Illinois Environmental Protection Agency

Bureau of Water • 1021 N. Grand Avenue E. • P.O. Box 19276 • Springfield • Illinois • 62794-9276

Division of Water Pollution Control
ANNUAL FACILITY INSPECTION REPORT
for NPDES Permit for Storm Water Discharges from Separate Storm Sewer Systems (MS4)

This fillable form may be completed online, a copy saved locally, printed and signed before it is submitted to the Compliance Assurance Section at the above address. Complete each section of this report.

Report Period: From March, 2017 To March, 2018

Permit No. ILR40 0052

MS4 OPERATOR INFORMATION: (As it appears on the current permit)

Name: City of Elmhurst Mailing Address 1: 209 N. York Street

Mailing Address 2: County: DuPage

City: Elmhurst State: IL Zip: 60126 Telephone: 630-530-3024

Contact Person: Kent Johnson Email Address: kent.johnson@elmhurst.org
(Person responsible for Annual Report)

Name(s) of governmental entity(ies) in which MS4 is located: (As it appears on the current permit)

City of Elmhurst, Illinois

THE FOLLOWING ITEMS MUST BE ADDRESSED.

A. Changes to best management practices (check appropriate BMP change(s) and attach information regarding change(s) to BMP and measurable goals.)

1. Public Education and Outreach ☐
2. Public Participation/Involvement ☐
3. Illicit Discharge Detection & Elimination ☐
4. Construction Site Runoff Control ☐
5. Post-Construction Runoff Control ☐
6. Pollution Prevention/Good Housekeeping ☐

B. Attach the status of compliance with permit conditions, an assessment of the appropriateness of your identified best management practices and progress towards achieving the statutory goal of reducing the discharge of pollutants to the MEP, and your identified measurable goals for each of the minimum control measures.

C. Attach results of information collected and analyzed, including monitoring data, if any during the reporting period.

D. Attach a summary of the storm water activities you plan to undertake during the next reporting cycle (including an implementation schedule.)

E. Attach notice that you are relying on another government entity to satisfy some of your permit obligations (if applicable).

F. Attach a list of construction projects that your entity has paid for during the reporting period.

Any person who knowingly makes a false, fictitious, or fraudulent material statement, orally or in writing, to the Illinois EPA commits a Class 4 felony. A second or subsequent offense after conviction is a Class 3 felony. (415 ILCS 5/44(h))

Owner Signature: Date: 05/31/18

Kent Johnson Printed Name: City Engineer Title:

EMAIL COMPLETED FORM TO: epa.ms4annualinsp@illinois.gov

or Mail to: ILLINOIS ENVIRONMENTAL PROTECTION AGENCY
WATER POLLUTION CONTROL
COMPLIANCE ASSURANCE SECTION #19
1021 NORTH GRAND AVENUE EAST
POST OFFICE BOX 19276
SPRINGFIELD, ILLINOIS 62794-9276

IL 532 2585
WPC 691 Rev 6/10

This Agency is authorized to require this information under Section 4 and Title X of the Environmental Protection Act (415 ILCS 5/4, 5/39). Failure to disclose this information may result in: a civil penalty of not to exceed $50,000 for the violation and an additional civil penalty of not to exceed $10,000 for each day during which the violation continues (415 ILCS 5/42) and may also prevent this form from being processed and could result in your application being denied. This form has been approved by the Forms Management Center.

PLEASE NOTE THAT ANNUAL REPORTING FOR SECTIONS B AND D CORRELATE TO EACH NOTICE OF INTENT BMP AS CHECKED ON ORIGINAL PERMIT AS FOLLOWS:

A. Public Education and Outreach
- ■ **A.1 Distributed Paper Material**
- ■ **A.2 Speaking Engagement**
- ■ **A.3 Public Service Announcement**
- ■ **A.4 Community Event**
- ■ **A.5 Classroom Education Material**
- ☐ A.6 Other Public Education

B. Public Participation/Involvement
- ☐ B.1 Public Panel
- ☐ B.2 Educational Volunteer
- ■ **B.3 Stakeholder Meeting**
- ■ **B.4 Public Hearing**
- ■ **B.5 Volunteer Monitoring**
- ☐ B.6 Program Coordination
- ☐ B.7 Other Public Involvement

C. Illicit Discharge Detection/Elimination
- ■ **C.1 Storm Sewer Map Preparation**
- ■ **C.2 Regulatory Control Program**
- ■ **C.3 Detection/Elimination Prior. Plan**
- ■ **C.4 Illicit Discharge Tracing Proced.**
- ■ **C.5 Illicit Source Removal Procedures**
- ■ **C.6 Program Evaluation/Assessment**
- ☐ C.7 Visual Dry Weather Screening
- ☐ C.8 Pollutant Field Testing
- ☐ C.9 Public Notification
- ☐ C.10 Other Illicit Discharge Controls

D. Construction Site Runoff Control
- ■ **D.1 Regulatory Control Program**
- ■ **D.2 Erosion & Sed. Control BMPs**
- ☐ D.3 Other Waste Control Program
- ■ **D.4 Site Plan Review Procedures**
- ■ **D.5 Public Inform. Handling Proc.**
- ■ **D.6 Site Inspection/Enforce. Proc.**
- ☐ D.7 Other Constr. Site Runoff Controls

E. Post-Construction Runoff Control
- ☐ E.1 Community Control Strategy
- ■ **E.2 Regulatory Control Program**
- ■ **E.3 Long Term O&M Procedures**
- ■ **E.4 Pre-Const Review of BMP Designs**
- ■ **E.5 Site Inspect. During Construction**
- ■ **E.6 Post-Construction Inspections**
- ☐ E.7 Other Post-Const Runoff Controls

F. Pollution Prevention/Good Housekeep.
- ■ **F.1 Employee Training Program**
- ■ **F.2 Inspection/Maintenance Program**
- ☐ F.3 Muni Operations Storm. Control
- ■ **F.4 Muni Operations Waste Disposal**
- ■ **F.5 Flood Mgmt/Assess Guidelines**
- ☐ F.6 Other Muni Operations Controls

A. Changes to best management practices.

No changes were made during this reporting year to the best management practices that were outlined in Elmhurst's 2016 Notice of Intent to obtain coverage under General NPDES Permit No. ILR10. In addition to their co-permitting efforts with the County of DuPage, as outlined in DuPage County's Annual Facility Inspection Report, the City of Elmhurst has accomplished the following tasks in the past year:

B. Attach the status of compliance with permit conditions, an assessment of the appropriateness of your identified best management practices and progress towards achieving the statutory goal of reducing the discharge of pollutants to the MEP, and your identified measurable goals for each of the minimum control measures.

Best Management Practices:

BMP No. A1-Distributed Paper Material, A-2 Speaking Engagement, A3-Public Service Announcement A4-Community Event, and A5-Classroom Education Material.

Measurable Goal(s), including frequencies: The City of Elmhurst relies on DuPage County for most of the activities related to these Best Management Practices. In addition the City also relies on its membership with the DuPage River Salt Creek Workgroup for activities related to this BMP. The County of DuPage has developed a general education and outreach program on storm water and water quality that is outlined in their annual report.

'17-'18 Milestones: Assist the County in assessing the program through a survey of educational audiences after educational efforts have been implemented over the permit term and use these results to make changes to current offerings or to establish new efforts if there is a deficiency. Assist the County in assessing new technologies for BMP's through staff to staff discussion and DuPage County countywide discussions at the Municipal Engineers Discussion Group.

Completed tasks in '17-'18: The City of Elmhurst has not received any requests from DuPage County for assistance in evaluating educational efforts. In the past year, City has completed the following tasks:

- City newsletter contained articles related to stormwater issues.
- The City of Elmhurst sponsored Arbor Day activities and also coordinated with the Conservation Foundation to sponsor a public River Sweep event.
- The City of Elmhurst updated the City website to include new current information about stormwater. (**http://elmhurststormwaterplan.org/**)
- The City of Elmhurst has provided tours of the Treatment Plant for educational purposes.
- City website continues to educate the public on rain barrels. The City also sells rain barrels to the public. (**http://www.elmhurst.org/index.aspx?NID=1031**)

- The City of Elmhurst hosted several public informational open houses about Elmhurst's efforts to implement several flood control projects throughout the City.
- The City of Elmhurst posted DuPage County's BMP Marketing Kits on the City's website.
- The City of Elmhurst has posted information about the City's Stormwater Management Incentive Program on the City's website (**http://elmhurststormwaterplan.org/157/Residential-Stormwater-Management-Incent**), on social media, and in the City newsletter.
- The City hosted an informational public event by DuPage County and the Conservation Foundation regarding the Salt Creek Watershed.

BMP No. B.3-Stakeholder Meeting, B.4-Public Hearing, and B.5-Volunteer Monitoring

Measurable Goal(s), including frequencies: The City of Elmhurst relies on DuPage County for most of the activities related to this Best Management Practice. In addition the City also relies on its membership with the DuPage River Salt Creek Workgroup for activities related to this BMP. The municipal engineers and water quality stakeholder committee will meet on a regular basis to review and discuss program development as it pertains to Appendix J of the DuPage County Stormwater Management Plan and the Federal Mandates such as the NPDES Phase II and TMDLs, as outlined in DuPage County's annual report.

'17-'18 Milestones: Continue to participate and support Municipal Engineers Discussion Group and Water Quality Stakeholders Groups. Participate in or assist in public hearings for possible DuPage County Stormwater Management Plan Appendix updates as needed and continue to hold seminars and open meetings regarding the City's recent comprehensive storm sewer/sanitary sewer study, potential future projects that have been identified, and new City policies aimed at water quality improvement and water quantity runoff reduction. Continue support of DuPage River Salt Creek Workgroup.

Completed tasks in '17-'18: In the past year, City has completed the following tasks:

- The Engineering Staff attended monthly meetings of the DuPage County Municipal Engineers Discussion Group where discussions regarding water quality improvements regularly take place.
- Continue to work with DuPage County as cooperative partners on the Illicit Discharge Detection and Elimination (IDDE) program.
- City staff continued to work with DuPage County on potential revision or edits to the 2013 Countywide Stormwater and Flood Plain Ordinance; including details and development of the Technical Guidance Document.
- City staff continues to have a working relationship with the Conservation Foundation and its members who monitor waterways in Elmhurst.
- City staff continues to be an active member of the DuPage River Salt Creek Workgroup which promotes water quality.
- The City participated in Salt Creek clean up activities.
- The City of Elmhurst, with the help of a consultant engineering firm, has hosted several public informational seminars about Elmhurst's efforts to implement several flood control projects throughout the City.
- City staff attended several seminars throughout the year regarding monitoring, permitting, and general BMP effectiveness.

BMP No. C.1-Storm Sewer Map Preparation, C.2-Regulatory Control Program, C.3-Detection/Elimination Prioritization Plan, C.4-Illicit Discharge Tracing Procedures, C.5-Illicit Source Removal Procedures, and C.6-Program Evaluation and Assessment.

Measurable Goal(s), including frequencies: The City of Elmhurst relies on DuPage County for most of the activities related to this Best Management Practice. Develop IDDE procedures with a County and municipal workgroup, that will map all storm sewer outfalls; determine proper procedures to detect illicit discharges as well as procedures for elimination of discharges; possible inclusion in ordinances (where appropriate) to prohibit non-storm water discharges into the storm sewer system and have appropriate enforcement procedures; and evaluation of monitoring procedures.

'17-'18 Milestones: Continue to work with the County on IDDE. Send updated maps, as changes occur, to DuPage County to be incorporated into their GIS database.

Completed tasks in '17- '18: In the past year, City has completed the following tasks:

- The City of Elmhurst has updated their existing storm sewer maps as new construction and modifications to the existing system have occurred. Those maps have been shared with the County as necessary.
- Continued to educate the public regarding Illicit Discharges with the help of a DuPage County billboard on Route 83 and public service announcements on TV outlets.
- With several new large-scale stormwater infrastructure construction projects the City continued to update our GIS database as projects closed out and as-built drawings were submitted to the City.
- City staff televised and cleaned many storm sewers throughout the City and used the information gathered to provide a more accurate GIS database and to confirm the functionalility of the City storm sewer. Additionally these efforts, although not finding any, kept an eye on potential illicit discharges.
- DuPage County performs regular dry weather screening of storm sewer outfalls for illicit discharges. City staff assists in tracking down the source of the illicit discharges if and when they occur.

BMP No. D.1-Regulatory Control Program, D.2-Erosion and Sediment Control BMPs, D.4-Site Plan Review Procedures, D.5-Public Information Handling Procedures, D.6-Site Inspection/Enforcement Procedures.

Measurable Goal(s), including frequencies: The City of Elmhurst relies on DuPage County for most of the activities related to this Best Management Practice. The County's Ordinance, effective April 23rd, 2013, is more restrictive in terms of BMP's than ever.

'17-'18 Milestones: Continue to adopt updates to the Stormwater Ordinance that implement changes incorporated in the BMP Manual. Continue to educate City Staff on the evolving regulations by offering and attending training programs and seminars. Review development plans to ensure they comply with the adopted Stormwater Ordinance and offer staff training opportunities to learn new methods of their evolving field. Continue to field public concerns about proposed developments and implement their concerns in Stormwater permit review. Continue to update City website with the on-going activities and policies. Continue to perform and document sediment and erosion control inspection and to offer employee training regarding on-site inspections. Continue to work with DuPage County on future revisions to the Ordinance. Continue to evaluate new policies for commercial and multi-family developments that promote/require BMPs and water quality.

Completed tasks in '17-'18: The City relies upon the County Ordinance for erosion control inspection requirements. In the past year, City has completed the following tasks:

- The Engineering Staff regularly attended monthly meetings of the DuPage County Municipal Engineers Discussion Group, where discussions regarding water quality issues and sediment and erosion control BMP technology took place. Many of these meetings include presentations by manufacturer representatives of new erosion and sedimentation control products which are now available. Also many meetings involved discussions regarding possible revisions and interpretations to the recently adopted Stormwater Ordinance.
- City staff continued to be involved with discussions with County staff about BMP standard details and possible development of a technical guidance document to supplement the Ordinance.
- The City of Elmhurst continued an aggressive erosion control program in 2016. Commercial and industrial construction sites over 1 acre are being inspected on a weekly basis and after significant rainfall events for compliance with sediment and erosion control requirements. City staff is working closely with commercial and industrial contractors to make sure they are aware of their requirements on the construction sites. Single-family residential construction sites are regularly inspected, and inspections for compliance with sediment and erosion control requirements have been made a part of other building-related inspections. Single-family builders are continuously being educated on new practices and techniques for good erosion control and BMP practices on small sites.

BMP No. E.2-Regulatory, E.3-Long Term O&M Procedures, E.4-Pre-Construction Review of BMP Designs, E.5-Site Inspections during Construction, E.6-Post-Construction Inspections.

Measurable Goal(s), including frequencies: The City of Elmhurst relies on DuPage County for most of the activities related to this Best Management Practice.

'17-'18 Milestones: Offer staff training opportunities where staff will review and learn new BMP methods. Attend training sessions for the review and design of permanent BMP's. Continue to enforce new Ordinance provisions and review plans to ensure BMP's are provided for all new residential and commercial developments as required by Ordinance. Continue to conduct regular site inspections during construction and conduct staff training on recognizing inappropriate discharge from a construction site. Be proactive in promoting Green development where possible.

Completed tasks in '17-'18: The City relies upon the County Ordinance for erosion control inspection requirements. In the past year, City has completed the following tasks:

- The Engineering Staff continued to attend monthly meetings of the DuPage County Municipal Engineers workgroup where discussions regarding water quality issues and sediment and erosion control BMP technology took place. Many of these meetings included presentations by manufacturer representatives of new erosion and sedimentation control products which are now available.
- The City of Elmhurst staff and elected officials have proactively encouraged developers to incorporate permanent BMPs into their final design, including permeable pavers, bioswales, rain gardens, and infiltration trenches and have offered alternatives to do so wherever possible with new development. This cost-sharing program has been greatly successful and is getting more and more popular.
- The City began the investigation into the possible installation of additional permeable paver parking lanes on Addison Avenue, with the financial help of DuPage County through their Water Quality Grant Program. Although the grant request was not accepted the City will continue to pursue funding options to possibly install more of these permeable parking lanes in 2018 during regulariiry scheduled paving operations on this street.
- In May, 2016 City of Elmhurst staff attended the two-day APWA annual Conference and EXPO in Schaumburg, IL which presented several seminars on BMP's installation, inspection, and maintenance.
- In March, 2017 City of Elmhurst staff attended the two-day Illinois Association for Floodplain and Stormwater Management annual conference in Springfield, IL which presented several seminars on BMP's installation, inspection, and maintenance.

BMP No. F.1-Employee Training Program F.2-Inspection and Maintenance Program, F.4-Municipal Operations Waste Disposal, and F.5-Flood Management/Assess Guidelines.

Measurable Goal(s), including frequencies: The City of Elmhurst relies on DuPage County for most of the activities related to this Best Management Practice. In addition the City also relies on its membership with the DuPage River Salt Creek Workgroup for activities related to this BMP. A working group will investigate and develop procedures for inspection and maintenance of government-owned stormwater facilities, buildings and grounds, and infrastructure that concentrate on employee training and record keeping. The City of Elmhurst will determine proper training procedures on good housekeeping and pollution prevention for appropriate supervisory and/or management employees. Supervisors and/or managers will then provide their employees with the appropriate training/information based on the needs of the facility. Continue on-going efforts to ease flooding and flood damages to the maximum extent practicable. Continue as scheduled and track progress of watershed plans, hydrologic and hydraulic models, and FIRM maps updates.

'17-'18 Milestones: Based on suggestions, evaluate the procedures for effectiveness and improve training as necessary. Offer a refresher training session to previous attendees that include updates. Make arrangements for regular training sessions. Coordinate with employee training to incorporate any revisions into pollution prevention and good housekeeping procedures and guidelines. Continue assistance in watershed plans, models, and FIRM map updates.

Completed tasks in '17-'18: In the past year, City has completed the following tasks:

- City staff members attended multiple MS4 Permit Implementation seminars, hosted by ASCE and APWA in March and May of 2017.
- The City of Elmhurst continued a program of regularly scheduled soil erosion control inspections for all construction sites.
- The Engineering Staff attended monthly meetings of the DuPage County Municipal Engineers workgroup where discussions regarding inspection and maintenance of government-owned stormwater facilities again took place.
- City contractors performed seven complete street sweepings of the entire City and two additional "leaf sweepings" during the fall to clear the streets. City staff also operates two street sweepers as needed for certain situations (e.g. before and after storm events, parades, or other special events).
- As part of a two and a half year program, City contractors cleaned almost 50% of the storm inlets and storm lines.
- The City of Elmhurst owns and operates a permanent covered storage structure for the City's supply of salt.
- Maintenance of the City's fleet is performed indoors at the City garage. All related fuel, oil, and fluids are properly stored, disposed of, or recycled.
- Washing of the City fleet is performed indoors and drains through a triple basin and into the sanitary sewer.

- Revised FIRM mapping, completed by ISWS, is currently in the 90-day appeal period. The City has provided comments to ISWS mapping appeals.
- City staff attended several seminars put on by DuPage County and the Conservation Foundation regarding protecting watersheds, the importance of native landscaping, and BMPs.
- City staff attended training put on by DuPage County regarding deicing and reducing salt usage.
- City staff attended several Lower Salt Creek Watershed Planning seminars put on by DuPage County, CMAP, and the Conservation Foundation.

C. Attach results of information collected and analyzed, including monitoring data, if any during the reporting period.

The City of Elmhurst relies on DuPage County for most of the activities related to data collection and water quality monitoring. DuPage County, together with volunteer organizations such as the DuPage River Salt Creek Workgroup, has completed habitat and biological surveys on many of the waterways in the County and their findings are included in their annual report.

D. Attach a summary of the storm water activities you plan to undertake during the next reporting cycle (including an implementation schedule.)

As stated in our March 2016 NOI, the following are activities that the City of Elmhurst will undertake during 2018-2019, including participation from our co-permittee DuPage County, and technical partner DuPage River Salt Creek Workgroup, are:

BMP No. A.1-Distributed Paper Material, A.2-Speaking Engagement, A.3-Public Service Announcement, A.4-Community Event, A.5-Classroom Education Material.

- Include at least one story related to stormwater runoff and water quality annually in the City newsletter. Add at least one water-quality related link to the City's website.
- Continue to hold annual Arbor Day events, with an emphasis on trees and other vegetation native to Illinois. Continue involvement in and support of annual river cleanup days on local rivers and streams.
- Continue to tour public through the City of Elmhurst Wastewater Treatment Plant.
- Continue to promote local recycling and special waste events such as Elmhurst College annual event.

BMP No. B.1 – Public Panel, **B.3-Stakeholder Meeting, B.4-Public Hearing**

- The City of Elmhurst staff will continue to participate and attend meetings of the DuPage County Municipal Engineers on a regular basis.
- The City of Elmhurst will participate in the IDDE hearings and meetings.

- The City of Elmhurst will continue to participate and attend meetings of the DuPage River Salt Creek Workgroup (DRSCW).
- The City of Elmhurst will work with DuPage County to investigate that agency possibly developing a "hotline: for water quality concerns.
- The City of Elmhurst will develop and start hosting one local public meeting annually for input on the adequacy of the City's MS4 program.

