Puyallup River Tributaries Effectiveness Monitoring Annual Report: July 2022 – June 2023 (Year 4)

Abstract

The Department of Ecology recently completed the fourth year of a ten-year water quality effectiveness monitoring study on three tributaries to the White River in King County. Monthly monitoring continued at the four long-term status and trends sites located in the drainages of Boise, Pussyfoot and Second Creek, which all flow directly into the White River (tributary to the Puyallup River). This report summarizes bacteria, nutrients, and conventional water quality parameter results from September 2022 through June 2023. Due to a position vacancy, no data was collected in July and August of Year 4. Additional bacteria samples were collected to support source identification efforts by the City of Enumclaw and Ecology's nonpoint staff. More details concerning site locations, sample frequency, methods, etc. are described in the study's Quality Assurance Project Plan[1] (Brownlee 2019).

Report Summary

- Ecology collected samples and measurements once a month at the two Boise Creek status and trend sites from September 2022 through June 2023. Monitoring started in December at Pussyfoot and Second Creek sites due to dry (Pussyfoot Creek) and stagnant (Second Creek) conditions in November. Second Creek was sampled through May, before it ran dry, while Pussyfoot Creek was sampled through June.
- The Boise Creek status and trends site met water quality criteria for *E. coli* during fall and winter seasons, but still exceeded fecal coliform targets set by the Puyallup River watershed TMDL for fecal coliform.
- The status and trends site for Second Creek was moved to the downstream location due to favorable sampling conditions.
- November, January, and March had lower-than-average flows in Boise Creek, while April had significantly higher flows than average (U.S. Geological Survey)
- Second Creek continues to have the highest total nitrogen and phosphorus levels, followed by Pussyfoot Creek.
- Boise Creek tributary, Pussyfoot Creek and Second Creek sites failed to meet the water quality criteria for dissolved oxygen on at least one occasion during Year 4.

[1] https://apps.ecology.wa.gov/publications/SummaryPages/1910040.html

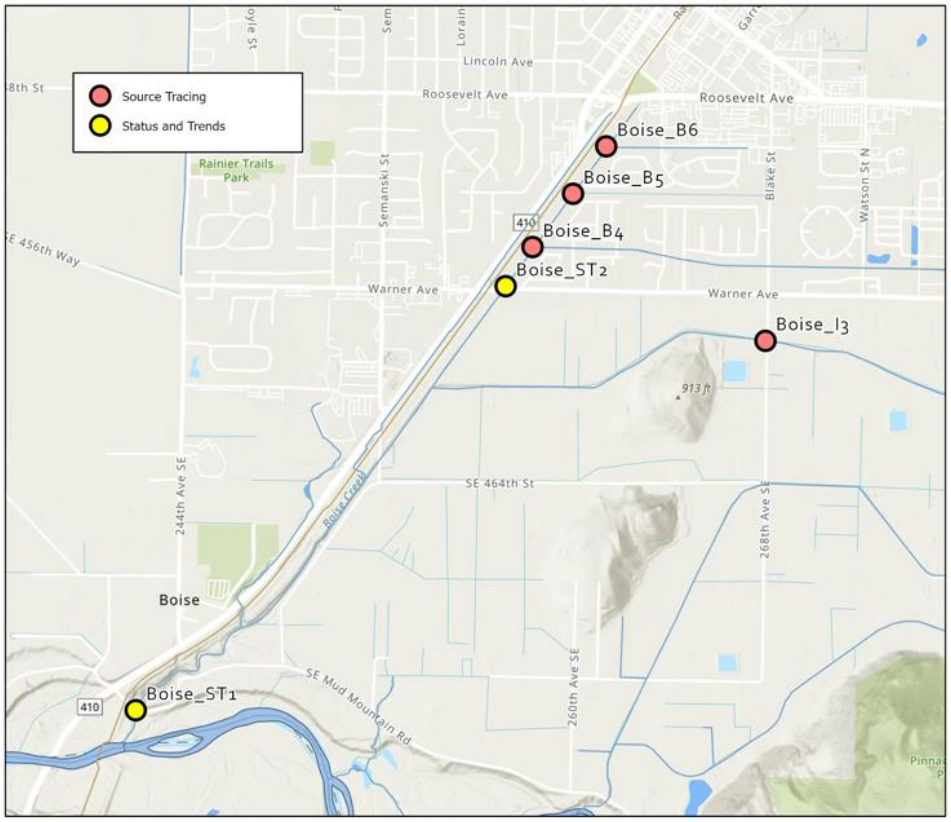

Figure 1. Boise Creek sampling sites during Year 4.

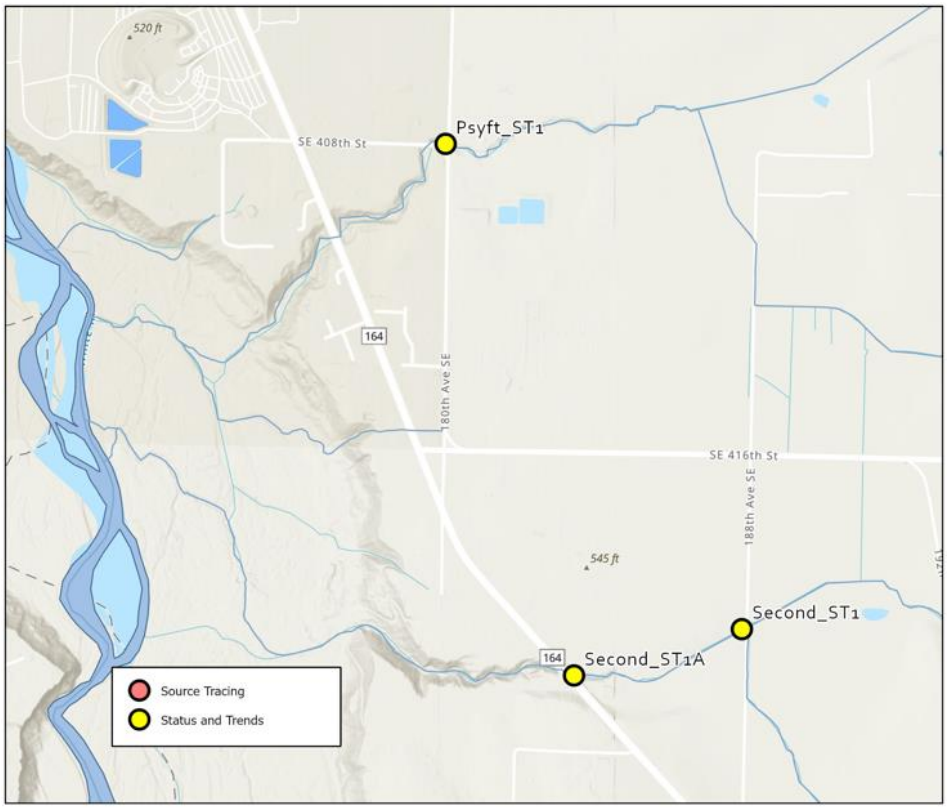

Figure 2. Pussyfoot and Second Creek sampling sites during Year 4.

Precipitation and Flow

The period from July 2022 through June 2023 had lower than average flows than a typical year at the Boise Creek USGS stream gage. This was particularly true during the fall, as well as March, May and June. April had considerably higher flows than average.

Table 1. Total precipitation and average discharge at Boise Creek at Mud Mountain Road Station.

