

Quantifying the Amount of Microfibers Found in Southern California Coastal Sediments.

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Introduction & Hypothesis

- Microplastics (typically defined as <5 mm) are caused by the degradation of macroplastics, by wave action, or other environmental factors.
- Microfibers, a subcategory of microplastics, are a pollutant caused by the degradation of synthetic yarn.
- As synthetic clothing is washed, many microfibers are discharged directly into the ocean as they are too small to be filtered out of grey water.
- An alarming amount of microfibers enter the ocean from anthropogenic sources (i.e., synthetic clothing).
- The main question our research project is trying to answer is whether there is a noticeable difference in microfiber quantities between Ventura State Beach and Newport Harbor, two vastly different areas that are located within Southern California.
- Due to a high prevalence of wastewater, runoff, and water reuse in residential areas, we expect the sediment samples collected in the harbor will have a higher amount of microfibers than samples collected near the channel delta.



Images of Lido Isle in Newport Harbor - Largest small-craft harbor on the West Coast (a); images of Ventura State Beach- Open ocean jetty. (b)



Image of sediments settling in 600 mL beakers (a); Buchner funnel and vacuum pump used in filtration process (b); and close-up images of microfiber on filter (c)

Method & Materials

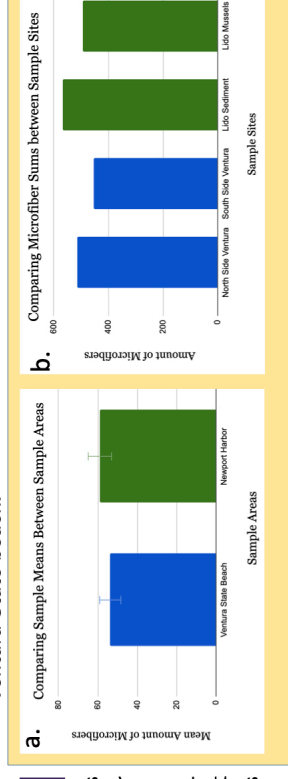
- **Sample collection:** 4 large bags of sediments was gathered, 2 of bags being samples from Newport harbor and the other two from Ventura State Beach.
- **Stratification:** combined 200 mL of saltwater with 100 mL of sand into a 600 mL beaker and then we mixed it so that microfibers would be suspended in water due to being less dense than the sediments.
- **Filtration:** This saltwater from the sand mixture is then poured into a Buchner Funnel filtration system that is attached to a pump to filter out the saltwater. This process, which is called a wash was repeated 5 times for each sediment sample.
- **Observation and quantification of microfibers:** All microfibers on the filter paper were examined, counted, and characterized under a Microscope and data was analyzed in Microsoft Excel.



I'd like to thank Dr. Brian Swig and Dr. Andrea Huvard for taking the time to guide me through research this summer. I'd also like to thank Allies in STEM for funding my research as well as my lab partner Elijah Hill for his effort and support.

Results

- The mean amount of microfiber pollution in sediments between the two sample sites were determined by a T-Test. Statistical significance was accepted at $p < 0.05$. This difference was to enough to be determined as statistically significant.
- A total of 2,029 microfibers were gathered and recognized under a light microscope; no other kind of micro-plastic was identified.
- Newport Harbor had a greater amount of microfibers compared to Ventura State beach.



(a) Bar graph comparing the sample mean between the different sample areas (n=36, p<0.05). The mean for Ventura State beach was 53.7222, while the mean for Lido Isle in Newport harbor was 59.

(b) Bar graph comparing the sum of the number of microfiber totals between the sample sites. The sample sites indicate the specific location of where sediments were taken from. (n=36).

Discussion

- Newport Harbor (the largest small-craft harbor on the West Coast) has more microfiber pollution compared to Ventura State Beach. Newport harbor pollution could be due to the high levels of traffic as well as the waste water discharge points.
- Our examination affirms that microfiber contamination is present in Southern California sediments.
- Microfibers have only recently been recognized as a potentially serious threat to our environment and very little is known about their distribution, concentrations, or direct effects upon an environment or ecosystem.
- The purpose of our research is to locate which locations are heavily impacted by microfiber pollution and bring awareness to them.

Acknowledgments:

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