

# Stanley Park Ecology Society Invasive Plant Management Plan



**January 2013**

**STANLEY PARK ECOLOGY SOCIETY**



# Table of Contents

1.0	Introduction .....	5
1.1	Goals and Objectives.....	5
1.2	The Stanley Park Ecology Society (SPES) .....	5
1.3	SPES Stewardship Programs.....	6
1.4	The Need for an Invasive Species Management Plan for Stanley Park.....	8
2.0	Invasive Plants.....	9
2.1	Six Key Threats to Biodiversity .....	10
2.2	Four Phases of Invasion .....	11
2.3	Invasive Plant Species in Stanley Park.....	11
2.4	Links to Climate Change .....	12
2.5	Invasive Plant Research in Stanley Park.....	13
2.5.1	Invasive Plant Mapping .....	13
2.5.2	English ivy Mapping .....	13
2.5.3	Invasive Species Spread Analysis .....	15
2.5.4	The Effects of Himalayan Blackberry on Biodiversity .....	15
2.5.5	Stanley Park Environmental Art Project.....	17
3.0	Management Approach .....	17
3.1	Prevention.....	18
3.1.1	TIPS for preventing the spread of invasive species.....	19
3.2	Early Detection and Rapid Response .....	21
3.3	Integrated Pest Management .....	22
3.4	Best Management Practices for Invasive Species Management .....	23
3.5	Setting Priorities.....	23
4.0	Management Activities .....	25
4.1	Timing.....	27
4.2	Pre-restoration Planning.....	28
4.3	Removal Methods .....	29

4.3.1	Manual Control .....	29
4.3.2	Chemical Control Methods .....	31
4.3.3	Biological Control Methods.....	31
4.4	Post-Removal Restoration .....	32
4.4.1	Replanting .....	32
4.4.2	Seeding.....	33
4.4.3	Mulching.....	34
4.5	Materials Disposal.....	34
4.6	Site Monitoring and Maintenance .....	35
4.7	Education and Outreach .....	35
APPENDIX A – Tree Ivy Program Report .....		37
APPENDIX B – SPES Restoration Sites .....		41
APPENDIX C – Invasive Plant Species of Stanley Park .....		44
APPENDIX D – Stanley Park Environmental Art Project Final Report .....		47
APPENDIX E – Checklist for artists harvesting invasive plant materials .....		50
APPENDIX F – Printed Educational Materials on Invasive Species.....		53
APPENDIX G – Best Management Practices and Maps for Invasive Plant Species in Stanley Park .....		57
	English holly ( <i>Ilex aquifolium</i> ) .....	57
	Himalayan blackberry ( <i>Rubus armeniacus</i> ).....	59
	English ivy ( <i>Hedera helix</i> ) .....	60
	Japanese knotweed ( <i>Polygonum cuspidatum</i> ) .....	63
	Scotch broom ( <i>Cytisus scoparius</i> ) .....	65
	Yellow lamium (Yellow archangel) ( <i>Lamium galeobdolon</i> ) .....	67
	Lesser periwinkle ( <i>Vinca minor</i> ).....	69
	Yellow flag iris ( <i>Iris pseudacorus</i> ).....	71
	Spurge laurel (Daphne) ( <i>Daphne laureola</i> ) .....	73
	Purple loosestrife ( <i>Lythrum salicaria</i> ).....	75
	Giant hogweed ( <i>Heracleum mantegazzianum</i> ) .....	77
	Fragrant water lily ( <i>Nymphaea odorata</i> ) .....	79
	Creeping buttercup ( <i>Ranunculus repens</i> ) .....	80
	St John’s wort ( <i>Hypericum perforatum</i> and <i>H. calycinum</i> ) .....	81

English laurel ( <i>Prunus laurocerasus</i> ) .....	83
Portugal laurel ( <i>Prunus lusitanica</i> ) .....	84
Butterfly bush ( <i>Buddleja davidii</i> ).....	86
Touch forget-me-not ( <i>Impatiens parviflora</i> ).....	88
Gorse ( <i>Ulex europaeus</i> ).....	89
Morning glory (Bindweed) ( <i>Convolvulus sepium</i> ) .....	91
Climbing nightshade (Bittersweet) ( <i>Solanum dulcamara</i> ).....	93
Reed canary grass ( <i>Phalaris arundinacea</i> ) .....	95
APPENDIX H – Timing of appropriate invasive plant removal .....	96
APPENDIX I – Pre-Restoration Site Survey Card.....	97
Works Cited.....	99

## List of Figures

Figure 1: General invasion process and management phases over time (Page & Lilley, 2008). .....	11
Figure 2: Preliminary survey map of English Ivy extent in Stanley Park comparing 2002 and 2009 data (SPES). .....	14
Figure 3: Multicriteria analysis of land suitability for Himalayan blackberry (left) and giant knotweed (right) , Stanley Park (Christiansen & Bondzio, 2007). .....	15

## List of Tables

Table 1: Bird species recorded in Himalayan blackberry ( <i>Rubus armeniacus</i> ) and natural habitats (Astley, 2010). .....	16
Table 2: Priorities for action in the management of invasive species. ....	24
Table 3: Summary of effectiveness for a range of control methods for some invasive plants found in Stanley Park. ...	26
Table 4: Recommended timing for prescribed control methods.....	27
Table 5: Estimated length of control phase (in years) before restoration (replanting) can begin .....	32

## 1.0 Introduction

Invasive plants are non-native species that pose undesired or negative impacts on native biota and ecosystems, managed landscapes and/or human health. These species are able to spread quickly, grow rapidly, and thrive in their new environments, resulting in impacts to environmental, economic and social systems.

Invasive species contribute to habitat loss. They are able to shade-out, smother and displace native plants that provide valuable habitat in our ecosystems. Some of these plants also produce toxic substances that inhibit the growth of native species. Others can alter water flow, cause erosion, or increase fire hazard. Invasive plants causing each of these issues are currently found in Stanley Park's forest.

The Stanley Park Invasive Species Management Plan was created by the Stanley Park Ecology Society (SPES) out of the need for guidance on effective invasive plant management which has become increasingly challenging in the Park. This plan was based on the *City of Coquitlam Invasive Plant Management Strategy* (2008) with their permission and additional information has been gained through SPES's work restoring native habitats in the Park in cooperation with the Vancouver Park Board since 2004. SPES's Best Management Practices for Invasive Species were first drafted for the Stanley Park Forest Management Plan in 2009 and are updated in this report with new species maps and methodologies. This report also contains results of several research projects conducted in the Park by students and volunteers over the past several years.

### 1.1 Goals and Objectives

**Goal:** To promote resilient and diverse forest ecosystems in Stanley Park by managing and controlling alien invasive plant species in an environmentally sensitive, timely and effective manner.

**Objectives:** Ensure regular monitoring of Stanley Park's forested areas and surroundings to ensure emergent invasive plant infestations are recognized before they have an impact on Stanley Park's ecosystems.

Prioritize management efforts to focus on invasive species according to their potential and realized threats to Stanley Park's forest ecosystems and infrastructure.

Apply best management practices for invasive plants while taking into account legal requirements, impacts on Park ecosystems, as well as the safety of Park staff, volunteers and visitors.

### 1.2 The Stanley Park Ecology Society (SPES)

SPES promotes awareness of and respect for the natural world and plays a leadership role in the stewardship of Stanley Park through collaborative initiatives in education, research and conservation.

To enhance the education opportunities in Stanley Park, the Vancouver Park Board established a partnership with SPES under a joint operating agreement signed in 1997 (SPES, 2010). This agreement named SPES as the primary provider of land-based education interpretive services in Stanley Park. SPES also advises the VPB on conservation issues within the Park with an emphasis on wildlife, habitat and Species at Risk. The Park Board provides funding for some SPES programs and allows for the use of their facilities, such as the Stanley Park Nature House on Lost Lagoon and the Dining Pavilion offices. SPES's role in the stewardship of Stanley Park is undertaken through a combination of education, research and conservation action. To accomplish this role, SPES offers a variety of programs that provide opportunities for individuals and groups to be involved in education and outreach, research, and conservation actions. SPES is a non-profit park partner and therefore must raise funds to operate through grants, donations and memberships. The Conservation and Stewardship Programs at SPES are almost exclusively funded by external donors and granting agencies although the Park Board also made financial contributions to the program in 2007, 2011 and 2012.

### **Summary of SPES Guiding Principles for the conservation of Stanley Park:**

- Assess and protect existing native habitat.
- Protect native biodiversity and the ecological health of the Park.
- Designate key areas of ecological significance and allocate specific best management practice objectives for each.
- Adopt the 'precautionary principle' in the face of proposed developments in the Park, favouring conservation as the first priority even when there is no known proof of negative consequences to the Park's ecological health from those developments.
- Adopt and implement a policy of "No Net Loss" of native species habitat.
- Provide for the long-term protection of natural areas in the Park with decision-making and ongoing monitoring to track ecological trends.

## **1.3 SPES Stewardship Programs**

### **Ivy Busters / Community Invasive Species Pulls**

In the summer of 2004 the SPES, at the request of and with support from Vancouver Park Board, began a program of English ivy removal, called Ivy Busters, engaging volunteers to manage the issue of invasive English ivy (*Hedera helix*) that had spread throughout the Park. Park Board workers had removed ivy from trees for several years and unionized staff members were usually on hand for the original Ivy Busters events to lend advice and to remove ivy from trees. The main focus of the original Ivy Busters program was to eliminate English ivy from the Park and educate participants about the impacts that invasive species have on our environment while individuals carried out the manual removal of plants. Although the program name and methodology has changed over the years, the general objectives are the same and it continues to provide everyone in the community an opportunity to contribute to and learn about invasive species management.

Invasive species management requires a holistic approach that looks at the immediate need to reduce the threat of invasive species while recognizing that they can only be 'managed' and not eliminated in many cases. In the early

days of the Ivy Busters program, the simple removal of the plants was considered effective, but over the years techniques have changed and now sites require more than a one-time visit to ensure the ivy is effectively removed. This program still aims to remove English ivy from priority areas in the park, but has a broader goal of restoring degraded habitats by removing many different invasive plant species, planting native species, decommissioning unsanctioned trails, and adding coarse woody debris, nest boxes and other enhancements to the sites. The program now functions with a long-term approach to managing the individual sites including pre-event site visits, and post-event monitoring, mapping, and maintenance.



***Community members in large groups can remove huge volumes of English ivy.***

### **SPES and the Vancouver Park Board**

SPES coordinates with the Vancouver Park Board on all habitat stewardship projects. Park staff approves all work sites prior to work commencing and are informed of pickup areas following events. Park Operations staff remove piles of invasive species left behind by volunteers by truck and the green materials are transferred to Richmond Energy Garden and Composting Facility (formerly known as Fraser Richmond Soil & Fibre). Park staff are also responsible for dealing with Japanese knotweed (*Polygonum cuspidatum*) and giant hogweed (*Heracleum mantegazzianum*). This is because these two species are particularly hard to manage and have been targeted for injection with herbicide according to recommendations in the Stanley Park Ecological Action Plan ([VPBR], 2011).

The winter windstorms of 2006-2007 strengthened SPES's working relationship with the Park Board and generated a flood of public interest in our programs which allowed for an increase in our organizational capacity. The Conservation Programs department of SPES was formed in September 2007 and a full-time Stewardship Coordinator was hired to oversee the rapidly growing invasive species removal programs. Since then, the program has been focused not only on providing the public with access to stewardship activities in the Park but also ensuring sound practices are exercised so that SPES play a leadership role in invasive species management in Vancouver.

### **Tree Ivy**

Another SPES program that focuses on reducing the spread of invasive species in Stanley Park is The 'Tree Ivy' program which was implemented in the spring of 2009. In this program, volunteers work in small teams to document and carefully remove English ivy climbing and impacting trees, shrubs, and other habitat features in the Park. The

primary goal of the Tree Ivy program is to slow the dispersal of English ivy in the Park by reducing plants that are acting as a seed source. It is predicted that the goals of this program will be complete by January 2013. A detailed report with results from the Tree Ivy program can be found in Appendix A.

### **Special Invasive Species Removal Team (SIRT)**

The Special Invasive Species Removal Team (SIRT) is a new program created in the fall of 2012 that specializes in targeting newly emerging and established invasive species in Stanley Park. This program engages small teams of volunteers to carefully document and remove invasive species with the overall goal of eliminating seed sources and root systems of various invasive species that have only newly emerged in the Park and occur in small, controllable populations. The goal of this program is to manage and control these species before they have the chance to expand further into the Park.



### **Stewardship Mapping**

Preliminary mapping surveys for all invasive alien plant species were undertaken by SPES staff and volunteers in Stanley Park from 2007-2009. Much of the data was collected by volunteers trained in species identification as they walked all of the roads and trails in the Park. In 2011 the maps were updated through a renewed funding support from the Park Board. For more information please see section 2.2.1.

### **Volunteers**

Volunteer time and commitment are central to managing invasive species in Stanley Park, which includes participation from community members, school groups, ESL groups, non-governmental organizations, and corporations. SPES charges a fee for most programs to cover the cost of having a Stewardship Coordinator and for expenses incurred for tools and equipment. Maps showing recent SPES restoration work are shown in Appendix B and a full set of details maps are included in the *Invasive Plant Mapping* final report created by SPES for the Park Board ([SPES], 2012).

*Small groups of community volunteers are needed to address invasive plant problems such as the removal of 'tree ivy'.*

## **1.4 The Need for an Invasive Species Management Plan for Stanley Park**

Taking current as well as future conditions into consideration, a rigorous and adaptive invasive plant management plan is needed to ensure that the Stanley Park's ecological integrity is maintained. Methodology concerning the best management practices for the removal of invasive plants has been created and used by SPES Stewardship Programs and these methodologies were also adopted into the 2009 Stanley Park Forest Management Plan.



The 2011 Stanley Park Ecological Action Plan ([VPBR], 2011) recommended that both short and long term strategies be implemented to combat the acute and ongoing problems of invasive species. In the short term, it was deemed necessary to get the most threatening species under control and at the same time prevent the spread of existing species and the introduction of new species into the park in the long term. The Park Board approved the plan that saw the management of invasive plants as a multi-pronged approach that recognizes the immediacy and extent of the treatment. It was recognized that while established plants like English ivy and Himalayan blackberry may only be able to be managed; some newly introduced and expanding plants, including knotweed, hogweed, loosestrife and lamium, should be eradicated quickly.

This report is intended to provide a guideline for effective invasive species management in Stanley Park and will act as a next step towards the long-term maintenance and restoration of the Park's ecological health and biodiversity.



*An “ivy desert” is when the groundcover of English ivy is close to 100%*

## 2.0 Invasive Plants

Invasive plants are non-native species that pose undesired or negative impacts on native biota and ecosystems, managed landscapes and/or human health. These species are able to spread quickly, grow rapidly, and thrive in their new environments, resulting in impacts to environmental, economic and social systems.

Invasive species are considered one of the greatest threats to biodiversity in our world today, second only to habitat loss. Many invasive plants are able to shade-out, smother and displace native plants that provide valuable habitat in our ecosystems. Some of these plants also produce toxic substances that inhibit the growth of native species, while others are poisonous to local wildlife or humans. Others can cause damage to abiotic elements of an ecosystem—altering water flows, causing erosion, or increasing fire hazard. Invasive plants causing each of these issues can be found in Stanley Park's forests today (see Appendix C for species list).

The introduction of invasive plants to an environment can happen in a number of ways. Many invasive species have been introduced into new settings and planted as garden ornamentals. In parks and greenways, many invasive plant infestations have been started through illegal dumping or improper disposal of garden waste from residences or managed areas. Similarly, seeds, fruit and other plant-matter can be spread by wind, wildlife, or ‘hitch-hiking’ on vehicles or shoes to new locations. Due to the fact that Stanley Park is located in an urban setting and is a high-traffic area in terms of vehicles and pedestrians, all of these means of introduction are a concern in the Park.

## 2.1 Six Key Threats to Biodiversity

Invasive plants pose six key threats to ecological or recreation values in parks and natural areas (Page & Lilley, City of Coquitlam Invasive Plant Management Strategy, 2008):

Competitive displacement of native plants and animals - Invasive plants monopolize resources such as light, moisture, and soil nutrients that are required by native plants to establish and grow. Invasive species can displace native species by depriving them of access to resources. However, this likely only occurs in sites with very abundant growth (either of single invasive species or groups of invasive species).

Increased Park management costs - Invasive plants increase Park management costs through either increased resource management planning (e.g., project management, park plans, monitoring, etc.) or the operational cost of maintaining vegetation communities (e.g., mowing, pruning, weeding).

Homogenization of regionally distinct plant communities - Invasive plants reduce plant community distinctiveness resulting in loss of unique plant communities. Conspicuous invasive species, such as purple loosestrife and yellow flag iris reduce the value of parks for some users because they are associated with loss of naturalness.

Change in ecosystem functions or dynamics - Invasive plants can impact ecosystems through systematic changes to productivity, disturbance, energy transfer, and other ecological processes on which plant communities depend. For example, the dense growth of Himalayan blackberry along streams and tributaries in the Park prevents the establishment of native riparian vegetation.

***Purple loosestrife is beautiful but when it invades it is capable of destroying wetland ecosystems.***



Hybridization and genetic effects - Hybridization is the risk that genes from invasive plants will mix with closely-related native species. Generally, hybridization only occurs between different varieties of the same species or between species of the same genus. Non-native lupin species may hybridize with streambank lupine (*Lupinus rivularis*), which is an endangered species found in the Lower Mainland.

Risks to human health - Few invasive plants pose risks to human health, particularly during park use or maintenance. Species that may pose health concerns include: giant hogweed (phototoxic sap), spurge-laurel (toxic sap), English holly (toxic berries), and Himalayan blackberry (scratches and punctures from thorns).

## 2.2 Four Phases of Invasion

Invasion is a temporally and spatially dynamic process as invasive plant populations spread both locally and regionally over time (Figure 1); this invasion process can be divided into four phases (Page & Lilley, City of Coquitlam Invasive Plant Management Strategy, 2008):

The *Pre-introduction Phase* occurs before an invasive plant is introduced; this is a key phase of invasion as the appropriate management activities could effectively prevent the introduction of invasive plants. However, if prevention is unsuccessful and invasive plants are able to establish, an *Introduction and Establishment Phase* begins. During this phase, invasive plants occur as isolated and sparse populations at or near the point of introduction; eradication measures are still feasible at this stage. This phase may be prolonged as some species take over 50 years before population growth begins to accelerate. In the next *Expansion Phase*, invasive plant populations expand rapidly and eradication becomes increasingly difficult. The final phase is the *Post-expansion Phase*, when invasive plants are widespread and abundant across the landscape; ongoing control activities must be implemented to reduce impact, but eradication is likely impossible. Species such as Himalayan blackberry and English ivy are in the *Post-expansion Phase*.

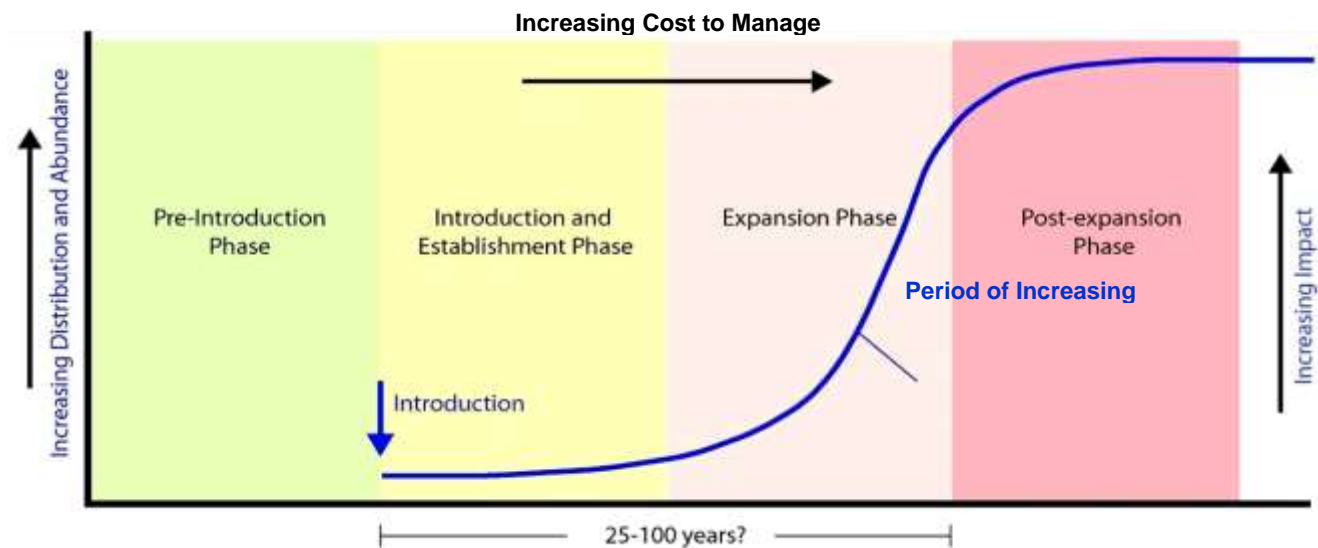


Figure 1: General invasion process and management phases over time (Page & Lilley, 2008).

## 2.3 Invasive Plant Species in Stanley Park

There are approximately 97 species of invasive plants that have been documented in Stanley Park. For practical purposes, these species have been ordered based on the priorities for management. Three species are considered well 'established' and are abundant or widespread in most areas of the park: Himalayan blackberry, English ivy and English holly (similar to species in the *Post-expansion Phase*). Another 10 species are considered 'expanding' as they are abundant in some areas, but have limited distribution in other areas. These include plants like Japanese knotweed, yellow lamium and yellow flag iris and are similar to plants in the *Expansion Phase*. There are 11 species

that are considered ‘emergent’ and are a high priority as they have limited distribution and are considered a new invader (similar to species in the *Introduction and Establishment Phase*). These include: St John’s wort, spurge laurel, giant hogweed and gorse. A further 73 species have been identified by plant experts and are considered low priority ‘trailside weeds’ at the moment. These species are considered a nuisance, but appear to be a minimal threat to natural biodiversity. Species in this category include: Canada thistle, common foxglove, and creeping buttercup. There are several species of plant that have not yet been found in Stanley Park but are considered highly invasive and should be watched for. These include species such as leafy spurge or carpet burweed (similar to species in the *Pre-introduction Phase*). Appendix C contains a complete list of non-native species that exist in the Park based on the different phases of invasion.

