

**SUMMARY NOTES OF THE NOVEMBER 9, 2022 MEETING OF THE
TECHNICAL ADVISORY COMMITTEE FOR
A CHLORIDE IMPACT STUDY FOR THE SOUTHEASTERN WISCONSIN REGION**

INTRODUCTION

The November 9, 2022, meeting of the Technical Advisory Committee (TAC) for *A Chloride Impact Study for the Southeastern Wisconsin Region* (Study) was convened online at 10:01 a.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 using the online software.

Members Present

Thomas M. Grisa, Chairman.....Director, Department of Public Works, City of Brookfield
Laura K. Herrick, Secretary..... Chief Environmental Engineer, SEWRPC
Roley Behm Public Works Superintendent, Racine County Highway Department
Benjamin Benninghoff..... Natural Resource Basin Supervisor, WDNR
Mandy Bonneville.....Deputy Director/County Conservationist, Walworth County
Brian Cater.....Interim Director of Public Works/City Engineer, City of Kenosha
Steven Corsi.....Research Hydrologist, Chemistry, USGS
Timothy GrundlProfessor Emeritus, School of Freshwater Sciences, UWM
David J. Hart.....Hydrogeologist, WGNHS
Bryan Hartsook Natural Resource Basin Supervisor, WDNR
Craig Helker..... Water Resources Biologist – Southern District, WDNR
Richard Hough..... Director of Public Works, Walworth County
Matthew T. MagruderEnvironmental Research Manager, MMSD
Max Marechal City Engineer, Engineering Department, City of West Bend
Cheryl Nenn..... Riverkeeper, Milwaukee Riverkeeper
Neal O'Reilly.....Director, Department of Conservation and Environmental Science, UWM
Charles Paradis..... Assistant Professor, Department of Geosciences, UWM
Scott M. Schmidt.....Chief Public Works Officer/County Surveyor, Washington Co. Hwy. Dept.
Kurt Sprangers..... Engineer in Charge, Environmental Engineering Section, DPW, City of Milwaukee
David Striffling..... Director, Water Law and Policy Initiative, Marquette University Law School
John Walker..... Director, Midwest Water Science Center, USGS
Michael Wieser.....Director, Engineering and Public Works, City of Cedarburg

Guests and Staff Present

Joseph Boxhorn.....Principal Planner, SEWRPC
Karin Hollister Principal Engineer, SEWRPC
Zijia LiEngineer, SEWRPC
Casey Loew.....Office Assistant, Department of Public Works, Racine County
Nicklaus NeureutherSpecialist-Biologist, SEWRPC
Aaron OwensSenior Planner, SEWRPC
Justin Poinssatte..... Senior Specialist-Biologist, SEWRPC
Thomas Slawski.....Chief Biologist, SEWRPC

REVIEW OF STUDY SCOPE AND FIELD WORK

Mr. Grisa asked Ms. Herrick, Chief Environmental Engineer of the Southeastern Wisconsin Regional Planning Commission (SEWRPC), to begin the agenda discussion items. Ms. Herrick briefly reviewed the Study background and scope. There were no questions from TAC members.

Mr. Neureuther reviewed the field work effort for the Study. Mr. Neureuther summarized the field work for stream (41 locations) and lake (6 lakes) monitoring sites and presented some of the draft preliminary results. Mr. O'Reilly asked if pH and heavy metals data were taken during the analysis and Mr. Neureuther responded that they were not measured. Mr. O'Reilly commented that increases in chloride can lead to increases in heavy metal toxicity. Mr. Corsi said that he will check on potentially available pH and metal data for the streams in the Study. Mr. Hart asked if land use data has been analyzed for the lake sites, and Mr. Owens responded that this work is in progress and will be documented in the field analysis report (TR 61). Ms. Nenn asked whether all the water sample data are in the WDNR SWIMS database, and Mr. Neureuther responded that most water sample data are in SWIMS but conductivity data are not due to the large size of the dataset. Mr. Benninghoff asked if effective or connected impervious would be tabulated for each contributing basin, and Mr. Owens responded that impervious surfaces that potentially receive salt applications will be assessed as part of the land use analysis and will be documented in one of the Study's technical reports.

Ms. Hollister discussed the data collection and management work. This included a review of the specific conductance and grab sample data, quality assurance/quality control summary, and the SEWRPC and outside data collected for the Study. Ms. Hollister noted the issues that staff has had getting the Study grab sample data into the WDNR SWIMS database correctly. Mr. Grisa asked if retailer data has been found that could help evaluate water softener use. Ms. Hollister responded that we have not asked for this information as it would be hard to confirm where the purchased salt was used, and in 2019 there was a shortage of sidewalk salt, thus softener salt was used in its place. Mr. O'Reilly added that there would be difficulty determining where the purchased salt is released into the environment, whether to wastewater treatment plants, groundwater, or streams. SEWRPC staff plan to use wastewater treatment plant data along with staff salt usage that was documented over the monitoring period to develop an estimate for water softener chloride contributions for the Region.

Ms. Hollister continued to discuss the deicing sources data. Mr. O'Reilly asked how we plan to describe impervious surfaces, and Ms. Hollister responded that we have roadways and parking lots well defined in the land use dataset. We most likely will have to make an assumption for sidewalks but anticipate that contribution to be small for private salting as compared to parking lots. Ms. Nenn commented that she has a list of deicing professionals and some retailers who have taken training classes, which may help address private deicing questions for the Study.

REVIEW OF DATA ANALYSIS

Mr. Boxhorn reviewed the work on the regression analysis for using specific conductance to estimate chloride concentration. This work will be used to convert the continuous specific conductance data collected at monitoring sites to estimated chloride concentrations, which will then be used to complete our monthly mass balance estimate for chlorides. Mr. Grundl asked about the importance of atmospheric deposition as a source of chlorides to the environment. Mr. Boxhorn and Ms. Hollister answered that atmospheric deposition is anticipated to be a minor source relative to other sources, especially road salting, but it is not insignificant. Mr. Walker commented that USGS has used SPARROW modeling to disaggregate in-stream pollutant load estimates into upstream subbasins and for regional regression analyses. Mr. Boxhorn indicated he will look into that tool further. Mr. Hartsook commented that dry weather versus wet weather relationships may be different for the stream regression analysis. Mr. Boxhorn noted that we are working on that question right now. Mr. Corsi noted that background chemistry such as hardness or major ions may be a good way to group the sites or as data for the regression analysis, and Mr. Boxhorn agreed.

