



Western Forest Products Inc.

**DRAFT**

# **Pest Management Plan for Forest Vegetation Management**

**Plan number #: PMP4 - 2014-2019**

**Port Alberni Forest Operation  
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**Kindry Mercer  
Novafor Forest Services Ltd.**

**December 19, 2013**

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**Date**

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# Introduction

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A *Pest Management Plan* (PMP) is a program for managing pests or reducing the damage caused by pests, and the methods involved in handling and using pesticides. A *PMP for Forest Vegetation Management* is a PMP in which the pest is forest vegetation in competition with young trees for light, water, nutrients and growing space. The goal of a PMP for forest vegetation management is to reduce the competitive advantage of natural vegetation over the desired crop trees. The PMP also addresses the treatment of vegetation prior to crop tree establishment (site preparation) and the reduction of vegetation on roads to maintain access and visibility.

The guiding principle in a PMP is *integrated pest management*, which is the management of pest populations using both preventative and direct methods of pest control.

The implementation of a PMP for forest vegetation management is a key component in the management of forest lands for timber production. The goal of forest management for timber production is the efficient development of forests comprised of high-value tree species while avoiding unreasonable adverse effects on humans, animals or the environment. This goal is achieved through the application of silviculture; the art and science of growing trees. On public lands in British Columbia, growing of new forests following harvesting is specified in the *Forest and Range Practices Act* (FRPA).

The Pest Management Plan contains the following sections:

- Identification of the geographic area of the PMP, the Operating Zones, and the parties responsible for implementing the plan;
- A description of the Integrated Pest Management Elements of the program;
- Information on Operational considerations;
- The Environmental Protection considerations; and
- The Pesticides that may be used in the plan area.

## Terminology

The following are the definitions of some commonly used terms in the document.

**Block:** cutblock; setting; harvested area; management unit for tracking most treatment information.

**Brushing:** vegetation management; brushing and weeding.

**Crop tree:** a species of tree or individual tree intended for harvesting; a commercial tree species; may be either conifers or deciduous (red alder and bigleaf maple are occasionally grown as crop trees).

**Forester:** a registered professional forester (RPF) registered with the Association of BC Forest Professionals.

**Free growing:** an individual or stand of healthy trees of a commercially valuable species (that have the minimum characteristics specified in a site plan or silviculture prescription), the growth of which is not impeded by competition from plants, shrubs or other trees; a legal requirement for logging companies on public land in BC (WFP has committed to achieve free growing within 20 years of logging commencement). Once achieved, forest companies are no longer responsible for the management of the stand; responsibility reverts to the Crown following successful achievement of free growing.

**Harvesting:** logging; removal of trees or a forest.

**PFZ:** pesticide free zone: a strip of land adjacent to a stream, lake or wetland where no pesticides are permitted.

**SP:** site plan, silviculture prescription (PHSP; pre-harvest silviculture prescription prior to 1995); document that summarizes the resources and planned management of a forest after logging.

**SPH:** stems per hectare; a measure of the frequency or density of a tree or shrub on an area of land.

# **Pest Management Plan Identification**

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## **Geographic Area**

The Pest Management Plan (PMP) is for Western Forest Product Inc.'s Port Alberni Forest Operation (PAFO), Tree Farm Licence (TFL) 44. It is comprised entirely of crown land and includes no private land. See attached map for boundaries.

The total area of the PMP is approximately 139,446 hectares; this is the area within TFL44 that is managed by WFP. Areas of the TFL44 with silvicultural liability managed by third parties will be excluded from the PMP area for example (BC Timber Sales).

## **Operating Zones**

No specific operating zones.

## **Principal Manager and Contact**

Vegetation management in the plan area is the responsibility of:

Brian Marcus, RPF, Area Forester, Port Alberni Forest Operation (250-720-4226)

# **Integrated Pest Management Elements**

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The Integrated Pest Management (IPM) program in the plan area has the following components:

- Prevention of Competitive Vegetation
- Description of Problem Vegetation
- Pre-treatment Monitoring Program
- Treatment Map
- Treatment Thresholds
- Vegetation Treatment Options – Chemical
- Vegetation Treatment Options – Manual
- Post-treatment Monitoring Program

## **Prevention of Competitive Vegetation**

The prevention of competitive vegetation involves the following six tactics:

1. Pre-harvest site identification of the ecosystem;
2. Pre-harvest determination of pre-existing vegetation;
3. Site preparation;
4. Planting;
5. Time-of-planting fertilization; and
6. Browse reduction or prevention.

These six tactics can reduce the competitive advantage of vegetation and therefore reduce the amount of direct intervention (use of pesticide and non-pesticide vegetation management) that is required.

### **Pre-harvest Site Identification of the Ecosystem**

The first step to ensure that the selected crop trees have a good chance of competing successfully is the classification of the site; specifically, the determination of the ecosystem. This, along with the determination of the pre-existing vegetation (below), is done by a forester, or a delegate, prior to timber harvesting.

All forest sites may be classified using the biogeoclimatic ecosystem classification system (BEC) (*A Field Guide for Site Identification and Interpretation in the Vancouver Forest Region*, Ministry of Forests, 1994). This classification permits the estimation of the likelihood that a site will produce brush; sites with higher nutritional status, for instance, have a higher likelihood of producing competitive brush species.

## **Pre-harvest Determination of Pre-existing Vegetation**

During the pre-harvest review a forester or delegate will also note any pre-existing vegetation. These are potentially competitive plant species, such as salmonberry or thimbleberry that exist in mature form in a forest stand prior to timber harvesting.

The information on pre-existing vegetation, the ecosystem classification and an estimation of the brushing potential, is recorded in the SP, prepared by a professional forester, or under a forester's direction, prior to harvesting. This information can be used to determine the likelihood for competitive vegetation following harvesting, and whether or not any or all of the next three tactics (site preparation, planting or time-of-planting fertilization) will be required and to what degree.

## **Site Preparation**

Site preparation is the treatment of a site to prepare it for natural or artificial regeneration (planting). Sites with vigorous natural vegetation following harvesting may be treated with a glyphosate product (products with the trade names of Vantage, Vantage Forestry and Vantage Plus Max II, all which have glyphosate as the active ingredient) applied with a ground foliar method (backpack or hose and gun).

Roadside slash-pile burning is another form of site preparation that can assist vegetation management although its primary purpose is the removal of roadside slash in preparation for planting. Slash burning results in the release of nutrients into the soil, and the extinguishment in the soil of the seeds of competitive species. The released nutrients permit the crop trees to grow quickly and the removed seed reduces the amount of competitive plant species.

Areas of disturbed soil such as roads or landings near known sites with invasive species such as gorse, Knotweed, or scotch broom, may be seeded with grass to reduce the likeliness of the invasive colonizing the area.

