to our managed crop trees) while carrying out sound silviculture treatments to achieve a free/well growing crop of trees. This Integrated Pest Management (IPM) framework will allow reforested areas to achieve free/well-growing status within the time frame specified in the approved stocking standards to reduce potential volume losses as a result of mortality and/or suppressed growing conditions. The end result is to ensure that silviculture obligations of BCTS PLBA are achieved in a timely and cost effective manner.

For the purposes of this plan, a pest includes any herbaceous vegetation, shrub or deciduous complex or community that:

- Inhibits prescribed plantation establishment;
- Hinders optimal growth and development of crop trees;
- Prevents a stand from achieving free/well growing;
- Affects an established plantation's overall health;
- Is a species defined as an Invasive or Noxious Weed; and/or,
- When combined with snow, causes damage to a crop tree by snow press.

All IPM activities conducted under this PMP will comply with all pertinent legislation, which includes but is not limited to *the Integrated Pest Management Act (IPMA)* and Regulations, *Forest and Range Practices Act (FRPA)* and associated Forest Planning and Practices Regulation (FPPR) and the *Fort St. John Pilot Project Regulation (FSJPPR)*.

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1.0 Introduction

1.1 Purpose

The purpose of this Pest Management Plan (PMP) is to implement a proactive program of identification, prevention, and monitoring of pests (herbs, shrubs and deciduous tree competition to our managed crop trees) while carrying out sound silviculture treatments to achieve a free/well growing crop of trees. This Integrated Pest Management (IPM) framework will allow reforested areas to achieve free/well growing status within the time frame specified in the approved stocking standards to reduce potential volume losses as a result of mortality and/or suppressed growing conditions. The end result is to ensure that obligations of British Columbia Timber Sales (BCTS) Peace-Liard Business Area (PLBA) are achieved in a timely and cost effective manner.

The objectives of this PMP are as follows:

- To establish free/well growing crop trees on a disturbed area in a cost effective manner with full consideration of human safety and social, environmental, and cultural values.
- To control competing vegetation or brush encroachment of young tree seedlings.
- To establish a clear decision making process that sets standards for timely and effective treatments.
- To promote the use of integrated vegetation management practices and strategies that minimizes vegetation pest problems and reduces the need for the use of herbicides.
- To promote reforestation of well-stocked stands and valuable tree species that support the provincial Timber Supply.
- To provide an open forum for public participation concerning PMP development and content.

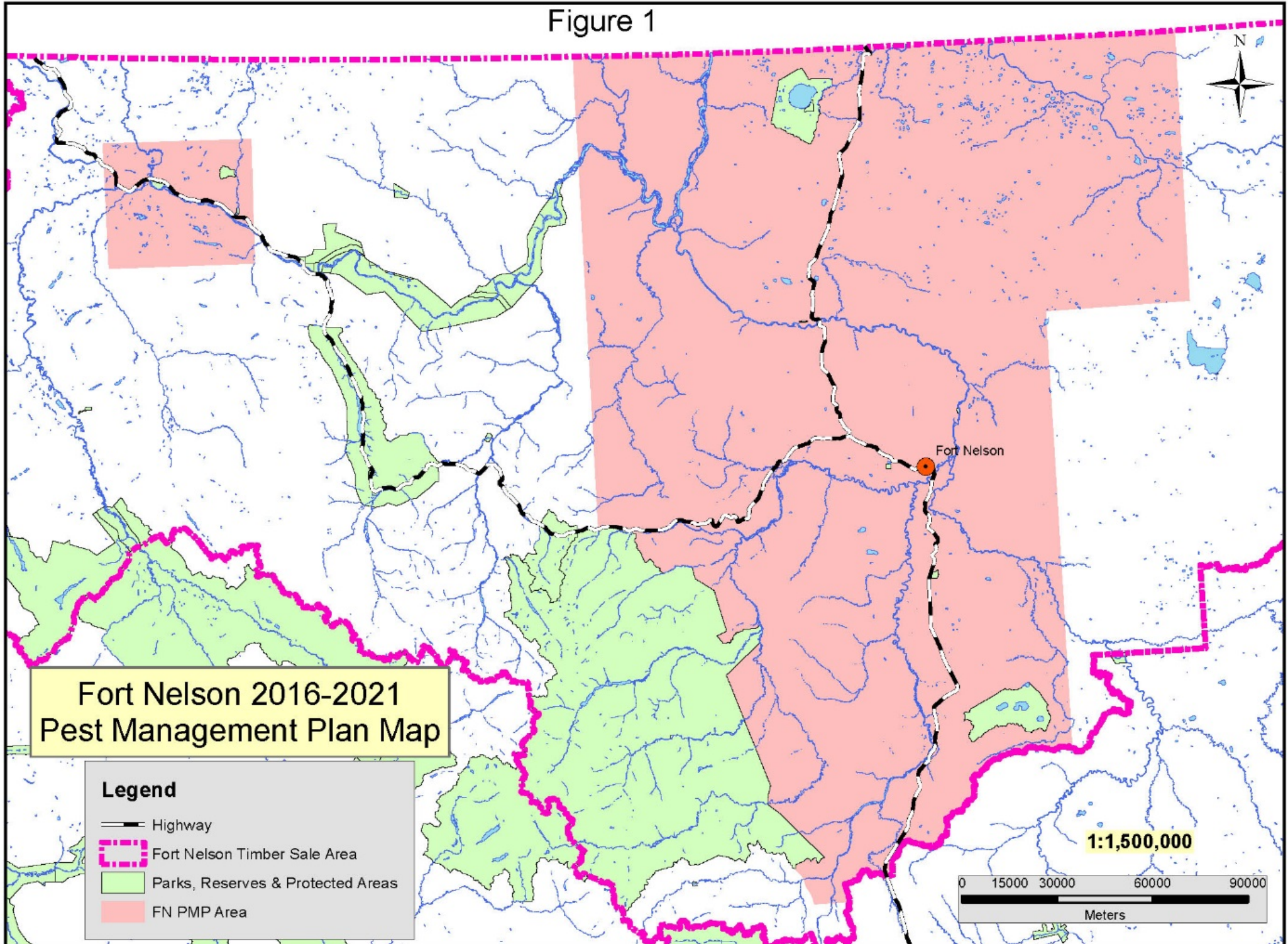
1.2 Scope

The BCTS PLBA geographically encompasses the Fort Nelson and Peace Natural Resource Districts. The administrative, planning, and management centre for the business area is the Timber Sales Office (TSO) located in Dawson Creek. In addition to the TSO, field teams are located in Dawson Creek (DC), Fort Nelson (FN), and Fort St John (FSJ). Currently each field team location is associated with an individual timber supply area, as shown on Figure 1, 2 and 3, while retaining their respective allowable annual cut apportionment and management prerogative.

1.3 Term

The expected effective term of this PMP will May 1, 2016 through April 30, 2021 as confirmed by the BC Ministry of Environment (MOE) registration of this PMP.

