



CANADIAN FOREST PRODUCTS LTD.

Mackenzie Operation

**Forest Vegetation
Pest Management Plan**

2016 – 2021

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SECTION 1: INTRODUCTION

1.1 CANFOR'S PEST MANAGEMENT PLAN FOR SILVICULTURE OBLIGATIONS

This Pest Management Plan (PMP) describes the integrated vegetation management process used by Canadian Forest Products Ltd. (Canfor) in relation to its silviculture obligations. The PMP 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 PMP 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 regimen 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 silviculture obligations, and Canfor's vegetation management strategy includes using herbicides where appropriate and as permitted by this PMP.

1.2 GEOGRAPHIC BOUNDARIES OF THIS PEST MANAGEMENT PLAN

This PMP applies to the various licenses that Canfor Mackenzie Division has or manages within the Mackenzie Timber Supply Area of the Northern Interior Forest Region and within the Fraser-Fort George Regional District. This area includes any of Canfor's managed openings that are contained within the areas identified on the Mackenzie Division's Pest Management Plan Area Map (Appendix 1).

This PMP includes all or part of the following operating areas that Canfor holds obligations in:

1. Blackwater,
2. Philip-Nation,

Other tenures not held by Canfor that fall within the geographic areas identified are not included in this PMP. The following is a geographic description of each operating area under the PMP:

Blackwater Operating Area: The Blackwater Operating area lies west of Williston Lake and extends north from the Nation River and Finlay-Nation Mainline to the Omineca Arm, and westward to the TSA boundary. The portion of the Blackwater Operating area that falls under this PMP from approximately the junction of the Finlay-Nation Mainline and the Thutade FSR west to the TSA boundary and from approximately Baldy Mountain south to the Nation River.



Philip-Nation Operating Area: The Philip-Nation is located on the west side of Williston Lake extending from roughly Nation Bay westward to Klawli Lake and from the Nation River south to the TSA boundary. A small portion of this from the Finlay-Nation Mainline north to the Nation River is not included in this PMP,

1.3 RESPONSIBILITY FOR VEGETATION MANAGEMENT

Within Canadian Forest Products Ltd., Mackenzie Division, the principal contact for information relating to this Pest Management Plan (PMP) is Doug Ambedian, RPF, Forestry Supervisor at (250)-997-2573

1.4 PEST MANAGEMENT PLAN LEGISLATION

A PMP is a plan that describes:

- A program for managing vegetation 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 a PMP and the use of pesticides in accordance with the terms and conditions of the PMP. Links to the *Integrated Pest Management Act* and *Integrated Pest Management Regulation* are provided below.

[Integrated Pest Management Act](#)

[Integrated Pest Management Regulation](#)

1.5 ROLE AND TERM OF THIS PMP

This PMP 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 PMP 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., Mackenzie 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 fill planting,
- newly planted seedlings,
- juvenile, commercially valuable coniferous trees.

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 IPM 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 IPM 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 stock type selection, need for site preparation, and scheduling of future treatments and assessments.

- *Early Identification of Brush Prone Sites* – biogeoclimatic ecosystem classification (BEC) zones and site series known to have high brush hazards are identified in the pre- and post-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 biogeoclimatic ecosystem 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 will be conducted, where appropriate, to improve microsites for newly established seedlings by reducing or rearranging slash, ameliorating adverse forest floor, soil, above and below ground vegetation structure, or other site biotic factors.

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 fill-planting 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 PMP, is an organism that limits or eliminates the ability of a seedling crop tree from establishing and/or reaching free growing status. While this could include many kinds of organisms, the focus of this PMP 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 biogeoclimatic 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 PMP 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)
- *A Field Guide to Site Identification and Interpretation for the North Central Portion of the Northern Interior Forest Region* (DeLong)
- *A Field Guide for Site Identification and Interpretation for the Southwest Portion of the Prince George Forest Region* (DeLong, Tanner, and Jull)

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 Table 1, 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 (Resources).

Table 1: Methods for monitoring seedling performance and vegetation

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 in a Predictive Herbaceous Scenario (see Section 2.3.4) 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 Treatment Thresholds and Decisions

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, but are not limited to, red elderberry, *Rubus* species (e.g. thimbleberry), *Ribes* species, black twinberry, *Sorbus* species, white-flowered rhododendron, high-bush cranberry, fireweed and grasses.

