Pest Management Plan for Invasive Alien Plant and Noxious Weed Control on Provincial Crown Lands within the South Coastal Mainland of British Columbia

Ministry of Transportation and Infrastructure
Ministry of Environment (BC Parks and Protected Areas)
Ministry of Forests, Lands, and Natural Resource Operations
Ministry of Agriculture

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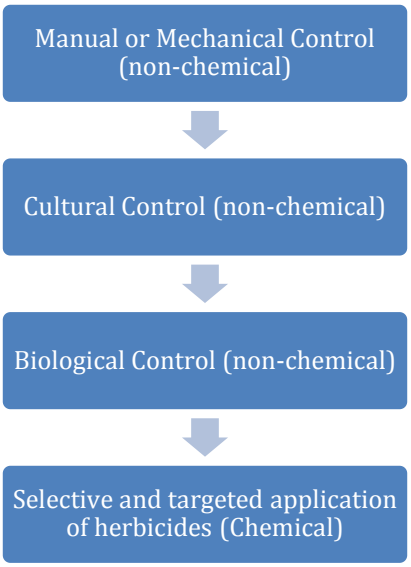
1.0 EXECUTIVE SUMMARY

An invasive alien plant is any plant species, not native to British Columbia (BC) that has the potential to cause undesirable or detrimental impacts to the economy as well as to human, animal and ecosystem health. The threat posed by invasive plant species that currently exist in BC or have the potential to spread to BC in the future is significant and growing. These introduced species have no natural predators or pathogens and, once introduced and established, can proliferate and aggressively out-compete native plants that sustain our natural ecosystems. In addition to impacts to natural ecosystems, there are significant socio-economic impacts to the province, with recreation, agriculture, wildlife, fisheries, forestry and First Nations cultural, medicinal and food plants also being negatively impacted. Goals to reduce the cumulative impacts caused by invasive alien plants are best achieved through an integrated approach of prevention and control on provincial Crown land. As such, the provincial ministries having invasive plant management responsibilities in B.C. have partnered to develop a coordinated and integrated approach to invasive alien plant management in B.C. and have worked together to create this Multi Agency Pest Management Plan (PMP).

The development of this PMP was led by the Environmental Services section of the Ministry of Transportation and Infrastructure (MoT), with collaboration and assistance from the B.C. Ministries of Forests, Lands and Natural Resource Operations (FLNRO), Environment (ENV), and Agriculture (AGRI). It has been developed in accordance with the *Integrated Pest Management Act* and its accompanying regulations. This PMP outlines an integrated pest management (IPM) approach for the control of invasive alien plants and noxious weeds, which includes prevention strategies, biological and cultural controls, manual/mechanical treatment methods and strategically-targeted, selectively applied and judicious use of herbicide on provincial Crown lands.

The following diagram shows the decision making or thought process involved when determining what type of treatment to use. Chemical treatments are only used as a last resort when other methods are not effective or practical. Often, a combination of the following treatment types will be used to treat an infestation.



This PMP covers the management of high priority invasive alien plants and/or noxious weeds on provincial Crown land within the geographic areas defined by the Greater Vancouver Invasive Plant Council (GVIPC), the Fraser Valley Invasive Plant Council (FVIPC), the Sea to Sky Invasive Species Council (SSISC) and a portion of the Coastal Invasive Plant Committee's (CIPC) area (the lower Sechelt peninsula). Appendix 1 contains a map of the area covered by the PMP. The area corresponds to the Sunshine Coast Regional District, Metro Vancouver and Fraser Valley Regional Districts, and the southwest half of the Squamish-Lillooet Regional District (the Squamish side). The area encompasses a diversity of ecosystems ranging from wetter Coastal Western Hemlock and drier Interior Douglas Fir forests in the valley bottoms and along the coast, to Engelmann Spruce/Subalpine Fir and Mountain Hemlock forests at the higher elevations. The area includes both urban and natural areas and includes both marine and freshwater ecosystems. This area of BC includes the most densely populated regional district in BC, and is home to over 2.5 million people, numerous community watersheds, and vast timber, agricultural and recreational values. The area is also home to many endangered native species and plant communities and critical wildlife habitats and these are the values that this PMP aims to protect.

In British Columbia, legislation exists that requires land occupiers to control noxious weeds. The *BC Weed Control Act* and its Regulation requires that land occupiers control designated noxious weeds on both private and Crown land in B.C. The *BC Forest and Range Practices Act* and accompanying Invasive Plant Regulation also contain a list of invasive species that require management. The Community Charter Regulation outlines requirements concerning invasive plants as well. There are also many species of invasive plants that are not yet listed in legislation, but are having detrimental impacts throughout the province. This PMP will target treatment of high priority invasive plants and/or noxious weeds on provincial crown land that are known to cause negative impacts if they are not controlled. The principal goal of the PMP is to prevent the introduction of such plants, and reduce the spread of existing plant populations to high-risk sites within the plan area.

2.0 INTRODUCTION

Section 24(2)(g) of the Integrated Pest Management Regulation (IPMR) requires the preparation of a pest management plan for herbicide use for the management of noxious weeds or invasive plants on more than 50 hectares a year of public land (e.g. provincial Crown land). To date, there has never been a multi-agency PMP prepared for provincial Crown land for the South Coastal Mainland of BC, however, the B.C. Parks and Protected Areas Division of the Ministry of Environment did create a single agency pest management plan for the PMP area that has been active for the past 5 years. All of the ministries with operational invasive plant management responsibilities hold invasive plant pest management plans elsewhere in the province, except for in the South Coastal Mainland. This PMP will complete the coverage for the province.

A PMP means a plan that describes:

- A program for managing pest populations or reducing damage caused by pests based on integrated pest management; and,

- The methods of handling, preparing, mixing, applying, and otherwise using pesticides within the program.

3.0 PURPOSE AND OBJECTIVES OF THIS PMP

3.1 PURPOSE

The primary purpose in developing this PMP is to provide a single document that describes a multi-agency approach/planning process for the management of invasive plants and noxious weeds, using the principles of Integrated Pest Management (IPM). This plan will support the effective management of high priority invasive plants on provincial Crown lands within the South Coastal Mainland of BC, while protecting environmental and socio-economic values.

3.2 OBJECTIVES

The objectives of this PMP are to ensure:

- Compliance with the provisions of the *Integrated Pest Management Act* (*IPMA*) and IPMR, as well as applicable federal, provincial and local government laws and regulations;
- The incorporation and use of the principles of IPM;
- Public and First Nations awareness of, and input into, invasive plant management at the landscape level;
- The responsible use of herbicides;
- The effective use of an IPM program that takes into account environmentally sensitive areas and land uses; and,
- Continued investigation into alternative non-chemical methods of invasive plant management while recognizing that for several species, herbicide use may be the only effective means of management or control.

Under this PMP, existing populations of invasive plants may not necessarily be treated, but rather, kept from expanding further (e.g. beyond a defined containment line). The focus of treatments is on new or small infestations of invasive plants where control is likely, or on leading edges or gaps between treatment areas and non-infested areas to reduce the risk of further spread into high risk sites.

The following treatments/methods are strictly **excluded** from this PMP:

- Silvicultural treatments (to remove plants that compete for light and resources with tree seedlings);
- Cosmetic treatments (i.e. to control weeds for aesthetic purposes) or treatment of nuisance weeds; and,
- Aerial spraying via helicopter, fixed-wing plane or applications by truck-mounted boom for invasive plant and/or noxious weed control.

4.0 IDENTIFYING INFORMATION

4.1 IDENTIFICATION OF PLAN HOLDER

The PMP holder will be the BC Ministry of Transportation and Infrastructure.

4.2 GEOGRAPHIC BOUNDARIES AND DESCRIPTION OF THE PMP AREA

The PMP Plan Area is restricted to provincial Crown land within the geographical areas defined by the GVIPC, FVIPC, SSISC and the lower Sunshine Coast portion of the CIPC area (i.e. the Sunshine Coast Regional District). For the purpose of this PMP, this area will be referred to as the 'South Coastal Mainland' or 'the Plan Area'. The South Coastal Mainland corresponds to the Metro Vancouver and Fraser Valley Regional Districts, the lower portion of the Sunshine Coast Regional District (Sechelt peninsula) and the southwest half of the Squamish-Lillooet Regional District (inclusive of Squamish but not including Lillooet). Appendix 1 contains maps showing the geographic boundaries of the PMP area.

The Plan Area encompasses the following areas/lands under the jurisdiction of the partnering agencies:

- The BC Ministry of Transportation and Infrastructure's Service Areas 4, 6, 7 and part of 5;
- Areas under the jurisdiction of the Ministry of Environment's Parks and Protected Areas Division, including Conservancies, Recreation Areas, Ecological Reserves, Provincial Parks, Protected Areas, Wildlife Management Areas, and lands acquired by this division, within the PMP area;
- The following BC Natural Resource Districts: Chilliwack, Squamish and the Sechelt side of the Sunshine Coast Natural Resource District
- Any additional Crown lands under the jurisdiction of the BC Ministry of Agriculture.

The Plan Area contains a diverse array of natural areas including forested, alpine, subalpine, riparian and marine/estuarine ecosystems. Within the PMP area, resource uses include, but are not limited to, conservation (e.g. wildlife habitat restoration or protection), hunting, trapping, grazing, parks and recreation, tourism, logging, community watershed protection, including Aquifer recharge areas, and transportation. Invasive plants can negatively impact all of these resources. Therefore, having a management plan to address both prevention of the spread and treatment of these invasive plants is essential to the management of these lands and the protection of the natural resources. Much of the provincial Crown land in this region of the province is located immediately adjacent to private land and therefore coordination through the regional weed committees and local governments, including First Nation Governments, is integral to the overall success of the program.

5.0 USE OF THIS PLAN ON PROVINCIAL CROWN LAND

Many areas of provincial Crown land, such as transportation corridors and recreation sites, can serve as vectors in the spread of invasive plants into protected lands (parks and protected areas) as well as onto agricultural lands. Consequently, control of invasive plants in high traffic areas such as transportation corridors and in recreation sites is a critical component of successful invasive plant management.

In addition to invasive plant surveys and/or treatments by the Ministry of Transportation and Infrastructure on lands under their jurisdiction, this PMP also allows the partnering agencies to conduct (or allow to be conducted), invasive plant survey and/or treatment activities on areas/land over which they have jurisdiction (as outlined in Section 4.2), provided that the following are adhered/committed to:

- Compliance with the requirements and commitments made in this PMP; and,
- Compliance with the requirements contained in the *IPMA,* IPMR, and other applicable legislation (e.g. the *Park Act* and the *Ecological Reserve Act*).

6.0 TERM OF PLAN

This plan shall be in effect for a five-year period from the date that the Confirmation of a Pesticide Use Notice has been obtained from the Ministry of Environment.

7.0 PERSON RESPONSIBLE FOR MANAGING INVASIVE PLANTS

The person responsible for coordinating the management of invasive plants under this PMP, and the principal contact for information related to this plan is:

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Environmental Coordinator
South Coast Region Environmental Services
Ministry of Transportation and Infrastructure
7818 6th Street, Burnaby, BC, V3N 4N8
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E-mail: Amber.MT.Smith@gov.bc.ca

8.0 PUBLIC USE WITHIN THE PLAN AREA

The principal land uses within the Plan Area are: forestry, agriculture, aquaculture, fishing, mining, recreation, tourism, hunting, fishing and medicinal and food plant gathering. Substantial timber harvest levels support several sawmills and pulp mills. Aquaculture tenures add considerable activity along coastlines and inlets. The area is also well known for its land and water based recreational activities. There are many highly used provincial parks and protected areas including conservancies, recreation areas, resort tenures, and forestry recreation sites that are popular

tourism destinations and important areas for the conservation of biodiversity. Hunting, fishing and non-consumptive activities like hiking, nature photography, boating and research activities are also common. Provincial Crown land is also used for harvesting medicinal and food plants, fishing and hunting, and trapping of fur bearing animals.

9.0 INVASIVE PLANT DEFINITIONS AND IMPACTS

9.1 DEFINITION

A variety of terms are often used interchangeably to refer to invasive plants, including “weeds”, ”noxious weeds”, “invasive plants”, and “invasive alien plants”. The Invasive Plant Council of BC defines an invasive plant as “any invasive alien plant species that has the potential to pose undesirable or detrimental impacts on humans, animals or ecosystems”, where the term alien refers to plants that did not exist in the South Coastal Mainland of BC prior to European settlement and/or its natural range did not historically include the South Coastal Mainland .

A noxious weed is any weed designated to be noxious under the BC *Weed Control Act* (*WCA*) and Regulations. The *Forest & Range Practices Act* (FRPA) Invasive Plant Regulation also has requirements for invasive plant management, but uses the term “prescribed invasive plant” to refer to plants on its designated list. Both of these Acts and their associated regulations are administered by the Ministry of Forests, Lands and Natural Resource Operations.

For the purpose of this PMP, the term “invasive plant” is used to include both invasive alien plants and noxious weeds.

9.2 SUMMARY OF IMPACTS

As defined above, invasive plants are non-native plants that have been introduced into B.C. and can cause ecological, economic and social problems for our province. Without the predators or pathogens that naturally control them in their native habitats, they can quickly spread out of control. These non-native or alien plants may have an advantage over our native plants. Often, they exhibit aggressive growth habits and out-compete crops and/or native plants, adversely affecting economic and environmental values. The resulting invasion can impact recreation and agriculture, damage both terrestrial and aquatic native ecosystems, reduce biodiversity, threaten species at risk, and reduce the abundance and availability of forage for wildlife, livestock and medicinal and food plants for people. Some species of invasive plants such as the invasive knotweeds can even damage infrastructure, while other species, such as giant hogweed, can be very toxic to humans and/or animals.