BMP No. C.1-Storm Sewer Map Preparation, C.2-Regulatory Control Program, C.5-Illicit Source Removal Procedures

- Update the atlas to reflect new construction and provide a copy of the updated atlas to DuPage County for their use in identifying MS4 outfalls to Waters of the U.S.
- The City will respond to County notices, including tracing all identified illicit discharges and ensuring corrective action and remediation.

BMP No. D.1-Regulatory Control Program, D.2-Erosion and Sediment Control BMPs, D.6-Site Inspection/Enforcement Procedures.

- The City of Elmhurst will continue to coordinate with DuPage County regarding updates to the Stormwater Ordinance on a regular basis in order to stay current with local and national regulations. The City will adopt any further required BMP-related ordinance changes.
- The City will continue to enforce the installation and maintenance of soil erosion and sedimentation control measures during construction activities.
- The City will continue to develop a new Stormwater Pollution Prevention Training for contractor's and will start to implement the requirement for certification of this program into the specifications for future City projects.

BMP No. E.2-Regulatory, E.5-Site Inspections During Construction,

- The City will require the installation and maintenance of permanent BMPs to control soil erosion and sedimentation for all residential and commercial developments as required by the new Stormwater Ordinance. Permanent BMPs installed on completed developments will be inspected once a year to ensure that they are being maintained.
- City staff will enforce new policies and procedures adopted by the City in 2014 and 2018 to promote/require practical and effective post-construction best management practices and when needed make recommendations for alterations to the policies/procedures.
- The City will continue to analyze the possibility of adopting new commercial and multi-family stormwater policies that promote/require BMPs.
- The City of Elmhurst will continue to utilize review forms and compile/complete inspection records.
- The City will seek training opportunities for City staff in terms of soil erosion control inspections.
- The City will continue to install and maintain major stormwater infrastructure throughout the City will the goal of stormwater flood mitigation.

BMP No. F.1-Employee Training Program, F.2-Inspection/Maintenance Program, F.5- Flood Mgmt/Assess Guidelines

- Continue to hold one training workshop per year for public works employees.
- Continue Comprehensive Storm Sewer and Sanitary Sewer study with the help of City consultant. Prioritize, budget, and implement storm/sanitary improvement projects identified in study.
- The City personnel will attend available training sessions on the implementation of permanent best management practices in proposed developments.
- The City will continue to work with DuPage County and FEMA on the remapping of Salt Creek.
- Continue to development and implement new Fats, Oils, and Grease (FOG) Program.
- City personal will continue to visit all food service establishments and auto service sites and educate business owners about the FOG Program.

E. Attach notice that you are relying on another government entity to satisfy some of your permit obligations (if applicable).

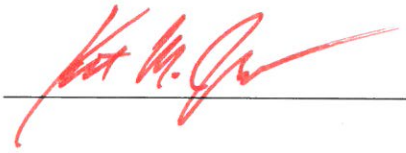
The City of Elmhurst is relying on the County of DuPage to satisfy some of their General NPDES Permit No. ILR40 obligations for the six minimum control measures: Public Education and Outreach, Public Participation/Involvement, Illicit Discharge Detection and Elimination, Construction Site Runoff Control, Post-Construction Runoff Control, and Pollution Prevention/Good Housekeeping. City staff will continue to work closely with County staff to ensure that all requirements of the City's NPDES permit are being met.

F. Attach a list of construction projects that your entity has paid for during the 2017-2018 reporting period.

- 2017 Contract Paving Project
- 2017 Watermain Improvements Project
- 2017 Watermain and Hydrant Repair Program
- 2017 Concrete Patching Project
- 2017 50/50 Sidewalk Repair Program
- 2017 Slabjacking Program
- Pine/Avon Stormwater Improvement Project

Certification

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for knowingly submitting false information, including the possibility of fine and imprisonment.

Authorized Representative Name and Title	Signature	Date
Kent Johnson, PE, CFM, City Engineer		05/31/18

DRSCW ILR40 Activities
March 2017 – February 2018

PART I. COVERAGE UNDER GENRAL PERMITS ILR40

Not applicable to the work of the DRSCW.

PART II. NOTICE OF INTENT (NOI) REQUIREMENTS

Not applicable to the work of the DRSCW.

PART III. SPECIAL CONDITIONS

Not applicable to the work of the DRSCW.

PART IV. STORM WATER MANAGEMENT PROGRAMS

A. Requirements

Not applicable to the work of the DRSCW.

B. Minimum Control Measure

1. Public Education and Outreach on Stormwater Impacts

DRSCW outreach activities for the year ending 2017 included:

- The DRSCW website was maintained during the reporting period and periodically updated with presentations and material (www.drscw.org).
- A searchable database with information on local aquatic biodiversity (IBIs), habitat (QHEI), and sediment and water column chemistry was maintained and periodically updated.
- The DRSCW created a "Water Resource Manager's Guide to Aquatic Bioassessment," to be finalized in 2018-2019.
- Public information available on the website includes:
  - Chloride Fact Sheets aimed at mayors and managers, public works staff, commercial operators, and homeowners.
  - Model salt Storage and Handling Ordinances and Policies.
  - Model Facilities Plan for Snow and Ice Control.
  - A fact sheet summarizing alternative deicing products.
  - Information of effective operating parameters for commonly used anti icing compounds.
  - Parking lots chloride application rate guidance example sheet and aide memoire.

- A brochure on coal tar sealants as a source of Polycyclic Aromatic Hydrocarbons (PAHs) aimed at homeowners (produced by the University of New Hampshire Stormwater Center).
- Detailed reports on the biolocal and chemical conditions of area waterways.

Technical Presentations

Workgroup meetings: The Workgroup hosts bimonthly meetings where technical presentations are made on a variety of water quality topics and surface water management subjects. The audience consists of mainly stormwater and wastewater professionals but the public is welcome to attend. Presentations made during the period March 1, 2017 to February 28, 2018 are listed below. Selected presentations are made available on the DRSCW website and upon request.

April 16, 2017 – Comprehensive Basin Assessment: East Branch 2014. Chris Yoder, Research Director, Midwest Biodiversity Institute

June 28, 2017 – Lower Salt Creek Watershed BMP Identification. Holly Hudson, Senior Aquatic Biologist, NE Illinois VLMP Coordinator, Chicago Metropolitan Agency for Planning (CMAP)

June 28, 2017 – DRSCW Nutrient Trading Development. Deanna Doohaluk, Watershed Project Manager, The Conservation Foundation/DRSCW

August 30, 2017 – Results of the 2015 Biological and Water Quality Study of the West Branch DuPage River Watershed. Chris Yoder, Research Director, Midwest Biodiversity Institute

October 26, 2018 – Results of the Leaf Litter Study. Presenter: Bill Selbig, Research Hydrologist, USGS - Wisconsin Water Science Center

December 13, 2018 – Stream Nutrient Assessment Procedure (SNAP). Robert Milter, Environmental Scientist, Ohio EPA

Other Water Quality Presentations or Workshops by the DRSCW

March 16, 2017 – Lower DuPage River Watershed Coalition Meeting (Plainfield, Illinois). Presentation on coal tar based sealcoats. Presenter: Deanna Doohaluk, TCF/DRSCW

April 6, 2017 – 319 Lower Salt Creek Watershed Based Plan Stakeholder Meeting (Elmhurst, Illinois). Monitoring and Conditions in Salt Creek. Presenter: Deanna Doohaluk, TCF/DRSCW

April 20, 2017 – College of DuPage (Glen Ellyn, Illinois). 'Got H2O? Water Resource Challenges Facing Northeastern Illinois'. Presenter: Stephen McCracken, TCF/DRSCW

April 25th –Illinois Wastewater Professional Conference IWEA Panel on monitoring (Springfield, Illinois). Presenter: Stephen McCracken, TCF/DRSCW

May 2, 2017 – Lower Des Plaines Watershed Group (Romeoville, IL). NIP Development. Presenter: Deanna Doohaluk, TCF/DRSCW

May 4th – Sweet Water Trust (Wisconsin). Adaptive Management Financing and Implementation and Project Selection (SMC), Oak Meadows Design and Financing. Presenter: Stephen McCracken, TCF/DRSCW and Erin Pande, ERA

June 8, 2017 – 319 Lower Salt Creek Watershed Based Plan Stakeholder Meeting (Brookfield, Illinois). Dissolved Oxygen Monitoring in Salt Creek. Presenter: Deanna Doohaluk, TCF/DRSCW

June 9, 2017 – IEPA (Springfield, IL). Development of the DRSCW Nutrient Trading Framework. Presenter: Deanna Doohaluk, TCF/DRSCW and Stephen McCracken, TCF/DRSCW

July 10, 2017 – Board of Commissioners of the Forest Preserve District of DuPage County (Wheaton, Illinois). Outreach Plan for Modification of the Fullersburg Woods Dam. Presenters: Erik Neidy, Forest Preserve District of DuPage County and Malcolm Mossman, Bluestem Communications

August 8, 2017 – Village of Oak Brook Board of Trustees (Oak Brook, Illinois). Outreach Plan for Modification of the Fullersburg Woods Dam. Presenters: Stephen McCracken, TCF/DRSCW and Malcolm Mossman, Bluestem Communications

August 10, 2017 – 319 Lower Salt Creek Watershed Based Plan Stakeholder Meeting (Villa Park, Illinois). River Restoration at Oak Meadows. Presenter: Deanna Doohaluk, TCF/DRSCW

September 27, 2017. Salt Creek Chapter of the Illinois Society of Professional Engineers. DRSCW approach to Watershed Management. Presenter: Stephen McCracken, TCF/DRSCW

October 5, 2017 – 319 Lower Salt Creek Watershed Based Plan Stakeholder Meeting (Westchester, Illinois). Progressing to a sensible salting policy in the Salt Creek Basin. Presenter: Deanna Doohaluk, TCF/DRSCW

December 7, 2017 – 319 Lower Salt Creek Watershed Based Plan Stakeholder Meeting (Itasca, Illinois). 2016 Monitoring Results for the Lower Salt Creek Watershed. Presenter: Deanna Doohaluk, TCF/DRSCW

February 28, 2018 – CSWEA Government Affairs Seminar (Springfield, IL). DRSCW Projects and NPDES Permits. Presenter: Nick Menninga, Downers Grove Sanitary District

2. Public Involvement and Participation **–** no activities

3. Illicit Discharge Detection and Elimination – no activities

4. Construction Site Storm Water Runoff Control - no activities

5. Post-Construction Storm Water Management in New Development and Redevelopment - no activities

6. Pollution Prevention/Good Housekeeping for Municipal Operations

Chloride Questionnaires
The DRSCW has attempted to track adoption of sensible salting BMPs in the program area since 2007. Monitoring ambient chloride concentrations has proven an imperfect metric for tracking efficiency trends in winter salt use. Tracking target BMP adoption in the program area provides opportunities to evaluate the impacts of the chloride management workshops; identify material for future workshops and form suppositions about salt use per unit of service expended inside the program area relative to 2006 levels.

In 2007, 2010, 2012, 2014, and 2016, the DRSCW distributed a questionnaire to approximately 80 municipal highway operations and public works agencies to obtain information about deicing practices throughout the program area. The findings of the 2016 questionnaires are summarized in attachment A. A new questionnaire will be distributed in spring of 2018 and the results will be supplied in the March 2018-Feburary 2019 Report.

Forty-three (43) agencies responded to the 2016 survey, the highest number of agencies ever responding to a program survey. The increase in use of dry NaCl and drop in liquid NaCl were both functions of the increased participation in the survey and do not appear to reflect a move away from application BMPs.

Almost all agencies in the program area have covered permanent salt storage facilities but there still some opportunities for storage and salt handling improvements across the watersheds, notably sweeping up loading areas post loading.

The 2016 survey did show increased implementation of certain priority best management practices:

- Spreading equipment calibration
- Use of weather forecasting for deicing response decisions
- Use of pavement temperature information for deicing response decisions

The survey shows expanded use of anti-icing (pretreatment) BMPs throughout the watershed, and continued use and testing of alternative deicing materials and additives to reduce total salt usage. Agencies who are still reporting use of more than 400 pounds of salt per lane mile may be prioritized by the Chloride Reduction Program for outreach and BMP information in 2018.

The 2016 survey highlights significant local deicing program management oversite improvements, particularly with control over application rates. Recordkeeping improvements have been implemented throughout the watershed area to better manage the quantity of salt being used in different situations. Nine out of 42 responses reported changes made to their program due to local deicing program workshops. Common methods of informing the public of policy or local program changes include the use of city or township website, newsletter, social media, and press releases.

Chloride Reduction Workshops
Two chloride reduction workshops were held during the reporting period ending March 2018.

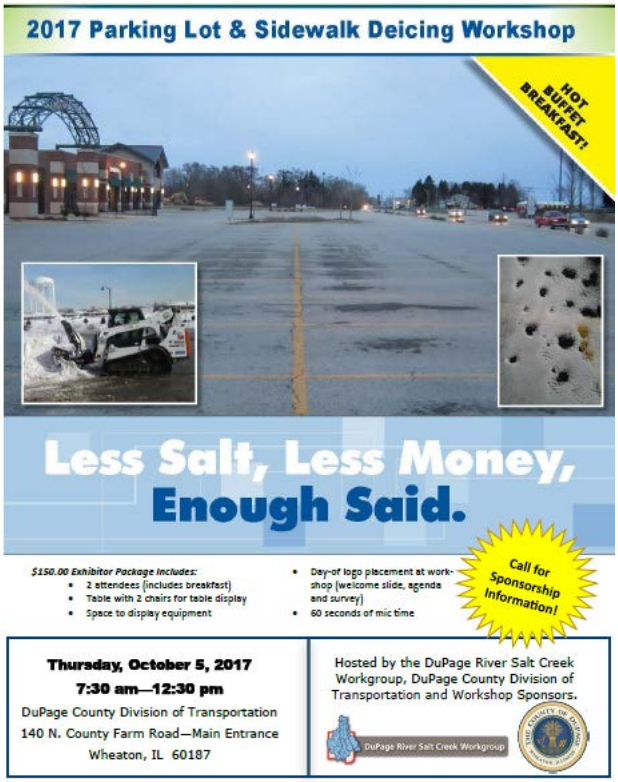
The **public roads deicing workshop** held at DuPage County DOT on October 12, 2017 with the following agenda:

- 7:00 - 7:25 Registration and Breakfast
- 7:25 -7:30 Welcome and Housekeeping- Mike Tuman, DuPage County DOT & Sponsor Recognition – Denver Preston, K-Tech Specialty Coatings
- 7:30 – 7:45 Salt Use & The Environment in the DRSCW Program Area - Stephen McCracken, The Conservation Foundation/DRSCW
- 7:45 – 8:00 MS4 Inspections for Public Works Facilities, Dan Bounds, Baxter & Woodman
- 8:00 – 8:45 Building an Award Winning Snowfighting Program, Bryan Beitzel, Village of Buffalo Grove
- 8:45 –9:00 BREAK (includes exhibitor mic time)
- 9:05 – 9:30 Automated Systems, Dave Kjederquist, Swenson
- 9:30– 10:00 Choosing the Right Blades, Gardi Willis, Kueper North America
- 10:00 – 10:30 Pavement Temperature Sensors, Mark DeVries, Vaisala
- 10:30 – 10:45 Break (includes exhibitor mic time)
- 10:50 – 11:20 Chloride Offset Program, Bryan Wagner, Illinois Tollway; Rick Radde, Village of Bensenville
- 11:20 – 11:55 Shared Services, Todd Hoppenstedt, Village of Montgomery
- 11:55 – 12:00 Wrap Up, Evaluations, Equipment Show

Attendance – 149 registered, 11 presenters/staff, 6 committee members/guests; 9 sponsors/exhibitors = 175 total. All participants received a certificate of attendance. We received 87 feedback forms from participants.

The **parking lots and sidewalks deicing workshop** was held at DuPage County DOT on October 5, 2017 with the following agenda:

- Ambient conditions and regulatory update: Stephen McCracken, The Conservation Foundation/DRSCW
- Information on developing efficient and cost-effective snow fighting operations, appropriate product selection, equipment selection, application rates, equipment calibration, ambient conditions monitoring. Presenters: Connie Fortin, Fortin Consulting and Chis Walsh, (former Public Works Director with City of Beloit, WI)
- Test on workshop materials.



Attendance - 82 registrations, 7 presenters/staff, 6 exhibitors/staff = 95 total. All participants received a training certificate and participants who successfully completed the test are recognized on DuPage County Stormwater Management's Water Quality – Pollution Prevention/Good Housekeeping web page. The DRCCW received 65 program evaluations from participants.

C. Qualifying State, Country or Local Program

Not applicable to the work of the DRSCW.

D. Sharing Responsibility

This report outlines the activities conducted by the DRSCW on behalf of its' members related to the implementation of the ILR40 permit. It is the responsibility of the individual ILR40 permit holders to utilize this information to fulfill the reporting requirements outlined in Part V.C. of the permit.

E. Reviewing and Updating Stormwater Management Programs

Not applicable to the work of the DRSCW.

PART V. MONITORING, RECORDKEEPING, AND REPORTING

A. Monitoring

The ILR40 permit states that permit holders "must develop and implement a monitoring and assessment program to evaluate the effectiveness of the BMPs being implemented to reduce pollutant loadings and water quality impacts". The DRSCW monitoring program meets the following monitoring objectives and requirements outlined in the permit:

- Measuring pollutants over time (Part V. A. 2. b. ii)
- Sediment monitoring (Part V. A. 2. b. iii)
- Assessing physical and habitat characteristics such as stream bank erosion caused by storm water discharges ((Part V. A. 2. b. vi)
- Collaborative watershed-scape monitoring (Part V. A. 2. b. x)
- Ambient monitoring of total suspended solids, total nitrogen, total phosphorus, fecal coliform, chlorides, and oil and grease (Part V. A. 2. c.)

The DRSCW water quality monitoring program is made up of two components: 1) Bioassessment and 2) DO monitoring.

BIOASSESSMENT

Overview and Sampling Plan

A biological and water quality survey, or "biosurvey", is an interdisciplinary monitoring effort coordinated on a waterbody specific or watershed scale. This may involve a relatively simple setting focusing on one or two small streams, one or two principal stressors, and a handful of sampling sites or a much more complex effort including entire drainage basins, multiple and overlapping stressors, and tens of sites. The DRSCW bioassessment is the latter. The DRSCW bioassessment program began in 2007 with sampling in the West Branch DuPage River, East Branch DuPage River and Salt Creek watersheds. From 2009-2016, each watershed was sampled on a 3-year rotation beginning with the West Branch DuPage River watershed in 2006. Beginning in 2017, watershed will be sampled in a 5-year rotation ensuring that each watershed will be sampled during the effective period of the ILR40 permit. The bioassessment program functions under a quality assurance plan agreed on with the Illinois Environmental Protection Agency (http://drscw.org/wp/bioassessment/). Table 1 details the bioassessment sampling dates for each DRSCW watershed.

Table 1. Bioassessment sampling dates for the DRSWC watershed

Watershed	Sampling Completed (year)	Sampling Scheduled (year)
West Branch DuPage River	2007, 2009, 2012, 2015	2020
East Branch DuPage River	2007, 2011, 2014	2019
Salt Creek	2007, 2010, 2013, 2016	2021

The DRSCW bioassessment program utilizes standardized biological, chemical, and physical monitoring and assessment techniques employed to meet three major objectives:

1) determine the extent to which biological assemblages are impaired (using IEPA guidelines);
2) determine the categorical stressors and sources that are associated with those impairments; and,
3) add to the broader databases for the DuPage River and Salt Creek watersheds to track and understand changes through time in response to abatement actions or other influences.

The data collects as part of the bioassessment is processed, evaluated, and synthesized as a biological and water quality assessment of aquatic life use status. The assessments are directly comparable to previously conducted bioassessments such that trends in status can be examined and causes and sources of impairment can be confirmed, amended, or removed. A final report containing a summary of major findings and recommendations for future monitoring, follow-up investigations, and any immediate actions that are needed to resolve readily diagnosed impairments is prepared following each bioassessment. The bioassessment reports are posted on the DRSCW at http://drscw.org/wp/bioassessment/. It is not the role of the bioassessments to identify specific remedial actions on a site specific or watershed basis. However, the baseline data provided by the bioassessments contributes to the Integrated Priority System that was developed to help determine and prioritize remedial projects (http://drscw.org/wp/project-identification-and-prioritization-system/).

Sampling sites for the bioassessment were determined systematically using a geometric design supplemented by the bracketing of features likely to exude an influence over stream resource quality, such as CSOs, dams and wastewater outfalls. The geometric site selection process starts at the downstream terminus or "pour point" of the watershed (Level 1 site), then continues by deriving each subsequent "panel" at descending intervals of one-half the drainage area (D.A.) of the preceding level. Thus, the drainage area of each successive level decreases geometrically. This results in in seven drainage area levels in each of the three watersheds, starting at the largest (150 sq. mi) and continuing through successive panels of 75, 38, 19, 9, 5 and 2 sq. mi. Targeted sites are then added to fill gaps left by the geometric design and assure complete spatial coverage in order to capture all significant pollution gradients including reaches that are impacted by wastewater treatment plants (WWTPs), major stormwater sources, combined sewer overflows (CSOs) and dams. The number of sampling sites by method/protocol and watershed are listed in Table 2 and illustrated in Figure 1.

