



Do Eastern Oysters Enhance the Deposition of Microplastics (and Sediments) to the Benthos in Hudson River Park (New York)?



Elena Davis¹, Theresa Trelles², Eliana Green³, Brett F. Branco³

¹Department of Biology, Queens University of Charlotte, ²Department of Chemistry, Brooklyn College, ³Department of Earth and Environmental Sciences, Brooklyn College

Microplastics and Eastern Oysters

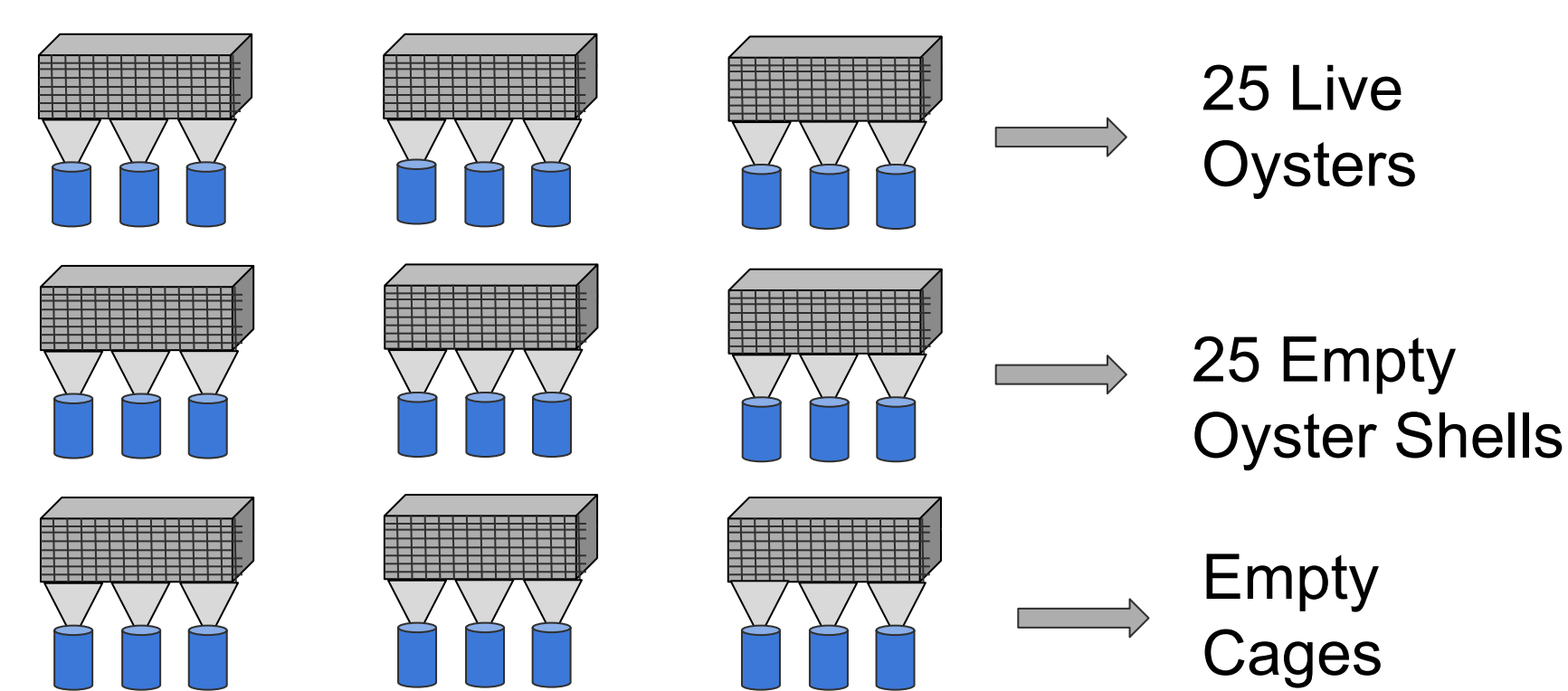
- Microplastics are found almost everywhere that we look for them. How do they move through the environment? Where do they accumulate? What impacts do they have on ecosystems?
- Hudson River Park Trust is establishing oyster cages off their piers.
- Oysters can filter 50 gallons of water per day, and thus can be exposed to a lot of microplastics. How does this affect movement of microplastics in the Hudson River Park?

