

British Columbia *Spartina* Eradication Program 2009 Progress Report



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Metro Vancouver

Port Metro Vancouver

The Nature Trust of BC

Vancouver Aquarium – River Works

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Over the course of summer and fall of 2009, *Spartina* removal events required a significant amount of effort. Appreciation is extended to the numerous volunteers and agencies who mapped and removed *Spartina*.

Executive Summary

In 2009, the British Columbia Spartina Working Group (BCSWG) continued to work toward the eradication of non-native, invasive *Spartina* species from the BC Coast. This multi-agency group recognizes the potential impacts of *Spartina* on local shorelines and wildlife habitat and is striving toward full monitoring of the BC Coast and complete eradication of all invasive *Spartina* species (*Spartina anglica*, *S. densiflora*, and *S. patens*).

In 2009, the *Spartina* program expended \$121,880 in direct and in-kind costs. Program components included monitoring, removal, coordination, and outreach which were guided by science and evaluation. The monitoring program included mapping approximately 6200 acres of shoreline around the Fraser Delta (Boundary Bay and Roberts Bank) and approximately 35 acres of shoreline on the East Coast of Vancouver Island, near Baynes Sound, and 200 acres in the Gulf Islands. The inventory revealed that the abundance and density of *Spartina anglica* in Boundary Bay and Roberts Bank increased dramatically from 2007 to 2009. Removal efforts in 2009 used manual hand digging, mechanical excavating, and covering techniques. Due to the lack of funding, there were numerous clones around the Fraser Delta that were not removed. This years outreach component focused on recruiting volunteers and increasing awareness of the impacts of *Spartina*. This was achieved through articles submitted to web and print media sources as well as a cross-boarder government airboat tour. Another component of the program is to use sound science and evaluation to improve the effectiveness of the program. In 2009, the BCSWG hired a consultant to create a BC Response Plan which will assess various management techniques that will give the BCSWG the information required to more effectively and efficiently eradicate *Spartina*.

Background

In 2003, *Spartina anglica* was found in the Fraser River Delta by Gary Williams, a consultant for the Port Metro Vancouver, while conducting habitat surveys of the intertidal areas. This was the first record of *S. anglica* in BC and raised concerns about the spread of this invasive cordgrass. The Fraser Delta has approximately 25,000 ha of tidal mud flat that is internationally recognized as important habitat for fish and migratory birds. In all of Canada, the Fraser Delta has the highest density of wintering waterfowl, shorebirds and raptors. Two other *Spartina* species have since been discovered in BC: *S. densiflora* (Vancouver Island) and *S. patens* (Burrard Inlet). These species tend to impact shorelines that are rockier and will establish on the high tide mark.

The impacts of *Spartina* species include: conversion of mudflats to monoculture stands, loss of habitat to waterbirds and fish, accretion of sediments, and modification of drainage patterns. Introduced on the Pacific Coast, *Spartina* over the years has spread northward from Washington. Intertidal areas in Washington dominated by *Spartina* have exhibited large declines in the abundance of shorebirds and waterfowl. Significant financial resources have been required to control *Spartina* in Washington State costing upwards of one million dollars per year. Even with this effort, *Spartina* continues to be a problem infesting many acres of shoreline habitat in Washington State. As with most invasive species, controlling the spread at the early stages of species expansion is the most cost-effective approach. Therefore, it is critical to ensure *Spartina* is eradicated in BC. Otherwise, the loss of intertidal habitats will be detrimental to a multitude of species, and will require considerably greater resources to control in the future.

The BCSWG formed in 2004 and includes members from both government and non-government organizations. The team represents a diversity of responsibilities including: environment, migratory birds, habitat restoration, and public use. In addition, the team liaisons with both the Puget Sound Partnership and the Washington State Department of Agriculture which are two U.S. agencies that are involved in *Spartina* eradication in Washington State. All agencies involved bring valuable expertise to the group. The focus of this group is to employ early detection, rapid response methods to eradicate *Spartina*. Currently, there are mapping and removal efforts taking place around the Fraser Delta, Bayne Sound (Vancouver Island), and the Gulf Islands. However, more work is needed to monitor other parts of the BC Coastline.



Figure 1. Areas in the Fraser River Delta

Fraser Delta Program - Detection

Detection – South Fraser

In 2009, mapping efforts continued to follow the same protocol from 2008. The manual method of walking the intertidal habitat with hand held Global Positioning System (GPS) units (Garmin Etrex, Garmin GPSmap76S, Garmin GPSmap60C & Marine Navigator Map 76) was used to identify the location of plants along Boundary Bay and Roberts Bank. Locations were denoted as one of: single seedling, clone <0.3m in diameter, clone 0.3m - 1.0m, clone > 1.0m in diameter, and 5m area of single plants. Surveying flags were used to mark the location of the plants. This was extremely valuable when it came to the removals because it reduced searching time and led to effective removals by volunteers. The area mapped this year was from Mud Bay to Beach Grove and Brunswick Point. There are still several areas in the Fraser Delta that have not been monitored. It is recommended that Westham Island in Ladner B.C. be the target location for monitoring expansion in 2010. This is due to the Islands ideal salt marsh habitat and its close proximity to the infestation at Brunswick Point.

Spartina anglica was found growing successfully in all intertidal zones and a variety of substrates ranging from sand to cobble. It has also been successful growing in brackish water at Brunswick Point. *Spartina* was found as single seedlings, as clones and integrated in with other marsh plants (e.g. *Triglochin maritimum*, *Salicornia virginica*, *Distichlis spicata*, *Scirpus maritimus*, *Plantago maritiae*, *Leymus mollis*). Figure 3 shows the cumulative mapping results for *S. anglica* in the Fraser Delta area in 2009.

