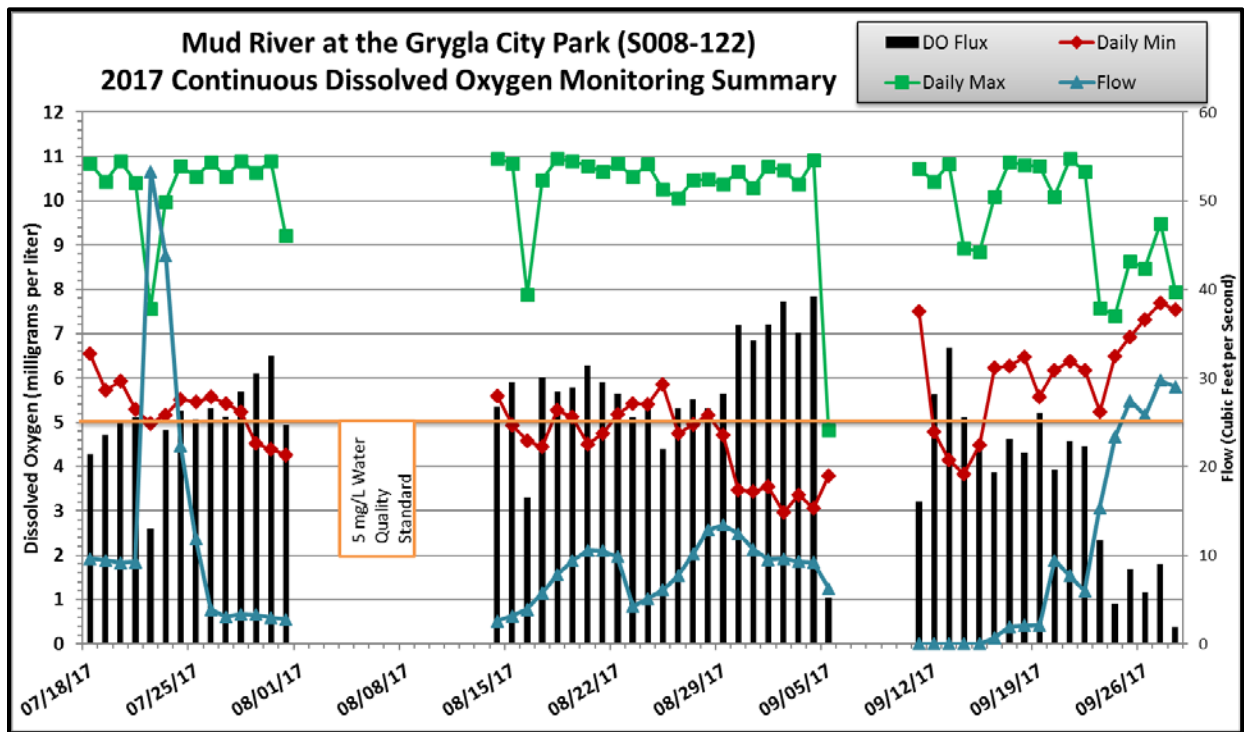


By Corey Hanson, Red Lake Watershed District Water Quality Coordinator. 4/18/2018.

- ✓ Continuous dissolved oxygen monitoring results from the 2017 monitoring season
- ✓ Clearwater River Watershed Restoration and Protection Strategy Project
- ✓ Thief River Falls Stormwater Water Quality Study
- ✓ Clearwater River Watershed Lakes Stressor Identification Report

Red Lake Watershed District Long-Term Monitoring Program

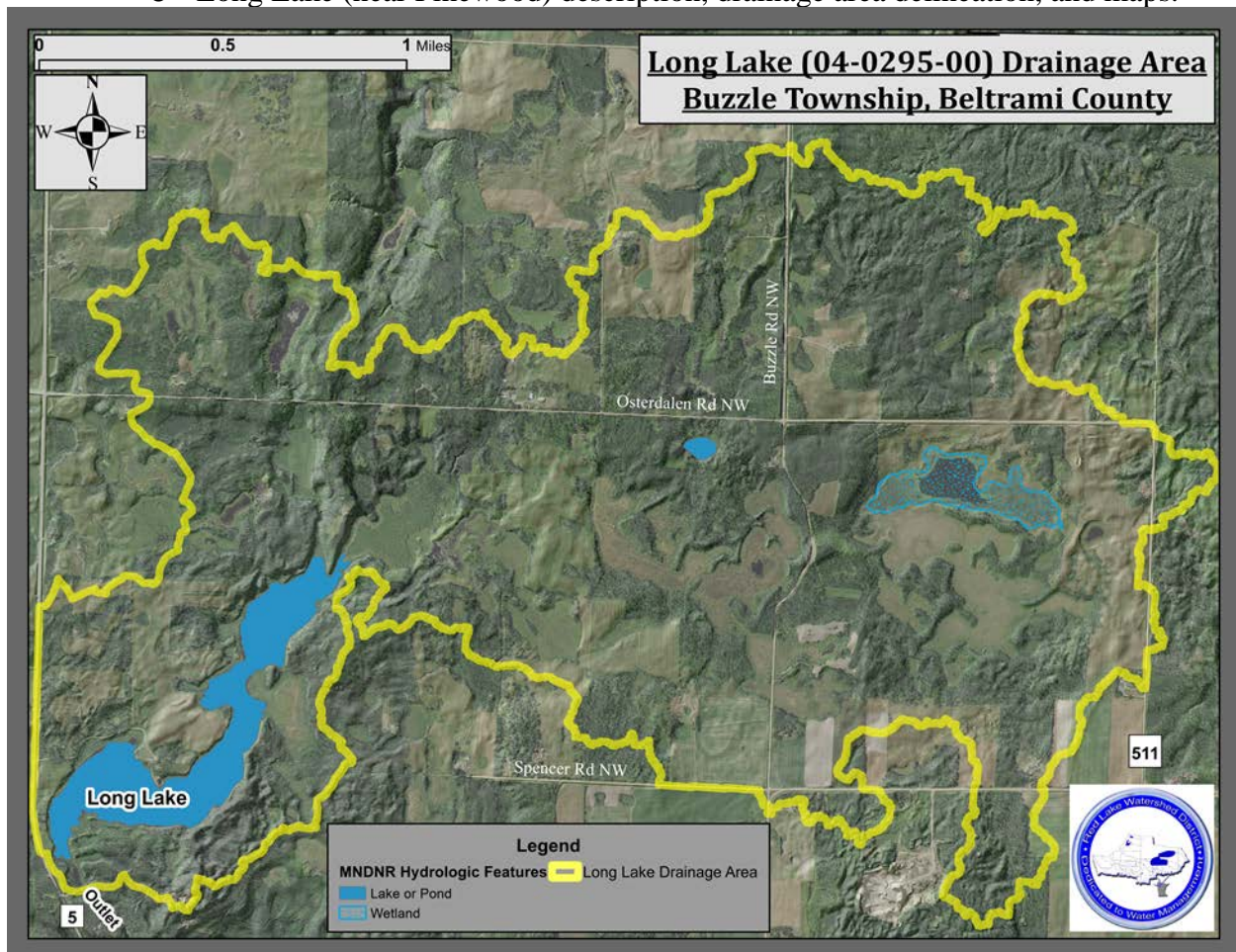
2017 dissolved oxygen logger data from the Mud River in Grygla was compiled, corrected, and summarized. Dissolved oxygen levels frequently (21 of 50 days with flow, 42%) dropped below 5 mg/L. As shown in the following chart, low dissolved oxygen levels typically coincided with low flows. Flow dropped to zero cubic feet per second at Highway 89 for five days in September.



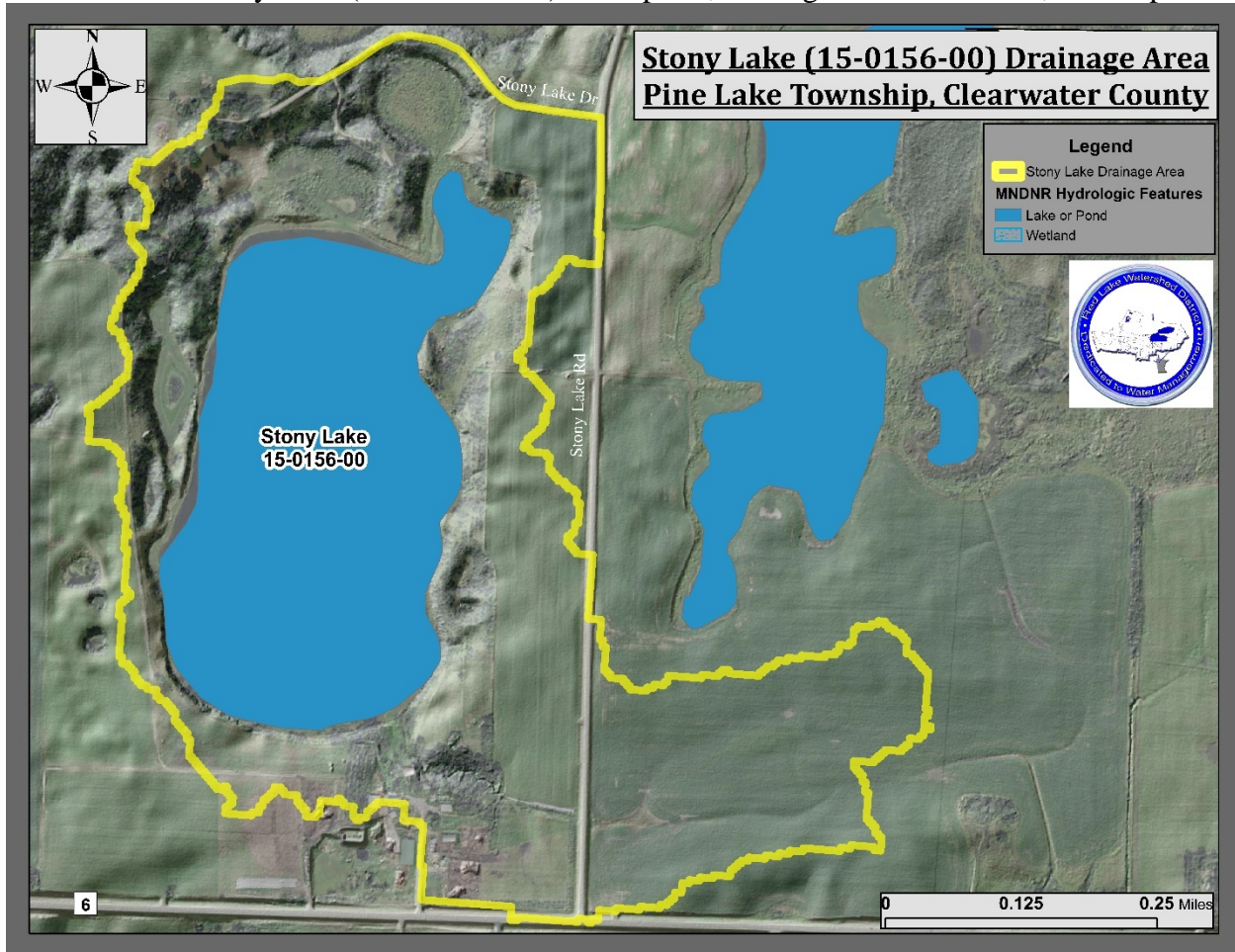
Clearwater River Watershed Restoration and Protection Strategy (WRAPS) Project