## **Planting**

On sites with a high brush hazard, vegetation can reach heights of 1.0 to 1.5 metres in the first growing season (May to September). Effective planting is a key tactic for reducing the competitive ability of vegetation because it can result in new trees (seedlings) that out-grow the vegetation and hence, reduce the need for a vegetation treatment.

Effective planting is defined as planting ecologically appropriate species, healthy seedlings, and seedlings that have characteristics that are suited to the site. Specifically, a larger seedling will likely grow more quickly than a smaller seedling, thereby improving its chances of out-growing competing brush species.

It is critical that planting on brush-prone sites be completed as soon as practicable after harvesting – the first spring if possible.

### **Time-of-planting Fertilization**

In addition to using healthy and fast growing seedlings, a fertilizer may be applied to the planted seedling at the time of planting to improve the rate of growth of the seedling in the first year or two. The fertilizer that is used is especially formulated for use with forest seedlings in coastal British Columbia, and is packaged in a teabag-like pouch that is placed near the seedling root by the tree planter.

### **Browse Reduction**

Browsing is the eating of young trees by black tail deer (*Odocoileus hemionus columbianus*) or Roosevelt elk (*Cervus canadensis*). Deer and Elk browse damage is generally not a serious problem in the plan area but can be of concern in specific parts of it; i.e. the Lower Klanawa River, Raymond Creek (Elk mainly), Corrigan Creek (Elk mainly), and below 700 metres elevation in the Great Central Lake area. Browsing is most common on red cedar seedlings but is also frequent on Douglas-fir seedlings; all species may be browsed occasionally. Browse damage occurs from the time of planting up until the young trees reach a height of 1.0 to 1.5 metres (2.0 metres for elk).

Controlling browse when it is widespread in a block, and is likely to occur for several years, can reduce the time that it takes for a young tree to reach the maximum browse height (1.0 or 2.0 metres) and therefore, reduce the likelihood that brush will encroach onto the young tree. Sometimes the ungulates will browse the competition but not commonly.

The primary browse reduction tactic is the use of browse guards that physically shield the young tree from browsing and in some cases provide a greenhouse effect resulting in rapid early growth. The products that have been used include Sinocast, Freegro, Treeguard and Vexar. Browse guards are used primarily on areas with historically severe browse (for example, the deer pull the seedlings out of the ground within days of planting) and areas that have been prescribed for reforestation with western red cedar (often red cedar must be planted due to ecological and economic limitations of other potential crop tree species). Some severe elk browse areas have had the free growing stocking standards adjusted in recognition of the challenges posed by the resident Elk population.

A secondary browse reduction tactic is being assessed - the use of the deer repellent, Plantskydd (primarily composed of pig's and/or cow's blood). Plantskydd is an excluded pesticide (un-restricted and does not require a PMP for application). It is mixed in water and applied either at the nursery prior to planting or on-site after planting.

## Description of Problem Vegetation

The problem vegetation in the plan area – vegetation that may require a direct intervention – can be classified into four types based on its growth characteristics:

1. Annuals – all above-ground portions of the plant die-back and re-grow each year;
2. Shrubs – continue to grow for more than one year; contain woody stems; have a maximum height of less than eight metres – most have a maximum height less than four metres;
3. Sub-ordinate Trees – same perennial growth and woody stems as shrubs but have a maximum height greater than eight metres and are not very competitive with evergreen crop trees; and
4. Dominant Trees – same perennial growth and woody stems as shrubs but have a maximum height greater than eight metres and are very competitive with evergreen crop trees.

These four types form the basis for treatment selection.

The following is a description of the problem plants, grouped by vegetation type, with a description of the frequency of the plant in the plan area and the manner in which it competes with crop trees.

### ***Annuals***

**Bracken fern** (*Pteridium aquilinum*) arises from rhizomes (underground roots that connect surface stems) in the drier portions of the plan area. On moderate to rich sites, where it attains heights up to two metres, this species can cause mechanical damage (smothering or bending of stems and branches by falling due to snow or rain) to conifers (the evergreen trees with cones) because it creates a pressing action on the trees – often after a snowfall or heavy rain. Competition for light is only moderate, but in well-established patches the species excludes other plants, perhaps as a result of allelopathy (the chemical interference of one plant with another). This reaction retards conifer growth and, in combination with light deprivation, can cause reduced growth or mortality.

**Fireweed** (*Epilobium angustifolium*) arises from wind blown seed in the wetter portions of the plan area and is only rarely a significant competitor requiring treatment. It can often cause mechanical damage when it falls over.

### ***Shrubs***

**Elderberry** (*Sambucus racemosa*) is common throughout the wetter and richer portions of the plan area. The species arises from seed or rhizomes or is pre-

existing in stands with a deciduous component (deciduous plants are plants that lose their leaves in the autumn) or in stands with natural gaps from blowdown (trees that have been knocked-over by wind). The vigour of pre-existing elderberry can be high, and early growth very rapid (up to two metres per year), because it has an existing root system even if the harvesting knocks off or kills the stem. It occasionally forms contiguous patches but is more often dispersed, is a moderate competitor for light, and will occasionally cause mechanical damage.

**Salmonberry** (*Rubus spectabilis*) is common throughout the wetter and richer portions of the plan area. **Thimbleberry** (*Rubus parvifolium*) is less common and occupies the same niche (an ecosystem with specific characteristics) as salmonberry, and is similar in terms of its competitiveness and its response to treatment (the shade produced from thimbleberry is slightly greater than salmonberry). Both of these species arise from seed or rhizomes – or are pre-existing in stands with a deciduous component or with natural gaps from blowdown. When these species are pre-existing at the time of harvest they can be particularly vigorous following harvesting, and their early growth can be rapid because they have a pre-existing root system, even if the above-ground portion is knocked-off or killed by the harvesting. In some cases, the shock of increased light levels combined with short root systems can retard the growth for one year. These species are aggressive competitors for light. Once established, they will often form contiguous covers that will cause a condition known as “blackout” in which there is minimal light reaching the ground. All crop trees in this situation will, as a minimum, have significantly reduced growth and vigour, and death will occur to shade intolerant species like Douglas-fir.

### ***Invasive Shrubs***

**Scotch broom** (*Cystisus scoparius*) is an invader species (a non-native plant introduced from Scotland) that occurs sporadically in the plan area but is increasing in frequency. It germinates from seeds onto roads, quarries and any exposed soil or disturbed site with ample light. Most of the heavy concentrations are isolated to dry land sorts, road ways and utility right-of-ways, although it can quickly occupy freshly harvested areas. It is a strong competitor for light and growing space. Scotch broom is identified in the WFP’s Forest Stewardship Plan as an invasive plant.

**Japanese and Giant Knotweed species** (*Polygonum spp.*) Knotweed is a non-native, highly invasive plant that is found along roadsides and wetlands within the plan area where it out-competes native vegetation and is extremely difficult to control once established. Knotweed is considered noxious under the *BC Weed Control Act*. Primarily reproduction is vegetative through long creeping rhizomes or by root fragments, which readily produce new plants. Japanese knotweed root pieces are known to contaminate new sites through movement of dirt. When growing near water, root fragments can be carried downstream to establish new colonies. Japanese knotweed and Giant knotweed are identified in WFP’s Forest Stewardship plan as invasive plants.

