UPPER SQUAMISH RIVER HABITAT RESTORATION PROJECT

COA-F17-F-1342
YEAR END FINAL REPORT

Prepared for:
Fish and Wildlife Compensation Program

Prepared by:
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Prepared for Fish and Wildlife Compensation Program on behalf of its program partners: BC Hydro, the Province of BC, Fisheries and Oceans Canada, First Nations, and Public Stakeholders

April 2, 2017 (updated May 10, 2017)

Executive Summary

The Upper Squamish River Habitat Restoration Project is a multi-year project that was divided into four major components during the fiscal year. The project fits direction within the directives identified in the Cheakamus Watershed Salmonid Action Plan as noted in Table 2 under Habitat Based Actions: a) Maintain existing constructed habitat enhancements for all salmonids; and b) Improve existing side channels and off-channel areas for all salmonids. These works included:

- Culvert upgrades on High Falls with changes to the outlet location and improved access into the spawning channel;

- Culvert replacement on Mile 22 Creek including redirecting flows along the east side (ditch) of the Forestry Road to increase flows downstream into the overwintering and rearing pond, converted 75m of the roadside watercourse into spawning habitat and constructed a 110m long spawning channel on the downstream (west) side of the road;

- Improvements to Branch 100 Creek including reconstructing the spillway to re-water the 12,000 m^2 wetland and improve flow and spawning habitat and construct a berm to maintain water levels in the over-wintering and rearing pond; and

- Modifications to the Ashlu off-channel habitats including cleaning out the four culverts along the Forestry Road, construction of 4 new spawning channels on the north side of the road (upstream of the culverts) to improve water conveyance to each of the 4 culvert crossings and deter beaver dam activity, riparian planting of native species to provide shade and habitat complexity, and the installation of beaver control fencing.

These works all provide important improvements to habitat for salmonids including chum salmon, coho salmon, pink salmon, steelhead salmon, and juvenile Chinook salmon as well as other fisheries and wildlife.

Contents

1.0 Introduction and Project Description

High Falls Creek

High Falls Creek (Watershed Code: 900-976-440) is a tributary of the Squamish River located at UTM: 10U 477759 5531322, Map 92G/14. It is a steep mountain watercourse with a watershed area of over 20,000 m^2, and a linear length of around 9,755 m it flows down the steep mountain slope flattening out at the road crossing of the Squamish Forestry Road, located just north of the BC Hydro managed Daisy Reservoir Penstocks and Tailrace. High Falls Creek is an important watercourse for coho, steelhead, chum, Chinook, and pink salmon as well as Dolly Varden, and other char.

Tasks:

- Excavation and restoration of 1,300 m^2 spawning habitat for salmonids;
- Gravel placement and CWD clusters;
- Realignment of smaller tributaries into one larger channel to provide consistent year round flows and generate over 2,000 m^2 overwintering rearing habitat;
- Vegetation management with grass seeding to provide ground cover.

Branch 100 Creek

Branch 100 Creek (Watershed Code: 900-976-419) is a tributary of the Squamish River located at UTM 10U 478547 5529962, Map 92G/14. The watercourse flows down a steep mountain side alongside Branch 100 access road directly into the Powerhouse Channel (part of the BC Hydro managed Daisy Reservoir Generating Station Penstocks).

Branch 100 Creek is an important spawning tributary for coho salmon that rear in the BC Hydro Powerhouse Channel that flows into the Squamish River. The lower section of Branch 100 Creek was obliterated when the Powerhouse Tailrace Channel was excavated in 1957. Side cast spoil along the banks of the channel form a partial dyke that impounds the flows from the remaining section of Branch 100 Creek and its tributaries to form a small wetland under an existing BC Hydro right of way. This stream had an accessible length of approximately 100 meters from the Powerhouse Channel to impassable culverts under the Squamish Main Forest Service Road but had less than 100 square meters of suitable salmon spawning gravels. In many years beavers construct their dams at the narrows where Branch 100 Creek has breached the side cast dyke, prior to flowing into the Powerhouse Channel. When these beaver dams are intact adult salmon access to the creek is restricted and the remaining spawning habitats upstream are inundated and unusable.

The watercourse discharges into a large complex pond that connects with 22 Mile Creek and is an important watercourse for rearing, overwintering, and spawning coho salmon as well as other salmonids and wildlife. In 2005 the Squamish River Watershed Society (in partnership with Fisheries and Oceans Canada and Squamish Nation) constructed 800 m2 of spawning habitat, installation of 36" metal culvert access under the Squamish Forest Service Road, and 4000 m^2 of pond and wetland habitat. In 2009 the SRWS continued work on Branch 100 Creek by repairing and realigning a beave baffle in order to maintain the overwintering and rearing pond habitat while providing year round flows in the spawning channel. An additional 560 linear metres of channel was constructed at that time improving over 18,750 m^2 of habitat for rearing and overwintering salmonids, in particular for juvenile coho salmon.