## 2.4 Links to Climate Change

The Intergovernmental Panel on Climate Change (IPCC) has reported that anthropogenic warming over time has resulted in major changes in ecosystem structure and function, species’ ecological interactions, and species’ geographical range ([IPCC], 2007). Climate change has been known to stem from anthropogenic factors such as, land-cover change, fragmentation, pollution, as well as invasive species (Hobbs & Cramer, 2008). Nonetheless, forests continue to store carbon in the form of slow-to-rot cedar logs and an estimated 600 tonnes per hectare of carbon is stored in Stanley Park’s forests (B.A. Blackwell & Associates, 2007).

A range of research has shown that some of potential impacts of climate change, such as elevated concentration in atmospheric CO<sub>2</sub> and nitrogen disposition, may increase the invasiveness of some plant species. With a predicted increase in the number of invasive plants entering our ecosystems, it is possible that these potential “biological invaders would alter basic ecosystem properties in ways that feed back to affect many components of global change” (Dukes & Mooney, 1999).

Although fast-growing stands of trees, notably the post-Hurricane Frieda Douglas-fir stands, are helping to remove greenhouse gases from the atmosphere, other areas are likely to be giving off more greenhouse gases than they are absorbing. Invasive plant infestations exacerbate greenhouse gas emissions by displacing native plants and increasing fire hazards. Any occurrence of forest fire, disease outbreak, or a large-scale windthrow event will cause a surge of carbon release. Therefore, maintenance of a healthy forest in Stanley Park is the best way to maximize its net greenhouse gas benefit.



***Giant hogweed is not only invasive but also a human health hazard due to the phototoxicity of its sap.***



## 2.5 Invasive Plant Research in Stanley Park

Research studies on invasive plant management have been conducted in Stanley Park by volunteers, students and professional scientists. A large portion of the research has focused on the management of English ivy since it is an established species of high priority in the Park; however, other high priority species have also been studied and monitored, such as Himalayan blackberry and giant knotweed.

### 2.5.1 Invasive Plant Mapping

On May 6, 2010, the VPB directed staff to form a working group with SPES to prioritize previously identified short-term restoration and enhancement activities to benefit the ecological health and biodiversity of Stanley Park. On January 17, 2011, the VPB approved a series of recommended actions to improve the ecological integrity of Stanley Park with the SPES including ‘invasive plant species’ as an area of concern. In June 2011, the VPB and SPES finalized contracts to update its invasive plant species mapping and integrate this information into the VPB’s Geographic Information System (GIS). Funding specified the mapping of several invasive plant species along edges in Stanley Park, four of which were also targeted to be mapped extensively in the 2006 windstorm blowdown areas.



*English ivy is actually native to the Caucasus Mountains in Russia. Its shade-tolerance and ability to grow in acidic soils makes it highly invasive in the Pacific Northwest.*

In January 2012, a report was produced upon completion of the mapping project, called “Invasive Plant Mapping in Stanley Park”. The report included updated maps of 20 invasive plant species found throughout the Park, maps of past SPES restoration sites, and maps of targeted invasive species in all of the blowdown areas. The report also provided detailed methodology for the mapping and a description of the development of operational systems to update maps in continuing collaboration with VPB staff including adding them to the City’s VanMap system.

Data collected from this mapping project was used to guide SPES’s future Stewardship Programs and was intended for use in an invasive species management plan for the Park. The updated maps by species and by area are included in Appendix C of this report and the full report can be found in the *Publications* section of the SPES website.

### 2.5.2 English ivy Mapping

Several students and SPES survey teams have studied invasive species in the Park. The earliest study, undertaken by UBC Environmental Science students, looked at the effects and control options for English ivy, the most extensive alien invasive plant in the Park.

The students conducted vegetation surveys at two sites similar in forest characteristics, but one site contained a dense undergrowth of ivy. The results of their statistical analysis showed that there was some difference in species composition between the two sites for shrubs and mosses, but not for ferns. They also found that there were more plant species in the no-ivy site and there was a statistically significant relationship between increased ivy density and decreased species diversity within the ivy sites (Quinn & Best , 2002).

One of the most significant contributions from this group of students was the first GIS map of the Park. Their map showed 25 hectares of ivy covered ground based on an earlier study completed in 1998. Eric Meagher, then Director of Maintenance Services for Stanley Park, believed that the total area of ivy infestation could be as high as 75 hectares. Since the forested area of Stanley Park is about 260 hectares, these estimates showed that ivy had invaded from 10% to 30% of the Park. R. Pallochuck, a Park Board employee, provided an approximate representation of ivy locations and abundance (light blue cross hatched areas in Figure 2). The maps also showed a clear correlation between the area of ivy present and the distance from roads and trails. This may be due to the increased light availability in edge habitats, the increased ability of invasive plants to spread in disturbed areas, or because high-traffic routes provide a source of infestation from seeds or dumping of garden waste.

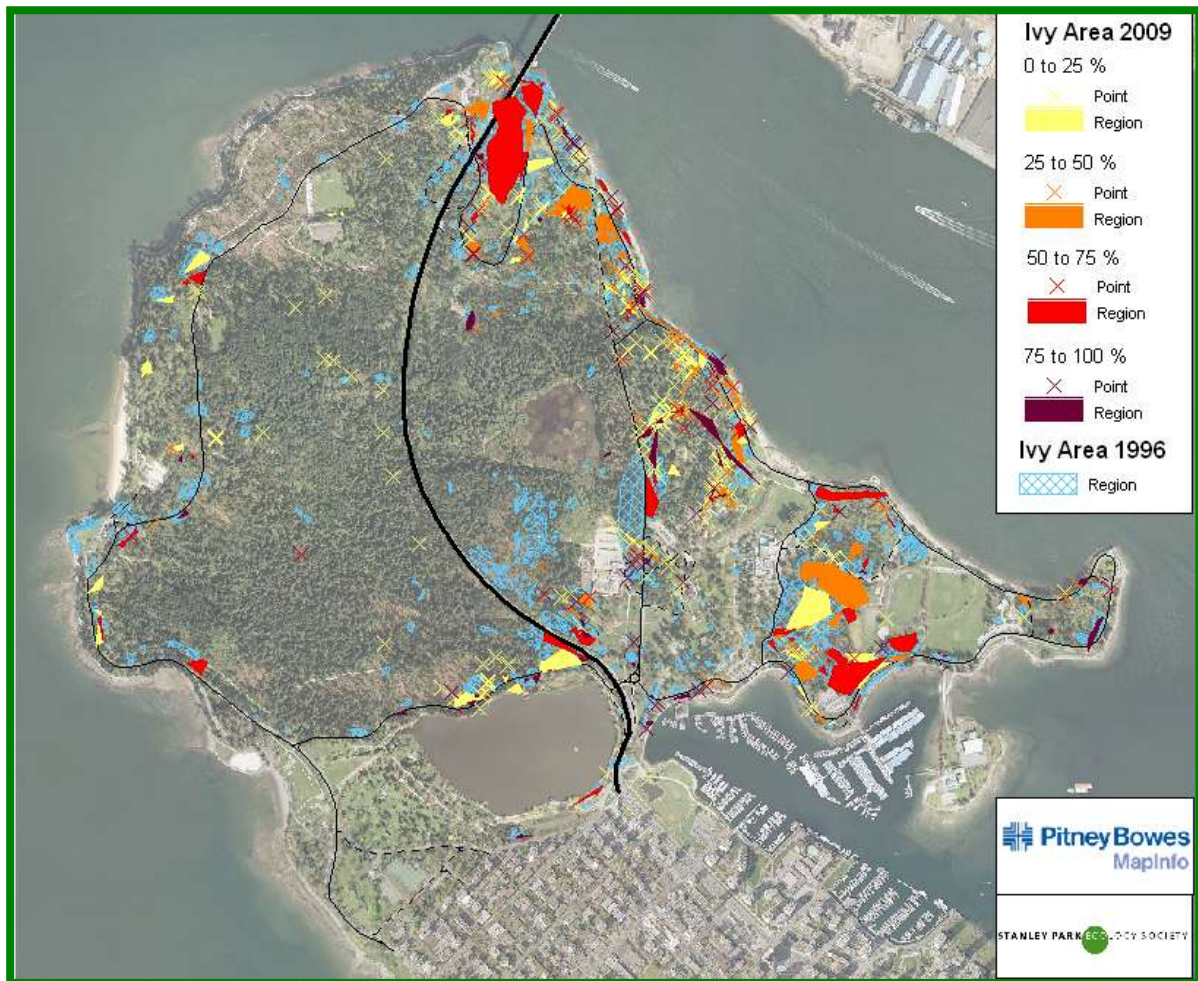


Figure 2: Preliminary survey map of English ivy extent in Stanley Park comparing 2002 and 2009 data (SPES).

Between 2007-2009 ivy mapping was again undertaken by volunteers and staff of SPES. Maps were created using the data collected showing the distribution and percent cover of ivy in areas throughout the Park. Areas with light ivy cover (yellow) indicate areas of ivy removal in the Park (Figure 2).

### 2.5.3 Invasive Species Spread Analysis

The second mapping study of invasive species in the Park was undertaken by Simon Fraser University GIS students. The students mapped the locations of all Himalayan blackberry and Japanese knotweed plants they could see by walking all of the Park trails and seawall. The purpose of the study was to conduct a spatial analysis of these two highly invasive plants following the 2006 windstorm to determine priority areas for removal in the Park. The parameters they analyzed to create a land suitability index included: the size of the patch, the proximity of the patch to a blowdown area, the type of canopy cover (closed versus open), and the proximity to streams and water bodies (Christiansen & Bondzio, 2007). These parameters were used in conjunction with Global Positioning System (GPS) data of current plant locations collected in the field to create a map that shows where the plants may spread. In Figure 3, an increasing probability of colonization by these plants is depicted by the transition from dark blue to yellow shading (i.e., light yellow areas have the highest probability of colonization). They found that blackberry tends to spread anywhere where there are openings or disturbances and knotweed spreads faster along waterways.

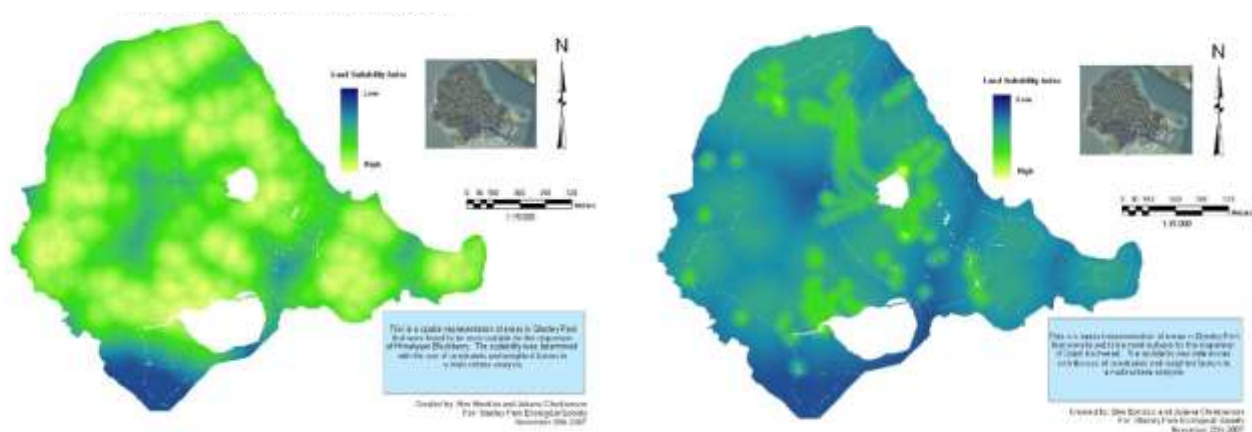


Figure 3: Multicriteria analysis of land suitability for Himalayan blackberry (left) and giant knotweed (right), Stanley Park (Christiansen & Bondzio, 2007).

### 2.5.4 The Effects of Himalayan Blackberry on Biodiversity

Although awareness of the problems associated with the spread of invasive plant species has grown in the last few years, true quantitative measures of their impacts are still lacking. Invasive plants undoubtedly have an economic impact; however, in an urban setting their effects are not yet fully understood. A recent study by Master's candidate Caroline Astley, analyzed the impact of a widespread and familiar invasive plant species, Himalayan blackberry (*Rubus armeniacus* formerly *discolor*), to determine what impact it has on local biodiversity. To measure this, an inventory of breeding birds in blackberry-dominated and "natural" landscapes was performed in the spring of 2009. Comparing

monocultures of blackberry and the overall diversity of breeding birds in areas dominated by blackberry to habitats with a greater diversity of native vegetation species showed that differences were present in terms of breeding bird diversity. Stanley Park offered an ideal location for studying the impacts of blackberry on bird diversity as there are several large patches of blackberry adjacent to forest and shrubs.

Through the study, the following birds were noted in each of the blackberry and natural habitats (see Table 1). The number of birds in the natural habitat outnumbered the birds in the blackberry by almost 2:1. In addition, 24 different species of birds were detected in the natural habitat while only 11 were found in the blackberry. Anecdotal observations also suggest that five species of birds may be actively using the blackberry for nesting habitat. These are: Anna's hummingbird, rufous hummingbird, American robin, song sparrow, and spotted towhee. Although these five species may be using the blackberries, many more are expected to use non-impacted habitats. Based on the findings of this study so far, it appears that monocultures of blackberry have a negative impact on breeding bird diversity (Astley, 2010).

**Table 1: Bird species recorded in Himalayan blackberry (*Rubus armeniacus*) and natural habitats (Astley, 2010).**

Species	Blackberry	Natural
American goldfinch	2	3
American robin	8	10
Black-capped chickadee	11	10
Bewick's wren	0	1
Black-headed grosbeak	0	1
Dark-eyed junco	4	6
Great blue heron	0	8
Golden-crowned kinglet	0	3
House finch	1	2
Northern flicker	0	2
Pine siskin	0	1
Pacific-slope flycatcher	0	1
Ruby-crowned kinglet	1	1
Rufous hummingbird	1	1
Song sparrow	7	13
Spotted towhee	10	5
Swainson's thrush	1	7
Unknown flycatcher	0	0
Unknown warbler	0	1
Violet-green swallow	0	1
White-crowned sparrow	0	1
Willow flycatcher	0	3
Winter wren	2	6
Yellow warbler	0	3
Yellow-rumped warbler	0	1
	<b>48</b>	<b>91</b>



### ***2.5.5 Stanley Park Environmental Art Project***

In the spring of 2009, the Ivy Project was initiated by SPES with Vancouver artist Sharon Kallis through the Stanley Park Environmental Art Project. Working collaboratively, the overall goal of the project was to re-purpose invasive plant materials in ways that would turn their negative impacts into positive ecological and social benefits through an artistic and ecologically restorative process. The project was very successful in achieving the desired goal and its corresponding objectives. English ivy and Himalayan blackberry were found to be particularly useful and effective invasive plants species for repurposing into wildlife habitat structures and restorative material, and in maintaining or enhancing site biomass. No re-growth of invasive plant material was observed following the plant drying process and after material was installed in the park. Native wildlife and plant use of structures was minimal, but this will likely increase with time and structure decomposition. A final report from the project can be found in Appendix D.



***Vancouver artist Sharon Kallis weaves English ivy removed from the park into habitat structures that replace biomass and stabilize soils.***

## **3.0 Management Approach**

As mentioned earlier in this document, invasive plants generally exhibit four stages of invasion: pre-introduction, introduction and establishment, expansion, and post-expansion (Page & Lilley, City of Coquitlam Invasive Plant Management Strategy, 2008). In order to effectively manage invasive plants in the Park, strategies should therefore target these different stages of invasion. The four stages for Invasive Plant Management include:

- Prevention
- Early Detection and Rapid Response (EDRR)
- Integrated Pest Management (IPM)
- Ongoing Management

### 3.1 Prevention

The easiest and most cost-effective way to reduce the impacts of invasive plants is to prevent them from establishing. Unfortunately, most of the invasive plants that are considered invasive in the Pacific Northwest are already established in Stanley Park, reducing the effectiveness of prevention strategies. However, prevention can also be effective in reducing or slowing the establishment of existing invasive plants in areas of the Park that have not yet been invaded. For example, forested areas with minimal to no human activity have fewer infestations of English ivy than areas near trails and roads. Prevention is also important as species that are currently not considered invasive may become a problem in the future, particularly in with the effects of climate change.



***Community volunteers must work with extra caution when removing invasives in blowdown areas or environmentally sensitive sites.***

Currently, there are only a handful of examples of prevention techniques being employed to stop the introduction of new species into Stanley Park:

Park operations staff are informed about the problem of invasive species in natural areas through the Stanley Park Forest Management Plan (VBPR, 2009). The use of invasive plants in gardens and other cultivated areas is addressed through internal mechanisms...

SPES and Park Board staff recently worked together to create educational materials to inform Park users, Park staff and Park stakeholders about their role in preventing the spread of invasive species. This included a poster to be distributed to key areas throughout the Park as well as in staff lunch rooms, meeting places, and other work areas to inform readers about the top 10 invasive plants and how to stop their spread (see Appendix E). Additionally an informative handout was created to be distributed to Park stakeholders including businesses, renters, filming crews and operations crews. This handout will hopefully be used by Park staff when issuing permits and overseeing works in the Park so that outside parties are aware of their role in preventing the introduction of new species or the spread of existing species in the Park (see Appendix E).

#### **Strategic Actions:**

- Impose restrictions on the use and movement of plants or plant parts to prevent the establishment of new invasive species or populations.
- Review Park management plans to restrict or prevent the use of known invasive plants.
- Research further information on invasive plants in the Pacific Northwest to identify emerging species before they establish in the Park.

- Giant hogweed is sparse in the Park and management should focus both on prevention of new populations through planting in gardens and early detection and rapid response.
- Use communication and education as the primary tool for preventing the introduction and distribution of invasive plants.
- Map and monitor the distribution of emerging invasive plants every two years to assess the effectiveness of prevention actions.



***Large groups of volunteers, such as corporate groups, will help clear large tracts of English ivy from less sensitive sites and ivy deserts such as those found on the east side of the park, near Avison Trail and around Third Beach.***

### ***3.1.1 TIPS for preventing the spread of invasive species***

The following list outlines selected Targeted Invasive Plant Solutions (T.I.P.S) for how to prevent the spread of invasive species, by activity ([IPCBC] , 2010):

#### **General**

- Maintain and restore ecosystem health to increase native plant community resilience against unwanted invaders.
- Re-vegetate disturbed areas with regionally appropriate (e.g. native), non-invasive, non-persistent seed mixtures or plants.
- Clean equipment, vehicles, recreational gear, pets, and clothes and dispose of plant seeds and plant parts accordingly.
- Control invasive plants prior to flowering or seed development using Integrated Pest Management (IPM) techniques.

## Park Operations and Maintenance

- Determine priority invasive plant species within your operating area.
- Stay informed through collaborations with regional experts and assist staff and contractors to identify and minimize spread of invasive plant species within your operating area.
- Increase awareness as to the identification of invasive plants and their impacts.
- Minimize soil disturbance and retain desirable vegetation during all operations.
- Carry out regular detection surveys and record the locations of invasive plants in your operating area.
- Keep equipment out of areas infested by invasive plants and keep equipment yards and storage areas free of invasive plants.
- Regularly inspect the undercarriages of vehicles and remove any plant material found.
- Use only clean materials, such as soil and gravel, for maintenance operations or restoration activities.
- Wash plant seeds and propagules from personal gear, equipment, vehicles and machinery at designated cleaning stations before leaving infested sites.
- Ensure soil that is being moved does not contain invasive plant seeds or propagules.
- Minimize unnecessary soil disturbance during road, trail, and other maintenance.
- Re-vegetate disturbed areas as soon after disturbance as possible using an appropriate combination of planting, seeding, and/or mulching.
- Treat infestations of invasive plants prior to disturbance (pre-treatment).

## Gardening

- Learn about invasive plants in your area and select the right plant for the right place. Be suspicious of exotic plants promoted as “fast spreaders” or “vigorous self-seeders,” as these are often invasive plants.
- Check with SPES or someone at the Invasive Plant Council of BC or call 1-888-WEEDSBC to see if a plant is invasive in your area.
- Request only non-invasive plants from your local nursery and gardening centre.
- Control established invasive plants using site and species appropriate methods. For example, hand pulling, digging, cutting, and mowing.
- Deadhead (remove) flowers, seedpods, and berries of known invasive plants to prevent reproduction through seeds and to reduce seed spread by birds, wildlife, pets, and people.
- Trade only non-invasive plants and seeds with other gardeners.
- Replace invasive plants with non-invasive exotic or native alternatives.
- Consult the BMP's in Appendix F or see the Invasive Plant Council of BC's Grow Me Instead booklet to learn more about non-invasive alternatives to horticulture's most unwanted plants.
- Dispose of invasive plant parts and seeds responsibly (i.e., bag and landfill or incinerate) and avoid conventionally composting invasive plants, as they may quickly re-establish.



### 3.2 Early Detection and Rapid Response

Early detection and rapid response has been the standard focus of invasive plant management as it is cost-effective and relatively successful. Sites with small and/or recent invasive plant introductions have the best potential for successful control or eradication. Success, however, depends on two distinct activities that can be difficult to combine.

The early detection component requires knowledge of an invasive plant before it establishes; this is based on information from other areas with similar environmental conditions. For example, plants that are invasive in maritime areas of Western Europe are often invasive in coastal BC. As well, it requires on-the-ground monitoring by professionals or experienced volunteers who are able to identify the plant. Taxonomic confusion and the lack of qualified observers can reduce effectiveness. Mapping and data management are also essential to make observations usable to those responsible for control activities.

