Western Forest Products Inc.
DEFINING A HIGHER STANDARD™

Pest Management Plan for Forest Vegetation Management

North Island Forest Operation

Plan #1 2017-2021

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4/5/2017

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Introduction

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. The pest in a PMP for forest vegetation management is forest vegetation in competition with young trees for light, water, nutrients and growing space. The goal of this PMP is to reduce the competitive advantage of natural vegetation over the desired crop trees as well as to addresses the management of invasive plants.

Vegetation management is just one phase in the overall management of a stand of trees over a rotation. It is mainly done to ensure that newly established tree seedlings survive, that growth rates of trees stay at acceptable levels, and to prevent competing vegetation from impeding crop trees from reaching free growing within legislated timeframes. Failure to meet the free growing standards can result in penalties and has potential implications on the future timber supply.

The overall purpose of this PMP is to describe the Integrated Pest Management Elements used to manage problem vegetation or pests. This includes describing and managing ecosystems to prevent vegetative pest problems, identifying problem vegetation, monitoring and prescribing treatments based on injury thresholds, treatments of vegetative pests, documentation and evaluation of the effectiveness of the treatments. In addition, the plan describes how environmental values and human health are protected and the standards used for herbicide applications.

The above information is contained in the following sections of the PMP:

- Identification of the geographic area of the PMP 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.
Conifer: Cone-bearing seed plants. Conifers are Gymnosperms. They are cone-bearing seed plants with vascular tissue; all living conifers are woody plants, the great majority being trees.

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

Cutblock: block; stand; harvested area; management unit for tracking most treatment information.

Deciduous: tree species that lose their foliage, typically in the fall.

Ecosystem: a functional unit consisting of all the living organisms (plants, animals, and microbes) in a given area, and all the non-living physical and chemical factors of their environment, linked together through nutrient cycling and energy flow.

Free growing: a stand of healthy trees of a commercially valuable species, the growth of which is not impeded by competition from plants, shrubs or other trees.

Harvest: in relation to timber, means to fell or remove timber, other than under a silviculture treatment,

Injury threshold means the point at which the abundance of pests and the damage they are causing or are likely to cause indicates that pest control is necessary or desirable.

Microsite: an small area, which exhibits, localized characteristics different from the surrounding area. For example, the microsites created by a rock outcrop with thin soils, or the shaded and cooled areas created on a site by the presence of slash.

No Treatment Zone (NTZ): an area of land that must not be treated with pesticide

Pesticide Free Zone (PFZ): an area of land that must not be treated with pesticide, and must be protected from pesticide moving onto it.

Pest: Problem Vegetation; any species of competing vegetation that causes unacceptable reductions in, or interferes with, the survival and growth performance of desired crop trees. It also includes invasive plants.

Pesticide: Under the Integrated Pest Management Act, a micro-organism or material that is represented, sold, used or intended to be used to prevent, destroy, repel or mitigate a pest, and includes a plant growth regulator, plant defoliator or plant desiccant, a control product as defined in the Pest Control Products Act (Canada), and a substance that is classified as a pesticide by regulation, but does not include micro-organisms, materials, substances or control products excluded from this definition by regulation.

Stems per Hectare (SPH): an measure of the frequency or density of a tree or shrub on an area of land.

Silviculture: The art and science of controlling the establishment, growth, composition, health and quality of forests and woodlands.

Stocking: The amount of trees on an area. Usually expressed as stems per hectare (sph).

Identifying Information

Geographic Area Covered by this Plan

The PMP is for forest lands managed by Western Forest Product Inc.'s (WFP) North Island Forest Operation (NIFO), which encompasses three operating zones, Holberg, Port McNeill and Jeune Landing.

The area covered by this PMP includes all three operating zones in the following tenures:

- Tree Farm License: 6
- Forest Licenses: A94737
- WFP's Private Managed Forest Lands: 29, 31 and 61
- Timber Licenses: T0860
- There are silviculture obligations within BC Timber Sales take back area that will also be covered under the PMP

A map of the PMP area can be found in **Appendix 1**.

Person Responsible for Managing Pests

The person responsible for managing pests in the area covered by this PMP is WFP's NIFO Sr. Operations Planner.

Principal Contact

For information relating to this PMP, contact Jon Flintoft, RPF, phone number: 250-956-5245.

Integrated Pest Management Elements

Integrated Pest Management (IPM) is the key to the pest management program and incorporates the following concepts:

- **Prevention** - managing ecosystems to prevent organisms from becoming pests;
- **Monitoring** - ongoing monitoring of pest populations;
- **Treatment** - establishment of treatment injury thresholds and control of pests through direct intervention; and
- **Evaluation** - formal evaluations of treatment success.

The IPM approach uses all available, practical techniques to directly deal with pest problems, including biological, physical, and cultural controls, as well as chemical treatments. All activities are done in a coordinated manner balancing costs, worker safety and minimizing environmental impacts while achieving the final goal. Many actions are employed to prevent pest problems rather than simply treating them when they occur. WFP is committed to the principals and practice of Integrated Pest Management and will use the techniques listed below in an integrated program to manage competing vegetation.

