



BCTS Peace-Liard Business Area

Pest Management Plan No. 402-557-2011/2016

2011 to 2016

March 2011

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

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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:

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Executive Summary

BCTS PLBA submits the following Pest Management Plan (PMP) for Forest Vegetation Management. This PMP shall be in force for a five-year period from the date that the Pesticide Use Notice is confirmed by the BC Ministry of Environment (MOE). The PMP shall encompass active BCTS PLBA operating areas.

The purpose of this PMP is to implement a proactive program of identification, prevention, and monitoring of pests (herbs, shrubs and deciduous trees) while carrying out sound silvicultural treatments to achieve a free growing crop of trees. This Integrated Pest Management (IPM) framework will allow reforested areas to achieve free 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 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 desired plantation establishment;
- Hinders optimal growth and development of crop trees;
- Prevents a stand from achieving free growing; or
- Affects an established plantation's overall health.

Vegetation management activities under this PMP will be targeted towards identified herb, shrub and deciduous pest species that are a risk (i.e. could lead to potential volume losses as a result of mortality and/or suppressed growing conditions) to achieving a free growing stand within the time frame specified in the Forest and Range Practices Act (FRPA).

A major component of this PMP is the Decision Making Keys (Appendix 3 and 4) which serves to identify the need for treatment, and help choose the best possible treatment for a site given possible habitat, consultation, and treatment restrictions. The range of pest management treatment options proposed for use by BCTS to achieve its silviculture goals includes:

Non-Chemical Treatment Methods	
Manual Brushing and Weeding (Power Saw)	Mechanical Site Preparation
Manual Brushing and Weeding (Hand Tools)	Girdling
Sheep Grazing (Dawson Creek Field Team)	
Herbicide Application Methods	
Aerial (Broadcast)	Basal Bark
Aerial (Spot)	Hack and Squirt
Backpack (Broadcast)	Cut Stump
Backpack (Spot)	Backpack (Selective – includes cone or roll-a-wick options)

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1.0 Introduction

The PLBA of BCTS geographically encompasses the Fort Nelson and Peace (formerly Dawson Creek and Fort St John) Forest 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 comprised of field-oriented staff reporting to the TSO are located in Dawson Creek, Fort Nelson, and Fort St John. Currently each field team location is associated with an individual timber supply area and retained its allowable annual cut apportionment.

This plan describes how the BCTS Forest Professionals will deal with competitive vegetation species managed in the plan area, the plan implementation, environmental and economic considerations, and communications with those interested in the treatment activities under the plan. Consideration of the public and First Nations interests are included and play a considerable role in the standards used in the implementation of this plan.

1.1 Purpose

The BCTS program operates within the Fort Nelson, Fort St. John and Dawson Creek Timber Supply Areas (TSA). Each block harvested by BCTS must achieve free growing status within the time frame specified in Silviculture Prescription or Site Level Plans as per BC's FRPA. Vegetation management activities are undertaken to enable conifer release (in order to achieve free growing), site preparation (for fill planting or for the establishment of a new crop of trees, before or after harvest), and brushing and weeding (crop tree survival). The objectives of this PMP are as follows:

- To establish free growing quality crop trees on a harvested area as defined by the FRPA in a cost effective manner with full consideration of wildlife habitat, water quality, cultural heritage, and the environment;
- To allow for longer term planning and to deliver a timely, effective program;
- To provide an open forum for public participation regarding PMP development, content and implementation;
- To reduce the number of referrals to Government agencies, First Nations, stakeholders and interested parties by establishing a clear decision making process that considers wildlife habitat, water and fishery, cultural, environmental and silvicultural values;
- To promote the use of techniques that minimize vegetation pest problems and reduces the need for and use of herbicides; and
- To promote well-stocked stands of valuable tree species in order to sustain Annual Allowable Cut (AAC) levels.

For the purpose of achieving free growing within the assessment period, vegetation that is, or in the near future will be, competing with crop trees will be treated to achieve the following goals:

- For planting site preparation;
- For plantation establishment;
- To encourage optimal growth and development of planted and naturally regenerated coniferous crop trees;

- To release coniferous crop trees from competing vegetation; and
- To meet acceptable conifer to brush ratios as defined in the current free growing stocking standards.

1.2 Scope

This plan is consistent with the requirements of and operates under the authority of the FRPA and regulations, Integrated Pest Management Act and the Integrated Pest Management Regulation. This PMP applies to silviculture obligations held by BCTS in the PLBA on crown land. Lands in agriculture settlement, First Nations reserves, and parks and protected areas, as defined by the Land Resource Management Plan, are excluded from the PMP. Figure 1 shows the area of the Fort Nelson TSA being under management of the PMP. This area is extended in the east to Kotcho Lake, and in the west, the area includes a Defined Forest Area Unit in the Smith River Area. The map shows these areas in details. The PMP area for the Fort St. John Field team (Figure 2) and Dawson Creek Field Team (Figure 3) encompasses the TSA of the respective field teams.

