Wolverton Creek Monitoring

Report 2015

Photo Credit: Jennifer Yeow

Report Prepared For:

The Wolverton Creek Water Users and Kalesnikof Lumber Ltd.

Report Prepared By:
Passmore Laboratory Ltd.
Winlaw
V0G 2J0

July, 2015

Wolverton Creek Summary Report for 2015

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 Water users collected data that contributed to this report. Thankyou to Judy Laret, Doug Adair and Ruth Hackett for collecting samples.

The program
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 reading of in stream flow gauges, calibration of gauges by flow 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 in 2015 readers collected 24 samples based on the following criteria:

- 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

The samples were tested for turbidity and conductivity. If turbidity is greater than 1NTU, total suspended solids were performed.

Between July 13th and Sept 9th, 7 samples were collected aseptically by an employee of Passmore Laboratory Ltd and tested for total coliforms, thermotolerant coliforms and E.coli.

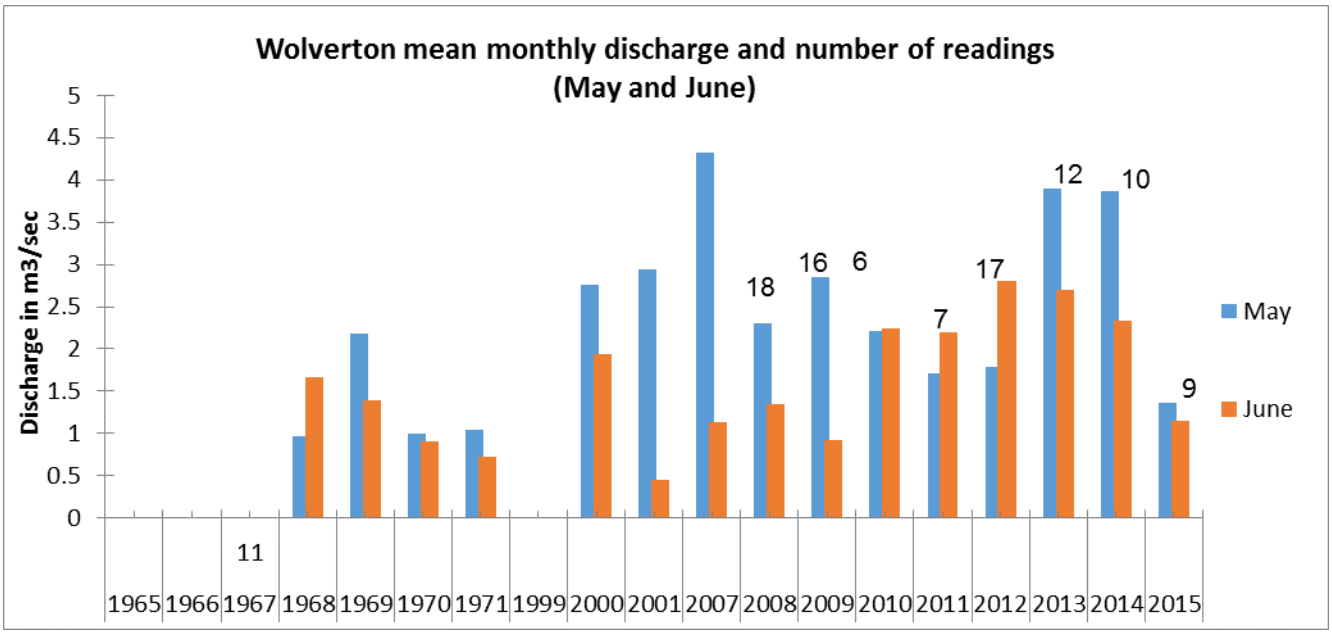
The objectives of the program are to:

1. **Collect water quality and flow data using a systematic sampling regime**
2. **Determine the number of days per year that parameters exceeded 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 km2 in size, and Wolverton Creek is 5.47 km in length. It is a second order stream with a northeast aspect.

