CAMPBELL RIVER

ELK FALLS 3 SIDE CHANNEL MONITORING 2009/10

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Prepared for:

BC Hydro
Bridge Coastal Restoration Program
6911 Southpoint Drive
Burnaby, BC V3N 1W4

Prepared by:

Campbell River Salmon Foundation
920 Alder Street,
Campbell River, BC, V9W 2P8

Northwest Hydraulic Consultants Ltd.
#202-3150 Island Highway North
Nanaimo, BC V9T 1V9
NHC Project Number 35027

Fisheries and Oceans Canada
#150-1260 Shopper's Row
Campbell River, BC V9W 2C8

Current Environmental
Unit E – 244 4th Street
Courtenay, BC V9N 1G6

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EXECUTIVE SUMMARY

The original Elk Falls 3 (EF3) side channel was constructed in Elk Falls Provincial Park and on the Catalyst Pulp Mill water intake property with the goal of providing suitable off channel rearing habitat for Coho salmon and trout. The channel was not functioning correctly and in 2008 a major retrofit saw a new 450 m long connector channel and intake constructed. For the 2009/10 grant period, the Campbell River Salmon Foundation (CRSF) applied to the Bridge Coastal Restoration Program (BCRP) for funding (09.CBR.07) to conduct follow up performance monitoring for the Elk Falls 3 construction project completed in 2008. Performance monitoring for five years was a condition of the BC Parks project approval. The 2009/10 EF3 monitoring focussed on physical and biological metrics. Biological monitoring covered salmonids and ecosystems. Physical monitoring included a review of the constructed works and function. The purpose of the monitoring is to measure the performance and success of the project, and to identify any additional work requirements.

The channel extension was colonized almost immediately after construction, as indicated by the observations of rearing juveniles in early fall of 2008 at the intake pool as well as the presence of spawning chum and Coho adults in November of 2008 and 2009. DFO and A-Tlegay Fisheries undertook a juvenile assessment, Gee trap mark/recapture survey, in 2009; June 10-12 and again September 8-10. Coho, trout, sticklebacks and sculpins were measured for length (mm) and weight (g) in June; in September only Coho and trout were sampled. Gee trapping in June 2009 caught a total of 131 Coho fry, 2 Chinook fry, 12 trout and 59 sculpins, as well as stickleback and crayfish in 70 traps. In September, 202 Coho, 5 trout and 89 sculpin were captured and marked in 64 traps. Of all the Coho captured in the Elk Falls #3 complex, 93% were in the new channel extension. The data from the Gee trapping survey indicates the estimated fry biomass (from Petersen estimates) in the new channel extension increased over the 3 months of sampling. Newly opened constructed off-channel habitat has an estimated Coho smolt production capacity of 0.34-0.67 sm/m^2 (Foy and Decker 1997, Keeley et al. 1996), thus Elk Falls #3 extension with a surface area of 2200 m^2 has the potential for nearly 5000 fry (1500 smolts at 30% survival fry to smolt). This would be 2.27 fry/m^2, and this number is for the small fry present in late spring. As 2008 was the first year of access to the channel for adults the low June 2009 fry numbers reflect the few spawners present. The potential habitat available for small Coho has been addressed, and when Coho adult returns improve the habitat will likely support more small fry. Data from Elk Falls #3 extension is well under the fry capacity estimate of at 0.17-0.28 fry/m^2 for both the June and September sampling, however taking into consideration that the numbers of Coho and the biomass increased during the sampling period is an indication of both recruitment and growth. It is encouraging to note that there was an increase of Coho fry numbers, from 374 to 611 during the period of low flow in the Campbell River, indicating Coho can access the new channel during low flow from either the downstream habitat or through the mainstem river intake, which was one of the objectives of the project construction. As well, the Coho biomass in the channel nearly doubled resulting from an average fry increase of 3.2 to 6.1 g from the June to September sampling, indicating the habitat is productive.

Three sample polygons were delineated for the ecosystem monitoring. The mean survival percentage of planted riparian vegetation calculated from all three polygons is 93.8%. This value exceeds the minimum 80% target set out by DFO and the anticipated survival rate of 85%. The

most significant impacts affecting the success of the planted vegetation include ungulate browse and antler rubbing, beaver browse, and desiccation. A large quantity and diverse makeup of volunteer plants were observed in all three sampling polygons. The recruitment of volunteer plants reflect the expected natural course of succession particular to the micro-climates of their respective segments and include species from ground cover, shrub, and tree layers. Currently, the proliferation of invasives does not pose an imminent threat to the success of planted stocks. However, if invasives begin to establish and compete with native stock, mechanical elimination may be required. Mitigative erosion control via soil bioengineering is achieved with live-staked willow (*Salix spp.*) and red osier dogwood (*Cornus stolonifera*). The banks of EF3 channel were visually assessed for evidence of soil erosion and it has been determined that in general, with the exception of an isolated occurrence of bank sloughing, the EF3 channel is stable including the restored mainstem bank where the intake was installed. Based on minimum biostandards for passerine production at 2 - 5 breeding pairs per hectare (ha), a total of 3 species specific cavity nesting features were installed using artificial snags giving rise to an estimated 5 passerine nesting sites per hectare. An additional 3 standing snags designed for woodpeckers, owls and bats were installed within the riparian area (0.6 ha) to encourage additional wildlife production. Wildlife tree observations show a total exceeding minimum biostandards of approximately 6.7 passerine nesting sites per ha, based on 4 nesting features confirmed to be active . Other wildlife supported by the EF3 channel include amphibians such as Pacific tree frogs (*Hyla regilla*) and the Blue listed red legged frog (*Rana aurora*), both confirmed to be present during a site inspection in September 2009.

The physical channel inspections took place in September 2009 and the winter of 2010. For the summer inspection the flow in the Campbell River was approximately 34 m^3/s. The inspection started at the intake and extended to the confluence of EF2 and EF3. The results of the inspection are recorded on the checklist and selected observations were recorded and photographed. The intake appeared to be functioning adequately. The intake trash rack was clear of debris and bank armour was intact. Only minor sediment accumulation comprised mainly of sand and gravel was observed in the sediment pool at the intake pipe outlet (Stn 0+50). In general the channel banks were intact with only limited erosion except at two locations. At Station 1+60 there was a 15 m long section of small slumps on the left bank. Another slump 2 m wide by 3 m high was observed on the left bank at Station 3+00. In both cases the risk of additional failure was high, but the risk of impaired channel function was low. Bio-stabilization techniques should be applied to the areas with slope failures (Stations 1+60 and 3+00) to help limit the extent of the erosion/slumps. Live willow stakes or erosion matting may be suitable strategies to stabilize the bank. The culvert under the Catalyst road was free of debris. The old EF3 wetland was charged above design due to beaver dam activities. As a result, the EF3 trail, and sections of parkland and Catalyst properties were partially inundated. The beaver dam was approximately 75 cm high and appeared to be active. Upstream and downstream fish passage appeared to be impaired. The beaver dam will likely be an ongoing maintenance concern. Strategies may include trapping the beavers, elevating the trail, installing control works and fencing, and/or physically removing the dam(s) at times. For the fall of 2009 the beavers were trapped and the dams were removed by a labour crew. The original EF3 channel to the wetland, and from the wetland to the confluence with the EF2 channel was in good condition.

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1.0 INTRODUCTION

In 2000, the original Elk Falls 3 (EF3) side channel was constructed in Elk Falls Provincial Park and on the Catalyst Pulp Mill water intake property (Figure 1) with the goal of providing suitable off channel rearing habitat for Coho salmon and trout. The channel functioned as intended for about ten months of the year until flow in the mainstem Campbell River was less than about 40 m^3/s. During periods from July to September inflows to the EF3 channel were significantly reduced and approximately 89% of the wetland habitat dewatered with a high potential for fish stranding in isolated pools. Inflows to the side channel were reduced when the invert elevation of the upper channel was higher than the mainstem Campbell River. A small amount of groundwater seepage continued to charge part of the wetland over the summer but the majority of suitable rearing habitat for fish and amphibians in the EF3 complex was lost.

The existing flow management strategy on the Campbell River requires flows to be ramped down to 28-40 m^3/s by August 1 and remain there until beginning to ramp up September 15 (October 4 target flow 122cms). The Campbell River Water Use Plan (draft 2004) when implemented, will move the date to July 1 for low flows, ramping to 96 m^3/s (target) by October 15. In order to improve the functionality of the EF3 channel, the Bridge Coastal Restoration Program (BCRP) provided funding (07.CBR.02) to the Campbell River Gravel Committee / Campbell River Salmon Foundation (CRSF) to analyze options to retrofit the existing project. Part of the options analysis process involved identifying, quantifying and comparing impacted 'values' to the Elk Falls Park. Through an iterative process amongst the working group, which included DFO, MoE, CRSF, BC Parks, and others, the best long term solution selected was to construct a new 450 m long channel and intake, and to connect to the original EF3. The working group worked through the Park Use Permit (PUP) process which included an environmental impact assessment and a BC Parks Level II assessment (NHC et al., 2008).

Final plans and specifications were completed in the spring of 2008. The project saw the construction of a new 600 mm diameter pipeline installed between the river and a new side channel starting on the left bank near the downstream end of First Island. The channel is 450 m long and connected to the upstream end of the existing EF3 channel. The new project provides up to 700 L/s of flow during the summer (and all year) to the channels and EF3 wetland (Figures 2 & 3). Construction took place between August and September 2008. Heavy equipment was provided by local contractors. The duration of the project was approximately 1.5 months. The intake has a low profile ductile iron manifold in the river bank. The downstream end of the pipe features a knife gate valve attached to a concrete head wall. The intake was installed by a pipe laying crew using open trench techniques. The channel was excavated with hydraulic track excavators. Brush, overburden, and gravel were removed from the park with haul trucks. The channel was complexed with LWD generated from the clearing work and additional LWD was brought in using trucks. The channel banks were sloped and vegetated. The existing intake was decommissioned and a 1200 mm culvert was installed under the Catalyst road. The park trail system was improved with a new surface and a bridge. During construction the trail system was intermittently closed, or detoured.

Other features were incorporated into the project to improve the overall values of the Elk Falls park area. These include an improved trail surface from the Catalyst water intake to the new channel intake area (approximately 1 km of trails). A new footbridge was constructed. Bird nesting cavities were installed to offset terrestrial impacts in the park. An extensive revegetation plan on all disturbed areas was implemented. Beaver dams were removed downstream of the EF3 wetland and a new outlet riffle (from EF3) was constructed.

The new side channel and intake were constructed with funding provided by CRSF and BCRP (08.CBR.01). The side channel now provides year round flows to the EF3 channel and at the same time increases wetted habitat for fish and amphibians by 1500 m^2 for a total of 18,500 m^2 of improved or new fish habitat. The incremental increase of wetted stream habitat has the potential to increase amphibian production as well as Coho production by over 1500 smolts per year (1 smolt / m^2 for channels) in the project footprint. This project also has the potential to increase productivity an additional 6,800 Coho smolts year (0.4 smolts / m^2 for wetlands) when including the EF3 wetland improvements (NHC et al, 2009). For the 2009/10 grant period, CRSF applied to BCRP for funding (09.CBR.07) to conduct follow up performance monitoring for the EF3 project. Conducting follow-up monitoring is considered a Best Management Practice (BMP) for a project of this scale. Performance monitoring for five years was also a condition of the BC Parks project approval. The 2009/10 EF3 monitoring focussed on physical and biological metrics. Biological monitoring covered salmonids and ecosystems. Physical monitoring included a review of the constructed works and function. The purpose of the monitoring is to measure the performance and success of the project, and to identify any additional work requirements.

2.0 GOALS AND OBJECTIVES

The objectives of this project were to monitor the biological and physical performance of the EF3 channel, and to identify any maintenance requirements or other improvements. This monitoring report satisfies the first biennial assessment and reporting requirement for 2009-2013 under the authority of Ministry of Environment Park Use Permit ST9910216 issued to Fisheries and Oceans Canada on Aug. 01 1999 for the Elk Falls #3 Side Channel (EF3) enhancement project. The objective of the Ecosystem Monitoring Program (EMP) is to evaluate the biological performance of the EF3 with a repetitive sub-sample of approximately 10% (600 m^2) of the channel and riparian habitat. Physical monitoring includes a review of the constructed works and channel function. All recommended maintenance and additional work are identified.

3.0 STUDY AREA

Elk Falls 3 (EF3) side channel is in Elk Falls Provincial Park and on the Catalyst Pulp Mill water pump station property on the left bank of the Campbell River starting approximately 350 m downstream of the John Hart generating facility. Vehicle access to the site is through the gated road to the Catalyst Pump Station off of the Gordon resource road. The site extends along the left bank floodplain and terminates at Elk Falls 2 Side Channel downstream of the mill pump station. The coordinates of the project at key locations are as follows:

- Intake; 334920 E, 5546060 N
- Wetland; 335600 E, 5545750 N
- Outlet (to EF2); 335800 E, 5545580 N

4.0 METHODS

4.1 Salmonids

Adult salmon surveys were conducted by DFO by walking alongside the channel complex and observing and identifying individual fish (number and species) in the fall of 2008 and 2009. Observations were recorded in field books and with photographs.

