

2020-21

Ridge to River

Puget Creek Water Quality Summary



Introduction

In 2020 Duwamish Tribal Services and community partners launched the Ridge to River project investigating the feasibility of remediating greenbelt areas near the Longhouse and Puget Creek with the aim of connecting the local trail system, particularly the Duwamish Longhouse, Pathfinder School, and South Seattle College. As part of

this project, a group of volunteers and youth coordinators trained with Sno-King Watershed Council in Global Water Watch (GWW) water quality monitoring methods to collect bacteriological and chemical indicators for Puget Creek; alkalinity was a particular concern due to the presence of cement kiln dust (CKD) deposits along the watershed. This report summarizes the volunteers' findings using GWW sources for interpretation.

Puget Creek sites

There are 5 active monitoring sites along Puget Creek. The sites start upstream at 19th and Brandon by the Puget Ridge Edible Park (seasonally dry May-Sept), then move downstream to include a cluster of 3 sites along Puget Way SW and 14th Ave SW: 1 site for where Puget Creek's Tributary A, which passes through CKD-contaminated grounds and daylights into the main stream, 1 upstream from Tributary A where the main stream flows down through the greenbelt from the Puget Ridge Edible Park site, and 1 just downstream from where those the 2 sources mix, but before entering the culvert . Once Puget Creek enters the culvert it is no longer accessible until the fifth location. The fifth site is near Idaho St where Puget Creek mixes with stormwater and flows into the Duwamish Waterway; it was

accessible only during daylight hours at low tide (in 2021 this was during the summer months). See the map below.



Map base from King County & City of Seattle

Limitations

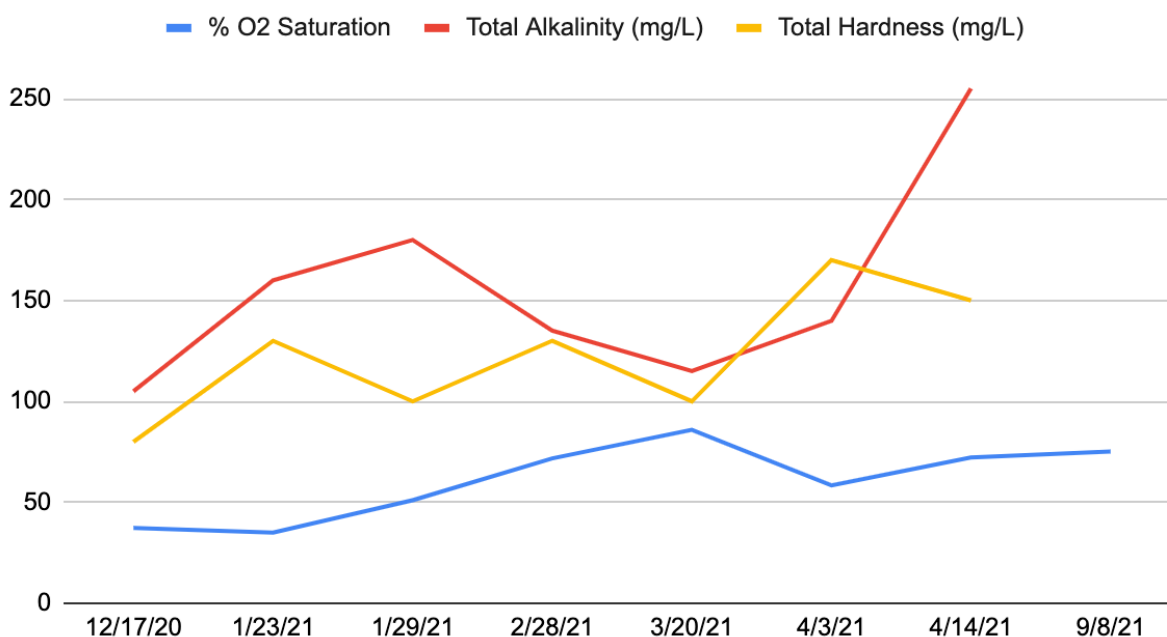
COVID-19 posed challenges to training and regular monthly monitoring capacity. All measures that were questionable as valid were excluded because it is better to have no data than incorrect data; many bacteriological counts were excluded for this reason due to quality control issues with the coliform media.

