MEMO TO FILE

Date: 2024-09-18

File: Cherryville

RE: Summary of the Cherryville Area – *Escherichia coli* (*E. coli*) Data Review

Introduction

The residents of Cherryville have expressed concern about fecal contamination in the surface water of the Shuswap River Watershed (the watershed). Two stewardship groups have been sampling surface water for *Escherichia coli* (*E. coli)* and other parameters since 2009. This memo will examine their recently collected *E. coli* data (August 2022 to May 2024), as well as historical *E. coli* data collected by the stewardship groups and the Ministry of Environment and Climate Change Strategy (ENV) that is available in the ENV database.

Background

Cherryville lies within the Shuswap River Watershed which includes Bessette Creek, Cherry Creek, Ferry Creek, Half Mile Creek, Monashee Creek, and Vance Creek, which all flow into the Shuswap River. Within the Bessette Creek sub-watershed are the tributaries of Harris Creek, Duteau Creek, Mid Bessette Creek, and Lower Bessette Creek. The watershed provides ample recreation opportunities, is used for agricultural and private domestic purposes, and is habitat for aquatic species, such as salmon. The Village of Lumby's wastewater treatment plant is situated along Bessette Creek, to the north of the Village of Lumby, and is permitted by ENV to discharge treated wastewater to Bessette Creek (ENV, 1991).

Since 2009, trained volunteers from the Cherryville Water Stewards and Lower Shuswap Stewardship Society have been collecting and analyzing water quality data in the Cherryville area (Figure 1). ENV has also collected samples periodically between 2009-2015 (Figure 1). Between 2022-2024, stewardship groups collected single samples from 12 sites in May, August and November of each year. In February 2024 a new sampling location was added (Sugar Lake Rd. 1 km). This sampling location is a culvert draining agricultural land and was sampled in February and April 2024.

