

# RED LAKE WATERSHED DISTRICT MONTHLY WATER QUALITY REPORT

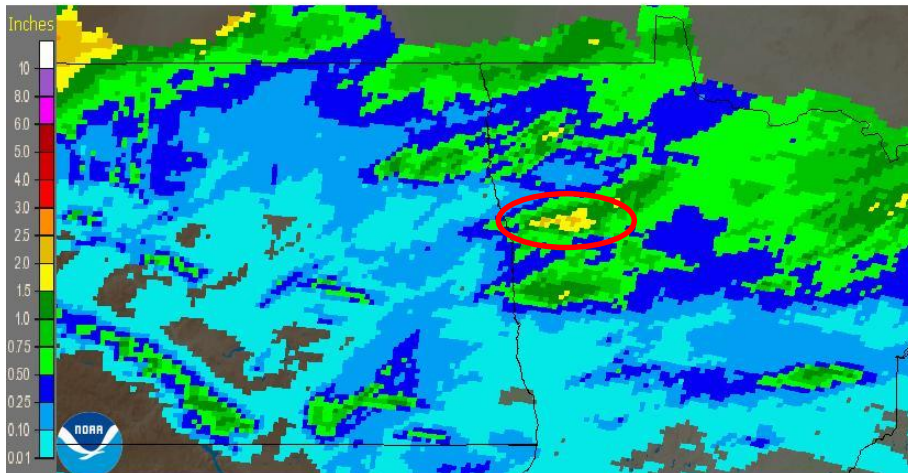
June 2015

By Corey Hanson, Red Lake Watershed District Water Quality Coordinator. July 30, 2015.

## June 3<sup>rd</sup>, 2015 Runoff

An area north of Highway 2, east of Gentilly, west of Brooks, and south of Red Lake Falls was subjected to an intense rainfall event in the early morning hours of June 3<sup>rd</sup>, 2015. Rainfall amounts greater than 5 inches were reported. The circled area on the following 24-hour rainfall map from the National Weather Service shows the size of area that was hit by the storm. Cyr Creek high enough to be flowing over Highway 32. In lower Badger Creek, the water was so high that it covered the top of the dissolved oxygen logger deployment pipe and it couldn't be retrieved until a later day. Even if the top of the deployment pipe was reachable under the water, it was impossible to see even inches into the muddy water. There was so much sediment in Lower Badger Creek that the water looked black and smelled like a freshly plowed field or a freshly tilled garden. Water was also black with sediment in Terrebonne Creek, Beau Gerlot Creek, and the Hill River.

Eastern North Dakota/Grand Forks, ND (FGF): 6/3/2015 1-Day Observed Precipitation  
Valid at 6/3/2015 1200 UTC- Created 6/12/15 8:37 UTC

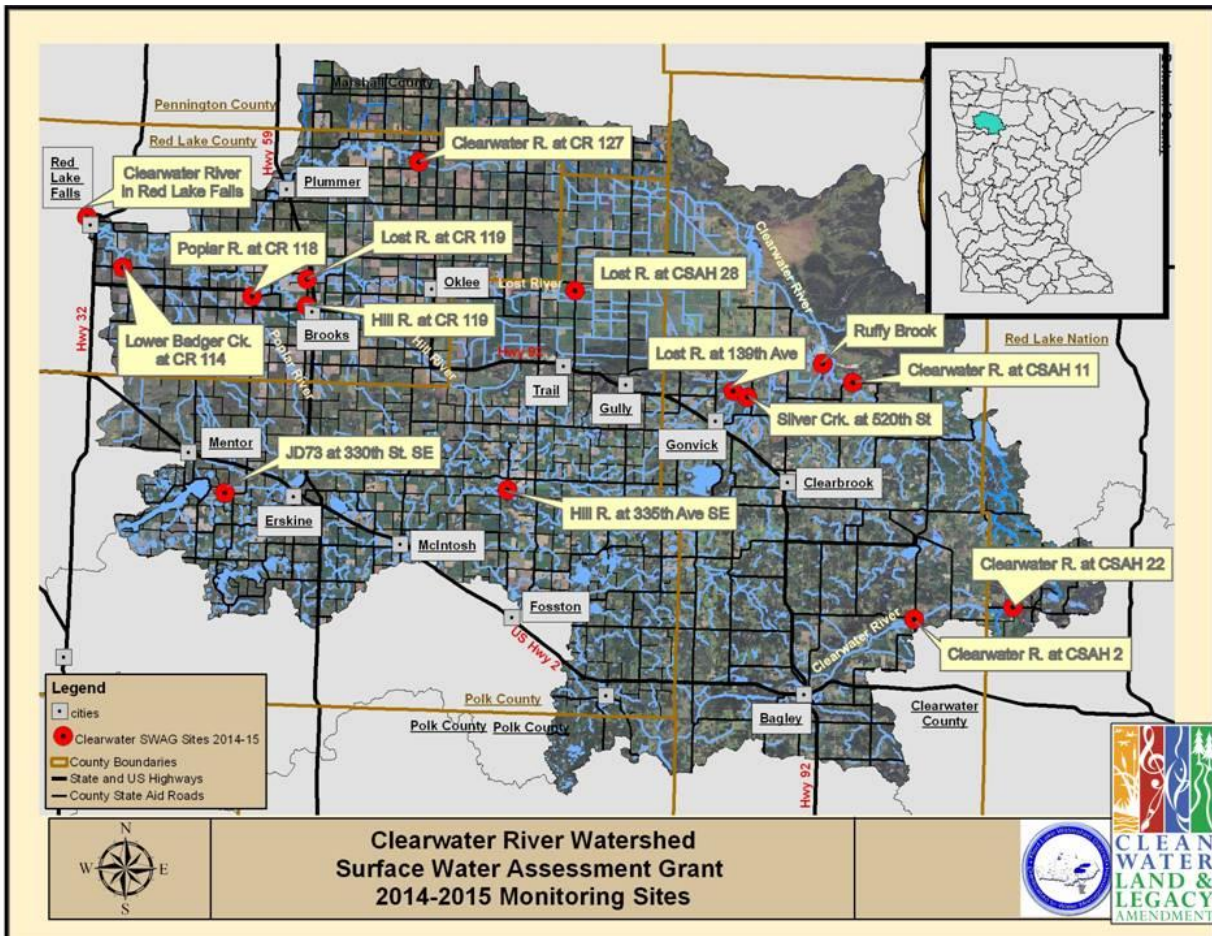


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## Clearwater River Surface Water Assessment Grant (SWAG)

Red Lake County, Clearwater County, and East Polk County Soil and Water Conservation staff resumed sampling for the Clearwater River SWAG in early June. Two rounds of samples will be collected at sites in each month of June, July, and August in 2015. An additional set of samples will be collected in the Lost River at CSAH 28, JD73 near Rydell National Wildlife Refuge, and the Hill River at 335<sup>th</sup> Ave to make up for a round of samples that was missed in June 2014. The SWAG project will pay for staff time, supplies, shipping, and E. coli analysis in 2015.



The dissolved oxygen probe on the East Polk SWCD's YSI sonde needed to be replaced.

High E. coli concentrations were found in:

- Hill River at 335<sup>th</sup> Ave
- JD73 near Rydell National Wildlife Refuge
- Lost River at 139<sup>th</sup> Ave
- Silver Creek at 520<sup>th</sup> Street
- Lost River at CSAH 28
- Lower Badger Creek (2 days, including RLWD sample results)

- Hill River near Brooks (2 days in June including RLWD sampling results)

High total suspended solids concentrations (relative to the State's proposed 30 mg/l and 15 mg/l standards) were found in:

- Lower Badger Creek (82 mg/l on 6/8/15)
- Lost River, north of Brooks (37 mg/l on 6/8/15)
- Clearwater River at County Road 127, east of Plummet (51 mg/l on 6/8/15)

### **Clearwater River Watershed Restoration and Protection (WRAP) Project**

- Objective 1 – Evaluation of Existing Data

2005-2014 monitoring data was assessed by RLWD staff using MPCA methods and water quality standards (including the proposed total suspended solids and river eutrophication standards). Total suspended solids, total phosphorus, biochemical oxygen demand, and dissolved oxygen flux water quality standards are going to differ by region. The maps available in supporting documentation from the MPC aren't detailed enough to be certain of which region's standards will be applied to every single reach. All of the analysis work was saved and the applied standards are documented in the table into which the results were compiled. So updates can be made easily if needed. Disclaimer: this is a local assessment of current water quality conditions for informational purposes and has no bearing upon the impairment status of any of these reaches. It will serve as a preview for the 2016 official water quality assessment by the Minnesota Pollution Control Agency (MPCA) that will assess 2006-2015 water quality data. It gives us a "heads-up" on areas that are lacking data and areas where more data should be collected during the remainder of the 2015 monitoring season in order to assess as many reaches as reasonably possible during the 2016 assessment.

A total of 101 reaches (a.k.a. assessment units, a.k.a. AUIDs) were examined for this assessment. Reaches in need of additional sampling were identified from this analysis.

- The Terrebonne Bridge monitoring site on the Clearwater River (S002-914) should be targeted for some extra sampling to get more data for the Lost River to Beau Gerlot Creek reach of the Clearwater River (09020305-511). E. coli levels are close to exceeding the standard. More E. coli samples should be collected to increase confidence in the assessment. More dissolved oxygen data is also needed from this reach to prove that it is meeting the water quality standards for that parameter.
- The Hill River upstream on Hill River Lake has some high E. coli readings, but insufficient data for an assessment. The minimum data requirements should be met by the Clearwater River Surface Water Assessment Grant project (09020305-539). This reach also needs more total suspended solids data to conduct an assessment. TSS data looks okay so far, but a minimum amount of data is needed to prove that it is meeting the standard.
- Polk County Ditch 14 (Maple Lake Outlet) from Maple Lake to Lower Badger Creek needs some extra sampling in the month of September because the E. coli geometric mean is very borderline at 125.6 CFU/100ml.

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- Clear Brook had a borderline E. coli geomeans of 134.2 CFU/100ml. It was sampled again in 2015 and had an E. coli concentration of 166.4 CFU/100ml that supports an impairment designation.
- Brooks Creek could use some additional E. coli data (09020305-578) and dissolved oxygen data.
- JD73 between Badger Lake and Mitchell Lake needs more sampling data for E. coli and total suspended solids. There are high readings that are cause for concern for both of those parameters.
- There is insufficient data for an assessment, but high total suspended solids concentrations have been recorded in the upper reaches of Clear Brook, a tributary of Silver Creek that runs through the town of Clearbrook, (AUID 09020305-572, Site S004-046, 470<sup>th</sup> Street crossing) and there is cause for concern there.
- The Lost River upstream of Pine Lake (09020305-529) needs some extra E. coli and BOD samples.
- Sampling should resume along Walker Brook (9020305-509). Total phosphorus data and biochemical oxygen demand data are needed to conduct an assessment using river nutrient eutrophication criteria.
- Additional dissolved oxygen data is needed to increase confidence in a borderline dissolved oxygen assessment.

