

By Corey Hanson, Red Lake Watershed District Water Quality Coordinator. 3/21/2017.

- ✓ Watershed Restoration and Protection project updates
- ✓ Long-Term Monitoring
- ✓ Longitudinal Sampling
- ✓ Maps

Long-Term Monitoring

- A dissolved oxygen logger was deployed in the Mud River near Grygla throughout the month of August 2016.
- High concentrations of E. coli bacteria were found in:
 - Ruffy Brook at CSAH 11
 - Silver Creek at 159th Ave, west of Clearbrook
 - Mud River in Grygla
 - Poplar River at CR 118
 - Terrebonne Creek at CSAH 92
 - Lower Badger Creek at CR 114
- High concentrations of total phosphorus were found in:
 - North River Nutrient Region (>0.05 mg/L):
 - Mud River in Grygla
 - Ruffy Brook at CSAH 11
 - Clearwater River at CSAH 2
 - Central River Nutrient Region (>0.1 mg/L):
 - Poplar River at CR 118
 - Lost River at 109th Ave
 - South River Nutrient Region (>0.15 mg/L):
- High total suspended solids (TSS) concentrations were found in:
 - >65 mg/L – All River Nutrient Regions
 - Poplar River at CR 118
- Low dissolved oxygen concentrations (<5 mg/L) were found in:
 - Lost River at 109th Ave, upstream of Pine Lake
 - Terrebonne Creek at CSAH 92
 - Judicial Ditch 73, upstream of Rydell NWR
 - Clearwater River at CSAH 2
 - Black River at 140th St. SW
- High biochemical oxygen demand concentrations were found in:
 - Poplar River at CR 118



Clearwater River Watershed Restoration and Protection (WRAP) Project

- Objective 2 – Water Quality Sampling
 - Water quality samples were collected along impaired reaches to provide supplemental data for the TMDL development process. Samples were collected to inform the stressor identification process. Longitudinal sampling was also conducted to improve knowledge about the locations of pollutant sources.
 - The Water Quality Assistant helped DNR staff with surveying of culverts along biologically impaired reaches in the Clearwater River watershed.
 - High concentrations of E. coli bacteria were found in:
 - Ruffy Brook at Township Road 5
 - Ruffy Brook at CSAH 11
 - Ruffy Brook at 510th St.
 - Ruffy Brook at 189th Ave
 - Ruffy Brook at 179th Ave
 - Ruffy Brook at 490th St
 - Ruffy Brook at CSAH 4
 - Ruffy Brook at 209th Ave
 - Ruffy Brook at CSAH 3
 - Ruffy Brook at State Highway 223
 - Beau Gerlot Creek at CR 114
 - Beau Gerlot Creek at CSAH 92
 - Clearwater River at CSAH 10
 - Walker Brook
 - Hill River at CSAH 35
 - Lost River at Lindberg Lake Road
 - Nassett Brook
 - Poplar River at CSAH 92
 - Poplar River at 250th St. SE
 - Poplar River at CSAH 49
 - Poplar River at 270th St. SE
 - Poplar River at CSAH 27
 - Poplar River at CSAH 1
 - Red Lake County Ditch 23
 - High concentrations of total phosphorus were found in:
 - North River Nutrient Region (>0.05 mg/L):
 - Ruffy Brook at Township Road 5
 - Ruffy Brook at CSAH 11
 - Ruffy Brook at 510th St.
 - Ruffy Brook at 179th Ave
 - Ruffy Brook at 189th Ave
 - Ruffy Brook at 490th St
 - Ruffy Brook at CSAH 4
 - Ruffy Brook at 209th Ave

- Ruffy Brook at CSAH 3
- Ruffy Brook at State Highway 223
- Central River Nutrient Region (>0.1 mg/L):
 - Poplar River at CSAH 92
 - Poplar River at 250th St. SE
 - Poplar River at 260th St. SE
 - Poplar River at 270th St. SE
 - Poplar River at CSAH 49
 - Poplar River at 290th St. SE
 - Poplar River at 220th Ave SE
 - Poplar River at 310th St SE
 - Poplar River at 315th St. SE
 - Poplar River at 255th Ave SE
 - Poplar River at CSAH 35
 - Poplar River at 267th Ave SE
 - Poplar River at 340th St. SE
 - Poplar River at CSAH 8, north of McIntosh
 - Poplar River at 350th St. SE
 - Poplar River at 360th St. SE, east of McIntosh
 - Poplar River at the west crossing of 370th St. SE
 - Poplar River at the east crossing of 370th St. SE
 - Poplar River at 310th Ave SE
 - Poplar River at 320th Ave SE
 - Poplar River at 380th St. SE, northwest of Fosston
 - Poplar River at CSAH 30
 - Poplar River at CSAH 6
 - Poplar River at 360th Ave SE
 - Poplar River at CSAH 27
 - Clearwater River at CSAH 10
 - Clearwater River at 310th Ave SE, NE of Oklee
 - Clearwater River at 370th Ave SE, N of Gully
 - Clearwater River at 400th Ave SE
 - Hill River at CSAH 35
 - Hill River at 335th Ave SE
 - Nassett Brook
 - Polk County Ditch 136, north of Gully
 - Tributary of the Poplar River Diversion (Gerdin Lake Outlet) at 240th Ave SE, north of Erskine
 - Judicial Ditch 3, NE of Oklee
 - Red Lake County Ditch 23
- High total suspended solids (TSS) concentrations were found in:
 - Ruffy Brook at Township Road 5

- Ruffy Brook at CSAH 11
- Ruffy Brook at 510th St.
- Ruffy Brook at 179th Ave
- Clearwater River at CSAH 5
- Clearwater River at CR 127
- o Low dissolved oxygen concentrations (<5 mg/L) were found in:
 - Poplar River at 350th Ave SE
 - Poplar River at CSAH 8, north of McIntosh
 - Poplar River at 360th St. SE, east of McIntosh
 - Poplar River at 310th Ave SE
 - Poplar River at 320th Ave SE
 - Poplar River at 380th St. SE, northwest of Fosston
 - Poplar River at CSAH 6, northeast of Fosston
 - Poplar River at 360th Ave SE
 - Poplar River at CSAH 27
 - Poplar River at CSAH 1
 - Poplar River at 425th St. SE
 - Poplar River at 450th St. SE
 - Walker Brook
 - Clearwater River at CSAH 10
 - Clearwater River at 310th Ave SE, NE of Oklee
 - Clearwater River at 370th Ave SE
 - Clearwater River at 400th Ave SE
 - Hill River at 335th Ave SE
 - Lost River at the Lindberg Lake Road
 - Tributary of the Poplar River Diversion (Gerdin Lake Outlet) at 240th Ave SE, north of Erskine
 - Ruffy Brook at CSAH 3
 - Ruffy Brook at State Highway 223
 - Polk County Ditch 136, north of Gully
 - Judicial Ditch 3, NE of Oklee
- o High concentrations of biochemical oxygen demand (>2.0 mg/L Central River Nutrient Region standard) were found in:
 - Clearwater River at CSAH 10
 - Hill River at CSAH 35
 - Poplar River at 250th St. SE
 - Poplar River at CSAH 49
 - Poplar River at 310th St SE
 - Poplar River at 315th St. SE
 - Poplar River at 267th Ave SE
 - Poplar River at CSAH 8, north of McIntosh
 - Poplar River at 340th St. SE
 - Poplar River at 350th St. SE
 - Poplar River at 360th St. SE, east of McIntosh

