Fraser Valley Watersheds Coalition
Unit 1 - 45950 Cheam Avenue
Chilliwack, B.C. V2P 1N6
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March 30, 2020

An Integrated Plan to Restore and Enhance Waterways in the City of Chilliwack

Hooge off-channel wetland -east view Oct. 2019

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Prepared for the Environmental Damages Fund, the Pacific Salmon Foundation, Canada Nature Fund for Aquatic Species at Risk, and the City of Chilliwack.

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Sincere thanks to our FVWC directors and community volunteers!
Together, we are working towards "*healthy watersheds and healthy communities*."

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Executive Summary

This project is a collaborative effort to enhance, restore and promote shared conservation values in the Chilliwack-Vedder River Watershed and Cultus Lake Watershed. Specifically, this project focuses on two main processes: 1) Addressing knowledge gaps related to the nitrogen and phosphorus in Cultus Lake and 2) Identify and implement restoration and enhancement opportunities to benefit targeted species at risk and improve community values.

This watershed has high recreational fisheries value and is known for its year-round world-class fishing opportunities. However, Vedder River/Chilliwack River lacks off-channel habitat, which can limit overwintering opportunities for juvenile salmonids in this system. Development-related alterations of salmonid habitat, encroachment of non-native plant species into riparian areas and loss of floodplain functions following diking have also occurred.

Through the combined efforts and contributions this year's projects resulted in:

- 4,053 m^2 of aquatic habitat restored
- 300 m^2 spawning channel gravel augmentation completed adjacent
- A stable outlet weir was reconstructed and backwatered to support fish passage
- 4,391 m^2 of riparian area was created and replanted with 6,855 individual native plants
- 550 student volunteers

This report summarizes the results of work completed between April 1, 2019 and March 31, 2020 under the financial contribution of the Environmental Damages Fund, Pacific Salmon Foundation, Canada Nature Fund for Aquatic Species at Risk, Wally Hall Jr. Memorial Steelhead Fishing Derby, DFO's Resource Restoration Unit, City of Chilliwack, local community members, and the Fraser Valley Watersheds Coalition.

Thanks to the momentum of on-the-ground restoration activities, the strength in partnerships, and importance of this project, further restoration plans are being developed to continue building on the long-term biodiversity of the area.

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1.0 Introduction

This project will employ strategies to address threats to species at risk (SAR) and their associated habitats through conservation and watershed planning and the implementation of restoration activities within the municipal boundaries of Chilliwack, British Columbia.

The population of Chilliwack is projected to double by the year 2041 and therefore, the development of both immediate and future management and restoration initiatives is critical to ensure ongoing ecological function. Waterways within the targeted area have been subject to impacts by numerous anthropogenic factors which threaten SAR such as the Coastrange (Pygmy) Sculpin, Salish Sucker and Sockeye, Chinook and Coho Salmon. Both the quality and quantity of SAR habitat in this area has been reduced due to infrastructure development, agricultural and forestry activities, introduction of invasive plant species and the increasing impacts of climate change. Impacts include reduced access to off channel habitat (vital to support various life-stage requirements), declining aquatic water quality (low dissolved oxygen levels, high water temperatures, degradation to habitat complexity and structures) and disruptions to natural systems (culverts, pump stations, etc.).

Key sub-set areas within the Chilliwack area will be identified, assessed and prioritized for restoration and habitat improvement activities which will be undertaken with the goal of ensuring the long-term health and biodiversity of these waterways in order to meaningfully contribute to the recovery of local SAR as well as support diverse aquatic species populations in general.

In year one of this project a working committee of strategic partners and stakeholders was formed to create a Planning and Prioritizing Matrix to determine project locations to complete SAR restoration activities and draft plans for future restoration opportunities. One meeting was held that focused on the implementation of Salwein East-West for 2020 restoration activities. The working committee completed a cultural overview assessment, the planning and matrix for restoration activities, and a Salish sucker assessment and designs. A site walking tour was also held for stakeholders to determine potential SAR restoration sites in Salwein East-West and linked it to previous restoration (i.e. Hooge wetland, Peach creek, and Stewart Creek) to set the stage for funders and stakeholders on opportunities and experiences led by the FVWC.

In year one three restoration activities were completed. These included the creation of Hooge wetland and the Peach Creek groundwater extension channel in Chilliwack B.C., and an extension of Stewart Creek at Wilson Park in Yarrow B.C. CNFASAR supported these projects through enhanced invasive species control, guarding of plants from beaver activity, bioengineering, and enhancement of the area by activities such as spreading bark mulch.

Additionally, the FVWC had planned for a Cultus Lake Summit to discuss the culturally driven eutrophication of Cultus Lake. However, with the developments of COVID-19, these plans have been modified to reflect the nature of the current situation with social distancing. In general, some

anticipated workplans and outcomes of this project had to shift considering COVID-19 and the inability to gather. However, the intentions to support aquatic SAR remain the same.

2.0 Goals and Objectives

Goal 1: Restore 1,068 m^2 of aquatic habitat and 1,000 m^2 of riparian habitat.

Goal 2: Overall project activities will target five aquatic species at risk including Coastrange (Pygmy) Sculpin, Salish Sucker and Sockeye, Chinook and Coho Salmon.

Goal 3: Project activities will implement 2 actions from recovery documents benefitting the Coastrange (Pygmy) Sculpin and the Cultus sockeye salmon.

Goal 4: Involve and engage 5 partners in the project.

Goal 5: Conduct 2 outreach events.

3.0 Planning and Prioritizing Matrix

3.1 Year 1 Project List and Priorities

Year 1 projects and priorities were identified and ranked using key parameters: including known habitat for species at risk, connectivity, level of degradation/opportunity for enhancement, willing landowners and a variety of others (Appendix A) Of, which two conceptual plans were developed Plan and Salwein East-West was moved to workplan development and priority one. (Appendix B)

The decision to proceed with 2020 project was based on access, resources, partnerships and overall improvement to Salish Sucker habitat and potential for downstream restoration in the subsequent years. Of which, Section 3.3, Pearson Ecological was contracted to assess the design rationale and provide feedback to support upcoming enhancement works.

3.2 Meeting and Site Visit

Two site visits to a planed potential upcoming restoration site was completed with DFO conservation officer, members of the Canada Nature Fund staff team, DFO Resource Restoration Unit, City of Chilliwack engineering staff and FVWC staff. The intention was two-fold, review potential restoration/enhancement site to benefit salmon and listed Salish Sucker- linking to existing restoration sites (habitat connectivity) and addressing habitat threats: reduced riparian areas, livestock encroachment into channel and improved hydrological function; and, establish partnership to assist in the delivery of the project.

A follow-up meeting was held to discuss the implementation of this project for the 2020 Instream fisheries works window, coordinating efforts with the annual ditch maintenance efforts and to develop priorities for enhancement efforts.

3.3 Salish Sucker Assessment

Pearson Ecological was contracted out to assess existing restoration sites- effectiveness and design components and provide design input to upcoming, connected restoration potential sites, to improve Salish Sucker habitat. The report indicates that shifting the hydrological flow through the modification of a weir, will supply a greater aquatic area with more resources/nutrients (DO/temp) and support greater habitat. In addition, minor adjustments of existing habitats and incorporation of design elements will support high-value habitat into the future. Appendix C.

3.4 Cultural Overview Assessment

FVWC reached out to Sto:lo Research and Resource Management Centre to complete a cultural overview assessment process, establish a partnership and engage in the committee. At this time, the general project sites were too broad and the SRRMC recommended completing an initial engagement session and provide in-depth plans for conceptual designs to inform on restoration designs in a more meaningful way. After which, COVID pandemic occurred and no follow-up meeting has been scheduled as of yet.

4.0 Restoration and Enhancement Projects

4.1. Peach Creek Salmon Habitat Restoration

Project Overview

Important spawning and rearing habitat for all species of salmon exists within the Chilliwack Vedder River Watershed. The purpose of this project was to increase viable off-channel habitats to support rearing and overwintering salmon, wildlife, and overall biodiversity.

