

COMOX VALLEY NATURALISTS SOCIETY WETLAND RESTORATION PROJECT REPORT 2008

Produced by
SELLENTIN'S HABITAT RESTORATION & INVASIVE SPECIES CONSULTING LTD.



Photo Credit Alison Millham

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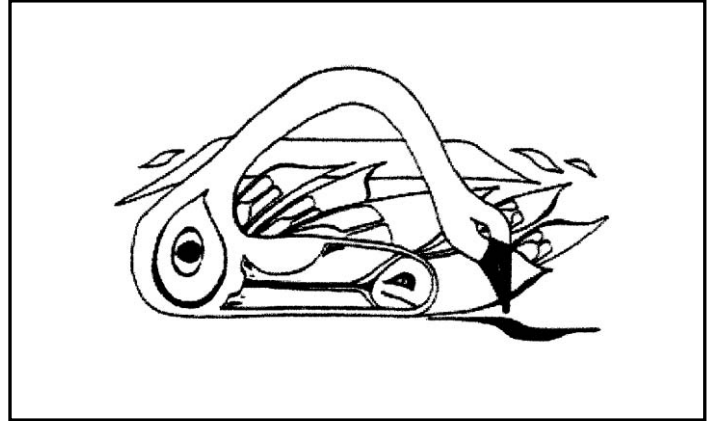
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EXECUTIVE SUMMARY

The Comox Valley Naturalists Society (CVNS) began removing the invasive alien plant purple loosestrife (*Lythrum salicaria*) from the Courtenay River estuary in 1991. Over the past 18 years their efforts have evolved into a holistic invasive plant management program that cares for 82 hectares of riverine/estuary/wetland habitat and 2 hectares of Garry Oak ecosystem. What started as a volunteer only project now sees a paid contractor with a part time crew of 3-5 employees working through the summer and early fall. While the project has evolved from a single to multiple species effort, invasive plant (IP) removal and prompt revegetation with the appropriate native species continues to be the central focus. Further, all work revolves around the timing and resources needed to eradicate purple loosestrife.

An annual report has been produced and distributed to funding agencies and CVNS members and interested parties since 2001. The report has been crucial in documenting activities and eliciting funds for the project.

In the 2004/2005 years the CVNS received additional funds from the Ministry of Transportation and the Inter-Ministry Invasive Plant Committee to conduct invasive plant inventories to Ministry of Forests and Range (MFR) protocols on northern Vancouver Island and nearby islands. More specifically, towns, cities, municipalities and areas which fell out of the jurisdiction were inventoried for IP's. These efforts have resulted in the north half of Vancouver Island having a near complete inventory of invasive plants.

Since counting of plants removed by this project began, purple loosestrife numbers have declined from a high of 24,520 in 1999 to 1204 in 2008. Over the 2002 to 2008 field seasons, 28,100kg of sawmill debris, 13,336kgs of yellow flag iris and 2,165kg of Japanese knotweed and 112,176 Himalayan balsam plants were removed from the Courtenay River estuary. The extent of Himalayan blackberry dominance in the CVNS managed areas has been mapped at 3.9 hectares with 3.3 hectares removed between 2003 & 2008

In 2008, crews continues to tackle purple loosestrife, yellow flag iris, Himalayan blackberry, knapweed and knotweed species, Himalayan balsam, giant hogweed as well as new ones such as *Spartina* species. A late season funding influx saw crews work through October focusing on Himalayan Blackberry removal in the Courtney Airpark and estuary. All IP information the CVNS collects is to MFR Invasive Alien Plant Program (IAPP) standards. All data has been entered into IAPP and is updated yearly.

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 wetlands, riverine and estuarine habitats in conjunction with replanting appropriate native species. Additionally, the crew has undertaken on a few occasions the removal of newly reported small infestation of invasive plants as a precautionary measure to prevent further spread. The removal data is entered in MFR IAPP and is key to understanding invasive plant populations, movement and planning future activities.

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 characterize 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 attempt to preservation of the remaining wetlands in the Comox Valley.

The Comox-Strathcona Regional District and the Comox Valley Regional District (CVRD) 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. As these noxious weeds must be disposed of in a landfill and cannot be composted, the CVRD has waived the tipping fees for this project. The CVRD 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*

1.0 BC COAST INVASIVE PLANT SUMMARY

The Comox Valley Naturalists Society (CVNS) has been collecting Invasive Alien Plant data since 2004. This data has been entered into the Ministry of Forest and Range (MFR) Invasive Alien Plant Program Application and thus contributes to regional as well as provincial understanding of invasive plant impacts and distribution. The italicized paragraph below is taken directly from the web page and describes the functions of the application/database.

“The Invasive Alien Plant Program (IAPP) Application is the database for invasive plant data in BC. It is intended to co-ordinate/share information generated by various agencies and non-government organizations involved in invasive plant management. The application has been developed to allow the entry, edit and query of invasive plant information including: site details; invasive plant inventory information; planning; treatment methods and data; and, monitoring data.”

<http://www.for.gov.bc.ca/hra/Plants/application.htm>

This divides the province into 3 separate areas. The Coast Zone includes Vancouver Island the Queen Charlotte Islands and the mainland coast to the boundary with Alaska. The two remaining zones are the southern interior and the northern interior. There are 32,000 invasive plant entries in IAPP for the Coast Zone of which 7559 or nearly ¼ are from the Comox Strathcona Regional District.

Table 1.0 below shows a summary of data taken from IAPP. The table should be interpreted as follows using Scotch Broom as an example – Scotch Broom is known to occur in the Coast Forest Region at 5533 sites and covers 1517 hectares. Scotch Broom makes up 17.3% of known invasive plant occurrences.

The knotweed, hawkweed, knapweed and sowthistle species data has been combined into respective complexes to give a better understanding of overall impact.

Table 1.0 - Coast Zone Top 15 Invasive Plant Species in Order of Occurrence

Coast Zone Top 15 IAPP Entries with no treatments, November 2008			
Species	Occurrence	Hectares	% Occurrence
Scotch Broom	5533	1517	17.3
Canada thistle	3344	901	10.5
Bull thistle	3338	1117	10.4
Oxeye daisy	3225	1101	10.1
Himalayan blackberry	2977	479	9.3
St. John's wort	2431	629	7.6
Common tansy	1927	490	6.0
Knotweed Complex*	1173	75	3.7
Curled dock	1092	112	3.4
Hawkweed*	959	62	3.0
Tansy ragwort	942	105	2.9
Hairy cat's-ear	440	45	1.4
Knapweed Complex*	426	104	1.3
Sowthistle Complex*	422	604	1.3
Common burdock	343	239	1.1
Totals	28572	7581	89.3
* combined to indicate overall species impact.	28572 of 32000 sites	7581 of 8433 hectares	89.3% of all occurrences

2.0 COMOX STRATHCONA REGIONAL DISTRICT SUMMARY

Introduction

Section 2.0 highlights invasive alien plant concerns for the former Comox Strathcona Regional District. Data was taken from the IAPP in September of 2008. At that time data was not subdivided into the Comox Valley Regional District and the Strathcona Regional District.

Background

Due to the efforts of the Comox Valley Naturalists, the former Comox Strathcona Regional District (CSRD) has the highest level of invasive plant inventory and control of any area on Vancouver Island and the mainland coast. Invasive plant inventories were conducted in all the cities, towns and communities from Courtenay north to Port Hardy and west to Gold River and Tahsis. In conjunction with inventories on crown lands, private forest company inventories and the CVNS efforts, the northern half of Vancouver Island has a near complete inventory of invasive plants with which to plan control efforts. What is missing from these efforts is a comprehensive inventory of Hydro, pipeline and rail corridors.

Discussion

The key to effective invasive plant control is treating a species early on before it has a chance to become well established and multiply exponentially. Figure 2.1 shows the stages of invasion in a chart format. This is graphic depicts the stages of invasion:

First is the **Introduction** of a given plant into its new environment. After a short while, the number of plants expands into an **Explosion** phase, but note, so do the costs of control. Unfortunately, it is typically only by the **Establishment** phase when public awareness is raised to a point that political funds become available to “remedy a problem”. This is a fallacy however. Costs of control by this stage have mushroomed to a prohibitive level. Scotch broom on Vancouver Island is a good case in point. It’s virtually everywhere and people want something done about it. It’s not going away anytime soon!

The new focus on environmental issues will hopefully translate into **consistent funding** for weed managers to concentrate on the lower part of this curve.

Figure 2.0 Stages of Invasion

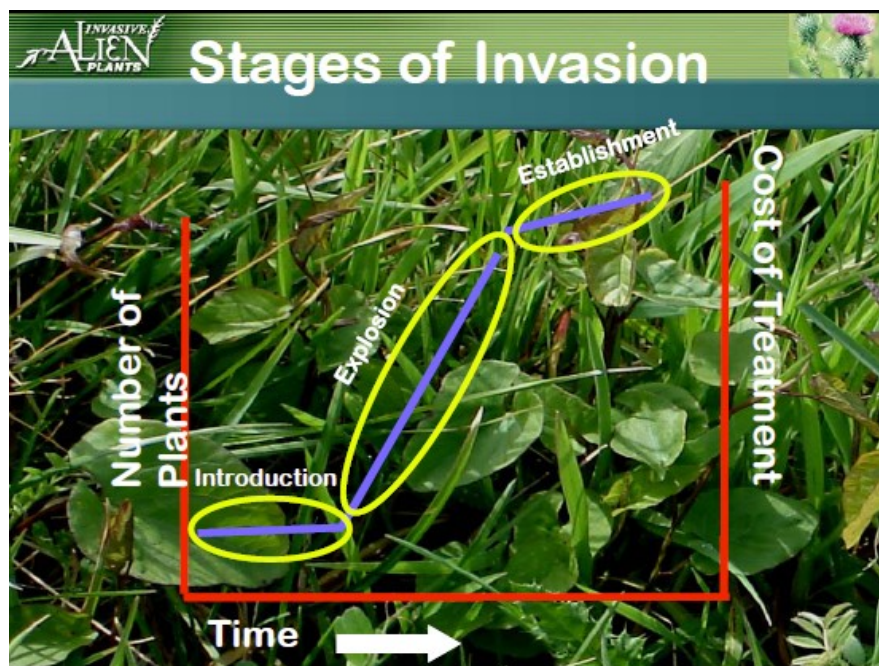


Table 2.0 shows the top 27 species that have been entered in the IAPP database as of September 2008. There were 7559 invasive plant occurrences covering 2041 hectares of land. This data gives a general

idea of what can be found on the landscape and to what degree a species has spread. This data does not indicate to what potential level a species may spread or its impacts upon ecosystems.

From table 2.0 it could be surmised that Scotch broom is at the establishment phase while knotweeds are in the explosion phase with the knapweeds not far behind.

