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MARINE MICROORGANISMS COULD BE THE POSSIBLE SOLUTION FOR ENVIRONMENTAL HEALTH CONCERNS

Exploring the community structure of Benthic diatoms and how microorganisms buried deep in the sand could signal if our beaches and waters are healthy

Our coastal towns in South Carolina are known around the world for their white beaches, copious golf courses and amazing seafood restaurants. What if the livelihood of our coast was compromised because we lack the resources to notify us if there is a concern with environmental health. Poor environmental health not only impacts our beaches, marshes, and barrier islands, but also our own well-being.

A bioindicator is an organism that signals for an ecosystem's health. There have been several organisms people have used to test environmental health, but many have not been successful. In Europe, bioindication is already a running project, where their first and foremost priority is keeping their coastal towns and the people that live in them safe. As we become more concerned with the health of our state, more and more individuals are desperate for answers regarding health concerns like pollution and water quality.

In the sand. Specifically, changes to the communities of diatoms or benthic microalgae (BMA) which are single cell, sediment-dwelling microbes that form the basis of estuarine food chains. BMA are responsible for up to 50% of primary production in estuarine systems through photosynthesis.

Connor Graham of Francis Marion University, an intern with the NSF Research Experience for Undergraduates at the College of Charleston, studied whether changes in the community of diatoms could signal changes in environmental health.

Working with Dr. Craig Plante, Graham visited five barrier islands in the Charleston, SC area and took samples from the saltmarsh to better understand the biogeography of diatoms. In order to use diatoms as bioindicators, the community structure of diatoms needs to be similar on all the islands. Community structure provides the information of what groups of populations of an organism are present and in what abundance. Graham also gathered measurements on the environmental factors like salinity, temperature pH, humidity, current, dissolved oxygen, wind, light, Photosynthetic Active Radiation and spartina density.

The goal of the project was to determine if the BMA communities differ based on geographic distance (due to dispersal limitation) or whether differences in community structure are due to disparate environmental factors on each island. (OK if this is the goal you need to explain what this means to the average reader)'

From the data gathered thus far which does not include DNA composition, a key component in community structure, Graham answer her objectives and question for just BMA biomass. Biomass is just the mass of plants or animals, in this example diatoms, present in a given area. So, community biomass does differ among islands, it is not based on geographic distance and some environmental factors (water temperature, current, pH, marsh and sediment salinity) are the potential cause for this variation.

The results that geographic distance does not correlate with biomass, is actually a good think in terms of bioindication. Potentially, we would like for community structure to correlate the same way which would be regardless of location the species are present on each island. Further data analysis is needed to actually identify the diatom species and this will occur in the Fall of 2018. Also, some key environmental factors like grain size and nutrients have not been analyzed so, the results they have now could change. Overall more research is needed to further support the hypothesis about diatoms as bioindicators for South Carolina's coast.

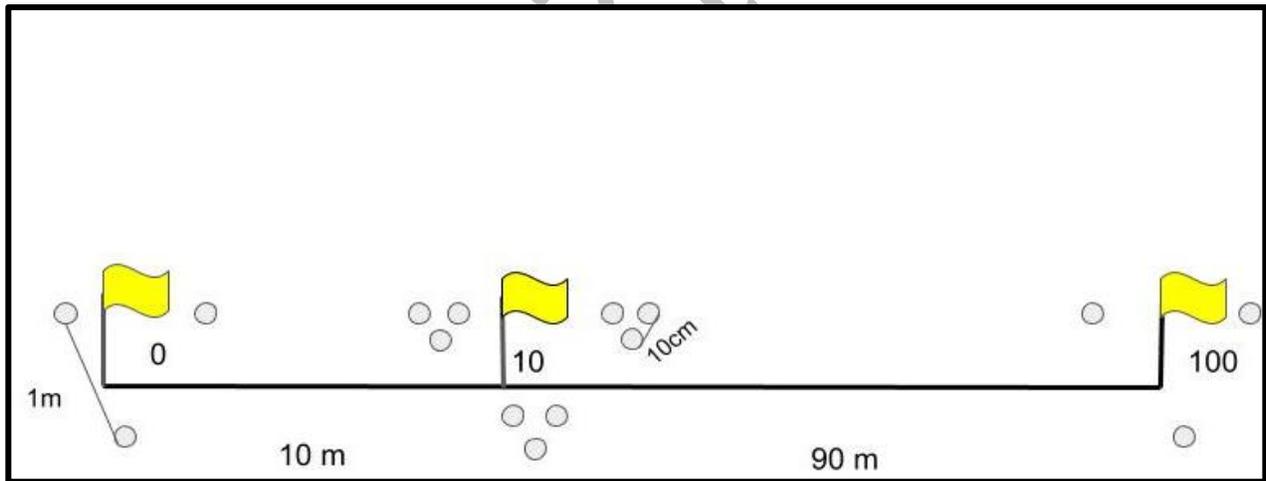


Figure 1. Sampling Method on Saltmarshes. Created by Connor Graham.

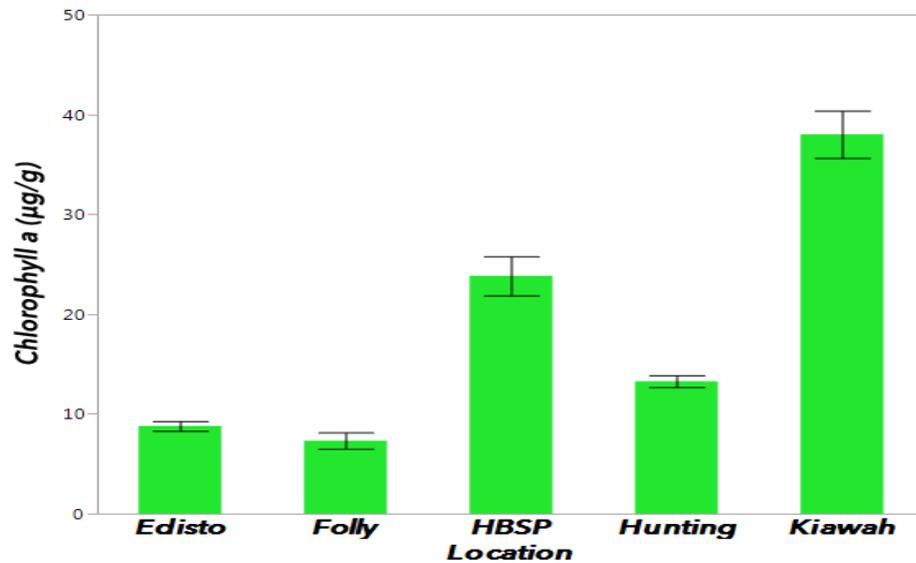


Figure 2. Community biomass difference among islands graph.

“This project is first cut at looking at BMA in salt marshes, but far so good. There are still a lot to more data to analyze, but it’s still going well.” Dr. Craig Plante

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