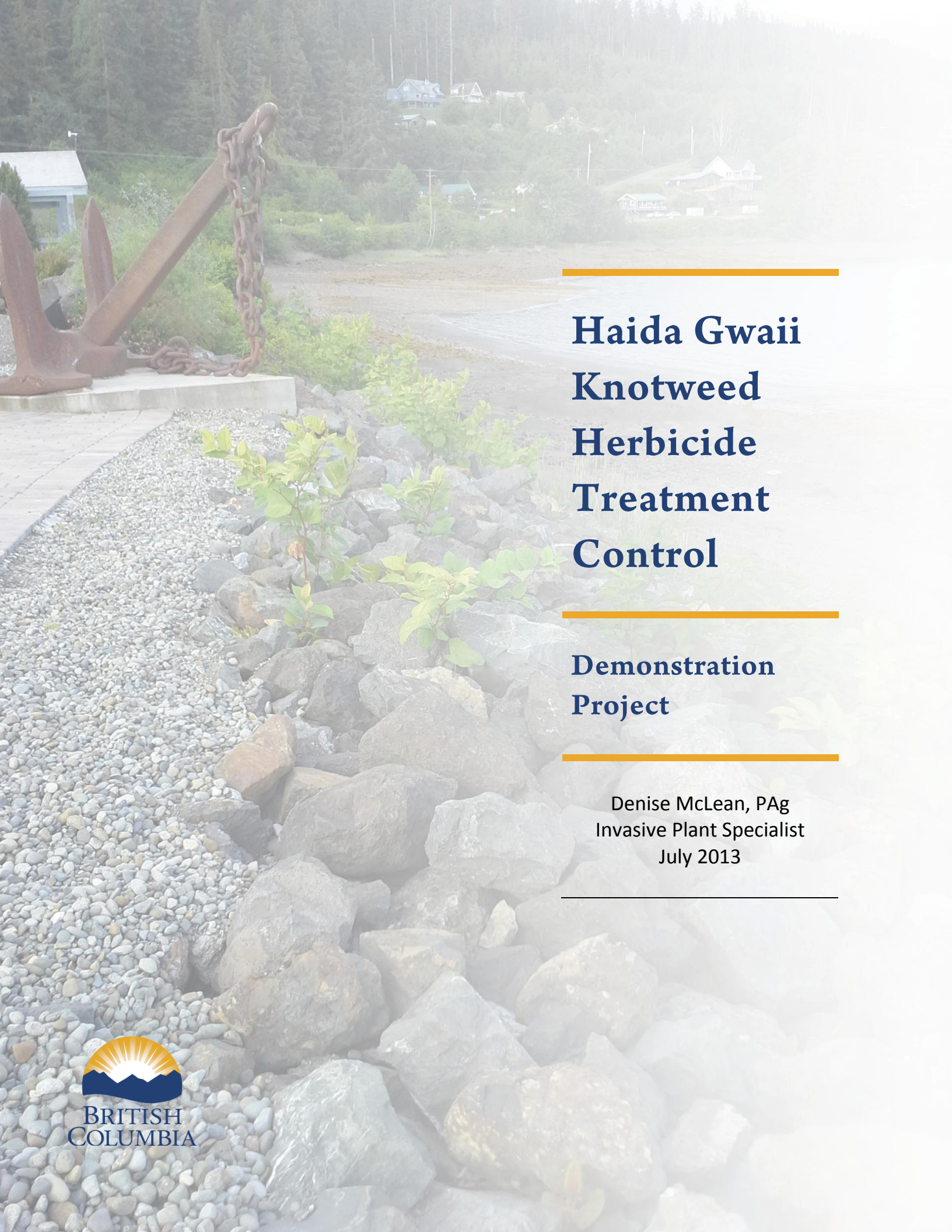

Haida Gwaii Knotweed Herbicide Treatment Control

Demonstration Project

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July 2013

BRITISH COLUMBIA

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Haida Gwaii Knotweed Herbicide Treatment Control Demonstration Project

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Background

Knotweed species have been reported to be present on Haida Gwaii since 1957 (Mike Cheney 2007). The species present include Himalayan Knotweed (*Polygonum polystachyum),* Japanese knotweed (*Fallopia japonica*) and recently confirmed Bohemian knotweed (*F. x bohemica*). Infestations of knotweed are found mainly in the settled areas of Haida Gwaii on private, federal and provincial Crown lands. These sites threaten both infrastructure and the environment on Haida Gwaii as many of the sites are located directly adjacent to roadways, utilities (water and sewer lines and pumping stations) and waterways.

