

COMOX VALLEY NATURALISTS SOCIETY WETLAND RESTORATION PROJECT 2006

SELLENTIN'S HABITAT RESTORATION & INVASIVE SPECIES CONSULTING LTD.



ACKNOWLEDGEMENTS 4

EXECUTIVE SUMMARY 5

INTRODUCTION 5

SUMMARY OF PROJECT FINANCES AND EXPENDITURES 6

 Table 1. Proposed and Actual Budget Considerations.....6

 Table 2. Planting Project Expenses.....6

Consequences of Invasive Alien Species(IAS)7

Background8

Purple Loosestrife (*Lythrum salicaria*)8

 Figure 1. Purple Loosestrife9

 Figure 2. Purple Loosestrife in bloom.....9

 Purple Loosestrife Removal 20069

 Table 3. 1999-2006 Days Worked Per Area, Purple Loosestrife Removal10

 Chart 1. Days Worked Per Area, Purple Loosestrife Removal10

 Chart 2. Purple Loosestrife Removal, 1999 - 2006.....11

Yellow Flag Iris (*Iris pseudacorus*).....12

 Figure 3. Yellow Flag Iris12

 Table 4. Landfilled Yellow Flag Iris and Knotweed Species12

Japanese & Giant Knotweed (*Polygonum cuspidatum* & *P. sachalinense*).....13

 Figure 5. Japanese Knotweed removed from Courtenay Estuary.....13

Himalayan Blackberries (*Rubus discolor*).....14

 Figure 6. Himalayan Blackberries in Courtenay River Estuary14

Himalayan Balsam (*Impatiens glandulifera*)15

 Figure 7. Small Himalayan Balsam seedlings, April 28 2006.....15

 Figure 8. Close-up of Himalayan Balsam Seedling15

 Figure 9. Himalayan Balsam in Bloom, 2 metres in Height.....15

Courtenay Airpark16

 Figure 10. Excavator preparing planting sites16

 Figure 11. Prepared Area Being Planted16

Alien Invasive Plant Inventory17

 Project Description.....17

 The Immediate Outcomes/Outputs Generated17

The Key Activities Undertaken to Achieve the Outcomes/Outputs17

SUMMARY OF WORK COMPLETED IN 2006 18

 Chart 3. Job Breakdown Summary19

RECOMMENDATIONS..... 20

Conclusion/Discussion20

REFERENCE: 21

APPENDIX 1..... 22

Location of Purple Loosestrife Removal - 200622

 Area 1 – Comox Bay Farms (CBF) - Ditch lines and ponds on DU Lands22

 Figure 12, Area 1. Comox Bay Farm Ponds23

 Figure 13, Area 1. Comox Bay Farm to Barry’s Farm.....23

 Area 2 – Slough through Simpson & Barry Farms to CBF.....24

 Figure 14, Area 2. Slough through Simpson & Barry Farms24

 Figure 15, Area 2. Slough and Barry’s Farm ditch line25

 Area 3 – Airpark Walkway26

 Figure 16, Area 3. Airpark Walkway26

 Figure 17, Area 3. Airpark Walkway27

 Figure 18, Area 3. Airpark Walkway27

 Figure 19, Area 3. Airpark Walkway28

 Area 4 – Courtenay River from Lewis Park to Airpark Marina.....28

 Figure 20, Area 4. Courtenay River from Airpark to Courtenay Slough29

 Figure 21, Area 4. Courtenay River from Standard to Lewis Parks30

 Area 5– Courtenay River north of Lewis Park including Tsolum River and Old Tsolum River channel and wetlands.30

 Figure 22, Area 5. Old Tsolum River Channel and Courtenay River31

 Figure 23, Area 5. Courtenay River and Old Tsolum River Channel32

 Figure 24, Area 5. Tsolum River showing location of Knotweed species.32

 Area 6 – Estuary on East side of Comox Road and south of Sawmill33

 Figure 25, Area 6. Courtenay River Estuary Purple Loosestrife33

 Area 7 – Glen Urquhart Creek Watershed34

 Figure 26, Area 7. Glen Urquhart Creek Watershed34

 Area 8, Stapley Road Wetland34

 Figure 27, Area 8, Stapley Road Wetland34

 Courtenay River Estuary, Yellow Flag Iris Removal35

 Figure 28, Area 6. Courtenay River Estuary Yellow Flag Iris & Knotweed Species35

APPENDIX 2..... 36

Location of Himalayan Blackberry Dominance36

 Figure 29, Courtenay River Estuary, Himalayan Blackberry Dominance36

 Table 5. 2003-05 Blackberry Species Measurements and Removal.....36

APPENDIX 3..... 37

 Himalayan Balsam removal Efforts, Courtenay River and Tsolum Slough37

APPENDIX 4..... 38

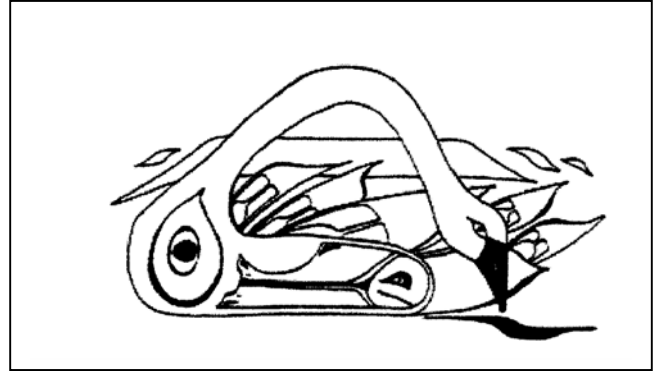
 Native Trees, Shrubs & Forbs Planted, Courtenay Estuary 200638

 List of Native Grass Plantings, Courtenay Airpark and 21st Street.....39

ACKNOWLEDGEMENTS

The ongoing efforts to remove non-native invasive plants from the Courtenay River, its estuary and surrounding wetlands was made possible through the financial help and support from the following organizations:

Comox Valley Naturalists Society
Regional District of Comox Strathcona
BC Inter-Ministry Invasive Plant Council
Ministry of Transportation
City of Courtenay
Ducks Unlimited
Shell Environmental Fund
Federation of BC Naturalists
Katimavik Youth Group
Nature Canada



This report was written by Ernie Sellentin and Alison Millham. Photographs by E. Sellentin, A. Millham and Kerry Griffiths. If you would like further information about the Comox Valley Naturalists Wetland Restoration Project please contact E. Sellentin via email at eselntin@shaw.ca

Contract Supervisor – Ernie Sellentin

With special thanks to the Crew:

Project Supervisor – Alison Millham

Field Crew - Kerry Griffiths, Graham Hilliar, Sebastian Woodroffe & Katimavik Volunteers

Project overseer – Fred Constabel and volunteers from the Comox Valley Naturalists Society that helped out on numerous occasions.

Ernie Sellentin
BSc Environmental Science

Sellentin's Habitat Restoration & Invasive Species Consulting Ltd

Wetland Habitat Restoration

710 Woodland Drive
Comox, BC
V9M 3H4
Phone: (250) 339-9103
Cell: (250) 702-2492
Email: eselntin@shaw.ca

EXECUTIVE SUMMARY

Over the past sixteen years the Comox Valley Naturalists Society (CVNS) has spearheaded the removal of purple loosestrife (*Lythrum salicaria*) from the wetlands of the Comox Valley. Purple loosestrife is an invasive alien species that out-competes native species, dries up and changes wetland ecology. Fieldwork by CVNS members, volunteers and hired employees has led to the realization that there are other invasive species and issues threatening the ecology and biodiversity of our local wetlands.

In 2002 the CVNS moved to a holistic approach of estuary/wetland management that includes removal of other invasives, planting of native species, and working with the local sawmill to solve bark debris problems in the Courtenay River estuary. Purple loosestrife numbers have declined from a high of 24,520 in 1999 to 5774 in 2006. Over the 2002 - 2006 field seasons, 28,100kg of sawmill debris, 12,066kg of yellow flag iris and 2,080kg of Japanese knotweed was removed from the Courtenay River estuary. The extent of Himalayan blackberry dominance has been mapped at 7457 m² with 4713 m² removed from 2003-2006. Additionally, the eleven plant communities of the estuary were mapped in 2003 along with identification of over 170 species of vascular plants.

In 2004 & 2005 the CVNS received funding from the Ministry of Transportation to inventory invasive plants on highways right-of-ways on northern Vancouver Island. Additional funds from the Inter-Ministry Invasive Plant Council in 2005 were used to inventory non-highway right-of-ways.

In 2004, 332 sites in the Comox Valley were identified as having non-native invasive species present totalling 87.9 hectares. A total of 3630 kg of meadow knapweed, 90 kg of knotweed and 200 kg of garbage were removed and landfilled.

The 2005 inventory of invasive plants continued to expand to the whole of the northern half of Vancouver Island, Denman, Hornby, Texada, Cormorant and Malcolm Islands. Inventory work was done in cooperation with Ministry of Forests and Range (MOFR) with the CVNS crew covering areas not under MOFR jurisdiction. The 2005 CVNS crew inventoried villages, towns, cities, regional districts, rural areas and gravel pits of the north island and identified 2,150 infestations of non-native plants.

In 2006 crews inventoried new occurrences of non-native species within the Courtenay River estuary and its wetlands. Acting on tips, invasive plants as far as Mt Washington were mapped and entered into the BC Ministry of Forests and Range Invasive Alien Plant Program database.

INTRODUCTION

The purpose of this report is to document the wetland and estuary habitat restoration work done in the Comox Valley by the CVNS and to raise awareness about non-native invasive species. The restoration efforts include the removal of invasive species from Comox Valley wetland, riverine and estuarine habitats and replanting with the appropriate native species. Additionally, an inventory for non-native species was conducted in the Comox Valley, cities and towns of the North Island, Denman, Hornby, Texada, Cormorant and Malcolm Islands.

SUMMARY OF PROJECT FINANCES AND EXPENDITURES

Funding for the Comox Valley Naturalists Wetland Restoration Project came from the Comox-Strathcona Regional District, City of Courtenay, Ducks Unlimited, Federation of BC Naturalists, Nature Canada and the Shell Environmental Fund. Table 1 shows the proposed budget and income for the project on the left hand side and the actual expenses and income on the right hand side. One major planting project was undertaken with funding from the Shell Environmental Fund. Expenses for the planting project are shown in table 2. [Appendix 4](#) contains the list of native plantings for 2006.

