Comments on the Water Quality Monitoring & Research Workgroup's Pilot Project Proposals

Table of Contents

I. Summary of Comments
II. Comments from Commenter #1
III. Comments from Commenter #2
IV. Comments from Commenter #3

Summary of comments:

- Preferred Proposal (only mentioned specifically by Commenter #2):
  - Fairfax Water's Proposal
- Clarification on scope and need
  - The pilot is aimed at measuring the impact of BMP implementation in total, not individual BMPs, as discussed by Commenter #2.
- Shared ideas (at least duplicated):
  - Monitoring should be year-round.
  - Monitor by collecting ion grab samples + continuous specific conductance.
  - Recommended grab samples:
    - Monthly sampling in non-winter months (Apr-Oct or Apr-Nov)
    - Bi-weekly to Weekly monitoring (Nov-Mar or Dec-Mar)
  - It is important to have a site with a historical record of water quality. A good candidate would be a site with bi-weekly and/or event sampling that has occurred at least over the winter season.
  - Reference watershed is not needed.
  - A control site should be used and would have to be in a similar location to the monitoring site.
  - Salt use data is a must know. Note, this is currently seen as unrealistic by the Salt Tracking & Reporting workgroup.
  - Monitoring of groundwater seeps (mentioned here by commenter #2 and in previous correspondence by commenter #1) would be valuable.
- Additional thoughts represented by single commenters:
  - In addition to scheduled sampling, winter storm-event grab samples should be collected.
  - Sodium may not be necessary to measure.
  - Stormwater management basins may not be useful to monitor, although they may provide some insight.
  - The historical record of salt use may not be available to provide a historical reference.
  - Preference for upstream and downstream sampling locations
- New ideas:
  - Need to base study on statistical significance and what it will take to get to that (e.g., sample size for a single site).
  - Developing a mass-balance would be useful for understanding ion residence time in the system.
  - Sodium samples may give insight into fate/transport compared to chloride.
  - Consider soil samples adjacent to roadways to observe residual runoff (i.e., after the winter storm).
  - May need other analytical constituents besides chloride and sodium like hardness and sulfate. We should consult with an analytical chemist to identify constituents that impact chloride availability.
  - Looking past the pilot, it may be useful to pool jurisdictional funds for more locations with long-term monitoring.

Commenter #1:

I see a lot of overlap between the pilot studies. Some thoughts after reading through the studies:

1) I think a control watershed is more important than a reference watershed. I think we have a reasonable handle on reference conditions, or at least variability in SC, Cl, and flow/discharge at a reference site will be much lower than in the pilot (and control) watersheds due to annual variations in snowfall amount, snowfall quantity per storm, etc.
2) I think the monitoring should be done throughout the year
3) Since salt application data will be available, I think performing a mass balance will be useful to get a sense for the residence time of chloride in the study watersheds (somewhat counter to monitoring ideas from elsewhere).
4) Grab samples once per month is probably good enough for non-winter if there are pre-existing data with biweekly and/or event sampling during Dec - Mar.
5) Having sodium concentrations in grab samples would be nice, though not crucial, because they could provide insight into salt movement directly from surfaces to streams (Na : Cl molar ratio ~1) versus indirect movement through soils and groundwater to streams (Na : Cl molar ratio <1).
6) I'm not sure that studying individual stormwater management basins ("BMPs") are as vital for the pilot study though doing so would likely provide some useful information.
7) I'd recommend staying away from ion-specific probes for chloride. I think high-frequency/continuous specific conductance accompanied with analysis of chloride (and perhaps other ions) in grab samples is a better way to go.
8) Unlike what was observed in New Hampshire (highest Cl in summer), Cl is substantially higher in the winter (Dec - Mar) in the Mid-Atlantic for most watersheds.

Commenter #2:

Three frameworks were submitted (CWP, FW, and JM). All three frameworks had useful perspectives included in the document. Based on the content of the documents, FW was the most organized, detailed, and complete of the group. Below are a few observations and comments on the Pilot Study.

