

TCMA Chloride Management Plan: Out of the Box and Into the Hands of the Users

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**15TH ANNUAL ROAD SALT SYMPOSIUM
FEBRUARY 4, 2016**



Chloride & Water Quality




What's the problem?

- Safe roads, parking lots & sidewalks are essential – high expectations from the public
- Chloride is a permanent pollutant
 - Cannot be treated or filtered with traditional BMPs
- 78% of the chloride applied in the TCMA is retained here (Stefan et al. 2008)
- Chloride concentrations in streams in the Northern US have approximately doubled from 1990-2011 (Corsi et al. 2015)



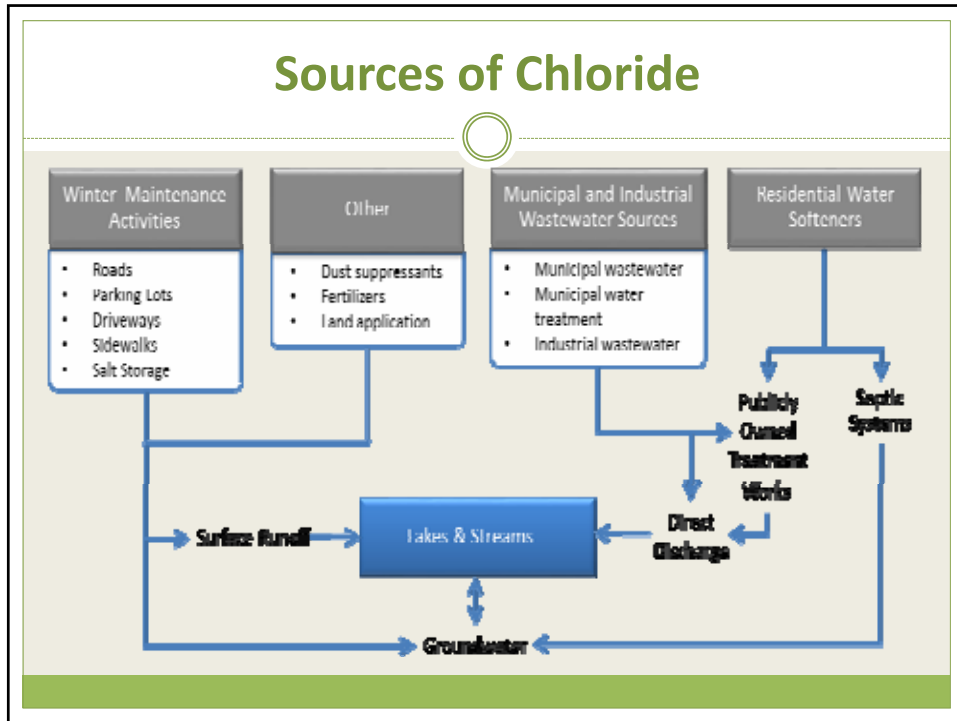
1 tsp. of de-icing salt pollutes **5 gallons** of water





What's the problem with salt?

- Chloride is toxic to aquatic life
 - 230 mg/L- long-term
 - 860 mg/L- short-term
- Contaminates groundwater
- Chloride can disrupt the natural mixing process in lakes
- Impacts vegetation and wildlife
- Corrodes road surfaces/bridges and damages reinforcing rods
- Potential human consumption concern



