



CANADIAN FOREST PRODUCTS LTD.

**Forest Management Group,
Fort Nelson Division**

Integrated Vegetation Management Plan

2014 – 2019

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Prepared by

Canadian Forest Products Ltd.

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SECTION 1: INTRODUCTION

1.1 CANFOR'S INTEGRATED VEGETATION MANAGEMENT PLAN FOR SILVICULTURE OBLIGATIONS

This Integrated Vegetation Management Plan (IVMP) describes the integrated vegetation management process used by Canadian Forest Products Ltd. (Canfor) - Fort Nelson in relation to its silviculture obligations. The IVMP is consistent with Canfor's Environmental Policy and Environmental Management System. Our Environmental commitments maybe viewed online by accessing the following URL: http://www.canfor.com/docs/news-2010/canfor-environment-policy_2011.pdf?sfvrsn=0 . The IVMP is to be used by Canfor staff and contractors when assessing and conducting vegetation management treatments, while considering the obligations of the Forest Stewardship Plan and other applicable forest management plan commitments.

A silviculture regime that involves the potential use of herbicides considers economic, environmental, and social concerns. Canfor's silviculture goal is to establish healthy, well-stocked stands of ecologically suited commercial tree species that recognize the sites' growth potential. Vegetation management is an integral part of meeting Canfor's legal requirements to produce Free Growing stands on its harvested obligations, and Canfor's vegetation management strategy includes using herbicides where appropriate and as permitted by this IVMP.

All process and procedures will comply with the Operational Plan in place that may include one of the following: Pre-Harvest Silviculture Prescription, Silviculture Prescription, or Site Plan. To date there are no Higher Level Plans for the Fort Nelson Forest District. The Fort Nelson 'Land and Resource Management Plan' (LRMP) has not been designated as a higher level plan but has been used as a guideline during the development of the IVMP.

1.2 GEOGRAPHICAL BOUNDARIES FOR THIS INTEGRATED VEGETATION MANAGEMENT PLAN

This IVMP applies to the various licenses that Canfor Fort Nelson Division has or manages within the Fort Nelson Timber Supply Areas of the Peace Forest Region and within the Prince George Regional District. This area includes any of Canfor's managed openings that are contained within the areas identified on the Fort Nelson Division Integrated Vegetation Management Plan Area Map (Appendix 1).

The geographical area is from the Fontas River – Dehatcho Creek, Klua Creek, Prophet River, on the south, along the eastern side of Kwadacha Wilderness Park, Stone Mountain Park, Toad River, Liard River, Smith River on the western side, the Yukon, Northwest Territories border on the north and the Alberta border on the east and encompasses both forested and non-forested land.

Within the identified geographical boundaries Canfor will commit to avoiding operating in areas identified in the Fort Nelson Land and Resource Management Plan (LRMP) as

having and supporting a diverse number of large mammals of global importance. These areas which are identified as Resource Management Zones (RMZs) in the LRMP include the following: 8 Mile/Sulphur; Aeroplane Lake; Churchill; Fishing; Moodie; Muskwa West; Prophet; Rabbit; Rainbow; Sandpile; Stone Mountain; Terminal; Kechika River Corridor; Muskwa River Corridor; Toad River Corridor; and Turnagain/Dall River Corridor.

1.3 RESPONSIBILITY FOR VEGETATION MANAGEMENT

Within Canadian Forest Products Ltd., Fort Nelson Division, the principal contact for information relating to this Integrated Vegetation Management Plan (IVMP) is Kristine Bock, RPF, Forestry Supervisor - Silviculture @ (250) 321-1784.

1.4 INTEGRATED VEGETATION MANAGEMENT PLAN LEGISLATION

An IVMP is a plan that describes:

- A program for managing vegetation populations or reducing damage caused by vegetation, based on integrated vegetation management; and,
- The methods of handling, preparing, mixing, applying and otherwise using herbicides within the program.

The *Integrated Pest Management Act* (IPMA) and the Integrated Pest Management Regulation (IPMR) require pesticides to be used pursuant to the principles of Integrated Pest Management (IPM), which requires the development of an IVMP and the use of pesticides in accordance with the terms and conditions of the IVMP.

1.5 ROLE AND TERM OF THIS IVMP

This IVMP shall be in force for a five-year period from the date that the Pesticide Use Notice has been confirmed by the BC Ministry of Environment (MoE).

The IVMP ensures the following:

- Legal accountability with the provisions of the IPMA, as well as all applicable federal, provincial and regional legislation;
- The incorporation and use of the principles of IPM; and,
- Public awareness of Canadian Forest Products Ltd., Fort Nelson Woodlands Division vegetation management program.

SECTION 2: INTEGRATED VEGETATION MANAGEMENT

2.1 INTRODUCTION

In the context of this document the term Integrated Vegetation Management (IVM) will be used to describe vegetation management using the principles of Integrated Pest Management. Vegetation refers to all plant life including, without limitation, grasses, sedges, forbs, vines, ferns, brush, deciduous trees, and coniferous trees.

2.2 OBJECTIVES OF CANFOR'S INTEGRATED VEGETATION MANAGEMENT PROGRAM

Canfor's integrated vegetation management objective is to prevent competing pest vegetation from causing injury or death, or having an unacceptable negative impact on:

- sites scheduled for planting or fillplanting,
- newly planted seedlings,
- juvenile, commercially valuable coniferous trees, and/or

While meeting the objectives of sustainable forest management by ensuring healthy and vigorous plantations, Canfor will use herbicides:

- appropriately as a vegetation management tool and seek a balance between social, economic, and environmental values; and,
- in a biologically and ecologically appropriate manner, with treatment strategies based on sound science.

