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*Salt Management Strategy
(SaMS): Addressing Chloride
Pollution from Winter Salts in
Northern Virginia*







Salt Management Strategy (SaMS)

Addressing Chloride Pollution from Winter Salts in Northern Virginia

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August 3, 2022

Presentation Overview

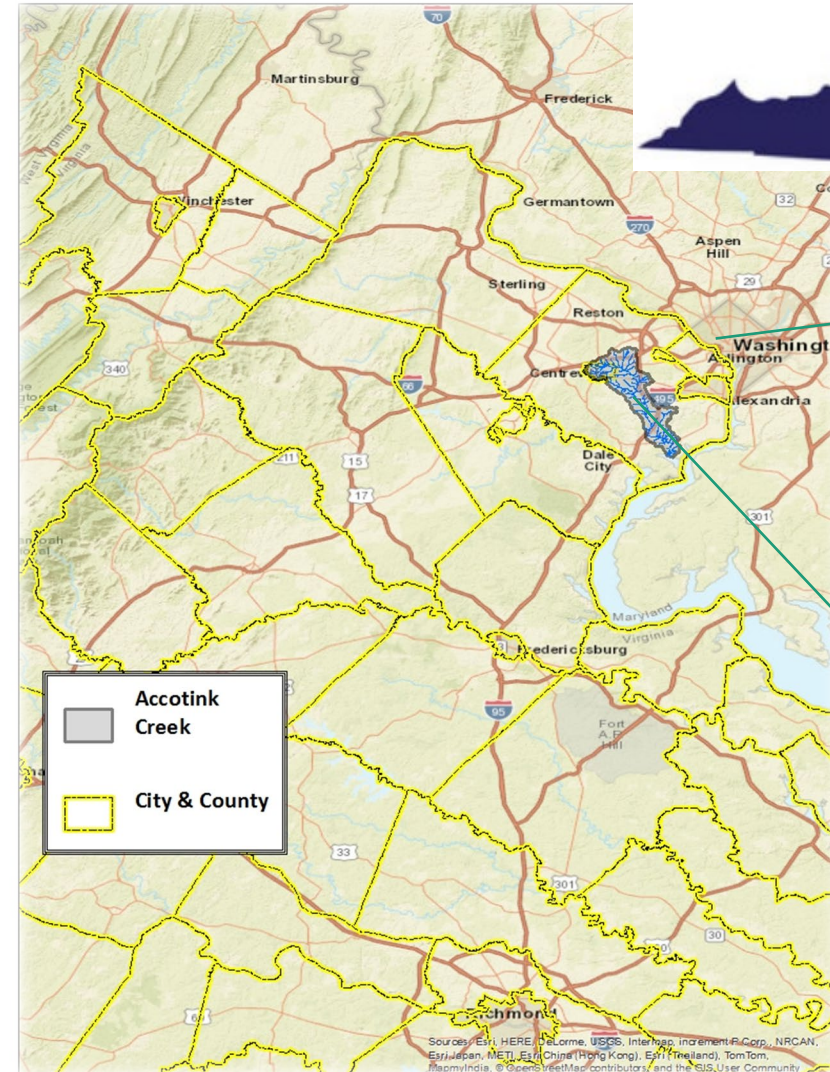
- Chloride Impairments in Virginia
 - Identifying the Source as Winter Salts
 - Challenges with this Pollutant Source
- SaMS Development
 - Framework
 - SaMS Toolkit Overview
- SaMS Moving Forward



