British Columbia Timber Sales
Okanagan and Selkirk Forest District
Integrated Pest Management Plan

July 6, 2016

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1.0 INTRODUCTION

This Integrated Pest Management Plan (IPMP) was prepared by BCTS to continue with their Integrated Pest Management Program for the next 5 years. This IPMP is consistent with strategies to be employed by BCTS to manage herbaceous and deciduous vegetation competing for light and other resources with conifer trees growing on managed forest lands and to assist in keeping roads accessible via road side applications Vegetation management, which involves the reduction or removal of undesirable vegetation within the vicinity of crop trees, is necessary to allow conifer crop trees to reach free-growing status and permit statutory silvicultural obligations to be met. This IPMP is consistent with the Integrated Pest Management Act and Regulations which replaced the Pest Control Act in December 2004. The Integrated Pest Management Act and Regulation establish conditions for the sale and use of pesticides through a classification system and regulatory provisions. It also sets out standards for licenses, certification, permits, Integrated Pest Management Plans (IPMPs), pesticide use notices and confirmations. The Regulation also contains public notification, consultation, reporting and record keeping provisions – as well as standards for use of integrated pest management and for human health and environmental protection.

1.1 PURPOSE OF PLAN

The ability to control pests is important to BCTS. Forest pests that result in tree mortality, growth reduction, or any other damage or negative impacts to forests and forest plantations must be managed promptly and effectively if the desired economic and silvicultural forest management objectives are to be met. Flexible and comprehensive pest management strategies and techniques are required to achieve prompt regeneration and full site-occupancy of harvested sites, in an environmentally sound and cost-effective manner.

The primary purpose of this IPMP is to provide the framework required for the implementation of Integrated Pest Management (IPM) strategies and to ensure pesticides are only used in the context of an IPM program. Pests resulting in tree mortality, growth reduction, or any other damage or negative impacts to forests and forest plantations must be managed promptly and effectively if the desired economic and silvicultural forest management objectives are to be met. Flexible and comprehensive pest management strategies and techniques are required to achieve prompt regeneration and full site-occupancy of harvested sites, in an environmentally sound and cost-effective manner which preserves or enhances environmental quality and protects human health.

An IPMP is required to:

- ensure compliance with the *Integrated Pest Management Act* and Regulations
- provide public awareness of and input into, BCTS's vegetation management program
- ensure responsible use of herbicides,
- facilitate the effective implementation of integrated programs (using an appropriate combination of herbicide and non chemical techniques) taking into account land uses and environmentally sensitive areas and to minimize herbicide use

In the short-term, prompt and effective integrated pest management will minimize mortality of seedlings and losses of growth due to competition from pest species for light, moisture, nutrients and space. In the long-term, this will result in successful forest plantations with desired crop species that are ready for harvest at optimum rotation ages.

1.2 SCOPE OF PLAN AND CONTACTS

This plan covers all Crown land operations for:

1. BC Timber Sales, Okanagan-Columbia Business Area, 2501 14th Ave, Vernon VIT 8Z1
   Contact Miles Howard, Planning Forester 250-837-7691, Peter Gribbon, Practices Forester 250-837-7714

Map 1-4 (Appendix 3) shows the operating areas of BCTS and the area covered by this IPMP. BCTS has chosen not to include some portions of their operating areas in the IPMP area. Vegetation management goals in those areas excluded will be achieved without the use of herbicides.

1.3 TERM OF PLAN

The term of this IPMP will be for 5 years from the date of plan confirmation (July 6st 2016 to July 5st, 2021

1.4 INPUT FROM REVIEW PROCESS

The boundaries and operating practices for the IPMP were developed and finalized using input from stakeholders, First Nations and members of the public who submitted written comments. Additional input on the requirements of wildlife and biodiversity will be incorporated if appropriate. Recommendations from stakeholders were used to refine the boundaries and the vegetation management strategies.

2.0 OVERVIEW AND HISTORY OF PLAN AREA

2.1 Overview of Plan Area

This IPMP applies to crown land contained within BCTS chart areas within the Revelstoke, Golden, and Okanagan TSAs as shown on Maps 1-4 in Appendix 3. Any blocks that BCTS holds silviculture obligation on fall under the jurisdiction of this IPMP.

Appendix 3 contains
Map 1-4 –BCTS Integrated Pest Management Plan Area Scale 1:150,000

2.2 Description of Plan Area

The plan area which is within the Revelstoke, Golden and Okanagan TSA's as shown on map 1-3 Appendix 3 and comprises the following:

- Areas to the north and south of the Trans Canada Highway within the Golden and Revelstoke TSA's.
- Blocks within TFL 23,55 & 56 administered by BCTS
- The peninsula north of Yellow Creek on Kinbasket Lake
- Goosegrass drainage
- Drainages that flow into the Goldstream (including Stitt, Norman Wood, Daydream and Nightmare Creeks)
- Upper portions of the Bigmouth drainage.
- Areas including the Double Eddy and Swan Creek drainages on the south west side of Kinbasket Lake
- The drainages of Blackwater, Succour, Bluewater, Goodfellow and Waitabit Creeks flowing into Kinbasket Lake
- Areas within the Esplanade ranges to the east of the southern end of Kinbasket Lake
- Areas adjacent to Golden in our Mt. Seven operating area. (please see note below regarding Mt. Seven).
- Cirque and twelve mile creek areas
- Areas north and east of Seymour arm on Shuswap lake
- Areas directly north of Trans Canada Highway in the vicinity of Crazy creek
- Areas directly south of the Trans Canada Highway in the vicinity of Craigllachie.

Note that the Operating area of Mount 7 is part of the IPMP however the application of herbicide or use of Triclopyr will not be utilized in this area. All other methods of pest management strategies will be utilized.

2.3 Biogeoclimatic Zones

In the IPMP area main valley elevations range from approximately 410 m (south of Revelstoke) increasing to 790 m asl in Golden, surrounding ridges and mountain peaks rise to 2,000–3,000 m. At lower elevations in the wetter northern and western portions the dominant biogeoclimatic subzones are Interior Cedar-Hemlock wet-cool (ICHwk1), very wet-cool (ICHvk1) and to a small extent moist-warm (ICHmw1, 2 and 3). Upper elevation areas are dominated by Engelmann spruce-Subalpine fir subzones mainly ESSFvc but to a lesser extent ESSFwc1, 2 and 4. The transition between the ICH and ESSF zones occur at approximately 1,280–1,400 m, depending on the subzone-variant and aspect.

In the drier south and eastern portions the subzones at lower elevations are Interior Cedar-Hemlock moist -cool (ICHmk1), wet-cool (ICHwk1), moist-warm (ICHmw1). Upper elevation areas are dominated by Engelmann spruce-Subalpine fir subzones warm, moist (ESSFwm) and wet, cold (ESSFwc 2) and Montane, spruce, dry cool (MSdk).

2.4 Commercial Use

The primary commercial use currently is forestry. A number of heli-skiing and Heli hiking operators have operations in the plan area.

2.5 Public Use

The most accessible blocks are those served by public roads or Forest Service Roads located in the areas closer to the main settlements of Revelstoke and Golden. On the east side of Lake Revelstoke, there is a 2-lane highway that parallels the shoreline that was built to service Mica Dam and is now primarily used by recreationists and logging trucks. In contrast, the west side of the reservoir has limited road access and is accessible only by boat or small ferry, except at the northern end. Areas at the south end of Kinbasket Lake are accessible by logging road. Much of the plan area is accessible only by boat or aircraft, is largely unpopulated and has very little use by the public. Recreation opportunities are limited and access points are well known. All vegetation treatment will be in harvested areas, which are used for a variety of recreational activities such as hunting, fishing and berry picking. No change to the historic use of the plan area by the public is expected to occur over the five year period of this plan.

2.6 History of Pest Management Activities

Over the last five years BCTS has managed vegetation under this IPMP utilizing a wide range of different treatment methods. A variety of vegetation management projects and employed several different techniques within the plan area. In an effort to minimize the competition from brush, prompt planting with large seedlings has been undertaken wherever vigorous brush competition is expected to occur. Broadcast burning has been used effectively in the past for site preparation. It is however difficult to manage given restrictions based on smoke management in addition to unreliable weather. Sheep grazing was attempted in the Revelstoke area several years ago; however, several factors make the use of sheep grazing impractical. Plastic brush mats have been used to suppress brush growth around seedlings but prohibitive costs and poor seedling survival has restricted their adoption in operations. Where brush or deciduous species must be treated to allow the conifers to grow, the goal has always been to choose the most appropriate treatment methods...

2.7 Community Water Supply Areas/ Licensed Domestic Water Intakes

Maps showing Licensed Domestic Water Intakes and Community Water Supply Areas within the IPMP area can be obtained by contacting the BC Timber Sales, Okanagan-Columbia Business Area.

