

Stoltz Bluff Sediment Remediation – Sept. 2017 Maintenance Project



(April 2017 drone photos courtesy of
Vadeboncoeur Consulting Inc.)

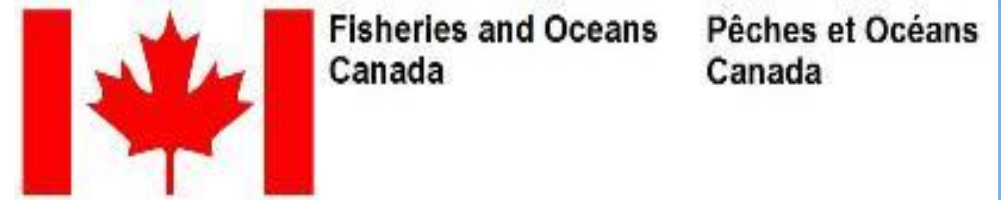
Stoltz Sediment Containment Overwhelmed by Major Debris Torrent from 'Clearwater' Creek Gully (late March 2017)



Rest of Sediment Containment Pond Network at Capacity April 2017



Cowichan Partners Rally to Investigate Major New Slope Failure and Identify 'Emergency' Mitigation Options



British Columbia
Conservation
Foundation



BCParks

McQuarrie Geotechnical Consultants Ltd. – Slope Hazard Assessment and 2017 Work Plan for Stoltz Bluff Maintenance & Mitigation

STOLTZ BLUFF SLOPE HAZARD ASSESSMENT

Prepared by:

McQuarrie Geotechnical Consultants Ltd.

For

BC Conservation Foundation
&
Cowichan Watershed Board

July 26, 2017
Project #17-4

Prepared by:



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STOLTZ BLUFF SLOPE HAZARD ASSESSMENT	MEMORANDUM
TO: BC Conservation Foundation	DATE: September 12, 2017
ATTN: James Craig	FILE: 17-4
SUBJECT: 2017 WORK PLAN	COPIES: Cowichan Watershed Board DFO

1. BACKGROUND

The report by McQuarrie Geotechnical Consultants Ltd dated July 26, 2017 outlined general measures to mitigate the landslide and sedimentation hazards affecting the river. Further field work was conducted on August 29, 2017 and a more detailed work plan for September 2017 is attached along with figures and cross-sections.

The work is focused on the gully of Clearwater Creek, which has become the main sediment source in this reach of the river. The gully banks are severely over-steepened, highly unstable, and cannot be stabilized. Instead, the objective of mitigation is to reduce down-cutting along the base of the gully and to reconstruct some capacity within the sediment basins at the mouth of the gully so as to reduce the amount of sediment reaching the river. The gully should be re-assessed each spring and the mitigation measures revised and repeated accordingly each summer for several years until the amount of debris and sediment reduces.

The bluffs are expected to continue to fail with almost constant raveling and larger failures during the wetter months. The August field assessment confirmed that a significant proportion of the creek flow is due to groundwater discharge in the headwalls of this gully. Further mitigation beyond the seasonal work described in this work plan must involve a detailed study of the upslope groundwater regime.

2. RECOMMENDED MEASURES

The existing site features are shown on the Location Map, attached as Figure 1 while Figure 2 illustrates the recommended mitigation measures. These measures vary along the gully in accordance with a series of stations staked in the field. Cross-sections are shown through each station in Figures 3A to 3C, illustrating the recommended measures.

The stations are marked from upstream to downstream for clarity but the sequence of the work should begin at the downstream end, as explained in the work plan.

Please contact me if you have any questions.



Eric J. McQuarrie, P. Eng.

Attachments:
Figures 1 through 5

For Unstable Clearwater Creek Gully – Must first stabilize creek bed elevation as exists now to avoid future erosion/down-cutting – requires minimal excavation and installation of log check dams for future gradient control