Research Question:

- Does the presence of oyster cages cause a flux of microplastics from the water column to the sediment?
- If yes, is it due to the presence of live oysters or due to the presence of oyster shells and the community that forms around them?



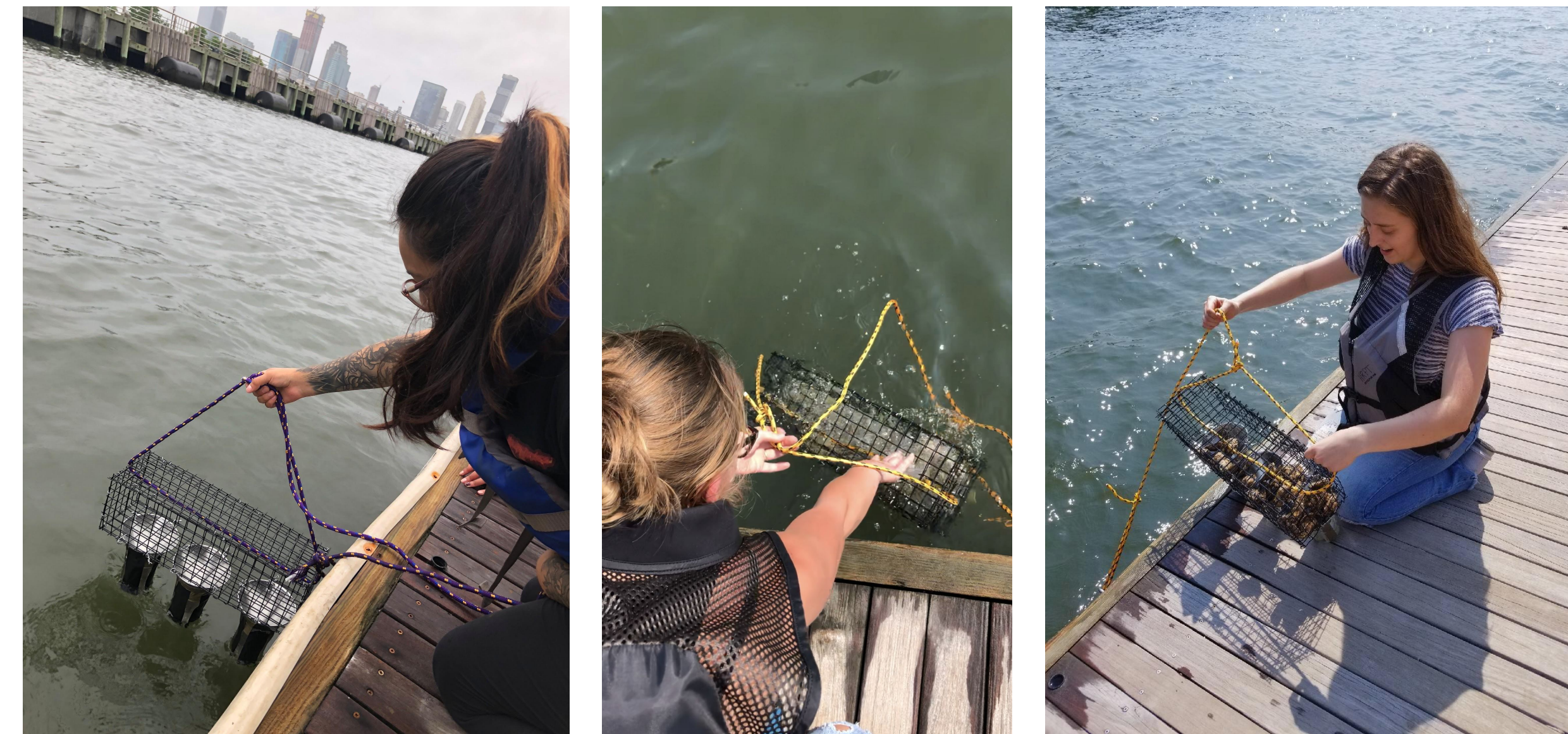
Methods



Cage Design



Cage: 20"x6"
Tin Funnels secured to glass mason jars with epoxy and gorilla tape.