- Objective 10 – Reports
 - Streams in the Clearwater River Watershed were classified for the prioritization of restoration and protection efforts using impairment status, fish index of biological integrity scores, macroinvertebrate index of biological integrity scores, *E. coli* data, dissolved oxygen, total phosphorus, Minnesota Stream Habitat Assessment scores, and total suspended solids data. Lakes were classified for restoration or protection priorities based on impairment status, total phosphorus

- data, chlorophyll-a data, and Secchi disk transparency data.
- A monitoring plan was written for inclusion in the Clearwater River WRAPS and TMDL reports. Maps of long term water quality and flow monitoring sites were created for that section.
 - A map of Pfankuch streambank stability rating results was created.
 - District staff reviewed a stressor identification report that was described the results of an investigation of factors that could be negatively affecting biology in Cross Lake and Hill River Lake. Neither Lake was officially impaired, but the lakes were relatively close to violating standards.
 - When completed, Section 3.1 of the Clearwater River WRAPS was shared with core team members.
 - Comments on Section 3.1 were received from MN DNR staff and the WRAPS report was edited to address those comments.
 - Long Lake (near Pinewood) description, drainage area delineation, and maps.



- Stony Lake (near Pine Lake) description, drainage area delineation, and maps.



- MN DNR staff provided the District with a draft Clearwater River Watershed Fluvial Geomorphology Report and shared a completed Upper/Lower Red Lakes Watershed Fluvial Geomorphology Report. District staff reviewed the Clearwater River geomorphology report and added information from the report to sections in the WRAPS report about protection considerations, sediment sources, targeting of geographic areas, and restoration/protection strategies.

RED LAKE WATERSHED DISTRICT MONTHLY WATER QUALITY REPORT

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Summary of methods used for a data-based categorization and prioritization of streams for restoration and protection:

Parameter:	Total Suspended Solids	<i>E. coli</i> Bacteria	Dissolved Oxygen	River Total Phosphorus and River Eutrophication	Fish Index of Biological Integrity	Macro-invertebrate Index of Biological Integrity	Habitat Minimum MSHA	Pfankuch Stability
Statistical Measurement:	Exceedance rate	Maximum monthly geomean	Percentage of days with <5 mg/L daily minimums (DO_5)	Summer average TP, BOD, Chl-a, and/or DO Flux	IBI score minus impairment threshold	IBI score minus impairment threshold	Minnesota Stream Habitat Assessment (MSHA) score & rating	Pfankuch stability rating
Poor Quality (not impaired) =	n/a	n/a	>10%	n/a	<0	<0	Poor score (<45), no IBI impairment	<0
Restoration (Impaired) =	>12.5%	>157.5	>15%	>(125% of Std)	<-21.7	<-12.89	Poor score (<45) & IBI Impairment	TSS Impairment & Unstable
Nearly Restored (Impaired) =	10%<x<12.5 %	126<x<157.5	10%<x<15%	Std<x<(125% of Std)	<0	-12.89<x<0	Fair score (<66) or better and an IBI impairment	TSS impairment & moderately unstable
Nearly Impaired =	7.5%<x<10%	94.5<x<126	>5%	>Std	<10.85	0<x<12.89	Fair score (45<MSHA<66)	No TSS impairment & moderately unstable, unstable, or mixed results
Highest Quality =	<7.5%	<94.5	<5%	<(75% of Std)	>10.85	>12.89	Good score (>66)	Stable

RED LAKE WATERSHED DISTRICT MONTHLY WATER QUALITY REPORT

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Categorization and prioritization of streams for restoration and protection (AUIDs '501 through '523):

Assessment Unit ID	Waterbody Name	Reach Description	River Nutrient Region (Applied to Local Planning)	Total Suspended Solids	E. coli Bacteria	Dissolved Oxygen	River Total Phosphorus and River Eutrophication	Fish Index of Biological Integrity	Macro-invertebrate Index of Biological Integrity	Habitat Minimum MSHA	Pfankuch Stability
09020305-501	Clearwater River	Lower Badger Cr to Red Lake R	Central	Restoration (Impaired)	Highest Quality	Highest Quality	Nearly Impaired			63, Fair	Unstable
09020305-502	Lower Badger Crk	CD 14 to Clearwater R	Central	Nearly Impaired	Restoration (Impaired)	Highest Quality	Highest Quality	Nearly Impaired	Nearly Impaired	48.6, Fair	
09020305-504	Poplar River	Highway 59 to Lost R	Central	Highest Quality	Restoration (Impaired)	Nearly Impaired	Nearly Impaired	Highest Quality	Nearly Impaired	69.3, Good	
09020305-508	County Ditch 57	Unnamed ditch to Clearwater R	Central	Highest Quality	Nearly Impaired	Poor Quality	Nearly Impaired				
09020305-509	Walker Brook	Walker Brook Lk to Clearwater R	North			Poor Quality					
09020305-511	Clearwater River	Lost R to Beau Gerlot Cr	Central	Nearly Restored (Impaired)	Nearly Impaired	Highest Quality	Nearly Impaired	Highest Quality	Highest Quality	57.8, Fair	Moderately Unstable
09020305-512	Lost River	Pine Lk to Anderson Lk	Central	Highest Quality	Nearly Restored (Impaired)	Highest Quality	Highest Quality	Nearly Impaired	Nearly Impaired	66.5, Good	
09020305-513	Ruffy Brook	Headwaters to Clearwater R	Central	Highest Quality	Restoration (Impaired)	Nearly Impaired	Nearly Impaired	Highest Quality	Nearly Impaired	73.8, Good	
09020305-517	Clearwater River	Headwaters to T148 R36W S36, east line	North	Highest Quality	Nearly Impaired	Restoration (Impaired)	Nearly Impaired				
09020305-518	Poplar River	Spring Lk to Highway 59	Central	Highest Quality	Nearly Impaired	Restoration (Impaired)	Nearly Impaired	Nearly Restored (Impaired)	Restoration (Impaired)	52.9, Fair	Stable
09020305-523	Polk CD 14	Maple Lake to Lower Badger Cr	Central	Highest Quality	Highest Quality	Highest Quality	Highest Quality	Nearly Impaired	Nearly Impaired	43, Poor	
Poor Quality = AUID failed to meet numerical standards due to non-pollutant factors, but it is not on the Draft 2018 List of Impaired Waters.										Poor quality	
Restoration (Impaired) = AUID is listed on the Draft 2018 List of Impaired Waters										Poor quality and Impaired	
Nearly Restored = AUID failed to meet numerical standards, but is relatively close to the impairment threshold										Fair to Good quality and impaired	
Nearly Impaired = AUID met numerical standards, but only by a small margin										Poor to fair quality, not impaired	
Highest Quality = AUID met numerical standards by a relatively significant margin										Good quality, not impaired	

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Assessment Unit ID	Waterbody Name	Reach Description	River Nutrient Region (Applied to Local Planning)	Total Suspended Solids	E. coli Bacteria	Dissolved Oxygen	River Total Phosphorus and River Eutrophication	Fish Index of Biological Integrity	Macro-invertebrate Index of Biological Integrity	Habitat Minimum MSHA	Pfankuch Stability
09020305-526	Unnamed Creek (Clear Brook)	Headwaters to Silver Cr	Central	Highest Quality	Nearly Restored (Impaired)	Restoration (Impaired)	Nearly Impaired				
09020305-527	Silver Creek	Headwaters to Anderson Lk	North	Nearly Impaired	Restoration (Impaired)	Highest Quality	Nearly Impaired	Nearly Impaired	Nearly Restored (Impaired)	56.1, Fair	Stable, Moderately Unstable
09020305-529	Lost River	T148 R38W S17, south line to Pine Lk	Central	Highest Quality	Restoration (Impaired)	Restoration (Impaired)	Highest Quality	Highest Quality	Highest Quality	53, Fair	
09020305-530	Lost River	Unnamed cr to T148 R38W S20, north line	Central		Restoration (Impaired)	Nearly Impaired				48.7, Fair	
09020305-539	Hill River	Hill River Lk to Lost R	Central	Highest Quality	Restoration (Impaired)	Highest Quality	Highest Quality	Nearly Restored	Nearly Impaired	59.5, Fair	
09020305-541	Unnamed Creek (Bee Lake Inlet)	Eighteen Lk to Bee Lk	Central			Poor Quality					
09020305-542	Unnamed Creek (JD73)	Mitchell Lk to Badger Lk	Central			Poor Quality					
09020305-543	Poplar River Diversion	Unnamed ditch to Badger Lk	Central			Poor Quality					
09020305-545	Unnamed crk (Nassett Creek)	T148 R38W S28, south line to Lost R	Central	Nearly Restored (Impaired)	Restoration (Impaired)	Restoration (Impaired)					
09020305-549	Unnamed Creek (JD73)	Tamarack Lk to Maple Lk	Central	Highest Quality	Highest Quality	Poor Quality	Highest Quality				
Poor Quality = AUID failed to meet numerical standards due to non-pollutant factors, but it is not on the Draft 2018 List of Impaired Waters.										Poor quality	
Restoration (Impaired) = AUID is listed on the Draft 2018 List of Impaired Waters										Poor quality and Impaired	
Nearly Restored = AUID failed to meet numerical standards, but is relatively close to the impairment threshold										Fair to Good quality and impaired	
Nearly Impaired = AUID met numerical standards, but only by a small margin										Poor to fair quality, not impaired	
Highest Quality = AUID met numerical standards by a relatively significant margin										Good quality, not impaired	