DFO and A-Tlegay Fisheries undertook a juvenile assessment, Gee trap mark/recapture survey, in 2009; June 10-12 and again September 8-10. In June 2009, 17 numbered Gee traps were baited with frozen salmon roe from Quinsam River Hatchery. A total of 37 traps were set at about 10 m intervals in representative Coho fry habitat types (pools, woody debris) in the new channel. An additional 23 traps were spread out through the old section of EF3, EF2 and EF1. In the September survey 58 traps were set, 32 in the new channel, and 16 in EF2. Traps were set for 24 hours then retrieved. Each trap catch was put in a bucket with the trap number and taken to the sampling station. Traps were reset, all species were counted and recorded from individual traps and all fish marked with a small caudal clip – June catches upper lobe, September lower lobe. Coho, trout, sticklebacks and sculpins were measured for length (mm) and weight (g) in June; in September only Coho and trout were sampled. Nose fork lengths to the nearest millimetre and the weight to the nearest 0.1 g using an OHaus Scout field scale (200g x 0.01g) were recorded. Individual catches were returned to the specific trap area. Traps were retrieved again 24 hours later, the catch counted and examined for the caudal clip mark and counts of marked (caudal clip) and unmarks recorded. (For the September survey catches in both the retrievals were also examined for upper lobe clips – in case any were still visible from the June clips). Catch, length and weight data were summarized for the two surveys.

4.2 Ecosystem

The EMP evaluates riparian restoration success based on Department of Fisheries & Oceans target 80% survival within three (10x20m) established representative polygons (Figure 5). Monitoring data includes an evaluation of biophysical performance of planted stream bank riparian stock by recording plant species, quantity, average growth of indicator species, and percent survival. In addition, summaries of plant recruitment, invasive species, indicator plant growth, soil bioengineering, wildlife trees, and channel morphology are included.
Three polygons, each measuring 10 by 20 m, were established within the stream's riparian area to assess the survival of planted vegetation one year after construction. Each polygon was divided down its centre by the stream's wetted width creating a 5 by 20 m polygon on either side (Figure 4). The polygons were established with the 20 m length parallel to the water's edge and the 5 m width ascending the slope of the bank. Growth data for observed riparian vegetation stock within each polygon is summarized. As the Department of Fisheries and Oceans (DFO) minimum target percentage for planted riparian vegetation survival is 80% this quantity is plotted against survey results. Indicator species are used to estimate growth in representative polygons since installation of plants in October 2008.

The species assemblage selected for riparian planting were based on ecological suitability observed in the various segments of EF3 and are summarized in the Riparian Planting

Prescription implemented in October 2008. Certain plant species were designated for installation based on micro climate characteristics anticipated within the various channel segments. The reach where Polygon 1 lies was planted with Segment A vegetation, Polygon 2 with Segment C, and Polygon 3 with Segment D. Semi-permanent polygon corner markers were established to act as references for future sampling events. The approximate locations of the polygons 1, 2 & 3 are downstream from wood stake benchmarks at 0+50, 2+00, and 3+50 respectively.

4.3 Physical Monitoring

Maintenance is generally low for side channel projects and should be performed on an as-need, or in some cases, a preventative basis. Typical maintenance activities for side channels may include, but are not limited to, clearing debris from the intake trash racks, seasonally adjusting the valve, cleaning sediment ponds, and seasonally removing beaver dams. Routine mechanized maintenance activities are not anticipated for the EF3 channel.

DFO holds the water licence for the project and is responsible for maintaining the channel. An inspection and maintenance program for the intake and channel is required to ensure adequate physical performance of the works. Inspections should occur once or twice per year, with one scheduled in the summer during low flow conditions (minimum) and one in December/January during or immediately following a high water event. As part of this document, a physical inspection checklist was created (Appendix B). The checklist reviews the condition of the various channel features such as the intake, trash rack, valve, culvert, berms, and others. An annual report should be prepared to access the physical performance of the project, and to help identify future maintenance requirements.

NHC conducted the low flow field visit on Sept 1, 2009. The channel was thoroughly reviewed by walking near the water's edge from the confluence with EF2 to the EF3 river intake (Figure 1). Observations were recorded in a field notebook, photos of key areas were taken, and the checklist form was completed. Significant floods of approximately 350 and 390 m3/s occurred in November 2009 and January 2010, the intake was inspected after the floods.

5.0 RESULTS & DISCUSSION

5.1 Salmonids

5.1.1 Adults

Adult Coho, chum and trout were observed in both the fall of 2008 and 2009 during walks alongside the channel complex (Photos 1 – 4). A few pinks, as well as Chinook and chum, were present in the lower Elk Falls 1 and 2 sections of the channels. Chum in EF3 were observed pairing up and spawning at the outlet of the channel near the Catalyst pipeline and in the channel section flowing into EF2. A few Coho adults and jacks were seen at the very top of the new EF3 extension, at the intake as well as at the riffle section near the road crossing. Since the channel design focuses on off channel rearing and refuge habitat, adult spawning was not targeted during design/construction; however, spawning gravel was added at riffle sections and pool tailouts. Adult salmon presence and spawning in both the fall of 2008 and 2009 indicates that the habitat and flows are attracting spawners. The immediate presence in the new extension of trout and salmon over-wintering, observed from bank walks in fall 2008 and 2009, also indicated the habitat is accessible to the juvenile rearing stages.

Thus far the Elk Falls #3 extension has provided valuable habitat for rearing Coho, exceeding the biomass and density of the other channels in the complex. Adult chum and Coho have been observed pairing up in the riffle areas downstream of the culvert in the original EF#3, and at the mainstem intake to the channel; however, the focus of the channel was for year round rearing and off channel refuge for fry. The channel extension was colonized almost immediately after construction, as indicated by the observations of rearing juveniles (Figure 1) in early fall of 2008 at the intake pool as well as the presence of spawning chum and Coho adults in November of 2008 and 2009.

5.1.2 Juveniles

DFO and A-Tlegay Fisheries undertook a juvenile assessment, Gee trap mark/recapture survey, in 2009; June 10-12 and again September 8-10. For the June survey, flows in the mainstem Campbell River were approximately 50 m^3/s. The Campbell typically has flows closer to 100 m^3/s at this time of year; however unusually dry weather resulted in decreased discharges since January 2009 (CRIFMS, 1998). This assessment was to establish baseline fry usage at higher discharge and compare to the rearing conditions and juvenile counts during normal low flow (30 m^3/s), as well as providing data on the usage and growth by salmonids in the new channel (EF extension 2008).

Gee trapping in June 2009, during the higher flows in the mainstem Campbell, caught a total of 131 Coho fry, 2 Chinook fry, 12 trout and 59 sculpins, as well as stickleback and crayfish in 70 traps (Table 1). In September, 202 Coho, 5 trout and 89 sculpin were captured and marked in 64 traps, all the Coho captured in the Elk Falls #3 complex, 93% of which were in the new channel extension. The species composition of trap catches differed in the sections of the channel complex (EF 1-3 extension), with Coho predominating in EF3 and Sculpins in EF2.

This study focused on fish usage of the channel; however, gee trapping, marking and recapture provided some recapture data. Petersen mark recapture estimates were calculated for Elk Falls #3 extension and the entire Channel complex (Table 2), note that EF1 – EF3 (old) did not provide enough recaptured marked fish. Estimates of Coho fry in the new channel (2200 m^2) was 374 (138-609 -95% CI), for the June sampling and 611 (354-867- 95%CI) for September. The Peterson estimate equation is provided below.

Equation 1. Petersen estimate N = ((M+1)(C+1))/(R+1)

N= estimate of population of Coho
M = the number of Coho fry marked on Day 1,
C = the total number of Coho captured on the Day 2 (examined)
R = the number of Coho caudal clipped captured on Day 2

The frequency distribution chart for Coho during the catch periods shows an increase in nose-fork length during that 3 month period (Figure 4). June size ranges were 49 mm-90 mm, with mean size at 64 mm, September catches were 63 mm-107 mm, with mean at 80 mm.

The data from the Gee trapping survey indicates the estimated fry biomass (from Petersen estimates) in the new channel extension has increased over the 3 months of sampling (Table 3). There are a few biostandards that we can use to evaluate the new habitat; the number of newly emerged fry/m^2, the number of smolts/m^2 produced from constructed habitat and the biomass estimates in grams/m^2. The 1.7 g/m^2 is near expected capacity in a natural stream, (2g/m^2 (Marshall and Britton 1980, M.Sheng pers comm). Newly opened constructed off-channel habitat has an estimated Coho smolt production capacity of 0.34-0.67 sm/m^2 (Foy and Decker 1997, Keeley et al. 1996), thus Elk Falls #3 extension with a surface area of 2200 m^2 has the potential for nearly 5000 fry (1500 smolts at 30% survival fry to smolt). This would be 2.27 fry/m^2, and this number is for the small fry present in late spring. As 2008 was the first year of access to the channel for adults the low June 2009 fry numbers reflect the few spawners present. The potential habitat available for small Coho has been addressed, and when Coho adult returns improve the habitat will likely support more small fry. Data from Elk Falls #3 extension is well under the fry capacity estimate of at 0.17-0.28 fry/m^2 for both the June and September sampling, however taking into consideration that the numbers of Coho and the biomass increased during the sampling period is an indication of both recruitment and growth. It is encouraging to note that there was an increase of Coho fry numbers, from 374 to 611 during the period of low flow in the Campbell River, indicating Coho can access the new channel during low flow from either the downstream habitat or through the mainstem river intake, which was one of the objectives of the project construction. As well, the Coho biomass in the channel nearly doubled resulting from an average fry increase of 3.2 to 6.1 g from the June to September sampling, indicating the habitat is productive. Most of the trap catch was Coho fry, with trout, sculpins, stickleback and crayfish also present. A point to monitor in the coming years is the over 3 fold increase in sculpin numbers to the new channel extension from June to September. This could have implications to Coho fry as sculpin predation may reduce numbers in future. Smolt output from the channel will also be assessed in May 2010, likely through installation of a fyke net assemblage at the outlet of the EF3 channel near the pipeline. Juvenile Coho and trout colonization and recruitment from

spawners to the new channel extension indicate the channel is functional for the target species and life stage; rearing salmonids.

5.2 Ecosystem

5.2.1 Survival

The mean survival percentage of planted riparian vegetation calculated from all three polygons is 93.8% (Table 5, Figures 5 & 6, Photos 5 - 7). This value exceeds the minimum 80% target set out by DFO and the anticipated survival rate of 85% (Appendix A). The most significant impacts affecting the success of the planted vegetation include ungulate browse and antler rubbing, beaver browse, and desiccation.

Mammal browsing activity did not result in plant mortality but had an observable impact on the growth of affected plants as represented by indicator plant #3 (Figure 7, Photo 8 & 9). A possible limiting factor to mammal browsing impacts is the abundance of alternative options in existing riparian vegetation. Desiccation leading to plant mortality was likely the result of installation at an incompatible site, insufficient burial depth or lack of mulch application. Conversely, survival of hydrophytes within wetland terraces built in Polygon 2 was poor with the most probable cause being that the terraces are too low in elevation relative to the operating water depth (Photo 10).

In general, deciduous indicator plant species *Salix spp.* & *Cornus stolonifera* and coniferous species *Thuja plicata* & *Picea sitchensis* in Polygons 1 & 3 showed positive growth rates (Figure 7 - 9). An exception to positive growth was observed in Indicator #3 (*Thuja plicata*) in Polygon 1 as a result of beaver browse (Figure 8). *Cornus stolonifera* is the only indicator species recorded in Polygon 2 as *Thuja plicata* & *Picea sitchensis* were not planted in Segment C where the moisture regime is not favorable.

5.2.2 Recruitment

A large quantity and diverse makeup of volunteer plants were observed in all three sampling polygons (Table 6). A number of these recruited species were common throughout all three polygons (e.g. *Alnus rubra* & *Rubus spectabilis*) while some were particular to the habitat found in a single polygon (e.g. *Lysichiton americanum* in Polygon 2). The recruitment of volunteer plants reflect the expected natural course of succession particular to the micro-climates of their respective segments and include species from ground cover, shrub, and tree layers. The benefits of native species recruitment include improved bank stability, increased groundcover, and inhibition of invasive species growth.

5.2.3 Invasive Species

Invasive plant species occurrence was observed within isolated sections of EF3 channel. Currently, the proliferation of invasives does not pose an imminent threat to the success of planted stocks. However, if invasives begin to establish and compete with native stock, mechanical elimination may be required. Future monitoring efforts will provide further conclusions to this effect. Amongst the most prevalent invasive species are Himalayan

blackberry (*Rubus discolor*) and Scotch broom (*Cytisus scoparius*). Both of these species are robust and resilient; they pose a real threat to native species dominance.

