

Miami Creek Restoration Report 2019

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Fraser Valley Conservancy
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Canada 

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Context

Miami River, located in Agassiz BC (see Figure 1), was identified as critical habitat for the endangered Salish Sucker (*Catostomus catostomus*) in the 2012 recovery strategy for this species (Fisheries and Oceans Canada, 2012). The majority of this watercourse exists within the floodplain of the Harrison and Fraser River, making the surrounding land fertile and well suited for farming. As a result, Miami River occurs within a highly modified agricultural landscape with many channelized sections degrading the water and habitat quality of the watercourse (pers comm. M. Pearson).

The project undertaken was modified from original design plans created by Pearson Ecological in 2018/2019. Limitations resulting from in-stream works timing prevented this project from being completed as planned in Summer 2018. The Fraser Valley Conservancy (FVC) picked up this project and the partnerships with BC Hydro, Harrison Hot Springs Resort, and Earthwise Society in order to complete this project in 2019/2020.

Pre-Existing Conditions

Southern Site:

The southern project site is located immediately downstream of the culverted road crossing on Golf Road (see Figure 2). This site is a linear, channelized portion of Miami River. Throughout this reach the stream banks and bed are reinforced with large rip-rap that extends >1m on the streambank shoulder. There is little gradient upstream of this reach which runs through lowland agricultural fields. As a result, there no gravel to create riffles in this reach where the grade would naturally create such features. The rip-rap prevents scouring pools here. A trail runs along the west side of the creek along the top of the stream bank. Riparian vegetation is a mixture of native shrubs and non-native Walnut trees.

Northern Site:

This site is located just north of a grove of cedar trees and just south of hydro transmission lines (see Figure 2). This area has little riparian vegetation and is dominated by Reed canarygrass (*Phalaris arundinacea*, RCG) and Policeman's helmet (*Impatiens glandulifera*). The prominence of RCG has led to infilling of the pool that existed at the confluence of Miami River and an unnamed tributary. As a result, the two waterways meet in a narrow channel where they join and flow north into Harrison Lake. This site becomes anoxic during the summer providing little to no habitat for fish.