Rapid response measures use established control and restoration measures to eradicate small populations of new invasive plants. Overall success of this component is limited by the effectiveness of the specific control method. Success also depends on having adequate resources to respond to invasive plant populations before they expand.



***Daphne laurel is a new invader and only found in a few locations in the park making it a prime target for rapid response.***

#### **Strategic Actions:**

- Develop and distribute a 'Watch List' of plants likely to be invasive in Stanley Park if introduced, or are at initial stages of invasion when eradication is possible.
- Use community-based monitoring to identify and track emerging invasive species. This should include providing identification and mapping information, or initial development of a web-based tool for managing information. SPES should continue managing GIS data of invasive species in the Park and collecting new data with the help of community volunteers.
- Designate resources and dedicate time to eradicating small populations of giant hogweed, Japanese knotweed, and other emerging invasive plants.
- Sites on the outer edge of population expansion should be a priority because their control will limit further invasion. This is considered a confinement strategy.

### 3.3 Integrated Pest Management

The City of Vancouver was the first municipality in Canada to adopt an Integrated Pest Management (IPM) approach to managing pest infestations in 1987. In the IPM approach, cultural, mechanical, and biological pest controls are used in preference over chemical pesticides. According to the City of Vancouver website, the program has allowed the city to focus on pest prevention, which has reduced and in some cases even eliminated our dependence on pesticides.

IPM is a decision-making process that includes identification and inventory of invasive plant populations, assessment of the risks that they pose, development of well-informed control options (that may include a number of methods), site treatment, and monitoring.

As invasive plant populations expand rapidly (i.e. during the expansion phase), eradication measures become increasingly difficult. Rather, control measures should be taken to prevent invasive plant populations from expanding by targeting populations at the outer boundary of expansion. In addition to controlling their expansion, restoration measures should also be taken by replacing invasive plant populations with native or non-invasive species. The desired plant community is one that is generally composed of native plants; it should be appropriate for the site's environmental conditions, maintain or increase ecological function, recreation use, and aesthetic value, and is also low-maintenance and self-sustaining.

In Stanley Park the IPM process for invasive plant species has largely been identified and undertaken by SPES. Since 2004 SPES has been engaged with Invasive Species Management with the cooperation of the Park Board. In 2009, SPES aided in the creation of the invasive plant section of the Stanley Park Forest Management Plan (B.A. Blackwell & Associates, 2007). In this document, specific actions towards the prevention and spread of invasive plants in the Park were identified including the following:

- To ensure regular monitoring of Stanley Park's forested areas and surroundings to ensure emergent invasive plant infestations are recognized before they have an impact on Stanley Park's ecosystems.
- To prioritize management efforts to focus on invasive species according to their potential and realized threats to Stanley Park's forest ecosystems and infrastructure.
- To apply best management practices for invasive plants while taking into account legal requirements, impacts on Park ecosystems, as well as the safety of Park staff, volunteers and visitors.

The plan also included an appendix with a first iteration of the Best Management Practices (BMPs) which have since been updated and are included in Appendix F of this document. Between 2007 and 2011, SPES had been undertaking a majority of the invasive species management in the park, working closely in tandem with the Park Board on a variety of restoration areas. The Stanley Park Ecological Action Plan ([VPBR], 2011) outlined more directives for Park Board and SPES in the management of Invasive Species. This new plan addressed an increased need for urgency on the issues of invasive plants in Stanley Park and included actions such as:

- Active restoration work to remove invasive species and restore habitat.
- Creating better and more up-to-date maps of species.
- Creating detailed maps of invasive species in blowdown areas.
- Securing equipment and use chemical controls for select species – knowtweed and hogweed.

- Creating better tracking of restoration areas.

The main way that SPES and VPB uses IPM process in Stanley Park is through the BMP documents and this Invasive Plant Management Plan.

### 3.4 Best Management Practices for Invasive Species Management

Best management practices (BMPs) can be defined as the most efficient (i.e. least amount of effort) and effective (i.e. best results) way of accomplishing a task – in this case, managing and controlling invasive plants in Stanley Park.

BMPs are based on repeatable procedures that have proven themselves over time for large numbers of people.

In order for management, control, and removal of invasive plant species to be successful, BMPs must be integrated into current operations in Stanley Park; take into consideration legal requirements (such as the breeding bird season as legislated in the Wildlife Act), and promote management practices while minimizing impacts to Stanley Park's ecosystems and recreational values. BMPs for the major invasive plant species in Stanley Park are provided in Appendix F.



*Small groups of dedicated youth volunteers come to the park in the summer to help with target species such as yellow flag iris and purple loosestrife.*

### 3.5 Setting Priorities

In the management of invasive species, it is important to select sites by setting priorities that will allow for the greatest success. Considering that exotic plant invasions generally exhibit four stages of invasion, as discussed earlier, setting priorities for invasive species management should also be based on:

- the feasibility of control
- ecological value or sensitivity of the affected habitat
- the existing or potential impacts of the invasive plant
- community interests

Species that are the most highly invasive and are newly emerging in the Park should be prioritized over those that are well established because they have an increased feasibility of control. For species that are already widespread and well established, such as English ivy, priorities must be set in a logical way to manage the problem. For example,

smaller, more isolated patches should be addressed before huge areas, such as large English ivy ‘deserts’ (from areas of lowest concentration to highest concentration). Likewise, invasive species intruding on sensitive areas such as streams, wetlands, or wet forest sites should be addressed before species on marginal or already degraded habitats (such as along roads or in cultivated areas). However, since much of the work in Stanley Park is done by volunteers, ease of accessibility, safety, and proximity to transportation are also major factors in site selection. Also, it is important to control the future spread of these species (such as removing fruiting ‘tree ivy’ or holly) before or in conjunction with controlling current infestations. Table 2 outlines the priorities for action in the management of invasive species.

**Table 2: Priorities for action in the management of invasive species.**

<b>Factors</b>	<b>Lower priority → Highest priority</b>		
<b>Size of area infested</b>	Large	Medium	Small
<b>Density in invaded areas</b>	> 40% coverage	10-40% coverage	<10% coverage
<b>Degree of establishment</b>	Well-established	Somewhat established	New introduction/ just getting established
<b>Potential negative impact to Park Ecosystems</b>	Low	Medium	High

As an example of how priorities are set in other areas of the Lower Mainland, the recommended approach to invasive species management in the Still Creek watershed was “to focus initial management activities on sites where ecological values are compromised by invasive plant dominance, but that have a good potential for improvement. A secondary emphasis is placed on sites and activities that can be used as demonstration projects, both for increasing public awareness and testing restoration techniques” (Page, 2006).

#### **Strategic Actions, general:**

- Target small patches of newly established species as the highest priority for immediate action especially focusing on environmentally sensitive areas.
- Sites with well-established monocultures of Himalayan blackberry, reed canary grass, and/or Japanese knotweed usually have reduced ecological values and are suitable for broad-scale removal techniques such as mowing, tilling, mulching, or (where suitable) herbicide use. These species should be prevented from forming dense thickets wherever possible but particularly in riparian and blowdown areas.
- Sites in upstream riparian areas should be a priority if they have the potential to disperse downstream. Many species (e.g., Japanese knotweed, policeman’s helmet, yellow flag iris) disperse along streams and rivers through water movement. Control strategies should initially focus on source populations at the most upstream point in the watershed to prevent re-establishment.
- Demonstration projects in high profile or accessible areas are important for testing techniques and promoting invasive plant management.
- Sites with high community interest should be considered a higher priority. Community involvement is essential for successful invasive species management; the selection of priority sites should include community participation and interest.



### Strategic Actions, by species:

- English ivy in forest habitats should be removed with a focus on preventing its spread and working in areas of low concentration to areas of high concentration. This should include removing small, isolated populations before they establish and spread in sensitive habitat areas, such as blowdown areas and Wildlife Management Emphasis Areas (MEAs; equivalent to ESAs), as well as cutting back ivy growth on tree trunks and canopies in large, established populations.
- English holly is extensive throughout the Park and efforts should be made to control its further spread. Small, newly established patches should be removed from sensitive areas and restoration areas and large, fruiting plants should be targeted for priority removal.
- Yellow lamium is less of a problem than English ivy because it does not grow on tree trunks and canopies and does not generally disperse by seed. All populations establish vegetatively, mainly from garden waste dumping. However, yellow lamium appears to be becoming much more abundant in several areas of the Park and can form dense understories in forest stands.
- Yellow flag iris and purple loosestrife should be removed in wetlands and non-forested riparian zones particularly around Beaver Lake and Lost Lagoon.
- Giant hogweed should immediately be removed in any habitat. Removal of entire plants has been done by Park Board staff in known areas. SPES will continue working with the Park Board to monitor and control the dispersal of giant hogweed. Eradication strategies for this species will include using herbicides (glyphosates).
- All Japanese knotweed (and other knotweeds) should be removed immediately with priority given to riparian areas from which it can spread. Japanese knotweed disperses through waterborne movement of root fragments and removing populations within or near stream channels should be undertaken before upslope removal; it may rarely disperse using seeds. It is less of a problem in non-riparian areas provided it is not flail-mowed and the soil is not disturbed which promote spread.

## 4.0 Management Activities

The management activities described in this section can be applied to carry out effective invasive plant control and restoration of degraded sites. The specific methods used for each plant species must be based on their individual ecology and so details for each can be found in the BMPs in Appendix F. Table 3 shows the most effective control methods for the most common invasive plant species (represented by the green boxes).

It should be acknowledged that invasive plant control can be in conflict with the values of some



***After the 2006 windstorm SPES volunteers proactively worked to remove blackberry and other shade-intolerant species in these areas.***

Park users, and if done inappropriately, can impact other Park values. Therefore, the following actions are recommended:

- Review and update information on the control and restoration methods that are appropriate for different situations in Stanley Park.
- Follow existing best management practices for invasive plant management in riparian areas in Stanley Park, particularly for the appropriate use of mowing, brush cutting, and mulching.
- Avoid vegetation clearing work in the bird nesting season between April 1 and July 31, unless nest searches are undertaken.
- Consult with regular Park users, the local community, and stewardship groups to provide awareness/education around planned large scale vegetation management projects. The potential negative effects of invasive plants on Park values, including wildlife habitat, should be emphasized.

**Table 3: Summary of effectiveness for a range of control methods for some invasive plants found in Stanley Park.**

A value of 0 indicates ineffectiveness, while a value of 3 indicates proven effectiveness. A value of -1 indicates treatments may provoke infestation by increasing seed germination or dispersing root fragments. The information included in this chart is adapted from the City of Coquitlam Invasive Plant Management Strategy (Page and Lilley, 2008). Permission for use granted by Lanny Englund, City of Coquitlam.

Control Method	Himalayan Blackberry	English Ivy	Yellow Lamium	Knotweed (+ others)	Morning Glory	Purple Loosestrife	Scotch Broom	Giant Hogweed
Mowing	2	1*	0*	-1	1	1*	1	1
Pruning	2	3 <sup>f</sup>	0	0	0	1 <sup>k</sup>	1	1 <sup>h</sup>
Raking	n/a	1	1	n/a	1	n/a	n/a	0
Brush cutting	2	1*	0	-1	0	0*	1	1
Root pulling <sup>b</sup>	1	2	2	0	2	2	3	0
Root cutting	1	1	1	-1	2	n/a	1	3
Tilling	2	1*	1*	-1*	2	2*	-1	2
Excavating <sup>c</sup>	3	2*	2*	3	2	2*	2	3
Mulching <sup>d</sup>	2	n/i*	1	0	1	0	1	1
Geotextile	2	n/i*	n/i*	2	2	0	0	2
Insect pest	n/a	n/a	n/a	n/a	n/a	3 <sup>g</sup>	n/a	n/a
Stem injection <sup>e</sup>	n/a	n/a	n/a	3 <sup>i</sup>	n/a	n/a	n/a	3

**Symbols**

\* Control methods are generally inappropriate for the type of habitat in which the species is found (e.g. forested areas cannot be mowed).

**n/a** not applicable

**n/i** no information

**a** pigs, cattle, sheep

**b** by hand

**c** excavation of roots and surrounding soil

**d** deciduous or mixed chips approx. 30 cm in depth

**e** injection of glyphosate into the stem using specialized equipment

**f** ivy removal from trees only

**g** introduction and maintenance of *Galerucella* beetles

**h** prevents flower development

**i** depends on the age of knotweed plants (established plants may be difficult to kill with herbicides)

## 4.1 Timing

When conducting restoration of areas infected with invasive plant species, the work is recommended during the growing season when plants are visible and have put energy into leaf and flower development. Some species, such as English ivy grow year round, while others such as Scotch broom must be removed early in the growing season to prevent the dispersal of seed. Timing of all control methods should take into account the breeding bird season, fisheries window, and other potential seasonal impacts. Appendix G gives an overview of information on the appropriate timing of invasive plant species management for the most common species. Table 4 below provides information on the timing of selected removal methods discussed in the following sections.

**Table 4: Recommended timing for prescribed control methods.**

The information included in this chart is adapted from the City of Coquitlam Invasive Plant Management Strategy (Page and Lilley, 2008). Permission for use granted by Lanny Englund, City of Coquitlam.

Control Method	Himalayan Blackberry	English Ivy	Yellow Lamium	Knotweed	Morning Glory	Purple Loosestrife	Scotch Broom	Giant Hogweed
Mowing	Late July-Sept	<i>n/a</i>	<i>n/a</i>	Late July-Sept <sup>b</sup>	May-Sept	July-Sept	May-June <sup>a</sup>	May-June <sup>a</sup>
Pruning	Late July-Sept	<i>n/a</i>	<i>n/a</i>	Late July-Sept <sup>b</sup>	<i>n/a</i>	July-Sept	May-June <sup>a</sup>	May-June <sup>a</sup>
Raking	<i>n/a</i>	All year	<i>n/a</i>	<i>n/a</i>	May-Sept	<i>n/a</i>	<i>n/a</i>	0
Brushcutting	Late July-Sept	<i>n/a</i>	<i>n/a</i>	<i>n/a</i>	<i>n/a</i>	<i>n/a</i>	May-June <sup>a</sup>	May-June <sup>a</sup>
Root pulling	Late July-Sept	All year	All year	<i>n/a</i>	May-Sept	May-June <sup>*a</sup>	Dec-June <sup>c</sup>	Apr-June

Root cutting	Late July-Sept	All year	All year	n/a	May-Sept	n/a		
Tilling	Late July-Sept	All year	All year	n/a	May-Sept	n/a	n/a	Apr-June
Excavating	All year	All year	All year	All year	May-Sept	May-June* <sup>a</sup>	All year	Apr-Aug
Woodchips	Late July-Sept	n/a	n/a	All year	May-Sept	n/a	May-June	n/a
Geotextile	Late July-Sept	n/a	n/a	All year	All year	n/a	n/a	All year
Insect pest	n/a	n/a	n/a	n/a	n/a	All year <sup>e</sup>	n/a	n/a
Stem injection	n/a	n/a	n/a	Aug-Sept <sup>d</sup>	n/a	n/a	n/a	May

### **Symbols**

**a** Before seeds have formed

**b** Mowing or pruning must be accompanied by removal of stems from the site to prevent resprouting or collection and on-site mulching/composting during hot weather

**c** Scotch broom can be pulled at any time of the year except when seeds are present (to prevent dispersal)

**d** Herbicide use after cutting and 1 m high regrowth

**e** Repeated introductions of *Galarucella* may be required for successful establishment (or re-establishment)

**\*** Purple loosestrife must be removed during the breeding bird season and outside of the fisheries window because this is the only time it is visible, but also before the seeds have set. Extreme care should be taken when working in wetlands and riparian areas at this time.

## **4.2 Pre-restoration Planning**

Prior to any invasive plant management work being done in the Park, there are several steps that must be taken to ensure the success of the chosen methodology:

**Site selection:** Sites to be restored may be selected based on several different factors.

- Priorities as outlined in section 3.5 above
- Grant deliverables or directives under which the work is funded
- Accessibility and proximity to facilities to accommodate volunteer abilities and group size



*There is only a short window of time for working to remove invasive species in wetlands in summer, after bird breeding time, when those species are flowering but prior to seed dispersal.*

- Seasonal timing and work windows as outlined in section 4.1 above

**Site assessment:** Prior to any work commencing on a chosen site, a pre-work site assessment should be undertaken by staff. The in-field assessment allows for a look at the site prior to the work and addresses issues such as public safety and environmental sensitivities. An example of the site assessment card that SPES uses to assess sites prior to holding volunteer events is shown in Appendix H.

Public safety issues to identify and address include:

- Camps, garbage and/or hazardous materials (sharps, glass) on site
- Dead trees, hung up branches or other falling hazards
- Slope steepness / stability
- Proximity to roads or seawall
- Remoteness / ease of access

Environmental sensitivities to identify and address include:

- Retaining and protecting existing coarse woody debris (nurse logs and stumps) and wildlife trees
- Documenting existing invasive and native plant species composition
- Identify and protect potential wildlife habitat such as ephemeral ponds, debris piles, nests, dens, burrows, etc.
- Soil sensitivity / potential erosion issues
- Surveying for and locating any bird nests (Apr-Jun)

**Site mapping / photos:** In addition to the pre-restoration reconnaissance survey it is standard practice to identify the sites using GIS software and orthophotos or to GPS the site prior to restoration. This information along with the recorded size of the restoration area and other restoration details not only provides valuable documentation of the work, but also provides the basis for future monitoring and maintenance activities. Pre and post restoration site photos are also important for documenting and reporting on the work. Examples of past restoration sites documented and mapped in the Park are shown in Appendix B.

## 4.3 Removal Methods

### 4.3.1 Manual Control

Manual controls are most effective on annual species and for small sites, but in reality, this is the most common method of control in parks and natural areas especially with volunteer involvement. It is important to note, that using these methods properly depends heavily on the biology of the plant species. For example the



*Manual control is the only way to remove invasive plants effectively in most areas of Stanley Park.*

mechanical control methods (like mowing and brush cutting) may foster rather than suppress plant growth.

The following methods are generally applied to manually manage invasive plants:

- Cutting (mechanical or manual) - methods include mowing, pruning, brush-cutting, or grazing of above ground stems, branches, and leaves.
- Soil and root removal (mechanical or manual) – methods include pulling, cutting, raking, tilling or excavation.
- Surface covering – mulching with organic material (e.g. wood chips, shredded leaves, straw, etc) or covering with geotextile fabric can act as a physical barrier to invasive plant growth.

### **Step by step approach to the manual removal of English Ivy**

1) Perform bulk ivy removal in strips, working from the top of a slope downward.

2) Standing on top of the ivy and down slope of the line of removal, disentangle or cut the ivy from around the base of native plants in the near vicinity of your line. After freeing your native plants, proceed to the top of your “ivy strip” and start pulling the leaves and stems along a line 2-3m in width.

3) Roll the ivy into cylindrical wads, much like rolling up a giant carpet. Pull out woody debris caught in the wads (such as fir branches) and place on the newly exposed soil. Pull or cut the wad free and drag over existing ivy to an “ivy mound” location.

4) Take care to remove any missed runner stems and roots by pulling and walking the length of the stems as you pull. The stems in some areas are strong and easy to thoroughly remove if “walked”. English ivy stems can regenerate from a piece 15cm in length if left behind.

5) If found climbing trees, cut ivy at chest height and remove from the bottom circumference of each tree. Make the cleared margin around the base at least 1.5m high.

6) Following the removal of one strip, continue wad removal until reaching the end of the strip. Go back to step 1 for the next strip.



### **4.3.2 Chemical Control Methods**

The Stanley Park Ecological Action Plan ([VPBR], 2011) recognized that current manual control methods have proven to be ineffective or unsafe for certain invasive plants species. The plan called for these species to be controlled soon otherwise the cost of their impacts will exponentially increase. Chemical control, i.e. focussed stem injection, is considered the most effective way to control hogweed and knotweed in particular. Since they have resisted mechanical removal, the use of root crown/stem injections is proposed to control them.

The Action Plan outlines that it will require a three-year program, where the herbicide glyphosate would be injected into the stems or root crowns of hogweed and knotweed stands. The procedure would first involve cutting the stems down, then injecting the herbicide into the hollow chamber of the stem just below the first or second node. The treatment was thought to need to be repeated for one to two years after the initial treatment to deal with dormant stands and the extensive rhizomes found below ground. This method has been used successfully in other jurisdictions, including Surrey, West Vancouver and Cypress Provincial Park. Since the herbicide is injected directly into the target plant, it poses little risk to the surrounding environment. To further prevent the possibility of exposure, the treated areas should be taped off and warning signs should be posted.

While glyphosate is not on the City's permitted pesticides list, Section 2.10 of the Health By-Law (No. 9535) allows application of a pesticide to destroy a health hazard (hogweed) and a pest infestation that would damage property (a knotweed infestation will result in loss of wildlife habitat and park land).

As of January 2013, the plan is approved and Park Board staff have purchased the chemical control equipment to be used by staff in Stanley Park and elsewhere in the park system for hogweed and knotweed. It was considered a much better investment than contracting this work; the capital cost is relatively low and follow-up monitoring and treatment especially in the second and third years will be required to ensure extermination. So far the procedures have not been implemented.

If any other chemical control methods are to be employed in the future, they too will need approval by Park Board and City staff.

### **4.3.3 Biological Control Methods**

Biological control generally involves the use of insects or other predators that are imported from the exotic plant's country of origin and then released on the treatment site. These biological control agents (usually insects) are strictly screened and tested before being imported and released. This is a long-term control method that is usually slow to take effect and is limited to



***Transplanting native plants is sometimes preferable to acquiring new plants from outside sources.***

specific invasive plant species in BC ([IPCBC] , 2010). This method is not currently being used in Stanley Park, but has been used in other areas of Vancouver for purple loosestrife. The Galerucella beetle has proved to have been a relatively successful and inexpensive option for the treatment of loosestrife ([ISCMV], 2012).

## 4.4 Post-Removal Restoration

Once the work of removing the invasive plants is complete, the site must be aided in the process of restoration and recolonization of native species. Since invasive species thrive in disturbed sites, removal areas must be treated to prevent regrowth. Most invasive removal events will leave some plant material behind and so return visits must be conducted at least 2-3 times following the event until the invasive plants are truly eradicated.