Japanese knotweed infestation

These plants will crowd out native vegetation and infest stream banks making them vulnerable to erosion. Labelled one of the world's 100 worst invasive species, knotweed is a significant threat to both the environment and infrastructure, and requires a long-term treatment strategy for successful control.

The knotweed species are of particular concern wherever they establish. Not only do they have the ability to spread rapidly and quickly, knotweed roots have the ability to push through cracks in pipes, roads and building foundations. Knotweed shoots can re-sprout after cutting and 1 cm root pieces can also re-sprout. Roots are prolific and extensive and extremely difficult to remove once established.

Himalayan knotweed infestation in Haida Gwaii

Knotweed Management on Haida Gwaii

Since 2005, management of invasive plants on Haida Gwaii has been accomplished through the Northwest Invasive Plant Council (NWIPC). The NWIPC works through a pooled funding delivery model where all stakeholders agree to a strategic plan and contractors for NWIPC manage invasive plants on all participating jurisdictions. The strategic plan gives direction by identifying which invasive plants and what kind of sites are most critical to manage. Contractors then direct their efforts on the invasive plants that are the most threatening to the local area. To gain greater efficiency and to take advantage of local knowledge, the NWIPC has divided the more than 40 million hectares that it encompasses into Invasive Plant Management Areas– each with its own contractor. Haida Gwaii is one of seven Invasive Plant Management Areas. More information on the NWIPC can be found at www.nwipc.org.

The Ministry of Forests, Lands and Natural Resource Operations (FLNR) works collaboratively with the NWIPC to treat invasive plants on provincial Crown land under the multi-agency Pest Management Plan.

Knotweed control has been very limited on Haida Gwaii. During consultation for the multi-agency Pesti Management Plan, concern was raised by the Haida First Nations regarding pesticide use. The province respected these concerns and other treatment methods were tested and monitored to see how effective they might be for knotweed. Further consultation was begun when it was clear that there was limited success with manual methods of control of knotweed that were tested including salt water, cutting and smothering.

Attempted smothering of knotweed

The manual work tested on knotweed has had variable success. Treatments with sea water to saturate the soil on sites next to the shore were successful on Himalayan knotweed but not on Japanese or Bohemian. The salt water treatments changed the salinity of the soil to a point where the plants could no longer tolerate it and they died. Salt water treatments outside of the shoreline are not practical due to distance and not suitable for non-shoreline sites as the soil will be negatively affected by the increased salt concentration. A number of different techniques to smother the plants were also attempted. These treatments have suppressed the knotweed beneath the covering but plants continue to appear on the edges. Mowing and cutting techniques have had little to no effect on the plants.