- Pictured (left) Theresa Trelles, (Center) Eliana Green, (Right) Elena Davis
- Cages were launched on July 16 at 4pm
- Traps and cages were attached to an eye hook at Pier 26 of the Hudson River
- Cages were 3-5 feet deep

Unexpected Findings

- 2 cages lost
- 2 sediment traps lost from an empty shell cage
- Sediment traps had more sediment in them than was expected
- Aside from microplastics, we found some interesting things!



New Research Questions: Did the oysters enhance sedimentation rates? Did the oyster cages have a higher percent organic content due to feces/pseudofeces deposition?

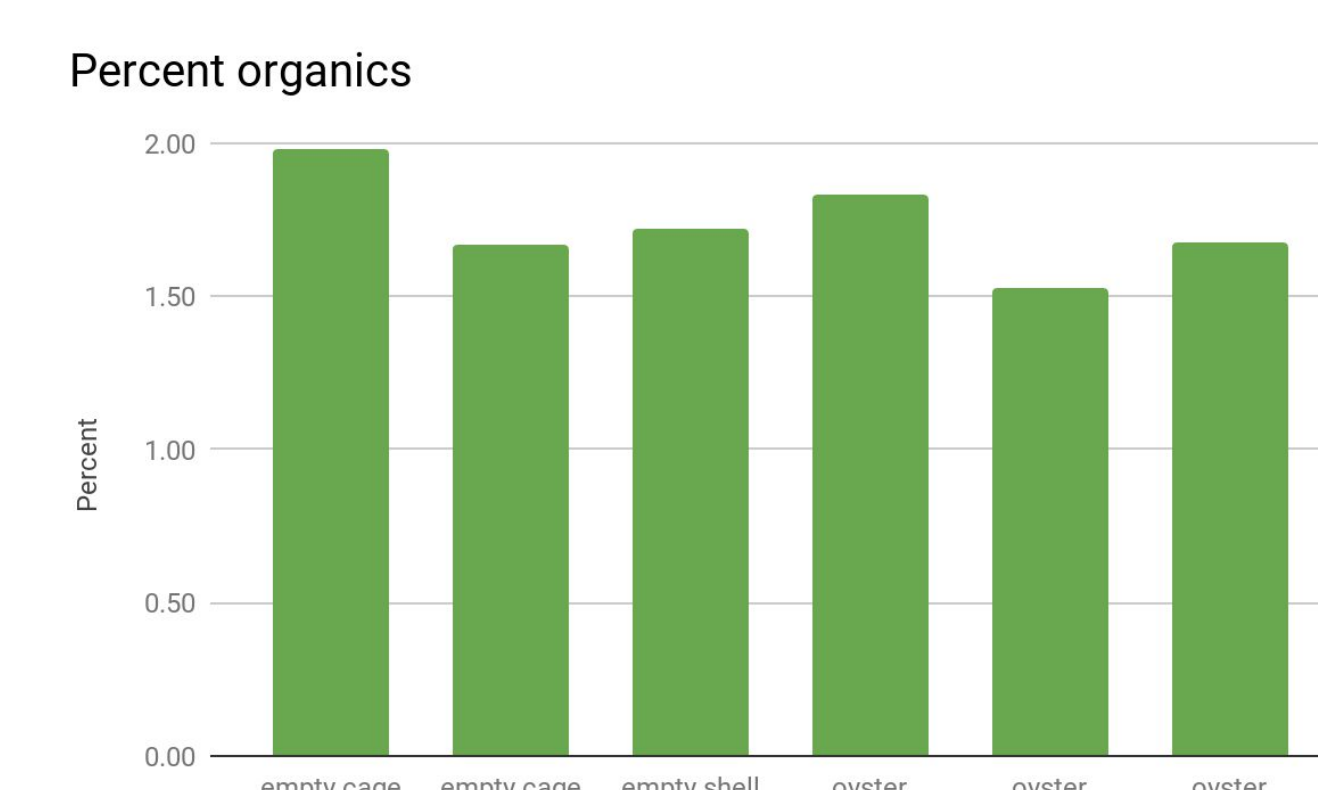
Sediment dry mass: dry to constant mass at 90C