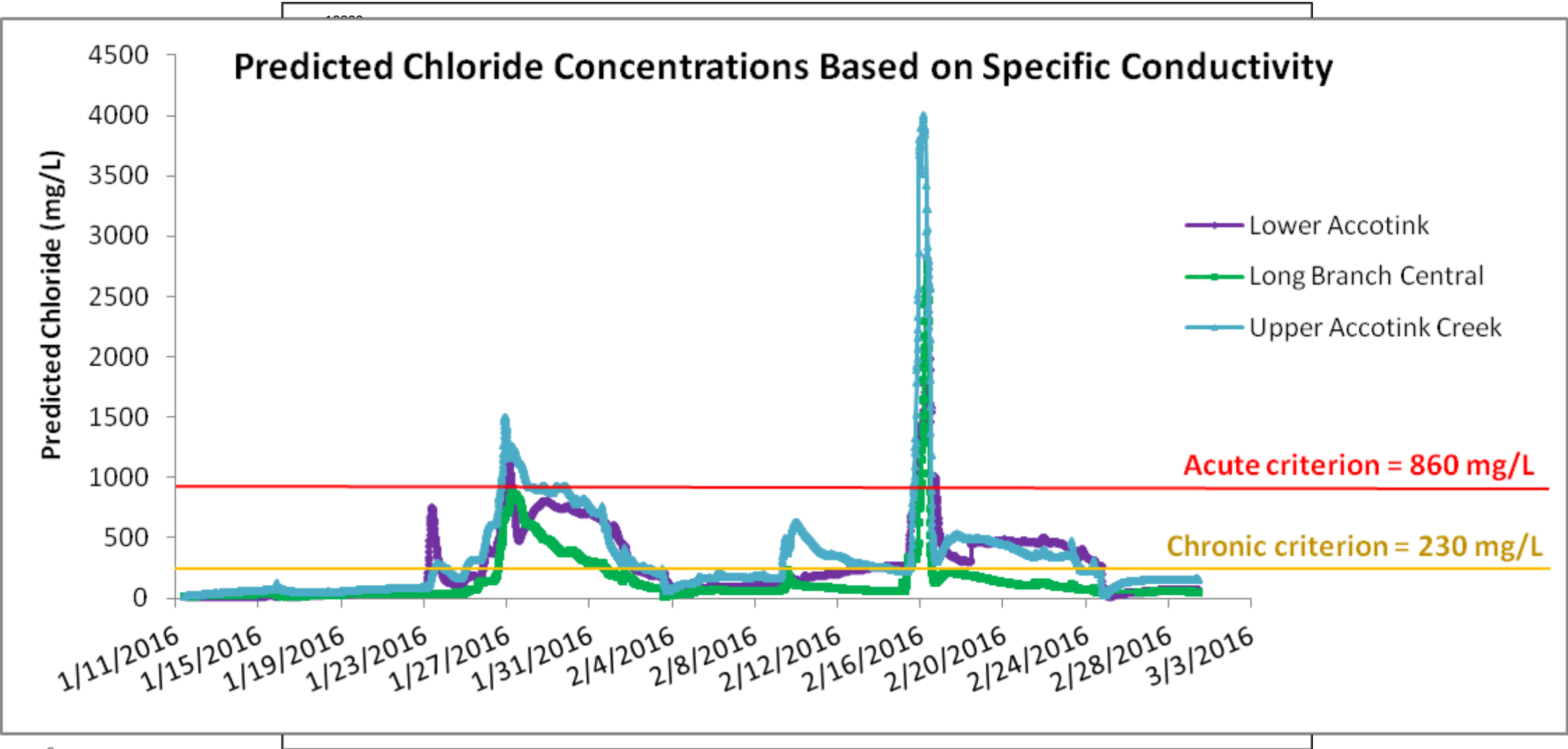
Virginia's Chloride Impairments

- Majority are associated with mining activities
 - Located in southwest Virginia
 - Several TMDLs developed to address (mostly as TDS)
- Winter salts identified source of pollutant (specifically chloride) in Accotink Creek TMDL
 - Located in northern Virginia
 - First chloride TMDL in VA that addresses this source type

