BATIQUITOS 2019 ANNUAL REPORT

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Background

In the spring of 2019, Preserve Calavera created a program, North San Diego County Watershed Monitoring Program (NSDCWMP) to carry on the decade-long work of San Diego Coastkeeper (SDCK) to assess the health of local surface waters. The three watersheds of Carlsbad's lagoons, all of which are part of the Carlsbad Hydrologic Unit, are evaluated for several parameters, physical, chemical, and biological on a bimonthly basis.

NSDCWMP is an all-volunteer citizen science effort with a leadership management team comprised of two Preserve Calavera board members (also leaders of the Buena Vista Creek and Agua Hedionda Lagoon monitoring teams) and a representative from and leader of the Batiquitos Lagoon team. Our technical advisors are from the CA Waterboard and the San Diego Regional Water Quality Control Board (SDRWCB). Data is posted at www.preservecalavera.org and on the CEDEN website and shared with SDRWCB and the city of Carlsbad. The program began testing in July 2019. Batiquitos Lagoon is listed as a 303(D) - impaired waterbody under federal and state Clean Water Act regulations for sedimentation.

According to the Batiquitos Lagoon website[1], "Batiquitos Lagoon consists of 610 acres with a drainage basin of about 55,000 acres. The watershed basin includes the cities of Carlsbad, San Marcos, and Encinitas, with its primary freshwater tributaries being San Marcos Creek from the east and Encinitas Creek which flows north along Green Valley, entering the lagoon under El Camino Real and La Costa Avenue, respectively. Accumulated silt has been filling up Batiquitos Lagoon, and the lagoon was expected to fill up within 50 years. Instead, a large dredging and enhancement project began in 1994 to open the lagoon to the ocean's tidal changes and flows, thus slowing down the filling of the lagoon with silt. This project, completed in 1997, was funded by the Port of Los Angeles."

Sample sites BTQ020 and BTQ030 are located on San Marcos Creek, and sample site BTQ010 is located on Encinitas Creek. It is not uncommon to see some variation in the readings between these two incoming creeks. BTQ030 is often dry, however, when there is water present it is likely a result of overflow or release from the San Marcos Lake Dam.

A dam built in 1952 to create Lake San Marcos dramatically reduced the amount of freshwater flow into San Marcos creek and subsequently the lagoon. Unfortunately, there have been many concerns around pollution in San Marcos Creek as a result of the improper release of lake water from a release valve toward the bottom of the dam. According to Jim Brown in the February 2018 Batiquitos Lagoon newsletter[2], "During rainstorm events, lake operators release many acre-feet of polluted water into the lower San Marcos Creek, ending up in the Batiquitos Lagoon Ecological Reserve and ocean. The Batiquitos Lagoon Foundation believes the Lake San Marcos dam operations and illegal water releases are among the most significant ongoing threats to the lagoon's water quality." These concerns have been brought to the attention of the San Diego Regional Water Quality Control Board and our work to continue to monitor the water quality in this creek will provide key data to assess the situation.

