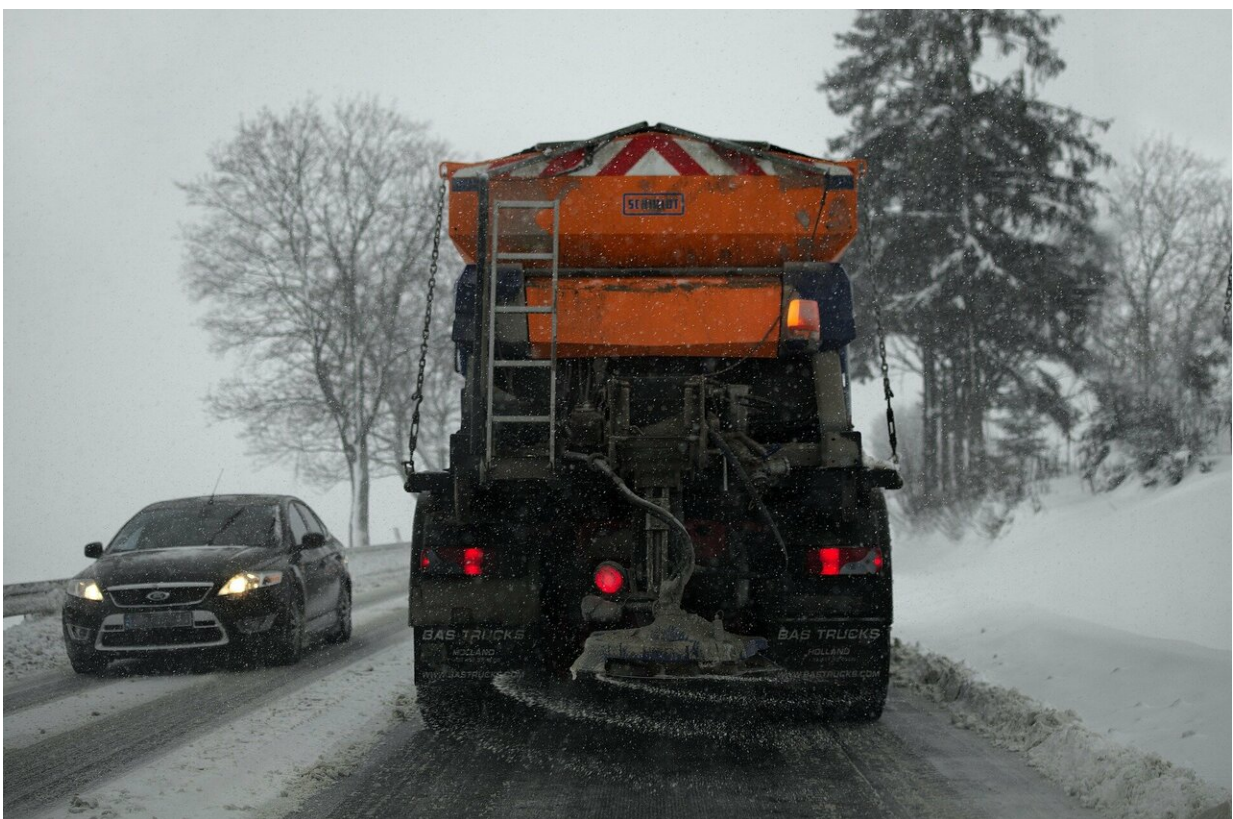


Chicago area grapples with reducing road salt as chloride levels rise in waterways, Lake Michigan

February 28 2022, by Talia Soglin and Ashley Capoot



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During icy Midwest winters, a Chicagoan's step onto the sidewalk is often met with a familiar crunch underfoot. But salt, used to keep roads

safe for driving and sidewalks safe for walking, comes with an ecological price: It ends up in our water, and once it's there, it's almost impossible to remove. As levels of chlorides continue to rise in Lake Michigan and exceed state limits in Chicago-area waterways, municipalities across the region are grappling with the urgent need to reduce the use of road salt in winter.

In November, the Illinois Pollution Control Board issued an order giving the city of Chicago, the Illinois and Cook County departments of transportation, the Metropolitan Water Reclamation District of Greater Chicago and more than 40 other organizations 15 years to meet the state's limit, pending approval from the U.S. Environmental Protection Agency.