**Gorse** (*Ulex europaeus*) is a spiny, perennial evergreen shrub, considered noxious under the BC *Weed Control Act*. It occurs sporadically within the plan area on roadsides, disturbed soils and to a limited extent into drier poorer cut blocks. Gorse is a dense evergreen shrub with a single upright stem, spine-like leaves, and fragrant yellow, pea-like flowers. Seedpods are hairy and black. Gorse can grow 1-3 metres in height at maturity.

Growing rapidly for the first 15 years, gorse can live up to 45 years. Maturing seedpods explode and disperse up to 18,000 seeds per mature plant. Gorse seeds are easily distributed by ants, animals, birds, and machinery. Dense patches can hinder re-vegetation of harvested areas. Gorse can also increase fire hazard as plants contain volatile oils and produce large amounts of litter. Gorse displaces native vegetation, thereby decreasing forage for wildlife and local plant biodiversity. Gorse is identified in WFP's Forest Stewardship Plan as an invasive plant.

### ***Sub-ordinate Trees***

**Bitter cherry** (*Prunus emarginata*) bitter cherry is a weak competitor with conifers unless it is established several years ahead of crop tree planting or the growth of conifers is stunted (by browse for example). Cherry that is several years older than the adjacent conifer trees can cause growth reduction and mechanical damage to Douglas-fir, the primary crop tree on most cherry dominated sites. In most cases, however, the species is not a serious competitor and only causes some minor mechanical damage in the early years of a stand.

**Pacific Willow** (*Salix lucida*) is infrequent in the plan area and occasionally occurs as a large coppice that interferes only slightly with the growth of conifers. It is most common as a shrub with negligible impact on crop trees and rarely treated.

**Western Flowering Dogwood** (*Cornus nutallii*) is most common as a shrub that can, in rare cases, grow in dense clusters on dry sites in the Great Central Lake area. Shrub heights and widths can reach three metres. Douglas-fir is the crop tree species generally associated with dogwood. Seedlings may need to be brushed where the density of competing dogwood is high and contiguous.

## ***Dominant Trees***

**Bigleaf maple** (*Acer macrophyllum*) is present mainly in harvested second growth stands in the drier portions of TFL 44. The coppices tend to form ball-shaped crowns with diameters similar to their height - six metres plus in the first three to five years following harvesting. Within this ball coniferous species are overly shaded and will often suffer severe mechanical damage. Young crop trees may also be smothered by leaf litter. Maple from seed tends to have a single stem and a narrower crown than maple from coppices and therefore, interferes less with crop trees.

**Red alder** (*Alnus rubra*) is common in all but the drier portions of the plan area and arises from airborne seed in virtually every block up to 400 metres elevation, one to eight years following harvesting at densities up to 50000 stems per hectare (sph) along roads, skid trails and other heavily disturbed areas (exposed mineral soils), and up to 10000 sph elsewhere. Typical densities of red alder are 200 to 2000 sph. Following establishment, the growth of red alder is rapid – up to three metres per year on good sites – and competition with conifers for light is severe in two to five years following establishment, depending on density and conifer species.

## ***Minor Species***

The plan area also includes some minor plant species that occasionally compete with crop trees but have not historically been controlled. There is currently no intention to include these species in any direct interventions with pesticides.

- Cascara (*Rhamnus purshiana*)
- Salal (*Gaultheria shallon*) – may be a strong competitor for nutrients and/or water but not controlled with pesticides.
- Grasses (*Poa* species)

## **Pre-treatment Monitoring Program**

Two methods are used to identify vegetation problems:

- 1. Pre-harvest assessment during site plan development**

Determination of the ecosystem and the existing vegetation prior to harvesting provides an estimate of brush potential. Sites with pre-existing vegetation, due to a deciduous forest type or openings, and sites with rich or moist ecosystems will have a greater potential vegetation component following harvesting. The ecosystems are mapped at 1:5000 scale in the Cutblock Site Plan.

Prior to road building or where forest floor will be disturbed as a result of site preparation, invasive plant species within 300m of the proposed treatment area are identified and mapped so spread can be limited.

- 2. Silviculture surveys**

Each block has at least three silviculture surveys performed from the time of harvesting until free growing. The kinds of surveys are:

- Stocking survey
- Survival surveys
- Regeneration surveys
- Stand performance surveys
- Free growing surveys

A post-planting inspection survey is performed immediately after planting on all blocks that are planted. The regeneration and free growing surveys involve the collection of specific data regarding the features of the crop trees on the site, information that is used to verify that the new forest has met or exceeded the prescribed standards in the SP. All of the surveys involve the observation of the relative competitive status of the natural vegetation versus the crop trees. Vegetation management treatments are prescribed based on the relative competitive position of the vegetation (or the state it will eventually reach given typical growth rates). Free growing standards, vegetation assessment standards and treatment thresholds are used to determine whether or not a treatment is required. For road access management, treatments are prescribed based on the likelihood that roadside vegetation will impede traffic or impair visibility.

## **Treatment Map**

Each proposed treatment has a detailed map prepared by a forester, and it shows, at a minimum, the location of the proposed treatment and any features (water bodies, wildlife tree patches or domestic water intakes) that may require a pesticide free zone or a no-treatment zone.

## **Treatment Thresholds and Free Growing Standards**

Treatment thresholds are the minimum characteristics of the competitive plants in relation to the crop trees wherein a treatment, either using pesticides or mechanical techniques, is required to ensure the achievement of a free growing stand. There are treatment thresholds for each combination of competitive plant and crop tree species. The treatment thresholds are summarized in Appendix A.

The thresholds are applied as per the procedures below.

### **Treatment Selection**

Treatment selection is guided by the treatment thresholds, which are in turn consistent with free growing principles. If a stand is not free growing, or will fail to be free growing at the end of the free growing window,<sup>1</sup> it generally requires some form of intervention, usually a brushing treatment. The major exceptions to this are when the trees in the stand are not free growing because they are too short to be considered free growing or infected with a disease.

Once a stand has been identified as possibly requiring treatment, the final decision, made by a forester or delegate, is based on the consideration of various factors: season, weather, cost, logistics, crew availability, environmental factors, overall objectives for a particular site, and the treatment thresholds. The decision to treat a stand is often simply a matter of timing such that as many blocks as possible may be treated, while minimizing the impact of encroaching brush due to time delays. The primary guide for the forester are the free growing standards (see below) and, secondarily, the standards for treatment selection; that is, the treatment thresholds.

