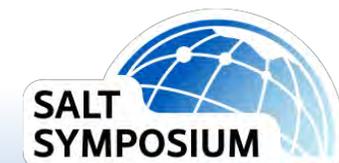




Brooke Asleson
Minnesota Pollution
Control Agency

Morning Speaker August 2

MPCA Smart Salting Tool





MPCA Smart Salting Tool



Brooke Asleson | MPCA Chloride Program Administrator

Why is salt a problem?

EPA criteria

230 mg/L
860 mg/L

Canada criteria
120 mg/L

Permanent
Pollutant

Disrupts
Lake
Mixing

Freshwater
Salinization
Syndrome

Contaminates
Groundwater

Chloride Sensitive species in MN

Macroinvertebrates

- Dragonfly larvae
- Mayflies
- Amphipods (side-swimmers)

Fish

- Least darter
- Pugnose shiner
- Walleye
- Northern pike

Plants

- Canada Bluejoint
- Lake Sedge
- Spike Rush
- Bulrush

Amphibians

- Wood frogs
- Tiger salamander
- Eastern newt

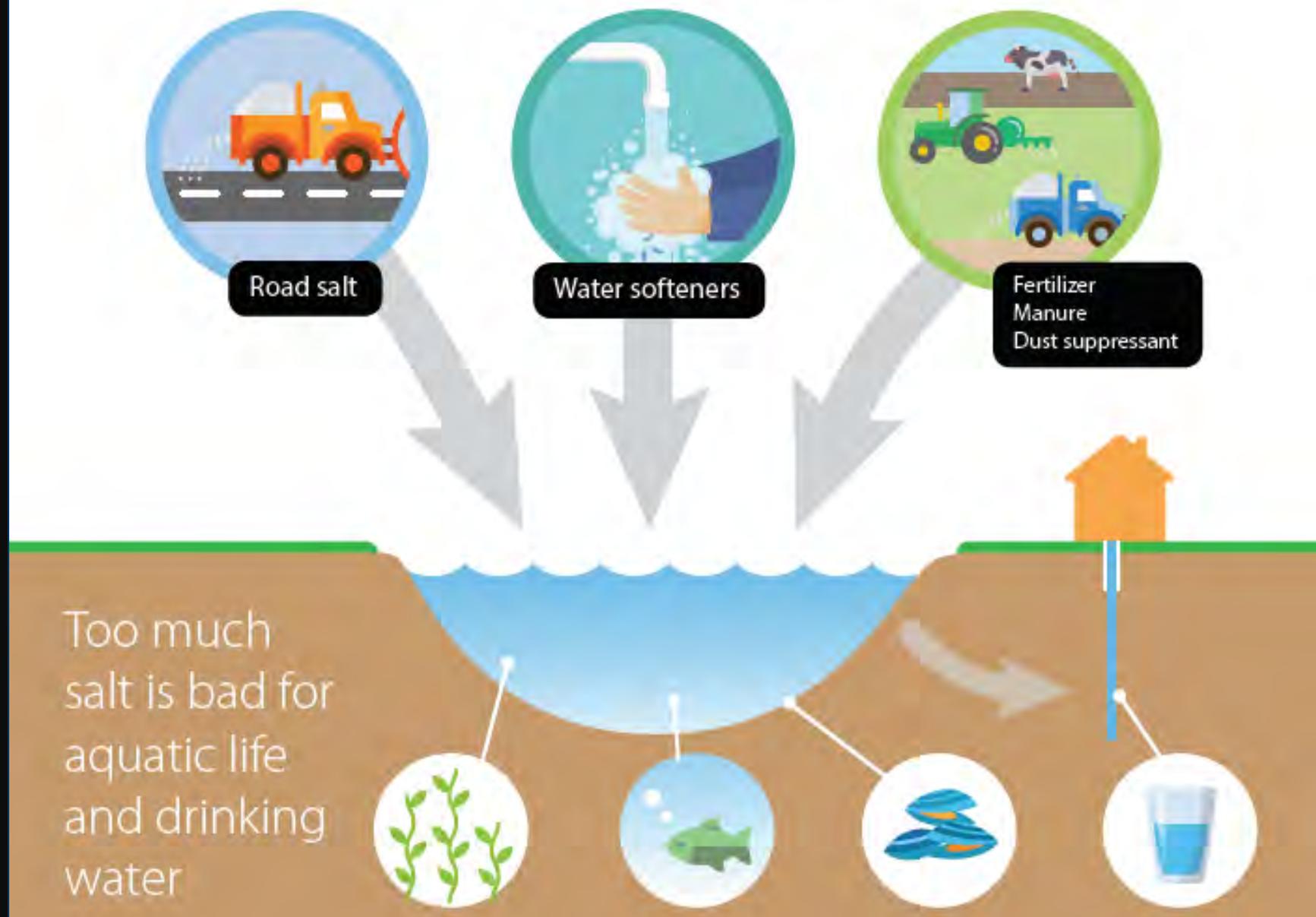


© MN DNR, Konrad P. Schmidt



Where is all this salt coming from?

Salt pollution comes from several sources



What happens to all the salt?



MPCA Chloride Reduction Program



**Agency Water
programs**



Training



Assistance



Resources

What is the Smart Salting Tool?