RED LAKE WATERSHED DISTRICT MONTHLY WATER QUALITY REPORT

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Assessment Unit ID	Waterbody Name	Reach Description	River Nutrient Region (Applied to Local Planning)	Total Suspended Solids	E. coli Bacteria	Dissolved Oxygen	River Total Phosphorus and River Eutrophication	Fish Index of Biological Integrity	Macro-invertebrate Index of Biological Integrity	Habitat Minimum MSHA	Pfankuch Stability
09020305-550	JD 73	Private ditch near 187th Ave NE to Tamarack Lk	Central	Highest Quality	Restoration (Impaired)	Restoration (Impaired)	Highest Quality	Highest Quality	Nearly Impaired	27.8, Poor	
09020305-551	Unnamed crk (Bee Lake Outlet)	Bee Lk to JD 73	Central			Poor Quality					
09020305-561	Trib. To Poplar R. Diversion	Gerdin Lk to Poplar R Diversion	Central					Nearly Restored (Impaired)		28.5, Poor	
09020305-574	Terrebonne Creek	CD 4 to CD 58	Central	Highest Quality	Restoration (Impaired)	Nearly Impaired	Highest Quality				
09020305-578	Brooks Creek	Unnamed cr to Hill R	Central		Nearly Restored (Impaired)						
09020305-590	SD 61	Unnamed ditch to Lost R	Central					Nearly Impaired	Highest Quality	45, Fair	
09020305-592	Unnamed ditch	Near Red Lake Nation Wild Rice	Central					Poor Quality			
09020305-641	Unnamed ditch (Hill R. tributary)	Ditch draining wetlands by S. Connection Lake	Central					Poor Quality	Poor Quality		
09020305-643	JD 72 Outlet	Unnamed ditch to Lost R	Central					Highest Quality	Nearly Impaired	37.5, Poor	
0920305-645	Lost River	Anderson Lk to Unnamed cr	Central	Highest Quality	Nearly Impaired	Nearly Restored (Impaired)	Highest Quality	Nearly Restored (Impaired)	Highest Quality	47.5, Fair	Moderately Unstable
Poor Quality = AUID failed to meet numerical standards due to non-pollutant factors, but it is not on the Draft 2018 List of Impaired Waters.										Poor quality	
Restoration (Impaired) = AUID is listed on the Draft 2018 List of Impaired Waters										Poor quality and Impaired	
Nearly Restored = AUID failed to meet numerical standards, but is relatively close to the impairment threshold										Fair to Good quality and impaired	
Nearly Impaired = AUID met numerical standards, but only by a small margin										Poor to fair quality, not impaired	
Highest Quality = AUID met numerical standards by a relatively significant margin										Good quality, not impaired	

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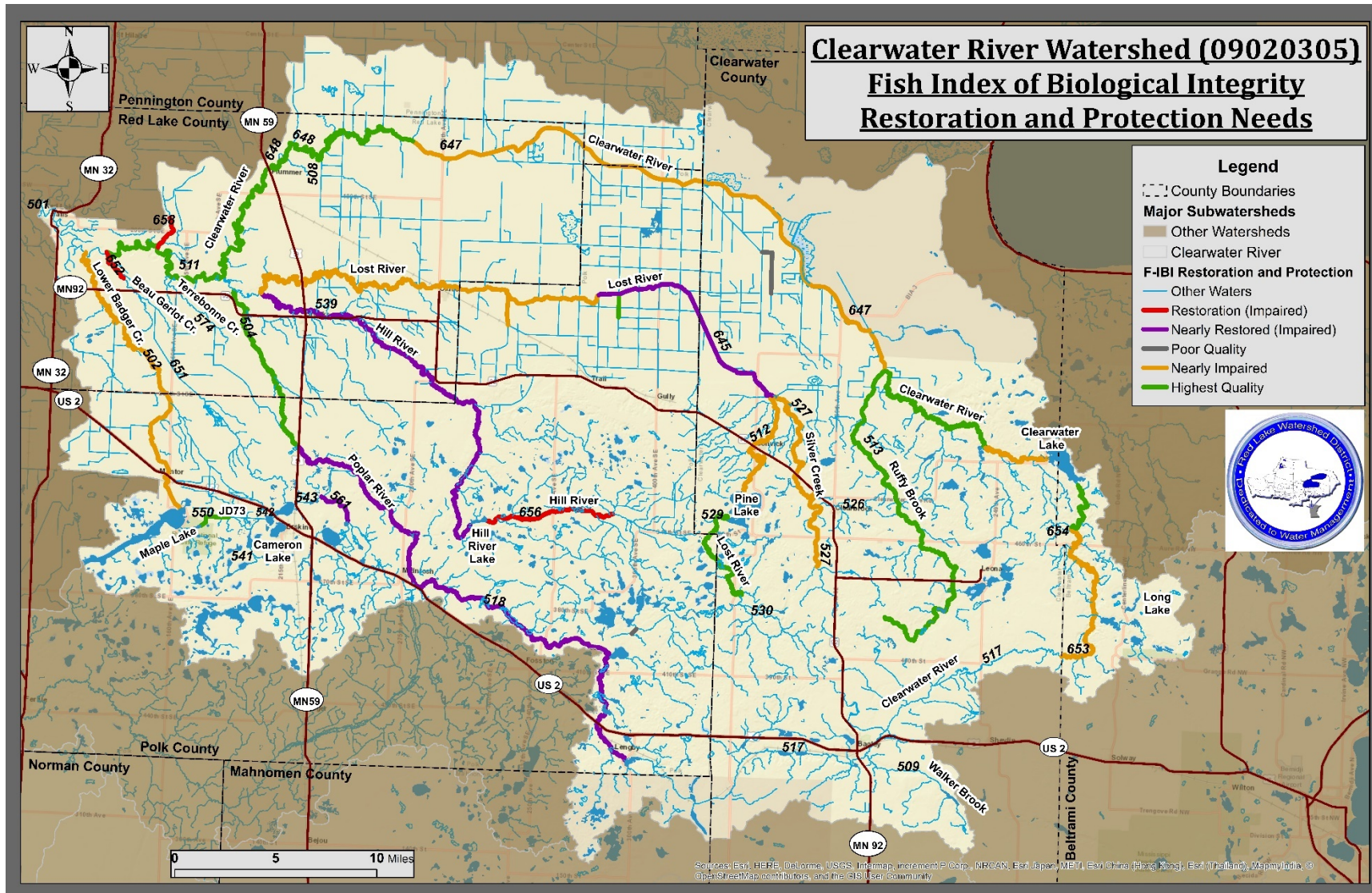
Assessment Unit ID	Waterbody Name	Reach Description	River Nutrient Region (Applied to Local Planning)	Total Suspended Solids	E. coli Bacteria	Dissolved Oxygen	River Total Phosphorus and River Eutrophication	Fish Index of Biological Integrity	Macro-invertebrate Index of Biological Integrity	Habitat Minimum MSHA	Pfankuch Stability
09020305-646	Lost River	Unnamed cr to Hill R	Central	Nearly Impaired	Nearly Impaired	Highest Quality	Highest Quality	Nearly Impaired	Nearly Impaired	43.5, Poor	Stable, Moderately Unstable
09020305-647	Clearwater River	Ruffy Bk to JD 1	Central	Nearly Restored (Impaired)	Restoration (Impaired)	Nearly Impaired	Restoration (Impaired)	Nearly Impaired	Nearly Impaired	39, Poor	Moderately Unstable
09020305-648	Clearwater River	JD 1 to Lost R	Central	Restoration (Impaired)	Highest Quality	Highest Quality	Nearly Impaired	Highest Quality	Highest Quality	54.5, Fair	Stable
09020305-649	Clearwater River	Clearwater Lk to Unnamed cr	North	Highest Quality	Highest Quality	Highest Quality	Highest Quality	Nearly Impaired	Nearly Impaired	70.5, Good	
09020305-650	Clearwater River	Unnamed cr to Ruffy Bk	North		Highest Quality	Highest Quality	Highest Quality	Highest Quality	Highest Quality	64.1, Fair	Unstable, Stable
09020305-651	Unnamed crk (Bee L. Outlet)	Bee Lk to JD 73	Central	Highest Quality	Restoration (Impaired)		Highest Quality				
09020305-652	Beau Gerlot Creek	-96.1947 47.8413 to Clearwater R	Central			Highest Quality		Restoration (Impaired)	Nearly Restored (Impaired)	56.4, Fair	Moderately Unstable
09020305-653	Clearwater River	T148 R35W S31, west line to Unnamed cr	North	Highest Quality	Highest Quality	Restoration (Impaired)	Nearly Impaired	Nearly Impaired	Nearly Impaired	44, Poor	Stable
09020305-654	Clearwater River	Unnamed cr to Clearwater Lk	North					Highest Quality	Highest Quality	63.4, Fair	
09020305-655	Hill River (CD68/81)	Cross L. to Br 4 CD 81 near Olga	Central			Nearly Impaired					
09020305-656	Hill River	Unnamed cr to Hill River Lk	Central	Highest Quality	Nearly Impaired	Restoration (Impaired)	Nearly Impaired	Restoration (Impaired)	Nearly Impaired	59.6, Fair	
09020305-658	Red Lake CD 23	-96.1479 47.8855 to Clearwater R	Central					Restoration (Impaired)		55, Fair	Stable
Poor Quality = AUID failed to meet numerical standards due to non-pollutant factors, but it is not on the Draft 2018 List of Impaired Waters.										Poor quality	
Restoration (Impaired) = AUID is listed on the Draft 2018 List of Impaired Waters										Poor quality and Impaired	
Nearly Restored = AUID failed to meet numerical standards, but is relatively close to the impairment threshold										Fair to Good quality and impaired	
Nearly Impaired = AUID met numerical standards, but only by a small margin										Poor to fair quality, not impaired	
Highest Quality = AUID met numerical standards by a relatively significant margin										Good quality, not impaired	

