

## **ABSTRACT**

**THESIS:** Removal of Microplastics from the Muncie Wastewater Treatment Plant

**STUDENT:** Jaymi R. Godfrey

**DEGREE:** Master of Science

**COLLEGE:** Sciences and Humanities

**DATE:** December 2022

**PAGES:** 89

The term “microplastic” refers to tiny plastic fragments that are a result of plastic degradation or were purposefully manufactured. Microplastic waste is a contaminant of emerging concern, and potentially impacts the environment and human health. Wastewater treatment plants (WWTPs) receive pollutants from domestic and diffusive sources that contain large quantities of microplastics. Despite being largely removed following treatment processes, wastewater effluent is still a major pathway for microplastics to enter the environment due to the high-water discharge rate from WWTPs. However, rates and mechanisms of microplastic removal during the wastewater treatment process are still unclear. The focus of this study is to determine how much microplastics are removed per each stage of the wastewater treatment processes, and reveal the temporal variations of the abundance of microplastic entering the Muncie WWTP. This study collects bi-weekly grab samples with duplicates which are then filtered using an assembled stack of sieves with mesh sizes between 425 and 25  $\mu\text{m}$ , as well as using Fenton Reagent as a method of organic oxidation and density separation via centrifuge to isolate microplastics. Then the microplastics are visually identified under a microscope based on morphology. Results indicate that fragments and films are the most dominant types, accounting for 35% of total microplastics

observed, followed by fibers. Microplastic concentration is 7.92 items/L<sup>-1</sup> on average for all samples, and also shows a general increasing trend from late February to mid-May during the sampling period. The concentration of microplastics is not strongly related to either river discharge or plant inflow based on correlation analysis. Findings from this research is helpful for the WWTP to evaluate future renovations related to the removal of microplastics as well as contribute to cutting-edge knowledge in the field.