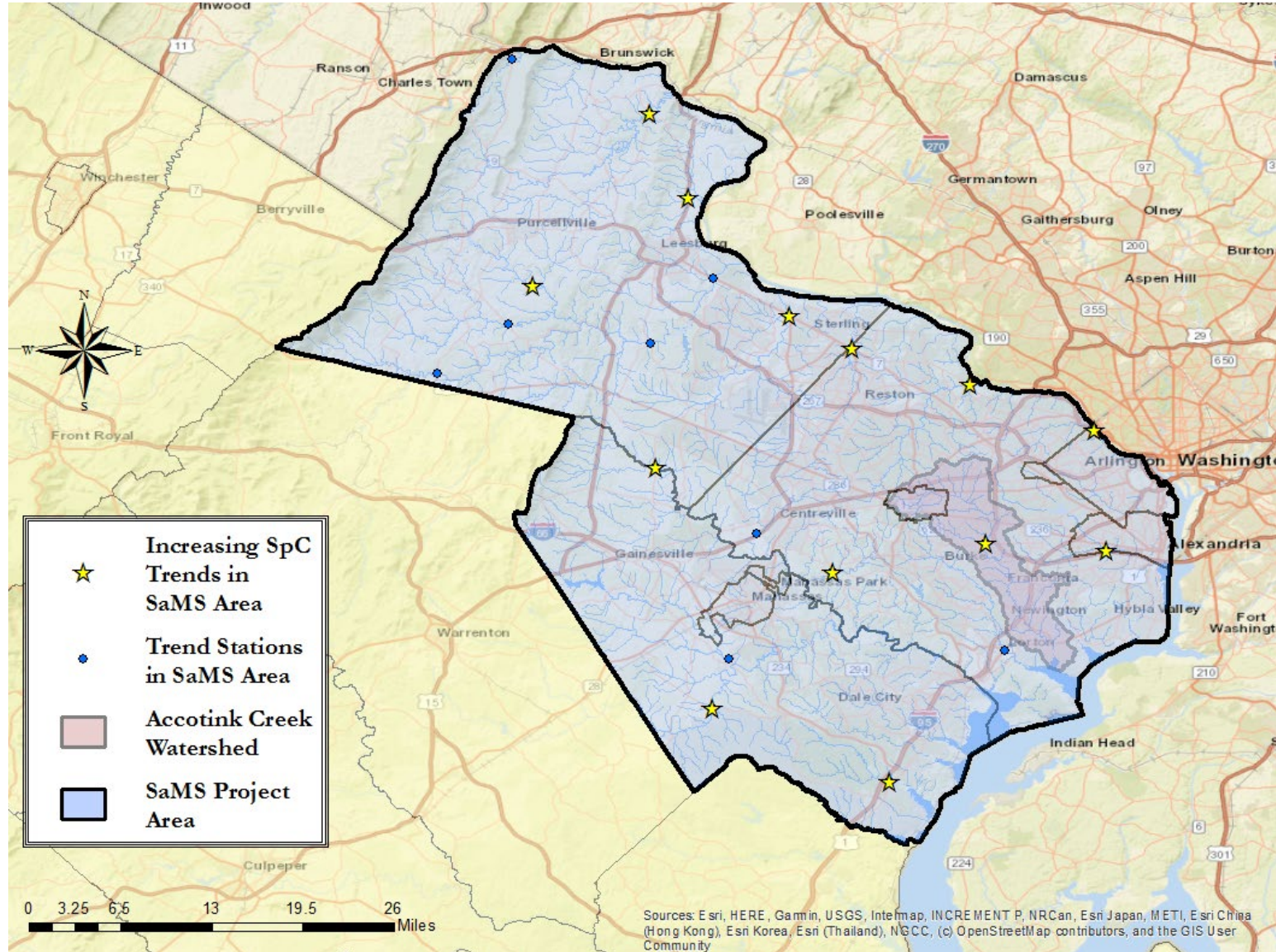
TMDL = Total Maximum Daily Load



Finding the Link between Chloride and Winter Storm Events



Increasing Specific Conductance Trends



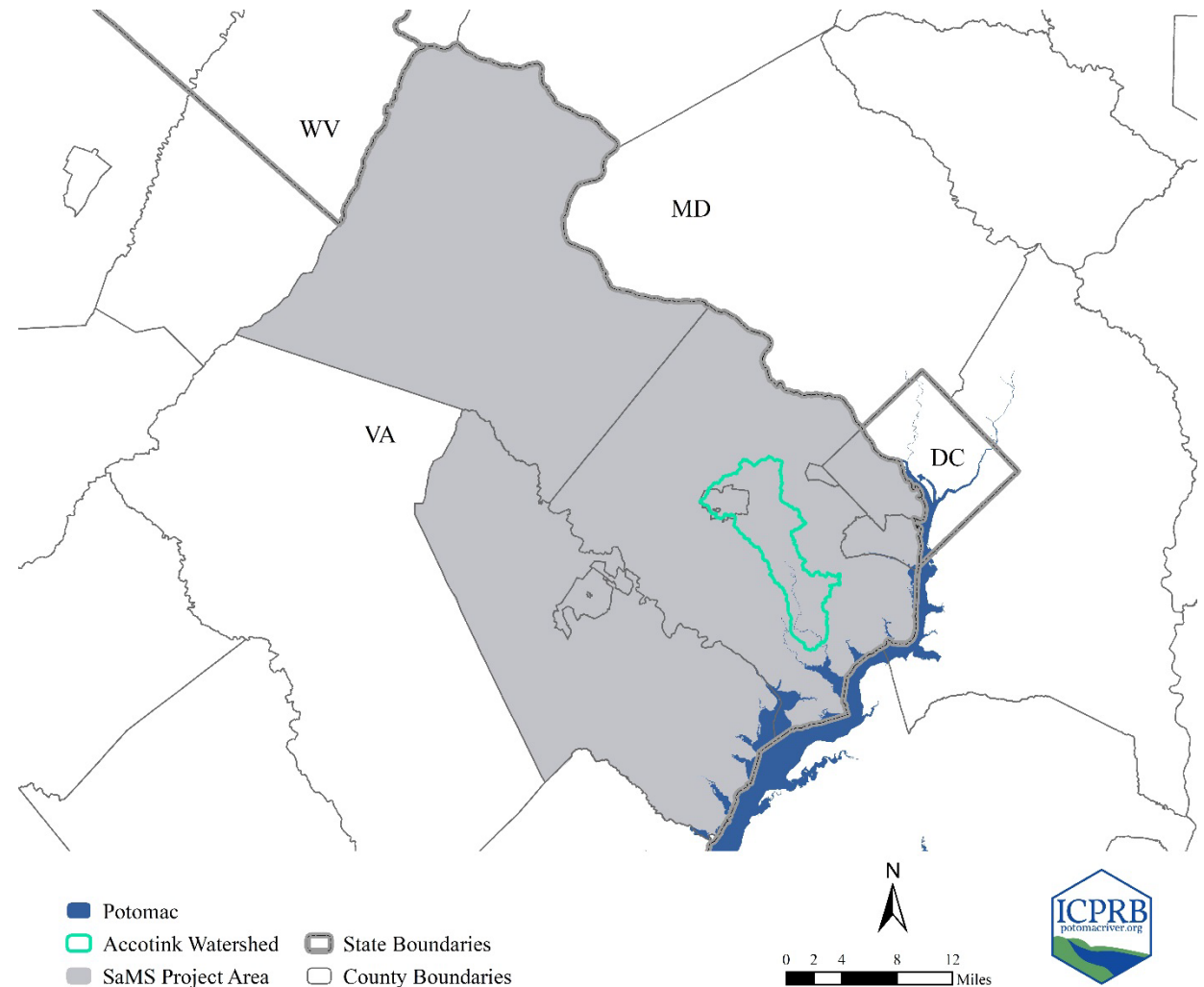
Challenges addressing this Source of Chloride



- Use of winter salts critical to maintain public safety and commerce moving.
- Management practices are implemented on a jurisdictional level, not specific to watersheds.
- Northern Virginia is highly urbanized, Accotink Creek's water quality issues are likely present in other watersheds.
- Winter management handled by both private and public sector providers.
- Impression that more salt = higher level of service
- Each winter storm event is unique.

Salt Management Strategy (SaMS)

- A broad, proactive and voluntary approach to develop solutions to minimize impacts while maintaining public safety in northern Virginia