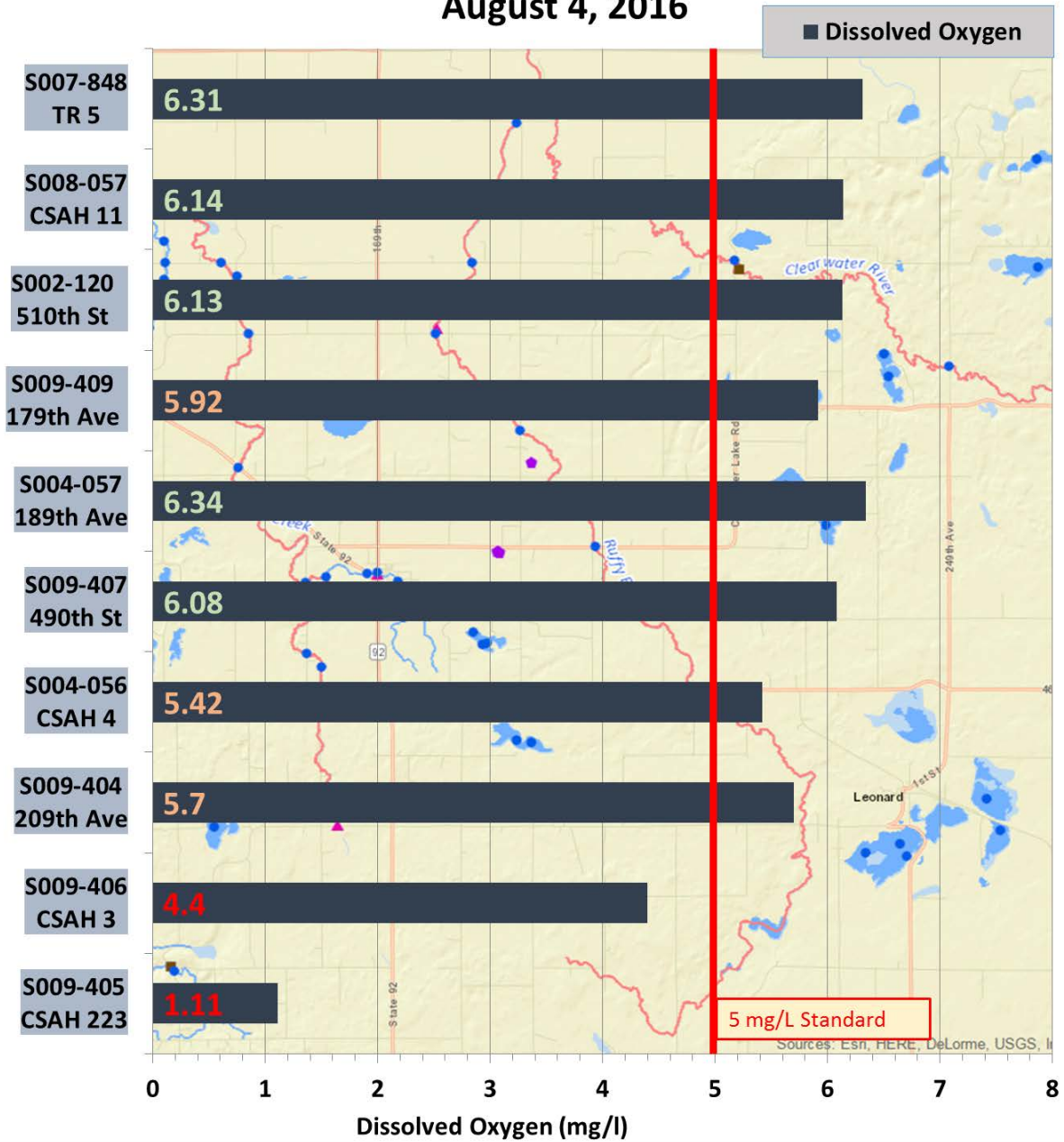
- Poplar River at the west crossing of 370th St. SE
- Poplar River at the east crossing of 370th St. SE
- Poplar River at 310th Ave SE
- Poplar River at 380th St. SE, northwest of Fosston
- Poplar River at CSAH 6, northeast of Fosston
- Poplar River at 360th Ave SE
- Poplar River at CSAH 27
- Within Whitefish Lake
- Poplar River at 425th St. SE
- Objective 3 – Flow Monitoring
 - The Water Quality Assistant checked on HOBO water level loggers and downloaded data from the loggers.
 - Rainfall events in August 2016 provided great opportunities for conducting flow measurements across a range of flow levels.
 - 53.5 cfs of flow was measured in Ruffy Brook at CSAH 11 on 8/7/16.
 - 78.5 cfs of flow was measured in Silver Creek at CR 111 on 8/7/16.
 - 20 cfs of flow was measured in the Hill River at 335th Ave on 8/8/16.
 - 2.94 cfs of flow was measured in Brooks Creek at Hwy 92 on 8/8/16.
 - 52.9 cfs of flow was measured in the Hill River at CR 119 on 8/8/16.
 - 27.1 cfs of flow was measured in Lower Badger Creek at CR 114 on 8/9/16.
 - 5.45 cfs of flow was measured in Beau Gerlot Creek at Cr 114 on 8/9/16.
 - 0.56 cfs of flow was measured in Terrebonne Creek at Hwy 92 on 8/9/16.
 - 51.3 cfs of flow was measured in the Poplar Rive at CR 118 on 8/9/16.
 - 55.8 cfs of flow was measured in the Lost River at CSAH 28 on 8/10/16.
 - 108 cfs of flow was measured in the Lost River at CR 119 on 8/10/16.
 - 40.9 cfs of flow was measured in Brooks Creek at Hwy 92 on 8/11/16.
 - Terrebonne Creek and Lower Badger Creek were too deep to wade on 8/11/16.
 - 128 cfs of flow was measured in Beau Gerlot Creek on 8/11/16. There was a manure/effluent-like smell in the air at this site.
 - 195 cfs of flow was measured in Lower Badger Creek at CR 114 on 8/12/16.
 - 60.7 cfs of flow was measured in Beau Gerlot Creek at CR 114 on 8/12/16.
 - 259 cfs of flow was measured in the Clearwater River at CR 127 on 8/15/16.
 - 13.1 cfs of flow was measured in Beau Gerlot Creek at CR 114 on 8/16/16.
 - 14.2 cfs of flow was measured in Beau Gerlot Creek at Hwy 92 on 8/16/16.
 - 3.36 cfs of flow was measured in Terrebonne Creek at Hwy 92 on 8/16/16.
 - 65.8 cfs of flow was measured in the Poplar River at CR 118 on 8/16/16.
 - 203 cfs of flow was measured in the Clearwater River at CR 127 on 8/17/16.
 - 67.9 cfs of flow was measured in the Lost River at CSAH 28 on 8/17/16
 - 13 cfs of flow was measured in the Lost River at the Lindberg Lake Road on 8/18/16
 - 1.48 cfs of flow was measured in Nasset Creek at Nasset Creek Dr on 8/18/16
 - 17.8 cfs of flow was measured in the Lost River at 109th Ave on 8/18/16
 - 38.1 cfs of flow was measured in the Lost River at 139th Ave on 8/18/16. Stage was high, but flow rate and velocity were lower than expected. A beaver dam could be seen in the distance, downstream of the crossing.