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. Table 2 below describes the measure of vegetation competition and seedling impact justifying treatment.

Table 2: Treatment threshold for vegetation management under Scenario 1

Indicator	Threshold Chosen	Measure	Treatment Threshold
Comeau's Index ¹	Comeau's Index, a commonly used vegetation index, 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)

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. Site classification is based on biogeoclimatic ecosystem classification system and is completed during the

¹ 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 tree 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).

development of the Silviculture Prescription/Site Plan. The following provide links to the Land Management Handbooks pertaining to the area covered by this PMP.

<https://www.for.gov.bc.ca/hfd/pubs/Docs/Lmh/Lmh54.pdf>

<https://www.for.gov.bc.ca/hfd/pubs/docs/Lmh/Lmh24.pdf>

For example “A Field Guide for Site Identification and Interpretation for the North Central Portion of the Northern Interior Forest Region - Land Management Handbook #54” cites vegetation potential for the SBS mk2 05 site series as moderate from black twinberry, thimbleberry, and fireweed.

Brush hazard ratings associated with BEC zones down to the site series applicable to this PMP are outlined in Table 3.

Table 3: Brush hazard rating for select biogeoclimatic ecosystem zones, sub-zones, variants, and site series in the Mackenzie TSA

BEC Zone, Subzone, Variant	Site Series									
	01	02	03	04	05	06	07	08	09	10
ESSF mv3	mod-high	low	low	mod-high	very high	high	very high	mod		
ESSF wk2	high	low-mod	high	very high	very high	high				
SBS mk1	mod	nil	low	low	low	low	mod	high	high	mod
SBS mk2	mod	low	low	low	mod	high				
SBS vk	very high	low	low	high	extreme	high	very high	nil	low	nil
SBS wk2	mod-high	low	low-mod	low	high	high				

BEC classes rated as moderate, high, very high, or extreme may need treatment based on the predictive herbaceous scenario. Where treatments are prescribed, a follow up site visit will be conducted to confirm treatment (conducted the same season, prior to treatment). These proactive treatments may minimize the potential for repeated treatments. The thresholds are described in the following table:

Table 4: Treatment thresholds for vegetation management under Scenario 2

Indicators	Thresholds Chosen	Measure	Treatment Threshold
Brush hazard by BEC	Based on local knowledge of treatment responses, observed data from surveys, and BEC, predictions are made as to the likelihood of requiring treatment. This is combined with Comeau’s Index to prescribe treatment.	See Table 3	Moderate, High, Very High, Extreme brush hazard rating
Comeau’s Index	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, balsam poplar, black cottonwood, alder species, willow species, Douglas maple and paper birch.

Treatment objectives for this scenario are to release crop trees from competition of deciduous species. Treatment thresholds are based on density and distribution of deciduous trees that reduce stocking and impact the ability to meet legal obligations as specified in the approved Forest Stewardship Plan (see Appendix 2 – Canfor Mackenzie FSP Stocking Standards) or Silviculture Prescription. 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 Practices Regulations Section 46.11 (link below).

http://www.bclaws.ca/EPLibraries/bclaws_new/document/ID/freeside/12_14_2004#section46.11

This PMP uses current practices as per the obligations and definitions pertaining to a “Free Growing Tree” as described in the FS 660, Section 18.a (link below).

<http://www.for.gov.bc.ca/hfp/silviculture/Surveys/FS660final2011.pdf>

2.3.5 Treatment Options and Selection Criteria

When undertaking vegetation management there are a range of commonly used treatment options available. Tables 5-10 describe the various treatments considered under this PMP, their relative benefits and limitations, and a rationale for selecting the treatment under this PMP.

Table 5: Aerial (helicopter) application methods for herbicides

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. 	<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 PMP</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.	

Table 6: Ground-based herbicide application 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 PMP</i> –This method is a key tool, and is especially useful in areas that have lots of leave trees and herbaceous vegetation.	
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-sprouting of target vegetation. ➤ Much bigger treatment window versus other herbicide treatment methods. ➤ Little or no buffer zone required protecting PFZ. ➤ Very little herbicide exposure to workers. ➤ Can be applied with more precision, and applicator can be more “selective” than other methods ➤ Uses less herbicide on a given area (reduced application rate) 	<ul style="list-style-type: none"> ➤ Stringent application constraints ➤ 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.
<i>Rationale for Selecting Treatment Method in PMP</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.	