Representativeness – Reference Sites

Data is collected from selected regional reference sites in northeastern Illinois preferably to include existing Illinois EPA and Illinois DNR reference sites, potentially being supplemented with other sites that meet the Illinois EPA criteria for reference conditions. One purpose of this data will be to index the biological methods used in this study that are different from Illinois EPA and/or DNR to the reference condition and biological index calibration as defined by Illinois EPA.

In addition, the current Illinois EPA reference network does not yet include smaller headwater streams, hence reference data is needed to accomplish an assessment of that data. Presently thirteen (13) reference sites have been established.

Table 2. Number of sampling sites in the DRSCW project area.

Method/Protocol	West Branch DuPage River (2013)	East Branch DuPage River (2014)	Salt Creek (2016)	Reference Sites (2006-2016)	Total Sites
Biological sampling					
Fish	44	36	51	13	144
Macroinvertebrates	44	36	51	13	144
QHEI	44	36	51	13	144
Water Column Chemical/Physical Sampling					
Nutrients*	44	36	51	6	137
Water Quality Metals	44	36	51	6	137
Water Quality Organics	18	11	16	6	51
Sediment Sampling	18	11	16	6	51

*Also included indicators or organic enrichment and ionic strength, total suspended solids (TSS), DO, pH and temperature

The bioassessment sampling includes four (4) sampling methods/protocols: biological sampling, Qualitative Habitat Evaluation Index (QHEI), water column chemical/physical parameter sampling and sediment chemistry. The biological sampling includes two assemblages: fish and macroinvertebrates.

FISH

Methodology

Methods for the collection of fish at wadeable sites was performed using a tow-barge or longline pulsed D.C. electrofishing apparatus (MBI 2006b). A Wisconsin DNR battery powered backpack electrofishing unit was used as an alternative to the long line in the smallest streams (Ohio EPA 1989). A three-person crew carried out the sampling protocol for each type of wading equipment sampling in an upstream direction. Sampling effort was indexed to lineal distance and ranged from 150-200 meters in length. Non-wadeable sites were sampled with a raft-mounted pulsed D.C. electrofishing device in a downstream direction (MBI 2007). Sampling effort was indexed to lineal distance over 0.5 km. Sampling was conducted during a June 15-October 15 seasonal index period.

Samples from each site were processed by enumerating and recording weights by species and by life stage (y-o-y, juvenile, and adult). All captured fish were immediately placed in a live well, bucket, or live net for processing. Water was replaced and/or aerated regularly to maintain adequate D.O. levels in the water and to minimize mortality. Fish not retained for voucher or other purposes were released back into the water after they had been identified to species, examined for external anomalies, and weighed either individually or in batches. While the

majority of captured fish were identified to species in the field, any uncertainty about the field identification required their preservation for later laboratory identification. Identification was made to the species level at a minimum and to the sub-specific level if necessary. Vouchers were deposited and verified at The Ohio State University Museum of Biodiversity (OSUMB) in Columbus, OH.

Results

The fish sampling results presented in this report summarize the findings for the mainstem reaches of the East Branch DuPage River, the West Branch DuPage River and Salt Creek. Information on the tributaries and detailed analysis of all results can be found at http://drscw.org/wp/bioassessment/.

The fish and macroinvertebrate results are presented as Index of Biotic Integrity (IBI) scores. IBI is an evaluation of a waterbodies biological community in a manner that allows the identification, classification and ranking of water pollution and other stressors. IBIs allow the statistical association of various anthropogenic influences on a water body with the observed biological activity in said water body and in turn the evaluation of management interventions in a process of adaptive management. Chemical testing of water samples produce only a snapshot of chemical concentrations while an IBI allows an evaluation of the net impact of chemical, physical and flow variables on a biological community structure. Dr. James Karr formulated the IBI concept in 1981.

East Branch DuPage River

Fish assemblage conditions throughout the East Branch DuPage River watershed a in the poor and fair ranges (Figure 1). However, the mainstem assemblages show similar quality or modest improvement at nearly all sites when 2014 data is compare to 2011 and approach 2007 levels.

Prior to the modification of the Churchill Woods dam in 2001, fish assembles upstream of the dam, were essentially that of a pond and dominated by sunfish, bullheads, golden shiner, and mosquito fish. Downstream of the dam, the fish assemblage reflected more lotic, stream like conditions with populations of sand shiner, johnny darter, horneyhead chub and rock bass. Since the modification of the Churchill Woods dam, eight new species have been recorded and other populations have expanded their ranges above the former dam site. Additionally, in 2014, two new species (banded darter and round goby) were recorded in the lower reaches of the East Branch. The appearance of the banded darter, a sensitive species, is a sign of improved quality in the lower nine miles of the main stem.

West Branch DuPage River

All survey sites fell consistently in the poor or lower fair ranges with slightly higher scores downstream from RM 8.1 and the Fawell Dam (Figure 2). No West Branch sites met the 41-point criterion synonymous with a good quality assemblage.

It should be noted that the Fawell dam is a barrier to several fish species. The DRSCW in cooperation with DuPage County and Forest Preserve District of DuPage County plans to modify the Fawell Dam to allow for fish passage. This project is expected to be completed by 2018.

Figure 1. Fish IBI scores in the East Branch DuPage River, 2014, 2011-12 and 2007 in relation to municipal POTW dischargers. Bars along the x-axis depict mainstem dams or weirs (only black bars impede fish passage). The shaded area demarcates the "fair" narrative range.

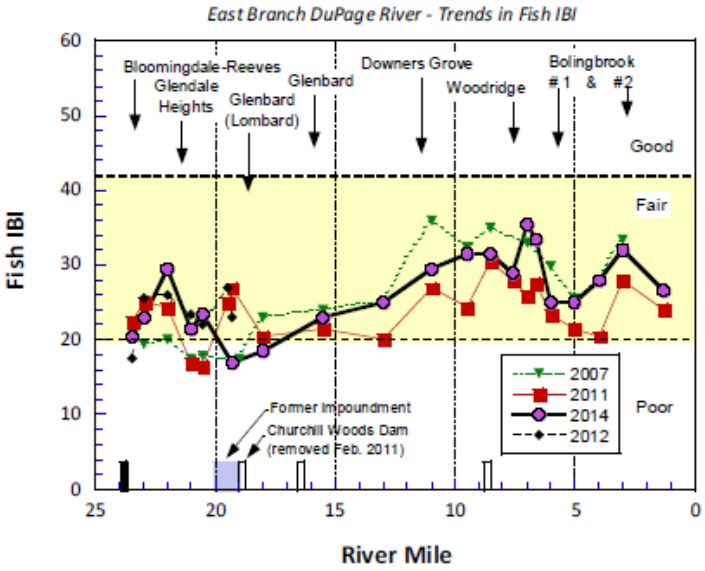
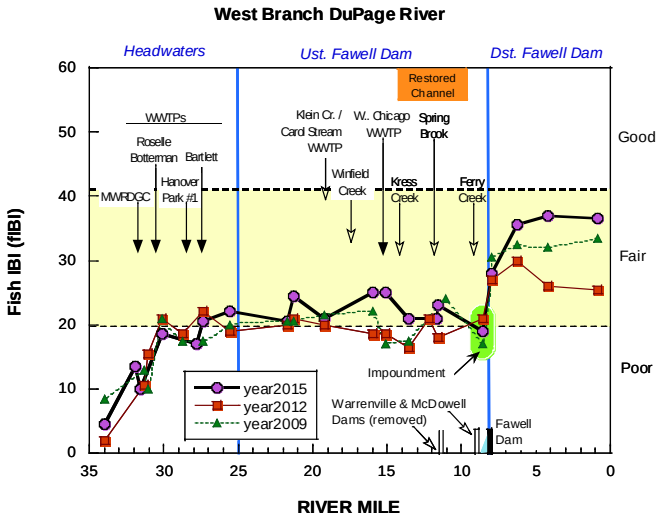


Figure 2. Fish IBI scores in the West Branch DuPage River, 2015, 2011-12 and 2007 in relation to municipal POTW dischargers. Bars along the x-axis depict mainstem dams or weirs (only black bars impede fish passage). The shaded area demarcates the "fair" narrative range.



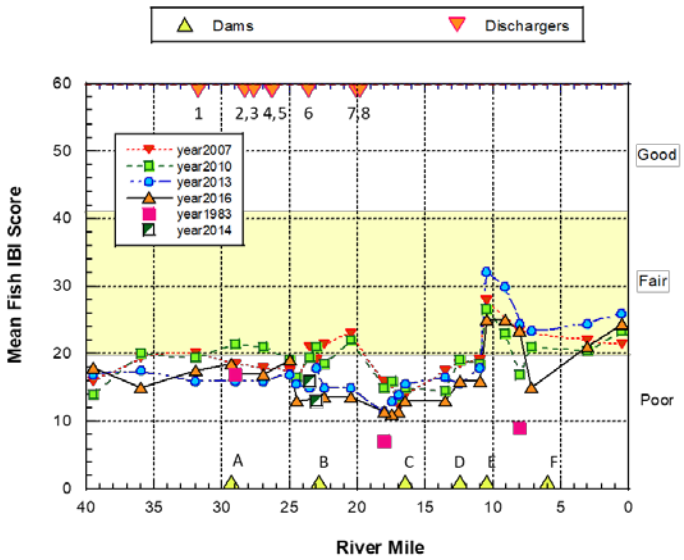
Salt Creek

Fish assemblages sampled in Salt Creek mainstem in 2016 were consistently in poor condition upstream from the Graue Mill Dam and mostly fair downstream to the confluence with the Des Plaines River (Figure 3). This was similar to the pattern observed in 2013 although fIBI scores were slightly higher than in 2016 at most sites in the lower one-half of the mainstem. In fact, the general response of the fish assemblage was similar longitudinally among all four survey periods.

The Graue Mill Dam is a barrier to upstream fish movement with 17 fish species found only downstream of the dam and only two species only found upstream (Table 18). Many of the species only found downstream should have populations that extend well upstream of the dam (johnny darter, smallmouth bass, rock bass, hornyhead chub, etc.). Thus the dam as a barrier is a key factor that limits the ability of certain species to recolonize the upper reaches of Salt Creek as other precluding stressors (e.g., D.O., siltation, organic enrichment) are resolved. The DRSCW plans to modify the Fullersburg Woods Dam to allow for fish passage. This project is expected to be completed by 2023.

There was a wide variation in fIBI scores among the tributaries with no sites meeting the General Use fIBI threshold and many sites in poor condition. Sites in the Addison Creek subwatershed had the lowest fIBI scores with most rated as poor across all years. This generally matches the pattern observed with the QHEI in Addison Creek with uniformly poor habitat. However, Addison Creek also has several water quality stressors and poor habitat condition in other tributaries did not result in the skew of fIBI scores in the poor range.

Figure 3. Fish Index of Biotic Integrity scores for samples collected from Salt Creek in 1983, 2007, 2010, 2013, 2014 and 2016 in relation to the locations of NPDES permitted facilities, combined sewer overflow (CSO) outfalls, dams and principal tributaries. The locations of dams are arrayed along the x-axis and noted as triangles. The shaded area indicates the range for a restricted fish assemblage as defined by Illinois EPA.



MACROINVERTEBRATES

Methodology

The macroinvertebrate assemblage is sampled using the Illinois EPA (IEPA) multi-habitat method (IEPA 2005). Laboratory procedures followed the IEPA (2005) methodology for processing multi-habitat samples by producing a 300-organism subsample with a scan and pre-pick of large and/or rare taxa from a gridded tray. Taxonomic resolution is performed to the lowest practicable resolution for the common macroinvertebrate assemblage groups such as mayflies, stoneflies, caddisflies, midges, and crustaceans, which goes beyond the genus level requirement of IEPA (2005). However, calculation of the macroinvertebrate IBI followed IEPA methods in using genera as the lowest level of taxonomy for mIBI calculation and scoring.

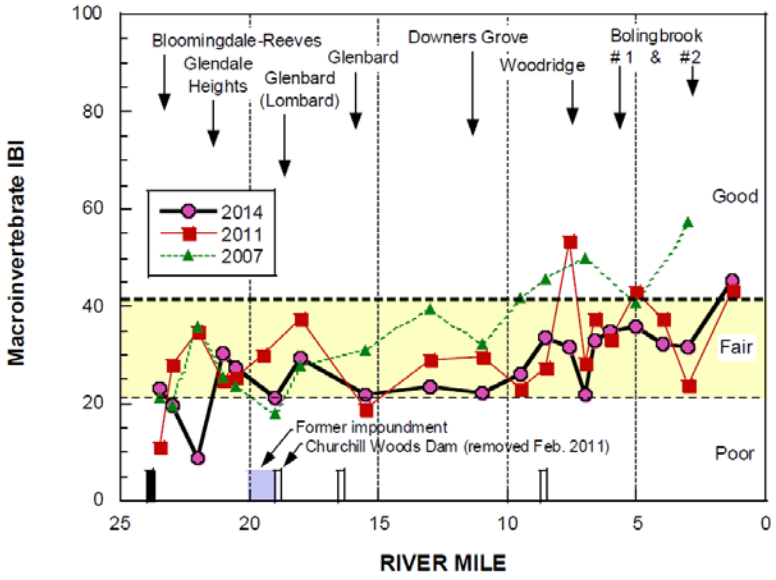
Results

The macroinvertebrate sampling results presented in this report summarize the findings for the mainstem reaches of the East Branch DuPage River, the West Branch DuPage River and Salt Creek. Information on the tributaries and detailed analysis of all results can be found at http://drscw.org/wp/bioassessment/.

East Branch DuPage River

Macroinvertebrate collections from the 2014 East Branch watershed survey fell entirely within the fair or poor quality ranges with the exception of a single "good" site on the lower mainstem (Figure 4). Assemblages throughout the study area are predominated by facultative and tolerant organisms most often associated with elevated nutrients, dissolved solids and low DO.

Figure 4. Macroinvertebrate IBI scores in the East Branch DuPage River, 2014, 2011-12 and 2007 in relation to municipal POTW dischargers. Bars along the x-axis depict mainstem dams or weirs (only black bars impede fish passage). The shaded area demarcates the "fair" narrative range.

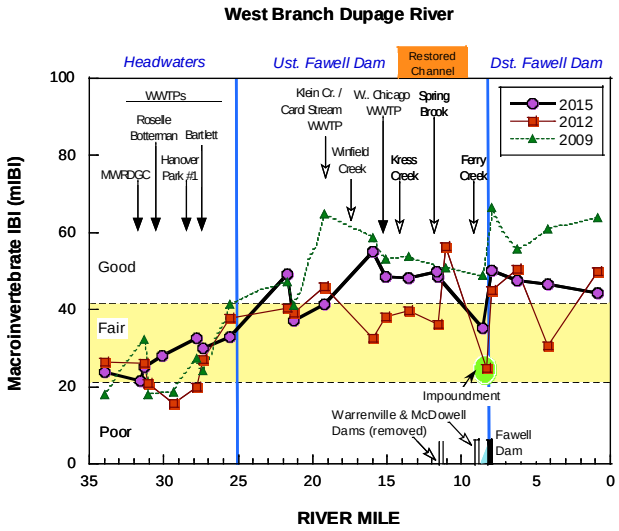


West Branch DuPage River

With few exceptions, West Branch macroinvertebrate assemblages from the upper, headwater reach reflected degraded but similar quality between 2007, 2009, 2012 and 2015 (Figure 5). The combination urban drainage, marginal habitat quality and a series of four major WWTP discharges in the small drainage were considered major contributors.

In both 2009 and 2015, major improvement in mIBI scores and clearly good mIBI ratings were detected upstream from Klein Creek and the Carol Stream WWTP (Figure 5). In 2009 and 2015, consistently good quality was maintained along the remaining length of the West Branch downstream to the mouth. In 2006, this downstream improving trend was more erratic; still 5 of the 8 sites between Klein Creek and the mouth exceeded Illinois criteria. In contrast, the 2012 trend was much less distinct as narrative ratings vacillated between a fair or lower good range status through most of the lower 20 mainstem river miles.

Figure 5. Macroinvertebrate IBI scores in the West Branch DuPage River, 2015, 2011-12 and 2007 in relation to municipal POTW dischargers. Bars along the x-axis depict mainstem dams or weirs (only black bars impede fish passage). The shaded area demarcates the "fair" narrative range.

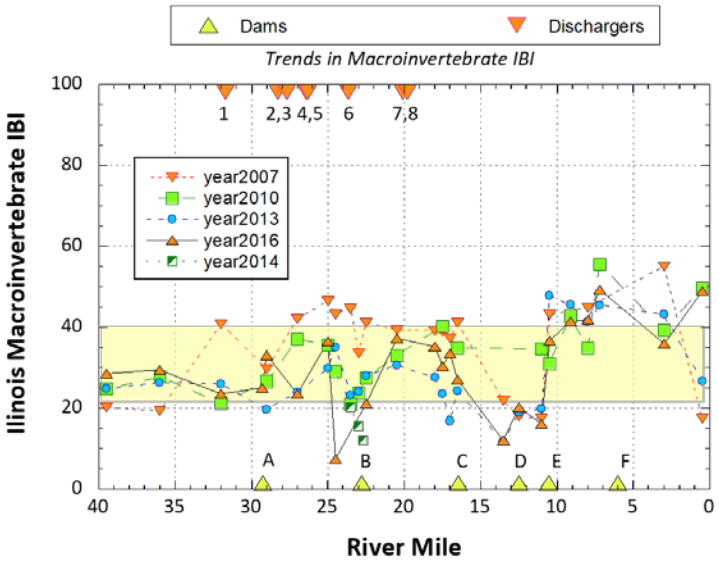


Salt Creek

In 2013 and 2016 the macroinvertebrate assemblages in the Salt Creek mainstem were rated fair at most sites upstream from the Graue Mill Dam, and good at four and fair at two of the six sites downstream from the dam (Figure 6). Longitudinally, scores decreased downstream from Spring Brook relative to those upstream. The confluence with Spring Brook marks the reach where multiple WWTPs discharge in short succession.

In the 2016, the Oak Meadows Dam (dam B on Figure 6) was removed in a project sponsored by the Forest Preserve District of DuPage County, DuPage County Stormwater Management, and the DRSCW. Post-project sampling was completed in 2017. Post-project, both mIBI and individual species taxa biodiversity improved at the site. The 2017 post-project mean mIBI (33.2) increased 9.6 points compared to the 2013 score. The project's objective is to increase the mean mIBI to 35. Post-project macroinvertebrate sampling to document the continued effects of this dam removal will occur in 2018 and 2019.

Figure 6. Macroinvertebrate IBI scores for samples collected from the Salt Creek mainstem, 2007, 2010, 2013, 2014, and 2016 in relation to publicly owned treatment works, low head dams (noted by diamond tipped bars adjoining the x-axis), and combined sewer outfalls (CSO). The shaded region demarcates the "fair" narrative range.



HABITAT

Methodology

Physical habitat was evaluated using the Qualitative Habitat Evaluation Index (QHEI) developed by the Ohio EPA for streams and rivers in Ohio (Rankin 1989, 1995; Ohio EPA 2006b) and as modified by MBI for specific attributes. Attributes of habitat are scored based on the overall importance of each to the maintenance of viable, diverse, and functional aquatic faunas. The type(s) and quality of substrates, amount and quality of instream cover, channel morphology, extent and quality of riparian vegetation, pool, run, and riffle development and quality, and gradient used to determine the QHEI score which generally ranges from 20 to less than 100. QHEI scores and physical habitat attribute were recorded in conjunction with fish collections.

Results

The QHEI data presented in this report summarize the findings for the mainstem reaches of the East Branch DuPage River, the West Branch DuPage River and Salt Creek. Information on the tributaries and detailed analysis of all results can be found at http://drscw.org/wp/bioassessment/.

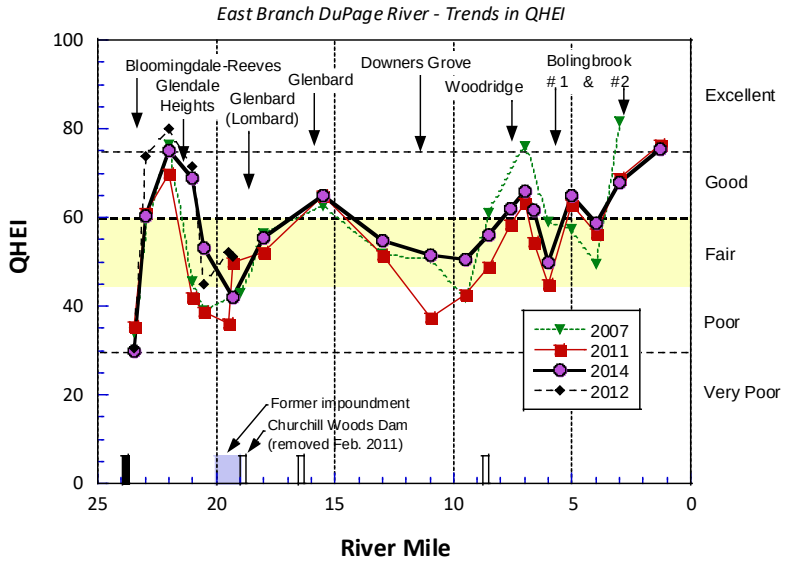
The physical habitat of a stream is a primary determinant of biological quality. Streams in the glaciated Midwest, left in their natural state, typically possess riffle-pool-run sequences, high sinuosity, and well-developed channels with deep pools, heterogeneous substrates and cover in the form of woody debris, glacial tills, and aquatic macrophytes. The QHEI categorically scores the basic components of stream habitat into ranks according to the degree to which those components are found in a natural state, or conversely, in an altered or modified state.