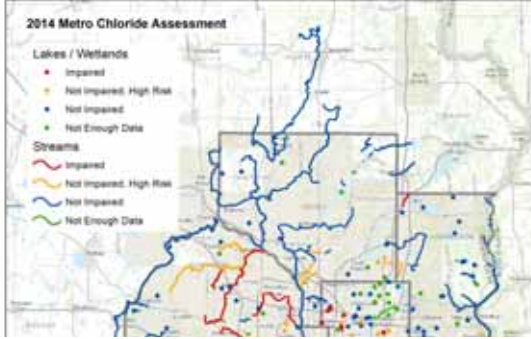


Chloride

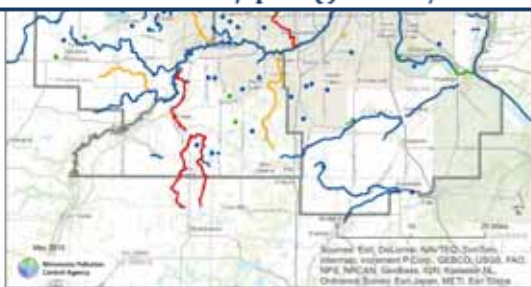



en.wikipedia.org/wiki/Interstate_Park

2014 Metro Chloride Assessment



www.pca.state.mn.us/programs/roadsalt.html



Sources

and 4
chloride
(pleted)
waters

and St.
(2014)

Chloride in MN Groundwater

- Shallow groundwater in the TCMA is impacted by high chloride concentrations
- 30% of shallow monitoring wells in the TCMA above standard
- About one-third of wells across the state showed increased concentrations over time
- Impact on baseflow concentrations in surface waters

| Land Use | Chloride (mg/L) |
|-----------------------|-----------------|
| Residential | 45 |
| Commercial/Industrial | 60 |
| Undeveloped | 15 |

TCMA

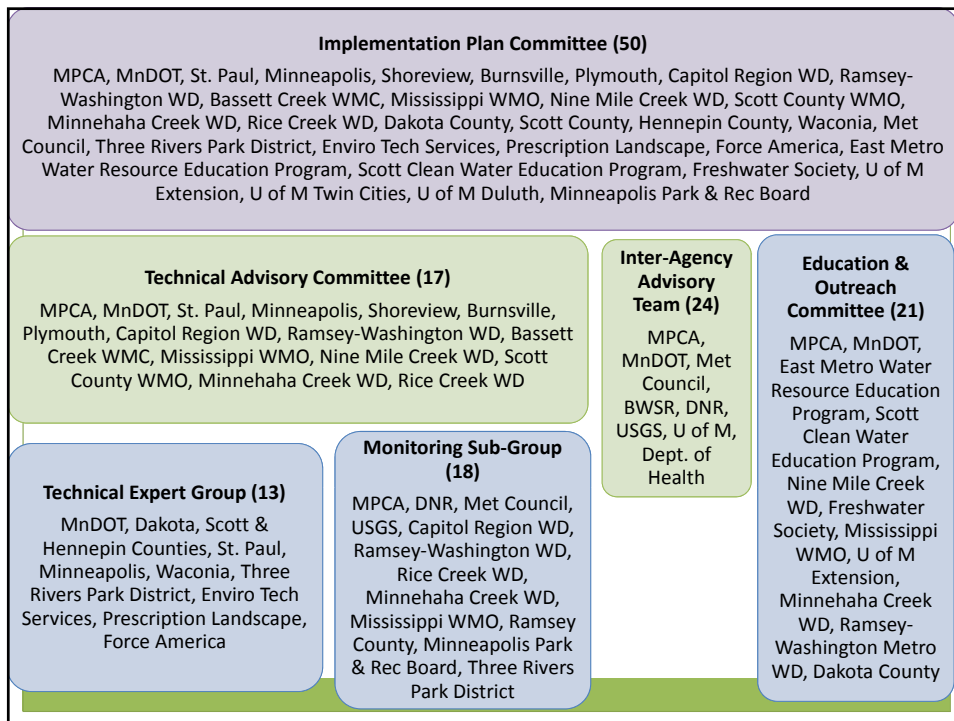
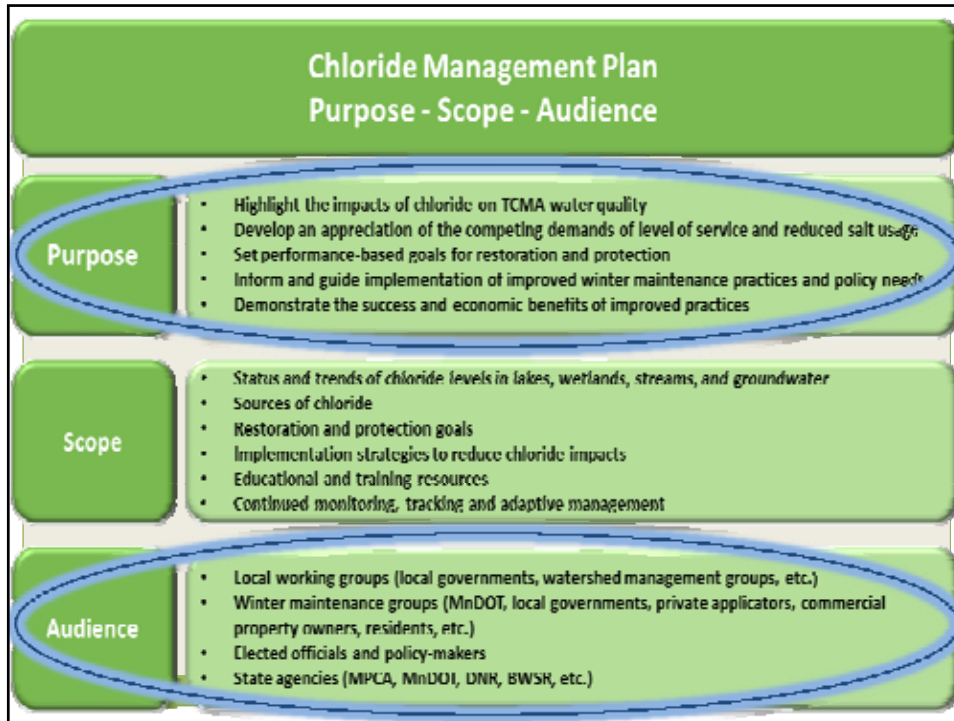
Twin Cities Metropolitan Area
Chloride Management Plan
DRAFT

