BUENA VISTA CREEK 2019 ANNUAL REPORT

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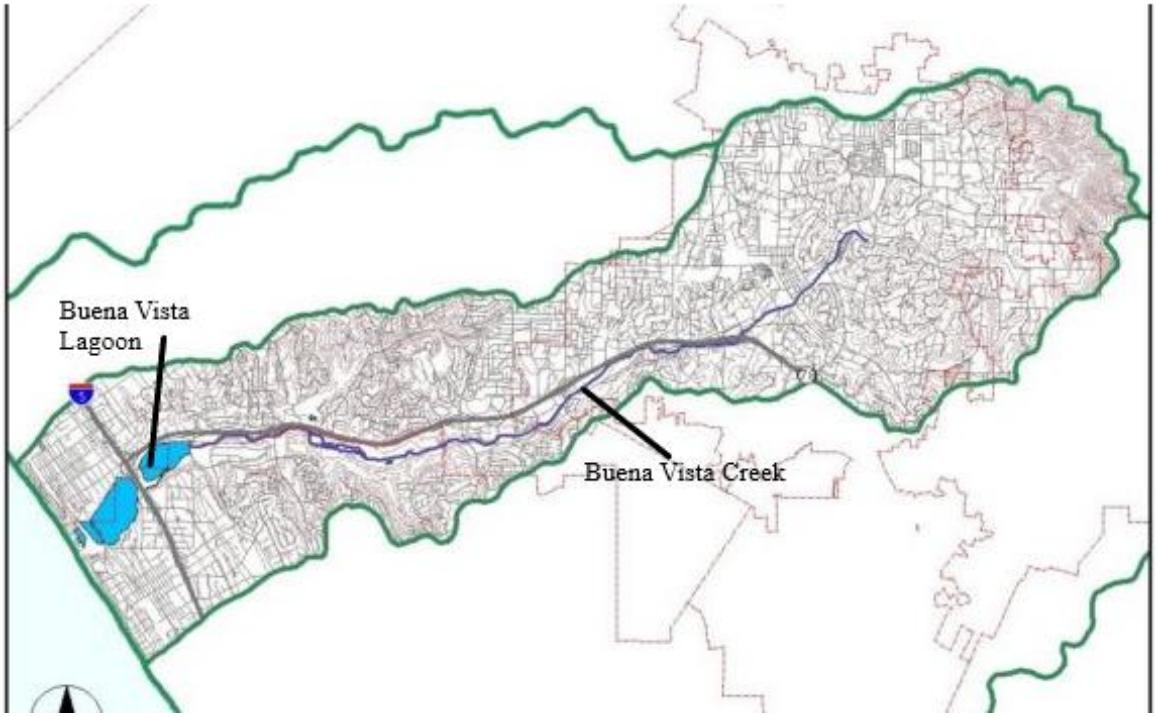
Background

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 a number of 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.

Buena Vista Lagoon which is part of both Oceanside and Carlsbad is fed by Buena Vista Creek whose headwaters are on the western slopes of the San Marcos Mountains.[1] Buena Vista Creek is the only creek feeding Buena Vista Lagoon which opens to the Pacific Ocean. Currently, due to a weir put in place in the 1940s near the mouth of the lagoon, it is freshwater and in a steady state of decline. In May 2020, the Final Environmental Impact Report prepared by The San Diego Association of Governments (SANDAG) was adopted by their Board of Directors.[2] The consequence is that the lagoon will be returned to its historic saltwater state when funding becomes available.

Figure 1



For 10 years SDCK monitored this watershed bimonthly, ending at the end of 2018. Data for 2009-2016 is posted on the California Environmental Data Exchange Network (CEDEN). For calendar years 2017 and 2018 data has been provided to our program by SDCK. During the last year that SDCK produced annual reports for their watersheds, 2016, Buena Vista Creek's water quality was rated as 'fair'. NSDCWMP has not yet created a similar scorecard to assess the overall health of the watershed.