2.8 Pesticides to be used under this IPMP

The two pesticides to be used under this IPMP are Glyphosate and Triclopyr have been carefully selected. Material Safety Data Sheets (MSDS) can be accessed at the following website www.provmweb.com, application rates and optimal treatment timing for both Triclopyr and Glyphosate are contained in Appendix 2. The herbicides may have more than one formulation and equivalent herbicides maybe used (e.g. Vantage and Vision). Surfactants and other additives maybe used to improve efficacy of treatments providing that labels are followed. In addition to Glyphosate and Triclopyr we will be completing a small trial using a biological herbicide for the inhibition of re-sprouting and re-growth from cut stumps of deciduous pest species. This product is called Control Peat Paste and the active ingredient is *Chondrostereum purpureum.*

The primary target species for Glyphosate are ferns (spiny wood and lady fern), thimbleberry, fireweed, raspberry, and bracken. Glyphosate is an amino acid compound which acts as a broad-spectrum, post emergence, translocated herbicide. It is used for control of many annual and deep-rooted perennial weeds including brush species in non-crop areas. Glyphosate is quickly deactivated in soil. It has a low acute toxicity to mammals and to fish. The chemical treatment techniques for Glyphosate are ground foliar with backpack and aerial spray with a helicopter. Triclopyr is a picolinic acid compound, which will give selective control of many woody plants and broadleaf weeds. The primary target species for Triclopyr are willows, Douglas maple and alder. It is

absorbed by the stem or leaves and translocated throughout the plant. It has a low acute toxicity to mammals but has higher fish toxicity. The treatment techniques available for Triclopyr are hack & squirt, stump treatment and thinline. The application of Triclopyr will be restricted to treatment of shrubs including willow, Douglas maple, aspen, birch, alder and cottonwood. The primary target species for Chontrol Peat Paste is alder, willow, poplar species, and Douglas maple. It is a biological herbicide and works by colonizing the cut stump surface which inhibits the resprouting and regrowth from the cut stumps. Chontrol Peat Paste is applied directly to freshly cut stumps by either a paint on or spray on method.

3.0 INTEGRATED PEST MANAGEMENT PROGRAM

Integrated Pest Management (IPM) is an approach to pest management that incorporates concepts such as:

- preventative management
- monitoring pest populations
- establishing treatment thresholds
- evaluating treatment efficacy
- employing adaptive management strategies

IPM uses all available practical techniques to directly deal with pest problems, including biological and physical controls, as well as chemical treatments.

The use of IPM as described in this plan will provide the following benefits:

- the most appropriate vegetation control techniques will be used resulting in minimized environmental impacts
- increased value of future timber crops due to shorter rotations and higher quality crops coming from healthy young plantations
- reduced management costs
- shortened rotation lengths and higher plantation volumes have the effect of making more wood available for future harvest, and reduce the industrial demands made on areas designated for non-timber values
- healthy trees resist pathogens better than unhealthy trees
- Roads can be deactivated earlier, reducing unauthorized hunter access to protected wildlife.

BCTS is committed to the principles and practice of IPM and will use the range of options described in Section 3.1 as part of an integrated program to manage competing vegetation on its forest land.

3.1 IPM Treatment Options

General

From our experience most sites in the ESSF and ICH zones develop a vigorous community of herbaceous and woody vegetation post-harvest, which competes with coniferous seedlings for light, nutrients and moisture. In addition to fierce competition during the growing season, vegetation press associated with the winter snowpack will damage many seedlings. These adverse conditions for the planted seedlings commonly result in the death of seedlings or reduced growth unless the vegetation is managed. The sites treated generally have dense coverage of woody brush and herbaceous vegetation displaying rapid growth. This competing vegetation restricts the amount of light, nutrients and moisture available to crop trees and cause physical damage making the establishment of successful plantations very challenging. In order to protect our investment and meet legal obligations competitive vegetation should be treated promptly.

Table 1 lists treatment options to be considered for BCTS vegetation management programs. The advantages and disadvantages of each are also described in Table 1. A more complete review can be found in the Ministry of Forests "Forest Vegetation Management Manual" (Boateng 2002). Each of the treatment options are to be considered during the assessment of the blocks contained within this permit application.

Most of the options listed in this section rely on using techniques to establish crop trees as rapidly as possible before vigorous communities of non-coniferous species develop. BCTS use bigger stock for planting areas with anticipated brush problems. It is usually necessary to have one winter to allow slash to settle and then to plant as

soon as possible to get the crop trees established before brush complexes develop fully. Broadcast burning is used for site preparation on selected sites

The overall strategy for vegetation management within the IPMP area is an integrated approach. Our experience indicates that the most effective management results from an ecologically based approach identifying site series and using our accumulated knowledge of how brush complexes develop on different site series within our operating areas. As plantations approach the age when free growing requirements have to be achieved some plantations have substantial growth of broadleaved trees (aspen, poplar and birch) as well as willow. Where this broadleaved component is preventing the achievement of free growing status; options are required for treatment.

Table 1

Treatment Method Description with Advantages and Disadvantages

Treatment Method – Silviculture Options

Description: A variety of techniques are available to assist planted trees to outgrow competing brush species. These silviculture options may include use of larger container planting stock, rapid planting after harvesting, and better micro siting of planted trees.

Advantages	**Disadvantages**
• Can produce significant benefits for little input • Environment friendly	• Not always effective in brushiest areas

Treatment Method – Pre Harvest Options for Vegetation Management

Description: During the pre-harvest planning process pest species and their potential impacts on future forest plantations are considered. As part of this planning process the anticipated pest hazard after harvest is estimated for each proposed cut block. These pest hazard estimates are based on known site-specific characteristics based on site series and/or on past experience with similar sites in the same geographic area. Based on these estimates pest management options are considered to mitigate future vegetation management issues. Some of the pre harvest options may include the following

- partial retention silviculture systems
- harvest season
- the management of soil

Advantages	**Disadvantages**
• -few environmental concerns • -potentially large return for little input	• often not complete solution to pest management

Treatment Method - Biological brushing

Description: Sheep grazing can be used for controlling brush round conifer

Advantages	**Disadvantages**
• Benefits sheep by providing forage • Few environmental concerns	• In order to utilize sheep grazing, a licensee must have an adequate number of hectares to satisfy a herd for the season • Potential of losses to the sheep • The sheep have to acquire a taste for the weed vegetation and initially conifer crop trees may suffer damage from browsing and animals treading on trees • Control of brush for 1 year only • Sheep grazing seems to be more effective on a two or three pass system, which can make costs very prohibitive • the public also has a negative attitude when a sheep herd takes potential jobs away from the community. • Over 60% of the area harvested by BCTS within the IPMP area is on slopes too steep for sheep to navigate

Treatment Method - Brush mats.

Description: Brush blankets made from biodegradable plastic are available to control brush by mulching the competing vegetation

Advantages	**Disadvantages**
• may give the conifers relief for a number of growing seasons following treatment; • few environmental concerns	• timing is very important • Snow creep and competing vegetation often move the mats making them ineffective

	• Voles often eat mats • not satisfactory when used on vigorous herbaceous perennial vegetation • expensive
Treatment Method - Manual brushing and weeding **Description** Treatment of competitive species is accomplished by manually cutting the brush surrounding crop trees with a handheld tool. For older established woody species the manual option is to cut and remove the competing stems from the growing space of crop trees using chainsaws.	
Advantages	**Disadvantages**
• provides employment • very target specific • Few environmental concerns • Can be used throughout the year – few operational or legal restrictions	• can be expensive • may only give the conifers relief for the season of treatment; • unsatisfactory when used on vigorous herbaceous perennial vegetation • Manual cutting promotes suckering resulting in even denser vegetation surrounding the crop tree in future years. • often results in inadvertent damage to leaders and branches of conifers as dense vegetation --makes it very difficult to locate planted seedlings • recognized by WCB as one of the highest risk groups for forest worker safety • removal of cut stems surrounding the crop trees is difficult • Risk of physical injury to workers; risk increases with repetitive entries. • Motorized saws expose workers & environment to toxic fumes • Difficult to use on areas with Cedar regeneration as this species blends in easily with competing vegetation.
Treatment Method - Prescribed Fire **Description:** Harvested sites have controlled burns to reduce slash loads and control residual vegetation	
Advantages	**Disadvantages**
• Results quickly obtained • Can be inexpensive • Simulates natural processes • Assists in hazard reduction	• Non-selective • Risk of wildfires • Negative air quality impacts • Limited number of days with suitable atmospheric conditions • Limited brush control and can exacerbate brush problem
Treatment Method - Manual girdling **Description:** Use of tool to cut away bark and cambium of competing deciduous trees	
Advantages	**Disadvantages**
• Extremely target specific • Few environmental concerns • Can be used throughout the year – • Conifer crop trees can be slowly released – reduced sun shock • Few operational or legal restrictions • Target specific	• Largely ineffective on smaller stems • Seed crop may be produced before girdled trees die. • Under story shrubs may increase following treatment • Seasonal constraints on treating smaller stems • Expensive • Risk of re-treatment due to sprouting or coppicing
Treatment Method -Aerial herbicide pre planting as site prep **Description:** Herbicide is applied by helicopter over area before trees are planted	
Advantages	**Disadvantages**
• allow young seedlings to be planted in an environment with little competition for light nutrients or moisture therefore letting trees gain sufficient height and caliper so that they can escape suppression from competitive weed species • often the least expensive • the longest term of weed control • Aerial application allows large areas to be treated in a relatively short time. This is of particular advantage in the Columbia Wet	• Risk of spraying areas not intended for treatment • Loss of employment opportunities for local community • Poor option where numerous creeks exist • Public may have environmental concerns • Potential impacts on fish and wildlife habitat