Table 2.0 - Top 27 Invasive Alien Plant Species, Comox Strathcona Regional District

Comox Strathcona Regional District Invasive Alien Plants - Sept 2008				
Species and 7 letter latin code	Occurrence	% Occurrence	Hectares	% Hectares
Scotch Broom (CYTI SCO)	1710	22.6%	427.28	20.4%
Canada thistle (CIRS ARV)	766	10.1%	229.91	11.0%
Himalayan blackberry (RUBI DIS)	699	9.2%	134.61	6.4%
Bull thistle (CIRS VUL)	682	9.0%	247.11	11.8%
Oxeye daisy (LEUC VUL)	652	8.6%	240.58	11.5%
St. John's Wort Goatweed (HYPE PER)	590	7.8%	212.75	10.2%
Common tansy (TANA VUL)	574	7.6%	84.32	4.0%
Knotweed Complex*	301	4.0%	16.24	0.8%
Curled dock (RUME CRI)	285	3.8%	8.19	0.4%
Field bindweed (CONV ARV)	161	2.1%	20.51	1.0%
Sheep sorrel (RUME ACE)	148	2.0%	4.18	0.2%
Hawkweed Complex*	77	1.0%	26.87	1.3%
Annual sow thistle (SONC OLE)	71	0.9%	116.64	5.6%
English ivy (HEDE HEL)	70	0.9%	8.34	0.4%
Hairy cat's-ear (HYPO RAD)	63	0.8%	7.55	0.4%
Groundsel (SENE VUL)	50	0.7%	5.12	0.2%
Knapweed Complex*	48	0.6%	4.67	0.2%
Burdock species (ARCT SPP)	43	0.6%	4.56	0.2%
Perennial sow thistle (SONC ARV)	42	0.6%	99.52	4.7%
Lady's-thumb (POLY PER)	40	0.5%	12.30	0.6%
Chicory (CICH INT)	38	0.5%	1.32	0.1%
Common burdock (ARCT MIN)	33	0.4%	35.36	1.7%
Creeping buttercup (RANU REP)	33	0.4%	11.25	0.5%
Giant hogweed (HERA MAN)*	32	0.4%	7.38	0.4%
Lamb's quarters (CHEN ALB)	25	0.3%	3.83	0.2%
Purple loosestrife (LYTH SAL)	24	0.3%	32.46	1.5%
Yellow iris (IRIS PSE)	23	0.3%	37.72	1.8%
Totals	7280 of 7559 occurrences	96% of all occurrences	2041 of 2096 hectares	97% of all hectares

Invasive Plants Spreading in the Comox Valley Regional District

1. Expect to see an increase in **knapweed species** in the CVRD to the hundreds of hectares in a few short years.
2. Expect to see a **knotweed species** on a stream in your neighbourhood and a doubling of the hectares covered within 5 years.
3. With only 32 known sites of **giant hogweed** within the regional district and considering the human health implications with this plant it should be a high priority for removal.

Recommendations

There is a real need within the Comox Valley Regional District for an agency to formulate and run an invasive plant management program and pool resources for the betterment of the area. Invasive plants know no boundaries and removal on only one side of the fence will result in overall failure.

Knotweeds, Knapweeds and Giant Hogweed are on the verge of the explosion phase and without a coordinated effort they will undoubtedly impact valued ecosystems and cause human health problems.

3.0 COMOX VALLEY NATURALISTS SOCIETY - WETLAND RESTORATION PROJECT

Background

Since 1991 and for the past eighteen years the Comox Valley Naturalists Society (CVNS) has spearheaded the removal of purple loosestrife from the wetlands of the Comox Valley. Purple loosestrife is an invasive alien species that out-competes native species while drying up and changing wetland ecology. Fieldwork by CVNS members, volunteers and contractors lead to the realization that there are other serious invasive plant (IP) species and complex issues threatening the ecology and biodiversity of our local wetlands.

By 2002 the CVNS had moved to a holistic approach of riverine/estuary/wetland management of 82 hectares that includes manual removal of other invasives, planting of native species, and working with the local sawmill to solve bark debris problems in the Courtenay River estuary. The eleven plant communities of the estuary were mapped in 2003 along with identification of over 170 species of vascular plants. Purple loosestrife numbers have declined from a high of 24,520 in 1999 to 1758 in 2007. Over the 2002 - 2008 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 in the CVNS managed areas has been mapped at 3.9 hectares with 3.3 hectares removed between 2003 & 2007.

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 (MFR) with the CVNS crew covering areas not under MFR 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.

The CVNS “Purple Loosestrife Project” of the 1990’s had morphed into the “Habitat Restoration Program” by 2004. The CVNS in essence was running an invasive weed management program for the Comox-Strathcona Regional District of (CSRD). Through the CVNS efforts the CSRD is in the unusual position of being the only area on Vancouver Island to have a current IP inventory across all jurisdictions. As the only recognized weed management program operating on Vancouver Island, the CVNS IP crew are often called upon to answer weed identification and management options and conduct spot outlier removals.

In 2008 crews continues to tackle purple loosestrife, yellow flag iris, Himalayan blackberry, knapweed and knotweed species, Himalayan balsam and giant hogweed. All IP information the CVNS collects is to Ministry of Forests and Range, Invasive Alien Plant Program (IAPP) standards. All data has been entered into IAPP and is updated yearly.

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 eighteenth year that the Comox Valley Naturalists Society has been waging war on purple loosestrife. All control efforts are by manual means; this has meant physically digging, bagging and removing all plants and plant parts found. As most infested areas are tidal or deep water (1+ metres), access is often gained by boat or with waders. Although native species have returned in greater numbers, other invasive plants have tried to colonize the disturbed areas.

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

Figure 3.1 Purple Loosestrife

Purple Loosestrife Removal 2008

In total **1204** purple loosestrife plants were removed from the wetlands and surrounding areas in the Comox Valley in 2008. The removal of purple loosestrife has continued a strong effort with all known sites being inspected numerous times throughout the season before receiving a final cleanup and inspection. The seven general locations where purple loosestrife was removed are listed in Table 1.



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 future reference.

A total of 18.1 days were dedicated to loosestrife removal in 2008. Large plants were found in the Slough, in the ponds near Superstore and in the estuary in 2008 (Areas 1,2 &6). 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.

Figure 3.2 Purple Loosestrife in Bloom

Purple Loosestrife Removal - Area and Number of Days Worked									
Loosestrife Removal	Days	Days	Days	Days	Days	Days	Days	Days	Days
Year	1999	2001	2002	2003	2004	2005	2006	2007	2008
Comox Bay Farm	18	8.1	5	5.5	2.9	4.3	1.6	3.5	1.07
Simpson & Barry Farms	5	1.8	1.3	5.1	3.2	1.2	1.9	2.7	0.87
Airpark & Walkway	4	0.9	3.1	3.3	3.5	0.8	3.3	1.6	2.53
Courtenay River	2	5.4	3.9	7.9	2.6	4.7	1.6	2.3	2.40
Lewis Park	15	27.9	14.8	12.8	16.5	14.1	6.1	8.3	2.53
Estuary	64	22.2	15.8	19.5	19.9	20.2	16.7	10.0	7.47
Malahat Drive	1	0.5	0.8	0.4	0.9	0.7	1.5	1.3	0.53
Stapley Rd/Camp River/Seal Bay Park				3.9	3.6	0.0	1.8	0.7	0.67
Totals	109	66.8	44.6	58.3	53	46	34.5	31.7	18.07

Table 3.0 1999-2007 Days Worked Per Area, Purple Loosestrife Removal

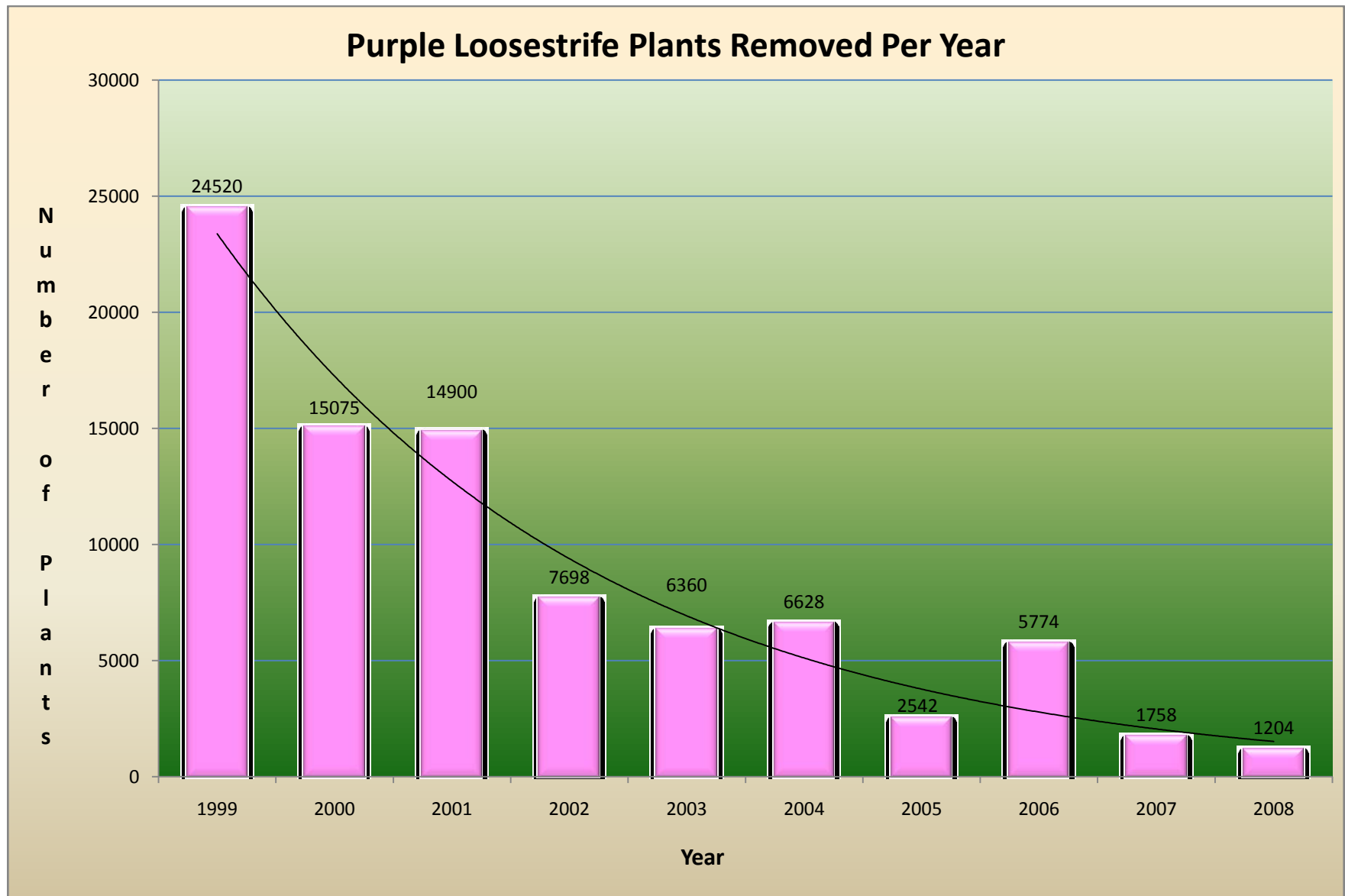


Chart 3.1 Purple Loosestrife Removal, 1999 - 2008

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 hardy perennial that re-grows from thick, tuberous rhizomes or corms. The rhizomes spread radially to produce large clonal populations. Rhizomes are drought tolerant.



Figure 3.3 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 is usually removed in conjunction with purple

loosestrife as they both grow in the same environments. In total 13,336 kg of yellow flag was removed from the Courtenay River estuary between 2002 & 2008. **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 2 shows the amounts of yellow flag iris and knotweed species that was disposed of at the Pigeon Lake Landfill from 2002 - 2007.