Data shows that the Clearwater River reach from Ruffy Brook to the Lost River may still be a candidate for delisting. The August E. coli geometric mean is uncomfortably close to exceeding the 126 CFU/100ml chronic standard at 122.7 CFU/100ml.

The Lost River (Anderson Lake to Hill River) is still meeting the E. coli and dissolved oxygen standards. That reach is also meeting the 30 mg/l total suspended solids standard.

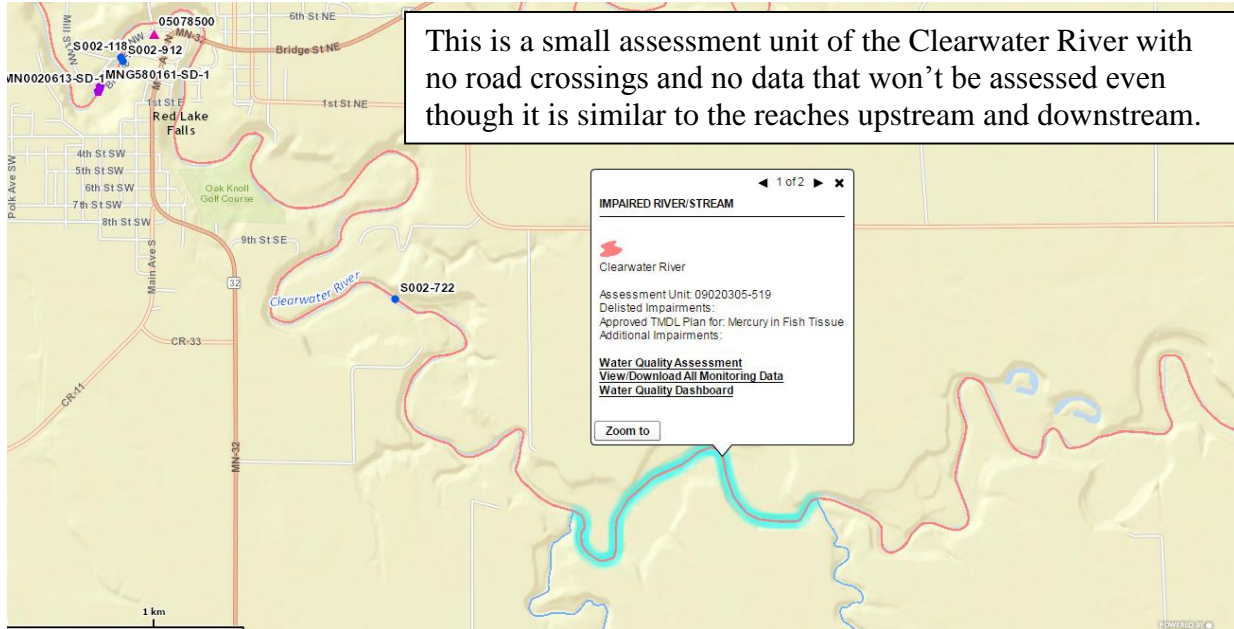
The Lost River is split at the Hill River confluence. So, there are reaches of the Lost River between the Hill River and the Poplar River and between the Poplar River and the Clearwater River that have no recent data. The amount of sand being moved by the channel appears to increase as the Lost River gets closer to the Clearwater River. So, some additional data collection at the County Road 118 crossing (S002-728) may be beneficial. There are no crossings between the Lost River's Polar River and Clearwater River confluences but that section of the river is designated as a separate assessment unit.

The MPCA's methods for creating assessment units (AUIDs) seem inconsistent. Some of the splits and designations will conflict with the State's goal of assessing all of the state's waters. On one hand, the Clearwater River from Ruffy Brook to the Lost River (58.47 miles) is designated as a single assessment unit, even though there are distinct differences between the channelized portion of that reach and the natural channel portion of that reach. On the other hand, the lower, more homogenous, reach of the Clearwater River (20.63 miles, total) is split into three separate reaches. One of those reaches, from Beau Gerlot Creek to Lower Badger Creek, has no crossings and therefore has no water quality data. This reach will never be assessed, even though it is similar enough to neighboring reaches to be combined with at least one of them. Many small,

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unnamed creeks, tributaries, and ditches are designated as assessment units within the Clearwater River watershed. Sixty-one of these AUIDs have no data at all. Sixty-eight AUIDs in the Clearwater River watershed have fewer than 20 days with water quality data (the minimum number of measurements for conventional parameters is 20).



The Clearwater River, in all assessable reaches downstream of Ruffy Brook, fails to meet the **30 mg/l water quality standard of total suspended solids**. Here are all of the reaches that are currently not meet the 30 mg/l total suspended solids standard:

- Clearwater River from Lower Badger Creek to the Red Lake River (AUID 09020305-501)
- Clearwater River from the Lost River to Beau Gerlot Creek (AUID 09020305-511)
- Clearwater River from Ruffy Brook to the Lost River (AUID 09020305-510)

There were reaches that may have to meet a more protective standard for total suspended solids. All of the reaches that may have to meet the **15 mg/l total suspended solids standard**, and had enough data for an assessment, seem to be meeting that standard. There are a couple of reaches where the exceedance rate is in the upper single digits and may be streams that should be targeted for protection efforts.

- Ruffy Brook from the headwater to the Clearwater River (AUID 09020305-513)
- The trout stream reach of the Clearwater River (AUID 09020305-516)

Assessments for E. coli are conducted by first calculating daily geometric means for each AUID ( $n$ th root of the product of the values). Then, using the most recent 10 years of data (2005-2014 in this case), geometric means are calculated for each calendar month. The river/stream/ditch cannot exceed 126 CFU/100ml in a calendar month, especially during months of May through September when aquatic recreation is most likely to occur. There is an acute standard of 1,260

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CFU/100ml that is applied like conventional parameters in that an exceedance rate greater than 10% triggers an impairment. There are a number of reaches in the Clearwater River watershed that fail to meet this standard. Some reaches also have months that are close to exceeding the standard. There are some reaches that don't yet have the minimum number of samples, but are areas of concern because high E. coli concentrations have been found in the limited number of samples that have been collected there. Extra sampling is recommended for those reaches.

<b>Assessment of Clearwater River Stream Data from 2005 through 2014 - Exceedances of the E. coli Standard</b>								
<u>River</u>	<u>AUID</u>	<u>Reach</u>	<u>May E. coli</u>	<u>June E. coli</u>	<u>July E. coli</u>	<u>Aug. E. coli</u>	<u>Sept. E. coli</u>	<u>E. coli Years</u>
Impairment Thresholds and Years Covered by the 2015 Assessment:			126	126	126	126	126	2004-2014
Lower Badger Crk	09020305-502	CD 14 to Clearwater R	28.1	129.0	188.7	55.2	118.5	2008-14
Poplar River	09020305-504	Highway 59 to Lost R	27.9	119.8	224.6	120.3	70.0	2005-2014
Ruffy Brook	09020305-513	Headwaters to Clearwater R	152.3	310.3	195.6	199.6	194.7	2005-2014
Beau Gerlot Creek	09020305-520	Upper Badger Cr to Clearwater R	22.2	90.3	722.3	212.4	56.7	2008-10
Unnamed Creek (Clear Brook)	09020305-526	Headwaters to Silver Cr	34.4	134.2	98.5	64.9	No data	2007-2014
Silver Creek	09020305-527	Headwaters to Anderson Lk	35.1	235.6	390.0	358.9	159.8	2005-2014
Lost River	09020305-529	T148 R38W S17, south line to Pine Lk	IF, OK	89.0	146.1	IF, OK	IF, concern	2005-2014
Lost River	09020305-530	Unnamed cr to T148 R38W S20, north line	28.2	67.6	81.0	159.5	67.3	2009-2010
Hill River	09020305-539	Hill River Lk to Lost R	35.7	346.1	305.8	203	130.5	2005-2014
Hill River	09020305-539	Cross Lk to Hill River Lk	IF, 3.1	IF, 52.5	IF, 86.5	IF, 108.6	IF, 149	2014
Unnamed Creek (JD73)	09020305-542	Mitchell Lk to Badger Lk	IF	IF	IF	IF, concern	IF	2005-06
Poplar River Diversion	09020305-543	Unnamed ditch to Badger Lk	IF, 25.8	IF, 128.8	IF, 28.8	IF, 387.3	IF, 56.1	05, 06, 14
Unnamed creek (Nassett Creek)	09020305-545	T148 R38W S28, south line to Lost R	33	IF, 277.8	300.8	IF, 279.9	113.6	2009-2010
Judicial Ditch 73	09020305-550	Unnamed ditch to Tamarack Lk	IF, 10.2	IF, 129.5	IF, 125.1	IF, 1081.9	IF, 837	2014
Unnamed Creek (Clear Brook Tributary)	09020305-572	Headwaters to Unnamed cr (Clear Brook)	No data	IF	No data	No data	IF, concern	2007-2014
Terrebonne Creek	09020305-574	CD 4 to CD 58	30.7	IF, 349.9	614.1	IF, 287.4	300.1	2008-2010
Brooks Creek	09020305-578	Unnamed cr to Hill R	IF, 63.9	IF, 184.4	IF, 173.9	IF, 288.5	IF, 181.4	2011, 2012
<b>IF = Insufficient data. Data exists, but not in the quantity needed to assess the reach</b>								
<b>IF, Concern - Insufficient data to assess, but some of the few values collected fail to meet the water quality standard</b>								

Four parameters are used to assess rivers and streams for eutrophication: total phosphorus (TP), chlorophyll-a, biochemical oxygen demand (BOD), and daily dissolved oxygen fluctuation (DO Flux).

