02SH35

IRELAND CREEK SIDECHANNEL

FINAL REPORT

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Date:	April 12, 2003

Acknowledgements

This project was made possible through the cooperation and joint efforts of:

Pete and Lillian Huwer, Landowners
Joe and Shauna Huwer, Landowners
Fisheries and Oceans Canada, Kamloops
Ministry of Water, Land and Air Protection
Thompson Basin Fisheries Commission
BC Hydro

Funding for this project was provided by:
BC Hydro Fish and Wildlife
Bridge Coastal Restoration Program

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Executive Summary

This project, 02SH35, is the second phase of the Ireland Side Channel Project. The first phase included the construction on the channel and the fencing of the riparian area with a two-fence system. The goal of the second phase included:

- Complexing the channel with rocks, trees and other wood material
- Planting the riparian area with native trees and shrubs
- Ensuring an adequate flow into the side channel by building a riffle to back up water in Ireland Creek and
- Establishing photo points for monitoring the success of the plantings and changes to the channel

These goals were met plus some additional work was done:

- The fence was altered to increase the planting area
- A riffle was constructed on the lower end of the side channel to raise the water level in the channel
- An off-channel waterer was installed
- The sediment pond was cleaned and prepared for easier future maintenance
- The riparian fence was strengthened at high pressure points and metal gates added for better management.

The work was done within the budget.

The planting appears to have a high survival rate and salmon fry could be seen within the channel.

Both the landowners involved in the project are pleased with the results and have been helping to promote other projects in the valley.

1.0 Introduction

Coho salmon have been in decline in the Middle Shuswap. One of the factors contributing to this decline has been loss of rearing habitat. Whitevalley Community Resource Centre Society (WCRC) in partnership with Fisheries and Oceans Canada (DFO) has been working to restore off-channel habitat in the Middle Shuswap and Bessette Creek. The Ireland Creek side channel is intended to supply rearing habitat for Coho, particularly Coho spawned in Ireland Creek.

Phase I of the project was completed in 2001. In this first phase, WCRC obtained the conservation water license for diverting the water from Ireland Creek for the side channel, excavated the channel, built the riparian fence and did some riparian planting. However, there wasn't enough funding to add much woody debris to the channel or complete the riparian planting. WCRC submitted a proposal to B.C. Hydro's Bridge Coastal Restoration Program for funds to complete the project.

2.0 Location and Site Description

The intake for Ireland Creek Side Channel is located at the confluence of Ireland Creek and the Shuswap River approximately 5 km south (upstream) of Mabel Lake (BCGS Map 82L037). The intake of the channel is on Ireland Creek 200 m upstream of the confluence. The side channel meanders through the farms of Pete and Joe Huwer for 1200 m before entering into the Shuswap River.

The constructed channel actually lies in the old Ireland Creek bed. In the 1960's the previous landowner shortened Ireland Creek by cutting a straight channel to the Shuswap River. The old channel was plugged off and has gradually been filling with sediment during flood periods. The old channel on Pete Huwer' s property was dry from mid-July to June at the start of this project while the lower section on Joe Huwer's property collected enough ground water to have a slight flow year round.

Pete Huwer operates a hog farm, 2804 Mabel Lake Road. The upper third of the channel runs between the road running from the house and hog barns and pasture. There were some alder growing along the old creek bed before construction (Figure 1).

Joe Huwer, 2856 Mabel Lake Road, raises cattle. The cows had complete access to the old channel so that there was no riparian vegetation. The banks were heavily trampled before construction (Figure 2).

This is bottomland within the flood plain for the Shuswap River and Mabel Lake. In 1972 and 1997, both farms were flooded.

During Phase I of the project, a controlled intake from Ireland Creek was installed to insure a year-round flow, the channel was defined and deepened where it was severely trampled and a riparian fence was built. Some complexing was done and Pacific willows were planted. The complexing consisted largely of burying wood along the banks that would later serve to anchor additional wood.

Figure 1: The upper channel before construction. The old streambed was dry most the year but retained some riparian vegetation.

Figure 2: The lower creek bed was accessible by livestock that denuded and trampled the banks.

