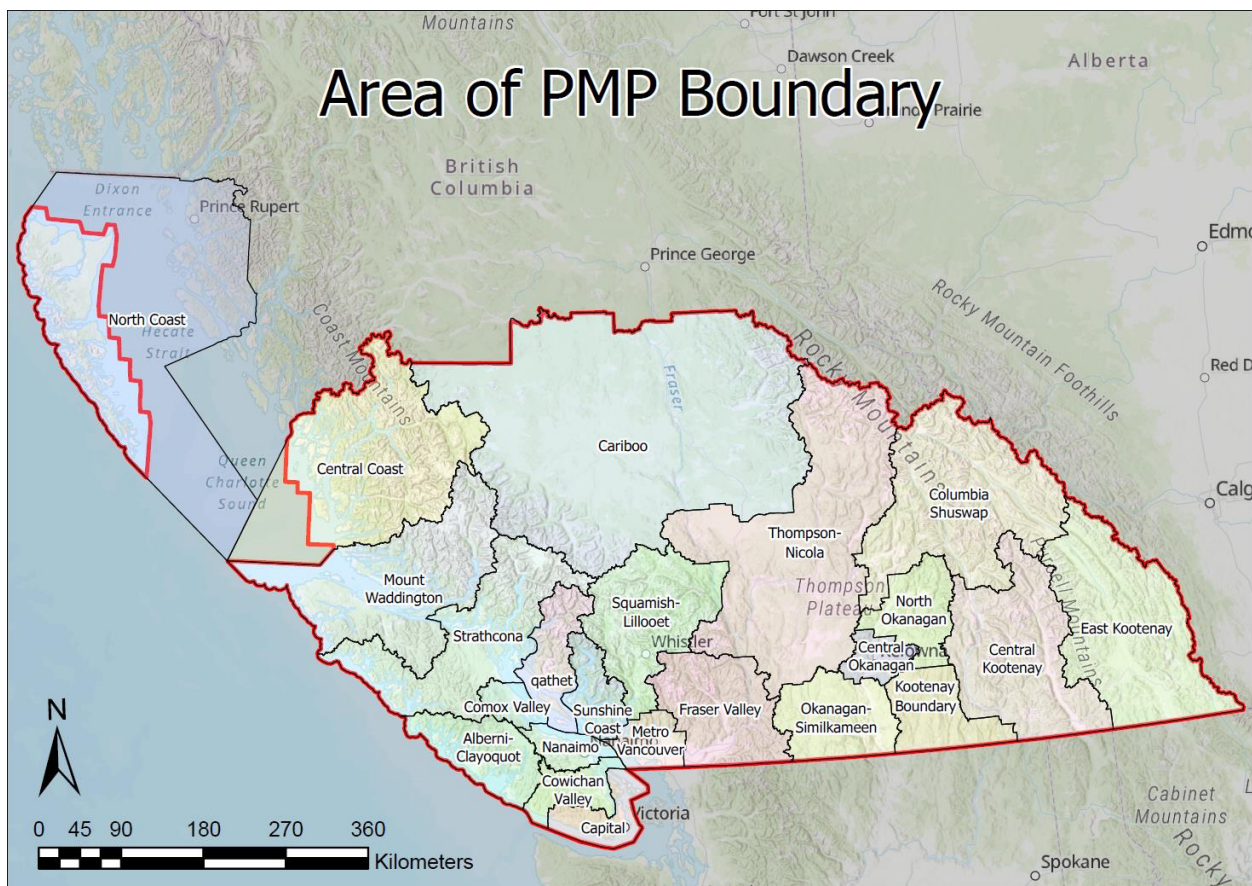




Invasive Plant Pest Management Plan for Provincial Public Lands in Southern and Coastal British Columbia



BC Ministry of Forests

Confirmation Number: 402-0687-24-29

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Executive Summary

An invasive plant is any non-native plant species that has the potential to cause undesirable or detrimental impacts to human or animal health, the economy, cultural values, and/or ecosystems. The term “invasive plants” includes “invasive alien plants”, “weeds” and “Noxious Weeds” for the purpose of this document. Invasive plants displace native plant species, decrease biodiversity, reduce forage and browse available for wildlife and domestic animals, reduce habitat for rare and endangered species, contribute to loss of aesthetic values, and cause changes to ecological community structure and function. Some invasive plants are toxic to humans and/or animals and can be a threat to infrastructure, reduce sightlines on roads, and cause significant economic losses to many industries including agriculture, forestry, and tourism. Efforts to reduce their cumulative impacts are best achieved through an integrated approach of prevention and control.

The *Weed Control Act* and Regulation in British Columbia (BC) require land occupiers, as defined in the Act, to control provincially listed Noxious Weeds on both private and public land. The BC *Forest and Range Practices Act* and accompanying Invasive Plants Regulation require forest and range tenure holders to incorporate measures in their forest and range plans to prevent the introduction or spread of listed invasive species. The BC *Integrated Pest Management Act* and Regulation provide the statutory authority to allow pesticide use on public lands as described in a Pest Management Plan (PMP).

The development of this PMP was led by the BC Ministry of Forests (FOR) with collaboration and assistance from the Ministries of Transportation and Infrastructure (MOTI), Environment and Climate Change Strategy’s Conservation and Recreation Division (ENV-CARD), and Water, Land and Resource Stewardship (WLRS). This version of the PMP builds on previous versions which incorporated input and feedback from numerous Indigenous communities throughout the PMP area as well as public consultation through posting of newspaper ads over the years in addition to specific feedback received on this version through the consultation period. Developed in compliance with the *Integrated Pest Management Act* and Regulations, it outlines an Integrated Pest Management (IPM) approach for the control of invasive plants on Provincial Public Land including prevention strategies, mechanical and manual treatment methods, biological control, and the use of herbicides.

This plan is intended to describe and provide guidance for an IPM approach for invasive plants on Provincial Public Land; it is not meant to be an operational plan. The Ministries work collaboratively together and with interested Indigenous Communities, and, where appropriate, with other land managers, local governments, regional invasive species committees or other

partnering agencies to design annual operational treatment plans within the PMP Area each year.

The PMP Area is restricted to Provincial Public Land within Southern and Coastal BC under the jurisdiction of the four Ministries involved. The area encompasses a diversity of ecosystems ranging from wetter Coastal Western Hemlock, Mountain Hemlock, and Coastal Douglas Fir forests of the coastal areas; drier Interior Douglas Fir, Ponderosa Pine, and Bunchgrass ecosystems in the Okanagan, Thompson-Nicola, and Rocky Mountain Trench; high-elevation Englemann Spruce-Subalpine Fir and Montane Spruce forests of the interior mountain ranges; valley bottom Interior Cedar-Hemlock forests of the Kootenays and Columbia-Shuswap; and Sub-Boreal Pine-Spruce and Sub-Boreal Spruce forests of the Cariboo region. 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 districts in the province and is home to over 4.7 million people, numerous community watersheds, Indigenous communities and vast timber, agricultural, cultural and recreational values. The area is also home to many endangered native species, plant communities, and critical wildlife habitats, all of which are values that this PMP aims to protect.

1.0 Introduction

Section 24(2)(g) of the British Columbia (BC) *Integrated Pest Management Regulation* (IPMR) requires the preparation and confirmation of a Pest Management Plan (PMP) for the management of Noxious Weeds and invasive plants on more than 50 hectares a year of public land, where herbicide is part of the management approach.

The development of this PMP was led by the BC Ministry of Forests (FOR) with collaboration and assistance from the Ministries of Transportation and Infrastructure (MOTI), Environment and Climate Change Strategy's Conservation and Recreation Division (ENV-CARD), and Water, Land and Resource Stewardship (WLRS). This version of the PMP builds on previous versions which incorporated input and feedback from numerous Indigenous communities throughout the PMP area as well as public consultation through posting of newspaper ads over the years in addition to specific feedback received on this version through the consultation period. Developed in compliance with the *Integrated Pest Management Act* and Regulations, it outlines an Integrated Pest Management (IPM) approach for the control of invasive plants on Provincial Public Land including prevention strategies, mechanical and manual treatment methods, biological control, and the use of herbicides.

This plan is intended to describe and provide guidance for an IPM approach for control of invasive plants on Provincial Public Land; it is not meant to be an operational plan. The Ministries work collaboratively together and with interested Indigenous communities, and where appropriate, with other land managers, local governments, regional invasive species committees or other partnering agencies to design annual operational treatment plans within the PMP Area each year.

1.1 Purpose and Objectives of this PMP

1.1.1 Purpose

This PMP describes how FOR, MOTI, ENV-CARD, and WLRS will ensure the effective management of invasive plants on Provincial Public Lands within the southern and coastal areas of BC while also protecting environmental and human health values.

This PMP is designed to replace the following three existing PMPs:

- South Coastal PMP (Confirmation # 402-0677-19-24)
- Southern Interior PMP (Confirmation # 402-0678-19-24)
- South Coastal Mainland PMP (Confirmation # 102-0671-21-26)

1.1.2 Objectives

The objectives of this PMP are to ensure:

- Legal accountability 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 effective use of the principles of IPM;
- The responsible use of herbicides; and,
- Inclusion of indigenous community and public input into invasive plant management at the landscape level.

All existing populations of invasive plants on Provincial Public Land within the PMP Area will not necessarily be treated under this PMP. Existing populations may be prevented from expanding beyond a defined containment boundary in some cases, whereas other populations may be too extensive to effectively treat except on extremely high value sites such as habitats with species at risk. The focus for treatments will be on invasive plants considered high priority that are new to the area, expanding into new geographic areas, and those on the leading edges or gaps between treatment areas where there is a risk of further spread into previously uninhabited, susceptible areas. The overarching goal is to completely control priority invasive plant sites and allow native or desirable species to re-establish.

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 plants; and,
- Aerial spraying via helicopter or fixed-wing plane.

1.2 Plan Holder and Description of the PMP Area

The PMP holder will be the BC Ministry of Forests (FOR); however, the PMP also applies to the three other Ministries with land management responsibilities: MOTI, ENV-CARD, and WLRS.

The PMP Area will be specific to Provincial Public Land under the jurisdiction of FOR, MOTI, ENV-CARD, and WLRS within the following geographical area:

- Vancouver Island, the Central Coast, and Haida Gwaii including the following Regional Districts: Capital, Cowichan Valley, Nanaimo, Alberni-Clayoquot, Comox Valley, Strathcona, Mount Waddington, Central Coast, and North Coast (Haida Gwaii only).
- South Coastal Mainland including the following Regional Districts: Metro Vancouver, Fraser Valley, Squamish-Lillooet, Sunshine Coast, and qathet.
- Southern Interior including the following Regional Districts: Okanagan-Similkameen, Central Okanagan, North Okanagan, Kootenay Boundary, Central Kootenay, East Kootenay, Columbia-Shuswap, Thompson-Nicola, and Cariboo.

A map showing the geographic boundaries of the areas covered by this PMP is shown in [Appendix 1](#).

The PMP Area contains a diverse array of natural areas including forested, alpine, subalpine, riparian, and marine/estuarine ecosystems. Resource uses within the PMP Area include conservation (e.g., wildlife habitat restoration or protection), gathering of medicinal and culturally important plants, hunting, trapping, grazing, parks and recreation, tourism, logging, community watershed protection including aquifer recharge areas, hydroelectric production, utility transmission and transportation. Invasive plants can negatively impact all these resources. Therefore, having a management plan to address both prevention of spread and treatment of invasive plants is essential to the management of these lands and the protection of natural resources. Much of the Provincial Public Land in this region of the province is located immediately adjacent to local government and/or private lands and therefore coordination with adjacent land managers is integral to the overall success of the program.

1.3 Use of This Plan on Provincial Public Land

This PMP provides the guidance for invasive plant management on Provincial Public Land; it informs and guides the development of annual operating plans. It is recognized that people using Provincial Public Land such as transportation corridors, natural resource roads, recreation sites, trails, Conservation lands and Parks and Protected Areas can serve as a means for the spread of invasive plants. Control of invasive plants in these areas is a critical component of a regional approach to successful invasive plant management.

Contractors, Local governments, Indigenous Governments, and/or other agencies or non-government organizations working in partnership with the Province of British Columbia may be authorized to work under this PMP by the PMP holder for IPM activities on Provincial Public Lands provided that the following are adhered to in a signed letter of agreement:

- Compliance with the contents of, and commitments made in, the 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*).

The following definition applies in this PMP document:

Provincial Public Land – Provincial Public Land under the jurisdiction of FOR, MOTI, ENV-CARD, and WLRS.

Additional definitions may be found in [Appendix 2](#).

1.4 Term of Plan

This plan shall be in force for a five-year period from the date that Confirmation of a Pesticide Use Notice has been obtained from the Ministry of Environment and Climate Change Strategy's Integrated Pest Management program (ENV).

1.5 Person Responsible for Managing Invasive Plants

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

Crystal Chadburn, P. Ag.
Senior Invasive Plant Specialist
Invasive Plant Program
Range Branch, BC Ministry of Forests
441 Columbia Street
Kamloops BC V2C 2T3
Tel: (778)974-5435
Invasive.Plants@gov.bc.ca

1.6 Public Use within the PMP Area

The principal land uses within the PMP Area include: forestry, conservation, agriculture, tenured grazing, mining, gas and oil development, recreation, hunting, fishing, guide outfitting,

gathering of culturally important, medicinal and food plants. Substantial timber harvest levels support numerous sawmills and pulp mills. Aquaculture tenures and import/export activities add considerable activity along coastlines and inlets. The area is also well known for its land and water based recreational activities. There are also many high use Provincial Parks and Protected Areas including conservation areas, conservancies, recreation areas and sites, and resort tenures 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 popular. Provincial Public Land is also used for harvesting of medicinal and food plants and fur bearing animals.