Prevention Program

The NIFO prevention program is split into two components; Forest Vegetation Management and Invasive Plant Management. The primary intent of the entire NIFO prevention program is to prevent the establishment/spread and minimize impacts of problem vegetation, in order to prevent the need for treatment.

Forest Vegetation Management

The Forest Range and Practices Act (FRPA) defines a free growing stand as "a stand of healthy trees of a commercially valuable species, the growth of which is not impeded by competition from plants, shrubs or other trees[1]". FRPA requires that all major license holders operating on Crown land prepare a Forest Stewardship Plan (FSP). The FSP[2] must prescribe stocking standards for establishing a free growing stand on the portions of the area of harvest that are in the net area to be reforested (NAR). The stocking standards outlined in the approved FSP must specify the regeneration/free growing dates, crop tree species, density, minimum distance between crop trees and the free growing height requirements.

The following steps below are taken by NIFO to ensure that a stand meets the established free growing requirements and prevents the need for a brushing treatment.

- Silviculture Instructions;
- Planting;
- Time of Planting Fertilization;
- Surveys

[1] Forest Range and Practices Regulation, Part 1- Definitions and Interpretation
http://www.bclaws.ca/civix/document/id/consol21/consol21/00_02069_01#section1

[2] Forest Stewardship Plan, North Vancouver Island Forest Operations
http://www.westernforest.com/wp-content/uploads/2012/12/NVI-FSP-Apr-25_12-amendment-1.pdf
The Forest Stewardship Plan for the North Vancouver Island Forest Operation is currently up for renewal and is in the review process with the Ministry of Forest Lands and Natural Resources. Once the FSP document is approved the referenced FSP above should be replaced with the most up-to-date version.

Silviculture Instructions

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. The planned cutblock is walked by a qualified professional[3] prior to harvest, classifying the ecosystems of the site using the Biogeoclimatic Ecosystem Classification system (BEC)[4]. The BEC of the site determines the stocking standards that will be applied. The estimation of the likelihood that a site will produce brush can also be done off of the ecosystem classification; sites with higher nutritional status, for instance, have a higher likelihood of producing competitive brush species or problem vegetation.

The pre-harvest site visit is also an opportune time to assess the pre-existing vegetation. Noting any competitive plant or tree species, such as salmonberry or Red alder that exist in the mature forest or adjacent previously harvested cutblock is a good indicator of what can be expected in the regenerated stand. Also, looking at adjacent regenerating stands in the area with similar attributes can aid in determining the brush potential of future stands.

The information on the ecosystem classification, pre-existing vegetation and an estimation of the brushing potential, is recorded by the qualified professional in the Silviculture Instructions. The Silviculture Instructions act as the initial road map for the block and help to determine whether or not any or all of the next tactics (planting, time-of-planting fertilization) will be required and to what degree.

Planting

Harvested cutblocks that have been identified in the Silviculture Instructions as having an elevated brush hazard will be planted and not left for natural regeneration. Effective planting is a key tactic for reducing the competitive ability of vegetation because it can result in crop trees (seedlings) that out-grow the vegetation and hence, reduce the need for vegetation treatment. There are four strategies that can be employed to ensure effective planting of a site;

Timing of activity

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

Planting density

Most planting prescriptions specify a target planting density of 900-1000 stems per hectare (sph). On high to very high brush hazard sites, planting density is typically increased by 100-200 sph. This ensures that the targets are achieved and helps combat the anticipated brush; having a few extra trees increases the probability of having enough trees that reach the free growing criteria.

Seedling selection

The quality of the planting stock is paramount in starting a vigorous plantation. Considerable research has been put into developing high gain seed for several of the conifer species (Hw, Cw, Fd, Ss, Pw) planted in the PMP area. WFP uses high gain seed wherever possible, which results in rapid growth of the seedlings, resulting in the plantation outgrowing much of the competing brush.

Selecting the right species for high brush hazard areas is also crucial. On brush-prone sites, species with rapid initial growth such as Sitka spruce or species with higher shade tolerance such as western red cedar will be planted.

[3] Typically a registered member of the Association of BC Forest Professionals

[4] A Field Guide for Site Identification and Interpretation in the Vancouver Forest Region, Ministry of Forests, 1994 https://www.for.gov.bc.ca/hfd/pubs/docs/Lmh/Lmh28.htm

Seedling stock size is also a key to increasing the competitive advantage of a seedling over brush competition. Specifically, a larger seedling will likely grow more quickly than a smaller seedling, thereby improving its chances of out-growing competing brush species.

Planting Quality

Elevated, well-drained microsites are preferred for all species on most sites. Tree planters are trained to identify the best microsite for the different species. Organic/mineral soil interface is generally ideal for all species because it maximizes nutrient availability for the seedlings. The root system has to be straight into the ground and to an adequate depth (root collar equal to soil surface). A well-planted tree located on a good microsite has a very good chance of out-competing brush on most sites. Microsite selection and stock handling is monitored closely by WFP staff during planting operations.

The above items are addressed in the Silviculture Instructions developed pre-harvest and revisited and revised as needed in the post-harvest assessment.

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.