Month	Total Precipitation (inches)	Average Discharge, CFS *(average for all years)*
July	0.99	16.2 *(13.0)*
August	0.07	8.8 *(8.3)*
September	0.11	3.8 *(8.8)*
October	3.19	4.8 *(16.0)*
November	5.59	21.7 *(45.0)*
December	5.85	56.1 *(53.0)*
January	2.58	43.3 *(64.0)*
February	2.99	60.0 *(58.0)*
March	2.19	21.8 *(50.0)*
April	6.21	60.0 *(41.0)*
May	1.67	23.6 *(32.0)*
June	1.85	9.3 *(24.0)*

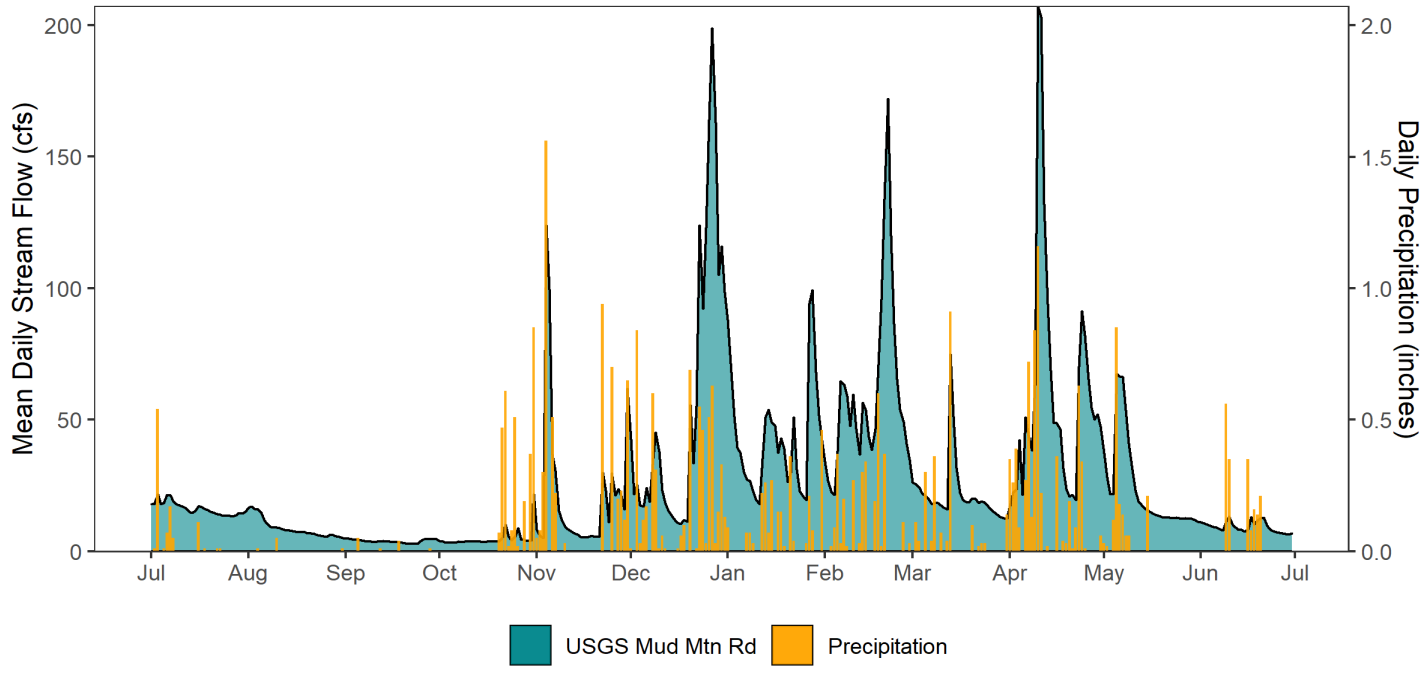

Figure 3. Mean daily stream flow (preliminary data from USGS site 12099600[2]) and daily precipitation (data from King County site 44u[3]) at Boise Creek at Mud Mountain Road station from July 2022 through June 2023.

[2] https://waterdata.usgs.gov/wa/nwis/uv/?site_no=12099600&PARAmeter_cd=00060,00065
[3] https://green2.kingcounty.gov/hydrology/DataDownload.aspx

Bacteria

Bacteria standards state 1) the geometric mean for *E. coli* must not exceed 100 cfu/100mL and 2) no more than 10 percent of all samples (or any single sample when less than ten sample points in an averaging period exist) should exceed 320 cfu/100mL. WAC 173.201A.200 states that it is preferrable to calculate a geomean by season, and the averaging period is not to exceed 90 days. For this analysis, data was split by season (October through December for fall, January through March for winter, etc.) for comparison against these criteria. Figure 4 shows box plots for each of the four seasons in Year 4. Note that some sites had an insufficient number of samples for calculating the geometric mean at certain times of the year, due to streams drying up for part of the year, as well as the position vacancy during July and August of 2022.

The Puyallup River Watershed Fecal Coliform TMDL (Mathieu and James, 2011) sets more protective targets using the fecal coliform indicator for the downstream Status and Trends sites on Boise and Pussyfoot creeks. During Year 4 none of these targets were met, and the following narrative will focus on the state water quality standards using *E. coli* mentioned above.

In summary, the downstream Boise Creek site (Boise_ST1) met both components of the criteria during the fall and winter months. Boise_ST2 also met criteria during the winter months. All other sites either exceeded criteria or had fewer than the minimum number of samples (three) required for comparison against the geometric mean component of the criteria. Data are outlined in further detail below.

Only one sample run was conducted during the summer months of 2022 due to the previously mentioned vacancy. That single sample event yielded an *E. coli* value of 140 cfu/100mL for Boise_ST1, and 380 cfu/100mL for Boise_ST2

During the fall months, Pussyfoot Creek (Psyft_ST1) and Second Creek (Second_ST1 & Second_ST1A) were sampled once, with *E. coli* values of 25, 220, and 230 cfu/100mL, respectively. Boise Creek at 268th Ave (Boise_I3) was sampled twice with *E. coli* values of 110 and 210 cfu/100mL (a minimum of three samples is needed to compare against geometric mean criteria). Boise_ST1 met both components of the *E. coli* criteria during this period, with a geomean of 82 cfu/100mL and a maximum value of 220 cfu/100mL. Boise_ST2 exceeded the first part of the criteria with a geometric mean of 152 cfu/100mL, while meeting the second part of the criteria at 280 cfu/100mL.

During the winter months Boise_ST1 and Boise_ST2 met both parts of the water quality criteria with geometric means of 43 and 45 cfu/100mL, respectively, as well as maximum values of 220 and 110 cfu/100mL, respectively. Boise_I3 was sampled once, with a value of 5 cfu/100mL. Pussyfoot Creek had a geometric mean of 51 cfu/100mL but exceeded the 10% rule with a maximum of 410 cfu/100mL. Second Creek was sampled at two locations, Second_ST1 and Second_ST1A. During Year 4 it was determined that the upstream site (Second_ST1) presented difficulty getting a representative sample at all but the higher flows, so the decision was made to switch to Second_ST1A downstream, which also captures an additional portion of the drainage. Both were sampled during this period to get overlapping data. The upstream site, Second_ST1, had a geometric mean of 37 cfu/100mL, and a maximum of 840 cfu/100mL. Downstream, Second_ST1A had a geometric mean of 222 cfu/100mL and a maximum of 720 cfu/100mL.