### **Pre-emptive Treatments**

It may also be prudent to treat a stand prior to the brush problem developing. For example, on very rich sites, the planted trees may be taller in the first year or two than the surrounding salmonberry or alder but only temporarily because the brush species will grow faster than the crop trees; immediate treatment would eliminate a problem before it developed. Furthermore, pre-emptive treatments often require less pesticide, have greater efficacy and cost less. It may also be practical to treat an area before the brush begins to significantly compete simply

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<sup>1</sup> The free growing window varies depending on the site series, and the age of the stand. For blocks with SPs approved under a Forest Development Plan the free growing window for deciduous stands is 5 to 8 years; for coniferous stands it is either 8 to 11 years or 11 to 14 years. Blocks with SPs approved under a Forest Stewardship Plan the late free growing date is 20 years.

because the work crew is in the area and it would be much more costly, due to the site's isolation and the uniqueness of the problem, to return later when the problem is fully developed. The timing of treatments will depend on various factors – travel logistics, coordination with other work, seasonal considerations, and the biophysics of the plant (foliar treatments, for example, are only effective when plants have their leaves).

The following is a summary of the free growing vegetation standards used in assessing whether or not a treatment is required. The treatment thresholds table is in Appendix A.

### **Free Growing Standards**

Free growing standards for public lands in British Columbia are detailed in the *Forest and Range Practices Act*. Based on these, to be free growing an SU (standards unit – the sub-unit of a block with similar characteristics and management standards – mapped and described in the SP) must contain free growing trees that are:

1. acceptable as outlined in the FSP;
2. well-spaced as outlined in the FSP;
3. free from infection;
4. free from unacceptable damage;
5. the required minimum height specified in the FSP or for pre-FSP blocks, the SP, or for SPs without minimum heights, at least 1.0 meter tall.
6. have 80% or more of the net area comprised of free growing trees; and
7. free from unacceptable brush and tree competition as described below.

### **Vegetation Assessment Standards**

Acceptable levels of competition will vary depending on the type of vegetation in the stand and in proximity to the crop tree – some types of plants are more competitive than others as discussed above in the section on vegetation types. Assessments are done either with randomly located 3.99 metre radius plots or by ocular estimates of the block or SU.

To review, the four types of vegetation and the species of plant in each group are:

Annuals – bracken fern and fireweed

Shrubs – salmonberry, thimbleberry, elderberry, Scotch broom, knotweed, gorse

Subordinate trees – bitter cherry, Pacific willow and western flowering dogwood

Dominant trees – red alder and bigleaf maple

The free growing standards are different for each of the four types of vegetation. The treatment thresholds (Appendix A) are based on this information:

**Annuals** – If the competitive vegetation is comprised of annual species then a treatment is required only if the vegetation is taller than the crop species and the crop is suffering from mechanical damage. No treatment is required if the crop species is at or above the height of the brush species regardless of the physical condition due to mechanical damage.

**Shrubs** – If the competitive vegetation is comprised of shrubs, then all crop species must be at least 100% the height of the vegetation and have good vigour as demonstrated by leader growth and foliage condition. Area cannot be free growing until the minimum acceptable number of crop trees are expected progress towards a mature stand without silvicultural intervention. In addition, measures may be taken to eradicate an invasive species (scotch broom, gorse, knotweed) from the site or limit the spread of the invasive to other sites. This may include treating roadsides and other areas outside the net area to be reforested.

**Subordinate trees** – If the competitive vegetation is comprised of subordinate tree species, then all crop species must have vigour that is unimpaired as demonstrated by leader vigor. Area cannot be free growing until the minimum acceptable number of crop trees are expected progress towards a mature stand without silvicultural intervention.

**Dominant trees (red alder)** – The SU is free growing if alder present will not impede the minimum acceptable number of crop trees from progressing towards a mature stand. Treatment of alder may occur in stands with 50 st/ha or greater if alder is significantly impeding stand vigor and/or expected to cause crop tree mortality. Higher densities of alder (up to 500 sph) may be acceptable if the conifers are large and the competitive species is small. Red alder and bitter cherry are acceptable at any density in small amounts as a means of rehabilitating or stabilizing soils along roads and creeks, in small patches up to 0.1 ha in size, and on slides.

**Dominant trees (bigleaf maple)** - If the competitive vegetation is comprised of the dominant tree, bigleaf maple, then the SU is free growing if there are less than 10 sph of bigleaf maple (coppices or single stem trees). At the plot level the crop tree is free growing if it is 150% the height of the maple within the entire growing space.

Due to the high variability in densities of red alder and bigleaf maple within a stand, free growing adjudication is based on the overall distribution of the competing vegetation species as determined by ocular estimates in addition to the plot data.

## Vegetation Treatment Options – Chemical

All pesticide treatment will be consistent with the *Integrated Pest Management Act*, the *Integrated Pest Management Regulation* and the Pesticide Use Notice Confirmation.

In the following discussion “glyphosate product” refers to the pesticides with the trade names Vantage Forestry, Vantage Plus Max II or Vantage XRT. “Triclopyr product” refers to Garlon RTU or Release XTR.

**Hack & Squirt** involves the cutting of frills – small notches – with a hatchet or similar tool around the circumference of red alder trees and spraying in approximately one ml per frill of 30% dilute glyphosate product in water (the concentration may vary with the manufacturer’s label depending on the specific product). All branches below the frills are removed. Target tree sizes are a minimum of 2 or 3 cm dbh or greater – anything smaller and the frills will cause the trees to break off in the wind. Smaller diameters may be treated by the cut stump method. Bitter cherry may be treated in this manner as well. The glyphosate product is carried in a bottle with a squirting apparatus. Treatment is feasible all year round although no treatment is permitted during heavy rain (if there is stem flow the worker must stop and switch to girdling). Also, during the sap flow period in May and June efficacy is reduced. Otherwise efficacy is generally 100%. Because this is a spot treatment, residual pesticide beyond the treated tree is minimal, and effects on fish, wildlife and soils are similarly reduced. Generally, there is no need for a no-treatment zone to maintain the PFZ.

**Cut stump** involves the cutting of smaller diameter red alder (<7 cm) with a chainsaw or hand tool and applying a glyphosate product (30% dilution in water or as per the label) or triclopyr product (30% in IsoparM) to the cut stump surface.

**Ground Foliar with a Backpack** involves the use of a hand-crank or motorized pump attached to a 20 litre tank that the worker carries on his or her back. Glyphosate product at a concentration of 1 to 3%, in water, is sprayed onto the foliage. For post-planting treatments application rates are 2 to 6 litres per hectare. For site preparation (treatments prior to planting) the manufacturer permits application rates up to 12 litres per hectare and the addition of a surfactant, such as Sylgard 309, an additive that reduces the surface tension of water-soluble pesticides and increases their penetration. Treatment usually occurs from mid-summer to early fall after crop trees have stopped growing and before leaf abscission of brush species. Exceptions are treatments of elderberry and Scotch broom that may be more successful in June-August provided the crop trees can be avoided. Stream levels are generally low at this time of year and uptake by the foliage is good. All the listed species may be treated with this technique; Scotch broom and bigleaf maple may be treated with the addition of a surfactant such as Sylgard 309. Provided the environmental conditions are

favourable – clear weather with moderate humidity and no wind – efficacy is very good. Treatment can either be as a broadcast or as a spot treatment, as required. Because the pesticide is sprayed through the air, there is a somewhat higher risk of contamination of pesticide free zones, as compared with hack and squirt. Therefore, no-treatment zones of 2 to 10 metres are established depending on wind direction and topography. The maximum permitted spray height is four metres (vegetation must be less than four metres tall as measured from the feet of the applicator).

