

By Corey Hanson, Red Lake Watershed District Water Quality Coordinator. July 24, 2015.

Spring is here!
(Maple Lake, April 13, 2015)



Clearwater River Watershed Restoration and Protection (WRAP) Project

- Objective 3 – Flow Monitoring
 - A round of spring flow measurements was made at stage/flow monitoring sites throughout the watershed, but flows were relatively low compared to what they usually are in the spring.
 - Flow was measured in Lower Badger Creek at the County Road 114 crossing at a stage that should have yielded a significant amount of flow and should have improved the site's flow rating curve. However, flow was only 0.33 CFS. There must be a very large beaver dam downstream (not visible from the road). A subsequent conversation with a landowner confirmed that there was indeed a beaver dam on Lower Badger Creek between CR114 and the Clearwater River.
 - 7.89 CFS of flow was measured in Judicial Ditch 73 by Rydell National Wildlife Refuge on April 7, 2015.
 - 7.86 CFS of flow was measured at the CSAH 30 crossing of the Poplar River on April 7, 2015.

- 4.41 CFS of flow was measured at the 109th Ave crossing of the Lost River upstream of Pine Lake on April 9, 2015.
- 27 CFS of flow was measured in the Clearwater River at CSAH2 on April 9, 2015.
- 11 CFS of flow was measured at the CSAH 28 crossing of the Lost River, north of Trail, on April 10, 2015.
- 4.07 CFS of flow was measured in Ruffy Brook at the CSAH 11 crossing.
- 59.8 CFS of flow was measured at the CSAH 11 crossing of the Clearwater River.
- Stage measurements were made at all HOBO water level logger deployment sites.
- Objective 4 – Continuous Dissolved Oxygen Monitoring
 - Dissolved oxygen loggers were calibrated in preparation for deployment in early May.
- Objective 9 – Civic Engagement
 - As of the end of April, the new watershed-based websites that were being developed by the RLWD, Emmons and Olivier Resources, and the MPCA were nearly ready to be launched.

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

- Task 5 – Flow Monitoring
 - 322 cubic feet per second of flow measured in the Red Lake River at CSAH 27 on April 3, 2015 (18.385' tape-down stage measurement).
 - This year's spring runoff was insufficient to wash out beaver dams on some smaller streams in the watershed. Cyr Creek, Kripple Creek (upstream of the monitoring site, thankfully), and Gentilly Creek were all affected by beaver dams that were still in place after spring runoff.
 - 0.91 CFS of flow was measured in Pennington County Ditch 96 on April 6, 2015. A significant fish barrier was discovered on the downstream side of the Highway 32 crossing.
 - HOBO water level logger deployments for the 2015 monitoring season were completed in April.
 - 239 CFS of flow was measured at the CSAH 27 crossing of the Red Lake River on April 27, 2015.
 - Stage measurements were made at all HOBO water level logger deployment sites