2.3 INTEGRATED VEGETATION MANAGEMENT (IVM) PROCESS

The elements of Canfor's IVM program are:

1. Prevention
2. Pest Identification
3. Seedling and Vegetation Monitoring
4. Injury Thresholds and Treatment Decisions
5. Treatment Options and Selection Criteria
6. Post-Treatment Effectiveness Evaluation

Each of the above IVM elements form an integral part of Canfor's vegetation management program and are discussed in detail below.

2.3.1 Prevention

Canfor employs the following preventative measures to avoid competitive vegetation problems. The Post Harvest Assessment Survey is conducted within one season of harvest. This survey is used to confirm the ecology classification of the block, and to identify areas where vegetation is expected to become a concern. Results of the walkthrough will guide planting timing, species and stocktype selection, need for site preparation, and scheduling of future treatments and assessments.

- *Early Identification of Brush Prone Sites* – Biogeoclimatic Ecosystem Classification zones and site series known to have high brush hazards are

- identified in the pre-harvest inspections, and appropriate treatment regimes are scheduled.
- *Selection of Appropriate Species* – The selection of species to be grown on a site must be ecologically suited to the site. Pre-harvest and post-harvest ecological classification will provide guidelines for species selection to maximize seedling performance and minimize the need for brushing treatments.
 - *Selection of Appropriate Stock Type* – The physiological characteristics that seedlings possess have a significant impact on seedling establishment and capacity to compete against encroaching vegetation. Small stock types may be appropriate for use on sites with a low competition hazard or other limiting factors, while larger stock types may be appropriate on sites with high competition hazard.
 - *Site Preparation* – Site preparation can be conducted, where appropriate, to improve microsites for newly established seedlings by reducing or rearranging slash, ameliorating adverse forest floor, soil, above and below ground vegetation structure, or other site biotic factors.

Other strategies that are used as a preventative measures include:

- *Use of Improved Seed* – Seed of the highest genetic worth available for the area is used to grow seedlings for planting and fillplanting activities. Seedlings grown from improved seed show faster growth than those grown from wild seed, providing these seedlings with an improved ability to compete with encroaching vegetation.
- *Minimizing Regeneration Delay* – Seedlings that are quickly established are more likely to compete successfully with problematic vegetation. Especially on brush-prone sites, seedlings should be planted as soon as possible following harvesting.
- *Maximizing Seedling Performance* – Seedlings that are planted in the best microsite possible and that remain undamaged during the planting process are more likely to compete successfully with problematic vegetation. Guidelines on stock handling to avoid seedling damage and optimizing the quality of planting microsites should be followed during planting activities.

2.3.2 Pest Identification

A pest, in the context of this IVMP, is an organism that limits or eliminates the ability of a seedling crop tree from establishing and/or reaching free growing status within the specified time period. While this could include many kinds of organisms, the focus of this IVMP is on plant species. Target species are outlined in the various scenarios described in the “Injury Thresholds” Section 2.3.4.

A fundamental activity in managing competing vegetation is the timely identification of vegetation that has the potential for negatively impacting crop trees. The first step is sound ecosystem classification from which vegetation species can be predicted. This prediction helps plan the most appropriate reforestation strategies that may help to control competing vegetation.

The next step in prompt pest identification is a post harvest site assessment, which is carried out in order to prescribe silviculture treatments. The site is assessed for site limiting factors including frost, drought, aeration, saturation, heavy vegetation competition, soil temperature and stability. Pest identification will also occur in the monitoring program which is described in Section 2.3.3.

The chief references for the identification of vegetation pests commonly found within the IVMP area include:

- *Plants of Northern British Columbia* (Mackinnon, Pojar, and Coupe)
- *Plants of Southern Interior British Columbia* (Parish, Coupe, and Lloyd)
- *Trees, Shrubs, Flowers* (Lyons)
- *Autecology of Common Plants in British Columbia: A Literature Review* (Haeussler, Coates, and Mather)

2.3.3 Seedling and Vegetation Monitoring

Canfor monitors and assesses seedling and vegetation performance using a combination of the following methods described in the table below. Treatment decisions will be based on current surveys (completed <18 months from treatment date). In each of the survey types referenced in the following table, information that is collected includes crop tree species, height, density, age and for competing vegetation species, height and distribution. This data is recorded and stored in our Corporate Database (Cengea).

Seedling and Vegetation Monitoring Methods	Frequency
<i>Survey - Regeneration Performance</i> – This more intensive type of survey is used on the more heterogeneous sites where it may be difficult to evaluate the performance of planted and natural stock and recommend brushing treatments. This survey is used to determine stocking levels and performance of planted and natural stock, and to prescribe brushing treatments or fill plants if necessary.	Once - 2 or 3 growing seasons after planting
<i>Walkthrough - Regeneration Performance</i> – Informal walkthroughs on more homogenous sites where seedling performance and competition hazard are easier to evaluate. This survey is used to determine stocking levels and performance of planted and natural stock, and to prescribe brushing treatments or fill plants if necessary.	May be scheduled when more information is required for a treatment decision.
<i>Walkthrough - Free Growing Recce</i> - Walkthrough survey used to confirm that block, or specific strata, will meet standards for Free Growing before a Free Growing Survey is undertaken.	Once – 5-10 growing seasons after planting. Scheduled as needed as survey regime progresses.
<i>Site Visit</i> - A site visit used to assess crop tree height, density and distribution, as well as brush competition and distribution. Also used on Predictive Herbaceous Scenario to confirm treatment.	May be scheduled when more information is required for a treatment decision.
<i>Survey - Free Growing</i> - The purpose of the Free Growing Survey is to gather data required to provide confidence and reliance that a free growing stand has been established. Data will be collected to produce a Free Growing report.	Once - 5 to 15 growing seasons after planting.