- A toolkit for multiple audiences
 - Optimize winter practices
 - Raise awareness
 - Monitor efforts
 - Adaptive implementation



SaMS Goals

The aim of this effort was to develop a strategy for Northern VA, that:

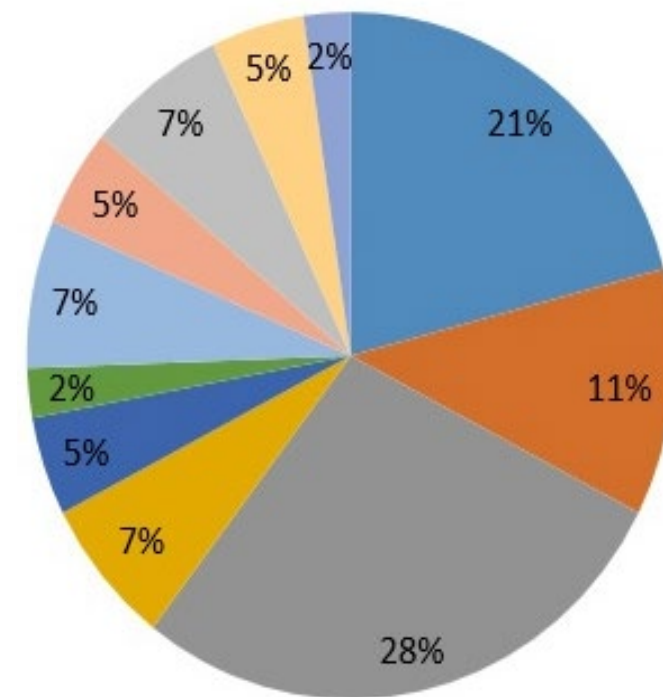
1. Uses a stakeholder-driven process to proactively address salt loads in the region and address the Accotink Creek chloride (salt) TMDLs.
2. Generates increased public awareness that leads to positive behavior changes, and long-term support for the continual improvement of deicing/anti-icing practices and actions.
3. Ensures continued protection of public safety, improves water quality and terrestrial habitat, and lessens the effects of deicing/anti-icing salts on drinking water resources, property and road infrastructure through information sharing and implementation of best practices over time.