East Branch DuPage River

Based on QHEI scores, mainstem habitat quality fell mostly in the fair to good ranges, but varied by location (Figure 7). Substrate embeddedness was a common characteristic of the mainstem as riffle or pool embeddedness was recorded at all but one location (EB23/RM 22.0).

Since the modification of the Churchill Woods dam in 2011, QHEI scores within and upstream of the former dam have increased by reflecting the appearance of riffles and increased habitat heterogeneity.

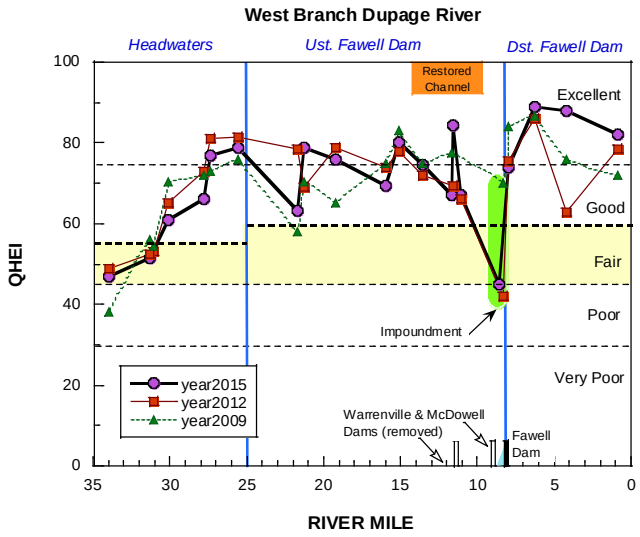
Figure 7. Qualitative Habitat Evaluation Index (QHEI) scores for the E. Branch DuPage River in 2007, 2011-12, and 2014 in relation to municipal WWTP discharges. Bars along the x-axis depict mainstem dams or weirs (black bars are dams that impede fish passage). The shaded region depicts the range of QHEI scores where habitat quality is marginal and limiting to aquatic life. QHEI scores less than 45 are typical of highly modified habitat.



West Branch DuPage River

Mainstem habitat quality in 2012 was good to excellent throughout most of its length and, with the exception of the extreme headwaters (upstream RM 30.1) and Fawell Dam pool (RM 8.3) (Figure 8).

Figure 8. Qualitative Habitat Evaluation Index (QHEI) scores for the W. Branch DuPage River in 2009, 2012, and 2015. Bars along the x-axis depict mainstem dams or weirs (black bars are dams that impede fish passage). The shaded region depicts the range of QHEI scores where habitat quality is marginal and limiting to aquatic life. QHEI scores less than 45 are typical of highly modified habitat



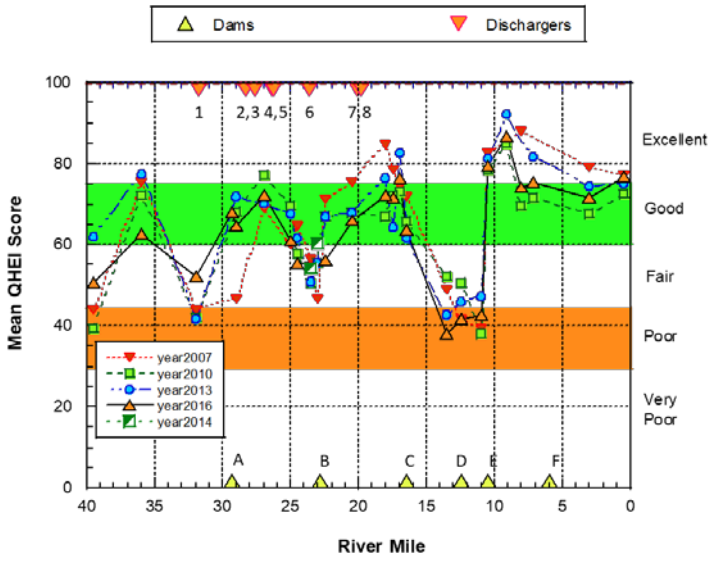
Salt Creek

In Salt Creek, most of the sites possessed the types and amounts of habitat features necessary to support aquatic life consistent with the Illinois General Use (Figure 9), with QHEI scores averaging 66.0 (range: 41.5-92.0) in 2013 and 64.3 (range: 38.0-86.5) in 2016. The longitudinal pattern in habitat quality was consistent between all years (2007, 2010, 2013 and 2016) with habitat generally improving in a downstream direction except where influenced by impoundments. Habitat was generally the poorest in the very headwaters and impoundments formed by low head dams. As in 2007 and 2010, the total number of modified quality attributes relative to the total number of good quality attributes at any given site generally did not overwhelm the capacity of a site to support aquatic life in 2013 and 2016, excepting in the impoundments formed by low head dams. The attributes of the QHEI that are most consistently potentially limiting to aquatic life are the embeddedness and siltation attributes with most sites having high silt cover and moderate to extensively embedded substrates. The prevalence of coarse substrate materials indicates the strongly biological potential if delivery of fines to the stream can be controlled.

In the 2016, the Oak Meadows Dam (dam B on Figure 9) was removed in a project sponsored by the Forest Preserve District of DuPage County, DuPage County Stormwater Management, and the DRSCW. Post-project sampling was completed in 2017. Post project QHEI increased at all sites with improvements in substrate, riparian, pool and riffle scores. Mean QHEI at the project location increased 12 points to 69.3 (or 68.5 if we discount SC35A, surveyed for QHEI post project only). All QHEI scores were within the "good" range (>60 QHEI points). The DRSCW is

optimistic its QHEI goal of >70 will be reached as riparian vegetation at the site matures. Post-project monitoring will continue in 2018 and 2019.

Figure 9. Qualitative Habitat Evaluation Index (QHEI) scores for Salt Creek plotted by river mile for data from 2007, 2010, 2013, 2014, and 2016. The orange-shaded region depicts the range of QHEI scores where habitat quality is marginal and limiting to aquatic life. QHEI scores less than 45 are typical of highly modified channels. The triangles arrayed along the x-axis in both plots show the locations of low-head dams.



WATER QUALITY CHEMISTRY

Methodology

Water column and sediment samples are collected as part of the DRSCW bioassessment programs. The total number of sites sampled is detailed in Table 2. Total number of collected samples by watershed typical for a full assessment by watershed are given in Table 3. The number of samples collected at each site is largely a function of the sites drainage area with the frequency of sampling increasing as drainage size increases (Table 4). Organics sampling is a single sample done at a subset of sites. Sediment sampling is done at a subset of 66 sites using the same procedures as IEPA.

The parameters sampled for are included in Table 6 and can be grouped into demand parameters, nutrients, demand, metals and organics. Locations of organic and sediment sites are shown on Figure 2. All sampling occurs between June and October of the sample year. The Standard Operating Procedure for water quality sampling can be found at http://drscw.org/wp/bioassessment/.

Table 3. Total number of samples by watershed typical for a full assessment by watershed

Watershed	Approximate # Sites	Demand Samples	Nutrients Samples	Metals Samples	Organics Samples
Salt Creek	51	280	280	149	16
West Branch DR	44	218	218	110	18
East Branch DR	36	196	196	100	11

Table 4. Approximate distribution of sample numbers by drainage area across the monitoring area.

Drainage Area and site numbers	>100 sq mi (n=12)	>75 sq mi (n=25)	>38 sq mi (n=11)	>19 sq mi (n=11)	>8 sq mi (n=15)	>5 sq mi (n=24)	>2 sq mi (n= 46)
Mean # Samples demand /nutrients	12	9	6	6	4	4	2
Mean # Samples metals	6	6	4	4	2	2	0

Table 6. Water Quality and sediment Parameters sampled as part of the DRSCW Bioassessment Program.

Water Quality Parameters	Sediment Parameters
Demand Parameters	**Sediment Metals**
5 Day BOD	Arsenic
Chloride	Barium
Conductivity	Cadmium
Dissolved Oxygen	Chromium
pH	Copper
Temperature	Iron
Total Dissolved Solids	Lead
Total Suspended Solids	Manganese
	Nickel
Nutrients	Potassium
Ammonia	Silver
Nitrogen/Nitrate	Zinc
Nitrogen – Total Kjeldahl	
Phosphorus, Total	
	Sediment Organics
Metals	Organochlorine Pesticides
Cadmium	PCBS
Calcium	Percent Moisture
Copper	Semivolatile Organics
Iron	Volatile Organic Compounds
Lead	
Magnesium	
Zinc	
Organics – Water	
PCBS	
Pesticides	
Semivolatile Organics	
Volatile Organics	

Results

The discussion presented below focuses on the constituents listed in the MS4 permit: total suspended solids, total nitrogen, total phosphorus, fecal coliform, chlorides, and oil and grease. Total nitrogen is presented as ammonia, nitrate, and total kjeldahl nitrogen (TKN). Prior to the 2016 sampling period, fecal coliform and oil and grease sampling was not conducted. Oil and grease sampling was added to the bioassessment sampling for Salt Creek in 2016. Fecal coliform and oil and grease sampling will be added to all future bioassessment sampling for the East Branch DuPage River (2019), West Branch DuPage River (2020), and Salt Creek (2021) ensuring that each watershed will be sampled for that parameter during the effective period of the ILR40 permit.

Detailed analysis and results for the other water quality constituents is located at http://drscw.org/wp/bioassessment/.

East Branch DuPage River

East Branch mainstem flows are effluent dominated during the late summer-early fall months. As such, chemical water quality is highly influenced by the concentration and composition of chemical constituents in WWTP effluents (Figures 10-13). The results in 2014 were consistent with 2011 during low flow periods with respect to observing no exceedances of Illinois water quality criteria for regulated parameters (i.e. TSS, NH_3-N).

West Branch DuPage River

Stream flow in the West Branch DuPage River is effluent dominated during summer months. As such, its water quality is highly influenced by the concentrations and composition of chemical constituents in the effluent as well as runoff from the urban and developed land cover in the watershed. Water quality sampling in 2012 during the summer low-flow periods suggest that the quality of treated effluent, with respect to regulated parameters (i.e., cBOD5, TSS, NH3), was generally good. Effluents did not result directly in exceedances of water quality standards for these parameters. However, increasingly elevated nutrient levels and their attendant influence on mainstem D.O. regimes remain problematic.

Salt Creek

Salt Creek drains a highly urbanized landscape with a high population density. The increase in Pollutants associated with urbanized landscapes have been documented. Given the high population density in the watershed, treated municipal effluent comprises a significant fraction of the total flow in Salt Creek and strongly influences water quality, especially with respect to nitrogen and phosphorus. The results in 2016 were similar to those in 2013 and 2010.

Figure 10. Concentrations of total suspended solids (top panel) and TKN (lower panel) from E. Branch DuPage River samples in 2007, 2011 and 2014 in relation to municipal WWTP discharges. Bars along the x-

axis depict mainstem dams or weirs (black bars are dams that impede fish passage). Red dashed lines shows the upper limits of concentrations typical for relatively unpolluted waters for TSS (McNeeley et al. 1979). Orange dashed line in TSS plot is the Ohio reference threshold for headwater (HW) and wadeable (WD) streams. For TKN, the orange dashed line represents the IPS threshold (1.0 mg/l). IPS is a tool developed by the DRSCW and MBI.

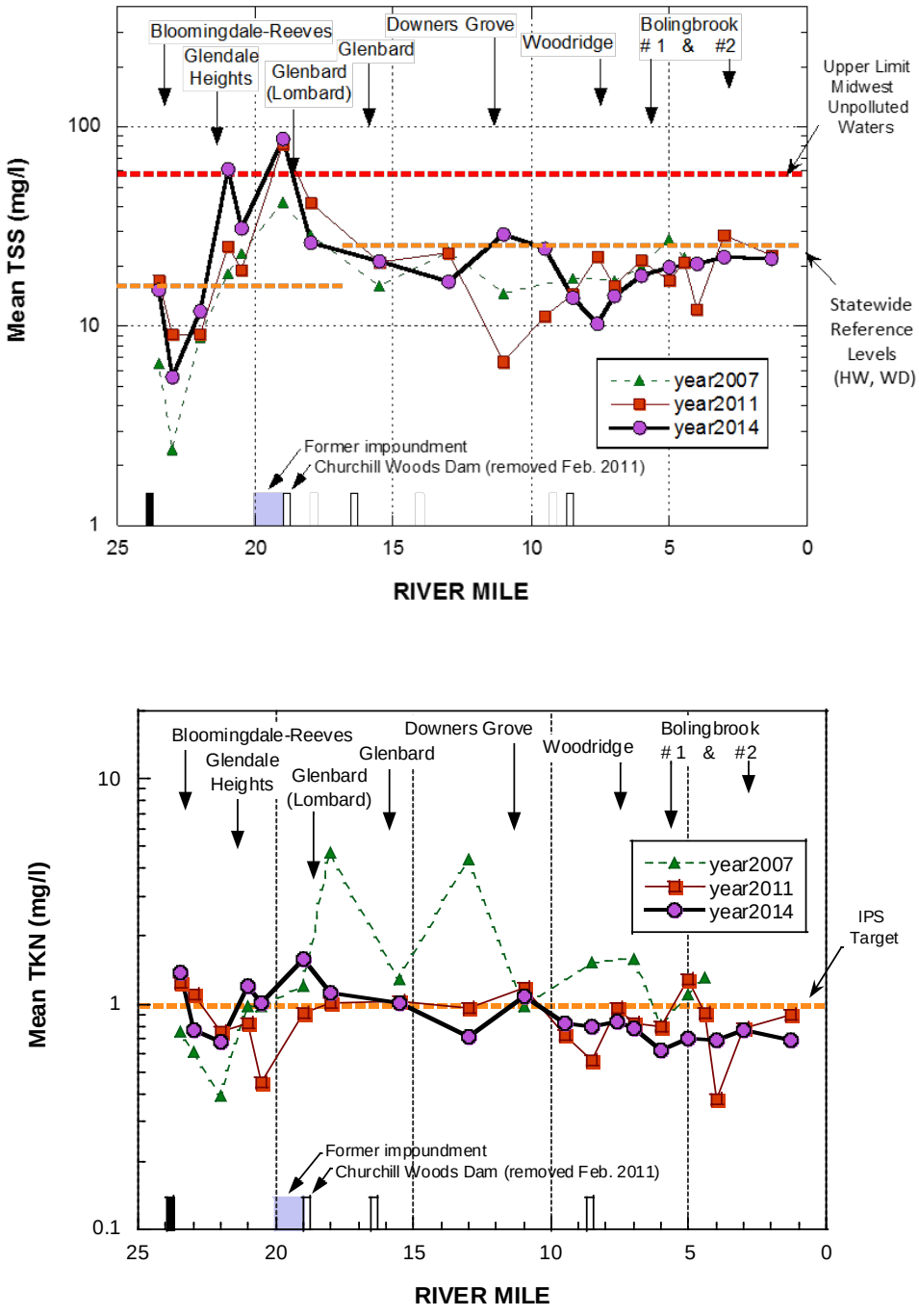
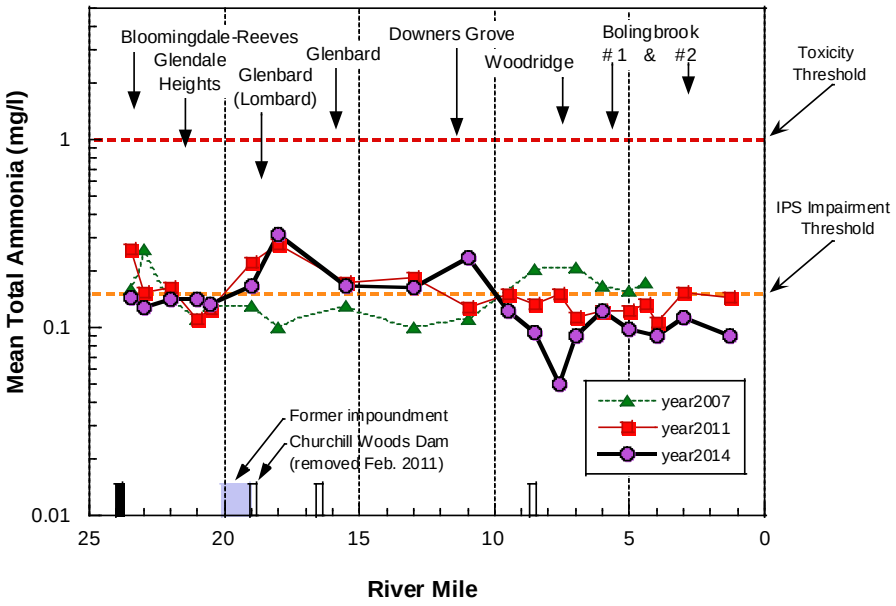


Figure 11. Concentrations of ammonia-N (top panel) and nitrate+nitrite-N (lower panel) from E. Branch

DuPage River samples in 2007, 2011 and 2014 in relation to municipal WWTP discharges. Bars along the x-axis depict mainstem dams or weirs (only black bars for dams that impede fish passage). For ammonia-N, the red dashed line (1.0 mg/l) represents a threshold concentration beyond which acute toxicity is likely; the orange dashed line (0.15 mg/l) is correlated with impaired biota in the IPS study. For nitrate+nitrite-N, orange dashed lines represent target concentrations for ecoregion 54 (1.8 mg/l) and the Illinois EPA non-standard based criteria (7.8 mg/l). The red dashed line is the Illinois water quality criterion for public water supplies (10 mg/l).



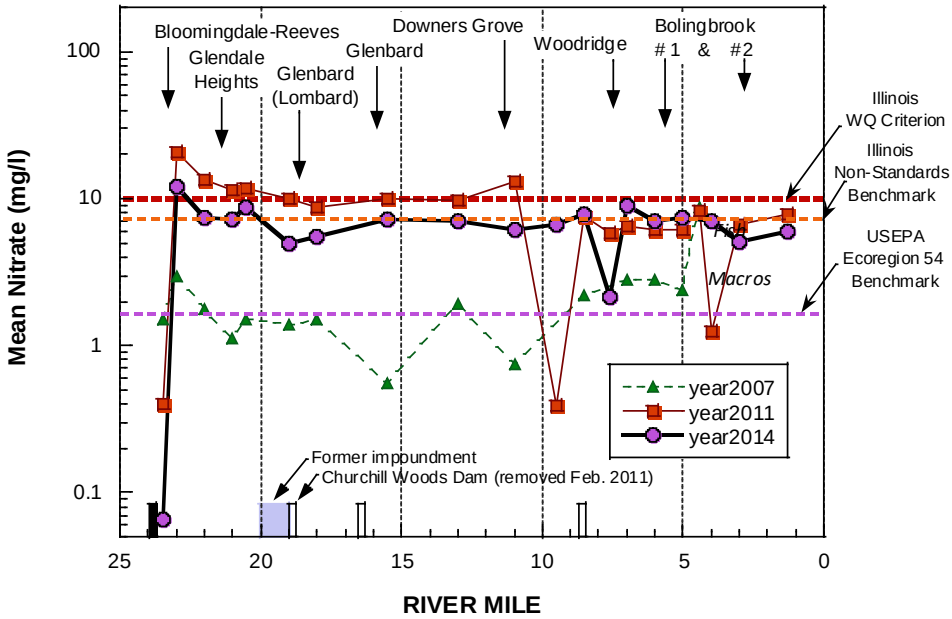


Figure 12. Concentrations total phosphorus from E. Branch DuPage River samples in 2007, 2011 and 2014 in relation to municipal WWTP discharges. Bars along the x-axis depict mainstem dams or weirs (black bars are dams that impede fish passage). For phosphorus, orange dashed lines represent target concentrations for ecoregion 54 (0.07 mg/l) and the Illinois EPA non-standard based criterion (0.61 mg/l). The 1.0 mg/l dashed red line is the suggested effluent limit.

