Wolverton Creek Monitoring

Report 2017 - 2018

Photo Credit: Jennifer Yeow

Report Prepared For:

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Wolverton Creek Summary Report for 2017 to 2018

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

Members of the Wolverton Creek Water users collected data that contributed to this report. Thankyou to Judy Laret, Doug Adair and Ruth Hackett for collecting samples and looking after the water system.

The 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 readings taken on a stream flow gauge located below the waterfall and water user intakes. Flow was not calculated this year due to retirement of our hydrometric specialist. However, we will be learning the salt dilution method (see attached) for use in the future. For this report, gauge readings were used to track flow against other water quality parameters.

The sample collection criteria is listed below

- Collect during and after storm events and/or heavy rain
- Collect at reduced frequency throughout the year
- Collect more samples during Spring freshet and Fall rain events
- Collect when creek water appears turbid and
- Samples are held cool and dark prior to delivery to lab

Regarding microbiological testing for drinking water quality evaluation - between July and November samples were collected aseptically by an employee of Passmore Laboratory Ltd and tested for thermotolerant (fecal) coliforms and E.coli.

The objectives of the program are to:

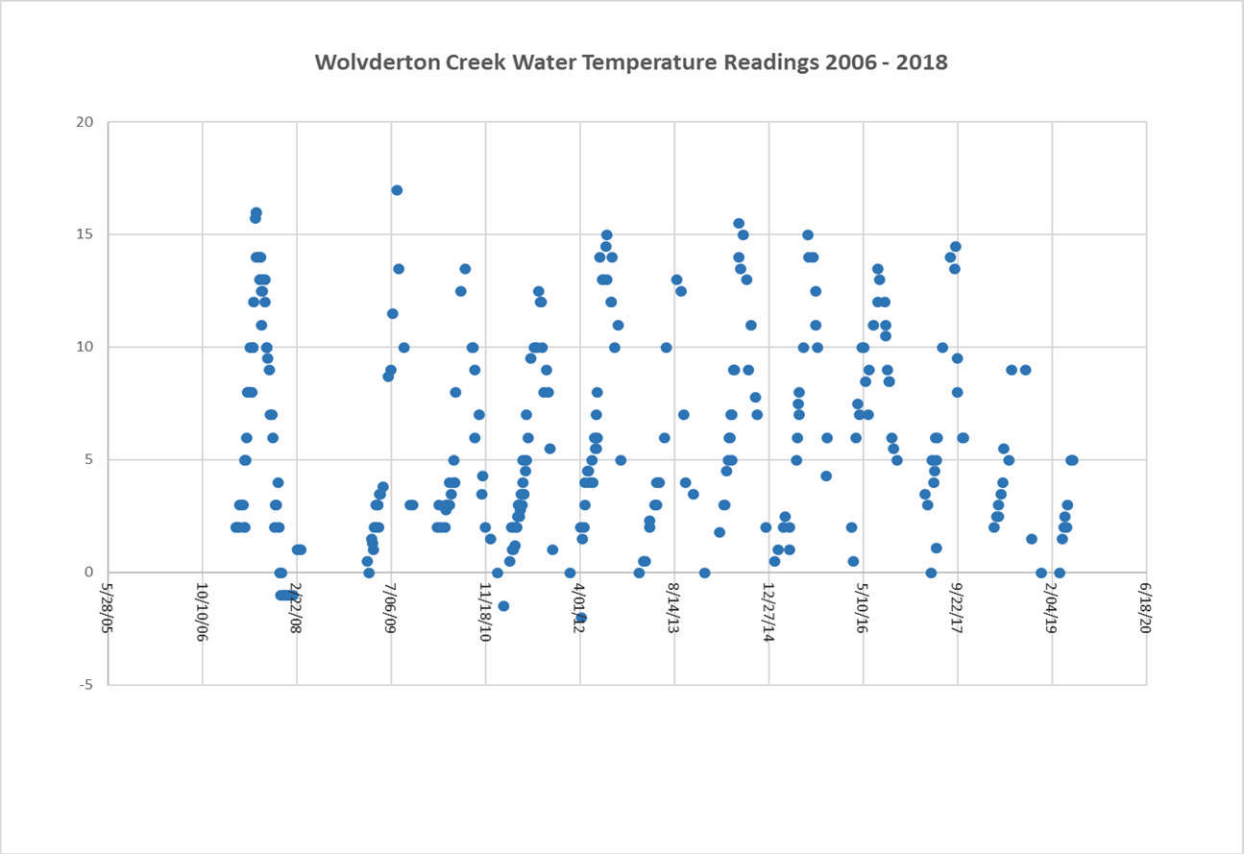
1. **Collect water quality and flow data using a systematic sampling regime**
2. **Determine the number of days per year that parameters exceed provincial drinking water quality guidelines as a function of discharge.**
3. **Examine trends in drinking water quality in Wolverton Creek as forest conditions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

