



Literature Review on Techniques to Reduce Salt Loading to Streams

Which techniques of salt application to roadways will result in less loading to streams?

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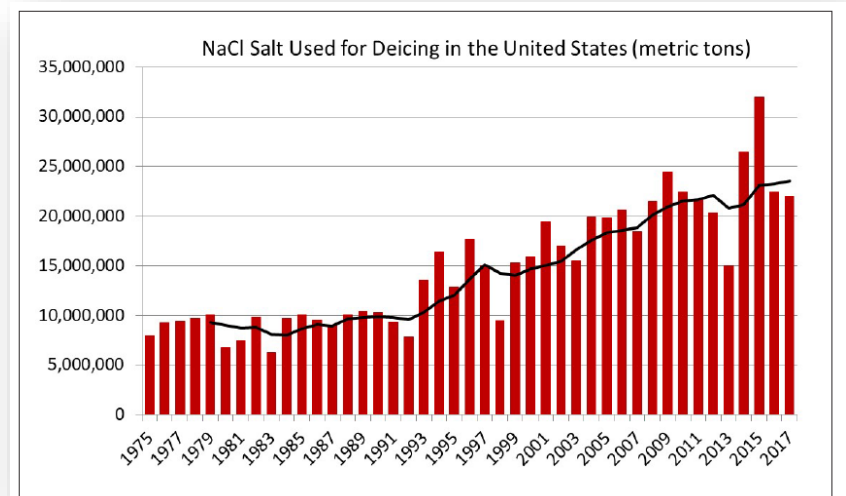
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Research Question and Hypothesis

- Question: Which techniques of salt application to roadways will result in less loading to streams?
- Hypothesis: Significant potential exists to reduce chloride inputs to surface and groundwater through adoption of salt reduction strategies in Maryland



Large Array of Winter Maintenance Best Practices Available

- “Literature Review of Winter Maintenance Best Practices”
 - Reviewed 57 papers
 - Salt reduction strategies, research papers, journal articles, and guidance documents
 - Findings
 - Persistence of chloride make reduction of salt use the best practice- extremely hard to quantify direct load reduction in streams
 - To reduce salt use, practices should be proactive, not reactive
 - Wide array of practices, many factors to determine which one is best
 - Compiled list of best practices in literature review
 - Used data to develop survey