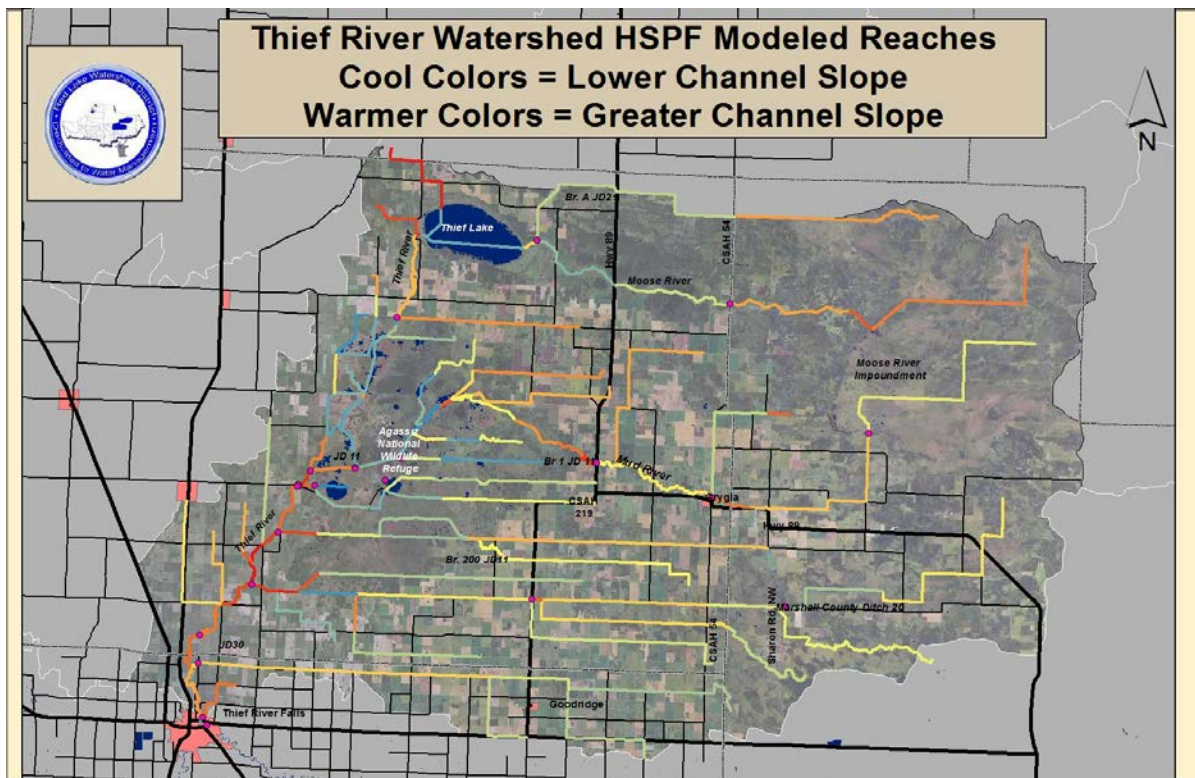
**Cyr Creek,
ponded by a
beaver dam**



- Task 10 – Civic Engagement
 - As of the end of April, the new watershed-based websites that were being developed by the RLWD, Emmons and Olivier Resources, and the MPCA were nearly ready to be launched.

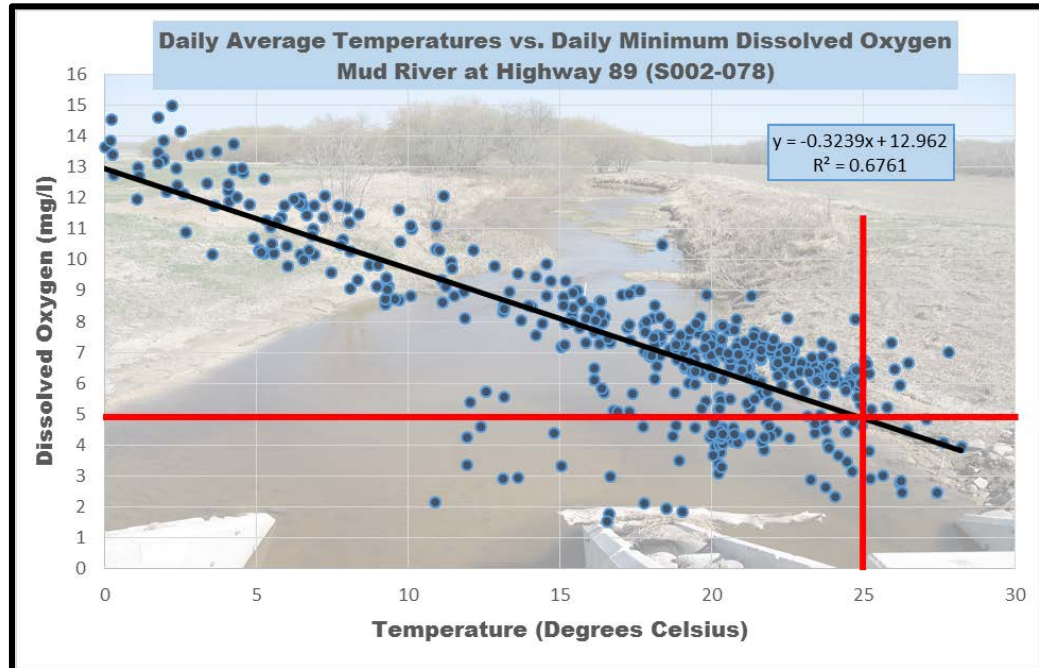
Thief River Watershed Restoration and Protection (WRAP) Project

- Task 5 – Flow Monitoring
 - Flow was measured in Judicial Ditch 30 on April 1, 2015.
 - 5.62 CFS of flow was measured in the Moose River at CSAH 54 on April 6, 2015
 - Spring runoff was minimal in 2015.
 - 6.5 CFS of flow was measured in Branch A of JD21 on April 6, 2015.
 - Stage measurements were made at all HOBO water level logger deployment sites.
- Task 8 – HSPF Modeling
 - Using the basic reach file from the first data request, channel slopes throughout the Thief River were mapped.