According to the board, the goal of the order "is not to avoid compliance, but rather to create a transparent tool, as authorized under the Clean Water Act, that allows incremental progress in reducing chloride while recognizing the issues presented in our State by the use of road [salt](#) during the winter months to maintain public safety."

Tests performed between 2006 and 2017 show dozens of chloride readings above 500 milligrams per liter, the Illinois EPA's chloride limit. Some readings—such as a February 2015 test at Diversey Parkway on the Chicago River's North Branch—are more than twice as high.

But ecological effects of chlorides on fish and insects begin to be seen at even lower levels, around 150 milligrams per liter, said Jennifer Hammer, the director of watershed programs and ecological restoration for the Conservation Foundation, which is working with the 48 municipalities and agencies.

Adding salt into the soil or [water](#) has a ripple effect. Plants and trees don't get the nutrients they need, and increased saline levels can reduce

species diversity in wetlands. For freshwater fish, and amphibians like wood frogs and salamanders, sodium chloride can interfere with their internal balance and harm reproductivity.

"If we continue to behave the way we are, we're going to be causing a lot of problems for future generations to have to clean up after us," said Scott Kuykendall, a water resources specialist for the McHenry County Department of Planning and Development, a leader in the push to reduce chloride use in winter. "We should be taking care of our own mess."

'Way overused'

Last winter, the Illinois Department of Transportation used more than 522,000 tons of salt, up from the winter before when it went though nearly 430,000 tons. Chicago's Department of Streets and Sanitation used more than 322,000 tons of salt last winter and has used about 174,508 tons this winter to date.

Maria Castaneda, a spokesperson for IDOT, said in an email the agency has "various best management practices in place to minimize the effects of chlorides in the environment while maintaining the roads for public safety," including storing all road salt on impermeable pads and calibrating salt-spreading equipment each year.

Evanston resident Mary Jane Chainski said she worries about salt getting into water sources.

"There's so much salt, you can see that it's way overused," she said last week after fleets of salt trucks had descended on the roadways ahead of a snowstorm. "Like everything else, we need to be thinking about the environment."

Northwestern University student Dana Hinchliffe said while he thinks

salt is necessary to keep people safe on the roads, he has to take extra care to protect the health of his 1-year-old puppy.

"I worry about it a little bit for Halo's sake because, of course, you can crack the skin on their paws," Hinchliffe said. "I think if we'd all have a preference, we'd choose not to have to salt the roads."

The 22-year-old said he has to take Halo outside at least three times a day in the winter, and he spreads a special kind of moisturizer on her paws to help keep them protected from the salt.

"You kind of just have to deal with it," he said. "My dog is my main priority."

Brine and beets

Just a single teaspoon of salt will permanently contaminate a 5-gallon bucket of water, Kuykendall said.

Road salt can wash into rivers and streams, sewer systems and filter through the soil into groundwater. Once it is in water, there isn't much municipalities can do to remove it. Wastewater treatment plants were never designed to remove chloride ions in the water that enters their systems. The only way municipalities could practically treat potable water for chlorides, Kuykendall said, is an expensive and wasteful process called reverse osmosis. The process, which involves pushing water through a semipermeable membrane, typically requires 5 to 50 gallons of water to produce only 1 gallon of water.

"The least costly way to address environmental issues," Kuykendall said, "is not to cause the environmental issue in the first place."

Communities like those in McHenry County, where drinking water

comes from groundwater, are more vulnerable to chloride increases than those like Chicago, which rely on larger, and therefore less easily adulterated bodies of water like Lake Michigan.

McHenry County's department of transportation has moved toward using salt brine, rather than rock salt, on some of its routes. The brine contains chlorides, but in diluted form, and is used along with beet juice, which helps the chlorides stick to the road.

On routes the department treats with brine, Kuykendall said, chloride emissions have gone down by about 38% compared with routes using rock salt.

The Chicago Department of Streets and Sanitation also "will at times use a combination of salt and beet juice to treat snowy and icy roads," said Mimi Simon, a spokesperson for the agency.

According to Nora Beck, a senior planner at the Chicago Metropolitan Agency for Planning, about 20% of communities in northeastern Illinois rely on nonlake sources of drinking water. She said she had not heard any complaints about drinking water from Lake Michigan tasting salty, but that taste was "definitely" a concern for northeastern Illinois groundwater-dependent communities. Salt can be tasted in water when chlorides reach a concentration of about 250 milligrams per liter.

