



## King County Streams Monitoring Update for September 2018



*The Sammamish River (seen here looking downstream at the York Bridge in Redmond) and its corridor have undergone a substantial transformation since colonization in the late 19<sup>th</sup> century. The river has been dredged and straightened. What once was a network of wetland and meanders has been replaced with productive croplands with agricultural ditches.*

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.

This month the focus is on the Sammamish River. The Sammamish is one of the major rivers of King County. It runs from the north end of Lake Sammamish to the north end of Lake Washington. The Sammamish River watershed spans 13 cities and two counties and drains a variety of landscapes from the Issaquah Alps in the south to the Sammamish Plateau in the east to Lynnwood in the north.



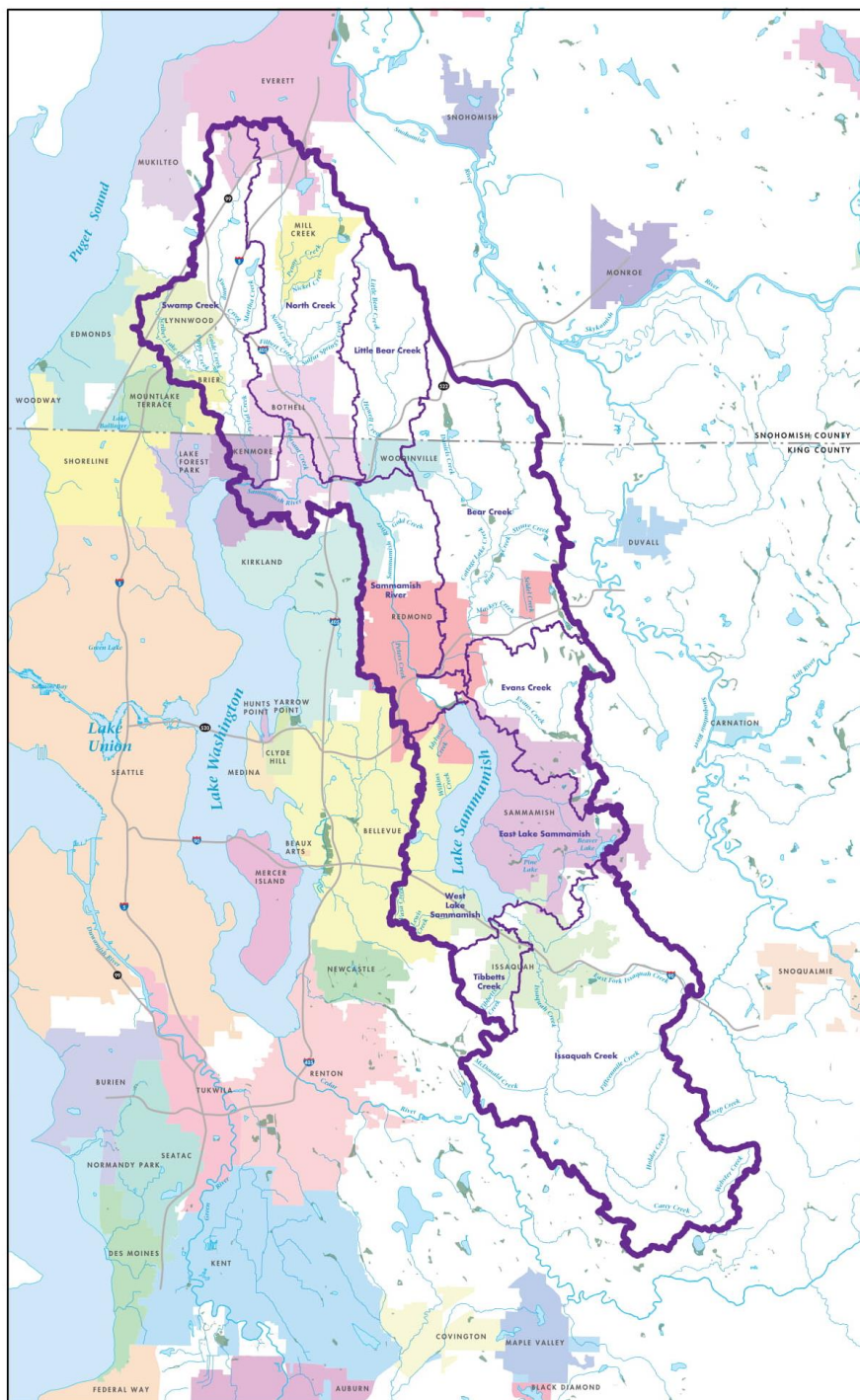
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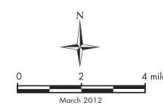
## *The Taming of the Slough – A Brief History of the Sammamish River*

Prior to European colonization, the Sammamish River corridor was a system of vast willow-infested wetlands with a narrow, meandering channel. The complex system of emergent, shrub, and forested wetland provided ideal habitat for fish, large and small mammals, and birds. Authors Stickney and McDonald described “dense forest [that] clothed the land and shut in the winding waterway.”



