Wolverton Creek Monitoring

Report 2011

Report Prepared For:

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Wolverton Creek Summary Report for 2011

Background
The charts and information below summarize findings obtained by monitoring Wolverton Creek. The summary is not intended to be a comprehensive assessment of the creek

Members of the Wolverton Creek Waterusers collected data that contributed to this report. Thankyou to Judy Laret , Doug Adair and Ruth Hackett for collecting samples.

The program
The present monitoring program is based on recommendations given in "Monitoring Guidelines to Evaluate the Effects of Forestry Activities on Streams in the Pacific Northwest and Alaska" by L.H. MacDonald. Sample frequency is based on recommendations from J. Allan Issacson, Forest Hydrologist, Idaho Sate. The program relies on manual reading of instream flow gauges, calibration of gauges by readings taken with a Price Current meter (RIC standard procedures). Velocity readings are taken at intervals of 6 to 12 inches across the stream. A stage discharge curve is developed and readers collect 30 to 40 samples a year based on the following criteria:

- Collect during and after storm events and/or heavy rain
- Collect more samples during Spring freshet and Fall rain events
- Collect when creek water appears turbid and
- Keep samples cool and dark prior to delivery to lab

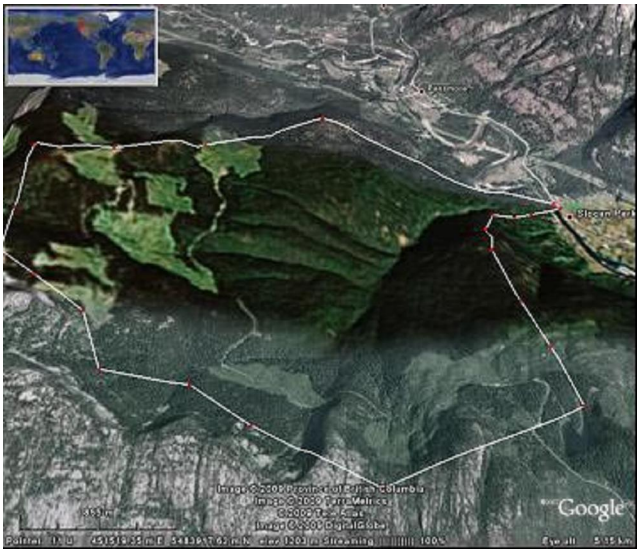
The samples are tested for turbidity and conductivity. If turbidity is greater than 1NTU, total suspended solids are performed on that sample. In late summer, 5 samples are collected by an employee of Passmore Laboratory Ltd and tested for Thermotolerant Coliforms and E.coli as recommended in Provincial Guidelines for evaluating drinking water.

The objectives of the 2011 program were to:

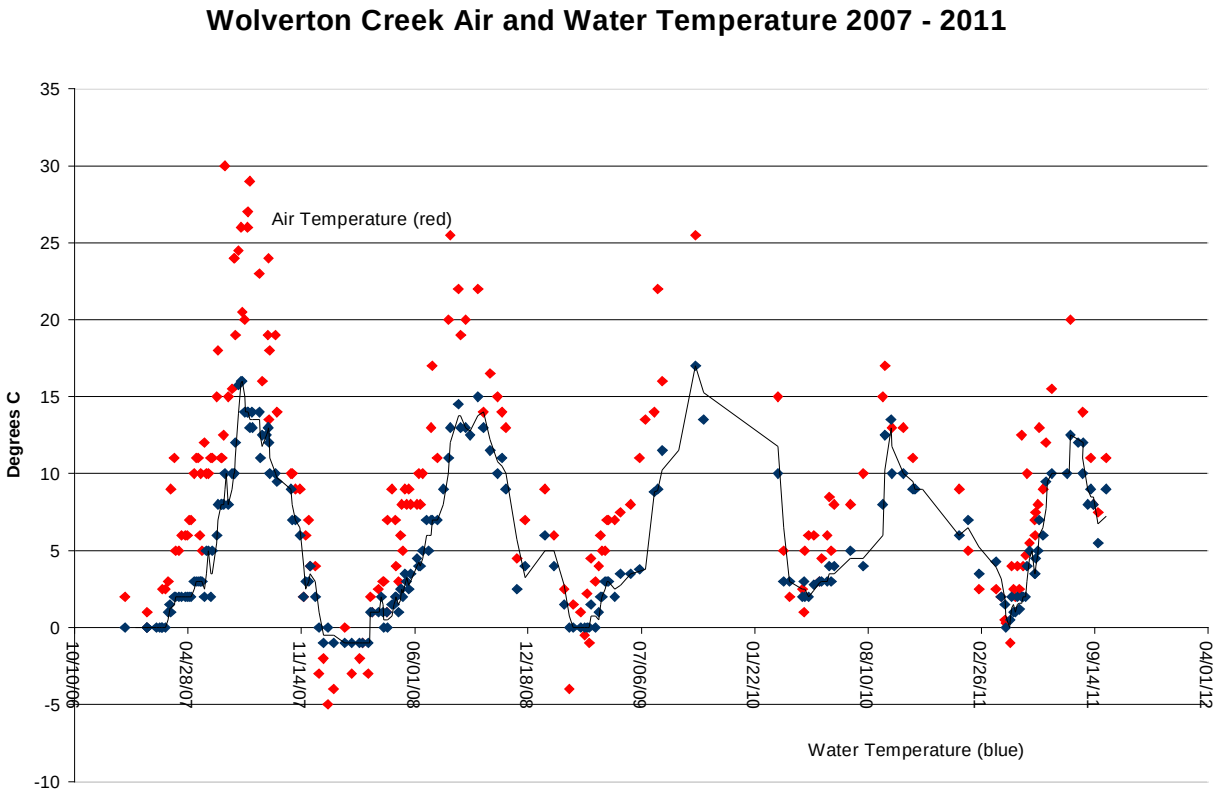
1. **Collect water quality and flow data using a systematic sampling regime**
2. **Determine the number of days per year that parameters exceeded provincial drinking water quality guidelines as a function of discharge.**
3. **Examine trends in drinking water quality in Wolverton Creek as forest development increases within the watershed.**

Characteristics of the Wolverton Watershed

Wolverton Creek watershed is located just north of Slocan Park, which is 20 km north of Castlegar . The creek drains the Norns Range northeast to the Slocan River. The Wolverton Creek watershed is 15.27 km_2 in size, and Wolverton Creek is 5.47 km in length. It is a second order stream with a northeast aspect. See Google earth photo below