- 1.12 cfs of flow was measured in Clear Brook at Hwy 92 on 8/23/16.
 - 13 cfs of flow was measured in Ruffy Brook at CSAH 11 on 8/23/16.
 - 137 cfs of flow was measured in the Clearwater River at CR 127 on 8/23/16.
 - 6.07 cfs of flow was measured in the Hill River at 335th Ave on 8/29/16.
 - 0 CFS of flow was observed in Terrebonne Creek on 8/29/16.
- Objective 6 – Stressor and Pollutant Identification

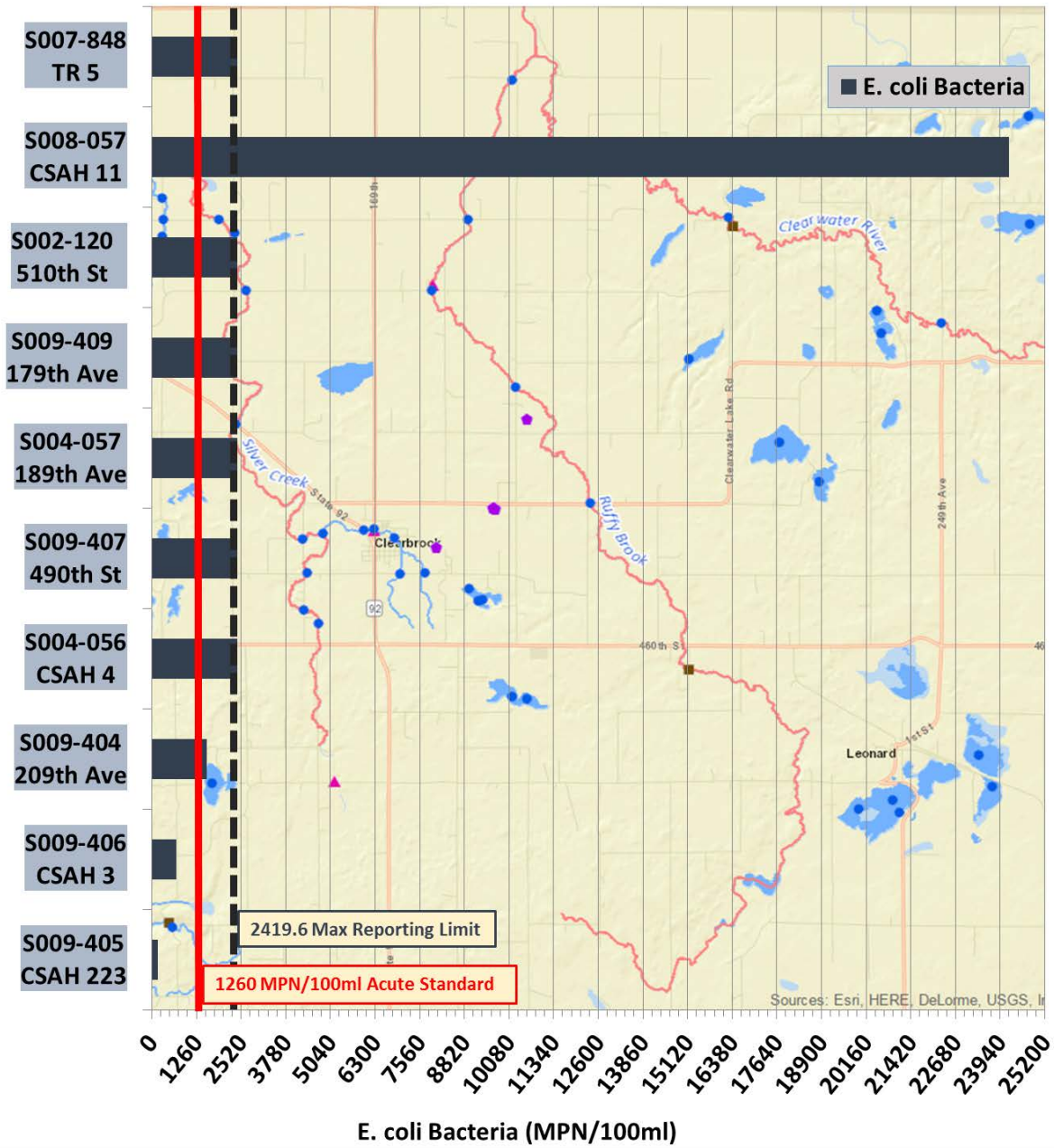


- Longitudinal samples were collected along Ruffy Brook to identify the locations in which pollutants, particularly E. coli bacteria, increase along the stream. This will help identify the locations of pollutant sources in the watershed so that restoration efforts can be targeted and based upon real data. E. coli concentrations were greater than the maximum reporting limit of 2,419.6 MPN/100ml throughout much of the watershed – from CSAH 4 to the confluence with the Clearwater River. The lab performed a 10X dilution for the sample that was collected at CSAH 11 and the concentration still exceeded the diluted maximum reporting limit of 24,196 MPN/100ml. A measurable increase occurred between 209th Ave and CSAH 4, indicating that the Rydeen livestock operation along 199th Ave is contributing to the E. coli problem in Ruffy Brook. A significant increase in E. coli concentrations also occurred between CSAH 3 and 209th Ave. Livestock operations along that reach of the stream also seem to be contributing to the E. coli impairment. The unrestricted access to the stream also appears to be causing stream bank instability, causing portions of the channel to become wider and shallower. Livestock operations and other sources caused an increase in E. coli bacteria between CSAH 223 and CSAH 3. There also are sources of E. coli upstream of CSAH 223 that caused the concentration to exceed the chronic standard at that location (178.9). Low dissolved oxygen levels were found in the headwaters of Ruffy Brook at CSAH 3 and CSAH 223.

