Cheakamus River Sidechannel Restoration Project 2002 (02.Ch.6)

Tantalus Walking Club on interpretive tour Nov. 2002

BC HYDRO FISH & WILDLIFE BRIDGE COASTAL RESTORATION PROGRAM

North Vancouver Outdoor School

Canada Government of Canada Fisheries and Oceans

Cheakamus River Sidechannel Restoration 2002
Final Report

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Executive Summary

This project involved the controlled breaching of the Cheakamus River dyke and construction of sidechannel habitat isolated on the river floodplain behind this dyke.

The river training dyke is located on the south bank of the Cheakamus River, immediately downstream of the BCH Bailey bridge. The dyke was breached by a 51 meter (m) long, .92 m diameter steel pipe, controlled by a cast iron gate valve on the downsteam end. A flow of water of between 40 and 100 cubic feet per second (cfs) will be diverted from the Cheakamus River into the newly created off-channel habitats through this intake and pipeline structure.

This project involved excavation and creation of approximately 750 meters of river-fed sidechannels to restore important pink salmon spawning and chinook salmon rearing habitats. During construction approx. 30,000 cubic meters (m^3) of material was excavated creating 4,600 square meters (m^2) of new habitat. A further 2,815 m^2 of habitat downstream of the project, in the lower reaches of the *Upper Paradise Spawning Channel* was significantly enhanced by the resulting increase in flows.

Approx. 5,000 m^3 of this excavated alluvial gravel was transported 4.5 kilometers (km) upstream and deposited on an active river bar. (linked project 02.Ch.7)

Introduction

The North Vancouver Outdoor School (NVOS) has worked with the Department of Fisheries and Oceans Canada (DFO) to develop a number of similar salmon habitat restoration projects on school property over the last two decades and has additional areas it wants to develop as more salmon habitat. These previous restoration projects have been directed at improving spawning and rearing habitats primarily for coho salmon and chum salmon. This project is directed at restoring important spawning and rearing habitats for pink and chinook salmon that were alienated prior to 1972 due to river changes attributed to the hydro-power development on the Cheakamus River including flood control dyke construction (Northwest Hydraulics, 2000)(DFO Report, 1957, Ref. 1&2).

Study Area

The habitat restoration site is located on the south bank of the Cheakamus River immediately downstream of the BC Hydro Bailey Bridge. The property is owned by the North Vancouver Outdoor School, School District 44 (North Vancouver).

Map reference is Natural Resources Canada NTS map Cheakamus 92G/14.
between (intake structure): N 49˚49.596' W123˚09.121' 10U 0489065 UTM 5519143
and (the channel exit): N 49˚49.290' W123˚09.147' 10U 0489034 UTM 5518577

Methods

A 750 m long corridor through the floodplain on NVOS property was laid out utilising existing isolated river braids wherever possible. Mixed soil overburden was spoiled on site at NVOS and clean alluvial gravel was stored near the BCH Bailey Bridge for later deposition on an upstream river bar as part of linked project 02.Ch.6. Existing encroaching trees were stored on site and later used as Large Woody Debris (LWD) refuge areas or placed in off-channel refuge ponds created along the channel margins.

This project lies within the floodplain of the Cheakamus River on the North Vancouver Outdoor School. This area lies in the area defined as Zone 1 (Riparian River Edge) of the restrictive convenants owned by the Nature Conservancy of Canada (NCC) that apply to this land. These convenants impacted all areas of construction. All excavated material was end hauled from the construction corridor to maintain the integrity of riparian plant life on the close edge margins. Channel margins that might have contributed silt into the channel were quickly seeded. Special care was taken that any and all terrestrial values adjoining this new aquatic habitat was not unduly impacted. A monitoring site was set up by NCC on the channel edge to track changes in habitat resulting from this project.

Excavation was done with Cat 225 and 235 excavators and Cat 966 loaders. Material was moved around site by a variety of standard dump trucks.

This new channel crossed over the existing Kisutch groundwater channel. Kisutch was “diverted” through 2 x 2-foot steel pipes. The new channel bottom was reinforced with geotec fabric and a poly liner to avoid excessive leakage at this crossing. The channel-crossing bottom was armoured with larger cobble through this area to discourage erosion by both water flows and spawning salmon.

NVOS partnered with Fisheries and Oceans Canada during all phases of the design and development of the proposed salmon habitat projects.

