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SEWRPC Technical Report No. 61

FIELD MONITORING AND DATA COLLECTION FOR THE CHLORIDE IMPACT STUDY

Chapter 1

INTRODUCTION

1.1 PURPOSE OF THIS REPORT

Past Southeastern Wisconsin Regional Planning Commission (Commission) studies indicate that there are insufficient data available to assess overall chloride conditions of surface waters within the Southeastern Wisconsin Region (Region). The frequency at which chloride or specific conductance levels were collected within streams and lakes are inadequate to characterize the dynamics of chloride concentrations and loads and potential impacts on the waterways of the Region. Deficiencies in available data are particularly apparent during critical winter months when the potential impacts of chloride on the surface waters are likely to be greatest. In order to conduct a comprehensive assessment of current chloride conditions and trends in the surface water resources of the Region for the Chloride Impact Study,[1] it was necessary for Commission staff to supplement existing water quality data collected by other agencies.[2]

For this Study, Commission staff established a set of water quality monitoring sites in streams and lakes that are representative of the Region. Water quality monitoring at selected stream locations included continuous collection of specific conductance using automated monitoring equipment. In addition, grab samples which capture water quality conditions at one point in time were regularly collected for chemical analysis. Where possible, stream monitoring sites were located near existing U.S. Geological Survey (USGS) stream gage stations to provide reliable streamflow data. Commission staff also collected flow data at several ungaged

[1] *SEWRPC Planning Report No. 57,* A Chloride Impact Study for Southeastern Wisconsin, *in preparation*.

[2] *For a description of all sources of water quality data used to assess current chloride conditions within the Region, see SEWRPC Technical Report No. 63,* Chloride Conditions and Trends in Southeastern Wisconsin, *in preparation.*

stream monitoring sites to support the interpretation of water quality data. Water quality monitoring at lake locations included collecting grab samples at several selected lake depths for chemical analysis. Lake monitoring also included collecting specific conductance levels and temperatures along a vertical profile at the deepest point of the lake.

One objective of this comprehensive monitoring strategy was to assemble a dataset consisting of simultaneously collected specific conductance and chloride samples. Datasets collected at stream monitoring sites were used to develop regression models to estimate chloride concentrations from specific conductance.[3] These regression models were then used to develop estimates of chloride concentrations at stream monitoring sites that were used for subsequent analyses conducted as part of the Study.

This Technical Report describes the field monitoring and data collection methods used in the Study, including:

- The approach used to select stream and lake water quality monitoring sites throughout the Region
- Characterization of the areas draining to the selected water quality monitoring sites
- A description of the equipment used for water quality monitoring and the process for installing the equipment
- How the continuous monitoring equipment was maintained
- A summary of the water quality parameters collected at continuous stream monitoring sites
- A description of the equipment and methodology used for collecting water quality grab samples at stream and lake monitoring sites
- Water quality parameters measured from grab samples that were sent to the Wisconsin State Laboratory of Hygiene for chemical analysis

[3] *SEWRPC Technical Report No. 64,* Regression Analysis of Specific Conductance and Chloride Concentrations*, in preparation.*

- Methodology used for winter weather event sampling at stream monitoring sites

- Quality assurance and quality control procedures for water quality monitoring and data collection

- Data management, documentation, and post-processing procedures

1.2 RELATIONSHIP OF THIS REPORT TO THE CHLORIDE IMPACT STUDY

This Technical Report documents the procedures and methodology used by Commission staff to collect water quality data at selected stream and lake locations within the Region for the Chloride Impact Study. The Chloride Impact Study was initiated due to heightened public concern over the effects of the growing use of road salt and evidence of increasing chloride concentrations in the surface and groundwater within the Region. The findings of this Study are being presented in a series of reports.

Major objectives of the Chloride Impact Study include:

1. Documenting historical and existing conditions and trends in chloride concentrations in surface and groundwater in the Southeastern Wisconsin Region

2. Evaluating the potential for increased amounts of chloride in the environment to cause impacts to surface water, groundwater, and the natural and built environment in the Region

3. Identifying the major sources of chloride to the environment in the Region

4. Investigating and defining the relationship between the introduction of chloride into the environment and the chloride content of surface and groundwater

5. Developing estimates of chloride loads introduced into the environment under existing conditions and forecasts of such loads under planned land use conditions

6. Evaluating the potential effects of climate change on the major sources of chloride under planned land use conditions

7. Reviewing the state-of-the-art of technologies and best management practices affecting chloride inputs to the environment and developing performance and cost information for such practices and technologies

8. Exploring legal and policy options for addressing chloride contributions to the environment

9. Developing and evaluating alternative chloride management scenarios for minimizing impacts to the environment from chloride use while meeting public safety objectives

10. Presenting recommendations for the management of chloride and mitigation of impacts of chloride on the natural and built environment

1.3 REPORT FORMAT AND ORGANIZATION

This Report is organized into four chapters. Following this introductory chapter, Chapter 2 describes the selection process for stream and lake monitoring sites. The Chapter also includes a characterization of the selected monitoring sites and their drainage areas.

Chapter 3 summarizes the methods and procedures used for the collection of water quality data at stream and lake monitoring sites. This Chapter describes the equipment used for continuous stream monitoring and how it was deployed and maintained. It also describes the methods used for collecting water quality samples for chemical analysis at stream and lake monitoring sites.

Chapter 4 describes the data management processes and quality assurance and quality control protocols for the datasets that were collected and maintained by Commission staff for this Study. The Chapter also describes the post-processing methodology for the continuous specific conductance datasets collected at the stream monitoring sites.