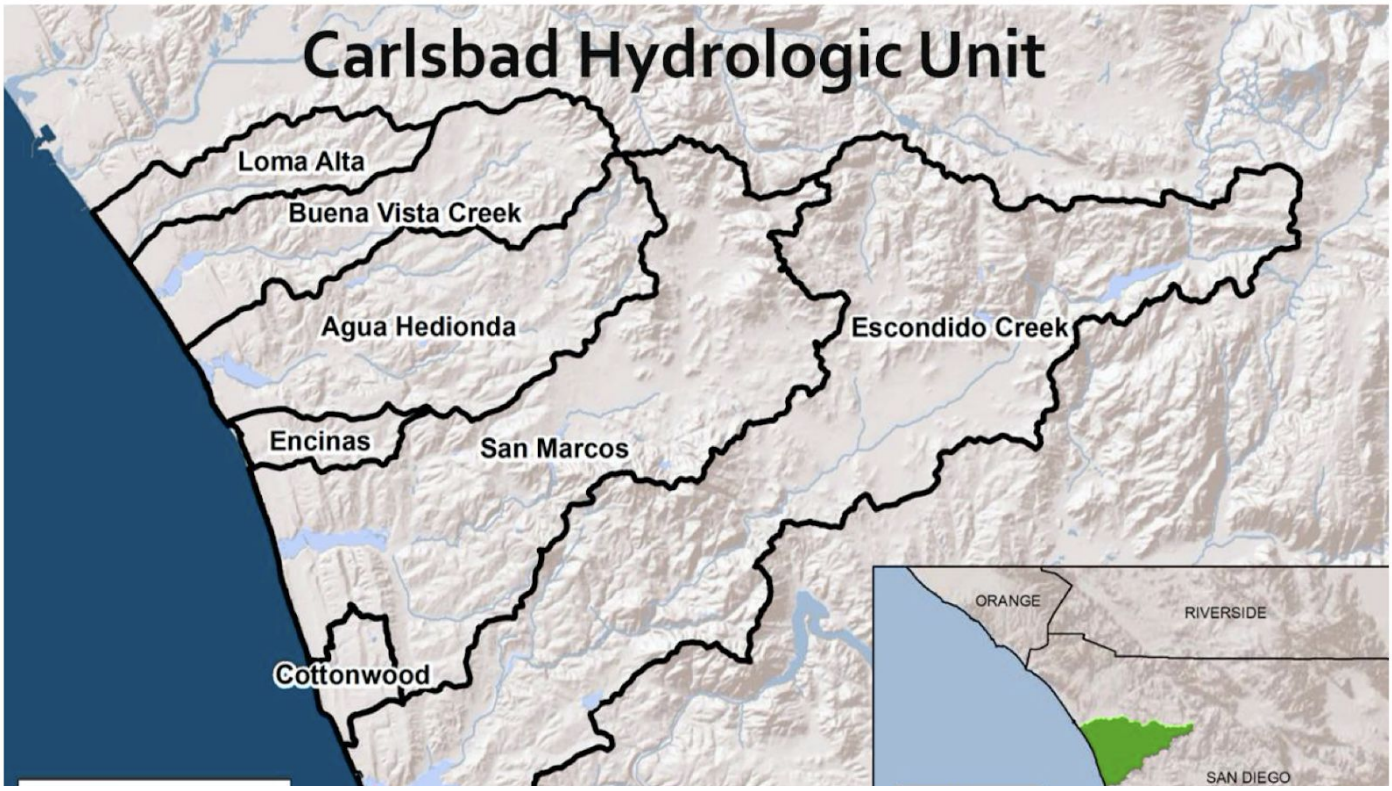


Figure 1Image from [Prioritizing Invasive Species Management in the Carlsbad Hydrologic Unit]

Figure 2 Image from [Batiquitos Lagoon Ecological Reserve]

For 10 years San Diego Coastkeeper monitored this watershed on a bimonthly schedule, ending in December 2018. Data for 2009-2016 is posted on the California Environmental Data Exchange Network (CEDEN). The purpose of this annual report is to 1) interpret the health of Batiquitos Lagoon for the testing period in 2019 and 2) look at historic trends (2009-present). Each parameter will be evaluated for anomalies and trends and the overall state of the watershed will be summarized based upon these results. Monitoring was carried out in July, September, and November of 2019.

