



**Canadian Forest Products Ltd.**  
Peace Liard Woodlands; Liard Business Unit  
RR#1, Mile 293 Alaska Highway  
Fort Nelson, British Columbia  
Canada V0C 1R0

# **PEST MANAGEMENT PLAN**

**2009-2014**

**Plan # 312-062-09/14**  
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## **1.0 Introduction**

### **1.1 Purpose**

Canadian Forest Products Ltd (Canfor) – Fort Nelson has prepared a Pest Management Plan (PMP) that encompasses the vegetation management practices and strategies for its operations within the Fort Nelson Forest District. Canfor's operations in Fort Nelson fall completely within the Fort Nelson Forest District. The PMP covers the Forest License A17007, A22797 and Pulpwood Agreement #14. These licenses allow for the management of both coniferous and deciduous forest management.

This PMP outlines strategies for managing competing vegetation while placing an emphasis on the prevention of brush problems and encouraging the use of non-chemical methods where operationally, biologically and economically feasible. In carrying out the processes and procedures detailed within this PMP Canfor will comply with its legal obligations set forth in Pre-Harvest Silviculture Prescriptions, Silviculture Prescriptions, and Site Plans as well as those obligations set forth in the Integrated Pest Management Act (IPMA) and Integrated Pest Management Regulation (IPMR).

Canfor believes in conducting business in a manner that protects the environment and ensures sustainable forestry and is therefore committed to a process that continually improves on activities involving environmental performance and stewardship. Canfor has in place a corporate wide system called the 'Forest Management System' (FMS) aimed at maintaining the integrity of the environment.

FMS has been integrated into all of Canfor's activities, including brushing and weeding activities. The FMS is audited by a third party to ensure compliance with the program and to ensure that activities are completed in an environmentally responsible manner. FMS is a component of a larger program called 'International Organization of Standards' (ISO) of which Canfor is certified to the ISO 14001 standard. ISO is a global organization aimed at achieving the highest standards when integrating environmental maintenance with forest industry practices.

### **1.2 PMP Legislation**

The Integrated Pest Management Act and regulation require pesticides to be used pursuant to the principles of Integrated Pest Management (IPM), which requires the development of a Pest Management Plan and the use of pesticide in accordance with the terms and conditions of the PMP. A PMP is a plan that describes a program used to manage vegetation populations as well as the methods of handling, preparing, mixing, applying, and otherwise using herbicides within the program.

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 PMP.

### **1.3 Geographic Boundaries and Operating Areas**

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. All area lies within the Fort Nelson Forest District boundaries.

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. See map located in Appendix 1 ‘Operating Area Map’ for details.

### **1.4 Term of 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 Environment (MOE).

### **1.5 Responsibility For Vegetation Management**

Within Canadian Forest Products Ltd., Peace Liard Woodlands, Liard Business Unit, the principal contacts for information relating to this PMP are Aliette Seigel, F.I.T., Forestry Supervisor @ (250) 233-6825 or Kristine Bock, R.P.F., Planning Forester @ (250) 233-6820.

## **2.0 Elements of Integrated Pest Management**

### **2.1 Prevention Measures**

The Forester responsible for implementing the Site Plan for each specific area will consider the following prevention measures to limit the amount of pest regeneration (pre-harvest treatments, site preparation, and reforestation). The prevention measure deemed to be the most appropriate will be one that is implemented. Understanding the biological factors that influence density and distribution of forest vegetation is key in the prevention of vegetation problems.

## **2.2 Pre-harvest Treatments**

Canfor does not currently carry out pre-harvest treatments, such as girdling or hack & squirt treatments of deciduous species. However, Canfor considers pre-harvest stand types in developing Site Plans that contain Standard Units (SUs) which are managed to either coniferous or deciduous stocking standards that are identified in Canfor's most current Forest Stewardship Plan (FSP). The location of these SUs may consider block edge timber types, block boundary configuration, and geographical features to potentially minimize future brush problems.

## **2.3 Site Preparation**

Site preparation methods may include disk trenching, mounding, piling, and other mechanical methods. Mechanical site preparation using heavy machinery should be conducted concurrent with harvesting to facilitate timely access to the blocks and would typically take place in the winter on frozen soils due to access issues and in-block soil conditions. Operating areas are mostly winter access only (i.e. ice road / ice bridge access). Site preparation activities on unfrozen ground has an extreme risk of producing soil disturbance (i.e. soil compaction; rutting) due typically to clay-based soils. Site preparation on wet soils also has the potential of negatively affecting the water table.

Site preparation provides better planter access as well as produces favorable microsites, increases soil warming and can produce an increase in earlier conifer growth while retarding competition vegetation growth. Therefore, site preparation can assist in the development and survival of the conifer crop trees.

There are many factors to consider when considering site preparation and it does not exclude the possibility for future treatment, however, it may give more flexibility in the timing and extent of the treatment.

## **2.4 Reforestation**

Large stock is desirable because of its overall size, its greater potential for vertical growth (to counter competition vertical growth), and its greater potential for survival under adverse conditions. For these reasons large stock is normally used in planting and therefore, the use of 2+0 stock with a plug size of a 410 or larger is preferable.

Stock quality is monitored throughout, from its growth in the nursery to the time of planting. Each tree must meet determined specifications in root collar diameter and height when lifted at the nursery. Planting stock is grown from locally collected class B seed sources. Class B spruce seed has been used since 1994 for most spruce seedlings. Stock obtained from local seed sources can only be planted within a certain distance from the collection site. Rigorous stock handling guidelines have been established and must be followed to reduce seedling shock and damage.

The timing of reforestation is also critical in acting as a preventative measure against brush competition. Block reforestation will be targeted within two growing seasons following harvest. Early reforestation will allow crop species to gain vertical growth prior to the establishment of brush species and allow crop trees to compete and survive for longer periods of time if brush competition becomes deleterious.

Conifer seedlings will be planted on the most suitable elevated microsites for optimum growth. Every planting season planting crews are given specific planting instructions with additional instructions provided for areas that have been site prepared. The planting is supervised closely and a method of systematic plots is used to monitor microsite selection and to ensure a high standard of quality work.

### **3.0 Pest Identification**

#### **3.1 Pest Definition**

For the purpose of this PMP, a “pest” refers to any vegetation non-crop species that poses an existing or potential threat to the survival of a crop tree or interferes with the crop tree development or with the crop tree achieving “free growing” status within the specified time period. This threat can be for light, moisture, nutrients, or growing space. The pest can be a plant that when combined with snow causes damage to the crop tree by snow press. Deciduous species such as aspen, cottonwood, birch, alder and willow that overtop crop trees, are considered to be pests to the crop trees established. Brushing treatments will be prescribed if the potential to reach detrimental pest levels have been identified.

#### **3.2 Primary Target Vegetation**

For the purposes of this PMP, primary target vegetation includes but is not limited to the following species that are most commonly found growing in cutblocks within Canfor’s operating areas. These species are listed individually but are more commonly found growing in complexes of one or more species.

- Aspen, *Populus tremuloides*
- Cottonwood ssp., *Populus balsamifera* ssp.
- Birch, *Betula papyrifera*
- Alder, *Alnus* ssp.
- Willow, *Salix* ssp.
- Rhododendron, *Rhododendron albiflorum*
- Rose, *Rosa* ssp.
- Raspberry, *Rubus idaeus*
- Fireweed, *Epilobium angustifolium*
- Grass, all varieties

### 3.3 Injury Thresholds

Thresholds applied to primary target species have been established to prevent the target vegetation from reaching heights and densities that will cause suppression, damage and mortality within the conifer crop. The injury thresholds identified below represent the timing at which the target vegetation becomes a pest to the establishment of crop species. These thresholds have been established by qualified foresters who have developed the thresholds after several years of working and observing crop tree performance in a variety of brush complexes found in Canfor's operating areas. Under this PMP when primary target species have reached, or have the potential to reach, these thresholds they are considered 'pests' and brushing treatments may be prescribed.

**Table 1. Injury Thresholds**

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

## 4.0 Pest Treatment

### 4.1 Treatment Rationale

A treatment may be implemented when: injury thresholds have been achieved or the potential to achieve the thresholds exists; site preparation is required; the “free growing” guidelines as set by the Ministry of Forests cannot be met, and or; greater than 10% of the crop trees are negatively affected by ‘pests.’

The values of the injury thresholds that are identified for each target species is the point where that species or complex of species begins to have significant impacts on the conditions identified below. Crop tree health and vigor become negatively affected when the conditions identified below become limiting.

- **Snow press:** crop tree damage or mortality due to snow press.
- **Shading:** the competing vegetation complex shades the crop trees to a degree where the crop trees vigorous growth and development is or is likely to be suppressed resulting in poor growth or possible mortality.
- **Soil temperature:** the competing vegetation complex is such that the soil temperature is reduced or is likely to be reduced thereby suppressing the growth level to poor or possibly causing mortality.
- **Nutrient:** the competing vegetation complex is such that the nutrient level required by crop trees for vigorous or normal development and growth is suppressed or likely to be suppressed to poor growth or possible mortality.
- **Moisture:** the competing vegetation complex is such that competition for limited moisture represses the crop trees reducing or likely to reduce the vigorous or normal development and growth to poor or possible mortality. Conversely the vegetation complex can retain too much moisture for the crop trees to achieve normal development and possibly cause mortality.
- **Allelopathy:** the competing vegetation complex releases chemicals that interfere with the vigorous or normal crop tree development and growth, with resulting poor growth or possible mortality.
- **“Free to grow”:** the “free growing” guidelines as set by the Ministry of Forests cannot be met.

For all decisions there is a level of professional judgment and experience that is necessary when dealing with actual and potential competition, suppression and mortality. While additional information is and will be collected through surveys or assessments for specifics, most decisions are conducted through professional judgment and local knowledge of how the pests or problems long term effect on the crop trees.