Tasks

- Improvement of access to spawning channel through clearing out of existing channel and restructuring weir and overflow structure to access 12,000 m^2 rearing habitat and create an additional 200 m^2 of new spawning habitat for salmonids;
- Placement of spawning gravel along newly aligned channel;
- Culvert crossing across Squamish Main Logging Road to improve flows from east side of road (ditch and streamside flowing down from Branch 100 access road);
- Resurfacing of road;
- Vegetation management with grass seeding to provide ground cover.

Mile 22 Creek

Mile 22 Creek is an ungazetted watercourse located at UTM 10U 479274 5530963 and flows down the steep mountainside west across the Squamish Forest Service Road and into the Powerhouse Channel. Mile 22 Creek and Branch 100 Creek both flow into a large wetland complex that provides outstanding habitat for rearing and overwintering coho salmon and other salmonids and wildlife. Water flows from Mile 22 Creek have been flowing along the east side of the Forest Service Road along the ditch and compromising fish health by diverting adult spawners away from prime habitat. The project to improve water flow from Mile 22 Creek involved installing an additional culvert under the Forest Service Road and redirecting flows from the road ditch to improve downstream flows for spawning salmon.

Tasks

- Construction of new channel to direct flows from east side of Squamish Main Logging Road for spawning and rearing of salmonids;
- Installation of new culvert across Squamish Main Logging Road connecting to new channel;

- Resurfacing of Logging Road;
- Vegetation management with grass seeding to provide ground cover.

Ashlu Beaver Baffle and Fencing Installation, Culvert Replacement along Off-Channel Habitat

The Ashlu River (Watershed Code: 900-976-383) is a tributary of the Squamish River located at UTM: 10U 478920 5527082 and is the site of the current Innergex Run of the River Hydroelectric Facility. Much of the Ashlu River has been diked as part of previous forestry operations and in the 1980s and through the 1990s and 2000s and extensive network of off-channel habitat was constructed by Fisheries and Oceans Canada, the Squamish River Watershed Society, Ledcor (as part of the IPP), and others. The off-channel habitat complex provides important habitat for coho, pink, chum, Chinook, and steelhead salmon as well as other wildlife species.

Tasks:

- Construction of four new spawning channels on north side or Ashlu Forest Access Road;
- Repairs, upgrades, and cleaning out of Culverts 1, 2, 3, & 4;
- Installation of large and coarse woody debris in newly aligned channel on north side of road;
- Improved access to over 50,000 m^2 of rearing and overwintering habitat;
- Placement of spawning gravel along 250 m section of newly constructed channel for spawning salmonids;
- Fencing (to prevent beaver access) along Forest Access Road;
- Riparian planting of native shrubs, grass seed, and trees to provide vegetation management and ground cover.

2.0 Goals and Objectives

The primary focus of this project was to upgrade the restoration undertaken in previous years and improve stream flows, spawning channels, overwintering and rearing habitat, and replace culverts to improve habitat primarily for coho salmon during all their life stages. Secondary benefits including improvements to habitat for pink salmon, chum, salmon, steelhead salmon, Chinook salmon, rainbow trout and char. The small tributary systems in the Upper Squamish River watershed are important for coho and other salmonids that require lower energy streams for spawning and rearing. The long-term benefits are expected to provide over 13,000 m^2 of new and improved habitat allowing access to over 75,000 m^2 of overwintering, spawning, and rearing habitat.

3.0 Study Area

The Upper Squamish River watershed consists of numerous tributaries. This project focused on four main systems, High Falls Creek: UTM: 10U 477759 5531322, Map 92G/14, 22 Mile Creek: UTM 10U 479274 5530963, Map 92G/14, Branch 100 Creek: UTM 10U 478547 5529962, Map 92G/14, and Ashlu River Off-Channel habitat: 10U 478920 5527082, Map 92G/14 (see map below in Section 8.0).

4.0 Methods

The main works were completed using a 325 Tracked Hydraulic Excavator along with a Caterpillar 966C Rubber Tire Front End Loader and articulated rock trucks to move the materials including the large woody debris, aggregate, and culverts. Details of the total volume of materials associated with each work site are provided below in “Results and Outcomes”.

5.0 Results and Outcomes

The results have been broken down into the four sections of work.