RED LAKE WATERSHED DISTRICT MONTHLY WATER QUALITY REPORT	March 2018
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Lake ID	Lake Name	TP Standard (mg/L)	Summer Average TP (mg/L)	TP Classification	Chlorophyll-a Standard (µg/L)	Summer Avg Chlorophyll-a (µg/L)	Chlorophyll-a Classification	Secchi Standard (m)	Secchi Depth (m)	Secchi Class	
04-0295-00	Long Lake (Buzzle Twp.)	0.03	0.044	Restoration (Impaired)	9	18.90	Restoration (Impaired)	2	2.04	Nearly Restored (Impaired)	
04-0297-00	Buzzle Lake	0.03	0.009	Highest Quality	9	2.22	Highest Quality	2	4.03	Highest Quality	
04-0298-00	Little Buzzle	0.03	0.010	Highest Quality	9	2.25	Highest Quality	2	4.62	Highest Quality	
04-0299-00	Funkley	0.03	0.019	Highest Quality	9	4.11	Highest Quality	2	2.69	Highest Quality	
04-0300-00	Whitefish	0.03	0.019	Highest Quality	9	5.37	Highest Quality	2	3.15	Highest Quality	
04-0303-00	Spring Lake (Buzzle Twp.)	0.03	0.014	Highest Quality	9	6.33	Highest Quality	2	3.24	Highest Quality	
04-0343-00	Clearwater Lake	0.03	0.019	Highest Quality	9	7.01	Nearly Impaired	2	2.82	Highest Quality	
15-0027-00	East Four-Legged Lake	0.06	0.014	Highest Quality	20	2.67	Highest Quality	1	2.03	Highest Quality	
15-0028-00	West Four-Legged Lake	0.06	0.013	Highest Quality	20	3.87	Highest Quality	1	2.28	Highest Quality	
15-0035-00	Spike Lake	0.03	0.028	Nearly Impaired	9	7.83	Nearly Impaired	2	2.94	Highest Quality	
15-0037-00	Nels Olson Lake	0.06	0.026	Highest Quality	20	4.25	Highest Quality	1	2.60	Highest Quality	
15-0038-00	Falk Lake	0.04	0.022	Highest Quality	14	6.44	Highest Quality	1.4	3.05	Highest Quality	
15-0040-00	Bagley Lake	0.03	0.021	Highest Quality	9	6.78	Nearly Impaired	2	3.00	Highest Quality	
15-0050-00	Long Lake (Clover Twp.)	0.03	0.010	Highest Quality	9	2.56	Highest Quality	2	5.52	Highest Quality	
15-0060-00	Walker Brook L.	0.03	0.024	Nearly Impaired	9	9.49	Nearly Impaired	2	3.30	Highest Quality	
15-0081-00	Lomond Lake	0.03	0.022	Highest Quality	9	6.84	Nearly Impaired	2	3.20	Highest Quality	
15-0083-00	Peterson Lake	0.04	0.020	Highest Quality	14	18.99	Nearly Impaired	1.4	3.70	Highest Quality	
15-0086-00	Johnson Lake	0.03	0.026	Nearly Impaired	9	11.48	Nearly Impaired	2	2.36	Nearly Impaired	
15-0090-00	Deep Lake	0.04	0.009	Highest Quality	14	2.50	Highest Quality	1.4	4.63	Highest Quality	
15-0104-00	Lone Lake	0.04	0.009	Highest Quality	14	1.67	Highest Quality	1.4	6.11	Highest Quality	
15-0137-00	Minnow Lake	0.03	0.019	Highest Quality	9	6.95	Nearly Impaired	2	3.09	Highest Quality	
15-0138-00	Sabe Lake	0.03	0.020	Highest Quality	9	3.30	Highest Quality	2	2.50	Nearly Impaired	
15-0139-00	First Lake	0.03	0.023	Nearly Impaired	9	9.33	Nearly Impaired	2	2.75	Highest Quality	
15-0140-00	Second Lake	0.03	0.028	Nearly Impaired	9	10.92	Nearly Impaired	2	2.37	Nearly Impaired	
15-0144-00	Lindberg Lake	0.04	0.035	Nearly Impaired	14	11.71	Nearly Impaired	1.4	2.92	Highest Quality	
15-0149-00	Pine Lake	0.06	0.025	Highest Quality	20	6.80	Highest Quality	1	2.28	Highest Quality	
15-0156-00	Stony Lake	0.06	0.137	Restoration (Impaired)	20	46.40	Restoration (Impaired)	1	2.10	Nearly Restored (Impaired)	
60-0012-00	Spring Lake (Lengby)	0.04	0.034	Nearly Impaired	14	9.90	Highest Quality	1.4	1.94	Highest Quality	
60-0015-00	Whitefish Lake	0.06	0.065	<12 Data Points	20	35.23	Nearly Impaired	1	1.18	Nearly Impaired	
60-0027-02	Cross Lake (Main Basin)	0.06	0.059	<12 Data Points	20	20.08	Nearly Impaired	1	1.33	Nearly Impaired	
60-0032-00	Turtle Lake	0.06	0.033	Highest Quality	20	23.87	Nearly Impaired	1	1.00	Nearly Impaired	
60-0189-00	Cameron Lake	0.06	0.094	Restoration (Impaired)	20	57.94	Restoration (Impaired)	1	0.41	Restoration (Impaired)	
60-0214-00	Badger Lake	0.06	0.022	Highest Quality	20	7.32	Highest Quality	1	2.69	Highest Quality	
60-0305-00	Maple Lake	0.06	0.039	Highest Quality	20	14.14	Highest Quality	1	1.29	Nearly Impaired	
Classification Calculation:		Concentration / Standard			Concentration / Standard			Standard / Average Depth			
Restoration (Impaired)		>1.25 Impaired			>1.25 Impaired			>1.25 Impaired			
Nearly Restored (Impaired)		<1.25 Impaired			<1.25 Impaired			<1.25 Impaired			
Nearly Impaired		>.75 Not impaired			>.75 Not impaired			>.75 Not impaired			
Highest Quality		<.75 Not impaired			<.75 Not impaired			<.75 Not impaired			

