

# PFAS found in nearly all fish tested from four northern Illinois rivers

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Channel catfish had the highest accumulation of PFAS in their tissues, the researchers found. Credit: Eric Engbretson/USFWS

Scientists tested nine fish species from four northern Illinois rivers for contamination with per- or polyfluoroalkyl substances, synthetic

chemicals found in numerous industrial and commercial products and known to be harmful to human health. They found fish contaminated with PFAS in every one of their 15 test sites. Elevated levels of PFOS, one type of PFAS compound, were found in nearly all fish tested.

The [findings](#) are reported in the journal *Science of the Total Environment*.

The qualities that make PFAS desirable for industrial uses—their durability and stability under stresses such as high heat or exposure to water, for example—also make these chemicals particularly problematic in the environment and hazardous to human and animal health, said Joseph Irudayaraj, a professor of bioengineering at the University of Illinois Urbana-Champaign who led the new study.

"PFAS contain multiple carbon-fluorine bonds, one of the strongest bonds in organic chemistry," Irudayaraj said. "Because of this, they are also very hard to break down. They persist for a long time because they are very, very stable."

There are nearly 15,000 PFAS chemicals, according to the U.S. Environmental Protection Agency. These are classified either as short-chain PFAS, which have less than six carbon-fluorine bonds, and long-chain PFAS, with six or more of these bonds, Irudayaraj said.

Long-chain PFAS were widely used before awareness grew about the hazards of these chemicals. More recently, many industries switched to using short-chain PFAS.

"It was thought that the short-chain PFAS were less toxic, and that they could more easily degrade," he said. "But surprisingly, that was not the case."

Now, both types of PFAS are found in groundwater, soil and human tissues.

"About 99% of people living in the U.S. have PFAS in their system," Irudayaraj said.

Despite a voluntary phasing out of some PFAS in industry in the U.S. and efforts to reduce PFAS pollution, these chemicals are still found in drinking water, [household products](#), food packaging and agricultural products, he said.

The researchers focused on fish in northern Illinois rivers because they are close to urban and industrial areas. Industrial emissions and urban rainwater runoff may further contaminate local waterways with PFAS. Sport fishing is also popular across the state, including in areas inside and near Chicago. More than 666,000 fishing licenses were issued across the state of Illinois in 2020.

The researchers focused on fish in the Pecatonica River, Rock River, Sugar River and Yellow Creek from 2021-22. The team collected dozens of samples from nine species of fish, including bluegill, channel catfish, common carp, northern pike, smallmouth bass and walleye. The fish represented different levels of the food chain, from those that feed only on plants, like bluegill, to those eating other fish, such as channel catfish and northern pike.

Back in the lab, the scientists analyzed fish tissues for 17 PFAS chemicals. They found PFAS-contaminated fish in every river they tested and in every one of their 15 sampling sites. Fish from the Rock River had the highest concentrations of PFAS in their tissues. Contamination levels were highest in channel catfish, at the top of the food chain, and lowest in the plant eaters.

Four chemicals known as perfluorooctanesulfonic acids or PFOS were detected in fish from every site tested.

"These are long-chain PFAS that have been in use over the past few decades," Irudayaraj said. "They were found in all the sites, along with a few short-chain PFAS."

Because fish are mobile, it is problematic to tie their contamination levels to the locale where they were sampled, he said. But the finding is worrisome for people who are exposed to the water or eating the fish from these sites.

"Further studies are warranted to comprehensively evaluate the occurrence and sources of PFAS throughout the state of Illinois," the researchers wrote. "Such information is crucial to better understand the distribution and potential risks of these compounds to the environment."

**More information:** Mia Sands et al, PFAS assessment in fish – Samples from Illinois waters, *Science of The Total Environment* (2024). DOI: [10.1016/j.scitotenv.2024.172357](https://doi.org/10.1016/j.scitotenv.2024.172357)

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