PROJECT

Project Name:	Fox Creek Stream Channel Restoration project	**R&E Project:**	CRE-25-13
General Location:	Fox Creek; west side of Klondike Hwy, North of Fox Creek bridge(50km North of Whitehorse,Yk)	**Project Dates:**	June-Aug. 2013
Field Work Conducted by:	Brian Bell (TKC) Harold Chambers John LaValle Shawna Tizya Coralee Johns	Al von Finster (Consultant) 2013 Y2C2crew (YG Env.)	
Report Prepared by:	Brian Bell, Ta'an Kwäch'än Council		

INTRODUCTION

The Ta'an Kwäch'än Council (TKC) has been undertaking the restoration of an extirpated stock of Chinook salmon to Fox (Richthofen) Creek, a tributary to Lake Laberge and the upper Yukon River, since 2007 in accordance with the *Chinook Salmon Stock Restoration Plan for Fox Creek* 2008 (CRE-52N-07). The first release of juvenile Chinook salmon was in the spring of 2009 and the first returns arrived in the fall of 2013.

The goal of this project was to improve the spawning and rearing habitat of Fox Creek for Yukon River Chinook salmon. The purpose of the project was to significantly reduce the quantity of silt and sand being deposited into the creek over the long term. This objective was accomplished by restoring the creek to its previous, pre-beaver dam, stream channel at two sites directly upstream of areas previously identified as high erosion areas. At both locations an abandoned beaver dam was removed by hand and a debris structure was created downstream in order to retrain the creek back to its pre-dam channel and away from the high erosion areas.

METHODS

The design of our project follows the principles of Ecological Restoration, as defined by the Society for Ecological Restoration International as, "*the process of assisting the recovery of an ecosystem that has been degraded, damaged, or destroyed.*" http://www.ser.org/resources/resources-detail-view/ser-international-primer-on-ecological-restoration. As we were dealing with a fluvial process we also adjusted our work project following the iterative process of adaptive management. Details on each location and the methodology used to measure and estimate the quantities were reported in the Final Report for YR R&E Project CRE-54-10 (TKC 2011). Please follow this link to access the

report. http://yukonriverpanel.com/salmon/wp-content/uploads/2011/04/cre-54-10-taan-kwachan-stewardship.pdf

This project included two types of restoration work at every site of stream retraining that included: 1. The breaching of abandoned beaver dams; and 2. the blocking of present channels at the bottom of erosion faces.

Breaching of beaver dams: Two, of the proposed three, abandoned beaver dams were breached using manual labour and hand tools (site 9+100 and 9+160). Following our adaptive management approach it was decided that the third dam (9+250) did not need to be breached, at that time, in order to achieve the desired outcome. The dams were breached at the location of the stream channel prior to the construction of the beaver dams. Organic material that was removed from the dam was deposited above the Ordinary High Water Mark (OHW) of the stream bank.

Blocking of present channels: After the abandoned dams were breached and water started flowing through the retrained channel we partially blocked the post-abandonment channel upstream of the areas of high erosion. Deadfall, standing dead trees, and remnant woody debris from the breached beaver dam were placed across the creek to reduce the water flowing through the post-abandonment channel and direct the flow towards the retrained channel. Wooden stakes were placed vertically into the stream bed on the downstream side to hold the debris piles in place. Some of these stakes were temporarily secured with rope to support the debris structures until they have stabilized securely in place. Woody debris and stream sediments have been accumulating on the debris structures and

RESULTS

Two, of the proposed three, abandoned beaver dams were successfully breached and new debris structures were placed immediately downstream. This work has accomplished our objective of retraining Fox Creek into pre-dam channels and away from the identified areas of high erosion. Visual observations show a significant reduction in sedimentation entering Fox Creek as well as an increase in the stream flow through the retrained channels.

Figures 1 and 2 in the 'Photos' section show: elder Norm Adamson and consultant Al von Finster discussing Fox Creek stream restoration work to be undertaken.
Figures 3 and 4: Environment Yukon's Yukon Youth Conservation Corp (Y2C2) crew removing abandoned beaver dam at site 9+100.
Figures 5 and 6: Before and after photos of site 9+100
Figures 7, 8, and 9: Site 9+100 after restoration work in fall and winter of 2013
Figures 10 and 11: Before and after photos of site 9+160
Figures 12, 13, and 14: Site 9+ 100 after restoration work in fall and winter of 2013
Figure 15: Ta'an Kwäch'än Council citizen Harold Chambers monitoring erosion at a fixed photo monitoring site at the top of eroding streambank at site 9+160.

