

By Corey Hanson, Red Lake Watershed District Water Quality Coordinator. 3/23/2020

### **River Watch**

District staff met twice with the Red Lake County Central River Watch students to answer questions about their River Watch Forum project. Their project was an educational program to teach 3<sup>rd</sup> grad students about aquatic invasive species (especially zebra mussels).



District staff also participated in a River Watch Forum planning meeting that was held in Crookston.

### **Bartlett Lake Management Plan**

District staff prepared an agenda and an outline of a lake management plan for the January Bartlett Lake Management Planning meeting. Meeting notes were typed and shared with the planning partners. A planning meeting was held on January 22, 2020. The meeting included a review of what was done to initiate the planning process in late 2019, a review of a draft plan outline, a review of information from the draft TMDL and WRAPS reports, a list of problems that could be addressed, and a list of actions to address problems. Fourteen people attended the meeting.

**Thief River One Watershed One Plan (1W1P)**

Thief River 1W1P partners began the processing of locally approving the Thief River Comprehensive Watershed Management Plan Memorandum of Agreement and approving submittal of the plan to BWSR.

**Clearwater River Watershed Total Maximum Daily Load and Watershed Restoration and Protection Strategy**

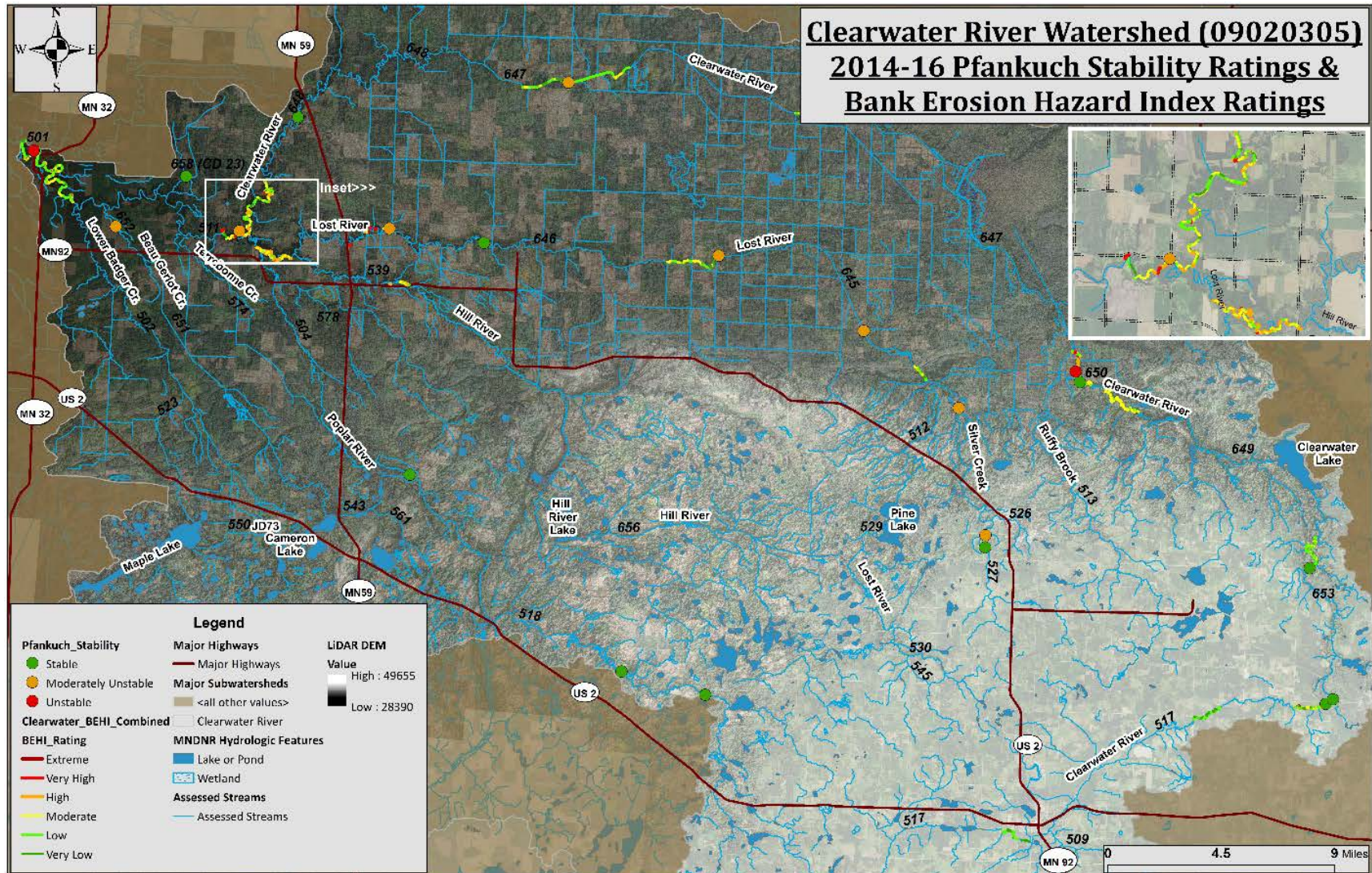
District staff completed a revision of the Clearwater River Watershed Total Maximum Daily Load document.

- *E. coli* load reduction goals were revised using loading capacity rather than load allocations.
- Boundary conditions for total suspended solids, *E. coli*, and total phosphorus were explained and incorporated into TMDLs where needed. Water quality conditions in tributaries were evaluated to determine which ones were meeting standards (not contributing to Clearwater River impairments) and which were exceeding standards (likely contributing to Clearwater River impairments). The table below, for example, shows that most tributaries met the TSS standard (<10% of samples exceeded the 30 mg/L) standard. However, the Lost River did exceed the standard at the furthest downstream Lost River sampling site. Because of the high frequency of excess total suspended solids in the Lost River, a wasteload allocation for total suspended solids was required for the Oklee wastewater treatment facility.

**Site-Specific Assessment (Years 2006-2015) of Total Suspended Solids for Pour-Point Sampling Stations on Tributaries of the Clearwater River**

