

New Lake Superior Pollutants

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Intro: This is Superior Science News. Today's program explores new pollutants in Lake Superior and their effects on the environment.

Chemicals like DDT have drawn much attention and concern over the years. The presence of chemicals, such as those from pesticides, beg the question, "What effects are these pollutants having on our environment?" Now scientists are concerned about another round of chemicals making their way into Lake Superior. They're called polybrominated diphenyl ethers or PBDEs. These chemicals act similarly to DDT and are commonly found in prescription drugs and detergents. Matt Hudson of the Great Lakes Indian Fish and Wildlife Commission says the chemicals are a growing problem in the Great Lakes.

"We're seeing increasing concentrations in the environment and also the fact that they're being found in the polar regions of the earth is showing that they're being transported via the atmosphere like traditional legacy pollutants."

Hudson says one reason PBDEs are so widespread is their substantial commercial use.

"It's somewhere around 80,000 chemicals, according to the Toxic Substance Control Act Registry. That's a lot of chemicals. It doesn't mean that all of these or very many of these at all are a concern when they get to the environment, but the fact is that we're not really sure which ones are and which ones aren't."

Hudson says a list of chemicals has been developed to help single out which ones affect the lake most.

"From an initial list of 22,000 chemicals, it's been whittled down to about 400 now of probable substances that we should really be taking a closer look at. Further screening is going to identify some top candidates for further surveillance and monitoring in the Great Lakes region."

He says some of that monitoring will have to start at the source.

"Wastewater is a source for a lot of these chemicals. If you think about it, in the morning you get up, take a shower, take a few pills, and all these things go down the drain, and they end up at a central location--a wastewater treatment plant. Our current wastewater technology isn't designed to remove pharmaceutical or biologically active compounds. They're designed remove pathogens and nutrients. So, there really isn't complete processing of these chemicals when they get to these wastewater treatment plants and they get released to the environment."

Hudson notes that their presence appears to have an impact on organisms in the

lake.

“A lot of these compounds are designed, pharmaceuticals are designed, to be biologically active. So, when they get into the environment, they can have a similar impact to organisms that are exposed to them. They could be effecting the reproduction--reproductive and development system and endocrine system in organisms.”

Peter Sorensen, a Sea Grant researcher with the University of Minnesota in St. Paul, says that fish can be affected.

“Endocrine disrupters are environmental chemicals that interfere with normal endocrine function and expose fish and wildlife. There are many classes of these things: estrogens, anti-estrogens. The first known really recognized endocrine disrupter was interestingly DDT, which had the effect of thinning egg shells in birds. This was because it acts as an estrogen.”

Sorensen says a study on the effects of sewage effluent or waste on fish from Duluth’s Western Lake Superior Sanitary District garnered interesting results.

“We saw in 2002 and 2004, that the effluent from a local plant here, and it’s a very well-run high-technology type plant does reduce reproductive success of male fish when they have to compete for spawning opportunities. These fish grew great in this effluent. They grew faster.”

But the results were not the same for female fish exposed to the sewage waste over long periods of time.

“They never regained their ability to reproduce; however, female fish that were exposed just three days, did. Although, I’m not quite sure how to interpret these results, I do think something happened here with these effluent exposures and female fish. There’s a long list of potential candidates. Things like acetaminophen and ibuprofen --some of these anti-inflammatories could have these effects on ovulation processes in fish.”

Sorensen believes that the presence of chemicals in the lake could cause fish populations to go haywire over time.

“One of the primary threats that endocrine disrupters pose to the environment is that they disrupt a natural and sexual selection processes in fish. They’re not killing them outright. They’re not suppressing fecundity outright. Actually, what they’re doing is they’re hijacking the normal evolutionary processes that allow these fish to evolve and respond to their environment normally and naturally and to reproduce and do well. This means that sometimes perhaps that maybe the most fit fish--the biggest, fastest growing--isn’t going to be the one that’s necessarily going to reproduce successfully if they’re exposed to these endocrine disrupters.”

He says their findings are not uncommon and now agencies will have to consider

the long-term implications.

“It’s the kind of thing that somehow regulatory agencies should at least be considering or getting their minds around. It’s not what’s effecting fish today or even this generation of fish, but what’s going to happen to many generations of fish many decades from now as their natural evolutionary processes are being warped and distorted by these compounds out there.”

In the meantime, Matt Hudson hopes businesses and industries can at least prevent any further pollution by using green chemistry.

“Green chemistry is the idea of using chemistry as a pollution prevention tool, so designing chemicals to be less hazardous when they get out into the environment.”

Hudson says everyone can do their part to keep Lake Superior healthy.

“Don’t flush your pharmaceuticals, flushing them will send them right out into the lake. Making your own cleaning products, buying things in bulk and using old standbys like vinegar, ammonia and bleach work pretty well. You end up saving money.”

. . . And preserving the natural state of the lake.

For Superior Science News, I’m Marie Zhuikov.

Outro: This is a production of Minnesota Sea Grant and KUWS radio.