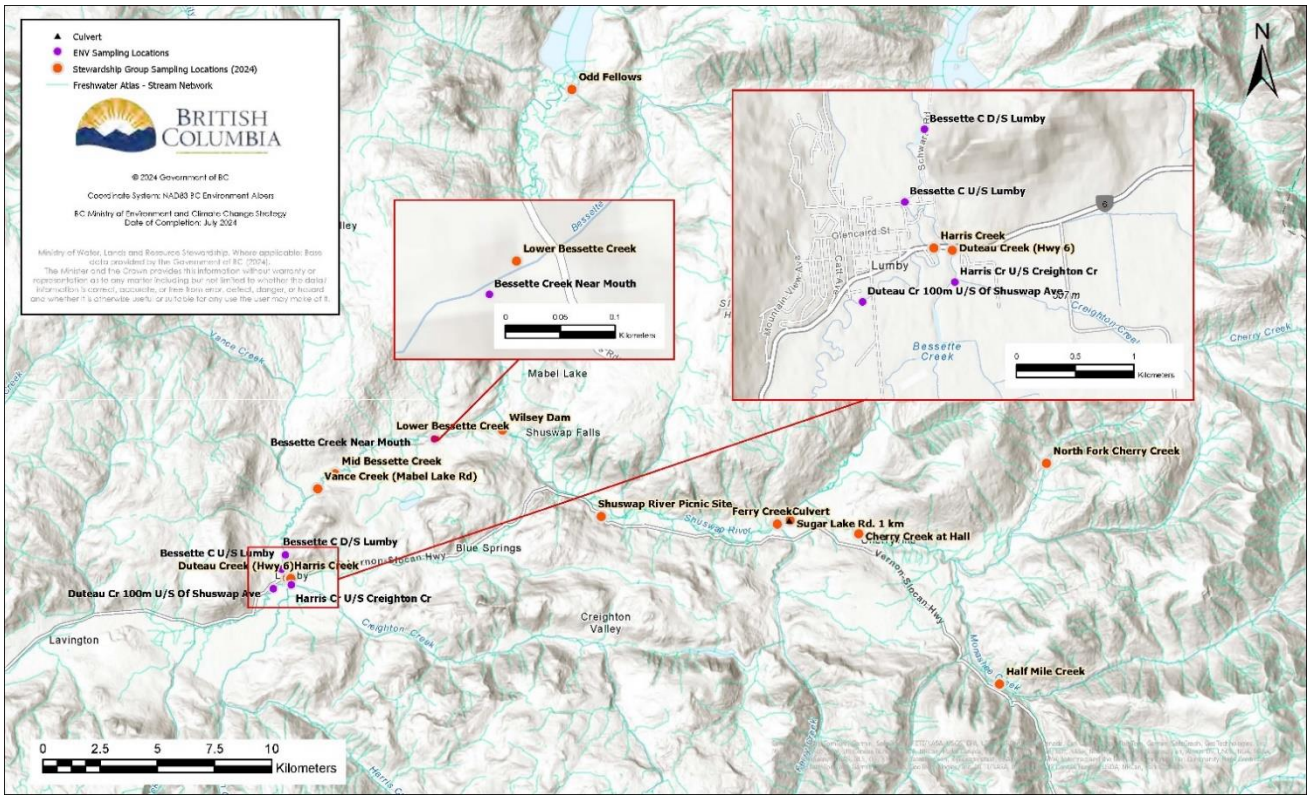

Figure 1. ENV and stewardship groups' sampling locations. The new sampling site of the culvert on Sugar Lake Rd. 1 km is also shown. Note: ENV and the stewardship groups may sample at the same sites.

Applicable Water Quality Guidelines for *E. coli*

Microbiological contamination can enter waterbodies from agricultural land use, stormwater runoff, septic leakage, domestic animals, and wildlife (Health Canada, 2023). Microbiological indicators are microscopic organisms used to indicate the possible presence of pathogens that may impact human health. While fecal coliforms, *E. coli*, and enterococci are all used as microbiological indicators of pathogenic bacterial levels, *E. coli* are currently the preferred freshwater indicator (Health Canada, 2023).

BC Water Quality Objective (WQOs) were established for Bessette Creek and tributaries in 1991 (ENV, 1991). However, the province has since established approved BC Water Quality Guidelines (WQGs)[1] based on up-to-date science, so the data was not compared to these older provisional WQOs (ENV, 1991).

Bacteriological samples tend to be highly variable in freshwater creeks. Many benchmarks (WQGs and WQOs) are therefore based on calculating a geometric mean from multiple samples collected over time. ENV commonly samples at a frequency of five samples collected over 30 days. This sampling frequency captures variable conditions in the environment, and the geometric mean analysis addresses the potential high variability in the samples. Many approved BC WQGs, which are applicable to water uses in the watershed, require a minimum of five samples in 30 days to be

[1] https://www2.gov.bc.ca/gov/content/environment/air-land-water/water/water-quality/water-quality-guidelines/approved-water-quality-guidelines

collected for comparison. This incudes WQGs for livestock, irrigation, source drinking water, and recreational uses.

The frequency of the sampling in 2022-2024 (approximately one sample per spring, summer, and fall season) did not meet the requirements for comparison to most of the BC WQGs for *E. coli*. There is, however, a BC Recreational Water Quality Guideline (BC RWQG) for primary contact recreational uses that single samples can be compared to which has a maximum of 400 /100 mL (ENV, 2019).

Results Assessment

August 2022-May 2024 Data

Examination of the data found that two samples exceeded the BC RWQG (400 /100 mL), at two different locations, both in the Bessette Creek Watershed where the recreational guideline was applicable (Table 1):

- Mid Bessette Creek: 511 MPN/100 mL on August 14, 2022, and
- Harris Creek: 687 MPN/100 mL on May 12, 2024.