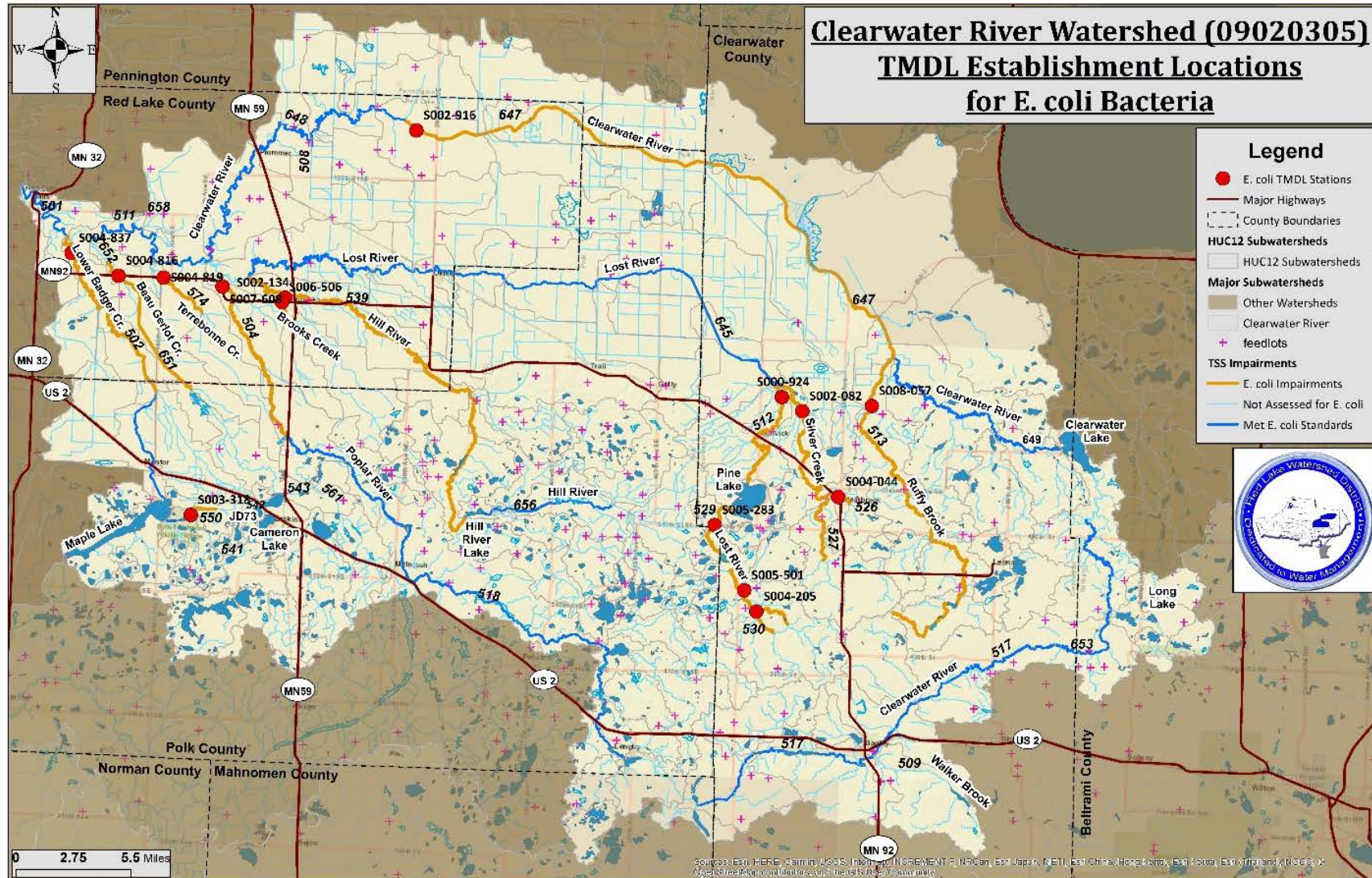
Clearwater River Tributary Stream:	Lower Badger Creek	Beau Gerlot Creek	Terrebonne Creek	Poplar River	Hill River	Lost River	Ruffy Brook
Furthest Downstream AUID (09020305-XXX):	502	652	574	504	539	505	513
Furthest Downstream AUID with Sufficient 2006-2015 TSS Data (09020305-XXX):	502	651	574	504	539	646	513
Furthest Downstream Station Number(s) with Sufficient TSS Data:	S004-837	S004-816	S004-819	S007-608	S002-134	S002-133	S007-848 S008-057
Number of Daily Mean TSS Values at Furthest Downstream Station	59	27	36	25	54	85	23
Percentage that Exceed 30 mg/L	6.4%	0.0%	2.8%	0.0%	3.7%	11.8%	4.3%

- The bank erosion hazard index rating (fluvial geomorphology results) map was revised.
- A map of feedlots within the Clearwater River watershed was created and added to the TMDL.
- After TMDLs had been revised, the load-based prioritization pedal was revised.



