

**SUMMARY NOTES OF THE JUNE 5, 2018 MEETING OF THE
TECHNICAL ADVISORY COMMITTEE FOR
A CHLORIDE IMPACT STUDY FOR THE SOUTHEASTERN WISCONSIN REGION**

INTRODUCTION

The June 5, 2018, meeting of the Technical Advisory Committee for *A Chloride Study for the Southeastern Wisconsin Region* was convened at the offices of the Southeastern Wisconsin Regional Planning Commission (SEWRPC) at 1:31 p.m. The meeting was called to order by Committee Chair Thomas M. Grisa, Director of the City of Brookfield Department of Public Works. Mr. Grisa welcomed the attendees to the meeting. Attendance was taken by circulating a sign-in sheet.

Members Present

Technical Advisory Committee Members

Thomas M. Grisa, Chairman.....Director, Department of Public Works, City of Brookfield
Laura K. Herrick, Secretary Chief Environmental Engineer, SEWRPC
Joshua Glass (for Scott Schmidt)Project Technician, Washington County Highway Department
James Hughes..... Chief State Highway Maintenance Engineer, WisDOT
Scott KroegerDirector, Public Works and Development, City of Muskego
Matthew Magruder.....Environmental Research Manager, MMSD
Jennifer Phillips (for Robie Anson) Water Quality Standards Reviewer, USEPA Region 5
Mark Piotrowicz.....Director, Department of Community Development, City of West Bend
David Strifling Director, Water Law and Policy Initiative, Marquette University Law School
Thomas WizaDirector, Engineering and Public Works, City of Cedarburg
Jake Zimmerman (for Benjamin Benninghoff).....Water Resources Engineer, WDNR

Guests and Staff Present

Joseph Boxhorn.....Senior Planner, SEWRPC
Micheal Hahn..... Executive Director, SEWRPC
Karin Hollister Senior Engineer, SEWRPC
Kevin Muhs..... Deputy Director, SEWRPC
Nicklaus NeureutherSpecialist-Biologist, SEWRPC
Neil O'Reilly.....Lecturer, UW-Milwaukee
Aaron Owens Planner, SEWRPC
Thomas SlawskiChief Biologist, SEWRPC
Bao TranSupervisor, Maintenance Team, WisDOT Southeast Region

UPDATE ON FUNDING FOR THE STUDY AND SCHEDULE

Mr. Grisa asked Mr. Hahn to provide an update on funding for the study and project schedule. Mr. Hahn noted that the Technical Advisory Committee (TAC) has not met since 2016, and in the interim SEWRPC staff have been busy securing funding for the project. The total project budget is \$1.7 million, and the Federal Highway Administration and SEWRPC are each contributing one-third of that amount, the Milwaukee Metropolitan Sewerage District (MMSD) is contributing \$170,000, the Fund for Lake Michigan is contributing \$127,000, and the Wisconsin Department of Natural Resources (WDNR) is contributing \$80,000 from the Great Lakes Protection Fund. Mr. Hahn indicated the SEWRPC staff will continue to pursue additional funding sources to meet the remaining project budget. Mr. Hahn noted that the project schedule is four years, with the monitoring effort starting this fall and continuing for two years. The following two years will include data analysis, modeling, and documentation.

UPDATE ON THE PROGRESS OF THE STUDY

Mr. Grisa invited Ms. Herrick to provide an update on the progress of the study and results from the Pewaukee River pilot monitoring site. Ms. Herrick utilized a Powerpoint presentation for the remaining topics on the agenda, and this presentation is included as Attachment A. Ms. Herrick briefly reviewed the project scope for new TAC members, and Mr. Hahn noted that the TAC will be providing input throughout the study progress.

Monitoring Equipment and Laboratory Analyses

Ms. Herrick next reviewed the conductance monitoring equipment selection for the 30 to 40 stream locations to be included as part of the Regional Chloride Study (Study). The SEWRPC staff reviewed nine different conductance monitoring devices from six manufacturers. Ultimately three devices were selected for pilot testing based on cost, temperature and conductance range and accuracy, availability of telemetry, the ability to measure water level, and calibration needs. Telemetry was deemed important so each monitoring location can be evaluated in near real time. This will allow the SEWRPC staff to know quickly if there is an issue at a location. Ms. Herrick indicated that one sonde with a chloride ion selective electrode (ISE) sensor will also be purchased for the Study, and will be used to spot check the stream monitoring locations as well as to develop quarterly chloride profiles during the project at up to four lakes in the Region. Dr. Slawski noted that lake groups have been encouraged to collect additional chloride or conductance data that can be used for this Study. Dr. O'Reilly said he would check data he has received from the U.S. Geological Survey (USGS) lake groups for useful chloride data for the Study.