2.0 Invasive Plants and Noxious Weeds

Invasive plants are plant species that are non-native or alien to the ecosystem under consideration. Their introduction causes, or is likely to cause, economic or environmental damage, or harm to human health. The term invasive plant is synonymous with invasive alien plant in BC, and for the purpose of this PMP, includes Noxious Weeds and invasive plants.

Invasive plants threaten the natural environment and are recognized globally as the second greatest threat to biodiversity after habitat destruction. Because invasive plants are no longer exposed to plant pests that regulate their populations in their native ranges, they are able to reproduce rapidly and spread aggressively, dominating natural areas and altering biological communities. The result of these invasions can include reduced recreation and crop values, damaged infrastructure, loss of native vegetation that is important forage for wildlife and livestock, reduced biodiversity including displaced species at risk, damaged native ecosystems, and cultural and human health impacts (e.g., allergic reactions, skin burns and abrasions, acute toxicity).

The following definitions apply in this PMP document:

Invasive plant – are non-native or alien to the ecosystem they inhabit. Their introduction causes, or is likely to cause, economic or environmental damage, or harm to human health. The term invasive plant is synonymous with invasive alien plant in BC.

Noxious Weed – any invasive plant species designated by regulation to be noxious under the BC *Weed Control Act* (WCA) and Regulation.

Nuisance plant– any plant that does not meet the definition of “invasive plant” or “noxious weed” that is controlled due to its unsightly and/or aggressive growth in cultivated landscapes.

Additional definitions may be found in [Appendix 2](#).

2.1 How Invasive Plants Are Spread

Although wind, water, and domestic and wild animals can disperse invasive plant seeds, human activity is often found to be the primary cause of invasive plant introductions and spread.

Invasive plants have been shown to be introduced and spread by the following activities:

- Construction and maintenance on transportation and utility corridors, rail lines, shipyards, highways, pipelines and power lines including moving and transporting soil, gravel, and fill;
- Forestry operations: road/landing/skid trail building and maintenance, machinery movement during harvesting, log hauling, post-harvest site preparation and planting, and creation of permanent openings in the forest canopy cover;
- Range activities: grazing, herding livestock, supplemental feeding and building of fences, stock trails, water developments, and corrals;
- Mining operations: road building and maintenance, movement of machinery, soil disturbances and storing of topsoil, and creation of permanent openings in the forest canopy cover;
- Gas and oil exploration and development: well drilling and pipeline construction, movement of machinery, and creation of temporary and permanent openings in forest canopy cover;
- Use of seed mixes that are contaminated with invasive plant seed.
- Horticultural practices: importation and planting of plant species that become invasive over time, careless disposal of garden refuse, unintentional seed introduction in soil; and,
- Recreational activities: disturbance of soil by all-terrain vehicles (ATVs), and other recreational activities, spread of invasive plants by hikers, vehicles and boats, and the dumping of aquatic plants into watercourses.

2.2 The Need to Control Invasive Plants

Hundreds of species of plants have been intentionally or unintentionally introduced to North America since European exploration and settlement began. Many have been beneficial to Canadians and have not become invasive. Others have become nuisance weeds in gardens and human-influenced landscapes. However, a small proportion end up as serious threats to natural

areas and native ecosystems, economic values, and human health. These serious threats from invasive plants are those that will be addressed by this PMP.

There are also legislative requirements to control invasive plants. The WCA and Regulation require land occupiers, as defined in the Act, to control species of provincially listed Noxious Weeds on both private and public lands, as well as additional species that are identified as noxious within specified Regional Districts.

Invasive plants can establish quickly and out-compete native plants, some of which are rare and at risk. Many invasive plants have short life cycles, while others are extremely long-lived (e.g., broom and gorse may live for 50 years or more, and their seed bank (seeds buried in the soil) may remain viable for decades). Seed banks allow plants to germinate, grow, and set seed while environmental conditions are favourable. Some invasive plant species further increase their advantage over native species by producing phytotoxic chemicals that inhibit the growth or establishment of other plants. Because invasive plants are introduced, they have few or no natural predators in BC's environments giving them a further advantage over native species.

Invasive plants have varying traits that allow them to rapidly invade new areas and out-compete native plants for light, water, and nutrients. Some of these traits include:

- Rapid growth rates;
- Profuse reproduction by seeds or vegetative structures;
- Specially adapted seeds to allow dispersal by wind, water, or animals;
- Prickles, spines, thorns, or sap that can cause physical injury and discourage predation by animals;
- Irregular germination ability allowing establishment during unideal conditions;
- Ability to alter soil conditions to benefit only the invasive species; and,
- Allelopathy (production of phytotoxic chemicals that inhibit the growth of other plants)

Invasive plants often have unhindered growth and reproduction because of these traits and the absence of natural predators that affect invasive plants in their native habitat. Their ability to outcompete native plants can result in large, dense infestations that may cause the following ecological, social, and economic problems:

- A decline in plant and animal diversity;
- Altered soil nutrient and hydrological cycles;
- Reduced soil productivity by affecting mycorrhizal fungi or changing soil chemistry;
- Negatively impacting the habitat of rare and endangered species;

- Increased costs to remove vegetation from impacted infrastructure;
- Reduced availability of traditional plants used for food and medicine;
- Reduced quality and quantity of forage for grazing and browsing wildlife and livestock;
- Toxic or injurious effects to animals and humans;
- Decreased quality of water and fish habitat;
- Changed ecological community structure and function;
- Impacts on aesthetic and touristic values, visual quality, and sightlines;
- Altered fire regimes; and,
- Reduced access to recreation areas.

3.0 The Integrated Invasive Plant Management Program

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

IPM is a decision-making process for determining what actions will be taken when pest problems occur. All available information is considered to manage pest populations effectively in an environmentally sound manner. Preventing organisms from becoming pests by keeping them at some acceptable level (i.e., below a level that causes damage), is generally the first step in an IPM program. Applied appropriately, this process results in improved management, lower costs, ease of maintenance, reduced environmental, cultural, societal, and economic impacts, and lower environmental impacts from control activities.

Successful implementation of an IPM program requires:

- Strategic, monitoring-based, prevention-oriented management;
- Extensive communication and cooperation among Federal and Provincial agencies, Indigenous Communities, local governments, private industry, landowners, and the general public;
- Public education and awareness programs such as those delivered in cooperation with local governments, the Invasive Species Council of BC, regional invasive species organizations, or other non-profit agencies; and,
- Continued resourcefulness, research, and innovation by invasive plant managers.

FOR, MOTI, ENV-CARD, and WLRS recognize that within the larger PMP Area there are localized areas with unique social and cultural values whose residents may wish to have further input and discussion on the operational delivery of invasive plant treatments under this PMP. The plan holder will respond to these requests while developing annual operating plans through best available means such as open house gatherings, email notifications, website postings, etc.

The elements of the Invasive Plant IPM Program for this PMP are:

- Prevention;
- Identification;
- Surveys, Inventories, and Data Management;
- Establishing Priorities and Management Strategies;
- Selecting Treatment Options and Methods; and,
- Monitoring and Evaluation.

Provincial Government, Indigenous communities, and other agencies or non-government organizations authorized to conduct activities under this PMP are committed to the principles and practice of IPM, and to the implementation of IPM steps as outlined in **Figure 1**.

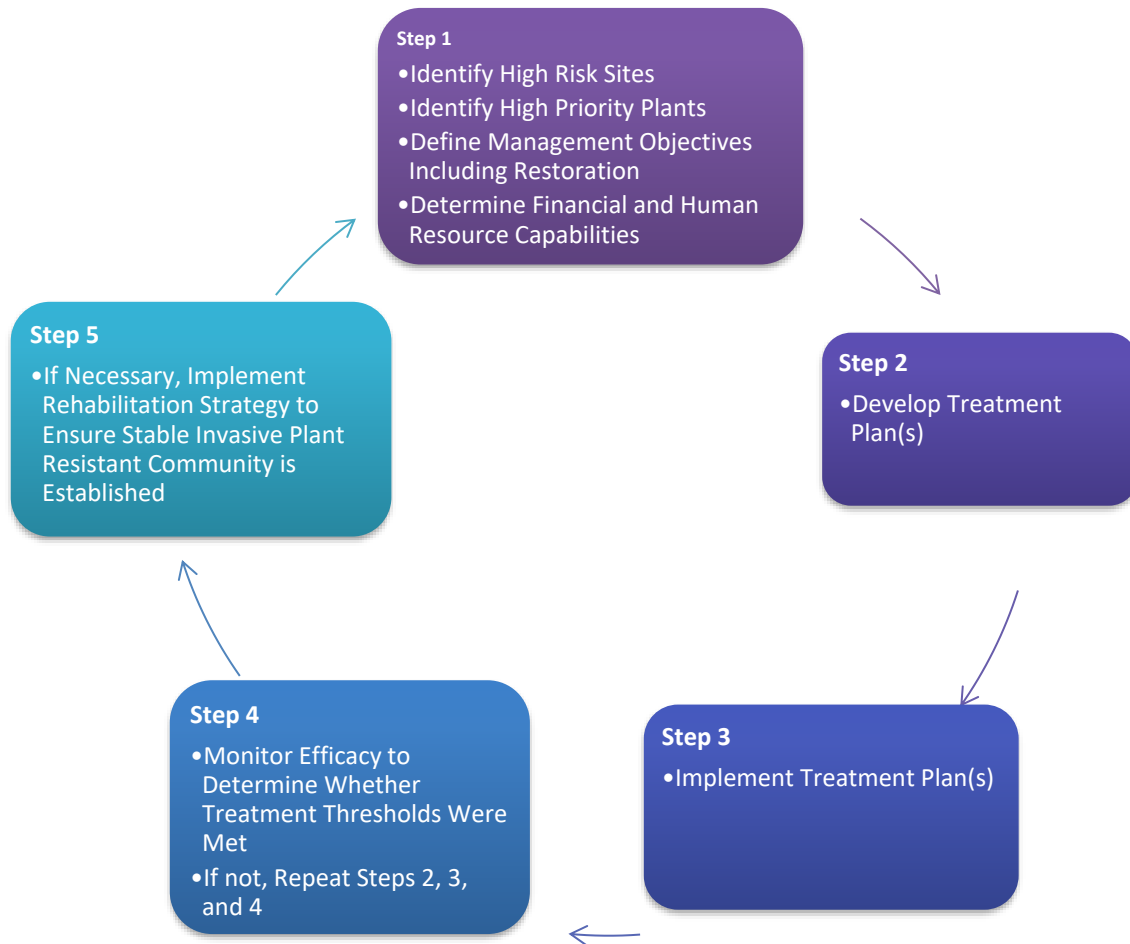


Figure 1 – IPM Steps for an Effective Invasive Plant Management Program

3.1 Prevention

Preventing the introduction of invasive plants into BC is the single most effective method of invasive plant control. When new invasive plant species do arrive in BC, preventing them from establishing is critical. This requires awareness and training of specialists, naturalists, and local residents to be able to identify and report new invasions, reporting systems that are linked to quick assessment processes, and response systems that plan and implement management activities before a species can firmly establish and spread. Communication through the Federal, Provincial, Regional and local level is necessary for all these components to be in place and to determine how the alien species are arriving so that preventative actions can be strengthened.

If a new invasive species does manage to establish, prevention of spread is a priority. This is achieved not only by direct control treatments but also by promoting healthy 'weed resistant' habitats in areas not infested. Prevention of spread and habitat health and 'weed resistance' are affected by activities that disturb natural habitats like road or recreational trail development, right of way disturbances for fence construction, timber harvesting, livestock grazing, and oil and gas development. Cleaning equipment, livestock, and outer clothing and footwear during these activities prevents the introduction and spread of invasive plant seeds to non-infested areas. Prompt seeding of disturbed sites using weed-free certified seed is also an important tool to establish healthy weed resistant plant communities and prevent the establishment of invasive plants as well as minimizing soil erosion.

The following are examples of land management practices that can help prevent invasive plant establishment and inhibit invasive plant growth. FOR, MOTI, ENV-CARD, and WLRS will implement the following practices, as applicable, on a site-specific basis:

- Prevent the movement of soils contaminated with priority invasive plant seed and propagules;
- Keep soil, subgrade, or surfacing material as free of invasive plant seeds and propagules as practicable when materials are being moved during road construction and maintenance activities;
- Educate operators of roadside mowers, excavators, and graders on best practices that will reduce spreading invasive plant seeds and propagules;
- Keep equipment yards and storage areas free of invasive plants to prevent the spread of invasive plant seeds and propagules from these high traffic areas;
- Inspect clothing, equipment, and vehicle undercarriages when working within and prior to leaving areas known to contain invasive plants;
- Wash clothing and equipment to dislodge potential plant seeds and propagules, and contain associated water, mud, and dirt on-site or at designated cleaning stations;

- Contain existing infestations away from areas with a high potential for spread such as roadsides, parking lots, staging areas, recreation sites, etc., so that plant propagules or seeds are not inadvertently transported by vehicles and equipment;
- Keep equipment and livestock out of infested areas where practicable;
- Re-vegetate disturbed areas adjacent to, or known to be at risk from, priority invasive plant infestations using an appropriate combination of scarification and native plantings or seeding with an ecologically appropriate seed mix free of invasive plant seeds. Request and check the Certificates of Seed Analysis for each species in a seed mixture *prior to purchase/mixing* to ensure there are no invasive plant contaminants using the guidelines here: https://www2.gov.bc.ca/assets/gov/driving-and-transportation/environment/invasive-species/invasive_plant_hiding_in_seed.pdf;
- Prevent overgrazing to maintain healthy plant communities that are resistant to invasive plant establishment and invasion;
- Minimize disturbance of desirable vegetation where possible; and,
- Educate staff and contractors to identify priority invasive plant sites that exist or threaten to establish within the PMP Area.