July 2015

Minnesota Pollution Control Agency

www.mpcr.org

nt Plan



Outline of the CMP

- 1. Background and Description
- 2. TCMA Chloride Conditions
 - Water quality conditions, sources, trends and TMDL summary, protection
- 3. Prioritizing and Implementing Restoration & Protection
 - Prioritization
 - Implementation strategies, Education resources, Citizens attitudes
 - Case studies, Cost, and Funding Opportunities
- 4. Monitoring and Tracking
 - Recommendations for monitoring, Tracking implementation efforts
- 5. Research Needs
- 6. Stakeholder Process

| TCMA CMP Performance-Based Implementation | | | | |
|---|---|---|---|---|
| Audience | years 1-2 | years 3-5 | years 6-10 | Beyond year 10 |
| Winter Maintenance Leadership (state, county, city, schools, private): those not involved in day to day operations of maintenance crew. | <ul style="list-style-type: none"> - Review responsibilities - Develop policies - Assess the situation - Create goals - Set priorities - Implement changes - Use WMAT | <ul style="list-style-type: none"> - Follow plan - Share successes | <ul style="list-style-type: none"> - Re-assess operations - Revise goals - Continue to implement changes - Share successes | <ul style="list-style-type: none"> - Re-assess operations - Revise goals - Continue to implement changes - Share successes. |
| Winter Maintenance Professionals (state, county, city, schools, private): plow drivers, mechanics, supervisors of crew. | <ul style="list-style-type: none"> - Attend training - Keep an open mind towards change - Look for ways to make salt use more efficient - Use WMAT tool - Create list with your desired changes - Prioritize your action plan - Implement changes - Use less salt | <ul style="list-style-type: none"> - Follow plan - Eliminate poor practices - Share successes - Use less salt | <ul style="list-style-type: none"> - Re-assess operations - Adjust goals - Follow plan - Eliminate all poor practices - Share successes - Use less salt | <ul style="list-style-type: none"> - Re-assess operations - Revise goals - Continue to implement changes - Share successes - Use less salt |
| Municipalities | <ul style="list-style-type: none"> - Create a plan - Start implementing the plan - Track progress - Use the WMAT - Prioritize actions - Continue monitoring | <ul style="list-style-type: none"> - Follow plan - Continue to improve practices - MS4s report progress to MPCA | <ul style="list-style-type: none"> - Review and revise plan - Continue to improve practices - MS4s report progress to MPCA | <ul style="list-style-type: none"> - Follow plan - Continue to improve practices - MS4s report progress to MPCA |
| Citizens | <ul style="list-style-type: none"> - Follow recommendations - Use less salt - Encourage others to use less salt | <ul style="list-style-type: none"> - Reduce salt use - Encourage others to reduce salt use | <ul style="list-style-type: none"> - Reduce salt use - Encourage others to reduce salt use. | <ul style="list-style-type: none"> - Continue to reduce salt use. |
| Policy Makers (city, county, state, other) | <ul style="list-style-type: none"> - Understand why we use salt - Understand what the options are for lower salt use | <ul style="list-style-type: none"> - Improve policy | <ul style="list-style-type: none"> - Improve policy | <ul style="list-style-type: none"> - Improve policy |