Restoration efforts targeted Peach Creek along the right bank of the Vedder River floodplain. Specifically, the intent was multi-fold; to improve salmon access to off-channel habitats, create rearing/overwintering habitats for juveniles and extend the adult spawning channel, while incorporating adaptive management, a community tree planting and project importance/awareness to landowners and the community at large.

This project is important in that actions to improve the channel and connection to the floodplain will improve salmon access to important habitats (particularly the off-channel refuge that is vital in this watershed) and will continue to build the momentum for active restoration with the municipality and community.

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Project Location

Peach Creek "Hooge Wetlands" and Spawning Channel extension, Chilliwack BC

The project activities occurred at three sites, both within crown land, managed by the City of Chilliwack, located between the Southern Rail trestle train bridge to the west, Peach Road to the east, the setback dike to the north (south of Keith Wilson Road) and the Vedder River to the south. The scope between 1 and 3, shown in Figure 1, is approximately 4 kilometers of impacted floodplain.

Figure 1. Project location with respect to Vedder River, Chilliwack BC. 1. Stable Berm outlet; 2. Hooge Wetlands off-channel pond; 3. Peach salmon spawning extension channel.

Goals and Objectives

The primary objective of this project was to collaborate with the City of Chilliwack to create and enhance salmon habitat along the north bank of the Vedder River floodplain – Peach Creek.

By creating additional off-channel habitat along Peach Creek and planting a riparian buffer zone, we are providing additional habitat for young salmonids and other SAR, specifically much needed off-channel habitat along Vedder River, which can experience periods of sudden high water flows and high turbidity. The enhancement will also improve habitat connectivity along the creek, add diversity to attract songbirds and amphibians and connect the community with the habitat through volunteer planting events. With the increasing population in Chilliwack, connected greenspaces are becoming more important. They allow residents to experience time in nature and enjoy their neighborhood. The enhancements completed will also provide more wildlife viewing opportunities for the residents.

This project enabled us to build momentum for partnerships with the City of Chilliwack and help ensure long-term stewardship of this area.

Specifically, the goals of this project were:

1. **Restoration of Habitat:** Construct a complex off-channel habitat that supports overwintering salmon use and wildlife and biodiversity values.
   Goal: minimum 1000m^2 (0.1 ha).

2. **Restoration of Habitat:** Extend/create a groundwater salmon spawning channel.
   Goal: minimum 150 linear meters extension - 225 m^2 (0.023 ha).

3. **Enhancement of Habitat:** Plant the newly created channel and pond with aquatic and riparian vegetation to support juvenile salmon. This includes the removal of invasive Himalayan Balsam.
   Goal: Replant a minimum of 1000 m^2 (0.1 ha) and remove a minimum of 1000 kg of toxic or harmful substances in the form of invasive species.

4. **Enhancement of Habitat:** Fish passage. Construct a stable outlet berm and weir to support adult salmon migration from the Vedder River into the floodplain off-channel habitats.
   Goal: Berm constructed.

5. **Community Engagement and Signage:** Promote increased stewardship through community and volunteer engagement. This includes hanging project signage to raise awareness for the activities.
   Goal: Minimum 60 volunteers assisting in the work.

Methods and Outcomes

Prior to instream works, FVWC and partners laid out the restoration design footprint, engaged the municipality on access and greenspace requirements and completed a BC species-at-risk, archaeological query and call before you dig to ensure in-situ values and infrastructure were identified and protected. Invasive Himalayan balsam was hand pulled along sections of the creek, where planned activities were to occur. Project safety signs were installed, and the city mailed letters to the neighbourhood to inform the community of the restoration efforts.

The instream construction was completed during the 2019 Instream fisheries works window and works were completed in the dry, except to connect the new channels and wetlands at the very end of project. Instream works occurred from September 3, 2019 to September 23, 2019 and worked on three specific sites (1-3, represented in Figure 1), and subsequent bioengineering, replanting and monitoring occurred from October 2019 to March 31, 2020.

1. Constructing the stable outlet channel berm and weir.

   Instream works were completed with a 200-series excavator, safety flaggers and on-site biologist. The berm was extended downstream into the Vedder River, along the right bank, through the placement of large boulders and regrading of the substrate. The extension of the berm allowed for greater ability to construct a small weir that backwatered the culvert to allow for improved fish passaged.

2. Construction of the Hooge Wetlands (off-channel pond).

   Instream works were completed with a 200-series excavator and an articulated Volvo. The goal was to transform the marginal seral field (covered with invasive grasses) into aquatic habitat. Prior to excavation, the wetland was flagged to ensure specific boundaries to protect the north dike and the groyne dike occurred. Large native plant species were also flagged off so that excavation avoided these species. The wetland was dug to expose groundwater, following the design. The excavated soil was side casted and trucked onsite by the Volvo to enhance the riparian area and reshape the land. Large wood and rootwads were installed along the banks of the channel and within the pond to add habitat complexity. During the construction an onsite cultural monitor was present to ensure cultural values were conserved through the process.

   Riparian and Bioengineering works were completed between October 2019 and March 31, 2020. Immediately after the excavation and creation of the off-channel wetland, the excavator was used to prepare replanting conditions. Using the bucket, the top of right bank was loosened

and roughened up. This allows the planted native vegetation opportunity for strong root growth. A cover crop of Winter wheat (*Triticum aestivum*) was hand spread over the site for erosion and sediment control measures.

Potted stock and live stakes were hand planted by FVWC field crew and volunteers. In the fall of 2019 two community planting events totalling 430 volunteers participating, occurred to support the riparian planting efforts. Planting was done in meandering rows to incorporate preferred microsites to produce a more natural appearance. Trees were placed according to their moisture requirements high, mid, or low bench (e.g. Douglas fir high bench, Cedars low bench) woody shrubs were placed mid to low bench depending on their moisture needs. The goal was to establish tree/shrub thickets along the newly built stream channels and wetland to reduce edge effects, shade the waterway, and create strong boundaries against invasive species such as Reed canary grass.

Plants selected for the site were comprised of pioneering plants species. Majority of the selected species can withstand drought and can tolerate some inundation. The strategy was to plant each species at different slightly varied topographic locations, as this can have a substantial effect on survival due to moisture differences over the years. The tree species such as Western Red Cedar (*Thuja plicata*) and big leaf maple (*Acer macrophyllum*), will provide shade and facilitate insect drop to support salmon species diet and growth. The shrub species (thimbleberry, rose, ocean spray, pacific ninebark) selected are very tolerant to drought, fast growing, and aggressive. A large portion of the shrubs selected are multi-stemmed species, as this helps them to colonize the area faster and tolerate some browsing. A total of 3606 individual native plants were planted over 3068m^2 representing a density of 1 plant per 2m^2 (Table 1). This density was selected to support the thickets and support the establishment of the buffer-boundary effect to reduce invasion and encroachment. Of the 3606 native plants planted, 115 were trees which offset about 357 tonnes of carbon. This is equivalent to removing 1307 tonnes of carbon dioxide from the atmosphere or removing 252 cars from the road for one year.

Some herbivory guards were incorporated into the planting to help establish the higher value trees and willow live stakes. A partially composted bark mulch was added around each plant and to the site, to help plants retain moisture and reduce mortality due to drought. Mycorrhizae (beneficial fungus) was also added into the planting holes of each tree/shrub to help the plants better find and retain moisture over the long term.

After the planting was completed, an additional cover crop of Winter wheat (*Triticum aestivum*) was spread over the site to help reduce erosion. By planting native trees ands shrubs densely over the site, the instance of Himalayan balsam returning and encroaching the waterway will be reduced.

The native plants such as salmonberry and thimbleberry will aid in bank stabilization and provide food for wildlife; big leaf maple and choke cherry provide important leaf litter and detritus for salmon, and additional habitat for birds and wildlife.

Table 1. Native vegetation planted at Hooge Wetland October 1, 2019-March 31, 2020.