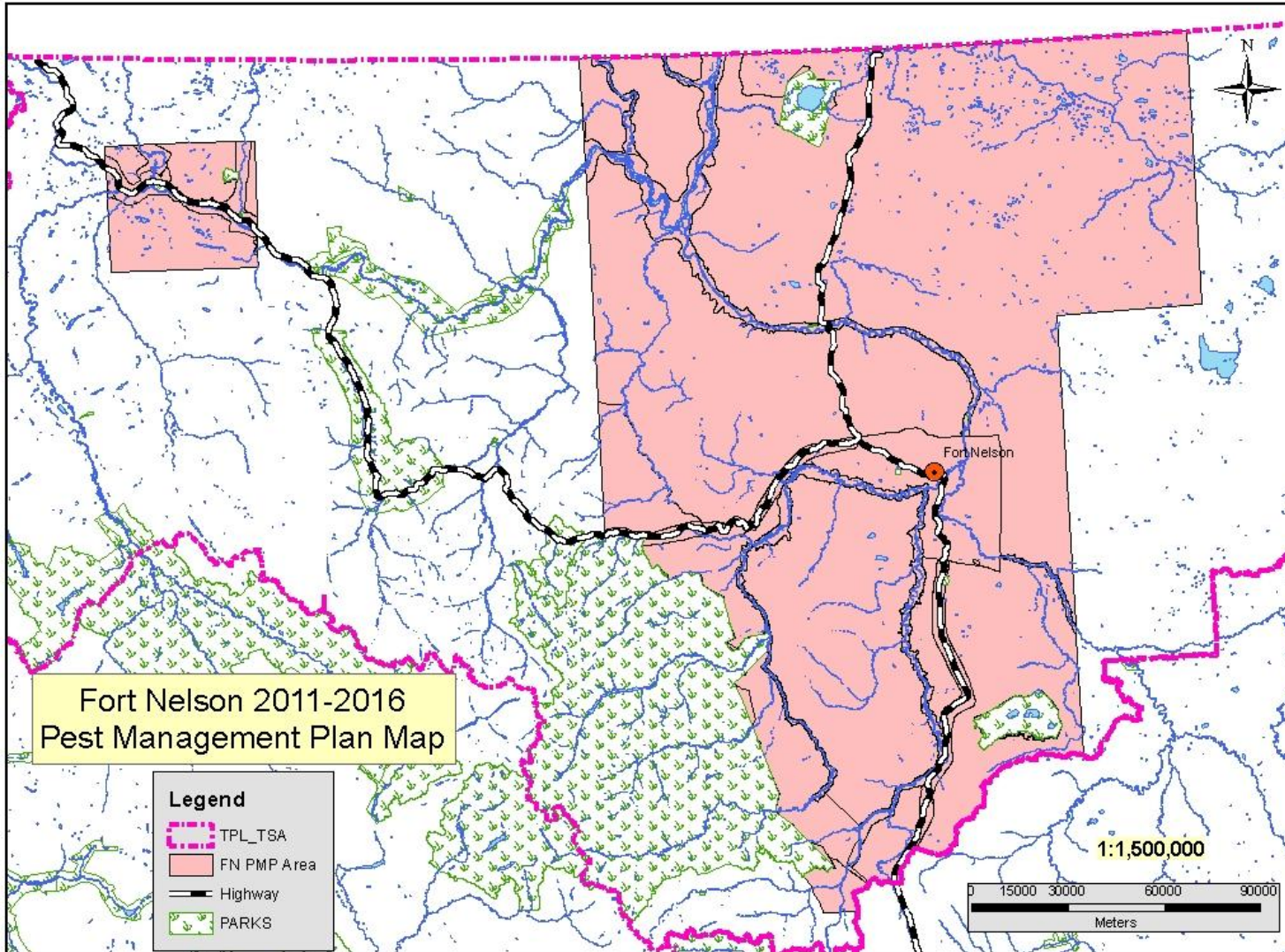


Figure 1 Map of Fort Nelson PMP Area

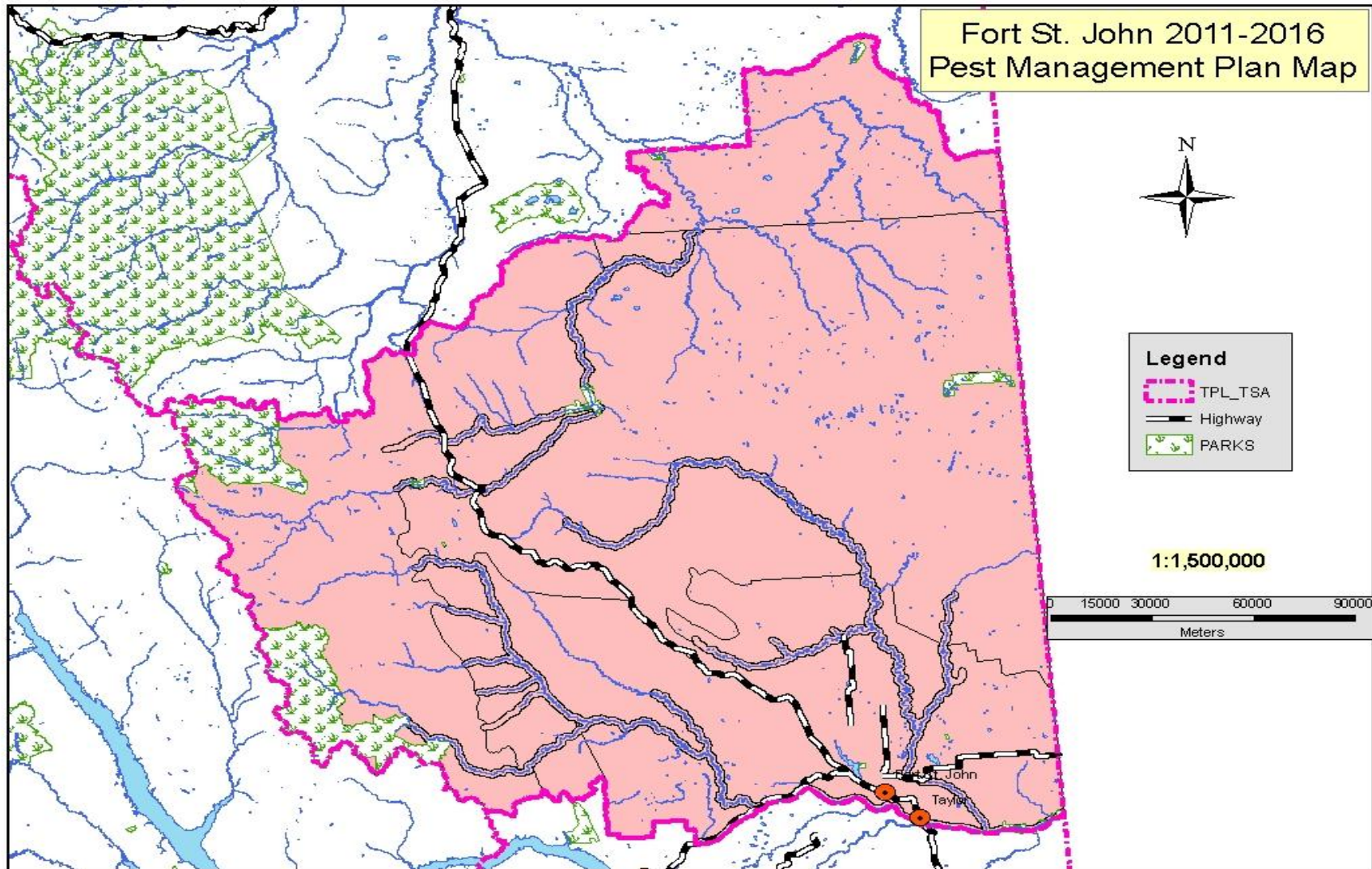


Figure 2 Fort St. John PMP Area

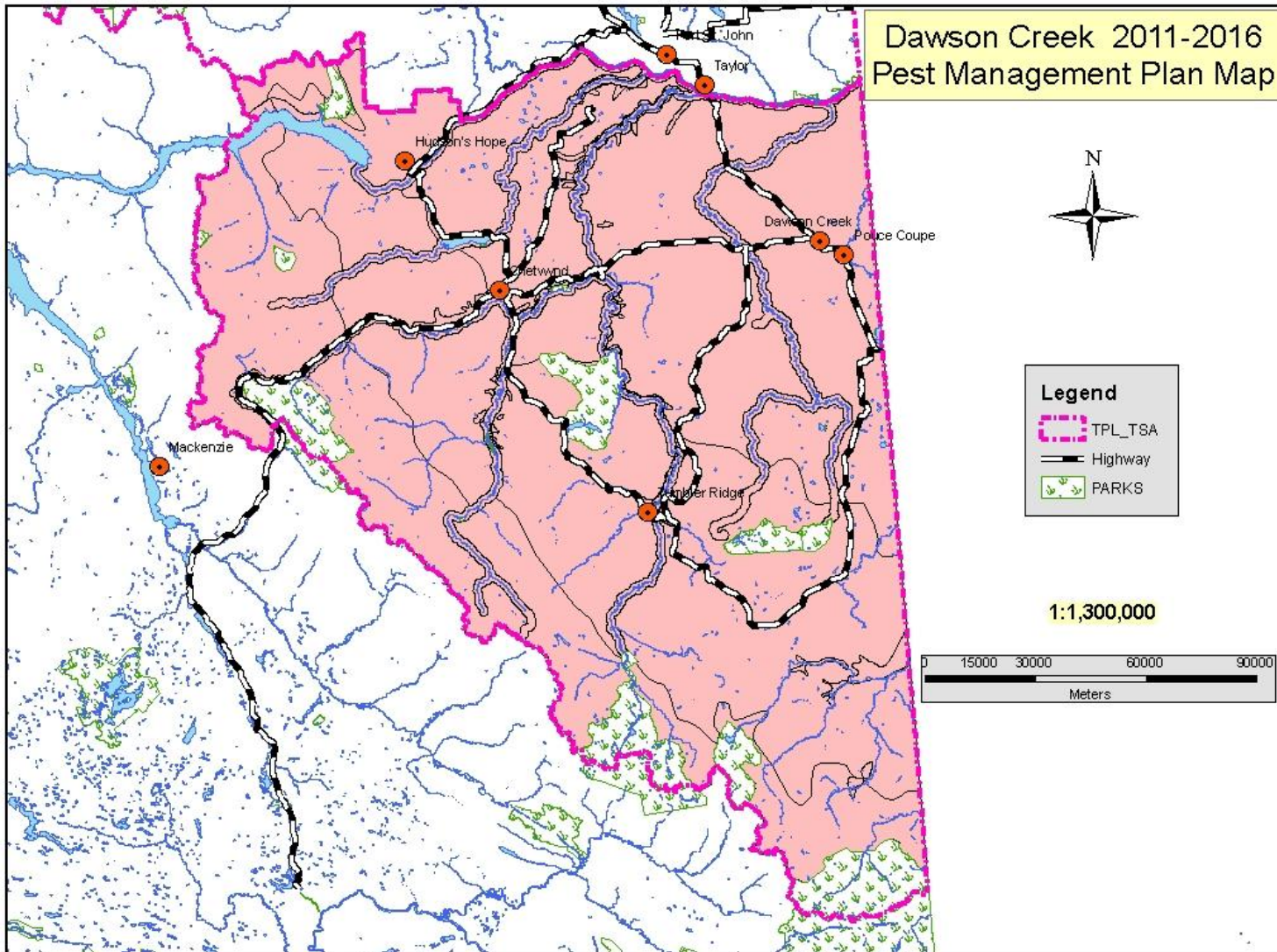


Figure 3 Dawson Creek PMP Area

1.3 Term

This PMP shall be in force for a five-year period beginning from the date that the Pesticide Use Notice is confirmed by the BC MOE.

2.0 Forest Cover

In this section, a description of the forest types found in the plan area, the types of forest crops that are being established, and the type of vegetative competition managed under the plan and history of vegetation management are presented.

2.1 BEC Zones

Biogeoclimatic Zones

The PLBA is dominated by the Boreal White and Black Spruce (BWBS) Biogeoclimatic Ecosystem Classification (BEC) Zone, and is the primary BEC zone in the Fort Nelson TSA. In the Fort St. John TSA, the Engelmann Spruce-Subalpine Fir (ESSF) zone occurs above the BWBS (at approximately 1200 metres) in the west and southwest portions of the TSA. In Dawson Creek, the Sub-boreal Spruce (SBS) BEC zone is located in the western portion of the TSA.

BWBS Description

Typical BWBS BEC Zone forest communities are a mosaic of pure or mixed hybrid spruce and aspen stands on the well-drained plateau sites, and lodgepole pine stands on the drier outwash deposits. Mixed pine and black spruce forests occupy the poorer, moister sites. Fire has had a significant impact on the development of the boreal forest landscape, and therefore there are few true climax forests because of the repeated fire history. Many seral stage pine stands occur at the higher elevations on the coarser-texture soils.

ESSF Description

The ESSF typically occurs above the Interior Cedar — Hemlock, Montane Spruce, or Sub-Boreal Spruce (SBS) zones. The Spruce — Willow — Birch zone is the subalpine zone that adjoins the ESSF along its northern boundary. The ESSF includes continuous forest at its lower and middle elevations and subalpine parkland at its upper elevations. Engelmann spruce and subalpine fir are the dominant climax tree species in the ESSF. Lodgepole pine is a widespread seral species after fire.

SBS Description

Upland coniferous forests dominate the sub-boreal landscape. Hybrid white spruce (*Picea engelmannii* x *glauca*) and subalpine fir are the dominant climax tree species. Lodgepole pine, a seral species in the SBS, is common in mature forests in the drier parts of the zone and both lodgepole pine and trembling aspen pioneer the extensive seral stands. Paper birch is another pioneer tree, often on moist, rich sites. Douglas-fir is usually a long-lived seral species in the SBS, occurring abundantly on dry, warm, rich sites and as a consistent, although small, component of many mesic forests, especially in the south-eastern part of the zone. Black spruce

also occurs occasionally in climax upland forest. Alluvial forests of black cottonwood, often with a minor component of spruce, occur to a limited extent on active floodplains of the major streams and rivers.

2.2 Area Descriptions

Fort Nelson

The Fort Nelson TSA is approximately 9.8 million hectares, of which only 1.4 million hectares (15%) of the total TSA is identified as part of the “Timber Harvest Land Base (THLB)”. The BEC Zone covers the majority of the area under this plan. Spruce dominated stands cover approximately 50% of the THLB, while aspen dominates about 38% with the remaining area being pine, cottonwood and balsam leading on 7.5%, 5% and less than 1% of the area, respectively.

Fort St. John

According to the Fort St John TSA’s most recent Timber Supply Review and Analysis, the area occupied by the dominant conifer tree species is as follows: lodgepole pine 55%, hybrid spruce 43%, and Balsam (subalpine fir) 2%. These are found as pure stands and as a mix with minor components of deciduous species throughout the area. The deciduous forests are dominated by aspen, with cottonwood and birch making up a minor component. These deciduous forests are located primarily in the southern and central portions of the TSA.

Dawson Creek

The Dawson Creek TSA is characterized by gently rolling prairie near Dawson Creek, eastern foothills near Chetwynd and Tumbler Ridge, and the rugged terrain of the Rocky Mountains around Monkman Park. The Dawson Creek TSA has 3 BEC Zones, BWBS, and ESSF in higher elevations and SBS in the western portion of the TSA. The forest cover is dominated by spruce and lodgepole pine. The commercially valuable coniferous species are white spruce, Engelmann spruce and lodgepole pine and to a lesser extent, black spruce, subalpine fir and larch. Deciduous forests are located primarily in the lower elevation Kiskatinaw plateau and Peace River lowland areas. The commercially valuable deciduous species are aspen and, to a lesser extent, balsam poplar (also referred to as cottonwood). In selected areas, birch is considered to be a commercial species.

2.3 Competitive Vegetation Species

There are three main types of vegetation communities found within the PMP area: herbaceous plants, shrubs, and non-crop deciduous trees. Shrubs can be divided into two categories: low and high. Low shrubs are woody plants, which 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. Plants grow together in associations known as vegetation complexes. A series of publications referred to as “Operational Summary for Vegetation Management” (QP # 19852) describes the vegetation complexes. Vegetation management activities under this PMP will be targeted towards the following communities and common dominant competitive species:

Herbs: Fireweed, horsetail, grasses, and ferns
Shrubs: Alder, willow, prickly rose, red elderberry and red raspberry
Deciduous: Cottonwood, trembling aspen, and birch

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 within the PMP area include, but are not limited to Grass: (*Calamagrostis* spp.), fireweed (*Epilobium angustifolium*), horsetail (*Equisetum* spp.) woodfern (*Dryopteris* spp.) and lady fern (*Athyrium Filix-Femina*).

Shrubs (vegetation community B): Shrubs can be divided into two categories: low and high. Low shrubs are woody plants, which 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.

Low shrubs (B-1): Include, but are not limited to prickly rose (*Rosa acicularis*), red osier dogwood (*Cornus sericea*), red elderberry (*Sambucus racemosa*), red raspberry (*Rubus idaeus*), thimbleberry (*Rubus parviflorus*), black twinberry (*Lonicera involucrata*), false azalea (*Menziesia ferruginea*), white flowering rhododendron (*Rhododendron albiflorum*).

High shrubs (B-2): These include, but are not limited to alder (*Alnus* spp.) and willow (*Salix* spp.). Alder is commonly found in many mature stands. After harvest, alder can potentially be a significant competitive species depending on the distribution and density throughout the site impacting seedling establishment and development. Willow is prevalent and is a significant browse species.

Deciduous trees (vegetation community C): Species include 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 and cottonwood is expected after harvest of stands with a component of aspen due to root and shoot suckering.

Potential brush hazard from herbaceous plants and low and high shrubs can be predicted for a biogeoclimatic zone, subzone and site series. Brush hazards, as classified by BCTS Foresters, range from low to very high. These hazards generally reflect the nutrient and moisture regime of the site.

2.4 Managed Forest Crops

The PLBA manages the forest land base for conifer, deciduous, and mixed (conifer and deciduous) crops. The management of the sites are based on plans that are developed prior to harvest. In general, sites that have dominant conifer or deciduous components (greater than 80% volume) are managed for that dominant component. For those sites that are mixed, specific areas of the cutblock are identified as separate standard units for conifer or deciduous management. With the exception of Fort St. John, a true intimate mix of deciduous and conifer stems on a site is not presently managed, as the stocking standards have not been developed, and the Timber Supply Review does not recognize mixed stand volume tables. There have been individual ‘one

off” mixed management standards for sites. The management of both conifer and deciduous stands allows for some switching of species management on a cutblock, and is tracked on the landscape for the TSA’s, to ensure the balance of conifer and deciduous management is maintained on the landscape.

3.0 The Integrated Pest Management Program

Integrated Pest Management (IPM) is a process for managing pests that:

- Plans and manages ecosystems to prevent pest establishment;
- Identifies existing and potential pest problems; Monitors populations of pests and beneficial organisms, damage caused by pests and the environment;
- Uses injury thresholds in treatment decisions; and
- Suppresses pest populations to acceptable levels by:
 - Using biological, physical, cultural, mechanical, behavioural and chemical controls in appropriate combinations,
 - Considering environmental and human health; and
 - Evaluating the effectiveness of pest management treatments.

IPM develops and promotes the use of integrated, ecologically sound pest management practices. The goal is to reduce the need for pesticide use by promoting good forest management techniques and where necessary to develop pest control programs that are economically, environmentally, and socially acceptable.

The British Columbia Ministry of Forests (Doliner and Borden, 1984) defines the term pest as being “...any organism or damaging agent designated as detrimental to effective resource management.” For the purposes of this plan, a pest includes an herbaceous, shrub or deciduous complex or community that:

- Inhibits plantation establishment;
- Hinders optimal growth and development of crop trees;
- Prevents a stand from achieving free growing; and
- Affects an established plantation’s overall health.

Vegetation management activities under this PMP will be targeted towards identified herb, shrub and deciduous pest species that are a risk (i.e. could lead to potential volume losses as a result of mortality and/or suppressed growing conditions) to achieving a free growing stand within the time frame specified in the FRPA.

Techniques such as biological control, manual brushing, and/or chemical controls may be implemented. Pesticides are used after the site assessments and treatment option key indicates they are needed. Any treatments will be made with the goal of removing only the target organism. Pest control methods are selected and applied in an effective and economical manner that minimizes risks to human health, beneficial and non-target organisms, and the environment.

3.1 Brush Prevention, Prediction, and Monitoring Methods

3.1.1 Prediction (planning)

Blocks are stratified using the BEC system during the development of the prescription. Site specific data (vegetation and species distribution, expected brush hazard, and moisture and nutrient status) coupled with the knowledge of how vegetation responds to harvest on a given ecotype is used to predict a potential pest problem and prescribe mitigating measures. Measures might include site preparation, species selection, stock type selection, harvest timing, planting timing and alteration of stocking standards. All critical site factors are assessed at this stage in order to ensure appropriate prevention measures are prescribed.

3.1.2 Prevention

Preventing vegetation from becoming a pest is an important component of this PMP. The following preventative measures will be implemented to promote the health and vigour of coniferous crop trees so that the likelihood of multiple vegetation management treatments is reduced.

Stocking Standards

Stocking standards were first legislated as requirements to ensure appropriate species and densities were replanted after harvesting. Silviculture prescriptions of the past gave reference to appropriate standards for Foresters to measure plantation success or failure against. Site plans (Site Level Plans in Fort St. John) reference stocking standards (and free growing criteria) in Forest Stewardship Plans (FSP), [Sustainable Forest Management Plans (SFMP) in Fort St. John]. Over the lifetime of this PMP, BCTS may be operating under stocking standards from silviculture prescriptions, site level plans and site plans.

