

## ABSTRACT

For decades, the abundance of microplastics in marine environments has been greatly underestimated. Microplastics classify as plastic particles that are less than 5mm in diameter, primarily deriving from polyethylene, polypropylene and other polymers. Within the last 76 years, plastic debris have exponentially increased due to a combination of industrial organizations abusing the inexpensive properties of plastics, the lifespan, and the abundance of the single-use product. Such particles not only have the potential to directly and negatively effect the well being of marine biota, but also have ability to indirectly impact humans through the process of biomagnification and bioaccumulation. Through the experimental testing of Jamaica Bay's oysters and waters, plastic particles were located in both variables. Such plastics consisted of fragments, film, clothing fibers, lines, nurdles, foam, and pellets. These results indicate that microplastics are being consumed by oysters and are, in fact, located in Jamaica Bay's waters.

## INTRODUCTION

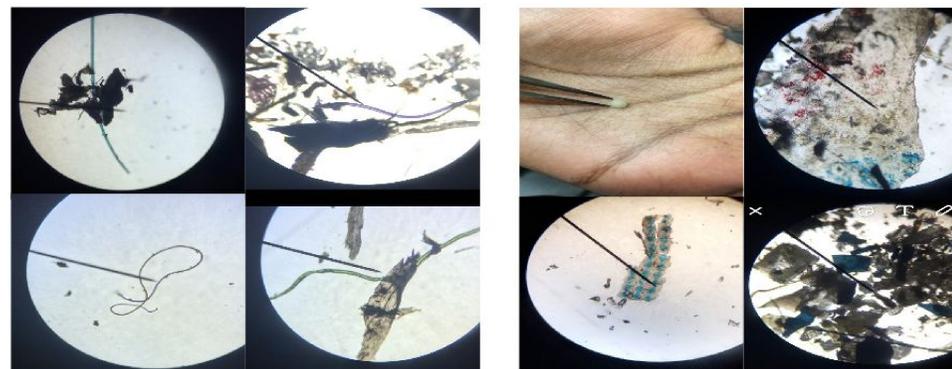
- Oyster importance:**
- Economically, oysters not only serve as natural protection during storm surges, but also are capable of filtering up to 50 gallons of water per day, eliminating toxins such as excess nitrogen. Due to such characteristics, oysters have helped purify waters, such as the gulf, that were impacted by oil spills and other manmade disasters. If a machine were to mimic these exact properties, the cost would be extremely expensive, and the outcome would not be done nearly as perfect and precise. Furthermore, oysters are essential to our environment, as they are situated in the industries of jewelry and restaurants. It would be much cheaper if NYC restaurants were to utilize NYC oysters, so that shipping fees and other charges would not apply. In addition, due to the past reputation of Jamaica Bay oysters, a myriad of scientists and organizations are interested in repopulating Jamaica bay oysters. Organizations such as the Billion Oyster Project have been dedicating much of their time, money, and energy into doing so. However, their efforts will not be successful if the plastics continue to be found in the oysters. Lastly, oysters serve as habitats for other animals, and their waste is utilized by a diverse number of species. Overall, oysters are a keystone species to their environment; meaning that if they develop problems, other organisms would suffer from them as well.
- Water column importance:**
- Micro plastics have the ability to both float and sink into sediments; Allowing for bottom feeders and other organisms to easily consume them.
- Impacts an array of sizes: Due to their accumulation in an array of depths, a myriad of diverse marine biota- ranging from clams to sperm whales- have been consuming micro plastics
- Primary microplastics: derive from certain cosmetics containing microbeads-microscopic beads which act as exfoliates in facial scrubs and body washes, adding texture to personal care products..
- Secondary microplastics: result from the degradation of larger plastics, for instance plastic bags and water bottles.