3.2 Identification

Accurate identification of invasive plant species and recognition of the threat posed by new invaders is fundamental for successful invasive plant management programs. Several resources are available for accurate identification of invasive plants. Dichotomous keys are useful for ensuring accurate species identification, and E-Flora BC (<http://www.geog.ubc.ca/biodiversity/eflora/>) provides an electronic atlas accessible to anyone with internet access. Additionally, the Province of BC's Invasive Species Management website contains information about invasive plant identification on the following pages:

- Resources and Publications: <https://www2.gov.bc.ca/gov/content/environment/plants-animals-ecosystems/invasive-species/publications>
- Priority Invasive Plants: <https://www2.gov.bc.ca/gov/content/environment/plants-animals-ecosystems/invasive-species/priority-species/priority-plants>

Stewardship and Ecology Specialists within FOR maintain herbaria of native and introduced plant samples collected from BC, and the Royal BC Museum provides species identification services to the Invasive Plant Program. Staff and contractors engaged in managing invasive plants are provided plant identification training and reference materials, and Ministry Invasive

Plant Specialists have access to taxonomic networks to provide additional support if required. Any species found that is a potential new invader to BC is collected, confirmed by taxonomists, and added to the Royal BC Museum herbarium.

3.3 Surveys, Inventory and Data Management

Invasive plant surveys are observations made at a single point in time to determine the occurrence of one or many species within a defined landscape. The difference between a survey and an inventory is that an inventory is a cataloguing of all invasive plants of concern within a management area, whereas a survey is an individual observation or a sampling of a representative portion of a larger landscape. In other words, an inventory is the overall picture within the geographic area, which is made up of one or many invasive plants surveys.

Inventories of invasive plant species within the PMP Area are required to effectively develop and implement provincial, regional, and local management strategies, and to measure program success. Surveys and inventories are conducted at different intensity levels, or categories, depending upon the individual situation.

Invasive plant surveys focus primarily on priority invasive plant species that pose a high risk of causing negative impacts including species listed either under BC *Forest and Range Practices Act's* Invasive Plants Regulation or in the WCA Regulation. Surveys may also focus on recording all invasive plants in a high priority area, which may include areas that pose a high risk of invasive plant spread such as public access points, parking areas, campgrounds, etc. Surveys are also an important first step in discovering a new incursion of a species and finding isolated patches of expanding species. Surveys confirm invasive plant infestation extent, size, distribution, and density.

Inventories and surveys may be conducted by truck, ATV, motorbike, bicycle, boat, helicopter, drone, horseback, or on foot depending on access to the area, the level of detail required, and budget. Efforts are made to choose the method that will have the least impact on the land base.

Areas that are likely to be susceptible to invasion will be examined in detail once the survey boundaries have been determined. Many dryland invasive species tend to invade grasslands and forest openings while riparian invasive species prefer lakeshores, ponds, sloughs, creeks, river edges, marshes, and seepage areas. Experience with Biogeoclimatic Zone and Subzone may also assist in focusing survey efforts. Areas that have been recently disturbed or that receive disturbance on a regular basis are carefully inventoried or surveyed as they are

generally susceptible to establishment of invasive species. Such areas may include, but are not limited to:

- Roadsides, ditches, pull-outs, and landings;
- Mining and gas and oil exploration and development activity sites;
- Recreation sites and campgrounds;
- Openings in the forest canopy;
- Burned areas;
- Air strips;
- Gravel pits and quarries;
- Areas where vehicle traffic and loading/unloading is common;
- Areas that have been overgrazed and areas of heavy livestock or wildlife use;
- Areas of 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.

The information recorded in an invasive plant survey includes location coordinates (UTM or Latitude and Longitude), a location description, land jurisdiction, the date the survey occurred, the invasive species present, the estimated size, distribution, and density of the infestation(s), and any pertinent site characteristics or additional information such as soil type or proximity to riparian areas. Site photos may also be taken. If the surveyor is unable to correctly identify a plant species, a sample or photo will be taken for identification.

Invasive plant survey and inventory data is housed within the Province's InvasivesBC invasive species database and mapping system. This comprehensive database and mapping application allows extraction of relational data, statistics and spatial mapping information, and is housed at the following web site: <https://www2.gov.bc.ca/gov/content/environment/plants-animals-ecosystems/invasive-species/invasivesbc>

The inventory information in the InvasivesBC database provides the basis for monitoring species activity, evaluating the effectiveness of treatment prescriptions at a local and landscape scale, and decision-making within the program. Extensive effort is made to maintain the inventory at a high standard including documenting over time invasive plant infestations as they shift and change in size, distribution, and density. Although the task is large due to the extent of area managed and number of species and infestations, collecting treatment and treatment monitoring data and updating survey data significantly helps to maintain the inventory.

3.4 Management Strategies

Managing invasive plant populations under an “injury threshold” approach is complex and confusing. The IPMR defines the injury threshold as “the point at which the abundance of pests and the damage they are causing or are likely to cause indicates that pest control is necessary or desirable.” The principle of injury threshold was developed for agricultural systems to manage the economic impacts that pests have on crops. There is an ecological and economic threshold associated with a pest density at which action is taken to prevent injury. Ecological, economic, cultural, and social impacts are all considered when determining the best invasive plant management strategy for a targeted species. Invasive plants that are determined to be a high threat and do not occur in a region, or occur only at very low population levels, are controlled before their populations expand to cause significant injury. It is only when invasive plant species have expanded to a large area and rehabilitation of critical habitats and other values are contemplated that injury thresholds as defined under the IPMR are considered. Government’s approach is based on selection of the optimum management strategy for each invasive plant species as presented below.

The selection of what invasive plant management strategy to employ on a landscape is determined by the review and consideration of the following key factors:

- 1) The risks or impacts that are caused by the invasive plant.
- 2) Species distribution across a defined landscape.
- 3) Invasiveness (threat) of the invasive plant species.
- 4) Susceptibility of habitats that are invaded or threatened by the species.
- 5) Density of plants at a site or potential for the species to become very dense.

Upon review of the current inventory data for each species, the distribution of known sites will either be considered localized within a defined area of susceptible habitat or endemic across the majority of susceptible habitat. If an invasive plant species is detected and confirmed to be a new incursion to the province, a provincial response plan is engaged with the objective of eradicating the new invader. This is referred to as **Early Detection Rapid Response (EDRR)**, which is explained in more detail on the Province’s Invasive Species Management website: <https://www2.gov.bc.ca/gov/content/environment/plants-animals-ecosystems/invasive-species/edrr>.

If a species is determined to be localized to a small area, or a new incursion to the management area or region, the resulting management objective may be to extirpate the species from the infested sites through a *Regional* EDRR treatment plan. If the localized infestation covers a

much larger area and there is no chance of eradicating the population, the resulting management objective is to contain the infestation to stop the spread and establishment into un-infested areas. This is referred to as **Containment**. Finally, if a species is determined to be endemic across most of one or more defined area of susceptible habitat behind a containment line, the resulting management action is referred to as **Rehabilitation**. Rehabilitation actions include biological control measures, repeated treatments, and re-vegetation. The potential for a species to cause impacts in the future due to high density indicates that rehabilitation may be required. These three strategies are discussed further below.

3.4.1 Early Detection Rapid Response

The objective of Early Detection Rapid Response (EDRR) is to eliminate infestations of new, high-risk invasive plant species before they become established within the province or region. The discovery of a new invader to the province invokes the BC EDRR Plan developed by the Inter-Ministry Invasive Species Working Group which is available on the Province's EDRR webpages at the following link: <https://www2.gov.bc.ca/gov/content/environment/plants-animals-ecosystems/invasive-species/edrr>). Management of a new invader to BC may also involve the federal government if the species is new to Canada or federally regulated. A new incursion of an invasive plant species into a region from another part of the province is also managed to achieve extirpation, based on assessed risk. This process is known as "Regional EDRR" or REDRR.

3.4.2 Containment

The management approach of this strategy is to prevent existing established invasive plant populations from spreading into new areas. This is often, though not always, facilitated by delineating a geographic polygon (i.e., containment line) around the infested area. A containment line is a boundary drawn on a map separating the main infestation of a species from the area where the species is not yet established. Once a containment line is drawn, intensive management is focused on smaller outlier or satellite infestations located outside of the main infestation. Management of some sites, such as extensive infestations in Pesticide Free Zones (PFZ) (See [Appendix 2](#) for definition) may focus on increased monitoring rather than treatment. Action taken inside the containment line is referred to as rehabilitation, explained in [Section 3.4.3](#). The containment area may be small or large depending on the distribution of the species; small containment lines typically cover one or several drainages or a portion of a valley. These lines may be uploaded and displayed in InvasivesBC for land manager and public viewing and for determining which sites require treatment. Large containment areas may cover significant portions of a region or of the province.

3.4.3 Rehabilitation

The management strategy for rehabilitation is to reduce the current impact(s) of an invasive plant species, or multiple species, to an acceptable level (i.e., below an injury threshold). Once the scale of an invasive plant infestation is significant enough to impact an ecosystem, the services it provides, or the economic values derived from it, the injury threshold of the site has been reached.

Rehabilitation treatments may be undertaken within a containment area to accelerate the recovery of an ecosystem to a previously existing natural or desired state. For some species, biological control is used within containment lines, either by itself or in combination with other management strategies, to weaken the invasive plant population by decreasing its density and ability to reproduce (See [Section 3.6.3](#) for more information about Biological Control). In summary, the management strategy of rehabilitation is to reduce the potential impacts at a site caused by high invasive plant densities, recognizing that eradication is no longer feasible, and that future management of the site must recognize the continued existence of these plants.

Re-vegetation of disturbed sites or areas previously infested with invasive plants can support the development of desired plant communities and the eventual return of healthy, functioning ecosystem. In some circumstances, however, supporting the natural succession of a site is the best solution. The following considerations should be made when choosing to revegetate an area:

- Are appropriate native or agronomic seeds or plants available and locally adapted to the site?
- Is the timing of seeding or planting appropriate?
- Are soil conditions and forecasted precipitation favourable for establishment?
- Is the seedbed appropriate for the seeding or planting method?
- Is site preparation needed and by what means?
- Will re-vegetation achieve the desired outcome or are additional invasive plant management treatments also needed such as mechanical or chemical treatments before or after re-vegetation?

Soil amendments, including fertilization, used on invasive plant infested areas can assist in reducing some invasive plant populations that are not well established. Soil amendments support more vigorous native or desirable plant growth, which helps to reduce the ability of invasive plant establishment and spread. Soil chemistry may be altered with the use of fertilizer to create less favourable soil conditions for some invasive plant species. However, the soil type and moisture regime will affect an invasive plant's response, and only a few invasive plant

species are potentially negatively impacted by soil amendments. This application methods may be cost prohibitive over large landscapes.

3.5 Establishing Treatment Thresholds

Once a non-native plant species has been designated a threat either through legislation, a formal risk assessment process, or through monitoring and determination by the land managers, it will be given a priority for control within the defined geographic area.

Ideally, treatments are executed when invasive plant population levels are low; long before the injury threshold is reached, and the cost of control is significant. In some cases, there may be no tolerance for invasive plant species at all. In other cases, the number of invasive plants that can be tolerated before control measures are considered may be much greater. The decision to implement treatments relates directly to the values threatened or sites occupied by a priority invasive plant (e.g., a site with a rare and endangered plant species or plant community may prompt a treatment decision at low invasive plant population levels). Other considerations include seasonality, weather conditions, financial and human resources, site accessibility, site conditions, scale of infestation, the ecological, economic, and societal consequences of not treating, and the availability of effective treatment options.

3.6 Invasive Plant Treatment Options

Treatments occur only when monitoring indicates thresholds have been reached and treatment is necessary. Multiple applications of all treatment types may be required for effective control.

All treatment options are considered after it has been established that a species or a site is designated as a high priority for control. The IPM approach is always used to ensure that an invasive plant species is receiving the most effective treatment. The following treatment options are considered for use either individually or in combination:

- Mechanical and manual control;
- Biological control; and
- Chemical control with herbicides.

3.6.1 Mechanical and Manual Control

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

- Prescribed burning

- Cultivation and tilling
- Dead-heading and pruning
- Covering and smothering
- Digging and excavating
- Hand pulling
- Hot water and steam application
- Mowing
- Mulching and sheet mulching

Mechanical and manual methods for invasive plant control are generally more practical for use on small sites or portions of sites because of their associated high cost and effort. Some of the benefits of mechanical and manual control include:

- The use of simple and readily available tools and equipment;
- Effective and environmentally safe methods if correctly timed and precautions taken to minimize soil disturbance and native vegetation loss in the treatment area;
- Available for invasive plant control in areas where herbicides cannot be used (e.g., they may be the best option when in close proximity to environmentally sensitive features);
- Effective at reducing invasive plant density or movement off site; and,
- Result in minimal or no impact to fish habitat if erosion and sedimentation are controlled.

The following points present some of the limitations of mechanical and manual control:

- Mowing is less effective on low-growing plants or plants that can re-sprout quickly after disturbance. Mowing may not be an appropriate control option on a site if seed feeding biocontrol agents are present;
- Cutting effectiveness is largely dependent on plant species, stem diameter, time of cut, and age of the plant. It is not appropriate for plants that reproduce by stem or root fragments;
- Prescribed burning can pose safety issues for both workers and the environment;
- Burning and mowing may exacerbate the growth of some invasive plant species, especially those that reproduce by rhizomes;
- Covering and smothering may be costly and labour intensive because treatment sites require regular monitoring to detect and repair torn materials and may prevent native vegetation from re-establishing on the site;

- Excavating can be costly and labour intensive and may require removal of concrete or fencing (e.g., when complete removal of all root fragments is required under such structures to prevent re-growth in rhizomatous species);
- Digging, excavating, and hand pulling are not suitable treatments for species with adventitious root buds and rhizomes;
- Soil disturbance created by mechanical and manual treatments may facilitate the re-establishment of invasive plants; and,
- Repeated follow-up treatments are often required to remove new germinants for three to five years or longer depending on the length of time the seeds remain viable.