Figure 1



**Fort Nelson 2016-2021
Pest Management Plan Map**

- Legend**
- Highway
 - ▭ Fort Nelson Timber Sale Area
 - ▭ Parks, Reserves & Protected Areas
 - ▭ FN PMP Area

1:1,500,000

0 15000 30000 60000 90000
Meters

Figure 2

Fort St. John 2016-2021 Pest Management Plan Map

Legend

- Highway
- Fort St John Timber Sale Area
- Parks, Reserves & Protected Areas
- FSJ PMP Area



1:1,500,000

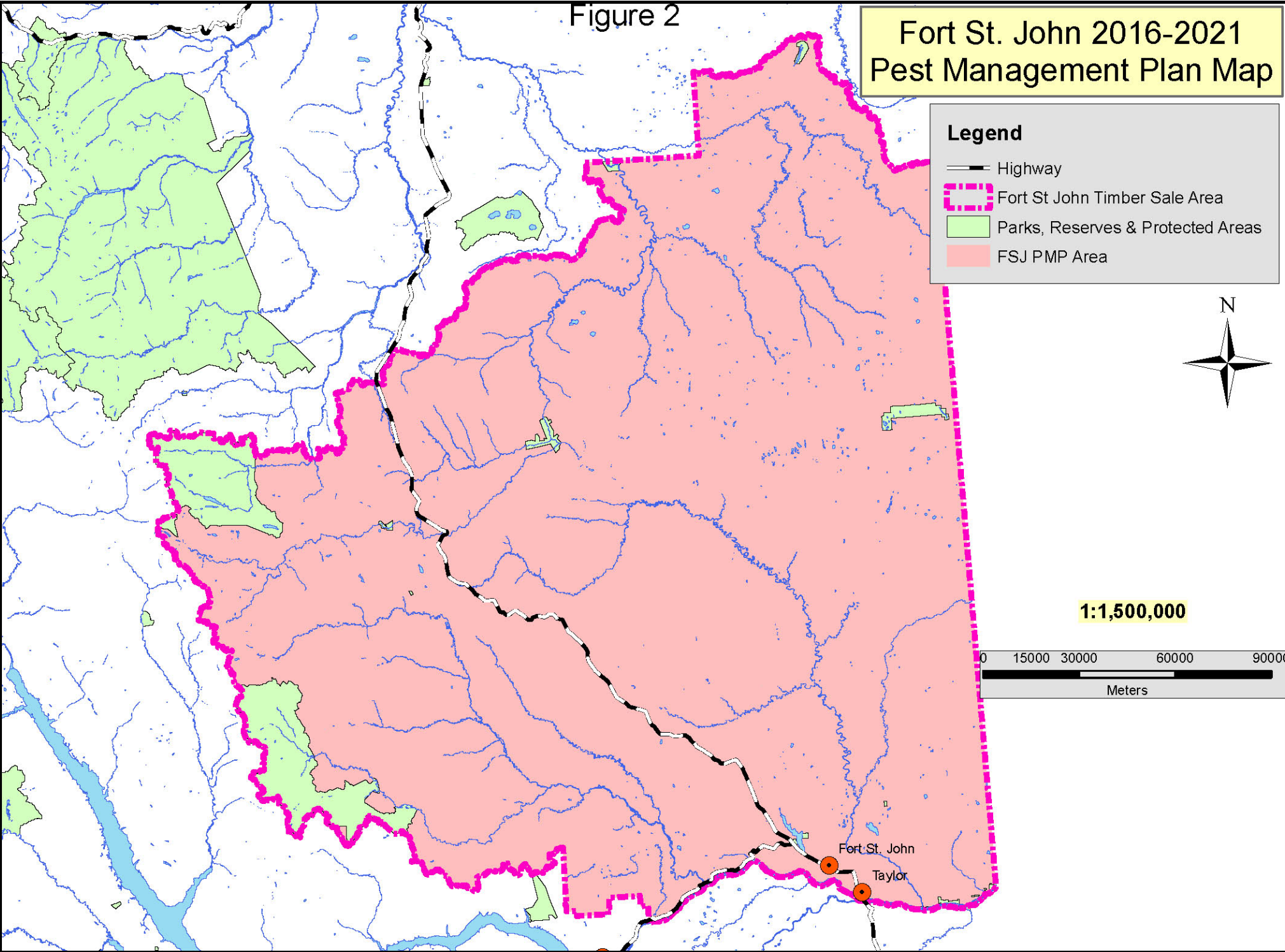
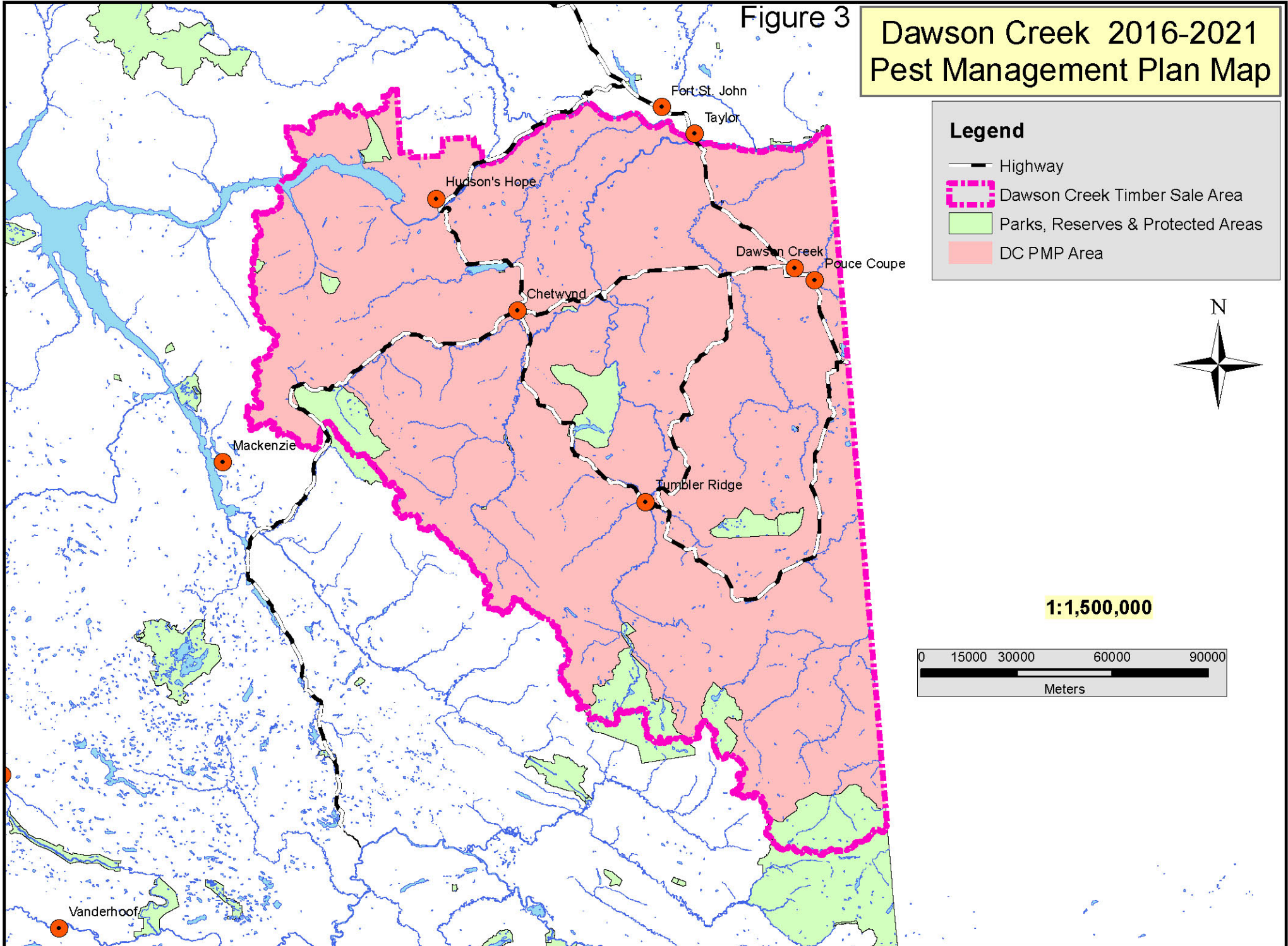


Figure 3

Dawson Creek 2016-2021 Pest Management Plan Map



1.4 Treatment Threshold

The *Integrated Pest Management Act* (IPMA) defines pest as “an injurious, noxious or troublesome living organism, but does not include a virus, bacteria, fungus or internal parasite that exists on or in humans or animals”. For the purposes of vegetation management activities under this integrated PMP, treatment threshold conditions are met where herbaceous, shrub and broadleaf (deciduous) complexes or communities are found to exhibit the following:

- Inhibits prescribed plantation establishment;
- Hinders optimal growth and development of crop trees;
- Prevents a stand from achieving free/well growing;
- Affects an established plantation’s overall health;
- Is a species defined as an Invasive or Noxious Weed; and/or,
- When combined with snow, causes damage to a crop tree by snow press.

For the purposes of this PMP, vegetation is divided into three possible competing vegetation communities.