3.0 Site Objectives

The objectives of this project were to:

- Increase the habitat values for juvenile salmonids within the channel by placing additional woody debris and rock
- Plant the riparian area with a variety of native trees and shrubs
- Build a riffle in Ireland Creek to raise the water level in the creek to provide adequate water flow during low flow periods
- Water the plants during the summer following planting to improve the survival rate
- Monitor the success of the project by establishing photo points and documenting site changes over a four year period.

4.0 Restoration Work Description

Work began in May after snowmelt but before high flows in either Ireland Creek or the Shuswap River. Dr. Chris Marchant, PhD toured the site and made recommendations of what species to be planted and when best to plant. The landowners were consulted to find out what was working and what wasn't.

A conservation water license was applied for and notification of work given to DFO and MWLAP.

4.1 PLANTING

Planting began in spring as soon as funding was confirmed and again in the fall along both sides of the channel. In May, bare-root stock totaling of 86 trees and 37 shrubs were planted. The trees varied from 2 to 6 feet. A mixture of spruce, cedar, fir, paper birch and water birch were planted. The shrubs included hawthorn, rose, chokecherry and Saskatoon.

The plants were purchased from a local nursery. The stock is propagated from local shrubs and trees and grown without irrigation. Past experience has shown these plants undergo less of a shock when transplanted than the plants purchased from nurseries that keep their plants heavily watered and fertilized. The cost of plants in the spring was $1930, the trees averaging $20 and the shrubs $5.70 each.

When planting, peat soil mixed with bone meal was mixed with the soil used to fill the holes around the root balls to encourage root growth. The holes were dug slightly deeper and wider that the root ball so that when backfilled the tree would be in a slight depression. This was done to allow the trees to be watered by hand. All plants were protected with vole guards. Birch, hawthorn and chokecherry were also protected from browsing with stucco wire held in place with wooden stakes or rebar (Figure 3). The cage also helps supports the plants from being smothered by the reed canary grass during the fall and wither. All the trees on the lower half to the channel were staked to prevent uprooting by floodwaters.

Figure 3: Stucco wire supported by 1.2 m lengths of 10mm rebar is used to support the trees and shrubs that are vulnerable to browsing by deer. The wire cages also helps to protect the plant from being smothered by the reed canary grass in the fall and winter when it becomes matted by snow. The wire cage is marked with flagging so the plants can be easily located in the tall grass for watering during the summer months.

A four-person crew did the planting. Planting included the lifting of plant material from the nursery in Lumby, the transportation of the plants and the actual planting. The spring planting took place in May for a period of 10 days for a total of $4,160. Approximately 2/3 of the channel was planted. Planting stopped when budding became pronounced. The remainder of the planting was done in late fall.

Noxious weeds were cut during the last week in July when the thistle began to flower.

High water in the Shuswap River consisted of three peaks that stretched from early June into the second week of July. The lower third of the channel was underwater for a longer period of time this spring due to the three peaks. This flooding is from water backing up from the Shuswap. Ireland Creek peaks in May and the intake gate controls the amount of water entering the side channel.

According to the landowner, the lower section of the channel is normally only flooded for one week. This year the flooding wasn't exceptionally high but lasted four weeks. The trees that were planted in the lowest 300 m of channel that were not tall enough to have at least the top half above the flood waters died. The inundated sections of the plants were completely coated by silt. In all, about 20 small spruce and 15 red osiers and water birch were lost. Fall planting in this area was limited to willows, the only tree or shrub that seems to be able to survive the flooding and silt (the landowners requested that we not plant cottonwood).

The plants were watered weekly during August and September by a two-person team using 20L pails.

Additional planting was done in October. 60 med to large (1-2 m) spruce and fir were planted. There were also 220 3-year old potted trees and shrubs and 20 bare-root red osiers. A list of the potted plants is given in Table 1.

Table 1: potted plants placed in the fall.

