Monitoring Conductivity levels at the Mouth of the Swash in Briarcliffe Acres, South Carolina

Ryan Kerns and Dr. Monica Gray

Introduction

Conductivity in water is used to measure how well water can pass a current. Conductivity is an indicator of the total amount of dissolved solids this is because conduction is dependent on the concentration of ionic substances. It is typically measured in areas such as Briarcliffe Acres where freshwater mixes with seawater as the conductivity tends to change rapidly making it a good site to monitor. It can be a good indication of how the stream water is affected by precipitation. Electrical conductivity has an almost direct linear relationship with total dissolved solids. The main difference between what was measured which is EQL measured conductivity and standard conductivity is that EQL measured conductivity is measured in a lab for more accurate results while normally it is measured in the field where the sample is taken. By using EQL measured conductivity the results should be more reliable.

Background & Motivation

- Water conductivity is important because when the conductivity increases or decreases drastically, from the standard measurements, it can indicate that there is some sort of pollution or environmental changes going on.
- Since conductivity is a useful parameter for measuring possible pollution, it can also be used to create plans to prevent pollution in the first place.
- Electrical conductivity has an almost direct linear relationship with total dissolved solids.

Methods

The Mouth of Swash is located near a body of freshwater mixing with the salt water of the ocean as displayed in Figure 1. During the monitoring of Briarcliffe Acres, many results on conductivity have been collected. The current results obtained are dated from Feb 20, 2019 to Feb 17, 2021 with a total of 47 samples taken. The measurements conducted are in a laboratory with Hach HQ40d reference method: SM 2510 A-2011 and 2510 B-2011. The meter used to measure conductivity is reported relative to 25 degrees Celsius as conductivity is dependent on temperature. There are many steps taken to ensure that the results obtained are done properly with the correct procedures, by doing so the measurements can be trusted.

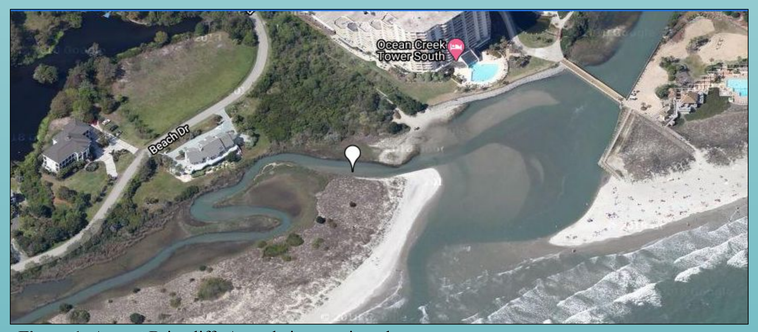

Figure 1: Area at Briarcliffe Acres being monitored

Acknowledgments: *Advisor, Dr. Monica Gray mgray2@coastal.edu*

Data collected

Table 1: Samples taken with important values.

Conductivity(µS/cm)										
Site Name	# Samples	Mean	S.D.	Median	Max	Min	10th	25th	75th	90th
Mouth of Swash	47	41,055	14,192	49,400	54,500	5,510	19,182	31,350	51,950	53,100

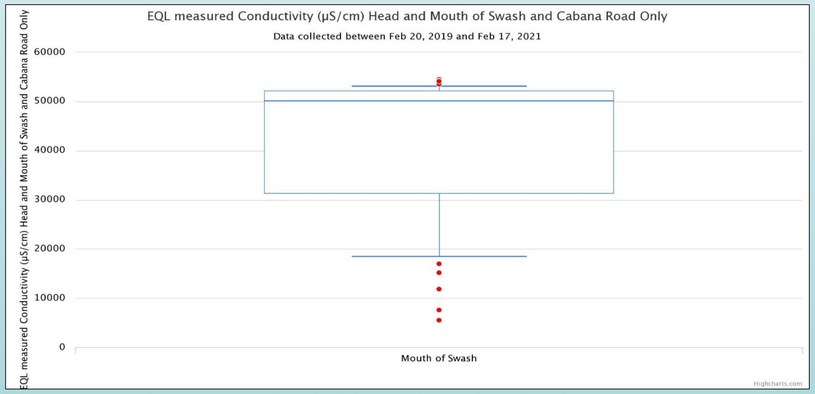

Figure 2: Box Plot for EQL measured conductivity over the samples collected

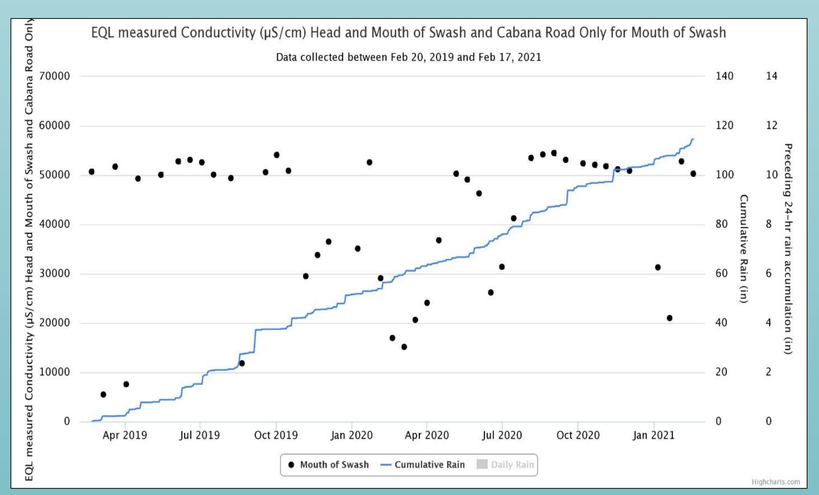

Figure 3: Conductivity levels at each sample with given rainfall data

Results/Discussion

- In the data collected you can see that the median number for conductivity is about 49,400 µS/cm
- This number makes sense as the samples are taken very close to the ocean and the average conductivity measure of sea water is around 50,000 µS/cm or slightly lower.
- The mean number for conductivity was however 41,055 which is a safe amount for seawater
- There are few outliers well below the median and mean all the way down to 5,510 µS/cm
- These outliers could have been caused by tide levels changing causing the Mouth of Swash to no longer be connected to the ocean.
- The conductivity could have lowered due to heavy rainfall. This can dilute the water, meaning it would be closer to pure water and less conductive however there seems to be little correlation with conductivity from Figure 3.

Conclusions

Conductivity monitoring is a good indicator for the amount of dissolved solids in the water whether it be salt or anything else. It is a good indicator because the amount of dissolved solids directly correlates with the amount of current water can pass as ions in the water cause the current. The procedures done during this monitoring were thorough as they were EQL conductivity measurements to ensure only the most accurate results are reported. The monitoring at Briarcliffe Acres led to some interesting results with the numbers varying greatly at some points. This is most likely due to the location where the monitoring is happening where freshwater mixes with saltwater causing big fluctuations in the overall conductivity. In conclusion, there are many reasons to monitor conductivity in water such as: being able to trace if there is a lot of pollutants in the water and preventing them from causing too much damage.

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