Bonney Lake Stream Team Program

Stream Monitor Program Goals

- Educate citizens about stream ecology, stream health, and nonpoint source pollution
- Involve citizens in observing, monitoring, reporting stream conditions
- Provide useful data/information to local Jurisdictions

What do our stream monitors do?

- Measure dissolved oxygen, water temperature, pH, nitrate-nitrogen, and turbidity
- Measure stream flow
- Conduct an annual habitat assessment

Program Background

Pierce Conservation District has coordinated a volunteer stream monitoring program in all four watersheds in Pierce County since 1994. Since that time PCD has engaged over 1,000 citizens in this program and currently more than 70 volunteers are involved with this effort. The goals of this program are to provide education to Pierce County residents about local streams, and the impact of our daily lives on stream water quality and habitat; as well as provide information on current stream conditions.

Why is monitoring important to your jurisdiction?

Volunteer monitors build awareness of pollution problems, learn about pollution prevention, raise awareness of problem sites, provide data for waters that may be unassessed, and increase the amount of water quality information available to local communities and decision makers.

Pierce Conservation District

How does this program work?
Local citizens are recruited from the local community through the PCD newsletter, Facebook page, and other media. Interested citizens attend a training focused on the basics of stream ecology; why we monitor; water quality testing for dissolved oxygen, nitrates, pH, and turbidity; flow measurement; and a habitat assessment with time for participants to practice sampling techniques. Staff also conducts a follow up field quality control session with each new monitor once they have established their monitoring routine.

Monitoring site selection is typically from a list of open monitoring sites or can be based on jurisdictional preference for a particular stream(s). Stream monitors can choose from three different monitoring schedules (monthly, bimonthly, quarterly) based on best fit with their personal schedule.

PCD provides the water quality kits to the volunteers. PCD staff provides ongoing maintenance of the kits including annual calibration of thermometers, checking and replacing reagents on a regular basis, and updating equipment as needed. The data collected using these kits is considered to be “red-flag” data, highlighting areas of concern where a more focused effort may be needed.

Volunteers
In 2017, 5 volunteers participated in monitoring of Fennel Creek contributing a total of 31 hours of volunteer time.

What happens with the data after it is collected?
The data is reviewed as it comes in to check for any missing, or unusual results or to clarify comments about conditions seen at the site. The results and additional comments are entered into an Access database. An annual snapshot of the data is prepared and sent to the volunteers and to our jurisdictional partners.

State Standards

The Washington State Department of Ecology sets standards for each stream based on beneficial uses for water temperature, dissolved oxygen, pH, and turbidity. While there are no nitrate standards issued by the department, nitrate concentrations in our surface waters can have significant impacts on the other metrics we do have standards for, and can cause significant alterations in biotic potential as well as overall habitat. The water quality data collected by volunteer stream monitors is presented in graphs along with the Washington State Department of Ecology standards. Red bars or red circles indicates those data points not meeting state standards.

Temperature and Dissolved Oxygen

Temperature and dissolved oxygen are two very important water quality features, and their levels determine what can live in our streams. High water temperatures reduce the ability of water to hold oxygen and also stresses the plants and animals that live in the stream. Warm water temperatures can be caused by lack of shading, erosion, stormwater runoff, and flow. Dissolved oxygen levels are affected by temperature, turbulence, photosynthesis, respiration, salinity, elevation, and amount of decaying matter.

pH

pH is a measure of the hydrogen ion concentration of water, which determines whether the water is acidic or basic. Aquatic plants and animals are sensitive to high or low pH. Factors that affect pH levels include photosynthesis, respiration, decomposition, stormwater runoff, and chemical spills. pH is measured on a scale ranging from 0 to 14 of pH units. A pH reading below 7 is considered acidic; above 7 is considered basic. It is important to know that the pH scale is “logarithmic”, meaning that for each one whole unit of change in pH, there is a ten-fold change in its acid or base level.