Table 1: August 2022 to May 2024 Stewardship Analytical Data

Sample Locations	**2022-08-14**	**2022-11-13**	**2023-05-14**	**2023-08-13**	**2023-11-19**	**2024-02-19**	**2024-04-02**	**2024-05-12**
Bessette Creek Watershed								
Harris Creek (Hwy 6)	271	23	24	293	17	-	-	**687**
Duteau Creek (Hwy 6)	305	19	215	82	24	-	-	210
Mid Bessette Creek	**511**	93	72	107	34	-	-	248
Lower Bessette Creek	307	66	105	74	11	-	-	291
Vance Creek (Mabel Lake Rd)	54	1	2	56	15	-	-	5
Middle Shuswap River								
Shuswap River (Wilsey Dam)	21	2	8	13	1	-	-	11
Shuswap River (Odd Fellows)	30	4	77	18	<1	-	-	70
Shuswap River Picnic Site	3	1	10	5	1	-	-	6
Cherry Creek								
North Fork Cherry Creek	8	<1	1	8	2	-	-	1
Half Mile Creek	1	<1	<1	1	<1	-	-	<1
Cherry Creek at Hall	6	2	10	10	<1	-	-	1
Upper Middle Creeks								
Ferry Creek	9	1	1	46	<1	-	-	<1
Sugar Lake Rd. 1 km	-	-	-	-	-	>2420	248	-

Note: All units are MPN/100 mL. Exceedances of the applicable guideline are bold and shaded.

E. coli concentrations in the other areas (Middle Shuswap River area and Cherry Creek area) were lower than in the Bessette Creek Watershed. Samples from these other areas were all below 100 MPN/100 mL and did not exceed the BC RWQG for primary recreational use.

The highest *E. coli* concentration recorded (> 2,240 MPN/100 mL) was from the Sugar Lake Rd. 1km site within the Upper Middle Creeks area. This sample was collected from a culvert draining agricultural lands in February 2024 and is not considered appropriate to compare to the BC RWQG.

On the next sampling date (April 2, 2024), the *E. coli* concentration was significantly lower (248 MPN/100 mL).

Historical Data

To help determine if *E. coli* concentrations in the area may be increasing or decreasing overall, the ENV Environmental Monitoring System (EMS) database was queried for historical *E. coli* data in the Cherryville area (Figure 2).

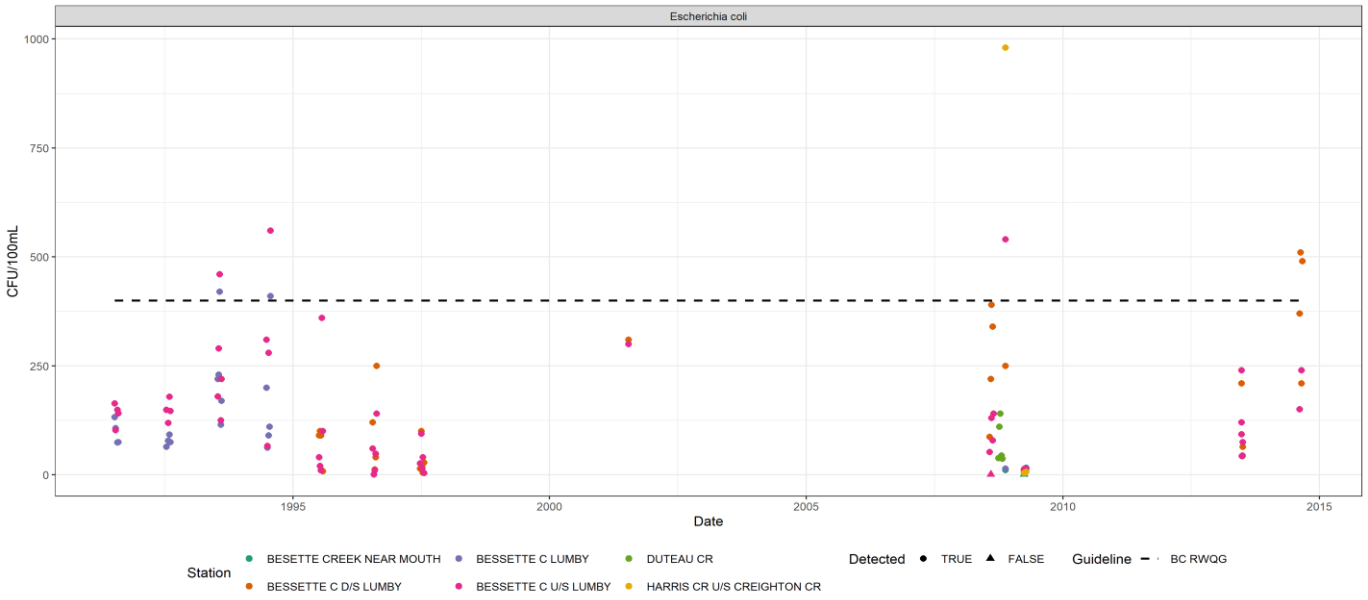

Figure 2. Historical *E. coli* Results Available in EMS. Results in EMS for *E. coli* are in CFU/100mL, whereas the stewardship group results are in MPN/100mL. CFU/100 mL and MPN/100 mL are generally considered equivalent units as the method varies depending on characteristics of the sample.