Original tool was created to assist winter maintenance operations:

- Evaluate practices for opportunities to reduce salt use
- Track progress
- Obtain Level 2 Smart Salting certification
- Evaluate dust control practices

Updated & expanded tool will now also assist organizations:

- Evaluate sources of chloride
- Learn more about each source
- Identify strategies and actions to reduce chloride
- Develop an Action Plan to reduce chloride



Phases of the Smart Salting tool

Phase 1: TCMA Chloride TMDL and Management Plan project

- 2014-2016 worked with Winter Maintenance Professional Tech Team to create the Winter Maintenance Assessment tool (WMAAt)

Phase 2: Statewide Chloride Management Plan project

- 2017-2018 renamed to Smart Salting Assessment tool (SSAt) and added:
 - Level of Service adjustments & Improved reporting options
 - Dust Control section

Phase 3: Smart Salting Tool expansion development project

- 2019-2021 Design phase included expanding the tool to include BMPs for water softening and fertilizer
- 2020 Developed framework for creating a GIS interface to estimate chloride contributions from all sources

Phase 4: Smart Salting Tool expansion implementation project

- 2022-2023 Build and test

Smart Salting Tool (SST)

The Smart Salting Tool is a resource to learn about local sources of chloride and all known salt saving best management practices for the large sources of chloride: winter maintenance, dust control, fertilizers, and water softening. It can be used to assist cities, counties, townships, watershed organizations, MS4 permittees, both public and private winter maintenance organizations and winter maintenance managers or staff determine where opportunities exist to improve practices, make reductions in salt among a variety of sources, and track progress.

Select a scope of interest:

Evaluate your estimated chloride contributions from all sources and gain knowledge on the different sources of chloride and steps to take to achieve reduction:

- Learn background information and environmental impacts of chloride sources
- Survey templates for understanding practices in your community regarding a chosen source
- Create an action plan for each source tailored to your operations

-  Evaluate Chloride Sources 
-  Modify Action Plan 
-  MPCA Permit Holder Finished Assessments 



For both public and private winter maintenance organization Choose to assess your winter maintenance or dust control operations and input information to:

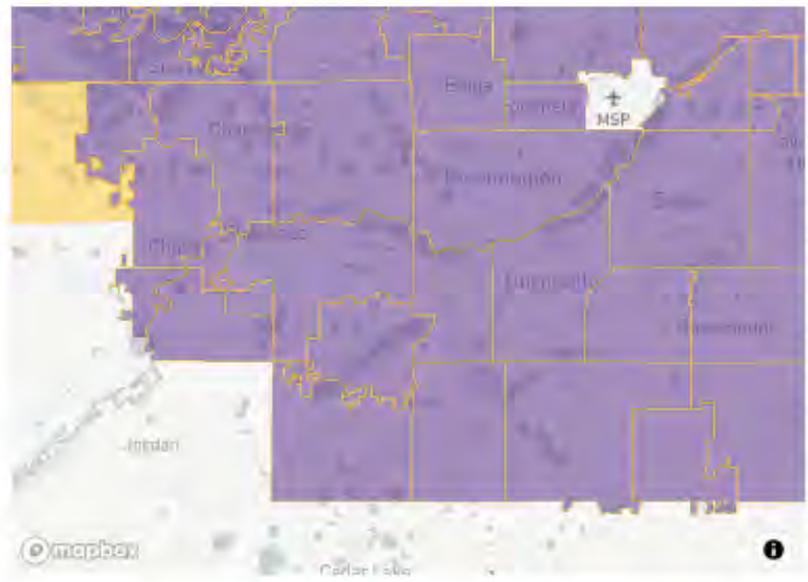
- Evaluate current practices
- Identify areas for improvement
- Develop goals to implement best practices
- Track BMP implementation progress and salt reduction
- Obtain or update Level 2 Smart Salting Certification

 Road Maintenance Organizations 

Smart Salting Tool (SST) - Evaluate Chloride Sources

Pick a boundary: MS4

City/Township

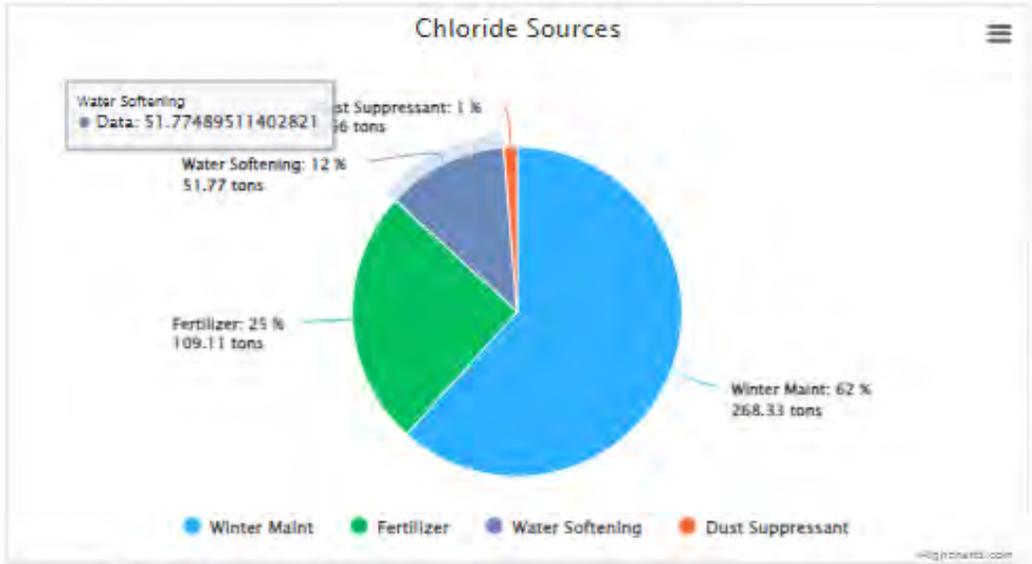


Use the boundary selector to define where you are evaluating chloride sources. Sources are quantified within the area identified – no upstream sources are included in the estimates.

