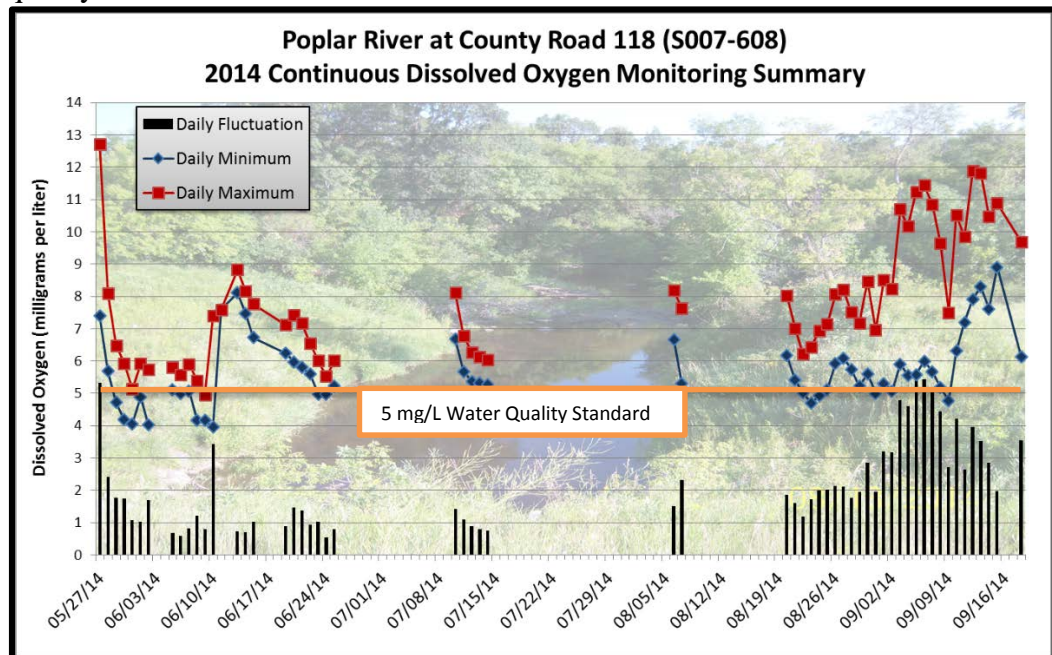


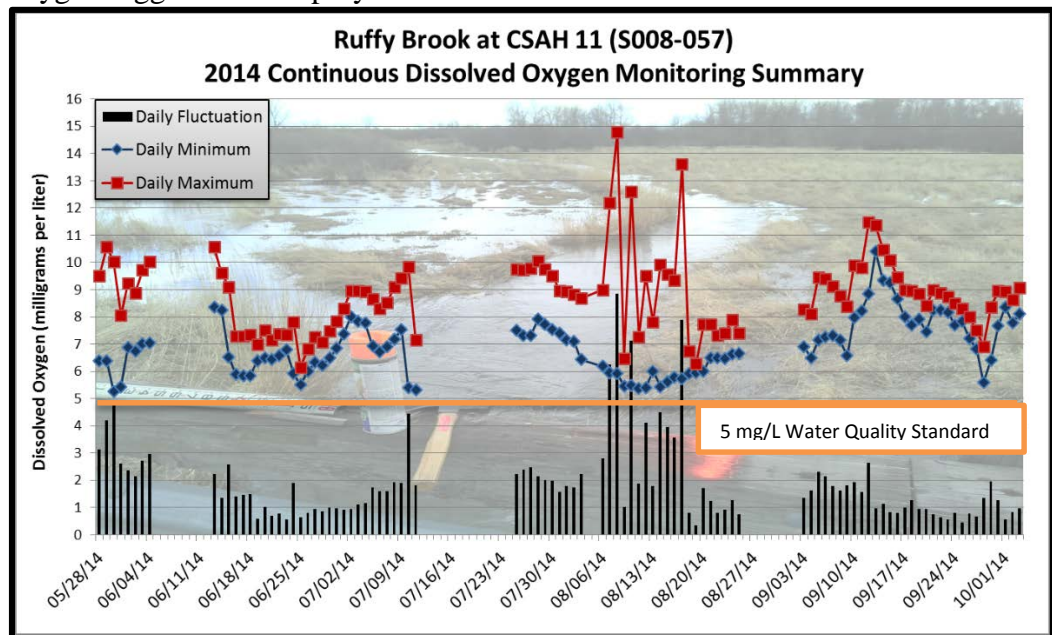
By Corey Hanson, Red Lake Watershed District Water Quality Coordinator. March 25, 2015.

Clearwater River Watershed Restoration and Protection (WRAP) Project

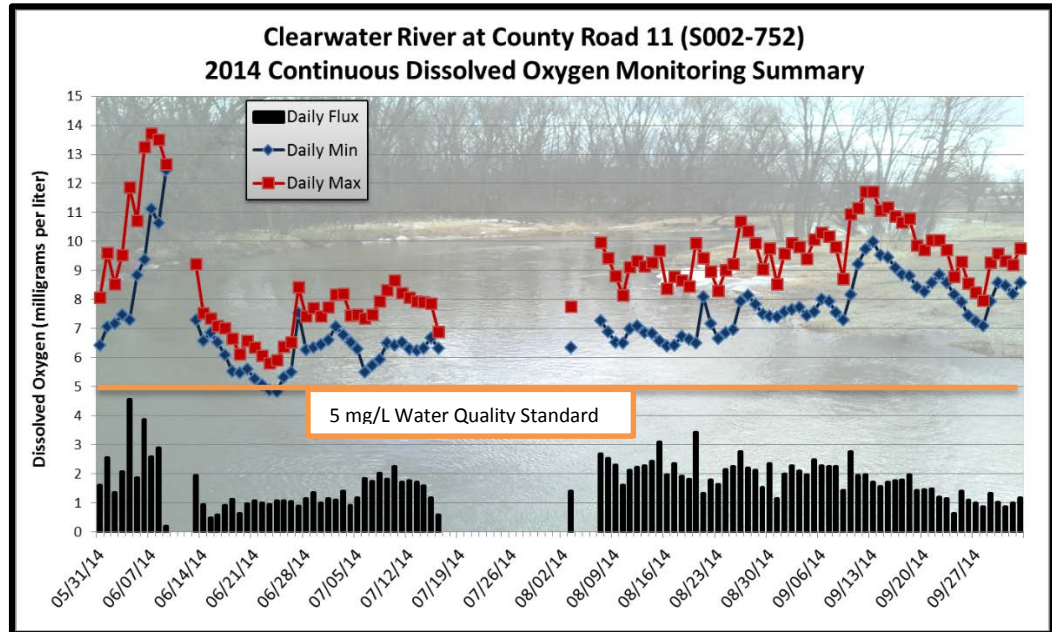
- Objective 3 – Flow Monitoring
 - Data was downloaded from HOBO water level loggers.
- Objective 4 – Continuous Dissolved Oxygen monitoring
 - 2014 dissolved oxygen measurements collected by Eureka Midge dissolved oxygen loggers that were deployed in the Poplar River at CR 118 were compiled, corrected, trimmed, plotted on a graph, assessed, summarized, and submitted to the MPCA. The Midge dissolved oxygen loggers have Clark cell probes and require flow past the probes in order to perform properly. This site is typically suitable for those probes because of relatively swift flow. The quality of readings from the probes may have been affected by debris on the deployment pipe during July and early August. Data from deployed loggers that needs to be adjusted based on fouling and calibration drift more than 2 mg/l is automatically deleted (USGS Techniques and Methods 1-D3). Sections of data from deployed loggers that don't reasonably match discrete measurements are also deleted. The probes seem to have worked fine in the early summer and in the latter part of the monitoring season (after debris was cleaned from the deployment pipe in August). Of the 59 days with usable data from the dissolved oxygen loggers, dissolved oxygen levels dropped below the 5 mg/l dissolved oxygen water quality standard during 14 days. This equals a percentage of 23.7%. Overall, 12.7% of the hourly readings were less than 5 mg/l. The data indicates that the stream is impaired by low dissolved oxygen. Monitoring the reach again in 2015 with an optical probe would add confidence to decisions made about this reach during the 2016 water quality assessment.



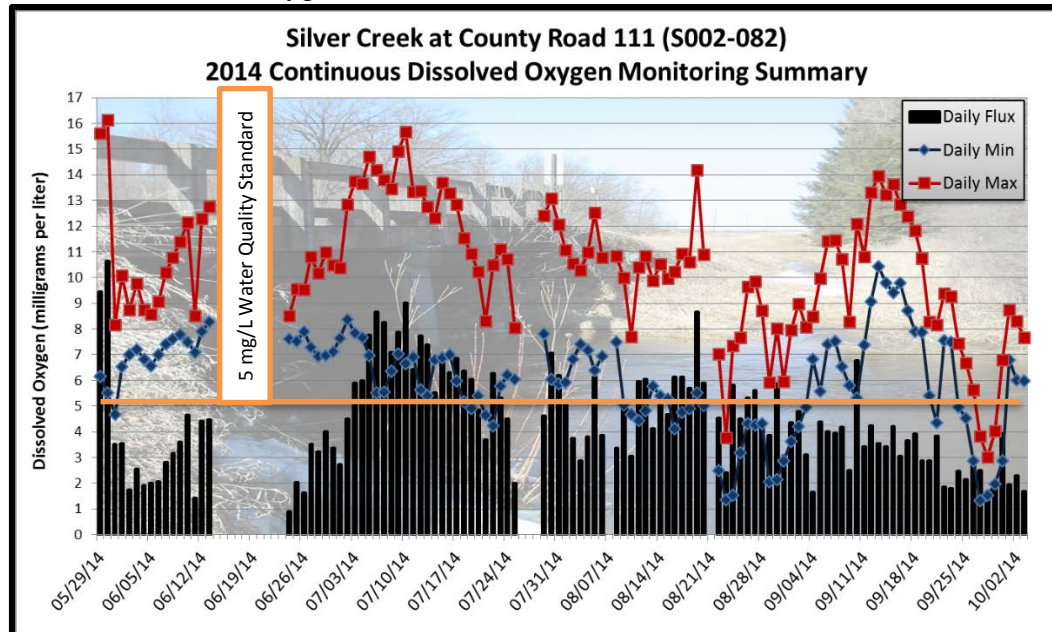
- 2014 dissolved oxygen measurements collected by In-Situ TROLL 9500 dissolved oxygen loggers that were deployed in Ruffy Brook at CSAH 11 were compiled, corrected, trimmed, plotted on a graph, assessed, summarized, and submitted to the MPCA. All of the dissolved oxygen data collected at this site were above the 5 mg/l water quality standard. This means that the water in this stream is very well suited for the support of a warm water fishery. Ruffy Brook used to be a trout stream, but a lot of work would be needed in order to restore it to that condition. The 2014 dissolved oxygen levels weren't high enough to meet the 7 mg/l water quality standard for trout streams because the daily minimum levels fell below the 7 mg/l mark during 55% of the days in which dissolved oxygen loggers were deployed.



- 2014 dissolved oxygen measurements collected by Eureka Midge and Eureka Manta dissolved oxygen loggers that were deployed in the Clearwater River at CSAH 11 were compiled, corrected, trimmed, plotted on a graph, assessed, summarized, and submitted to the MPCA. Only 2 days out of the 59 days in which dissolved oxygen loggers were deployed had daily minimum levels lower than the 5 mg/l water quality standard (only 3.4%). Those two measurements were 4.88 and 4.84, so they didn't fall very far below the standard. This data shows that this section of the Clearwater River is meeting the water quality standard for dissolved oxygen.

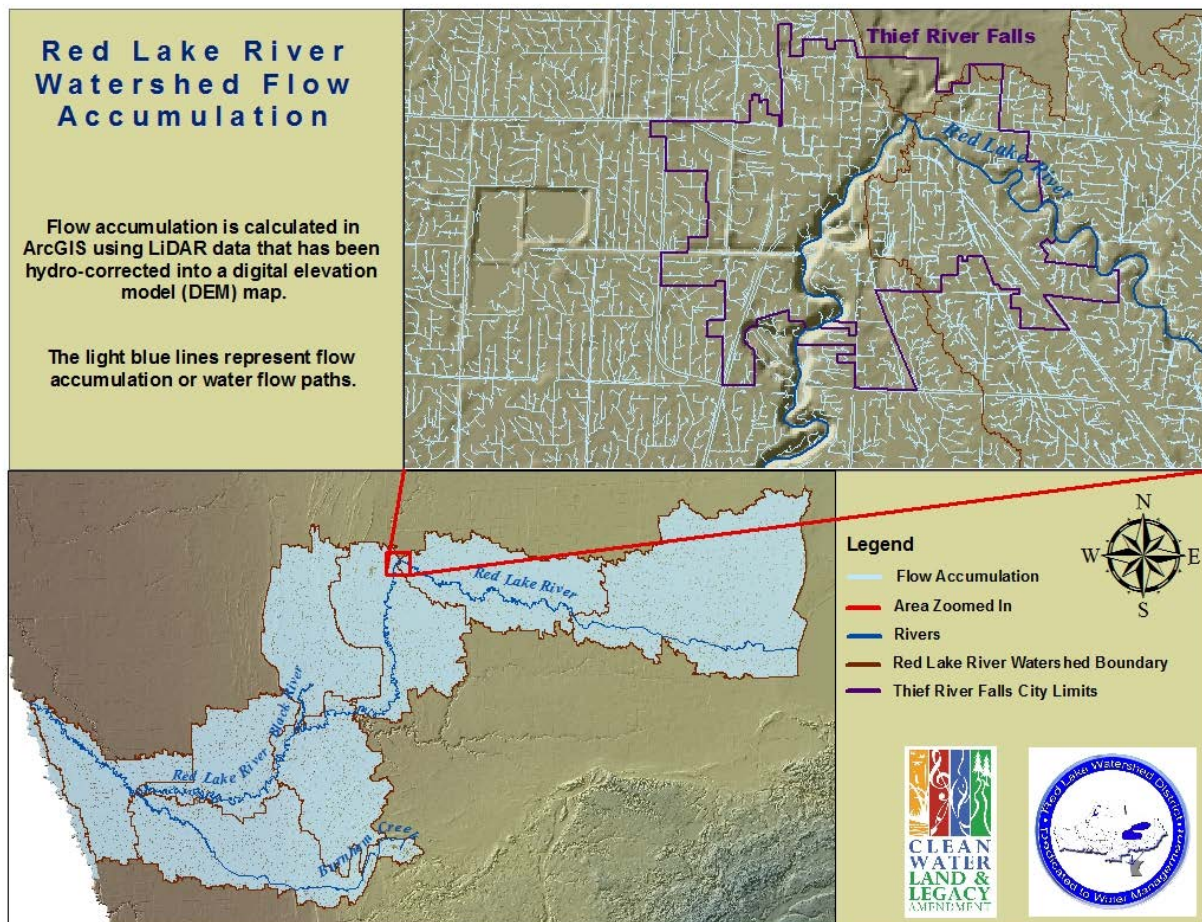


- 2014 dissolved oxygen measurements collected by a HOBO U26-001 dissolved oxygen logger that was deployed in Silver Creek at CR 111 were compiled, corrected, trimmed, plotted on a graph, assessed, summarized, and submitted to the MPCA. This reach may be impaired by low dissolved oxygen. Water in the stream becomes stagnant during periods of low flow. Of the 113 days in which a dissolved oxygen logger was deployed at the site, 31 days had daily minimum dissolved oxygen readings that dropped below 5 mg/l (27.4%). The overall percentage of the readings (collected once every 30 minutes) that dropped below 5 mg/l was 11.3% (561 readings out of 4958). This site also had relatively high levels of dissolved oxygen fluctuation.



- Objective 9 – Civic Engagement
 - Links to documents and online resources were provided to Emmons and Olivier Resources (EOR) staff for inclusion in a new website being created for the Clearwater River watershed.
- Objective 10 – Reports
 - A semi-annual progress report was completed and submitted to the MPCA Project Manager.

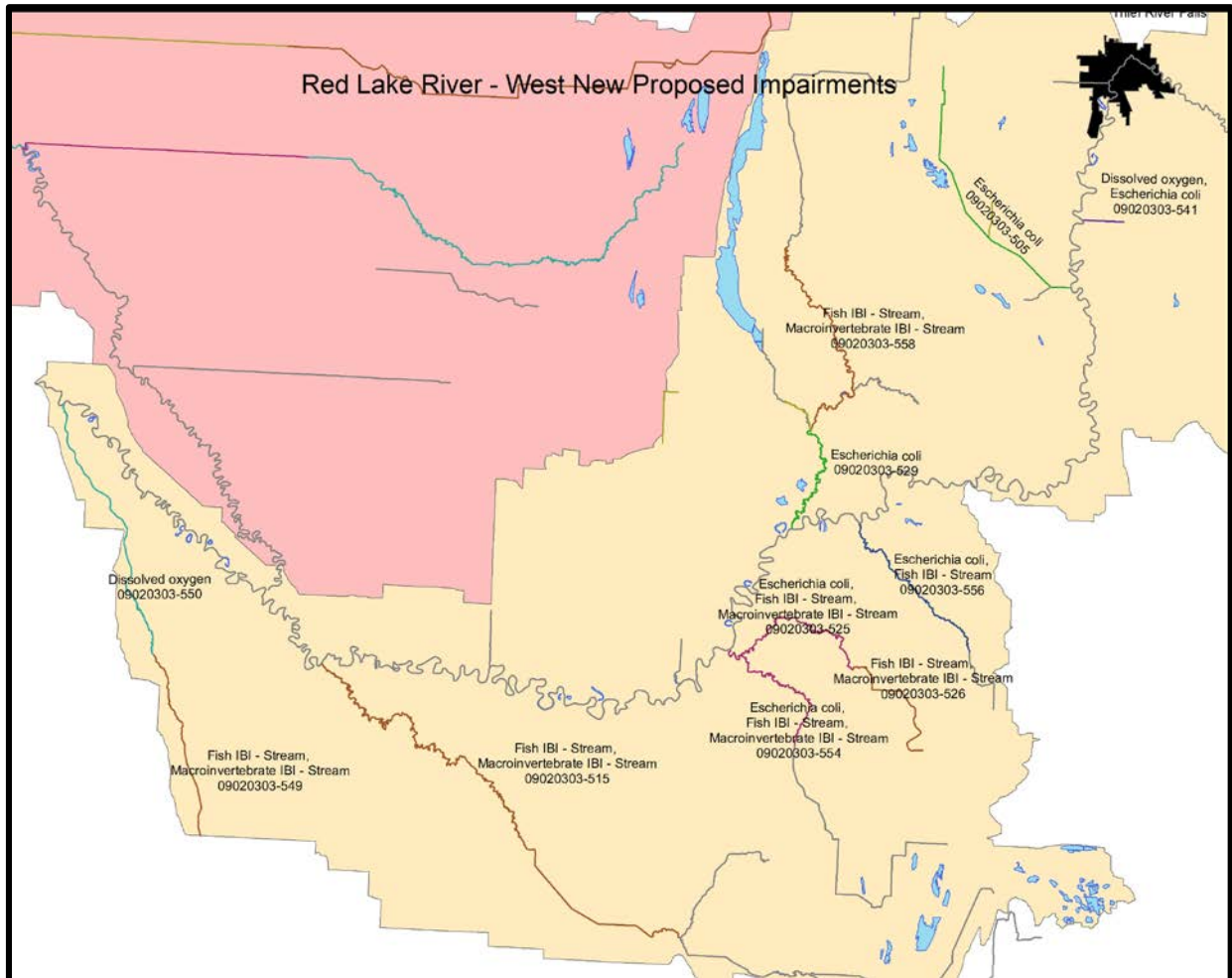
Red Lake River Watershed Assessment Project
(Watershed Restoration and Protection - WRAP)

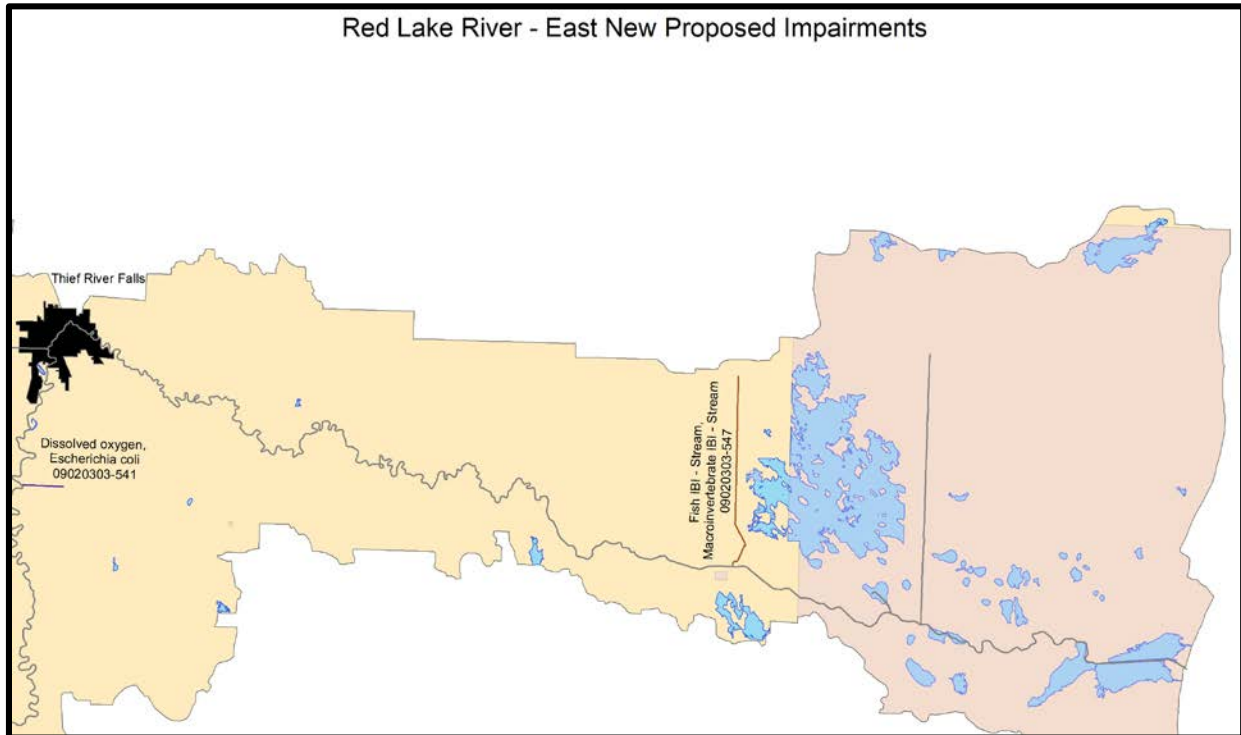


- Task 5 – Flow Monitoring
 - Data was downloaded from HOBO water level loggers.
- Task 7 – Stressor Identification
 - RLWD staff provided information to MPCA staff to aid in the writing of a biotic stressor identification report for the Red Lake River watershed.
- Task 8 – Data Entry
 - New S-codes (unique site identification codes assigned to water quality monitoring sites by the Minnesota Pollution Control Agency) were received from

the MPCA. They were used to complete the data submittal spreadsheets for new sites that were monitored for the first time in 2014.

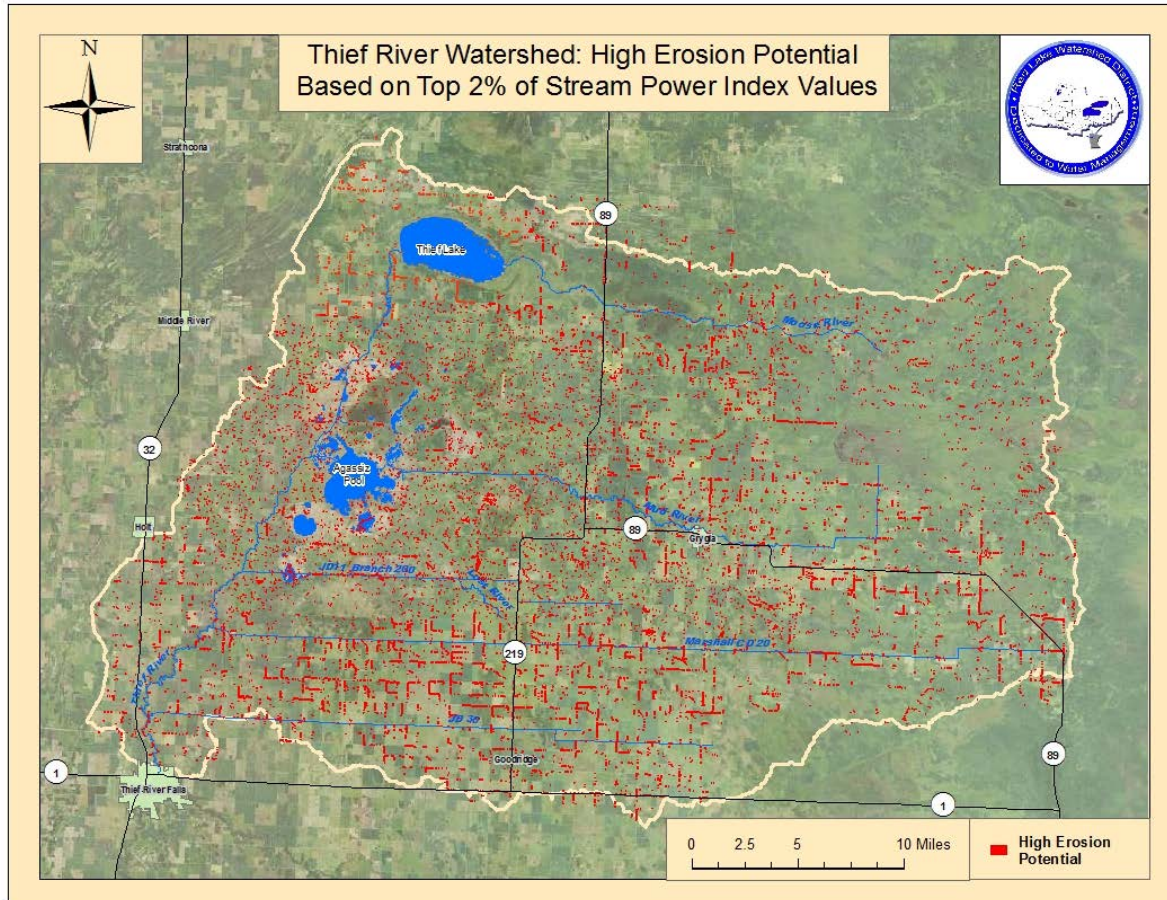
- Task 9 – Data Analysis
 - RLWD and EOR staff prepared for a Professional Judgement Group meeting that was held in February 2015 to discuss the results of the 2014-15 water quality assessment of the Grand Marais Creek and Red Lake River watershed.





- Task 10 – Civic Engagement
 - Links to documents and online resources were provided to Emmons and Olivier Resources (EOR) staff for inclusion in a new website being created for the Red Lake River watershed.
- Task 12 – Reports
 - A semi-annual progress report was completed and submitted to the MPCA Project Manager.
 - DNR staff have been working on prioritization of Red Lake River HUC12 subwatersheds.

Thief River Watershed Restoration and Protection (WRAP) Project



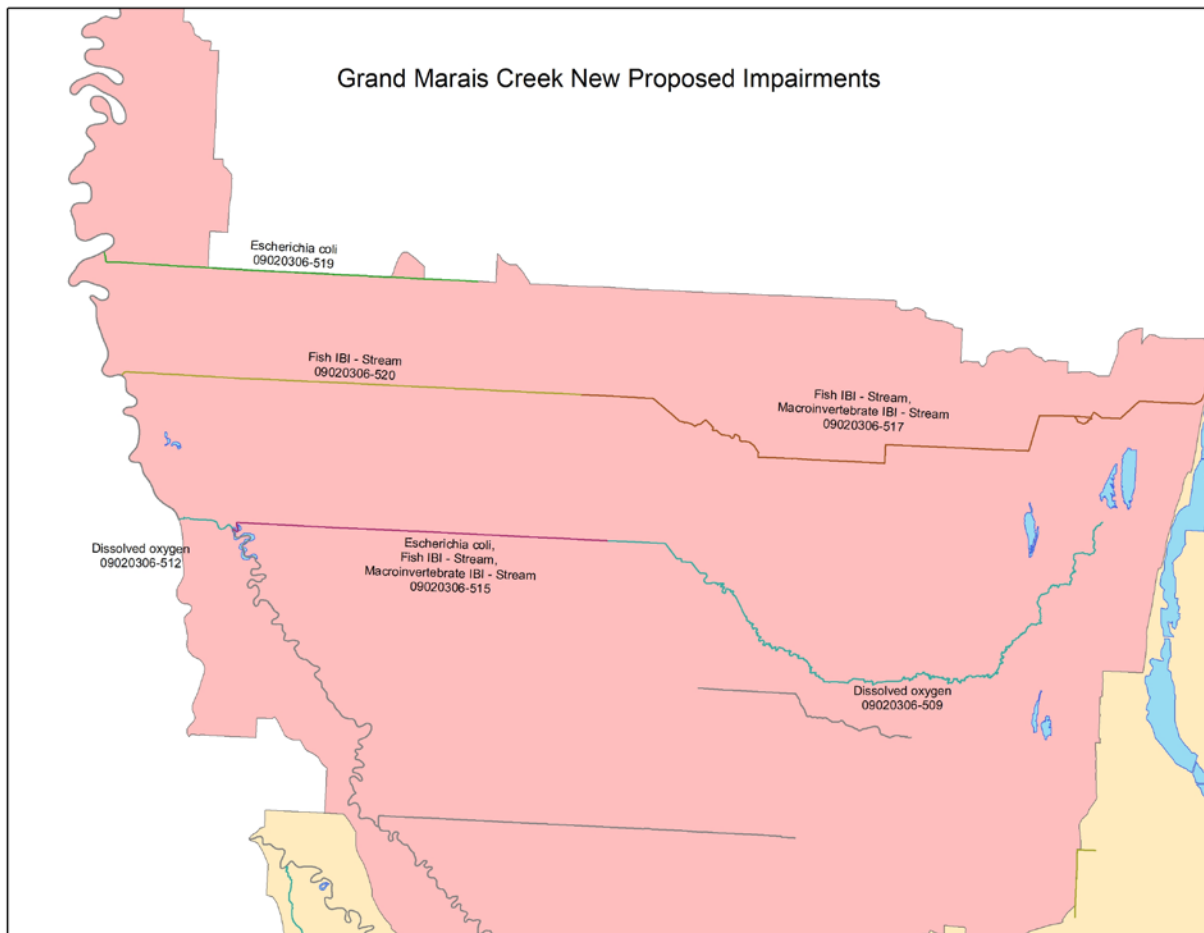
- Task 5 – Flow Monitoring
 - Data was downloaded from HOBO water level loggers.
- Task 9 – Data Entry
 - New S-codes (unique site identification codes assigned to water quality monitoring sites by the Minnesota Pollution Control Agency) were received from the MPCA They were used to complete the data submittal spreadsheets for new sites that were monitored for the first time in 2014.
- Task 10 - Civic Engagement
 - MPCA staff wrote an article about how new water quality standards will affect the Thief River watershed in future water quality assessments.
 - Text was provided to Emmons and Olivier Resources (EOR) staff for use in the creation of a new website that is being created for the Thief River watershed.
 - RMB Environmental Laboratories staff have prepared a newsletter for the Thief River watershed that will be mailed once a website address is established (and added to the newsletter) for the Thief River watershed webpage that is currently under development.
- Task 13 – Reports
 - A semi-annual progress report was completed and submitted to the MPCA Project Manager.

Grand Marais Creek Watershed Restoration and Protection Project

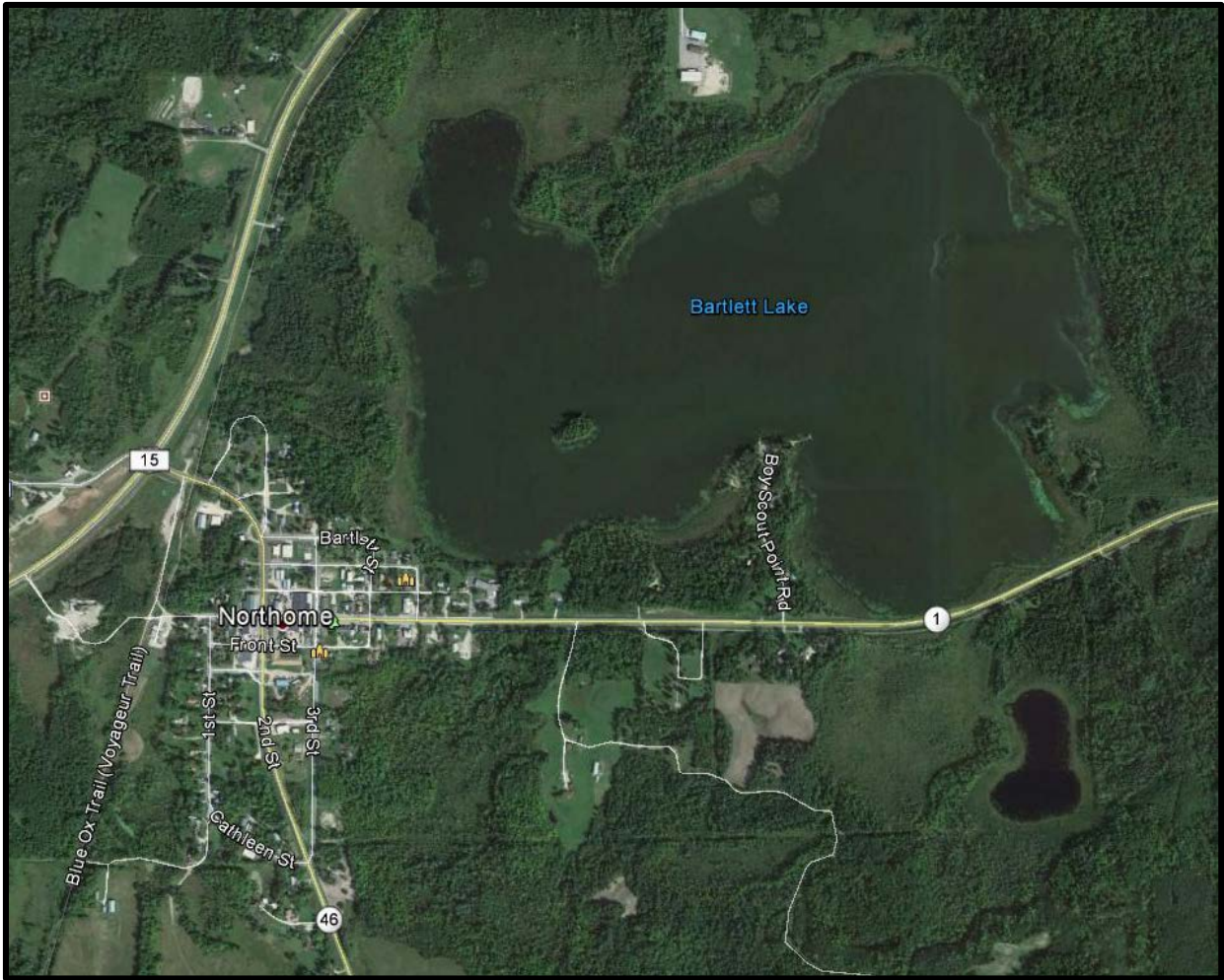
Emmons and Olivier Resources staff worked on coordination, scheduling, and a list of topics for early 2015 technical advisory committee and stakeholders meetings. They also worked on budget tracking and semi-annual progress reports. The development of TMDL and WRAPS reports was initiated.

A pH impairment on the Headwaters to County Ditch 2 reach of Grand Marais Creek (AUID 09020306-507) will likely be taken off of the 303(d) List of Impaired Waters.

RLWD and EOR staff prepared for a Professional Judgement Group meeting that was held in February 2015 to discuss the results of the 2014-15 water quality assessment of the Grand Marais Creek and Red Lake River watersheds.

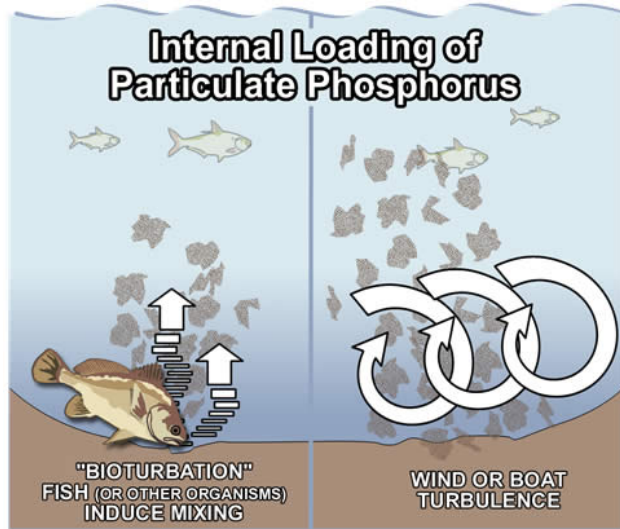


Bartlett Lake



A Paleolimnological study of Bartlett Lake has been proposed by the St. Croix Watershed Research Station Director and the station's Senior Scientist and will receive some funding. Here is some information from the proposal:

Bartlett Lake is located just outside of the town of Northome, Minnesota. The lake is over 300 acres and reaches a maximum depth of about 16 feet. The lake has a long history of environmental stress that has resulted in frequent cyanobacterial blooms and winter fish kills. Although current loadings of phosphorus to the lake have been strongly curtailed, the lake still suffers from extremely high phosphorus (P) levels and poor water quality. Currently, most unnatural sources are limited to some storm drainage and a few lake homes. Secchi readings often less than 1 meter and water column total phosphorus (TP) values approach hypereutrophic levels.



Historical loading of nutrients likely occurred from both a lumber mill and creamery that were located on Bartlett's shoreline. Legacy effects though internal loading (nutrients may be continuing to impact this resource. Current concern for the lake centers on its impaired status because it does not meet current state standards (30 $\mu\text{g/l}$ TP) for shallow lakes in the northern lakes and forest ecoregion. These impairments and a known history of excess nutrient loadings have led to questions of how much the productivity of Bartlett has changed over time:

- What was the natural or historical condition of the lake?
- What is the current trajectory of the lake after the land use improvements that have been made since the 1970s?
- How should management goals be set for this valued regional resource?

Knowledge of the natural state of a lake and an understanding of the timing and magnitude of historical ecological changes are critical components for any management and remediation plan. This project would use paleolimnological and sediment techniques to reconstruct the nutrient and algal history, temporal and spatial trends in sedimentation, and the distribution and availability of phosphorus within the sediments of Bartlett Lake. Results will provide a history of ecological changes that have occurred in the lake during the last 150 years and form the foundation for developing a nutrient management strategy for the lake.

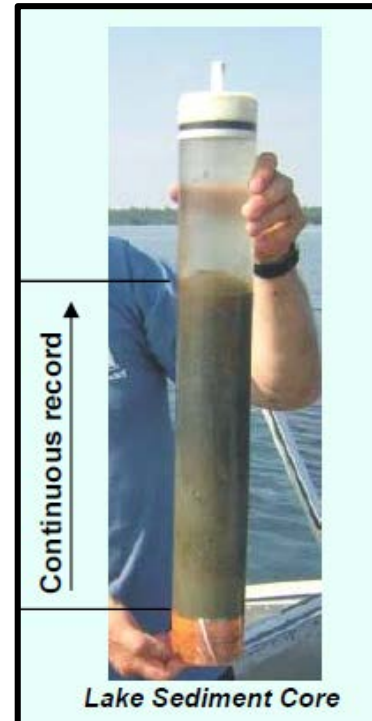
With any lake management plan it is important to have a basic understanding of natural fluctuations within the system. Reliable long-term data sets, on the order of 30 - 50 years, are generally not available for most regions of the country. Through the use of paleolimnological techniques and quantitative environmental reconstructions, we can estimate past conditions and natural variability, identify timing and causes of ecological changes, understand current lake function, and determine rates of change and recovery.

The primary aim of this project is to use paleolimnological analysis of dated sediment cores to reconstruct changes in the lake condition over the last 150 years using multiple lines of evidence including biogeochemistry, sediment accumulation, and diatom and algal remains as biological indicators.

Four to five cores will be collected from the lake basin to fully characterize the sediment depositional environment and current distribution of sediment phosphorus in the lake. Two cores will be fully dated using radioisotopes and all cores will have whole core magnetics and loss-on-ignition analyses run to allow alignment among cores, followed by analysis of sediment phosphorus in all cores. The single core from the lake's central basin will be further subjected to diatom, fossil pigment, and biogenic silica analysis to assess whole lake algal response histories. The diatom remains will be used to model changes in water column TP. Diatoms quite often make up the main type of algae in a lake and therefore changes in diatom community structure are symptomatic of algal changes in response to water quality. In the state of Minnesota, diatom analysis has been used as one line of evidence for developing nutrient criteria, lake-specific nutrient standards, and prioritizing management actions.

In addition, the researchers propose to characterize changes in algal productivity and nutrient availability using additional biogeochemical analyses of the cores. Biogenic silica concentration and flux will be measured in the central basin core to determine historical levels of diatom production. Whereas the relative percent change in diatom communities is an effective measure of water quality over time (using diatom-inferred TP), whole lake algal changes can inform us about the absolute changes in algal production and the historical presence of nuisance algae, such as blue-green algae.

Last, the burial efficiency and behavior of P in sediments are critical for understanding how a lake will respond to nutrient reductions. Lakes that experience excess loading of P can lose it in one of two ways. It can leave via outflow or get permanently buried in the sediments. For lakes with low linear sedimentation rates and/or long residence times, the ability to bury P is key to lake recovery from excess nutrient loading. Scientists will characterize the P burial efficiency of Bartlett Lake by determining the spatial and temporal distribution of P fractions across the Bartlett Lake basin in conjunction with analysis of Fe and Al content of the cores to assess the binding capacity for P. From these data they will estimate recovery times for the lake under different loading scenarios.



Other Notes

- Water quality related topics from the January 22, 2015 RLWD Board of Managers meeting:
 - The Board reviewed an additional funding request from the Clearwater SWCD for installation of two lakeshore protection projects on Pine Lake from the District's Erosion Control Funds, RLWD Project No. 164. Administrator Jesme stated that that in 2013 the Board funded two lakeshore protection projects with the Clearwater SWCD. Construction has been completed, with a shortfall of funding in the amount of \$711.28. Motion by Knott, seconded by Tiedemann, to contribute an additional \$711.28 from the 2013 Erosion Control Funds to the Clearwater SWCD for completion of two lakeshore protection projects on Pine Lake. Motion carried.
- RLWD staff helped Red Lake Department of Natural Resources staff with the development of a work plan for the Upper and Lower Red Lakes Watershed Restoration and Protection Project.
- January 2015 issue of the River Rendezvous from the International Water Institute: http://www.iwinst.org/wp-content/uploads/2015/01/RWRendez_Issue-20_Jan2015-pdf.pdf
 - North Dakota River Watch
 - Minnesota Watershed Pollutant Load Monitoring
 - 20th Anniversary of River Watch
- The EPA has approved the MPCA's proposed changes to water quality standards addressing eutrophication of rivers and streams and the replacement of the existing turbidity standard with a standard of total suspended solids. This doesn't mean that the changes to the standards are official yet, but they are one step closer to that status.
- Governor Mark Dayton has proposed an initiative aimed at protecting Minnesota's waters from erosion and runoff pollution. Known as the Buffer Initiative, the legislation requires at least 50 feet of perennial vegetation around Minnesota's waters.
 - <http://www.dnr.state.mn.us/buffers/index.html>

Upcoming Meetings/Events

- **February 1, 2015** – Semi-annual progress reports for the Thief River, Red Lake River, Grand Marais Creek, and Clearwater River Watershed Restoration and Protection projects are due.
- **February 4, 2015** – Marshall County Water Resources Advisory Committee Meeting
- **February 11, 2015** – Red Lake River and Grand Marais Creek Best Professional Judgment Group meeting for the Minnesota pollution Control Agency's official assessment of 2004 through 2014 water quality data in those watersheds. The meeting will be held from 10 am to 2 pm at the Red Lake Watershed District meeting room.
- **March 5, 2015** – 12th Annual Red River Basin Water Quality Monitoring Training, 8:30 am - 4:00 pm at the University of Minnesota Crookston

- **March 9, 2015** – Pennington County Water Resource Advisory Committee Meeting, 9AM at the Pennington County SWCD
- **March 9, 2015** – Grand Marais Creek Watershed Restoration and Protection Project Technical Advisory Committee meeting and public open house event at the East Grand Forks Campbell Library
 - 1:00 – 3:00 PM - Technical Advisory Committee meeting
 - 4:00 – 6:00 PM – Open House
- **March 16, 2015** – Red Lake Watershed District Overall Advisory Committee Meeting
- **March 17, 2015** – Red River Basin River Watch Forum at the University of Minnesota, Crookston campus
- **March 18, 2015** – One Watershed One Plan Kick-Off Meeting at the Red Lake Watershed District Office.
- **March 23-24, 2015** – Snake River and Grand Marais Creek HSPF Model Training Workshop
- **April 8, 2015** – Marshall County Water Resources Advisory Committee Meeting
- **May 29, 2015** – Target date for completion of a draft watershed TMDL for the Thief River watershed.
- **June 8, 2015** – Pennington County Water Resource Advisory Committee Meeting, 9AM at the Pennington County SWCD
- **June 30, 2015** – Target date for completion of a draft Thief River Watershed Restoration and Protection Strategy (WRAPS) report
- **June 30, 2015** – Scheduled completion date for the Thief River Watershed Restoration and Protection Project.
- **July 8, 2015** – Marshall County Water Resources Advisory Committee Meeting
- **September 2015** – Pennington County Outdoor Education Day
- **September 2015** – Northwest Minnesota Water Festival in Fertile and Warren
- **September 2015** – Thief River Open House Meeting
- **November 4, 2015** – Marshall County Water Resources Advisory Committee Meeting
- **December 31, 2015** – Planned completion date for the Red Lake River Watershed Restoration and Protection Project (Draft TMDL and WRAPS reports)

Plans for early 2015

- Thief River Watershed Restoration and Protection Project.
 - Creating Stream Power Index maps.
 - Create a web page dedicated to the Thief River Watershed
 - Flow characterization and load calculations
 - Pollutant identification for reaches with dissolved oxygen impairments
 - Work on writing Watershed TMDL and WRAPS report documents
- Red Lake River Watershed Assessment Project
 - Creating Stream Power Index maps.
 - Create a webpage dedicated to the Red Lake River
 - Flow characterization
 - Work on writing Watershed TMDL and WRAPS report documents

- Provide input during the assessment process
- Clearwater River Watershed Restoration and Protection Project
 - Finish compiling 2014 continuous dissolved oxygen data
 - Compile existing data and summarize existing reports
 - Plan 2015 monitoring
 - Create a webpage dedicated to the Clearwater River watershed
- Grand Marais Creek Watershed Restoration and Protection project
 - Technical advisory committee and public open house meetings.
- Articles for the 2014 RLWD Annual Report
- Compile 2014 stage and flow data

Quote of the Month:

“The man who does not work for the love of work, but only for money, is not likely to make money nor find much fun in life.”

– Charles Schwab

“To love what you do and feel that it matters – how could anything be more fun?”

– Katherine Graham

Red Lake Watershed District Monthly Water Quality Reports are available online at:
<http://www.redlakewatershed.org/monthwq.html>.

“Like” the Red Lake Watershed District on [Facebook](#) to stay up-to-date on RLWD reports and activities.