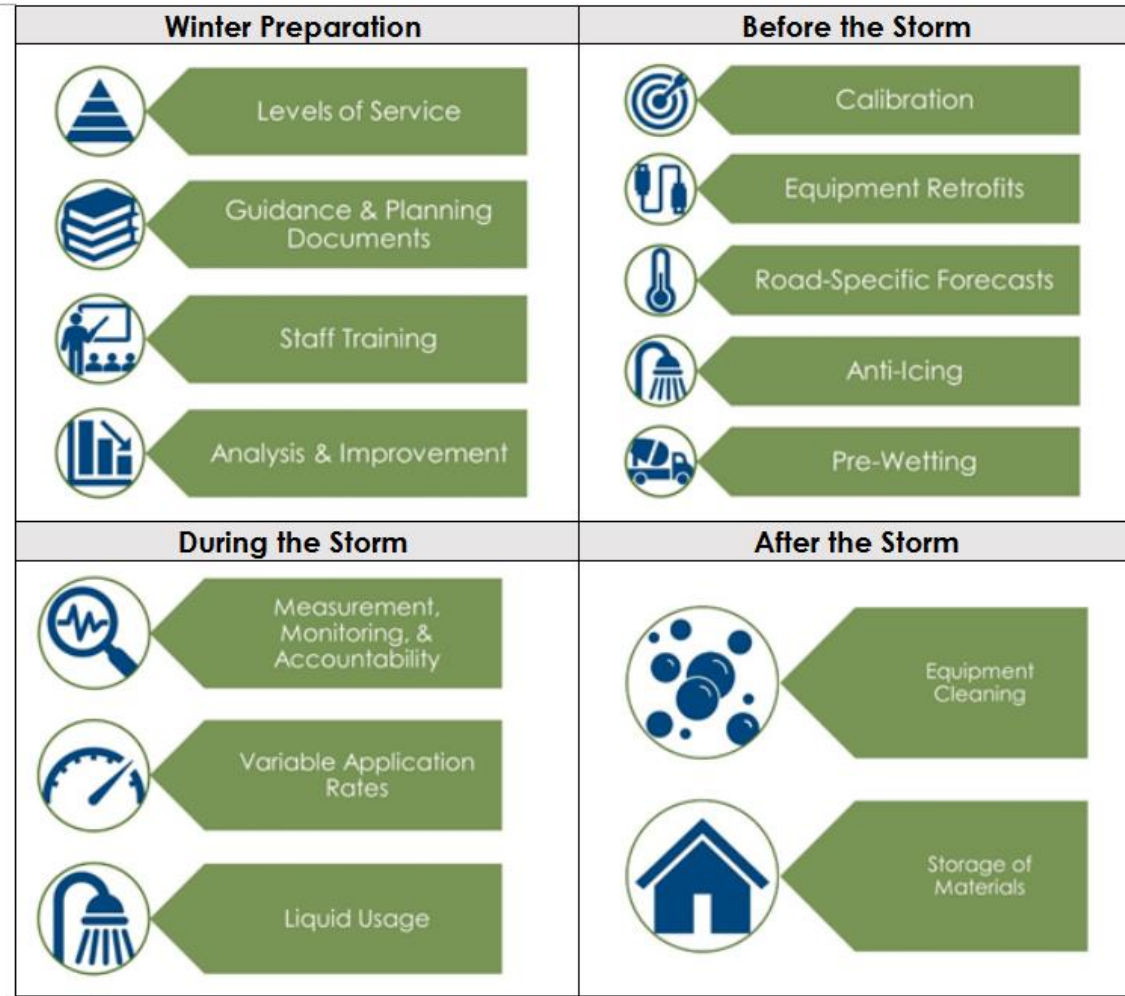
To reduce salt use, practices should change from reactive to proactive

- Literature Review
 - Fundamental Practices (low capital)
 - Calibration
 - Output measurement
 - Accountability
 - Designated levels of service
 - Training

To reduce salt use, practices should change from reactive to proactive

- Literature Review
 - Supplemental Six
 - Variable application rates
 - Road-specific forecasts
 - Cold-temp specific practices
 - Liquid material usage
 - Pre-wetting
 - Anti-icing