2.3.4 Injury Thresholds and Treatment Methods and Decisions

Decision Thresholds and Action Levels

With respect to a development and implementation of a *decision protocol* for determining whether or not treatment is required, there are three scenarios to address. These scenarios can be applied to portions of or entire openings where treatment is recommended based on the results of injury thresholds:

Scenario 1: Obvious Herbaceous/Shrub – In this scenario, herbaceous vegetation levels are well developed, and crop trees have been established long enough (1-2 growing seasons) that response can be assessed with respect to seedling attributes.

Target Species - Vegetative species in this scenario include Aspen, Cottonwood, Birch, Alder, Willow, Rhodendron, Rose, Fireweed, and Grass.

Treatment objectives are to control competing vegetation long enough that crop trees are able to recover from injury, and that crop trees can generate adequate growth to keep ahead of recovering brush levels. The table below describes the measure of vegetation competition and seedling impact justifying treatment.

Indicators of Injury	How the Thresholds were Chosen	Measure	Threshold Beyond Which Treatment will be Applied
Vegetation Index: Comeau's Index**	A commonly used vegetation index is Comeau's Index, which is a measure of total density of vegetation multiplied by vegetation height divided by crop tree height.	sum (% cover of brush species x height) <i>divided by</i> (tree height)	> 80 (recommend treatment)

**Comeau's Index (CI) is a simple index that measures the competition for sunlight with regards to crop trees. CI is calculated as the sum of the products of cover and height for all non-crop species within a 1.26 meter radius around a crop tree, divided by crop-seedling height. CI shows that growth declines with increases in competition index. There is a very rapid decline in growth as CI increases from 0 to 100. At CI=100, growth is approximately 60% of that of a seedling growing free from competition. At a CI=150, seedlings receive 30% of the full sunlight in midsummer and would achieve approximately 45% of potential growth rates (Comeau, 1993).

Scenario 2: Predictive Herbaceous – In this scenario, at the time of assessment, the vegetation levels may or may not be fully expressed. Additionally, crop trees may not be established or have not been established long enough that response can be assessed with respect to seedling attributes. Predictive herbaceous is ecology driven and the **target vegetation** includes the species that are described in Scenario 1.

Treatment objectives focus on maintaining current seedling vigor prior to injury; specifically on sites where (if left untreated) we forecast that vegetation competition will cause injury to crop trees. This is a predictive scenario, whereby treatment decisions are based on brush hazard ratings that are assigned by site ecology and the pre-harvest condition. Pre-harvest site assessments are completed on the blocks to assess the brush species on site and the current level of brush hazard. As well, nearby areas are looked at to help predict what level of brush hazard might exist post-harvest.

The thresholds are described in the following table:

Indicators	Cause	Measure	Threshold
1. Brush Hazard by BEC Association	Based on local knowledge of treatment responses, observed data from surveys, and Biogeoclimatic Ecosystem Classification (BEC), we are able to predict which site types have likelihood of requiring brushing treatments. This is combined with the indicators below to prescribe treatment.	Site assessment	Moderate, High to Very High brush hazard rating
2. Vegetation Index (Comeau's)	See Comeau's Index description under Scenario 1. For a site preparation decision where no tree data exists, use 20 cm (target height for Sx 412 2+0).	sum (% cover of brush x height) / (tree height)	> 80 (recommend treatment)

Scenario 3: Obvious Deciduous Vegetation Competition – Expressed deciduous competition results in imminent or measurable negative crop tree impact.

Target Species - For the purpose of this scenario, “deciduous vegetation” refers to Trembling aspen, Cottonwood, Alder species, Willow species, and Birch.

A treatment objective for this scenario is to release crop trees from competition of deciduous species. Definition of thresholds is more difficult for this scenario as some densities and distributions of deciduous may not be harmful to the stand, whereas others may be deleterious. Specific thresholds with respect to treatment of deciduous are difficult to prescribe and must be measured against legal silviculture obligations. The following threshold provides guidance:

Without treatment, Free Growing obligations (i.e. minimum number of free growing stems per hectare) will not be met because the distribution of deciduous species results in a stand > 1.0 contiguous hectare where deciduous species are encroaching on the *effective growing space* of the crop tree. Without treatment, Free Growing obligations will not be met. See Forest and Range Practise Regulations Section 46.11.

This IVMP uses current practices as per the obligations and definitions pertaining to a “Free Growing Tree” as described in the FS 660, Section 18.a.
<http://www.for.gov.bc.ca/hfp/silviculture/Surveys/FS660final2011.pdf>

The following table identifies the time at which the target vegetation becomes a hindrance to the establishment of crop species. When primary target species have reached, or have the potential to reach these thresholds they are considered to be competition and brushing treatments may be prescribed.

Injury Thresholds			
Target Vegetation	Density (stems/ha or %)	Height (m)	Comment
Aspen	≥ 400 sph	≥ 100% the height of crop tree	*Species can be present singly or as a complex *may apply height and density thresholds separately
Cottonwood	≥ 400 sph	≥ 100% the height of crop tree	*Species can be present singly or as a complex *may apply height and density thresholds separately
Birch	≥ 400 sph	≥ 100% the height of crop tree	*Species can be present singly or as a complex *may apply height and density thresholds separately
Alder	≥ 15%	≥ 100% the height of crop tree	*Species can be present singly or as a complex *must apply both thresholds concurrently
Willow	≥ 15%	≥ 100% the height of crop tree	*Species can be present singly or as a complex *must apply both thresholds concurrently
Rhodendron	≥ 15%	≥ 80% crop tree height	* Mature plants difficult to obtain good efficacy *must apply both thresholds concurrently
Rose	≥ 15% complex ≥ 25% singly	≥ 100% crop tree height	*Thresholds treatable applicable 0-6 years post-harvest or for site preparation *must apply both thresholds concurrently
Raspberry, Fireweed, Grass	≥ 15% complex ≥ 30% singly	≥ 100% crop tree height	*Species can be present singly or as a complex *Thresholds treatable applicable 0-6 years post-harvest or for site preparation

2.3.4.1 Treatment Options and Selection Criteria

A consistent decision-making process will ensure that appropriate treatments are being prescribed for each area. The below tables of potential brushing methods are used to aid Canfor staff in identifying when a treatment is required and what type of treatment method is available for implementation under variable conditions.