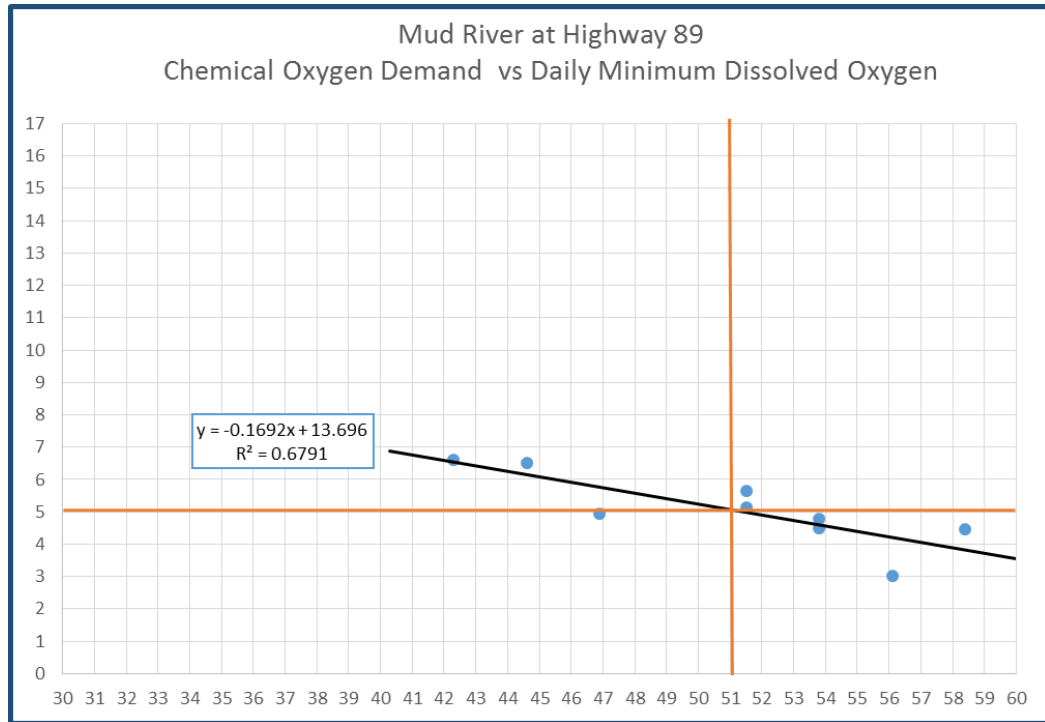


• Task 10 – Data Analysis

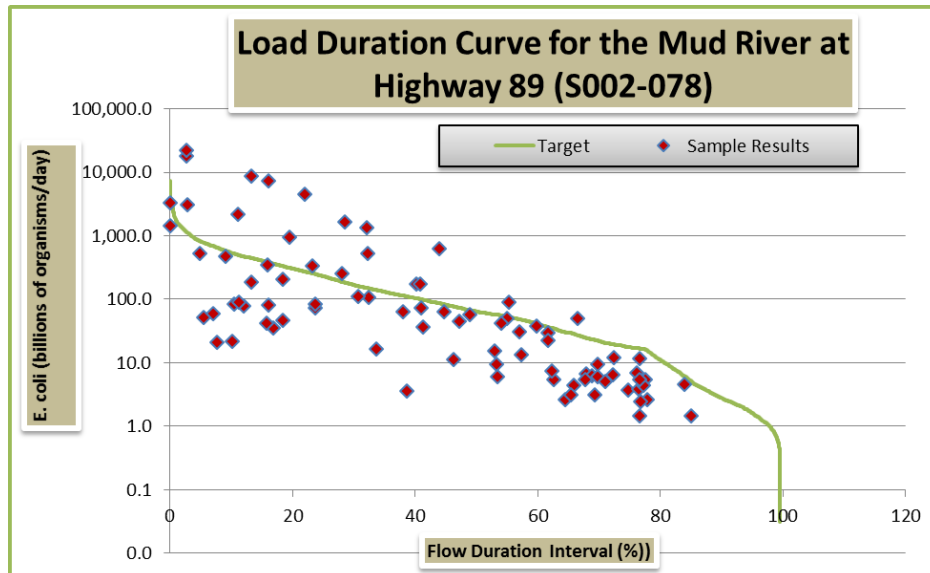
- The Mud River dissolved oxygen data (daily minimums and dissolved oxygen fluctuation from dissolved oxygen loggers) correlated best with temperature (as expected) and correlated relatively well with chemical oxygen demand (COD). Previous TMDLs that set limits for COD are seemingly non-existent, so more analysis will be performed to see if a more conventional parameter would work as the pollutant of concern. Also, HSPF model outputs can be analyzed to find correlations between dissolved oxygen and potential pollutants of concern.
- Cold water can hold more dissolved oxygen than warm water. As expected, there definitely is a correlation between temperature and dissolved oxygen in the Mud River. However, data does not indicate that temperature is causing a dissolved oxygen impairment. A polynomial trendline through the data provides the best fit, but that trendline never goes below 5 mg/l. A linear trendline intersects the 5 mg/l threshold at a temperature of 24.58. Only 1.5% of the daily average temperatures recorded by deployed multi-parameter sondes in 2007, 2008, 2009, and 2012 were greater than 24.58 degrees Celsius. The data indicates that temperatures in the Mud River rarely reach a level that would limit dissolved oxygen concentrations to 5 mg/l or less. The Mud River provided ample potential for dissolved oxygen in at least 98.5% of the days that were monitored. Low dissolved oxygen readings have occurred throughout the range of daily average temperatures from 10.89°C to 25.81°C. There seems to be another factor aside from temperature that is causing the low dissolved oxygen readings. It is something that only affects dissolved oxygen when water is above a certain temperature (approximately 10°C).



