

DISTRICT OF WEST VANCOUVER

750 17th STREET, WEST VANCOUVER, BC V7V 3T3

6.

COUNCIL REPORT

Attachments for item 6. provided under separate cover

Date: May 26, 2014 File: 0117-20/IPSS
From: Corinne Ambor, Manager of Parks Planning and Community Stewardship; and Dan Henegar, Manager of Arboriculture and Horticulture
Subject: 2014 District of West Vancouver Invasive Plants Strategy: Final Report

RECOMMENDED THAT:

- 1. The Invasive Plants Strategy, attached to the report dated May 26, 2014, as Appendix A, be approved; and that
2. The Invasive Plants Strategy be incorporated into District work plans, and into the budget process for 2015 and for subsequent years.

Purpose

This report provides Council with an Invasive Plants Strategy for the District of West Vancouver ("District"), developed by the Invasive Plants Working Group (Appendix A). The Invasive Plants Strategy ("Strategy") is a policy document that sets the direction for the management of invasive plants within the District over the next five years. This report provides an overview and key highlights of the Strategy.

1.0 Background

1.1 Prior Resolutions

At the October 15, 2012, regular meeting, Council passed the following resolutions: THAT

- 1. The report dated October 3, 2012, from the Manager of Parks Arboriculture and Horticulture, and the Acting Senior Manager of Parks, titled "Invasive Plant Species Update and Next Steps", be received for information; and that
2. Staff formulate an Invasive Plant Species Strategy for the District, using a Working Group model, to provide guidance and direction for controlling invasive plant species for the next five years; and that
3. The Draft Terms of Reference for the Invasive Plant Species Strategy Working Group, and the recommendation for the establishment of the Working Group, be referred to the Community Engagement Committee for

their review and approval.

At the April 8, 2013, regular meeting, Council passed the following resolution:

THAT the report dated March 19, 2013 from the Community Engagement Committee regarding revisions to the Invasive Plant Species Strategy Working Group Terms of Reference be received for information.

At the July 8, 2013, regular meeting, Council passed the following resolution:

THAT the report dated June 3, 2013 from the Manager of Parks Planning and Community Stewardship, titled "Invasive Plants Working Group Interim Report" be received for information.

1.2 History

In October, 2012, based on recommendations in the Parks Master Plan, Council passed a resolution to develop a policy on invasive plant species, using the District's Working Group model.

The Invasive Plants Working Group ("IPWG") is comprised of seven members of the community, a member of Council, a representative from School District 45, and supported by District staff; the IPWG was co-chaired by two members of the community. The IPWG held its first meeting in January, 2013. The IPWG's Terms of Reference included the following duties:

1. Review all relevant background documents and similar strategy documents and practices in other jurisdictions, including relevant legislation and bylaws;
2. Determine the scope of the invasive plant issue in the District, and develop a clear definition of the problem;
3. Develop options for solutions that can be incorporated in the Invasive Plants Strategy, and provide recommendations for action, including:
 - funding
 - database/ mapping
 - approaches for specific parks or areas most threatened
 - public education/ information
 - engagement of and ongoing communication with community stewardship groups, nurseries, landscapers, and related groups
 - possible amendment of various bylaws
 - performance measures to assess success, including future monitoring.
4. Prepare a draft Invasive Plants Strategy document for Council approval which will set clear direction for the management and control of invasive plants in the District of West Vancouver over the next five years.

2.0 Policy

2.1 Policy

The IPWG followed Council's Community Engagement Policy, which encourages citizen participation via Working Groups, and which governs the Working Group process:

http://westvancouver.ca/sites/default/files/dwv/assets/gov/docs/Committees-Groups/Committees/Community-Engagement/Documents/COMMUNITY_ENGAGEMENT_POLICY_5_0.PDF

2.2 Bylaw

The 'Pesticide Use Control Bylaw 4377, 2004' was adopted by Council in 2004, and governs the use of pesticides on public or private land for cosmetic purposes:

<http://westvancouver.ca/government/bylaws-strategies-reports/bylaws/pesticide-use-control-bylaw>

The 'Good Neighbour Bylaw 4380, 2004' lists the following as noxious weeds and requires their removal: Canada Thistle (*Cirsium arense*), Bindweed or Morning Glory (*Convolvulus sp.*), Couchgrass (*Agropyron repens*), Purple Loosestrife (*Lythrum salicaria*), and Giant Hogweed (*Heracleum mantegazzianum*):

<http://westvancouver.ca/government/bylaws-strategies-reports/bylaws/good-neighbour-bylaw>

3.0 Analysis

3.1 Discussion

It is widely acknowledged that non-native, invasive plant species are having significant ecological and economic impacts on a global scale. Invasive plants are considered the second most significant threat to global biodiversity after habitat loss. Closer to home, within urban areas like Metro Vancouver, invasive plants can pose human health risks and cause significant damage to parks and infrastructure.

Invasive Plants Working Group

The IPWG established the following principles to guide the development of the District's Invasive Plants Strategy:

- Set priorities for prevention, eradication, containment and control of invasive plants.
- Protect, restore and defend our natural environment.

- Emphasize leadership by District staff by demonstrating best practices for invasive plant management.
- Educate residents and businesses about invasive plants and their management.
- Foster greater involvement of stewardship groups, residents and businesses to increase the District's capacity to manage invasive plants.
- Use cost-effective and efficient measures to manage invasive plants.
- Collaborate with other jurisdictions for the development of a regional invasive species strategy.
- Measure and evaluate the effectiveness of invasive plant management.

2014 District of West Vancouver Invasive Plants Strategy

The Strategy contains 44 recommendations, and proposes a plan for phased implementation over the next five years. The highest priority recommendations include:

- Prioritizing treatment of giant hogweed and knotweed species. A risk assessment was used to determine treatment priority of the nineteen target plant species (Schedule B of the Strategy);
- Amending the Pesticide Use Control Bylaw to allow for the use of pesticides, following Best Management Practices for control of invasive plants when necessary;
- Utilizing pesticides to control invasive plants only when Best Management Practices indicate that either the plant is more harmful to the environment than the use of pesticides; or that other control methods are not effective, are not feasible, or may cause more serious environmental harm;
- Providing annual funding to support invasive plant management for the next five years; and
- Reallocating some funding and staff activity from beautification activities to effective management of invasive plants.

The Strategy also emphasizes many prevention measures to reduce the spread of invasive plants, including the following:

- Use of Best Management Practices in all aspects of invasive plant management;
- Discouraging the sale and planting of invasive plants on public and private lands;
- Developing a communication and education plan to support the Strategy and to ensure that the message reaches a diversity of audiences within the

community; and

- Providing enhanced support for stewardship groups to facilitate the groups to continue their work controlling invasive plants and restoring natural areas.

To provide clarity, nineteen “target” invasive plants were identified by the IPWG to be of the most concern currently for the District. Schedule A of the Strategy outlines a concise summary of the nineteen target invasive plant species with information on how to recognize these target plants (including pictures), a description on the impact or damage caused by the plant, and advice on Best Management Practices for the removal of the invasive plant, and restoration of the area. This schedule is intended to be a reference guide for the community.

Next Steps

The Invasive Plants Strategy, on approval by Council, will form the basis for the District’s actions related to invasive plants management for the next five years.

Upon approval by Council, recommendations in this Strategy will be incorporated into Divisional staff work plans beginning in 2014, and into the budget process for 2015 and subsequent years.

3.2 Sustainability

Globally, invasive plants are considered to constitute a major threat to biodiversity, second only to habitat destruction. Development and implementation of an Invasive Plants Species Strategy will enable the municipality to actively and effectively address this issue.

3.3 Consultation

In April 2013, the IPWG hosted five “public outreach sessions” to gauge the public’s awareness of invasive plants, understanding of options to control invasive plants, and interest in future volunteering opportunities for invasive plant removal efforts in District parks. Members of the IPWG developed information boards, a questionnaire, and a game to test the public’s knowledge of invasive plants identification. Working Group members also attended these sessions. In June 2013, the IPWG also hosted a booth at Community Day.

In February 2014, the IPWG hosted two Open Houses on the draft Invasive Plants Strategy, which was also made available on the web and via westvancouverITE.

3.4 Communications Process

The following communications processes have supported the IPWG’s activities:

- Advertisements were placed in local newspapers promoting the IPWG’s

“public information sessions” in 2013 and the Open Houses in 2014;

- Information boards were developed with Working Group assistance for the 2013 “public information sessions”; these boards were also used at the 2014 Open Houses. Additional boards were provided at the 2014 Open Houses with details about the draft Strategy;
- The existing Invasive Plants brochure was used at all public events and is available at District facilities;
- An IPWG webpage, with the IPWG’s meetings and activities, was created for the public’s information, and as an opportunity for the public to provide feedback:

<http://westvancouver.ca/government/committees-groups/working-groups/invasive-plants-working-group>

- An invasive plants webpage is on the District’s website, and is referenced in the District’s promotional material. This page has photos of invasive plants, a link to the draft Strategy, and information on how to treat invasive plants (see Schedule A of the Invasive Plants Strategy):

<http://westvancouver.ca/invasiveplants>

- Extensive public notification via email and regular mail went to members of the public who had indicated interest; ratepayer and neighbourhood groups; local property management companies; gardening and landscaping companies; and garden retailers.

4.0 Options

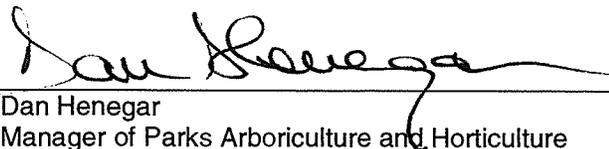
4.1 Council may:

- Direct staff to proceed with the recommendations in this report; and/or
- Request further information; and/or
- Not approve the recommendations.

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Appendix A: Invasive Plants Strategy.

District of West Vancouver Invasive Plants Strategy

May 20, 2014

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Acknowledgements

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Executive Summary

The Invasive Plant Problem

It is widely acknowledged that non-native, invasive species are having significant ecological and economic impacts on a global scale. Invasive plants are considered the second most significant threat to global biodiversity after habitat loss¹. Closer to home, within urban areas like Metro Vancouver, invasive plants can pose human health risks and cause significant damage to parks and infrastructure.

Invasive plants are a major concern in the District of West Vancouver (the District). Several problematic invasive plants are established in the District, with dozens more invasive plants present in Metro Vancouver. A list of nineteen “Target” plants is identified in this Strategy. Some of these, like knotweed and hogweed, require immediate action. Wind and water action, improper disposal including dumping, soil transfer, and landscape maintenance activities all contribute to their spread. Many continue to be available for sale and are used in gardens and landscapes.

The Need for Action

Knotweed species and giant hogweed are two high risk species identified in the District which have the potential to affect human health, damage infrastructure, and degrade natural ecosystems. In recent years, the District has taken steps to manage these plants through direct control methods and by raising community awareness of the issue. However, further action is needed for these species and there are numerous other invasive plants species that also require management. The Invasive Species Council of BC states that “without efforts to contain their spread, invasive plants will generally increase their distribution area an average of 14% annually. This exponential rate means populations double every five years making the task of eventual control financially insurmountable.”²

Taking immediate action to prevent further invasive plant spread will save the District money over the long term. A United States Congressional report stated that “A single dollar spent on prevention can avoid 17 dollars in later expenses.”³ While there is no similar known measure for Canada or Metro Vancouver, in the case of invasive plants, prevention is more effective than cure.

Local stewardship groups have taken action to manage some types of invasive plants in local parks, some for many years and with excellent results. This Strategy recommends enhanced support for stewardship groups to continue their work.

¹ Environment Canada. Why Are Invasive Alien Species a Problem? <http://www.ec.gc.ca/eee-ias/default.asp?lang=En&n=4612AC81-1>

² Invasive Species Council of British Columbia. Invasive Plant Strategy for British Columbia. 2005

³ Office of Technology Assessments of the United States Congress. Harmful, non-indigenous species in the United States. 1993.

The Strategy

West Vancouver Council recognized the significance of the threats posed by invasive plants and established the Invasive Plants Working Group in late 2012 to develop this Invasive Plants Strategy. Schedule C describes the Working Group's activities. The Strategy contains 44 recommendations and proposes a plan for phased implementation over the next five years, in section 5.3. The highest priority items include:

- Prioritizing treatment of giant hogweed and knotweed species. A risk assessment was used to determine treatment priority of the nineteen target plant species (Schedule B);
- Amending the Pesticide Use Control Bylaw to allow for the use of pesticides following Best Management Practices for control of invasive plants when necessary;
- Utilizing pesticides to control invasive plants only when Best Management Practices indicate that either the plant is more harmful to the environment than the use of pesticides or that other control methods are not effective, feasible or may cause more serious environmental harm;
- Providing annual funding to support invasive plant management for the next five years; and
- Reallocating some funding and staff activity from beautification activities to effective management of invasive plants.

The Strategy emphasizes many prevention measures to reduce the spread of invasive plants. These include the use of Best Management Practices (BMPs) in all aspects of invasive plant management, discouraging the sale and planting of invasive plants on public and private lands, and developing a Communication and Education Plan to support the Strategy and ensure the message reaches a diversity of audiences within the Community.

Schedule A offers general BMPs for removal and restoration practices as well as detailed BMPs for treatment of the nineteen target plant species.

1 Introduction

The problems related to invasive plants are not unique to British Columbia. Throughout the world, invasive plants can be found in locations where they have no natural predators or effective competition to control their spread. The consequences can be significant. Invasive plants cause disruption to natural ecosystems by out-competing local species and creating mono-cultures. When invasive plants establish themselves in urban areas, they can cause significant damage to parks and infrastructure.

Many invasive plant species are available in nurseries and garden stores, and some continue to be planted by landscapers and gardeners. Once in place, they spread easily by wind and water action, improper disposal including dumping, soil transfer, and maintenance activities like mowing, weedeating, pruning, brushing. All these activities are major contributors to the spread of invasive plants in Metro Vancouver.

Invasive plants are a major concern in the District of West Vancouver (the District). In particular, knotweed species and giant hogweed have the potential to affect human health, damage infrastructure, and degrade natural ecosystems. In recent years, the District has taken steps to manage these two high risk invasive plant species through direct control methods and by raising community awareness of the issues. Local stewardship groups have also assisted the District to manage some types of invasive plants in local parks.

However, like many other municipalities, the District has not yet taken sufficient action to control the spread of invasive plants. Further delay will only create a larger, more costly problem. “Without efforts to contain their spread, invasive plants will generally increase their distribution area an average of 14% annually. This exponential rate means populations double every five years making the task of eventual control financially insurmountable.”⁴

The District of West Vancouver Parks Master Plan, adopted by Council in July 2012, recommended the development of an Invasive Plants Strategy as a high priority, and made several specific recommendations to control invasive plants. Council recognized the significance of the threats posed by invasive plants and established the Invasive Plants Working Group (Working Group) in late 2012 to develop a Strategy for the next five years.

1.1 Purpose

The purpose of the Invasive Plants Strategy is to create a policy document which will set clear direction for the management of invasive plants within the District of West Vancouver over the next five years.

1.2 Statement of Principles

The Working Group has established principles to guide management of invasive plants:

⁴ Invasive Species Council of British Columbia. Invasive Plant Strategy for British Columbia. 2005

- Set priorities for prevention, eradication, containment and control of invasive plants.
- Protect, restore and defend our natural environment.
- Emphasize leadership by District staff by demonstrating best practices for invasive plant management.
- Educate residents and businesses about invasive plants and their management.
- Foster greater involvement of stewardship groups, residents and businesses to increase the District's capacity to manage invasive plants.
- Use cost-effective and efficient measures to manage invasive plants.
- Collaborate with other jurisdictions for the development of a regional invasive species strategy.
- Measure and evaluate the effectiveness of invasive plant management.

These principles form the basis for all management actions and recommendations in this Strategy.

1.3 So what's the problem?

1.3.1 What is an invasive plant?

Invasive plants are defined as plants that have been introduced by humans to areas outside of their natural range, where they become established and can spread with the potential to cause significant economic, social, and environmental damage⁵. Many introduced plants do not become established because they are unable to adapt to local conditions, while others are not considered a risk even if they do. However, there are some plants that, in the absence of natural predators and other controls, are able to flourish and pose significant risks⁶.

There are very significant risks associated with invasive plants which give urgency to the need to address this problem in the very near term. This is particularly true of Metro Vancouver: a large regional hub with a major port and trade centre, a location on the Pacific flyway for migratory birds, a variety of globally significant species and ecosystems and a growing population with significant development. All of these factors contribute to the region's susceptibility to the introduction and spread of invasive plants. Climate change is predicted to increase BC's vulnerability to invasive plant species.⁷

Invasive plants affect the region economically through the degradation and loss of productive land, damage to infrastructure and property and potential for reduced property values. Environmentally, invasive plants contribute to a loss of biodiversity and the degradation of wildlife habitat, water quality and soils. Invasive plants can have health impacts on people and animals, reduce recreation opportunities and alter valued viewsapes.