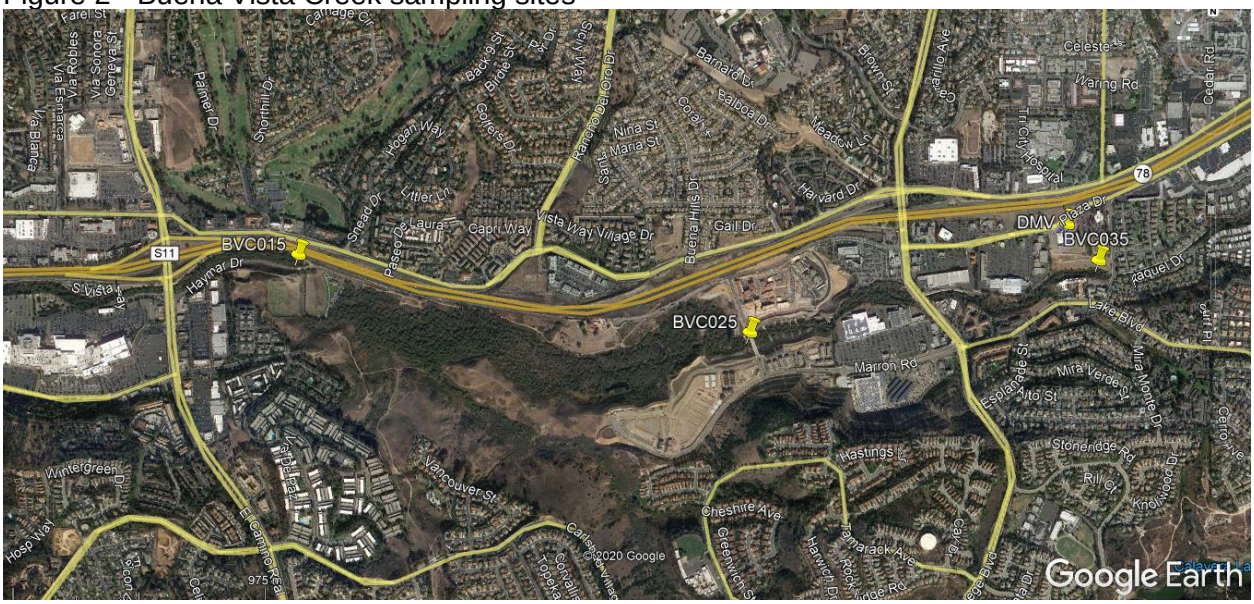
The purpose of this annual report is to 1) interpret the health of Buena Vista Creek for the testing period in 2019 and 2) look at historic trends (2009-present). Each parameter will be evaluated for anomalies and trends and the overall state of the watershed will be summarized based upon these results. Monitoring was carried out in July, September and November of 2019.

[1]https://scwrp.org/projects/buena-vista- icreek-watershed-plan/
[2]https://bvaudubon.org/bv-lagoon-enhancement/

Sampling Sites

The Buena Vista Creek team sampled the same sites (BVC015, BVC025 and BVC035) as had been tested for the previous two years with SDCK identified in the map below:

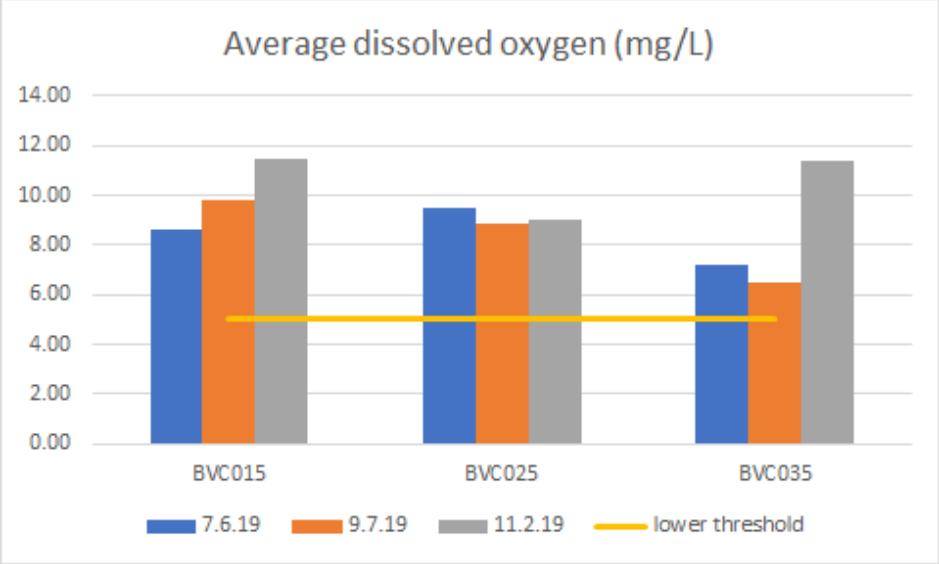
Figure 2 - Buena Vista Creek sampling sites



