Puntledge River Habitat Restoration

Powerline Side-Channel Improvements
2003 – 2004

03Pu.02

March 2004

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Executive Summary

Location:	Located on the south side of the Puntledge River , 8.5 km from the mouth, near the confluence of the Browns River. Access to the site is off the BC Hydro R.O.W. at the end of Powerhouse Road.		
Watershed Code:	92055320094-4200		
Map References:	92 F-11		
UTM Co-ordinates:	Zone 10.	5,506,029 m N; 352,219 m E	(NAD83)
Construction Drawings:	31-62-A1; 31-62-14; 31-62-15; 31-62-16; 31-62-17		
Cost Summary:	Total 2003/04 costs		**$ 31,710**
	BC Hydro		**$ 24,675**
	In Kind (DFO, Volunteers)		**$ 7,035**

The Powerline side channel was constructed in 1991 through a joint partnership with BC Hydro, Fisheries and Oceans, Ministry of Water, Land and Air Protection and the Steelhead Society. The main purpose of the channel is to provide spawning habitat for pink salmon in the upper channel and rearing habitat for trout and coho in the lower channel.

Activities in the Powerline side-channel in 2003/04 include the installation of a new screened box intake and pipeline to replace the open culvert design, excavation of 150 m of channel length to the original design grade, and the creation of over 300 square metres of spawning habitat. Following the first fall/winter season of operation, further design modifications were made to the intake box to reduce plugging of the screen during flood events.

These measures will improve water flow through the channel, thereby improving spawning and incubation success, and increasing the productivity and survival of summer rearing and overwintering juvenile salmonids. The Powerline Side-channel Improvement Project addresses the interruption of gravel and wood recruitment and the reduction in spawning and rearing habitat below the diversion dam, as outlined in the BCRP Strategic Plan Volume 2, Chapter 3 (Puntledge River), by improving stable off-channel spawning, summer rearing and overwintering habitat and ensuring its integrity over the long term.

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1 Introduction

1.1 Background

The Powerline side-channel was constructed in 1991 through a joint partnership with BC Hydro, Fisheries and Oceans, Ministry of Water, Land and Air Protection and the Steelhead Society of B.C. The main purpose of the side-channel is to provide spawning habitat for pink salmon in the upper channel and rearing habitat for trout and coho salmon in the lower channel.

1.2 Need Statement

Spawning habitat in the Puntledge mainstem below Comox Lake is presently limited to the lower-most reach (reach 1), and small pockets in the upper section of reach 3. The spawning grounds in reach 1 were cited as being impacted from accentuated fall-winter freshets following the expansion of the hydro facilities in 1955, and the lack of gravel inputs leading to declines in the fall-run chinook stock (Marshall, 1971).

Gravel sources and gravel recruitment to the lower Puntledge River reflect geologic processes that took place in south-western British Columbia since the last (Fraser) glaciation, 15,000 years ago. Events during and after the retreat of the glaciers resulted in deposition of gravel mainly around the present 150 m (500 ft) contour. The information suggests that a large proportion of gravel deposits (post-glacial deltaic gravel and sand sediments) in the Puntledge River became unavailable for transport by the construction of the diversion dam at elevation 130 m (430 ft) asl downstream of Comox Lake. Historically, the lake would have settled much of these gravel deposits, therefore gravel recruitment downstream of the lake would have been limited. Supply Creek, the main tributary between the two dams probably once provided moderate contributions as evidenced by the formation of gravel bars at the confluence of this tributary with the Puntledge mainstem (Bengeyfield and McLaren, 1994). Since 1912 gravel contributions from sources above the diversion dam have been eliminated by the dam and are now restricted to the deltaic and fluvial terrace sediments downstream. The falls reach likely never supported much spawning but was mainly a transport reach and gravel recruitment from this reach is limited to the scouring of the thin alluvial deposits along the banks (Bengeyfield and McLaren, 1994).

Not only has hydro-electric development in the watershed interrupted gravel recruitment to the lower river from dam construction, but the regulation of flow downstream of the dam has resulted in frequent rapid fluctuations in discharge and occasional excessive flow events which have scoured existing gravel. The reduction in good quality spawning gravel in the lower reaches is further complicated by the repeated utilization of the same spawning habitat by different species, mainly pink and chum salmon (MacKinnon *et al*., 1979).

The proposed project addresses the interruption of gravel and wood recruitment and the reduction in spawning and rearing habitat below the diversion dam, as outlined in the BCRP Strategic Plan Volume 2, Chapter 3 (Puntledge River), by improving stable off-channel spawning, summer rearing and overwintering habitat and ensuring its integrity over the long term.

1.3 Objectives

The objectives of the Powerline Side-channel Improvement Project are to improve the spawning success of adult salmon and trout, incubation survival of eggs and juvenile rearing downstream by improving water flow through the channel.

2 Study Area

The Powerline side-channel is located on the south side of the Puntledge River in Reach 3, also called the diversion reach, near the confluence of the Browns River (Figure 1). The side-channel consists of alternating gravel beds and rearing pools flowing through a mixed second growth riparian forest. The channel is approximately 560 m in length with over 5000 m^2 of spawning and rearing habitat.

3 Methods

3.1 Site Isolation and Fry Salvage

A coffer dam was built above the original channel intake using approximately 30 bulk bags filled with pit run gravel and sealed with heavy gauge clear plastic sheets (Photo 1 and 2). The bulk bags were placed with a PC150 excavator on gravel and bedrock substrate in the Puntledge River manistem. The complexity and size of the side-channel and marsh areas made it impractical to fry salvage the entire channel. Since most of the construction work was restricted to the top 200 meters of the channel, this was the only area that was fry salvaged. This was completed using baited minnow traps and pole seines. Fry were released in the side-channel below the work site. Water flow to the channel was diverted around the work site using portable 3" pumps. Clean water from the river was discharged approximately 200 meters downstream of the top of the channel in order to maintain flow downstream of the work site. The base flow was approximately 757 lpm (200 gpm U.S). At the end of each construction day the water was allowed to flow back into the channel through the intake pipe and was shut-off the next morning after the pumps were turned back on.

3.2 Rock Breaking

To install the new intake and improve flow into the side-channel a PC150 excavator with a rock breaker was used to excavate a hole for the intake and pipeline. Rock was also jack hammered and excavated out of the top 150 meters of channel to lower the channel control inverts and increase discharge. This rock was used to backfill the pipeline after installation.

3.3 Intake Installation and modifications

The intake and pipeline was fabricated by Les Colville Welding and Fabrication in Courtenay, BC. The intake box is 4' wide by 8' long and 2' deep. The top and sides of the intake are screened with 3/8" dia. aluminum mesh screen. The pipeline dia. is 20" (Appendix C). Further design modifications were made to the intake structure following winter flood events, which caused the screen to plug with fine gravel. A deflector wing was fabricated to be installed upstream of the screened intake box. This wing will increase the velocity of water over the

screened intake and reduce the amount of fine gravels that are transported over the screen at moderate to high flows. A new slotted (grizzly) screen will replace the top screen of the existing intake box. This screen will increase the surface area. Finally, a screened bank intake will be installed which will act as a back-up intake if the screened box plugs up during high river flows (see drawings in Appendix C).

3.4 Spawning Gravel Relocation / Installation

To improve water discharge into the side-channel both a new intake was installed and the top 150 meters was excavated. In the process, all of the spawning gravel in this section of channel had to be removed. New spawning habitat was created further downstream by placing gravel on top of the existing bedrock channel bed and installing a rock riffle using 61 tonnes of shot rock at the bottom-end to create an optimum hydraulic gradient for spawning (Photo 3). Approximately 185 tonnes of spawning gravel was placed in the channel upstream of the riffle, creating approximately 300 square metres of spawning habitat.