Table 7: Ground-based non-herbicide methods - small engine

Non-Herbicide – Brushsaw Method	
Manual Brushing – Worker cuts target vegetation with a brushsaw or chainsaw.	
Benefits	Limitations
<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.
<i>Rationale for Selecting Treatment Method in PMP</i> - Can be effective if crop trees are taller and not suppressed (but will not make “Free Growing”)	

Table 8: Ground-based non-herbicide methods - hand tools

Non-Herbicide – Girdle	
Manual Girdling – Worker uses hand-girdling tool and removes a continuous strip of bark around individual stems, eventually (2-3 years) killing the trees.	
Benefits	Limitations
<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.
<i>Rationale for Selecting Treatment Method in PMP</i> - Can be effective if crop trees are taller and not suppressed (but will not make “Free Growing”)	

Table 9: 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 PMP</i> - Only other realistic option to herbaceous treatment if herbicide cannot be used.	

Table 10: Ground-based non-herbicide methods - 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 PMP</i> – Creates favourable microsites and achieves temporary brush control	

2.3.6 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 PMP does not attempt to create a treatment decision matrix that may exclude or that may apply extraneous constraints upon a treatment decision.

Figure 1 below illustrates the process and describes guidelines for selecting an appropriate brushing method in Canfor Mackenzie. This process is greatly simplified and the actual treatment choice may be different than below with a stated rationale.

2.3.7 Post-Treatment Evaluation

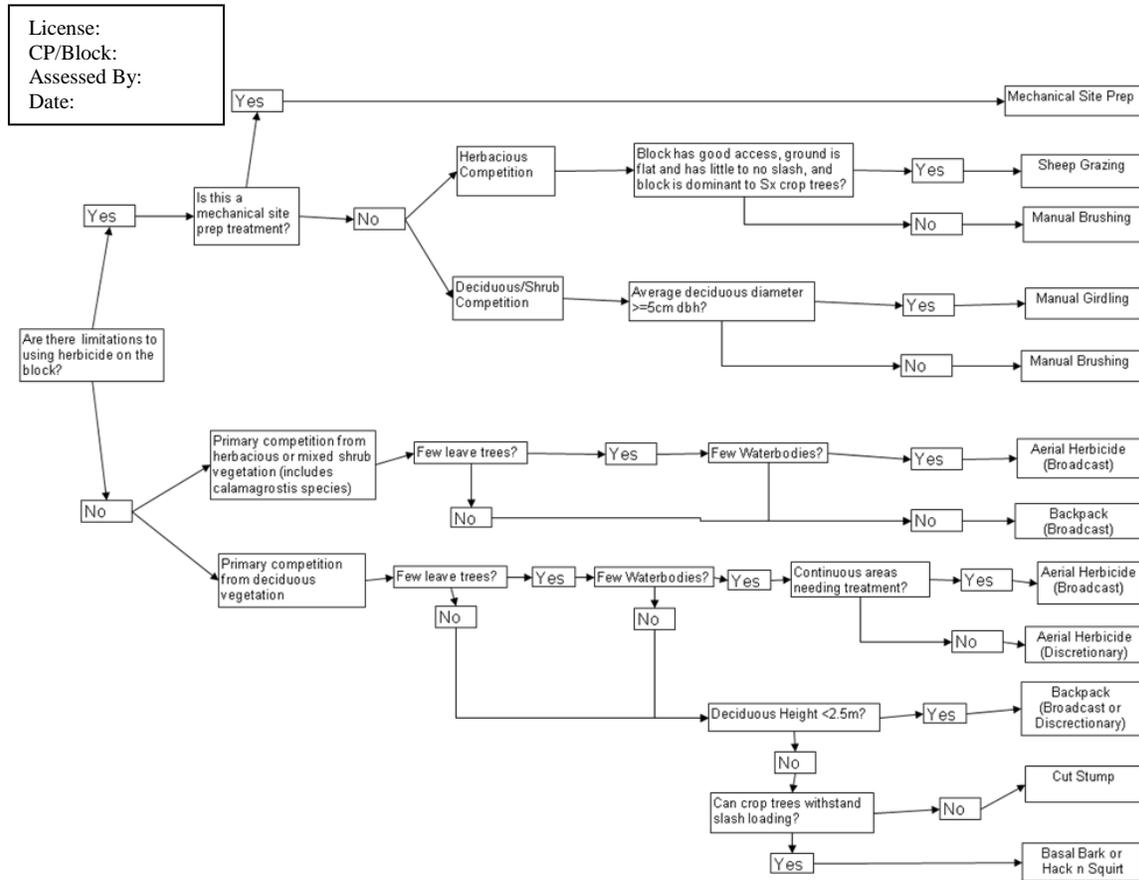
All blocks where treatment has been conducted will be visually assessed within 12 months of treatment. Table 11 details aspects of the treatments to be evaluated.