Nitrogen

Nitrogen is an essential plant nutrient required by all plants and animals for building protein. Nitrogen is present in several different forms in aquatic ecosystems. Nitrate is one form of nitrogen that can be easily used by plants and animals. The concentration and supply of nitrates in a stream depends on the surrounding land use. Sources of nitrates include human and animal waste, fertilizers, and stormwater run-off. Excessive amounts of nitrates stimulate increased plant and algae growth (eutrophication) which leads to lower oxygen levels as they begin to die off. During spring, nitrate levels may increase due to fertilization of lawns and fields. During winter, high rainfall can cause increased run-off of organic matter such as leaves, twigs, grass, and other debris. Decomposition of this organic material releases nitrates.

Turbidity

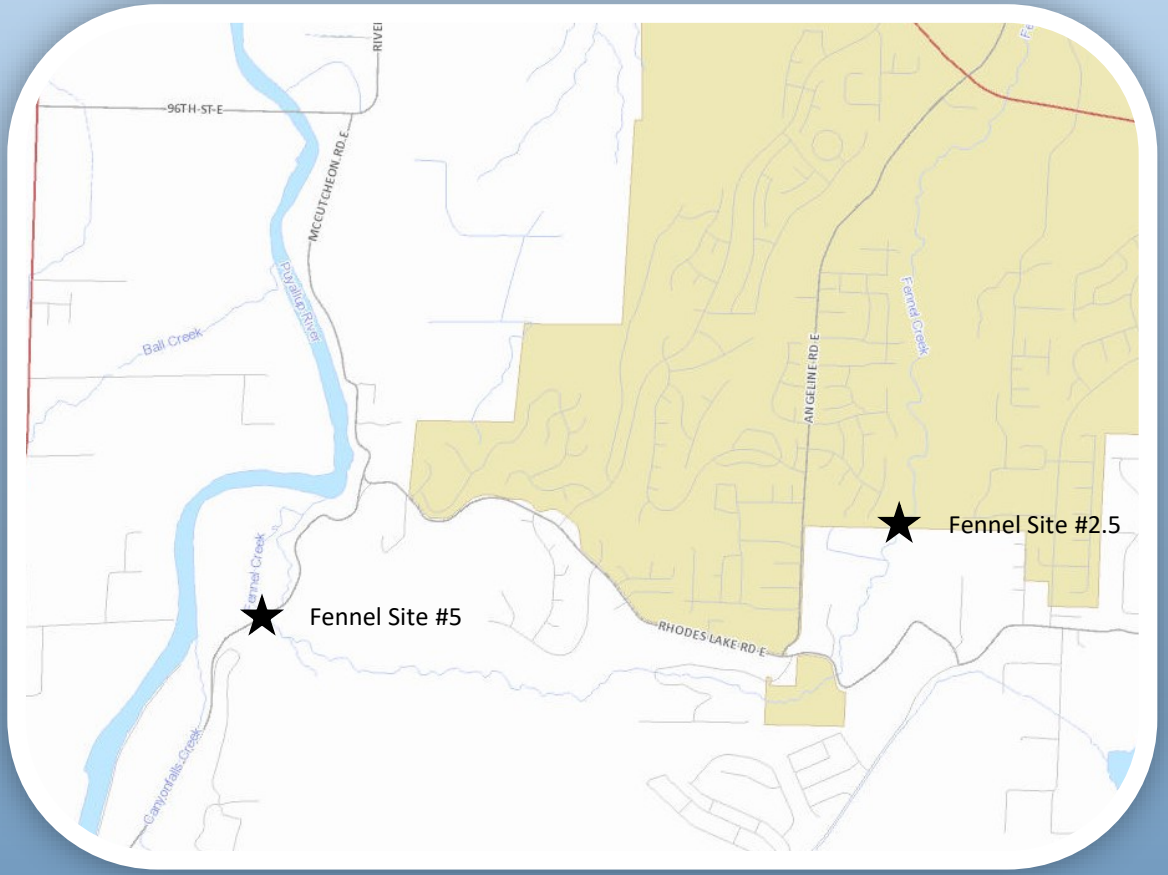
Turbidity is a measure of a stream's overall clarity. This generally varies throughout the year within any stream system, but large variations throughout a given period can be an indicator of problems with runoff, erosion, deforestation, or human activity. Clear water is important for many types of aquatic animal and plants species throughout their lifespan, and the hallmark of clear, cool water is especially important to anadromous salmonid species in the area.

