

Newhalem Riparian Restoration Project Seattle City Light



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PROJECT BACKGROUND

The Newhalem Riparian Restoration Project, is located in the town of Newhalem and on Babcock Creek just west of Newhalem. The town of Newhalem is located in Whatcom County within the upper Skagit Watershed on highway 20, approximately 15 miles east of Marblemount and 64 miles from Interstate 5. The town itself is an unincorporated town owned by Seattle City Light (SCL) for the Skagit River Hydroelectric Project. The Skagit River and five tributaries run through Newhalem and the land surrounding Newhalem, is the Ross Island National Recreation Area and North Cascades National Park, managed by the National Park Service.

The need for restoration in the project area was originally identified through the Upper Skagit Knotweed Program surveys throughout Newhalem, led by Skagit Fisheries Enhancement Group (SFEG). SFEG knotweed surveys in the Newhalem found widespread weeds of concern in riparian areas and also found evidence of these weeds spreading from Newhalem downstream into National Park Service land and the Skagit River floodplain. In 2013 the need for restoration in the riparian areas of Newhalem was brought forward by SCL and in 2014 SFEG signed a 2 year Memorandum of Agreement (MOA) with SCL to implement restoration actions.

The overarching goal of the Newhalem Riparian Restoration Project was to work in the riparian area of the Skagit River within SCL lands and restore identified areas and their native plant communities through invasive control and revegetation.

This report documents the work completed under the Newhalem Riparian Restoration Project MOA from June of 2014 through September of 2015. This includes the control of invasive species through the riparian areas of Newhalem and along Babcock Creek, monitoring of these sites and the revegetation of these areas.

Overall, results detailed in this report document a significant reduction of invasive species in the riparian areas of Newhalem. Based on the findings detailed in this report, the overall recommendation for the Newhalem riparian area is that to insure the effectiveness of initial invasive control work completed by SFEG, follow up treatment of all weed species is needed. Follow up work is recommended for the next 3 years. Because of the level of control achieved in the project work areas, follow up work would be minimal and should focus on early detection and the control of invasive plant resprouts in the riparian areas. Specific recommendations for each weed species are included in this document. For a summary of recommendations, see table 6.

PROJECT SET UP

Per the MOA with SCL, the Newhalem Riparian Restoration Project was divided into 5 weed control actions. Each action represents an invasive species management priority or control action (table 1). In addition to control actions outlined in the MOA the riparian areas were broken up into management areas. Each management area has distinct geographic boundaries and associated weed populations (table 2). Developing management areas for weed control was important in creating discrete work plans for the Washington Conservation Corps (WCC) crews that implemented control with SFEG. This report details

the work completed for each management area and control action as well as the recommendations for future work. Each section of this report is broken up by weed control action. Recommendations in this report for continued restoration are based on data from vegetation monitoring plots and visual site assessments.

To track site restoration over time vegetation monitoring plots were set up to represent each control action and management area. There were five plots set up in total. The goal of these plots was assess baseline conditions to develop site appropriate revegetation plans and to track changes in vegetation overtime. Vegetation monitoring results are referred to in this report in relationship to each control action and as reference data for that action.

Table 1. Weed Control actions in Newhalem and Babcock Creek.

Weed Control Priority Action	Control Area	Plot
Control Traveler's Joy (<i>Clematis vitalba</i>)	Gorge Powerhouse, along Skagit River to NPS Bridge.	Plot 1402-03
Control English Ivy (<i>Hedera helix</i>)	Gorge Powerhouse, along Skagit River to NPS Bridge.	Plot 1401
Control other invasives (target weed list.	Gorge Powerhouse, along Skagit River to NPS Bridge.	Plot 1401-03
Control Jewel weed	Babcock Creek	Plot 1405
Control Blackberry	Babcock Creek	Plot 1404

Table 2. Weed Control Management Areas in Newhalem and Babcock Creek.

Weed Management Area	Weed species controlled	Plot
Below the Green House Drive, Skagit River Left (Gorge Powerhouse)	Species controlled; English Ivy, clematis, robina hispida, golden chain, Himalayan blackberry.	Plot 1401
Skagit River Right; Gorge Powerhouse Bridge to Ladder Creek	Species controlled; clematis, creeping blue bells, sycamore maple, Himalayan blackberry.	Plot 1402
Skagit River Right and Left; Ladder Creek to Newhalem Mainstreet	Species controlled; clematis, vinca minor, English ivy, golden chain, sycamore maple, creeping blue bells, black walnut, English hawthorn, Himalayan blackberry.	Plot 1403
Skagit River Right; Newhalem Mainstreet to NPS Bridge	Species controlled; clematis, vinca minor, English Ivy, golden chain, sycamore maple, creeping blue bells, black walnut, English hawthorn, Himalayan blackberry.	no plot
Babcock Creek	Blackberry and Jewel Weed	Plot 1404 -1405

Non-native invasive plant species that were controlled and mapped through this project are listed below:

Highest priority species controlled:

Common Periwinkle (*Vinca minor*)
English ivy (*Hedera helix*)
Himalayan blackberry (*Rubus armeniacus*)
Travelers joy (*Clematis vitalba*)
Jewel weed (*Impatiens capensis*)

Secondary priority species controlled:

Black locust (*Robinia pseudoacacia*)
Bristly locust (*Robinia hispida*)
Creeping blue bells (*Campanula rapunculoides*)
English hawthorne (*Crataegus laevigata*)
English holly (*Ilex aquifolium*)
Field bindweed (*Convolvulus arvensis*)
Golden chain (*Laburnum anagyroides*)
Scotch broom (*Cytisus scoparius*)
Sycamore maple (*Acer pseudoplatanus*)

SFEG mapped all noxious weeds controlled within the project area. Mapping of weeds was identified as important in order to track weed locations, to perform follow up treatment over time and to better understand weed distribution. Weeds were mapped using garmin etrex gps units and a unique identification code. Patches were coded by USDA weed code abbreviations, year found and a unique number. Patches were mapped by recording a single point per patch area (Figure 1). Points for each weed species are assumed to have a 50 foot radius of connected infestation.

