

## Group 2: Jackson Creek & West Plum Creek – 2023

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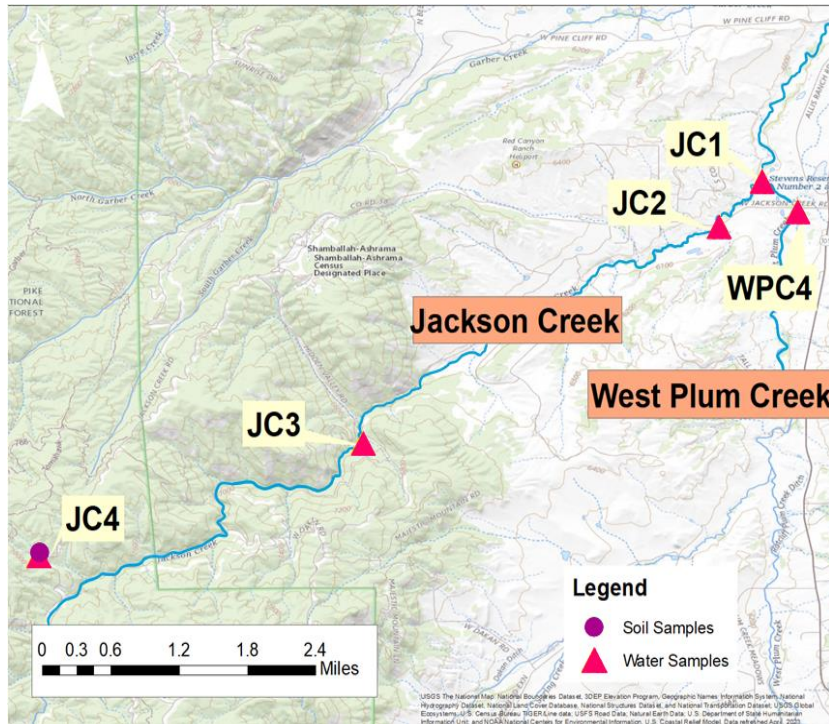


Figure 1. Site map of locations tested by Group 2.



Figure 2. Confluence of Jackson Creek into West Plum Creek (5-19-23).

Table 1. Site information

Site ID	Latitude	Longitude	Site Description
JC1	39°21'3.18"N	104°58'31.67"W	Jackson Cr. upstream from confluence with W. Plum Cr.
JC2	39°20'44.73"N	104°58'51.86"W	Jackson Cr. at Jackson Creek Rd
JC3	39°19'15.96"N	105° 1'34.98"W	Jackson Cr. at Hidden Valley Rd
JC4	39°18'10.20"N	105° 3'50.76"W	Tributary of Jackson Cr. in Pike NF
WPC4	39°20'50.67"N	104°58'15.65"W	W. Plum Cr. at Jackson Creek Rd

### Main Findings

- At WPC4 Total Coliform decreased by over 57% and *E. coli* increased by 260% since 2022
- At JC2 Total Coliform decreased by 99.8% and *E. coli* decreased by 95% since 2022
- Jackson Creek contributes 33% of flow in W. Plum Creek but does not substantially impact the COC loading
  - Concentrations at JC1 were lower than those at WPC4 for all parameters (except  $\text{NO}_3^-$ ) indicating the COCs are not coming from Jackson Creek
- Thallium likely coming from weathered granite, sequestered in clay soils
  - Mobilized during wet seasons
- Nitrogen levels exceed standards in Proposed Regulation 38 at JC1, JC2, and WPC4
  - Increased risk of algal blooms
- As and Se concentration were below detection level for all sites except at JC4 where Se exceeded Proposed Regulation 38 standards

Table 2. Measured water quality parameters and flow rates

Date	Site ID	pH*	Conductivity ( $\mu\text{S}/\text{cm}$ )	Temp** ( $^{\circ}\text{C}$ )	Dissolved Oxygen <sup>^</sup> (mg/L)	Alkalinity <sup>^</sup> (mg $\text{CaCO}_3/\text{L}$ )	Turbidity (NTU)	Flow Rate (cfs)
5/16/2023	JC4	7.04	85.1	12.6	7.44	23.6	10.8	0.2
5/16/2023	JC3	7.38	56.0	9.4	8.31	15.8	31.1	182
5/16/2023	JC2	7.24	65.3	12.9	7.01	18.9	52.1	70
5/16/2023	WPC4	7.4	117.5	14.9	7.99	33.9	129	123.6
5/16/2023	JC1	7.25	62.3	18.4	7.52	18.6	55.6	60

N/M = Not Measured; \*Standard limit 6.5 to 9 [4]; \*\*Daily Max 24.3 $^{\circ}\text{C}$ ; <sup>^</sup>Standard min 6.0 mg/L [4]; <sup>^</sup>Standard limit 20 mg  $\text{CaCO}_3/\text{L}$  [1]

