



King County Streams Monitoring Update for October 2018



Streams in King County, like Coal Creek above, have begun to fill with autumn rains, while the vegetation nearby turns from yellow into grey.

Thank you for your interest in the Streams Monitor, a monthly update from King County's [Routine Stream and River Monitoring Program](#), which samples water quality at 74 sites on streams each month.

The rains have returned to the King County region. This year's summer weather was drier and warmer than normal, and flow and temperature data from our monitored streams indicate a noticeable departure from the norm. This month's Streams Monitor focuses on how summer 2018 compared to past years.



In the News: Chinook Salmon Return to Thornton Creek After an Eight-year Absence



Two Chinook salmon swam 1.5 miles up Thornton Creek to spawn. The spawning ground is at a recently restored habitat site completed by Seattle Public Utilities.

For the first time in eight years, Chinook salmon were spotted spawning in Thornton Creek. Thornton Creek is the largest watershed in Seattle and one of the most impacted streams in the region. Most nearby residents historically saw the creek as an obstacle to development and subsequently channelized and re-routed creek flows into ditches and culverts. More recently, some devoted advocates and the City of Seattle have restored some sections of the creek to regain healthier conditions. The creek now has some stretches of beautiful riparian forest, active beaver ponds, and clear springs.

Seattle Public Utilities (SPU) recently completed the Thornton Creek Confluence project in the Meadowbrook neighborhood, which provided both stream habitat restoration and flood control. SPU's urban creek biologist Katherine Lynch praised the unique project:

"We engineered the streambed vertically and horizontally. Four years after construction, it is maintaining very high-quality gravel. The Chinook salmon pair travelled almost one and a half miles to select this site for spawning. That's a vote of confidence!"



Unfortunately, the creek still has some room for improvements in habitat, with multiple undersized culverts and large stream sections that are still piped underground. Water quality challenges remain, including untreated waste from camp sites, leaking side sewers, and the runoff of polluted stormwater. In addition, there is a large population of invasive New Zealand mudsnails. Not surprising nearly half of this urban watershed is rooftop, driveway, roads, or parking – otherwise known as impervious surfaces. Impervious means that rainfall cannot infiltrate into the soil. Open space, parks and vacant land only comprise about eight percent of the watershed.

The return of two Chinook salmon to Thornton Creek to spawn is very exciting and a good indication that we're on the right track. Further habitat restoration, culvert replacement, and stormwater and pollution controls can lead to improved recovery for Thornton Creek and other streams in the region.



What My Stream Did Over the Summer...