## **4.2 Plantation Monitoring**

Monitoring of plantations throughout their life is an important step in ensuring their long-term health and productivity. Monitoring for vegetation competition is incorporated into existing regeneration surveys, planting inspections, stocking surveys, brush assessments, or free grow surveys. The typical timing, sequence, and frequency of block inspections are as follows but deviations are common due to variations in brush, block location, site characteristics, etc.

- Planting Inspections - within 15 days of planting.
- Regeneration/Stocking Surveys - 1 - 4 years after planting. Stocking surveys can take place anytime between the time of planting and the late FG date of 20 years identified in FSP conifer stocking standards.
- Brush assessments – conducted along with surveys or periodically/randomly during reconnaissance flights
- Free Growing Surveys - 15 - 20 years after harvest.

In each of the above surveys, information such as average crop tree height, crop tree species, average competition height by species, competition species mix, competition percent cover and crop tree health may be collected. This data is used to help determine if competing vegetation has the potential to inhibit plantation establishment, optimal growth or prevent a stand from achieving free growing status.

Due to limited ground access to most of the operating areas during periods when the vegetation competition is in its growth stage, aerial inspections of many planted areas are conducted on an annual basis. Using photos and notes taken during these aerial inspections will provide evidence of competition levels. In those areas where it may be deemed necessary for treatment prior to a completed formal survey, the Vegetation Manager will undertake a limited vegetation hazard assessment.

## **4.3 Treatment Selection Options**

The following are treatment methods used or considered for use by Canfor. A detailed description of each treatment method is provide in Appendix 2 ‘Pest Management Treatment Selection Options’ which identifies benefits, limitations, environmental impacts, and so forth of each method and this too is intended as a guide in the selection of a treatment method.

- Mechanical Site Preparation
- Mechanical Brushing
- Manual Brushing
- Snapping and Girdling
- Biological – Grazing

- Herbicide
  - Ground Herbicide
    - Single Stem
      - Hack & Squirt
      - Basal Bark
      - Cut stump
    - Spot
      - Backpack
        - Selective (avoiding non-target areas or species)
        - Broadcast (treatment of a complete area)
  - Aerial Herbicide
    - Selective (pilot/monitor selective)
    - Broadcast

#### **4.4 Treatment Method Selection**

A consistent decision-making process will ensure that appropriate treatments are being prescribed for each area. The ‘Treatment Method Decision Making Matrix’ found in Appendix 3 is an aid used by Canfor staff in identifying when a treatment is required and what type of treatment method is available for implementation under variable conditions.

Below is a list of some of the criteria that are considered when choosing a particular treatment method. These criteria and how they relate to each particular treatment method can be found in Appendix 5 as well. Please note that it is not required that each guidance criteria be considered on every block. Any single criteria or combination of criteria may be used to make treatment decisions.

- worker and public safety
- target species characteristics
- objective of Site Plan
- crop health
- timing
- cost
- public/First Nation concerns or input
- efficacy
- environmental aspects (wildlife, riparian features, topography, etc.)
- block characteristics (shape, size, etc)
- operational/logistical challenges
- benefits/limitations of treatment methods
- topographical constraints
- limitations set out in Site Plan/Silviculture Prescription/Pre-Harvest Silviculture Prescription

## 5.0 Herbicides Used for Vegetation Control

Herbicides proposed for use, within the scope of this PMP, are registered for forestry use under the “*Pest Control Products Act*” and have been deemed safe when applied according to label conditions.

The following table lists all the herbicides that are proposed for vegetation management or control under this PMP. These herbicides are non-selective in that they will affect most types of vegetation although their effectiveness varies with species, application rates, and application techniques. The herbicides will be applied according to label conditions and all conditions and restrictions stated in this PMP.

**Table 2. Recommended Herbicide List Under PMP**

HERBICIDE (Common Name)	ACTIVE INGREDIENT (Chemical)	PCP #	USAGE	APPLICATION TECHNIQUE	
				AERIAL	GROUND
VisionMax®	Glyphosate (49%)	27736	New	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	New	Yes	Yes

## 6.0 Operational Information

### 6.1 Pesticide Transport

The federal *Transportation of Dangerous Goods Act (TDGA)*, the *Integrated Pest Management Act* and regulation stipulate the minimum standards for the transport of pesticide. At this time, none of the pesticide covered in this PMP have transport requirements under the *Transportation of Dangerous Goods Act*. Only the requirements in the *Integrated Pest Management Act* apply to the transport of pesticide under this PMP. The legal transport requirements under the *Integrated Pest Management regulation* are as follows:

Pesticide must be:

- secured during transport in such a way that the pesticide cannot escape, be discharged or removed without authority
- in an original, undamaged product container complete with the label originally affixed by the manufacturer; or,
- in a container designed for containing pesticide and labeled with:
  - trade name of the pesticide and its registration number under the federal Act;
  - name and concentration of active ingredient

Transport of pesticides must be in a vehicle that:

- is ventilated to the outside;
- is lockable;
- has a clear visible sign on the door that reads “warning: chemical storage-authorized persons only”;
- has a compartment used strictly for the transport and temporary storage of pesticides;
  - the above compartment cannot be used to store or transport people, animals, food or drink intended for human or animal consumption, household furnishings, toiletries, clothing, bedding, personal protective equipment, emergency response equipment.
- has a pesticide compartment that is separated from the passenger compartment of the vehicle

## **6.2 Pesticide Storage**

The Integrated Pest Management Act and regulations and the Workers’ Compensation Board regulates the storage of pesticides. These storage requirements apply to both temporary, on-site storage and long-term storage of pesticides. These are the requirements for the storage of pesticides as stated in the Integrated Pest Management Regulation:

Storage facility must:

- be lockable and remain locked when unattended and access to storage facility is only given to authorized persons;
- be ventilated to the outside atmosphere;
- never be used to store animals, food or drink intended for human or animal consumption, household furnishings, toiletries, clothing, bedding, personal protective equipment, emergency response equipment.
- have clearly visible signage reading “WARNING: CHEMICAL STORAGE-AUTHORIZED PERSONS ONLY” on every access door;

## **6.3 Pesticide Mixing and Loading**

Pesticide mixing and loading will be consistent with the requirements of Integrated Pest Management Regulation. Pesticides shall be mixed and loaded only at designated mix sites. A list of requirements and procedures during the mixing and loading of pesticides follows:

- Ensure that filling/mixing station is not located within a Pesticide Free Zone or buffer and is a reasonable distance away from any waterbody to ensure that the waterbody or sensitive area will be protected should a spill occur
- The safety of workers must be paramount
- Ensure that emergency response equipment is readily available to all workers
- Spill kit, First Aid Kit, clean water supply and eye wash station should be available at the mix site or within a reasonable distance from the mix site
- Product label and MSDS should be available to workers from the mix site to ensure proper mixing and application of pesticides
- Protective clothing and personal protection equipment must be worn by those in contact with pesticide.
- Ensure measures are in place to prevent back flow of herbicide into clean water source while loading and mixing.
- Any container used to mix, prepare or apply a pesticide must not be washed or submerged in a body of water.
- Detailed and accurate mixing records are kept.

#### **6.4 Disposal of Containers & Unused Pesticides**

All 115-litre herbicide containers (shuttles) shall be returned to the manufacturer for re-use. If the containers pump out system becomes damaged, it shall be triple rinsed and returned for recycling. If the container becomes damaged, it shall be triple rinsed and punctured. For all non-sealed herbicide containers (i.e. 10 litre containers) the following precautions shall be taken to ensure minimal hazard to the environment.

- Triple rinse at the mix site where the container was used
- Rinsate shall be drained into the spray tanks for application onto the treatment area
- After triple rinsing, each container shall be punctured to prevent reuse.
- Empty containers shall be delivered to and disposed of at an approved landfill in a timely manner

Transport and storage of all used and rinsed containers must be as outlined in the storage and transport section of this PMP. The application contractor will be responsible for tracking all pesticide containers during the length of the project. Prior to leaving any active area the application contractor will ensure that all pesticide containers are fully accounted for and removed from the area.

## 6.5 Spill Response Plan

All contractors engaged in pesticide operation activities shall be familiar with the Spill Response section of Canfor's Emergency Preparedness and Response Plan and shall have copies of this plan available to all workers during the storage, transport, mixing, loading, and application of pesticides. All personnel involved in the application of pesticides will also be familiar with Canfor's FMS which includes Environmental Instructions that guide forestry activities.

Pursuant to the *Environmental Management Act*, the *Spill Reporting Regulation* and the *Integrated Pest Management Act*, Canfor's spill plan shall be followed when carrying out pesticide operations. All spills shall be reported immediately to a company official. The company representative shall report the spill to the Provincial Emergency Program (PEP) where required based on the spill report details provided by the individual that was involved with the spill.

The minimum spill kit contents as per the Pesticides Applicators handbook are:

- 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;
- Waste-receiving container with lid;
- Copy of clean up procedures.

The following procedures must be followed if a spill occurs;

- all personnel shall be protected from herbicide contamination by wearing appropriate protective clothing and safety gear;
- any persons 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 materials 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 one kilogram of product of herbicide is spilled, 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 R.C.M.P.; 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.

## **6.6 General Water Pick Up and Storage**

Maintaining the purity of the water source and using clean water for mixing pesticide is essential. The following guidelines should be followed during water pick-up and storage of water for the purpose of herbicide treatments:

To ensure clean water is being used for mixing pesticides, all precautions should be taken to ensure pick-up and storage equipment is kept clean and uptake of water is done in a way to prevent contamination of water by silt, sand and gravel particles.

To prevent contamination of waterbodies during water pick-up, all precautions should be taken to prevent backflow of pesticide into the water source.