- TP standard = 0.05 mg/l in the North Region and 0.10 mg/l in the Central Region
- Chlorophyll-a = 7 mg/l in the North Region and 18 mg/l in the Central Region. (not commonly sampled within rivers)
- BOD standard = 1.5 mg/l in the North Region and 2 mg/l in the Central Region
- DO Flux standard = 3 mg/l in the North Region and 3.5 mg/l in the Central Region

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**Assessment of Clearwater River Stream Data from 2005 through 2014 - Exceedances of Eutrophication Standards**

River	AUID	Reach	TP	TP Std (mg/l)	Chl-a	Chl-a Std (µg/l)	BOD	BOD Std (mg/l)	DO Flux	DO Flux Std
<b>Impairment Thresholds and Years Covered by the 2015 Assessment:</b>			<b>10%</b>	<b>.05/.1/.15</b>	<b>10.0%</b>	<b>7/18/35</b>	<b>10%</b>	<b>1.5/2/3</b>	<b>10.0%</b>	<b>3/3.5/4.5</b>
Clearwater River	09020305-501	Lower Badger Cr to Red Lake R	37.2	0.100	0%	18	No data	2.0		3.5
Clearwater River	09020305-510	Ruffy Bk to Lost R	49.7%	0.100	No data	18	38.2%	2.0	30.1%	3.5
Lost River	09020305-507	Anderson Lk to Hill R	13.9%	0.100	No data	18	No data	2.0	No data	3.5
Hill River	09020305-539	Hill River Lk to Lost R	63.6%	0.100	No data	18	No data	2.0	No data	3.5
Clearwater River	09020305-517	Headwaters to T148 R36W S36, east line	53.8%	0.050	No data	7	100%/27.8%	1.5/2		3
Silver Creek	09020305-527	Headwaters to Anderson Lk	62.5%	0.100	No data	18	No data	2.0	66.4%	3.5
Clearwater River	09020305-516	T148 R35W S31, west line to Clearwater Lk	37.8%	.05, Apr-Sept	No data	7	No data	1.5	45.6%	3
Lost River	09020305-529	T148 R38W S17, south line to Pine Lk	25.0%	0.100	No data	18	16.7%	2.0	55.7%	3.5
Poplar River	09020305-504	Highway 59 to Lost R	80.5%	0.100	No data	18	18.2%	2.0	9.3	3.5
Poplar River	09020305-504	Spring Lk to Highway 59	62.8%	0.100	No data	18	No data	2.0	63.7	3.5
Walker Brook	09020305-509	Walker Brook Lk to Clearwater R	IF, concern	0.050	No data	7	No data	1.5	No data	3
Ruffy Brook	09020305-513	Headwaters to Clearwater R	82.6%	0.050	No data	7	No data	1.5	38.3%	3
Lost River	09020305-512	Pine Lk to Anderson Lk	2.1%	0.100	No data	18	No data	2.0	51.9%	3.5
Poplar River Diversion	09020305-543	Unnamed ditch to Badger Lk	IF, concern	0.100	No data	18	No data	2.0	No data	3.5
County Ditch 57	09020305-508	Unnamed ditch to Clearwater R	25.0%	0.100	No data	18	No data	2.0	30.6%	3.5
Hill River	09020305-539	Cross Lk to Hill River Lk	60.0%	0.100	No data	18	No data	2.0	No data	3.5
Clearwater River	09020305-511	Lost R to Beau Gerlot Cr	48.5	0.100	No data	18	No data	2.0	No data	3.5
Terrebonne Creek	09020305-574	CD 4 to CD 58	20.0%	0.100	No data	18	No data	2.0	No data	3.5
Unnamed Creek (Clear Brook)	09020305-526	Headwaters to Silver Cr	75.0%	0.050	No data	7	No data	1.5	No data	3
Brooks Creek	09020305-578	Unnamed cr to Hill R	IF, OK	0.100	No data	18	No data	2.0	No data	3.5
Unnamed Creek (Clear Brook Tributary)	09020305-572	Headwaters to Unnamed cr (Clear Brook)	76.5%	0.050	No data	7	No data	1.5	No data	3
Unnamed creek	09020305-569	Headwaters to Maple Lk	IF, concern	0.100	No data	18	No data	2.0	No data	3.5
Unnamed creek	09020305-570	Unnamed cr to Maple Lk	IF, concern	0.100	No data	18	No data	2.0	No data	3.5

**IF** = Insufficient data. Data exists, but not in the quantity needed to assess the reach  
**IF, Concern** - Insufficient data to assess, but some of the few values collected fail to meet the water quality standard  
**IF, OK** = Insufficient data for assessment, but enough to indicate that the reach is meeting the standard  
**No data** = No data for this parameter is available in EQUIS

Dissolved oxygen is necessary for the support of aquatic life. The standard is based upon the daily minimum dissolved oxygen values. Most warm water streams and rivers need to maintain a concentration of 5 mg/l for 90% of the days for which data is collected. Cold water fisheries (trout streams) need to meet a more protective standard of 7 mg/l. Dissolved oxygen typically reaches its daily minimum level in the early morning hours. The MPCA requires a certain number of measurements taken prior to 9 am in order to prove that a reach is meeting the standard. Ideally, dissolved oxygen loggers can be deployed to record dissolved oxygen levels at regular intervals. These loggers record the true daily minimum and maximum dissolved oxygen levels. The daily minimum concentrations can be subtracted from the daily maximum concentrations to calculate daily dissolved oxygen fluctuation. Data from dissolved oxygen loggers (within the 2005-2014 window of time) is available from 11 of the assessment units in the Clearwater River watershed. At least 10 additional sites are being monitored with dissolved oxygen loggers in 2015. The sites that have data available for an assessment of pre-9am data were either monitored with deployed dissolved oxygen loggers or are close enough to the RLWD office to allow for pre-9am discrete measurements. Water quality sampling does not start until 11 AM due to the time due to a 24-hour holding time for E. coli samples and the timing of overnight

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shipping deliveries of samples to RMB Environmental Laboratories. So, special efforts are needed in order to visit sites prior to 9 am to measure dissolved oxygen levels. The WRAP project provides some funding for those efforts. The following table lists the reaches in which potential dissolved oxygen impairments were identified.

<b>Assessment of Clearwater River Stream Data from 2005 through 2014 - Potential Dissolved Oxygen Impairments</b>						
River	AUID	Reach	DO12 All (EQuIS)	DO5 All (EQuIS)	DO5 9am	DO7 All (EQuIS)
<b>Impairment Thresholds and Years Covered by the 2015 Assessment:</b>			<b>10.0%</b>	<b>10.0%</b>	<b>10.0%</b>	<b>10.0%</b>
Poplar River	09020305-504	Highway 59 to Lost R	2.1%	2.6	37.4	0.0
Poplar River	09020305-504	Spring Lk to Highway 59	12.8%	17.0	57.6	0.0
County Ditch 57	09020305-508	Unnamed ditch to Clearwater R	30.4%	31.0%	84.4%	0.0%
Walker Brook	09020305-509	Walker Brook Lk to Clearwater R	65.7%	83.1%		21.4%
Ruffy Brook	09020305-513	Headwaters to Clearwater R	0.0%	0.0%	10.5%	0.0%
Clearwater River	09020305-516	T148 R35W S31, west line to Clearwater Lk	0.0%	0.0%	16.5%	0.0%
Clearwater River	09020305-517	Headwaters to T148 R36W S36, east line	40.0%	45.2%		22.2%
Unnamed Creek (Clear Brook)	09020305-526	Headwaters to Silver Cr	44.4%	52.2%	No data	0.0%
Silver Creek	09020305-527	Headwaters to Anderson Lk	1.1%	1.4%	28.8%	0.0%
Lost River	09020305-529	T148 R38W S17, south line to Pine Lk	22.3%	28.9%	86.3%	3.4%
Lost River	09020305-530	Unnamed cr to T148 R38W S20, north line	46.3%	39.5%	IF	72.7%
Hill River	09020305-539	Cross Lk to Hill River Lk	12.5	17.4	No data	66.7%
Unnamed Creek (Bee Lake Inlet)	09020305-541	Eighteen Lk to Bee Lk	18.2%	25.5%	IF	0.0%
Unnamed Creek (JD73)	09020305-542	Mitchell Lk to Badger Lk	12.8%	17.0%	IF	0.0%
Poplar River Diversion	09020305-543	Unnamed ditch to Badger Lk	27.7%	35.8	IF	0.0
Judicial Ditch 73	09020305-550	Unnamed ditch to Tamarack Lk	31.9%	40.5	No data	IF, OK
Unnamed creek (Bee Lake Outlet)	09020305-551	Bee Lk to JD 73	18.3%	25.6%	IF	0.0%
Unnamed creek	09020305-569	Headwaters to Maple Lk	IF, concern	IF, concern	No data	No data
Unnamed Creek (Clear Brook Tributary)	09020305-572	Headwaters to Unnamed cr (Clear Brook)	41.7%	50.0%	No data	0.0%
Unnamed Ditch	09020305-638	Unnamed ditch to Clearwater River	61.5%	66.7%	IF	IF
Unnamed Creek	09020305-639	Lk Lomond to Clearwater R	72.7%	80.0%		IF
<b>IF = Insufficient data. Data exists, but not in the quantity needed to assess the reach</b>						
<b>IF, Concern - Insufficient data to assess, but some of the few values collected fail to meet the water quality stan</b>						
<b>IF, OK = Insufficient data for assessment, but enough to indicate that the reach is meeting the standard</b>						
<b>No data = No data for this parameter is available in EQuIS</b>						
<b>DO12 = All discrete dissolved oxygen measurements from all 12 months of January through December (% of daily</b>						
<b>DO5 = Dissolved oxygen over the 5 summer months of May through September (% &lt;5 mg/l)</b>						
<b>DO7 = Dissolved oxygen over the 7 cooler months of October through April (% &lt;5 mg/l)</b>						
<b>DO5 9am = Dissolved oxygen measurements collected during the months of May through September prior to 9am plus any low readings observed during those months (daily minimum would definitely fall below 5 mg/l if</b>						