Site 1 - 19th & Brandon by Puget Ridge Edible Park

This site dries up in the warmer months.

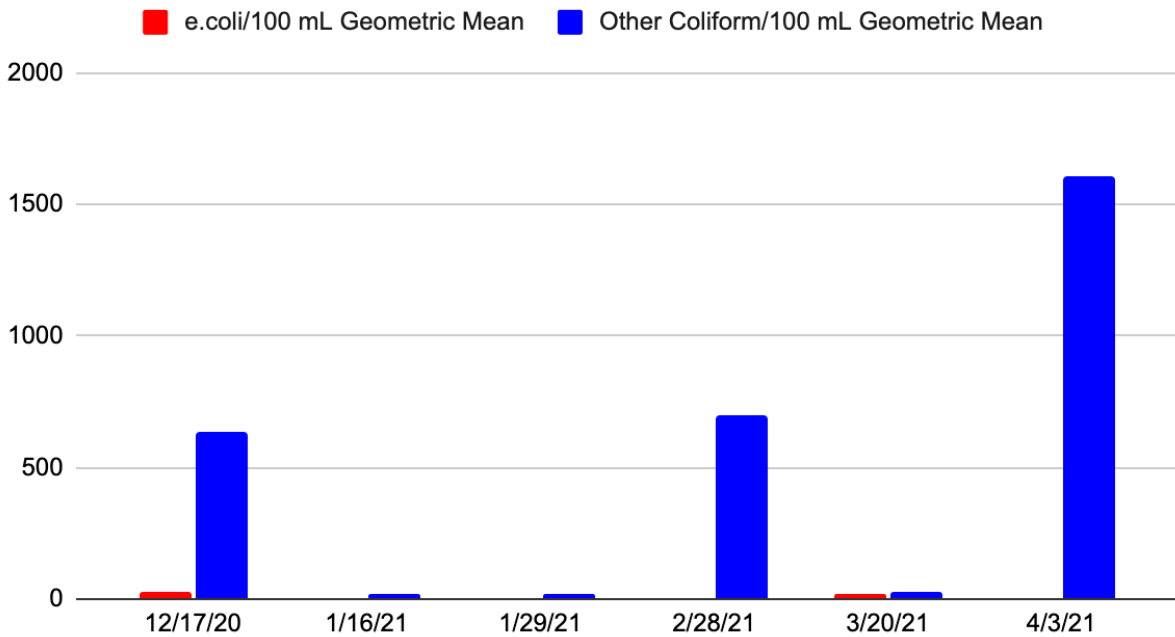
	pH	Dissolved O2 (mg/L)	% O2 Saturation	Total Alkalinity (mg/L)	Total Hardness (mg/L)	Turbidity (JTU)	E. Coli/100 mL	Other coliform/100 mL	Comments
<i>Optimum range</i>	6.0-8.5	5-11	60-125	51-150	15-200	<10	<200	N/A	
12/17/20	7	4.3	37.3	105	80	10	28	632	Heavy rain in last 24 hrs; foam accumulation
1/16/21	NC	NC	NC	NC	NC	NC	0	23	NC
1/23/21	7	4.7	35	160	130	IN	IN	IN	NC
1/29/21	7	6	51.04	180	100	5	0	23	Woody debris, light film
2/28/21	7	8.5	71.77	135	130	2	0	698	NC
3/20/21	7	9.7	85.92	115	100	5	16	30	Heavy rain. Soapy look, oily on top, litter
4/3/21	7	6.7	58.39	140	170	2	0	1611	NC
4/14/21	7	8.1	72.28	255	150	2	IN	IN	Water level low
9/8/21	8	6.1	75.2	NC	NC	2	IN	IN	NC