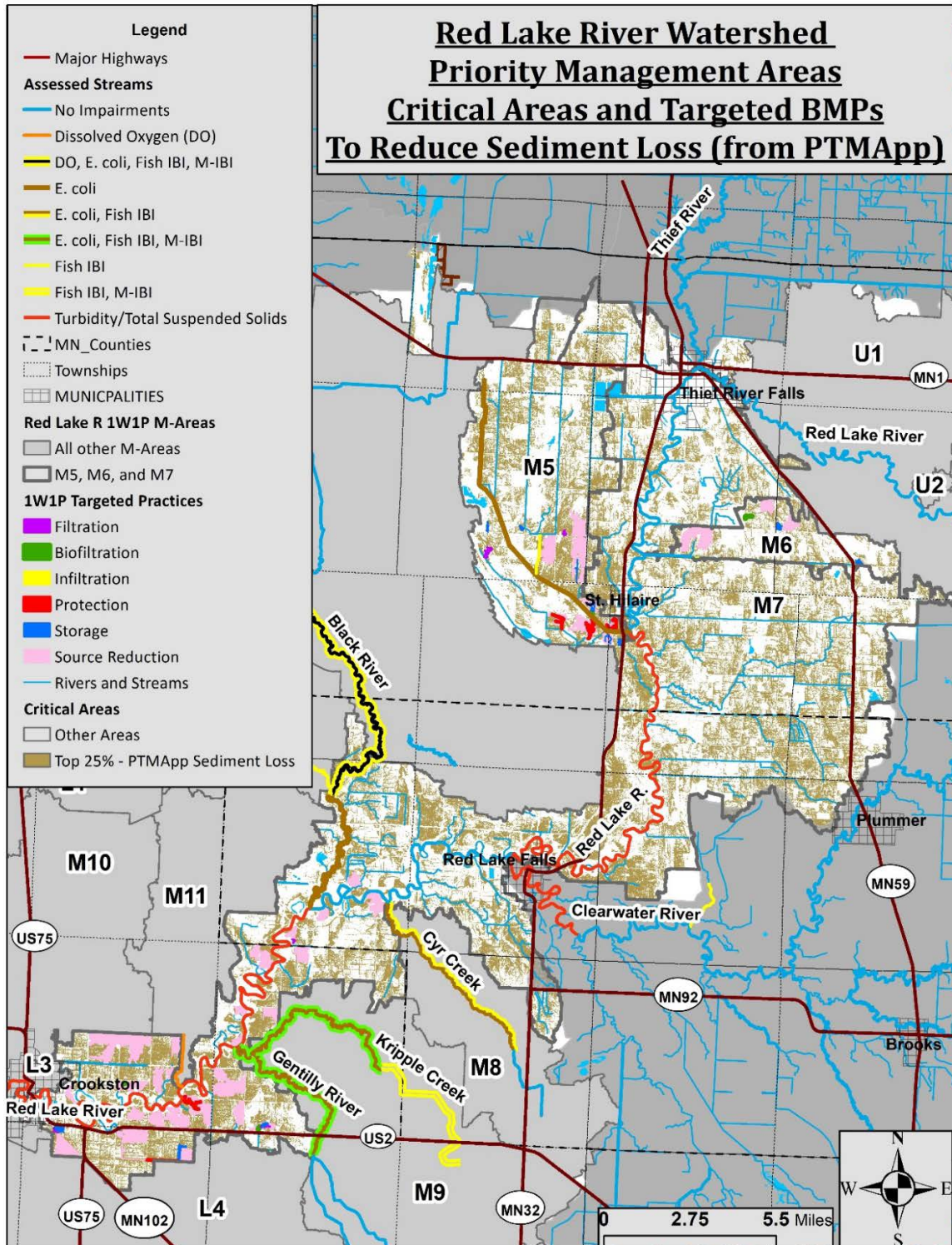
# RED LAKE WATERSHED DISTRICT MONTHLY WATER QUALITY REPORT

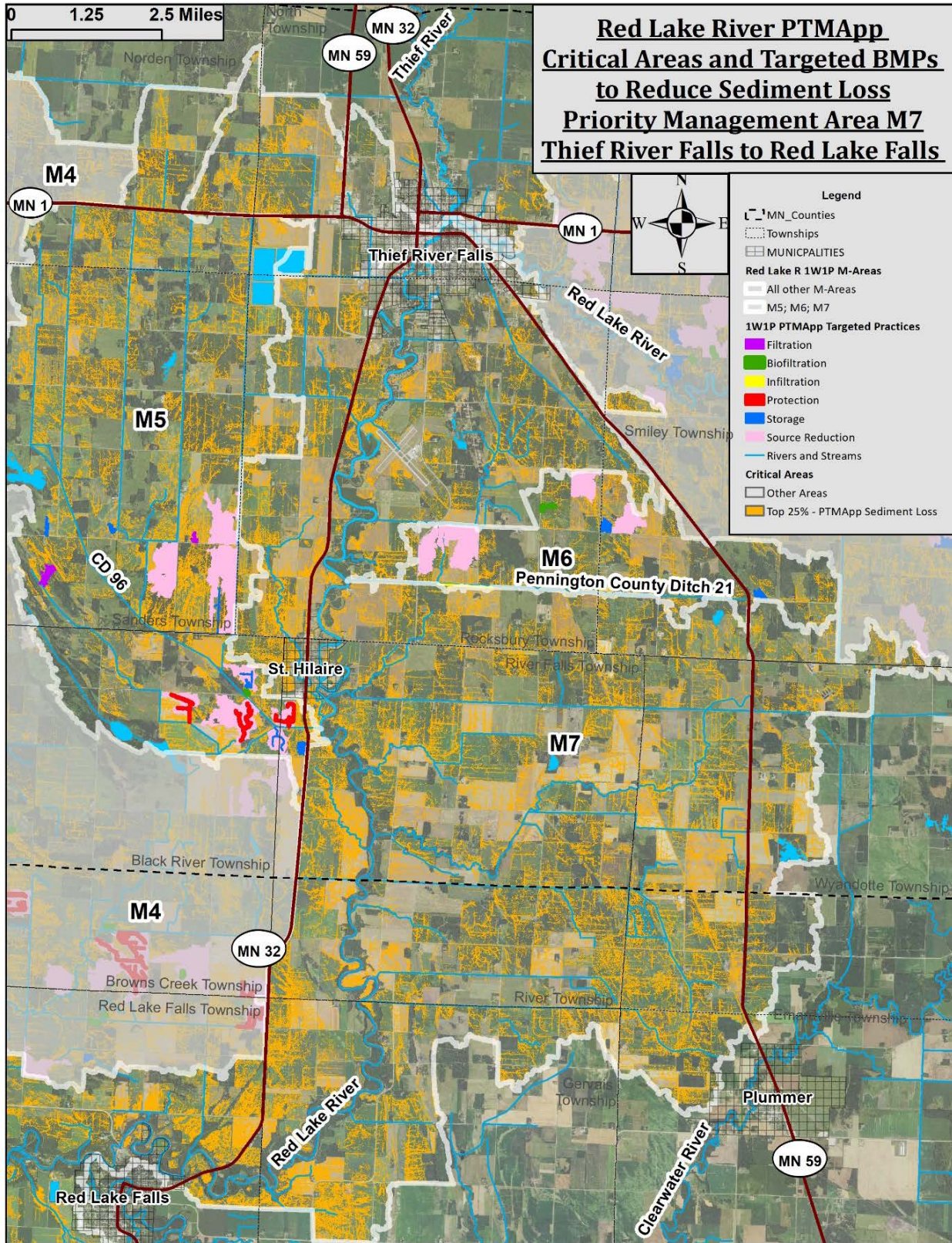
January 2020



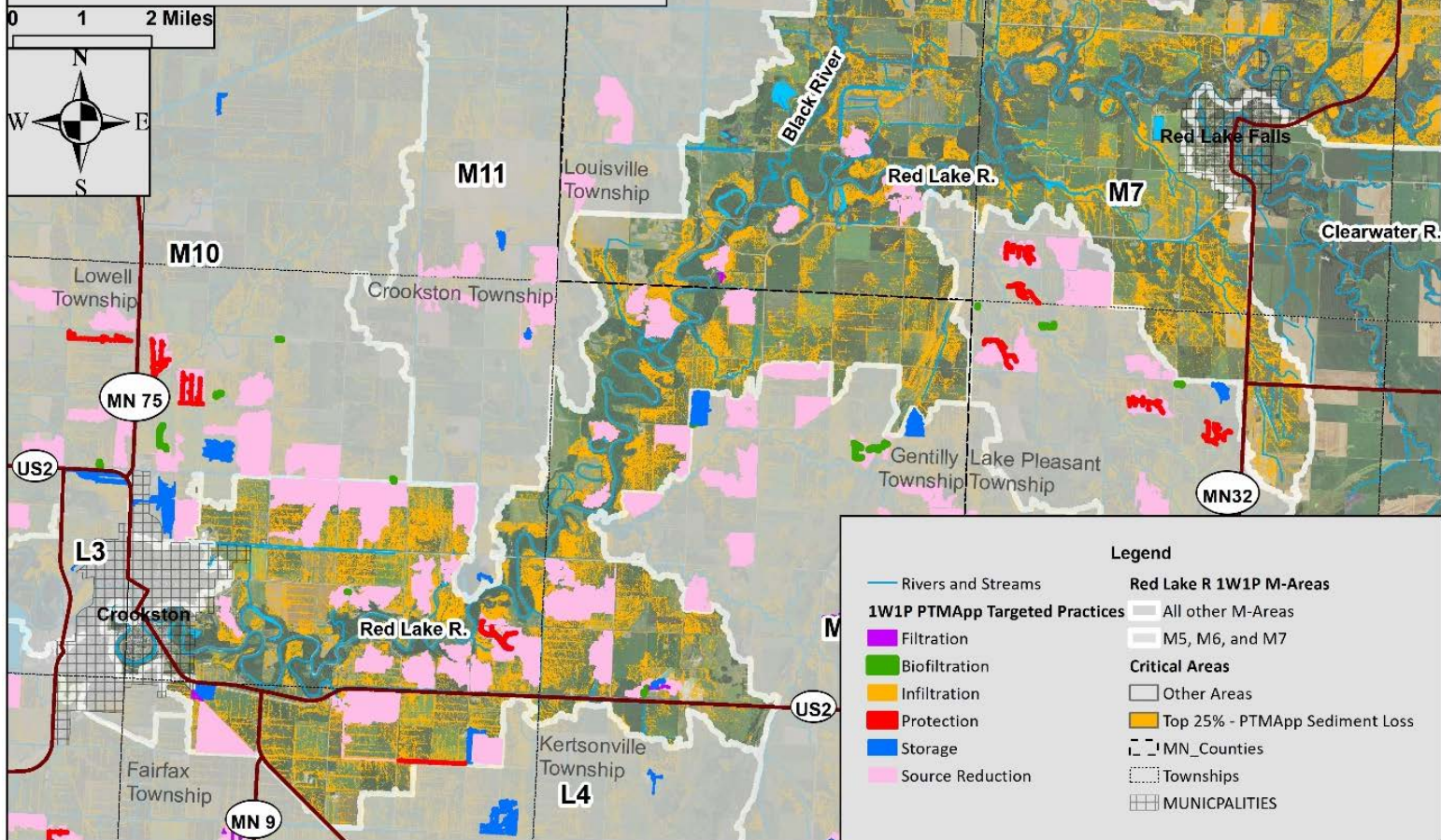
**Red Lake River Watershed One Watershed One Plan**

District staff created new maps for the Small Watershed Focus 319 Grant workplan.