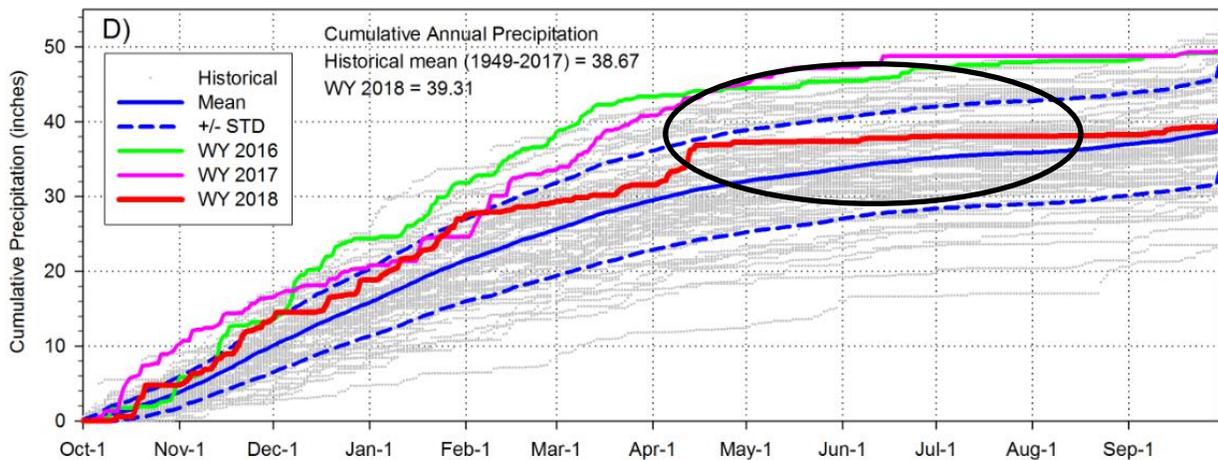
By Timmy Clark

When students return to schools in September, they are often asked “what did you do over the summer?” Students will gloat, stammer, or mumble through their summer trials, trips, and tribulations (I was a mumbler). Here at King County, we do not know how the summer went until we dive into the data, and that often happens much later – long after students have returned to their classrooms.

The summer of 2018 was dry, but not the driest on record, and warm, but not the warmest on record. Flows were low at many streams, but not at their lowest. It certainly is not quite as exciting when conditions are not at their extremes, but personally, I am happy to have a moment away from extremes, whether meteorological or political.

Table 1. April 2018 was wetter than typical, but May through September was drier than typical.

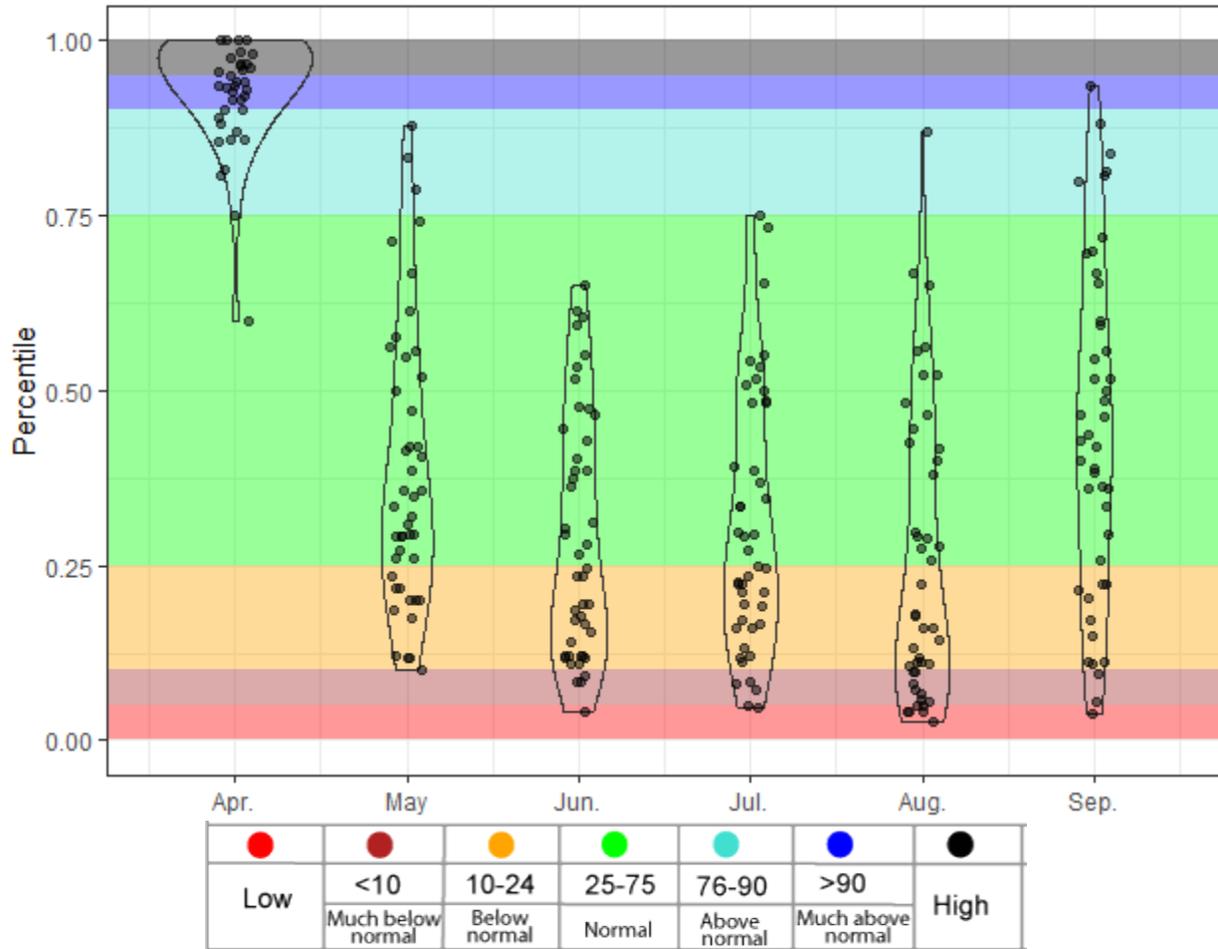
Month	2018 Observed	Historic Average	Difference
April	5.69	2.71	+2.98
May	0.12	1.94	-1.82
June	0.63	1.57	-0.94
July	0.05	0.70	-0.65
August	0.20	0.88	-0.68
September	1.04	1.50	-0.46