Our chloride source estimates use land cover, roadway information, and water use data. The loading rates have been matched to findings from various local and statewide research projects. These initial values are a starting point for understanding chloride in the selected area.

Modify these estimates with your own knowledge using the tables found after "Evaluate Chloride Sources". Use the background information tabs for direction on gathering better information. To evaluate a combination of areas, create action plans for each target boundary then combine the reports.

MS4 Boundary Selected: **Laketown Township**



Data sources & method will be provided for each source.

Learn background information on the environmental impacts of your chloride sources and explore resources and tools to help in the development of your action plan.

Evaluate Chloride Sources

Once you're finished evaluating all of your chloride sources

Complete Action Plan

Smart Salting Tool (SST) - Chloride Environmental Impacts

1

Environmental Impacts

2

Fertilizer

3

Water Softening

4

Winter Maintenance

5

Gravel Roads

6

Industry

Chloride Environmental Impacts

[Go Back](#)

[Next Section](#)

[1. Background - About](#)

[2. Background - Data and Monitoring](#)

[3. Background - Policies and Education](#)

[How chloride works](#)

[Sources](#)

[Environmental Impacts](#)

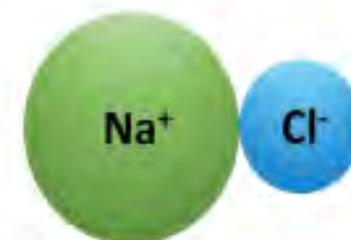
[Infrastructure Impacts](#)

Chloride and water

When referring to salt in this tool, we are talking about chemical compounds that contain a chloride ion. These compounds include sodium chloride (NaCl or rock salt), calcium chloride (CaCl_2), magnesium chloride (MgCl_2) and potassium chloride (KCl or potash). "Salt" and "chloride" are often used interchangeably when referring to this type of pollution.



At a chemistry level, salt dissolves in water because the positive and negative charges are attracted to each other. When salt is mixed with water, the salt dissolves and the chloride bonds with the water. The chloride ion will remain with the water molecule wherever it travels and does not break down naturally. It takes only one teaspoon of salt to permanently pollute five gallons of water. Once in the water, there is no feasible or cost effective way to remove the chloride. As a result, chloride remains in our lakes, streams, wetlands and ground water and it is toxic to the insects and fish living in those waters. Not only does it have negative impacts on freshwater species, but it can also disrupt the natural mixing cycle of lakes as well as change the chemistry of those waters that aquatic life depends on. This is why reduction in salt use is our best and only realistic option to minimize chloride pollution.



Chloride Environmental Impacts

Go Back

Next Section

1. Background - About 2. Background - Data and Monitoring 3. Background - Policies and Education

Chloride policies

Educate public & staff

How to implement an educational campaign for salt reduction

Minnesota Statewide Chloride Management Plan

Get familiar with the [Minnesota Statewide Chloride Management Plan \(CMP\)](#) published by the MPCA in 2021 to address chloride impacts to Minnesota water resources. The goal of this plan is to provide information and strategies to assist local partners in reducing salt at the source while providing safe and desirable conditions for the public.

General Education and Outreach tools

Efforts should include a clear message on why reducing chloride use is important for the environment and for saving money, as well as how to effectively use salt. The messaging should be understandable to a general audience.

Public education and outreach

The Minnesota Pollution Control Agency's [Statewide Chloride Resources webpage](#) has a collection of educational resources for organizations to use. Resources include awareness videos and printable posters, brochures, and postcards.

Community Leaders education

Policy makers have an important role to play in making chloride reduction decisions that protect Minnesota's valuable water resources. In conjunction with the We Are Water MN the MPCA offers free virtual workshops that share strategies that can help reduce chloride pollution while saving money. Participants will learn about the impacts of chloride on the environment and specific action steps to make policy changes in your community to reduce chloride pollution. Learn more about Community Leaders workshop on the [MPCA Smart Salting Training webpage](#) and contact the MPCA if you are interested in hosting a workshop for your community.



Low Salt, No Salt Minnesota

The [Low Salt, No Salt Minnesota program](#) includes a toolbox intended for local government unit (LGU) staff to use to reduce chloride use in their communities. Materials include a presentation, videos, recruitment templates, conversation starters and handouts. This can be used for a variety of audiences; however the targeted audience is property managers, homeowners/townhome associations and faith-based communities.

Isaak Walton League of America Salt Watch

Salt Watch program to Minnesota residents. Communities can partner with the organization to bring the program to your area. Participants can request a free kit that helps them find out whether salt pollution is a problem in local streams, lakes, and wetlands. The program can help your organization identify hotspots as well as help the public develop an understanding of the problem with chlorides, generating interest in chloride reduction.

There is more source-specific training available or coming soon. Check out the [MPCA Smart Salting Training webpage](#) for available trainings.