REVIEW OF REPORT STRATEGY AND WORKING GROUP SIGNUP

Mr. Boxhorn next introduced the lead staff for the seven technical reports (TR) that will be developed as part of this Study, and staff provided a brief summary of each report. Mr. Owens introduced TR 61 – Field Monitoring and Data Collection and TR 66 – State of the Art for Chloride Management. Mr. Boxhorn summarized TR 62 – Impacts of Chloride, TR 63 – Chloride Conditions and Trends, and TR 64 – Regression Analysis. Ms. Hollister introduced TR 65 – Mass Balance Analysis and Mr. Striffling summarized TR 67 – Legal and Policy Considerations for the Management of Chloride.

Ms. Herrick indicated that the technical reports will be written to a more technical audience, while she will lead the Study Planning Report (PR 57) which will be written to a more general audience. Planning Report No. 57 will summarize the technical reports as needed, and also analyze potential future chloride conditions, alternative scenarios, and recommendations to reduce the impact of chloride on the environment. There were no questions from the TAC members on the Study report strategy.

Ms. Herrick next introduced to the TAC potential working groups for completion of the Study. The purpose for these working groups would be to include a smaller group of individuals to provide input on particular topics, usually in a less formal setting such as email or online discussions. Two working groups were suggested, one for data analysis and another for state-of-the-art for reducing chlorides in the environment. TAC members were encouraged to volunteer for one or both groups, either via the online chat or in an email to Ms. Herrick after the meeting. Volunteers received during and immediately after the meeting include the following:

Data Analysis working group – Mr. Paradis, Mr. O'Reilly, Mr. Hartsook (also recommended involving the WDNR Water Evaluation Section for the regression analysis), Mr. Grundl, Mr. Hart, Mr. Corsi

State-of-the-Art working group – Mr. Benninghoff (also recommended including a representative from one of the regional businesses, perhaps AO Smith, that develop and manufacture water softeners), Ms. Samantha Katt (WDNR)

NEXT STEPS FOR THE PLAN

Ms. Herrick reviewed the next steps for the Study. Work will continue on the regression and loading analyses, research and report writing, and information gathering for state-of-the-art practices

Ms. Herrick announced that the next TAC meeting is anticipated to be in spring 2023 and will include review of chapters from the TR 61 (field monitoring) and TR 62 (impacts of chloride) reports. She indicated that meeting agendas, presentations, and summary notes along with draft chapters will all be posted on the SEWRPC project website at www.sewrpc.org/chloridestudy.

Ms. Herrick asked the TAC if an online or in-person format is preferred for future meetings. The majority of the group preferred online meetings.

ADJOURNMENT

There being no further business, the meeting was adjourned by unanimous consent at 11:32 a.m.

Respectfully submitted,

Laura Herrick
Recording Secretary

ATTACHMENT

Attachment A – Meeting presentation (265858)

#265857 – PR-57 SUMMARY NOTES CHLORIDE TAC NOV 9, 2022
200-1100
LKH/AWO/NJN/JEB/KMH/ZL
12/2/22

Southeastern Wisconsin **Regional Planning Commission**



Chloride Impact Study for the Southeastern Wisconsin Region

TAC Meeting
November 9, 2022

#265585

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●●●●● Speakers

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- Laura Herrick, Chief Environmental Engineer
- Nick Neureuther, Specialist-Biologist
- Karin Hollister, Principal Engineer
- Joe Boxhorn, Principal Planner
- Aaron Owens, Senior Planner
- Dave Strifling, Director, Water Law and Policy Initiative, MU Law School



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Outline

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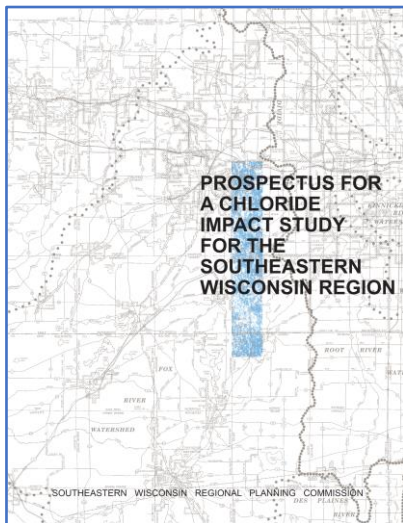
- Study Background and Scope
- Field Monitoring and Sampling
- Data Collection and Management
- Preliminary Analysis
- Planned Study Reports
- Working Group Signup
- Next Steps



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Study Background

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Prospectus developed 2014-2016

- Explore the need for a regional chloride impact study
- Recommend a potential scope and content of a study
- Propose a study schedule
- Recommend a budget
- Propose potential funding

www.sewrpc.org/chloridestudy



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Study Scope

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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
- Develop performance and cost information for practices
- Explore legal and policy aspects