## The Sammamish Watershed

- Watershed Boundary
- Basin Boundary
- Stream
- Major Road
- Lake & River



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Water and Land Resources Division

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A major Native American winter village, *tlah-WAH-dees*, was located at the mouth of the Sammamish River, which was occupied by the *ssts'p-abc* ("meander dwellers") and *s-tah-PAHBSH* ("willow people"). Several archeological sites have been found in and near today's Marymoor Park. The native tribe around Lake Sammamish was known to settlers as the Squak people (the river was called the Squak Slough). Archeological excavations have unearthed projectile points (arrowheads), scrapers (for scaling fish and fleshing hides), and other tools constructed from chert, chalcedony, jasper, quartz, and obsidian. In 1855, the Treaty of Point Elliott was signed between the U.S. government and leaders of most Puget Sound tribes, and the Washington territorial governor moved to relocate the native people. A leader of the willow people, *Sah-wich-ol-dahw*, did not accept the validity of the treaty and joined the Battle of Seattle in 1856. Following the attack and the Puget Sound war, the native people of the Sammamish were relocated, aided by Henry Yesler. In 1862, a smallpox plague killed as much as half of the remaining native population. Today, the Sammamish River is a usual and accustomed fishing area for the Muckleshoot Indian Tribe.

The Sammamish River and adjacent valley has been significantly altered since the first non-indigenous settlers came to the valley. There were fewer than 10 settlers in the Sammamish river corridor in 1870 when the first survey of the river began. Early settlers began clearing the river to improve navigation and the adjacent valley for agriculture. By the mid-1880s, the river was navigable over its entire length by shallow-draft steamers and was used to float logs and coal barges from Lake Sammamish to Lake Washington. By 1887, a branch of the Seattle, Lake Shore & Eastern Railroad reached from Seattle to the recently founded City of Bothell and construction continued until the line passed along the eastern shore of Lake Sammamish to Issaquah and then east to North Bend.



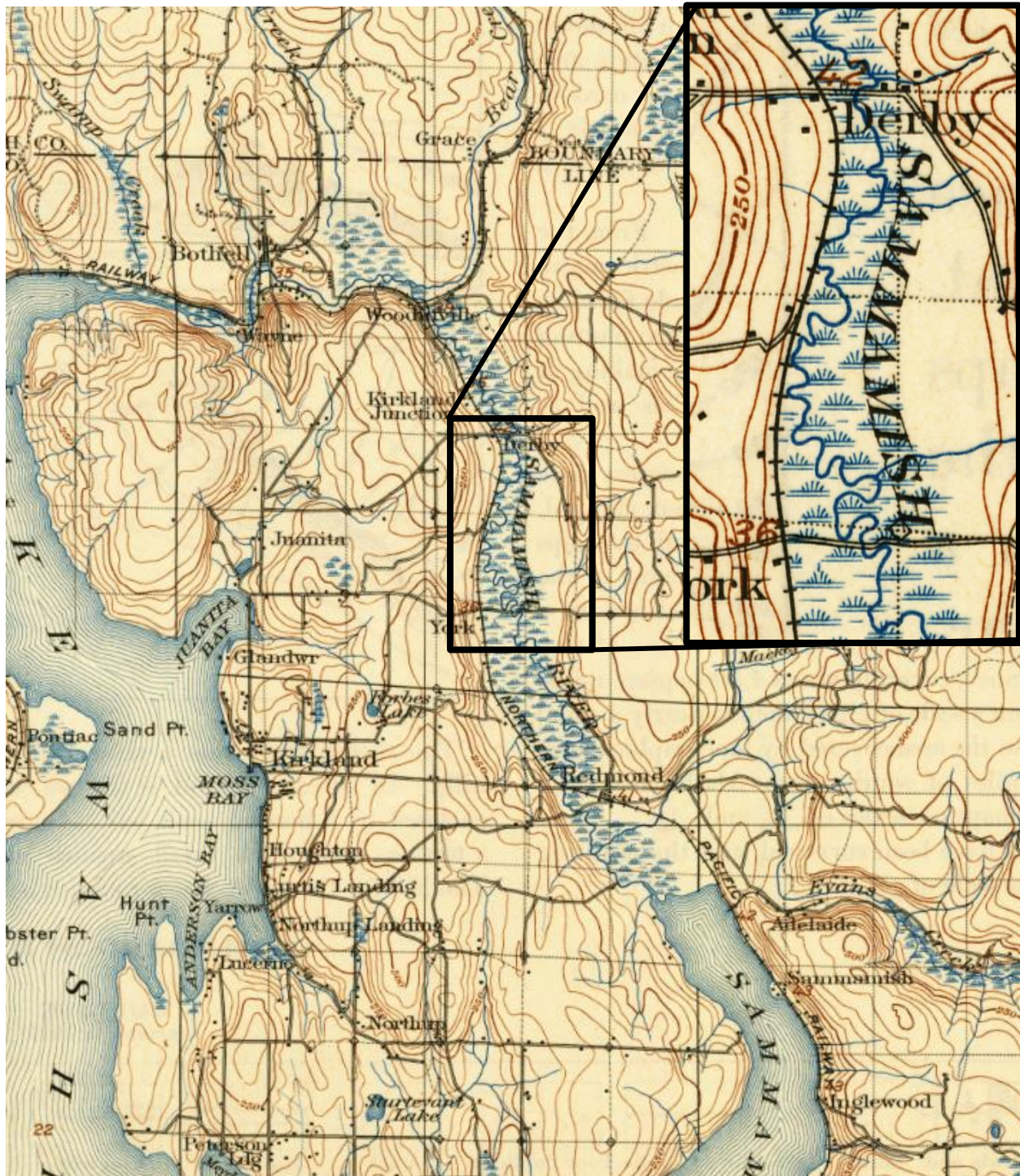
*The Bothell Brothers Tramway, seen here in 1885, was a crude track of 6" diameter pole rails, on which cars ran on concave wheels. The tramway was laid west of First Street to the Sammamish River. After 1917, logs were floated to the mills by way of the new Montlake Cut. (Bothell Historical Museum; all rights reserved.)*