2006 CVNS Proposed Budget				2006 CVNS BUDGET EXPENSES			
	Days	Rate	Total		Days	Rate	Total
Supervisor	64	\$ 156.00	\$ 9,984.00	Supervisor	63.5	Variable	\$ 8,138.68
Field worker	54	\$ 100.10	\$ 5,405.40	E. Sellentin	11.3	\$ 156.00	\$ 1,757.60
Field worker	54	\$ 100.10	\$ 5,405.40	Fieldworkers	81.7	\$ 110.00	\$ 8,990.67
Labour totals	172		\$ 20,794.80	Labour totals	156		\$ 18,886.95
Vehicle, tools, Insurance	3	\$ 500.00	\$ 1,500.00	Vehicle, tools, Insurance	4	\$ 500.00	\$ 2,000.00
Fuel	1	\$ 300.00	\$ 300.00	Fuel	1	\$ 181.00	\$ 118.83
Weed eater	5	\$ 35.00	\$ 175.00	Weed eater	1	\$ 35.00	\$ 35.00
Boat & motor	1	\$ 200.00	\$ 200.00	Boat & motor	0		\$ -
Plants	1	\$3,630.24	\$ 3,630.24	Plants	1	\$ 2,923.03	\$ 2,923.03
Compost	1	\$ 821.76	\$ 821.76	Compost	1	\$ 719.04	\$ 719.04
				Equipment Rental			\$ 2,037.98
		Total	\$ 27,421.80	Miscellaneous			\$ 592.59
						GST	\$ 1,757.41
						Total	\$ 29,070.83
PROJECTED INCOME				ACTUAL INCOME			
CSRD			\$ 18,000.00	CSRD			\$ 18,266.00
City of Courtney			\$ 2,500.00	City of Courtney			\$ 2,500.00
Ducks Unlimited			\$ 2,000.00	Ducks Unlimited			\$ 1,500.00
FBCN			\$ 1,500.00	FBCN			\$ 2,000.00
CVNS				Nature Canada			\$ 2,500.00
Shell funds			\$ 4,453.61	Shell Enviro Fund			\$ 4,452.00
			\$ 28,453.61				\$ 31,218.00

Table 1. Proposed and Actual Budget Considerations

Plants, Compost, GST, PST	\$ 4,173.59
All Found Excavator Costs	\$ 2,037.98
Labour	\$ 2,222.67
Total for project	\$ 8,434.23

Table 2. Planting Project Expenses

Consequences of Invasive Alien Species¹(IAS)

The following italicised paragraphs are taken from the websites of the Global Invasive Species Program² and from statements by its associated Invasive Species Specialist Group. These paragraphs are meant for readers to familiarize themselves with the issues and the dangers associated with allowing an unchecked spread of invasive alien species.

Species suddenly taken to new environments may fail to survive but often they thrive, and they become invasive. This process, together with habitat destruction, has been a major cause of extinction of native species throughout the world in the past few hundred years. Although in the past many of these losses have gone unrecorded, today, there is an increasing realisation of the ecological costs of biological invasion in terms of irretrievable loss of native biodiversity.

Invasive species are organisms (usually transported by humans) which successfully establish themselves in, and then overcome, otherwise intact, pre-existing native ecosystems. Biologists are still trying to characterise this capability to invade... But whatever the causes, the consequences of such invasions - including alteration of habitat and disruption of natural ecosystem processes - are often catastrophic for native species.” <http://www.issg.org/> January 29, 2003

“Failure to address the underlying causes of biological invasion and mitigate the impacts of IAS (Invasive Alien Species) will result in both losses and gains. We will, for example, lose numerous species, genetic resources, and quite possibly the entire concept of “protected” areas. Poverty, malnourishment, human migration, and disease epidemics will, on the other hand, increase.” <http://jasper.stanford.edu/gisp/home.htm> January 29, 2003

The above paragraphs highlight the very real dangers created by IAS. In particular, the last paragraph raises the possibility of losing protected areas (parks, ecological preserves) as what could be considered repositories of native species and genetic diversity. The concept of “protected” areas is especially relevant as we move to a local scale and the preservation of the remaining wetlands in the Comox Valley.

The Comox-Strathcona Regional District has also recognized this threat when they adopted Bylaw No. 2347, a bylaw to regulate noxious weeds in 2001. At that time Purple Loosestrife was the only weed on the list. Subsequent amendments have added Japanese Knotweed, Yellow Flag Iris, Spotted Knapweed, English Ivy, Giant Hogweed, Scotch Broom, Gorse, Dalmation Toadflax and as of March 2005, Himalayan Blackberry. The RDCS actions show a commitment to Manage Noxious Weeds and support for the Wetland Restoration Project.

¹ *Invasive Alien species (IAS) are “introduced deliberately or unintentionally outside their natural habitats where they have the ability to establish themselves, invade, out compete natives and take over the new environments.”*

² *International group of scientists that are laying the groundwork to address invasive alien species in science, education, management and policy through collaborative international action*

Background

Within weeks of the 1991 discovery of purple loosestrife (*Lythrum salicaria*) in the Courtenay River estuary, CVNS members and volunteers armed with shovels began the task of removing it. Bio-controls of predatory beetles were released in 1994 but as of 2006 no insects or feeding damage has been found. By 1995, previous efforts were proving to be unsuccessful as the Courtenay River was still infested with loosestrife and the estuary was a sea of pink. As CVNS volunteers began suffering from burnout, outside funds were solicited to hire workers. Eco-Action supported these efforts with a crew and supervisor for the 1998-99 seasons; other funding was sought with limited success.

In 2001 the CVNS applied for and was successful in acquiring core project funding from the Regional District of Comox Strathcona. With this core funding a strategy was implemented to measure loosestrife removal. This new strategy involved counting the roots of all loosestrife plants removed and mapping locations. Real numbers showed the level of effort being undertaken and a dramatic decline in purple loosestrife presence. The CVNS project was succeeding and this success now gave funding agencies a reason to financially support the project. Since 2001 all removal efforts have been measured and mapped.

As work crews continued with the purple loosestrife project it became apparent that there were other invasive species threatening native habitat. New invaders are added to the list as they become recognized as problematic. By 2006, yellow flag iris (*Iris pseudacorus*), Knotweed species (*Polygonum cuspidatum*, *P. sachalinense*), Scotch Broom (*Cytisus scoparius*), Policemen's Helmet (*Impatiens glandulifera*), and Himalayan blackberry (*Rubus discolor*) were all targeted for various degrees of removal efforts.

Purple Loosestrife (*Lythrum salicaria*)

Purple loosestrife, a tall beautiful flowering plant, invades wetlands and gradually takes them over to the exclusion of other plants. As a perennial plant, loosestrife increases its woody root mass yearly, which can result in drying out marshes, destroying native habitat and displacing wildlife. The City of Courtenay, the Town of Comox and the Regional District of Comox-Strathcona have put this invasive plant on their noxious weed list.

This is the sixteenth year that the Comox Valley Naturalists Society (CVNS) have been waging war on purple loosestrife. Although native species have returned in greater numbers, other invasive plants have tried to colonize the disturbed areas.



Figure 1. Purple Loosestrife

Distinguishing features include a square stock and lance shaped leaves with a leaf within a leaf pattern.



Figure 2. Purple Loosestrife in bloom

Purple Loosestrife Removal 2006

In total 5774 purple loosestrife plants were removed from the wetlands of the Comox Valley in 2006. The 2006 removal of purple loosestrife has continued a very strong effort with all sites being inspected numerous times throughout the season before receiving a final cleanup and inspection.

The eight general locations where purple loosestrife was removed are listed in Table 3 and displayed in Chart 1.

Chart 2 shows the number of purple loosestrife plants removed from 1999 - 2006 with a logarithmic trendline predicting further declines in purple loosestrife numbers.

[Appendix 1](#) contains aerial photographs indicating the locations where purple loosestrife was removed in the last few years.

❖ **Appendix 1 is meant to act as a field guide and maps for the 2007 season and beyond.**

A total of 34.5 days were dedicated to loosestrife removal in 2006. Large seed bearing plants are still being found, but are beginning to decrease. Large plants were found along the Slough and beside Superstore (Areas 1&2). Loosestrife seeds from these plants would be carried upstream and downstream by tidal influences to sprout in the ditch lines of the Comox Bay Farm, Barry's Farm or the Courtenay River estuary.

Areas	Days	Days	Days	Days	Days	Days	Days
	1999	2001	2002	2003	2004	2005	2006
1. Comox Bay Farm	18.0	8.1	5.0	5.5	2.9	4.4	1.6
2. Simpson & Barry Farms	5.0	1.8	1.3	5.1	3.2	1.2	1.9
3. Airpark & Walkway	4.0	0.9	3.1	3.3	3.5	1.0	3.3
4. Courtenay River	2.0	5.4	3.9	7.9	2.6	4.8	1.6
5. Lewis Park	15.0	27.9	14.8	12.8	16.5	15.1	6.1
6. Estuary	64.0	22.2	15.8	19.5	19.9	21.2	16.7
7. Glen Urquhart Watershed	1.0	0.5	0.8	0.4	0.9	1.0	1.5
8. Stapley Road Wetland				3.9	3.6		1.8
Totals	109.0	66.8	44.6	58.3	53.0	48.7	34.5