Belt where high annual rainfall and unpredictable weather patterns make a sustained spray window uncommon • Option for steep areas, areas with no vehicle access, are suited to aerial application method	
Treatment Method - Aerial post planting herbicide **Description:** Herbicide is applied by helicopter over the planted trees	
Advantages	**Disadvantages**
• Same advantages as Aerial herbicide pre planting as site prep	• Same disadvantages as Aerial herbicide pre planting as site prep • Certain conifer species will be killed if over sprayed • Conifer species must be dormant
Treatment Method - Ground based pre planting herbicide as site prep **Description:** Herbicide is applied manually at ground level using a backpack applicator. Either as a broadcast or spot application of Glyphosate to leaves of target species using backpacks sprayers.	
Advantages	**Disadvantages**
• allows young seedlings to be planted in an environment with little competition for light, nutrients or moisture therefore letting trees gain sufficient height and caliper so that they can escape suppression from competitive weed species • very effective in controlling most major target species • Spot applications quite target specific • often less expensive than the majority of treatment options • longest term of weed control • permits treatment of only target species and avoidance of desirable species	• Treatment layout costs often significant • Limited to short vegetation • Potential impacts on fish and wildlife habitat • Significant seasonal treatment constraints. • Public may have environmental concerns • Risk of spraying areas not intended for treatment • Possible exposure of operators to herbicide • This application method is impractical if target vegetation is taller than the applicator • Herbicide application rates are similar to aerial rates; however, consistent coverage is more difficult to attain than with aerial.
Treatment Method - Ground based post planting herbicide **Description:** Herbicide is applied manually at ground level using a backpack applicator post planting either as a broadcast or spot application of Glyphosate to leaves of target species using backpack sprayers.	
Advantages	**Disadvantages**
• Same advantages as ground based pre planting as site prep	• Same disadvantages as ground based pre planting as site prep • Certain conifer species will be killed if over sprayed • Conifer species must be dormant
Treatment Method - Basal bark stem treatment **Description:** for older established woody species either by hack and squirt or by basal bark treatments of individual trees. These treatments are directed at only those individual stems which threaten individual conifers ability to be classed as free growing.	
Advantages	**Disadvantages**
• allow young seedlings to be planted in an environment with little competition for light, nutrients or moisture therefore letting trees gain sufficient height and caliper so that they can escape suppression from competitive weed species often less expensive than the majority of treatment options • the longest term of weed control permits treatment of target species and avoidance of desirable species	• Public may have environmental concerns • Possible exposure of operators to herbicide • Triclopyr has higher toxicity to fish than Glyphosate
Treatment Method – Roadside application of Herbicide **Description:** Herbicide is applied manually at ground level using a backpack applicator, boom sprayer, power hose/ nozzle either as spot or broadcast applications of Glyphosate to leaves of target species along road right a ways.	
Advantages	**Disadvantages**
• Can be effective for multiple years • Cost effective method of controlling roadside brush to ensure safe sight lines along roads. • very effective in controlling most major target species • Spot applications quite target specific	• Potential impacts on fish and wildlife habitat • Significant seasonal treatment constraints. • Public may have environmental concerns • Possible exposure of operators to herbicide

Treatment Method – Roadside application of Triclopyr Description: for older established woody species either by hack and squirt backpack sprayer, boom sprayer, power hose, Nozzle, spray bottle, or modified brush saw or basal bark treatments of individual trees along roadsides.	
Advantages	**Disadvantages**
• Can be effective for multiple years • Cost effective method of controlling roadside brush to ensure safe sight lines along roads. • very effective in controlling most major target species • Spot applications quite target specific	• Potential impacts on fish and wildlife habitat • Significant seasonal treatment constraints. • Public may have environmental concerns • Possible exposure of operators to herbicide • Triclopyr has higher toxicity to fish than Glyphosate
Treatment Method - Biological herbicide treatments **Description:** Biological herbicide is applied directly to a freshly cut stump during the growing season. Chontrol Peat Paste is a non-chemical herbicide that contains micro-organisms as the active ingredient (*Chrontrostereum purpureum*) Peat Paste is designed to inhibit resprouting and regrowth from cut stumps of alder and has also been effective on aspen and cherry. We will be performing a trial of Chontrol Peat Paste on willow, alder, maple, poplar, and birch species.	
Advantages	**Disadvantages**
• Environmentally safe • Can be applied in proximity to water • Can be effective for multiple years	• Not tested on many of our pest species • Can be labour intensive to apply

Treatment Method – Pre Harvest Herbicide or Basal Bark Stem Treatment **Description:** Herbicide is applied manually at ground level using a backpack applicator either as spot or broadcast applications of Glyphosate to leaves of target species or by hack and squirt or by basal bark treatments of Triclopyr to individual trees prior to harvest commencement.	
Advantages	**Disadvantages**
• allows young seedlings to be planted in an environment with little competition for light, nutrients or moisture therefore letting trees gain sufficient height and calliper so that they can escape suppression from competitive weed species • very effective in controlling most major target species • Spot applications quite target specific	• Potential impacts on fish and wildlife habitat • Significant seasonal treatment constraints. • Public may have environmental concerns • Possible exposure of operators to herbicide • Triclopyr has higher toxicity to fish than Glyphosate • Treatment layout and costs can be significant

Treatment Method – Roadside clearing through physical removal of vegetation by ripping out shrubs mechanically. **Description**: physically ripping out vegetation using excavator equipment or by hand.	
Advantages	**Disadvantages**
• Environmentally safe • Can be applied in proximity to water • Can be effective for multiple years	• Very Expensive • Causes erosion of cut slopes and fills lopes along the road side.
Treatment Method – Physical cutting of roadside vegetation **Description:** Mechanically cutting roadside vegetation using brush saw, power saw, or excavator type equipment with brushing attachment.	
Advantages	**Disadvantages**
• Environmentally safe • Can be applied in proximity to water	• Expensive • Encourages the re-sprouting and quick re-growth of vegetation.

3.2 Competitive Vegetation

Most common competitive vegetation is well known and readily identified. If necessary, references such as Trees, Shrubs and Flowers (Lyons 1976) will be used to confirm identification.

Common vegetative pests of forest plantations in the IPMP plan area. (**Table 2**) can be divided into the following three categories based on their height class within the forest structure, from forest floor to canopy

Table 2
Common Target Brush Species Requiring Treatment in Columbia Forest District

Herbaceous	Small Shrubs	Large shrubs & trees
Bracken fern Lady fern, Spiny Shield Fern Fireweed	Rubus species Thimbleberry Elderberry Rhododendron False azalea	Alder spp Douglas maple Populus species Willow Birch

A description of the major competitive species is as follows:

Thimbleberry *(Rubus parviflora)* is common throughout the wetter and richer portions of the entire management area. It is often very competitive with newly planted conifers. Ferns, Spiny Wood Fern (*Dryopteris expansa*) and Lady Fern (*Athyrium filix-femina*), are common throughout the plan area. It is found on the wetter sites. It is frequently a competitor for light, water, and nutrients. It forms a low continuous mat, and in so doing chokes off all conifers that are under its canopy. Bracken (*Pteridium aquilinum)* arises from rhizomes. On moderate to rich sites, where it attains heights greater than one meter, this species will cause physical damage to conifers as presses on the trees - often after snowfalls. Competition for light is only moderate, but in well-established patches the species appears to exclude other plants, perhaps as a result of allelopathy and this retards conifer growth and, in combination with light deprivation, can cause mortality. Broadcast foliar treatments of the species are warranted in these thicker patches. Bracken is very competitive in the ICH and ESSF zones. Fireweed (*Epilobium angustifolium*) is common throughout the plan area. It arises from seed banks and can be a serious competitor... False azalea (*Menziesia ferruginea*) and Rhododendron (*Rhododendron Albiflorum*) are common throughout the area of the plan. They occur with vaccinium species on similar sites. In some situations they can create severe competition with conifer crop tree growth. Paper birch *(Betula papyifera*),black cottonwood (*Populus balsamifera),* aspen (*Populus tremuloides),* Douglas Maple *(Acer glabra),* alder species (*Alnus spp)* and willow species (*Salix spp*) are all common woody species that compete with crop trees throughout the plan area. They often interfere with conifer growth as the trees approach free growing and treatment is required. In addition the woody species mentioned above often cause road side sight line safety issues. These species can colonize cut slope and fill slope areas as well as ditch lines along roads and impair the vision of traffic on these roads. Methods to maintain safe sightlines include herbicide, manual cutting and physical removal.

3.3 Monitoring

BCTS staff or contractors will make an initial determination of potential competing vegetation concerns at a site prior to it being harvested when collecting field data for Site Plans. Following harvesting, BCTS staff will carry out the following activities:

a) Post Harvest Plan Preparation

A post harvest plan will be developed for each unit by BCTS RPF or RFT staff with experience in vegetation management within the Interior Wet Belt. The post harvest plan will determine the treatments planned based on the requirements set out in the Silviculture Prescription / Site Plan and / or stocking standards. For road right of ways BCTS is required to maintain safe sight line on all active roads.

The following site characteristics may be considered as part of this evaluation:

- pest species present
- ungulate browse
- brush seed sources
- brush species present
- forest floor characteristics
- brush growth vigour
- slash distribution

- Spatial distribution of competing brush
- Availability of plantable spots
- Environmental conditions that may affect treatment selection (e.g., stream class, location and density, wildlife use)
- Safe sightline requirements on active roads.

b) Regeneration Surveys

BCTS conducts regeneration surveys as required dependent on the degree of brush competition and performance of crop trees. Vegetation competition information will be collected and recorded during these surveys if current conditions or site series ratings indicate potential brush problems. Data collected will include:

- Crop tree species, density, height and vigor
- Height (mean or mode - most common), species and density of competing vegetation (% cover or stems per ha)
- Environmental conditions that may affect treatment selection (e.g., stream class, location and density, wildlife use)
- Distribution of conifer crop trees and competing vegetation (e.g., clumped, scattered or uniform).

c) Preparation of annual vegetation management program

The annual vegetation management program will be scheduled within the RESOURCES database by a Registered Professional Forester each year prior to commencement of field season. The Integrated Pest Management Decision Model (Appendix 1A, 1B, 1C) will be used as a standard process for arriving at pest management decisions. Pest management options will be reviewed in consideration of existing and/or anticipated pest hazards. Optimal treatment thresholds for crop trees will be determined based on pre-treatment evaluations and on past experience with similar sites, and a pest treatment regime will be chosen on that basis. The strategies listed in 3.6 give broad guidance around which individually tailored treatments can be scheduled for each stratum. Glyphosate treatments will be a treatment option on the site series identified in table 3. Small areas with site series with Severity Ratings of Low (L) or Medium (M) maybe treated.

d) Detailed Site Assessments

Detailed Site Assessments (DSA) as described in section 6.4.11 will be conducted prior to planned treatments. Data may be collected to confirm or supplement the information from regeneration surveys. BCTS or contractor personnel using quantitative plots and/or "walk-through's" in areas will normally do these assessments. No sites will be treated with herbicide unless experienced personnel have completed a DSA.