Latin name	Common name	Size	Quantity
Thuja plicata	Western red cedar	5 gal	15
Acer Macrophyllum	Big leaf maple	5 gal	40
Prunus virginiana	Choke cherry	5 gal	30
Pseudosuga menziesii	Douglas fir	5 gal	5
Crataegus douglasii	Black hawthorn	5 gal	15
Alnus rubra	Red alder	2 gal	10
Rosa nutkana	Nootka rose	1 gal	100
Rubus parviflorus	Thimble berry	1 gal	160
		2 gal	100
Acer Circinatum	Vine maple	1 gal	40
		2 gal	80
Amelanchier alnifolia	Saskatoonberry	1 gal	180
Ribes sanguineum	Red flowering currant	1 gal	60
		2 gal	100
Philadelphus lewisii	Mock orange	1 gal	140
Holodiscus discolor	Ocean spray	1 gal	60
		2 gal	100
Symphoricarpos albus	Snow berry	1 gal	71
Spirea douglassi	Hardhack	1 gal	100
Myrica gale	Sweet gale	1 gal	100
Rubus spectabilis	Salmonberry	2 gal	100
Salix sp.	Willows	Whip	2000
Spirea douglassi	Hardhack	Live-stake	1100
TOTAL			4706

3. Construction of the Peach salmon spawning extension channel.

Prior to any restoration works, extensive landowner and community engagement occurred. This was because of the high profile, significant use of the area. FVWC staff and City of Chilliwack staff distributed newsletters to adjacent residents. Follow-up detailed project information packages were distributed to the residences within proximity of the project activities and trail users; safety fencing and signage was installed, and safety flaggers were onsite to keep people safe, answer questions and share on the importance of this project.

Instream works were completed with two 200-series excavator and two articulated Volvos. The goal was to extend the spawning channel upstream along the floodplain to capture groundwater, water table. Prior to excavation, the channel alignment was flagged to ensure specific boundaries to protect the north dike and the river dike occurred. Large native plant species were also flagged off so that excavation avoided these species. Extension involved excavating down to ~0.45 m beneath the water table surface and extended with a gradient between 0-3% to support ideal spawning conditions. Large wood and rootwads were installed along the banks of the channel to add habitat complexity. The extension of the channel truncated existing trails. To mitigate for this, a pedestrian footbridge was constructed. During the construction an onsite cultural monitor was present to ensure cultural values were conserved through the process. After the channel was constructed, an independent arborist was contracted to ensure the excavation activities did not result in any damage to surrounding areas. This was an important contribution to the project, as the channel alignment and scope of this phase of project was within close proximity to private residences, and project team wanted to ensure any potential impact as a result of project activities (such as heavy machinery movement around the base of trees) did not result in hazards for the community (and were addressed if they were identified). No adverse impacts to the floodplain forest that could affect the private residences occurred.

Immediately after the channel was constructed, a 100-series excavator was used to loosen and roughen to reduce compaction within the access route used to create the extension channel. Large wood and rootwads were added to support soil building processes and deter access. In the winter of 2019, additional planting, representing 892m^2 with 276 individual plants were dug-in at the upper end of the extension channel to restore the forested section, close-off the accessway used by the machinery, and support the important visual aesthetic, completed by the FVWC field team (Table 2). Of the 276 native plants that were planted, 36 were trees which offset about 112 tonnes of carbon. This is equivalent to removing 409 tonnes of carbon dioxide from the atmosphere or removing 79 cars from the road for a one year.

Table 2. Native vegetation planted at Peach channel extension October 1, 2019-March 31, 2020.

Latin name	Common name	Size	Quantity
Acer Macrophyllum	Big leaf maple	2 gal	20
		5 gal	10
Crataegus douglasii	Black hawthorn	5 gal	6
Alnus rubra	Red alder	2 gal	10
Ribes sanguineum	Red flowering currant	1 gal	50
Rosa nutkana	Nootka rose	1 gal	30

Rubus parviflorus	Thimble berry	2 gal	30
Acer Circinatum	Vine maple	2 gal	20
Cornus sericea	Red osier dogwood	Whip	60
Salix sp.	Willows	Whip	20
Physocarpus capitatus	Pacific ninebark	Live stake	30
TOTAL			276

Monitoring and Maintenance

The monitoring efforts completed as part of this project help to set a baseline and track the spatial and temporal changes to the site as a result of restoration efforts and natural processes and helps fill in information about known data gaps. Monitoring activities include measuring water quality and surveying for fish presence in the constructed off-channels. Water quality and fish surveys were completed three times between February 2019 and March 2020 to encompass seasonal changes in water quality and fish presence in the constructed channels. Monitoring for fish presence and water quality was completed at nine sites during the first sampling date in February 2019 (figure 2). An additional sampling site was added in November 2019 (Peach 10) and three more sampling sites were added in March 2020 (Peach 2a, Peach 11, and Peach 12) to encompass the newly created Hooge wetland and to add areas that had extra areas of high aquatic habitat value (figure 2). Collecting and analyzing water quality and fish presence data will help to determine if the restoration efforts in Peach Creek are working as intended to create suitable aquatic habitat for salmonids and other aquatic life.

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Figure 2. Geo-referenced map of the sampling locations used at Peach Creek during fish and water quality monitoring done between February 2019 and March 2020.

Reference ID	UTM Zone	Easting	Northing	Sample Type
Peach 1	10 U	570413	5438256	Fish presence and water quality.
Peach 2a	10 U	570496	5438336	Fish presence and water quality.
Peach 2	10 U	570527	5438520	Fish presence and water quality.
Peach 3	10 U	570609	5438976	Fish presence and water quality.
Peach 4	10 U	570841	5438878	Fish presence and water quality.
Peach 5	10 U	571048	5438924	Fish presence and water quality.
Peach 6	10 U	571173	5438926	Fish presence and water quality.
Peach 7	10 U	573375	5438858	Fish presence and water quality.
Peach 8	10 U	573251	5438919	Fish presence and water quality.
Peach 9	10 U	573084	5438999	Fish presence and water quality.
Peach 10	10 U	571120	5438991	Fish presence and water quality.
Peach 11	10 U	571163	5439006	Fish presence and water quality.
Peach 12	10 U	571066	5438949	Fish presence and water quality.

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Water Quality and Fish Usage

Water quality was measured to understand the aquatic habitat conditions of Peach Creek and to determine if the water in the constructed channels is suitable for aquatic life. Eight water quality parameters were measured and recorded. These include temperature, dissolved oxygen in both percentage and milligrams per litre, conductivity, salinity, pH, turbidity, and depth. Dissolved oxygen, temperature, and conductivity were all measured using a YSI Pro probe. Dissolved oxygen readings were taken in both % and mg/L to ensure that no false readings were recorded. Temperature and dissolved oxygen are important parameters because they ensure that water quality in the site are suitable for fish life. Temperatures should remain below 15 ^{o}C and dissolved oxygen should remain greater than 5 mg/L to ensure optimal conditions for salmonids. Salinity, conductivity, and pH were measured using an Oakton Pctstestr Series 50 Pocket Tester.

At Peach Creek highest average temperature was recorded in November 2019 at 8.9 ^{o}C and the lowest temperature was recorded in February 2019 at 3.3 ^{o}C (table 3). Average temperatures remained within the optimal range for suitable aquatic habitat year-round (figure 3). Average dissolved oxygen also remained within optimal levels year-round (figure 3). The lowest recorded average dissolved oxygen was 10.5 mg/L in November 2019. Overall, both dissolved oxygen and temperature remained with optimal conditions for salmonids to survive and complete their life stages.

Other water quality parameters recorded at Peach Creek are summarized in table 3. pH remained in a similar range between 7.7 and 8.0 at all three sampling dates and turbidity was found to be greater than 21 NTU year-round. Conductivity was the greatest in February 2019 at 97.1 µS/cm but remained in the same range between 61-65 µS/cm between November 2019 and March 2020. The difference could be attributed to changes in the surrounding watershed such as flooding, or it could be attributed to additional sampling locations being added to the November 2019 and March 2020 sampling dates altering the average. Overall, the water quality at Peach Creek between February 2019 and March 2020 was suitable for salmonids to survive and complete their life cycles.

Table 3. Average water quality parameters at Peach Creek taken during three sampling dates between February 2019 and March 2020. Salinity was not taken after February 2019 because a new pocket tester was used to collect data that measured salinity in ppt instead of ppm which is not sensitive enough to detect salinity in freshwater systems.