5.2.4 Soil Bioengineering

Mitigative erosion control via soil bioengineering is achieved with live-staked willow (*Salix spp.*) and red osier dogwood (*Cornus stolonifera*). Live stakes create a living root mat that stabilizes the soil by reinforcing and binding substrate and by removing excess soil moisture. The banks of EF3 channel were visually assessed for evidence of soil erosion and it has been determined that in general, with the exception of an isolated occurrence of bank sloughing, the EF3 channel is stable including the restored mainstem bank where the intake was installed (Photos 11 & 12). Bank destabilization observed In Polygon 3 appears to be caused by a game trail established along the crest of the bank (Photo 13).

5.2.5 Wildlife Trees

Based on minimum biostandards for passerine production at 2 - 5 breeding pairs per hectare (ha), a total of 3 species specific cavity nesting features were installed using artificial snags giving rise to an estimated 5 passerine nesting sites per hectare. An additional 3 standing snags designed for woodpeckers, owls and bats were installed within the riparian area (0.6 ha) to encourage additional wildlife production. Visual inspection of the nests for signs of utilization, including nesting behaviour and whitewash, are summarized in Table 7. Wildlife tree observations show a total exceeding minimum biostandards of approximately 6.7 passerine nesting sites per ha, based on 4 nesting features confirmed to be active (Photo 14).

5.2.6 Other Parameters

Observations of channel dimensions, water depth, and large woody debris (LWD) composition are recorded in Table 8. These parameters have a direct effect on the quality of fish habitat provided by EF3 channel such as water temperature, hydraulics, and available cover.

Other wildlife supported by the EF3 channel include amphibians such as Pacific tree frogs (*Hyla regilla*) and the Blue listed red legged frog (*Rana aurora*), both confirmed to be present during a site inspection in September 2009 (Photos 15 & 16).

5.3 Physical Monitoring

The low flow inspection took place on September 1, 2009. The flow in the Campbell River was approximately 34 m3/s. The inspection started at the intake and extended to the confluence of EF2 and EF3. The results of the inspection are summarized on the checklist (Appendix B) and selected observations are described in this section.

The intake appeared to be functioning adequately. The intake trash rack was clear of debris and bank armour was intact (Photo 11). Only minor sediment accumulation comprised mainly of sand and gravel was observed in the sediment pool at the intake pipe outlet (Stn 0+50). It is difficult to estimate the volume of gravel in the pool due to its depth below the water surface,

however, the volume appeared to be quite small and was on the order of 1 - 2 m^3. The valve was approximately halfway open during the inspection (Photo 16).

In general the channel banks were intact with only limited erosion except at two locations. At Station 1+60 there was a 15 m long section of small slumps on the left bank (Photo 18). Another slump 2 m wide by 3 m high was observed on the left bank at Station 3+00 (Photo 13). In both cases the risk of additional failure was high, but the risk of impaired channel function was low. The culvert under the Catalyst road was free of debris. The water level was approximately 0.15 m above the obvert at the upstream and downstream end. The old EF3 wetland was charged above design due to beaver dam activities (Photo 19). As a result, the EF3 trail, and sections of parkland and Catalyst properties were partially inundated. The beaver dam was approximately 0.75 m high and appeared to be active (Photo 20). Upstream and downstream fish passage appeared to be impaired. The original EF3 channel to the wetland, and from the wetland to the confluence with the EF2 channel was in good condition.

The channel performed largely as intended during the first year of operation. The intake was working as intended. The intake should be monitored frequently to ensure it is functioning properly. If debris collects on the trash rack it should be removed promptly. During fish migration periods in the fall the valve can be opened to help flush the channel and to draw spawning fish into the channel.

Bio-stabilization techniques should be applied to the areas with slope failures (Stations 1+60 and 3+00) to help limit the extent of the erosion/slumps. Live willow stakes or erosion matting may be suitable strategies to stabilize the bank.

The beaver dam will likely be an ongoing maintenance concern. Strategies may include trapping the beavers, elevating the trail, installing control works and fencing, and/or physically removing the dam(s) at times. For the fall of 2009 the beavers were trapped and the dams were removed by a labour crew. Woody materials from the beaver dams were removed from the site so they could not be reused for a new dam. The inundation on the EF3 trail is an indicator of when the beaver dams are being built up. Over the long term there may be impacts to the vegetation around the wetland if the water levels are above historic/natural levels.

Significant floods of approximately 350 and 390 m3/s occurred in November 2009 and January 2010, the intake was inspected after the floods. No damage was observed at the intake.

6.0 RECOMMENDATIONS

6.1 Salmonids

1. Smolt outmigrants should be monitored in spring 2010.

2. Sculpin densities should be monitored.

3. Adequate in- and outmigration accessibility should be maintained during the migration periods over or around the beaver dam.

6.2 Ecosystem

Pursuant to the original assessment and reporting requirements under the Park Use Permit (ST9910216) for this Ecosystem Monitoring Program the biological performance of EF3 appears to be meeting or exceeding the design objectives. Continued monitoring in 2011 will provide useful information to determine if biological performance continues on a succesful trend. Continued sampling will maintain the polygons established in September 2009 and include a minimum of the same sampling procedures with additional parameters included as needed.

To ensure continued success of the EF 3 channel enhancement project, the following recommendations are made to improve performance of the constructed wetland terraces in Segment C, increase survival rates, and prevent further channel destabilization at 3+00.

1. Species likely to be targeted by browsing animals should be treated seasonally with an olfactory deterrent such as liquid blood meal (e.g. Platskyyd) or by mechanical armouring such as fencing.

2. Wetland planting terraces in Segment C should be re-stocked with obligate hydrophytes where continual saturation is expected.

3. Implement bioengineering techniques at the bank destablization site at 3+00. To ensure the best success to establish vegetative cover over the eroding bank the locations for installation should be made in accordance with the particular species' moisture requirements down the bank's gradient. For example, staked *Cornus stolonifera* or *Salix spp.* (subhygric to hydric moisture regime) will best be suited to installation at a depth where direct contact with ground water seepage is possible. Whereas, a species such as Picea sitchensis (mesic moisture regime) requires a location where the groundwater table is >60cm depth or where soil stored water occurs.

4. Further control erosion by discouraging ungulate travel along the immediate slope crest by course woody debris complexing.

6.3 Physical Monitoring

The following is a list of recommendation for the EF3 channel project:

1. Open the valve fully during spawning season (September to December), open the valve halfway during the rest of the year.

2. Apply bio-stabilization techniques to the eroding areas at Station 1+60 and 3+00.

3. Trap or manage the beavers and routinely check/remove the beaver dam(s) during the fish migration periods.

4. Potentially install additional gravel to replenish spawning areas downstream of the Catalyst access road.

5. Annually inspect the channel, identify issues and repair.

7.0 REFERENCES

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8.0 ACKNOWLEDGEMENTS

This project was made possible through financial contributions from BC Hydro's Bridge Coastal Restoration Program and the Campbell River Salmon Foundation. In-kind contributions were provided by Fisheries and Oceans Canada.

A-Tlegay Fisheries Society provided the technicians for the juvenile trapping survey. The Campbell River Salmon Foundation contributed project support and accounting services. Catalyst Pulp Mill and BC Parks own and manage the Elk Falls channel lands and they continue be excellent partners.

Northwest Hydraulic Consultants Ltd. (Graham Hill, P.Eng) conducted the physical assessment and provided the overall project management for this study. Current Environmental (Rupert Wong, RPBio.) undertook the ecosystem monitoring component, and Fisheries and Oceans Canada (Shannon Anderson, Biologist) contributed the fisheries enumeration and analysis.

TABLES

Table 1. All Catch (and clipped) Gee trapping survey Elk Falls Channel complex June and September 2009.

Elk Falls channels		June 10-12 2009						
	# traps	Coho	Chinook	CT trout	RB Trout	Sculpin	Stickleback	Total Catch
EF3ext	37	82	0	5	1	26	0	114
EF3old	12	38	0	3	0	2	0	43
EF2	17	5	0	1	0	29	5	40
EF1	4	6	2	2	0	2	4	16
		September 8-10 2009						
EF3ext	32	188	0	3	2	87	2	282
EF3old	17	14	0	0	0	0	3	17
EF2	15	0	0	0	0	0	4	4

Table 2. Petersen population estimate for Elk Falls #3 extension and for Elk Falls Channel Complex for June and September surveys.

Area	10-Jun	8-Sep
Elk Falls Extension Channel (new 2008)	Coho	Coho
Number marked (clipped)	82	188
Total number examined	26	41
Number of marked (clipped) recoveries	5	12
Petersen estimate	374	611
Lower 95% CL	138	354
Upper 95% CL	609	867
(R+1)/(C+1)	0.22	0.31
Elk Falls Channel complex EF1-3 inclusive	Totals June	Totals Sept
Number marked (clipped)	131	202
Total number examined	34	61
Number of marked (clipped) recoveries	6	19
Petersen estimate	660	629
Lower 95% CL	262	419
Upper 95% CL	1058	840
(R+1)/(C+1)	0.20	0.32

Table 3. Actual measured Biomass (g) of Coho fry in Elk Falls channel complex and expanded, based on Elk Falls 3 extension and all channels Petersen estimates - June and September 2009.

Site	Coho catch		Expanded Coho catch		Mean Length (mm)		Mean Weight (g)		Measured Biomass g		% change	Expanded Biomass g		% change
	10-Jun	8-Sep	10-Jun	8-Sep	10-Jun	8-Sep	10-Jun	8-Sep	10-Jun	8-Sep	June-Sept	10-Jun	8-Sep	June-Sept
EF3 ext	82	188	374	611	66	80	3.2	6.1	263	1149	436	1200	3733	311
EF3 old	38	14			63	78	2.6	5.4	100	76	75			
EF2	5	0			60	0	2.3	0.0	11	0				
EF1	6				0	0	0	0.0	0	0				
All traps	131	202	660	629	64	80	2.9	6.0	385	1211	315	1938	3772	195

Table 4. Elk Falls 3 extension population, density and biomass estimates.

		10-Jun			8-Sep		
	Area m^2	Coho fry	Coho/m^2	g/m^2	Coho fry	Coho/m^2	g/m^2
EF3ext sampled	2200	82	0.04	0.1	188.0	0.09	0.5
EF3ext Petersen estimate expanded	2200	374	0.17	0.54	611	0.28	1.7

Table 5. Elk Falls Channel 3 - Bioinventory vegetation survey including survival assessment - Sept. 01 '09.

Polygon 1			*Polygon 2*			*Polygon 3*		
Tree	RB	LB	***Tree***	RB	LB	***Tree***	RB	LB
Western Red Cedar		3				Western Red Cedar	1	1
Hemlock	2	3				Hemlock	1	1
Sitka spruce		1				Sitka Spruce		1
Maple	5					Maple		2
						Grand Fir		1
						Douglas Fir	1	
Shrub			***Shrub***			***Shrub***		
ROD (rooted)*	10	3	ROD (stake)*	4		ROD (rooted)*		1
ROD (stake)*		9	Red Flowering Currant	3		Red Flowering Currant	9	
Red Flowering Currant	2	1	Red Elderberry	3		Evergreen Huckleberry	3	
Twinberry	1	1	Ocean Spray	3	1	Twinberry	1	
Ocean Spray	2	1	Salmonberry	7	1	Oceanspray	5	
Salmonberry	3	4	Devil's Club		1	Salmonberry	7	6
Snowberry	1		Stink Currant	3	9	Snowberry	2	3
Black Hawthorn		1	Willow spp (stake)	7	14	Salal	1	
Nine Bark		3				Saskatoon Berry		1
Willow spp (rooted)		1				Black Hawthorn		1
Willow spp (stake)	10	2				Nootka Rose		2
						Willow spp (rooted)		2
						Willow spp (stake)	11	11
* Red Osier Dogwood								
Ground Cover			***Ground Cover***			***Ground Cover***		
Sword Fern	7		Sword Fern	6	2	Sword Fern	4	3
Salal	2		Sedge	14	9	Lady Fern		2
Lady Fern	1		Lady Fern	3	4			
			Salal		1			
Mortality			***Mortality***			***Mortality***		
Hemlock	1					Grand Fir	1	
Live stake	4	2	Live stake	6		Live stake	3	
Sub ttl. live	46	33	**Sub ttl. live**	53	42	**Sub ttl. live**	46	38
Sub ttl. Mortality	5	2	**Sub ttl. mortality**	6	0	**Sub ttl. mortality**	4	0
Survival %	90.2	94.3	**Survival %**	89.8	100.0	**Survival %**	92.0	100.0
Total Plants	**8**		**Total Plants**	**101**		**Total Plants**	**88**	
Total Live	**99**		**Total Live**	**95**		**Total Live**	**84**	
Total Mortality	**7**		**Total Mortality**	**6**		**Total Mortality**	**4**	
Survival %	**91.9**		**Survival %**	**94.1**		**Survival %**	**95.5**	

Grand Ttl. Live	**258**
Grand Ttl. Mortality	**17**
Mean Survival %	**93.8**

Table 6. Elk Falls Channel 3 - Observed recruits, stressors, and growth of indicator species - Sept. 01 '09.