Invasive Plant Management

The WFP North Island Forest Operation Forest Stewardship Plan provides direction in the control and prevention of spreading invasive plants by providing diligent measures to prevent further spread of invasive plants. A summary of the measures includes:

- Inspection and treatment of active gravel pits, recreation sites, employee parking areas and equipment yards;
- Procurement of gravel pit material that contains no high priority plants (seeds or plant parts);
- Inspection of vehicle and equipment undercarriages, and subsequent cleaning if working in an area with priority invasive plants;
- Treatment of high priority invasive plants on road building or timber harvesting projects before activities commence, including along skid trails, landings and heli-drop zones;
- Seeding cut-slopes of newly of newly built un-vegetated roads within $\leq$ 1 year of road building within 100m of existing priority high risk species infestations;
- Education of roadside mowing and brushing equipment operators to recognize priority invasive plants so that they do not spread them.

WFP planning staff and contractors receive training in the identification of the high risk invasive plants (knotweed and scotch broom) as they are recognized as a risk of affecting forest management objectives.

Problem Vegetation Identification Program

The problem vegetation in the plan area can be classified into three types, shrubs, invasive shrubs and trees.

Shrubs

Salmonberry (*Rubus spectabilis*), **Elderberry** (*Sambucus racemosa*) and **Thimbleberry (***Rubus parvifolum*) are common throughout the wetter and richer portions of the PMP area. All of these species arise from seed or rhizomes, root-like structures that grow parallel to the ground just beneath the surface. When these species exist pre-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 harvesting. 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 vigor and rarely, a high risk of mortality.

Invasive Shrubs

Scotch broom (*Cystisus scoparius*) is an invader species that occurs sporadically in the PMP area. 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, gravel pits, 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 North Vancouver Island Forest Operation FSP as an invasive plant.

Japanese knotweed, Giant knotweed, Himalayan and **Bohemian knotweed** species, (*Polygonum* spp.). Knotweed is a non-native, highly invasive plant that is found along roadsides and wetlands. It out-competes native vegetation and is extremely difficult to control once established. Knotweed is considered noxious under the BC Weed Control Act. Reproduction is primarily vegetative through long creeping rhizomes or by root fragments, which readily produce new plants and can 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 North Vancouver Island Forest Operation FSP as invasive plants.

Trees

Red alder (Alnus rubra) is common throughout the PMP area and arises from airborne seed that can establish on all types of sites, but in general seeds in more heavily on richer sites or disturbed sites, like roadsides. Following establishment, the growth of red alder is rapid – up to three meters 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.

Monitoring Program

There are two methods used to identify competing problem vegetation. The first is to predict where competing vegetation is likely to develop using ecosystem information (discussed in Prevention Section). The second method is information gathering during regularly scheduled field surveys. It is essential during these surveys to be able to identify potential pests and to predict future impact on the crop trees. Data collected during regularly scheduled surveys is the main method used in evaluating problem vegetation. Each block has a minimum of three types of silviculture surveys performed from the time of harvesting until free growing. The types of surveys are:

- Stocking and survival survey
- Stand assessment survey
- Free growing survey

The objective of all these types of surveys is to monitor the stand over time and ensure that the stand is on track to meeting the free growing stocking criteria. If problem vegetation is identified in any of the above surveys and it is anticipated that a treatment is needed, a "Detailed Site Assessment" (DSA) is carried out, **Appendix 2**. Data collected includes:

- Crop tree height and annual height growth;
- Problem vegetation species, density, height, and annual height growth.

The area is then scheduled for a pre-treatment assessment (see more details in Pre-Treatment Inspection Procedures).

Injury Thresholds Program

Injury threshold is defined in the Integrated Pesticide Management Regulation[5] as "the point at which the abundance of pests and the damage they are causing or are likely to cause indicates that pest control is necessary or desirable". The injury thresholds that were chosen for the problem vegetation identified in this PMP are based on specific objectives for forest vegetation management and invasive plant management.

Forest Vegetation Management

Treatment selection is guided by the injury thresholds, which are in turn consistent with free growing principles. Table 1, below, outlines the injury thresholds for the target species identified in this PMP. A treatment, either using chemical or manual techniques, will be selected if the identified problem vegetation meets the density and competition thresholds.

Problem Vegetation	Density Threshold	Competition Threshold	Treatment Options Manual	Treatment Options Chemical
Salmonberry, elderberry and thimbleberry	If no treatment were carried out, the number of acceptable, well-spaced conifers would be expected to meet or exceed the minimum Free Growing targets	Taller than crop tree and expected to remain so without treatment	Cut	Foliar backpack
Red Alder	Determined by a qualified professional	Impediment to free growing	Cut, Girdle,	Foliar Backpack, Stem Injection

Table 1: Injury Thresholds for identified problem vegetation for Forest Vegetation Management

[5] Integrated Pest Management Act, 1 Definitions
http://www.bclaws.ca/civix/document/id/loo91/loo91/604_2004#section1

Invasive Plant Management

The PMP area currently does not have a large distribution of the identified problem vegetation invasive plant species Scotch broom and Knotweed spp. The selection of injury thresholds have been chosen so that they align with the management strategies as outlined by the Coastal Species Committee.