Develop alternate chloride management scenarios

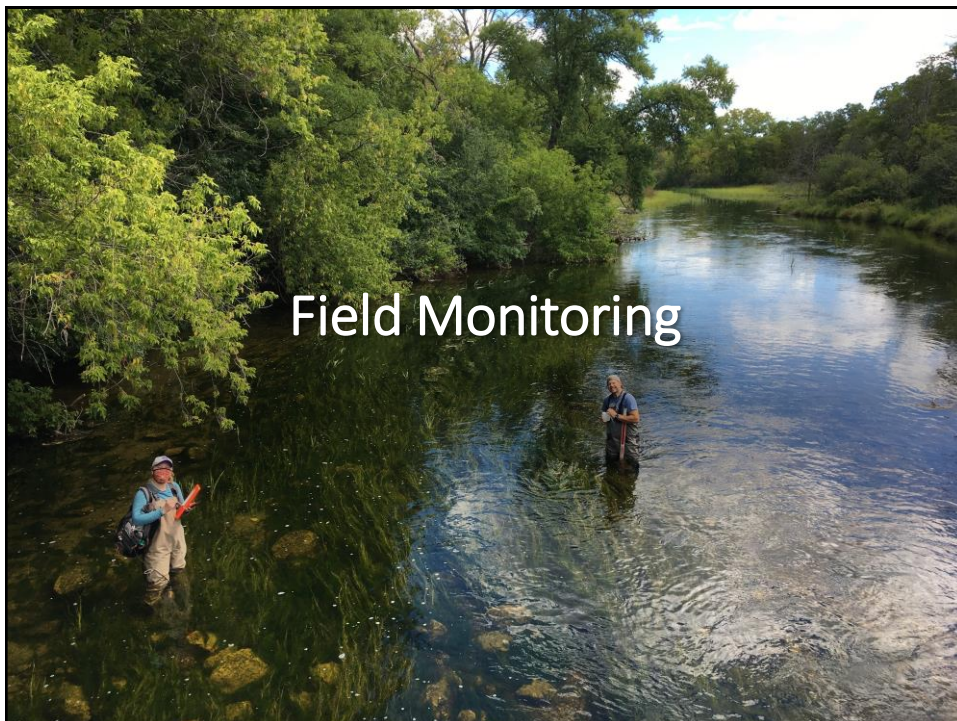
- Meet public safety objectives
- Minimize harm to the environment
- Cost effective



Source: Public Works Magazine

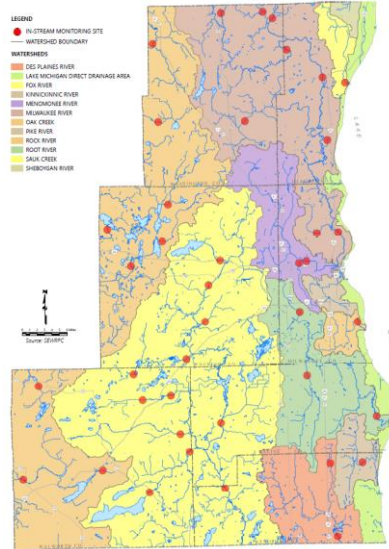


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●●●● Stream Monitoring Locations



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Stream Monitoring Equipment

Data collection began during Summer 2018, continued into 2021

- Continuous monitoring – 5-minute interval
 - specific conductance
 - water temperature
 - water depth above the sensor
 - Online data access and retrieval
- 



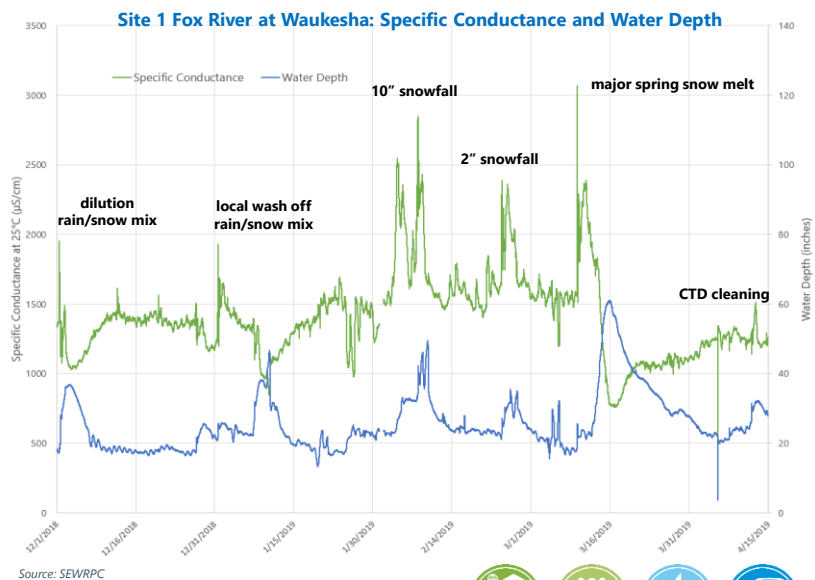
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Stream Monitoring Site Maintenance 9

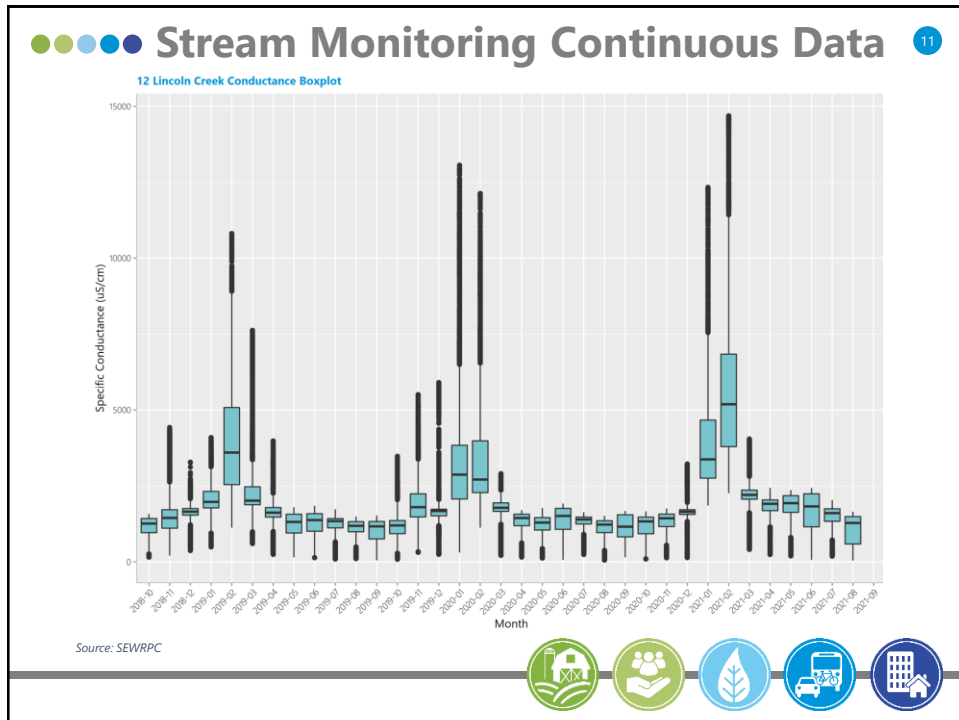


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Stream Monitoring Continuous Data 10