Polygon 1	*Polygon 2*	*Polygon 3*
Recruit	***Recruit***	***Recruit***
Red Alder, Fireweed, Maple, Trailing Blackberry, Sedge, Salmonberry, Red Elderberry	Horsetail, Salmonberry, Vanilla Leaf, Bracken Fern, Sedge, Red Huckleberry, Miner's Lettuce, Dogwood, Hedge Nettle, Sword Fern, Bracken Fern, Red Alder, Red Elderberry, Skunk Cabbage	Oregon Grape, Red Alder, Salmonberry, Swordfern, Herb Robert, Trailing Blackberry, Galium spp., Bracken Fern
Stressors	***Stressors***	***Stressors***
Deer and beaver browse	Deer and beaver browse, inundation	Deer and beaver browse, erosion due to proximity to game trail
Indicator Growth (cm)	***Indicator Growth (cm)***	***Indicator Growth (cm)***
Red Osier Dogwood Avg = 24.5	Red Osier Dogwood Avg = 31	Willow Avg = 32
Western Red Cedar Oct 08' Sep 09'		Western Red Cedar Height = 90 New Growth = 25
80 110		
90 110		Western Red Cedar Oct 08' Sep 09'
80 23		80 90
		90 100
		80 110
		Sitka Spruce 50 60

Table 7. Elk Falls Channel 3 - Wildlife tree usage observations - Sept. 01 '09

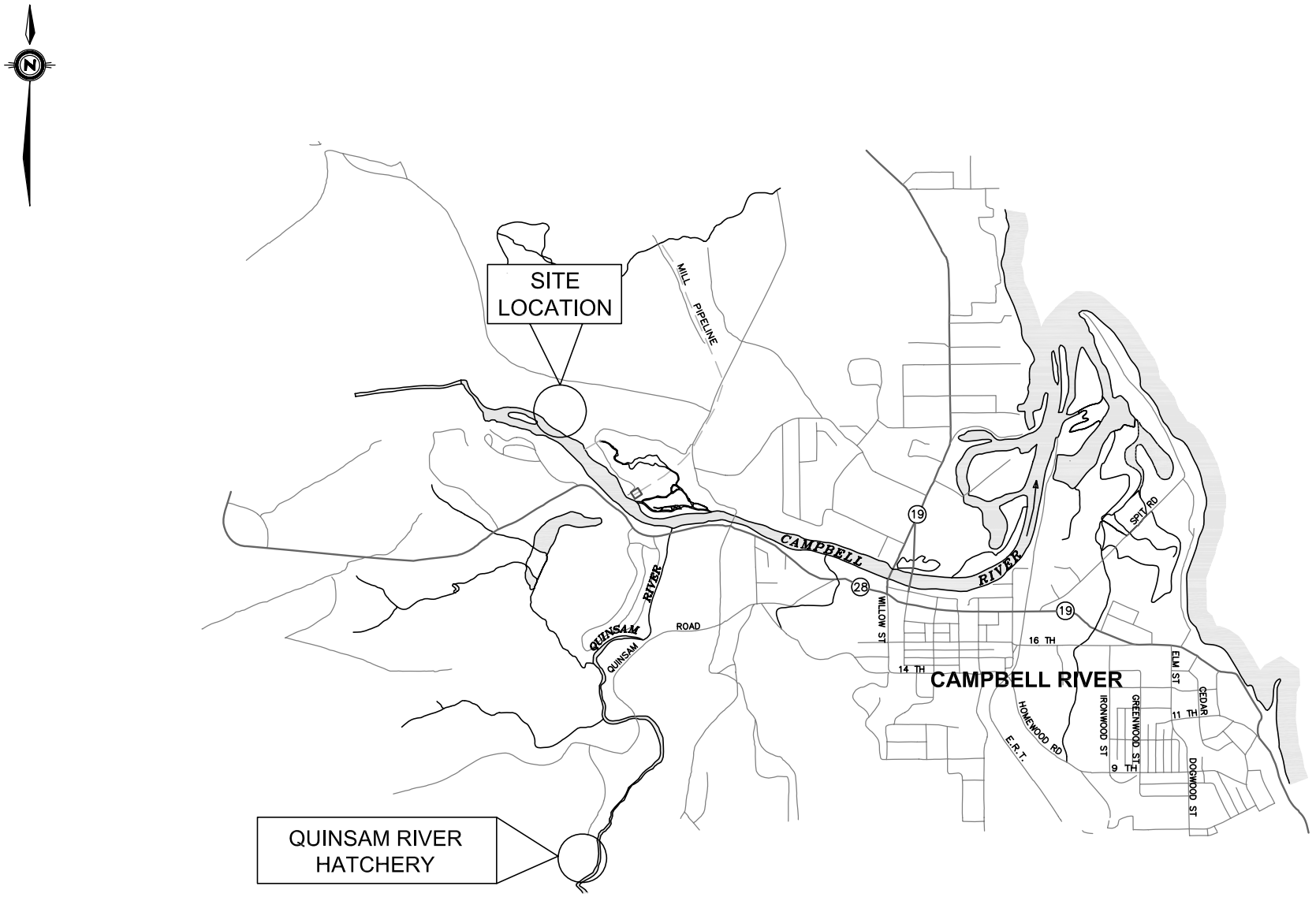
Tree	Tree species	Location	Nesting evidence (Y/N)	Observations
1	Cedar	R bank	N	No cavity, scaling
2	Hemlock	R bank	Y	Double 3cm cavity w/ whitewash
3	Cedar	Unspecified	Y	Grey feather
4	Alder	L bank	Y	Recruit , no cavity, nest in crook of branch
5	Hemlock	L bank	Y	Large cavity, white feather
6	Fir	L bank	N	No activity
7	Unspecified	Unspecified	N	Recruit, no cavity, extensive scaling
Total number of observed nesting sites: 4				
Adapted from field observations made by Graham Hill P.Eng				

Table 8. Elk Falls #3 – Channel Morphology Observations – Sept 01'09.

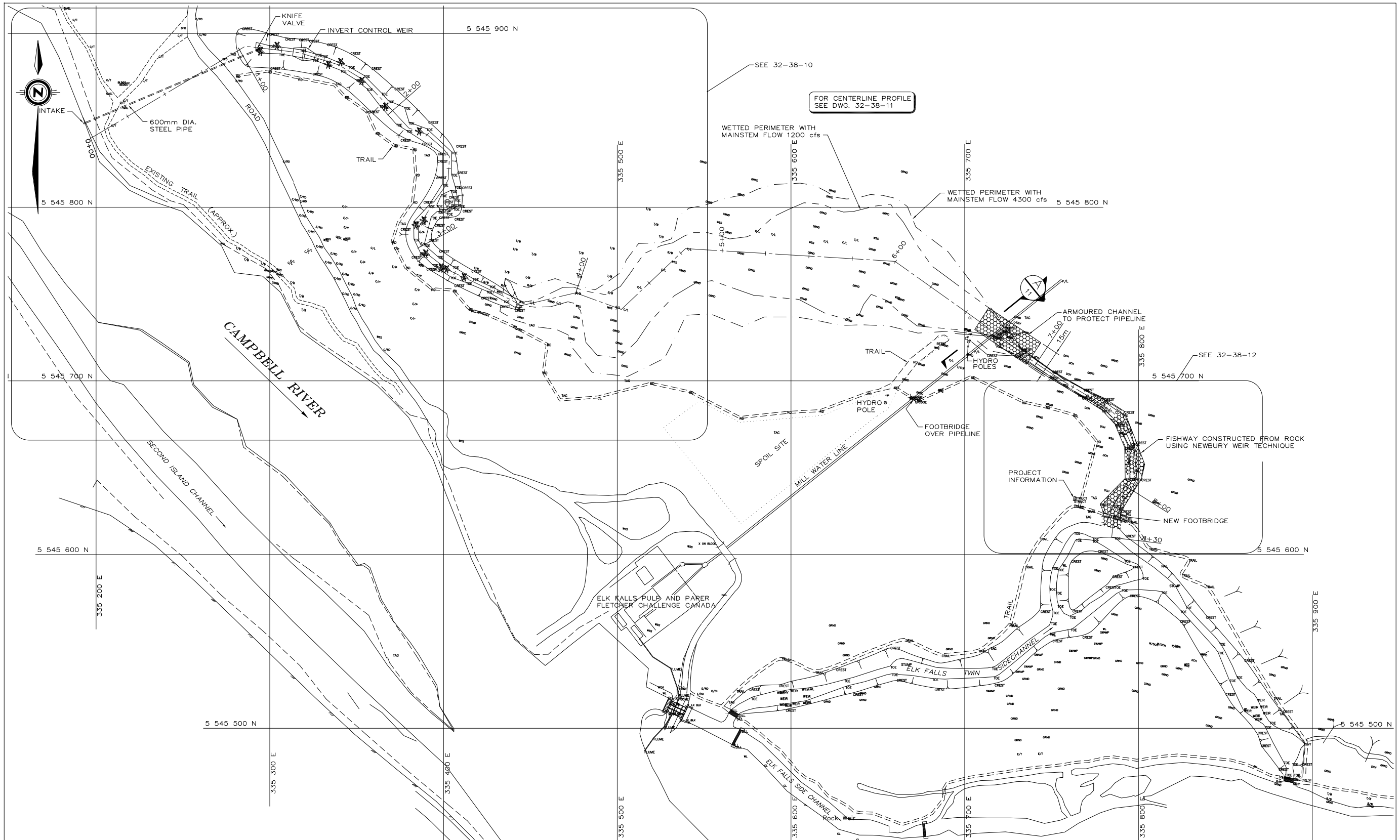
Polygon 1		*Polygon 2*		*Polygon 3*	
Other parameters		***Other parameters***		***Other parameters***	
LWD pcs =	16	LWD pcs	21	LWD pcs =	23
avg depth (cm) =	74.3	avg depth (cm)	61.7	avg depth (cm) =	80.7
wetted width (m)=	7.9	wetted width (m) =	8.2	wetted width (m) =	4.5
wetted area (m2)=	158	wetted area (m2) =	164	wetted area (m2) =	90
LWD cover (est %) =	30	LWD cover (est %) =	30	LWD cover (est %) =	40
		Notes:			
		shallow planting terraces were built and planted with aquatics, however little survival was observed.			

FIGURES

Figure 1. Location Map.



SITE LOCATION

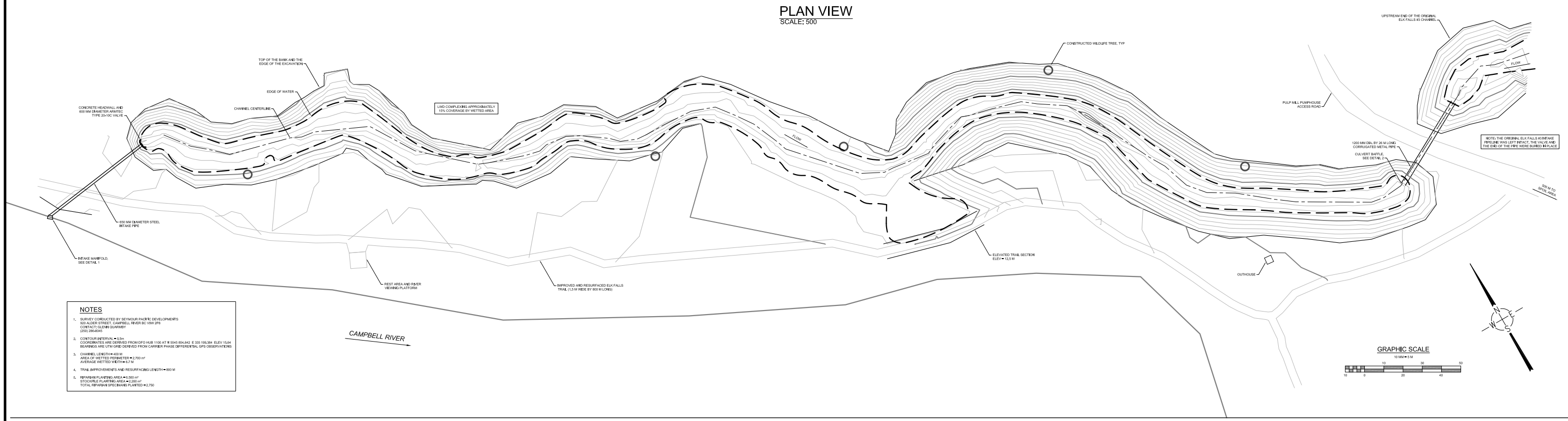


32-38-10 32-38-11 32-38-12	UPPER CHANNEL PLAN PROFILE AND SECTIONS FISHWAY PLAN	1. ALL UNITS ARE IN METRES UNLESS SPECIFIED OTHERWISE. 2. SURVEY DATA BASED ON UTM CO-ORDINATES AND GEODETIC ELEVATIONS DERIVED FROM McELHANNEY HUB 4565. 3. SURVEYED BY R. NORGAN (DFO), WESTERN SURVEY SYSTEMS AND McELHANNEY BETWEEN 1992 AND 1999. 4. SURVEYED BY MacMILLAN BLOEDEL, MAY 1999.	1. 2.	JUNE 99 JULY 99	– UPPER CHANNEL ALIGNMENT REVISED – NEWBURY WEIRS RELOCATED UPSTREAM – FOOTBRIDGE ADDED OVER NEWBURY WEIRS – C.S.P. CULVERT LENGTHENED – PROPOSED TRAIL ADDED TO RIGHT BANK	DESIGNED RD/RN DRAWN RN/DT CHECKED	DEPARTMENT OF FISHERIES AND OCEANS HABITAT AND ENHANCEMENT BRANCH	SCALE 1:1000
		NO. DATE REVISIONS	3.	DEC 99	– AS BUILT – C.S.P. AND BOX CULVERT NOT INSTALLED AT TOP END OF CHANNEL	RECOMMENDED	CAMPBELL RIVER ELK FALLS PARK REARING COMPLEX SITE PLAN	DATE MAR. 1999
		5. OCT 00 – ELK FALLS SIDE CHANNEL AS-BUILT 6. MAY 01 – INTAKE PIPE ALIGNMENT AS-BUILT	4.	MAR 00	– INTAKE PIPELINE, VALVE AND MANHOLE ADDED REVISIONS CONTINUED	APPROVED		DRAWING NUMBER 32-38-09
DWG. NO.	REFERENCE DRAWINGS	NOTES	NO.	DATE	REVISIONS	APPROVED		REVISION 6

