

# The Great Lakes



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## **Abstract**

The effects of plastic pollution on the Great Lakes and wildlife.

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## Plastic Pollution

It is quickly becoming realized that plastic pollution is a real, major threat that is harming the ecological health and quality of the Great Lakes. Plastic is being discovered in all portions of the lakes, including surface water, along beaches, in the water column, and in lake sediment. It has also been recently discovered that surface water densities of plastic in the open water of the Great Lakes is as great as the concentrations of plastic found in oceanic gyres, such as the Great Pacific garbage patch and the North Atlantic gyre. It is estimated that 10,000 metric tons enter the Great Lakes each year from the US and Canada.



## Clean Ups

Data gathered from volunteer beach cleanups has shown that more than 80 percent of anthropogenic litter found along the shorelines of the Great Lakes is plastic. Because this is a newly discovered issue, it is unclear how the lake sediments and water column are impacted from plastic. There are many possible sources of plastic in the Great Lakes. Some of these sources include: Microbeads from beauty products, plastic pellets from plastic manufacturing industries, waste from beach goers, and litter that may get caught in storm drains. Plastic debris in the environment is a threat due to its resistivity to photo-oxidative, thermal, biological and mechanical processes. The environmental issues associated with plastic pollution are significant. Plastics degrade slowly in the environment and can harm wildlife that mistaken the plastic for food or get entangled. Once entangled, it can be difficult for animals to escape, which can cause

strangulation, starvation and drowning. Plastic can also disperse persistent organic pollutants and heavy metals. Plastics can transport invasive species and pathogens.

Plastic pollution can also have a significant economic effect. The direct cost of combating plastic debris in the Great Lakes is estimated to cost \$468,000,000 per year. Accumulation of debris on shorelines can deter recreation, cause injury and reduce tourism. Property values may also decrease due to plastic debris on shorelines and impact quality of life. Macroplastics floating on the surface can also cause damage to marine vessels and entangle propellers. Toxic chemicals can be released when the plastics degrade, including BPA's, heavy metals, ethers, bisphenol, and phthalates. These chemicals can be transferred up the food web and pose a threat to animals and humans.

## The Great Lakes

In Lake Erie and Lake Huron, plastic debris is the number one anthropogenic waste source found. The Lake with the lowest plastic waste is Lake Superior. Plastic debris in lakes is influenced by surface water patterns and currents. The greatest plastic concentrations are found in areas of converging surface currents. Topography, wind currents and proximity to populated areas and pollutant sources impact the plastic concentrations in a given area. It is interesting to scientists that visible plastic accumulation zones are not seen in the Great Lakes because some current structures of the lakes have gyre patterns. Accumulation is likely disrupted by sustained wind events. Plastic accumulation is greatest with high human population and high input from rivers carrying plastic. This means that plastic may stay along the shoreline. Degradation processes and sediment type can affect how long plastics debris can remain on beaches.

## Questions

There are many questions that have not been answered yet regarding plastic pollution in the Great Lakes. Some of these questions include:

- 1) What are the actual plastic inputs into the Great Lakes basin each year?
- 2) How do different plastic types degrade in the Great Lakes?
- 3) Are there eco-toxicological consequences and threats to human health?