⁵ Invasive Species Council of British Columbia. What are invasive species? Retrieved July 7, 2013, from <http://www.bcinvasives.ca>.

⁶ Environment Canada. Invasive Alien Species in Canada. Retrieved July 7, 2013, from <http://ec.gc.ca>.

⁷ Climate Change Impacts Research Consortium. Climate change and vulnerability to invasive plant species in British Columbia: The economics of an uncertain future. Retrieved December 20, 2013 from <http://www.sfu.ca/ccirc/node/10>

Recognizing the threats posed by invasive plants, the federal government developed *An Invasive Alien Species Strategy for Canada* in 2004. This Strategy responded directly to an international commitment made by Canada to control invasive species, after signing the *Convention of Biological Diversity* at the 1992 Rio Summit. The Strategy recognizes the important role all levels of government have in controlling invasive species.

1.3.2 What is the extent of the problem in West Vancouver?

The District started building a GIS (Geographic Information System) based mapping inventory in 2013, using the District's GIS system WestMap. Data regarding the location of knotweed species and giant hogweed has been collected since 2011, and is now being checked and entered into WestMap. Figure 1 shows invasive plant mapping to date. This current data significantly underestimates the extent of invasive plant infestations in the District for two reasons:

1. The knotweed species and giant hogweed inventory is a work-in-progress; and
2. There are 17 other invasive plant species on the Target List (Schedule B) in the District which have not yet been inventoried in WestMap.

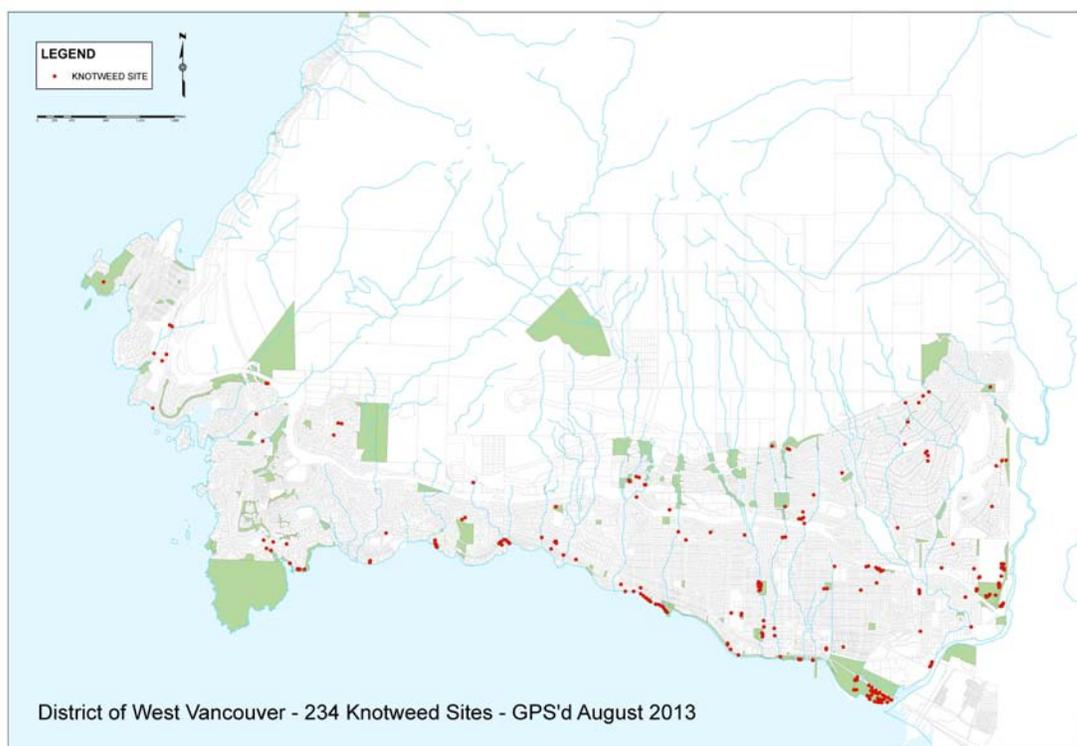


Figure 1. Representative sample of current mapped extent of invasive plants in the District of West Vancouver. Map is under development.

1.3.3 What is the District of West Vancouver doing about the problem?

The Parks Master Plan (2012) stressed the importance of protecting and restoring the District's natural environment and listed as its first goal: "Protect ecological integrity, species habitat and diversity, and heritage values." It also recommended the development of an Invasive Plants Strategy as a high priority. Council's 2013 top priorities reflect this view and includes as a priority, the community's commitment to natural capital.

The District of West Vancouver has made efforts to control the highest risk invasive plants. Since 2010, the District has undertaken a pilot project for the control of Japanese knotweed using chemical stem injection in target areas. This pilot project is in addition to earlier and on-going efforts to control giant hogweed. However, the District has made limited efforts to control the spread of other less threatening invasive plants.

Other District initiatives include:

- Developing public communications materials and creating an invasive plant inventory that will be expanded as resources allow;
- Providing support and coordination to local stewardship groups in their efforts to control invasive plants on public land; and
- Communicating with regional organizations such as the Invasive Species Council of Metro Vancouver (ISCMV), BC Parks, Ministry of Highways, CN Rail and neighbouring municipalities.

1.3.4 Why develop a strategy?

Due to the speed with which invasive plants are spreading in Metro Vancouver, it is imperative that the community take increased steps to prevent, eradicate, contain, and control invasive plants before more significant damage occurs. Making expenditures now means fewer resources will need to be expended in the future. A United States Congressional report stated that "A single dollar spent on prevention can avoid 17 dollars in later expenses."⁸ While there is no similar known measure for Canada or Metro Vancouver, in the case of invasive plants, prevention is more effective than cure.

A District wide strategy is necessary to:

- Bring attention to the problem by showing what is being done and what needs to be done;
- Ensure consistency in prevention and treatment practices between staff, stewardship groups and community members; and
- Provide an organized platform from which the District can move forward to coordinate the implementation of recommended actions.

⁸ Office of Technology Assessments of the United States Congress. Harmful, non-indigenous species in the United States. 1993.

2 SITUATION ASSESSMENT

2.1 Plant List – A Moving Target: Which invasive plants should be managed in West Vancouver?

In order to provide clarity, the Working Group identified a “target list” of 19 invasive plants that should receive priority attention by the District (Table 1). Schedule B documents how this list was derived. There are numerous other weed species that occur in West Vancouver, and more that will establish in the future. The target list aims to include those species of most concern at the present time.

The target plants are classified into four management categories (prevent, eradicate, contain, and control) based on best estimates of their distributions in the District. New plants may be added to the target list and the management category for each plant species may change as the District’s invasive plant inventory develops.

Eradicate – aims to target emergent invasive plants with small numbers of localized populations (e.g. giant hogweed). With quick action and early detection it may be possible to get rid of the species within the District.

Contain – aims to restrict plants that are widespread in the District to isolated sites with some possibility of eventual eradication (e.g. knotweed species). The goal is to restrict these plants to stop their spread.

Control – aims to manage plants that are widespread in the District with little chance of eradication. These plants are only worked on in specific sites where they can be restrained (e.g. butterfly bush).

Prevent – aims to keep invasive plants out. They may be present in surrounding jurisdictions such as Washington State or the Fraser Valley, or are able to grow in similar environments and latitudes (e.g. yellow flag iris).

Table 1. Target invasive plants list for the District of West Vancouver (listed alphabetically)

Common Name	Scientific Name	Management Category
Blackberry – Himalayan Blackberry – evergreen/cutleaf	<i>Rubus armeniacus</i> (synonym: <i>Rubus discolor</i>) <i>Rubus laciniatus</i>	Control
Butterfly bush	<i>Buddleia davidii</i>	Control
Cherry laurel (English laurel)	<i>Prunus lauroceracus</i>	Control
Clematis – old man’s beard (traveler’s joy)	<i>Clematis vitalba</i>	Contain
English holly	<i>Ilex aquifolium</i>	Control
English ivy	<i>Hedera helix</i>	Control
Giant hogweed	<i>Heracleum mantegazzianum</i>	Eradicate
Gorse	<i>Ulex europaeus</i>	Eradicate
Goutweed (bishop’s weed)	<i>Aegopodium podgaria</i>	Contain
Hawkweed – orange	<i>Hieracium aurantiacum</i>	Eradicate

Common Name	Scientific Name	Management Category
Knotweed – bohemian Knotweed – giant Knotweed – Japanese Knotweed – Himalayan	<i>Fallopia x bohemica</i> <i>Fallopia sachalinensis</i> <i>Fallopia japonica</i> <i>Polygonum polystachyum</i>	Contain
Lamium (yellow archangel)	<i>Lamium galeobdolon</i>	Contain
Periwinkle (vinca)	<i>Vinca minor</i>	Contain
Policeman’s helmet (Himalayan balsam)	<i>Impatiens glandulifera</i>	Contain
Purple loosestrife	<i>Lythrum salicaria</i>	Eradicate
Reed canarygrass	<i>Phalaris arundinacea</i>	Eradicate
Scotch broom	<i>Cytisus scoparius</i>	Contain
Small flowered touch-me-not	<i>Impatiens parviflora</i>	Eradicate
Spurge laurel (daphne laurel)	<i>Daphne laureola</i>	Contain

The Invasive Plants List in Schedule B lists existing and potential invasive plants in the District. It can be made available to the public when requested. Species with the potential to invade the District are in the “Prevent” management category. Early detection of these species is critical to enable a co-ordinated rapid response to take place. In the world of invasive plants this approach is referred to as Early Detection Rapid Response (EDRR). The Provincial government has an EDRR program.

2.2 Assessing Risk: How do we focus our efforts?

The risk associated with an invasive plant species combined with its stage of infestation (current distribution) in the District provides a quantifiable way to determine the most appropriate and cost effective response.

Risk Rating

The Working Group developed a risk rating to determine the relative risk of each species on the target list. Schedule B contains background information on the risk assessment.

Factors considered include:

- Impact on human health and/or safety
- Impact on sensitive ecosystems (e.g. creeks and riparian areas, wetlands, rocky bluffs, foreshore) and/or to forest ecosystem (e.g. shade tolerant species)
- Impact on infrastructure
- Impact on recreational opportunities and aesthetic values
- Persistence (i.e. degree of effort and expertise required for removal)

Stages of Infestation

There are three stages of plant invasion:

1. Introduction. During the introduction stage the species occurs at relatively low levels of infestation. Populations are small and consist mainly of individual plants. **Eradication** at this stage is usually feasible.

2. Colonization. The second phase of invasion is known as colonization, during which the plant begins to spread (patch expansion) and disperse over short distances. Infestation size increases. At this stage eradication is more difficult, but it is feasible to **contain** infestations and prevent further spread.
3. Naturalization. The third stage, naturalization, occurs when the species disperses over long distances and becomes abundant across the landscape. Infestation size is large and widespread. At this stage it is only feasible to **control** the species at specific sites to reduce impact on valued land or assets.

The stage of infestation of target plant species in the District has been estimated based on local and regional knowledge.

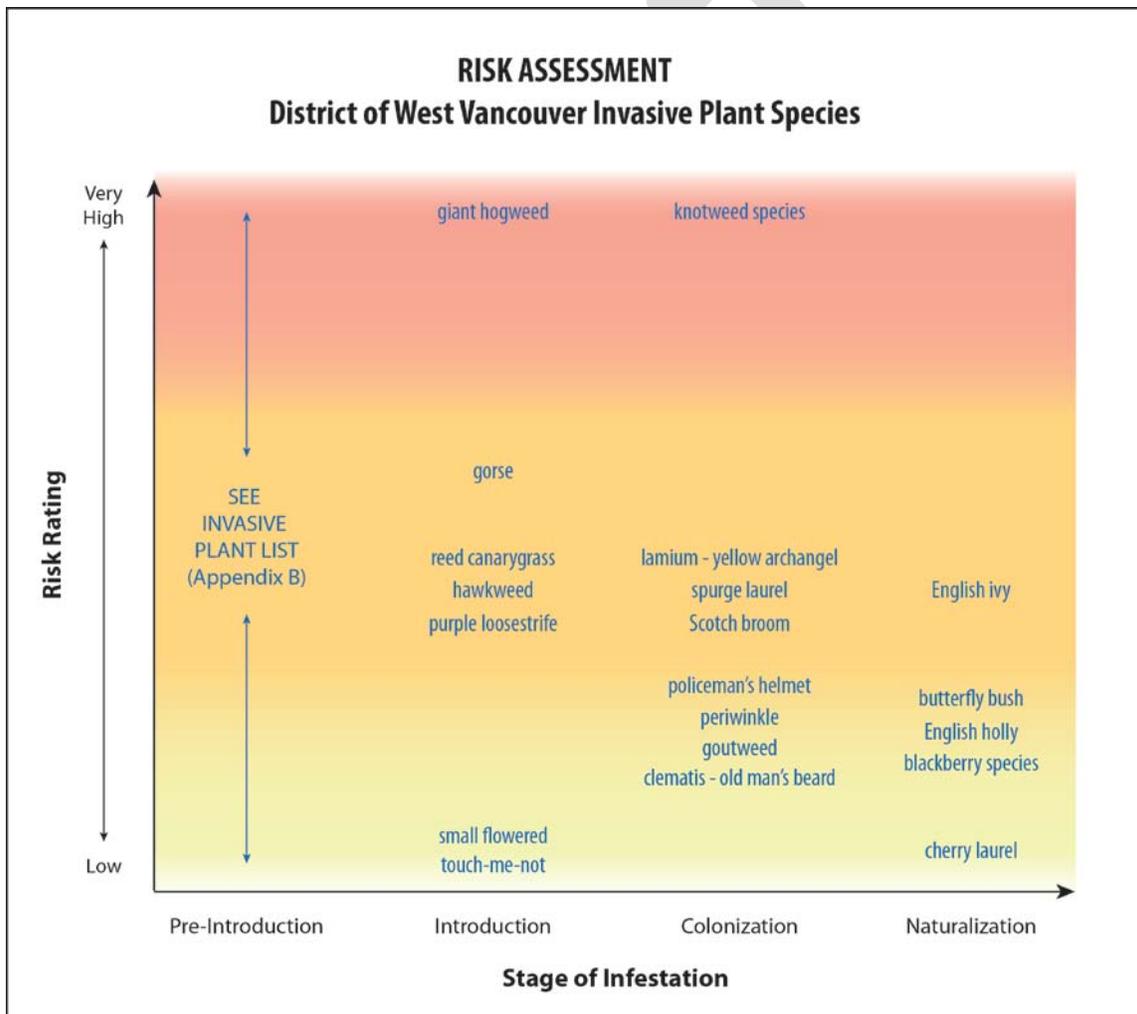


Figure 2. Risk assessment of target invasive plants in the District of West Vancouver.

The resulting risk assessment graphic (Figure 2) allows the District to prioritize management actions. This includes preventing new invasive plant species through early detection, targeting emerging species in the eradicate category, and containing or controlling high risk established

species. The Working Group notes that knotweed species and giant hogweed are high priority plants for immediate attention.

Recommendations – TARGET SPECIES

- 2.2.1. Prioritize treatment of target species in the very high risk category (see Figure 2 this page).
- 2.2.2. Prioritize treatment of species in the eradicate management category (see Table 1, page 6).
- 2.2.3. Adopt measures to contain or control high risk established species.
- 2.2.4. Discourage the sale, planting, transfer or exchange of any plant on the invasive plant species list.
- 2.2.5. Regularly update both the invasive plant species list and target species list and the prescribed management category of each plant species as new local and regional information becomes available.

2.3 Priority Sites: Where should we manage invasive plants?

The District of West Vancouver covers an area of 5,362 hectares, much of it on private land. A large percentage (48.5%) of the land base is forest cover. The balance includes other types of natural areas (e.g. creeks, foreshore, rocky bluffs), parks, buildings, roads, and other infrastructure. Future development will result in additional changes to land type. The District has a long boundary between the developed area and the forest (sometimes called the urban-forest interface).

A large proportion of the District is public land for which District Parks and Engineering staff are directly responsible. Of particular concern on public land is the spread of invasive plants along riparian and transportation corridors, the foreshore and the urban-forest interface.

The challenge for the District is how to use finite resources to manage effectively for invasive plants across a large and diverse land area. Prioritization will assist with determining the most effective use of resources. In order to maximize treatment feasibility these containment strategies can be employed:

- Focus on the least disturbed area first⁹
- Focus on small isolated patches before large patches
- Start upstream and work downstream to prevent source populations from spreading downstream
- Start at the outer edge of an infestation and work inwards
- Focus on “spread pathways” (creeks, paths and roadways)

Table 2 describes priority management zones in the District. These zones should be reviewed regularly to account for new development and changing land use.