- Sondes were deployed in the Mud River during the summers of 2007, 2008, 2009, and 2012. That data was summarized into daily records of daily minimum, daily maximum, and daily fluctuation (flux). Those true daily statistics can be compared to sampling data that was collected during the deployments in order to identify a pollutant that appears to have a negative correlation with daily minimum dissolved oxygen levels or daily dissolved oxygen flux. Total phosphorus (TP) and biochemical oxygen demand (BOD) did not appear to have an influence upon dissolved oxygen levels. The usefulness of the BOD data for assessing this particular reach and for trying to find a correlation with dissolved oxygen is that the laboratory's reporting limit for BOD is 2 mg/l. Seventy-five percent of the samples from the Mud River at Highway 89 (S002-078) that were analyzed for BOD were reported as <2 mg/l. The proposed BOD eutrophication criteria for this reach of the Mud River is ≤ 1.5 mg/l (lower than the lab's reporting limit).
- Laboratory analysis of chemical oxygen demand (COD), however, nearly always returns a real value that can be more useful in statistical analysis than the censored BOD data. A simple regression analysis that plots daily minimum DO against COD does indicate that dissolved oxygen is negatively correlated to COD concentrations. Dissolved oxygen levels appear to decrease as COD levels increase. In the following graph, the DO trend and DO water quality standard intersect at a COD concentration of approximately 51 mg/l.



- Flow was summarized for the Mud River. HSPF modeled flows were compared to measured flows. They did not correlate very well. There was a lot of overestimation and underestimation. The fact that there is a water control structure and a wildlife impoundment between the Mud River and the only long-term USGS gage on the Thief River may have made modeling this part of the watershed more difficult. Impoundment operations on the upper end of the Mud River watershed (Moose River Impoundment) would also make it difficult to accurately simulate flows in the Mud River using a model.
- A flow duration curve was created for the Mud River. A load duration curve for E. coli was also created.