Stocking standard variances can occur due to unforeseen site limitations reducing the stocking on the sites. Variances may be attributed to existing and potentially limiting site conditions such as a high brush hazard, which might impede the subsequent establishment of a free growing plantation to legislated stocking standards. Subhygric to subhydric sites with high to very high brush hazards are normally targeted for stocking variances. In these cases, variances to the stocking standards are requested.

Planting Timing (scheduling)

In order to ensure seedling survival, establishment, development, and the ability to compete with associated vegetation, timing of reforestation activities is critical on sites having high to very high brush hazards. Sites having a high to very high brush hazard rating will be reforested within two planting seasons following harvest. We will strive to plant these high risk sites within one season; however, stock availability, slash loading, plantability, and budgets may interfere with this very short window of opportunity. On sites having a low to moderate brush hazard, planting will occur within the regeneration delay period.

Harvest Timing

BCTS will encourage the completion of harvest operations on sites or part sites having a high to very high brush hazard within one harvest season. This will allow the sites to be planted before the vegetation becomes fully expressed. The planting of the partially logged blocks will be dependent upon stock availability, and the impact planting would have on the harvesting operation.

Site Preparation

Site preparation improves planting microsites where limiting factor(s) might inhibit seedling establishment or growth potential. The need for site preparation is usually identified at the prediction stage (site plan) and verified during a post harvest walkthrough. Site preparation will be utilized on selected sites in order to provide seedlings with an optimum chance of establishing themselves and developing to their fullest potential on the site. Table 1 defines the objectives of site preparation and typical methods that BCTS employs in order to meet these objectives.

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

In some instances, site preparation via windrowing, trailing or other broadcast mechanical site preparation treatments can stimulate brush competition. The losses associated with no site preparation and the potential future losses associated with stimulated vegetative competition must be assessed by the person prescribing the site preparation. Individual spot methods of site preparation do not stimulate brush competition the same.

Appropriate Stock Type

The stock type will be selected for the prevailing site conditions and existing or potential brush hazard. Small stock types (313 and smaller) are adequate on sites with low brush hazard. Sites with a moderate to high brush hazard and good rooting medium are suited to a larger stock type (410 and larger). Site preparation may allow smaller stock to be used in brushier sites.

The larger seedling is able to withstand competition and will occupy the site sooner because of the larger top, higher volume of roots, carbohydrate reserve, size and number of buds, stem diameter and percentage of sun needles. Larger stock types have a bigger stem diameter which allows it to withstand grass and herbaceous press due to snow. Larger stock types or two year old stock are used on sites anticipated to have a very high brush hazard.

Microsite Selection

Optimum crop tree growth is achieved through the selection of appropriate microsites. Traditionally, BCTS has directed seedlings to be planted in well-decomposed organic soil, humic soil and mineral soil, in an elevated site, where possible.

Increased Planting Density

On most sites, the stocking standards are a target of 1200 stems per hectare (SPH) and a minimum of 700 SPH, though there are some differences and variances, as discussed in 'Stocking Standards'. Planting densities will be managed to reflect the influence of site conditions such as brush, natural regeneration, and anticipated seedling mortality on the future densities of the site. Improvements in the tree handling and nursery practices have significantly reduced the mortality rate. Increasing planting density will not 'beat the competition' through numbers, or crown closure, however the increased planting density is more likely to meet free growing with less intensive brushing treatments.

Planting Immediately After Harvest

Completing planting the summer immediately after logging is optimal. Tree orders have to be submitted prior to the start of the winter logging season. Predicting the number of trees required for next year's planting season can be difficult, as it is possible that the area to be planted was not logged. The seedling availability is dependent upon the amount of risk Foresters are willing to take with the seedling order, as BCTS allows the Timber Sales Licensee a 2 to 3 year period to complete logging, after the issuance of the license.

Planting Season

Summer planting is ideal because it allows for rapid root egress and below ground establishment in warmer, moist soils. Summer planting has risks due to the seedlings' active growth, making them less tolerant of stock handling, and immediate planting is required (no more than 5 days from lifting to planting). Nurseries can often have problems delivering summer seedlings because they are weather dependant, have a shorter growing season, and require excellent planning and scheduling. Properly hardened off summer stock can be established sooner with less shock than spring stock planted one year later.

Spring planting may not be successful the season after logging due to extended periods of frozen ground, a very short spring, and a quick transition to summer. Winter stored, spring stock, planted in late spring/early summer can suffer from planting shock and poor initial performance.

3.1.3 Monitoring

Dawson Creek and Fort Nelson

Conducting properly timed surveys in combination with informal walkthroughs and aerial reconnaissance (where access is an issue) is essential in identifying and addressing problems, which may affect achievement of a free growing plantation. The FRPA Regulations direct that a survey must be completed in order to declare that regeneration delay and/or free growing have been met. Surveys and walkthroughs can be completed at any time prior to free growing to ensure that stocking and brush levels are acceptable and that free growing parameters will be achieved within the appropriate time frame. A monitoring regime can include any or all of the activities listed in Table 2.

Table 2 Silviculture Survey Methods and Survey Objectives

Pre-Harvest Brush Assessments	Performed while completing silviculture prescriptions. Any evaluation and recommendation for pre-harvest brush vegetation management is performed at this stage.
Post-Harvest Walkthroughs	Determine plantability, necessity of site preparation, stock type selection, verification of the brush hazard, and verify the silviculture prescription.
Regeneration Surveys	Conducted within the regeneration delay period in order to ensure that regeneration delay has been met.
Brush Assessments	Verification of the brush hazard of an area and confirm the treatment regime required.
Stocking Surveys	Generally completed after regeneration delay has been declared. The purpose of the survey is to confirm the density of crop trees and identify any performance issues.
Free Growing Surveys	Performed to confirm the free growing status of an opening. Can be used to identify where additional brushing treatments are required,

Walkthroughs can be completed at any time during the life of the opening. Monitoring procedures will remain flexible and open to change.

Fort St. John

Reforestation

Reforestation in the Fort St John Timber Supply Area (TSA) is guided by the Fort St John Pilot Project Regulation (FSJPPR) and the Sustainable Forest Management Plan No. 2 (SFMP). The SFMP contains a landscape level strategy for reforestation.

This strategy has the following key features to:

- Set standards for reforestation to provide restocking of harvested areas;
- Provide a landscape level assessment of reforestation success based on a comparative measure of future volume;
- Ensure that Professional Foresters will have Professional accountability at the cut block level to vary regimes and provide for other values as they progress to a landscape level target for volume; and

- Allow continuous improvement by providing feedback on landscape level reforestation success. Silviculture regimes and/or corrective action can be considered across the landscape and implemented in a cost effective manner that considers all values being managed.

Traditionally, reforestation success has not been measured at a landscape level. This strategy extends beyond previous practices and provides an additional measure to assure adequate management and conservation.

This strategy applies to all area harvested after November 15, 2001 under the FSJPPR.

Table 3 Survey Timing and Methods in Fort St John Operating Area

<p>-Stocking Surveys: 2 Yr Post Plant (C & M), 3 Yr PHC (D) -Brushing Surveys: 5 Yr Post Plant (C & M), Pre-MSQ-10 Yr PHS (C & M) -Regen. Surveys: 7 Yr PHC (D) -Free Growing: 9/10 Yr PHS (D)</p>	<p>-PHS-Post Harvest Start -PHC-Post Harvest Completion -FG and RG declarations -For Blocks with both Con and Dec SUs use Conifer timelines -Some survey names differ between genus and contract</p>
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Conifer			Deciduous		
Year	Activity	# of Plots	Year	Activity	# of Plots
1	Harvest start	NA	1	Harvest Completion	NA
2	Plant	NA	3	Stocking Survey (Regen Performance-Genus)	**1 plot/ha
4	Stocking Survey (2 yr Post Plant-Genus)	1 plot/ha	7	Regen. Survey (Regen Performance- Genus)	1 plot/ 4 ha
7	Brushing Survey (5 yr Post Plant-Genus)	1 plot/ 4 ha	9	Free Growing Survey (FG -Genus)	1 plot/ 4 ha
10	Brushing Survey (Pre-MSQ -Genus)	1 plot/ 4 ha	14	MSQ (MSQ-Genus)	1 plot/ ha
15	MSQ Survey (MSQ-Genus)	1 plot/ ha			

Silviculture Requirements for Crop Trees” provide guidance to Foresters preparing Site Level Plans.

The landscape level assessment of stocking will be measured using a Mean Stocked Quadrant (MSQ) method. Individual crop trees are assessed based on measures that are identifying the trees as able to survive and contribute to the harvestable volume at rotation. The crop tree assessment requirements are set out in Appendix 2 of this document.

Deciduous Areas

Minimum well spaced stocking densities are described in Appendix 2 and are used to determine Establishment Delay.

Mixedwood Areas

In the short term mixedwood management will be achieved primarily through reforestation strategies that maintain separate deciduous and coniferous strata. The reforestation strategies will involve approaches that stratify the area to be reforested into discrete deciduous and

coniferous strata (i.e. splitting cutblocks or reforesting conifers in clusters or strips), and apply the respective stocking standards and well growing standards. .

For the term of the SFMP No. 2, mixedwood regimes for intimate mixtures of conifer and deciduous will be established on 10% of the harvested mixedwood landbase as operational trials. Over the longer term a strategic approach will be developed to guide the deployment of reforestation strategies that will establish an appropriate desired future forest condition. Mixedwood forests will be sustained by managing forest type distribution.

Stocking standards for intimate mixtures of conifer and deciduous will require further development. The interim requirements will be based on the FSJPPR and the “Updated Prince George Forest region Mixedwood Standard Operating Procedures” Sec 4.3 dated March 9 2001. Documented variations from these procedures can be made to establish operational trials.

Landscape Level Assessment of Reforestation Success

The landscape level reforestation assessment system measures reforestation performance and determines if reforestation obligations are complete. Block level reforestation requirements are replaced with landscape level reforestation requirements. Further explanation can be found in Appendix 2.

3.2 Treatment Thresholds

A crop tree will be considered at risk for damage when vegetation competition occupies the growing space of the crop tree, depriving it of light, water and nutrients. Damage assessment and action levels for applying vegetation management treatments need to take into account the condition of the crop tree and the vegetation.

Table 4: Vegetation Treatment Thresholds

Primary Target Vegetation	Density/Cover Threshold	Height Threshold	Requirements
Aspen	≥400 sph	≥ 100% of the crop tree height	May apply the height and density thresholds separately
Birch	> 400 sph	> 100% of the crop tree height	May apply the height and density thresholds separately
Cottonwood	> 400 sph	> 100% of the crop tree height	May apply the height and density thresholds separately
Alder	>15%	> 80% of the crop tree height	Must apply the height and density thresholds concurrently
Willow	>15%	> 100% of the crop tree height	Must apply the height and density thresholds concurrently
Dogwood	>30%	> 100% of the crop tree height	Must apply the height and density thresholds concurrently
Rhododendron	>30%	> 100% of the crop tree height	Must apply the height and density thresholds concurrently
Rose	>30%	> 100% of the crop tree height	Must apply the height and density thresholds concurrently Target crop trees must be < 6 years for treatment to occur

Fireweed	>30%	> 100% of the crop tree height	Must apply the height and density thresholds concurrently Target crop trees must be < 6 years for treatment to occur
Raspberry	>30%	> 100% of the crop tree height	Must apply the height and density thresholds concurrently Target crop trees must be < 6 years for treatment to occur
Grass	>10%	> 80% of the crop tree height	Must apply the height and density thresholds concurrently

The Vegetation Treatment thresholds are not meant to replace sound Professional judgement. If, in the opinion of the Professional Forester, a site requires treatment and the Brush Assessment falls short of the treatment thresholds, it may be treated. Conversely, if a Brush Assessment shows that it requires treatment, but in the Professional Forester’s or District staff’s opinion does not require treatment, the site may not be treated. Rationale and justification will be provided when prescribing treatments below the threshold.

The data will be collected during a routine walkthrough or as a component of a regeneration survey. Strata of one (1) hectare or larger will be scheduled for a detailed site assessment and vegetation control treatment and subjected to the Decision-Making Key constraints.

When completing site assessment, staff should also take into consideration the signs of suppression, caused from competition for light and nutrients (whereby thick competition insulates the soil and reduces overall early season soil temperature), including:

- chlorosis of crop trees;
- stunted and bushy leaders exhibiting poor growth;
- short (shade) needles; or
- weak and slender stems.

Reductions in growth potential due to mechanical damage can also be detected during brush assessments. These are exhibited by:

- vegetation press which creates sweeps, crooks, and weak stems;
- damage to crop trees by adjacent vegetation causing defoliation, uneven crown development or stem damage; or
- mortality.

On older (10 years) sites or backlog sites where high shrubs and deciduous competition are more expressed, the criteria used to determine the need for treatment will be the derived from the Free Growing Guidelines.

3.3 Treatment Options and Selection

The following tables show the treatment options and considerations for treatment in the PLBA. The single stem treatment (Table 5) and broadcast treatment (Table 6) options have been

determined as economically and operationally viable options for treating vegetation complexes under this plan, based on the past experience of staff in the PLBA:

BCTS Foresters will follow a Decision Process to determine the appropriate brushing methods to use for treatments. See Appendix 3 for the Decision Process and Appendix 4 for the Treatment Selection Process. Treatment Options will vary depending upon the pest hindering the crop tree and the timing of the proposed treatment. The type of competition a crop tree may receive can be thought of as a limiting factor.