Characteristics of the Wolverton Watershed

Wolverton Creek watershed is located just north of Slocan Park, and 30 km north of Castlegar. The creek drains the Norns Range west to the Slocan River. The Wolverton Creek watershed is 15.27 square km in size, and Wolverton Creek is 5.47 km in length. It is a second order stream with a northeast aspect.

Wolverton Creek gauge

Temperature



The chart above shows Wolverton Creek water remains relatively cool (less than 15 degrees C) for most of the year. Of the 30 readings taken during 2017 and 2018, over 90% were 10C or less. As seen in the chart, most of the readings are between 0 and 7C and no obvious trends are discernable over 11 years.

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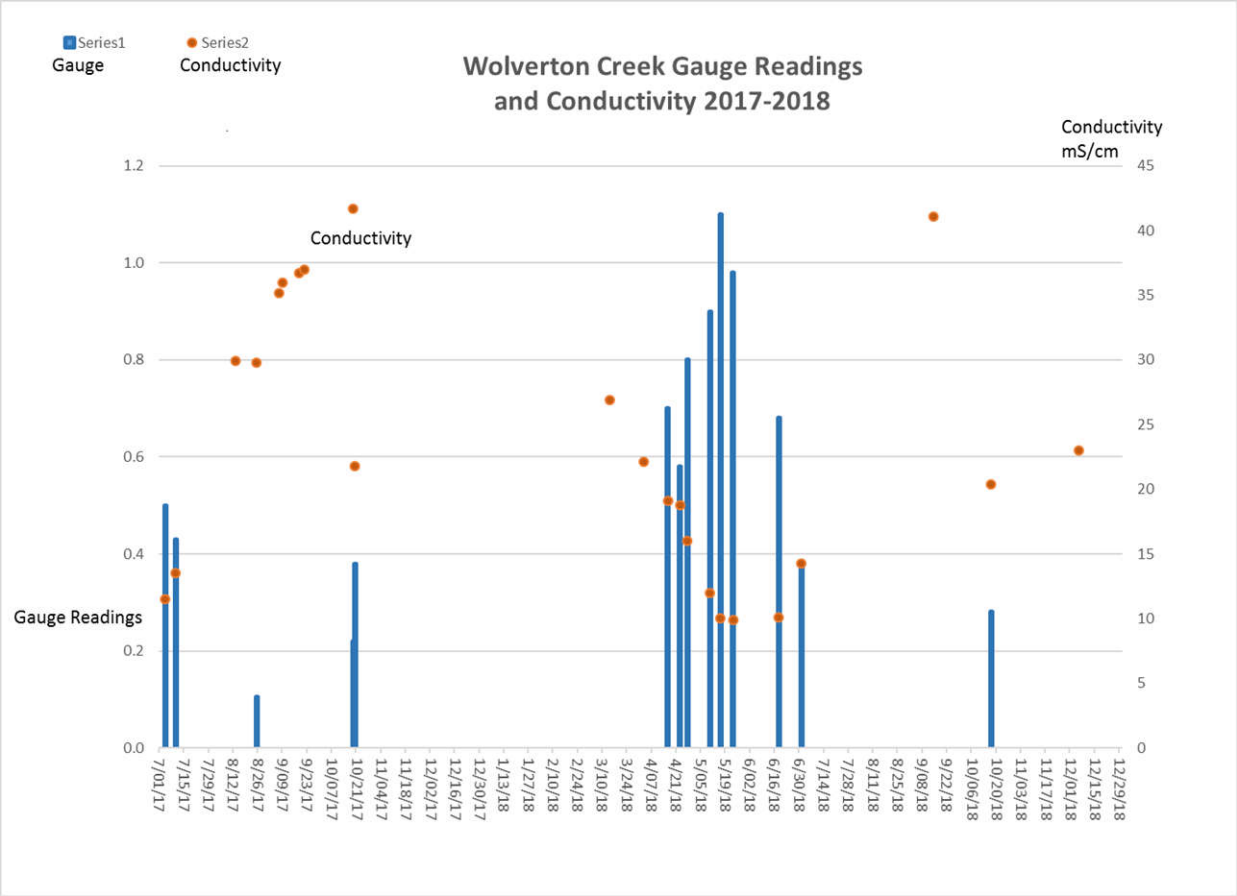
Conductivity and Gauge