⁹ Focusing on least disturbed areas first may seem counterintuitive. Experience elsewhere shows that focusing management priorities on areas with few or no invasive plants is cost effective in the long term, whereas removing invasive plants once established is difficult and costly.

Table 2. Priorities in Invasive Plant Management Zones.

Land Type	PRIORITY		
	Very High	High	Medium
Natural Area (includes parks)	Sensitive and rare ecosystems (riparian corridors, rocky bluffs, foreshore, etc.)	Forest ecosystems	Highly disturbed ecosystems; isolated, small parcels
Urban Area	New development bordering natural areas	Existing development bordering natural area. New development not bordering natural areas.	Existing development not bordering natural areas.
Transportation Corridors (e.g. highways, arterial roads, rail)	Intersection with very high priority natural areas	Intersection with high priority natural areas	Intersection with urban area and medium priority natural areas

Establishment of invasive plant management zones can help the District to prioritize management actions. This includes targeting intact natural areas largely unaffected by invasive plants, new development areas and transportation corridors which intersect natural areas.

Recommendation – PRIORITY MANAGEMENT ZONES

2.3.1. Develop a map, showing location of priority invasive plant species in relation to areas of concern as delineated in the management zones table. Use the map to prioritize areas for treatment.

2.3.2. Conduct a review of priority management zones every 3 to 5 years to assess effectiveness and address changing land uses.

2.4 Mapping: How do we keep track of the situation?

An invasive plant inventory provides the foundation for all management decisions. An inventory can supply important information, including:

- what invasive plants are present;
- where invasive plants are located;
- what treatment (if any) has been recommended and/or completed;
- how effective has the treatment been; and,
- the status of the infestation.

The District started building a GIS (Geographic Information System) based mapping inventory in 2013, using the District's GIS system WestMap. This system is able to indicate graphically the location of invasive plants. It can provide information to allow for regular updates and tracking of invasive plants spread and treatment. This system may be expanded to include other invasive plants as necessary. The Province also maintains a database as part of its Invasive Alien Plant Program (IAPP).

How should invasive plant information be collected?

Developing an inventory of invasive plants in the District requires a phased approach. Currently the District's efforts are focused on knotweed species and hogweed data collected since 2011. The District's large area (much of it on private property) and high percentage of forest land and other natural areas, affect how much inventory work can be completed in a given year. Availability of District staff and volunteers to assist is also a limitation. Currently, the District encourages the public to report occurrences of invasive plants. Implementation of a local online public reporting mechanism for high risk species could benefit the inventory process.

Recommendations – INVENTORY

2.4.1. Continue the development of a district-wide inventory of invasive plants on public and private land and update continuously. This includes developing a mechanism for the public to report plants on the target list and invasive plants list and developing techniques for mapping and monitoring of invasive plants so residents and community groups may participate effectively.

2.4.2. Share data from the invasive plant inventory with other jurisdictions/institutions (e.g. CN Rail, BC Parks, neighbouring municipalities etc.).

The most current mapped inventory is shown in Figure 1 and can be accessed online in WestMap at westvancouver.ca.

3 Guidelines for Invasive Plant Management – on the ground

3.1 Treatment and Control Methods

There is considerable information available regarding invasive plants and their management in this province and abroad. Science and management strategies continue to evolve as new threats are identified. Much of this information can be publicly accessed and used either directly or adapted to meet specific conditions in West Vancouver.

Generally, protocols and strategies should be guided by the ***Provincial Pest Management Plan (PMP) for the South Mainland Coast***¹⁰. The Invasive Species Council of British Columbia (ISCBC) and the Invasive Species Council of Metro Vancouver (ISCMV) are also excellent sources of relevant information. These local sources provide the latest Best Management Practices (BMPs) related both to the treatment of specific invasive plants and general preventative practices to reduce spread. Using this information, the District has created its own BMPs for the treatment and control of invasive plants (Schedule A).

Treatment methods generally fall under four categories: preventative maintenance, mechanical treatment, chemical treatment, and biological control. Determining the appropriate treatment method depends on several factors, namely: effectiveness, cost-efficiency, practicality, safety, and potential for environmental harm.

Preventative maintenance involves maintenance techniques that reduce opportunities for invasive plants to become established. These measures are used commonly in landscaped

¹⁰ BC Ministry of Environment. Pest Management Plan for Invasive Alien Plant and Noxious Weed Control on Provincial Crown Lands within the South Coastal Mainland of British Columbia. Retrieved Aug 2, 2013, from <http://gov.bc.ca>

settings (both large scale planted beds in public areas and smaller scale gardens on private property). A good example of preventative maintenance is applying mulch to prevent weed seed from establishing on exposed bare soil.

Mechanical treatment involves physically removing plants by hand, with tools or with machinery. It also includes other types of physical treatment such as covering infestations with plastic, cardboard or deep mulch to smother invasive plants. In some cases mechanical treatment can have a detrimental effect such as triggering a plant to expand its root system, sprout new shoots, or initiate seed germination.

Chemical treatment refers to the application of pesticides to control invasive plants. The Working Group shares the concerns of residents about the use of pesticides and recommends the use of pesticides only when necessary. Due to the threats posed by knotweed species and the ineffectiveness of mechanical treatments, current Best Management Practices recommend the use of pesticides. There are, however, other situations when the use of pesticides may be necessary when other methods are not possible (e.g., large patches of hogweed, or sites inaccessible for mechanical removal). Therefore, the Working Group strongly recommends adherence to Best Management Practices when considering controlling invasive plants with pesticides.

Biological control relies on the introduction of a plant's natural enemies (e.g. insects, parasites and pathogens) to reduce its population. Currently the only target species in District with an approved bioagent is purple loosestrife. In the future, bioagents may be available for control of some target species including knotweed, Scotch broom and gorse.

Recommendations – TREATMENT AND CONTROL METHODS

- 3.1.1. Ensure the District's Best Management Practices for invasive plants follow the most current scientific information and management strategies.
- 3.1.2. On public lands, the use of pesticides to control invasive plants should only be used when Best Management Practices indicate that: a) the invasive plant is more harmful to the environment than the use of pesticides, or b) other control methods are not effective, feasible, or are considered to be more harmful to the environment than the use of pesticides.
- 3.1.3. On private lands, residents should follow the Best Management Practices for control and management of invasive plants. The use of pesticides must comply with current municipal and provincial regulations. This can be best achieved by retaining the services of a Certified Pesticide Applicator¹¹ who holds a Pesticide User License.

3.2 Best Management Practices/District Practices

Best Management Practices (BMPs) are approaches based on known science that result in the most effective outcome. Schedule A to this Strategy, sets out the best known approach for addressing or managing invasive plants in the District. It is important to update these BMPs

¹¹ Under the BC Integrated Pest Management Act and Regulations a Pesticide User License is required if a person provides or offers to provide a service involving the use of a non-excluded (e.g. glyphosate) pesticide under a contract for services. Further, pesticide application must be performed by or supervised by someone with a pesticide applicator certificate endorsed by the appropriate category of pesticide use (e.g. Landscape-General or Industrial Vegetation and Noxious Weeds).

based on monitoring results at local sites, changes in management practices and new information learned from other agencies.

Recommendations – BEST MANAGEMENT PRACTICES

- 3.2.1. Implement Best Management Practices (Schedule A) for control of invasive plants, and ensure they are made available to the public.
- 3.2.2. Encourage the removal of any invasive plant species that may be used as nesting sites prior to March 15th and after August 15th to avoid the nesting season (e.g. blackberry species, English ivy, etc.).
- 3.2.3. Develop guidelines for District staff to review a site prior to maintenance work being undertaken on a boulevard or any District land.

3.2.1 Contaminated Materials Management

Invasive plants and their seeds can be dispersed in many ways. Wind, water, birds and animals, illegal dumping, vehicles, equipment, and transportation of contaminated material are some examples. Many of these factors are out of the District's control; however, strategies can be adopted to manage others.

One of the most common and preventable ways that invasive plants spread into natural areas is by illegal dumping of green waste. Dump sites are typically located in natural areas behind residential properties or at the end of short, unsanctioned trails on the edge of natural areas. Education on proper disposal techniques targeting both residents and landscape contractors may help curtail this problem.

Control of potentially contaminated materials (e.g. fill, soil, gravel, excavated material from construction sites) at the source would prevent the spread of invasive plants. Although this is a regional issue, raising awareness of the problem among target audiences (e.g. construction, demolition and landscape contractors) is a first step towards solving the problem. Simple measures such as inspecting and cleaning equipment and vehicles after contact with contaminated materials will reduce the chance of spread.

Recommendations – CONTAMINATED MATERIALS MANAGEMENT

- 3.2.4. Work with Metro Vancouver to develop soil transfer and disposal regulations and adopt regional "invasive free" certification for soil suppliers and **keep pace with Best Management Practices at a regional level.**
- 3.2.5. Amend the District's invasive plant communication materials to include information on the proper transport and disposal of invasive plants and contaminated soil in keeping with regional policy as it is developed.
- 3.2.6. Develop equipment cleaning protocol to reduce possibility of invasive plant spread via District equipment. Share protocol with private contractors.

3.3 Restoration

Treatment of invasive plants can result in removal of vegetative cover and exposure of bare soil. These conditions are ideal for new invasive plants to establish. Some areas will recover naturally after treatment. For example, in forests at the urban margin and many parks, there can be enough native plants to re-vegetate newly weeded areas through seed germination or plant

spread. However, other areas may require restoration through selective planting and/or other methods to reduce the risk of soil erosion and re-invasion by non-native plants. In these cases, a restoration plan should be prepared before invasive plants are removed.

Restoration methods include:

- Natural colonization or succession (including altering site conditions to promote succession);
- Seeding of desirable grasses;
- Replanting with appropriate trees and shrubs; and
- Planting of live cuttings.

Successful restoration planting is dependent on choosing plant species which are ecologically suited to the site conditions. Typically, primary succession trees and shrubs (those which naturally colonize disturbed sites) will have the highest survival rates. Schedule A contains Best Management Practices, including appropriate plant species, for restoration planting.

Recommendations – RESTORATION

3.3.1. Restoration, with native plants where appropriate, should accompany invasive plant removal to reduce risk of re-infestation by invasive plants. Refer to Best Management Practices noted in Schedule A.

4 Strategies to Mitigate the Spread of Invasive Plants

4.1 Regulations and bylaws

4.1.1 Regulatory Framework

The District of West Vancouver does not have a specific bylaw to manage invasive plants. However, there are provisions in other bylaws and regulations. Table 3 contains a summary of federal, provincial and municipal regulations related to invasive plant management.

Table 3. Summary of existing regulations related to invasive plant management.

Jurisdiction	Regulation/Bylaw	Relevance
Federal	Plant Protection Act S.C. 1990, c.22	Regulates distribution of listed invasive plants
	Seeds Act, R.S.C. 1985, c. S-8	Regulates distribution of listed invasive plants
Provincial	Weed Control Act [RSBC 1996] CHAPTER 487	Controls listed noxious weeds on all but federal lands
Municipal	Good Neighbour Bylaw No. 4380, 2004	Requires removal of noxious weeds listed in Schedule A of this bylaw which current includes: Canada thistle, morning glory, couchgrass, purple loosestrife, and giant hogweed.
	Parks Regulation Bylaw No. 3110, 1984	Controls dumping of yard trimmings (which may contain invasive plants); prohibits removal of park plants
	Boulevards Bylaw No. 3191, 1984	Requires property owners to maintain (e.g. weeding, mowing) boulevards fronting their property. Currently under review by the District.
	Business Licence Bylaw No. 4455, 2005	Requires annual renewal of business licences for businesses (including landscape/gardening sector)
	Pesticide Use Control Bylaw No.	Limits use of pesticides to control invasive plants

Jurisdiction	Regulation/Bylaw	Relevance
	4377, 2004	
	Solid Waste Utility Bylaw No. 4740, 2012	Permits disposal of invasive plants (but not soil) as part of yard trimmings collection process
	Soil Removal and Deposit Regulation Bylaw No. 3786, 1992	Permits soil removal but does not address potential spread of remnant invasive plants and/or seed stock in soil

* Specific bylaw protection

The District can adopt the Provincial Weed Control Act but is not required to. The Provincial Weed Control Act covers many types of land not present in the District, like agricultural land; and it does not include many species that are on the Target List in this document. The District can also use the Community Charter to control invasive plants. The Community Charter enables the District to create bylaws, which is a mechanism already in place.

The District has several bylaws that could be used to control invasive plants. Some bylaw provisions are clear, reasonable and well-known and could have increased enforcement immediately. For example, the Business Licence Bylaw requires every landscaping or gardening business to have a licence, and the Parks Regulation Bylaw prohibits disposal of any waste, including invasive plants, in any park.

Other existing District bylaws could be used to address invasive plant problems. These would require communication with the public before enforcement. For instance, the Boulevards Bylaw (currently under review) requires residents to maintain the boulevards adjoining their properties and limits the height of planting. Boulevards are a vector for invasive plant spread, so this bylaw could be effective in reducing both natural spread and spread as a result of maintenance practices, particularly if the bylaw were amended to preclude the planting of invasive plants, as recommended in the Parks Master Plan.

Some existing bylaws limit management options for invasive plants. For example, the District's Pesticide Use Control Bylaw has restricted and delayed chemical treatment of knotweed. The Working Group therefore strongly recommends that the Pesticide Use Control Bylaw be amended to allow for the use of pesticides following Best Management Practices for control of invasive plants when necessary.

Education and communication of Best Management Practices are the preferred option to encourage property owners to remove invasive plants. However, bylaws can be used to support the District when property owners are either unwilling or unable to remove invasive plants of concern.

Any proposals for new bylaws or changes to existing bylaws should consider these general principles:

- Education and communication should precede use of regulations;
- Regulations should be used sparingly and only after other measures have been tried.

4.1.2 Business Licences, Building Permits, and Other Regulatory Mechanisms

Municipal mechanisms such as the business licence and building permitting processes offer opportunities to communicate with those whose activities may contribute to the spread of invasive plants. For example, increasing awareness among landscape and garden professional could discourage the planting of targeted plant species and encourage proper transport and disposal practices.

Recommendation – BYLAWS

4.1.1. Increase enforcement of business licenses for landscaping and gardening companies, and use the business licencing process as an opportunity to distribute Best Management Practices and educational materials re invasive plants.

4.1.2. Amend the Pesticide Use Control Bylaw to allow for the use of pesticides following Best Management Practices for control of invasive plants when necessary.

4.1.3. Amend the Boulevards Bylaw to include a schedule listing the target list of invasive plants not to be planted on boulevards.

4.1.4. Amend the Parks Regulation Bylaw to prevent the planting of invasive plants on District lands.

4.1.5. Amend Schedule A of the Good Neighbour Bylaw to include knotweed species.

4.1.6. Increase enforcement of the maintenance provisions of the Boulevards Bylaw for property owners as it relates to invasive plants.

4.2 District Managed Lands

The District is responsible for the management of public land. Urban areas include boulevards, medians, parks, District facilities, roads and trails. The School District manages school grounds. The District is also responsible for a large area of forest and other natural areas. Management strategies will differ between urban and natural areas.

Recommendations – DISTRICT MANAGED LANDS

4.2.1. Update and adopt staff Best Management Practices for the management of invasive plants on public land including identification, treatment, removal, disposal and restoration options.

4.2.2. Develop Best Management Practices for district storage areas and equipment to reduce the spread of invasive plants.

4.2.3. Continue and enhance education of all District staff on Best Management Practices.

4.3 Private Lands and Privately Managed Lands

Privately owned land occupies a significant portion of the lands within District boundaries. In addition to private lots owned by residents and businesses, a large portion of the upper lands is privately owned. Future development on private lands may increase the spread of invasive plants. The District shares a long boundary with Cypress Provincial Park which is managed by BC Parks. There are other stakeholders who manage the transport and utility corridors crossing the District, such as CN Railway, the Ministry of Highways, and BC Hydro.

To be effective in the control and management of invasive plants, the District must manage its own lands and work with residents and other stakeholders on private lands.

Recommendations – PRIVATE LANDS

- 4.3.1. Collaborate with large scale land owners and other entities to encourage use of Best Management Practices set out in Schedule A for invasive plant species management on private land, in transportation corridors (road and rail) and undeveloped natural areas.
- 4.3.2. Develop an “Approved Contractor” list for invasive plant removal for District managed lands.
- 4.3.3. Communicate with nurseries and garden-related businesses operating in the District about the problems posed by invasive plants.
- 4.3.4. Discourage planting of any species on the invasive plant list on residential lots and new developments.
- 4.3.5. Educate property owners about their obligations, particularly regarding boulevard maintenance and dumping.