High Falls Creek:

- Excavation and restoration of 1,300 m^2 spawning habitat for salmonids;
- Gravel placement and CWD clusters;
- Realignment of smaller tributaries into one larger channel to provide consistent year round flows and generate over 2,000 m^2 overwintering rearing habitat;
- Vegetation management with grass seeding to provide ground cover.

Branch 100 Creek:

- Improvement of access to spawning channel through clearing out of existing channel and restructuring weir and overflow structure to access 12,000 m^2 rearing habitat and create an additional 200 m^2 of new spawning habitat for salmonids;
- Placement of spawning gravel along newly aligned channel;
- Culvert crossing across Squamish Main Logging Road to improve flows from east side of road (ditch and streamside flowing down from Branch 100 access road);
- Resurfacing of road;
- Vegetation management with grass seeding to provide ground cover.

Mile 22 Creek:

- Construction of new channel to direct flows from east side of Squamish Main Logging Road for spawning and rearing of salmonids;
- Installation of new culvert across Squamish Main Logging Road connecting to new channel;
- Resurfacing of Logging Road;

- Cleaning out of large pond complex to improve flows for rearing and overwintering habitat for salmonids;
- Vegetation management with grass seeding to provide ground cover.

Ashlu River Off-Channel Habitat Improvements:

- Realignment of channels on north side or Ashlu Forest Access Road;
- Repairs, upgrades, and cleaning out of Culverts 1, 2, 3, & 4;
- Installation of large and coarse woody debris in newly aligned channel on north side of road;
- Improvements to over 50,000 m^2 of rearing and overwintering habitat;
- Placement of spawning gravel along 250 m section of newly constructed channel for spawning salmonids;
- Fencing (to prevent beaver access) along Forest Access Road;
- Riparian planting of native shrubs, grass seed, and trees to provide vegetation management and ground cover.

6.0 Discussion

Works on this project commenced in June 2016 and were interrupted by late summer fire shutdown in August. Work was able to resume in September but the early start of winter rains restricted access and physical works. Most of the physical works were completed by December 2016 with the final riparian plantings, mapping, and monitoring occurring in February/March 2017.

7.0 Recommendations

Works are expected to continue into year two with additional culvert crossing associated with High Falls Creek, improvements to the main channel along Branch 100 Creek, and road upgrades (undertaken by Sko-omish Logging) associated with Mile 22 Creek. This project had challenges involving timing due to the early winter that set in during October and lasted well past March, resulting in delays in work completion.

8.0 Acknowledgement

We would like to thank Fisheries and Oceans Canada, our project partners and Fish and Wildlife Compensation Program for funding and supporting this project.

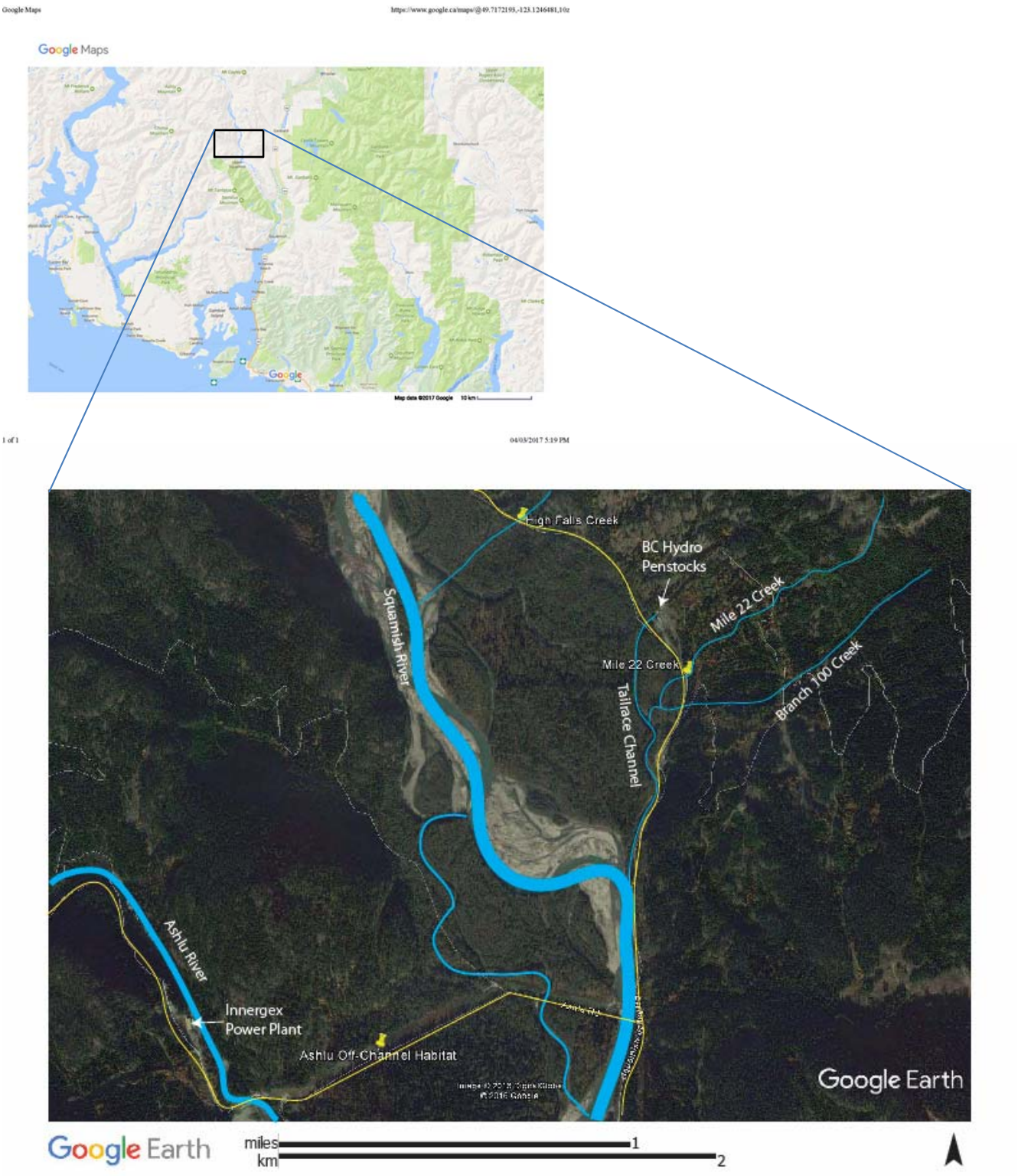
We would also like to take this time to thank:

- Randall Lewis, Squamish Nation
- Dave Nanson, Al Johnson and other Fisheries and Oceans Canada for all of their assistance; and
- John Hunter & Company

9.0 References

- BC Hydro Fish and Wildlife Coastal Restoration Program. “Branch 100 Creek Wetland Project” 05.CH.03. March 2006. Squamish River Watershed Society.
- BC Hydro Fish and Wildlife Coastal Restoration Program. “Cheakamus Powerhouse Channel Restoration” 09.CMS.02. March 2010. Squamish River Watershed Society.
- BC Hydro Fish and Wildlife Compensation Program Cheakamus Watershed Salmonid Action Plan. Final Draft. October 2011.
- Pacific Salmon Foundation. “Squamish River Watershed Salmon Recovery Plan”. Prepared by Golder Associates. May 2005.
- Tobe, E, 2002. Inventory of Existing Watershed Related Projects within the Squamish Forest District. Revised May 2011.

10.0 Site Map


Google Maps
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High Falls Creek
BC Hydro
Penstocks
Mile 22 Creek
Squamish River
Mile 22 Creek
Tailace Channel
Branch 100 Creek
Ashlu River
Innergex
Power Plant
Ashlu Off-Channel Habitat
Google Earth
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11.0 Photos

Mile 22 Creek & Branch 100 Creek
November 30, 2016

Facing north towards BC Hydro Power Generating Plant (Penstocks)

Facing west towards newly constructed channel that will connect with Mile 22 Creek culvert

Facing west along newly constructed connector channel for Mile 22 Creek

Facing north from Branch 100 Creek to wetland complex (at north end Mile 22 Creek enters)

December 7, 2016

Realignment of roadside ditch/channel on east side of Forest Service Road (facing south; water flowing south into Branch 100 Creek culvert)

Facing west towards newly constructed channel after culvert installed across Forest Service Road at Mile 22 Creek

Ashlu Off-Channel Habitat: Beaver Baffles, & Fencing
November 30, 2016

Facing north, new channel construction and culvert installation along north side of road

Facing east towards “Culvert 1”

Facing north-east towards “Culvert 1”

“Culvert 1” – facing north, upstream of road

Facing north between “Culvert 1” and “Culvert 2”; note new connector culvert

Facing east towards “Culvert 2”

Facing east towards “Culvert 2”

Facing north just above “Culvert 2” at new culvert to improve flows and prevent beaver obstructions

Facing east towards “Culvert 3”

Site #6 “Culvert 2” – facing upstream, north of road; note gravel weir to maintain rearing habitat (top of photo)

Facing east towards “Culvert 3”

Facing north towards new culvert/berm between “Culvert 3” & “Culvert 4”

Facing east towards “Culvert 4”

“Culvert 3” – facing north, upstream of road; note gravel berm

“Culvert 4” – facing upstream on north side of road

Fencing (photo taken March 20, 2017)