Lake Superior Drowning in Microplastics

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Overview

Billions of microplastic particles litter the shores and waters of Lake Superior [1]. However, the ecological impact of microplastics on the flora and fauna of Lake Superior have not been fully realized. Microplastic saturation of our waterways affects us by suffocating our native flora and fauna and contaminating our food and water sources [2]. Beyond monitoring, however, research related to potential solutions remains limited. Beyond the Lake Superior region, research on microplastics in freshwater systems and remediation efforts can be broadly applied.

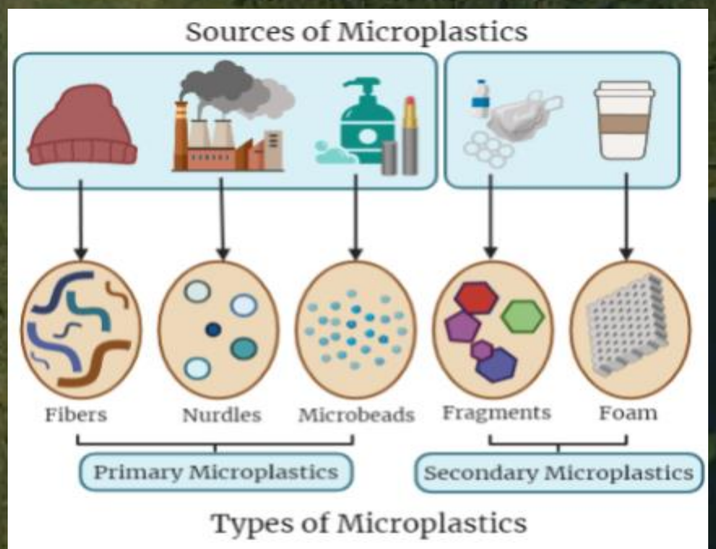

Figure 1. Examples of macroplastic items and the type of microplastic each create.

Objectives

- Encourage continued research of microplastic impacts on the Lake Superior ecosystem
- Increase community awareness regarding microplastic impacts

Materials and Methods

We conducted an extensive literature review to:

- Generate a baseline understanding of the ecological implications of microplastic contamination on Lake Superior's ecosystem, and
- Explore potential solutions within the scientific and citizen communities.