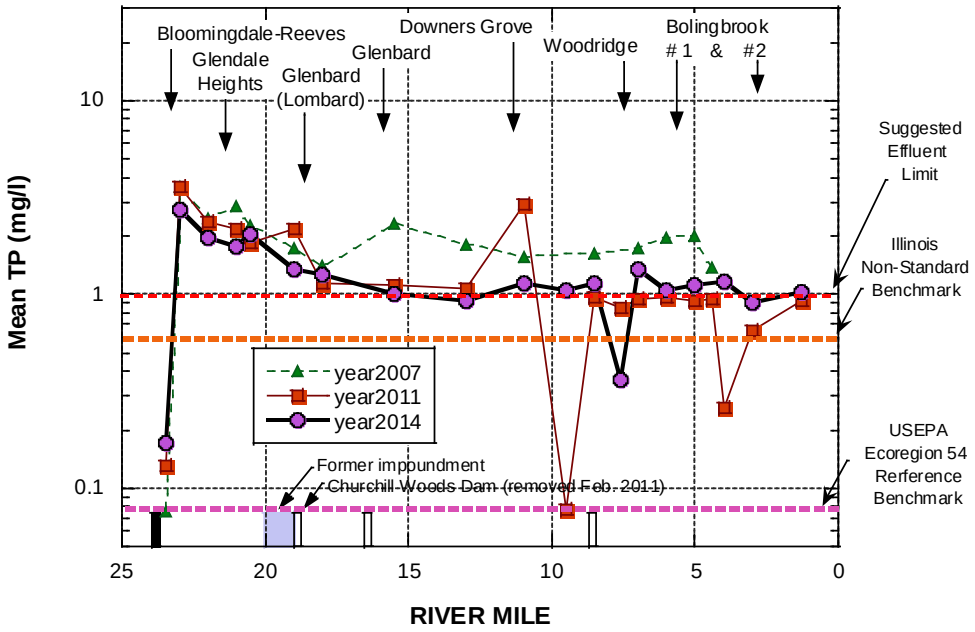


Figure 13. Chloride concentrations from the East Branch DuPage River in the summer of 2007, 2011 and 2014.

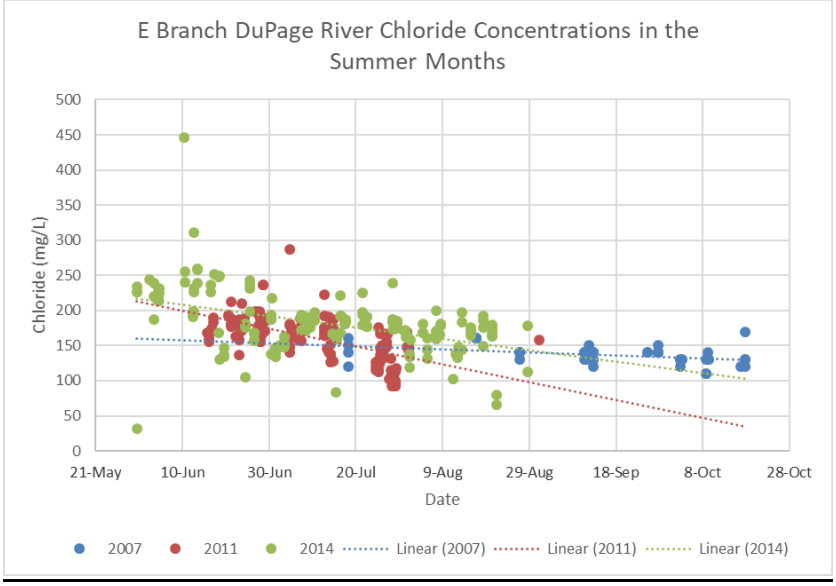
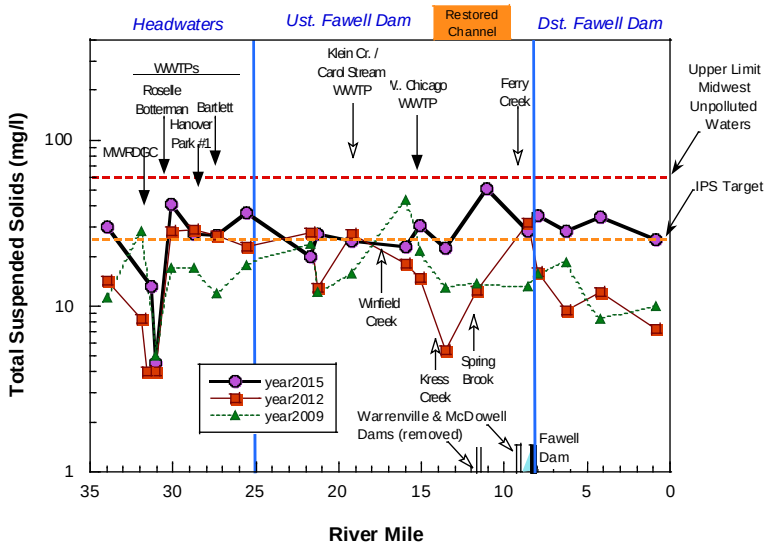


Figure 14. Concentrations of total suspended solids (top panel) and TKN (lower panel) from W. Branch DuPage River samples in 2008, 2012 and 2015 in relation to municipal WWTP discharges. Bars along the x-axis depict mainstem dams or weirs (black bars are dams that impede fish passage). Red dashed lines shows the upper limits of concentrations typical for relatively unpolluted waters for TSS (McNeeley et al. 1979). Orange dashed line in TSS plot is the Ohio reference threshold for headwater (HW) and wadeable (WD) streams. For TKN, the orange dashed line represents the IPS threshold (1.0 mg/l). IPS is a tool developed by the DRSCW and MBI.



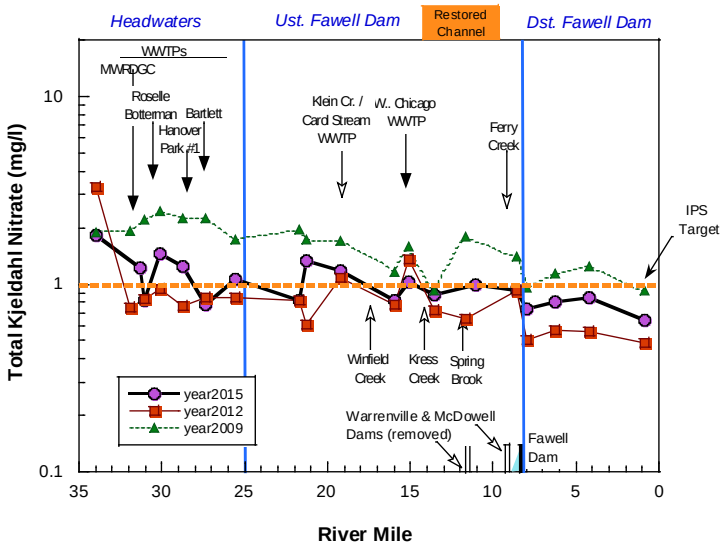
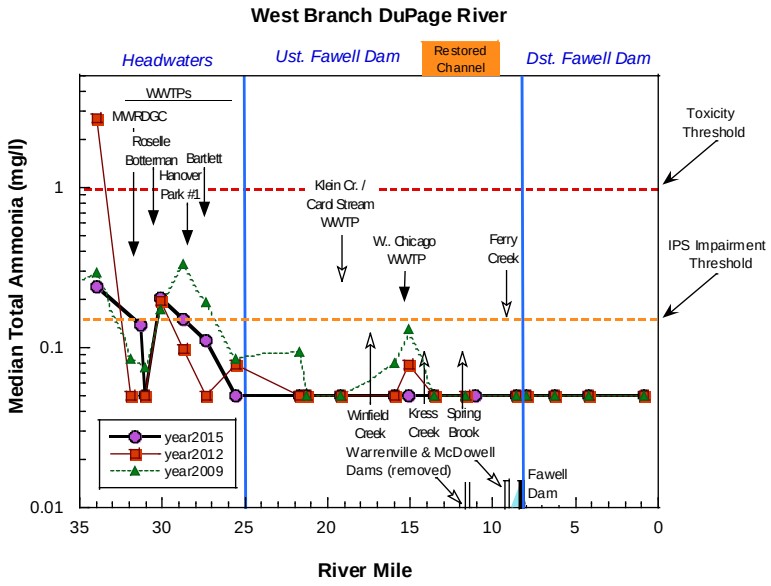


Figure 15. Concentrations of ammonia-N (top panel) and total nitrate (lower panel) from W. Branch DuPage River samples in 2008, 2012 and 2015 in relation to municipal WWTP discharges. Bars along the x-axis depict mainstem dams or weirs (only black bars for dams that impede fish passage). For ammonia-N, the red dashed line (1.0 mg/l) represents a threshold concentration beyond which acute toxicity is likely; the orange dashed line (0.15 mg/l) is correlated with impaired biota in the IPS study. For total nitrate, red line represents the Illinois Water Quality Criterion, orange dashed line represents the Illinois Non-Standards Benchmark, and purple line represents the US Ecoregion 54 Benchmark.



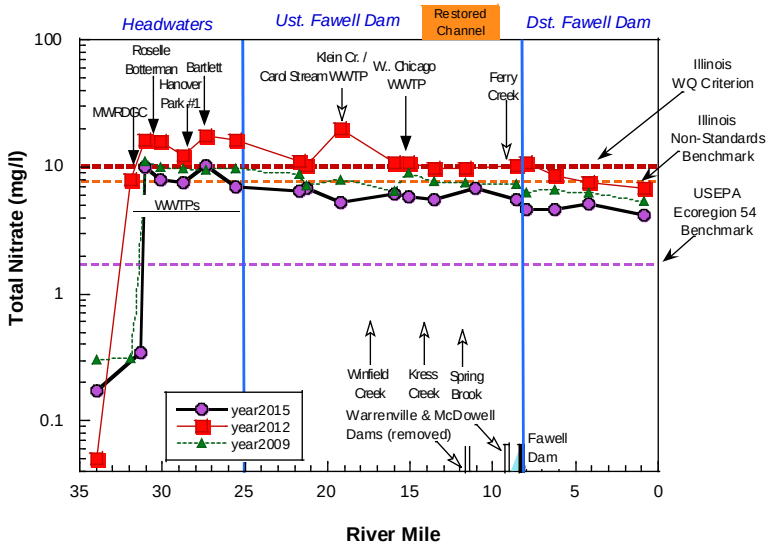
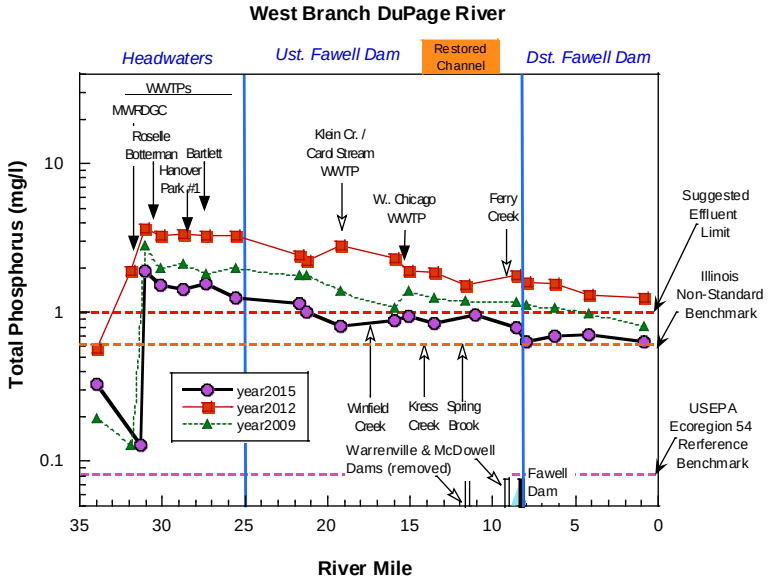


Figure 16. Concentrations total phosphorus (top panel) and chloride (lower panel) from W. Branch DuPage River samples in 2008, 2012 and 2015 in relation to municipal WWTP discharges. Bars along the x-axis depict mainstem dams or weirs (black bars are dams that impede fish passage). For phosphorus, orange dashed lines represent target concentrations for ecoregion 54 (0.07 mg/l) and the Illinois EPA non-standard based criterion (0.61 mg/l). The 1.0 mg/l dashed red line is the suggested effluent limit. For chloride, red dashed line represents the Illinois Water Quality Criterion (500 mg/L) and orange dashed lines represent the IPS threshold for fish and macroinvertebrates. IPS is a tool developed by the DRSCW and MBI.



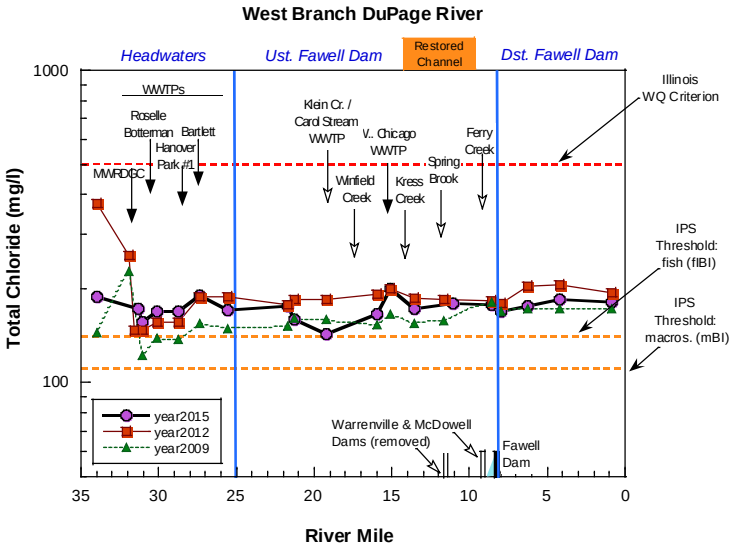
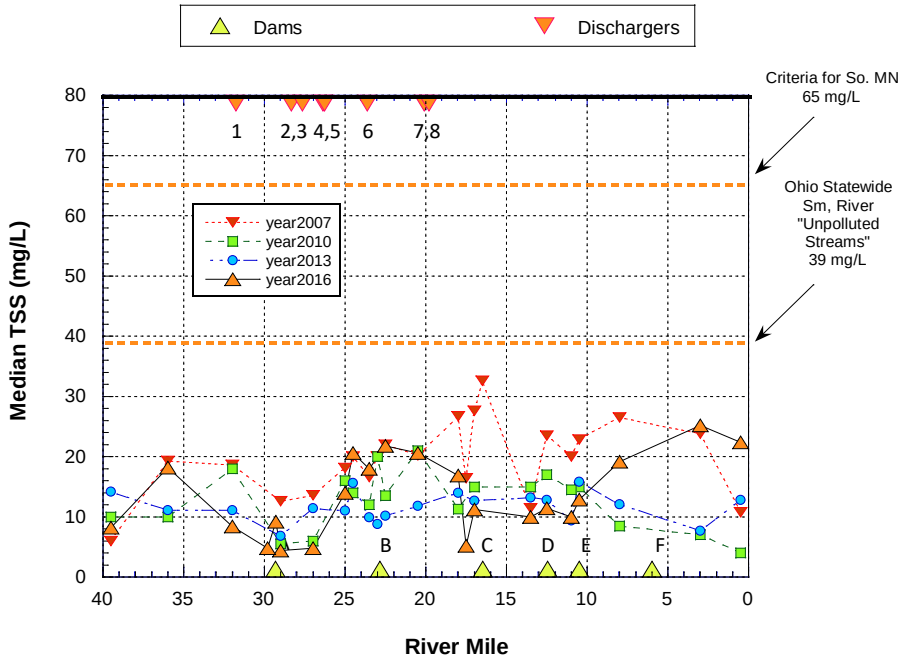


Figure 17. Concentrations of total suspended solids (top panel) and TKN (lower panel) from Salt Creek samples in 2007, 2010, 2013, and 2016 in relation to municipal WWTP discharges. Yellow triangles along the x-axis depict mainstem dams or weirs. Orange dashed lines shows the upper limits of concentrations typical for relatively unpolluted waters for TSS (McNeeley et al. 1979). Blue dashed line in TSS plot is the Ohio reference threshold for headwater (HW) and wadeable (WD) streams. For TKN, orange dashed line represents the IPS threshold (1.0 mg/l). IPS is a tool developed by the DRSCW and MBI.



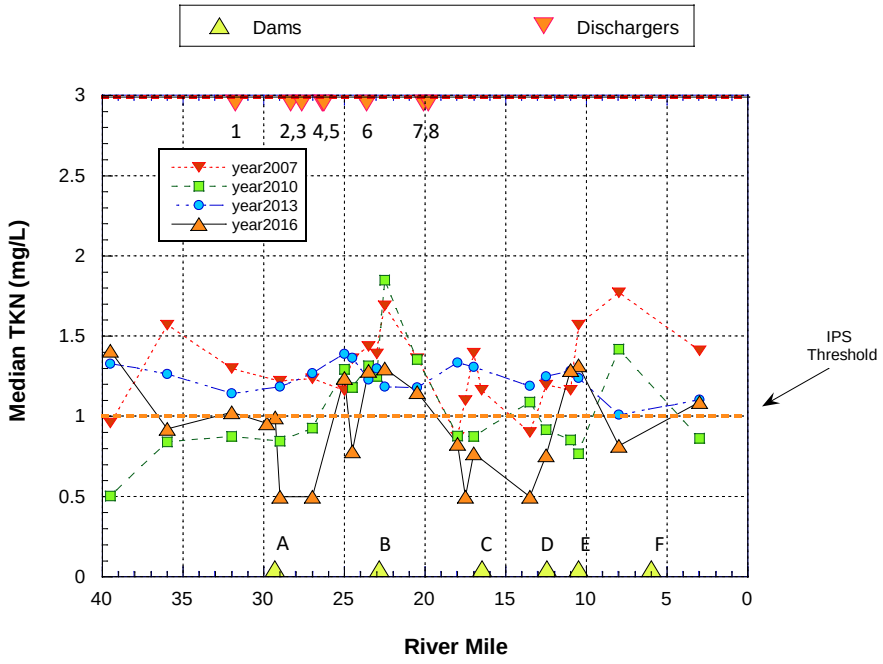


Figure 18. Concentrations of ammonia-N (top panel) and total nitrate (lower panel) from Salt Creek samples in 2007, 2010, 2013, and 2016 in relation to municipal WWTP discharges. Yellow triangles along the x-axis depict mainstem dams or weirs. For ammonia-N, the blue dashed line (1.0 mg/l) represents a threshold concentration beyond which acute toxicity is likely; the orange dashed line (0.15 mg/l) is correlated with impaired biota in the IPS study. For total nitrate, red line represents the Illinois Water Quality Criterion, orange dashed line represents the Illinois Non-Standards Benchmark, and purple line represents the US Ecoregion 54 Benchmark.