### 4.4.1 Replanting

Planting native species speeds up the process of natural selection and allows for the reintroduction of some species of plants that may have been eliminated through heavy invasive infestation. Plants may be container-grown and bought from reputable dealers, but it is preferable to use salvaged trees and shrubs or live-cuttings to reduce the opportunity to introduce new species by bringing in outside soils. Plant species should be chosen to reflect specific site characteristics especially soil moisture and nutrient regime. Watering may be necessary in the dry season and it is usually beneficial also to add mulch. Planting sites must be carefully monitored for several years to ensure invasive species do not recolonize. Most planting done by SPES staff and volunteers involve the planting of shrubs and ferns. Tree plantings should be approved by the horticulture/arborist staff of the Park Board. Plant size should be at least 1 gallon and density should be 1 m or less for shrub plantings. Table 5 below shows the estimated length of control phase (in years) before restoration (replanting) can begin.



***Plantings must be maintained for several years to ensure their success.***

**Table 5: Estimated length of control phase (in years) before restoration (replanting) can begin**

These estimates are very general and do not reflect site-specific issues such as the intensity of the control method (e.g., mowing frequency), seed-bank, or the amount of root energy. Many sites will require monitoring and maintenance in perpetuity. The information included in this chart is adapted from the City of Coquitlam Invasive Plant Management Strategy (Page and Lilley, 2008). Permission for use granted by Lanny Englund, City of Coquitlam.



Control Method	Himalayan Blackberry	English Ivy	Yellow Lamium	Knotweed	Morning Glory	Purple Loosestrife	Scotch Broom	Giant Hogweed
Mowing	2-5 yrs	n/a	n/a	n/a	1-3 yrs	2-5 yrs	2-5 yrs	2-5 yrs
Pruning	2-5 yrs	n/a	n/a	n/a	n/a	ongoing	1-3 yrs	ongoing
Raking	n/a	2-5 yrs	2-5 yrs	n/a	1-3 yrs	n/a	n/a	n/a
Brushcutting	2-5 yrs	n/a	n/a	n/a	n/a	n/a	1-3 yrs	2-5 yrs
Grazing	2-5 yrs	n/a	n/a	n/a	n/a	n/a	n/a	2-5 yrs
Root pulling	1-3 yrs	2-5 yrs	2-5 yrs	n/a	1-2 yrs	ongoing	1-5 yrs	n/a
Root cutting	1-3 yrs	2-5 yrs	2-5 yrs	n/a	1-2 yrs	n/a	n/a	1-3 yrs
Tilling	1-3 yrs	2-5 yrs	2-5 yrs	n/a	1-2 yrs	n/a	n/a	1-3 yrs
Excavating	1-3 yrs	1-2 yrs	1-2 yrs	1-2 yrs	1-2 yrs	1-2 yrs	1-2 yrs	1-2 yrs
Woodchips	1-3 yrs	n/a	n/a	n/a	1-2 yrs	n/a	1-5 yrs	n/a
Geotextile	1-2 yrs	n/a	n/a	>5 yrs	1-2 yrs	n/a	n/a	1-3 yrs
Insect pest	n/a	n/a	n/a	n/a	n/a	ongoing	n/a	n/a
Stem injection	n/a	n/a	n/a	1-5 yrs	n/a	n/a	n/a	1-3 yrs

According to prescriptions given for the Still Creek Watershed, plantings in parks or natural areas should never be considered maintenance free. They recommended that plantings be inspected and maintained monthly during the first two growing seasons with quarterly inspections and maintenance for up to 5 years (Page, 2006). It is possible that plantings may require monitoring and maintenance in perpetuity to prevent invasive species establishment depending on the species and the area that is restored.

#### 4.4.2 Seeding

When natural vegetation or soil is disturbed, seeding can be used as an effective tool to aid in native species recolonization if the grasses/plants are capable of resisting re-invasion. As an example, leafy spurge (*Euphorbia esula*) was decreased 67% two years after grass seeding in Minnesota (Biesboer, Darveau, & Koukkari, 1994). Some factors for consideration when seeding sites include:

- **Site Preparation/Scarification** - A well-prepared seedbed is vital in providing the best germination potential; scarify/rip any compacted soil, create an evenly rough surface, ensure natural drainage patterns are maintained, and place coarse woody debris sporadically across site to provide protection from erosion.

- **Ordering** - Use native grass seeds in natural areas; if an agronomic seed mixture is ordered, ensure that it is of a grade that limits the potential introduction of weed seeds (i.e. a minimum of Common No. 1 Forage Mixture or better).
- **Timing of Seeding** - Spring (mid-March to early June) is best, fall (late August to early October, but after soil is moist) is acceptable; summer only in emergencies.

### 4.4.3 Mulching

Mulching and adding geotextiles is one way to encourage natural regrowth and discourage invasive regrowth at pull sites. Organic mulches include wood chips, shredded leaves, pine straw, bark, straw, or peanut hulls. As organic mulches decompose they can replenish some key elements necessary for productive soil and can improve soil structure. Organic mulches should be applied at least 10-15 cm deep and because they decompose they may need to be reapplied periodically. Avoid fine-textured mulches that compact and prevent oxygen and water movement to the root system. Mulching is one of the least expensive and most beneficial urban forestry maintenance activities available because it:

- Stimulates root growth
- Helps control weeds
- Improves soil moisture infiltration and retention, soil structure and soil fertility
- Increases soil organic matter and number of soil organisms
- Reduces soil erosion
- Prevents or reduces soil compaction from foot and vehicle traffic
- Helps insulate soil from cold and heat
- Protects tree trunk and surface roots from mower and string-trimmer damage
- Provides environment for mycorrhizal fungi

### 4.5 Materials Disposal

Invasive plants are proficient at spreading to new areas by seeds or vegetative fragments, so disposal must be planned carefully. Many invasive plant species can regrow from small vegetative fragments even after composting. Generally, the safest way to dispose of invasive plant material is by incineration or bagged in the landfill ([IPCBC] , 2010).

After every invasive species removal event run by SPES, Park Board staff are informed of the site so that operations staff can come and collect the plant material. All invasives removed in the park are brought to the Richmond Energy Garden and Composting Facility (formerly known as Fraser Richmond Soil & Fibre).



*Tree planting in the park is always done in conjunction with the Park Board arborist*

## 4.6 Site Monitoring and Maintenance

Following the treatment, it is important to monitor sites over the long-term. As mentioned above, to successfully remove invasive plants from an area it often requires multiple maintenance treatments. Depending on the success of treatments, different management techniques may need to be applied (see BMP's for details).

Generally, site monitoring and maintenance in the park includes the following steps:

- Post-treatment follow up visits to the site should occur within 1-2 years, depending on the species. For sites that are more sensitive or where signage/fencing was installed will need to be visited sooner.
- For most sites, a second or third event may be held on site to remove regrowth, maintain plantings and ensure the success of the project. SPES currently involves small groups and specialized groups of volunteers to perform maintenance events on sites worked on by larger groups in the past.
- Maps, photos and pre-treatment assessments should be revisited and updated if necessary.

## 4.7 Education and Outreach

SPES is committed to incorporating community education into all of our stewardship program offerings and restoration projects. Whether it is direct contact with volunteers who attend the events, Park users who see work in action, public browsing signage, or the media who are interested in our activities, SPES always seeks out the opportunity to engage the public and raise awareness about the issue of invasive plants through our programs. The printed materials in Appendix E are used for passive education while programs such as the Stanley Park Environmental Art Project (SPEAP), Stanley Park Invasives Removal Youth Teams (SPIRYT), and Introduced Invaders school program are designed for actively engaging the community.

SPES has developed signage which is installed on site to inform park users and stakeholders about specific projects. To supplement this on-site signage, additional communications may be necessary especially if the project is in a highly visible or controversial location. The communications alert found in Appendix E is an example of the kind of document that is useful for Parks Communications staff to relay information to the public and the media if needed.

Throughout the management process, it is important to maintain strong ties with direct partners, researchers, regional groups and other managing agencies involved in invasive plant management to remain up-to-date on invasive plant concerns, share best management practices, and to contribute to initiatives at a regional level ([IPCBC], 2010). Similarly, this information must be communicated to Park staff, volunteers and visitors in order to ensure that these strategies are applied properly and effectively in Stanley Park and beyond.



***Media interest in invasive plant projects is fairly low, although they have come out for large corporate events.***



***Education around highly visible restoration sites is essential to maintaining public support.***



## APPENDIX A – Tree Ivy Program Report



English ivy impacting native species and habitat structures in Stanley Park. Photo by: Greg Ferguson

### Background

English ivy (*Hedera helix*) is a common non-native, invasive plant species found in British Columbia's Lower Mainland region. In Stanley Park, ivy is one of the most abundant invasive plant species and has been the focus of removal efforts by Stanley Park Ecology Society (SPES) since 2004.

Like other invasive species, ivy negatively impacts native species and habitat. When ivy climbs trees and other structures, its form of growth changes and it begins to produce fruits and seeds. Seeds may be eaten by certain bird and mammal species or simply fall to the ground. This facilitates both short and long distance dispersal, thus increasing impacts. To slow the further spread and impact of ivy in Stanley Park, it's important to reduce the production of seeds.

In April of 2009, SPES initiated a tree ivy removal program which involved volunteers in documenting and removing ivy growing up trees, shrubs and other structures in Stanley Park. The two main goals of the program were:

- To slow the spread of English ivy in Stanley Park and beyond, thus reducing its impact on forest ecosystems; and
- To protect and restore native species and natural structures that English ivy is impacting.

“As a biologist, I appreciate what we are doing- removing invasive species and making this urban park a little more natural. The other volunteers are great and that's why I keep coming back.” –Michael Arbeide, Tree Ivy Volunteer





SPES Tree Ivy Removal Program volunteers. Photo by: Robyn Worcester

## Program Results 2009-2013

June 27<sup>th</sup> 2013 marked the final session of the Tree ivy removal program, which regularly happened on Thursdays for three hour sessions. After four years, the group has now conducted a complete sweep of the Park removing English ivy from more than 8000 accessible trees and shrubs. The team will reassess the continuation of the project and monitor regrowth; but for now they will shift their focus on tackling other invasive species in the Park.

### Quick Facts:

- 80 volunteers engaged in the project
- Over 1900 volunteer hours committed to the project over 4 years
- 176 volunteer sessions
- 6495 trees and 1679 shrubs cleared of English ivy

### Trees and Shrubs Cleared of English ivy

A total of 8228 accessible trees, shrubs and structures were cleared of English ivy. Most of the vegetation cleared were trees, comprising 79% (6495), shrubs comprising 20% (1679), and other materials including sign posts and structures comprising 1% (54). Of the tree species cleared, 55% were coniferous species and 45% were deciduous species.



“Not many people have the opportunity to be outside working in the Park, but as part of Tree Ivy we have to do this and it’s a lot of fun.” -Phil Viaud, Tree Ivy Volunteer



News reporters filming volunteers as they remove ivy from some of the last accessible trees in Stanley Park to celebrate the completion of one full sweep of the Park. Photo: Ivy Smith

### **Conclusion**

Although volunteers conducted an entire sweep of the trees in the Park, due to volunteer safety or accessibility issues there are still about 25 trees in the Park that have not been cleared of ivy. SPES staff will work towards enhancing the benefits of this project by mitigating regrowth as they work with volunteers to remove English ivy from the ground in priority areas where the trees have now been released of the ivy. Plans will be put in place to monitor the growth of ivy on the trees within the next year.

### **Acknowledgements**

SPES would like to thank the many volunteers who have committed to this project over the years; especially Phil Viaud and Tom McIlfaterick for their leadership over the course of this project. Your passion for conservation is inspiring and will make a lasting impression on Stanley Park.

### **Literature Cited**

Fenger, M, T. Manning. J. Cooper, S. Guy, and P. Bradford. 2006. Wildlife and trees in British Columbia. B.C. Ministry of Forests and Range and Lone Pine Publishing. Canada.



# What can you do ?



SPES Tree Ivy Removal Program volunteers. Photo: Ivy Smith

## What You Can Do To Help Stop the Spread of Invasive Plants

- Investigate the potential invasiveness of plant species before you buy or plant them.
- Remove invasive species from your garden and choose to grow native plants instead.
- Avoid letting invasive plants go to fruit or seed.
- Avoid composting invasive plant materials or seeds as they can spread.
- Educate others about invasive species and the problems they pose on our local ecology.

For more information on the tree ivy removal program and how you can help conserve Stanley Park's ecology please contact: [stewardship@stanleyparkecology.ca](mailto:stewardship@stanleyparkecology.ca) or 604-718-6547.



## APPENDIX B – SPES Restoration Sites

### SPES Invasive Plant Removal Sites, 2007-2011

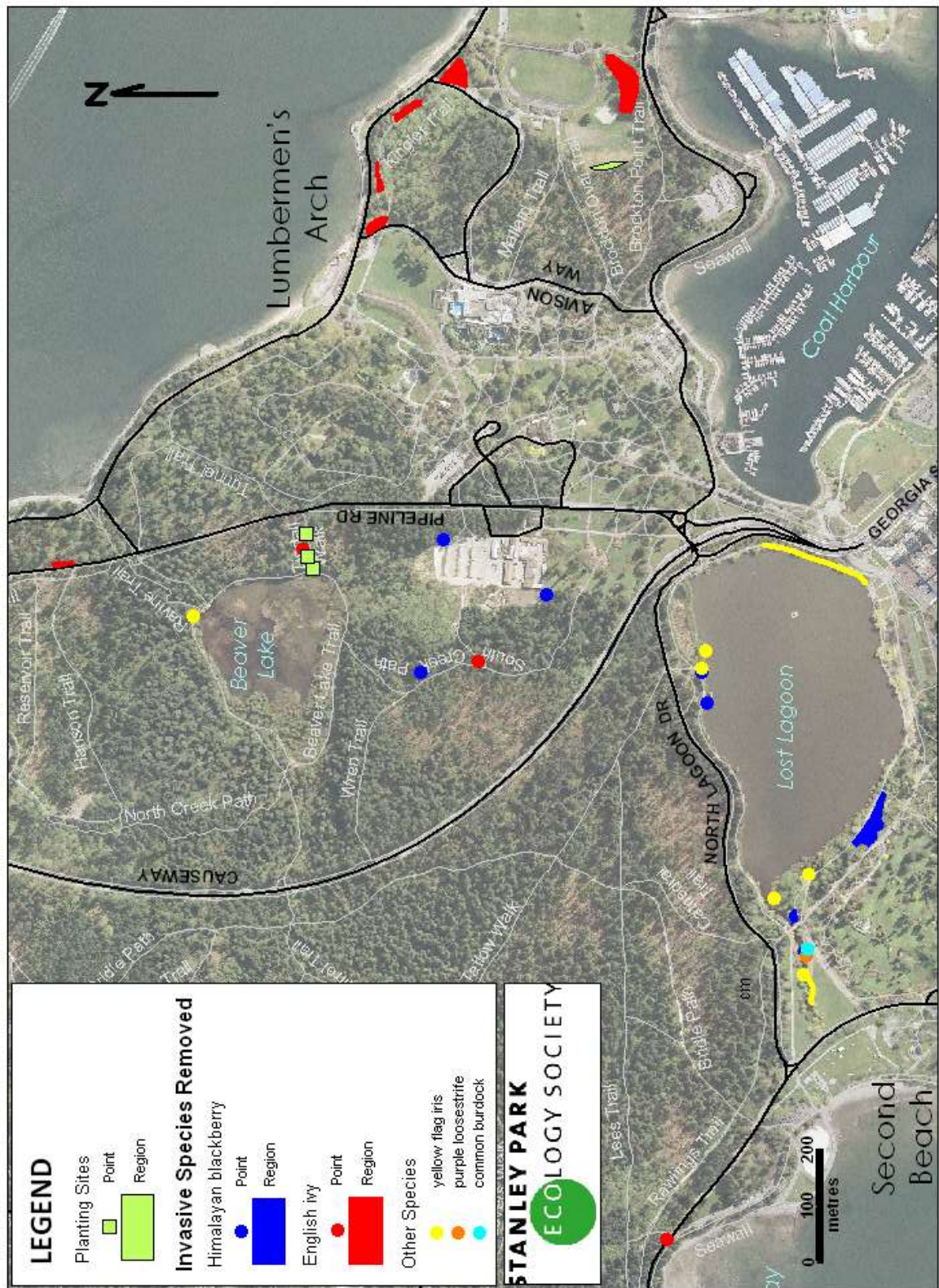








# Habitat Restoration Activities in Stanley Park June-December 2012



## APPENDIX C – Invasive Plant Species of Stanley Park

### Established Species in Stanley Park Natural and Sensitive Areas:

(Established species are abundant or widespread in most areas of the park)

Hedera helix (English ivy)  
Ilex aquifolium (English holly)  
Rubus armeniacus [formerly discolor] (Himalayan blackberry)

### Emergent Species in Stanley Park's Natural and Sensitive Areas:

(Emergent species are limited distribution or a new invader)

Arctium spp (burdock)  
Buddleja davidii (Butterfly bush)  
Cytisus scoparius (Scotch broom)  
Daphne laureola (Spurge laurel) (Daphne)  
Heracleum mantegazzianum (Giant hogweed)  
Hypericum calycinum (St John's-wort)  
Impatiens parviflora (Small-flowered touch-me-not)  
Prunus laurocerasus (English laurel)  
Prunus lusitanica (Portugal laurel)  
Robinia pseudo-acacia (black locust)  
Ulex europaeus (Gorse)\*  
Vinca minor (Lesser periwinkle)

### Expanding Species in Stanley Park Natural and Sensitive Areas:

(Expanding species are abundant in some areas, but have limited distribution in other areas)

Calystegia sepium (Morning glory) (Bindweed)  
Iris pseudacorus (Yellow flag iris)  
Lamium galeobdolon (Yellow lamium) (Yellow Archangel)  
Lythrum salicaria (Purple loosestrife)\*  
Nymphaea odorata (Fragrant water lily)  
Phalaris arundinacea (Reed canary grass)  
Polygonum cuspidatum (Japanese knotweed)\*  
Rubus laciniatus (Evergreen blackberry)  
Solanum dulcamara (Climbing nightshade) (Bittersweet)

### Trailside Species (Examples of most extensive trailside weeds):

(These are non-native species considered a nuisance, but of minimal threat to natural area biodiversity)

Anthoxanthum odoratum (sweet vernalgrass)  
Bellis perennis (English daisy)  
Bidens frondosa (leafy bur-marigold)  
Calystegia sepium (hedge bindweed)  
Cirsium arvense (Canada thistle)  
Cirsium vulgare (common thistle)  
Dactylis glomerata (orchard grass)  
Daucus carota (Queen Anne's lace)

*Digitalis purpurea* (common foxglove)  
*Erastium fontanum* ssp. *triviale*, (mouse-ear chickweed)  
*Eschscholzia californica* (California poppy)  
*Geranium robertianum* (herb robert)  
*Gnaphalium uliginosum* (marsh cudweed)  
*Hesperis matronalis* (dames rocket)  
*Holcus lanatus* (common velvet-grass)  
*Hordeum murinum* (wall barley)  
*Hypericum maculatum* (spotted St. John's-wort)  
*Hypericum perforatum* (common St. John's-wort)  
*Hypochaeris radicata* (hairy cat's-ear)  
*Lactuca muralis* (wall lettuce)  
*Lactuca serriola* (prickly lettuce)  
*Lapsana communis* (nipplewort)  
*Lathyrus latifolius* (perennial peavine)  
*Lepidium heterophyllum* (purpleanther field pepperweed)  
*Linum usitatissimum* (common flax)  
*Lolium multiflorum* (Italian ryegrass)  
*Lotus pedunculatus* (big trefoil | stalked birds-foot trefoil)  
*Lychnis coronaria* (rose campion)  
*Lycopus europaeus* (gypsywort)  
*Lysimachia punctata* (spotted loosestrife)  
*Matricaria matricarioides* (pineapple weed)  
*Meconopsis cambrica* (Welsh poppy)  
*Medicago lupulina* (black medic)  
*Medicago sativa* (alfalfa)  
*Myosotis scorpiodes* (common forget-me-not)  
*Nymphaea odorata* (white water lily)  
*Oenothera glazioviana* (red-sepaled evening primrose)  
*Papaver rhoeas* (corn poppy)  
*Persicaria maculosa* (spotted ladythumb)  
*Phleum pratense* (Timothy grass)  
*Phyllostachys* sp (bamboo sp.)  
*Plantago lanceolata* (ribwort plantain)  
*Plantago major* (broad-leaved plantain)  
*Poa annua* (annual bluegrass)  
*Polygonum aviculare* (common knotweed)  
*Polygonum convolvulus* | *Fallopia convolvulus* (black bindweed)  
*Prunella vulgaris* ssp. *vulgaris* (European self-heal)  
*Ranunculus acris* (meadow buttercup | tall buttercup)  
*Ranunculus repens* (creeping buttercup)  
*Rumex conglomeratus* (clustered dock)  
*Rumex obtusifolius* (bitter dock)  
*Sagina procumbens* (procumbent pearlwort)



*Senecio sylvaticus* (wood groundsel | woodland ragwort)  
*Setaria viridis* (green bristlegrass)  
*Silene rubra* (campion sp.)  
*Silene vulgaris* (bladder campion)  
*Sisymbrium officinale* (hedge mustard)  
*Sonchus arvensis* (perennial sow-thistle)  
*Sonchus asper* (prickly sow-thistle | spiny sow-thistle)  
*Sonchus oleraceus* (common sow-thistle)  
*Stellaria media* (chickweed)  
*Symphytum x uplandicum* (hybrid comfrey)  
*Tanacetum vulgare* (common tansy)  
*Taraxacum officinale* (common dandelion)  
*Trifolium dubium* (small hop-clover | suckling clover)  
*Trifolium hybridum* (alsike clover)  
*Trifolium pratense* (red clover)  
*Trifolium repens* (white clover)  
*Verbascum thapsus* (great mullein)  
*Veronica filiformis* (slender speedwell)  
*Veronica serpyllifolia* (thyme-leaved speedwell)  
*Vicia cracca* (tufted vetch)  
*Vulpia bromoides* (barren fescue | brome fescue)

#### Watch List:

(These are non-native species considered highly invasive but not yet found in Stanley Park)

*Acer platanoides* (Norway Maple)  
*Berteroa incana* (Hoary alyssum)  
*Cirsium palustre* (Marsh plume thistle)  
*Clematis vitalba* (Evergreen clematis | Traveler's Joy | Old man's beard)  
*Cynoglossum officinale* (Hound's-tongue)  
*Euphorbia esula* (Leafy spurge)  
*Fallopia sachalinensis* (Giant | Sakahalan knotweed)  
*Fallopia x bohemica* (Bohemian knotweed)  
*Humulus lupulus* (Common hop)  
*Impatiens glandulifera* (Policeman's helmet | Himalayan Balsam)  
*Linaria genistifolia* spp. *dalmatica* (Dalmatian toadflax)  
*Polygonum polystachyum* (Himalayan knotweed)  
*Soliva sessilis* (Carpet burweed)

## APPENDIX D – Stanley Park Environmental Art Project Final Report

### 2009 Stanley Park Ecology Society Ivy Environmental Art Project

#### Background

Invasive species management is a key priority for the Stanley Park Ecology Society (SPES) and the Vancouver Park Board (VPB) in restoring naturally functioning ecosystems in Stanley Park. As such, significant effort and amounts of invasive species are removed from the Park, with the main species being English ivy (*Hedera helix*).