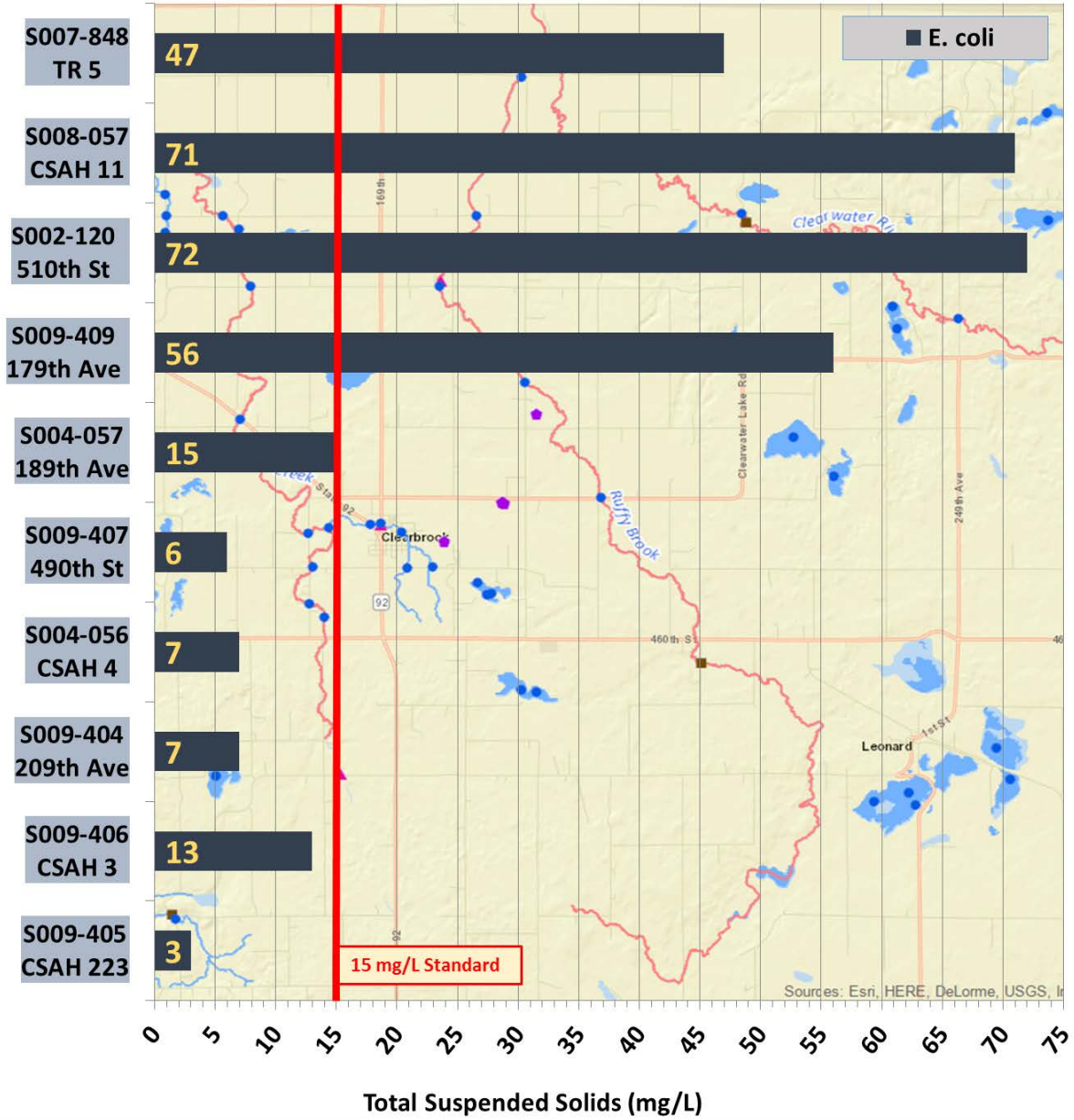
Ruffy Brook Longitudinal Dissolved Oxygen on August 4, 2016