Environmental Impacts



Fertilizer



Water Softening



Winter Maintenance



Gravel Roads



Industry

Evaluate Chloride Sources from Fertilizer

[Previous Section](#)

[Next Section](#)

[1. Explore Fertilizer Sources](#)

[2. Background - About](#)

[3. Background - Initiatives](#)

[4. Background - Improvement](#)

[5. Surveys](#)

[6. Tools](#)

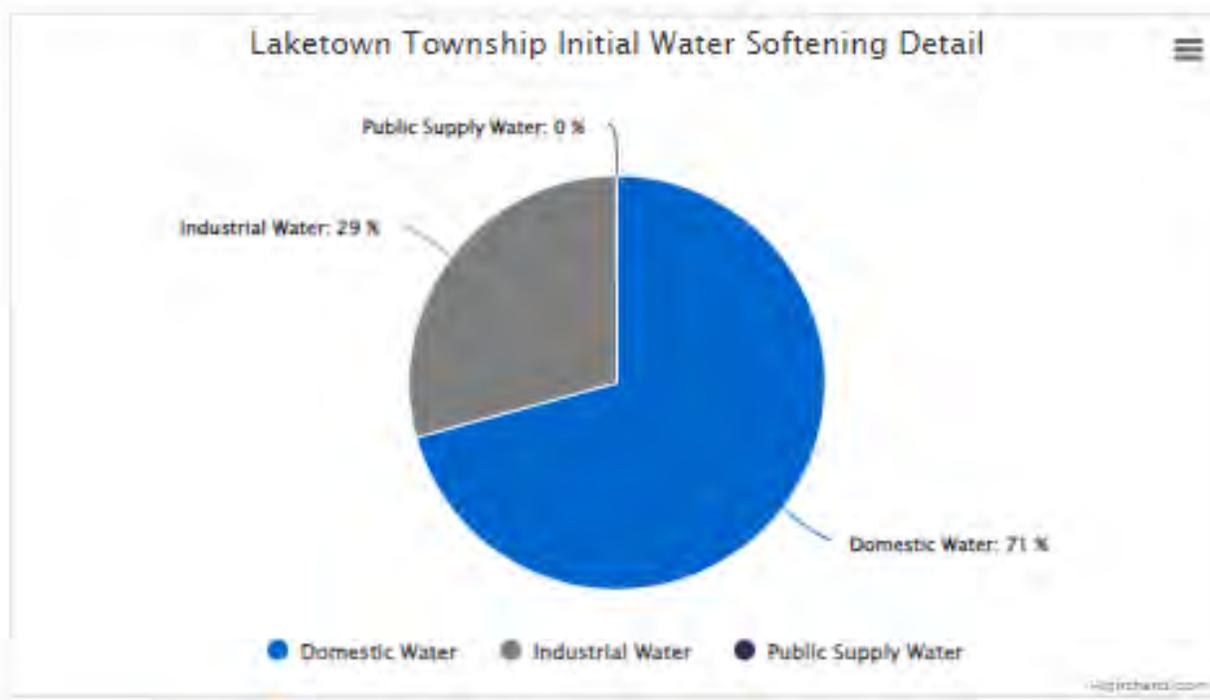
Smart Salting Turfgrass Fertilizer Survey

We've established a standalone set of survey questions that can be used to understand turfgrass fertilizer practices in your community. The survey questions can help evaluate fertilizer practices in your community. The links below provide a survey template that can be modified and distributed directly, as well as a key that can help you organize and interpret the results.

- [Survey Template for Homeowners](#)
- [Survey Template for Turfgrass Professionals](#)
- [Guide to Results for Homeowners Survey](#)
- [Guide to Results for Turfgrass Professionals Survey](#)

If your community is familiar with using web surveys, we encourage you to use these questions to design your own turfgrass web survey. You can also print your survey and have it available at outreach events in your community.

	Hardness (gpg) ↓	Volume Used (gal/yr) ↓	Efficiency (grains removed per pound NaCl) ↓	Total (Tons of Cl/yr)
Domestic Water ↓	23.122	36,175,777	2,500	334.59
Industrial Water ↓	23.122	23,915,178	4,000	138.24
Public Supply Water ↓	23.122	0	3,500	0
Total				51.77





Evaluate Chloride Sources from Water Softening

Previous Section

Next Section

1. Explore Water Softening Sources 2. Background - About 3. Background - Initiatives 4. Background - Improvement 5. Surveys

Water Hardness

Water Softening - Why the chloride?

Chloride Source Reduction

"Source Reduction" means using less in the first place. It is physically possible to remove chloride from water, but it's unlikely that removing chloride will ever be economically feasible to do for drinking water or wastewater due to the immense costs. Source reduction is the most effective way of keeping chloride from becoming a long-term community-wide problem. To learn more about why chloride pollution is a problem visit [Chloride 101 by MPCA](#)

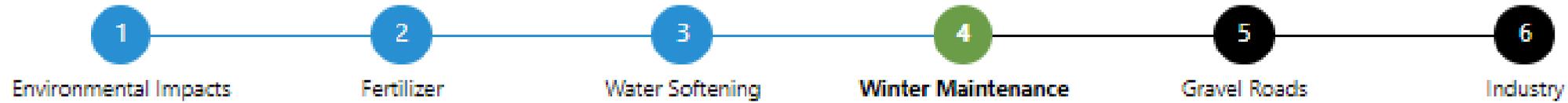
What ways can a community reduce water softening chloride at the source?

Use less soft water.

- **Water Conservation** practices at any scale can play a role in reducing the amount of soft water used in a community. Water efficient appliances and low flow fixtures can help these efforts. Behavioral practices, such as taking shorter showers or not letting the sink run, can play a major role as well. Regularly checking for and fixing leaks is an important practice to encourage as well.
- **Plumbing select appliances with soft water** could have a major impact on the overall amount of salt used by reducing the overall volume of soft water created. For example, a typical American household may use 27% of their total water use for toilet flushing. On an annual scale, 30% may be used for outdoor water use such as irrigation. In this example, not softening toilet or irrigation that water would create direct savings of over 50% based on softening salt used and may even allow the user to use a smaller, more efficient water softening unit.
- **Blending softened water** with unsoftened water can be accomplished on site to produce finished water with a consistent hardness in the usable range. Blending is not a common practice but is possible using equipment that is commonly found built in on many point-of-entry water softeners.