In the first year of implementation SFEG with the assistance of the Washington Conservation Corps Crew mapped over 125 distinct weed patches across the project areas. At the close of the project SFEG had mapped and treated 142 weed patches.

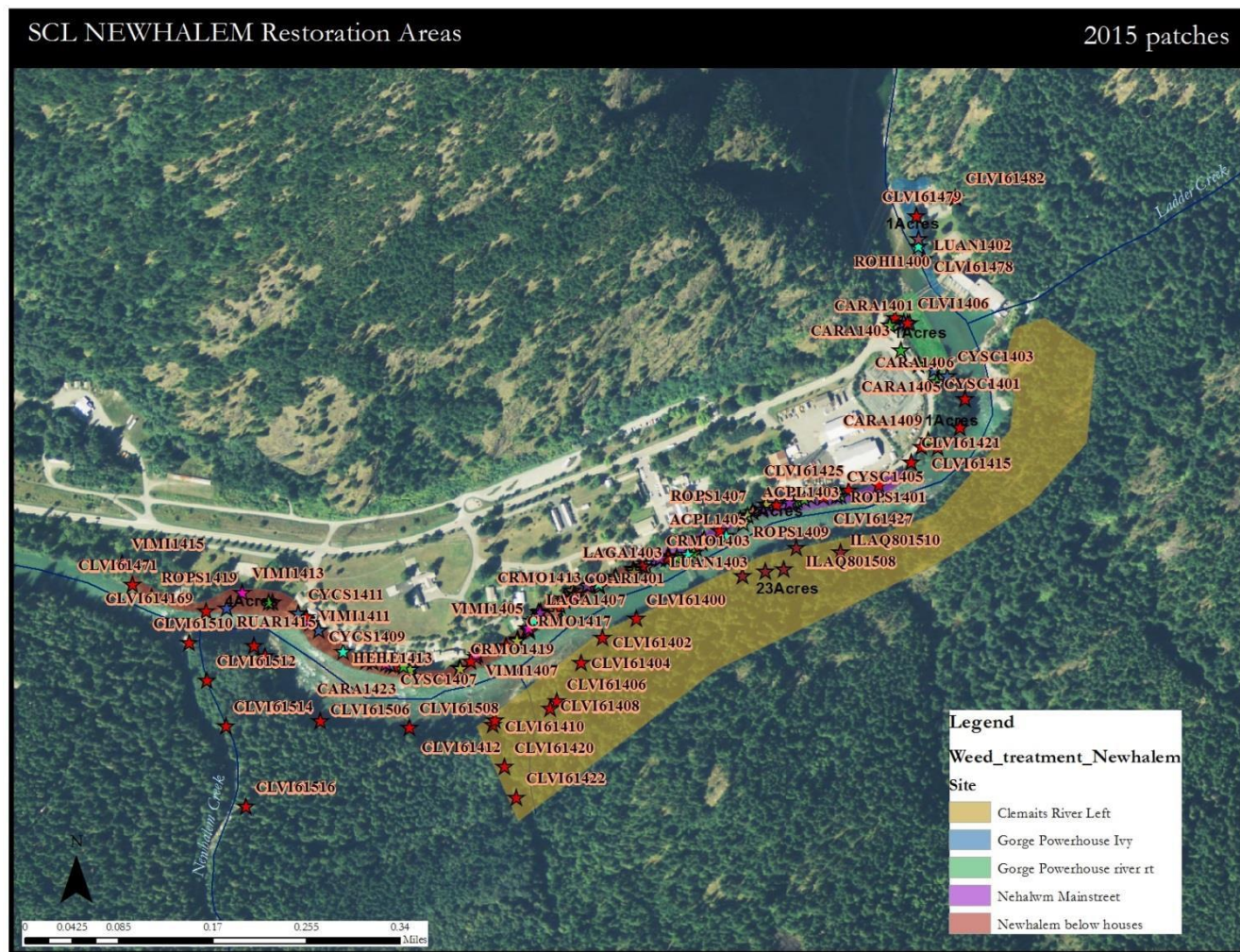


Figure 1. Distribution of invasive species mapped in Newhalem.

CLEMATIS CONTROL, FROM GORGE POWERHOUSE ALONG SKAGIT RIVER TO NPS LAND

Over 50 patches of travelers joy (*Clematis vitalba*) were treated throughout the project area from 2014 to 2015. Patches were defined as continuous area of infestation and were up to 40ft wide in some areas. Clematis control was achieved through both chemical treatment (foliar spray, E-Z ject and cut and paint) and hand removal. Initial control was done with herbicide, using a foliar spray with a mix of 2.5% glyphosate, trade name AquaNet. After initial herbicide treatments in 2014, in 2015 follow work was done with hand removal techniques and spot spraying. SFEG found that Clematis infestations were present throughout the riparian areas of Newhalem.

Clematis infestations were much more extensive than originally estimated and the spread of clematis infestation from SCL land to NPS land below Newhalem is of serious concern. Treatment of clematis through this project has controlled all infestations and over 50% of mapped patches appear to be dead,

however small resprouts will continue to be an issue and will need to be surveyed for and treated for this work to be successful in the long term. Without continued follow up work, clematis will continue to re-infest now clean areas. SFEg recommends that controlling this weed, because of its effective seed dispersal and extensive infestation should be one of the highest priorities for future restoration work in Newhalem.