Table 3. 1999-2006 Days Worked Per Area, Purple Loosestrife Removal

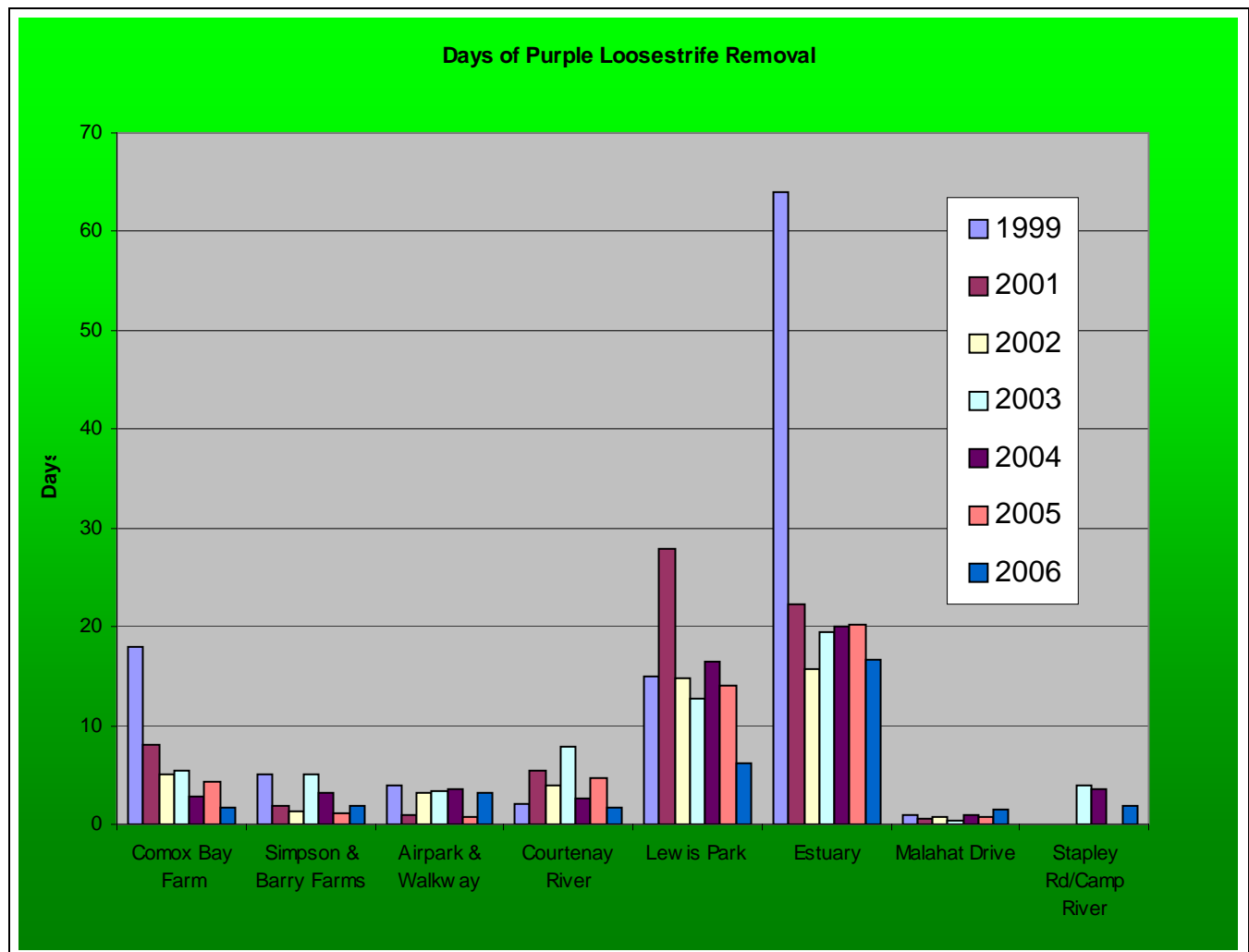


Chart 1. Days Worked Per Area, Purple Loosestrife Removal

Purple Loosestrife Removal

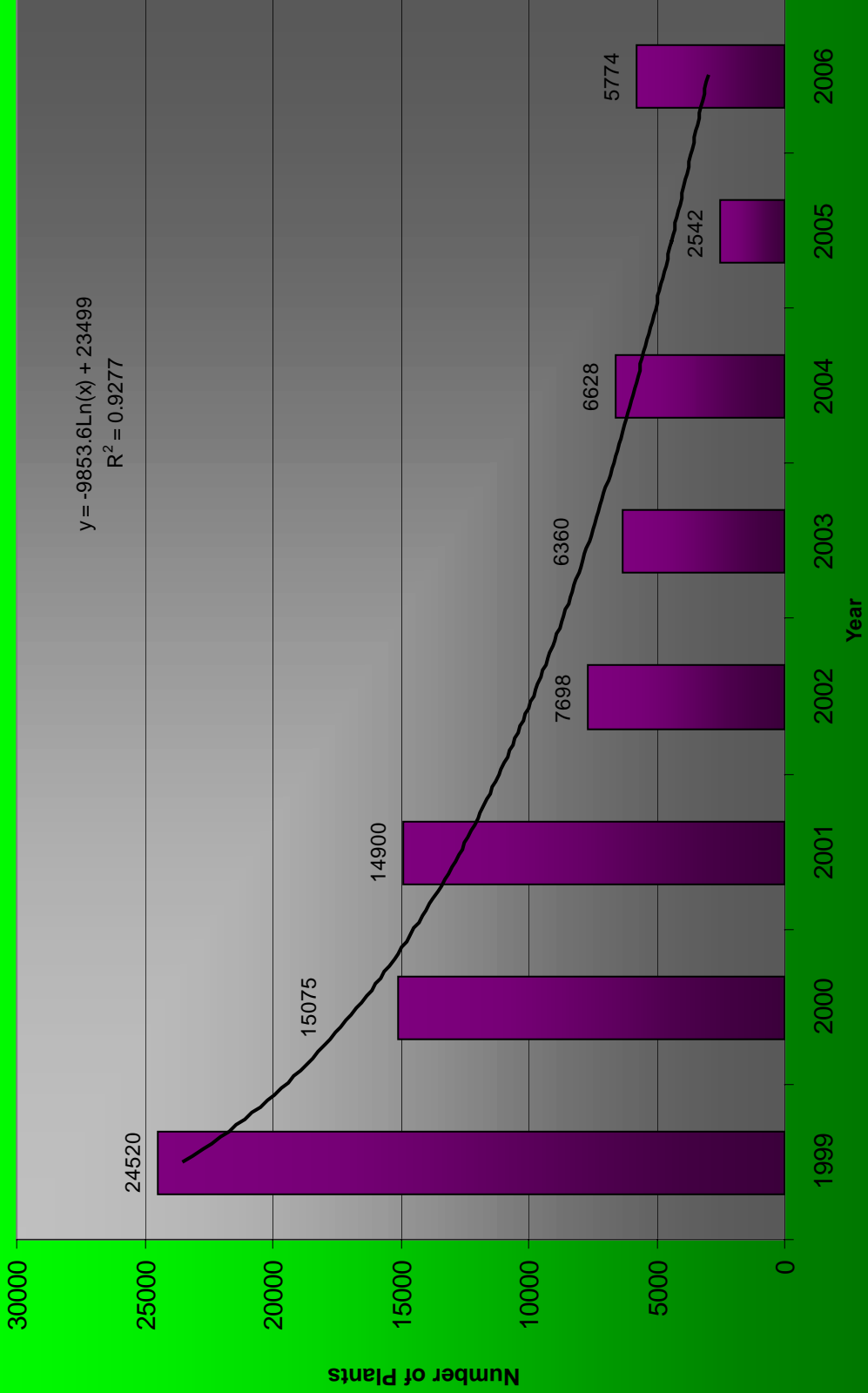


Chart 2. Purple Loosestrife Removal, 1999 - 2006

Yellow Flag Iris (*Iris pseudacorus*)

Planted for its showy yellow spring flowers and for its erect sword like leaves it often escapes the garden to spread locally along shorelines, stream flats, and into fresh and brackish marshes. Yellow flag iris is a hearty perennial that re-grows from thick, tuberous rhizomes or corms. The rhizomes spread radially to produce large clonal populations. Rhizomes are drought tolerant.



Figure 3. Yellow Flag Iris

Both rhizomes and seeds of iris are transported downstream during winter’s high water floods to form new colonies. Yellow flag iris will grow vigorously in water or wet soil to the complete exclusion of cattails (*Typha latifolia*).

Yellow flag iris was removed in conjunction with purple loosestrife in 2006. In total 12,066 kg of yellow flag was removed from the Courtenay River estuary between 2002 & 2006. **It will be important to monitor yellow flag presence over the next few years and remove all plants as they mature and flower (easy to find) and before they can contribute to the seed bank.** Table 4 shows the amounts of yellow flag iris and knotweed species that were disposed of at the Pigeon Lake Landfill from 2002 - 2006.

Year	Kilograms	Yellow flag iris	Knotweed species	Garbage
2006	750	670	58	22
2005	200	200		
2004	1,040	1010		30
2003	5,460	5,176	284	
2002	6,810	5,010	1,800	
Overall total	14,260	12,066	2,142	52

Table 4. Landfilled Yellow Flag Iris and Knotweed Species

While the bulk of yellow flag iris has been removed from the Courtenay River estuary there still remains a considerable viable seed bank in the soil. Areas disturbed in the process of removing yellow flag iris corms are often re-colonized with yellow flag seedlings from the seed bank. It was necessary to hoe or weed most areas a couple of times to stop re-establishment. Additionally, areas that were removed of blackberries and replanted with native grasses and herbs required the weeding of thousands of yellow flag iris seedlings that sprouted from the ever-present seed bank.

Japanese & Giant Knotweed (*Polygonum cuspidatum* & *P. sachalinense*)

Knotweed species are present in hundreds of locations throughout the Comox Valley and thousands of locations on Vancouver Island. It is being spread to and from sites through the movement and disturbance of knotweed contaminated soils. Knotweed grows in all types of habitats from dry sand dune to wetland habitats. It forms large dense stands three metres or taller in wetlands and along streams choking out native species and endangering fish and their habitat.



Knotweed species are members of the Buckwheat Family, herbaceous, semi-woody perennials with egg-shaped leathery leaves and greenish-white flowers that bloom in clusters along the stem. With stout hollow stems, knotweeds can grow to three metres in height forming dense clumps resembling bamboo. Soils contaminated with a rhizome piece as small as 5 grams can produce another plant. The rhizomes can penetrate concrete or asphalt, burrow into hardpan soils to a depth of 2 metres, and reach 7 metres around the base of the plant.

Figure 4. Japanese Knotweed in Bloom

Along the banks of the Courtenay River and in the estuary, knotweed has grown into dense groves excluding all other plant communities. In Europe and the UK there is a longer history of naturalization and spread of knotweed species than in North America. The destructive potential of knotweed species



has been recognized in the UK with a legislation making it illegal to introduce knotweed into the natural environment.

Knotweed species are extremely difficult to remove in wetland habitats due to the reproductive ability of its rhizomes, with rhizomes less than 5 grams able to re-sprout an entire new plant. Established plants should not be disturbed (rhizome contaminated soils spread infestations further) unless sufficient funding is in place to effect a complete removal within two treatments (Huckins, E. 2003).

Figure 5. Japanese Knotweed removed from Courtenay Estuary

For fear of spreading knotweed infestations further we were reluctant to target new plants for removal in 2006. Research continues for better methods of knotweed eradication, as our current approach is

manual removal. The most successful techniques rely primarily on the use of herbicides with glyphosate as the active ingredient. Currently in Canada there are no herbicides approved for use in wetlands. Figure 5 shows a small plant that was removed in 2002 by hand digging and disposing of the roots in a landfill. We continue to remove new sprouts from this site each year.

Himalayan Blackberries (*Rubus discolor*)

Known for their delicious berries, Himalayan blackberries are a major invasive alien species in the estuary of the Courtenay River. Blackberries spread through seeds and via vines that touch earth at their tips and sprout roots. The ability of vines to root at their tips allows blackberries to colonize



areas where it would be difficult to get established with seeds alone. In this manner, blackberries have extended from roadsides and disturbed areas into the Courtenay River estuary. Once established blackberries out compete native species by sending up new vines that can reach lengths in excess of 15 meters. These vines grow up through native species such as twinberry, tip over when not supported and grow on top of the native species. Over time, the dead vines press the native species down, deny them sufficient light and eventually smother native shrubs out.

Blackberries dominated 5% of the estuary or 23% of the upland area of the estuary before removal began in 2003. The aerial photograph in Appendix 2 highlights the locations of the major blackberry infestations in the Courtenay River estuary. Of the 7457m² of blackberries, 1299m² were removed in 2003, 3243m² were removed in 2004 and 127m² removed in 2005. There were no removal efforts in 2006 but all previously cleared areas were maintained. There remains approximately 2743m² of blackberries in the estuary scattered over 7 different areas.

Figure 6. Himalayan Blackberries in Courtenay River Estuary

Removal of blackberries involves cutting back the vines to access the root base of the plant and then digging out the roots. Once dug out, root wads and smaller roots that are exposed to the sun expire. Complete removal of blackberries will require continued visits to pull remaining roots as they sprout. Figure 6 shows blackberries gaining a height greater than 6 metres by using the limbs of a spruce tree for support. Small amounts of Nootka rose can be seen in the left foreground of the photo. [Appendix 2](#) contains the mapping and removal efforts for Himalayan Blackberries.

Himalayan Balsam (*Impatiens glanduliflora*)

Also known as Policeman's Helmet this annual succulent can grow up to 2 meters in height. Not yet regulated by the *Weed Control Act of BC*, this plant is listed as a nuisance weed by the Ministry of Agriculture. Often planted for its lovely flowers, which range from white to pink to reddish, this native of the Himalayas can quickly escape the backyard to establish in wetlands, streams and riparian areas. Each plant can produce up to 800 seeds and has the amazing ability to eject the seeds up to 8 meters away. The buoyant seeds can travel as far as 20 kilometers and are able to germinate under water.