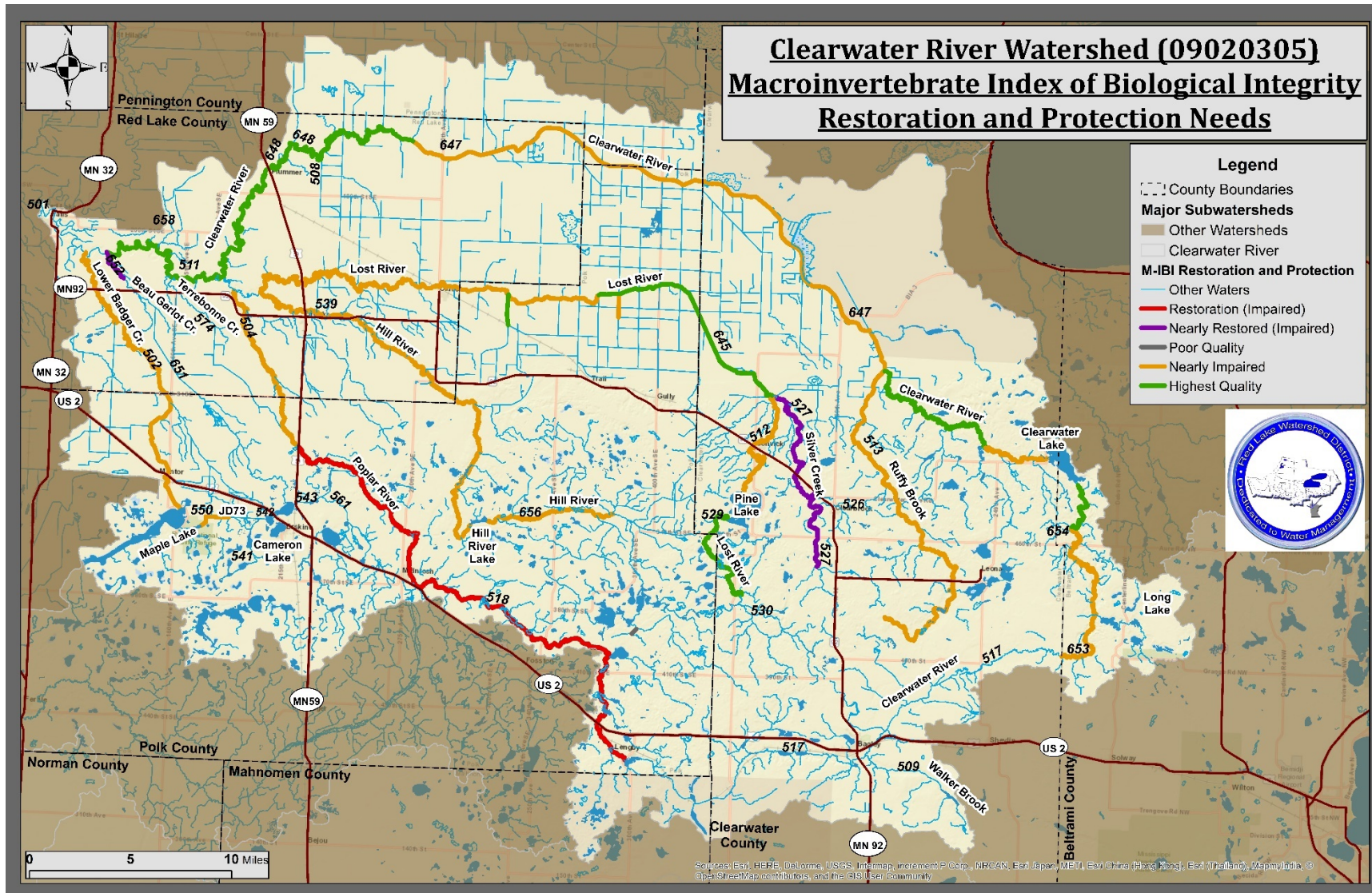
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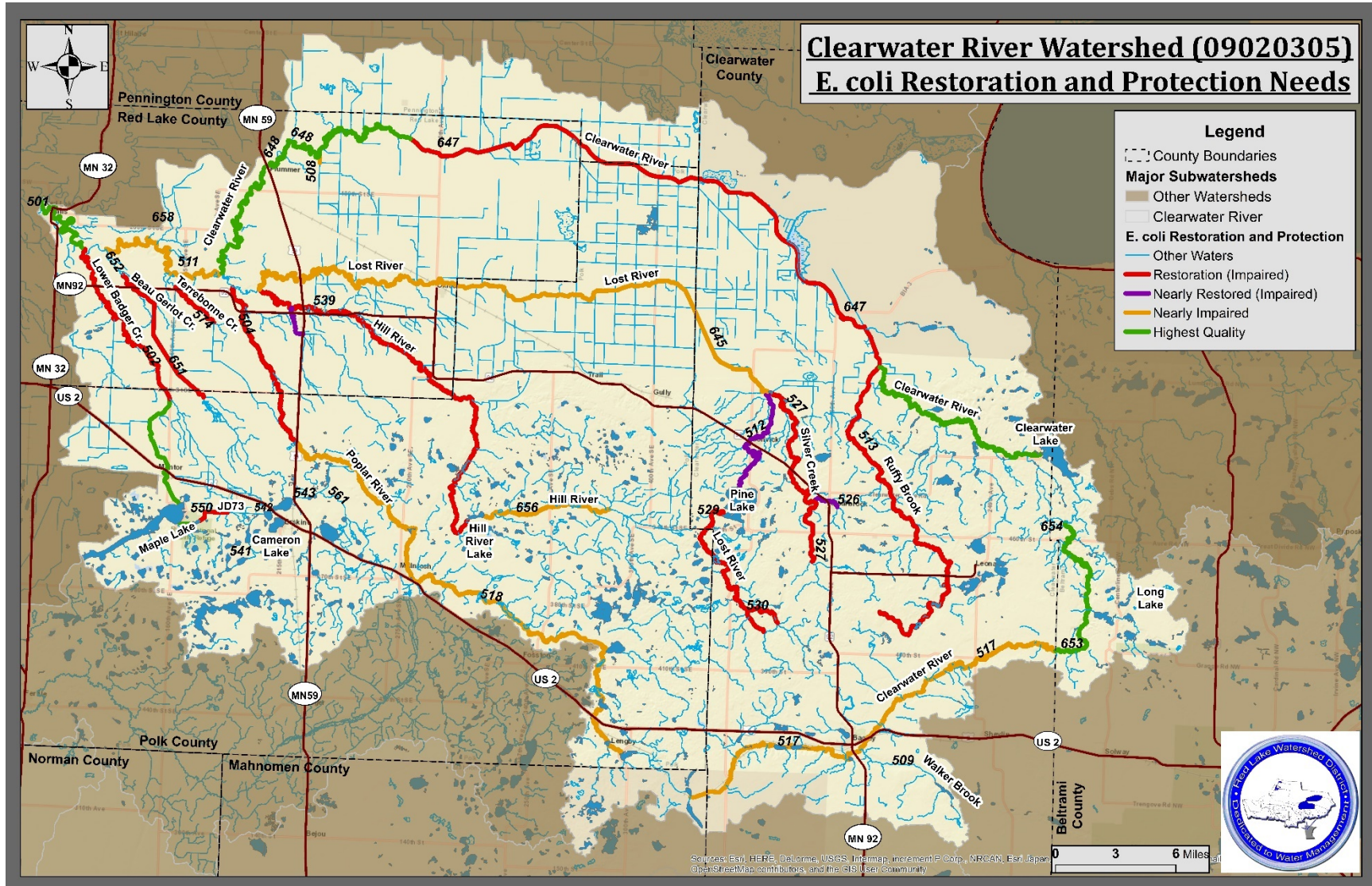
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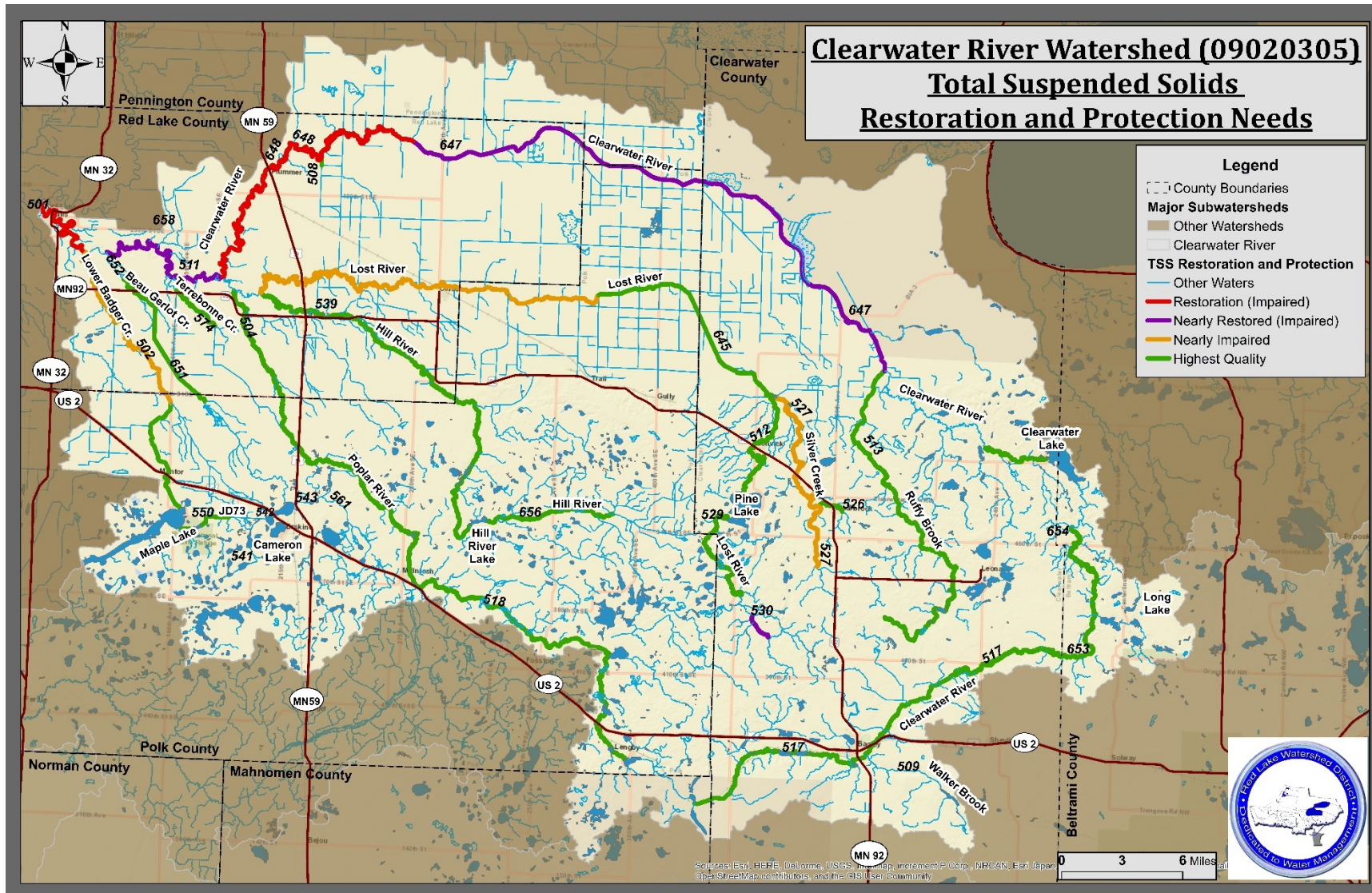
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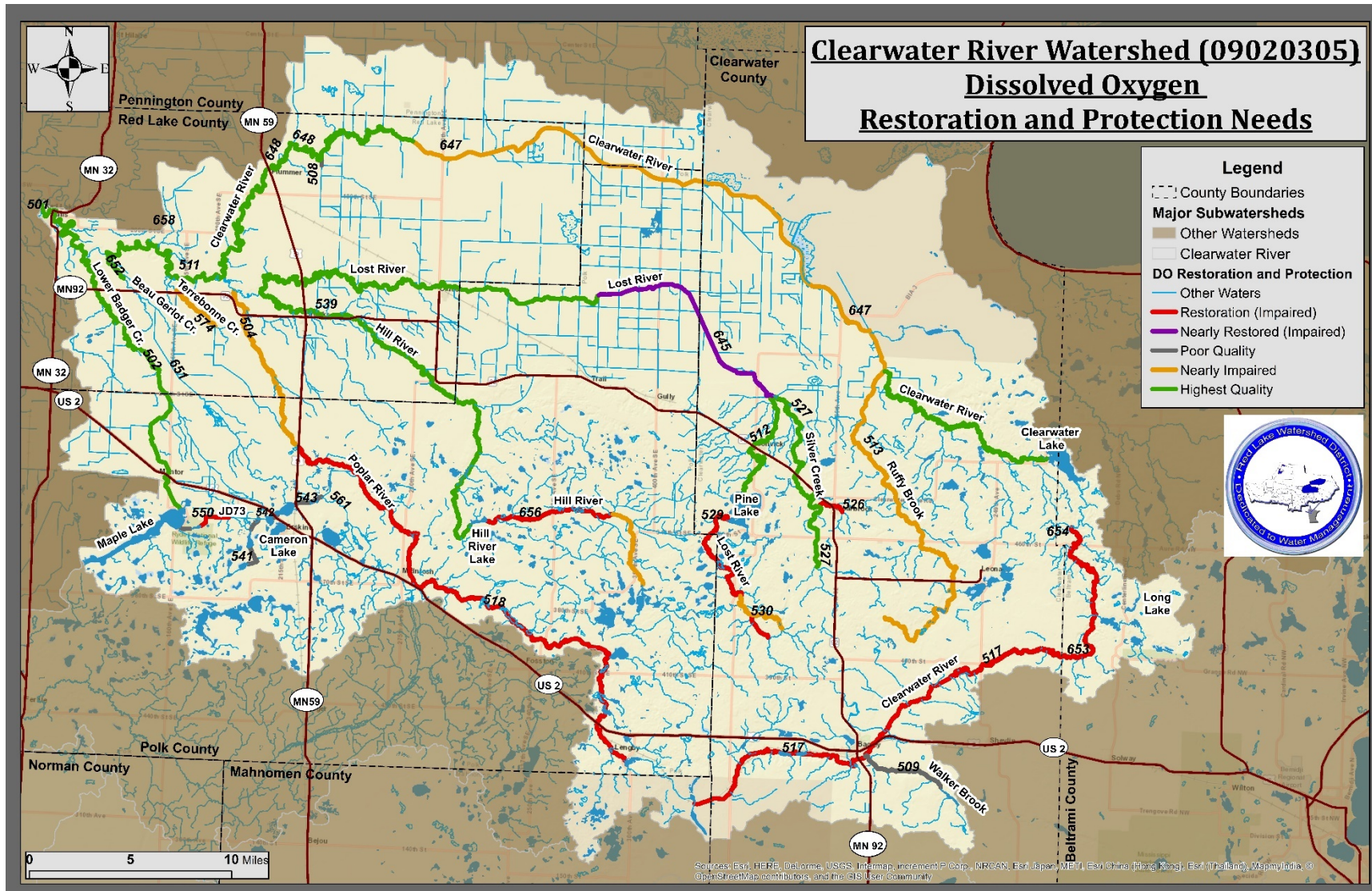