Vegetation monitoring data collected for plots in Newhalem show substantial clematis control was achieved but that follow up work is needed. Plot 1402 was set up in a clematis control area adjacent across from the Gorge Powerhouse. Baseline data in this plot showed that clematis covered 10% of the plot area in 2014 prior to project implementation. Follow up monitoring in September 2015 recorded <1% clematis present in the area. Plot 1403 which was set up adjacent to the trail of cedars bridge, showed 15% coverage of clematis in 2014 prior to project work and <1% in post project monitoring in September 2015. These monitoring results show the progress that has been made in control, but that small areas of clematis still remain, supporting the need for follow work is still needed (figure 2-3).

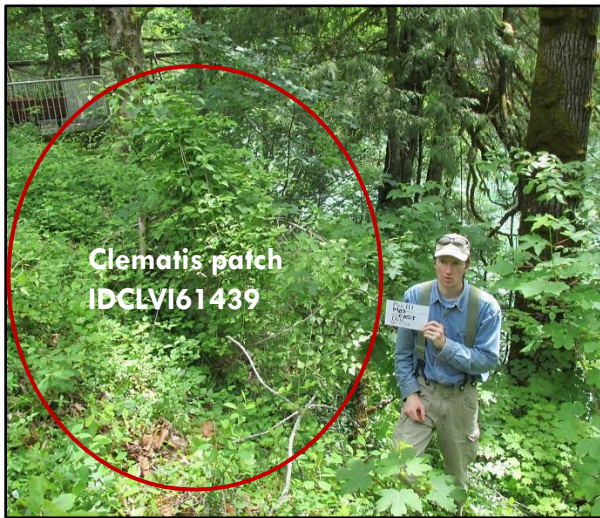


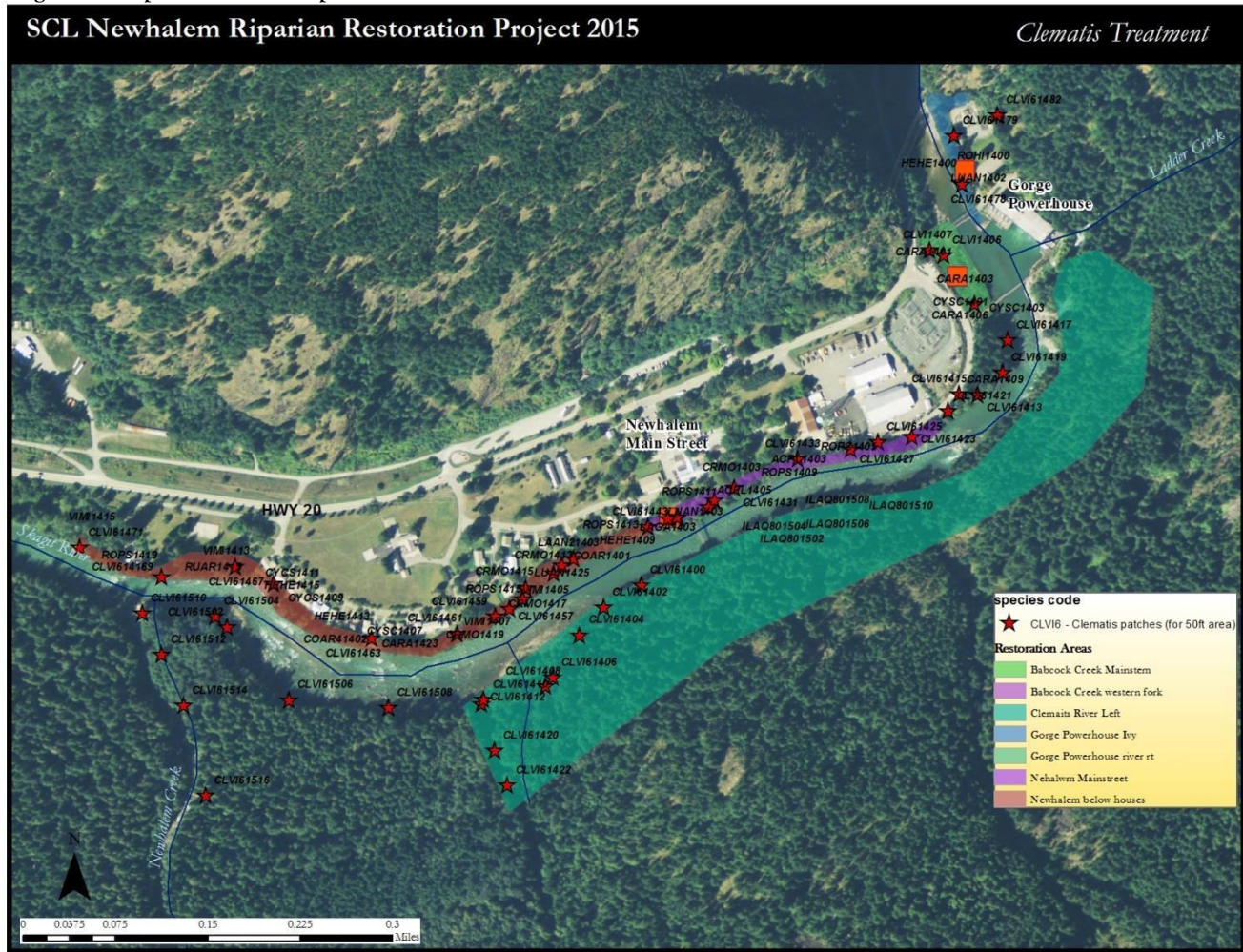
Figure 2. plot 1403 prior to treatment, photo shows extensive clematis infestation.