Proper disposal of invasive plants or invasive plant parts following control is important; reproductive propagules and seeds should be bagged and disposed of in a landfill or other designated disposal site.

Targeted grazing may also be considered a form of mechanical control. Targeted grazing involves using cattle, goats, or sheep for invasive plant control and has the following advantages:

- May be economical if livestock are readily available and trained to target invasive plants;
- May hinder plant development and seed formation and will gradually deplete root reserves because the tops of young plants are continuously grazed; 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.

Some of the limitations of targeted grazing include:

- The grazing may result in removal of desirable vegetation in conjunction with targeted invasive plants even when animals are trained to graze the invasive plant;
- Multiple treatments are necessary and their timing is critical;
- Targeted grazing may create additional soil disturbance and compaction of wet soils;
- Animal husbandry and transportation costs can be prohibitive;
- Targeted grazing may create conflicts with wildlife populations (e.g., from predation or disease transmission);
- Vegetative growth of some invasive plants species and encourage spread and increased density may be stimulated by targeted grazing; and,
- Targeted grazing may require additional infrastructure to contain livestock.

3.6.2 Biological Control

Biological control or biocontrol of invasive plants in BC involves the deliberate use of host specific organisms such as insects to reduce invasive plant populations. The goal of biological control is not to eliminate or eradicate target invasive plants in BC, but rather to improve ecosystem health by reducing the impacts of invasive plant populations below environmentally and economically acceptable levels. The biological controls, referred to as bioagents, go through years of rigorous testing on their biology, host-range, safety, and efficacy to ensure that the bioagent brought into Canada, and by extension British Columbia, will not negatively impact any native or economically important species. The work done to ensure the safety of these bioagents is an international collaboration between the Province of BC, Agriculture and Agri-Food Canada, other Canadian and U.S. jurisdictions, international researcher scientists, and the Canadian Food Inspection Agency (CFIA). The CFIA governs the importation and release of all biological control agents into Canada: <https://inspection.canada.ca/plant-health/invasive-species/biological-control-agents/eng/1514956211166/1514956212112> .

The bioagents selected are the natural predators of the target invasive plant species, co-existing in a predator prey relationship, meaning that the bioagents will never eradicate their target. The bioagents attack and weaken the target invasive plant species and reduce the plant species' density on the landscape over time. Biological control agents are not released at sites where eradication is desired or necessary. Biological control is most effective for long-term management, site rehabilitation post disturbance, or when other treatment options are not feasible or economically practical.

A complete list of biological control agents used operationally and under development in BC is available online at: <https://www2.gov.bc.ca/gov/content/environment/plants-animals-ecosystems/invasive-species/biological-control/biological-control-agents-host-plants>

The benefits of using biological control agents include the following:

- Biological control affords long-term control on sites with well-established invasive plant populations;
- The spread of invasive plants into new areas is often slowed by the bioagents;
- Biological control can be used in areas where other treatment methods may not be feasible;
- Biological control may reduce invasive plant populations below a level where significant environmental or economic damage can occur; and,
- If a bioagent is available for an invasive plant species and is adapted to the location of release, it may be the most cost-effective, long-term management option for invasive plant control.

Some limitations to using biological control include the following:

- Research and testing to obtain a bioagent takes many years prior to any bioagent being approved for use;
- Some bioagents may be slow to affect target invasive plant species once introduced to BC because they can take 10 or more years to become established, increase in number, and disperse;
- Some invasive plants have been established in the province for decades and are prolific seeders with large soil seed banks; this increases the time it takes for bioagents to affect target plant species populations;
- Some biological control agents have specific habitat requirements and may not be able to survive at all invasive plant infestation sites; and
- Bioagents are not available for all invasive plant species.

3.6.3 Applications of Herbicides

Herbicides are used when no other method of control is practical or effective after careful consideration of all the above listed IPM treatment options. All herbicides are applied on a targeted or spot application basis to control invasive plants with the goal of reducing herbicide use on each site over time. The benefits of herbicide use include:

- Effective and safe IPM tool;
- Results in complete control in a shorter period than other methods and allows for more sites to be managed in an area because less time is spent at each site.
- There is less chance of ongoing re-establishment and fewer treatments required over time resulting in greater permanent control at the landscape level.
- Treatment costs may be significantly lower than those associated with mechanical and manual methods and therefore more invasive plants can be treated; and,
- No soil disturbance or soil compaction.

Some of the limitations for use of herbicides include the following:

- Herbicides are typically not used within PFZs near water sources or near wells (See [Section 4.7](#));
- The use of herbicides is limited in areas with seasonal water courses and on sites with coarse soils. For example, residual herbicides (those that remain active for one or more seasons after treatment) cannot be used on plants growing on soils containing greater

than 70% sand or in areas that drain into creeks even if the watercourse is dry at the time of application. Non-residual herbicides may be applied in these areas provided that the required PFZs are adhered to as required in the IPMR; and,

- More than one herbicide application may be needed at a location to address previously ungerminated seeds or missed plants within the infestation area.

3.7 Treatment Method Selection

Generally, no treatment method will achieve effective control from a single treatment unless the target infestation is a single plant or newly established with no seed bank at the location. The success of different treatment methods will depend on characteristics of the target invasive plant, timing of treatment, and site-specific conditions. The integration of several control methods into an IPM program is often more effective than using a single type of treatment method alone. General conditions associated with selection and use of treatment options are shown in **Table 1**. Other considerations include seasonality, weather conditions, financial and human resources, site accessibility, site conditions, target species phenology, composition and percent cover, and the ecological, economic, cultural, and societal consequences of not treating.

Table 1 - General conditions associated with treatment options

Treatment	Conditions for Use
<p><u>Mechanical and Manual</u> (e.g., covering, smothering, cutting, digging, excavating, girdling, hand pulling, mowing, pruning, tilling, prescribed burning)</p>	<p>New, small infestations; Applicable to most species but exacerbate some infestations (e.g., rhizomatous hawkweed or knotweed species); Sometimes require re-vegetation with grasses, forbs, or other native or agronomic plant species.</p>
<p><u>Biological</u> (i.e., systematic release of host-specific insects or pathogens that feed or attack exclusively on target invasive plants)</p>	<p>Older, established invasive plant populations with widespread occurrences beyond the biocontrol agent release site. Not available for all invasive plant species. Significant pre-release host specificity testing required prior to Federal approval for important and release (eg. 10+ years research).</p>
<p><u>Chemical</u> (i.e., judicious, strategically targeted use of herbicides)</p>	<p>Infestation size is variable Restricted use within close proximity to species at risk, domestic wells or water intakes, water licenses, agricultural food production systems, environmentally sensitive or riparian areas (the area adjacent to streams, lakes and wetlands), PFZs, no treatment zones (NTZ) (See definition in Appendix 2), high public use areas during peak season, or other sensitive areas.</p>

3.8 Monitoring and Evaluation

Monitoring is conducted to determine changes in invasive plant populations over time. Monitoring can be used to detect new invaders, to measure the effect of treatments on the target invasive plant and on non-target vegetation, and to record trends that may be occurring in an invasive plant population. The InvasivesBC database is an important component of monitoring because it houses long-term inventory, treatment, and monitoring data. Monitoring results are used to guide program direction and provide appropriate feedback for adjustments to ensure the Invasive Plant Program is effectively managing invasive plants. Some specific components of monitoring are described below.

3.8.1 Species Monitoring

Inventory surveys, or pre-treatment monitoring, are completed visually, repeated over time, and provide a record of information about invasive plant occurrence, density, and site characteristics. FOR, MOTI, ENV-CARD, and WLRS maintain the integrity of the species inventory by routinely monitoring invasive plant sites and updating surveys as resources allow. Most sites are surveyed annually through species-specific and geographic-specific survey activities before receiving treatment. An exception to this is a site that has a new priority species that is encountered during the delivery of a treatment program. In years following an initial survey, site survey information is updated from treatment information collected in the field.

3.8.2 Treatment Monitoring and Evaluation

A minimum of 10% of treatments, both chemical and non-chemical, are monitored annually to ensure the following:

- Compliance with the commitments made in this PMP;
- Compliance with the IPMA, IPMR, and other legislation;
- Correct completion of treatment records in the InvasivesBC database; any errors found are returned for correction to the person who conducted the treatment;
- That the best treatment method was chosen or whether another method should be employed;
- Efficacy of control method used;
- Protection of environmentally sensitive areas;
- Potential or actual impacts to non-target vegetation;
- Re-growth of invasive plants; and,
- Follow up treatment requirements, if any.

Monitoring/evaluation of chemical treatment occurs no earlier than 2 weeks post treatment to provide adequate time for herbicide to take effect on the target plants. Visible signs of treatment such as browning or curling of leaves on the invasive plant vary dependant on the herbicide product used and its mode of operation. Monitors under this PMP must be experienced with herbicide treatment and familiar with the specific treatment method used at each site being monitored. Most herbicide products potentially used under this PMP require application to actively growing plants and effects of treatment may not show during periods of drought or extreme temperature so monitoring may need to be delayed until the plants are actively growing again in some cases. A successful treatment under this PMP required a minimum of 85% of target plants successfully treated at a location. If minimum efficacy of 85%

is not confirmed during monitoring, additional treatments are required, and monitoring on the same site will occur following the subsequent treatments until the required minimum treatment efficacy is reached. In addition, if 85% treatment efficacy is not achieved, it will be determined whether this is due to the treatment method not being effective for the target invasive plant species (eg. all plants were treated but it didn't work as well as expected), due to poor timing or difficult climatic/weather conditions or whether it was due to applicator error (eg. some of the plants were missed during treatment etc.), and these reasons will be addressed and corrected prior to subsequent treatments to ensure continual improvement in the treatment programs operating under this PMP. In the rare case that monitoring finds that any infraction of the PMP or the *Integrated Pest Management Act* has occurred such as treatment within Pesticide Free Zones, impacts to adjacent native plants, treatment signs missing or incompletely filled out etc., a stop work order is generally issued until further monitoring can be completed and an incident report is submitted to the Ministry of Environment and Climate Change Strategy's Integrated Pest Management section by the PMP holder to determine the next steps and any potential remediation required.

Biological control treatments are monitored to determine the following:

- Establishment of the biocontrol agents released;
- Biological control agent population growth and dispersal; efficacy of agent(s) and level of invasive plant control achieved over time; and,
- Identification of gaps in biological control agent effectiveness due to biological control agent habitat preferences.

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

4.0 Operational Information

The operational information 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 method of its application, and the type of equipment required for each method [**IPMR Section 58(3)(c)**].

4.1 Qualifications and Responsibilities of Persons Applying Herbicides

The transportation, storage, handling, application, and disposal of pesticides are governed by Federal and Provincial legislation. Ministry personnel, contractors, and other agencies working under this PMP 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 the following publications:

- Canadian Pesticide Education Program Applicator Core Manual British Columbia Edition, produced by the BC Ministry of Environment and Climate Change Strategy.
- Standard Practices for Pesticide Applicators, produced by WorkSafeBC.

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. Uncertified applicators must complete assistant applicator training annually as per IPMR Division 5.1. Those authorized to treat invasive plants under this PMP will be provided with pre-work information and enough oversight to ensure they fully understand the legislative requirements contained in the PMP.

The responsibilities of the Certified Pesticide Applicator are to:

- Confirm that uncertified applicators have successfully completed annual assistant applicator training;
- Be present at the site at all times while herbicide applications are occurring with available proof of certification;
- Ensure that applications do not violate this PMP or applicable legislation;

- Supervise no more than four assistant applicators at one time;
- Maintain continuous auditory or visual contact with the assistant applicators;
- Be within 500 meters of persons being supervised; and,
- Comply with the standards contained in Division 7 of the IPMR and all other applicable legislation.

4.2 Procedures for Safely Transporting Herbicides

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

The PMP holder shall ensure that Ministry personnel, contractors, and other agencies working under this PMP abide by the following procedures for safely transporting herbicides within the PMP 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. Herbicides that come in large (e.g., 10 litre) containers can be transferred to smaller, easy to use containers for transport and use at small sites.
- 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 address 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.
- Ensure that the vehicle operator reads and understands the herbicide labels and the product Safety Data Sheet (SDS) for all herbicides being transported.

4.3 Procedures for Safely Storing Herbicides

The plan holder shall ensure that Ministry personnel, contractors, and other agencies working under this PMP follow these procedures for safely storing herbicides within the PMP Area:

- Ensure that herbicides are stored in accordance with the IPMA, IPMR, and WorkSafeBC's *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 name and 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, 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 the words "WARNING – CHEMICAL STORAGE – AUTHORIZED PERSONS ONLY" in block letters that are clearly visible;
- Keep storage facilities separate from work and living areas and away from food, flammable materials, bodies of water, and water sources;
- Ensure storage facilities are equipped with necessary spill equipment, first aid kits, and the SDS for the herbicides being stored;
- Ensure that the person responsible for the storage area notifies the appropriate fire department of the presence of herbicides on the premises;
- Ensure herbicides that release vapours and are labelled with a "poison" symbol on the label are kept in a storage facility that is not attached to or within a building used for living accommodation; and,
- Persons responsible for herbicide storage in vehicles shall ensure that all herbicides are stored in a locked canopy or similar arrangement separate from the driver and personal protective gear.