ORIGIN FOR BLANK A1 WITH HP ANNOTATION

PLAN VIEW

SCALE: 500

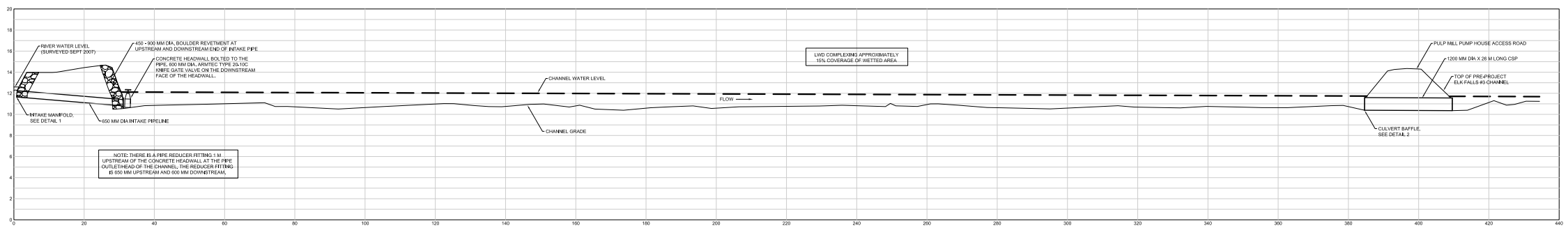


NOTES

1. SURVEY CONDUCTED BY SEYMOUR PACIFIC DEVELOPMENTS
   500 ALDER STREET, CAMPBELL RIVER BC V9W 2P8
   CONTACT: GLENN QUARNBY
   (250) 286-4043
2. CONTOUR INTERVAL = 0.5m
   COORDINATES ARE DERIVED FROM DFO HUB 1100 AT N 5545 854.642 E 335 159.384 ELEV 15.44
   BEARINGS ARE UTM GRID DERIVED FROM CARRIER PHASE DIFFERENTIAL GPS OBSERVATIONS
3. CHANNEL LENGTH = 400 M
   AREA OF WETTED PERIMETER = 2,700 m²
   AVERAGE WETTED WIDTH = 6.7 M
4. TRAIL IMPROVEMENTS AND RESURFACING LENGTH = 600 M
5. RIPARIAN PLANTING AREA = 5,000 m²
   STOCKPILE PLANTING AREA = 2,200 m²
   TOTAL RIPARIAN SPECIMENS PLANTED ≅ 2,750

CHANNEL PROFILE

SCALE: 750 (H) 250 (V)



No.	REVISIONS Description	By	Date

Designer:	Project Number: 3-5027	Drawing Scale: AS SHOWN
Drafter: KEH/GRH	Drawing Date: 01/21/2009	Original Drawing Scale: 0 20mm
Reviewer:	Drawing File Name: 3-5027-001.dwg	

Campbell River Salmon Foundation
920 Alder Street
Campbell River, B.C. V9W 2P8

nhc
Northwest Hydraulic Consultants Ltd
202-3150 Island Highway North
Nanaimo, B.C., Canada V9T 1V9
Office: (250) 758-6425 Fax: (250) 758-9264

ELK FALLS #3 INTAKE REPAIR
AS-BUILT
PLAN AND PROFILE

Sheet Reference Number
1
1 of 2

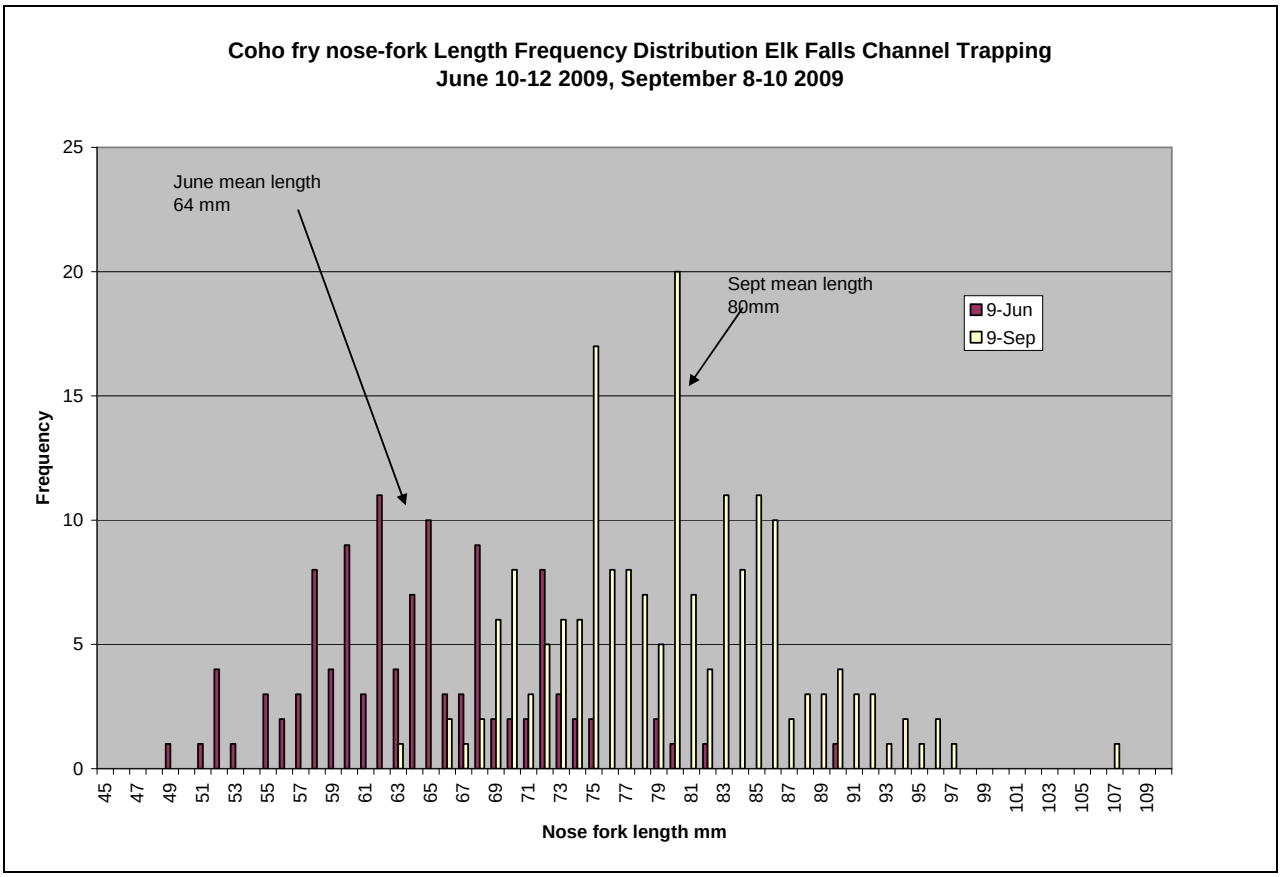


Figure 4. Comparative length frequency distribution of Coho fry in Elk Falls Channel complex, June and September 2009.

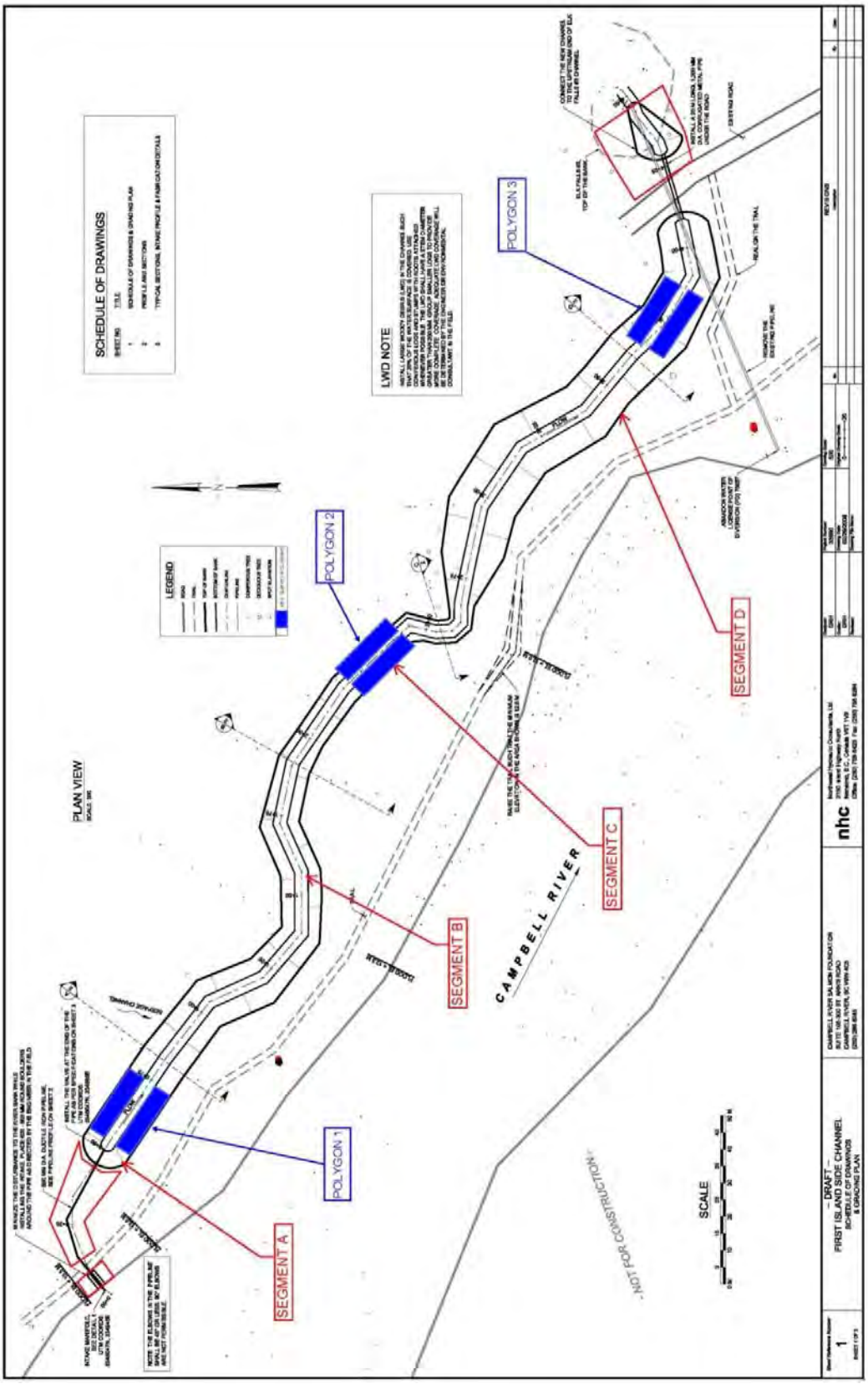


Figure 5. Approximate locations of Bioinventory Polygons (blue rectangles) of Elk Falls III Side Channel Ecosystem Monitoring Program (Sept. 01, 2009