2.3.4.1.1 Aerial-Based Herbicide Methods

Herbicide - Helicopter Methods	
Helicopter Discretionary - Non-continuous, discretionary application of herbicide across portions of areas within a cutblock. Equipment includes a helicopter with low-pressure boom with conventional or high volume nozzles. Varying glyphosate application rates possible.	
Helicopter Broadcast - Continuous application of herbicide across all or a portion of areas within a cut block. Equipment includes a helicopter with low-pressure boom with conventional or high volume nozzles. Varying glyphosate application rates possible.	
Benefits	Limitations
<ul style="list-style-type: none"> ➤ Highly effective control over a number of years ➤ Little to no contact of herbicide to workers ➤ Lowest cost brushing method ➤ Able to treat slashy, steep ground more safely than a ground treatment. ➤ Effective for use in remote areas with no summer road access 	<ul style="list-style-type: none"> ➤ Less selective than other methods. ➤ Stringent application constraints ➤ High public profile ➤ Intensive preparation and follow up ➤ Mature leave trees limit use of this method. ➤ Visual quality affected for a number of years ➤ Technically demanding
<i>Rationale for Selecting Treatment Method in IVMP</i> –We have not found a more effective, cost efficient method for vegetation control, and we have found this method to be the safest in regards to workers on the ground.	

2.3.4.1.2 Ground-Based Herbicide Methods

Herbicide - Backpack Methods	
Backpack Discretionary - Non-continuous, discretionary application of herbicide across portions of areas within a cutblock. Equipment includes low-pressure backpack sprayer with adjustable nozzles. Varying glyphosate application rates possible.	
Backpack Broadcast - Continuous application of herbicide across all or a portion of areas within a cut block. Equipment includes low-pressure backpack sprayer with adjustable nozzles. Varying glyphosate application rates possible.	
Benefits	Limitations
<ul style="list-style-type: none"> ➤ Effective control over a number of years. ➤ Can treat on blocks with lots of mature standing leave trees. ➤ Can be applied with more precision, and applicator can be more “selective” than a helicopter. ➤ Little or no buffer zone required protecting PFZ. 	<ul style="list-style-type: none"> ➤ Stringent application constraints ➤ Intensive preparation and follow up ➤ Effectiveness diminishes as height of brush increases. ➤ Needs a very high level of supervision and layout. ➤ Higher potential of worker exposure to herbicide. ➤ Safety concerns with wearing heavy equipment on rough terrain.
<i>Rationale for Selecting Treatment Method in IVMP</i> –This method is a key tool, and is especially useful in areas that have lots of leave trees and herbaceous brush.	
Herbicide - Brushsaw Methods	
Cut Stump - Non-continuous, discretionary application of herbicide onto cut surfaces of target vegetation only. Equipment generally includes a brushsaw with a user-controlled herbicide attachment that applies herbicide beneath the surface of the cutting blade. Varying glyphosate application rates possible but are much lower rates than Aerial and Backpack methods.	
Benefits	Limitations
<ul style="list-style-type: none"> ➤ Effective control over a number of years preventing re- 	<ul style="list-style-type: none"> ➤ Stringent application constraints

<p>sprouting of target vegetation.</p> <ul style="list-style-type: none"> ➤ Much bigger treatment window versus other herbicide treatment methods. ➤ Little or no buffer zone required protecting PFZ. ➤ Very little herbicide exposure to workers. ➤ Uses less herbicide on a given area (reduced application rate) 	<ul style="list-style-type: none"> ➤ Intensive preparation and follow up ➤ Needs a very high level of supervision and layout. ➤ Safety concerns with wearing heavy equipment on rough terrain. ➤ Expensive equipment required.
<p><i>Rationale for Selecting Treatment Method in IVMP</i> –This method is a good tool for blocks that have high numbers of leave trees or numerous water bodies with primarily broadleaf competition, and shows good effectiveness in preventing re-sprouting of aspen.</p>	
<p>Herbicide – Basal Bark</p>	
<p>Basal Bark – Non-continuous, discretionary application of herbicide onto surfaces of target vegetation only.</p>	
<p>Benefits</p>	<p>Limitations</p>
<ul style="list-style-type: none"> ➤ Effective control over a number of years. ➤ Can treat on blocks with lots of mature standing leave trees. ➤ Can be applied with more precision, and applicator can be more “selective” than a helicopter. ➤ Little or no buffer zone required protecting PFZ. 	<ul style="list-style-type: none"> ➤ Stringent application constraints ➤ Intensive preparation and follow up ➤ Needs a very high level of supervision and layout. ➤ Higher potential of worker exposure to herbicide. ➤ Safety concerns with wearing heavy equipment on rough terrain.
<p><i>Rationale for Selecting Treatment Method in IVMP</i> –This method is a good tool for blocks that have high numbers of leave trees or numerous water bodies with primarily broadleaf competition, and shows good effectiveness in preventing re-sprouting of aspen. Treatment does not immediately increase slash level in treatment area.</p>	