4.4 Procedures for Safely Mixing, Loading and Applying Herbicides

The plan holder shall ensure that Ministry personnel, contractors, and other agencies working under this PMP adhere to these procedures for safely mixing, loading, and applying herbicides within the PMP Area:

- Ensure all mixing, loading, and application of herbicides are carried out or directly supervised by a Certified Pesticide Applicator with the appropriate category of certification, and that all manufacturer’s recommendations are adhered to as specified on the herbicide labels;
- Ensure all mixing, loading, and application of herbicides are undertaken in a safe manner.
- Ensure all mixing and loading is done in areas at least 15 meters from a PFZ, no treatment zone (NTZ), body of water, fish or wildlife habitat, water sources, or other environmentally sensitive features (e.g., agricultural production areas). The area where mixing and loading occur should be selected to prevent any potentially spilled herbicide from entering these areas;
- 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 the PMP, an SDS for each herbicide product, emergency telephone numbers, and first aid supplies are present and available at or near each mixing, loading, or treatment site;
- 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 as a carrier for herbicide applications. Prior to any water being collected in the field from a natural source for invasive plant applications, all relevant permits shall be acquired.

4.5 Procedures for Safe Disposal of Empty Herbicide

Containers and Unused Herbicides

The responsibility of container disposal will lie with the contractor or other agency working under this PMP, except where herbicides are applied by plan holder personnel.

The plan holder shall ensure that Ministry personnel, contractors, and other agencies working under this PMP follow these procedures for the safe disposal of empty herbicide containers and unused herbicides within the PMP Area:

- Ensure that all herbicide waste is disposed of in a manner consistent with relevant laws 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. Alternatively, triple rinsed or pressure rinse containers, 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 4.3 (Procedures for Safely Storing Herbicides).

4.6 Procedures for Responding to Herbicide Spills

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

- Ensure that a herbicide spill kit accompanies all vehicles carrying herbicides within the PMP Area and contains, at a minimum, the instructions for a spill response, emergency telephone numbers, kitty litter, large plastic garbage bags, shovels, ABC type fire extinguisher, polyethylene or plastic tarp (3 meter x 3 meter minimum), dustpan and shop brush, flagging tape and rope, first aid kit, and personal protective clothing and equipment (rubber gloves, safety glasses).
- Ensure that the following spill procedures are followed if a herbicide spill occurs within the PMP 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) If applicable, absorbent material shall be spread over the spill 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 disposed of only in a designated landfill;

- 9) When more than five kg or litres of herbicide¹ is spilled, the person responsible for the project will immediately report it to Emergency Management BC by telephoning 1-800-663-3456 or, where that is impractical, to the 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 or project supervisor.

¹*Environmental Management Act Spill Reporting Regulation, Reportable Levels for Certain Substances, Item #19.*

4.7 Herbicide Selection and Use

Herbicide selection is driven first by the conditions of the site and second by the target species. Currently, only glyphosate products may be used up to 1 meter away from the high water mark if selectively applied for control of Noxious Weeds or invasive plants. Glyphosate products can also be used selectively applied up to the high water mark of a temporary, free-standing body of water and over a dry stream that is not fish bearing or does not drain directly into a fish bearing body of water. All other herbicides can only be used where a 10 meter PFZ can be maintained away from the high water mark by ensuring an adequate buffer zone, unless the label of that herbicide product requires a greater buffer zone beyond 10 meters. However, if a product on the following list is approved for use within PFZs in the future, then that label expansion will be adopted under this PMP.

The list of herbicide active ingredients shown in Section 4.7.1 below includes all possible active ingredients that may be used within the term of this PMP. However, due to the proposed five-year duration of the PMP, it is not possible to precisely forecast with certainty what herbicide active ingredients will or will not be used from this list. Many of the herbicide active ingredients listed for possible use within this PMP are sold under a variety of Trade Names. The Plan holder reserves the right to utilize any and all available products (i.e., Trade Names) for the below listed active ingredients, provided that they are registered for the intended purpose under the Federal *Pest Control Products (PCP) Act*.

4.7.1 Properties and Use Patterns of Herbicide Active Ingredients Proposed for Use:

Aminocyclopyrachlor - A dispersible granule mixed in water and applied as a selective, foliar spray for control of undesirable brush and woody species in non-crop areas. It is quickly taken up by leaves, stems, and roots, and translocated throughout the plant. Visible effects include

bending and twisting of stems and leaves, and may be seen on plants within a few hours of application. Example product Trade Names include: Truvist, Navius FLEX, Navius VM

Aminopyralid - A selective, residual herbicide giving season-long to 2 season control when used at label application rates. It is a broadleaf specific herbicide registered for use in invasive plant control. It is an enzyme that functions by its systemic mode of action. It is absorbed by both leaves and roots and translocates throughout the plant. Example product Trade Names include: Milestone, Clearview, Restore II, Restore NXT.

Chlorsulfuron - Useful for the control of hard to manage annual and perennial broadleaf vegetation by both foliar and root uptake. Chlorsulfuron may be used to spot treat established species not controlled by other herbicides. Chlorsulfuron will not be used as a soil-applied residual herbicide under this PMP. It is effective at very low application rates, and it has a long residual in the soil when there is high soil pH. It will not be applied near trees or other desirable plants or in areas where their roots may extend, and it will not be applied in locations where it may be moved or washed into contact with the roots. Example product Trade Names include: Truvist.

Clopyralid - A selective, residual herbicide that is effective for up to 2 years. . When applied to target herbaceous species, it will not injure trees or shrubs in close proximity. For perennial weeds, it will control the initial top growth and inhibit re-growth during the season of application. Example product Trade Names include: Lontrel XC.

Dicamba - A selective, non-residual herbicide used for the treatment of young, actively growing broadleaf weeds, brush species, and other species of invasive plants. It will control many broadleaf herbaceous species that cannot be effectively treated using physical controls or glyphosate applications. It can be safely mixed with other herbicides to broaden the number of target species controlled. Because it is selective, it is useful in areas where grasses are to be retained on the site. Example product Trade Names include: Banvel II, Vanquish, DyVel DSp.

Diflufenzopyr – A selective, non-residual herbicide that improves the efficacy of certain auxin-like herbicides such as dicamba on many broadleaf weed species. Diflufenzopyr aids the activity of these broadleaf herbicides by causing increased disruption of normal growth patterns at a plant’s growing points in the roots and shoots. Much like picloram, it may persist in the soil and cannot be used near desirable trees or their root systems. Care must be taken to avoid areas where soil may be moved or where there is a shallow aquifer or domestic water intake, especially where there are permeable soils. It also may not be used in any residential areas. Example product Trade Names include: Overdrive, Distinct WDG.

Flazasulfuron – Used for control of both annual and perennial species. It is a selective, systemic herbicide for pre-emergence and early post-emergent uses. It has a broad spectrum of activity for grasses, broadleaf weeds, and sedges. It is rapidly absorbed into the plant leaves, translocating through xylem and phloem to the meristem where it stops plant growth. Symptoms include discoloration of new leaves and halting growth within a few hours. Visual symptoms appear in three to four days with complete death in 20 to 25 days. It is safe to birds, fish, bees, and other beneficial insects. Example product Trade Names include: LongRun 25WG.

Flumioxazin and pyroxasulfone - Is an effective preemergence herbicide used on selective grass and broadleaf weeds. It is residual for up to three months and is most effective when applied to clean, weed free soil. Preemergent seedlings are controlled when exposed to sunlight following contact of soil applied herbicide. Length of residual control is dependent on application rate, rainfall, and temperature conditions. This combination will assist in prevention of herbicide resistance. Example product Trade Names include: Torpedo EZ.

Fluroxypyr - A selective herbicide for the control of annual broadleaved weeds in rangeland, permanent pasture, rights-of-way, industrial and other non-crop areas. It is effective for controlling hard-to-kill annual broadleaved weeds such as kochia (including glyphosate-resistant plants). It is a systemic auxin-type herbicide and moves within the plant for control of above-ground and underground plant tissues. The product controls weeds by disrupting normal plant growth patterns. Symptoms include epinasty (twisting of the stems) and swollen nodes. Example product Trade Names include: Starane, Pulsar, Sightline B.

Glyphosate - A non-selective, non-residual herbicide that kills actively growing vegetation on contact. It is not persistent - its effects are rendered inactive when it contacts soil, and the product binds to the soil and is not mobile. It may be used up to 1 meter away from a high-water mark near waterbodies if selectively applied for invasive plant control. The product Roundup WeatherPRO (PCP 33653) can be used for stem injection of knotweed plants. Example product Trade Names include: Credit Xtreme, Roundup WeatherMAX, Roundup WeatherPRO, Roundup Transorb, Vantage Plus Max, Vantage XRT, VP480.

Halosulfuron - A selective herbicide for the post-emergence control of nutsedge and numerous species of invasive plants and broadleaf weeds in turfgrass, ornamentals, landscaped areas, and other specified non-crop areas. Many species of established turfgrasses are tolerant to halosulfuron when applied as directed on the product label. Example product Trade Names include: Sandea WG.

Imazapyr - A non-selective, residual herbicide that gives season-long control of most species of annual and perennial broadleaf plants, grassy weed species, and some species of invasive

aquatic plants. It is effective at low application rates. It works by preventing germination of seeds, is readily absorbed through foliage and roots, and moves rapidly throughout the plant where it breaks down tissue. It is particularly useful in controlling vegetation that has not been effectively managed using a combination of mechanical and manual controls and glyphosate application. Treated plants stop growing soon after spray application. Example product Trade Names include: Arsenal, Arsenal PowerLine, Habitat Aqua.

Indaziflam – A selective herbicide that provides pre-emergent and, when formulated with other active ingredients, post-emergent control of annual grasses and broadleaf weeds. It works to reduce the emergence of seedlings by inhibiting cellulose biosynthesis and can cause necrosis or yellowing on emerged susceptible plants if applied to herbaceous tissue. It is registered for agricultural use, and use in non-residential non-crop areas such as railroad and rail yards, fence rows, managed roadsides, etc. Examples of product trade names include: Esplanade SC.

MCPA (dimethylamine salt) – A selective, foliar applied broadleaf herbicide used for the control of numerous species of invasive plants in non-crop and industrial areas. It is absorbed through the leaves or roots and is readily translocated in the plant. MCPA at recommended rates persists in the soil up to one month in most growing conditions and up to six months in drier climates. Example product Trade Names include: DyVel.

Mecoprop-p (dimethylamine salt) - A selective, non-residual, translocated herbicide that interferes with growth regulation in many invasive plant species. Because it is selective, it is useful in areas where grasses are to be retained on the site. It is most effective when the target plant is actively growing and is more actively taken up by the foliage than the roots. Example product Trade Names include: Trillion, Par III, DyVel DSp.

Metsulfuron-methyl - A selective, residual herbicide that is effective in the suppression and management of difficult to control invasive plants such as common tansy and Canada thistle. It works by causing rapid inhibition of plant cell division and growth. Typical symptoms, such as discolouration, may not be noticeable for several weeks after treatment depending on growing conditions and plant susceptibility. Example product Trade Names include: Escort, Clearview, Navius VM.

Picloram - A selective, broadleaf specific, residual herbicide that can remain in the soil for several years and continue to control susceptible vegetation. It is a systemic herbicide for use on a wide variety of broadleaf invasive plants. Because picloram may persist in the soil, care must be taken to avoid areas where soil may be moved or where there is a shallow aquifer or domestic water intake. This product is typically only used in the interior portion of the PMP Area and is only used under suitable environmental conditions (e.g., deep water table). The

mode of action and soil persistence allows for a broader application window. Example product Trade Names include: Tordon 101, Tordon 22K, Grazon XC.

Propyzamide – A selective herbicide, for control of certain perennial and annual grasses and broadleaf weeds in turf, crops and pastures. It is readily absorbed by roots and less so through leaves. Propyzamide is ineffective in high organic content soils. Best results are achieved when it is applied in cool, moist soils and rain follows 2 days later. Example product Trade Names include: Kerb SC (only to be used under this PMP if the PMRA label restrictions can be met for the specific site type).

Rimsulfuron – A selective herbicide that stops plant growth by inhibiting amino acids essential for cell division. Typical symptoms usually appear in five to seven days but may take longer if cool and/or dry conditions persist. Does not provide residual control of grass or broadleaf weed seedlings after application. Example product Trade Names include: Elim 25 SG, Prism SG (only to be used under this PMP if the PMRA label restrictions can be met for the specific site type).

Florpyrauxifen-benzyl – A new active ingredient recently developed. Alternating active ingredients is important to prevent herbicide resistance and this new active ingredient has won the American Chemical Society's Green Chemistry Institute's award for its favourable human health and environmental profiles. It has low persistence in soil and water and low toxicity to organisms such as birds, insects, and fish. Example product Trade Names include Rinskor, Milestone NXT, Restore NXT.

Triclopyr - A selective herbicide that controls many invasive broadleaf plants and is very effective in controlling many recently identified invasive shrubs and deciduous tree species. It works by accumulating in the areas of active cell growth and interfering with normal plant growth processes. It is absorbed by green bark, leaves, roots, and cut stem surfaces and moves throughout the plant. Example product Trade Names include: Garlon RTU, Garlon XRT.

2,4-D - A selective, non-residual, translocated herbicide that interferes with growth regulation in many invasive plant species. Because it is selective, it is useful in areas where grasses are to be retained on the site. It is most effective when the target plant is actively growing and is taken up more by the foliage than the roots. Example product Trade Names include: Aspect, Grazon XC, Trillion, DyVel DSp, 2,4-D Amine 600.