Cutting knotweed has not been an effective control measure

Timeline

June 2012	On June 21, 2012 the Village of Queen Charlotte approached the Integrated Stewardship Team on Haida Gwaii regarding assistance to control knotweed with herbicides on their property (leased Crown land) where they wanted to put in playground equipment and build a new teen center. The site had been contaminated with knotweed infested fill in previous years. The Stewardship Team was subsequently tasked with preparing a briefing note for Minister Steve Thomson's (FLNR) meeting with the Village of Queen Charlotte UBCM (Sept.19, 2012).
July 2012	Due to the lack of success of manual treatments, the Ministry of Transportation and Infrastructure informed the NWIPC in July 2012 that manual treatment of knotweeds would no longer be funded.
September 2012	To provide further information on knotweed and herbicide use (glyphosate in particular), Denise McLean, Invasive Plant Specialist, FLNR, visited Haida Gwaii in September 2012 and presented to the Integrated Stewardship Committee. This information and supporting documentation was used to prepare a briefing note for the Executive of the Council of Haida Nations.
October 2012	The Council of Haida Nations Executive Working Group met on October 2, 2012 with this as an agenda item. Dave Ralph, Senior Invasive Plant Technologist, FLNRO and Yvonne Herbison, Regional Pesticide Officer, Health Canada, were available to answer questions. Dave Ralph was later contacted to provide additional information on the best time for treatments. The Executive passed a motion to allow the use of glyphosate on Knotweed at two areas – Village of Queen Charlotte grounds and Skidegate.
April 2013	Preparations for herbicide trials began with consultation with the Skidegate Band Council to explain the process, determine a suitable site and answer any questions regarding the herbicide proposed. The Band Council requested more information especially on the safety of the herbicide glyphosate and what the plan was for a trial. As a result, in April 2013, Yvonne Herbison and Denise McLean presented to the Village of Queen Charlotte, Port Clements Mayor and Skidegate Band Council on herbicide safety, particularly glyphosate, and the threat of knotweed. Both local governments requested public information meetings before the treatment progressed.
May 2013	Public information open houses were held in mid-May 2013 with booths on Knotweed growth and management, invasive plants in general (staffed by NWIPC), mapping of invasive plants (courtesy of FLNR) and Integrated Pest Management. Open House venues included Skidegate - which provided easy access for both Skidegate and Village of Queen Charlotte residents - on May 22; and in Port Clements for those residents in the North to attend on May 23.
As a result of these meetings, a site was found in Skidegate –the sewage pump station and backup generator – which best demonstrated the use of herbicide while protecting critical infrastructure. A brief plan outline was sent to the Skidegate Band Council which was approved.	

Project Goal

Demonstrate various herbicide treatment techniques choosing the best technique for the plant species, location and stage of growth. Also, to allow staff of FLNR and Village of Queen Charlotte to train and review treatment technique options under the supervision of a Certified Applicator.

Treatment Plan

Three treatment sites were selected based on suitability for demonstration, the size of the infestation and species of knotweed , and threat to infrastructure. All sites had been previously mapped and infestation size recorded on the Provincial Invasive Alien Plant Program (IAPP) application (http://www.for.gov.bc.ca/hra/Plants/application.htm).

Bohemian knotweed at Village of Queen Charlotte empty lot (Site 1)

Treatment type selected at each site will vary depending on the species targeted, plant size and site location. As with any treatment type used to control invasive plants, a succession of treatments is often required to completely eradicate the target plants from a site. Knotweed treatments will likely require additional applications of herbicide in 2013 to ensure all plants at a site are treated.

Dave Ralph and Denise McLean will travel to Haida Gwaii to assist in the planning, layout, treatments and record keeping. All treatment data will be entered into the IAPP application. A certified applicator will treat sites later in 2013. All activities will comply with the *Integrated Pest Management Act* and Regulation and Pest Management Plan # 402-0657-2010/15 (http://www.for.gov.bc.ca/hra/plants/PMP.htm). Future treatments, outside of this demonstration, will only be undertaken after further consultation.

Site 1:Village of Queen Charlotte empty lot.

IAPP site #117467

Target Species	Bohemian Knotweed
Site Description	Due to construction of the playground in spring 2013, the site contained knotweed of different sizes ranging from 2 or 3 leaves to 2 meters tall. Treatment type was assigned based on the size of plants.
Treatment Type	Stem Injection, Wipe-on and foliar spray

Site 2: Oceanview Dr.

IAPP site # 117303. South side of hwy

Target Species	Japanese Knotweed
Site Description	Located adjacent to the highway and is an extension of the original site located across the highway. This site was suitable to demonstrate treatment in and around native plants using stem injection.
Treatment Type	Stem Injection. Injecting across the stem, leaving stem on.