Problem Vegetation	Management Strategy	Injury Threshold	Treatment Options Manual	Treatment Options Chemical
Scotch broom	*Contain*- These species have established infestations throughout the PMP area	Contain existing infestations and prevent spread to un-infested areas	Hand-pulling, Cut	Foliar Backpack
Japanese knotweed, Giant knotweed, Himalayan knotweed and Bohemian knotweed	*Eradicate*- These species are known to occur only in limited distribution and low density throughout the PMP area	Eradicate if found within new cutblocks/roads. Containment strategy will be employed existing infestation sites within the PMP area.	Cut	Foliar Backpack

Table 2: Injury Thresholds for identified problem vegetation for Invasive Plant Management

Treatment Options

Chemical

All pesticide treatments will be consistent with the Integrated Pest Management Act, the Integrated Pest Management Regulation and the Pesticide Use Notice Confirmation. Any herbicides that will be proposed for use, within the scope of this PMP, will be registered for forestry use under the "Pest Control Products Act" and have been deemed safe when applied according to label conditions. Glyphosate and Triclopyr will be the active ingredients for all herbicide products that will be used under this PMP. Table 3 shows some of the products that will be used under this plan. Equivalent products with the same active ingredient may be utilized. These herbicides are non-selective in that they will affect most types of vegetation although their effectiveness varies with species, application rates, and application techniques. The herbicides will be applied according to label conditions and all conditions and restrictions stated in this PMP.

Herbicide (Common Name)	Active Ingredient (Chemical)	PCP#	Application Type
VisionMax™	Glyphosate	27736	Ground
Garlon™ XRT	Triclopyr	28945	Ground

Table 3: Example of products that will be used under this plan with the active ingredients of Glyphosate or Triclopyr

Stem Injection

Description: Stem injection is the application of an herbicide/water/dye mix to the stems of individual target trees. A dye (Basacid Blue) is used to allow the applicators and supervisors to ensure that the target amount of herbicide mix is applied. The amount of dye used shall not exceed the equivalent of 20 ml dye per 100 L mix. Normally, stem injection is accomplished by cutting into the sapwood and applying a small amount of herbicide mix into the cuts.

Rational for Selecting:

- If the problem vegetation identified is Red alder then stem injection is a good option due the quick nature of the treatment.
- 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).
- Selective nature of the application makes it an effective technique for the management of environmentally sensitive features. Because this is a spot treatment, residual pesticide beyond the treated tree is minimal; effects on fish, wildlife, soils are similarly reduced.

Benefits:

- Stem injection historically in the area under this PMP has been more effective than manual girdling for Red alder treatment. The main reason for this is that most of the areas that are at the optimum time for treatment have a mixture of many sizes of alder, including small alder. Experience[7] indicates that girdling is effective on larger alder, but on very small alder (< 4 cm diameter at breast height), the girdled alder re-sprout several new leaders and continue to grow. Stem injection acts quickly (mortality typically within a year), and normally the alder will not produce further seed following treatment. However, girdled trees take two to three years to die, thus if the alder are at or near seed bearing age at the time of treatment, they will produce a substantial amount of seed before they die, this will lead to increased alder numbers.
- Stem Injection is highly selective and injury to crop trees is uncommon.

Limitations:

- Pesticide Free Zones need to maintained as per the specifications in the Integrated Pesticide Management Regulation.
- Typically problem vegetation cannot be less than 2 or 3 cm in diameter at breast height, making this not a good treatment option for salmonberry, thimbleberry or elderberry.

Ground Foliar with a Backpack

Description: Ground foliar spraying is the application of an herbicide/water mix onto the foliage of individual plants or clusters of plants, using a manually-operated, low-volume, pressurized backpack. Treatment usually occurs from mid-summer to early fall after crop trees have stopped growing and before leaf abscission of brush species.

Rational for Selecting:

- Good option if treating high densities of problem vegetation of salmonberry, elderberry, thimbleberry or Knotwood spp.
- The vegetation must be less than 4 meters tall.
- Not as selective of an application technique as stem injection, so there is an increased risk to sensitive environmental features and potential introduction of herbicide into Pesticide Free Zones.

[7] Based off of observations from foresters from the various operating zones in NIFO

Benefits:

- Past experience in the PMP area with high density problem vegetation[8] have shown that backpack foliar is the most efficient management method from a treatment effectiveness and cost perspective.

Limitations:

- Caution must be exercised to avoid treating areas where desirable species may be affected.
- Because the pesticide is sprayed through the air, there is a somewhat higher risk of contamination of pesticide free zones, as compared with stem injection.
- The maximum permitted spray height is four meters (vegetation must be less than four meters tall as measured from the feet of the applicator).

Manual

Girdling

Description: Girdling involves cutting one or more strips through the bark, phloem, vascular cambium and some wood in a complete ring from around the entire tree trunk with a special girdling tool or other hand tool. After the bark has been severed, the tree is left to die. The above-ground parts continue to grow, but the roots starve and the tree slowly dies.

Rational for Selecting:

- Good option in riparian areas or other environmentally sensitive sites.
- Girdling is generally not used on trees less than 3 cm in diameter at breast height, preferred diameter is greater than 5 cm.
- Girdling is effective on Red alder but not on any of the problem shrub vegetation
- Girdling is not acceptable in situations where tree failure could lead to public or worker injury or property damage. Blowdown of dead trees may pose a safety problem alongside well travelled areas.