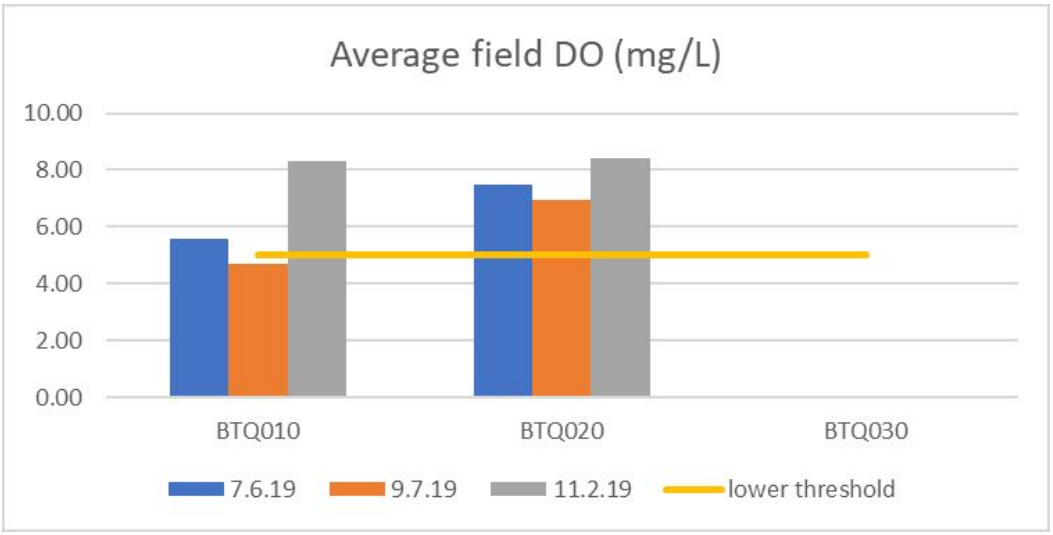
Sampling Sites

The Batiquitos team sampled the same sites (BTQ 010, BTQ020, and BTQ030) as had been tested with SDCK identified in the map below. BTQ 030 was dry for all three sampling dates, which is why there is no data present for BTQ030 in the charts and discussion below.