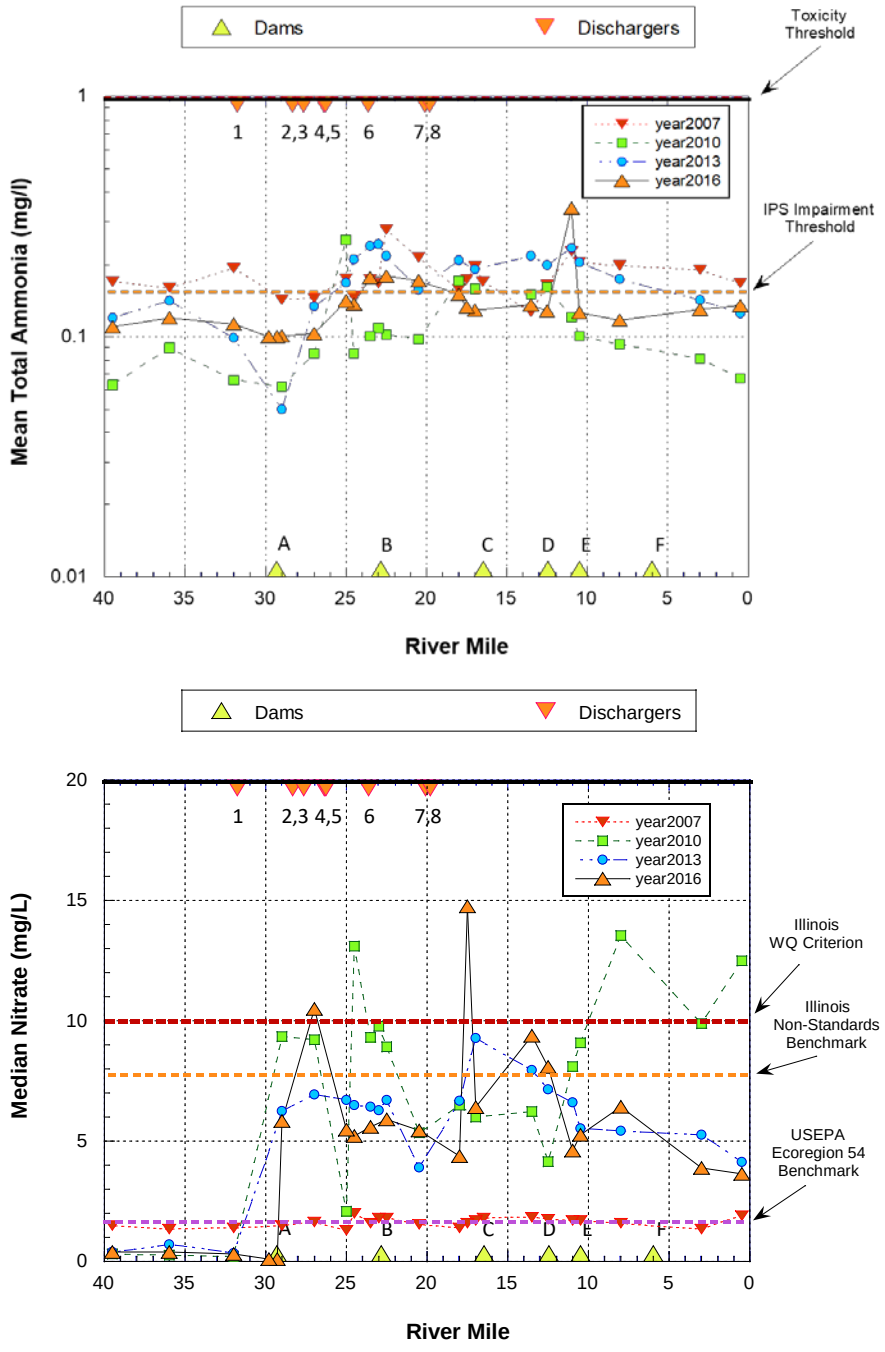
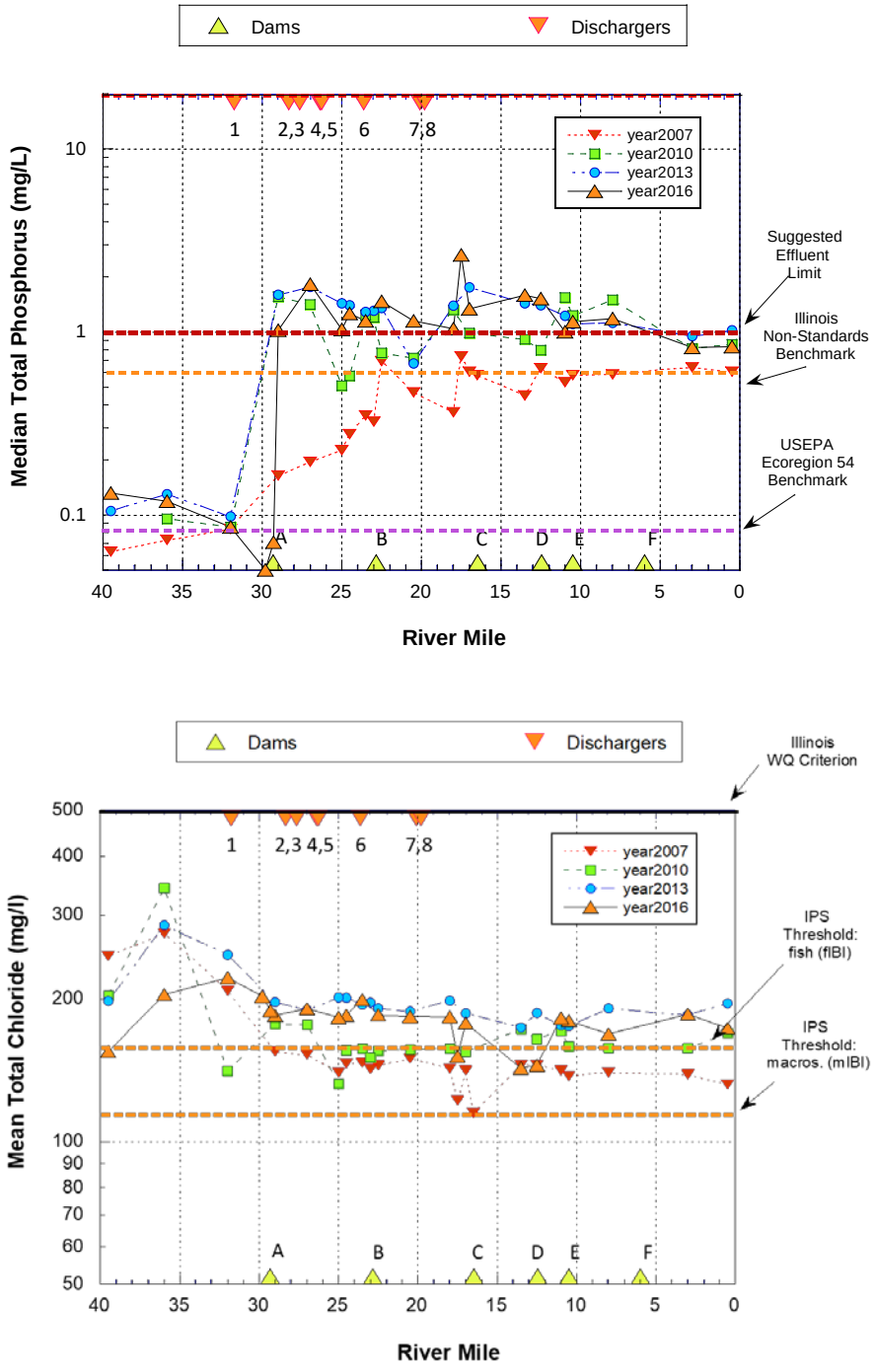


Figure 19. Concentrations total phosphorus (top panel) and chloride (lower panel) from Salt Creek samples in 2007, 2010, 2013, and 2016 in relation to municipal WWTP discharges. Yellow triangles along the x-axis depict mainstem dams or weirs. For phosphorus, purple dashed lines represent target concentrations for ecoregion 54 (0.07 mg/l) and orange dashed line represents the Illinois EPA non-standard based criterion (0.61 mg/l). The 1.0 mg/l dashed red line is the suggested effluent limit. For chloride, red dashed line represents the Illinois Water Quality Criterion (500 mg/L) and orange dashed lines represent the IPS threshold for fish and macroinvertebrates. IPS is a tool developed by the DRSCW and MBI.



In 2016, samples for Fat, Oil and Grease (FOG) was collected at six (6) sites on the mainstem Salt Creek and one (1) site on Addison Creek. The results are summarized in Table 7.

Table 7. Concentrations of Fat, Oil and Grease in 2016 in the Salt Creek watershed.

Site Number	Latitude	Longitude	River Mile	Result (mg/L)
Salt Creek				
SC44	42.01197	-88.00092	29.3	Non detect
SC41	41.9703	-87.98817	25.0	Non detect
SC23	41.93694	-87.98423	22.5	1.63
SC37	41.88378	-87.96054	17.5	Non detect
SC49	41.82576	-87.90004	8.0	Non detect
SC29	41.8183	-87.83371	0.5	Non detect
Addison Creek				
SC-28	41.86116	-87.86774	1.5	2.47

Sediment Chemistry Results

Detailed analysis and results for sediment chemistry is located at http://drscw.org/wp/bioassessment/.

DISSOLVED OXYGEN (DO) MONITORING

Background and Methodology

The Illinois Environmental Protection Agency (IEPA) report, Illinois 2004 Section 303(d) List, listed dissolved oxygen (DO) as a potential impairment in Salt Creek, and the East and West Branches of the DuPage River. The report suggested that the DO levels in selected reaches of these waterways might periodically fall to levels below those required by healthy aquatic communities.

All rivers and creeks in DuPage County are classified as General Use Waters. The present water quality standards for dissolved oxygen in General Use Waters is:

1. During the period of March through July
    a. 5.0 mg/L at any time; and
    b. 6.0 mg/L as a daily mean averaged over 7 days.

2. During the period of August through February,
    a. 3.5 mg/L at any time;
    b. 4.0 mg/L as a daily minimum averaged over 7 days; and
    c. 5.5 mg/L as a daily mean averaged over 30 days.

Following listing on the 303 (d) list three TMDLs were prepared by the IEPA for Salt Creek and the East Branch of the DuPage River. In response to the TMDLs, the DRSCW committed to develop and manage a continuous long-term DO monitoring plan for the project area in order to assess the nature and extent of the DO impairment and to allow the design of remedial projects. The continuous DO data is also used to assess the impact of DO improvement projects such as the Churchill Woods and Oak Meadow dam removals.

Typically, the continuous DO monitoring project includes two to three (2-3) sites on the West Branch DuPage River, four to five (4-5) sites of the East Branch DuPage River, and three to four (3-4) sites on Salt Creek. The program began in 2006 and data has been collected each year since. Each site is equipped with a HydroLab DS 5X which collects data on DO, pH, conductivity and water temperature. Stations have a sample interval of one hour and collect data from June through to October (the seasonal period recognized as containing the lowest annual levels of stream DO). The continuous DO monitoring program functions under a quality assurance plan agreed on with the Illinois Environmental Protection Agency (http://drscw.org/wp/dissolved-oxygen/). Details on the site location are included in Table 1 and site locations are included on Map 5.

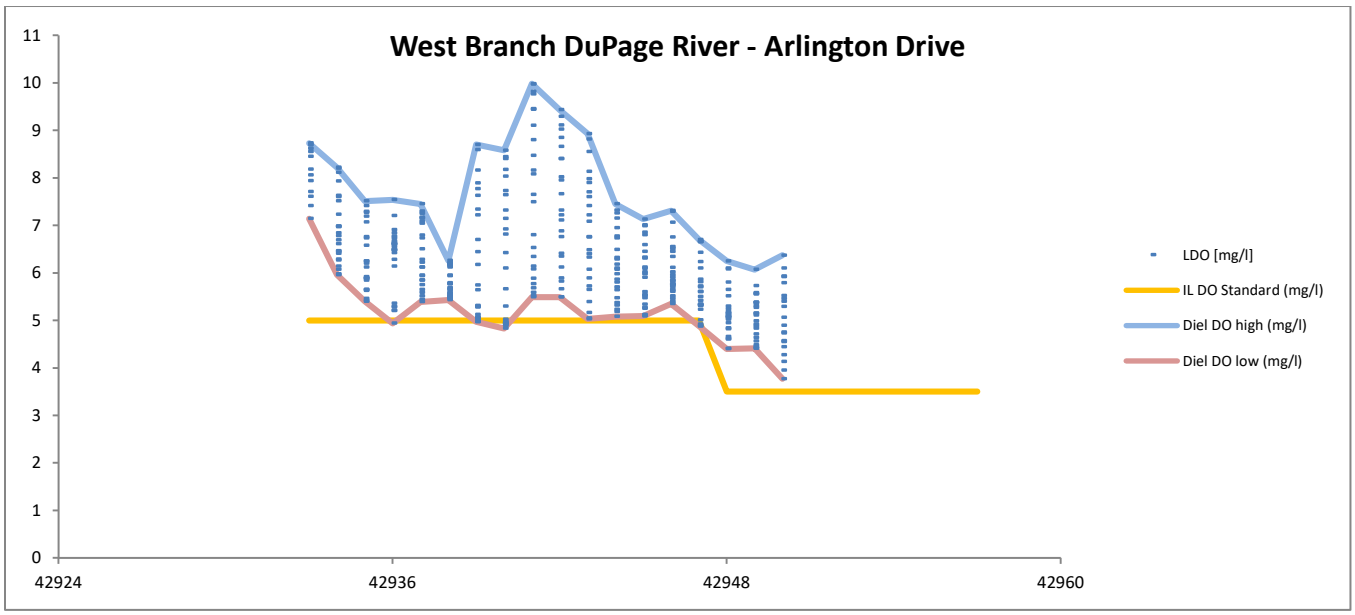
Table 5. Continuous DO monitoring locations in the DRSCW watersheds

Site ID	Stream Name	River Mile	Latitude	Longitude	Location
WBAD	W. Br. DuPage R.	29.9	41.9750	-88.1386	Arlington Drive
WBBR	W. Br. DuPage R.	11.7	41.825268	-88.179456	Butterfield Road
WBWD	W. Br. DuPage R.	11.1	41.82027	-88.17212	Downstream of Warrenville Grove Dam
EBAR	E. Br. DuPage R.	23.0	41.935171	-88.05843	Army Trail Road
EBCB	E. Br. DuPage R.	18.8	41.88510	-88.04110	Former Churchill Woods pool (Crescent Blvd)
EBHL	E. Br. DuPage R.	14.0	41.82570	-88.05316	Hidden Lake Preserve
EBHR	E. Br. DuPage R.	8.5	41.76800	-88.07160	Upstream Hobson Rd
EBWL	E. Br. DuPage R.	4.0	41.71230	-88.09160	Downstream of 2nd mine discharge
SCOM			41.941279	-87.983363	Oak Meadows Golf Course upstream of former Dam
SCBR	Salt Creek	16.1	41.864686	-87.95073	Butterfield Road
SCFW	Salt Creek	11.1	41.825493	-87.93158	Fullersburg Woods upstream of Dam

Results

Results of the continuous DO monitoring conducted in the summer of 2017 is included in Figures 20-24.

Figure 20. Dissolved Oxygen plots for West Branch DuPage River sites WBAD (top panel) and WBBR (lower panel).



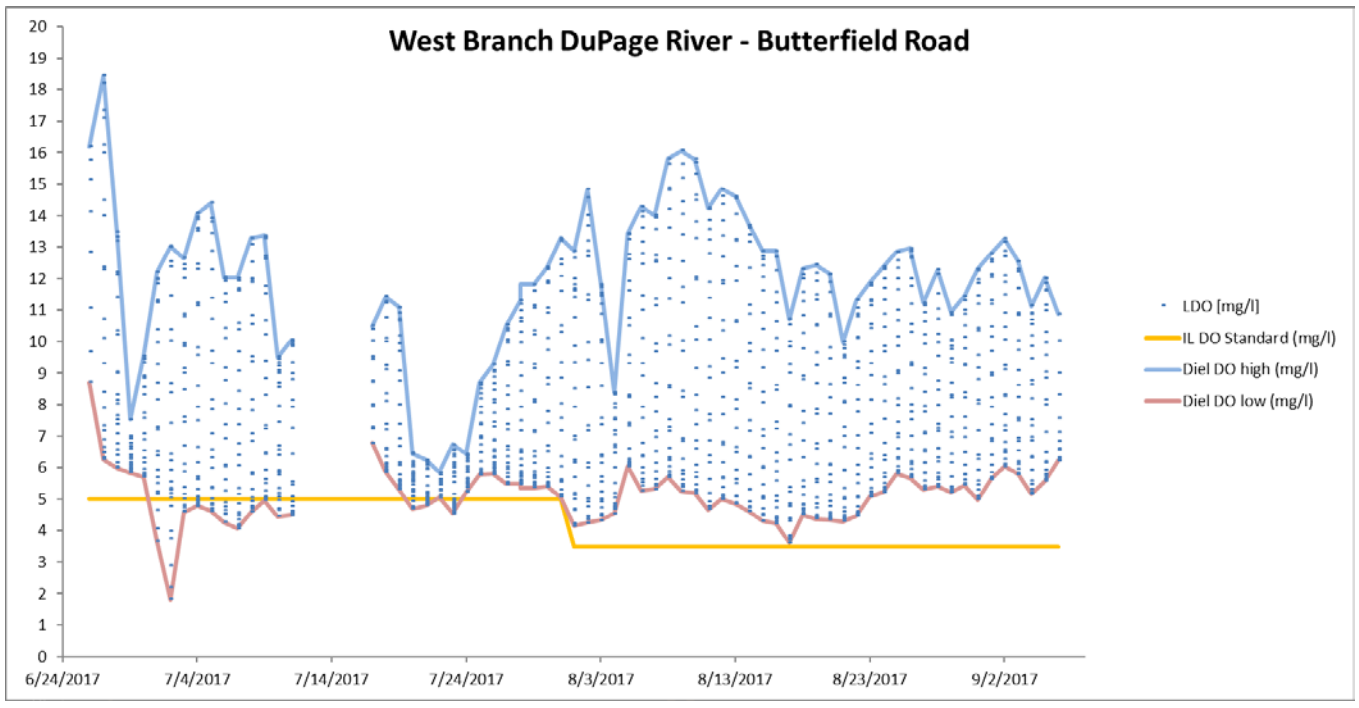
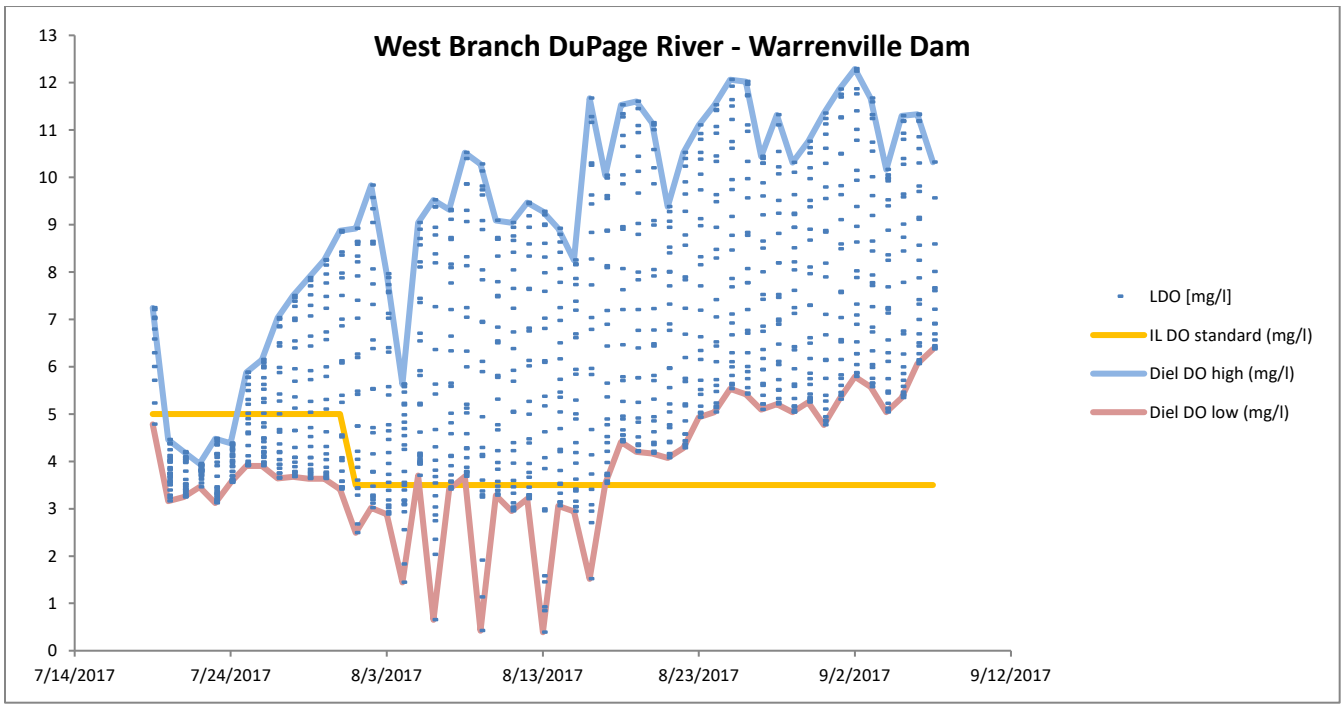


Figure 21. Dissolved Oxygen plots for West Branch DuPage River sites WBWD (top panel) and East Branch DuPage River sites EBAR (lower panel).