Currently, all invasive plants removed from Stanley Park are incinerated. This ensures that these species will not re-grow and spread in other areas. This process involves a large amount energy and time, from moving invasive plant material to appropriate incineration sites and the resulting incineration process. In addition, the management of invasive species removes a large amount of biomass from the Park. At sites where natural restoration processes are allowed to proceed, there may be a substantial time lag in the replacement of this biomass.

Given these two circumstances, the Ivy Project was initiated in the spring of 2009 by SPES and Vancouver artist Sharon Kallis through the Stanley Park Environmental Art Project. The project was completed in the spring of 2010.

#### Project Objective and Goals

Working together, our overall goal was to re-purpose invasive plant materials in ways that would turn their negative impacts into positive ecological and social benefits through an artistic and ecologically restorative process. This goal resulted in the following objectives:

- re-purpose invasive species (in particular English ivy) that are removed from Stanley Park into environmental art works so to reduce the amount of biomass being removed from management sites and being incinerated;
- create art works that mimic natural habitat structures found in Stanley Park;
- find alternative ways of restoring degraded sites with re-purposed plant materials;
- investigate the re-growth of invasive species, the use of structures by wildlife, and their benefit as a restoration material; and
- involve and educate the public in invasive species management and habitat restoration.



English ivy, a common non-native, invasive species removed from Stanley Park (Photo: Greg Ferguson).

## Project Results

- 3 sites were selected for the project: a control site, a treatment site, and a restoration site.
- Approximately 25 m<sup>3</sup> of English ivy biomass was re-purposed into environmental and restorative works.
- 9 natural habitat structures were created and installed on the control and treatment sites: 3 nurse logs; 1 snag; and 5 hanging nests.
- 6.58m<sup>2</sup> of English ivy bio-netting, 5 native plant berms/ wattles, and 32 native plants were used to stabilize and re-vegetate a 43.6m<sup>2</sup> section of eroding slope



English ivy environmental art works established on treatment site to restore habitat (Photo: Greg Ferguson).

All structures were made by crocheting and weaving English ivy and Himalayan blackberry (*Rubus discolor*), both common invasive species removed from Stanley Park.

- 11 scheduled community events and 1 youth workshop were provided.
- 188 participants were involved in the project: 23 seniors; 114 adults; 18 youth; and 33 children.
- Project promotion was undertaken through the internet, email, posters, press releases, and 2 television interviews.
- A website was created to inform the public and other stakeholders about the project.
- Workshops held at the Stanley Park Nature House proved to be most effective in engaging the public.

Observations of the control and treatment sites over a ten month period indicated the following conditions:

- no English ivy or other plant growth was observed on structures;
- structural ivy was dry; minor to moderate amounts of leaf material accumulated on structures; and
- there was minor use of structures by wildlife and native plants.



Volunteer weaving dried English ivy into restorative art work (Photo: Sharon Kallis).

## Discussion

The Ivy Project was very successful in achieving the desired goal and its corresponding objectives. English ivy and Himalayan blackberry were found to be particularly useful and effective invasive plant species for re-purposing into wildlife habitat structures and restorative materials, and in maintaining or enhancing site biomass.

No re-growth of invasive plant material was observed following the plant drying process and after material was installed in the park. Native wildlife and plant use of structures was minimal, but this will likely increase with time and structure decomposition.

There was excellent outreach and public education accomplished regarding the concerns of invasive species in our environment and how they can be re-purposed in beneficial ways.

Overall, this project proved to be very environmentally, economically, and socially rewarding.

## Acknowledgements

SPES would like to thank the following people, organizations, and funders for supporting this successful project: Sharon Kallis (the artist), the Vancouver Board of Parks and Recreation, the Community Arts Council of Vancouver, the Vancouver Foundation, Vancity & Citizens Bank of Canada, the British Columbia Arts Council, and the Canada Council for the Arts.

Further information on the Ivy Project can be found at <http://theivyproject.wordpress.com/> or by contacting SPES's Stewardship or Public Programs departments: Phone: 604-718-6522.



Volunteers restoring habitat with re-purposed English ivy bio-netting and planting of native species at slope restoration site (Photos: Thomas Strand).

## APPENDIX E – Checklist for artists harvesting invasive plant materials

If a local artist or another group wants to try harvesting invasive plant species for art purposes, they should first find out who owns or manages the land and see if there is already an organized method in place for stewardship. If not, they can try and get permission to host a community removal effort, and built it into an organized project or series of workshops. If they want to work solo, they should have someone who knows plants and the ecology of an area do a site survey to identify areas that are eligible for removing invasives; not everywhere will be. It is also important to recognize that there are several provincial and municipal laws regarding the removal of plant material on both public and private lands that need to be observed.

The following checklist was based on text from the book *Common Threads: weaving community through collaborative eco-arts* by Sharon Kallis (New Society Publishers, 2015).

### Safety

- ☐ Have someone assist you. It is best to have a “pull-buddy” in case of an emergency
- ☐ Wear long pants and sleeves and closed toe boots that are good for the job - no open toes summer sandals
- ☐ Do a bit of research and make sure that chemicals are not being used for invasive management in the area you want to work. Some common sense can help here too, have you noticed there are large dead/brown swathes of grasses or shrubs in the area? This might be from spraying.
- ☐ A few phone calls to find out who manages the area and what their policy is should give you an answer of whether this is a place you want to work or not.
- ☐ High visibility vest are a great idea, they keep you visible which is helpful when you are working in either a small group- or trying to keep track of a larger group.
- ☐ Wear gloves. Long armed suede “rose gloves are best for prickly bushes and leather gloves are a must for harvesting blackberry vine in the first step of cutting and thorn removal.
- ☐ Urban Forest Alert: if the area you are working in is an urban wild zone, extra safety measures should be taken. It is easy to stumble into a deserted nest of broken glass, drug paraphernalia, rusty metal or other human detritus that can be either unsafe or just unpleasant to walk into. If you are leading the invasive removal, include a check for areas this might be a concern in your initial site inspection. Have some gear on hand to help clean up the area safely.
- ☐ Bring snacks to your removal event: I know this seems a weird thing to state under safety, but removing invasives can be hard physical labour, so have a planned break with fruit or cookies; something to refuel the workers and help avoid low blood sugar wobbles that can come on quickly when working hard outside. Tuck hand sanitizer into your snack kit.
- ☐ Make sure you have or are covered under general liability insurance.

### Environmental Concerns:

- ☐ Harvest time for some species is right in the middle of small bird nesting season, and many bushes make for excellent homes. Stay at the bush edge, and be aware of birds, pick another spot if there seems to be a lot of action in the bushes nearby. The Migratory Bird Convention Act (1994) protects the nests and eggs of most



bird species in Vancouver because incidental harming of birds from vegetation clearing can have long-term consequences for migratory bird populations.

- ☐ Be very careful of young native plants in infested areas, and work around them; gently lift invasives up and over and around the species you want to encourage.
- ☐ Do not remove ivy from trees: Use a pair of clippers and clip the vine about 1.5 meter up from the ground, gently remove the vines towards the earth and pull away from trunk; leave the higher vines on the tree to die off. Two reasons for this; ivy can weigh a ton, literally, so pulling up a tree to release ivy can be very dangerous. Also, ivy grows into little nooks of bark, so when you pull it off it leaves the tree bark open and vulnerable to parasites.
- ☐ Often invasives around wetlands and watercourses provides the only habitat between land and water. The riparian area regulations restrict the removal of vegetation near watercourses so you need to observe local laws and guidelines if you are removing plants in these areas. Also, think about planting tall riparian native species to replace the invasives that are removed.
- ☐ Be careful about spreading seeds. Some species such as scotch broom and yellow flag iris have seed heads that can spill seeds into new areas.

#### **Tools:**

- ☐ Gloves & hi-vis vest
- ☐ A few shovels
- ☐ Secateurs
- ☐ Tarps
- ☐ A wheelbarrow might also be handy to push everything in.
- ☐ A garbage bag for debris
- ☐ If you are working in riparian/ wet zones, hip waders might be needed, or at the very least, let participants know before hand to wear rain boots.

#### **Site inspection:**

- ☐ Start off the pull by doing a brief walkabout and identify any areas where there is tripping hazards or difficult, unstable footing.
- ☐ Check the site for human use and hazardous materials.
- ☐ Identify the native plant and animal species in the area that you want to be sure and leave alone.
- ☐ Make sure everyone participating clearly understands the invasive species characteristics for identification, as well as recognizes the native species in the area. As an example, English ivy transforms radically from a pointed leaf to a rounded leaf when it matures. The native blackberry vine, is a small delicate trailing blue-spruce coloured vine whereas the invasive blackberries- Himalayan and European are both large and bush like. Though the small delicate native blackberry is hard to find where the invaders are, you would certainly not want to tell someone to 'go pull the blackberry', to come back and find a pile of the species we want to support.

#### **Piles of bio mass**

- ☐ As you pull invasives make piles on tarps that can be lifted out of the area to a decent work spot. Sort what is pulled into piles of useful and not useful, as fits your project plans.
- ☐ Any material that you plan on taking back to a studio or other outdoor work area should be stripped of surplus seed heads, rootling's or leaves before leaving the site. Be very cautious when moving invasive

species that you are not assisting the plant by spreading its reach further. Either use invasive species in the location that you found them and work right on site, or do whatever material prepping on location so spreading does not occur.

- ☐ Find out what your local area policy is on invasive plant waste, sometimes if there is no process to refer to just leaving the pile to die on site where it was removed will work- it depends on how the plant likes to spread, and how easily it roots. If this is the method you use, go back and check the site occasionally; roll the pile over, make sure it is not rooting from underneath. Again, both disposal and a plants vigour for re-rooting itself will be different in various areas, different times of year and vary from plant to plant.
- ☐ Do not compost! For most plants putting any fresh studio waste scrap from invasive species in your compost is just asking it nicely to root. Use your regular garbage system for disposal. In Vancouver, that standard garbage is actually cooked to a high enough temperature to kill any seeds or rootlings.

### **Safe Studio Practice:**

- ☐ Some plants can be an irritant to the skin for certain people so do a bit of research on the plants you want to work with. Have gloves in the studio for people to use, and keep a stash of vinyl or latex gloves on hand for outdoor workshops. Let people know when you introduce the project if there is any concern in this regard. For instance, a small percentage of the population will have an adverse reaction to English ivy with itchy, reddened skin where contact happens. Let people know if they feel anything tingly or itchy to stop right away, wash well with soap and water, and then use gloves. I have met a few people who knew they were allergic to ivy, and in all cases they were invasive removers or gardeners with a long history with the plant and the allergy developed over time.
- ☐ Have lap cloths: old towels or old bed sheets torn to a 1 m x 30 cm size work really well as lap cloths that not only keep people's clothes clean, but give a skin barrier for anyone wearing shorts or a skirt in the studio.
- ☐ Wash hands well with soap and water after working with any natural materials.

### **Invasive plants, specific harvest notes and uses.**

See *Common Threads: weaving community through collaborative eco-arts* by Sharon Kallis (New Society Publishers release date January 2015) for detailed procedures and timing.





### **Final Advice:**

Once you get going you will figure out your own material quantities and processing times, and determine how much material you can actually cope with. If you are lucky enough to have the option, partner up with an existing ecology group that does regularly scheduled community stewardship programming. Participate in a few pulls, and talk with the organizer about what you want to do, and discuss what works from their perspective for you to participate and take materials away. These individuals are likely an excellent resource of knowledge to help you figure out what a local invasive removal calendar might be as well know the best practices in your part of the world. Once you have a relationship established you can hopefully work with this group, and glean from the 'pull –pile' at days end. Learning to not be greedy, but to only take what seems a reasonable amount for processing is hard- it takes some experience to learn to estimate. Remember, the less excess you end up with in the studio the less invasive green waste you have to dispose.

## APPENDIX F – Printed Educational Materials on Invasive Species

# Introduced Invaders

Non-native, invasive plants outcompete native species. They damage the ecological integrity of our natural areas and lead to economic and social costs.


 <p><b>English Holly</b> (<i>Ilex aquifolium</i>) Grows in sun and shade in well drained soil; requires lots of water. Native Alternative: Tall Oregon Grape</p>	 <p><b>Morning Glory</b> (<i>Convolvulus arvensis</i>) Grows in various light and soil conditions; common in gardens. Native Alternative: Bunchberry</p>	 <p><b>English Ivy</b> (<i>Hedera helix</i>) Grows in various light and soil conditions. Native Alternatives: Salal, Sword Fern</p>
 <p><b>Yellow Lamium</b> (<i>Lamium galeobdolon</i>) Grows in moist, shaded and open areas. Native Alternative: False Lily of the Valley</p>	 <p><b>Common Periwinkle</b> (<i>Vinca minor</i>) Grows in a range of soil types; shade tolerant. Native Alternative: Foam Flower</p>	 <p><b>Giant Hogweed</b> (<i>Heracleum mantegazzianum</i>) Caution: Phototoxic. Common by streams and roads. Native Alternative: Elderberry</p>
 <p><b>Japanese Knotweed</b> (<i>Polygonum polystachyum</i>) Grows in partial to full sun. Native Alternative: Red-osier Dogwood</p>	 <p><b>Himalayan Blackberry</b> (<i>Rubus armeniacus</i>) Grows in partial shade to full sun. Native Alternative: Salmonberry</p>	 <p><b>Yellow Flag Iris</b> (<i>Iris pseudacorus</i>) Grows in partial shade to full sun along lakes, ditches and slow-moving rivers. Native Alternative: Skunk Cabbage</p>

### How Can You Help?

- Remove invasive species from your property and dispose of them in the garbage to avoid introducing them into natural areas.
- Plant native species adapted to the local environment.
- Educate others about invasive species.
- Volunteer with a local community group to remove invasive species.

**STANLEY PARK**  **ECOLOGY SOCIETY**

[www.stanleyparkecology.ca](http://www.stanleyparkecology.ca)



# Root Out the Invaders

## Stop the spread of invasive species in Vancouver

We need your help in tackling invasive species in the natural areas of Vancouver's parks. English ivy and Himalayan blackberry are two examples of non-native, invasive species that cause ecological harm to native plants and wildlife habitats.

Invasive plant species are primarily transported to their new locations by people, either accidentally or intentionally. Effective invasive species management is a priority for the Vancouver Board of Parks and Recreation, Stanley Park Ecology Society and other environmental stewardship groups. We hope you will join us in preventing their spread.

### What you can do:

- Remove invasive plant seeds and materials from clothes, footwear and vehicle tires regularly.
- Avoid recycling or composting invasive plant materials.
- Limit soil disturbance when working in parks and natural areas.
- Share with others what you know about invasive species.

### For additional information:

Stewardship Programs Coordinator  
Stanley Park Ecology Society  
604-718-6547 or [stewardship@stanleyparkecology.ca](mailto:stewardship@stanleyparkecology.ca)  
[www.stanleyparkecology.ca](http://www.stanleyparkecology.ca)





## ---- Communications Alert ----

### Removal of invasive blackberry patch next to the Stone Bridge at Lost Lagoon in Stanley Park

On the morning of 21<sup>st</sup> of November, 2012 Vancouver Park Board staff will be removing invasive Himalayan blackberry from a site near the Stone Bridge at Lost Lagoon in Stanley Park. The invasive patch is in a sensitive area and is being removed to restore bird habitat and improve water quality as a part of the Stanley Park Ecological Action Plan. The plan calls for the removal of invasive plant species (see details below) as well as the restoration of habitat around Lost Lagoon (see attached action plan) for the benefit of water quality and native bird species.

The site has been subject to an extensive plan created as a collaboration between Stanley Park Ecology Society (SPES) staff and students of BCIT's Ecological Restoration program (see attached). Following the removal of the Himalayan blackberry by machines, the students will be working on the site to restore habitat by putting down mulch and replanting with native species.

SPES and VPB staff will be on site for the mechanical removal of the blackberry on Wednesday morning to address concerns from the public. For more information please contact Guy Pottinger at the Park Board or Robyn Worchester at SPES.

Guy Pottinger            604-830-2071

Robyn Worchester      604-290-5750





## **The Problem with Invasive Plant Species**

Invasive exotic plants are introduced species, typically far from their natural geographic range; that pose undesired or negative impacts on native biota and ecosystems, managed landscapes and/or human health. These species can spread quickly, grow rapidly, and thrive in their new environments, resulting in negative impacts to environmental, economic and social systems.

Invasive species are considered one of the greatest threats to biodiversity in the world today, second only to habitat loss. Many invasive plants are able to shade-out, smother and displace native plants that provide valuable habitat in our ecosystems. Some produce toxic substances that inhibit the growth of native species, while others are poisonous to local wildlife or humans. Others can cause damage to abiotic elements of an ecosystem, altering water flows, causing erosion, or increasing fire hazard.

In 1998, the Park Board adopted a Volunteer Policy that describes the relationship between volunteer work and union work. Invasive plant pulling and monitoring in the park has been conducted within that policy since that time.

Methodology concerning the best management practices for the removal of invasive plants has been created and used by SPES Stewardship Programs and was adopted into the 2009 Stanley Park Forest Management Plan.

## **Invasive Species Remediation Strategy**

As the management of invasive species is both an acute and ongoing problem, there are several options to address this problem in both the short and long term. In the short term, it is necessary to get the most threatening species under control and at the same time and for the long term, prevent the spread of existing species and the introduction of new species into the park.

Management of invasive plants should take a multi-pronged approach that recognizes the immediacy and extent of the treatment. While established plants like English ivy and blackberry can only be managed, some newly introduced and expanding plants, including knotweed, hogweed, loosestrife and lamium should be eradicated quickly. Current manual control methods have proven to be ineffective for these latter species and if they are not controlled soon, the cost of their impacts will exponentially increase (refer to table on page 21 in the Forest Management Plan).

## APPENDIX G – Best Management Practices and Maps for Invasive Plant Species in Stanley Park

### English holly (*Ilex aquifolium*)

Established Species in Stanley Park Natural and Sensitive Areas:



#### Description

- \* Broadleaf evergreen shrub/tree with prickly leaves
- \* Can grow from 5 to 18 m high
- \* Reddish orange berries (poisonous to humans) are found on female trees

#### Ecology

- \* Native to Europe
- \* Grows in shade or sun in well-drained soil
- \* High water requirements
- \* Reproduction by suckering, layering, or by seed

### Removal

- \* Small plants can be pulled or dug up when soil is moist.
- \* Best to remove all of the plant. Cutting at the base usually results in re-sprouting from the crown, monitoring & follow up required
- \* Applying herbicide to a cut stump is the most effective for large plants

### Priority Actions for Stanley Park

- \* Removal of plants from restoration areas. Hand-pulling for small plants, and mechanical removal for larger plants
- \* Control of large, fruiting plants in other areas of the Park; control of lower branches to prevent suckering
- \* Removal of holly as-seen during field activities elsewhere in the Park

### Suggested Alternative Plants

- \* native evergreen trees
- \* Oregon grape (*Mahonia nervosa*)
- \* Tall Oregon grape (*Mahonia aquifolium*)
- \* Pacific crabapple (*Malus fusca*)
- \* Arbutus (*Arbutus menziesii*) (will only work on the dries, sunniest sites)
- \* Salal (*Gaultheria shallon*)

# Invasive Plant Species in Stanley Park 2011

## English Holly



Copyright 2011 Stanley Park Ecology Society.  
Not intended for navigational purposes. For reference use only.