Table 3 ***Treatment Options based on Potential Competition from Small Shrubs and Herbaceous Vegetation by Site Series***

Biogeo Subzone	Site Series	Vegetation Competition Severity Rating*	Treatment Options
ICHwk1	01	H	All vegetation management options may be considered
	02	L	Glyphosate- limited use only
	05	VH	All vegetation management options may be considered
	04	M-H	All vegetation management options may be considered
	06/07	VH	Glyphosate- limited use only
	08/09	VH	Glyphosate- limited use only
ICHvk1	01	H-VH	All vegetation management options may be considered
	03	L-M	Glyphosate- limited use only
	05	H-VH	All vegetation management options may be considered
	04	M-H	All vegetation management options may be considered
	06-	N/A	Glyphosate- limited use only
ICHmw1	02	L	Glyphosate- limited use only

	03	L	Glyphosate- limited use only
	04	M	All vegetation management options may be considered
	01	M	All vegetation management options may be considered
	05	H	All vegetation management options may be considered
	06	M	Glyphosate- limited use only
	07	M	Glyphosate- limited use only
ICHmw2	02	L	Glyphosate- limited use only
	03	L	Glyphosate- limited use only
	04	M	Glyphosate- limited use only
	01	M	All vegetation management options may be considered
	05	H	All vegetation management options may be considered
	06	M	All vegetation management options may be considered
	07	M	All vegetation management options may be considered
	08	M	All vegetation management options may be considered
	09	M	All vegetation management options may be considered
ICHmw3	02	L	Glyphosate- limited use only
	03	L	Glyphosate- limited use only
	04	M	All vegetation management options may be considered
	01	M	All vegetation management options may be considered
	05	H	All vegetation management options may be considered
	06	M	All vegetation management options may be considered
	07	M	All vegetation management options may be considered
	08	M	Glyphosate- limited use only
ICHmk1	03	L	Glyphosate- limited use only
	04	L	Glyphosate- limited use only
	01	M	All vegetation management options may be considered
	05	M	All vegetation management options may be considered
	06	H	All vegetation management options may be considered
	07	VH	Glyphosate- limited use only

Table 3(continued) Treatment Options based on Potential Competition from Small Shrubs and Herbaceous Vegetation by Site Series

Biogeo Subzone	Site Series	Vegetation Competition Severity Rating*	Treatment Options
ESSFwc1	01	H-VH	All vegetation management options may be considered
	02	M	Glyphosate- limited use only
	03	H-VH	All vegetation management options may be considered
	04at	H-VH	Glyphosate- limited use only
	05-t	H-VH	Glyphosate- limited use only
ESSFvc	01	H	All vegetation management options may be considered
	02	L	Glyphosate- limited use only
	03	L-M	All vegetation management options may be considered
	04	H-VH	All vegetation management options may be considered
	05	VH	Glyphosate- limited use only
	06	VH	Glyphosate- limited use only
ESSFwc2	01	H	All vegetation management options may be considered
	02	L	Glyphosate- limited use only
	03	L-M	Glyphosate- limited use only
	04/05	M	All vegetation management options may be considered
	06	H-VH	All vegetation management options may be considered

	07	VH	Glyphosate- limited use only
	08-	VH	Glyphosate- limited use only
	09	VH	Glyphosate- limited use only
	10	VH	Glyphosate- limited use only
ESSFwc4	02	L	Glyphosate- limited use only
	03	L M-	Glyphosate- limited use only
	04	H	All vegetation management options may be considered
	05	H-VH	All vegetation management options may be considered
	06	H-VH	All vegetation management options may be considered
	07	VH	Glyphosate- limited use only
	08	VH	Glyphosate- limited use only
ESSFdk	02	L	Glyphosate- limited use only
	03	M	All vegetation management options may be considered
	04	L	Glyphosate- limited use only
	01	M	All vegetation management options may be considered
	05	M	All vegetation management options may be considered
	06	M	All vegetation management options may be considered
	07	M	All vegetation management options may be considered
ESSFwm	02	L	Glyphosate- limited use only
	03	M	All vegetation management options may be considered
	01	M	All vegetation management options may be considered
	04	M	All vegetation management options may be considered
MSdk1	02	L	Glyphosate- limited use only
	03	L	Glyphosate- limited use only
	04	L	Glyphosate- limited use only
	01	M	All vegetation management options may be considered
	05	M	All vegetation management options may be considered
	06	M	All vegetation management options may be considered
	07	M	All vegetation management options may be considered

*Severity ratings are locally developed and constitute the sum of locally based knowledge over the past 20 years

3.4 Treatment Thresholds

It is anticipated that the preventative measures described earlier in this document will help reduce the need for direct treatments on many sites within the plan area. When necessary however, vegetation will be treated either by manual methods or herbicide. A herbicide treatment may be prescribed if it seems likely that:

a) Vegetation currently competing with potential conifer crop trees will in all likelihood prevent an adequate number of potential crop trees from reaching free-growing status; or
b) Vegetation not currently competing with conifer crop trees but where forest site, conifer stocking, target species, and other information strongly indicate that competition will prevent an adequate number of potential crop trees from reaching free-growing status.

3.5 Vegetation Management Strategies for BCTS

The overall strategy is for rapid restocking to reduce the need for subsequent management inputs. Studies have demonstrated that conifer crop trees have the greatest response to competing vegetation control when treatments are applied before competition becomes severe. If conifer seedlings are left under competition for an extended period, their ability to respond to the treatments is reduced because of changes to their physiology and crown development. Moreover, since young seedling growth is exponential, increases in their initial growth rates will be reflected in significant size gains as they mature.

Other benefits from aggressive and early intervention on brush prone sites include:

a) Easier identification of conifer seedlings by silviculture workers, thus minimizing damage to them and allowing treatments to be restricted to an area around them, rather than more general treatment of the site.
b) Reduced herbicide use or manual cutting requirements as target species will be smaller and less frequent.

BCTS recognizes that reduced management inputs result from well-planned treatments and have developed the following strategies.

3.5.1 Strategy for Site Prep

Sites that have been recently harvested and are planned for planting have a Post-Harvest Plan prepared which addresses plantability. Vegetation competition (herbaceous/small shrub) is not always fully expressed but factors such as the biogeoclimatic variant, site series, competition severity ratings, vegetation complex and previous experience with similar sites in the area may lead vegetation managers to conclude that treatments may be necessary. Table 3 gives ratings and lists treatment options for individual site series to allow identification of problem areas prior to planting and develop a plan tailored to that site.

3.5.2 Strategy for younger stands

Regeneration Surveys on established conifer crops by either BCTS silviculture staff or contractors will (if required) stratify potential openings into areas that require brushing and / or fill planting.

On the brushiest sites experience shows that herbicide treatment is the most effective option. The intent is to chemically treat blocks or portions of blocks where weed competition is limiting seedling growth and survival. Also, in order to reduce overall herbicide application rates, ground based spot treatments will be used where feasible. Monitor and revise strategy if required.

3.5.3 Strategy for stands approaching free growing

Undertake pre free growing/brush surveys prior to legal time frame to develop brush management prescriptions where required.

Competition from woody deciduous species like alder, Douglas maple, willow, birch, aspen and cottonwood on young conifers normally lasts significantly longer than that associated with the herbaceous and shrub species noted in the previous section. A single large alder or maple coppice can also potentially affect the free-growing status of a large number of conifer crop trees. However, most conifer stands can tolerate, and in some cases even benefit from, relatively low densities of deciduous trees and the overall impact of such deciduous competition remains under study. In the interim, BCTS will control woody deciduous species if their height, density, and distribution are currently or projected to prevent the licensee from meeting free-growing obligations.

The vast majority of sites do not require any intervention with competition to crop trees not being sufficient to impact free growing status. It is our intention to chemically treat only the portions of the block where broadleaved species competition is impacting free to grow status on enough trees to threaten free growing status of the entire block. This has been shown to leave significant amounts of deciduous trees in treated stands

3.6 Herbicide Application Rates

The three herbicides that will be used under this IPMP are Glyphosate and Triclopyr and Chontrol Peat Paste *Chondrostereum purpureum*. Their respective application rates and methods, advantages and limitations and management procedures as compared to non-herbicide treatments, are described in Table 1 and Appendix 2. Appendix 2 provides further detail on Application Rates and Optimal Treatment Timing for Glyphosate and Triclopyr and Chontrol Peat Paste.

All pesticide treatments will be conducted as per this IPMP and federal and provincial legislation (in place at time of treatment) regulating the use of pesticides.

3.7 Evaluation of Operational Practices

BCTS is continually examining vegetation management practices to improve the efficacy and cost effectiveness of these practices. Specifically, BCTS may undertake:

a) An examination of the appropriateness of planting stock selections and the growth performance of this material after planting.

monitor the performance of seedlings in different microsites and make changes to the tree planting specifications and vegetation management practices based on these findings

4.0 Management Practices and Procedures

Section 3 lists the operational vegetation management techniques used by BCTS. All the treatment methods listed in 3 may be prescribed. Manual cutting or girdling will also be used if necessary in pesticide-free zones, buffer zones, and other areas where pesticide use is precluded by environmental or other considerations.