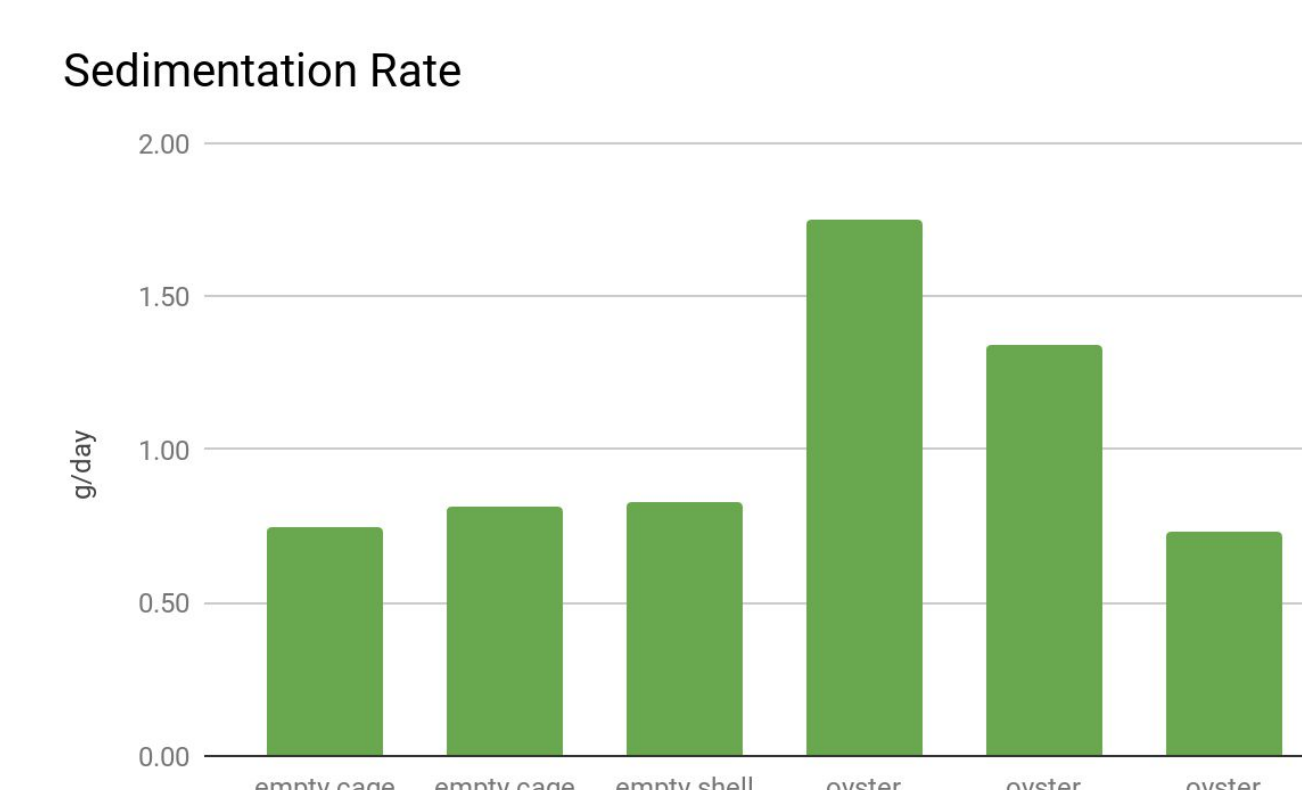
% Organic matter by loss on ignition: 550C for 3 hours