Table 11: Post-treatment evaluation considerations

Efficacy
Coverage of intended treatment area
<ul style="list-style-type: none"> • absence of striping (herbicide applications only) • absence of missed areas
Treatment 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 • location of damage, if any (terminal bud, needles, stem, etc.)
Prescription Evaluation
<ul style="list-style-type: none"> • treatment meets needs of plantation
Compliance
Pesticide Free Zones (herbicide applications only)
<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 treatment boundary maps • consistent with treatment plan • no evidence of herbicide outside of marked boundaries (herbicide applications only)

Figure 1: Brushing Method Selection Model

Use this model to select the most suitable brushing method. Circle the final choice. Add any comments to rationalize treatment choice.



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.

NOTE: This model 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 should also be considered when reaching a final brushing treatment decision.

Comments	
Comments	
Comments	
Comments	

Non-compliance of herbicide applications identified during the post-treatment evaluation 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 FOR HERBICIDE USE

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 PMP:

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

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 PMP 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

Vegetation management activities involving the use of herbicides under this PMP will incorporate 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

Strategies for protecting community watersheds, domestic water sources, fish, wildlife, riparian areas, and wildlife habitat features for vegetation management activities that do not involve the use of herbicides will be in accordance with any or all of:

- Forest Planning and Practices Regulation
- Forest Stewardship Plan
- Sustainable Forest Management Plan
- the site plan/silviculture prescription for the site
- any other pertinent higher-level plan, directive, or guideline

In this PMP, 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 or agricultural water sources in the PMP area.

The domestic water sources present in the TSA will be protected according to Integrated Pest Management regulation section 71 that requires a 30 m no-treatment zone around a water supply intake or well used for domestic or agricultural purposes, including water for livestock or for irrigation of crops. The residences that Canfor is aware of are tracked spatially on the land base; this information will be used to identify potential domestic water sources.

A Pesticide Free Zone (PFZ) will be established around any other established community watersheds that may be developed during the term of this PMP to ensure that the integrity of the watershed is maintained. The area of the PFZ will comply with the standards set at that time.

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

4.2.1 Definitions

The following definitions are taken from the Integrated Pest Management Regulation, the Forest Planning and Practices Regulation, the *Forest and Range Practices Act*, the *Wildlife Act*, and/or the Government Actions Regulation. Refer to these Acts and Regulations for further information.

“Body of water” does not include a human-made, self-contained body of or structure for water.

“Stream” means a watercourse, including a watercourse that is obscured by overhanging or bridging vegetation or soil mats, which contains water on a perennial or seasonal basis, is scoured by water or contains observable deposits of mineral alluvium, and that

- a) has a continuous channel bed that is 100m or more in length, or
- b) flows directly into
 - i. a fish stream or a fish-bearing lake or wetland, or
 - ii. a licensed waterworks

“Wetland” means a swamp, marsh, bog, or other similar area that supports natural vegetation, that is distinct from adjacent upland areas

“Classified wetland” means a wetland as described in the Forest Planning and Practices Regulation section 48 (1) and (2)

“Fish stream” means a watercourse that

- a) is frequented by any of the following species of fish:
 - iii. anadromous salmonids;
 - iv. rainbow trout, cutthroat trout, brown trout, bull trout, Dolly Varden char, lake trout, brook trout, kokanee, largemouth bass, smallmouth bass, mountain whitefish, lake whitefish, arctic grayling, burbot, white sturgeon, black crappie, yellow perch, walleye or northern pike;
 - v. a species identified as a species at risk
 - vi. a species identified as regionally important wildlife, or
- b) has a slope gradient of less than 20% unless the watercourse
 - vii. does not contain any of the species of fish referred to in paragraph (a),
 - viii. is located upstream of a barrier to fish passage and all reaches upstream of the barrier are simultaneously dry at any time during the year, or
 - ix. is located upstream of a barrier to fish passage and no perennial fish habitat exists upstream of the barrier

