

Salt Use & Health Impacts

Presentation to the Board of Health
May 7th, 2025

Presenters

Bryan Johnson & Charlie Romines – *City of Madison Engineering and Streets*

Tim Pelton – *Dane County Highway and Transportation*

Joe Grande – *Madison Water Utility*

Allison Madison – *Wisconsin Salt Wise*

Logan Prichard & Chee Thao – *Public Health Madison & Dane County*

Bryan Johnson & Charlie Romines

City of Madison Engineering and Streets



Streets Division & Salting

Winter 2025

Charlie Romines Streets Division Superintendent



Not a New Problem

- All the salt from every salt user down on sidewalks, parking lots, and roads finds its way into our waters
- Enters the storm drains and out into our lakes & infiltrates our drinking water.
- This has been a known problem *for decades.*
 - See this Capital Times article from **1977.**
- We **must** be cautious with salt

City wells fail to meet EPA salt standards

By WHITNEY GOULD
Of The Capital Times Staff

Although the city has cut back drastically on its use of de-icing road salt in recent years, the water in several Madison wells still contains salt concentrations above the level at which the Environmental Protection Agency recommends a warning for the sake of hypertension sufferers, University of Wisconsin researchers have found.

Dan Willard, the environmental studies professor who did the study, thinks the city probably should alert residents whose water comes from the affected wells. But City Health Director Karl Mohr says that would upset people needlessly when there is no real cause for alarm.

Using data collected by the city, Willard, Prince Beach and Tim Diehl traced the rise in sodium and chloride levels in 13 of the city's 27 wells between 1951 and 1975.

The increases, also reflected in the water in our lakes, parallel what until recently was a continuous growth of road salt use dating back to the '50s, Willard concluded. Much of the salt flushed off the streets seeps through soil into ground water which is the source of our drinking water.

The most dramatic jump was in Well No. 4 on North Randall Avenue, where sodium levels rose from three to 25 parts-per-million (ppm) in the 24-year period and chloride escalated from 19 to 55 ppm.

Two other wells of 14 tested had sodium levels above 20 ppm, the level at which the EPA advises a warning for those with high blood pressure, which is linked to the water-retention properties of sodium.

They were Well No. 2 on Vilas Avenue and Well No. 17 on South Hancock Street, according to Willard. Well No. 2 near Lake Wingra showed an increase in sodium from 10 ppm in 1951 to 35 ppm in 1972 and an increase in chloride of 3 ppm in 1951 to 23 ppm in 1975.

(The wells throughout the city are all interconnected. But in most cases, people living in a given area are getting their water from the nearest well, according to Water Utility officials.)

The elevated salt levels are well
(Continued on Page 4, Col. 3)

MADISON, WIS., Monday, June 27, 1977

City wells rather salty

(Continued on Page 4, Col. 3)

within the 250 ppm safety limit set by the U.S. Public Health Service for drinking water, and Willard stresses there is "no cause for alarm."

But he thinks it might be a good idea for the city to include a note in the water bills of people whose water supply comes from the affected wells, to alert those on low-salt diets.

"It probably should be something more than the warnings on cigarette packages, which nobody pays any attention to, and something less than 'Everybody should get out of town,'" he said.

But Mohr said he saw no need for such a notice. "I hate to do something like that unless it's absolutely necessary," he said. "In many cases you just alarm people for no reason. And in most instances where people have been diagnosed as hypertensive, their physicians are taking these things into account" in recommending limits on salt intake.

City Water Utility Manager Larry Russell agrees with Mohr. "Any kind of a general warning would be more of a scare than anything else," he says, noting, however, that at one point the city did send out a note to dieticians advising them of the rise in salt levels.

At the current levels, a person would have to consume huge quantities of water to be affected by the salt content, Russell said, and short of drinking distilled water, there's not much that anybody can do about the situation.

But Russell added that the city is watching the salt figures as indicators of ground water quality.

In the meantime, warns Russell, a larger health hazard for some people is softened drinking water, which contains salt concentrations as high as 100 ppm.

In most cases, the cold water coming out of a home faucet is not softened. But city inspectors, according to Russell, occasionally come upon a home where a water softener has been attached directly to the incoming water line, thus adding softening salts to the drinking water as well as that used for washing.

"It's not a large problem," he said, "but there probably are some people who are drinking softened water and don't know it."

Willard expects salt concentrations in the wells to decline in the next few years, to reflect reductions in the use of road salt. But it won't happen right away, he said, because ground water moves very slowly.

In the winter of 1972-73, the city dumped some 5,001 tons of de-icing salt on its streets, according to streets supervisor Lloyd Sarbacher. Concern about salt contamination prompted the City Council to order a program of gradual reduction. And by last winter, salt use had been cut back to 1,519 tons — a drop of 73 per cent.

"A rare example of protective legislation in time," Willard said of the salt cutbacks.

The Salt Problem Isn't Just a Madison Problem

The Washington Post

Scientists have found a 'sleeping giant' of environmental problems: Earth is getting saltier

Salt used to de-ice roads is the single biggest source of salt in the U.S.

October 31, 2023

milwaukee journal sentinel Jan. 14, 2025

Wisconsin waters have a road salt problem. Here's what to know, and how to help.

MISSOURI

FOX 2 now

Road salt runoff creates environmental harm to wildlife

Jan 14, 2025



Jun. 26, 2024

Road salt runoff causes increased chloride levels in Lake Champlain



Kitchener-Waterloo

Nov 26, 2023

Reducing road salt use 'not something that can wait' as Ontario lakes see oxygen depletion, researcher says

Waterloo region's salt philosophy is 'applying the right amount in the right area,' manager says



January 25, 2023

Salt makes icy roads less dicey, but it poisons the land. Here's what Kansas is doing about it

Chicago Tribune

March 18, 2021

Salt may be a savior for roads, but it imperils Chicago-area water and wildlife. Some communities and agencies are working to change that.

9NEWS

December 29, 2014

Study: Road salt polluting Denver's Cherry Creek

Detroit Free Press

April 13, 2017

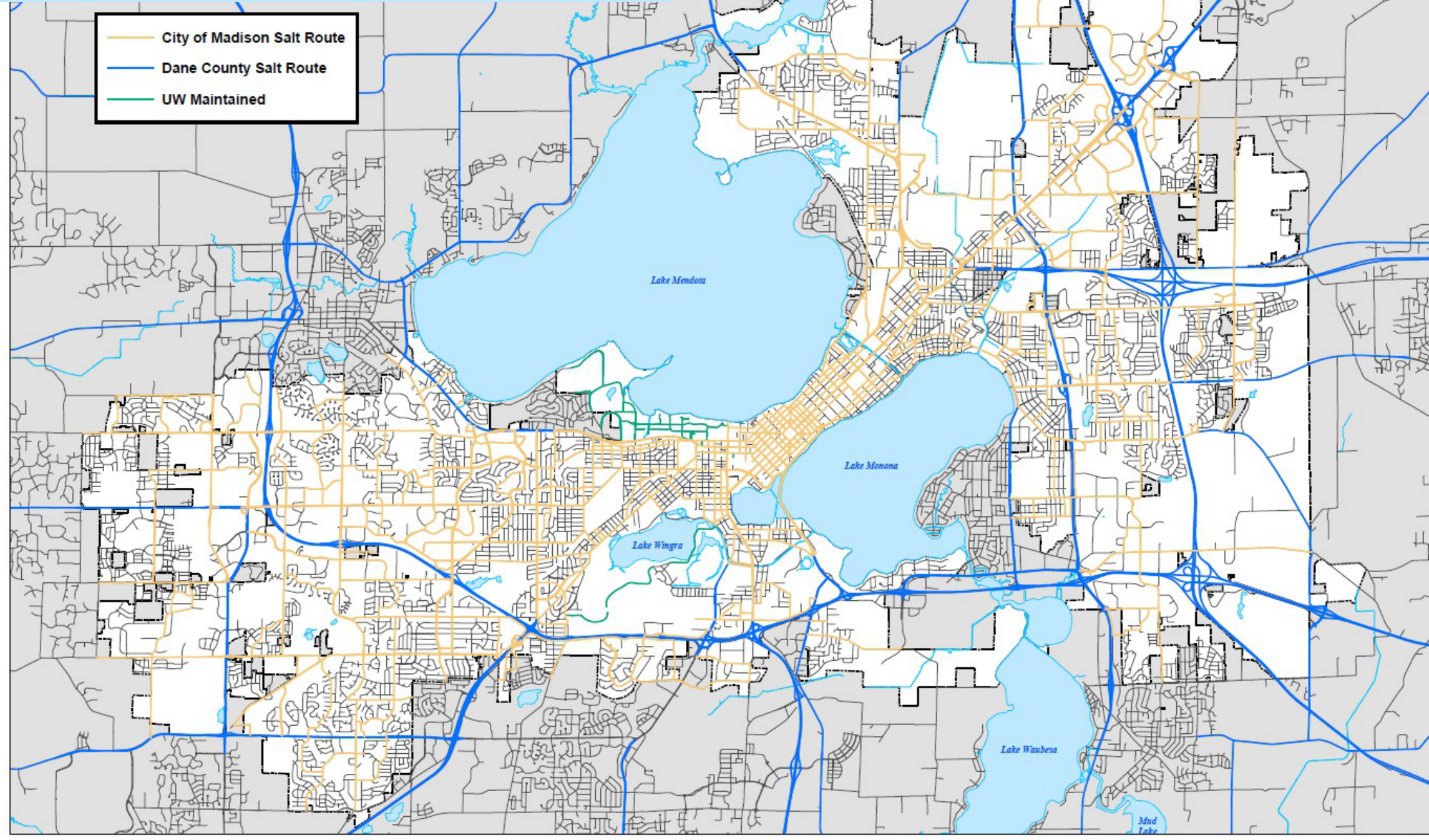
Michigan lakes are getting saltier; road salt to blame

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

91.3 wyso January 31, 2024

Road salt use has doubled in the U.S., and it's polluting water. How Ohio is trying to prevent that.