Date	Temperature	Dissolved Oxygen (mg/L)	Dissolved Oxygen (%)	Turbidity (NTU)	pH	Conductivity (µS/cm)	Salinity (ppm)	Depth (m)
Feb-19	3.3	14.1	105.9	21.0	7.7	97.1	49.9	0.4
Nov-19	8.9	10.5	90.4	21.0	7.8	64.6	-	0.5
Mar-20	5.8	11.8	94.1	21.0	8.0	61.3	-	0.5

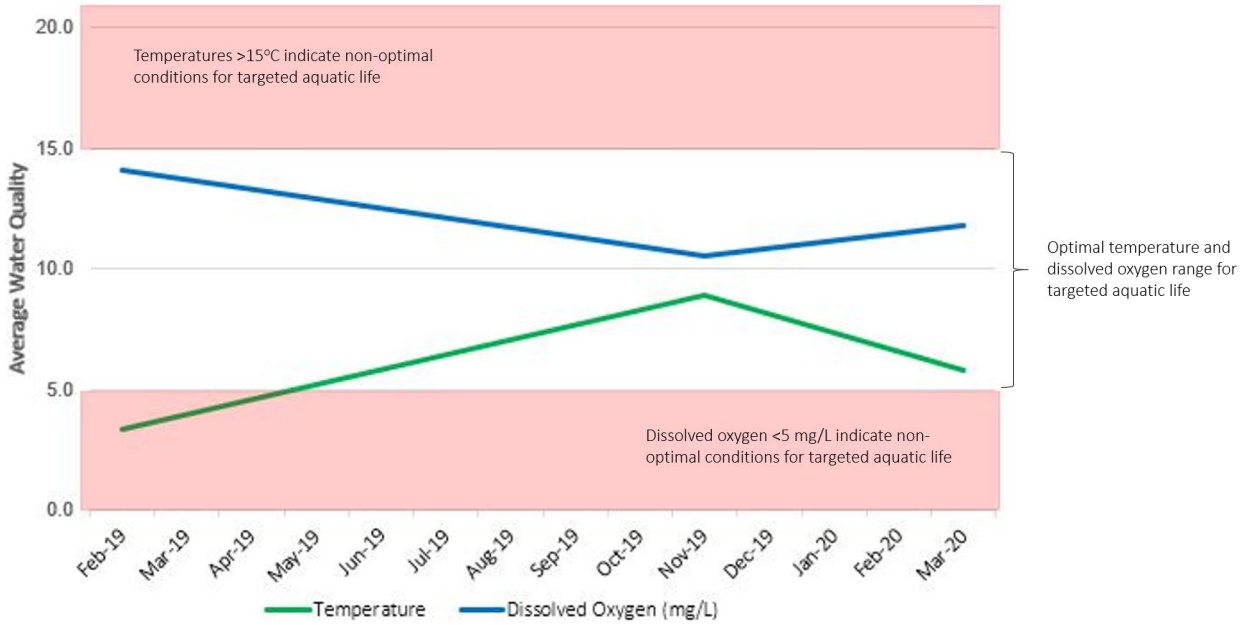

Figure 3. Graph showing the monthly changes in temperature (°C) and dissolved oxygen (mg/L) in Peach Creek. The red zones indicate unsuitable conditions for aquatic habitat. Temperatures exceeding 15°C and dissolved oxygen levels below 5 mg/L indicate conditions that are not suitable for aquatic life. Water quality was measured three times between February 2019 and March 2020.

Fish presence surveys were completed to determine what species of fish use the constructed channels at Peach Creek and to determine the overall health and life-stage of fish, particularly salmonids, using the channels. Fish presence was surveyed three times between February 2019 and March 2020. Fish were caught using Gee traps at nine sampling sites in February 2019. One extra sampling site, Peach 10, was added in November 2019 and three more sampling sites, Peach 2a, Peach 11, and Peach 12, were added in March 2020 to encompass the newly created Hooge wetland and to add extra areas of high aquatic habitat value. Prior to setting traps, water quality and water depth were measured to ensure that conditions were safe for trapping. Traps were only set if the water depth was deep enough to fully submerge the trap, the water temperature was between 0°C and 15°C, and if dissolved oxygen was at least 5 mg/L. If these water conditions were met, then two Gee traps were set at each sampling location. In addition to two Gee traps, one Feddes trap was set at sites Peach 11 and Peach 12. Traps were checked no longer than 24 hours after being set and fish were counted by species, weighed, and measured in body length. The time the trap was set and pulled was recorded to determine catch per unit effort.

A total of 319 fish and five different species were caught at Peach Creek between February 2019 and March 2020. Two salmonid species were caught; coho which was the most predominant species making up 53% of the total fish caught and rainbow trout which comprised 2% of the total fish caught (figure 4). There were no recorded invasive species in the sampling area. Coho was recorded the most in March 2020 (figure 5); however, there were four additional sampling locations and the newly constructed Hooge wetland in March 2020 compared to February 2019 which might account for the greater number of coho (figure 5). Additionally, March 2020 saw the highest number of threespine stickleback (*Gasterosteus aculeatus*) compared to the other two sampling dates (figure 5). This is likely due to higher spring temperatures in March 2020 compared to February 2019 when the ground was still snow covered.

The results of the fish sampling highlight the varied usage of the site by numerous fish species. The absence of recorded invasive fish species is also encouraging as these fish are not present in numbers that would inhibit the habitat usage by the native species. Coho salmon were found to be of healthy size; with the average length being 75.4 mm (table 4). Healthy coho salmon should be between 80 mm and 90 mm following their second summer (Raymond, 1986). This value is very close to the average fish size found in Peach Creek, and many fish were well within this size category. A coho salmon in its first fall should have grown from 30 mm to 50 mm (Raymond, 1986). The smaller coho found during sampling fell within this size range. Monitoring efforts suggest that the coho salmon within Peach Creek are growing at a healthy level and there are no health concerns.

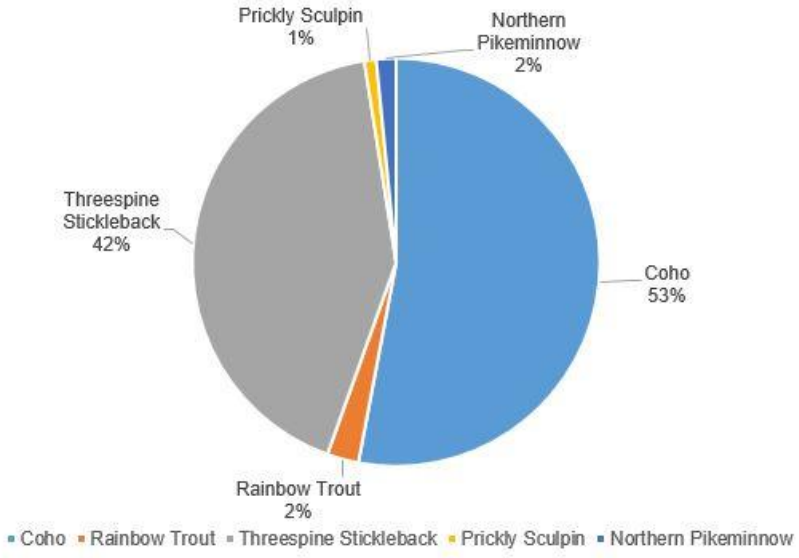

Figure 4. Graph showing the proportion of fish species caught during fish monitoring at Peach Creek between February 2019 and March 2020.