Figure 7. Small Himalayan Balsam seedlings, April 28 2006



Figure 8. Close-up of Himalayan Balsam Seedling

Since 2001 our crew noticed that small patches of the showy plant along the Courtenay River and the Old Tsolum back channel were increasing in size and excluding native plants. Eradication efforts



began in 2006 at the furthest point upstream on the Old Tsolum Channel in early June. As the seedlings were just 10cm tall, they were easily hand pulled out of the ground. Up to 1000 plants could be pulled, bagged, and piled along the thicker infestations in an hour. The plants were piled upland in a dry, undisturbed area and left to expire. The plants grew quickly so each week the crew would count the number of plants they each could pull in an hour and average that number for the week. By the end of August the remaining plants had reached their full height of 2 metres and began to flower. Concern that the plant would soon begin seeding, crews then used machetes to cut the remaining stalks at the base. Again the crews counted how many plants they could cut down in an hour and averaged that number for the day. The seeds from Himalayan Balsam can remain viable for up to 3 years and it is expected to take that long to see significant numbers reduction and control of this plant. Please see [Appendix 3](#) for Himalayan Balsam removal numbers.

Figure 9. Himalayan Balsam in Bloom, 2 metres in Height

Courtenay Airpark

The Comox Valley Naturalists Society acts as stewards of the Airpark for the City of Courtenay. As such the CVNS has a goal of naturalizing the Airpark by removing non-native species and establishing healthy populations of native species from adjacent natural areas. The establishment of a Garry Oak ecosystem species has begun in drier areas and estuarine species in the wetter areas.

Soils along the Airpark Walkway are comprised of compacted poor quality fills and range from coarse to fine gravels, clays and debris from construction sites including concrete, asphalts and metals.

Figure 10. Excavator preparing planting sites

The compact nature of the soils in the Airpark makes digging with hand tools physically demanding, time consuming and non-productive. For this reason, the bulk of removal efforts

and planting of native species was done with the aid of a rented mini-excavator. The excavator was used to remove blackberries, dig holes for native plantings and load a track carrier with composted mulch. Over 80 cubic metres of mulch was mixed into the soil and applied around the native plantings to improve soil nutrients and quality.



In late May and early June of 2006 135 hours were spent removing invasive species and planting 660 native shrubs and 35 flats of native grasses in various areas of the Courtenay Airpark.

For a list of the 2006 plantings please see Appendix 4.

Figure 11. Prepared Area Being Planted

Alien Invasive Plant Inventory

The goal of this project was to conduct an inventory of non-native invasive plants within the Regional District of Comox Strathcona (RDCS) and the Cities, Towns Villages and Unincorporated areas outside the Regional District. The objective is to use the inventory to get a better understanding of the extent of non-native species infestations and how best to manage/remove non-native species within the.

Project Description

As part of the Comox Valley Naturalist Society Wetland Restoration Project, funding from the Inter-Ministry Invasive Plant Council and Ministry of Transportation was used to:

1. Identify, map and measure non-native invasive plants on Crown lands in the Regional District of Comox Strathcona
2. Where economically viable remove by hand small infestations of non-native invasive species
3. Dispose of Non-native invasive species at the RDCS Pidgeon Lake landfill
4. Enter all data on the Invasive Species Atlas of BC website at:
<http://shim.bc.ca/atlasses/invasivespecies/main.cfm>
5. Produce a final report documenting all findings

The Immediate Outcomes/Outputs Generated

Funding from the IMIPC arrived in mid July with inventory of invasive plants beginning on July 20, 2005. Funding was also received from the Ministry of Transportation for inventory work including highways right of ways and gravel pits on North Vancouver Island. Funding from IMIPC and MOT was combined for inventory purposes as determining jurisdictional issues would have used an unacceptable amount of administration time. The Comox Valley Naturalist Society (CVNS) crew inventoried the following areas:

- Mud Bay in the south to Miracle Beach in the north, and north half of Texada Island
- City of Courtenay, City of Comox, Town of Cumberland
- Mt Washington Parkway and Mt Washington Resort
- North half of Texada Island
- Town of Gold River, Town of Tahsis, District of Campbell River, Sayward Valley
- Town of Port McNeil, Town of Port Hardy, Town of Port Alice
- Malcolm Island, Cormorant Island & Alert Bay
- Inventory of MOT Service Area 3, North Island Gravel Pits

Inventory crews identified 2,150 infestations of non-native invasive plants on North Vancouver Island. At each site data was collected to MoFR standards including UTM coordinates. When possible, small single plant infestations were removed by hand, bagged and disposed at the local landfill.

The Key Activities Undertaken to Achieve the Outcomes/Outputs

- Three crewmembers attended a one-day Ministry of Forests and Range Invasive Plant training program in Nanaimo.
- North Vancouver Island Inventory split between MOFR and Comox Valley Naturalists inventory crews.

- Maps acquired from MOFR showing areas they had covered and where CVNS crew should focus their efforts
- Field work (inventory) begins on July 25th and continued until the end of October 2005
- Single plants were removed and landfilled by the inventory crew as a rapid response to an isolated infestation
- Data entry started in late November and is ongoing
- Data uploaded from GPS to laptop and Garmin mapping software to check accuracy and for quick location for field removal.
- Data is being entered onto the MOFR IAPP database

SUMMARY OF WORK COMPLETED IN 2006

A total of 910.5 hours or 121.2 days were spent on the project as of January 1st 2006. Chart three shows the job allocations in graph format. Hours of work were broken down into ten categories by 7.5-hour days. These categories with a detailed job description are as follows:

1. Loosestrife – 31.2 days
 - Removal, bagging and hauling of purple loosestrife to composting facility
2. Site maintenance, Seed Collection –29.8 days
 - Watering, weeding, mulching of current and previous plantings. Collection and cleaning of native plant seeds for planting in rehabilitated areas
3. MoT, IMIPC Inventory - 23.6 days
 - Ministry of Transportation & Inter-Ministry Invasive Plant Council Funding (2005 funding)
 - Data entry of invasive plants to Ministry of Forests and Range Invasive Alien Plant Program.
4. Planting
 - All work required for planting including plant selection, ordering, delivery site preparation, planting and initial watering.
5. Himalayan Balsam – 14.9 days
 - Removal along Courtenay and Tsolum Rivers
6. Blackberry species –12.3 days
 - Cutting of canes away from native species, removal of roots and exposure to sun
7. Yellow Flag – 8.9 days
 - Removal, bagging and hauling of yellow flag iris to Pigeon Lake landfill
8. Books and Writing – 6.8 days
 - Funding proposals, budgeting, payroll calculations, remittances to Canada Customs and Revenue Agency, Records of Employment, T4's, and year end report
9. Broom – 6.3 days
 - Removal at Courtenay Airpark and Cumberland Interchange
10. Work preparations – 5.7 days
 - Boat maintenance, tool maintenance (sharpening, handle replacement), tool allocation, and daily work planning and vehicle cleanup.
11. Knotweed – 4.2 days
 - Removal bagging and hauling of knotweed roots to Pigeon Lake landfill.
12. Public Relations and Other – 3.1 days
 - Public meetings, communication with local & provincial government
13. Species Inventory – 1.2
 - Inventory of invasive plants in local area, entry into database

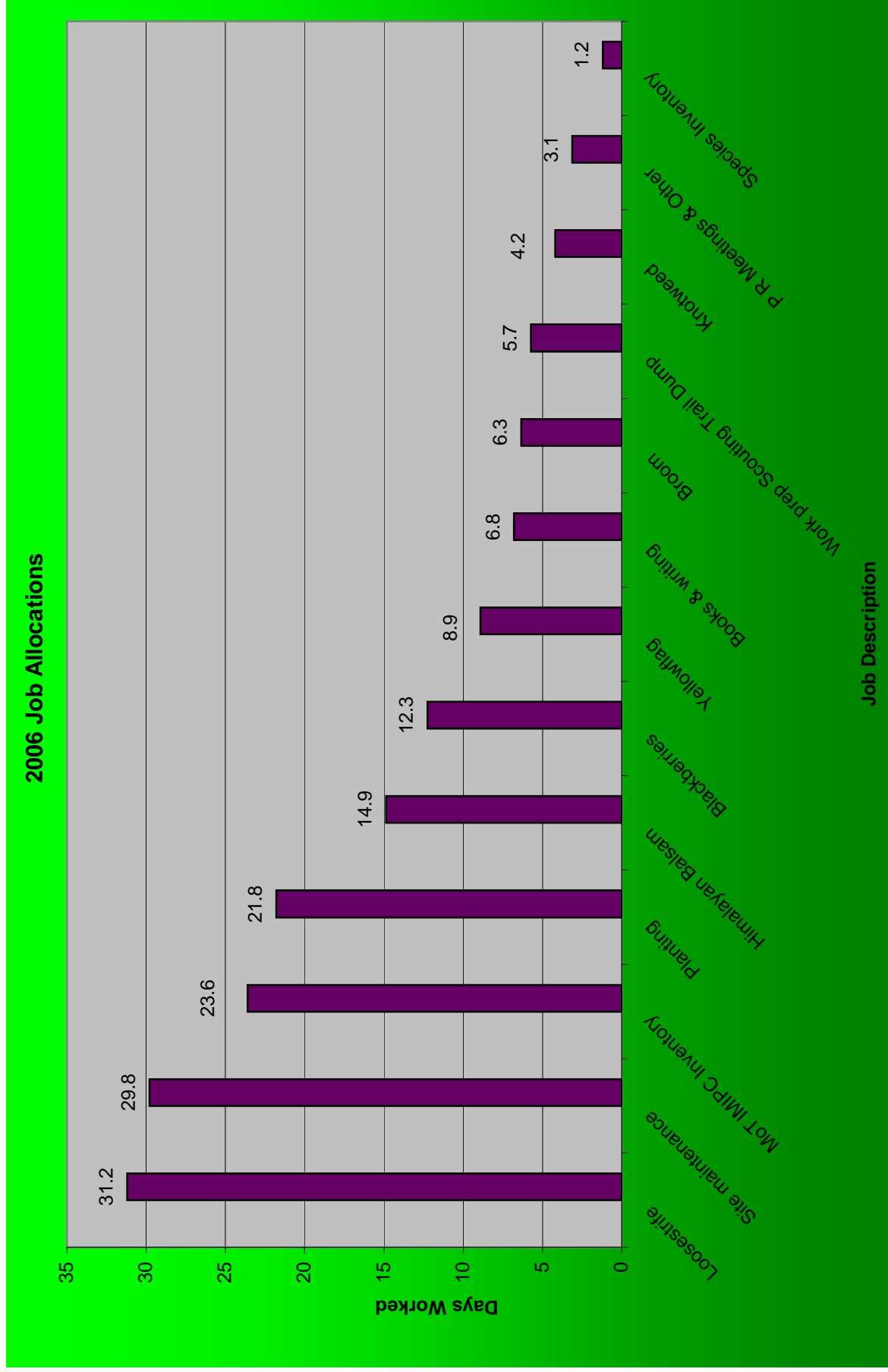


Chart 3. Job Breakdown Summary

RECOMMENDATIONS

The 2007-year needs a continued focus on the eradication of purple loosestrife. The strong efforts in the past few years has left few large loosestrife plants able to contribute to the seed bank for the 2007 season. Of all the infested areas only the Simms farm/slough area is of concern. A thorough effort was put forth in the Simms/Slough area in 2006 with less than 300 plants discovered. Due to the mucky nature of this area it requires extreme caution and determination to ensure the area is covered adequately.