Year	Yellow flag iris	Knotweed species	Garbage	Kilograms
2008	580	85	95	760
2007	690	106	20	816
2006	670			670
2005	200			200
2004	1010		30	1,040
2003	5,176	284		5,460
2002	5,010	1,800		6,810
Overall total	13,336	2,275	145	15,756

Table 3.1 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 has been 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 (*Fallopia japonica* & *F. sachalinense*)

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. Soils



contaminated with a rhizome piece as small as 7 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.

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. This is mainly attributed to urban development and erosion of streambanks during flooding. 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.

Figure 3.4 Japanese Knotweed in Bloom

Along the banks of the Courtenay River, Tsolum and in the estuary, there are currently 34 known actively spreading knotweed sites totalling 0.67 hectares. Table 2.0 on page 10 shows 301 sites of knotweed covering 16.4 hectares in the CSRD. In trials conducted by MFR in 2006 it was determined that mechanical removal of knotweeds on sites with easy access costs about \$200,000 per hectare.

Impacts of knotweed in riverine and riparian areas include:

- it causes fundamental changes to the functioning of riparian systems
- it can tolerate long periods of submersion and poor soils, allowing it to establish and grow on the lower banks of rivers and creeks, where there is little competition because it evolved as a primary colonizer of volcanic slopes its native Orient, it can rapidly colonize fresh sediment deposits and other nutrient poor, disturbed sites.
- it excludes lower, slower native plants and trees beneath its extensive canopy due to shade, competition for moisture and nutrients, its dense matted litter mass and alleopathy.
- it exacerbates flooding by clogging river and stream channels with its large stalks, thus decreasing water flow through channels and changing natural erosion and deposition patterns
- sedimentation into important salmon habitat can be the result

Expect to see a knotweed species on a stream in your neighbourhood and a doubling of the hectares covered within 5 years.

Knotweed species are extremely difficult to remove in wetland habitats due to the reproductive ability of their rhizomes, with rhizomes less than 7grams able to resprout an entire new plant. Established plants should not be disturbed (rhizome contaminated soils spread infestations further) unless sufficient funding is in place for repeated removal efforts. For fear of spreading knotweed infestations further no large plants were targeted for treatment in 2008.

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.

Blackberry cover dominated 2.1 of 4.1 hectares of upland area in the Courtenay River estuary prior to removal beginning in 2002. Since 2002, 3.87 hectares of blackberry have been removed by the CVNS crew, 1.48 from the estuary and 1.8 hectares from the Courtenay Airpark. The aerial photographs in [Appendix 2](#) highlight the locations of the major blackberry infestations in the Courtenay River estuary.

The 2008 efforts focused on maintaining previously cleared areas. Additionally, blackberry removals were conducted in Area 1 (0.022 ha) in the estuary and Area 4 in the Airpark (0.016 ha).

Figure 3.6 Himalayan Blackberries in Courtenay River Airpark

Figure 3.6 shows blackberry removal efforts from one area of the Airpark.. 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.



Himalayan Balsam (*Impatiens glanduliflora*)

Also known as Policeman's Helmut, 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 Ministry of Agriculture. This native of the Himalayas, often planted for its lovely flowers, which range from white to pink to reddish, can quickly escape the backyard to establish itself 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 kilometres and are able to germinate under water.



Figure 3.7 Small Himalayan Balsam seedlings, April 28 2006

Figure 3.8 Close-up of Himalayan Balsam Seedling

In 2001 our crews noticed small patches of the showy plant along the Courtenay River and the Old Tsolum back channel that were increasing in size and excluding native plants. Eradication efforts began in 2006 and continued in 2007 & 2008 at the furthest point upstream on the Old Tsolum Channel in early June. When the seedlings are just 10cm tall, they are easily hand pulled out of the ground, yet by the end of August the remaining plants had reached their full height of 2 metres and began to flower. Crews counted how many plants they could pull out in an hour and averaged that number for the day.



In 2006, 99,110 plants were removed with 11,061 plants in 2007 and 2005 plants in 2008.



Himalayan Balsam Removal			
Year	2006	2007	2008
Number of Plants	99110	11061	2005

Table 3.2 Himalayan Balsam Removal

The seeds from Himalayan Balsam can remain viable for up to 3 years and coincidentally after 3 years of removal plant numbers are showing a dramatic decline.. Additional Himalayan Balsam sites were found in 2007 & 2008 along the Slough, Glen Urquart Creek, Courtenay River and at an area along Dove Creek Road. These upstream areas were prioritized for removal in 2008.

Figure 3.9 Himalayan Balsam in Bloom

Courtenay Airpark

The Comox Valley Naturalists Society acts as stewards of the Airpark for the City of Courtenay. The CVNS has a goal of naturalizing the Airpark by removing non-native species and establishing healthy populations of native species similar to 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 3.10 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 is done with the aid of a rented mini-excavator. The excavator is used to remove blackberries, dig holes for native plantings and load a track carrier with composted mulch. Over 100 cubic metres of mulch has been mixed into the Airpark soils and applied as a mulch 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.

Throughout the summer of 2007 & 2008 the native plants and grasses were watered, weeded and maintained.

Figure 3.11 Prepared Area Being Planted

4.0 Alien Invasive Plant Inventory

The goal of this project was initially 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 of the inventory is to determine of the extent of non-native species infestations and how best to manage/remove non-native species.

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 into the Invasive Alien Plant Program Database hosted by the Ministry of Forests: http://www.for.gov.bc.ca/hfp/invasive/IAP_01.htm
5. Produce a final report documenting all findings

The Immediate Outcomes/Outputs Generated

Funding from the IMIPC arrived in mid July 2005 with inventory of invasive plants beginning on July 20. 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 use 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
- District of Campbell River
- Town of Gold River, Town of Tahsis
- Sayward Valley
- Town of Port McNeil, Town of Port Hardy, Town of Port Alice
- Malcolm Island, Cormorant Island & Alert Bay
- Inventory of MOT North Island Gravel Pits

Data was collected to Ministry of Forests and Range Invasive Alien Plant Program protocols.

Inventory crews identified 2,150 infestations of non-native invasive plants on North Vancouver Island

In 2008 field crews located, mapped and entered 8 new Invasive plants sites into the IAPP database (24 in 2007).

5.0 SUMMARY OF WORK COMPLETED IN 2008

A total of 1078 hours or 143.7 days were spent on the project as of November 10, 2008. Chart three shows the job allocations in graph format. Hours of work were broken down into thirteen categories by 7.5-hour days. These categories with a detailed job description are as follows:

1. Loosestrife – 18.2 days, 136.5 hours
 - Removal, bagging and hauling of purple loosestrife to composting facility
2. Site maintenance – 11.9 days, 237 hours
 - Watering, weeding, mulching of current and previous plantings in airpark and estuary.
3. Blackberry species – 50.5 days, 379.0 hours
 - Expansion of area treated in Courtenay Airpark. Maintenance of previously cleared ground: cutting of canes and removal of roots.
4. Books, Report Writing, Public Relations, Stat Holidays. – 18.2 days, 136.3 hours
 - Bookkeeping & payroll (7.5 days), crew training (OFA Level One First Aid & safety, 6 days), holiday pay (4.5 days)
5. Yellow Flag – 13.6 days, 102.5 hours,
 - Removal, bagging and hauling of yellow flag iris to Pigeon Lake landfill
6. Himalayan Balsam – 3.5 days, 26 hours
 - Removal along Courtenay and Tsolum Rivers, Slough, Glen Urquhart Creek and private residence in Dove Creek
7. Species Inventory- 0.5 days, 3.5 hours
 - Locate, map and inventory invasive species within the Comox Valley management area.
8. Other – Giant Hogweed, Knapweed, Lamium, Vinca - 11.4 days, 85.5 hours
 - Removal of outlier plant infestations that had human health concerns or potential to spread and cause significant environmental harm.
9. Work preparations – 5.9 days, 44.5 hours
 - Daily work planning, trail, tool and vehicle maintenance (cleanup), scouting for invasive plants and hauling of materials to landfill.
10. Planting, Seed Collection - 1.9 days, 14.0 hours
 - Planting of native shrubs and forbs, collection, cleaning and packaging of native plant seeds for planting in rehabilitated areas
11. Broom – 5.9 days, 44.3 hours
 - Removal of 100's of small germinates at Courtenay Airpark and Estuary
12. Knotweed – 2.3 days
 - Removal of new infestations and cutting stems, bagging and hauling of knotweed roots to Pigeon Lake landfill.

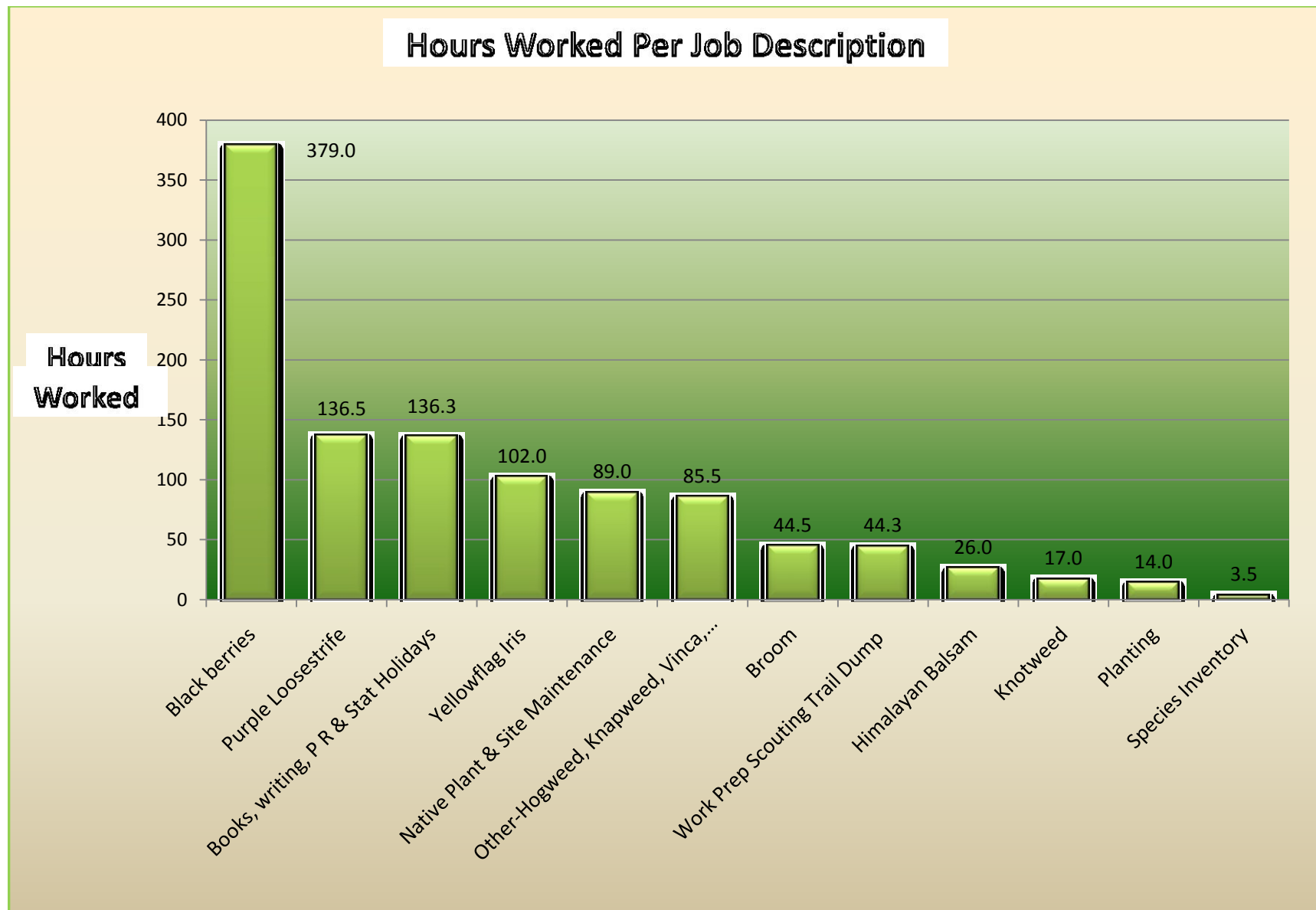


Chart 5.0 Job Breakdown Summary

6.0 RECOMMENDATIONS

One of the strengths of CVNS Wetland Restoration program is the consistency of effort and the ongoing field work in scouring 80+ hectares of land looking for purple loosestrife. In doing this, field crews are also able to identify and remove other invasive plants from the same areas. Strong efforts in the past few years have left few large loosestrife plants able to contribute to the seed bank for the 2009 season. A thorough effort in the Simms/Slough area in 2007 (144 plants removed) has resulted in a decline to 56 plants in 2008. Due to the mucky nature of this area it requires extreme caution and determination to ensure the area is covered adequately.