4 Results

Between August 2003 and March 2004 the following construction and monitoring activities were completed in the Powerline side-channel:

- Installation of a screened box intake and pipeline extension to the Powerline side-channel.
- Excavation of the upper 150 m of channel to lower the invert to the original design grade.
- Construction of a 300 square metre spawning platform using ~61 tonnes of shot rock and ~185 tonnes of spawning gravel.
- Visual surveys of salmon spawning activity in the channel (pink, coho and chum).
- Hydraulic sampling in the upper channel mid-winter to determine incubation survival.
- Installation of a sign adjacent the channel to raise public awareness about the importance of the fish habitat structures and channel improvements, and the overall value of this channel in the ecologic health of the Puntledge River watershed.
- Fabrication of a deflector wing, new intake screen, and a screened bank intake to be added to the existing intake unit during the 2004 instream fisheries work window.

5 Discussion

Following completion of the instream activities and installation of the new intake, flows into the Powerline side-channel were visibly higher. The improved discharge provided the necessary attraction flows for pink salmon to enter the side-channel for the first time on their own (previous years have required hatchery staff to release adults into the channel). Escapement of pink salmon in the Powerline side-channel for 2003 is estimated at 1000, while 35 chum, 10 chinook and 200 coho salmon were also observed during the spawning season. The average coho smolt density for many constructed side-channels in B.C. and the Pacific Northwest is 0.67 smolts/m2 (Koning and Keeley, 1997). Using this biostandard, the expected coho smolt production from the Powerline side-channel is approximately 3350 smolts. Results from hydraulic sampling in January 2004 indicate a mean incubation survival of 67% for the 9 redds sampled (range: 24% - 91%) (Table 1).

A significant flood event in late October allowed the opportunity to observe the operation of the new screened box intake at high flows. During this event, the intake screen became plugged with fine gravel, a chronic problem in the system due to the abundance of shale that quickly breaks down into small particles. However, the channel was still being fed from seepage around the old intake culvert along the bank at the time. Following the flood, close monitoring of the intake continued in order to determine whether plugging remained an issue at lower flows. Hatchery staff now must routinely sweep the intake screen, however, the intake has eliminated the transport and settling of gravel and sediment in the channel itself and the need to regularly excavate the channel with heavy equipment.

It is anticipated that the modifications made to the intake box and the addition of a screened bank intake will alleviate the plugging problems. Although there may be a requirement for periodic cleaning of the screens, the new intake will eliminate the problems with sediment infilling the channel and the high maintenance (regular excavation) as well as negative impacts on spawning, incubation, and juvenile rearing, that were associated with this deposition.

6 Recommendations

Operation of the new combination screened intake, deflector and bank intake will be closely monitored during the first season of high flows after installation. Screens will be inspected for plugging, and channel flows will be measured and compared at various river flows. A maintenance schedule will be developed with Puntledge Hatchery staff that will include regular visits to clean screens (if necessary), adjusting the intake valve during floods and conducting inspections following flood events.

7 Acknowledgements

This project was made possible through 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 (Nanaimo).

8 References

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B.C. Hydro. 2000. Bridge-Coastal Fish and Wildlife Restoration Program Strategic Plan. Prepared by Regional Consulting Ltd., Global Fisheries Consultants Ltd.,.,D.B. Lister & Associates Ltd., and Summers Biological Services with mapping by GIS Innovations.

Koning, C.W. and E.R. Keeley. 1997. Salmonid biostandards for estimating production benefits of fish habitat rehabilitation techniques. *In* P.A. Slaney and D. Zaldokas [eds.] Fish Habitat Rehabilitation Procedures. Watershed Restoration Technical Circular No. 9.

MacKinnon, C.N., H. Genoe and D.C. Sinclair. 1979. Puntledge River Project 1972 - 1977. Fish. and Mar. Serv. Tech. Rep. No. 842, Enhancement Services Branch, Vancouver, 126 p.

Marshall, D. E. 1971. 1970 Puntledge River biological program. Memo to L. Edgeworth and D. MacKinnon. Dept. of Fish. & Forestry, Pac. Reg. Memo. 31-3-P1, 16 p. + app.

Figure 1. Lower Puntledge River showing location of the Powerline and Jack Hames Side-channels.

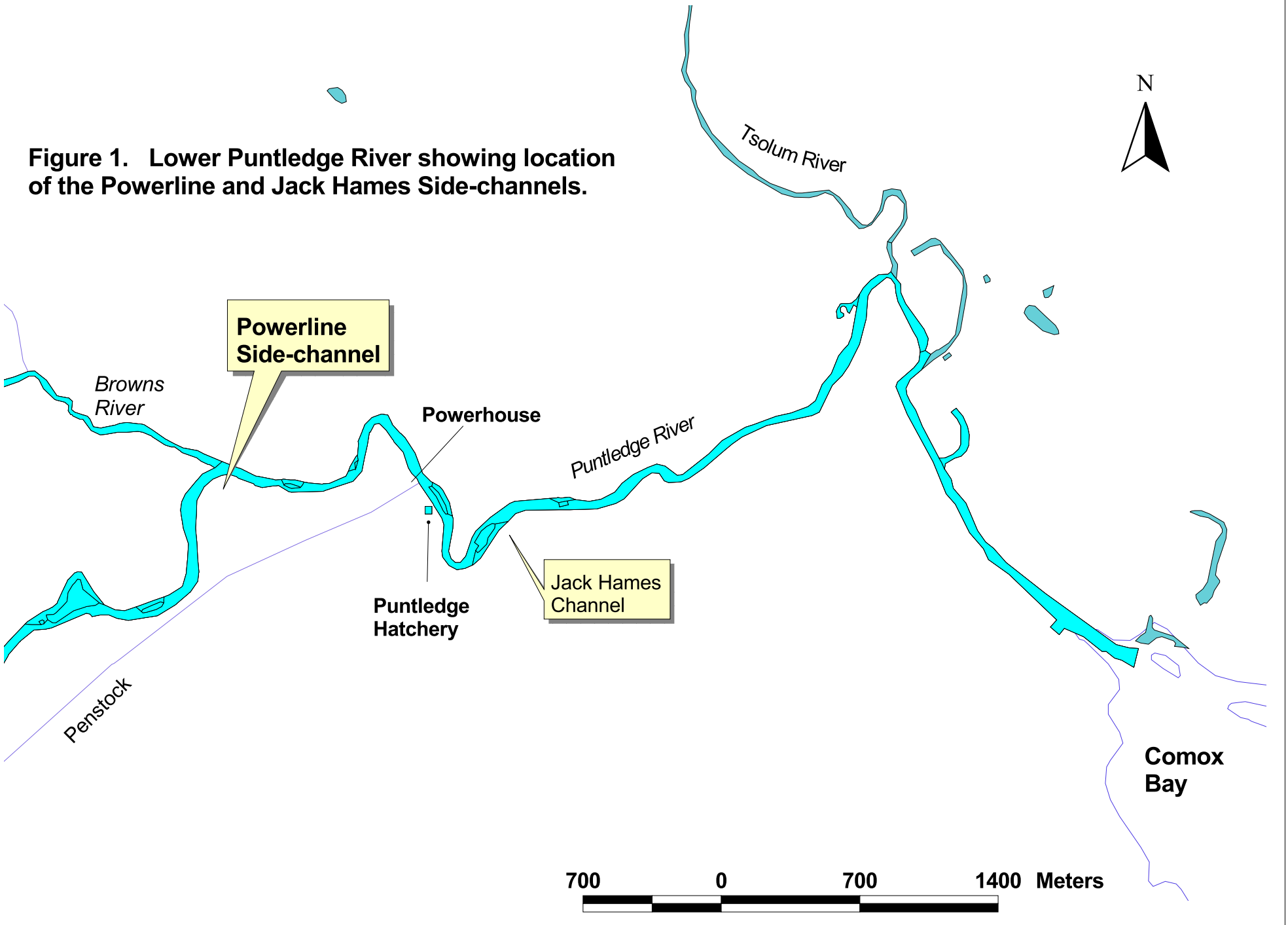


Photo 1. View of the original intake into the Powerline side-channel taken from the mainstem river.