Problems caused by invasive plants have increased dramatically in recent decades, due in part to growth and spread of human populations. Population growth can lead to greater disturbance of the land, increased demand for food and fibre, overuse of public land for recreation and commercial production, increased international travel, and globalization of world trade. All of these can advance the introduction, establishment, and spread of invasive plant species.

9.3 INVASIVE PLANT GENERAL CHARACTERISTICS

Many invasive plants have characteristics that permit them to rapidly invade new areas and out-compete native and/or desirable plants for light, water, and nutrients. Some of these characteristics include:

- Early maturation;
- Profuse reproduction by seeds and/or vegetative structures;
- Specially adapted seeds to assist their movement by wind, water or wildlife;
- Prickles, spines, thorns, or sap that can cause physical injury and repel animals;
- The ability to parasitize other plants;
- Allelopathy (production of chemicals that inhibit the growth of other plants); and,
- High photosynthetic rates.

9.4 HOW INVASIVE PLANTS ARE SPREAD

Although wind, water, domestic and wild animals can disperse invasive plant seeds, human activity is often found to be the primary cause of invasive plant introductions and/or spread. Invasive plants have been shown to be introduced and/or spread by the following activities:

- Construction and maintenance activities on transportation and utility corridors, rail lines, ship yards, highways, pipe lines and power lines that involve moving and transporting soil and fill;
- Forestry operations (e.g. road/landing/skid trail building and maintenance, machinery movement during harvesting, post harvest site preparation, log hauling);
- Range activities (e.g. grazing, herding livestock, and building of stock trails, water developments and corrals);
- Mining operations (e.g. road building and maintenance, movement of machinery, creation of permanent openings in the forest canopy cover);
- Horticultural practices (e.g. importation and planting of plant species that, over time, become invasive, careless disposal of garden refuse, unintentional seed introduction in soil); and,
- Recreational activities (e.g. disturbance of soil by all terrain vehicles and other recreational vehicles and boats and the dumping of aquatic plants into watercourses).

9.5 THE NEED TO CONTROL INVASIVE PLANTS

Invasive plants can cause ecological, social and economic problems by:

- Competing with native vegetation for light, moisture and nutrients;
- Causing declines in biodiversity/ species richness;

- Altering nutrient and hydrological cycles;
- Reducing soil productivity by affecting mychorrizal fungi or changing the chemistry (allelopathic chemicals);
- Negatively affecting the habitats of rare and endangered species;
- Reducing the quality and quantity of forage for grazing and browsing wildlife and livestock;
- Reducing food supplies for many plant-feeding insects;
- Decreasing water and fish habitat quality;
- Changing ecological community structure and function;
- Increasing wildfire hazard;
- Dominating sites for prolonged periods after establishment (negatively altering the ecosystem functions);
- Hindering restoration efforts and increasing costs to rehabilitate disturbed ecosystems;
- Taking over agricultural areas and competing with crops being grown;
- Reducing the access to recreational areas or making them less desirable to visit;
- Impacting infrastructure and increasing costs to fix or clear away vegetation from potentially impacted infrastructure;
- Increasing safety hazards on roadsides due to reduction of sightline visibility and growth on or in front of roadside signage;
- Causing irritations, burns and even blindness to humans and or animals; and,
- Reducing the availability of native plants and animals gathered or hunted for food or medicinal purposes.

10.0 INTEGRATED INVASIVE PLANT MANAGEMENT

This section deals specifically with the objectives and steps for managing invasive plants on provincial Crown land in the South Coastal Mainland area of BC, using the principles of Integrated Pest Management.

This PMP aims to achieve reduced spread and effective, long-term invasive plant management compatible with both the legislated mandate(s) for their control, and the needs of humans, animals, plants, and environmental resources at and beyond the treatment site. No single tactic can solve the current invasive plant problem or prevent future infestations; therefore, it is often necessary to combine several treatment methods into an IPM program.

IPM is a decision making process for determining what actions will be taken when pest problems occur. In IPM programs, all available information is considered in order to determine the best way to manage pest populations in an effective and environmentally sound manner. Preventing organisms from becoming pests, by keeping them at some acceptable level (i.e. below a level that causes damage), is the first step in any IPM program. When applied appropriately, an IPM process will result in improved management, lower costs, ease of maintenance and lower environmental impacts from control activities.

Successful implementation of an IPM program requires:

- Multiple-tactic, monitoring-based, prevention-oriented management;
- Extensive communication and cooperation among federal and provincial agencies, First Nations, local governments, private industry, and private landowners;
- Public education programs (e.g. in cooperation with the regional weed committees and Invasive Plant Council of BC); and,
- Continued research and innovation by invasive plant managers and the sharing of new information.

The 6 elements of the IPM process used in this PMP are:

- Prevention (Planning);
- Pest Identification;
- Conducting Inventories/Surveys and Monitoring Pest Populations;
- Establishing Injury Levels and Treatment Thresholds;
- Pest Treatment Options and Treatment Method Selection; and,
- Post-Treatment Evaluations.

The partnering Ministries, and any contractors who may be authorized to conduct activities under this plan, will be committed to the principles and practice of IPM, and the implementation of the IPM steps as outlined on the following diagram:

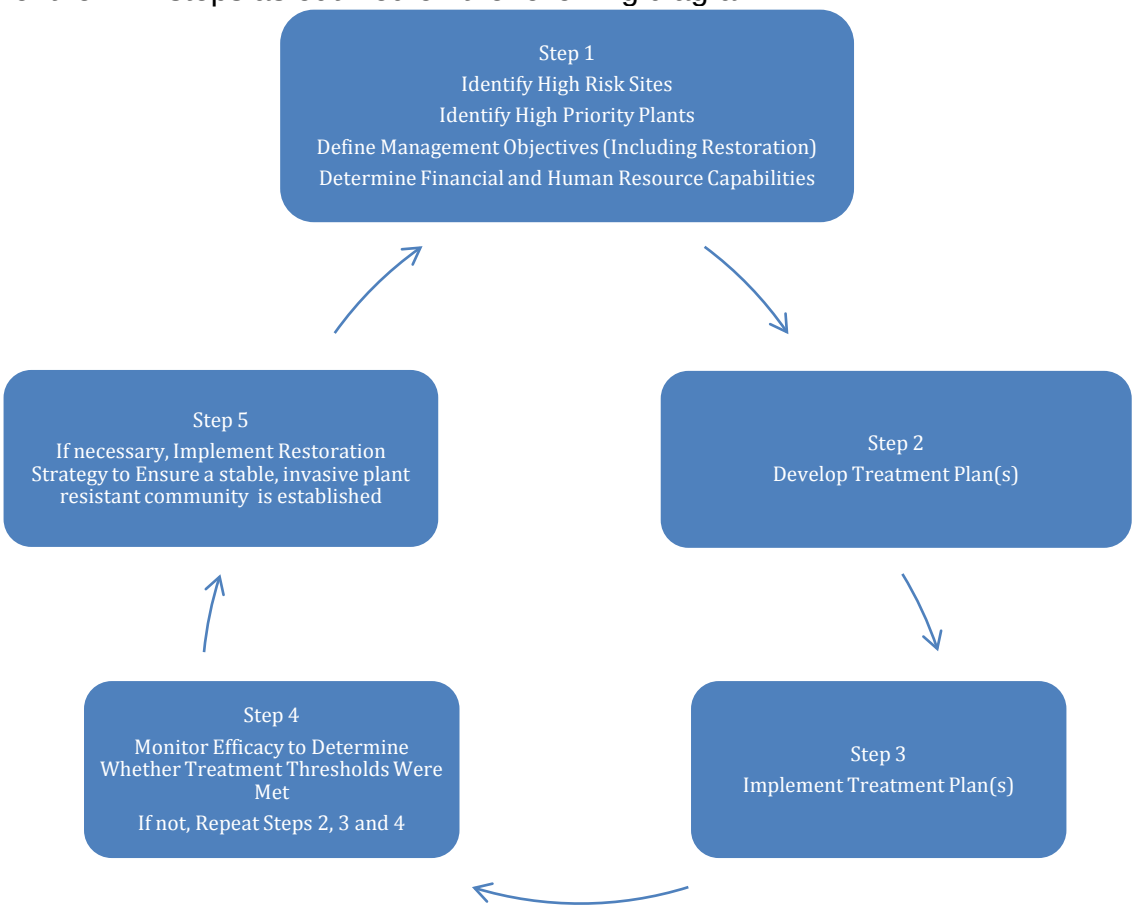

Figure 1: The IPM Steps for an Effective Invasive Plant Management Program

10.1 PREVENTION (PLANNING)

Preventing the initial establishment and spread of invasive plants is the single, most effective method of invasive plant control. The first line of prevention is stopping these alien species from entering Canada. The lead agency responsible for this is the Canadian Food Inspection Agency (CFIA), http://www.inspection.gc.ca/english/toce.shtml. The partner Ministries to this PMP work together via the Inter-Ministry Invasive Species Working Group (IMISWG) and partner with the CFIA on initiatives affecting BC.

If an invasive plant that is not known to exist in BC already does arrive, the most effective method of control is to prevent it from establishing by acting immediately and effectively. This requires public awareness and training of the contractors and staff of all agencies involved, maintenance of reporting systems that are linked to quick assessment processes (e.g. the online Report-A-Weed and 1-888-WEEDSBC) and existence of a provincial response system that allows for quick assessment, planning and implementation of the appropriate treatment or management technique, before the invasive species can firmly establish and start spreading. In BC, this process is referred to as Early Detection Rapid Response (EDRR). Communication through the Federal, Provincial, Regional and local level is necessary for all these components to be in place and to determine how the invasive alien species are arriving so that preventative actions can be strengthened. Ongoing surveying by the provincial ministries is important for detecting new infestations early, as well as monitoring the spread and effectiveness of treatments for species already known to be present.

Invasive plants will invade areas that provide suitable habitat for their survival and proliferation. This includes, for example, soils disturbed through road or recreational trail development, right of way fence construction, and timber harvesting. For these reasons it is important to clean equipment, livestock and outer clothing and footwear to prevent the introduction of invasive plant seeds to non-infested sites. Another important method to prevent the introduction of invasive plants is to minimize soil disturbance where there is a potential invasive plant seedbed. Intact or pristine ecosystems in the South Coastal Mainland are generally resistant to most invasive plant species. Mature forests may be able to exclude invasive plants by virtue of their wide, dense canopies that limit the establishment of under story vegetation through shading. Susceptible habitats for invasive plants are created when forest openings occur, typically associated with resource extraction, urbanization or by natural disturbance (e.g. erosive forces). Prompt seeding of disturbances is an important tool to prevent the establishment of invasive plants, as well as minimizing soil erosion.

The partnering agencies on this PMP will be working closely with the GVIPC, FVIPC, SSISC, and the CIPC, as well as the Invasive Plant Council of BC (IPCBC), who are responsible for promoting education in order to encourage prevention techniques such as deferred or rotational grazing, erosion control, proper fertilization, re-seeding or planting of disturbed areas, and wherever possible, minimizing disturbance to desirable or native vegetation that can provide competition and thereby reduce the likelihood of invasive plant establishment. Further information on education and preventative measures can be obtained from the IPCBC website at: http://www.invasiveplantcouncilbc.ca/.

The following are examples of land management practices that, if implemented, can help prevent invasive plant establishment and/or inhibit invasive plant growth.

The partnering Ministries authorized to undertake invasive plant control under this PMP will implement the following practices, where possible, on a site-specific basis:

- Prevent the movement of soils contaminated with invasive plant seed and vegetative plant parts;
- Educate roadside mower, excavator and grader operators on best practices that will reduce the spread of invasive plant seeds and plant parts;
- Keep equipment yards and storage areas free of invasive plants;
- Inspect and clean clothing and vehicle/equipment undercarriages when working in, and prior to leaving, areas known to contain invasive plants;
- Keep equipment out of infested areas;
- Minimize disturbance to native vegetation where possible; and,
- Revegetate disturbed areas adjacent to infested areas or areas known to be at risk of invasive plant establishment using an appropriate grass seed mixture that is free of invasive plant seeds.

10.2 PEST IDENTIFICATION

Accurate identification of invasive plants is important for the following reasons:

- To collect accurate invasive plant inventories and to monitor invasive plant populations over time;
- To make decisions about control requirements, depending on the species growth stage, physical location, degree of invasiveness, and how widespread it is; and,
- To make decisions about control methods depending on the plant species. Some may be easily controlled by non-chemical methods, but others may only be effectively managed through a combination of chemical and non-chemical methods.

10.2.1 AVAILABLE RESOURCES FOR INVASIVE PLANT IDENTIFICATION

For invasive plant management, it is important to have a basic understanding of plant biology, including knowledge of growth stages, life cycles and classification, so that the safest, most appropriate and effective control methods may be used. There are numerous publications that will assist in the identification of invasive plants. Fact Sheets (including Weed Alerts), guidebooks and brochures, and web-based information will all assist in the identification, management and control of invasive plants. The table below indicates some of the web sites where information on invasive plant identification can be accessed.

Table 1: Web Sites for Invasive Plant Identification and Information in BC

CIPC	http://www.coastalinvasiveplants.com
FVIPC	http://fraservalleyweeds.com
GVIPC	http://www.gvipc.ca/
SSISC	http://www.ssisc.info/home
BC Ministry of Agriculture	www.weedsbc.ca www.agf.gov.bc.ca/cropprot/weeds.htm www.agf.gov.bc.ca/cropprot/weedguid/weedguid.htm
Invasive Plant Council of BC (Fact Sheets)	www.invasiveplantcouncilbc.ca/compendium/browse.php?q=Fact%20Sheet
E-Flora BC	http://www.geog.ubc.ca/biodiversity/eflora/

10.3 CONDUCTING INVENTORIES AND MONITORING PEST POPULATIONS

An inventory of invasive plant species within the Plan Area is required to address resource impacts of invasive plants and to effectively plan provincial, regional, and local invasive plant containment and control strategies. Monitoring invasive plant species (especially priority species) through regular inspections is an essential planning and prevention tool. The data obtained from the invasive plant monitoring inspections is needed to determine what action, if any, is required to reduce the possibility of long-range spread and to determine post-treatment effectiveness.