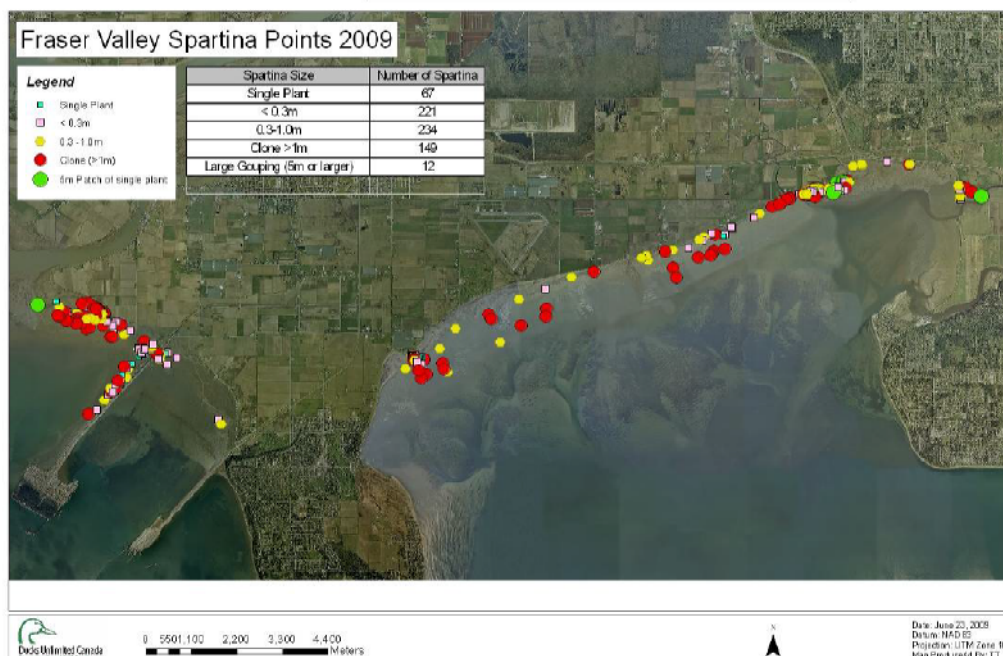


Figure 2. Cumulative 2009 *Spartina anglica* Distribution in the Fraser Delta Area

Evaluation – Fraser Delta

Overall there was over 100% more *Spartina anglica* plants detected in 2009 than 2008. This increase is characterized by double the amount of clones in the <0.3m size range, and almost quadruple the amount of clones in the 0.3m – 1.0m size range, and over double the amount of clones in the >1.0m group. The only notable decrease is a 74.5% reduction in clones > 5m. This data shows a deviation from the decreasing trend in *S. anglica* seen from 2006-2008.

Table 1. *Spartina anglica* Size Classes Mapped from 2005-2009 in Boundary Bay and Roberts Bank.

Size	2005	2006	2007	2008	2009
Single plants	167	107	41	56	67
Clone < 0.3m	329	229	111	110	221
0.3m -1.0m Clone	204	210	108	60	234
Clone > 1.0m	90	42	33	61	149
Patch approx 5m	0	97	49	47	12
Total	790	685	342	334	683

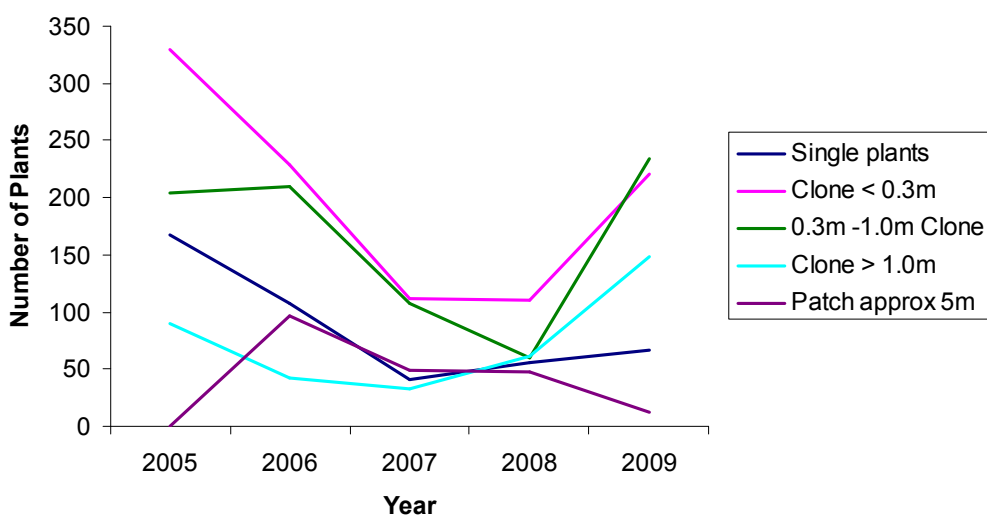


Figure 3. *Spartina anglica* Size Classes Mapped from 2005-2008

The following three focus areas of greatest concern were selected for analysis (See Figure 1 for their locations):

1. Brunswick Point
2. 112th Street
3. Mud Bay

Brunswick Point

This area has great ecological value to avian and fish species and is also a significant source of biofilm that shorebirds utilize as a valuable food source. The *S. anglica* infestation in this area has spread considerably over the past three years. Many clones can now be found along the Delta Port Causeway and have spread not only further out onto the mudflat but westward in the intertidal marsh zone. It is recommended that this area be highlighted as a priority area for removals in 2010 due to the rapid spread and seed dispersal potential of the nearby Fraser River. The rapid expansion may be attributed to lack resources to address this particular infestation in 2007 and 2008.