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*The former twists and turns of the Sammamish River are shown in this historic USGS topographic map from 1897. (USGS, Seattle Quadrangle, 1897.)*



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*The Steamboat Mayblossom transported people from Bothell to Lake Washington and Seattle via the Sammamish River, ca. 1910. (University of Washington Libraries, Special Collections, WA0566.)*

The completion of the Lake Washington Ship Canal and Hiram M. Chittenden Locks in 1916 lowered Lake Washington by 9 feet and thereby the mouth of the Sammamish River, substantially improved the drainage of the Sammamish valley, particularly below Woodinville. By 1936 the river was substantially straightened and the valley drained by ditches by local drainage districts. In 1964 the U.S. Army Corps of Engineers (Corps) completed a project that included river dredging, construction of a weir at the Lake Sammamish outlet, and straightening of the river below the weir. This project practically eliminated flooding in the Sammamish River valley, reduced maximum flood elevations, and increased the minimum summer elevation of Lake Sammamish and decreased the maximum winter elevation. As a local sponsor of the Corps' project, King County assumed responsibility for maintaining the constructed channel. The weir was modified in 1998 to improve passage for anadromous salmon during low flow. Currently, the [Willowmoor Floodplain Restoration Project](#) is being designed to alter the transition zone between the Sammamish River and Lake Sammamish in Marymoor Park to improve natural complexity and habitat value while addressing maintenance costs and sustainable flood control.



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***Dredging in Lake Sammamish, February 10, 1934. (University of Washington Libraries, Special Collections, CWA0115.)***

Once steamboat traffic in the Sammamish River ended in 1916, it is believed that there were informal boat races up and down the slough, but the first official race did not happen until 1934, when the Seattle Outboard Association put on what *The Seattle Times* billed as the Lake Washington-Lake Sammamish Weekend Steeplechase. On March 4, 1934, the first Sammamish Slough Race was held. Soon the race became an annual event with attendees in the tens of thousands ogling the spectacle of the slough's 63 curves over 13 miles and the resulting crashes. Once the river was dredged and straightened, the thrill of the race was quieted. And in 1976, the race was halted after a spectator was injured. [Read more about the race at HistoryLink.](#) And [watch footage of the race here.](#) Check out [footage of waterski races here.](#)



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*Members of the Seattle Outboard Association regularly raced on the Sammamish River. Bridge pilings, logs and overhanging branches made the course quite a challenge. The driver of this boat built by Thompson Boatbuilders is Jim "Hotdog" Henry. (Seattle Post-Intelligencer Collection, Museum of History & Industry, Seattle; all rights reserved.)*