Water Chemistry - 19th & Brandon



While pH remained in the optimum range throughout the year, dissolved oxygen levels were intermittently too low to support healthy fish populations, and crossed the threshold for acute mortality, depending on species and life stage; invertebrates are also likely to struggle to survive and thrive under low dissolved oxygen levels. Alkalinity was consistently moderate (51-150 mg/L) to high (150+ mg/L), indicating the water has elevated buffering capacity against fluctuations in pH. Hardness and turbidity (the measure of cloudiness due to suspended matter) were intermittently elevated, but not outside the healthy range for most fish and humans. Most of the year there were significantly higher measures of alkalinity vs. hardness, which may have been related to elevated chloride and sulfate ions from pollution.

Coliform - 19th & Brandon



There was very limited E. Coli present (geometric means ranging from 0 to 28) and low to moderate free living/non-fecal coliform levels.

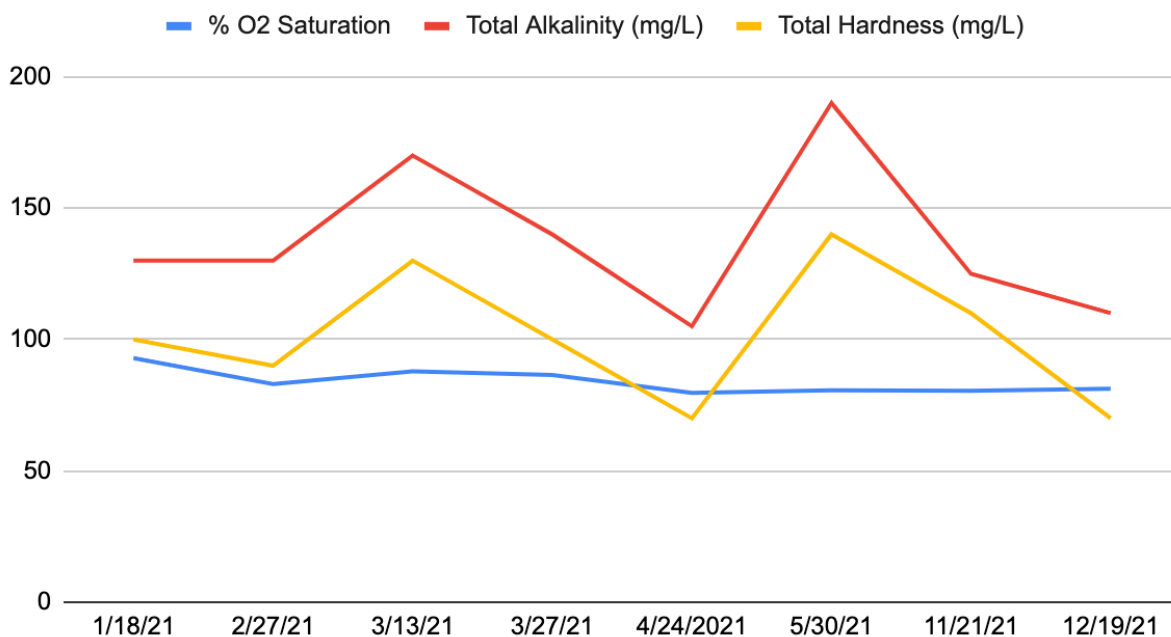
Site 2 - Puget Way upstream

This site has very low flow in the warmer months, and 2021 saw drought conditions across much of the Northwest bringing water levels even lower.