City of Madison is not the only salt applicator in the area



Dane County
Highway

University

Private lots &
roads

Other
municipalities

How does the Streets Division use salt on the roads?



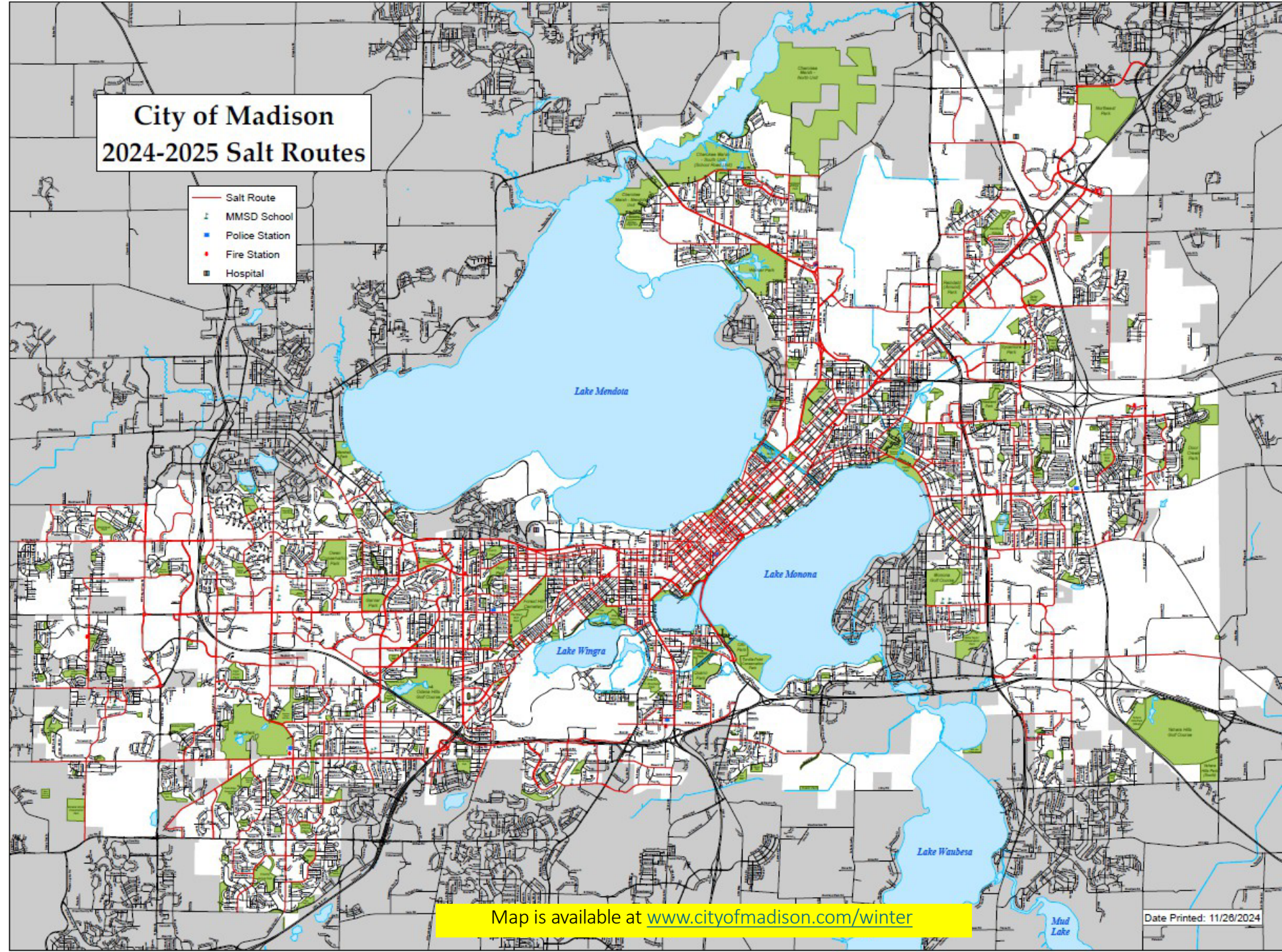
Salt spread on salt routes only.

Salt applied at rates appropriate for weather conditions.

782 miles of traffic lanes that make up the main thoroughfares.

32 individual trucks cover these routes. Each truck takes roughly 3 hours to complete 1 lap through route under best case conditions.

Used by Metro Buses, near schools, near emergency services (hospitals, fire stations, etc.)



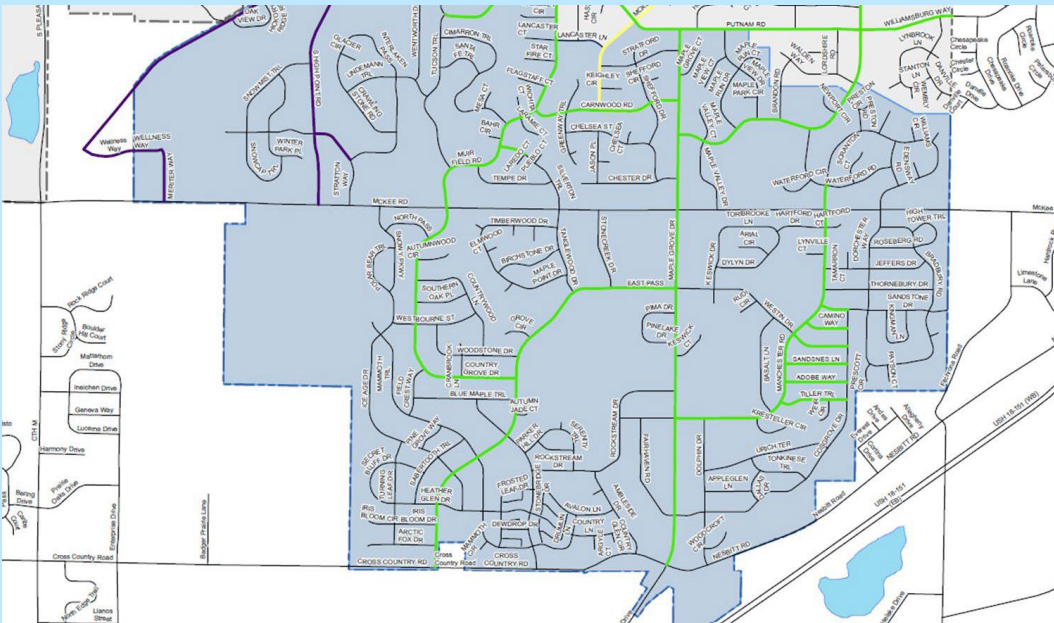


How does the Streets Division Control Salt Use

Pre-treat brining when conditions allow



Route Evaluations & Reductions



Equipment Calibration



How the
Streets
Division
Controls
Salt Use



Salt Applicator Trainings



Improved Salt Use Tracking

Still Learning and Improving



Piloting new style of plow blade that may conform with the road surface better



Vaisala GroundCast monitors to help get more accurate pavement temperatures

What Salt Routes Look Like (Eventually)

Salt, time, temperature, and traffic combine to help make roads free from snow (mostly).

This is Olin Ave between S. Park Street and John Nolen Drive.



When it's it's too cold to salt.

This is Colony Drive between Inner and Gammon. It's part of the salt route for John Muir Elementary. Sand used for traction since temperatures were below 20 degrees.



This is a plowed residential street.



Magnesium Chloride (New for 2024-2025)



Average Tons of Salt Used by the Streets Division from
Winter of 2018-19 to Winter of 2023-24:
8,199.88 tons





www.cityofmadison.com/Winter

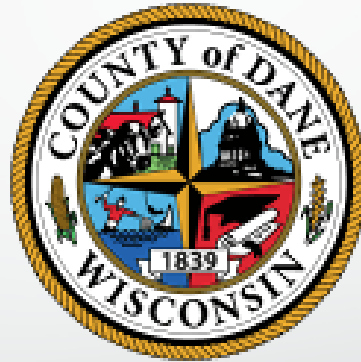
streets@cityofmadison.com

Tom Pelton



Dane County Highway and Transportation

Dane County Highway and Transportation



Tim Pelton

Deputy Highway Commissioner –
Operations

Dane County Highway is responsible for maintaining State and County highways

- 1,100 County lane miles
- 1,500 State lane miles
- 415 County and State bridges within our County.
Bridges tend to freeze up before roadways.



Average tons of salt Dane County used between the winters of
2020/2021 to 2024/2025:

25,245

All materials are stored in covered buildings





- As of 2024, Highway has 22 tanks throughout the county with a storage capacity of 191,400 gallons of brine
- The tanks are 8700 gallon double walled tanks
- In 2020/2021: 392,920 gallons of brine were used
- In 2024/2025: 898,395 were used on State and County roadways for pre-wetting of material and anti-icing

Dane County Highway uses different types of equipment for brine. All the plow trucks have pre-wet capabilities and the material and brine functions are calibrated yearly.