2.3.4.1.3 Ground-Based Non-Herbicide Methods – Small Engine

<p>Non-Herbicide – Brushsaw Method</p>	
<p>Manual Brushing – Worker cuts target vegetation with a brushsaw or chainsaw.</p>	
<p>Benefits</p>	<p>Limitations</p>
<ul style="list-style-type: none"> ➤ No herbicide use. ➤ Public acceptance ➤ Can be applied selectively ➤ Can be used in riparian areas or pesticide free zones 	<ul style="list-style-type: none"> ➤ Re-sprouting of target species, may require re-treatment ➤ Safety hazards associated with saws, exhaust fumes, and repetitive motion injuries. ➤ High treatment cost. Expensive equipment required. ➤ Relative short window for treatment (after leaf out to end of July). ➤ Not effective on herbaceous brush.
<p><i>Rationale for Selecting Treatment Method in IVMP</i> - Can be effective if crop trees are taller and not suppressed (but will not make “Free Growing”)</p>	

2.3.4.1.4 Ground-Based Non-Herbicide Methods – Hand Tools

<p>Non-Herbicide – Girdle</p>	
<p>Manual Girdling – Worker uses hand-girdling tool and removes a continuous strip of bark around individual stems, eventually (2-3 years) killing the trees.</p>	
<p>Benefits</p>	<p>Limitations</p>
<ul style="list-style-type: none"> ➤ No herbicide use. ➤ Public acceptance. ➤ Can be applied selectively. ➤ Low cost hand tools so workforce can gear up easily. 	<ul style="list-style-type: none"> ➤ Re-sprouting, may require multiple treatments. ➤ High treatment cost due to low productivity. ➤ Cannot use for herbaceous. ➤ Repetitive strain injuries common.
<p><i>Rationale for Selecting Treatment Method in IVMP</i> - Can be effective if crop trees are taller and not suppressed (but will not make “Free Growing”)</p>	

2.3.4.1.5 Ground-Based Non-Herbicide Methods – Livestock

Non-Herbicide – Sheep	
Sheep Grazing – 1-3 shepherds guide a herd of sheep (1,000 – 1,500 head) through areas where they eat target vegetation.	
Benefits	Limitations
<ul style="list-style-type: none"> ➤ No herbicide use. ➤ Not constrained by weather conditions. 	<ul style="list-style-type: none"> ➤ Moderate to high amounts of damage to crop trees (especially Pli and Fdi and any species in June) ➤ High treatment cost. ➤ Can only use for certain herbaceous species and only provides a couple months of control. ➤ Can only use on good access, flat blocks with low to no slash. ➤ Need a group of blocks in close proximity to make a “program”. ➤ Risk of disease spread to wild ungulate populations. ➤ Potential damage to pesticide free zones and riparian areas from herd. ➤ Risk of predation.
<i>Rationale for Selecting Treatment Method in IVMP</i> - Only other realistic option to herbaceous treatment if herbicide cannot be used.	

2.3.4.1.6 Mechanical Site Preparation

Non-Herbicide – Mechanical Site Preparation	
Mechanical Site Prep – Creating improved microsites for reforestation where site limiting factors might inhibit seedling performance, for example soil temperature, soil moisture, competing vegetation, or physical barrier (slash loading)	
Benefits	Limitations
<ul style="list-style-type: none"> ➤ No herbicide use. ➤ Public acceptance. ➤ Increased soil temperature 	<ul style="list-style-type: none"> ➤ Temporary brush control ➤ Expensive ➤ Access limitations ➤ Possible soil compaction and rutting ➤ Potential for surface erosion ➤ High visual impact ➤ Site constraints – slope, slash, duff layer depth
<i>Rationale for Selecting Treatment Method in IVMP</i> – Creates favourable microsites and achieves temporary brush control	

2.3.5 Selection of Treatment Method

Treatment method selection takes into consideration a number of factors including physical (see Benefits and Limitations in Treatment Methods tables), legal and political constraints as well as stakeholder concerns. Treatment efficacy and treatment cost are also considerations in selecting an appropriate method of treatment.

Legal and political constraints will influence treatment selection. Legal constraints must be addressed and accommodated within all strategies. Political constraints may come from a number of sources. These constraints may be identified through a number of avenues, for example public consultation, regulatory agencies, Forest Stewardship Plan processes, and Land and Resource Management Plan processes.

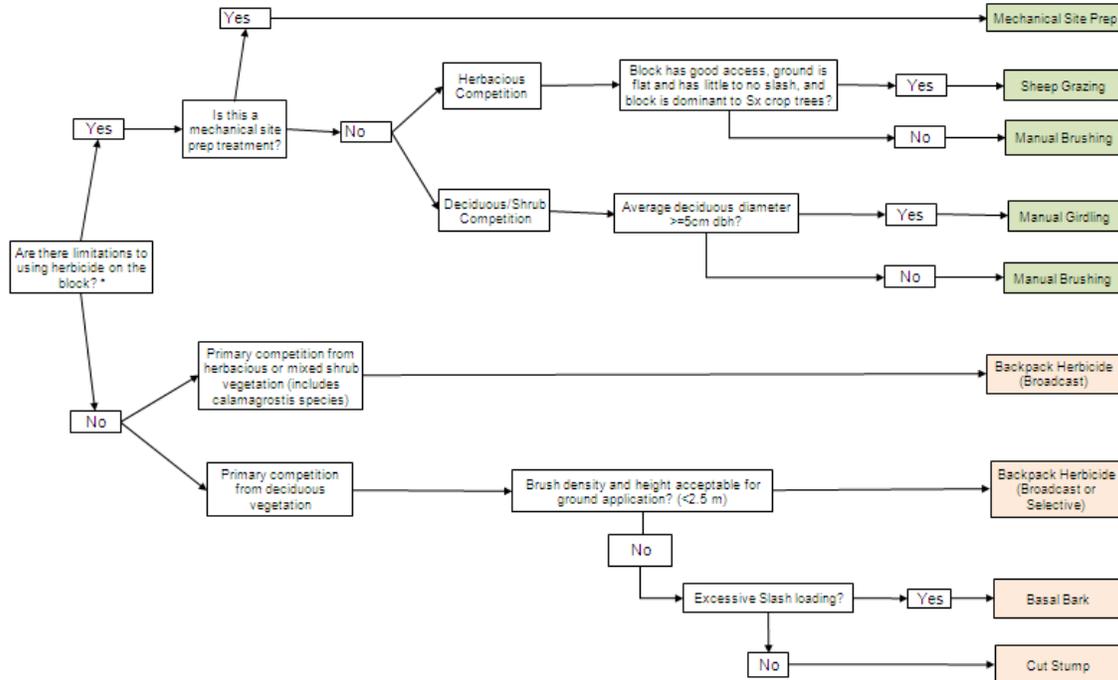
Due to the complexity of issues that may influence a treatment decision, this IVMP does not attempt to create a treatment decision matrix that may exclude or that may apply extraneous constraints upon a treatment decision.