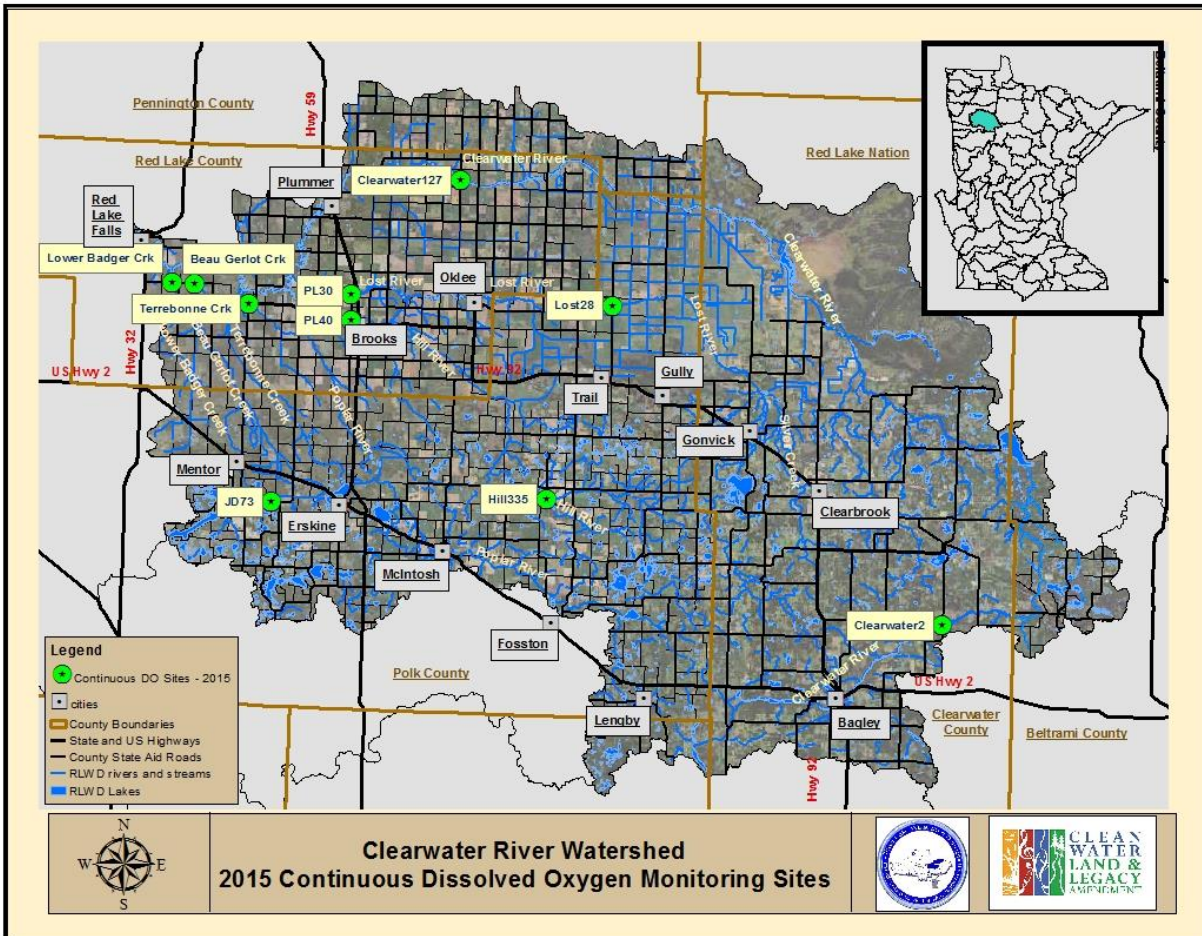
Un-ionized ammonia is the toxic form of ammonia. The percentage of total ammonia that is in the un-ionized form increases with temperature and pH levels (an equation is used to determine the percentage of a sample that may be in the un-ionized form). The standard for most warm-water rivers and streams is 0.04 mg/l, but cold-water streams must meet a more protective standard of 0.016 mg/l. No impairments were found for this parameter in 2005-2014 data collected within the Clearwater River watershed. The trout stream reach of the Clearwater River (09020305-516) is currently listed as impaired for un-ionized ammonia. However, more recent data (2005-2014) shows that the reach is no longer exceeding the water quality standard and is a reach that should be delisted from the 303(d) List of Impaired Waters.

- Objective 2 – Water Quality Sampling
  - Additional parameters will be added to the suite of parameters that are analyzed for samples that are collected for the Clearwater River Surface Water Assessment Grant at sites at which dissolved oxygen loggers are deployed.
- Objective 3 – Flow Monitoring
  - 16.1 CFS of flow was measured in the Poplar River at CSAH 30 near Fosston on June 15, 2015.
  - 33.8 CFS of flow was measured in the Poplar River at CR 118 on June 15, 2015.
  - 132 CFS of flow was measured in Lower Badger Creek on June 9, 2015.
  - 49.1 CFS of flow was measured in Beau Gerlot Creek on June 9, 2015.
  - June rainfall and runoff events washed out the beaver dam on Lower Badger Creek that was artificially raising water levels and adding difficulty to the eventual calculation of flows based upon water levels.
- Objective 4 – Continuous Dissolved Oxygen Monitoring



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- Dissolved oxygen loggers were deployed at 9 sites at the beginning of May
  - Lower Badger Creek at CR114
    - All dissolved oxygen measurements were  $>7$  mg/l in the first half of June (6/5/2015 – 6/17/2015)
    - All dissolved oxygen readings were greater than 5 mg/l during the latter half of the month of June (6/18/2015 – 6/29/2015).
  - Terrebbonne Creek at Hwy 92
    - All dissolved oxygen readings were greater than 5 mg/l throughout the month of June.
  - Judicial Ditch 73 by Rydell National Wildlife Refuge
    - There were a couple of days during the first half of June in which dissolved oxygen fell below 5 mg/l.
    - Dissolved oxygen levels in the latter half of the month of June fell below 5 mg/l more frequently.

- Hill River at 335<sup>th</sup> Ave
  - There were 2 days in the first half of June 2015 in which dissolved oxygen concentrations dipped below 5 mg/l in the Hill River upstream of Hill River Lake.
  - In the latter half of June, all of the dissolved oxygen readings in this part of the Hill River were greater than then the 5 mg/l water quality standard.
- Clearwater River at CSAH 2
  - There were some low dissolved oxygen readings during the first half of June. The deployment pipe needed to be cleaned, so sediment may have negatively affected dissolved oxygen readings.
  - In the latter half of June, the dissolved oxygen record showed that the pipe quickly filled with sediment and caused dissolved oxygen readings to crash. Dissolved oxygen readings temporarily improved after a mid-deployment cleaning, but the pipe quickly filled with sediment. The deployment pipe was then moved to a spot in the channel that will be less susceptible to sedimentation and should have more water movement past the sensors. Dissolved oxygen readings improved greatly after the move.
- Lost River at CSAH 28
  - In the first half of June, this portion of the Lost River was able to maintain dissolved oxygen levels greater than 5 mg/l for all but one day.
  - In the latter half of June, dissolved oxygen levels began to fall below 5 mg/l near the end of the 4<sup>th</sup> deployment at this site.
- Clearwater River at County Road 127
  - Dissolved oxygen readings crashed in mid-June, during the latter part of the 3<sup>rd</sup> deployment at this site.
  - All of the dissolved oxygen readings taken during the latter half of June in this part of the Clearwater River were greater than 5 mg/l.
- Hill River at County Road 119, north of Brooks
  - In the first half of June, dissolved oxygen readings at this site were great during the first few days of the third dissolved oxygen logger deployment at this site, then the readings may have been affected by sedimentation.
  - The deployment pipe was cleaned
  - During the 4<sup>th</sup> deployment at this site, in the latter half of June, all dissolved oxygen readings were above the 5 mg/l threshold.
- Lost River at County Road 119, north of Brooks
  - The deployment pipe was cleaned. There was a lot of very long strands of filamentous algae in the channel. A bunch of algae had accumulated on the deployment pipe.
  - All dissolved oxygen readings in the 3<sup>rd</sup> and 4<sup>th</sup> dissolved oxygen logger deployments at this site (June 5<sup>th</sup> through June 29<sup>th</sup>).

**RED LAKE WATERSHED DISTRICT  
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- MPCA staff provided RLWD staff with dissolved oxygen data that was collected using a dissolved oxygen logger deployed in the Clearwater River in Red Lake Falls (Site S002-118 at the Klondike Bridge) in August and September of 2014. Dissolved oxygen levels were great at this site. The lowest reading was 7.31 mg/l, which is better than the 7 mg/l water quality standard for trout streams.
- Objective 6 – Stressor and Pollutant Source Identification
  - Photos of erosion were taken during monitoring. Some sites were identified where side water inlets should be installed to reduce gully erosion. There are many miles of road ditches within the Clearwater River watershed with almost no vegetative buffer, especially in the western half of the watershed.



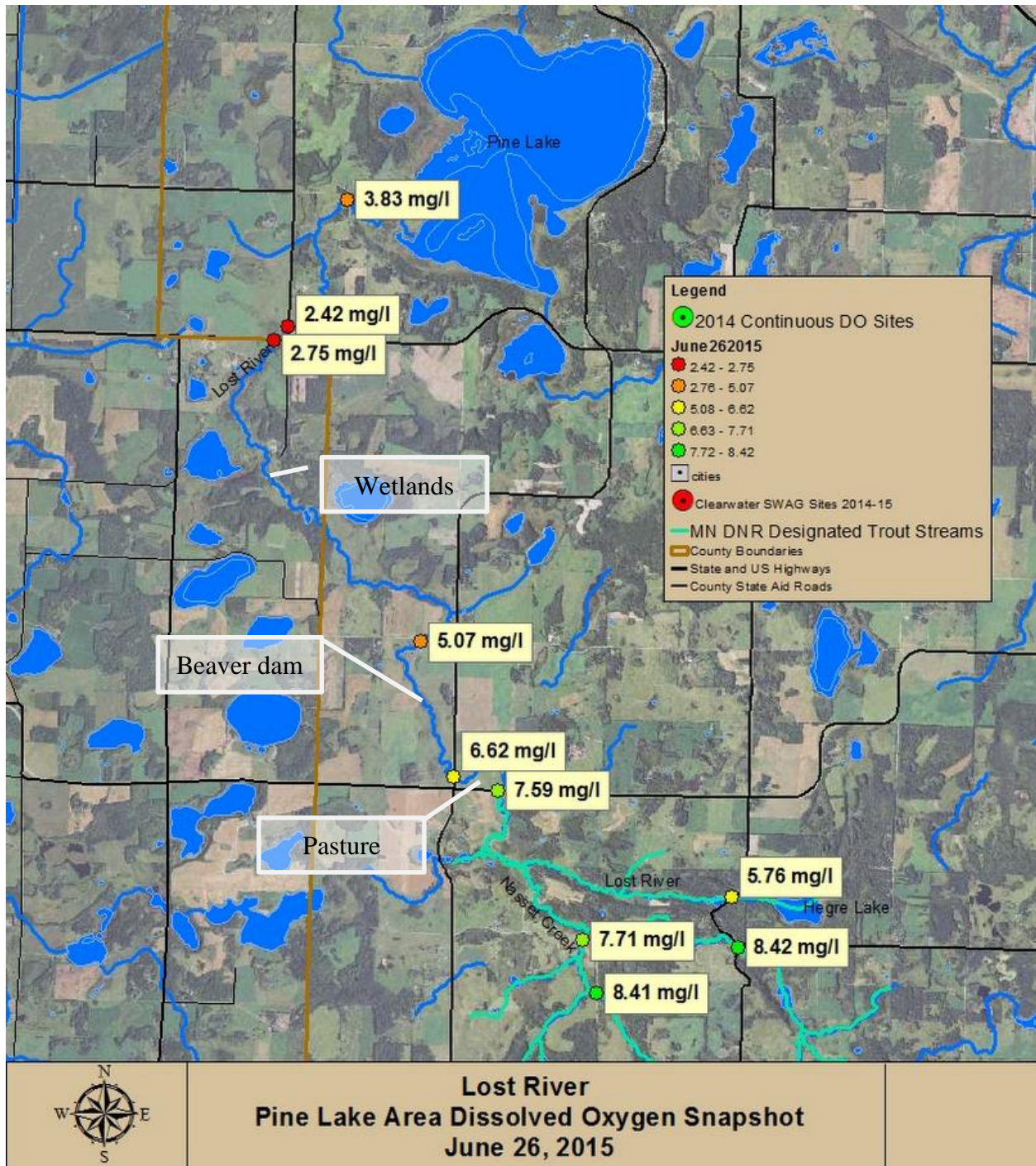
- A large number of cliff swallows were living under the CR119 Bridge over the Lost River. Their droppings regularly plopped into the river as they flew around when they were observed on June 25, 2015.