Figure 4. Distribution of *S. anglica* at Brunswick Point 2007

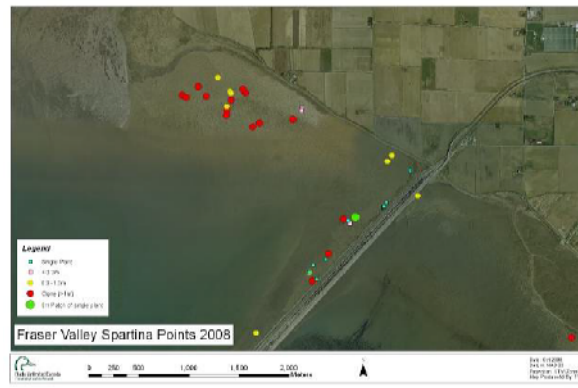


Figure 5. Distribution of *S. anglica* at Brunswick Point 2008*

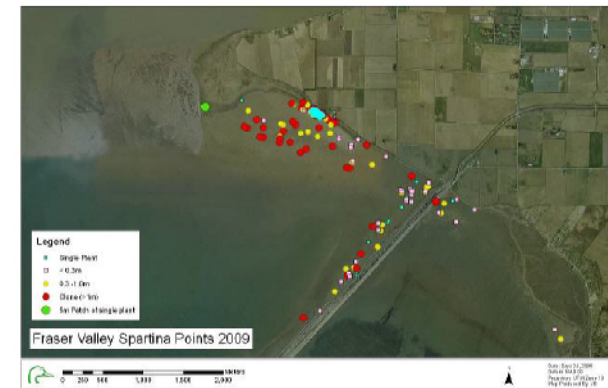


Figure 6. Distribution of *S. anglica* at Brunswick Point 2009

* Mapping efforts in 2008 missed a group of ~20 clones that are seen in the 2007 map. These clones were included in the 2009 inventory.

112th Street

The 112th Street area was selected as a focus area as it is the densest and largest infested area in Boundary Bay. Despite the thorough removals in 2007 and 2008 (which involved multiple passes to find any plants left behind) there is still a large infestation found in this area in 2009. The majority of points in the 2009 data are clones in the 0.3-1.0m range. This may indicate that some seedlings germinated after the removals were conducted in 2008 and grew to this size range in one year and/or some plants and/or rhizomes were left behind. It was discovered that many people digging out the plants were leaving partial plants/rhizomes in the ground. This emphasizes the need for field training on identification and proper removal of the plants, including underground rhizomes. It appears that from 2007-2009 the infestation has spread in both a westward and eastward direction and has increased in the number of plants. The aggressiveness of this invasive can be seen by the continued prosperity of this species despite concerted removal efforts for three consecutive years.

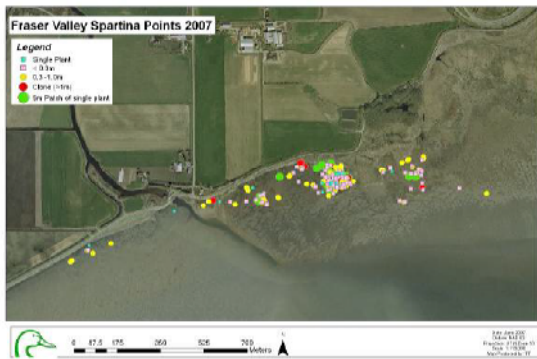


Figure 7. Distribution of *S. anglica* at 112th Street 2007

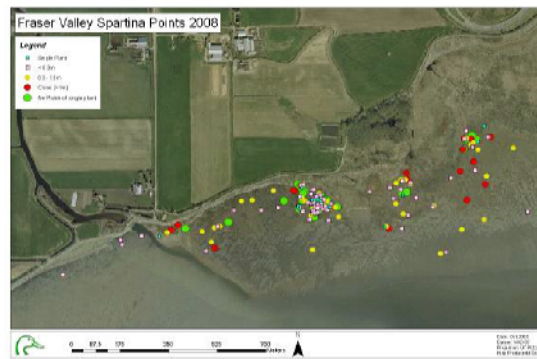


Figure 8. Distribution of *S. anglica* at 112th Street 2008

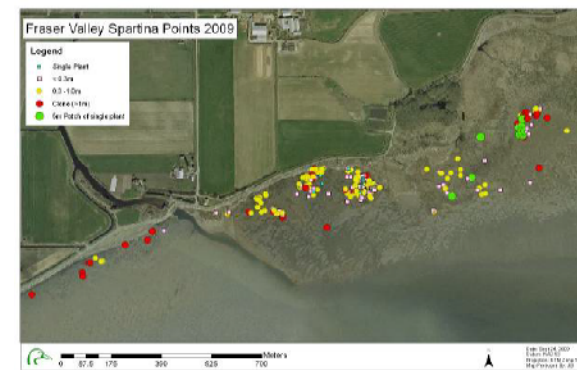


Figure 9. Distribution of *S. anglica* at 112th Street 2009

Mud Bay

Mud Bay was selected as an area of concern as it is right at the mouth of the Serpentine River which could spread the seeds to new locations. The infestation in this area was spreading both east and west from 2007-2008. In 2009 it appears that the infestation is continuing to spread to the east but removal efforts seem to have been effective in stopping the spread to the west. From 2008-2009 it appears as though there are fewer clones larger than a meter and more clones in the 0.3-1.0m range.