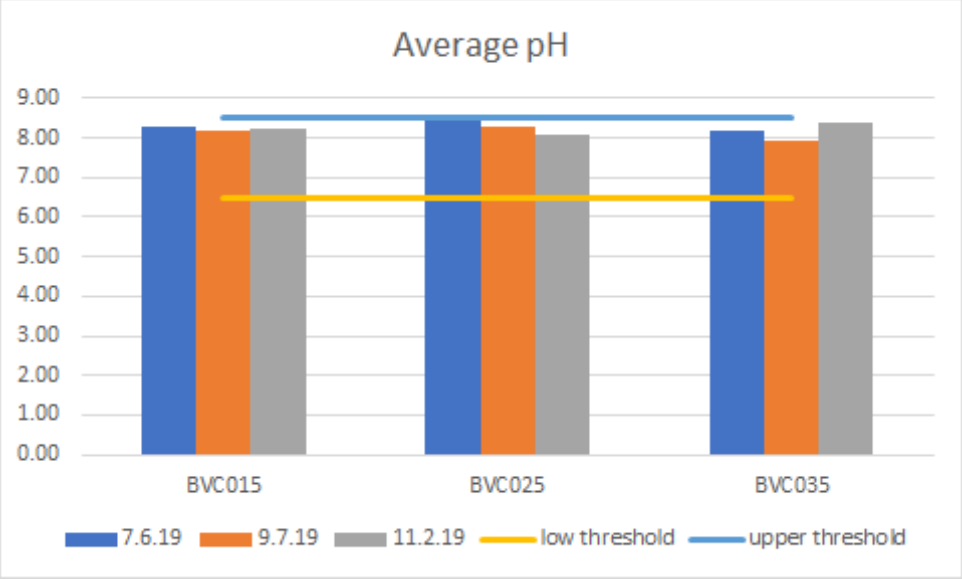
Field Parameters

Our field teams of 2-4 trained volunteers visit 3 sites within each watershed where water samples are collected for laboratory analysis and *in situ* measurements made for dissolved oxygen, conductivity and pH. One field sample is filtered for some of the nutrient tests and the other used for bacteria, turbidity, and total phosphorus measurements.

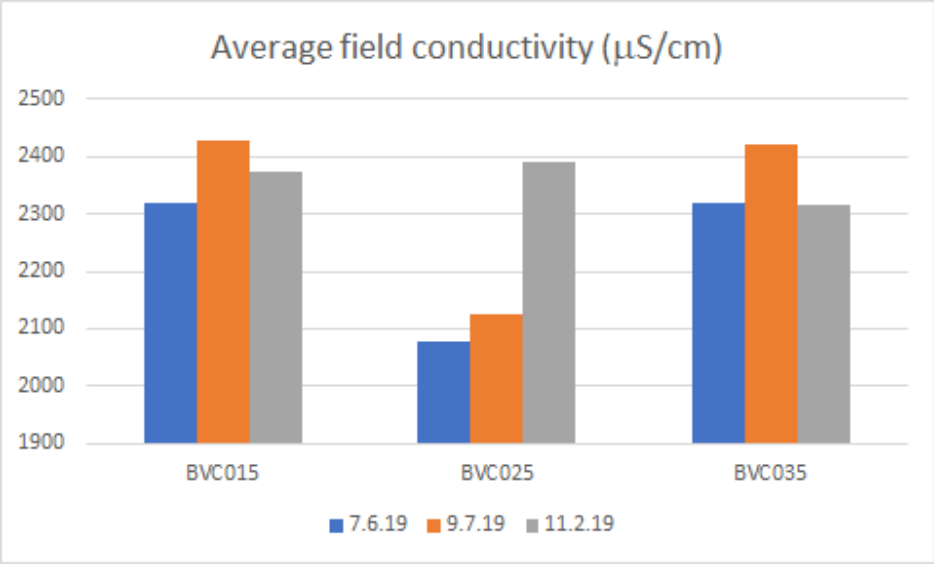
Dissolved oxygen was consistently above the San Diego Basin Plan[3] threshold of 5.0 mg/L, generally ranging above 6.0 and below 11.0 mg/L at all 3 sites. These levels represent a healthy amount of oxygen in the water for aquatic animals.