*The Sammamish River also hosted less speedy raft races. April 18, 1956 – J.C.'s raft race. (Eastside Heritage Center Photograph Collection L87.44.2 and L87.44.6)*



*With human manipulation, the Sammamish River was straightened, wetlands drained, and flooding practically eliminated. The Sammamish Valley is one of King County's finest areas of agricultural production. Aerial photo from 1964 (University of Washington Libraries, Special Collections, WAS4168.)*

Today, the Sammamish River is designated as impaired by the Washington Department of Ecology and the U.S. Environmental Protection Agency due to high water temperature, low oxygen, high pH, and high bacteria levels.

### **Sources and further readings:**

[King County Science and Technical Support Section Reports on the Sammamish River.](#)

Benson, Jim. *Taming of the Slough: The History of the Sammamish Slough Race "The Crookedest Race in the World"*. CreateSpace Independent Publishing Platform. 2018.

Johnston, Helen, and Richard Johnston. *Willowmoor: The Story of Marymoor Park*. King County Historical Association. 1976.

Stickney, Amy Eunice, and Lucie McDonald. *Squak Slough 1870-1920*. Friends of the Bothell Library. Bothell, WA. 1977.



## Summary of September 2018 Observations for King County Monitored Streams

- **Sampling dates**

- Sep. 11 – North Lake Washington and Lake Sammamish ([Water Resources Inventory Area \[WRIA\] 8](#)).
- Sep. 12 – South Lake Washington, Pipers Creek ([WRIA 8](#)), Green River and Vashon–Maury Island ([WRIA 9](#)), and Boise Creek ([WRIA 10](#)).
- Sep. 17 – Streams of Snoqualmie and Skykomish rivers ([WRIA 7](#)).

- **Rainfall, snowmelt, and flow**

- Before sampling in WRIs 8 and 9, flows had increased slightly due to 0.25 to 1 inch rainfall between Sep. 9 and 12. Generally more rain fell in southeast King County. Sampling preceded a mid-sized storm event that spiked stream flows on Sep. 15.
- WRIA 7 flows were about normal for this time of year due to the recent rainfall, but some streams did not receive as much rainfall and were still running a little below normal.

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

- **Water quality**

- **Fecal coliforms**

- Twenty-nine sites (accounting for 25 streams) had **high fecal coliform levels** above Washington state peak criteria:
  - **Patterson Creek** draining to the Snoqualmie River;
  - **Longfellow Creek** draining to the West Waterway of the Duwamish Estuary;
  - **Cedar, Forbes, Juanita, McAleer, Thornton, and Yarrow** creeks draining into Lake Washington;
  - **Eden, Idylwood, Issaquah, North Fork of Issaquah, Laughing Jacob, Lewis, Pine Lake, and Tibbetts** creeks draining into Lake Sammamish (Laughing Jacob had the highest concentration at 1,300 colonies per 100 milliliters);
  - **Little Bear, North, and Swamp** creeks draining into the Sammamish River;
  - **Mill and Newaukum** creeks draining to the Green River;
  - **Lower Green River**;
  - **Rock Creek** draining to Soos Creek;
  - **Boise Creek** draining to the White River; and
  - **Mileta** Creek on Vashon Island.
- Twenty-two sites (accounting for 18 streams) have had **ongoing high fecal coliform levels** that are above the state geometric mean criteria.
  - Over a third of monitored streams in WRIA 8 have fecal coliform geometric means over the state standards (16 of 40 sites).



- Longfellow, Springbrook, Fisher, Gorsuch, Judd, and Tahlequah creeks in WRIA 9 also had geometric means above the state criteria.

## ***Dissolved oxygen, Temperature, and pH***

- **Patterson** (WRIA 7), **Evans, Kelsey, Issaquah-North Fork, Laughing Jacob, Pine Lake, Sammamish, Swamp, Tibbetts,** and **Yarrow** creeks (WRIA 8), and **Middle Green, Springbrook, Rock, Mill,** and **Mileta** creeks (WRIA 9) was below the state criteria for **dissolved oxygen**.
- The **Cedar River** was above the state criteria for pH.
- Many streams had sample **temperatures** that were above the state standard. However the state standards 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 standard.
  - 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. Field staff did not observe any notable changes at the site.

[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  $n^{\text{th}}$  root of the product of  $n$  numbers. The statistical threshold is based on the 90<sup>th</sup> percentile of observed levels.