| Success Stories | | | | |
|--------------------------------------|-----------------|--|----------------|---|
| Entity | Time Period | Main Actions Implemented | Salt Reduction | Cost Savings |
| University of Minnesota, Twin Cities | Start 2006 | Began making salt brine and anti-icing and adopted several other salt reduction BMPs. | 48% | New equipment cost \$10,000 \$55,000 cost savings first year |
| City of Waconia | Start 2010 | Switch from 1:1 sand:salt to straight salt & liquid anti-icing; calibration; equipment changes; use of air and pavement temperatures. | 70% | \$8,600 yearly cost savings (\$1.80 per lane-mile) |
| City of Prior Lake | 2003-2010 | Upgrade to precision controllers & sanders; anti-icing & pre-wetting; use of ground temperatures, best available weather data; on-site pre-mix liquid & bulk-ingredient storage, mixing & transfer equipment; staff education. | 42% | \$2,000 per event estimated cost savings; 20 – 40 mg/L decrease in receiving-water chloride (liquid app-only watershed) |
| City of Richfield | Start 2010 | All-staff Training*; yearly sander calibration; use of low-pavement-temp de-icers; road crown-only application; minor-arterial-road policy adjustments. | > 50% | \$30,000: 2010-2011 \$70,000: 2011-2012 |
| Rice Creek Watershed District Cities | 2012-2013 | Staff training; purchased shared anti-icing equipment | 32% | \$26,400 in one winter |
| City of Cottage Grove | 2011-2012 | Staff training | Not available | \$40,000 in one winter |
| City of Shoreview | Start 2006 | Stopped using a salt/sand mixture and moved on with straight salt; set up all its large plow trucks with state of the art salt spreading controls, pre-wetting tanks and controls and pavement sensors; use of calcium chloride in the pre-wetting tanks reduced the amount of rock salt as well; all applicators and supervisors annually attend *Training; crews attend an annual snowplow meeting to review procedures and talk about salt use and conservation methods; trucks set up for anti-icing main roads with calcium chloride. | 44% since 2006 | \$24,468 in 2014 |
| City of Eagan | Start 2005 | Moved from a 50/50 salt/sand mix to straight salt; eliminated purchase of safety grit; EPOKE winter chemical application technology; use AVL; pre-wet at spinner | Unknown | \$70,000 annual savings |
| Joe's Lawn & Snow | Start 2013-2014 | Owner & staff Training*; purchase of new spreader, temperature sensors; equipment calibration; use of temperature data; on-going experimentation. | 50% | \$770 estimated cost savings in 2014 Expected to use 20 tons, only use 9 tons |

Winter Maintenance Assessment tool (WMA_t)