From Oct. 1 to Sept. 30, 2018, very little rain fell between mid-April and the end of September. From June to September, less than an inch of rain fell as measured at the Sea-Tac airport. The chart above shows past years cumulative rainfall and the mean and standard deviation (STD).



STREAMS MONITOR



April 2018 stream flows were typically well above normal. In May and June, flows were about normal with some streams a bit low. Most monitored streams had lower than normal flows in July and August in summer 2018. Flows in September ranged from much below normal to flows much above, with most flows at about the norm.



Summary of October 2018 Observations for King County Monitored Streams

- **Sampling dates**
 - Oct. 9 – North Lake Washington and Lake Sammamish ([Water Resources Inventory Area \[WRIA\] 8](#)).
 - Oct. 10 – South Lake Washington, Pipers Creek ([WRIA 8](#)), Green River and Vashon–Maury Island ([WRIA 9](#)), and Boise Creek ([WRIA 10](#)).
 - Oct. 15 – Streams of Snoqualmie and Skykomish rivers ([WRIA 7](#)).
- **Rainfall, snowmelt, and flow**
 - Before sampling in WRIAs 8 and 9, flows had increased slightly due to 0.25 to 1 inch rainfall between Oct. 7 and 9. Generally more rain fell in southeast King County.
 - WRIA 7 flows on Oct. 15 were decreasing since the larger rain event on Oct. 9.

A description of the water quality standards may be found at the end of this email.

- **Water quality**

- **Fecal coliforms**

- Twenty-six sites (accounting for 21 streams) had **high fecal coliform levels** above Washington state peak criteria:
 - **Forbes, Juanita, Lyon, McAleer, Thornton, and Yarrow** creeks draining into Lake Washington;
 - **Idylwood, Issaquah, North Fork of Issaquah, Pine Lake, and Tibbetts** creeks draining into Lake Sammamish (Issaquah Creek had the highest concentration at 2,500 colonies per 100 milliliters);
 - **Bear, Cottage Lake, Evans, Little Bear, North, and Swamp** creeks draining into the Sammamish River;
 - **Pipers** Creek draining to the Puget Sound;
 - **Springbrook** Creek draining to the Green River;
 - **Boise Creek** draining to the White River; and
 - **Tahlequah** Creek on Vashon Island.
 - Twenty-four sites (accounting for 20 streams) have had **ongoing high fecal coliform levels** that are above the state geometric mean criteria.
 - Nearly half of monitored streams in WRIA 8 have fecal coliform geometric means over the state standards (18 of 40 sites).
 - Longfellow, Springbrook, Gorsuch, Judd, and Tahlequah creeks in WRIA 9 also had geometric means above the state criteria.