Results

This project has resulted in a total of almost 8,000 square metres of enhanced off channel spawning and rearing habitat for pink, chinook, coho, and chum salmon and steelhead trout.

This project resulted in the creation of 750 m of new side channel habitat totalling approx. 4,600 m^2 in area. Additional 550 m^2 of off-channel refuge ponds (filled with woody debris) were also created as part of this project. Utilisation by spawning chum and coho salmon in the fall 2002 season is document on the supporting as built construction drawings in Appendix C.

An intake structure was installed through the dyke just downstream of the BCH Bailey Bridge, which can provide up to 100 cfs flows.

A “side benefit” of these flows has been a demonstrated improvement in spawning capacity in the lower reaches of the existing *Upper Paradise Spawning Channel*. Approx. 2,815 m^2 of the Upper Paradise and Kisutch channels, 355 m in length have been enhanced by these augmented flows.

Informational signs have been installed that will enhance awareness of the salmonid resource. (Appendix D) Signage has been installed indicating the support of the BC Hydro Bridge Coastal Fish and Wildlife Restoration Program.

During construction approx. 390 m of new trail, three new bridges and an aquatic sampling station were created to provide access to this new habitat and an educational experience for thousands of school age children and members of the public.

A treated, wooden structure was installed in-channel to hold up to 5 million eyed salmonid eggs in incubation trays. This part of the project was completed with input from the staff at the Tenderfoot Creek Hatchery, who will be utilising this structure in future brood years for pink and chinook stock enhancement.

Discussion

The work will expand the amount of critical spawning habitat for pink salmon, which is believed to limit the ability of this species to recover their pre-hydro development levels of abundance in the Cheakamus River (Appendix 2). There will be additional benefits to chinook salmon that will access these habitats during their critical early-rearing life stage. BCH monitoring of out-migrating salmon smolts in the spring of 2000 identified an eleven-fold decrease in chinook smolt emigration from the Cheakamus River as compared to the out-migration of this species observed in a DFO 1966 study. This decrease in smolt numbers was postulated to be the result of the loss of channel complexity and abandonment of important sidechannels by the Cheakamus River from 1966-2000 as a result of the effects of hydroelectric development in the watershed (Melville and McCubbing, 2000).
• Coho and chum salmon and steelhead trout will also benefit from the habitat created. Coho and chum salmon utilised this new habitat during the their fall 2002 spawning season.
• Increased salmon returns to the relatively stable sidechannel habitat 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. A late November, 2002 count showed 228 chum carcasses in the new channel.

• To minimise the effects of diverting the river flow into the new pink channel, during low flow periods less water will be diverted as flow through the pipeline will be largely dictated by river stage and river water surface elevation. At absolute low river minimum flow (15 cms) the diverted flow would be in the 20 cfs range which will be less than 5% of the predicted minimum flow in the mainstem which would not be expected to significantly affect water surface elevation in downstream reaches below the point of diversion. In addition, flow/habitat suitability models used by the Cheakamus River WUP would not predict significant decreases in coho, Chinook or steelhead rearing habitat productivity from a flow variation of this magnitude. Lastly the reach of river that will be affected is not used to any large degree by spawning chum salmon which primarily use the river reach below the side channel discharge point as these areas are significantly affected by groundwater discharges which spawning chum salmon prefer in the Cheakamus River. (DFO, Matt Foy, Pers. Comm. Feb 2002)

• A staff gauge has been installed at the intake valve assembly to assist in quantifying this diversion flow. Ongoing monitoring of flows in the channel during the winter of 2002 – 2003 will help to define appropriate valve settings and flow regimes during critical flow seasons and events both in relation to mainstem and the new channel flows but also downstream back-watering considerations of existing Kisutch Channel infrastructures.

Limiting factors:

The first limiting factor that will be addressed is the loss of riverine side channel habitat that is critically important for spawning pink and for rearing 0+ chinook salmon juveniles. This restoration site is located on the historic active floodplain of the Cheakamus River that is now largely isolated from direct river

flow by the BCH bridge and dyke on the right bank of the Cheakamus River and upstream of the bridge on the left bank. Spawning surveys carried out in 1955 and 1957 confirm these isolated 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) summarised the importance of these sidechannel 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 (Appendix 2.). 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 sidechannel habitats (McCubbing and Melville, BCH reports in prep.).