There remains a number of immature non-flowering yellow flag iris plants and a considerable yellow flag iris seedbank in the estuary. The plants should be removed early in 2007 with a summer long follow-up and weeding of seedbank sprouts. All areas where plants were removed in previous years should also be checked for seedlings. Where blackberries were previously removed and the soil exposed to sunlight a heavy crop of yellow flag iris sprouted. Continued weeding in areas where blackberries are removed will be necessary to control the establishment of yellow flag iris.

Efforts to remove Himalayan blackberries should continue in 2007. There remains 2915m² of the original 7457 m² of blackberries that dominated 23% of the upland area of the estuary. An ongoing check for blackberry shoots in restored areas will reveal roots missed in previous eradication efforts. Areas cleared of blackberries are ideal for the planting of desirable native grasses, herbs and shrubs.

Japanese knotweed continues to expand its presence along the banks of the Courtenay River and upland areas of the Comox Valley. Knotweed has been successfully removed from one location with ongoing removal efforts at another location. Continued Inventory will allow future control/eradication efforts. With a much heavier rate of knotweed infestation, the state of Oregon may be able to provide valuable information on control and eradication methods (Huckins, E. 2003). The Nature Conservancy of Oregon is currently trial testing stem injection of herbicides to control knotweed. Preliminary tests show promising results with further tests and final analysis available in the summer of 2004 (Soll, J., 2003).

Conclusion/Discussion

The ongoing effort of the CVNS at removing purple loosestrife is showing a promising decline in the occurrence of this destructive wetland plant. The potential exists for further declines in purple loosestrife numbers in the next few years. The removal of loosestrife has evolved into a holistic project of wetland management that monitors the health of the estuary through a yearly presence in the field. For example, this continued presence has lead to the recognition of the destructiveness of Himalayan Blackberries, Himalayan Balsam and Yellow Flag Iris to the ecology and food webs of estuarine ecosystems.

Vigilance of threats by new invasive species, combined with field identification can get an early start to prohibiting the establishment of undesirable alien plant species. Early detection and rapid response (eradication) are the keys to success and cost control when removing an invasive alien species.

REFERENCE:

Hitchcock, C.L., and A. Cronquist. 1973. *Flora of the Pacific Northwest*. University of Washington Press, Seattle, Washington.

Huckins, E. 2003. Watershed Technical Specialist, Lincoln Soil and Water Conservation District, Newport, Oregon. Personal communication with E. Sellentin.

Pojar, J., and A. MacKinnon. 1994. *Plants of Coastal British Columbia including Washington, Oregon & Alaska*. Lone Pine Publishing, Vancouver, B.C.

Soll, J. 2003. The Nature Conservancy and Metro Parks and Greenspaces, Stem injection of Japanese and giant knotweed, Preliminary Results Report 1. The Nature Conservancy, Portland Oregon.

Vaartnou, M., 2003. *Establishment of a Native Seed Industry for the West Coast of Vancouver Island, Final Report 2002/03*. Unpublished.

APPENDIX 1.

Location of Purple Loosestrife Removal - 2006

The areas are as follows:

1. Area 1 – Comox Bay Farms ditch lines and constructed ponds
2. Area 2 – Simpson & Barry Farms to CBF
3. Area 3 – Airpark Walkway
4. Area 4 – Courtenay River from Lewis park to Airpark Marina
5. Area 5 – Courtenay River north of Lewis Park
6. Area 6 – Estuary on East side of Comox Road and south of Interfor’s sawmill
7. Area 7. – Glen Urquhart Creek Watershed - Detention Pond, Malahat Drive
8. Area 8 – Stapley Road Wetland

Area 1 – Comox Bay Farms (CBF) - Ditch lines and ponds on DU Lands

- A total of 1.6 days was spent on removing purple loosestrife from this area (4.3 days 2005, 2.9 days 2004, 5.5 days 2003, 5 days 2002). It was visited on three different occasions with a three leaved, six-sided stemmed hybrid found flowering.
- This area covers the ponds and all the ditch lines to Barry’s farm
- 23 plants removed

This area is owned by Ducks Unlimited and is accessed through the south side of the Superstore parking lot or through the farm. Purple loosestrife was found and removed along the ditch lines and around the ponds. A new area of mature purple loosestrife was found in 2005 just to the west of the ponds. The plants were removed but the mature plants there have left a substantial seed bank in the soil. This area will need to be checked on a regular basis. Teasel was also found at this site and removed.

Denotes purple loosestrife presence and removal_____



Black circle denotes dominance by Himalayan blackberries_____



Yellow Flag presence: removed and not removed_____



Knotweed (Japanese, Giant & Himalayan)_____



Teasel_____



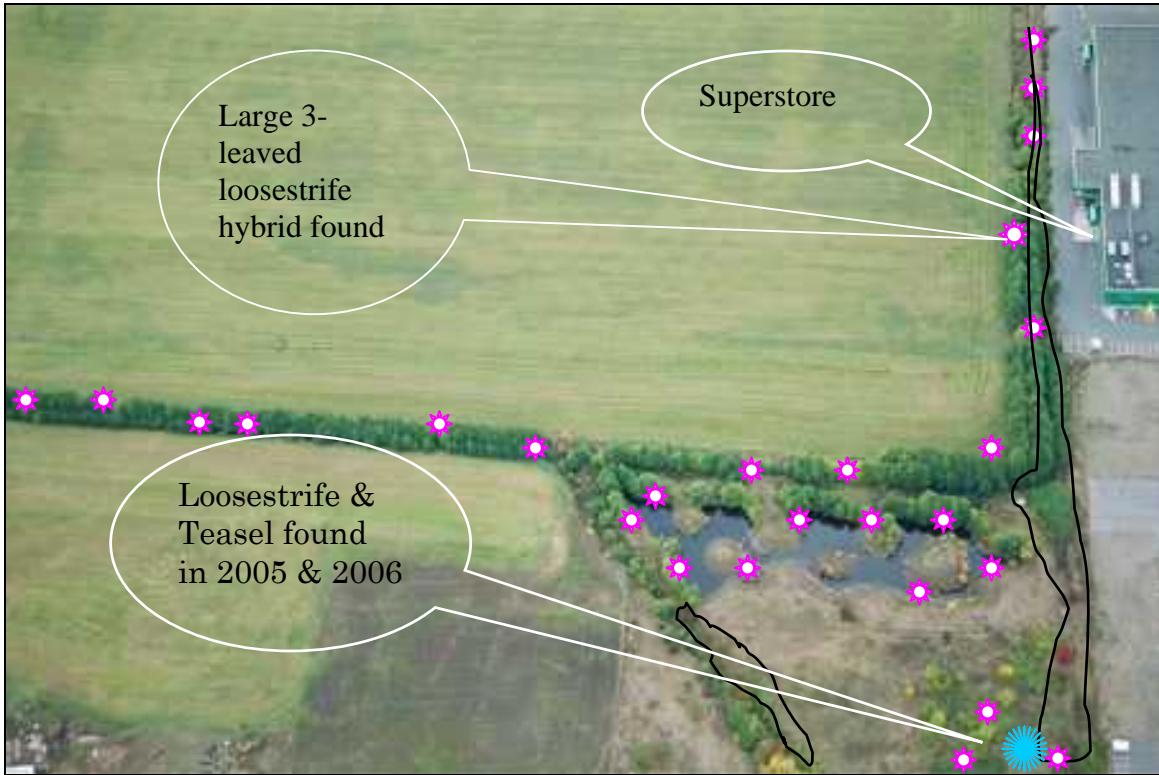


Figure 12, Area 1. Comox Bay Farm Ponds



Figure 13, Area 1. Comox Bay Farm to Barry's Farm

Area 2 – Slough through Simpson & Barry Farms to CBF

- 1.9 days 2006 (1.2 days in 2005, 3.2 days 2004, 2003, 1.5 days 2002, 1 day 2001, 1 day 1999)
- This area is downstream from a seed source and upstream from a tidal seed source
- 270 plant – 2006, 14 plants - 2005

Due to heavy coverage by cattails (*Typha latifolia*), Area 2 is very difficult to cover thoroughly. Because purple loosestrife grows well amongst cattails it is necessary to cover all cattail-dominated areas well. One large plant and 13 smaller plants were found in 2005. Hundreds of plants were removed from the locations in Figure 12 in 2003 & 2004. **Extreme caution is necessary when working in this area as in places the bottom has over 60 cm of soft mud.** Using a canoe along with a 14-foot tide allows reasonable access to this area.

