



# **What is the proposed Integrated Pest Management Plan (PMP) all about?**

## **BACKGROUND**

A Companion to the Proposed 2009-2014 Coastal Integrated Pest Management Plan

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This document is intended to provide background information and a basic explanation of the coastal integrated pest management plan currently presented for review and comment.

## **The Problem:**

### **What are invasive alien plants and noxious weeds, and why are they a problem?**

Invasive alien plants can be described as plants introduced to coastal BC that aggressively out-compete other plants. The following definitions help to distinguish the various terms associated with these plants for purposes of this PMP.

Invasive – a plant that aggressively forms monocultures and can negatively affect our economy, the environment and human health. It may also be a plant listed under provincial legislation, the *Forest & Range Practices Act* – Invasive Plant Regulation.

[http://www.qp.gov.bc.ca/statreg/reg/F/ForRangPrac/18\\_2004.htm](http://www.qp.gov.bc.ca/statreg/reg/F/ForRangPrac/18_2004.htm)

Alien - a plant introduced to coastal BC from some other part of the world; also known as exotic, non-native or non-indigenous. Most alien plants are *not* invasive, but approximately 10-15% are.

Noxious – a plant listed under the *Weed Control Act* – Weed Control Regulation.

[http://www.qp.gov.bc.ca/statreg/reg/W/66\\_85.htm](http://www.qp.gov.bc.ca/statreg/reg/W/66_85.htm) . These plants are typically agriculturally related.

While there is some overlap in listed species, each is problematic for a variety of reasons. From this point forward in the document, “invasive plants” refers to any plants that are invasive, alien and/or noxious.

Invasive plants can quickly spread out of control because they are not kept in check by the insects and disease that normally do this in their native lands. They can therefore put all of their energy into proliferation (not having to defend themselves). Invasive plants exhibit aggressive growth patterns, creating monocultures and exclude most other life forms. They reduce recreational and crop values, and displace native vegetation (used as forage and shelter by wildlife, and as food, cultural and medicinal purposes by First Nations), ultimately damaging native ecosystems and reducing biodiversity. Some are toxic and even deadly to people.

South coastal BC is presently under siege by invasive plants. There are a few hundred invasive plant species that occupy this region, covering vast areas. When this is considered in relation to the projected human population increase of about a million people by the year 2025 in coastal BC, we soon recognize that the challenge that lies ahead to land managers. There is a profound cost associated with any further inaction. Rare and endangered plant and animal species are vulnerable to continuing advances of these invaders. British Columbia, with its rich biological diversity, is more at risk than any other province. And south coastal British Columbia is particularly at risk relative to other parts of BC and Canada due to our milder and wetter climate.

### **How do they spread?**

Invasive plants are introduced and spread mainly by humans, as well as by wind, water, livestock, and wildlife. Problems caused by invasive plants have increased dramatically in recent decades, due in large part to an increasing human population. Population growth leads to greater disturbance of the land via urbanization, increased demand for food, fibre and resources. Invasive plants generally

require light and soil disturbance to spread. The following four human activities have also been shown to significantly increase their spread into new areas:

- Construction, maintenance and movement of machinery along transportation routes and along utility corridors (pipelines, power lines etc.);
- Resource extraction activities (e.g. road/landing/trail construction and maintenance, machinery and raw resource hauling);
- Horticultural practices (e.g. importation and planting of invasive plants and the careless disposal of garden and backyard refuse into natural areas or ditchlines) and;
- Recreational activities (e.g. rutting by ATV's, boating, and the dumping of aquatic plants into watercourses).

Increased travel, globalization of trade and climate change is accelerating the trend.