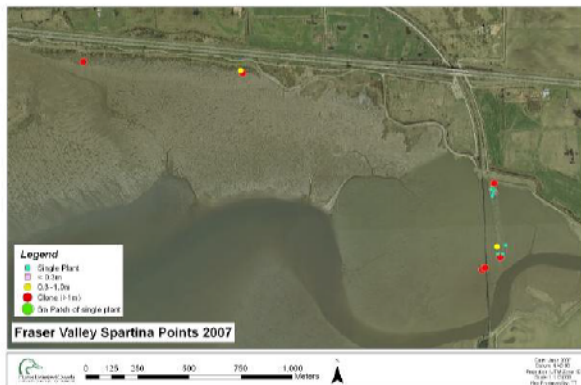


Figure 10. Distribution of *S. anglica* at Mud Bay 2007



Figure 11. Distribution of *S. anglica* at Mud Bay 2008



Figure 12. Distribution of *S. anglica* at Mud Bay 2009*

*The 3 clones in the >1.0m class near the train trestle were not mapped in 2009 but are still present at this location

Fraser Delta Program - Removals

Manual Removals

Early detection and rapid response is the mandate for the BCSWG. This strategy ensures that the maximum effort possible is allocated to combat this invasive prior to it invading large areas of shoreline. The high priority areas (112th Street, Mud Bay, and Brunswick Point) determined in 2008 were the target locations for this years removal efforts. Consistent with the previous methodology of this program, participants dug up individual plants and clones using long and short-handled garden shovels into large garbage bags. At 112th Street (Boundary Bay) a small all-terrain vehicle gathered up the bags and transported them to the Boundary Bay dyke. In all other areas the bags were manually carried to the dyke. Following the events, the bags were loaded onto a truck that transported them to Metro Vancouver's incinerator. This year over 3,000 kg of *Spartina* and substrate was incinerated.

Some of this years funding was allocated to hiring two students for a 10 day period. The crew focused on removals, seed head clipping, supervising the excavator, and installing covering plots. The crew was a useful part of the *Spartina* eradication program. They removed numerous plants <0.3m thus preventing them from becoming large, unmanageable clones in the future. The crew was a cost effective means of accomplishing removals (\$3000 in wages for 193 hours of work). However, a few considerations are the staff time associated with managing and hiring the crew. In order to make this more efficient, it would be better to hire a crew for a longer period of time (less supervision as they become more familiar with the work) and to hire more staff (perhaps a crew of 4 rather than 2 because the time spent on interviews and hiring would pretty much remain the same but more could be accomplished).

Removals were conducted from Mud Bay to 112th with volunteers. The student crew removed most of the smaller clones between 104th to 64th. There were no removals south of the Delta Port causeway.

Mechanical Removals

In previous years, machine excavating of *Spartina* had been conducted with a large amphibious excavator from Concord Excavating. This year it was decided to change the machine to a Spyder-Can excavator as it was more economical and had a broad spectrum of capabilities.

Table 2 - Excavator Rates

Contractor	Mobilization	Hourly Rate
Concord Excavating	\$3400	\$350
Spydercan	\$400	\$ 85

A preliminary onsite visit was conducted with the operator/owner from Spyder-Can All-Terrain Excavating to decide if the machine could operate in the extremely soft, clay-based mud. It was

determined by the operator that the machine could handle the soft substrate. To get the machine onsite, approvals were granted by Fraser River Estuary Management Program, Corporation of Delta, Canadian Wildlife Service, Tsawwassen First Nations, and the Ministry of Environment.

On August 18th, 2009, members of the BCSWG met the owner/operator of Spydercan at Brunswick Point. The machine work was aborted after an unsuccessful 2 hour attempt to make it out onto the mud flat. On the vegetated high intertidal zone the machine sunk ~3 feet and made a track ~12 feet across. This was because there was too high of a weight/surface ratio and an inability to gain purchase in the mud with the front bucket. It was determined that if the machine was getting stuck in this substrate, it would only get worse the further out it went. Being that a lot of the target clones are further than 300m out, it was decided that the machine would not be able to reach these clones. It is recommended for future operations to observe the machine in question working in similar conditions to the target site in order to determine the capabilities of both the machine and operator. Or if similar conditions cannot be replicated, then the machine and operator must demonstrate that they have worked in similar environmental conditions prior to project initiation.



Figure 13. Spydercan Stuck at Brunswick Point

The cost of this trial was \$750 which included the mobilization fee and four hours of work. The revised plan for *Spartina* excavation at Brunswick Point was to use the amphibious excavator from Concord.

Concord Excavating and Contracting Ltd. was hired to conduct mechanical removals of *Spartina* at Brunswick Point. Approvals were granted by Fraser River Estuary Management Program, Corporation of Delta, Canadian Wildlife Service, Tsawwassen First Nations, and the Ministry of Environment. A 2010 Linkbelt amphibious excavator with 0.6 PSI of ground pressure was used to remove and bury over 70 clones (>0.3m) and from the mudflat. These removals took 25 hours of machine time. The excavator dug holes and buried these clones with a minimum cap of 2m of substrate. The total cost for these removals including mobilization was \$12,800.



Figure 14. 2010 Linkbelt Amphibious Excavator Removing *Spartina anglica* at Brunswick Point, B.C.

A burial site study conducted in 2007 examined 66 burial sites. It was found that all sites were free from *Spartina* and in some areas, native plants had already begun to repopulate the site. These results suggest that *Spartina* plants were not able to grow to the surface after being buried 2m deep. These results were expected because of the burial depth; however no studies or data had previously proven the effectiveness of burial techniques. Over all the burial site study supports the use of an excavator as a control technique. Monitoring of the 2009 burial sites will be conducted in 2010.