Table 5 Single Stem Treatment Options

	Single stem Treatment Methods					
	<u>Manual Brushing and Weeding (Power saw)</u>	<u>Manual Brushing and Weeding (Hand tools)</u>	<u>Manual Girdling</u>	<u>Hack and Squirt Herbicide Treatment</u>		<u>Backpack Herbicide-Basal Bark Application</u>
Product Used	None	None	None	Glyphosate	Chontrol Peat Paste	Triclopyr
Target Vegetation	tall shrub and deciduous complexes	herbaceous and shrub complexes	deciduous stems > 6 cm DBH	deciduous species, targets stems >2cm DBH	deciduous species, targets stems >2cm DBH	alder, willow, aspen, birch and cottonwood
Equipment Used/ Application Method	chainsaws and/or brushsaws	variety of hand tools and handpulling	-hand girdling tool-individual stem treatment -removal of a ring of bark and cambium	-hatchet or sandvik , squirt bottle - frilling stem (to the cambium layer) and coating cut surface with herbicide -application rates vary	-hatchet or sandvik , squirt bottle - frilling stem (to the cambium layer) and coating cut surface with herbicide -application rates vary	-low pressure backpack sprayer with thinline nozzle -application rate varies directly with size of stems -quantity used varies
Treatment cost	\$500-\$1500/ha	\$500-\$1000/ha	500-\$2000/ha	\$500-\$1500/ha	\$500-\$1500/ha	\$500-\$1000/ha
Cost Factors	-access -terrain, -trafficability -density and size of target species	-access -terrain, trafficability -density, size, and visibility of target species	-access -terrain, -trafficability -density and size of target species	access -terrain, -trafficability -density and size of target specie	access -terrain, -trafficability -density and size of target specie	-access -terrain -trafficability -density & size of target stems
Treatment Efficacy	- immediate release -2-3 year setback of competition -usually requires 2 treatments in order to reach free growing	-immediate release -2-3 year setback of competition -usually requires 2 treatments in order to reach free growing -timing of treatment is important	-3 or more years efficacy -treatment may take 1-3 years to manifest itself	- - selective treatment with no collateral damage	- - selective treatment with no collateral damage	-Permanent efficacy of treated stems -low collateral damage -PFZ's and buffers retain significant vegetation
Worker Safety	-repeated motion becomes physically difficult -previous site preparation, slash loading, and slope are issues -exposure to exhaust fumes high risk for worker injury	-repeated motion becomes physically difficult -previous site preparation, slash loading, and slope are issues	repeated motion becomes physically difficult -previous site preparation, slash loading, and slope are issues	-proper procedure to be followed in minimising exposure to herbicide -trafficability most critical - hand tool use can be a risk	-proper procedure to be followed in minimising exposure to herbicide -trafficability most critical - hand tool use can be a risk	proper procedures to be followed in minimising exposure to herbicide -trafficability
Public Safety	-Slash loading in the opening -creates an initial fire hazard	Slash loading	None	concern with herbicide use	concern with herbicide use	-concern with herbicide use -concern with contact and berry consumption after application

Single stem Treatment Methods

	Manual Brushing and Weeding (Power saw)	Manual Brushing and Weeding (Hand tools)	<u>Manual Girdling</u>	<u>Hack and Squirt Herbicide Treatment</u>		<u>Backpack Herbicide-Basal Bark Application</u>
Mitigation	- Repetitive strain injury training	Repetitive strain injury training	Repetitive strain injury training	Repetitive strain injury training	Repetitive strain injury training	- safety equipment and procedures -signage required to notify public -pre-treatment walkthrough recce confirming no public presence onsite
Effect of Treatment on Soil	-decomposition of litter and slash may result in initial nutrient increase	-decomposition of litter and slash may result in initial nutrient increase	None	initial nutrient and soil temperature increase	initial nutrient and soil temperature increase	increase in soil temperature
Effect of treatment on Fisheries	-possibility for debris to enter watercourses -reduction in thermal cover along streams	none	-possibility for debris to enter watercourses - thermal cover reduction along sensitive streams	PFZ required – no impact when measures taken to protect integrity of watercourses	PFZ required – no impact when measures taken to protect integrity of watercourses	PFZ required – no impact when measures taken to protect integrity of waterbodies
Mitigation	- debris removal a contract requirement - buffer critical streams	n/a	retain appropriate buffer on critical streams as per Forest Practices Code of BC Act	N/A	N/A	N/A
Effect of treatment on Wildlife and Habitat	-slash loading may restrict passage -re-sprouting of browse species will become beneficial	None	None	-Short term reduction in forage, cover and browse - vegetation complex change may reduce some habitat -reduced cover in the short term	-Short term reduction in forage, cover and browse - vegetation complex change may reduce some habitat -reduced cover in the short term	-Reduced forage, cover and browse in the short term -Vegetation complex change may reduce some habitat -short term cover reduction - able to retain habitat by design
Benefits of Treatment	-no herbicides used equates to a high public acceptance -provides regional employment treatment can target certain species	-no herbicides used equates to a high public acceptance -provides regional employment -treatment can target certain species	-no herbicides used equates to a high public acceptance -provides regional employment -treatment can target certain species	-very high efficacy -not injurious to crop trees - retention of valuable browse species possible -moderate human exposure	Non chemical – biological control	-High efficacy -Selective application -Alternate chemical use -Lengthy treatment window -Minimal risk of exposure to chemical
Limitations	-low efficacy with regards to control of competing vegetation -high power tool safety hazard -high cost -high level of supervision necessary -high initial high fire hazard in t - crop tree damage without proper technique	-low efficacy with regards to control of competing vegetation -high cost when compared to other methods -high level of supervision necessary - crop tree damage without proper technique	-dead vegetation affects visual quality for several years -stems prone to breakage at the girdle -high cost associated -high level of supervision required	-high cost -tool safety -hazard -dead vegetation affects visual quality for several years following treatment	Product expiry – relatively short self life	-Moderate human toxicity if chemical exposure occurs -Slow treatment -Stringent supervision necessary

Table 6 Broadcast Treatment Options

	Broadcast Treatment Methods			
	Aerial Herbicide Application	Backpack Broadcast Herbicide	Cut Stump Herbicide Application	Grazing
Product Used	Glyphosate	Glyphosate	Glyphosate	None
Target Vegetation	all vegetation complexes	all vegetation complexes <2.0 metres in height	Deciduous species >1.5 cm DSH	
Equipment Used/ Application Method	- helicopter -low pressure booms	low pressure backpack sprayer and adjustable nozzles	-Brushsaw with application attachment or chainsaw and squirt bottle -Alternative applicator: backpack sprayer with sponge -Cut stem and coat stump with herbicide solution -Application rates vary directly with number and size of stems	- Sheep
Treatment cost	\$300-\$500/ha	▶ \$500-\$900/ha	\$500-\$3000/ha	-500-700/ ha
Cost Factors	-access -pre-treatment layout -block size/configuration -snags & wildlife trees and terrain -waterbody frequency or drainage density	-access to treatment area -difficulty of terrain and trafficability -vegetation density & distribution	-access -terrain, trafficability -density and size of target stems	- access - size of treatment area
Treatment Efficacy	-species, timing, dosage & density can affect relative efficacy -2-4 years of complete efficacy possible non-selective approach assures uniform coverage -changes in leading vegetation species possible -PFZ's and buffers retain significant vegetation	-species, timing, dosage & density impact efficacy -2-4 years of complete efficacy -non-selective treatment - worker diligence necessary requiring high degree of supervision	-100% effective on treated stems -selective treatment	-Access -Target species - trafficability for the animals
Worker Safety	-limited contact with herbicide (only mixers and loaders handle chemical) -helicopter safety issues -Layout trafficability hazards	-proper procedures to be followed in minimising exposure to herbicide -trafficability most critical	-proper procedure to be followed in minimising exposure to herbicide -trafficability most critical -danger from use of power tools	Predation
Public Safety	-General concern with herbicide use, contact and berry consumption after application	▶ concerns with herbicide use contact and berry consumption after application	-concern with herbicide use -creates high fire hazard	issue with animals on the road
Mitigation	-worker safety equipment and procedures required -post treatment notification signs -pre-spray recce to ensure block is clear of people and large animals	- post treatment notification signs -Worker safety equipment and standard operating procedures -Pre treatment walkthrough recce confirming no public presence onsite	- training for power tools -post treatment notification signs -worker safety equipment and standard operating procedures -pre-treatment walkthrough recce confirming no public presence	- fencing shepherd or dog to monitor the animals

	Broadcast Treatment Methods			
	Aerial Herbicide Application	Backpack Broadcast Herbicide	Cut Stump Herbicide Application	Grazing
			onsite	
Effect of Treatment on Soil	-initial increase in soil nutrients and soil temperature -risk of mass wasting on highly erodable soils or steep slopes	-initial increase in soil nutrients and soil temperature -risk of mass wasting on highly erodable soils or steep slopes	-initial nutrient increase -increase in soil temperature	None
Effect of treatment on Fisheries	PFZ required – no impact when measures taken to protect integrity of waterbodies	PFZ required – no impact when measures taken to protect integrity of waterbodies	PFZ required – no impact when measures taken to protect integrity of waterbodies	Potential for introduction of sheep droppings into the water
Effect of treatment on Wildlife and Habitat	-reduced forage, browse and cover in the short term - vegetation complex change may reduce some habitat	reduced forage, browse and cover in the short term - vegetation complex change may reduce some habitat	reduced forage, browse and cover in the short term - vegetation complex change may reduce some habitat	- reduced forage and cover for the short term - vegetation complex change may reduce some habitat -Potential for disease transfer to wild populations. Ensure domestic sheep are not within the range of wild sheep populations.
Benefits of Treatment	-cost effective -High productivity High efficacy with low human exposure	-moderate efficacy makes treatment a good alternative to aerial herbicide - coverage possible when: waterbodies, snags, steep slopes, and irregular opening configuration present	-high efficacy -low herbicide exposure to humans -not damaging to crop trees	- non chemical treatment - public perception
Limitations	-technically demanding -non-selective -stringent application constraints -high public profile -intensive preparation and follow-up necessary -dead vegetation affects visual quality for a few years	-non-selective -stringent application constraints -high public profile -intensive preparation and follow-up necessary dead vegetation affects visual quality for a few years	-very high cost -high product wastage possible -double treatment -power tool safety hazard -tedious and time consuming -high level of supervision necessary -high fire hazard	-access - mobility for the animals

3.4 Herbicide Application Rates for Vegetation Control

The BCTS Program 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:

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

Table 7. Proposed Maximum Application rates for glyphosate

Target Species	Maximum Application Rate
<i>Twinberry</i>	3.5 l/ha
<i>Aspen, Birch, Rose</i>	4.5 l/ha
<i>Cottonwood (Balsam Poplar)</i>	4.5 l/ha
<i>Elderberry, Willow, Fireweed</i>	5.0 l/ha
<i>Horsetail</i>	5.0 l/ha
<i>Thimbleberry, Raspberry</i>	5.0 l/ha
<i>Bluejoint Grass, Alder, White Flowered Rhododendron</i>	6.0 l/ha
<i>Azalea, Bracken Fern, Lady Fern</i>	6.0 l/ha

If proposed application rates are greater than the listed maximums, a **rationale** must be documented and provided in any **Notice of Intent to Treat (NIT)**, as well as 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. In these cases the maximum application rate will be based on the target species with the highest 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.

Table 8 Proposed Application Rates for Release™ (Triclopyr)

Target Species Density Cottonwood, Aspen, Birch	Application Rate/Stem	1000 Stems/Ha	5,000 Stems/Ha	10,000 Stems/ha
Basal Bark Applications				
Streamline: Stem dia. 0.1 - 2.0 cm DBH	Up to 2ml	0.96 kg a.i./ha 2.0 Litres/ha	4.8 kg a.i./ha 10.0 Litres/ha	9.6 kg a.i./ha 20.0 Litres/ha
Stem dia. 2.1 - 6.0 cm DBH	Up to 3ml	3.0 Litres/ha	15.0 Litres/ha	30.0 Litres/ha
Stem dia. > 6.1 cm DBH	Up to 4ml	4.0 Litres/ha	20.0 Litres/ha	40.0 Litres/ha
Thinline:	1.0 ml per CM	1.0 ml per CM	1.0 ml per CM	1.0 ml per CM

Stem dia. > 8 cm DBH	DBH	DBH	DBH	DBH
Cut Stump Applications:				
Brush Saw Applicator		4.0 Litres/ha	20.0 Litres/ha	40.0 litters/ha

Release™ (Triclopyr) is mixed at a 1:3 ratio using mineral or vegetable oil and applied using a backpack sprayer with a flat fan nozzle, spray bottle, or brush saw applicator.