There remains a few mature flowering yellow flag iris plants, numerous immature non-flowering plants and a considerable seedbank in the Courtenay River estuary. Continuous monitoring and removal of seedling can be done in May and again in June & July as more mature plants come into flower. All areas where plants were removed in previous years should also be checked for invasive plant seedlings and replanted with native species. **Special attention should be paid to areas where recent storm activity has blown trees down and left exposed soils.**

Efforts to remove Himalayan blackberries should continue in 2009. There remains 6200m² of blackberries dominating the undisturbed natural part of estuary in [Figure 29](#). An ongoing check for blackberry shoots in restored areas has revealed 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 is being spread by development activities and by scouring water during storm events. Five small Knotweed plants were successfully removed from one location in 2007 and 2 more sites in 2008 including ongoing removal efforts at another location. Continued inventory will help manage future control/eradication efforts. **A knotweed control program for the Courtenay and Tsolum Rivers must soon become a reality as the costs to control these species is climbing each year.**

Conclusion/Discussion

The ongoing effort of the CVNS at removing purple loosestrife continues to show a promising decline in the occurrence of this destructive wetland plant. The potential exists for further decline in purple loosestrife numbers in the upcoming 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, Yellow Flag Iris and other invasive plants to the ecology and food webs of estuarine ecosystems.

Up to date information of threats by new invasive species, combined with field identification are the primary means of prohibiting new 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.

7.0 REFERENCE:

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APPENDIX 1

Location of Purple Loosestrife Removal - 2008

The areas are as follows:

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

Mapping Legend

Purple loosestrife presence and removal	
Black circle denotes dominance by Himalayan blackberries	
Yellow Flag presence: removed and not removed	 
Knotweed (Japanese, Giant & Himalayan)	
Teasel	
Himalayan Balsam	

Area 1 – Comox Bay Farm and Barry's Farm

- A total of 1.1 days were spent on removing purple loosestrife from this area (3.5 days in 2007, 1.6 days in 2006, 4.3 days 2005, 2.9 days 2004, 5.5 days 2003, 5 days 2002).
- This area covers the ditch lines to Barry's farm, ponds and surrounding upland area - though this year no plants were found at the pond.
- 7 plants removed

The northern most section of Area 1 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 in the dry upland areas surrounding 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 continues to be found at this site and removed.

The southern section is private property and is currently owned by the Barry family. Access to the site is by working upstream or downstream in the ditch line. Owners are aware of the CVNS work surrounding the removal of purple loosestrife.

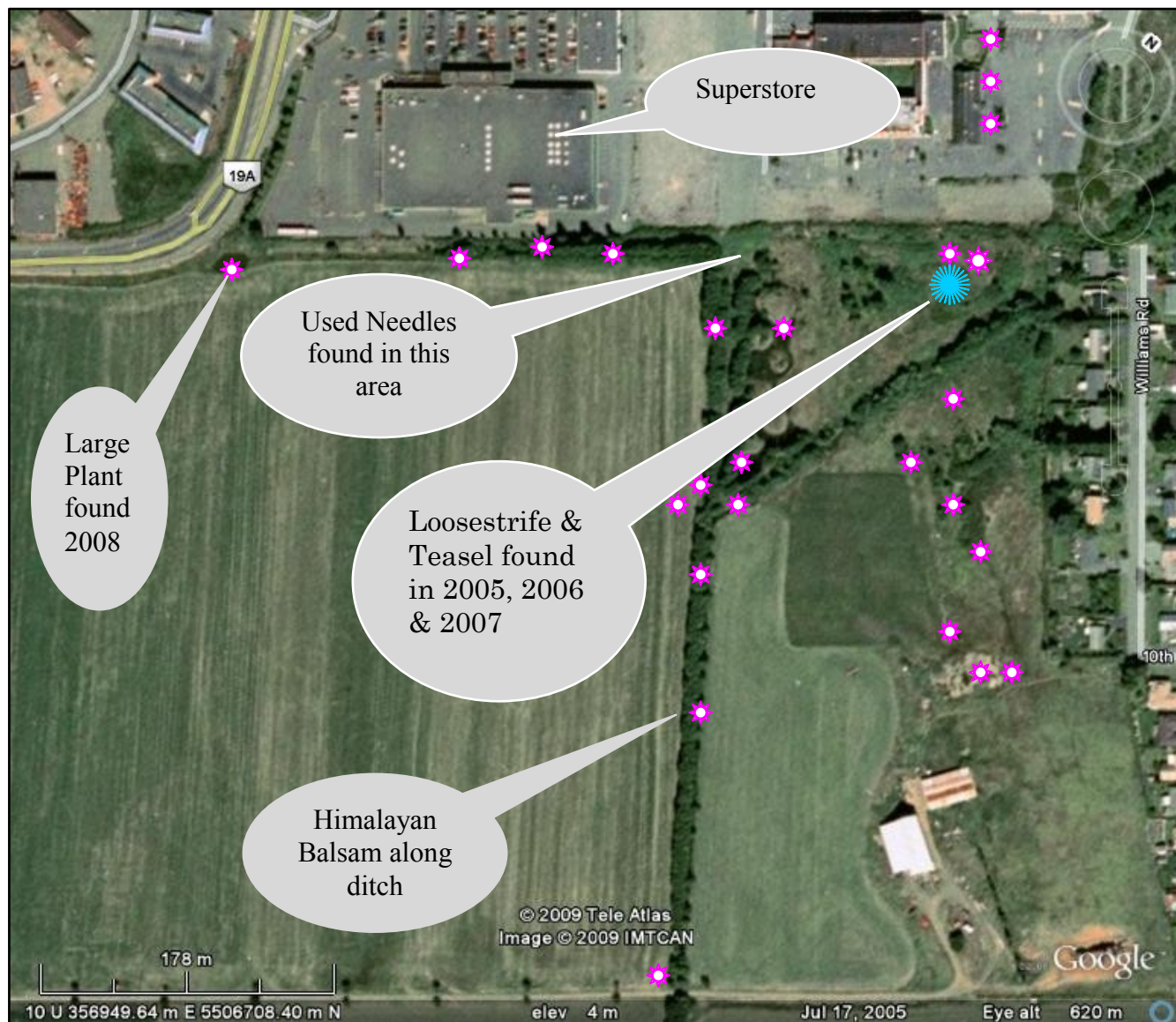


Figure 12, Area 1. Comox Bay Farm



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

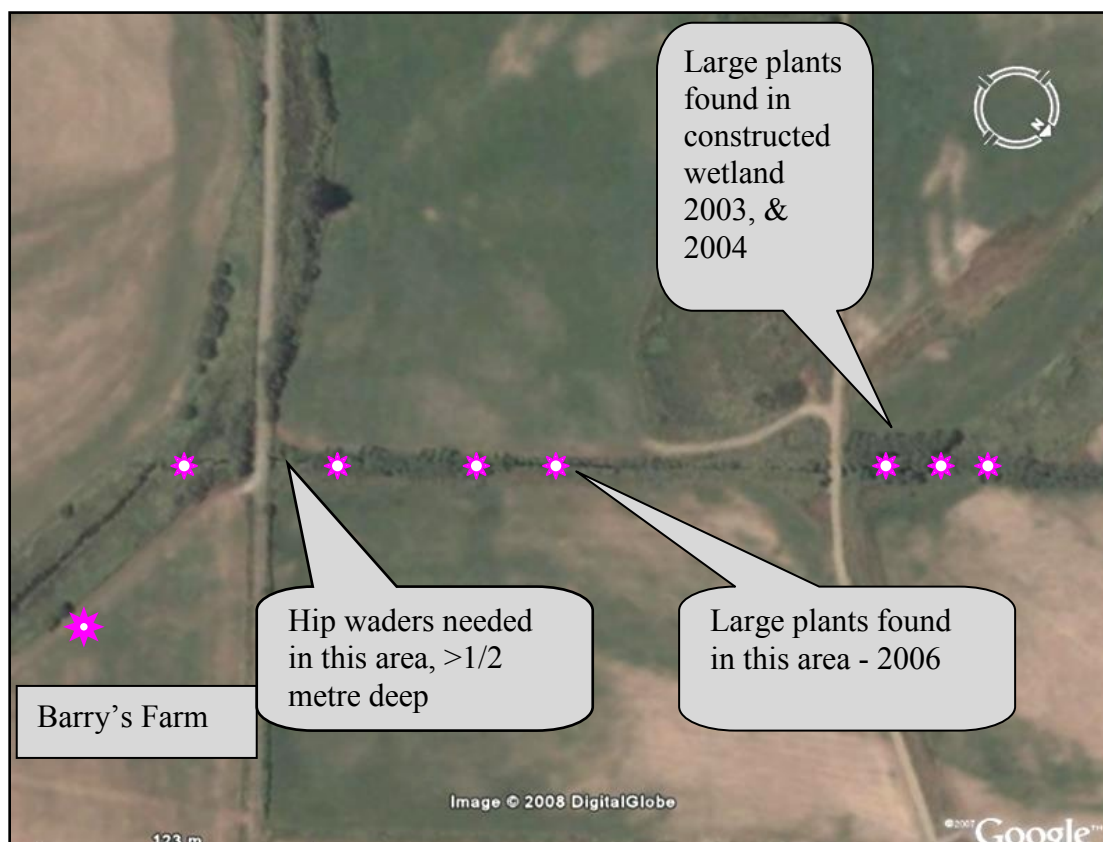


Figure 14, Area 1. Barry's Farm ditch line

Area 2 – Slough through Simpson & Barry Farm to CBF

- 1 day in 2008, (2.7 days in 2007, 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 original seed source and upstream from a tidal seed source
- 56 plants in 2008, 31 plants in 2007, 270 plants in 2006, 14 plants in 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 locations in Figure 15 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.