- Longitudinal dissolved oxygen measurements were collected in the Lost River and Nasset Brook upstream of Pine Lake to determine the extent of the dissolved oxygen problem. Dissolved oxygen levels ranged from a low of 2.42 mg/l upstream of Pine Lake to highs of 8.41 and 8.42 mg/l in the upper, designated trout stream reaches of Nasset Creek and the Lost River. Pasture, beaver dams, and riparian wetlands are identifiable as potential causes of decreases in dissolved oxygen along this section of the Lost River.

# RED LAKE WATERSHED DISTRICT MONTHLY WATER QUALITY REPORT

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- Objective 9 – Civic Engagement
  - Clearwater River Watershed information can be found at:  
<http://www.rlwdwatersheds.org/cw-watershed>

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

**RED LAKE WATERSHED DISTRICT  
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- Task 1 – Evaluation of Existing Data
  - Assessment results (5 exceedances, geometric means, etc.) for the Red Lake River and the Grand Marais Creek watersheds were compiled into a table. Those results were then used to identify sites that were the closest to being restored (greater than, but close to the impairment threshold) and those that are in the most danger of becoming impaired (below, but closest to the impairment threshold). The information in these tables can be used for both the Red Lake River and Grand Marais Creek WRAP projects and for the One Watershed One Plan process.

<b>Top Five Reaches Needing Protection to Avoid Impairment by E. coli Bacteria (2004-2014)</b>			
<u>River</u>	<u>Reach</u>	<u>AUID</u>	<u>Maximum Monthly Geomean</u>
Red Lake River	County Ditch 96 to Clearwater R	09020303-504	121.3
Black River	Headwaters to -96.4328 48.0146	09020303-557	114.2
Unnamed ditch (Little Black River)	Unnamed ditch (Headwaters) to Little Black R	09020303-527	103.8
RLWD 15 (Brandt Channel)	Headwaters to CD 66	09020306-509	98.4
Red Lake River	Black R to Gentilly R	09020303-502	97.4

<b>Top Five Reaches Impaired by E. coli Bacteria that are Closest to Being Restored (2004-2014)</b>			
<u>River</u>	<u>Reach</u>	<u>AUID</u>	<u>Maximum Monthly Geomean</u>
Black River	-96.4328 48.0146 to Little Black R	09020303-558	153.0
Gentilly River	CD 140 to Red Lake R	09020303-554	200.7
Penn. County Ditch 96	Headwaters to Red Lake R	09020303-505	264.0
Black River	Little Black R to Red Lake R	09020303-529	278.0
Kripple Creek	Unnamed cr to Gentilly R	09020303-525	491.3

**RED LAKE WATERSHED DISTRICT  
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<b>Top Six Reaches Needing Protection to Avoid Impairment by Total Suspended Solids (2004-14)</b>			
<u>River</u>	<u>Reach</u>	<u>AUID</u>	<u>Exceedance Rate</u>
Black River	Headwaters to -96.4328 48.0146	09020303-557	7.3%
Burnham Creek	Polk CD 15 to Red Lake R	09020303-515	6.4%
Penn. County Ditch 96	Headwaters to Red Lake R	09020303-505	5.7%
Kripple Creek	Unnamed cr to Gentilly R	09020303-525	5.3%
County Ditch 21	Unnamed cr to Red Lake R	09020303-541	4.8%
Grand Marais Creek	Headwaters to CD 2	09020306-507	4.8%

<b>Top Five Reaches Impaired by Total Suspended Solids that are Closest to Being Restored (2004-14)</b>			
<u>River</u>	<u>Reach</u>	<u>AUID</u>	<u>Exceedance Rate</u>
Black River	Little Black R to Red Lake R	09020303-529	12.3%
Red Lake River	County Ditch 99 to Burnham Cr	09020303-506	13.8%
Red Lake River	Headwaters to Thief R	09020303-508	16.2%
Red Lake River	County Ditch 96 to Clearwater R	09020303-504	24.0%
Red Lake River	Black R to Gentilly R	09020303-502	29.3%

<b>Top Five Reaches Needing Protection to Avoid Impairment by Low Dissolved Oxygen (2004-2014 DO5)</b>				
<u>River</u>	<u>AUID</u>	<u>Reach</u>	<u>Existing or Proposed Impairments</u>	<u>Percent of DO5 Daily Mins &lt;5 mg/l</u>
Gentilly River	09020303-554	CD 140 to Red Lake R	E. coli, fish,	5.6%
Cyr Creek	09020303-556	CR 14 to Red Lake R	E. coli, fish	5.6%
Black River	09020303-529	Little Black R to Red Lake R	Turbidity, E. coli	5.4%
County Ditch 1	09020303-536	CD 60 to Red Lake R	Not assessed	5.0%
Burnham Creek	09020303-515	Polk CD 15 to Red Lake R	Turbidity, fish, macroinvertebrates	4.4%

<b>Top Five Reaches Impaired by Dissolved Oxygen that are Closest to Being Restored (2004-2014 DO5)</b>				
<u>River</u>	<u>AUID</u>	<u>Reach</u>	<u>Existing or Proposed Impairments</u>	<u>Percent of Daily Mins &lt;5 mg/l</u>
Judicial Ditch 60	09020303-542	Lateral Ditch 4 to Red Lake R	DO	11.4%
Black River	09020303-558	-96.4328 48.0146 to Little Black R	Turbidity, E. coli, fish, macroinvertebrates	17.3%
Branch C of CD 66	09020306-510	Headwaters to CD 66	Not assessed	17.6%
Red Lake River	09020303-508	Headwaters to Thief R	DO, HgF	2.1%
Unnamed ditch (Little Black River)	09020303-527	Unnamed ditch (Headwaters) to Little Black R	E. coli	25.0%

- Task 5 – Flow Monitoring
  - 103 CFS was measured in Kripple Creek on June 5, 2015.
  - 48.2 CFS of flow was measured in the Gentilly River on June 9, 2015.
  - 45.2 CFS of flow was measured in Cyr Creek on June 9, 2015.



## RED LAKE WATERSHED DISTRICT MONTHLY WATER QUALITY REPORT

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- June rains washed out beaver dams that were artificially raising water levels in Gentilly Creek, Kripple Creek, and Cyr Creek.
- Task 7 – Stressor Identification
  - Erosion was reported along fields on the north side of the Red Lake River, east of Thief River Falls after a rain event. Georeferenced photos were taken of erosion problems.



- Because of the timing and intensity of the early June rain fall event south of Red Lake Falls, there was a lot of soil loss from fields in the area. This photo shows a field ditch near Cyr Creek with gully erosion.



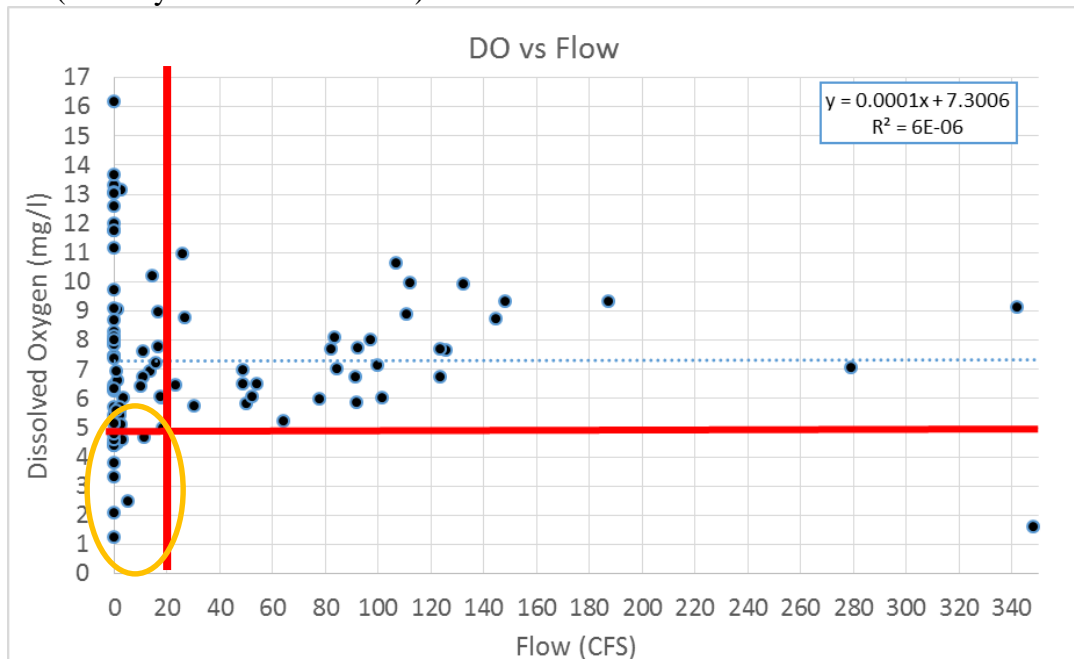
- Task 10 – Civic Engagement
  - Red Lake River Watershed information can be found online at: <http://www.rlwatersheds.org/rl-watershed-info>

**Thief River Watershed Restoration and Protection (WRAP) Project**

- Task 7 – Stressor Identification
  - Erosion problems were photographed in the Marshall County Ditch 20 watershed