Schematic of Clearwater Creek Gully – Plan View

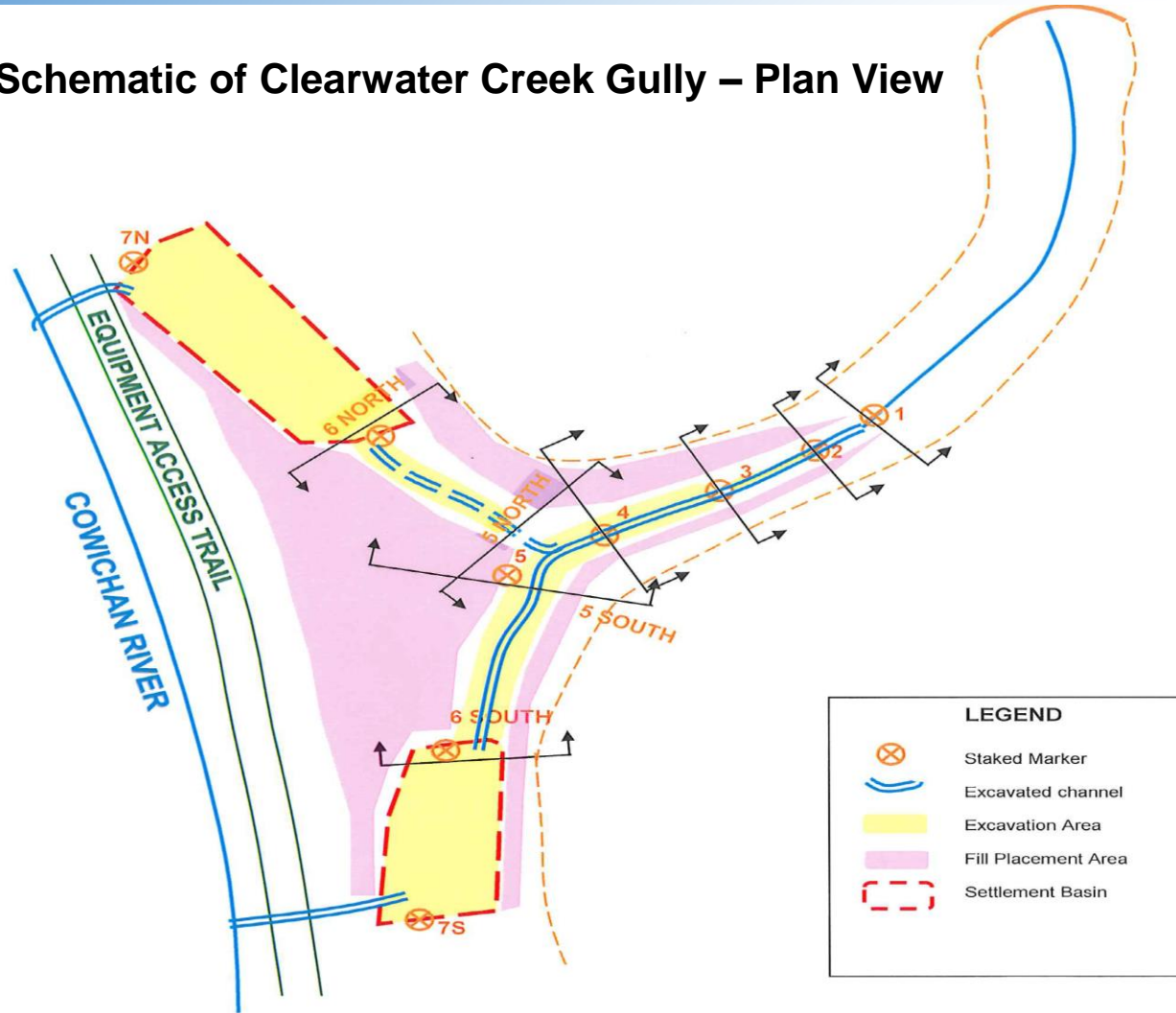
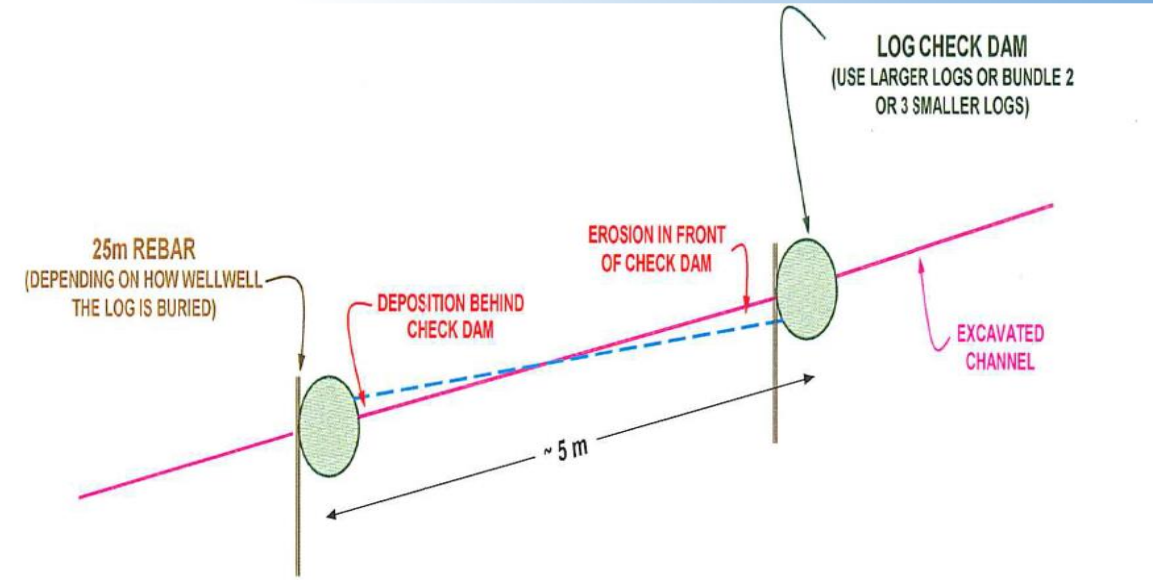