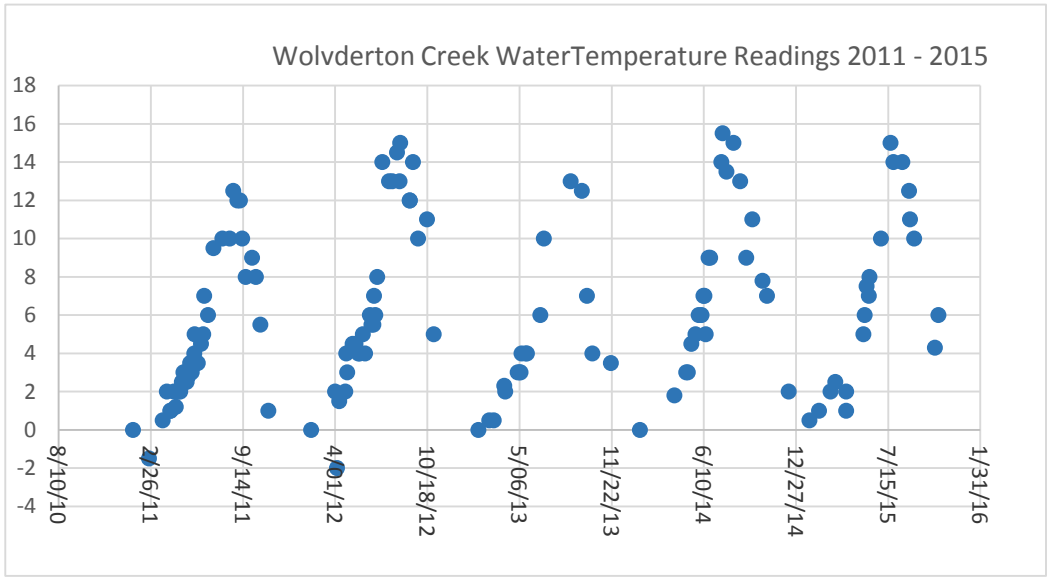
Flow



* Indicates number of readings taken during May and June combined.

Historically, Wolverton Creek experiences high flow in May. The creek was monitored by Water Survey Canada between 1965 and 1971. The current program has been monitoring flow for 11 non consecutive years. Years 2002 - 2006 were not monitored. It appears that May, 2007 and 2013 and 2014 were relatively high flow years when compared with 2015.

Temperature



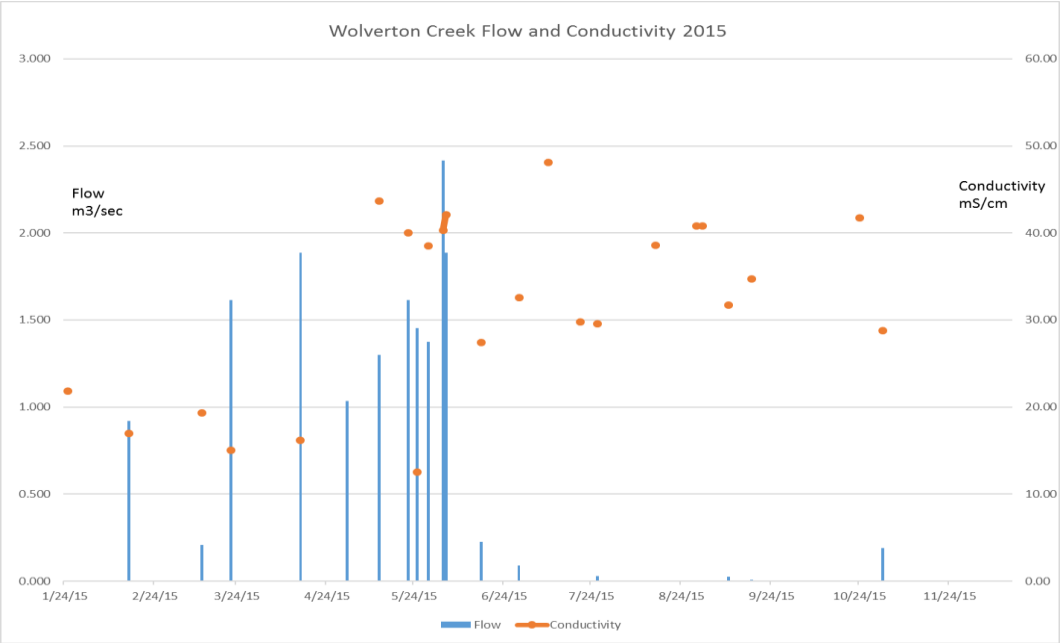
The chart above shows Wolverton Creek Water remains relatively cool (less than 15 degrees centigrade) for most of the year. Past studies on local creeks have shown that drinking water quality stays high when water temperatures are below 10 degrees C (1). In 2015, seventy percent of the readings were less than 10C.

Conductivity and Flow

Conductivity is expressed as "specific conductance 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 in the water. E.g. 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. For example, as flow increases, dissolved minerals decrease & conductivity decrease. Conductivity can also vary when disturbance occurs in the watershed (6). In Fall, when flow decreases, conductivity (and mineral content) rises. Below is the chart for conductivity vs. flow for Wolverton Creek between for 2015.