- 1) Herbaceous plants (vegetation community A):** Herbaceous species predominately compete with newly planted seedlings for light and commonly contribute to vegetation and snow press. Species found in areas within this PMP include, but are not limited to: fireweed (*Epilobium angustifolium*), grass (*Calamagrostis spp.*), horsetail (*Equisetum spp.*), and lady fern (*Dryopteris spp.*).
- 2) Shrubs (vegetation community B):** Shrubs can be divided into two categories: low and high. Low shrubs are woody plants that typically grow to be less than 1.5 metres in height, whereas high shrubs tend to typically grow to heights taller than 1.5 metres.
 - a) low shrubs:** Species include, but are not limited to: thimbleberry (*Rubus parviflorus*), black twinberry (*Lonicera involucrata*), white flowering rhododendron (*Rhododendron albiflorum*), prickly rose (*Rosa acicularis*), and red raspberry (*Rubus idaeus*).
 - b) high shrubs:** Species include, but are not limited to: alder (*Alnus spp.*) and willow (*Salix spp.*). Alder is commonly found in many mature stands within the PMP area. After harvest, alder can potentially be a significant competitive species depending on the ecology, and the distribution and density throughout the site.
- 3) Broadleaf trees (vegetation community C):** Species include, but are not limited to: trembling aspen (*Populus tremuloides*), cottonwood (*Populus balsamifera*) and paper birch (*Betula papyrifera*). Many forest stands have a minor component of mature aspen. A moderate to very high brush hazard from aspen may occur after harvest of stands with a component of aspen due to root suckering.

The identification reference sources for the plant species within the PMP area are ‘Plants of Northern British Columbia, (Mackinnon, Andy, et al. 1999)’ and ‘Rare Native Vascular Plants of British Columbia, (Douglas, George W., et al. 1998)’.

2.0 The Integrated Pest Management Program

Treatment selections are directly linked to silviculture survey and/or Detailed Site Assessment (DSA) recommendations (see Appendix 1). These recommendations will include a determination of the crop tree limiting factor(s) and the necessity for treatment reflecting the above thresholds described in Section 1.4. The DSAs are completed by a qualified person during on-site inspections within 18 months of the proposed date of treatment, including herbicide application to verify the need for treatment, and/or consideration of alternatives. These DSAs will be completed for every anticipated brushing site and will be used to support of the Notification of Intent to Treat (NIT) consultation meetings where BCTS will retain a copy on file for a period of three years following treatment and shall include at a minimum the following:

1. Site Characteristics
2. Identified Treatment Options and Constraints
3. Treatment Selection
4. Identified Water bodies, Streams and Wetlands
5. Associated Vegetation
6. Purpose of Treatment
7. Other Resource Values
8. Treatment Map

The Vegetation Treatment thresholds are not meant to replace sound Professional judgement. A rationale will be provided by a registered professional forester (RPF) when prescribing any treatment below the threshold.

One or a combination of the following methods may be utilized during the term of this PMP:

2.1 Prediction, Prevention and Monitoring Methods

2.1.1 Prediction (planning)

The FRPA stipulates that a Site Plan (SP) or Site Level Plan (SLP) must be prepared in order for a proposed cutblock to be harvested. The SP or SLP define the management strategies and objectives for all aspects of forest operations including harvest plan information, Biogeoclimatic Ecological Classification (BEC), stocking standards, maximum soil disturbance, retention requirements and other critical factors.

Blocks are generally stratified using the BEC system during the compilation of the site specific data (vegetation and species distribution, expected brush hazard, and moisture and nutrient status). This information, coupled with knowledge of how vegetation responds to harvest on a given ecotype is used to predict a potential pest problem and prescribe mitigating measures. These mitigating measures might include site preparation, species selection, stock type selection, harvest timing, planting timing and alteration of stocking standards.

2.1.2 Prevention

The focus of this IPM strategy is the long term prevention of crop tree damage or growth impedance from pests using silviculture management techniques such as planting, manual brushing, chemical and/or biological control measures. Pesticides are used only after monitoring indicates they are appropriate according to established guidelines including comparing and contrasting all available options while adhering to the over-riding objective of minimizing risks to human health, negative impacts to non-target organisms, and the environment as a whole.

BCTS PLBA employs the following preventative measures to manage competitive vegetation:

- **Early Identification of Brush Prone Sites** – BEC zone classification and site series known to have high brush hazards are identified in the pre-harvest inspections, and appropriate treatment regimens are scheduled and implemented.
- **Use of Improved Seed** – Seed of the highest genetic worth available for the area (Class A Seed) is used to grow seedlings for planting and fill planting activities where available. Seedlings grown from improved seed show faster growth than those grown from wild seed, thereby improving their ability to compete with encroaching vegetation.
- **Selection of Appropriate Species** – Pre- and post-harvest ecological classification will provide guidelines for species selection to maximize seedling performance and minimize the need for brushing treatments.
- **Selection of Appropriate Stock Type** – The physiological characteristics of seedlings possess have a significant impact on seedling establishment and capacity to compete against encroaching vegetation. For example, small stock types may be appropriate for use on sites with a low competition hazard or other limiting factors, while larger stock types may be appropriate on sites with high competition hazard.
- **Minimizing Regeneration Delay** – Seedlings that are quickly established are more likely to compete successfully with problematic vegetation. Seedlings should be planted as soon as possible following harvesting, especially on sites with high hazard.
- **Maximizing Seedling Performance** – Seedlings that are planted in the best microsite possible and that remain undamaged during the planting process are more likely to compete successfully with problematic vegetation. Guidelines on stock handling to avoid seedling damage and optimizing the quality of planting microsites are followed during planting activities.
- **Increased Planting Density** - Planting densities will be managed to reflect the influence of site conditions such as brush, natural regeneration, and anticipated seedling mortality.
- **Site Preparation** – Site preparation will be conducted, where appropriate, to improve microsites for newly established seedlings by reducing or rearranging slash, ameliorating adverse forest floor, soil, above and below ground vegetation structure, or other site biotic factors.

Table 1: Site Preparation Objectives and Associated Methods

Objective of Site Prep	Site Preparation Method
Reduce established vegetative competition	Mechanical, Manual, Chemical
Improve soil temperature	Mechanical, Chemical
Improve soil moisture and aeration	Mechanical
Reduce slash loading/increase no. of plantable spots	Mechanical, Broadcast Burning
Improve drainage by establishing ditches	Mechanical

2.1.3 Monitoring

Harvested blocks and plantations are evaluated on a regular basis, where each block, stratum and microsite present a unique environment for brush ingress. Properly timed and thorough surveys are essential in identifying and addressing problems which may affect the survival and/or growth of crop trees, or restrict the achievement of a free/well growing plantation.

Surveys and walkthroughs are scheduled throughout the plantations' development in order to ensure that stocking and brush levels are acceptable and that free growing parameters will be achieved within the appropriate time frame. The data/information collected during the surveys includes, but is not limited to the following: density of the vegetation, height of the crop trees, height of the brush species, type of brush species, and the affect the brush is having on the crop trees.

The normal monitoring regime is:

Pre-harvest stage: Pre-harvest brush assessments are performed while completing SP and SLP field work. Evaluation and recommendations for pre-harvest vegetation management is initially prescribed at this stage.

Year 0: Post Harvest assessments confirm the SP or SLP prescription with regards to planting and/or site preparation, the plantability and the brush hazard of the area.

Years 1-4: A regeneration delay survey is completed to ensure that regeneration delay has been met, to assess brush and other competing vegetation, and evaluate survival and performance of crop trees.

Years 5-9: Regeneration surveys and/or walkthroughs are completed in order to determine the levels of stocking and the need for brushing treatments.

Years 10-20: Free/well growing surveys to determine whether free/well growing requirements have been met as per Survey Manual and the FSJPPR.

2.2 Consideration of Treatment Type

Each block that is considered for vegetative management will have a brush assessment completed, and the stocking levels and performance assessed. These assessments will be reviewed and approved by a qualified forest professional. The decision to treat will be based on

whether competing vegetation meets the criteria as outlined in Section 1.4 and a record will be kept for each opening describing the circumstance and rationale on the completed DSA.