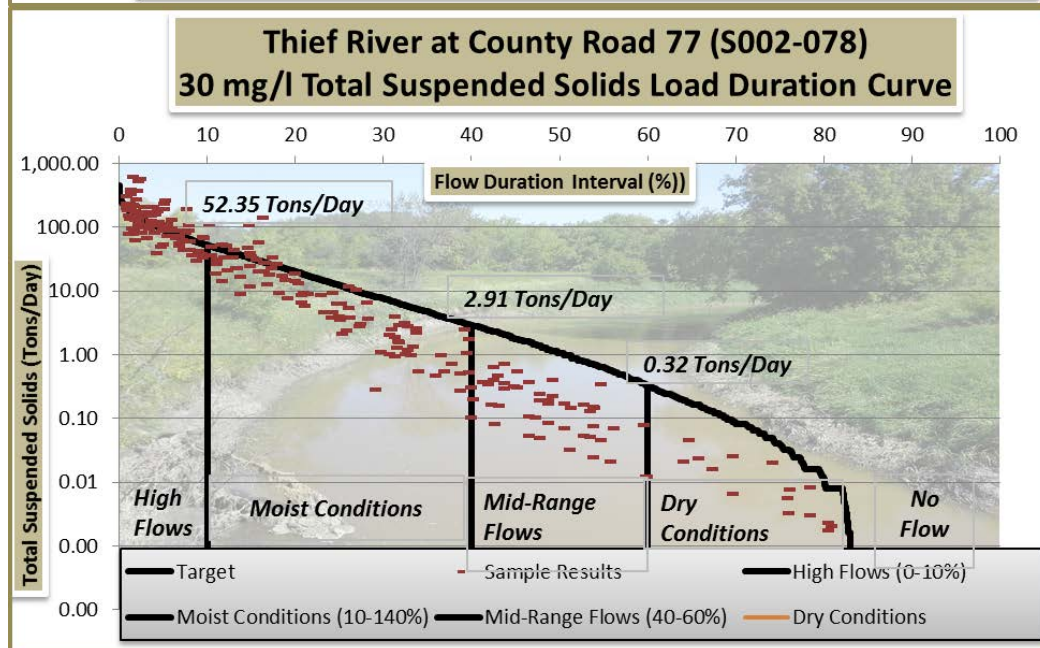
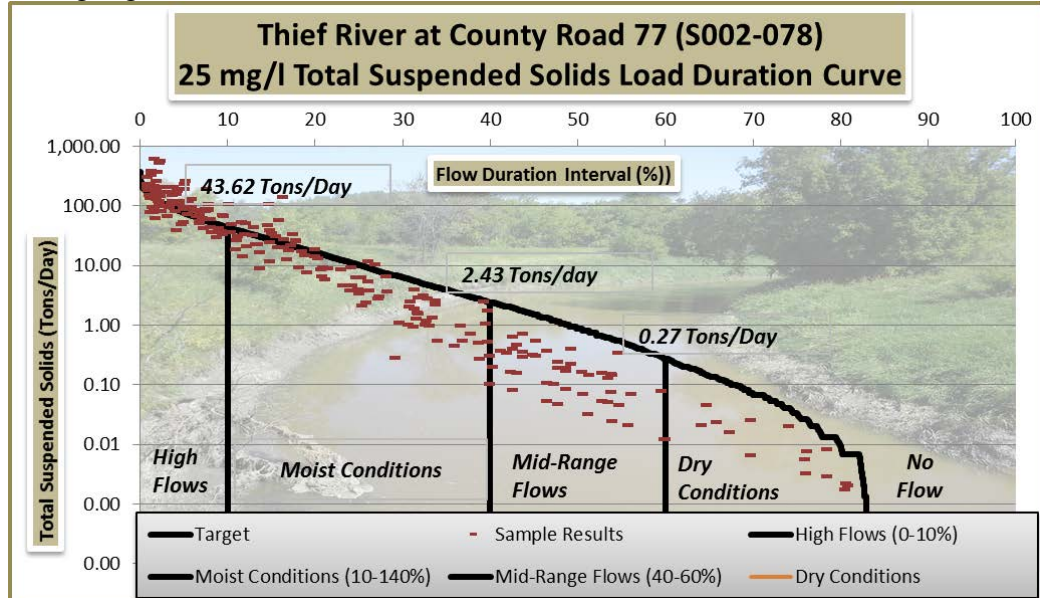


- Before calculating a TMDL for E. coli on the Mud River, the data was re-assessed using 2005-2014 data (the most recent official assessment used 2004-2013 data). The assessment found that the Mud River is now meeting the E. coli water quality standard (<126 CFU/100ml) and a TMDL will not be needed. The Mud River will be recommended for delisting at the next opportunity.

Mud River Assessment Reach 09020304-507 2005-2014 E. coli Data	
Month	E. coli Geometric Mean
April	17
May	28
June	93
July	117
August	68
September	41
October	101