Benefits:

- Girdling allows for the worker to target only the problem vegetation as individual stems and species can be removed or left on a tree-by-tree basis.
- Girdling can be used in riparian areas where herbicide use is prohibited, and it does not introduce herbicides into the environment.

Limitations:

- Girdling is not an effective option for large treatment areas or in dense brush, because it becomes too laborious and costly.
- Treatment is not effective on large stems with thick bark.
- Girdled trees take two to three years to die, thus if the alder are at or near seed bearing age at the time of treatment, they will produce a substantial amount of seed before they die.
- Crew needs to be skilled in the techniques as poor girdling will not result in the proper depth and width of the girdles and thus mortality of the targeted tree.

Cutting

Description: Manual cutting is cutting with hand tools – axes, sandviks, machetes, handsaws or powersaws. Use of this treatment method is quite rare because of the high cost and low efficacy.

Rational for Selecting:

- Use of this treatment method is quite rare because of the high cost and low efficacy.

[8] Salmonberry, elderberry and/or thimbleberry sites

- Appropriate in areas that are highly sensitive; protects areas close to fish-bearing streams and other environmentally sensitive areas, since it can be done without causing excessive erosion or damage to the streambed.

Benefits:

- Allows for the immediate removal of target problem vegetation.
- Good option in areas where target vegetation is widely scattered.

Limitations:

- Highly labor intensive and not ideal for difficult terrain or dense vegetation.
- Depending on the problem vegetation being targeted can increase the fire risk with the buildup of debris.
- High risk of cut vegetation re-sprouting.

Evaluating Effectiveness

All herbicide brushing treatments will be evaluated by visual inspection to examine efficacy within one year following treatment; manual girdling will be within three years following treatment . This feedback is incorporated into the decision making process for future treatments on similar stands. Post Treatment Evaluations assess the following:

- Effectiveness of the treatment relative to the prescription objective.
- Unintended impacts; e.g. herbicide damage to crop trees or cut seedlings.
- Need for further treatment.
- Does the stand meet the free growing standards.
- Treatment boundary compliance.

Operational Information

Safely Transporting Pesticides

Pesticide transport is regulated by the federal Transportation of Dangerous Goods Act (TDG) and the Integrated Pest Management Act and Regulations. At this time, no herbicides covered under this PMP are regulated under the TDG. To ensure safe transport of pesticides, the following procedures will be followed:

- Pesticide containers will be inspected prior to departure for damage or leakage. Transport will be limited to undamaged containers
- Decking of transport vehicle shall be of a non-absorbent material.
- Spill cleanup equipment (shovel, absorbent pads) along with a spill contingency plan and a first aid kit shall accompany transported pesticides.
- Pesticide containers shall be secured during transport and placed in locked compartments when vehicles are left unattended
- Pesticides will be carried separate from the passenger section of the vehicle.
- All drivers of vehicles transporting pesticides shall be trained and aware of the spill contingency plan.
- Pesticides shall not be transported with food, feed, seeds, drugs, or drinking water in the same compartment.
- People and/or animals shall not ride in the back of a vehicle containing herbicides.
- Herbicide mixture shall be transported only in labeled herbicide containers, marked "mixture" and including ratio of mix.
- Personal protection equipment and personal first aid equipment shall be carried in a closed compartment separate from the pesticide containers.
- The transport vehicle (or an accompanying vehicle) will carry a spill clean-up kit adequate for the amount of pesticide being transported, in addition to relevant documents such as material safety data sheets and WFP spill procedures.

Safely Storing Pesticides

Historically in the Port McNeill and Jeune Landing operating zones, storage of pesticides is generally the responsibility of the brushing contractor. Pesticides will still be stored in accordance with the Integrated Pest Management Act and Regulations and the WorkSafe BC document "Standard Practices for Pesticide Applicators".

In the Holberg Operating Zone pesticides will be stored in a WFP facility that is separate from a food storage area, ventilated, locked when unattended and accessible only to authorized persons.

- Each access door to a pesticide storage facility will have a clearly visible sign stating "WARNING: CHEMICAL STORAGE – AUTHORIZED PERSONS ONLY"
- An inspection of the storage facility will be completed quarterly; reviewing MSDS sheets to make sure that they are up-to-date will be a part of this inspection.
- Anyone that takes herbicide out of the storage facility is required to fill out the Chemical/Pesticide Storage Daily Control Record form.

In the field, any pesticides that will be stored in any vehicles will be locked in canopy compartments or storage chests separate from the driver and safety equipment.