## Himalayan blackberry (*Rubus armeniacus*)

Established Species in Stanley Park Natural and Sensitive Areas:



### Description

- \* An evergreen shrub with trailing, arching stems
- \* Thick canes and curved thorns
- \* Can grow up to 7 m in one season, forming dense thickets
- \* Have 3 to 5 oval leaflets that are shiny green on top, pale green with fine hairs underneath
- \* Pinkish-white flowers with 5 petals in spring; berries are red, turning a deep purple-black in mid-late summer

### Ecology

- \* Native to western Europe
- \* Sunny to partly shady areas with rich, wet to moist soil
- \* Thrives in open, disturbed areas such as roadsides and fields

### Removal

- \* Properly identify invasive blackberry plants and mark any native plants in the middle of the infestation
- \* Best method is to cut canes down, then remove root-crowns using a pickaxe or shovel
- \* Herbicide applications can be used
- \* Mechanical mowing can be used, but recommended when the plants are just beginning to flower. Should not be done on soils prone to compaction or erosion
- \* Grazing by goats/ pigs is effective at removing re-growth
- \* Replanting with native plants is necessary on sites where large infestations have been removed
- \* Requires several years of maintenance

### Priority Actions for Stanley Park

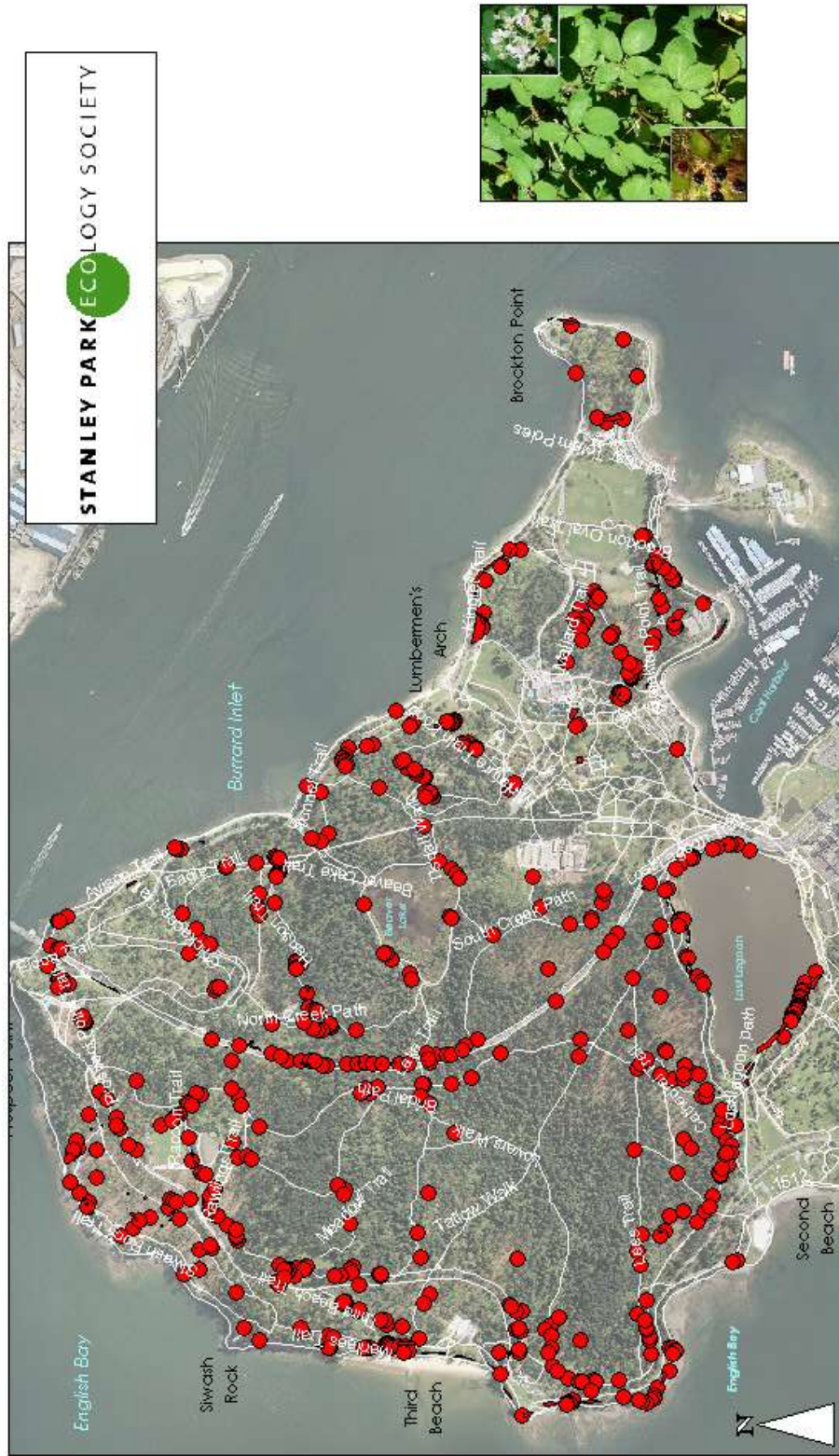
- \* Hand-pulling of all noticeable invasive blackberry plants in blowdown areas
- \* Removal of larger patches (late-July through early August) surrounding blowdown areas, replanting with native plants with high habitat value for wildlife
- \* Control of blackberry to prevent fruiting in the Park
- \* On-going monitoring of all blowdown areas and targeted regions

### Suggested Replacement

- \* native evergreen trees
- \* prevent re-invasion, replant with native shrubs such as:
  - Salmonberry (*Rubus spectabilis*),
  - Tall Oregon grape (*Mahonia aquifolium*),
  - Salal (*Gaultheria shallon*)

# Invasive Plant Species in Stanley Park 2011

## Himalayan Blackberry



Invasive Plant Species  
● Himalayan Blackberry

Copyright 2011 Stanley Park Ecology Society.  
Not intended for navigational purposes. For reference use only.



## English ivy (*Hedera helix*)

Established Species in Stanley Park Natural and Sensitive Areas



### Description

- \* Evergreen vine with lobed, waxy leaves featuring juvenile and mature growth forms
- \* Inconspicuous white flowers ripen into hard, blackish berries on mature plants
- \* Growing at roughly 1m/year, it forms thick mats which can smother other vegetation
- \* Commonly seen growing up tree trunks

### Ecology

- \* Native to the Caucasus Mountains in Russia
- \* Shade-tolerant, but grows under a range of conditions
- \* Prefers moist, nutrient rich soils

### Removal

- \* Pull by hand, removing the whole plant (esp. roots), mulch with 20cm of mulch following removal when possible
- \* Climbing ivy is a priority for removal. Vines should be cut at breast height and removed to the ground; and the area around the tree base cleared of ivy
- \* If full removal not possible on mature plants, remove flowers to prevent spread by seed
- \* Herbicides not recommended due to thick leaf cuticle

### Priority Actions for Stanley Park

- \* Manual removal of ivy vines/ patches growing in blowdown areas, Wildlife MEA's or buffer areas
- \* Target tree-climbing/ fruiting ivy plants
- \* Small, isolated patches; and infestations threatening sensitive habitat

### Suggested Alternative Plants:

- \* Kinnikinnick (*Arctostaphylos uva-ursi*)
- \* Salal (*Gaultheria shallon*)
- \* Piggy-back plant (*Tolmiea menziesii*)
- \* Bunchberry (*Cornus canadensis*)
- \* Western honeysuckle (*Lonicera ciliosa*)

# Invasive Plant Species in Stanley Park 2011

## Ivy



## Japanese knotweed (*Polygonum cuspidatum*)

Expanding Species in Stanley Park Natural and Sensitive Areas:



### Description

- \* Can grow between 1 to 5 m tall
- \* Bamboo-like long, hollow stems and heart-shaped leaves
- \* Forms dense thickets through extensive creeping rhizomes
- \* Can grow up to 8cm per day!
- \* Deep, strong rooting systems are able to break concrete

### Ecology

- \* Ornamental originally from eastern Asia
- \* Able to grow under a range of conditions; tolerates full sunlight to semi-shade
- \* Thrives in moist environments
- \* In North America, the majority of reproduction occurs vegetatively. The plants can re-grow from 1cm long root-fragments; stem fragments can also take root

### Removal

- \* Very difficult to control using any method
- \* Possible to control small stands with repeated pulling of stems and/or covering the plants with landscape cloth
- \* Advised to pull or cut stems as soon as they reach 10 cm in height (about every two weeks during the growing season)
- \* The most effective known method is to inject the stems with herbicide
- \* Mechanical mowing is not recommended
- \* Research in the UK is underway on biocontrols
- \* All plant matter should be bagged, and removed from the site; incineration recommended
- \* Regular monitoring during the growing season (April through September) is required... checking a radius of 9 meters around the removed areas

### Priority Actions for Stanley Park

- \* High priority plant for removal and eradication from the Park
- \* Target smallest patches, and those in close proximity to wet or open areas first
- \* Smaller and accessible patches can be dealt with through volunteer efforts

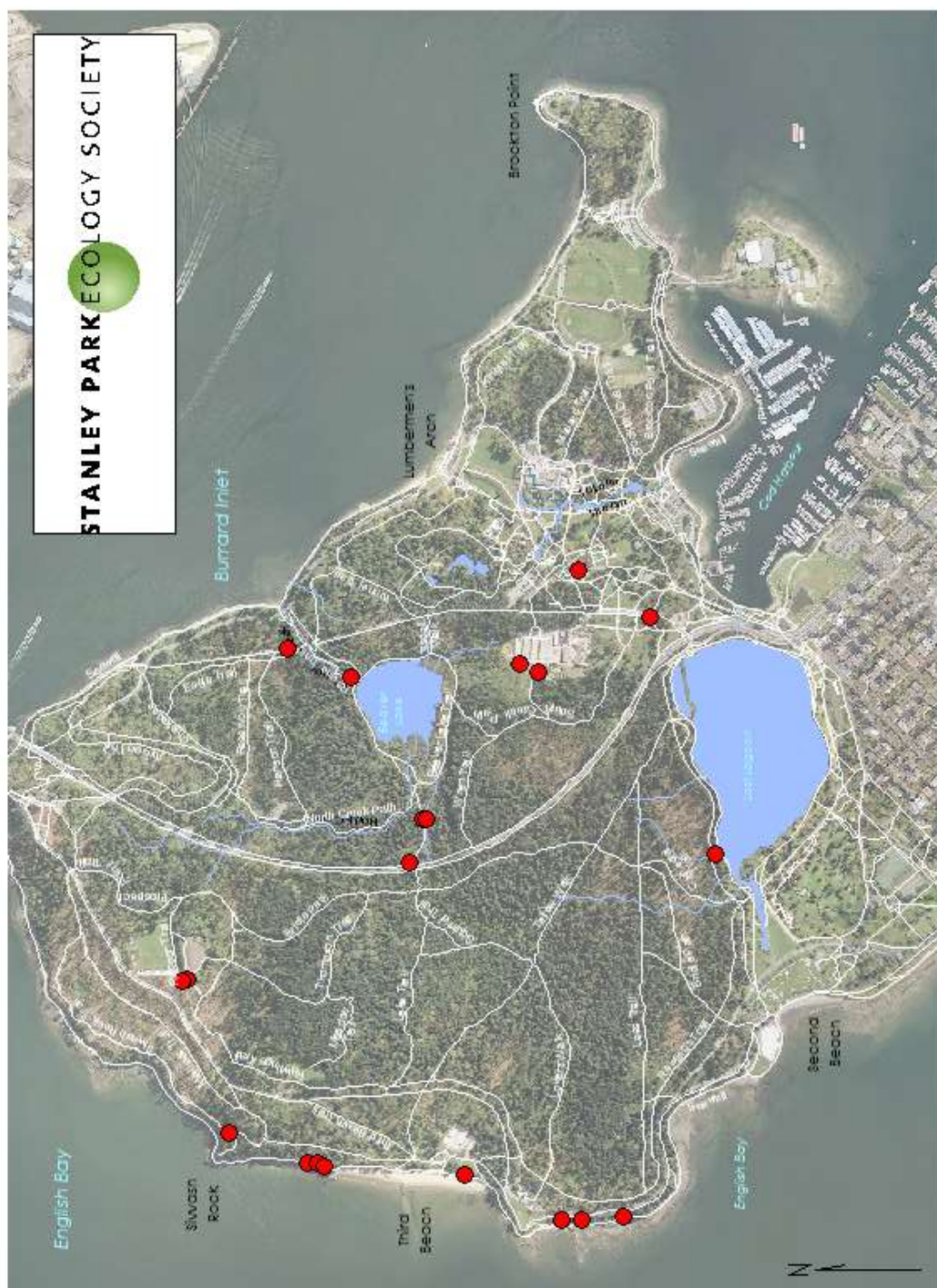
### Suggested Alternative Plants

- \* native evergreen trees
- \* Salal (*Gaultheria shallon*)
- \* Red elderberry (*Sambucus racemosa*)
- \* Oceanspray (*Holodiscus discolor*)
- \* Mock-orange (*Philadelphus lewisii*)
- \* Red-osier dogwood (*Cornus stolonifera*)
- \* Thimbleberry (*Rubus parviflorus*)



# Invasive Plant Species in Stanley Park 2011

## Japanese Knotweed



Copyright Stanley Park Ecology Society.  
Not intended for navigational purposes. For reference use only.



## Scotch broom (*Cytisus scoparius*)

Emergent Species in Stanley Park Natural and Sensitive Areas:



### Description

- \* A perennial, woody shrub (up to 2m tall), with green branches
- \* Blooms between April and June with pea-like yellow flowers which later become seed pods
- \* Seed pods are black and around 5cm long containing numerous seeds (seed producing after 3 years)
- \* On a warm summer days you can often hear the seed pods popping open

### Ecology

- \* Native to Mediterranean areas of Europe
- \* Shade intolerant, thriving in disturbed, open areas
- \* Sandy, well-drained soils
- \* Produces phytotoxins and acidifies soils, inhibiting growth of other/ native plants

### Removal

- \* Seedlings and small plants can be pulled by hand
- \* Seed-producing plants should be removed before seeds set
- \* Larger plants can be removed using a weed wrench or by cutting the stem below the soil and covering the cut stem/ root mass with soil
- \* All removals should ensure minimal soil disturbance
- \* Several bio-controls available
- \* Herbicide use possible
- \* soils generally contain huge loads of long-lived seeds; any disturbance can release dozens of new germinants

### Priority Actions for Stanley Park

- \* Mature plants near blowdown areas (especially E1/E2- near the seawall and N1- beside the meadow) should be removed before seeds distributed to reforested areas
- \* Other broom infestations in the Park should also be treated in the near future

### Suggested Replacement

- \* native evergreen trees
- \* Salal (*Gaultheria shallon*)
- \* Snowberry (*Symphoricarpos albus*)
- \* Saskatoon (*Amelanchier alnifolia*)
- \* Nootka rose (*Rosa nutkana*)



## Scotch Broom



**Invasive Plant Species**  
● Scotch Broom

## Yellow lamium (Yellow archangel) (*Lamium galeobdolon*)

Expanding Species in Stanley Park Natural and Sensitive Areas:



### Description

- \* A trailing, evergreen, perennial groundcover with square stems
- \* The heart-shaped leaves are typically variegated and slightly hairy
- \* For a short time, it has small upright yellow flowers

### Ecology

- \* Very aggressive and well adapted to growing in shaded and open areas
- \* Does best in moist shaded sites such as ravines
- \* Seeds are typically dispersed by ants, which are attracted to the oils found in the seeds and can carry them up to 70 m from the parent plant

### Removal

- \* Manual removal by picking the whole plant including roots

### Priority Actions for Stanley Park

- \* Complete removal of patch near to E2
- \* Other patches in close proximity to blowdown (such as near the hollow tree and the Children's Farmyard parking lot) should be second priority

### Suggested Replacement

- \* *Salal (Gaultheria shallon)*
- \* *Yerba buena (Clinopodium douglasii)*
- \* *Piggy-back plant (Tolmiea menziesii)*
- \* *Kinnikinnick (Arctostaphylos uva-ursi)*
- \* *Bunchberry (Cornus canadensis)*



# Invasive Plant Species in Stanley Park 2011

## Yellow Lamnium



Invasive Plant Species  
● Yellow Lamnium

Copyright 2011 Stanley Park Ecology Society.  
Not intended for navigational purposes. For reference use only.

## Lesser periwinkle (*Vinca minor*)

Emergent Species in Stanley Park Natural and Sensitive Areas:



### Description

- \* A perennial, evergreen herb with trailing stems
- \* The shiny, dark green leaves are 2 to 3 cm long, opposite and oval shaped
- \* The flowers are violet to blue in colour

### Ecology

- \* Native to Switzerland south to much of the Mediterranean basin and across much of north Africa
- \* Grows most vigorously in moist soil with only partial sun, but it will also grow in the deepest shade, even in poor soil
- \* Often found in gardens and on the edges of parks and natural spaces where garden waste is illegally dumped

### Removal

- \* By hand, pulling the above ground portion of the plant and digging out its roots

### Priority Actions for Stanley Park

- \* Removal from forested/ sensitive areas, or gardens near forested/ sensitive areas
- \* Control spread into new areas by gardening staff (it is still actively used as an ornamental plant).

### Suggested Replacement

- \* Wild ginger (*Asarum caudatum*)
- \* Smooth alumroot (*Heuchera micrantha*)
- \* Piggy-back plant (*Tolmiea menziesii*)
- \* Yerba buena (*Clinopodium douglasii*)
- \* Salal (*Gaultheria shallon*)



# Invasive Plant Species in Stanley Park 2011

## Common Periwinkle



Invasive Plant Species  
● Common Periwinkle

Copyright 2011 Stanley Park Ecology Society.  
Not intended for navigational purposes. For reference use only.



## Yellow flag iris (*Iris pseudacorus*)

Expanding Wetland Species:



### Description

- \* A robust, clumping perennial herb
- \* Can grow to 40 cm to 1.5 m tall
- \* Only yellow-flowered iris found in BC's wildlands

### Ecology

- \* Native to Europe and the British Isles, Western Asia, North Africa, and the Mediterranean region
- \* Grows in a variety of fertile wetland habitats
- \* Reproduces via seed or rhizome
- \* Can grow aggressively, out-competing native species and altering wetland habitat

### Removal

- \* Digging out plants or cutting seedpods off plants after flowering
- \* Although not recommended for wetlands, spot-applications of herbicides is an option for large infestations
- \* Yellow flag produces a substance in its leaves and rhizomes that can cause skin irritation, so it's important to wear gloves and cover skin when pulling, cutting, or digging

### Priority Actions for Stanley Park

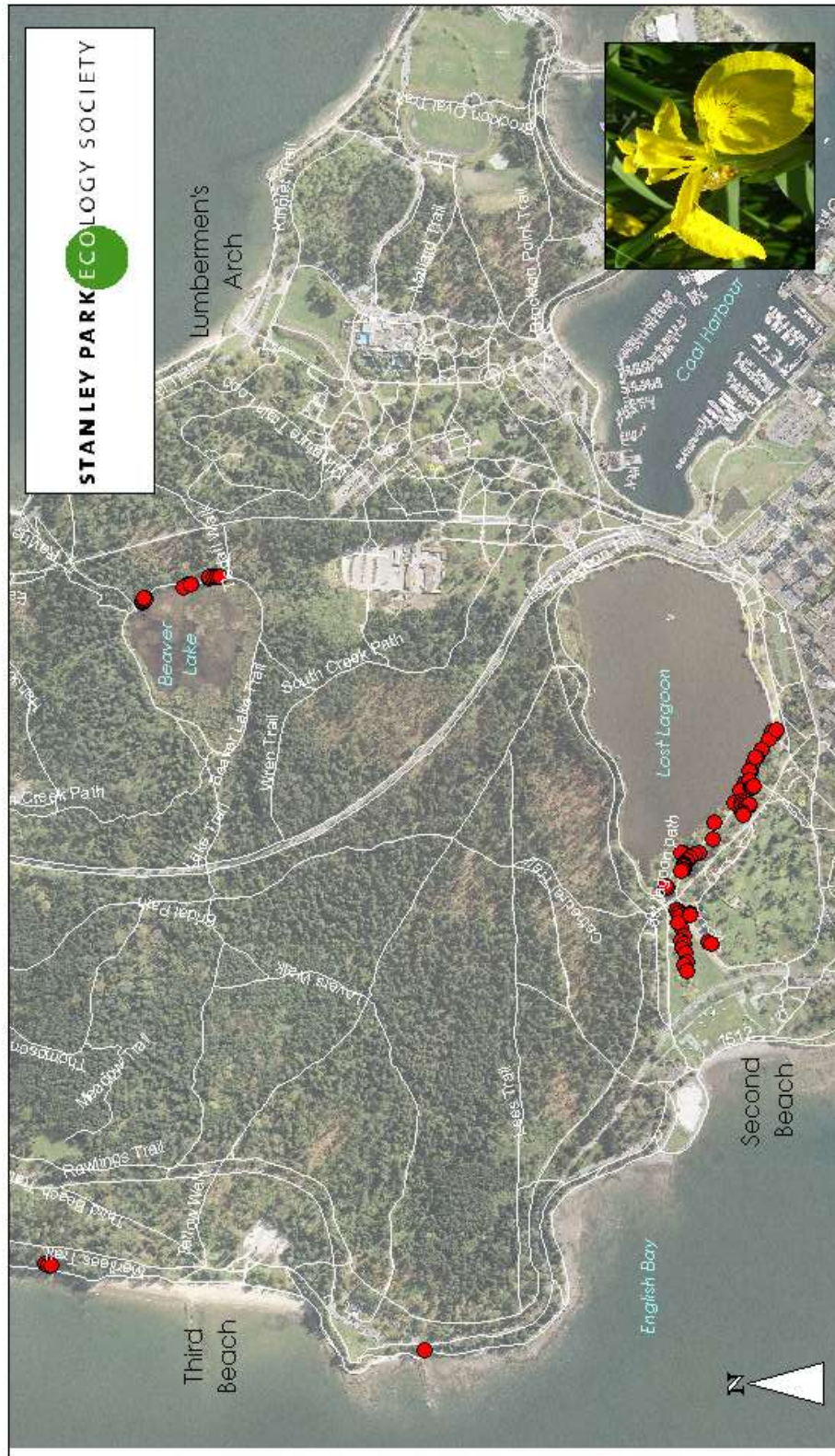
- \* Control spread into new wetlands by gardening staff (it is still actively used as an ornamental plant).
- \* Control further spread in Beaver Lake and Lost Lagoon through seed-head removal
- \* Dig-out plants when possible to further control infestation

### Suggested Replacement

- \* Hardhack (*Spiraea douglasii*)
- \* Skunk cabbage (*Lysichiton americanum*)
- \* Willow spp.

# Invasive Plant Species in Stanley Park 2011

## Yellow Flag Iris



Copyright 2011 Stanley Park Ecology Society.  
Not intended for navigational purposes. For reference use only.