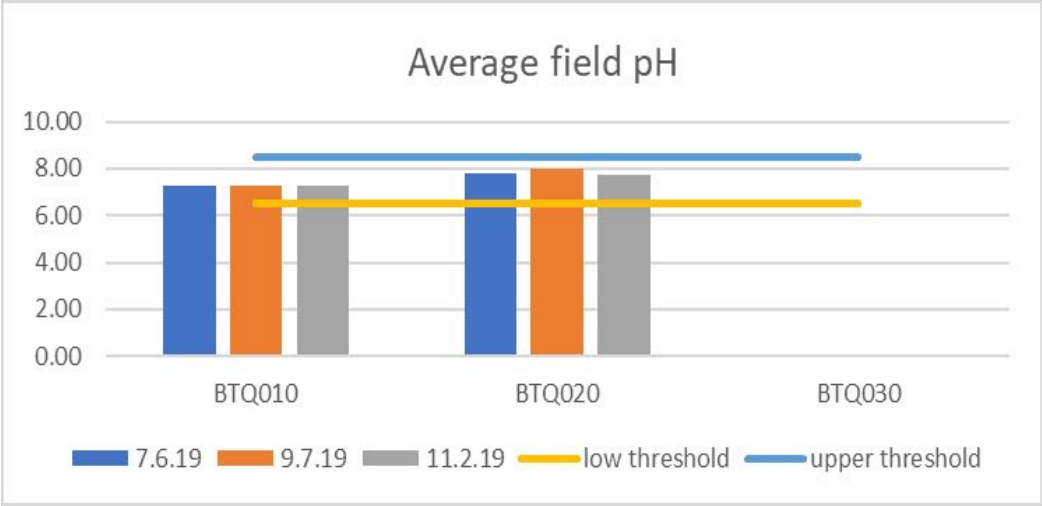
Figure 3 - Batiquitos sampling sites

Field Parameters

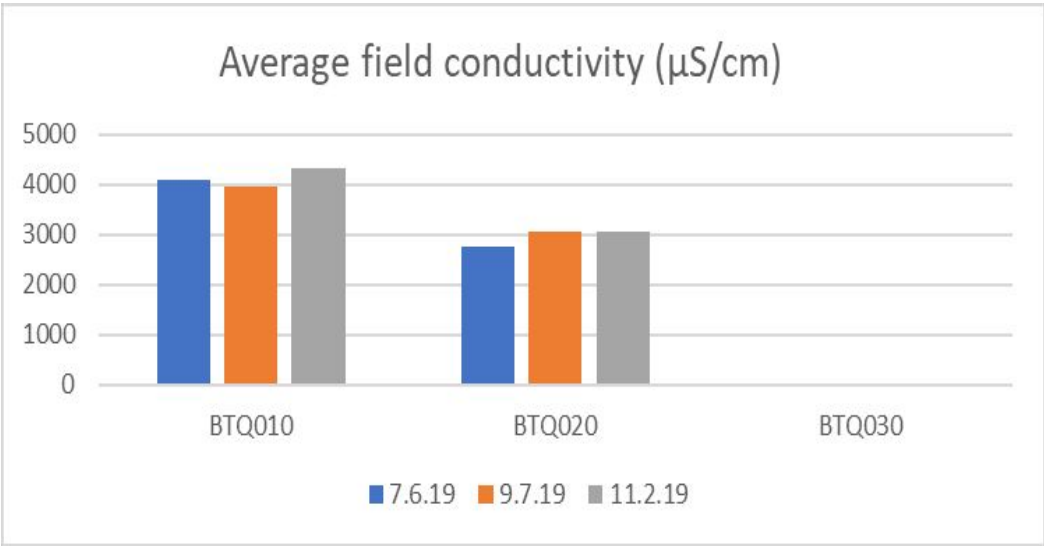
Dissolved oxygen was generally above the San Diego Basin Plan[3] threshold of 5.0 mg/L, except for BTQ010 in September 2019 which was slightly below the threshold. These levels represent a healthy amount of oxygen in the water for aquatic animals.



The pH ranged between 7.0 and 8.0 at both sites for all three sampling sessions, within the acceptable range for the Basin Plan[3] of 6.5-8.5.



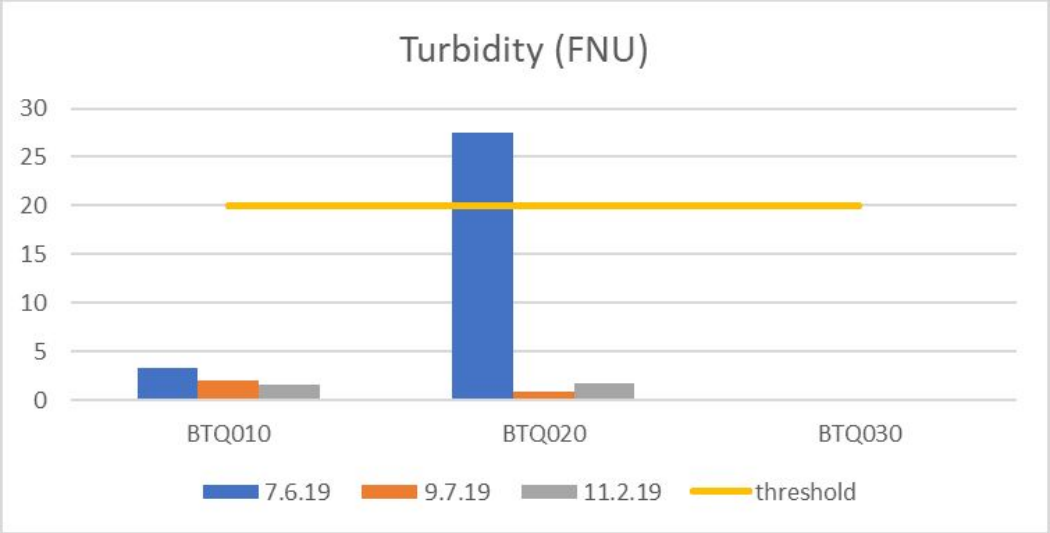
Conductivity fluctuated between 4000-4500 µS/cm for BTQ010 and between 2500-3000 µS/cm for BTQ020. This compares with historic data for this parameter. There is no threshold for conductivity, it merely reflects the amount of dissolved minerals in the water.