## **7.0 Monitoring**

### **7.1 Pre-Treatment Inspections**

Pre-treatment inspections are performed via aerial reconnaissance or walkthrough of the treatment area. For aerial applications a Canfor representative or individual approved by a Canfor representative and the pilot performing the application will be the individuals conducting the pre-treatment inspections. For ground applications the applicators and a Canfor representative or individual approved by a Canfor representative will be individuals conducting the pre-treatment inspection. The items reviewed during the inspection include:

- Flagging schedule and layout standards;
- Layout configuration including treatment boundaries, No Treatment Zone's, Pesticide Free Zone's and buffers;
- Identification of critical resource features on or in the vicinity of the block;
- Pesticide application rates
- Target species
- Treatment objectives
- Safety concerns;

## **7.2 Equipment Calibration**

### **7.2.1 Aerial Operations Equipment Calibration**

The aircraft and spray systems shall be calibrated, characterized and patternized using the CCAP Clinic conducted by the Ministry of Forests or an approved equivalent independent clinic, each year prior to commencing operations. Proof of this calibration for aerial applications accompanied by the swath width analysis will be available to the project supervisor prior to program commencement. All equipment must conform to the listed data on the data information sheet issued by the clinic.

The project supervisor shall check the calibration of each spray system prior to starting the program. Periodic calibration checks during the project will be conducted and recorded. Maintenance of the spray system is the responsibility of the application contractor. The contractor shall have qualified personnel (minimum qualifications are aircraft maintenance engineer, apprentice engineer, or non flying spray pilot who is familiar with the spray equipment specifications) on each spray site who will ensure the equipment conforms, at all times, to the manufacturers standards. Daily checks must be conducted to ensure this conformity is maintained.

### **7.2.2 Ground Operations Equipment Calibration**

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

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

Maintenance and repairs must be conducted daily to ensure that packs are performing to standards. If leaks, lack of pressure or other problems arises, the backpack sprayer will be shut down immediately and will not be used until it has been repaired and calibrated.

Equipment used for basal bark, hack & squirt and cut stump procedures will also be calibrated, however, this calibration is less stringent given that the amount of chemical shall be distributed over the area according to a known number of target stems found on the treatment site. This calibration is an ongoing process and the contractor's supervisor should be aware of areas within the treatment area where target vegetation is most dense and areas that require no treatment.

### 7.3 Pesticide Applicator Qualifications

For aerial treatments, the pilot must hold a certificate in the Pesticide Applicator category. For ground-based treatments, supervisors must hold a certificate in the Pesticide Applicator category. The ratio of non-certified applicators to certified supervisors will not exceed 4:1, excluding the mixer and/or loader. Supervisors must maintain continuous non-assisted auditory or visual contact with uncertified applicators at all times during pesticide treatments.

### 7.4 Pesticide Application

During all pesticide applications the applicator shall adhere to the legal requirements of the Integrated Pest Management Regulation as outlined below. Individuals involved in the use of pesticides shall:

- Be aware of the boundaries of the treatment area;
- Be aware of the storage and transport requirements of this PMP;
- Be aware of other contractual requirements;
- Wear personal protective equipment;
- Ensure equipment has been calibrated and is in good working order;
- Inspect the treatment area to ensure familiarity with the boundaries and critical features on the block as well as to ensure all regulatory requirements can be met in carrying out the application;
- Take measures to avoid the use of pesticide over vertebrate wildlife or domestic animals that are visible to the user;
- Ensure that pesticide is being applied in appropriate weather and daylight conditions;

### 7.5 Pesticide Treatment Signage

Road accessible sites shall have a sign posted advising the public of the recent herbicide application. Signs containing specific site information will be posted prior to treatment and will remain posted for a minimum of (30) thirty days post treatment. Signs will be posted at all road or trail entrances to the treatment site. Signs will be a minimum of 28 cm X 43 cm (11 X 17 inches), water resistant and shall contain the following information.

- The words “**HERBICIDE USE NOTICE**” in capital letters not less than 2.0 cm tall;
- Herbicide utilized - trade and common names;
- PCP number;
- Treatment date or dates (i.e. August 01 - 31, 2009);
- Application method(s);
- Purpose of treatment;
- Licensee Name, address, contact person and telephone number.

## 7.6 Pesticide Application Monitoring Procedures

All herbicide treatments will be conducted under the direct supervision of a Canfor supervisor, employee or contractor. During all herbicide operations, temperature, relative humidity and wind speed shall be recorded. These parameters shall be taken and recorded immediately upon entering the treatment area, prior to treatment commencing. The frequency of recording parameters will depend on the type of application and weather behavior but will occur at half hour intervals at a minimum. When there is appreciable change in weather, more frequent monitoring should occur. When weather conditions have exceeded the thresholds listed in the table below, application of pesticide should cease.

**Table 3. Weather Thresholds to Pesticide Application**

Weather/Condition	Treatment	Threshold	Action	Rationale
Wind*	Aerial & Backpack	>8km/hr	No spray	*prevent drift into NTZ/PFZ *prevent drift onto non-target vegetation
	Hack & Squirt, Basal Bark, Cut Stump	NA	NA	*no risk of drift with these treatment types
Daylight*	All methods	30min before sunrise until 30min after sunset	No Treatment	*worker safety *protection of resources
Precipitation*	Aerial & Backpack	Precipitating or precipitation imminent <sup>1</sup>	No Spray	*to prevent dilution of pesticide mixture *to prevent run-off of pesticide to non-target vegetation and or treatment area
	Hack & Squirt, Basal Bark, Cut Stump	When efficacy of treatment is at risk (monitor/supervisor discretion)	No Treatment	*ensure maximum efficacy of treatment
Snow/Ice on vegetation*	All methods	Snow/Ice covers brush	No Treatment	*to ensure pesticide adheres to foliage *to prevent dilution of pesticide mixture *to prevent run-off of pesticide to non-target vegetation and or treatment area *ensure maximum efficacy of treatment
Dew/Water on Vegetation*	All methods	Dew/rainwater flows off foliage	No Treatment	*to ensure pesticide adheres to foliage *to prevent dilution of pesticide mixture *to prevent run-off of pesticide to non-target vegetation and or treatment area *ensure maximum efficacy of treatment
Temperature	Aerial – CSS <sup>2</sup>	>26.5 degrees C	No Spray <sup>3</sup>	*risk of pesticide evaporation prior to foliar absorption *health and safety of backpack applicators
	Backpack	>30 degrees C	No Treatment	
Relative Humidity (RH)	Aerial – CSS <sup>2</sup>	<40%	No Spray <sup>3</sup>	*risk of pesticide evaporation prior to foliar absorption
	Backpack	<30%	No Treatment <sup>3</sup>	

RH/Temperature	Aerial – LDS <sup>4</sup>	<35%, >30 degrees C	No Spray <sup>3</sup>	*risk of pesticide evaporation prior to foliar absorption
RH/Wind/Temperature	Aerial	40-55%, >4km/hr, >16 degrees C	No Spray <sup>3</sup>	*risk of pesticide evaporation prior to foliar absorption *prevent drift into NTZ/PFZ *prevent drift onto non-target vegetation

**Footnotes:**

\* located adjacent to a weather/condition parameter indicates an IPM Regulatory requirement

1. Imminent precipitation is rain forecasted within 2 hours for Vision and 30 minutes for VisionMax

2. CSS refers to Conventional Spray System nozzle configuration

3. A treatment which is utilizing Vision should consider halting operations, use of VisionMax can treat to higher thresholds due to chemical properties that reduce the risk of evaporation of product prior to absorption into foliage

4. LDS refers to Low Drift Spray nozzle configuration

## 7.7 Post Treatment Effectiveness Evaluation

All treatment areas will be scheduled for evaluation within one growing season after treatment. Efficacy will be evaluated on-site by means of aerial flight, walkthrough, or scheduled survey.

Post treatment observations for each treatment area may include:

- An evaluation of the efficacy of the treatment
- A review of whether all target vegetation was treated
- Information about whether the application rate was appropriate in the circumstances; and
- Information about whether the targeted pest was affected by the control option chosen and if the level of control was acceptable (ie whether treatment objectives were met).

## 8.0 Environmental Protection

### 8.1 Community Watersheds, Domestic Water Sources, & Agricultural Water Sources

Currently there are no community watersheds classified as community watersheds within the boundaries of this PMP. A 100-meter Pesticide Free Zone (PFZ) will be established around community watersheds that may be developed during the term of this PMP to ensure that the integrity of the watershed is maintained.

All domestic water intakes present, within the term of this PMP, will be protected according to the Integrated Pest Management regulation section by a 30 meter Pesticide Free 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, and this information will be used to identify potential domestic water sources.

## **8.2 Protection of Fish and Riparian Resources**

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. These areas are identified in section 1.3 of this PMP.

Fish and riparian resources are identified at pre-harvest and are managed through approved site level plans which include Pre-Harvest Silviculture Prescriptions, Silviculture Prescriptions, or Site Plans as well as operational plans such as Canfor's Forest Stewardship Plan (FSP) and Sustainable Forest Management Plan (SFMP). The application of herbicides will be consistent with the protection measures stated in those plans. Further protection of fisheries and riparian resources is provided through proper treatment selection, the application of professional judgment, compliance with requirements in the Integrated Pest Management Act and regulation and consideration of site-specific information gathered during consultation

### **8.2.1 Fisheries Resources**

To maintain the fisheries resource, a Pesticide Free Zone (PFZ) will be established around any body of water that is fish bearing or drains into a fish bearing body of water within 100m.

A minimum 10m PFZ will be maintained along all water bodies, dry streams and classified wetlands, except where reduced PFZ's are allowed under the Integrated Pest Management Regulation. Where reduced PFZ's are allowed, buffers will be established along PFZ's where applicable. Buffers applied to a PFZ will be of adequate size to further ensure no pesticide from the treatment will impact the feature being protected. The Canfor supervisor or other qualified professional will determine these buffer widths.

### **8.2.2 Riparian Habitat**

To maintain high-value riparian habitat, a Pesticide Free Zone (PFZ) will be established around fish bearing streams, streams that flow directly into fish bearing streams within 100m, classified wetlands and any riparian feature that has been classified as a wildlife habitat feature.

A minimum 10m PFZ will be maintained along all water bodies, dry streams and classified wetlands, except where reduced PFZ's are allowed under the Integrated Pest Management Regulation. Where reduced PFZ's are allowed, buffers will be established along PFZ's where applicable. Buffers applied to a PFZ will be of adequate size to further ensure no pesticide from the treatment will impact the feature being protected. The Canfor supervisor or other qualified professional will determine these buffer widths.