Ms. Herrick also briefly reviewed laboratory costs for grab sampling to be completed as part of the study. The grab samples will be taken to correlate the conductance measurements in the field to actual lab-analyzed chloride concentrations. She commented that samples to date have been sent to the State Lab of Hygiene in Madison. Mr. Magruder indicated that he will find out what the MMSD laboratory charges for sample analysis and provide this information to SEWRPC staff. Dr. O'Reilly recommended looking into a courier service to deliver the 30 to 40 samples to the lab in Madison if it is decided to have the State Lab of Hygiene continue lab analysis for the project. Ms. Herrick said grab sampling will occur approximately once a month when staff visit each of the monitoring locations for equipment cleaning. She noted there is the potential for the chloride sonde to reduce the need for grab sampling. The SEWRPC staff plan to do both sampling and sensor readings for a period to confirm the accuracy of the chloride ISE sensor, and then review the interval for grab sampling.

Pilot Site

Ms. Herrick next reviewed the results from the pilot site located on the Pewaukee River near the SEWRPC office. Three conductance sensors were evaluated from November 2017 to date, and performed well over the winter. Dr. O'Reilly asked if the conductance sensors were vented, and Mr. Owens indicated that the METER Group device is vented. Dr. O'Reilly noted that the vented cable may foul and will need to be cleaned along with the sensors. He also indicated that USGS staff has experimented with the pattern and size of the holes drilled in the PVC cases around the sensors and may have ideas to share.

Dr. O'Reilly noted that if the sensors become buried in the sediment at the bottom of the stream, the sensor may be measuring groundwater conductance levels. Mr. Owens said that the sensors will be attached to 8-inch concrete blocks, with the intent to keep them up in the stream flow and prevent sediment fouling as much as possible.

Ms. Herrick reviewed a graph showing monitoring results from the three sensors at the pilot site. She noted that the data from the three conductance sensors tracked each other well, and that the pressure sensor on the METER Group device provided insight for when flows increased. Ms. Herrick showed slides on which average air temperature and snow depths were overlaid on the sensor data to evaluate potential causes of

changes in specific conductance at the pilot site over the past winter. (Specific conductance is the conductance reading normalized to 25°C.) Mr. Grisa commented that runoff can occur at temperatures below 32°F due to salting. Ms. Herrick indicated that air temperature impacts will be evaluated further as the study proceeds.

Ms. Herrick next reviewed a graph of the pilot site monitoring results, which included specific conductance data for the entire period of record from the METER Group sensor and chloride concentrations from the six grab samples collected to date. Staff collected samples about once a month, with an additional sample taken April 5, 2018, during a period of high conductance. She noted that the April 5, 2018, chloride concentration at the pilot site was 560 mg/l, which exceeds the chloride chronic toxicity criterion of 395 mg/l and was the highest chloride concentration sampled at the pilot site to date.

Ms. Herrick discussed the fouling of the monitoring equipment at the pilot site. Fouling of the equipment was observed during both winter and spring operation. The equipment fouling included both biofilm and sediment accumulation. Dr. O'Reilly asked if chloride stratification in the stream is anticipated since it is necessary for the equipment to be in water depths of three feet or more. Mr. Owens answered that the three-foot depth is required to protect the equipment from freezing and ice movement. Dr. Boxhorn added that the SEWRPC staff will evaluate stream monitoring locations for good flow characteristics, and chloride stratification is not anticipated. Dr. O'Reilly asked if rating curves will be developed at each monitoring location. Ms. Herrick responded that USGS stream gages will be used as much as possible, and rating curves may be developed at a few select locations. Mr. Hahn noted that available hydraulic models will also be used to develop flows at the monitoring locations as needed.