The pH ranged between 7.5 and 8.5, again within the acceptable range for the Basin Plan[3] of 6.5-8.5.



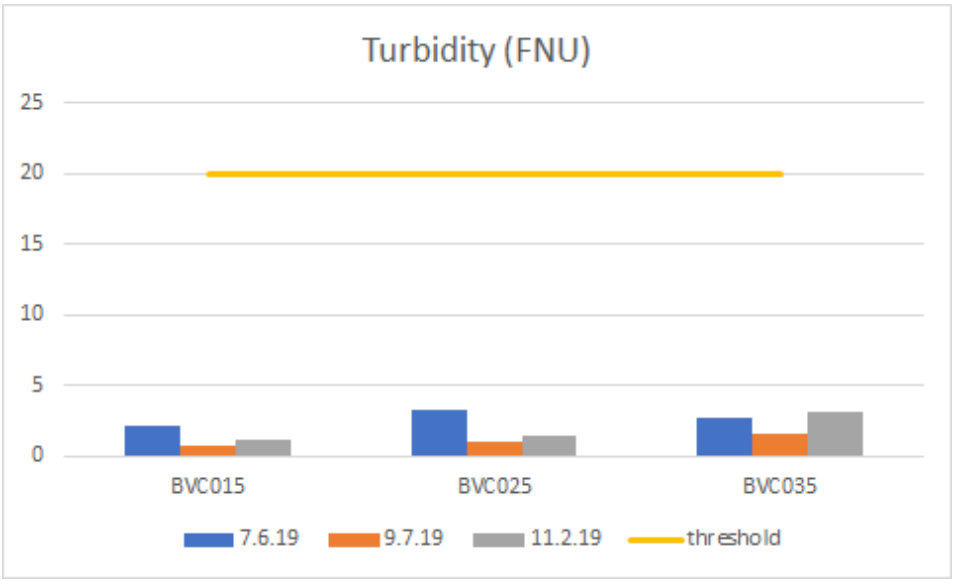
Conductivity fluctuated between 2000-2500 µS/cm. This compares with historic data for this parameter. There is no threshold for conductivity, it merely reflects the amount of dissolved minerals in the water.



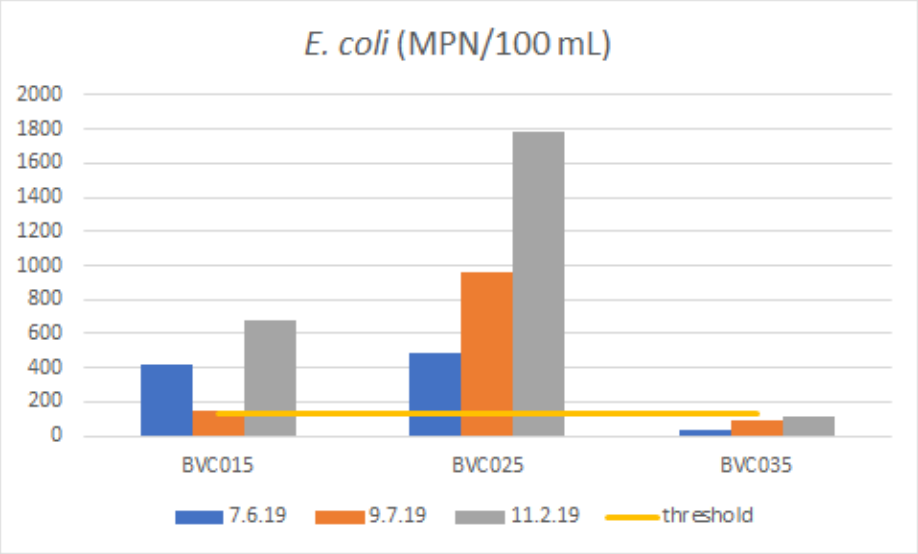
Laboratory tests

Turbidity (cloudiness), total coliform, *E. coli*, nitrates, total phosphorus, reactive phosphorus and ammonia are measured in the lab using 'grabbed' samples transported from the field. Trained volunteers then process the samples: unfiltered samples are used for total coliform and *E. coli* as well as turbidity and total phosphorus. The remaining filtered sample is used for reactive phosphorus, nitrates and ammonia.