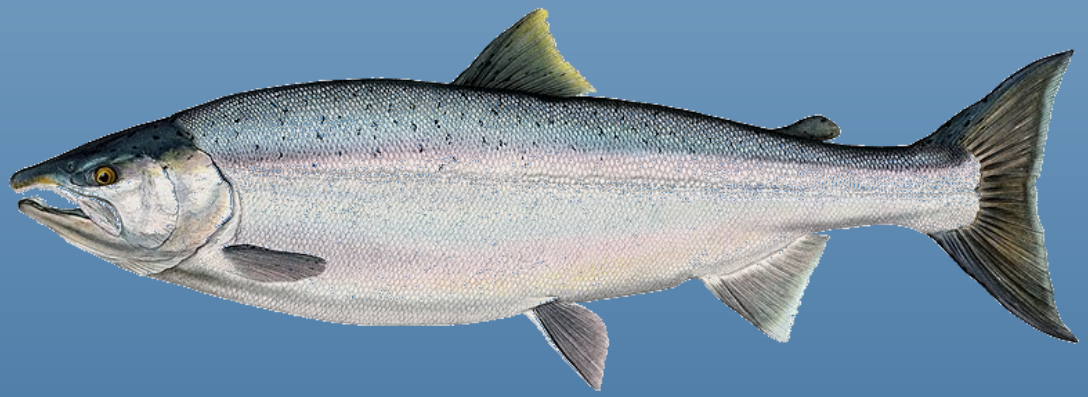
Fennel Creek Monitoring Site

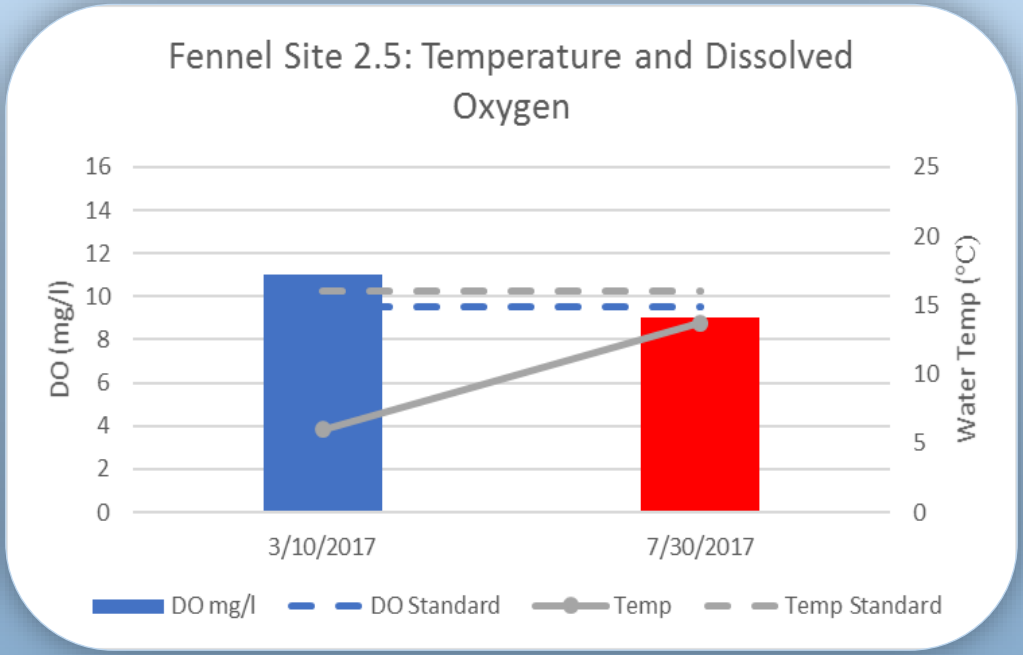
Fennel Creek, located in the Puyallup watershed, flows approximately 8 miles from its headwaters on the plateau near Bonney Lake to its confluence with the Puyallup River near Alderton. The lower reaches of Fennel (below Victor Falls) supports Chinook, coho, pink, chum and steelhead.