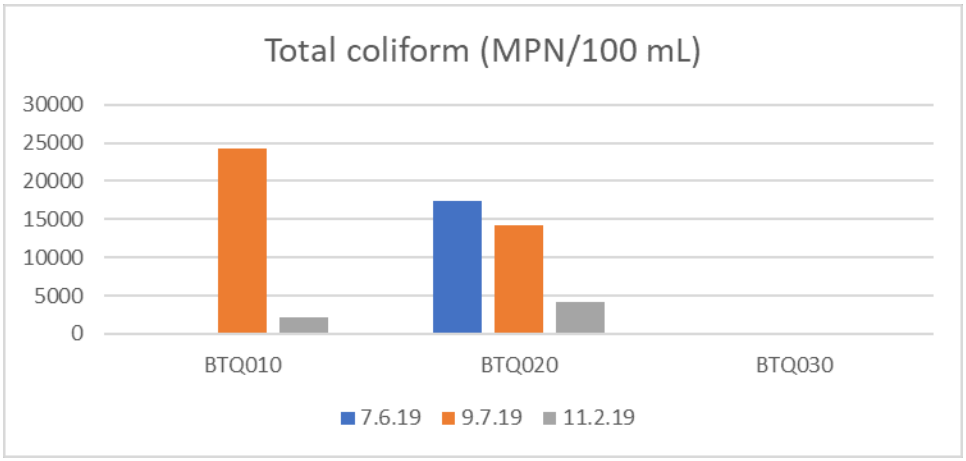
Laboratory tests

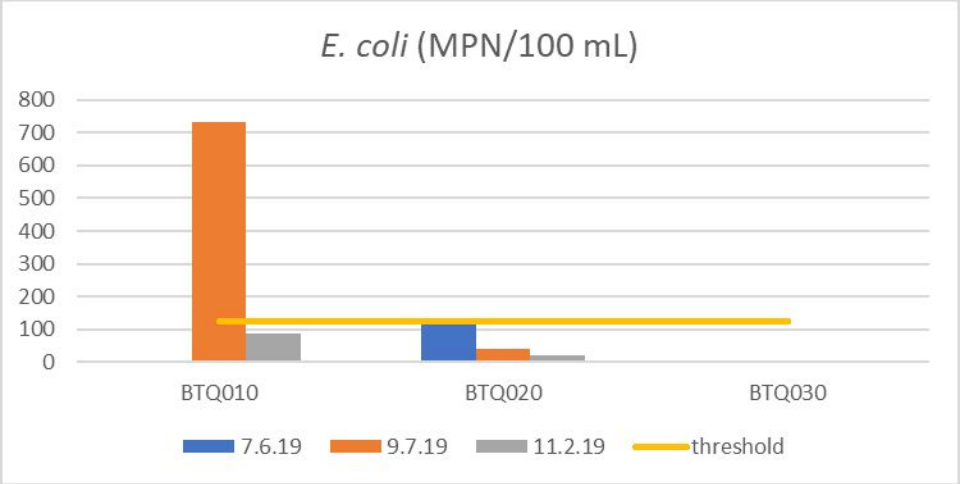
Turbidity (cloudiness), total coliform, *E. coli*, nitrates, total and reactive phosphorus, and ammonia are measured in the lab using 'grabbed' samples transported from the field.

High turbidity can hinder light penetrating water which may affect photosynthesis. The threshold is 20 FNU. We had one outlier at BTQ020 in July with especially high turbidity levels above 20 FNU this may have been a result of a high level of sediment pulled in when the water was sampled due to the low water level. For the other sampling sites and dates, the turbidity was never higher than 3.5 FNU.