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Water Sampling - Streams 12

Monthly grab samples collected at each site: October 2018 to October 2020

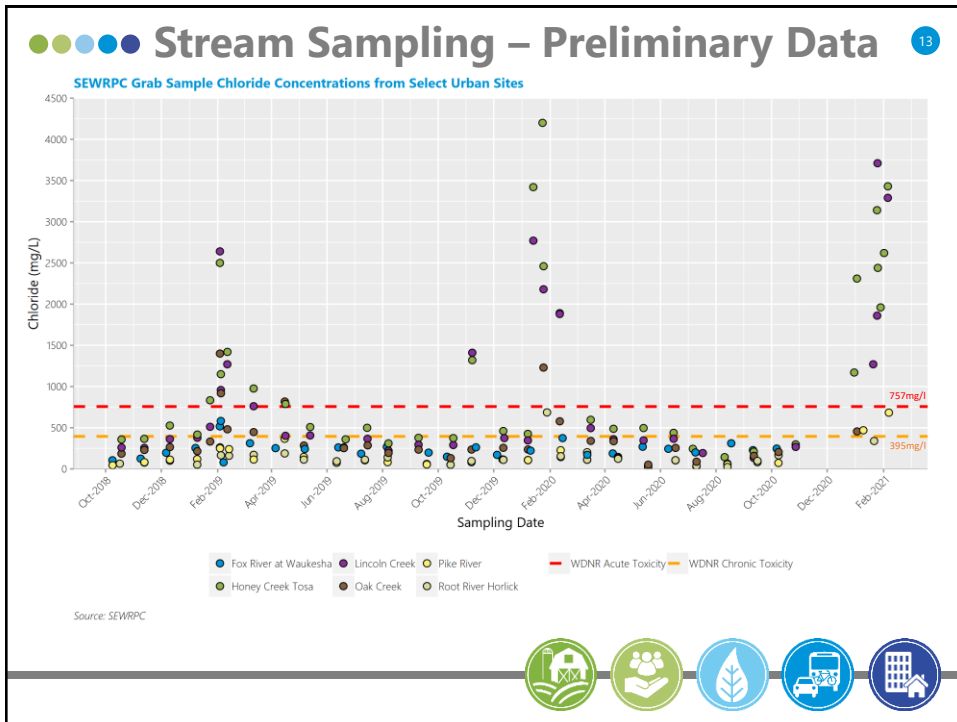
Samples tested at the Wisconsin State Lab of Hygiene

- Chloride, Sulfate (Anions)
- Metals (Cations)
 - Calcium
 - Magnesium
 - Potassium
 - Sodium