Science/Evaluation

Covering Plot Trials

Field tests conducted by The Nature Conservancy in Oregon found that the most efficient and cost-effective control method for *Spartina patens* was covering techniques. The BCSWG wanted to see if this method could also be effective at removing *Spartina anglica*. The covering method can be used for all patch sizes. This technique eliminates *Spartina spp.* by shading it, thereby preventing photosynthesis. It takes approximately 2 years to destroy the clone once the geotextile has been installed. In the high intertidal area replanting the covered area once the fabric has been removed is not required as colonization by native plants occurs within 2-3 years after the fabric has been removed. The low intertidal area has very little vegetation so once the *Spartina* clone has been removed it can return to its natural, unvegetated state.

On November 12th, 2009 members of the BCSWG installed four new covering test plots in the low intertidal zone off of 104th at Boundary Bay. Previous attempts in 2008 to anchor covering plots in the low intertidal zone at Brunswick Point had failed. The failure was due to insufficient anchoring techniques for the level of tidal energy. Also, most of the burlap sandbags were either deflated as the weave of the fabric was too large for the fine mud substrate that was used to fill them or they were torn apart from the tidal energy. A different location was selected for the new test plots as all of the clones in the low intertidal area at Brunswick Point had been removed by an amphibious excavator earlier in 2009. Based on findings from the first covering trial, new anchoring techniques were developed. When installing the Amoco 2002 Woven geotextile the spatial boundaries of the patch were determined and the fabric was cut such that it extended 1.5' beyond the border of the *Spartina* clone to prevent any rhizomes

from growing our beyond the fabric. Duplicates of two techniques were then used to anchor the geotextile fabric to the mudflat, these included:

Anchoring Technique 1 – (Plot ID BB01-BB02) The edges of the fabric were folded under about 5". Six foot lengths of rebar that were bent at the top to create a hook and were used to secure each of the four corners and the middle of the plot. 15" plastic stakes were placed on the edges of the fabric between the rebar and were also used to secure the middle sections. Both the 15" plastic stakes and 6' lengths of rebar that were installed at the perimeter of the fabric were angled towards the center of the covering as they were driven in to prevent tidal currents and wind from lifting the edges. Four synthetic sandbags were also used to secure the fabric.

Anchoring Technique 2- (Plot ID BB03-BB04) The second anchoring technique was a replicate of the first except it did not include the sandbags.

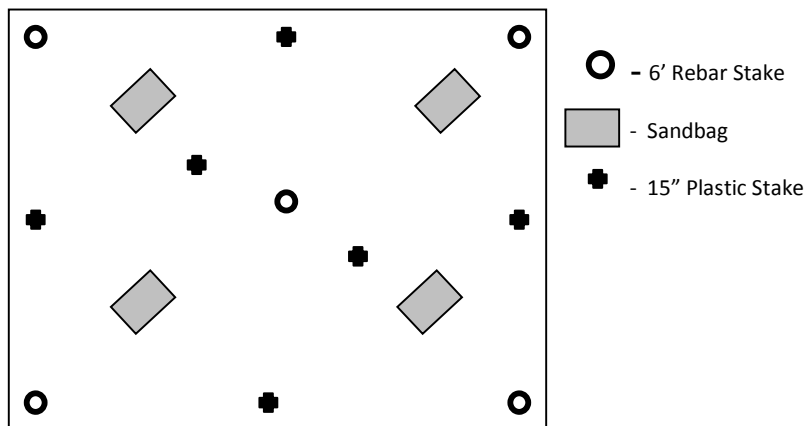


Figure 15. *Spartina* Covering Plot - Anchoring Method 1

When these plots were monitored in March 2010 it was discovered that both anchoring techniques had failed. It appeared as though the geotextile had torn around where the anchors had pierced the fabric and then the wave energy lifted the fabric. It is recommended that the BCSWG consults with members of The Nature Conservancy in Oregon to determine what anchoring methods may be effective in low intertidal areas. The results from the covering plot trials in 2008 and 2009 have shown that the anchoring techniques that the BCSWG have developed are only effective in high intertidal areas.

BC Response Plan

The BCSWG sent out a request for proposal to create a BC *Spartina* Response Plan. EDI Environmental Dynamics Inc. was selected to complete the plan. This plan aims to look into biological, physical, and chemical management options and create a cost estimate for the different approaches. The purpose of this plan is to give the BCSWG the information required to more effectively and efficiently eradicate *Spartina*. This plan should be completed by April 2010.

Vancouver Island Program

In 2005, on Vancouver Island, *Spartina patens* was confirmed in the Comox estuary (has been present for several decades), and *Spartina densiflora* was detected in and around Baynes Sound. Despite much of the shoreline of Vancouver Island and the Gulf Islands being at risk for invasion, most of the region has yet to be surveyed for the presence of *Spartina*. In 2008, the Coastal Invasive Plant Committee (CIPC) developed an Island *Spartina* Working Group

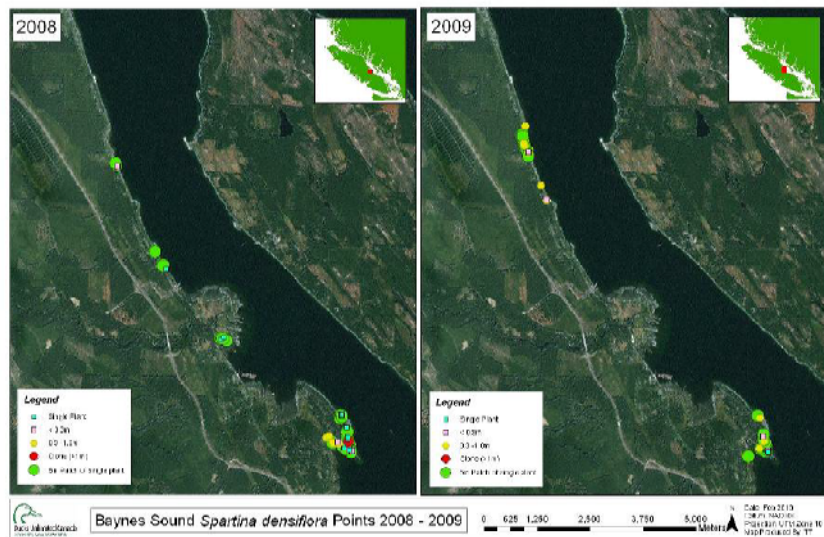


Figure 16 – 2008 *Spartina densiflora* Distribution in Baynes Sound

to develop a *Spartina* monitoring and management program on Vancouver Island and the Gulf Islands. Their goal is to have a group that can focus specifically on *Spartina* to coordinate inventory/management, and report back to the CIPC and the BCSWG regarding progress.

