

Study finds mercury prevalent in many western fish

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A new survey by researchers at Oregon State University and the U.S. Environmental Protection Agency of more than 600 rivers and streams in the western United States found widespread mercury concentrations in fish.

Though few of the more than 2,700 fish analyzed in the study contained alarmingly high levels of mercury, the prevalence of the element throughout 12 western states caught the researchers somewhat by surprise.

"Mercury is everywhere," said Alan Herlihy, a research associate professor with OSU's Department of Fisheries and Wildlife and one of the authors of the study. "It was literally in every fish we sampled, which suggests an atmospheric source. There also tended to be a noticeable difference between 'piscivores,' or fish-eating fish, and non-piscivores such as salmonids."

The researchers found that mercury levels were much higher in the larger fish-eating species, including bass, walleye, northern pike and pikeminnow. These piscivores are not as widespread throughout western river systems as salmonids, such as rainbow and cutthroat trout, which had lower levels of mercury.

Results of the study were published earlier this month in the journal *Environmental Science and Technology*.

The researchers say the risk for humans who may occasionally eat fish from the streams is fairly low and they compare the mercury levels in most of the larger piscivorous fish they analyzed to that found in cans of store-bought tuna. Consumption of those products in moderation is considered safe, though infants, young children, pregnant women and persons who eat a lot of fish have higher risk levels than the general population.

Less clear is the impact of that mercury on fish-eating birds and mammals, said Robert Hughes, also an author on the paper and an OSU fisheries and wildlife research associate professor.

"If I were a mink or an otter," Hughes said, "I'd be concerned. Those guys are loading up on fish containing mercury and we don't really know at what levels they may be affected. In birds, the effects of mercury contamination are neurological or behavioral – and often subtle. They may not clean their young, or they may leave eggs unattended in their nests.

"We simply haven't done enough studies to know all of the impacts, especially on fish-eating animals," Hughes added.

The study, based on data collected from EPA's Environmental Monitoring and Assessment Program, encompassed nearly 188,000 miles of perennial streams and rivers in the western United States. The selection of the more than 600 creek and river sample sites was done randomly to address regional questions about the prevalence of mercury contamination among fish in western rivers; not to do a stream-by-stream analysis of the impact.

The EPA's "tissue-based water quality criterion" is set at 0.3 micrograms of mercury per gram of fish tissue. In the survey, only 2.3 percent of the stream network that contained large (5 inches or longer) salmonids had

mercury levels at or exceeding that 0.3 mg level. Salmonids were the most prevalent group of species, found in 41 percent of the network sampled.

On the other hand, large bass, walleye and other piscivores were found in only 10 percent of the streams and rivers, yet 57 percent of them met or exceeded the 0.3 microgram level.

"The difference in mercury levels between salmonids and piscivores is likely a function of their diet," Hughes said.

"Most of the salmonids we sampled were insect-eaters. Older, very large salmon may respond more like piscivores, but we didn't sample salmonids of that size."

In looking at mercury levels in fish across the West, the most important factors "were where the fish were in the food web, and their ages," Herlihy said. "The older a fish is, the larger it is, and the more fish that it eats, the more likely it is to bioaccumulate mercury."

Mercury levels of 0.1 micrograms per gram of tissue are considered a threshold of concern for fish-eating mammals, though little research has been done on how different levels of mercury affect mink, otter and related animals. Nevertheless, the survey found that 93 percent of the streams and rivers with large piscivores exceeded that level of mercury deemed "protective" for fish-eating mammals.

Conducting the study with Herlihy and Hughes were Spencer Peterson and John Van Sickle of the EPA National Health and Ecological Effects Research Laboratory, located on the OSU campus.

Mercury entering the water via the atmosphere has a variety of natural and manmade sources, the researchers say, including coal power plants

from as far away as China, the burning of heavy oils and other fossil fuels, and even forest fires.

In the survey, the researchers did find 13 fish from eight different sites that had very high mercury concentrations – levels of 1.0 microgram or higher – likely indicating a point source. These high levels could be caused by nearby mines, dump sites or gravel pits, they added.

"There are mercury 'hotspots' out there," Hughes said, "but they are not common in the West. What we found, though, is that mercury is in fish throughout the western United States, and at higher levels in piscivores than in salmonids."

Source: Oregon State University

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