Table 9 Proposed Application Rates for Chontrol Peat Paste

Target Species Density Cottonwood, Aspen, Birch	Application Rate/Stem	1000 Stems/Ha	5,000 Stems/Ha
Cut stump Applications			
Streamline: Stem dia. At stump 2.0 cm – 6.0 cm	5 ml/ stem	5.0 litres/ha	25.0 litres/ha

3.5 Treatment Selection

A decision making process will be used to evaluate if there is a need for treatment and which measures will be employed. This “Treatment Decision Matrix” illustrates how vegetation management decisions are made. This process clearly identifies how a decision is made to treat a site. The process includes all of the methods proposed, and all factors foreseen to be of influence during the term of the PMP. The decision-making process takes into account the site factors and other forest values and uses. The Treatment Selection Process in Appendix 4 depicts how a particular vegetation management treatment is chosen.

Onsite vegetation is initially divided into one of three possible competing vegetation communities: Herbaceous plants, shrubs, and non-crop deciduous trees. The competitive vegetation and vegetation complexes that are targeted by this PMP are detailed in Section 2.2 “Competitive Vegetation Species” of this plan.

Considering the variety of factors, several treatments are eventually ruled out by going through the dichotomous key and asking critical, objective questions. Possible and suitable treatment options are then extrapolated for the block or stratum given the above site-specific factors and constraints. This Treatment Selection Process is a tool that provides the silviculturist with optimum treatments. The key is not intended to replace or supersede a Forester’s Professional judgement. If a Professional Forester recommends a treatment other than the one chosen using the Treatment Selection Process, then a rationale will be prepared and put on file and/or this rationale shall be explained in the Notification of Intent to Treat.

3.6 Post Treatment Evaluation

Post-Treatment Evaluations shall be completed in the year following treatment during an aerial flight or an on-block field inspection. For blocks where herbicides were used, the assessments shall focus on the previous year’s treatments with regards to efficacy of treatment, coverage, pesticide-free zone (PFZ) incursions and boundary incursions evaluation. This evaluation shall take place in the summer, once vegetation has fully expressed itself.

For blocks where non-chemical methods were used, factors such as slash loading, efficacy of treatment, degree of release, and crop tree damage shall be assessed.

The Post-Treatment Evaluation will be implemented in an effort to refine future vegetation management prescriptions and strategies, will determine the need for any immediate treatment (i.e. missed areas), and will monitor application contractor performance. BCTS PLBA commits to revisiting 100% of all blocks treated with herbicide and at least 50% of all strata treated by non chemical means in the previous year and completing an inspection report. Records of post treatment evaluations may include, but are not limited to; FS 706 (Vegetation Management Treatment Evaluation), field map with comments, date, and initials of reviewer or file note with summary comments. The efficacy records will be maintained on the Opening Files a minimum of three years

4.0 Environmental Protection

4.1 Community Watersheds and Domestic Water Intakes

Dawson Creek

There is a Community Domestic Water Supply Area for the Kiskatinaw River, which has a draft management plan in place.

In keeping with Provincial Legislation, no application of pesticides shall occur within thirty (30) metres of a domestic water intake. Domestic water intakes for the communities in the Dawson Creek Forest District are located in areas where there are no forest management activities taking place.

- The City of Dawson Creek draws its water from the Kiskatinaw River at Arras, which is an agricultural area.
- The Village of Pouce Coupe obtains its water from Dawson Creek.
- The District of Hudson's Hope draws its water from the Peace River, the intake is within the boundary of the town site.
- The Town of Chetwynd obtains its water from ground sources.
- The District of Tumbler Ridge obtains its water from ground sources. Pumping wells are located at the junction of HWY 29 and Flatbed Creek, and at 5 km on the Heritage Highway heading south toward Quintette Mountain.

Fort Nelson

Groundwater reserves are scarce and are used sparingly.

- The Town of Fort Nelson and Fort Nelson First Nation draw their water supply from the Muskwa River.
- The community at Prophet River and the Indian Band draw water from Adsette Creek,
- The community of Toad River draws its water from the Toad River.

Fort St. John

There is a Resource Management Zone for the Charlie Lake watershed area contained within the Fort St John Land and Resource Management Plan (LRMP). This was previously the water source for the City of Fort St John, and is still the water source for Charlie Lake residents. The City of

Fort St John now draws its water from wells located beside the Peace River. The District of Taylor also draws its water from the same wells.

All NIT treatment maps submitted to the Administrator will identify all known domestic water intakes in the PMP area and will be updated annually. Notifications sent to parties that may be affected by proposed activities in this PMP will be requested to notify the contact in the letter, of any water intakes the party may have.

4.2 Fisheries Resources and Riparian Areas

The area encompassed within this PMP includes significant riparian values. In keeping with mandates outlined in all forest related plans (i.e. Forest Development Plan, LRMP, Forest Stewardship Plans ,site plans , site level plans) and relevant legislation, identified fisheries and riparian habitat shall be protected from chemical pesticides. For biological controls (ie chontrol peat paste) , a PFZ is not required, however riparian integrity will be maintained in treatment applications. . All flowing watercourses or water bodies within the treatment area shall be protected with a PFZ and an appropriate minimum buffer width as defined in Table 9 below.

Table 10. Minimum Pesticide Free Zone and Buffer Widths

Area of Concern	Application Method	PFZ width (m)	Buffer Width (m)	Comments
Streams S1 - S5 Wetlands W1, W3, W5 Lakes L1 and L3 Inc. Seasonal watercourses (NCDs/S6)	Aerial (rotary) using conventional spray system	10	25	Buffers are included as an extra measure to protect the Pesticide Free Zone (PFZ).
	Aerial (rotary) <i>(using a low drift delivery system)</i>	10	20	The buffer width listed includes the PFZ. For example 10 m PFZ + 15 m “protection zone” = 25 m buffer.
	Backpack Broadcast, (Spot or Selective) Backpack Basal	10	15	The forest Professional will carefully determine whether or not to allow pesticide use within the “protection area” of the buffer.
	Backpack Cone Cut Stump Lance Inject Hack and Squirt	10	10	If a dry, non fish bearing stream, that does not drain within 100m of a fish bearing water body, it can be treated.
Domestic water intake	Any	30	40	-

Table 11. Requirements for No Pesticide Free Zones or Buffers.

For glyphosate application, no Pesticide Free Zone (or associated buffer width) is required along or around a body of water where:		
Area of concern	Conditions	Glyphosate application
Body of water (greater than 25 m ²)	<ul style="list-style-type: none"> -Temporary free-standing body of water -Not a classified wetland or wildlife habitat feature -Not fish bearing and does not drain into a fish bearing body of water within 100m 	Must not be applied below the high water mark.
Body of water (smaller than 25m ²)	<ul style="list-style-type: none"> -Temporary free-standing body of water -Not a classified wetland or wildlife habitat feature -Not fish bearing and does not drain into a fish bearing body of water within 100m 	May be applied to body of water if conditions are met
Dry Stream(watercourse) (not including ditches etc.)	<ul style="list-style-type: none"> -Dry stream is not a wildlife habitat feature, and -Not fish bearing when wet 	May be applied over dry stream if conditions are met

4.3 Wildlife Values

The Peace-Liard Business Area has many important and diverse habitats for mammal, bird, amphibian, and fish species. Wildlife will be managed according to current and evolving biodiversity guidelines.

Wildlife values and habitat are identified at pre-harvest and are managed through approved silviculture prescriptions, site level plans, Forest Operating Schedules and throughout the objectives, targets and indicators set out in the each respective field team’s SFMP, Forest Stewardship Plan or Sustainable Forest Initiative. The application of herbicides will be consistent with the protection measures stated in those plans. Further protection of wildlife values and habitat is provided through proper selection of treatments and timing, the application of professional judgement, compliance with requirement in the Federal Species at Risk Act, BC Wildlife Act and the IPM Act and Regulation, as well as through consideration of site specific information gathered during consultation. The application of herbicides will be consistent with the protection measures stated in those plans.

Further protection of wildlife values and habitat is provided through proper selection of treatments and timing, the application of professional judgement, compliance with requirement in the Federal Species at Risk Act, BC Wildlife Act and the IPM Act and Regulation, as well as through consideration of site specific information gathered during consultation.

All wildlife values and critical habitats identified in forest plans, higher level plans and recently identified locations or in this PMP or through the consultation/referral process shall be protected when carrying out 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;
- opening size limitations with regards to treatment; and
- the retention of valuable ungulate browse species such as willow and red osier dogwood.

In addition to the special precautions listed in the ‘Implementation of Pesticide Treatment’ Section of this document, the precautions listed in Table 11 below, have been developed by Ministry of Environment Habitat Biologists for the Dawson Creek and Fort St John Districts, and will be followed in Fort Nelson, in order to maintain wildlife habitat integrity. The following table was also developed by MOE Habitat Biologists for the Dawson Creek and Fort St John Districts in 2000.

Table 12. Critical Wildlife Habitat Precautions

Resource Feature	Critical Habitat	Precaution
Riparian Reserve Zone	All riparian vegetation such as large wildlife trees, under-story trees, shrubs, grasses and herbs.	No herbicide treatments will be permitted
Riparian Management Zone	Large wildlife trees, under-story trees, shrubs, grasses and herbs.	Spot or selective applications
All Stream and Wetland Classifications	All riparian vegetation and riparian habitat such as large wildlife trees, under-storey trees, shrubs, grasses and herbs	See Table 3 above
Active Beaver Dams	All vegetation within 60 metres of this resource feature.	30 m No Treatment Zone
Mineral Licks	All vegetation within 100 metres of this resource feature in order to provide cover for animals using these sites.	100 m No Treatment Zone
Stick Nests	Cover provided by a living tree(s).	10 m No Treatment Zone
Known Trumpeter Swan Activity Sites	All vegetation within 200 metres of the water body provides cover and forage. The known sites offer unique characteristics for attracting Trumpeter Swans.	200m No Treatment Zone
Wildlife Tree Patches	Deciduous and coniferous trees including under-storey vegetation such as shrubs , grasses and herbs contained within the patch	No herbicide treatments or falling of deciduous residuals will be performed unless deemed unsafe
Wildlife Tree Clumps	Standing deciduous and conifer residual trees.	No falling will be performed unless deemed unsafe
Ungulate Winter Range	To maintain a quality and quantity of ungulate winter range areas and associated thermal and escape cover.	Treatments will abide by the GAR orders and general wildlife measures.
Muskwa –Kechika Special Habitat Management Zone	Ensure that the wilderness characteristics and wildlife habitat are maintained over time while allowing resource development.	Presently, BCTS Fort Nelson does not anticipate any herbicide applications to take place in this zone over the life of this PMP. BCTS will work with the First Nation groups and other parties to ensure the input when developing the proposed actions that will be included in this or a subsequent PMP.

The precautions noted above may be subject to change over time. The appropriate Professional should be contacted when proposed activities may impact these features.

4.4 Food Plants

Many First Nation members and other local residents gather country foods and special plants for medicinal purposes from the land including berries (raspberries and other unspecified berries) and other foodstuffs. No specific areas requiring special management were identified; however, areas frequently used are often near to travel corridors (primarily rivers), near settlements (cabins, camping, settlement, and stopover areas), and at gathering areas (regularly or commonly used areas that have a high probability of individuals gathering traditional forest resources). These areas are partially identified in partially completed Traditional Use Studies. As these areas are identified during the term of this PMP, BCTS will address the concerns at that time. Identified food plants within the PMP area include most edible berry species. Some of the more common edible berry species include:

Wild Red Raspberry *Rubus idaeus*
Wild Strawberry *Fragaria virginiana*
Highbush Cranberry *Viburnum edule*
Common Blueberry *Vaccinium myrtilloides*
Dwarf Blueberry *Vaccinium caespitosum*
Black Huckleberry *Vaccinium membranaceum*
Saskatoon *Amelanchier alnifolia*
Muskeg Berry, *Rubus chamaemourus*
Bunch Berry (*cornus candanesis*)

Public interested in berry picking will be made aware of specific sites in which herbicides have been used by proper signage at the treatment site. Signs will be posted along access points to the treatment site prior to and after a vegetation management project involving herbicides.

4.5 Biodiversity Considerations

Biodiversity is the diversity of plants, animals and other living organisms in all their forms and levels of organisation. It includes the diversity of genes, species and ecosystems, and the functional and evolutionary processes that link them.

Biodiversity is threatened by:

- fragmentation and alienation;
- habitat degradation by industrial and recreational developments and practices or by urban encroachment;
- direct impact on specific plant and animal species (e.g. consumptive use by people); and
- increased/improved access and increasing numbers of people.

Maintaining biodiversity depends on:

- the conservation and connectivity of large areas as ecological benchmarks at the regional level;
- providing habitat variety and connectivity at the landscape (watershed) level; and
- management practices at the stand level.

A number of objectives and strategies are being pursued at the landscape and site levels in the District, including:

- Maintaining natural biodiversity throughout the plan area;
- Undertaking Landscape Unit planning in priority areas;
- Managing natural seral stage distribution by landscape unit using knowledge of natural versus disturbance patterns;
- Identifying and mapping suitable sites for maintaining representative, natural functioning areas; and
- Linking important habitats to maintain connectivity across the landscape.

On Fort Nelson and Dawson Creek BCTS blocks that are identified as requiring vegetation management, biodiversity considerations will be addressed through the operational planning processes of the Forest Development Plan/Forest Stewardship Plan and individual block silviculture prescriptions/site plans.

On Fort St. John BCTS blocks that are identified as requiring vegetation management, biodiversity considerations will be addressed through the operational planning processes and associated indicators of the SFMP, Forest Operations Schedule and individual Site Level Plans/Silviculture Plans.