Figure 3. plot 1403, patch CLVI61439 was dead in 2015, <1% clematis remains in this area.

Clematis work areas were broken into four sections which are described below.

Figure 4. Map shows clematis patches in Newhalem.



Area: Below Green House Drive, Skagit River Right

In the area below the green house drive infestations of clematis were minor with small patches interspersed throughout the English ivy. However, a large source population along the eastern greenhouse fence is of serious concern and is in need of retreatment in 2016. This area was extensively treated in 2014, however the 2015 fall treatment of this fence line could not be done in this area due to downed power lines from the Newhalem fire. The bare ground at the ivy control site adjacent to the river is also vulnerable to new clematis and weed infestation. This area will need to be monitored carefully to prevent invasion.

Area: Skagit River right, Gorge Powerhouse Bridge to Ladder Creek

The treatment segment on the Skagit River right from the gorge powerhouse bridge to ladder creek, was the worst infestation of clematis in the Newhalem riparian area when the project began in 2014. When work began clematis had climbed up the gorge bridge and had covered approximately .4 acre of ground below the bridge with additional infestations throughout the native vegetation in the area. Where clematis had not overtaken native vegetation, it had interwoven itself into native vegetation. Treatment of this section was difficult because of the volume of clematis and the way it had interwoven into native plants. Crews worked to remove clematis from native plants prior to treatment. As of the fall of 2015 only small clematis resprouts were found in this area.



Figure 5. photo spring of 2014, clematis patch was in the river and strangling adjacent tree.

Area: Skagit River right and left, Ladder Creek to Newhalem Mainstreet

The treatment of the section on the Skagit River right from ladder creek to Mainstreet, began in 2014. Clematis infestations were found throughout this area, clematis in this section had also climbed many of the mature trees. Clematis patches were also found in the floodplain area on the Skagit River left and especially along Newhalem Creek and the gravel bars of the river. Most of the river left patches were small and appeared to have recently established. Because of the fires in the summer, there was no access to the trail of the cedars and retreatment of clematis patches on the river left was not done in the fall of 2015. However, clematis was spot sprayed on river left in the spring of 2015. Transect surveys of this section are recommended for 2016. This is because of the small resprouts that can be found. Survey is also recommended to be conducted during low flows as there will likely be many small resprouts along the river margin.



Figure 6. Clematis patch adjacent to Skagit River, beginning to strangle native vegetation.

Area: Newhalem Mainstreet to NPS bridge

The treatment segment on the Skagit River right from Newhalem Mainstreet to the NPS bridge, began in 2014. Clematis infestations were found throughout this area, with one patch covering a 15 by 30ft area (figure 6).



Figure 7. Slope covered in clematis, found below the Newhalem housing in 2014.

IVY CONTROL, FROM GORGE POWERHOUSE ALONG SKAGIT RIVER TO NPS LAND

Prior to project implementation in 2014, ivy was present in dense monocultures in Newhalem from below the greenhouse drive to the powerhouse on the Skagit River left and on the right side of the Skagit River from the Ladder Creek Bridge to the pump house at the western end of Newhalem. From 2014 to 2015 SFEG worked to control ivy throughout Newhalem. Initial control was done with foliar spray of 2.5% glyphosate, trade name AquaNet. Newhalem ivy work was broken into 3 work areas and ivy control covered approximately 2.8 acres in these areas.

The baseline vegetation monitoring plot 1401 was set up below the green house drive in an area of dense ivy. Baseline plot data recorded prior to project work showed a 90% cover of ivy. In the fall of 2015 post treatment, percent cover was reduced to 23%. As described in the section below ivy control below the greenhouse drive (plot 1401) was especially difficult due to the density of the coverage, however significant progress has been made as shown by the 67% reduction in percent cover. Other areas that had similar ivy coverage prior to treatment now appear to have less than 1% coverage, such as the section of adjacent to Newhalem mainstreet (figure 11).

Overall, despite the continued presence of some ivy, treatment in all of these areas was successful with a significant reduction in ivy coverage at every control site. However, given that ivy is still present, follow up surveys and treatment are recommended for all areas. Site specific details are described below.

Area: Below Green House Drive, Skagit River Right:

Prior to treatment of ivy in this area was very dense, extending over a foot in depth in many section in continuous coverage. Ivy in this area extended from east of the greenhouse to the gorge powerhouse actively covering at least 8 mature trees. Extensive treatment of the ivy in this section has been done since the summer of 2014. All ivy girdling the trees has been cut down (figure 1 and 2) and approximately 70% of ivy has been controlled.



Figure 8. Greenhouse drive ivy control area during spring 2014 work, removal of ivy being removed shown here.



Figure 9. Ivy climbing trees was girdled in the spring of 2014, shown in this photo ivy dying on large trees in the fall of 2014 as a result of this work.

Beginning in the spring of 2014 ivy was foliar treated with 2.5% glyphosate, trade name AquaNet, treatment occurred in the fall of 2014 and again in the spring of 2015. Treatment of ivy in this area has been challenging due to the depth of the infestation and some sections of ivy are still actively growing. As illustrated in figure 2, significant progress has been made and ivy has been controlled in many sections. After two seasons of chemical treatment the remaining patches are recommended for hand removal.



Figure 10. Before, 2014 ivy below Gorge Powerhouse bridge (left) and after (right) September 2015 absence of ivy below the bridge.