Douglas maple	*Acer glabrum*	1 gal	10	$ 4.00	$ 40.00
Mountain alder	*Alnus incana ssp. Tenuifolla*	1 gal	10	$ 4.00	$ 40.00
Water birch	*Betula occidentalis*	2 gal	25	$ 4.00	$ 100.00
Paper birch	*Betula papyrifer*	2 gal	25	$ 4.00	$ 100.00
Red osier dogwood	*Cornus sericea*	1 gal	50	$ 4.00	$ 200.00
Trembling aspen	*Populus tremuloides*	1&2 gal	50	$ 3.00	$ 150.00
Choke cherry	*Prunus virginiana*	2 gal	20	$ 4.00	$ 80.00
Prickly rose	*Rosa acicularis*	1 gal	15	$ 3.00	$ 45.00
Nootka rose	*Rosa nutcana*	1 gal	15	$ 3.00	$ 45.00
TOTAL			220		$800.00

Fall planting was done in the same manner as the spring planting using bone meal and peat soil. All species were vole guarded and some species caged.

4.2 COMPLEXING

The channel was complexed with both wood and rock. Seventy-six fir and larch trees were placed in the channel. The trees averaged 25 cm at the base and 10 m long. The trees had been topped at approximately 10 cm to fit on the truck but the roots were kept on. The trees were traded with a landowner for some consultation (in-kind) regarding some bank erosion on a creek on his property. The only cost was for the excavator to collect and pile the trees ($535).

The trees were delivered on site by a hook truck ($428). The hook truck spread the logs at five pre-marked sites just outside the riparian fence.

These trees were anchored with large blast rock (~ 1 m). Half of a dump truck load was dumped next to each of the log piles. The rock was drilled and chain was epoxied to rock. The other end of the chain was stapled to the log with 12 cm log staples. Short pieces of chain were used so that the chain is hidden when the logs are in place.

The wood and rock was placed with a Hitachi 120 excavator. This machine was large enough to handle 2 m rock while still fitting into narrow riparian areas. A tractor with front-end forks was used to pass the trees over the riparian fence to the excavator. The trees were placed in the channel so that they have a random appearance. Short pieces of chain were used to anchor the logs so that about half of the trees are submerged (Figure 4).

Figure 4: Chain was epoxied to holes drilled into large rocks and stapled to one or both ends of a tree. Short lengths of chain were used on approximately half the wood to provide in-stream cover. These logs are submerged even during low water. Effort was made to keep the chain hidden for aesthetic value.

Because the anchor rocks were attached to the trees outside the riparian exclosure in a field that is sometimes cultivated, these areas where cleaned up by hand. A tractor with a front-end bucket was used to carry the smaller rock to the lower end of the channel where a riffle was built.

The landowners also contributed 3 dump truck loads of woody material from their property. This material consisted of cedar and fir logs and a large Manitoba maple that had blown over. It ranged from 60 cm in diameter to small limbs. The brushier material was used to create “brush clusters” while the cedar and fir logs were placed individually and anchored with rock.

The brush clusters were built by placing the smaller limbs in a pile in the channel. This was anchored by placing a 4 m limb (30-60 cm diameter) with a rock chained to both ends over top of the smaller limbs (Figure 5).

Figure 5: Brush was piled in pool areas and held in place by logs placed on top of the pile. The logs were anchored weighted with rock.

Some of the upper sections of the site were complexed by hand. Using an excavator would have damaged the existing riparian vegetation. In some areas there simply wasn't room for a machine to work. The hand complexing was done by using cedar slabs that were light enough to carry.

A local portable saw mill provided slabs (the outside cuts of the log that are normally discarded). Usually, after the first cut is made, the log is flipped and the opposite side of the log cut. The mill owner was asked to make the second cut adjoining the first cut. This would give a single rounded slab that when placed in the water would look like a

whole log (Figure 6). The slabs would be light enough to carry and offer more in-stream cover than a whole log because of the cavity underneath.

Figure 6: Cedar slabs used for complexing. The two-sided slabs are light enough to install by hand and resemble whole logs when placed in the water. The cavity provides more in-stream cover than whole logs.

Figure 7: The slabs can be chained underneath so the chain is not visible.

Figure 8: The slabs were chained together and anchored to the bank in various configurations to give them a random appearance. This method allowed the placement of woody debris in areas where there were not machine accessible. There is very little disturbance of either the riparian area or the stream using this method.

The mill operator donated the slabs. Cutting the two-sided slabs required extra work on his part but the owner is active in restoration work and wanted to see the results of the idea. He estimated a cost of $5 per slab.