SaMS: Stakeholder-driven Development

- Recommendations collaboratively developed and consensus-driven
- 43 entities represented by 63 individuals
- Participants include: VDOT, VA Dept. of Health, 2 (Two) Water Authorities Water, 9 (Nine) Counties/Cities, local NGOs



Stakeholder Advisory Committee Representation
(by organization)



SaMS Development Framework

Stakeholder Advisory Committee (SAC)

- Large stakeholder body
- 4 meetings

Workgroups

- 6 groups, comprised of SAC members
- 4-5 meetings each

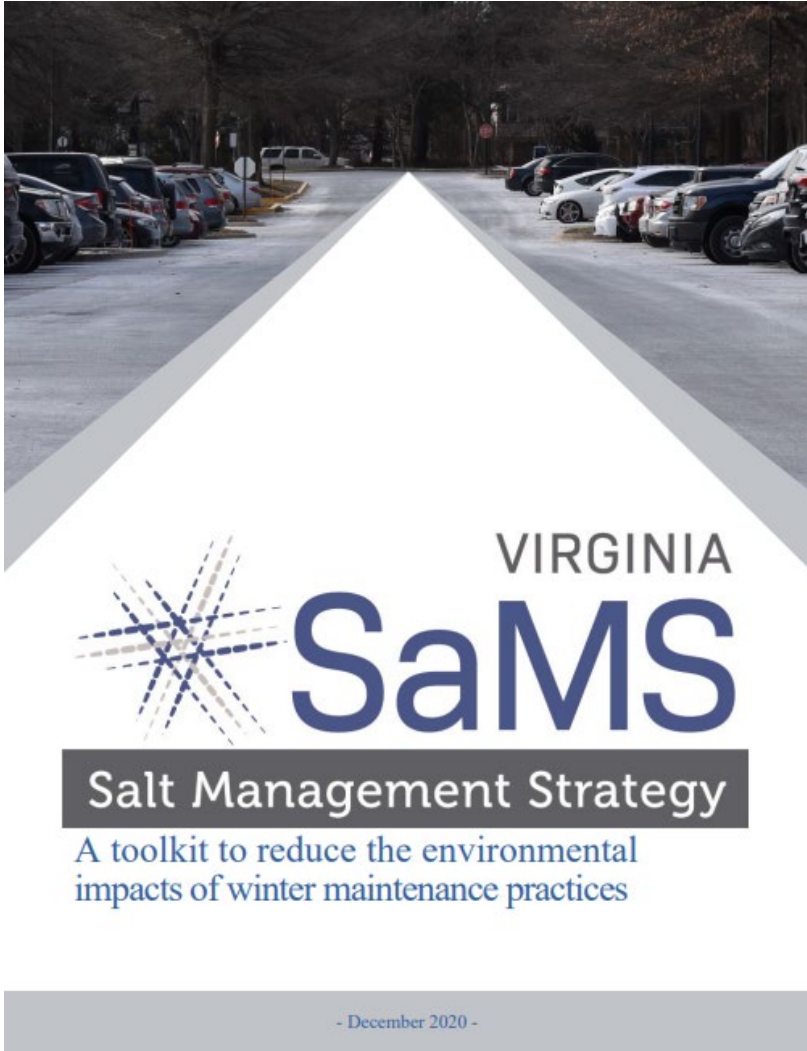
Steering Committee

- 1-2 representatives from each workgroup
- 1 meeting

SaMS Workgroups:

1. Traditional Best Management Practices
2. Non-Traditional Best Practices
3. Education & Outreach
4. Water Quality Monitoring & Research
5. Salt Tracking & Reporting
6. Government Coordination

SaMS Toolkit: Best Practices and Recommendations



- Comprises winter maintenance best practices and recommendations
- “Toolkit”: Organizations can pick and chose best practices
- Addresses a variety of audiences:
 - Winter maintenance professionals
 - Researchers
 - Water quality monitoring groups
 - Local governments
 - General public
- Resource for voluntary as well as permitting programs
- Available online at <https://www.novaregion.org/1498/SaMS-Toolkit>

SaMS Toolkit Addresses

Traditional BMPs

- Presents relative costs and savings for the 50+ different BMPs
- Winter maintenance BMP implementation process
- Application rate evaluation process



Non-Traditional BMPs

- Evaluation of non-chloride deicers
- Process for piloting new deicers
- Overview of certification/training programs transferable to VA
- Best practices for residents and drivers



SaMS Toolkit Addresses (cont.)