10.3.1 CONDUCTING INVASIVE PLANT INVENTORIES/SURVEYS

Currently, invasive plant inventory data pertaining to provincial Crown land within the PMP area is housed within the Ministry of Forests, Lands and Natural Resource Operation's Invasive Alien Plant Program (IAPP) Application. This comprehensive database contains and allows for extraction of relational (data and statistics) and spatial (mapping) information, and can be accessed at the following web site:

http://www.for.gov.bc.ca/hra/Plants/application.htm

Invasive plant inventories/surveys will generally focus on invasive plant species listed under the *Weed Control Act, FRPA*, the *Community Charter Act* or their regulations, and priority species as determined by the regional weed committees. Some species inventoried are not yet regulated by provincial legislation; however, they are known to have invasive properties and have the potential to cause negative impacts, if not effectively managed.

Invasive plant inventories/surveys will be conducted in accordance with the methodology outlined in the IAPP Application reference guides.

Inventories/surveys may be conducted by truck, all terrain vehicle (ATV), motorbike, bicycle, boat, or on foot, depending on accessibility of the area, the level of detail required, and budget constraints. Efforts are made to choose the method that will have the least impact on the land base.

Once the inventory/survey area is determined, those roads, trails and areas that are likely to be susceptible for invasion by the target species will be surveyed more closely. Many dry land invasive species tend to invade grasslands and forest openings while riparian invasive species prefer lakeshores, ponds, sloughs, creeks, river edges, marshes and seepage areas. A review of each invasive species' biogeoclimatic zone/subzone preferences may also assist in focusing survey efforts. Experience with site series or plant associations is also beneficial. Areas that have been recently disturbed or that receive disturbance on a regular basis are carefully inventoried/surveyed as well, as these are generally the preferred habitats of invasive species. Such areas may include, but are not limited to:

- Roadsides, ditches, pullouts and landings;
- Recreation sites;
- Openings in the forest canopy;
- Burned areas;
- Air strips;
- Gravel pits;
- Areas where vehicle traffic and loading/unloading is common;
- Areas of heavy livestock and/or wildlife use;
- Areas where there has been recent development, or construction sites where machinery has been present; and,
- Any other areas where human activity or natural disturbance may increase the likelihood of invasive plant introduction, establishment and spread.

When a target species is detected, the information is recorded on a *Site and Invasive Plant Inventory Record* (see Appendix 2). If it is a new site, information specific to the site, as well as for the invasive plant found at the site, is recorded. If the site is an existing site, then only the Site ID and data specific to the survey of any invasive plant infestation found is recorded.

The information collected (and recorded) for an invasive plant site shall include the UTM coordinates (northing, easting and zone), location, date, species, size of infestation (ha), distribution, density, any pertinent site characteristics or additional information, and site photos. If the surveyor is unable to correctly identify a particular plant species as an "invasive alien", a sample will be taken for proper identification. All of this information will then be uploaded into the IAPP Application database in a timely manner.

10.3.2 MONITORING INVASIVE PLANT POPULATIONS

Staff and contractors of the partnering Ministries monitor priority invasive plants on a regular basis. Monitoring priority invasive plant species through regular inspections is an essential part of any invasive plant management program. The data from monitoring inspections will be used to determine what action is required, if any, to reduce the possibility of long range spread, and to ensure that treatment methods being used are effective.

Monitoring consists of ongoing assessment of known sites that are actively being treated, as well as regular inspection of infestations that may require treatment in the future. Invasive plant details will be documented using the IAPP *Site and Invasive Plant Inventory Record* (Appendix 2) (refer to the Inventory & Monitoring Reference Guide found at http://www.for.gov.bc.ca/hra/plants/RefGuide.htm). Information available in the IAPP Application will focus monitoring efforts on high priority species in or adjacent to high-risk sites.

Monitoring provides a record of information about invasive plant occurrence, density, and site conditions. Monitoring is done visually and critical observations are recorded. Analysis of the monitoring data will allow for an ongoing assessment of change over time. All sites will be assessed or reassessed before treatment decisions are made. Pre-treatment evaluations will be conducted to monitor site conditions and to ensure that the proposed treatment is the most effective for the targeted vegetation. Treatment timing is especially important if herbicides will be used. The effectiveness of many herbicides depends on the growth stage and condition of the target plants. Ensuring that herbicide applications are as effective as possible will help reduce the need for future herbicide use at a site.

Using their own internal standards, the partnering ministries will maintain site integrity by routinely inspecting and monitoring invasive plant sites for potential or existing problems. Sites are monitored based on a rotational cycle. Species composition, projected growth rates, site location, and human and financial resources will determine this cycle.

10.4 ESTABLISHING INJURY LEVELS AND TREATMENT THRESHOLDS

DEFINITIONS

Injury level - the level after which the growth of a given invasive alien plant population at a specific site will cause some unacceptable impact e.g. to public safety, recreation, natural or managed ecosystems.

Treatment threshold - the level at which a particular treatment should be applied in order to keep a given plant population at a given site from reaching the injury level.

Invasive plant management is a process that continues over many years. Managers are continually re-assessing and re-prioritizing treatment areas and balancing the current priorities with available resources. This iterative process is called "setting treatment action thresholds". Since invasive plants are alien/non-native species, the preferred threshold is the prevention of the species from entering the South Coastal Mainland of BC (the Plan Area), the Province of

BC, western Canada or Canada. If however, an invasive plant arrives that is known to be aggressive or has demonstrated rapid growth resulting in negative impacts (environmentally, economically or socially), then actions are taken to manage it. The point where unacceptable negative impacts are likely to occur is referred to as the injury level.

The decision to take action and apply control measures may be based on the information gathered through a monitoring program or based on knowledge of the species' behaviour in similar environments in a neighbouring jurisdiction. Treatments are not completed in accordance with a predetermined schedule, but rather when and where a survey reveals that it is needed. All management decisions are made on a site-specific basis and are dependent on a variety of factors, including the many physical and environmental conditions in the South Coastal Mainland. All sites are considered unique and shall be identified, assessed and treated based on the most effective method for the particular site and species being treated. The term "treatment threshold" is used to describe the point when it is determined that action should be taken to ensure that the infestation does not reach the injury threshold.

10.4.1 ESTABLISHING INJURY LEVELS

Determining the Injury Level for a specific species of invasive plant depends on the unique characteristics of that species, including the rate of spread and specific impacts it may cause if it is allowed to spread. Injury levels will also depend on the current distribution and the potential range of the species, both throughout BC and within in the South Coastal Mainland (the Plan Area).

The information required to determine the injury level for a species is gathered from scientific literature reviews, local knowledge of the impacts caused by the plant, and/or information gathered from neighbouring jurisdictions currently managing the invasive plant species. The injury level for some plants, such as Giant Hogweed, will be very low due to the health and safety risk they pose; however, other species may cause minimal impacts even if they spread, and therefore are unlikely to be targeted for treatment. If it is not known whether a non-native plant will cause negative impacts, monitoring will occur until the injury level is determined, and it has been determined that the species is causing, or has potential to cause, unacceptable impacts. Injury levels will also depend on locally valued resources or sensitive habitats at risk of being impacted by invasive plants.

10.4.2 PRIORITIZING SPECIES

In order to focus treatments where they will be most effective and coordinate invasive plant management activities between the agencies involved, a localized and science-based approach to prioritizing species is required. Determining when treatments are needed and what treatment methods are appropriate requires shared agreement regarding whether the species in question will be managed for either prevention, eradication, containment, or control within the particular management area (generally the regional weed committee boundary) (see Appendix 1).

A comprehensive and detailed risk assessment tool, known as the "Invasive Plant Core Ranking Process" will be used to determine the category for each invasive species within the

management area in question. This tool was developed by cooperation between the Ministry of Forests, Lands and Natural Resource Operations and the Invasive Plant Council of B.C. to help land managers make invasive plant management decisions. It is available at http://www.gov.bc.ca/invasive-species The tool was designed to assist land managers in deciding which invasive plant species should be actively managed, which species should be monitored for change, and which species have unfortunately established beyond our ability to control them in that particular management area. The Invasive Plant Core Ranking Process assigns a numerical value to each plant species based on a series of questions regarding the biology, ecology, species impact and management potential. The higher the score, the higher the priority to manage that particular species will be in the management area being assessed. To be effective and accurate, only individuals or groups with knowledge of the science behind invasive plant management and familiarity with the management area will use the tool and develop priority lists.

Higher scores are generally given to plants that:

- Pose a high risk of spreading (based on a combination of available habitat, biological methods of reproduction and the dispersal potential of the plant itself or via anthropogenic vectors of spread);
- Are very "invasive" (ie. very competitive, spread rapidly and often out-compete existing vegetation to form dense stands);
- Have high potential to cause social, economic or environmental damage;
- Are legally designated to be controlled; and,
- Have a relatively good chance of being controlled, which depends on a combination of the control methods available, and the current range or distribution (new infestations and/or species with limited distribution are more likely to be successfully controlled).

Once the plants have received a score, they will be placed into one of the following categories that indicate the management goals for that species. In addition, BC Parks and Protected Areas division will also follow the BC Parks Threat Analysis in which species and habitats (i.e. Biogeoclimatic (BEC) zones) have been prioritized by region.

Category 1: Prevent

- New Species not present in BC or in the Plan Area, but likely to establish if introduced.
- *Management Focus:* Early Detection Rapid Response.

Category 2: Eradicate

- Species that are new to the management area (eg. regional weed committee boundary) with limited distribution and low density on infested sites; and/or
- Species invading susceptible habitats, sensitive areas, or sites containing red- or blue-listed species; and/or
- New infestations of established species in the area outside of the main population.
- *Management Focus*: Eradication (i.e. the permanent removal of 100% of an invasive plant species from a selected site or area. This is usually only attainable for small isolated patches/clumps of an invasive plant or noxious weed species. Eradication may take many years of repeated treatments to be achieved.)

Category 3: Contain

- Species that are well established in some, but not all, portions of the management area;
- Can include established infestations along transportation corridors and areas of concentrated activities such as trails, campgrounds, parking lots, garbage dumps, maintenance yards, and gravel pits.
- For some species in this category, where agreement amongst the various agencies conducting invasive plant management programs in the area is reached, a containment line can be established and mapped online in IAPP. A containment line is a boundary drawn on a map delineating the main infestation of a species from the area where the species is not yet established. Once a containment line is drawn, management for these species is focused on the smaller outlier or satellite infestations located outside of the containment line. Treatments would generally only occur within the containment boundary if sensitive sites or unique resources were at risk. Appendix 3 contains the criteria that must be met to create a containment line in IAPP.
- Preventing or reducing access to areas with invasive plant infestations is also a strategy employed in containment.
- *Management Focus:* Containment to the current location and/or distribution.

Category 4: Strategic Control

- Established low-density or high-density infestations that are widely distributed and fairly common throughout the South Coastal Mainland area.
- Eradication or Containment is no longer possible within the management area.
- *Management Focus:* Treatments will be focused in high value or sensitive areas only, either for environmental, social or economic reasons.

Appendix 4 contains a list of current priority invasive plants in each regional weed committee management area within the Plan Area. It must be noted that if new information becomes available and/or new species of invasive plants are identified within the Plan Area, the management category lists are subject to change. The list in Appendix 4 is neither exhaustive nor is it static. As new priority invasive plant species are identified or distributions change over the 5-year period of this PMP, they will be incorporated into this list.

10.4.3 ESTABLISHING TREATMENT THRESHOLDS

The treatment threshold is directly related to the site conditions, the species present and the treatment goal(s). For example, a site with a rare and endangered plant species or plant community may prompt a treatment decision at low invasive plant population levels. Treatment thresholds may also vary depending on the type of treatment chosen for the site (i.e. mechanical, cultural, chemical or biological control). Also, since the treatment goals (and therefore the acceptable injury levels) depend on the priority level/management category assigned to the species, the treatment thresholds will also vary between the four management categories. For species under the 'Prevent' and 'Eradicate' categories, there may be no tolerance for any individuals of that species (i.e. zero treatment threshold), and in other cases

the number of invasive plants (i.e. the population size) that can be tolerated before control measures are considered may be much greater.

In all cases however, treatments are ideally executed when invasive plant population levels are low, long before the injury threshold is reached, thereby reducing expenses and the unnecessary introduction of treatment agents into the environment. A general guideline for determining the maximum treatment threshold based on the management category is provided in Table 2, below. Site characteristics are always considered as well and may result in the treatment threshold being higher or lower than indicated in the table below.

Table 2: General Guidelines for determining Treatment Thresholds based on Management Categories

Management Category	Treatment Threshold
Prevent	Reached if even one plant is discovered, as the goal for these species is to prevent establishment in the Plan Area or the province.
Eradicate	Reached as soon as the species is discovered because eradication is most likely to be successful if treatments begin when the infestation is still relatively small and localized.
Contain	Only reached if the species has begun to spread outside of the established area and/or containment area boundary.
Control	May only be reached where sensitive sites or important resources are being threatened.

Invasive plant specialists from the partnering agencies and the regional weed committees review the management categories and priorities annually in order to develop a treatment plan for that year. Treatment thresholds are also re-considered annually and are often a function of the available financial and human resources. The number of sites and allocation of funding will be the principal drivers of the overall control program strategy on an annual basis, starting with management of the highest priority sites or species first.

10.5 Pest Treatment Options and Treatment Method Selection

Treatment occurs only when monitoring indicates thresholds have been reached and treatment is necessary. Several methods are selected from educational, biological, cultural, manual, mechanical, and chemical control tactics, and then integrated into a treatment program. Vigilant record keeping is a cornerstone to the program's success. The provincial IAPP Application is where records reside.

