

Heart Creek Clear Span Bridge Construction



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By

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Infrastructure

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behalf of its program partners BC Hydro,
The Province of BC, Fisheries and Oceans
Canada, First Nations and Public
Stakeholders

Executive Summary

It is with great pride that I announce the “Completed” sign will be placed on the construction signs that informed residents and the travelling public of the Heart Creek Fish Passage Improvement Project. The Ministry and their partners have long known about a fish barrier on Heart Creek as a result of several freshets that scoured out the stream bed leaving the approximately 2.5 metre wide culvert perched and restricting fish use to the lower 265 metres of the creek. Ministry and their partners worked on the planning and design of the clear span bridge for a year and a half prior to the construction that started in May 2015. Seven months later on November 15, 2015 the project was officially completed with the opening of a new 18 metre long clear span, two lane bridge. The construction period extended through the Kokanee spawning period and all of the Kokanee navigated through the new channel, under the new bridge, and into a reach of Heart Creek that has not seen Kokanee in 35 years.

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Introduction

Since 1978 the culvert under the Highway 6 crossing of Heart Creek has been considered a fish barrier due to large freshets that scoured out the stream bed which resulted in a perched culvert which restricted the Kokanee, Rainbow Trout and Bull Trout to the lower 265 metres of Heart Creek (Figures 1 and 2).



Figure 1. Culvert under Highway 6 – August 1978



Figure 2. Culvert under Highway 6 – September 2014

The Ministry of Transportation and Infrastructure realized this was an issue and had started on plans to remove the culvert and install a bridge; trouble was the culvert under Highway 6 was in good condition

and not scheduled to be replaced any time in the near future. With the culvert not on the replacement list funding for the project would be a long time coming from the Ministry. The Ministry does have an Environmental Enhancement Fund to restore, protect and enhance environmental resources with direct benefits to the provincial highway infrastructure, projects, safety, maintenance and operations, and in 2014 we wanted to sink our teeth into a larger project. The Heart Creek project was perfect; the plan was on the shelf and just required some minor tweaking to put it in place, it met our requirements for the Environmental Enhancement Fund in benefiting fisheries resources, and it was a larger project. Only concern we had was the price tag; initial Ministry estimates of the project were \$1.2 million (This figure ranged anywhere from \$1.2 Million to \$1.9 million). The Environmental Enhancement Funds were not sufficient to fund the entire project so we started a new venture in applying for grants to help us achieve our goals. Thankfully our goals/mandate closely corresponded with those of the Fish and Wildlife Compensation Program and the Department of Fisheries and Oceans Recreational Fisheries Conservation Partnership Program. Grants applications were submitted and we were ecstatic to hear that the Fish and Wildlife Compensation Program gave us \$175,000 and DFO (RFCPP) gave us \$100,000 towards the bridge. This was enough money to put the contract out to BC Bid for major construction projects. Neel-co Builders (2014) Ltd, were the successful bidders on the contract at a cost of \$1,415,445.18.

Phase 2 of the Heart Creek project is in the initial design phase with construction hopefully in 2017 or 2018 depending on funding. Phase 2 will open up an additional 1.2 linear kilometres of stream habitat and remove all man made barriers on the creek.

Goals and Objectives

The primary goal of the project and as indicated on the construction signs was the fish passage improvement to the system. The culvert was perched approximately 2.5 metres and photos taken under the plunge pool showed upwards of 100 Kokanee staging at this one spot. The culvert under Highway 6 was in good condition so was not on the replacement list for years to come so this was strictly a fish passage project (Figure 3).



Figure 3. Construction Sign with partner's logos

In terms of the primary goal of improving fish passage it was achieved even before the project was completed as all the Kokanee found additional habitat upstream of the Highway 6 crossing (Figure 4) and these works will provide for fish passage in perpetuity.

I guess the other goal of having a team come together to complete a project for the benefit of fish was the largest accomplishment I'll walk away from this project with. In the pre-construction meeting sitting around a table going through the why we are doing this project with 20 people ranging from employees of Neel-co, the Rod and Gun Club, the Ministry, and stakeholders I could feel a certain sense of pride that this was all being done to improve fish passage, it felt quite amazing actually.

In the final walk through of the project with Hank Scown (President of the Nakusp Rod and Gun Club) and Crystal Klym (FWCP Columbia Region Manager), Hank had mentioned that a past member of his club had fought to have this project completed 30 years ago to no avail, but things were corrected and fish are now passing the former barrier, and working with some great people, made this project a true pleasure to work on.