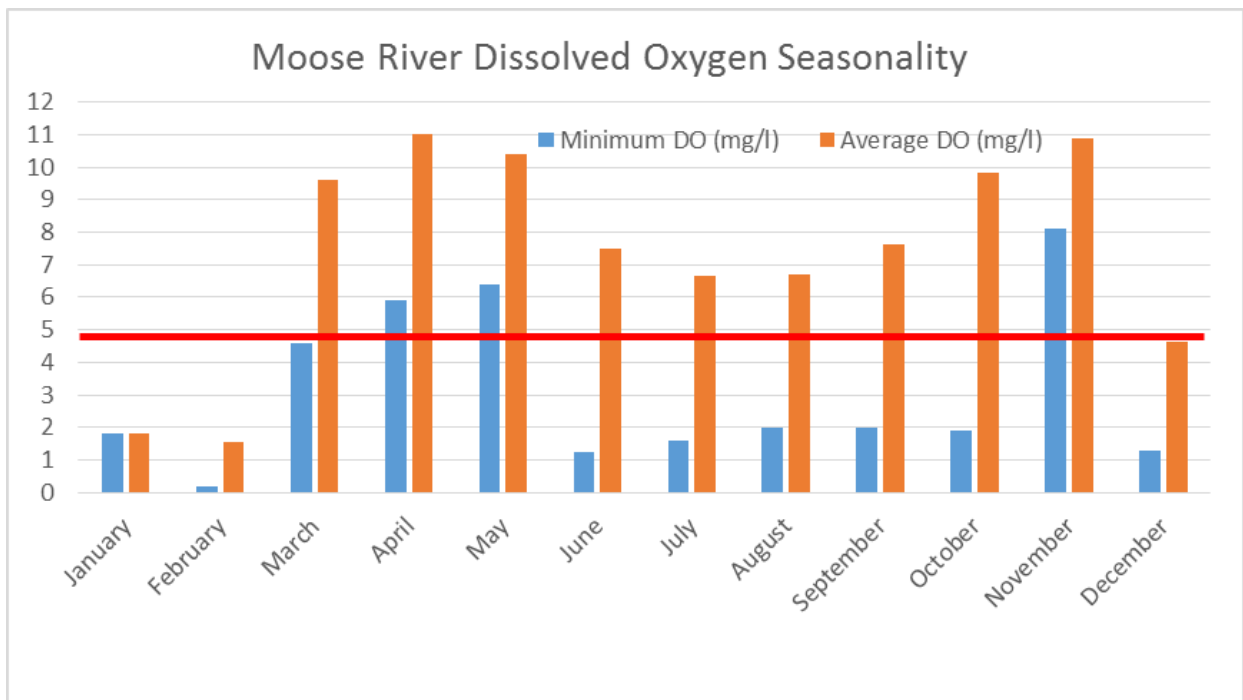
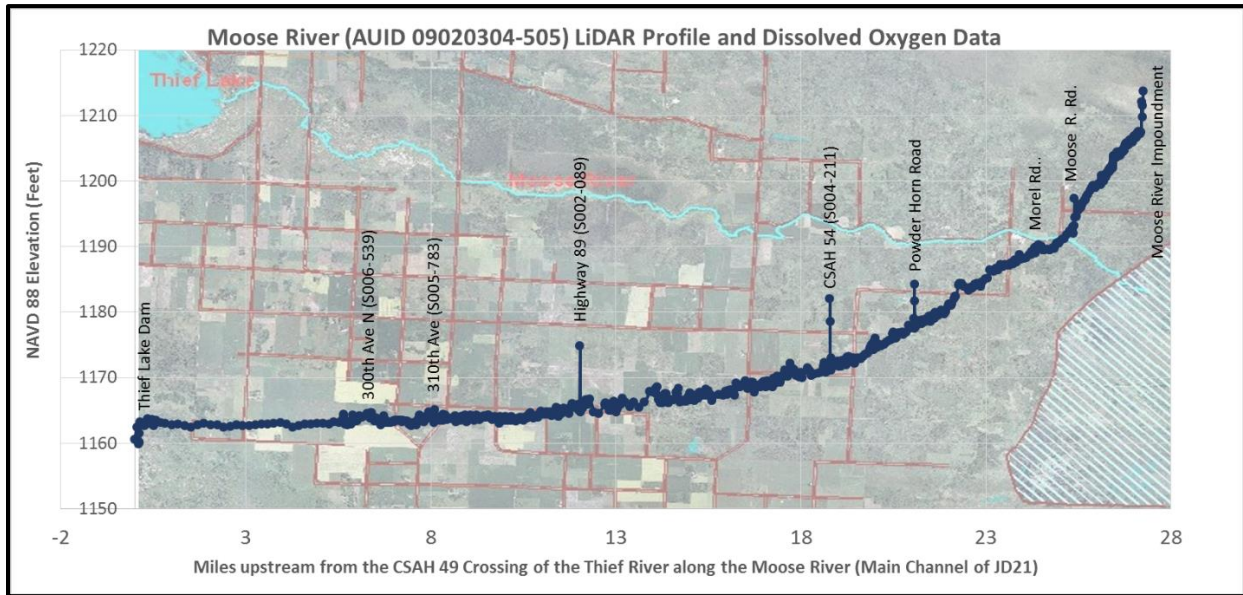
- Task 10 – Data Analysis
  - Data from the Moose River was analyzed in an attempt to find a pollutant that is influencing dissolved oxygen. Correlations between dissolved oxygen data and pollutants were weak. Flow levels seemed to be more important for keeping dissolved oxygen levels above 5 mg/l than any of the potential pollutants of concern. All but one of the low dissolved oxygen readings recorded at CSAH 54 (the only site with flow data) occurred when flows were lower than 20 CFS.



- Part of the problem with dissolved oxygen in parts of the Moose River is that the gradient flattens out and the water becomes more stagnant near Thief Lake.

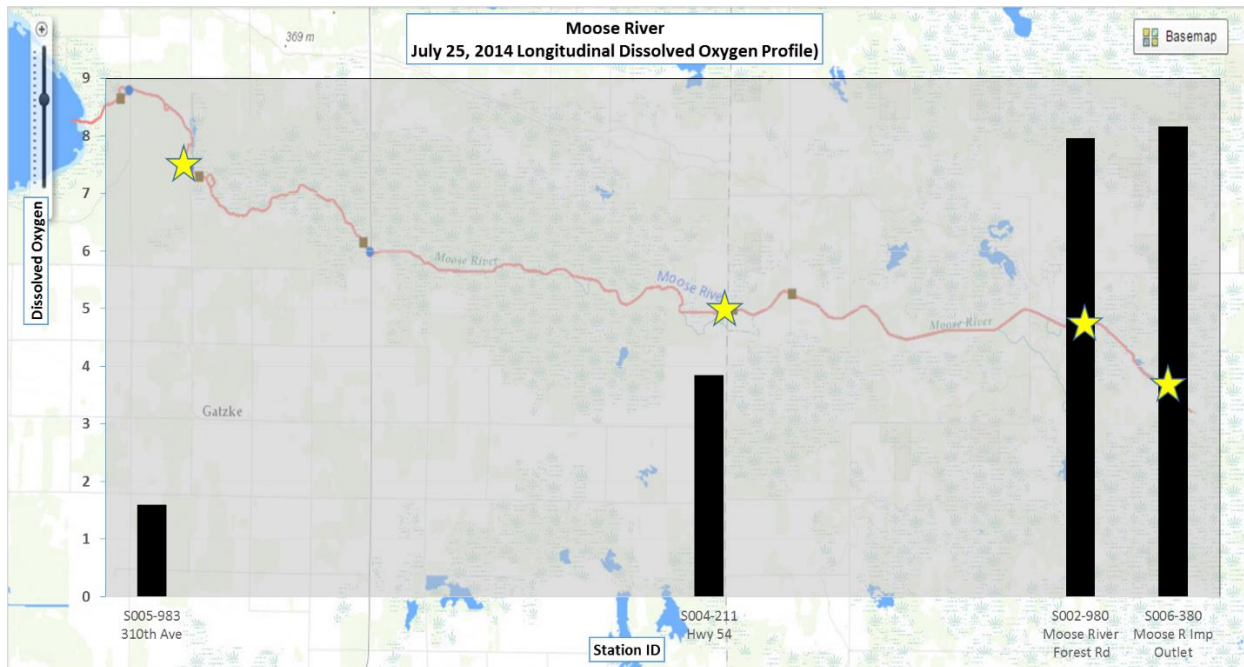
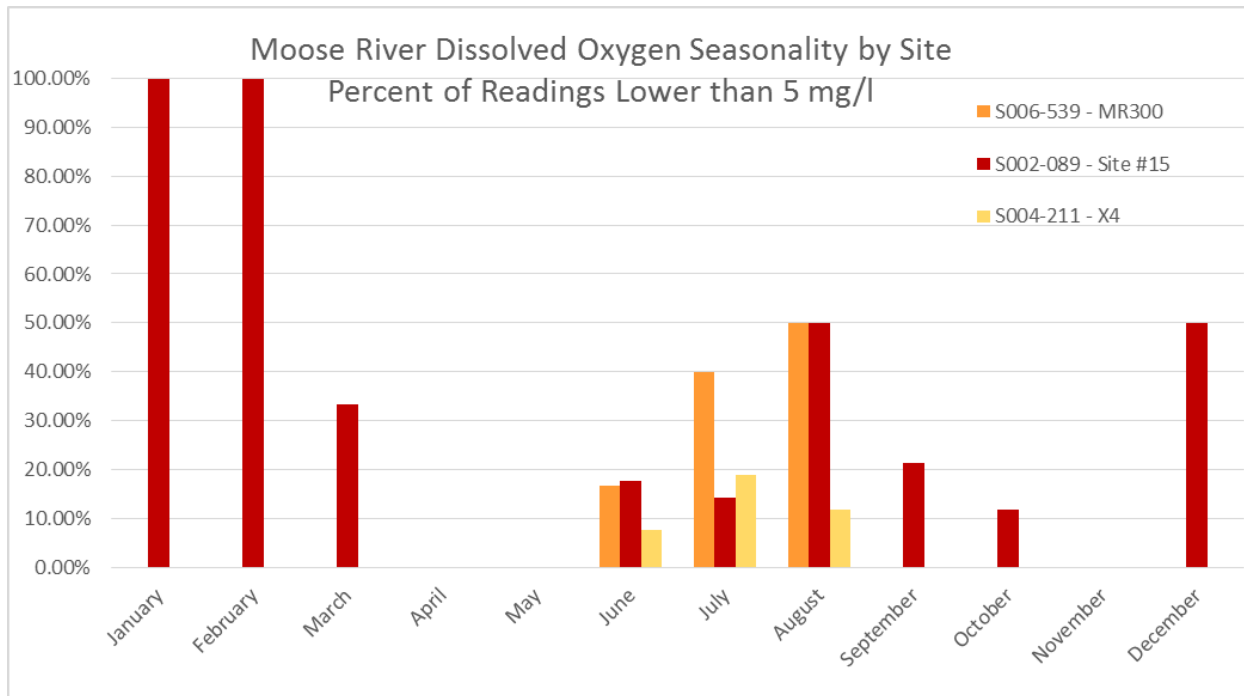
# RED LAKE WATERSHED DISTRICT MONTHLY WATER QUALITY REPORT

June 2015



# RED LAKE WATERSHED DISTRICT MONTHLY WATER QUALITY REPORT

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- Low E. coli concentrations were recorded in Branch A of Judicial Ditch 21 in June of 2015. This brings the geometric mean down below the 126 CFU/100ml chronic water quality standard. The June geometric mean decreases from a 128 CFU/100ml after 2014 monitoring to a geometric mean of 111.4 CFU/100ml geometric mean after 2015 monitoring. The reach could be a candidate for delisting. If a 10% margin of safety and 5% reserve capacity for future development are factored into a delisting decision, the reach would actually have

- to obtain a loading rate that is equivalent to a 107.1 CFU/100ml geometric mean in order for it to be confidently delisted.
- The relationships among sulfates, sulfides, sulfites, hydrogen sulfide, and other pollutants were researched.
  - An assessment of water quality in the Thief River watershed using recent data (2005-2014) was started (similar to the one completed for the Thief River that is described earlier in this document).
  - Task 11 - Civic Engagement.
    - Thief River WRAP newsletters were mailed to approximately 150 people. There also are printed copies available at the RLWD office.
    - Thief River Watershed information can be found online at: <http://www.rlwdwatersheds.org/tr-watershed-info>
  - Task 13 – Reports
    - RLWD staff worked on writing the Thief River Watershed TMDL and Watershed Restoration and Protection Strategy Reports. Content and findings from monthly water quality reports were added to Thief River Watershed TMDL and WRAPS Reports.