10.5.1 TREATMENT METHOD SELECTION

The integration of a number of treatment strategies into an IPM program has been shown to be more effective than using a single option alone. Generally, with invasive plants, no individual method will achieve control in a single treatment. The success of different treatment methods depends on the species of invasive plant you are trying to control, as the choice of a treatment method(s) generally relates to specific invasive plant characteristics. Treatment selection is based on information compiled from invasive plant and site monitoring results.

General conditions associated with use of treatment options are shown in Table 3 below.

Table 3: General Conditions Associated with Treatment Options

Treatment	Conditions for Use
Manual and Mechanical (e.g. covering/smothering, cutting, digging/excavating, girdling, hand pulling, mowing, pruning, stabbing, tilling, spot burning (flaming))	• new, small incursions • used to limit rhizomatous root spread and to prevent seed production • generally applicable to all species • generally requires restoration (to some extent) with native grasses and plant species
Cultural (i.e. targeted grazing by sheep or goats)	• incursion size is variable, otherwise similar to mechanical treatments • not an option for all sites; location, uses and site characteristics may be limiting
Biological (i.e. systematic release of insects that feed exclusively on targeted invasive plant species)	• older, more established incursions generally with widespread occurrences of target species beyond treatment site • currently only applicable to thistles, knapweeds, toadflaxes, purple loosestrife, tansy ragwort, leafy spurge and St. John's wort within the Plan Area
Chemical (i.e. judicious, strategically targeted use of herbicides)	• incursion size is variable • woody plants are generally treatable with the active ingredient triclopyr, herbaceous plants are generally treatable with the active ingredients glyphosate or aminopyralid • restricted use within close proximity to: species at risk, domestic water intakes, water licenses, agricultural food production systems, environmentally sensitive or riparian areas, or public use areas.

Other considerations include seasonality, weather conditions, financial and human resources, site accessibility, site conditions, target species composition and percent cover, and the consequences of not treating. A combination of one or more treatment methods is often used to increase the effectiveness and efficiency.

10.5.2 PEST TREATMENT OPTIONS

IPM involves the use of different techniques to control invasive plants. When treatment thresholds are met or surpassed, the following treatment option or options will be considered:

- Manual and mechanical and control (**non-chemical)**;
- Cultural control (**non-chemical)**;
- Use of biological control agents (**non-chemical)**;
- Selective and spot applications of herbicides (**chemical);** and,
- A combination of one or more of the above.

The following diagram shows the decision making or thought process involved when determining what type of treatment to use. Chemical treatments are only used as a last resort when other methods are not effective or practical. Often, a combination of the following treatment types will be used to treat an infestation.

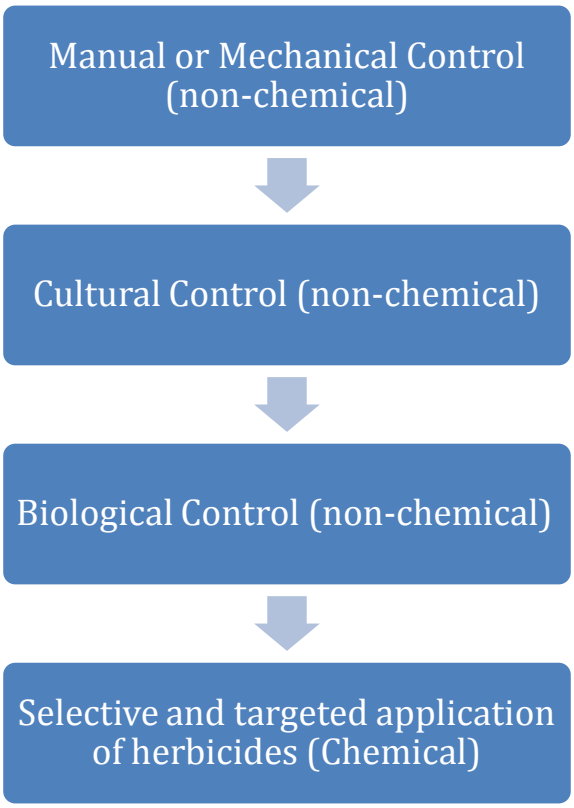

Figure 2: The decision making or thought process involved when determining the treatment type to be used for a particular invasive plant site.

10.5.2.1 MANUAL AND MECHANICAL CONTROL

Manual and mechanical control methods that may be used in the integrated invasive plant management program include:

Covering/Smothering;
Cutting;
Digging/Excavating;
Girdling;
Hand pulling;
Mowing;
Pruning;
Stabbing;
Tilling; and
Spot burning (Flaming).

Rationale, Selection Criteria, and Benefits of Using Manual and Mechanical Control

Manual and mechanical methods of invasive plant control:

- Are effective and environmentally safe methods if timed correctly and precautions are taken to minimize soil disturbance and native vegetation loss in the treatment area;
- Are sometimes the only available techniques for invasive plant control in areas where herbicides cannot be used (e.g. first option to be considered when in close proximity to environmentally sensitive features);
- Are sometimes an effective approach to reduce invasive plants or reduce their movement off site;
- Are rarely used when eradication of invasive plants is the goal, but can weaken the population and/or reduce their spread to new sites; and,
- Have only small and short-term impacts on fish and wildlife.

Limitations of Manual and Mechanical Control

- Mowing is less effective on low-growing plants that are growing beneath the mowing height, and can result in more stems being produced (because it cuts the tops of plants, allowing more buds to grow) and cannot be done when flower-feeding bio-control agents are working on a site;
- Cutting effectiveness is largely dependent on the plant species, stem diameter, time of cut, and age of the plant;
- Flaming can pose safety issues for both workers and the environment;
- Some invasive plant species respond favourably to burning and/or mowing;
- Covering/smothering can be very costly and labour intensive, as treatment sites require regular monitoring to detect and repair torn material(s);
- Excavating can be very costly and labour intensive as complete removal of all root fragments must be obtained to prevent re-growth; and,

- Restoration, including prompt re-establishment of native vegetation, is highly recommended to prevent erosion and the re-establishment of invasive plants; and repeated follow-up treatments must be conducted to remove all new germinants, often for 3-5 years, sometimes longer.
- If large areas are hand-pulled on top of Archaeological sites, there is a potential for disturbance to the site. To avoid this impact, the provincial government partnering agencies will review the location of known archaeological sites (ie. review the Remote Access Archaeological Database (RAAD)), prior to conducting large scale mechanical treatments that could potentially have an impact. If an invasive plant site is found to overlap with a known archaeological site, alternate treatments will be considered or further consultation with the affected First Nations would occur prior to treatment.

Disposal of Invasive Plants/Plant Parts Following Manual or Mechanical Treatments

Proper disposal of invasive plants or invasive plant parts following manual or mechanical control is very important. As a general rule, invasive plants, plant parts and seeds should be bagged and disposed of in a landfill or other designated disposal site. Disposal options will differ in each region, and therefore it is recommended that information on proper disposal for specific invasive plant species is gathering by contacting the regional weed committee for the region in which work is being done.

10.5.2.2 CULTURAL CONTROL

Targeted grazing is the only cultural control method that may be used in the integrated invasive plant management program.

Rationale, Selection Criteria, and Benefits of Using Targeted Grazing

Targeted grazing (e.g. using goats or sheep) for invasive plant control:

- Is economical and does not pose the potential environmental risks of indiscriminant herbicide use;
- May retard plant development and seed formation and gradually deplete root reserves (by the continual grazing of the tops of young plants); and,
- May be a viable option for control of certain species of invasive plants in areas where manual or mechanical methods or herbicides cannot be used.

Limitations of Targeted Grazing

- Is a “non-selective treatment” therefore sometimes native or desirable vegetation is eaten in conjunction with the targeted invasive plants;
- Is only appropriate in locations with proper fencing to be safe and effective; and,
- Animal husbandry and transportation costs can be prohibitive.

10.5.2.3 BIOLOGICAL CONTROL AGENTS

It is the responsibility of the Ministry of Forests, Lands and Natural Resource Operations to introduce biological control agents when and where appropriate to reduce invasive plant populations. Biological control agents (predominately insects) are released to attack and weaken target invasive plant species and over time reduce their population size.

The partnering agencies in this PMP will work together and help to distribute or find sites for the release of biological control agents, as needed.

A complete listing of biological control agents that are in general use and those being developed for invasive plants in British Columbia is available on-line at:

http://www.for.gov.bc.ca/hfp/biocontrol/index.htm

Rationale, Selection Criteria, and Benefits of Using Biological Control Agents

- Have been proven effective to reduce herbicide use and also achieve long-term control on sites with well-established invasive species populations;
- Are typically utilized in areas where invasive plant infestations and distribution are too established to be reduced effectively by other treatment methods;
- Once established, provide an inexpensive, long-term, and non-toxic means to control weed populations;
- Field releasing is relatively inexpensive and scheduling with other duties keeps release and monitoring costs low;
- Reduce invasive plant populations below a level where significant environmental or economic damage occurs; and,
- There are very few known worker and public safety issues associated with releasing biological control agents.

Limitations on Using Biological Control Agents

- After their introduction, biological control agents can take 5 to 10 years to become established and increase to numbers large enough to cause damage to the target plants;
- Ongoing monitoring is required to determine establishment, dispersal and impact on invasive plant populations;
- Does not result in eradication of the invasive plant species from sites;
- Some specialized equipment and training is required for transporting, releasing, distributing and monitoring biological control agents;
- Release sites must generally be areas where disturbance of the invasive plants is minimal;
- Costs to study, rear and screen agents for release are very high;
- Biological controls are not available for all invasive plant species; and,
- There is some public concern as to whether native flora and fauna may be impacted by release of biological agents.

10.5.2.4 SELECTIVE AND SPOT APPLICATIONS OF HERBICIDES

All herbicide applications under this PMP will be selective or spot applications to target high priority invasive plants, with an emphasis on using herbicide application reduction over time. Existing populations of invasive plants may not necessarily be treated, but rather, prevented from expanding further (i.e. beyond a defined containment line). The focus of treatments will be on "leading edges" (i.e. perimeter edges) or gaps between treatment areas that could allow further spread into priority sites.

Herbicide use is considered to be the last resort under this PMP (i.e. used only if no other method is practical or effective). Application techniques will be selected that minimize injury to non-target plants and soils through spray drift and leaching in soils. Consequently, applications by stem injection wick/wipe on, cut and insert, cut and paint, basal bark and squirt bottle will be used where practical.

Where practical, herbicides containing the active ingredients glyphosate, triclopyr, or aminopyralid will be the preferred herbicides applied under this PMP for the eradication or containment of priority invasive plant species, at high-risk sites, or where other control options have proven ineffective. The safest and most effective herbicide will be chosen on a case by case basis depending on the site characteristics and species of invasive plant.

Many herbicides have been shown to be effective for invasive plant control without having unacceptable impacts to the environment when used at application rates recommended on the label. At no time will herbicides be applied at application rates higher than those specified on their respective labels.

Rationale, Selection Criteria, and Benefits of Using Selective and Spot Applications of Herbicides

- Herbicides offer a useful tool that can be integrated with other invasive plant management techniques;
- With the exception of biological control agents, the economic costs of treating many invasive plant sites with herbicides may be significantly lower than other treatment methods;
- It is very unlikely that manual, mechanical or cultural techniques alone will be effective at achieving the required level of control to reduce the spread of high priority invasive plants and manage existing infestations at priority sites due to their specialized biology and persistence;
- The use of herbicides applied at prescribed label application rates (i.e. listed on the label) should provide excellent control of target invasive plants; and,
- The degradation of habitat as a result of invasive plant infestations (i.e. "biological pollution") may exceed degradation resulting from judiciously applied, targeted use of specific herbicides (that readily break down in the environment).

Limitations on Using Selective and Spot Applications of Herbicides

- With the exception of herbicides containing the active ingredient glyphosate, herbicides cannot be applied to invasive plants growing within 10 meters of water bodies, dry streams, or classified wetlands;

- At least one follow-up application is generally required to give total control of most invasive plant species; and,
- Exposure to herbicides may present a risk to workers, the public and untargeted species of plants and animals (e.g. wildlife) if not completed in accordance to the Integrated Pest Management Act and Regulations, standards listed in this Pest Management Plan, and/or instructions on the herbicide label.

10.6 POST TREATMENT EVALUATIONS

Selected treatment sites will be inspected and evaluated to ensure:

- Compliance with the commitments made in this PMP;
- Compliance with the *IPMA* and IPMR;
- Successful achievement of the required level of control; and,
- Collection and sharing of information.

Agency staff or qualified contractors will undertake post-treatment monitoring at selected treatment sites, and records of the data collected will be entered into the IAPP Application.

When evaluating the results of both chemical and non-chemical controls, the following information/data shall be collected (by visual observations) and recorded to establish whether:

- Control technique(s) chosen provided acceptable control;
- Environmentally sensitive areas were adequately protected;
- Established PFZs and NTZs were appropriate for the treatment method used;
- Off-site herbicide movement or impact on surrounding or adjacent non-target vegetation or soils was observed in the area;
- Herbicide application rate needs to be adjusted based on the results;
- Re-growth of invasive plants treated by manual or mechanical methods had occurred;
- Follow-up treatments are required at the site; and
- The treatment program was cost-effective.

The timing and procedure for evaluating specific treatment programs will depend on the treatment method. Agencies operating under this PMP shall take reasonable efforts to ensure that treatment sites are evaluated within one year of the treatment.

The success of biological control releases will be evaluated for agent establishment within 2 years after release for applicable species. Once establishment is verified on a site, assessment of dispersal and efficacy of the agent will also be assessed.

Agencies operating under this PMP may also conduct “during treatment” inspections of both herbicide applications and/or manual/mechanical treatments being conducted under this PMP. These inspections may assess, for example, public and worker safety, environmental concerns, completion schedules and adherence to standards, specifications and the commitments made in this PMP.