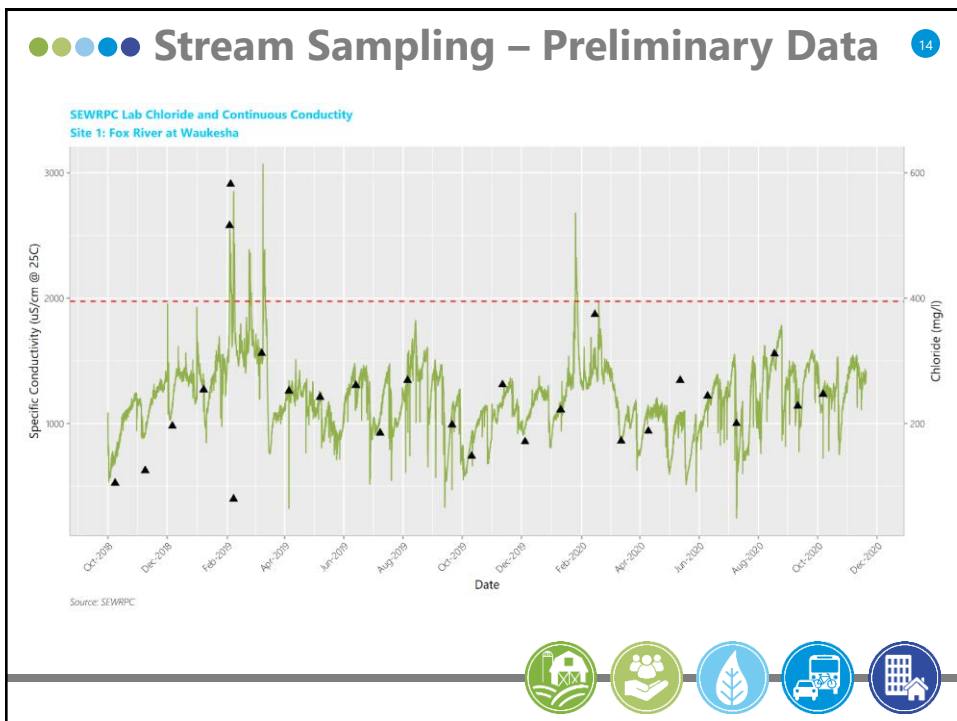
Winter Event Sampling

- Targeted high conductance
- Continued into 2021

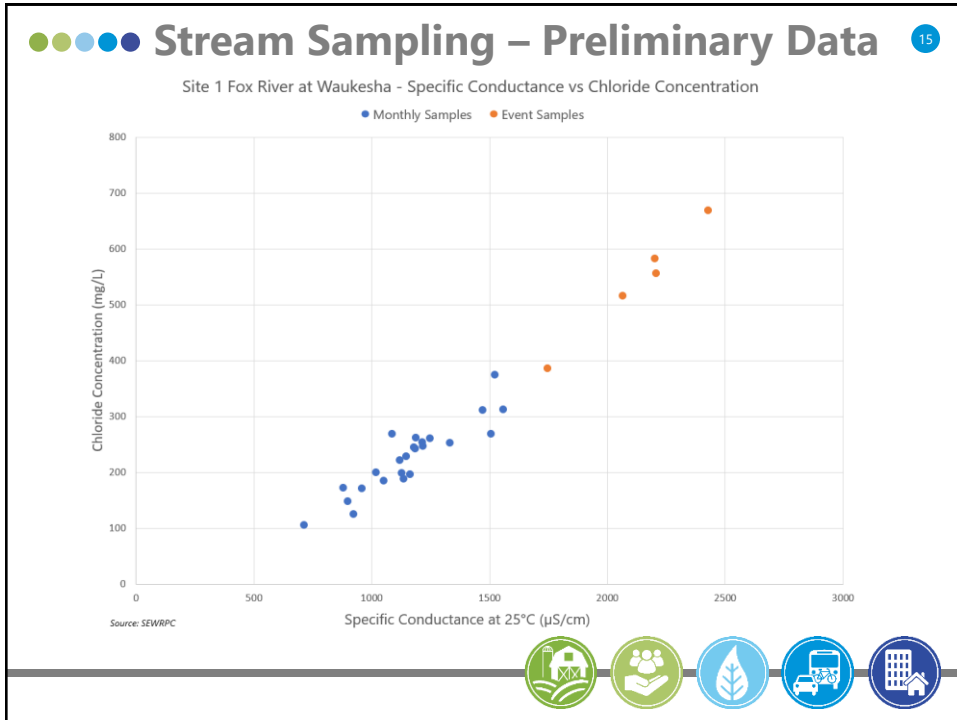
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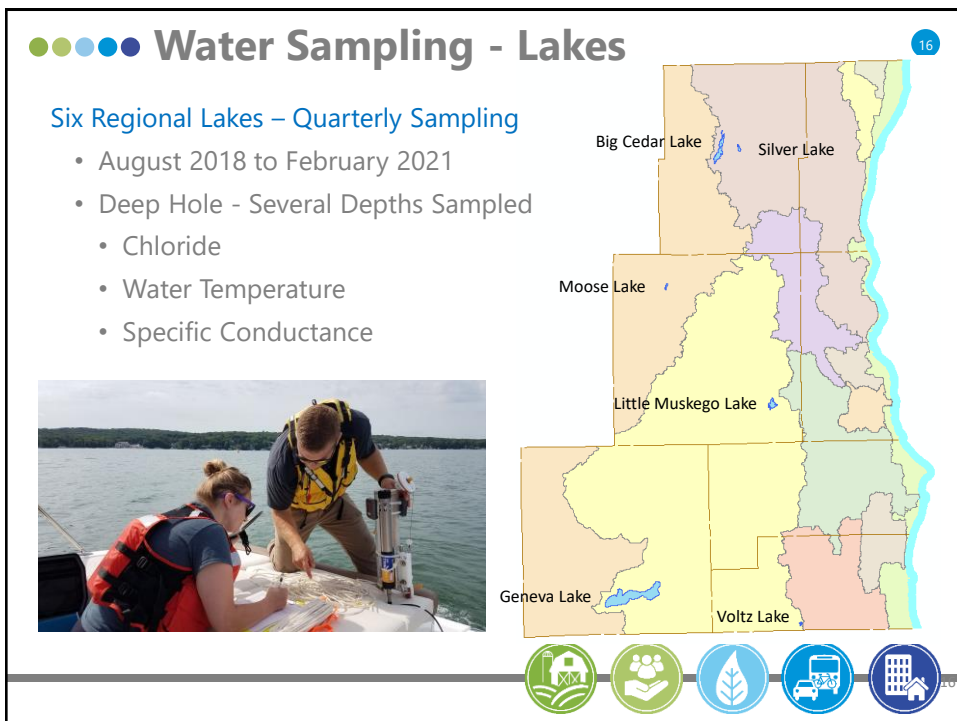
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Winter Sampling - Lakes

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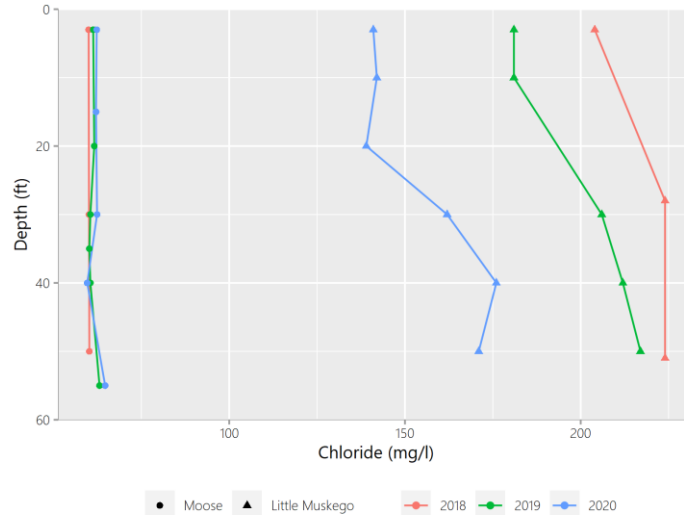


