Jocelyn Miller
Class of 2024
Marine Affairs

Presence of Microplastics within *Crassostrea virginica* in Western Long Island Sound

Gail Hartnett, Ph.D. & Jean-Paul Simjouw, Ph.D.
Department of Biology and Environmental Science

Crassostrea virginica are Eastern oysters that inhabit the coast from Maine to the Gulf of Mexico and use filter feeding to consume food. Filter feeding benefits marine ecosystems by removing pollutants, however, these pollutants may accumulate in the oysters. A common pollution issue is microplastics, which are plastic pieces or fibers that are under five millimeters (Zhang, 2021). The presence of microplastics in the oysters create a major concern for the entire food chain.

The purpose of this study is to determine if microplastics are present in the oysters of Western Long Island Sound. Since shellfish are a common food source for humans, it is important to know what is in them. This study will also help determine locations where oysters have more plastic pollution. Factors such as proximity to New York, demographics, climate, and current regulations may impact the microplastic load in oyster tissues. Results from this study and studies like it could lead to new regulations and depuration processes to benefit human health. Three oyster farms each provided 24 eastern oysters: Stella Mar Oysters (Stamford), Copps Island Oysters (Norwalk), and Briarpatch Shellfish Company (Milford). The oysters were dissected by removing the stomach, gills, and adductor muscle. Three oysters were combined into one sample to react with 50 mL of 30% hydrogen peroxide in a covered jar. The jars were placed into an incubating shaker for 24 hours at 65°C and 80 rpm, then left in the shaker for an additional 48 hours at room temperature and 80 rpm. After, 150 mL of filtered 5 M NaCl was added to each beaker and mixed. After settling overnight, vacuum filtration was used to remove the microplastics from the surface of the liquid in the beaker, onto glass fiber 50 mm filter paper. Next, Nile Red was used to stain the microplastics that had accumulated on the filter paper. Using a microscope and UV light, the microplastics were counted.

The results showed a significant statistical difference between oysters from different locations. Stella Mar oysters, collected from Stamford averaged 2.18 microplastics per gram; while the Briarpatch oysters, collected from Milford averaged 0.73 microplastics per gram. This may be because Stamford is closer to New York City, which has a high population that creates greater pollution. Stella Mar is also located farther into the Sound which makes any pollution less likely to circulate out into the open ocean. Stella Mar and Briarpatch oysters did not have any significant statistical difference between their tissues. Copps Island Oysters showed statistical differences between the stomach vs muscle and gills vs muscle. The muscle contained less microplastics then the other tissues. Once plastics get embedded within the muscle, they are unable to exit. Meanwhile, oysters may be able to excrete plastics within the stomach and gills. Overall, there were plastics within every sample collected from all three sites.

Further research would help verify the results of this study. Additional samples would add precision and adding more locations would provide information on other areas of the Sound. Woodside (2019) showed similar results of plastic content from the East side the Connecticut coast. Additional studies would allow better knowledge on conditions within coastal Connecticut that could help with new regulations and policies.

References

Woodside, Christine. "How Much Plastic Is in Your Body? Scientists Turn to Oysters, Mussels for Clues." Connecticut Health Investigative Team, 5 Jan. 2019, http://c-hit.org/2018/12/26/how-much-plastic-is-in-your-body-scientists-turn-to-oysters-mussels-for-clues/.

Zhang, Kai, et al. "Understanding Plastic Degradation and Microplastic Formation in the Environment: A Review." *Environmental Pollution*, Elsevier, 23 Jan. 2021, https://www.sciencedirect.com/science/article/abs/pii/S0269749121001329?via%3Dihub.