Site 3: Skidegate sewage lift station

IAPP site #117624 (site has extended from the original site upstream)

Target Species	Himalayan Knotweed
Site Description	This site surrounds the Skidegate Village sewage lift station and backup generator. There is risk that the knotweed will infiltrate the pipes and foundations of the works building causing damage. The site also borders a creek where there is risk that the knotweed will out-compete native vegetation and cause streambank erosion during high water events.
Treatment Type	Foliar spray

Herbicide Proposed for all treatments

RoundUp WeatherMax - (active ingredient: glyphosate) PCP # 27487

2013 Treatments

Product used for all treatments: RoundUp WeatherMax PCP # 27487. All applicators will wear appropriate personal protective equipment including safety glasses, rubber gloves, rubber boots and impermeable suits.

Site 1:Village of Queen Charlotte empty lot.

IAPP site #117467 - see treatment area map attached as Appendix I (page 13)

Treatment Date and Time	June 26, 10:30am
Pre-treatment Preparation	Site was ribboned off by QCC staff before treatment and left for 24hrs after treatment. Treatment signs were erected and left in place for 14 days. Treatment signs were posted on all access points and the 2 small patches by the youth center.
Treatment	**Stem Injection: large plants** • Type A: using JK stem injector. Injecting across the stem, leaving stem on. 5ml/plant undiluted (100%) • Type B: using hypodermic needles. Cutting plant off between the 2nd and 3rd node and injecting down through the membrane. 5 ml per plant. 50% dilution. Plant stems were bagged for transport to drying/burning site. **Personnel:** Supervisor: Denise McLean. Operators: David Ralph, Alvin Cober, Ben Greenough, VQC Works Supervisor and 3 maintenance staff (Maximum four people operating at any one time) **Wipe-on: medium sized plants** • Using a PVC hockey stick style wick applicator. 22% solution. **Personnel:** Supervisor: Denise McLean. Operators: David Ralph, Alvin Cober, 3 VQC maintenance staff (One operator at a time) **Foliar Spray: small plants:** • Done on June 27, 9am 1.35% solution (not done on June 26 due to wind exceeding 20km/hr) • Using a back-pack and a hand-held sprayer **Personnel:** Supervisor: Denise McLean. Operators: David Ralph and Alvin Cober

Site 1 - Stem injection type A

Site 1 - Stem injection type B

Site 1 - Wipe-on

Site 1 - Foliar spray

Site 2: Oceanview Dr.

IAPP site # 117303. South side of hwy

Treatment Date and Time	June 26, 11:30am
Pre-treatment Preparation	Sign was posted. Replaced on June 27th (disappeared) and reposted on June 28th and July 2nd.
Treatment	**Stem Injection** • Using JK International LLC stem injector. Injecting across the stem, leaving stem on. 17 stems injected. 5ml/plant undiluted (100%). **Personnel:** Supervisor: Denise McLean. Operator: Alvin Cober

Sign posted at Site 2

Site 2 - Stem injection

Site 3: Skidegate sewage lift station

IAPP site #117624 (site has extended from the original site upstream)

Treatment Date and Time	June 27th 3:45pm
Pre-treatment Preparation	The high water mark for the creek was determined and ribboned with Pesticide Free Zone ribbon. Treatment was limited to outside of one meter from the high water mark which coincided with the dripline of large stream-side alder trees. Site was ribboned off for 24 hrs and signs posted at access points.
Treatment	**Foliar Spray application on Himalayan knotweed** • 1.35% solution • Using a back-pack and a hand-held sprayer. **Personnel:** Supervisor: Denise McLean. Operators: David Ralph and Alvin Cober

Site 3 - ribboned off

Site 3 - Foliar spray

Monitoring Plan

The effect of the treatments will be determined by measuring the percentage of knotweed stems affected by the treatment. As knotweeds have extensive root systems, any re-growth will also be noted. Monitoring for effectiveness will be done monthly (late July, late August, late September and Spring 2014) by Alvin Cober, and results recorded.
The monitoring template to be used is attached as Appendix II (page 14).

For a visual record, overview photographs will be taken before, during and after treatment at established photo-points. After treatment, photographs will be taken once a week to show progression of treatment effects.