“Wildlife” means

- a) vertebrates that are mammals, birds, reptiles, or amphibians and are prescribed as wildlife under the *Wildlife Act*,
- b) fish from or in the non-tidal waters of BC, including
 - i. vertebrates of the order Petromyzoniformes (lampreys) or class Osteichthyes (bony fishes), or

- ii. invertebrates of the subphylum Crustacea (crustaceans) or phylum Mollusca (mollusks), and
- c) invertebrates or plants listed by the minister responsible for the administration of the *Wildlife Act* as endangered, threatened, or vulnerable species, and includes the eggs and juvenile stages of these vertebrates, invertebrates, and plants.

“Habitat” or “wildlife habitat” means the air, soil, water, food, and cover components of the environment on which wildlife depend directly or indirectly in order to carry out their life processes

“Wildlife habitat feature” may be identified by the minister responsible for the *Wildlife Act* as habitat of with the following characteristics and is considered to require special management that has not otherwise been provided for under regulation:

- a) a fisheries sensitive feature
- b) a marine sensitive feature
- c) a significant mineral lick or wallow
- d) a nest of
 - i. a bald eagle,
 - ii. an osprey,
 - iii. a great blue heron, or
 - iv. a category of species at risk that is limited to birds
- e) any other localized feature that the minister responsible for the *Wildlife Act* considers to be a wildlife habitat feature

4.2.2 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 treatment area reconnaissance 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 application 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.

4.2.3 Wildlife Habitat Features

Wildlife Habitat features are identified pre-harvest and are managed through approved Silviculture Prescriptions, Site Plans, Forest Stewardship Plans, and/or Sustainable Forest Management Plans. Wildlife Habitat Features found in the Canfor Mackenzie operating areas include:

- Caribou Ungulate Winter Range

The application of herbicides will be consistent with the protection measures stated in those operational plans. Observation of wildlife habitat features post-harvest will be reported to Canfor representatives, and where necessary, site-specific protection measures may be implemented.

4.2.4 Riparian Areas

Riparian features are identified pre-harvest and are managed through approved Silviculture Prescriptions, Site Plans, Forest Stewardship Plans, and/or Sustainable Forest Management Plans. The application of herbicides will be consistent with the protection measures stated in those operational plans.

4.2.5 Species at Risk

Canfor is certified under several forestry certification brands, and the application of herbicides under this PMP will be consistent with the protection measures 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.

To date, no "Species at Risk" have been identified in any postharvest areas under this plan.

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.

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.

4.4.1 Wildlife Trees, Wildlife Tree Patches or Wildlife Habitat

Refer to section 4.2, Strategies to Protect Fish and Wildlife, Riparian Areas, and Wildlife Habitat

4.4.2 Wildlife Values (Flora and Fauna)

Refer to section 4.3, Strategies to Prevent Herbicide Treatment of Food Intended for Human Consumption

4.4.3 Silviculture Techniques and Preventative Measures

Refer to section 2.3.1, Prevention Program

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, Foliar	>26.5 C No Spray	No Spray	>10 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 4.7.2 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 PMP

Herbicides proposed for use within the scope of this PMP 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 PMP for vegetation control.

Herbicide Trade Name	Active Ingredient	Application			Pesticide Control Products Act #
		Usage	Aerial	Ground	
Vision, Vision Max Vantage Forestry, Weed-Master	glyphosate	common	yes	yes	19899, 27736, 26884, 29009

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: Mackenzie Division Pest Management Plan Area Map



Appendix 2: Mackenzie Division Forest Stewardship Plan Stocking Standards Excerpt of Section 8

