Impact of Wastewater Treatment Plants on Microplastic Abundance in Local Waterways

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The Maumee River is the largest tributary of Lake Erie in the Great Lakes watershed. The objective was to identify the presence of microplastics in the Maumee River and two of its tributaries, and to compare the quantities of microplastics present up and downstream from two wastewater treatment plants. Samples were collected three different times at five locations. Sampling locations were upstream and downstream from each of the two wastewater treatment plants and at the confluence of the two tributaries that flow into the Maumee River which was in a more isolated area. It was hypothesized that more microplastics would be found downstream from wastewater treatment plants than upstream due to lack of a treatment plant filtration and focus on plastics. Collected samples were brought into the lab where an oil separation method was used to separate the microplastics from the water, samples were then filtered and rinsed with isopropyl alcohol to dissolve residual oil. Filtered, dried samples were examined and microplastics quantified under a 40x dissecting microscope. Qualifications for microplastic identification were the ability for the microplastics to melt on contact with a hot needle. The average number of identified microplastics was greater downstream from both wastewater treatment plants. The average number of microplastics at the confluence of the two tributaries was lower than other sampling locations. Statistical analysis comparing average microplastics per milliliter upstream and downstream at each location supported the hypothesis that more microplastics would be found downstream from wastewater treatment plants than upstream ($p=0.00103$).

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