

Assessing tire wear particles and rubber-derived chemicals in urban Great Lakes ecosystems



Core Question: How do tire wear particles and related chemicals move through Michigan's urban aquatic ecosystems?

Tire wear particles are emerging as a major environmental threat to the Great Lakes and their urban watersheds. Created by the mechanical abrasion of vehicle tires on roadways, these particles represent roughly eighty-five percent of the microplastics found in our waterways. While microplastics are already known to be ubiquitous in the region, concentrations in urban tributaries can be ten times higher than in offshore waters, leading to some of the highest recorded levels in fish worldwide.

The danger of these particles is twofold. Beyond the physical presence of the microplastics themselves, they leach a toxic cocktail of rubber-derived chemicals into the environment. One specific byproduct, known as 6PPD-quinone, has proven lethal to iconic Great Lakes species like coho salmon and lake trout. Recent monitoring has detected this chemical in urban streams at levels dangerously close to these lethal thresholds. Because these chemicals are highly hydrophobic, they do not easily dissolve in water and instead tend to build up in the tissues of living organisms. This creates a high potential for bioaccumulation and biomagnification, where toxin concentrations

increase as they move up the food chain from small invertebrates to top predatory fish.

This research project aims to fill critical knowledge gaps regarding how these contaminants move through Michigan's urban aquatic ecosystems. Scientists will characterize the levels of tire particles and associated chemicals in water, sediment, and local wildlife. By studying species at different levels of the food web, the team will evaluate how these pollutants transfer from primary producers to the fish that support Michigan's recreational and commercial fisheries. The ultimate goal is to provide the data necessary to guide smarter stormwater management and policy decisions, ensuring the long-term health of coastal habitats and the protection of vulnerable aquatic species against this pervasive source of urban pollution.

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