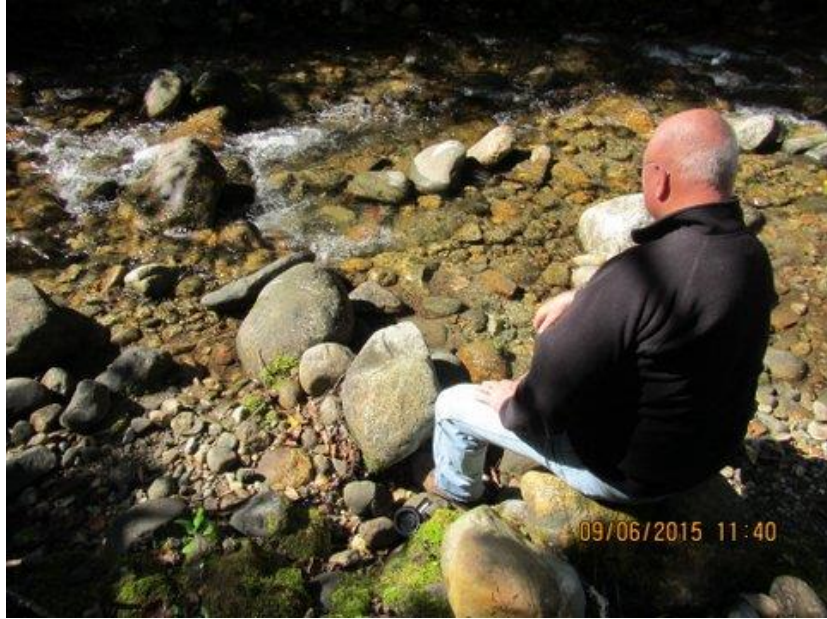


Figure 4. Hank Scown, President of the Nakusp Rod and Gun Club watching the Kokanee spawn upstream of Highway 6

Study Area

The worksite was located on Highway 6, 300 metres East of the Fauquier Ferry terminal (See Figure 5). Heart Creek drains an area of 30.5 square kilometres and is a tributary to Lower Arrow Lake. The worksite was approximately 100 metres long in order to construct the channel at the proper gradient to pass fish and approximately 100 metres wide along Highway 6 to account for the detour road alignment.



Figure 5. Google Earth Image of the study area.

Methods

Construction started in May 2015 with the creation of a detour road located immediately upstream of the Highway 6 alignment. Traffic was moved over and work commenced in earnest to meet instream work windows and be ahead of Kokanee spawning. Water in Heart Creek was pumped through the work area and released downstream of the worksite while the stream channel was re-created to remove the 3 metre drop that made it previously unpassable for fish. Once the channel was completed the steel H piles were driven into the soils at the top of the stream bank (some up to 35 metres deep) and then encased in concrete. The stringers were brought in and the bridge deck was poured in place under the careful eye of the Ministry Representative and the Contractor's Environmental Monitor. The last step was the removal of the detour road and culvert and general clean-up of the site.

As mentioned in the Executive Summary the construction period extended through the Kokanee spawning period in Heart Creek. The new channel did not pose an issue with Kokanee, in fact, all fish had migrated up through the new channel, under the new bridge, through the temporary detour culvert and spawned upstream of Highway 6 for the first time in 35 years. We expected that the Kokanee would make it through the new channel as designed, but what were not expected were the comments from the local residents around the work site. Initially residents were uncertain about the Ministry's decision to install a bridge at the site as the Kokanee are only able to make it an additional 265 metres upstream before encountering another barrier. Once the fish started making it above the Highway 6 crossing the local residents praised and congratulated the Ministry and their partners for ensuring fish passage in perpetuity.

In Appendix A there is a collection of the weekly construction updates provided by our Ministry Representative on site during construction. This will show you week by week progress on the bridge and channel construction as well as highlighting what went right, and any concerns were raised.

Results and Outcomes

Before and after results are shown in Figures 6 and 7.



Figure 6. Highway 6 Crossing of Heart Creek (September, 2014)



Figure 7. Highway 6 Crossing of Heart Creek (October, 2015)

Figure 7 still shows the detour and creek culvert in place, but they have since been removed providing for fisheries access above Highway 6. Results were pretty neat to see as Kokanee had made it up past the Highway for the first time in 35 years. The fish seemed to have very few issues making it up the new creek channel and through the culvert. So far the results and the outcomes were as expected for this project.