## Spurge laurel (Daphne) (*Daphne laureola*)

Emergent Species in Stanley Park Natural and Sensitive Areas:



### Description

- \* A shade tolerant shrub with oblong, evergreen leaves, yellow-green fluted flowers and small, black berries
- \* Looks like it could be from the rhododendron family and is often mistaken for a native species in the local forested areas

### Ecology

- \* Adapted to shade and semi-shaded areas
- \* Commonly found in the understorey of Douglas fir dominated forests along coastal BC

### Removal

- \* Pull or dig out whole plant by hand (wearing gloves)
- \* Considered toxic by Worksafe BC- consult their website for more information

### Priority Actions for Stanley Park

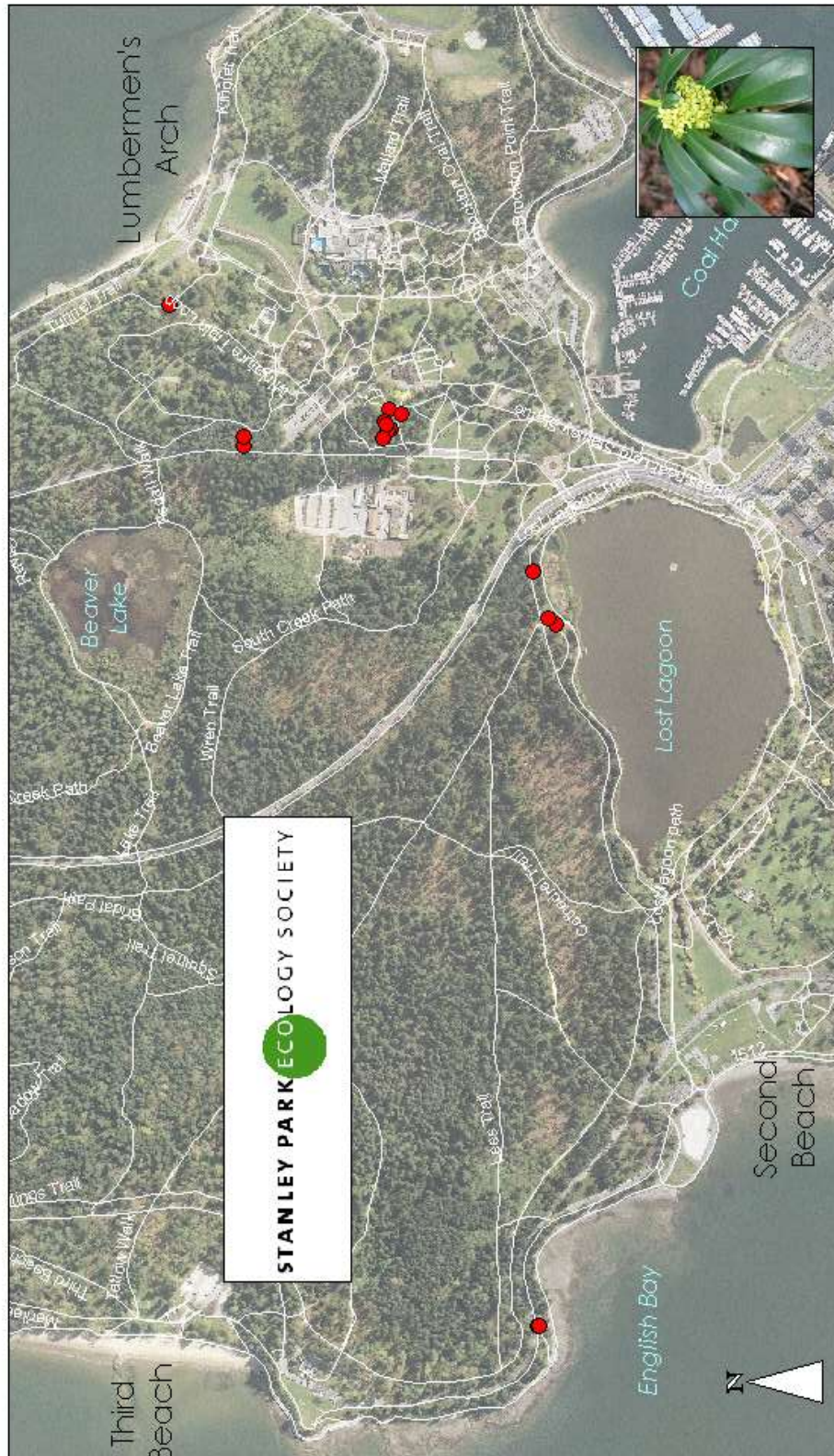
- \* Remove any plants found in the Park

### Suggested Replacement

- \* Kinnikinnick (*Arctostaphylos uva-ursi*)
- \* Salal (*Gaultheria shallon*)
- \* Oregon grape (*Mahonia nervosa*)

# Invasive Plant Species in Stanley Park 2011

## Daphne Laurel



Copyright 2011 Stanley Park Ecology Society.  
Not intended for navigational purposes. For reference use only.



## Purple loosestrife (*Lythrum salicaria*)

Emergent Species in Stanley Park Natural and Sensitive Areas:



### Description

- \* A tall perennial wetland herb
- \* Has a square, woody stem with opposite, dark green, lance-shaped leaves and purple-magenta flower spikes
- \* Flowers have 5 to 7 petals, which appear from July through October
- \* Can grow up to 3 m tall

### Ecology

- \* Native to Eurasia
- \* Found in wetlands such as cattail marshes, sedge meadows and open bogs
- \* Occurs along stream and river banks and lake shores
- \* Found in ditches and other disturbed wet soil areas
- \* Able to produce over 2.5 million seeds per year

### Removal

- \* Plants can be removed by hand using special hooks to scoop out the roots from the muddy lakeside bottom
- \* Biological control using an introduced biological control agent, the Galerucella beetle, to eat the newly produced flower and leaf buds, thereby decreasing productivity of the plants

### Priority Actions for Stanley Park

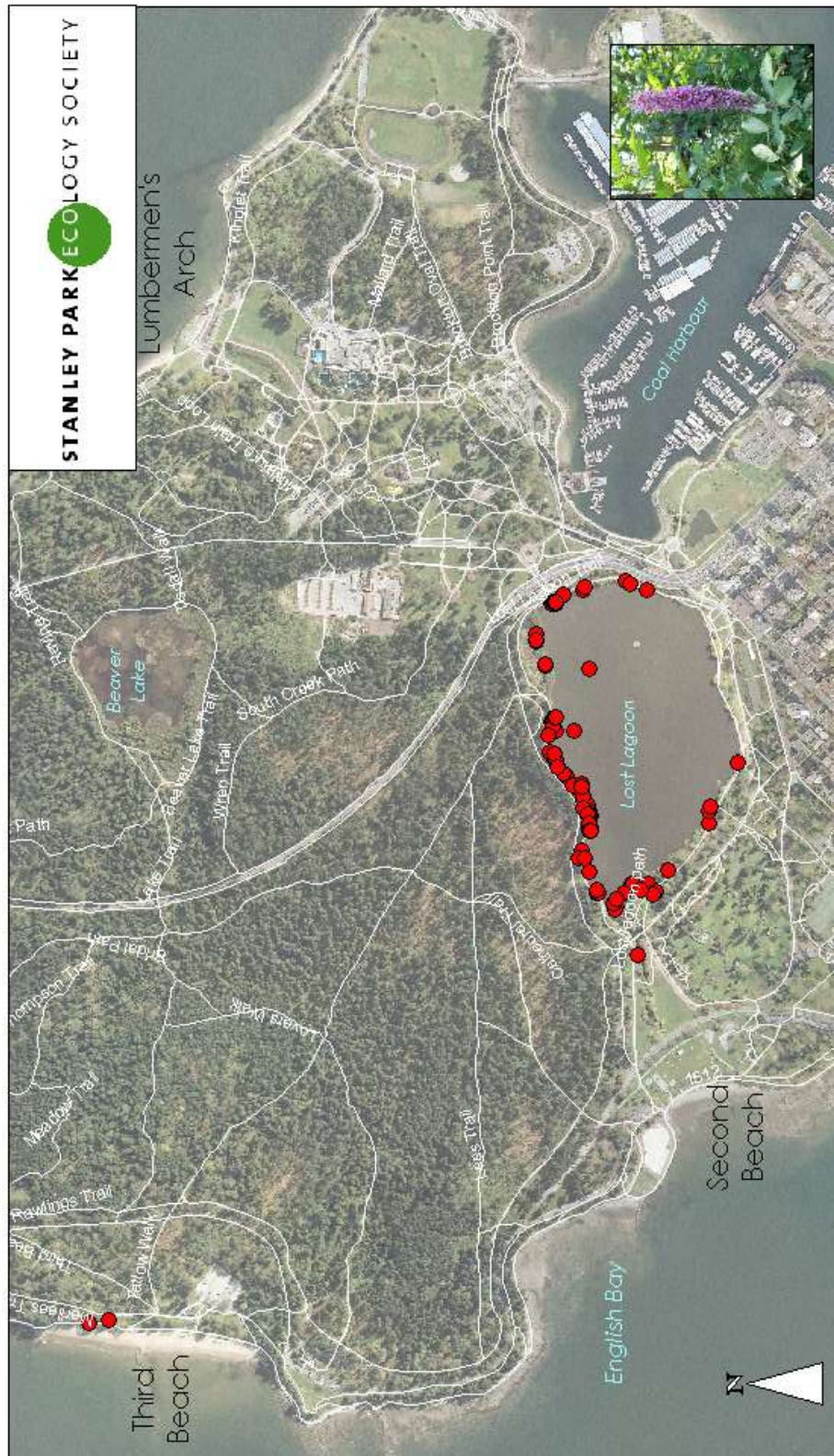
- \* Pull or dig-out plants in Beaver Lake and Lost Lagoon
- \* Cut off flowers when not possible to remove whole plant

### Suggested Replacement

- \* Hardhack (*Spiraea douglasii*)
- \* Large-leaved lupine (*Lupinus polyphyllus*)

# Invasive Plant Species in Stanley Park 2011

## Purple Loosestrife



Invasive Plant Species  
● Purple Loosestrife

Copyright 2011 Stanley Park Ecology Society.  
Not intended for navigational purposes. For reference use only.



## Giant hogweed (*Heracleum mantegazzianum*)

Emergent Species in Stanley Park Natural and Sensitive Areas:



### Description

- \* Perennial plant, flowering from late spring to mid-summer with numerous large white flowers clustered in an umbrella-shaped head
- \* Has large stem which can grow between 5 – 10 cm in diameter and is a dark reddish colour, and a deep tap-root
- \* Leaves are large and jagged in shape

### Ecology

- \* Native to Caucasus Mountains and southwestern Asia
- \* Grows in a variety of habitats especially moist areas but commonly found near streams, creeks and roads
- \* Produces up to 50,000 winged seeds per year per plant

### Removal

- \* Phototoxic- can cause skin irritation and even blindness. Protective clothing is recommended, consult Worksafe BC for more information
- \* Pull plants, ensuring full removal of roots. Easiest when soil is wet.
- \* Cutting by hand/ mowing is not recommended, as it stimulates plant growth
- \* Bio-control: cattle and pigs both eat hogweed
- \* Herbicides can be used for larger infestations. Glyphosate can be used for stem injections.
- \* Seeds left behind can germinate 7 – 15 years later; annual monitoring is recommended

### Priority Actions for Stanley Park

- \* Park Board staff will remove entire plants from all areas of the Park with high traffic areas of highest priority

### Suggested replacement

- \* native evergreen trees
- \* Red elderberry (*Sambucus racemosa*)
- \* Hardhack (*Spiraea douglasii*)
- \* Red-osier dogwood (*Cornus stolonifera*)

\* Salal (*Gaultheria shallon*)

# Invasive Plant Species in Stanley Park 2011

## Giant Hogweed



Copyright 2011 Stanley Park Ecology Society.  
Not intended for navigational purposes. For reference use only.



## Fragrant water lily (*Nymphaea odorata*)

### Expanding Wetland Species



#### Description

- \* Perennial plant that forms large dense colonies in ponds and wetlands.
- \* Leaves are heart shaped and arise on long flexible stalks from large thick rhizomes
- \* Leaves usually found on water surface, with fragrant flowers growing on separate stalks with white-pink petals and a yellow center

#### Ecology

- \* Native to eastern North America
- \* Found in freshwater aquatic systems such as ponds, streams and lakes
- \* Prefers depths of 1-2m
- \* Rapidly reproducing plants take over habitat from native aquatic plants, and increase the rate of pond succession

#### Removal

- \* Can be dug up, although physical control is difficult due to reestablishment from seeds and rhizomes
- \* For large infestations, cutting of plants is easiest
- \* Herbicide use not recommended for waterways

#### Priority Actions for Stanley Park

- \* Cutting of plants in Beaver Lake recommended, but of secondary importance to purple loosestrife and yellow flag iris infestations
- \* Control spread into new areas by gardening staff (it is still actively used as an ornamental plant).
- \* Beaver (*Castor Canadensis*) presence in Beaver Lake has resulted in the removal of this plant in areas where they are most active.

#### Suggested replacement:

- \* Yellow Pond-Lily (*Nuphar polysepalum*)
- \* Watershield (*Brasenia schreberi*)

## Creeping buttercup (*Ranunculus repens*)

Expanding Species in Stanley Park Natural and Sensitive Areas:



### Description

- \* Hairy perennial with fibrous roots and long stalks
- \* Dark green leaves often with white spots and divided into 3 leaflets that are lobed and toothed with hairy texture
- \* Flowers are bright yellow and large, typically 10 to 35mm wide
- \* Has horizontal stems known as stolons rooting at the nodes, giving rise to several erect flowering stems

### Ecology

- \* Found in moist disturbed sites, fields, pastures, gardens, lawns, ditches and clearings
- \* Common at low elevations, especially in settled areas
- \* As with most buttercup species, contains a toxin that can result in pain and inflammation in grazing animals

### Removal

- \* Pull or dig out whole plant using hands, spade or pitch-fork

### Priority Actions for Stanley Park

- \* Removal of large patches threatening native species in blowdown areas

### Suggested Replacement

- \* native evergreen trees
- \* Wild ginger (*Asarum caudatum*)
- \* Smooth alumroot (*Heuchera micrantha*)
- \* Piggy-back plant (*Tolmiea menziesii*)
- \* Yerba buena (*Clinopodium douglasii*)
- \* Salal (*Gaultheria shallon*)

## St John's wort (*Hypericum perforatum* and *H. calycinum*)

Emergent Species in Stanley Park Natural and Sensitive Areas:



### Description

- \* A herbaceous perennial which can grow to 1 – 3 feet in length
- \* Has erect stems branching in upper part, Roots are short and trailing
- \* Leaves are pale green and oblong and are attached directly to the stem, the flower is bright yellow
- \* Used for medicinal purposes e.g. to treat depression, anxiety, and sleep disorders

### Ecology

- \* A common garden plant, it can be found in uncultivated ground, woods, roadsides and meadows
- \* Can alter growth form and habit to promote survival
- \* Thrives in areas with either a winter or summer dominant rainfall pattern

### Removal

- \* Manual removal by picking the whole plant including roots
- \* Biological control through beetles

### Priority Actions for Stanley Park

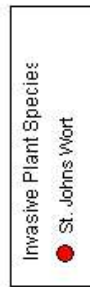
- \* Hand removal of all plants found in forested and sensitive areas of Stanley Park
- \* Hand removal of plants found in cultivated/ heavily managed landscapes of the Park
- \* Control spread into new areas by gardening staff (it is used as an ornamental plant).

### Suggested Replacement

- \* Kinnikinnick (*Arctostaphylos uva-ursi*)
- \* Salal (*Gaultheria shallon*)
- \* Piggy-back plant (*Tolmiea menziesii*)
- \* Bunchberry (*Cornus canadensis*)



## St. John's Wort



Copyright 2011 Stanley Park Ecology Society.  
Not intended for navigational purposes. For reference use only.



## English laurel (*Prunus laurocerasus*)

Emergent Species in Stanley Park Natural and Sensitive Areas:



### Description

- \* Evergreen shrub which can grow to 5-7 meters in height
- \* Trunk and branches are covered by a smooth blackish bark
- \* Leaves are oval, oblong and are finely toothed. Are green and shiny
- \* Flowers are small and white and have a strong odour

### Ecology

- \* Originally native to south eastern Europe and Asia minor
- \* Grows in sunlight or partially shaded areas
- \* Prefers moist, well drained, acidic soil and tolerates salt spray
- \* Fast growing; seeds distributed by birds

### Removal

- \* Hand pull small seedlings
- \* Clip plant before it flowers or remove all spent flowers before they can form fruit
- \* Berries, leaves and bark are poisonous, wash hands afterwards

### Priority Actions for Stanley Park

- \* Pulling/ removal of all plants found in forested and sensitive areas of Stanley Park
- \* Removal of seeds from plants in cultivated areas of the Park

### Suggested replacement

- \* native evergreen trees
- \* Ninebark (*Physocarpus capitatus*)
- \* Oceanspray (*Holodiscus discolor*)
- \* Red Elderberry (*Sambucus racemosa*)
- \* Salmonberry (*Rubus spectabilis*)
- \* Salal (*Gaultheria shallon*)

## Portugal laurel (*Prunus lusitanica*)

Emergent Species in Stanley Park Natural and Sensitive Areas:



### Description

- \* Small evergreen shrub which can grow to 5m
- \* Young stalks and branches are reddish in colour
- \* Bark on trunk and larger branches is smooth, blackish-brown
- \* Leaves up to 12cm long are pointed at tips and finely toothed. Are green and shiny
- \* Flowers are small and white, scented
- \* Mature fruit are small black drupes

### Ecology

- \* Originally native to Spain and Portugal
- \* Able to grow in forest understory, low light conditions (prefers sunlight)
- \* Prefers moist, well drained soils
- \* Fast growing; seeds distributed by birds

### Removal

- \* Hand pull small seedlings
- \* Clip plant before it flowers or remove all spent flowers before they can form fruit

### Priority Actions for Stanley Park

- \* Pulling/ removal of all plants found in forested and sensitive areas of Stanley Park
- \* Removal of seeds from plants in cultivated areas of the Park

### Suggested replacement

- \* native evergreen trees
- \* Ninebark (*Physocarpus capitatus*)
- \* Oceanspray (*Holodiscus discolor*)
- \* Red Elderberry (*Sambucus racemosa*)
- \* Salmonberry (*Rubus spectabilis*)
- \* Salal (*Gaultheria shallon*)







## Butterfly bush (*Buddleja davidii*)

Emergent Species in Stanley Park Natural and Sensitive Areas:



### Description

- \* Deciduous shrub with arching branches
- \* Flowers in mid to late summer- showy purple flowers with orange centres
- \* Single flowers can produce up to 40,000 seeds... up to 3 million seeds per plant
- \* Can reproduce vegetatively by sprouting/ suckering
- \* Mature stems have peeling grey-brown bark
- \* Forms dense thickets

### Ecology

- \* Native to China
- \* Typically found on disturbed sites
- \* Grows on sunny sites
- \* Prefers moist, well-drained soils, but is able to grow anywhere

### Removal

- \* Hand pull small seedlings; or dig up larger plants, removing as much of the roots as possible (ensure minimal soil disturbance)
- \* 'Mowing' mature plants when they are flowering (if too large to dig up)
- \* Clip plant before it flowers or remove all spent flowers before they go to seed (June/ July)

### Priority Actions for Stanley Park

- \* Removal of plants in cultivated areas of the Park; especially around Prospect Point picnic area, Lost Lagoon, and Lumberman's Arch
- \* Pulling/ removal of all plants found in blowdown, forested and sensitive areas of Stanley Park
- \* Control spread into new areas by gardening staff (it may have been established as an ornamental plant).

### Suggested replacement

- \* native evergreen trees
- \* Red flowering currant (*Ribes sanguineum*)
- \* Ninebark (*Physocarpus capitatus*)
- \* Oceanspray (*Holodiscus discolor*)
- \* Red Elderberry (*Sambucus racemosa*)
- \* Salal (*Gaultheria shallon*)

# Invasive Plant Species in Stanley Park 2011

## Butterfly Bush



Copyright 2011 Stanley Park Ecology Society.  
Not intended for navigational purposes. For reference use only.