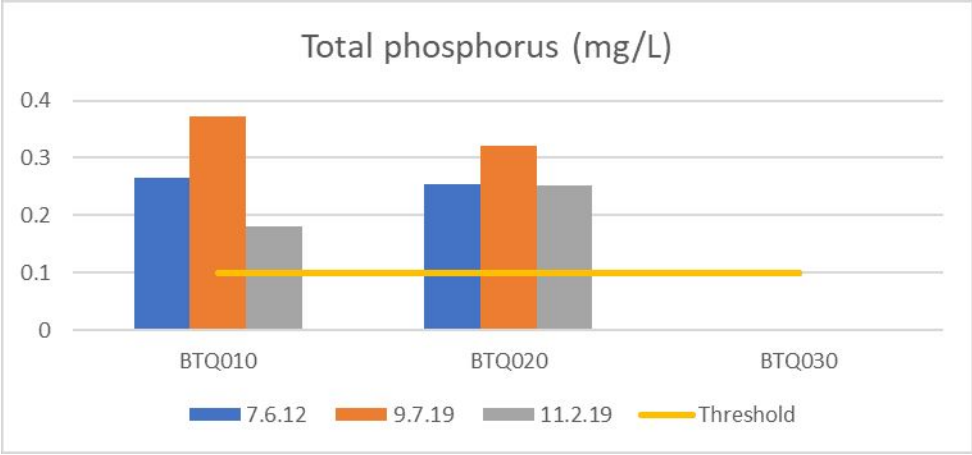


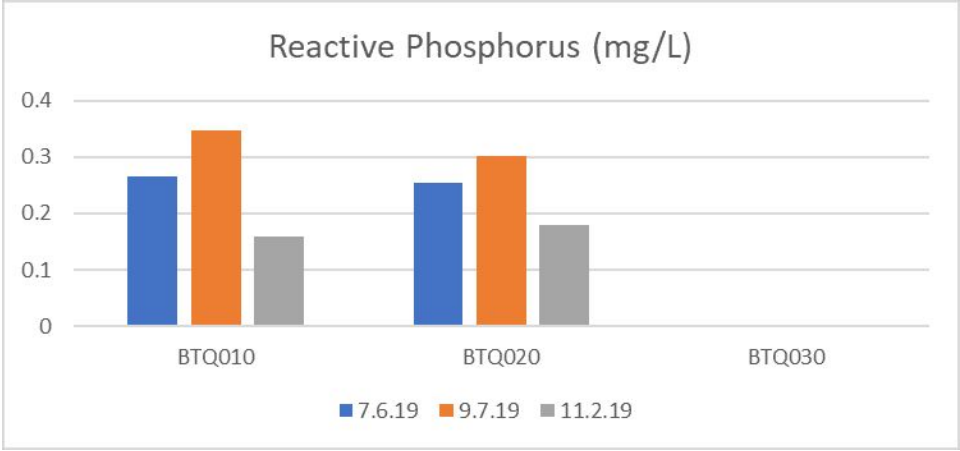
Coliforms are a group of bacteria found in the digestive tracts of animals, including humans and their wastes. They are also found in plant and soil material. They may or may not indicate pathogenic bacteria. There is no threshold for these bacteria due to the wide types of sources. *E. coli*, however, is much more indicative of potential concern as many strains are pathogenic. The test we run, using IDEXX Quanti-tray/Colilert, measures all *E. coli*, pathogenic or not. The threshold for this bacteria is 126 MPN/100 mL^3. We had one high reading at BTQ010 in September 2019 with an elevated E. *coli* level above 700 MPN/100 mL, other readings at this site and readings at BTQ020 were below the threshold 126 MPN/100 mL.