The slabs were carried to the streamside by hand and chained together underneath so the chain would not show. It took about an hour for a two-man team to build and place a slab grouping.

Rock clusters were used in some of the small pools. This provides in-stream cover and increased the aesthetic value of side channel (Figure 9).

Figure 9: Large rocks placed in the side channel improve both the habitat and aesthetic values of the stream.

4.3 OTHER WORK

4.3.1 INTAKE

A low profile bend-away weir was built in Ireland Creek approximately 10 m upstream of the intake structure. The bendaway kicks the thalweg over to the right bank so that it sweeps the area in front of the intake. This small structure was enough to clear the sediment from in front of the intake. Previously a sandbar had been obstructing the water during the low summer flows (Figures 10-12). With the water sweeping the intake, the low flow into the channel was approximately 2 m^3/s.

A riffle downstream of the settling pond had been in the original design. However, the upstream neighbor is extremely sensitive to flooding and objected to any raising of the creek level.

Figure 10: A low profile bend-away upstream of the intake kicks the thalweg to the right bank. The rocks located downstream were in place prior to construction.

Figure 11: Sediment was partially obstructing flow into the intake. The intake was installed outside the work window so was set back into the bank, separated from the by a thin berm. This berm was not completely washed away during freshet. Sediment subsequently collected around what remained of the bank. June 01

Figure 12: The bend-away has been built moving the thalweg toward the right bank of the creek. This has washed the collected sediment away from the intake. Sept 02

4.3.2 SEDIMENT POND

The sediment pond was cleaned. Ireland Creek has large amounts of suspended sediments during freshet and after hard rains due to land clearing higher in the watershed. Approximately 1.5 m of sediment had collected in the sediment pond since it's construction in 2000. This was removed by the excavator and trucked to a low spot in an adjoining field (Figures 13-14).

The intake was closed and water pumped from Ireland Creek to the side channel downstream of the pond. A cloth fence was placed downstream of the pond and upstream of the fresh water being pumped in. Fry were moved using minnow traps and nets before dredging started. A platform of rock was placed at the edge of the sediment pond so that the excavator could sit on the level at the pond's edge to remove the sediment and place it in a dump truck. A gate was put in the fence for easy access. The landowner owns a small excavator and is willing to clean the pond in the future at his own expense now that there is easy access and a position to work from.

Figure 13: Sediment has filled the collection pond at the intake structure. June 01

Figure 14: The collection pond after the sediment was removed. September 02

4.3.3 PHOTO POINTS

Eleven photo points were established (see Appendix B). The points are spots marked on permanent features such as a bridge or road crossing or are marked by an orchard post driven into the ground. The camera is set on the marker so that photos taken over intervals are easily comparable.

4.3.4 OFF-CHANNEL WATERER

An off-channel cattle waterer was installed (Figure 15). This waterer uses ground temperature to keep the water from freezing in the winter. Two of these waterers were purchased in the initial phase of the project but only one installed. Livestock still had access to a site in the lower third of the channel. Installing the waterer eliminated livestock access to the channel. Installation involved burying a water line from a nearby barn under the side channel and burying the waterer itself. The landowner supplied the backhoe and labor.

Figure 15: The waterer was installed outside the fenced riparian area. The tank is largely underground and the above ground part of the structure is insulated. The water stays ice-

free to –15^{o} C. It is no longer necessary to allow cattle access to the side channel, reducing the amount of sediment within the channel.

4.3.5 RIFFLE

A riffle was built approximately 100 m upstream of the confluence of the side channel and the Shuswap River. This raised the water level approximately 20 cm behind the riffle effecting about 200 m of channel (Figure 16). The water level in the Shuswap River and the water table were lower this year than it has been in several years reducing the habitat area in the lower end of the side channel. The riffle would be submerged during higher river flows.

Figure 16: A riffle was built on the lower end of the channel to raise the water level by 30 cm. The creek and water table levels were the lowest the landowner (since 1970) had seen them. Placing the weir at the intake to increase the flow to the side channel and building the riffle on the lower end increased habitat values.