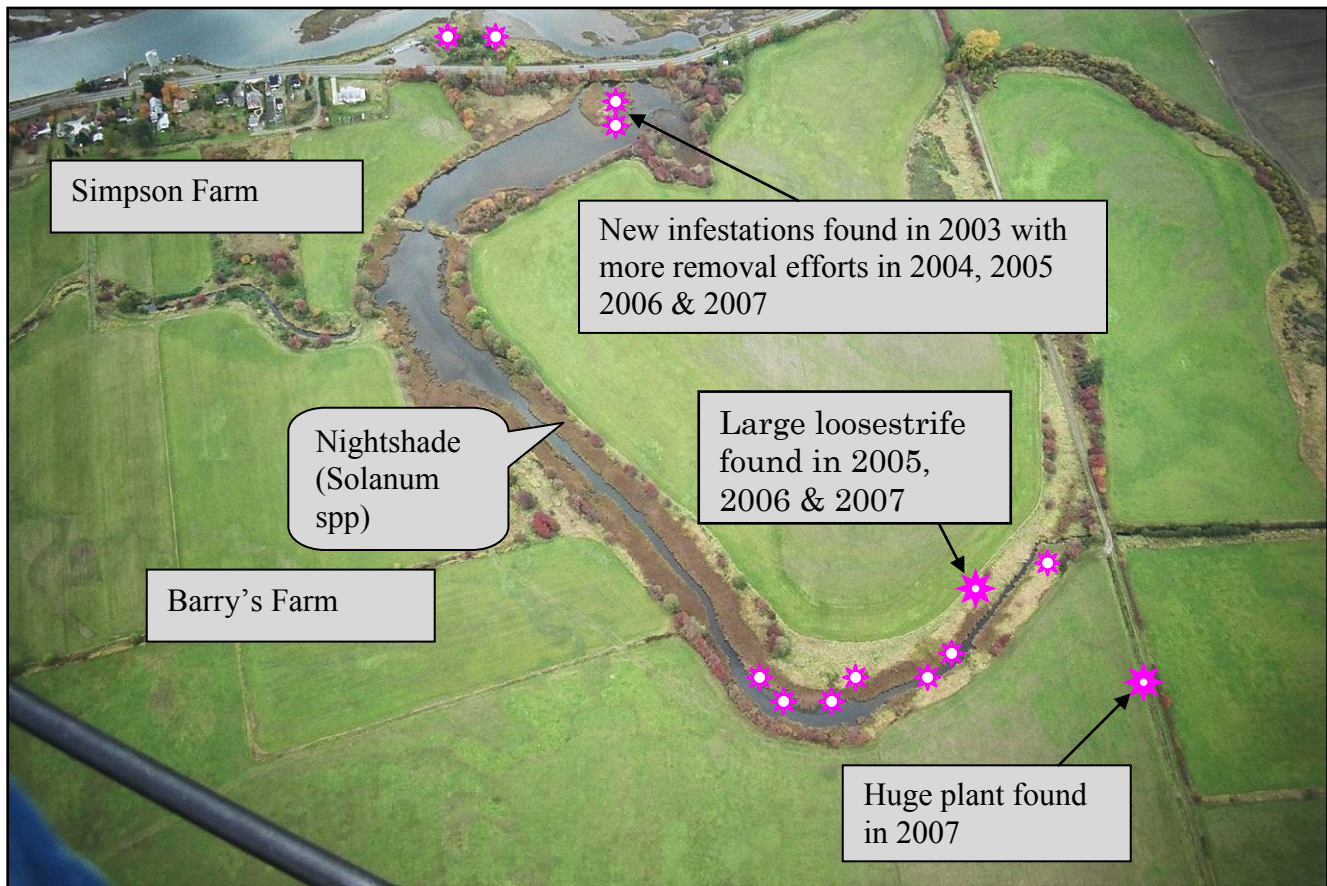


Figure 15, Area 2. Slough through Simpson & Barry Farms

Area 3 – Airpark Walkway

This is a large area extending from the freshwater marina to 31st Street. There are scattered patches of loosestrife, yellow flag iris, knotweed, broom and a number of other invasive plants from one end to

the other. Himalayan blackberries are a major concern along the length of the walkway. The amount and variety of invasive species is likely due to the proximity to development and is widely used by the public.

- 2.5 days removing purple loosestrife in 2008, 1.6 days in 2007, 3.3 in 2006, 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
- Maintenance of 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.
- Seed collection of native grasses and plants for future propagation.
- Knotweed patches growing larger despite efforts to control via cutting stems and landfilling
- 47 purple loosestrife plants removed in 2008, 31 plants in 2007