Ms. Herrick noted that after analyzing the performance of the three sensors deployed at the pilot site this past winter and spring, SEWRPC staff selected the METER Group CTD-10 conductance, temperature, and depth sensor and the Em60G solar remote data logger and telemetry system for use in the Study. This setup showed the least amount of fouling during pilot testing, is cost effective, and has the added benefit of the pressure sensor to provide depth of water information at each monitoring location.

Source Data Needs

Ms. Herrick indicated that SEWRPC staff plan to request deicing data for the Region as part of the Study. The request will ask for both historical data from the last 20 years and data for the Study monitoring period of fall 2018 to fall 2020. The SEWRPC team plans to make the data request via letters to both public and private sources this year. Mr. Grisa recommended that the data request be made as soon as possible to allow communities and contractors to have sufficient time to make any necessary alterations in their tracking methods. Ms. Herrick noted that private vendor data may be difficult to collect, and welcomed any ideas the TAC may have. Mr. Zimmerman commented that the WDNR receives annual reports from MS4 communities in March that compile monthly salting totals. Mr. Wiza confirmed that the City of Cedarburg compiles monthly salting totals.

REVIEW OF PROPOSED STUDY MONITORING LOCATIONS

Mr. Grisa invited Ms. Hollister to present the proposed preliminary monitoring locations to be installed this year as part of the Study. She gave the TAC a map and a list of 45 preliminary site locations. Ms. Hollister noted that the current list of potential monitoring locations was refined from an original list of approximately 60 sites, and the site numbers presented are not continuous as they retain the original numbering. The number of sites will be further reduced to 30 to 40 based on field visits, which will assess site suitability (water depth and channel substrates), access, and safety. She indicated that proposed monitoring sites were selected based on multiple factors including distribution of sites by watershed and county, types of contributing land use, proximity of sites to USGS stream gaging sites, status of streams

relative to impairment due to chloride, locations of potential chloride-contributing sources, and capturing a variety of stream sizes.

Ms. Hollister noted that the MMSD also has continuous monitoring locations for conductance in Milwaukee County, and the Study will take advantage of data collected from those locations in order to not duplicate effort. Mr. Magruder commented that the MMSD has changed how often continuous conductance data are collected from five-minute to hourly intervals and data will be downloaded once a month. He noted there will be a minor delay in acquiring the MMSD conductance data for the Study. Mr. Magruder indicated that MMSD has begun using heat blankets so that the conductance sensors will no longer be removed from the streams during the winter. He also said that MMSD staff can collect grab samples as requested at their stream monitoring locations when the streams are not frozen.

Dr. O'Reilly asked if the selection of potential monitoring locations included consideration of contributing drainage areas dominated by septic systems. Mr. Hahn replied that SEWRPC staff have access to GIS data identifying unsewered areas of development which were used to help select the monitoring locations. Mr. Glass asked if the selection of potential monitoring locations took into account road sections where counties are applying only liquid brine for deicing. Ms. Hollister said that information regarding these areas was not available for the initial determination of proposed sites, but would be helpful to have as the study progresses. Mr. Bao offered contacts at Walworth County (Assistant Director of Highways Mike Sierakowski or Superintendent Dave Woodhouse) who could provide brine application information for that County.

Mr. Zimmerman inquired if some of the potential monitoring locations straddled wastewater treatment plant discharges, noting that monitoring data from locations downstream of plant discharges will not be representative of chloride contributions from land runoff. Dr. Boxhorn commented that SEWRPC staff have discussed obtaining discharge monitoring reporting data for wastewater treatment plants with WDNR staff, and noted that the potential monitoring locations do bracket a few wastewater treatment plant discharges.

Dr. O'Reilly commented that the proposed monitoring locations have a nice distribution of stream sizes, and noted that the location on Sussex Creek is largely influenced by pumping from the Halquist quarry. Ms. Herrick requested that the TAC review the potential monitoring locations and provide comments to her (lherrick@sewrpc.org). It would also be helpful to know if there are any other water quality sampling studies currently occurring in the Region. Mr. Strifling asked if the all the monitoring sites were going to be captured for the same two year period. Ms. Herrick indicated that all the stations would be monitored for the same two year period starting fall 2018, and would capture two winter seasons. Ms. Hollister noted that there are approximately 20 to 25 potential monitoring locations that are considered first priority for installation due to a unique or important feature associated with the site (e.g. located near a stream gage).