### **8.3 Wildlife Resources**

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. These areas are identified in section 1.3 of this PMP.

Wildlife values and habitat are identified at pre-harvest and are managed through approved site level plans which include Pre-Harvest Silviculture Prescriptions, Silviculture Prescriptions, or Site Plans as well as operational plans such as Canfor's Forest Stewardship Plan (FSP) and Sustainable Forest Management Plan (SFMP). The application of herbicides will be consistent with the protection measures stated in those plans. Further protection of wildlife values and habitat is provided through proper treatment selection, the application of professional judgment, compliance with requirements in the Federal Species at Risk Act, BC Wildlife Act, Integrated Pest Management Act and regulation, as well as through consideration of site-specific information gathered during consultation.

The maintenance of wildlife habitat and wildlife resources is protected through the establishment of Pesticide Free Zones that are consistent with Integrated Pest Management Regulation. Canfor has gone above and beyond the requirements contained within the regulation and have identified No Treatment Zones around numerous resource features.

#### **8.4 Food & Food Plants**

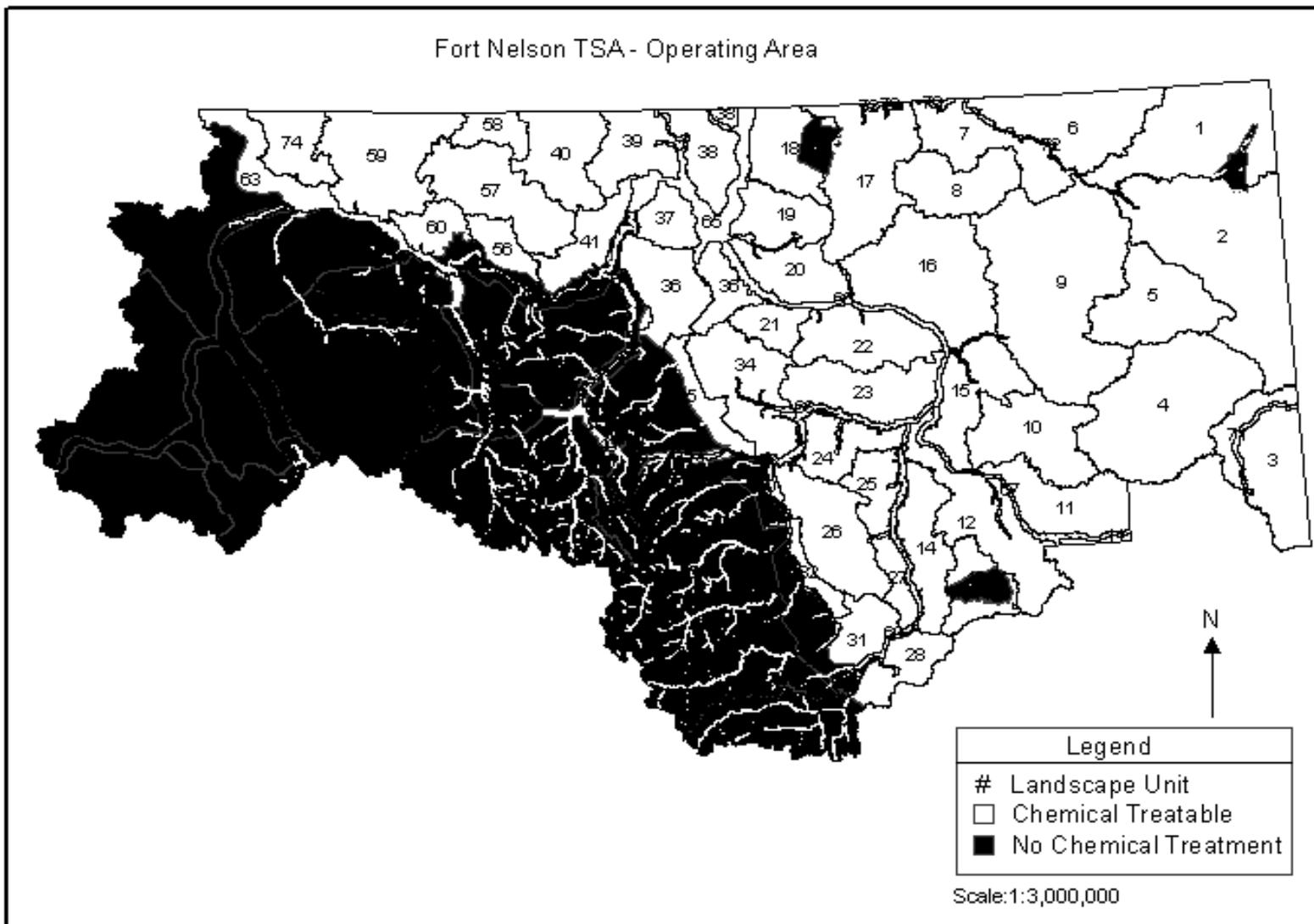
To protect food intended for human consumption during the transport and storage of pesticide, pesticide will be placed in a separate compartment as per the Integrated Pest Management Regulation requirements, as it is described in Section 6.1 and 6.2 of this document.

To protect naturally occurring food sources, patches of critical food plants and or plants intended to be used for medicinal purposes that are identified within the consultation process with the First Nations and other stakeholders; these areas will be excluded from treatment via a 20m No Treatment Zone. In addition, for treatment areas within 1km of a residential dwelling, the occupants will be notified prior to treatment. Signage will also be posted at treatment sites that are accessible by the public. Procedures for signage are outlined in Section 7.5.

DEFINITIONS, GLOSSARY OF TERMS AND ACRONYMS	
Active beaver lodging	Active beaver ponds and lodges can be identified by the presence of: recently gnawed woody vegetation(stumps or branches); well compacted trails leading from water to upland; accumulations of branches and short logs, often denude of bark, floating in ponds, lakes or gentle streams; evidence of mud or freshly killed vegetation on dams and lodges; and observations of beaver in the immediate vicinity.
Active Ingredient a.i.	The chemical component in a product or formulation that causes the pesticidal effect
Backpack	A method of ground treatment where an applicator has a tank on his/her back and sprays pesticide to the treatment site in a predetermined manner.
Basal Bark Treatment	A method of ground treatment where the backpack applicator sprays a solution of herbicide directly on to the woody species stem. Release® is generally the herbicide of choice for this treatment.
Blue Listed Species	Includes vulnerable rare taxa that could become candidates for the Red List in the foreseeable future.
Body of Water	Does not include a man-made, self contained body of or structure of water.
Broadcast	An application of herbicide over an entire continuous area rather than on individual plants (CPPA, 1986), covering <b>greater than 50%</b> of the gross block area or there is one continuous treatment patch greater than 20 ha in size. The method of application can be aerial or ground. This term is used to define the size or scale of treatment.
Buffer Zone	A strip of land between a PFZ, and other area that requires protection, and the treatment area. Generally pesticides are not directly applied to the buffer zone; some pesticides may be deposited in the buffer zone by drift, runoff or leaching. Buffer Zone widths must be adequate to ensure the protected area is free from any pesticide deposit under the weather conditions and spray method at the time of application.
CCAP Clinic	Calibration, Characterization, and Patternization Clinic - an approved method of measuring an aircraft's spray system.
Competing Vegetation	Herbaceous or woody (deciduous) vegetation that competes with crop trees for light, water and nutrients.
Conifer Release	The control of competing vegetation to permit crop trees to become the dominant species on a forest area.
Crop Trees	Species of trees that are intended to produce commercial timber products.
CSS	Conventional Spray System. The aircraft spray system setup normally used for broadcast or discretionary spray where extra drift control is not essential.
Cut Stump	A treatment method where a combination of mechanical and herbicide treatment is used to control woody species. The stem is cut near ground level and the herbicide (Vision®) is applied to the stem cut area or the herbicide (Release®) is applied to the stem cut area and outer stump area.
Fish Bearing	In relation to a body of water or classified wetland, means the body of water or classified wetland is frequented by: anadromous salmonids; 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; a species of fish identified as a species at risk under section 11(1) of the <i>Government Actions Regulation</i> , or; a species of fish identified as regionally important wildlife under section 11(2) of the <i>Government Actions Regulation</i> .
Food	Includes anything manufactured, sold or represented for use as food or drink for humans or animals, and also includes an ingredient that is mixed, or intended to be mixed, with food.
FMS	Stands for Forest Management System which states Canfor's environmental commitments as part of CSA certification.
FSP	Stands for Forest Stewardship Plan which is Canfor's operational plan that implements results and strategies in compliance with the <i>Forest and Range Practices Act</i>
Girdling	A treatment method using girdling tools to remove the outer layer of the trunk around the circumference of the trunk, from a woody (deciduous) species.

