
What do microplastics mean for aquatic food webs? Some insight from ongoing experimental work in a freshwater ecosystem laboratory.

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Abstract

Although research on microplastics (MPs) has evolved rapidly in recent years, researchers do not yet have a complete understanding of how MPs are impacting ecosystems. The effects of MP exposure are highly variable according to exposed species and MP traits. For example, aquatic zooplankton and smaller fishes that visually select their food might be more likely to ingest MPs due to resemblance to food items. Smaller-bodied animals also tend to contain higher concentrations of MPs by body weight in their digestive tracts and organs. In high enough concentrations, MPs might act to restrict energy flow through food webs by reducing the nutritional value of prey species, whether by food dilution, direct toxicity increasing homeostatic costs, or reductions in abundance. In this work, we used two in-lake, large mesocosm experiments to explore how exposure to microplastics affected the composition of essential food web nutrients – fatty acids – in yellow perch (*Perca flavescens*) and zooplankton. We found that MP concentration did not affect fatty acid composition in the fish and zooplankton when supplemental fish food was provided. However, preliminary findings from the second experiment suggest that body weight was lower in fish exposed to

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29,240 particles L-1 MP concentrations when supplemental feeding was not provided. We will discuss how MPs might affect food webs by disrupting the flow of energy, how food webs might differ in resilience to these effects, our results so far from the experiments, and our future work on MPs and food webs.

Keywords: food webs, fatty acids, stable isotopes