Photo 2. New screened box intake isolated from river during installation in 2003.

Photo 3. Looking downstream at new rock weir and spawning platform located approximately 150 m downstream of intake.

Table 1. Results of hydraulic sampling at the Powerline side-channel, January 9, 2004.

Lower Spawning Platform (above new weir)

		Subsurface							
Redd #	Fall in 183cm	DO	Saturation %	Temp. °C	Eyed Eggs	Dead Eggs	Live Alevins	Dead Alevins	% Survival
1	17 mm	13.5	99	3.7	0	27	38	0	58.5
2	20 mm	13.6	98	3.1	0	78	52	0	40.0
3	2 mm	13.4	98	3.5	0	227	72	1	24.0
4	4 mm	13.1	96	3.4	0	86	217	0	71.6
5	2 mm	13.1	96	3.3	0	65	670	3	90.8

Upper Spawning Platform

		Subsurface							
Redd #	Fall in 183cm	DO	Saturation %	Temp. °C	Eyed Eggs	Dead Eggs	Live Alevins	Dead Alevins	% Survival
6	?	11.7	89	3.4	166	74	284	0	85.9
7	17 mm	12.4	93	3.4	1	10	100	0	91.0
8	17mm	7.5	58	3.7	157	28	38	0	87.4
9	12 mm	12.4	92	3.7	0	34	39	0	53.4

Appendix A

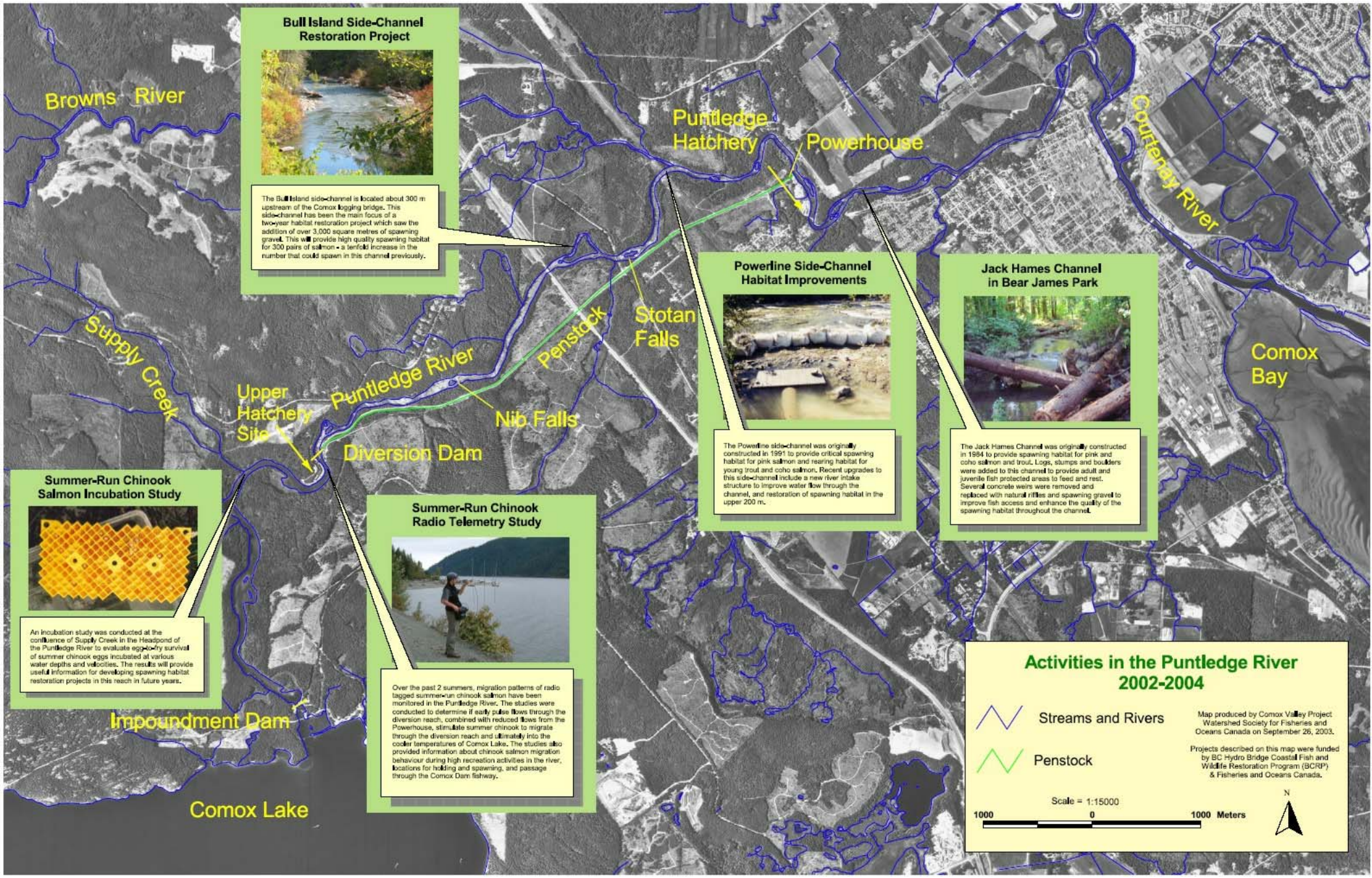
BC HYDRO FISH & WILDLIFE
BRIDGE COASTAL RESTORATION PROGRAM

Financial Statement

Income & Expenses

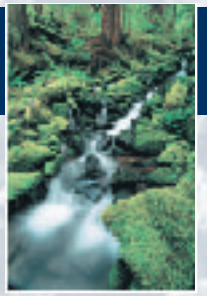
	Income	Expensed	
Income			
BCRP	$ 31,180		
(DFO In-Kind)	$ 7,035		
Total Income			
Expenses		**BCRP**	**(DFO In-kind)**
Project Personnel			
Project supervision, fry salvage	$ 1,181	$ 1,181	
Project reporting	$ 1,575		$ 1,575
Technicians	$ 1,750	$ 250	$ 1,500
Professional (engineer, eng-tech, biologist, etc.)	$ 2,450		$ 2,450
Equipment & Expenses			
Equipment (PC150 excavator, rock breaker, mobil/demobil)	$ 7,708.53	$ 7,708.53	
Intake Fabrication	$ 11,249.87	$ 11,249.87	
Materials (gravel, shot rock incl trucking)	$ 2,959.68	$ 2,959.68	
Equipment rental (pumps, cut-off saw)	$ 160.50	$ 160.50	
Signage	$ 1,055	$ 1,055	
Misc. field expenses	$ 110.16	$ 110.16	
Overhead			
Administration (5% of total)	$ 1,510	0	$ 1,510
GST	$1,519.53	$ 1,519.53	
Subtotal (not incl. GST)	$ 31,709.74	$ 24,674.74	$ 7,035
Total Expensed		$ 31,180	
Balance		*$ 6,505.26	

*Unspent BCRP financial contribution to be returned to: BC Hydro, BCRP
6911 Southpoint Drive (E16)
Burnaby, BC. V3N 4X8
ATTENTION: JANICE DOANE



Appendix B. Confirmation of BCRP Recognition: sample of poster display at Puntledge Hatchery showing summary of activities in the Puntledge River from 2002 - 2004.