Safely mixing, loading and applying pesticides

- All pesticide application must be performed in accordance with the label instructions for the pesticide.
- MSDS sheets will be provided by WFP prior to project commencement. The contractor is required to review all MSDS and pesticide labels with all crew prior to handling any herbicide and determine what protective clothing and safety precautions are to be followed.
- An adequate spill kit with WFP spill procedures must be present at all times
- First aid equipment and eye wash station shall be located in close proximity to the filling and mixing station.
- A copy of the NIFO Emergency Preparedness Response Procedures (EPRP) must be on site at all times, relevant emergency contact phone numbers can be found within this document
- The Contractor's Certified Pesticide Applicator(s) will personally supervise the filling of all pesticide equipment.
- When herbicide is being poured from containers larger than 1 litre, a drip pan of at least twice the size of the pouring container must be used.
- Mixing sites must be at least 30 meters from any waterbody or dry stream.
- Water pumping will be done in such a way that cross-contamination of the water source would not be possible
- Containers used to prepare, mix or apply a pesticide must not be washed or submerged in a body of water.
- Mix only the amount needed for the application during the current treatment window.
- Perform all mixing outdoors. If mixing in the back of a vehicle, ensure adequate lighting and ventilation.
- Mix system for backpack foliar spray and stem injection is to be located in a waterproof tub or vat in order to ensure the containment of any overflow or spill. The tub or vat shall have an open support over the bottom in order to ensure backpacks, jugs or bottles are not in contact with any residual or spilled product within the vat.
- Each backpack mix and/or stem injection mix shall be recorded once loaded into the backpack or spray bottles. The record shall include:
    1. Pest Management Plan number
    2. Contractor name and service license number
    3. Date and time
    4. Herbicide used and PCP Number
    5. Mixer name and certification
    6. Volume of herbicide
    7. Volume of carrier
    8. Name of applicator(s)
    9. Cutblock or opening number
    10. These records shall be checked and signed by the mixer

Safe disposal of empty pesticide containers and unused pesticides

Unused pesticide must be returned to the manufacturer or disposed of in an appropriate facility. Empty pesticide containers will be triple rinsed, altered so they cannot be reused and disposed in an approved landfill or collection facility.

Responding to pesticide spills

WFP staff will refer to WFP's NIFO Emergency Preparedness Response Plan (EPRP) (**Appendix 3**) for worker level information regarding the requirements for spill reporting and spill clean-up. These procedures detail actions that must be taken if a spill occurs and are reviewed at the pre-work crew meeting. These procedures include instructions regarding stopping the source of the spill, blocking entry into waterways, containing and cleaning up the spill, and reporting the spill.

Environmental Protection Strategies

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 and the Integrated Pest Management Regulation.

The requirements in the Integrated Pest Management 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

Strategies to Protect Community Watershed and other Domestic and Agricultural Water Sources

There are no community watersheds or other agricultural water sources within the area covered by this PMP. If any community watersheds are established during the term of this PMP, treatments therein shall be carried out in accordance with the Integrated Pest Management Regulation.

All domestic water intakes that have water licenses associated with them have been mapped and are shown on maps in **Appendix 1**. All water intakes and wells are managed, as a minimum, as per the Integrated Pesticide Management Regulation[9]. 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 meters will be added to the entire stream above the intake.

Fish and Riparian Areas

Work around water bodies is carefully planned in advance through an inventory and prescription process. The classification of water bodies will determine the level of protection that is required during pest management activities.

Where necessary, Pesticide Free Zones (PFZ) will be established. A PFZ is an area of land that must not be treated with pesticide and must be protected from pesticide moving onto it[10]. The purpose of the PFZ is to protect an adjacent feature, such as water bodies. In addition, a no treatment zone may also be established adjacent to a PFZ for the purpose of preventing pesticide from reaching that PFZ. No treatment zones (NTZ) are areas where no treatment by pesticide may be carried out. All zones are measured in slope distance from the high water mark of the given water body. Table 4, describes the management of water bodies under this PMP.

[9] Integrated Pesticide Management Regulation section 71
http://www.bclaws.ca/civix/document/id/loo91/loo91/604_2004#section75
[10] Integrated Pesticide ManagementRegulation, definitions
http://www.bclaws.ca/civix/document/id/loo91/loo91/604_2004#section73

Type of Treatment	Herbicide	Water Body Description	Pesticide Free Zone Width	No Treatment Zone (m)
Ground Foliar with a Backpack or Stem Injection	Any herbicide	Domestic water sources	10	30* Can reduce the no-treatment zone if reasonably satisfied that the smaller zone will ensure that pesticide from the use will not enter the water supply intake or well.
Ground Foliar with a Backpack or Stem Injection	Non-glyphosate	Bodies of water, dry streams and classified wetlands	10	5
Stem Injection	Glyphosate	Bodies of water or a classified wetland that is fish bearing or that drains directly into a fish bearing body of water or along or around a dry stream that when wet is fish bearing or drains directly into a fish bearing body of water	5	0
Stem Injection	Glyphosate	Bodies of water if the body of water is not fish bearing at any time of the year and does not drain directly into a fish bearing body of water.	2	0
Ground Foliar with a Backpack or Stem Injection	Glyphosate	Up to but not below the high water mark of temporary, free-standing bodies of water, dry streams that are not fish bearing at any time of the year and do not drain directly into a fish bearing body of water.	0	0
Stem Injection for invasive plants identified under this plan	Glyphosate	Between 1 m and 10 m above the high water mark of any body of water	1	0

Table 4: Pesticide Free Zone and No Treatment Zones that will be applied within the PMP area

Wildlife & Wildlife Habitat

The herbicides used in the PMP area have no known unreasonable adverse effects on wildlife and wildlife habitat when applied according to the product label. Wildlife and wildlife habitat will be protected as follows:

- Ensure that herbicide use is directed only at target problem vegetation.
- Comply with the provincial Wildlife Act and the federal Species at Risk Act.
- Minimize soil erosion caused by vegetation management activities to reduce impact on desirable plants or wildlife.
- Eradicate or Control invasive plants
- Treatment of forage species adjacent to Ungulate Winter Range or Wildlife Habitat Area boundaries will be as per the Objectives for the UWR or WHA.