### **Grand Marais Creek Watershed Restoration and Protection Project**

RLWD staff provided input on the historical section of the Grand Marais Creek Watershed Monitoring and Assessment Report that is being written by the MPCA. The stressor identification process identified a rock check dam that is a potential fish passage barrier and an erosion hazard at the lower end of Polk County Ditch 2. The structure doesn't seem to have been keyed into the bank, so the bank appears to be eroding around the edges of the structure.



## RED LAKE WATERSHED DISTRICT MONTHLY WATER QUALITY REPORT

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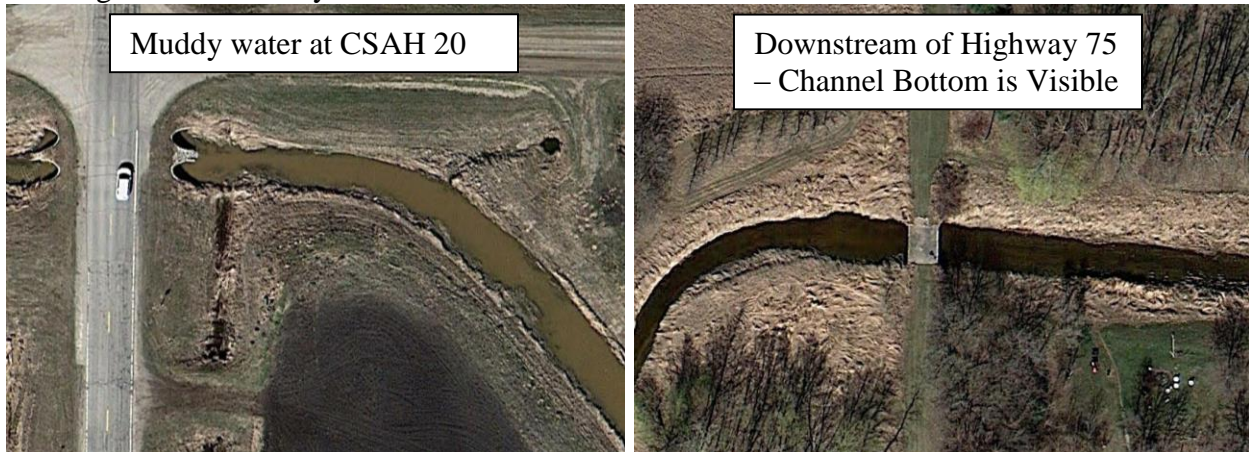
Photos of a rock check dam along AUID 515 immediately upstream of its confluence with the Grand Marais Creek on July 30, 2014 (left) and September 24, 2014 (right).



MPCA staff provided RLWD and Emmons and Olivier Resources staff with dissolved oxygen data from loggers that were deployed throughout the Grand Marais Creek WRAP project area in 2014.

Grand Marais Creek flow measurement data was entered into flow rating curve spreadsheets. Red Lake DNR staff measured flow at Grand Marais Creek WRAP monitoring sites after rainfall events created some runoff.

Aerial photos show a dramatic increase in turbidity between the Highway 75 and CSAH 20 crossings of Polk County Ditch 20.

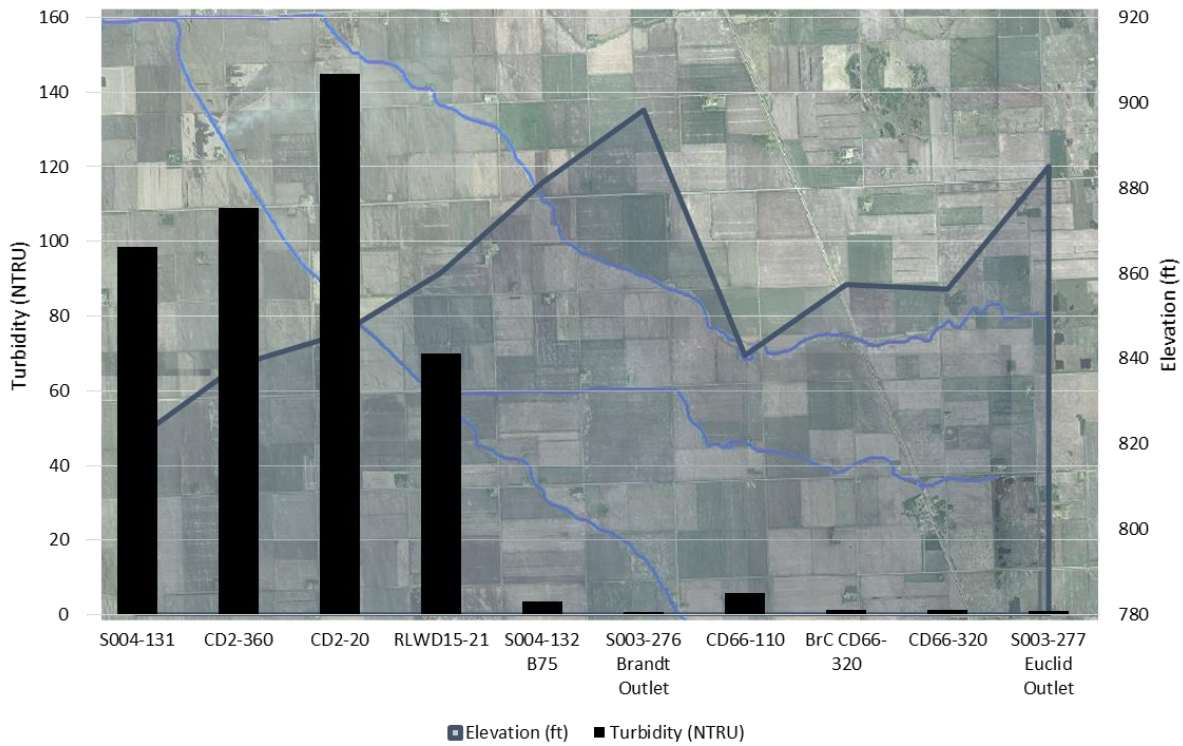


Longitudinal turbidity measurements were made along the Polk County Ditch 2 drainage system. The measurements identified a dramatic increase in turbidity along what is now called RLWD Ditch 15. Polk County Ditch 66 had relatively low turbidity. Turbidity was just 3.46 NTRU at Highway 75, but increased to 145 NTRU by the time it got to CSAH 20.

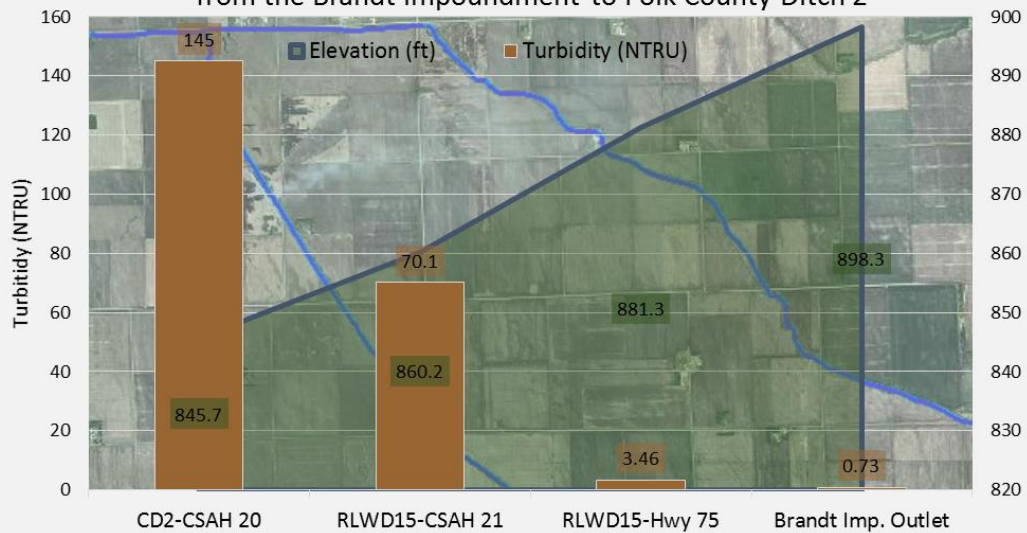
# RED LAKE WATERSHED DISTRICT MONTHLY WATER QUALITY REPORT

June 2015

### Polk County Ditch 2 Turbidity and LiDAR-Based Elevation



### RLWD Ditch 15 Turbidity and LiDAR-Based Elevation from the Brandt Impoundment to Polk County Ditch 2



**Red Lake Watershed District Long-Term Monitoring Program**

The Second round of sampling at RLWD long-term monitoring sites was mostly completed in June.