5.0 Consultation

Development of this plan included consultation with First Nations, Trapline tenure holders, Guide Outfitter tenure holders, and local community members where the plan has the potential to coincide with and impact on these other residents' and land users' interests and activities. The objectives of consultation on this PMP were to:

- To identify and address concerns prior to the review process to avoid or minimize unnecessary delays and concerns;
- To ensure input into the identification and resolution of concerns and issues about the proposed PMP and its potential impact;
- To provide notification and pertinent information to First Nations, stakeholders, and the general public from an early stage in the planning process.

The table below shows the timeline for the consultations. Specific information for the consultation can be made available upon request.

Table 13 Consultation Timeline

Group	Date	Activity
Guides and Trappers	2011-03-28	Letters sent to Guides and Trappers regarding the PMP consultation
First Nations	2011-03-28	Letter sent; phone calls made; some meetings held
General Public	2011-02-14	Advertised in the Northeast News, Peace River Block News, Fort Nelson News, Alaska Highway News.

The Consultation Report that accompanies the PMP provides a detailed record of consultation carried out during the development of the plan. The Consultation Report is comprised of the main report (highlighting the concerns and how they will be addressed) and an Appendix for each meeting (containing an invitation letter, the meeting minutes, and a follow-up letter).

As a result of the consultation process BCTS PLBA has committed to certain actions for each group. In general, the groups wish to receive adequate notification of planned activities and would like to create a good working relationship with the BCTS Forester. It will be the Foresters' responsibility to ensure effective communication with each individual or group to address the specific needs. If concerns are brought forward during the term of this plan, BCTS will consider altering the plan. All interested parties would be notified if changes are made.

5.1 General Consultation Practices

As a result of general management practices that have evolved over the life of past PMPs a consultation/notification process has been implemented. The following points are considered general management practices for notification for areas that may be treated following procedures outlined in this PMP:

- If during a public consultation, the BCTS representative offers to directly notify an individual about an intended herbicide use, before performing the use, a BCTS representative will notify the individual in the agreed manner and time;
- Notify the affected Range, Guide and Trapping Tenure holders. An affected tenure holder is defined as a tenure holder whose tenure area contains an area that BCTS plans to treat with methods described under this plan; and
- Notify affected First Nations. A First Nations group will be notified if BCTS plans to treat area with methods described in this plan, and the area falls in the tradition use area.

5.2 First Nations Consultation

Consultation with First Nations has been undertaken during the revision of this PMP. Annually, consultation will be completed to review the more detailed proposed silviculture treatments in each calendar year.

There are a number of First Nations whose traditional territory is coincident with the area under this PMP. Those First Nations will be invited to participate in the development of the Pest Management Plan and review of annual pest management activities under the plan.

In the Fort Nelson TSA, the following First Nations were invited:

- Fort Nelson First Nations, Fort Nelson Indian Band
- Lower Post First Nations, (Kaska Dena Council)
- Prophet River First Nations,
- Acho Dene Koe (Fort Liard)
- Dene Tha' (Assumption)

The Dene Tha' have traditional territory within the Fort Nelson Forest District but not within the geographical area of this PMP will be consulted on the relevant PMP outside of this process

In the Dawson Creek and Fort St John TSAs, the following First Nations were invited :

- West Moberly First Nations
- Saulneau First Nations
- Kelly Lake
- McLeod Lake Indian Band
- Prophet River First Nations
- Lheidli T'enneh
- Blueberry River First Nation
- Doig River First Nation
- Halfway River First Nation

Some community's identified areas of Critical Use Area or Interest Areas. The First Nations requested specific consultation and information on activities occurring in those areas. This consultation will be completed as part of the consultation on the Annual Notification of Intent to Treat (NIT) that will be provided to each First Nation Band Office annually.

A BCTS representative will request a meeting be held with the designated First Nation representative annually, ordinarily beginning in April, to review proposed silviculture treatments, including chemical stand tending, for the current calendar year. All vegetation management options will be considered. Where requested, Detailed Site Assessments (DSA) shall be made available for each block to allow the representatives to review the specifics and rationale of each treatment. Any other applicable silviculture treatment prescriptions shall be made available, as requested, for any block under the plan.

Trappers and First Nations will be offered opportunities to see proposed blocks prior to, during and after treatment. Educational trips will be offered to resource users and First Nations to demonstrate the effects of different vegetation management techniques, at different intervals after treatment.

5.3 Stakeholders and Public Consultation

Trappers and Guide Outfitters were sent letters outlining the PMP development. A number of trappers and Outfitters contacted the office for more information. Most of the interest was where the activity was occurring. One person did express concerns regarding pesticide use however most stakeholders did not have any concerns once the details of the PMP were discussed. An outfitter expressed concerns regarding disease transfer between domestic and wild sheep. This was noted and comments have been made in the risk tables.

5.4 Other Processes

This PMP is consistent with all senior level operational plans and it is written to ensure compliance with all current EMS, CSA and SFI certification criteria. In Fort Nelson and Dawson Creek, these plans include the respective field team Forest Development Plan and Forest Stewardship Plan, and the individual silviculture prescriptions and site plans written for areas where operational treatment shall occur. In Fort St. John, this plan is consistent with the SFMP No. 2, Forest Operating plans and stand level plans. There may be a need in the future to make adjustments to this plan should changes be made to the SFMP No. 2.

Interpretive Sites, Recreation Sites and Trails that have objectives set in accordance with the FRPA are considered as Higher Level Plans. The objectives deal primarily with access and visual management. BCTS commits to adhere to these objectives and to minimizing the impact on the recreational experience of users of these sites and trails. Copies of the objectives, and a map showing the location and boundaries of the sites and trails are available for viewing at the Peace Forest District and Regional offices.

During the development of this plan, discussions between Range Tenure holders and forestry interests are under way in the Dawson Creek Forest District and Fort St. John interests have also

been invited to participate. The discussions are referred to as the TRIMC or “Range and Timber Overlaps Impact Mitigation Initiative”. These discussions are primarily focussed on activities in the Dawson Creek Forest District and are also primarily focused on pre-harvest land use decisions; however, there may be best management practices or agreements between forestry and Range Tenure holders developed in future that could be brought into decision making and activities under this plan.

6.0 Operational Standards

6.1 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 for review.

6.2 Handling Practices (Transport and Storage)

Minimum standards for pesticide transport and storage are stipulated in the Transportation of Dangerous Goods Act, and the Integrated Pest Management Act and Regulations. During the transport of a pesticide it must be secured in a manner that prevents the escape, discharge or unauthorized removal of the pesticide from the transport vehicle

The vehicle transporting the pesticide must:

- Be equipped with a lockable compartment that is strictly utilized for the temporary storage of the pesticides listed in this PMP. No other material, organic, or inorganic may be stored or transported in this compartment;
- Be clearly labelled with appropriate placards and have the following words written on each entry point “WARNING: CHEMICAL STORAGE – AUTHORIZED PERSONS ONLY” written in block letters; and
- Contain spill response equipment sufficient to respond effectively given the type and amount of chemical transported and in accordance with legislation and the BCTS Environmental Management Systems (EMS) standards

Pesticides must be stored in a storage facility that:

- Is separated from, not attached to, nor contained within, a building that is used for living accommodations or used for storage of food intended for human or animal consumption;
- Is ventilated so that pesticide vapours are vented outside;
- Is locked when unattended;
- Is accessible only to persons authorized by the person storing the pesticide; and
- Has a door that provides access with a sign that is clearly visible to a person approaching, with the words “WARNING: CHEMICAL STORAGE – AUTHORIZED PERSONS ONLY” written in block letters.

Within 60 days after starting to store pesticides at a location, a confirmation holder must provide notice of the storage location to the fire department that is closest to that location. Temporary storage in the back of a locked vehicle (5 ton van), is permissible when all conditions for herbicide storage are met. The temporary storage must be inspected a minimum of twice in any 24 hour period. The locked vehicle must be parked in a location such that no product could flow into a water body should a leak occur while unattended.

6.3 Water Usage and Storage

Clean water is essential for use as the carrier for herbicide treatments. Water must be obtained from as clean a source as possible and stored in a clean, closed container. The following standards shall be implemented to ensure clean water:

- All water sources must be approved by the BCTS representative prior to their use;
- Any water obtained from a stream (as defined by the Water Act) must have the appropriate approvals (i.e. Section 8 short term approval);
- Use a cleaning, or filter system, which removes silt, sand, or gravel particles from the water prior to the water entering the storage unit; and
- Use a back-flow valve in line between the water source and the storage unit to ensure no contaminants could flow back into the water source.

6.4 Mixing and Loading of Pesticides

All pesticides used under this PMP shall be mixed at designated mixing and filling stations. Requirements and procedures to be followed during the mixing and loading of pesticides are:

- Mix sites must be approved by the BCTS representative prior to use;
- Mix sites must be located away from PFZ's and a reasonable distance to protect any water body or sensitive area should a spill occur
- The contractor carrying out treatment shall ensure that all Mixers and Loaders of pesticides hold a valid and current Pesticide Applicator's Certification of the appropriate category;
- Mixers and Loaders of pesticides shall have emergency response equipment including MSDS and product labels adequate to deal with a worst case scenario respective of the amount of chemical on site;
- Ensure that an appropriate backflow device is used within the system used to fill the application equipment;
- Equipment shall not be left unattended during filling;
- Ensure that empty containers are triple rinsed and slashed. All rinsed water must be used in the application tank. There will be no rinsing or disposal of rinse solution into any water body;
- Keep a detailed list of all areas slated for treatment from the mix site, including a map of treatment zone within permitted area (showing any restrictions i.e. PFZ's), maximum treatment area, active ingredient per hectare, and
- Detailed and accurate records of every load must be completed and kept at mix site.

6.5 Container and Unused Pesticide Disposal

All 115 litre empty pesticide containers (shuttles) shall be returned to the manufacturer for re-use. If the containers should become damaged, they shall be triple rinsed and returned for recycling. All 10 litre containers shall be triple rinsed, punctured and disposed of in an approved landfill, in a timely manner.

- When triple rinsing container, rinse volume shall be drained into the spray tanks for application onto the treatment area;
- Once triple rinsed, 10 litre containers shall be punctured to prevent reuse;
- Empty containers shall be delivered to an approved landfill or container collection site in a timely manner; and
- All cleaning of equipment and rinsing of containers shall be carried out at the mix site, well away from any watercourse.

6.6 Spill Plan

Pursuant to the Waste Management Act, the Spill Reporting Regulation and the Integrated Pest Management Act and Regulations, the Spill Contingency Plan and Emergency Response Plan consistent with the BCTS EMS program, shall be followed when carrying out herbicide operations. All spills shall be reported immediately to a designated BCTS representative. The Project Supervisor/Contract Administrator, in conjunction with the Ministry representative, shall report the spill to the Provincial Emergency Program (PEP) where required (for herbicides used under this PMP all spills are reportable by law), and to MOE.

All contractors engaged in herbicide operation activities shall be familiar with the BCTS Spill Contingency Plan and Emergency Response Plan. In addition, all contractors will provide BCTS with their spill response plan, which must be tailored to address their operations.

6.7 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, Pesticide Free zones (PFZ's), associated buffers, No Treatment Zones (NTZ's) and retention patches. All layout shall occur at a timing approved by the BCTS representative.

6.8 Layout for Aerial and Ground Applications

For aerial applications, coloured bags shall be utilized while employing distinct colours for PFZ's and associated buffers, boom type (e.g. conventional vs. low drift) and treatment boundaries:

- All distances for PFZ's, buffers, etc., shall be measured;
- Prior to treatment, all aerial bag layout shall be flown by the BCTS representative ensuring that the applicator (pilot) understands the bagging and associated treatment and no treatment zones;
- For ground based applications (backpack, basal, hack and squirt and cut stump), treatment boundaries shall be located in highly visible ribbon. Ribbons for treatment boundaries shall be no more than 10 metres apart; and
- PFZ's shall be clearly marked (ensuring the appropriate protection and buffer) in durable and persistent flagging tape, with no more than five (5) metres between ribbons.

6.9 Variance in Layout Standards

Distances and standards for boundary marking will vary depending on brush conditions (distribution, density, height). Variations for Aerial Applications might include reducing distance between markers and increasing marker (bag) size in order for applicators (pilot) to better follow lines. For ground applications, variations include reducing the distance between ribbons in order to insure the integrity of PFZ's and boundaries.

6.10 Mapping

Detailed maps should include: all streams and waterbodies, PFZ lines, boundaries, bag and ribbon lines with colours noted, distances of all ribbon and baglines (in order to calculate amount of chemical needed). These shall include:

- Unit number;
- Treatment boundaries;
- Treatment areas listing size and application rate for each;
- Areas of No Treatment;
- Waterbodies;
- Bag or ribbon lines with colours, and distances;
- A colour legend;
- Treatment type, ie spot, broadcast, etc.; and
- Any special condition pertaining to the treatment area

6.11 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 (herein referred to as the Ministry Representative), or an appointed contractor (herein referred to as the Contract Administrator). BCTS will commit to supervising and monitoring 100% of aerial spray operations. A Ministry Representative will be on the treatment block, or as close as possible, during all aerial spray operations. Ministry representatives and Contract Administrators will have training and/or experience in on-site monitoring of similar operations.