During the spring months Boise_ST1 and Boise_ST2 each exceeded the geometric mean criteria, with values of 110 and 185 cfu/100mL, respectively, and had 90th percentile values of 160 and 240

cfu/100mL, respectively. Boise_I3 was sampled twice, with values of 68 and 160 cfu/100mL. Pussyfoot Creek exceeded criteria with a geometric mean of 216 cfu/100mL, and a maximum of 270 cfu/100mL. Second Creek was only sampled twice, due inadequate flows during the June sample run. Second_ST1 had values of 44 and 320 cfu/100mL, while downstream Second_ST1A had values of 110 and 320 cfu/100mL.

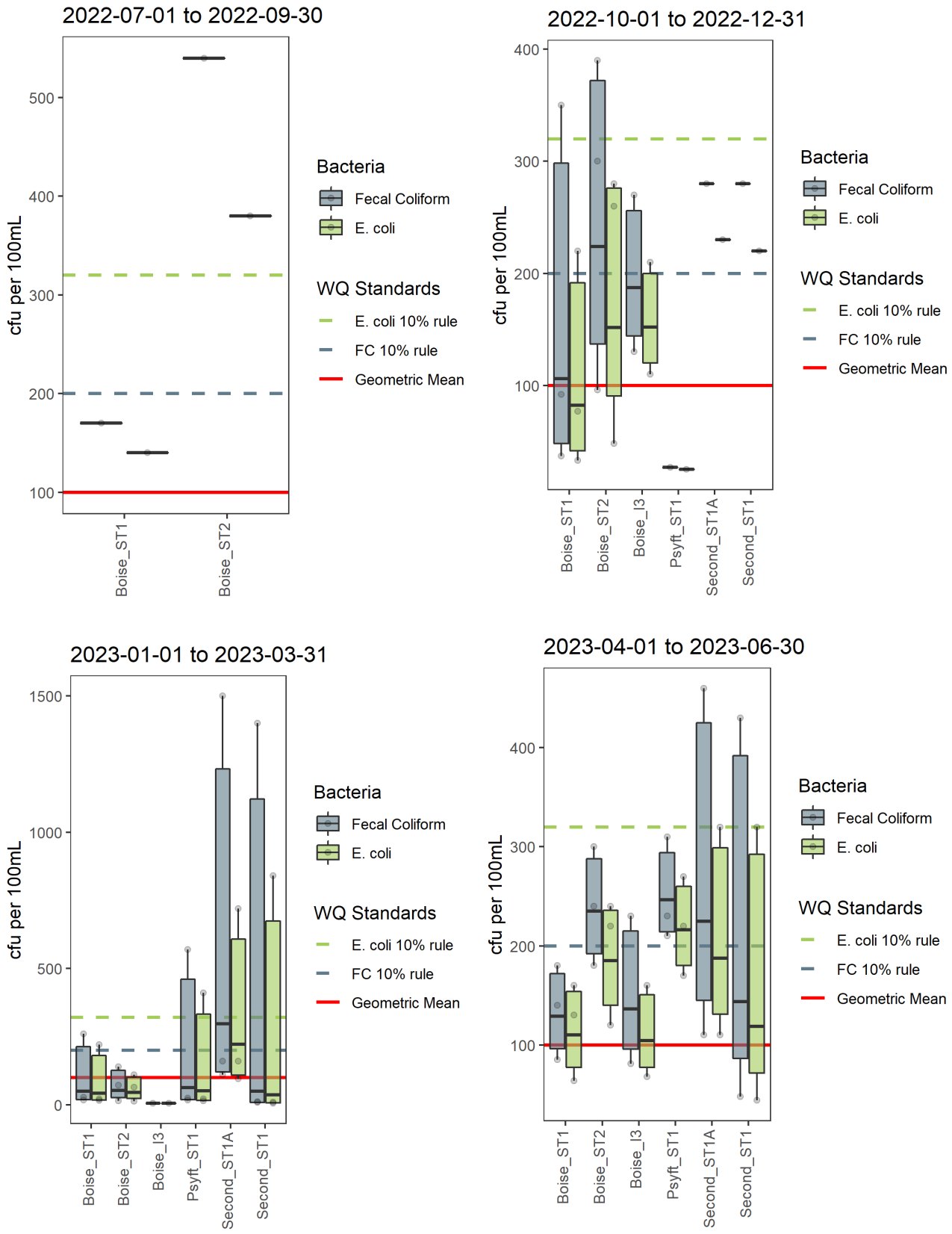

Figure 4. Bacteria levels from summer (upper left), fall (upper right), winter (lower left) and spring (lower right) with geometric mean (black solid line in boxplot) and 90th percentile (top of colored boxes). Note the varied scales on the y-axis. Water quality standards displayed as horizontal lines.

Source Tracing

Samples were collected from several locations along the City of Enumclaw's stormwater ditch on several occasions, upstream of Boise_ST2, in order to evaluate bacterial loading from the three lateral stormwater drainages going into the ditch. Boise_B4 is upstream of where the downstream stormwater input, "Lateral A", mixes in the ditch, while Boise_B5 is upstream of "Lateral B", and Boise_B6 is above another input further upstream. No consistent trend was observed, though certain months showed strong indications of inputs from the different laterals. These data were shared with the City of Enumclaw to assist with their ongoing efforts to address potential sources.

Table 2. *E. coli* values from samples collected at several locations along the stormwater ditch that drains into Boise Creek.

Location	9/20/2022 *E. coli* (cfu/100mL)	11/7/2022 *E. coli* (cfu/100mL)	12/12/2022 *E. coli* (cfu/100mL)	1/9/2022 *E. coli* (cfu/100mL)	4/11/2023 *E. coli* (cfu/100mL)	6/13/2023 *E. coli* (cfu/100mL)
Boise_ST2	380	260	48	64	120	245
Boise_B4	240	92	120	140	37	330
Boise_B5	-	-	210	13	-	-
Boise_B6	-	-	48	-	-	-

Nutrients

Concentrations for nutrients continued to be highest at Second Creek during Year 4, followed by Pussyfoot Creek. These smaller tributaries have considerably lower flows and smaller drainages containing mostly farm land, so it is expected to see greater concentrations in them compared with Boise Creek which has a much larger watershed that includes large areas of undeveloped forestland. Nitrogen concentrations starting climbing in November on Boise Creek after the first significant precipitation of the water year, and were highest on the two smaller tributaries in December during the first sample event of the water year. Phosphorous concentrations spiked in March on all three streams.

The Lower White River pH TMDL contains allocations for Soluble Reactive Phosphorous (SRP), with some language specifying load and wasteload allocations (LA and WLA) on Boise Creek. Using USGS stream discharge data for Boise Creek (station 12099600) and orthophosphate (OP) data from Year 4 (OP is the primary constituent of SRP), Figure 5 shows appoximate loading rates of OP near the mouth of Boise Creek. Figure 5 also shows the sum of the applicable WLA and LA based on seasonality and flow in the White River. Many months had no WLA or LA based on these criteria. For the months that did, none exceeded the total allocations. Please note that the WLA, which is set to point source effluent (Enumclaw WWTP and MS4) cannot be accurately assessed from a downstream site such as Boise_ST1; Figure 5 is an approximation and is not considered a concrete assessment of whether or not the applicable WLA is being met.

