Cheakamus River Floodplain Restoration – Evans Creek Re-watering Project
Final Report
Project Number 14.CMS.01

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Executive Summary

The Cheakamus River Floodplain Restoration – Evans Creek Re-watering project expands upon previous habitat restoration projects funded by BC Hydro Fish and Wildlife Conservation Program in the Dave Marshall Salmon Reserve adjacent to the Cheakamus River. The project created over 3,000 square metres of spawning and rearing habitats for coho salmon that will also benefit Chinook, pink and chum salmon stocks as well as cutthroat and steelhead trout. The original floodplain habitats were degraded due to changed river flow, sediment budgets, and installation of flood protection works due to impacts of the Daisy Lake dam, transmission towers and access road construction in 1957.

The importance of this habitat was demonstrated during the flood of record in 2003, when over 90% of the surviving Pink salmon fry that migrated past the BC Hydro Water Use monitoring traps the next spring, were found to have originated in these restored habitats. Coho and chum salmon will benefit in a similar manner from these works.
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1.0 Introduction
The Cheakamus River Floodplain Restoration – Evans Creek Re-watering Project involved expanding upon existing fish habitat work within the Cheakamus River floodplain. Squamish River Watershed Society (SRWS) partnered with the Squamish First Nation, Cheakamus Centre (School District #44), and Fisheries and Oceans Canada during all phases of the design and development of the salmon habitat project. The focus of the project was to provide habitat to support pink, coho, chum, and Chinook salmon. The original floodplain habitats were degraded due to changed river flow, sediment budgets and installation of flood protection works due to impacts of the Daisy Lake dam, transmission towers and access road construction in 1957.

The newly constructed channels now re-water and reconnect channels on the Cheakamus River floodplain that were first constructed in the 1980’s.

2.0 Goals and Objectives
The goals and objectives for this project included:

- Construction of over 1,500 square metres of rearing habitat for coho salmon in the Dave Marshall Salmon Reserve spawning channels;
- Place large woody debris (LWD) and boulder clusters to provide refugia and complexing for juvenile salmonids;
- Restore and expand a portion of Moody’s Channel to re-establish stable salmon spawning habitat and create over 150 square metres of habitat for Chinook, coho, chum, and pink salmon;
- Provide access to Squamish Nation residents and allow future expansion to re-water Evans Creek (as part of Phase 3 of the project);
- Revegetate the site with native riparian plants to assist with shading, food source, and refugia;
- Expand the interconnecting ground water and intake fed channels to maximize on salmon habitat on the protected outside areas of the Cheakamus River dyke.

2.1 Limiting Factors
1. Several limiting factors were addressed in this project including the loss of riverine side channel habitat that provides critically important spawning areas for pink salmon and for rearing 0+ Chinook salmon. These areas are also important for chum spawning and coho rearing. Spawning surveys carried out in 1955 and 1957 confirm these areas supported important spawning populations of pink, chum and coho salmon prior to hydroelectric development of the river (DFO, 1957, Ref. 1&2). D.B. Lister (2001) summarized the importance of these side channel habitats for sustaining pink salmon populations in the Cheakamus River and suggested active restoration of these areas as the only practicable means of recovering these populations. Downstream trapping studies on the Cheakamus River in 2000 and 2001 attributed significant declines in Chinook smolt abundance since 1966 with loss of channel complexity and loss of side channel habitats (McCubbing and Melville, BCH reports).
2. The second limiting factor addressed was the loss of nutrients due to the effects of the Daisy Lake Reservoir and diversion of nutrients out of the basin through the power tunnel to the Squamish River. This project now increases the biomass of salmon produced by the lower Cheakamus River thereby increase the amount of marine derived nutrients that enter the ecosystem each year, as attested by the large number of chum salmon that immediately made use of the channel in early November, 2014. All the project works are largely directed at securing the benefits of previous investments in these restored habitats or are to improve the functionality of these areas to better support present day salmon recovery efforts in this section of the Cheakamus River.

2.2 Value added benefits

This project has extended and expanded upon the Dave Marshall Salmon Reserve, which is recognized as one of the premier outdoor education facilities in Canada. All previous restoration projects have been designed to complement the educational programs developed by the Cheakamus Centre (former North Vancouver Outdoor School). This project now also functions to direct water to the Evans Creek Re-watering Project, which is supported by the Squamish First Nation. The FWCP will not find a higher profile area to showcase their program or their efforts to restore watersheds damaged by hydro-electric developments. Simple informational signs have been placed on-site for interested members of the public. The Cheakamus Centre sees hundreds of students each year pass through the area on educational field trips. This area provides excellent nature viewing opportunities and supports high densities of bald eagles each winter which earns this site international recognition. Cheakamus Centre, Squamish Nation, DFO, BC Hydro, and the Squamish River Watershed Society have long collaborated on improving environmental values in this area and these works will continue and strengthen that relationship.

3.0 Study Area

The proposed salmon habitat restoration sites are located on the west bank of the Cheakamus River downstream of the Paradise Valley Road Bailey Bridge. The project is located immediately south of the Cheakamus Centre, School District 44 (North Vancouver) designated as District Lots 1245 and 1244 within the New Westminster Land District. The project is situated adjacent to BC Hydro ROW and on IR 11 land. Maps covering the site are Natural Resources Canada National Topographic System 92G/14 and GeoData British Columbia Terrain Resource Information Management 92G.085 (see map/drawing).