	pH	Dissolved O2 (mg/L)	% O2 Saturation	Total Alkalinity (mg/L)	Total Hardness (mg/L)	Turbidity (JTU)	E. Coli/100 mL	Other coliform /100 mL	Comments
<i>Optimum range</i>	6.0-8.5	5-11	60-125	51-150	15-200	<10	<200	N/A	
1/18/21	7.5	10.1	92.9	130	100	2	IN	IN	No rain within last 72 hours
1/23/21	NC	NC	NC	NC	NC	NC	1	0	Evidence of opossum and/or raccoon activity in stream

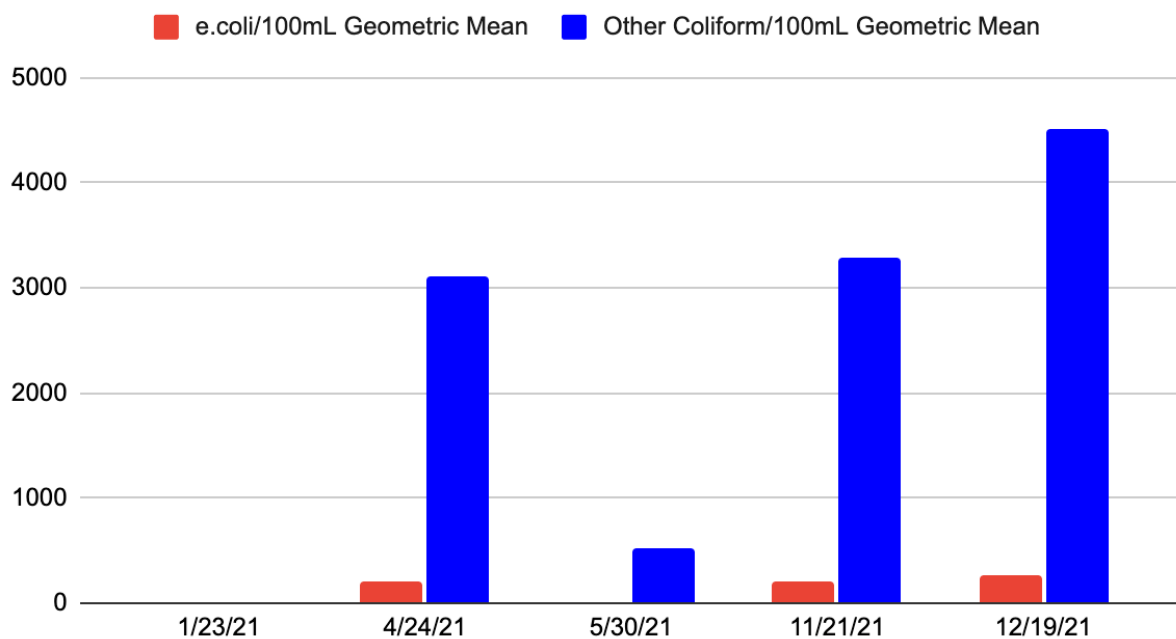
2/27/21	8	10.3	83	130	90	NC	IN	IN	Sample from training
3/13/21	8	10.4	87.8	170	130	2	IN	IN	No rain within last 24 hours
3/27/21	8	10.5	86.5	140	100	2	IN	IN	NC
4/24/21	7.5	9	79.7	105	70	5	208	3115	Light rain during sample and previous 12 hours
5/30/21	8.5	8.5	80.6	190	140	2	1	528	Low flow
11/21/21	8	9.3	80.44	125	110	5	200	3278	Tent 50' upstream
12/19/21	7	9.9	81.2	110	70	2	262	4519	Rain within last 24hrs

Water Chemistry - Puget Way Upstream



At this site pH tended to be slightly elevated from the measures taken upstream at 19th & Brandon, but within a healthy range for most humans and wildlife. Dissolved oxygen, hardness, and turbidity were in low to moderate ranges. Alkalinity was consistently moderate (51-150 mg/L) to high (150+ mg/L), indicating the water has elevated buffering capacity against fluctuations in pH. In all samples throughout the year there were significantly higher measures of alkalinity vs. hardness, which may have been related to elevated chloride and sulfate ions from pollution.