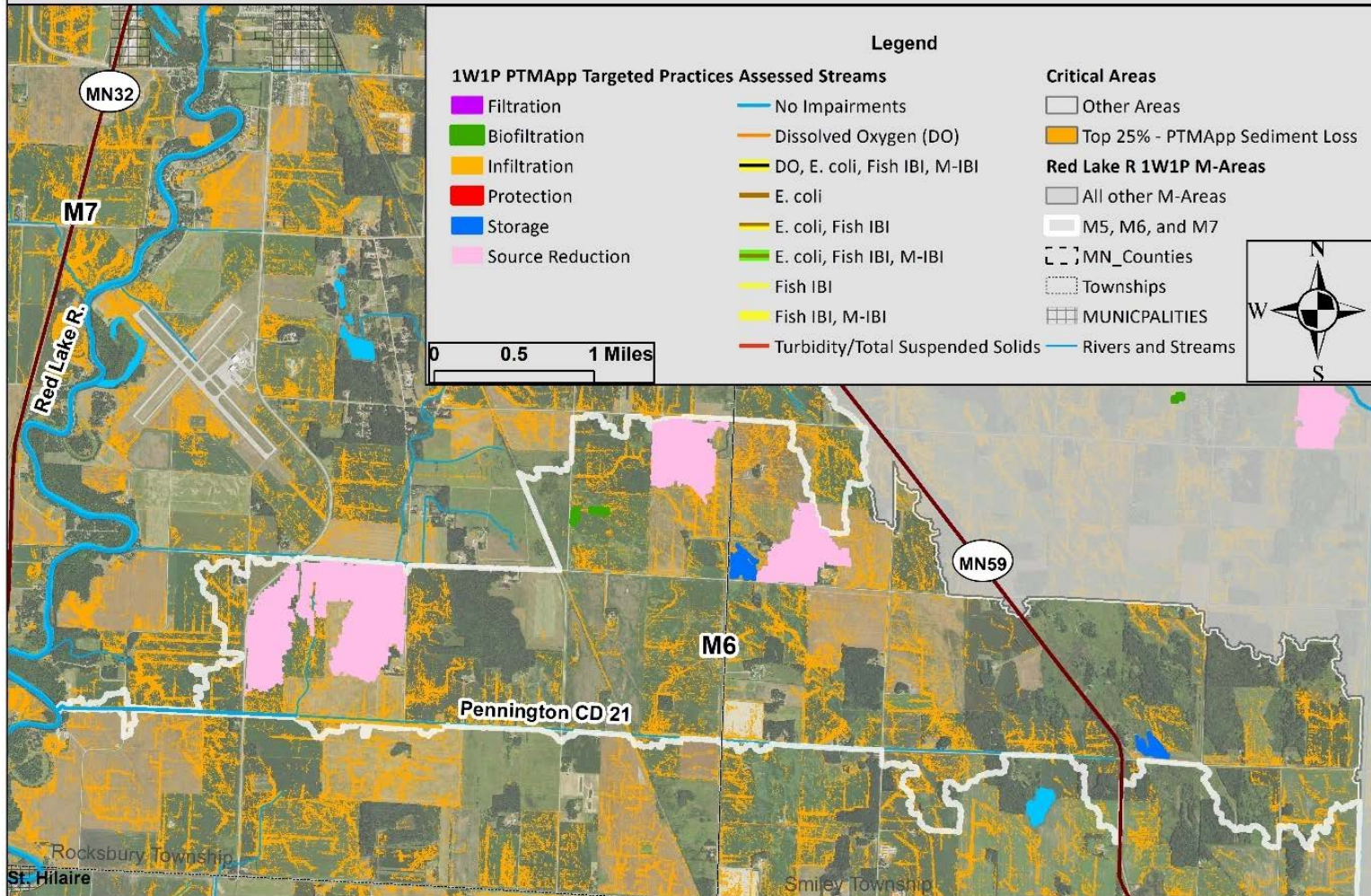
**Red Lake River PTMAApp  
Priority Management Area M7  
Red Lake Falls to Crookston  
Critical Areas and Targeted BMPs  
to Reduce Sediment Loss**



## Red Lake River Watershed

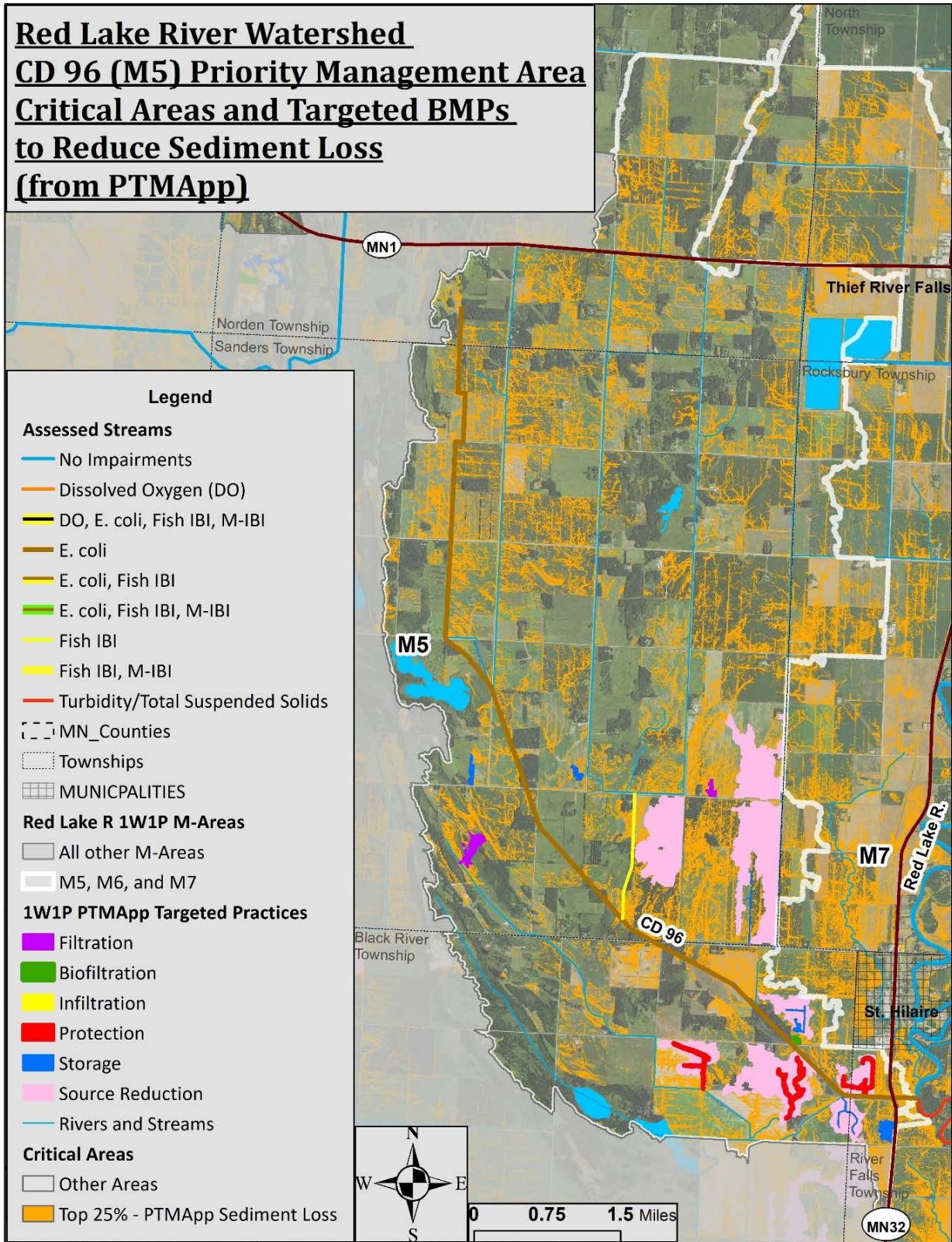
### Pennington County Ditch 21 (M6) Priority Management Area