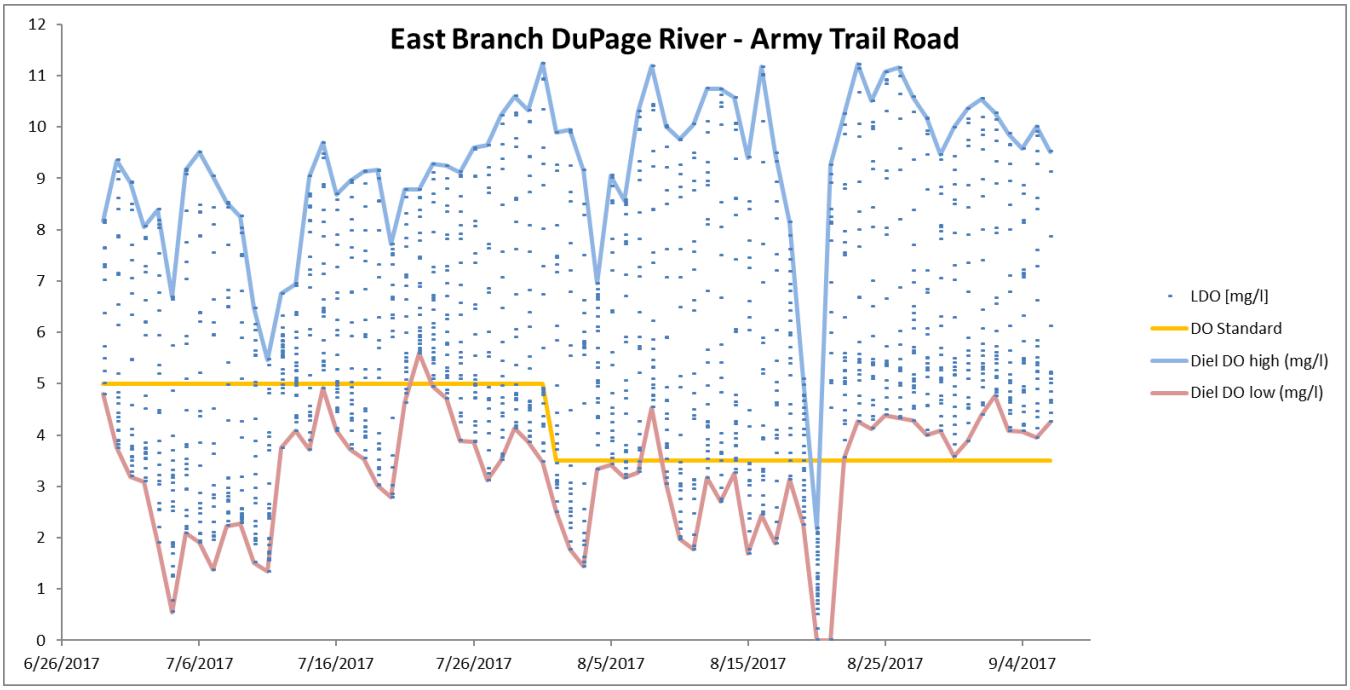
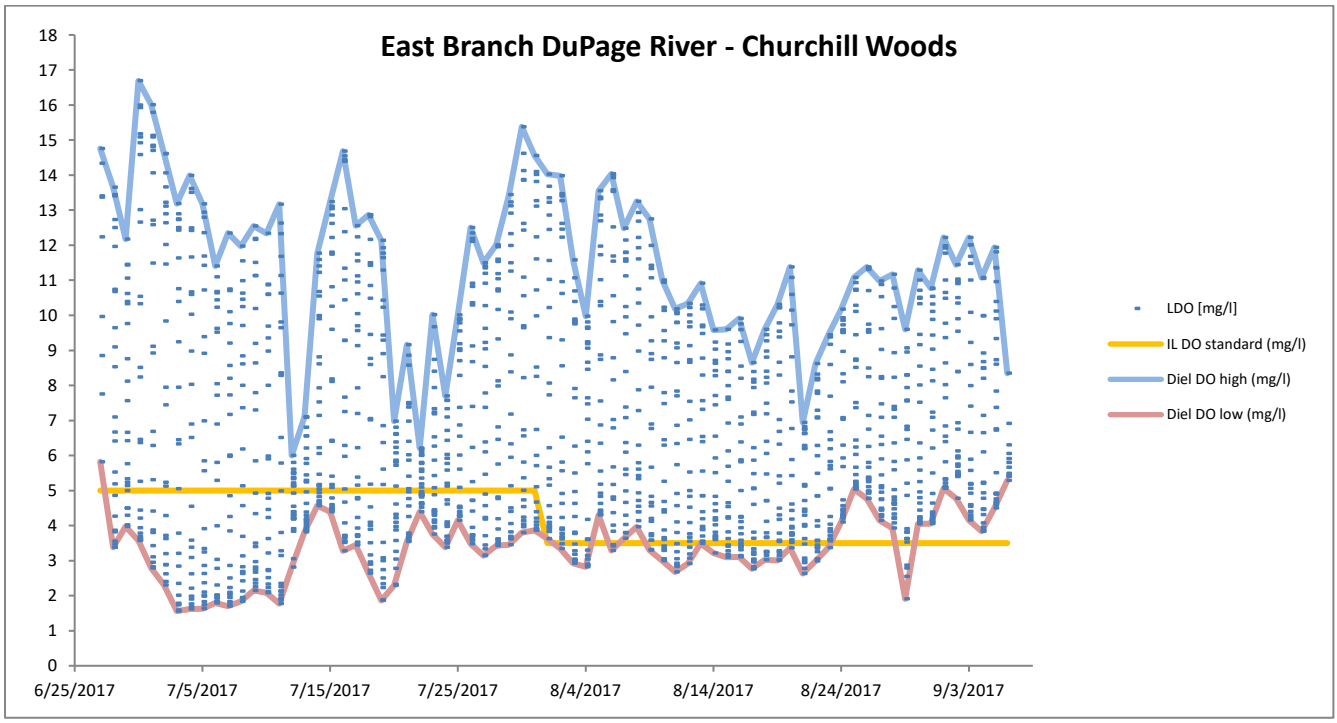


Figure 22. Dissolved Oxygen plots for East Branch DuPage River sites EBCB (top panel) and EBHL (lower panel).



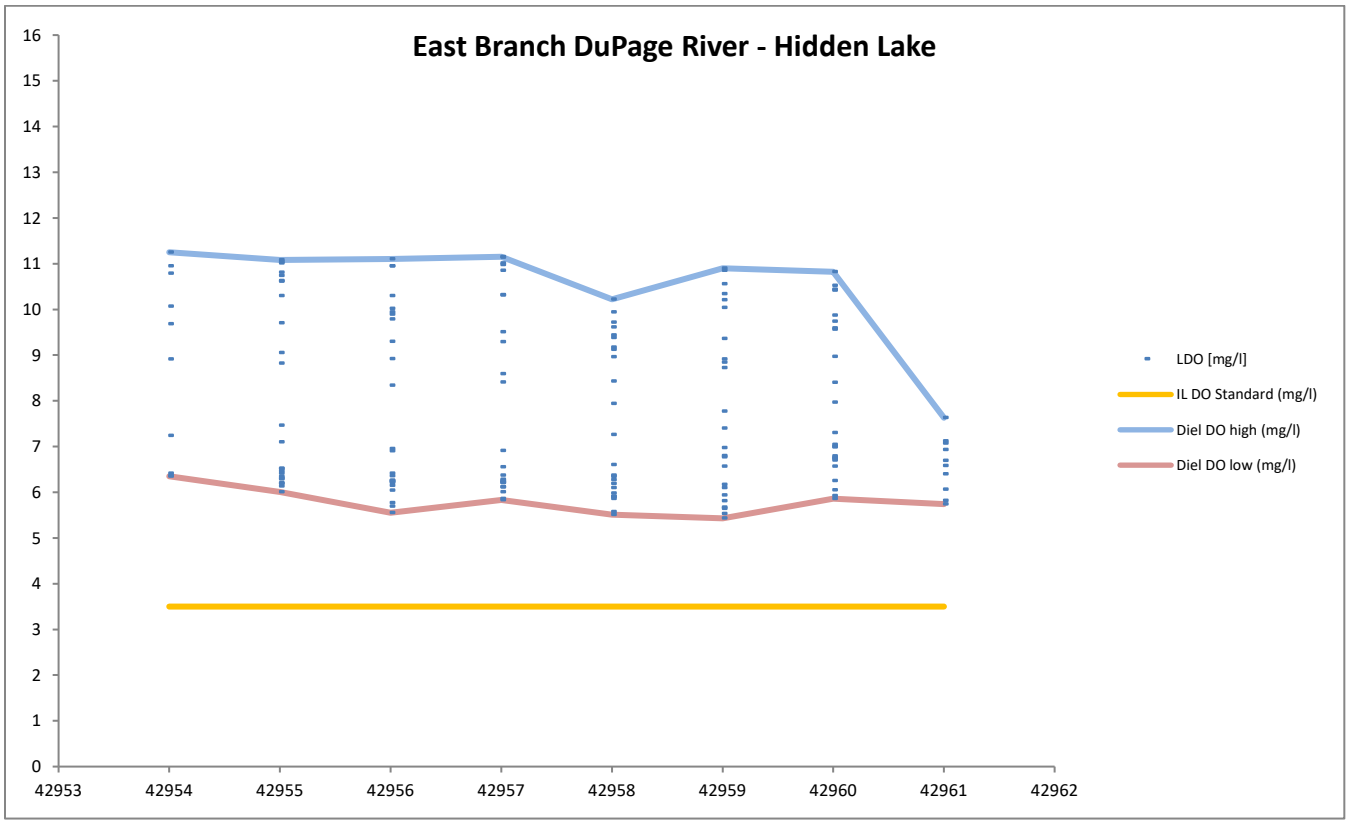
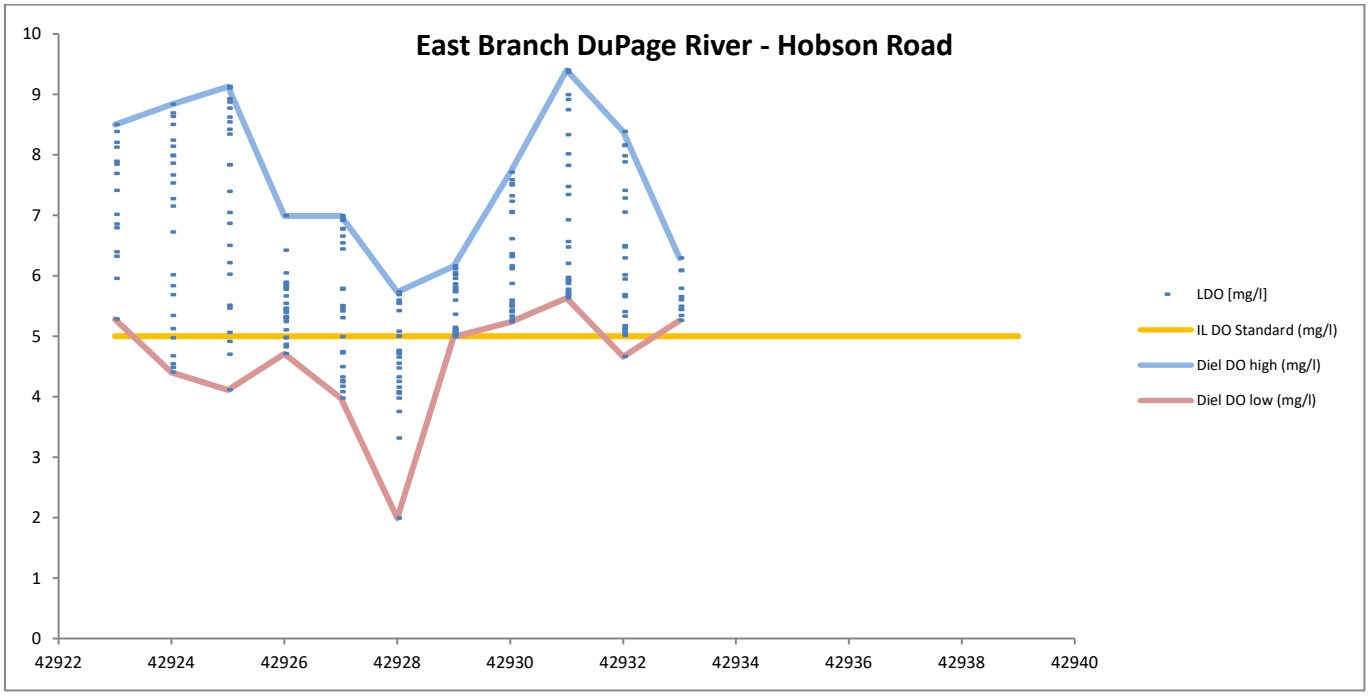


Figure 23. Dissolved Oxygen plots for East Branch DuPage River sites EBHR (top panel) and EBWL (lower panel).



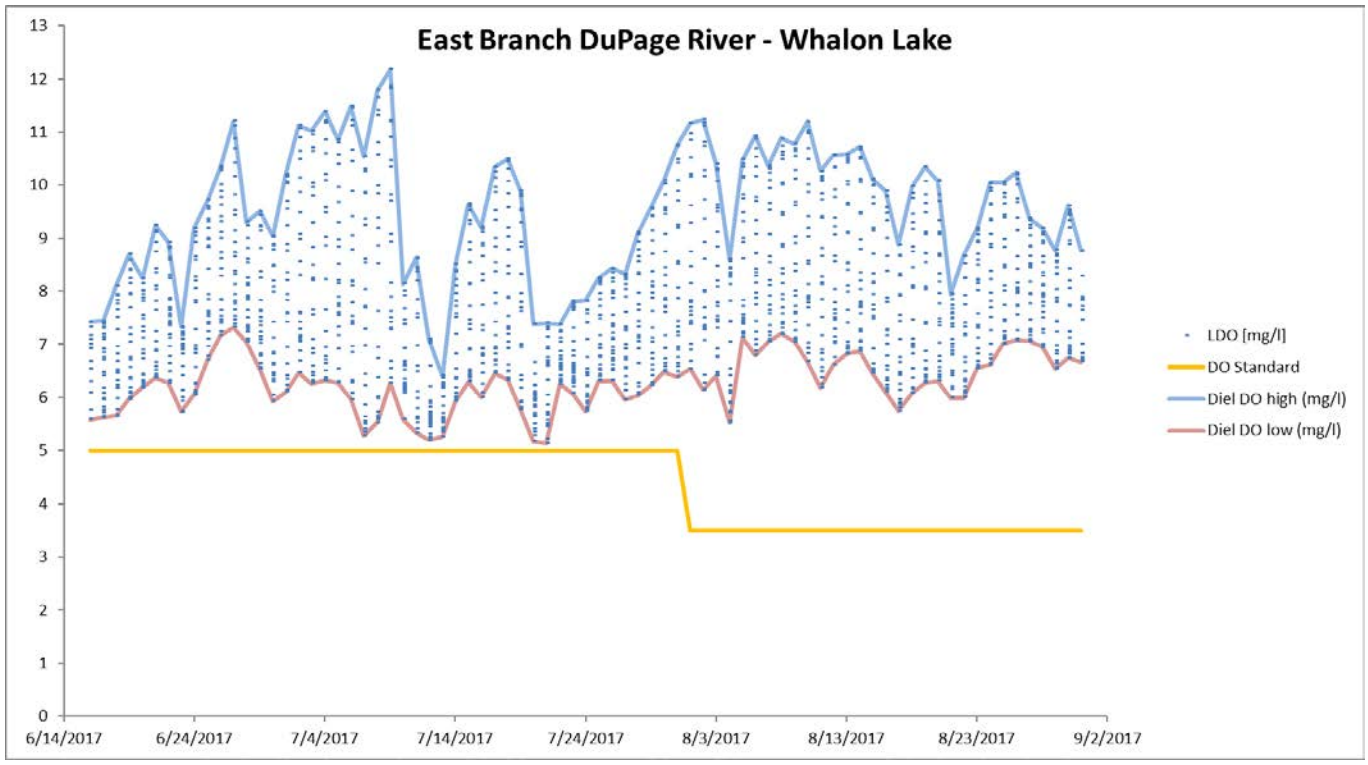
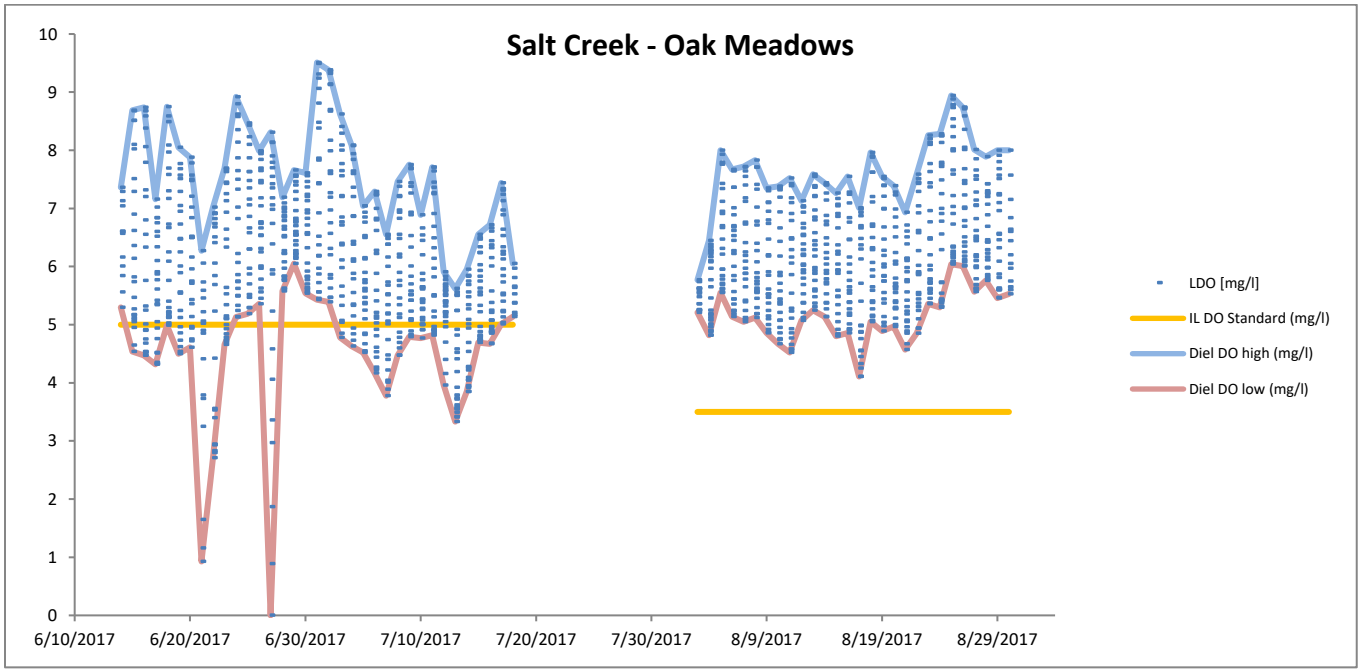


Figure 24. Dissolved Oxygen plots for Salt Creek sites SCOM (top panel) and SCBR (lower panel).



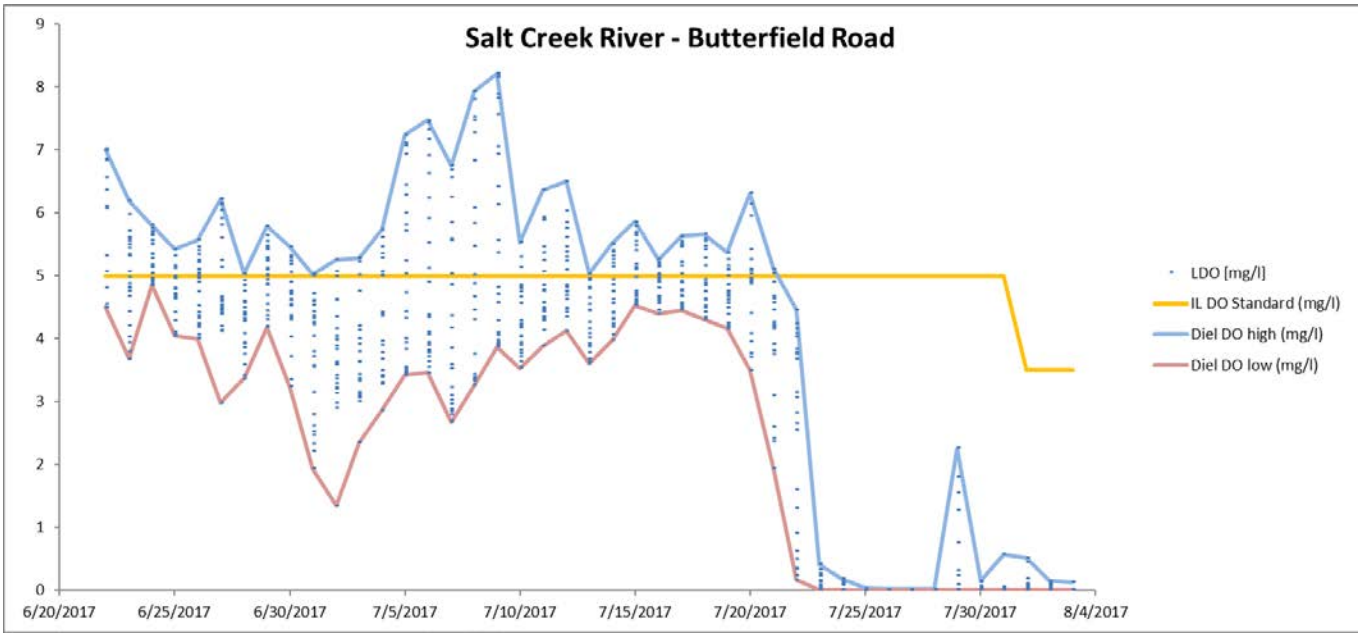
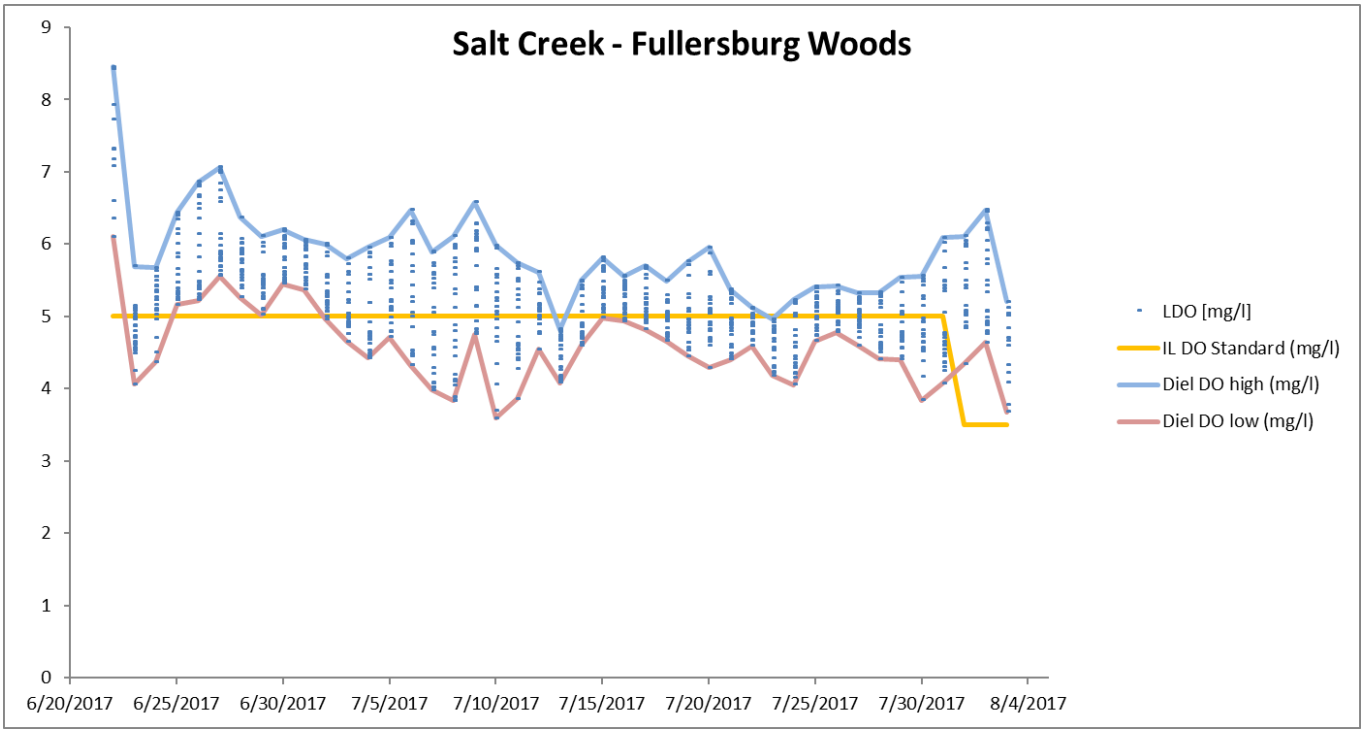


Figure 25. Dissolved Oxygen plots for Salt Creek sites SCFW.