**Ground Foliar with a Hose and Gun** is similar to ground foliar with a backpack but a truck mounted spray unit is used with a hose and gun apparatus. Treatment concentrations, target species, worker safety and environmental requirements are similar. As with backpack treatments, a no-treatment zone is required to maintain pesticide free zones and the maximum spray height is four metres above the spraying platform (measured from the worker's foot-level either on the ground or the deck of the truck or trailer). Depending on the hose length and pump power, spraying is feasible up to 100 metres.

**Basal** is the application triclopyr product involving the use of similar equipment as ground foliar with a backpack (usually manually operated). Triclopyr product is mixed in IsoparM in concentrations of 10 to 30% and dribbled at very low pressure onto the lower stem of the target plant. During the summer, a light neutral oil may be added to reduce the volatility of the IsoparM on hot days (temperature over 26 degrees). The mixture is absorbed into the plant through the bark. Treatment is most effective between April and October when the plants are photosynthetically active. The targets are similar to hack & squirt but also include bigleaf maple, dogwood, elderberry and Scotch broom (any species with waxy foliage, coarse bark or early leaf abscission). Efficacy is good provided the season is correct. Higher concentrations (i.e., 30%) are required when treating in the spring or fall. No-treatment zones greater than required for hack & squirt but less than those required for ground foliar treatments (typically five metres) are established to ensure there is no violation of the pesticide free zones.

**Thinline** – This is a spot treatment done by a worker with a squirt bottle. The worker often treats the maples during hack and squirt or basal project. 100% Triclopyr is used. Both sides of each stem are squirted with the pesticide. If done during the growing season, efficacy is very good.

### **Site Preparation and Roadside Applications**

Both of the foliar spray application methods – ground foliar with backpack, and ground foliar with hose & gun – may be employed for site preparation treatments or roadside applications. Rates of treatment up to 12 litres per hectare may be used. Site preparation or roadside treatments with glyphosate products may have a surfactant, such as Sylgard 309, added. This is feasible because there are no crop trees (they can be avoided during roadside applications) and there is often dust on the foliage on roadsides, which impairs penetration.

## **Vegetation Treatment Options – Manual/Mechanical**

**Girdling** involves the removal of a ring of bark, phloem, vascular cambium and some wood in a complete ring around the main bole of a tree. This is done to treat red alder in areas where chemical methods are not appropriate and where the trees are large enough (minimum 3 cm diameter at breast height – 1.3 m – (dbh) but preferred dbh is greater than 5 cm). It is also successful on bitter cherry but not on bigleaf maple. Like hack and squirt, the lower limbs must also be removed.

**Power saw cutting** involves the cutting of competing species using a chainsaw. Usually this is done in areas of thick salmonberry and mixed brush types as a site preparation where pesticides cannot be used, and may be done prior to fill planting. It may also be done in pesticide free zones as an annual treatment to maintain light levels for emerging conifers. Thick patches of young red alder and bitter cherry are sometimes treated in this manner when pesticide treatments are not available. ‘No-treatment zones’ are not required though slash must be kept away from streams and ditches. Efficacy is usually only for one growing season or less, depending on the age of the brush – re-sprouting can be quick and vigorous except in tall or high density conifer stands, or where the brush species are older. When treating salmonberry, timing can enhance the effectiveness of this treatment – it is best to cut competing vegetation during the 2 – 3 week period around full leaf emergence.

Large red alder (>7 metres tall) in stands with crop trees greater than 5 metres tall may be felled with chainsaws and result in minimal coppicing. This is the preferred treatment for larger red alder in older stands.

Power saw may be used to reduce maple coppice to a single stem where pesticide treatments are not available. This reduces the size of the area taken up by the coppice, however it does not prevent the remaining stem from competing with crop trees.

**Manual cutting** is cutting with hand tools – axes, sandviks, machetes or handsaws. Use of this treatment method is quite rare because of the high cost and low efficacy. It is occasionally applied in small amounts in locales where setting up for a more effective treatment would be too expensive or where pesticides are not permitted.

**Stem bending** is the best treatment for tall bracken (more commonly known as bracken wackin’). Bracken that is approximately one metre in height or taller will topple in the winter and often smother seedlings. By physically removing the bracken the tree is allowed to grow free. Removal of any sized bracken will result in increased light levels to crop trees. Treatment is often required at least once a year until the seedlings are tall and rigid. Long sticks, hockey sticks, golf clubs, long handled shovels, or bare hands are tools for this treatment. Fireweed may also be treated this way.

**Hand-pulling** is a rarely used technique for dealing with very small (less than 1.5 metres tall) red alder and bitter cherry. The worker grasps the stem and pulls it out by its roots. This is an alternative to foliar techniques. One possible drawback of this technique is that if the stem breaks at the root collar the plant can re-sprout. The treatment is more difficult in rocky soils.

**Stump-pulling** is a rarely used technique for dealing with mature bigleaf maple stumps. Usually during the yarding phase of ground-based timber harvesting, the excavator used to forward logs pulls the bigleaf maple stump out of the ground.

## **Post-treatment Monitoring Program**

All treatments are reviewed during a follow up assessment. Those results are reviewed by a forester and, if necessary, subsequent treatments are planned.

Manual treatments: Walkthrough assessment or free growing survey (if in free growing window) the following summer, or the following year depending on efficacy. Manual treatments may take longer to have an effect and so a follow-up of these treatments may be delayed for over one year.

Chemical treatments: Walkthrough assessment or free growing survey (if in the free growing window) within a month (for some treatments) or the following summer.

This follow-up assessment is done during one of the regularly scheduled surveys or as a specific activity.

The purpose of the follow-up survey is to determine the success of the treatment:

- Was the treatment performed as per the plan – was the area treated in the manner prescribed?
- Were the appropriate pesticide free zones or no-treatment areas established – were there any unintended impacts?
- Was the treatment a success – did it achieve the intended goal?
- Is there a need for any further treatments – is the stand free growing?

These questions are answered by visually assessing whether the treated plants have succumbed or whether their vigour has been significantly reduced. Once the treatment has been reviewed, a follow-up comment is entered into CENGEA, the database for all planned and completed silviculture activities.