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Lake Sampling Data - Summer

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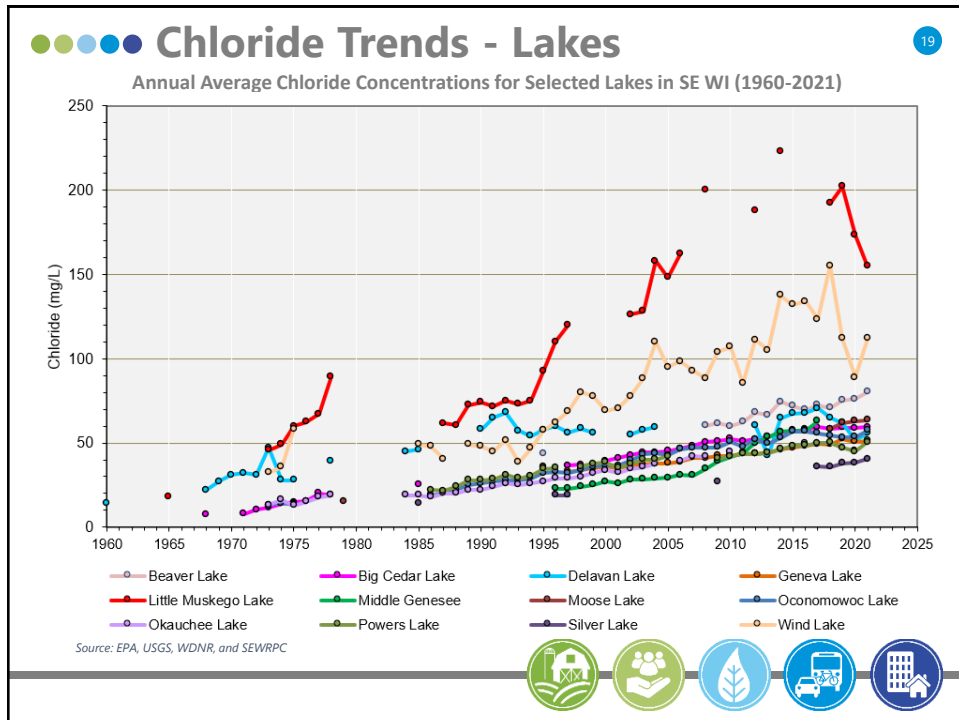
Moose Lake vs Little Muskego : Summer Chloride Samples



Source: SEWRPC



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Project Data Collection Summary

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Data Collection By the Numbers

- Stream Samples
 - Over 1,150 samples taken
 - October 2018 through October 2020 (into August 2021 select sites)
- Lake Samples
 - Over 350 samples taken
 - 11 separate sampling periods
 - August 2018 to February 2021
- Continuous Data Observations
 - Over 12.5 million observations
- Streamflow Measurements
 - 65 measurements at 20 sites



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Project Data Collection Summary

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Maximum Chloride Concentrations (Stream Samples - Monthly)

1. 1890 mg/L – Site 53 Honey Creek at Wauwatosa, 2/11/2020
2. 1880 mg/L – Site 12 Lincoln Creek, 2/11/2020
3. 1460 mg/L – Site 60 Root River at Grange Ave, 2/10/2021

- Maximum chloride concentrations for winter event samples up to 3 times higher than regular monthly samples

Maximum Chloride Concentrations (Lake Samples - Quarterly)

1. 270 mg/L – Little Muskego Lake at 65 ft, 2/22/2019
2. 259 mg/L – Little Muskego Lake at 65 ft, 2/17/2020
3. 256 mg/L – Little Muskego Lake at 50 ft, 2/22/2019

Chloride Toxicity Criteria	Chronic	Acute
Wisconsin	395 mg/L	757 mg/L
US EPA	230 mg/L	860 mg/L



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Project Data QA/QC

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Data Quality – Consistency – Accessibility

- Project Protocols and Procedures
- Data Management and Documentation
- Equipment Operation Verification for Stream Monitoring Sites
- Lab Data Review
- Continuous Datasets – Equipment Malfunction, Fouling



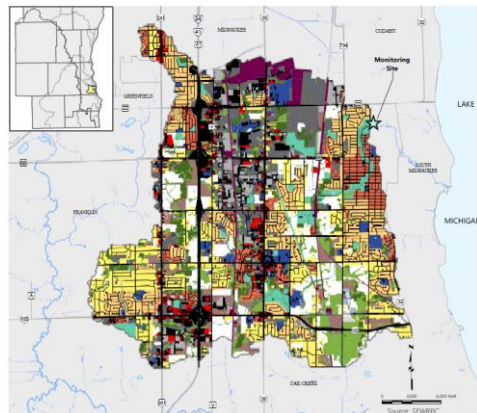
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SEWRPC Inventory Datasets

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Commission datasets used for site characterization and analysis

- Land Use Data
- Population and Households
- Topography
- Hydrography
- Watershed Boundaries
- Transportation System Data
- Municipal Boundaries
- Sewer Service Area Boundaries



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Outside Data Collection

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Water Quality Data

- MMSD
- SWIMS (WDNR, Water Action Volunteers, Milwaukee Riverkeeper, and others)
- Storet (EPA)
- NWIS (USGS)
- Local Lake Districts
- Municipal Governments



Additional Datasets

- USGS Stream Gage Data
- Streamflow Measurements (MMSD, WDNR)
- Meteorological Data



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Outside Data – Chloride Sources

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Chloride Source Data

- Road Salt/Deicers – (WDNR/MS4, WisDOT, request letter to non-MS4 communities)
- WWTP, Industrial Wastewater, and Land Spreading Data (WDNR)
- CAFO Data (WDNR)
- Crop Data and Fertilizer Usage (USDA/NASS, WDATCP, UW-Extension)
- Private Salting Data (Commission Staff Survey, Literature Review)
- Water Softener Usage Data (Commission Staff Survey)
- Atmospheric Chloride Deposition (NADP)



