

## Stream Water Chemistry Report Summary

Stream Name: Old Woman's River

Water Chemistry Parameters	Observed Value					Standard
	2013	2014	2015	2016	2017	
<b>Total Suspended Solids (mg/L)</b>	8.17 ± 2.44	6.88 ± 2.64	5.01 ± 6.89	6.70 ± 4.49	4.89 ± 5.97	< 8.9
<b>Alkalinity (mg/L)</b>	250.29 ± 16.35	257.25 ± 17.66	233.00 ± 74.05	207.15 ± 42.80	274.21 ± 40.49	> 130
<b>Chloride (mg/L)</b>	24.07 ± 2.50	22.57 ± 2.70	19.58 ± 6.63	18.49 ± 6.15	18.08 ± 5.72	
<b>Total Phosphorus (mg/L)</b>	0.04 ± 0.01	0.03 ± 0.01	0.02 ± 0.01	0.04 ± 0.02	0.03 ± 0.05	< 0.01 - 0.03
<b>Chlorophyll a Content (mg/L)</b>	1.24 ± 0.37	0.28 ± 0.40	1.66 ± 0.98	4.72 ± 6.83	2.02 ± 1.88	
<b>Temperature (°C)</b>	14.96 ± 1.61	14.00 ± 1.61	14.97 ± 3.64			
<b>pH</b>	8.00 ± 0.15	7.90 ± 0.13	7.73 ± 0.32			Between 6.5-8.5
<b>Conductivity (spc)</b>	0.475 ± 0.05	0.534 ± 0.05	0.622 ± 0.37			
<b>Dissolved Oxygen (mg/L)</b>	7.10 ± 0.66	7.56 ± 0.66	7.73 ± 2.89			> 6.0
<b>Total Organic Nitrogen (mg/L)</b>	0.63 ± 0.04	0.58 ± 0.04	0.57 ± 0.21	0.77 ± 0.35	0.62 ± 0.14	< 1.1
<b>Caffeine (µg/L)</b>			0.0216 ± 0.031			

The water quality at Old Woman's River has remained relatively stable across the past five years. There has been a trending, but not statistically significant, decrease in total suspended solids at this site. Specifically, we have observed a 40% decrease in total suspended solids in this stream between 2013 and 2017. Throughout the entire five-year monitoring program this stream has remained well within the recommended guidelines for total suspended solids and is now approaching levels comparable to the reference stream (Black Creek).

We have observed no statistically significant or trending decrease in total phosphorus or total organic nitrogen at Old Woman's River. These trends indicate that cattle wastes are either a minor input of nutrients in this watershed or their wastes are deposited on land but are still entering the stream during storm events. As the 2015 caffeine levels at Old Woman's River were the highest of any stream in the Six Streams monitoring program, it is also possible human wastes are an important source of nutrients in this system.

Across the five years of data collected at Old Woman's River the extreme weather events of 2016 coincided with particularly poor water quality at this site. Low chloride and alkalinity values indicate increased rainwater inputs into this watershed, which pairs with the 22% and 208% increase in total organic nitrogen and chlorophyll a content above 2013 values. By 2017 the total organic nitrogen levels decreased back to relatively average concentration for Old Woman's River, with a corresponding decrease in chlorophyll a content as well. That said, we generally observe a negative linear regressive relationship between chlorophyll a values and chlorine ( $P = 0.007$ ;  $R^2 = 0.10$ ) as well as a near significant relationship with alkalinity ( $P = 0.051$ ;  $R^2 = 0.04$ ). We do not observe a significant relationship of any type between chlorophyll a and total organic nitrogen ( $P = 0.895$ ;  $R^2 < 0.001$ ) or total phosphorus ( $P = 0.536$ ;  $R^2 < 0.001$ ). As such, it is likely inorganic nitrogen inputs are driving chlorophyll a trends at this site, such as  $\text{NO}_3^-$  — a nitrogen compound readily taken up by plants known to be highly mobile during storm events.