Analysis of Microplastic Compositions in Salt and Freshwater on the South Shore of Long Island

Fallon, Emma (School: West Islip High School)

Microplastics (MP) are small fragments of plastic less than 5mm in dimension, that have recently received attention due to their high prevalence in the environment, potential to disrupt natural ecosystems, and cause negative health consequences. An experiment was conducted to investigate whether microplastics are present in surface water from local salt and freshwater bodies. Surface water collected from salt and freshwater were stained with a Nile Red solution, then filtered using a Millipore Vacuum Filtration System. Microplastics were illuminated under a yellow long pass emission filter (500 nm) and a Night Sea SFA Beam Light head (bluelight 440-460 nm). A Celestron Digital Microscope was used for microplastic analysis. 229 total MPs were identified from six 500 mL samples, averaging 7.8 MPs per 100mL. Despite variation in MP concentrations, MPs were present in all samples. Surface water MPs only account for 1% of MPs in the ocean, so the MP concentrations at saltwater sites at different depths of the water are likely much higher. Currently, there are no methods of removing MPs from the environment, but in order to protect our water resources from further pollution, it's necessary to limit plastic use and target specific types of plastic that are most commonly polluted. Infrared Microscopy is currently being used to analyze the chemical compositions of the MPs. Infrared light is shot into the plastic and it absorbs varying amounts of light at different wavelengths which represent the MP's functional groups. So far, polyethylene terephthalate (PET) was found from Robert Moses State Park and cellophane was identified in Argyle Lake. This will lead future research toward detecting toxic heavy metals in the microplastics, such as cadmium and arsenic, known carcinogens.

Awards Won:

National Oceanic and Atmospheric Administration - NOAA: Science Communication Award