# Operational Information

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The following is a summary of the operational requirements of the PMP and includes the following information:

- Responsible Personnel
- Pesticide Containment
- Pesticide Transport
- Pesticide Storage
- Mixing, Loading and Applying of Pesticides
- Disposal of Pesticides and Pesticide Containers
- Spill Plans

The standards for the use and handling of pesticides are detailed in the *Integrated Pest Management Act* and *Integrated Pest Management Regulation*. The legislation is the primary guide for pesticide operations and if there is any discrepancy or insufficiency in the following document, the legislation will take precedence.

The following is a summary of the content contained in the legislation and the document *Integrated Pest Management Act and Regulation Forest Pest Management Sector Review Paper*. Sections of the sector review paper that have been used here are underlined.

## Responsible Personnel

Brushing prescriptions and detailed treatment maps are created by professional foresters or registered forest technicians. The pesticide applications, handling, daily record keeping and usage activity, are delegated to experienced service licensees.

## Pesticide Containment

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. The container must be designed for the containment of the pesticide, with a label that displays the pesticide's trade name, the name and concentration of the pesticide's active ingredient and the pesticide's registration number under the federal Act (*Pesticide Control Products Act*). This requirement does not apply to tanks being used for mixing pesticides for, or holding pesticides during, use.

## **Pesticide 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.

## **Pesticide Storage**

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 vapours are vented outside;
- Locked when unattended; and
- Accessible only to persons authorized by the person storing the pesticide.

## **Mixing, Loading and Applying of Pesticides**

All pesticide application must be performed in accordance with the label instructions for the pesticide.

A confirmation holder must ensure:

- Each individual who will be using a pesticide ... is informed of:
  - The boundaries of the proposed treatment area,
  - The requirements for personal protection, and
  - The pesticide use procedures required to protect human health and the environment;
- The application equipment is in good working order and, if required, is calibrated to conform with the application rates on the pesticide label;
- An inspection of the treatment area is carried out to ensure that the applicable regulatory requirements and standards can be met in carrying out the pesticide use; and
- That the following precautions are taken in carrying out the pesticide use:
  - Precautions to prevent unprotected human exposure to pesticide;
  - Precautions to ensure that domestic water sources, agricultural water sources and soil used for agricultural crop production are protected for their intended use; and
  - Avoiding the use of pesticide over vertebrate wildlife or domestic animals that are visible to the user.

- That their use of a pesticide does not remove vegetation that is necessary to:
  - Prevent erosion of a streambank;
  - Prevent debris that would cause an unreasonable adverse effect from entering a stream; or
  - Maintain slope stability in areas where landslides have occurred.

A confirmation holder must not:

- Engage in ... foliar spraying outdoors unless the weather conditions are as per the requirements in the Weather Monitoring section;
- Use a residual pesticide on water-saturated soil, during heavy rainfall or if heavy rainfall is imminent;
- Spray a pesticide on foliage covered by ice or frost or if water is flowing on the foliage; or
- Spray a pesticide after 30 minutes after sunset or before 30 minutes before sunrise.

A container used to prepare, mix or apply a pesticide must not be washed or submerged in a body of water. Pesticides must be prevented from entering any body of water or irrigation system used to draw water from for the containment, preparation, mixing or application of a pesticide by maintaining a gap between the pesticide and the equipment used to draw water.

## **Disposal of Pesticides and Pesticide Containers**

Unused pesticide must be returned to the manufacturer or disposed of in an appropriate facility.

Emptied pesticide containers will be triple rinsed, the rinsed liquid added to the spray mix for application to treatment areas, and the containers crushed before being taken to an approved landfill or recycling depot. All pesticide containers must be accounted for.

## **Spill Plans**

A pesticide spill kit and contingency plan will be maintained at mixing and loading sites. The pesticide spill kits will contain the materials listed on page G-4 of the *MoF Herbicide Field Handbook* (Boateng 2002). Included in the kit will be a spill contingency plan that will be reviewed with applicators and mixing/loading personnel prior to the start of each project. The spill contingency plan will contain measures similar to those on page G-5 of the *Herbicide Field Handbook*. A company representative must approve both the spill kit and contingency plan prior to project commencement.

The spill kit must be used in all locations that can be accessed by trucks.

### **Remote-access Spill Kit**

In areas with limited access – access by helicopter, floatplane or boat with no truck – a reduced-content spill kit is permissible. The remote-access spill kit will have the following minimum contents:

- Spill contingency plan and emergency contact information and phone numbers
- Kitty litter or similar absorbent substance
- Absorbent pads (Absorbal)
- Large garbage bags (two or more)
- Personal protective equipment (if not already in possession of workers)
- Shovels (may be with fire equipment)
- Flagging tape
- Appropriate first aid kit as per WorksafeBC requirements

# **Environmental Protection**

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There are various procedures undertaken in the plan area that facilitate protection of the environment. First, there are requirements for environmental protection specified in the *Integrated Pest Management Act* or the *Integrated Pest Management Regulation*. Second, there are management practices in the plan area that also protect or enhance the environment but are not specifically required by law.

The requirements in the IPM Act and Regulation include processes associated with:

- Community Watersheds & Domestic Water Supplies
- Fish & Riparian Areas
- Wildlife & Wildlife Habitat
- Human Food Sources
- Pre-treatment Inspection Procedures
- Pesticide Equipment Maintenance & Calibration
- Weather Monitoring

Environmental protection or enhancement not specified in law and are associated with:

- Identification of Vulnerable Organisms
- Retention of Red Alder
- Planting of Minor Species

## **Community Watersheds & Domestic Water Supplies**

There are various water users in the plan area, both licensed and unlicensed and community watersheds: China Creek Community Watershed, Malachan Community Watershed, Haggard Lake Community Watershed and Cousteau Community Watershed.

All domestic water intakes that have water licenses associated with them have been mapped and are shown on maps included with this plan. All water intakes and wells are managed, as a minimum, as per the IPM Regulation: They will have a 30-metre radius no-treatment zone and this zone may be reduced if reasonably satisfied that the smaller zone will ensure that pesticide from the use will not enter the water supply intake or well. In addition, where requested, an additional no-treatment zone of up to 30 metres will be added to the entire stream above the intake.

## **Fish & Riparian Areas Protection**

The value of preserving, or in some cases enhancing, fish and riparian values is recognized and the vegetation management program is conducted accordingly. Standard provisions for pesticide use include:

- Identifying and mapping all streams, lakes and wetlands and establishing no-harvest riparian management areas (see below); and
- Establishing 10 metre “pesticide free zones” (PFZs) and associated no-treatment zones around all streams, lakes, wetlands, and identifying them in the field with flagging tape or similar markers. Must also identify and provide PFZs for ditches that are connected to fish-bearing streams for some treatments.

Selective (non-broadcast) treatments with glyphosate products are permitted 2 to 10 metres from wet or dry, non-fish-bearing streams.