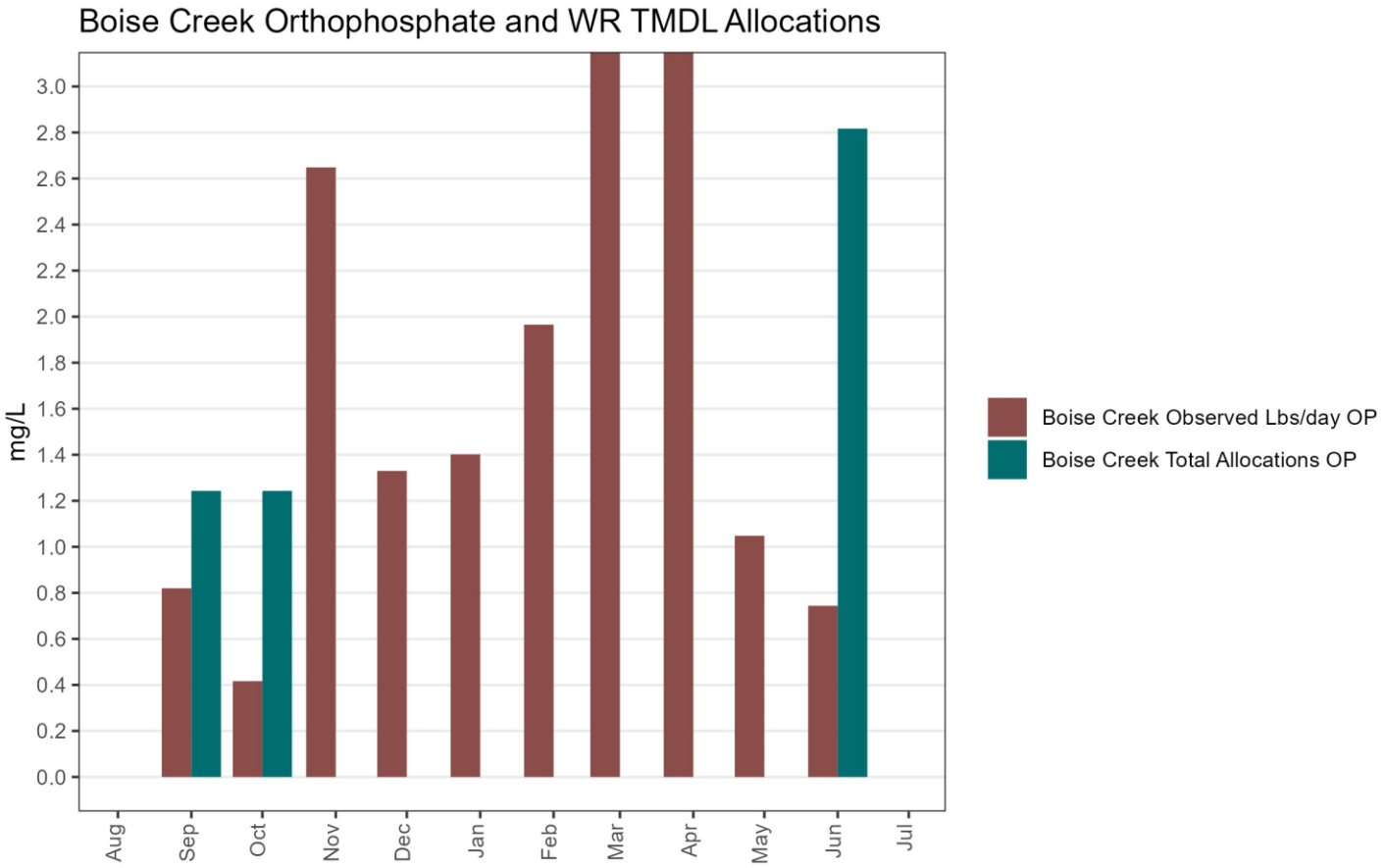

Figure 5. Orthophosphate loading at Boise Creek during Year 4 compared to approximate White River TMDL load allocations for Boise Creek (Gray and Mathieu, 2022).

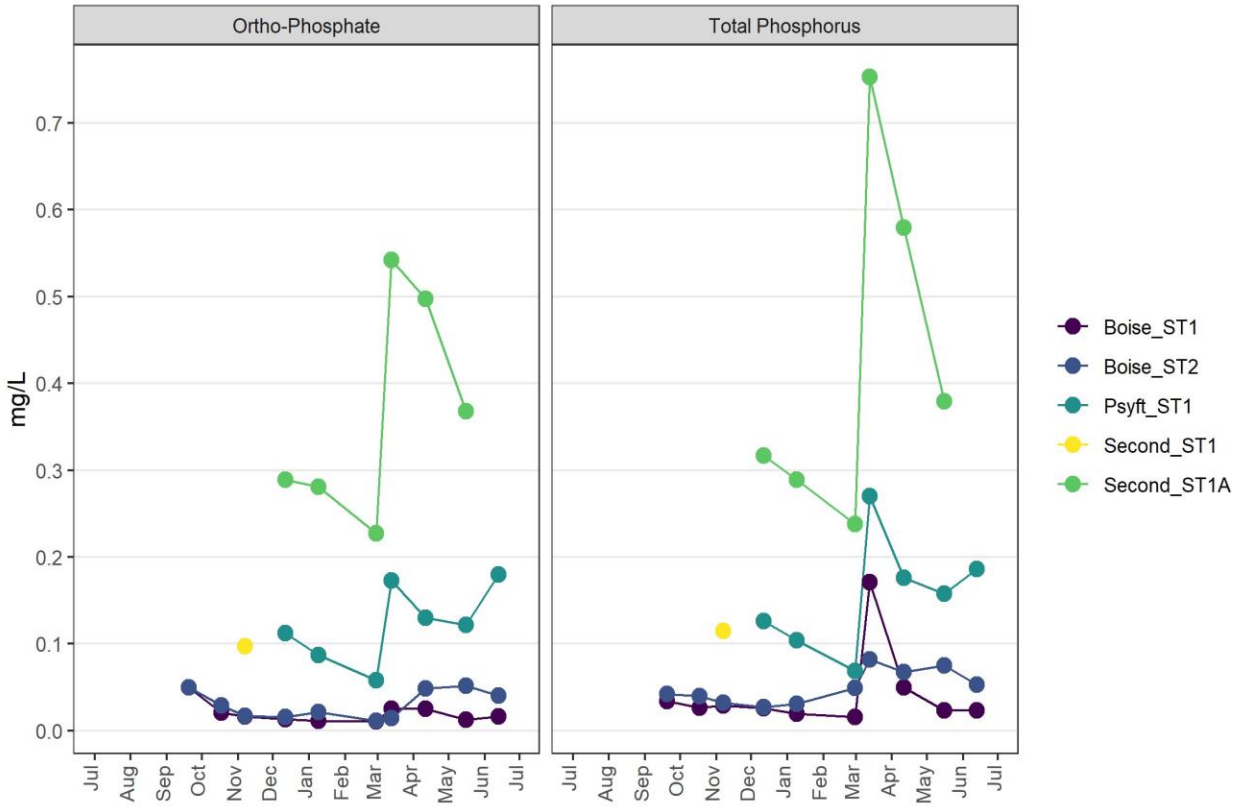

Figure 6. Phosphorous concentrations over time during Year 4.