Fennel Creek is designated as core summer habitat and according to state water quality standards, water temperature should be ≤ 16˚C, dissolved oxygen should be ≥ 9.5 mg/l, and pH should fall between 6.5 and 8.5.

Site 2.5 is located at 11110 185th Ave. E., Bonney Lake above Victor Falls. It is accessed via a small park between two homes, and the monitoring takes place from the bridge. Site 5 is located at the west side of bridge at McCutcheon Rd, below Victor Falls.

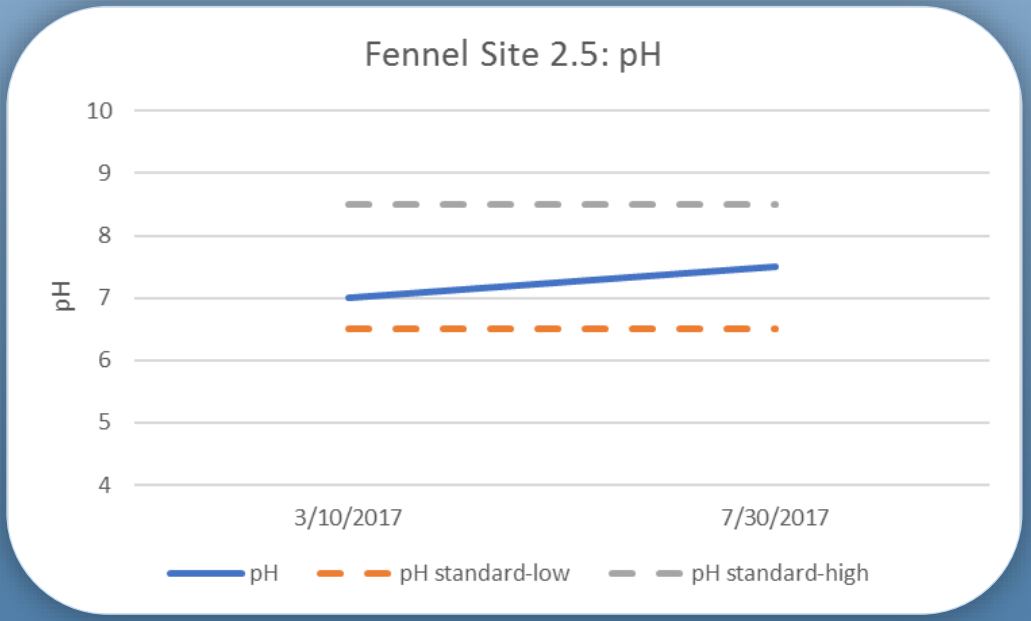


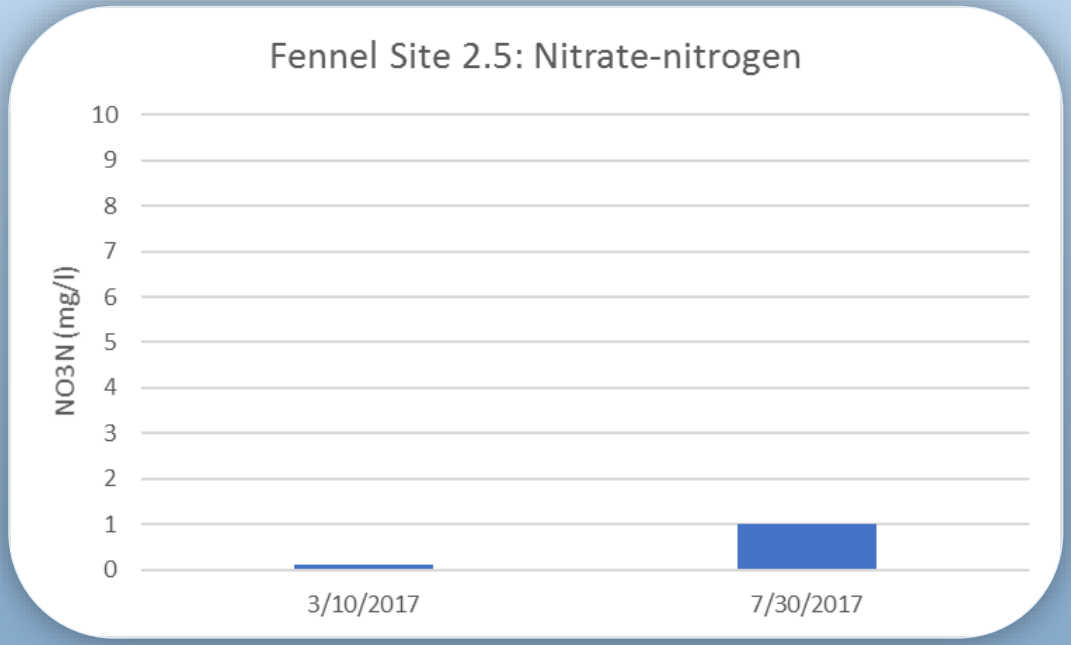




This graph shows dissolved oxygen levels and water temperatures during 2017. Water temperature met state standards on both sampling dates, while dissolved oxygen levels did not meet standards on one sampling date.

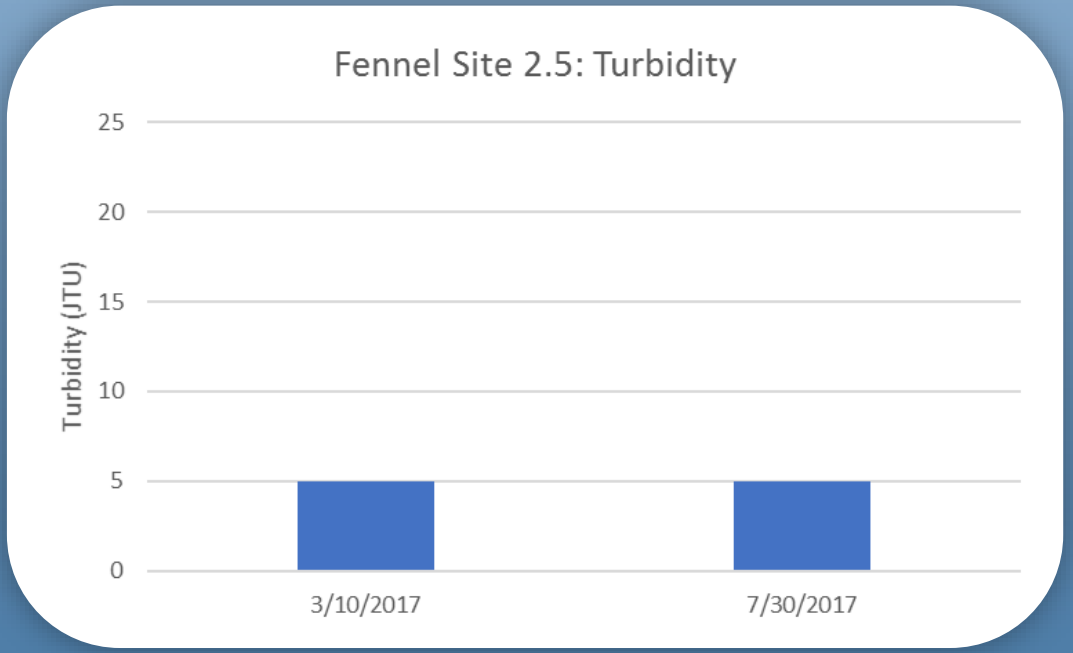
This graph shows pH levels during 2017. pH data met state standards on both sample dates.