Restoring Salmon Habitat in the Puntledge River Watershed
Powerline Side-Channel



The Powerline Side-Channel was originally constructed in 1991 to provide critical spawning habitat for pink salmon in the upper channel and rearing habitat for young trout and coho salmon in the lower channel. Spawning habitat in the main channel of the Puntledge River is in short supply due to the interruption of gravel transport from the upper river by the diversion dam.

Recent upgrades to this side-channel include a new river intake structure installed in 2003. This intake improves water flow through the channel, spawning success of adult salmon and trout, incubation survival of eggs, and juvenile rearing downstream. This side-channel currently provides over 5,000 square metres of spawning and rearing habitat.

Improvements to the Powerline Side-Channel were made possible through funding from the BC Hydro Bridge Coastal Fish and Wildlife Restoration Program (BCRP). This program provides $1.5 million annually to projects that restore fish and wildlife populations and habitat impacted by the construction of hydroelectric generating stations in 15 watersheds located along the coast, the Fraser Valley, Bridge River, Shuswap River and on Vancouver Island. The program is managed by a Board comprised of three public, three First Nation, one federal, one provincial and one BC Hydro representatives.

Other contributers and project partners include:

Fisheries and Oceans Canada
Steelhead Society of B.C.
Ministry of Water, Land and Air Protection
Comox Timber Ltd.
Puntledge River Restoration Committee
Courtenay & District Fish and Game Protective Association

Canada
British Columbia
BC Hydro Fish & Wildlife
Bridge Coastal Restoration Program

From the Comox Valley Record, August 22, 2003

Bear James Park Upgrades Coming...

If you go out in the woods today you're in for a big surprise! At least in Bear James Park anyway...

Fisheries and Oceans Canada and BC Hydro Bridge Coastal Fish and Wildlife Restoration Program have teamed up to provide upgrades to the spawning channel located, in part, in the City of Courtenay's Bear James Park at the former Fish and Game Club site on Rod and Gun Rd.

Channel improvements will also be undertaken at the Powerline spawning channel located in the Hydro Right of Way upstream of Puntledge Hatchery.

The channel upgrades and habitat complexing will benefit returning pink salmon and juvenile salmonids.

Activities will commence on Tuesday August 26 and will be completed within a week. The public is asked to stay clear of designated work areas at both sites during this time for safety reasons.

For more information, please contact Fisheries and Oceans Puntledge Hatchery at 703-0909.

Restoring the Puntledge

By Larry Peterson
Puntledge River Restoration Committee

Checking out restoration work at Bull Island is, from left, Brian Munroe, assistant manager of the Puntledge River Hatchery, Janice Doane, project manager with BC Hydro's Bridge Coastal Fish and Wildlife Restoration Program, and Larry Peterson, of the Puntledge River Restoration Committee.

After decades of closure, the Puntledge River was open to sport-fishing for the third year in a row. The fishery closed at the end of last month, but during the season, which started October 1, there were12 to 30 cars at Condensory Bridge every day.

One day in October, four motorhomes, each carrying two Italian fishers, found their way to the Puntledge. One day last month, four Japanese visitors roamed its banks.

The abundance of fish and the generous but reasonable opportunities to retain coho, chum and chinook were strokes of good fortune and good management.

So how has all this come about?

Many factors and many people have played roles. First, about six years ago, the Courtenay Fish and Game Club, the local chapter of the Steelhead Society and other concerned citizens staged a large rally to insist on a predator control program for seals in the lower river. These seals were taking up semi-permanent residency in the inter-tidal zone and intercepting adult spawners on their way up-river. More importantly, the seals were feasting on young, downstream migrants on their way out to sea. Over half of all Puntledge River smolt production was being intercepted and consumed.

Secondly, the Puntledge River Restoration Committee reformed and began lobbying politicians, provincial and federal fisheries and BC Hydro to initiate and carry out a revitalization program which would see stepped-up fish production so there would be enough bodies out there to prejudice the odds towards survival instead of against it.

The second half of the equation was habitat improvement so that fish had abundant areas to spawn and rear and suitable water flows to guarantee efficiency of spawning and rearing.

Over the past five years, the Puntledge River Hatchery staff have been pumping out coho, chinook, pinks and chums to the point that salmon production has almost returned to historical levels.

BC Hydro has paid for and worked with the Department of Fisheries and Oceans (DFO) for side-channel construction and gravel placement at such places as Bull Island, (a semi-natural, $200,000 project just upstream of Stotan Falls), the power-line area and the Courtenay Fish and Game side-channel.

Altogether, about $227,000 has been spent on restoration.

BC Hydro has guaranteed flows which are favorable for fish and provincial fisheries has both a cut-throat trout and a steelhead program in their early stages. There is a spirit of cooperation which is showing obvious positive results.

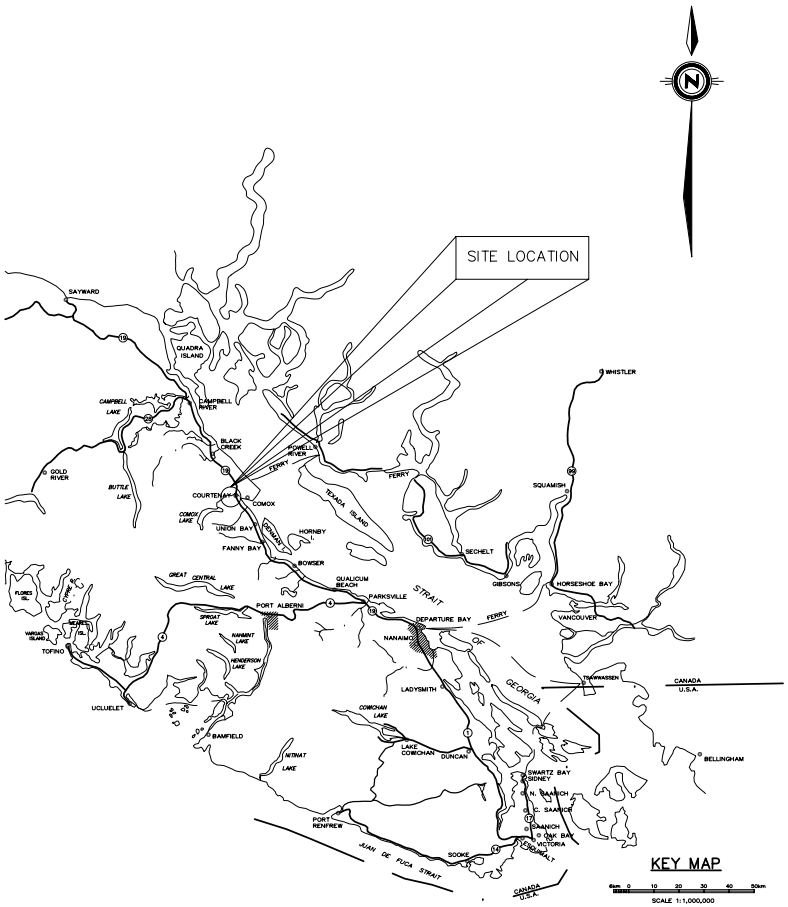
There is also another part to the effort. Ocean survival in the past four years has been excellent with the subsiding of El Nino and the rich upwellings of nutrients in the North pacific.