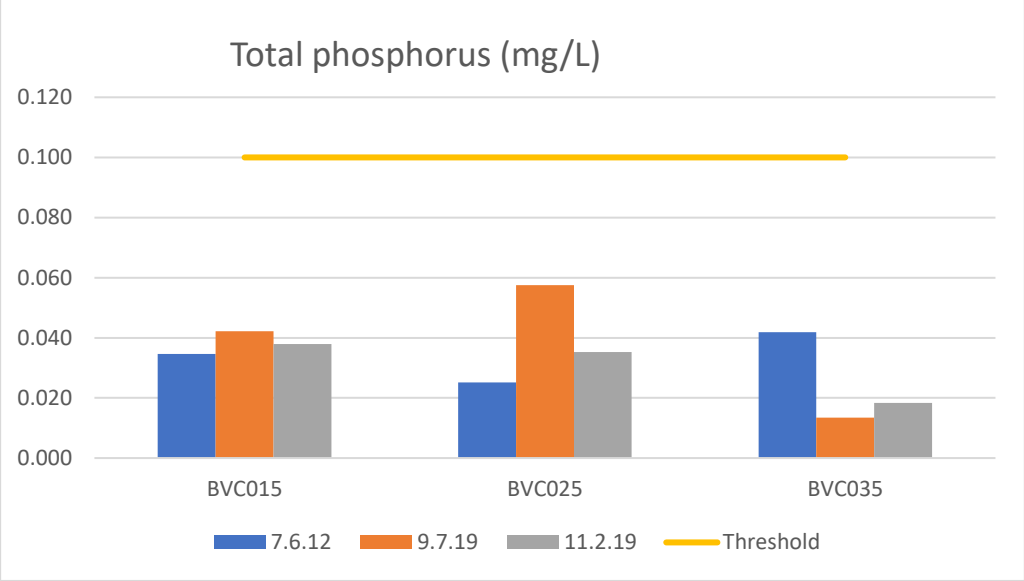
High turbidity can hinder light penetrating water which may affect photosynthesis. The threshold is 20 FNU. For our three sites, the turbidity was never higher than 3.5 FNU.



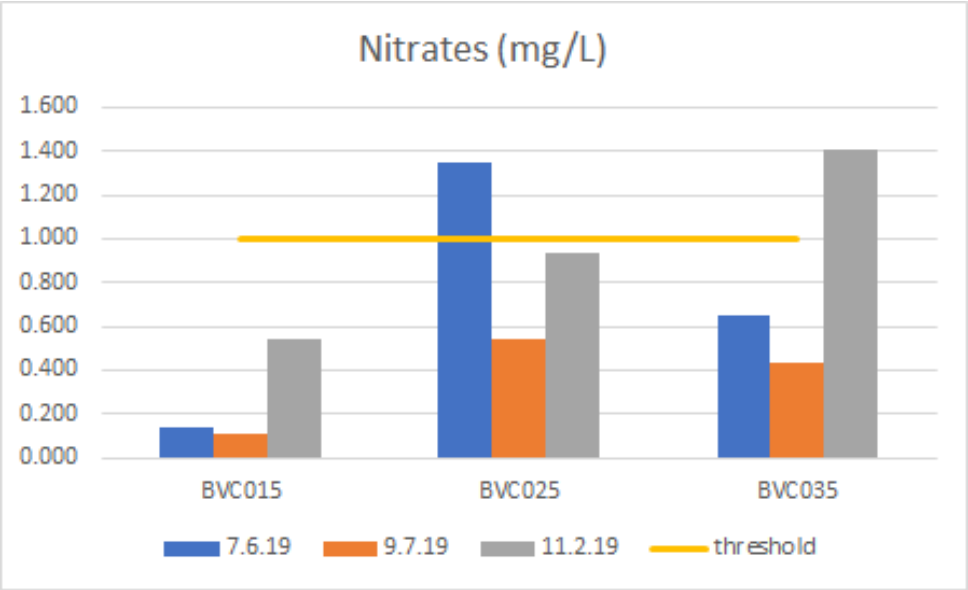
Coliforms are a group of bacteria found in the digestive tracts of animals, including humans and their wastes. They are also found in plant and soil material. They may or may not indicate pathogenic bacteria. There is no threshold for these bacteria due to the wide types of sources. *E. coli*, however, 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]. Our most upstream site, BVC035, never was above the threshold. However, both BVC025 and BVC015 were always higher than 126 MPN/100 mL with the former site sometimes up to 14x the threshold. This is an area of concern. The downstream site is consistently much lower but still above threshold.