Use less salt for treating hard water.

- **More efficient water softeners** can be key for reducing salt use. Efficiency upgrades can be accomplished in many ways, and the topic is covered more completely in the section on [Water Softener Optimization](#). The amount of improvement that can be made using this approach may be especially effective in residential and commercial settings. Surveying the community will be helpful in assessing the improvement potential of an optimization program.
- **Centralized hardness reduction** can reduce hardness in the water before it's distributed to the community. These methods work at large, community-wide scales. It's imperative for water users in the area to adjust their practices based on the new water hardness by either adjusting the settings on their softener or removing it if the new hardness is acceptable. Learn more in the section on [Centralized Hardness Reduction](#).
- **Saltless Water Conditioning** may be implemented by some water users in the community who are open to reducing hard water impacts without removing hardness. Learn more about water conditioning methods in the section on [Alternative Solutions for Preventing Scale](#).



Evaluate Chloride Sources from Winter Maintenance

[Previous Section](#)
[Next Section](#)

[1. Explore Winter Maintenance Sources](#)
[2. Background - About](#)
[3. Background - Where](#)
[4. Background - What](#)

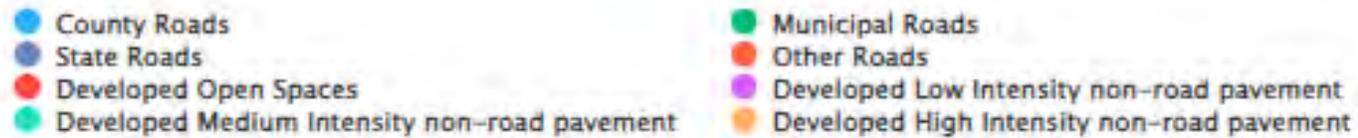
[Initial Results](#)
[Modify Results](#)

MPCA is using the best available information to calculate chloride data. **If you have more accurate information please click Modify Results tab to update the information.**

Data Source(s): Impervious estimates were derived from the 2019 National Landcover Database. Roads data are provided by MnDOT and publicly accessible.

Road Chloride Loading					Non-Road Pavement Surfaces Chloride Loading				
	County Roads	Municipal Roads	State Roads	Other Roads		Developed Open Spaces	Developed Low-Intensity	Developed Med-Intensity	Developed High-Intensity
Lane Miles	39,766	17,484	6,951	4,917	Pavement Area (acres)	670,311	318,253	51,819	7,339
					% Development Deiced	0.25	4.375	16.25	22.5

Laketown Township Modified Winter Maintenance Detail



Highcharts.com

Reset

Road Chloride Loading					Non-Road Chloride Loading				
	County Roads 	Municipal Roads 	State Roads 	Other Roads 		Developed Open Spaces 	Developed Low-Intensity 	Developed Med-Intensity 	Developed High-Intensity 
Lane Miles 	39.77	17.48	6.95	4.92	Pavement Area (acres) 	670.31	318.25	51.82	7.34
					% Development Deiced Applied 	0.25	4.375	16.25	22.50
Average Annual Salt Rate (tons of salt per lane mile) 	7.79	3.89	7.79	1.95	Average Annual Salt Rate (tons per acre) 	0.036	0.036	0.036	0.036
Total Chloride Load (tons)	309.808	67.997	54.141	9.594	Total Chloride Load (tons)	0.06	0.501	0.303	0.059

Total = 442.369 tons

1

Environmental Impacts

2

Fertilizer

3

Water Softening

4

Winter Maintenance

5

Gravel Roads

6

Industry

Evaluate Chloride Sources from Winter Maintenance

[Previous Section](#)
[Next Section](#)

1. Explore Winter Maintenance Sources 2. Background - About 3. Background - Where 4. Background - What

[Why Deicers are Used](#)
[Chloride in Deicers](#)
[Environmental Impacts of Chloride Deicers](#)
[Non-chloride Deicers](#)

Why chloride is used in deicers and the common types of chloride-based deicers used in winter operations.

Most deicers we use contain chloride. When referring to salt, we are talking about deicers that contain chloride. The chemical properties of salt make it effective at melting ice but result in chloride building up in our environment as it does not break down naturally. **There are no labeling laws governing deicers: none are truly environmentally safe, and none work in all conditions.**

Chloride-based deicers are the most commonly used deicers because they are relatively cheap compared to non-chloride deicers and are more widely available. Deicers have an effective temperature range that they perform best in, depending on the chemical ingredients in the product. Below is an overview of commonly used chloride deicers:

Chemical	Common Aspects	Delivered State	Lowest Practical Meeting Temperature
Sodium Chloride (NaCl)	<ul style="list-style-type: none"> • Corrosive • Inexpensive • Very available • Most used without corrosion inhibitor added 	<ul style="list-style-type: none"> • Rock salt, can be made into a brine 	15°F

1

Environmental Impacts

2

Fertilizer

3

Water Softening

4

Winter Maintenance

5

Gravel Roads

6

Industry

Evaluate Chloride Sources from Gravel Road Maintenance

[Previous Section](#)[Next Section](#)

1. Explore Gravel Road Maintenance Sources 2. Background - About 3. Background - Considerations

[Dust Suppressants for Dust Control](#)[Dust Suppressants & Chloride](#)[Types of Dust Suppressants](#)

Why dust control is important how dust suppressants are beneficial.