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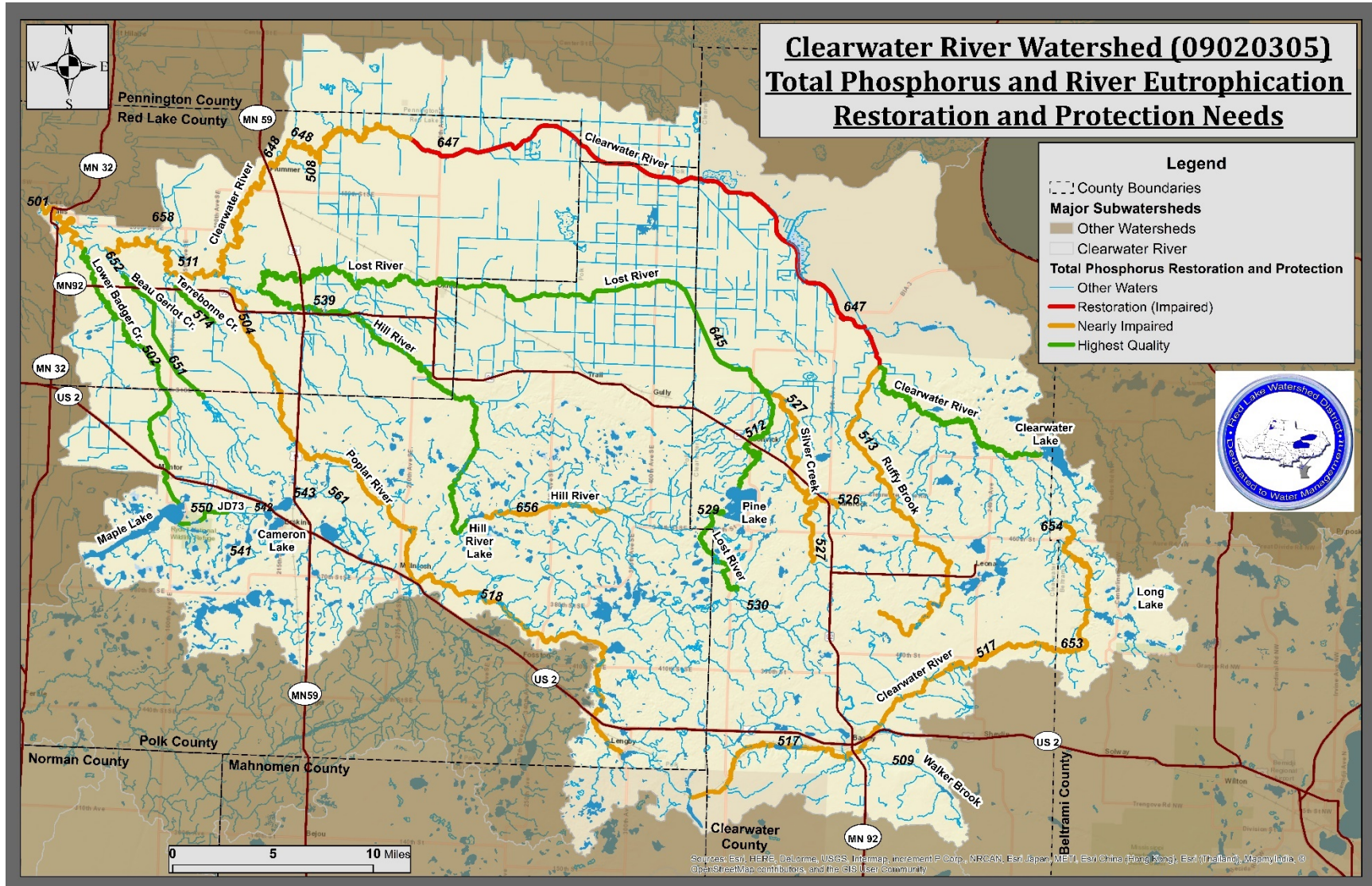
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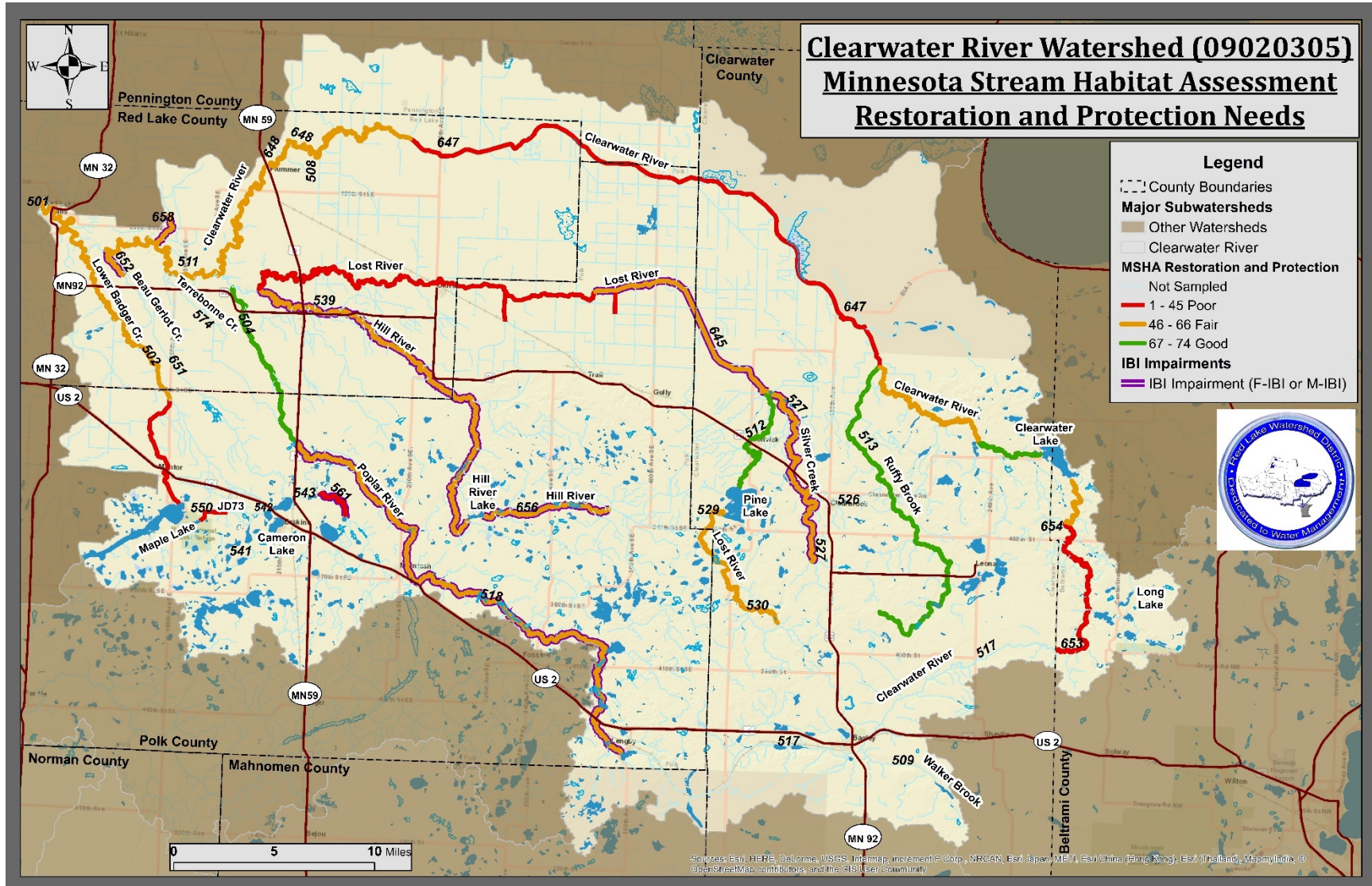
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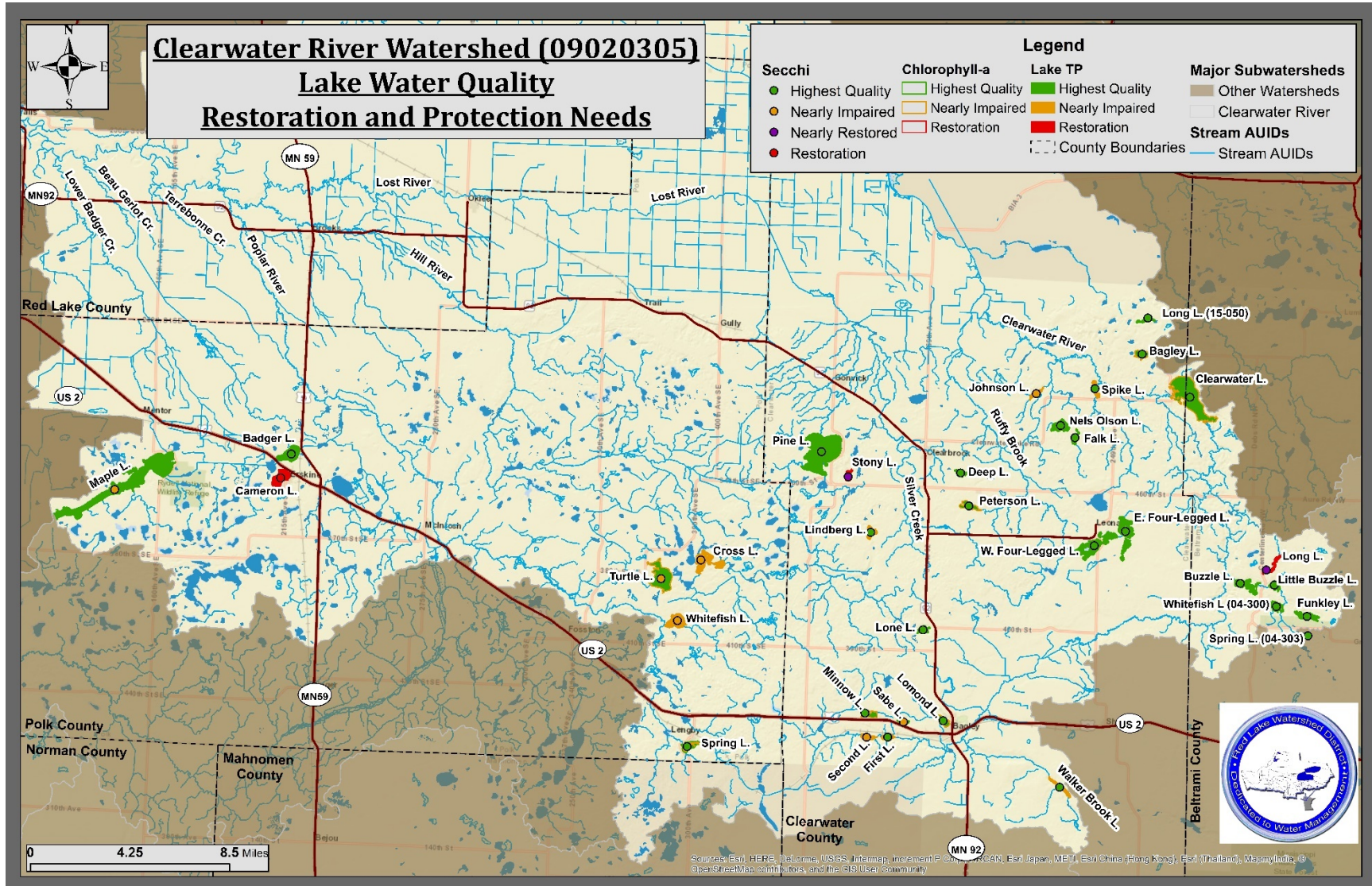
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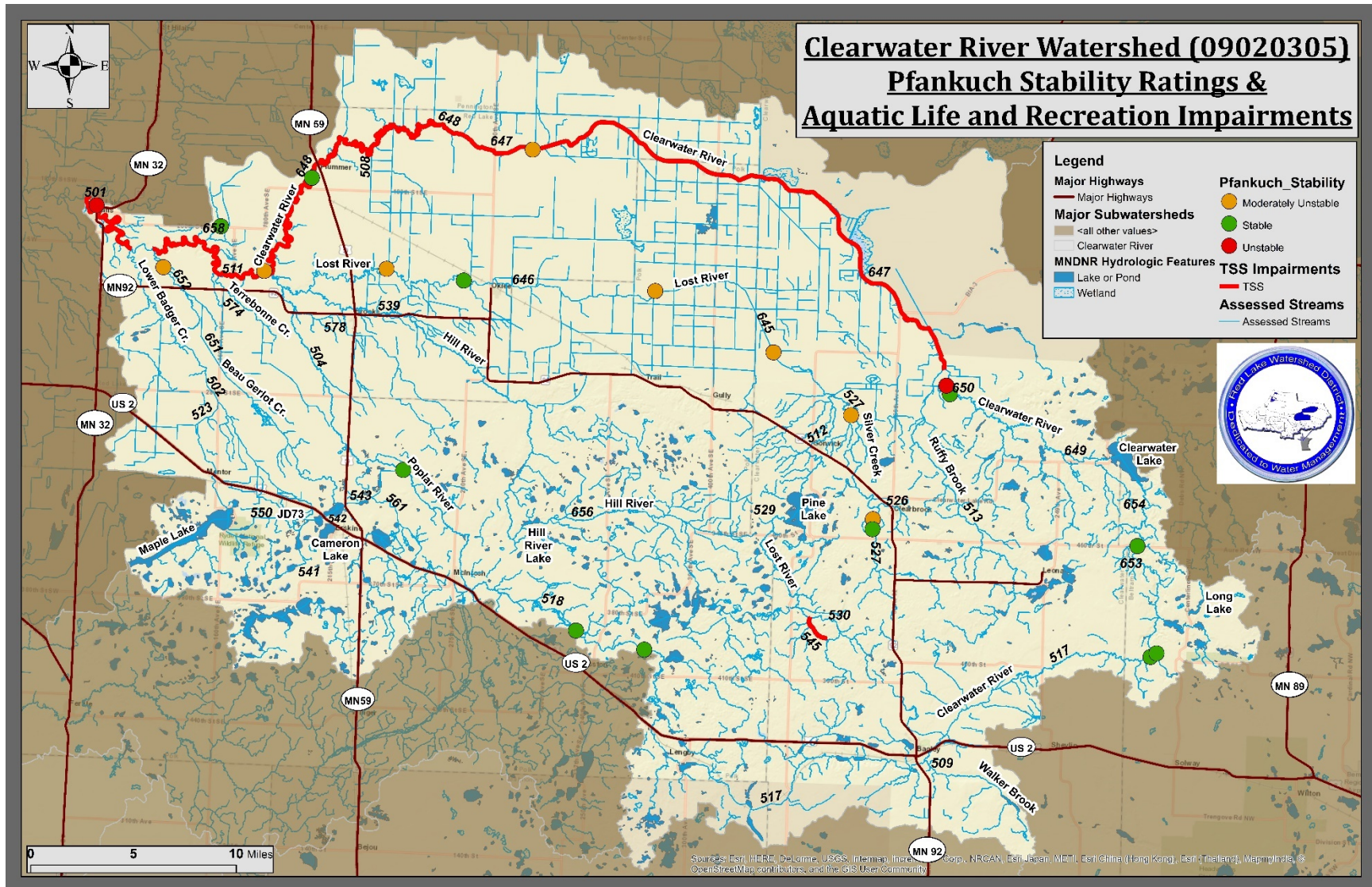