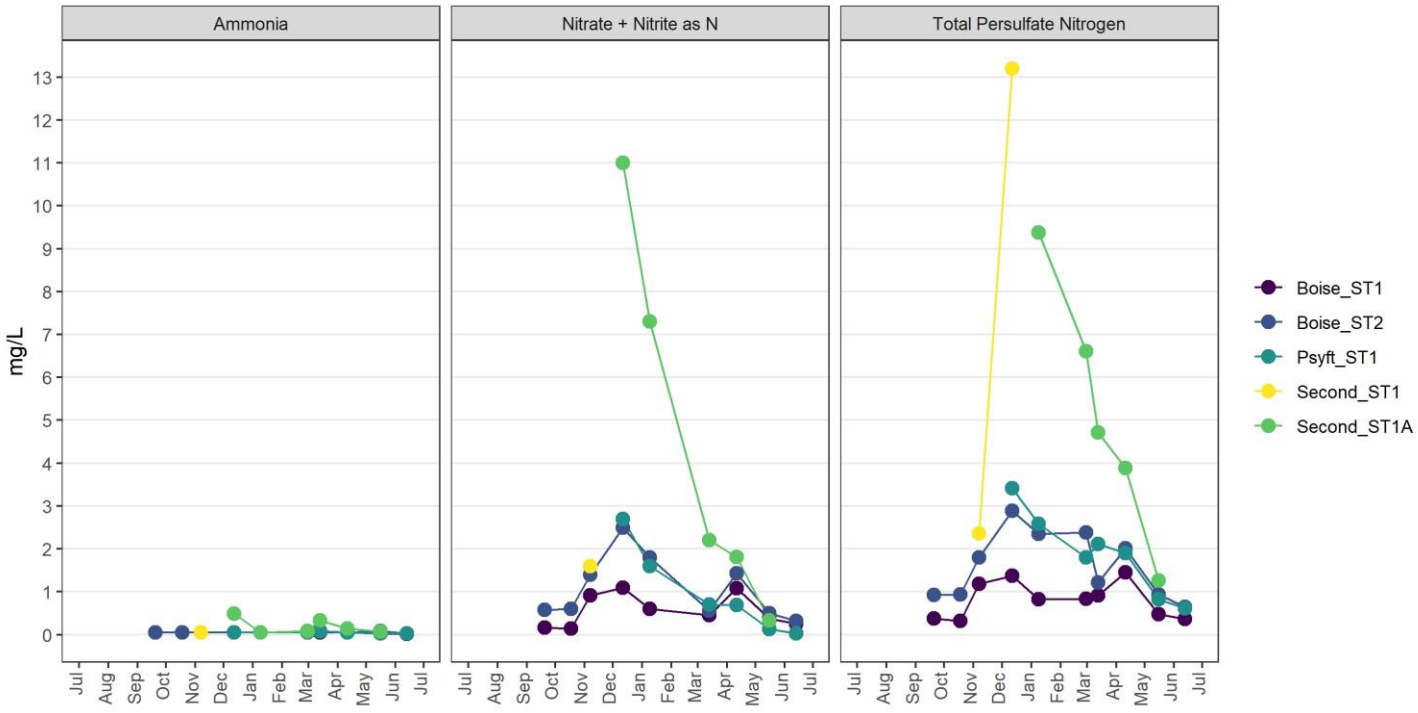

Figure 7. Nitrogen concentrations over time during Year 4.

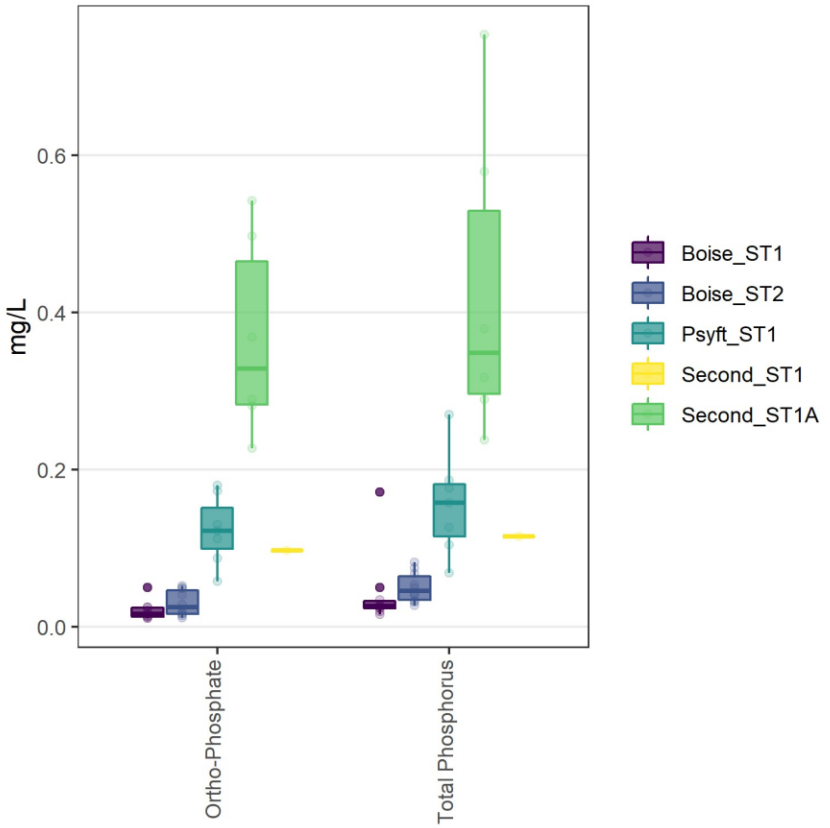

Figure 5. Phosphorous levels with median value represented as solid line in the boxplot.

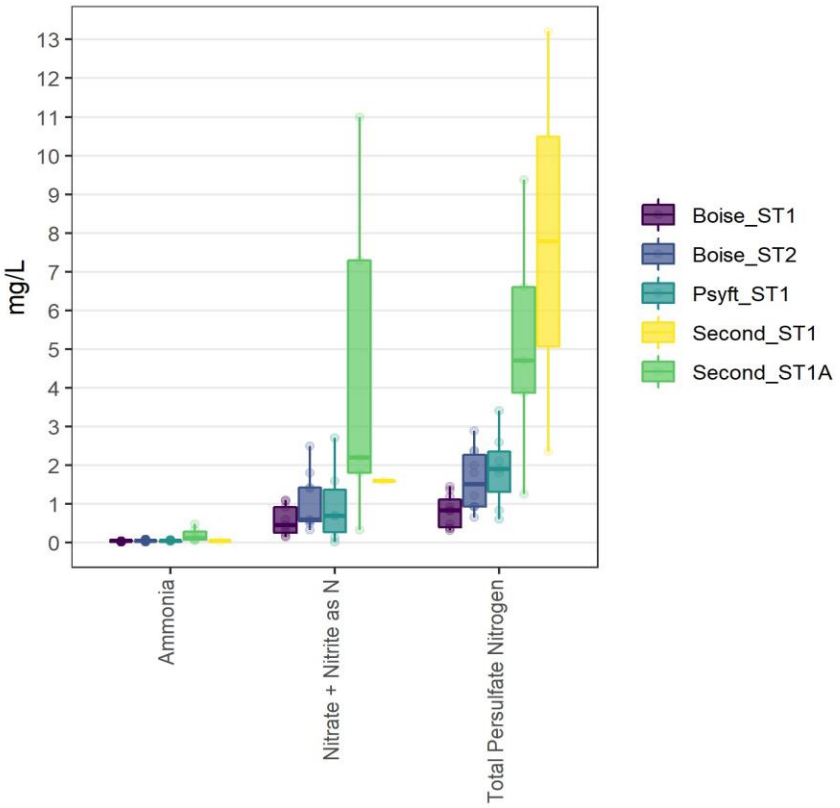

Figure 6. Nitrogen levels with median value represented as solid line in the boxplot.