- **Dissolved oxygen, Temperature, and pH**

- **Forbes** and **Swamp** creeks (WRIA 8), and **Springbrook, Rock, Mill, and Mileta** creeks (WRIA 9) was below the state criteria for **dissolved oxygen**.
 - No stream was in violation of the state criteria for pH.



- Many streams had sample **temperatures** that were above the state criteria. However the state criteria are based on a seven-day moving average of daily maximum temperatures. Not all streams have continuous temperature monitoring. The following streams have continuous temperature monitoring and exceeded the state criteria in 2018.
 - WRIA 7: Snoqualmie River (North, Middle, and South Forks), Patterson Creek, Griffin Creek, Cherry Creek.
 - WRIA 8: Cedar River, Issaquah Creek (mainstem and North Fork), Lewis Creek, Laughing Jacobs Creek, Sammamish River, Bear Creek, Evans Creek, Little Bear Creek, Swamp Creek, North Creek, Lyon Creek, McAleer Creek, Thornton Creek, May Creek, and Juanita Creek.
 - WRIA 9: Lower Green River, Little Soos Creek, Jenkins Creek, Soos Creek, Mill Creek, Newaukum Creek, and the Duwamish River.

Nutrients

- Stream nutrient (phosphorus and nitrogen) levels at nearly all sites were similar to the typical historic values for the time of the year.
- **Mileta Creek** on Vashon Island, draining to Quartermaster Harbor, had uncharacteristically high phosphorus and ammonium levels in the September sample. Nutrient levels were normal in the October sample.

[Click Here to Explore King County Stream Water Quality Data](#)



Purpose of Updates

As part of its routine stream monitoring program, King County monitors water quality at 73 sites within streams in WRIs 7, 8, 9, and one stream, Boise Creek, in WRIA 10. Typically these updates will be completed one month after the streams are sampled once all laboratory analysis and quality assurance procedures are completed.

These updates serve several purposes:

1. To alert interested parties when the most recent King County routine stream monitoring data is uploaded and publicly available on the [Streams Water Quality Monitoring Data webpage](#).
2. To provide initial quality assurance and control of the routine data by identifying outliers and anomalies with regards to *historic stream conditions* and *regional observations*.
3. To provide a cursory, snapshot narrative of regional stream conditions based on the observed stream quality measurements, stream gage data, and meteorological data. This analysis is **not** comprehensive and is meant to serve as a starting point.

To provide context and a relative scale, water quality data may be compared to Washington State Water Quality Standards. These comparisons should **not** be used to determine impairment and are for interpretive purposes only.

Brief Background of Washington State Water Quality Standards

- The Washington State legislature has established **water quality standards** ([WAC 173-201A](#)) for the **protection of human health** and **aquatic life**.
- For the protection of aquatic life, standards are established for temperature, dissolved oxygen, pH, total dissolved gas, turbidity, and toxic chemicals (e.g., metals, polychlorinated biphenyls or PCBs, and pesticides).
- The routine water quality data collected by King County allow for the comparison of **temperature, dissolved oxygen, pH, and un-ionized ammonia**. The standards for each of these are dependent on the **designated aquatic life use** (e.g., salmon spawning and core summer habitat).

Fecal coliform bacteria are used as indicators of pathogens associated with fecal material from warm-blooded animals. The standards for fecal coliforms are dependent on the **designated recreational use**:

- extraordinary primary contact — swimming and tributaries to lakes or shellfish harvest;
- primary contact — swimming or water skiing; and
- secondary contact — fishing or wading.

The fecal coliform criteria include both a geometric mean criterion and a statistical threshold value (or peak). The geometric mean is defined as the n^{th} root of the product of n numbers. The statistical threshold is based on the 90th percentile of observed levels.