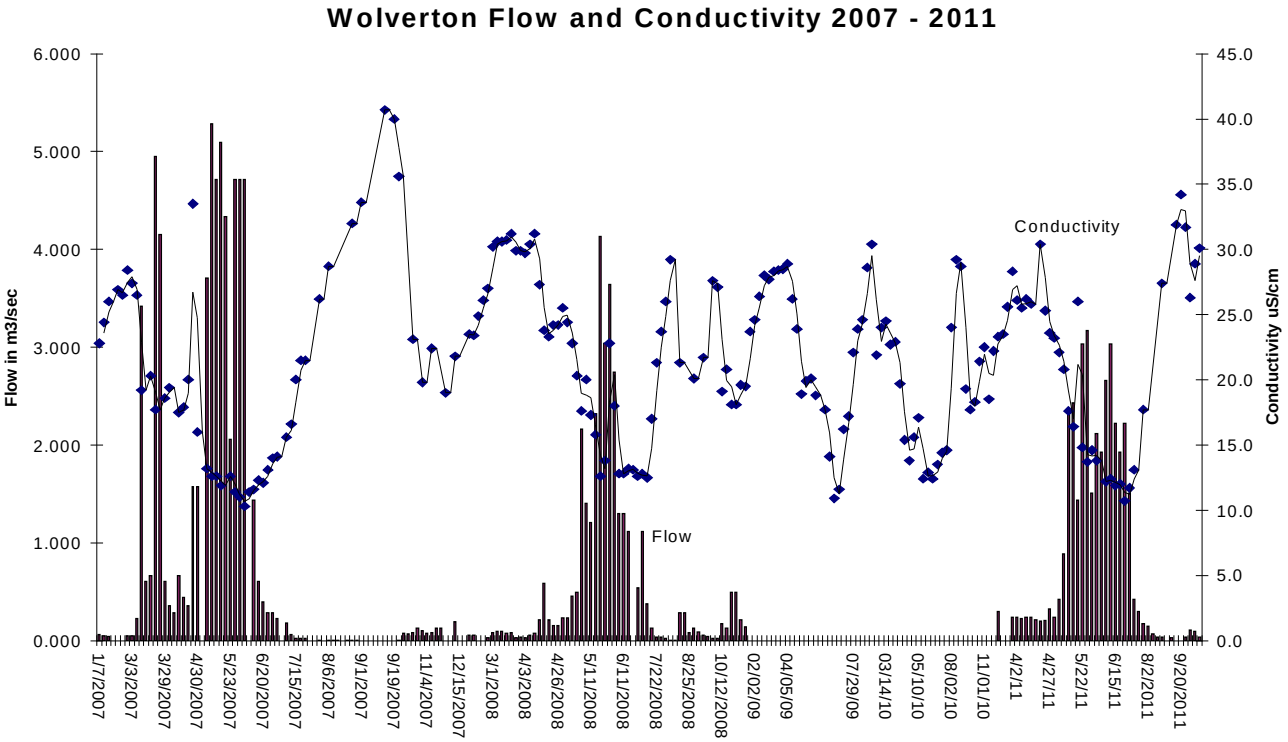


Temperature



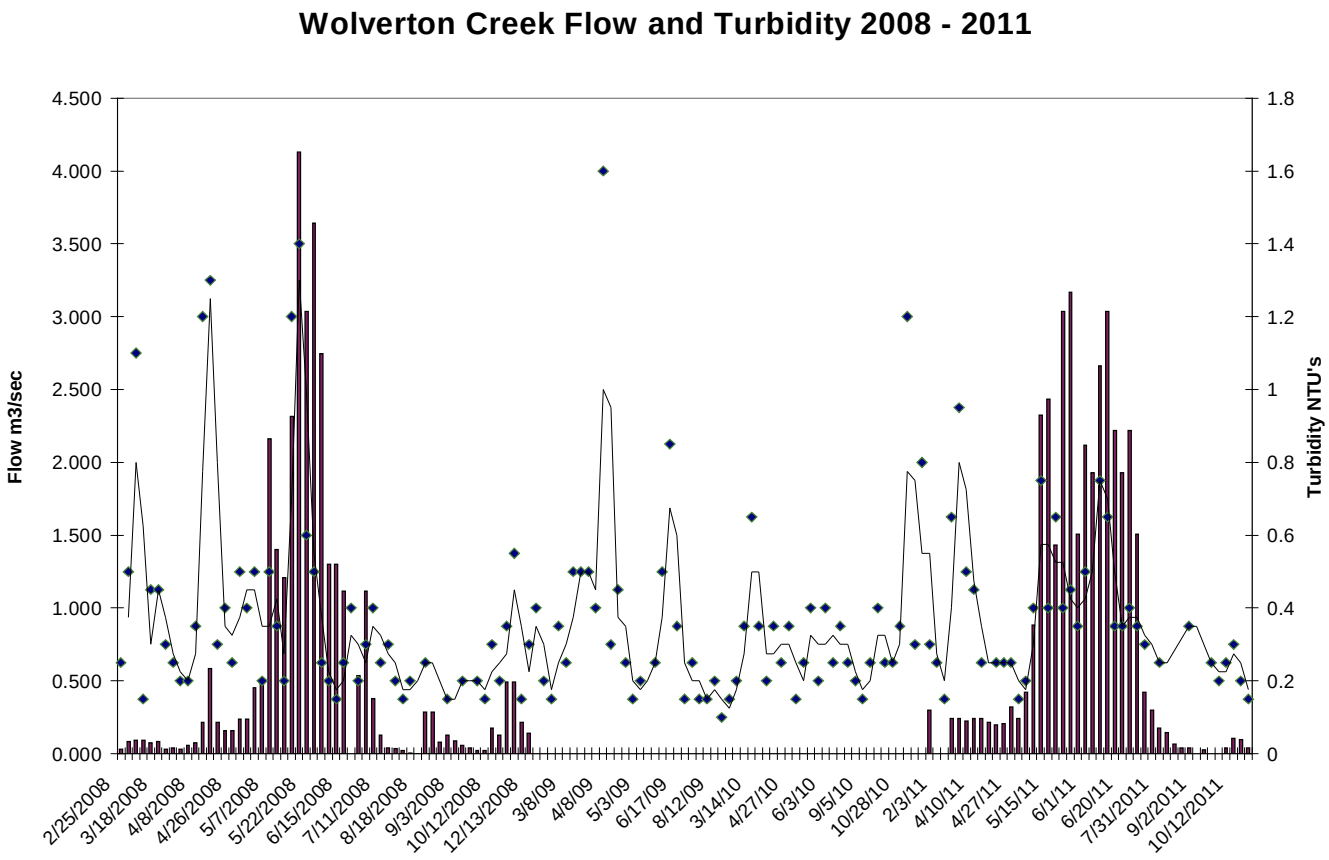
As seen in the chart above, Wolverton Creek remains cool even when air temperatures rise. For this reason, it provides a cool water input into the main Slocan River. Cool water from creeks like Wolverton give refuge to aquatic life because even when the creek is flowing below the surface its cool water enters the Slocan River. This may be why we see so many small fish just below the Slocan Park bridge. The highest temperature recorded between 2007 and 2011 was 17 degrees C. Eighty five percent of readings were less than 10 degrees C . Wolverton water temperatures for 2011 were similar to those seen in 2009 and 2010.