Area: Skagit River right and left, Ladder Creek to Newhalem Mainstreet

Prior to project implementation ivy was found throughout the area from Ladder Creek bridge to Newhalem mainstreet. Ivy in this section was not as dense as the greenhouse drive, and was easily hand pulled in some sections, however there were 3 sections with continuous ivy over 25ft in length. Beginning in the spring of 2014 ivy was foliar treated with 2.5% glyphosate, trade name AquaNet. Ivy was hand pulled in the fall of 2014 and the spring summer and fall of 2015. Ivy was piled on sites and larger areas of ivy were removed from the sites and piled in the green house yard.

After two years of focused treatment and removal very few small sprouts of ivy remain in this section. However, follow up hand removal will be needed for at least several years to make sure small resprouts do not re-establish.



Figure 11. Before, 2014 ivy near Newhalem Mainstreet (left) and after (right) September 2015 absence of ivy and new plantings in the area.

Area: Skagit River right, Newhalem Mainstreet to NPS bridge

Ivy is established in dense coverage from Newhalem Mainstreet to the pump house and tennis courts. This area was treated with herbicide from 2014 -2015. Many trees in this section were also being strangled by ivy. The WCC uncovered most trees in this section by girdling ivy at the tree base and cutting and painting large roots or ez-jecting them. Herbicide treatment in this section has knocked the ivy back significantly, however this area needs follow up treatment with herbicide.



Figure 12. Prior to treatment in 2014 ivy, clematis and vinca near Newhalem Mainstreet at the beginning of the Newhalem houses.

BABCOCK CREEK, HIMALAYAN BLACKBERRY CONTROL

Babcock creek is a tributary of the Skagit River located just west of Goodell creek and Newhalem proper. While upper Babcock is fairly channelized in the upper reaches the last 0.5 mile of Babcock creek is braided and split into two channels with a wide floodplain. This geography makes control of invasives in this area challenging. Himalayan blackberry (*Rubus armeniacus*) on Babcock creek was identified prior to 2014 through knotweed surveys conducted by SFEG and the WCC. Himalayan blackberry is of special concern at this location because, it was not found in surveys of the Skagit river through NPS lands below this creek. Given the substantial impact of Himalayan blackberry in the infested riparian areas of the middle Skagit river, control of this weed along the creek and prevention of spread into the Skagit was prioritized and included in the Newhalem Riparian Restoration Project.

Control of blackberry began in 2014. In the spring of 2014, SFEG and WCC mowed down blackberry patches and returned to treat blackberry in the fall of 2014. This process was repeated in 2015. Retreatment of blackberry was completed in early September of 2015. Blackberry was only found in the area of creek between HWY 20 and the Skagit River. However, blackberry was found and treated on both forks of the creek. This area is directly below the SCL powerlines.

Treatment of blackberry in 2014 did not significantly control blackberry based on visual assessment and the baseline vegetation plot monitoring data collected for the site. Based on data from Plot 1404 which is in the center of the project site, blackberry coverage was 17% in 2014 prior to treatment and up to 30% in the fall of 2015. This increase in blackberry coverage is likely due to the mowing of vegetation and subsequent reduction of native cover, increasing the visibility of the blackberry. These results also confirm that continued treatment is needed at this site. Important to note is that 2015 blackberry treatment occurred at the time of monitoring and therefore results of this second round of treatment are not represented in the data.

Despite finding an increased presence of blackberry, the 2015 vegetation monitoring of this site also revealed a healthy diversity of native plants. With 16 native plant species present in the plot and many native species posed to fill in areas of blackberry treatment. For example, coverage of red-osier dogwood increased from 2% to 18%, gooseberry went from <1% to 4% coverage, and many healthy native shrubs such as salmon berry, thimbleberry, spirea, indian plum and elderberry were all present.

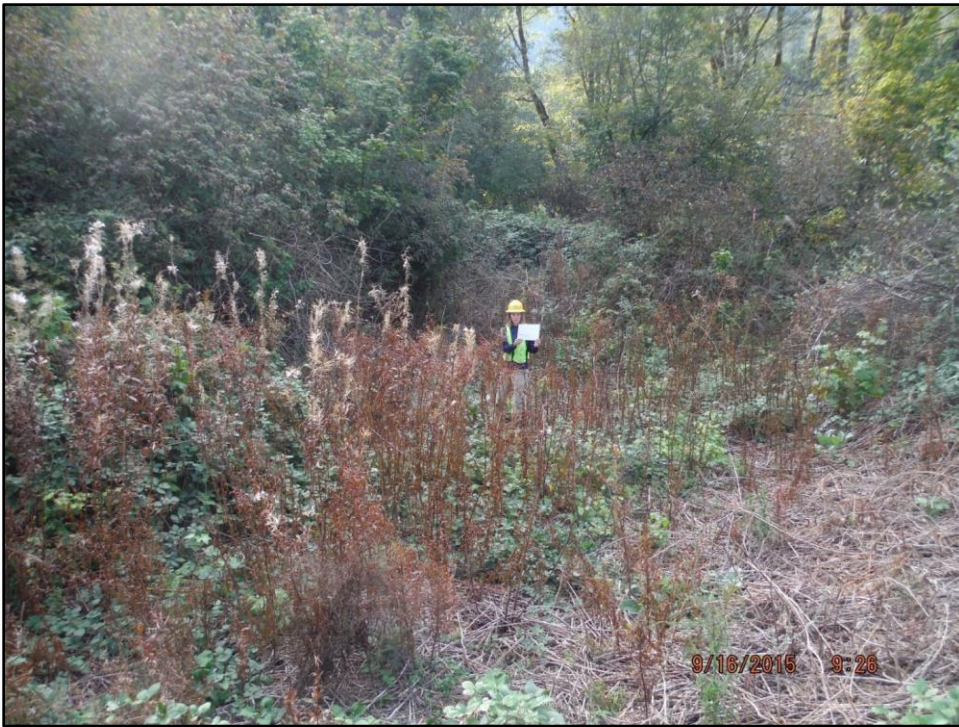


Figure 13. Plot 1404, Babcock creek blackberry treatment.