4.4 Communication and Education

The public consultation process held in advance of the development of this Strategy revealed that awareness levels about invasive plants vary widely. Some residents are very well informed, and some did not know what invasive plants are or why they are a concern. Most people had some understanding of the invasive plants issue, but most did not know what actions they could or should take.

Engaging residents is seen by the Working Group as a crucial step in the management and control of invasive plants. Comprehensive communications and education can provide residents with the information and tools to take appropriate action with invasive plants on their property, and also support the work of stewardship groups.. A great deal of information exists in the public realm. The District can make this information available through regular channels like westvancouver.ca.

Schedule A provides information on invasive plants and Best Management Practices, which this Strategy recommends be made available to the public so residents can have an easy reference on invasive plants.

Recommendations – COMMUNICATION AND EDUCATION

- 4.4.1. Develop and implement a Communication and Education Plan to support the Invasive Plants Strategy.

4.5 Stewardship Groups and Community Volunteers

The District has limited resources with which to manage invasive plants. Assistance from stewardship groups and other community volunteers over the years has been invaluable in the control of some invasives plants, for example, the control of ivy in Lighthouse Park by the Lighthouse Park Preservation Society. District support for stewardship groups’ invasive plant initiatives would further support the control of invasive plants as well as many of the principles listed earlier in the document. These groups often have specialized expertise or local knowledge that can assist invasive plant management, in addition to assisting with identification and removal. School groups and youth organizations are another important source of community volunteers eager to assist in the control of invasive plants.

Stewardship groups rely on some District resources to support their efforts (e.g. having a staff person present during invasive plant removal events to provide supervision and advice). Stewardship groups have pointed out that for every hour of a volunteer removing ivy (or similar stewardship activity), another volunteer has put in a half hour of work organizing dates, locations, publicizing the stewardship event through emails, posters, websites; organizing equipment, refreshments and prizes is also part of this role, in addition to ensuring volunteers sign in and are oriented to the work they are doing.

The District has assisted with communications support and encouragement. Stewardship groups have stated that they would appreciate increased support from the District for coordinating their events so they can focus on volunteer recruitment and other activities that directly support management of invasive plants.

Recommendations – STEWARDSHIP GROUPS AND COMMUNITY VOLUNTEERS

- 4.5.1. Enhance support and collaboration with local stewardship groups to coordinate and facilitate invasive plant removal activities.
- 4.5.2. Work with existing volunteer groups and encourage the creation of new groups to contribute to the inventory of high risk invasive plants.
- 4.5.3. Encourage neighbourhood monitoring and management of invasive plants.
- 4.5.4. Share District Best Management Practices with stewardship groups and community volunteers to ensure consistent management standards.

4.6 Interagency and Inter-jurisdictional Cooperation

Invasive plant species are frequently spread over long distances, often across multiple jurisdictions. Cross border movement of invasive plants and seeds is inevitable due to our extensive regional trade and transportation network. Natural dispersal from wind, water, birds, and animals can also be extensive. A coordinated, regional effort is required to control the establishment and spread of invasive plants.

The District should work closely with local agencies and stakeholders, including different levels of government, to have, to the fullest extent possible, similar bylaws, priorities, and protocols relating to invasive plant species and transport of soils. Ideally these measures would be consistent across all municipalities within Metro Vancouver.

Recommendation – INTERAGENCY AND INTER-JURISDICTIONAL COOPERATION

- 4.6.1. Collaborate with other agencies and jurisdictions to support and develop regional strategies to manage invasive plants, including ISCMV's efforts to develop a regional invasive species strategic plan.

5 Implementation Plan and Monitoring

5.1 Funding

It is expensive to control invasive plants and yet doing nothing is not an option. Invasive plant control costs will escalate rapidly if action is delayed. The most cost-effective option for controlling invasive plants is to treat them aggressively and as soon as possible.

The problem facing all jurisdictions is how to find the funding necessary for the management of invasive species. Funding sources are limited to: better use of existing resources, grants from senior governments/agencies or tax increases. It may be unlikely that District citizens would opt for a tax increase solely for the management of invasive plants. The Working Group strongly recommends that invasive plant management be accomplished by providing annual funding for the next five years and by reallocating some existing funding from beautification activities.

Better use of existing resources: the District currently directs a certain level of resources toward community beautification. This is appreciated by many but a focus on invasive plants management, at least in the short term, is considered by the Working Group to be a wiser use of resources in the face of the invasive plants issue. Increased education about invasive plants will provide citizens with a better understanding of the threats posed by invasive plants. Over time, this may lead to increased support for a shift from beautification activities toward invasive plant management.

The Parks Master Plan stresses the importance of protecting and appreciating the District's natural spaces, including streams, forests, shoreline and other ecosystems. Its number one goal is to "protect ecological integrity, species habitat and diversity, and heritage values" and recommends sustainable landscaping with native plants.

Recommendations – FUNDING

- 5.1.1. Provide annual funding to support invasive plant management for five years.
- 5.1.2. Reallocate some funding and staff activity from beautification activities to effective management of invasive plants.
- 5.1.3. Pursue non-District funding opportunities and grants to support invasive plant management.
- 5.1.4. Where cost-effective, the District should use contractors to control and remove invasive plants.

5.2 Monitoring and Evaluation

Monitoring is necessary to evaluate whether control efforts for invasive plants are working. This process provides important information that can be adapted to improve the effectiveness of subsequent treatments and ensure invasive plants do not recolonize previously treated areas.

Recommendation – MONITORING AND EVALUATION

- 5.2.1. Develop a framework for annual assessment of the progress of the Invasive Plants Strategy.

5.3 Implementation Plan

The implementation plan includes all key recommendations within the Invasive Plant Strategy. They appear in the same sequence and sub sections as the rest of the document. The implementation plan identifies the priority, phasing and relative cost of each recommendation.

Priority: The priority has been rated as either very high (VH), high (H), moderate (M), or low (L). Low is relative since all recommendations are important.

Phasing:

- Short – within 2 years
- Medium – 2-5 years
- Long – 6-10 years
- Ongoing

Approximate Cost: Capital project costs are per project; ongoing costs are on an annual basis.

- Low – under \$25,000
- Mod – \$25,000-\$75,000
- High – over \$75,000

Table 4. Implementation Plan.

Key Recommendations		Priority	Phasing	Relative Cost
Target Species				
2.2.1	Prioritize treatment of target species in the very high risk category.	VH	Short	High
2.2.2	Prioritize treatment of species in the eradicate management category.	H	Short	High
2.2.3	Adopt measures to contain or control high risk established species.	H	Short	High
2.2.4	Discourage the sale, planting, transfer or exchange of any plant on the invasive plant species list.	H	Ongoing	Low
2.2.5	Regularly update both the invasive plant species list and target species list and the prescribed management category of each plant species as new local and regional information becomes available.	L	Ongoing	Low
Priority Management Zones				
2.3.1	Develop a map, showing location of priority invasive plant species in relation to areas of concern as delineated in the management zones table. Use the map to prioritize areas for treatment.	H	Short	Low
2.3.2	Conduct a review of priority management zones every 3 to 5 years to assess effectiveness and address changing land uses.	L	Medium	Low
Inventory				
2.4.1	Continue the development of a district-wide inventory of invasive plants on public and private land and update continuously. This includes developing a mechanism for the public to report plants on the target list and invasive plants list and developing techniques for mapping and monitoring of invasive plants so residents and community groups may participate effectively.	H	Ongoing	Low/Mod

Key Recommendations		Priority	Phasing	Relative Cost
2.4.2	Share data from the invasive plant inventory with other jurisdictions/institutions (e.g. CN Rail, BC Parks, neighbouring municipalities etc.).	M	Ongoing	Low
Treatment and Control Methods				
3.1.1	Ensure the District's Best Management Practices for invasive plants follow the most current scientific information and management strategies.	H	Ongoing	Low
3.1.2	On public lands, the use of pesticides to control invasive plants should only be used when Best Management Practices indicate that: a) the invasive plant is more harmful to the environment than the use of pesticides, or b) other control methods are not effective, feasible, or are considered to be more harmful to the environment than the use of pesticides.	VH	Short	Low
3.1.3	On private lands, residents should follow the Best Management Practices for control and management of invasive plants. The use of pesticides must comply with current municipal and provincial regulations. This can be best achieved by retaining the services of a Certified Pesticide Applicator who holds a Pesticide User License.	H	Medium	Low
Best Management Practices				
3.2.1	Implement Best Management Practices (Schedule A) for control of invasive plants, and ensure they are made available to the public.	H	Short	Low/ Medium
3.2.2	Encourage the removal of any invasive plant species that may be used as nesting sites prior to March 15 th and after August 15 th to avoid the nesting season (e.g. blackberry species, English ivy, etc.).	L	Ongoing	Low
3.2.3	Develop guidelines for District staff to review a site prior to maintenance work being undertaken on a boulevard or any District land.	Medium	Medium	Low
Contaminated Materials Management				
3.2.4	Work with Metro Vancouver to develop soil transfer and disposal regulations and adopt regional "invasive free" certification for soil suppliers and keep pace with Best Management Practices at a regional level.	L	Ongoing	Low
3.2.5	Amend the District's invasive plant communication materials to include information on the proper transport and disposal of invasive plants and contaminated soil in keeping with regional policy as it is developed.	M	Medium	Low
3.2.6	Develop equipment cleaning protocol to reduce possibility of invasive plant spread via District equipment. Share protocol with private contractors.	M	Medium	Low/ Mod
Restoration				
3.3.1	Restoration, with native plants where appropriate, should accompany invasive plant removal to reduce risk of re-infestation by invasive plants. Refer to Best Management Practices noted in Schedule A.	H	Ongoing	Low
Bylaws				
4.1.1	Increase enforcement of business licenses for landscaping and gardening companies, and use the business licencing process as an opportunity to distribute Best Management Practices and educational materials re invasive plants.	H	Short	Low
4.1.2	Amend the Pesticide Use Control Bylaw to allow for the use of pesticides following Best Management Practices for control of invasive plants when necessary.	VH	Short	Low

Key Recommendations		Priority	Phasing	Relative Cost
4.1.3	Amend the Boulevards Bylaw to include a schedule listing the target list of invasive plants not to be planted on boulevards.	M	Short	Low
4.1.4	Amend the Parks Regulation Bylaw to prevent the planting of invasive plants on District lands.	M	Medium	Low
4.1.5	Amend Schedule A of the Good Neighbour Bylaw to include knotweed species.	M	Short	Low
4.1.6	Increase enforcement of the maintenance provisions of the Boulevards Bylaw for property owners as it relates to invasive plants.	H	Medium	Low/Mod
District Managed Lands				
4.2.1	Update and adopt staff Best Management Practices for the management of invasive plants on public land including identification, treatment, removal, disposal and restoration options.	H	Short	Low
4.2.2	Develop Best Management Practices for district storage areas and equipment to reduce the spread of invasive plants.	M	Medium	Low
4.2.3	Continue and enhance education of all District staff on Best Management Practices.	H	Ongoing	Low
Private Lands				
4.3.1	Collaborate with large scale land owners and other entities to encourage use of Best Management Practices set out in Schedule A for invasive plant species management on private land, in transportation corridors (road and rail) and undeveloped natural areas.	M	Long	Low
4.3.2	Develop an “Approved Contractor” list for invasive plant removal for District managed lands.	M	Short	Low
4.3.3	Communicate with nurseries and garden-related businesses operating in the District about the problems posed by invasive plants.	M	Short	Low
4.3.4	Discourage planting of any species on the invasive plant list on residential lots and new developments.	H	Short	Low
4.3.5	Educate property owners about their obligations, particularly regarding boulevard maintenance and dumping.	H	Medium	Low/Mod
Communication and Education				
4.4.1	Develop and implement a Communication and Education Plan to support the Invasive Plants Strategy.	H	Short	Mod
Stewardship Groups and Community Volunteers				
4.5.1	Enhance support and collaboration with local stewardship groups to coordinate and facilitate invasive plant removal activities.	M	Short	Mod
4.5.2	Work with existing volunteer groups and encourage the creation of new groups to contribute to the inventory of high risk invasive plants.	M	Ongoing	Low
4.5.3	Encourage neighbourhood monitoring and management of invasive plants.	L	Medium	Low
4.5.4	Share District Best Management Practices with stewardship groups and community volunteers to ensure consistent management standards.	H	Short	Low
Interagency and Inter-Jurisdictional Cooperation				
4.6.1	Collaborate with other agencies and jurisdictions to support and develop regional strategies to manage invasive plants, including ISCMV's efforts to develop a regional invasive species strategic plan.	M	Ongoing	Low
Funding				

Key Recommendations		Priority	Phasing	Relative Cost
5.1.1	Provide annual funding to support invasive plant management for five years.	VH	Short	High
5.1.2	Reallocate some funding and staff activity from beautification activities to effective management of invasive plants.	VH	Medium	Low
5.1.3	Pursue non-District funding opportunities and grants to support invasive plant management.	M	Medium	Low
5.1.4	Where cost-effective, the District should use contractors to control and remove invasive plants.	M	Ongoing	Low
Monitoring and Evaluation				
5.2.1	Develop a framework for annual assessment of the progress of the Invasive Plants Strategy.	M	Ongoing	Low

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6 Schedule A. Best Management Practices and Target Plant Profiles

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Schedule A –Best Management Practices (BMPs) and Target Plant Profiles

6.1 General Practices for Invasive Plant Removal:

- Seek the assistance of a person experienced in invasive plant removal if you are uncertain about any aspect of control.
- Always wear gloves.
- Check whether any safety precautions are required unique to the plant being removed.
- Remove plants, plant parts and seeds from personal gear, clothing, pets, vehicles, and equipment.
- Avoid unloading, parking, or storing equipment and vehicles in infested areas.
- Bag or tarp plants, plant parts and seeds before transporting to recommended disposal type.
- Avoid unnecessary soil disturbance. When soil is disturbed restoration planting is often beneficial to help prevent the re-establishment of invasive plants.
- When removing invasive plants in a garden setting consider native plant replacement options as well as recommended non-native plants.
- Recommended treatment timing is approximate and will vary year to year depending on weather. It is best to avoid treatment once fruit or seeds appear.
- Avoid the removal of any invasive plant species that may be used for bird nesting during the nesting season, March 15th to August 15th (e.g. blackberry species, English ivy, etc.)

6.2 General Practices for Restoration Planting:

- Seek the assistance of a person experienced in ecosystem restoration if you are uncertain about any aspect of restoration.
- Follow the same precautions outlined above in section 1.1 to avoid spreading invasive plants.
- Growing conditions vary within the District. It is critical to select ecologically appropriate plant species for the site. Sun exposure and moisture preference are particularly important.
- Native plants should never be taken from a park or natural area (i.e. disturbing one area to restore another).
- Plant material should conform to the B.C. Landscape Standards for container grown stock.
- To increase survival rates, planting is best carried out during cool, moist seasons: late fall to early spring.
- If possible avoid bringing in soil. There is a very high likelihood that imported soil will be contaminated with invasive plants.
- Avoid soil disturbance. If there is a risk of soil erosion, apply a fiber mat (such as co-co matting), straw or mulch (non-cedar chipped woody material). Within a riparian area, erosion prevention measures such as silt fencing may be necessary to prevent sediment from entering the watercourse.
- Carry out follow-up monitoring and maintenance multiple times per year until the native plant community has successfully established and invasive plants no longer pose a threat.
- Besides planting native plants such as those recommended in Section 1.3, consider planting native tree species (e.g. red alder, black cottonwood, Douglas-fir, western redcedar, and Sitka spruce).

6.3 Target Plant Profiles and Species Specific Best Management Practices

Plants are in alphabetical order by common name. The moisture preference of native plants recommended for restoration sites is denoted by:

D – Dry; M – Moist; W – Wet. All information has been compiled from the sources listed below unless otherwise cited. For further information, visit the West Vancouver Invasive Plants website.