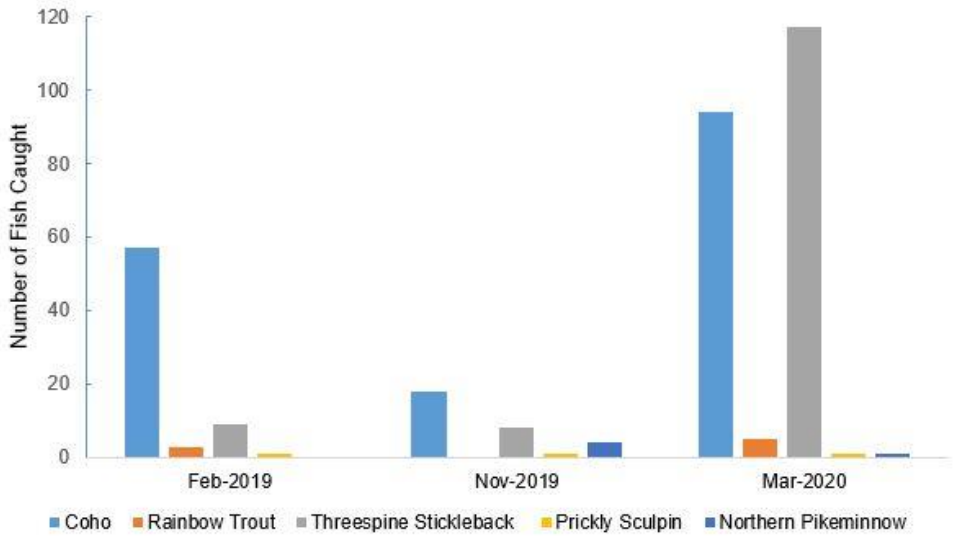

Figure 5. Graph showing the number of fish of each species caught during fish monitoring at Peach Creek at three sampling dates between February 2019 and March 2020.

Table 4. The number and proportion of each species caught at three sampling dates between February 2019 and March 2020. Average mass and body length were calculated for each species over all three sampling dates and catch per unit effort was cumulatively averaged across all sampling dates.

Date	Coho	Rainbow Trout	Threespine Stickleback	Prickly Sculpin	Northern Pikeminnow
Feb-2019	57	3	9	1	0
Nov-2019	18	0	8	1	4
Mar-2020	94	5	117	1	1
Total	169	8	134	3	5
Percentage of Total Fish Caught (%)	53.0	2.5	42.0	0.9	1.6
Average Mass (g)	6.4	12.2	0.5	16.4	9.9
Average Length (mm)	75.4	93.0	36.4	99.7	78.8
Average Catch Per Unit Effort (CPUE)	0.830401048				

Invasive Species Removal

In the summer, fall and winter, the field team and volunteers' hand-pulled invasive Himalayan Balsam (*Impatiens glandulifera*) along the channel and wetlands. This annual herbaceous plant is a prolific seeder and can overwhelm a riparian area, and their seeds can remain viable for an estimated two years, compounding the invasion. The plants were uprooted, green-waste bagged and composted at the municipal landfill site (at the composting facility). A total of 960 Kilograms was removed. The goal will be to return the following year to continue to uproot the plants, before they go to seed, to reduce the seedbank and decrease the spread of invasion along these channels.

Summary of Outcomes

1 **Restoration of Habitat:** Construct a complex off-channel habitat that supports overwintering salmon use and wildlife and biodiversity values.
Goal: minimum 1000 m^2
Actual Result Achieved:
- 2,022 m^2 off-channel pond was created (salmon rearing and overwintering)
- 300 m^2 spawning channel gravel augmentation completed adjacent

Status: Complete.

2. **Restoration of Habitat:** Extend/create a groundwater salmon spawning channel.
Goal: minimum 150 linear meters extension - 225 m^2
Actual Result Achieved:
- 1,956 m^2 of spawning channel was created (Peach extension 275 linear meters upstream along the right bank of the floodplain).

Status: Complete.

3. **Enhancement of Habitat.** Plant the newly created channel and pond with aquatic and riparian vegetation to support juvenile salmon. This includes the removal of invasive Himalayan Balsam.
Goals: Replant a minimum of 1000 m^2, and remove a minimum of 1000 tonnes of invasive plants
Actual Result Achieved:
- 3960 m^2 was replanted with 4,982 individual native plants.
- 960 Kilograms of invasive balsam removed.

Status: Complete.

4. **Enhancement of Habitat.** Fish passage. Construct a stable outlet berm and weir to support adult salmon migration from the Vedder River into the floodplain off-channel habitats.
Goal: Berm constructed.
Actual Result Achieved: A stable outlet weir was reconstructed and backwatered to support fish passage.
Status: Complete.

5. **Community Engagement and Signage:** Promote increased stewardship through community and volunteer engagement. This includes hanging project signage to raise awareness for the activities.
   Goal: Minimum 60 volunteers assisting in the work.
   Actual Result Achieved:
   - 440 student volunteers
   - 30 Landowners contacted and information pamphlets shared on the importance of this project

   Status: Complete.

Benefits to Species at Risk

This project aligns with the objectives of the Canada Nature Fund for Aquatic Species at Risk by taking a multi-species approach. The construction of the Peach Creek groundwater extension channel also included the addition of large woody debris for added stream complexity and the addition of spawning gravels. The riparian buffer zones were replanted with native species. The construction of the Hooge wetland converted an empty field of invasive grasses to a wetland pond with the addition of large woody debris and a large riparian area. While this project focused on restoring habitat for salmonids, other species at risk will also benefit from the habitat values provided by these sites. These restoration efforts support the recovery efforts for species such as Salish sucker, Northern red-legged frog (*Rana aurora*), great blue heron (*Ardea herodias fannini*), and coastal western painted turtle (*Chrysemys picta bellii*) by implementing actions as described in recovery documents (2017 Nooksack Dace/Salish Sucker Action Plan, 2018 Recovery Strategy for the Western Painted Turtle (*Chrysemys picta bellii*) Pacific Coast population in Canada), management plans (2016 Management Plan for the Northern Red-Legged Frog in Canada, 2016 Management Plan for the Great Blue Heron *fannini* subspecies in Canada), COSEWIC status reports, and best management practices (e.g. 2015 Salish Sucker Collection Guidelines).

The planning and creation of Hooge Wetland and the Peach Creek groundwater extension channel took into consideration Salish sucker as these sites fall within potential critical habitat for this species. While Salish sucker was not found at either of these project locations during preliminary assessments and monitoring, Hooge wetland and Peach creek groundwater extension channel provide potential habitat for Salish sucker by increasing off-channel habitat within the Chilliwack Vedder river watershed and providing structurally complexed habitat with large wood and large riparian buffers.

The creation of Hooge wetland provides a shallow, slow moving and structurally complexed pond habitat for Northern red-legged frog oviposition and the banks have been planted with shrub species such as hardhack for egg-mass anchorage. Hooge wetland also falls within the critical functioning zone of the coastal western painted turtle and provides open permanent water and a sandy substrate for digging nests. Great blue herons require cottonwood forests for building their nests. Both Hooge wetland and the Peach creek groundwater extension channel provide foraging habitat for great blue

heron. Additionally, the riparian zones of these sites have been planted with tree species such as douglas-fir, big-leaf maple, and black cottonwood which will provide potential long-term rookery sites for breeding.

Additional Values

Through this salmon habitat restoration project, FVWC was able to connect with trail users, residents, community groups and educate them about the benefits of restoration projects. Vedder elementary students and Chilliwack 6th's South Side Beaver Colony (youth group) participated in the tree planting event, and educational opportunities were provided to give students an opportunity to learn all about fish, wildlife, and the importance of riparian areas. Many of the teachers expressed interest in returning to the site with their students and checking on the progress and health of the restoration project. By completing suburban restoration projects there is an increased chance to view and appreciate wildlife, and community awareness of how watershed health can benefit people is an important part of the overall value of the project. The constructed off-channel pond may offer flood relief, particularly during the winter high water storm events.

Recommendations and Next Steps

Further actions recommended for this project include:

- Controlling/removing invasive species such as Himalayan balsam along the newly planted riparian area. Himalayan balsam is an annual plant and can be effectively controlled by limiting the amount of seed produced. Removing plants before they go to seed will effectively reduce the number of seeds produced and prevent further spread.
- Monitor the off-channel habitat for water quality and fish use.
- Photo-point monitoring.