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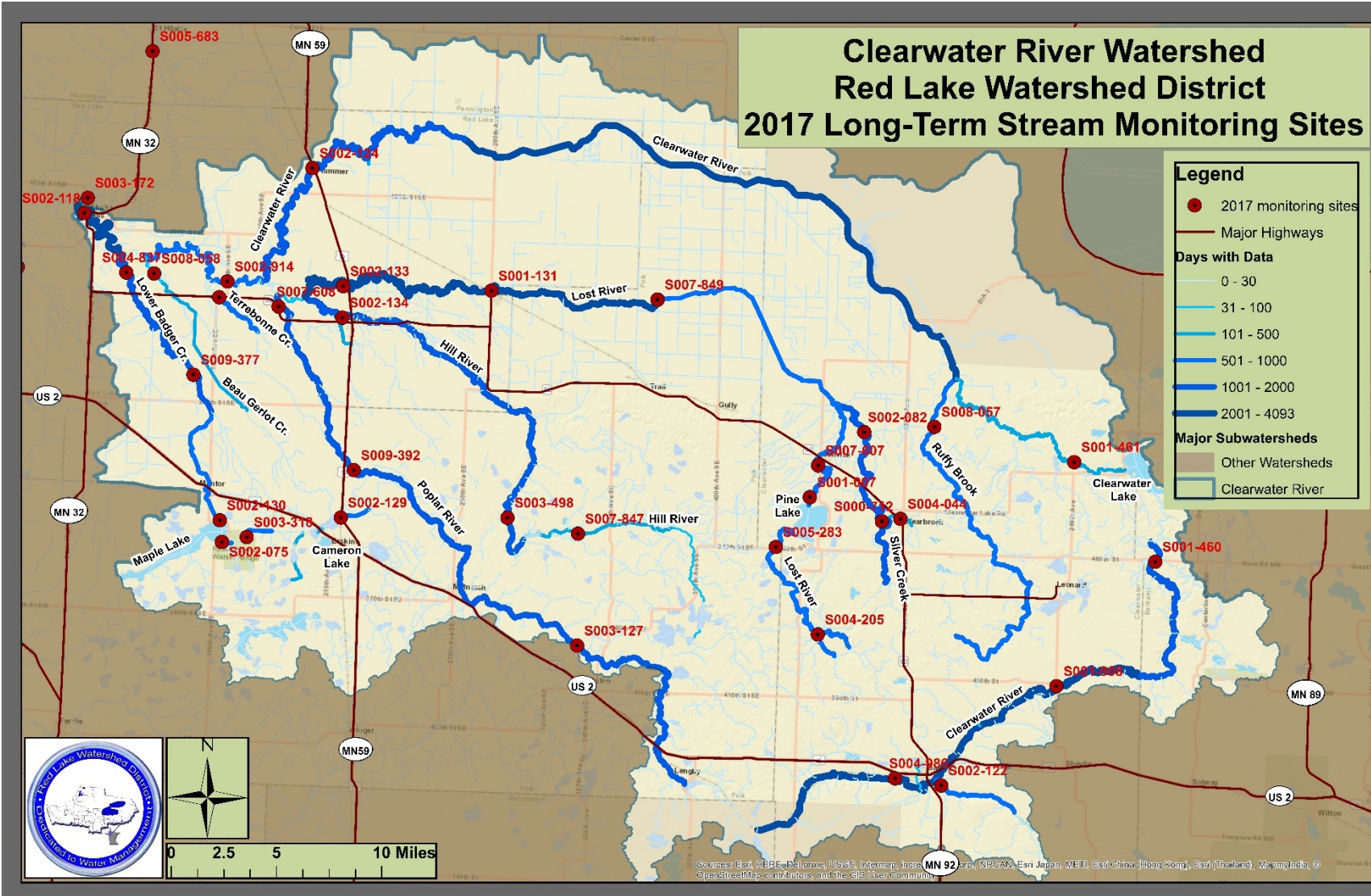
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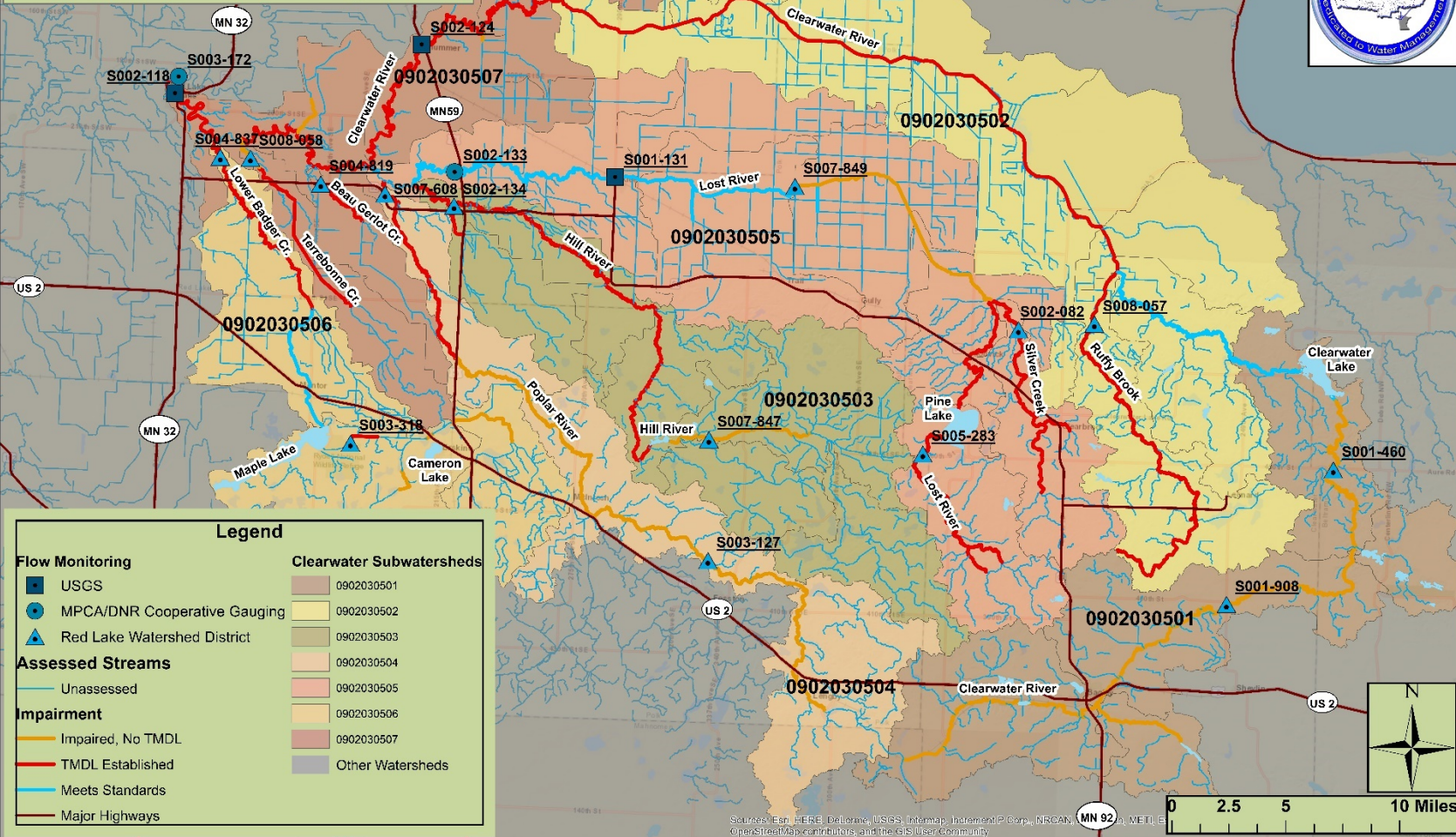
Clearwater River Watershed Red Lake Watershed District 2017 Long-Term Stream Monitoring Sites