Discussion

The bridge and channel changes have worked as planned. During site inspections in Late September the Kokanee all made it under the bridge, but a natural log jam was encountered approximately 150 metres upstream of the construction site. During phase two of the project the ministry will investigate the log jam in the creek to ensure passage and eliminate the fish barrier under Applegrove Road which will open up another 1.2 km of stream channel and habitat. We are currently working through the initial studies to base our design around. By opening the barrier under Applegrove Road up we could run into issues with a sewer and water line owned by BC Hydro downstream of the Highway 6 crossing. We will have BC Hydro's concerns addressed in the hydrology/hydraulic study we have recently commissioned. The ministry's bridge group is currently quite busy and my estimate of a 2017 construction year has been said to be "quite ambitious" and the costs for this much higher than the Highway 6 Bridge due to the amount of fill overtop of the culvert (5-7 metres of fill). We may be utilizing an as and when contract our Bridge staff have to have a consultant design the bridge for us and have our local bridge staff review their design as opposed to doing the work in-house which would be cheaper.

Recommendations

With the Highway 6 bridge in place there is little, if any, extra work involved. Monitoring of the site will be ongoing by our District Bridge Area Manager and District Area Road Manager and if problems do arise they will be addressed by Ministry staff.

When we are looking at construction of phase 2 it is recommended that we bring down a piece of equipment and relocate some of the large woody debris in the creek to allow the fish to make it up to the Applegrove Road site and once construction is completed there it will simply be monitoring of the bridge and channel condition.

Acknowledgements

This project absolutely could not have been brought to fruition without the external financial support from the Fish and Wildlife Compensation Program, the Department of Fisheries and Oceans, Recreational Fisheries Conservation Partnership Program, and the Nakusp Rod and Gun Club. As mentioned previously the financial resources in our Environmental Enhancement Fund were not enough to cover the total costs and your contributions were enough to make this project a go.

Personally I would like to thank Hank Scown, and Paul Seaton (Nakusp Rod and Gun Club) for putting up with my phone calls and emails to make sure paperwork was in, the fish habitat assessments were completed, and asking for local knowledge.

I would also like to thank Crystal Klym and Trevor Oussoren with the Fish and Wildlife Compensation Program for coming out to see the project, helping us through the paperwork aspects of the grant application process (I had never completed one before), and believing in the Ministry that we could pull this project off. Guys it has been a pleasure working with you on this and we look forward to working on other projects with you in the future.

Bruce Runciman and Suzanne Thorpe with DFO, thanks for your help and understanding trying to work with tight time lines and helping us out as required.

Thanks to the residents of Fauquier and the surrounding area who put up with seven months of construction detour and noise in their backyard while we constructed the project. We really do appreciate your patience.

What Does a Fish Say When it Swims into Concrete?

Submitted by Duane A. Wells, Environmental Services Coordinator

Dam.

If fish could talk, for all intents and purposes, that is what they would say in the lower reaches of Heart Creek after the stream channel eroded out below the Highway 6 culvert near Fauquier. This left the fish trapped and up against the rocky road perimeter, and with fewer places to spawn.

That is until this summer, when the ministry installs a new 18-metre long clear span bridge to replace a 3.5-metre structural plate corrugated steel culvert.

This is being accomplished through the ministry's Environmental Enhancement Fund and Bridge Rehabilitation Fund, and generous donations of time and money from our partners, the Nakusp Rod and Gun Club, the Department of Fisheries and Oceans' Recreational Fisheries Conservation Partnership Program and the Columbia Fish and Wildlife Compensation Program.

This restoration project is phase one of two on Heart Creek. Construction has just begun, with completion scheduled for October.

Phase two, anticipated to happen in 2016 or 2017, will remove another barrier further upstream on Heart Creek. Planning is in the



Kokanee in the plunge pool at the outlet of the Highway 6 culvert on Heart Creek.

early stages now, but once the barrier there is replaced with a bridge, fish will be able to swim unimpeded up to 1.5 kilometres, until they encounter a natural waterfall. The area available for the stream's Kokanee, Bull Trout and Rainbow Trout will be doubled.

It's a project the environmental folks here in Kamloops are pretty excited about because our enhancement projects are usually a lot smaller than this. Special thanks to all of our project partners for their support, and to the financial gurus (and Sean Wong) at HQ for understanding and working with our complicated accounting methods. ♦

QUICK KOKANEE FACTS

Kokanee are sockeye salmon that spend their entire lives in fresh water, never going to sea.

Natural populations are found from California to Alaska, and in northeast Asia. Populations of native kokanee are more abundant and widespread in B.C. than anywhere else.

During spawning season, kokanee change colour from silver, to crimson with a green head (though sometimes they will change to black).