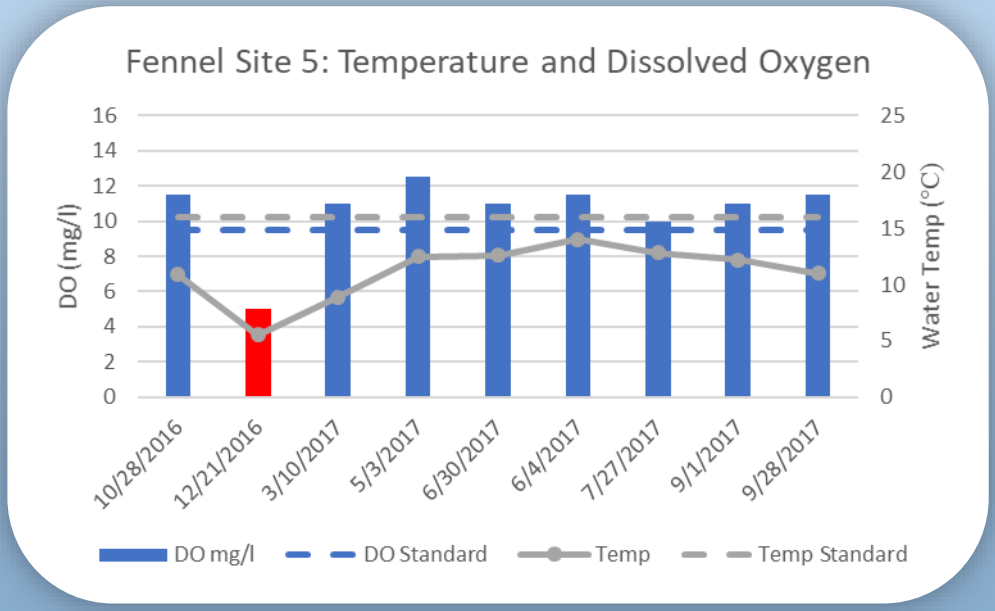




There are no state standards for nitrates at this time.

This graph displays the turbidity results for 2017.





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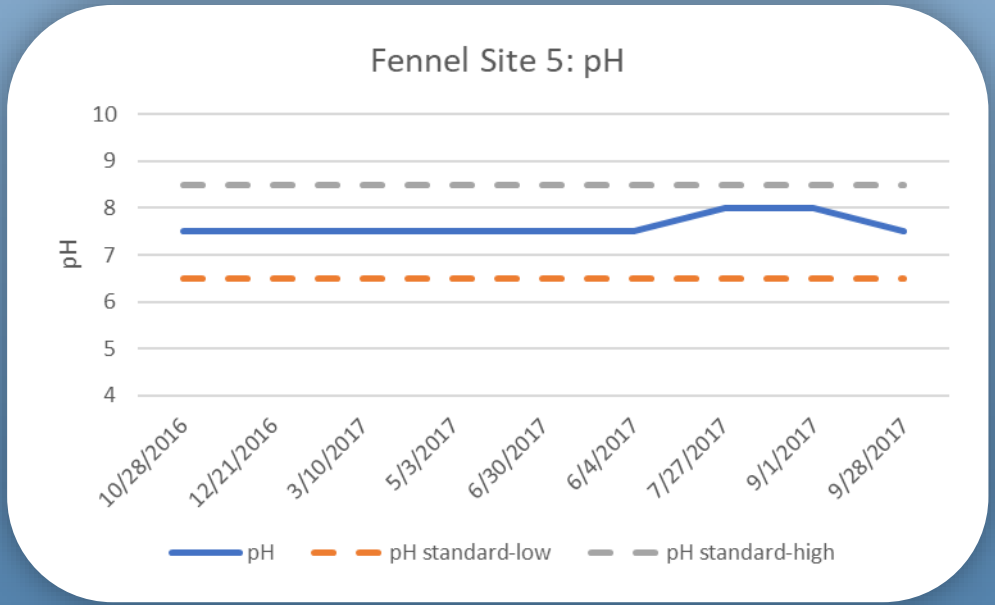