NEXT STEPS FOR THE PLAN

Mr. Grisa invited Ms. Herrick to review the next steps for the Plan. Ms. Herrick summarized that up to 40 of the preliminary proposed stream locations will have conductance, temperature, and depth sensors with telemetry installed this summer/fall. She noted that SEWRPC staff will reach out to communities and private contractors this year for deicing data. SEWRPC staff will continue to monitor and clean the pilot site equipment through the summer as well as collect samples for laboratory analysis. Ms. Herrick indicated that the chloride sonde will be tested for use on lakes this year. Finally, Ms. Herrick noted that the Study's official two year monitoring period will begin in late fall 2018.

Ms. Herrick commented that the next TAC meeting will be scheduled as needed. She noted that email updates to the TAC may be used to keep everyone informed. She said all information for the Study is also archived on the SEWRPC website at www.sewrpc.org/chloridestudy.

ADJOURNMENT

There being no further business, the meeting was adjourned by unanimous consent at 2:25 p.m.

Respectfully submitted,

Laura Herrick
Recording Secretary

ATTACHMENT

Attachment A – Meeting presentation (243385)

#243324 – PR-57 SUMMARY NOTES CHLORIDE ADVISORY GROUP JUN 5, 2018
200-1100
MGH/LKH/TMS/JEB/AWO/KMH/cc/md
6/20/18



Chloride Impact Study for the Southeastern Wisconsin Region

June 5, 2018

Technical Advisory Committee Meeting

#242775

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Outline

- Study Schedule and Funding
- Study Scope
- Monitoring Equipment
- Pilot Testing
- Study Data Needs
- Potential Monitoring Locations
- Next Steps

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Schedule and Funding Partners

- Four Year study (2018-2022)
- Two Year monitoring (2018-2020)



U.S. Department of Transportation
Federal Highway Administration



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MMSD
PARTNERS FOR A CLEANER ENVIRONMENT



Fund for Lake Michigan
Clearly making a deep impact.

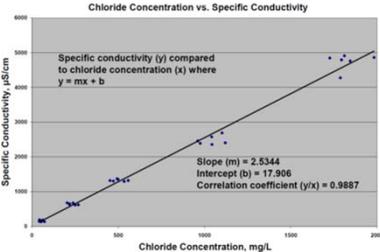


WISCONSIN
DEPT. OF NATURAL RESOURCES

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Study Scope

- Examine all sources of chloride
- Compile chloride, conductance, and flow data for stream, lake, and groundwater resources
 - Existing and Historical
 - Deploy 30-40 sites for this Study
 - Establish relationships between conductance and chloride concentrations



Chloride Concentration vs. Specific Conductivity

Specific conductivity (y) compared to chloride concentration (x) where $y = mx + b$

Slope (m) = 2.5344
Intercept (b) = 17.906
Correlation coefficient (r) = 0.9987

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Study Scope

- Chloride loading analyses and forecasts
 - Existing and planned 2050 conditions
 - Evaluate potential effect of climate change on winter road maintenance operations under planned 2050 land use conditions
- Review State-of-the-Art
 - Identify and evaluate best practices and technology
 - Explore legal and policy aspects
 - Develop performance and cost information for practices
- Develop alternate chloride management scenarios
 - Meet public safety objectives
 - Minimize harm to the environment
 - Cost effective



Public Works Magazine

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Monitoring Equipment

- Specific Conductance Sensor for continuous monitoring in streams
 - In-Situ Aqua Troll 100 with telemetry - \$3,400 per unit
 - METER Group CDT-10 with telemetry - \$1,300 per unit
 - HOBO Conductivity Logger without telemetry - \$750 per unit
- Factors considered for equipment
 - Conductivity range and accuracy
 - Water level (pressure) sensor – METER Group
 - Temperature range
 - Calibration needs

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Monitoring Equipment

- Specific Conductance Sensor for continuous monitoring in streams
 - Additional supplies for each site are about \$100 (cable conduit, PVC pipe housing, stakes, zip ties, concrete block, rope)
- Sonde with Chloride ISE sensor and Conductance sensor for spot sampling and lake profiles
 - Device, sensors, and cable total cost of approximately \$4,500