Anti-Icing tanker



Direct liquid or anti-icing truck



Newer equipment ordered for winter maintenance

- Y shoots for better placement of material, enhanced capacity of brine and less hopper room for material
- Six (6) additional 1300 gallon direct liquid trucks
- Two (2) 4000 gallon liquid tank trucks
- Twelve (12) tandem axle trucks with 500 gal brine tanks
- One (1) 6500 gallon tanker



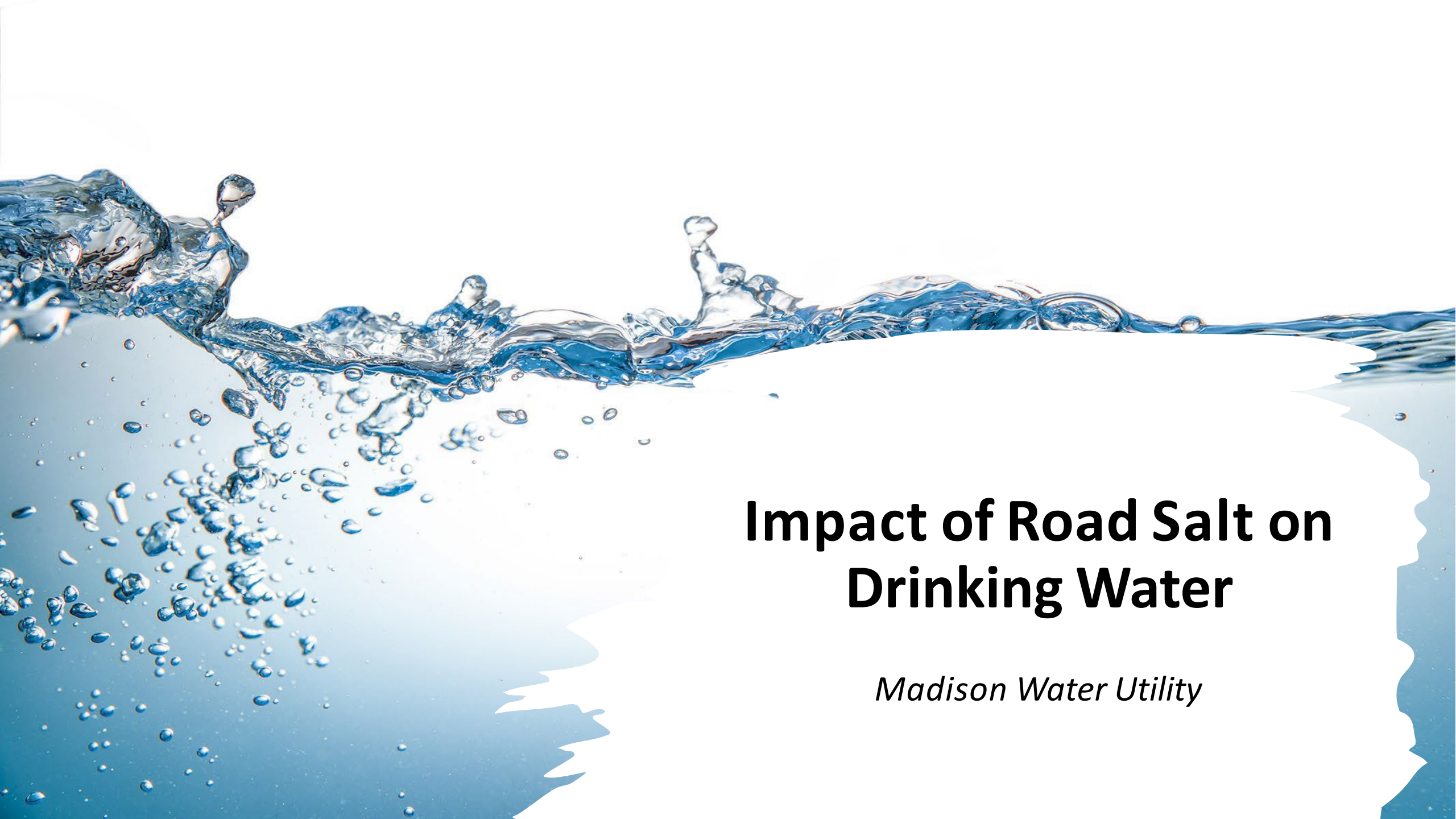
Challenges

- **Balancing environmental concerns with traveling public safety**
- **Motorists need to reduce speed in winter conditions**
- **Expectations for dry and clear roadways**



Joe Grande

Madison Water Utility



Impact of Road Salt on Drinking Water

Madison Water Utility

Rock Salt = Sodium + Chloride



- Crystalline Solid
- Highly Soluble in Water
- Lowers the Freezing Point
- Low Cost



Drinking Water Standards:

Maximum Contaminant Level (MCL)

Primary MCL

- Legally **enforceable** standard that applies to public water systems (PWS)
- **Protect public health**
- Examples
 - Arsenic
 - Mercury
 - Nitrate

Secondary MCL

- **Non-mandatory** water quality standards; non-enforceable
- Assist PWS to manage drinking water for **aesthetic concerns**: taste, color, and odor
- Examples
 - **Chloride**
 - Iron
 - Zinc

What about Sodium?

- There is neither a primary nor a secondary standard
- **Drinking Water Advisory**: reduce sodium in drinking water to between 30 and 60 mg/L based on esthetic effects (i.e., taste)
- EPA Guidance Level: 20 mg/L

“This value was developed for those individuals restricted to a total sodium intake of 500 mg/day and should not be extrapolated to the entire population”

Rock Salt – Improves Public Safety ... or for Convenience?



... and at What Cost?

Road Salt & The Water Cycle



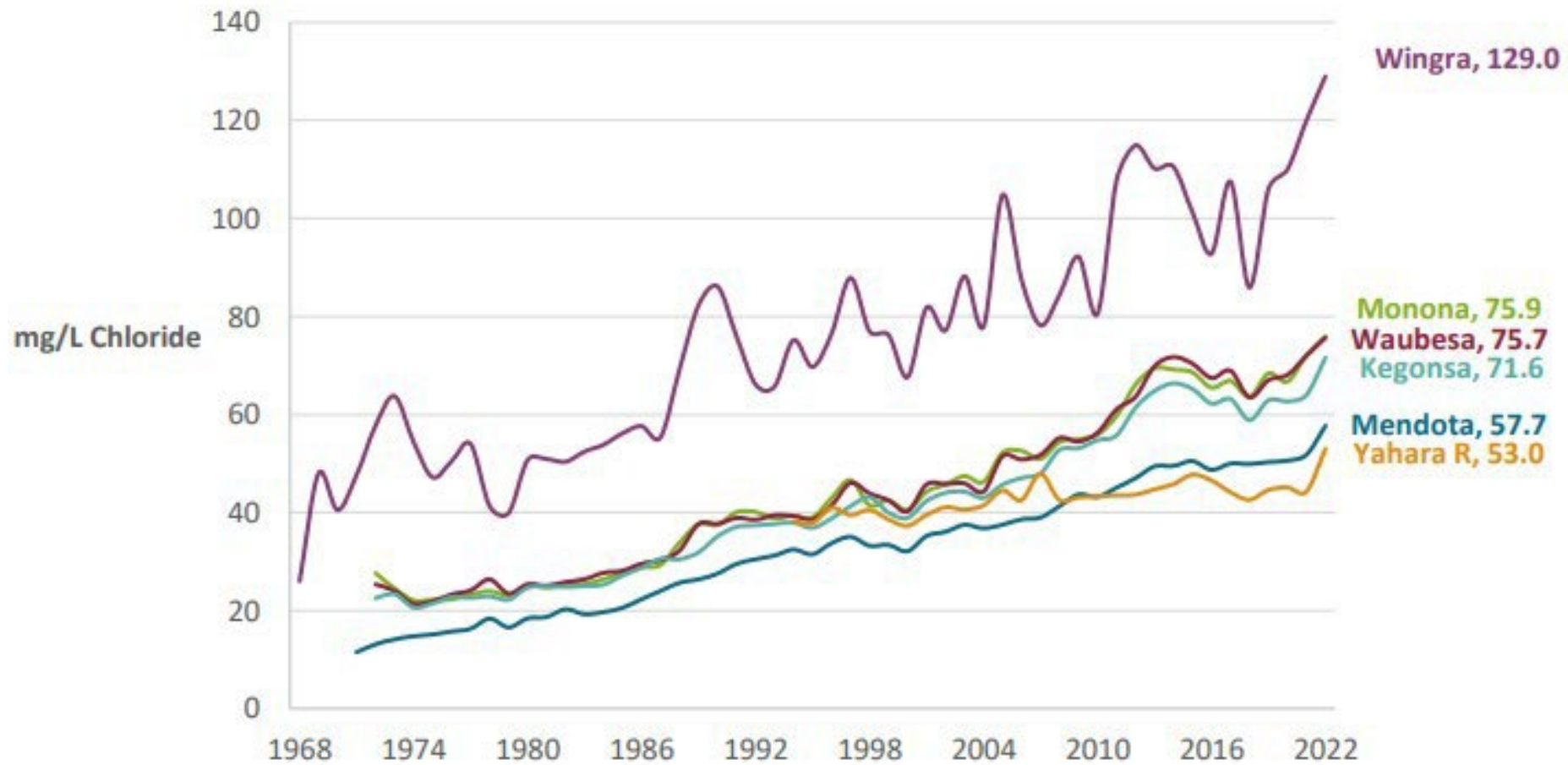
Area lakes and groundwater show **rising** sodium and chloride levels