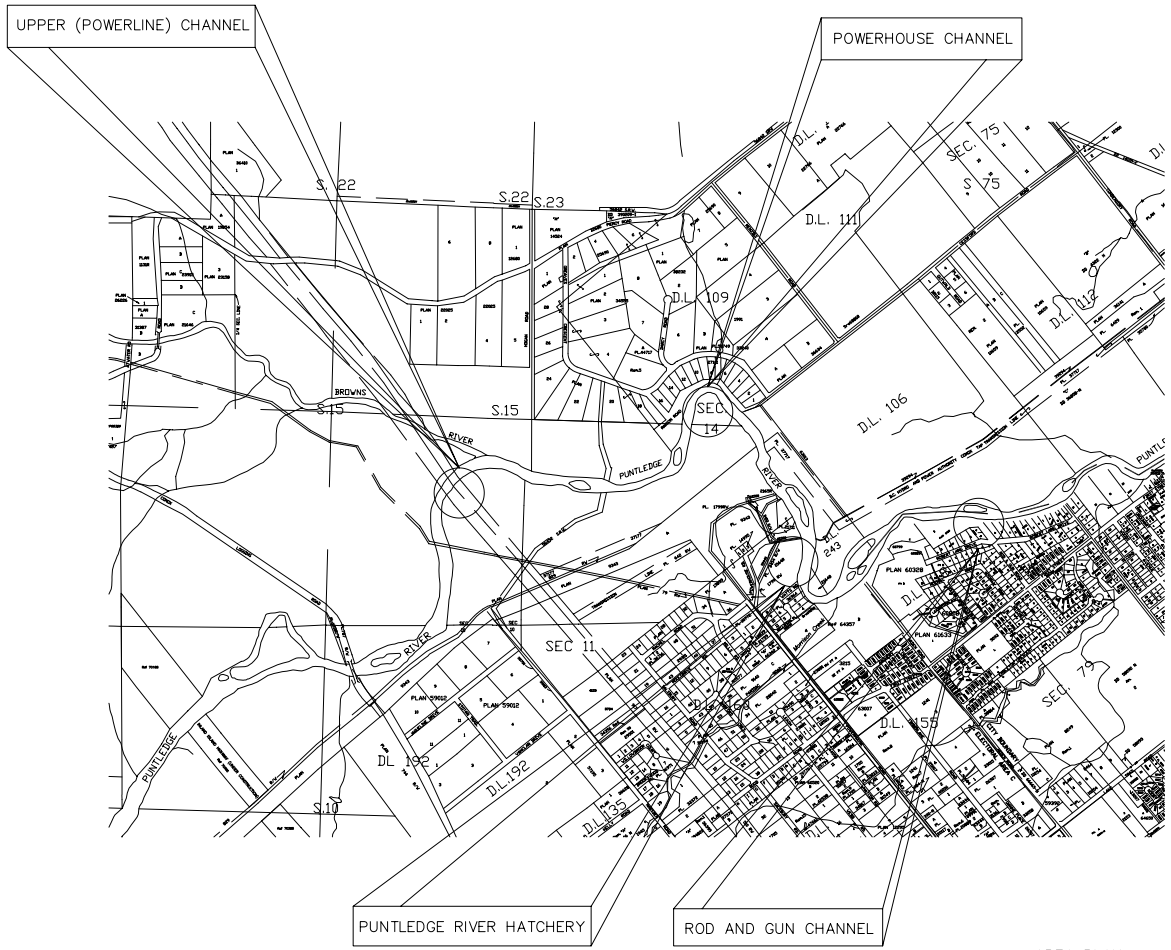
The impact on salmon species has been pronounced and positive. Whether conditions are also starting to favor steelhead and cutthroat is still unknown, and all we can do is continue to plan and work and hope. We also need to get an estuary complexing study, still in the planning stages, under way.

We are not there yet. Much work and good fortune are still needed, but the Puntledge is on its way to once again becoming a world-class river.

Meanwhile, funding applications for monitoring Bull Island and further restoration on other parts of the Puntledge have been submitted to BC Hydro's Bridge Coastal Program.

The largest project being considered is restoration of spawning habitat for summer-run chinook downstream of the Comox Lake dam.





DEPARTMENT OF FISHERIES AND OCEANS
OCEANS + COMMUNITY STEWARDSHIP - SOUTH COAST

Appendix C

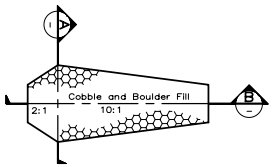
DWG. NO.	REFERENCE DRAWINGS	NOTES	NO.	DATE	REVISIONS