BABCOCK CREEK, JEWEL WEED CONTROL

Jewel weed (*Imatiens capensis*) was identified during SFEG and WCC knotweed program surveys prior to 2014. However, it was misidentified by the WCC crew as policeman's helmet, a class B weed species and is therefore listed as such in the MOA. Although, jewel weed is only on the state noxious weed list to monitor, its ability to rapidly overtake areas of native vegetation concerned SCL. This and that the weed was not found anywhere on the Skagit's NPS lands below the creek lead to SCL's decision to undertake control of the weed at this site.

The jewel weed at Babcock Creek appears to have spread from the SCL road that leads to a cell phone tower, which is above Highway 20 and another dead end access road that crosses the western channel. The cell phone tower road edge is the area where Jewel weed is at its highest density; in some places in 2014 it covered 100% of the creekside. As of 2015 jewel weed surveys, the weed is present in the last .5 miles of Babcock creek and is found on both outlets and is nearing the Skagit mainstem. Fortunately, during 2015 knotweed surveys no jewel weed was found on upper Skagit River in NPS lands.

Treatment of Jewelweed since 2014 has made a significant impact on patches, however very detailed and rigorous surveys of both channels are needed to insure that it does not spread to the Skagit mainstem. In 2014 control was mostly undertaken through hand removal. This approach was twofold, one to conserve the native plants interspersed with the jewel weed and two many of the work days scheduled in this area did not have weather that was acceptable for herbicide treatment. However, with follow up monitoring in 2015

and increased spread of the weed. Herbicide treatment was therefore prioritized and jewel weed was treated with 2.5% glyphosate, trade name AquaNet in the summer of 2015.

Vegetation monitoring data from the site (plot 1405) show significant results for jewel weed control. Plot 1405 was set up at one of the most densely infested sites on Babcock Creek. Initial monitoring data in the spring of 2014 showed that jewel covered 85% of the site. Follow up monitoring in the fall of 2015 found 0% jewel weed in this area. This is likely because the area was treated with herbicide in June and the plant does tend to die back by September. Treatment areas were also clear in areas dominated by badge moss which was not present in the baseline monitoring data. Also of note in the data, the presence of salmon berry, sword fern, and fringe cup all increased at the site. This site also has a healthy composition of native plants and canopy cover.

Again, prioritized surveys and foliar treatment of jewel weed is recommended for this creek. Significant steps have been made towards its control and follow up is needed to insure this weed does not continue to infest new areas. It is also recommended to survey and treat jewel weed more than once during the year, its phenology is such that it will grow and flower over the course of the entire summer.



Figure 14. Plot 1405, Babcock creek jewel weed prior to treatment in the spring of 2014.

OTHER INVASIVE CONTROL, FROM GORGE POWERHOUSE ALONG SKAGIT RIVER TO NPS LAND

In Newhalem proper in addition to the treatment work focused on Ivy and Clematis control. The following noxious weed species found were identified as weeds of concern and controlled:

Table 3. Weed species controlled in Newhalem.

species code	common name	distribution
ACPS	Sycamore maple	dense and needs follow up
CARA	Creeping blue bells	found along the top edges from gorge bridge to trail of cedars
COAR4	Field bindweed	sparse, none found in 2015
CRMO	English hawthorne	along the river from ladder creek to end of newhalem housing
CYSC	scotch broom	found below newhalem housing
ILAQ80	English holly	found on river left, trail of cedars
LAAN2	Golden chain	found below green house drive and from ladder creek to end of newhalem housing.
LUAN	annual honesty	found below newhalem mainstreet
ROHI	Robinia Hispida	found along green house drive
ROPS	Black locust	found from ladder creek bridge to end of newhalem housing
RUAR9	Himalayan blackberry	found below gorge bridge
VIMI2	Vinca minor	found densely covering areas from trail of cedars bridge to the end of newhalem housing.

Vegetation monitoring plot 1403, located adjacent to the trail of cedars bridge captured many of these species (table 3). The below results from the monitoring plot show the change in invasive species coverage at that site. These changes represent overall changes seen throughout the project area.

Table 4. Invasive species present in Plot 1403

Species	coverage in 2014	coverage in 2015	Change in coverage
Creeping blue bells	2%	1%	1%
Sycamore maple	30%	35%	increase 5%
Himalayan blackberry	1%	0%	1%
Common Periwinkle/vinca	55%	1%	54%
English hawthorne	4%	0%	4%
Clematis	15%	1%	14%
Black walnut	2%	3%	increase 1%

English ivy	<1%	0%	1%
Golden chain	2%	2%	no change
Janapenese berberis	<1%	<1%	1%

All invasive trees listed in table 2, with less than 6 inch dbh were ez-jected or cut and painted with glyphosate. The exception is the sycamore maples, which were only treated from Ladder creek to about 20ft before the trail of cedars bridge. All trees of larger than 6 inches were decided to be the responsibility of SCL staff due to the potential safety hazards associated with their removal and were additionally not removed by SCL. The EZ-ject, was loaded with imazapyr bullets and performed on these trees with varying results. Many trees were impacted by the injection but not completely dead by 2105. SCL did not have EZ-ject available in the fall of 2015 so retreatment of these trees is needed. Trees injected or cut and painted include, golden chain (*Laburnum anagyroides*), English hawthorne (*Crataegus laevigata*), English holly (*Ilex aquifolium*) and black locust (*Robinia pseudoacacia*) and Sycamore maple (*Acer pseudoplatanus*). Sycamore maple is currently being studied by SCL and control is scheduled for future work.