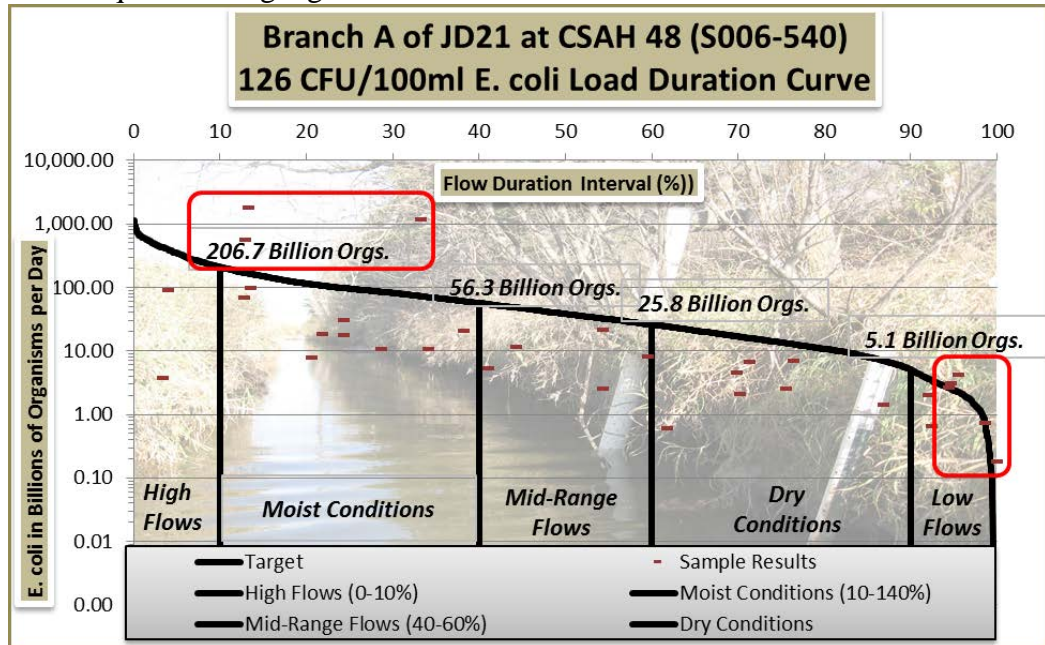
- The Agassiz Pool to Red Lake River reach of the Thief River is listed as impaired by high turbidity and requires a TMDL. The total suspended solids concentration that correlates with the former 25 NTU turbidity standard is 25 mg/l. The proposed total suspended solids water quality standard for the Thief River is 30 mg/l. Initial TMDL calculations for this reach were calculated using both of those standards.
- The official adoption of regional total suspended solids standards is being delayed by a lawsuit. The Coalition of Greater Minnesota Cities along with the Minnesota Environmental Science and Economic Review Board (MESERB), the League of Minnesota Cities and the Soybean Growers are filing a challenge with the Minnesota Court of Appeals of the new water quality standards that the Minnesota Pollution Control Agency recently adopted. These organizations are concerned that the new rules (particularly the nutrient standards) will cost city wastewater treatment facilities millions of dollars in additional cost. They also allege that the rules are “not based in good science” and have “no measurable environmental benefit.” Those statements, without a doubt, will add some heat to any debate over the standards. It is unfortunate that clearly beneficial standards (like the total suspended solids standards) are being delayed because of issues with the nutrient standards. One obvious issue worth mentioning here is that streams in the “North” region are going to be required to meet a biochemical oxygen demand standard (1.5 mg/l) that is lower than RMB Environmental Laboratory’s minimum reporting limit for that parameter (2 mg/l). All results that are less than 2 mg/l are reported as “<2,” so there will be no values reported as levels of 1.5 mg/l or smaller. This could affect the Mud River, upper Red Lake River, and parts of the Clearwater River watershed. On the other hand, some of the complaints about the standards are coming from cities that have done very little (or nothing) to remove phosphorus in the past, so the addition of phosphorus removal may be an overdue change. Cost has been presented as an issue. The City of Moorhead claims (in an October 2, 2014 Star Tribune article entitled “Outstate cities plan to challenge state water regulations”) that phosphorus removal will increase costs “by up to \$10 million over the next 20 years.” That would average out to \$500,000 each year. If Moorhead’s population is still approximately 40,000, that would equal a manageable \$12.50 per person each year (approximately \$1/month).

- Load duration curves were created for total suspended solids in the Thief River. They show that the exceedances of the water quality standard typically occur during high flows.



- Total suspended solids TMDLs were calculated for the Agassiz Pool to Red Lake River reach of the Thief River.
- Load duration curves were created for the Branch A of JD21 E. coli impairment TMDLs were also calculated for the ditch. E. coli data collected between from 2005 through 2014 was used to represent current conditions. The ditch is close to meeting the standard. The 2005-2014 128 CFU/100ml geometric mean for the month of June is just 2 units higher than the water quality standard of 126 CFU/100ml. A 16% reduction in E. coli is needed in order to meet the standard

(with a 10% margin of safety and 5% reserve capacity) during the month of June. This is equal to a target geometric mean of 107.1 CFU/100ml.



- Task 11 - Civic Engagement
 - As of the end of April, the new watershed-based websites that were being developed by the RLWD, Emmons and Olivier Resources, and the MPCA were nearly ready to be launched.
- Task 13 – Reports
 - RLWD staff worked on writing the Thief River Watershed TMDL Report.

Red Lake Watershed District Long-Term Monitoring Program



The first round of samples for the District's long-term monitoring program were collected in April. Spring runoff was minimal in 2015. Thus, overland and in-channel erosion was also minimal. Results from the first round of water quality samples were good at most sites due to a lack of runoff.

Grand Marais Creek Watershed Restoration and Protection Project

Stage measurements were made at all HOBO water level logger deployment sites.