Injury Threshold	Means the point at which the abundance of pests and the damage they are causing or are likely to cause indicates that pest control is necessary or desirable.
IPM	Integrated Pest Management means a process for managing pest populations that includes: planning and managing ecosystems to prevent organisms from becoming pests; identifying existing or potential pest problems; monitoring pest populations along with damage caused by pests and environmental conditions; using injury thresholds in making treatment decisions; suppressing pest populations to acceptable levels while considering mode of control (biological, physical, cultural, mechanical, behavioural, and chemical) and the protection of environmental and human health; to evaluate the effectiveness of pest management treatments.
IPMA	Integrated Pest Management Act
IPMR	Integrated Pest Management Regulation
Invasive Plant	Has the same meaning as under the <i>Forest and Range Practices Act</i>
NTZ	No Treatment Zone – means an area of land that must not be treated with pesticide.
Pest	Means an injurious, noxious or troublesome living organism, but does not include a virus, bacteria, fungus or internal parasite that exists on or in humans or animals.
Pesticide	A micro-organism or material that is represented, sold or intended to be used to prevent, destroy, repel or mitigate a pest and includes: a plant growth regulator, plant defoliator, or plant desiccant; a controlled product as defined in the <i>Pest Control Products Act</i> (Canada); and a substance that is classified as a pesticide by regulation but does not include micro-organisms, materials, substances or control products excluded from this definition by regulation.
PMP	Pest Management Plan – a plan that describes a program for managing pest populations or reducing damage caused by pests based on IPM and the methods of handling, preparing, mixing, applying and otherwise using pesticides within the program.
PFZ	Pesticide Free Zone - means an area of land that must not be treated with pesticide and must be protected from pesticide moving onto it.
Qualified Monitor	Means a person who has the prescribed qualifications.
Selective Application	Means the application of a pesticide to individual plants so that the vegetation between the individual plants is not treated.
SFMP	Stands for Sustainable Forest Management Plan which is an operational plan that state social, environmental, and economical indicators and targets that are reported on annually for CSA certification purposes.
Snapping	A method of controlling woody species by manually snapping the stems.
Spot Application	An application of herbicide to localized or restricted areas (CPPA, 1986) in a series of mini broadcasts (patches), with no continuous patch greater than 20 ha in size where the competition has been stratified for treatment. Treatment area(s) will be <b>less than 50%</b> of the gross block area. The method of application can be aerial or ground. This term is used to define the size or scale of treatment
SU	Stands for Standard Units which state reforestation processes, procedures and requirements contained within the Pre-Harvest Silviculture Prescription, Silviculture Prescription, or Site Plan developed for each block.
Use	With respect to pesticides, includes mix, prepare or apply, and possess for the purpose of applying.
Wildlife Habitat Feature	Means a wildlife habitat feature identified under section 9 of the <i>Government Actions Regulation</i>

# APPENDIX 1: OPERATING AREA MAP



## APPENDIX 2: PEST MANAGEMENT TREATMENT SELECTION OPTIONS

### NON-HERBICIDE - MECHANICAL, MANUAL, BIOLOGICAL TREATMENTS AND CONSIDERATIONS

CRITERIA	MECHANICAL BRUSHING	MANUAL BRUSHING	GIRDLING - POST HARVEST	BIOLOGICAL
<b>Methods</b>	<ul style="list-style-type: none"> <li>• Selective</li> <li>• Broadcast</li> </ul>	<ul style="list-style-type: none"> <li>• Selective</li> </ul>	<ul style="list-style-type: none"> <li>• Selective</li> </ul>	<ul style="list-style-type: none"> <li>• Broadcast</li> </ul>
<b>Equipment</b>	<ul style="list-style-type: none"> <li>• Brush saws</li> <li>• Chain saws</li> <li>• Power trimmers</li> </ul>	<ul style="list-style-type: none"> <li>• Small hand axes</li> <li>• Machetes</li> </ul>	<ul style="list-style-type: none"> <li>• Chain saws</li> <li>• Girdling hand tools</li> <li>• Girdling power tools</li> </ul>	<ul style="list-style-type: none"> <li>• Sheep</li> </ul>
<b>Target Vegetation</b>	<ul style="list-style-type: none"> <li>• Woody species for Brush and Chain saws</li> <li>• Grasses and herbaceous species for trimmers</li> </ul>	<ul style="list-style-type: none"> <li>• Woody species</li> </ul>	<ul style="list-style-type: none"> <li>• Woody species</li> </ul>	<ul style="list-style-type: none"> <li>• All vegetation except grasses</li> <li>• (Grass may be treated in early growth stages)</li> </ul>
<b>Worker and Public Safety</b>	<p><b>Workers</b></p> <ul style="list-style-type: none"> <li>• Use of dangerous tools</li> <li>• Possible fire hazard from use of tools</li> <li>• Possible fire hazard from debris produced</li> <li>• Terrain, harvesting debris and mechanical site preparation can effect worker safety</li> </ul> <p><b>Public</b></p> <ul style="list-style-type: none"> <li>• Ground debris from slash created can limit public access</li> </ul> <p><b>Factors</b></p> <ul style="list-style-type: none"> <li>• Workers require special training</li> </ul>	<p><b>Workers</b></p> <ul style="list-style-type: none"> <li>• Repeated motions required to operate cutters physically difficult</li> <li>• Possible fire hazard from debris produced</li> <li>• Terrain, harvesting debris and mechanical site preparation can effect worker safety</li> </ul> <p><b>Public</b></p> <ul style="list-style-type: none"> <li>• Ground debris from slash created can limit public access</li> </ul> <p><b>Factors</b></p> <ul style="list-style-type: none"> <li>• Workers require special training</li> </ul>	<p><b>Workers</b></p> <ul style="list-style-type: none"> <li>• Repeated motions required to operated hand tools physically difficult</li> <li>• Possible fire hazard from use of power girdlers</li> <li>• Terrain, harvesting debris and mechanical site preparation can effect worker safety</li> </ul> <p><b>Public</b></p> <ul style="list-style-type: none"> <li>• No safety concerns</li> </ul> <p><b>Factors</b></p> <ul style="list-style-type: none"> <li>• Workers require special training</li> </ul>	<p><b>Workers</b></p> <ul style="list-style-type: none"> <li>• Large carnivores</li> </ul> <p><b>Public</b></p> <ul style="list-style-type: none"> <li>• No safety concerns</li> </ul> <p><b>Factors</b></p> <ul style="list-style-type: none"> <li>• Specific herding practices required to reduce wildlife concerns</li> </ul>
<b>Environmental Impact - Fish</b>	<ul style="list-style-type: none"> <li>• Debris may enter water courses and increase oxygen demands</li> <li>• Possible gas spills entering water courses when using power tools</li> </ul> <p><b>Factors</b></p> <ul style="list-style-type: none"> <li>• Remove debris from watercourses</li> <li>• Refuelling sites located away from water courses</li> </ul>	<ul style="list-style-type: none"> <li>• Debris may enter water courses and increase oxygen demands</li> </ul> <p><b>Factors</b></p> <ul style="list-style-type: none"> <li>• Remove debris from watercourses</li> </ul>	<ul style="list-style-type: none"> <li>• Possible gas spills entering water when using power girdlers.</li> </ul>	<ul style="list-style-type: none"> <li>• Feces from penning sites cannot enter watercourses</li> <li>• Herd movement across streams may disturb stream beds</li> </ul> <p><b>Factors</b></p> <ul style="list-style-type: none"> <li>• Place penning sites where drainage cannot enter water</li> <li>• Limit movements of herds across watercourses</li> <li>• Bridge watercourses when necessary to cross</li> </ul>

**NON-HERBICIDE - MECHANICAL, MANUAL, BIOLOGICAL TREATMENTS AND CONSIDERATIONS (continued)**

<b>CRITERIA</b>	<b>MECHANICAL BRUSHING</b>	<b>MANUAL BRUSHING</b>	<b>GIRDLING - POST HARVEST</b>	<b>BIOLOGICAL</b>
<b>Environment Impact – Wildlife</b>	<p><b>Wildlife</b></p> <ul style="list-style-type: none"> <li>Some animal components are reduced and some are increased for a short term</li> </ul> <p><b>Birds</b></p> <ul style="list-style-type: none"> <li>Some bird species components are reduced and some are increased for a short term</li> </ul>	<p><b>Wildlife</b></p> <ul style="list-style-type: none"> <li>Some animal components are reduced and some are increased for a short term</li> </ul> <p><b>Birds</b></p> <ul style="list-style-type: none"> <li>Some bird species components are reduced and some are increased for a short term</li> </ul>	<p><b>Wildlife</b></p> <ul style="list-style-type: none"> <li>Some animal components are reduced and some are increased for a short term</li> </ul> <p><b>Birds</b></p> <ul style="list-style-type: none"> <li>Some bird species components are reduced and some are increased for a short term</li> </ul>	<ul style="list-style-type: none"> <li>Some animal components are reduced and some are increased for a short term</li> <li>Risk of diseases spread to wildlife</li> <li>Risk of predators</li> </ul> <p><b>Factors</b></p> <ul style="list-style-type: none"> <li>Use health protocol procedures</li> <li>Use proper herding and guarding procedures</li> </ul> <p><b>Birds</b></p> <ul style="list-style-type: none"> <li>Some bird species components are reduced and some are increased for a short term</li> </ul>
<b>Environmental Impact - Soils</b>	<ul style="list-style-type: none"> <li>Decomposition may cause a slight increase in nutrients over time</li> <li>Possible gas spills when using power tools</li> </ul>	<ul style="list-style-type: none"> <li>Decomposition may cause a slight increase in nutrients over time</li> </ul>	<ul style="list-style-type: none"> <li>Possible gas spills when using power girdlers.</li> </ul>	<ul style="list-style-type: none"> <li>Feces may change acidity at penning sites</li> <li>Herd movements may cause some compaction</li> </ul>
<b>Environmental Impact - Water</b>	<ul style="list-style-type: none"> <li>Possible gas spills entering water when using power tools</li> </ul>	<ul style="list-style-type: none"> <li>No known impact on water quality</li> </ul>	<ul style="list-style-type: none"> <li>Possible gas spills entering water when using power girdlers.</li> </ul>	<ul style="list-style-type: none"> <li>Feces from penning sites may drain into water effecting water quality</li> </ul> <p><b>Factors</b></p> <ul style="list-style-type: none"> <li>Penning sites must be located so no drainage into water course can occur</li> </ul>
<b>Topographical Constraints</b>	<ul style="list-style-type: none"> <li>Topography is a factor in worker safety and accessibility</li> <li>Method may be limited on steep slopes</li> </ul>	<ul style="list-style-type: none"> <li>Topography is a factor in worker safety and accessibility</li> <li>Method may be limited on steep slopes</li> </ul>	<ul style="list-style-type: none"> <li>Topography is a factor in worker safety and accessibility</li> <li>Method may be limited on steep slopes</li> </ul>	<ul style="list-style-type: none"> <li>Steep slopes, harvesting slash, etc., will limit accessibility and effectiveness</li> <li>Low wetlands too wet for the sheep and causes soil disturbance.</li> </ul>
<b>Competing Vegetation Impact</b>	<ul style="list-style-type: none"> <li>Short term, immediate control of treated vegetation</li> </ul> <p><b>Factors</b></p> <ul style="list-style-type: none"> <li>May require treat more than once in each treatment year</li> <li>May require treatment over several years</li> <li>Suckering prevalent on Aspen , Willow and Cottonwood</li> </ul>	<ul style="list-style-type: none"> <li>Short term, immediate control of treated vegetation</li> </ul> <p><b>Factors</b></p> <ul style="list-style-type: none"> <li>May require treat more than once in each treatment year</li> <li>May require treatment over several years</li> <li>Suckering prevalent on Aspen, Willow and Cottonwood</li> </ul>	<ul style="list-style-type: none"> <li>Control of most woody species treated</li> <li>Suckering may occur on some species (Aspen, Willow, and Cottonwood)</li> </ul>	<ul style="list-style-type: none"> <li>Short term immediate control</li> <li>Trampling a benefit to controlling the vegetation</li> </ul> <p><b>Factors</b></p> <ul style="list-style-type: none"> <li>Use of more than one pass in a treatment year</li> <li>May require treatment over several years</li> <li>Potential trampling of crop may result in poor form and vigour with potential for mortality.</li> </ul>
<b>Time of Treatment</b>	<ul style="list-style-type: none"> <li>2 - 3 weeks after foliar flush for best results</li> <li>Year round for woody species, if access available</li> </ul>	<ul style="list-style-type: none"> <li>Immediately after full leaf flush (2-3 weeks) treatment for best results.</li> <li>Year round, if access available</li> </ul>	<ul style="list-style-type: none"> <li>Year round, if accessible</li> <li>Immediately after full leaf flush (2-3 weeks) treatment for best results</li> </ul>	<ul style="list-style-type: none"> <li>Late May to early September</li> <li>Early after spring plant growth for best results.</li> </ul>