FIGURE 2.
MITIGATION PLAN MAP
Scale 1:1,000



NOTES:

1. Ensure logs are well buried at both ends to prevent it from being washed downslope (see cross-sections). Sidewall failures should increase burial before peak winter flow.
2. Initially bury at least 50% of log diameter below the channel grade. The stream will tend to erode immediately downstream of the log and deposit on the upstream of the next log.
3. If needed, rebar can be installed for additional anchorage on the downstream side of the logs. Use 25M bars minimum 1.2 m long, driven roughly 2 m o/c.

Maintenance of existing creek bed elevation will help with sediment retention and gradual 'shallowing' of gradient for increased channel resilience

With Sept. 22/17 Announcement of Successful Cowichan Tribes CRF Proposal – Work Begins at Stoltz Bluff on Sept. 26th (supervised by BCCF)

STOLTZ BLUFF STABILIZATION

The Cowichan Watershed
The Cowichan River, Vancouver Island's 5th largest river, flows west for 47 km from Cowichan Lake to Cowichan Bay on the Strait of Georgia. Cowichan, derived from the Coast Salish word "Kwawastan" meaning "land accessed by the sea", is one of BC's most important watersheds with a rich history of First Nation culture long before settlement by the first Europeans in the late 1800s.

The Cowichan River has been renowned as a significant producer of wild salmon, steelhead and trout populations. For Cowichan tribes, the river provided sustenance and spiritual value over thousands of years. With its discovery by Europeans, the river eventually became a destination for anglers from around the world.

While its reputation as a major fish producer is well-earned, the river has not been spared from impacts of industrial development and encroaching urbanization through the years. Concerns about these effects culminated in 2004 when Cowichan Tribes sponsored a scientific review of factors contributing to salmon stock declines and strategies for rebuilding currently weak runs.

The Cowichan Recovery Plan (2005) identified preservation of adequate stream flows and sediment management as its two highest priorities for fish conservation.



The Sediment Issue
To maximize egg survival, salmon and trout need clean, sediment-free gravel in which to spawn. If too much silt settles in the spaces between the gravel, eggs will suffocate and/or fry will be unable to emerge and will die within the gravel. Spawning studies in 2005 revealed that egg-to-fry survival was 86% in test incubators above major sediment sources close to Cowichan Lake, compared to less than 7% at sites on the lower river. Additionally, sand and other sediments fill gravels normally used by juvenile salmon and steelhead to avoid high winter flows, and clean gravel is more productive for aquatic insects or "fish food".

Stoltz Bluff was a major sediment source.

Stabilizing Stoltz
Stoltz Bluff is a 400m long deposit of glacial sediment about 60m in average height. Sediment source studies indicated that Stoltz was the largest point source contributor on the Cowichan (10-28,000 cubic metres per year), and that its composition was 76% sand, silt and clay.

Major instream work was completed between July 10 and September 15, 2006. Follow-up work in 2007 included additional bank protection, terrace maintenance and plant ingrowth.

Final design of stabilization works consists of a realigned river channel and terrace at the base of the bluff with bank protection in the form of rip-rap, bioecoviv weirs and bioengineering (willow and cottonwood plantings).

