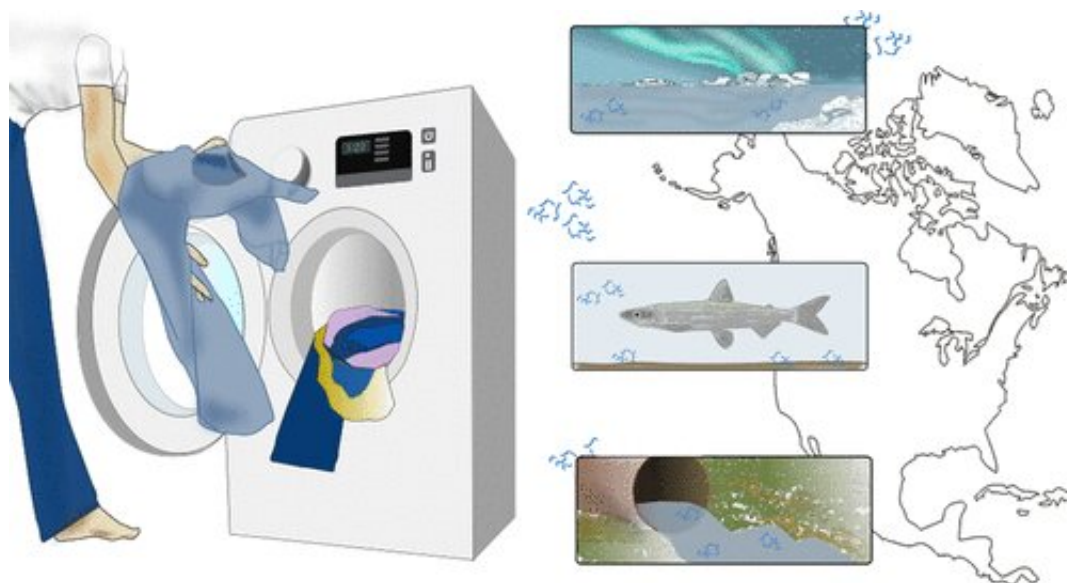


The widespread footprint of blue jean microfibers

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Credit: American Chemical Society

With many people working from home during the COVID-19 pandemic, blue jeans are a more popular wardrobe choice than ever. But most people don't think about microscopic remnants of their comfy jeans and other clothing that are shed during laundering. Now, researchers reporting in *ACS' Environmental Science & Technology Letters* have detected indigo denim microfibers not only in wastewater effluent, but also in lakes and remote Arctic marine sediments.

Over the past 100 years, the popularity of denim blue jeans has grown

immensely, with many people wearing this type of clothing almost every day. Studies have shown that washing denim and other fabrics releases microfibers—tiny, elongated particles—to wastewater. Although most microfibers are removed by wastewater treatment plants, some could still enter the environment through wastewater discharge, also known as effluent. Blue jean denim is composed of natural cotton cellulose fibers, processed with synthetic indigo dye and other chemical additives to improve performance and durability. Miriam Diamond, Samantha Athey and colleagues wondered whether blue jeans were a major source of anthropogenic cellulose microfibers to the [aquatic environment](#).

The researchers used a combination of microscopy and Raman spectroscopy to identify and count indigo denim microfibers in various water samples collected in Canada. Indigo denim made up 23, 12 and 20% of all microfibers in sediments from the Great Lakes, shallow suburban lakes near Toronto, Canada, and the Canadian Arctic Archipelago, respectively. Despite a high abundance of denim microfibers in Great Lake sediments, the team detected only a single denim microfiber in the digestive tract of a type of fish called rainbow smelt. Based on the levels of microfibers found in wastewater effluent, the researchers estimated that the [wastewater treatment plants](#) in the study discharged about 1 billion indigo denim microfibers per day. In laundering experiments, the researchers found that a single pair of used jeans could release about 50,000 microfibers per wash cycle.

Although the team doesn't know the effects, if any, that the microfibers have on [aquatic life](#), a practical way to reduce denim microfiber pollution would be for consumers to wash their jeans less frequently, they say. Moreover, finding microfibers from [blue jeans](#) in the Arctic is a potent indicator of humans' impact on the environment, the researchers add.

More information: Samantha N. Athey et al. The Widespread

Environmental Footprint of Indigo Denim Microfibers from Blue Jeans, *Environmental Science & Technology Letters* (2020). DOI: [10.1021/acs.estlett.0c00498](https://doi.org/10.1021/acs.estlett.0c00498)

Provided by American Chemical Society

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