Water Quality Measurements

Turbidity

Turbidity levels were observed in the range of zero to 23.5 NTU. No increases of >5 NTU were observed between an upstream and downstream location.

Dissolved Oxygen

Dissolved oxygen levels at Boise Creek tributary (Boise_ST2), Pussyfoot and Second Creek sites were observed below the daily minimum criteria of 10 mg/L and 95% saturation. Boise_I3 was also measured below the 95% saturation criteria.

Temperature, Specific Conductivity, and pH

Discrete temperature measurements exceeded the supplemental spawning criteria for temperature on Boise Creek (13°C 7-day average daily maximum Sept 1-July 1). Similarly, some discrete measurements on Pussyfoot and Second Creeks exceeded the applicable criteria on those waterbodies (16°C 7DADMax). Continuous data is needed to comprehensively compare with the temperature criteria.

Some low pH values were observed on Boise and Second Creeks that were below the minimum of 6.5.

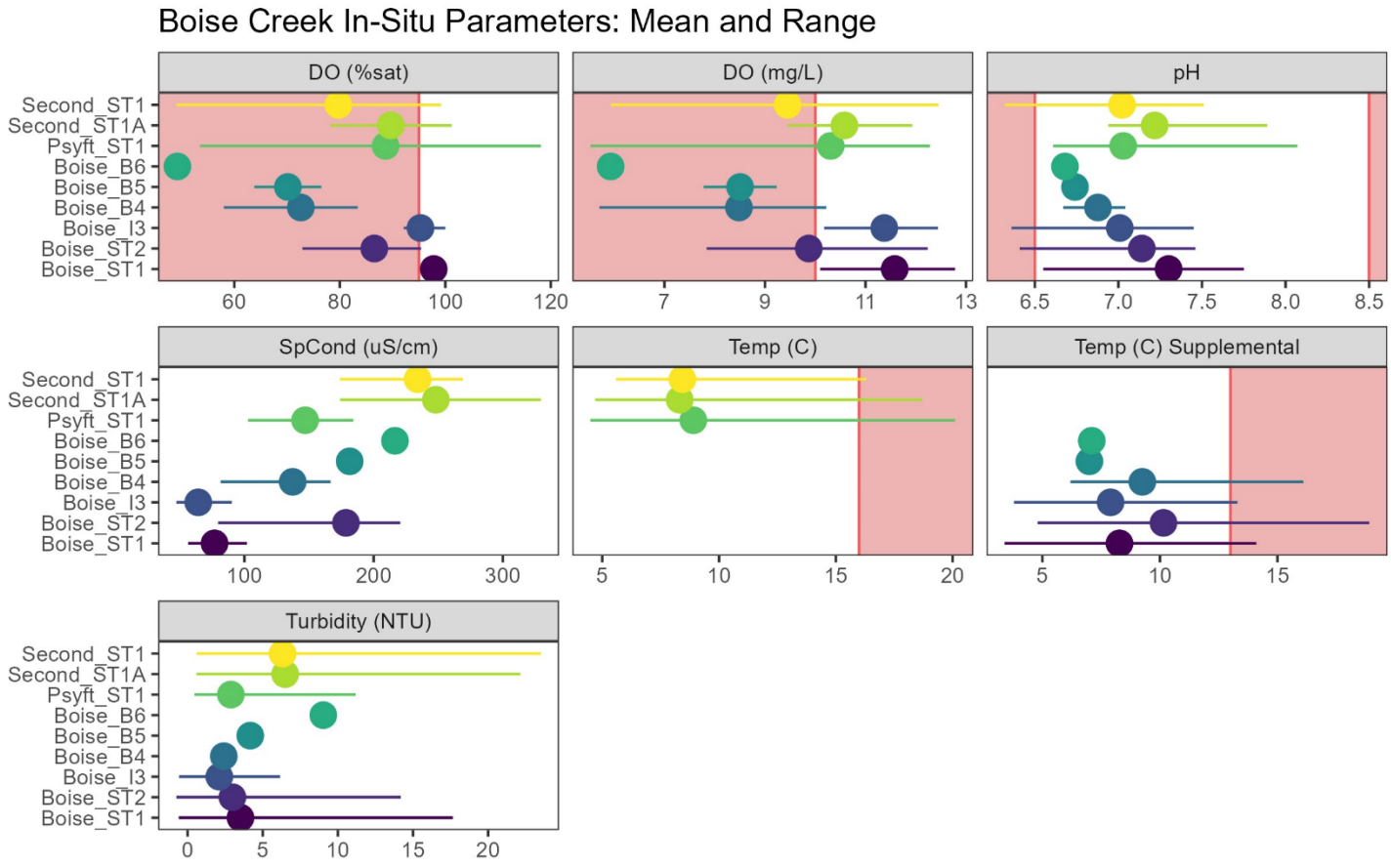

Figure 7. In-situ water quality parameters by site during Year 4 with water quality criteria marked in red. Note the supplemental spawning criteria for Boise Creek from Sept 1-July 1 (13°C).

References

Brownlee, A. 2019. Quality Assurance Project Plan: Puyallup River Tributaries Effectiveness Monitoring. Ecology publication 19-10-040.

Gray, D. and Mathieu, N. 2022. Lower White River pH Total Maximum Daily Load. Washington State Department of Ecology, Olympia, WA. Publication No. 22-10-011. https://apps.ecology.wa.gov/publications/SummaryPages/2210011.html

Mathieu, N. and James, C. 2011. Puyallup River Watershed: Fecal Coliform Total Maximum Daily Load – Water Quality Improvement Report and Implementation Plan. Washington State Department of Ecology, Olympia, WA. Publication No. 11-10-040. https://test-fortress.wa.gov/ecy/publications/SummaryPages/1110040.html

Dickes, B. 2015. Pussyfoot Creek and Second Creek Fecal Coliform Characterization Monitoring: Two Tributaries to the White River. Washington State Department of Ecology, Olympia, WA. Publication No. 15-10-048. https://testfortress.wa.gov/ecy/publications/SummaryPages/1510048.html

U.S. Geological Survey. Boise Creek at Buckley, WA - Monitoring location 12099600. USGS Water Data for the Nation. https://waterdata.usgs.gov/monitoring-location/12099600/#parameterCode=00060&period=P7D&showMedian=true

Water Quality Program, 2018. Water Quality Program Policy 1-11: Washington's Water Quality Assessment Listing Methodology to Meet Clean Water Act Requirements. Ecology publication 18-10-035. https://fortress.wa.gov/ecy/publications/SummaryPages/1810035.html

Water Quality Standards for Surface Waters of the State of Washington Section 173-201A. https://apps.leg.wa.gov/WAC/default.aspx?cite=173-201A

Appendix

Table A1. Preliminary results for all Boise, Pussyfoot and Second Creek sites. Blank cells represent that a sample or measurement was not collected.

