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PFAS

Toxic 'forever chemicals' ubiquitous in Great Lakes basin, study finds

PFAS chemicals present in air, rain, atmosphere and water in basin, which holds nearly 95% of US freshwater

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Toxic PFAS “forever chemicals” are ubiquitous in the Great Lakes basin’s air, rain, atmosphere and water, new peer-reviewed [research](#) shows.

The first-of-its-kind, comprehensive picture of [PFAS](#) levels for the basin, which holds nearly 95% of the nation’s freshwater, also reveals that precipitation is probably a major contributor to the lakes’ contamination.

“We didn’t think the air and rain were significant sources of PFAS in the Great Lakes’ environment, but it’s not something that has been studied that much,” said Marta Venier, a co-author with [Indiana](#) University.

PFAS are a class of 15,000 chemicals used across dozens of industries to make products resistant to water, stains and heat. The chemicals are linked to cancer, kidney disease, birth defects, decreased immunity, liver problems and a range of other serious diseases.

They are dubbed “forever chemicals” because they do not naturally break down and are highly mobile once in the environment, so they continuously move through the ground, water and air. PFAS have been detected in all corners of the globe, from penguin eggs in Antarctica to polar bears in the Arctic.

The new paper is part of a [growing body of evidence](#) showing how the chemicals move through the atmosphere and water.

Measurements found PFAS levels in the air varied throughout the basin - they were much higher in urban locations such as Chicago than in rural spots in northern [Michigan](#). That tracks with how other chemical pollutants, like PCBs, are detected, Venier said.

But levels in rain were consistent throughout the basin - virtually the same in industrialized areas such as Chicago and Cleveland as in Sleeping Bear Dunes, a remote region in northern Michigan. The finding was a bit “puzzling” Venier said, adding that it probably speaks to the chemicals’ ubiquity.





A fisherman in Bayfield, Wisconsin. Photograph: Scott Olson/Getty Images

PFAS “background levels” are now so high and the environmental contamination so widespread that the atmospheric counts, including in rain, are relatively consistent. The PFAS in rain could be carried from local sources, or have traveled long distances from other regions. Regardless, it is a major source of pollution that contributes to the lakes’ levels, Venier added.

Water contamination levels were highest in Lake Ontario, which holds the most major urban areas, including Toronto, and is last in line in the lake system’s west-to-east flow. Lake Superior, which is the largest and deepest body with few urban areas on its shores, showed the lowest levels.

PFAS tend to accumulate in Lake Superior and Huron because there’s little water exchange, while Lake Ontario relatively quickly moves the chemicals into the Saint Lawrence Seaway and Atlantic Ocean.

The study did not address what the levels mean for human health and exposure, but [fish consumption](#) advisories are in place across the region, and many cities have [contaminated](#) drinking water.

The levels found in water and atmosphere will probably increase as scientists are able to identify more PFAS, most of which cannot be detected by currently reliable technology.

“We need to take a broad approach to control sources that release PFAS into the atmosphere and into bodies of water ... since they eventually all end up in the lakes,” Venier said.

This article was amended on 18 May 2024 to remove Buffalo as one of the urban areas on Lake Ontario; it is on Lake Erie.

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