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Appendix A. Photo-documentation

(Instream Restoration and Construction-stable Outlet Berm)

A. 2019 Instream, upstream view of the outlet culvert and stabilized berm. B. Downstream view of the outlet and berm.

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Appendix A. Photo-documentation

(Instream Restoration and Construction-Hooge Wetlands)

A. 2019 Instream east view with two reference tree clusters (red polygon and yellow polygon) during construction, with 2018 instream channel creation indicated as blue dashed line. B. south-east view of wetland construction. C. West-view of connection channel from wetland to constructed stream (2018). D. North view of wetland during construction. E. North-east view of wetland construction F. East view of construction, prior to LWD placement, and after groundwater has been exposed.

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Appendix A. Photo-documentation

(Instream Restoration, Construction and Replanting Hooge Wetlands)


A


B


C


D

A. Intake pipe and flange from 2018 instream and the connection pipe to supply wetland with summer flows. B. East view of wetlands after rootwads installed. C. Volunteers planting. D. Panoramic view of volunteers planting.

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Appendix A. Photo-documentation

(Annotated photographic mark-up-Hooge Wetlands)

A. Annotated wetland as-built, using a south-west view of the Hooge Wetlands (off-channel rearing and overwintering pond).

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Appendix A. Photo-documentation

(Peach Creek extension channel)

A. Upstream view of groundwater channel being constructed – clearing channel right of way. B. Depth of cut in the dry upstream view. C. Upstream view, groundwater exposed. D. Placing rootwads and LWD to complex the habitat. E. Upstream view after all rootwads placed. F. Retuning chum salmon (bottom left) using the newly constructed spawning habitat.

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Appendix A. Photo-documentation

(Peach Creek extension channel)

A. Downstream view machine roughening and loosening soil to reform floodplain forest. B.Rootwads and logs added to support soil and forest regrowth and close access. C. Footbridge required to reconnect trail. D. Hazard tree risk assessment. E. FVWC plants access with native plants. F. Close up of native plants being dug-in.

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4.2 Stewart Creek at Wilson Park

Project Overview

Important spawning and rearing habitat for all species of salmon exists within the Chilliwack Vedder River Watershed. The purpose of this project was to increase viable off-channel habitats to support rearing, overwintering salmon, wildlife and overall biodiversity.

Restoration efforts targeted Stewart Creek within a 0.78-acre City owned parcel, Wilson Park. Stewart Creek is a dynamic stream that runs through agricultural land in Chilliwack BC. The stream originates on Vedder Mountain, flows west through Chilliwack and joins the Sumas canal, which empties into the Fraser River. The cold mountain water input to this stream increases the quality of the habitat and provides good year-round dissolved oxygen levels. However, this creek is impacted by numerous challenges such as removal of riparian vegetation, development and infilling, agricultural run-off, and encroachment from invasive plant species such as Reed canary grass (*Phalaris arundinacea*) and Himalayan balsam (*Impatiens glandulifera*).

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Project Location

Wilson Park- 4325 Wilson Road, Chilliwack BC

This property, owned by the City of Chilliwack and known as Wilson Park is approximately 0.78 acres and is located in Yarrow, BC. Stewart Creek, a fish-bearing watercourse, flows south-west along the south side of the property. Approximately 107 meters of creek and riparian habitat runs through the property.