Airborne dust from roads and open surfaces, called fugitive dust, is a form of air pollution. All unpaved roads will release dust due to traffic. The amount of dust that an unpaved road produces is dependent on a variety of factors including the amount of traffic, the quality and type of gravel, and the climate of where the road is located. High traffic and high-speed areas will produce more dust.

Minnesota regulations require any person operating any commercial facility to take appropriate measures to control fugitive dust. Besides reducing air pollution, dust control provides other benefits like:

- Protect employee health and reduce costs of employee health care
- Reduce equipment maintenance and depreciation costs
- Improve community relations

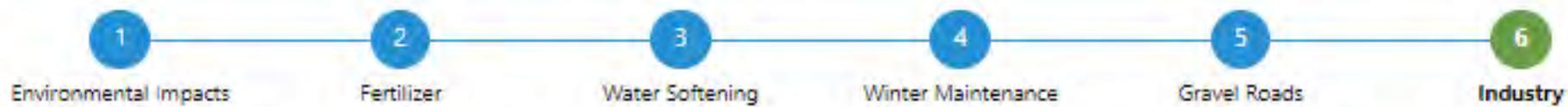


Dust control measures can include facility planning and layout, considering vehicle traffic patterns, and applying dust control treatments. Dust control treatments, called dust suppressants, consist of liquids applied to roads and open surfaces to control airborne dust. When used correctly, dust suppressants on gravel roads can:

- Extend the lifespan of aggregate surfaces
- Increase visibility conditions for vehicle traffic
- Ensure better health for community members
- Prevent excessive dust and sediment from being deposited into surface waterbodies.

Allowing fugitive dust to spread causes air pollution - dust suppressants are used to control this. However, the improper use of dust suppressants can pollute local bodies of water.

Smart Salting Tool (SST) - Evaluate Chloride Sources from Industrial Processes



Evaluate Chloride Sources from Industrial Processes

[Previous Section](#)

[Start an Action Plan](#)

Industrial section is under construction, please continue to complete your plan



Smart Salting Tool (SST) - Chloride Source Assessment

Chloride Source Assessment

Create an action plan to address the chloride sources in your area of operations by selecting action items to build your plan. Each item has the option to mark as "Complete" or "Underway".

- Select "Complete" for items your organization has done.
- Select "Underway" for items your organization is planning to do, is in the process of doing, or is an ongoing initiative.

Note that if an action item is left unchecked, it will not be included in the action plan.