Water Quality Monitoring

- Trends in regional specific conductance
- General criteria for a monitoring program
- Pilot project design: Monitoring water quality response to BMP implementation
- Models for predicting chloride concentration
- “Grab-and-Go” resource for existing project area monitoring
- Conceptual model of salt origin, transport and fate



SaMS Toolkit Addresses (cont.)

Salt Tracking and Reporting

- Metrics/forms to encourage standardization:
 - BMP Implementation and Effectiveness
 - Salt Product Use
- Short term goal: organizational tracking
- Longer term goal: reporting for regional analysis



Governmental Coordination

- Public communication on Levels of Service
- Pre and post-season coordination, including communications
- Shared training and other pooled resources opportunities



SaMS Toolkit Addresses (cont.)

Education & Outreach

- Pilot outreach campaign (Nov-Dec 2019)
- Baseline awareness survey (Dec 2019)
- SaMS Logo and use policy
- Principles for developing messages and materials
- Media Toolkit: Messages and infographics
- Funding Sources



SaMS Toolkit: Content Overview

- Planning and Application Practices
- Tracking and Reporting
- Best Practices for the General Public
- Education and Outreach
- Water Quality Monitoring
- Funding Sources and Financial Considerations
- Inter-Governmental Coordination
- Future Recommendations and Research Needs
- Implementation



3 Planning and Application Practices

The SAC, through the efforts of the smaller workgroups, collected and analyzed available information and evaluated practical solutions to address the detrimental impacts of salts used for winter maintenance. This section summarizes the resulting recommendations and resources regarding best practices, with supporting information and implementation tools included in the Appendices. The term "practice" includes both the planning and application phases of a continual program improvement process, including the following:

- Note, measuring and tracking of salt use is also addressed in its own section ([Section 4](#)).

To provide the reader a roadmap of this section:

- [Section 3.1](#) details the audience considerations.
- [Section 3.2](#) provides context for the pilot project.
- [Section 3.3](#) includes information on traditional salt products ([Section 3.3.1](#)), recommended process for piloting salt use in future versions of the toolkit.
- [Section 3.4](#) addresses application process that is provided in whole.
- [Section 3.5](#) provides the context for maintenance certification and training.
- [Section 3.6](#) documents a recommended contracting in future versions of the toolkit.

3.1 Audience Considerations

The planning and application practices discussed in this section were designed with specific audiences in mind. Specifically, these audiences include winter maintenance professionals and decision makers like elected officials, government agency leaders, property managers, and homeowners associations. However, all are encouraged to read through [Section 3](#) as it provides an understanding of the challenges winter maintenance organizations face and the opportunities they have for reducing their salt use. Because of the diverse audiences within the winter maintenance profession, those that have influence over the profession are discussed below.

Table 2. P

Therefore, in order to make informed monitoring decisions and conclusions, inform maintenance operations and water monitoring organizations is crucial.

7.3 Pilot Project Approach: Monitoring Water Quality Response to BMP Implementation

A pilot study process is recommended to learn the best approach to evaluate changes in water quality as a result of changes in salt use and BMP implementation ([Appendix M](#)). Monitoring the impact of BMP implementation may be a challenging pursuit given the numerous variables in both winter storms and winter storm maintenance. Since the best ways to evaluate changes in water quality related to changes in salt use and BMP implementation may not be currently known, the use of a pilot project allows methods to be improved through experience. Through implementation of iterative pilot studies, lessons can be learned and an optimal evaluation approach can be defined.

The recommended pilot monitoring program proposes sampling two small watersheds to control for outcomes and compare results. The two small watersheds where new BMPs are implemented and a control watershed where no changes are made. Differences between both watersheds can be measured using a number of metrics, such as [M - Section 6.1](#) that must be viewed in the context of other variables such as snowfall, the amount of salt used (see [Appendix M - Section 6.2](#)). Using this information, the impact of BMP implementation can be evaluated using a weight-of-evidence approach.