2.2.1 Guidance for Herbaceous and Shrub Competition Prescriptions

Treatment objectives: maintain current seedling vigour potential prior to injury on sites where if left untreated the vegetation complex competition will very likely cause injury to crop trees based on site condition and brush hazard. Site brush hazard is based on BEC zone classification completed during the development of the SP or SLP.

‘Release’: DSA describes a site with prominent herbaceous and/or shrub competition impacting crop trees that have been established for one or two growing seasons but are not exhibiting favourable growth and vigour characteristics. The ‘release’ treatment will be prescribed to control the competing vegetation to enable the crop trees time and space to recover from injury and express their potential.

‘Establishment’: DSA describes a site where the herbaceous and shrub competition is present or likely to become present based on site conditions, BEC zone brush indicators, and the crop trees have not yet been established for one or two growing seasons. The ‘establishment’ treatment will be prescribed considering the competing vegetation levels may or may not be fully expressed but can be expected to out-compete the not yet established crop trees to enable them to better express their potential.

2.2.2 Guidance for Broadleaf Competition Prescriptions

Treatment objectives: manage crop tree growth and vigour potential on sites where if left untreated the competition will very likely cause injury based on site condition and brush hazard. Site brush hazard is based on BEC zone classification completed during the development of the SP or SLP.

‘Release’: Conifer crop tree release from broadleaf competition may be prescribed to reduce suppression or increase growth rates to meet free/well growing requirements. The following are some of the variables considered by the forest professional completing the field assessment and treatment selection process:

- Distribution of deciduous species in an area > 1.0 hectare that results or may result in less than the minimum number of required free growing stems.
- Deciduous species encroaching upon the effective growing space of crop trees, where without treatment, free growing obligations may not be met.
- Deciduous species encroaching upon the effective growing space of crop trees where distribution and/or densities may result in mortality or the suppression of crop trees.

Manual and Biological Methods

- Girdling
- Snap / Hinge
- Mechanical Brushing and Weeding (saw)
- Manual Brushing and Weeding (hand)
- Brush Mats
- Sheep Grazing
- Mechanical Site Preparation
- Prescribed Burning

Chemical Methods

- Aerial (Broadcast and/or Discretion)
- Backpack (Broadcast)
- Backpack (Directed Foliar)
- Backpack (Spot)
- Hack and Squirt
- Basal Bark
- Cut Stump

Treatment Options will vary depending upon the pest hindering the crop tree and the timing of the proposed treatment. Factors influencing treatment selection include the following:

Target Species Height – Backpack foliar treatments are typically not appropriate once the height of the target brush species approaches 2 metres in height. Sheep grazing will similarly be constrained by the ability of sheep to reach the foliage.

Target Species Diameter – While virtually any deciduous tree stem can be girdled, there are upper and lower diameter limits beyond which treatment becomes impractical. These will vary somewhat depending on the species of tree and the type of girdling tool being used. In general, diameters less than approximately 3 cm, or greater than 20 cm, are not suitable for treatment. Manual treatments will have an upper practical limit as diameters approach 10 cm.

Target Species Distribution – Broadcast foliar treatments are not appropriate if the target brush is distributed only in discrete clumps. Discretionary treatments are not generally appropriate if the target brush is uniformly distributed over the treatment unit.

Physical Impediments to Treatment – Large numbers of overhead obstacles such as residual trees can preclude aerial treatments. Steep slopes and heavy slash loading can make ground-based treatments such as backpack, manual, mechanical and sheep grazing impractical.

Degree of Constraint of Treatment Due to Required Buffering etc. – Blocks with many features that require buffering may be impractical to treat chemically. Pesticide Free Zones (PFZ), No Treatment Zones (NTZ), and Buffers may be required for resource values such as water bodies, wetlands, roads, etc. Some highly constrained units may have little area left treatable once the chemical buffers are in place.

Target Species-Crop Tree Protection Conflict – Some brush species such as cow parsnip may no longer be susceptible to chemical treatment by the time the crop trees have hardened off sufficiently to avoid chemical damage. This incompatibility may be consistent every year, or it may only apply in certain years when a wet summer has slowed conifer hardening off (lomas growth) or when early frosts cause succulent target species to wilt.

Special Wildlife Features – Special wildlife features may be identified within some units that will constrain treatment options. Heavy browsing might reduce the need for brushing in an area

that has little alternative browse available. Manual and mechanical treatments might be restricted when the slash loads likely to result from the treatment could obstruct a heavily use game trail. Sheep grazing has been opposed by MOE representatives in high grizzly bear use areas and in areas with wild sheep populations the practice is not recommended.

Aboriginal Rights Infringement – When specific information indicates that there is a higher likelihood of treatments infringing on aboriginal rights on a unit certain treatments may be considered unsuitable, a buffer or NTZ may be implemented. For example, if consultation with a First Nation produced information that a specific site was used for berry-picking, a broadcast chemical treatment would be considered inappropriate.

Potential for Conflict – Certain features of a proposed treatment unit might indicate that chemical treatment could result in an unacceptable risk of creating conflict with members of the general public, aboriginal groups, local residents or other stakeholders. For example, proximity to a residence might result in the choice of a less controversial treatment.

Potential Damage to Crop Trees – Certain treatments may expose the crop trees in a unit to unacceptable levels of risk of damage. For example, crop trees that have developed under a thick aspen canopy often become spindly. Treatments that remove the surrounding stems suddenly can result in toppling of the crop trees. Aerial spraying or girdling may be preferred in such cases. Alternately, manual treatments may be inappropriate where heavy slash loading can occur or palatability of target vegetation can be an issue when considering sheep grazing.

Other factors such as treatment windows, time required to treat an area, administrative load, priority of treatment based on risk of crop tree mortality, and efficacy are weighed separately from the above process, but are also considered when selecting treatment methods. Final treatment prescriptions are then verified in the field by experienced BCTS staff to ensure the most appropriate treatment is utilized.

2.3 Herbicide Application Rates for Vegetation Control

BCTS PLBA commits to using the lowest treatment rates that will provide effective control of competing vegetation.

Herbicides to be used for brush control under this PMP are listed in Table 2 below with proposed maximum application rates in Table 3.

Table 2: Herbicides

Trade Name	Active Ingredient	PCP No.
<i>Vision®</i>	<i>Glyphosate 35.6%</i>	<i>19899</i>
<i>Vantage Forestry®</i>	<i>Glyphosate 35.6%</i>	<i>26884</i>
<i>Release®</i>	<i>Triclopyr 48%</i>	<i>22093</i>
<i>Weedmaster®</i>	<i>Glyphosate 35.6%</i>	<i>29009</i>
<i>Vision(Max)®</i>	<i>Glyphosate 54.0%</i>	<i>27736</i>
<i>Chontrol Peat Paste</i>	<i>Chontrosterium purpureum 0.67%</i>	<i>29293</i>

Table 3: Proposed Maximum Application rates for Vision Max (Preferred Herbicide)

Kg Active Ingredient (A.I.)/ha based on Weedmaster and equivalent rates for VisionMax

Plant Species Treated	Weedmaster (35.6%)		VisionMax (54%)	
	L/ha	kg A.I./ha	L/ha	kg A.I./ha
Twin Berry	3.5	1.246	2.3	1.242
Aspen, Birch, Rose, Cottonwood,	4.5	1.602	3	1.620
Elderberry, Willow, Fireweed, Horsetail, Thimbleberry , Raspberry	5	1.78	3.3	1.782
BlueJoint Grass, Alder, White Flowered Rhododendron, Azalea, Bracken fern, Lady Fern	6	2.136	4	2.160

If proposed application rates are greater than the listed maximums, a rationale must be documented and provided in any NIT, as well kept on file. For chemical site preparation activities, application rates shall be consistent with manufacturers suggested application rates found on the label. Proposed application rates may never exceed rates on the product label. Where vegetation complexes exist, more than one target species may be identified and in these cases the maximum application rate will be based on the target species with the highest application rate. Discretion will be used to ensure that a target species with low percent coverage and higher application rate is not used in determining the application rate.