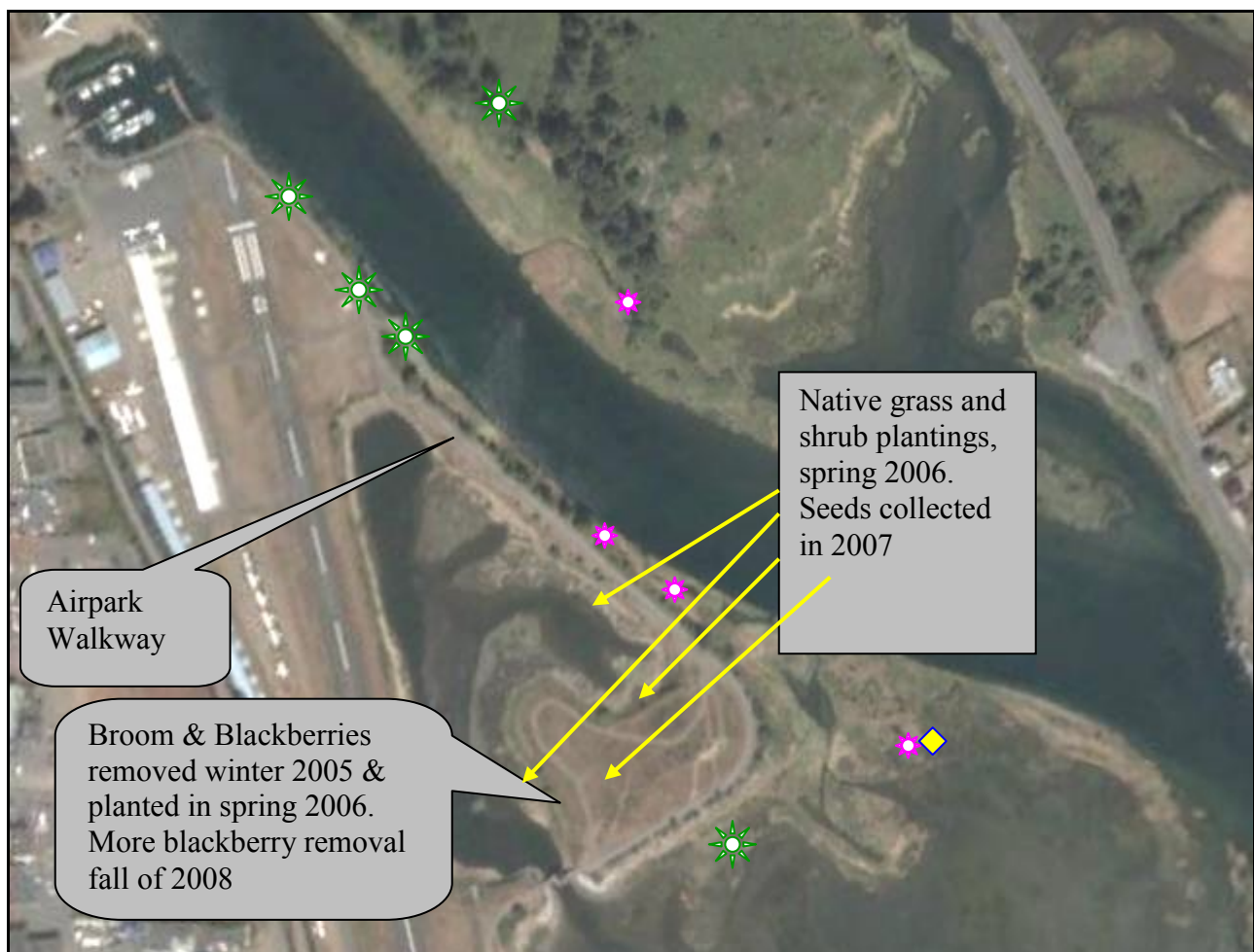


Figure 16, Area 3. Airpark Walkway

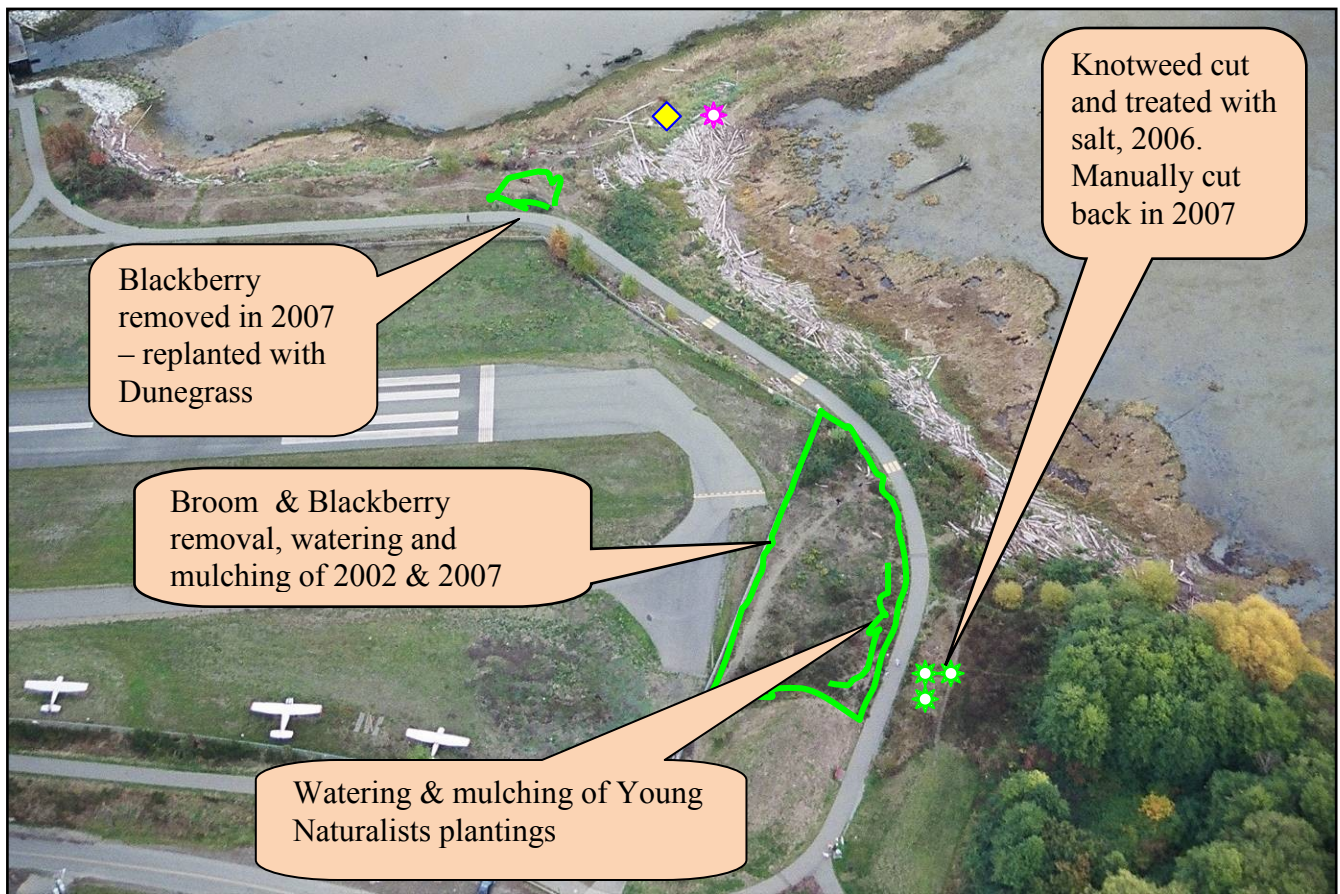


Figure 17, Area 3. Airpark Walkway

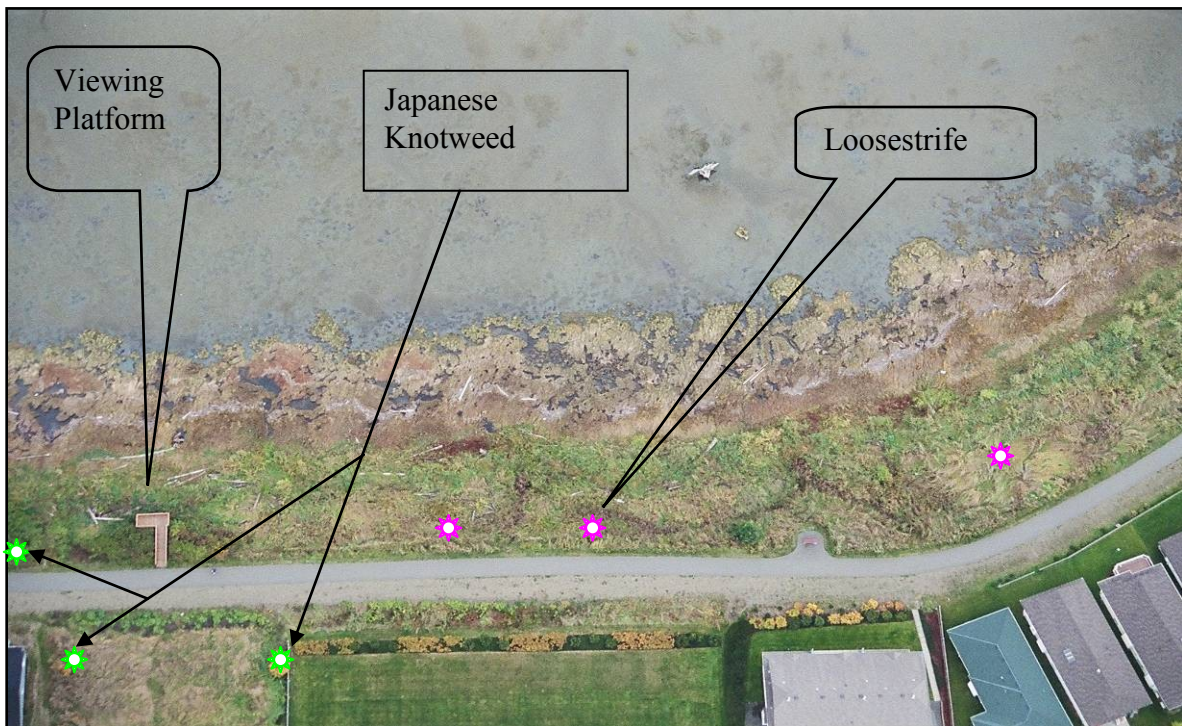


Figure 18, Area 3. Airpark Walkway

- 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 a canoe in 2008. 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, 2006 & 2008 but not in 2004, 2005 or 2007.

- 2.5 days removing purple loosestrife in 2008, 2.3 days in 2007, 1.6 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
- 31 plants in 2008, 97 plants in 2007

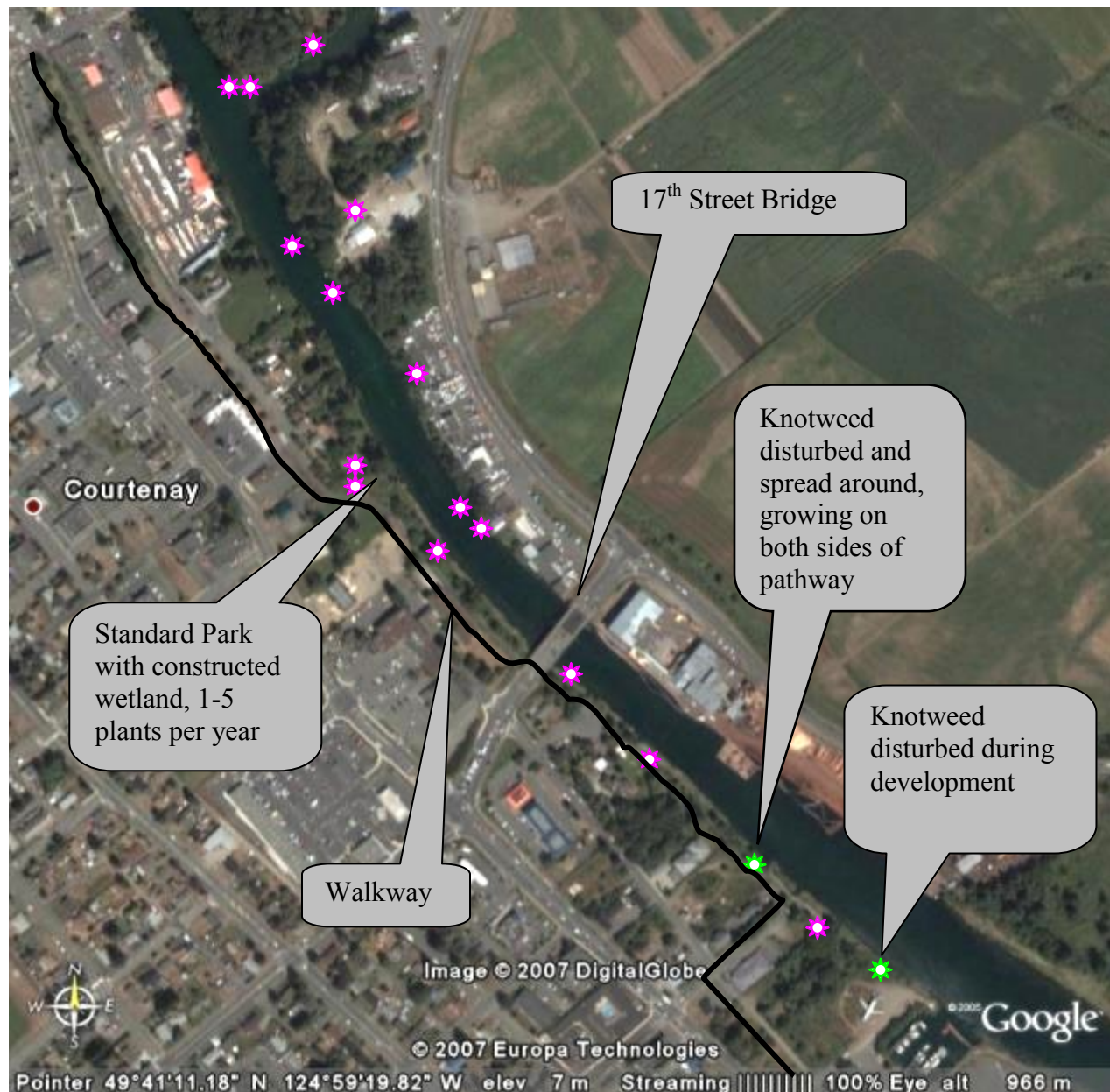


Figure 20, Area 4. Courtenay River from Airpark to Courtenay Slough

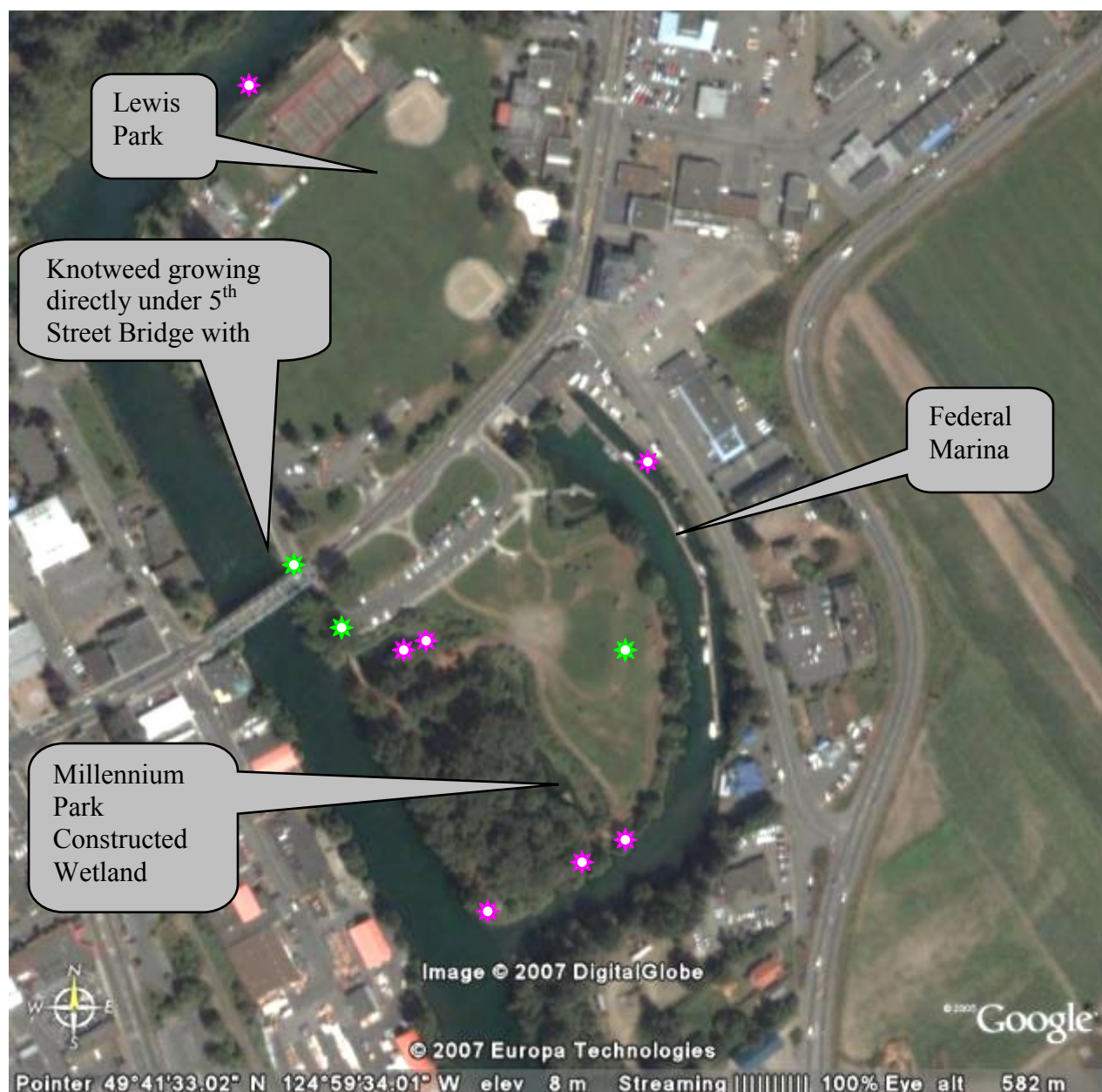


Figure 21, Area 4. Courtenay River from Standard to Lewis Park

Area 5– Courtenay River north of Lewis Park

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, Himalayan balsam and giant knotweed have become well established. Impatiens is also spreading downstream along the Courtenay River.