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Laboratory Costs

- State Laboratory of Hygiene Costs
 - Approximately \$25 per sample for chloride only
 - Approximately \$150 per sample for chloride, hardness, sulfate, sodium, potassium, calcium, and magnesium to correlate specific conductance and chloride
 - Additional costs not included
 - Drive time and expense to lab
 - Ice and cooler for full sampling regimen
- Chloride Sensor may offset these costs
 - Plan to do both lab sampling and sensor readings for a period to confirm accuracy of chloride sensor, and then review



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Pilot Testing

- Deploy several types of conductance sensors and data loggers at a common location to:
 - Compare how they perform relative to one another (sensor and telemetry)
 - Confirm deployment strategy for winter
 - Evaluate data interval (5-15 min)
 - Evaluate device fouling



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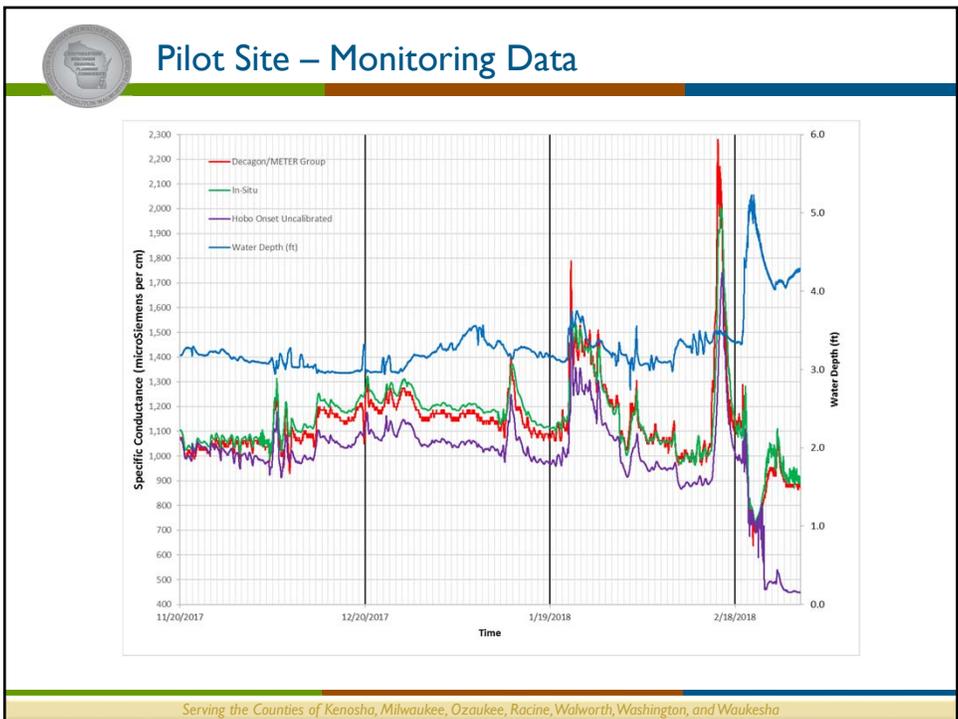
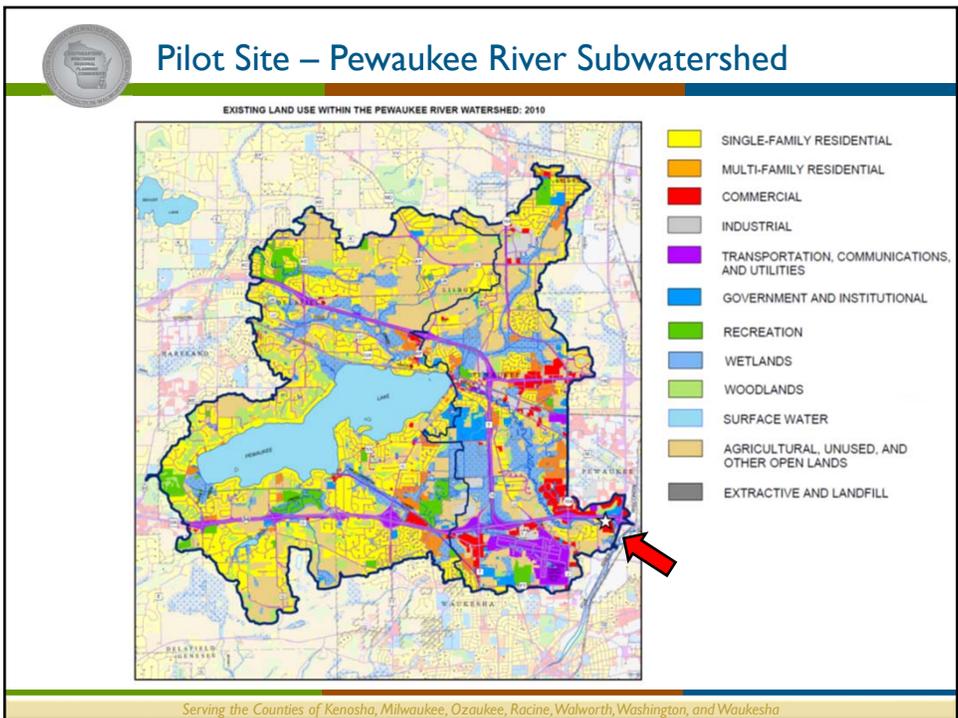