Conductivity



Conductivity or specific conductance is a measure of the ability of water to carry a charge. It is directly related to the concentration of dissolved minerals. As the total dissolved substances in the water increases, the conductivity of the water also increases. There is usually an inverse relation between conductivity and flow. E.g. as flow in increases, dissolved minerals decrease & conductivity decreases. In Fall when water flow decreases, conductivity and mineral content increases. This cyclic pattern can be seen for years 2007, 2008, and 2011 above. Flow was not calculated for years 2009 and 2010.

Turbidity

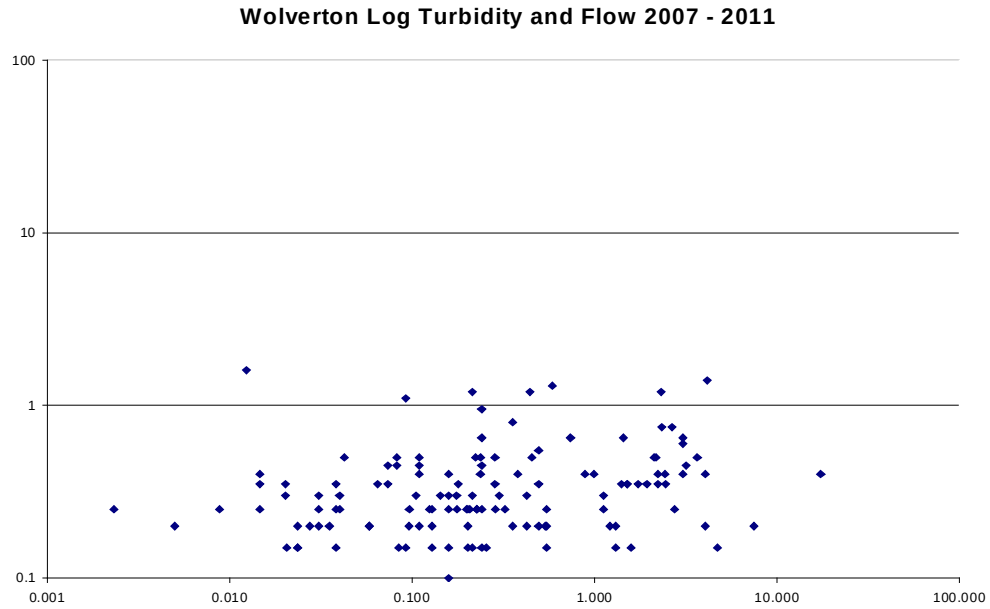


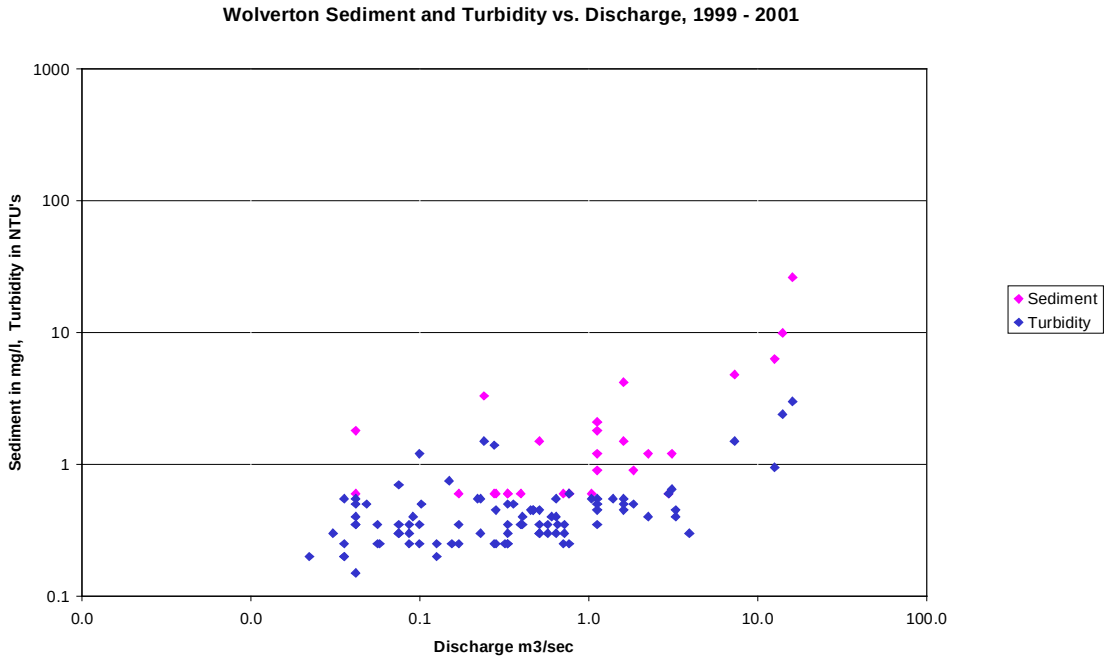
Turbidity is a "measure of the relative clarity of water. It is caused by suspended and colloidal matter, such as clay, silt, finely divided organic and inorganic matter, and plankton and other microscopic organisms. However, turbidity is not a direct measure of suspended particles suspended in the water. It is, rather, a measure of the scattering effect that such particles have on light. A directed beam of light remains relatively undisturbed when transmitted through absolutely pure water, but even the molecules in a pure fluid will scatter light to a certain degree.

The most important health-related effect of turbidity is its ability to shield microorganisms from disinfection. Turbidity, which has been shown to be correlated with the contamination of water by *Giardia* and *Cryptosporidium*. Hence, Turbidity serves as a measure for indicating the risk of contamination by these pathogens. Ministry Guidelines for Turbidity in drinking water is 1NTU.

Wolverton Creek Year	Highest Turbidity Reading	%Samples greater than 0.5NTU	% Samples less than 0.25NTU	Number of Samples
2007	2.1	10	50	40
2008	1.4	24	32	53
2009	1.6	22	55	27
2010	1.2	13	50	24
2011	0.95	22	40	35

Turbidity cont.