The flowchart below describes the process guideline for selecting a brushing method in

Canfor Fort Nelson operating areas. This process is greatly simplified and the actual treatment choice may be different than below with a stated rationale.

Brushing Method Selection Guide

NOTE: This decision flowchart is a guide to help determine brushing treatments; factors such as block location, size of treatment area, terrain issues (i.e. slope, slash levels), and cost will be considered when reaching a final brushing treatment decision.



* Limitations to using herbicide on the block may include: specific SP requirements, wildlife habitats (i.e. nests, dens identified on block), ungulate winter ranges, stakeholder limitations, pesticide free zones, old growth management areas, and other limitations specified in higher level plans.

2.3.6 Post-Treatment Evaluation

For all treatment areas a “Post Treatment Audit” will be conducted within 12 months of treatment. All blocks where treatment has been conducted will be visually assessed for the following:

Efficacy
Coverage of intended treatment area
<ul style="list-style-type: none"> • absence of striping • absence of missed areas
Chemical Efficacy
<ul style="list-style-type: none"> • level of removal of target vegetation • current level of competition
Seedling Damage
<ul style="list-style-type: none"> • level of seedling damage due to chemical • level of seedling damage due to manually cut brush • location of damage, if any (terminal bud, needles)
Prescription Evaluation
<ul style="list-style-type: none"> • treatment meets needs of plantation and schedule follow up monitoring survey. (See Section 2.3.3)
Compliance
Pesticide Free Zones
<ul style="list-style-type: none"> • no evidence of herbicide compromise into Pesticide Free Zones
Boundaries
<ul style="list-style-type: none"> • as mapped on final bag maps • consistent with treatment plan • no evidence of herbicide outside of marked boundaries

*Non-compliance identified during the Post Treatment Audit will be reported to the Ministry of Environment.

Subsequent surveys as described in Section 2.3.3 may be conducted to further evaluate seedling performance and vegetative response to treatment.

SECTION 3: OPERATIONAL INFORMATION

3.1 PROCEDURES FOR SAFELY TRANSPORTING HERBICIDES

The federal *Transportation of Dangerous Goods Act* (TDGA) and the *Integrated Pest Management Act* regulate the transportation and handling of poisonous substances, which may include some herbicides.

The following procedures will be followed while transporting herbicides for application under this IVMP:

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

3.2 PROCEDURES FOR SAFELY STORING HERBICIDES

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

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

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

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

3.3 PROCEDURES FOR SAFELY MIXING, LOADING, AND APPLYING HERBICIDES

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

- Mixing of herbicides must always be conducted in a safe manner.
- Safety spill kits, spill response plans and first aid supplies shall be present on or near the treatment site.
- Eye wash station(s) and protective clothing as recommended on the respective product labels shall be available on or near the treatment site.
- Product labels and Material Safety Data Sheets will be available on or near the treatment site to ensure that quantities of herbicides being mixed and used are consistent with label rates.
- There shall be no mixing or loading of herbicides within 15 metres of sensitive environmental features (i.e. riparian management areas as described in the *Forest and Range Practices Act* and non classified waterbodies).
- Ensure that the application equipment is in good working order and, if required, is calibrated to conform to the application rates on the pesticide label.
- Implement precautions to prevent unprotected human exposure to pesticides.
- Implement precautions to ensure that domestic water sources, agricultural water sources and soil used for agricultural crop production are protected for their intended use.
- Ensure that, to prevent treatment of watercourses, the suction hoses used for herbicide(s) will not be used to pick up water from natural sources such as streams or ponds. The intake of water for mixing will be protected from backflow into the natural source by an “air gap” or “reservoir” between the source and the mixing tank.

3.4 PROCEDURES FOR THE SAFE DISPOSAL OF EMPTY HERBICIDE CONTAINERS AND UNUSED HERBICIDES

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

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

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

3.5 PROCEDURES FOR RESPONDING TO HERBICIDE SPILLS

Spill treatment equipment shall be at or near storage (including mobile storage) mixing and loading sites, and it shall include the at least following:

- Personal protective equipment
- Absorbent material such as sawdust, sand, activated charcoal, vermiculite, dry coarse clay, kitty litter or commercial absorbent
- Neutralizing material such as lime, chlorine bleach or washing soda
- Long handled broom, shovel, and waste-receiving container with lid