Coliform - Puget Way Upstream



E. Coli was present at levels that pose an elevated risk to humans in April, November, and December 2021; this could result from human and/or wildlife activity. Other free living/non-fecal coliform levels were low to moderate.

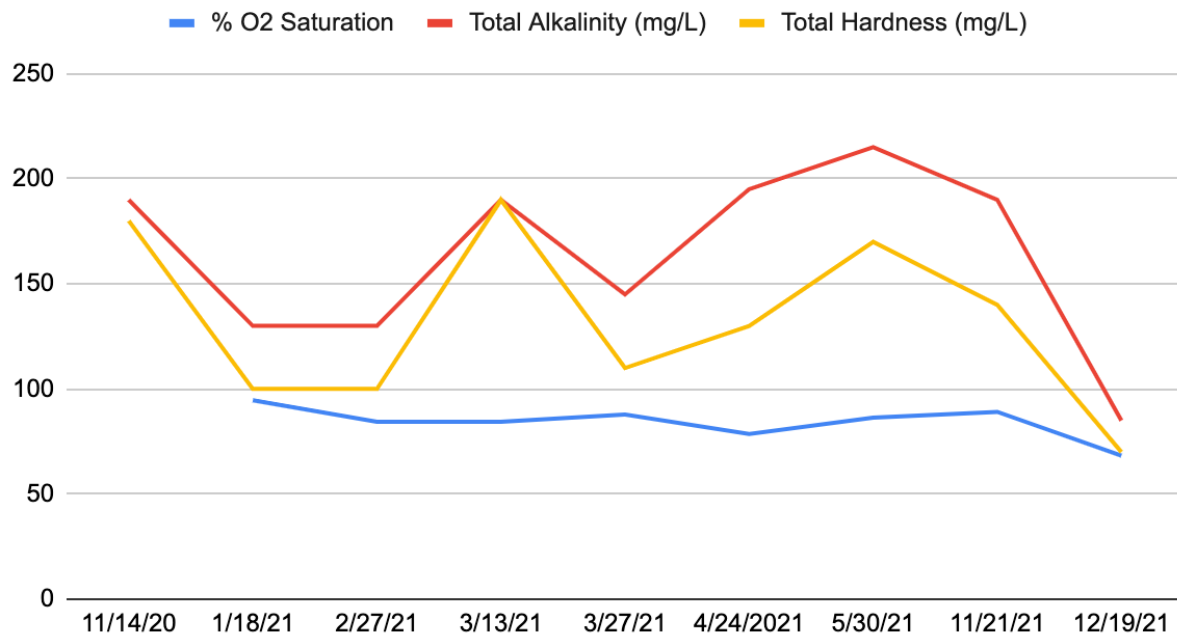
Site 3 - Tributary A outflow

This site has very low flow in the warmer months, and this year we saw drought conditions across much of the Northwest bringing water levels even lower.

	pH	Dissolved O2 (mg/L)	% O2 Saturation	Total Alkalinity (mg/L)	Total Hardness (mg/L)	Turbidity (JTU)	E. Coli/100 mL	Other coliform/ 100 mL	Comments
<i>Optimum range</i>	6.0-8.5	5-11	60-125	51-150	15-200	<10	<200	N/A	
11/14/20	8	9.5	NC	190	180	2	NC	NC	Sample from training
1/18/21	7	10.2	94.61	130	100	IN	IN	IN	No rain within past 24 hours
1/23/21	NC	NC	NC	NC	NC	NC	0	0	Evidence of opossum and/or raccoon activity in stream
2/27/21	8	10.5	84.36	130	100	5	IN	IN	Sample from training
3/13/21	8	10.5	84.36	190	190	2	IN	IN	No rain within last 24 hours
3/27/21	8	10.4	87.81	145	110	2	IN	IN	NC
4/24/21	8	9.3	78.53	195	130	5	1	400	Light rain during sample and previous 12 hours
5/30/21	8	9.1	86.3	215	170	2	14	431	Low flow
11/21/21	8	10.3	89.09	190	140	5	10	6738	NC
12/19/21	7	8.5	68.3	85	70	2	13	3694	Rain within last 24hrs