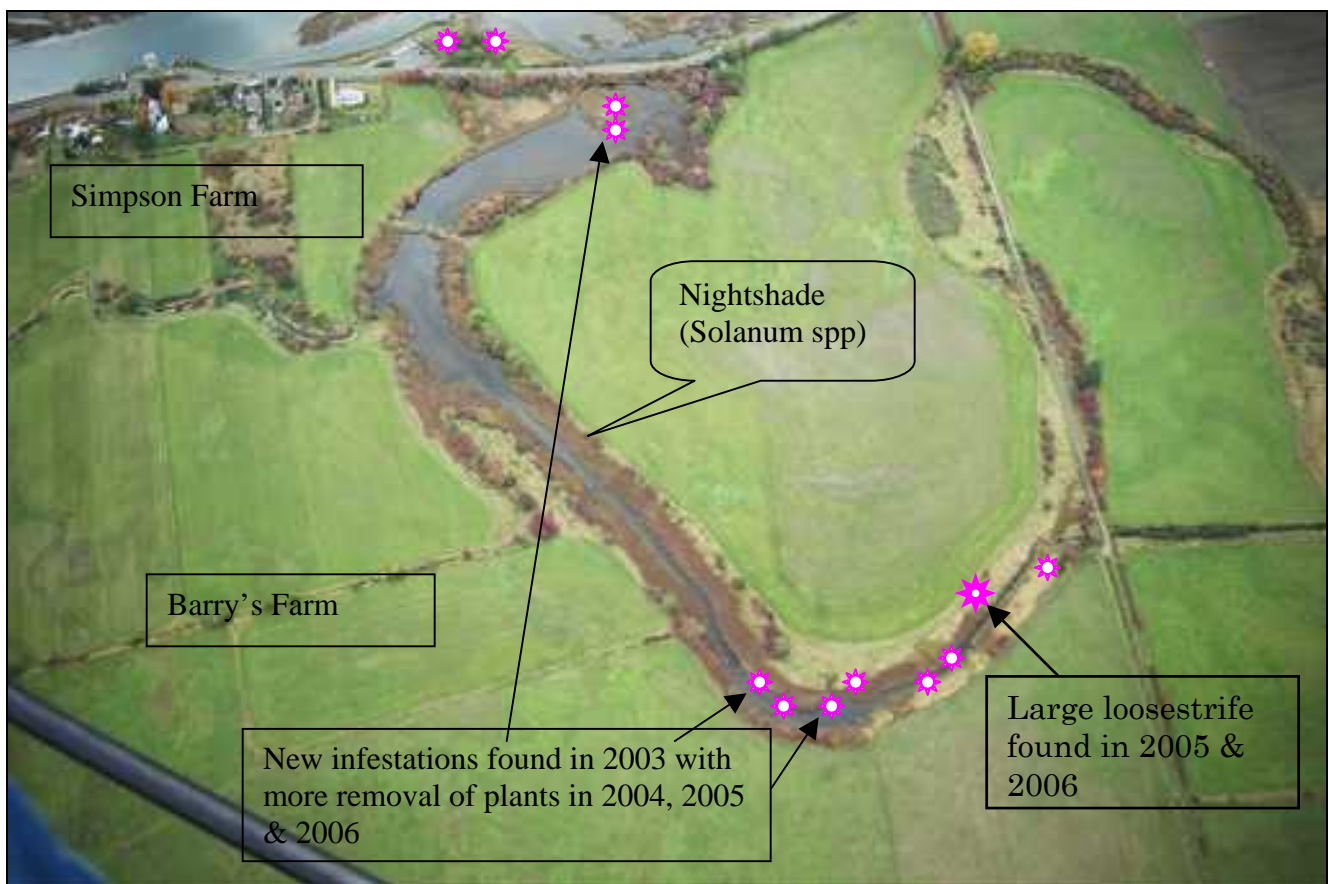


Figure 14, Area 2. Slough through Simpson & Barry Farms

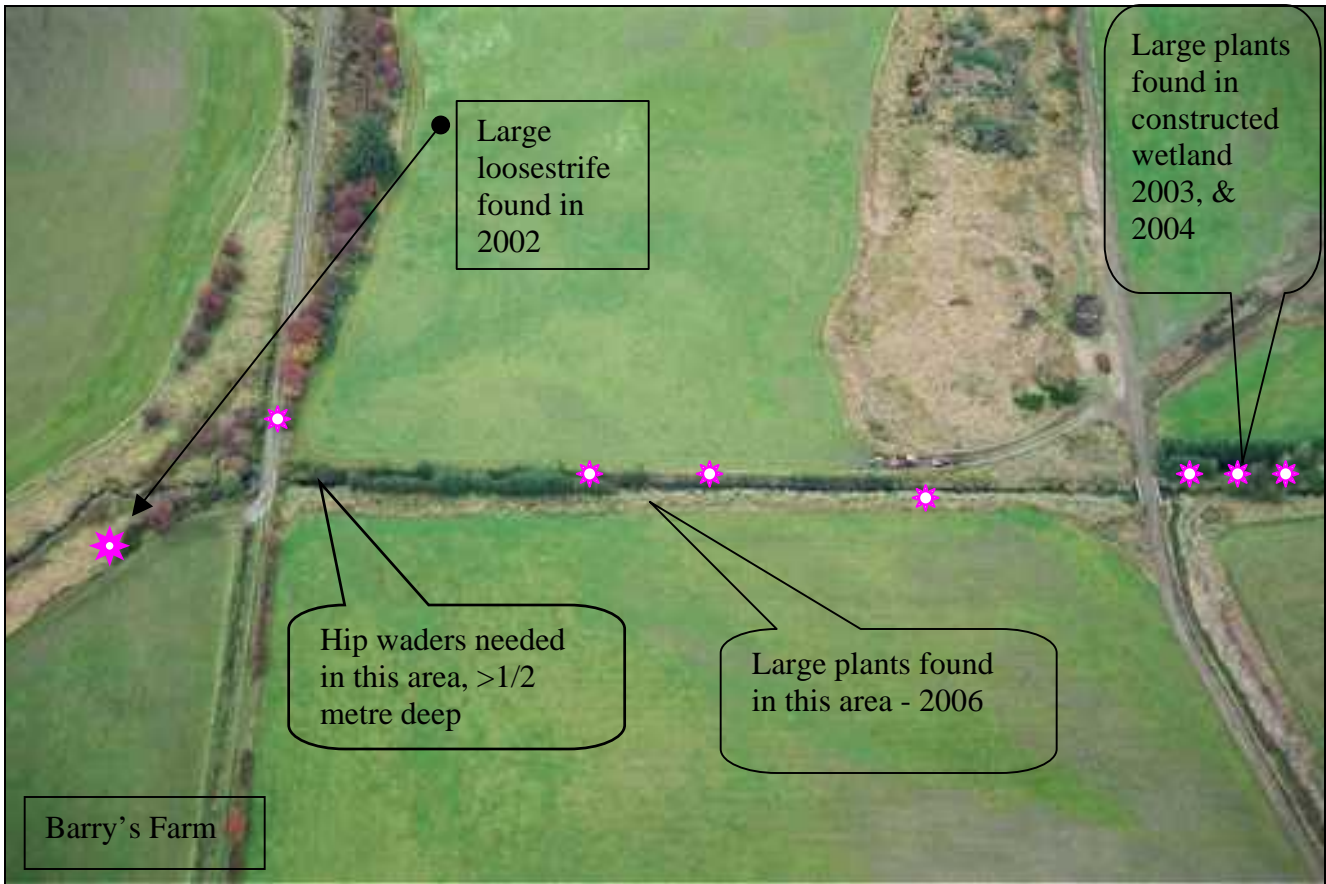


Figure 15, Area 2. Slough and Barry's Farm ditch line

Area 3 – Airpark Walkway

This is a large area extending from the freshwater marina to 31st Street. There are scattered patches of loosestrife and knotweed from one end to the other. Himalayan blackberries are a major concern along the length of the walkway.

- 3.3 days removing purple loosestrife, 0.7 days in 2005, 3.5 in 2004, 3.3 in 2003, 3.1 days 2002, 1 day 2001, 4 days 1999
- Blackberries and broom removed by mini excavator in winter of 2005
- 656 plantings of native species around airpark and 21st Street on the east side of the Courtenay River
- Weeding of blackberries and broom and maintenance of plantings from 2003. Forty-five flats of native grass species planted in 2005 and spring 2006.
- Knotweed patches growing larger despite efforts to control via cutting stems and landfilling
- 80 loosestrife plants removed in 2006, 11 plants 2005



Figure 16, Area 3. Airpark Walkway

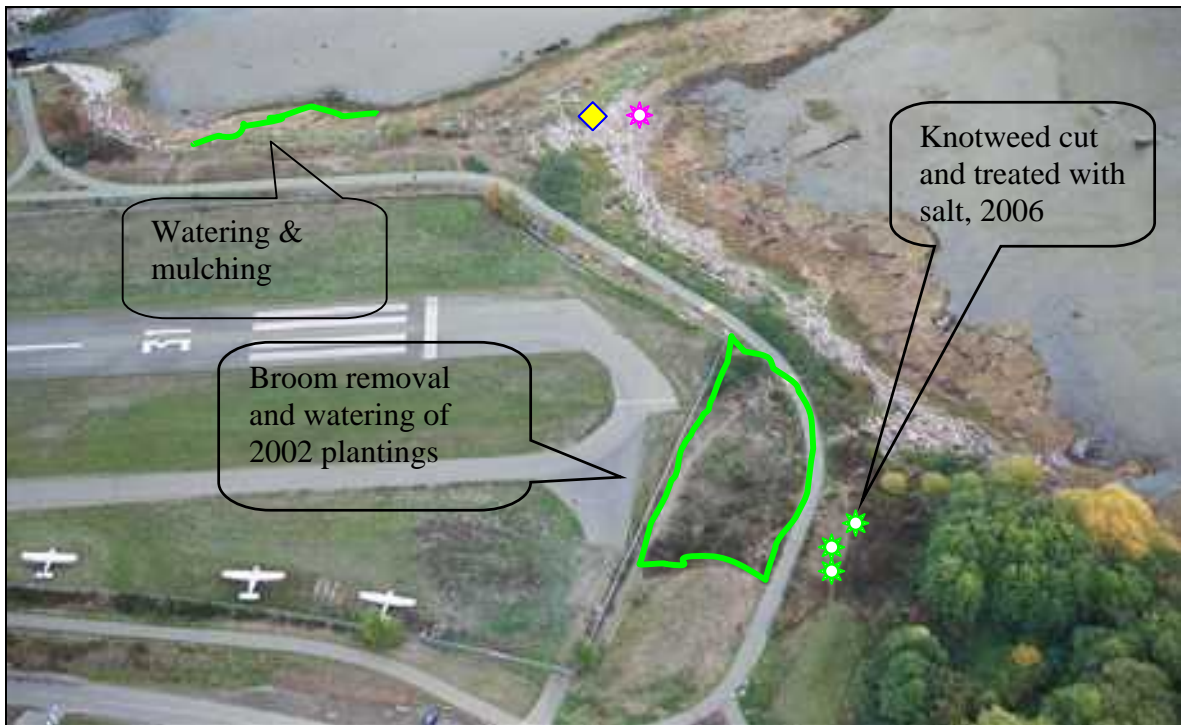


Figure 17, Area 3. Airpark Walkway

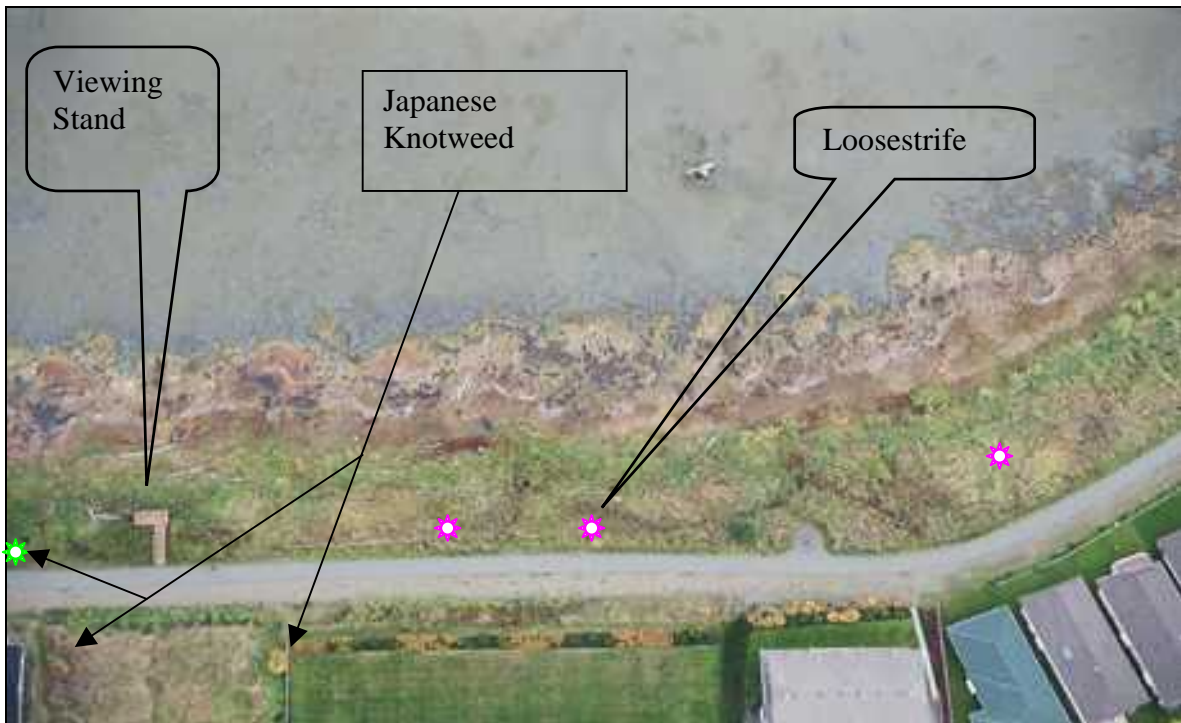


Figure 18, Area 3. Airpark Walkway

Knotweed indicated in Figure 18 is growing amongst Nootka rose. This makes it very difficult to remove without destroying a significant amount of Nootka rose. Further work will be needed to get at all the knotweed roots. It may be necessary to remove some Nootka rose in this area and replant it after knotweed is removed.