- BC Parks & Invasive Species Council of BC (ISCBC) “Best Practices for Invasive Plants in Parks and Protected Areas of British Columbia” 2011
- ISCBC “Grow Me Instead” Booklet 2011 Version 2
- ISCBC T.I.P.S. sheets <http://www.bcinvasives.ca/resources/outreach-materials/invasive-plants-tips>
- Invasive Species Council of Metro Vancouver (ISCMV) website (November 2013) (www.iscmv.ca)
- BC Ministry of Agriculture - Weeds BC website (November 2013) (www.weedsbc.ca)

Target Invasive Plant	How to Identify	Danger/Impact	How to Remove/Control	Restoration and Planting Alternatives
<p>BLACKBERRY SPECIES</p> <p>Himalayan <i>Rubus armeniacus</i> (synonym: <i>Rubus discolor</i>)</p> <p>Evergreen/cutleaf <i>Rubus laciniatus</i></p> 	<p><u>Size</u>: Evergreen, trailing shrub growing to 3m tall and 12m long</p> <p><u>Flowers</u>: Small, white to pinkish, 5-petalled, in clusters of 5-20</p> <p><u>Fruit</u>: Black, shiny, hairless to 2cm in diameter, ripen from mid-summer to fall</p> <p><u>Leaves</u>: Large, rounded or oblong, toothed leaflets</p> <p><u>Stem</u>: Robust, stiff canes with large, flattened prickles. First year canes can root from the tips to produce daughter plants.</p> <p><u>Location</u>: Roadsides, riparian areas, forest edges, agricultural areas, disturbed areas. Prefers full sun.</p>	<p>Forms dense, impenetrable thickets which displace native vegetation. Can prevent establishment of native shrub and trees species.</p> <p>Limits movement of large animals and reduces access for recreation. Reduces sight lines along roadways and trails.</p> <p>Thickets along stream banks can increase flood and erosion potential.</p>	<p>Use a Pulaski, mattock or backhoe to remove as much root as possible. Remaining root fragments will re-sprout.</p> <p><u>Timing</u>: Avoid treatment once fruit appears to prevent further spread.</p> <p><u>Disposal</u>: Place in municipal Green Waste Program containers for composting. Do not compost in home compost bin.</p> <p><u>Follow-up</u>: Monitor at least twice annually for re-growth and new seedlings.</p>	<p>Plant native or non-invasive species including:</p> <p><u>Native Plants for Restoration Sites</u>:</p> <p>Nookta rose (D-M) <i>Rosa nutkana</i></p> <p>Thimbleberry (D-M) <i>Rubus parviflorus</i></p> <p>Snowberry (D-M) <i>Symphoricarpos albus</i></p> <p><u>Additional Alternatives for Gardens</u>:</p> <p>Marionberry or Boysenberry <i>Rubus</i> ‘Marion’ or ‘Boysen’</p> <p>Red raspberry <i>Rubus idaeus</i> hybrids</p> <p>Huckleberry <i>Vaccinium parvifolium</i>, <i>V. membranaceum</i> or <i>V. ovatum</i></p>

Target Invasive Plant	How to Identify	Danger/Impact	How to Remove/Control	Restoration and Planting Alternatives
<p>BUTTERFLY BUSH <i>Buddleja davidii</i></p>  	<p><u>Size:</u> Lanky shrub growing up to 5m tall</p> <p><u>Flowers:</u> Lilac, purple, white or pink with a yellow to orange centre, growing in long, cone-shaped, drooping clusters; blooming in summer</p> <p><u>Leaves:</u> Opposite, lance shaped; green above, grey and wooly below.</p> <p><u>Stem:</u> Woody</p> <p><u>Location:</u> Riparian areas, forest edges, roadsides, disturbed areas, gardens</p>	<p>Forms dense, shrubby thickets which displace native vegetation. This includes sensitive and rare ecosystems such as stream banks and rock/lichen plant communities.</p> <p>Can supplant other plants as a nectar source, reducing the pollination of native plant species.¹²</p>	<p>Cut back branches and dig out entire root. Use saw to cut larger plants as close to ground as possible. If roots aren't removed, stump may sprout and require repeat cutting treatment to exhaust the plant. Bag seed and flower heads to avoid spread.</p> <p><u>Timing:</u> November to May is best to avoid spreading seed.</p> <p><u>Disposal:</u> Place in municipal Green Waste Program containers for composting. Do not compost in home compost bin.</p> <p><u>Follow-up:</u> Monitor at least once annually for re-growth and new seedlings.</p>	<p>Plant native or non-invasive species including:</p> <p><u>Native Plants for Restoration Sites:</u></p> <p>Red-flowering currant (D) <i>Ribes sanguineum</i></p> <p>Saskatoon berry (D) <i>Amelanchier alnifolia</i></p> <p>Lewis's mock orange (D) <i>Philadelphus lewisii</i></p> <p><u>Additional Alternatives for Gardens:</u></p> <p>Meyer lilac <i>Syringa meyeri</i></p> <p>California lilac <i>Ceanothus</i> spp. and hybrids</p> <p>There are dozens of alternative non-invasive plants that will attract butterflies.¹³</p>

¹² Washington Invasive Species Council http://www.invasivespecies.wa.gov/priorities/butterfly_bush.shtml

¹³ Butterflies and How to Attract Them. Washington Department of Fish and Wildlife <http://wdfw.wa.gov/living/butterflies/butterflies.pdf>

Target Invasive Plant	How to Identify	Danger/Impact	How to Remove/Control	Restoration and Planting Alternatives
<p>CHERRY LAUREL (English laurel, common laurel) <i>Prunus laurocerasus</i></p>  	<p><u>Size:</u> Evergreen shrub to medium sized tree, growing 5-15m tall</p> <p><u>Flowers:</u> 1cm across with five creamy-white petals; part of a narrow cluster of a 30-40 flowers; blooming in early spring to in early summer</p> <p><u>Fruit:</u> Small cherry 1-2cm across, turning black when ripe in early autumn</p> <p><u>Leaves:</u> Dark green, leathery, shiny, with a finely toothed serrated margin. May have almond scent when crushed.</p> <p><u>Stem:</u> Woody</p> <p><u>Location:</u> Forested areas, gardens; shade tolerant</p>	<p>Its rapid growth, evergreen habit and tolerance of drought and shade allow it to out-complete native vegetation on the forest floor.</p> <p>Seeds are spread by bird droppings.</p>	<p>Cut back branches and dig out entire root. Use saw to cut larger plants as close to ground as possible. If roots aren't removed, stump will sprout and require repeat cutting treatment to exhaust the plant.</p> <p><u>Caution:</u> The berries, leaves and bark are all poisonous if consumed.</p> <p><u>Timing:</u> December to June is best to avoid spreading fruit/seed.</p> <p><u>Disposal:</u> Place in municipal Green Waste Program containers for composting. Do not compost in home compost bin.</p> <p><u>Follow-up:</u> Monitor at least once annually for re-growth and new seedlings.</p>	<p>If soil disturbance occurs, plant shade tolerant native plants including:</p> <p><u>Native Plants for Restoration Sites:</u> Red elderberry (M-W) <i>Sambucus racemosa</i></p> <p>Vine maple (M) <i>Acer circinatum</i></p> <p>Dull Oregon grape (D-M) <i>Mahonia nervosa</i></p> <p><u>Additional Alternatives for Gardens:</u> Hick's Yew <i>Taxus x media 'Hicksii'</i></p> <p>Cedar species <i>Thuja plicata</i> or <i>occidentalis</i></p> <p>Mexican mock orange <i>Choisya</i> species</p> <p>Evergreen huckleberry <i>Vaccinium ovatum</i></p>

Target Invasive Plant	How to Identify	Danger/Impact	How to Remove/Control	Restoration and Planting Alternatives
<p>CLEMATIS – OLD MAN’S BEARD (traveller’s joy) <i>Clematis vitalba</i></p>   <p>(<i>Clematis climbing tree</i>)</p>	<p><u>Size</u>: Perennial, climbing vine to 30m long.</p> <p><u>Flowers</u>: Small, greeny-white, scented flowers</p> <p><u>Fruit/Seed</u>: Tiny fruits have long, silky appendages. Together they form a white, fluffy ball.</p> <p><u>Leaves</u>: Opposite, lance-shaped, pale green</p> <p><u>Stem</u>: Woody</p> <p><u>Location</u>: Forested areas, gardens</p>	<p>Can girdle trees and can cause tree failure by forming heavy mats in the canopy.</p>	<p>Cut stems at ground leaving vines and foliage to die. Roots are shallow and can be pulled.</p> <p><u>Timing</u>: No restriction on timing, however dormant clematis can be easier to spot from November to March when other trees and shrubs have dropped their leaves.</p> <p><u>Disposal</u>: Place in municipal Green Waste Program containers for composting. Do not compost in home compost bin.</p> <p><u>Follow-up</u>: Monitor at least once annually for re-growth and new seedlings.</p>	<p>Plant native or non-invasive species including:</p> <p><u>Native Plants for Restoration Sites</u>: Typically restoration is not needed after removal of a clematis vine)</p> <p>If significant tree damage has occurred, replace with a native tree species (e.g. red alder, black cottonwood, Douglas-fir, western redcedar, Sitka spruce)</p> <p><u>Alternatives for Gardens</u>: Other clematis species <i>Clematis sp.</i></p> <p>Honeysuckle <i>Lonicera ciliosa</i></p>

Target Invasive Plant	How to Identify	Danger/Impact	How to Remove/Control	Restoration and Planting Alternatives
<p data-bbox="201 240 369 293">ENGLISH HOLLY <i>Ilex aquifolium</i></p> 	<p data-bbox="590 240 894 293"><u>Size:</u> Large, evergreen shrub, growing up to 25m tall</p> <p data-bbox="590 334 905 355"><u>Flowers:</u> Small, white, 4-lobed</p> <p data-bbox="590 396 894 449"><u>Fruit:</u> Reddish orange berries on female plants</p> <p data-bbox="590 490 905 573"><u>Leaves:</u> Evergreen, oval, shiny with 3-5 sharp spines on each side</p> <p data-bbox="590 613 737 634"><u>Stem:</u> Woody</p> <p data-bbox="590 675 852 729"><u>Location:</u> Forested areas, gardens; shade tolerant</p>	<p data-bbox="947 240 1272 449">Forms dense, shrubby thickets which displace native vegetation on the forest floor. Suppresses native plant germination by dominating water and nutrient consumption.</p> <p data-bbox="947 490 1209 544">Seeds are spread by bird droppings.</p>	<p data-bbox="1304 240 1629 482">Cut back branches and dig out entire root. Use saw to cut larger plants as close to ground as possible. Stump may sprout and require repeat cutting treatment to exhaust the plant. Bag seed and flower heads to avoid spread.</p> <p data-bbox="1304 522 1619 576"><u>Timing:</u> Avoid treatment once fruit appears.</p> <p data-bbox="1304 617 1629 758"><u>Disposal:</u> Place in municipal Green Waste Program containers for composting. Do not compost in home compost bin.</p> <p data-bbox="1304 799 1598 881"><u>Follow-up:</u> Monitor at least once annually for re-growth and new seedlings.</p>	<p data-bbox="1661 240 1986 326">If soil disturbance occurs, plant shade tolerant native plants including:</p> <p data-bbox="1661 367 1965 482"><u>Native Plants for Restoration Sites:</u> Red elderberry (M-W) <i>Sambucus racemosa</i></p> <p data-bbox="1661 522 1818 576">Vine maple (M) <i>Acer circinatum</i></p> <p data-bbox="1661 617 1923 670">Dull Oregon grape (D-M) <i>Mahonia nervosa</i></p> <p data-bbox="1661 711 1944 826"><u>Additional Alternatives for Gardens:</u> Holly-leaved osmanthus <i>Osmanthus heterophyllus</i></p> <p data-bbox="1661 867 1818 920">Meserve hollies <i>Ilex x meserve</i></p> <p data-bbox="1661 961 1829 1015">San Jose holly <i>Ilex x aquipernyi</i></p> <p data-bbox="1661 1055 1902 1109">Evergreen huckleberry <i>Vaccinium ovatum</i></p>

Target Invasive Plant	How to Identify	Danger/Impact	How to Remove/Control	Restoration and Planting Alternatives
<p>ENGLISH IVY <i>Hedera helix</i></p>  	<p><u>Size:</u> Evergreen, creeping vine, up to 30m long</p> <p><u>Flowers:</u> Small, greenish-yellow, 3-5cm diameter</p> <p><u>Leaves:</u> Waxy, 5-10cm in length; juvenile leaves 5 lobed, adult leaves unlobed</p> <p><u>Stem:</u> Woody, often covered in root hairs</p> <p><u>Location:</u> Forested areas, gardens; shade tolerant</p>	<p>Rapidly displaces native vegetation, forming dense carpets on forest floor.</p> <p>Can girdle trees and can cause tree failure by forming heavy mats in the canopy.</p> <p>Can accelerate deterioration of manmade structures.</p>	<p>Hand pull. Ivy climbing a tree should be a priority for removal. Cut stems around tree trunk at breast height and pull back from tree base.</p> <p><u>Caution:</u> Do not pull ivy from high sections on trees as this may pull down large tree branches.</p> <p><u>Timing:</u> No restriction on timing, however ivy is easiest to spot from November to March when other trees and shrubs have dropped their leaves.</p> <p><u>Disposal:</u> Place in municipal Green Waste Program containers for composting. Do not compost in home compost bin.</p> <p><u>Follow-up:</u> If removing an entire patch, monitor at least once annually for re-growth and new seedlings.</p>	<p>Plant native or non-invasive species including:</p> <p><u>Native Plants for Restoration Sites:</u> Salal (D) <i>Gaultheria shallon</i></p> <p>Piggy-back plant (M-W) <i>Tolmiea menziesii</i></p> <p>Kinnikinnick (D) <i>Arctostaphylos uva-ursi</i></p> <p><u>Additional Alternatives for Gardens:</u> Purple wintercreeper euonymus <i>Euonymus fortunei</i> 'Coloratus'</p> <p>Taiwan creeping raspberry <i>Rubus pentalobus</i></p> <p>Privet honeysuckle <i>Lonicera pileata</i></p> <p>Bunchberry <i>Cornus canadensis</i></p>

Target Invasive Plant	How to Identify	Danger/Impact	How to Remove/Control	Restoration and Planting Alternatives
<p>GIANT HOGWEED <i>Heracleum mantegazzianum</i></p>  	<p><u>Size</u>: Very large, up to 5m tall</p> <p><u>Flowers</u>: White flowers in umbrella-shaped heads up to 1.5m in diameter; may start blooming in June</p> <p><u>Leaves</u>: Shiny, large with coarse, jagged edges, cut into 3 large segments</p> <p><u>Stem</u>: Hollow, reddish-purple blotches, streaks, or spots, and stiff bristly hairs</p> <p><u>Mistaken Identity</u>: Often confused with native cow parsnip which is smaller to 2.5m tall¹⁴</p> <p><u>Location</u>: Riparian areas, roadsides, agricultural land, disturbed areas</p>	<p>Very dangerous to human health. Sap causes extreme skin dermatitis in the presence of sunlight. Contact can lead to welts, rashes, blistering, and scarring. If sap gets into the eyes, it can lead to temporary or permanent blindness.¹⁵</p> <p>Displaces native vegetation and reduces suitable habitat for wildlife.</p> <p>Produces copious seeds (100,000 seeds per plant). Dense taproot will keep producing leaves.</p>	<p>Due to health risk, best removed by a professional. If attempting removal yourself, cut the root crown 8-10cm below soil with a sharp blade. Pesticides may be used in certain situations where BMPs indicate that either a) the invasive plant is more harmful to the environment than the use of pesticides, or b) other control methods are not effective, feasible or are considered to be more harmful to the environment than the use of pesticides.</p> <p><u>Caution</u>: Wear protective water proof clothing, gloves and safety goggles. Bag plant and seed heads in garbage bag to avoid spread and contact during handling/transport.</p> <p><u>Timing</u>: April to September (before plant goes dormant).</p> <p><u>Disposal</u>: Do not compost. Do not put in green waste container. Dispose in landfill. Cut material can be left on site to decompose if there is no risk of contact with plant for three weeks AND there are no seeds.</p> <p><u>Follow-up</u>: Monitor every six weeks until no re-growth or new seedlings appear (seed bank lasts several years).</p>	<p>Plant native or non-invasive species including:</p> <p><u>Native Plants for Restoration Sites</u>: Red elderberry (M-W) <i>Sambucus racemosa</i></p> <p>Vine maple (M) <i>Acer circinatum</i></p> <p>Salmonberry (M-W) <i>Rubus spectabilis</i></p> <p><u>Additional Alternatives for Gardens</u>: Blue elderberry <i>Sambucus cerulean</i></p> <p>Ligularia <i>Ligularia dentate</i></p> <p>Rodgersia <i>Rodgersia spp.</i></p> <p>Shieldleaf Rodgersia <i>Astilboides tabularis</i></p>

¹⁴ Giant hogweed or cow parsnip? <http://www.strathcona.ca/departments/transportation-and-agriculture-services/agriculture-services/weeds/giant-hogweed-or-cow-parsnip/>

¹⁵ Work Safe BC Toxic Plant Warning for giant hogweed:
http://www.worksafebc.com/publications/health_and_safety/bulletins/toxic_plants/assets/pdf/tp0602.pdf

