

The Efficacy of using Oysters as a Filtration System for Polluted Water

Chicken of the Cs

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Abstract

Our Project was to use oysters to clean up local waterways that have been polluted by sewage spills. Our mission is to test the efficacy of the oysters in cleaning water clarity, quality and bacterial load. Our long term goal is to introduce or “seed” a large number of young oysters to actively improve the water quality in our local waters.

Background & Motivation

Between December 2019 and February 2020 Ft. Lauderdale, the city directly to the South of us, spilled over 211 million gallons of raw sewage into our shared waterways. Because our local waters were suffering we started thinking about a SeaPerch project that could help, eventually we came up with oysters being used to clean water. Our research into cleaning efforts showed that oysters are capable of cleaning up to 50 gallons of water a day. We found a polluted waterway that also had a high salinity enough so the oysters could survive at 14-28 ppt.



Figure 5: Sewage Spill at Actual Test Site

Methodology

At first we approached this virtually, we talked about it online and we discussed who on the team would accomplish which tasks. Collectively we researched water quality and oysters, and oyster farming. Then we started meeting up mainly for water sampling. Meeting virtually allowed for a higher productivity, after we had all the samples we just had to wait for the oysters to do their work take measurements.

Figure 2: technical device for collecting data on water quality.



Next Steps

Next for our project we were planning on continuing our Experiment with oysters that were native to South Florida. We hope that native oysters would prove to be even more suited to local water temperature and eventually use these oysters to help with pollution. While the oysters we used were effective we don't want bring in a non-native species to the area. We are searching for an academic expert to help us select the proper species, because most searches for live oysters end up with those suited for restaurants, in the future we will find native oysters to apply to the experiment for more accurate results. After proof of concept, we hope to use our ROV to distribute young oysters under docks to start cleaning our local waters.

Results & Discussion

- We found in a 36 hour test that the oysters did do a good job at cleaning the water clarity, removing chlorophyll and had some effect on bacterial. We also chose to investigate how temperature might affect the results, the data varies which means the oysters did clean the water however the bucket placed outside at a higher temperature seems to have been a incubator that grew bacteria rather than reducing it. A second experiment was run for a week, although all of the oysters died during the longer time period (we believe due to lack of O2) one container still showed had a 24.9% decrease in bacteria.

5794	Floating vegetation, palm frond, sediment on neighbors lawn, low tide
646	Kept in AC
213	Kept refrigerated
8704	Kept outside in shade, ambient temperature
4352	Placed in air conditioned garage
12033	Placed in normal AC
10112	Placed in the shaded outdoors

Figure 3: MPN of bacteria with notes

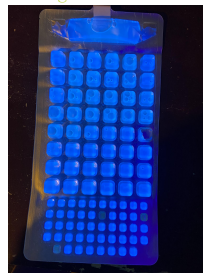


Figure 1: bacteria being shown under UV



Figure 4: The Oysters

Conclusion

With the oysters successfully cleaning the water and improving the levels of bacteria, water clarity, and phytoplankton; we found that oysters could be used as a solution to many of the polluted waterways. From research and our first hand experience in this project we learned how rivers can have water flow due to tides but some waterways with two exposures to tidal pull have complex behaviors. We also learned how truly polluted humans can make rivers in a short period of time. Now we understand the problem of pollution and how to solve it, although we were not able to fully deploy the oysters yet we believe it is a viable solution to help our community's waterways.

Acknowledgements

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