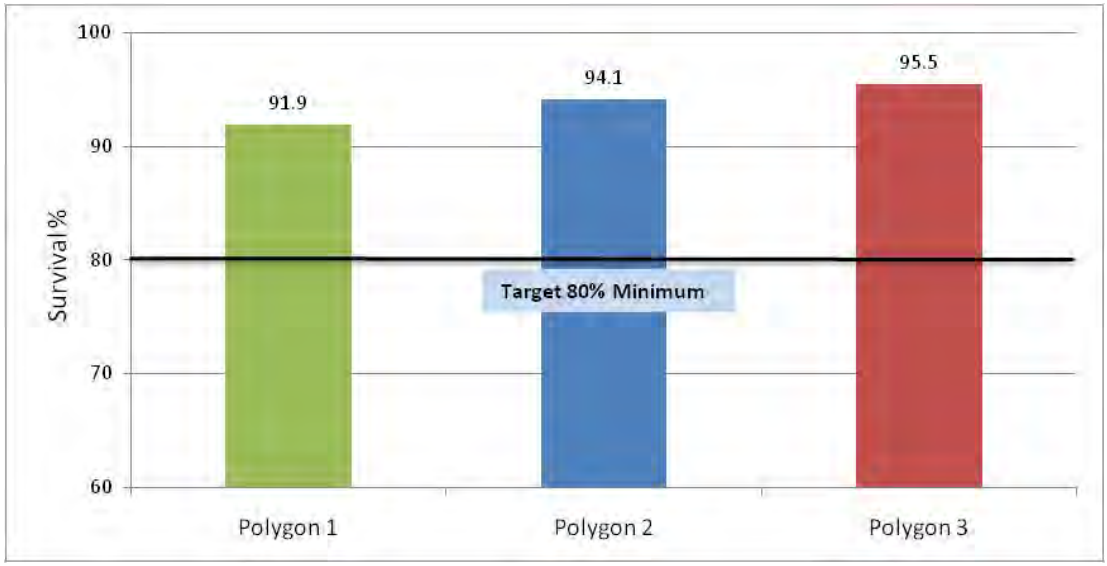


Figure 6. Mean survival percentage of plants in Polygons 1-3 compared to DFO target 80% minimum.

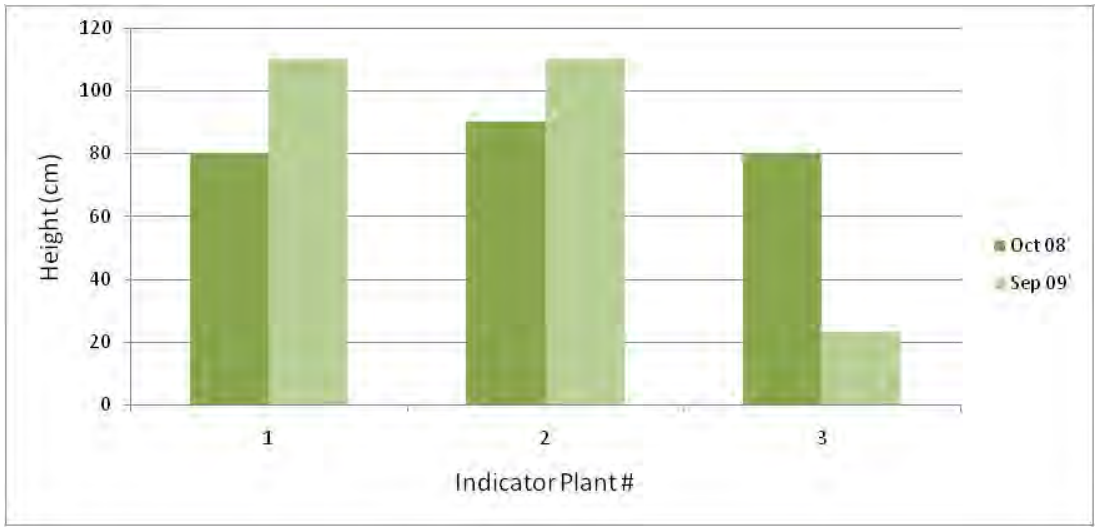


Figure 7. Polygon 1 indicator plant growth of *Thuja plicata* from Oct. '08 to Sep. '09.

Figure 8. Polygon 3 indicator plant growth of *Thuja plicata* (# 1-3) & *Picea sitchensis* (# 4) from Oct. '08 to Sep. '09.

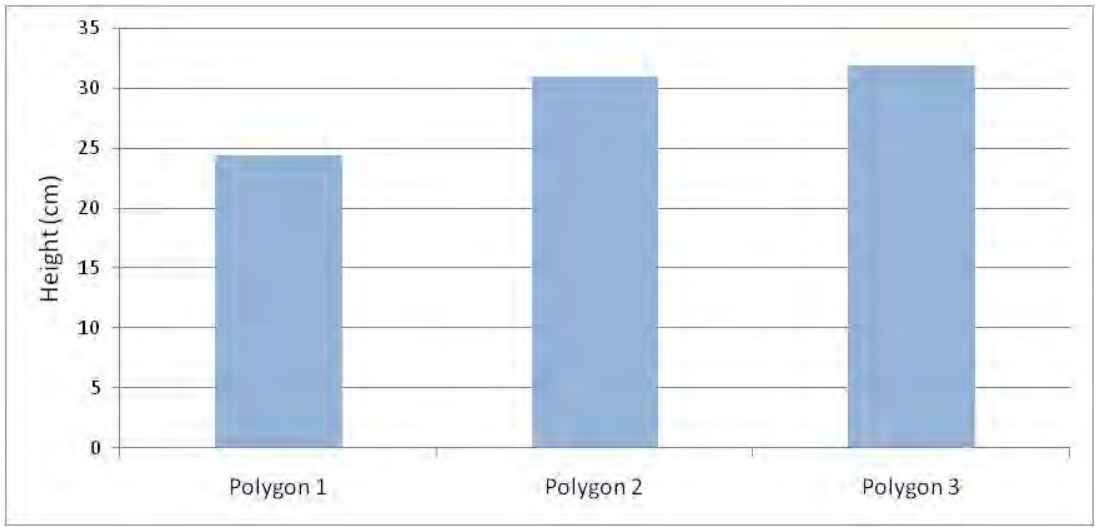


Figure 9. Mean growth of live staked *Cornus stolonifera* & *Salix spp.* indicator plants in Polygons 1-3 from Oct. '08 to Sep. '09.

APPENDIX A

Implemented Riparian Prescriptions

RIPARIAN PLANTING PRESCRIPTION	EF3 sidechannel	Date: October 2, 2008

WATERSHED Code:	900-000500	WATERSHED:	**Campbell River**
REGION:	**East Coast Vancouver Island**	LOCATION:	**Campbell River**

RIPARIAN SITE DESCRIPTION

LAND TENURE:	Owner	Parcel (Lot) Identification:	
Government	**Ministry of Environment**		
Coordinates	UTM Easting = 516201; UTM Northing = 5428935		
WATERCOURSE:	**Elk Falls #3 Sidechannel**	**PLANTING UNIT:**	

Segment	Begins at:	Ends at:	Segment width:	Elevation:	Segment Length:	Plantable Area
A	0+00 m	1+50 m	14 m	13 – 14.5 m	**150 m**	**~ 2,100 m^2**
B	1+50 m	2+25 m	8 m	12 - 14 m	**75 m**	**~ 600 m^2**
C	2+25 m	2+70 m	4 m	11.5 - 12 m	**45 m**	**~180 m^2**
D	2+70 m	4+50 m	15 m	11.5 16 m	**180 m**	**~ 2,700 m^2**
E	Endhaul dump site	Endhaul dump site	40 m	16 – 21 m	**55 m**	**~ 2,200 m^2**
F	6+50 m	8+30 m	5 m	11.5 – 12 m	**180 m**	**~900 m^2**
Notes:	This prescription provides for suitable and reasonable replacement of riparian natives to restore areas disturbed during the course of sidechannel development. Additional live stake planting is recommended along margins of rock riffle and armour features to establish a living root mat expected to reinforce substrate upon rock is placed.					
		Total Length and Area of plantable ground under this prescription			**~685 m**	**~8,680 m^2**

ECOLOGY	**BioGeoClimatic Classification**		
ZONE:	SUBZONE & VARIANT:	SITE SERIES:	EDAPHIC REGIME:
CWH	**xm1**	**05**	**4-5 / C-D** – fresh to moist / rich
Coastal Western Hemlock	Very dry maritime -eastern	Western Red Cedar-Sword fern	

SOIL TEXTURE:	LFH LAYER(S):	SOIL DEPTH:	Coarse Fragments:	ASPECT:	SLOPE:	ELEVATION:	Stream Class:
SL – Sandy Loam	0 - 5 cm	40 - 60 cm	15 - 35 %	SW	1-2%	10 - 15 m	S2

Comments: Existing topsoil (organic overburden) should be carefully stockpiled and reused.

RATIONALE:

- Riparian restoration within the cut is expected to restore features, functions and conditions that are vital to the natural maintenance of stream health and productivity in the new Elk Falls 3 sidechannel segment.
- To provide erosion protection and augment bank stability some additional soil bioengineering methods (live stake) have been incorporated into the prescription. Bioenginering installations at the toe of the slope are expected to provide structural integrity as the willow stems take root and grow, adding significant resistance to sliding or shear displacement.
- To provide erosion protection and vegetative cover over material endhauled to a stockpile area adjacent to the Catalyst pump station.

PLANTING PRESCRIPTION:

OBJECTIVES:	Enhance fish habitat and biodiversity of the new Elk Falls 3 sidechannel segment by planting a selection of native plant species suited to the site's ecology.	
PLANTING DIFFICULTY RATING:	Easy - Moderate	No obstacles to planting are anticipated however some steep areas exist.
SITE PREPARATION METHOD:	Excavator with manual finishing	Final grading may require manual finishing. Where required, provide minimum of 30 cm of topsoil for planting areas.
NET AREA TO BE PLANTED:	~ 8,680 m^2	Planting area includes segments A through D of the new Elk Falls 3 sidechannel alignment, any disturbed areas approaching park trails, and the stockpile of endhauled material adjacent to the Catalyst pump station. Dimensions are based on field measurements. Final area may vary.
PLANT SPECIES & QUANTITY:	Refer to attached list (page 2)	
PLANT SOURCES:	Local nurseries specializing in native plant species. Wildlings may be used if dormancy has been achieved for deciduous species. Transplanting should be done carefully to ensure minimum disturbance to the plant's root system.	
TYPE OF STOCK	Container or bareroot as available. Largest stock available is recommended.	
AGE CLASS	one or two year old stock as availability dictates.	
SPACING:	variable - see plant list and comments	
PLANTING HOLE SIZE:	1.5 times the diameter of the root ball	Need for screefing should be minimal to non-existent due to construction activity. Remove existing non-natives if present.
DEPTH:	1.5 times the depth of the root ball	
PLANTING MEDIUM:	Ensure stock is planted in an adequate depth (45-60cm) of suitable substrate free of invasive species.	
PLANTING SOIL:	No fertilizer required at time of planting (see special clauses).	
SHADING:	**n/a**	No supplemental shading required.
EXPECTED SURVIVAL:	**85%**	Biggest threats to survival will be desiccation during summer months and browse by ungulate and beaver.

