



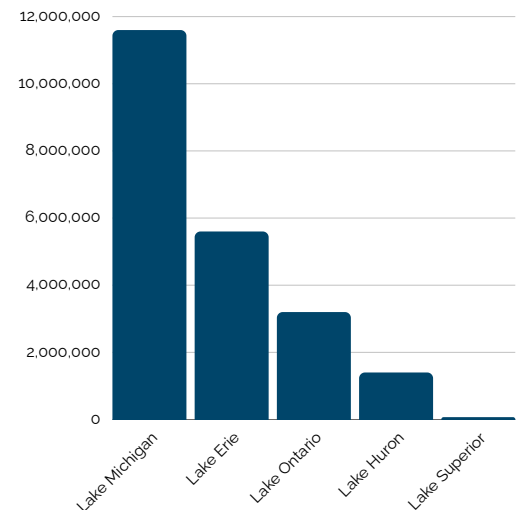
## What are Microplastics?

Microplastics are units of plastic that measure between .001 micrometers and 5 millimeters in size, about the size of a grain of rice. [Primary microplastics](#) are pieces of plastic that are purposefully manufactured to be small in size, such as glitter, cosmetic beads, and pellets. Secondary microplastics are produced by the degradation of larger plastic items such as plastic bags, toys, textiles, packaging, and more. Microplastics are ubiquitous throughout almost all aspects of daily life, from beauty and hygiene products to clothing and transit vehicles. According to the [International Union for Conservation of Nature](#), there are seven primary sources of microplastics entering the aquatic environment: synthetic textiles (50-75%), vehicle tires (10-20%), city dust (10-20%), road markings (3-5%), marine coatings (1-2%), personal care and cosmetic products (1%), and plastic pellets (<1%). As clothing is washed, the material breaks down over time, releasing microfibers into wastewater and making them the highest contributor of microplastics in waterways.

## Microplastics and Human Health

Human consumption of microplastics is a growing health concern. As microplastics have been incorporated into the food chain, humans are consuming about a credit card's worth of microplastics [per week](#), specifically from the consumption of [fish or bottled water](#). Research aimed at understanding the impacts of microplastics on human health is still in its infancy, however, recent research proposes that consumption of microplastic may cause adverse effects on human health. A 2021 study revealed that microplastics have the ability to cross the blood-brain barrier and permeate cell membranes, creating the potential to linger throughout the body. It is unknown for how long microplastics remain in the body, and researchers are investigating whether the acidic conditions of the gut are able to degrade microplastics after ingestion. Emerging research suggests that those lingering microplastics could be linked to excess [inflammation, oxidative stress and metabolic disorders](#). Microplastics can also [absorb heavy metals](#), including carcinogens, and further research is needed to determine if microplastics are a source of these metals in humans.

### Pounds of plastic entering each of the Great Lakes per year:



Source: [Rochester Institute of Technology](#)

### Further Reading:

[EPA Research on Microplastics](#)

[Recent Research on Microplastics and Disruption of Gut Processes](#)

[Alliance for the Great Lakes Plastics Report](#)

[Membrane Bioreactors for Wastewater Treatment](#)

[Microplastics in Cropland](#)

## Microplastics and the Great Lakes

Like other coastal areas, the Great Lakes are no stranger to litter. A study from the Alliance for the Great Lakes found that [86% of litter](#) on the shores of the Great Lakes is composed partially or completely of plastic. Researchers at [RIT](#) were able to quantify how much plastic enters each of the Great Lakes, with Lake Michigan having the most, and Lake Superior, the least (see above graph). In total, the researchers estimate that 10,000 tons of plastic enters the Great Lakes per year.

## Recent Federal Action to Address Microplastics

**Microbead-Free Waters Act of 2015:** Signed into law in 2015, [this law](#) prohibits the manufacturing, packaging, and distribution of rinse-off cosmetics containing plastic microbeads. This law also applies to products that are both cosmetics and non-prescription drugs, such as toothpastes.

**MICRO Plastics Act of 2020:** [This bill](#) directs the EPA to develop a pilot program to test the efficacy and cost effectiveness of technologies to prevent the release of microplastics into the environment, and to remove them from the environment once they get there.

**Reducing Plastics in Wastewater Act:** Sponsored by Representative Chris Jacobs (R-NY), [this bill](#) would help municipal water treatment facilities reduce and remove microplastics from wastewater, making available funds from the Clean Water State Revolving Fund.

**Plastic Pellet Free Waters Act:** Under [this bill](#), The Environmental Protection Agency would be required to issue a final rule that prohibits certain discharges of plastic pellets and other pre-production plastic into waters of the United States.

**Farewell to Foam Act:** Introduced by Senator Chris Van Hollen (D-MD) and Representative Lloyd Doggett (D-TX), the [Farewell to Foam Act](#) would phase out single-use plastic foam, such as foodware and packing peanuts.

**Break Free from Plastic Pollution Act:** The goal of this [bill](#) is to make manufacturers of single-use plastic packaging accountable for the collection, reuse, recycling, and disposal of packaging from consumers. This prevents the plastic from becoming a pollutant and entering the animal and human food chain through waterways. This approach, sometimes referred to as “extended producer responsibility,” places the responsibility for the cleanup of plastic waste on producers of plastic.

## Water Treatment Technology Advancements and Modifications

Wastewater treatment plants are a route through which microplastics enter the Great Lakes. On average, preliminary and primary treatment removes 72% of microplastics from influent wastewater, while plants with secondary treatment remove 88%, and those with tertiary treatment remove [94%](#). Nearly 1,450 municipal wastewater treatment plants collectively discharge [4.8 billion gallons of treated water](#) to the Great Lakes basin daily, and 98% of that total discharge has secondary or tertiary treatment. Some wastewater treatment plants have adopted the use of additional technologies to filter microplastics with an efficacy rate of [99%](#). Unfortunately, microplastics can [re-enter the water system](#) through agricultural runoff. A product of wastewater treatment is a sludge containing biosolids (and, unintentionally, microplastics) filtered out of wastewater that is applied to agricultural fields as fertilizer. When applied to soil, microplastics [can be present in](#) runoff that contaminates local waterways, reintroducing microplastics to the aquatic environment.