Winter 2023

Newsletter

Education ● Events ● Resources

MASTER WELL OWNER NETWORK

A program of the Penn State College of Agricultural Sciences and Cooperative Extension

ENVIRONMENTAL HAZARDS OF ROAD SALT

DID YOU KNOW THAT RUNOFF CONTAINING DE-ICING CHEMICALS CAN DAMAGE OUR RIVERS AND STREAMS?

Road salt and deicing chemicals are very commonly used substances to prevent or eliminate ice that has formed on various surfaces. This practice originated in the 40s and 50s when only about 5,000 tons were spread annually on roads and surfaces. However, in the following decades, road salt usage has grown exponentially, and we now use about 20 million tons of road salt annually, roughly 123 pounds for every American. This exponential increase in road salt has caused various problems for water quality and water-related infrastructure over these past 70 years of usage. The problems are even greater in highly urbanized areas where chloride levels are much higher because of the large amounts of impermeable land cover.

These deicing chemicals work by lowering the freezing point of the ice that is present on the surface. It forms a brine which causes salt crystals, usually sodium chloride, to pull water molecules out of the ice. This brine then dramatically speeds up the melting process as it continues to form over time. The sodium chloride in the applied salt is then dissolved into sodium and chloride ions and then makes its way into the environment, where they can cause many problems.

Chloride poses a significant risk to both surface water and groundwater quality. Surface water contamination of chloride tends to be very seasonal, with highly elevated levels occurring in the winter due to deicing practices. Surface water contamination by road salts can occur rapidly and is usually widespread throughout the country. One study done in 2018 showed that 37% of the drainage area in the contiguous U.S. had experienced an increase in salinity over the last 50 years.

In addition, another 2014 U.S. Geological Survey found that 84% of streams studied had rising salinity levels, and 29% had levels that exceeded government standards. Also, it is important to note that chloride is negatively charged and therefore is repelled by soil particles. This results in chloride not being captured/retained by green infrastructure so rain gardens or other practices will not help to filter out chloride particles. The adverse effects of excessive chloride also significantly affect the wildlife inhabiting a water body.

Chloride is a highly soluble and mobile ion that allows it to spread rapidly throughout a water body once contaminated. It is also toxic to wildlife once it gets above

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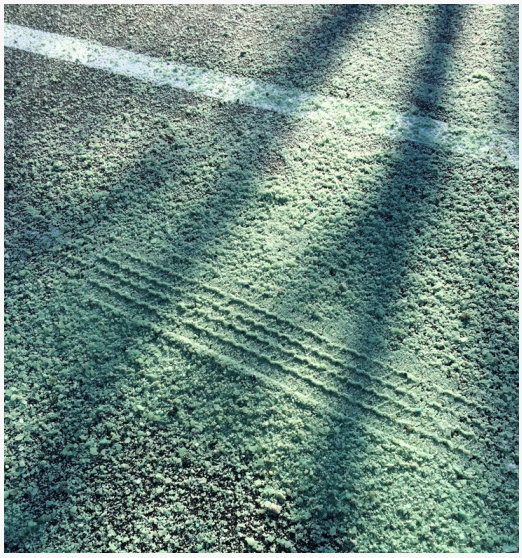
230 mg/L and can be especially persistent because nothing naturally breaks down chloride in the environment. High chloride levels can also inhibit the growth/reproduction of aquatic species, impact food sources, and disrupt amphibian osmoregulation. In addition, high chloride levels can also lead to oxygen depletion. The chloride in the water creates an oxygen-deficient layer in the waterbody that can be detrimental to fish and other aquatic life. A study in New Hampshire showed that from 2008 to 2016, the number of waterbodies impaired due to chloride increased from 19 to 46 in just eight years. This increase in contamination is an alarming trend that we see in New Hampshire and throughout the country.

Road salt can also cause a multitude of issues for homeowners with a private water supply. Excessive chloride levels can accelerate the corrosion of drinking water infrastructure. One study from 2018 evaluated various private water supplies in New York near a road salt storage facility. This study found that rising chloride levels in well water resulted in increased galvanized corrosion of the pipes. In addition, they created a model that found that roughly 25% of the private water supply population in New York could be affected by chloride contamination from road salts.



Road salt thicker than the snow it was supposed to melt by woodleywonderworks is licensed under CC BY 2.0.

As a result of all the problems that excessive road salt can cause, there have been a lot of advancements in environmentally friendlier options/practices compared to traditional salting procedures. One common way to reduce roadway salt dropped is to implement application regulators onto plow vehicles. These regulators can dramatically limit the amount of excess salt dropped, resulting in lower environmental hazards at the benefit of a reduced cost. Another common technique is using liquid salt brine to replace traditional road salt. The brine can be spread more evenly and efficiently and begins to work immediately as it is already a solution. Switching to a liquid brine can reduce the salt being dropped on roadways by as much as 70%. However, the downside of liquid brine is that it is less effective at lower temperatures than traditional road salt. These are just a few of the many advancements in deicing practices as we become more aware of road salt's dangers in our environment.