- 2.5 days removing purple loosestrife in 2008, 8.3 days in 2007, 6.1 in 2006, 16.5 days in 2004, 12.8 days in 2003, 14 days 2002, 28 days 2001, 14 days 1999
- 152 purple loosestrife plants removed in 2008, 613 in 2007
- 316 Himalayan Balsam removed in 2008, 11,061 in 2007. Indicated by purple line.

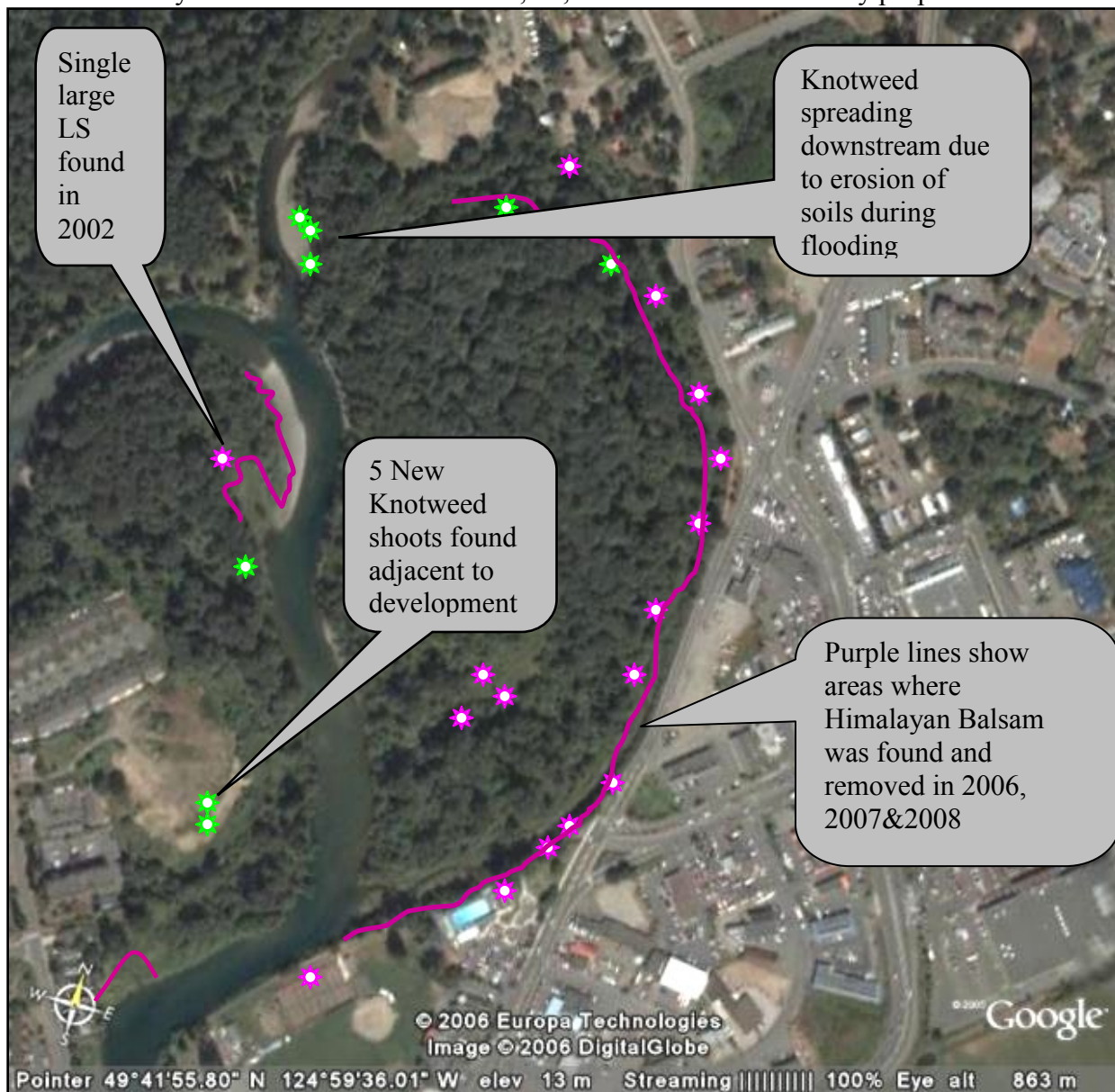


Figure 22, Area 5. Old Tsolum River Channel and Courtenay River

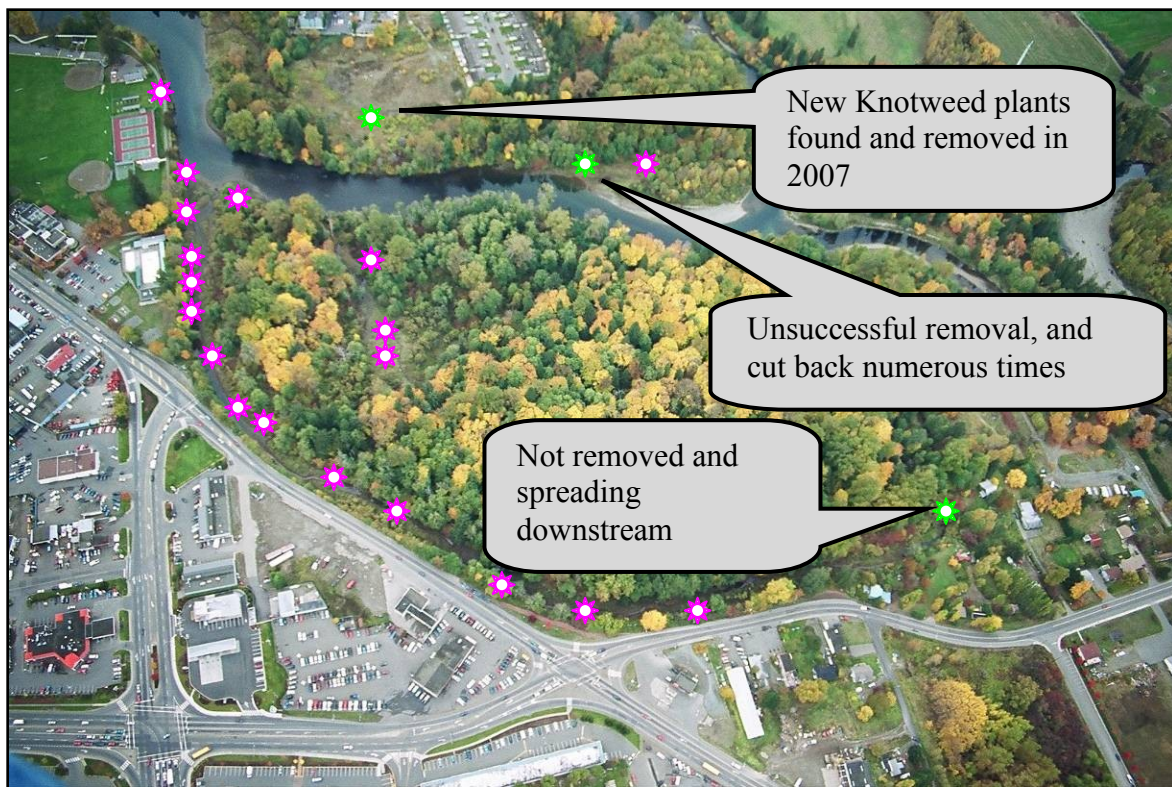


Figure 23, Area 5. Courtenay River and Old Tsolum River Channel

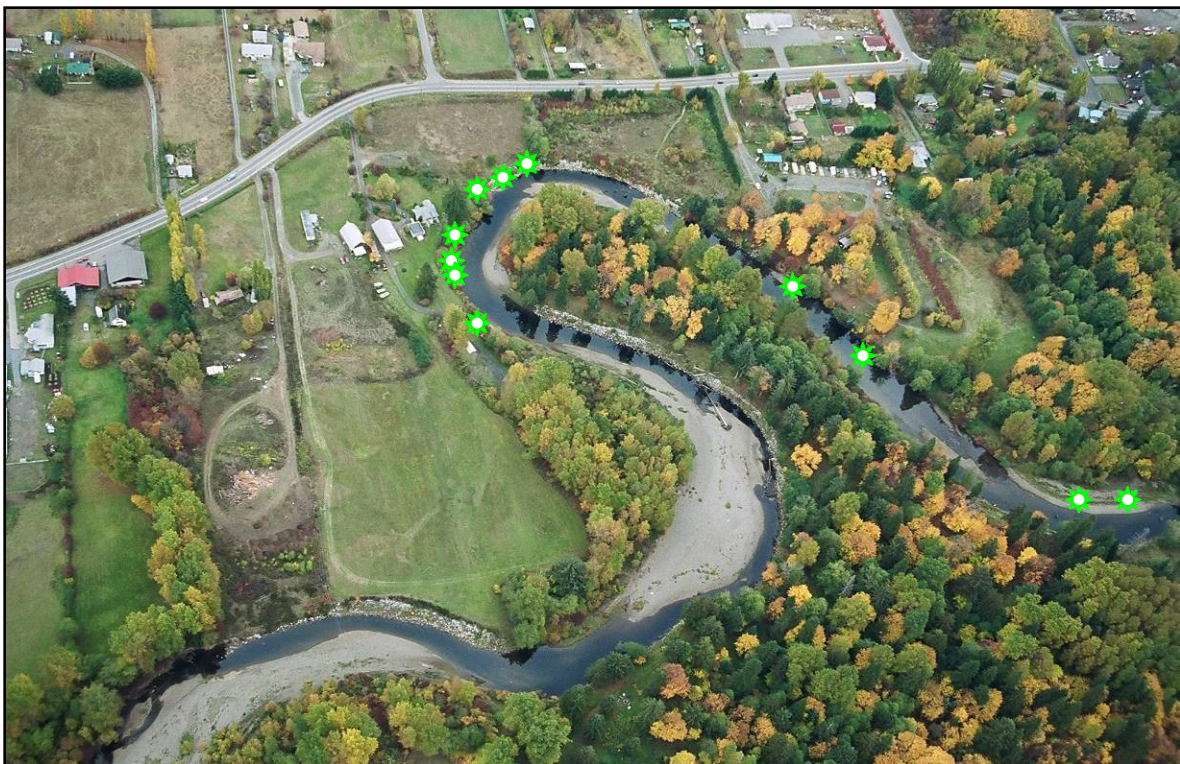


Figure 24, Area 5. Tsolum River locations of Knotweed sites.

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.

- 7.5 days removing purple loosestrife in 2008, 10 days in 2007, 16.7 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
- 872 plants removed in 2008, 856 in 2007, 4352 plants 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 to 2008. 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

- 0.5 days and 34 purple loosestrife plants removed in 2008, 1.3 days with 18 plant in 2007 (1.5 days with 110 plants in 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 was not found in 2007. This may be because the vegetation has grown and may be effectively shading out light for propagation. Plants continue to be found in the detention pond.



Figure 26, Area 7. Glen Urquhart Creek Watershed

Area 8 Stapley Road Wetland

- 1 hour and 1 plant found in 2008, 0.7 days with 67 plants in 2007
- (1.8 days, 110 plants, 2006)

This area is on 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 2008.