4.3.6 FENCING

The riparian fencing was modified. One of the concerns of the landowners was poor access to the riparian exclusion. On the upper third of the channel, Peter Huwer's property, there were no gates. Gates not only make access to the riparian area for maintenance easier, but also make the extraction of an animal much simpler. There was also a short stretch of fence by the intake where there was a lot of pressure when he moved his sows.

Gates were added to the riparian exclosure and the weak spot in the main fence at the crossing between the intake and the sediment pond was reinforced with rails (Figure 17).

Figure 17: Rails were place at the uppermost crossing where hogs are frequently moved. The bottleneck pressure was too much strain on just the page wire fence.

On Joe Huwer's property, there are two fences along the side-channel. There is a wire (either 7-strand high tensile or page wire) fence set back 10 to 15 m from the creek and an electric fence that is set back 2-3 m from the top of bank. The landowner uses the area in between the two fences for light grazing. Initially the landowners were reluctant to

give up much pasture and placed the electric fence as close to the top of bank as possible. However, after seeing the results of the spring planting, they allowed the electric fence to be moved back another 2 m from the creek to allow room for the larger trees. This involved loosening the two strands of wire, pulling and re-setting the posts.

5.0 COSTS

The project came in on budget. There were some differences from the proposed to the actual (Tables 1 & 2).

Table 2: Project Personnel Costs

Position	Hours	Rate per Hour	Total Cost	Proposed Cost	In kind	BCRP Cost
Project Supervisor	144	$40.00	$5760.00	$2400.00	$1340.00	$4420.00
Planting Advisor	1	$50.00	$400.00	$400.00	$0	$125.00
Planting Crew	348.5	$14.05*	$11,115.72	$4,800.00	$0	$11,115.76
Complexing Crew	174.5	$17.26*	$1311.94	$600.00	$0	$1,322.94
Administration			$4709.00	$4,309.00	$400	$4309.00
TOTAL			**$23,296.66**	**$12,509.00**	**$1740.00**	**$21,292.70**

* Including holiday pay and employer contributions.

Table 3: Equipment* and Expenses

Item	Amount	Rate per Hour	Total Cost	Proposed Cost	In kind	BCRP Cost
Excavator	70 hrs	$85	$5950	$5500	$1413	$4538
Backhoe	9 hrs	$45	$405	$1300	$0	$405
Tractor	10 hrs	$40	$400	$1750	$0	$400
Rock	7 lds	$257/ld	$1800	$1500	$0	$1800
Rootwads, Logs **			$1328	$4800	$200	$1128
Chain, epoxy			$750	$1000	$0	$750
Bare Root Stock			$5478	$6700	$0	$5478
Potted Stock			$800	$4800	$0	$800
Grass Seed			$0	$200	$0	$0

Fertilizer			$200	$200	$200	$0
Vole guards, Stucco wire, posts			$1005	$700	$500	$505
Rock Drill, Pump Rental		$	$546	$400	$0	$546
Pickups & Chainsaws		$	$300	$600	$0	$300
Total			**$18962.00**	**$29450.00**	**$2313.00**	**$16650.00**

*GST not included
** This included developing and hauling

The cost of labor and supervision were double the proposed costs. This was more than compensated by the lower machine time and the lower cost of plants.

The machine costs were lower because the larger trees were planted without the use of a backhoe. The ground proved to be too rough or too wet for a machine to get to all the planting sites. Because the trees were all planted by hand, machine dug trees were of no advantage because the dirt containing the root ball was too heavy to carry or manipulate. The price of the trees and shrubs were lower because they were lifted by WCRC's crew.

This worked out well as the overall price was less and WCRC was able to employ the planting crew for a longer period. Also, the crew would lift in the morning and would lift only the number of trees they would be able to plant that afternoon. Other crew members would have the holes dug so the lifting crew could plant the trees within a couple of hours of lifting and minimize the shock.

The two-year-old potted material was purchased at about half the normal cost.
The woody material added to the channel was cheaper than expected due to some trading, in-kind work and contributions by the landowners.

The use of slabs was for in stream cover was inexpensive and had no adverse impact on the existing riparian.