Target Invasive Plant	How to Identify	Danger/Impact	How to Remove/Control	Restoration and Planting Alternatives
<p>GORSE <i>Ulex europaeus</i></p>  	<p><u>Size</u>: Evergreen shrub 1-3m tall</p> <p><u>Flowers</u>: Small, bright yellow, pea-like</p> <p><u>Fruit/Seeds</u>: Flattened, dark, hairy pods, 10-20mm long</p> <p><u>Leaves</u>: Evergreen, alternate; leaflets arranged in threes on young plants but reduced to stiff scales or spines when mature</p> <p><u>Stem</u>: Single, densely branched, upright</p> <p><u>Mistaken Identity</u>: Resembles Scotch broom but Scotch broom has no spines</p> <p><u>Location</u>: Dry, open clearings, roadsides, coastal bluffs, agricultural areas, disturbed areas</p>	<p>Forms dense, shrubby thickets which displace native vegetation. Serious threat to sensitive and rare ecosystems such as rock/lichen plant communities. Impedes native shrub and tree regeneration on logged or disturbed sites.</p> <p>Reduces access for recreation, and increases fire hazard.</p> <p>Spreads rapidly by exploding seed pods. Seed can be carried by sea water.</p> <p>This plant is rare in Metro Vancouver therefore early detection and eradication is critical to prevent establishment. One patch has been observed in the median at the Horseshoe Bay Ferry Terminal.</p>	<p>Dig young plants in loose soil removing entire root. Cut back large plants as close to ground as possible. Incomplete pulling or cutting can stimulate root fragments to re-sprout. Stump may sprout and require repeat cutting treatment to exhaust the plant.</p> <p><u>Caution</u>: Sharp spines can puncture tires and skin.</p> <p><u>Timing</u>: Avoid treatment once seed pods appear to prevent further spread.</p> <p><u>Disposal</u>: Place in municipal Green Waste Program containers for composting. Do not compost in home compost bin.</p> <p><u>Follow-up</u>: Monitor at least twice annually until no re-growth or new seedlings appear (seed bank lasts 25-40 years).</p>	<p>Plant native or non-invasive species including:</p> <p><u>Native Plants for Restoration Sites</u>:</p> <p>Nootka rose (D-M) <i>Rosa nutkana</i></p> <p>Snowberry (D-M) <i>Symphoricarpos albus</i></p> <p>Thimbleberry (D-M) <i>Rubus parviflorus</i></p> <p><u>Additional Alternatives for Gardens</u>:</p> <p>Shrubby cinquefoil <i>Dasiphora (Potentilla) fruticosa</i></p> <p>Forsythia <i>Forsythia</i> hybrids</p> <p>Deciduous yellow azalea <i>Rhododendron luteum</i></p> <p>Japanese kerria <i>Kerria japonica</i> 'Pleniflora'</p>

Target Invasive Plant	How to Identify	Danger/Impact	How to Remove/Control	Restoration and Planting Alternatives
<p>GOUTWEED (Bishop's weed) <i>Aegopodium podgaria</i></p>  	<p><u>Size:</u> Perennial, growing to 70cm tall</p> <p><u>Flowers:</u> White flowers in umbrella-shaped heads up to 10cm in diameter, blooming in late spring, throughout summer</p> <p><u>Leaves:</u> Broad, toothed; solid green or variegated (white and green)</p> <p><u>Stem:</u> Erect, hollow, grooved</p> <p><u>Location:</u> Forested areas, riparian areas, roadsides, disturbed areas; shade tolerant</p>	<p>Displaces native vegetation, forming dense colonies in understory.</p> <p>Commonly dumped illegally. Grown as a garden ground cover which spreads into adjacent natural areas.</p>	<p>Dig plant removing as much root as possible. Take care to remove all plant parts as fragments will re-sprout. Cover treatments of black plastic (for 2 growing seasons) or cardboard and mulch are effective.</p> <p><u>Timing:</u> Any time during growing season as spread is primarily through vegetative means not by seed. Targeting the plant in early spring and again in late spring is optimal to exhaust the plant.</p> <p><u>Disposal:</u> Place in municipal Green Waste Program containers for composting. Do not compost in home compost bin.</p> <p><u>Follow-up:</u> Monitor at least twice annually for re-growth and new seedlings.</p>	<p>Plant native or non-invasive species including:</p> <p><u>Native Plants for Restoration Sites:</u> Wild ginger (M) <i>Asarum caudatum</i></p> <p>Sword fern (M-W) <i>Polystichum munitum</i></p> <p>Piggy-back plant (M-W) <i>Tolmiea menziesii</i></p> <p>Salmonberry (M-W) <i>Rubus spectabilis</i></p> <p><u>Additional Alternatives for Gardens:</u> Hostas <i>Hosta spp.</i> and hybrids</p> <p>Barrenwort <i>Epiranthis spp.</i> and hybrids</p> <p>Yerba Buena <i>Clinopodium douglasii</i></p> <p>Alumroot <i>Heuchera</i> hybrids</p> <p>Woodland strawberry <i>Fragaria vesca</i></p>

Target Invasive Plant	How to Identify	Danger/Impact	How to Remove/Control	Restoration and Planting Alternatives
<p>HAWKWEED - ORANGE <i>Hieracium aurantiacum</i></p>  	<p><u>Size:</u> Small perennial herb, up to 30cm tall</p> <p><u>Flowers:</u> Bright orange clusters atop slender branch stems</p> <p><u>Leaves:</u> Hairy on both sides, arranged in rosette at base of stem</p> <p><u>Stem:</u> Single, unbranched, leafless, covered with bristly black hairs</p> <p><u>Location:</u> Meadows, open areas, disturbed sites (roadsides, ski runs, clearings)</p>	<p>Displaces native vegetation, forming dense carpets. This may include sensitive and rare ecosystems such rock/lichen plant communities and alpine meadows.</p> <p>Reduces grazing habitat as it has no food value to wildlife.</p> <p>New to Metro Vancouver, found primarily along Highway 1 and ski runs in West Vancouver.</p> <p>Spreads by seed, roots and above ground runners. Can be spread by contaminated soil and hay.</p>	<p>This plant is new to Metro Vancouver. Contact the ISCMV for further information as they have prioritized treatment and have been treating the plant at Cypress Provincial Park. If growing in a garden setting, dig plant, removing as much root as possible. Take care to remove all plant parts as fragments will re-sprout.</p> <p><u>Timing:</u> Avoid treatment once seed appears to prevent further spread.</p> <p><u>Disposal:</u> Place in municipal Green Waste Program containers for composting. Do not compost in home compost bin.</p> <p><u>Follow-up:</u> Monitor at least once annually for re-growth and new seedlings.</p>	<p>Plant native or non-invasive species including:</p> <p><u>Native and Non-Native Alternatives for Gardens:</u></p> <p>Arkwright's campion <i>Lychnis x awkwrightii</i></p> <p>Pinks and campions <i>Dianthus spp.</i> and hybrids</p> <p>Alpine aster <i>Aster alpinus subsp. vierhapperi</i></p> <p>Heart-leaved arnica <i>Arnica cordifolia</i></p> <p>Blanket flower <i>Gaillardia aristata</i></p>

Target Invasive Plant	How to Identify	Danger/Impact	How to Remove/Control	Restoration and Planting Alternatives
<p>KNOTWEED SPECIES</p> <p>Japanese, Giant, Bohemian <i>Fallopia species</i></p> <p>Himalayan knotweed <i>Polygonum polystachyum</i></p>  <p><i>Components of knotweed plant</i></p>  <p>Japanese knotweed</p>  <p>Himalayan knotweed</p>	<p><u>Size:</u> Large, woody bamboo-like shrubs, 1-5m tall</p> <p><u>Flowers:</u> Small, white/green in plume-like clusters</p> <p><u>Leaves:</u> Variable. Japanese: spade-shaped; Giant: larger, heart-shaped; Bohemian: hybrid of Japanese and Giant; Himalayan: lance-shaped, pointy. Leaves appear in zigzag pattern along stems.</p> <p><u>Stem:</u> reddish-brown, hollow</p> <p><u>Location:</u> Riparian areas, roadsides, disturbed sites, landscapes. Will go almost anywhere.</p>	<p>Forms dense, impenetrable thickets which displace native vegetation.</p> <p>Dominates stream banks, increasing erosion potential.</p> <p>Degrades wildlife and fish habitat.</p> <p>Reduces access for recreation. Reduces sight lines along roadways and trails.</p> <p>Able to grow through cement, house foundations and walls.</p> <p>Spreads prolifically by root and stem segments. Fragments float downstream to form new infestations.</p> <p>Extensive root system capable of re-sprouting even after many years of control.</p>	<p>Do not treat manually. Manual treatment is ineffective and may cause further spread. Should be removed by a professional using pesticide application. Live knotweed should not be cut as this method is ineffective and disposal results in a high likelihood of spread during transport.</p> <p><u>Timing:</u> Pesticide treatment occurs during the growing season and is most effective in late summer. Plant is dormant during the winter.</p> <p><u>Disposal:</u> Pesticide killed material can be left on site to decompose. Cut material can be placed in municipal Green Waste Program containers for composting. Do not compost in home compost bin.</p> <p><u>Follow-up:</u> Monitor at least twice annually. Continue monitoring for several years even after no re-growth appears.</p>	<p>Plant native or non-invasive species including:</p> <p><u>Native Plants for Restoration Sites:</u> Red-osier dogwood (W) <i>Cornus stolonifera</i></p> <p>Willow species (W) <i>Salix sp.</i></p> <p>Snowberry (D-M) <i>Symphoricarpos albus</i></p> <p>Native tree species (eg. red alder, black cottonwood, Douglas-fir, western redcedar, Sitka spruce)</p> <p><u>Additional Alternatives for Gardens:</u> Black elderberry <i>Sambucus racemosa var. melanocarpa</i></p> <p>Peegee hydrangea <i>Hydrangea paniculata</i> 'Grandiflora'</p> <p>False Solomon's seal <i>Maianthemum (smilacina) racemosum subsp. Amplexicaule</i></p>

Target Invasive Plant	How to Identify	Danger/Impact	How to Remove/Control	Restoration and Planting Alternatives
<p data-bbox="201 237 548 293">LAMIUM - YELLOW ARCHANGEL <i>Lamium galeobdolon</i></p>  	<p data-bbox="590 237 905 293"><u>Size:</u> Evergreen, low-growing vine</p> <p data-bbox="590 326 831 383"><u>Flowers:</u> Bright yellow, blooming in spring</p> <p data-bbox="590 415 905 537"><u>Leaves:</u> Heart-shaped, serrated; upper sides often have silver/white pattern and wrinkly texture</p> <p data-bbox="590 570 873 602"><u>Stem:</u> Square shaped, hairy</p> <p data-bbox="590 634 915 724"><u>Location:</u> Riparian areas, forested areas, gardens; shade tolerant</p>	<p data-bbox="947 237 1251 350">Rapidly displaces native vegetation, forming dense carpets in understory. Roots can strangle other plants.</p> <p data-bbox="947 383 1272 537">Commonly dumped illegally from spent hanging baskets. Also grown as a garden ground cover which spreads into adjacent natural areas.</p> <p data-bbox="947 570 1272 659">Can produce copious seeds that are dispersed primarily by ants.</p>	<p data-bbox="1304 237 1629 350">Repeated mechanical removal can be done by pulling above ground portion and digging as much root as possible. Remaining root fragments will re-sprout. Cover treatments (black plastic or thick layers of cardboard and mulch) may be effective. Pesticides may be used in certain situations where BMPs indicate that either a) the invasive plant is more harmful to the environment than the use of pesticides, or b) other control methods are not effective, feasible or are considered to be more harmful to the environment than the use of pesticides.</p> <p data-bbox="1304 878 1629 1000"><u>Timing:</u> Any time of year. Avoid large stream-side removals during rainy months where erosion is a concern.</p> <p data-bbox="1304 1032 1629 1187"><u>Disposal:</u> Place in municipal Green Waste Program containers for composting. Do not compost in home compost bin.</p> <p data-bbox="1304 1219 1629 1308"><u>Follow-up:</u> Monitor at least twice annually for re-growth and new seedlings.</p>	<p data-bbox="1661 237 1986 326">Heavily mulch site after pulling. Plant native or non-invasive species including:</p> <p data-bbox="1661 358 1965 415"><u>Native Plants for Restoration Sites:</u></p> <p data-bbox="1661 415 1850 480">Sword fern (M-W) <i>Polystichum munitum</i></p> <p data-bbox="1661 513 1902 570">Piggy-back plant (M-W) <i>Tolmiea menziesii</i></p> <p data-bbox="1661 602 1923 659">Dull Oregon grape (D-M) <i>Mahonia nervosa</i></p> <p data-bbox="1661 691 1902 748">Kinnikinnick (D) <i>Arctostaphylos uva-ursi</i></p> <p data-bbox="1661 781 1944 846"><u>Additional Alternatives for Gardens:</u></p> <p data-bbox="1661 846 1902 911">Hostas <i>Hosta spp.</i> and hybrids</p> <p data-bbox="1661 943 1955 1000">Barrenwort <i>Epirnedium spp.</i> and hybrids</p> <p data-bbox="1661 1032 1892 1089">Yerba Buena <i>Clinopodium douglasii</i></p> <p data-bbox="1661 1122 1839 1179">Alumroot <i>Heuchera</i> hybrids</p> <p data-bbox="1661 1211 1860 1268">Bunchberry <i>Cornus Canadensis</i></p> <p data-bbox="1661 1300 1850 1365">Wild ginger <i>Asarum caudatum</i></p>

Target Invasive Plant	How to Identify	Danger/Impact	How to Remove/Control	Restoration and Planting Alternatives
<p>PERIWINKLE (vinca) <i>Vinca minor</i> <i>Vinca major</i></p>  	<p><u>Size</u>: Evergreen, low-growing herb with trailing stems</p> <p><u>Flowers</u>: Blue to purple, blooming in spring and intermittently through summer</p> <p><u>Leaves</u>: Shiny, dark leaves, opposite and oval shaped, 2-3cm long</p> <p><u>Stem</u>: Slender, somewhat woody, green</p> <p><u>Location</u>: Riparian areas, forested areas, gardens. Prefers shade</p>	<p>Displaces native vegetation, forming dense carpets in understory.</p> <p>Commonly dumped illegally. Grown as a garden ground cover which spreads into adjacent natural areas.</p>	<p>Pull the above ground portion and dig entire root.</p> <p><u>Timing</u>: Any time of year. Avoid large stream-side removals during rainy months where erosion is a concern.</p> <p><u>Disposal</u>: Place in municipal Green Waste Program containers for composting. Do not compost in home compost bin.</p> <p><u>Follow-up</u>: Monitor at least once annually for re-growth and new seedlings.</p>	<p>Heavily mulch site after pulling. Plant native or non-invasive species including:</p> <p><u>Native Plants for Restoration Sites</u>:</p> <p>Sword fern (M-W) <i>Polystichum munitum</i></p> <p>Dull Oregon grape (D-M) <i>Mahonia nervosa</i></p> <p>Piggy-back plant (M-W) <i>Tolmiea menziesii</i></p> <p>Kinnikinnick (D) <i>Arctostaphylos uva-ursi</i></p> <p><u>Additional Alternatives for Gardens</u>:</p> <p>Hostas <i>Hosta spp.</i> and hybrids</p> <p>Barrenwort <i>Epiredium spp.</i> and hybrids</p> <p>Yerba Buena <i>Clinopodium douglasii</i></p> <p>Alumroot <i>Heuchera</i> hybrids</p> <p>Woodland strawberry <i>Fragaria vesca</i></p> <p>Bunchberry <i>Cornus Canadensis</i></p> <p>Wild ginger <i>Asarum caudatum</i></p>

Target Invasive Plant	How to Identify	Danger/Impact	How to Remove/Control	Restoration and Planting Alternatives
<p>POLICEMAN'S HELMET (Himalayan balsam) <i>Impatiens glandulifera</i></p>  	<p><u>Size:</u> Annual herb, growing 1-2m tall. Emits a strong, sweet, gasoline-like smell.</p> <p><u>Flowers:</u> Showy white, pink or reddish flowers shaped like an English policeman's helmet</p> <p><u>Leaves:</u> Smooth, egg-shaped clustered in groups of 3-5; toothed edges</p> <p><u>Stem:</u> Upright, hollow, smooth and purple-tinged</p> <p><u>Location:</u> Riparian areas, gardens</p>	<p>Displaces native vegetation, forming dense colonies in riparian areas. Increases erosion potential when it dies back in the winter.</p> <p>Seed capsules explode at maturity launching seed up to 5 meters from the plant. Seed can travel by water.</p>	<p>Hand pull from base of plant prior to seed set. Where there is risk of stream bank erosion, cut plant at base to avoid soil disturbance.</p> <p><u>Timing:</u> Spring. Avoid treatment once seeds appear to prevent further spread. Seeds can start as early as June.</p> <p><u>Disposal:</u> Place in municipal Green Waste Program containers for composting. Do not compost in home compost bin.</p> <p><u>Follow-up:</u> Monitor at least once annually for new seedlings (seeds last for 18 months).</p>	<p>Plant native or non-invasive species including:</p> <p><u>Native Plants for Restoration Sites:</u> Salmonberry (M-W) <i>Rubus spectabilis</i></p> <p>Sword fern (M-W) <i>Polystichum munitum</i></p> <p><u>Additional Alternatives for Gardens:</u> Cardinal flower <i>Lobelia cardinalis</i></p> <p>Beard-tongue <i>Penstemon barbatus</i></p> <p>Wild bleeding heart <i>Dicentra formosa</i></p> <p>Red columbine <i>Aquilegia formosa</i></p> <p>Pink monkey flower <i>Mimulus lewisii</i></p>