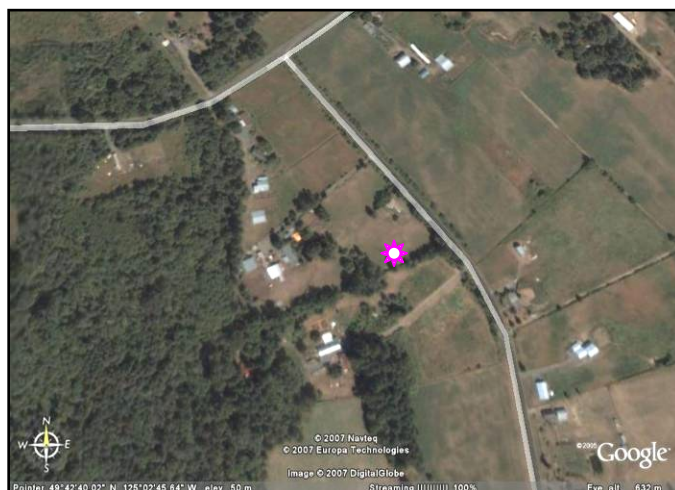


Figure 27, Area 8, Stapley Road wetland

Courtenay River Estuary, Yellow Flag Iris Removal

This was the sixth year that yellow flag iris (*Iris pseudacorus*) and knotweed species were targeted for removal. Yellow flag iris was removed throughout Figure 28 area in 2007. 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 2007.

- ◆ Yellow flag iris removed 2002 - 2008
- ☀ Knotweed species initial removal 2002, follow-ups in 2003-2008
- ☀ Knotweed infestations
- ☀ Knotweed Removed in 2006, root had drifted in and began growing

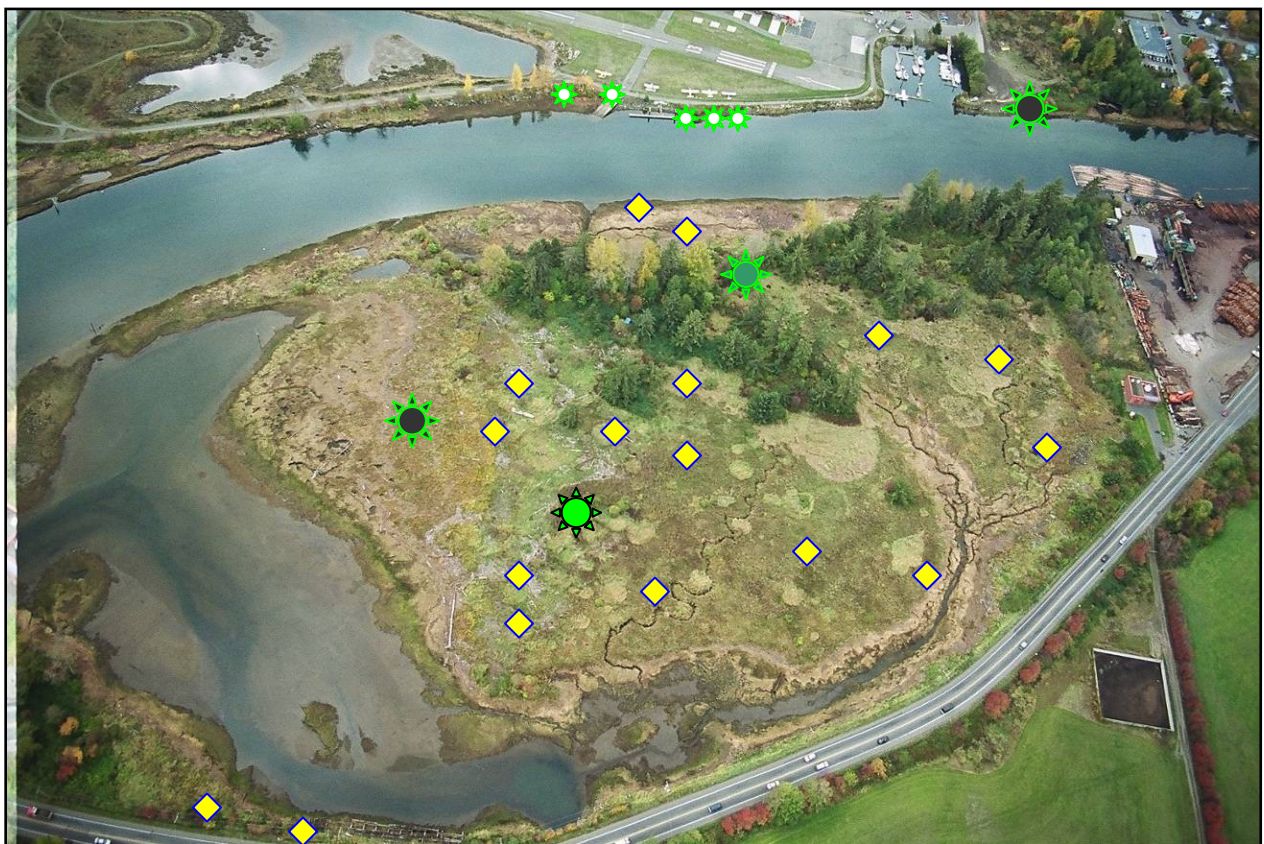


Figure 28, Area 6. Courtenay River Estuary Yellow Flag Iris & Knotweed Species

APPENDIX 2 –HIMALAYAN BLACKBERRY DOMINANCE AND REMOVAL

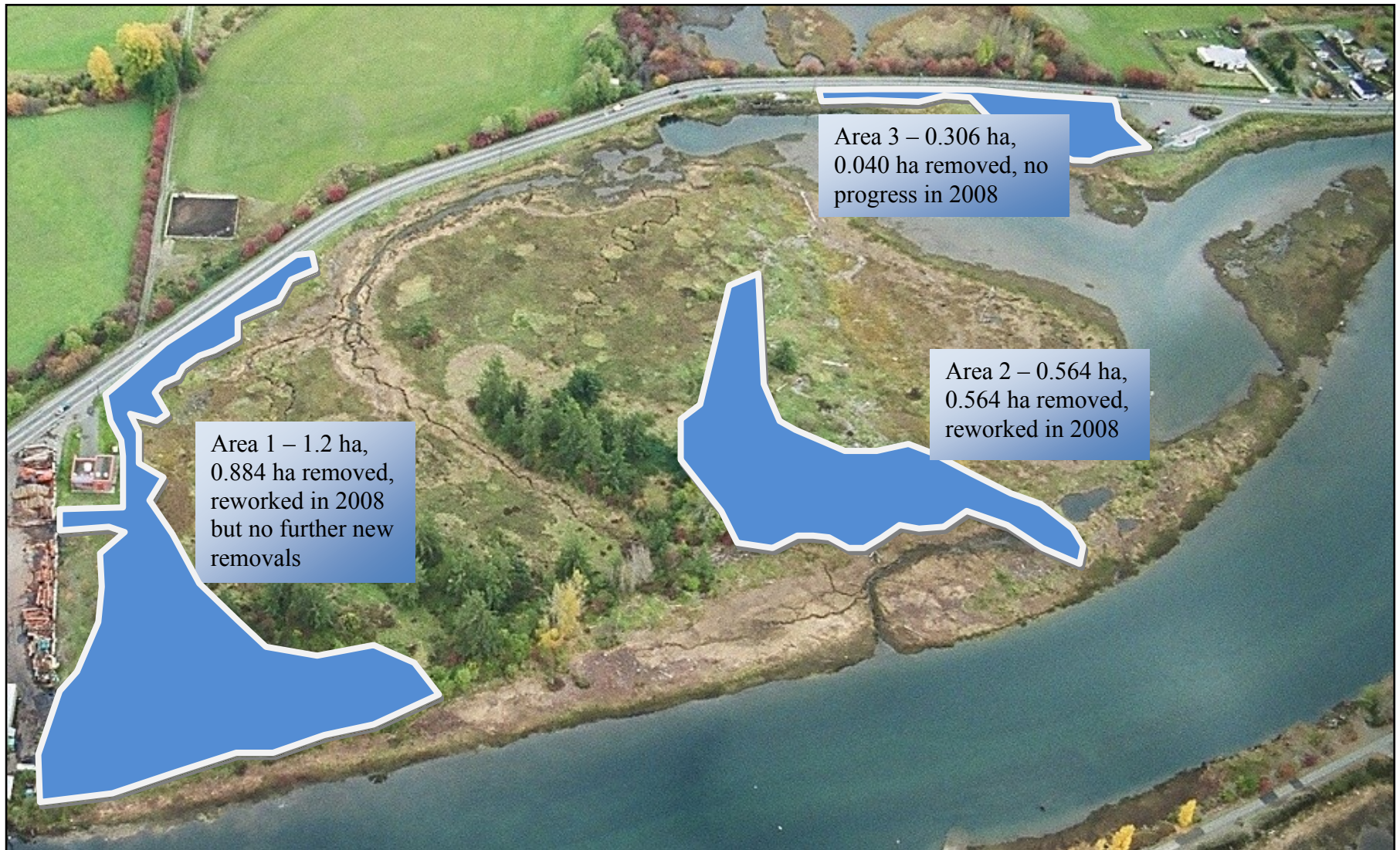


Figure 29, Courtenay River Estuary, Himalayan Blackberry Dominance

Table 3 2003-2007 Blackberry Species Measurements and Removal

Area #	Metres squared	m ² removed	Percent removed
1	12000	8844	74%
2	5640	5640	100%
3	3057	299	10%
4	18000	15300	85%
Total Blackberries measured in 2007	38697	30083	78%

Figure 30 shows areas where 1.5 hectares of Himalayan blackberry and Scotch Broom has been removed between 2002 and 2008. The entire area received a complete removal effort of blackberry in the fall of 2008. Blackberry has not been removed on the ocean side of the path due to erosion concerns. The area has seen extensive plantings of native species as removal progresses. New plantings receive a boost of compost, fertilizer and watering at times of drought. Watering continues until the plants become well established (2-3 years).

**Figure 30, Courtenay River Airpark, Himalayan Blackberry and Scotch Broom Removal**

APPENDIX 3 2008 EXPENDITURES

2008 CVNS Wetland Restoration Project Budget			
Descriptor	Days	Rate	Total
Contract Management	7.4	\$166.00	\$1,222.40
Contract Management	4	NC	
Field Supervisor	70.9	\$166.00	\$11,764.27
Field Supervisor	2.0	NC	
Field workers	21.6	\$110.00	\$2,379.66
Field workers	2.1	NC	
Field workers	44.9	\$124.21	\$5,582.53
Labour totals	152.98		\$20,948.86
Descriptor	Months/ Days	Rate	Total
Vehicle, tools, Insurance	4.5	\$500.00	\$2,250.00
Vehicle, tools, Insurance	1.5	NC	
Fuel	1	\$552.56	\$552.56
Weed eater days	9	\$35.00	\$315.00
Equipment/materials total			\$3,117.56
Labour totals			\$20,948.86
Subtotal			\$24,066.42
GST			\$1,203.32
Total			\$25,269.74

Project Contributors	Amount
Comox Valley Regional District	\$18,000.00
Nature Canada	\$3,000.00
City of Courtenay	\$2,500.00
Ducks Unlimited	\$2,000.00
Total	\$25,500.00



Bog Orchid, Courtenay River Photo by Alison Millham
Front Cover Photo: Grassy area of Courtenay River Estuary