Historically, Wolverton experiences a sharp decline in flow every year around the middle of June. As can be seen in the chart below this occurred at the end of June.

Regarding low flow, historically 2-3 of the readings were below 0.01m3/sec in August – October, the low flow time of year. In 2015, 8 readings were below 0.01m3/sec.



Conductivity and Flow

Year	Minimum Flow and date occurred (m3/sec)	Maximum Flow and date occurred (m3/sec)	Minimum Conductivity and date occurred (uS/cm)	Maximum Conductivity and date occurred (uS/cm)
2011	0.027 (9/07)	3.168 (5/26)	10.7 (6/22)	34.2 (9/20)
2012	0.003 (9/28)	3.871 (6/05)	9.4 (7/01)	38.7 (9/28)
2013	0.006 (8/25)	6.64 (5/22)	8.8 (6/09)	33.5 (9/18)
2014	0.002 (9/23)	5.29 (5/23)	11.2 (5/28)	62.3 (7/18)
2015	0.024 (9/9)	2.42 (6/03)	12.5 (5/25)	48 (7/09)

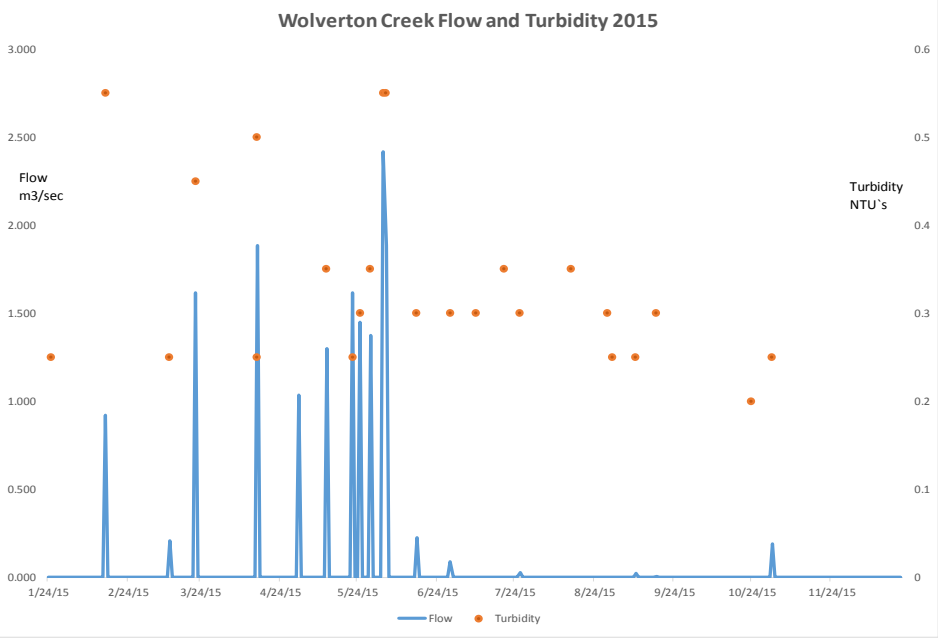
Turbidity

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 such particles have on light.

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

The protocol for this program is to measure suspended sediment on samples over 0.5NTU.

Generally, Wolverton has very low turbidity. In 2015, over eighty-five percent of the samples collected were less than 0.5NTU.



Turbidity Chart

Wolverton Creek Year	Highest Turbidity Reading	%Samples greater than 0.5NTU	Number of Samples
2015	0.55	12.5	24

Coliform Bacteria

Coliforms refer 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 may include other bacteria, viruses, protozoa (giardia, cryptosporidium) and multicellular parasites. There are no Provincial guideline limits for total coliforms in untreated drinking water but thermotolerant (fecal) coliforms and E.coli are not permitted.

The counts in 2015 were lower than seen in 2014. Three samples were taken from water users homes in mid August and early September. A low count of 1/100ml fecal coli was seen in one sample.

As a surface water source, Wolverton, like other creeks, is at risk for contamination especially during summer.

Coliform Bacteria Test Results for 2015. Taken at the gauge site

Date	Fecal Coliforms CFU/100ml	E.coli CFU/100ml
7/13/2015	1	1
8/20/2015	0	0
8/30/2015	0	0
9/04/2015	1	1
9/09/2015	1	1
9/17/2015	1	1
9/23/2015	0	0

References

2. Wolverton Creek Monitoring Summary Report 2014, Jennifer Yeow, Passmore Laboratory Ltd.

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

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

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

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