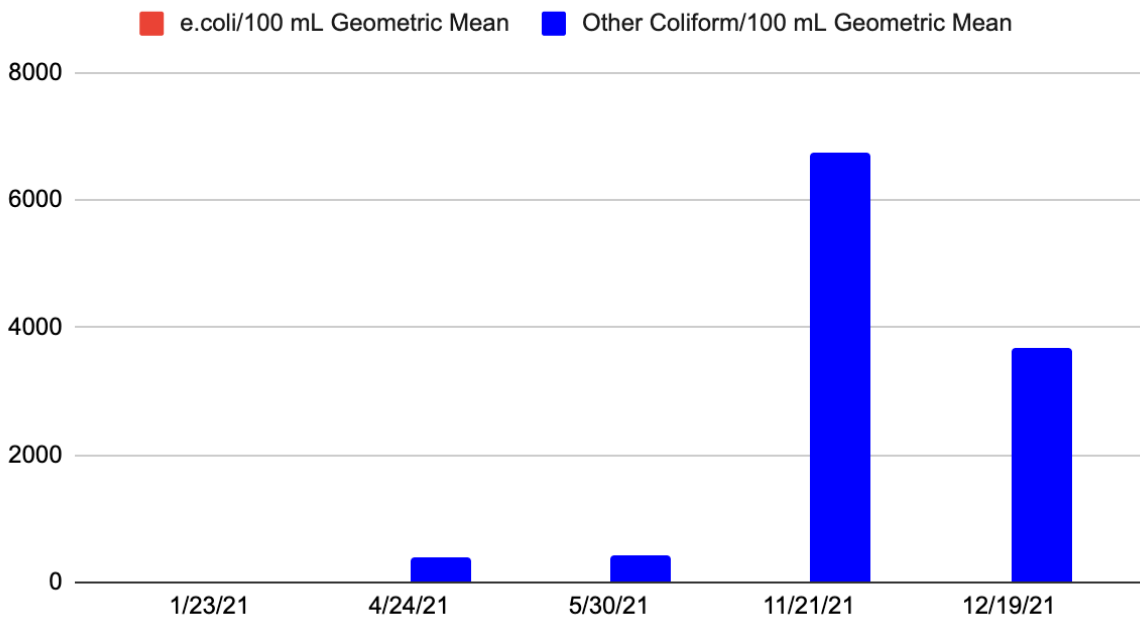
The pH in Tributary A tended to be elevated but still within a healthy range for most humans and wildlife. Dissolved oxygen and turbidity were healthy as well. Alkalinity was highest at this site and consistently moderate (51-150 mg/L) to high (150+ mg/L), with May's measure being very high. There were significantly higher measures of alkalinity vs. hardness throughout the year; this may be related to elevated chloride and sulfate ions from pollution.

Water Chemistry - Puget Way Tributary A



There was very limited E. Coli present (geometric means ranging from 0 to 14) and low to moderate free living/non-fecal coliform levels.

Coliform - Puget Way Tributary A



Site 4 - Puget Way culvert (mix of main stream & Tributary A)