**NON-HERBICIDE - MECHANICAL, MANUAL, BIOLOGICAL TREATMENTS AND CONSIDERATIONS (continued)**

<b>CRITERIA</b>	<b>MECHANICAL BRUSHING</b>	<b>MANUAL BRUSHING</b>	<b>GIRDLING – POST HARVEST</b>	<b>BIOLOGICAL</b>
<b>Efficacy - Term</b>	<ul style="list-style-type: none"> <li>• &lt; 1 year for herbaceous</li> <li>• &lt;1 to 2 years for deciduous</li> </ul>	<ul style="list-style-type: none"> <li>• &lt; 1 year for herbaceous</li> <li>• &lt;1 to 2 years for deciduous</li> </ul>	<ul style="list-style-type: none"> <li>• 2 - 3 years for most deciduous species</li> </ul>	<ul style="list-style-type: none"> <li>• Under Review</li> </ul>
<b>Limitations</b>	<ul style="list-style-type: none"> <li>• Not effective in controlling Aspen and Cottonwood</li> <li>• Repeated entries may be required for control</li> <li>• Repeated entries causes a large amount of small slash creating access problems for workers, the public and wildlife</li> <li>• Slash creates habitat for rodents. Concern about increased rodent populations, which may girdle crop trees</li> <li>• Short term control, low efficacy</li> <li>• Response of competition is to sucker</li> <li>• Ground road access required to keep costs down.</li> <li>• High costs</li> </ul>	<ul style="list-style-type: none"> <li>• Not effective in controlling Aspen and Cottonwood</li> <li>• Repeated entries may be required for control</li> <li>• Repeated entries causes a large amount of small slash creating access problems for the workers, the public and wildlife</li> <li>• Slash creates habitat for rodents. Concern about increased rodent populations, which may girdle crop trees</li> <li>• Short term control, low efficacy</li> <li>• Response of competition is to sucker</li> <li>• Ground access required to keep costs down.</li> <li>• High costs</li> </ul>	<ul style="list-style-type: none"> <li>• Cannot be used on deciduous stems of less than 2 cm in diameter</li> <li>• Takes up to 3 years before full benefit is achieved</li> <li>• Stems may break at point of girdle creating access problems</li> <li>• Response of competition is to sucker</li> <li>• Ground access required to keep costs down.</li> <li>• High cost</li> </ul>	<ul style="list-style-type: none"> <li>• Does not control grass species, except when able to treat early in year when grass is &lt;1m.</li> <li>• Efficacy unknown on many herbaceous species</li> <li>• Concerns in areas of deer, moose and wild sheep populations</li> <li>• When using in identified grizzly bear areas extra precautions must be taken</li> <li>• Many species respond vigorously to grazing</li> <li>• Compaction of soils with repeated treatments</li> <li>• When using in damp areas, wetter areas have to be avoided</li> <li>• Concerns when using near fish bearing streams</li> <li>• Vegetation height a limiting factor</li> <li>• Ground access required to consider this option.</li> <li>• High costs</li> </ul>
<b>Costs</b>	<ul style="list-style-type: none"> <li>• \$550 - \$ 2200 per ha, single treatment</li> <li>• Repeated treatments very likely.</li> </ul> <p><b>Factors</b></p> <ul style="list-style-type: none"> <li>• Ground access</li> <li>• Density of stems and cover of herbaceous species</li> <li>• Slope and other terrain factors</li> <li>• Treatment size area and conformity</li> <li>• Fire hazard potential</li> </ul>	<ul style="list-style-type: none"> <li>• \$700 - 1500 per ha, single treatment</li> <li>• Repeated treatments very likely.</li> </ul> <p><b>Factors</b></p> <ul style="list-style-type: none"> <li>• Ground access</li> <li>• Density of stems</li> <li>• Slope and other terrain factors</li> <li>• Treatment size area and conformity</li> <li>• Fire hazard potential</li> </ul>	<ul style="list-style-type: none"> <li>• \$600 - 900 per ha, single treatment</li> <li>• Repeated treatments very likely.</li> </ul> <p><b>Factors</b></p> <ul style="list-style-type: none"> <li>• Ground access</li> <li>• Density of stems</li> <li>• Slope and other terrain factors</li> <li>• Treatment size area and conformity</li> </ul>	<ul style="list-style-type: none"> <li>• \$600 - 1700 per ha, single treatment</li> <li>• Repeated treatments very likely.</li> </ul> <p><b>Factors</b></p> <ul style="list-style-type: none"> <li>• Ground access with animal transport vehicles</li> <li>• Location of penning area</li> <li>• Composition of vegetation</li> <li>• Treatment size area and conformity</li> <li>• Watercourses within the treatment area</li> <li>• No treatment areas</li> <li>• Slope and other terrain factors</li> <li>• Wildlife concerns</li> <li>• Size of flock</li> </ul>

Note: Snapping is not included in the above chart as Canfor does not have the information needed to provide a good analysis.

**HERBICIDE - GROUND APPLICATIONS AND CONSIDERATIONS**

<b>TREATMENT OPTIONS</b>	<b>BROADCAST</b>	<b>AVOIDANCE/ SELECTIVE</b>	<b>SPOT HACK &amp; SQUIRT</b>	<b>BASAL BARK CUT STUMP</b>
<b>Product</b>	Vision, VisionMax	Vision, VisionMax	Vision, VisionMax	Release
<b>Chemical</b>	Glyphosate	Glyphosate	Glyphosate	triclopyr
<b>Application Method</b>	<b>Ground Backpack</b> <ul style="list-style-type: none"> <li>Broadcast</li> </ul>	<b>Ground Backpack</b> <ul style="list-style-type: none"> <li>Broadcast with avoidance of specific species.</li> </ul> <b>Or</b> <ul style="list-style-type: none"> <li>Broadcast of specific competition species.</li> </ul>	<b>Ground Backpack</b> <ul style="list-style-type: none"> <li>Spot treatment around or near crop trees.</li> </ul> <b>Or</b> <b><u>Hack &amp; Squirt</u></b> <ul style="list-style-type: none"> <li>Single stem treatment of competitive deciduous species.</li> </ul>	<b>Ground Backpack</b> <ul style="list-style-type: none"> <li>Selective treatment of specific species around or near crop trees.</li> </ul> <b>Or</b> <b>Cut Stump</b> <ul style="list-style-type: none"> <li>Single stem treatment of competitive deciduous species</li> </ul>
<b>Equipment Required</b>	<ul style="list-style-type: none"> <li>Backpack Sprayers</li> <li>Broadcast spray nozzle</li> <li>Mix/load system</li> <li>Spill Kit</li> <li>Flagging</li> </ul>	<ul style="list-style-type: none"> <li>Backpack Sprayers</li> <li>Broadcast Spray nozzle</li> <li>Mix/load system</li> <li>Spill Kit</li> <li>Flagging</li> </ul>	<b><u>Spot</u></b> <ul style="list-style-type: none"> <li>Backpack Sprayers</li> <li>Cone or other item to protect crop trees.</li> <li>Special nozzle for low band spray.</li> <li>Flagging</li> <li>Mix/load system</li> <li>Spill kit</li> </ul> <b><u>Hack and Squirt</u></b> <ul style="list-style-type: none"> <li>Squirt container</li> <li>Hack tool</li> <li>Flagging</li> <li>Mix/load system</li> <li>Spill Kit</li> </ul>	<b><u>Basal Bark</u></b> <ul style="list-style-type: none"> <li>Backpack sprayers</li> <li>Special nozzle for thinline or streamline spray</li> <li>Flagging</li> <li>Mix/load system</li> <li>Spill kit</li> </ul> <b><u>Cut stump</u></b> <ul style="list-style-type: none"> <li>Power tool</li> <li>Backpack sprayer</li> <li>Flagging</li> <li>Mix/load system</li> <li>Spill Kit</li> </ul>
<b>Target Vegetation</b>	<ul style="list-style-type: none"> <li>All vegetation types</li> </ul>	<ul style="list-style-type: none"> <li>All vegetation types, avoiding specific species.</li> <li>Selected species only</li> </ul>	<b><u>Spot</u></b> <ul style="list-style-type: none"> <li>All vegetation types</li> </ul> <b><u>Hack &amp; Squirt</u></b> <ul style="list-style-type: none"> <li>Woody species</li> </ul>	<ul style="list-style-type: none"> <li>Woody species</li> </ul>