6.11.1 Applicator Qualifications

All herbicide treatments will be conducted or directed, and or monitored by an individual who holds a valid Pesticide Applicator Certificate. For aerial treatments, the pilot and Mixers will hold a certificate in the Forestry General category. For ground-based treatments, the Application Contractor's Supervisor must hold a certificate in the Forestry General category. The ratio of non-certified applicators to certified applicators shall not exceed 4:1. Certified applicators shall maintain continuous non-assisted auditory or visual contact with uncertified applicators at all times during pesticide treatments. All certificate information shall be retained on file.

6.12 Aerial Applications

During all aerial applications, BCTS shall ensure, through contractual stipulations, that the chosen applicator adhere to the following standard operating procedures:

- A pre-work conference will be held with the BCTS Ministry Representative (or Contract Administrator) and the chosen application contractor and all applicators (pilots) and ground crew members. The appropriate BCTS Field Team, shall ensure familiarity with emergency procedures, spill contingency plan, communication protocols, application parameters, layout standards, rates and mixes, order of spray operations and site specific concerns on an individual block by block basis. Certificate numbers shall be recorded and an aircraft safety briefing shall be conducted;
- All aerial layout shall be inspected by the Layout Supervisor and each BCTS Field Team Ministry Representative (or Contract Administrator) at least two (2) days prior to treatment. Any layout corrections shall be made at that time;
- The Ministry of Representative (or Contract Administrator) shall ensure that there is at least one (1) Monitor present per helicopter. The Monitor shall record one weather check (temperature, relative humidity, wind speed and direction) per load, ensure the integrity of any PFZ's;
- The Ministry Representative (or Contract Administrator) and Monitors shall be in constant communication with the pilot throughout application operations; and
- All pesticide use shall be recorded on the application contractor's pesticide use record form by the Mixer or Loader and shall be provided to the appropriate BCTS Field Team, and retained on file by the applicator for a period of three (3) years.

6.13 Ground Applications

During ground spraying or single stem treatment operations, the Ministry Representative (or Contract Administrator) shall ensure the chosen Application Contractor adhere to the following contractual stipulations:

- A pre-work conference will be held with the BCTS Ministry Representative (or Contract Administrator), the chosen Application Contractor, all applicators, and ground crew members. BCTS shall ensure familiarity with emergency and environmental management procedures, spill contingency plan, application parameters, and site specific concerns on an individual block by block basis.
- The Contractor shall supply one supervisor and one Crewleader/Monitor who shall ensure the integrity of any PFZ's or sensitive areas and verify acceptable levels of coverage. The Monitor should be in constant radio contact with the Supervisor.
- All pesticide use shall be recorded by the Mixer or Contract Supervisor in the Herbicide Operations Records, which shall be provided to the appropriate BCTS Field Team office, and retained on file by the applicator for a period of three (3) years.

6.14 Equipment Maintenance and Calibration

All equipment used for the application of herbicides shall be calibrated and maintained on a regular basis. For aerial applications, the delivery methods shall be via helicopter using two distinct methods: conventional and low drift. For ground applications, backpack sprayers, frilling tools, squirt bottles, lance injectors or cut stump equipment shall be used.

6.14.1 Aerial Equipment

All equipment shall be calibrated prior to commencing operations. Proof of calibration for aerial (rotary & fixed wing) applications and the Swath Kit Analysis or a recognized BCTS approved calibrations system shall be provided by the applicator to the respective BCTS Field Team representative, at the beginning of each spray season.

The spray system must have as operational equipment, a swath marker which provides the pilot with a Global Positioning System (GPS), and a physical marker. The GPS must record the swaths digitally in relation to the block or treatment boundaries to be submitted to BCTS. Maintenance of the spray equipment is the responsibility of the Application Contractor who will ensure the equipment conforms, at all times, to the manufacturer's standards. Daily checks must be conducted to ensure conformity is maintained.

6.14.2 Ground Equipment

Equipment used for backpack applications shall be calibrated prior to commencing spray operations, ensuring that each individual is familiar with appropriate target delivery rate and equipment functioning.

Maintenance and repairs must be conducted by a maintenance person designated by the Application Contractor as needed. The maintenance person must be knowledgeable in the operation and repair of the equipment. The equipment operation must conform to the manufacturer's specifications.

Calibration is measured by checking the distance travelled and the swath width for a known volume of spray. These calibration checks shall be performed at the beginning of each spray contract for each Field Team in the BCTS PLBA and shall be the responsibility of the Application Contractor's Supervisor.

Equipment used for basal bark, hack and squirt, and cut stump procedures will also be calibrated, however this calibration is less stringent given that the amount of chemical shall be distributed over the area according to a known number of target stems found on site. Calibration is an ongoing process and the Contractor's Supervisor should be aware of target vegetation density within the treatment area.

6.15 Pesticide Treatment Signs

BCTS PLBA commits to the following minimum standards for information on 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 must be of suitable material considering the elements, and be posted at a reasonable height and location to be visible to the average person approaching the area. Signs will be posted prior to treatment and will remain posted for a minimum of 14 days. 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;
- and contain, at a minimum the following information:
 1. Description of treatment area
 2. Purpose of Treatment (targeted species)
 3. Pesticide Trade Name, Common Name, and active ingredient
 4. Proposed and alternate dates of Chemical Application
 5. PCP registration number
 6. Ministry Field Team Office, Address, Contact Name and Phone Number

6.16 Site and Weather Monitoring Procedures

During all herbicide operations, temperature, relative humidity, and windspeed shall be recorded at regular intervals. All personnel 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 exceed 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.

Hack and squirt, cut stump, and basal bark applications using Vision® (Glyphosate) and Release® (Triclopyr) shall be stopped by the Contractor’s Supervisor in periods of rain or snow when water or snow prevent product from being applied effectively according to the manufacturer’s label.

6.17 Detailed Site Assessment Requirements

BCTS PLBA is committed to performing Detailed Site Assessments (DSA) for every anticipated brushing site. Detailed Site Assessments in support of the Notification of Intent to Treat will require an on-site inspection, by a qualified person, completed within 18 months prior to the proposed date of herbicide application in order to verify the need for treatment, and or, look at alternatives.

The site assessment 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

BCTS will retain a copy of the DSA on file for a period of 3 years following treatment.

6.18 Notification of Intent to Treat (NIT)

Each Field Team in the BCTS PLBA will submit an NIT to the Administrator each year at least 21 days prior to the application of pesticides. The NIT will include a map showing treatment locations, the permitted area, and a summary of the attributes of each block proposed for treatment.

6.18.1 Modifications to the NIT

Additions of up to 10% of the total treatments area will be submitted to the Administrator, at least 2 business days before using the pesticide in the area involved. In the event that the total area of treatment will exceed 10% of the original planned area, BCTS will re-submit the NIT at least 21 days before the pesticide use that causes the excess.

6.19 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 3 years following treatment.

Appendix 1 Detailed Site Assessment Document



PEST MANAGEMENT PLAN - DETAILED SITE ASSESSMENT
Opening: 94 _____



OPENING IDENTIFICATION & LOCATION:

Operating Area:		Longitude:	
Landscape Unit Number:		Latitude:	
Operating Zone Number:		Air Photo Numbers:	
Tenure / CP / Block:		Gross Block Area (ha):	
Opening Number:		Gross Stratum Area (ha):	
Stratum:		Proposed Treatment Area (ha):	
SP / PHSP Date:		Access:	

SITE HISTORY:

Harvest Date:	
Site Preparation (type & year):	
Planting (stock & year):	
Fill Planting:	
Stand Tending (type & year):	
If previous chemical used	
list rate, method, purpose and date:	

STOCKING:

Date & Type of Survey 1:	
Date & Type of Survey 2:	
Inventory Component:	
Silviculture Component:	
Conifers/ha:	
Well Spaced Stems/ha:	
Deciduous Stems/ha:	
Av. Crop Tree Ht. (cm):	
Av. Crop Tree Diameter (mm):	
Date Stocking Info. Collected:	

SITE CHARACTERISTICS:

BGC Zone, Subzone, Var., S		Moisture / Nutrient Regime:	
Elevation (m):		Slope (%):	
Aspect:		Topography:	
Dead Standing Trees #/ha.		Dist.	
Live Standing Trees #/ha.		Dist.	
Physical Factors Affecting Treatment			

TREATMENT & PESTICIDE INFORMATION:

Selected Method:		Product Trade Name:	Vision
Objective:		Active Ingredient:	Glyphosate
Expected Outcome:		PCP Number:	19899
		Proposed Application Rate:	L/Ha
		Proposed Timing (month/year):	Aug-09

BODIES OF WATER, WATERCOURSES & WETLAND AREAS:

Type:	Depth (m):	Width (m):	State	PFZ (m)	Buffer (m)	No Treatment (m)	Comments

Measures to be taken to protect bodies of water and watercourses: * estimated state of waterbody at time of treatment (wet or dry)

COMPETING VEGETATION:

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

* estimated state of waterbody at time of treatment (wet or dry)

CONDITION OF CROP TREES (Indicate % of trees in each condition code)

Species	Sw	PI			Species	Sw	PI
Healthy/stressed:					Leader Length (cm)		
Height					Age		
Basal Dia (mm)							
Factors (chlorosis-c, uneven crown-u, crooked stem-s, stunted leader-l):							
Comments:							



PEST MANAGEMENT PLAN - DETAILED SITE ASSESSMENT
Opening: 94 _____



PURPOSE OF TREATMENT:

List all preventative measures that were taken or attempted on this site to avoid the need for treatment:

Describe current pest problem in relation to the treatment threshold outlined in PMP.

TREATMENT OPTIONS / CONSTRAINTS: (in order of preference)

Treatment Type:	Comments / Constraints:
Aerial Discretionary	Effective control of brush competition, however overstory residuals limit effectiveness
Ground Broadcast	Effective control of brush competition for small areas with proper access
Manual Brushing	Repeated entries required, cost prohibitive

OTHER RESOURCE USERS:

First Nations Dwellings
 Water Users Watershed
 Recreational Use Agricultural Use
 Major Roadway Other _____

Comments: _____

Obvious Presence (Y or N):

Beaver _____ Eagle Nests _____ Osprey Nests _____

Comments: _____

Fisheries:

Waterbodies within treatment site bounda Yes _____ No _____

Waterbodies immediately adjacent to treatment sit YES _____ No _____ Closest Distance (m): _____

Classification of waterbodies (map identified waterbodies):

Wetland _____ River _____ Stream _____ Ditch _____ Lake _____ Ephemeral _____

Other _____

Are fish present? Yes _____ No _____

Comments: _____

INFORMATION ATTACHED:

- 1:10 000 Treatment Map
- Regeneration survey and/or Brush Assessment
- Decision Making Key Question Sheet
- Stratum & Seedling photos
- SP / PHSP if Applicable

DETAILED SITE ASSESSMENT CHECKLIST:

Operating Zone/HMZ	
First Nations Concerns	
Stakeholders	
Landscape Issues	
Within 10 km2	
Stand Management Objectives	
Silviculture Treatment History (includes Preventative Measures)	

Site Factors Assessment Key Question Sheet

Answer each question based on the stratum.

See Appendix X for a complete copy of the Site Factors Assessment Key

1	What is the target vegetation complex? (A, B, or C)	
2	What is the average height of the target vegetation complex? (< or > 2.0m)	
3	Is the treatment area within a potential Pesticide Free Zone? (Y or N)	
4	Are the watercourses > 80m apart on average? (Y or N)	
5	Are the seedlings > 75cm in height on average? (Y or N)	
6	Is the average crop tree height able to withstand slash loading? (Y or N)	
7	What is the distribution of the brush in the stratum? (P, C, or S)	
8	Is the average competition stem size (DSH) > 1.5cm? (Y, N, or N/A)	
9	Is the average competition stem size (DBH) > 2.5cm? (Y, N, or N/A)	
10	Is there reasonable ground access to this block? (Y or N)	

- 1 Vegetation community A: herbaceous including grasses, ferns, and fireweed
Vegetation community B: shrubs including willow, alder, black twinberry, etc.
Vegetation community C: deciduous including aspen, cottonwood, and birch
- 2 Impacts the decision as to whether a ground chemical application is possible due to height limitations
- 3 This question addresses the issue of whether there is potential to complete chemical brushing on the site.
- 4 Impacts the decision as to whether an aerial application is possible due to limitations on layout and how treatable area will be maximized
- 5 Cone spray foliar application is only possible if seedlings are less than 75 cm. In height.
- 6 Slash loading addresses the issue of whether the crop tree is able to withstand the vegetation around it being cut down. Crop tree vigor, height, and diameter must be compared to the density, diameter, and height of the target competing vegetation. As a general comparison, the crop tree height should average half of the competition height and/or there must be enough gaps in the stand as a whole to fell competition so as to leave crop trees unencumbered.
- 7 Brush Distribution: P = Patchy
C = Continuous
S = Scattered
- 8 DSH = diameter stump height (only applicable to woody stem competing vegetation)
Impacts E-Zject decision. Stems less than 1.5cm are difficult to treat using this system
- 9 DBH = diameter breast height (only applicable to woody stem competing vegetation)
Impacts girdling treatment option. Stems less than 2.5cm. Are difficult to treat effectively & quickly.
- 10 Reasonable ground access means:
 - 1) 2WD;
 - 2) 4WD maximum 4km;
 - 3) quad maximum 2km;
 - 4) walk maximum 1km; or
 - 5) any combination of the above criteria



PEST MANAGEMENT PLAN - DETAILED SITE ASSESSMENT



Opening 94
DETAILED SITE ASSESSMENT FIELD FORM

OPENING IDENTIFICATION & LOCATION:

Opening Number:	0	Longitude:	1900-01-00
Tenure / CP / Block:	0	Latitude:	1900-01-00
Stratum:	0	Gross Block Area (ha):	0.00
		Gross Stratum Area (ha):	0.00
		Proposed Treatment Area:	0.00

SITE HISTORY:

STOCKING:

Harvest Date:	1900-01-00	Inventory Component:	0
Date & Type of Survey:	0	Silviculture Component:	0
		Av. Crop Tree Ht. (cm):	0

If previous chemical used, list rate, method, purpose and date.