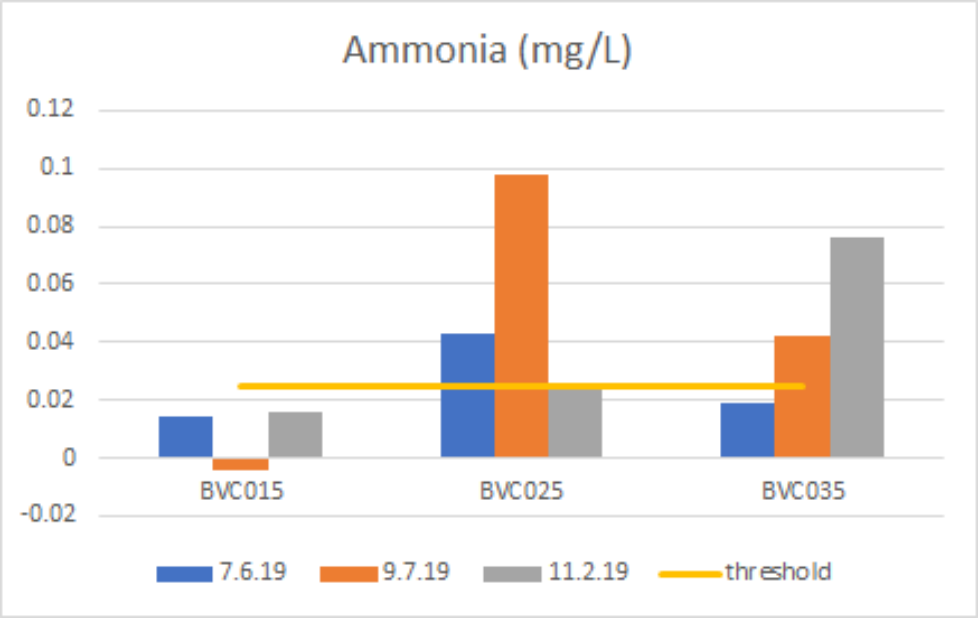
Elevated phosphorus is often the result of fertilizer runoff and can lead to algal blooms. The threshold for San Diego watersheds is 0.1 mg/L[3]. The range for total phosphorus was well below threshold for all sites in 2019.



Nitrates, too, generally come from fertilizer runoff. The most downstream site was consistently well below the threshold of 1.0 mg/L[3]. For the upstream sites nitrates showed more variability, sometimes being over threshold.



Lastly, ammonia[4], whose threshold was 0.025 mg/L was always below threshold at BVC015 and varied, as for phosphorus and nitrates at the other two upstream sites. Natural sources of ammonia come from the breakdown of organic wastes, forest fires, animal from runoff and human waste, exchange with the atmosphere and nitrogen fixation.



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 (see the blue h

BVC015, most downstream, is always lower in nutrients than the upstream sites while also being above threshold for *E. coli.* At this site the water has passed through inhabited and commercial areas then traveled through the Buena Vista Creek Ecological Reserve before passing through a driving range. There may be less fertilizer runoff in this last reach of the creek or merely more runoff water to dilute the pollutants. Homeless encampments within wetland areas is always a concern when looking at *E. coli* levels. We did not have the capacity to determine the presence of encampments upstream unless they were within sight of the field teams test sites and didn't note any during this period.

The high *E. coli* is a puzzle. Appendix A shows storm drain outfalls along Buena Vista Creek which could possibly be contributing to the *E. coli.* As you may be aware, there is also an aging sewer line that runs near the creek.