**HERBICIDE - GROUND APPLICATIONS AND CONSIDERATIONS (continued)**

TREATMENT OPTIONS	BROADCAST	AVOIDANCE/ SELECTIVE	SPOT HACK & SQUIRT	BASAL BARK CUT STUMP
<b>Worker and Public Safety</b>	<p><b>Worker</b></p> <ul style="list-style-type: none"> <li>• Proper procedures must be followed to minimize worker exposure.</li> <li>• Terrain, harvesting debris and mechanical site preparation can effect worker safety</li> </ul> <p><b>Public</b></p> <ul style="list-style-type: none"> <li>• Low risk of public exposure</li> <li>• Signs erected prior to treatment</li> <li>• Pre-treatment ground checks to ensure no public present</li> </ul>	Same as Broadcast	Same as Broadcast	Same as Broadcast
<b>Environmental Impact - Fish</b>	<ul style="list-style-type: none"> <li>• Pesticide Free Zones with adequate buffers.</li> </ul>	Same as Broadcast	<p><b><u>Spot</u></b></p> <ul style="list-style-type: none"> <li>• Pesticide Free Zones with adequate buffers</li> <li>• Spray contained in select area</li> </ul> <p><b><u>Hack &amp; Squirt</u></b></p> <ul style="list-style-type: none"> <li>• Direct application to tree trunk.</li> <li>• Pesticide Free Zone with adequate buffers</li> </ul>	<ul style="list-style-type: none"> <li>• Direct application to tree trunk or stump</li> <li>• Spray contained in select area</li> <li>• Pesticide Free Zone with adequate buffers</li> </ul>

**HERBICIDE - GROUND APPLICATIONS AND CONSIDERATIONS (continued)**

<b>TREATMENT OPTIONS</b>	<b>BROADCAST</b>	<b>AVOIDANCE/ SELECTIVE</b>	<b>SPOT HACK &amp; SQUIRT</b>	<b>BASAL BARK CUT STUMP</b>
<b>Environmental Impact – Wildlife</b>	<p><b>Wildlife</b></p> <ul style="list-style-type: none"> <li>Some animal components are reduced for a short term</li> <li>Some animal components are increased for a short term</li> </ul> <p><b>Birds</b></p> <ul style="list-style-type: none"> <li>Some bird species components are reduced for a short term</li> <li>Some bird species components are increased for a short term</li> </ul>	<p><b>Wildlife</b></p> <ul style="list-style-type: none"> <li>Forage species avoided if non-competitive</li> <li>Some animal components are reduced for a short term</li> <li>Some animal components are increased for a short term</li> </ul> <p><b>Birds</b></p> <ul style="list-style-type: none"> <li>Some bird species components are reduced for a short term</li> <li>Some bird species components are increased for a short term</li> </ul>	<p><b>Spot Wildlife</b></p> <ul style="list-style-type: none"> <li>Little effect to browse species unless browse species in direct competition to the crop tree</li> <li>Little effect to cover</li> <li>Treat only areas needed</li> </ul> <p><b>Birds</b></p> <ul style="list-style-type: none"> <li>Little effect to protection from predators</li> <li>Little or no effect to food supply</li> <li>Little or no effect to cover</li> </ul> <p><b>Hack &amp; Squirt Wildlife</b></p> <ul style="list-style-type: none"> <li>Some animal components are reduced and some are increased for a short term.</li> </ul> <p><b>Birds</b></p> <ul style="list-style-type: none"> <li>Some bird species components are reduced and some are increased for a short term</li> </ul>	<p><b>Wildlife</b></p> <ul style="list-style-type: none"> <li>Little effect to browse species unless in direct competition with crop trees</li> <li>Some animal components are reduced for a short term</li> <li>Some animal components are increased for a short term</li> <li>Treat only areas needed</li> </ul> <p><b>Birds</b></p> <ul style="list-style-type: none"> <li>Little or no effect to food supply</li> <li>Some bird species components are reduced for a short term</li> <li>Some bird species components are increased for a short term</li> </ul>
<b>Environmental Impact - Soils</b>	<ul style="list-style-type: none"> <li>Increase in soil nutrients</li> <li>Possible increase in soil temperatures</li> </ul>	<ul style="list-style-type: none"> <li>Increase in soil nutrients</li> <li>Possible increase in soil temperatures</li> </ul>	<p><b>Spot</b></p> <ul style="list-style-type: none"> <li>Some increase in soil nutrients</li> <li>Possible increase in soil temperatures surrounding crop trees</li> </ul> <p><b>Hack &amp; Squirt</b></p> <ul style="list-style-type: none"> <li>No effect</li> </ul>	<ul style="list-style-type: none"> <li>No effect</li> </ul>
<b>Environmental Impact - Water</b>	<ul style="list-style-type: none"> <li>Pesticide Free Zones with adequate buffers on all water</li> <li>Areas of wells and water licenses have an extended PFZ</li> </ul>	<b>Same as Broadcast</b>	<b>Same as Broadcast</b>	<b>Same as Broadcast</b>
<b>Topographical Restraints</b>	<ul style="list-style-type: none"> <li>Topography is a factor for worker safety and access</li> <li>Severe terrain (slopes &gt;45%) may limit use</li> </ul>	<b>Same as Broadcast</b>	<b>Same as Broadcast</b>	<b>Same as Broadcast</b>

**HERBICIDE - GROUND APPLICATIONS AND CONSIDERATIONS (continued)**

TREATMENT OPTIONS	BROADCAST	AVOIDANCE/ SELECTIVE	SPOT HACK & SQUIRT	BASAL BARK CUT STUMP
<b>Competing Vegetation Impact</b>	<ul style="list-style-type: none"> <li>Treatment year – quick mortality; little to gradual regrowth</li> <li>Year 1: limited growth of most species depending on rate applied</li> <li>Year 2: considerable regrowth and some new growth</li> <li>Year 3: general return of all species</li> </ul> <p><b>Other Factors</b></p> <ul style="list-style-type: none"> <li>PFZ's, NTZ's, etc., will leave vegetation complexes within the treatment areas</li> </ul> <p>Method tends to produce missed areas within the swaths.</p>	<p><b>Same as Broadcast</b></p> <p><b>Other Factors</b></p> <ul style="list-style-type: none"> <li>PFZ's, NTZ's, avoidance areas, etc., will leave vegetation complexes within the treatment areas</li> </ul>	<p><b>Spot</b> <b>Same as Broadcast</b></p> <p><b>Other Factors</b></p> <ul style="list-style-type: none"> <li>Treatment of direct competition vegetation immediately surrounding the crop tree leaves extensive vegetation within the treatment area</li> </ul> <p><b>Hack &amp; Squirt</b></p> <ul style="list-style-type: none"> <li>Slow change of treated species</li> </ul> <p><b>Other Factors</b></p> <ul style="list-style-type: none"> <li>Treatment of woody species only</li> </ul>	<p><b>Basal Bark</b></p> <ul style="list-style-type: none"> <li>Slow change of treated species</li> </ul> <p><b>Cut Stump</b></p> <ul style="list-style-type: none"> <li>immediate removal of competing species from crop tree area.</li> </ul> <p><b>Other Factors</b></p> <ul style="list-style-type: none"> <li>Treatment of woody species only</li> </ul>
<b>Time of Treatment</b>	<p><b>Site Preparation</b></p> <ul style="list-style-type: none"> <li>During vigorous growth of the target vegetation, prior to planting crop trees</li> <li>Leaf drop or die back should be less than 25% of the above ground vegetation</li> </ul> <p><b>Brushing and Weeding</b></p> <ul style="list-style-type: none"> <li>During vigorous growth of the target vegetation.</li> <li>Crop trees must be dormant and “hardened off”</li> </ul> <p>Leaf drop or die back should be less than 25% of the above ground vegetation</p>	<p><b>Same as Broadcast</b></p>	<p><b>Spot</b> <b>Same as Broadcast</b></p> <p><b>Hack &amp; Squirt</b></p> <ul style="list-style-type: none"> <li>Year round - except when the outer layer of the plant is frozen</li> </ul>	<ul style="list-style-type: none"> <li>Year round with the following exceptions: <ul style="list-style-type: none"> <li>⇒ outer layer of plant is frozen</li> <li>⇒ rain or melting frost mixes with spray on outer layer of plant</li> <li>⇒ snow to deep to treat lower portion of plant</li> </ul> </li> </ul>
<b>Efficacy - Term</b>	2 - 4 years depending on species and rate	2 - 4 years depending on species and rate	<p><b>Spot</b> 2 - 4 years depending on species and rate</p> <p><b>Hack &amp; Squirt</b> 4 - 6 years</p>	4 - 6 years

**HERBICIDE - GROUND APPLICATIONS AND CONSIDERATIONS (continued)**

TREATMENT OPTIONS	BROADCAST	AVOIDANCE/ SELECTIVE	SPOT HACK & SQUIRT	BASAL BARK CUT STUMP
<b>Limitations</b>	<ul style="list-style-type: none"> <li>• Competition height effects efficacy (Maximum height = 2.0 meters)</li> <li>• Competition height for worker safety. Maximum height is worker chest level</li> <li>• Intense level of supervision necessary</li> <li>• Intensive block preparation required</li> <li>• Good access required</li> <li>• Steep slopes difficult to treat</li> </ul>	Same as Broadcast	<p><b><u>Spot</u></b></p> <ul style="list-style-type: none"> <li>• Must be conducted when crop trees are visible while target vegetation has adequate top growth</li> <li>• Steep slopes difficult to treat without effecting nearby crop trees</li> </ul> <p><b><u>Hack &amp; Squirt</u></b></p> <ul style="list-style-type: none"> <li>• Woody species only</li> <li>• Dense competition difficult to treat</li> <li>• Good access required</li> <li>• Steep slopes difficult to treat</li> <li>• Costly</li> </ul>	<ul style="list-style-type: none"> <li>• Woody species only</li> <li>• Dense competition may be difficult to treat</li> <li>• Good access required</li> <li>• Steep slopes difficult to treat</li> <li>• costly</li> </ul>
<b>Cost</b>	<ul style="list-style-type: none"> <li>• \$400-1050 per ha</li> <li>• Single treatment probable.</li> </ul>	<ul style="list-style-type: none"> <li>• \$450-1050 per ha</li> <li>• Single treatment probable.</li> </ul>	<p><b><u>Spot</u></b></p> <ul style="list-style-type: none"> <li>• \$750-950 per ha</li> <li>• Single treatment probable.</li> </ul> <p><b><u>Hack &amp; Squirt</u></b></p> <ul style="list-style-type: none"> <li>• \$800-1000 per ha</li> <li>• Single treatment probable.</li> </ul>	<ul style="list-style-type: none"> <li>• \$600-1200 per ha</li> <li>• Single treatment probable.</li> </ul>