Lake Michigan salt levels

The sheer size of Lake Michigan—where most of northeastern Illinois gets its drinking water—protects it from the highest concentrations of chloride contamination, but chloride levels in the [freshwater lake](#) are rising too.

A December 2021 study from the University of Wisconsin-Madison

found that the lake's chloride levels have risen from about 9 milligrams per liter in 1980 to about 15 milligrams per liter today, primarily due to the use of road salt. Chloride levels in Lake Michigan have been rising steadily since the 19th century, when the lake's chloride levels reached only 2 milligrams per deciliter.

After the Clean Water Act went into effect in 1972, chloride levels in Lake Erie and Lake Ontario got lower. That didn't happen in Lake Michigan.

Rob Mooney, a postdoctoral researcher at UW-Madison who worked on the chloride study, said that although researchers don't have a definitive answer as to why, it could be because Lake Michigan has a much longer water replacement time—the time it takes for the water in each lake to be completely replaced—than Erie and Ontario.

Lake Michigan's water replacement time is about a century, meaning researchers might not be able to see the full effects of the Clean Water Act yet. It's also difficult to track industrial sources of salt, Mooney said, and those sources could be changing from one Great Lake to another.

The lake's chloride numbers are far below the U.S. EPA's toxicity threshold.

But chloride levels in the lake are likely to continue rising in the future, the UW study warns.

In a quirk of geography, most road salt that ends up in the Chicago River does not end up in Lake Michigan. Instead, it flows south into the Mississippi River and eventually lands in the Gulf of Mexico. That's because of the 1900 reversal of the Chicago River away from the lake, a decision made to protect the city's drinking water from waterborne disease.

But because the city's wastewater flows away from its own drinking water, its chloride levels can affect other communities.

And salt that is placed near the lake, such as salt used on Chicago's miles of lakefront paths, almost certainly ends up directly in the lake, Mooney said.

Part of the problem, Kuykendall said, is the tendency to use more salt than is necessary out of an abundance of caution, or a fear of liability should someone slip and fall. That's particularly true of private property owners, Kuykendall said, for whom "there is just no oversight at all." Safety issues are no small concern in Chicago, where people—especially people with disabilities—are often faced with piles of snow and ice as they try to navigate the city's sidewalks in winter.

But Kuykendall and other smart salt advocates are pushing for better education and better salt practices. People should understand, they say, that simply using more salt isn't necessary to make a surface safer.

"It's that perception, that you have to be walking across crunchy salt in order for it to be safe. And that is a huge misconception," said Hammer, the Conservation Foundation director. Very little salt is needed to work, she said. Salt that can be seen sitting on the ground in clumps has been wasted, she added.

Building trends

In 2018, the Chicago Area Waterways System—which includes the Chicago River, the Chicago Sanitary and Ship Canal, the Calumet River and Cal-Sag Channel—and the Lower Des Plaines River became subject to stricter water quality standards.

However, once the November order is approved by the U.S. EPA, it will

relieve the 48 municipalities and agencies from having to meet these stricter standards so long as they continue to show reductions in chloride usage.

They will be required to participate in work groups and make an official plan showing how they will reduce their use of salt in the first six months, including the implementation of a number of specific best practices regarding the storage and cleanup of salt, and the use of technology to best calibrate the amount of salt needed to specific weather conditions. Annual reports must be made public.

Hammer said she doesn't expect to see much change in the first five years of the EPA order. "Every winter is different, so it's really hard to compare one winter to the other in how much salt gets used," she said. "It's going to take some time to build some trends." The order is set to be reevaluated in five-year chunks.

Hammer said in an email that if the petitioners are not able to meet the [chloride](#) requirements at the end of the 15-year period they will "likely" be able to apply for another 15-year variance.

Kuykendall emphasized that people and cities and agencies must get smarter about the ways in which they use road salt.

"Water is necessary for all life. Whether you're in the tundra, or the tropics, or the Midwest, water is necessary for all life. Water is also necessary for all economic development," Kuykendall said. "Nobody's going to invest in homes or businesses if they don't have access to safe, clean, reliable and affordable water."

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