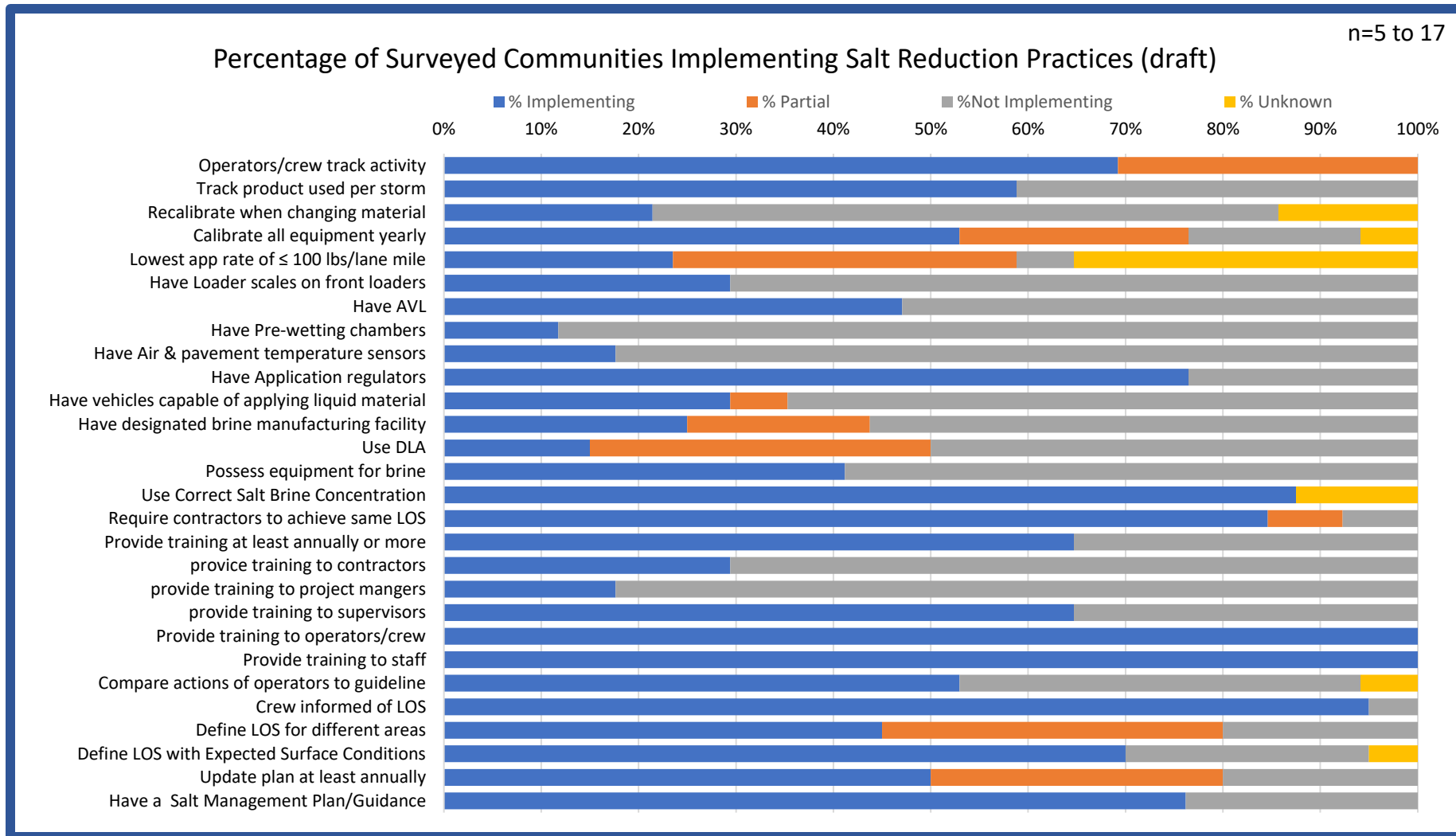
Large Array of Winter Maintenance Best Practices Available