11.0 OPERATIONAL INFORMATION

The operational information included in this section includes:

- Qualifications and responsibilities of persons applying herbicides;
- Procedures for safely transporting herbicides [**IPMR Section 58(3)(a)(i)**];
- Procedures for safely storing herbicides [**IPMR Section 58(3)(a)(ii)**];
- Procedures for safely mixing, loading and applying herbicides [**IPMR Sections 58(3)(a)(ii) and (iii)**];
- Procedures for the safe disposal of empty herbicide containers and unused herbicides [**IPMR Section 58(3)(a)(iv)**];
- Procedures for responding to herbicide spills [**IPMR Section 58(3)(a)(v)**]; and,
- Identification of each pesticide that will be used under the plan, the manner of its application, and the type of equipment required for each manner of application [**IPMR Section 58(3)(c)**].

11.1 Qualifications and Responsibilities of Persons Applying Herbicides

The transportation, storage, handling, application and disposal of pesticides are governed by federal and provincial legislation. The partnering ministry personnel and their contractors will follow safe handling practices including workplace requirements for Workplace Hazardous Materials Information System (WHMIS) labelling and worker education. The required practices for pesticide applicators are detailed in:

- Worker's Compensation Board of British Columbia (1998) *Occupational Health and Safety Regulation – BC Regulation 296/97 as amended by BC Regulation 185/99 – Sections 6.70 to 6.109;*
- BC Ministry of Environment, Lands and Parks (2005) *Handbook for Pesticide Applicators and Dispensers*; and,
- Workers' Compensation Board of British Columbia (1990) *Standard Practices for Pesticide Applicators.*

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All herbicide applications under this PMP will be conducted or supervised by a person who holds a Pesticide Applicator Certificate endorsed for the class of pesticide and the pesticide use required under this PMP.

The responsibilities of the Certified Pesticide Applicator are to:

- Be in continuous attendance at the site;
- Have available proof of certification;
- Supervise no more than 4 uncertified assistants at one time;
- Maintain continuous contact, auditory and/or visual, with the uncertified assistants;
- Be within 500 meters of persons being supervised; and,
- Comply with the standards contained in Division 7 of the IPMR.

11.2 Procedures for Safely Transporting Herbicides

The *Transport of Dangerous Goods Act* regulates the handling and transportation of poisonous substances that may include herbicides. The *IPMA* and IPMR also specify certain transport requirements/procedures.

The plan holder shall ensure that ministry personnel and/or contractors follow these procedures for safely transporting herbicides with the Plan Area:

- Ensure that herbicides are carried in a compartment that is secured against spillage and unauthorized removal. The compartment shall be separate from food and drinking water, safety gear, spill containment equipment and people;
- Ensure that all herbicide containers are inspected for defects prior to transporting. Herbicides shall be kept in their original containers and with original labels. If original labels are not available, the herbicides shall be placed in appropriate containers that have the trade name, active ingredient concentration and pesticide registration number affixed to the outside of the container;
- Ensure that the vehicle is equipped with a first aid kit, fire extinguisher, spill contingency plan and kit, and that the vehicle operator has been trained on how to handle spills;
- Ensure that all documents and placards are carried in, or placed on, transport vehicles if required under the *Transportation of Dangerous Goods Act*, the *IPMA* or the IPMR; and,
- Ensure that the vehicle operator reads and understands the herbicide labels and the product Material Safety Data Sheet (MSDS) for all herbicides being transported.

11.3 PROCEDURES FOR SAFELY STORING HERBICIDES

The plan holder shall ensure that ministry personnel and/or contractors follow these procedures for safely storing herbicides with the Plan Area:

- Ensure that herbicides are stored in accordance with the *IPMA*, IPMR and the Workers' Compensation Board document *Standard Practices for Pesticide Applicators*;
- Keep herbicides in their original containers and with original packaging. If original packaging is not available, the herbicides shall be placed in appropriate containers that have the trade name, active ingredient concentration and pesticide registration number affixed to the outside of the container;
- Ensure that storage facilities are locked when left unattended, ventilated to the outside atmosphere, are entered only by persons authorized to do so, and that there is a placard affixed and maintained on the outside of each door leading into the storage area bearing, in block letters that are clearly visible, the words "WARNING – CHEMICAL STORAGE – AUTHORIZED PERSONS ONLY";
- Keep storage facilities separate from work and living areas, and away from food, flammable materials, bodies of water and water sources;
- Ensure the storage facility is equipped with necessary spill equipment, first aid kits, and the appropriate MSDS for herbicides stored;
- Ensure that the person responsible for the storage area notifies the appropriate fire department of the presence of herbicides on the premises; and,
- Ensure that herbicides that release vapours, and bear a "poison" symbol on the label are stored in a storage facility that is not attached to or within a building used for living accommodation.

The plan holder has no direct control of the herbicide storage practices of its contractors while they are not under contract to them. Some contractors may store herbicides for extended periods of time in vehicles when performing a number of herbicide treatments for the plan holder(s). The contractor's vehicle is considered a mobile storage unit. Persons responsible for the herbicide storage shall ensure that all herbicides are stored in a locked canopy or similar arrangement, separate from the driver and personal protective gear.

11.4 PROCEDURES FOR SAFELY MIXING, LOADING AND APPLYING HERBICIDES

The plan holder shall ensure that ministry personnel and/or contractors follow these procedures for safely mixing, loading and applying herbicides within the Plan Area:

- Ensure that all mixing, loading and application of herbicides is carried out by, or directly supervised by, a Certified Pesticide Applicator with the appropriate category of certification, and that all manufacturer's recommendations, as specified on the herbicide labels, are adhered to;
- Ensure that all mixing, loading and application of herbicides are undertaken in a safe manner. All mixing and loading shall be undertaken only in areas at least 15 meters from, and selected to prevent any spilled herbicides from entering, pesticide-free zones, no treatment zones, bodies of water, fish or wildlife habitat, water sources, or other environmentally sensitive features (e.g., agricultural production areas);
- Ensure that a spill tray is used during all mixing and loading of herbicides to catch and contain any small spills that may occur;
- Ensure that containers used to mix, prepare or apply herbicides are not washed or submerged in any body of water;
- Ensure that eye wash station(s), protective clothing, safety spill kits, spill response plans, a copy of this PMP, each herbicide product's MSDS, emergency telephone numbers and first aid supplies are present and available at or near each mixing, loading or treatment site. This will help ensure that quantities of herbicides being mixed and used are consistent with labels;
- Follow all directions and restrictions on herbicide product labels, including adhering to the recommended re-entry times to treated areas unless personal protective equipment is worn; and,
- Ensure that the listed herbicides in this PMP will only be mixed with water to dilute herbicide concentrations.

11.5 PROCEDURES FOR SAFE DISPOSAL OF EMPTY HERBICIDE CONTAINERS AND UNUSED HERBICIDES

Except where herbicides are applied by plan holder(s) personnel, the responsibility of container disposal will lie with the contractor.

The plan holder shall ensure that ministry personnel and/or contractors follow these procedures for the safe disposal of empty herbicide containers and unused herbicides with the Plan Area:

- Ensure that all herbicide waste is disposed of in a manner consistent with the requirements of the BC *Environmental Management Act,* Special Waste Regulation, and in accordance with the manufacturer's instructions as noted on the product label, as appropriate;
- Ensure that empty herbicide containers are returned to the herbicide distributor as part of their recycling program; or triple rinsed or pressure rinsed, altered so that they cannot be reused, and disposed of in a permitted sanitary landfill or other approved disposal site; and
- Ensure that all leftover herbicide mix is stored for future use in a manner consistent with the requirements specified in Section 11.3 (procedures for safely storing herbicides).

11.6 PROCEDURES FOR RESPONDING TO HERBICIDE SPILLS

The plan holder shall ensure that ministry personnel and/or contractors follow these procedures for responding to herbicide spills within the Plan Area. If contractors that work under this PMP have their own spill response plan, they must meet or exceed the following procedures:

- Ensure that a herbicide spill kit accompanies all vehicles within the Plan Area, and contains, as a minimum, the instructions for spills, emergency telephone numbers, agricultural white lime (25 kg), kitty litter (2-20 kg bags), large plastic garbage bags (4), shovels (2), Nutrasol pesticide neutralizing solution (1), an ABC type fire extinguisher, polyethylene or plastic tarp (3m x 3m minimum), dustpan and shop brush, flagging and rope, a herbicide first aid kit, and personal protective clothing/equipment (rubber gloves, safety glasses); and,
- Ensure that the following spill procedures are followed if a herbicide spill occurs within the Plan Area:

    1. All personnel shall be protected from herbicide contamination by wearing appropriate protective clothing and safety gear;
    2. Any person exposed to a herbicide shall be moved away from the place of the spill;
    3. First aid should be administered, if required;
    4. The source of the spill should be stopped;
    5. The spilled material should be stopped from spreading by creating a dam or ridge;
    6. The project supervisor shall ensure operations cease until the spill is contained and the source is repaired;
    7. Absorbent material shall be spread over the spill, if applicable, to absorb any liquid;
    8. The absorbent material shall be collected in garbage bags or containers with the contents clearly marked, removed from the spill site, and placed in garbage bags or containers;
    9. When more than one litre of herbicide is spilled, the person responsible for the project will immediately report it to the Provincial Emergency Program by telephoning 1-800-663-3456 or, where that is impractical, to the local police or nearest detachment of the R.C.M.P.; and,

10. An approved representative of the plan holder(s) will be notified of the details related to the spill as soon as is practical by the contractor project supervisor.

11.7 IDENTIFICATION OF EACH HERBICIDE THAT WILL BE USED UNDER THE PLAN, THE MANNER OF ITS APPLICATION, AND THE TYPE OF EQUIPMENT REQUIRED FOR EACH MANNER OF APPLICATION

There are four (4) herbicide active ingredients proposed for use under this PMP. The manner of application, and the type of equipment required for each manner of application are outlined in the following table. It must be noted that each herbicide active ingredient listed in this table may be registered for sale and use in Canada as one or more products (e.g. the active ingredient glyphosate is currently available in over 200 registered products). Any or all products that are registered for sale or use in Canada, and that contain one or more of the active ingredients proposed for use, may be used within this PMP.

Table 4: Herbicide Active Ingredients Proposed for Use, Their Manner of Application and the Equipment Required for Their Application

Active Ingredient	**aminopyralid**	**triclopyr**	**glyphosate**	***Chondrostereum purpureum*** Species of naturally occurring fungus native to B.C.*
Manner of Application	spot treatment onto foliage	spot treatments to plant leaves or stems (e.g., basal bark), direct application or injection onto or into freshly cut stumps or stems	spot treatments onto foliage, direct application to plant leaves, direct application or injection onto or into freshly cut stumps or stems	spot treatments on cut surface of stumps.
Equipment Required for Application	backpack sprayer, ATV/quad	wick/wipe on, backpack sprayer, ATV/quad, squirt bottle, or injection tool	wick/wipe on, backpack sprayer, ATV/quad, squirt bottle, or injection tool	Squeeze bottle (comes in a paste)

Chondrostereum purpureum fungus is the active ingredient in a 'reduced risk' biological herbicide called Chontrol Peat Paste. It is currently being tested for its potential to reduce the number of passes of brush control required along highways, thereby reducing the amount of carbon emissions and impacts on non-target species that currently occur with mechanical brush cutting methods. It is also being tested on woody invasive plants species as an alternative to chemical herbicides. This product is not currently being used operationally on Crown land, but inclusion in this PMP will allow for its use should it prove effective within the next 5 years.

11.8 DESCRIPTION OF APPLICATION EQUIPMENT PROPOSED FOR USE

The following is a description of each type of application equipment proposed for use under this PMP:

Backpack Sprayer: A portable, manually operated, low pressure container with a nozzle and a positive shut-off system used for the spot application of herbicides onto foliage, basal bark areas, or into or onto freshly cut stems and stumps.

ATV/Quad: A motorized vehicle equipped with a pump, holding tank for spray mix, and a nozzle (low pressure) used for the spot application of herbicides onto foliage.

Wick/Wipe On Applicators: Absorbent pad, wicks or rope attached to a long-handled applicator or stick used to apply herbicides onto foliage, basal bark areas, or freshly cut stems or stumps.

Squirt Bottle: Hand-held, non-pressurized container used to apply herbicides onto basal bark areas, or freshly cut stems or stumps.

Injection Tools: Used to inject herbicides into individual stems.

12.0 ENVIRONMENTAL PROTECTION STRATEGIES AND PROCEDURES

All invasive plant management activities proposed for use under this PMP will incorporate:

- Strategies to protect community watersheds;
- Strategies to protect domestic and agricultural water sources;
- Strategies to protect fish and wildlife, riparian areas, bodies of water and wildlife habitat;
- Strategies to prevent herbicide contamination of food intended for human consumption;
- Pre-treatment inspection procedures for identifying treatment area boundaries;
- Procedures for maintaining and calibrating herbicide application equipment; and,
- Procedures for monitoring weather conditions and strategies for modifying herbicide application methods for different weather conditions.

In BC Parks and Protected Areas, “Invasive Plants in British Columbia Protected Lands: Best Management Practices” will be followed.

In this PMP, all pesticide-Free zones (PFZs) and no-treatment zones (NTZs) will comply with the standards contained in Division 7 of the IPMR.

Definition: **Pesticide-free zone (PFZ) –** an area of land that must not be treated with pesticides, and must be protected from pesticides moving into it. PFZs are measured by the horizontal distance from the high water mark. PFZs will be identified, marked/flagged prior to any herbicide application.

Definition: **No-treatment zone (NTZ)** – an area of land that must not be treated with pesticides. NTZs will be identified, marked/flagged prior to any herbicide application.