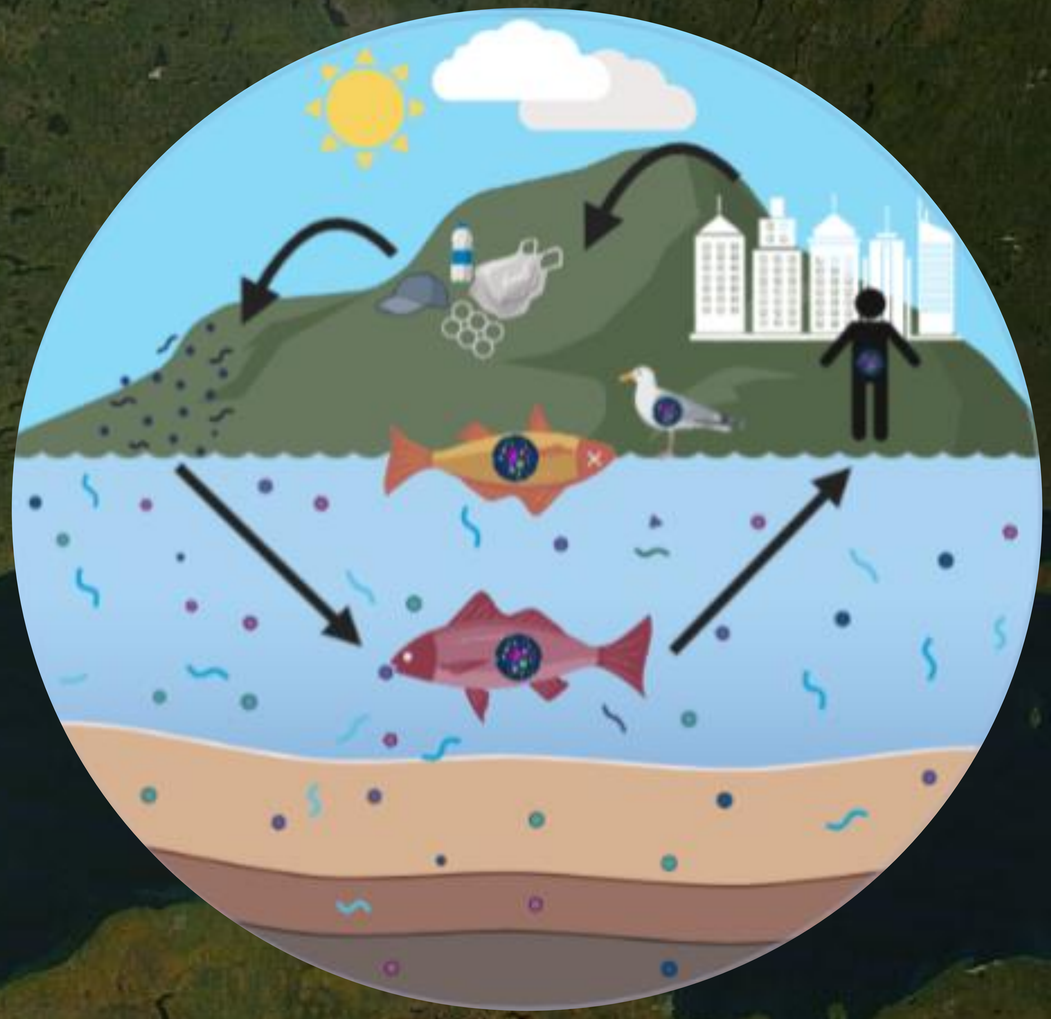

Figure 2. The Microplastic Cycle. Microplastics are a byproduct of plastic production and breakdown of consumer goods. Microplastics within freshwater systems inflict harm onto wildlife and human populations due to their presence in sediments and surface waters.

Research Findings

Microplastic pollution in Lake Superior is a complex issue with narrow-focused research. The estimated abundance of microplastics on Lake Superior's surface is more than 2.4 billion particles with abundance values varying across locations [1]. These microplastics fall within differing morphological categories (Figure 1), but, in Lake Superior, 67%, the majority, represent fibers [3]. Overall, our literature review suggests that in terms of abundance and morphology, Lake Superior's results are consistent with global microplastics data [4]. However, our literature review reveals little ecological or solution-based research in Lake Superior and freshwater systems.

Discussion

Microplastic research and public education are of utmost importance. Our findings suggest that an overabundance of microplastics, comparable to global numbers, reside in Lake Superior. Despite this, research remains targeted at marine systems and focused on abundance rather than ecological impacts and remediation.

Conservation Implications

As contamination of microplastics in Lake Superior increases, the particles are digested by fish, birds, and other species, including humans. Our findings encourage increased research focused upon these ecological impacts of microplastics upon freshwater systems. Additionally, our findings encourage solution-based microplastic research which includes spreading awareness to the Lake Superior region community in regards to actions that consumers and voters can take in mitigating the overabundance of microplastics in the Lake Superior region.

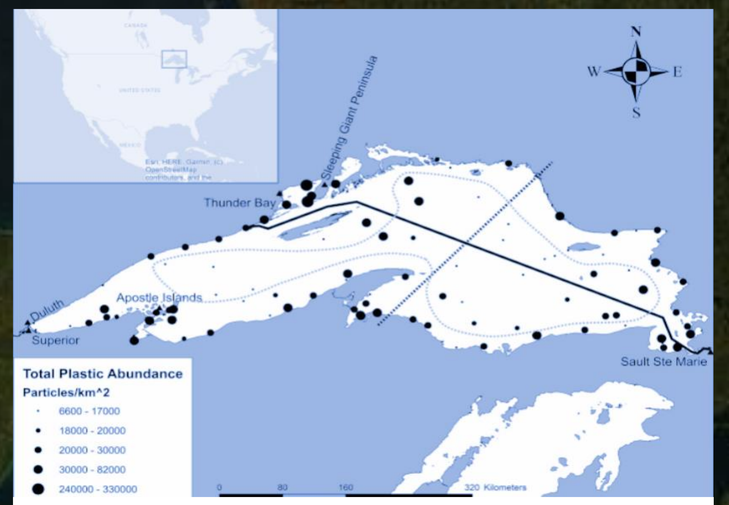

Figure 3. Total plastic abundance at varying locations across the Lake Superior region [1].

Literature Cited

(1) Cox, K., Brocious, E., Courtenay, S. C., Vinson, M. R., & Mason, S. A. (2021). Distribution, abundance and spatial variability of microplastic pollution on the surface of Lake Superior. *Journal of Great Lakes Research*, *47*(5), 1358–1364. https://doi.org/10.1016/j.jglr.2021.08.005

(2) Munno, K., Helm, P. A., Rochman, C., George, T., & Jackson, D. A. (2021). Microplastic contamination in Great Lakes fish. *Conservation Biology*.

(3) Hendrickson, E., Minor, E. C., & Schreiner, K. (2018). Microplastic abundance and composition in western Lake Superior as determined via microscopy, Pyr-GC/MS, and FTIR. *Environmental Science & Technology*, 52(4), 1787–1796.

(4) Barnes, D. K., Galgani, F., Thompson, R. C., & Barlaz, M. (2009). Accumulation and fragmentation of plastic debris in global environments. *Philosophical transactions of the royal society B: biological sciences*, *364*(1526), 1985-1998.