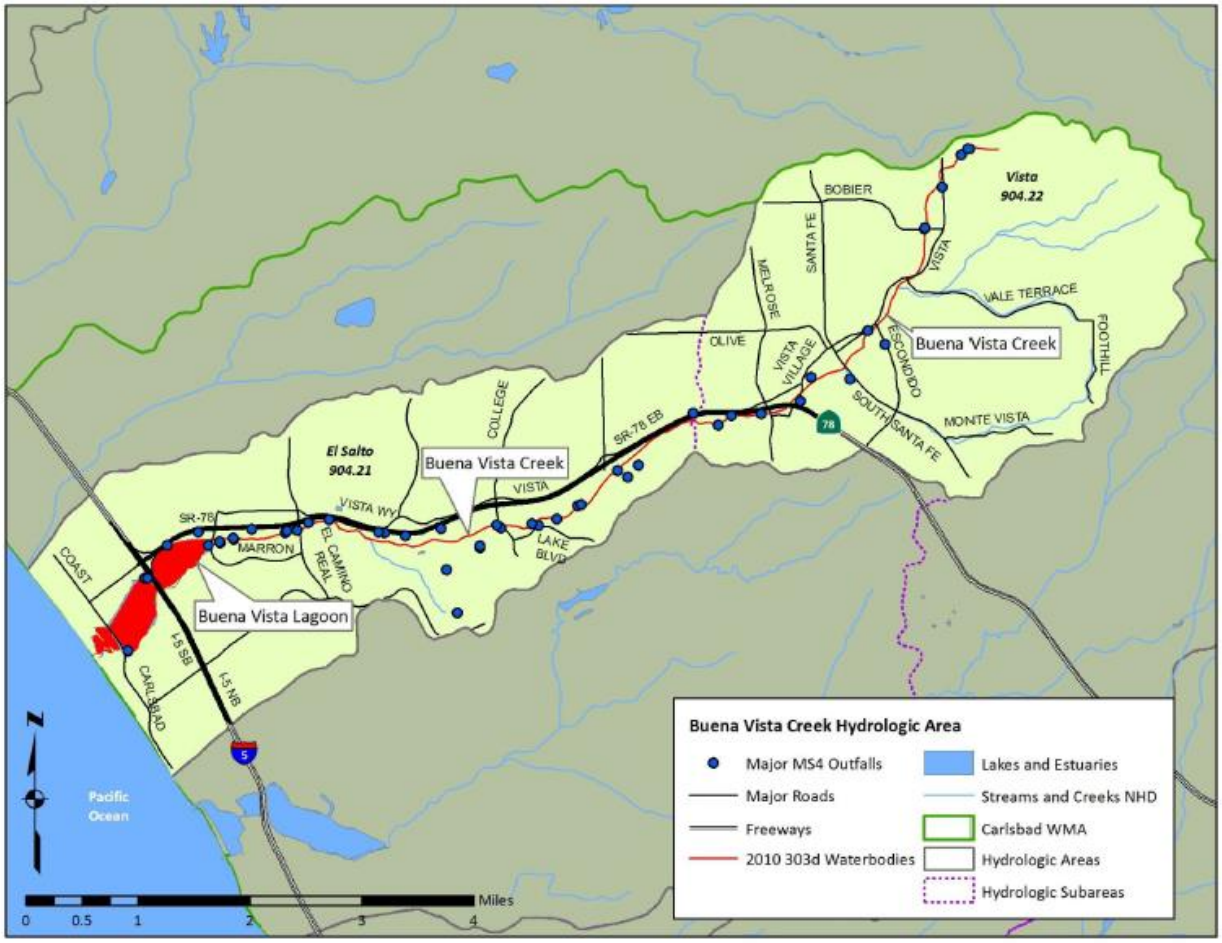
As you can see from the MS4 outfall map, the creek and lagoon are on the 303(d) list which indicates impairment from one or more pollutants (e.g., bacteria, sediment, nutrients).

[3]https://www.waterboards.ca.gov/sandiego/water_issues/programs/basin_plan/docs/R9_Basin_Plan.pdf

[4]The Hach methodology for measuring ammonia with their TNT830 kit requires the pH be adjusted in the field to ensure accuracy of the results. To the best of our knowledge SDCK did not follow this step nor have we to date. We will be testing to see the effect of omitting this step before our next testing cycle. See https://www.hach.com/asset-get.download-en.jsa?id=7639983749 for detailed procedures.

APPENDIX A

Figure A-2: Buena Vista Creek HA – Major Outfall Information



From WQIP (2018) of Carlsbad Watershed Area, Appendix A, MS4 Outfalls.