Microplastics in the Russian River

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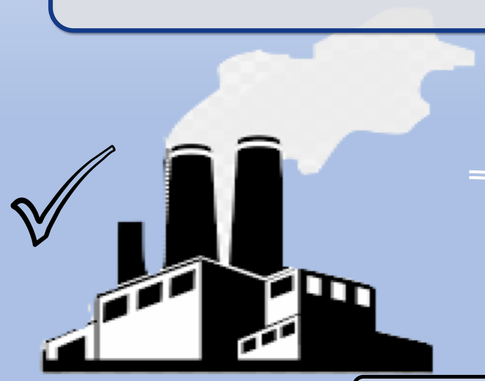
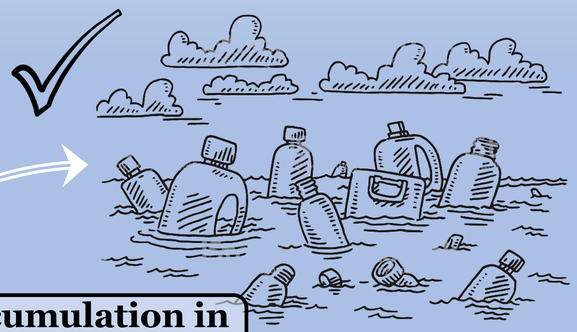
Introduction

Microplastics are plastics that are smaller than 5 millimeters in size. They are made of compounds that do not biodegrade, and the extent of the damage they cause to freshwater ecosystems is still being investigated. We conducted our research along the Russian River to identify the spatial distribution of microplastics. We sampled every 2 miles and started upstream at Steelhead Beach, stopped at the populated Johnson's Beach, and made our way to Jenner, where the Russian River empties into the ocean. We hypothesized that the highest percentage of microplastics would be found downstream from Johnson's Beach. Our methodology included submerging a five-gallon bucket and pouring its contents through several sieves. We organized the plastics by size and location. In addition, we measured the depth and stream velocity at each location. With the results from this project, Russian River conservationists will be able to use our data to create effective methods for plastic pollution prevention.



Plastic Production

Freshwater Transportation



Accumulation in Oceans

Methods and Materials...

- We used a *5-gallon bucket* to collect the water samples.
- Poured bucket into a stack of *six sieves* (sized *4mm, 2mm, 0.5mm, 0.25mm, 0.125,* and *0.063mm).*
- Waited for water to drain and repeated the process three more times for a total of four samples per site.
- Analyzed each sieve individually.
- Collected substances caught and put into a plastic bag that was labeled by site number.
- We planned to stop every two miles to take samples.
- We mapped out ten sites to sample.

Future Research...

- Even though we didn't find any microplastics, we still believe they are present in the watershed.
- We mainly saw visible plastic pollution in the roots above the water and caught in trees.
- We think these will eventually go into the river and then make their way to the ocean.
- We believe that pieces of plastic are carried into the ocean through rivers and break down into microplastics.
- If we had the resources, we would have tested the area where the freshwater meets the ocean.
- We also would have tested in the middle of the river instead of solely at the banks to get a wider variety of data.
- Take water samples in low-income areas and compare them to high-income areas like the Russian River.

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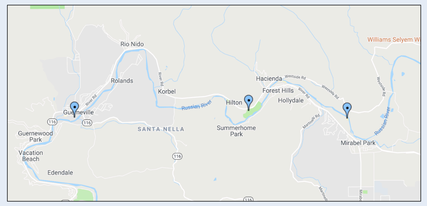
What We Could Have Done Better...

- We only took samples along the river banks. We possibly could have had different results if we had tested farther out.
- We encountered miles upon miles of private property, so we could only stop at three spots instead of ten, which didn't give us a broad range for data.
- Our group didn't take into account until much later on that many microplastics now take the form of microbeads found in facewash and other spa products, and that those are extremely hard to see in a sieve.



Map of where we took our data along the Russian River.

What the Literature Says...

Mohawk-Hudson River Watershed:

- We modeled our research plan off of a study done by Union College at the Mohawk-Hudson River Watershed in New York.
- Researchers also used a five-gallon bucket and a set of sieves to accomplish sample collection.
- Later analysis proved to be difficult because much of what they caught was organic material.
- They then used hot peroxide to decompose the organic matter to be able to identify the microplastics caught in the material.

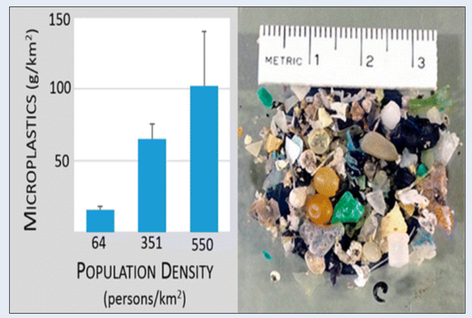


Fig. 1 shows a positive correlation between the population density in an area and total microplastics found in four estuaries in the Chesapeake Bay between the months of July and December.

Rhine River:

- Another study on the abundance of microplastics was done in the Rhine River in France where samples were taken in 11 locations.
- Researchers found non-organic material in all the samples.
- The average amount found was 892,777 particles per km^2, and the highest amount found was in the Rhine-Ruhr metropolitan area with a concentration of 3.9 million particles per km^2.
- It was specifically noted that the concentrations of microplastics varied by location, and that factors such as distance from wastewater treatment plants and tributaries played a role in the distribution.

References

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