Chloride levels at some City wells have **tripled** over the last 20 years

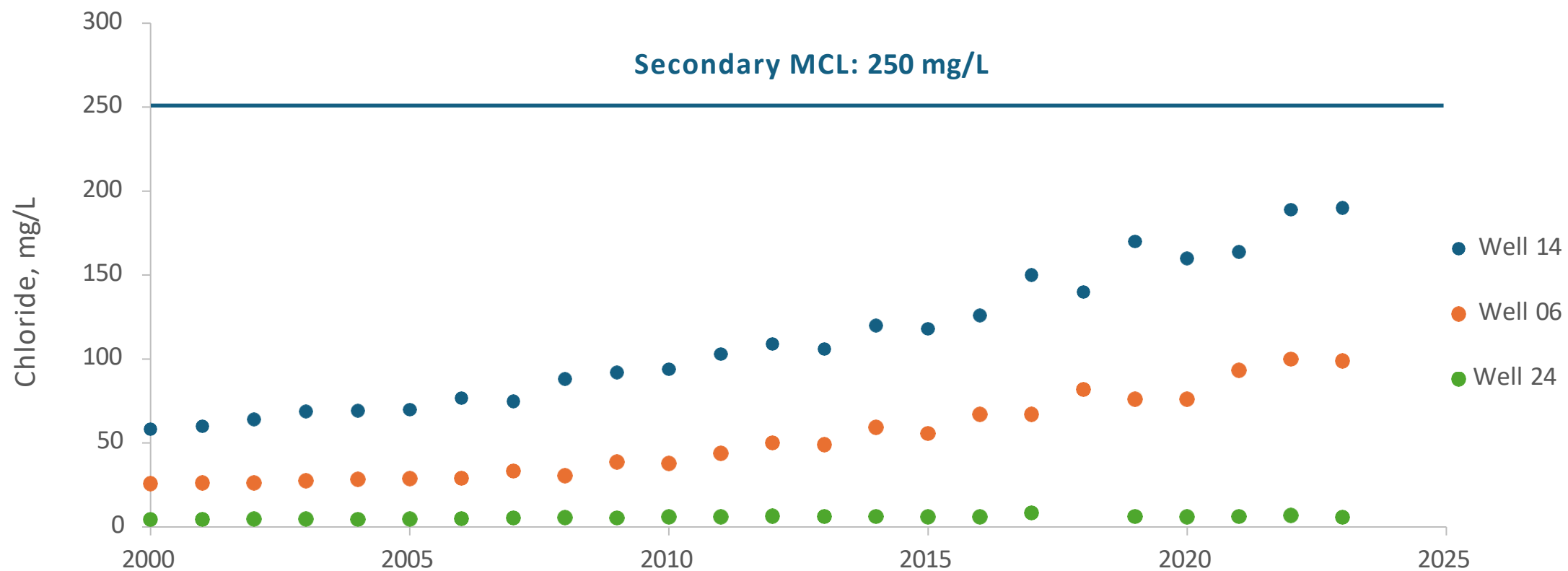
Deep aquifer wells are **less vulnerable** but show signs of impact

Chloride in Madison-Area Lakes

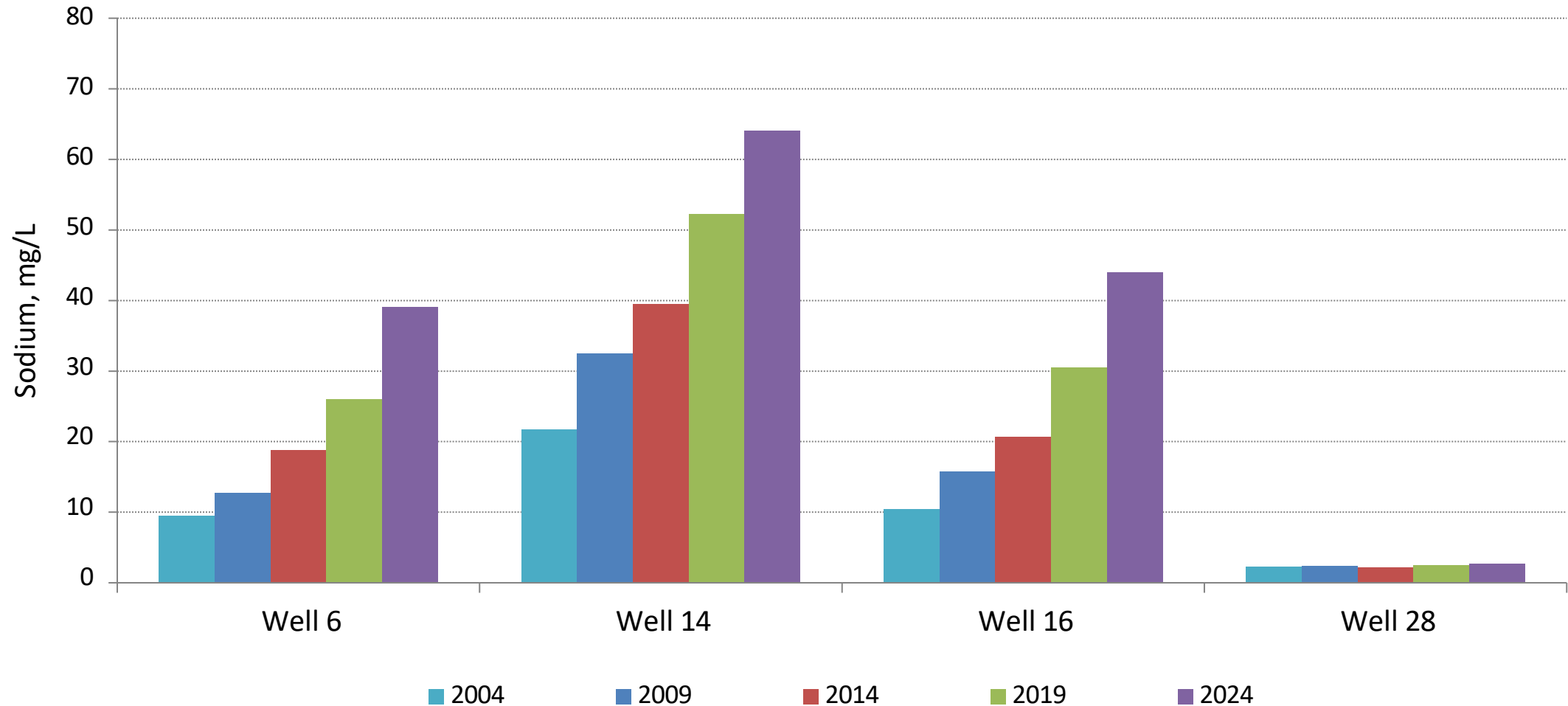
Source: Road Salt Report 2022



Chloride in Select Madison Wells



Sodium in Select Madison Wells



Water Treatment Options



Source: Li et al., 2022. *Science of the Total Environment*. Volume 821

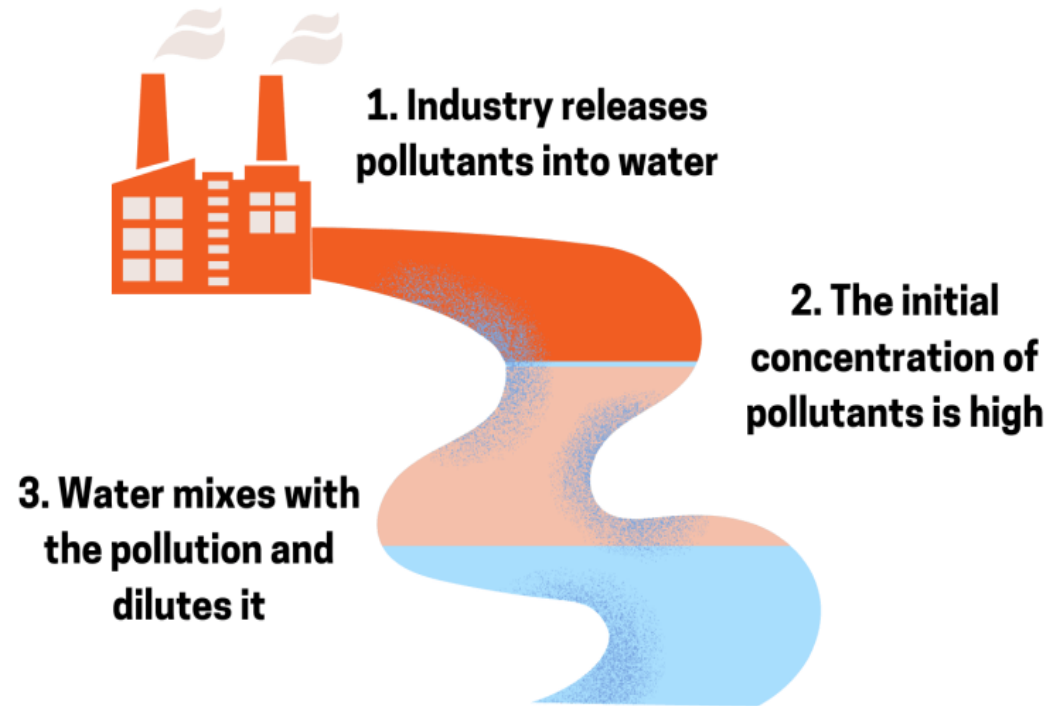
Dilution – Infiltrate Clean Water
Well Modification / Rehabilitation
Membranes – Reverse Osmosis

- Large Building Footprint
- Energy Intensive
- Expensive to Build & Operate

New Source Development

Solution: Dilution or Prevention

DILUTION IS THE SOLUTION TO POLLUTION: THE CONCEPT



Source: pollutioneducation.com

*A better (or the best) solution is to
keep contaminants out of the water
in the first place.*

Questions?