Table A-2: Stocking Standards

Standard ID	LRMP RMZ Management Category	Landscape Unit Biodiversity Emphasis	Regime	Species	Regen Delay	Minimum Stocking	Minimum Height		
							Pli	Fdi	Other
HIGH ELEVATION (1050M +)									
25101	Enhanced-General	Low-Medium Biodiversity	Xeric - Subxeric	Sx, Pli, Bl, Fdi, Sb	7	500	1.0	1.4	0.6
25102	Special	High Biodiversity	Xeric - Subxeric	Sx, Pli, Bl, Fdi, Sb	7	400	1.0	1.4	0.6
25103	Enhanced-General	Low-Medium Biodiversity	Submesic - Mesic	Sx, Pli, Bl, Fdi, Sb	7	700	2.0	1.4	0.8
25104	Special	High Biodiversity	Submesic - Mesic	Sx, Pli, Bl, Fdi, Sb	7	700	2.0	1.4	0.8
25105	Enhanced-General	Low-Medium Biodiversity	Subhygric	Sx, Pli, Bl, Sb, Fdi	4	700	2.0	1.4	0.8
25106	Special	High Biodiversity	Subhygric	Sx, Pli, Bl, Sb, Fdi	4	600	2.0	1.4	0.8
25107	Enhanced-General	Low-Medium Biodiversity	Hygric - Subhydric	Sx, Pli, Bl, Sb, Fdi	4	500	1.0	1.0	0.6
25108	Special	High Biodiversity	Hygric - Subhydric	Sx, Pli, Bl, Sb, Fdi	4	400	1.0	1.0	0.6
LOW ELEVATION (< 1050M)									
25109	Enhanced-General	Low-Medium Biodiversity	Xeric - Subxeric	Sx, Pli, Bl, Fdi, Sb	7	500	2.0	1.4	1.0
25110	Special	High Biodiversity	Xeric - Subxeric	Sx, Pli, Bl, Fdi, Sb	7	400	2.0	1.4	1.0
25111	Enhanced-General	Low-Medium Biodiversity	Submesic - Mesic	Sx, Pli, Bl, Fdi, Sb	7	700	2.0	1.4	1.0
25112	Special	High Biodiversity	Submesic - Mesic	Sx, Pli, Bl, Fdi, Sb	7	700	2.0	1.4	1.0
25113	Enhanced-General	Low-Medium Biodiversity	Subhygric	Sx, Pli, Bl, Sb, Fdi	4	700	2.0	1.4	1.0
25114	Special	High Biodiversity	Subhygric	Sx, Pli, Bl, Sb, Fdi	4	600	2.0	1.4	1.0
25115	Enhanced-General	Low-Medium Biodiversity	Hygric - Subhydric	Sx, Pli, Bl, Sb, Fdi	4	500	1.4	1.0	0.8
25116	Special	High Biodiversity	Hygric - Subhydric	Sx, Pli, Bl, Sb, Fdi	4	400	1.4	1.0	0.8

Appendix 3: Mackenzie Division – Sites of Biological Significance Standard Work Practice



FMG - Standard Work Procedure

16-May-14

Sites of Biological Significance

Date Revised: April 16, 2015

Purpose or Intended Results		Responsibility	
To provide guidance on management around sites of biological significance		Planning, Permitting and Silviculture Foresters, Field Operations	
Critical Points Safety and Quality	1. Compliance with certification and legal requirements and Sustainable Forest Management Plans (SFMP) objectives/strategies.		
	2. Maintain effective function and wildlife use of Sites of Biological Significance		
Step #	Description of Work Element	Responsibility and Sources	
		Responsibility	Supporting Information
1	Permitting and Field Ops staff and their field contractors are responsible know what the Sites of Biological Significance are and how to identify them in the field. The Forest Scientist will make this information available. It is the responsibility of the Permitting Foresters to ensure that all field contractors doing layout for them are aware of and follow this SWP.	Field Ops, Permitting Foresters, Forest Scientist	Indicator Data Sheet for Sites of Biological Significance, Field Ops Annual FSC Training Sessions



