

A Spatial Analysis of Microplastic Densities in the Penobscot Bay Estuary on the Central Maine Coast

Microplastics are pieces of plastic ranging in size from 300 to 5000 microns that enter the environment as byproducts of plastic manufacture. Dispersal of microplastics throughout the marine environment is mediated by biological, physical, and chemical variables. Microplastics are detrimental to all marine trophic levels, from causing false satiation in plankton to concentrating and desorbing harmful organic pollutants into the guts of small fish and seabirds. The objective of this study was to survey surface microplastic densities at four sites throughout the Penobscot Bay, Maine to see if there was a spatial trend correlated with distance from supposed sources such as wastewater treatment plants (WWTPs) and runoff from larger population centers, most of which dump into the Penobscot River. It was hypothesized that sample sites furthest upriver, and therefore closer to these potential sources, would contain greater microplastic densities. However, it was found that the site in the river proper contained the lowest plastic densities, while the station near the Bagaduce River, about halfway between the Penobscot River and the oceanic waters of the Gulf of Maine, contained the highest. It is likely that the Bagaduce River contains sources of microplastics, but more work needs to be done in that area to locate them.

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