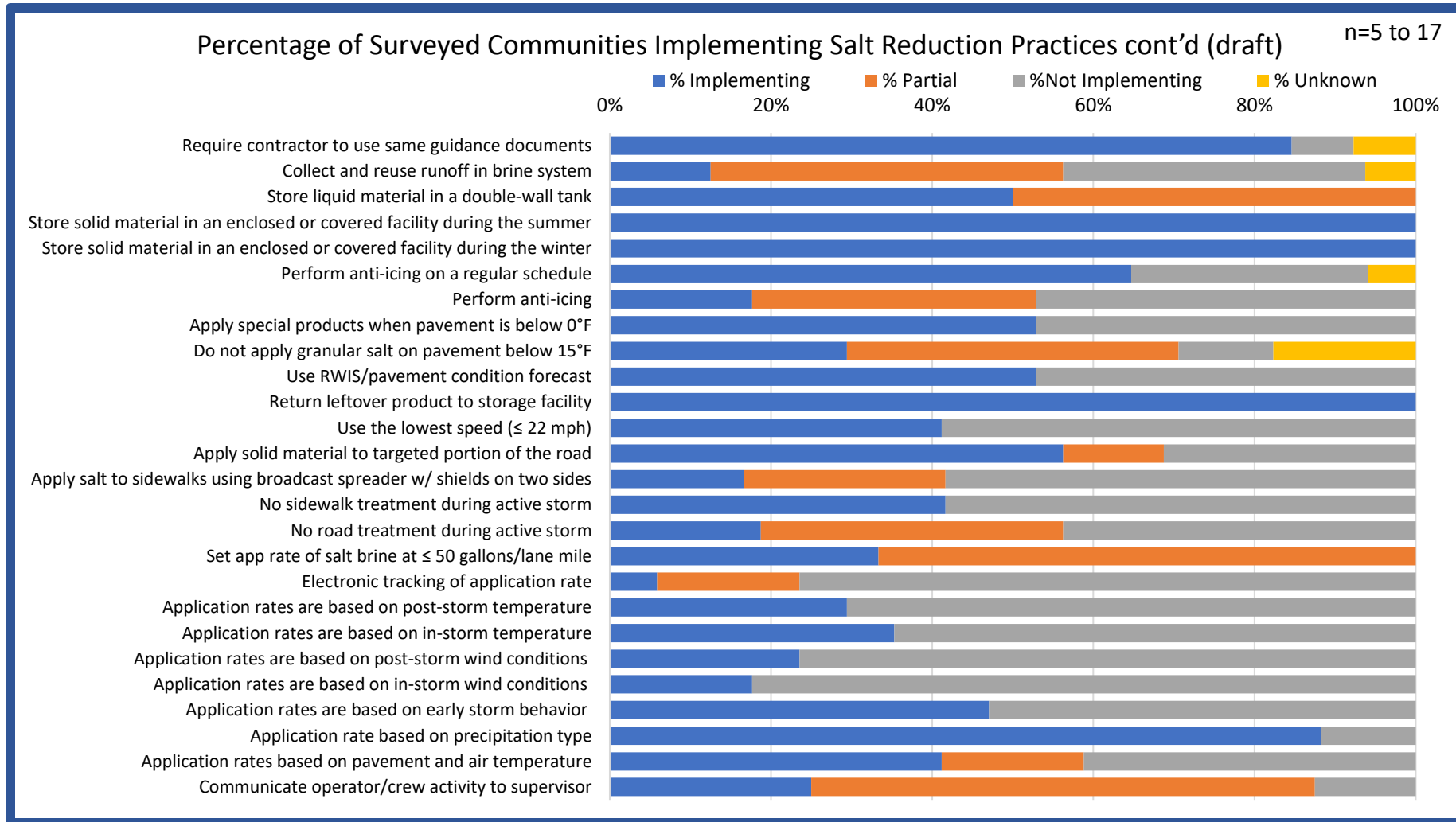
Baseline Practices in Maryland MS4 Communities Vary

- Survey
 - Developed with SHA
 - Pivoted from contractors to MS4
 - Primary Survey: MS4
 - Secondary Survey: Contractors
 - Sent out to 43 MS4 jurisdictions
 - 5 Phase I communities finished
 - 12 Phase II communities finished
 - Respondents mixture of stormwater/watershed manager, superintendent, highway/roads/DPW manager