Step #	Description of Work Element	Responsibility and Sources	
		Responsibility	Supporting Information
2	Rare Ecosystems > 0.25 ha are to be reserved from harvest and road-building; Uncommon Ecosystems are either to be reserved and/or have 50 sph prescribed on them - see the Ecosystem Representation SWP for details.	Field Ops, Permitting Foresters	Ecosystem Representation SWP
3	Red and Blue-listed Plant Communities are to be managed as per the Tables in Appendix A.	Field Ops, Permitting Foresters	Appendix A - Red and Blue Listed Plant Communities
4	Raptor Stick Nests. The nest should be checked in spring (mid-April through early July) to determine the species is using the nest. More than one check may be required. Management is then based on the type of species as per Appendix B. If the block will be logged before the species can be confirmed in the field, a picture of the nest shall be taken and given to the Forest Scientist or qualified expert and the species likely to have made it determined. UTM locations must be taken of all raptor nests, and given to WIM to enter in the Wildlife Features file. In no case can a tree with an active nest (with birds and/or eggs) be cut down under the Wildlife Act, and an eagle or osprey nest can NEVER be cut down even if inactive.	Field Ops, Permitting Foresters, Forest Scientist	Appendix B of this SWP, Wildlife Act Section 34, Northern Goshawk BMP brochure

Step #	Description of Work Element	Responsibility and Sources	
		Responsibility	Supporting Information
5	<p>Hot or Thermal springs. If you discover a hot springs, first walk the surrounding area to ensure there are not more springs in the vicinity and try to determine the source of the water feeding the springs. Contact the Forest Scientist or a qualified professional biologist to check the site for the presence of any red or blue-listed species occurring in the vicinity of the spring(s), and report any occurrences to the Forest Scientist and the local MFLNRO. Establish a reserve around the springs and the creek feeding the springs (if present). The size of the buffer around the spring will depend on the presence of any listed species, as well as the existing vegetation surrounding the springs and recreational use and trails. Design the buffer in association with the Forest Scientist or local biologist; Hot Springs > 100 m² should generally receive a large, wind-firm reserve (e.g., 200 m). Hot springs smaller than this require smaller, but still wind-firm forested buffers. Ensure that the location and type of any new roads and road crossings will not restrict water flow to the hot springs, or deposit sediment into them or into streams which may flow into them. Ensure that any recreation values associated with the hot springs are maintained (e.g., trails into them, visual quality from the hot spring, etc.). If the hot or thermal spring is located within a karst landscape and could be described as a significant karst spring, then refer to best management practices within the Karst Management Handbook for British Columbia. http://www.for.gov.bc.ca/hfp/publications/00189/Karst-Mgmt-Handbook-web.pdf.</p>	Field Ops, Permitting Foresters, Forest Scientist	Karst Management Handbook for British Columbia. http://www.for.gov.bc.ca/hfp/publications/00189/Karst-Mgmt-Handbook-web.pdf .
6	<p>Ephemeral Ponds or vernal pools receive variable treatment depending on their size and the characteristics of the surrounding forest. Minimum treatment for small ponds includes a 7-m MFZ and retention of understory trees and vegetation within this zone, which must be ribboned if the pond is outside a ribboned reserve such as a WTP/RRZ. Most ponds should have a forested buffer along at least one side. The buffer should be placed in the area that includes any large logs (habitat for many amphibians). In the dry areas or south-facing slopes, this buffer should be placed on the north or east side where denser stands naturally grow and it will be slightly cooler. Larger ponds with riparian forest adjacent to them should have this habitat retained in a ribboned reserve, wind-firmed if necessary with a RMZ with understory retention and/or feathering. For ponds large enough to be classified as wetlands, follow the Riparian SWP. Avoid crossing even small ponds with roads. Note that many small ephemeral pools may also serve as wallows.</p>	Field Ops, Permitting Foresters	