Pesticide applications will only be directed towards vegetation competing with conifer crop trees or to prepare sites for planting or to assist in roadside brushing activities. Ground-based applications will normally involve broadcast or spot treatments. Sites considered for aerial Glyphosate applications will need to meet a number of criteria, including:

- A uniform distribution of target species requiring treatment that are less than 3 meters in height;
- No environmentally sensitive areas that could be impacted by aerial treatments;
- No operational constraints to aerial application, such as topography, obstacles such as snags, and frequent no-treatment areas.

Section 5 lists the steps to be taken to protect the environment.
Section 6 describes the specifications and standards to be followed

5.0 ENVIRONMENTAL PROTECTION

5.1 Domestic Water Intakes

The domestic water sources present in the IPMP area 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.

5.2 Fisheries Resources and Riparian Areas

In this IPMP, BCTS 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.

5.2.1 Strategies to Protect Fish and Wildlife 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 Site Plans. Herbicide field layout contractors must identify all applicable water bodies.

All pesticide applications covered by this plan along or around bodies of water, dry streams and classified wetlands must have a 10 m PFZ measured from the high water mark of the body of water, dry stream or classified wetland.

However the following exceptions apply for glyphosate applications for forestry uses:

1 Along or around a body of water or classified wetland that is: not fish-bearing at any time of the year and does not drain into fish-bearing body of water within 100m. A 2m PFZ applies but selective application methods must be used between 2m and 10m above the high water mark

2 Along or around a temporary or a free-standing body of water that
   - is not a classified wetland nor a wildlife habitat feature and is not fish-bearing at any time of year and does not drain into fish-bearing body of water within 100m. No PFZ required but no glyphosate to be applied below the high water mark.
   - is not a wildlife feature is not fish-bearing does not drain directly into a fish-bearing body of water within 100ms and is either smaller than 25m 2 or not a wetland. No PFZ required.

3 **Dry stream** that is not a wildlife habitat feature or fish-bearing when wet and does not drain directly into a fish-bearing body of water within 100m. No PFZ is required

5.3 Wildlife Values

"Wildlife Habitat features" are identified pre-harvest and are managed through approved Silviculture Prescriptions, Site Plans, Forest Development Plans, or Forest Stewardship Plans. Wildlife Habitat features include:

- Mule Deer Ungulate Winter Range; and
- Caribou Ungulate Winter Range

The application of herbicides will be consistent with the protection measures stated in those operational plans.

The species of greatest concern due to their intrinsic connection to forest development and therefore vegetation management are the grizzly bear and the mountain caribou. The intent of this IPMP is to address habitat management issues for these species of concern and will be consistent with Higher Level Plan Strategies and Objectives. The following standards will be employed to protect species of concern:

- In areas that overlap with caribou habitat as specified in a GAR order pertaining to Mountain Caribou the retention of ungulate forage (willow, Douglas maple) is not desirable in order to help regulate moose populations. The build up of moose in the area well above historic levels has brought in an increasing number of predators that are believed to be predating on the endangered caribou.
- Ungulate Winter range - in the non - caribou portion of the IPMP area the retention of ungulate forage (willow, Douglas maple) may be desirable
- Areas of productive Vaccinium spp will be avoided wherever possible.
- Moist areas such as those containing skunk cabbage, horsetail, carex spp, lily spp, cow parsnip, sedge are preferred forage areas for grizzly bears and will be avoided wherever possible.

5.4 Vulnerable Plant Species

BCTS had a Plants and Ecosystems at Risk study and report completed in March of 2009. This report lists 2 red listed plant species in the ICHmk (Dark lambs quarters and Smoothe goldenrod), 3 red listed plants species in the ICHmw (Mountain moonwort, smooth goldenrod, cup clover), 1 red listed plant in the ICHwk (mountain moonwort). When operations are prescribed in these BEC zones the identification of these plants will be made aware to the applicators and these plant species will be avoided.

5.5 Human consumption food protection

First Nations and stakeholders use berry plants and other special plants for food and medicinal purposes. We will seek to learn of important berry-picking and medicinal plant harvest areas during the IPMP public review and comment and during First Nations consultation sessions. On areas identified with food or medicine plants intended for human consumption, BCTS will attempt to prevent exposure to herbicides through avoidance of treatment, timing of treatment, selective treatments, or using non-herbicide treatments. All blocks treated with herbicides will have signs located from all approaches as required by the IPM regulations.

5.6 General Biodiversity Considerations

BCTS's general approach to vegetation management emphasizes target-specific application techniques that minimize impacts on non-target species and provides for retention of competing deciduous tree and shrub species wherever practical. This will ensure that many of the required habitat attributes for a large variety of smaller species such as birds and fur-bearers will be maintained. Measures to promote retention of stand biodiversity include:

- When required use of spot applications around conifer crop trees, leaving other target species untreated
- Only using herbicides when silviculturally necessary
- Retaining untreated areas associated with pesticide-free zones, buffer zones, wildlife tree patches, etc.

6.0 SPECIFICATIONS AND STANDARDS

The following specifications and standards reflect BCTS's commitment to conducting vegetation management programs in a safe and effective manner. Some of the standards discussed in this section have been derived from recognized government and industry sources; rather than repeating them verbatim in this plan, reference is made to their source documents. These documents are available for viewing by written request. BCTS project supervisors will use checklists, similar to those in the MOF Herbicide Field Handbook (Revised), edited by

Boateng (2002) or in the 1992 Canadian Vegetation Management Alliance manual "Industry Standards and Good Practices for Vegetation Management".

6.1 Personnel Qualifications for Plan Development, Implementation and Signing Authority

This plan was developed under the supervision of a Registered Professional Forester (RPF). Pre- and post treatment site assessments will be carried out by technical or professional staff with a least 5 years of experience in silvicultural surveys and/or vegetation management. Final approvals regarding treatment areas and methods will be made by a forester with at least 5 years of experience in vegetation management.

6.2 Worker Training and Protection

All pesticide treatments will be done by or directly supervised by applicators certified by BC Environment under the appropriate applicator category. A certified applicator can still supervise up to four uncertified individuals. However, these uncertified assistants are now required to complete specific training to ensure they can safely apply pesticides. Vegetation management contractors applying herbicides for BCTS under this plan will be contractually obligated to provide their workers with the following:

- Copies of Material Safety Data Sheets for any herbicides used under this IPMP
- Protective clothing and equipment in accordance with that contained in the table on page E-7 of the MOF Herbicide Field Handbook (Revised), edited by Boateng (2002)
- a first aid kit and wash (including eyewash) facilities at or near treatment areas

6.3 Equipment Maintenance and Calibration

Ground foliar application equipment will be calibrated as described on page C-1 of the MOF Herbicide Field Handbook (Boateng 2002) at least once per spray season. Contractors applying herbicides aerially must have their systems calibrated in accordance with approved Ministry of Forests Lands and Natural Resources procedures and have their sprayer calibrations checked by the Ministry. Applicators will also have to ensure their equipment is maintained and serviced in accordance with manufacturers' instructions.

6.4 Safe Herbicide Handling Practices

Standards set out in the Regulation are intended to ensure that any person storing, transporting or using a pesticide does so only in a manner that minimizes hazards to human health and the environment.

6.4.1 Transport

Pesticides must be transported in a manner that is sufficient to prevent escape, discharge or unauthorized removal of the pesticide from the transport vehicle; and that prevents contamination of food or drink intended for human or animal consumption, or of household items such as furnishings, clothes, toiletries, or bedding.

- herbicide to be carried in a secure lockable compartment;
- herbicide to be transported in original labeled container;
- herbicide to be carried separately from food, safety gear and people;
- spill equipment to be carried on vehicle; and
- appropriate documents and placards to be carried in or placed on vehicle during transport.

6.4.2 Storage

A pesticide must be kept, handled, stored or transported in the container in which it was originally packaged and with the label originally affixed by the manufacturer, or in an appropriately designed and labeled container. Pesticides (other than domestic or excluded pesticides) must be stored in a storage facility that is:

- separated from (and not used for storage of) food intended for human or animal consumption;
- ventilated so that pesticide vapors are vented outside;
- Locked when unattended; and
- Accessible only to persons authorized by the person storing the pesticide.

Each door providing access to a pesticide storage facility must have a sign that is clearly visible to a person approaching, with the words "WARNING: CHEMICAL STORAGE – AUTHORIZED PERSONS ONLY" written in block letters. Fumigants and other pesticides that release vapors and bear a "poison" symbol on the label must be stored in a facility that is not attached to or within a building used for living accommodations.

Within 60 days after starting to store pesticides at a location, a pesticide licence or confirmation holder must provide notice of the storage location to the fire department closest to that location
The storage is equipped with necessary spill equipment, first aid kits, and the appropriate Material Safety Data Sheets of herbicides stored.

6.4.2 Mixing and loading

Mixing and loading of herbicides will be conducted as per instructions contained on page F-2 of the MOF **Herbicide Field Handbook**, (Revised), edited by Boateng (2002) as well as chapter 5 of **Handbook for Pesticide Applicators** and according to label directions. In addition, a pesticide spill kit and contingency plan will be maintained at the mixing and loading sites.