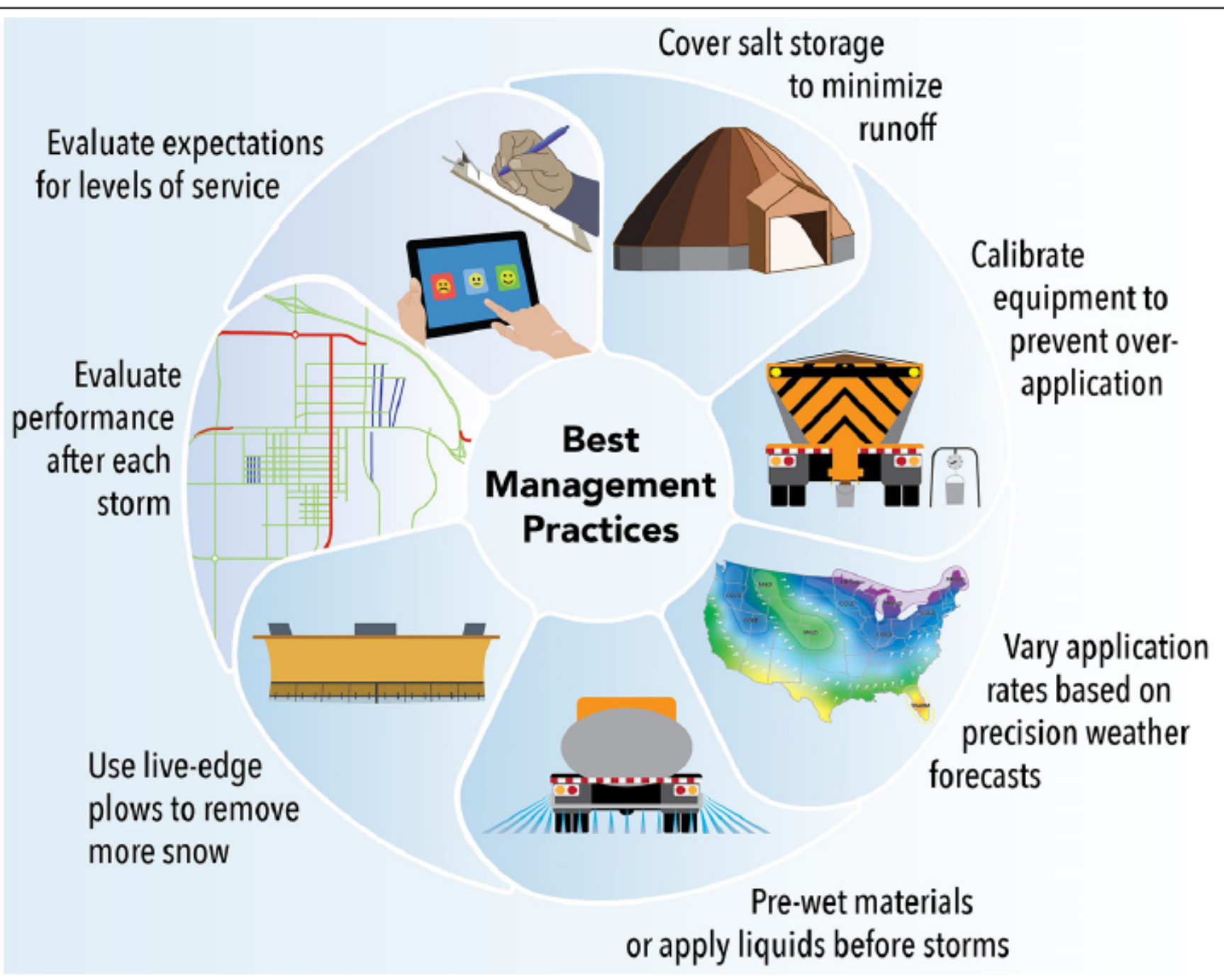


www.madisonwater.org/water-quality

(608)-266-4654

Allison Madison

Wisconsin Salt Wise



- Training workshops
- Open houses
- Monthly webinars
- E-newsletter
- Facebook, Instagram
- Local collaborations
- State-level advocacy

Allison Madison

wisaltwise@gmail.com

Is road salt prohibited or permitted? – Explanation with examples and tips

★★★★★ (12 reviews) • 07.04.2025 • Editorial team at fachanwalt.de

ADMINISTRATIVE LAW

Road salt is prohibited – a statement that has different meanings in different regions, as regulations prohibiting road salt vary considerably between federal states. The use of road salt to combat ice and snow is a topic characterized by both environmental and safety concerns. Generally, the use of road salt is prohibited for private households, with restrictions. This is primarily due to the high environmental impact associated with its use.

Road salt: effects, use and consequences

Road salt, also known as **sodium chloride**, is widely used to combat snow and ice. It **lowers the freezing point of water**, causing ice and snow to thaw. In Germany, road salt is common both in private households and on public roads. However, its use causes **environmental damage**, as it can **penetrate the soil and groundwater, causing harmful effects**. Road salt can also **corrode** infrastructure such as vehicles, bridges, and roads.

Due to these negative effects, there are different regulations regarding the use of road salt in different federal states, with some regions **restricting or prohibiting its use**, while others continue to allow it to ensure **road safety**.

Road salt allowed or prohibited?

The use of road salt **varies depending on the application and location**, with **private use** on sidewalks and driveways **restricted or prohibited** in many German cities to reduce environmental damage. The first bans in the private sector came into force in the **1980s**, as the **environmental impacts** became increasingly recognized, and led to the development of **individual municipal regulations**.



About the author

[Editorial team Fachanwalt.de](#) →



Table of contents

Road salt: effects, use and consequences

> Road salt allowed or prohibited?

In which federal states is road salt prohibited?

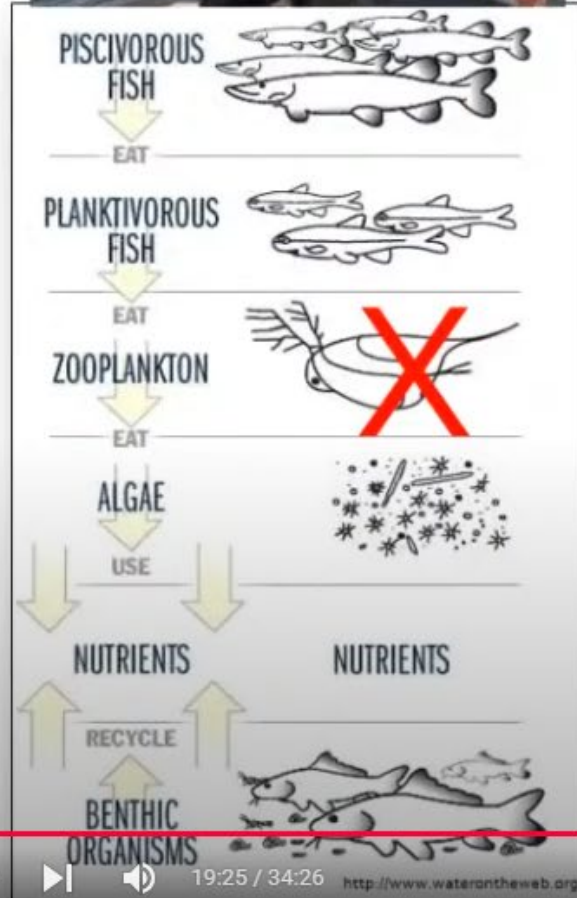
> Examples (as of 2023)

What penalties are threatened?

> Examples from case law

> How can a specialist lawyer help?