DESIGNED
DRAWN RN
CHECKED
RECOMMENDED
APPROVED
APPROVED

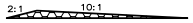
PUNTLEDGE RIVER
UPPER (POWERLINE) CHANNEL
KEY MAP AND AREA PLAN

SCALE: AS SHOWN
DATE: 25 SEP 02
DRAWING NUMBER: 31-62-A1
REVISION

NEWBURY WEIR
NTS

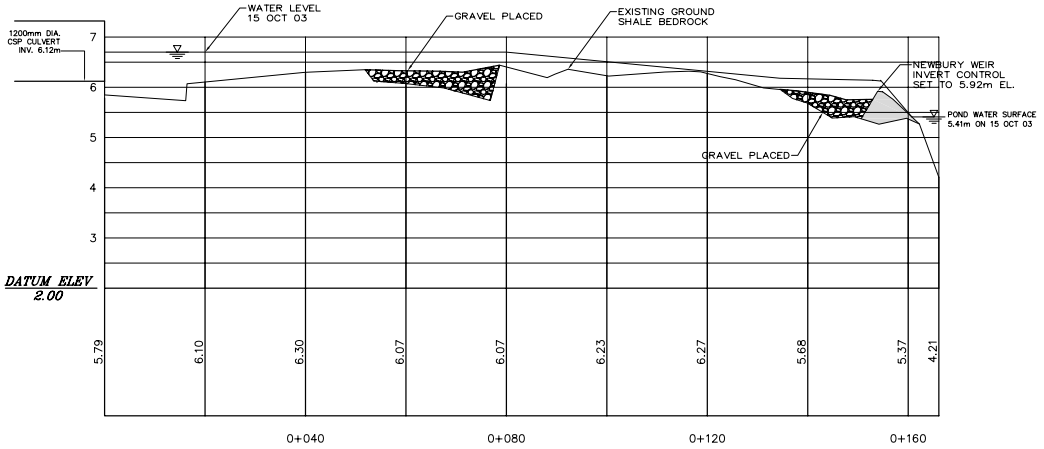


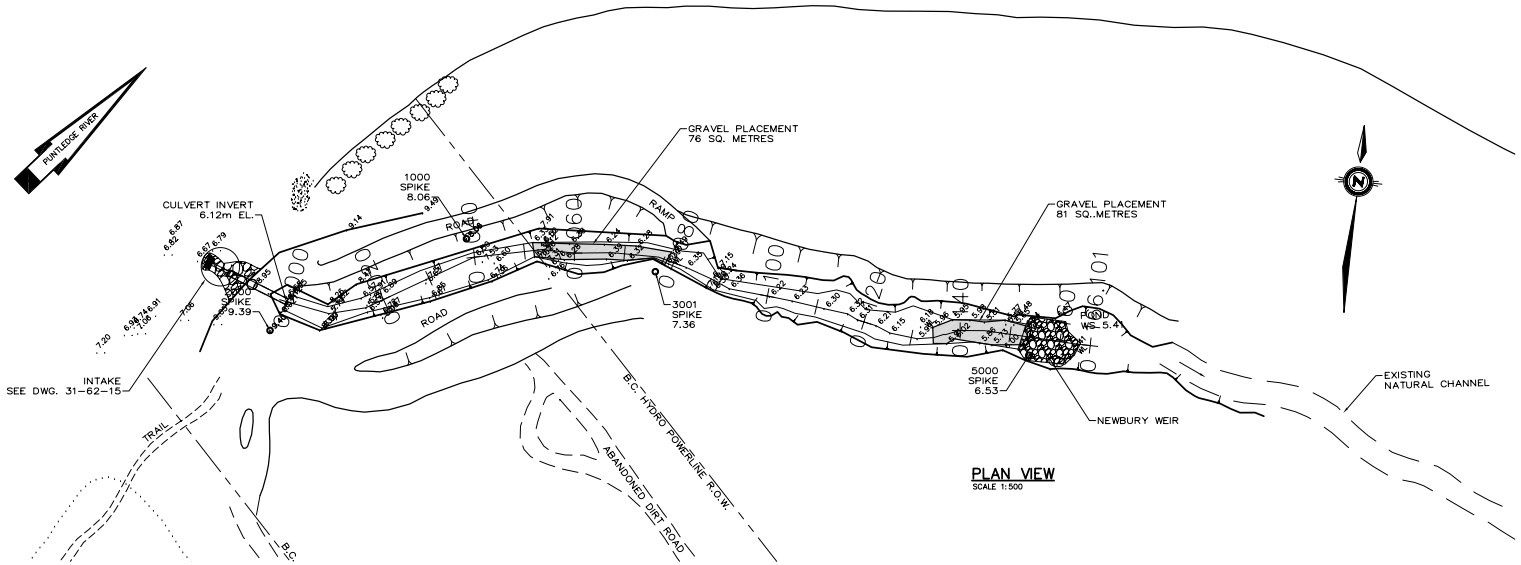
Section A



Section B

CENTRELINE PROFILE
SCALE HORIZ 1:500 VERT 1:50





PLAN VIEW
SCALE 1:500

DEPARTMENT OF FISHERIES AND OCEANS
OCEANS AND COMMUNITY STEWARDSHIP - SOUTH COAST

Appendix C

NOTES:
1. ALL DISTANCES STATIONING AND ELEVATIONS ARE IN METRES
2. ALL ELEVATIONS ARE ASSUMED AND BASED ON CULVERT INVERT 8.06 METRES
3. ALL COORDINATES ARE ASSUMED ORIGIN
4. BEARINGS ARE ASTRONOMIC AND ARE DERIVED FROM COMPASS
5. SURVEYED 27 OCT 98 BY RN DFO-RRU SOUTH COAST DIVISION
6. SURVEYED 08 SEP 03 BY RN/DP DFO-RRU SOUTH COAST DIVISION
7. SURVEYED 15 OCT 03 BY RN/DP DFO-RRU SOUTH COAST DIVISION

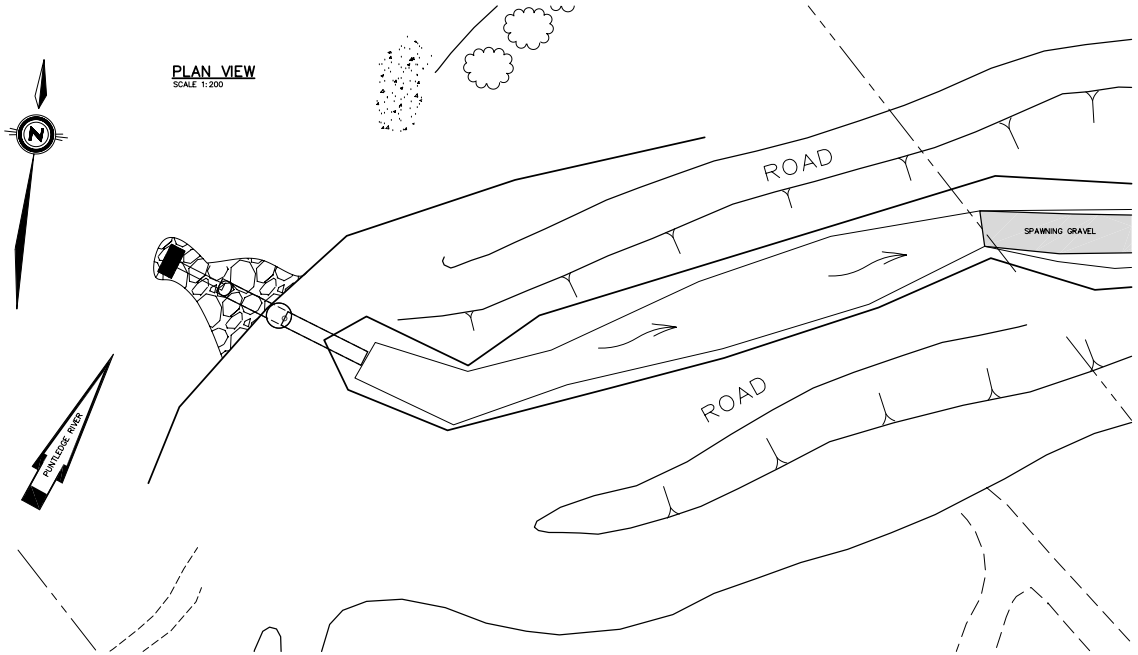
NO.	DATE	REVISIONS
1	20 OCT 03	REVISED TO REFLECT ASBUILT - INSTALLATION OF RIVER INTAKE - EXCAVATION OF CHANNEL - PLACEMENT OF SPAWNING GRAVEL - CONSTRUCTION OF NEWBURY WEIR

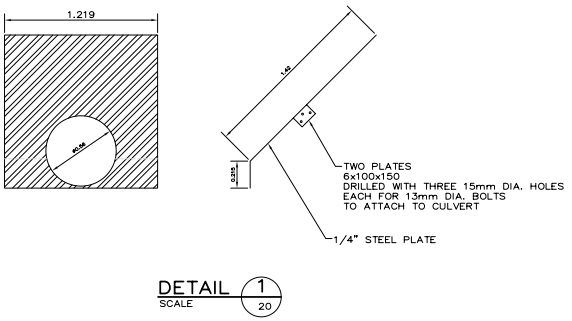
DESIGNED: RN/RD
DRAWN: RLN
CHECKED:
RECOMMENDED:
APPROVED:
APPROVED:

PUNTLEDGE RIVER
UPPER (POWERLINE) CHANNEL
REMEDIAL WORKS
SITE PLAN AND PROFILE

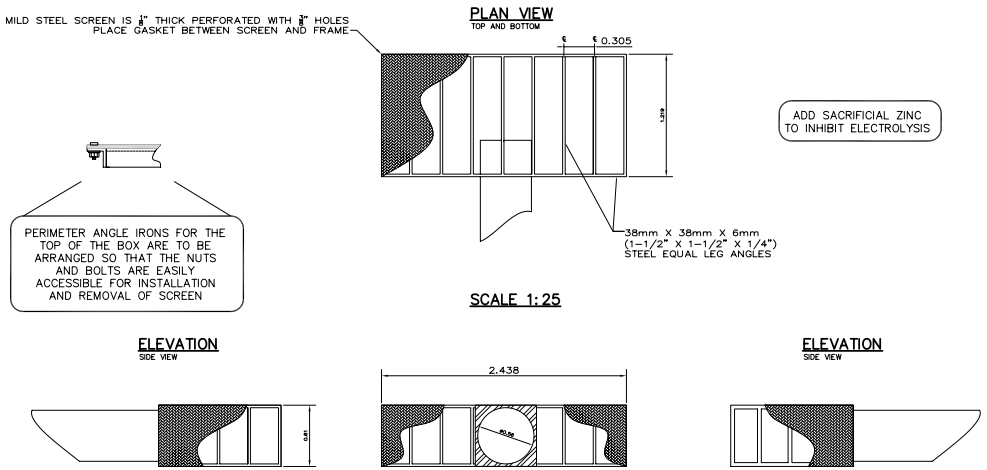
SCALE: AS SHOWN
DATE: 24 SEP 02
DRAWING NUMBER: 31-62-14
REVISION: 1

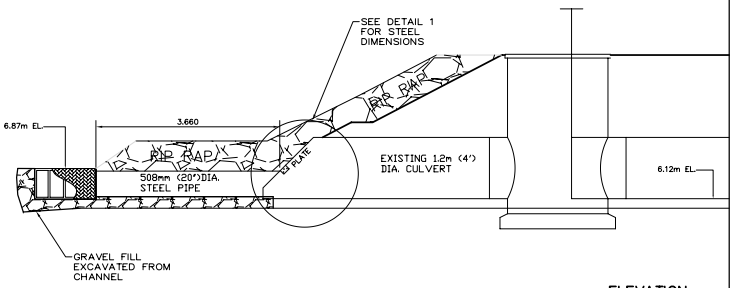
DWG. NO. | REFERENCE DRAWINGS | NOTES





DETAIL 1/20
SCALE





ELEVATION
SCALE 1:50

DEPARTMENT OF FISHERIES AND OCEANS
OCEANS AND COMMUNITY STEWARDSHIP - SOUTH COAST

Appendix C

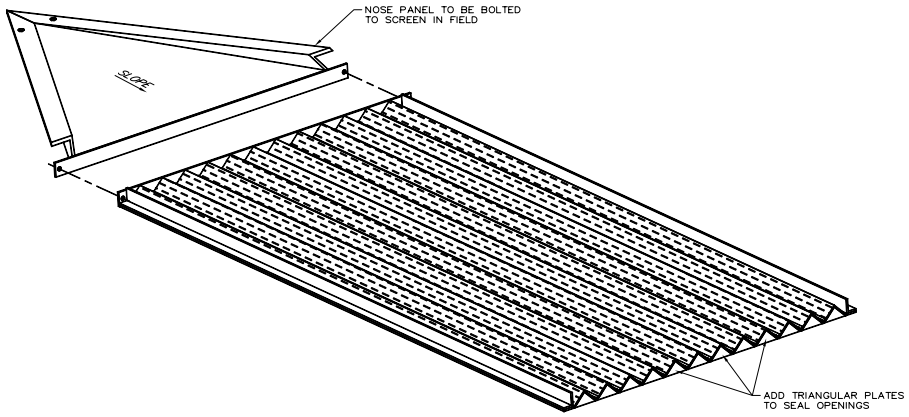
NO.	DATE	REVISIONS
1	20 OCT 03	REVISED TO REFLECT ASBUILT

DESIGNED RN/RD
DRAWN RLN
CHECKED
RECOMMENDED
APPROVED
APPROVED

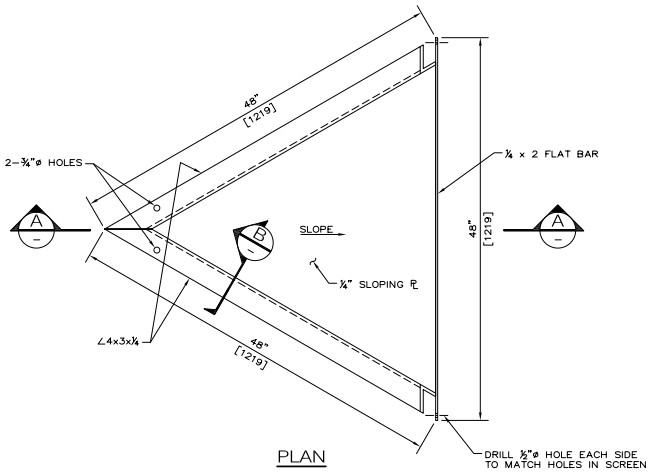
PUNTLEDGE RIVER
UPPER (POWERLINE) CHANNEL
INTAKE IMPROVEMENT
DETAILS

SCALE 200
DATE 20 SEP 02
DRAWING NUMBER 31-62-15
REVISION 1

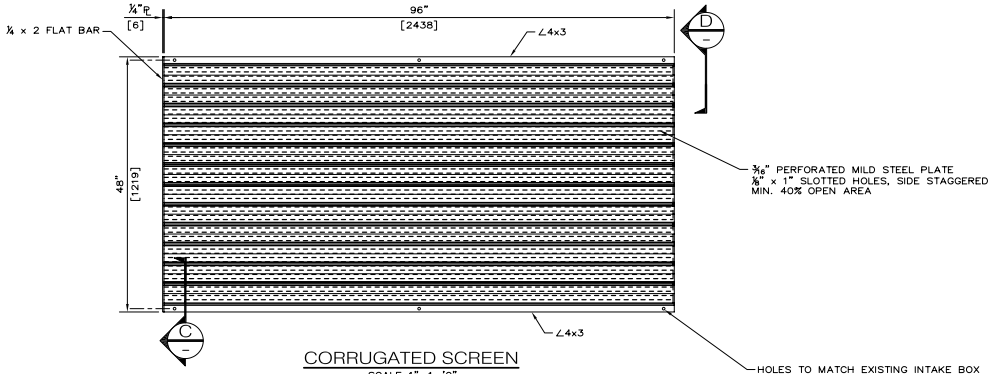
DWG. NO. | REFERENCE DRAWINGS | NOTES



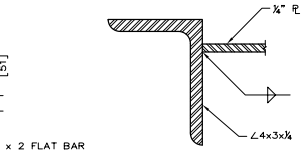
SCREEN ASSEMBLY
NOT TO SCALE



PLAN
NOSE PANEL
SCALE 1½"=1'–0"

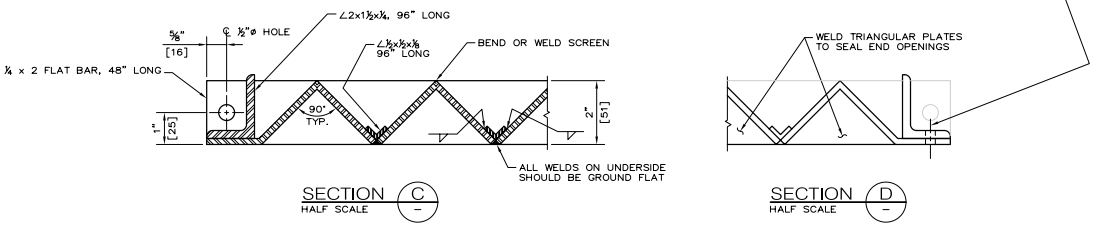


CORRUGATED SCREEN
SCALE 1"=1'–0"



SECTION A
1½"=1'–0"