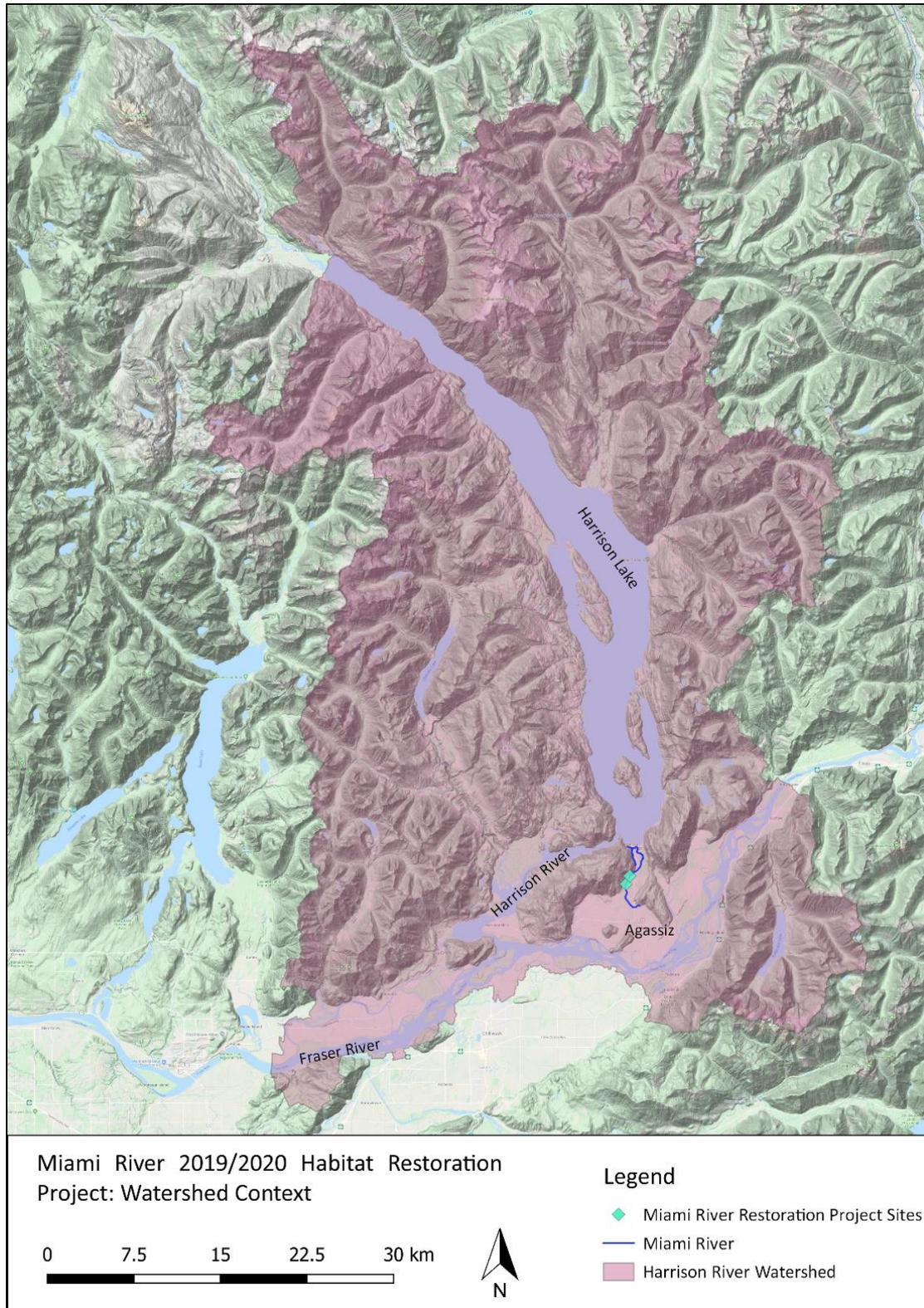


Figure 1: Project site location in Agassiz, BC; located within the Harrison River watershed.



Design

Project design was completed by Mike Pearson of Pearson Ecological. Habitat limitations for Salish Sucker in this part of Miami River include riffle habitat for spawning and deep pool habitat for rearing and summer habitat. This project aims to provide each of these two habitat features within a 600 meter reach (see Figure 2).

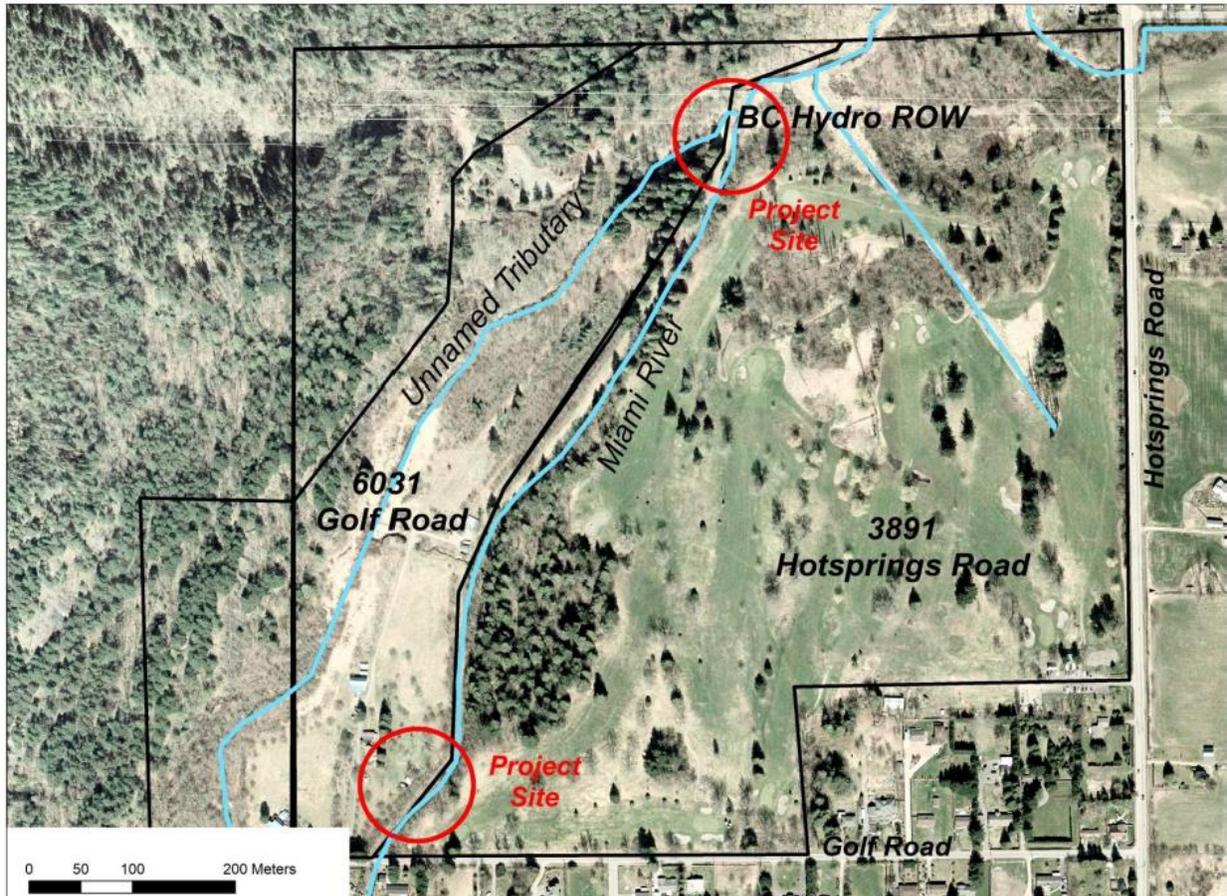


Figure 2: Site overview. North: deep pool habitat South: riffles.

Northern Site:

This project area meets all of the criteria of BC Hydro for distance from nearest hydro towers, machinery operation and plant selection. The site will be access from Earthwise Society property to the south. Digging in this site will be limited by water levels and saturation of sediments as swamp pads will not be available in this location. This site will target the removal of vegetation and fine sediments that have accumulated at the confluence of Miami Creek and an unnamed tributary. Prior to construction silt curtain will be installed to prevent sedimentation downstream. A fish salvage will be implemented in accordance with DFO and FLNRO approved guidelines. Deep pool habitat (>0.75m) will be created at the depth of the existing channel invert (see Figure 3). All removed sediments are to be integrated into existing hillslope to south of project area and

seeded with Fall Rye to prevent erosion. Biologically appropriate native riparian species will be planted after construction (see Appendix A – Planting Plan).

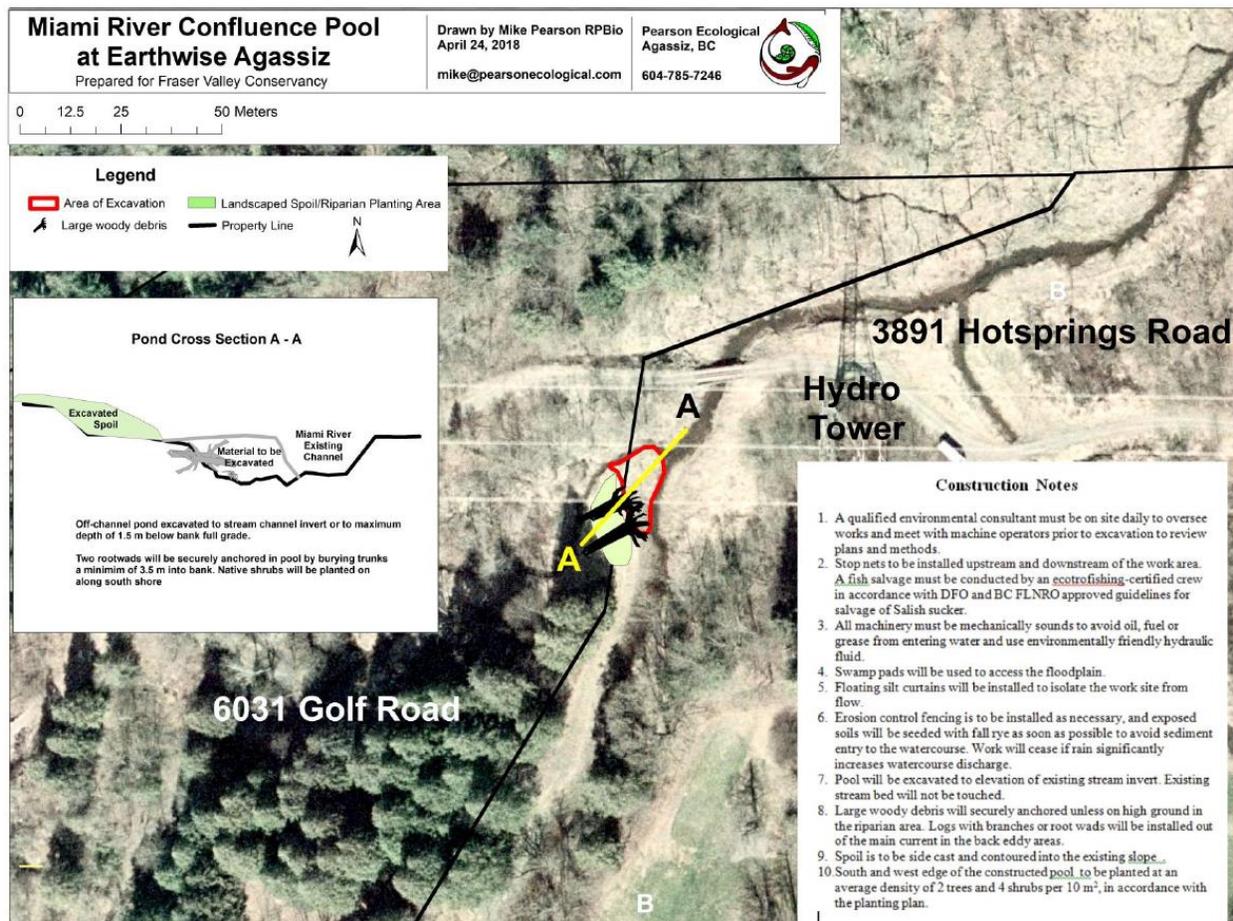


Figure 3: Project design for deep pool habitat at northern project site.

Southern Site:

Designed to provide spawning habitat, a series of three riffles will be installed to replace the rip-rap currently lining the streambed of Miami River. The riffles will be designed to ensure that each step down is no more than 0.5% grade in order to prevent head cutting and eroding banks. The crest of the riffles will be a minimum of 25cm below the invert of the culvert in order to ensure that no flooding will result from their construction. All riffles will be built in the standard Newbury Weir design: A core of boulders to provide stability and washed ‘spawning gravel’ (5-55mm) installed over top (see Figure 4). Rip-rap will be replaced along the sides of the creek to armour the banks. Additional boulders will be randomly placed through riffle gravel to break up flow- dissipating energy and creating fish passable eddies and channels.

Prior to construction, if water is present on site, electroshocking will be used to determine fish presence and salvage as necessary.