12.1 Strategies and Procedures to Protect Community Watersheds

Under this plan, applicable herbicide applications proposed to occur within 100 meters of a community watershed boundary will be carried out according to the following strategies and procedures:

- The location of community watersheds to be protected will be verified by accessing the Community Watershed Database, maintained by the BC Ministry of Environment, at the following web site;

  http://www.env.gov.bc.ca/wsd/data_searches/comm_watersheds/index.html

- Herbicides shall not be stored within a community watershed for more than 24 hours prior to their use, and shall be removed from the community watershed within 7 days of use, unless they are stored in a permanent structure;
- A 10 meter PFZ shall be maintained from the point of herbicide application and all bodies of water within the community watershed;
- A 30 meter PFZ shall be maintained down slope from the point of herbicide application and all licensed water intakes within the community watershed;
- A 100 meter PFZ shall be maintained upslope from the point of herbicide application and all licensed water intakes within the community watershed;
- All PFZs shall be measured and marked/flagged prior to herbicide use; and
- Herbicide use shall be discontinued if herbicide residues or breakdown products are detected at a community watershed water intake, and further use shall not be undertaken until the BC Ministry of Health Services medical health officer has been satisfied that all required measures have been implemented to preserve water quality.

12.2 Strategies and Procedures to Protect Domestic and Agricultural Water Sources

The plan holder shall ensure that prior to herbicide applications for invasive plant management, strategies are developed and implemented that identify and protect domestic and agricultural water sources. The table below describes the minimum protective measures that shall be implemented. The NTZs in this table reflect the standards as specified in Sections 71(3) and 71(4) of the IPMR.

Table 5: Minimum Protective Measures Under the IPMR to Protect Domestic and Agricultural Water Sources

IPMR Section	Uses	Permitted Applications	NTZ
71(3)	All pesticide applications except bacterial pesticides	General Rule – Must maintain a 30 m NTZ around a water supply intake or well used for domestic or agricultural purposes, including water for livestock and irrigation purposes	30 m NTZ
71(4)	All pesticide applications except bacterial pesticides (eg. Biological herbicides such as Chontrol)	May reduce the NTZ under section 71(3) if reasonably satisfied that the smaller zone will ensure that pesticide from the use will not enter the water supply intake or well	NTZ at discretion of applicator

The plan holder shall ensure that, prior to herbicide applications for invasive plant management, the locations of registered domestic and agricultural water sources shall be verified visually and/or by assessing applicable government web sites. Attempts to identify and locate unregistered domestic and agricultural water sources will be made by visual observations and/or by attempting to contact the owner/occupier of the land prior to herbicide applications.

12.3 Strategies for Protecting Fish and Wildlife, Riparian Areas, Bodies of Water and Wildlife Habitat

In order to protect fish and wildlife, riparian areas, bodies of water and wildlife habitat from adverse effects during invasive plant management (chemical and non-chemical), the plan holder will implement the following strategies to minimize any adverse and lasting effects on natural ecosystems:

- Ensure that whenever herbicide, manual or mechanical control methods are applied, efforts are made to eliminate harmful alteration, damage or destruction to fish or fish habitat. Reducing negative impacts on streamside vegetation and bank stability will reduce erosion and water turbidity. To prevent contamination of water in fish bearing streams, glyphosate will not be applied to ditches that flow directly or indirectly into fish bearing streams;
- Ensure that where sensitive ecosystems or 'at risk' plant, vertebrate or invertebrate species have been identified in higher-level plans, wildlife management areas, and other plans, they will be managed accordingly within the PMP;

- Ensure that whenever control methods involving herbicide application are proposed in areas identified as Karst lands, that the Best Management Practices specific to herbicide applications, as identified in the MFR publication entitled "*Karst Management Handbook for British Columbia"*, are followed; (http://www.for.gov.bc.ca/hfp/publications/00189/Karst-Mgmt-Handbook-web.pdf);
- Ensure that there is communication with agencies responsible for species at risk prior to carrying out invasive plant management activities, so that protective measures may be implemented, where possible;
- Ensure that best management strategies (as derived from documents on species habitat, lifecycle information and locations) are practiced during invasive plant management;
- Hold pre-work meetings with plan holder(s) personnel and/or contractors and affected agencies to ensure all involved in the invasive plant management process can competently protect species at risk, riparian areas, bodies of water and wildlife habitat during the course of the work;
- In order to reduce invasive plant control impacts on fish and wildlife, riparian areas and wildlife habitat, ensure that contract documents and prescriptions will describe best management practices, including, but not limited to:
    - no refueling of machinery or herbicide mixing within 15 meters of a riparian zone;
    - no clean up (excluding the case of an emergency spill) or disposal of herbicide materials within 15 meters of riparian zones; and
    - a requirement to install descriptive flagging such as "Riparian Zone" and "Pesticide-Free Zone" placed appropriate intervals.
- Ensure that the minimum protection measures during herbicide applications for bodies of water (temporary, permanent, fish-bearing, not fish-bearing), dry streams, and classified wetlands are followed according to the requirements specified in the IPMR. These requirements are summarized in Table 6 below.

Table 6: PFZ Requirements Under the IPMR When Applying Herbicide for Invasive Plant Control

Permitted Application	PFZ	Regulation Section
Non-glyphosate Applications Around or along a body of water or dry stream and classified wetland using any pesticide except glyphosate, subject to label restrictions and including all application methods	**10 meter PFZ**	**73(1)**
Glyphosate Applications If the glyphosate product is applied by **selective application methods** down to but not below the high water mark of temporary, free-standing bodies of water that are not fish-bearing at any time of the year and do not drain directly into a fish-bearing body of water	**1 meter PFZ above the high water mark**	**74(2)(a) and 77(2)**
If the glyphosate product is applied by **selective application methods** over a dry stream that is not fish-bearing at any time of the year and does not drain directly into a fish-bearing body of water	**0 meter PFZ**	**74(2)(b)**

12.4 Strategies to Prevent Herbicide Contamination of Food Intended for Human Consumption

Berry picking is common throughout the Plan Area. Although most of the gathering is of native plants and berries, some invasive plant berries, such as Himalayan and cutleaf evergreen blackberry are frequently used as food. Bee keeping areas, vegetable gardens, and areas containing agricultural crops or domestic animals are also found at many locations within the Plan Area, but generally far removed from any potential treatment area(s). In addition, First Nations people within the Plan Area may use several species of plants for ethno-botanical purposes.

The plan holder shall ensure that, prior to herbicide applications for invasive plant management, strategies are developed and implemented to prevent herbicide contamination of food intended for human consumption including:

- During the required consultation process, First Nations will be invited to forward the names of those plant species of cultural importance, so that they are not inadvertently affected during treatment activities. Additional invasive plant species will be added to this list if identified by First Nations bands and other groups or individuals. Efforts will continue through formal and informal consultation to determine the locations of these

activities. Some measures could include delay of treatment or alteration of treatment boundaries;
- Non-chemical methods of invasive plant management shall be considered where treatment objectives can be achieved;
- If control methods involve the application of herbicides, increased NTZs may be maintained, if required, during herbicide applications around areas where food for human consumption is growing;
- Treatment notices shall be posted at public access points to proposed treatment areas advising of treatment near the food crops. This will ensure that people are aware that the area has been treated with herbicides; and,
- Where possible, herbicide treatments shall be timed to minimize impacts on food plants (e.g., control of Himalayan or cutleaf evergreen blackberry after the fruit has predominantly dropped from the vine).

12.5 Pre-Treatment Inspection Procedures for Identifying Treatment Area Boundaries

The following procedures shall be implemented to ensure that treatment area boundaries are identified and clearly marked prior to herbicide applications:

- A pre-treatment inspection shall be conducted to establish treatment boundaries and to document the location of environmentally sensitive areas;
- Treatment area boundaries and the location of environmentally sensitive features shall be mapped and maps will then be made available to the Contractor;
- A pre-treatment meeting shall be held between the Contractor and the plan holder to confirm treatment area boundaries and the locations of environmentally sensitive features; and,
- Marking/flagging of all PFZs and/or NTZs shall be completed prior to herbicide application.

12.6 Procedures for Maintaining and Calibrating Herbicide Application Equipment

All herbicide application equipment used under this PMP for invasive plant management shall be safe, clean, in good repair, compatible and appropriate for the herbicide being applied. All backpack sprayers shall be inspected and calibrated prior to the commencement of herbicide applications each year, and weekly throughout the application season. The Ministry or Regional Weed Committee responsible for conducting the treatments under this PMP shall conduct random inspections to ensure that the applicators are complying with all sections of the PMP, including a visual inspection of the equipment being used to ensure that it is in good repair and safe for use. An example of an Equipment Calibration and Checklist form is shown in Appendix 5. Contractors will also be required to complete and submit on a weekly basis an operational log (along with treatment records) to the Contract Coordinator that includes information on equipment maintenance and calibration. Calibration is not undertaken on wick/wipe on applicators or squirt bottles.

Backpack sprayers shall also be re-calibrated when changing herbicide products or when nozzle output begins to vary.

12.7 Procedures for Monitoring Weather Conditions and Strategies for Modifying Herbicide Application Methods for Different Weather Conditions

12.7.1 Weather Monitoring

An anemometer (wind speed measuring device) and thermometer will be used at the treatment sites before herbicide treatment occurs to ensure weather conditions are suitable for herbicide application, and periodically during herbicide applications.

Wind speed and direction, precipitation, temperature and sky conditions (clear, overcast, cloudy, partly cloudy) will be recorded for foliar herbicide applications when using backpack sprayers. Temperature, precipitation, frost and dew conditions will be recorded for stem, bark, wick/wipe-on and stump applications. Persons applying herbicides are responsible for checking each product label for guidelines for applying herbicides under various weather conditions.

12.7.2 Stop Treatment Conditions

The certified pesticide applicator has the final authority on when herbicide applications should be stopped due to inclement weather or adverse site conditions. Backpack herbicide operations shall be stopped when parameters are exceeded according to the manufacturer's label.

Herbicide applications shall be stopped:

- When conditions prevent the herbicide product from being applied effectively according to label instructions (e.g., periods of rain or snow); OR
- When wind speed and/or direction causes the foliar backpack application of herbicide to drift and/or miss the target invasive plants; OR
- Ground wind velocity is over 8 km/hour for foliar backpack application; OR
- The maximum temperature stated on the herbicide label is exceeded; OR
- It begins to rain, increasing the chances of excessive runoff and leaching; OR
- There is ice or frost on the foliage.

13.0 Reporting, Notification and Consultation

13.1 Reporting

Accurate record keeping allows both plan holder and the Administrator, *IPMA,* to:

- Monitor the quantity of herbicides used;
- Ensure compliance with the IPMR;
- Ensure compliance with the commitments made in this PMP; and,

- Ensure compliance with the contents of the Pesticide Use Notice.

The plan holder will ensure that each of the required records described below are maintained.

13.1.1 CONFIRMATION HOLDER USE RECORDS

Both the plan holder and each contracting firm that applies herbicides for the plan holder must maintain daily records of herbicide use.

Section 37(1) of the IPMR describes the requirements for these records. The following records must be kept for each treatment location and day of use:

- The date and time of the herbicide use;
- The name of the invasive plant targeted by the use or the purpose of the herbicide use;
- The trade name of each herbicide used and its registration number under the federal Act;
- For each herbicide used, the method and rate of application and the total quantity used;
- The prevailing meteorological conditions including temperature, precipitation and velocity and direction of the wind measured at the beginning of each day before starting treatment, re-measured if obvious changes in environmental conditions occur throughout the day, and re-measured at the end of any treatment day; and,
- A record for each piece of the holder's herbicide application equipment that requires calibration showing when the equipment was calibrated and the data upon which its calibration was based.

In addition to maintaining daily records of herbicide use, all users of the PMP will retain records of site assessment and invasive plant inventory as well as operational herbicide and other treatment records. These records will include:

- Site assessment and invasive plant inventory forms;
- Treatment notifications;
- Maps of invasive plant sites, treatment and biological control;
- Pre and post treatment records of sites; and
- Project checklists including equipment, First Aid and spill kit.

13.1.2 ANNUAL REPORT FOR CONFIRMATION HOLDERS

In accordance with Section 39 of the IPMR, the plan holder will provide to the Regional Administrator, *IPMA,* the following information for each calendar year by January 31 in the next calendar year for operations conducted under this PMP during the calendar year:

- The name and address of the confirmation holder, and their confirmation number;
- Trade name and active ingredient of the herbicide(s) applied, including their PCP numbers;
- Locations and total area treated (ha); and,
- Quantity of each active ingredient applied (kg).

13.2 NOTIFICATIONS

The plan holder commits to providing the following notifications with respect to this PMP.

13.2.1 NOTIFICATION OF PMP CONFIRMATION

The plan holder will, within 7 days of the plan confirmation date, make available, for the term of the confirmation, a copy of the confirmation and the PMP with relevant maps at their local office to allow inspection by the public.

13.2.2 ANNUAL NOTICE OF INTENT TO TREAT

As per section 42 of the IPMR, for the purpose of an annual Notice of Intent to Treat, the plan holder will prepare and retain a detailed map showing the treatment locations for the applicable calendar year, which indicate the following for each treatment location:

- The proposed treatment areas; and
- The geographic or other sensitive features that require a PFZ or NTZ.

The plan holder will forward, in writing, to MoE, at least 21 days prior to treatment in each year during which the PMP is in effect, an Annual Notice of Intent to Treat (NIT) for the following year. The NIT will be submitted to each Regional Office of MoE within whose geographic boundaries herbicide applications are being proposed. This NIT will identify:

- Name and business location of confirmation holder(s);
- Proposed treatment areas;
- Proposed treatments;
- Herbicides proposed for use and their method of application; and,
- The total area proposed for treatment.

13.2.3 REQUESTS TO AMEND THE PMP

The plan holder will forward, in writing, to MoE, amendments requested for the PMP. Amendment requests to add new application techniques or similar changes will not require further public advertising or First Nations consultation; provided that the amendment request is within land owned or controlled by the plan holder**.** Amendments to add new active ingredients will require further public advertising and/or First Nations consultation*.*

13.2.4 NOTIFICATION OF CONTRAVENTION

Section 72(1)(d) of the IPMR requires that a confirmation holder give written notice to the Administrator regarding a contravention of the *IPMA* or IPMR that involves the release of a pesticide into the environment. The plan holder commits to abiding by this requirement.