High E. coli concentrations were found in:

- North Cormorant River
- Blackduck River
- Darrigans Creek
- Burnham Creek at CSAH 48
- Browns Creek at County Road 101
- Pennington County Ditch 21. There was a large difference between duplicate samples of >2,419.6 CFU/100ml and 107.6 CFU/100ml. This helps provide more evidence to support the idea that the problem is localized and likely caused by birds living under the bridge (droppings wouldn't be completely mixed throughout the water column).
- Poplar River at CSAH 30 near Fosston
- Poplar River at County Road 118
- Clearwater River at Highway 2, east of Bagley
- Clearwater River, upstream of Clearwater Lake
- Lost River, upstream of Pine Lake
- Silver Creek near Clearbrook
- Silver Creek at County Road 111
- Clear Brook at Highway 92 in Clearbrook. Clear Brook had a higher E. coli concentration than Silver Creek on June 23<sup>rd</sup>, 2015.
- Lost River at CSAH 8
- Hill River at CSAH 35
- Hill River near Brooks (2 days in June including SWAG sampling results)
- Judicial Ditch 73 at the Badger Lake inlet
- Gentilly Creek
- Kripple Creek
- Cyr Creek
- Lower Badger Creek (2 days, including SWAG sample results)
- Terrebonne Creek
- Beau Gerlot Creek

High total phosphorus (relative to the State's proposed river nutrient eutrophication criteria) were found in:

- Poplar River at CSAH 30 near Fosston
- Clearwater River at Highway 2, east of Bagley
- Clearwater River, upstream of Clearwater Lake
- Lost River, upstream of Pine Lake



High total suspended solids concentrations (relative to the State's proposed regional TSS standards) were found in:

- Kripple Creek
- Lower Badger Creek
- Red Lake River in Crookston
- Red Lake River at the Murray Bridge in East Grand Forks
- Thief River near Thief River Falls

On June 9<sup>th</sup>, 2015, when total suspended solids (TSS) concentrations were as high as 233 mg/l in the Red Lake River (at Murray Bridge in East Grand Forks), TSS concentrations were low in Grand Marais Creek. The TSS concentration in Grand Marais Creek at 110<sup>th</sup> Street NW (just upstream of the confluence with Polk County Ditch 2) was just 1 mg/l. The TSS concentration in Polk County Ditch 2 on that same day was 62 mg/l.

### **Chief's Coulee Monitoring**

Pennington County SWCD and RLWD staff will be collecting samples along Chief's Coulee, a drainage system on the northern part of Thief River Falls, in 2015.

The second set of samples were collected along Chief's Coulee on June 2, 2015. Between Atlantic Avenue and Dewey Avenue, the E. coli level increased from 1,413.6 CFU/100ml to >2,419.6 CFU/100ml. Diesel range organics were detected at both Dewey Avenue (24 mg/l) and Atlantic Ave (.23 mg/l).

### **One Watershed One Plan**

Several meetings and phone conferences were held in June to discuss parts of the one watershed one plan process. A shapefile of areas of concern that should be analyzed by the PTMApp (Prioritize, Target, and Measure Application) was finalized. Planning regions were discussed at length.

### **Other Notes**

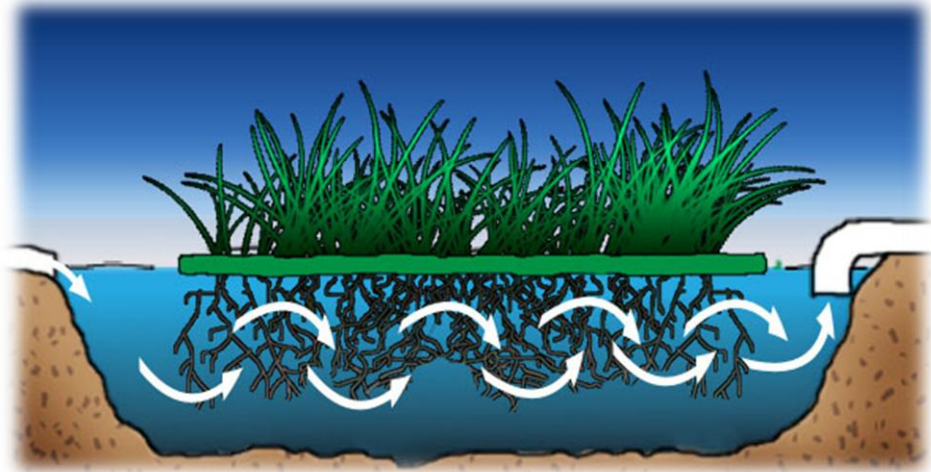
- The Red Lake Watershed District 2014 Annual Report was finalized and made available on the District's website:  
<http://www.redlakewatershed.org/Annual%20Reports/2014%20Annual%20Report.pdf>
- The District hired a summer Water Quality Assistant, Claire Carlson. Her first day was on June 1<sup>st</sup>, 2015.

### **June Meetings/Events**

- **June 2015** - Clearwater River Surface Water Assessment Grant sampling resumes.
- **June 2, 2015** – Clearwater County Water Plan Meeting
  - The RLWD Water Quality Coordinator gave a presentation on water quality within the Clearwater River.

- Committee members were curious about the ammonia impairment in the trout stream reach of the Clearwater River. The assessment that was completed later in the month revealed that the reach is no longer impaired by un-ionized ammonia.
- Bagley Lake had a blue-green algae bloom this year
- The Clearwater SWCD will have a booth at the Clearwater County Fair.
- Percent Protected and Percent Disturbed maps were presented to the committee by the Clearwater SWCD staff.
- Priority concerns for the county's water plan were discussed.
- **June 8, 2015** – Pennington County Water Resource Advisory Committee Meeting, 9AM at the Pennington County SWCD
  - Clean Water Fund project ideas were discussed.
    - Bank stabilization is needed at the Greenwood Street Bridge. A sewer line is nearly exposed by the erosion.
    - A city-wide stormwater assessment for the City of Thief River Falls was discussed.
  - Pennington County has received funding to fight against the spread of aquatic invasive species (AIS). There is a new display in the Pennington County SWCD office with lots of information about aquatic invasive species. License holders have been printed and distributed to local bait shops and other licensing agents.
  - Shoreland buffers were discussed, including the new law and the county's inventory that is currently in progress.
  - An update was given on the progress of the Red Lake River One Watershed One Plan project.
- **June 17, 2015** – One Watershed One Plan teleconference to discuss priority statements.
- **June 26, 2015** – Red River Basin Monitoring Advisory Committee Meeting, Sand Hill Watershed District, Fertile, 9:30 AM
  - North Ottawa and Rabbit River cattail harvesting project
    - This project is evaluating the potential capture of nutrients by utilizing cattails grown and harvested within shallow flood reservoirs. Harvested vegetation utilized for bioenergy.
    - If cattails are left to die within the pools, they contribute nutrients. Harvesting cattails more successfully removes those nutrients.

- Floating island water treatment cells are also being tested within existing flood reservoirs.



- The Upper and Lower Red Lakes Watershed Restoration and Protection project has begun. The Red Lake Department of Natural Resource will be leading that project and doing the majority of the work.
- The Red Lake River One Watershed One Plan project was discussed.
- The MPCA has 205 water level gauges installed at sites throughout the state for their Load Monitoring Network.
- The International Water Institute is sampling mercury in the Thief River at the CSAH 7 monitoring site near Agassiz National Wildlife Refuge.
- International Water Institute staff have created infographics to describe and promote the Red River Basin and North Dakota Pilot River Watch Programs.



## RED LAKE WATERSHED DISTRICT MONTHLY WATER QUALITY REPORT

June 2015

- There will be a River Watch booth at the Polk County Fair, along with a stream table.
- Bruce Paakh, of the MPCA, announced that he is planning to retire in September.
- North Dakota Outdoors wants to tape an episode of their show during the next River Explorers kayak trip.
- International Water Institute FDR Project Monitoring 2015-16 Monitoring Plan
  - The International Water Institute is monitoring the water inlet site and outlet site at three flood impoundments in the Red River Basin to determine nutrient and sediment loads entering and exiting these impoundments. The Brandt, Angus-Oslo #4, and OCFWSS PL566 Impoundments have been selected for the study.
- **June 30, 2015** – Target date for completion of a draft Thief River Watershed Restoration and Protection Strategy (WRAPS) report
- **June 30, 2015** – Semi-annual progress reports are due for the Thief River, Red Lake River, Grand Marais Creek, and Clearwater River Watershed Restoration and Protection projects.

### Upcoming Meetings/Events

- **July 8, 2015** – Marshall County Water Resources Advisory Committee Meeting at Florian Park.
- **September 2015** – Pennington County Outdoor Education Day
- **September 2015** – Northwest Minnesota Water Festival in Fertile and Warren
- **September 2015** – Thief River Open House Meeting
- **September 14, 2015** - Pennington County Water Resource Advisory Committee Meeting, 9AM at the Pennington County SWCD
- **September 25, 2015** – Red River Basin Monitoring Advisory Committee Meeting, Sand Hill Watershed District, Fertile, 9:30 AM
- **October 2015** – Creation and distribution of a Red Lake River newsletter.
- **November 4, 2015** – Marshall County Water Resources Advisory Committee Meeting
- **December 31, 2015** – End date for the Thief River Watershed Restoration and Protection Project (extended from June 30, 2015).
- **December 31, 2015** – Deadline for Red Lake River Watershed TMDL and WRAPS reports
- **June 30, 2016** – End date for the Red Lake River Watershed Restoration and Protection Project (extended from June 30, 2015)

**Plans for the rest of 2015**

- Thief River Watershed Restoration and Protection Project.
  - Creating Stream Power Index maps.
  - Maps of HSPF model results
  - Flow characterization and load calculations
  - Pollutant identification for reaches with dissolved oxygen impairments
  - Complete a draft Thief River Watershed TMDL Report
  - Complete a draft Thief River Watershed Restoration and Protection Strategy Report
  - Technical Advisory meeting to review TMDL and WRAPS reports
  - Edit TMDL and WRAPS reports based on comments during the review process.
- Red Lake River Watershed Assessment Project
  - Creating Stream Power Index maps.
  - Flow characterization
  - Provide input during the assessment process
  - Complete a draft Red River Watershed TMDL Report
  - Complete a draft Red River Watershed Restoration and Protection Strategy Report
  - Technical Advisory meeting to review TMDL and WRAPS reports
- Clearwater River Watershed Restoration and Protection Project
  - Stage and flow measurements at sites where HOBO water level loggers are deployed.
  - Continuous dissolved oxygen data collection at a minimum of 9 sites. Consider moving sondes to new sites midway through the monitoring season if aquatic life support is verified.
  - Move dissolved oxygen loggers to new sites if aquatic life support is proven during the first half of the monitoring season.
  - Water quality sampling.
  - Dissolved oxygen data compilation after the monitoring season.
  - Data entry and submittal to EQuIS
  - Stage and flow data compilation.
- Grand Marais Creek Watershed Restoration and Protection project
  - Technical advisory committee and public open house meetings.
  - Emmons and Olivier Resources staff will work on writing the TMDL and WRAPS reports.
- Sampling and monitoring dissolved oxygen in the Mud River in Grygla in an attempt to better understand the blue-green algae problem that was discovered last fall. Abraxis blue-green algae testing kits were ordered.

**RED LAKE WATERSHED DISTRICT  
MONTHLY WATER QUALITY REPORT**

**June 2015**

**Quote of the Month:**

“Strong reasons make strong actions”  
– William Shakespeare

Red Lake Watershed District Monthly Water Quality Reports are available online at:  
<http://www.redlakewatershed.org/monthwq.html>. Learn more about your watershed at:  
<http://www.rlwdwatersheds.org/>

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