**Table 3.** Metals, anions, solids, organics, nutrients, and pathogens

2023 Group 2 – Jackson Creek & West Plum Creek			Concentrations												
			Metals (mg/L)					Anions (mg/L)		Solids (mg/L)	Organics (mg/L)	Nutrients (mg/L)		Pathogens (mpn/100 mL)	
			As	Fe	Mn	Se	Tl	NO <sub>2</sub> <sup>-</sup> - N	NO <sub>3</sub> <sup>-</sup> - N	TSS	TOC	P	TN	Coliform	<i>E. coli</i>
EPA	Aquatic Life Chronic [1]		0.15	1.0	-	-	-	-	-	-	-	-	-	-	
	Aquatic Life Acute [1]		0.34	-	-	-	-	-	-	-	-	-	-	-	
	Human Recreation [2]		1.8E-05	-	0.05	0.17	2.4E-04	-	10	-	-	-	-	-	
	Drinking Water [3]		0.01	-	-	0.05	0.002	1	10	-	-	-	-	-	
	Secondary Drinking Water [3]		-	0.3	0.05	-	-	-	-	-	-	-	-	-	
CDPHE	Regulation 38 Chronic [4]		2.0E-05*	1.0*	1.7**	0.0046	-	0.05	-	-	-	0.11 <sup>▲</sup>	0.53*	-	126
	Regulation 38 Acute [4]		0.34	-	3.1**	0.0184	-	-	10	-	-	-	-	-	
USDA	USDA Livestock [5]		0.01	0.3	0.05	0.05	-	10	30	-	-	-	-	200	-
	Detection Limit (mg/L)		0.0168	0.0003	0.0001	0.0109	0.0049	0.1	0.1	-	0.17	0.029	0.17	1	1
Sample	Site ID	Date	As	Fe	Mn	Se	Tl	NO <sub>2</sub> <sup>-</sup> - N	NO <sub>3</sub> <sup>-</sup> - N	TSS	TOC	P	TN	Coliform	<i>E. coli</i>
Water	JC4	5/16/2023	BDL	0.24	0.003	<b>0.011</b>	BDL	BDL	BDL	2	6.7	BDL	0.14	330	BDL
	JC3	5/16/2023	BDL	0.23	0.010	BDL	BDL	BDL	0.12	23.4	7.6	BDL	0.30	10	10
	JC2	5/16/2023	BDL	0.16	0.021	BDL	<b>0.006</b>	BDL	0.18	268	8.5	0.034	0.67	6.1	5.1
	WPC4	5/16/2023	BDL	<b>1.1</b>	0.026	BDL	BDL	BDL	0.17	176	20	<b>0.74</b>	<b>2.5</b>	330	170
	JC1	5/16/2023	BDL	0.04	0.021	BDL	BDL	BDL	0.21	66.7	8.9	BDL	1.2	100	56
Soil	JC4-S	5/16/2023	BDL	NM	0.005	NM	0.006	0.028	0.37	NM	NM	NM	NM	NM	NM
<b>Notes:</b> A/BDL = Above/Below Detection Limit N/M = Not Measured *Total Recoverable Standards (all other standards are for dissolved metals) **Calculated using Table Value Standards assuming 111 mg CaCO <sub>3</sub> /L average low flow hardness [6] ▲Phosphorus standard is 0.03 mg/L within Chatfield Reservoir and 0.11 mg/L for most tributaries *Average of Regulation 38 proposed standards for cold and warm waters For information on other constituents, please see Data Appendix <b>Bold</b> values represent total metal concentrations. All other concentrations are dissolved. For information on other constituents, please see Data Appendix.								[1] US EPA National Recommended Water Quality Criteria - Aquatic Life Criteria Table; freshwater standards ( <a href="https://www.epa.gov/wqc/national-recommended-water-quality-criteria-aquatic-life-criteria-table">https://www.epa.gov/wqc/national-recommended-water-quality-criteria-aquatic-life-criteria-table</a> ) [2] US EPA National Recommended Water Quality Criteria - Human Health Criteria Table; consumption of water & organisms ( <a href="https://www.epa.gov/wqc/national-recommended-water-quality-criteria-human-health-criteria-table">https://www.epa.gov/wqc/national-recommended-water-quality-criteria-human-health-criteria-table</a> ) [3] US EPA Drinking Water ( <a href="https://www.epa.gov/ground-water-and-drinking-water/national-primary-drinking-water-regulations">https://www.epa.gov/ground-water-and-drinking-water/national-primary-drinking-water-regulations</a> ) [4] CDPHE Regulation 38 for Upper South Platte River Basin ( <a href="https://cdphe.colorado.gov/water-quality-control-commission-regulations">https://cdphe.colorado.gov/water-quality-control-commission-regulations</a> ) [5] USDA Livestock Drinking Water ( <a href="https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs144p2_051302.pdf">https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs144p2_051302.pdf</a> ) [6] Chatfield Reservoir Storage Reallocation Feasibility Study 2013							
<b>Recommendations</b> <ul style="list-style-type: none"> <li>Continue to monitor nutrients in the streams to prevent algal blooms (specifically sites JC1, JC2, and WPC4)</li> <li>Further evaluation on presence of thallium in Chatfield Watershed soils, plants, and water</li> </ul>								<ul style="list-style-type: none"> <li>Investigate bioavailability of thallium to provide insight on the level of concern</li> <li>Conduct flowrate and COC measurements again during normal conditions                             <ul style="list-style-type: none"> <li>Measurements were gathered the week of 5/15 after a historic rainfall event</li> </ul> </li> <li>Investigate the cause of increase in <i>E. coli</i> concentrations at WPC4 (since 2022)</li> </ul>							