#### Critical Areas and Targeted BMPs to Reduce Sediment Loss (from PTMApp)



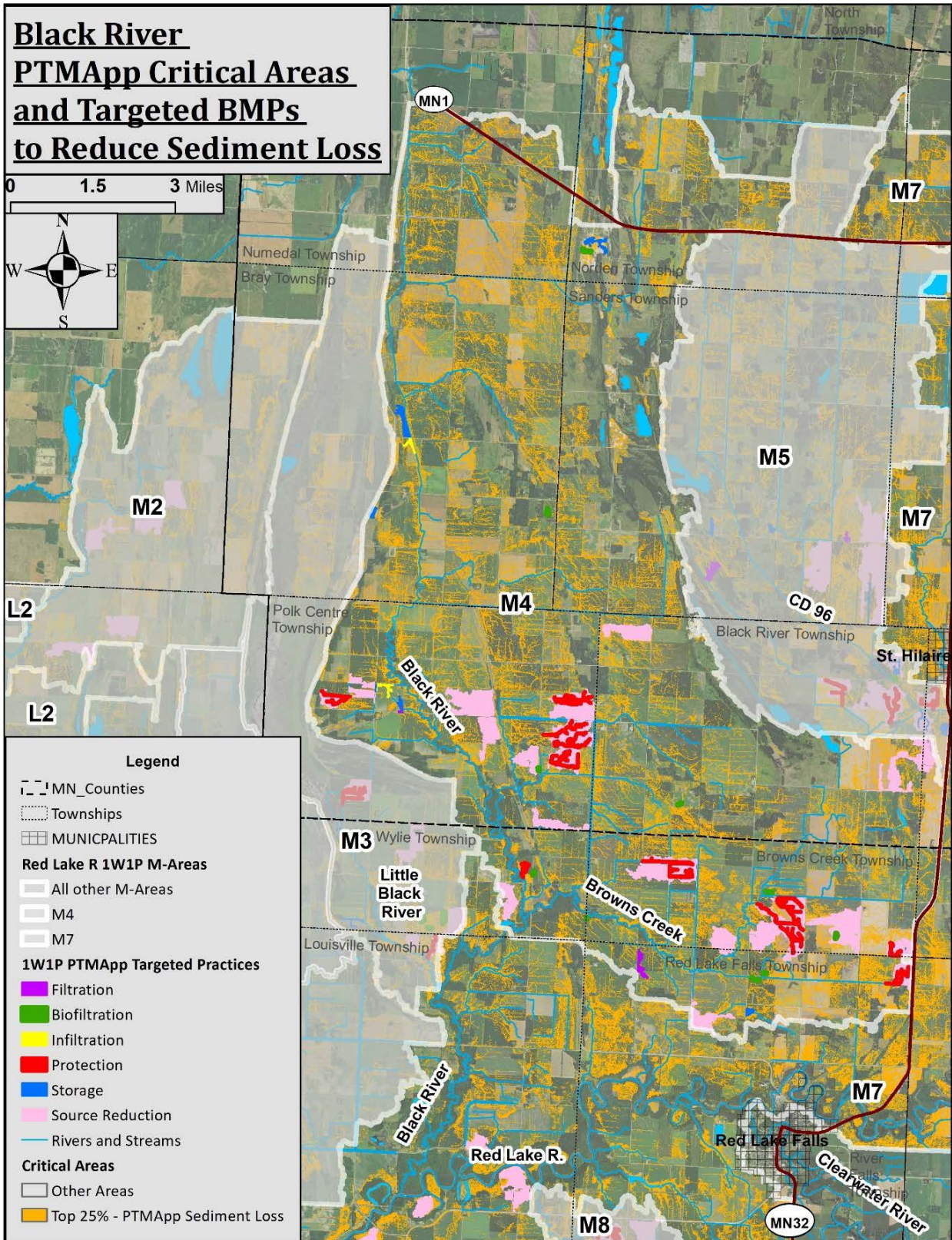


**Red Lake River Watershed**  
**CD 96 (M5) Priority Management Area**  
**Critical Areas and Targeted BMPs**  
**to Reduce Sediment Loss**  
**(from PTMApp)**



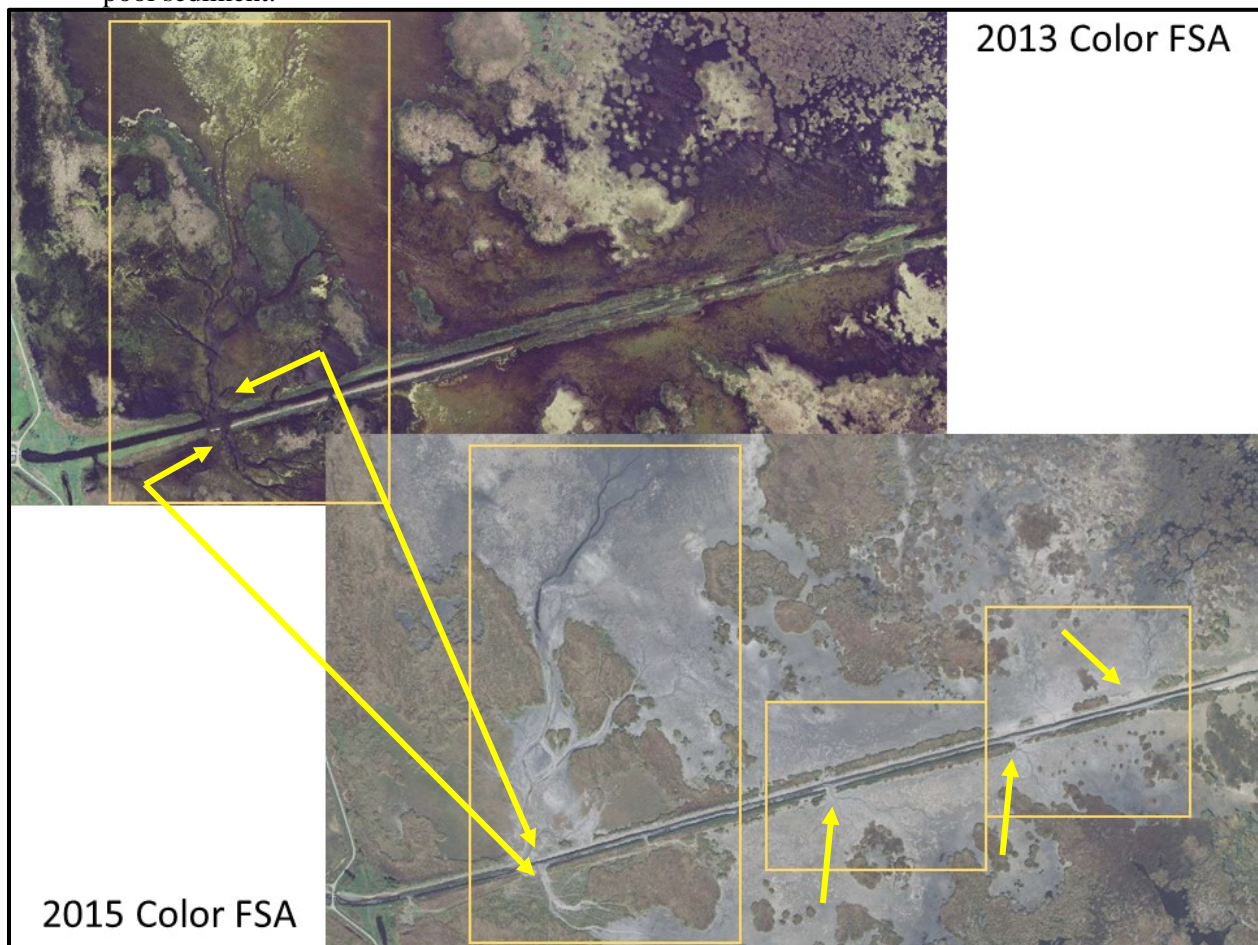
**Black River  
PTMApp Critical Areas  
and Targeted BMPs  
to Reduce Sediment Loss**