Chief's Coulee Monitoring

Pennington County SWCD and RLWD staff worked together to plan a sampling effort on Chief's Coulee in Thief River Falls. Chief's coulee drains urban and agricultural land in northwest Thief River Falls. The outlet of the Coulee is downstream of the confluence of the Thief River and Red Lake River at Red Robe Park on the west side of the Red Lake River. There is little or no flow in the coulee most of the year except during rainfall events or high flows in spring. Monitoring of the coulee is needed to gather data for a potential drainage improvement project.

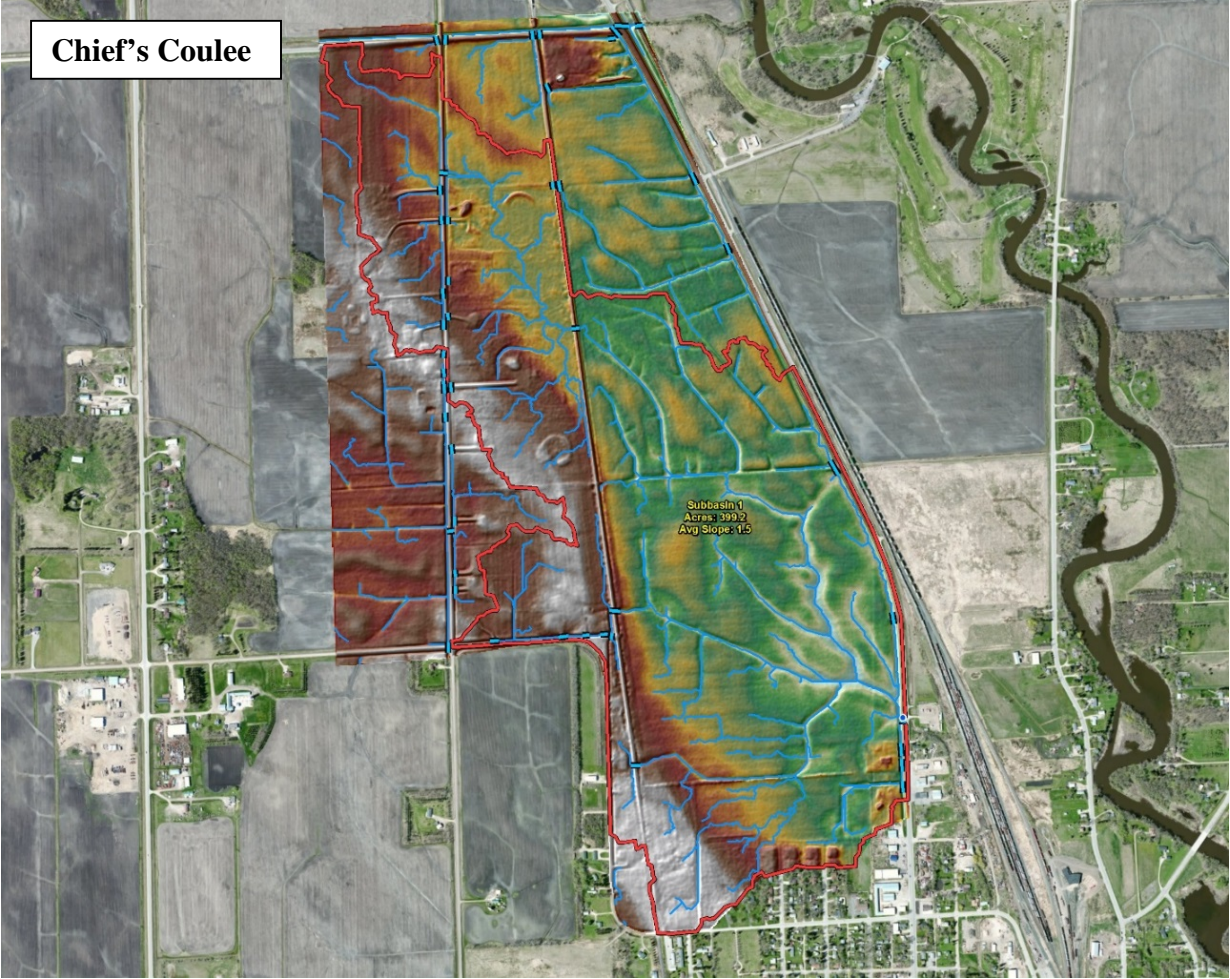
Due to low flow, monitoring of the coulee will be done during rainfall events when there is sufficient water flow for data and sample collection. If there is enough water flow, samples will be taken at the Highway 32 site once a month for baseline data. Four sites throughout the coulee will be monitored during rainfall events. An estimate of 6-8 samples at each site will be taken in 2015.