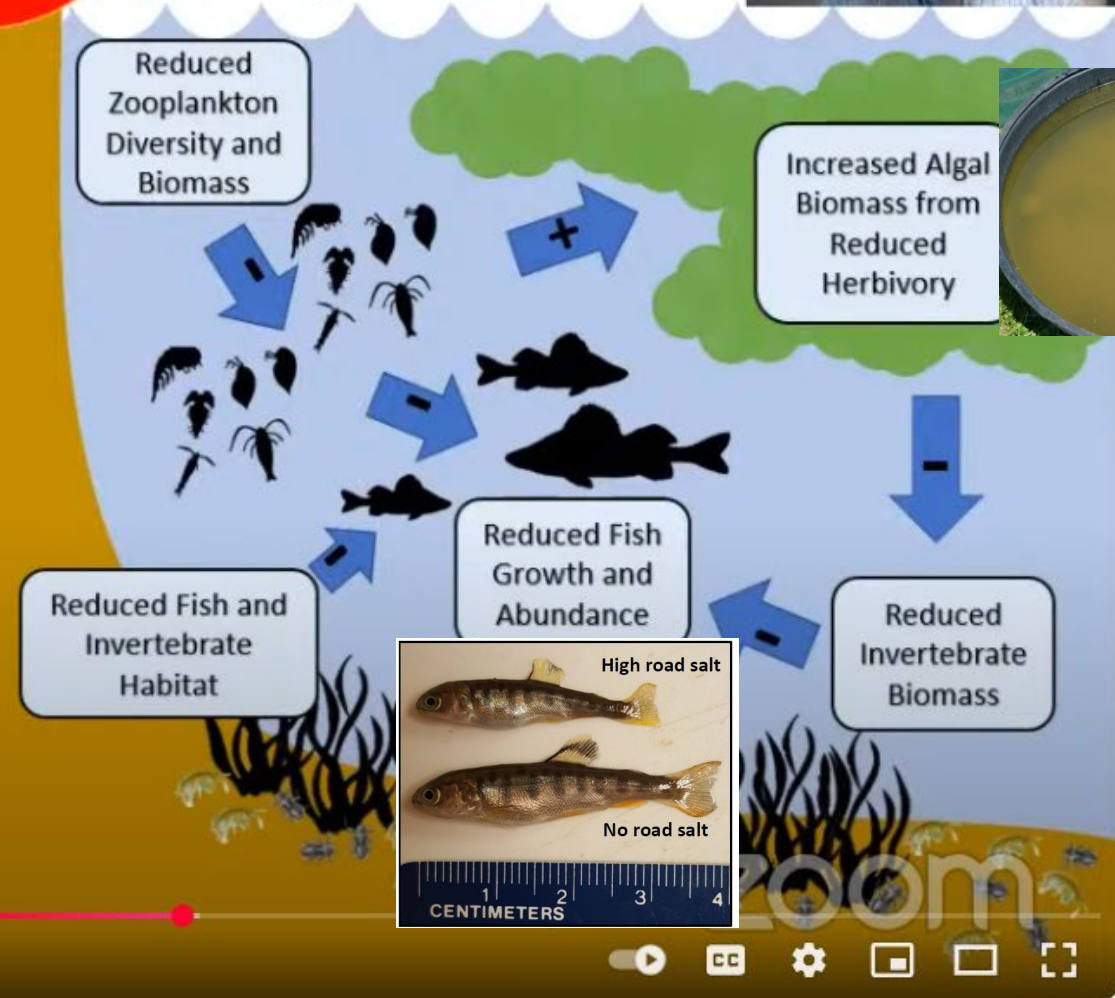
Alternatives to road salt



Salt
Pollution

Putting together the
impacts on lake f

Bill, University ...