Courtesy B.C. Fish Facts: www.env.gov.bc.ca/wld/documents/fishfacts/kokanee.pdf

A newspaper article was completed by the Arrow Lakes News on October 27, 2015 regarding the bridge construction, but was horribly inaccurate. They said the bridge was constructed as a result of a mud slide/road collapse. The slide issues were on the Needles side of the lake, and did not include a bridge. The article was not posted here due to the number of inaccuracies in the reporting of the story. The partners in the bridge construction were not identified in the article.

Appendix A – Weekly Updates of the Bridge Construction

Below is the Weekly Report No.1 for the week ending on July 25, 2015 as an example. Weekly Reports No. 1-17 are available in PDF upon request.

To: PROJECT MANAGER

Attn.: Robbie Kalabis (via e-mail Rob.Kalabis@gov.bc.ca)

WEEKLY BRIDGE REPORT No. 1 for week ending July 25, 2015

Name of Bridge: Heart Creek Bridge No.8519 **Project No.23890-0000**

Contractor: Neel-co Builders (2014) Ltd. **Subs:** Marcon Metals, Lockwood Bros, Harris Rebar

Site Condition: Max. Temp. 33°C **Weather:** Hot and dry until Saturday, when heavy rain fell (first in a month)
Min. Temp. 11°C **Water elevation:** Creek low, water gauge to be established next week

Work completed in week: CEMP and Safety Plans accepted. TMP resubmitted and under review. Shop drawings for precast stringers, bearing pads and steel railings accepted. Rebar bending detail sheets accepted for both abutments. Pile installation plans under review. Mobilize office trailer, two excavators, dump truck and tracked crane. Install construction signs(with the exception of the C-035 and C-035EOP signs) clearing for detour and upstream channelization, embankment for detour about 30% constructed, Riprap haul started from stockpiles and armouring started on upstream east side of channel, install silt fencing, set up fish barricade, set up 6 inch pump to dewater channel, disassemble about 15% of multiplate culvert.

Program for coming week: Finalize TMP. Install C-035 and C-035EOP signs. Dewater stream channel. Remove bottom of multiplate south of highway, continue with riprap installation south of highway, install temporary culvert, continue with detour construction.

Work completed to date: Bird nesting survey completed. CEMP and Safety Plans accepted. TMP resubmitted and under review. Install construction signs(with the exception of the C-035 and C-035EOP signs) clearing for detour and upstream channelization, embankment for detour about 30% constructed, Riprap armouring started on upstream east side of channel, set up fish barricade, set up 6 inch pump to dewater channel, disassemble about 15% of multiplate culvert.

Percentage of contract completed 10 %

BRIDGE: Substructure 0%, Superstructure 0%, Deck 0%, Demolition 15%

CHANNELIZATION: Rip Rap 5%, Boulders 0%

APPROACHES: Embankment 0%, Gran. Sub-base 0%, Sur.Agg. 25mm 0 %,

ENVIRONMENTAL MITIGATION: 15%

Personnel employed: Superintendent, TCS/First Aide, Machine Operator, Labourer, Environmental Monitor,

Machine Operator/Truck Driver

Official completion date: November 15, 2015 **Anticipated completion date:** November 15, 2015

Comments: A bit of a slow start, but coming together.

Safety Program: Binnie staff orientated. Notice board set up for safety postings, muster station established, tool box meeting conducted.

Site Visitors: None

Ministry Representative:Bill Smith.....
Binnie Construction Services Ltd.

c.c. Neil O'Neill, Regional Bridge Const. Supervisor., Southern Interior Region, MoT Kamloops (via e-mail: Neil.ONeill@gov.bc.ca)

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Duane Wells, Environmental Services Co-ordinator, MoT Kamloops (via e-mail: Duane.Wells@gov.bc.ca)

Project Weekly Photos



Photo 1 – July 23 – Existing culvert exposed, top have removed



Photo 2 – July 23 - 6 inch water pump being installed under the supervision of the Environmental Monitor



Photo 3 - July 23 – Fish barrier installed upstream of dewatering sump



Photo 4 – July 23 – Temporary lane shift, looking east on Hwy



Photo 5 – July 23 – Temporary lane shift, looking west on Hwy



Photo 6 – July 24 – Excavating for riprap placement south of Hwy on east side of creek



Photo 7 – July 24 – Riprap excavation lined with geotextile and starting placement of 500kg riprap



Photo 8 – July 24 – Placement of 500 kg riprap south of Hwy on east bank of Heart creek