0 1.5 3 Miles



**Other Notes**

- District technicians and staff have been staying up to date on 2020 flood forecasts and have been sharing information on the District's Facebook page.
- District staff worked on writing water quality reports for September, October, November, and December 2019.
- District staff compiled links to existing information about the Thief River for the City of Thief River Falls and created a fact sheet about Thief River water quality.
- A comparison of 2013 and 2015 aerial photos of the Judicial Ditch 11 channel within Agassiz Pool (pre/post JD 11 clean-out) confirmed that the excavation and flushing of sediment from the JD 11 was not the only concern with the JD 11 excavation. The breaches in the spoil bank allowed gully erosion to expand into the pool. Gully erosion had been occurring near the radial gate outlet (bottom, left corner of the following aerial photos) prior to the additional cleaning of the JD 11 channel. The gully erosion within the pool was documented in the Assessment of Water Quality Conditions: Agassiz National Wildlife Refuge, 2012 report (<https://ecos.fws.gov/ServCat/DownloadFile/23563?Reference=24863>) that was written by United States Fish and Wildlife staff. Those in-pool gullies were so large that they were given names within the report. Cleaning additional JD 11 channel created more locations in which head differential between the pool and the JD 11 channel encourages extensive erosion of pool sediment.



RED LAKE WATERSHED DISTRICT  
MONTHLY WATER QUALITY REPORT

January 2020

- District staff contacted RMB Environmental Laboratories to assemble an electronic data deliverable file of 2019 water quality sampling data. New sampling stations from 2019 were established in EQUIS.
- West Polk SWCD District Manager Nicole Bernd named 2019 Outstanding Soil and Water Conservation District Employee: [https://bwsr.state.mn.us/sites/default/files/2020-01/Snapshots-story-2-January-2020-MASWCD\\_0.pdf](https://bwsr.state.mn.us/sites/default/files/2020-01/Snapshots-story-2-January-2020-MASWCD_0.pdf)
- District staff helped MPCA staff review a list of sites that may be reclassified as Class 4C waters (One or more designated uses are impaired or threatened but establishment of a TMDL is not required because the impairment or threat is not caused by a pollutant). Many of these reclassifications were supported by information in TMDL documents and stressor identification reports.

Potential Recategorization Requests for the 2020 Draft List of Impaired Waters (January 2020)				
Watershed	HUC 8	Reach	Reach Name	Reach Description
Grand Marais Creek	9020306	507	Grand Marias Creek	Headwaters to CD2
		509	RLWD Ditch 15	Headwaters to CD66
		515	CD2	CD66 to Grand Marais Creek
		517	CD43 (JD25)	Unnamed Ditch to CD7
		520	JD75	CD7 to Red River
Thief River	9020304	505	Moose River	Headwaters to Thief Lake
		507	Mud River	Headwaters to Agassiz Pool
Red Lake River	9020303	547	CD43	Unnamed Ditch to Red Lake River
		545	Penn. CD96	Unnamed Ditch (Br2 CD96) to Unnamed Creek (CD96)
		558	Black River	-96.4328 48.0146 to Little Black River
		525	Kripple Creek	Unnamed Creek to Gentilly River
		526	Kripple Creek (CD66)	Unnamed Ditch to Unnamed Creek
		554	Gentilly River	CD140 to Red Lake River
		515	Burnham Creek	Polk CD15 to Red Lake River
Clearwater River	9020305	517	Clearwater River	Headwaters to T148R36WS36 east line
		529	Lost River	T148R38WS17 south line to Pine Lake
		550	JD73	Unnamed Ditch (near 187th Ave SE) to Tamarack Lake
		539	Hill River	Hill River Lake to Lost River
		561	Unnamed Creek	Gerdin Lake to Poplar River Diversion
		652	Beau Gerlot Creek	-96.1947 47.8413 to Clearwater River
		658	Red Lake CD23	-96.1479 47.8855 to Clearwater River
		527	Silver Creek	Headwaters to Anderson Lake

Water quality related notes and minutes from the January 9, 2019 Red Lake Watershed District Board of Managers meeting.

- Engineer Nate Dalager, HDR Engineering, Inc., reviewed the agenda for the January 17, 2020 Pine Lake Project Work Team. Dalager stated that the Project Team will look at the potential of replacing the existing dam, which would allow the District to lower the lake level to get more Flood Damage Reduction benefits. Lowering the lake level would also help with less oxygen degeneration. Dalager noted that if the existing dam was replaced, a new Operating Plan would need to be put in place. Administrator Jesme reminded that Board that the current structure is a petitioned for project, with a benefitted area that pays for any maintenance and operating cost. The Board suggested that Administrator Jesme and Legal Counsel Sparby research the legalities

of replacing a structure that is currently a petitioned project, should the project team recommend an alternative which could involve the existing structure. Dalager stated an example that the lake level could be lowered after Labor Day or a time agreed to by the property owners. Manager Torgerson discussed the concerns of the landowners regarding the ability to replenish the water released in the fall. Additional discussion was held on the potential of ring dikes/cabin flood proofing program.

Water quality related notes and minutes from the January 23, 2019 Red Lake Watershed District Board of Managers meeting.

- Wayne Johnson, City of Thief River Falls, appeared before the Board to discuss the Clean Water Act as it pertains to the collection of data within the Red Lake River and Thief River. Johnson stated that the City of Thief River Falls is entertaining the idea of moving the intake of water supply for residents of the City of Thief River Falls to the Red Lake River instead of the current site on the Thief River, which would require installation of a pipe down the middle of the river. Johnson indicated that they have a good idea of where the source of contamination of the current site comes from. Johnson requested information collected by the District and other agencies, to assist in preparing a fact sheet to present to federal legislators to aid their plight. It was the consensus of the Board, that Administrator Jesme direct District staff, to work with Mr. Johnson for the development of a fact sheet with data collected by the District to assist the City of Thief River Falls.
- Engineer Tony Nordby, Houston Engineering, Inc., discussed three alternatives for repair to the outlet of Ditch 10, RLWD Project No. 161. Nordby stated that after the Spring 2019 event and Fall 2019 rain event, additional cracks have formed, with water starting at the top, disappearing as it goes down the riprap and then spraying out towards the bottom. FEMA is currently reviewing site information for potential federal funding. Discussion was held on Alternative 3, which would require the installation of a pipe that would outlet into the existing plunge pool. Nordby stated that with this option, the current in-place rock and concrete would be used as a secondary outlet for high flows. The estimated construction cost for Alternative 3 is \$220,000, for a total of \$322,000 with contingencies. Motion by Dwight, seconded by Ose, to authorize Nordby to explore Alternative 3 for additional design, specifications and cost, for the repairs to the outlet of Ditch 10, RLWD Project No. 161. Motion carried.
- Engineer Nate Dalager, HDR Engineering, Inc., discussed the information he presented at the Pine Lake Project, RLWD Project No. 26, team meeting that was held January 17, 2020. Dalager discussed the achievable goals and alternatives. Administrator Jesme discussed applying for a CPL Grant due to this project having the possibility of fish passage. Additional research will need to be completed on the outlet structure. Dalager discussed the potential of an additional 600 acft. of storage, that could be used as Star Value with the RRWMB for potential funding.
- Administrator Jesme stated that he received notice that the District was awarded a CPL Grant in the amount of \$168,420 for the Burnham Creek Project, RLWD Project No. 43B, for repairs to a wildlife outlet structure that failed. This project is an 80-acre complex owned by the District but managed by the MN DNR. Jesme will meet with staff from HDR Engineering, Inc., next week to work towards getting the project ready for the Advertisement for Bids.