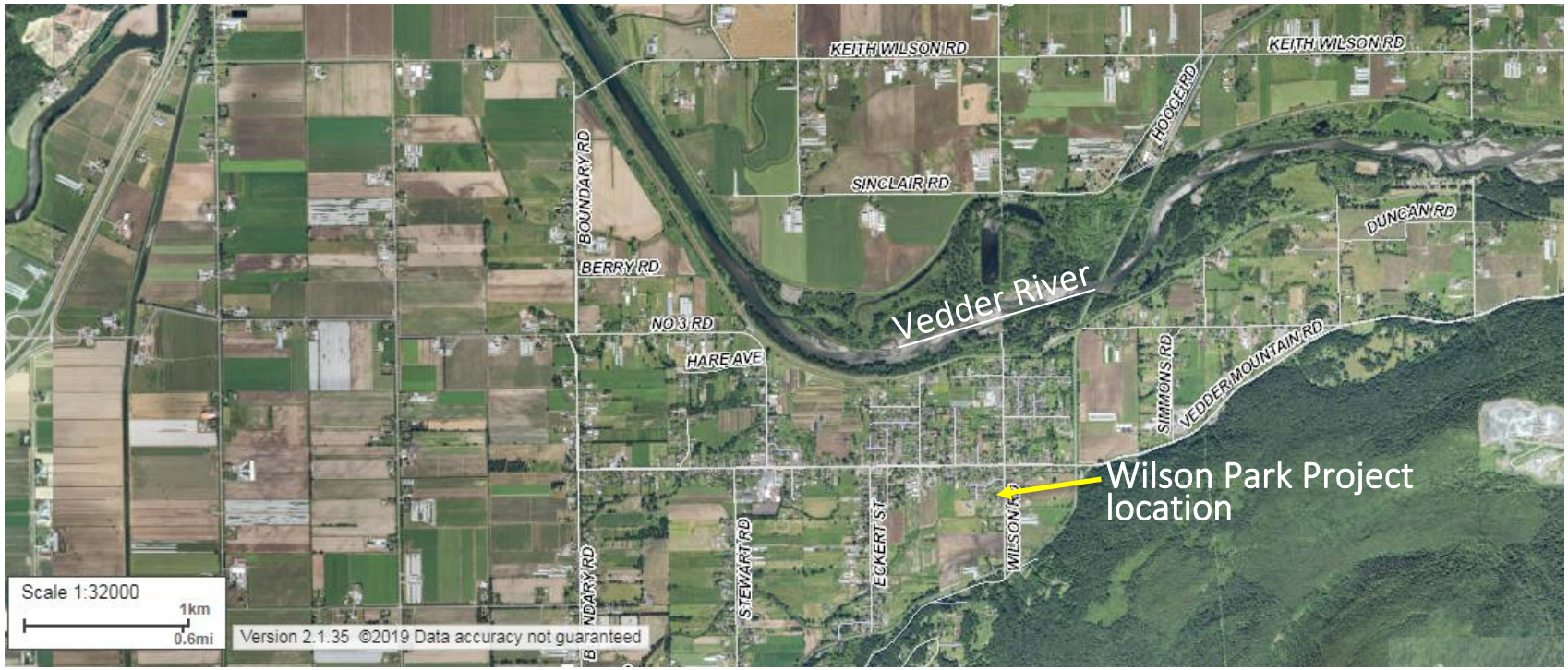

Figure 6 Project location with respect to Vedder River, Chilliwack BC

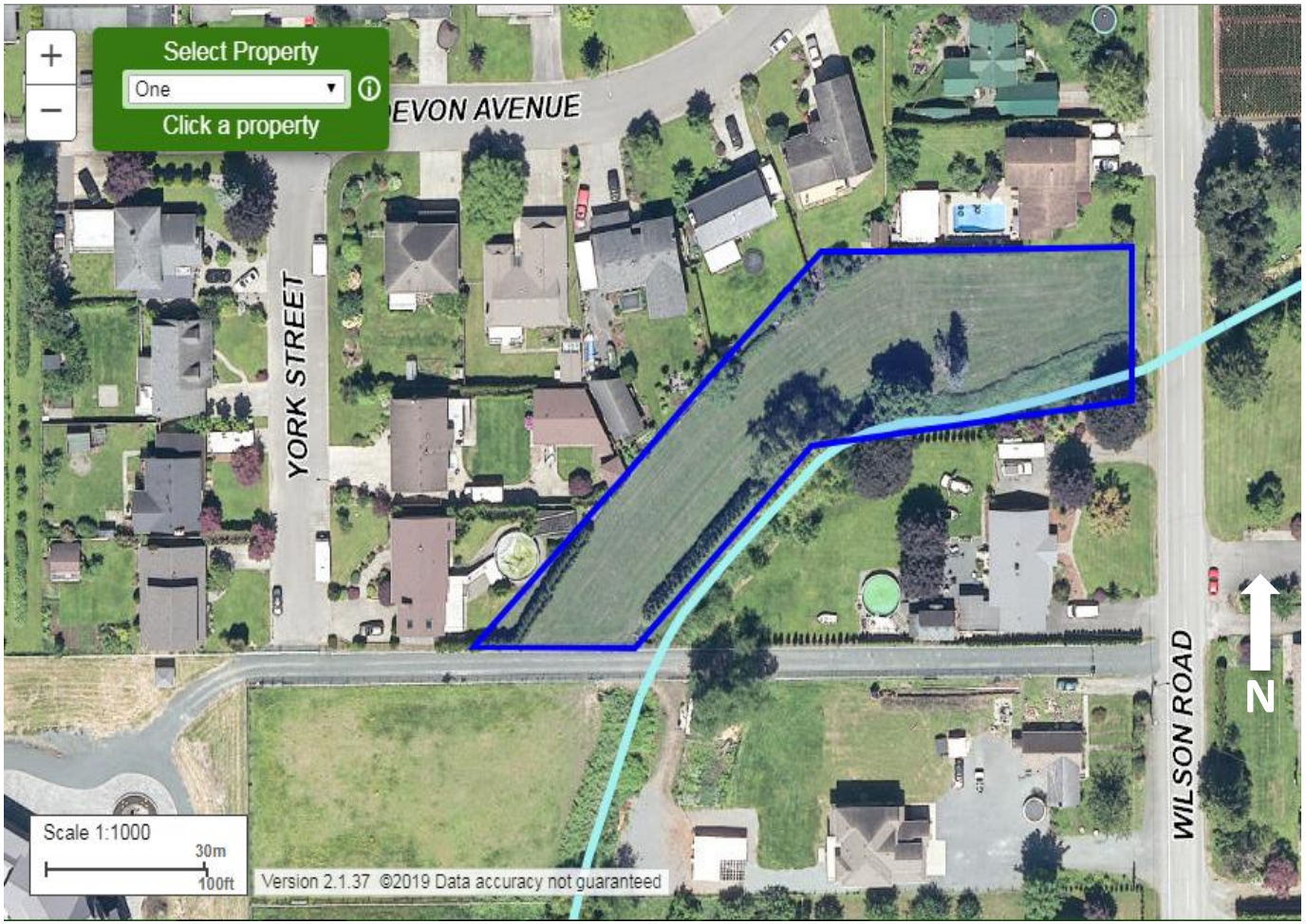

Figure 7 Wilson Park- 4325 Wilson Road

Goals and Objectives

The primary objective of this project was to collaborate with the City of Chilliwack to create and enhance salmon habitat in Wilson Park.

By creating additional off-channel habitat along Stewart Creek and planting a riparian buffer zone within the park we are providing additional habitat for young salmonids, specifically much needed off-channel habitat along Stewart Creek, which can experience periods of sudden high water flows and high turbidity. The enhancement will also improve habitat connectivity along the creek, add diversity to attract songbirds and amphibians and connect park users with the habitat through a volunteer planting event and increased park amenities. With the increasing population in Chilliwack, city park spaces are becoming ever more important. They allow residents to experience time in nature and enjoy their neighborhood. The enhancements completed in the park will also provide more wildlife viewing opportunities for the residents.

This project allowed us to build momentum for partnerships with the City of Chilliwack and help ensure long-term stewardship of this area.

Specifically, the goals of this project were:

6. **Restoration of Habitat:** Construct a complex off-channel habitat that supports overwintering salmon use and wildlife and biodiversity values.
   Goal: minimum 68 m^2

7. **Enhancement of Habitat.** Plant the newly created channel and pond with aquatic and riparian vegetation to support juvenile salmon. This includes the removal of invasive Himalayan Balsam.
   Goal: Replant a minimum of 90 m^2

8. **Conservation of Habitat.** Install permanent fencing to delineate sensitive salmon habitat.
   Goal: Off-channel pond is fenced.

9. **Community Engagement and Signage:** Promote increased stewardship through community and volunteer engagement. This includes hanging project signage to raise awareness for the activities.
   Goal: Minimum 20 volunteers assisting in the work. Permanent signage installed at project site.

Methods and Outcomes

Prior to instream works, FVWC and partners laid out the restoration design footprint, engaged the municipality on access and park use requirements and completed a BC species-at-risk, archaeological query and call before you dig to ensure in-situ values and infrastructure were identified and protected. Invasive Himalayan balsam was hand pulled along sections of the creek, where planned activities were to occur. Project safety signs were installed, and the city mailed letters to the neighbourhood to inform the community of the restoration efforts.

The instream construction was completed during the 2019 Instream fisheries works window. During August 26, 2019 and August 29, 2019, a 100 series excavator constructed an off-channel pond along Stewart Creek, within Wilson Park. An isolation berm was first built to separate Stewart Creek from the construction activities. Then the connection channel and pond were excavated. The pond was dug to approximately 0.45m below the groundwater level, to ensure summer rearing habitat. The excavated soil was side casted to enhance the riparian area and build up a riparian berm between the creek and the pond. Some excess material was trucked offsite. Large wood was installed along the banks of the channel and within the pond to add habitat complexity.

After the pond and connection channel were constructed, and large root wads were placed, the excavator was used to prepare replanting conditions. Using the bucket, the berm and top of right bank were loosened and roughened up. This allows the planted native vegetation opportunity for strong root growth. A cover crop of Crimson clover (*Trifolium incarnatum*) was hand spread over the site for erosion and sediment control measures.

In September 2019, 140 linear ft. (42.67m) of permanent split rail cedar fencing was installed along the newly constructed pond, protecting 506 m^2 of habitat. The goals of the fencing were to delineate and keep anthropogenic activities away from the sensitive aquatic habitats and ensure public safety around water

In the fall of 2019, the off-channel pond and the surrounding banks of Stewart Creek were planted with 1,117 individual native trees, shrubs, sedges, and rushes, Table 1. In January 2020 a follow up planting of 756 individual plants occurred to infill the shrub and aquatic plant layers, Table 1a. Yarrow Community School had five classes, 110 students, participate in the planting event on October 11th, 2019. The City of Chilliwack environmental coordinator led the students in replanting activities; FVWC staff led the students in discovering aquatic insects that were present in the stream and educational games.

After the planting was completed, an additional cover crop of Winter wheat (*Triticum aestivum*) was spread over the site to help reduce erosion. By planting native trees ands shrubs densely over the site,

the instance of Himalayan balsam returning and encroaching the waterway will be reduced. The native plants such as salmonberry and thimbleberry will aid in bank stabilization and provide food for wildlife; big leaf maple and pacific crab apple provide important leaf litter and detritus for salmon, and additional habitat for birds and wildlife. The selected native aquatic plugs have dense rhizomes and roots that can help with erosion control and the improvement of water quality by acting as filters to remove sediments. They also provide habitat structure for invertebrates that many other species depend upon as a food source and their leaves are used as nesting material for birds.

This site is a public park and an important aspect of the project, led by the City of Chilliwack, was to enhance park amenities. The improved amenities benefit public users, increases community connection to nature- viewing salmon and wildlife, and fosters a community's sense of place. The City of Chilliwack installed two new parking stalls, a bench, a garbage can and a citizen science photo-point monitoring station. Refer to Appendix A. Photo-documentation for representative project photos and Appendix B. As-Built diagram.

