

Scientists puzzled by mercury's jump in Great Lakes fish

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Great Lakes. Credit: CC0 Public Domain

It's not supposed to be like this. Though advisories about toxic mercury in fish have continued in Michigan and the surrounding Great Lakes, with recommendations to limit consumption of certain species to a few

times per month, the amount of mercury found in fish tissues has dropped steadily over decades since the 1970s. That corresponded with the reduction of pollution coming from Midwestern smokestacks as regulations tightened, pollution prevention technology improved, and coal-fired factories and power plants went offline.

But over the last several years, that started changing. Scientists are finding mercury levels rising in large Great Lakes [fish](#) such as walleye and [lake trout](#). Curiously, it's occurring with fish in some locations but not others. Researchers are still trying to figure out why.

The mercury levels are not surpassing U.S. Environmental Protection Agency thresholds. But researchers want to determine if what they are seeing is a temporary trend or a trajectory that's only going to worsen.

The answer has large ramifications for Michigan's vital sports fishing industry. Anglers spent \$2.4 billion in trip-related expenses and equipment in 2011, according to the Michigan Department of Natural Resources.

Mercury is a heavy, silvery metal, unusual in that it's liquid at room temperature. It's naturally occurring, but is rare to find uncombined with other elements.

It's very toxic to humans and animals - and unlike many other toxins, mercury remains in the environment for very long periods of time, moving up the food chain and compounding inside animals that ingest it.

The EPA has found mercury in water has the potential to cause kidney damage from short-term exposures at levels above the maximum contaminant level of just 0.002 parts per million. Mercury can inhibit brain development in fetuses and children, and harm immune systems and adult heart function.

Environment and Climate Change Canada, a similar agency to the U.S. Environmental Protection Agency, looks at data collected from multiple fish species and herring gull egg monitoring across the Great Lakes. One of the survey sites for gull eggs is on Canada's Fighting Island, in the Detroit River near Wyandotte, said Agnes Richards, a research scientist with Environment Canada.

"We've been monitoring since the 1970s, and the (mercury contamination) trends overall have been declining - as have been the emissions of mercury into the atmosphere and deposition into the lakes," she said. "We decided to look at recent trends, from 2000 to 2015. What we found is, at some specific sites, trends have reversed."

The researchers published a finding of their studies in late December.

The issue has been noticed on the Michigan side of the Great Lakes as well.

"Out of 19 data sets, we see eight where we can see a significant trend" of mercury levels rising in certain fish, said Joseph Bohr, aquatic biologist for the Michigan Department of Environmental Quality's Water Resources Division, which does its own fish monitoring.

On Lake Michigan, walleye and lake trout from Grand Traverse Bay show increases, Bohr said. On Lake Huron, walleye from Saginaw Bay and lake trout from Thunder Bay have rising levels. Mercury levels in Lake Erie walleye have also risen. The average rate of increase is about 2 percent per year in the fish, he said.

But at least for now, the mercury spikes are in isolated locations.

"We have 11 other data sets where we're not showing any significant increase," Bohr said.

Scientists only have hypotheses regarding why this is occurring. The trend of warming Great Lakes could be a factor, said Shane De Solla, an ecotoxicologist with Environment Canada and co-author on the recent study.

Many types of mercury in the environment tend to pass through fish when ingested. But a type known as methylmercury tends to be absorbed into fish tissues. As small fish eat contaminated insects, and medium-sized fish eat the smaller fish, and large game fish eat the medium fish, those mercury concentrations get magnified exponentially, a process known as bioaccumulation.

"The lakes are slightly warmer, and that increases the production of methylmercury," De Solla said.

The region's more frequent and intense storms in recent years could also be a factor, Richards said.

"That results in a lot of flooding, and the re-suspension of sediments," she said. "What was buried before can become exposed, and that can increase the conversion of mercury to methylmercury."

And invasive species in the Great Lakes likely also play a role.

"It's really significantly changed the food web," Bohr said.

The timelines for the explosion of invasive zebra and quagga mussel populations in the Great Lakes, as well as the round goby, a small fish, rather neatly correlate with the reversal of declining mercury levels in sport fish, he noted.

"You can't just ignore that," he said.

Further evidence of invasive species' disruption of fish diets as a possible culprit for the mercury mystery comes from carp. In Grand Traverse, Saginaw and Thunder bays, unlike walleye and [lake](#) trout, carp aren't showing rises in their [mercury levels](#), Bohr said. From the St. Clair River, through Lake St. Clair and the Detroit River, carp are even showing decreases in mercury, he said.

That's significant, because bottom-feeding carp are eating different meals than the large sport fish.

"They're low on the food chain," Bohr said. "They're just mucking around on the bottom eating insects, basically."

De Solla said he doesn't "see anything catastrophic in the next little while." But if the [mercury](#) numbers do continue to increase in Great Lakes fish, "it could become a problem again."

That highlights the importance of continued monitoring, Richards said, "to see if this is a slight oscillation or a growing trend."

That could be jeopardized on the U.S. side, as President Donald Trump's 2017 budget proposal calls for elimination of virtually all Great Lakes restoration funds.

Bohr said most of the DEQ's work to evaluate toxins in fish is done through state funding. But, "indirectly, any federal budget cuts are likely to have an impact," he said.

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