## **Touch forget-me-not (*Impatiens parviflora*)**

Emergent Species in Stanley Park Natural and Sensitive Areas:



### **Description**

- \* Annual succulent herb, growing 20-80 cm tall
- \* Alternate leaves are stalked, saw-toothed 3-12 cm long
- \* Pale yellow flowers have pouched sepals with straight spurs directed backwards
- \* Close relative of the highly invasive Policeman's Helmet

### **Ecology**

- \* Native to Himalayas
- \* Prefers shaded, moist nutrient-rich woodlands
- \* Commonly found in disturbed areas beside forests and ditches

### **Removal**

- \* Manual removal by picking the whole plant including roots
- \* Potential seed banks in soil may require up to 3 removals

### **Priority Actions for Stanley Park**

- \* Hand removal of all plants found in forested and sensitive areas (especially riparian areas) of Stanley Park
- \* Hand removal of plants found in cultivated/ heavily managed landscapes of the Park

### **Suggested Replacement**

- \* Wild ginger (*Asarum caudatum*)
- \* Piggy-back plant (*Tolmiea menziesii*)
- \* Bunchberry (*Cornus canadensis*)
- \* Salal (*Gaultheria shallon*)



## Gorse (*Ulex europaeus*)

Emergent Species in Stanley Park Natural and Sensitive Areas:



### Description

- \* Perennial evergreen shrub growing 1-3 meters tall
- \* Bright yellow pea-like flowers at the end of branches in February and March
- \* Sharp, spiny thorns along branches (more as plant ages)
- \* Primarily reproduces by seed
- \* Oils in the plant cause fire hazard

### Ecology

- \* Fixes Nitrogen, and does well in a range of soil conditions
- \* Does best in moist, well-drained soils
- \* Best in moderate shade to full sun
- \* Commonly found on disturbed sites

### Removal

- \* Seedlings and small plants can be pulled by hand
- \* Larger plants can be removed using a weed wrench or by cutting the stem below the soil and covering the cut stem/ root mass with soil
- \* Herbicides can be used. Replanting recommended following applications
- \* Gorse weevil used as biocontrol in some areas, with limited success; goats also used in some cases

### Priority Actions for Stanley Park

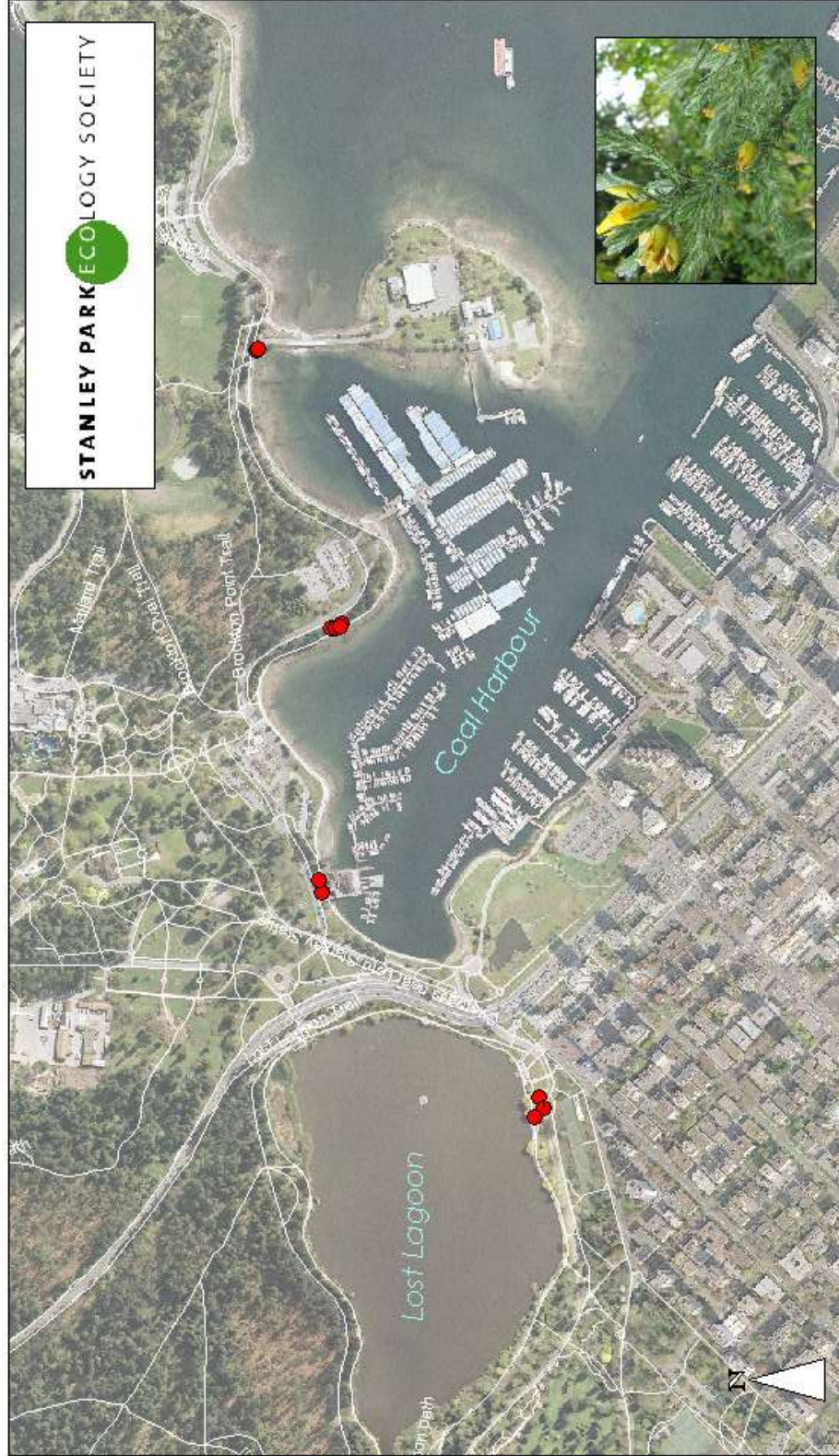
- \* Mature plants near blowdown areas (especially E1/E2- near the seawall) should be removed before seeds distributed to reforested areas
- \* Other broom infestations in the Park should also be treated in the near future

### Suggested Replacement

- \* native evergreen trees
- \* Snowberry (*Symphoricarpos albus*)
- \* Saskatoon (*Amelanchier alnifolia*)
- \* Nootka rose (*Rosa nutkana*)
- \* Salal (*Gaultheria shallon*)

# Invasive Plant Species in Stanley Park 2011

## Gorse



Invasive Plants Species:  
● Gorse (16)

Copyright 2011 Stanley Park Ecology Society.  
Not intended for navigational purposes. For reference use only.



## Morning glory (Bindweed) (*Convolvulus sepium*)

Expanding Species in Stanley Park Natural and Sensitive Areas:



### Description

- \* Perennial vine, most active growth from late-spring through summer
- \* Tubular flowers have 5 petals, and are white or pinkish-white in colour
- \* Leaves are heart-shaped in appearance
- \* Reproduction by seed and vegetative

### Ecology

- \* Native to Eurasia
- \* Very common invasive plant in gardens and disturbed areas
- \* Form dense mats that out-compete native species, and strangle others

### Removal

- \* Manual removal by picking the whole plant including roots- easiest to do this during early summer when the plant is visible, and not yet fruiting. Care must be taken to avoid erosion into waterways
- \* Can re-grow easily from left roots. Monitoring required several times per year.

### Priority Actions for Stanley Park

- \* Pulling/ removal of all plants found in forested and sensitive areas of Stanley Park. Current priority is Lost Lagoon

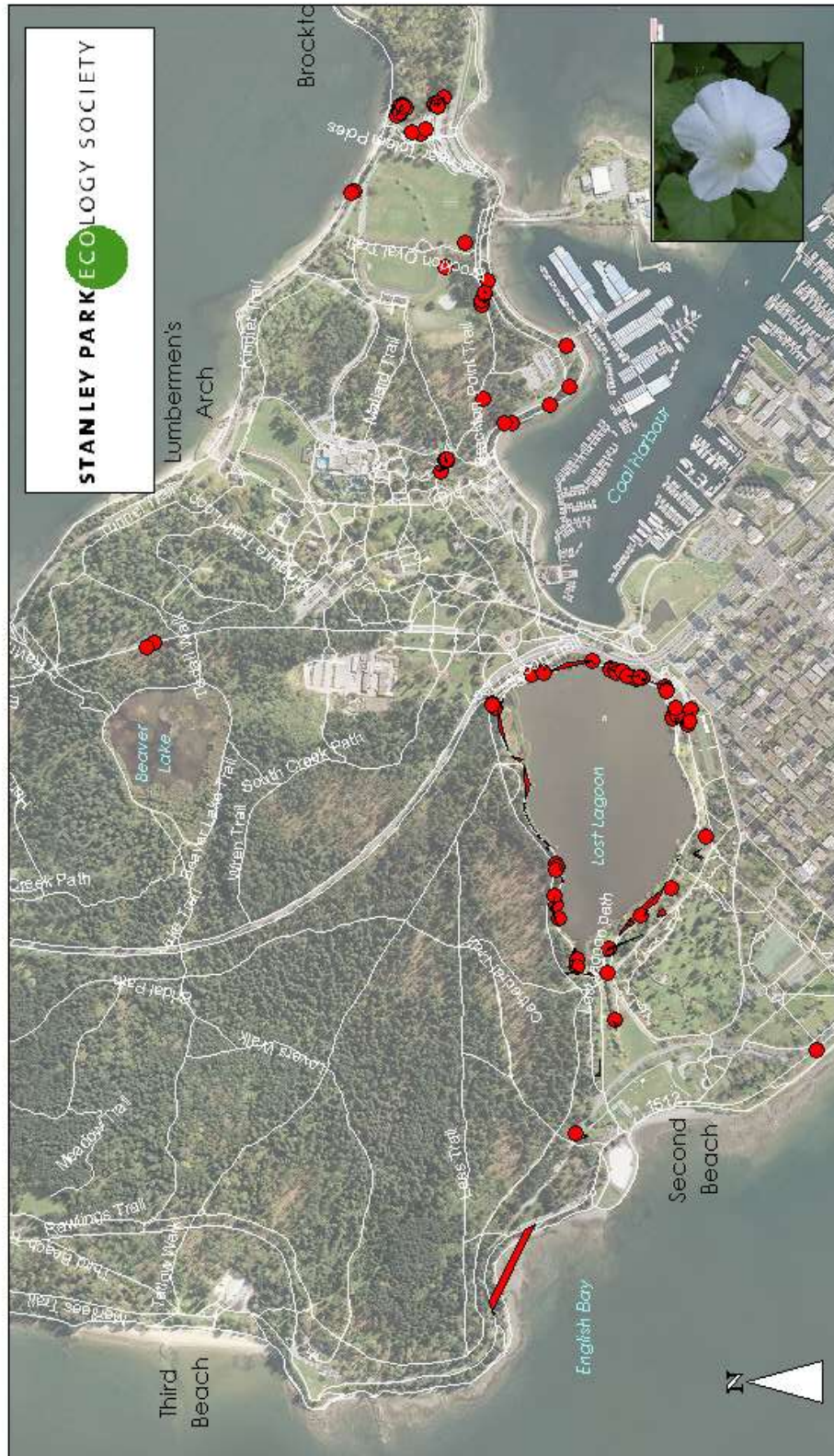
### Suggested Replacement

- \* Wild ginger (*Asarum caudatum*)
- \* Piggy-back plant (*Tolmiea menziesii*)
- \* Bunchberry (*Cornus canadensis*)
- \* Western honeysuckle (*Lonicera ciliosa*)
- \* Salal (*Gaultheria shallon*)



# Invasive Plant Species in Stanley Park 2011

## Morning Glory



Copyright 2011 Stanley Park Ecology Society.  
Not intended for navigational purposes. For reference use only.

## Climbing nightshade (Bittersweet) (*Solanum dulcamara*)

Expanding Species in Stanley Park Natural and Sensitive Areas:



### Description

- \* Perennial vine, can also appear semi-woody and shrub-like
- \* Star-shaped purple flowers, with petals pointed backwards
- \* Berries are red, eggshaped or round
- \* Leaves are dark green, with two 'ear-shaped' lobes near the base
- \* Strong odour when leaves are crushed
- \* Whole plant contains toxins (member of the nightshade family—same as the ones in green potatoes)

### Ecology

- \* Originally from Eurasia
- \* Found along waterways and open areas
- \* Can form dense thickets, out-competing native plants
- \* Seeds dispersed by birds, or root/ stem fragments carried by water

### Removal

- \* Manual removal by picking the whole plant including roots- easiest to do this during early summer when the plant is visible, and not yet fruiting. Care must be taken to avoid erosion into waterways
- \* Can re-grow easily from left roots. Monitoring required several times per year.
- \* Herbicides are not recommended, however, glyphosate and triclopyr have been used

### Priority Actions for Stanley Park

- \* Pulling/ removal of all plants found in forested and sensitive areas of Stanley Park. Current priority is Lost Lagoon

### Suggested Replacement

- \* Wild ginger (*Asarum caudatum*)
- \* Piggy-back plant (*Tolmiea menziesii*)
- \* Bunchberry (*Cornus canadensis*)
- \* Western honeysuckle (*Lonicera ciliosa*)
- \* Salal (*Gaultheria shallon*)



STANLEY PARK ECOLOGY SOCIETY





## Reed canary grass (*Phalaris arundinacea*)

Expanding Wetland Species:



### Description

- \* Perennial, cool-season rhizomatous grass
- \* Creeping rhizomes can form thick layers, out-competing other plants
- \* Stems can grow 2m tall, and leaves are typically 2cm wide, and up to 50cm long
- \* Hollow stems with clasping auricles
- \* Inflorescence are pale purple (rather than pale green) when flowering in May and June

### Ecology

- \* Native to Eurasia (some debate over whether native to interior of the Pacific Northwest of North America)
- \* Found in wetlands, ditches and roadsides
- \* Seeds dispersed easily through a range of means
- \* Highly competitive with native species due to dense infestations

### Removal

- \* Manual removal through digging up whole plants in small patches
- \* Mowing over 5 times per year for a 10-year timeframe will control the plants (under this amount will not control it)
- \* Covering the infestation with shade cloth. Layers of cardboard or through solarization has also worked
- \* Herbicide applications have proven successful in some areas

### Priority Actions for Stanley Park

- \* Monitoring of infestation near Beaver Lake and associated creeks and riparian areas.
- \* Pulling/ removal of all plants found in wetland and sensitive areas of Stanley Park

### Suggested Replacement

- \* Hardhack (*Spiraea douglasii*)
- \* Large-leaved lupine (*Lupinus polyphyllus*)
- \* Native grass species

## APPENDIX H – Timing of appropriate invasive plant removal

		WINTER		SPRING			SUMMER			FALL		WINTER	
SPECIES NAME		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC
English ivy ( <i>Hedera helix</i> )	Present												
	Flowering												
	Reproduction												
	Removal												
policeman's helmet ( <i>Impatiens glandulifera</i> )	Present												
	Flowering												
	Reproduction												
	Removal												
purple loosestrife ( <i>Lythrum salicaria</i> )	Present												
	Flowering												
	Reproduction												
	Removal												
English holly ( <i>Ilex aquifolium</i> )	Present												
	Flowering												
	Reproduction												
	Removal	Optimum November to June. Take care to avoid spreading seeds during removal in October-December											
Himalayan blackberry ( <i>Rubus armeniacus</i> )	Present												
	Flowering												
	Reproduction												
	Removal												
Japanese knotweed ( <i>Fallopia japonica</i> )	Present												
	Flowering												
	Reproduction	Not known to set viable seed in North America. Spreads by Rhizomes and from plant fragments											
	Removal	Digging can be undertaken year round. Stems can be cut April through October when leaves are present.											
common periwinkle ( <i>Vinca minor</i> )	Present												
	Flowering												
	Reproduction	Does not set viable seed. Spread by runners which root at the nodes and by Dumping of garden waste.											
	Removal												
spurge-laurel ( <i>Daphne laureola</i> )	Present												
	Flowering												
	Reproduction												
	Removal												
yellow lamium ( <i>Lamum galeobdolon</i> )	Present												
	Flowering												
	Reproduction												
	Removal												
morning glory ( <i>Calystegia sepium</i> )	Present												
	Flowering												
	Reproduction												
	Removal	Hand pull and dig out year round but especially during flowering periods before seeds are produced.											
Scotch Broom ( <i>Cytisus scoparius</i> )	Present												
	Flowering												
	Reproduction												
	Removal												

# APPENDIX I - Pre-Restoration Site Survey Card

STANLEY PARK  ECOLOGY SOCIETY

## Invasive Site Survey Card

Point ID: \_\_\_\_\_ Date: \_\_\_\_\_

Point Location: \_\_\_\_\_ UTM: E \_\_\_\_\_ N \_\_\_\_\_

Survey Crew: \_\_\_\_\_

Aspect: \_\_\_\_\_ % Slope: \_\_\_\_\_

Invasive pull area: \_\_\_\_\_ m<sup>2</sup>

Invasive density / amount<sup>1</sup> \_\_\_\_\_ %

Trees infected: \_\_\_\_\_ #

Habitat Type<sup>2</sup>: \_\_\_\_\_

Site Type<sup>3</sup>: \_\_\_\_\_

Photo Record: N: \_\_\_\_\_ (ID)  
(from center) S: \_\_\_\_\_ (ID)  
W: \_\_\_\_\_ (ID)  
E: \_\_\_\_\_ (ID)

### Ecological Classification

#### Surface Shape

Concave  
Convex  
Straight

#### Meso Slope

☐ Crest  
☐ upper  
☐ middle  
☐ lower  
☐ toe  
☐ depression  
☐ flat

#### Microtopography

☐ smooth  
☐ moderately mounded  
☐ strongly mounded  
☐ extremely mounded

#### Rocky substrates

☐ Cobbles/stones  
☐ Bedrock  
☐ none

#### Other notes: (y / n)

☐ Gullies  
☐ Slope Failures  
☐ Flood Hazard  
☐ Open Water

### Hazards

Wasp nests water holes needles glass other: \_\_\_\_\_

### Wildlife / Habitat Values

nests CWD berry bushes wildlife tree rodent runways other: \_\_\_\_\_

### Points of Interest:

Interpretive opportunities: shell middens CMTS Other \_\_\_\_\_

### Plant Species (Most to least abundant with est % cover):

Invasive Spp:	
Native Herbs:	
Native Shrubs:	
Trees:	



Sketch of Area

[illegible]

\*1 **Invasive Coverage:** 1-100  
 \*2 **Habitat type:** Wetland, Riparian, Conifer forest, deciduous forest, mixed forest, open area, other.  
 \*3 **Site Type:** Blowdown area, ESA (ID:\_\_\_\*4\_\_\_), young forest, Mature conifer forest, Mixed forest, Deciduous Forest, Plantation  
 \*4 **ESA ID:** Wetland, riparian, steep slope, Old growth, Ecotone, Surficial Geology, Deciduous Patch, 6.0 Skunk Cabbage

\*1 **Invasive Coverage:** 1-100  
 \*2 **Habitat type:** Wetland, Riparian, Conifer forest, deciduous forest, mixed forest, open area, other.  
 \*3 **Site Type:** Blowdown area, ESA (ID:\_\_\_\*4\_\_\_), young forest, Mature conifer forest, Mixed forest, Deciduous Forest, Plantation  
 \*4 **ESA ID:** Wetland, riparian, steep slope, Old growth, Ecotone, Surficial Geology, Deciduous Patch, 6.0 Skunk Cabbage

\*1 **Invasive Coverage:** 1-100  
 \*2 **Habitat type:** Wetland, Riparian, Conifer forest, deciduous forest, mixed forest, open area, other.  
 \*3 **Site Type:** Blowdown area, ESA (ID:\_\_\_\*4\_\_\_), young forest, Mature conifer forest, Mixed forest, Deciduous Forest, Plantation  
 \*4 **ESA ID:** Wetland, riparian, steep slope, Old growth, Ecotone, Surficial Geology, Deciduous Patch, 6.0 Skunk Cabbage

\*1 **Invasive Coverage:** 1-100  
 \*2 **Habitat type:** Wetland, Riparian, Conifer forest, deciduous forest, mixed forest, open area, other.  
 \*3 **Site Type:** Blowdown area, ESA (ID:\_\_\_\*4\_\_\_), young forest, Mature conifer forest, Mixed forest, Deciduous Forest, Plantation  
 \*4 **ESA ID:** Wetland, riparian, steep slope, Old growth, Ecotone, Surficial Geology, Deciduous Patch, 6.0 Skunk Cabbage

## Works Cited

- Astley, C. (2010). *How does Himalayan blackberry (Rubus armenicaus) impact breeding bird diversity? A case study of the Lower Mainland of British Columbia*. Royal Roads University.
- B.A. Blackwell & Associates Ltd., Stanley Park Fire Preparedness Plan for 2007 (North Vancouver: B.A. Blackwell & Associates Ltd., 2007)
- Biesboer, D., Darveaux, B., & Koukkari, W. L. (1994). *Controlling leafy spurge and Canada thistle by competitive species*. St. Paul, MN: Submitted to the Minnesota Dept. of Transportation. Office of Research Administration. .
- Christiansen, J., & Bondzio, B. (2007). *Spatial analysis report of two invasive species. Himalayan Blackberry (R. discolor) and Giant Knotweed (P. sachalinense) found in Stanley Park*.
- Dukes, J., & Mooney, H. (1999). Does global change increase the success of biological invaders? *TREE*. 14 (4), 135-139.
- Hobbs, R. J., & Cramer, V. A. (2008). *Restoration Ecology: Interventionist Approaches for Restoring and Maintaining Ecosystem Function in the Face of Rapid Environmental Change*. Murdoch, Western Australia: School of Environmental Science, Murdoch University.
- [IPCBC] , I. (2010). *Local Government Toolkit for Invasive Plant Management*. Retrieved January 6, 2013, from Invasive Plant Council of BC:  
[http://www.bcinvvasiveplants.com/iscbc/images/stories/documents/reports/Local\\_Govt\\_Toolkit\\_2011\\_03\\_31\\_WEB.pdf](http://www.bcinvvasiveplants.com/iscbc/images/stories/documents/reports/Local_Govt_Toolkit_2011_03_31_WEB.pdf)
- [IPCC]. (2007). Intergovernmental Panel on Climate Change. In M. Parry, O. Canzian, J. Palutikof, P. van der Linden, & C. Hanson (Ed.), *Climate Change 2007 - Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the IPCC* (p. 976). Cambridge: Cambridge University Press.
- [ISCMV], I. S. (2012). *Target Species: Purple Loosestrife*. Retrieved January 6, 2013, from <http://www.iscmv.ca/target-species/purple-loosestrife>
- Kallis, Sharon. (2015) *Common Threads: weaving community through collaborative eco-arts*. New Society Publishers (not yet released).
- Page, N. (2006). *Invasive Plants in the Still Creek watershed*. City of Burnaby and City of Vancouver.
- Page, N., & Lilley, P. (2008). *City of Coquitlam Invasive Plant Management Strategy*. City of Coquitlam.
- [SPES]. (2012, January ). *Stanley Park Ecology Society* . Retrieved January 21, 2013, from Invasive Plant Mapping in Stanley Park final report: [http://stanleyparkecology.ca/wp-content/uploads/downloads/2012/11/Ferguson\\_SPES\\_Invasives-Report\\_2012.pdf](http://stanleyparkecology.ca/wp-content/uploads/downloads/2012/11/Ferguson_SPES_Invasives-Report_2012.pdf)

- Quinn, H., & Best, R. (2002). *English ivy in Stanley Park: effects of the invasion and implications for management*. UBC Environmental Sciences Masters Thesis.
- SPES. (2010). *State of the Park Report for the Ecological Integrity of Stanley Park*. Vancouver: Stanley Park Ecology Society.
- [VPBR]. (2011). *Stanley Park Ecological Action Plan*. Retrieved January 21, 2012, from [http://stanleyparkecology.ca/wp-content/uploads/downloads/2012/02/VPB\\_St Stanley\\_Park\\_Ecological\\_Action\\_Plan\\_revised.pdf](http://stanleyparkecology.ca/wp-content/uploads/downloads/2012/02/VPB_St Stanley_Park_Ecological_Action_Plan_revised.pdf)
- [VPBR], V. B. (2009). *Stanley Park Forest Management Plan*. Vancouver: Vancouver Park Board.