The second limiting factor to be addressed is 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 will increase the biomass of salmon produced by the lower Cheakamus River and thereby increase the amount of marine derived nutrients that enter the ecosystem each year.

Applicability to Program Objectives:

Former spawning and rearing areas have been lost, primarily due to simplification of the Cheakamus River in Reach 4 due to dyke and bridge construction for protection and access to transmission lines, diversion of flows out of the basin directly into the Squamish River and loss of wood and gravel recruitment due to the effects of Daisy Lake created by dam construction (Northwest Hydraulics, 2000). All these impacts are related to the footprint effects of the Cheakamus River power project. These footprint impacts such as altered fluvial processes, caused by reduced downstream flows, and controlled flow releases have resulted in less downstream diversity such as side channels to the main river. This loss of riverine side channels critically limits spawning and rearing habitat for pink and chinook salmon. Migrating pink fry provide a major source of food for other species such as steelhead trout and chinook and coho pre-smolts prior to their migration to saltwater in the spring. Loss of side channel habitat and lower base flows in the main stem of the river have resulted in increased dependence of smolts and fry to these main-stem habitats. These fish are then more susceptible to fall flood event conditions.

Loss of nutrients due to the effects of the Daisy Lake reservoir and diversion tunnel will be addressed by increasing the source of marine derived nutrients to the lower Cheakamus River. This sidechannel habitat will increase salmon returns to the river and have the ability to hold salmon carcasses through winter floods and prevent them being swept out of the watershed. This will maximise the value of the marine derived nutrients to the local ecosystem.

Added value benefits includes informational signs placed at the site for interested members of the public. The site is adjacent to the North Vancouver Outdoor School which 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.

a) Monitoring Plan and Evaluation

1. *Ongoing* - Physical monitoring of water flows in the habitat and its use by spawning and rearing salmon will occur on a daily basis by NVOS staff.
2. *Ongoing*- Formal adult counts of spawning pink salmon are carried out by Golder and Associates and Squamish Nation under contract to Fisheries and Oceans as part of an annual monitoring program for salmon escapements in the watershed. NVOS staff provide a weekly count of channel utilisation by salmonids during the spawning seasons.
3. *September 2002-March 2005*-
DFO has agreed to monitor and assess fish populations in the developed habitat area over a three-year period to document fish use. This monitoring would include minnow trapping in early spring to document use by rearing salmonids such as chinook, coho and steelhead.

The project design provides a controllable outlet allowing for independent enumeration and marking. By co-ordinating the local monitoring program with the Water Use Planning Fish Technical Committee (WUP-FTC) river monitoring program, the data from this project will be separated from the overall river monitoring studies.

The WUP-FTC has expressed concerns about

(a) ensuring an accurate assessment of smolt migration into and through the channel
(b) accurate distinction between smolts originating from the mainstem and the new channel
(c) planned species use, and
(d) impact on spawners using the mainstem.

To address the FTC concerns, the level of monitoring undertaken on this habitat feature would reflect the importance that the WUP technical committee placed on the production attributed to this new habitat. If the WUP committee required accurate estimates of production then full inlet and outlet traps could be placed on this habitat to enumerate production. (DFO, Matt Foy, Pers. Comm., Feb 2002)

The design of the channel allows for the placement of adequate trapping facilities. The intake structure design ensures the minimum amount of fry entrainment because the structure is near the streambed and most actively migrating fry and smolt are found in the upper water column. Also, the likelihood of juvenile salmonids being passively transported through the pipeline is limited as the intake will be in a fast-flowing section of the stream and the water inlet is protected by a baffle reverse flow system which would require the juveniles to swim actively upstream to enter the intake port located at the downstream side of the intake structure. Flow through the pipeline diversion can be regulated to allow for a lower flow during any planned juvenile assessment program to minimise juvenile entrainment in the intake and improve enumeration of production at the lower end of the sidechannel. The sidechannel habitat's discharge enters the Kisutch and Upper Paradise sidechannels, which are already recommended for WUP monitoring in the future. Therefore, any increased production from this new habitat could be economically and practically captured in an assessment of the pre-existing sidechannels. Discussions include a long-term assessment of this new habitat in the WUP monitoring plan to ensure consistency with the planned assessment of pre-existing off-channel projects. (DFO, Matt Foy, Pers. Comm., Feb 2002)