Surfactant or Adjuvants - Adjuvants and surfactants are chemicals or agents that are sometimes added to herbicide spray mixes to allow for easier mixing, and to assist in the spreading of the herbicide spray mix and the wetting of, and adherence to, the surface of the plants being treated. This has been shown to decrease the possibility of drift (the movement of the applied material away from the intended target to adjacent areas by wind). Some adjuvants

and surfactants may also be used to adjust the pH of the herbicide spray mix. Spray mixes that are highly to mildly alkaline (i.e., pH greater than seven) have been shown to break down (degrade) or hydrolyze more rapidly, reducing the effectiveness of the herbicide being applied. If required, surfactant or adjuvant products may be added to the herbicide active ingredients proposed for use under this PMP.

Herbicide Active Ingredient Formulations - Several herbicide active ingredients listed above are included in different final products as different formulations. For example, 2,4-D is available as an Amine, an Ester, and a Choline. While each formulation has slightly different characteristics (i.e., volatility), they break down in the environment the same way.

Additional background information on the environmental, toxicological, and other parameters of the herbicides listed can be found in [Appendix 3](#).

4.7.2 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 and Hand-Held Sprayers: 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.

Vehicle Mounted Sprayer: A motorized vehicle equipped with a pump, holding tank for spray mix, and nozzles (low pressure) attached to handguns, booms and or boomless nozzles used for spot and broadcast applications of herbicides onto foliage. The vehicle may be a truck or an ATV.

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.

Injection Tools: Used to inject herbicides into individual hollow stems.

No aerial application will be conducted under this PMP.

5.0 Environmental Protection Strategies and Procedures

Environmental protection is one of the principal reasons for the existence of each Ministry's Invasive Plant Program. Preventing the introduction and spread of invasive plant species is a key factor in long term invasive plant management success and environmental protection. To

support this, the Ministries have developed best management practices in collaboration with the Invasive Species Council of BC, which can be found at:

<https://www2.gov.bc.ca/gov/content/environment/plants-animals-ecosystems/invasive-species/publications>

There are circumstances where the use of herbicide is the only method that can effectively remove invasive plant species in order to protect ecosystems. This is particularly true when the target invasive plant species spreads by underground roots or rhizomes, or can regrow from deep taproots, and when site goals require extirpation of all target species, or restoration of a site is required because an injury threshold has been exceeded. The risk to ecosystem health and function that can result from invasive plant establishment and spread is far greater than the risk of safe, localized herbicide use. In addition, targeted application of herbicide often has the least long-term footprint on the site as compared to mechanical control methods, and enables the fastest recovery of desirable vegetation at the site.

All invasive plant management activities proposed for use under this PMP will incorporate strategies to ensure the protection of our environment. These procedures require that any person(s) applying or handling herbicides under the authority of this PMP be cognizant of the location of the following:

- All community, domestic and agricultural water sources;
- Riparian areas, wetlands, and all bodies of water whether they contain fish or not;
- Wildlife habitat and species at risk; and,
- Food plants intended for human consumption, including Indigenous peoples food sources and traditional medicinal use.

The term riparian is used in the context of this plan to mean a vegetated area of land adjacent to a stream, river, lake, or wetland.

All PFZs established under this PMP will comply with the standards contained in Division 7 of the IPMR. A PFZ is defined as an area of land that must not be treated with pesticides and must be protected from pesticide contamination through either direct means (e.g., through herbicide drift) or indirect (e.g., soil and/or water movement). PFZs are measured by the horizontal distance from the high-water mark, and they will always be identified and flagged prior to any herbicide application. Buffer zones large enough to ensure the integrity of PFZs will be applied outside PFZs to decrease the risk of a breach. Products containing glyphosate are eligible for selective application within a PFZ up to 1 meter away from the high-water mark of any riparian area. If herbicide is inadvertently applied within a PFZ, this use is immediately reported to the

PMP holder who immediately reports it to the Environmental Protection Division (ENV). The confirmation holder is responsible for inspecting the site, arranging any necessary testing, coordinating any required site remediation, and contacting any affected landowners.

5.1 Procedures to Protect Community Watersheds

The following precautionary procedures will be implemented within community watersheds:

- PFZ procedures described in Section 5.0 will be followed for all community watersheds;
- The location of community watersheds to be protected will be verified by accessing the Community Watershed Database, maintained by the BC Ministry of Environment and Climate Change Strategy, 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 removed from the community watershed within seven 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, and only selectively applied glyphosate shall be used where necessary within this PFZ up to one meter away from high water;
- A 30 meter NTZ shall be maintained from all licensed water supply intakes or wells within the community watershed.
 - This 30 meter NTZ may be reduced by the PMP holder if priority invasive plants are present within the 30 meter NTZ, and the following four criteria are met:
 1. the PMP holder is reasonably satisfied that the smaller NTZ will prevent herbicide from entering the water supply intake or well;
 2. consultation with the well or water intake owner has occurred;
 3. rationale for the decision has been documented in writing PRIOR to treatment; and,
 4. the PMP holder and the land manager responsible for the jurisdiction being treated agree to reduce the NTZ.
 - For water intakes from linear waterbodies such as streams, creeks or rivers:
 - No NTZ is required for treatment downstream of a water intake, however the 10 meter PFZ requirements (or one meter PFZ if selectively applying glyphosate) will still be required.
 - 30 meter NTZ is required upstream of a water intake.
 - All PFZs shall be measured and marked/flagged prior to herbicide use.

5.2 Procedures to Protect Domestic and Agricultural Water Sources

PFZ procedures described in Section 5.0 will be followed for all domestic and agricultural water sources. The PMP holder shall ensure that all Certified Pesticide Applicators with authorization to work under this PMP take steps to determine the location of registered domestic and agricultural water sources prior to herbicide application for invasive plant management near private and/or agricultural lands.

Certified Pesticide Applicators working under this plan shall:

1. Ensure both online water license and well map layer resources provided by ENV and listed below are reviewed prior to treatment:
 - a. The BC Water Resource Atlas <https://catalogue.data.gov.bc.ca/dataset/bc-water-resources-atlas/resource/ad27cad8-f5db-489b-9c87-96d3efe85104>
 - b. Groundwater wells and aquifers: <https://apps.nrs.gov.bc.ca/gwells/>

NOTE: this website indicates that not all groundwater wells are registered with the province, as registration was voluntary until February 29, 2016. The PMP holder has been advised that only approximately 60% of wells are currently mapped within BC as of 2019;

2. Review records in InvasivesBC to check for comments indicating previous location of wells or water license intakes in the area;
3. Conduct visual observation looking for wells, water lines into nearby creeks, notifications posted on private land fences, or other indicators that water is being extracted for domestic or agricultural purposes within 30 meters of the treatment area;
4. Attempt to contact landowners directly that have private lands located within 30 meters of a proposed treatment site to confirm the location of wells or water licence intakes and if they are currently active. Landowner contact is especially important in areas with new home construction or where the well and water licence on-line map layers indicate there are numerous wells located in the local area, as it may indicate that additional unmapped wells or water licenses are also present; and
5. Ensure that any time an unregistered/unmapped well or water licence intake is located, a comment is made in the InvasivesBC record, so the presence of the well or water intake is available to inform all potential future treatments.

Table 2 describes the minimum protective measures that shall be implemented. The No Treatment Zones (NTZs) in this table reflect the standards as specified in Sections 71(3) and 71(4) of the IPMR.

Table 2 - 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 (Bacterial pesticides are not considered for use in this PMP)	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 (Bacterial pesticides are not considered for use in this PMP)	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 Plan Holder

*See the definition in [Appendix 2](#)

5.3 Procedures for Protecting Riparian Areas, Bodies of Water and Wetlands

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

- PFZ procedures described in [Section 5.0](#) will be followed for all bodies of water, wetlands, and riparian areas;
- Ensure that whenever herbicide, mechanical or manual control methods are applied, efforts are made to prevent harmful alteration, damage or destruction to fish or their habitat. Reducing negative impacts on streamside vegetation and bank stability will reduce erosion and water turbidity.
- Ensure that best management practices that comply with the IPMR are applied 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 riparian areas and bodies of water during their work.
- Prevent invasive plant control impacts on water bodies and riparian habitat by ensuring that contract documents and prescriptions will describe best management practices, including, but not limited to, no refuelling of machinery or herbicide mixing within 15 meters of a riparian zone, no clean up (excluding the case of an emergency spill), and including a requirement to install descriptive flagging such as “Riparian Zone” and “Pesticide-Free Zone” placed at 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 adhered to according to the requirements specified in the IPMR.
- Additional information has been provided by the Ministry of Environment and Climate Change Strategy Integrated Pest Management Section including their “Body of Water” and “Directly Draining” policies and those shall be followed in all cases to help ensure compliance with the *Integrated Pest Management Act*.

5.4 Procedures to Protect Wildlife Habitat/Species at Risk

In order to protect wildlife and species at risk from adverse effects during invasive plant management, the plan holder will implement the following procedures to minimize any adverse and lasting effects on natural ecosystems:

- Consider sensitive ecosystems or 'at risk' plant, vertebrate or invertebrate species when developing treatment plans for a given site;
- Consult the following layers in iMapBC at <http://maps.gov.bc.ca/ess/sv/imapbc>:
 - WSI-IO-Red-listed Species – Nonsensitive;
 - WSI-IO-Blue-listed Species – Nonsensitive;
 - WSI-SO-Red-listed species – Nonsensitive;
 - WSI-SO-Blue-listed Species – Nonsensitive; and
 - Endangered Species and Ecosystems – Non-Confidential Occurrences – Conservation Data Centre;
- Ensure that there is communication with agencies responsible for species at risk prior to invasive plant management being carried out, so that management plans can be adjusted accordingly;
- Ensure that best management practices (as derived from documents on species habitat, lifecycle information and locations) are applied during invasive plant management; and,

- 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 and wildlife habitat during their work.

5.5 Procedures to Prevent Herbicide Contamination of Food

Sources Intended for Human Consumption

Berry picking, bee keeping areas, vegetable gardens, organic farms, and areas containing agricultural crops or livestock are also found at many locations within the PMP Area. In addition, Indigenous communities within the PMP Area use several species of plants for ethno-botanical purposes. Invasive plants readily become established in areas where past ground and vegetation disturbance has occurred, such as road, landing, and utility construction; timber harvesting; heavy cattle, horse, and/or wildlife grazing; all-terrain vehicle activity; and other human induced and natural disturbances. This disturbance and invasive plant encroachment displace native vegetation; as a result, these areas often provide limited opportunities for natural food harvesting. This helps to greatly reduce the risk of human food contamination as there is often separation between those areas most likely to receive direct herbicide application for invasive plant control from those areas where ethno-botanical collections usually occur. The risk of human contact with herbicides still exists, as does the risk to affect natural use plants, therefore ongoing communications around areas and species generally used for collection of food sources will occur. Control measures applied in specific use areas will ensure resource plants are not contaminated with herbicide, and invasive plants are effectively removed. The perimeter of treatment areas will be clearly marked by signage to deter entry to sites and avoid exposure.

The PMP holder will consider alternative treatment methods adjacent to organic agriculture farms at the request and upon commitment by the agriculture producer to complete the treatments to achieve the desired invasive plant control objectives for the site(s). Provincial Public Land will not be used as buffer zones for adjacent private organic farms.

Invasive plant herbicide treatments and honeybee interactions may be perceived risks within the PMP Area. Review of scientific literature and the herbicide labels for products covered under this PMP has been completed and will be maintained. All proposed products have low to no bee toxicity. Beekeepers who raise concerns regarding invasive plant treatments on Provincial Public Land adjacent to hives on private land will be encouraged to participate in annual land manager invasive plant planning sessions. Accommodations regarding timing of treatments to miss the flowering period may be a possible solution where practical, however it

has been confirmed by the Provincial Apiculture Specialist that the products included for potential use under this PMP should not impact hives and as bees are olfactory foragers and herbicides have a strong scent when applied, bees are unlikely to forage on treated invasive plants species. Managing invasive plants to protect the diversity of native and desirable plant communities will help to protect a variety of healthy pollen sources for pollinators throughout a longer growing season than a single monoculture of a non-native invasive plant would provide.

5.6 Procedures to Protect Indigenous Communities' Interests in Traditional Food/Medicine Gathering and Culturally Significant Areas

Indigenous people within the PMP Area may use several species of native plants for ethno-botanical purposes.

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

- Identification of native plant species and culturally significant sites:
 - During consultation for the PMP, Indigenous communities were invited to forward the names of those plant species of cultural importance, so that they are not inadvertently affected during treatment activities. Additional plant species and sites of cultural importance will be added to this list if identified by Indigenous communities and others.
 - Efforts will continue through ongoing consultation and engagement to identify culturally significant plants and sites.
- Proposed treatment area notification:
 - Where requested, Indigenous communities will be provided with information on where treatment is planned each spring.
- Invasive Plant management adjacent to traditional use plants and culturally significant sites:
 - Provide annual training to on-ground treatment contractors to recognize traditional use plants and culturally significant sites;
 - Ensure on-ground treatment contractors are following chance find management guidelines (see [Appendix 4](#)) when performing manual/mechanical treatments that disturb the soil;

- Check the provincial database of registered archaeological sites whenever mechanical treatments using heavy equipment (e.g., excavation) are considered and take appropriate measures (e.g., applying for permits, hiring an archaeologist, notifying Indigenous communities) when such treatments are planned to occur within a registered archaeological site;
- Consider non-chemical treatment methods of invasive plant management where treatment objectives can be achieved;
- Post treatment notices at public access points, including water access, to proposed herbicide treatment areas advising of herbicide use near these sites. This will communicate that the area has been treated with herbicides and signs will advise when it is safe to re-enter the area. In most cases, this is 24 hours from the time of herbicide application; and,
- Where possible, time herbicide treatments to minimize impacts on food/medicinal plant production and harvesting (e.g., delay treatments until after the fruit has dropped from the plant, use of non-residual herbicides if possible) and on cultural uses (e.g., delay treatments until after traditional use occurs, use of non-residual herbicides if possible).