Partnership



- Technical Expert Team – 2011
 - State: MnDOT
 - County: Scott, Dakota, Hennepin
 - City: Minneapolis, St. Paul, Waconia
 - Other Gov't: Three Rivers Park District
 - Private: EnviroTech, Prescription Landscape, Force America, Fortin Consulting (hired by MPCA)

Technical Team Goal

Develop an easy-to-use, flexible and comprehensive tool to help agencies and companies reduce salt usage in the 7-county metro

WMAt Goals

1. Document current practices
2. Chart a path towards salt reduction
3. Allow a flexible approach for implementing BMPs
4. Develop a strategy unique to operation
5. Evaluate small areas of winter maintenance
6. Shows user recommended practices (learning tool)

LIVE DEMO

[http://stormwater.pca.state.mn.us/index.php/Winter Maintenance Assessment tool \(WMAt\)](http://stormwater.pca.state.mn.us/index.php/Winter_Maintenance_Assessment_tool_(WMAt))

<http://ltiweb02.limno.com/WMAT/User.vbhtml>

Salt Savings Mode

Table of Contents

General Links

- Home Page

Questionnaire Sections:

- General Information
 - General Information (100% complete)
- Salt Usage/Storage Data (100% complete)
- Inventory
 - Calculus (100% complete)
 - Controlled (100% complete)
- Efficiency
 - Delays (100% complete)
- Reduce Waste
 - Storage (100% complete)
 - Spilling (100% complete)
 - Leaking (100% complete)
 - Sprinkled/Edged (100% complete)
 - Clacking (100% complete)
 - Assessment (100% complete)
 - Application Speed (100% complete)
 - Application Frequency (100% complete)
- Before Winter
 - Salts (100% complete)
 - Level of Service (100% complete)

Assessment Calculations & Reporting:

- Check for Road Zones & View Report Status

Salt Usage/Storage Data

General

Current (2015-16)

How many salting events did you encounter?

How much salt did you purchase?

Current (2015-16)

How much bulk salt did you purchase (in tons)?

How much salt/sand mix did you purchase (in tons)?

How much salt did you store?

Current (2015-16)

How much bulk salt was stored during the winter (in tons)?

How much bulk salt remained after the winter (in tons)?

How much salt/sand mix was stored over the winter (in tons)?

Reduce Waste: Application Speed

Q4.5.a. At what speed do you spread salt on roads?

| Current/Future (2015-2020) | Practice (2015-2020) | Response |
|-------------------------------------|-------------------------------------|----------------|
| <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | 22 mph or less |
| <input type="checkbox"/> | <input type="checkbox"/> | 23-29 mph |
| <input type="checkbox"/> | <input type="checkbox"/> | 30-39 mph |
| <input type="checkbox"/> | <input type="checkbox"/> | 40-50 mph |

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Salt Savings Mode

Report Generated on 03/20/2016 9:17:21 AM

Salt Savings Summary

Assessment Name: St. Paul - Salt Savings (2015-16)
 Location: St. Paul - Salt Savings
 Winter Period: 2015-16
 Surface Type(s): Low Speed Roads

| Winter Operations: | Prediction |
|---|--|
| <p>16,000 tons of salt stored 500 tons of salt/sand mix stored 10% salt in salt/sand mix</p> <p>12,000 tons of salt used 0 tons of salt/sand mix used 250,000 gallons of liquid used 25,000 gallons used for pre-wetting 225,000 gallons used for anti-icing</p> <p>\$82.00 per ton of salt \$0.12 per gallon of liquid</p> <p>0% salt used on high-speed roads 100% salt used on low-speed roads 0% salt used on parking lots 0% salt used on sidewalks and trails</p> <p>0% sand/salt mix used on high-speed roads 100% sand/salt mix used on low-speed roads 0% sand/salt mix used on parking lots 0% sand/salt mix used on sidewalks and trails</p> <p>0% liquid used on high-speed roads 100% liquid used on low-speed roads 0% liquid used on parking lots 0% liquid used on sidewalks and trails</p> | <p>10,997 tons of salt needed (total granular + liquid) 10,123 tons of salt needed (granular) 411,791 gallons of liquid needed 44,444 gallons for pre-wetting 367,347 gallons for anti-icing</p> <p>10% salt in salt/sand mix</p> <p>1,877 tons of salt likely to be saved (granular sources only) 181,794 gallons of liquid likely to be saved 1,691 tons of salt likely to be saved (from both liquid and granular sources)</p> <p>13.8% reduction potential</p> <p>Predicted Cost Savings:</p> <p>Salt Savings: \$153,910.00 Liquid Savings: -\$18,415.00 Net Savings: \$134,495.00</p> |