2.4 Post Treatment Evaluation

Post-Treatment Evaluations shall be completed in the year following treatment when full leaf out has occurred by an aerial flight or an on-block field inspection. The assessments shall focus on the previous year's treatments with regards to efficacy of the treatment, coverage, slash loading, degree of release, crop tree damage, and verifying that the integrity of PFZ's and boundaries were maintained. The evaluation will also confirm that there was no unreasonable impact to the environment in an effort to refine future vegetation management prescriptions and strategies and it will determine the need for any immediate follow-up treatment (i.e. missed areas).

3.0 Environmental Protection Measures

3.1 Community Watersheds and Domestic Water Intakes

There are no known watersheds currently classified as "community watersheds" within the boundaries of this PMP. A PFZ will be established around any community watersheds that may be developed during the term of this PMP to ensure that the integrity of the watershed is maintained. The area of the PFZ will comply with the standards set at that time.

There are no known domestic or agricultural water wells or water supply intakes that occur within the boundaries of any harvested area that BCTS PLBA is responsible for, however if, during the term of this PMP, one is established, a 30 metre NTZ will be designated around the well or intake, pursuant to Section 71 of the IPMR.

3.2 Fisheries Resources, Riparian Areas and Wildlife Features

Riparian and Wildlife features are identified pre-harvest and protection measures prescribed through approved SPs, SLPs, Forest Development Plans, or Forest Stewardship Plans. Riparian and Wildlife features are further assessed through DSAs and pre-treatment inspections by BCTS staff, during treatment layout, and the final pre-treatment block reconnaissance. In keeping with mandates outlined in all forest plans and relevant legislation, identified habitat shall be protected with a series of measures including appropriate PFZ's, buffers & NTZ's as described in Table 4.

Table 4: Pesticide Free, Buffer and No Treatment Zones for Riparian & Wildlife Features

Area of Concern	Application Method	PFZ (m)	Buffer (m)	NTZ (m)
Classified S1-S6 Streams, L1,L2,L3,L4 Lakes, W1-W3,W5 Wetlands	Aerial Conventional	10	10	
	Aerial (low drift delivery system)	10	5	
	Backpack (Broadcast)	10	5	
	Backpack (Directed Foliar)	10	5	
	Backpack Cone	10	5	
	Hack and Squirt	10	5	
	Cut Stump	10	5	
	Backpack Basal	10	2	
Dry S5, S6, NCD's, Temporary free standing body of water	Aerial (low drift delivery system)	N/A	N/A	
	Backpack Ground	N/A	N/A	
	Backpack Cone	N/A	N/A	
	Hack and Squirt	N/A	N/A	
	Cut Stump	N/A	N/A	
	Backpack Basal	10	2	
Temporary free standing body of water > 25 m ² *	All application methods	High Water Mark	N/A	
Domestic water intake	Any			30
Active beaver lodge/ pond/dam	Aerial			50
Raptor nest	All (except manual)			100
Mineral Licks**	All	10	5	

* non fish bearing & does not drain into a fish bearing waterbody, & is not a classified wetland nor a wildlife habitat feature

** Mineral licks are protected at the development stage by inclusion in Wildlife Retention Areas

3.3 Wildlife Values

The PLBA has many important and diverse habitats for mammal, bird, amphibian, and fish species. Wildlife shall be managed according to current and evolving biodiversity guidelines and all standards as stated within legislation will be followed.

All wildlife values and critical habitats identified in higher level plans, or while conducting fieldwork, or through the consultation/referral process shall be considered prior to carrying out any treatments under this PMP. Examples of treatment objectives tailored to suit wildlife habitat needs include:

- pesticide free zones
- pesticide dosage thresholds for areas of significant value
- spot treatments
- manual treatments
- where feasible, the retention of ungulate browse species such as willow and red osier dogwood

3.4 Food Plants

First Nations and stakeholders use berry plants and other special plants for food and medicinal purposes. As part of the public review and consultation process for this PMP and annual NITs, BCTS will attempt to learn of important berry-picking and medicinal plant harvest areas. On a site specific basis, where proposed treatment areas are identified as containing food or medicinal plants intended for human consumption, BCTS will attempt to prevent exposure to herbicides by utilizing selective treatments, timing of treatments, using non-herbicide treatments or avoidance of treatment. All blocks treated with herbicides will have signs at entrances as required by the IPM regulations.

3.5 Species at Risk

A fundamental component of sustainable forest management (SFM) is the conservation of species and plant communities at risk. BCTS has several strategic documents that directly or indirectly refer to the management of species at risk (SAR). Professional Biologists were consulted in order to create a SAR Management guide in 2011 to provide guidance to the Peace-Liard Business Area on the best management practices of species at risk in the Peace Region. Should a species at risk be identified in the planned treatment area, a host of resources including the *Peace SAR Management Guidelines Document* and the following Ministry of Environment websites will be consulted for the best management practices of the identified species.

<http://www.env.gov.bc.ca/wld/frpa/iwms/index.html>

<http://www.env.gov.bc.ca/atrisk/toolintro.html>

<http://a100.gov.bc.ca/pub/eswp/>

BCTS PLBA is certified under several forestry certification standards, and the application of herbicides under this PMP will be consistent with the protection measures stated in our Sustainable Forest Management Plan and above mentioned SAR document.

BCTS has implemented training for staff and contractors for identification of at risk species and plant communities found within the PMP area. Observation of species at risk post-harvest will be reported to BCTS representatives, and where necessary, the observations will be reported to the MOE and site-specific protection measures may be implemented.

4.0 Operational Standards

4.1 Boundary Layout Procedures

All areas scheduled for herbicide application shall be subject to a pre-treatment ground layout in order to locate and mark all treatment boundaries, PFZ's, associated buffers, NTZ's and retention patches. All layout shall occur at a timing approved by the BCTS representative.

4.2 Layout for Aerial and Ground Applications

Trained staff lay out the treatment areas implementing appropriate strategies for each block using GPS, satellite imagery, and/or the most recent map as a reference. This layout consists of an intensive block reconnaissance to identify and mark all treatment boundaries, PFZ's, associated buffers, NTZ's and retention patches identified in the silviculture survey or DSA, or discovered during the reconnoitre.

Treatment areas and PFZ's are GPS traversed as part of layout and are clearly marked with bags or flagging ribbon to ensure they are clearly visible to the herbicide applicators.

4.3 Final Pre-treatment Reconnaissance

Immediately prior to the application of herbicide, the treatment prescription is verified by the BCTS representative to ensure:

- the most appropriate treatment is prescribed;
- treatment boundaries are adequate to ensure pesticide is not applied to adjacent areas and sensitive feature(s);
- applicable regulatory requirements and standards can be met while carrying out the brushing treatment; and
- no general public, grazing wildlife or livestock present in the treatment area.

4.4 Safety During Operations

The health and safety of personnel is paramount. All persons operating under this PMP will follow their respective safety certification requirements (i.e. BC Forest Safety Council's SAFE Companies), which will meet or exceed the legislated requirements in British Columbia. Contractors will make available, upon request, a copy of their safety program and training records for review.

4.5 Handling Practices

4.5.1 Transport

The federal *Transportation of Dangerous Goods Act* (TDGA) and the *Integrated Pest Management Act* (IPMA) regulate the transportation and handling of poisonous substances, which may include some herbicides. The following procedures will be followed while transporting herbicides for application under this PMP:

- Limited amounts of herbicide concentrate will be carried in any one vehicle. The quantity will be no more than what is necessary for each project.
- Herbicide concentrate will only be carried in a secure lockable, signed compartment.
- Herbicide concentrate will only be transported in original labeled containers.
- Herbicide concentrate will always be carried separately from food and drinking water, safety gear, and people.
- Spill containment and clean up equipment will be carried separately from herbicides but in close proximity to the herbicide on each vehicle during herbicide transport and use.
- Appropriate documents such as operations records and material safety data sheets (MSDS) will be carried in each vehicle during herbicide transport and use.