Study_Specific_Location_ID	Field_Collection_Start_Date	Fecal Coliform	E. coli	Ammonia as N	Ammonia	Nitrate + Nitrite as N	Nitrite-Nitrate	Total Persulfate Nitrogen	Ortho-Phosphate	Total Phosphorus	Temperature, water	Dissolved Oxygen	Dissolved Oxygen Percent Saturation	Conductivity, Specific (at 25 deg C)	pH	Turbidity	Barometric pressure
Boise_B4	9/20/2022	290	240														
Boise_ST1	9/20/2022	170	140	0.05		0.17		0.374	0.05	0.0339	12.7	10.42	98.2	96.1	7.57	0.01	29.274
Boise_ST1	9/20/2022	160	150	0.05		0.17		0.395	0.05	0.0303	12.9	10.37	98.1	96.1	7.63	0.03	29.274
Boise_ST2	9/20/2022	540	380	0.05		0.58		0.932	0.05	0.042	14.3	8.24	80.4	211.5	7.46	-0.18	29.159
Boise_I3	10/18/2022	130	110								10.9	10.18	92.1	90.2	7.45	-0.56	29.415
Boise_ST1	10/18/2022	92	77	0.05		0.14		0.318	0.0207	0.0263	10.8	10.98	99.2	101.9	7.47	-0.59	29.53
Boise_ST1	10/18/2022	84	84	0.05		0.14		0.324	0.021	0.0253	11	11.01	99.9	101.8	7.62	-0.55	29.53
Boise_ST2	10/18/2022	390	280	0.05		0.6		0.94	0.0287	0.0399	12.1	7.84	72.9	220.5	7.39	-0.75	29.43
Boise_B4	11/7/2022	160	92								8.1	9.16	77.6	81.7	6.67	1.64	28.8
Boise_I3	11/7/2022	270	210								5.8	11.62	92.9	68	7.24	2.55	28.8
Boise_ST1	11/7/2022	350	220	0.05		0.92		1.19	0.0161	0.0287	6	12.15	97.6	79.5	7.26	1.83	28.91
Boise_ST2	11/7/2022	300	260	0.05		1.4		1.8	0.0167	0.0324	7.8	9.56	80.2	146.8	7.02	0.97	28.8
Second_ST1	11/7/2022	280	220	0.05		1.6		2.36	0.097	0.115	7.1	5.93	49	248.1	6.32	1.1	29.01
Boise_B4	12/12/2022	150	120								6.2	8.84	71.4	166.6	6.88	3.12	29.28
Boise_B5	12/12/2022	240	210								6.8	7.78	63.8	191	6.7	4.69	29.27
Boise_B6	12/12/2022	65	48								7.1	5.93	49.2	216.5	6.68	9.03	29.27
Boise_ST1	12/12/2022	37	33	0.05		1.1		1.37	0.0134	0.0256	5	12.7	99.6	84.1	7.35	1.4	29.37
Boise_ST1	12/12/2022	45	37	0.069		1.2		1.29	0.0131	0.0213	5.1	12.57	98.6	84.1	7.35	1.51	29.38
Boise_ST2	12/12/2022	96	48	0.05		2.5		2.89	0.016	0.0273	5.9	11.08	89	201	7.21	1.16	29.27

Psyft_ST1	12/12/2022	27	25	0.05		2.7		3.41	0.112	0.126	5	10.92	85.6	178.1	6.93	0.7	29.54
Second_ST1A	12/12/2022	280	230	0.49		11		13.2	0.289	0.317	5.3	9.89	78.2	329.3	6.96	2.72	29.51
Boise_B4	1/9/2023	140	140								6.6	10.22	83.4	147.7	7.04	2.51	28.69
Boise_B5	1/9/2023	14	13								7.2	9.23	76.5	171.9	6.78	3.65	28.67
Boise_ST1	1/9/2023	27	22	0.05		0.6		0.824	0.0113	0.0194	5.7	12.01	95.7	70.8	7.4	1.15	28.72
Boise_ST1	1/9/2023	20	17	0.05		0.61		0.827	0.0113	0.0171	5.8	11.93	95.3	70.6	7.39	1.06	28.74
Boise_ST2	1/9/2023	72	64	0.05		1.8		2.35	0.0212	0.0311	6.4	10.89	88.4	199.9	7.27	1.22	28.66
Psyft_ST1	1/9/2023	25	21	0.05		1.6		2.59	0.0868	0.104	6.2	10.55	85.2	144.6	6.96	1.13	28.96
Second_ST1	1/9/2023	11	10								6.9	10.15	83.4	269	7.08	0.93	28.89
Second_ST1A	1/9/2023	110	95	0.05		7.3		9.37	0.281	0.289	6.4	10.47	85.1	276.4	7.17	0.88	28.92
Boise_I3	2/28/2023	5	5								3.8	12.44	94.4	56.9	6.83	1.2	28.75
Boise_ST1	2/28/2023	17	16	0.05			2.9	0.836	0.0105	0.0158	3.4	12.78	96.1	66	7.11	1.48	28.86
Boise_ST2	2/28/2023	15	13	0.05			8.4	2.38	0.0114	0.0494	4.8	12.24	95.4	211.1	7.29	6.56	28.77
Psyft_ST1	2/28/2023	17	15	0.05			5.5	1.8	0.0579	0.0685	4.5	12.28	95	133.9	6.97	0.84	29.03
Psyft_ST1	2/28/2023	22	18	0.05			5.9	1.83	0.0612	0.0714	4.6	12.27	95.1	133.7	6.99	0.84	29.03
Second_ST1	2/28/2023	8	6								5.6	12.45	99.2	245.5	7.51	0.61	28.97
Second_ST1A	2/28/2023	160	160	0.092			23	6.61	0.227	0.238	4.7	11.93	92.8	249.4	7.27	1.04	29
Boise_ST1	3/13/2023	260	220	0.05		0.46		0.92	0.0252	0.171	5.6	12.08	96	65.3	6.82	17.65	29.02
Boise_ST1	3/13/2023	230	220	0.065		0.48		0.952	0.0269	0.0888	5.6	12.03	95.6	66.9	6.72	15.66	29.02
Boise_ST2	3/13/2023	140	110	0.089		0.56		1.22	0.0144	0.082	6	11.16	89.7	79.6	6.41	14.19	28.92
Psyft_ST1	3/13/2023	570	410	0.076		0.7		2.11	0.173	0.27	5.6	11.13	88.4	122.2	6.61	11.18	29.203
Second_ST1	3/13/2023	1400	840								5.6	10.84	86.4	208	6.95	23.5	29.15
Second_ST1A	3/13/2023	1500	720	0.33		2.2		4.71	0.542	0.753	5.7	11.04	88	210	6.94	22.15	29.17
Boise_B4	4/11/2023	48	37														
Boise_I3	4/11/2023	230	160								5.7	12.17	97.1	47.3	6.36	6.15	29.28
Boise_ST1	4/11/2023	180	160	0.05		1.08		1.45	0.0249	0.05	5.9	12.33	98.8	56.4	6.55	9.53	29.38
Boise_ST2	4/11/2023	180	120	0.05		1.43		2.01	0.0485	0.0676	8.4	11.18	95.2	111.9	6.63	4.81	29.29