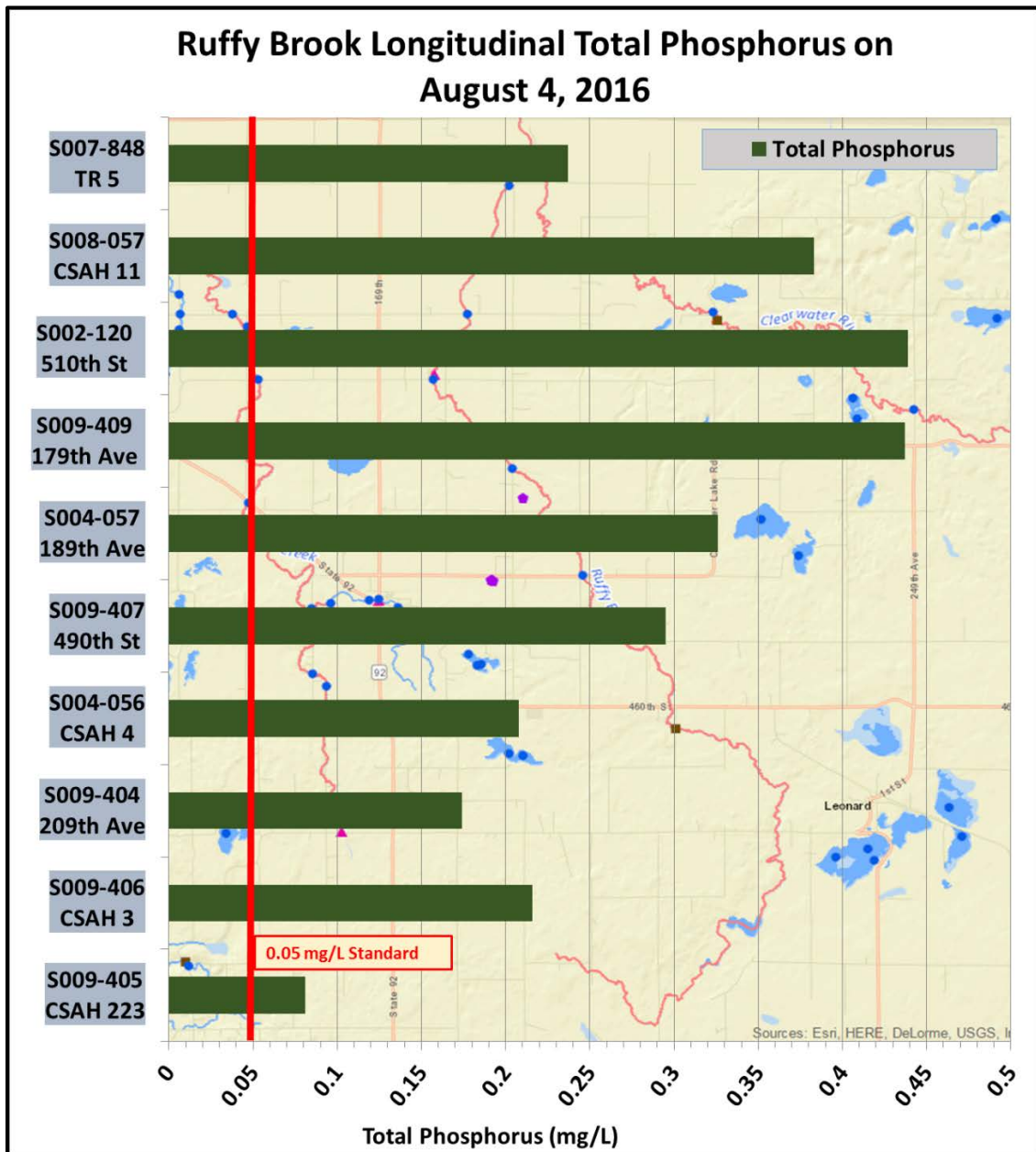


Ruffy Brook Longitudinal *E. coli* on August 4, 2016



Ruffy Brook Longitudinal Total Suspended Solids on August 4, 2016

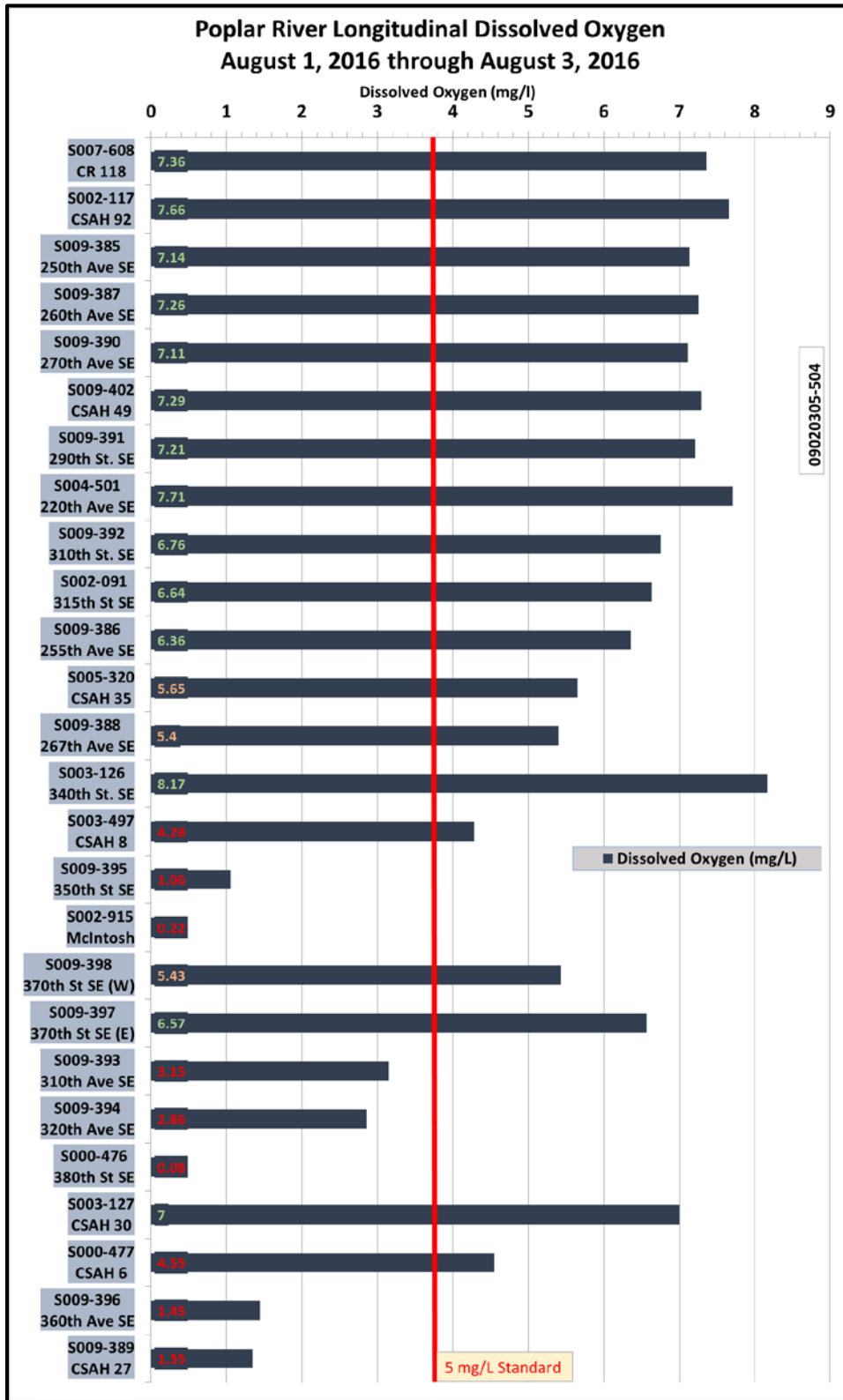




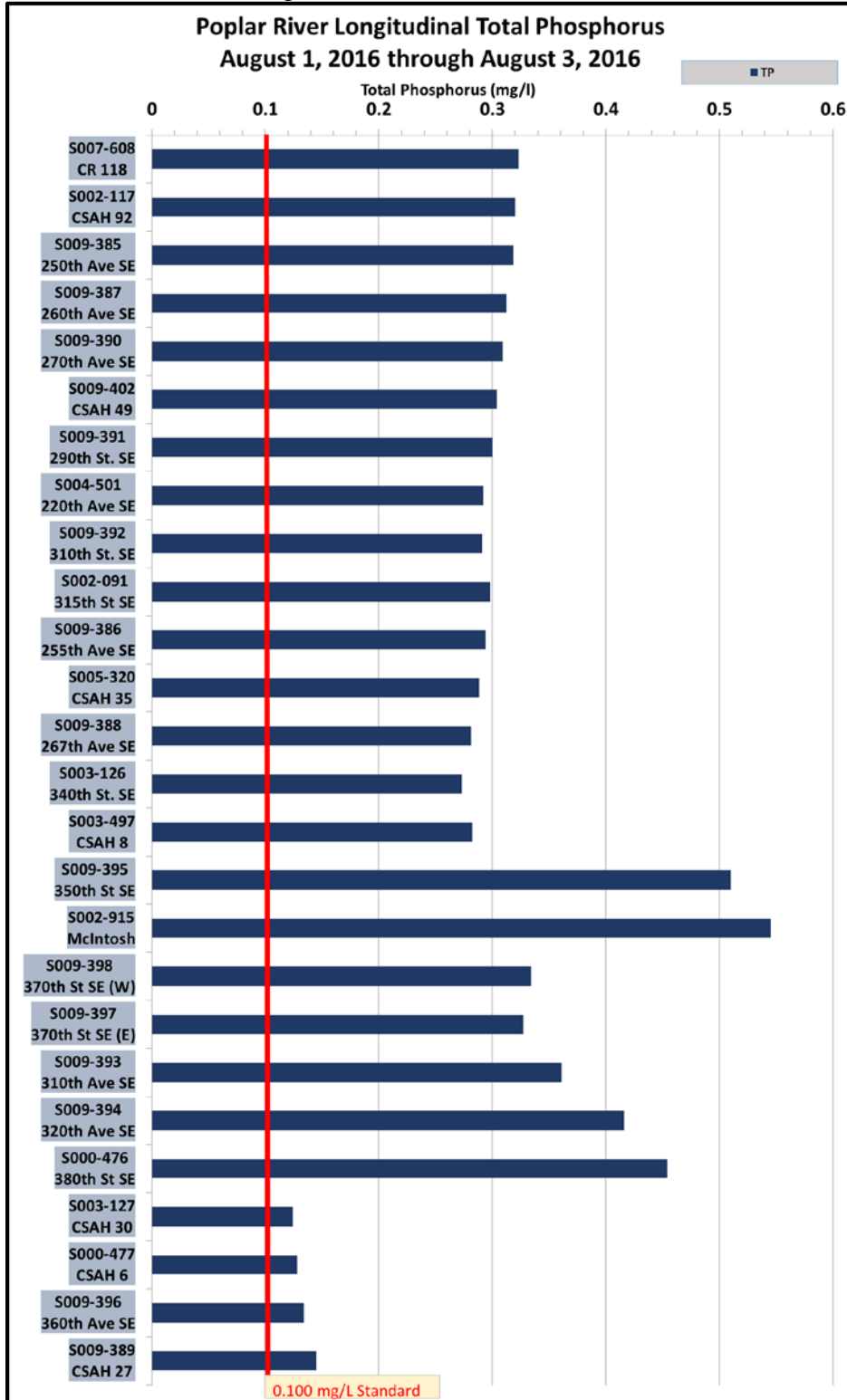
- The Water Quality Assistant completed a set of longitudinal water quality measurements and samples along the Poplar River on 8/2/16 and 8/3/16. Dissolved oxygen levels were low at many of the crossings in the headwaters of the Poplar River. The dissolved oxygen concentration at the Spring Lake Outlet was okay, but DO levels were low at all of the crossings between that location and the CSAH 30 crossing near Fosston (450th St. SE, 440th St. SE, 425th St. SE, CSAH 1, CSAH 27, 360th Ave SE, and CSAH 6). Downstream of a good DO concentration of 7 mg/l at CSAH 30, dissolved oxygen crashed down to 0.08 at the next crossing (380th St. SE). Dissolved oxygen concentrations were also low at all of the other crossings upstream of 255th Ave SE, with the exception of the east crossing of 370th St. SE and 340th St. SE.