Ecological Consequences of Salting our Freshwater

Bill Hintz, University of Toledo



WI Salt Wise
333 subscribers

Analytics

Edit video

15



Share

Promote

Download

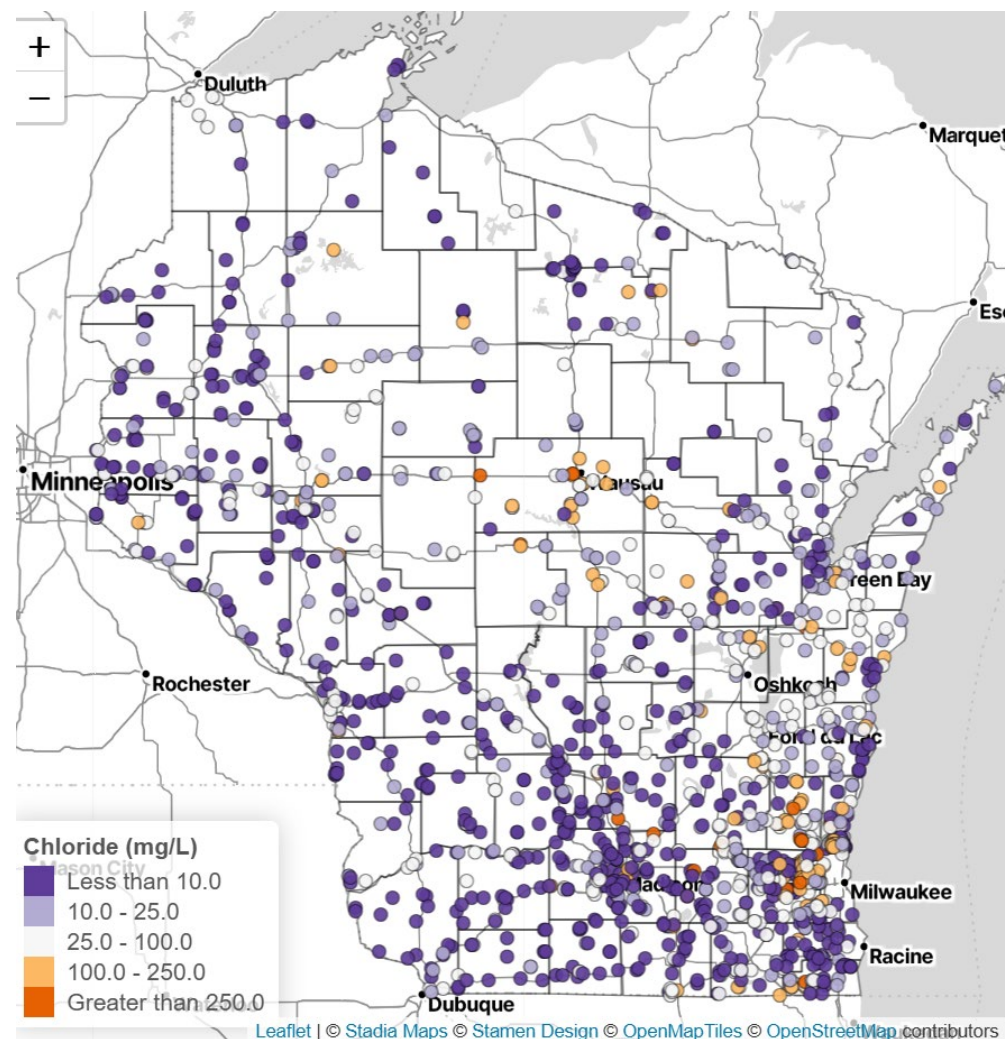
Clip



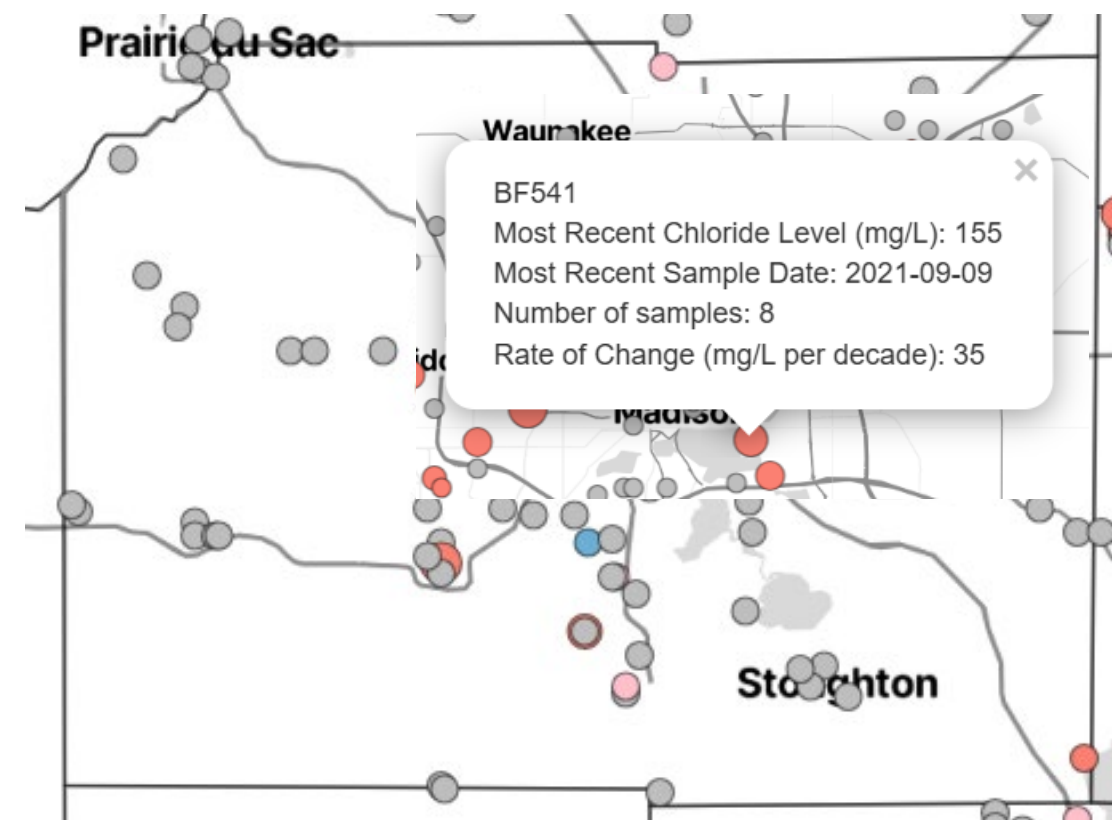
424 views Streamed 1 year ago

Chloride in Public Drinking Water Wells

Concentrations



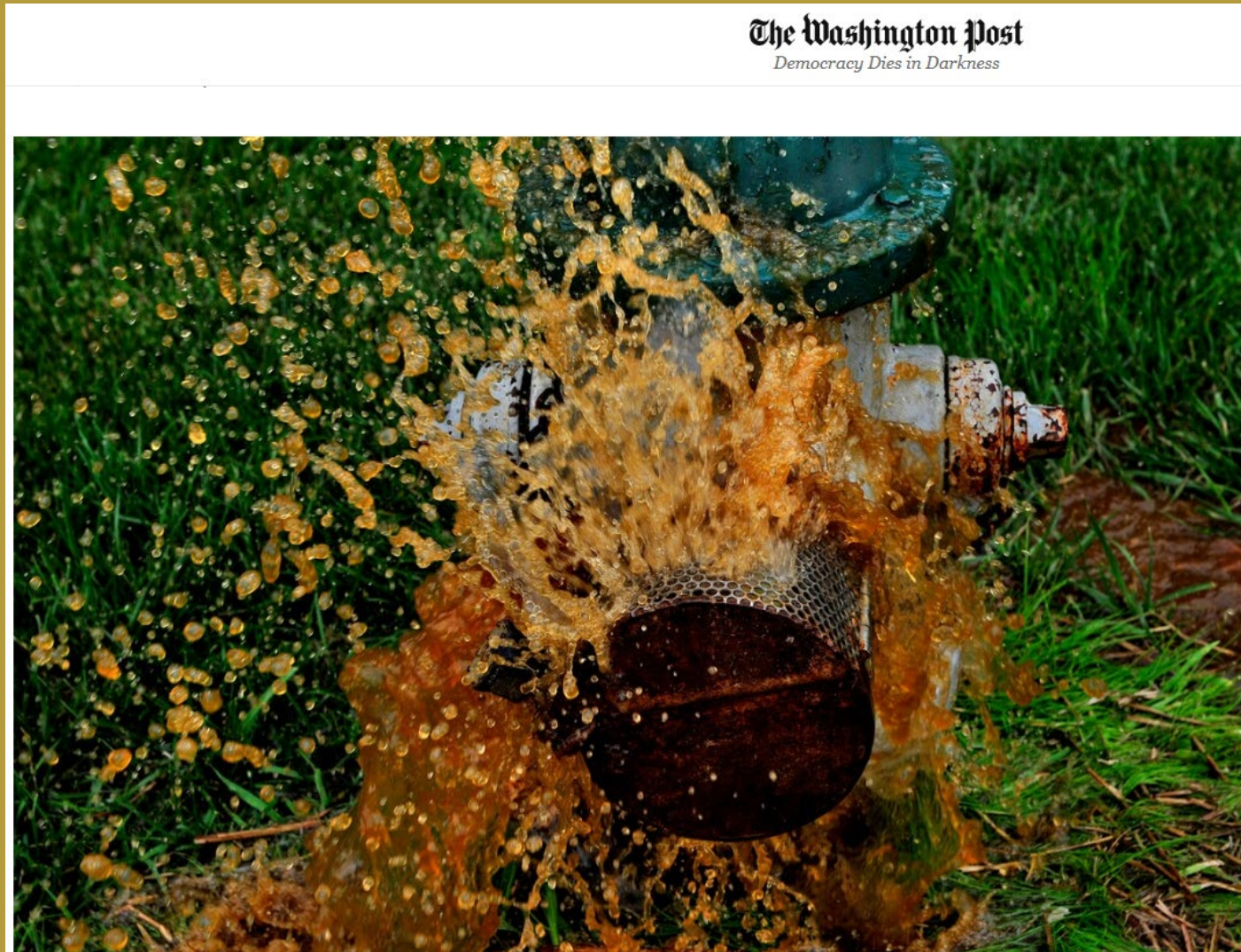
Trends



Chemical cocktail formation and soil salinization



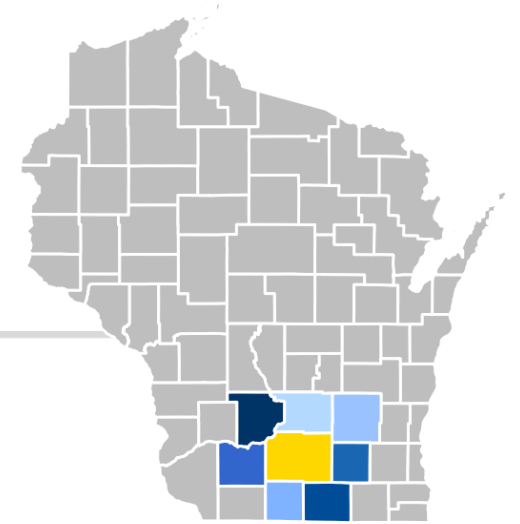
Sujay Kaushal,
University of Maryland



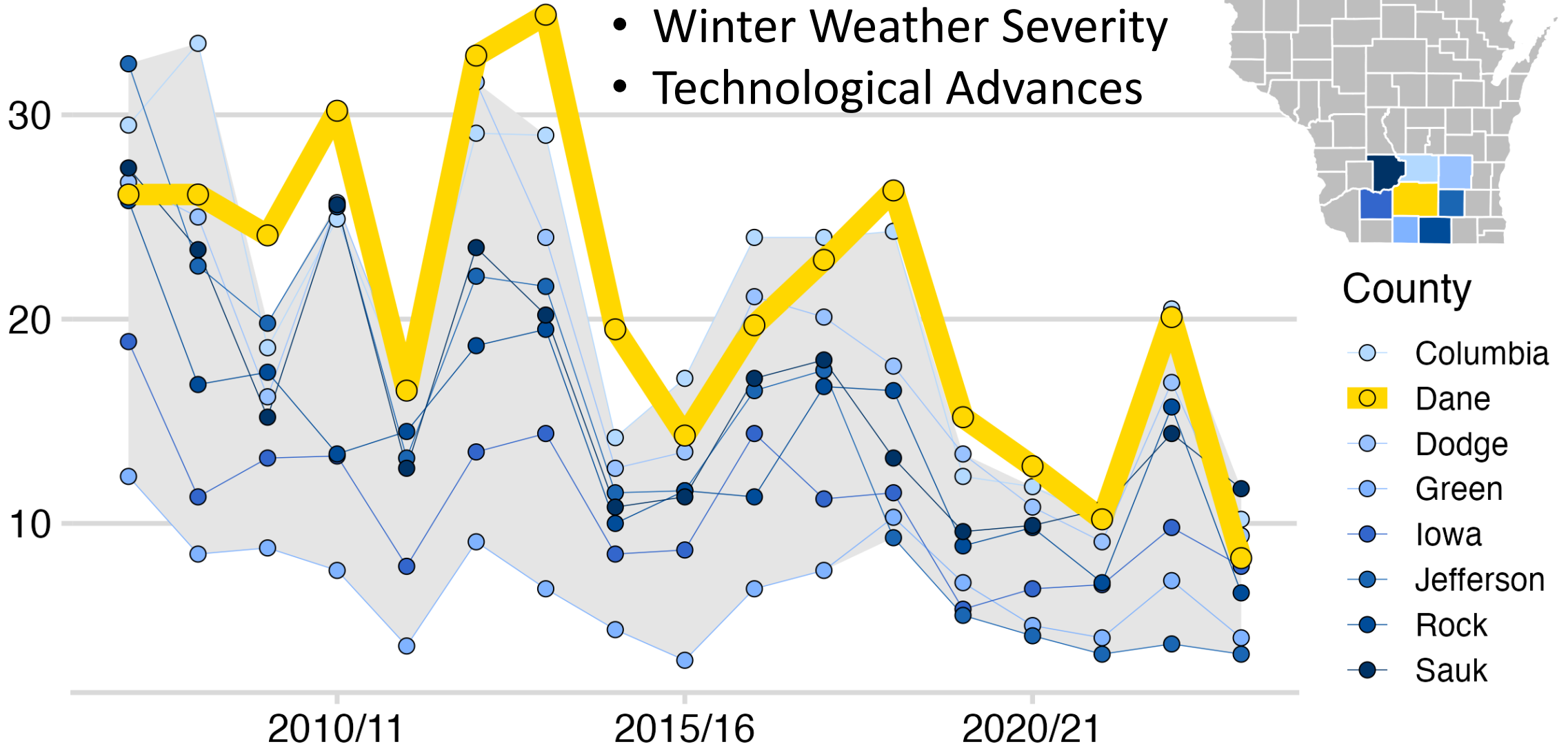
Brown water pours from an opened hydrant on Wednesday in Potomac, Md. Montgomery County residents have been making reports about it since March. Officials blame salt and manganese. (Michael S. Williamson/The Washington Post)