Invasive plants are able to establish quickly and out-compete native plants; some of which are rare and endangered. The following list outlines some characteristics that give invasive plants an edge:

1. Early maturation / short life cycles;
2. Profuse reproduction by seeds and/or vegetative structures;
3. Seed viability (long life in the soil, due to resistance to molds etc.);
4. Seed dormancy ensures periodic germination and prevents seedlings from sprouting during unfavourable conditions;
5. Seed adaptations to assist spread e.g. burs, ability to float or catch wind;
6. Production of toxins that suppress the growth of other plants;
7. Prickles, spines, or thorns that can cause physical injury and repel animals;
8. The ability to parasitize other plants;
9. Seeds resemble shape and size of crop seeds, which makes cleaning difficult;
10. Roots and underground structures with large food reserves;
11. Survival and seed production under adverse environmental conditions and;
12. High photosynthetic rates.

## **What are the environmental and human impacts?**

The specific environmental impacts invasive plants have on our ecosystems vary from species to species, site to site. Invasive plants, collectively, create permanent impacts on ecosystems and ultimately contribute to the loss of biodiversity - the diversity of living things and ecosystems that is essential for sustaining both environmental and human well being. In First Nations culture, "everything is connected". Invasive plants destroy this connectedness and disrupt the ecological balance that has existed long before Europeans settled here. Further, invasive species are often cited as the second greatest threat to biodiversity worldwide after habitat destruction (e.g. land clearing). Invasive plants can also cause negative environmental impacts by altering nutrient and hydrological cycles, changing soil chemistry, reducing food supplies for many plant-feeding insects, decreasing water quality and fish habitat, increasing wildfire hazard and frequency, and dominating sites for prolonged periods after establishment, thus making restoration efforts difficult and very costly.

The following are examples of the impacts related to a few notable priority invasive plants that would be potentially targeted for treatment within or within close proximity to high-risk sites under this PMP.

## **Invasive Knotweeds – Japanese, Giant, Bohemian and Himalayan**

- Can fundamentally change the functioning of streams and rivers by excluding lower, slower growing native plants and trees beneath its extensive canopy, due to shade, competition for moisture and nutrients, and its dense-matted litter mass. With minimal sunlight available to drive freshwater food chains at the stream level, aquatic insects that prefer woody plants as food exit. With coarse woody debris and potential food sources negated over time, fish habitat is negatively impacted. Also, knotweeds' extensive root system (that can extend up to 20 meters) lacks true root hairs necessary to bind, and hold in place, stream bank soil. During heavy rain events, banks can erode resulting in sedimentation and further spreading stem and root material downstream, where they lodge and perpetuate their growth cycle.
- Can grow through small cracks in pavement, concrete or drainage structures, reducing structural integrity of public infrastructure—a huge potential burden to tax payers.
- Reduce highway sightlines (visibility), therefore a safety concern.
- As little as 0.7 of a gram of root material or any part of the stem can regenerate a new plant within days in warm, wet conditions. As such, there is significant cost associated with removal/control of knotweed. Land values are or will be negatively impacted, if a given area becomes knotweed infested. A one-time mechanical removal of knotweed, considering disposal and remediation costs can exceed \$200,000.00 per hectare. In England (where the climate resembles our own), the plant is referred to in legislation as “controlled waste” and must be disposed of at licensed landfills.



**Knotweeds are amongst the most difficult plants on earth to control.  
They are rapidly overtaking coastal riparian areas.**

### **Giant Hogweed**

- Produces clear, watery sap that sensitizes human skin to sunlight, resulting in severe burns, blistering and painful dermatitis. Purplish or blackened scars can last for up to seven years. There have been reports of blindness, if sap gets into ones eyes.
- Forms a dense canopy, out-competing and displacing native riparian plant species.
- Increases soil erosion along stream banks in winter when plants collapse (as hogweed roots do not hold/bind soil as well as a healthy complex of native trees, shrubs and herbs). Fish populations are potentially at risk.