5.7 Procedures for Safe Herbicide Application

Ensuring that correct environmental protection procedures are in place can be further strengthened by requiring that handling and applying herbicides is conducted in a manner that reduces the risk of accidents caused by human error or equipment malfunction.

5.7.1 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;
- A pre-season meeting shall be held between the Contractor and the plan holder or their representative to confirm procedures for determining 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.

5.7.2 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 equipment shall be inspected and calibrated prior to the commencement of herbicide applications each year, and once every 10 days throughout the application season. Backpack sprayers and vehicle-mounted sprayers shall also be re-calibrated when changing herbicide products or when nozzle output begins to vary. Calibration is not undertaken on wick/wipe-on applicators.

An example of an Invasive Plant Treatment Calibration record is shown in [Appendix 5](#).

5.7.3 Procedures for Monitoring Weather

An anemometer (device used for measuring wind speed) and thermometer will be used to ensure weather conditions are suitable for herbicide application at treatment sites before herbicide treatment occurs and periodically during herbicide application. Wind speed and direction and temperature will be recorded prior to application.

The certified pesticide applicator has the final authority to decide when herbicide applications should be stopped due to inclement weather or adverse site conditions. Examples of conditions when herbicide applications should cease are as follows:

- When parameters are exceeded according to the manufacturer's label; OR
- When conditions prevent the herbicide product from being applied effectively according to the label instructions (e.g., periods of rain or snow); OR
- When wind speed and/or direction causes the foliar application of herbicides to drift and/or miss the target Noxious Weed or invasive plant; OR
- Ground wind velocity is over 8 km/hour for foliar or soil applications; OR
- The maximum air temperature exceeds 27°C, or the maximum stated on the herbicide label is exceeded; OR
- It begins to rain during the herbicide application, increasing the chances of excessive runoff or leaching; OR
- There is dew, ice or frost on the foliage.

6.0 Reporting, Notification, Consultation, Ongoing Engagement and Plan Amendments

The plan holder, partnering organizations, and each contracting firm that applies herbicides under this PMP are committed to following the IPMR when managing invasive plants. The plan holder will maintain a high standard of communication, record keeping and professionalism when developing and consulting on this PMP and any future amendments that may arise. Specific activities in these areas, as well as requirements under the IPMA are outlined in this section.

6.1 Reporting

Accurate record keeping allows both plan holder and the Administrator of the 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.

6.1.1 Confirmation Holder Use Records

The plan holder, partnering organizations and each contracting firm that applies herbicides under this PMP 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:

- Date and time of the herbicide use;
- PMP confirmation number;
- Jurisdiction (land ownership) of the treatment site;
- Names of all applicators and certification number of certified applicators;
- Name(s) of the invasive plant(s) targeted for treatment;
- Trade name of each herbicide used and its registration number under the Federal PCP Act;
- For each herbicide used, the method and rate of application and the total quantity used;

- Prevailing meteorological conditions including temperature, precipitation and velocity and direction of the wind, these conditions should be measured at the prior to treatment, and re-measured if obvious changes in environmental conditions occur throughout the day;
- 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;
- Any advice given to owners or managers regarding things such as safe re-entry time or any additional precautions that should be taken to minimize exposure to the pesticide.

All users of the PMP will retain records of site assessment and invasive plant inventory in addition to the daily herbicide use described above, 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.

If the licensee decided under section 71 (4) that a no-treatment zone may be reduced, the information on which the licensee based the decision must also be included.

Most of the inventory, assessment, treatment and monitoring information will be entered into and housed in the InvasivesBC.

6.1.2 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:

- The name and address of the confirmation holder, and their confirmation number;
- Names and Service Licence numbers of companies which applied herbicide under the PMP.
- Trade names and active ingredients of the herbicides applied, including their PCP Act Registration numbers;
- Locations and total area treated (ha);
- Methods used to apply herbicides;

- Quantity of each active ingredient applied (kg);
- Methods of non-herbicide pest controls used and the estimated total area of their use; and,
- Geo-referenced data of all the sites treated with herbicide the previous calendar year.

6.2 Notifications

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

6.2.1 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 PMP to allow inspection by the public through posting on the FOR website at:

<https://www2.gov.bc.ca/gov/content/environment/plants-animals-ecosystems/invasive-species/integrated-pest-management/pmp-pup>

6.2.2 Annual Notice of Intent to Treat

As per Section 42 of the IPMR, the plan holder will forward, in writing, an annual Notice of Intent to Treat (NIT) to ENV at least 21 days prior to treatment commencing in each year the PMP is in effect. The NIT will identify:

- Name and business location of confirmation holder(s);
- Estimated area proposed for treatment;
- Proposed treatment methods;
- Herbicides proposed for use and their method of application;
- The web address for InvasivesBC ; and,
- A .kmz file of all sites intended for possible treatment with herbicide during that calendar year.

6.2.3 Notification of Contravention

Section 72(1)(d) of the IPMR requires that a confirmation holder give written notice to the administrator on 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. The plan holder will also be responsible for inspecting the site, arranging any necessary testing, coordinating any required site remediation, and contacting any affected landowners.

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;
- Failure to flag PFZs prior to treatment;
- Application of treatment herbicides within prohibited zones;
- Improper clean-up 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.

6.2.4 Posting of Treatment Notices

Treatment Notices will be posted and maintained in locations so that they are clearly visible and legible from each approach for which public/employees/contractors access the treatment area or at locations where due diligence would seem to require them. The signs shall remain posted for 14 days following herbicide application, and contain the following information:

- The trade name and active ingredient of the herbicide that was used;
- The date and time of the herbicide used;
- The purpose of the treatment;
- Precautions to be taken to prevent harm to people entering the treatment area;
- The PMP confirmation number;
- 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 square centimetres;
- Water resistant;
- Display the title “Notice Herbicide Use: Spot Treatment of Invasive Plants” in bold letters that are clearly legible to a person approaching the treatment area.
- Contain a cautionary symbol, like a stop sign or a raised hand that will draw the attention of a person approaching the treatment area.

6.3 Consultation

Prior to submitting a Pesticide Use Notice to ENV for PMP confirmation, the plan holder will carry out a consultation process with the public and Indigenous communities. The objectives of conducting consultations for this PMP are:

- To increase awareness of the PMP process and of the principles of Integrated Pest Management that are embodied in the PMP;
- To ensure that there is 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 submitted for confirmation;
- To ensure a transparent and accountable review process for the PMP;
- To educate 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 notified of the PMP development and invited to consult 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 two notices, at least 40 cm² in size, will be published within a two-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 in various locations, as stated in the public notifications and on FOR’s Invasive Plant Program website to allow the public to view and download the PMP text and the maps.

<https://www2.gov.bc.ca/gov/content/environment/plants-animals-ecosystems/invasive-species/integrated-pest-management/pmp-pup>

The ministries will also consult with all Indigenous communities in the PMP Area to share information and request input into the development of the PMP and promote on-going meaningful communication on invasive plant management.

6.4 On-going Engagement

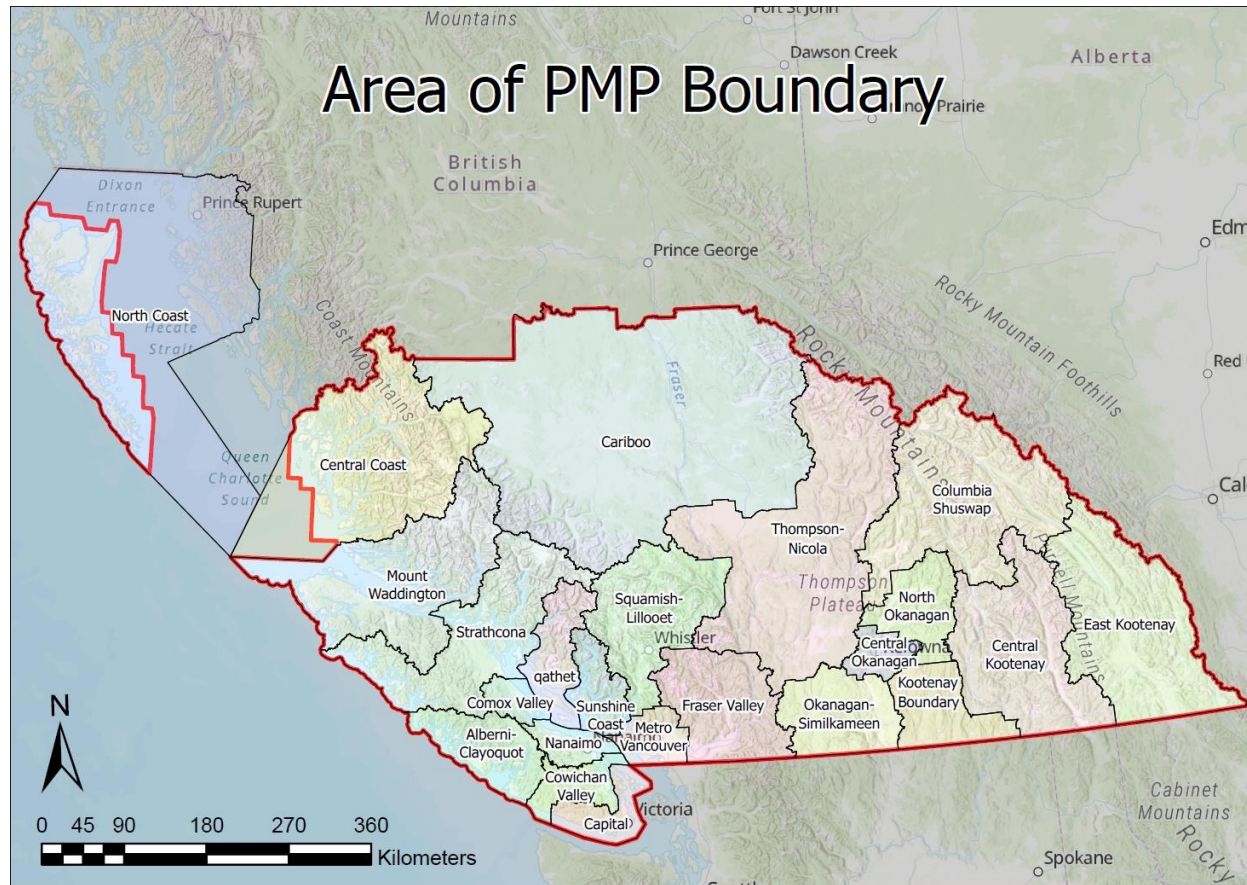
The plan holder will continue to consult and engage with both the public and Indigenous communities as required throughout the life of the PMP to receive information on operational plans and continue further education on the PMP and invasive plant management on Provincial Public Lands in BC.

6.5 Requests to Amend the PMP

The plan holder will forward in writing to ENV any request for an amendment to the PMP. Amendment requests concerning minor edits to the text, new application techniques or similar changes will not require further public advertising or Consultation within Indigenous communities unless an Indigenous community has requested to be contacted prior to any edits to the PMP. Amendments to add new active ingredients will require further public advertising and Indigenous Consultation.

Appendix 1: Map of PMP Area

Overview Map with the PMP Area Outlined in Red:



Appendix 2: Definitions, Acronyms and Abbreviations

Definitions

Control: Manage invasive plants on a site to prevent spread from that site.

EDRR: Early Detection Rapid Response – is a strategy that will prevent a species from establishing by detecting it when it first arrives and responding quickly to reports so that effective eradication can occur. EDRR involves having systems for recruiting and training many people to act as ‘spotters’ who look for newly arriving species. This is coupled with a reporting and evaluation system that quickly confirms identity and indicates the degree of risk presented by the newly arrived species and begins a course of action or response to eradicate the species from BC while communicating province-wide alerts.

Eradicate: Remove all plants from a site or area. This may require several years of treatment.

Industrial area: Industrial is considered as one type of non-cropland that encompasses facilities where manufacturing, processing, or storage of commercial goods occurs.

IMISWG: The Inter-Ministry Invasive Species Working Group (IMISWG) has provided policy direction, coordination, and collaborative delivery of provincial invasive species programs for the Province of BC since 2004.

Several land-based ministries have responsibility for Noxious Weed and invasive plant management, including Ministries of Forests, Environment and Climate Change Strategy, Water, Land and Resource Stewardship, Transportation and Infrastructure, and Energy and Mines. The IMISWG functions to bring together provincial ministries and agencies, each with unique mandates, program goals and technical expertise.

Invasive plants: are non-native or alien to the ecosystem under consideration. Their introduction causes, or is likely to cause, economic or environmental damage, or harm to human health. The term invasive plant is synonymous with invasive alien plant in BC.

Noxious Weed: any invasive plant species designated by regulation to be noxious under the BC *Weed Control Act* (WCA) and Regulations.

No-Treatment Zone (NTZ): is defined in the IPMR as an area of land that must not be treated with pesticide. NTZs will be identified and marked/flagged prior to any herbicide application.

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 and marked/flagged prior to any herbicide application.

REDRR: Regional Early Detection Rapid Response – is a strategy that will prevent a newly arrived species from establishing by detecting it when it first arrives *in a Region* and responding quickly to reports so that effective eradication can occur. REDRR involves having systems for recruiting and training many people to act as ‘spotters’ who look for newly arriving species. This is coupled with a reporting and evaluation system that quickly confirms identity and indicates the degree of risk presented by the newly arrived species and begins a course of action or response to eradicate the species from a Region while communicating Region-wide alerts.