Create a new chloride source assessment

New Assessment

Edit existing chloride source assessment

Select



Edit Assessment

Delete Assessment

Update an Action Plan

Select



Update Plan

Smart Salting Tool (SST) - Chloride Source Assessment

Create a new action plan

Regulatory Permit ⓘ

MS4 Permittee

Action Plan Name

Laketown Township Example_MS4

Action Plan Start Date ⓘ

7/1/2023

Action Plan End Date ⓘ

6/30/2024

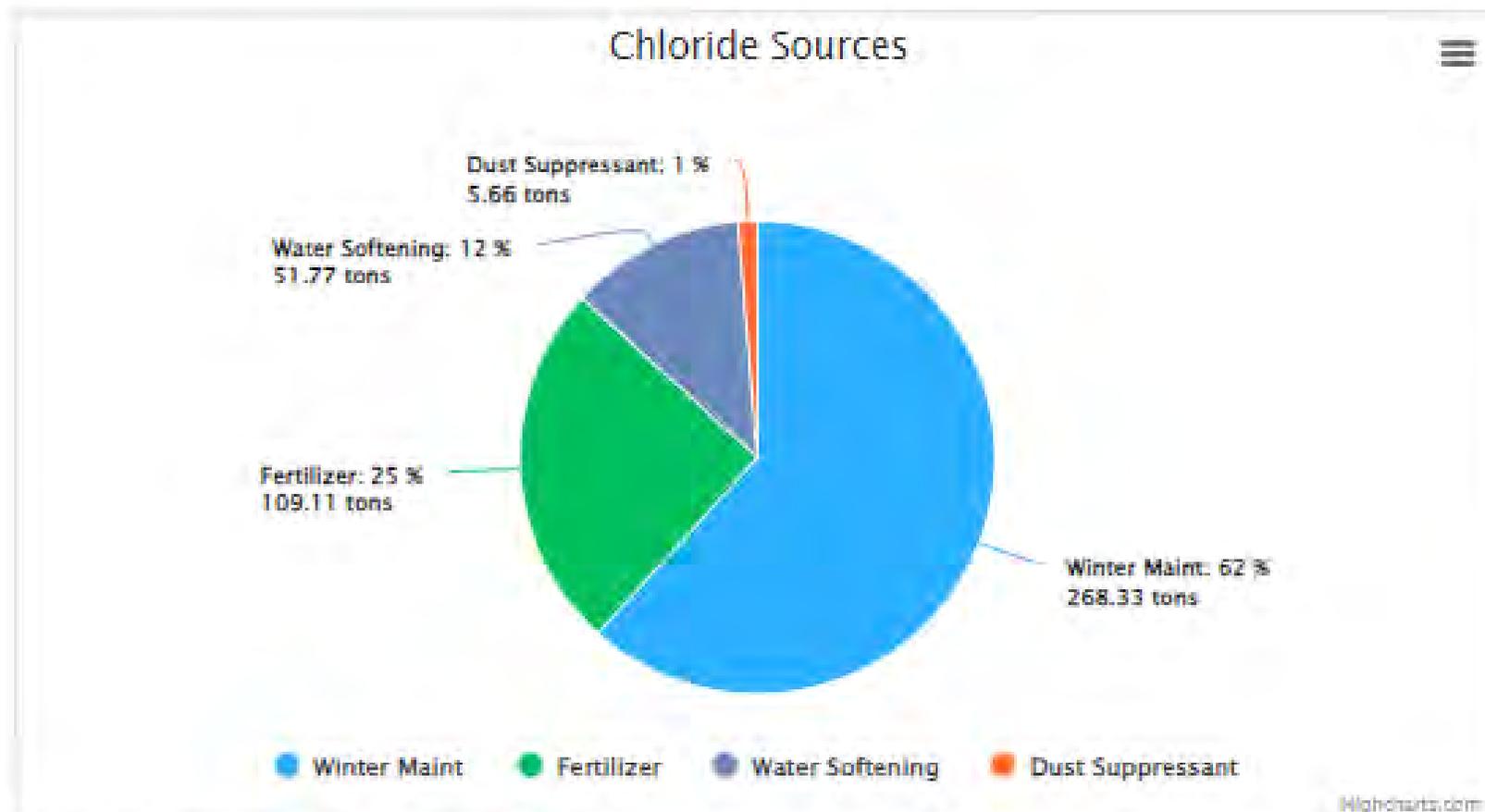
Copy From Existing Action Plan ⓘ

Select

Continue

Go Back

MS4 Boundary Selected: **Laketown Township**



Source(s) to include in action plan

- Monitoring
- Fertilizer
- Water Softening
- Winter Maintenance
- Gravel Road Maintenance
- MS4 Permit

Continue

Go Back

Data sources & method will be provided for each source.

Smart Salting Tool (SST) - Water Softening Assessment

1. Monitoring Chloride
2. Fertilizer
- 3. Water Softening**
4. Winter Maintenance
5. Gravel Road
6. MS4
7. View Action Plan

> Evaluate Chloride Sources from Water Softening

▸ Chloride Sources

▸ Gathering Information

▸ Action Steps

Continue

Go Back

1. Monitoring Chloride
2. Fertilizer
3. Water Softening
- 4. Winter Maintenance**
5. Gravel Road
6. MS4
7. View Action Plan

> [Evaluate Chloride Sources from Winter Maintenance](#)

▶ Chloride Sources

▶ Gathering Information

▼ Action Steps

Professional engagement and outreach

 Meet with winter maintenance professionals such as managers and operators. This group can help with local deicers expertise. Visit the [MPCA Smart Salting training webpage](#) for training program details and schedule.

- Support winter maintenance professionals in your community to get MPCA Smart Salting trained and certified.
 - Complete
 - Underway
- Host an MPCA Smart Salting for Property Managers Certified Training for property managers, winter maintenance supervisors, environmental staff, and those that hire winter maintenance staff.
 - Complete
 - Underway
- Facilitated technical support of the general audience
 - Complete
 - Underway
 - Utilize the [Low Salt No Salt Minnesota](#) materials for residents, and business and property managers.
 - Host a MPCA Smart Salting for Community Leaders workshop.
- Assess your winter maintenance organization's practices: [MPCA Smart Salting tool's winter maintenance assessment](#)
 - Complete
 - Underway

Smart Salting Tool (SST) - MS4 Permit Assessment

1. Monitoring Chloride
2. Fertilizer
3. Water Softening
4. Winter Maintenance
5. Gravel Road
- 6. MS4 Permit**
7. View Action Plan

▶ Minimum Control Measure 1 - Public Outreach

▶ Minimum Control Measure 3 - Illicit discharge detection and elimination

▶ Minimum Control Measure 6 - Pollution prevention/good housekeeping for municipal operations

▶ Discharges to impaired waters with a USEPA-Approved TMDL that includes an applicable watershed

[Continue](#)

[Go Back](#)

Smart Salting Tool (SST) - Finish Action Plan

Thank you for Creating an Action Plan!

[Download Action Plan \(Word\)](#)

[Download Action Plan \(PDF\)](#)

[Update Action Plan](#)

[Back to Homepage](#)

Chloride Reduction Action Plan for MS4s

This plan was created using the MPCA Smart Salting tool

MPCA

Laketown Township Example_MS4

Location: ms4-city (Laketown Township)

Start Date: 7/1/2023 End Date: 6/30/2024

Username: brooke.asleson@state.mn.us

Chloride Sources Evaluated: Monitoring Chloride, Fertilizer, Water Softening, Winter Maintenance, Gravel Road Maintenance

MS4 permit #:

Introduction

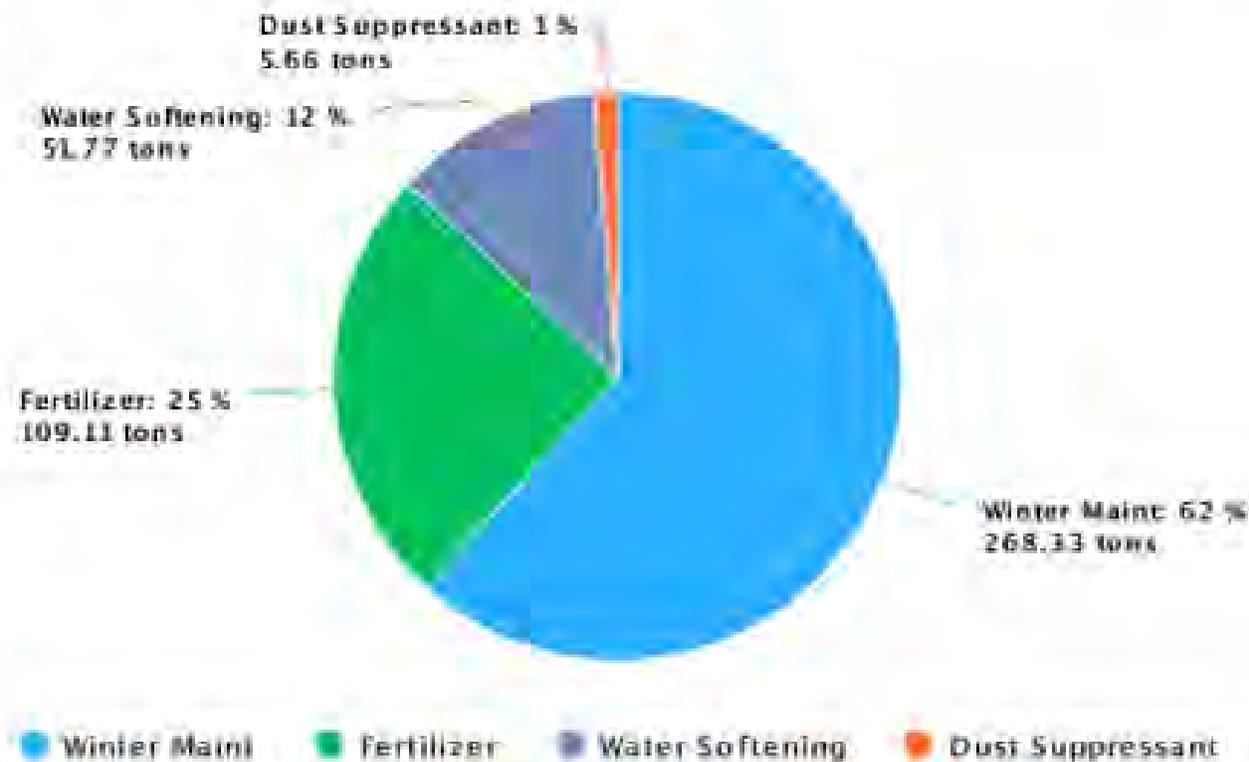
Chloride is a permanent pollutant that does not break down or degrade over time and will persist in our waters. It is a pollutant of concern because it is toxic to freshwater fish, amphibians, insects, and plants. Once used, it seeps into lakes, streams, and groundwater. It is far too expensive and difficult to remove with current technologies (such as reverse osmosis).

Chloride sources

Chloride enters lakes, streams, wetlands, and groundwater from a variety of sources, including: salt applied to roads, parking lots, trails, and sidewalks for winter maintenance, water softener brine discharge to municipal wastewater treatment plants (WWTPs), water softener discharge to a septic system, agricultural and turf fertilizers, industrial discharge, land application of manure, land application of WWTP sludge, and dust suppressants used for gravel road maintenance.

The chart below is the estimated amount of chloride by source type in the selected boundary.

Laketown Township Initial Chloride Sources



Chloride reduction action item checklist

Reducing chloride at the source is needed throughout the state of Minnesota, not only to restore already impacted waters but also to protect all water resources. Chloride is persistent in the environment, and once it there, is difficult to remove. This also means that chloride will continue to accumulate in the environment over time.

For each chloride source assessment created both the estimated and any modified data about the source in the community. The data is followed by the action items the community has chosen to complete to address the chloride sources identified.

Chloride background action items

General background information

Learn about chloride's impacts on the environment and evaluate chloride conditions of your surface waters.

- Review [Minnesota Statewide Chloride Management Plan](#).
 - Complete
 - Underway

- Identify if local waters are impaired by chloride or if monitoring has occurred. Visit [Minnesota's chloride conditions](#) interactive map.
 - Complete
 - Underway

- Create a monitoring plan for your community to create a baseline and track water quality trends. Review guidance:
 - Complete
 - Underway

MS4 Permit Compliance Self-Check

The following questions are in regard to the MS4 General Permit, item 16.5:

Do you distribute educational materials or equivalent outreach about deicing salt?

- Yes
- No
- Not applicable, I do not represent a city or township

Do you distribute these educational materials or equivalent outreach to the following audiences? Check all that apply.

- Residents
- Businesses
- Commercial facilities
- Institutions

Do the educational materials or equivalent outreach cover the following? Check all that apply.

- Impacts of deicing salt use on receiving waters
- Methods to reduce deicing salt use
- Proper storage of salt or other deicing materials

How do you distribute the educational materials or equivalent outreach? Check all that apply.

- Website
- Social media
- Newsletter
- Newspaper
- Utility bill insert
- Other

Smart Salting Tool (SST) - Road Maintenance Organizations

Create assessment reports on your operations including evaluations on:

- Level of Service
- Best Management Practices
- Salt Saving Calculations

To obtain Level 2 Certification, must complete and submit all assessment options within your operation's category.

Choose your assessment category:

-  
-  
-  



The name Minnesota comes from the Dakota (Sioux) words *mnisota*, meaning "sky-tinted waters" or "sky-blue waters."

Water is an important part of Minnesota's past and present - let's protect it for our future

Thank you!



BROOKE ASLESON

CHLORIDE PROGRAM ADMINISTRATOR

brooke.asleson@state.mn.us