**Giant Hogweed is a human health hazard**



**Giant Hogweed is also a significant threat to riparian ecosystems**

### **Scotch Broom**

- Can produce over 30,000 seeds per plant per year; expel the seeds from their pods a distance of up to 5 meters, and the seeds can remain viable in soil for up to 80 years. Represents a real threat to endangered Garry oak ecosystems and other sensitive terrestrial areas, as very little soil is required to grow a mature plant.
- Creates a fire hazard, where established, especially when dry.
- Can prevent reforestation (direct competition to conifer seedlings).
- Offers little cover in winter, and being slightly toxic, is unpalatable to most wildlife.
- Pollen triggers a severe allergic reaction in some people.



**A coastal bluff ecosystem in the dry Coastal Douglas Fir biogeoclimatic zone is a high-risk site for invasion by invasive plants**

### **Gorse**

- Oils in foliage are extremely flammable and increase the risk of wild fires where large monocultures exist.
- Extremely sharp spines can injure people and pets.
- Can smother crop trees in forestry plantations.
- Litter from gorse acidifies the soil, making it unsuitable for native vegetation.

### **Purple loosestrife and Yellow flag iris**

- Are extremely invasive in wetlands, rivers and lakes.
- Do not require soil disturbance to form dense monocultures.
- Create very poor habitat and provide no nutrient value for waterfowl and other wildlife that frequent these sensitive habitats.
- High seed production and matted root systems make control very difficult.

### **What are the economic impacts?**

The US Forest Service has identified invasive species as one of its four critical threats to its natural areas. Economic statistics are more widely available from the US than in Canada, but research is currently being compiled here. By extrapolating American statistics, it is safe to say that invasive plants cost the Canadian economy at least a few billion dollars each year. And this does not consider indirect costs, or intangible costs, such as the destruction of a wetland or loss of an endangered plant or animal species. If these costs were quantified, the amount would be markedly higher. The impacts to our economy are, nevertheless, significant.

To learn more, click to see the following related papers:

[http://www.llbc.leg.bc.ca/public/PubDocs/bcdocs/439433/200803CI\\_Invasive.pdf](http://www.llbc.leg.bc.ca/public/PubDocs/bcdocs/439433/200803CI_Invasive.pdf)

[http://aic.ucdavis.edu/research1/economics\\_of\\_invasive\\_plants.pdf](http://aic.ucdavis.edu/research1/economics_of_invasive_plants.pdf)

## **What has been done to control invasive plants in south coastal BC?**

Biological control agents have been released in the Coast Forest Region since the late 1960's for species too numerous and widespread to be controlled by any other means. These releases have been carried out by staff from Ministry of Forests & Range and Ministry of Agriculture & Lands, as well as by qualified individuals from naturalist clubs. Only in the past few years however, has invasive plant management been elevated in importance and conducted abroad. Ministry of Forests & Range staff, co-op students and contractors are now engaged in the challenge of identifying and mapping populations, and conducting control measures. They, unfortunately, are not keeping up with the pace of change across the coastal landscape and the presence of priority invasive plants is starting to become most evident. More needs to be done.

## **A Solution to the Problem:**

Preventing new introductions and the spread of invasive plants is an issue of shared responsibility and requires the involvement of relevant government agencies, academia, First Nations, private and voluntary sectors. It all starts with education. Prevention is the single most effective management strategy. As there has never been comprehensive weed management in south coastal British Columbia, an integrated pest management plan is currently being developed to address the problem. The agencies involved are sometimes known as BC's "dirt ministries" – the Ministry of Forests & Range (the proponent), the Ministry of Transportation & Infrastructure, the Ministry of Environment and Ministry of Agriculture & Lands (the partners). Given that most invasive plants require light and soil disturbance to proliferate, these agencies are the logical ones to attempt to control them on provincial Crown lands. Important advances can be realized by working closely with the Coastal Invasive Plant Committee, demonstrating leadership and developing capacity in other groups compelled to take action. Only through a cooperative effort will "biological pollution" or "botanical bullies" (invasive plants) be controlled at the landscape level.