6.4.3 Treatment area layout

a. Ground-based applications: All Pesticide Free Zones will be marked prior to treatment with flagging ribbon. The creeks themselves may be flagged with ribbon. This will aid the field staff when installing the PFZ's. The treatment boundaries will be flagged when necessary. The ribbons will be hung at eye level, and will be hung close enough together so that the applicator can easily distinguish and follow the boundaries.

b. Aerial applications: All boundaries will initially be flagged prior to treatment with ribbon. In the days before the proposed treatment, large bags will be hung along the boundary to provide a better visual boundary for the pilot and applicator.

c. Individual Stem Based Operations: Boundaries may be based on geographical features. Flagging tape may be hung at the road edge with the rest of the boundary following a geographical feature. All Pesticide Free Zones will be flagged prior to treatment with flagging ribbon.
Deployment of flagging tape and bags will occur just prior to project commencement to help ensure changing weather does not change the size or location of watercourses.

6.4.4 Weather monitoring

An anemometer, thermometer, and when appropriate, relative humidity measurement equipment will be used at the treatment sites before and during foliar applications to ensure weather conditions are suitable for herbicide application. Foliar treatments will only be carried out when:

- Temperatures are less than 30 degrees Celsius for ground spraying or below 26.5 degrees Celsius for aerial spraying
- Wind speed is less than 8 km per hour
- For aerial spraying, when relative humidity is greater than 50%. 40% relative humidity may be accepted if drift control nozzles are used
- For ground spraying, when relative humidity is greater than 30%
- No precipitation is anticipated within the window of product rain fastness
- There is not a temperature inversion present
- Wind is not blowing in the direction of environmentally sensitive areas
- The applicator crew foreman will be responsible for shutting down operations if the above criteria are not met.

Weather readings will be recorded on appropriate forms and kept in BCTS files for at least three years after project completion.

6.4.5 Environmental monitoring

For foliar applications, BCTS and contractor staff may deploy and monitor drift cards in or near pesticide-free zones to help ensure spray drift is not entering these zones. Site monitors will maintain continual contact with applicators and operations will be curtailed if encroachment of spray into Pesticide Free Zone occurs or seems imminent. The applicator crew foreman will be responsible for shutting down operations if this proves necessary.

6.4.6 Container disposal

Residual herbicide and herbicide containers will be disposed of as per the MOF Herbicide Field Handbook, (Boateng, 2002, p. F-11). Emptied herbicide containers will be triple-rinsed and the rinsate will be added to the

spray mix for application to treatment areas. All used containers will be accounted for, crushed and taken to an approved landfill site.

6.4.7 Cleaning and Storage of Herbicide Spray Equipment

Herbicide spray equipment will be cleaned and stored as per the MOF Herbicide Field Handbook, p F-12.

6.4.8 Emergency response

Herbicide spill kits containing the materials listed on page G-4 of the MOF Herbicide Field Handbook (Boateng 2002) will be available at or near treatment sites. Included in these kit(s) will be a spill contingency plan that will be reviewed with applicators and mixing/loading personnel prior to the start of each project

A spill contingency plan consisting of the following information will be used:

- reporting procedures and telephone numbers
- reporting responsibilities (i.e.--- who will be responsible for reporting any spills or other accidents that may occur during pesticide application)
- minimum contents of the spill kit that must be on-site during pesticide application and transport, such as absorbent materials, shovels, bags, labels, gloves, etc.
- instructions regarding the cleanup procedures to be followed in the event of a spill
- locations where the spill plan will be posted during application and transportation

Both the spill kits and contingency plans must be approved by a representative of BCTS prior to project commencement.

This plan will be reviewed with applicators and mixing/loading personnel prior to the start of each project. Herbicide spill kits based on p. G-4 of the MOF Herbicide Field Handbook (Boateng 2002) will be available at treatment sites.

6.4.9 On-site treatment notification

Unless otherwise approved by the Deputy Administrator, *Pesticide Control Act* signs giving notice of herbicide treatments will be placed at the access points of treatment areas at least 48 hours prior to project , and will remain in place for at least 60 days after completion of treatments.

Each sign will contain information as specified in Section 63 (1) of the Integrated Pest Management Regulation.

6.4.10 Treatment Notices

Notification of Intent to Treat

At least 21 days before the first use of pesticide in each calendar year, a confirmation holder must submit an annual notice of intent to treat to the Administrator. The notice must contain the following information related to the intended use of pesticide:

- The name and business location of the confirmation holder;
- A description of the proposed treatment locations for the calendar year and a map or diagram that clearly identifies those locations;
- A description of the proposed treatment for each area, including the pesticide to be used and its method of application; and
- The total area of treatment areas in the proposed treatment locations for the calendar year. The information provided by the confirmation holder in the annual notice of intent to treat must be based on a detailed map or diagram prepared and retained by the confirmation holder showing proposed treatment areas and the geographic features that require a pesticide-free zone or no-treatment zone. The detailed maps or diagrams are to be provided to the Administrator within three business days if requested. A confirmation holder must ensure that a person applying a pesticide on the confirmation holder's behalf has access to the detailed maps or diagrams. Pesticides can only be used in areas described in the notice of intent to treat, except that after a notice of intent to treat has been submitted, a confirmation holder may increase the total area of treatment by up to10%. if written notice is given to the Administrator at least two business days before using the pesticide in the area involved. If, during a calendar year, a confirmation holder intends to exceed the total area of treatment by more than 10%, he or she must provide the Administrator with a revised notice of intent to treat at least 21 days before the pesticide use that causes the excess.

Notification of Individuals

Following the required public consultations, BCTS agreed to directly notify Wildsight of all proposed pesticide application in the Golden TSA

6.4.11 Detailed Site Assessment

BCTS will conduct and prepare a Detailed Site Assessment (DSA), including a treatment prescription for each site before the use of herbicides. Existing forestry documents may be used as components of the Detailed Site Assessment.

The DSA may contain (but is not limited to) the following information:

- IPMP operating zone
- site identification (i.e., opening number, tenure, cutting permit number and/or block number)
- stratum (if applicable)
- site series
- conifer crop tree and competing vegetation data
- stocking species
- average height of crop trees (meters)
- target species
- percent cover or density of target species
- average height of target species; average diameter of target broadleaf trees
- Treatment rationale (explicit justification for use of herbicides, evidence of thresholds or guidelines, etc.)
- bodies of water, watercourses, and wetland areas, along with their Forest Practices Code or other applicable legislation classifications
- fish habitat present, and required protective measures
- wildlife habitat and biodiversity considerations and required protective measures
- Community Watersheds or water intakes within 200 meters of the proposed treatment site
- other human activities associated with the site
- herbicide prescription details
- Pesticide trade name and PCP No.
- application rate (kg active ingredient/ha)
- treatment area
- quantity of active ingredient
- treatment method(s)

DSAs will be reviewed by a suitably qualified staff member approved and signed by a staff member personally familiar with the sites or with the qualifications of personnel collecting data. DSAs will be available to the Deputy Administrator upon request.

6.5 Written Records of Projects

The following records will be retained in either electronic or written form for the term of the IPMP:

- copy of current Integrated Pest Management Plan
- Correspondence and forms related to IPMP development consultation activities
- Monitoring and treatment selection forms, including:
    a) Detailed Site Assessment
    b) Post treatment evaluation
- records of review and information processes conducted with neighbours and First Nations, as per Section 1.4
- copies of notifications of intent to treat sent to MNRO prior to treatments
- maps and pesticide use records for areas treated with registered pesticides
- Project checklists (ISO 14001 Inspection Forms)
- Area treated with non-chemical techniques

6.6 Project Development and Implementation

BCTS staff and contractor personnel will ensure critical elements of vegetation management projects involving the use of herbicides are considered and carried out. Examples of the key steps which must be in place include (but are not limited to) the following:

- Proposed treatments consistent with Integrated Pest Management Plan
- Contractor carrying out work licensed and has appropriate numbers of certified applicators. All pesticide treatments will be done by or directly supervised by applicators certified by the Ministry of Environment in the appropriate applicator category.
- Pre-treatment work conference held with contractor and staff; spill contingency plans, locations of environmentally sensitive areas, IPMP conditions, project roles and responsibilities, etc.
- Treatment area field layout complete, including flagging of no-treatment, pesticide-free, and buffer zones
- Pre-treatment notifications provided
- Equipment checks, water supply location(s)
- Location of washing, eye wash stations
- Use of personnel protective equipment
- Herbicide application rate and methods
- Measurement and recording of weather conditions
- Transport, storage and disposal of herbicide containers
- Posting of treatment advisory signs
- Monitoring of treatment activities
- Environmental monitoring - use of drift cards, water samples etc.
- Post-treatment evaluation - review of treatment effectiveness, adherence to IPMP conditions, impact on crop trees, etc.

6.7 Maps or Diagrams

Maps used to plan and carry out vegetation management operations will be at a 1:5000 or 1:10,000 scales and will contain the site specific information discussed earlier in this document (location of water courses, associated pesticide-free zones, treatment boundaries etc.). Maps that identify the location of treatment sites will be submitted with NITs according to Section 43 (2) (b).

6.8 Follow-up Reports

BCTS will submit annual summaries of its vegetation management data on a form prescribed by BC Environment by January 31st of the following calendar year.

7.0 DEFINITIONS

Buffer zone: A strip of land between a pesticide-free zone or other areas that requires protection, and the treatment area. The purpose of the buffer zone is to prevent entry of residues of the applied material through drift, runoff, or leachate into the pesticide-free zone or other area that requires protection. The size of these zones will vary with application methods used, terrain, weather, herbicide, height/density of forest cover, and nature of target species.