Himalayan blackberry (*Rubus armeniacus*)

In addition to blackberry being present on Babcock Creek, it was also found below the gorge powerhouse bridge and the greenhouse drive and near the pump house at the end of newhalem. Blackberry was treated with 2.5% glyphosate solution in all of these areas, achieving substantial control. Follow up treatment is recommended for 2016.

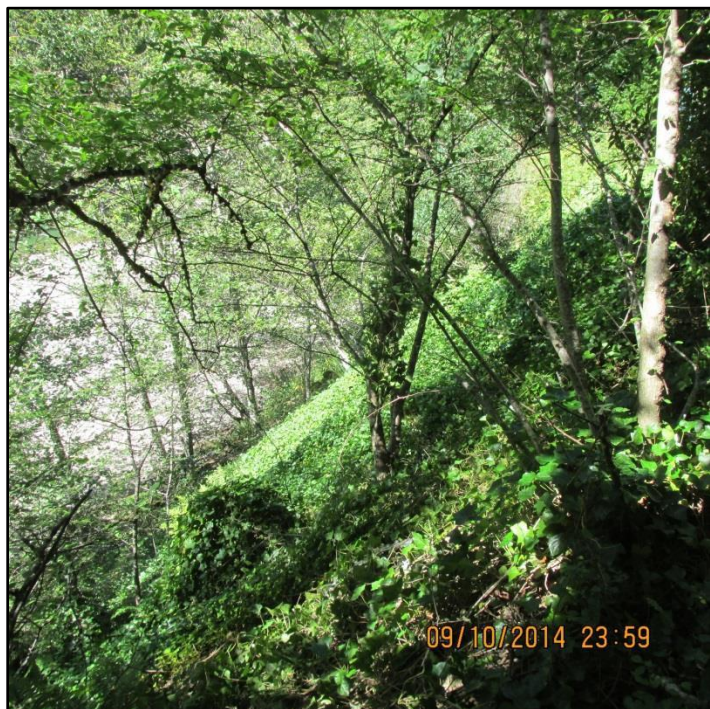


Figure 15. Area below green house, blackberry and ivy shown in photo covered this area in 2014.

Scotch broom (*Cytisus scoparius*) was found mostly behind the Newhalem houses. Scotch was hand removed from this area. Some of the Scotch broom was very large and will need follow up monitoring.

Common periwinkle (*Vinca minor*) was densely present from the Trail of the Cedars Bridge to the Newhalem tennis courts. Baseline monitoring results at plot 1403 adjacent to trail of cedars show that vinca covered 55% of the area in 2014 and by 2015 only 1% remained. This 54% reduction in percent cover is representative of control at all sites, herbicide treatment in 2014 was very effective on the vinca patches. In 2015 vinca coverage was so low that vinca was not treated with herbicide but re-sprouts were removed by hand. Based on field observation, the control of vinca was one of the most effective in the project area. Herbicide used to treat vinca was 2.5% glyphosate. In 2016 monitoring of vinca removal areas is recommended. Small re-sprouts are recommended for hand removal.



Figure 16. Vinca cover adjacent to Trail of Cedars Bridge in 2014 prior to treatment, also shown in photo sycamore maple.

Bristly locust (*Robinia hispida*) was found along the greenhouse drive. This weed species is not on the Washington State Noxious Weed list, but is listed in other states and was therefore a weed of concern and treatment was undertaken. SFEG treated the locust with glyphosate herbicide in 2014 and 2015. Retreatment of this species is recommended as there was still some small resprouts that needed treatment as of 2015.

Creeping blue bells (*Campanula rapunculoides*), where another species that was discovered during treatment. Like Robinia this species is not listed as a noxious weed by the Washington State Noxious Weed Board, but is listed in other states as a noxious weed. The blue bells seem to have spread from landscaping in Newhalem and are present along the top edge of the banks from the gorge bridge to Newhalem mainstreet (blue bells shown in figure 15). Unfortunately, treatment of this species was not very successful. It does not seem to respond well to glyphosate herbicide treatment. Continued control is recommended with an alternate herbicide.



Figure 17. Creeping blue bells in 2014, patch CARA1401.

REVEGETATION OF RESTORATION AREAS

After successful treatment of target weed species, 4 areas that did not have adequate native plant cover after invasive weed treatment were planted with appropriate native species. This action promoted slope stability, and will help to prevent re-infestation by non-native species. Areas replanted were deemed as needing re-vegetation by mutual agreement of both SFEG and SCL as were planting specifications for each site (Figure 18).

Planting originally included the area below the green house drive/adjacent to the Gorge Powerhouse, however ivy control was not sufficient to plant during the project timeline. Planting in this area is recommended for 2016. The plant lists for the other 4 sites are listed in table 5.

Figure 18. This map shows the geographic locations of planting areas in Newhalem.



Newhalem Riparian Restoration Project

Table 5. Plant lists for restoration sites in Newhalem.