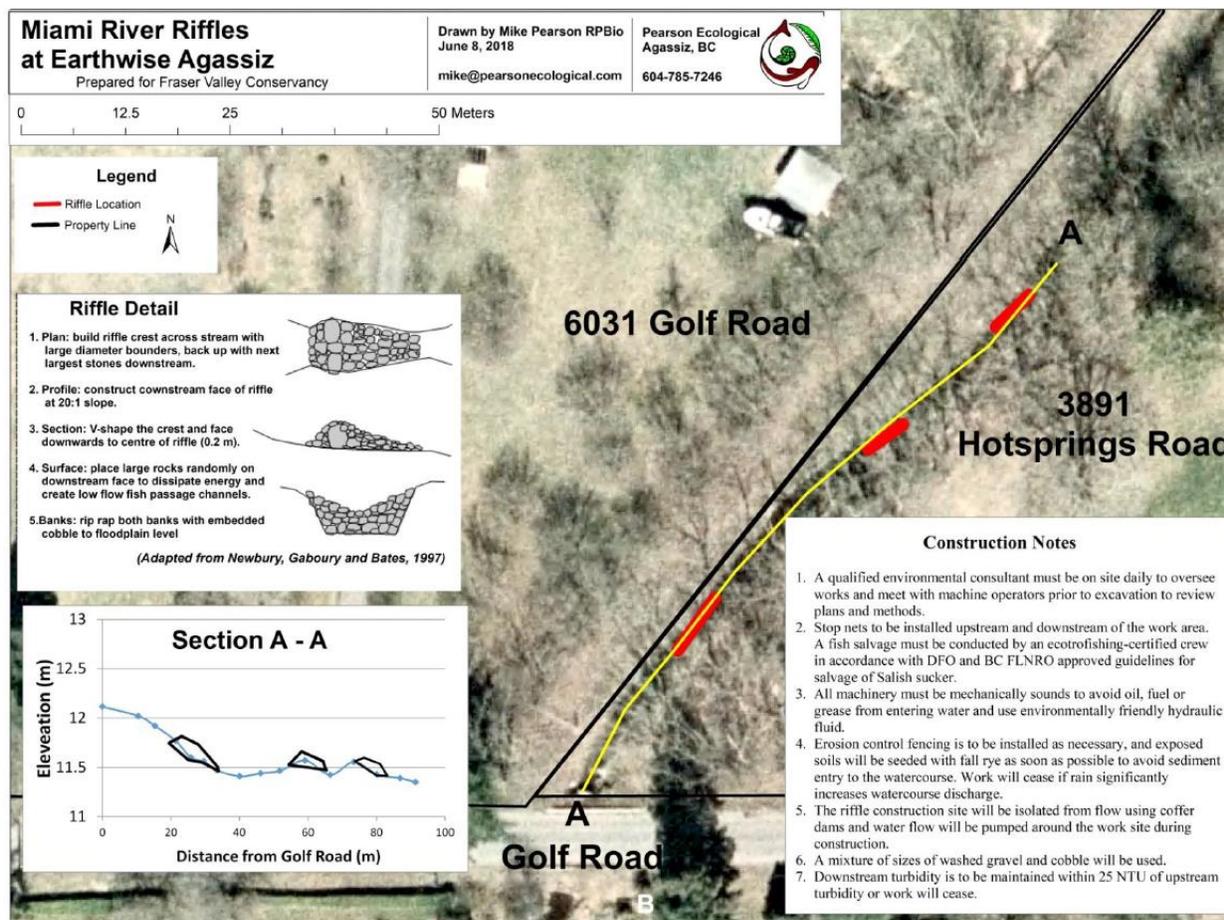


Figure 4: Project design for riffle construction at southern project site.

Timeline, Personnel

All construction will take place during the in-stream works window from August 15th to September 15th. Native plants will be installed once sufficient precipitation has fallen to ensure plants do not desiccate and will be completed no later than December 15th to ensure that planting has occurred prior to the ground freezing. Monitoring will continue into spring 2020.