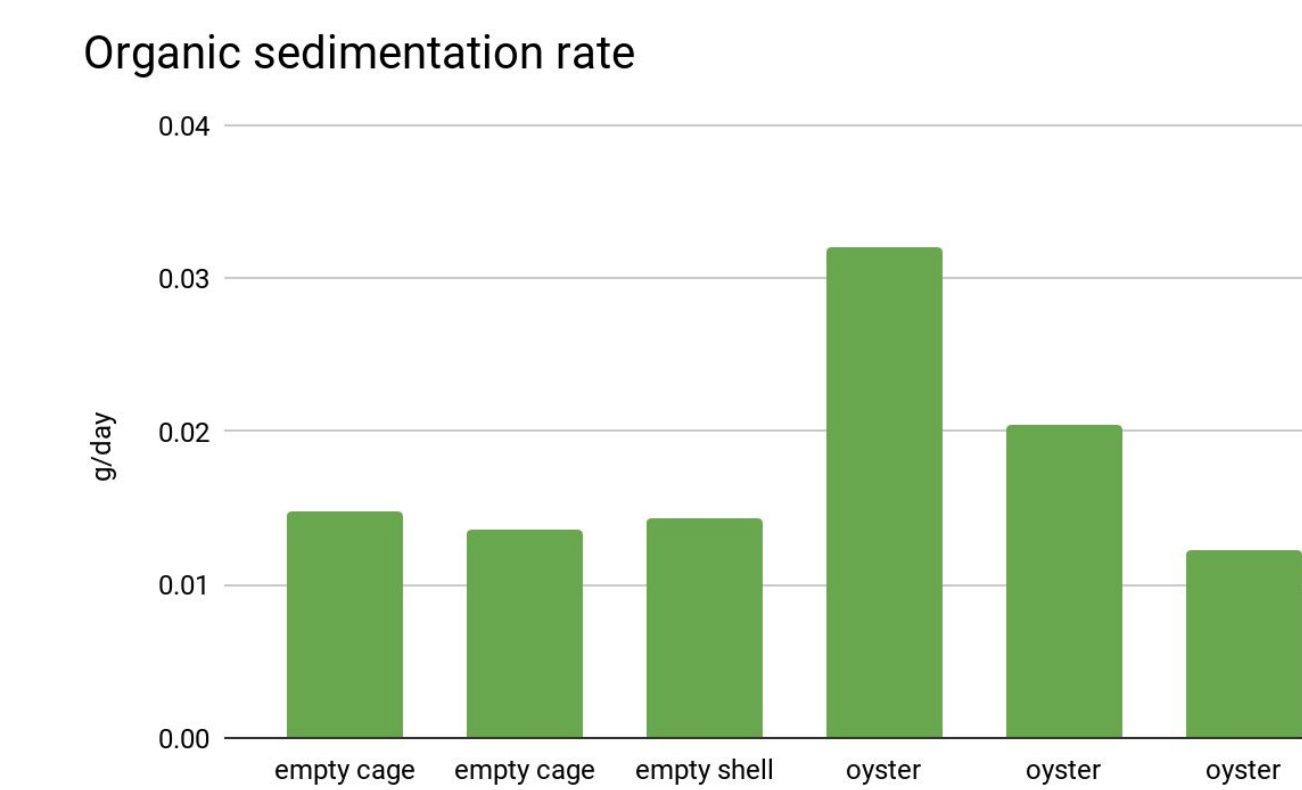
Results



Highest % organics found in empty cage traps, but no clear pattern across all cages.