RED LAKE WATERSHED DISTRICT
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Total phosphorus concentrations exceeded the 0.100 mg/L river eutrophication standard throughout the entire reach that was sampled. There was a very significant increase downstream of the CSAH 30 crossing (near Fosston), however.

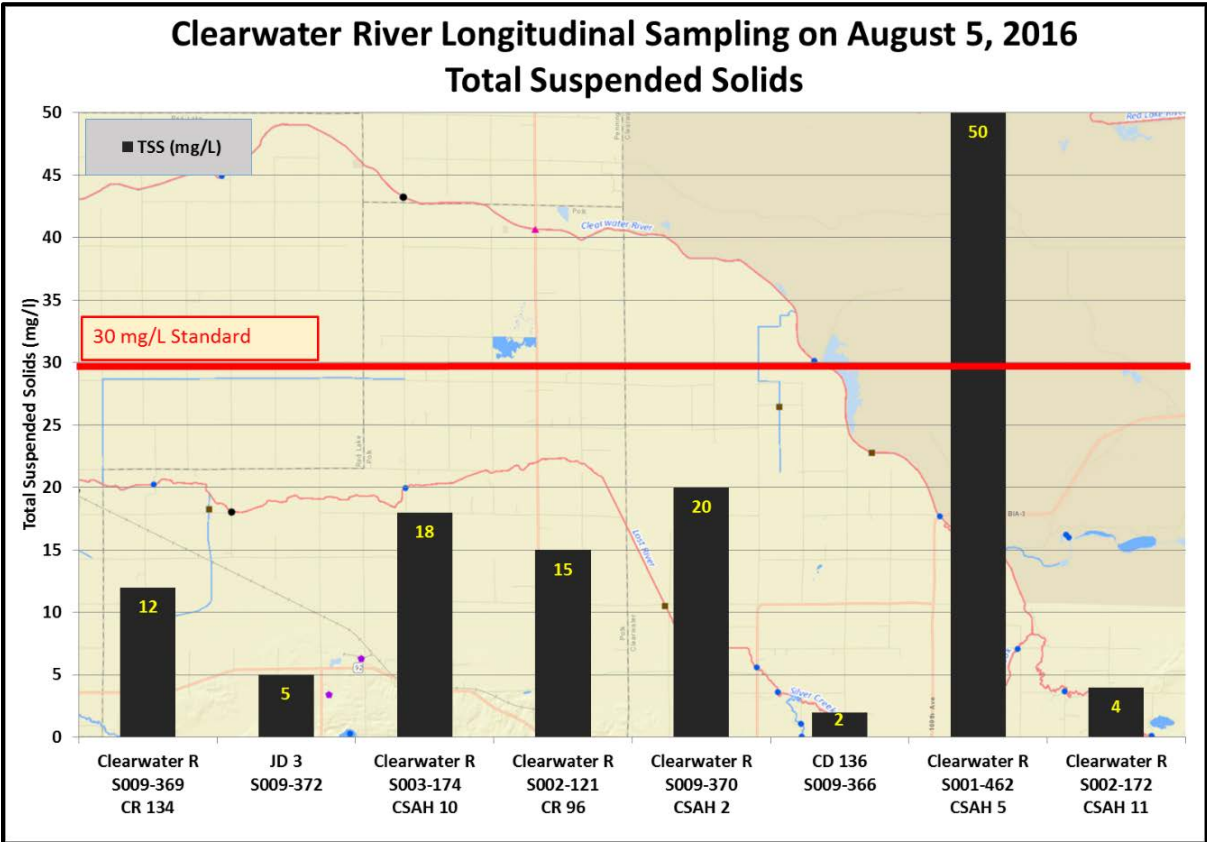


- Microbial Source Tracking (fecal DNA) samples were collected on August 4, 2016. Flows were high in all of the streams and rivers that were sampled due to a 2.5” rainfall and runoff event. Water in the Clearwater River looked muddy.
 - Silver Creek (159th Ave, S000-712) – >2,419.6 MPN/100ml
 - Birds: Present (trace)
 - Humans: Present (trace)
 - Ruminants: Present (high concentration)
 - Dog: Present (low concentration)
 - Goose: Absent
 - Ruffy Brook (CSAH 11, S008-057) – >24,196 MPN/100ml
 - Birds: Absent
 - Humans: Absent
 - Ruminants: Present (moderate concentration)
 - Clearwater River (CSAH 10, S003-174) – 1,413.6 MPN/100ml
 - Birds: Absent
 - Humans: Absent
 - Ruminants: Present (low concentration)
 - Goose: Absent

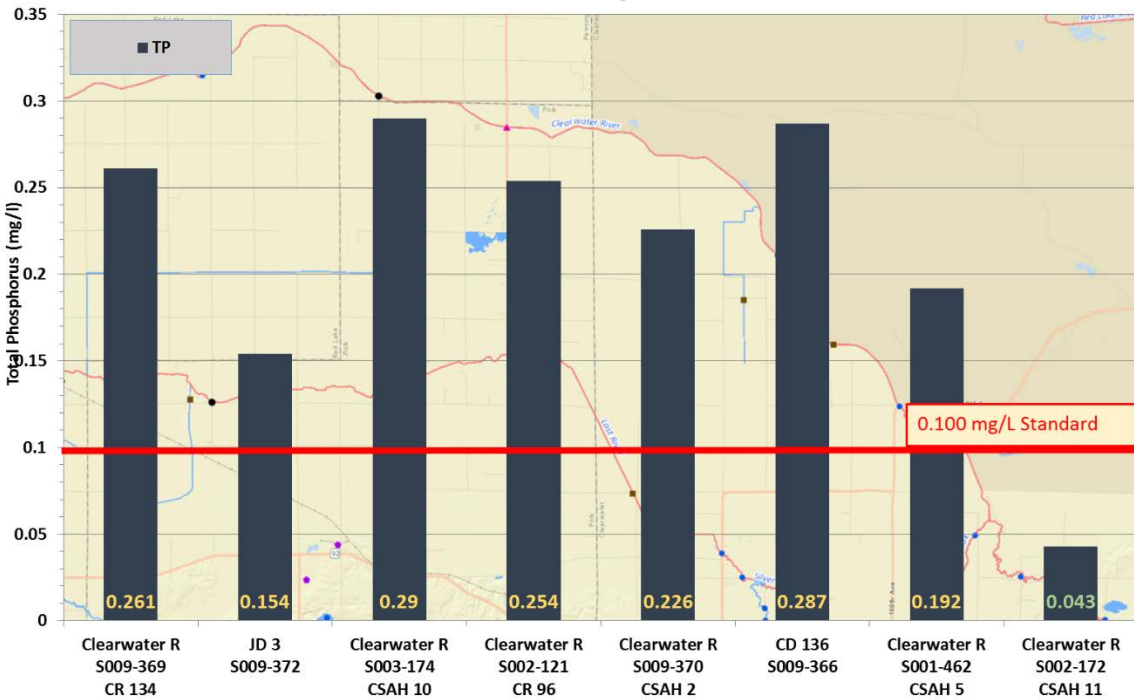
Ruffy Brook at CSAH 11 on August 4, 2016



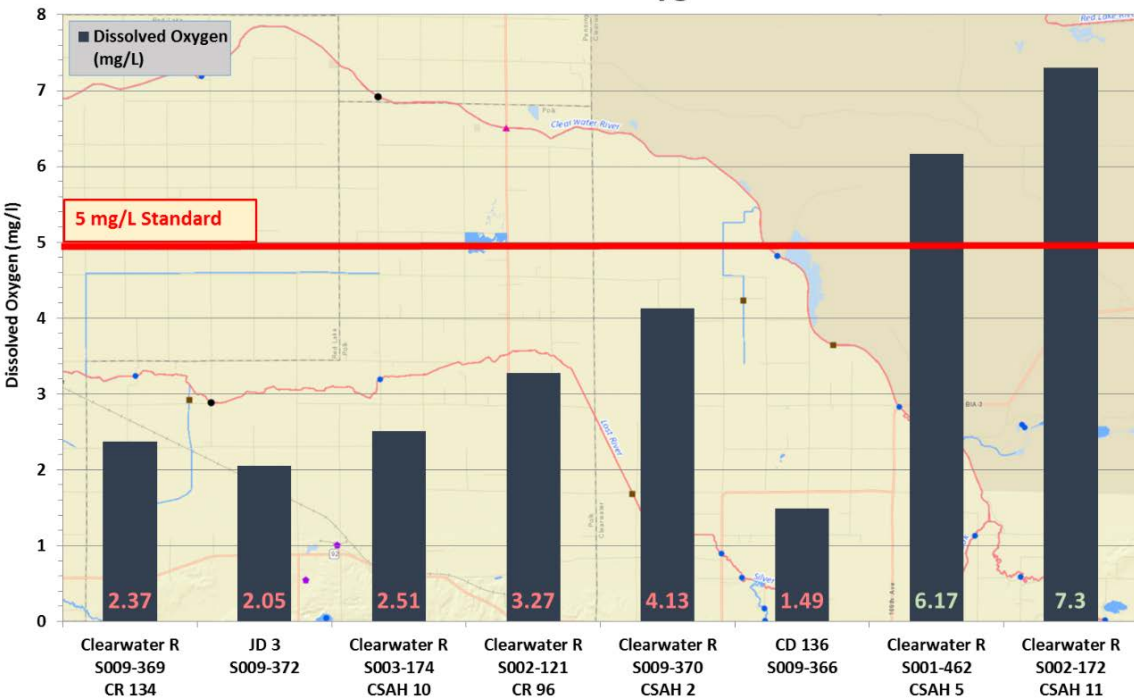
- Longitudinal water quality samples and in-situ measurements were collected along the Clearwater River and its tributaries upstream and downstream of wild rice paddies while the paddies were being drained in preparation for harvest. Dissolved oxygen levels in the Clearwater River were clearly being negatively impacted by drainage from the paddies. Dissolved oxygen concentrations in ditches were very low, despite high and “normal” flows. Turbidity and TSS are also increased in the river downstream of the paddies, but only one site exceeded the 30 mg/l TSS standard. Nitrogen and phosphorus concentrations increase significantly.



Clearwater River Longitudinal Sampling on August 5, 2016
Total Phosphorus



Clearwater River Longitudinal Sampling on August 5, 2016
Dissolved Oxygen



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

The end date of the Red Lake River WRAP contract was extended to December 31, 2016.

- Task 1 – Existing Data
 - The RLWD Water Quality Coordinator provided comments to the MPCA during the public comment period (August 1-31, 2016) for the Draft 2016 List of Impaired Waters.
 - The Grand Marais Creek chlorpyrifos (pesticide) impairment was identified at the pour point of the Grand Marais Creek watershed. The specific sampling location was along the cut-channel, which will no longer be assessed after the completion of the Grand Marais Creek outlet restoration. However, it is highly likely that the pesticide pollution came from somewhere upstream of the cut-channel; either from Grand Marais Creek or its tributary ditches. Additional sampling for chlorpyrifos is recommended for future sample collection on Grand Marais Creek and Polk County Ditch 2.
- Task 7 – Stressor Identification
 - Pennington County Ditch 43 (CD43) was examined for stressor identification purposes. The buffer along portions of the ditch is insufficient. Vegetation in the ditch has been sprayed. A draft stressor identification section for CD43 was written for the Red Lake River TMDL report.
 - The RLWD Water Quality Assistant completed a set of longitudinal water quality measurements along the Black River upstream of the Little Black River confluence (mainly to examine how dissolved oxygen levels change throughout the watershed). The primary monitoring site on the 09020303-558 reach of the Black River, “Black River South” or S003-943, was the only site along that reach that failed to exceed 5 mg/l. On the channelized, Judicial Ditch 25 portion of the Black River, low dissolved oxygen levels were only found in the headwaters ditches that converge to flow into the main channel of JD 25 near the intersection of 144th Ave NW and 160th St. NW.
- Task 9 – Data Analysis
 - 2015 continuous dissolved oxygen data from the Black River at CR58 (“Black River North,” S003-948) was compiled and corrected. Dissolved oxygen concentrations fell below 5 mg/l on 55 of the 62 days (88.7%) in which a dissolved oxygen logger was deployed at that site. That continuous dissolved oxygen data was used to re-assess the channelized portion of the Black River (AUID 09020303-557)
 - 2006-2015 DO5_9AM = 94.7% of daily minimums are < 5 mg/l
 - May-September dissolved oxygen data measured prior to 9 am
 - 2006-2015 DO5_All = 55.4% of daily minimums are < 5 mg/l
 - All May-September dissolved oxygen data
 - 2015 continuous dissolved oxygen data from the CSAH 45 crossing of Burnham Creek (S007-638) was compiled and corrected. It was discovered that the MPCA has placed this site within the “Polk County Ditch 15 to Red Lake River” reach of Burnham Creek (09020303-515), even though the site is located upstream of the

confluence of CD 15 and Burnham Creek. The cause of this error is a faulty GIS layer that erroneously shows CD15 entering Burnham Creek on the south/upstream side of CSAH 45. In reality, the ditch enters Burnham Creek 200 yards north/downstream of CSAH 45.

- Task 10 – Civic Engagement
- Task 12 – Reports
 - RLWD staff spent time writing the Red Lake River Total Maximum Daily Load (TMDL) report.

Grand Marais Creek Watershed Restoration and Protection Project

Emmons and Olivier Resources, Inc. staff completed a new draft of the Grand Marais Creek Watershed Total Maximum Daily Load report. RLWD staff reviewed the draft TMDL document and a list of changes/responses to comments. RLWD staff acquired Polk County Ditch 2, Judicial Ditch 1, and Judicial Ditch 75 flow data from the MPCA and provided it to EOR staff. The LiDAR profile of Grand Marais Creek was examined. Aerial photos were explored to identify fish passage and flow barriers. Longitudinal E. coli sampling results from Polk County Ditch 2 were reviewed and provided to EOR staff.

Other Notes

- Photos of Clear Brook and the Clearbrook stormwater pond were taken after a 2.5” rain.
 - City employees stopped to visit and discuss Clear Brook. The city may be replacing the Main St. culverts because the current culverts are moving, failing, and damaging the street. They may also retrofit the dam on the pond near the Brookfield Apartments in Clearbrook (upstream of Main St.), possibly dredge the pond, and/or restore the stream channel by removing the dam. This sounds like a project for which the RLWD could provide assistance, with technical/ecological guidance from MN DNR staff.

Aerial view of the pond along Clear Brook in the town of Clearbrook





Clear Brook Dam
in the town of
Clearbrook



Clearbrook stormwater pond after a runoff event

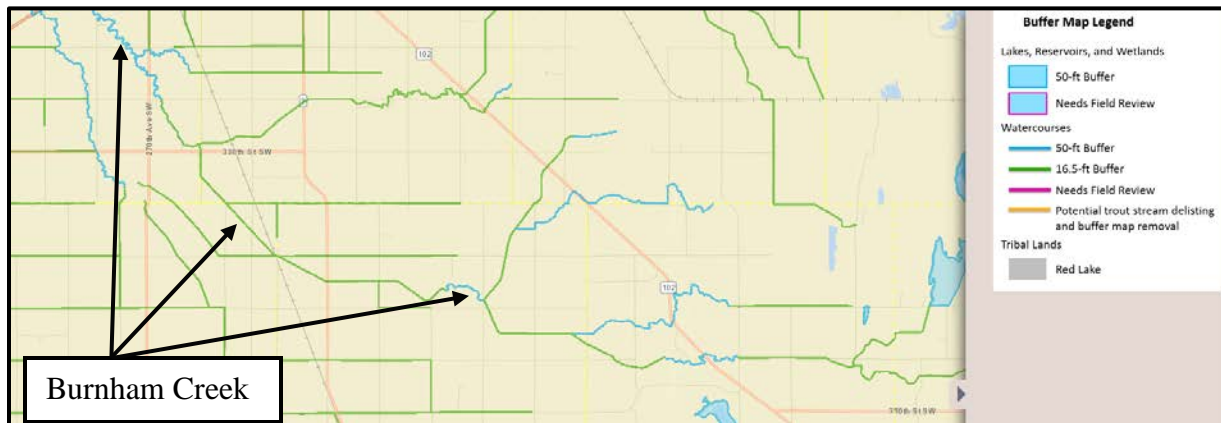
- 2006-2015 Mud River E. coli data was assessed. The reach is being considered for delisting. The reach as a whole still meets the E. coli standard. The long-term monitoring site at Hwy 89 (S002-078) meets the standard. However, recent sampling has found high concentrations in and near the City of Grygla that could cause the river to remain on the List of Impaired Watershed due to an E. coli impairment. Regular samples were collected from the CSAH 54 crossing of the Mud River and from the city park. Water was also tested for blue-green algae. No positive test results for blue-green algae were discovered.

August 2016 Meetings and Events

- **August 3, 2016** – Buffer Law workshop at the Ralph Engelstad Arena in Thief River Falls
 - Overview of 2016 buffer statute clarifications
 - A roadside ditch is not necessarily a public ditch
 - (Legal) water accesses are allowed
 - Roads/trails are acceptable
 - Alfalfa is compliant
 - Tillage is okay if it is only temporary (for planting).
 - “Other waters” are not required to have a buffer under the law, but buffers may be required under local ordinances.
 - There are means for compensating landowners for adding buffers along public waters, even retroactively.
 - Buffers along public waters need to be installed by November 1, 2017.
 - Buffers along ditches need to be installed by November 1, 2018.
 - BWSR is working on an “Administrative Penalty Order Plan” to deal with noncompliance.
 - Alternative practices may be used instead of a buffer, but they must provide a comparable water quality benefit.
 - Mapping process; DNR & Local government units roles and timelines
 - DNR staff had reviewed 2,600 comments and made 1,400 changes at the time of the workshop.
 - Many channels no longer exist.
 - Some channels have been replaced with tile.
 - Noticed in a quick review of the map:
 - Despite being a natural stream, the inlet to Puposky Lake is not being protected as a public water and is only required to have a 16.5 foot buffer. The natural watercourses connecting Puposky Lake to Crane Lake and Strand Lake also received just the minimal, 16.5-foot buffer, amount of protection.
 - There was a portion of the natural portion Lost River that was given 16.5 feet of protection instead of 50 feet. This has been fixed.
 - Some significant streams are not sufficiently protected by the law (from a water quality and biological integrity point of view) because they have not received DNR shoreland classification. Channelized portions of Burnham Creek and the Black River are only required to have a 16.5-foot buffer, even on sections that are bracketed by natural reaches that require a 50-foot buffer. The application of buffer requirements along Burnham Creek is remarkably discontinuous.

RED LAKE WATERSHED DISTRICT MONTHLY WATER QUALITY REPORT

August 2016



- Buffer program policies and timelines
- Compliance and Enforcement: Options and Process for Electing Jurisdiction for Counties and Watershed Districts
 - Discussion about whether residents would be better served by state or local staff.
 - There needs to be coordination between counties and watershed districts to decide who will hold jurisdiction over which watercourse. Avoid overlapping jurisdiction. Each waterbody should be under the jurisdiction of only one organization.
 - There is a March 31, 2017 deadline for counties and watershed districts to notify BWSR of their enforcement intentions.
 - Answer could be dependent upon funding.
 - LGUs can still opt-in after March 31, 2017.
 - LGUs need to opt-in by July 2, 2017 to receive buffer enforcement funding.
- Financial Resources for Buffer Implementations
- Local Implementation and Coordination

Red Lake Watershed District Monthly Water Quality Reports are available online at:

<http://www.redlakewatershed.org/monthwq.html>.

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