## **What is an Integrated Pest Management Plan (PMP)?**

An integrated pest management plan is a plan that describes a systematic program for managing pest populations (e.g. invasive plants) or reducing the damage caused by pests based on the principles of integrated pest management. The program includes an array of the most effective and environmentally friendly control methods or combination of methods, including manual, mechanical, cultural, biological, and, as a last resort, chemical. Manual/mechanical methods include burning, cutting, digging/excavating, mowing, pulling, smothering, steaming etc. and prompt restoration with ecologically suited grasses, plants, and shrubs, if there is associated soil disturbance. Biological control refers to the introduction of an agent, typically an insect, which feeds exclusively on the target invasive plant species. It is the insect predator that would feed on the target plant in its native land. The only agents approved for use that have applicability to south coastal BC, are used to control invasive knapweeds, thistles, toadflaxes, tansy ragwort, St. John's wort and purple loosestrife. If chemical control or herbicides are proposed for use, their methods of handling, preparing, mixing, and application must be described in the PMP. The plan must include strategies to protect community watersheds, domestic and agricultural water sources, fish and wildlife, riparian areas, and wildlife habitat. The PMP also must include strategies to prevent herbicide contamination of food intended for human consumption, as well as pre-treatment inspection procedures (to identify treatment area boundaries), procedures for maintaining and calibrating herbicide application equipment, and procedures for monitoring weather conditions, and strategies for modifying herbicide application methods for different weather conditions.

## What Provincial Crown Land is Included in this PMP?

Although this PMP is being prepared by the BC Ministry of Forests & Range on land over which they have jurisdiction, it is also intended to be used for invasive plant control on provincial Crown land within south coastal BC under the jurisdiction of the BC Ministries of Environment, Transportation and Infrastructure, and Agriculture & Lands.

The map below depicts the outer boundaries of the area that the proposed PMP covers (i.e. south coastal BC).



Provincial Crown land covered under this PMP includes the following by agency:

Ministry of Forests & Range - Forest Service Roads, cut blocks and in-block roads, riparian areas and gravel pits within the South Island, Campbell River, North Island-Central Coast, and Sunshine Coast (excluding the Sechelt side) Forest Districts.

Ministry of Environment - conservancy areas, ecological reserves, protected areas, provincial parks, wildlife management areas, transfers of administration and control and acquisitions, including ecologically sensitive areas, riparian and wetland areas.

Ministry of Transportation & Infrastructure - rights-of-ways, gravel pits, high traffic areas, and areas adjacent to sensitive ecological sites within Service Areas 1, 2, 3 and part of 5.

Ministry of Agriculture & Lands - provincial Crown lands not covered by the other three agencies.

## **Will the public and First Nations get the chance to provide comments on the draft PMP before it comes into effect?**

Before the draft PMP is submitted to the BC Ministry of Environment for confirmation (approval), the BC *Integrated Pest Management Act* and Regulations requires that:

- The applicant (i.e. Ministry of Forests & Range) place notices (2 within a 2 week period) in newspapers circulated in the various communities within the geographic boundaries of the PMP and give the public a 30 day period in which to provide comments; and,
- Undertake consultations with First Nations within the geographic boundaries of the PMP.

## **What herbicides are being proposed for use under the PMP, and when might they be applied?**

Herbicides are but one tool of many that can be used to control invasive plants. The absence of herbicides to date on provincial Crown lands in south coastal BC, has in part, contributed to the present, widespread state of invasive plants today. Many people are unaware of just how incredibly tough and persistent invasive plants are. For instance, a gentleman in Courtenay, B.C. has been faithfully mowing the same knotweed in his yard since 1945. When the costs of fuel and pollution of the environment are considered over this period of time versus just a few judicious and strategically targeted herbicide applications, the latter represents a vastly cheaper, faster and more environmentally friendly option. Herbicide may be required for some species, but keep in mind the following:

- The principles of IPM will be adhered to, ensuring that herbicides, if used, will be strategically targeted and judiciously applied, with an emphasis on using less herbicide over time.
- Existing populations of invasive plants may not necessarily be treated, but rather, kept from expanding further (i.e. beyond a defined containment line). The focus of treatments will be leading edges or gaps between treatment areas that pose risk of further spread into high risk sites e.g. ecologically sensitive areas.
- Herbicide use is considered the last resort under this PMP (i.e. only if no other method is practical such as biological, cultural, manual or mechanical control). If used, all efforts will be made to utilize application methods that minimize any opportunity for herbicide to become airborne and/or reach unintended targets through spray drift. As such, “stem-injection”, “wick-on”, “cut & paint” or “cut & inject” will be the primary application techniques considered. If these techniques are not practical, then “basal bark” or back-pack/ATV spot spray application methods will be employed, as a final resort.

While there are hundreds of herbicide products registered for use to control invasive plants in Canada, only three are proposed for use under this PMP. Their active ingredients include glyphosate, triclopyr and aminopyralid. These ingredients were chosen for their favourable environmental profile (minimal toxicity, persistence and mobility) in a generally wet climate. The following matrix is a summary of the herbicides proposed for use in this PMP.

## Characteristics of Proposed Herbicides

Trade Name:	Milestone*	Garlon Ultra	Vantage Plus Max
Registration No. :	28517	28434	27615
Active Ingredient:	aminopyralid (240 g/L)	triclopyr (480 g/L)	glyphosate (480 g/L)
Form:	liquid	vegetable (seed) oil	liquid
How It Works:	causes uneven plant cell division and growth	mimics auxins (plant growth hormones), disrupting growth	interferes with cellular processes specific to only plants
Selectivity:	selective	selective	non-selective
Species Controlled:	broadleaf invasive plants	broadleaf and woody invasive plants	invasive grasses, broad leaf plants, shrubs, and trees (all plants)
Application Methods:	spot treatments using backpack /ATV sprayer onto foliage of invasive plants	spot treatments with backpack /ATV sprayer onto foliage of broadleaf and woody plants, cut & paint on freshly cut stumps to prevent re-sprouting, or basal bark application on woody species	spot treatments using stem injection or cut & inject (for hollow cavity stem species) or wick or backpack sprayer onto foliage of invasive herbaceous plants (including grasses) and woody plants, or cut & paint on freshly cut woody stumps to prevent re-sprouting
Persistence in Soil: <i>(typical half life in soil)</i>	6 -39 days final breakdown products are carbon dioxide and organic compounds	30-46 days final breakdown products are carbon dioxide, water and organic compounds	3-174 days final breakdown products are carbon dioxide and inorganic phosphate
Toxicity:	low toxicity to humans and aquatic insects, practically non-toxic to mammals, birds and fish	low toxicity to humans, practically non-toxic to birds, bees, fish, and other aquatic organisms	practically non-toxic to fish, mammals, honeybees, slightly toxic to birds and other aquatic organisms

\* registered as a “reduce-risk” herbicide under Canada’s Pest Regulatory Management Agency

For more information, click on the following for each herbicide label:

**Milestone:** [http://pr-rp.pmra-arla.gc.ca/PR\\_SOL/pr\\_web.ve1?p\\_ukid=11815](http://pr-rp.pmra-arla.gc.ca/PR_SOL/pr_web.ve1?p_ukid=11815)

**Garlon Ultra:** [http://pr-rp.pmra-arla.gc.ca/PR\\_SOL/pr\\_web.ve1?p\\_ukid=11769](http://pr-rp.pmra-arla.gc.ca/PR_SOL/pr_web.ve1?p_ukid=11769)