### **Meetings and Events from December 2019**

**January 7, 2020** – Civic engagement co-learning workshop in Bemidji

- A group of MPCA staff and local government staff shared experiences and brainstormed ways to provide incentives to improve public meeting attendance, ways to get a “bigger bang for your

buck” by combining programs, planning programs with multiple partners, and distributing information after meetings.

**January 9, 2020** – Franklin Middle School science fair judging

- One of the projects that District staff judged was recommended to the Pennington SWCD for their annual award, which the student then won:  
[http://trfradio.com/2020/01/28/science-fair-award-winner/?fbclid=IwAR3y7WwinIxzqL3eMbCeDxiZxDsvghsLRj\\_RqJ31TVNMD1bZTyWM-gmZKM](http://trfradio.com/2020/01/28/science-fair-award-winner/?fbclid=IwAR3y7WwinIxzqL3eMbCeDxiZxDsvghsLRj_RqJ31TVNMD1bZTyWM-gmZKM)

**January 13, 2020** – Pennington County Water Resources Advisory Committee

- Clean Water Fund Project Updates
  - SWCD staff worked with Pennington County staff to install 11 side water inlet pipes for the CD 96, 21, 16 Gully Control and Buffer Implementation project
  - SWCD staff submitted a Clean Water Fund grant application for cover crops and side water inlets in the lower Thief River and JD 30/18/13 Watersheds.
  - SWCD staff met with Wes Drake, TSA Engineer, on the Hartz Park and Greenwood Streambank Sites. Survey and design work began for the Hartz Park and Greenwood St. Bridge streambank stabilization projects.
- Cooperative Weed Management Area Grant
- One Watershed One Plan updates
- Buffers
- Geologic Atlas
  - Chris Rohlfing was hired to work on the geologic atlas project and has located over 100 wells.
- Activity Reports

**January 16, 2020** – Red Lake River One Watershed One Plan Planning Work Group meeting

- Finalize 2020-2021 Workplan
- Project tracking database
- Glen Kajewski (Minnesota Agriculture Water Quality Certification Program)
  - Piggyback funding to offer high incentives

**January 22, 2020** – Bartlett lake Management Plan meeting in Northome.

**January 27, 2020** – Red River Basin Monitoring Advisory Committee meeting to plan the Annual Red River Basin Water Quality Training

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

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

Learn more about the Red Lake Watershed District at [www.redlakewatershed.org](http://www.redlakewatershed.org).

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

“Like” the Red Lake Watershed District on [Facebook](https://www.facebook.com/redlakewatershed) to stay up-to-date on RLWD reports and activities.

## City of Thief River Falls Drinking Water Supply: Upstream Water Quality in the Thief River and Red Lake River



### Current Water Quality Conditions in the Thief River and Red Lake River

The city of Thief River Falls obtains its drinking water from a surface water intake on the Red Lake River downstream from the Red Lake River's confluence with the Thief River. High concentrations of total suspended solids (TSS) and other pollutants in the Thief River, between Agassiz Pool in Agassiz and the Red Lake River confluence in Thief River Falls have violated state water quality standards for the protection of aquatic life, contributed to violations of Safe Drinking Water Act drinking water standards in the City of Thief River Falls' water supply, contributed to taste and odor complaints, affected water treatment costs, and contributed to sedimentation within the Thief River Falls Reservoir.

The Thief River, between Agassiz Pool and the Red Lake River, is listed as impaired by excess turbidity and exceeds the 30 mg/L total suspended solids (TSS) water quality standard at a frequency that exceeds the 10% impairment threshold. The TSS impairment of the Thief River extends upstream to a monitoring station near the outlet of Agassiz Pool.

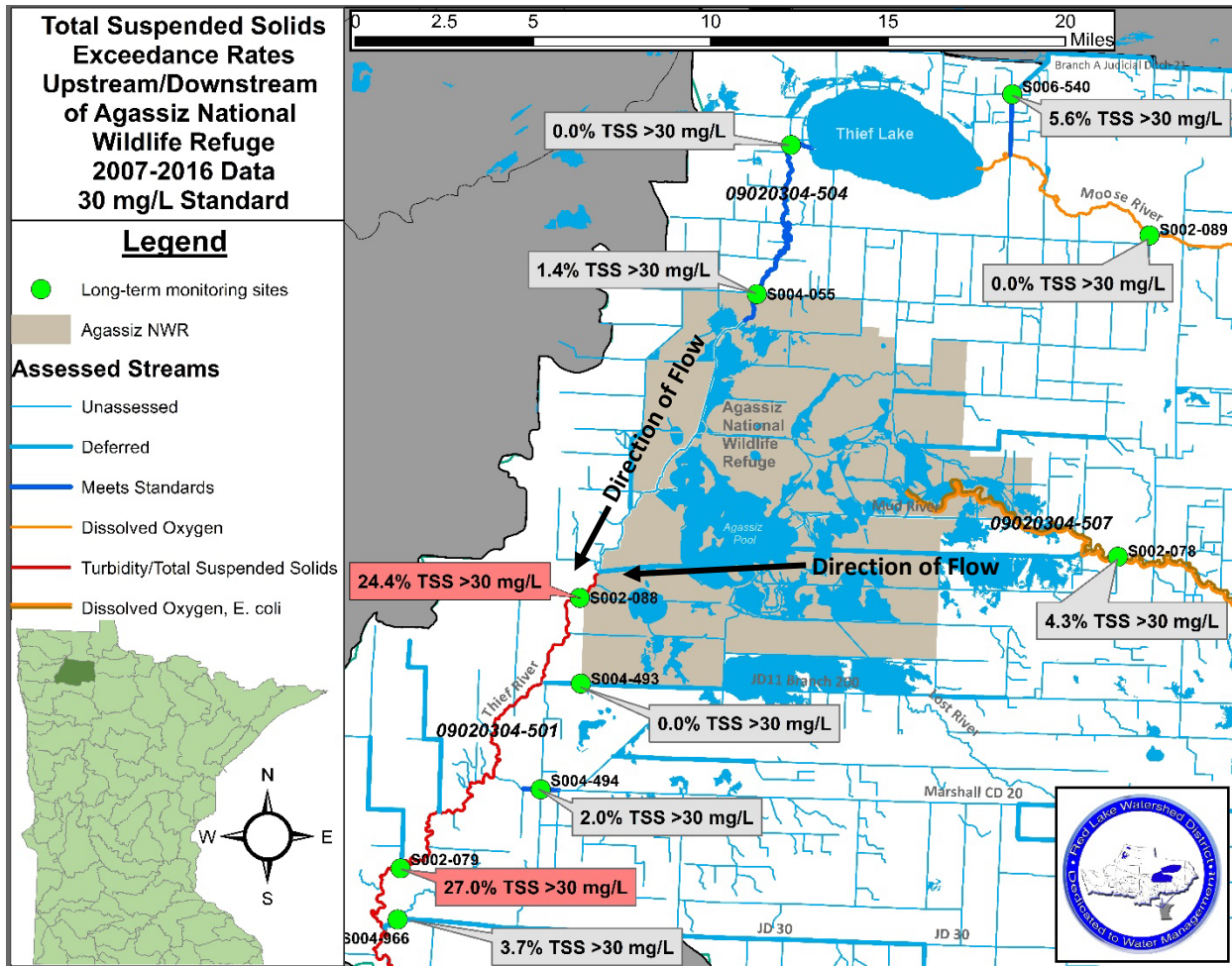
Station	Stream	Location	Average 2007-2016 April - Sept. TSS Concentration (mg/L)	90th Percentile 2007- 2016 April - Sept. TSS Concentration (mg/L)
S002-078	Mud River	Hwy 89, upstream of Agassiz Pool	8.7	19
S004-055	Thief River	380th St. NE, upstream of Agassiz Pool	9.3	18.5
S002-088	Thief River	Marshall CSAH 7, downstream of Agassiz Pool	32.3	60
S002-079	Thief River	140th Ave, near Thief River Falls	22.9	45.4
S007-063	Red Lake River	Pennington CSAH 7, upstream of Thief River Falls	9.0	23.8