Figure 19, Area 3. Airpark Walkway

Area 4 – Courtenay River from Lewis Park to Airpark Marina

This area was searched on two different occasions using the boat and outboard motor. Purple loosestrife plants were found along the entire section of the river with no plants found in the Federal Government

freshwater marina. Purple loosestrife was found in the constructed wetland at Simms Park in 2003 but not in 2004 or 2005.

- 1.6 days removing purple loosestrife in 2006, 4.7 days 2005, 2.6 days 2004, 7.9 days 2003, 3.5 days – 2002, 5 days – 2001, and 2 days in 1999
- 8 plants in 2006, 31 plants in 2005



Figure 20, Area 4. Courtenay River from Airpark to Courtenay Slough



Figure 21, Area 4. Courtenay River from Standard to Lewis Parks

Area 5– Courtenay River north of Lewis Park including Tsolum River and Old Tsolum River channel and wetlands.

The old Tsolum River Back channel was dramatically altered in 1981 when the Tsolum River changed course and cut this channel off from its flow. As such this channels flow is now mainly tidal with rapid infilling via silt deposition and is an area under constant change. The yearly infilling with silt makes the channel ideal habitat for the colonization by invasive species. In addition to purple loosestrife an annual plant of the impatiens family (*Impatiens glandulifera*) has become well established in a large part of the grass habitat. Impatiens is also spreading downstream along the Courtenay River. Efforts at removal began in the 2006 season.

- 6.1 days removing purple loosestrife in 2006, 16.5 days in 2004, 12.8 days in 2003, 14 days 2002, 28 days 2001, 14 days 1999
- 931 purple loosestrife plants removed in 2006, 804 in 2005
- 83,950 Himalayan Balsam (*Impatiens glandulifera*) removed from this area in 2006. Indicated by purple line.

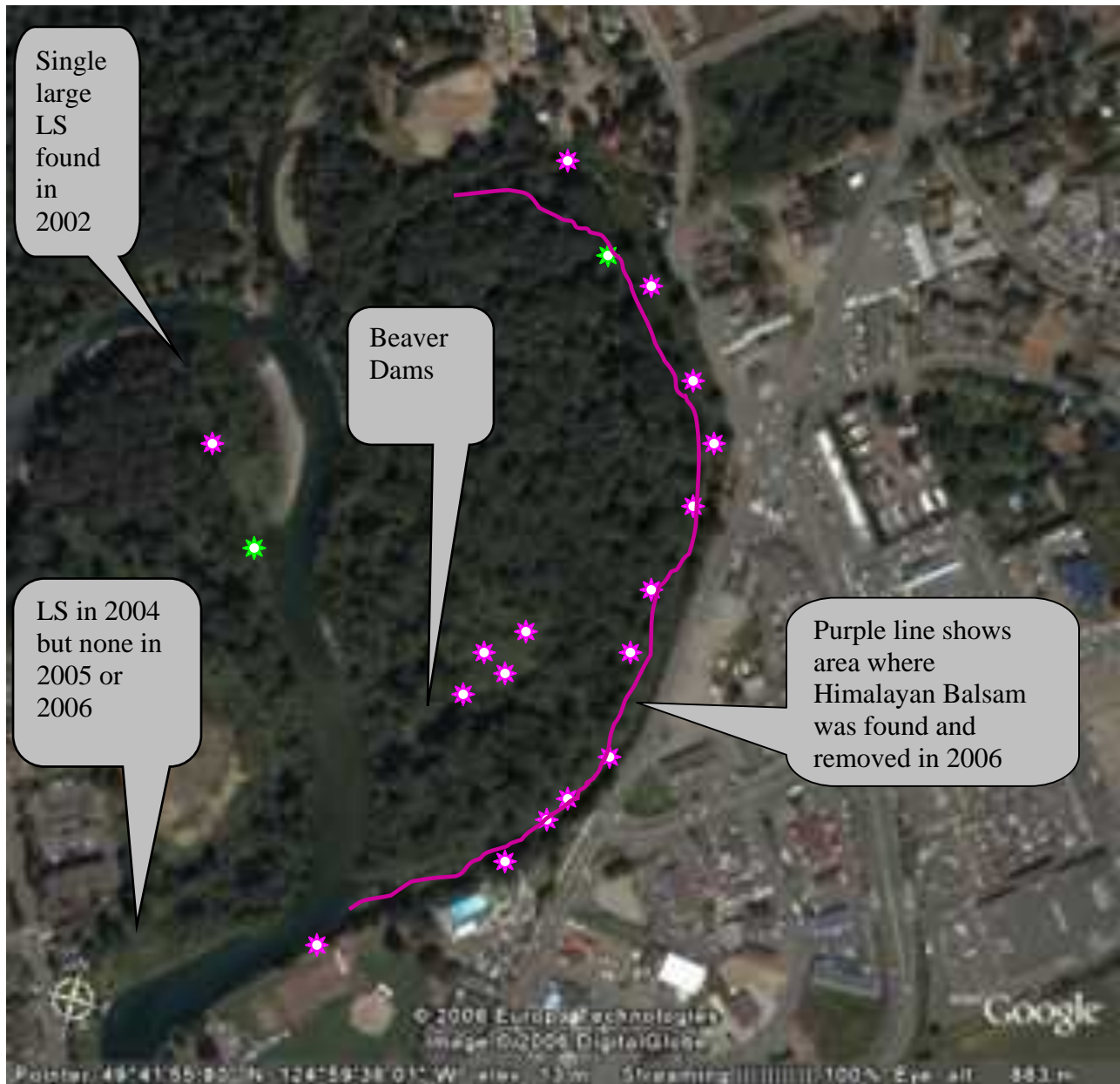


Figure 22, Area 5. Old Tsolum River Channel and Courtenay River

- The Knotweed shown in Figure 18 is growing in riprap making it difficult to remove without major expense or by using chemical herbicides.
- Giant and Japanese Knotweed can be observed growing side by side in Figure 18.



Figure 23, Area 5. Courtenay River and Old Tsolum River Channel



Figure 24, Area 5. Tsolum River showing location of Knotweed species.

Area 6 – Estuary on East side of Comox Road and south of Sawmill

Area 6 is the last remnant stand of significantly treed, wild habitat that remains of the Courtenay River estuary. This area is vital to the preservation of a healthy stock of native plant species and thus the ecological diversity of the area.

- 16.7 days removing purple loosestrife in 2006, 20.2 days 2005, 19.9 days 2004, 19.5 days 2003, 15.8 days 2002, 22.2 days 2001 and 64 days in 1999
- 4352 plants removed in 2006, 1354 in 2005



Figure 25, Area 6. Courtenay River Estuary Purple Loosestrife

Figure 25 shows the location of purple loosestrife removed in 2003, through 2006. The marks indicate the approximate areas where loosestrife is most prevalent. These areas are generally the same year to year but the entire area should be checked annually.

Area 7 – Glen Urquhart Creek Watershed

➤ 1.5 days, 110 plants, 2006

A large loosestrife plant was found at the upstream side of the intersection of Glen Urquhart Creek and Thorpe Drive in east Courtenay in 2004. This loosestrife plant top was removed in 2005 & 2006 and will need to be removed again in 2007. The discovery of this plant in 2004 emphasizes the importance of covering previously infested areas with diligence on a yearly basis.



Figure 26, Area 7. Glen Urquhart Creek Watershed

Area 8, Stapley Road Wetland

- 1.8 days, 110 plants, 2006

This area is private property with a pond that drains into nearby ditches. Potential to spread seeds downstream to nearby Courtenay River. Thorough check of nearby ditches in 2004 revealed no purple loosestrife. Another check should be scheduled in 2007.

Figure 27, Area 8, Stapley Road Wetland



Courtenay River Estuary, Yellow Flag Iris Removal

This was the fifth year that yellow flag iris (*Iris pseudacorus*) and knotweed species were targeted for removal. Yellow flag iris was removed throughout Figure 28 area in 2006. Seedlings continue to sprout from the seedbank and are removed when encountered. Older plant flower after two-three years and are then easily spotted. Approximately 670 kgs of yellow flag iris was removed in 2006.

- ◆ Yellow flag iris removed 2002 - 2006
- ☀ Knotweed species initial removal 2002, follow-ups in 2003, 2004, 2005 & 2006
- ☀ Knotweed infestations
- ☀ Knotweed Removed in 2006, root had drifted in and began growing



Figure 28, Area 6. Courtenay River Estuary Yellow Flag Iris & Knotweed Species

APPENDIX 2.