4.5.2 Storage

Herbicides will be stored in accordance with the *IPMA* and Regulations and the WorksafeBC document “Standard Practices for Pesticide Applicators”. In summary, the storage area must:

- be ventilated to the outside atmosphere;
- be locked when left unattended;
- restrict access to authorized persons;
- be placarded on the outside of each door leading into the facility in which the herbicides are stored bearing, in block letters that are clearly visible, the words “WARNING – CHEMICAL STORAGE – AUTHORIZED PERSONS ONLY”.

In addition, the person responsible for the storage area shall notify the appropriate fire department of the presence of herbicides on the premises.

Some contractors may store herbicides for extended periods of time in vehicles when performing herbicide treatments for BCTS. The vehicle is considered a mobile storage unit. Persons responsible for the herbicide storage shall ensure that all herbicides are stored in a locked canopy, or similar arrangement, separate from the driver and personal protective equipment.

4.6 Mixing, Loading, and Applying Herbicides

All mixing, loading and application of herbicides shall be carried out by certified pesticide applicators in the appropriate category of certification. General procedures and precautions include:

- Mixing of herbicides must always be conducted in a safe manner.

- Safety spill kits, spill response plans and first aid supplies shall be present on or near the treatment site.
- Eye wash station(s) and protective clothing as recommended on the respective product labels shall be available on or near the treatment site.
- Product labels and MSDS will be available on or near the treatment site to ensure that quantities of herbicides being mixed and used are consistent with label rates.
- There shall be no mixing or loading of herbicides within the designated PFZ + buffer or NTZ of sensitive environmental features (i.e. riparian management areas as described in the *FRPA* and non-classified waterbodies).
- Ensure that the application equipment is in good working order and, if required, is calibrated to conform to the application rates on the pesticide label.
- Implement precautions to prevent unprotected human exposure to pesticides.
- Implement precautions to ensure that domestic water sources, agricultural water sources and soil used for agricultural crop production are protected for their intended use.
- Ensure that, to prevent treatment of watercourses, the suction hoses used for herbicide(s) will not be used to pick up water from natural sources such as streams or ponds. The intake of water for mixing will be protected from backflow into the natural source by an “air gap” or “reservoir” between the source and the mixing tank.

4.7 Safe Disposal of Empty Herbicide Containers and Unused Herbicides

Empty containers shall be disposed of in accordance with the manufacturer's instructions as noted on the product label or provincial instructions and recommendations that are detailed in the BC MOE document Handbook for Pesticide Applicators and Dispensers (1995). As a minimum, empty herbicide containers shall be:

- Returned to the herbicide distributor as part of their recycling program; or,
- Triple rinsed or pressure rinsed, then altered so they cannot be reused; and,
- Disposed of in a permitted sanitary landfill or other approval disposal site.

Unused herbicides will be stored at the herbicide distributor’s warehouse or another approved facility.

4.8 Herbicide Spill Response

Spill treatment equipment that adheres to the product’s manufacturer specifications and specific MSDS shall be at or near storage (including mobile storage) mixing and loading sites, and it shall include the at least following type of equipment:

- Personal protective equipment – gloves, goggles, cover-alls, etc.;
- Absorbent material - sawdust, sand, activated charcoal, vermiculite, dry coarse clay, kitty litter or commercial absorbent;
- Neutralizing material - lime, chlorine bleach or washing soda;
- Hand tools - long handled broom, shovel; and
- Waste-receiving container with lid – barrel, pails.

A copy of an approved spill response plan shall be at or near each work site. All personnel working on a project involving herbicides should be familiar with its contents. If contractors that work under this PMP have their own spill response plan, it must meet or exceed the requirements as described in BCTS's Emergency Response Plan Standards, generally described below:

- All personnel shall be protected from herbicide exposure by wearing appropriate protective clothing and safety gear;
- Any person exposed to a herbicide shall be moved away from the place of the spill;
- First aid should be administered, if required;
- The source of the spill should be stopped;
- The spilled material should be stopped from spreading by creating a dam or ridge;
- The project supervisor shall ensure operations cease until the spill is contained and the source is repaired;
- Absorbent material shall be spread over the spill, if applicable, to absorb any liquid;
- The absorbent material shall be collected in garbage bags or containers with the contents clearly marked;
- Contaminated soil or other material will be removed from the spill site and placed in garbage bags or containers;
- The person responsible for the project shall contact an approved representative of BCTS for shipping instructions and disposal requirements;
- When more than one kilogram or one litre of herbicide is spilled on land, or any amount into a waterbody, the person responsible for the project will immediately report it to the Emergency Management British Columbia by telephoning 1-800-663-3456. The Contractor project supervisor will notify a designated BCTS representative of the spill details as soon as practicable.

4.9 Project Supervisor and Monitors Minimum Qualifications

All herbicide treatments carried out under this PMP will be conducted under the direct supervision of either a BCTS supervisor, or an appointed contractor. All herbicide treatments will be conducted or directed, and/or monitored by an individual who holds a valid Pesticide Applicator Certificate – Forestry General. Training records will be kept and made available for all staff handling or utilizing pesticides including Assistant Applicators as per *IPMA* and *IPMR*.

4.10 Equipment Maintenance and Calibration

All herbicide application equipment shall be calibrated to the satisfaction of BCTS before herbicide application operations commence. This includes verifying that the application equipment is in proper working order and, if required, is calibrated to conform to the application rates on the pesticide label.

Calibration is an ongoing process. Equipment speeds, nozzle sizes, spray pressure and helicopter height are examples of variables that are adjusted during spray operations to achieve optimal herbicide application coverage and rates.

4.10.1 Aerial Equipment

Equipment calibration and swath kit analysis will be performed by BCTS staff or an approved external contractor. Proof of calibration and the swath kit analysis shall be submitted to BCTS and kept for at least two years.

Maintenance of the spray equipment is the responsibility of the application contractor. The contractor shall have qualified personnel on each spray site who will ensure the equipment conforms, at all times, to the manufacturer's standards.

4.10.2 Ground Equipment

The application contractor shall calibrate equipment used for backpack applications. Equipment should be calibrated:

- for each individual applicator using hand-held or backpack equipment;
- at the beginning of each season and the start of each new treatment area;
- any time the application equipment is changed or repaired;
- for each change in size or type of nozzle; and
- any time the pesticide or formulation of a pesticide is changed

A maintenance person, designated by the application contractor, must conduct maintenance and repairs. The maintenance person must be knowledgeable in the operation and repair of the equipment. The equipment operation must conform to the manufacturers' specifications. Records will be kept by contractors for each piece of calibrated equipment for a minimum of two years.

4.11 Pesticide Treatment Signs

Signs containing site specific information with regards to treatment of each site shall be posted at all road or trail accessible points to the treatment area. Signs will be posted prior to treatment and will remain posted for a minimum of 14 days as required under *IPMA* and *IPMR*. All Pesticide Treatment Signs will:

- include the title "NOTICE OF PESTICIDE USE" OR "NOTICE OF HERBICIDE USE" in capital letters not less than 2.0 cm tall;
- be a minimum size of 550 cm²
- Be water resistant
- and contain, at a minimum the following information:
 1. Description of treatment area
 2. Purpose of Treatment
 3. Pesticide Trade Name, Common Name, and Active Ingredient
 4. Date of Application
 5. Method of application
 6. PCP registration number
 7. BCTS Office, Address, Contact Name and Phone Number

4.12 Site and Weather Monitoring Procedures

During all herbicide operations, temperature, relative humidity, precipitation, wind speed and wind direction shall be recorded at regular intervals. A person involved in monitoring herbicide operations shall possess a valid British Columbia Pesticide Applicator's Certificate (Forestry General Category) Aerial and Backpack herbicide operations shall cease when:

- windspeed exceeds 8 km/hr;
- temperatures below 0°C or exceeds 26.5°C for aerial applications and 30°C for backpack applications;
- vegetation is too wet (dew or rainwater);
- rain is forecast or imminent within two (2) hours of commencement of treatment, and
- during aerial applications, the relative humidity falls below 40%, (30% for backpack applications).

Weather conditions shall be recorded on the Pesticide Use Record Form.