Historical *E. coli* samples were also not collected at the frequency required for application of other WQGs besides the single sample BC RWQG of 400 /100 mL for primary recreational use (ENV, 2019). In the historical data there were eight exceedances of the BC RWQG. Overall, the historic results were similar to the stewardship groups' August 2022 to May 2024 data showing little change from historic to the recent data collected.

Conclusions

While the current field programs are not comprehensive in frequency and sampling quality assurance and quality control (QA/QC) protocols, it can be inferred from the results that more work is warranted to look at sources of *E. coli* within the watershed. Based on the August 2022 to May 2024 results, the Bessette Creek Watershed (particularly the Harris Creek and Mid Bessette Creek sampling locations) was observed to have higher *E. coli* concentrations than other areas monitored and exceeded the BC RWQG for primary contact recreation on two occasions.

The historical ENV data for *E. coli* incorporates the Bessette Creek Watershed only and based on a previous report, inputs of fecal bacteria to the Bessette Creek Watershed are widespread and likely enter the system through multiple and diffuse sources (ENV, 2008). The concentrations of *E. coli* in some months within Bessette Creek Watershed were high. Sample locations in the Bessette Creek Watershed are within the Village of Lumby or are surrounded by agricultural land use. Harris Creek

had the highest *E. coli* values within the Bessette Creek Watershed for both the recent stewardship data (687 MPN/100 mL) and the historic ENV data (980 CFU/100 mL). Duteau Creek, on the other hand, had no exceedances of the BC RWQG in both data sources.

Despite the exceedances in the Bessette Creek Watershed, the Middle Shuswap River is where most recreation takes place (Wilsey Dam - Shuswap River, Odd Fellows - Shuswap River, and Shuswap River Picnic Site), and *E. coli* results did not exceed BC RWQGs for recreational water use at the sample locations near these recreational locations.

The highest *E. coli* concentration (>2,240 MPN/100 mL) occurred at Sugar Lake Rd. 1 km, which was sampled at a culvert next to agricultural lands in February 2024. This is not a recreational area nor a time of year when recreational activity occurs. A second sample at this location (April 2024), had a significantly lower *E. coli* concentration (248 MPN/100 mL). The February sample likely captured snowmelt and/or surface water runoff from a storm event and suggested an issue with upland fecal matter sources. The high *E. coli* value at the Sugar Lake Rd. 1 km site in February 2024 triggered an inspection of the cattle operation above this culvert by the ENV Compliance and Environmental Enforcement Branch (CEEB). The inspection found some instances of non compliance and the follow-up report can be viewed at this link: CEEB Reports

Microbiological data tends to be variable in nature due to differing inputs, weather conditions, and sample collection timing and requires a sampling program that is comprehensive in frequency and sampling QA/QC protocols; therefore, it is difficult to establish an increasing trend with the current data set. However, the data does demonstrate a consistent input of *E. coli* throughout the watershed with higher concentrations in the Bessette Creek Watershed.

Recommendations

The following recommendations would help address future water quality concerns in the watershed:

- Encourage the stewardship groups to establish a sampling program including QA/QC protocols that are consistent with the Surface Water Quality Stewardship Toolkit.
- Encourage the stewardship groups to forward water quality concerns, such as the February 2024 results at Sugar Lake Rd. 1 km, immediately to the RAPP line along with photos. Reports can be made via phone or online at RAPP Reporting

References

British Columbia Ministry of Environment and Climate Change Strategy (ENV). 2019. BC Recreational Water Quality Guidelines: Guideline Summary. Water Quality Guideline Series, WQG-02. Prov. B.C., Victoria B.C. recreational_water_quality_guidelines_bcenv.pdf (gov.bc.ca)

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