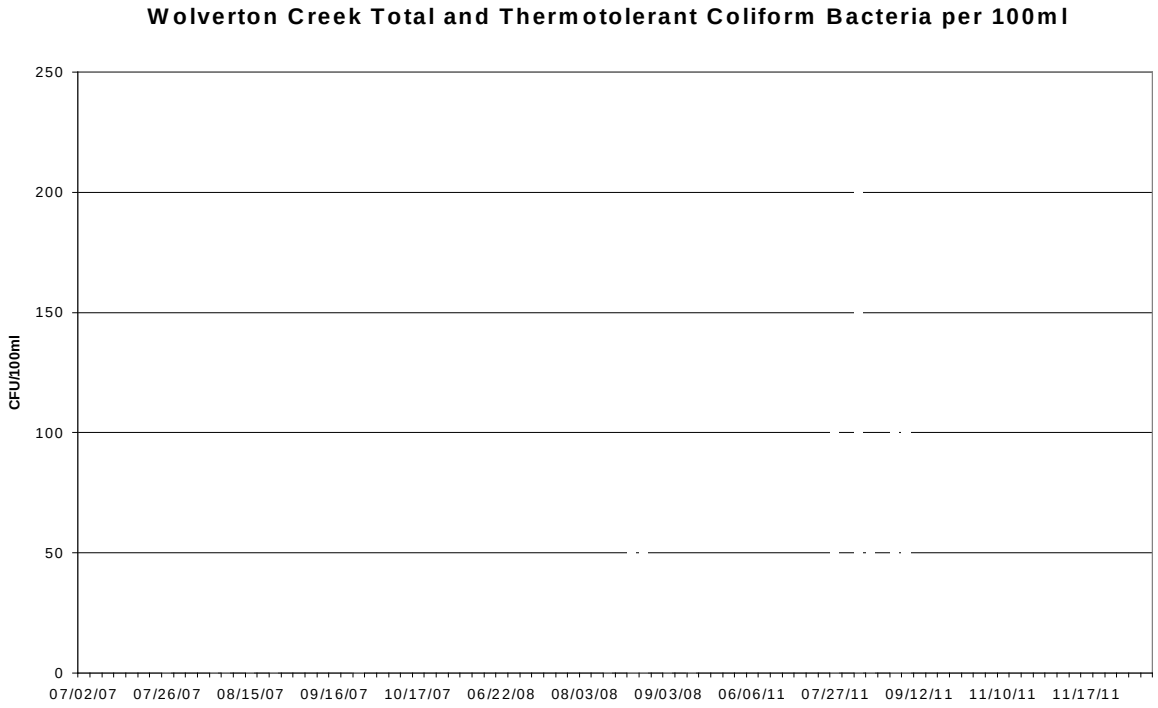


A comparison of the log charts for turbidity and suspended solids (see above) shows a variation between the relation of these parameters and flow. E.g. turbidity is not as sensitive to changes in flow as suspended solids. We quit doing suspended solids when turbidity was greater than 1NTU to make the program more efficient and because there are no government standards for suspended solids.

Based on these recent findings and the fact that in 2011, some Wolverton Creek waterusers noticed sediment buildup in their water lines while the majority of turbidity readings remained low (see table page 4) we may want to reinstate suspended solids. This parameter is more related to stream channel integrity than turbidity. When suspended solids are high stream channels are eroded.

Coliform Bacteria

Coliform refers to a group of bacteria that have been tested for over 90 years as indicators of human infection. Their presence is used to indicate that other pathogenic organisms of fecal origin may be present. These include other bacteria, viruses, protozoa (giardia, cryptosporidium) and multicellular parasites. There are no provincial guideline limits for total coliforms in drinking water but thermotolerant coliforms and E.coli are not permitted.
The significance of high total coliforms seen in 2011 is not clear. While there are no standards for this bacteria their presence indicates a higher level of nutrients (possibly plant source) in the water and may relate to high counts of other bacteria. We do tend to see higher total coliforms when water temperature is low. Overall, Wolverton Creek microbiological water quality is and has always been excellent.



Wolverton Creek Date	Total Coliforms/100ml	Thermotolerant Coliforms/100ml
July 26, 2011	100	0
August 16, 2011	228	0
August 25, 2011	79	0
September 2, 2011	131	1 (no E.coli)
September 7, 2011	115	0

Respectfully submitted,

Jennifer Yeow, Passmore Laboratory Ltd.