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

- All personnel shall be protected from herbicide exposure by wearing appropriate protective clothing and safety gear;
- Any person exposed to a herbicide shall be moved away from the place of the spill;
- First aid should be administered, if required;
- The source of the spill should be stopped;
- The spilled material should be stopped from spreading by creating a dam or ridge;
- The project supervisor shall ensure operations cease until the spill is contained and the source is repaired;
- Absorbent material shall be spread over the spill, if applicable, to absorb any liquid;
- The absorbent material shall be collected in garbage bags or containers with the contents clearly marked;
- Contaminated soil or other material will be removed from the spill site and placed in garbage bags or containers;
- The person responsible for the project shall contact an approved representative of Canfor for shipping instructions and disposal requirements;
- When more than five kilograms of product of herbicide is spilled on land, or any amount into a waterbody, the person responsible for the project will immediately report it to the Provincial Emergency Program by telephoning 1-800-663-3456 or, where that is impractical, to the local police or nearest detachment of the RCMP and an approved representative of Canfor will be notified of the details related to the spill as soon as is practical by the Contractor project supervisor

SECTION 4 ENVIRONMENTAL PROTECTION STRATEGIES AND PROCEDURES

All vegetation management activities intended for use within this IVMP will incorporate measures designed to protect the following:

- Strategies to protect community watersheds, and other domestic water sources
- Strategies to protect fish and wildlife, riparian areas, and wildlife habitat
- Strategies to prevent herbicide treatment of food intended for human consumption
- Pre-treatment inspection procedures for identifying treatment area boundaries
- Procedures for maintaining and calibrating herbicide application equipment
- Procedures for monitoring weather conditions and strategies for modifying herbicide application methods for different weather conditions and

In this IVMP, Canfor based the size of its pesticide-free zones (PFZ) and no treatment zones (NTZ) on the standards currently contained in the *Integrated Pest Management Act* and Regulations.

4.1 STRATEGIES TO PROTECT COMMUNITY WATERSHEDS AND OTHER DOMESTIC WATER SOURCES

There are no community watersheds that exist in Canfor Fort Nelson operating areas. A Pesticide Free Zone (PFZ) will be established around any other established community watersheds that may be developed during the term of this IVMP to ensure that the integrity of the watershed is maintained. The area of the PFZ will comply with the standards set at that time.

Due to the location of Canfor's tenure (Crown land located away from private land), there are no known water supply intakes or wells used for domestic or agricultural purposes on Canfor's tenure where there are agreed upon measures that are in excess of requirements outlined in Regulation.

Pursuant to section 71 of the Integrated Pest Management Regulation, a 30 m no-treatment zone will be implemented around any water supply intake or wells used for domestic or agricultural purposes, including water for livestock or for irrigation of crops.

4.2 STRATEGIES TO PROTECT FISH AND WILDLIFE, RIPARIAN AREAS, AND WILDLIFE HABITAT

4.2.1 Pesticide Free Zones (PFZ)

"Pesticide Free Zone" means an area of land that must not be treated with pesticide and must be protected from pesticide moving into it.

Water bodies are identified, pre-harvest, in conjunction with the development of Silviculture Prescriptions, Site/Exemption Plans, or Site Level Plans. Herbicide layout contractors conduct a reconnaissance of the treatment area to identify water bodies post-harvest.

A 10m PFZ will be maintained along all water bodies, dry streams and classified wetlands, except:

- Glyphosate may be applied up to 2 m from the high water mark, if:
 - (i) the body of water or classified wetland is not fish bearing at any time of the year and
 - (ii) selective applications methods are used between 2m and 10m above the high water mark.
- Glyphosate may be applied up to but not below the high water mark, if the body of water is:
 - (i) a temporary free-standing body of water,
 - (ii) not a classified wetland or wildlife habitat feature, and
 - (iii) not fish bearing and does not drain into a fish bearing body of water within 100m.
- Glyphosate may be applied to a temporary free standing body of water if the body of water is:
 - (i) either smaller than 25 m² or not a wetland,
 - (ii) not a wildlife habitat feature, and
 - (iii) not fish bearing and does not drain into a fish bearing body of water within 100 m.

Glyphosate may be applied to a dry S-5 or S-6 stream if the dry stream is not a wildlife habitat feature and not fish-bearing when wet.

Riparian Reserve zones will be treated as Pesticide Free Zones and their integrity will be maintained through the establishment of a no-treatment zone of a sufficient distance to ensure the maintenance of the RRZ.

To ensure the protection of riparian habitat and fisheries resources Canfor will not conduct pesticide operations in the Muskwa-Kechika Special Management Category provided in the Fort Nelson Land and Resource Management Plan.

4.2.2 Wildlife Habitat Features and Riparian Area

Wildlife Habitat features, Wildlife Habitat Areas and Riparian areas are defined in Regulation and identified pre-harvest and managed through approved Silviculture Prescriptions, Site Plans and Forest Stewardship Plans and Sustainable Forest Management Plans. The application of herbicides will be consistent with the protection measures stated in those operational plans and/or Regulation. Observation of wildlife habitat features post-harvest will be reported to Canfor representatives, and where necessary, site-specific protection measures will be implemented through the establishment of Pesticide Free Zones.

To ensure the protection of wildlife resources Canfor will not conduct pesticide operations in the Muskwa-Kechika Special Management Category provided in the Fort Nelson Land and Resource Management Plan.

4.2.3 Species at Risk

Canfor is certified under several forestry certification brands, and the application of herbicides under this IVMP will be consistent with the protection measures strategies stated in our Sustainable Forest Management Plan.

Canfor has developed annual training for staff and contractors for assistance in proper identification of at risk species and plant communities found within Canfor's operating areas. Observation of species at risk post-harvest will be reported to Canfor representatives, and where necessary, the observations will be reported to the Ministry of Environment and site-specific protection measures may be implemented.

Where species at risk are encountered they will be excluded from treatment area or they will be protected by a "Pesticide Free Zone".