Regarding FTC concerns about fish use, a mixture of species is planned unless use by other species reaches a level considered a negative impact on pink and chinook salmon survival. It is intended the project will provide a core habitat for recovering the pink salmon population in the Cheakamus River while providing some benefits to other salmonid species using those habitats. (DFO, Matt Foy, Pers. Comm., Feb 2002)

The magnitude of expected impact on the numbers of spawners using mainstem habitats due to drawing in spawners to the restored is considered insignificant considering the variation in spawning returns to the river due to marine harvest and survival factors. Also, the numbers or proportion of adult salmon using existing sidechannel and mainstem areas varies each year dependant of river flow and groundwater levels. In flood years a large proportion of chum salmon return can spawn in sidechannel areas and this can reverse in years of low river flow and decreased groundwater discharges in sidechannel habitats. Given the extremely limited amount of adult enumeration planned by the WUP for the Cheakamus River and the other major confounding factors that the WUP monitoring program will have to consider, the net effect of adult salmon diverting to this single restored sidechannel habitat would not be expected to be measurable. (DFO, Matt Foy, Pers. Comm., Feb 2002)

Monitoring for an extended period is contingent upon future funding availability.

4. *Ongoing* - The Cheakamus River Technical Committee is developing a Water Use Plan monitoring program that will look at the relative contribution of restored habitats to overall river productivity and the proposed project could be included in that study (S. MacFarlane, DFO, Pers. comm.).

5. *March 2005*- a report summarising the fish populations and statistics from the ongoing counts of spawners, children, and water flows, as well as updated photographs, will be provided to BC Hydro and all partnership groups.

b) Risks and Benefits

The risk of potential negative impacts is nil. Prior to the 1950's the site was part of the braided flood channel of the Cheakamus River. The area is now protected from direct upstream flooding from the Cheakamus River by a dyke, except for backwater effects from downstream during extreme flood events.

Non-target benefits include the high value bird and mammal habitat provided by the wetted areas and the salmon produced from those areas. It is known that common predators of salmon such as mink, bear, otter, Bald Eagle, Great Blue Heron, Belted Kingfishers, Common and Hooded Mergansers and American Dippers will all make use of salmon bio-mass as a seasonal food source. During extreme flood events, protected sidechannel habitats are used by all species of fish found in the Cheakamus River.

7: Acknowledgements

This project would not have been possible without the financial support of BC Hydro Bridge Coastal Fish and Wildlife Restoration Program and the technical and supervisory support of Fisheries and Oceans Canada Pacific Region Habitat and Enhancement Branch, particularly Matt Foy, Harold Beardmore, Jonathan Bulcock and Jesse´ Neri.

Excavation contraction was provided by John Hunter Ltd. This project could not exist as it does today without the exceptional support of Rick Hunter et al, supplying additional time and effort above and beyond the requirements of this contract including supply of additional Large Woody Debris and cobble rock. The work of John Hunter Jr. as the primary excavator operator is of particular note. His sensitive attention to detail and unique site requirements are largely responsible for the channel's final form.

Letters of support:
Randall Lewis Squamish Nation, Harold Beardmore P.Eng. Fisheries and Oceans, Edith Tobe, Executive Director of the Squamish River Watershed, Steve Rochetta BC WLAP Habitat Officer for Squamish, Rob Bell-Irving, Fisheries and Oceans Community Advisor for the Squamish-Howe-Sound.

8: References

•Department of Fisheries, Canada 1957. A report on the fisheries problems related to the power development of the Cheakamus River system. Vancouver B.C. 39p. + appendices.

•Melville, M. and D. McCubbing. 2000. Assessment of the 2000 Juvenile Salmon Migration from the Cheakamus River, using Rotary Screw Traps (draft). Prepared for BC Hydro, Burnaby. 36 p. + appendices

•Northwest Hydraulic Consultants. 2001. Analysis of channel morphology and sediment transport characteristics of the Cheakamus River. Prepared for BC Hydro, Burnaby. 40p. + appendices.