A pesticide free zone (PFZ) is a strip of land, usually 10 metres in width, adjacent to the treatment side of a stream or water body, and measured horizontally from the high water mark (the high point of stream flow). Pesticides may not be directly applied to or allowed to reach the PFZ via drift, runoff or leachate (substances carried underground by water). No-treatment zones are strips of land between PFZs and the treatment area. They are designed to protect the integrity of the PFZ. The width of the no-treatment zone will vary with the application technique, the pesticide used, the topography and the weather conditions.

### **Procedure for Classification of Water Bodies and Establishment of No-harvest Riparian Areas**

Riparian areas are specified under the *Forest and Range Practices Act, Forest Planning and Practices Regulation, Division 3*. This legislation describes the requirements for riparian areas on public lands in British Columbia, including water body classification. This classification system is used to determine the appropriate minimum requirements for no-harvest riparian areas on Crown lands and private lands managed within public tenures.

Initial classification of water bodies – streams, lakes and wetlands – is performed by fish-identification specialists who assess and classify all the main water bodies and most of the minor water bodies as well, in a broad area. Following this, in-block streams are surveyed and mapped, and given their final classification by the layout engineer. Borderline cases are reviewed by staff engineers or fish-identification specialists. The only features associated with water that are not necessarily surveyed and mapped are “non-classified drainages” (water bodies that do not have continuous channels or alluvial deposits and therefore are not streams). These are usually small and ephemeral (only flow part of the year).

## **Wildlife & Wildlife Habitat**

Pesticide use when it is performed appropriately should have minimal impact on wildlife.

There are four tactics used in pre-harvest planning that serve to maintain or enhance wildlife habitat:

1. Creation of no-harvest riparian management areas on all larger fish-bearing water bodies; creation of management zones on all classified water bodies.
2. Establishment of wildlife tree patches (generally 7% but as high as 15% of total harvest area,) to achieve stand level biodiversity in each block (forest that is reserved from harvesting for at least one rotation);
3. Identification and management of nest trees and bear dens.
4. Designation of old growth management areas (OGMAs), Wildlife Habitat Areas and Ungulate Winter Ranges provide older seral habitat for wildlife on a landscape level.

## **Deer & Elk**

There are black tail deer throughout the plan area plus a few resident herds of Roosevelt elk. Where deer and elk winter ranges have been identified they are incorporated into harvesting plans.

For the Klanawa and Upper Nitinat portion of TFL 44, an Elk Habitat Management Strategy is in place. This strategy includes the maintenance of some deciduous stands and provision for forage opportunities.

## **Human Food Sources**

Naturally occurring food suitable for human consumption is an important resource within the plan area. Potential food resources include berries, mushrooms and medicinal plants. The strategies that will be applied to protect each of these resources from pesticide use are outlined below.

Known berry-picking areas will be established by consulting with First Nations, and will be protected by establishing treatment buffers and/or modifying treatment dates. Signs will be posted at the time of treatment, as per the IPM Regulation, and will be left in place for at least 14 days.

At present there are no known areas used for medicinal plants; therefore, no specific strategies are in place regarding their protection.

There are no other known locations for human food collection.

## **Pre-treatment Inspection Procedures**

Ground-based pesticide applications will be conducted by service licensees in accordance with the IPM Act and Regulation, Pesticide Use Notice Confirmation and this PMP. The confirmation holder will ensure that the treatment plan is based on survey information no more than 18 months old.

The licensee or designate will ensure the correct protocols are in place prior to treatment, including:

- Appropriate licensing;
- Appropriate training, personal protective equipment and certification (one certified person per a maximum of 4 supervised workers with the supervisor within 500 metres, audio or visual);
- Marking of all pesticide-free zones with an agreed upon colour of ribbon – marking should be done immediately prior to treatment to avoid errors due to changes in the weather;
- Marking of treatment areas, no-treatment zones, walkways, working strips for large blocks and completed trees or areas as required and with an agreed upon colour of ribbon. Marking may not be required where readily visible landmarks such as geographic features, roads or timber edges are utilized as treatment boundaries;
- All necessary equipment for the specific application;
- Spill kits, fire equipment and safety gear;
- Public notification (signs);
- Appropriate weather and environmental conditions;
- Treatment is consistent with the prescription; and
- A final inspection has been completed by the foreperson.

## **Maintaining and Calibrating Pesticide Application Equipment**

Ground foliar application equipment will be calibrated as described on page C-1 of the *MoF Herbicide Field Handbook* (Boateng 2002). Applicators will also have to ensure their equipment is maintained and serviced in accordance with manufacturers' instructions.

Service licensees will be responsible for maintaining and calibrating pesticide application equipment.

## **Weather Monitoring**

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

- Temperatures are less than 26.5 degrees Celsius
- Wind speed is less than 8 km per hour
- Relative humidity is greater than 30%
- No precipitation is forecast for at least 6 hours (or less as per the manufacturer's label)
- There is not a temperature inversion present
- Wind is not blowing in the direction of environmentally sensitive areas

If all of these conditions are not met the project will be shut down or alternate work will be done. Weather readings will be recorded on field notepaper and kept in company files for at least three years after project completion. A Western Forest Products Inc. representative or trained delegate will do the monitoring.

## **Identification of Vulnerable Organisms**

Vulnerable organisms will be identified at or prior to SP development where ever possible. Vulnerable organisms are listed with the Conservation Data Centre. Once identified, management of the organism will be as per the Identified Wildlife Management Strategy or the Forest Stewardship Plan:

<http://www.env.gov.bc.ca/wld/documents/identified/IWMS%20Procedures.pdf>

## **Retention of Red Alder**

Red alder occurs naturally throughout most of the plan area. It is the primary target of the vegetation management program and pesticide treatments. In addition to being a potentially valuable crop tree, red alder also contributes to biodiversity if retained in the forest. It does so by adding nitrogen to forest sites – nitrogen that is available as a growth enhancer for other plants and organisms. Red alder also creates gaps in the canopy of evergreen forests that allows light to reach the forest floor, which in turn results in the maintenance of light-requiring plants used by other organisms for food and cover.

## Planting of Minor Species

Douglas-fir, red cedar, western hemlock and yellow cedar, plus a variety of minor species are included in planting programs throughout the plan area. The latter include mountain hemlock, western white pine and Sitka spruce.

## Pesticides

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The pesticides that may be used in the PMP include:

Release XRT (active ingredient – *triclopyr*) – manufactured by Dow Agro Sciences (Canada)

Garlon RTU (active ingredient – *triclopyr*) – manufactured by Dow Agro Sciences (Canada)

Vantage Forestry, Vantage Plus Max II, Vantage XTR (active ingredient – *glyphosate*) – Dow Agro Sciences (Canada)

## Application Methods and Equipment

The products with glyphosate as an active ingredient may be applied using the following application methods and equipment:

- Hack & squirt (and cut-stump): hatchet or similar hand tools and applicator bottles with squirting apparatus;
- Ground foliar-backpack: motorized or manually-operated backpack sprayers
- Ground foliar-hose & gun: truck or trailer mounted motorized sprayer with hose and spray gun

Release XTR or Garlon RTU may be applied with the following application methods and equipment:

- Basal (and cut-stump): motorized or manually-operated backpack sprayers
- Thinline: applicator bottles with spraying apparatus

Please refer to the product manufacturers' websites, listed below, for up-to-date product descriptions, Material Safety Data Sheets (MSDS) and application instructions (labels).