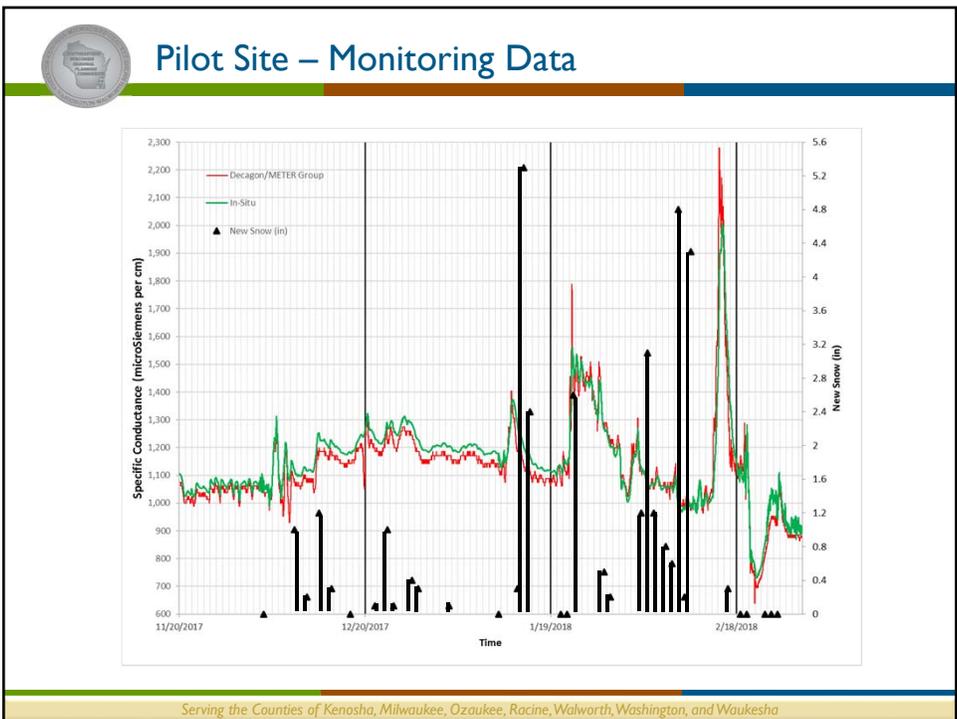
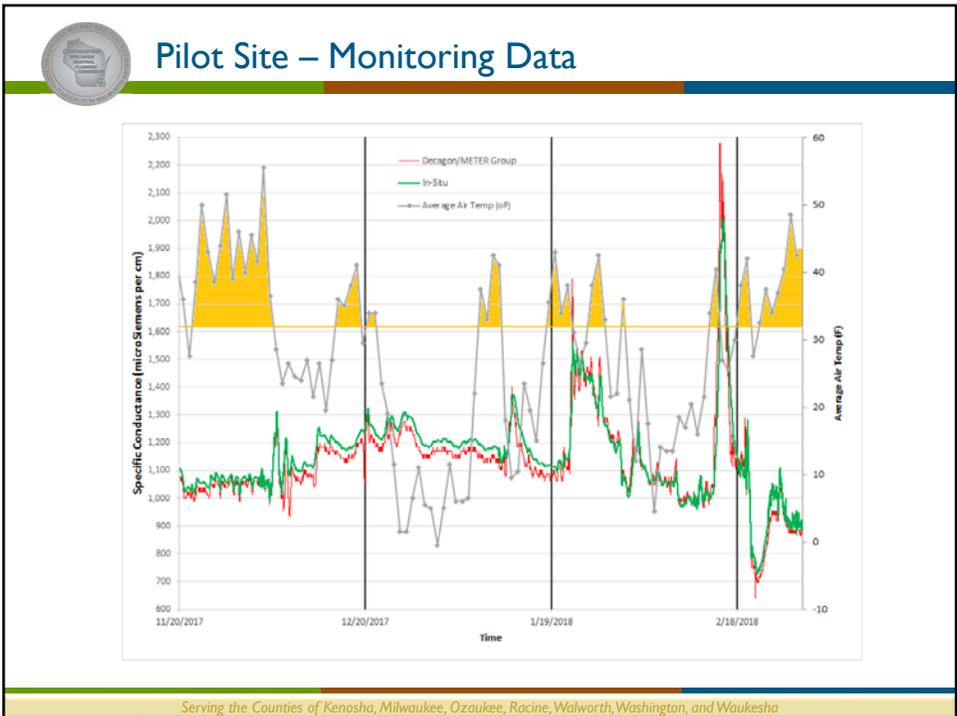
Pilot Testing