Conductivity is expressed as "specific conductance or microseimens per cm at 25 degrees C".
It is a measure of the ability of water to carry an electric charge and is directly related to the concentration of dissolved ions. E.g. as the total minerals and organic compounds dissolved in the water increases, the conductivity of the water also increases. There is usually an inverse relation between conductivity and flow. For example, as flow increases, dissolved minerals decrease & conductivity decreases.



Historic Conductivity

Year	Minimum Conductivity and date occurred (uS/cm)	Maximum Conductivity and date occurred (uS/cm)
2013	8.8 6/09)	33.5 (9/18)
2014	11.2 (5/28)	62.3 (7/18)
2015	12.5 (5/25)	48 (7/09)
2016	10.4 (6/8)	64.2 (10/8)
2017	9.9 (5/23)	41.7 (10/19)
2018	11.5 (7/4)	41.1 (9/14)

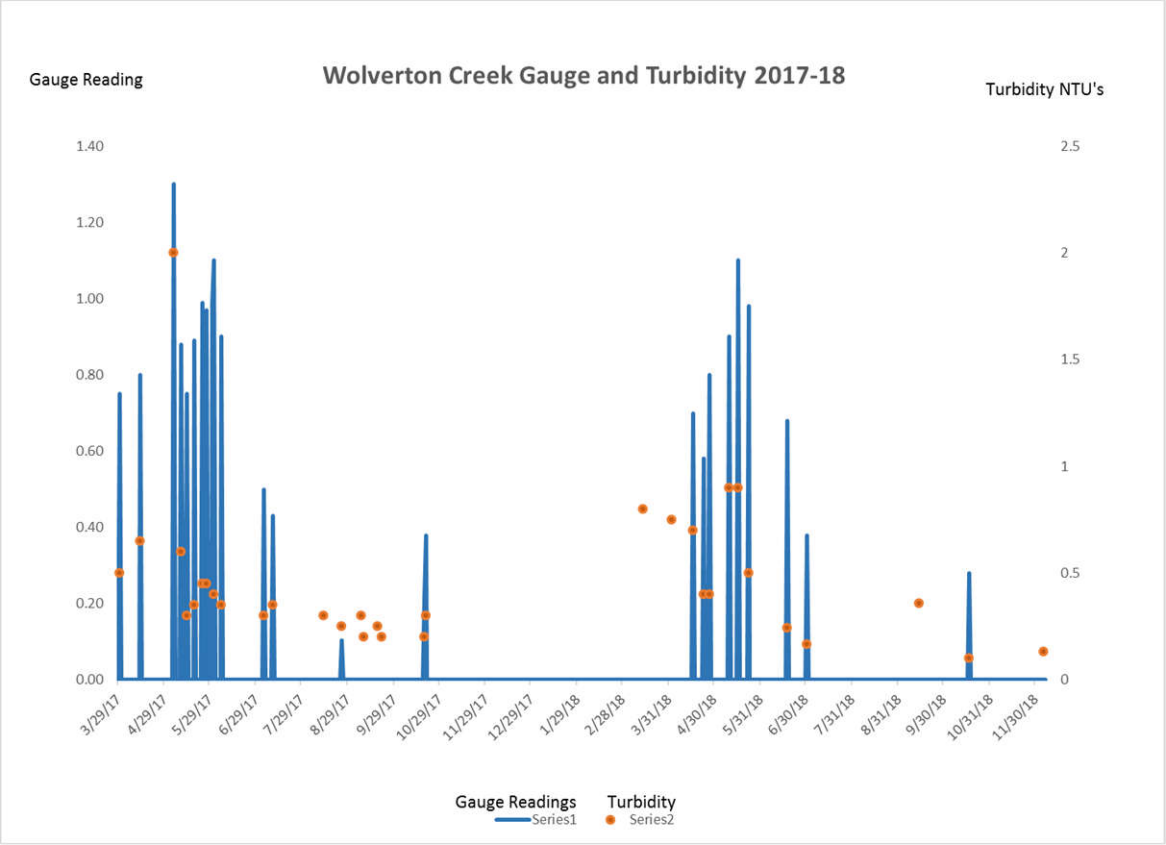
Turbidity

Turbidity is a "measure of the relative clarity of water. It is caused by colloidal matter, such as clay, silt, finely divided organic and inorganic matter, plankton and other microscopic organisms suspended in the water. It is not a direct measure of suspended particles in the water. Rather, turbidity measures of the scattering effect that particles have on light.

The most important health-related effect of turbidity is the fact that particles can shield microorganisms from disinfection. Turbidity has been shown to be correlated with the contamination of water by *Giardia* and *Cryptosporidium* and serves to estimate the risk of contamination by these pathogens. Ministry Guideline limits for turbidity in drinking water are 1NTU. NTU's refers to "nephelometric turbidity units" and is a scale developed for this test.

Generally, Wolverton has very low turbidity. In 2017, twenty-two samples were collected and only one was over 1NTU. In 2018 all samples were less than 1 NTU.

Turbidity Chart



Wolverton Creek Year	Highest Turbidity Reading	%Samples less than 1 NTU	Number of Samples (n)
2017	2	94	18