Collection of the following information on salt application and BMP implementation study is recommended to allow for informed conclusions:

- Salt application (listed in order from the more basic and easily obtained information to obtain level of information):
 - The number of days that salting operations were deployed and if brine was used.
 - Seasonal totals of salt used plus the total area serviced by the operation.
 - Storm event totals plus the total area serviced by the operation.
 - Storm event salt application totals per location (e.g., snowplow route, plow path, etc.) serviced by the operation. This level of detailed information provides the most insight into the effectiveness of salt application.
- BMP Implementation: Information on the type of BMPs implemented, and if any (e.g., every storm, only once) is essential for understanding the magnitude of impact.

The success of this pilot program depends on voluntary partnerships between many private winter maintenance professionals. Partnerships between government agencies will also bolster the success of the pilot monitoring program.

Material/analytical costs for the project are estimated to be about \$20,000-\$100,000. The pilot monitoring program represents an iterative approach that will be modified with time as the program runs its course (2-5 years).



9 Future Recommendations and Research Needs

During SaMS development, there were many concepts identified for future evaluation, research, and discussion. In most cases, these were concepts that did not receive enough workgroup discussion and vetting to warrant including in the SaMS Toolkit. Additionally, the workgroups explicitly identified the need for future toolkit updates and evaluations of existing resources and recommendations. A brief description of all future recommendations and research needs discussed throughout the SaMS Toolkit is consolidated in this section. Additional detail on each can be found in their respective toolkit section.

Unless otherwise identified, the recommended timeline to revisit and address these items is suggested to occur during the first recommended SaMS Implementation Assessment Forum. [Section 11](#) discusses the SaMS Implementation Assessment Forum, as it was envisioned at the time the SaMS Toolkit was completed.



Future Recommendations and Research Needs

- Planning and Application Practices ([Section 3](#))
 - Piloting/evaluating new alternative deicing products to identify whether effective and environmentally safe through future research is encouraged. ([Section 3.3.5](#))
 - During the first SaMS Assessment Forum, discussing adoption of a certification and training program approach for use in Northern Virginia. If such an approach is adopted by the SAC or similar body, strategies for encouraging certifications are recommended to be reviewed periodically by that body. ([Section 3.5](#))
 - Continuing discussions, led by the entity that assumes SaMS implementation, regarding improved property management contracts after experience is gained through SaMS implementation and review of other contract models from around the country (e.g., the [contract template developed by the City of Edina, Minnesota in late 2018](#)). Specifically, future evaluation should identify either a specific recommended contract model or certain components any property management contract for winter maintenance activities should contain to promote the use of best practices. ([Section 3.6](#))
- Tracking and Reporting ([Section 4](#))
 - Developing model forms for tracking and reporting product use and BMP implementation that are customizable for small private service providers, civic/homeowner associations, and other specific audiences. ([Section 4](#))
 - Evaluating opportunities to conduct regional scale reporting, analysis, peer learning, and to develop improved future communications. This effort relies on organizations voluntarily adopting more consistent tracking of product use and BMP implementation, such as the information recommended to be collected in [Appendix J](#). ([Section 4.5](#))

(Continued on the following page)

There had numerous direct and indirect benefits in other parts of the USA have included reduced materials cost, possible improved drinking water improvements. Indirect benefits included enhanced public perception of certified entities. Where certification and training programs have been implemented with all of these benefits. Discussions should be held with training programs for use in Northern Virginia. Such a mid-Atlantic jurisdictions to benefit from enhanced approach is adopted, strategies for encouraging

Where provider certification programs were identified and made available information, five of those programs, including the certifying program. These programs either host training locations, making it viable for applicators in Virginia. This information on





Did you know...

Salt applied to paved surfaces during slick weather conditions helps keep us safe, and businesses and vital services open. However, after a snow event, salt residue lingers and impacts:



Public health:

Affecting those serviced by drinking water supplies with higher salt concentrations.



Infrastructure:

Corrosion and damage to roads, bridges, sidewalks and parking lots leads to higher maintenance and replacement costs.



The environment:

Increases in stream and groundwater salinity impact freshwater fish and other aquatic life.

VIRGINIA SaMS

Salt Management Strategy WINTER SALT SMART

Help Virginia be Winter Salt Smart

Follow these winter safety tips to give snowplows the room and time to operate, allowing roads to get cleared more efficiently with appropriate salt application:



Stay home, avoid non-essential travel and telework if possible.



Plan travel times to avoid driving during and immediately after a storm.



If you *must* go out, take public transportation.



Wait to drive until road conditions improve.



Monitor weather closely, as forecasts can change quickly.



What to do during and after a storm?



Clear snow by shoveling early and often, and apply salt only where needed.



If the sun comes out and you can wait, let the sun do some of the work before you apply salt.