For more information about traditional road salt alternatives, check out this “friendly deicing” article: https://extension.psu.edu/watershed-friendly-deicing.

Author: Justin Mansberger, Water Resources Educator

Resources

New Hampshire Department of Environmental Services, 2021. Road Salt and Water Quality
Minnesota Pollution Control Agency. 2022. Minnesota Stormwater Manual: Environmental Impacts of Road Salt and Other De-icing Chemicals
Columbia University Climate School, State Of the Planet. 2018. "How Road Salt Harms the Environment"
ACS Publications. 2018. "Impact of Road Salt on Drinking Water Quality and Infrastructure Corrosion in Private Wells"

Farewell: Natalie Marioni

For the last two years, I have been coordinating the new volunteer training and volunteer communications for the Master Well Owner Network program. It has been a joy getting to know our volunteers and learning about what motivates them to teach others about best management practices in private drinking water systems. I've also been able to work with our online course developers and fellow MWON coordinators to make updates to both the MWON volunteer training course and the public-facing Private Wells and Water Systems Management course. Our recent cohort of MWON volunteers were the first two take the course with many updated, interactive components, making the course more engaging.

As we wrap up another wonderful year of MWON programming, I am also wrapping up my time as the MWON Volunteer Coordinator. Last month, I accepted a new position within Penn State Extension and with this new position comes additional responsibilities. Because I will need to focus on these new responsibilities, I'm stepping away from the MWON program to ensure that the MWON volunteers have the focus they deserve. ***Thank you for everything you do as volunteers and as stakeholders for private drinking water systems.***

Cheers,

Natalie

Welcome: Jeremy Leaidicker

Hello MWON volunteers! I am excited to take on the role of Volunteer Coordinator for the Master Well Owner Network. Some of you may have may have met me through my role as the Master Watershed Coordinator in the Endless Mountains. I currently live in Wyoming County with my wife Courtney. Living in NEPA I see many of the challenges well owners face in rural and suburban settings. Volunteers like you make it possible for us to reach that vast audience. Together I hope we can build on the great foundation that Natalie has built for this program. I look forward to working with all of you to bring knowledge and awareness to well owners throughout the Commonwealth.

Happy holidays,

Jeremy

Welcome: Faith Kibuye

Faith Kibuye is an Extension Specialist with the Water Resources Team located at the University Park Campus. Faith holds Bachelor of Science in Environmental Health Science, and a Ph.D. in BioRenewable Systems. Her research focus is on the management of water resources and understanding fate, transport, and treatment of contaminants of emerging concern. In her role she also part of the Master Well Owner Network (MWON) coordination team where she serves as a liaison of current and new research on private drinking water systems.

MWON Welcomes 37 New Volunteers in 2023!

In 2023 we once again hosted two training classes, one in the spring and one this fall, providing our Master Watershed Stewards with an opportunity to expand their knowledge in private drinking water systems. The most recent cohort was the first to take our updated online course, with additional images and graphics supporting the content narrative and enhanced interactive elements to better facilitate participant learning.

We're thrilled to report that 37 new volunteers joined the MWON program in 2023!

The new volunteers are from Allegheny, Berks, Bucks, Centre, Chester, Cumberland, Elk, Erie, Lackawanna, Lancaster, Lebanon, Lehigh, Montgomery, Northampton, Philadelphia, Susquehanna, Washington, Wyoming, and York counties. These new volunteers join a network of 263 active MWON volunteers statewide!

Congratulations to all of our new volunteers!

Resource Highlight: Private Wells and Water Systems Management Course

Wondering how you, too, can get information about the management of private drinking water systems? Take Extension's online, self-paced course. This online course will help you identify the proper location, construction, maintenance, testing and treatment of a water well, spring or cistern.

https://extension.psu.edu/private-wells-and-water-systems-management

SAVE THE DATE: PA Farm Show

Dates
Saturday, January 6 - Saturday, January 13, 2024

Location
Pennsylvania Farm Show Complex & Expo Center
2300 N. Cameron St, Harrisburg, PA 17110

https://www.farmshow.pa.gov/

What is the Master Well Owner Network?

The Penn State Master Well Owner Network (MWON) is a program dedicated to educating PA residents about the proper construction and management of private water systems. This program aims to educate private water system owners and promote better management of private wells, springs, and cisterns throughout the state.

MWON Sponsors

This project is made possible in part by Penn State Extension, the Pennsylvania Department of Environmental Protection and the Pennsylvania Ground Water Association.

Important Websites

Master Well Owner Network
http://extension.psu.edu/water/mwon

Penn State Extension Drinking Water
http://extension.psu.edu/water/drinking-and-residential-water

PA Ground Water Association
http://www.pgwa.org/

National Ground Water Association
http://www.wellowner.org/

Penn State Drinking Water Interpretation Tool
http://dwit.psiee.psu.edu/

Penn State Resources for Well and Spring Owners
https://extension.psu.edu/resources-for-water-well-spring-and-cistern-owners