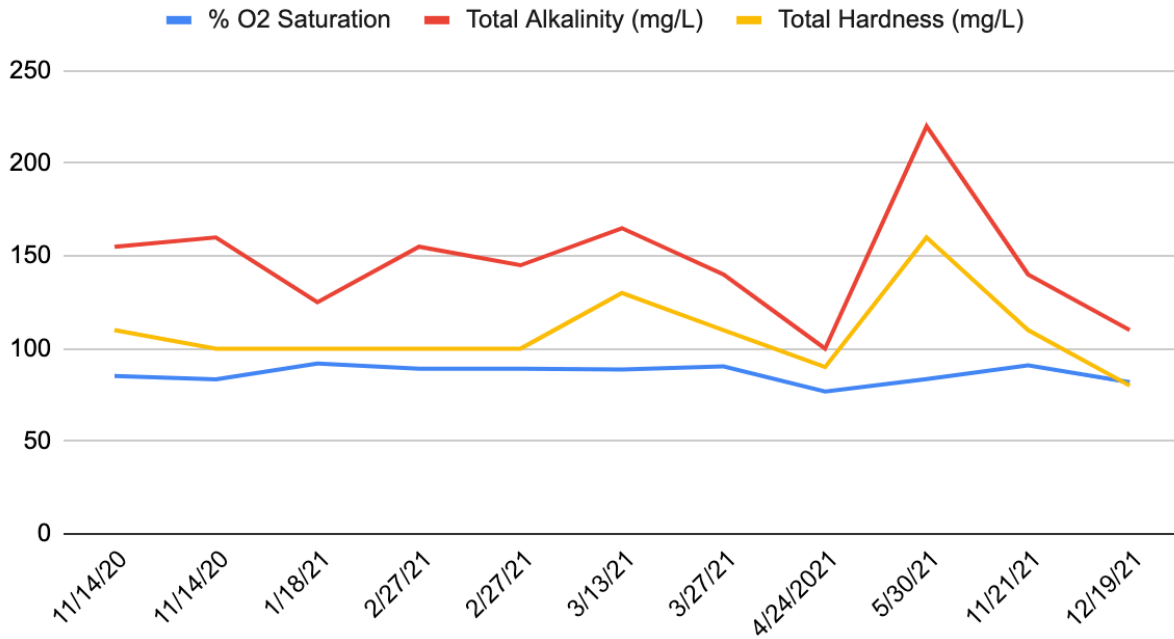
This site has very low flow in the warmer months, and this year saw drought conditions across much of the Northwest bringing water levels even lower.

	pH	Dissolved O2 (mg/L)	% O2 Saturation	Total Alkalinity (mg/L)	Total Hardness (mg/L)	Turbidity (JTU)	E. Coli/100 mL	Other coliform/ 100 mL	Comments
<i>Optimum range</i>	6.0-8.5	5-11	60-125	51-150	15-200	<10	<200	N/A	
11/14/20	8	9.7	85.2	155	110	2	NC	NC	Sample from training
1/18/21	7.5	10	92	125	100	2	IN	IN	No rainfall past 24 hours
1/23/21	NC	NC	NC	NC	NC	NC	1	1	Evidence of opossum and/or raccoon activity in stream
2/27/21	8	10.9	89.2	155	100	5	0	0	Sample from training - limited growth
3/13/21	8	10.5	88.7	165	130	2	IN	IN	No rain within last 24 hours
3/27/21	8	10.7	90.4	140	110	2	IN	IN	NC
4/24/21	8	9.1	76.84	100	90	10	252	2846	Light rain during sample and previous 12 hours
5/30/21	8.5	8.8	83.5	220	160	2	1	531	NC
11/21/21	8	10.5	90.96	140	110	5	363	2791	NC
12/19/21	7.5	10.2	81.9	110	80	2	252	2777	Rain within last 24hrs

The pH at the culvert where the main stream and Tributary A sources mixed tended to be elevated but still within a healthy range for most humans and wildlife. Dissolved oxygen and turbidity were healthy as well. Alkalinity was also elevated at this site and consistently moderate (51-150 mg/L) to high (150+ mg/L), with May's measure being very high in line