2018	0.9	85	13

Fecal Coliform Bacteria

Coliforms refers to a group of bacteria that have been used for over 90 years as indicators of water potability. Their presence indicates that other pathogenic organisms of fecal origin may be present. These may include other bacteria, viruses, protozoa (giardia, cryptosporidium) and multicellular parasites. Provincial guidelines for drinking water state that no total, fecal coliforms or E.coli should be present. This is normally achieved by chlorinating the water. However, total coliforms are usually from a plant source and not associated with human infection. Of the three samples collected in 2017, two had both fecal coliforms and E.coli. However, the samples were taken from residential sources not at the creek. In 2018, three of the four samples contained fecal coliforms and E.coli. *Elevated counts are a reminder of the fact that Wolverton, like other creeks, is at risk for contamination - especially during summer when water temperatures are higher*.

Coliform Bacteria Test Results for 2016 - 2018.
Taken at the gauge site (except where noted)

Date	Fecal Coliforms CFU/100ml	E.coli CFU/100ml
7/1/2016	28	8
8/14/2016	0	0
9/2/2016	1	2
9/24/2016	0	2
10/4/2016	1	2
8/14/2017 Taken at Doug's unfiltered	7	7
8/15/2017 Taken at Judy's unfiltered	6	6
9/07/2017	0	0
8/14/2018	3	3
8/23/2018	0	0
9/14/2018	16	10
11/07/2018	4	4

CFU = colony forming units

References

1. Wolverton Creek Monitoring Summary Report 2016 - 17, Jennifer Yeow, Passmore Laboratory Ltd.

2. Wolverton Creek Hydrogeomorphic Assessment December 5, 2006, Apex Geoscience Consultants Ltd.

3. Water Survey Canada's website: http://scitech.pyr.ec.gc.ca/waterweb

4. Water quality guidelines from the Provincial Govt's website: http://www.env.gov.bc.ca/wat/wq/BCguidelines/approv_wq_guide/approved.html#1

5. Monitoring Guidelines to Evaluate the Effects of Forestry Activities on Streams in the Pacific Northwest & Alaska L.H McDonald EPA 910/9-91-001