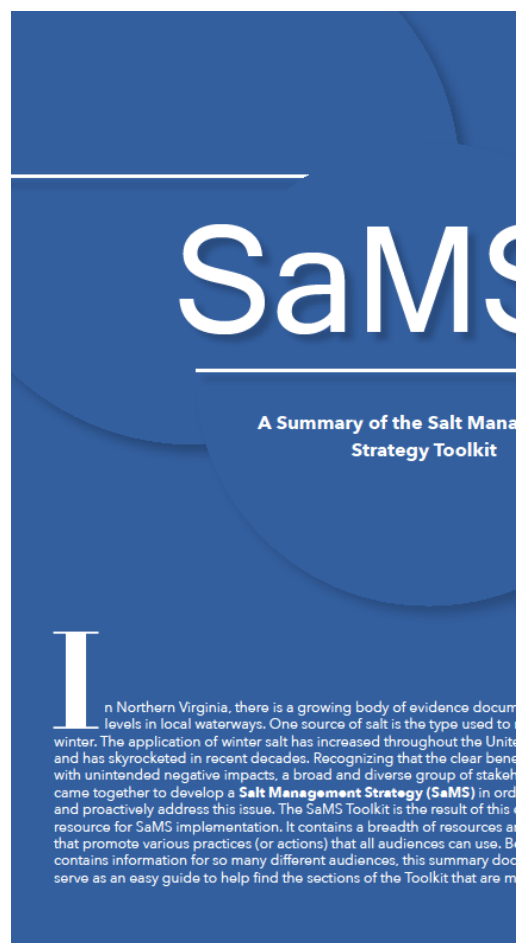


Apply salt after clearing snow. Never use salt to “burn off” snow. It will quickly dilute and requires more salt.



After the storm, sweep up the extra salt or traction material and use it again next time.

Digging into SaMS for the first time



QUICK VIEW SECTION 4

AUDIENCES BY SECTION TRACKING & REPORTING

AUDIENCE	SECTIONS OF THE SaMS TOOLKIT										
	1	2	3	4	5	6	7	8	9	10	11
Winter Maintenance Professionals	•	•	•	•					•	•	•
Businesses	•	•	•	•					•	•	•
Other Groups, Contracting Services	•	•	•	•					•	•	•
Non-govt Organizations	•	•	•		•	•			•	•	•
Researchers	•	•	•	•			•		•	•	•
Water Monitoring Groups	•	•	•				•		•	•	•
Elected Officials & Local Leaders	•	•	•	•	•	•	•	•	•	•	•
HOAs	•	•	•	•	•	•			•	•	•
Drinking Water Providers	•	•	•	•	•	•	•	•	•	•	•
Commissions & Councils	•	•	•	•	•	•	•	•	•	•	•
Governments	•	•	•	•	•	•	•	•	•	•	•
General Public	•	•	•		•	•			•	•	•



APPLICABLE AUDIENCES

PRIMARY



SECONDARY



What is covered in this section:

- Background information on the Salt Use Tracking and Best Management Practice Implementation Tracking forms included in Appendix J that are flexible to suit any scale of reporting or type and size of winter maintenance organization.
- Information on the various levels of detail that an organization can use to track salt use and helpful concepts to consider when tracking that information.
- Links between the BMP Implementation tracking form and recommendations from Section 3 Planning and Application Practices.
- A discussion of the importance of consistency in winter maintenance tracking of salt and BMP use and future plans to consider regional analyses of this information to track progress and facilitate peer learning.

How Can SaMS be Useful?

- SaMS is a **resource** for interested individuals/entities to:
 - **Develop** and **implement** a winter maintenance plan and suite of best management practices
 - **Identify** opportunities to improve levels of service, and reduce winter operations costs.
 - **Make** informed budget decisions about enhanced winter operations equipment
 - **Calculate** optimized salt application rates and **evaluate** how closely actual operations achieve goals

SaMS Going Forward

- SaMS completed February 2021, concluding DEQ lead role for development
- Stakeholders lead implementation:
 - Voluntary efforts by all
 - MS4 jurisdictions also have permit conditions/action plans
- Northern Virginia Regional Commission (NVRC) coordinates implementation efforts
- Continued collaboration of stakeholders to:
 - Support private sector training needs
 - Share successes and lessons
 - Periodically revisit and update strategy



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<https://www.novaregion.org/1498/SaMS-Toolkit>
<https://www.novaregion.org/1399/Northern-Virginia-Salt-Management-Strate>