Approximately $3,000.00 was spent on improving the existing fencing. This work included moving the inner fence away from the creek to create more planting area, placing rails at a high pressure area and installing gates to allow easier maintenance and management of the riparian area.

6.0 RESULTS

All the objectives of this project were met:

- Woody debris and rock were added to increase fish habitat values. The trees and rock were place randomly to give a natural appearance. Initially, one of the landowners was reluctant to have woody material strewn along the channel because he thought it would detract from the appearance. However, because there is no visible chain and the randomness of the placement, both the landowners were pleased with the result. They were also pleased with number of juvenile salmonids visible in the channel after the wood was placed.

  The use of two-sided cedar slabs for complexing areas that were not machine accessible turned out to be cost effective. It took an hour for a two-person team to place the slabs shown in Figure 8. The material was donated but could probably be purchased for about $5 per slab. Brushier material such as saplings could also be attached to the slabs for denser cover.

- The riparian area was planted with native trees and shrubs. The first 2 to 4 m from the water were planted heavily with conifer and deciduous trees and shrubs. The total 10 m riparian setback area requested by DFO was too large an area to be planted or maintained. By having an electric fence offset several meters from the water within the total riparian setback, a manageable areA was planted and is being maintained while the rest of the riparian area is grazed. This arrangement will provide a vegetated buffer strip along the channel that provides shade for the channel while being managed for weeds. As the trees and shrubs grow, the inner

fence will be extended towards the outer fence. This arrangement requires closer management on the part of the landowner but offsets the landowners concerns about sudden loss of productivity, weed propagation, increased fire hazard and reduced property values. The landowners were especially pleased with the use of larger conifers.

While it generally takes two years before an accurate assessment of the planting can be make, the first year survival rate was good for most species. 90% of the large spruce and cedar (1-2 m) have survived. 95% of the smaller spruce (.5m) that were above the flooded area survived. Only about 15% of the 30 small spruce that were planted in the flooded area survive. This area was replanted to willows. There are also some cottonwood volunteers appearing.

The deciduous trees and shrubs are above 60% except for the large birch (2 m). Of the 12 planted, only two have survived the first year. The smaller (0.3 – 0.5 m) paper and water birch are about 70% after the first year.

- A bendaway weir was built upstream of the intake to direct the thalweg towards the intake. The bendaway has caused the thalweg to move towards the intake side of the stream, removing the sand that was partially obstructing the intake. The structure is small enough that the sensitive upstream neighbor was satisfied that would not affect his property.

- The riffle raised the water level in the lower end of the side channel so that the logs used for complexing are largely submerged even in drier years. During a normal year the river level would keep the riffle submerged.

- The fence was improved by the placement of rails and gates. The two-fence system being used on this riparian area requires more intensive management than simply restricting all livestock from the area. The landowners have to monitor the grazing area and be able to move the livestock in and out. Metal gates makes this much less of a task and increases the chances of success. Re-enforcing high-

pressure areas with rails lowers the chances of livestock damage to riparian vegetation and stream banks.

- Setting up the sediment pond so that the landowner can easily clean it, greatly increases the likelihood that the channel will be maintained properly. The landowner has a small excavator and dump truck and is happy to do future maintenance on his own now that the procedure can be done in an hour.

7.0 CONCLUSION

This project appears to be successful in that all the goals were achieved within the budget. The addition of wood and rock to the channel and the planting of trees and shrubs have added to the fish and wildlife habitat values as well as to the general appearance of the channel. The landowners are pleased with the project. The success of this project has had beneficial repercussions elsewhere in the valley.

The Huwers are respected ranchers in the Mabel Lake community. Their turnabout from being at odds with DFO to successfully partnering with them on this project has convinced other landowners to participate in restoration projects. Having seen a muddy backwater turned into a treed stream that is full of salmon fry in a few years time has replaced their skepticism with enthusiasm. Joe Huwer now is in the process of fencing of a wide riparian leave strip along 800 m of the Shuswap River on his property of Lawrence Road.

Stream restoration work, especially riparian exclosures, will not work unless it has the support and participation of the landowners. While it is too early to measure the survival rate of the plantings or the increase in the fry population, this project can be said to be successful because of the enthusiasm of the landowners and the positive effect on the local community.