Reporting

Treatment and monitoring reports will be provided to the Council of Haida Nations, the Skidegate Band Council, the Village of Queen Charlotte, the Haida Gwaii Integrated Stewardship Committee and FLNR in November 2013 following fall monitoring, and again in May 2014 following spring monitoring of treatment sites.

Long Term Treatment Plan

Monitoring results will determine a long term treatment plan on each site. As the season progresses, additional knotweed stems will appear that were missed in the first treatment. To ensure that the entire infestation is eradicated, additional treatments will be needed in the first year and in following years. Further consultation will be held in Spring 2014 or sooner to discuss results and future treatment plans.

Appendix I – Map of Site 1-Village of Queen Charlotte empty lot

Haida Gwaii Knotweed Herbicide Treatment Control Demonstration Project

Date Monitored:

Site Location	Knotweed Species	Treatment Type	Area Treated	Number of Stems Treated	% Affected by treatment	% Killed by Treatment	Comments
Site 1:							
Village of Queen Charlotte IAPPsite #117467	Bohemian	Stem Injection Type A					
		Stem Injection Type B					
		Wipe-on		n/a			
		Foliar Spray		n/a			
Site 2:							
Highway 16, south side IAPP site# 1173030	Japanese	Stem Injection Type A					
Site 3							
Skidegate Lift Station IAPP site# 117624	Himalayan	Foliar Spray		n/a			

ADDENDUM

Haida Gwaii Knotweed Herbicide Treatment Demonstration Project
Summary of Results - July 2014
Denise McLean, Ministry of Forests, Lands and Natural Resource Operations

Site Name	Area	Knotweed Species	Description	Herbicide Treatment:	Total undiluted herbicide used[1]	Treatment Results	Overall Results and Comments
Village of Queen Charlotte Field	0.5 ha	Bohemian	Plants range from 5 cm to 1 meter tall. Larger plants on the edge of the field, and small plants in the middle. Plants were flagged before treatment and a biodegradable dye was added to the herbicide to mark where herbicide was applied.	**Large plants:** Stem Injection and Cut-and-insert June 2013: 66 stems treated September 2013: 4 stems treated	June 2013: 330 ml Sept 2013: 20 ml	Stems rapidly dropped leaves, turned brown and died.	Due to on-going disturbance at the site, new plants emerged throughout the season, requiring additional treatments.
				Medium Plants: Foliar (backpack) spray June 2013: 0.217 ha September 2013: 0.0261 ha June 2014: 0.0043 ha	June 2013: 132 ml Sept 2013: 159 ml June 2014: 26 ml	Plants turned yellow within 10 days and died within 3 weeks	
				Small Plants: Wipe-on June 2013: 0.0046 ha June 2014: 0.0043 ha	June 2013: 70.4 ml June 2014: 60 ml	Plants turned yellow within 10 days and died within 3 weeks.	
Oceanview Drive	2 m^2 (0.0002 ha)	Bohemian	Site contained 17 tall, large stems and a few very short stems.	**All Plants:** Stem injection June 2013: 17 stems September 2013: 6 stems	June 2013: 85 ml Sept 2013: 30 ml	Plants rapidly dropped leaves, turned brown and died.	June 2014: All visible stems in this isolated patch died. On-going monitoring will continue.
Skidegate Village Sewage Lift Station #1	0.25 ha	Himalayan	Dense patches of knotweed extending from the streambank into the fenced lift station, surrounding the shed, generator pad and lift-station standpipe.	**All Plants:** Foliar spray June 2013: 0.435 ha September 2013: 0.0043 ha A one meter band along the stream was marked with ribbon to identify the Pesticide Free Zone. No treatment occurred in this area.	June 2013: 265 ml Sept 2013: 26.2 ml	All treated plants gradually turned yellow, then brown and died.	Plants had been mowed before the first herbicide treatment, limiting the ability to treat all the plants present. Follow-up treatment in September to control plants previously cut and scattered plants within the fenced area. The area continues to be re-infested from the plants growing along the streambank.

[1] **Roundup WeatherMax with Transorb.2 Technology (active Ingredient: Glyphosate)**