Location of Himalayan Blackberry Dominance

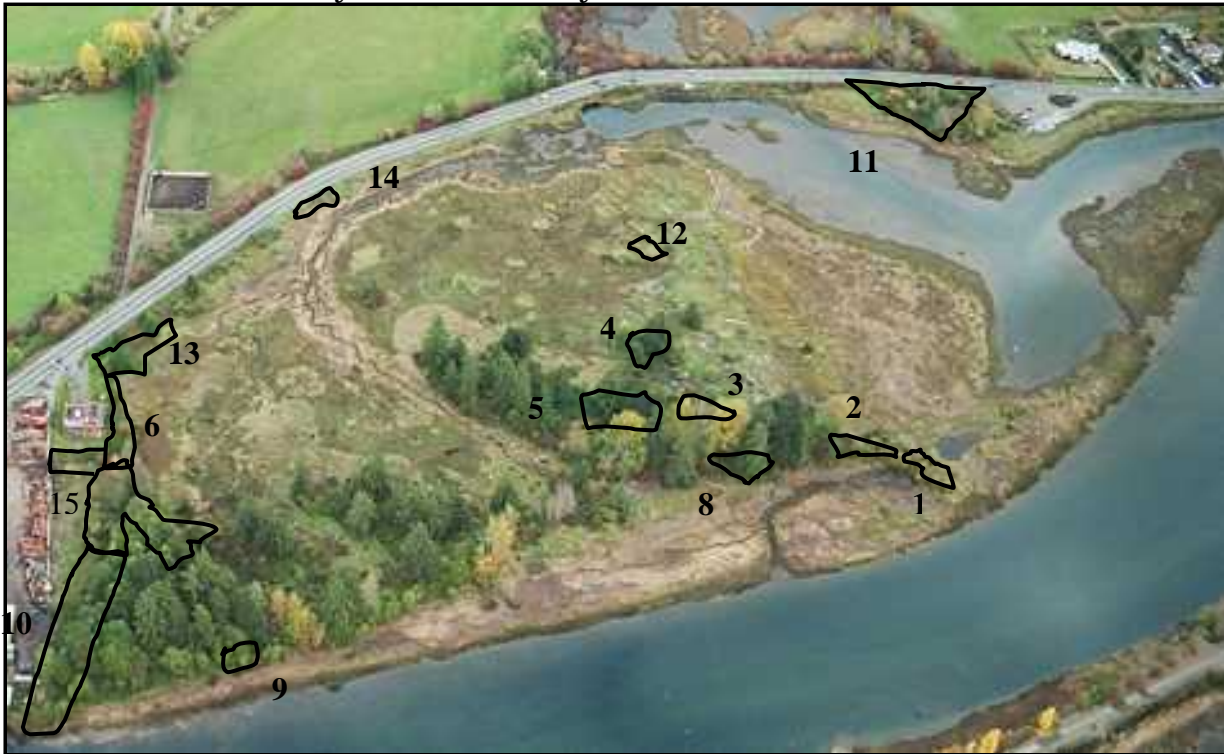


Figure 29, Courtenay River Estuary, Himalayan Blackberry Dominance

Area #	Square metres	Percent coverage	Percent removed	m ² removed
1	61	50.00%	100%	61
2	98	50.00%	100%	98
3	299	70.00%	100%	299
4	266	80.00%	0%	0
5	843	60.00%	100%	843
6	484	95.00%	100%	484
7	763	75.00%	95%	725
8	256	100.00%	100%	256
9	89	60.00%	50%	45
10	935	50.00%	100%	935
11	2308	60.00%	20%	462
12	60	75.00%	100%	60
13	291	60.00%	50%	146
14	403	50.00%	0%	0
15	301	75.00%	100%	301
Total Blackberries 2002	7,457			4713
Removed 2003	1,299		Square Metres	% BB
Removed 2004	3,243	Estuary Area	159,000	5%
Removed 2005	172	2002 Upland Area	33,142	22.5%
Remaining	2,743	2006 Upland Area	33,142	8.3%

Table 5. 2003-05 Blackberry Species Measurements and Removal

APPENDIX 3.**Himalayan Balsam removal Efforts, Courtenay River and Tsolum Slough**

2006 Himalayan Balsam Removal Data			
Date	Location	# Removed by Hand	Hours
7-Jun-06	Tsolum	10500	10.5
9-Jun-06	Tsolum	9000	9
13-Jun-06	Tsolum	16000	16
22-Jun-06	Tsolum	14500	14.5
28-Jun-06	Tsolum	8400	14.5
13-Jul-06	Tsolum	7200	8
20-Jul-06	Tsolum	8500	4
31-Jul-06	Courtenay River	1000	2
3-Aug-06	Courtenay River	400	0.5
13-Aug-06	Tsolum	6200	6
14-Aug-06	Tsolum	4250	4.5
15-Aug-06	Tsolum	2000	2
24-Aug-06	Tsolum	1800	1.5
28-Aug-06	Slough	50	1
6-Sep-06	Slough	50	1
Subtotal		89850	95
Date	Location	# Machete Cut	
1-Sep-06	Tsolum	2370	2.5
7-Sep-06	Tsolum	6890	9.5
Subtotal		9260	12
Total All Control Methods		99110	107

APPENDIX 4.**Native Trees, Shrubs & Forbs Planted, Courtenay Estuary 2006**

Qty	Size	Description
6	1 gal	Amelanchier alnifolia - Saskatoon Berry
6	1 gal	Arbutus menziesii - Arbutus
72	10cm	Arctostaphylos uva-ursi - Kinnikinnick
24	1 gal	Cornus stolonifera - Red Osier Dogwood
22	2 gal	Corylus cornuta - Beaked Hazelnut
48	1 gal	Crataegus douglasii - Black Hawthorn
11.5	Flats	Garry Oak Grass Spp
20	Flats	Other West Coast Native Grass Plants
24	1 gal	Holodiscus discolor - Ocean Spray Creambush
18	10 cm	Lathyrus japonicus - Beach Pea
24	1 gal	Lonicera involucrata - Black Twinberry
6	1 gal	Mahonia aquifolium - Tall Oregon Grape
24	1 gal	Malus fusca - Pacific Crabapple
6	1 gal	Myrica Gale - Sweet Gale
6	2 gal	Oemleria cerasiformis - Indian Plum
6	1 gal	Philadelphus lewisii - Mock Orange
24	1 gal	Physocarpus capitatus - Ninebark
14	2 gal	Quercus garryana - Garry Oak
12	1 gal	Rhamnus purshiana - Cascara
8	1 gal	Ribes sanguineum - Red Flowering Currant
24	1 gal	Rosa gymnocarpa - Baldhip Rose
48	1 gal	Rosa nutkana - Nootka Rose
12	2 gal	Rosa pisocarpa - Clustered Wild Rose
48	1 gal	Rubus parviflorus - Thimbleberry
48	1 gal	Rubus spectabilis - Salmon Berry
12	1 gal	Salix sitchensis - Sitka Willow
12	1 gal	Salix lucida - Pacific Willow
12	1 gal	Sambucus racemosa - Blue Elderberry
24	1 gal	Sambucus racemosa - Red Elderberry
12	1 gal	Spirea douglasii - Hardhack
6	1 gal	Symphoricarpos albus - Snowberry
4	1 gal	Symphoricarpos mollis - Trailing Snowberry
6	1 gal	California Waxmyrtle - Myrica californica
649.5		Subtotal for Plant Species
96	Yards	#1 Approved compost soil

**List of Native Grass Plantings, Courtenay Airpark and 21st Street
Native Grass Species Planted, Courtenay Estuary, Spring 2006**

Common Name	Latin Name	# FLATS	Pojar Ecology	Pojar Page	Comments or Notes from Many Vaartanou	Location Planted UTM	WP#
Roemer's Fescue	<i>Festuca idahoensis</i> var <i>roemeri</i>	7	Low to mid elevations. Similar but drier than: Meadows, open forest and edges, rocky slopes and clearings. GO	375	One free unique variant with purple stems when in seed (July), marked and to be kept separate	0357341 5504877	G001
Lemmon's Needlegrass	<i>Stipa lemmonii</i>	1.5	In Illustrated Flora of BC Habitat is on dry sandy slopes and grasslands in the steppe and montane zones. GO	50		0357344 5504877	G007
California Oat Grass	<i>Danthonia californica</i>	3	Sandy and rocky ridges and lakeshores and in grassland and meadows from low to mid elevations. Common in Southern half of region. GO	383		0357341 5504863 0357371 5504873	G002 G010
Alaska Brome	<i>Bromus sitchensis</i>	2	Moist to dry meadows, stream-banks, sea beaches, bluffs, talus slopes and slide tracks, also open forest. Common from lowlands to subalpine elevations.	373		0357086 5505059	G018
Blue Wildrye	<i>Elymus glaucus</i>	4	Open forests (conifer and decid). In dry to moist opening, rocky slopes and clearings, common at low to mid elevations.	363		0357351 5504872 0357313 5504927	G005 G014

Common Name	Latin Name	# FLATS	Pojar Ecology	Pojar Page	Comments or Notes from Many Vaartanou	Location Planted UTM	WP#
Tufted Hairgrass	<i>Deschampsia cespitosa</i>		Tidal marshes, beaches, meadows, gravely river bars, rocky ridges, lakeshores, rocky areas in bogs. Common from sea level to alpine.	384			
Slimstem Reedgrass	<i>Calamagrostis stricta</i>	2	Grows in wetlands, wet meadows, dune slacks and on shores and stream banks, but it is only scattered in our region. GO	365		0357312 5504927	G013
Nootka Reedgrass	<i>Calamagrostis nutkaensis</i>	3	Exposed coastal headlands, cliffs, beaches, slide tracks, muskeg and clearing. Often dominant ground cover in Sitka spruce forest on old beach ridges, also in open forest, from lowland cedar/hemlock stands to subalpine hemlock. Occurs usually within 30km of tidewater and most abundantly in habitats exposed to wind and sea spray.	365		0357347 5504857 0357312 5504928	G003 G015
Spike Bentgrass	<i>Agrostis exarata</i>	2	Common at upper levels of tidal marshes and rocky beaches, wet meadows, river bars, clearings, moist and open ground from sea level to mid elevations.	366	Creeps and is a pure beach species. Looked quite dead when dug	0357320 5504921	G011
Red Fescue	<i>Festuca rubra sp arenicola</i>	4	Tidal marshes, beaches, stream-banks, mountain meadows, river flats, clearings, roadsides, fields. Common from sea level to high elevations.	376	East Coast of VI variety larger than West coast, not as showy. Needle like with red highlights.	0357345 5504876	G006
Slender Wheatgrass	<i>Elymus trachycaulus</i>	2	Occurs in drier habitats (meadows, gravel bars, rocky slopes, open forest) and drier climates (strait of Georgia – Puget sound)	362	Only known location on VI is Arbutus Bay btwn Qualicum and Parksville?	0357313 5504928	G012

Common Name	Latin Name	# FLATS	Pojar Ecology	Pojar Page	Comments or Notes from Many Vaartnou	Location Planted UTM	WP#
Slender Hairgrass	<i>Deschampsia elongata</i>	1 (30 small plants)	Frequently found from low to high elevations, in moist clearings, meadows and open forest and along streams and lakes, often in disturbed sites near inhabited areas. GO	384	Short lived (3 years) but a prolific seed producer. Earliest to be seen	0357349 5504871	G004
Grass Species Purchased from Mr Vaartnou, 2005							
Tufted Hairgrass	<i>Deschampsia cespitosa</i>	8	Tidal marshes, beaches, meadows, gravely river bars, rocky ridges, lakeshores, rocky areas in bogs. Common from sea level to alpine.	384		0357339 5504906 0357334 5504906	G016 G017
Dune Grass	<i>Elymus mollis</i>	4	Coastal dunes, sand and gravel beaches, edges of shoreline forests: strictly maritime: often the dominant cover on offshore, treeless sea-bird islands	364		0357349 5504871 0357373 5504874	G008 G009
Red Fescue	<i>Festuca rubra</i> sp <i>pruinosa</i>	2	Tidal marshes, beaches, stream-banks, mountain meadows, river flats, clearings, roadsides, fields. Common from sea level to high elevations.	376	West Coast of VI, later than east coast variety, showier and slightly smaller than east coast. Needle like with red highlights		

Number of Flats 45.5* **GO** – native to Garry Oak Ecosystem.** Common name in **Bold** indicates that it is native or recommended for planting.Native Grasses Identified in Courtenay River Estuary 2003

- Tufted hairgrass (*Deschampsia cespitosa* ssp. *beringensis*)
- Meadow barley (*Hordeum brachyantherum*)



Green Heron, Simms Millennium Park

Front Cover Photos, Clockwise from top left-hand corner.

1. Japanese Knotweed Removal using mini-excavator
2. Giant, Japanese & Himalayan Knotweed
3. Large Purple Loosestrife Plant Removed in 2006
4. Crew Member removing Himalayan Balsam along Courtenay River Residence
5. Crew working the Courtenay River for Purple Loosestrife
6. Centre Photo, Crew in Boat and on the banks of Courtenay River at Lewis Park, Purple Loosestrife Removal.