Table 5. Vegetation Planted in 2019

Latin name	Common name	Size	Quantity
Fraxinus latifolia	Oregon ash	5 gal	5
Acer Macrophyllum	Big leaf maple	5 gal	5
Prunus virginiana	Choke cherry	2 gal	5
Malus fusca	Pacific crab apple	2 gal	5
Crataegus douglasii	Black hawthorn	2 gal	5
Thuja plicata	Western red cedar	5 gal	5
Tsuga heterphylla	Western hemlock	5 gal	2
Pseudosuga menziesii	Douglas fir	5 gal	2
Pinus contorta var. contorta	Shore pine	2 gal	2
		Total trees	**36**
Lonicera involucrata	Black twinberry	2 gal	25
Osmaronia cerasiformis	Oso berry	1 gal	50
Physocarpus capitatus	Pacific ninebark	2 gal	40
Roas nutkana	Nootka rose	2 gal	40
Rubus spectabilis	Salmonberry	2 gal	70
Symphoricapus albus	Snowberry	1 gal	30
Ribes sanguineum	Red flowering currant	2 gal	50
Philadelphus lewisii	Mock orange	1 gal	50
		Total shrubs	**355**
Carex obnupta	Slough sedge	Plugs	150
Carex mertensii	Mertins sedge	Plugs	144
Juncus effusus	Common rush	Plugs	144
Carex densa	Dense sedge	Plugs	144
Scirpus acutus	Hard stem bull rush	Plugs	144
		Total aquatic plugs	**726**
		TOTAL plants 2019	**1117**

Table 6a. Vegetation Planted in 2020

Latin name	Common name	Size	Quantity
Lonicera involucrata	Black twinberry	2 gal	12
Physocarpus capitatus	Pacific ninebark	1 gal	15
Rubus spectabilis	Salmonberry	1 gal	15
Symphoricapus albus	Snowberry	1 gal	15
Ribes sanguineum	Red flowering currant	1 gal	15
Philadelphus lewisii	Mock orange	1 gal	15
		Total shrubs	**87**
Carex obnupta	Slough sedge	Plugs	150
Carex mertensii	Mertins sedge	Plugs	144
Juncus effusus	Common rush	Plugs	144
Carex densa	Dense sedge	Plugs	144
		Total aquatic plugs	**582**
		TOTAL plants 2020	**756**
		Total plants from 2019+2020	**1,873**

Summary of Outcomes

1. **Restoration of Habitat:** Construct a complex off-channel habitat that supports overwintering salmon use and wildlife and biodiversity values.
   Goal: minimum 68 m^2
   Actual Result Achieved: 75m^2 restored instream salmon habitat.
   Status: Complete.

2. **Enhancement of Habitat.** Plant the newly created channel and pond with aquatic and riparian vegetation to support juvenile salmon. This includes the removal of invasive Himalayan Balsam.
   Goal: Replant a minimum of 90 m^2
   Actual Result Achieved: 431 m^2 of riparian planting using 1,873 individual native plants.
   Status: Complete.

3. **Conservation of Habitat.** Install permanent fencing to delineate sensitive salmon habitat.
   Goal: Off-channel pond is fenced.
   Actual Result Achieved: 140 linear ft (42.67 m) of permanent fencing protecting 506 m^2 of sensitive salmon habitat.
   Status: Complete.

4. **Community Engagement and Signage:** Promote increased stewardship through community and volunteer engagement. This includes hanging project signage to raise awareness for the activities.
   Goal: Minimum 20 volunteers assisting in the work. Permanent signage installed at project site.
   Actual Result Achieved: 110 student volunteers.
   Status: Complete.

Benefits to Species at Risk

This project aligns with the objectives of the Canada Nature Fund for Aquatic Species at Risk by taking a multi-species approach. The construction of the Stewart Creek off-channel at Wilson Park also included complexing the stream with large wood and completing over 400m^2 of riparian planting. While this project focused on restoring habitat for salmonids, other species at risk will also benefit from the habitat values provided by this site. These restoration efforts support the recovery efforts for species such as Salish sucker, red-legged frog, great blue heron, and Oregon forest snail (*Allogona townsendiana*) by implementing actions as described in recovery documents (2017 Nooksack Dace/Salish Sucker Action Plan, 2014 Recovery Strategy for the Oregon Forestsnail in Canada), management plans (2016 Management Plan for the Northern Red-Legged Frog in Canada, 2016 Management Plan for the Great Blue Heron *fannini* subspecies in Canada), COSEWIC status reports, and best management practices (e.g. 2015 Salish Sucker Collection Guidelines).

The creation of the off-channel at Stewart creek took into consideration Salish sucker as this site falls within potential critical habitat for this species. While Salish sucker was not found during preliminary assessments and monitoring, this project provides additional potential habitat for Salish sucker by increasing off-channel habitat within the Chilliwack Vedder river watershed and providing structurally complexed habitat with large wood and large riparian buffers.

The creation of the Stewart creek off-channel provides a slow moving and structurally complexed pond habitat for Northern red-legged frog oviposition and the banks have been planted with shrub species such as hardhack and a variety of sedges and rushes that will be beneficial for egg-mass anchorage. Stewart creek also falls within the critical functioning zone of the Oregon forest snail. The riparian zone of the off-channel in Wilson park was planted with species to reflect a mixed forest floodplain to provide suitable Oregon forest snail habitat. The constructed off-channel of Stewart creek also provides foraging habitat for great blue heron. Additionally, the riparian zone of this site was planted with tree species such as douglas-fir and big-leaf maple which will provide potential long-term rookery sites for breeding.

Additional Values

Through the Wilson Park, Stewart Creek salmon habitat restoration project, FVWC was able to connect with local park users and educate them about the benefits of restoration projects. Yarrow elementary students participated in an educational, outdoor event at the park where they learned all about fish, wildlife, and the importance of riparian areas. Many of the teachers expressed interest in returning to the site with their students and checking on the progress and health of the restoration project.

By completing suburban restoration projects there is an increased chance to view and appreciate wildlife in a suburban park setting, and community awareness of how watershed health can benefit people is an important part of the overall value of the project.

The constructed off-channel pond to Stewart Creek may offer flood relief, particularly during the winter high water storm events.

Recommendations and Next Steps

Further actions recommended for this project include:

- Controlling/removing invasive species such as Himalayan balsam along the newly planted riparian area. Himalayan balsam is an annual plant and can be effectively controlled by limiting the amount of seed produced. Removing plants before they go to seed will effectively reduce the number of seeds produced and prevent further spread.
- Monitor the off-channel habitat for water quality and fish use.
- Photo point monitoring

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Appendix A. Photo-documentation

(Construction and planting of Wilson Park, Stewart Creek Chilliwack BC.)

A. 2019 excavation to create new off-channel habitat. B. Excavator shapes pond and surrounding riparian area. C. Large wood delivered to site. D. Plants laid out and waiting for student volunteers. E. City of Chilliwack, Environmental Coordinator, shows class how to plant a tree. F. Completed riparian planting.

5.0 Cultus Lake Summit

The Cultus Lake Summit (the Summit) is a key activity in Year one of this project. The purpose of the Summit was to gather a variety of stakeholders including Fisheries and Oceans Canada, municipal/regional engineering and environmental departments, local professional biologists and other key stakeholders as identified through the planning process. The Summit would facilitate discussion with these stakeholders to discuss the drivers of cultural eutrophication of Cultus lake and discuss ways to mitigate these drivers. Results of this summit will provide guidance to external partners intending to implement separate initiatives with mutually beneficial intended outcomes post summit.

All the details of the Summit had been worked out. Due to COVID-19 a shift in the delivery of the Summit had to be made, however the intended outcomes remain the same. On March 11, 2020, the UN World Health Authority (WHO) declared that the Covid-19 virus had become a pandemic. Subsequent actions and orders by all levels of government and public health authorities in Canada to curtail public activities in order to slow the spread of the virus impacted the ability of Fraser Basin Council (FBC) to deliver the planned in-person Cultus Lake Summit, under the terms of a funding agreement with the Fraser Valley Watersheds Coalition (FVWC). Prior to public health concerns coming to the fore, the Summit had been scheduled to take place on March 25, 2020 at the Cultus Lake Golf Club.

FVWC and FBC have agreed that in order to avoid health risks through an in-person meeting and comply with recommendations of public health officials, the Cultus Lake Summit would be, at a minimum, postponed. The ability of FBC to convene the Summit in the future will be subject to the availability of funding for this purpose.

FVWC and FBC further agreed that remaining resources available to convene the Summit be redirected to develop communications products that will serve to inform and encourage collaborative action on Cultus Lake water quality, including work to reverse lake eutrophication and related impacts on the Cultus Pygmy Sculpin, a federal species at risk that is unique to the Lake. These communications products will be helpful in the ability of FBC to engage various interests in the future to enhance collaboration with respect to Cultus Lake. Appendix D

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7.0 List of Appendices

Appendix A. Restoration Projects Ranking Matrix

Appendix B. Conceptual Restoration Designs

Appendix C. Pearson Ecological Salish Sucker Report

Appendix D. Cultus Lake Summit Final Report