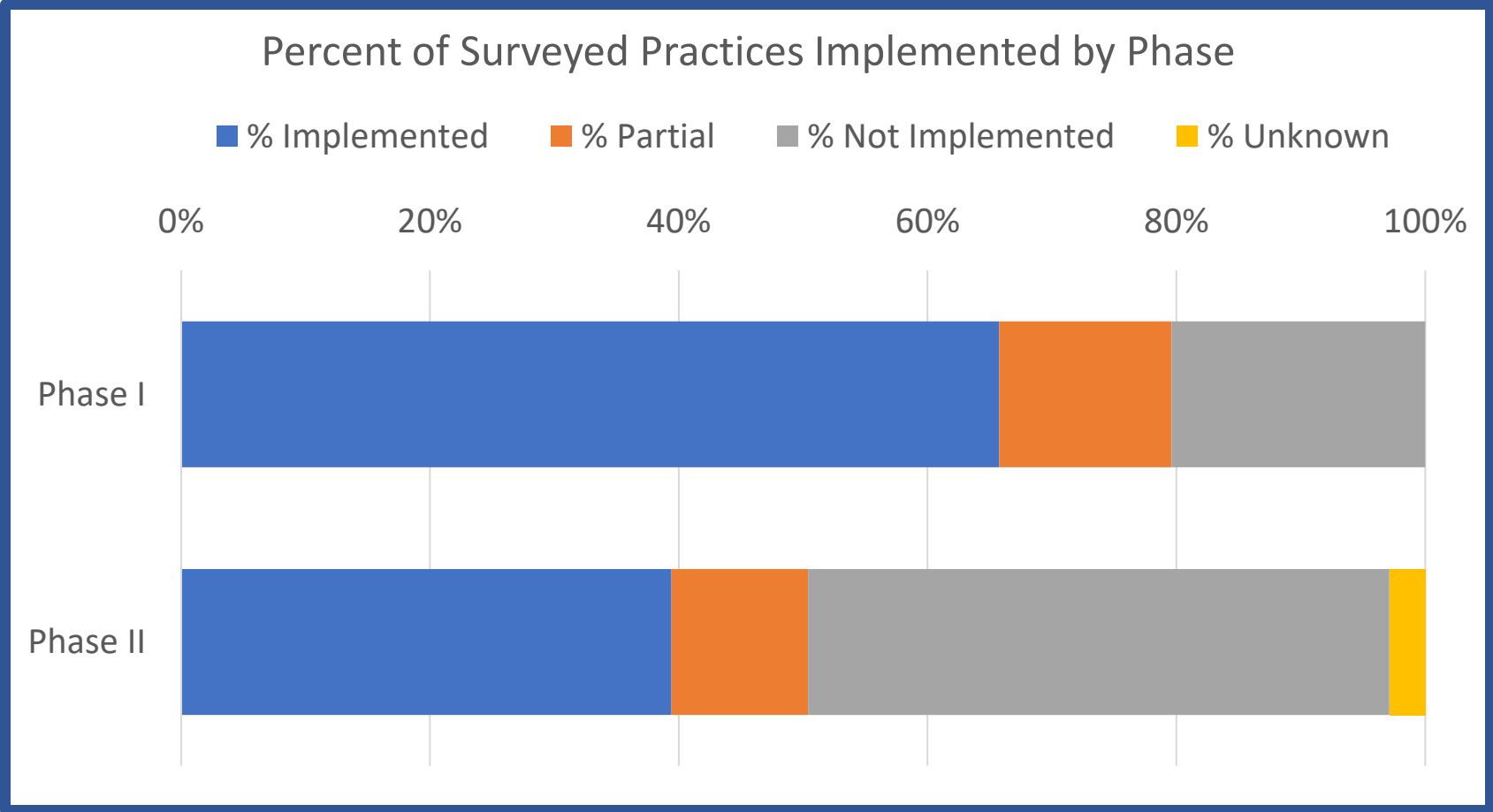
Survey showed existing gaps in implementation



Survey showed existing gaps in implementation



Current Implementation Varies with Phase I and II



Education and cost are major barriers to implementation

- Baseline information for many jurisdictions not easily accessible
 - Stormwater managers need to get information from different department
- Current implementation varies, especially between Phase I and Phase II (size)
- SHA, although one of the biggest users, have made significant effort in salt reduction
- Various salt reduction strategies available, but limited resources, information make it difficult to implement/select
 - Disconnect between stormwater community and salt operators
 - No one size fits all solution, should have guidance on BMP selection based on size, resources, snowfall

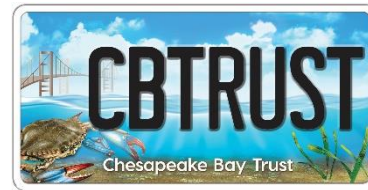
Contact Information

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Acknowledgment



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Translation Slides by Karl Berger

What does this mean for me?

- This is not a science issue.
 - Science is clear that current practice is causing unacceptable harm
 - Practices exist that can reduce salt use
- This is a management issue
 - How do we bring best practice information to the salt user community and overcome institutional barriers to implementation

What does this mean for me?

- Information about how to reduce salt use is not part of the usual stormwater BMP framework
- The main consumers of this information will be highway maintenance and public works staff
- Yet the final responsibility for information dissemination and action will rest with stormwater managers under MS4 permit requirements

What does this mean for me?

What do I take from this if I am a practitioner:

- There are a lot of salt reduction practices from which to choose.
- Some of the most promising practices can result in cost savings, but the initial capital investment/training tends to be a barrier

What do I take from this if I am a regulator:

- This is not a problem that the standard approach of implementing BMPs and counting reduction credits can fix.