Cost Item	Description	Unit cost	PST	GST
Channel construction – equipment May22 - July 24	Cat 225,235 excavator 966 loader, dump trucks	93337.75	0	6533.64
Electroshocking Kisutch prior to construction of crossing	Electroshocking labour	695.00	0	48.65
Electroshocking equipment	Rental	130.00	0	0
Photography costs	Film and developing	105.26	11.50	7.37
Digital imaging	DFO and NVOS	0	0	0
Kisutch crossing liner	Heavy clear poly	53.96	4.05	3.78
Kisutch crossing liner	Geotec fabric inc. freight	539.20	38.40	37.74
Sand bags	Flow control during const.	267.00	20.02	18.69
Intake pipe	179.9 ft x 3 ft	9168.01	687.60	641.76
Groundcover seed (inc. freight)	Erosion control	378.00	0	26.46
Footbridge materials	Lumber, concrete, nails	239.70	17.98	16.78
NVOS Invoice # 37535	**July 29, 2002**	**104913.88**	**779.55**	**7334.87**
Rotary Drill Rental	Footbridge anchoring	45.00	3.37	3.15
Freight	Intake pipe delivery	422.50	0	29.58
Footbridges and signposts	Lumber	2110.93	154.19	147.77
Intake structure	Fabrication of upstream grate	4887.00	366.53	342.07
Intake structure	Modification of grate	404.25	28.88	28.30
Intake structure	Modification of grate	1999.00	144.41	139.94
Intake structure	Valve	3410.00	244.50	238.70
Mini excavator rental	Bypass trail construction	440.00	0	30.80
NVOS Invoice # 37536	**October 1, 2002**	**13718.68**	**941.88**	**960.33**
Footbridge materials	Lumber	155.29	11.65	10.87
Intake structure	Fabrication of pipe	7532.52	547.88	527.88
Intake installation	Labour, equipment, rentals	140464.00	0	984.48
NVOS Invoice # 37537	**December 17, 2002**	**21751.81**	**559.53**	**1523.23**
NVOS Invoice # 37535	July 29, 2002	104913.88	779.55	7334.87
NVOS Invoice # 37536	October 1, 2002	13718.68	941.88	960.33
NVOS Invoice # 37537	December 17, 2002	21751.81	559.53	1523.23
Invoice Totals		**140384.37**	**2280.96**	**9818.43**

Invoice	37535	37536	37537	Total spent in 2002
Unit total	104913.88	13718.68	21751.81	140384.37
PST	779.55	941.88	559.53	2280.96
GST	7334.87	960.33	1523.23	9818.43
TOTAL:	113,028.30	15,620.89	23,834.57	**152,483.76**

In-Kind Contributions	Supplied by:	Unit Value:	Total:
Project Design / Engineering	DFO	11 days @ $500	5500.00
Project Design	DFO / NVOS	2 days @ $300	600.00
Contracting	DFO	2 days @ $400	800.00
Layout	DFO / NVOS	6 days @ $500	3000.00
Construction Supervision	DFO	40 days @ $500	20,000.00
Construction supervision	NVOS	15 days @ $300	4500.00
Labour: Landscaping / seeding	NVOS	10 days @ $300	3000.00
Labour: Building trails	NVOS	7 days @ $300	2100.00
Labour: Construction of bridges	NVOS	10 days @ $300	3000.00
Labour: Construction of incubation box	NVOS	3 days @ $300	900.00
Labour / materials: Intake gauge / stand	NVOS	1 day @ $300	300.00
Labour / materials: Barriers / signage	NVOS	2 days @ $300	600.00
Rip rap rock	NVOS		20,000.00
Large Woody Debris	NVOS / John Hunter Ltd		29,000.00
3 foot concrete culverts	NVOS	7 @ $200	1400.00
Labour: Accounting, copies etc.	NVOS	8 days @ $300	2400.00
Signage:	Coho Festival		1000.00
Total In-Kind Contributions			**$103,100.00**

•Appendix B: Recognition of BC Hydro Bridge Coastal Fish and Wildlife Restoration Program

• All publicity activities will be made in the name of the "BC Hydro Bridge Coastal Fish and Wildlife Restoration Program.

• Information regarding the project will be communicated to members of the Squamish / Lilooet River Watershed Society which include most of the groups in the area that are interested in fish and wildlife issues. NVOS was represented at / and regularly attended the Water Use Plan Consultative Committee meetings.

• The North Vancouver Outdoor School produces a school newsletter, which goes out to a wide audience of staff, students, alumni and partners. This project has been included in that newsletter.