Human Food Source

Plants may be used by First Nations or stakeholders for food and medicinal purposes. WFP will seek to identify specific harvest areas during the consultation process. In order to avoid the elimination of valued plants or to prevent human exposure to pesticides in specific areas, WFP will undertake one or more of the following measures:

- avoid treatment
- alter treatment timing
- use selective treatment methods
- use non-herbicide treatment methods

Pre-treatment Inspection Procedures

Before treatment of a unit takes place the following protocols should be completed:

- A maximum of 18 months prior to treatment a WFP representative will visit all proposed treatment sites, verify the need and type of treatment using the Integrated Pest Management Elements outlined in this plan. Any necessary layout of treatment boundaries will be completed at this time. It is not uncommon for the treatment areas that were identified for treatment from silviculture surveys to be adjusted based on the pre-treatment inspection.
- WFP will review all treatment maps and prescriptions to make sure that they align with this PMP and are clear and appropriate.
- Either in the office or if required onsite all maps and prescriptions will be reviewed by a WFP representative and the designated contractor prior to release for treatment, confirming that all treatment prescriptions and methods are attainable and specific environmental concerns have been reviewed and identified clearly,
- The contractor crew boss will ensure that each crew member applying herbicide is informed of the boundaries of the proposed treatment unit.

Pesticide Equipment Maintenance & Calibration

The contractor is responsible for all equipment maintenance and calibration in accordance with manufacturer's instructions and relevant legislation and regulations. Contractors will be required to maintain detailed daily records of amount of herbicide applied, and the number of hectares treated. WFP will review these records to monitor that target application rates are being adhered to.

Weather Conditions

Weather conditions have the potential to reduce treatment efficacy and/or increase pesticide loss to the environment. 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. Weather conditions will be monitored and recorded prior to treatment, as well as during and after the treatment if weather conditions change.

Treatment Type	**Temp.**	**Dew or Frost or water flowing on Foliage**	**Wind**	**Relative Humidity**	**Rain or Heavy Fog**
Ground Foliar with a Backpack	>26.5 C No Treat	No Treat	>8 km/hr No Treat	<40% No Treat	No Treat if imminent within 4 hours
Stem Injection	N/A	N/A	N/A	N/A	Water Flow on Stem No treat

Table 6. Weather Conditions Affecting Treatment

Pesticide Descriptions

Trade Name	Active Ingredient	Manufacturer	PCP No.
VisionMax	Glyphosate	Monsanto Canada	27736
Vantage Forestry	Glyphosate	Dow Agro Sciences Canada	26884
Garlon	Triclopyr	Dow Agro Sciences Canada	28945

Table 7: The pesticides that may be used in the PMP area

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
- Sylgard 309 (PCP # 23078) – a silicone *surfactant* mixed with glyphosate products to increase the penetration (reduces the surface tension of water-soluble pesticides); manufactured by Dow Corning.

All of these pesticides are registered for forestry use under Canada's Pesticide Control Products Act. They have been deemed safe by Health Canada when applied according to the instructions outlined on their labels. Newly developed products from the same or a different manufacturer may be used over the course of the PMP, provided they have the same active ingredient and are registered for forestry/silviculture or woodlands management. Application rates will conform to the application rates specified on the pesticide label. WFP commits to using the lowest treatment rates that will provide effective control for competing vegetation.

Application Methods and Equipment

Application Method	Active Ingredient (Trade Name)	Application Equipment
Ground Foliar with a Backpack	Glyphosate	Backpack sprayer, power hose/nozzle
	Triclopyr	
Stem Injection	Glyphosate	Hatchet (or similar handtool) and spray bottle

Table 8: Table 8 identifies the manner of application and the equipment required to apply the pesticides listed above (Table 7).

Labels and Material Safety Data Sheets

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

- Basacid Blue: BASF Canada Inc. – www.basf.com/basf-canada/index_e.shtm
- Sylgard 309: http://www.truenorthspecialty.com/english/Products_herbicides.htm
- Vantage Forestry, Sylgard 309, Garlon RTU and Garlon XRT: Dow Agro Sciences (Canada) www.dowagro.com/ca
- Vision products: Monsanto Canada – www.monsanto.ca

Appendix 1: Maps

Western Forest Products Inc.
DEFINING A HIGHER STANDARD™

Pesticide Management Plan for North Island Forest Operation

- First Nation Reserve
- Communities
- Park
- Private Land
- Mainline
- Highway
- Roads
- Holberg
- Jeune Landing
- Port McNeill
- FL A94737
- T0860
- BCTS
- Registered Drinking Water Sources
- Hydrometric Station
- Licenced Spring
- Water Rights POD
- Community Forest
- Community Watershed
- Proposed PMP Boundary
- Licence-Tenure
- Potential Treatment Sites
- 20K Mapsheet
- Ocean
- Rivers, Lakes
- Wetland