Table 1: Personnel and organizations involved in the Miami River Stream Restoration.

Task	Organization	Personnel
Project design	Pearson Ecological	Mike Pearson
Project supervision	Pearson Ecological Fraser Valley Conservancy	Mike Pearson Natasha Wilbrink
Construction	Megna Terra Civil	Calvin Park
Monitoring	Miami River Streamkeepers	Janne Perin
Planting design/installation	Fraser Valley Conservancy	Natasha Wilbrink

Site Preparation

Pre-construction monitoring began in July 2019 to establish baseline conditions for each of the two project sites. Monitoring included basic water quality parameters as well as water level and photo documentation of changes over season. Pre-construction monitoring was completed in two iterations before in-stream works began.

In order to prepare for working in a wetted stream installation of a silt curtain was required. This served to prevent silt laden water from exiting the project site and moving downstream causing a massive increases in turbidity levels. The silt curtain was left in place for the duration of in-stream works and removed after silt had settled out of the water column.

Electro-shocking was completed for the southern project site immediately before construction began. The containment net was left in place throughout construction works to ensure that no downstream fish were able to move into the site. No surface water was present upstream of the project site.

Dissolved oxygen (DO) readings were taken at the downstream (northern) project site to determine suitability for fish at the time of construction. DO readings $<2.0\text{mg/L}$ and water temperatures $>20^{\circ}\text{C}$ indicated that survivability for fish was low excluding them from the project area.

Construction

Construction began on September 5th and was completed on September 6th. In total 1.5 days were spent constructing the new riffles at the southern project site while 0.5 days were spent constructing the deep pool habitat at the northern site.

Access for the southern site was achieved from the west site of Miami Creek through Earthwise property and required the removal of interpretive signage as well as an old gate. Three large walnut trees were removed using heavy machinery in order to access to the site through windows in order to minimize destruction to established riparian vegetation. The Walnut trees that were removed were replaced with native alternatives during revegetation. In addition to these, all walnut saplings that were within the project site were cut and removed to allow for native vegetation planting. In addition, multiple mature diseased Hazelnuts suffering from blight were removed with the use of machinery.

Construction of the riffle required the removal of multiple layers of rip rap from the creek bed. One layer of large stones was left to armour the unstable soils making up the bed of Miami Creek. Excess rip rap was used to create the core of the riffles that were installed. In total three loads of gravel were required to fill in the three constructed riffles.





Figure 5: Southern site, riffle installation. Top left: water levels in September and depicts the conditions of the creek prior to construction with riprap covering the bottom and sides of the creek creating a uniform straight channel. Bottom left: rock core of Newbury weir riffle. Right: site during high water February 2020. Marker depicts the same spot in photos.

Revegetation

Planting took place on November 2nd with the help of 5 volunteers and one Earthwise employee. In total 102 plants were installed along the creek restoration site between Earthwise and the Harrison Resort golf course. Of these 22 were trees, planted to increase canopy cover and infill spots created by the removal of Walnut Trees, and 80 were riparian shrubs. These shrubs were planted immediately adjacent to the creek and set back to infill the wide-open area that had no understory vegetation. Adjacent to the excavated pond north of the cedar grove on Earthwise property, 118 plants were installed. Of these 41 were trees, planted on the upper tiers of the spoil pile. Trees selected reflected those found in the Cedar grove to increase the footprint of this habitat type. Shrubs selected for this area were chosen for sun tolerance and growth capabilities.

Next Steps

Monitoring

Monitoring will continue to be implemented by the Miami River Stream Keepers in 2020 for comparison with baseline conditions established prior to construction works. Fish trapping, lead by Mike Pearson, occurred in Fall 2019 during a workshop hosting 8 children, two Earthwise staff and one volunteer. This monitoring yielded one adult male Salish Sucker downstream of the newly constructed riffles.