SECTION B
HALF SCALE



SECTION C
HALF SCALE

SECTION D
HALF SCALE

FISHERIES AND OCEANS CANADA
OCEANS AND COMMUNITY STEWARDSHIP - SOUTH COAST

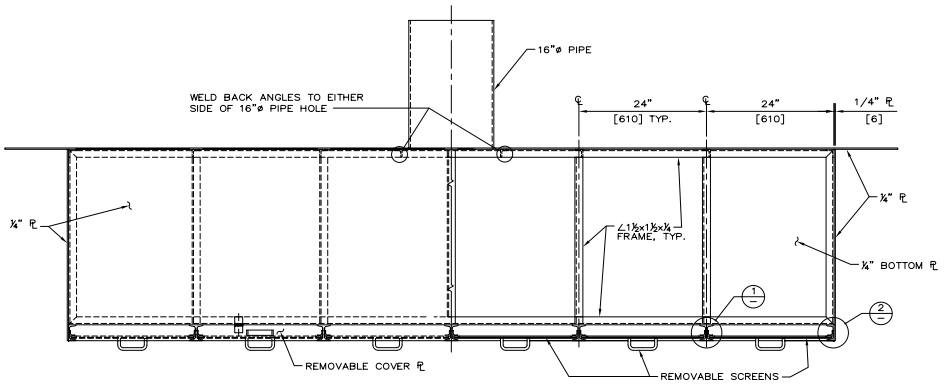
Appendix C

DWG. NO.	REFERENCE DRAWINGS	NOTES	NO.	DATE	REVISIONS

DESIGNED: RLN/RD/MS
DRAWN: DT
CHECKED:
RECOMMENDED:
APPROVED:
APPROVED:

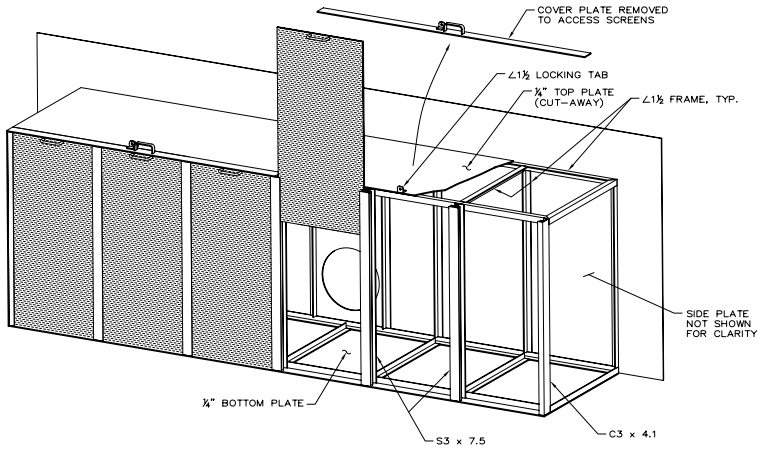
PUNTLEDGE RIVER
UPPER (POWERLINE) CHANNEL
INTAKE SCREEN
STEEL FABRICATION

SCALE: AS SHOWN
DATE: MARCH 2004
DRAWING NUMBER: 31-62-16
REVISION:

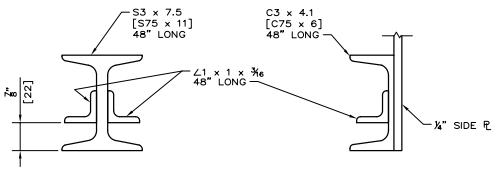


PLAN
SCALE 1"=1'-0"

TOP PLATE AND REMOVABLE COVER PLATE NOT SHOWN ON THIS HALF FOR CLARITY

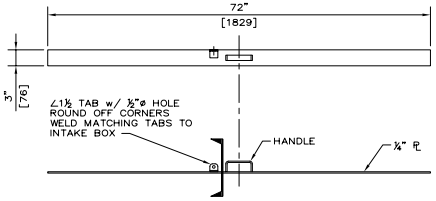


PARALLEL PROJECTION
NOT TO SCALE



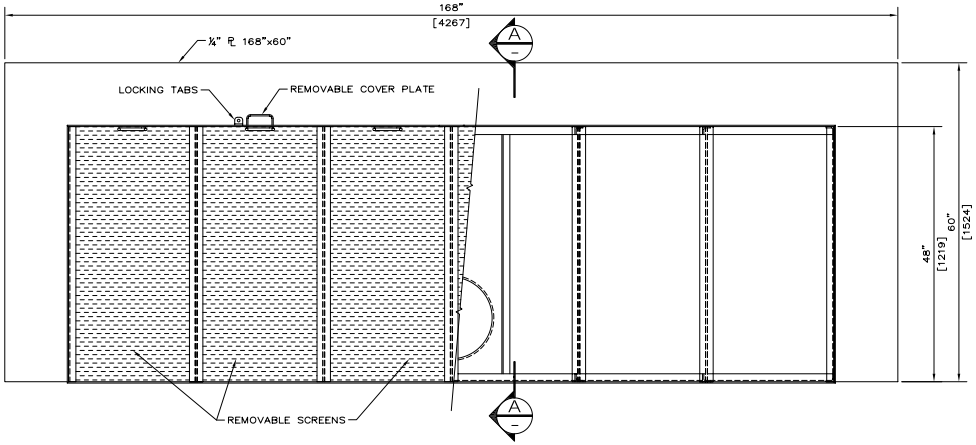
DETAIL 1 HALF SCALE

DETAIL 2 HALF SCALE

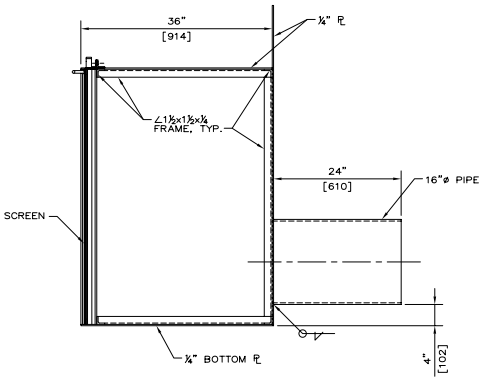


REMOVABLE COVER PLATE 2 - REQ'D
SCALE 1"=1'-0"

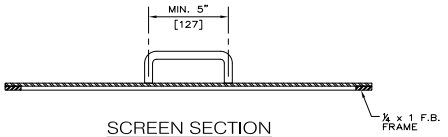
SECTION
N.T.S.



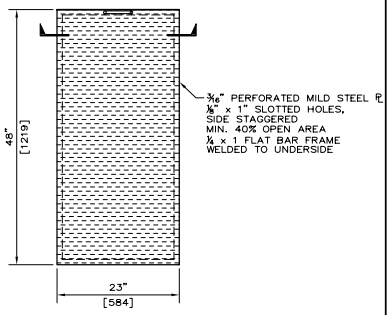
FRONT ELEVATION
SCALE 1"=1'-0"



SECTION A
SCALE 1"=1'-0"



SCREEN SECTION
SCALE 3"=1'-0"



SCREEN PANEL 6 - REQ'D
SCALE 1"=1'-0"

FISHERIES AND OCEANS CANADA
OCEANS AND COMMUNITY STEWARDSHIP - SOUTH COAST

Appendix C

DWG. NO.	REFERENCE DRAWINGS	NOTES	NO.	DATE	REVISIONS

DESIGNED: RLN/RD/MS
DRAWN: DT
CHECKED:
RECOMMENDED:
APPROVED:
APPROVED:

PUNTLEDGE RIVER
UPPER (POWERLINE) CHANNEL
BANK INTAKE
FABRICATION

SCALE: AS SHOWN
DATE: MARCH 2004
DRAWING NUMBER: 31-62-17
REVISION: