RED LAKE WATERSHED DISTRICT MONTHLY WATER QUALITY REPORT

July - August 2017

By Corey Hanson, Red Lake Watershed District Water Quality Coordinator. 1/23/2018

- ✓ District Monitoring
- ✓ Longitudinal Sampling
- ✓ Tindolph Beach Closure and Investigative Water Quality Sampling
- ✓ Fecal DNA Analysis for the Mud River and Walker Brook
- ✓ Clearwater River Watershed Restoration and Protection Strategy
- ✓ Red Lake River Watershed Restoration and Protection Strategy
- ✓ Thief River Watershed Restoration and Protection Strategy

Red Lake Watershed District Long-Term Monitoring Program

The RLWD water quality program received help for a part of the summer from an intern, Bryanna Grefthen, who worked RLWD from July 10, 2017 until August 11, 2017. A full round of district monitoring was completed during the month of August.

Monitoring for blue-green algae problems in the Mud River in Grylga resumed. Samples were regularly collected and a dissolved oxygen logger was deployed. Water was tested for the presence of algal toxins using Abraxis test kits. The tests indicated that algal toxins were absent in all the samples that were collected in 2017.

High concentrations of total suspended solids (in excess of state water quality standards) were found in:

- Moose River at CSAH 54 – 64 mg/L
- Thief River at 380th St NE (north boundary of Agassiz National Wildlife Refuge) – 64 mg/L

A relatively high turbidity reading was found in the Moose River in early August. Abnormally high turbidity readings and total suspended solids concentrations were found in the Thief River upstream of Agassiz National Wildlife Refuge. The issue was investigated on 8/10/2017. The cloudiness in the water in the Thief River began somewhere between 400th St. NE and CSAH 6. There was no runoff occurring at the time. If the channel bottom was being disturbed within that reach, the clay particles from that disturbance would have stayed in suspension for a long time.

RED LAKE WATERSHED DISTRICT MONTHLY WATER QUALITY REPORT	July - August 2017

High concentrations of *E. coli* bacteria (>126 MPN/100ml) were found in:

- Blackduck River
- Burnham Creek at 180th Ave SW, downstream of the Spring Gravel stream restoration project (>2,419.6 MPN/100ml)
- Clear Brook
  - CSAH 92 (three times)
  - CSAH 5
  - Main St S
  - Railroad Ave NE
- Clearwater River at CSAH 2
- Darrigan's Creek (1,935 MPN/100ml)
- Hill River
  - 350th St. (downstream of a livestock operation)
  - 345th Ave SE
  - 340th St. SE (west crossing)
  - 290th St. SE
  - 290th Ave SE (twice)
  - 250th Ave SE
  - County Road 129 (240th Ave SE)
  - County Road 130 (230th Ave SE)
  - County Road 119 near Brooks
- Lost River
  - CSAH 8 near Gonvick
  - South Pine Lake Road (Pine Lake inlet)
  - 109th Ave, upstream of Pine Lake
  - Lindberg Lake Road
  - 141st Ave
- Moose River at CSAH 54
- Mud River
  - Grygla City Park
  - CSAH 54
  - Dylan Road
  - Flintlock Road
- Nassett Creek
  - Both crossings of Nessett Cr Dr
  - 410th St. (1,732.9 MPN/100ml at 410th St.)
- North Cormorant River (>2,419.6 MPN/100ml)
- O' Briens Creek
- Ruffy Brook at CSAH 11
- Silver Creek
  - CSAH 18
  - 161st Ave.
  - 159th Ave. twice, 1250 MPN/100ml daily geometric mean on 8/16/2017
  - 470th St.
  - 500th St.
- South Cormorant River
- Thief River at 140th Ave NE near Thief River Falls

RED LAKE WATERSHED DISTRICT MONTHLY WATER QUALITY REPORT	July - August 2017

High concentrations of total phosphorus that exceeded stream eutrophication standards were found in:

- Beau Gerlot Creek at County Road 114
- Blackduck River
- Chief's Coulee at Dewey Ave. in Thief River Falls
- Clear Brook
  - CSAH 92 (twice)
  - CSAH 5
  - Main St S
  - Railroad Ave NE
  - CSAH 74 (west crossing)
- Clearwater River at CSAH 10
- Cyr Creek
- Darrigan's Creek
- Grand Marais Creek at 110th St NW
- Heartsville Coulee at 13th St. SE
- Hill River
  - 290th Ave SE
  - CSAH 35
  - 335th Ave SE
- Lost River
  - Lindberg Lake Road
  - 109th Ave, upstream of Pine Lake
  - South Pine Lake Road (Pine Lake inlet)
  - CSAH 28
  - CSAH 5 in Oklee
  - County Road 119 near Brooks
- Lower Badger Creek
- Moose River at CSAH 54
- Nassett Creek
  - Both crossings of Nessett Cr Dr
  - 410th St. (1,732.9 MPN/100ml at 410th St.)
- North Cormorant River
- O' Briens Creek
- Polk County Ditch 2
- Poplar River
  - 310th St. SE
  - CSAH 30 near Fosston
  - County Road 118 (twice, mostly orthophosphorus)
- Red Lake County Ditch 23 (twice, nearly all orthophosphorus)
- Ruffy Brook at CSAH 11
- Silver Creek at CR 111
- South Cormorant River
- Thief River at 380th St NE (north boundary of Agassiz National Wildlife Refuge)

Low dissolved oxygen concentrations (<5 mg/L) were found in:

- Branch 200 of Judicial Ditch 11
- Burnham Creek at CSAH 48
- Chief's Coulee at Dewey Ave. in Thief River Falls
- Clear Brook
  - CSAH 74 (west crossing)
  - CSAH 92
- Clearwater River
  - CSAH 10 (during wild rice paddy drainage), eight days
  - Tower Road near Bagley
- Grand Marais Creek at 110th St NW (twice)
- Hill River
  - CSAH 29 (Cross Lake outlet), twice
  - CSAH 3 (twice)
  - 355th St. SE (twice)
  - 350th St. SE
  - 340th St. SE (twice)
  - 380th Ave. SE (twice)
  - 365th Ave. SE
  - Hill River Lake outlet
  - CSAH 35 (twice)
  - 320th St. SE
  - 310th St. SE
  - 290th Ave SE
- Little Black River at CR 102
- Lost River
  - 141st Ave
  - Lindberg Lake Road
  - 109th Ave, upstream of Pine Lake (three days)
  - South Pine Lake Road (Pine Lake inlet)
  - 530th St. (Anderson Lake outlet)
  - CSAH 28 (twice)
- Lower Badger Creek
- Moose River at Highway 89
- O' Briens Creek
- Polk County Ditch 14 (Maple Lake outlet), twice
- Poplar River Diversion at the Badger Lake inlet
- Red Lake County Ditch 23 (four days)
- Silver Creek
  - 161st Ave.
  - CSAH 18
  - 139th Ave (Anderson Lake inlet)
- Thief River at 380th St NE (north boundary of Agassiz National Wildlife Refuge)
- Walker Brook at CSAH 19 (twice)

High concentrations of biochemical oxygen demand (>2.0 mg/L in the Central River Nutrient Region and >3.5 mg/L in the Southern River Nutrient Region) were found in:

- Clearwater River at CSAH 10
- Mud River at Highway 89
- Poplar River
  - 310th St. SE
  - CSAH 30 near Fosston
- Red Lake River at CSAH 219
- Thief River at 140th Ave NE near Thief River Falls

Some notably good water quality monitoring results include:

- Very low *E. coli* bacteria concentrations (<10 MPN/100ml) in
  - Gentilly Creek
  - Hill River at the outlet of Hill River Lake
  - Judicial Ditch 30, Polk County Ditch 2
  - Lower Badger Creek
  - Polk County Ditch 14 (Maple Lake outlet)
- Very low TSS (1 mg/L or less) in
  - Clear Brook (all crossings)
  - Clearwater River
    - Klondike Bridge in Red Lake Falls
    - CSAH 12 (Terrebonne Bridge)
    - CSAH 11
    - CSAH 14
    - CSAH 2
    - Tower Road near Bagley
  - Hill River
    - County Road 119 near Brooks
    - 290th Ave SE
    - CSAH 35
    - 335th Ave SE
  - Judicial Ditch 73
  - Lost River
    - County Road 119 north of Brooks
    - CSAH 8
    - 109th Ave, upstream of Pine Lake
    - 141st Ave, upstream of Pine Lake
    - Lindberg Lake Road
  - Mud River in Grygla
  - Nassett Creek
  - Poplar River at 310th St. SE
  - Red Lake County Ditch 23
  - Thief River at CSAH 7
- Lower Red Lake River sites in Crookston, Fisher, and East Grand Forks met the 65 mg/L.

- It is also notable that the 8/10/2017 sample collected in Chief's Coulee met E. coli standards (67.7 MPN/100ml). It's just the second time that an *E. coli* concentration lower than 126 MPN/100ml has been recorded at the Dewey Avenue crossing. Unfortunately, concentrations of other pollutants were very high.
    - 5.05 mg/L of ammonia nitrogen
    - 1.54 mg/L of total phosphorus
    - 7.77 mg/L of total Kjeldahl nitrogen

Dissolved Oxygen Logger Deployments

Dissolved oxygen loggers were deployed in streams that were in need of additional data. The loggers were programmed to record dissolved oxygen concentrations at 30-minute intervals. The around-the-clock monitoring is necessary to record actual daily minimum concentrations and to record the amount of fluctuation that occurs in one day. Seasonal water quality staff deployed loggers, retrieved loggers, downloaded data, cleaned the loggers, calibrated the loggers during each round of deployments, and collected extra field measurements at dissolved oxygen logger deployment sites.

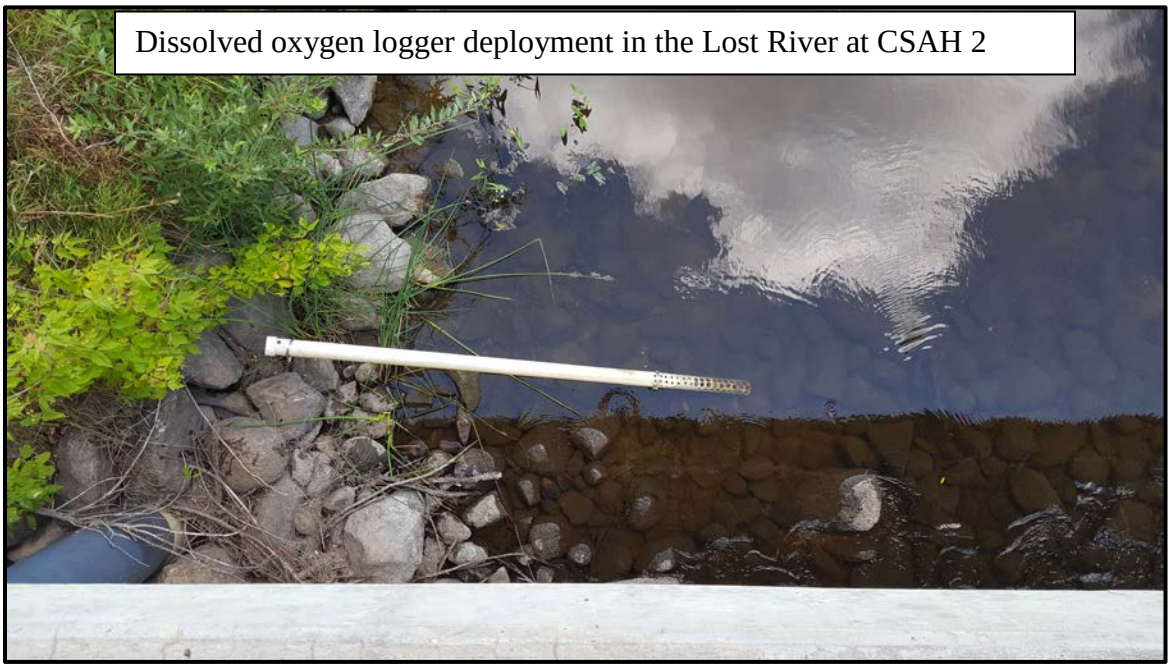
Dissolved oxygen logger deployment in the Hill River at 290th Ave SE

In early July, dissolved oxygen loggers were deployed in Cyr Creek, Red Lake County Ditch 23, Hill River, Burnham Creek, and the Clearwater River. In late July, Eureka Manta dissolved oxygen loggers were deployed in Grand Marais Creek and Polk County Ditch 2. The Minnesota Pollution Control Agency also deployed a dissolved oxygen logger in Cyr Creek for their stream metabolism study. The MPCA was studying the stream to get a better understanding of what is causing low dissolved oxygen levels. The RLWD dissolved oxygen logger was removed from Cyr Creek in mid-July because the creek went dry.

RED LAKE WATERSHED DISTRICT MONTHLY WATER QUALITY REPORT	July - August 2017

Cyr Creek stopped flowing in mid-July (Culvert under 220th St. SW on 8/7/17)

The Pennington County Ditch 23, Burnham Creek, and Cyr Creek channels went dry, so the dissolved oxygen loggers and pipes were removed from those sites. One of the loggers from the dry sites was then moved to Nassett Creek and another was moved to the Lost River at CSAH 2.



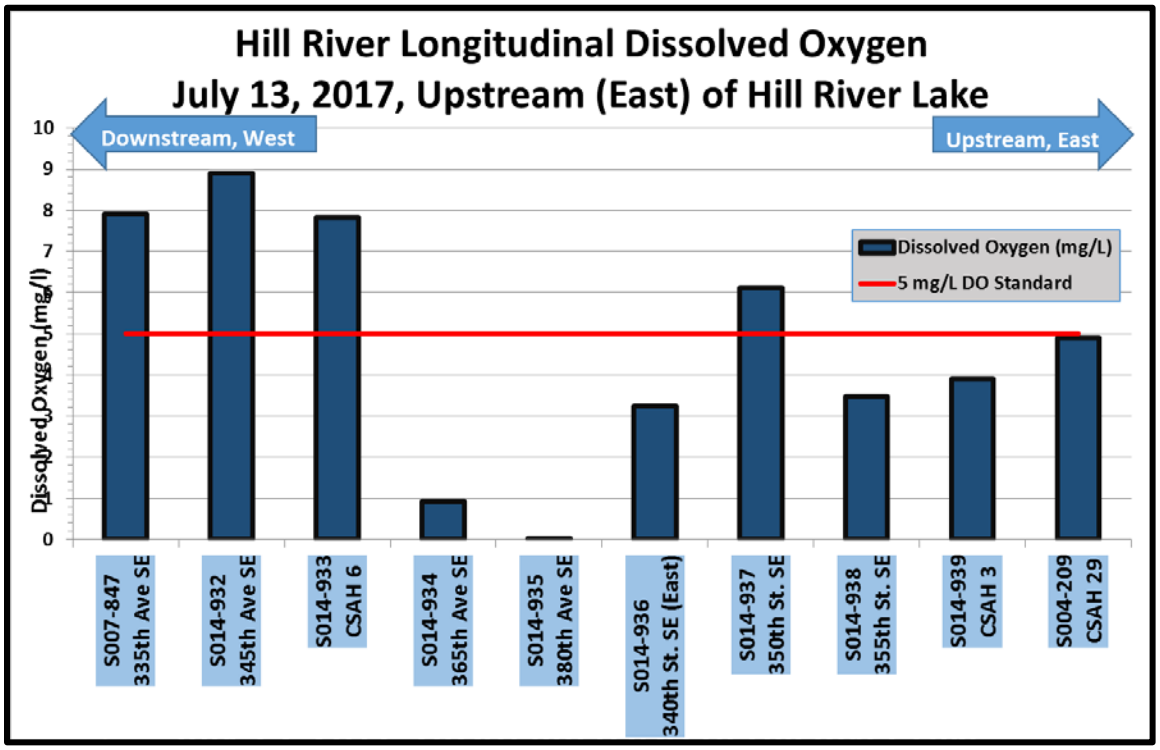
Dissolved oxygen logger deployment in the Lost River at CSAH 2

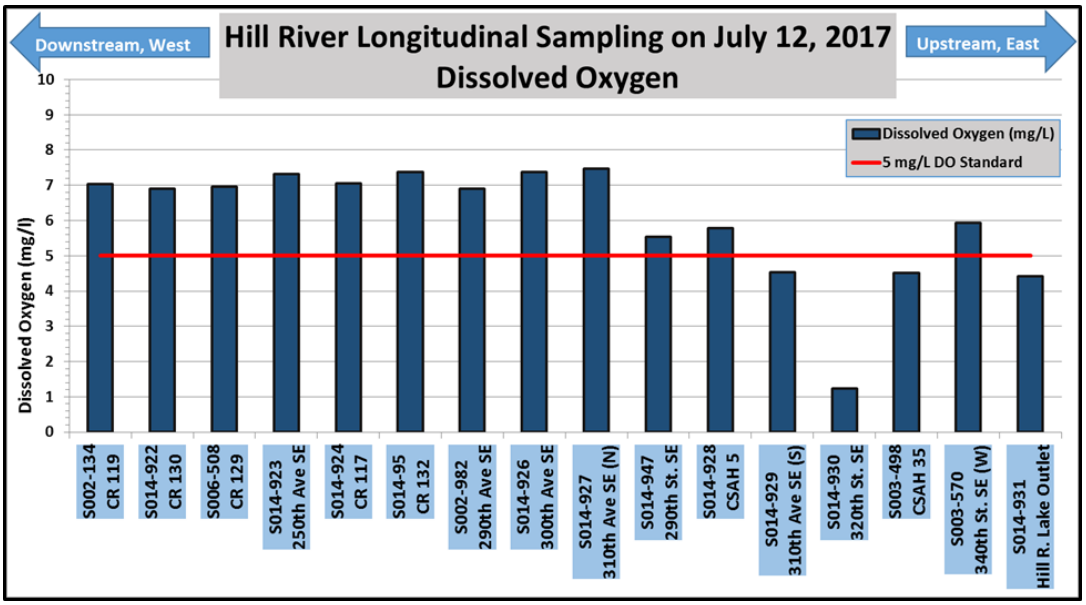
RED LAKE WATERSHED DISTRICT MONTHLY WATER QUALITY REPORT	July - August 2017

Longitudinal Water Quality Sampling

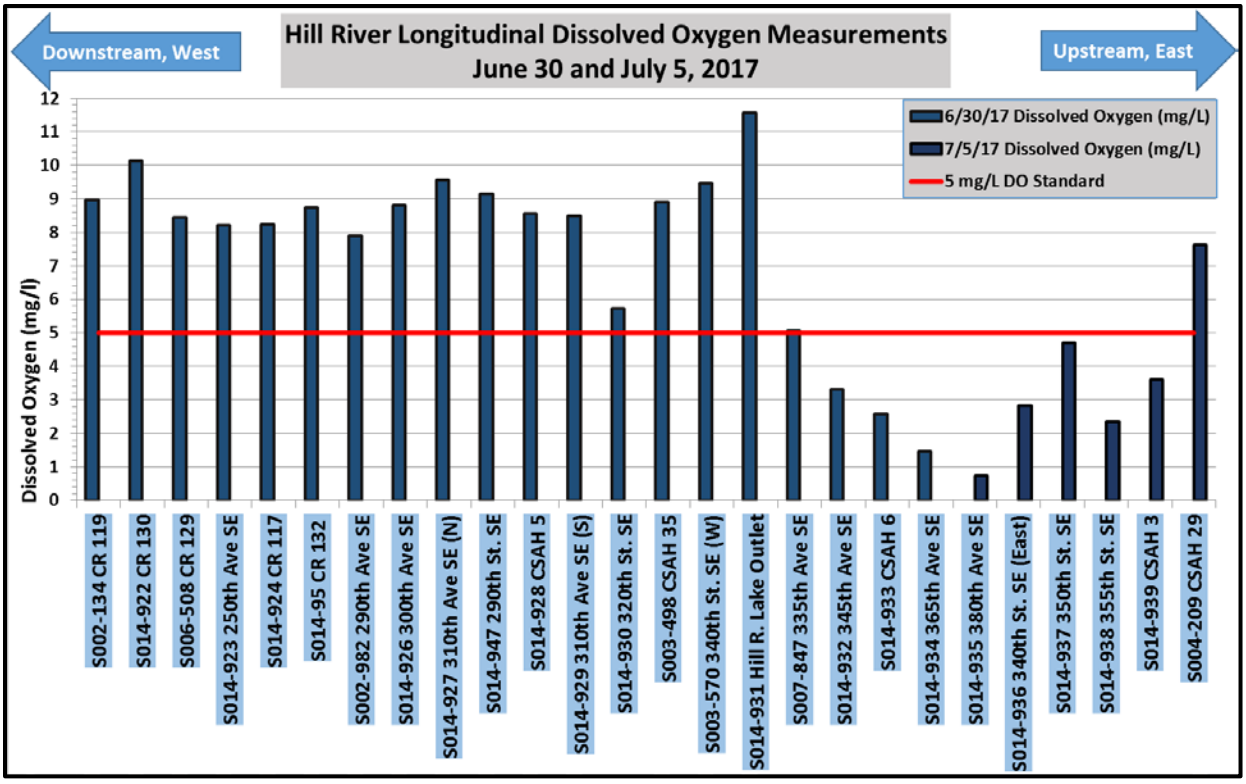
Longitudinal sampling at a series of accessible sampling stations along a stream can provide a snapshot of water quality conditions. That snapshot can be examined to identify reaches of streams in which water quality is degraded and reaches in which it improves. Areas where water quality declines can be examined for pollutant sources and landscape features that may be contributing to water quality problems.

Seasonal water quality staff collected longitudinal dissolved oxygen samples along the Hill River on multiple occasions during the summer of 2017. Similar patterns in dissolved oxygen concentrations were found in both rounds of measurements. Dissolved oxygen levels are being negatively affected between Cross Lake and Olga. The dissolved oxygen concentrations in the Hill River appear to be depressed along the reach that flows north, shortly downstream of Hill River Lake. The reach has a relatively low gradient and flows through wetlands where decomposition of organic material consumes dissolved oxygen and there is a lack of turbulence for reoxygenation. As the Hill River turns to the west, near 310th Ave SE, the gradient increases and dissolved oxygen concentrations also increase.

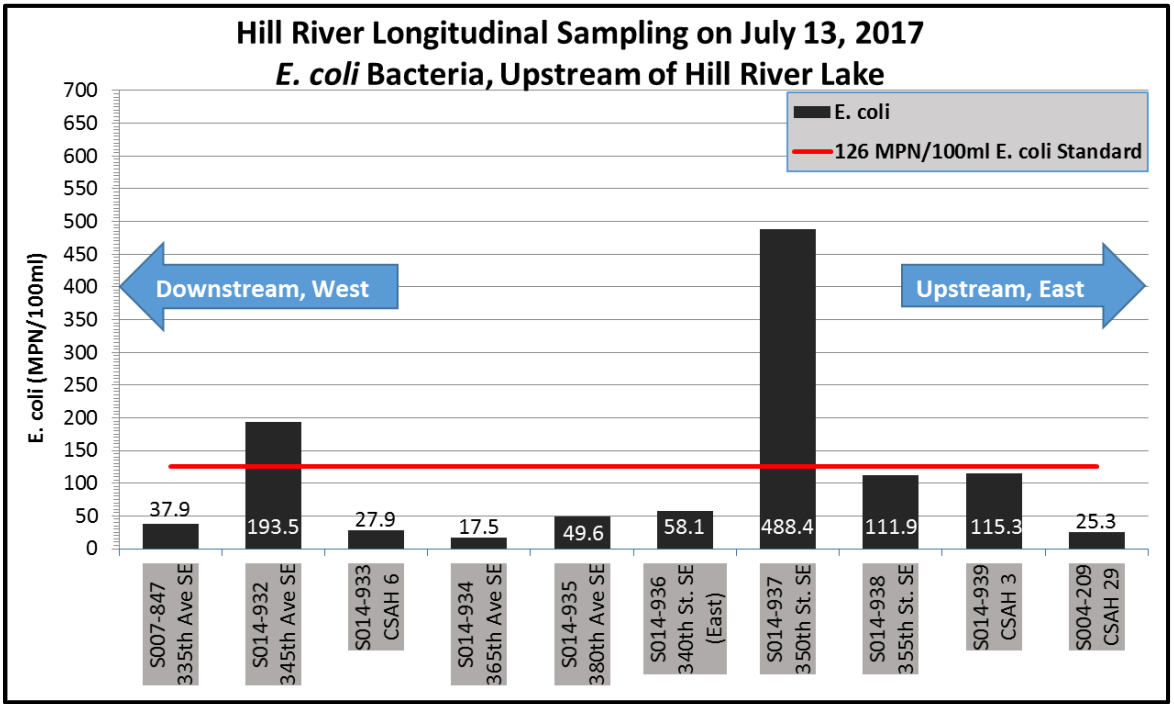


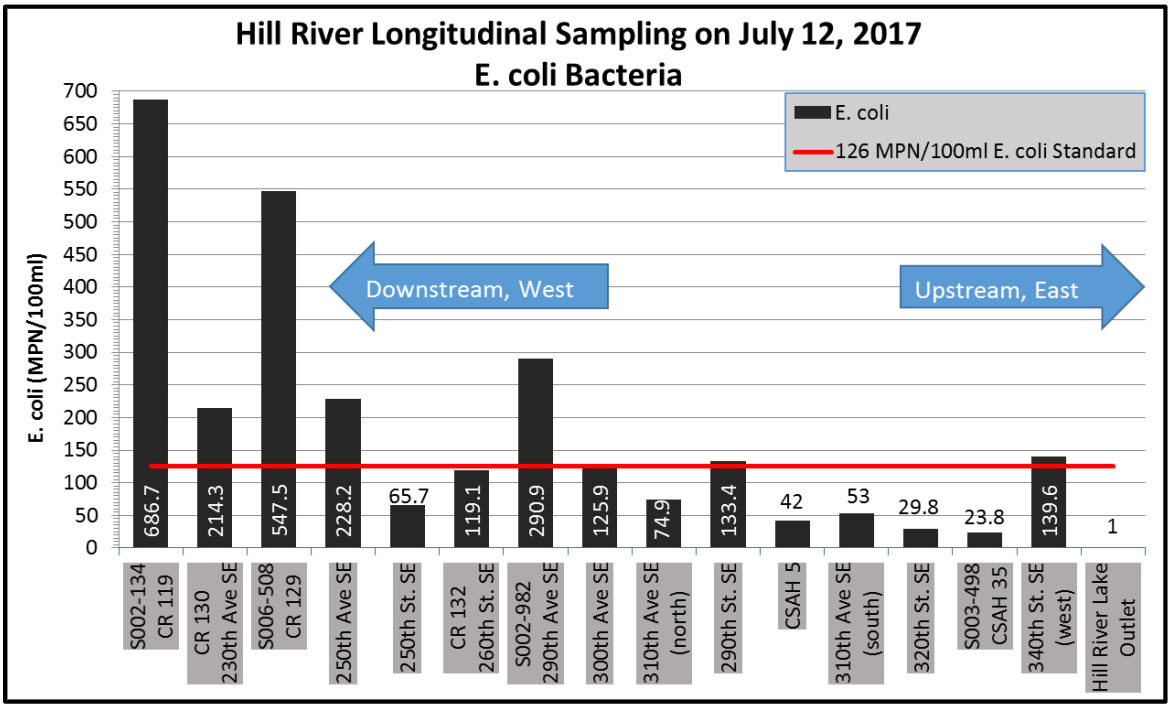


Seasonal staff collected longitudinal samples along the Hill River downstream of Hill River Lake on July 12, 2017 and along the Hill River upstream of Hill River Lake on July 13, 2017. Something is causing very low dissolved oxygen levels in the Hill River near Olga. The longitudinal dissolved oxygen measurements downstream of Hill River Lake confirmed what assessment statistics and biological sampling results have suggested.



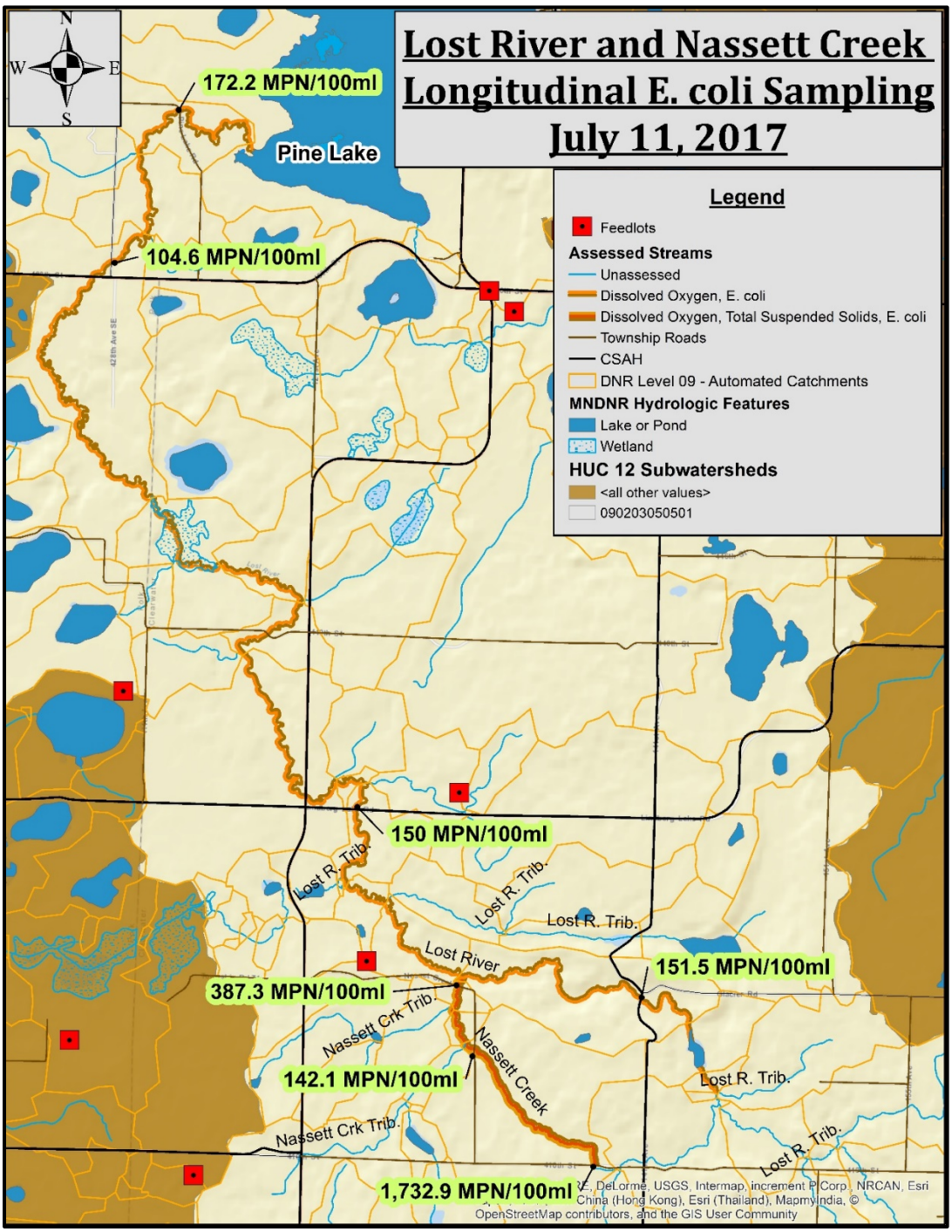
Longitudinal sampling along the Hill River also revealed areas in which there are significant increases in concentrations of *E. coli* bacteria.





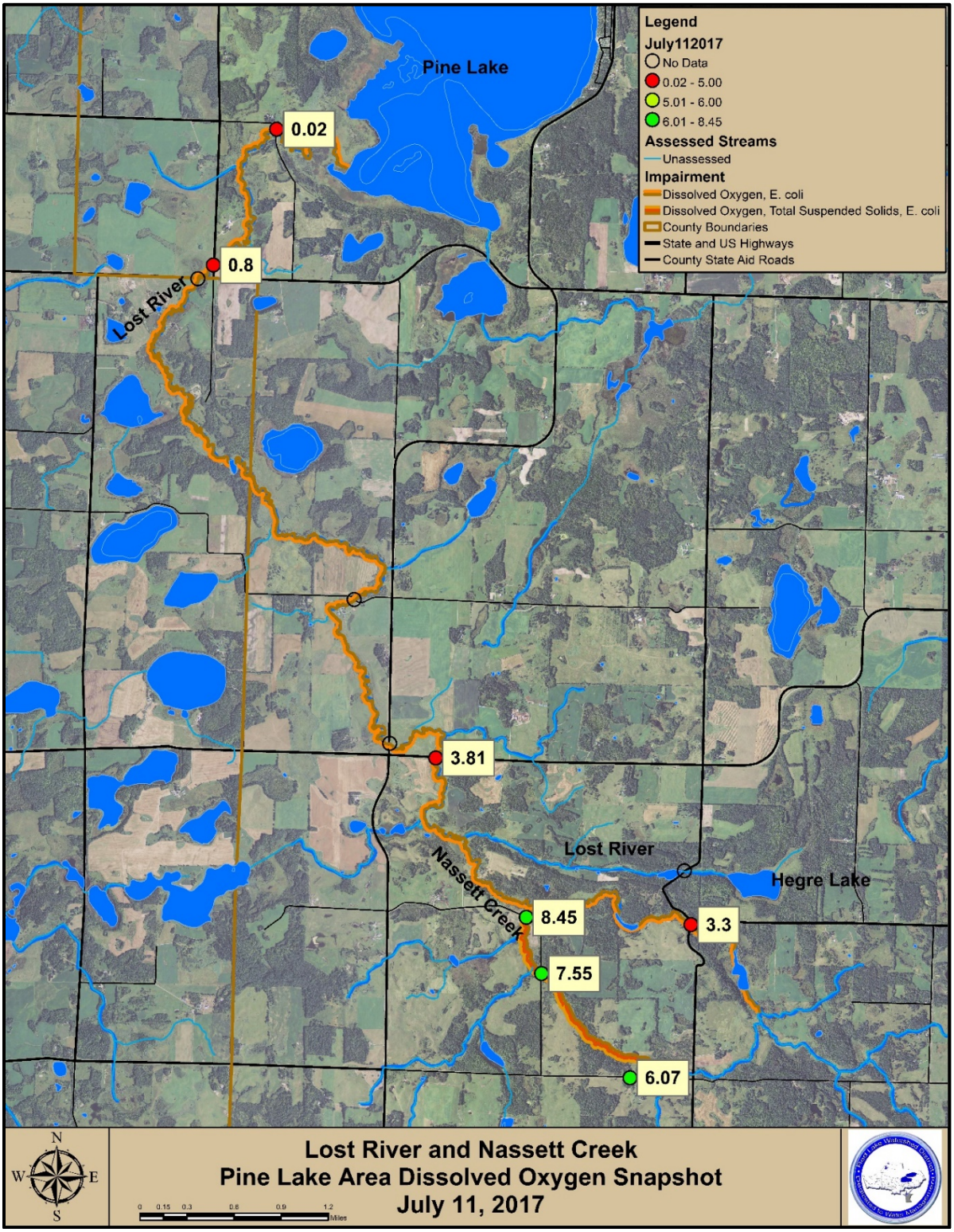
RED LAKE WATERSHED DISTRICT MONTHLY WATER QUALITY REPORT	July - August 2017

Seasonal water quality staff collected *E. coli* longitudinal samples at crossings of Nassett Brook and the Lost River near Pine Lake on July 11, 2017. *E. coli* increased along the reach between the two crossings of Nessett Creek Drive (two furthest downstream crossings) where livestock have access to the stream. There was a sheen on the water in the Lost River.



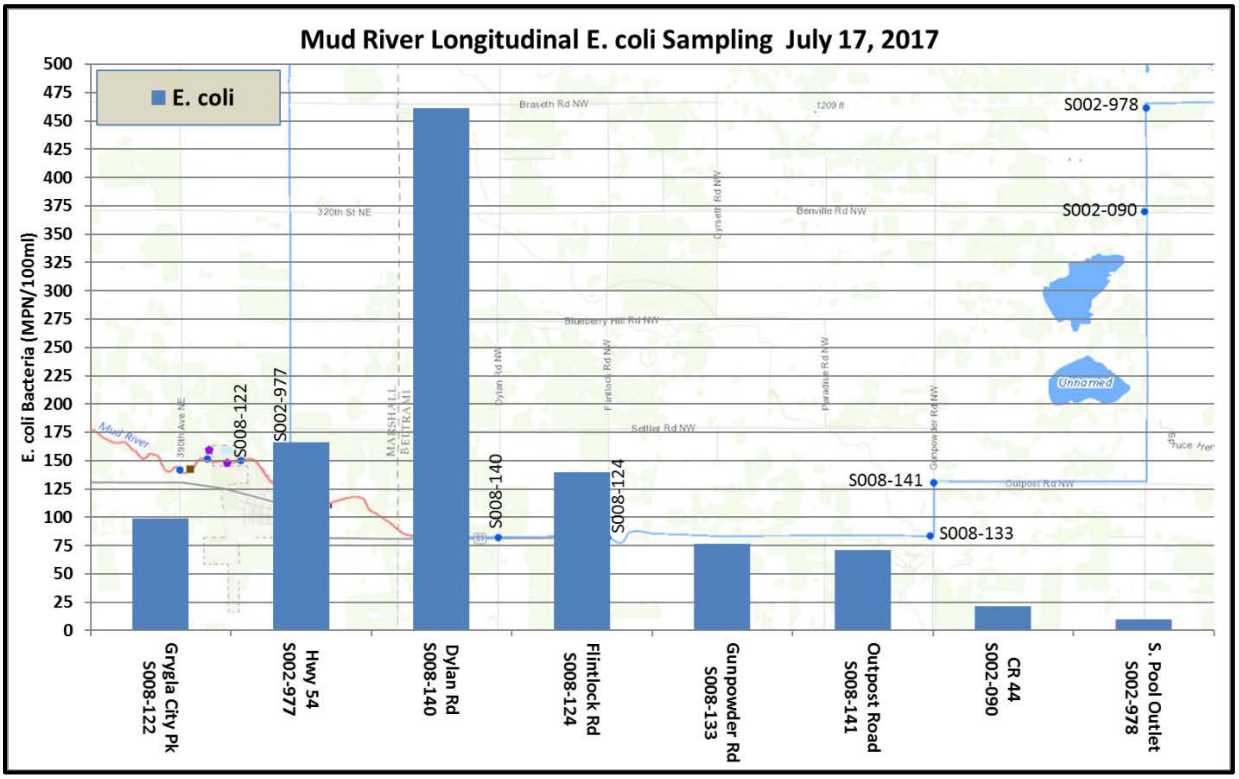
RED LAKE WATERSHED DISTRICT MONTHLY WATER QUALITY REPORT	July - August 2017

Dissolved oxygen levels were good within Nassett Creek, but low throughout the Lost River upstream of Pine Lake. Dissolved oxygen levels were near zero in the Lost River near the Pine Lake inlet.



RED LAKE WATERSHED DISTRICT MONTHLY WATER QUALITY REPORT	July - August 2017

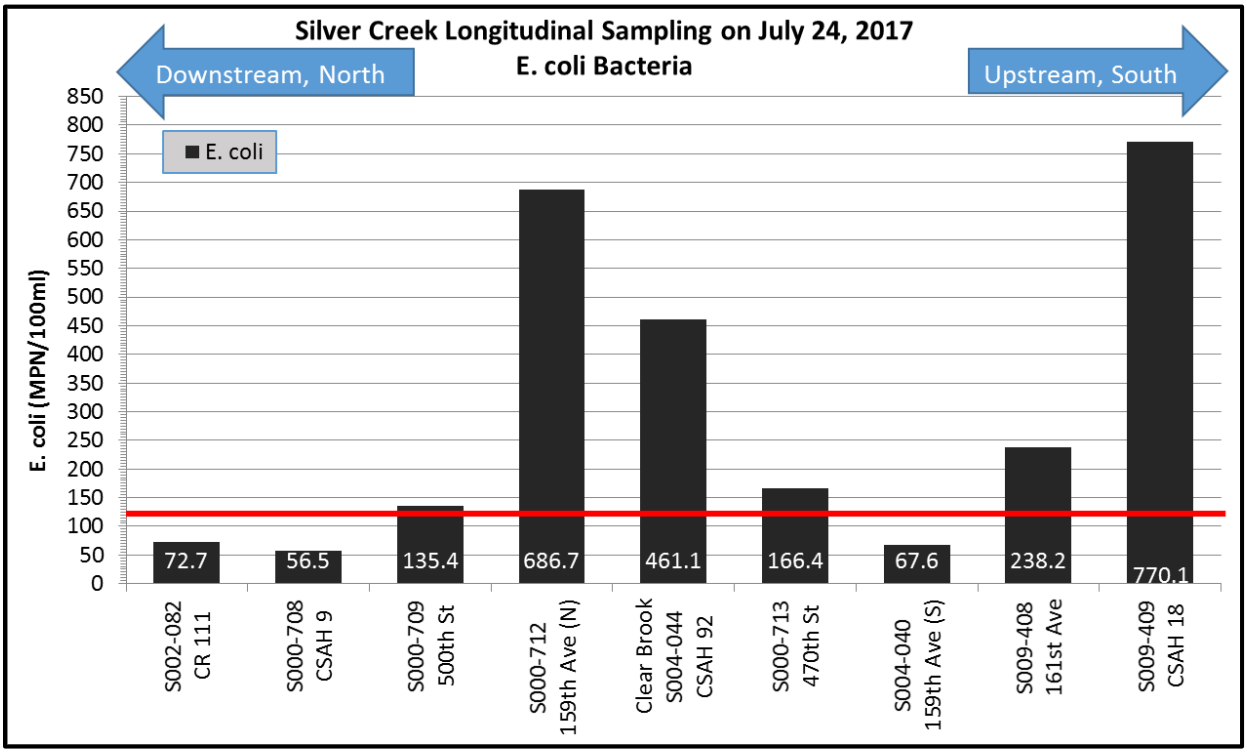
Seasonal water quality staff collected longitudinal *E. coli* samples along the Mud River between the outlet of the Moose River impoundment and Grygla to identify the source of the *E. coli* impairment in Grygla. The *E. coli* concentration leaving the impoundment was very low (9.8 MPN/100ml). Concentrations rose above the 126 MPN/100ml at the Flintlock Road crossing and peaked at the Dylan Road crossing. The concentration at CSAH 54 was 166.4 MPN/100ml. There was a decrease between CSAH 54 and the Grygla City Park.

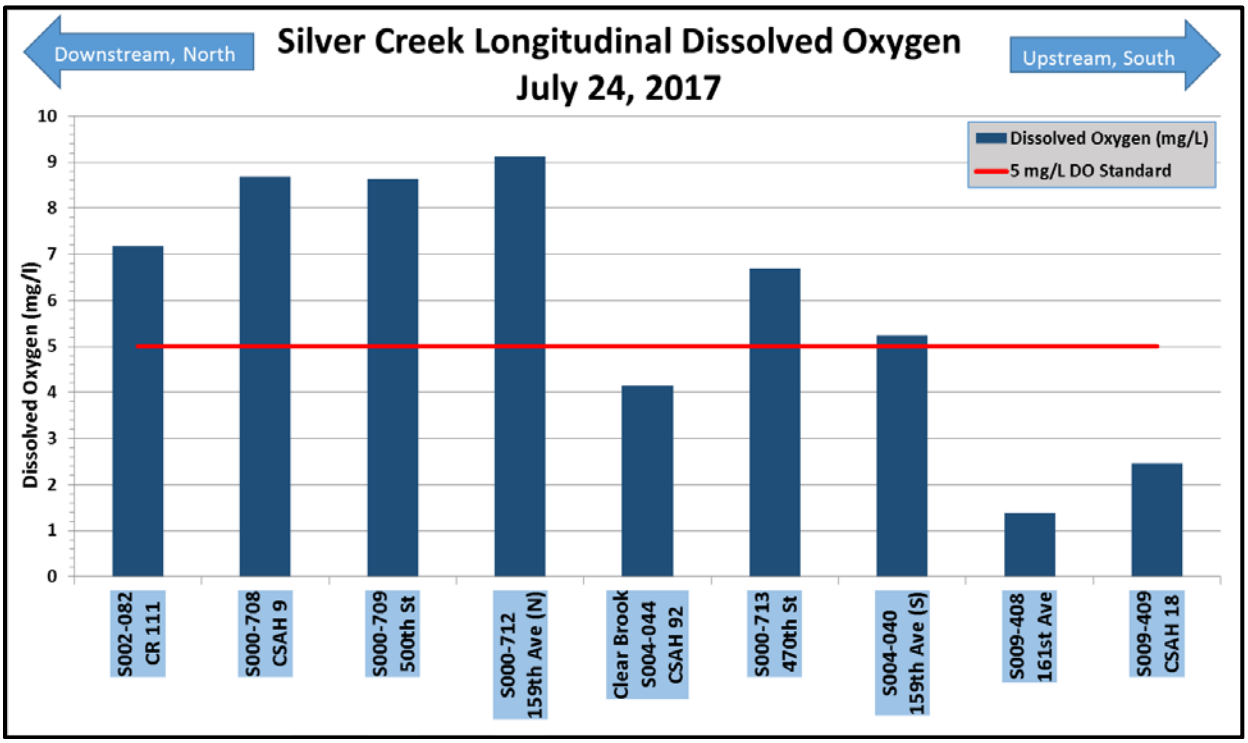


RED LAKE WATERSHED DISTRICT MONTHLY WATER QUALITY REPORT

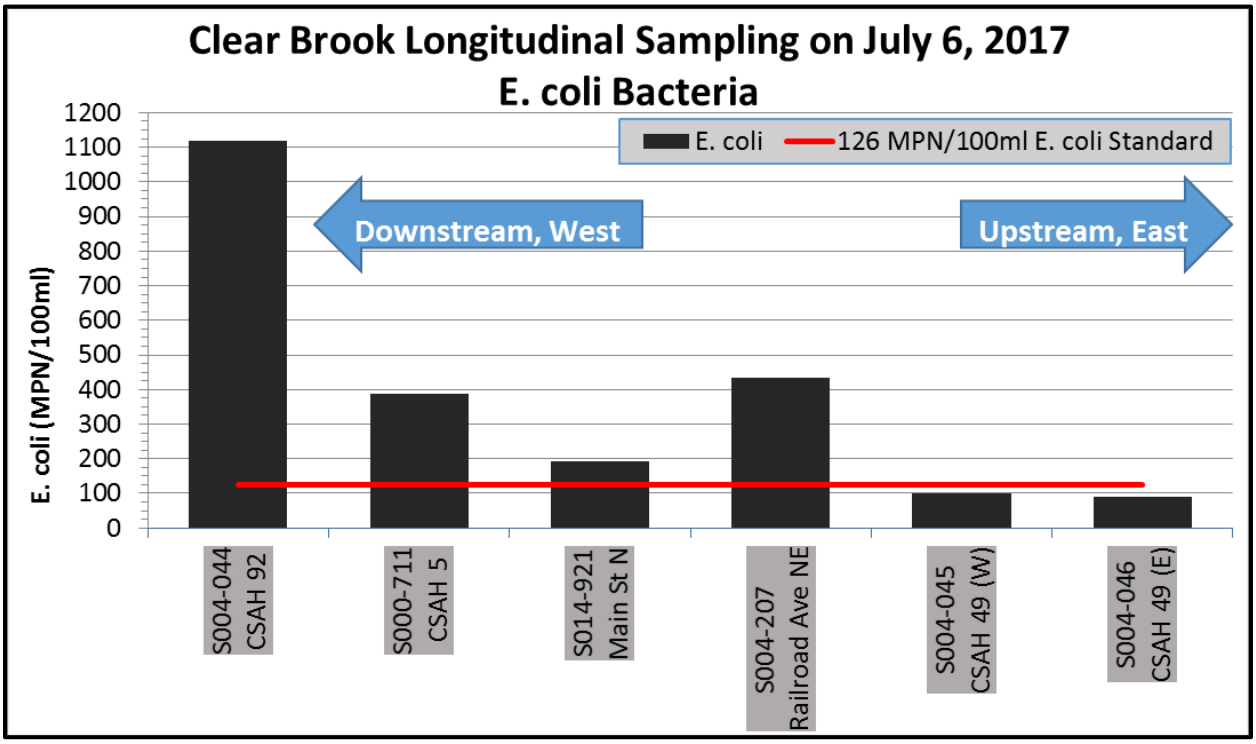
July - August 2017

Seasonal water quality staff collected longitudinal *E. coli* samples along Silver Creek and its tributaries on July 24, 2017. Clear Brook, and the section of land around the confluence of Clear Brook and Silver Creek remains the area where restoration efforts should be focused.



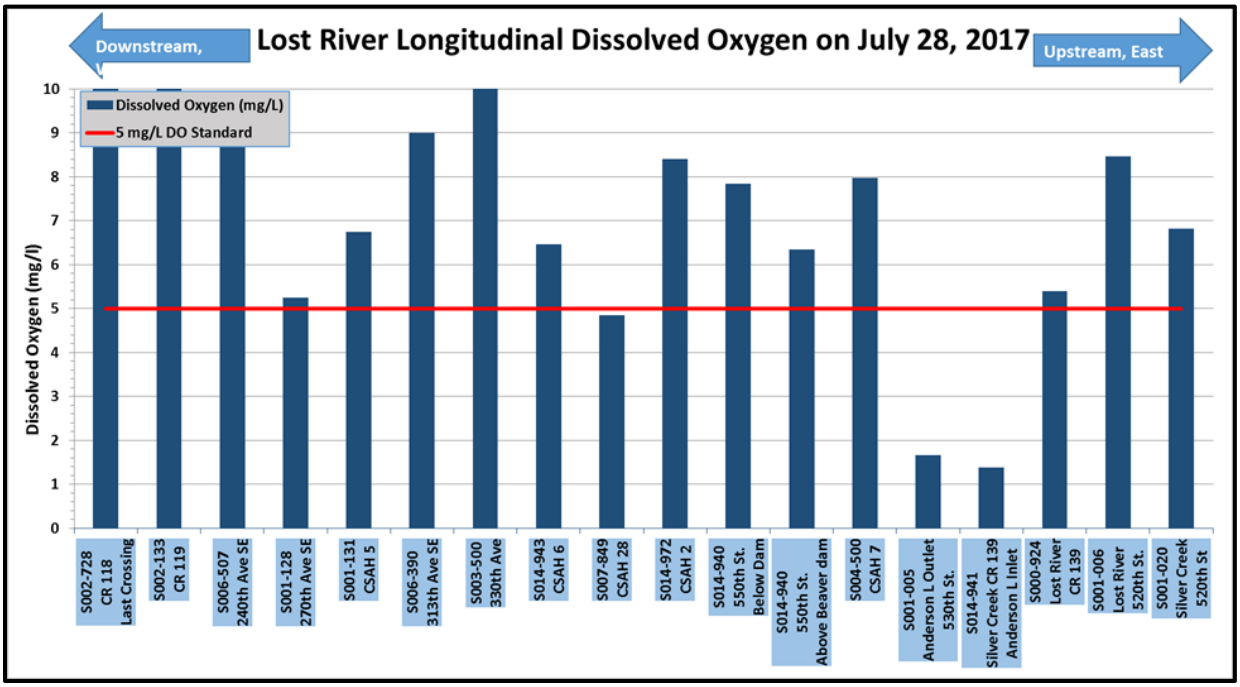


Longitudinal sampling along Clear Brook found that *E. coli* concentrations are high at all the crossing that are within the town of Clearbrook. There was a large increase between CSAH 5 and CSAH 92.



High *E. coli* concentrations have been recorded near the outlet of Maple Lake at the CSAH 10 crossing of Polk County Ditch 14. High concentrations of bacteria in lake water would be a health hazard. So, investigative samples were collected to see if the bacteria were coming from the lake or from the wetland between the lake and CSAH 10. Samples were collected at CSAH 10 and at the outlet structure on 7/25/2017. E. coli was a very low 5.2 MPN/100ml at the out let structure and increased to 124.6 MPN/100mL (very near the 126 MPN/100mL standard) within the short distance between the two crossings. Waterfowl within the wetland through which the channel flows would be the primary suspected source of excess *E. coli* bacteria.

Seasonal water quality staff recorded dissolved oxygen measurements along a long stretch of the Lost River on July 28, 2017 that included the dissolved oxygen-impaired assessment unit number 09020305-645 (Anderson Lake to CSAH 28).



Using DNA Analysis to Identify Sources of *E. coli* Bacteria

A microbial source tracking sample was collected from the Mud River in Grygla. The sample was sent to the Source Molecular Laboratory in Miami, Florida to determine the source of fecal bacteria through DNA analysis. Human and ruminant (livestock) fecal DNA markers were found in the sample.

Date	Site Name	S-Code	E. coli (CFU/100ml)	Analysis Requested	Quantification	DNA Analytical Results	Contribution to Fecal Pollution
7/18/2017	Mud R. @ Grygla	S008-122	62	Bird Fecal ID		Not Detected	
7/18/2017	Mud R. @ Grygla	S008-122	62	Ruminant Bacteroidetes ID	Low, Not Quantified	Detected	Potential Contributor
7/18/2017	Mud R. @ Grygla	S008-122	62	Beaver Fecal ID		Not Detected	
7/18/2017	Mud R. @ Grygla	S008-122	62	Goose Bacteroidetes ID		Not Detected	
7/18/2017	Mud R. @ Grygla	S008-122	62	Human Bacteroidetes ID 1	1.76E+02	Detected	Contributes at low levels
7/18/2017	Mud R. @ Grygla	S008-122	62	Human Bacteroidetes ID 2		Not Detected	

A microbial source tracking sample was also collected from Walker Brook near Bagley. Tests did not find evidence of beaver, goose, or human fecal DNA markers. Low levels of bird fecal DNA markers and moderate levels of ruminant (livestock) fecal DNA markers were found.

RED LAKE WATERSHED DISTRICT MONTHLY WATER QUALITY REPORT	July - August 2017

Lafave Park and Tindolph Beach Sampling

The beach in LaFave Park in Thief River Falls (Tindolph Beach) was closed due to poor water quality in August of 2017. RLWD staff collected water samples that were analyzed for the presence of algal toxins and for *E. coli* bacteria concentrations. The water appeared green with algae and duckweed. The ground was covered with goose droppings. A representative of the KTRF radio station spoke with RLWD staff while RLWD staff were at the beach collecting samples and asked if the results could be shared. Test results were shared with local media. No algal toxins were found in the samples. *E. coli* concentrations, however, were very high. *E. coli* samples were collected from the west side, east side, and center of the beach area. The samples were collected at an approximate depth of 2 feet (knee-deep). Concentrations ranged from 1,413.6 MPN/100ml to 2,419.6 MPN/100ml and emphatically validated the city's decision to close the beach. The Minnesota Pollution Control Agency's acute standard for E. coli bacteria is 1,260 MPN/100ml and the chronic (monthly geometric mean) standard is 126 MPN/100ml.

E. coli concentrations from the beach area:

- West edge of the beach area: 2,419.6 MPN/100ml
- Center of the beach area: 1,413.6 MPN/100ml
- East edge of the beach area: 1,986.3 MPN/100ml
- Overall geometric mean: 1,894 MPN/100ml

The situation was featured in most local news outlets in both video and print. Below, are some links to news videos and articles about the closing of the beach.

- https://www.youtube.com/watch?v=U5qYnTEi5F8
- https://www.youtube.com/watch?v=k8t5rbw0vTk
- http://www.grandforksherald.com/news/4313653-e-coli-found-waters-near-closed-thief-river-falls-beach
- http://www.thiefriverfallsonline.com/thief-river-falls-news/samples-reveal-e-coli-present-at-beach/
- http://www.thiefriverfallsonline.com/thief-river-falls-news/tindolph-beach-sample-reveals-serious-health-risk/

To answer a question about water quality in the open-water portion of the Thief River Falls Reservoir, *E. coli* samples were collected from the 1st Street Bridge. The results of those samples were relatively low and did not exceed any water quality standards. *E. coli* poses a threat to aquatic recreation, but not as much of a threat to aquatic life. The fish in the river should be just as safe as they usually are, as long as they are properly handled, cleaned, and prepared. The *E. coli* concentration in the Red Lake River at the 1st Street Bridge in Thief River Falls was roughly 73 MPN/100ml on August 17, 2017. That concentration is lower than the MPCA's 126 MPN/100ml (chronic) standard for E. coli bacteria. So, the *E. coli* problem at Tindolph Beach does not seem to be causing a problem downstream within the open-water portion of the reservoir, most likely due to dilution.

RED LAKE WATERSHED DISTRICT MONTHLY WATER QUALITY REPORT	July - August 2017

Red Lake Watershed District Stream Gaging and Flow Monitoring

HOBO water level loggers continued to collect water level measurements at 24 monitoring sites throughout the Clearwater, Red Lake River, Thief River, and Grand Marais Creek watersheds. Summer water quality staff received training on flow measurement methods. Flows were measured in the Clearwater River at County Road 127 to improve the flow rating curve for that location and improve the accuracy of TMDL calculations.

Clearwater River Watershed Restoration and Protection Strategy (WRAPS) Project

- Objective 1 – Existing Data
  - The dissolved oxygen impairments of two reaches of the Clearwater River (channelized and natural portions) between the Ruffy Brook confluence and the Lost River confluence were officially removed from the list of impaired waters by the MPCA. The dissolved oxygen impairment of Walker Brook will also be removed from the Draft 2018 303(d) List of Impaired Waters.
- Objective 8 – Data analysis
  - Longitudinal total suspended solids assessment for the Clearwater River.
- Objective 9 – Civic Engagement
  - RLWD, MPCA, and RMB Labs staff coordinated to plan a fall open house event.
    - RMB Labs staff produced a draft newsletter to inform residents about water quality conditions in the watershed and publicize the open house event. The newsletter was reviewed by RLWD and MPCA staff. RLWD staff created a map of impaired waters and a table that lists impaired waters that were used in the newsletter.
  - "Water Minute" radio announcements were written
    - **Clearwater WRAPS Water Minute Text**
      - The Clearwater River is located in northwestern Minnesota. It begins in a series of lakes and wetlands near Bagley and flows downstream to Red Lake River in Red Lake Falls.
      - Significant tributaries of the Clearwater River include the Lost River, Ruffy Brook, and Lower Badger Creek.
      - Lakes found within the watershed include Clearwater Lake, Pine Lake, Maple Lake, and many smaller lakes.
      - The Clearwater River has an excellent fishery, including walleye, channel catfish, northern pike, bass, and even rainbow trout.
      - The river offers enjoyable scenery, accesses, and even some mild rapids for kayaking and canoeing adventures.
      - Water from the Clearwater River uniquely supports cultivation of wild rice within paddies, north of Clearbrook.
      - The Clearwater River watershed has areas of exceptionally clean water, especially in the headwaters and the Clearwater Lake area. However, some streams in the watershed are being investigated because they have too much sediment, too much *E. coli* bacteria, or too little dissolved oxygen. Plans are currently being written to describe strategies for fixing these problems.

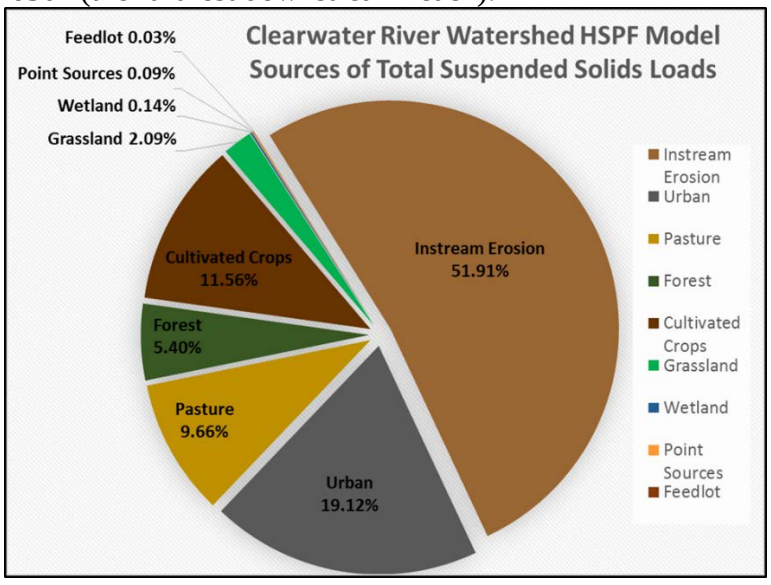
- Learn more by contacting the Red Lake Watershed District or visiting www.rlwdwatersheds.org.

- **Watershed Restoration and Protection Projects Water Minute**
  - The Minnesota Pollution Control Agency uses a watershed-based approach to restoring and protecting Minnesota's rivers, lakes, and wetlands. Throughout a 10-year cycle, state and local organizations work within each of the state's 80 major watersheds to evaluate water conditions, identify problems, set priorities, establish goals for improvement, and take actions designed to restore or protect water quality. When each watershed's 10-year cycle is completed, a new cycle of monitoring, assessment and implementation begins.
  - The Red Lake Watershed District is currently drafting the results of the study of the Clearwater River Watershed. This study was designed to determine the condition of this water resource and, then, create plans that will guide efforts to protect and restore water quality throughout the watershed.
  - Local citizens can help become involved with implementation strategies for restoration and projection of the Clearwater River Watershed study. Public meetings are being scheduled for September 25th in Mentor and Red Lake Falls. For more information, please contact the Minnesota Pollution Control Agency or the Red Lake Watershed District. Information about the Clearwater River can be found online at www.rlwdwatersheds.org.
- **Dissolved Oxygen Water Minute**
  - We all know that humans need to breathe oxygen to survive. Fish and other animals that live in the water also need oxygen to survive. Waters that have high levels of dissolved oxygen are considered healthy. Waters that have low levels of dissolved oxygen are considered unhealthy.
  - Minnesota's waters are tested for oxygen on a periodic basis. When a water body doesn't have enough oxygen, a plan is written to correct that pollution. Low dissolved oxygen can be caused by pollution from runoff. When oxygen levels get too low for fish to breathe, a lake may experience a fish kill.
  - We can ensure healthy oxygen levels and good fish habitat by:
    - Reducing pollution
    - Keeping extra sediment and yard waste out of streams and lakes
    - Protecting stream and ditch banks with vegetative buffers
    - Allowing trees, shrubs, and native plants to grow and provide shade along streambanks, and
    - Restoring stream channels
  - By working together, we all can do our part in protecting and restoring Minnesota's lakes and streams. For more information, contact the Minnesota Pollution Control Agency or the Red Lake Watershed District.
- ***E. coli* Bacteria Water Minute**
  - The waters of Minnesota are an important resource. Unfortunately, they sometimes contain unsafe concentrations of bacteria. These bacteria

originate in the guts of warm-blooded animals such as pets, wildlife, livestock and us. Septic systems and wastewater treatment facilities treat most of the bacteria that originates from humans. High bacteria concentrations are often caused by groups of animals near water, such as.
    - Animal feedlots
    - Birds under bridges; and
    - Flocks of waterfowl;
- The concentrations of bacteria in lakes and streams are used as indicators of the overall health of the water body. Minnesota's waters are tested for bacteria on a periodic basis. When a water body has too much bacteria, a plan is written to correct that pollution.
- Help us keep excess bacteria out of our waters by:
    - Keeping livestock fenced away from lakes and streams
    - Making sure septic systems are properly functioning
    - Picking up pet waste
    - Not feeding waterfowl
- By working together, we can do our part in protecting and restoring Minnesota's lakes and streams. For more information, please contact the Minnesota Pollution Control Agency or the Red Lake Watershed District.

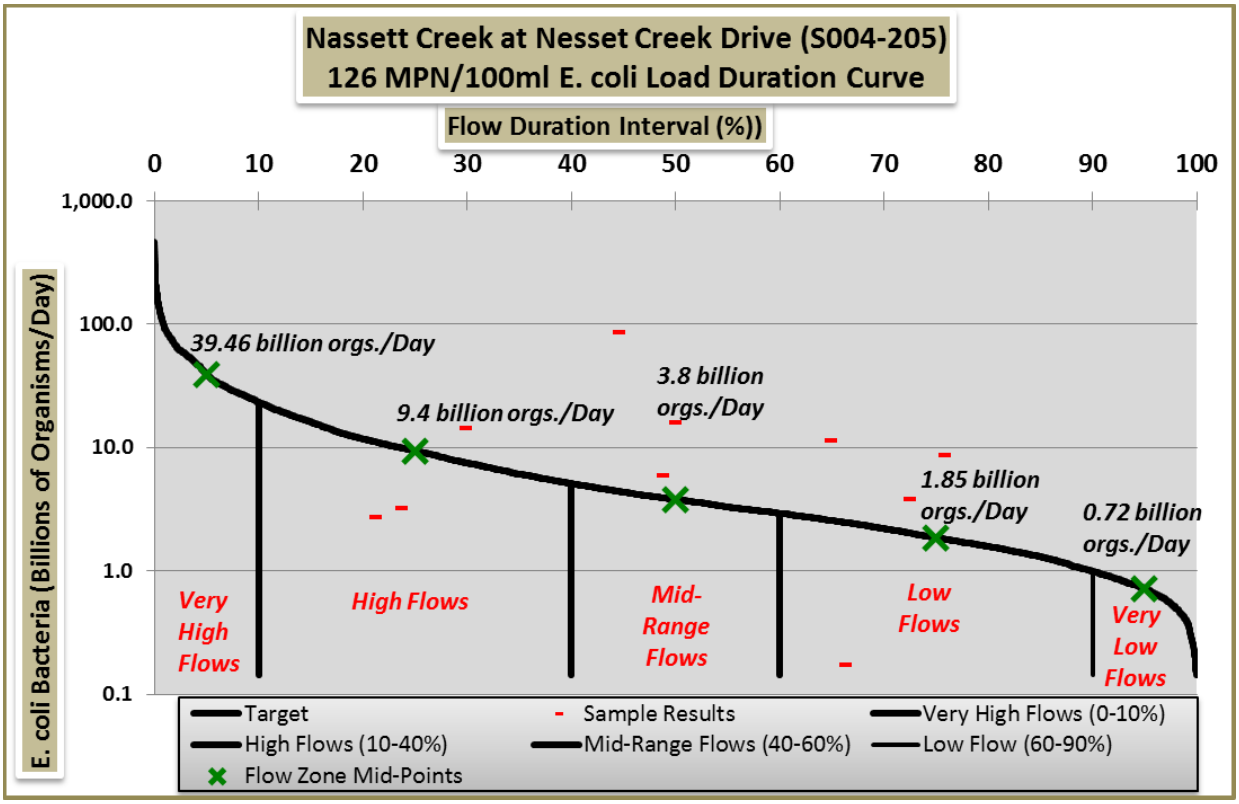
- RLWD staff contacted the Maple Lake Improvement District to plan for a WRAPS discussion at a future meeting.
- Maple Lake Improvement District and Clearwater Lake Area Association members were added to the list of contacts for the Clearwater River WRAPS
- A mailing list was created for the 2017 Clearwater River WRAPS newsletter.

- Objective 10 – Reports
    - Clearwater River watershed population records and trends
    - Red Lake County Ditch 23 Stressors
    - Map of trend analysis sites
    - Revised Clearwater River HSPF sediment source graph using simulated data for "Reach 650" (the furthest downstream reach).

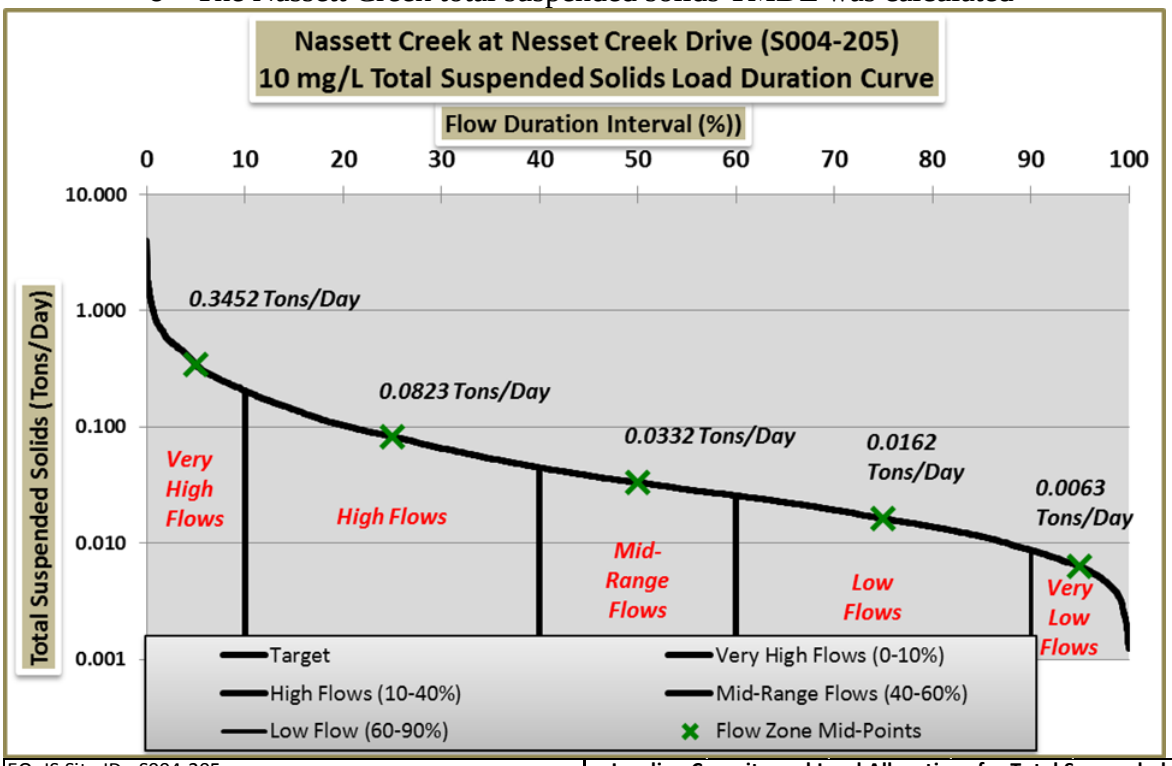


- The Nassett Creek *E. coli* TMDL was calculated.

Nassett Creek (09020305-545) Annual E. coli Load Reductions	Very High Flows	High Flows	Mid-Range Flows	Low Flows	No Flow	Total
Current Daily Load (10^9orgs/day)	131.39	79.23	148.44	34.41	No Data	--
Load Allocation (10^9orgs/day)	35.51	8.46	3.42	1.67	0.65	--
Load reduction (10^9orgs/day)	95.88	70.77	145.02	32.74	-	--
% of Flows Represented	10%	30%	20%	30.0%	10.0%	100%
# of Days Represented	36.5	109.5	73.0	109.5	36.5	365.00
Annual Load Reduction (10^9orgs/year)	3,499.47	7,749.05	10,586.68	3,585.52	-	**25,420.71**
Total Current Load	4,795.58	8,675.73	10,836.07	3,768.23	0	28,075.61
Percent Reduction	**73.0%**	**89.3%**	**97.7%**	**95.2%**	0.0%	**90.5%**

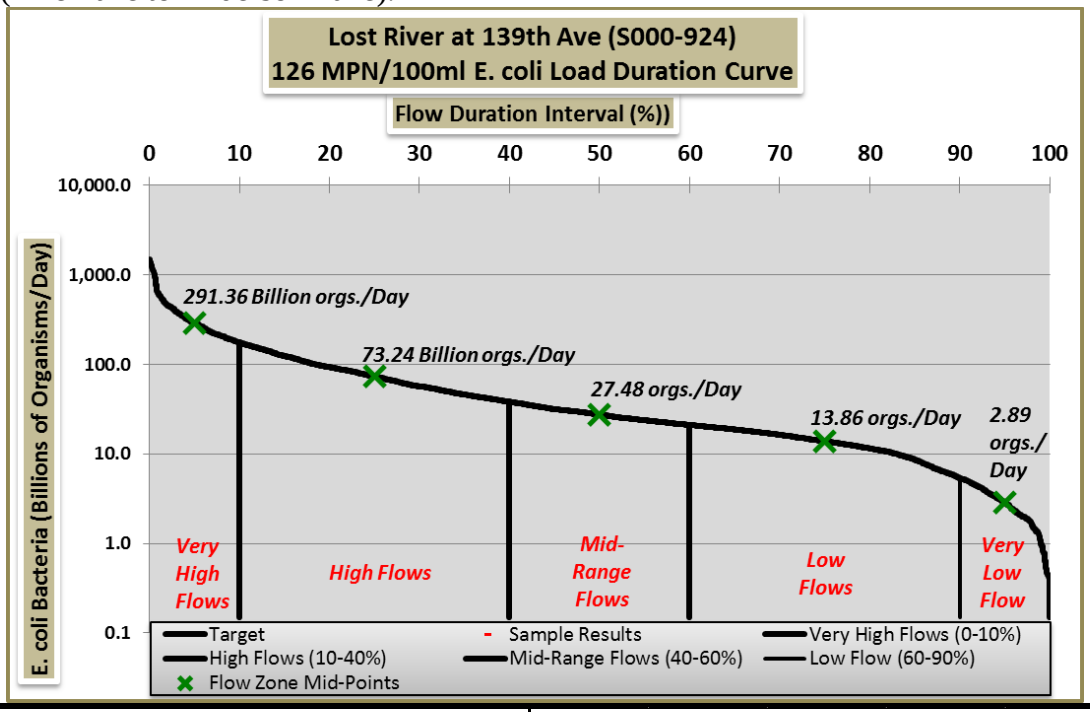


- The Nassett Creek total suspended solids TMDL was calculated



EQuIS Site ID: S004-205		Loading Capacity and Load Allocations for Total Suspended Solids in Nassett Creek at Nesset Creek Drive				
HSPF Modeled Flow Data						
Drainage Area (square miles):	6.15	AUID: 09020305-545				
%MS4 Urban:	0.00	Duration Curve Zone				
Total WWTF Design Flow (mgd):	0	Very High	High	Mid	Low	Very Low
TMDL Component		Values expressed as Tons per Day of Sediment				
TOTAL DAILY LOADING CAPACITY at 10 mg/L		0.345	0.082	0.033	0.016	0.006
Wasteload Allocation						
No WWTF in this watershed		0	0	0	0	0
Communities Subject to MS4 NPDES Requirements		0	0	0	0	0
Livestock Facilities Requiring NPDES Permits		0	0	0	0	0
"Straight Pipe" Septic Systems		0	0	0	0	0
Reserve Capacity		0	0	0	0	0
Daily Load Allocation		0.311	0.074	0.030	0.015	0.006
Daily Margin of Safety		0.035	0.008	0.003	0.002	0.001
		Values expressed as Tons per Day of Sediment				
TOTAL MONTHLY LOADING CAPACITY		0.345	0.082	0.033	0.016	0.006
Wasteload Allocation						
Permitted Wastewater Treatment Facilities		0%	0%	0%	0%	0%
Communities Subject to MS4 NPDES Requirements		0%	0%	0%	0%	0%
Livestock Facilities Requiring NPDES Permits		0%	0%	0%	0%	0%
"Straight Pipe" Septic Systems		0%	0%	0%	0%	0%
Reserve Capacity - No Towns or Cities in this watershed		0%	0%	0%	0%	0%
Load Allocation		90%	90%	90%	90%	90%
Margin of Safety		10%	10%	10%	10%	10%
		Values expressed as Tons per Day of Sediment				
MEDIAN FLOW		12.799	3.050	1.231	0.601	0.234
FLOW DURATION INTERVAL OF MEDIAN FLOW		5%	25%	50%	75%	95%

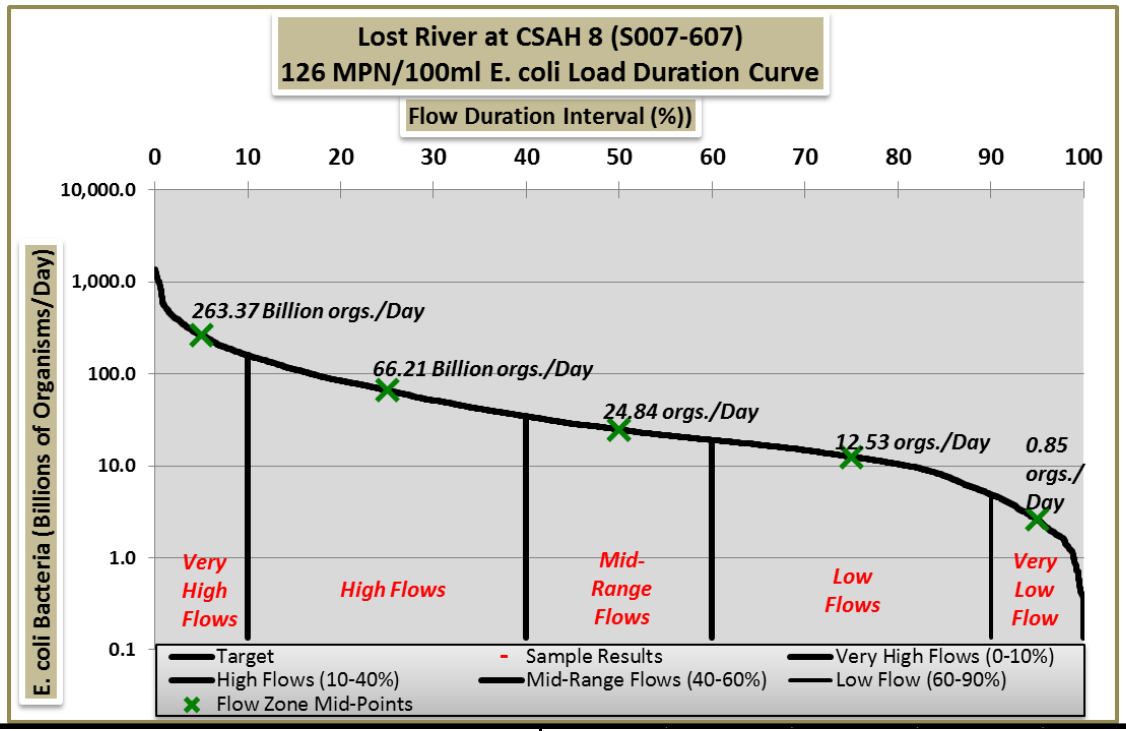
o *E. coli* TMDLs were calculated for two sites along the 09020305-512 reach of the Lost River (Pine Lake to Anderson Lake).



Drainage Area (square miles): 54.56 Monitoring Site Flow record used to develop flow zones and loading capacities: S000-924 (EQuIS) *E. coli* Standard: 126 MPN/100ml %MS4 Urban: 0.00 Total WWTF Design Flow (mgd): 0.00	**AUID 09020305-512 Lost River at 139th Ave (S000-924) Loading Capacity and Load Allocations for *E. coli***				
	Duration Curve Zone				
	Very High	**High**	**Mid-Range**	**Low**	**Very Low**
TMDL Component	Values expressed as Billions of Organisms per Day				
TOTAL DAILY LOADING CAPACITY	291.36	73.24	27.48	13.86	2.89
Wasteload Allocation					
Gonvick WWTF MN0020541-SD-1	18.66	18.66	18.66	0	0
Communities Subject to MS4 NPDES Requirements	0	0	0	0	0
Livestock Facilities Requiring NPDES Permits	0	0	0	0	0
"Straight Pipe" Septic Systems	0	0	0	0	0
Reserve Capacity	0.00	0.00	0.00	0.00	0.00
Daily Load Allocation	243.56	47.26	6.08	12.48	2.60
Daily Margin of Safety	29.14	7.32	2.75	1.39	0.29
	Values expressed as Billions of Organisms per Day				
TOTAL MONTHLY LOADING CAPACITY	291.36	73.24	27.48	13.86	2.89
Wasteload Allocation					
Permitted Wastewater Treatment Facilities	6%	25%	68%	0%	0%
Communities Subject to MS4 NPDES Requirements	0%	0%	0%	0%	0%
Livestock Facilities Requiring NPDES Permits	0%	0%	0%	0%	0%
"Straight Pipe" Septic Systems	0%	0%	0%	0%	0%
Reserve Capacity	0%	0%	0%	0%	0%
Load Allocation	84%	65%	22%	90%	90%
Margin of Safety	10%	10%	10%	10%	10%
	Values expressed as Billions of Organisms per Day				
MEDIAN FLOW	94.51	23.76	8.92	4.50	0.94
MEDIAN OF FLOW DURATION ZONE	5%	25%	50%	75.0%	95.0%

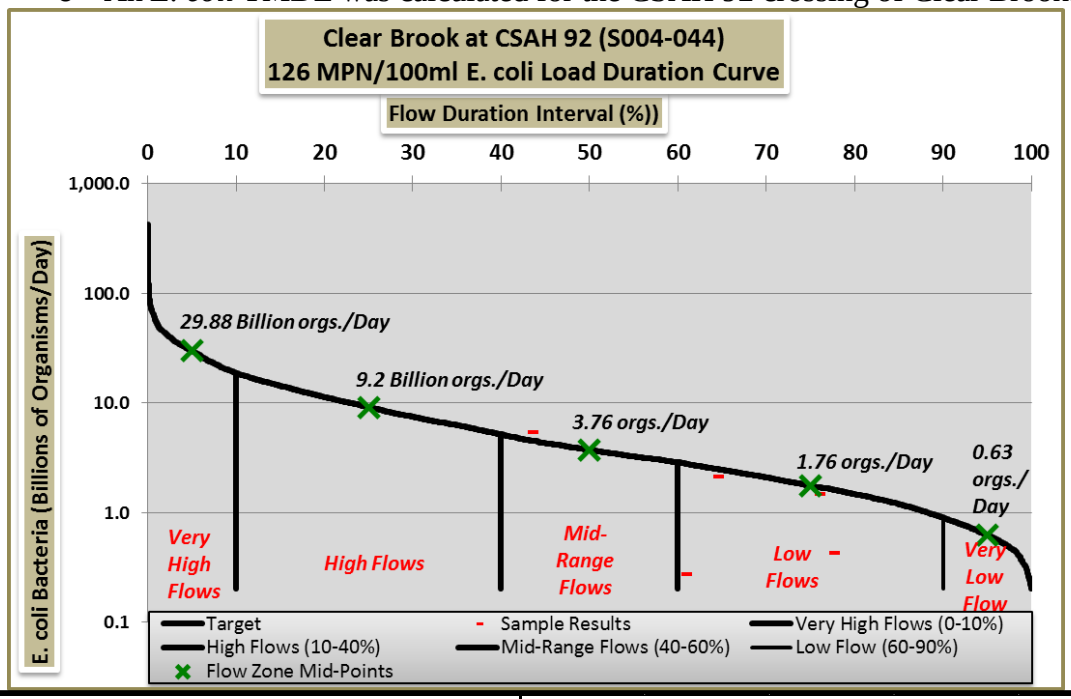
RED LAKE WATERSHED DISTRICT MONTHLY WATER QUALITY REPORT

July - August 2017



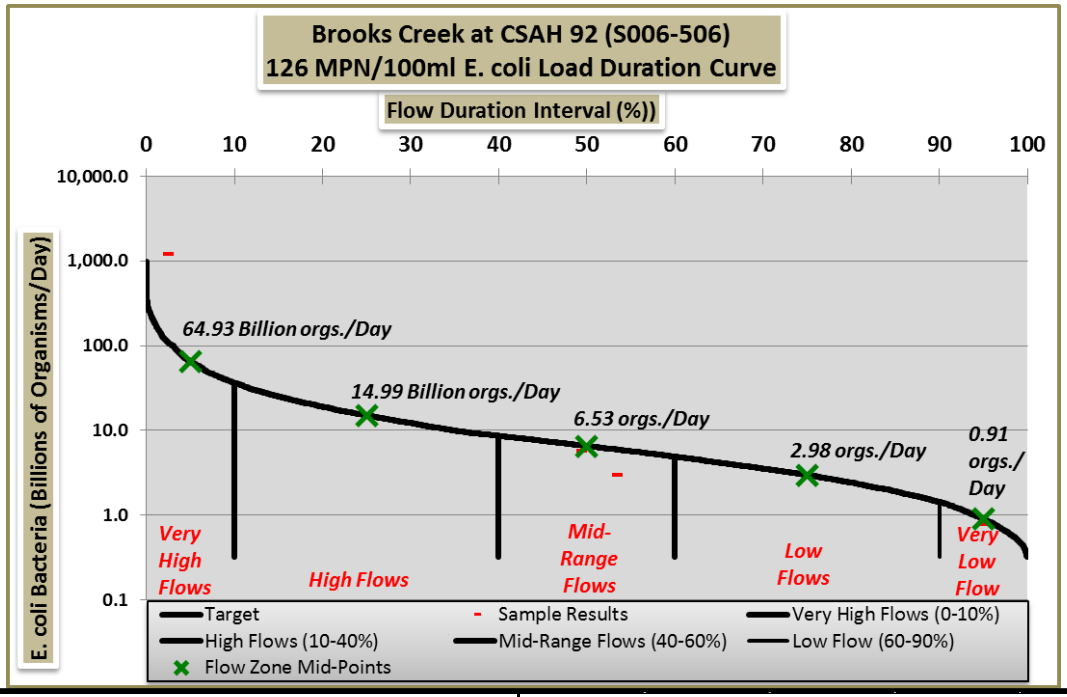
Drainage Area (square miles): 54.56 Monitoring Site Flow record used to develop flow zones and loading capacities: S000-924 (EQuIS) *E. coli* Standard: 126 MPN/100ml %MS4 Urban: 0.00 Total WWTF Design Flow (mgd): 0.00	**AUID 09020305-512** **Lost River at 139th Ave (S000-924)** **Loading Capacity and Load Allocations for *E. coli*** **Duration Curve Zone**				
	Very High	**High**	**Mid-Range**	**Low**	**Very Low**
TMDL Component	Values expressed as Billions of Organisms per Day				
TOTAL DAILY LOADING CAPACITY	291.36	73.24	27.48	13.86	2.89
Wasteload Allocation					
Gonvick WWTF MN0020541-SD-1	18.66	18.66	18.66	0	0
Communities Subject to MS4 NPDES Requirements	0	0	0	0	0
Livestock Facilities Requiring NPDES Permits	0	0	0	0	0
"Straight Pipe" Septic Systems	0	0	0	0	0
Reserve Capacity	0.00	0.00	0.00	0.00	0.00
Daily Load Allocation	243.56	47.26	6.08	12.48	2.60
Daily Margin of Safety	29.14	7.32	2.75	1.39	0.29
	Values expressed as Billions of Organisms per Day				
TOTAL MONTHLY LOADING CAPACITY	291.36	73.24	27.48	13.86	2.89
Wasteload Allocation					
Permitted Wastewater Treatment Facilities	6%	25%	68%	0%	0%
Communities Subject to MS4 NPDES Requirements	0%	0%	0%	0%	0%
Livestock Facilities Requiring NPDES Permits	0%	0%	0%	0%	0%
"Straight Pipe" Septic Systems	0%	0%	0%	0%	0%
Reserve Capacity	0%	0%	0%	0%	0%
Load Allocation	84%	65%	22%	90%	90%
Margin of Safety	10%	10%	10%	10%	10%
	Values expressed as Billions of Organisms per Day				
MEDIAN FLOW	94.51	23.76	8.92	4.50	0.94
MEDIAN OF FLOW DURATION ZONE	5%	25%	50%	75.0%	95.0%

- An *E. coli* TMDL was calculated for the CSAH 92 crossing of Clear Brook.



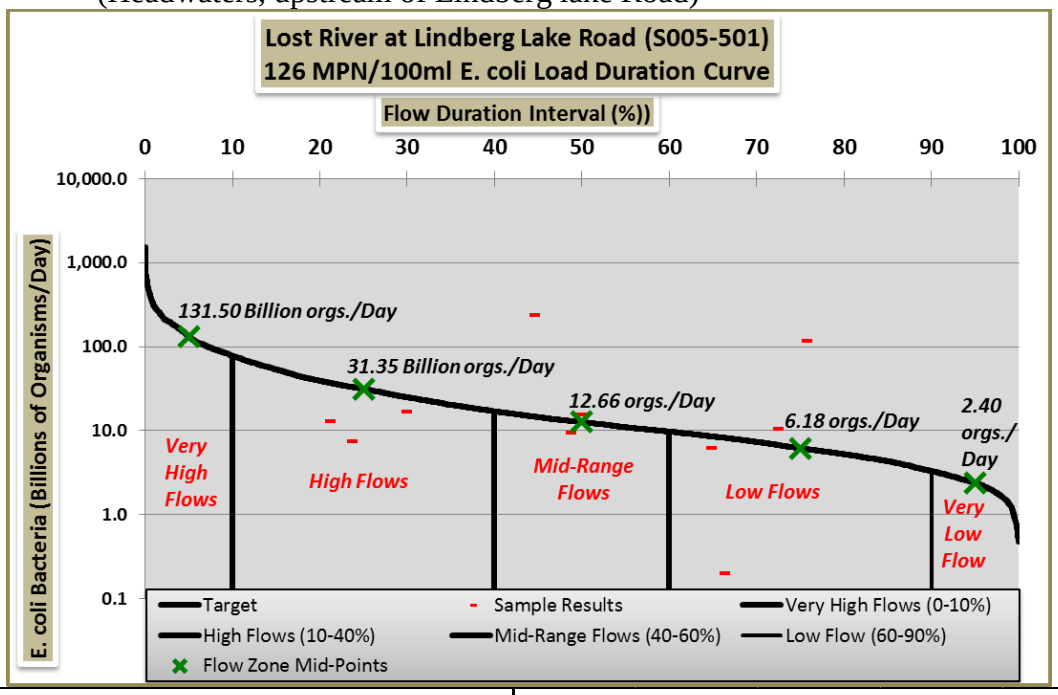
Drainage Area (square miles): 5.95 Monitoring Site Flow record used to develop flow zones and loading capacities: S004-044 (EQuIS) *E. coli* Standard: 126 MPN/100ml %MS4 Urban: 0.00 Total WWTF Design Flow (mgd): 0.00	**AUID 09020305-526 Clear Brook at CSAH 92 (S004-044) Loading Capacity and Load Allocations for *E. coli***				
	Duration Curve Zone				
	Very High	**High**	**Mid-Range**	**Low**	**No Flow**
TMDL Component	Values expressed as Billions of Organisms per Day				
TOTAL DAILY LOADING CAPACITY	29.88	9.20	3.76	1.76	0.63
Wasteload Allocation					
Permitted Wastewater Treatment Facilities (none)	0	0	0	0	0
Communities Subject to MS4 NPDES Requirements	0	0	0	0	0
Livestock Facilities Requiring NPDES Permits	0	0	0	0	0
"Straight Pipe" Septic Systems	0	0	0	0	0
Reserve Capacity	0.00	0.00	0.00	0.00	0.00
Daily Load Allocation	26.89	8.28	3.38	1.58	0.57
Daily Margin of Safety	2.99	0.92	0.38	0.18	0.06
	Values expressed as Billions of Organisms per Day				
TOTAL MONTHLY LOADING CAPACITY	29.88	9.20	3.76	1.76	0.63
Wasteload Allocation					
Permitted Wastewater Treatment Facilities	0%	0%	0%	0%	0%
Communities Subject to MS4 NPDES Requirements	0%	0%	0%	0%	0%
Livestock Facilities Requiring NPDES Permits	0%	0%	0%	0%	0%
"Straight Pipe" Septic Systems	0%	0%	0%	0%	0%
Reserve Capacity	0%	0%	0%	0%	0%
Load Allocation	90%	90%	90%	90%	90%
Margin of Safety	10%	10%	10%	10%	10%
	Values expressed as Billions of Organisms per Day				
MEDIAN FLOW	9.69	2.98	1.22	0.57	0.20
MEDIAN OF FLOW DURATION ZONE	5%	25%	50%	75.0%	95.0%

- An *E. coli* TMDL was calculated for Brooks Creek.



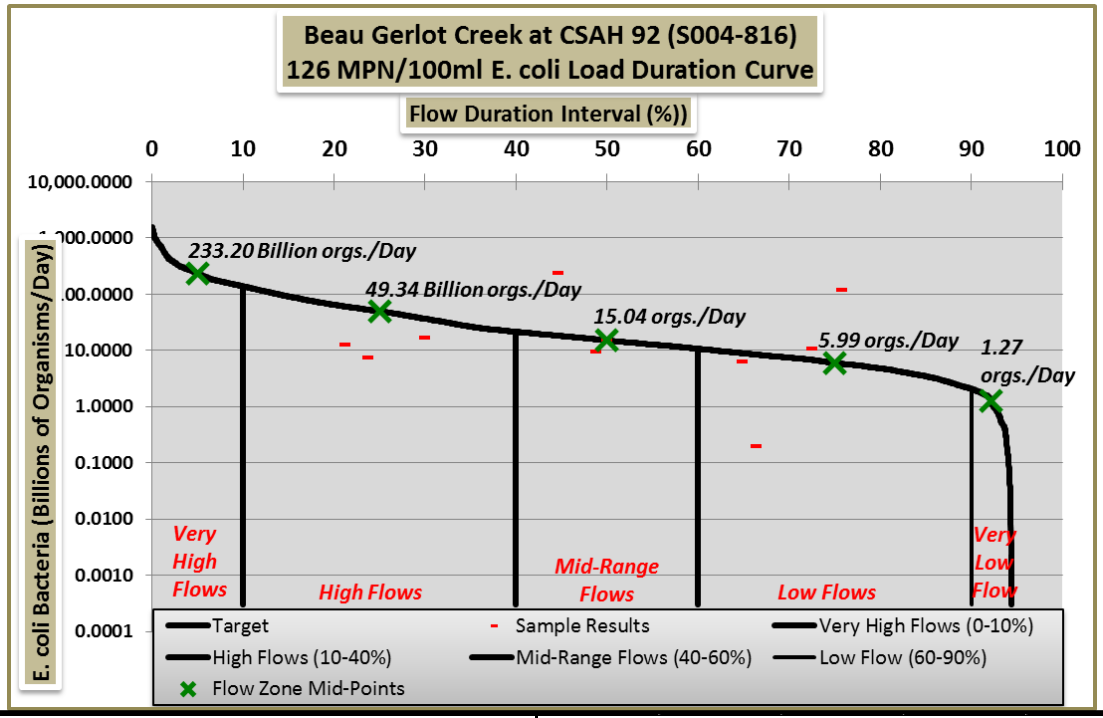
Drainage Area (square miles): 23.49 Monitoring Site Flow record used to develop flow zones and loading capacities: S004-044 (EQuIS) *E. coli* Standard: 126 MPN/100ml %MS4 Urban: 0.00 Total WWTF Design Flow (mgd): 0.00	AUID 09020305-578 Brooks Creek at CSAH 92 (S004-044) Loading Capacity and Load Allocations for *E. coli* Duration Curve Zone				
	Very High	**High**	**Mid-Range**	**Low**	**Very Low**
TMDL Component	Values expressed as Billions of Organisms per Day				
TOTAL DAILY LOADING CAPACITY	64.93	14.99	6.53	2.98	0.91
Wasteload Allocation					
Permitted Wastewater Treatment Facilities (none)	0	0	0	0	0
Communities Subject to MS4 NPDES Requirements	0	0	0	0	0
Livestock Facilities Requiring NPDES Permits	0	0	0	0	0
"Straight Pipe" Septic Systems	0	0	0	0	0
Reserve Capacity	0.00	0.00	0.00	0.00	0.00
Daily Load Allocation	58.44	13.49	5.88	2.68	0.82
Daily Margin of Safety	6.49	1.50	0.65	0.30	0.09
	Values expressed as Billions of Organisms per Day				
TOTAL MONTHLY LOADING CAPACITY	64.93	14.99	6.53	2.98	0.91
Wasteload Allocation					
Permitted Wastewater Treatment Facilities	0%	0%	0%	0%	0%
Communities Subject to MS4 NPDES Requirements	0%	0%	0%	0%	0%
Livestock Facilities Requiring NPDES Permits	0%	0%	0%	0%	0%
"Straight Pipe" Septic Systems	0%	0%	0%	0%	0%
Reserve Capacity	0%	0%	0%	0%	0%
Load Allocation	90%	90%	90%	90%	90%
Margin of Safety	10%	10%	10%	10%	10%
	Values expressed as Billions of Organisms per Day				
MEDIAN FLOW	21.06	4.86	2.12	0.97	0.29
MEDIAN OF FLOW DURATION ZONE	5%	25%	50%	75.0%	95.0%

- An *E. coli* TMDL was calculated for the 09020305-530 reach of the Lost River (Headwaters, upstream of Lindberg lake Road)



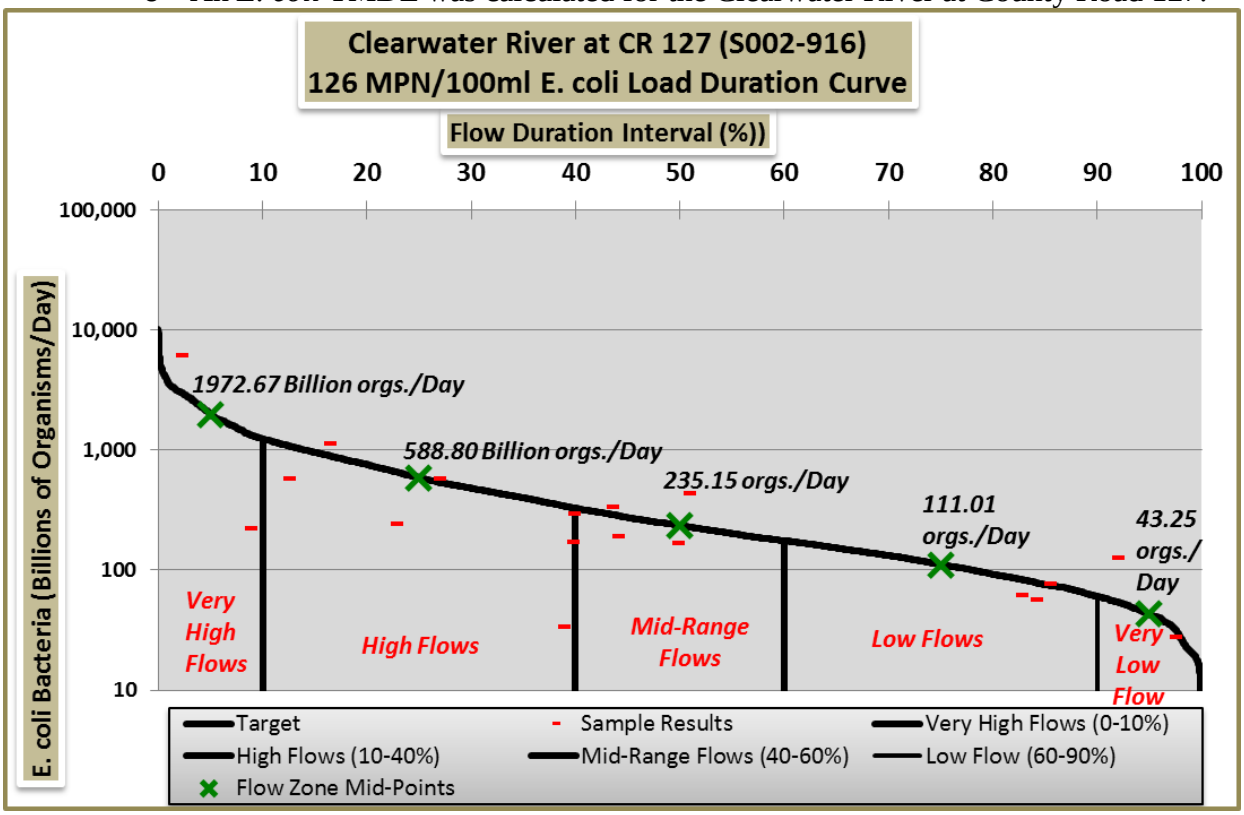
Drainage Area (square miles): 20.5 Monitoring Site Flow record used to develop flow zones and loading capacities: S005-501 (EQuIS) *E. coli* Standard: 126 MPN/100ml %MS4 Urban: 0.00 Total WWTF Design Flow (mgd): 0.00	**AUID 09020305-530 Lost River at Lindberg Lake Road (S005-501) Loading Capacity and Load Allocations for *E. coli***				
	Duration Curve Zone				
	Very High	**High**	**Mid-Range**	**Low**	**Very Low**
TMDL Component	Values expressed as Billions of Organisms per Day				
TOTAL DAILY LOADING CAPACITY	131.50	31.35	12.66	6.18	2.40
Wasteload Allocation					
Permitted Wastewater Treatment Facilities (none)	0	0	0	0	0
Communities Subject to MS4 NPDES Requirements	0	0	0	0	0
Livestock Facilities Requiring NPDES Permits	0	0	0	0	0
"Straight Pipe" Septic Systems	0	0	0	0	0
Reserve Capacity	0.00	0.00	0.00	0.00	0.00
Daily Load Allocation	118.35	28.22	11.39	5.56	2.16
Daily Margin of Safety	13.15	3.14	1.27	0.62	0.24
	Values expressed as Billions of Organisms per Day				
TOTAL MONTHLY LOADING CAPACITY	131.50	31.35	12.66	6.18	2.40
Wasteload Allocation					
Permitted Wastewater Treatment Facilities	0%	0%	0%	0%	0%
Communities Subject to MS4 NPDES Requirements	0%	0%	0%	0%	0%
Livestock Facilities Requiring NPDES Permits	0%	0%	0%	0%	0%
"Straight Pipe" Septic Systems	0%	0%	0%	0%	0%
Reserve Capacity	0%	0%	0%	0%	0%
Load Allocation	90%	90%	90%	90%	90%
Margin of Safety	10%	10%	10%	10%	10%
	Values expressed as Billions of Organisms per Day				
MEDIAN FLOW (93.74% of HSPF Reach 441 Discharge)	42.66	10.17	4.11	2.01	0.78
MEDIAN OF FLOW DURATION ZONE	5%	25%	50%	75.0%	95.0%

- An *E. coli* TMDL was calculated for Beau Gerlot Creek



Drainage Area (square miles): 23.76 Monitoring Site Flow record used to develop flow zones and loading capacities: S004-816 (EQuIS) *E. coli* Standard: 126 MPN/100ml %MS4 Urban: 0.00 Total WWTF Design Flow (mgd): 0.00	**AUID 09020305-651 Beau Gerlot Creek at CSAH 92 (S004-816) Loading Capacity and Load Allocations for *E. coli***				
	Duration Curve Zone				
	Very High	**High**	**Mid-Range**	**Low**	**Very Low**
TMDL Component	Values expressed as Billions of Organisms per Day				
TOTAL DAILY LOADING CAPACITY	233.20	49.34	15.04	5.99	1.27
Wasteload Allocation					
Permitted Wastewater Treatment Facilities (none)	0	0	0	0	0
Communities Subject to MS4 NPDES Requirements	0	0	0	0	0
Livestock Facilities Requiring NPDES Permits	0	0	0	0	0
"Straight Pipe" Septic Systems	0	0	0	0	0
Reserve Capacity	0.00	0.00	0.00	0.00	0.00
Daily Load Allocation	209.88	44.41	13.54	5.39	1.14
Daily Margin of Safety	23.32	4.93	1.50	0.60	0.13
	Values expressed as Billions of Organisms per Day				
TOTAL MONTHLY LOADING CAPACITY	233.20	49.34	15.04	5.99	1.27
Wasteload Allocation					
Permitted Wastewater Treatment Facilities	0%	0%	0%	0%	0%
Communities Subject to MS4 NPDES Requirements	0%	0%	0%	0%	0%
Livestock Facilities Requiring NPDES Permits	0%	0%	0%	0%	0%
"Straight Pipe" Septic Systems	0%	0%	0%	0%	0%
Reserve Capacity	0%	0%	0%	0%	0%
Load Allocation	90%	90%	90%	90%	90%
Margin of Safety	10%	10%	10%	10%	10%
	Values expressed as Billions of Organisms per Day				
MEDIAN FLOW (91.15% of HSPF Reach 601 Discharge)	75.65	16.01	4.88	1.94	0.41
MEDIAN OF FLOW DURATION ZONE	5%	25%	50%	75.0%	95.0%

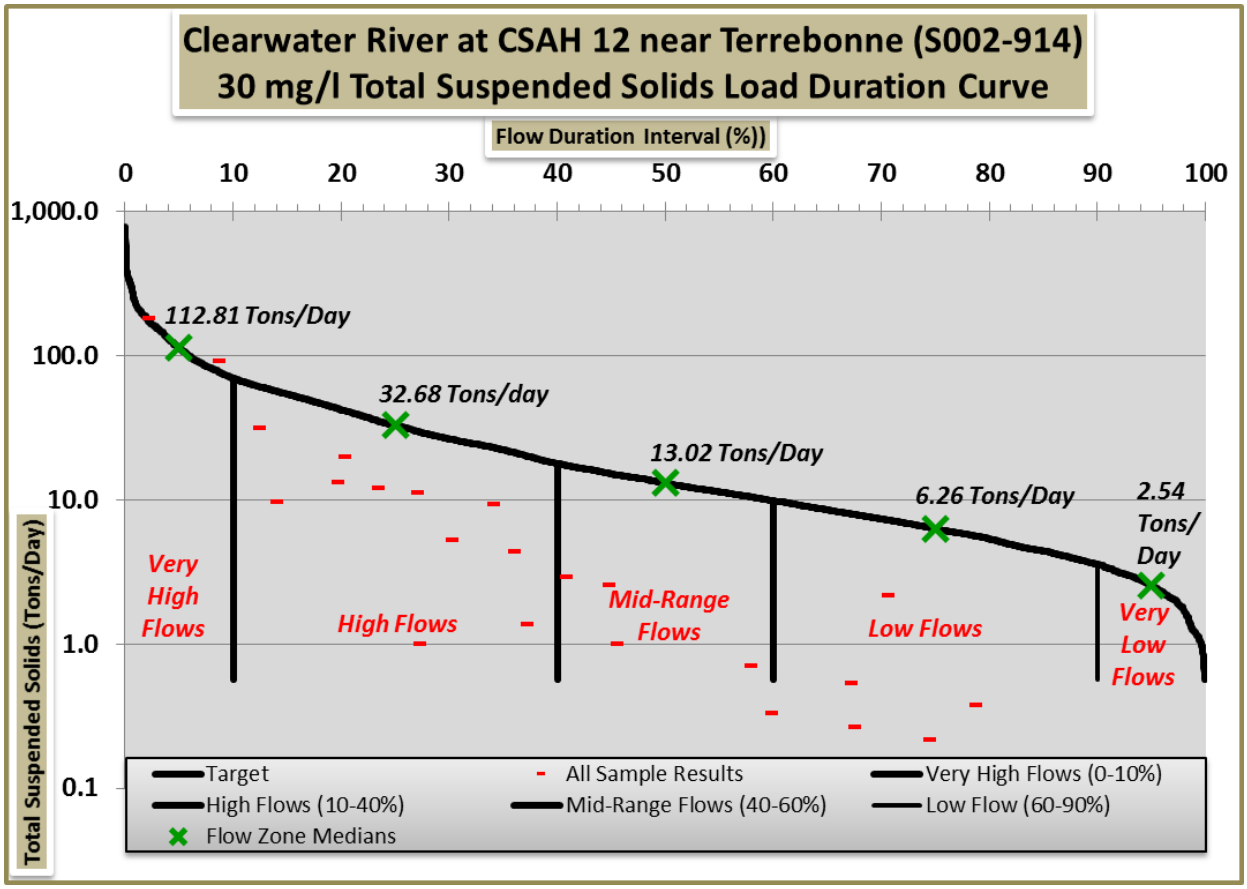
- An *E. coli* TMDL was calculated for the Clearwater River at County Road 127.



Clearwater River (09020305-647) Annual E. coli Load Reductions at S002-916	Very High Flows	High Flows	Mid-Range Flows	Low Flows	No Flow	Total
Current Daily Load (10^9orgs/day)	3,217.70	433.03	283.60	50.52	-	--
Load Allocation (10^9orgs/day)	1,775.40	529.92	211.64	99.91	38.93	--
Load reduction (10^9orgs/day)	1,442.30	(96.89)	71.96	(49.39)	(38.93)	--
% of Flows Represented	10%	30%	20%	30.0%	10.0%	100%
# of Days Represented	36.5	109.5	73.0	109.5	36.5	365.00
Annual Load Reduction (10^9orgs/year)	52,644.05	-	5,253.13	-	-	**57,897.19**
Total Current Load	117,446.23	47,416.95	20,702.60	5,531.94	0	191,097.72
Percent Reduction	**44.8%**	**0.0%**	**25.4%**	**0.0%**	0.0%	**30.3%**

- A total suspended solids TMDL was calculated for the Clearwater River at the CSAH 12 Bridge near Terrebonne.

Clearwater River at CSAH 12 (AUID 09020305-511, Site S002-914) Total Suspended Solids Load Reductions	Very High Flows	High Flow	Mid-Range Flows	Low Flows	Very Low (No) Flow	Annual Total
Current Daily Load (tons/day)	136.335744	10.7761509	1.5143719	0.71931189	0	
Load Allocation (tons/day)	95.7822932	27.6802375	10.9717714	5.2285638	2.06555586	--
Load reduction (tons/day)	40.5534508	-16.904087	-9.4573995	-4.5092519	-2.0655559	--
% of Flows Represented	10%	30%	20%	30%	10%	100%
# of Days Represented	36.5	109.5	73.0	109.5	36.5	365
Annual Load Reduction (tons/year)	1480.2	0.0	0.0	0.0	0.0	**1,480.20**
Total Current Load	4976.25465	1179.98852	110.549149	78.7646517	0	6345.55697
Percent Reduction	**29.7%**	0.0%	0.0%	0.0%	0.0%	**23.3%**



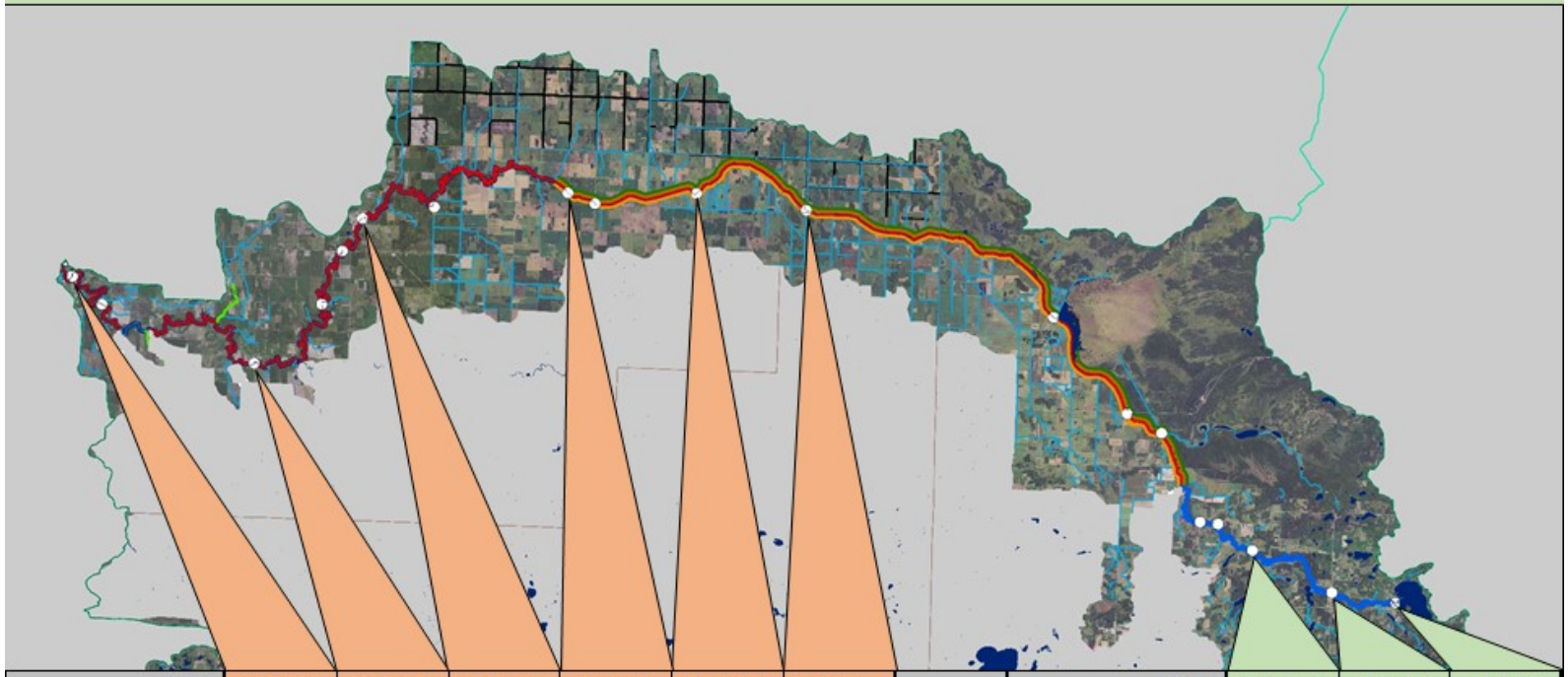
- An *E. coli* load allocation methodology section was written.
- An *E. coli* wasteload section was written.
- A microbial source tracking section was written.
- A map was created to show longitudinal site-specific assessment results for the Clearwater River between Clearwater Lake and the Red Lake River.
- The narrative portion of the total suspended solids TMDL Summary section in the TMDL was written.

  - A section for the permitted sources of lake pollutants was written.
  - Cameron Lake characterization, sources, and solutions were documented.
  - Verified Long Lake (04-0295-00, near Pinewood) sampling data with Beltrami County staff. There are no obvious sources of excess pollutants near the lake. It might be difficult to identify the cause of the impairment.
  - A Hill River stressor identification section was written.
- A list of Watershed-wide restoration and protection strategies was started.
- A map of Clearwater River HUC10 subwatersheds was created.
- The biological stressor summary section for the Clearwater River WRAPS was written.
- A Lost River stressor section was written.
- Clearwater River watershed index of biotic integrity maps were created.
- Causes of low dissolved oxygen in the Poplar River Diversion were documented.
- Permitted sources of total suspended solids were described in a section of the TMDL.
- A section for the non-permitted (nonpoint) sources of total suspended solids was started.
  - Wind erosion
  - Stormwater
  - Nassett Creek TSS sources (cattle in the stream)
- Photos of completed projects were found for inclusion in the reasonable assurances section of the report.
- A section for the sources of *E. coli* bacteria was started and sources for the following categories/areas were described:
  - Permitted *E. coli* sources
  - Nassett Creek *E. coli* sources
  - Lower Badger Creek *E. coli* sources
  - Poplar River (09020305-504) *E. coli* sources
  - Lost River (09020305-512) *E. coli* sources
  - Ruffy Brook *E. coli* sources
  - Clear Brook *E. coli* sources
  - Silver Creek *E. coli* sources and 2017 longitudinal sampling results
  - Lost River (09020305-529) *E. coli* sources and 2017 longitudinal sampling results
  - Lost River (09020305-530) *E. coli* sources (combined with 09020305-529)
  - Hill River (09020305-539) *E. coli* sources
  - Judicial Ditch 73 *E. coli* sources
  - Terrebonne Creek *E. coli* sources
- Completed maps:

RED LAKE WATERSHED DISTRICT MONTHLY WATER QUALITY REPORT	July - August 2017

Clearwater River

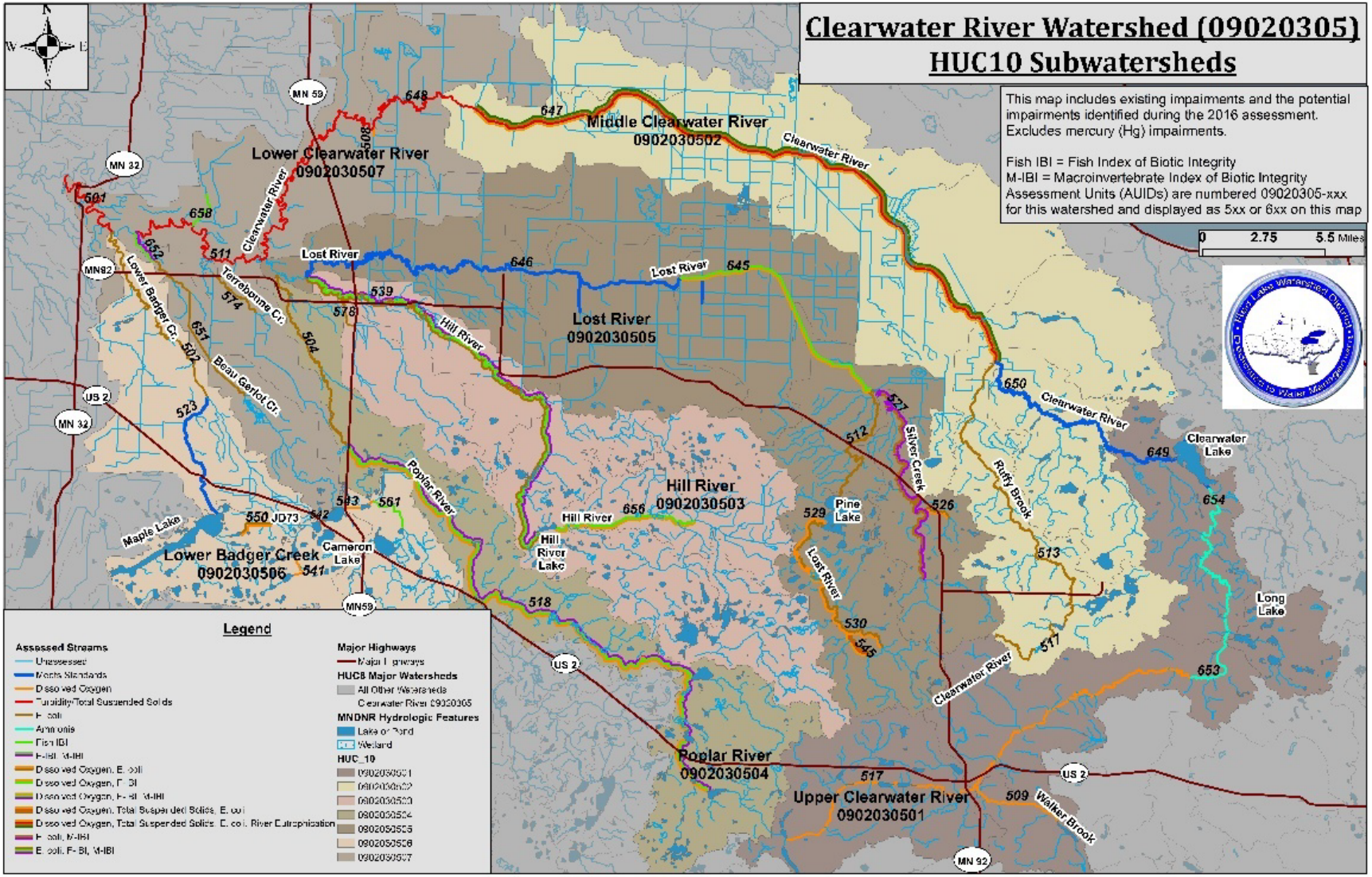
Site-By-Site Assessment Results for Total Suspended Solids
2007-2016 Data



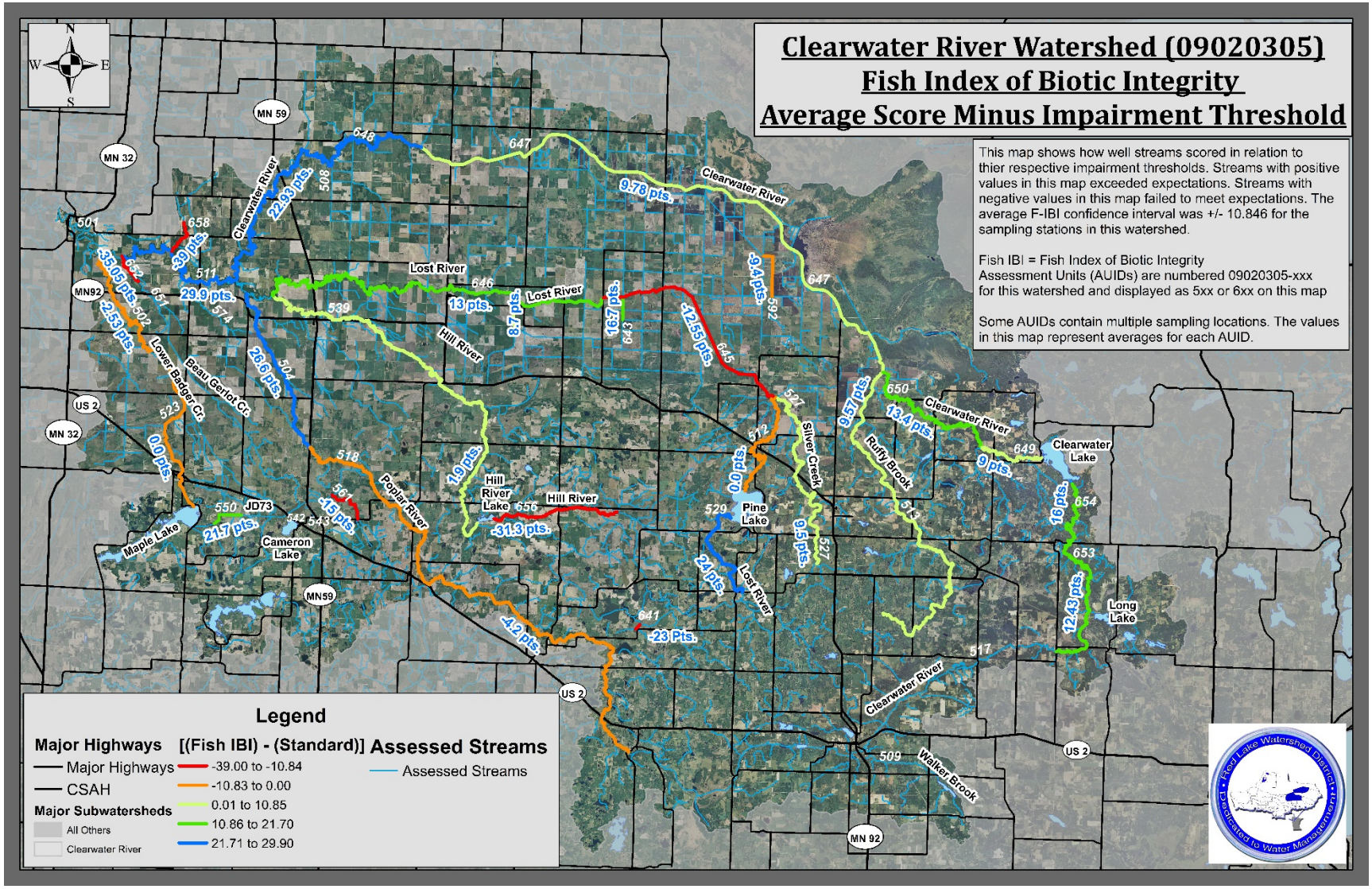
Site ID:	S002-118	S002-914	S002-124	S002-916	S003-174	S002-121
AUID (09020305-XXX)	501	511	648	647	647	647
Street/Road:	Bottineau Ave	CSAH 12	Minnesota St. N	280th Ave SE	CSAH 10	370th Ave SE
Percentage of TSS Samples > 30 mg/L	27.0%	11.4%	25.0%	13.6%	16.1%	10.2%
Percentage of Secchi Tube Transparency <25 cm	20.4%	0.0%	14.1%	0.0%	No Data	6.6%
Number of April-Sept. Days with TSS Samples:	226	35	112	22	31	49

Site ID:	S002-752	S001-461	S002-119
AUID (09020305-XXX)	650	649	649
Street/Road:	CSAH 11	CSAH 14 (249th Ave)	Clearwater Lake Rd.
Percentage of TSS Samples > 15 mg/L	0.0%	0.0%	0.0%
Percentage of Secchi Tube Transparency <40 cm	0.0%	0.0%	0.0%
Number of April-Sept. Days with TSS Samples:	12	7	20

RED LAKE WATERSHED DISTRICT MONTHLY WATER QUALITY REPORT	July - August 2017

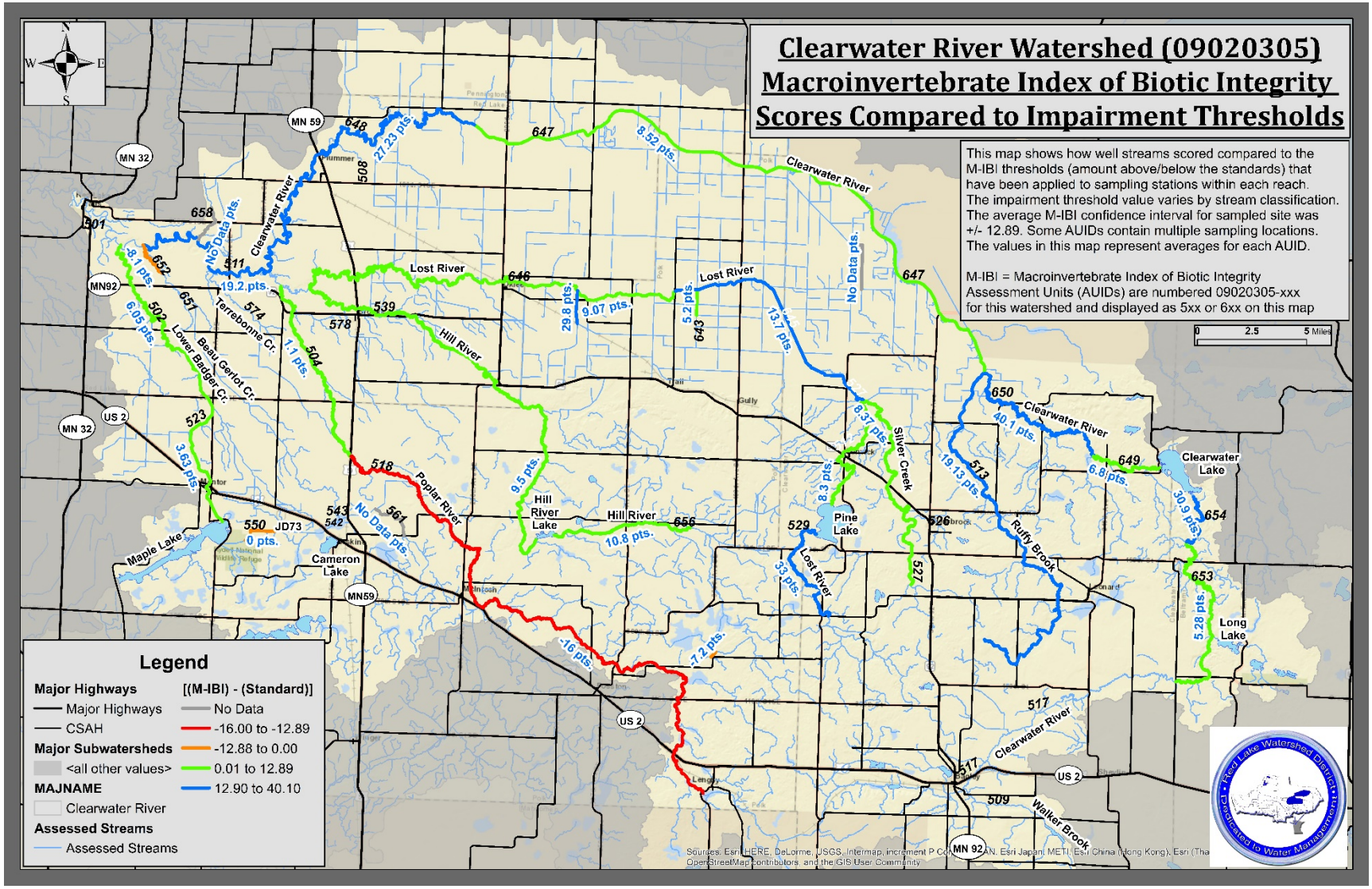


RED LAKE WATERSHED DISTRICT MONTHLY WATER QUALITY REPORT	July - August 2017

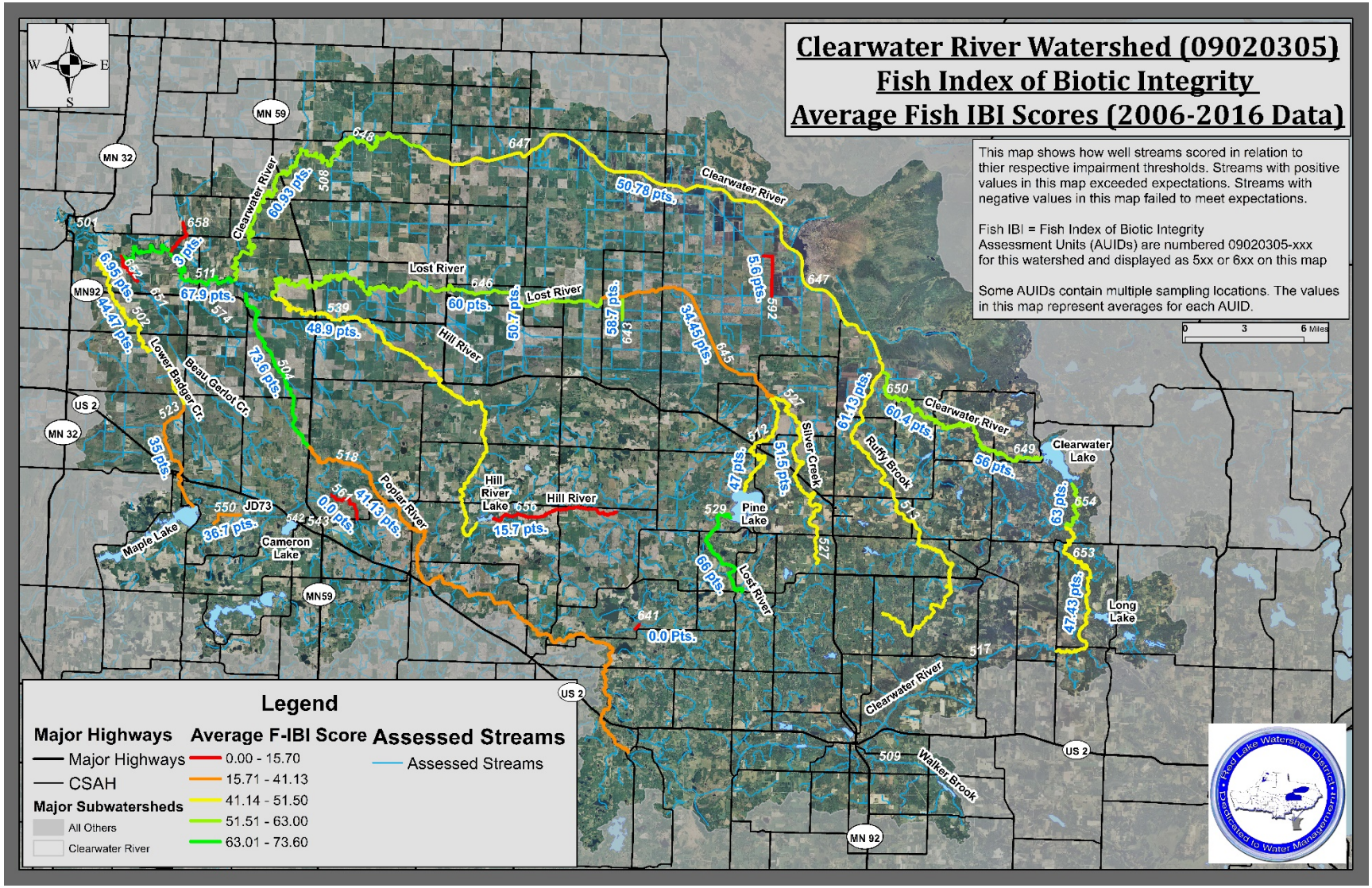


RED LAKE WATERSHED DISTRICT
MONTHLY WATER QUALITY REPORT

July - August 2017

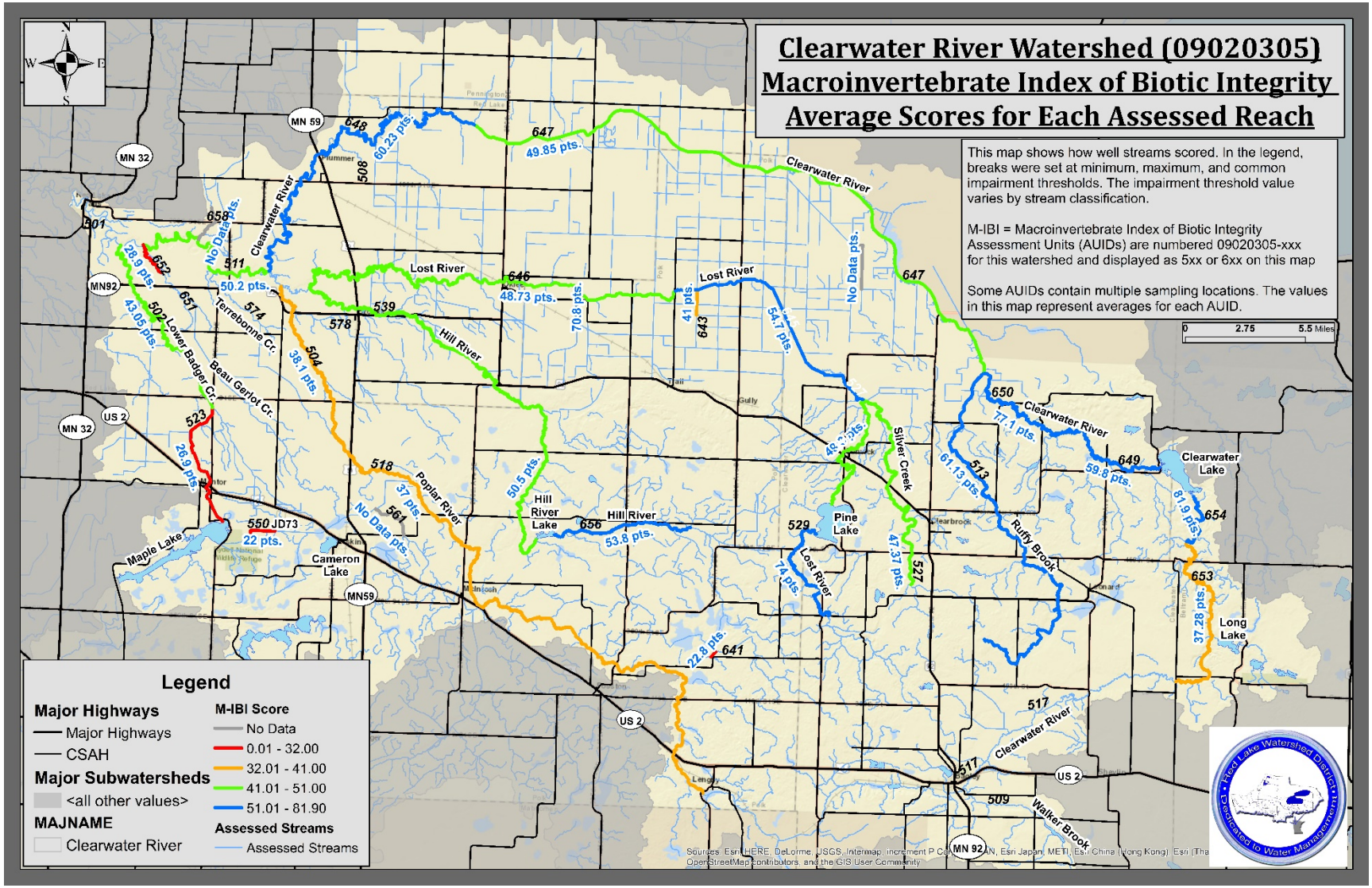


RED LAKE WATERSHED DISTRICT MONTHLY WATER QUALITY REPORT	July - August 2017



RED LAKE WATERSHED DISTRICT
MONTHLY WATER QUALITY REPORT

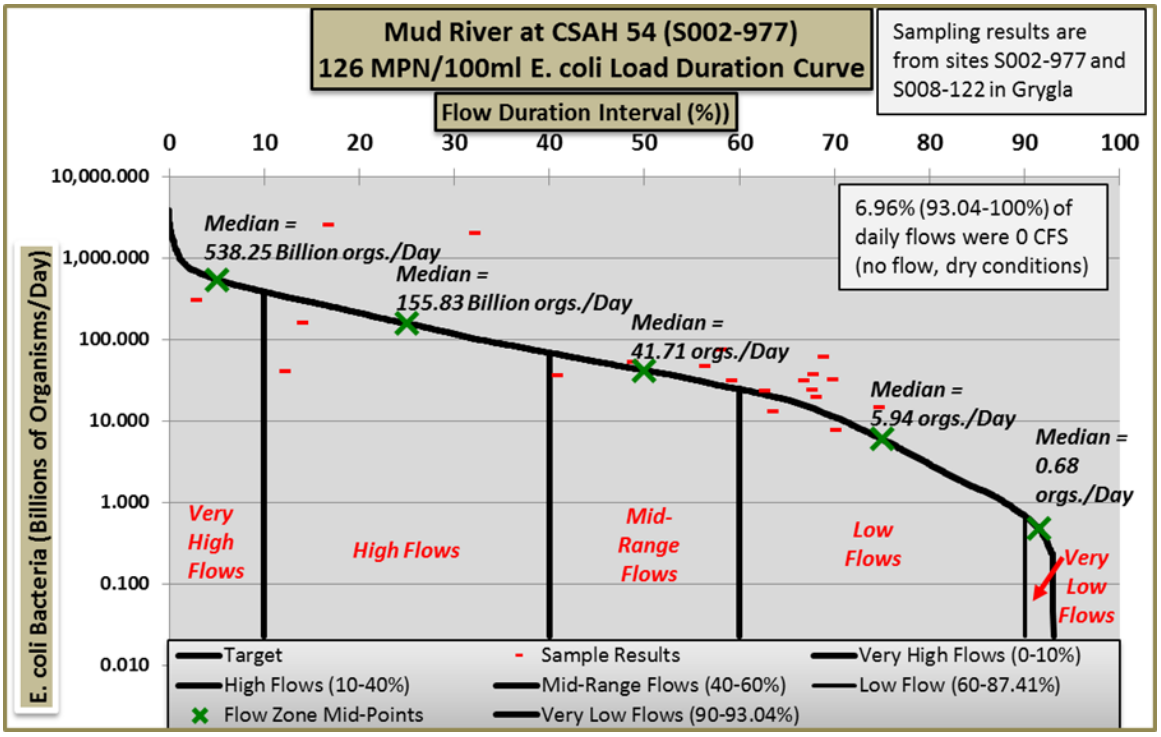
July - August 2017



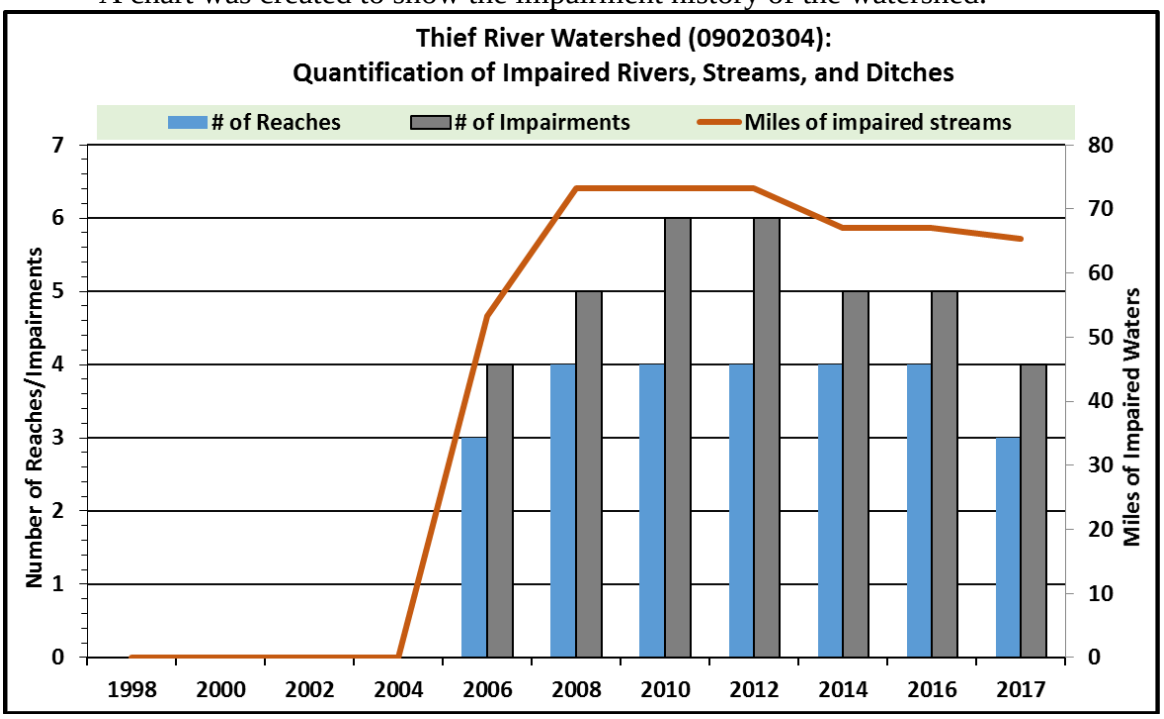
Thief River Watershed Restoration and Protection Strategy

RLWD staff began completing an *E. coli* TMDL for the Mud River.