The work was carried out by TKC staff, a Y2C2 work crew, and the contractor experienced in fish habitat management and restoration, Al von Finster.

DISCUSSION

TKCs Fox Creek Chinook Salmon Restoration Program (the Program) is restoring Chinook habitat and the wild stock of Fox Creek, in address of Priority a) of Appendix 1 of Attachment C to the YRSA. This project is the primary habitat component of the Program. Chinook Salmon access to ***productive*** spawning and rearing habitat will be restored in accordance with 2013 Near Term Priority Restoration/Implementation/10.

The outcome of the stream diversion at site 9+100 was a total success; visual observations show that sediment moving into the stream from the erosion cliff has ended. The entire main flow of Fox Creek was successfully diverted away from the high erosion area at this site.

Site 9+160 is also considered as having the desired successful outcome of reduced stream sediment loading. At site 9+160 the contribution of sediments has been reduced to insignificant. At this site a considerable but unquantified stream flow has been directed through the re-established "pre-dam" stream channel. An estimated 85 to 95% of the stream now flows through the excavated channel at site 9+160.

Adaptive management was applied to the proposed work at site 9+250. In the third week of July there was a catastrophic flood that caused a sand bar to form in front of the abandoned beaver dam at site 9+250. These geomorphic changes lead us to conclude that the excavation of that particular dam was unnecessary.

TKC staff will continue monitoring the erosion and stream diversion sites. The next keystone time period for monitoring will be in the spring of 2014, after the spring freshet. Fixed locations for photo monitoring of the sites have been established to monitor the changes over time (fig. 15).

It was an excellent experience for the TKC Stewards to be able to share their knowledge of the Restoration Plan and Chinook salmon biology with the Y2C2 crew this year.

PHOTOS

Fig. 1 Elder Norm Adamson and consultant Al von Finster

Fig. 2. Norm and Al on top of eroding slope at site 9+100

Fig. 3 Environment Yukon's Y2C2 crew working on abandoned dam at 9+100

Fig. 4 Y2C2 crew completion of removal of beaver dam

Fig. 5 Site 9+100 before restoration work July 5, 2013

Fig. 6 Site 9+100 after restoration work Aug. 7, 2013

Fig. 7 Site 9+100 October 5 2013

Fig. 8 Site 9+100 October 25 2013

Fig. 9 Site 9+100 November 3 2013

Fig. 10 Site 9+160 before restoration work July 5, 2013

Fig. 11 Site 9+160 after restoration work September 12, 2013

Fig. 12 Site 9+160 October 25, 2013

Fig. 13 Site 9+160 November 15, 2013

Fig. 14 Site 9+160 Freeze up November 23, 2013

Fig. 15 TKC citizen Harold Chambers monitoring erosion from fixed photo site

REFERENCES

Chinook Salmon Stream Restoration Plan for Fox Creek (February 2008)
Environmental Dynamics Inc. (EDI project # 07-YC-0028)
Restoration & Enhancement Fund (project #CRE-54N-06)

Chinook Salmon Restoration Sediment Survey: Fox Creek Bank Erosion
Ta'an Kwäch'än Council (July 2010)

Fox Creek Beaver Management and Salmon Restoration Plan
Environmental Dynamics Inc. (EDI project # 07-YC-0028)
Restoration & Enhancement Fund (project #CRE-54N-06)

Guidelines for the Management of Beaver in Fish-Bearing Streams in the Yukon (1999)
Department of Fisheries and Oceans (DFO), habitat and enhancement branch

Yukon Environmental & Socio-economic Assessment Board (YESAB)
Yukon Government and Ta'an Kwäch'än Council YESAB Consolidated Decision Document - Accepted (YESAB file # 2013-0070)

Yukon River Panel Restoration and Enhancement Fund: Stage II Detailed Proposal 2013
Restoration & Enhancement Fund (project #CRE-25-13)

Yukon Water Board
Yukon Water Use Licence # CN13-037