RIPARIAN PLANTING PRESCRIPTION	EF3 sidechannel	Date: October 2, 2008

RECOMMENDED PLANT LIST:

SEG	COMMON NAME	SCIENTIFIC NAME	Minimum Quantity	Minimum Spacing	Comments
	TREES				
A,B, C	Bigleaf maple	*Acer macrophyllum*	**80**	6.0 m	Excavate planting hole 1.5 times the dia and depth of root ball. Bonemeal and peat moss may be added to backfill native soil in each planting hole to increase organic matter content and enhance retention of water and nutrients.
A,C, D,E	Douglas-fir	*Pseudotsuga menziesii*	**80**	6.0 m	Clustering groups of $\geq$ 3 specimens is acceptable for all tree species with minimum spacing of 6 m to be respected.
C,F	Western red cedar	*Thuja plicata*	**70**	6.0 m	As above
A,C, D	Grand fir	*Abies grandis*	**70**	6.0 m	As above
A,C, D	Sitka spruce	*Picea sitchensis*	**70**	6.0 m	As above
A,C, D	Western hemlock	*Tsuga heterophylla*	**70**	6.0 m	As above
E	Red Alder	*Alnus rubra*	**100**	6.0 m	As above
A,D	Black Hawthorn	*Crataegus douglasii*	**50**	6.0 m	As above
A,B	Douglas maple	*Acer glabrum*	**50**	6.0 m	As above
A,B	Vine maple	*Acer circinatum*	**50**	6.0 m	As above
A,D	Pacific crab apple	*Malus fusca*	**10**	6.0 m	As above
A,D	Black twinberry	*Lonicera involucrata*	**50**	6.0 m	As above
	SHRUBS				
A-D	Nootka Rose	*Rosa nutkana*	**160**	2.0 m	Mid & upper slope
A,C, D,E	Red Flowering Currant	*Ribes sanguineum*	**80**	2.0 m	Mid & upper slope
A-D	Red huckleberry	*Vaccinium parvifolium*	**80**	2.0 m	Mid & upper slope near decaying CWD
A-D	Evergreen huckleberry	*Vaccinium ovatum*	**80**	2.0 m	Mid & upper slope
A-D	Salal	*Gaultheria shallon*	**60**	2.0 m	Mid & upper slope
A-D	Pacific Ninebark	*Physocarpus capitatus*	**80**	2.0 m	Lower slope
A-D	Salmonberry	*Rubus spectabilis*	**116**	2.0 m	Lower slope
A-D	Thimbleberry	*Rubus parviflorus*	**44**	2.0 m	Mid slope
A-D	Saskatoon	*Amelanchier alnifolia*	**80**	2.0 m	Upper slope
A-D	Snowberry	*Symphoricarpus albus*	**80**	2.0 m	Upper slope
A-D	Oceanspray	*Holodiscus discolor*	**80**	2.0 m	Upper slope
A-D	Hardhack	*Spirea douglasii*	**80**	2.0 m	Lower & mid slope
A-D	Red Osier Dogwood	*Cornus stolonifera*	**80**	2.0 m	Rooted stock
A-D	Red Osier Dogwood	*Cornus stolonifera*	**150**	2.0 m	Live stake
A-D	Scouler's willow	*Salix scouleriana*	**40**	2.0 m	Rooted stock
A-D	Hooker's Willow	*Salix hookeriana*	**40**	2.0 m	Rooted stock
A-D	Scouler's Willow	*Salix scouleriana*	**150**	2.0 m	Live stake
A-D	Pacific Willow	*Salix lucida*	**156**	2.0 m	Live stake
A-D	Devil's Club	*Oplopanax horridus*	**5**	2.0 m	Lower slope
A-D	Stink currant	*Ribes bracteosum*	**17**	2.0 m	Lower slope
	GROUND COVER				
A,D	Bleeding Heart	*Decent formosa*	**5**	Fill plant	Target along high traffic areas
A,D	Piggy-back plant	*Tolmieq menziesii*	**5**	Fill plant	Target along high traffic areas
A,D	Fringecup	*Tellima gradniflora*	**10**	Fill plant	Target along high traffic areas
A,D	Large-leaved avens	*Geum macrophyllum*	**10**	Fill plant	Target along high traffic areas
A,D	Tall Oregon grape	*Mahonia aquifolium*	**30**	Fill plant	Target along high traffic areas
A,D	Foxglove	*Digitalis purpurea*	**30**	Fill plant	Target along high traffic areas
A,D	Deer fern	*Blenchnum spicant*	**30**	Fill plant	Target along high traffic areas
A,D	Lady fern	*Athyrium filix femina*	**33**	Fill plant	Target along high traffic areas
A,D	Sword fern	*Polystichum munitum*	**100**	Fill plant	Target along high traffic areas
A,D	Creeping Oregon grape	*Mahonia repens*	**10**	Fill plant	Target along high traffic areas
A,D	Dull Oregon-grape	*Mahonia nervosa*	**20**	Fill plant	Target along high traffic areas
	AQUATICS				
B,C	Hard-stemmed Bulrush	*Scirpus acutus*	**20**	Fill plant	Plant in wetland shelf submerged okay
B,C	Skunk Cabbage	*Lysichiton americanum*	**20**	Fill plant	Plant along channel edges near hwm
B,C	Small flowered bulrush	*Scirpus microcarpus*	**20**	Fill plant	Plant along channel edges near hwm
B,C	Slough sedge	*Carex obnupta*	**20**	Fill plant	Plant along channel edges near hwm
B,C	Wapato bulbs	*Sagittaria latifolia*	**6**	Fill plant	Plant bulbs ~6" below substrate along wetland shelf
	TOTAL PLANTS		**2,777**		

APPENDIX B

Inspection Checklist

CAMPBELL RIVER ELK FALLS #3
INTAKE AND CONNECTOR CHANNEL

INSPECTION CHECKLIST

Date: Sept 1, 2009			Inspected by: NHC/Graham Hill
Check one:	Summer/Low Flow Inspection ☑ Winter/High Flow Inspection ☐		
	Condition (check one)		Repair completed? / Notes
	Good/Pass	Poor/Fail	
INTAKE			
Water depth over intake	☑	☐	approx. 2 – 5 cm at u/s end of trash rack intake box
Trash rack	☑	☐	clear of debris, as constructed
Rock armour	☑	☐	as constructed
Intake valve	☐	☐	appeared to be in good condition, a turning test was not performed, rec'd greasing and turning the valve.
Sediment Pond accumulation	☑	☐	approx 1/4m3 of accumulated fine gravel and sand
Water depth and flow rate (channel)	☑	☐	water depth over the left concrete outfall wing was 5 cm, valve @ ½ open, valve could be opened more to provide additional flow
CHANNEL (fish barriers, tampering/vandalism, adequate freeboard, riffles intact, continuous flow)			
Trail inundation	☐	☑	the trail alongside the old EF3 channel was inundated at 2 places – water depth was approx 20 cm.
Bird nesting snags/ cavities	☑	☐	2 natural and 5 constructed bird snags were observed.
Culvert at Pump Station Road	☑	☐	clear of debris, wl ~ 15 cm above obvert u/s and d/s
Bank erosion	☑	☐	very limited bank erosion
Bank slumping/sedimentation	☐	☑	slumping at sta 3+00 (2 m x 3 m) and at sta 1+75, (1 m x 15 m), req'd bio engineering
Beaver Dams	☐	☑	beaver dam at exit of wetland u/s of pulp mill culvert, approx 75 cm high, active, access berm only has 30 cm freeboard
Bank riparian vegetation	☑	☐	very good survival rate (>90%) of planted vegetation, some browsing and die-off (see bio monitoring report), 1 large maple with a rotted stem fell across the channel.
Wetland outlet riffle elevation	☐	☑	a large beaver dam was situated on the riffle, the u/s water level was approx +75 cm.

APPENDIX C

Financial Statement
Performance Measures
Confirmation of BCRP Recognition

Project # 09.CBR.07

Financial Statement Form

	BUDGET		ACTUAL	
	BCRP	**Other**	**BCRP**	**Other**
INCOME				
Total Income by Source				
Grand Total Income (BCRP + other)		0.00		0.00
EXPENSES				
Project Personnel				
Wages	2,500.00		1,845.00	1,845.00
Consultant Fees	7,000.00	6,400.00	7,655.00	6,400.00
(List others as required)				
Materials & Equipment				
Equipment Rental				
Materials Purchased				
Travel Expenses	500.00		500.00	
Permits				
(List others as required)				
Administration				
Office Supplies				
Photocopies & printing				
Postage				
(List others as required)				
Accounting(CRSF)		600.00		600.00
Total Expenses	10,000.00		10,000.00	8,845.00
Grand Total Expenses (BCRP + other)		17,000.00		18,845.00
BALANCE (Grand Total Income – Grand Total Expenses)	*The budget balance should equal $0*	0.00	*The actual balance might not equal $0**	-1,845.00

* Any unspent BCRP financial contribution to be returned to: BC Hydro, BCRP
6911 Southpoint Drive (E14)
Burnaby, B.C. V3N 4X8
ATTENTION: JANICE DOANE

Project # 09.CBR.07

Performance Measures

Using the performance measures applicable to your project, please indicate the amount of habitat actually restored/enhanced for each of the specified areas (e.g. riparian, tributary, mainstream).

Performance Measures – Target Outcomes													
Project Type	**Primary Habitat Benefit Targeted of Project (m^2)**	**Primary Target Species**	**Habitat (m^2)**										
			Estuarine	In-Stream Habitat – Mainstream	In-stream Habitat – Tributary	Riparian	Reservoir Shoreline Complexes	Riverine	Lowland Deciduous	Lowland Coniferous	Upland	Wetland
Impact Mitigation													
Fish passage technologies	Area of habitat made available to target species												
Drawdown zone revegetation/stabilization	Area turned into productive habitat												
Wildlife migration improvement	Area of habitat made available to target species												
Prevention of drowning of nests, nestlings	Area of wetland habitat created outside expected flood level (1:10 year)												
Habitat Conservation													
Habitat conserved – general	Functional habitat conserved/replaced through acquisition and mgmt												
	Functional habitat conserved by other measures (e.g. riprapping)												
Designated rare/special habitat	Rare/special habitat protected												
Maintain or Restore Habitat forming process													
Artificial gravel recruitment	Area of stream habitat improved by gravel plmt.												
Artificial wood debris recruitment	Area of stream habitat improved by LWD plcmt												
Small-scale complexing in existing habitats	Area increase in functional habitat through complexing												
Prescribed burns or other upland habitat enhancement for wildlife	Functional area of habitat improved												
Habitat Development													
New Habitat created	Functional area created												

The objective of this project was to monitor the biological and physical performance of the EF3 extension project which was designed in 2007/08 (BCRP 07.CBR.02) and constructed in 2008/09 (BCRP 07.CBR.01) - no new habitat was created.

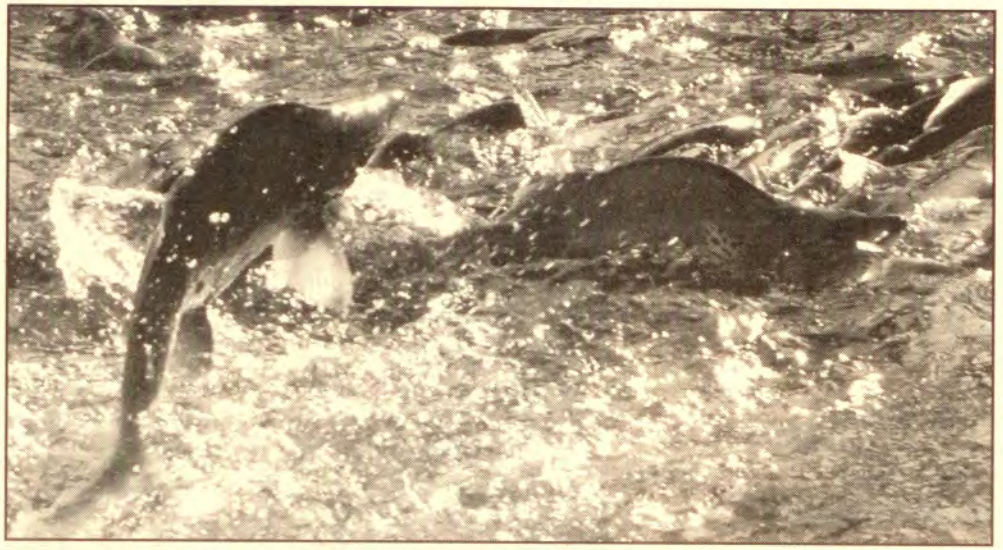
Campbell/Quinsam - 10-year summary

By David Ewart, Watershed Enhancement Manager, Quinsam River Hatchery, Fisheries & Oceans Canada.

Pinks: The Campbell has never been a pink salmon river, although some fish return every year to spawn in the spawning channels at Second Island, Elk Falls #1 & #2, Raven channel complex, and on placed gravel sections in the upper river and near the highway bridges. The 10 year average return is fairly constant at approximately 2,000 adults per year.

Coho: Like pinks, the Campbell has never historically had a large number of coho, although with more side channel development and constant flows through the Elk Falls canyon, habitat for coho has increased significantly. Run size has fluctuated greatly in the past 10 years from highs of 2,000 adults in 2001 to lows of 150 in 2006. As habitat for spawning and rearing increased in the Campbell in the late 1990s and through the new decade, ocean survival hit coho at the marine end of their life cycle with very poor ocean survival, (less than one per cent down from three per cent). This has affected recent coho returns in the river. If ocean conditions improve, coho production from the Campbell should increase with the improved habitat conditions.

Chinook: Much work in the Campbell river has been focussed on chinook salmon. Gravel placements for spawning adults have been the main emphasis, and a lot has been learned about where chinook select to spawn in the river, the conditions and substrate that are best suited to this stock, and methods to restore habitat to these areas. Since 1999, returns have been fairly stable at an average of 736 adults per year. A high of 1,076 was recorded in 2006 with a low of 511 in 2007. Many factors influence survival rates and returns of chinook to the Campbell. Like the coho, ocean marine survival dropped very significantly in the period between 2004 and 2008, and the returning adults in the past two years are as a result of this very poor condition in the ocean. Chinook have a longer ocean life history than other salmon, and they will be riding through this for the next two years when hopefully, conditions will improve and more adults will return



to spawn. Highlights of some projects currently being worked on in the Campbell with Quinsam Hatchery staff are:

• **Campbell River Chinook incubator project:** Up to 500,000 eyed chinook eggs are being reared in the Second Island channel in incubators this winter. They will remain in the incubators for three months and released as unfed fry to the Campbell. This is in an attempt to return more adults to the upper Campbell to spawn, and is the fifth year of a six year project. Returns of adults are starting to be recorded now, and it is proving to be a success as the fish are returning to the Campbell to spawn and not the Quinsam. This project is funded this year by the Campbell River Salmon Foundation and is an important strategy to boost start the chinook returns to the areas of the river where habitat restoration has been done.