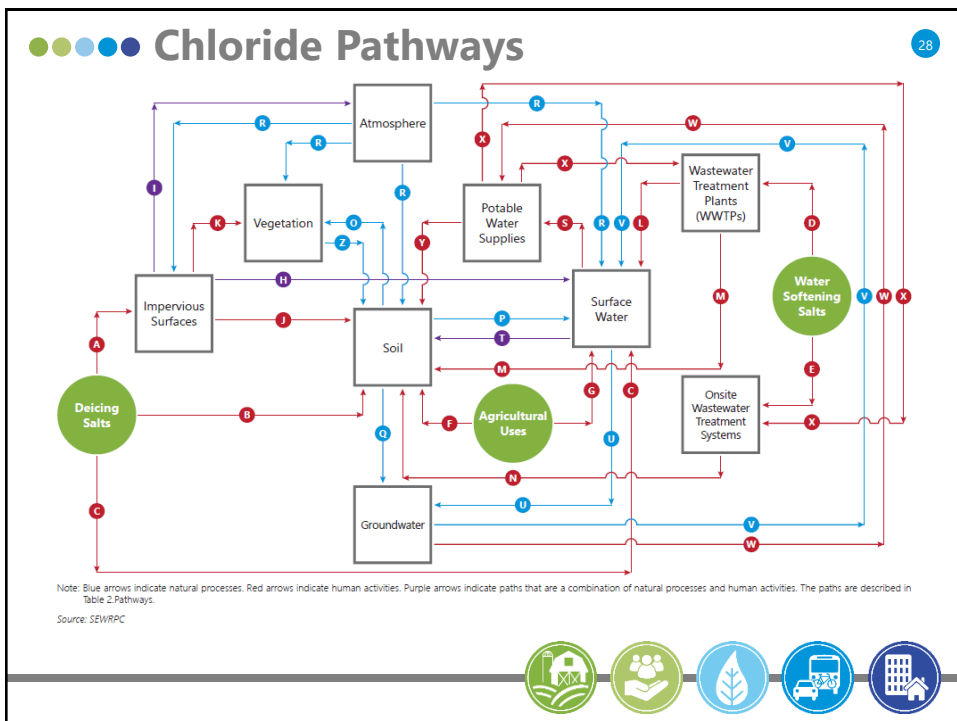
Source: Wikimedia/Badger Water Softener Co.



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Regression Analysis

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Use the observed in-stream Specific Conductance data to estimate chloride concentrations

- Evaluate data to establish a relationship between chloride and specific conductance
- Develop equation(s) for various scenarios
- Use equations to estimate chloride concentrations from our Specific Conductance dataset
- Use chloride concentration estimates to examine chloride conditions and trends across the Region and compute in-stream chloride loads

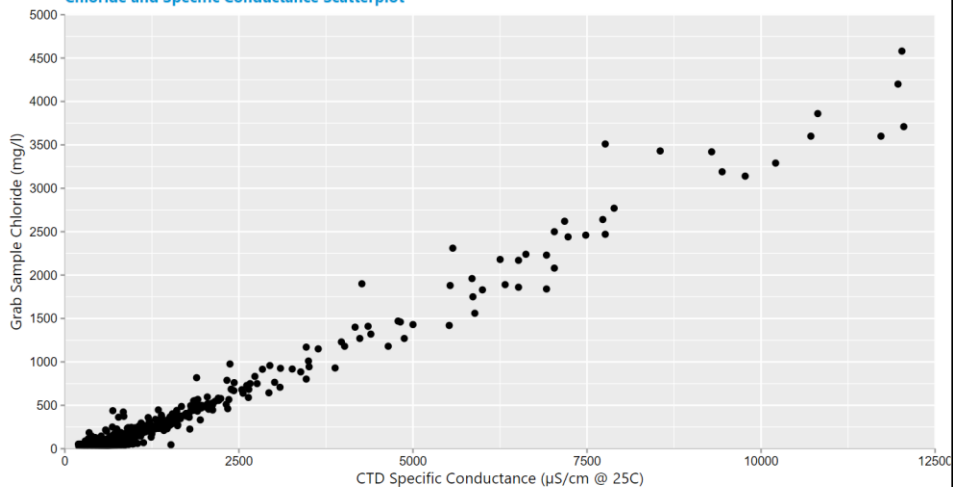


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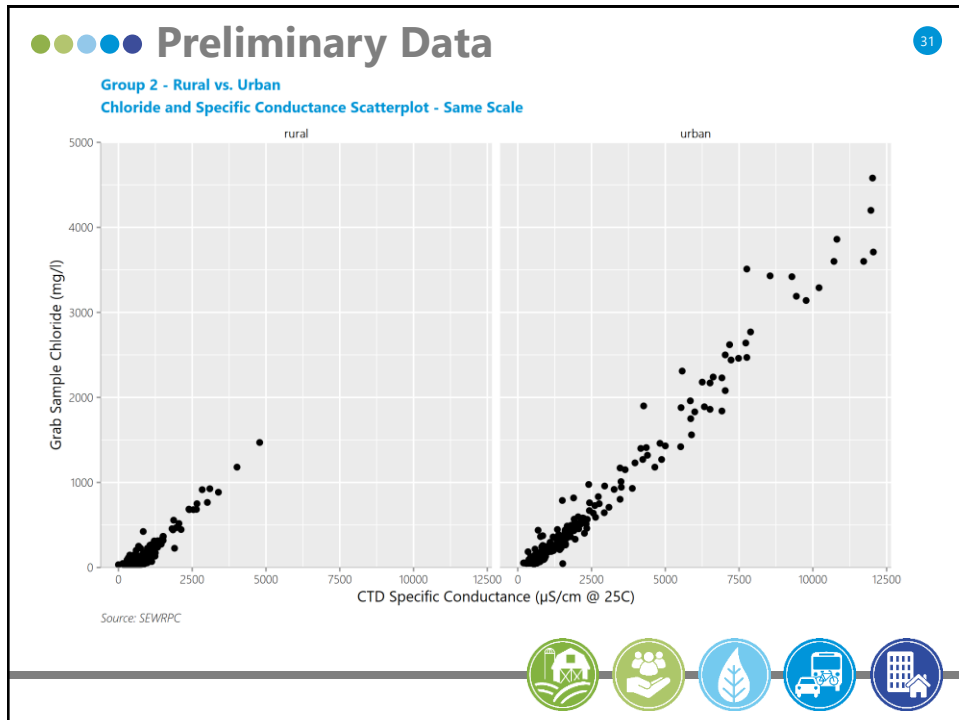
Preliminary Data