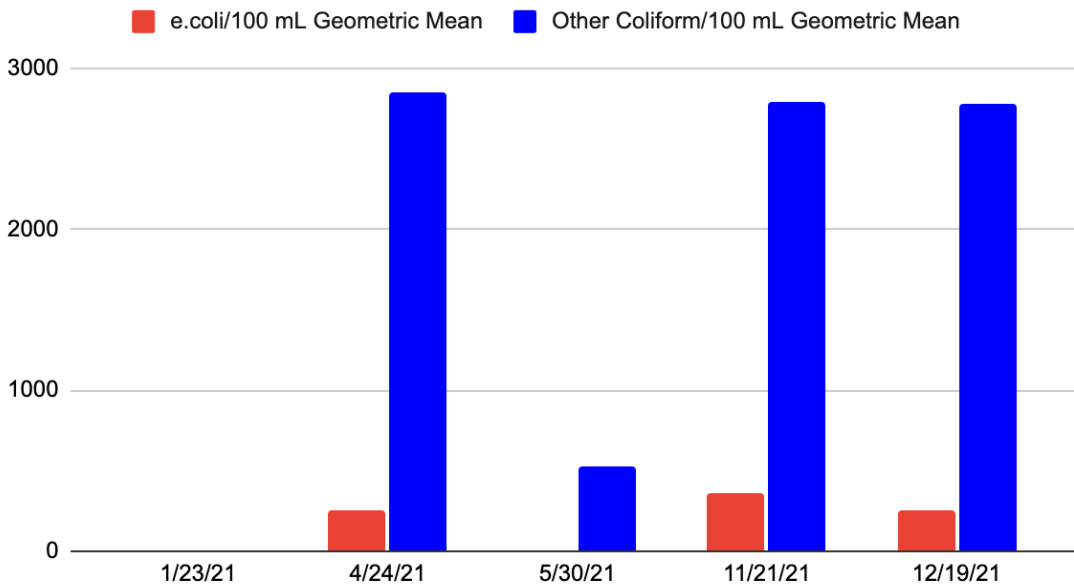
with the outflow from Tributary A that month. There were significantly higher measures of alkalinity vs. hardness, possibly indicating elevated chloride and sulfate ions from pollution.

Water Chemistry - Puget Way Culvert



E. Coli was present at levels that pose an elevated risk to humans in April, November, and December 2021; this could result from human and/or wildlife activity. Other free living/non-fecal coliform levels were low to moderate.

Coliform - Puget Way Culvert



Site 5 - ū?alaltx^w (Idaho Street outflow under NUCOR)

This site has very low flow in the warmer months, and this year we saw drought conditions across much of the Northwest bringing water levels even lower. It is only accessible for a short time at low tide (minimum -2 MLLW) in daylight hours.

Date	pH	Dissolved O2 (mg/L)	% O2 Saturation	Total Alkalinity (mg/L)	Total Hardness (mg/L)	Turbidity (JTU)	E. Coli/100 mL	Other coliform/100 mL	Comments
<i>Optimum range</i>	6.0-8.5	5-11	60-125	51-150	15-200	<10	<200	N/A	
7/15/21	8	10	112.14	80	200+	2	IN	IN	NC
7/24/21	7.5	8.4	85.07	190	160	2	IN	IN	Drought conditions & low flow
9/8/21	8	6.1	78.9	NC	NC	2	NC	NC	NC

While pH, dissolved oxygen, and turbidity were at healthy levels at this site, alkalinity was elevated for one sample, and hardness was extremely high for both. This is not particularly surprising given that this site is a mix of the stream water entering the culvert at Puget Way SW, road runoff, and residual saline water from high tide.

Acknowledgements & Contact

With gratitude to staff, volunteers, and partners including:

- Duwamish Tribal Services
- King Conservation District
- Sno-King Watershed Council
- Puget Soundkeeper
- Delridge Neighborhood Development Association
- West Duwamish Greenbelt Trails
- South Seattle College
- Boy Scout Troop 284
- Urban@UW Spark grant program



Monitoring in small groups will continue every other month in 2022. For questions or to join as a monitor, please contact Kristin Dew: kndew@uw.edu or 425-999-7317