## METHODS

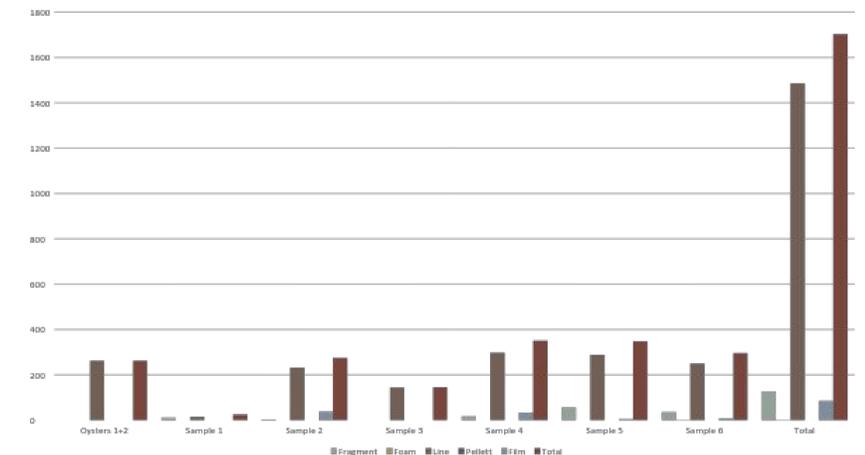
1. Sample Collection
2. Wet sieving
3. Wet peroxide oxidation
4. Density separation
5. Microscopic Examination
6. Gravimetric Analysis

## DISCUSSION

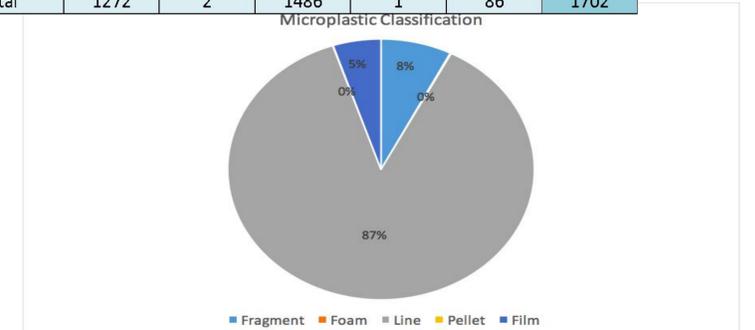
- Oysters:**
  - Oysters located in Jamaica Bay's oysters are consuming microplastics.
  - One prediction is that this is due to a misinterpretation. The diet of an oyster primarily consists of phytoplankton (or commonly known as microplankton) and zooplankton. The average phytoplankton size grows to 0.08mm. Zooplankton ranges from 0.56mm to 1mm. Microplastics classify as particles that are less than 5mm. Both phytoplankton and zooplankton are <5mm. Thus, it is possible that oysters are mistaking the microscopic plastic particles for plankton. Furthermore, if plankton is small enough to pass through the stomach linings, then the microplastics will be able to as well.
- Water Column:**
  - As presented in the data table, microplastics are present in Jamaica Bay's waters.
  - Before rainfall, only 446 microplastics were present, the majority consisting of clothing lines and fibers.
  - After rainfall, 996 microplastics were counted. These plastics were much more diverse, spanning from line to film.
  - Combined Sewer Overflows are responsible for run off water, domestic sewage, and industrial wastewater. Certain sewers allow for the direct discharge from the street to oceans and other bodies of water. The direct release of polluted water allows plastics to enter waterways, due to the lack of proper screening. If the concentration of plastics increases during or after rainfall, then it can be concluded that CSOs are responsible for the plastic presence.



## RESULTS



Sample Number	Before rainfall					Total
	Fragment	Foam	Line	Pellet	Film	
Oyster 1+2			260			260
Sample 1	12		14			26
Sample 2	4		232		38	274
Sample 3	1		145			146
Sample 4	18		298	1	35	352
Sample 5	58		288		5	349
Sample 6	38	2	249		8	295
<b>Total</b>	<b>1272</b>	<b>2</b>	<b>1486</b>	<b>1</b>	<b>86</b>	<b>1702</b>



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- The Irondale Foundation

## LITERATURE CITED

- Avio, C.G., et al., Experimental development of a new protocol for extraction and characterization of microplastics in fish tissues: First observations in commercial species from Adriatic Sea, Marine Environmental Research (2015), <http://dx.doi.org/10.1016/j.marenvres.2015.06.014>
- Masura, J., et al. 2015. Laboratory methods for the analysis of microplastics in the marine environment: recommendations for quantifying synthetic particles in waters and sediments. NOAA Technical Memorandum NOS-OR&R-48.