## Other Substances

Other substances used in pesticide work and their uses:

- Basacid Blue – a blue dye mixed with pesticides to increase visibility – manufactured by BASF Canada Inc.
- Halt – an antifoaming agent mixed with glyphosate products to reduce foaming during foliar spraying operations – manufactured by Dow Agro Sciences Canada
- IsoparM – mixed with Release XTR for basal applications; increases the spread-ability; manufactured by Esso
- Light Neutral Oil 100R – mixed with Release XTR and IsoparM on hot days (temperature over 26 degrees) to reduce the volatility of IsoparM; manufactured by Chevron
- Sylgard 309 – mixed with glyphosate products to increase the penetration (reduces the surface tension of water-soluble pesticides); used in site preparation treatments, roadside applications and for foliar treatments of Scotch broom and bigleaf maple; manufactured by Dow Corning

## Labels and Material Safety Data Sheets

Labels and up-to-date MSDS for the pesticides and other substances are available on the manufacturers' websites.

Garlon RTU

Release XTR

Vantage

Vantage Forestry

Vantage Plus Max II

IsoparM

[http://www.truenorthspecialty.com/english/Products\\_herbicides.htm](http://www.truenorthspecialty.com/english/Products_herbicides.htm)

Sylgard 309

[http://www.truenorthspecialty.com/english/Products\\_adjuvants.htm](http://www.truenorthspecialty.com/english/Products_adjuvants.htm)

- Basacid Blue: BASF Canada Inc. –  
[http://worldaccount.basf.com/wa/NAFTA~fr\\_FR/Catalog/FunctionalPolymers/doc4/BASF/PRD/30055116/.pdf?title=&asset\\_type=msds/pdf&language=EN&validArea=US&urn=urn:documentum:ProductBase\\_EU:09007af88009a4fd.pdf](http://worldaccount.basf.com/wa/NAFTA~fr_FR/Catalog/FunctionalPolymers/doc4/BASF/PRD/30055116/.pdf?title=&asset_type=msds/pdf&language=EN&validArea=US&urn=urn:documentum:ProductBase_EU:09007af88009a4fd.pdf)
- Light Neutral Oil 100R: Chevron –  
[www.chevron.com/products/prodserv/BaseOils/products.shtml](http://www.chevron.com/products/prodserv/BaseOils/products.shtml)

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*Western Forest Products Inc. Pest Management Plan for Forest Vegetation Management Confirmation#: 111-0216-07/12*, C.T.Buss, 2007.

*Western Forest Products Inc. Forest Stewardship Plan Mid-Island Stillwater and Port Alberni Forest Operations*, January 2012.

# Appendix A – Treatment Thresholds

## Treatment Thresholds

Target Species	Density Threshold	Competition threshold	Treatment Options Manual	Treatment Options Chemical	Active ingredient for chemical treatment
Red Alder	>50 sph or as determined by forestry professional	Impediment to free growing	Cut, Girdle, Hand Pull,	Basal, Foliar Backpack, Foliar Vehicle mount, Hack and Squirt,	Glyphosate or Tryclopir
Bitter Cherry	Any as determined by forestry professional	Impediment to free growing	Cut, Hand Pull	Basal, Hack and Squirt	Glyphosate or Tryclopir
Big Leaf Maple	>10 sph or as determined by forestry professional	Impediment to free growing	Single stem, Cut	Basal, Foliar Backpack, Foliar Vehicle mount, Hack and Squirt, Thinline	Tryclopir with possible surfactant
Pacific Willow and Dogwood	Any as determined by forestry professional	Impediment to free growing	Cut, Girdle	Basal, Hack and Squirt,	Glyphosate or Tryclopir
Salmonberry, Elderberry and Thimbleberry	Any as determined by forestry professional	Taller than crop tree and expected to remain so without treatment	Cut	Foliar Backpack, Foliar Vehicle mount,	Glyphosate
Bracken Fern, Fireweed	Any as determined by forestry professional	Taller than crop tree and expected to remain so without treatment	Manual Stem Bending	Foliar Backpack, Foliar Vehicle mount	Glyphosate
Scotch Broom	Any as determined by forestry professional	Taller than crop tree and expected to remain so without treatment	Cut, Hand Pull,	Foliar Backpack, Foliar Vehicle mount	Glyphosate or Tryclopir with surfactant
Canadian Thistle	Any as determined by forestry professional	Taller than crop tree and expected to remain so without treatment	Cut	NA	NA
Japanese Knotweed	Any as determined by forestry professional	Any – as required to prevent spread	NA	Foliar Backpack, Foliar Vehicle mount, Hack and Squirt,	Glyphosate

## Notes

Considerations when choosing treatment type include: Worker safety, environmental requirements, proximity to other resources, size and density of brush species relative to crop tree, expected long term efficacy, cost of treatment, and weather conditions.

In no-pesticide areas manual treatment is used.

Small patches or strips of high density red alder and bitter cherry may be retained for biological reasons. For example, five metre wide strips of red alder along stream banks, or 20 by 20 metre patches of bitter cherry.

For foliar spray treatments, Sylgard 309, or a similar surfactant may be added where deemed necessary for maximum efficacy. A surfactant may also be added for treatment of Scotch broom and big leaf maple.



# Pest Management Plan for Forest Vegetation Management Port Alberni Forest Operation



## Legend

- Water/License
- Cave
- Community Watershed
- TFL 44
- Mainlines
- Highway 4
- Streams
- Karst Potential
- Active Blocks
- Non Free-Growing Blocks
- Indian Reserve
- First Nation Treaty Lands
- City - Port Alberni
- Water



1:85,000

**Disclaimer**  
Although we take great care in the preparation of this information and are confident that it is accurate, we do not give any warranty as to its accuracy or suitability for any purpose that it might be used for. Users assume the risk associated with the accuracy and results of the contents of this document.

**Map Note**  
Inquiries relating to this map should be directed to Western Forest Products, Port Alberni Forest Operation, P.O. Box 2001, Port Alberni, B.C. V9Y 7N3

*Through its Sustainable Forest Management Plan, WFP is committed to using herbicide on less than 0.2% per year of its defined forest area of 139,446 ha. During the previously approved PMP period, (2007-2012), WFP treated a yearly average of 0.02% of the defined forest area. Future planning estimates a similar usage pattern over the term of the PMP.*

Albers Equal Area Projection  
North American Datum 1983 - NAD83  
Project Directory: \\dcfile01\pdp\gis\projects\management plans\pesticide\management\_2013.mxd  
Date: Dec 2013