This year mapping and removal efforts on Vancouver Island were limited to Baynes Sound. The mapping followed the same protocol as the Fraser Program. Table 3 shows a decrease of *S. densiflora* from 2008-2009 in Baynes Sound. In 2008, 790kg of *S. densiflora* was removed and in 2009, 140kg was removed. The Vancouver Island Conservation Land Management Program provided a staff member to map and remove *S. densiflora* for 6 days. Fourteen kilometres of shoreline was monitored and all *S. densiflora* that was found was removed. The methodology for mapping and removals were similar to those used on the Fraser Delta, except for the disposal method. Instead of being incinerated the plants were disposed of above the high tide

line and the seed heads were collected and transported to the City of Cumberland's waste disposal facility.

Table 3. *Spartina densiflora* Size Classes Mapped from 2008-2009 in Baynes Sound.

Size	2008	2009
Single Plant	12	1
< 0.3m	6	4
0.3 - 1.0m	5	9
Clone (> 1m)	1	0
5m Patch of single plant	40	31
Total	64	45

Data Management

In 2009, data were collected on the type of *Spartina* recorded (species and size class) and the extent of the area mapped. The type and size class data were entered in two databases: the BC Invasive Alien Plant Program (IAPP) and Community Mapping Network (CMN). The contribution to the IAPP provided data on a provincial basis, while the CMN data were used to target areas for planning control and further monitoring. Data can be viewed at www.spartina.ca.

DUC GIS staff collected the data from all field workers, which were combined into one GIS shapefile before sending it to the CMN site administrator. This approach reduced GIS data management by CMN and provided more flexibility for analysis.

Outreach

Website

- Community mapping network was used to display spatial data on the web including the information on the distribution of *Spartina*. (www.spartina.ca)
- The Greater Vancouver Invasive Plant Council – volunteer call out (<http://www.gvipc.ca/>)
- Go Volunteer – volunteer call out (<http://www.govolunteer.ca/>)
- Ducks Unlimited Canada – volunteer call out (<http://www.ducks.ca/>)
- Friends of Semiahmoo Bay Society –volunteer call out, information & partner links (<http://www.birdsonthebay.ca/>)

Print Media

- Peace Arch News (July, 2009)
- Georgia Straight (July, 2009)

Tours

- Aliens in the Bay Tour by Corp of Delta and Friends of Semiahmoo Bay (May 2009)
- Air Boat Tour for Government Officials (Sept, 2009)
- Telus Day of Service – 25-30 Telus volunteers directed by Corp of Delta staff for 2 hours removing Spartina (end of May 2009)

Finances

The Port Metro Vancouver provided a grant for \$20,000 for the 2009 program. The funding covered the hard costs of the excavators, the student crew, and other supplies required for manual removals. The BC Trust for Public Lands provided \$20,000 of funding to be used in 2009. This funding was allocated to cover the costs of the BC Response Plan and the covering test plot trials. In addition to external funding, members of the BCSWG contributed time and resources to the project. These in-kind and direct contributions were essential to the success of the project this year. Major contributors in the BCSWG include DUC, the Vancouver Aquarium, and the Corporation of Delta.

The total cost of the *Spartina* program in 2009 was \$121,880. The expenses included \$45,280 in direct costs and \$76,600 in in-kind donations from members of the BCSWG. A total of 16 agencies contributed financial resources (direct or in-kind) to the project (Table 4). The breakdown of each program component (Inventory, Removals, Coordination, Outreach, and Science/Evaluation) can be found in Figure 17.

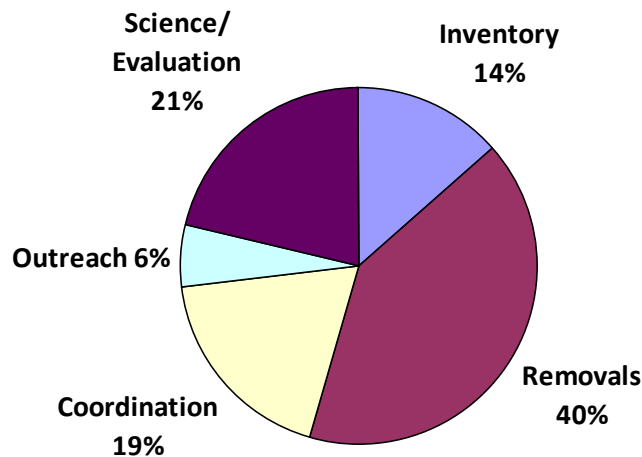


Figure 17 - Percent of Total Expenses for Each Spartina Eradication Program Component for 2009