- Mud River load duration curve



- A chart was created to show the impairment history of the watershed.



- An *E. coli* TMDL for the Mud River at CSAH 54 was calculated.

Drainage Area (square miles): 133.81 Monitoring Site Flow record used to develop flow zones and loading capacities: S002-977 (EQuIS) *E. coli* Standard: 126 MPN/100ml %MS4 Urban: 0.00 Total WWTF Design Flow (mgd): 0.00	AUID 09020304-507 Mud River at CSAH 54 (S002-977) Loading Capacity and Load Allocations for *E. coli* Duration Curve Zone				
	Very High	**High**	**Mid-Range**	**Low**	**Very Low**
TMDL Component	Values expressed as Billions of Organisms per Day				
MEDIAN FLOW	174.61	50.55	13.53	1.93	0.15
MEDIAN OF FLOW DURATION ZONE	5%	25%	50%	75.0%	91.5%
TOTAL DAILY LOADING CAPACITY	538.25	155.83	41.71	5.94	0.47
Wasteload Allocation					
Permitted Wastewater Treatment Facilities	0	0	0	0	0
Communities Subject to MS4 NPDES Requirements	0	0	0	0	0
Livestock Facilities Requiring NPDES Permits	0	0	0	0	0
"Straight Pipe" Septic Systems	0	0	0	0	0
Reserve Capacity	0.00	0.00	0.00	0.00	0.00
Daily Load Allocation	484.43	140.25	37.54	5.35	0.43
Daily Margin of Safety	53.83	15.58	4.17	0.59	0.05
	Values expressed as Billions of Organisms per Day				
TOTAL MONTHLY LOADING CAPACITY	538.25	155.83	41.71	5.94	0.47
Wasteload Allocation					
Permitted Wastewater Treatment Facilities	0%	0%	0%	0%	0%
Communities Subject to MS4 NPDES Requirements	0%	0%	0%	0%	0%
Livestock Facilities Requiring NPDES Permits	0%	0%	0%	0%	0%
"Straight Pipe" Septic Systems	0%	0%	0%	0%	0%
Reserve Capacity	0%	0%	0%	0%	0%
Load Allocation	90%	90%	90%	90%	90%
Margin of Safety	10%	10%	10%	10%	10%
	Values expressed as Billions of Organisms per Day				
MEDIAN FLOW	174.61	50.55	13.53	1.93	0.15
MEDIAN OF FLOW DURATION ZONE	5%	25%	50%	75.0%	91.5%
FLOW DURATION ZONE	Very High	High	Mid-Range	Low	Very Low

Mud River (09020304-507) at CSAH 54 Annual E. coli Load Reductions at S002-977	Very High Flows	High Flows	Mid-Range Flows	Low Flows	Very Low Flows	Total
Current Daily Load (10^9orgs/day)	53.00	229.80	157.97	203.49	No Data	
Load Allocation (10^9orgs/day)	484.43	140.25	37.54	5.35	0.43	
Load reduction (10^9orgs/day)	-	89.55	120.42	198.14	-	
% of Flows Represented	10%	30%	20%	30.0%	3.0%	93%
# of Days Represented	36.5	109.5	73.0	109.5	11.1	339.60
Annual Load Reduction (10^9orgs/year)	-	9,805.98	8,790.93	21,696.74	-	**40,293.64**
Total Current Load	1,934.50	25,163.30	11,531.48	22,282.46	0	60,911.74
Percent Reduction	0.0%	**39.0%**	**76.2%**	**97.4%**	0.0%	**66.2%**

- The MPCA officially removed the *E. coli* impairment of Branch A of Judicial Ditch 21 from the list of impaired waters.
- An updated calculation of water quality assessment statistics (2007-2016 data) was completed by RLWD staff for the Thief River watershed. Sites were ranked based on how close they were to meeting or exceeding the water quality standards for total suspended solids, *E. coli* bacteria, dissolved oxygen, Fish Index of Biotic Integrity, Macroinvertebrate Index of Biotic Integrity, and total phosphorus.

- Total Suspended Solids

River	Reach	AUID	TSS Std Exceedance Rate	Proximity to Std	TSS Standard	TSS Years
Thief River	Agassiz Pool to Red Lake R	09020304-501	22.0%	12.0%	30	2007-2016
Mud River	Headwaters to Agassiz Pool	09020304-507	10.3%	0.3%	15	2007-2016
Unnamed Ditch (Branch A of JD21)	Unnamed ditch to Moose R	09020304-555	5.6%	4.4%	30	2011-2016
Mud River	Headwaters to Agassiz Pool	09020304-507	4.0%	6.0%	30	2007-2016
Unnamed Ditch (Judicial Ditch ~~18~~ 30)	T154 R42W S14, east line (JD30) to Thief R	09020304-509	3.7%	6.3%	30	2008-2016
Moose River	Headwaters to Thief Lk	09020304-505	2.7%	7.3%	15	2007-2016
Moose River	Headwaters to Thief Lk	09020304-505	0.0%	10.0%	30	2007-2016
Thief River	Thief Lk to Agassiz Pool	09020304-504	0.0%	>10%	30	2007-2016
Unnamed Ditch (Ditch 200)	Unnamed ditch to unnamed ditch	09020304-511	0.0%	>10%	30	2007-2012
County Ditch 20	Unnamed ditch (Branch A CD 30) to Unnamed ditch (Branch D CD 20)	09020304-519	0.0%	>10%	30	2007-2016
Unnamed Ditch	Unnamed ditch to unnamed ditch	09020304-534	0.0%	>10%	30	2008-2009
Impaired reach in need of restoration		Not impaired, but close. Needs protection				

- *E. coli* Bacteria

River/Ditch Name	Reach Description	AUID	May E. coli	June E. coli	July E. coli	Aug. E. coli	Sept. E. coli	Max. Geo-Mean	Proximity to Std	E. coli Years
Thief River	Agassiz Pool to Red Lake R	09020304-501	11.4	47.8	92.7	74.5	124.2	124.2	1.8	2005-2014
Mud River	Headwaters to Agassiz Pool	09020304-507	27.7	93.7	116.4	75.4	41.1	116.4	9.6	2005-2014
Unnamed Ditch (Branch A of JD21)	Unnamed ditch to Moose R	09020304-555	17.7	99.5	34.6	41.6	63.3	99.5	26.5	2011-2015
County Ditch 20	Unnamed ditch (Branch A CD 30) to Unnamed ditch	09020304-519	13.3	43.5	70.6	52.0	39.4	70.6	55.4	2007-2014
Thief River	Thief Lk to Agassiz Pool	09020304-504	4.6	24.9	31.2	45.8	66.4	66.4	59.6	2005-2014
Unnamed Ditch (Judicial Ditch ~~18~~ 30)	T154 R42W S14, east line (JD30) to Thief R	09020304-509	16.2	51.1	45.8	42.1	43.9	51.1	74.9	2008-2014
Unnamed Ditch (Ditch 200)	Unnamed ditch to unnamed ditch	09020304-511	9.7	19.9	46.0	25.8	21.8	46.0	80.0	2007-2012
Moose River	Headwaters to Thief Lk	09020304-505	10.1	35.1	44.5	30.9	45.4	45.4	80.6	2005-2014
Impaired reach in need of restoration		Not impaired, but close. Needs protection								

- Dissolved Oxygen

River/Ditch Name	Reach Description	AUID	Percentage of values <5 mg/l		
			DO12_All (EQuIS)	DO5_All (EQuIS)	DO5_9am
Unnamed Ditch (Branch 200 of JD11)	Unnamed ditch to unnamed ditch (Hwy 219 to 290th Ave NE)	09020304-534	18.2%	21.6%	57.1%
Unnamed Ditch (Ditch 200)	Unnamed ditch to unnamed ditch	09020304-511	8.8%	12.4%	IF, 100%
Moose River	Headwaters to Thief Lk	09020304-505	9.7%	11.7%	IF, 65%
County Ditch 20	Unnamed ditch to CD 32	09020304-513	6.5%	8.7%	40.0%
Unnamed Ditch (Br1 of JD11)	Unnamed ditch (Br15 JD11) to unnamed ditch (Br 7 JD11)	09020304-543	2.6%	5.4%	No data
County Ditch 20	Unnamed ditch (Branch A CD 30) to	09020304-519	2.2%	2.9%	42.9%
Thief River	Agassiz Pool to Red Lake R	09020304-501	5.9%	2.9%	0.0%
Unnamed Ditch (Branch A of JD21)	Unnamed ditch to Moose R	09020304-555	1.7%	1.9%	IF, 0%
Mud River	Headwaters to Agassiz Pool	09020304-507	1.3%	1.7%	16.0%
Judicial Ditch 11	Unnamed ditch (Branch 194 of JD11) to Thief River	09020304-536	0.0%	1.6%	No data
Unnamed Ditch (Judicial Ditch 30)	T154 R42W S14, east line (JD30) to Thief R	09020304-509	1.0%	1.2%	3.3%
Judicial Ditch 11	Unnamed ditch (Moose R Impoundment South Pool Outlet) to unnamed ditch (Benville Rd)	09020304-521	0.0%	0.0%	IF, 0%
Thief River	Thief Lk to Agassiz Pool	09020304-504	0.0%	0.0%	IF, 0%
Judicial Ditch 11 (Lost River Pool)	Unnamed ditch (Mud River) to unnamed ditch (Br 194 JD11)	09020304-535	0.0%	0.0%	IF, 0%
Impaired reach in need of restoration		Not officially impaired, but needs protection			

- Total Phosphorus

River	Reach	AUID	TP Std (mg/l)	Summer Avg TP	Proximity to Standard
Mud River	Headwaters to Agassiz Pool	09020304-507	0.050	0.06	0.01
Moose River	Headwaters to Thief Lk	09020304-505	0.050	0.05	0.00
Thief River	Agassiz Pool to Red Lake R	09020304-501	0.100	0.07	-0.03
Unnamed Ditch (Judicial Ditch ~~18~~ 30)	T154 R42W S14, east line (JD30) to Thief R	09020304-509	0.100	0.07	-0.03
Mud River	Headwaters to Agassiz Pool	09020304-507	0.100	0.06	-0.04
Moose River	Headwaters to Thief Lk	09020304-505	0.100	0.05	-0.05
County Ditch 20	Unnamed ditch (Branch A CD 30) to Unnamed ditch (Branch D CD 20)	09020304-519	0.100	0.06	-0.05
Unnamed Ditch (Ditch 200)	Unnamed ditch to unnamed ditch	09020304-511	0.100	0.05	-0.05
Thief River	Thief Lk to Agassiz Pool	09020304-504	0.100	0.04	-0.06
Unnamed Ditch (Branch A of JD21)	Unnamed ditch to Moose R	09020304-555	0.100	0.03	-0.07
Impaired reach (potential, not official) in need of restoration		Not impaired, but close. Needs protection			

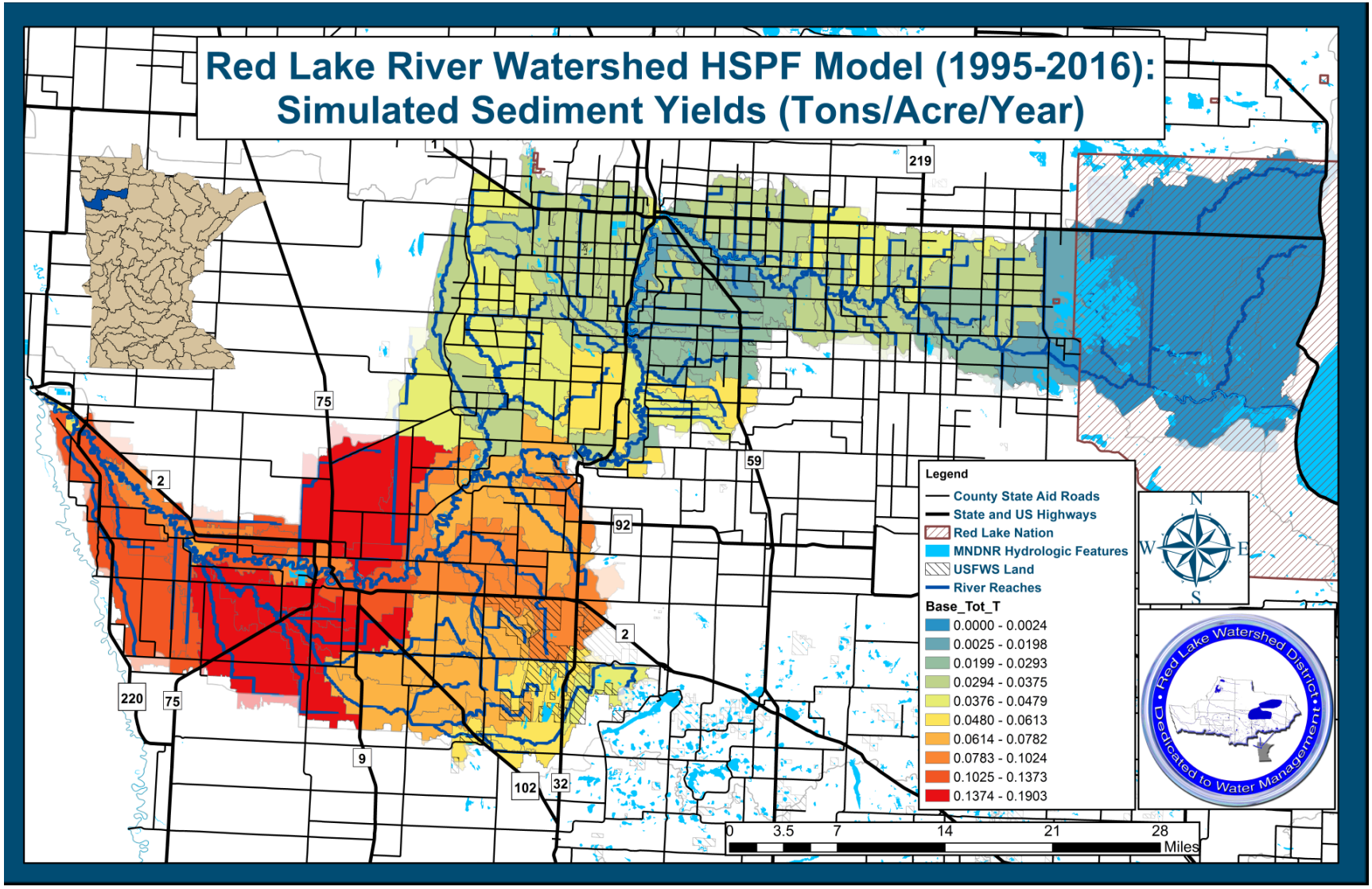
Red Lake River Watershed Restoration and Protection Strategy

RLWD staff began working on edits to the Red Lake River Total Maximum Daily Load report, including:

- New map of the Judicial Ditch 60 drainage area
- Comparison of data from Judicial Ditch 60 with data from Kripple Creek
- Began a detailed read-through and review of the Red Lake River TMDL to check for editing needs.
- Stressor summary table
- Nonpoint pollutant source summary table
- Edited the section that discusses the HSPF model
- In-stream sediment source data from the existing HSPF model were used to create new sediment source pie charts for the Red Lake River. The numbers didn't look realistic, though. The model drastically overestimated urban sources and underestimated in-stream sources. This problem was shared with MPCA and RESPEC modeling staff. They were aware of the problem and were in the process of updating the model.
- An updated version of the Red Lake River HSPF model was completed by the consultants, RESPEC, for the MPCA. They also create a Scenario Application Manager (SAM) program for the Red Lake River watershed. The SAM program can be used to

extract water quality information and simulate the implementation of best management practices.
    - There may still be some issues with the model. The model appears to include significant septic system inputs in sub-basins where there are no homes.
    - A revised sediment yield map was created.
- A short time after information from the updated HSPF model was incorporated into the Red Lake River WRAPS and TMDL documents, the revisions of those documents were completed and sent to the MPCA Project Manager.
- Detailed review and editing was completed. In July, the Red Lake River Watershed TMDL and WRAPS documents were revised to the point where only updated/corrected HSPF model data was needed in order to complete the revisions and send the documents to the MPCA Project Manager for further review.
- RLWD staff provided information to the MPCA Watershed Assessment Team about Heartsville Coulee, which was being considered for recategorization. The dissolved oxygen impairment is being caused by something other than a pollutant.

RED LAKE WATERSHED DISTRICT MONTHLY WATER QUALITY REPORT	July - August 2017



Other Notes

- Emmons and Olivier Resources, Inc. staff completed a revised version of the Grand Marais Creek Watershed Restoration and Protection Strategy document
- A final report was completed for the Grand Marais Creek Watershed Restoration and Protection Strategy project.
- The HOBO water level logger deployment pipe, HOBO water level logger, and posts wre retrieved from the Red Lake River at CSAH 27.
- A website was created for the Thief River One Watershed One Plan
    - **http://www.rlwdwatersheds.org/thiefriver1w1p**
    - Updates were made to the website prior to meetings – whenever new meeting materials, agendas, or minutes became available.
- Clearwater River Watershed HSPF modeling data was shared with SWCD staff.
- Reports, GIS layers, photos, maps, and other information was uploaded to a shared FTP site for the Thief River One Watershed One Plan process.
- A water quality report was completed for the month of May 2017.
- A new word, "partici-pointed," was accidentally "coined" at an August meeting. Although the person meant to say "participated", "partici-pointed" could actually be useful to describe disappointment with participation (combination of the words participation and disappointed). It could describe the feeling a person gets when they have something that they want to say, but are left out of a conversation.
- The Minnesota Pollution Control Agency sent a notice that they officially delisted dissolved oxygen impairments on two reaches of the Clearwater River (09020305-647 – Ruffy Brook to JD1 and 09020305-648 – JD1 to Lost River). The MPCA also officially removed the *E. coli* impairment on Branch A of JD 21 (09020304-555) from the Draft 2018 303(d) List of Impaired Waters. The recategorization of the dissolved oxygen impairment of Walker Brook (09020305-509 - Walker Brook Lake to Clearwater River), has also been officially reviewed and approved.
- The International Water Institute scheduled multiple community paddle events:
    - Crookston (Fri, September 8 - 4:00 - 7:00 pm)
    - Crookston (Sat, September 9 - 10:00 am - 2:00 pm)
    - Thief River Falls (Mon, September 11 - 4:00 - 7:00 pm)
    - East Grand Forks (Tue, September 12 - 4:00 - 7:00 pm)
- A solar eclipse occurred on August 21, 2017. Unfortunately, the skies were too cloudy in Thief River Falls to observe the eclipse.
- Ashley Hitt and the seasonal water quality staff toured the RMB Environmental Laboratories facility.

- The City of Thief River Falls has recently installed a kayak/canoe launching ramp at Lafave Park.

July and August 2017 Meetings and Events

- **July 11, 2017** – Marshall County Water Resources Advisory Committee meeting in Newfolden
  - Buffer initiative
  - Thief River One Watershed One Plan
  - Snake-Middle River WRAPS
- **August 18, 2017** – Thief River One Watershed One Plan meeting
  - Vision presentation
  - Priority Resource Concerns and Issues
  - Meeting Schedule
  - Stakeholder Participation Plan
  - Outline
  - Prioritization Matrix
  - Planning Region Boundaries
- **August 21, 2017** – Red Lake River One Watershed One Plan conference call
- **August 28, 2017** – We Are Water informational meeting at the Valley Technology Park in Crookston (Ashley Hitt attended)
  - This was an informational meeting about the possibility that the West Polk SWCD may host a 1000 square foot traveling exhibit called We Are Water. The exhibit features state wide and local information about Minnesota's water story, bringing together personal narratives, historical materials and scientific information.

RED LAKE WATERSHED DISTRICT MONTHLY WATER QUALITY REPORT	July - August 2017

Quote of the Month:
"There is only one way to avoid criticism: do nothing, say nothing, and be nothing."
- Aristotle

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

Learn more about the Red Lake Watershed District at www.redlakewatershed.org.

Learn more about the watershed in which you live (Red Lake River, Thief River, Clearwater River, Grand Marais Creek, or Upper/Lower Red Lakes) at www.rlwdwatersheds.org.

"Like" the Red Lake Watershed District on Facebook to stay up-to-date on RLWD reports and activities.