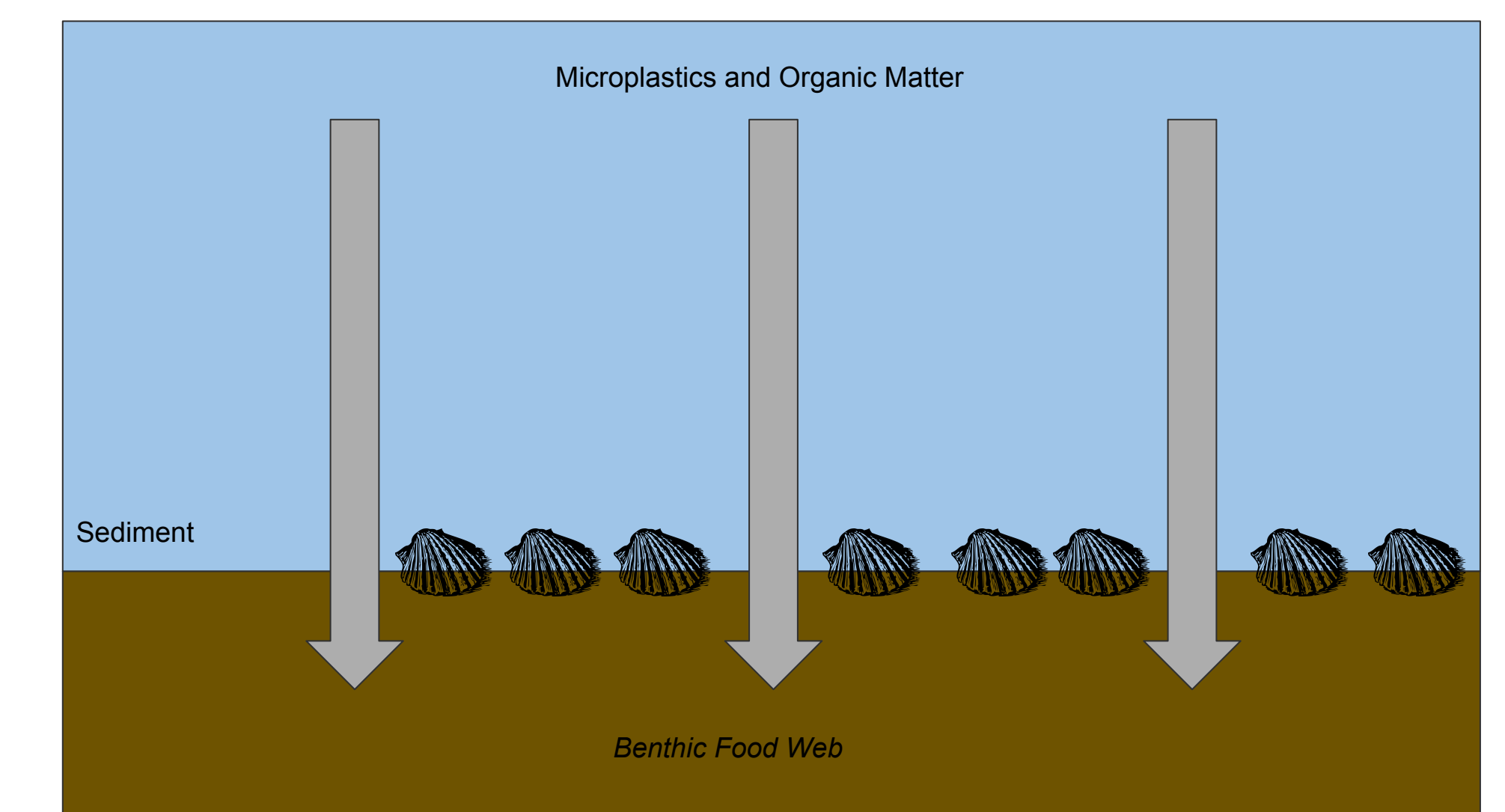
Generally higher sedimentation rates found in oyster cages, however further investigation must be done



Generally higher organic sedimentation rates found in oyster cages, but more replicates of other cage types are needed

Discussion

- Due to lost cages and traps, statistical analysis of results was not possible.
- Presence of live oysters seems to enhance amount of sediment collected in traps. This could be due to the feeding behavior of the oysters.
- Expected higher percent organic matter in the live oyster traps due to feces/pseudofeces. Not supported by the results.
- It is possible that oyster feeding contributed to the sediment amount, but that oyster pseudofeces do not contain much organic material
- Live oyster cages seem to produce higher flux of organic material to the benthos. This could lead to low benthic dissolved oxygen conditions near oyster cages.
- Our sediment trap design was very effective in collecting sediment in the Hudson River?



Because oysters are filter feeders, they could be relocating microplastics in the water column to the sediment. Microplastics that enter the sediment through the deposition of organic matter in oysters could then enter the benthic food web.

- With the rest of the samples from the 19 sediment traps collected, microplastic particles will be analyzed via the Nile Red Staining method
- Microplastics will be identified by using fluorescent tagging, then examination under a microscope

Lessons Learned

- Use plastic funnels
- Add a filter at the top of traps to prevent live organisms from getting in sample
- Sediment traps were very effective

Acknowledgements:

I would like to acknowledge the support of the Hudson River Park Trust for providing access to the study site, and help in constructing and launching the oyster cages. David Bergman and Nico Perrini from the Rockaway Waterfront Alliance Environmental Program helped in constructing sediment traps and lab work. This work was supported by the National Science Foundation's Research Experience for Undergraduates program through Grant No. 1659537