Psyft_ST1	4/11/2023	210	170	0.05		0.693		1.9	0.13	0.176	6.8	11.03	94.9	102.9	6.93	5.2	29.53
Second_ST1	4/11/2023	430	320								9.1	10.79	93.5	173.9	7.09	10.94	29.49
Second_ST1A	4/11/2023	460	320	0.14		1.81		3.88	0.497	0.579	9.1	10.7	92.7	174.1	7.07	11.55	29.51
Boise_I3	5/16/2023	81	68								13.3	10.46	100	58.9	7.16	1.21	29.327
Boise_ST1	5/16/2023	85	64		0.025	0.382		0.48	0.0127	0.0235	13.6	10.26	98.7	65.9	7.75	1.41	29.436
Boise_ST2	5/16/2023	300	220		0.082	0.504		0.938	0.0518	0.0752	18.9	8.36	89.9	203.4	7.4	1.09	29.327
Psyft_ST1	5/16/2023	230	220		0.03	0.133		0.829	0.122	0.158	20.1	10.71	118.1	162.8	8.07	0.62	29.56
Second_ST1	5/16/2023	48	44								16.3	6.54	66.8	259.6	7.18	0.85	29.525
Second_ST1A	5/16/2023	110	110		0.07	0.331		1.26	0.368	0.379	18.7	9.45	101.2	249.5	7.89	0.6	29.545
Second_ST1A	5/16/2023	94	87		0.071	0.287		1.18	0.363	0.373	18.9	9.51	102.4	248.7	7.91	0.59	29.548
Boise_B4	6/13/2023	1100	330								16.1	5.71	58	153.3	6.92	2.36	29.191
Boise_ST1	6/13/2023	140	130		0.016	0.258		0.371	0.0164	0.0234	14.1	10.1	98.2	82.5	7.72	1.31	29.286
Boise_ST2	6/13/2023	240	240		0.025	0.323		0.651	0.0404	0.0532	16.9	8.17	84.3	200.1	7.32	0.73	29.188
Boise_ST2	6/13/2023	260	250		0.025	0.323		0.665	0.0412	0.0518	16.9	8.14	84	200.1	7.31	0.67	29.191
Psyft_ST1	6/13/2023	310	270		0.03	0.025		0.608	0.18	0.186	14.1	5.53	53.5	184.2	6.73	0.47	29.445

Table A2. Dates with total daily precipitation greater than 0.1 inches (data from [King County site 44u](https://green2.kingcounty.gov/hydrology/DataDownload.aspx)[4]).

Date	Precipitation (inches)
7/2/2022	0.01
7/3/2022	0.54
7/5/2022	0.01
7/6/2022	0.07
7/7/2022	0.17
7/8/2022	0.05
7/16/2022	0.11
7/18/2022	0.01
7/22/2022	0.01
7/23/2022	0.01
8/4/2022	0.01
8/10/2022	0.05
8/31/2022	0.01
9/5/2022	0.05
9/12/2022	0.01
9/18/2022	0.04
9/28/2022	0.01
10/20/2022	0.07
10/21/2022	0.47

[4] https://green2.kingcounty.gov/hydrology/DataDownload.aspx

10/22/2022	0.61
10/23/2022	0.02
10/24/2022	0.08
10/25/2022	0.51
10/26/2022	0.02
10/28/2022	0.19
10/30/2022	0.37
10/31/2022	0.85
11/1/2022	0.05
11/2/2022	0.08
11/3/2022	0.3
11/4/2022	1.56
11/6/2022	0.51
11/7/2022	0.22
11/10/2022	0.03
11/22/2022	0.94
11/25/2022	0.7
11/27/2022	0.2
11/28/2022	0.23
11/29/2022	0.12
11/30/2022	0.65
12/1/2022	0.01
12/3/2022	0.84
12/4/2022	0.03
12/5/2022	0.12
12/6/2022	0.17
12/8/2022	0.6
12/9/2022	0.31
12/10/2022	0.01
12/11/2022	0.06
12/12/2022	0.01
12/16/2022	0.01
12/17/2022	0.06
12/18/2022	0.1
12/20/2022	0.69
12/22/2022	0.01
12/23/2022	0.55
12/24/2022	0.46
12/25/2022	0.03
12/26/2022	0.51
12/27/2022	0.63
12/28/2022	0.03
12/29/2022	0.15
12/30/2022	0.33
12/31/2022	0.13
1/1/2023	0.09
1/7/2023	0.07
1/8/2023	0.07
1/9/2023	0.03
1/12/2023	0.22
1/13/2023	0.26
1/14/2023	0.07
1/15/2023	0.27
1/17/2023	0.15
1/18/2023	0.15
1/19/2023	0.02
1/21/2023	0.36
1/22/2023	0.04
1/26/2023	0.03
1/27/2023	0.21
1/28/2023	0.08

1/31/2023	0.46
2/3/2023	0.02
2/4/2023	0.09
2/5/2023	0.37
2/6/2023	0.03
2/7/2023	0.2
2/8/2023	0.02
2/10/2023	0.27
2/12/2023	0.03
2/13/2023	0.3
2/14/2023	0.34
2/17/2023	0.19
2/18/2023	0.6
2/19/2023	0.02
2/20/2023	0.37
2/26/2023	0.11
2/28/2023	0.03
3/2/2023	0.11
3/3/2023	0.04
3/5/2023	0.3
3/7/2023	0.04
3/8/2023	0.36
3/10/2023	0.07
3/12/2023	0.04
3/13/2023	0.91
3/20/2023	0.1
3/22/2023	0.02
3/23/2023	0.03
3/24/2023	0.03
3/31/2023	0.14
4/1/2023	0.35
4/2/2023	0.26
4/3/2023	0.39
4/4/2023	0.09
4/6/2023	0.27
4/7/2023	0.72
4/8/2023	0.13
4/9/2023	0.84
4/10/2023	1.16
4/11/2023	0.22
4/13/2023	0.02
4/16/2023	0.36
4/18/2023	0.04
4/19/2023	0.03
4/20/2023	0.19
4/21/2023	0.01
4/22/2023	0.09
4/23/2023	0.63
4/24/2023	0.34
4/25/2023	0.01
4/30/2023	0.06
5/1/2023	0.03
5/2/2023	0.02
5/4/2023	0.12
5/5/2023	0.85
5/6/2023	0.18
5/7/2023	0.14
5/8/2023	0.06
5/9/2023	0.06
5/15/2023	0.21
6/9/2023	0.56

6/10/2023	0.35
6/16/2023	0.35
6/17/2023	0.08
6/18/2023	0.16
6/19/2023	0.14
6/20/2023	0.21

Contact information

Water Quality Program

Southwest Regional Office
Author: Julian Sammons
P.O. Box 47600
Olympia, WA 98504-7600
Phone: 360-584-2753

Related Information

- This report is available on the Puyallup Partnership webpage[5].
- Data for this project is available in Ecology's EIM Database,[6] Study ID: EFF_PRT.
- Data is displayed on Puyallup River Tributaries Effectiveness Monitoring StoryMap[7].
- Bacteria data is displayed on Whatcom Conservation District StoryMap[8].

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[5] https://www.ezview.wa.gov/site/alias__1962/37699/puyallup_river_watershed_improvement_project.aspx
[6]https://apps.ecology.wa.gov/eim/search/Eim/EIMSearchResults.aspx?ResultType=EIMStudyTab&StudyUserIdSearchType=Contains&StudyUserIds=EFF_PRT
[7] https://waecy.maps.arcgis.com/apps/MapSeries/index.html?appid=20f291f848cb48fd8c879704f5464461
[8] https://www.arcgis.com/apps/webappviewer/index.html?id=5395274198aa4365b96fbaf01b4db43b&extent=-13894004.8062%2C6045956.0065%2C-13306968.4289%2C6336110.9659%2C102100