Community Watershed: A community watershed, as defined in Section 41 of the Act *(Forest Practices Code or other applicable legislation Operational Planning Regulation)*

Environmentally sensitive areas: Areas identified as having a high non-timber resource values; these can include fisheries, water, wildlife habitat, and recreation values. Such areas may have restrictions on forestry activities such as harvesting and silviculture.

Ephemeral streams: Streams that do not flow all year round; they are typically dry in the summer and contain flowing water from fall through spring.

Fish bearing in relation to a body of water or wetland means that it is frequented by:

- Anadromous salmonids;
- Rainbow trout, cutthroat trout, brown trout, bull trout, Dolly Varden, char, lake trout, brook trout, kokanee, largemouth bass, small mouthed bass, mountain whitefish, lake whitefish, arctic grayling,

burbot, white sturgeon, black crappie, yellow perch, walleye, northern pike; or• A species of fish identified under section 11 (1) or as regionally important wildlife under section 11 (2) of the *Government Actions Regulation*

Identified Wildlife Habitat Feature. May be identified by the Minister responsible for the Wildlife Act by any or all of the following:

- a fisheries sensitive feature;
- a marine sensitive feature;
- a significant mineral lick or wallow;
- a nest of : a bald eagle; an osprey; a great blue heron; a category of species at risk that is limited to birds;
- any other localized feature that the minister responsible for the Wildlife Act considers to be a wildlife habitat feature. Refer to Section 9 of the Government Actions Regulation, BC Reg 17/2004, if further details are required.

Fisheries sensitive zones: Aquatic environments which are important for the life history of fish, including areas which may not be defined as streams. They may include side and flood channels, valley wall ponds, swamps, seasonally flooded depressions, lake littoral zones or spawning areas, estuaries, and recreationally fished areas.

Forest Development Plan: An operational plan guided by the principals of integrated resource management which details the logistics of timber development over a period of at least five years.

Gully: An area containing a stream where

a) the overall stream gradient is at least 25%, and
b) a reach of that stream, greater than 100 m long, has
   (i) a side wall greater than 3 m,
   (ii) a side slope greater than 50%, and
   (iii) a stream channel gradient greater than 20% *(Forest Practices Code or other applicable legislation Operational Planning Regulation)*.

Lake: A naturally occurring static body of water greater than 2 m in depth and greater than 1 ha in size, or a licensed reservoir (Proposed Forest Practice Standards) (*Guidelines for the Protection of Fish and Fish Habitat including Riparian Areas during the use of Glyphosate and other Selected Forestry Herbicides in British Columbia)*.

Lake Class: A designation, made by the district manager, for lakes with a riparian class of L1 that indicates the width of a lakeshore management zone and the practices that are appropriate within the zone *(Forest Practices Code or other applicable legislation Operational Planning Regulation).*

Pest Control Products Act: A federal Act administered by Agriculture Canada. The Act provides that, in order to be registered for sale or use in Canada, a pesticide must be accompanied with evidence of effectiveness for the purposes claimed. The pesticide must be accurately labelled as to composition and hazards. The seller must also provide adequate directions for use. *(Handbook for Pesticide Applicators and Dispensers)*.

Pest Control Service: A person (company, firm, proprietorship, agency, etc.) who by himself or by the employees provides a service involving the use or application of pesticides. A certified pesticide applicator must be in attendance at each pesticide application *(Handbook for Pesticide Applicators and Dispensers)*.

Pesticide: under the *B.C. Pesticide Control Act,* any substance or mixture of substances, other than a device, intended for killing, controlling or managing insects, rodents, fungi, weeds and other forms of plant or animal life that are considered to be pests *(Handbook for Pesticide Applicators and Dispensers)*.

Pesticide Free Zone: A strip of land, adjacent to a stream or water body and measured from the high-water mark. The applicator must prevent, as far as possible and to his utmost ability, the entry of pesticides, by direct application, drift, runoff, or as leachate, into the pesticide free zone. It is recognized that very low levels (parts per billion or trillion) are commonly found in all areas with new detection technologies. However, the pesticide free zone is to be maintained by the professional capabilities of the applicator who is qualified to make the

necessary judgements regarding equipment, terrain and weather conditions. Specific authorization is needed if the pesticide free zone is to less than 10 meters...

Riparian Area: The land adjacent to the normal high-water line in a stream, river or lake extending to the portion of land that is influenced by the presence of the adjacent ponded or channeled water. Riparian areas typically exemplify a rich and diverse vegetation mosaic reflecting the influence of available surface water (Proposed Forest Practices Standards).

Selective application" means the application of a pesticide to individual plants so that the vegetation between individual plants is not treated

Silviculture Prescription/Site Plan: A documented process for collecting site-specific field data, establishing site-specific management objectives and standards for producing a free-growing stand, and prescribing a series of treatments necessary to achieving these objectives and standards. A Silviculture Prescription is a legal requirement as per Sections 22 and 23 of the *Forest Practices Code or other applicable legislation of British Columbia Act*. The content requirements are specified in the *Operational Planning Regulation.*

Stream or River" means a watercourse, including a watercourse that is obscured by overhanging or bridging vegetation or soil mats, that contains water on a perennial or seasonal basis, is scoured by water or contains observable deposits of mineral alluvium, and that has a continuous channel bed that is 100 m or more in length, or flows directly into a fish stream, a fish-bearing lake or wetland, or a licensed waterworks

Tributary: A stream feeding, joining or flowing into a larger stream (Aquatic Habitat Inventory Glossary).

Water bodies: - Under the Integrated Pest Management Act Regulation the definition "body of Water" does not include a human-made, self-contained body of or structure for water.

Wetland" means a swamp, marsh, bog, or other similar area that supports natural vegetation, that is distinct from adjacent upland areas. A **"classified wetland"** is a wetland referred to as having a class W1, W2, W3, W4 or W5 under the *Forest Planning and Practices Regulation*. Classified wetlands include all wetlands that are:

1. Not less than 0.25 ha in size in one of the following biogeoclimatic zones or subzones:
   (a) Ponderosa Pine
   (b) Bunch Grass
   (c) Interior Douglas-fir, very dry hot, very dry warm or very dry mild; or

2. Not less than 0.5 ha in size in one of the following biogeoclimatic zones or subzones:
   (a) Coastal Douglas-fir
   (b) Coastal Western Hemlock, very dry maritime, dry maritime or dry sub maritime.

8.0 APPENDICES

Appendix 1A Integrated Pest Management Decision Model - Outline

Appendix 1B Integrated Pest Management Decision Model

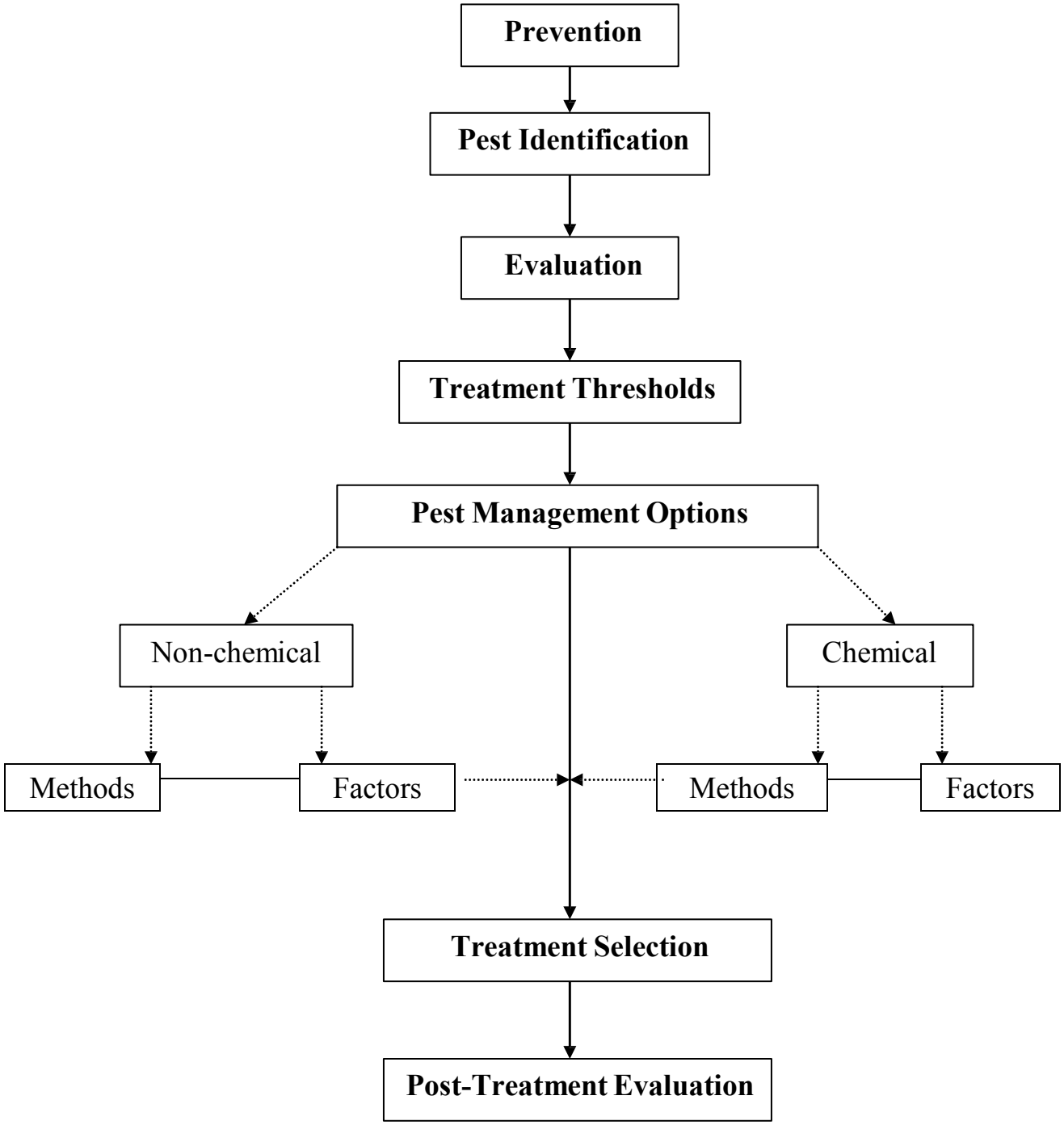
Appendix 1C Integrated Pest Management Decision Model - Vegetation Management Options