Site			
Area2 : River right below gorge powerhouse bridge/clematis area			
size: 0.6 acres			
spacing: 5 foot			
number of plants: 300			
plant name	scietific name	number	notes
ocean spray	<i>Holodiscus discolor</i>	25	
red flowering currant	<i>Ribes sanguineum</i>	25	top of slope
snowberry	<i>Symphoricarpos albus</i>	25	top of slope
nine bark	<i>Physocarpus capitatus</i>	25	
ocean spray	<i>Holodiscus discolor</i>	25	
notka rose	<i>Rosa nutkana</i>	10	top of slope
casacara	<i>Rhamnus purshiana</i>	25	
saskatoon	<i>Amelanchier alnifolia</i>	10	
kinikini	<i>Arctostaphylos uva-ursi</i>	10	ground cover
red osier dogwood	<i>Cornus sericea</i>	25	flood area
willow			flood area
flowers to seed?			
	total	205	
notes:			
Site			
Area 3 : River right below gorge powerhouse bridge/clematis area			
size: 0.6 acres			
spacing: 15-20 foot			
number of plants: 155			
plant name	scietific name	number	notes
ocean spray	<i>Holodiscus discolor</i>	25	
red flowering currant	<i>Ribes sanguineum</i>	10	
snowberry	<i>Symphoricarpos albus</i>	10	
nine bark	<i>Physocarpus capitatus</i>	25	
ocean spray	<i>Holodiscus discolor</i>	25	
goats beard	<i>Aruncus</i>	10	along banks
thimbleberry	<i>Rubus parviflorus</i>	10	along banks
saskatoon	<i>Amelanchier alnifolia</i>	10	
black twinberry	<i>Lonicera involucrata</i>	10	
	total	135	
Site			
Area4 : Bare slope near Newhalem mainstreet			
size: 0.1 acres			
spacing: 5 foot			
number of plants:70			
plant name	scietific name	number	notes
ocean spray	<i>Holodiscus discolor</i>	10	
sword fern	<i>Polystichum munitum</i>	10	
snowberry	<i>Symphoricarpos albus</i>	10	
nine bark	<i>Physocarpus capitatus</i>	10	
vine maple	<i>Acer circinatum</i>	10	
cedar	<i>Thuja plicata</i>	5	
hemlock	<i>Tsuga heterophylla</i>	5	
doug fir	<i>Pseudotsuga menziesii</i>	5	
goats beard	<i>Aruncus</i>	5	
	total	70	
notes:			
Site			
Area 5 : underplanting mainstreet/sycamore maple area			
size: 0.8 acres			
spacing: 20 feet			
number of plants: 215			
plant name	scietific name	number	notes
Western red cedar	<i>Thuja plicata</i>	30	
Hemlock	<i>Tsuga heterophylla</i>	30	
Doug Fir	<i>Pseudotsuga menziesii</i>	30	
vine maple	<i>Acer circinatum</i>	25	
big leaf maple	<i>Acer macrophyllum</i>	35	
nine bark	<i>Physocarpus capitatus</i>	25	
ocean spray	<i>Holodiscus discolor</i>	25	
	total	200	

CONCLUSIONS

The initial goals of the Newhalem Riparian Restoration Project were met by the project close in 2015. High levels of noxious weed control was achieved through restoration actions from 2014-2015. However, SFEG recommends continued treatment is necessary for the project to be successful. Treatment would involve surveying Newhalem riparian areas in the spring summer and fall for noxious weed resprouts and treating any live patches found. Surveying should be done in transects to insure that resprouts are not missed. Recommended timing for retreatment actions is summarized in table 6. Below.

Table 6. Recommendations for continued riparian restoration in the Newhalem area, timing is only estimation.

Newhalem Riparian Restoration Project

Spring work

area	action	time
Below the Green House Drive, Skagit River Left (Gorge Powerhouse)	retreat ivy, clematis (entire area, includes around greenhouse and behind fence) also look for rubina and ez ject any invasive trees.	2 days
Skagit River Right; Gorge Powerhouse Bridge to Ladder Creek	transect survey for clematis, retreat all resprouts, ez ject invasive trees.	1 day
Skagit River Right and Left; Ladder Creek to Newhalem Mainstreet	transect survey for clematis, retreat all resprouts, make sure to look for small patches along river and survey both creeks. Ez ject and cut and paint holly	1 day
Skagit River Right; Newhalem Mainstreet to NPS Bridge	retreat ivy, vinca, clematis.	2 days
Babcock Creek	survey both channels for jewel weed and spray large areas, hand pull small sprouts	1 day

Summer Work

area	action	time
Below the Green House Drive, Skagit River Left (Gorge Powerhouse)	retreat ivy, clematis (entire area, includes around greenhouse and behind fence) also look for rubina and ez ject any invasive trees.	1 day
Skagit River Right; Gorge Powerhouse Bridge to Ladder Creek	transect survey for clematis, retreat all resprouts, ez ject invasive trees.	1 day
Skagit River Right and Left; Ladder Creek to Newhalem Mainstreet	transect survey for clematis, retreat all resprouts, make sure to look for small patches along river and survey both creeks. Ez ject and cut and paint holly	1 day
Skagit River Right; Newhalem Mainstreet to NPS Bridge	retreat ivy, vinca, clematis.	1 day
Babcock Creek	survey both channels for jewel weed and spray large areas, hand pull small sprouts, mow blackberry (1 hr).	1 day

Fall Work

area	action	time
Below the Green House Drive, Skagit River Left (Gorge Powerhouse)	retreat ivy, blackberry and clematis (entire area, includes around greenhouse and behind fence) also look for rubina and ez ject any invasive trees. Plant slope.	4 days
Skagit River Right; Gorge Powerhouse Bridge to Ladder Creek	transect survey for clematis, retreat all resprouts, ez ject invasive trees.	.5 day
Skagit River Right and Left; Ladder Creek to Newhalem Mainstreet	transect survey for clematis, retreat all resprouts, make sure to look for small patches along river and survey both creeks. Ez ject and cut and paint holly	.5 day
Skagit River Right; Newhalem Mainstreet to NPS Bridge	retreat ivy, vinca, clematis.	2.5 days
Babcock Creek	Treat blackberry along both channels	1 day