1) In my opinion it will be difficult to "assess the effectiveness" of the BMPs at this stage of the program. It does not appear that there are sufficient historical records of deicing and road salt application materials to provide a reference of the loads entering the local streams that contribute to the existing conditions. The FW framework correctly indicates "*It might be difficult to measure the impact of any one particular BMP, instead it might be more appropriate to focus on the total benefits resulting from implementation of BMPs*". Additionally, evaluation of a BMP requires a precise control of a broad range of variables. The CWP framework points out "*A monitoring study to evaluate the effect of a BMP on runoff water quality is a smaller scale assessment compared to evaluating long-term trends in-stream water quality*". It will be important to select a site with an historical record of water quality as well as a substantial level of deicing and road salt application with good access downstream of the runoff. It is unclear if a "reference station" is needed. Contributions of the regional geochemistry could be estimated based on the geology of the area. It may be more beneficial to use an upstream/downstream approach to the point of discharge for the salt loading. This would help control the number of sample locations as well as sample number.
2) Frequency of sampling- the study should be conducted year round. Collection of water quality grab samples should be tailored to the seasonal cycle of deicing solution and road salt application. During the winter months (Nov-Mar?) samples should be collected weekly. In Apr-Oct monthly samples should be sufficient. We should discuss whether a statistical basis is essential to the success of the pilot program at this stage.

3) Analytical constituents – all three frameworks have similar analytical approaches. We need input from an analytical chemist to determine if the water quality grab samples should also include other analytes which may alter availability of the dissolved fraction of CL^- . It appears that hardness and sulfate may be two additional constituents we should consider in the analytical suite.
4) Additional sample matrix – we should consider the inclusion of soil samples adjacent to the roadway as an ongoing source of CL^- after the winter season has passed and the application of deicing solutions or road salt has ceased. There could be a residual runoff.
5) Potential groundwater seeps – if we decide to evaluate the potential of groundwater seeps, there are a few options to consider. The installation of temporary piezometers between a roadway and a receiving stream (provided there is sufficient hydrologic head) could be an option. Alternatively, the use of a geoprobe to collect conductivity readings from the groundwater would eliminate the need for drilling wells.
6) In terms of the overall evaluation of the frameworks – the FW submission is the most appealing over the long-term. If the document is an indication of the future products, it gets my vote.

Commenter #3:

Everything looks great! Just some quick comments.

1) The purpose is to determine the effects on water quality from a BMP, ex. Salt brine, right? If so, the control site would have to be a location very similar to the monitoring site, but with unchanged, but of known quantity, salt usage.
2) Neely emphasized the importance of the data being statistically significant; if not, it's just collecting data to collect data. There are ways to calculating how many samples are needed to determine significance (this would be more Neely/Sujay wheelhouse). I think Joel's research would include this fact too. If funding is limited, it will likely be better to focus on one spot to make sure it's significant, rather than spread the funds to different locations and not really be able to produce useful information. Although the pilot project will likely only be one location, for long term monitoring, it might be more beneficial for jurisdictions to pool together funding for select locations.
3) One thought I'm not sure that came through in our plan was that the tracking portion of the monitored site AND the control site are super important. If the amount of salt put down on either site is unknown or inaccurate, there's no way to quantify any benefits.
4) I think all 3 plans go well together! Once you finalize a date for the next meeting, I'm going to see if Neely can come, as she has a lot of experience with developing monitoring plans for regulatory purposes. She definitely asked me really hard questions that I hadn't thought about at our meetings!
5) Other Monitoring- The Baltimore Reservoir system has done chloride monitoring for quite a while (I think the past 30 years) with some gaps. They are working on a new monitoring plan I believe, not 100% sure of the status
    a. https://pubs.usgs.gov/sir/2011/5101/
    b. https://www.baltometro.org/sites/default/files/bmc_documents/watershed-action-strategy_2018-progress-report.pdf