Figure 6: North site post-construction. Left: November 2019, prior to planting. Right: February 2020 during high water.

Maintenance

This site will require the addition of spawning gravel to ensure the long-term success of the project. Because no areas for gravel recruitment occur upstream of the constructed riffles, as water displaces the gravel that was added during initial construction, we will be required to bring in rock. Recommendations are to use a gravel slinger, and that the addition of gravel occur within 3 years of construction.

Invasive species maintenance may also be required on this site to ensure the survival of native plant stock installed. This includes ongoing removal of diseased vegetation as well as the systematic replacement of walnut trees with native alternatives. This replacement should be strategic to ensure that stream shading is maintained as native vegetation matures and fills in gaps created by walnut removal. In addition, this site contains Policeman's Helmet (*Impatiens glandulifera*) and Himalayan Blackberry (*Rubus armeniacus*) that must be maintained to ensure that they do not overtake the riparian area.

Project Support

This project could not have been completed without the generous support of volunteers and community groups (see Table 2 for breakdown). The Miami River Stream Keepers were instrumental in monitoring this site before and after construction. Their skill in conducting water monitoring was perfectly applied in this instance outside of the scope of their normal study area. They were able to provide all of the gear necessary for monitoring. Community volunteers came out with great attitudes to help us plant an incredibly challenging site with very little topsoil and extensive rip-rap throughout the site. Earthwise not only provided an incredibly helpful staff member to help with planting but also provided gloves and shovels. They also prepared snacks for volunteers and provided all necessary facilities for the work party.



Table 2: Volunteer support for project in 2019. Regular unskilled volunteers are valued at \$20/hr *denotes skilled volunteer valued at \$30/hour.

Group	Description of Task	# of people	Number of Hours	Total Time donated	Dollar Value of labour
Miami River Stream Keepers*	Water monitoring	1	6 days @ 4 hrs/day	24	720
Community Volunteers	Planting	5	3	15 hrs	300
Earthwise Society*	Planting	1	8	8 hrs	240
				Total value	\$1,260



References

Fisheries and Oceans Canada. 2012. Recovery Strategy for the Salish Sucker (*Catostomus* sp.) in Canada [Proposed]. Species at Risk Act Recovery Strategy Series, Fisheries and Oceans Canada, Vancouver. viii + 64 pp.

Appendix A – Planting Plan

Miami Creek

Latin Name	Common Name	Size	Units
Shrubs			
<i>Rubus spectabilis</i>	Salmonberry	2 gal	10
<i>Osmaronia cerasiformis</i>	Indian Plum	2 gal	15
<i>Lonicera involucrata</i>	Black Twinberry	2 gal	15
<i>Rosa nootkantensis</i>	Nootka Rose	2 gal	20
<i>Cornus sericea</i>	Red Osier Dogwood	2 gal	20
Trees			
<i>Acer macrophyllum</i>	Bigleaf Maple	5 gal	5
<i>Betula papyrifera</i>	Paper Birch	5 gal	7
<i>Acer circinatum</i>	Vine maple	5 gal	10

Cedar Grove – confluence of Miami Creek and Tributary

Latin Name	Common Name	Size	Units
Aquatics			
Aquatic Mix - Wild Harvest		Seeds	
Shrubs			
<i>Physocarpus capitatus</i>	Pacific Ninebark	2 gal	17
<i>Spirea douglasii</i>	Hardhack	2 gal	20
<i>Holodiscus discolor</i>	Oceanspray	2 gal	15
<i>Conrus sericea</i>	Red Osier Dogwood	2 gal	15
<i>Ribes sangeuineum</i>	Redflowering currant	2 gal	10
Trees			
<i>Thuja plicata</i>	Western Red Cedar	5 gal	17
<i>Tsuga hertophylla</i>	Western Hemlock	5 gal	15
<i>Populus tricarpa</i>	Black Cottonwood	2 gal	9