4.13 Pesticide Use Record and annual report Form

Each Field Team in the BCTS PLBA will retain a record of all activities conducted under the PMP during the calendar year. This information will be submitted as a report to the Administrator by January 31st of the following calendar year. The BCTS Field Teams will retain a copy of all records for a period of three years following treatment.

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Appendix 1: Detailed Site Assessment Document

OPENING IDENTIFICATION & LOCATION:

TSL/Block:		Latitude:	
Opening Number:		Longitude:	
		Gross Block Area (ha):	
Operating Area:		Stratum:	
		Stratum Area (ha):	
Access:		Treatment Area (ha):	

*Is opening in the HRFN CCUA: Y / N

PROPOSED TREATMENT:

Selected Method:		Product Trade Name:	Vision
Objective:		Active Ingredient:	Glyphosate
Proposed Timing (m/yr):			
PCP Number:		Application Rate(L/H):	
Current issue(s):			

SITE HISTORY:

Harvest Date:		Inventory Component:	
Site Preparation (type & yr):		Silviculture Component:	
Planting (species & yr):		Conifers/ha:	
Fill Planting:		Deciduous Stems/ha:	
Stand Tending (type & yr):		Av. Crop Tree Ht. (m):	
If previous chemical used		Av. Decid. Tree Ht. (m):	
Purpose / Method:		Well Spaced Stems/ha:	
Rate / Date:		Date of Stocking Info.:	

STOCKING:

SITE CHARACTERISTICS:

BEC Zone/Var./Site Series:		Moisture/Nutrient Regime:	
Elevation (m):		Slope (%):	
Aspect:		Topography:	
Dead Standing Trees #/ha.		Physical Factors Affecting Treatment:	
Live Standing Trees #/ha.			

STREAMS, WETLANDS AND LAKE AREAS:

Type:	PFZ (m)	Buffer (m)	Dry (Y/N)	NTZ (m)	Comments:
Other Resources: (Y/N) Beaver ___ Nests ___ Mineral Lick ___ Stakeholder(s) ___					
Comments:					

COMPETING VEGETATION:

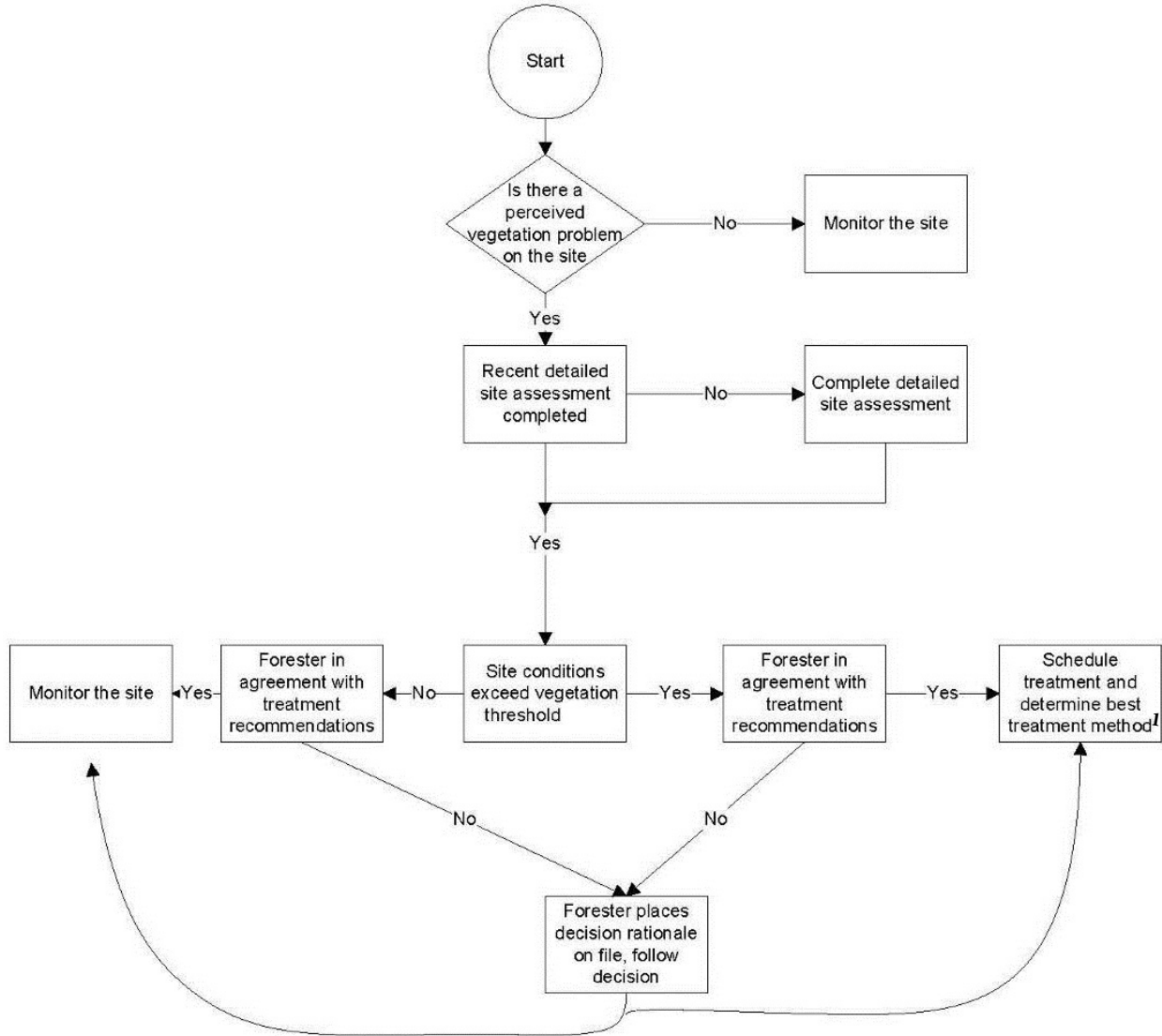
Species	Cover (%)	Ave. Ht. (m)	Range Ht (m)	Continuous - C		Overstorey - O		Present Risk	Future Risk
				Patchy - P	Scattered - S	Understorey - U	Neither - N		

CONDITION OF CROP TREES:

Species	Sx	PI	Species	Sx	PI
Healthy/Stressed:			Leader L (c)		
Height			Age		
Diameter (mm)					
Factors (chlorosis-c, uneven crown-u, crooked stem-s, stunted leader-l):					
Comments:					