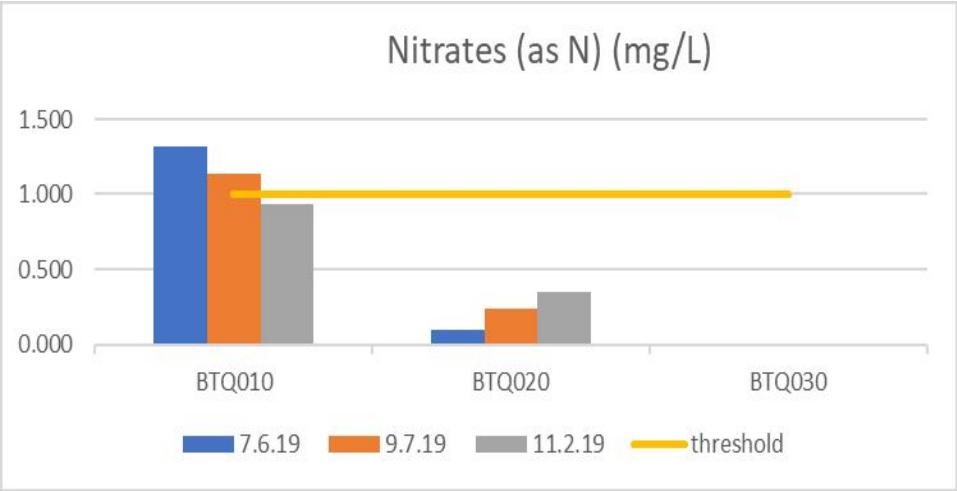


Elevated phosphorus is often the result of fertilizer runoff and can lead to algal blooms. The threshold for San Diego watersheds is 0.1 mg/L[3]. The range for total phosphorus was above the threshold for both sites for all samples. This could be a result of the large housing developments in close proximity to these sampling locations.

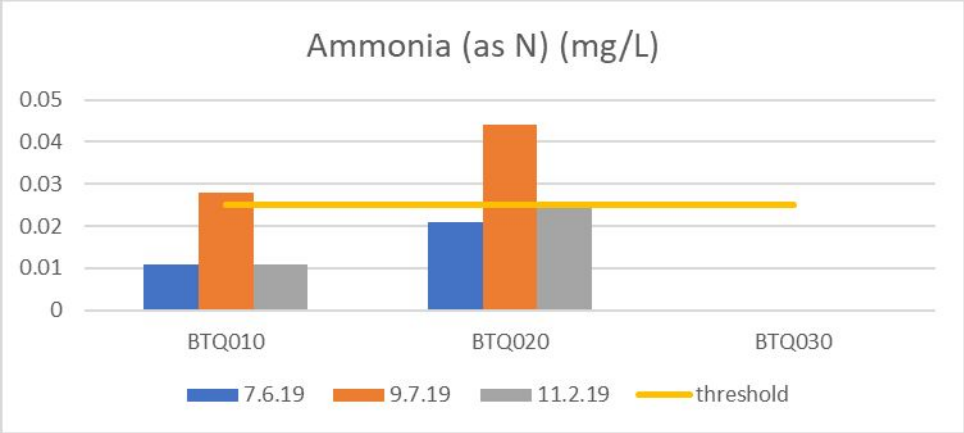




Nitrates, too, generally come from fertilizer runoff. BTQ020 from San Marcos Creek was well below the threshold, while BTQ010 from Encinitas Creek was above the threshold of 1.0 mg/L[3] in July and September, but slightly below the threshold in November.



Lastly, for ammonia, the threshold is 0.025 mg/L. Our readings were always below the threshold in July and November, but slightly above the threshold in September, a similar trend was seen with the phosphorus readings above.



Final thoughts

It's difficult to explain some of the differences at our testing sites. The NSDCWMP is strictly a monitoring one but one would like to understand the sources of the pollutants we see. Some of the high levels of nutrients and bacteria are likely tied to runoff in the rainy season. Although we were disappointed not to have water to sample from BTQ030, the fact that the creek was dry at that location is a good indication that the illegal release of water has been halted. It is not surprising that BTQ010 and BTQ020 show differing results as they are sampled from two separate creeks. The high bacterial levels is a concern which we will continue to monitor, especially during rain events.

[1]https://batiquitoslagoon.org/about.html
[2]https://batiquitoslagoon.org/blf_newsletter_2-2018.pdf
[3]https://www.waterboards.ca.gov/sandiego/water_issues/programs/basin_plan/docs/R9_Basin_Plan.pdf