4.3 STRATEGIES TO PREVENT HERBICIDE TREATMENT OF FOOD INTENDED FOR HUMAN CONSUMPTION

Canfor shall attempt to locate areas where there is food grown for human consumption and take the appropriate precautions during vegetation management operations to avoid treatment of these areas. Such precautions may include providing increased buffer zones around these areas during herbicide applications, timing applications, or using non-chemical methods of vegetation management. Signs will be posted at all entrances to the treatment site to meet regulatory requirements (as per Sec 64(1) of the Integrated Pest Management Regulations).

Herbicide will not be stored or transported in the same compartments as human food.

When, during the information-sharing or referral process, an interested party has identified site-specific locations of highly productive berry patches or medicinal plants within a proposed treatment area, and the existence of these berries and/or medicinal plants has been confirmed by Canfor staff, every effort will be made to protect these areas through implementation of pesticide free zones, treatment selection, or scheduling of treatments. If pesticide free zones are established, they will be of adequate size to ensure no pesticide from the treatment will impact the food plants.

At this time, the only expected "food plants" that are used are berries and medicinal plants. It is presumed that a majority of the harvesting of berries and medicinal plants occurs along all-weather roads throughout the District, but exact locations and the types of plants being harvested are not available. If chemical treatments are proposed for use in the vegetation pest control, and no concerns have been raised about protection of berries and/or medicinal plants within the treatment area, the treatment will occur as planned. Also, treatment of areas within 1km of permanent, private residence on private land will not occur until the owner of the residence has been notified.

4.4 PRE-TREATMENT INSPECTION PROCEDURES FOR IDENTIFYING TREATMENT AREA BOUNDARIES

A pre-treatment inspection will be completed on all treatment sites by the contractor and/or Canfor supervisor to identify treatment area boundaries and the presence of the general public, grazing wildlife and livestock. During this inspection, sensitive areas such as bodies of water and no treatment zones are noted on maps. The contractor is instructed to follow the bagging/flagging requirements as depicted on the treatment layout map.

During the pre-work discussion, contractor representatives shall be instructed in the bagging/flagging requirements and precautions, and review the methodology and procedures for applications and handling of the herbicide.

No treatment is to proceed until it is confirmed there is no presence of the general public and there is no visible grazing wildlife or livestock in the treatment area.

4.5 WEATHER MONITORING AND STRATEGIES

Measurements will be made to record weather conditions prior to treatment, at the end of treatment and in between treatment if there has been a change in site or weather conditions. The following items will be recorded for foliar treatment methods:

- Wind speed and direction
- Relative Humidity (RH)
- Presence of frost or dew
- Precipitation
- Temperature
- Sky conditions (clear, overcast, cloudy, partly cloudy)

The following table describes strategies for modifying application according to changing weather conditions:

	Temp.	Thick Dew or Frost on Leaves	Wind Speed (km/hour)	Relative Humidity (%)	Rain, Inversion, Fog	Freezing Conditions
Aerial Foliar (conventional)	>26.5 C No Spray	No Spray	>8 No Spray	<40 No Spray	No Spray	No Spray
Aerial Foliar (low drift)	>30 C No Spray	No Spray	>8 No Spray	<35 No Spray	No Spray	No Spray
Backpack	>26.5 C No Spray	No Spray	>8 No Spray	<40 No Spray	No Spray	No Spray
Cutstump, Hack and Squirt					No application if raining	No Application
Basal Bark					No application if stem is wet	As long as snow is below treatment height

4.6 PROCEDURES FOR MAINTAINING AND CALIBRATING HERBICIDE APPLICATION EQUIPMENT

The application contractor shall ensure that the application equipment is in good working order and, if required, is calibrated to conform to the application rates on the pesticide label. Proper calibration is very important to ensure herbicide is not under or over applied.

4.6.1 Aerial Herbicide Equipment

All equipment shall be calibrated prior to commencing operations for that season. Proof of this calibration for aerial applications and the swath kit analysis shall be kept by the treatment contractor for at least 2 years.

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

4.6.2 Ground Herbicide Equipment

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

- for each individual applicator using hand-held or backpack equipment,
- at the beginning of each season
- at the start of each treatment job
- any time the application equipment is changed
- for each change in size or type of nozzle
- any time the herbicide or formulation of a herbicide is changed

A maintenance person, designated by the application contractor, must conduct maintenance and repairs. The maintenance person must be knowledgeable in the operation and repair of the equipment. The equipment operation must conform to the manufacturer's specifications.

Records will be kept by contractors for each piece of calibrated equipment for a minimum of 2 years.

SECTION 5: FORESTRY HERBICIDES PROPOSED FOR USE UNDER THIS IVMP

Herbicides proposed for use within the scope of this IVMP are registered for forestry use under the Pesticide Control Products Act. They have been deemed safe when applied according to the instructions outlined on their labels.

The herbicides listed below are proposed for use within the context of this IVMP for vegetation control.

<u>HERBICIDE</u> (Common Name)	ACTIVE INGREDIENT (Chemical)	PCP #	USAGE	<u>APPLICATION TECHNIQUE</u>	
				AERIAL	GROUND
VisionMax®	Glyphosate (49%)	27736	Common	Yes	Yes
Vision®	Glyphosate (41%)	19899	Common	Yes	Yes
Vantage®	Glyphosate (35.6%)	26884	Common	Yes	Yes
Release®	Triclopyr (48%)	22093	Uncommon	No	Yes
Weed Master®	Glyphosate (41%)	29009	Common	Yes	Yes

The most common herbicide used in forestry is glyphosate. It is selected for its low toxicity and high efficacy in treating competing forest vegetation. When applied at relatively low rates, it effectively manages competing forest vegetation species without significant damage to coniferous trees.

Appendix 1: Fort Nelson Division Integrated Vegetation Management Plan Area Map

