Michigan lakes are getting saltier; road salt to blame

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If trend continues, study predicts, salt levels will present risk to aquatic ecosystem in inland lakes

(Photo: Jessica J. Trevino, Detroit Free Press)

Our freshwater lakes are getting saltier — and one of the largest studies ever of lake salinity blames the use of de-icing salts for roads.

That could eventually mean disruption of aquatic ecosystems, and even make lakes unusable for drinking water or irrigation, the researchers say.

The study of North American lakes predicts that many freshwater lakes will have salt levels exceeding parameters set by the U.S. Environmental Protection Agency, above which significant risks would be expected for a majority of species — "in the next 50 years if current trends continue."

The study, published Monday in the Proceedings of the National Academy of Sciences' PNAS journal, looked at 371 inland freshwater lakes throughout the Midwest and Northeast, where the highest density of freshwater lakes occurs in North America. Studied lakes were required to have at least 10 years of data sampling for chloride content, lower mean chloride concentrations to exclude brackish lakes, and a surface area of 4 hectares or larger. In Michigan, Gull Lake (northwest of Battle Creek) and Higgins Lake (west of Roscommon) were evaluated. The study did not look at the Great Lakes.

"In the Adirondacks region, where there's very little human development, we saw no change in chloride levels, or actually saw levels decrease," said Nicholas Skaff, a doctoral student at Michigan State University's Department of Fisheries and Wildlife and a co-author of the study.

"Anywhere there's even a small amount of human development, we saw increasing trends in chloride concentrations. If only 1% of the area around the lake had human development, there were pretty significant increases."

The connection to human development is related to the roads, driveways, parking lots and rooftops that come with it. "Chloride is often trapped in sediments," Skaff said. "But if you don't have sediments, if you have impervious surfaces, it's much easier for chloride to run off into our water bodies and cause salinization."

The strongest impact, the study shows, is from human development within 500 meters (about 1,640 feet) of lakes. In most cases, lake-protecting zoning and other regulations don't extend to those distances, he said.

Previous research shows higher salt concentrations can disrupt the lives of tiny plants and animals vital to the freshwater aquatic food web — the small, shrimp-like creatures eaten by small fish, that in turn are eaten by larger fish. At higher concentrations, high salinity can affect fish and even render lakes unusable for human drinking water and irrigation.

Saltier water can also increase the abundance of cyanobacteria, which can cause potentially human health-harming algal blooms. A cyanobacteria-fueled algal bloom near Toledo in August 2014 prompted the precautionary shutdown of the city's water supply, leaving more than 500,000 Toledo and southeast Michigan residents without municipal water for days.

A front end loader adds salt from the salt dome into a 12 ton salt and plow truck at the Oakland County Road Commission in Waterford on Saturday, January 4, 2014. (Photo: Eric Seals, Detroit Free Press)

Matthew Herbert, aquatic ecologist at the Lansing office of the Nature Conservancy, a nonprofit environmental advocacy group, called the study, "really interesting and pretty groundbreaking."

"Most papers will compare a wetland that receives a lot of salt, versus wetlands that don't," he said. "It's usually thought of as being a pretty localized thing. But this sounds like a pretty robust study. This would indicate road salt is probably a bigger issue than what we generally thought of it in the past. It's clearly something we need to understand better — especially if they found it across that many lakes."

But understanding the problem and its connection to spreading road salt doesn't make solutions any easier. "If we don't remove snow and ice from roads, people get into crashes, they get hurt, and they die," said Craig Bryson, spokesman for the Road Commission for Oakland County. "If there was anything as effective as salt, anywhere near the same price range, we would seriously consider it. But there isn't." There's an expectation that roads will be cleared and de-iced when a winter storm hits, Bryson said. "There was a time when people expected things to slow down when there was a snowstorm," he said. "These days, for a vast section of our society, that's no longer an option. People say, 'I have to go to work; I can't be late; and I'm not going to add more time to my commute.'"

And the Road Commission can't take special care around water bodies, if a well-traveled road is near it. "Oakland County, probably more than anywhere else in southeast Michigan, is covered with wetlands, lakes, streams," Bryson said. "Every other road is, 'Something Lake Road.'"

But the Road Commission has taken steps over the last decade to reduce the amount of salt it uses on roads, Bryson said. That includes liquid brine-sprayers on trucks, spraying saltwater on the salt to activate it into ice-melting mode more quickly. In the last five years, the Road Commission has averaged spreading 63,000 tons of salt per year. Fifteen or more years ago, it was about 83,000 tons of of salt per year on average, Bryson said.

"We've actually reduced by about half the salt spread rates on our trucks, from 400 pounds of salt per lane mile to 200 pounds of salt per lane mile," he said.

That's the type of thing, Skaff said, he hopes comes from his research.

"We are encouraging municipalities, private businesses and homeowners to take a thoughtful approach on when and how to apply de-icer," he said. "Even individual homeowners — some researchers have shown 50% of road salt applications are applied by private homeowners and businesses. So even individual people can make a difference."

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