Exceedances of the TSS standard are infrequent in the Thief River and Mud River upstream of Agassiz Pool and infrequent in the Red Lake River upstream of Thief River Falls. Only one sample (4.35% of 23 samples) exceeded the 30 mg/L standard at the CSAH 7 crossing of the Red Lake River (S007-063) in 2007-2016 data. Concentrations of TSS have been strongly trending upward in the Thief River at CSAH 7,

## City of Thief River Falls Drinking Water Supply: Upstream Water Quality in the Thief River and Red Lake River

downstream of Agassiz Pool. Trends in the Thief River and Red Lake River near Thief River Falls have been a mixture of upward, downward, and steady trends.

### Sources of Excess Sediment and other Pollutants



Multiple studies sought to explain why TSS levels and assessment statistics are worse downstream of Agassiz Pool compared to upstream stations even though upstream waters meet the TSS standard and the pool has been capturing sediment. Erosion from high-flow discharges caused erosion of the Judicial Ditch 11 outlet channel in the past, but that channel has been repaired and stabilized. Reports from the USFWS document a sediment management strategy and results of drawdowns upon sediment and vegetation within the pool. Those reports reveal plans to flush sediment downstream and describe how extensive erosion has occurred within the pool during drawdowns. Those activities are the most likely cause of excess TSS that has been recorded in the Thief River at CSAH 7.

High flows and erosion (streambank erosion and agricultural runoff) contribute to total suspended solids (TSS) concentrations. Riparian buffers were lacking in extent or quality along some channels. The Minnesota Buffer Law has helped by requiring perennial vegetative buffers along rivers and ditches. Hydrological Simulation Program Fortran (HSPF) models identified relatively high sediment yield rates for subwatersheds along the Thief River compared to the upstream, eastern portion of the Thief River Watershed and compared to the Red Lake River upstream (east) of Thief River Falls.



## **City of Thief River Falls Drinking Water Supply: Upstream Water Quality in the Thief River and Red Lake River**

Unstable streambanks have been documented along the length of the Thief River and its tributaries. Fluvial geomorphology studies found unstable Pfankuch stability ratings at 2 of 3 stations along the Thief River between Agassiz Pool and the Red Lake River. Each station along the Red Lake River, upstream of Thief River Falls, received a “stable” Pfankuch stability rating. Erosion rates along the Agassiz Pool to Red Lake River portion of the Thief River ranged from 31.7 tons/mile/year to 161 tons/mile/year. Erosion rates along the Red Lake River were lower with a range of 12.7 tons/mile/year to 45.8 tons/mile/year.

A stormwater drainage system within the city of Thief River Falls, was found to be contributing high concentrations of *E. coli* bacteria to the Thief River Falls Reservoir. Progress has been made on reducing pollutants in that channel through septic system upgrades and city sewer hook-ups.

### **Sedimentation and Water/Sediment Management of Agassiz Pool**

Multiple rivers/ditches flow into Agassiz Pool, within Agassiz National Wildlife Refuge. The Mud River (also known as Judicial Ditch 11) enters the pool from the east. The Thief River (State Ditch 83) enters the pool from the north. The Sediment (suspended and bed load) accumulates within Agassiz Pool. A portion of the Judicial Ditch 11 channel crosses the pool from east to west. The pool has been accumulating sediment since its construction. A radial gate dam is used to flood and drain the pool. The accumulation of sediment has filled-in portions of the pool and affected waterfowl habitat.

Analysis of water quality data in figures on page 59 of the Thief River Watershed Restoration and Protection Strategy show that TSS concentrations have generally decreased in the Mud River upstream of Agassiz Pool and increased in the Thief River downstream of Agassiz Pool since regular monitoring began in the 1990s.

A 2008-2010 study by the United States Geologic Survey recorded higher loads of sediment at the two Agassiz Pool outlets (12,939 tons/year plus 2,175 tons/year) than the total of loads that were recorded at three monitored inlets (3,065 tons/year).

The 2011 Sediment Loading and Sources to Agassiz National Wildlife Refuge study by Shawn Schottler and Daniel Engstrom used sediment cores and radioisotope soil fingerprinting to characterize the amount of sedimentation within Agassiz Pool and likely sources. The dominant source of the sediment within Agassiz Pool was erosion of upland and fields. The study estimated that 1.2 million metric tons of inorganic sediment have accumulated in Agassiz Pool since controlled inundation of the refuge (approximately 1940). The study identified a concern that the Judicial Ditch 11 channel was full of sediment and infilling of the pool could accelerate.

A project was funded in 2012 by the Clean Water Fund (Agassiz Pool Accelerated Sediment Reduction) to target the watershed of Agassiz Pool with grassed filter strips, grade stabilization structures, and windbreaks to reduce runoff.

The United States Fish and Wildlife Service adopted a strategy for removing existing sediment from the Refuge through flushing and scouring from multiple drawdowns and breaches over several years. High TSS concentrations have been recorded during drawdowns, especially while flow rates are receding. The pooled water is relatively low in TSS, but erosion within the pool begins as the water levels drop. The high TSS concentrations occurred after much of the pooled water had drained and flow became concentrated within the ditch channel and gullies that formed at breaches in the Judicial Ditch 11 spoil bank.

## City of Thief River Falls Drinking Water Supply: Upstream Water Quality in the Thief River and Red Lake River

A 2012 study by the United States Fish and Wildlife Service examined the effects of a drawdown and reported that “the drawdown within the pool caused significant disturbance to emergent wetland vegetation and substrate in the immediate vicinity of the Ditch-11 Outlet. The head differential created between water surface elevations in the main ditch system extending upstream of the Ditch-11 Outlet and water surface elevations within Agassiz Pool appear to have created velocities sufficient to flatten vegetation and scour multiple networks of channels.



### References

- Thief River Watershed Restoration and Protection Strategy (WRAPS) Report:
  - <https://www.pca.state.mn.us/sites/default/files/wq-ws4-49a.pdf>
- Thief River Watershed Total Maximum Daily Load (TMDL) Report:
  - <https://www.pca.state.mn.us/sites/default/files/wq-iw5-11e.pdf>
- Assessment of Nutrients and Suspended Sediment Conditions in and near the Agassiz National Wildlife Refuge, Northwest Minnesota, 2008–2010:
  - <https://pubs.usgs.gov/sir/2012/5112/sir2012-5112.pdf>
- Assessment of Water Quality Conditions: Agassiz National Wildlife Refuge, 2012:
  - <http://ecos.fws.gov/ServCatFiles/reference/holding/23563?accessType=DOWNLOAD>
- Sediment Loading and Sources to Agassiz National Wildlife Refuge:
  - <https://catalog.data.gov/dataset/sediment-loading-and-sources-to-agassiz-national-wildlife-refuge>
- Decision Analysis of Mitigation and Remediation of Sedimentation Within Large Wetland Systems—A Case Study Using Agassiz National Wildlife Refuge:
  - <https://pubs.usgs.gov/of/2014/1180/pdf/ofr2014-1180.pdf>
- Sediment Loading and Sources to Agassiz National Wildlife Refuge
  - By Shawn Schottler and Daniel Engstrom (not currently available online)