Appendix 2 Application Rates and Optimal Treatment Timing for Vision and Release

Appendix 3 Map

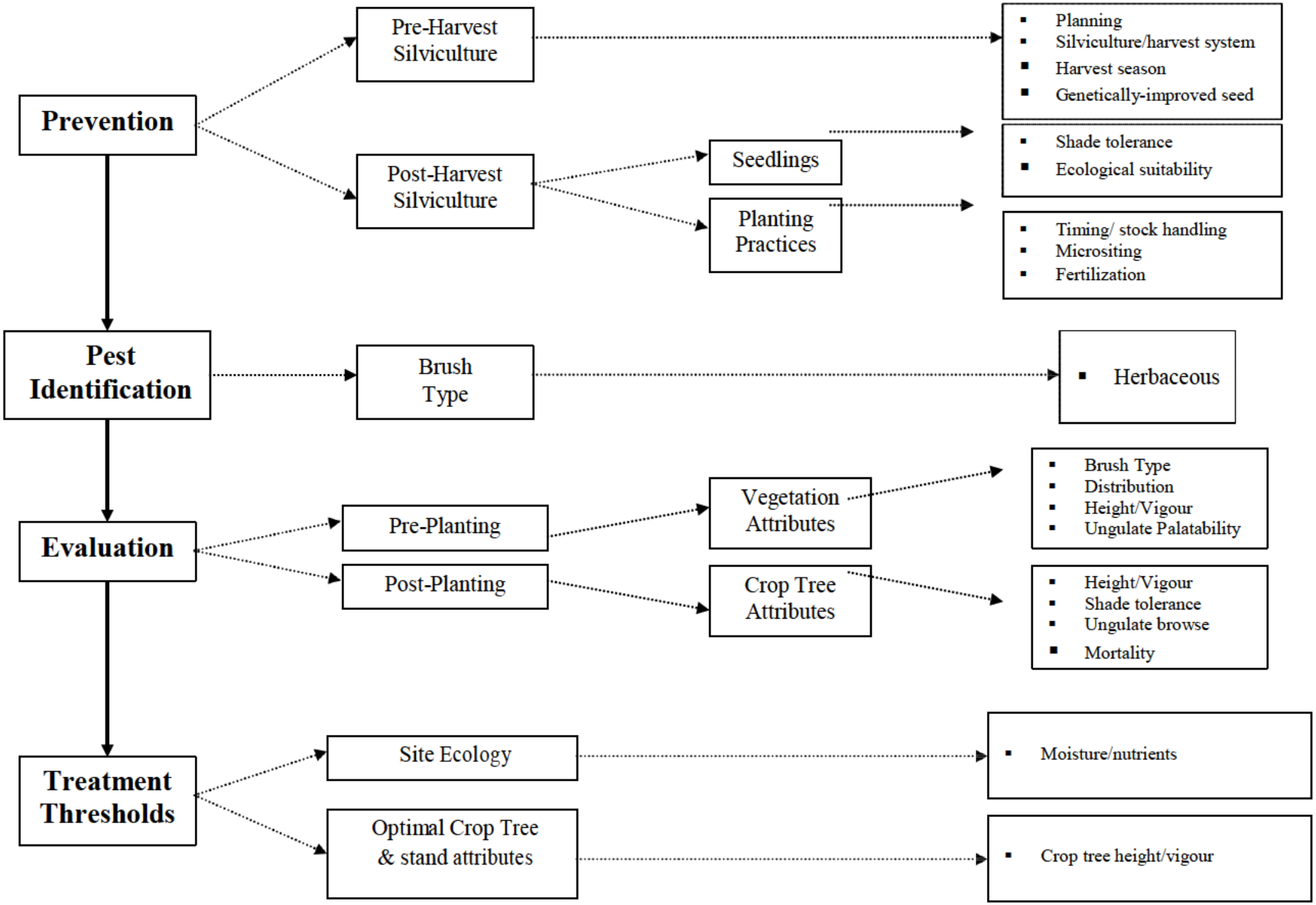
Appendix 1A
Integrated Pest Management Decision Model – Outline

This model will be used as a standard process for arriving at pest management treatment methods.



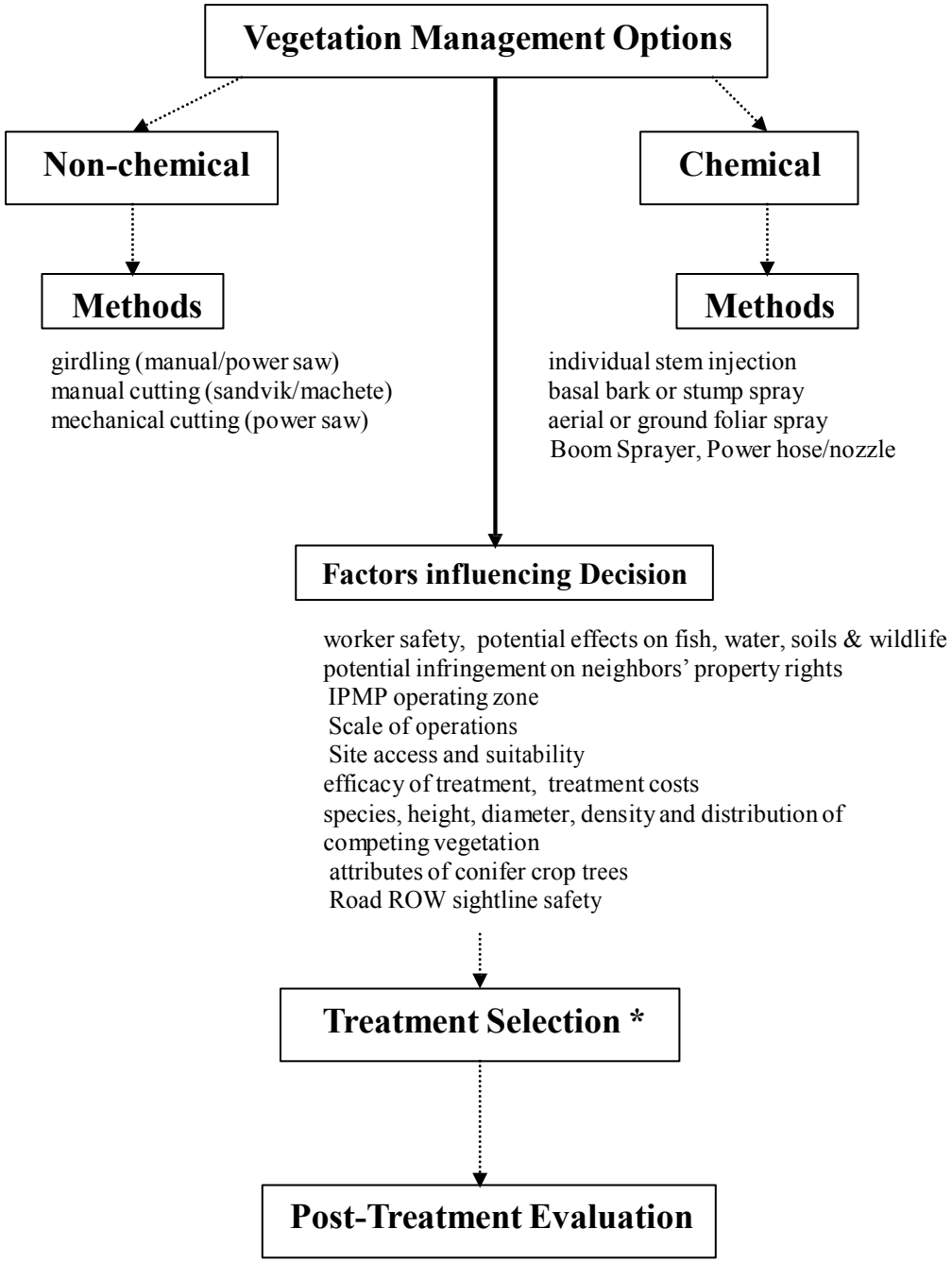
Appendix 1B
Integrated Pest Management Decision Model

This model will be used as a standard process for arriving at pest management treatment methods.



Appendix 1C
Integrated Pest Management Decision Model - Vegetation Management Options

This model will be used as a standard process for arriving at vegetation management treatment methods.



APPENDIX 2

Pesticides used under this Plan

Trade Name	Active Ingredient	PCP No.
Vantage XRT	Glyphosate	29994
Vision Max	Glyphosate	27736
Garlon RTU	Triclopyr	29334
Garlon XRT	Triclopyr	28945
Chontrol Peat Paste	*Chondrostereum purpureum*	29293

**Other products that have the active ingredient Glyphosate, Triclopyr, Chondrostereum purpureum may be used subject to BCTS approval*

Information on the Herbicides Vantage XRT, Vision Max, and Garlon XRT, RTU www.provmweb.com
Information on Chontrol Peat Paste can be found www.mycologic.ca

APPENDIX 3

Maps for all Operating Zones

Map 1-4 IPMP maps, 1:150,000