Wisconsin County Salt Use

tons per lane mile



- Winter Weather Severity
- Technological Advances

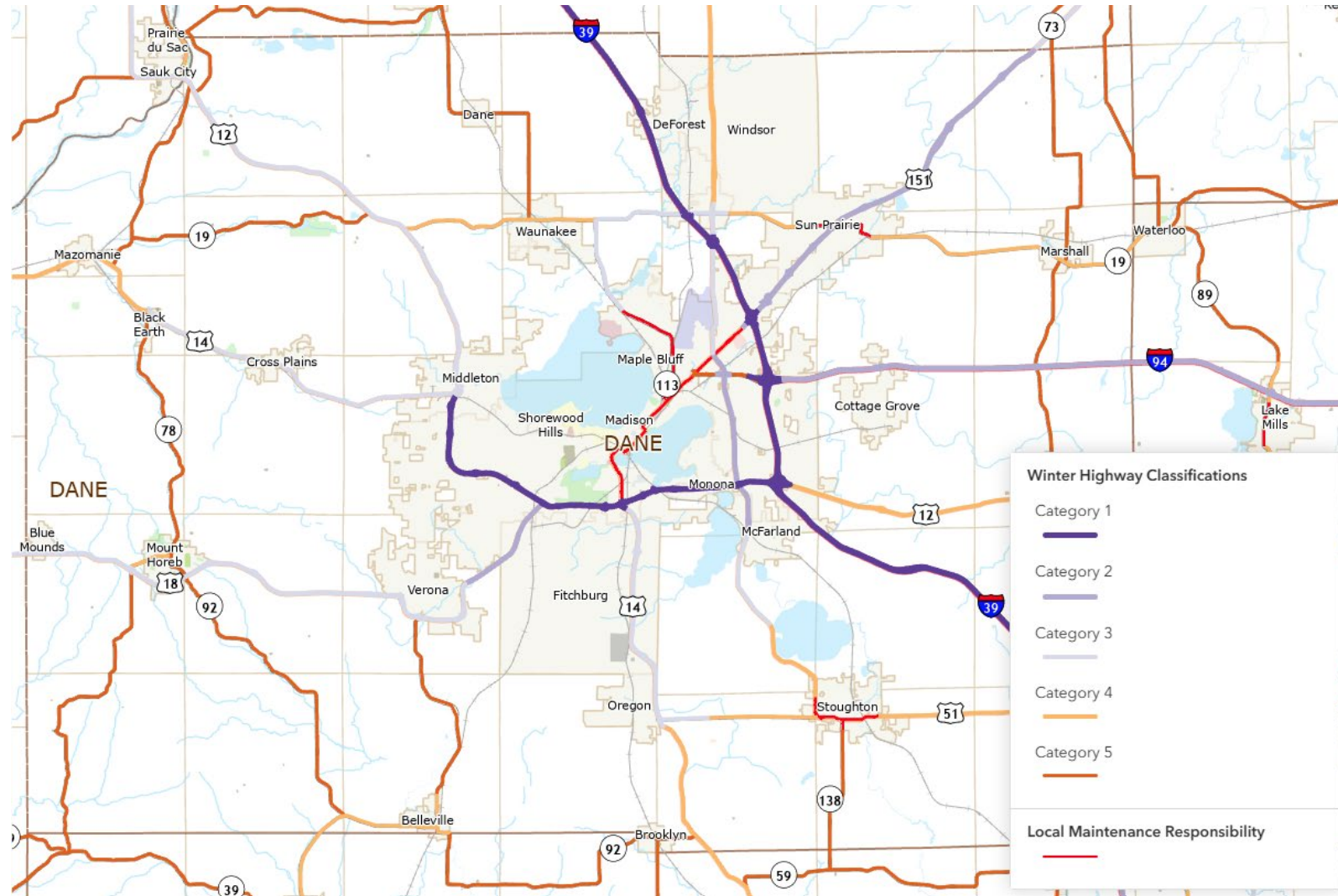


Data from WISDOT, graphic by Hilary Dugan

WisDOT Level of Service Categories

Category 2

- Strive for “passable roadway” conditions during the storm
- Plowing is the first priority for snow removable
- Only enough de-icing agents to keep the total accumulation workable, minimizing bonding
- Considered inappropriate to attempt to melt the snow as fast as it hits the ground or keep the highway wet



Next Steps

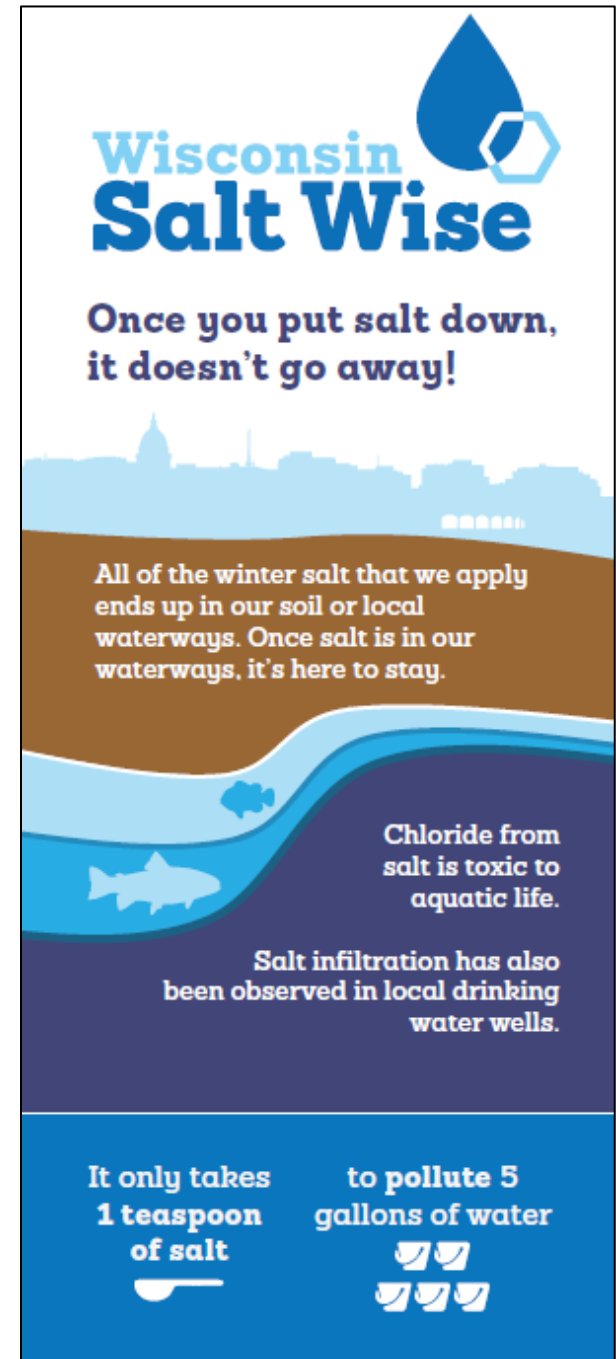
– EASY collaborations

- Join a Wednesday Webinar
- Sign up for our quarterly newsletter
- Support public education/awareness
 - Winter Salt Week 2026
 - Like us and share posts on social media
- wisaltwise@gmail.com



– Local solutions

- Promote municipal LOS policies and sidewalk ordinances that reinforce sensible salting
- Encourage regional collaborations around policies/norms



Logan Prichard & Chee Thao

Public Health Madison and Dane County

Health Impacts of Road Salt

Chee Thao

Logan Prichard

May 2025



Health impacts

- Human health risks from road salt are minimal
- There are no health-based standards for sodium or chloride in drinking water
- DHS recommends 20 ppm or less of sodium in drinking water for people on a low salt diet



Health impacts

- Aesthetic recommendation of 30-60 ppm for sodium
 - For taste
 - From 1997-2017, sodium has increased on average from 6.7 to 12.8 ppm (median 8.2 ppm, maximum 46.0 ppm)
- Aesthetic recommendation of 250 ppm or less for chloride
 - For taste, color or odor

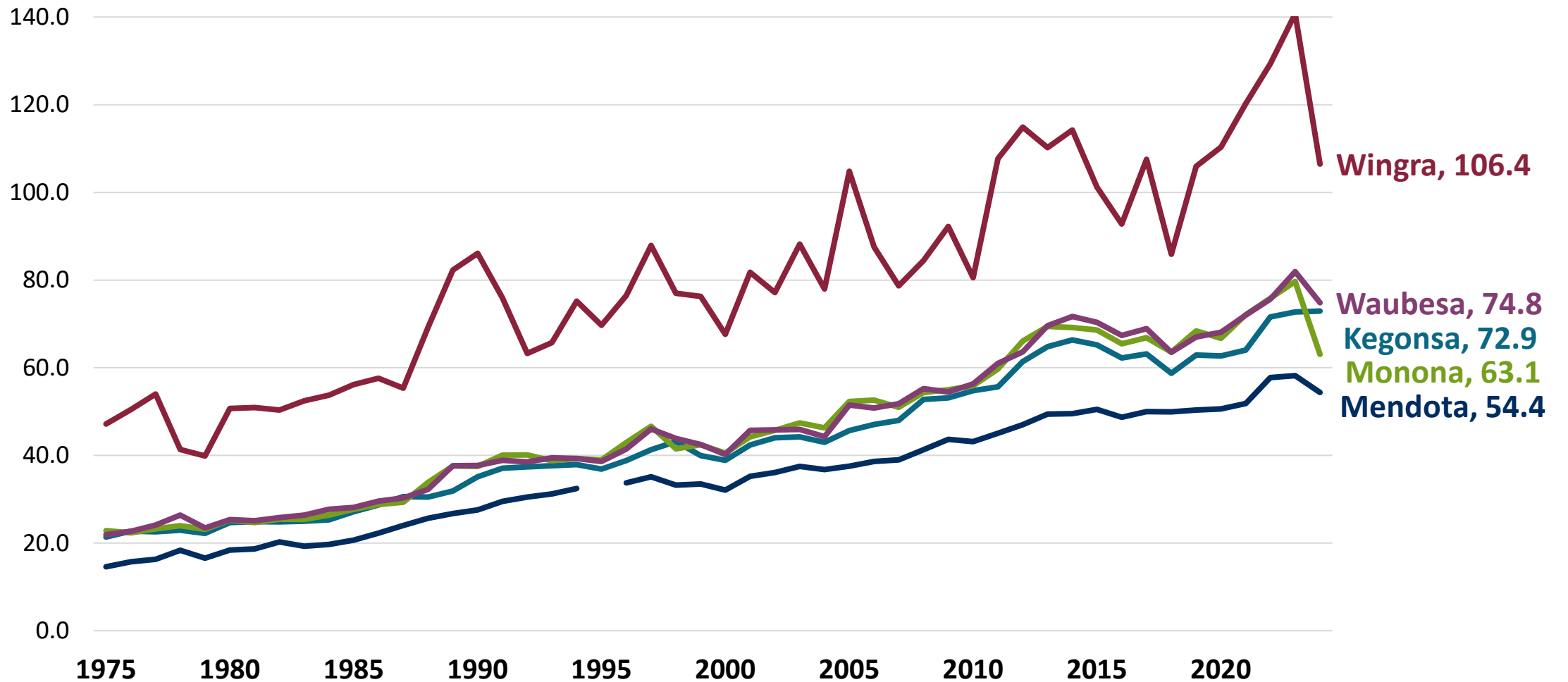


Public Health Intersections

- We collect monthly samples from lakes and outfalls for chloride concentrations
- Public health Lab analyzes the samples
- Data is publicly available for use on [chloride data dashboard](#)



Chloride Dashboard



Key takeaways

- Legacy issue that if continued may present issues long term but currently, road salt presents minimal risks to the general public health
- Individual actions will help reduce future impacts





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