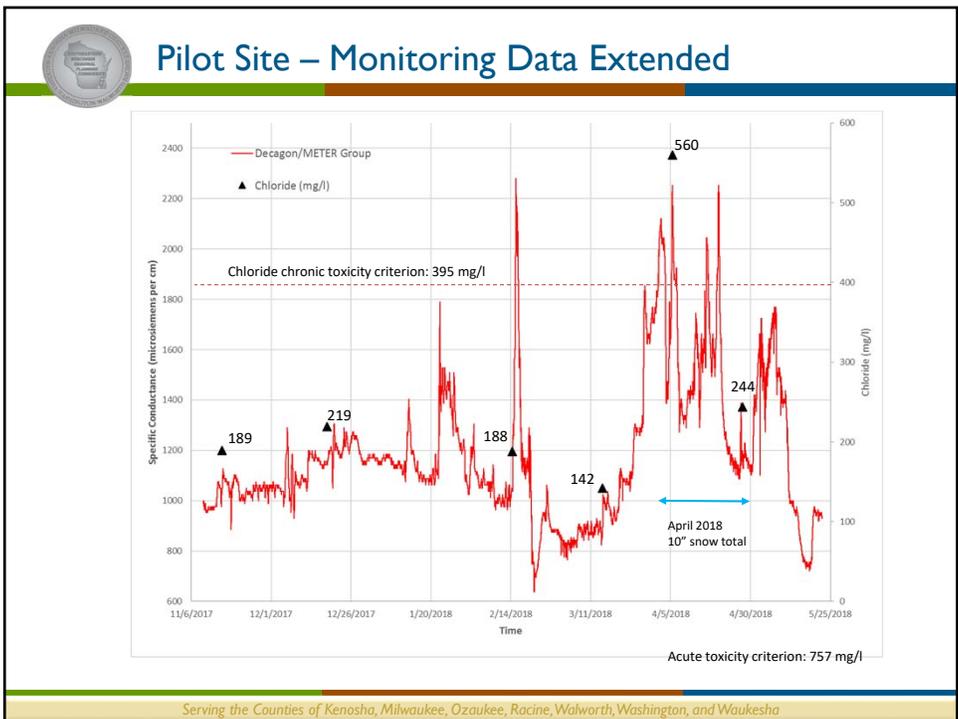
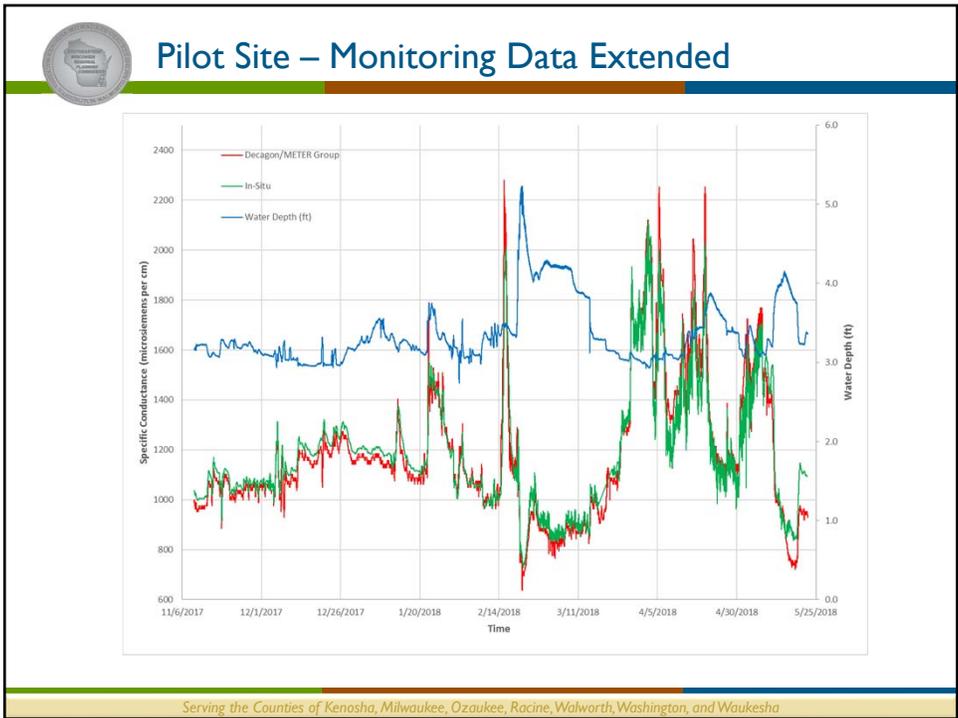
- Collect water samples
 - Test sampling technique during winter
 - Lab analysis for chloride and other major ions contributing to conductance
 - Used to develop correlation to chloride



