Improving the Methodology of Microfiber Trends Quantified Through Sediments from the Ventura Harbor

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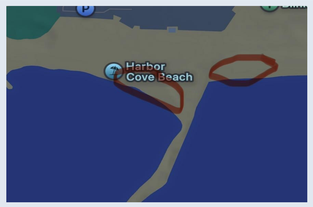
Research Question

Do the microfiber concentrations we quantify match the tourism trend in Ventura Harbor?

Background

- Microfibers are now considered the most abundant microdebris in the ocean, as marine ecosystems are thought to be the final destination for as much as 11 million tons of discarded plastic waste each year (Volgare et al., 2022).
- Microfibers are a subset of microplastics, defined in the literature as plastic less than 5 micrometers in size, allowing them to easily settle in marine sediments and be ingested by multiple trophic levels of aquatic organisms.
- The key to monitoring pollution trends is the use of biomarkers. They have been widely studied in marine systems to identify the most appropriate indicators of microfiber pollution trends (Bendell et al., 2020).

Method



- Sediment samples were collected from both sides of the harbor
- We rinsed and filtered 20 sediment samples per collection month
- Microfiber from each sample were collected onto filter paper that were then placed under a microscope where we counted the fibers
- The total number and colors of the fibers were recorded

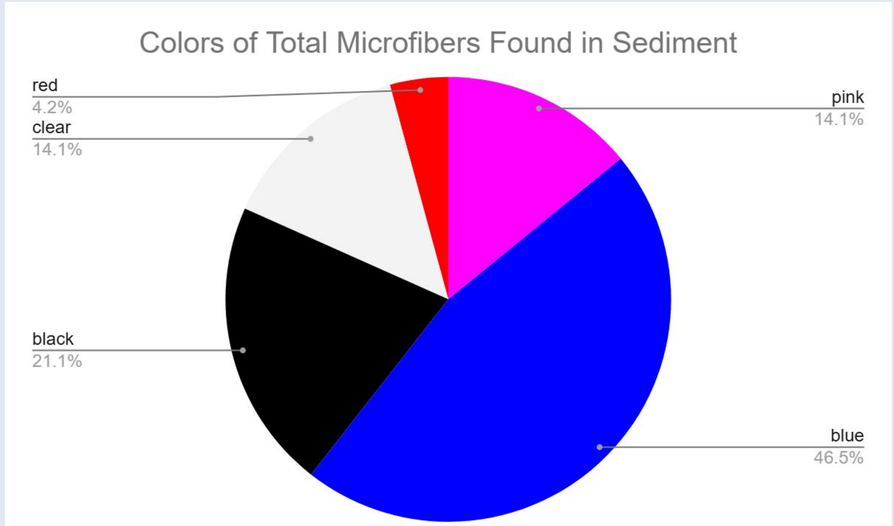


Figure 1: Pie chart of the color distribution of the microfibers found in the sediment samples.

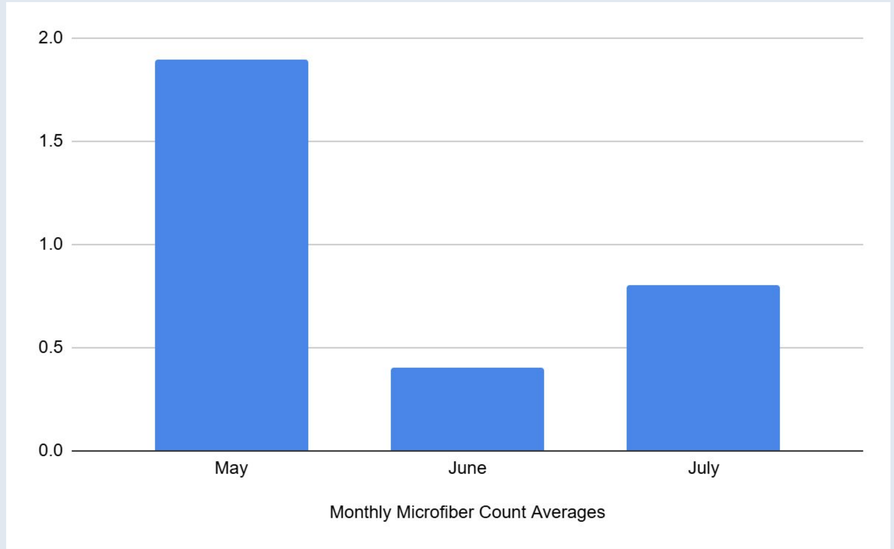


Figure 2: Bar graph of the average amount of microfibers found in the samples collected in May, June, and July.

Results

- The majority of the microfibers found in the sediment were blue
- The May sediment samples had the most microfibers
- The microfiber pollution trend did not match the tourism rate at Ventura Harbor

Conclusions

- The predominance of blue fibers suggests a primary source of the microfiber pollution in Ventura Harbor
- The lack of fibers in the sediment samples could have resulted from tidal movement, sediment resuspension, or variability in water waste discharge.
- Possible future research with FTIR to identify the composition of the main pollutants

References

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2. Bendell, L I, et al. “Use of Sediment Dwelling Bivalves to Biomonitor Plastic Particle Pollution in Intertidal Regions; a Review and Study.” PloS One, U.S. National Library of Medicine, 22 May 2020, pmc.ncbi.nlm.nih.gov/articles/PMC7244099/.
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4. Volgare, M., et al. “A Versatile Approach to Evaluate the Occurrence of Microfibers in Mussels Mytilus galloprovincialis.” Scientific Reports, vol. 12, no. 1, 2022, p. 21827.