• **Gravel placement in the First Island:** CRSF has been a lead in restoring gravel to a prime area of the Campbell where chinook used to spawn, and want to spawn. There is now significant amounts of gravel placed in this area, and chinook moved in to use it on the first year. Quinsam hatchery staff will assess the new section this fall. We are very encouraged with this project and are confident that it will provide spawning habitat for chinook where they want it in the Campbell.

Chum: The species that has benefitted the most from habitat restoration work in the Campbell River has been chums. In 1999, the return was 3,000 adults. In 2005, the run peaked at 50,000, which was at historic escapement levels for the system. Proceeding and during this time period, significant habitat restoration works had been done in the Campbell river and estuary, including gravel placements, spawning channel construction, estuary planting, and various water use and estuary use planning processes which drastically improved the watershed for chum production. The stock has responded very well, and although returns have declined to a low of 5,000 in 2007 due to very poor ocean survival, it is expected that this will pick up as the ocean improves.

Quinsam River

Pinks: Returns have fluctuated over the past 10 years, with an average of 100,000 adults. A low of 30,745 was recorded in 2006, and was most likely a result of poor ocean survival conditions (like all the other species). Since then however, pink returns have increased and to date in 2009, over 900,000 pink adults have been counted in the Quinsam, which is the largest return ever recorded here. This is a positive indicator that ocean survival rates have greatly improved.

Highlights of work done in the Quinsam are:

• In 2005, a fishway was carved through three cascade areas in the upper river. This has provided a much greater area for salmon, (pinks in particular), to migrate to in low flow conditions. This project has been a huge success, and is a significant contributor to the overall increased productivity in the Quinsam.

Chinook: The 10 year average return to the Quinsam River has been 7,804 adults, with a high of 12,527 in 2001 and a low of 5,430 in 2008. Again, ocean conditions are the overarching reasons for high and low abundance during this time with the current returns coming in from a series of very poor ocean rearing years. In addition, in 2004, Chinook production at Quinsam river hatchery was cut by 20 per cent due to program reviews and funding issues, which will have an impact on returns into the future.

Overall though, this run is sustained at a high level by hatchery production and natural spawning in the river, and contributes significantly to the fishery locally and along the BC coast into Alaska.

Coho: Coho returns have been very erratic over the past 10 years, with very serious declines being experienced in the past four return years.

It has gone from highs of 23,000 in 2001 to a record low of only 2,445 in 2006. Prior to 1999, returns averaged at around 20,000 adults for many years, but with very poor ocean conditions during 2004 to 2008, coho have been the species that has suffered the most, (survival rates plummeted from five per cent down to .5 per cent).

It is hoped that ocean conditions have improved in the last two release years and that we will see an improvement in the next few years.

Note that in 2004, coho production at the hatchery was cut by 30 per cent due to program reviews and funding issues, so this has also had an affect in declining returns.

**Note: Campbell data DOES NOT include transfers to channels from Quinsam.*

*Note: Campbell data DOES NOT include transfers to channels from Quinsam.

COHO ADULT RETURNS

YEAR	CAMPBELL	QUINSAM
1973	1,000	3,000
1974	1,500	5,832
1975	400	3,819
1976	150	2,115
1977	700	21,689
1978		11,862
1979	750	13,148
1980		39,538
1981	500	26,202
1982	300	22,399
1983		22,895
1984	500	27,313
1985	500	31,655
1986	500	37,051
1987		26,509
1988	250	35,790
1989	500	31,269
1990	250	25,486
1991		24,669
1992		20,384
1993	200	9,875
1994		11,096
1995		35,959
1996	500	10,516
1997	250	20,352
1998	250	24,338
1999	250	12,908
2000	250	20,289
2001	2,000	23,578
2002	1,500	19,665
2003	500	17,529
2004	1,000	17,758
2005	200	4,740
2006	150	2,455
2007	1,421	5,904
2008	604	5,774

CHINOOK ADULT RETURNS
(No Jacks Included)

YEAR	CAMPBELL	QUINSAM
1973	4,300	5
1974	2,500	253
1975	2,250	300
1976	4,000	267
1977	2,500	424
1978	5,000	428
1979	2,500	912
1980	1,000	1,108
1981	1,100	937
1982	750	2,034
1983	750	1,806
1984	1,297	2,679
1985	1,415	3,820
1986	4,951	2,845
1987	2,586	3,660
1988	3,087	9,925
1989	2,241	12,539
1990	2,899	13,491
1991	1,420	6,939
1992	819	4,175
1993	251	2,299
1994	365	2,365
1995	319	1,782
1996	340	2,412
1997	272	2,583
1998	316	4,004
1999	805	6,339
2000	623	6,588
2001	799	12,527
2002	988	10,688
2003	674	6,647
2004	920	8,670
2005	395	9,131
2006	1,076	8,274
2007	511	5,745
2008	573	5,430

PINK ADULT RETURNS

YEAR	CAMPBELL	QUINSAM
1973	1,000	4,000
1974	4,000	7,500
1975	1,500	30,000
1976	10,000	24,001
1977	1,400	4,235
1978		15,098
1979	2,000	9,697
1980		19,985
1981	2,000	21,541
1982	500	6,840
1983		28,892
1984	500	12,893
1985	500	30,601
1986	10,000	231,974
1987	3,500	123,543
1988	5,700	170,600
1989	1,000	35,429
1990	5,000	439,624
1991	2,000	105,617
1992	5,600	231,588
1993		31,390
1994	5,000	92,102
1995	1,000	37,025
1996	2,000	121,834
1997	2,000	83,102
1998	2,000	75,942
1999	2,000	138,630
2000	2,000	147,042
2001	3,000	247,778
2002	2,000	113,703
2003	2,000	102,019
2004	1,000	34,970
2005	1,600	116,625
2006	4,870	30,756
2007	1,222	122,163
2008	2,852	98,125

CHUM ADULT RETURNS

YEAR	CAMPBELL	QUINSAM
1973	4,000	1,000
1974	3,500	400
1975	3,000	400
1976	5,500	800
1977	5,200	27
1978		5
1979	7,500	405
1980		2
1981	2,000	200
1982	3,000	251
1983		
1984	4,000	500
1985	8,700	514
1986		
1987		
1988	1,500	104
1989		
1990		4
1991		
1992	10,000	5
1993		6
1994		
1995		
1996	8,000	185
1997	20,000	225
1998	10,000	145
1999	3,000	58
2000	4,000	68
2001	35,000	31
2002	40,000	1,535
2003	18,200	100
2004	44,494	647
2005	50,213	1,075
2006	8,000	261
2007	5,068	249
2008	19,437	180

Campbell River Salmon Foundation Annual Report 2009

The Campbell River Salmon Foundation has completed its second year of operations and is well into the third year. This report is intended to update our members, partners and contributors on our recent projects and plans for the future.

The current Board of Directors is comprised of:

MB. (Mike) Gage, Chairperson
Kent Moeller, Treasurer
Joe Painter, Director
Richard Chapple, Director
Dale Blackburn, Director
George Stuart, Director
Mark Gage, Director
Kris Mailman, Vice Chairperson
Monique Hebert, Secretary
Therisa Lowe, Banquet Chairperson
Don Bendickson, Director
Martin Buchanan, Director
Mike Moscovich, Director

Our second annual Banquet, Auction and Dance held March 22, 2009 was a sold out event attended by 400 people and was a huge success raising $74,000. C.R.S.F. will hold its 3rd Banquet on March 13th, 2010 at the same venue, Campbell River Community Centre. Mark your calendar and be sure to watch for further announcements.

The following is a list of projects in which we are partners and contributors in 2009.

On February 6th, 2009 the Storey Creek Fish Passage was created under Fairway #12.

This passage enables Coho smolts to return to the ocean from storage ponds upstream of the #12 Fairway and also provides passage for them to return in 3 years as adults hopefully in 2012 or 2013. Coho stocks in Storey Creek will be monitored this fall and if they are not present, the creek will be fryseeded next spring by D.F.O.

Quinsam River Cascades Fish Passage assessment was funded this year by Bridge Coastal Restoration Program (BCRP).

CRSF loaned $13,000 to the D.F.O. to jump start the down stream counting of juvenile pink Salmon. These funds will be repaid in full to CRSF by BCRP when the project and final reports are completed to BCRP's satisfaction. Total cost of this project is $37,290.

In March 2009 the construction of a counting fence at Village Bay Lake was completed in partnership with Quadra Island Salmon Enhancement Society. Total cost of the project was $17,000. $4,000 from CRSF and $13,000 from Q.I.S.E.S.

On May 20th, 2009 CRSF partnered with Sayward Fish & Game Association to plant Red Cedar, Douglas Fir, Spruce and some Red Alder seedlings on the banks of the Salmon River and the Big Tree rearing channels. The seedlings and browse protectors were donated by the Ministry of Forests. CRSF and Sayward Fish & Game Association shared the cost of planting.

On July 13th, 2009 CRSF funded the construction and rehabilitation of a Coho rearing channel on private property in the lower Salmon River across from Woodlands Lodge at Sayward. Total cost of excavation was $2,719.

July 20th, 2009 CRSF contributed $5,000 to the BC Centre for Aquatic Health Science to help fund their ongoing study of juvenile Salmon release as it responds to the plankton bloom in local ocean conditions. This contribution of $5,000 is our second such contribution since 2008.

August 2009 BCRP funded further spawning gravel placement in the Upper Campbell River in the first Island area. Local contractors placed 2,500 tons of material in 5 days. The total cost is probably less than the $180,000 that was planned. The project was almost identical to the work done by the same contractors in 2006. All of the major spawning gravel placement in the Campbell River is done by local contractors and fully funded by BCRP.

July, August and September 2009
An assessment of adult fish migration past the Salmon River Diversion Dam is now being conducted by a crew of biologists on contract to the DFO and partially

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July, August and September 2009
An assessment of adult fish migration past the Salmon River Diversion Dam is now being conducted by a crew of biologists on contract to the DFO and partially funded by BCRP. Fish are being tagged and watched by electronic devices to see if and how many can actually make it past the facility that diverts water from the Salmon River via canal into Brewster Lake and then into Lower Campbell and John Hart via Fry and Gray Lakes. Stay tuned for the final report. BCRP contribution is $100,000. D.F.O. contribution is approximately $45,000.

Campbell River Elk Falls # 3 monitoring study to determine the amount of use from the latest improvements to flow (improvements were made in 2008). Cost of this project is fully funded by BCRP in the amount of $17,000.

In September 2009 Simms Creek Stewards Society received $1,000 from CRSF to create more water storage in the headwaters of Simms Creek.

In October 2009 CRSF partnered with Gillard Pass Fisheries Association with $2,000 for the capturing and tagging of Chinook in the Phillips River for assessment when tags are recovered.

Also in October 2009 CRSF funded BCCF (Living Rivers) in support for the Salmon River Watershed Nutrient Enrichment Program 2009-2011. The "ask" totals $30,000 over 3 years or $10,000 per year. This would provide the fertilizer and labour to treat target reaches of the Salmon River below BC Hydro's diversion dam and the Upper White River. Funding by CRSF will replace funds previously supplied by Western Forest Products Forest Investment account which was cancelled this year due to budget shortfalls.

"Last but certainly not the least"... CRSF and DFO will jointly conduct a project entitled "Campbell River Mainstream Chinook Enhancement" in the upper Campbell River above the confluence of the Quinsam. CRSF will contribute $10,000. This project starts October 1st, 2009 and is in its 5th year and was previously funded by the Pacific Salmon Commission.

As you can see we are growing in capacity, thanks to all of the local stream keepers within our mandate. And a big thank you to all of those that have contributed by supporting CRSF.

Financial support is important and the way the money is spent is equally important.

The Board of Directors of CRSF is entirely made up of volunteers. We have a minimum of four meetings per year. The Banquet Committee is also volunteer and they have at least four meetings to pull the event together.

CRSF operates out of the office of Seymour Pacific Developments Ltd at 920 Alder Street in Campbell River. We are appreciative of the use of their facilities and their friendly staff.

Funds from the Pacific Salmon Commission and others for local projects have been greatly reduced in 2009. This has given CRSF an opportunity to fill the void. Our funds are generated from Individual and Corporate donations, Partnerships as well as money raised by our excellent Banquet Committee in 2008/2009. Thank you to all of those involved.

M.B. (Mike) Gage
Chairperson C.R.S.F.

Mission: To promote salmon enhancement in watersheds between the Oyster River and south of the Salmon River estuary and the adjacent mainland coast.