Target Invasive Plant	How to Identify	Danger/Impact	How to Remove/Control	Restoration and Planting Alternatives
<p>PURPLE LOOSESTRIFE <i>Lythrum salicaria</i></p>   <p>Photo courtesy of King County Noxious Weed Control Program</p>	<p><u>Size:</u> Perennial herb, growing to 3m tall</p> <p><u>Flowers:</u> Purple-magenta spikes, blooming from July to October</p> <p><u>Leaves:</u> Opposite to whorled, dark green, lance-shaped</p> <p><u>Stem:</u> Stiff, smooth, square, woody</p> <p><u>Mistaken Identify:</u> Can be confused with native fireweed but purple loosestrife does not produce windborne seeds.</p> <p><u>Location:</u> Riparian areas, disturbed wet soil areas (including roadsides), gardens.</p>	<p>Aggressively invades riparian areas displacing native vegetation.</p> <p>Plant roots can alter waterways.</p> <p>Reduces food sources for wildlife.</p> <p>Each plant can produce up to 2.5 million seeds. Can also reproduce by root fragments.</p>	<p>Pull from base of plant, taking care to remove all rhizomes. Small patches can be dug. Remaining root fragments will re-sprout. Biological control (Galerucella beetle) of large infestations is relatively successful but may require ongoing, repeat introductions and will not lead to eradication.</p> <p><u>Timing:</u> July to August when plant is blooming (and therefore clearly visible) but prior to seeds appearing.</p> <p><u>Disposal:</u> Place in municipal Green Waste Program containers for composting. Do not compost in home compost bin.</p> <p><u>Follow-up:</u> Monitor at least once annually for re-growth and new seedlings. Eradication of large infestations is unlikely but repeated annual treatment will contain the plant at lower levels.</p>	<p>Plant native or non-invasive species including:</p> <p><u>Native Plants for Restoration Sites:</u> Hardhack (W) <i>Spiraea douglasii</i> Red-osier dogwood (W) <i>Cornus stolonifera</i> Willow species (W) <i>Salix sp.</i> Cattail (W) <i>Typha latifolia</i></p> <p><u>Additional Alternatives for Gardens:</u> Blazing star <i>Liatris spicata</i> Tall Delphinium <i>Delphinium elatum</i> Bloody iris <i>Iris sanguinea</i> Spike speedwell <i>Veronica spicata</i></p>

Target Invasive Plant	How to Identify	Danger/Impact	How to Remove/Control	Restoration and Planting Alternatives
<p>REED CANARYGRASS <i>Phalaris arundinacea</i></p>  	<p><u>Size</u>: Grass, growing to 2m tall</p> <p><u>Flowers</u>: Dusty pink to yellow or brown flowering heads to 30cm long, composed of many small spikelets</p> <p><u>Leaves</u>: Green to yellow, broad flat leaves (up to 25mm wide) with parallel veins</p> <p><u>Stem</u>: Hollow, jointed, up to 2m long. Typically unbranched, though new shoots may grow at leaf base.</p> <p><u>Location</u>: Riparian areas, disturbed wet soil areas, (including roadsides), agricultural areas</p>	<p>Aggressively invades riparian areas displacing native vegetation. Forms dense stands.</p> <p>Reduces wildlife habitat value.</p>	<p>Cut plants regularly and frequently to prevent seed production and weaken root reserves. Rhizomes are very difficult to pull and remaining fragments will readily sprout. Digging may damage sensitive riparian areas.</p> <p><u>Disposal</u>: Can be left on site to decompose.</p> <p><u>Follow-up</u>: Cut plants 3 times per year for minimum 4 years. Eradication or control of large infestations is unlikely and often unfeasible.</p>	<p>Plant native or non-invasive species including:</p> <p><u>Native Plants for Restoration Sites</u>:</p> <p>Hardhack (W) <i>Spiraea douglasii</i></p> <p>Red-osier dogwood (W) <i>Cornus stolonifera</i></p> <p>Willow species (W) <i>Salix sp.</i></p> <p>Cattail (W) <i>Typha latifolia</i></p>

Target Invasive Plant	How to Identify	Danger/Impact	How to Remove/Control	Restoration and Planting Alternatives
<p>SCOTCH BROOM <i>Cytisus scoparis</i></p>  	<p><u>Size</u>: Evergreen shrub, growing 3m tall</p> <p><u>Flowers</u>: Yellow, pea-like, sometimes for red markings</p> <p><u>Fruit/Seeds</u>: Flat pods with fine hairs on edges</p> <p><u>Leaves</u>: Lower leaves stalked and have three leaflets. Upper leaves simple and un-stalked.</p> <p><u>Stem</u>: Five-angled, ridged, woody, brown to green</p> <p><u>Location</u>: Roadsides, disturbed areas, dry areas</p>	<p>Forms dense colonies which displace native vegetation. Serious threat to sensitive and rare ecosystems such as rock/lichen plant communities. Produces a toxic substance that prevents other plants from establishing.</p> <p>Limits movement of large animals and reduces access for recreation. Reduces sight lines along roadways and trails.</p> <p>Increases fire hazard.</p>	<p>Pull small plants when soil is moist, ensuring all root is removed. Cut large plants below ground or as close to base as possible.</p> <p><u>Timing</u>: May to July prior to seed pods appearing.</p> <p><u>Disposal</u>: Place in municipal Green Waste Program containers for composting. Do not compost in home compost bin.</p> <p><u>Follow-up</u>: Monitor at least twice annually for re-growth and new seedlings. Seed can remain viable for at least 30 years.</p>	<p>Plant native or non-invasive species including:</p> <p><u>Native Plants for Restoration Sites</u>:</p> <p>Nootka rose (D-M) <i>Rosa nutkana</i></p> <p>Snowberry (D-M) <i>Symphoricarpos albus</i></p> <p>Thimbleberry (D-M) <i>Rubus parviflorus</i></p> <p>Red alder (D-M) <i>Alnus rubra</i> (will provide shade and competition for nitrogen to reduce broom growth)</p> <p><u>Additional Alternatives for Gardens</u>:</p> <p>Shrubby cinquefoil <i>Dasiphora (Potentilla) fruticosa</i></p> <p>Forsythia <i>Forsythia</i> hybrids</p> <p>Deciduous yellow azalea <i>Rhododendron luteum</i></p> <p>Japanese kerria <i>Kerria japonica</i> 'Pleniflora'</p>

Target Invasive Plant	How to Identify	Danger/Impact	How to Remove/Control	Restoration and Planting Alternatives
<p>SMALL FLOWERED TOUCH-ME-NOT <i>Impatiens parviflora</i></p>  	<p><u>Size</u>: Annual herb, growing to 40cm tall</p> <p><u>Flowers</u>: Small, whitish-yellow flowers shooting from short stems at top of plant</p> <p><u>Leaves</u>: Broad, toothed, veined</p> <p><u>Stem</u>: Erect</p> <p><u>Location</u>: Forested areas; shade tolerant</p>	<p>Displaces native vegetation, forming dense colonies in understory.</p> <p>Seed capsules explode at maturity. Seed can travel by water.</p>	<p>Hand pull from base of plant prior to seed set.</p> <p><u>Timing</u>: Spring. Avoid treatment once seeds appear to prevent further spread. Seeds can start as early as June.</p> <p><u>Disposal</u>: Place in municipal Green Waste Program containers for composting. Do not compost in home compost bin.</p> <p><u>Follow-up</u>: Monitor at least once annually for new seedlings.</p>	<p>Plant native or non-invasive species including:</p> <p><u>Native Plants for Restoration Sites</u>:</p> <p>Sword fern (M-W) <i>Polystichum munitum</i></p> <p>Dull Oregon grape (D-M) <i>Mahonia nervosa</i></p> <p>Piggy-back plant (M-W) <i>Tolmiea menziesii</i></p> <p>Salmonberry (M-W) <i>Rubus spectabilis</i></p> <p><u>Additional Alternatives for Gardens</u>:</p> <p>Hostas <i>Hosta spp.</i> and hybrids</p> <p>Barrenwort <i>Epirhedium spp.</i> and hybrids</p> <p>Yerba Buena <i>Clinopodium douglasii</i></p> <p>Alumroot <i>Heuchera</i> hybrids</p> <p>Woodland strawberry <i>Fragaria vesca</i></p> <p>Wild ginger <i>Asarum caudatum</i></p>

Target Invasive Plant	How to Identify	Danger/Impact	How to Remove/Control	Restoration and Planting Alternatives
<p>SPURGE LAUREL (daphne laurel) <i>Daphne laureola</i></p>  	<p><u>Size</u>: Evergreen shrub 0.5-1.8m tall, clusters of stems</p> <p><u>Flowers</u>: Fragrant, yellow, bell shaped flowers clustered at branch tips</p> <p><u>Fruit</u>: Small, black berries</p> <p><u>Leaves</u>: Oblong, evergreen, waxy</p> <p><u>Stem</u>: Woody, upright, often branched</p> <p><u>Mistaken identity</u>: closely resembles members of the Rhododendron family</p> <p><u>Location</u>: Forested areas, gardens; shade tolerant</p>	<p>Displaces native vegetation and unfavourably changes the soil chemistry.</p> <p>All parts of the plant are toxic. Sap can cause skin irritation and consumption of any plant parts (including berries) can be fatal.</p> <p>Although toxic to humans, seeds are readily eaten by birds and spread in their droppings.</p>	<p>Dig plant removing as much root as possible. A weed wrench may aid removal of larger plants. For very large clumps cut stems below the soil or as low as possible to prevent re-sprouting. Bag seeds and berries to avoid spread.</p> <p><u>Caution</u>: Wear gloves and protective clothing. Do not transport in closed vehicle or burn or chip as plant can release noxious chemicals.¹⁶</p> <p><u>Timing</u>: Avoid treatment once fruit appears.</p> <p><u>Disposal</u>: Place in municipal Green Waste Program containers for composting. Do not compost in home compost bin.</p> <p><u>Follow-up</u>: Monitor at least once annually for re-growth and new seedlings.</p>	<p>If soil disturbance occurs, plant shade tolerant native plants including:</p> <p><u>Native Plants for Restoration Sites</u>:</p> <p>Oregon grape (D-M) <i>Mahonia nervosa or aquifolium</i></p> <p>Red elderberry (M-W) <i>Sambucus racemosa</i></p> <p>Vine maple (M) <i>Acer circinatum</i></p> <p><u>Additional Alternatives for Gardens</u>:</p> <p>Skimmia cultivars <i>Skimmia</i> spp.</p> <p>Winter daphne <i>Daphne odora</i></p> <p>Rhododendron cultivars <i>Rhododendron</i> spp.</p> <p>Huckleberry (M) <i>Vaccinium ovatum</i> (evergreen), <i>V. parvifolium</i>, or <i>V. membranaceum</i></p>

¹⁶ Work Safe BC Toxic Plant Warning for spurge laurel:

http://www.worksafebc.com/publications/health_and_safety/bulletins/toxic_plants/assets/pdf/tp0601.pdf



7 Schedule B. Background Information: Target Plants List, Invasive Plants List and Risk Assessment



Schedule B – Background Information: Target Plants List, Invasive Plants List and Risk Assessment

This schedule documents how the target plants list, invasive plants list and risk assessment were developed.

7.1 Target Plants List

Three local invasive plant lists were used to develop a target plants list for the District: Invasive Species Council of Metro Vancouver (ISCMV), Metro Vancouver Parks and the City of North Vancouver (CNV) invasive plants lists. **The target list only includes plants established in West Vancouver with identified risks and well documented treatment methods.**

7.2 Invasive Plants List

The table below is a comprehensive list of invasive plants which have established themselves or have the potential to establish in the District and pose a significant risk to local ecosystems, human health and safety and/or infrastructure. Early detection of the plant species which have not yet established will allow a co-coordinated rapid response to take place. The species already identified in the District are highlighted in yellow in table below. Plants are listed in alphabetical order.

Invasive Plant List

A word about garden plants:

The Invasive Plants List includes several common garden species in the 'Prevent' category. These plants have qualities that make them likely invaders in the future. Keep a watchful eye on these plants. If they are spreading into adjacent parks and natural areas take action to remove them from your garden and prevent their spread.

Common Name	Scientific Name	West Vancouver Management Category	Jurisdictional Comparison				RISK TYPE/COMMENT AGRI – Agricultural ECO – Ecological REC – Recreation INFRA – Infrastructure HEALTH – Human Health
			ISCMV List (website 2013)	Metro Vancouver Parks List (2006)	City of North Vancouver List (2011)	BC Noxious Weed List	
Aucuba	<i>Aucuba japonica</i>	Prevent					ECO Forest (proposed by IPWG)
Blackberry – Himalayan	<i>Rubus armeniacus</i>	Control	Yes	Yes	Yes		ECO REC Forest edges, riparian, disturbed sites
Blackberry – evergreen/cutleaf	<i>Rubus laciniatus</i>	Control	Yes	Yes			ECO REC Forest edges, riparian, disturbed sites, rock/lichen plant communities
Butterfly bush	<i>Buddleia davidii</i>	Control	Yes	Yes	Yes		ECO Forest edges, riparian, disturbed sites, rock/lichen plant communities
Carpet Burweed	<i>Soliva sessilis</i>	Prevent	Yes	Yes			REC Open turf (golf, parks); observed on Vancouver Island
Cherry laurel (English laurel)	<i>Prunus lauroceracus</i>	Control	Yes		Yes		ECO Forest
Clematis – old man’s beard (traveller’s joy)	<i>Clematis vitalba</i>	Contain	Yes		Yes		ECO Forest

Common Name	Scientific Name	West Vancouver Management Category	Jurisdictional Comparison				RISK TYPE/COMMENT AGRI – Agricultural ECO – Ecological REC – Recreation INFRA – Infrastructure HEALTH – Human Health
			ISCMV List (website 2013)	Metro Vancouver Parks List (2006)	City of North Vancouver List (2011)	BC Noxious Weed List	
Comfrey	<i>Symphytum officinale</i>	Prevent		Yes			ECO Disturbed sites; observed in CNV
Common hop	<i>Humulus lupulus</i>	Prevent			Yes		ECO Forest edge; observed in CNV, Burnaby
Common reed	<i>Phragmites australis</i>	Prevent	Yes			Yes	ECO Disturbed open sites, coastal shorelines; observed in Richmond
Cordgrass - dense flowered	<i>Spartina densiflora</i>	Prevent		Yes			ECO Intertidal zone
Cordgrass - English	<i>Spartina anglica</i>	Prevent	Yes	Yes		Yes	ECO Intertidal zone; observed in Boundary Bay
Cordgrass - salt meadow	<i>Spartina patens</i>	Prevent		Yes			ECO Intertidal zone; observed in District of North Vancouver
Dalmatian toadflax	<i>Linaria dalmatica</i>	Prevent	Yes	Yes			ECO Dry, disturbed sites; observed on Vancouver Island and BC Interior
English holly	<i>Ilex aquifolium</i>	Control	Yes	Yes	Yes		ECO Forest
English ivy	<i>Hedera helix</i>	Control	Yes	Yes	Yes		ECO INFRA Forest
Eurasian water milfoil	<i>Myriophyllum spicatum</i>	Prevent	Yes	Yes			AGRI ECO REC Lakes, ponds, slow moving streams; observed in Metro Vancouver
European mountain ash	<i>Sorbus aucuparia</i>	Prevent		Yes			ECO Forest
False brome	<i>Brachypodium sylvaticum</i>	Prevent		Yes			ECO Forest (woodland type); observed in Cowichan Lake, Oregon
Flowering rush	<i>Butomus umbrellatus</i>	Prevent	Yes	Yes		Yes	ECO Wetlands, riparian; observed at Hatzic Lake
Garlic mustard	<i>Alliaria petiolata</i>	Prevent	Yes	Yes		Yes	ECO Forests, riparian, disturbed sites; observed in Surrey
Giant hogweed	<i>Heracleum mantegazzianum</i>	Eradicate	Yes	Yes	Yes	Yes	ECO HEALTH Forest, riparian, disturbed sites
Giant reed	<i>Arundo donax</i>	Prevent		Yes			ECO Riparian