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Pilot Testing - Fouling

- March 14, 2018 field visit after 4 months of winter operation:
 - Sediment and biofilm accumulation



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Pilot Testing - Fouling

- June 1, 2018 field visit after 2.5 months of spring operation:
 - More biofilm accumulation on sensor housings with some caddisfly and stonefly larvae attaching to sensors
 - Sediment/debris still main fouling concern
 - METER Group device again seemed to have least amount of fouling impeding sensor function



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Study Data Needs

- We will be seeking deicing data from winter maintenance providers (public and private) for both historical (20 yrs) and winter 2018 – 2020:
 - Quantity of deicers used (event and season)
 - Application rates
 - Application practices

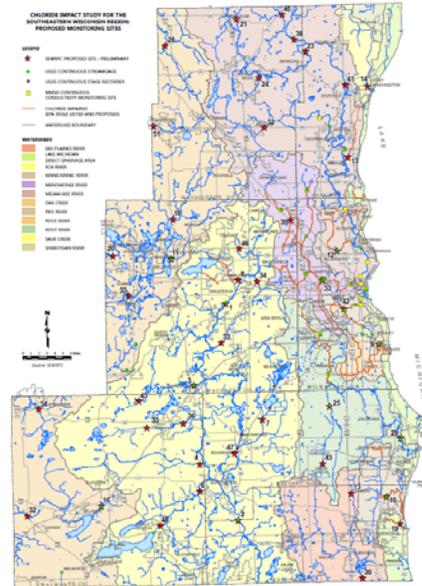


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Potential Monitoring Locations

- Site Selection Considerations
 - Distribution throughout the Region and among the major watersheds
 - Existing streamflow gage locations
 - Existing and historical conductance/chloride monitoring locations
 - Contributing area land use
 - Wastewater treatment plants
 - Chloride-impaired waters 303(d)
 - Public lands and ease of access



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Next Steps

- Deploy up to 40 conductance sensors this summer/fall at stream locations
- Reach out to communities/private contractors for deicing data
- Continue to gather data at the pilot location this summer
- Test chloride sensor use for lakes
- Begin official monitoring period late fall 2018

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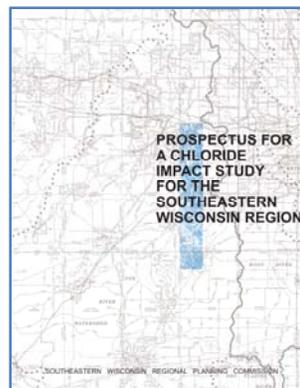
For More Information

- Website for the project
 - <http://www.sewrpc.org/SEWRPC/Environment/ChlorideImpactStudy.htm>

- Contacts

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