Table 4. BC Spartina Eradication Program Expenditures 2009

Agency	Program Components					Summary		
	Inventory	Removals	Coordination	Outreach	Science/ Evaluation	Direct Costs	In-Kind	Total Contribution
BC Ministry of Environment	\$800	\$800	\$1,200	\$800	\$2,000		\$5,600	\$5,600
BC Trust For Public Lands					\$20,000	\$20,000		\$20,000
City of Surrey - SHARP Program		\$3,000				\$200	\$2,800	\$3,000
City of Surrey - SNAP Program		\$2,600				\$200	\$2,400	\$2,600
Coastal Invasive Plant Council			\$600				\$600	\$600
Community Mapping Network	\$4,000						\$4,000	\$4,000
Corporation of Delta	\$400	\$7,800				\$1,400	\$6,800	\$8,200
Ducks Unlimited Canada	\$4,100	\$6,000	\$12,200	\$800	\$4,000	\$3,100	\$24,000	\$27,100
Environment Canada- Canadian Wildlife Service	\$2,000	\$7,000	\$1,000				\$10,000	\$10,000
Friends of Semiahmoo Bay Society			\$2,000	\$400			\$2,400	\$2,400
Greater Vancouver Invasive Plant Council			\$400	\$200			\$600	\$600
Metro Vancouver		\$200	\$400				\$600	\$600
Parks Canada	\$880					\$80	\$800	\$880
Van Aquarium - River Works	\$3,200	\$3,100	\$3,000	\$4,600		\$300	\$13,600	\$13,900
Vancouver Island Land Management Program	\$1,200	\$1,200					\$2,400	\$2,400
Port Metro Vancouver		\$18,000	\$2,000			\$20,000		\$20,000
Total Expenses	\$16,580	\$49,700	\$22,800	\$6,800	\$26,000	\$45,280	\$76,600	\$121,880

Cross Border Partnerships

Government Officials Airboat Tour – Brunswick Point

On Sep 30, 2009 an airboat tour of Brunswick Point was conducted with Government Officials. The purpose of the tour to highlight the progress the BCSWG had achieved in controlling the *Spartina* infestation in the Fraser Delta and to establish a dialogue and foster discussions for a stronger collaboration between the different provincial and federal agencies as well as Washington State in dealing with *Spartina*. Attendees included: BC Ministry of Environment (Matthias Herborg), Ministry of Agriculture and Lands (Linda Wilson - MAL Manager Invasive Species Plant program), Fisheries and Oceans Canada (Joanne Lawrence, Senior Policy Analyst), Canadian Wildlife Service of Environment Canada (Kathleen Moore Ecosystem Conservation Coordinator, Barry Smith Regional Director), Washington Department of Agriculture (Bob Smith, Brad White, Dan Newhouse - Director, Tanner O-Ketal – Puget Sound *Spartina* Coordinator), Invasive Plant Council of BC (Crystal Klym, Project Manager), Community Mapping Network (Rob Knight). Participants met at Wellington Point Park in Delta, BC, and launched 2 airboats brought up by Washington Department of Agriculture. The tour followed Canoe Pass on the Fraser River, under the Westham Island bridge, and then westward to Brunswick Point. *Spartina* clones and covering plots were shown to attendees.

Outcomes of the tour include both DFO and MAL joining the BCSWG. EC-CWS will work with EC headquarters staff in priority setting and project selection criteria for the Invasive Alien Species Partnership Program funds. It was agreed that *Spartina* is at the early stage of infestation in BC and sufficient resources at the early stages will prevent a large scale expansion that has occurred in other areas of the Pacific Coast. However, the current funding (i.e. loss of provincial and federal Invasive Species Funding and reduced funding from industry and partners) will result in the expansion of *Spartina*. Washington State strongly supports all efforts to eradicate *Spartina* given the resources they employ to eradicate *Spartina* and will continue to partner with BC.

Gulf Island *Spartina* Monitoring Tour

In 2006, a drift card study was conducted by BCSWG in partnership with several US organizations to assess the potential spread of *Spartina* in Washington State and British Columbia. This study identified multiple areas within the Gulf Islands that had a high probability of infestation. Several nearby sites in the San Juan Islands have existing *Spartina anglica* infestations which also contributed to concern about the potential of *Spartina* in the Gulf Islands. As part of the BC *Spartina* Working Groups (BCSWG) efforts to expand the monitoring territory and to continue collaborative cross-border work, a monitoring tour of the Gulf Islands was conducted.

On September 16th Cameron Sanjivi (Parks Canada – Gulf Islands National Parks Reserve), Tanner Ketel, and Robert Smith (Washington State Department of Agriculture), and

Claire de la Salle (Ducks Unlimited Canada) met on South Pender Island at Poets Cove Marina for a two day *Spartina* monitoring tour. Shoreline substrate data was obtained by Parks Canada to target the search efforts to the most suitable habitat within the Gulf Islands. The WSDA donated the boat, fuel and staff time to aid in the monitoring efforts. Over the two day period, approximately 90km of coastline was monitored on Sidney, South Pender, Saturna, Cabbage, and Tumbo Islands. No *Spartina* was detected along these coastlines.

It is recommended that Parks Canada conduct an annual *Spartina* monitoring program in the Gulf Islands National Park Reserve. Despite our monitoring efforts this year, there are many areas that have not been surveyed that could potentially be harbouring *Spartina*. If *Spartina* is detected in the Gulf Islands it should be added to the BCSWG online inventory