**HERBICIDE - AERIAL TREATMENTS AND CONSIDERATIONS**

<b>CRITERIA</b>	<b>BROADCAST</b>	<b>SELECTIVE/DISCRETIONARY</b>
<b>Product</b>	Vision, VisionMax	Vision, VisionMax
<b>Chemical</b>	Glyphosate	glyphosate
<b>Application Method</b>	<p><b>Helicopter:</b> (Conventional or Low Drift Systems)</p> <ul style="list-style-type: none"> <li>Broadcast                             <ul style="list-style-type: none"> <li>Greater than 50% of the treatment unit is treated in a continuous manner.</li> </ul> </li> </ul>	<p><b>Helicopter:</b> (Conventional or Low Drift Systems)</p> <ul style="list-style-type: none"> <li>Selective/Discretionary                             <ul style="list-style-type: none"> <li>50% or less of the treatment area is treated in a continuous or non-continuous application.</li> <li>Patches of specific leading species are treated.</li> <li>A specific species is treated in a continuous manner at a specified rate. Other species, within the specified treatment area, are treated at a different rate.</li> </ul> </li> </ul>
<b>Equipment Required</b>	<ul style="list-style-type: none"> <li>Helicopter with spray equipment</li> <li>Mix/load equipment</li> <li>Spill kit</li> </ul> <p>(All items as per Equipment in Section 6)</p>	<b>Same as Broadcast.</b>
<b>Worker and Public Safety</b>	<p><b>Workers:</b></p> <ul style="list-style-type: none"> <li>Limited contact with chemical when using designated system (as per Section 6).</li> <li>Worker safety equipment and procedures required (as per Section 6).</li> </ul> <p><b>Supervisors and Monitors:</b></p> <ul style="list-style-type: none"> <li>No exposure for off block supervisors.</li> <li>On block monitors have minimal exposure during conventional applications.</li> </ul> <p><b>Public:</b></p> <ul style="list-style-type: none"> <li>Low risk of public exposure.</li> <li>Signs erected prior to treatment to warn public.</li> <li>Pre-treatment air and ground checks to confirm no public present during treatment.</li> </ul>	<b>Same as Broadcast.</b>
<b>Environmental Impact - Fish</b>	<ul style="list-style-type: none"> <li>Pesticide Free Zones and adequate buffers required for all waterbodies.</li> <li>Pesticide Free Zones with adequate buffers and/or No Treatment Zones adjacent to riparian areas.</li> </ul>	<b>Same as Broadcast</b>

**HERBICIDE - AERIAL TREATMENTS AND CONSIDERATIONS (continued)**

<b>CRITERIA</b>	<b>BROADCAST</b>	<b>SELECTIVE/DISCRETIONARY</b>
<b>Environmental Impact – Wildlife</b>	<p><b>Wildlife</b></p> <ul style="list-style-type: none"> <li>• Some animal components are reduced for a short term</li> <li>• Some animal components are increased for a short term</li> </ul> <p><b>Birds</b></p> <ul style="list-style-type: none"> <li>• Some bird species components are reduced for a short term</li> <li>• Some bird species components are increased for a short term</li> </ul>	<p><b>Wildlife</b></p> <ul style="list-style-type: none"> <li>• Some animal components are reduced for a short term</li> <li>• Some animal components are increased for a short term</li> </ul> <p><b>Birds</b></p> <ul style="list-style-type: none"> <li>• Some bird species components are reduced for a short term</li> <li>• Some bird species components are increased for a short term</li> </ul> <ul style="list-style-type: none"> <li>• Only areas where the target species is the leading competitor are treated.</li> </ul>
<b>Environmental Impact - Soil</b>	<ul style="list-style-type: none"> <li>• Increase in soil nutrients.</li> <li>• Possible increase in soil temperatures.</li> </ul>	<ul style="list-style-type: none"> <li>• Increase in soil nutrients in treated area.</li> <li>• Possible increase in soil temperatures in treated area.</li> </ul>
<b>Environmental Impact - Water</b>	<ul style="list-style-type: none"> <li>• Pesticide Free Zones with adequate buffers are established on all waterbodies.</li> <li>• Areas of wells and water licenses have an extended PFZ.</li> </ul>	<b>Same as Broadcast</b>
<b>Topographical Restraints</b>	<ul style="list-style-type: none"> <li>• Topography is not a factor in this treatment type.</li> </ul>	<b>Same as Broadcast</b>
<b>Competing Vegetation Impact</b>	<p><b>Treatment area and species</b></p> <ul style="list-style-type: none"> <li>• Treatment year - no change to gradual change, depending on treatment timing.</li> <li>• Year 1: limited growth of most species, depending on the rate applied.</li> <li>• Year 2: possibly considerable regrowth of target species, and/or new growth of other competing species.</li> <li>• Year 3: general return of most species.</li> </ul> <p><b>Other Factors</b></p> <ul style="list-style-type: none"> <li>• PFZ's, NTZ's, non-treatment areas, etc., will leave vegetation complexes within the treatment unit.</li> <li>• Low Drift systems tend to produce swath striping.</li> <li>• Reduced application rates tend to reduce impact on target vegetation and increase regrowth.</li> <li>• Reduced application rates tend to reduce impact on non-target vegetation.</li> </ul>	<p><b>Treatment area and species</b></p> <ul style="list-style-type: none"> <li>• Treatment year - no change to gradual change, depending on treatment timing.</li> <li>• Year 1: limited growth of most species, depending on rate applied.</li> <li>• Year 2: possibly considerable growth of target species, and/or new growth of other competing species.</li> <li>• Year 3: general return of most species.</li> </ul> <p><b>Other Factors</b></p> <ul style="list-style-type: none"> <li>• PFZ's, NTZ's, areas not of target species, etc., will leave extensive vegetation complexes within the treatment unit.</li> <li>• Low Drift systems tend to produce swath striping.</li> <li>• Reduced application rates tend to reduce impact on target vegetation and increase regrowth.</li> <li>• Reduced application rates tend to reduce impact on non-target vegetation.</li> </ul>

**HERBICIDE - AERIAL TREATMENTS AND CONSIDERATIONS (continued)**

CRITERIA	1.1.1.1 BROADCAST	SELECTIVE/DISCRETIONARY
<b>Time of Treatment</b>	<p><b>Site Preparation</b></p> <ul style="list-style-type: none"> <li>• During vigorous growth period of target species, prior to crop tree planting.</li> <li>• Leaf drop or die back should be less than 25% of the above ground vegetation.</li> </ul> <p><b>Brushing and Weeding</b></p> <ul style="list-style-type: none"> <li>• During vigorous growth period of target species.</li> <li>• Crop trees must be dormant and “hardened off”.</li> <li>• Leaf drop or die back should be less than 25% of the above ground vegetation.</li> </ul>	<p><b>Same as Broadcast</b></p>
<b>Efficacy - Term</b>	<ul style="list-style-type: none"> <li>• 2 - 4 years depending on species and rates.</li> </ul>	<ul style="list-style-type: none"> <li>• 2 - 4 years depending on species and rates.</li> </ul>
<b>Limitations</b>	<ul style="list-style-type: none"> <li>• First Nations concerns</li> <li>• Areas with multiple waterbodies</li> <li>• Limited use on low wetlands</li> </ul>	<ul style="list-style-type: none"> <li>• First Nations concerns</li> <li>• Areas with multiple waterbodies</li> <li>• Limited use on low wetlands.</li> </ul>
<b>Cost</b>	<p><b>Conventional Spray System</b></p> <ul style="list-style-type: none"> <li>• +/- \$200-400 per hectare.</li> </ul> <p><b>Low Drift System</b></p> <ul style="list-style-type: none"> <li>• +/- “\$450-700 per hectare.</li> </ul> <p><b>Factors for both systems</b></p> <ul style="list-style-type: none"> <li>• Waterbodies within treatment areas.</li> <li>• Treatment area size and shape.</li> <li>• Pre-treatment layout complexity.</li> <li>• Access.</li> <li>• Snags, wildlife trees, leave areas, etc.</li> <li>• Chemical rates – Will be as outlines in Appendix 6 (Herbicide Rate Table) with the objective to apply sufficient chemical to adequately suppress the brush treatment with one entry. Should the rate be to low to obtain adequate efficacy on a single treatment an additional treatment may be necessary and the area treatment costs will increase accordingly.</li> </ul>	<p><b>Conventional Spray System</b></p> <ul style="list-style-type: none"> <li>• +/- \$200-400 per hectare.</li> </ul> <p><b>Low Drift System</b></p> <ul style="list-style-type: none"> <li>• +/- \$475-750 per hectare.</li> </ul> <p><b>Factors for both systems same as Broadcast</b></p> <p><b>Plus:</b></p> <ul style="list-style-type: none"> <li>• Size of target areas within the total treatment unit.</li> <li>• Complexity of target area shapes.</li> </ul>



# APPENDIX 3: TREATMENT METHOD DECISION MAKING MATRIX