In addition, the plan holder has implemented contractor guidelines to ensure compliance. Failure of the contractor to observe the following requirements may be cause for contractor dismissal:

- Violation of the requirements of the *IPMA* or the IPMR;
- Mixing of herbicides in inappropriate locations such as near environmentally sensitive zones;
- Failure to use adequate personal protective equipment when required by the product label;
- Application of treatment herbicides within prohibited zones;
- Improper cleanup or reporting of spills;
- Application of herbicides by uncertified personnel without appropriate supervision;
- Improper disposal of unused herbicides or containers;
- Improper equipment calibration;
- Application of herbicides under inappropriate or unsafe conditions;
- Failure to properly complete and submit daily operating logs or records; or,
- Handling, storing, mixing, transporting, or applying herbicides in a manner that violates product labels**.**

13.2.5 PUBLIC NOTIFICATION PRIOR TO TREATMENT

Notification of individuals, communities and organizations in the time and manner as agreed during the public consultation process, will be completed prior to treatments. The plan holder will maintain a record of all public notifications for each treatment area.

13.2.6 FIRST NATIONS NOTIFICATION PRIOR TO TREATMENT

Notification of First Nations in the time and manner as agreed during the First Nations consultation process will be completed prior to treatments. The plan holder will maintain a record of all First Nations notifications for each treatment area.

13.2.7 EMPLOYEE NOTIFICATION PRIOR TO TREATMENT

The plan holder will provide internal notification to all potentially affected employees in advance of all herbicide treatments via electronic mail, bulletins or written postings (i.e., Treatment Notices). Examples may include notifying Park Facility Operators and Area Supervisors responsible for parks within the targeted area or maintenance personnel with the BC Ministry of Transportation and Infrastructure.

Employee notification is not normally conducted in advance of mechanical methods of invasive plant control such as cutting or manual removal.

13.2.8 POSTING OF TREATMENT NOTICES

Prior to treatment, Treatment Notices will be posted in locations so that they are clearly visible and legible from each approach maintained by the plan holder for public/employees/contractors to access the treatment area or at additional locations for the

purposes of due diligence. The signs shall remain posted for 24 hours following herbicide application, and contain the following information:

- The trade name and active ingredient of the herbicide that will be used;
- The date and time of the herbicide application;
- The purpose of the treatment;
- The method of application;
- Precautions to be taken to prevent harm to people entering the treatment area;
- The PMP confirmation number; and
- The plan holder(s) contact information.

For each treatment location, the applicator will maintain a record of where notices were posted.

The Treatment Notices shall:

- Be a minimum size of 550 sq. cm and water resistant;
- Display the title "**Notice of Pesticide Use"** in bold letters that are clearly legible to a person approaching the treatment area. Substitution of "pesticide" with "herbicide" or another appropriate category of pesticide is permissible.

An example of a Treatment Notice is shown in Appendix 6.

13.3 CONSULTATIONS

13.3.1 PUBLIC CONSULTATION PLAN

Prior to submitting a Pesticide Use Notice to MoE for PMP confirmation, the plan holder will carry out a consultation process with the public.

The objectives of conducting consultations when this PMP is at the draft stage are:

- To increase public awareness of the PMP process and of the principles of Integrated Pest Management that are embodied in the PMP;
- To ensure that the public have an opportunity to identify concerns, and for the plan holder(s) to address those concerns before the PMP is finalized and a Pesticide Use Notice is submitted for confirmation;
- To ensure a transparent and accountable review process for the PMP;
- To educate the public on the need to manage invasive plants; and,
- To explain how the planning process that is described in the PMP recognizes the need to protect human health and the environment.

The public will be consulted during PMP development via notices in local community newspapers within the geographic boundaries of the plan.

As per Section 61(1) of the IPMR, at least 45 days before submitting a Pesticide Use Notice, the first of 2 notices, at least 40 cm^2 in size, will be published within a 2 week period in newspapers circulated in the various communities (or nearest communities).

During the public consultation process, the draft PMP will be accessible to the public at the Ministry of Transportation and Infrastructure Regional Office in Burnaby, as well as on the Ministry of Transportation and Infrastructure's Invasive Plant Program website: http://www.th.gov.bc.ca/invasiveplant/ , as stated in the public notifications.

13.3.2 PUBLIC CONSULTATION REPORT

The plan holder will submit to the Administrator, *IPMA*, a Public Consultation Report that contains:

- A summary of public consultations, including the names and addresses of those who provided input, the nature of their concerns and/or recommendations, and the plan holder(s) response to the input from the public; and

- A list of newspapers in which notification of the pending PMP submission appeared, along with the publication dates and a photocopy or tear sheet of a representative advertisement.

13.3.3 FIRST NATIONS CONSULTATION PLAN

In addition to the objectives for public consultation outlined in Section 13.3.1, the plan holder will consult with First Nations to avoid potential infringement on aboriginal rights, treaty rights, or cultural values during activities anticipated under the PMP. The plan holder not only has an obligation to consult with First Nations, it must also attempt to address their concerns and accommodate their cultural interests. Consultation processes must take into account the BC Treaty negotiation process and the current litigation actions by First Nations respecting aboriginal land use or sovereignty. Both of these major issues can have an impact on the plan holder invasive plant management program. In light of the above sensitivities and special concerns, the plan holder is committed to establishing and maintaining positive relationships with First Nations through meaningful and respectful consultation.

In conducting these First Nations consultations, the plan holder will follow all of the procedures outlined in the May, 2006 publication entitled *"Draft Guidelines for IPM Proponents Conducting Consultations with First Nations"*, published by the BC Ministry of Environment, Integrated Pest Management Program.

The First Nations within the geographic area covered by the PMP are shown in Table 7 below.

Table 7: First Nations Within the Plan Area

Te'Mexw Treaty Association	Leq'a:mel First Nation	Cheam First Nation	Klahoose First Nation
Siska Indian Band	Popkum First Nation	Kwikwetlem First Nation	Lower Similkameen Indian Band
Aitchelitz	Scowlitz First Nation	N'Quatqua First Nation	Lytton First Nation
Skatin First Nations	Seabird Island	Ch-ihl-kway-uhk Tribal Society	Lil'wat First Nation
Tsawwassen First Nation	Shxwha:y Village	Sto:lo Tribal Council	Musqueam Nation
Toosey Indian Band	Shxw'ow'hamel First Nation	Douglas First Nation	Nooaitch Indian Band
Toosey Indian Band	Skawahlook First Nation	Kwantlen First Nation	Oregon Jack Creek Band
Samahquam Nation	Skowkale First Nation	Peters Band	Yale First Nation
Nlaka'pamux Nation Tribal Council	Skwah First Nation	Snaw'Naw'As Nation	Boothroyd Band
Nicola Tribal Association	Soowahlie Indian Band	Union Bar Band	Hul'qumi'num Treaty Group
Esh-kn-am Cultural Resources Management Services	Squiala First Nation	Tsilhqot'in National Government	Sto:lo Nation
St'at'imc Chiefs Council	Sumas First Nation	Penticton Indian Band	Ashcroft Indian Band
St'at'imc Chiefs Council	Tzeachten First Nation	shishalh (Sechelt) First Nation	Boston Bar First Nation
Lillooet Tribal Council	Yakweakwioose Band	Semiahmoo First Nation	Bridge River Indian Band
Okanagan Nation Alliance	Laich-kwil-tach Treaty Society	Seton Lake Band	Sts'ailes Indian Band
T'it'q'et Administration	Stz'uminus First Nation	Sliammon First Nation	Coldwater Indian Band
Lower Nicola Indian Band	Cowichan Tribes	Spuzzum First Nation	Cook's Ferry Indian Band
Tsilhqot'in National Government	Halalt First Nation	Squamish Nation	Kwaw-kwaw-apilt First Nation
In-SHUCK-ch Nation	Lake Cowichan First Nation	Upper Similkameen Indian Band	Cayoose Creek Band
Matsqui First Nation	Lyackson First Nation	Tsleil-Waututh Nation	Katzie
Chawathil First Nation	Penelakut Tribe	Kanaka Bar Indian Band	

13.3.4 FIRST NATIONS CONSULTATION REPORT

In order to facilitate Ministry of Environment consideration of the adequacy of First Nations consultations and of the plan holder response to any issues raised, the plan holder will prepare a report that describes the consultation process and outcomes. This report will be submitted to the Administrator, *IPMA,* in conjunction with the submission of the Pesticide Use Notice application. A copy of this report will also be provided to the First Nations with whom consultation was conducted and to the Ministry prior to initiation of pesticide use. When the report is sent to a First Nation, a letter will be included that indicates to the First Nation that they may submit comments or concerns regarding the report to the Ministry.

13.3.5 INTERAGENCY CONSULTATION AND COORDINATION

All agencies involved in this plan work cooperatively to control invasive plants in the province of British Columbia and are all actively involved in coordinating invasive plant management programs with other Ministries, agencies and stakeholders. Information on invasive plant inventories, treatment and biological weed control will be provided to these groups on an ongoing basis. Since the BC *WCA* states that 'every occupier has the responsibility to control noxious weeds', the Ministry of Transportation and Infrastructure will conduct its integrated invasive plant program within the Plan Area in communication and cooperation with other 'land occupiers' including, but not limited to:

- BC Ministry of Agriculture
- BC Ministry of Forests, Lands and Natural Resource Operations
- BC Ministry of Environment
- Utilities, including BC Hydro, British Columbia Transmission Corporation, and Terasen Gas
- First Nations
- Local governments including Regional Districts and Municipalities
- Coastal Invasive Plant Committee
- Greater Vancouver Invasive Plant Council
- Fraser Valley Invasive Plant Council
- Sea to Sky Invasive Species Council
- The Nature Trust of BC
- *Range Act* agreement holders

Appendix 1: Maps of the South Coastal Mainland (The Plan Area)