How Can I Access the WMAAt

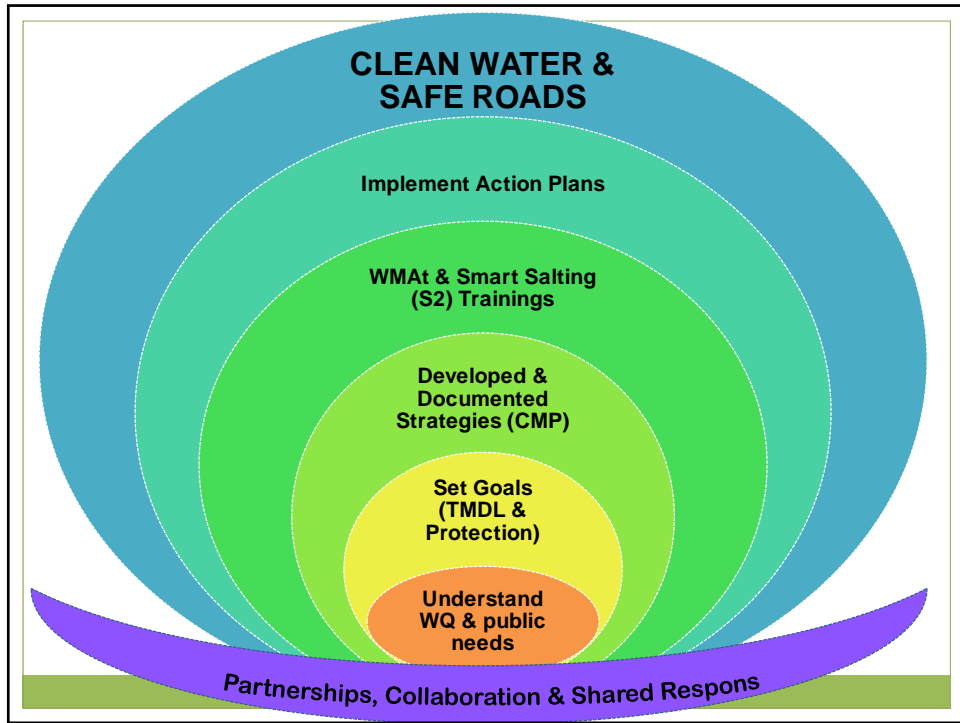
- The MPCA is currently funding & hosting the tool
- Available **NOW** for use ([Google search – WMAAt stormwater](#))
- Visit the MPCA's Minnesota Stormwater Manual new Smart Salting section:
http://stormwater.pca.state.mn.us/index.php/Road_salt,_smart_salting_and_winter_maintenance
- Link can also be found at MPCA's Road Salt & Water Quality website

MPCA Smart Salting Level 2 Training

- Explore the tool with guided instruction
- Demonstrate how the tool can assist with planning and prioritizing BMPs
- Demonstrate how the tool can help show progress
- Discuss how the tool can be used to gain support to implement BMPs
- First pilot Nov. 2015 hosted by Minnesota Street Superintendents Association

**Audience: Winter
Maintenance
Supervisors and
Leadership**





THANK YOU for being part of the solution!



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