Sites will be monitored for E. coli, nitrogen: (ammonia as N, nitrate & nitrite, and total Kjeldahl nitrogen), orthophosphate as P, total phosphorus, total suspended solids (TSS), diesel range organics, gasoline range organics (GROs) chlorophyll-a and fluoride. Field measurements will be taken with a Sonde when possible for Dissolved oxygen, pH, conductivity, temperature. Turbidity will also be taken using a portable turbidimeter and photos will be taken at the sites. The field data and water samples will be collected alternately by the Pennington SWCD the RLWD. Costs for the lab analysis will be paid alternately by the Pennington SWCD and the RLWD.

RED LAKE WATERSHED DISTRICT
MONTHLY WATER QUALITY REPORT

April 2015

Chief's Coulee



Other Notes

- The International Water Institute staff wrote an April 2015 issue of the International Water Institute River Rendezvous newsletter. This issue focuses on the River Watch Forum and the 20-year history of the River Watch program: http://www.iwinst.org/wp-content/uploads/2015/04/RWRendez_Issue-21-Final.pdf
- A checklist for 2015 long-term monitoring program samples was created to guide this year's sampling.
- The RLWD's Eureka Manta didn't calibrate this spring. It has been used for 10 monitoring seasons, so it has served its purpose and can be retired. The RLWD Board approved the purchase of a new sonde.
- The MPCA Project Manager for the Clearwater River Surface Water Assessment Grant visited the District office as part of a "site visit" required by the grant contract.
- The MPCA released a list of 58 enforcement actions that occurred in the first quarter of 2015. Violations that occurred within the Red Lake Watershed District included
 - American Crystal Sugar, East Grand Forks, for wastewater violations
 - This is the only one of the three violations in the RLWD that involved discharge to surface waters.
 - City of Erskine wastewater treatment plant, Erskine, for wastewater violations
 - Rolfson Farms, Bagley, for feedlot violations
- Work commenced on the construction of underground shear walls to stabilize the large area of unstable riverbank between Highway 2 and the Red Lake River near 6th Street in Crookston. Minnesota Department of Transportation crews began work last week on the \$6.5 million, state-funded project, which will involve digging trenches in the riverbank and filling them with a sodium bentonite mix to stabilize it. A specialized crane was used to dig the 70-foot deep trenches for the walls. <http://www.grandforksherald.com/news/region/3741947-work-begins-stabilize-creeping-crookston-riverbank>



- Dry weather, rolled fields, and high winds combined to cause some extreme wind erosion in the area. Dust storms occurred in multiple locations. This field by St. Hilaire had extreme wind erosion and deposition within the road ditch.



April Meetings/Events

- **April 8, 2015** – Marshall County Water Resources Advisory Committee Meeting
- **April 15, 2015** – Red Lake River One Watershed one Plan Advisory Committee Meeting
- **April 16, 2015** – Clearwater River Surface Water Assessment Grant site visit.
- **April 21, 2015** – One Watershed One Plan LGU planning meeting in Red Lake Falls

Upcoming Meetings/Events

- **May 29, 2015** – Target date for completion of a draft watershed TMDL for the Thief River watershed.
- **June 2015** - Clearwater River Surface Water Assessment Grant sampling resumes.
- **June 8, 2015** – Pennington County Water Resource Advisory Committee Meeting, 9AM at the Pennington County SWCD
- **June 17, 2015** – One Watershed One Plan teleconference to discuss priority statements.
- **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.
- **July 8, 2015** – Marshall County Water Resources Advisory Committee Meeting
- **August 2015** – Hold a technical advisory meeting to review the findings in the Thief River Watershed TMDL and WRAP re
- **September 2015** – Pennington County Outdoor Education Day
- **September 2015** – Northwest Minnesota Water Festival in Fertile and Warren
- **September 2015** – Thief River Open House Meeting
- **November 4, 2015** – Marshall County Water Resources Advisory Committee Meeting
- **December 31, 2015** – End date for the Thief River Watershed Restoration and Protection Project (extended from June 30, 2015).

- **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.
 - Create a web page dedicated to the Thief River Watershed
 - 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.
 - Create a webpage dedicated to the Red Lake River
 - 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
 - Assess existing data (2005-2014).
 - Determine where more data is needed.
 - Plan 2015 monitoring
 - Create a webpage dedicated to the Clearwater River watershed
 - 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.
- 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.

Quote of the Month:

“If our thoughts and hopes are elsewhere, it is impossible to set our faces steadily toward the work required of us.”

– Anonymous

“Obstacles are those frightful things you see when you take your eyes off your goals.”

– Anonymous

“Toleration is the greatest gift of the mind; it requires the same effort of the brain that it takes to balance oneself on a bicycle.”

– Helen Keller

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

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