B. Recordkeeping

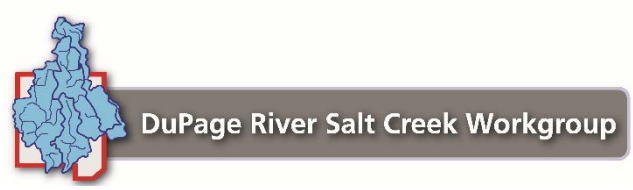
All monitoring data including by not limited to laboratory results, chain of custodies (COCs), and quality assurance protection plans (QAPP) will be maintained by the DRSCW for a minimum of 5 years after the expiration of the ILR40 (effective on 03/01/2016). The records are maintained at the DRSCW office located at The Conservation Foundation, 10S404 Knock Knolls Road, Naperville, Illinois 60656 and are accessible to the IEPA for review.

C. Reporting

The DRSCW is not responsible for preparing and submitting an Annual Report to the IEPA by the first day of June for each year that the permit is in effect. It is the responsibility of the individual ILR40 permit holders to utilize the information provided in this report to fulfill the reporting requirements outlined in the permit.

Attachment A

2016 Deicing Program Survey Results



BAXTER & WOODMAN Consulting Engineers

DuPage River Salt Creek Workgroup

Chloride Education and Reduction Program
2016 Deicing Program Survey

March 16, 2017

Section 1
Background and Purpose

The DuPage River Salt Creek Workgroup (DRSCW) is a coalition of communities, sanitary districts, environmental organizations, and professionals working to improve the ecological health of Salt Creek and the Upper DuPage River. DRSCW is responding to water quality requirements for chloride as the East and West Branch of the DuPage River and Salt Creek have been identified as having chloride related impairments. Total Maximum Daily Load (TMDL) analysis performed by the Illinois Environmental Protection Agency recommended significant reductions in chloride loading for each of the streams to meet the water quality standard for chloride (500 mg/L).

DRSCW formed a Chloride Committee and the Chloride Education and Reduction Program to develop and promote alternatives to conventional roadway deicing practices and guide the implementation of the alternatives. An element of the program is gathering information from municipal deicing programs via survey questionnaires to benchmark municipal activities and identify positive changes in protocols. This report serves to summarize the responses received from the 2016 deicing program survey.

Funding for the program and this report is provided in part by the Illinois Environmental Protection Agency through Section 319 of the Clean Water Act and DRSCW member dues.

1.1 Background Information

Municipal road salting was identified as a source of chloride loading to DRSCW watersheds. As a result, DRSCW distributed a survey questionnaire to about 80 municipalities and public works agencies in November 2006 and April 2007 to obtain baseline information about deicing practices throughout the watersheds. Thirty-nine responses to the survey were received, forming an informed baseline of the deicing programs implemented in the watersheds. A similar survey was distributed in 2010. Thirty-two public agencies responded to the 2010 survey which helped to note positive changes in local deicing practices. In 2012 and 2014, the survey generated 34 and 27 responses respectively, which further documented the chloride reduction practices. Forty-three (43) agencies responded to the 2016 survey, the most agencies ever responding to a program survey.

1.2 Goals of the Questionnaires

The 2016 Deicing Program Survey was conducted in the spring of 2016 to follow up with the agencies on any changes and/or improvements in their deicing programs, potentially because of DRSCW Chloride Reduction Program efforts, and any resulting effects on salt application rates.

The 2016 survey questionnaire asked for information about deicing practices and strategies per the following categories:

- General deicing and snow removal information
- Deicing and snow removal equipment

- Application rates
- Salt storage
- Equipment maintenance and calibration
- Management and record-keeping

The responses to the survey are summarized in Section 2 of this report. The responses are compared to those received in earlier surveys to determine if any changes or improvements have occurred. The survey and response data are included in **Appendix A**.

Section 2
Survey Responses

2.1 Survey Responses

Forty-three agencies responded to the 2016 survey. The following subsections summarize the responses in each of the categories described in Section 1. The survey and all responses are included in **Appendix A** of this report. Note that not all agencies provided responses to all questions, and some agencies answered some questions in different ways, resulting in some inconsistencies in survey results.

2.1.1 General Deicing and Snow Removal Information

The survey asked agencies for general deicing and snow removal information. All responding agencies provided some information. Survey responses indicated approximately 10,800 lane miles of road serviced by deicing programs throughout the watersheds.

2.1.1.1 Salt Application and Price

The majority of agencies indicated an average salt application rate of 200-300 pounds per lane mile (lbs/lm). **Figure 2-1 shows** the respondent's salt application rate distribution from 2010 to 2016.

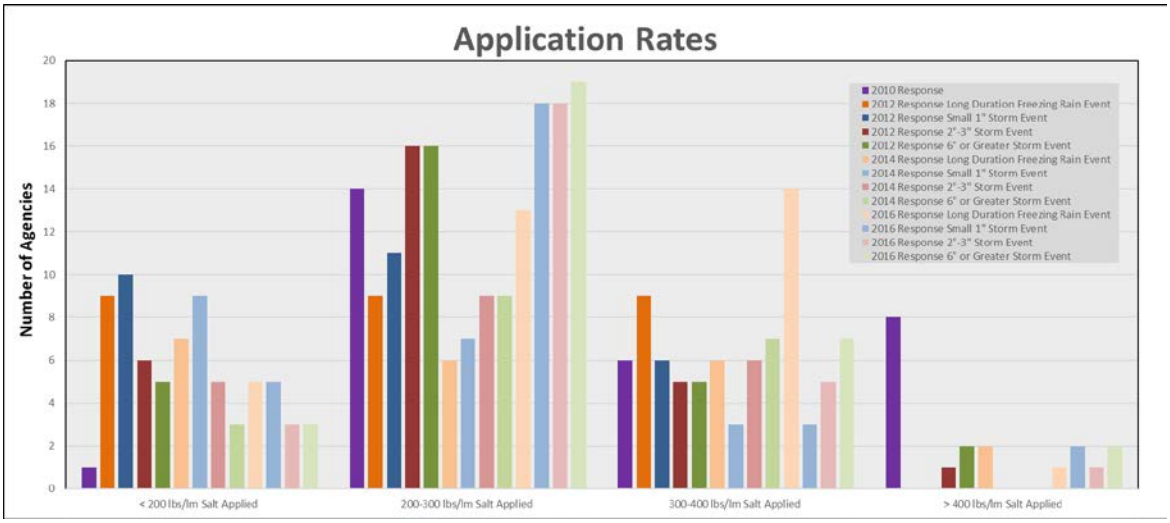


Figure 2-1 – Average Salt Application Rates

Regarding salt prices, 26 of the 43 agencies responding indicated an increase in salt or deicing product prices over the past few years. Eleven agencies reported a decrease in salt or deicing product price over the past few years. Nine agencies indicated that product prices have remained the same.

2.1.1.2 Deicing, Anti-Icing, Pre-Wetting, and Deicing Agents

Information about deicing, pre-wetting, and anti-icing practices, as well as the deicing agents used was requested by the survey. The following is a list of deicing agents used by respondents:

- Each of the 43 responding agencies reported the use of salt
- Thirty-two agencies reported the use of dry rock salt
- Twenty-two agencies used liquid calcium chloride, a significant increase from previous surveys
- Thirteen agencies reported the use of pre-manufactured liquid products

From the 43 respondents, 25 agencies indicated that they implement anti-icing practices; in most cases the anti-icing program included occasional pre-salting or liquid application in priority locations. This suggests an increase in the number of agencies implementing anti-icing practices watershed wide.

The 2016 survey asked about liquid anti-icing mixes, and in general, most respondents using liquids make a home-made mix of 70% - 90% salt brine and 10% - 30% beet juice, pre-manufactured liquid, and/or calcium chloride.

2.1.1.3 Weather and Pavement Temperature Forecasting

Out of the agencies responding, 30 agencies use a weather forecasting service (1 agency did not answer). This suggests a significant increase in the use of weather forecasting services watershed wide.

Additionally, 30 of 41 respondents are making use of a pavement temperature forecast report or similar service (2 agencies did not answer). This suggests a significant increase in the use of pavement temperature information throughout the watershed, an improvement in best management practices implementation.

2.1.2 Deicing and Snow Removal Equipment

All agencies use snow plows or similar equipment. Thirty-two agencies have mechanically controlled spreading equipment, and 33 have computer-controlled equipment. Equipment for spreading liquids is used by 25 agencies.

2.1.3 Salt Storage

The provided responses indicated the following salt storage practices:

- Forty-three responded that salt storage areas are fully enclosed storage structure or have impervious storage pads
- Forty agencies store salt on an impervious pad
- Thirty-four agencies indicated that drainage from their storage area(s) is controlled or collected

- Twenty-seven agencies indicated that they store salt in a single storage area
- Thirty-five agencies store salt in an enclosed area
- Sixteen reported that residual salt in loading areas is swept up

2.1.4 Equipment Maintenance, Cleaning, and Calibration

Forty agencies responded that equipment is washed at an indoor station draining to a sanitary sewer. Five agencies indicated outdoor washing in areas not drained to a sanitary sewer. Two respondents reported collecting and reusing wash water for brine making.

Forty-two agencies responded to the survey regarding equipment calibration. Thirty-five agencies indicated that they calibrate their de-icing equipment, an increase in the number of agencies performing calibration as a best management practice. Most of the 35 agencies providing calibration information perform calibration annually, with 1 agency calibrating 2 times per season, and 3 agencies calibrating after major maintenance or repairs.

2.1.5 Management and Record-Keeping

Twenty-one agencies indicated that operators are trained annually (or more often). Eleven of the remaining agencies train at the start of employment and one agency did not specify a training schedule.

From a management standpoint, the rate of salt application is established by the director or supervisor in 37 agencies, and solely by the operators in four agencies. This indicates a significant increase in the director or supervisor level of control over application rates from previous surveys.

During spreading, the rate of product application is controlled by the operator in 31 agencies, controlled automatically in 9 agencies and set at a fixed rate in 4 agencies.

The 2016 survey responses indicate a significant increase in record keeping best management practices in recent years. Twenty-three agencies keep records of salt usage per truck, 34 keep records for each storm event, and twenty keep records for each winter season.

2.2 Survey Analysis

The following subsections provide survey conclusions developed by comparing information from the 2016 survey to responses received from the 2014 survey or previous surveys. Forty-three (43) agencies responded to the 2016 survey, while 27 agencies responded to the 2014 survey. The number of new agencies responding to the survey is a positive for the amount of information provided for study and program participation overall, but results in some changes or inconsistencies in information trends.

2.2.1 Alternative Methods and Practices Analysis

Many of the questions in the survey focused on the use of alternative deicing agents, methods, and practices such as pre-wetting and anti-icing. **Figure 2-2** illustrates the percentage of respondents that use various deicing agents as reported on the 2007, 2010, 2012, 2014, and 2016 questionnaires.

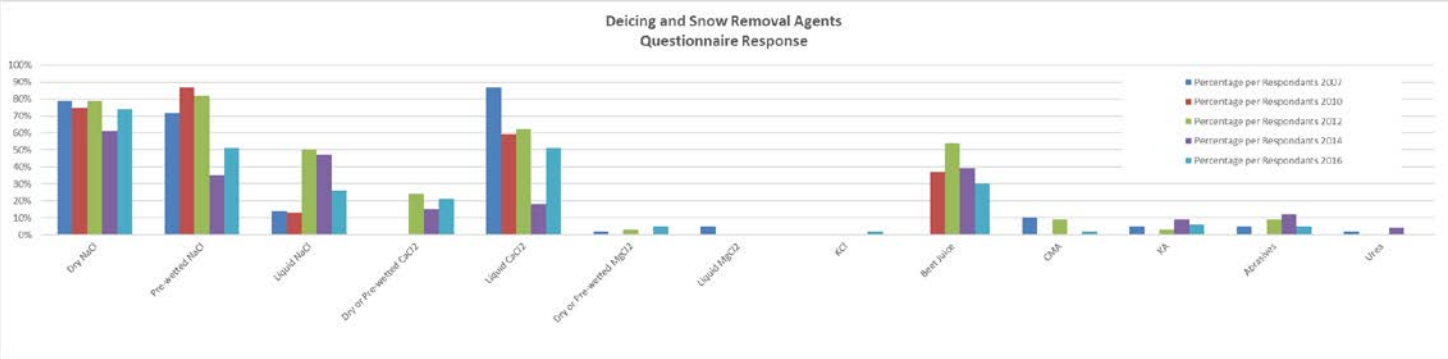


Figure 2-2 – Deicing and Snow Removal Agents

The survey results indicated that the use of dry and pre-wetted salt (NaCl) has increased. While 50% of agencies reported using pre-wetted salt, previous program information suggests that the level of pre-wetting is much higher than this throughout the watershed. The 2016 survey percentages may be skewed by the new agencies providing information this year, and inexperience with the type of information being asked by the survey. Follow up with individual agencies for future surveys may be needed.

Similarly, the 2016 survey results indicate an increase in the amount of agencies using dry salt. Previous program information suggests that fewer agencies use dry salt (not pre-wetted), and follow up with individual agencies may be needed to further detail the information being requested by the survey. The apparent decrease in the use of liquid NaCl (brine) may also be a result of the new respondent's inexperience with the survey, or may be an opportunity for the Chloride Committee to investigate further expansion of the use of brine as a BMP.

Other analysis observations include:

- Results show an increase in the use of all forms of Calcium chloride ($CaCl_2$). The increase in liquid CaCl2 is significant, roughly 30% higher.
- Results show an increase in the use of dry or prewetted Magnesium chloride ($MgCl_2$).
- No 2016 responders used liquid $MgCl_2$ and Urea.
- A few respondents used Potassium Chloride (KCl) compared to none in previous years.

- Calcium Magnesium Acetate (CMA), Potassium acetate (KA), and Abrasives have decreased since 2014.

- Beet juice as an additive continued in popularity.

Information provided about anti-icing practices that agencies may be employing indicated in 2007 that 14 agencies reported the use of anti-icing practices. In 2010, 20 agencies reported using anti-icing practices. In 2012, 20 agencies reported using anti-icing practices, and in 2014, 13 agencies used anti-icing practices. In 2016, 26 agencies used anti-icing practices. Compared to 50 percent in 2014, 60 percent of local agencies are implementing some form of anti-icing practices in 2016. This trend suggests improvement in the use of anti-icing BMPs over time, with the most widespread use in 2016.

Two of the responding agencies reuse vehicle wash-water for making brine solutions compared to none from the 2014 survey.

2.2.2 Salt Application Rates

In 2007, survey respondents were asked about their average annual salt usage. In 2012, 2014, and again in 2016, respondents were asked about annual salt usage. Respondents gave their annual usage for each winter season which provides a good benchmark for how weather has affected salt application rates. **Figure 2-3** shows an approximated annual salt usage in lbs/lane mile for each watershed in the study area reported from the 2007, 2012, 2014, and 2016 surveys. Annual salt application rates generally decreased from 2007 – 2012 in the watersheds, and increased from 2012-2014 as a result of snowfall and storm event frequency variation. The 2016 survey responses indicated that the per lane mile use of salt in the 2015-16 winter has decreased from that in most previous years. The number and type of winter storm events occurring each year and the different number of agencies providing usage information for each survey make developing direct usage trends or correlations difficult.

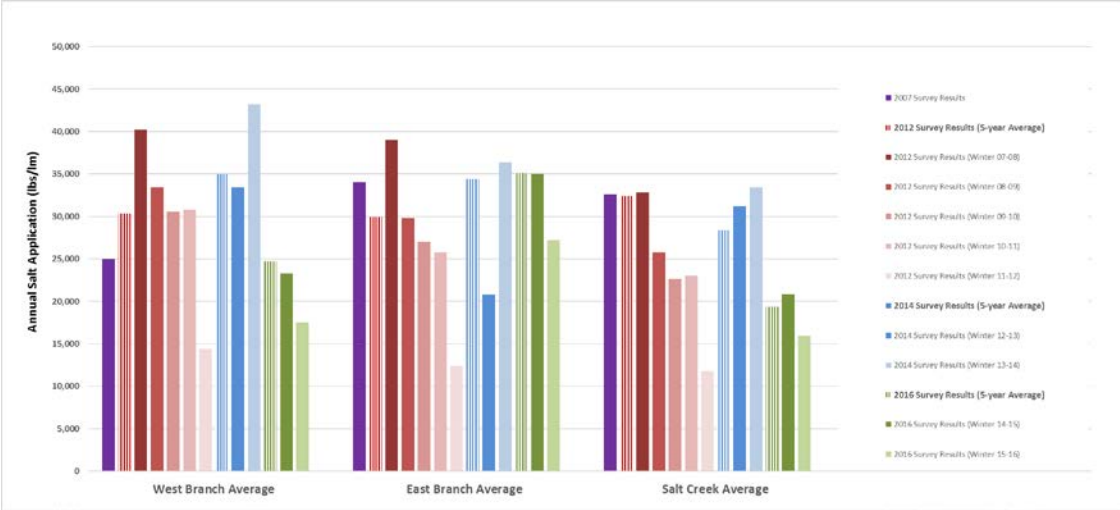


Figure 2-3 – Annual Salt Application Reported from 2007 - 2016

Survey respondents were asked about the average salt application rate per lane mile based on specific storm events. This information more comparably describes a community's salt usage, or application rate. **Figure 2-1** shows salt application rates reported from the 2010, 2012, 2014, and 2016 surveys. In general the number of agencies applying 200-300 lbs/lm has increased from 2010 to 2016. The other reported application rates have stayed relatively constant over the period. The majority of increases shown for 2016 are due to the increase in the number of agencies providing information for the 2016 survey.

Both annual salt usage data and salt application rates provide insight into individual agency programs and salt application across watersheds, as well as a valuable benchmark for future survey and Chloride Reduction Program efforts. Both of the above values will continue to be requested of agencies in future surveys to compare and report deicing program improvements, and presumed water quality improvements.

2.3 Survey Conclusions

The purpose of the 2016 survey was to gather follow-up information to determine if alternative deicing practices are being implemented in the DuPage River/Salt Creek watersheds and any resulting effects on salt application rates. Forty-three (43) agencies responded to the 2016 survey, the highest number of agencies ever responding to a program survey. As there were several new agencies providing information, the 2016 survey results may be skewed by the new agencies providing information this year, and inexperience with the type of information being asked by the survey. Follow up with individual agencies for future surveys may be needed.

Almost all agencies in the program area have covered permanent salt storage facilities; however there are still some opportunities for storage and salt handling improvements across the watersheds.

The 2016 survey shows increased implementation of best management practices for deicing program implementation for the following:

- Spreading equipment calibration
- Use of weather forecasting for deicing response decisions
- Use of pavement temperature information for deicing response decisions

The survey shows expanded use of anti-icing (pretreatment) BMPs throughout the watershed, and continued use and testing of alternative deicing materials and additives to reduce total salt usage. Agencies reporting use of more that 400 lbs of salt per lane mile are opportunity for the Chloride Reduction Program to expand outreach and BMP information.

The 2016 survey highlights significant local deicing program management oversite improvements, particularly with control over application rates. Recordkeeping improvements have been implemented throughout the watershed area to better manage the quantity of salt being used in different situations. Nine out of 42 responses reported changes made to their program due to local deicing program workshops. Common methods of informing the public of policy or local program changes include the use of city or township website, newsletter, social media, and press releases.

In order to perform a more definitive trend analysis of program improvements and reductions in salt usage, additional information will need to be collected over time. Information should continue to be collected to characterize any deicing program BMP improvements and resulting reductions in salt usage occurring within the DRSCW watersheds.