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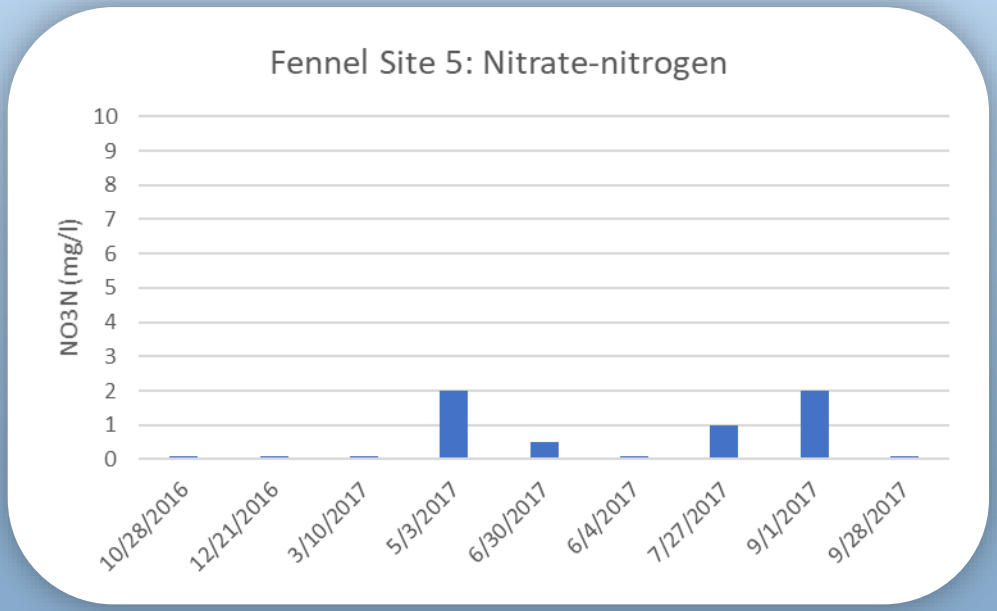

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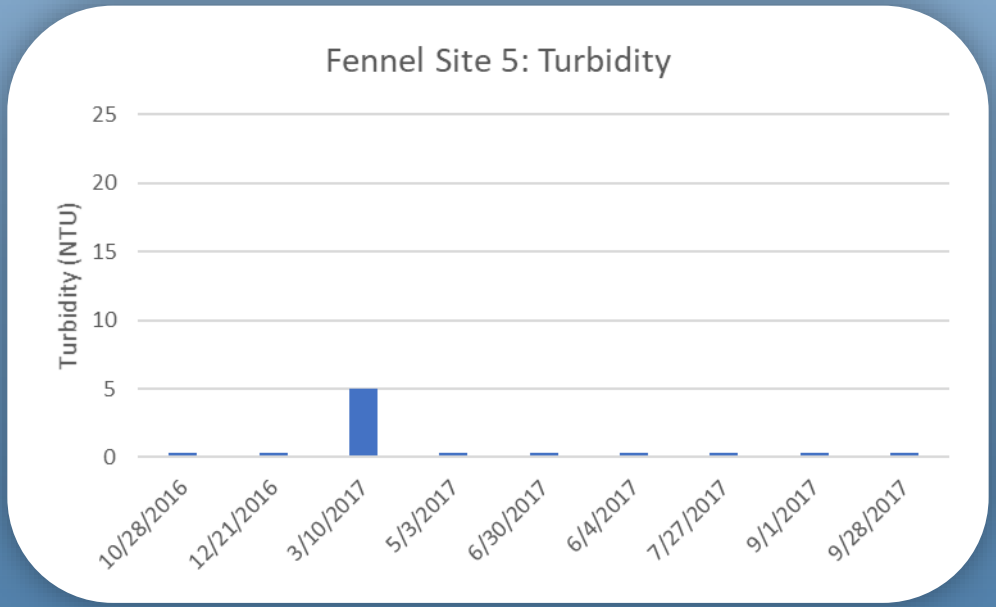

Summary

The dissolved oxygen reading on July 30 2017 at Site #2.5 could be low due to high water temperatures during the summer. In the summer flows are generally lower and the water is warmer, holding less oxygen. This is a new site, so data for 2017 is limited.

There were no observations to explain the low dissolved oxygen reading on December 21 2016 at Site #5. Low dissolved oxygen during the winter could be due to stagnant flows or decomposition of biological material. The higher turbidity reading on March 10 2017 was likely due to a storm event that occurred in the previous 24 hours.