Total project costs including feasibility, design and construction were approximately \$1.3 million. Maintenance of constructed works and assessment of ecological benefits will be included in a Stoltz Bluff monitoring program.



Project Partners:
BC Conservation Foundation
BC Ministry of Environment
BC Parks
Cowichan Tribes
Fisheries and Oceans Canada

Project Design/Construction:
Brimicom & Assoc. (Architectural Ltd.)
David Ross Consulting Ltd.
Aur Design/Landscape Services Ltd.
Aur Design/Cowichan Tribes
200-110

Project Funders:
BC Ministry of Environment
BC Ministry of Transportation
British Columbia
Fisheries and Oceans Canada

Project Funders:
British Columbia Conservation Trust Fund
British Columbia Environment
British Columbia Heritage Foundation
British Columbia Parks
British Columbia Recreation Society
British Columbia Tribes
British Columbia Wildlife Society
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COWICHAN RIVER, 2006
PROVINCIAL HERITAGE RIVER 1995. CANADIAN HERITAGE RIVER 2004.

EXTREME CAUTION

ACTIVE CONSTRUCTION

Fish Habitat Restoration Works in Progress

Project: 

Contact:
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Project Manager
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www.bccf.ca

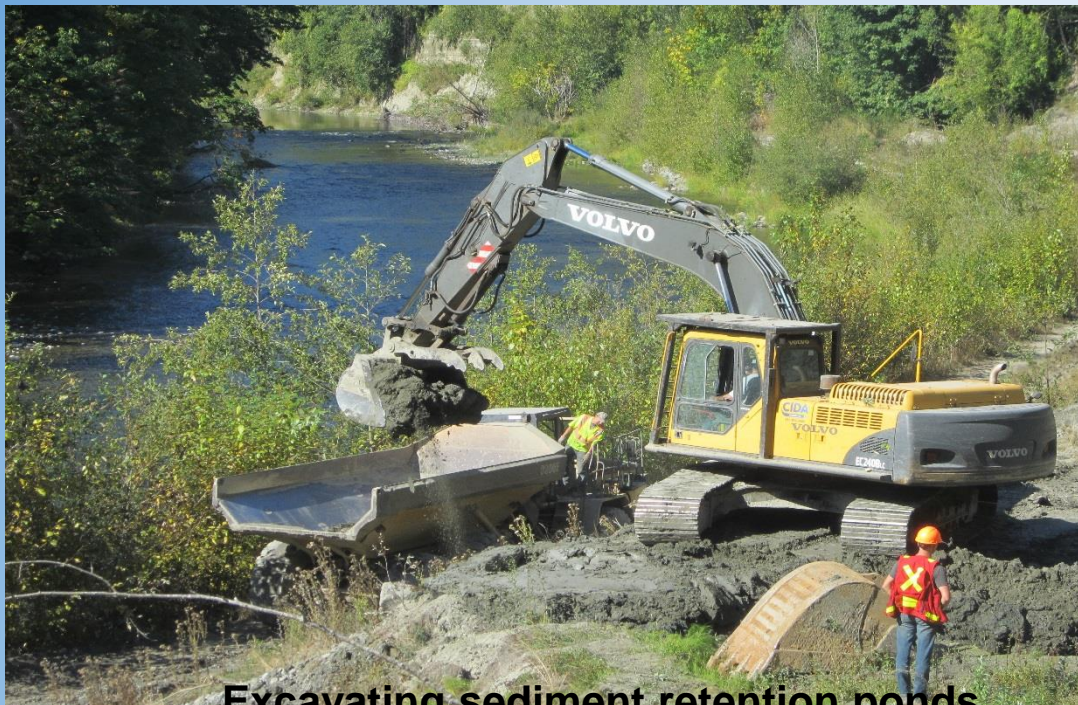


Clearing access trail and service road at toe of Bluff



Begin excavating sediment retention ponds





Excavating sediment retention ponds



Adding additional height to sediment containment berms



Clearwater Creek Running 'Silty' Even Before Start of Work On-Site (e.g., small gully headwall failure observed/video-recorded by BCCF on Sept 28th)



Clearwater Creek Flows Through 'Drain' in Stoltz Bluff Access Road (upstream of Cowichan River)





Raised elevation of containment berm



Partially excavated sediment retention pond



Excavating accumulated sediment and preparing route for overflow channel from Clearwater Creek

Maintenance will continue in the week of October 2nd!



March 2003 'Before'



January 2008 'After'



June 2010 'After'