Common Name	Scientific Name	West Vancouver Management Category	Jurisdictional Comparison				RISK TYPE/COMMENT AGRI – Agricultural ECO – Ecological REC – Recreation INFRA – Infrastructure HEALTH – Human Health
			ISCMV List (website 2013)	Metro Vancouver Parks List (2006)	City of North Vancouver List (2011)	BC Noxious Weed List	
Gorse	<i>Ulex europaeus</i>	Eradicate	Yes	Yes	No	Yes	ECO REC Dry, open clearings, coastal bluffs, disturbed sites
Goutweed (bishop's weed)	<i>Aegopodium podgaria</i>	Contain		Yes	Yes		ECO Forest edges, riparian, disturbed sites
Hawkweed – orange	<i>Hieracium aurantiacum</i>	Eradicate	Yes	Yes			ECO Meadows, open areas, disturbed sites
Japanese butterbur	<i>Petasites japonicus</i>	Prevent			Yes		ECO Riparian; observed in CNV
Knotweed – bohemian Knotweed – giant Knotweed – Japanese Knotweed - Himalayan	<i>Fallopia x bohemica</i> <i>Fallopia sachalinensis</i> <i>Fallopia japonica</i> <i>Polygonum polystachyum</i>	Contain	Yes Yes Yes Yes	Yes Yes Yes Yes	Yes Yes Yes Yes	Yes Yes Yes Yes	ECO INFRA Riparian, disturbed sites
Kudzu	<i>Pueraria montana</i>	Prevent	Yes	Yes			ECO INFRA REC Disturbed sites, forest edge
Lamium (yellow archangel)	<i>Lamium galeobdolon</i>	Contain	Yes	Yes	Yes		ECO Forest, riparian
Maple - Norway	<i>Acer platanoides</i>	Prevent					ECO Forest
Morning glory	<i>Calystegia sepium</i>	Prevent	Yes	Yes			ECO Disturbed sites, restoration plantings
Parrot's feather	<i>Myriophyllum aquaticum</i>	Prevent	Yes				ECO REC Lakes, ponds, slow moving streams; observed in Richmond and DNV
Periwinkle (vinca)	<i>Vinca minor</i>	Contain	Yes	Yes	Yes		ECO Forest, riparian
Policeman's helmet (Himalayan balsam)	<i>Impatiens glandulifera</i>	Contain	Yes	Yes	Yes		ECO Forest, riparian
Portuguese laurel	<i>Prunus lusitanica</i>	Prevent					ECO forest (proposed by IPWG)
Purple deadnettle	<i>Lamium purpureum</i>	Prevent	Yes				ECO Forest edge, meadow
Purple loosestrife	<i>Lythrum salicaria</i>	Eradicate	Yes	Yes			ECO Riparian
Reed canarygrass	<i>Phalaris arundinacea</i>	Eradicate	Yes	Yes			ECO AGRI Riparian

Common Name	Scientific Name	West Vancouver Management Category	Jurisdictional Comparison				RISK TYPE/COMMENT AGRI – Agricultural ECO – Ecological REC – Recreation INFRA – Infrastructure HEALTH – Human Health
			ISCMV List (website 2013)	Metro Vancouver Parks List (2006)	City of North Vancouver List (2011)	BC Noxious Weed List	
Scotch broom	<i>Cytisus scoparius</i>	Contain	Yes	Yes	Yes		ECO Dry, open clearings, rock/lichen communities, disturbed sites
Small flowered touch-me-not	<i>Impatiens parviflora</i>	Eradicate	Yes	Yes	Yes		ECO Forest
Spurge laurel (daphne laurel)	<i>Daphne laureola</i>	Contain	Yes	Yes	Yes		ECO Forest
Sweet woodruff	<i>Galium odoratum</i>	Prevent					ECO Forest (proposed by IPWG)
Wild chervil	<i>Anthriscus sylvestris</i>	Prevent	Yes	Yes		Yes	AGRI ECO Riparian, disturbed sites, fields; observed in the Fraser Valley
Yellow flag iris	<i>Iris pseudacorus</i>	Prevent	Yes	Yes		Yes	ECO Riparian; observed at Caulfield Park in West Vancouver
Yellow loosestrife	<i>Lysmachia vulgaris</i>	Prevent	Yes				ECO Wetlands, riparian

7.3 Risk Assessment

The risk assessment evaluates the relative consequence (impact) of an invasive plant species and the current predicted stage of infestation in the District.

Risk Rating

Score	RISK RATING				
	Human Health & Safety	Ecosystem	Infrastructure	Recreation & Aesthetic Value	Persistence
2	Immediate and detrimental effect on human health	Impacts sensitive/rare ecosystems (e.g., creeks and riparian areas, wetlands, rocky bluffs, foreshore)	Direct impact on infrastructure (e.g. roads, buildings, underground utilities)	N/A	Removal requires a trained professional
1	Potential impact on human health	Impacts forested ecosystems (e.g. shade tolerant)	Indirect impact on infrastructure (e.g. creates hazard trees)	Impedes recreation access and/or impacts viewsapes	Requires 3 or more repeat manual treatments
0	No direct impact	Primarily impacts disturbed sites	No significant impact	No significant impact	Removal typically requires only 1 to 2 repeat manual treatments*

* Successful treatment of any invasive plant is dependent on annual monitoring/follow-up to ensure plant does not persist. Most species have seed banks which survive for multiple years.

Score Matrix

RISK	
Score	Rating
4 - 6	Very High
3	High
2	Moderate
1	Low

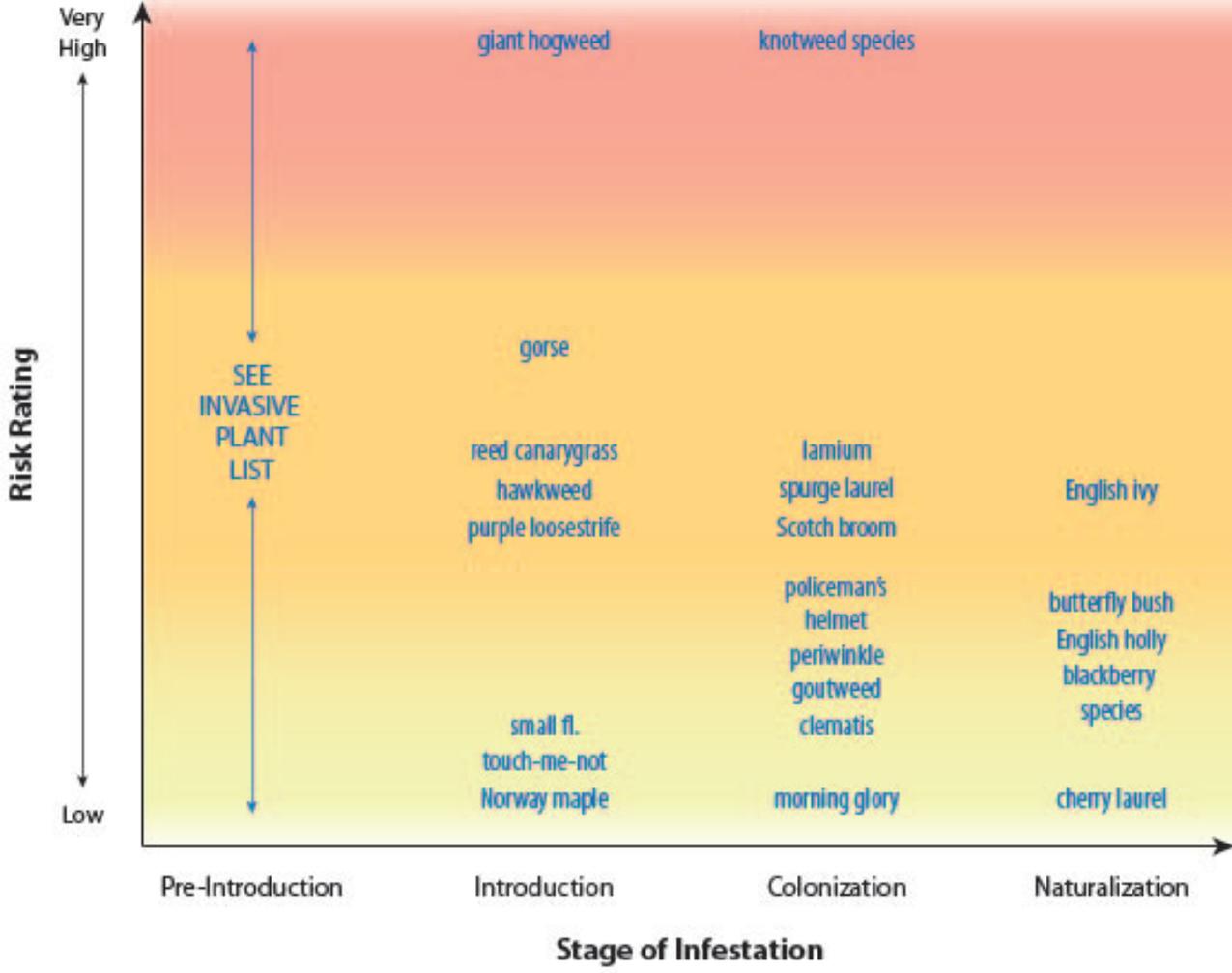
STAGE OF INFESTATION		
Score	Rating	Management Category
0	Pre-Introduction	Prevent
1	Early Introduction	Eradicate
2	Introduction	Eradicate
3	Introduction-Colonization	Contain
4	Colonization	Contain
5	Colonization-Naturalization	Control
6	Naturalization	Control

Risk Assessment Table – Target Plant List

Common Name	RISK RATING							STAGE OF INFESTATION		
	Human Health & Safety	Ecosystem	Infrastructure	Recreation & Aesthetic Value	Persistence	TOTAL SCORE	Risk Rating	SCORE (Stage of Infestation)	Stage of Infestation	Management Category
Blackberry – Himalayan Blackberry – cutleaf evergreen				1	1	2	Moderate	6	Naturalization	Control
Butterfly bush		2				2	Moderate	5	Colonization-Naturalization	Control
Cherry laurel (English laurel)		1				1	Low	5	Colonization-Naturalization	Control
Clematis (traveler’s joy, old man’s beard)		1		1		2	Moderate	3	Introduction-Colonization	Contain
English holly		1			1	2	Moderate	5	Colonization-Naturalization	Control
English ivy		1	1	1		3	High	5	Colonization-Naturalization	Control
Giant hogweed	2	2			2	6	Very High	2	Introduction	Eradicate
Gorse		2		1	1	4	Very High	1	Early Introduction	Eradicate
Goutweed (Bishop’s weed)		1			1	2	Moderate	3	Introduction-Colonization	Contain
Hawkweed – orange		2			1	3	High	1	Early Introduction	Eradicate
Knotweed – Bohemian Knotweed – Giant Knotweed – Japanese Knotweed – Himalayan		2	2		2	6	Very High	3	Introduction-Colonization	Contain
Lamium (yellow archangel)		1			2	3	High	4	Colonization	Contain
Periwinkle (vinca)		1			1	2	Moderate	3	Introduction-Colonization	Contain
Policeman’s helmet (Himalayan balsam)		2				2	Moderate	3	Introduction-Colonization	Contain
Purple loosestrife		2			1	3	High	1	Early Introduction	Eradicate
Reed canarygrass		2			1	3	High	1	Early Introduction	Eradicate
Scotch broom		2			1	3	High	4	Colonization	Contain
Small flowered touch-me-not		1				1	Low	2	Introduction	Eradicate
Spurge laurel (daphne laurel)	1	1			1	3	High	4	Colonization	Contain

RISK ASSESSMENT

District of West Vancouver Invasive Plant Species





8 Schedule C. Activities of the Invasive Plant Working Group

The Invasive Plants Working Group (Working Group) had its first meeting on January 16, 2013, and met formally 23 times until their final meeting in April 2014. They also visited various sites through two separate tours in different seasons to understand the impact of invasive plants on parks, creeks, foreshore and other areas in the District. Below is a list of activities of the Working Group. This list does not detail every activity, some of which involved considerable investment of time by members of the Working Group.

Activities include:

- The Working Group met with representatives of the City of Coquitlam, the District of North Vancouver, the City of North Vancouver and the Executive Director of the Invasive Plants Council of Metro Vancouver to share expertise and experience;
- Broke into three sub groups to focus on specific areas. Each group brought recommendations to the Working Group for consideration in developing the Invasive Plant Species Strategy:
 - Methodology Subgroup: to focus on which invasive plants should receive priority for control, and to consider strategies for controlling each;
 - Communications and Education Subgroup: to focus on outreach during policy development, and then on how to communicate effectively once the Invasive Plant Species Strategy is developed and approved; and
 - Legislation Subgroup: to focus on legislation that will influence policy development such as the BC Weed Control Act, and the District's own bylaws;
- Drafted the Terms of Reference for the Invasive Plants Strategy document;
- Hosted five public outreach sessions around the District in April, 2013, to gauge the public's awareness of invasive plants, understanding of options to control invasive plants, and interest in future volunteering opportunities for invasive plant removal efforts in Parks;
- Developed information boards, a questionnaire, and a game to test the public's knowledge of invasive plants identification. These items supported the public outreach in April 2013;
- Hosted a booth at Community Day on June 1, 2013;
- Developed the draft Invasive Plants Strategy document over summer and fall of 2013. The Working Group worked with a consultant with technical expertise in invasive plants to formulate the Strategy document and provided input and direction throughout the

drafting process which involved several reviews and considerable discussion. The draft Strategy was made public at the end of January 2013;

- Worked with the consultant to develop two documents which accompany the Invasive Plants Strategy document: Schedule A Best Management Practices and Target Plant Profiles, and Schedule B Plant Lists and Risk Assessment;
- Held two open houses on February 5 and February 26, 2014. These were supported by additional information boards, highlighting details about the Strategy;
- Posted the draft Strategy on westvancouverITE for public comment during February 2014; and
- Reviewed public feedback which resulted in the final draft of the Strategy.

9 Schedule D. Glossary of Terms

Beautification

Landscape activities carried out by municipal staff on municipal land such as maintaining planted beds and hanging baskets.

Best Management Practice (BMP)

Approach based on known science that results in the most effective outcome.

Certified Pesticide Applicator

A person who has passed the pesticide applicator written exam in the applicable use category (e.g. Landscape, Industrial Vegetation and Noxious Weeds etc.) and is therefore certified to apply certain restricted pesticides in BC. Certification is overseen by the BC Ministry of Environment.

Foreshore

The part of a shore between the high and low water marks or between the water and cultivated or developed land. Generally refers to land immediately next to the ocean.

Interface (Urban-Forest)

The forested zone located next to urban areas (buildings and infrastructure).

Invasive Species

Non-native organisms introduced to areas outside of their natural range which cause negative health, environmental and/or economic impacts.

Invasive Plants List

A comprehensive list of invasive plants either known to exist or with the potential to exist in the District and pose a significant risk to local ecosystems, human health, and/or infrastructure (Schedule B).

Inventory

A spatial record (map) of an invasive plant which shows its distribution and extent (size of infestation).

Monitoring

Activities and practices required to determine environmental quality and identify changes over time (i.e. monitoring for re-growth of an invasive plant after it has been removed).

Natural Area

An undeveloped parcel of land with recognizable local ecosystem components. Does not include maintained green spaces such as sport fields or landscaped parks.

Natural Colonization or Succession

Natural process by which one ecological community (plants and associated organisms) is succeeded by another that is better adapted to changing ecological conditions.

Succession continues until either a climax community (e.g. old growth) is reached or there is a disturbance (e.g. landslide) which sets the process back to an earlier stage.

Pesticide User License

The license required under the BC Integrated Pest Management Act for smaller scale use of pesticide on public land and certain types of private land (e.g. multi-family residences). A license is required by contractors who are chemically treating invasive plants on public lands.

Restoration

The act of returning a damaged ecological system back to its former state. In the case of invasive plants this may include re-planting native plant species after invasive plants have been removed.

Riparian

The transition zone between aquatic and upland ecosystems.

Spread Pathways/ Vectors

The means by which invasive plants may spread (e.g. wind and water action, improper disposal including dumping, soil transfer, and maintenance activities like mowing, weedeating, pruning, brushing or by intentional sale, exchange or planting).

Target Plants List

The 'target list' of invasive plants identified by the Working Group to receive priority attention by the District (listed in section 2.1, table 1).