

This is Wisconsin Water News, a production of the University of Wisconsin Sea Grant Program. I'm your host, Marie Zhuikov. Today's episode is:

UW-Milwaukee Researchers Examine Road Salt's Year-Round Impact on Wisconsin Rivers

Winter in Wisconsin is road salt season, as workers try to ensure that roadways are as safe and non-slippery as possible during bouts of snow and ice.

Yet, as public information campaigns like [Wisconsin Salt Wise](#) point out, the application of road salt comes with trade-offs. Salt, or sodium chloride, can harm freshwater ecosystems. According to Salt Wise, "It only takes one teaspoon of salt to pollute five gallons of water to a level that is toxic to native aquatic organisms." Salt can also impact drinking water.

As research currently underway at the University of Wisconsin-Milwaukee is uncovering, increased levels of chloride from road salt can persist in surface waters even in summer—when no salt is being applied—because it appears to be stored in groundwater.

A study titled, "[Mass Discharge of Road Salt via Groundwater to Surface Waters in Southeastern Wisconsin](#)," is investigating two sites in Racine County along the Root River: one is urban, the other rural. Led by Assistant Professor [Charles Paradis](#), this work is being funded by the University of Wisconsin Water Resources Institute in its 2021 through 2023 cycle.

Working with Paradis are graduate student Leah Dechant and several undergraduate students, through UW-Milwaukee's [Support for Undergraduate Research Fellows program](#).

Ultimately, the work that Paradis and his student team are doing can help policy makers determine the best possible decisions when it comes to road salting practices.

Paradis explains.

"Clearly, road salt is good for public safety, but it may not be so good for environmental health, so where's that balance? If we give this information to those who set that policy and practice road salt application, maybe they can do so in way that is best suited to balance public safety and environmental health."

Paradis first became interested in the issue after a 2019 talk given by Cheryl Nenn of [Milwaukee Riverkeeper](#) about her annual Milwaukee river basin quality report. Nenn also pointed Paradis to a report published by the [Southeastern Wisconsin Regional Planning Commission](#). Laura Herrick, a planning commission environmental engineer, had written about road salt in river water and noted elevated chloride concentrations in the Root River during summer.

Paradis recalled the report's findings.

"They proposed the hypothesis that road salt is being stored in the groundwater that is connected to the river, and the groundwater serves as a continuous, long-term source for chloride to enter the river."

The commission's observation needed better testing, and Paradis was eager to provide that. He needed high-frequency samples of chloride and flow measurements at multiple locations along the Root River in the summer. That's where graduate student Dechant and the undergraduates have been a major asset.

Field sampling began in July 2021. From July to September, they collected surface water samples three days per week. Moving into fall, sampling shifted to biweekly using the same locations and procedures.

Half of the samples underwent high-level isotopic and chemical analysis. The other half were subject to benchtop pH and alkalinity low-level testing in the Paradis lab.

For Dylan Childs, a senior geology major from Stoughton and one of the undergraduates who has worked on the project, the process was rewarding.

“I’ve really come to enjoy the scientific method and research in general. This was probably the first research project where I got to go out in the field, and it was a lot of fun having that hands-on experience, as well as going into the lab, too. I felt so much more involved.

“Having this additional research experience as an undergrad has definitely helped me hone in on what I want to do with my future.”

In addition to people power, the research is aided by technology. United States Geological Survey gauging stations are located at the study sites. These stations beam publicly accessible data, including flow data, to the internet. Continuous monitoring devices have also helped; these record temperature, conductivity—which is a proxy for chloride—and depth around the clock.

Through data collected from the USGS gauging stations, the monitoring devices and water samples collected in the field, the team is capturing a richer picture of what’s actually happening in the Root River. Paradis noted that chloride concentrations in the river water have remained relatively constant—even when flow has increased, when one might expect to see dilution as a result. This lends credence to the hypothesis that chloride is being stored in groundwater, providing a continuous source.

While almost a year and half of the project period still remains, Dechant will present the team’s findings so far in a poster session at the 2022 conference for the [Wisconsin Section of the American Water Resources Association](#), which will take place March 10th and 11th.

That’s it for this episode of Wisconsin Water News, just one of the ways that Wisconsin Sea Grant, which is 50 years old this year, promotes the sustainable use of Great Lakes resources through research, education and outreach. Listen and subscribe to us through I-Tunes and Google Play or at seagrant.wisc.edu. Thank you to Charles Paradis and Dylan Childs, and to science communicator Jennifer Smith for the script. And thank you for listening.

If you like Wisconsin Water News, you might like our other podcast about eating Wisconsin fish, called “The Fish Dish.”