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Group 1 - Entire Region
Chloride and Specific Conductance Scatterplot



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Chloride Loading – Chloride Sources 32

Chloride Source Loading

- Gathering data for each significant source of chloride
- Estimate the monthly chloride load from each source
- Quality and quantity of data varies among both the chloride source and data source

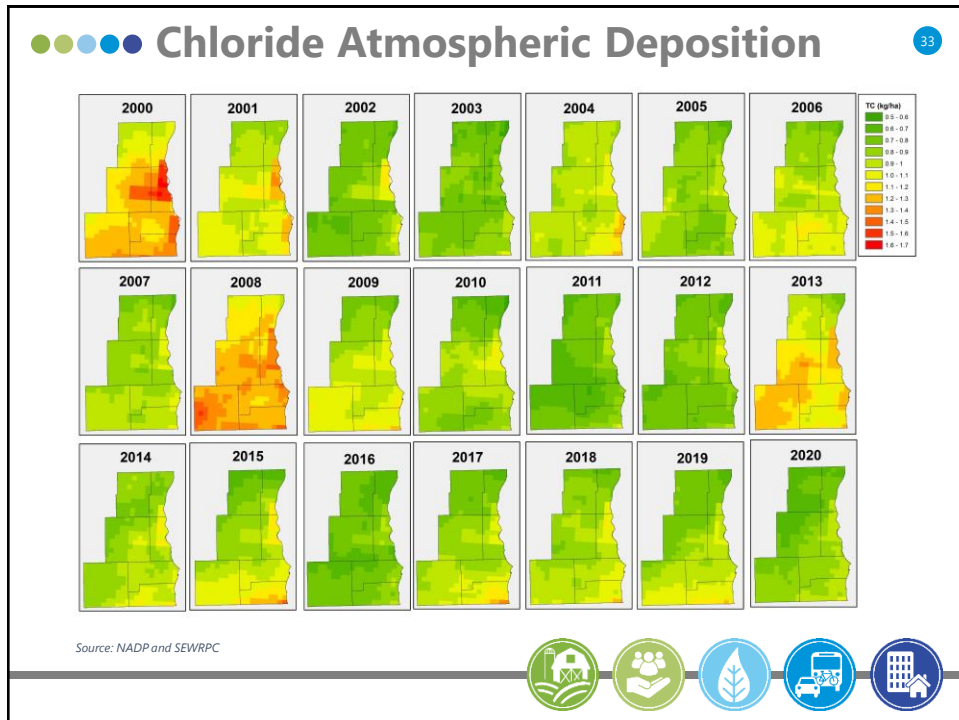


Source: Wikimedia/Michael Dibb



Source: Wikimedia/Charles Passarella

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●●●●● Chloride Loading Estimation

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In-Stream Chloride Loading

- Regression equation(s) will be used to estimate chloride concentration from observed Specific Conductance
- Monthly chloride loads will be estimated for select sites
- Monthly chloride loading estimates require a reliable discharge record
- Computational approach investigation for developing chloride loads
 - Computation Interval
 - Variability in the datasets
 - Missing data
 - Central tendency parameter

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Planned Study Reports

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Technical Reports

- TR 61 – Field Monitoring and Data Collection
- TR 62 – Impacts of Chloride on the Environment
- TR 63 – Chloride Conditions and Trends in SE WI
- TR 64 – Regression Analysis of Specific Conductance and Chloride
- TR 65 – Mass Balance Analysis for Chlorides in SE WI
- TR 66 – Chloride Management: State of the Art
- TR 67 – Chloride Management: Legal and Policy Considerations

Planning Report PR 57

- Summarize technical reports
- Potential Future Chloride Conditions
- Alternative Scenarios
- Recommendations to Reduce the Impact of Chloride



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Working Group Signup

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Intent is a smaller group of individuals to provide input on a particular topic. Interactions would be less formal than the TAC and could be done via email as Commission staff have questions or need input.

Data Analysis

- Regression analysis – best fit and how to group the datasets
- Mass balance analysis – assumptions for various sources of chloride
- Trends analysis – historical data help

State-of-the-Art

- Winter snow removal and deicing
- Water softening
- Agricultural fertilizing and feedlots

Please note your Working Group interest in the GoTo Chat or in an email to Laura after the meeting.



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Next Steps

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- Continue research and report writing
- Continue regression analysis
- Continue loading analysis
- Continue state-of-the-art information gathering

Anticipate the next TAC meeting to be spring 2023 and include review of draft chapters from TR 61 (field monitoring) and TR 62 (impacts of chloride)

Meeting agendas, presentations, and minutes along with draft text will all be posted on the project website

www.sewrpc.org/chloridestudy




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Project Funding Provided By

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Commission Staff Contributors

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- Laura Herrick – Chief Env. Engineer
 - Mike Hahn - retired
 - Joe Boxhorn
 - Ron Printz - retired
 - Karin Hollister
 - Aaron Owens
 - Megan Beauchaine
 - Nicklaus Neureuther
 - Alexis McAdams
 - Julia Orłowski
 - Zijia Li
 - James Mahoney
 - Kathy Sobottke
 - Kim Walsh - intern
 - Santos Quispe - intern

- Tom Slawski – Chief Biologist
 - Dale Buser
 - Justin Poinsatte
 - Zofia Noe
 - Mike Borst
 - Emma Weiss-Burns - intern
- GIS Staff
 - Rob Merry
 - Mike Gosetti
 - Tim Gorseger
 - Patti Bouchard
- Support Staff
 - Megan Deau
 - Alexa Carzoli



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Thank You

Laura Herrick | Chief Environmental Engineer
lherrick@sewrpc.org | 262.953.3224

Tom Slawski | Chief Specialist-Biologist
tslawski@sewrpc.org | 262.953.3263

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