• Signage explaining the history of the river and this project's gravel excavation and placement will be developed and placed both at the delivery site and nearer the road, possibly in the vicinity of the Paradise Valley Road Bailey Bridge

Appendix C: Construction Details / Images

(see attached files)

• Site plan (overall)
• Site plan (channel specific)
• Channel as-built drawings including fall 2002 spawner utilisation (6 sheets)
• Intake detail (site plan)
• Intake detail (pipe section as constructed)
• Intake detail (upstream grate)
• Images (before, during and after construction)

Appendix D: Additional Information

• Canadian Coast Guard Intake approval document

Appendix D: Interpretative Trail Signage Text

Interpretative signage was provided through funding from the Coho Festival. It is organised in a loop starting on the river bank opposite the main school, extending along the new Cheakamus Side Channel, Upper Paradise Spawning Channel and the Kisutch Refuge Channel. The text of this signage is included below:

Ever Changing River

As a river meanders within its banks, gravel is deposited to create new bars and new side channels are created. Dykes have confined the Cheakamus River to a narrower area reducing its ability to create side channels and increasing the possibility of salmon eggs being washed away by high flows.

Eagle Roosting

Large cottonwoods provide perfect perches for bald eagles attracted by the spawning salmon - an ideal food source. The eagles can swoop down from their perch and feed on salmon, expending a minimum amount of energy. These large trees provide shade for the river, a source of Large Woody Debris (LWD) and habitat for migrating songbirds.

Complex Habitat (non-fish)

The complexity of this habitat also benefits wildlife such as eagles, beavers, otters, bears, ducks, herons and others.

Simplified Spawning Habitat

This habitat has been designed for maximum production of chum salmon fry. Chum only use these channels for 4 months before heading out to the sea. The size of the gravel is consistent and the width and depth is consistent to increase available habitat and improve the survival rates. Coho salmon, which stay in these channels for a year or more, need a more varied habitat for rearing.

Groundwater Source

Water in these channels come from upwelling from the groundwater table as well as seepage and piped water from the Cheakamus River. The groundwater source provides a year round supply of cool, clear water. As the water is naturally filtered through the rock, there is less siltation so the water in the channels remain clear. Siltation of the watercourse can smother the salmon eggs and clog the gills of juveniles depriving them of oxygen. The stable environment provided by these channels makes it less likely for salmon eggs to wash away, increasing the chances for survival. These channels aim to heal and restore the habitat by mimicking the features of a natural watercourse.

Complex Habitat (coho)

Complex habitat is more suitable for coho fry in their year or more of freshwater rearing before heading for the ocean. The waterfall provides increased oxygenation of the water. The Large Woody Debris (LWD) and overhanging vegetation provide food for the fry. The complexity of the habitat also benefits wildlife such as eagles, beavers, otter, bears, dippers, herons and others.

Canadian Coast Guard / Garde côtière canadienne

Pacific Region
Suite 355-555 West Hastings Street
Vancouver, BC V6B 5G3
Tel. (604) 775-8895

NAVIGABLE WATERS PROTECTION ACT

WORK ASSESSMENT

APPLICANT INFORMATION	
APPLICANT'S FILE #:	NWP # 8200-00-6205.2
OWNER: Fisheries & Oceans Canada - Annacis	OWNER'S REP. :
ADDRESS: Habitat and Enhancement Branch 100 Annacis Parkway, Unit 3 Delta BC V3M 6A2 Attn: Johnathan Bullock	ADDRESS: Attn:

SUBJECT SITE DESCRIPTION
TYPE OF WORK: Intake
WORK IS: P (Legend: P=Proposed E=Existing EP=Existing/Proposed)
WATERWAY: Cheakamus River
APPROX. COORDINATES: Latitude 49° 49' 37" N Longitude 123° 9' 11" W
SITE DESCRIPTION: adjacent to the Hydro Bailey Bridge, DL 1245, NWD, British Columbia

It has been determined, pursuant to ss. 5(2) of the Navigable Waters Protection Act, that the proposed work as shown in these plans will not substantially interfere with navigation if it is built or placed, and maintained in accordance with these plans, site description and schedule provided by the proponent. Since conditions may change it would be advisable, in the case of a proposed work, to obtain a reassessment if the work has not commenced within two years from the date hereon.

J Schellenberg — (SIGNATURE)

Navigable Waters Protection Officer — (TITLE)

Jim Schellenberg — (PRINT NAME)

Aug 1/02 — (DATE)