This portion of the Cheakamus River floodplain is directly downstream of the “Dave Marshall Salmon Reserve” and contains an extensive network of restored fish habitats.
that have been constructed over the past thirty years. The area is separated from the main river by dikes, which provide a degree of protection to the restored habitats during significant floods. Many of the areas targeted for rehabilitation or improvement have been partly funded by BC Hydro in the past and continue to provide benefits to the salmon recovery efforts in the Cheakamus River.

4.0 Methods

This project involved the use of a two Cat 320/321 excavators and Cat 966 front end loader as well as a D250 Cat Volvo and gravel truck that was used to transport gravel. New connector channels diverting flows from Moody’s Channel (augmented by flows from the newly installed Duck Pond Intake) were constructed to provide spawning, rearing, and over-wintering habitat. The channels were excavated with the Cat 320 & 321 units and gravel, removed from the site was transported by the D250 Cat truck. The Cat 950 and 966 front end loaders were used to place the gravel and position the culverts into place. Large woody debris and boulders were placed using the Cat 320 & 321 excavator. Several excavators and operators worked simultaneously on various parts of the project including Squamish Nation member contractor Atwell Contracting. The total habitat restored was around 7,600 square metres rearing habitat and 800 square metres of spawning habitat for a total linear length of over 1,200 metres.

The original project design and alignment was determined by several on-site walkabouts between DFO, SRWS, BC Hydro, Squamish Nation, and Cheakamus Centre staff well in advance of the works proceeding. A final survey of the site will be undertaken by March 2015 and as-built design drawings will be submitted to BC Hydro.

5.0 Results

This project involved undertaking works to improve existing fish habitats and create new habitats for the benefit of Chinook, coho, pink and chum salmon. The SRWS partnered with Fisheries and Oceans Canada, Squamish Nation, and the Cheakamus Centre during all phases of the design and development of the proposed salmon habitat projects.

The new works have now expanded and restored restore fish habitat in and around the Lower Paradise Channel consisting of the following:

1. 7,600 square metres rearing habitat & 800 square metres of spawning habitat for a total linear length of 1,200 metres;
2. Over a dozen large woody debris and boulder clusters placed along the spawning channels and rearing habitat;
3. Four new bridge/road crossings and three culvert connectors;
4. Native grass seed revegetation along the disturbed sites;
5. Signage acknowledging funding support and partnerships.
Increased salmon returns to the relatively stable side-channel habitat now provide improved foraging opportunities for birds such as the Bald Eagle, Great Blue Heron and Belted Kingfisher. Additional marine derived nutrients from the salmon carcasses provide an important food and nutrient source for both aquatic and terrestrial animals and plants in the Cheakamus River.

6.0 Discussion
The Cheakamus IR 11 Project is a multi-year multiple phased project that involves the partnership of Squamish Nation, Cheakamus Centre, Fisheries and Oceans Canada, and the Squamish River Watershed Society. An important component of this project is also the support from BC Hydro and the Transmission Corporation. The overall objective, to provide off-channel habitat along the inner sections of the dyked portion of the Cheakamus River and restore the coho populations along with benefiting chum, pink, and Chinook salmon. This phase of the project helped to create over 7,600 square metres of high quality rearing habitat and over 800 square metres of spawning habitat for coho salmon. The intention is to now expand into Phase 3 through the “Notch Connector” to allow water to flow west across Paradise Valley Road into the Evans Creek tributary and fully activate the entire inner channels and help to compensate for the dykes, dams, and other artificial obstructions that have been impacting populations over the past half century.

7.0 Recommendations
The only recommendation is to work towards continuing on with the next phases of this project to direct flows through the Notch Connector and ultimately to help re-water Evans Creek.

8.0 Acknowledgement
We would like to thank BC Hydro and the Fish and Wildlife Compensation Program for all of their help and assistance is funding and supporting this year’s project.

We would also like to take this time to thank:
- Randall Lewis, and the support from Squamish Nation including the contribution of the gravel that was used to create spawning habitat for this project;
- Cheakamus Centre
- Dave Brown and the Sea to Sky Fisheries Round Table
- Matt Foy, Dave Nanson, Sam Gidora, Al Johnson and other Fisheries and Oceans Canada for all of their assistance; and
- John Hunter Company & Atwell Contracting (Dan Lewis) for their excellent work!
9.0 References


Appendices

I. Financial Statements

   See attached

II. Performance Measures and Outcomes

   See attached
III. Confirmation of FWCP Recognition

Signage is being installed alongside the project (see photos below in Section IV) and a short summary of the project is being included in the Squamish River Watershed Society website (www.squamishwatershed.com).

Image of signage:
IV. Photos

Prior to construction (June 2014)

During construction (September 2014)
November 12, 2014

New Channel – riffle for spawning salmon– facing north west

New culvert crossing under Moody’s Lane – facing north
Downstream of photo above (facing south)
Second new culvert crossing & new channel facing north

Facing south towards newly re-watered channel
Facing downstream from bridge crossing along Moody’s Lane

Upstream (facing north) from Moody’s Lane bridge crossing
Downstream section towards Moody’s Channel – preparing for diversion to Evans Creek Connector (facing west – note channel does not extend beyond scrub brush)

Bottom end (south) of new channel construction – note Chum salmon in bottom right of photo
V. Map of Site
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