Step #	Description of Work Element	Responsibility and Sources	
		Responsibility	Supporting Information
7	Great Blue Heron Nests - Take the UTM of the nest location and give it to the Forest Scientist and the MFLNRO immediately. The area will likely be made into a WHA. No logging or road-building to occur within 500 m of the rookery until the WHA is finalized.	Field Ops, Permitting Foresters, Forest Scientist	Appendix B of this SWP, Wildlife Act Section 34
8	Nests of Red or Blue-listed Bird Species nesting in Forests, Open Forest, or Open Range - Take the UTM and a photo and give it to the Forest Scientist and MFLNRO rare and endangered species biologist. If you don't know what the species, call the Forest Scientist or a qualified professional to come out and check it. Management will be planned together with those parties depending on what species it is. The species as of April 2015 include: Lewis Woodpecker, Flammulated Owl, Williamson's Sapsucker, Short-eared Owl, Common Nighthawk, Olive-sided Flycatcher, Long-billed Curlew, Broad-winged Hawk, and Western Screech Owl. Check the Species database for the current list or ask the Forest Scientist to do this.	Field Ops, Permitting Foresters, Forest Scientist	Species Database, High Value Snag SWP
9	Carnivore Dens. Search for other dens or entrance holes nearby, and try to determine the species from the den guide. Take the UTM location and inform the Forest Scientist. Grizzly bear and wolverine dens require a 100 m reserve minimum. If multiple grizzly dens are found within a small area, inform MFLNRO, as this is likely a traditional hibernation area and is highly significant. Wolf dens should be buffered by a forested reserve large enough to offer security cover and so they cannot be seen from an open road and require a timing restriction from March 1 through July 31. Coyote, fox, and black bear dens should have a small WTP placed around them, large enough to offer security cover (animal can't be seen when at the den entrance). Badger dens require only a 5m MFZ, unless a maternal den is found, which requires a WTP of at least 50 m. If any active dens are found, try to avoid the area with machinery during the denning period. Ensure that any den dug under a tree with the roots of that tree for support has a MFZ large enough that the tree will not be cut, or a reserve placed around it.	Field Ops, Permitting Foresters, Forest Scientist	Canfor Carnivore Den Guide, Wildlife Habitat Features Guidance Document (MOE 2014)

Step #	Description of Work Element	Responsibility and Sources	
		Responsibility	Supporting Information
10	<p>Licks and Wallows - Take the UTM of the feature and determine if the lick or wallow is significant. A significant feature will have multiple, well-established trails coming into it, and evidence of multiple species use, or use by many individuals of one species. Size is also a good indication, significant lick/wallows are usually large (> 100 m²). Significant licks and wallows will get a minimum reserve of 100 m. Non-significant licks and wallows require forested reserves large enough to be wind-firm and provide security cover to the animals using the feature. The reserve should incorporate at least 2 of the trails coming into the feature, and must connect the feature to any nearby escape cover (rock cliffs) if present. Timing restrictions should be placed on blocks adjacent to licks from May 1 through July 31, and for wallows from Sept 1 through November 30th. Inform the Forest Scientist of all licks and wallows found (for inclusion in the monitoring study), and involve the Forest Scientist in the design of reserves for significant licks and wallows.</p>	Field Ops, Permitting Foresters, Forest Scientist	Wildlife Habitat Features Guidance Document (MOE 2014)
11	<p>Avalanche Paths- The path is managed according to its habitat value for grizzly bear and ungulates. See the Avalanche Path SWP for how to manage the paths and Appendix A, Classification of Avalanche Paths for how to classify those that are not already classified in Canfor's GIS system. Involve the Forest Scientist for situations involving multiple high value avalanche paths.</p>	Field Ops, Permitting Foresters, Forest Scientist	1.4.1b SWP Management around Avalanche Paths, 1.4.1b Appendix A Classification of Avalanche Paths
12	<p>Bat Hibernaculum - Most often these sites are caves or abandoned mines, but they can also be a large fissure in a rock face or a narrow rock crevice. Karst landscapes, with their many caves and sinkholes, are significant areas for bat hibernacula. Bat droppings (similar to mouse pellets) are often present at the base of the entrance and the smell of ammonia can be detected at active hibernaculum. If you suspect you have found one, contact the Forest Scientist or a qualified professional to design a reserve around the site and place a timing restriction on it (likely from October through May) to prevent disturbance to hibernating bats.</p>	Field Ops, Permitting Foresters, Forest Scientist	Wildlife Habitat Features Guidance Document (MOE 2014)



Step #	Description of Work Element	Responsibility and Sources	
		Responsibility	Supporting Information
13	Bat Maternity Roosts - often natural sites like large hollow trees, broken-top wildlife trees, wildlife trees with sloughing bark or hollow branches, or rock crevices. The roost is often on warm-facing aspects, to help keep the young warm while they are developing. Bat droppings (guano) are often present at the base on the entrance and the smell of ammonia from the bats urine may be noticeable at recently used roosts. If you suspect you have found one, contact the Forest Scientist, or a qualified professional to design a worksafe, wind-firm reserve around the site and place a timing restriction (generally from May through September) on it.	Field Ops, Permitting Foresters, Forest Scientist	Wildlife Habitat Features Guidance Document (MOE 2014), High Value Snag SWP



Appendix 4: Mackenzie Division – Species at Risk and Sites of Biological Significance Training.