**Vantage Plus Max:** [http://pr-rp.pmra-arla.gc.ca/PR\\_SOL/pr\\_web.ve1?p\\_ukid=6241](http://pr-rp.pmra-arla.gc.ca/PR_SOL/pr_web.ve1?p_ukid=6241)

### What types of treatments/methods are strictly excluded from the PMP?

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

- Native plant species such as salmonberry, alder, or other brush species that may be potentially problematic. Only alien plants that are either invasive or noxious may be targeted;
- Silvicultural treatments (to rid plants that compete for light and resources with tree seedlings);
- Cosmetic or nuisance weed control;
- Aerial spraying via helicopter, fixed-wing plane or truck-mounted boom applications. All herbicide treatments will be selectively applied on a spot-treatment only basis to the targeted invasive plants.

## **Summary (5 W's):**

### **WHAT is this proposed Pest Management Plan (PMP) all about ?**

Vitally important, under represented natural areas such as ecological reserves and wildlife management areas are at risk to increasingly prevalent invasive plant infestations. These plants have the ability to overtake established native plant communities, disrupt natural food webs and destroy ecological integrity. They can also threaten local agriculture, human health and degrade public infrastructure. This PMP allows participating provincial agencies to take control of this ever-increasing problem within their own jurisdictions.

### **WHO is involved?**

Four provincial agencies are partnering in the preparation of the PMP - Ministry of Forests and Range, Ministry of Environment, Ministry of Transportation and Infrastructure, and Ministry of Agriculture and Lands.

### **WHERE will it be in effect?**

If confirmed, control measures against invasive plants may be permitted on provincial Crown lands that:

1. Exist within the geographic area as defined by the collective outline of the Capital, Cowichan Valley, Alberni-Clayoquot, Comox Valley, Strathcona, Powell River and Mount Waddington Regional Districts and
2. Fall within the mandate of the participating ministries, should financial and human resources exist to act:

Ministry of Forests & Range - Forest Service Roads, cut blocks and in-block roads, riparian areas and gravel pits within the South Island, Campbell River, North Island-Central Coast, and Sunshine Coast (excluding the Sechelt side) Forest Districts.

Ministry of Environment – conservancy areas, ecological reserves, protected areas, provincial parks, wildlife management areas, transfers of administration and control and acquisitions, including ecologically sensitive areas, riparian and wetland areas;

Ministry of Transportation & Infrastructure - rights-of-ways, gravel pits, high traffic areas, and areas adjacent to sensitive ecological sites within Service Areas 1, 2, 3 and part of 5.

Ministry of Agriculture & Lands – unoccupied provincial Crown land not covered by the other three agencies.

### **WHEN will it be approved for use?**

The term of the PMP will be for five (5) years. After public and First Nation consultations are complete, this PMP will be submitted for confirmation in the spring of 2009, allowing these agencies to operate under the PMP in the summer of 2009 when most invasive plants are actively growing and most easily identified.

## **WHY is it necessary?**

There has never been comprehensive landscape level weed management conducted on provincial Crown land across south coastal British Columbia. This is one of the reasons that the problem has reached dire levels. And there is a profound cost associated with further inaction as invasive plants continue to proliferate at alarming rates. Rare and endangered plant and animal species are vulnerable to the continuing advance of invasive plants. British Columbia, with its rich biological diversity, is more at risk than any other province such as the United States. And south coastal British Columbia is more at risk than any other part of BC due to our mild, wet climate and burgeoning human population.

We all have a responsibility to do something about invasive plants.

Get involved.....and be part of the solution!

### **To learn more about invasive plant management in BC, please visit the following websites:**

Coastal Invasive Plant Committee - <http://www.coastalinvasiveplants.com>

Invasive Plant Council of BC - <http://www.invasiveplantcouncilbc.ca/>

Ministry of Forests & Range - <http://www.for.gov.bc.ca/hra/Plants/index.htm>

Ministry of Agriculture & Lands - <http://www.agf.gov.bc.ca/cropprot/weeds.htm>