SITE CHARACTERISTICS:

Dead Standing Trees	#/ha.	0	Dist.	0	Physical Factors Affecting Treatment
Live Standing Trees	#/ha.	0	Dist.	0	

TREATMENT & PESTICIDE INFORMATION:

Selected Method:	0	Product Trade Name:	Vision
Objective:	0	Active Ingredient:	Glyphosate
Expected Outcome:	0	PCP Number:	19899
		Proposed Application Rate:	L/Ha
		Proposed Timing (month/yr)	Aug-09

BODIES OF WATER, WATERCOURSES & WETLAND AREAS:

(In block and within 25 meters of block boundary)

Type:	Depth (m):	Width (m):	State	PFZ (m)	Buffer (m)	No Treatment (m)	Comments
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0

Measures to be taken to protect bodies of water and watercourses* estimated state of waterbody at time of treatment-wet or dry

* estimated state of waterbody at time of treatment (wet or dry)

COMPETING VEGETATION:

Species	Cover %	Ave. Ht. (m)	Range Ht (m)	Continuous-C Patchy-P Scattered-S	MWLAP Species	Present Risk	Potential Risk
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0

Appendix 2 Fort St. John Silviculture Requirements for Crop Trees

Silviculture Requirements for Crop Trees

The Following sections have been taken from the Fort St John Sustainable Forest Management Plan (FSJ SFMP). This section outlines unique obligations and requirements for BCTS Fort St John Field Office as provided by the SFMP.

Well Growing Requirement for Conifer Crop Trees

The requirements for well growing conifer crop trees correspond to standards for free growing trees set out in the “Establishment to Free Growing Guidebook, Revised Ed. May 2000” with exceptions/clarification noted below:

1. Well Spaced

At the assessment phase of fifteen years the crop trees using a Mean Stocked Quadrant (MSQ) Plot and inter tree distance criteria does not apply.

2. Free from Vegetative Competition

All herbaceous, brush and deciduous competition within a 1m radius cylinder of the crop tree must be assessed.

- A crop tree that is 150% of all herbaceous, brush and deciduous competition within a 1m radius cylinder is well growing.
- A crop tree that is 100% of all herbaceous (including grass) competition within a 1m radius cylinder is well growing.
- A crop tree that is taller than vegetation (includes birch and brush species), excluding aspen, cottonwood, on three of four quadrants in the 1m radius cylinder is well growing.
- A crop tree may be accepted as well growing if it is taller than countable aspen and/or cottonwood in at least three of four quadrants of the 1m radius cylinder and the number of countable aspen or cottonwood does not exceed 2. Quadrants may be aligned to minimize the number of quadrants with vegetation taller than the crop trees. A countable aspen cottonwood is a tree that is greater than the median height of all potentially well growing trees within the 3.99m radius plot.
- A crop tree may be accepted as well growing if the vegetation does not impede the growth of the crop tree and is not expected to impede the future growth of the tree. The forester must stratify these areas and provide a rationale for accepting the crop trees.

Stocking Requirement for Conifer Crop Trees

Stocking requirements are set out in the Site Level Plan (SLP) and are measured at establishment delay and post planting surveys.

Stocking Standards

Table A provides a standard for Site Level Plans and documenting Establishment Delay. The values are well spaced numbers.

Decreases in target stocking will require a documented field condition that would justify a lower target stocking. Conditions such as, poor site with a low original stocking, wet site with limited suitable microsite, areas with high likelihood of natural ingress would be considered to justify reduced TSS.

At establishment a planting target well spaced stocking density of at 1400 well spaced st/ha is recommended for most sites.

If the Professional Forester who prepared the site level plan for the area is of the opinion that the area in the cutblock in which reforestation is required is a complex of different types of sites interspersed, then the stocking requirements for the complex is the number of trees per hectare determined by the following procedure:

- (i) first, estimate the amount of area in each type of site;
- (ii) second, for each type of site, multiply the amount of area of that type by the stocking requirement for that type of site determined in accordance with Table A;
- (iii) third, add the total number of well spaced trees required for all types of sites as determined under subparagraph (ii);
- (iv) fourth, divide the total number of trees required for the complex by the area of the cutblock.

The minimum strata size is 2 hectares.

<i>Type of Area</i>	<i>Type of Site</i>	<i>Min. No. of Trees per ha. (MSS)*</i>	<i>Target No. Trees per ha. (TSS)*</i>	<i>Countable conifer ESSF/BWBS</i>
Coniferous	Xeric-Subxeric	500	1000	Sw, Pl, Bl
Coniferous	Submesic-Mesic	700	1200	Sw, Pl, Bl, Sb
Coniferous	Subhygric	500	1000	Sw, Pl, Bl, Sb, Lt
Coniferous	Hygric-Subhydric	400	800	Sw, Pl, Bl, Sb, Lt

*well spaced trees per hectare (see Table B for equivalent MSQ)

Table B

Well-spaced trees/ha	MSQ
0	0.0
100	0.3
200	0.7
300	1.2
400	1.7
500	2.1
600	2.5
700	2.8
800	3.1
900	3.3
1000	3.5
1100	3.6
1200	3.7
1300	3.8
1400	3.9
1500	3.9
1600	3.9
1700	3.9
1800	4.0

Minimum Inter-Tree Distance

The recommended minimum inter-tree spacing at establishment will be 2.0m, however, at the Forester's discretion the minimum distance may be decreased to 1.5 m to capture the best microsite. Further reductions to a 1.0m minimum will require a documented justification from the implementing Forester. Reductions below 2.0m are expected to occur frequently on the subhygric and wetter sites.

For MSQ plots minimum inter tree distance does not apply.

Maximum Density

Maximum density for well growing plantation will be 10,000 countable stems per hectare.

When determining if the number of conifer trees exceeds maximum density, conifers should be counted as described below:

The height of a countable crop tree depends on whether the median height of the well spaced crop trees in the survey plot is greater or less than 2m. The height of a countable crop tree is:

1. More than 50% of the median height of the preferred and acceptable well spaced trees in the survey plot, if the median height is 2m or greater; and
2. More than 30% of the median height of the preferred and acceptable well spaced trees in the survey plot, if the median height is less than 2m.

Well Growing and Health Requirement for Deciduous Crop Trees

Health

- Live aspen tree must be at least 2m in height and the tree pith must not be laterally displaced more than 30 cm from the root crown pith location².
- Aspen tree must not originate from a cut stump³.
- Aspen tree must have at least one live leader⁴.
- Aspen tree stem must not have a wound that is greater than 10% of the stem circumference, or is greater than 10% of the total length of the stem.⁵
- Aspen tree stem must not have any fungal infections or insect infestations affecting tissues below the bark surface, visible without destructive sampling⁶.
- Aspen tree must not be browsed so as to limit its ability to become a crop tree.

Well Growing

- Minimum height 1.5m⁷
- Minimum inter tree spacing 0.5m⁸
- 100% or more than the tallest competing vegetation within a 1m radius of the crop tree⁹

² A requirement of the Establishment to Free Growing Guidebook, Prince George Forest Region, May 2000, Appendix 6, Boreal Broadleaf Stocking Guidelines, BWBS.

³ Stems originating from the sides or cut surface of stumps are very susceptible to breakage at the coppice point

⁴ The objective is that the tree have a single stem that will develop into a healthy crop tree. Accordingly, a healthy, free growing aspen tree must have an identifiable live leader. It is not important that a portion, though not all, of the leader may be killed by for example venturia blight or be browsed. There is no agreement on a minimum leader length of a healthy aspen tree and as a result no minimum length is prescribed.

⁵ This standard is modified from the conifer standard, and threshold percent values are chosen subjectively.

Research should be undertaken to determine more exactly the size of an open wound at free growing assessment that is likely to limit the development of a healthy crop tree. A wound is defined as an injury in which the cambium is dead or completely removed from the tree exposing the sapwood. Measure the wound across the widest point of the exposed sapwood. Healed over wounds (=scars) are acceptable. Causes of mechanical damage to aspen commonly include gnawing by beaver, cattle, deer, elk or moose; logging activities; or windthrow scrapping. Fire or sunscald damage can also be the source of the wound. Injury of young aspen stems is considered an important entry court for decay organisms. Injury of mature aspen would pose a lesser concern since the resulting potential damage of decays would be much less.

⁶ Stem infections that may be seen are likely caused by cytospora canker or sooty-bark canker, and infestations that may be seen are likely caused by poplar borer. The significance of some diseases, such as armillaria, to aspen is not clear, and as well it is expected that such diseases could not be identified at the time of free growing.

⁷ A requirement of the FSJPPR, December 2001

⁸ A requirement of the FSJPPR, December 2001

⁹ A requirement of the FSJPPR, December 2001

Stocking Requirement for Deciduous Crop Trees

Stocking requirements are set out in the Site Level Plan (SLP) and are measured at establishment delay.

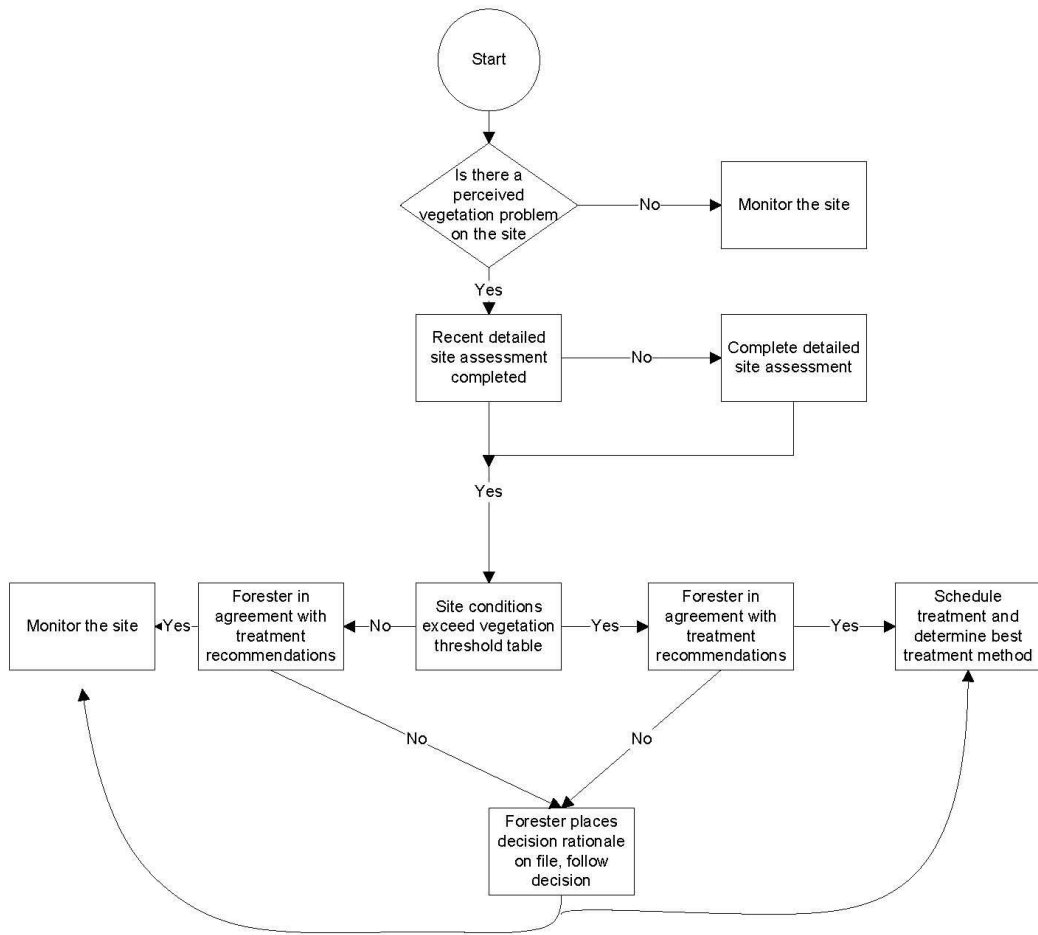
Stocking Standards

Table A provides a standard for SLPs and silviculture regimes. The values are well spaced numbers. Minimum intertree spacing 0.5m.

Table A				
<i>Type of Area</i>	<i>Type of Site</i>	<i>Min. No. of Trees per ha. (MSS)*</i>	<i>Minimum height</i>	<i>Countable Deciduous</i>
Deciduous	Xeric-Submesic	4000	1.5m	At
Deciduous	Mesic-Subhydric	4000	1.5m	At, Ac (max. component of 15% birch)

Appendix 3 Treatment Decision Matrix

BCTS- Peace Liard Business Area
Vegetation Management Treatment Decision Process



Appendix 4 Treatment Selection Process

BCTS- Peace-Liard Business Area Treatment Selection Process