Appendix 2: Treatment Decision Matrix

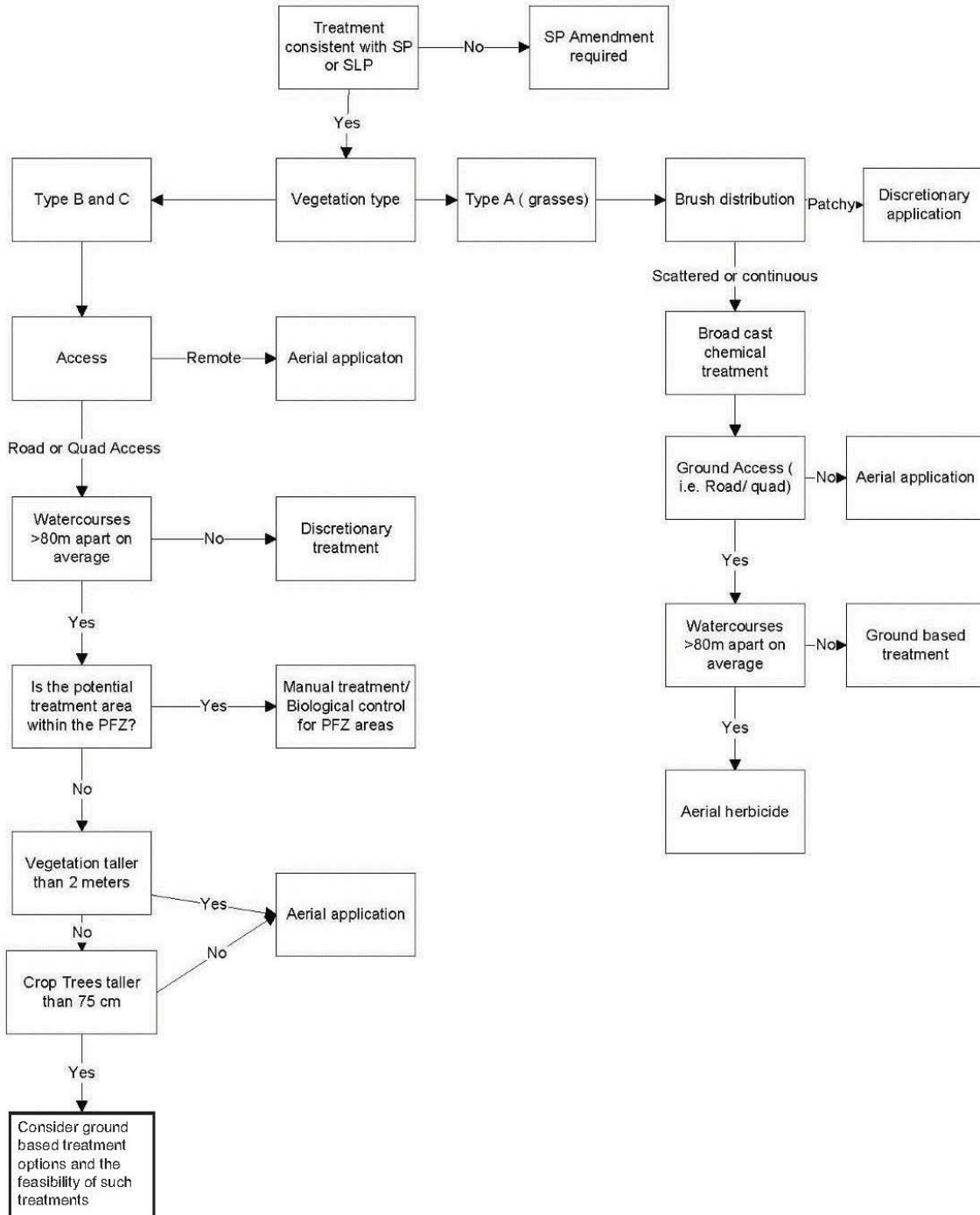
BCTS- Peace Liard Business Area
Vegetation Management Treatment Decision Process



¹ Critical Community Use Area (CCUA) Management Principles Agreement - BC Timber Sales Peace -Liard Business Area (BCTS) and Halfway River First Nation (HRFN) agreement of management principles regarding the planning and execution of timber harvesting and reforestation activities with in HRFN CCUA

Appendix 3: Treatment Selection Process

**BCTS- Peace-Liard Business Area
Treatment Selection Process**



Appendix 4: Herbicide Application Method and Considerations

HERBICIDE APPLICATION METHODS					
	Aerial foliar (glyphosate)	Ground Broadcast and Directed Foliar (glyphosate and triclopyr)	Basal Bark (triclopyr)	Cut Stump, Hack & Squirt (glyphosate)	Chontrol Peat Paste
Efficacy*	2-4 years Herbaceous Deciduous	2-4 years Herbaceous Deciduous	4 + years Deciduous	4 + years Deciduous	Moderate reduction of resprouting and regrowth,
Types of Equipment / Method of application	Applying liquid herbicides to leaves with aerial broadcast.	Applying liquid herbicides to leaves and stems. Applied by hose, backpack sprayer, truck or ATV-mounted sprayer	Herbicide is sprayed on the lower 50cm of the stem. One sided, streamline or thin line methods.	Application of herbicide to cut stems of trees during or after slashing to prevent suckering.	Manual brushing followed by Chontrol paste applied topically to fresh cut stumps.
Workers Safety	Exposure to herbicide application minimal.	Exposure to herbicide. Proper safety gear needed.	Exposure to herbicide. Proper safety gear needed.	Exposure to herbicide. Proper safety gear needed.	Exposure to fungus. Proper safety gear needed.
Effects on Wildlife	Mammal populations: Reduce some cover in short term. Limited effect on food supply. Birds: Reduce some coverage for nests.	Mammal populations: Reduce forage and cover in short term. Birds: Reduce cover for nests.	Mammal populations: Reduce some cover in short term. Limited effect on food supply. Birds: Reduce some coverage for nests.	Mammal populations: Reduce some cover in short term. Limited effect on food supply. Birds: Reduce some coverage for nests.	Mammal populations: no reports of adverse effects on birds or mammals.
Effects on Fish	Adequate PFZ required.	Adequate PFZ required.	Adequate PFZ required.	Adequate PFZ required.	Adequate PFZ required.
Measures for Reducing hazards	PFZ and NWZ required.	PFZ and NWZ (no work zone) required. Danger snags fallen prior to entering area.	PFZ and NWZ required. Danger snags fallen prior to entering area	PFZ and NWZ required. Danger snags fallen prior to entering area	Danger snags fallen prior to entering area
Public concerns	Exposure to herbicide - Posting of signs and notification.	Exposure to herbicide - Posting of signs and notification.	Exposure to herbicide - Posting of signs and notification.	Exposure to herbicide - Posting of signs and notification.	No known mammalian toxins

NON-CHEMICAL METHODS						
	Manual Brushing & Weeding	Mechanical Brushing & Weeding	Mechanical Site Preparation	Prescribed Burning	Manual or Mechanical Girdling and/or Snap/Hinge	Grazing (sheep and goats)
Efficacy*	< 1 year	< 1 year for herbaceous +/- 2 years for deciduous	3 – 5 years	3 – 5 years (if correct intensity achieved)	+/- 3 years setback for deciduous if successful	1-2yrs or longer if treatments repeated.
Types of Equipment / Methods of Application	Spot treat around crop trees, Hand held cutters.	Spot treat around crop trees, Brush saws or chain saws.	Crawler, excavator, disc trencher	Equipment & burning tools. Complete area burned.	Individual stem treatment removing bark from stems.	Stem cutting and defoliation by grazing
Worker Safety	Use of manual tools, repetitive movement, hard physically.	Use of dangerous tools & saws. High risk of injury. Exhaust fumes.	Use of dangerous tools and machinery.	Use of dangerous tools and machinery. Smoke and fire.	Use of dangerous tools and saws. Repetitive motion injuries	Very safe for workers
Effects on Wildlife	Mammals: May reduce access from debris and may reduce browse and hiding cover in short term. Birds: May reduce cover and nest opportunities.	Mammals: May reduce access from debris and may reduce browse and hiding cover in short term. Birds: May reduce cover and nest opportunities.	Mammals: May reduce access from debris and may reduce browse and hiding cover in short term. Birds: May reduce cover and nest opportunities.	Mammals: May reduce access from debris and may reduce browse and hiding cover in short term. Birds: May reduce cover and nest opportunities.	Mammals: May reduce access from debris and may reduce browse and hiding cover in short term. Birds: May reduce cover and nest opportunities.	Reduction of local food for native ungulates. Potential for negative interactions with predators such as cougars and bears.
Effects on Fish	Adequate buffer required to keep debris out of watercourse and not increase direct sunlight on stream surface.	Adequate buffer required to keep debris out of watercourse and not increase direct sunlight on stream surface.	Adequate buffer required to keep debris out of watercourse and not increase direct sunlight on stream surface.	Adequate buffer required to keep debris out of watercourse and not increase direct sunlight on stream surface.	Adequate buffer required to keep debris out of watercourse and not increase direct sunlight on stream surface.	Adequate buffer required to keep debris out of watercourse and not increase direct sunlight on stream surface.
Measures for Reducing Hazards	NWZ required. Danger snags fallen prior to entering area	NWZ required. Danger snags fallen prior to entering area	NWZ required. Danger snags fallen prior to entering area	NWZ required. Danger snags fallen prior to entering area	NWZ required. Danger snags fallen prior to entering area	NWZ required. Danger snags fallen prior to entering area
Public Concerns	General acceptance of method	General acceptance of method	General acceptance of method	General acceptance, but concerns of smoke exist.	General acceptance of method	General acceptance of method