Figure 1. Overview Map with the Plan Area Outlined in Red

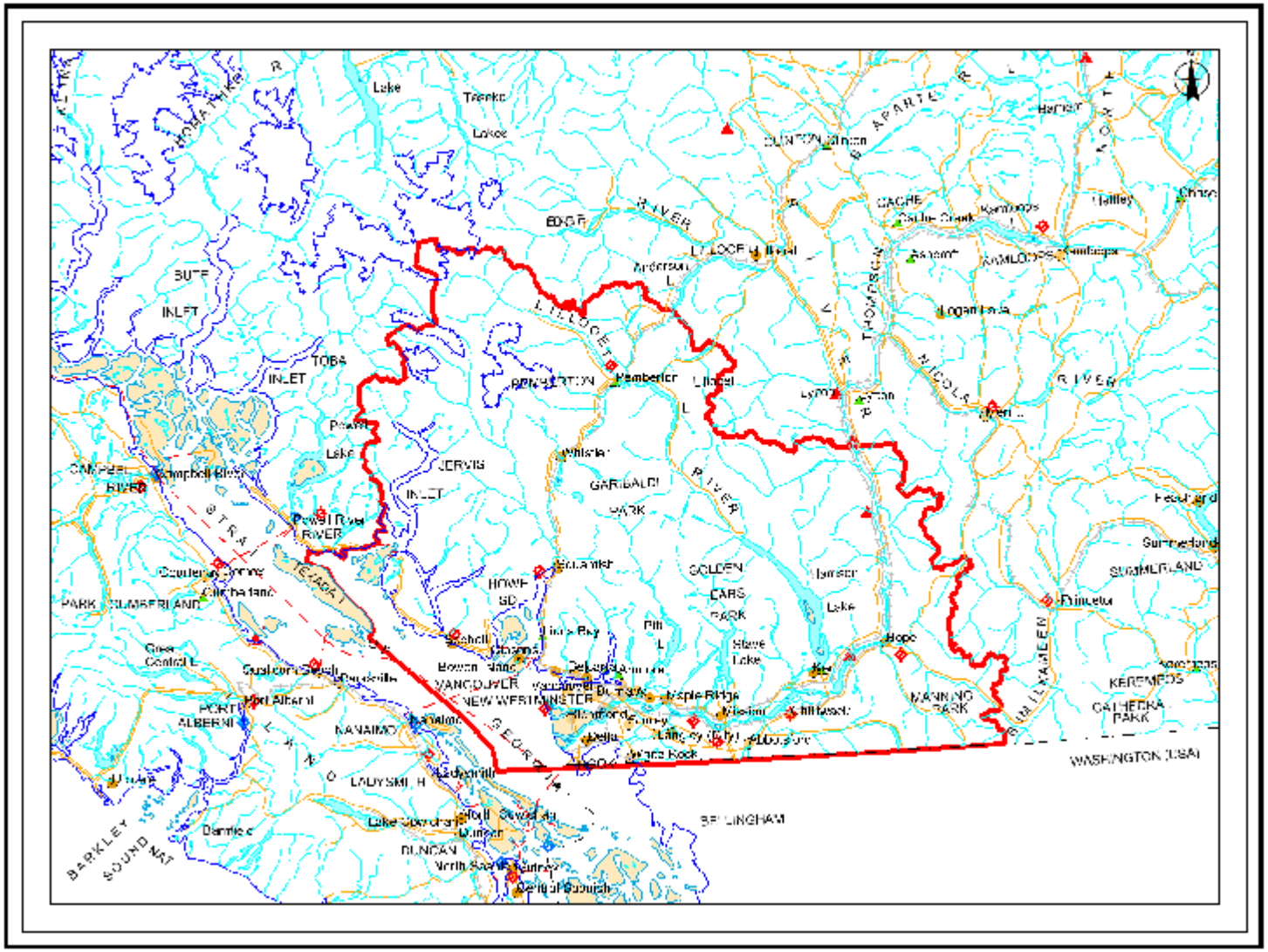
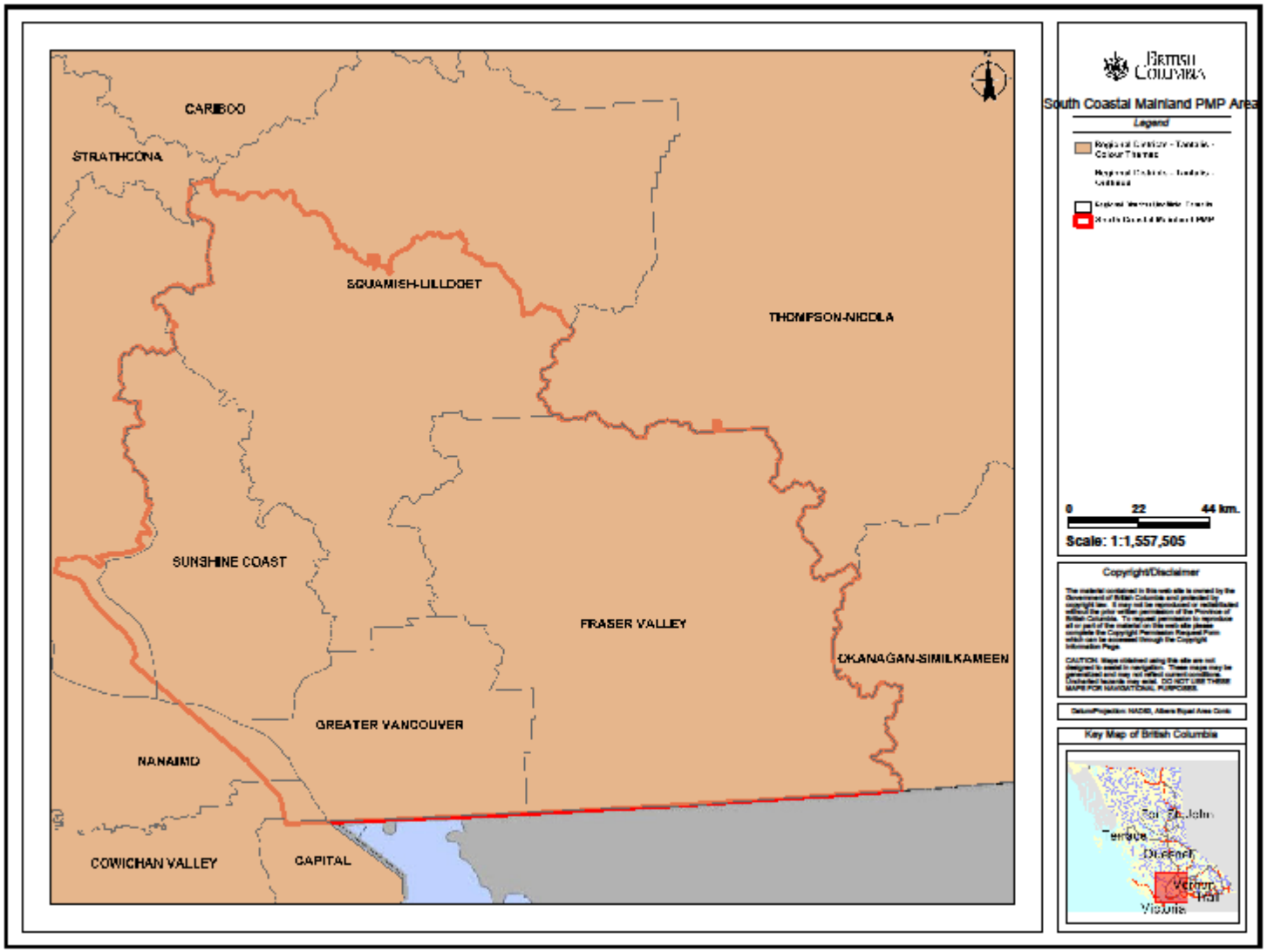


Figure 2. Map of the Plan Area with Regional Districts and the Ministry of Transportation and Infrastructure Regions



Appendix 2: Site and Invasive Plant Inventory Record

SITE AND INVASIVE PLANT INVENTORY RECORD

DATA ENTERED INTO INVASIVE ALIEN PLANT PROGRAM ☐	ENTERED BY	TEMPORARY FIELD SITE #

SITE SITE ALREADY EXISTS ☐

SITE CREATED DATE * (YYYY-MM-DD)	MAPSHEET	(ASSIGNED AT DATA ENTRY) SITE ID	TREATMENT ID

PAPER FILE ID	DISTRICT CODE	RANGE UNIT ID	PASTURE

SURVEY AGENCY *	EMPLOYER

SURVEYOR(S)	JURISDICTION

GPS/UTM GRID

ZONE *	EASTING *	NORTHING *	OR	LATITUDE *	LONGITUDE *

BIOGEOCLIMATIC CLASS

ZONE	SUBZONE	VARIANT	PHASE	SITE SERIES

SITE CHARACTERISTICS

SLOPE %	ASPECT	ELEVATION (M)

SITE SOIL TEXTURE

COARSE ☐ FINE ☐ ORGANIC ☐

LOCATION/SITE

LOCATION	COMMENTS

INVASIVE PLANTS

FOR DATA ENTRY ENTER EACH SPECIES SEPARATELY	AREA * (Ha)	DISTRIBUTION CODE	SURVEY TYPE CURSORY	SURVEY TYPE OPERATIONAL	SURVEY TYPE PRECISE	DENSITY (PLANTS/m2)	SITE PRIORITY	PROPOSED ACTIVITY
PLANT SPECIES *			☐	☐	☐			M ☐ C ☐ B ☐ NONE ☐
	PROPOSED HERBICIDE					PROPOSED BIOAGENT		
PLANT SPECIES			☐	☐	☐			M ☐ C ☐ B ☐ NONE ☐
	PROPOSED HERBICIDE					PROPOSED BIOAGENT		
PLANT SPECIES			☐	☐	☐			M ☐ C ☐ B ☐ NONE ☐
	PROPOSED HERBICIDE					PROPOSED BIOAGENT		
PLANT SPECIES			☐	☐	☐			M ☐ C ☐ B ☐ NONE ☐
	PROPOSED HERBICIDE					PROPOSED BIOAGENT		

COMMENTS

SAME DATE AS SITE? ☐ OR SURVEY DATE (YYYY-MM-DD) _____ (*An invasive plant survey date is mandatory.)

FS 1260 HSP 2006/06

NOTE: MANDATORY DATA FIELDS ARE INDICATED WITH *

Appendix 3: Containment Lines

Protocol to Establish Invasive Plant Containment Lines in the IAPP Application

Approved by IMIPWG May 26, 2009

DEFINITION:
The objective of containment in invasive plant management is to prevent large infestations from spreading to un-infested areas. Establishing containment lines around targeted invasive plant species' infestations defines the areas that require treatment and assists in management planning. Inside the containment line the infestation of the invasive plant species is extensive and it is not possible to eradicate the target species. Outside the line the infestation is limited and preventing spread and achieving a long term goal of eradication is possible.
The establishment and location of containment lines is determined through stakeholder consensus and are set within geographic areas such as Regional Invasive Plant Committee boundaries or cross-regional areas of the Province. The location of the containment line is based on considerations of the following: a) target invasive plant species' current distribution and abundance; b) known vectors and projected rate of spread; c) natural barriers to movement (e.g. height of land, lakes or rivers), d) ecological factors, and e) other management objectives within the area. Containment lines are housed in the Invasive Alien Plant Program (IAPP) Application, so that their locations are communicated and clear to all stakeholders and their invasive plant management crews.
Outside the containment polygon or area all sites of the species being contained need to be managed including enhanced awareness work, inventory, treatment, and monitoring. Management objectives inside a containment line may include rehabilitation of sites, or specific inventory and control actions on areas deemed to be critical from an economic or conservation perspective.

PROCEDURES:
As the support and action of all stakeholders and partners is required for successful containment of invasive plants, the following steps are required to establish containment lines:

1. Members of regional Invasive Plant Committees can propose and discuss containment lines. If lines are wholly within the regional invasive plant committee"s area and consensus agreement on the location of the line can be reached, the request is forwarded to the Inter-Ministry Invasive Species Working Group (IMISWG) for review.

2. If proposed lines cross the boundaries of two or more regional invasive plant committees, all committees affected must agree to the lines and locations before they are forwarded to the IMISWG.

3. An agency or organisation can propose containment lines to the IMISWG, the Invasive Plant Council of BC (IPCBC), as well as to regional invasive plant committees. Proposals received by the IMISWG or IPCBC will be referred to the affected regional committee(s) for consideration and support, and the committee will ensure final submission to the IMISWG.

4. The IMISWG will review proposed containment lines and either approve their inclusion in IAPP or discuss with those making the proposal why inclusion is not approved at that time or at that location.

5. If lines are approved for inclusion in IAPP, those making the proposal will work with the IAPP Technician to have the lines uploaded into IAPP.

6. Regular review and adjustment of containment lines is the responsibility of the sponsoring regional committees, agencies and organisations, and the IMISWG.

Appendix 4: Priority Invasive Plants in the South Coastal Mainland Region

It must be noted that if new information becomes available and/or new species of invasive plants (i.e. "new invaders") are identified at a site, the management category lists are subject to change. This list is neither exhaustive nor is it static. As new priority invasive plant species are identified within the PMP area during the 5-year period for which this PMP is proposed, they will be incorporated into this list.

List of Current Priority Invasive Plant Species by Region

Species		Management Area (Regional Weed Committee Boundary) C = CIPC; S=SSISC; F=FVIPC; G = GVIPC			
Common Name	Latin Name	Prevent	Eradicate	Contain	Control
Garlic Mustard	*Alliaria petiolata*	SFG	C		
Burr Chervil	*Anthriscus caucalis*	SF	CG		
Wild Chervil	*Anthriscus sylvestris*	S	C	FG	
Butterfly bush	*Buddleja davidii*			SCG	F
Diffuse Knapweed	*Centaurea diffusa*		F	SCG	
Spotted Knapweed	*Centaurea maculosa Centaurea stoebe ssp micranthos*		F	CG	S
Canada thistle	*Cirsium arvense*				SCFG
Scotch Broom	*Cytisus scoparius*			CF	SG
Spurge Laurel / Daphne	*Daphne laureola*		F	SCG	
Blueweed	*Echium vulgare*		FG	SC	
Japanese Knotweed	*Fallopia japonica*			SC	FG
Giant Knotweed	*Fallopia sachalinensis*			SCFG	
Bohemian Knotweed	*Fallopia x bohemica*			SC	FG
English Ivy	*Hedera helix and varieties*			S	CFG
Giant Hogweed	*Heracleum mantegazzianum*		SCF	G	
Orange Hawkweed	*Hieracium aurantiacum*	G	C	SF	
English Holly	*Ilex aquifolium*			S	CFG
Himalayan balsam / Policeman's helmet	*Impatiens glandulifera*			SCF	G
Yellow Flag Iris	*Iris pseudacorus*		SF	C	G
Dalmation Toadflax	*Linaria genistifolia spp. Dalmatica*		FG		SC
Purple Loosestrife	*Lythrum salicaria*		S		CFG

Himalayan Knotweed	*Polygonum polystachyum*		S	CFG	
Himilayan Blackberry	*Rubus armeniacus R. discolor*			S	CFG
Milk Thistle	*Silybum marianum*	FG	C	S	
Common Tansy	*Tanacetum vulgare*				SCFG
Gorse	*Ulex europaeus*	SG	F	C	
Periwinkle	*Vinca minor Vinca spp.*				SCFG
Yellow Archangel/Lamium	*Lamiastrum/Lamium galeobdolon*				SFG
Evergreen Blackberry	*Rubus laciniatus*			S	FG
Cordgrass, salt-meadow	*Spartina alterniflora*	CS	G		
Cordgrass, english	*Spartina anglica*	S	CG		
Cordgrass, dense-flowered	*Spartina densiflora*	SG	C		
Cordgrass, Saltwater	*Spartina patens*	SG	C		
Kudzu	*Pueraria Montana Pueraria lobata*	SCFG			
Yellow Starthistle	*Centaurea solstitialis*	SCF	G		

Appendix 5: Equipment Calibration Checklist

CALIBRATION RECORD

Date_____

Calibration # _____

Company_____

Calibration Location_____

Instructions for backpack sprayer (for 400L / ha application)

Measure a 25m by 25m square in a field or landing at least 20 m away from any riparian area or watercourse. Using water in equipment, measure the time taken with each piece of equipment and nozzle combination to fill a measuring cup to 1.0 L. This time indicates the time taken for a piece of equipment to release 400 L of carrier to 1 hectare of area. Have every applicator evenly cover the 25m test square in the time allotted for each piece of spray equipment. Record equipment and applicator times below with each applicator understanding the swath speed for correct coverage with each piece of equipment. Each applicator will undergo three calibrations with each piece of equipment.

Equipment and Applicator Summary

Applicator	Spray equipment	Correct Time (sec)	Calibration attempts (sec)
			1
			2
			3
			1
			2
			3
			1
			2
			3
			1
			2
			3
			1
			2
			3
			1
			2
			3

Appendix 6: Example of Treatment Notice

NOTICE OF PESTICIDE USE

Treatment Area:

Pest(s) To Be Controlled:

Pesticide Name(s), Active Ingredient(s) & Registration Number(s) (PCP):

Start Time & Date Of Pesticide Application:

Alternate Start Time & Date:

Pesticide User Licensee Name & Licence Number:
Telephone Number:

Precautions to Minimize Exposure to Pesticides: **Do not enter the treated area before**

Do not remove this sign before

For emergency medical information contact:
B.C. Drug and Poison Information Centre 1-800-567-8911 or 604-682-5050