Regional Invasive Plant or Species Committee: refers to regional non-profit committees that coordinates invasive plant and/or species management in a specific region of BC.

Rehabilitation/Restoration: Invasive plant species establishment and spread can have long lasting and sometimes irreversible negative impacts on an area. Rehabilitation of sites may be justified if the impacts have consequences, such as loss of critical wildlife habitat or culturally valued plants and ecosystems, or negative impacts on agricultural crops. Rehabilitation efforts may result in restoration of the degraded habitats to native habitats given adequate resources, planning and time.

Residential: Residential is defined on some herbicide labels as "... sites where bystanders, including children, may be potentially exposed during or after spraying. This includes around homes, schools, parks, playgrounds, playing fields, public buildings or any other areas where the general public, including children, could be exposed."

Riparian: The term riparian is used in the context of this plan to mean a vegetated area of land adjacent to a stream, river, lake, or wetland.

Selective Application: is defined in the IPMR. It means the application of a pesticide to individual plants so that the vegetation between the individual invasive plants is not treated.

Targeted or Spot Treatment: The IPMR, Section 77.1 states: "...must not apply herbicide more than 1.5 meters from a targeted weed or plant." It is important to try and control seedlings and seed drop from the invasive plants while not negatively impacting competing vegetation or risking contamination of sensitive habitats. The applicator will ascertain what constitutes spot treatment with applications being equal or less than the 1.5 meters specified in the regulations. Examples:

- Seed drop has occurred and a herbicide with some residual nature is being used - then it may be desirable to treat up to 1.5 meters from the plant.

- A non-selective herbicide such as glyphosate is being used; then only the individual invasive plants should be treated with no or minimal application on non-target vegetation or the ground.

Urban: Urban is defined as areas within town or city legal limits or boundaries.

Acronyms and Abbreviations

ATV	All-Terrain Vehicle
BC	British Columbia
EDRR	Early Detection Rapid Response
ENV-CARD	Conservation and Recreation Division (Ministry of Environment and Climate Change Strategy)
ENV	Ministry of Environment and Climate Change Strategy's Integrated Pest Management program
FOR	Ministry of Forests
FRPA	Forest and Range Practices Act
IPM	Integrated Pest Management
IPMA	Integrated Pest Management Act
IPMR	Integrated Pest Management Regulation
MOTI	Ministry of Transportation and Infrastructure
SDS	Safety Data Sheet
NIT	Notice of Intent to Treat
NTZ	No Treatment Zone
PCP	Pest Control Products
PFZ	Pesticide Free Zone
PMP	Pest Management Plan
PMRA	Pest Management Regulatory Agency
REDRR	Regional Early Detection Rapid Response
WCA	Weed Control Act
WHMIS	Workplace Hazardous Materials Information System

Appendix 3: Environmental, Toxicological and other Parameters of Herbicides

There is a large volume of studies, information and other sources used by the Federal Health Canada's Pest Management Regulatory Agency (PMRA) to determine whether to register a product for use in Canada, and if registered what use conditions and mitigation actions, such as buffer zones, should be included on the product label. It is not the intent of this PMP to go into detail on the science behind the label as the responsibility and authority to do that rests with the PMRA. The PMRA has the resources including hundreds of scientists to evaluate the thousands of studies required from different habitats, using different laboratory and modelling techniques and measuring methods. These resources are also needed to sort and assess the variability resulting from such a volume of studies. The PMRA works with its counterparts in other countries to align the processes used to regulate pest control products and ensure the protection of health and the environment.

From the Health Canada Web Page:

<http://www.hc-sc.gc.ca/cps-spc/pest/part/protect-proteger/publi-regist/index-eng.php>

“One of the mandates of the *Pest Control Products Act* is to increase transparency in the pesticide registration system. A key mechanism for meeting this mandate is the Pesticide Public Registry.

The Public Registry is a collection of non-confidential information on pesticides and the pesticide regulatory system. All publicly available information on currently registered pesticides is available here.”

The Public Registry and other search engines, indicated in the following table, are some of the information sources used in development of this PMP. There is also a large volume of unpublished studies that are available in the public reading room of the PMRA.

Table 3 - Principal Information Resources Used in Determining Status and Parameters Considered in Herbicide Use

WEB PAGE	ADDRESS
Health Canada – Public Registry	http://www.hc-sc.gc.ca/cps-spc/pest/part/protect-proteger/publi-regist/index-eng.php
ECOTOX database of the U.S. Environmental Protection Agency	http://cfpub.epa.gov/ecotox/
Ecological and Environmental Safety	http://www.sciencedirect.com/science/journal/01476513
Journal of Environmental Quality	https://access.onlinelibrary.wiley.com/journal/15372537
Science direct	https://www.sciencedirect.com/
The Extension Toxicology Network	http://extoxnet.orst.edu/
Canadian Environmental Quality Guidelines, (including the Water Quality Guidelines for the Protection of Aquatic Life)	https://ccme.ca/en/resources search engine: http://cegg-rcqe.ccme.ca/

Appendix 4: Chance Find Management Guidelines for Invasive Plant Management Operations



Chipped stone flakes and core artifacts

INTRODUCTION

FOR, MOTI, ENV-CARD, and WLRS are committed to the responsible management of heritage sites within the Southern and Coastal PMP area. The intent of these chance find procedures is to provide contractors working under this PMP with guidelines for the appropriate response to the discovery of known or suspected heritage sites during invasive plant treatment activities. The objective for providing this information is to minimize disruption to treatment activities while promoting the preservation and proper management of heritage sites.

The following sections:

- 1) Describe the provincial heritage regulatory framework;
- 2) Present step-by-step guidelines for heritage site chance find management, including a procedure for the identification, treatment and management options for human remains;
- 3) Identify the limitations of the Chance Find Management Guidelines; and,
- 4) Provide a list of heritage management contacts to be notified in the event that heritage resources are encountered during construction activities.



Fire altered rock

BC REGULATORY FRAMEWORK

Heritage sites in British Columbia are managed in accordance with the *Heritage Conservation Act* (RSBC 1996, c. 187). Section 12 of the *Heritage Conservation Act* (HCA) specifies that an individual (or corporation) must not damage, excavate, dig in or alter, or remove any heritage object from a heritage site, except in accordance with a permit issued by the Minister. The HCA confers automatic protection upon all heritage sites that pre-date AD 1846, regardless of whether they are recorded in the Provincial Heritage Register, and regardless of whether they are located on Provincial Public Land or private property. Certain sites, including human burials and rock art sites with heritage value, are automatically protected, regardless of their antiquity.



Waterlogged basket (cleaned)

It is important to note that all archaeological sites, regardless of their condition, are protected by the HCA and that it does not distinguish between “intact” (i.e., those sites which are in a pristine, or undisturbed state) and “disturbed” (i.e., those sites which have been subject to alteration, permitted or otherwise) sites. Post AD 1846 historical heritage sites can be protected by Provincial Ministerial Order or Designation by an Order-in-Council.



Shell midden deposits

GUIDELINES FOR CHANCE FIND MANAGEMENT

Step 1: If suspected archaeological materials or features are encountered, stop work in the immediate vicinity of the find and secure the area. Do not undertake further work that could disturb the find, including moving any soil from the vicinity of the site or adjacent spoil material;

Step 2: Contact the Archaeology Branch (see Contacts) for advice on further action;

Step 3: Inform the Ministry Representative (see Contacts).

Note: Based on the nature of the incident, it may be determined that there are no further concerns and activities may continue, or further assessment or mitigation may be required.

MANAGEMENT OPTIONS

In the event that an archaeological site is confirmed, discussions will occur between the Archaeology Branch, the contractor, Indigenous communities, and the Ministries in order to select the appropriate management option*. Options could include:

- 1) Avoidance through partial activity redesign or relocation. This results in minimal impact to the archaeological site, is the preferred option from a cultural resource management perspective and is the least expensive option. An archaeologist impact assessment may be required to define site limits;
- 2) Application of temporary and/or permanent site protection measures as approved by the Archaeology Branch (e.g., fencing off the site, capping the soil). An archaeological impact assessment to identify site boundaries and archaeological monitoring to verify the effectiveness of protective measures may be required;
- 3) Archaeological mitigation consisting of controlled excavations or archaeological construction monitoring; and,
- 4) Monitoring of construction or maintenance activities near the site by a professional archaeologist.

*A permit under Section 12 of the HCA may be required prior to undertaking any of these options.

CHANCE FIND – HUMAN REMAINS

- 1) If suspected human remains are encountered (either intact or disturbed), immediately stop invasive plant management activities and secure the area;
- 2) Do not undertake further work that could disturb the remains. This includes disturbing and/or moving soil;
- 3) Inform the Ministry Representative of the discovery;
- 4) Contact the Archaeology Branch;
- 5) A designate shall contact all Indigenous communities with traditional interests in the area;
- 6) The archaeologist or designate may visit the site with a representative(s) from the local Indigenous community(ies);
- 7) If it is determined that the human remains are not archaeological in nature (i.e., forensic), the local policing authority and Office of the Coroner will be contacted by the Archaeology Branch;
- 8) Discussions between the Archaeology Branch, local Indigenous communities, archaeologist, and the contractor will identify appropriate follow-up procedures including the appropriate treatment of the human remains and reburial procedures.



Bone and antler artifacts

LIMITATIONS

This document was prepared for the exclusive use of invasive plant management contractors working under the Invasive Plant Pest Management Plan for Provincial Public Lands in Southern and Coastal BC. Consistent with the intent of the *Heritage Conservation Act*, contractors are advised that if unanticipated cultural materials or features are encountered during invasive plant management activities, all work in the immediate area should cease, and the guidelines for heritage site chance find management, as presented above, should be implemented. Should contractors have any concerns about archaeological deposits or human remains, an archaeologist should be contacted for direction.

CONTACTS

MINISTRY CONTACT:

Invasive Plant Specialist
Invasive Plant Program, Range Branch
Invasive.plants@gov.bc.ca

ARCHAEOLOGY BRANCH RECEPTION:

Email: Archaeology@gov.bc.ca
Phone: (250) 953-3334

Appendix 5: Invasive Plant Treatment Calibration Records

Calibrating Backpack Sprayers

Even small backpack sprayers require calibrating. Accuracy and knowledge of the sprayer output is essential for proper application of herbicides. Knowing the sprayer output will ensure correct rates of herbicide is being applied to achieve the required level of control.

Before Calibration:

1. Make sure the tank is clean to prevent clogging of hoses and nozzles.
2. Check that all hoses and fittings are not leaking,
3. Ensure the nozzle is not worn or damaged.

These inconsistencies will certainly affect the output.

Calibrating:

First measure the delivery rate or the output of your backpack sprayer by:

1. Accurately measure and mark a test area in the field. For example, a 50 square meter area.
2. Pump up pressure on the backpack sprayer and begin spraying over the measured test area, while maintaining a steady, uniform walking speed and a steady pumping pace, ensuring you are covering the ground evenly with spray and keeping the height of the nozzle at the same distance above the ground (variation in speed and pumping pressure will change the output).
3. Track the amount of time it takes you to spray the area you have marked out.
4. Accurately measure the amount of water required to refill the tank by spraying water from your backpack into a container for the same period of time it took you to spray the measured area (ensure you maintain constant pump pressure).
5. Calibrate the sprayer delivery rate (output) by using the following formula to find the correct amount of herbicide to measure into your backpack.

$$\text{Sprayer Delivery Rate (L/ha)} = \frac{\text{Liters used in test X } 10,000 \text{ m}^2}{\text{Test area (50 square meters)}}$$

E.g., $\frac{\text{L X } 10,000 \text{ m}^2}{10 \text{ m X } 5 \text{ m}} = \frac{\text{_____}}{50 \text{ m}^2} = \text{_____ L/ha}$ (sprayer delivery rate)

Secondly, calculate the area that can be treated with a full tank:

$$\text{Area sprayed by 1 tank} = \frac{\text{Volume of spray mixture in tank (capacity in liters)}}{\text{Sprayer Delivery Rate (Liters per hectare)}}$$

E.g., $\frac{\text{_____ L}}{\text{L/ha}} = \text{_____ ha}$ sprayed by 1 tank

Thirdly, calculate the amount of herbicide to add to the backpack sprayer tank as follows:

$$\text{Amount of herbicide to add to tank} = \text{application rate of herbicide (L/ha)} \times \text{area sprayed by one tank}$$

E.g., Amount of product to add to tank = _____ rate (L/ha) X _____ ha. = _____ liters or _____ milliliters (= amount of herbicide to add to tank)

(To convert liters to milliliters, multiply x 1,000)

Calibrating ATV / Boom Sprayers

Unit type: _____

Date: _____

Determine spray volume to a test area:

(A) **Test strip area:** (_____ m long) x (_____ m wide) = _____ m²

(B) **Equipment specifications (where applicable)**

- Transmission gear: _____
- Engine RPM: _____
- Speedometer setting: _____ km/h

(C) **Spray tank pressure:** _____ Kpa or _____ p.s.i.

(D) **Amount of time used to spray area:** _____ seconds

(E) **Volume of water used in test:** _____ liters

(F) **Calculate spray volume per unit area:**

1) Spray volume (L/ha) = $\frac{\text{"water used in test" (=E) x 10,000m/ha}}{\text{Area of test strip in m}^2 \text{ (=A)}}$

2) Spray volume = _____ L/ha

(G) **Calculate # of Ha. one full spray tank will cover:**

- # of Ha = $\frac{\text{Sprayer tank volume (\# of Liters)}}{\text{Spray volume (L/ha) (=F)}}$

(H) **Amount of product to add to tank:**

- Product amount (Liters) =
Ha tank will cover (=G) x Application rate (L/ha)

Note: always refer to label for appropriate application rate and spray volume that corresponds with the herbicide and target weeds.