

Direct Microplastic Inputs to the Laurentian Great Lakes from Wastewater Treatment Plants

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Whilst wastewater treatment plants (WWTPs) have an inadvertent high microplastics retention capacity (typically >70%), they are also an important point source of pollutants to aquatic environments. This allows WWTPs to serve as important control points to reduce microplastics pollution to receiving water bodies. In this study, we used a combination of spatially explicit total plastic waste generation and facility data from the International Joint Commission, to estimate the annual inputs of microplastics associated with direct wastewater discharges into each of the five Laurentian Great Lakes. The empirical calculations and plastic inputs take into account the population density and gross regional product bordering the lakes' coastlines, as well as the relative proportions of primary, secondary, and tertiary treatment of the discharging WWTPs. These inputs are then tracked within a simple microplastics balance model. The model is used to assess the impacts of converting and improving wastewater treatment processes along the Great Lakes continuum.