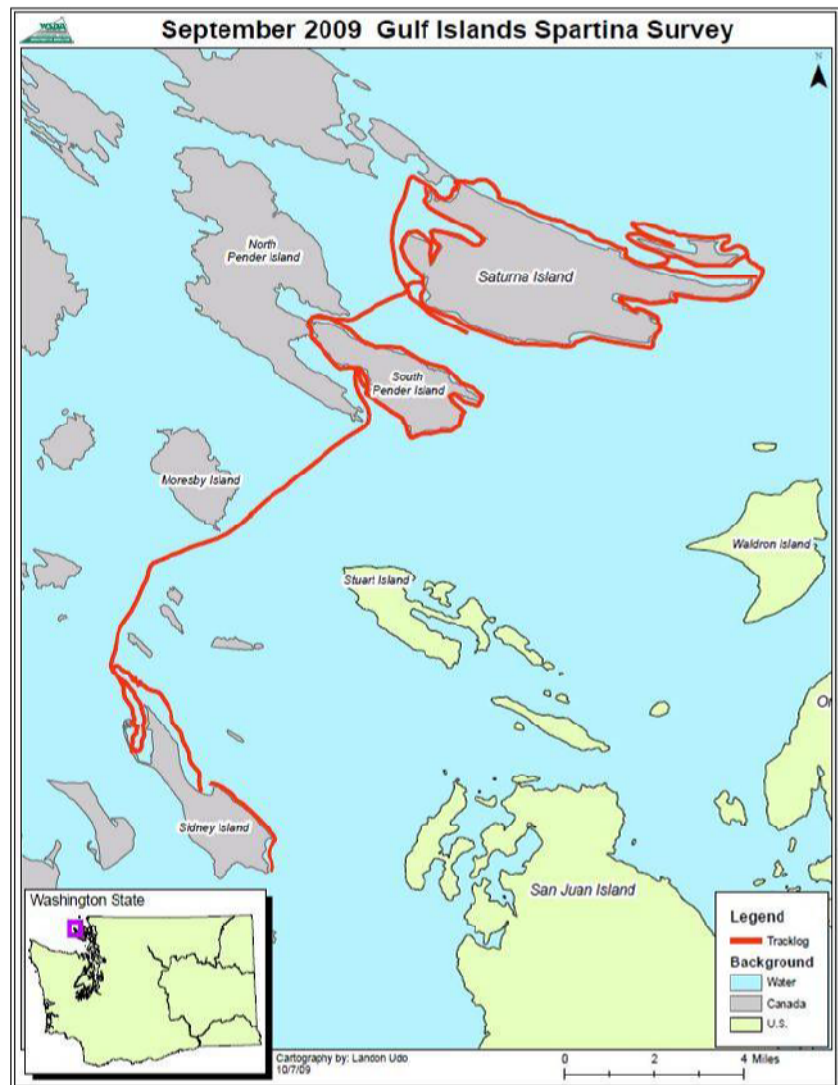


Figure 19 – 2009 Gulf Islands *Spartina* Survey Track

(www.spartina.ca) using the BCSWG mapping protocol and then the most effective removal method can be determined between Parks Canada and the BCSWG. Regardless if *Spartina* is found, the extent of areas searched should also be added to the online inventory.

Action Plan on Ocean Conservation and Coastal Climate Change Adaptation

On February 12, 2010 Gordon Campbell – Premier of British Columbia, Christine O. Gregoire – Governor of Washington, Theodore R. Kulongoski – Governor of Oregon, and Arnold Schwarzenegger – Governor of California signed the Pacific Coast Collaborative’s (PCC) Action Plan of Ocean Conservation and Coastal Climate Change Adaptation. Part of this action plan is an agreement to prevent and reduce the spread of invasive species in order to preserve the integrity of our coastal systems. The rapid detection and early response and eradication for *Spartina spp.* is listed as a top priority for the PCC. This action plan may result in greater government awareness and involvement in *Spartina* eradication in B.C.

Concluding Remarks

The success of the 2009 *Spartina* Project could not have been completed without the commitment of the agencies of the BCSWG or the contribution from the Port Metro Vancouver and the BC Trust for Public Lands. This generous support allowed agencies to pay for staff time, equipment, contractors, and administrative costs that totalled \$76,600 in in-kind and \$45,280 in direct donations.

There was a dramatic 51% increase in *S. anglica* plants detected in the Fraser Delta from 2008 - 2009. This was the first time since 2006 that the infestation had increased in the number of plants detected. The spatial data for both the 112th and Brunswick Point areas show that from 2007-2009 the infestation had notably expanded its reach and density. The Mud Bay area showed a minor increase in the extent and density of the infestation from 2007-2009. Due to the rapid expansion of the infestation at Brunswick Point and the ecological important of this area, it is recommended that the majority of removal efforts are focused on this area. It is also recommended that the BCSWG expand the area inventoried to include Westham Island in Ladner, B.C. This area should be targeted due to the Islands ideal salt marsh habitat and its proximity to the infestation at Brunswick Point.

The Vancouver Island Program monitored and removed spartina in a 14km stretch of shoreline in Baynes Sound. From 2008-2009 there was a small decrease in the amount of *S. densiflora* detected. The current lack of monitoring on Vancouver Island is of great concern yet, without additional resources, the Island Spartina Working Group and the BCSWG are extremely limited in the ability to increase mapping efforts. Increasing corporative monitoring with agencies such as Parks Canada will help to expand monitoring efforts.

It is recommended that the BCSWG continue to develop and implement adaptive management practices such as airboat reconnaissance, covering techniques, and using kayaks for shoreline monitoring. This will allow the eradication program to change as new methods are learned and as new challenges arise. The newly created BC Reponses plan will also help to guide the direction of BC's eradication program.

The cross-border partnerships that have been developed over the years have proved to be an extremely valuable asset to the BCSWG. Through joint ventures such as the drift card study we are now able to target our mapping approach to focus on areas with high risk of infestation. Continued collaborative work will facilitate information sharing and will improve and expand control techniques associated with *Spartina* in both BC and Washington.

The main limitation to the effectiveness of the BCSWG eradication program is funding. Nurturing partnerships and awareness surrounding *Spartina* with Provincial and Federal governments and with the Pacific Coast Collaborative should be a focus for the BCSWG.