Date: 05/04/2017

SCALE:1:90,000

0 2 4 8 12 16 Kilometers

N

Appendix 2: Detailed Stand Assessment

North Island Forest Operations

Detailed Stand Assessment

Block / SU:	
Survey Crew:	
Date:	
Size of Area to be Treated:	
Proposed Treatment Method:	
DBH Average of Brush:	

Conifer Species Present:	**%**	**Height**
Proposed label		

Problem vegetation	Species	height	Leader	Density

	Y/N
Fish Habitat Present	
Unclassified streams present?	
PFZs required in field?	
PFZs established?	
Wetlands in Treatment area?	
Unugulate Winter Range within 500m?	
Domestic Water Intake within 200m?	
Domestic Residence within 200?	
Other site characteristics?	

Will block be FG after treatment?	

What year should treatment happen?	

Comments:

Appendix 3: Spill Response Procedures

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Pesticides

Typical Physical and Chemical Properties			
Appearance	Various	**Flash Point**	93°C
Odour	Odourless to slight	**Pour Point**	0°C
Solubility	Soluble in all proportions	**Viscosity**	Moderate
Vapour Density	Will sink to ground levels	**Specific Gravity**	Sinks in water (1.17)
TDG Classification/UN Number		N/A	

Safety Measures

Warnings

- Vapours are heavier than air.
- Empty containers may contain toxic vapours.
- Ingestion of significant quantities can be lethal.
- Eye contact causes irritation.
- Skin contact can cause toxic effects due to absorption.
- Inhaling vapours can cause respiratory irritation, intoxication, headache, vomiting, unconsciousness with convulsions, and death.

Personal Protection

- Wear impervious, chemical-resistant clothing, gloves, footwear, and goggles when appropriate to do so; neoprene, Nitrile and PVC are suitable protective materials.
- An organic vapour cartridge respirator may be needed in confined spaces but is not required for routine use and handling.

Precautions

- Eliminate ignition sources.
- Avoid contact with caustic, acids, chlorine, ozone and peroxides.
- Do not mix, store or apply in galvanized or unlined steel containers or spray tanks. Stainless steel is acceptable.
- Restrict access and work upwind of spill.

Response to Fires

Consider action only if safe!

- Avoid confined spaces.
- Extinguish fire with CO2, dry chemical, alcohol foam or water fog. (Water or foam mixed with herbicide may cause frothing.)
- Use water to cool containers exposed to fire.

Pesticides and Herbicides

Response to Spills

Consider actions only if safe!

Containment and Recovery

- **On land**, block entry into waterways.
- Do not flush into sewer or drainage system.
- Contain spill by diking with earth or other barrier.
- Recover minor spills with sorbent.
- Neutralize any remaining residue with lime.
- **On water**, many pesticides sink and mix; contain spill by isolating contaminated water through damming or diversion.

Storage, Transfer and Disposal

- Store closed, labeled containers in cool, well-ventilated areas away from incompatible materials such as fertilizers and fuels.
- Segregate waste types and place in clearly marked containers.
- Consult Purchasing Manager or Environmental Department on transportation and disposal requirements (use approved recycling/disposal service provider).

First Aid

Get prompt medical attention!

Eyes	– Flush eyes immediately with fresh, warm water (not hot water) for 20 minutes while holding the eyelids open. – Remove contact lenses, if exposed to vapours or liquid.
Skin	– Remove contaminated clothing. – Wash skin thoroughly with soap and water.
Inhalation	– Move victim to fresh air. – Perform CPR if victim not breathing. – Provide oxygen if victim is having difficulty breathing.
Ingestion	– Do not induce vomiting. – If victim vomits, keep head below hips to prevent aspiration.

Response to Spills

Eliminate ignition sources! ***Consider actions only if safe!***

Containment and Recovery

- **On land**, block entry into waterways.
- Do not flush into sewer or drainage system.
- Contain spill by diking with earth or other barrier.
- Recover minor spills with sorbent.
- **On water**, do not try to contain or remove petroleum ether spills.
- Use booms to contain and concentrate spills of mineral spirits.
- Recover mineral spills using sorbent, skimmer or vacuum truck.
- Protection booming can be considered for water intakes/marinas.

Storage, Transfer and Disposal

- Store closed, labeled containers in cool, well-ventilated areas away from incompatible materials such as fertilizers and fuels.
- Segregate waste types and place in clearly marked containers.
- Consult Purchasing Manager or Environmental Department on transportation and disposal requirements (use approved recycling/disposal service provider).

First Aid

Get prompt medical attention!

Eyes
- Flush eyes immediately with fresh, warm water (not hot water) for 20 minutes while holding the eyelids open.
- Remove contact lenses, if exposed to vapours or liquid.

Skin
- Remove contaminated clothing.
- Wash skin thoroughly with soap and water.

Inhalation
- Move victim to fresh air.
- Perform CPR if victim not breathing.
- Provide oxygen if victim is having difficulty breathing.

Ingestion
- Do not induce vomiting.
- If victim is conscious, give milk or water to drink.
- If victim vomits, keep head below hips to prevent aspiration.