RED LAKE WATERSHED DISTRICT MONTHLY WATER QUALITY REPORT

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Clearwater River Watershed 2017 Flow Monitoring Sites



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Clearwater Lakes Stressor Identification Report

The MPCA and MN DNR coordinated to collect and assess biological data from lakes in the Clearwater River Watershed. Index of biological integrity (IBI) scores were calculated to assess the quality of fish populations within lakes. Of the lakes that were formally assessed, no lakes were found to be impaired during the assessment. There were some lakes that had low fish IBI scores but were not assessed due to recent winterkills (Pine Lake and Badger Lake). Cross Lake and Hill River Lake were considered vulnerable due to their proximity to the impairment threshold. Those lakes were the focus of the stressor identification report due to their vulnerability to future impairment.

The shoreline habitat of Cross and Hill River Lakes has been only minimally altered by development. Connectivity could be an issue that is affecting the fish populations in these lakes. The Hill River connects those two lakes and portions of the river are impaired by low dissolved oxygen levels and poor fish IBI scores downstream of each of those lakes. Evidence suggests that land use and nutrient loading from the contributing watersheds of those two lakes may be having the greatest impact upon fish communities. The report recommends water quality data collection within the lakes, enhancement of lakeshore habitat, improvement of lakeshore buffers, and an examination of fish passage at the Hill River Lake Dam.

DOW	Lake Name	County	Nearshore Survey Year(s)	Notes	MNDNR GIS Acres	FIBI Tool	% Littoral	FIBI Score(s)	Below Impairme Threshold
04-0300-00	Whitefish	Beltrami	2015	Repeated within year (June and August)	125	4	42	77, 66	No, No
04-0343-00	Clearwater	Beltrami	2013		999	2	34	73	No
15-0060-00	Walker Brook	Clearwater	2015	Small; Low effort – 1 of 10 stations seined	95	4	42	48	No
15-0081-00	Lomond	Clearwater	2013	Small; Low effort – 1 of 10 stations seined	95	4	47	59	No
15-0137-00	Minnow	Clearwater	2014	Low effort – 4 of 10 stations seined	110	5	87	71	No
15-0149-00	Pine	Clearwater	2014	Low effort – 7 of 18 stations seined; recent winterkill	1238	5	100	15	Yes
60-0012-00	Spring	Polk	2014		130	4	33	67	No
60-0015-00	Whitefish	Polk	2015	Repeated within year (June and August)	243	7	81	43, 43	No
60-0027-00	Cross	Polk	2014		166	7	90	40	No
60-0142-00	Hill River	Polk	2014		103	5	68	28	No
60-0214-00	Badger	Polk	2010	Not assessable – recent winterkill	255	5	100	6	Yes
60-0305-00	Maple	Polk	2010, 2015		1576	7	100	31, 67	Yes, No
≤ lower CL > lower CL & ≤ Threshold > threshold & ≤ upper CL > upper CL NA = Not available									

RED LAKE WATERSHED DISTRICT MONTHLY WATER QUALITY REPORT

March 2018

Thief River Stormwater Study

The Pennington SWCD received funding from BWSR to complete a study of stormwater runoff within the City of Thief River Falls. The project was a partnership among the SWCD and the city. Houston Engineering, Inc. was hired as a consultant. The study found that a majority of the city's stormwater runoff enters the Thief and Red Lake Rivers untreated. Eroding river banks are also contributing large amounts of sediment and phosphorus to the rivers. The study targeted, identified, and prioritized surface water treatment projects based on feasibility, potential water quality benefits, and cost effectiveness. The information in the report can be used to apply for grant funding.

The potential projects and best management practices were ranked based on their cost effectiveness for reducing sediment and phosphorus runoff. Detailed maps were created to identify locations where the most pollutant runoff is occurring and where treatment projects would be most effective.

Table 11. Ranking of BMP's.

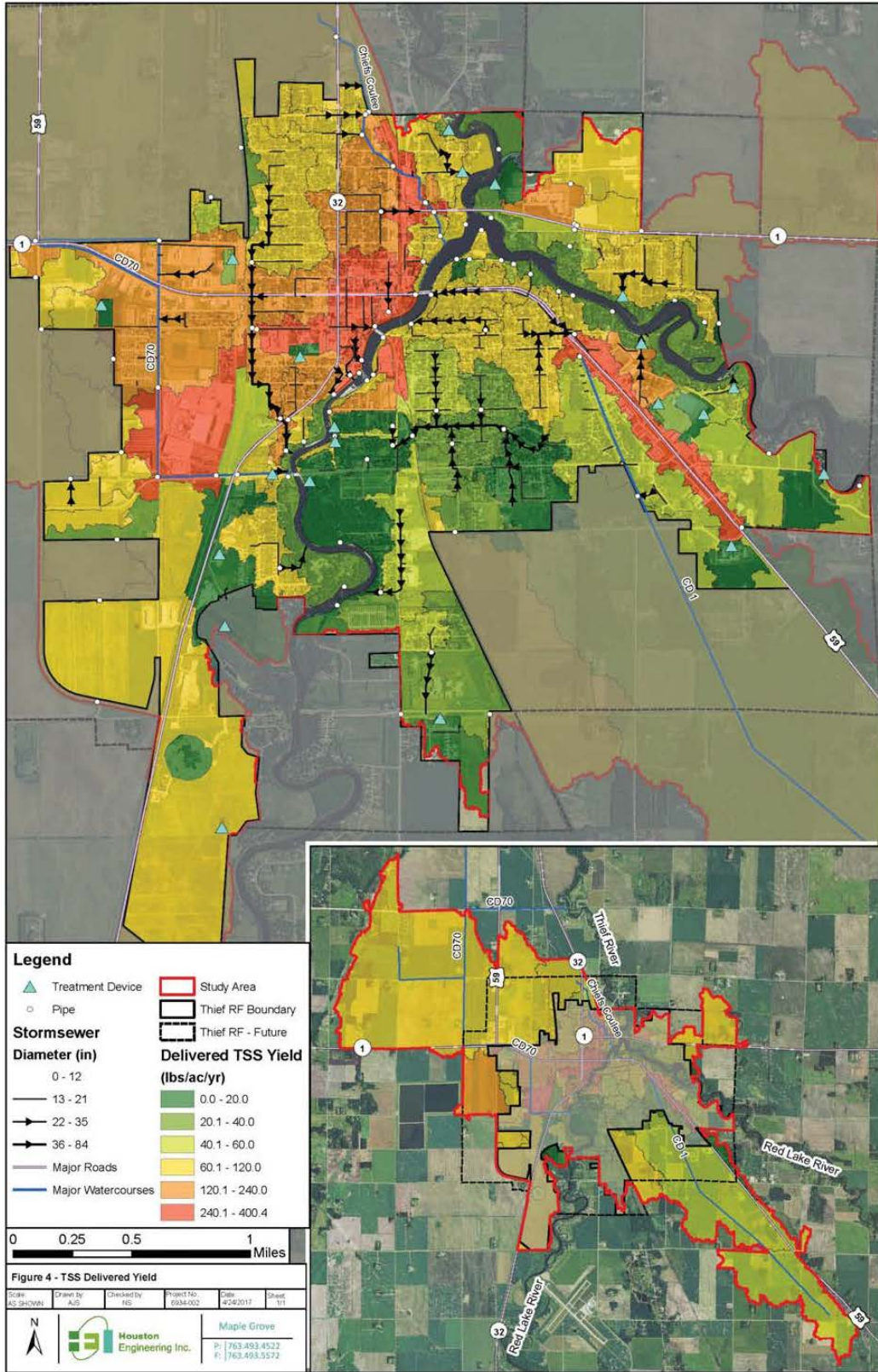
Rank	BMP		Land Authority	TSS	TP	Capital Cost Est.	TSS	TP	Rank Scale ^c (0-10)
	ID	Project Name		Reduction (tons/yr)	Reduction (lbs/yr)		Value (\$/ton/yr)	Value (\$/lbs/yr)	
1	SS2	Hartz Park	City	165.0	140.0	\$ 144,240	\$ 870	\$ 1,030	9.7
2	SS3	Greenwood	City	137.0	157.0	\$ 121,410	\$ 890	\$ 770	9.6
3	SS1	Wenzloff	City	83.0	70.0	\$ 140,160	\$ 1,690	\$ 2,000	7.3
4	4	Hwy 59 Pond ^A	Private	20.6	56.3	\$ 360,200	\$ 17,520	\$ 6,400	6.1
5	5	Arctic Cat Wetland	Private	4.3	19.0	\$ 251,000	\$ 57,980	\$ 13,220	5.0
6	9	Oxbow Wetland ^B	City Easement	3.3	24.4	\$ 389,000	\$ 116,760	\$ 15,960	4.9
7	11	NCTC 2 Pond w/Reuse	College	3.3	15.2	\$ 235,000	\$ 71,620	\$ 15,480	4.9
8	3	Hartz Park Filter	City	4.2	24.9	\$ 530,000	\$ 125,120	\$ 21,310	4.8
9	8	Fairgrounds Pond	County	2.7	11.2	\$ 179,000	\$ 67,240	\$ 16,040	4.8
10	2	Hartz Warehouse Pond ^A	Private	2.4	9.4	\$ 161,800	\$ 68,690	\$ 17,170	4.8
11	12	Labree & 12th St Pond	City	1.2	4.8	\$ 78,000	\$ 63,230	\$ 16,090	4.7
12	7	Sherwood Ave Filter	City	1.8	9.7	\$ 169,000	\$ 92,690	\$ 17,380	4.7
13	1	Sports Field UG Reuse	School	2.3	5.7	\$ 242,000	\$ 104,890	\$ 42,470	4.3
14	10	NCTC 1 Biofiltration	College	0.4	2.0	\$ 85,000	\$ 204,360	\$ 42,400	3.9
15	6	Downtown Tree Trench	City	0.4	2.0	\$ 397,000	\$ 942,100	\$197,040	0.0

^A Includes the cost of required private land acquisition cost based on 2017 tax appraisal (see Table 6).

^B Does not include the cost of lime-sludge disposal (see Table 6).

^C Rank Scale is the equal rating of rank for four categories: TSS Reduction, TP Reduction, TSS Value, and TP Value. The values in each category were proportionally scaled to fit a range of 0 to 10 (0 being the least desirable) so that values could be averaged across all categories. For example, if a BMP had the highest value for each category, it would be assigned a 10 for each category and, thus, a Rank Scale of 10.

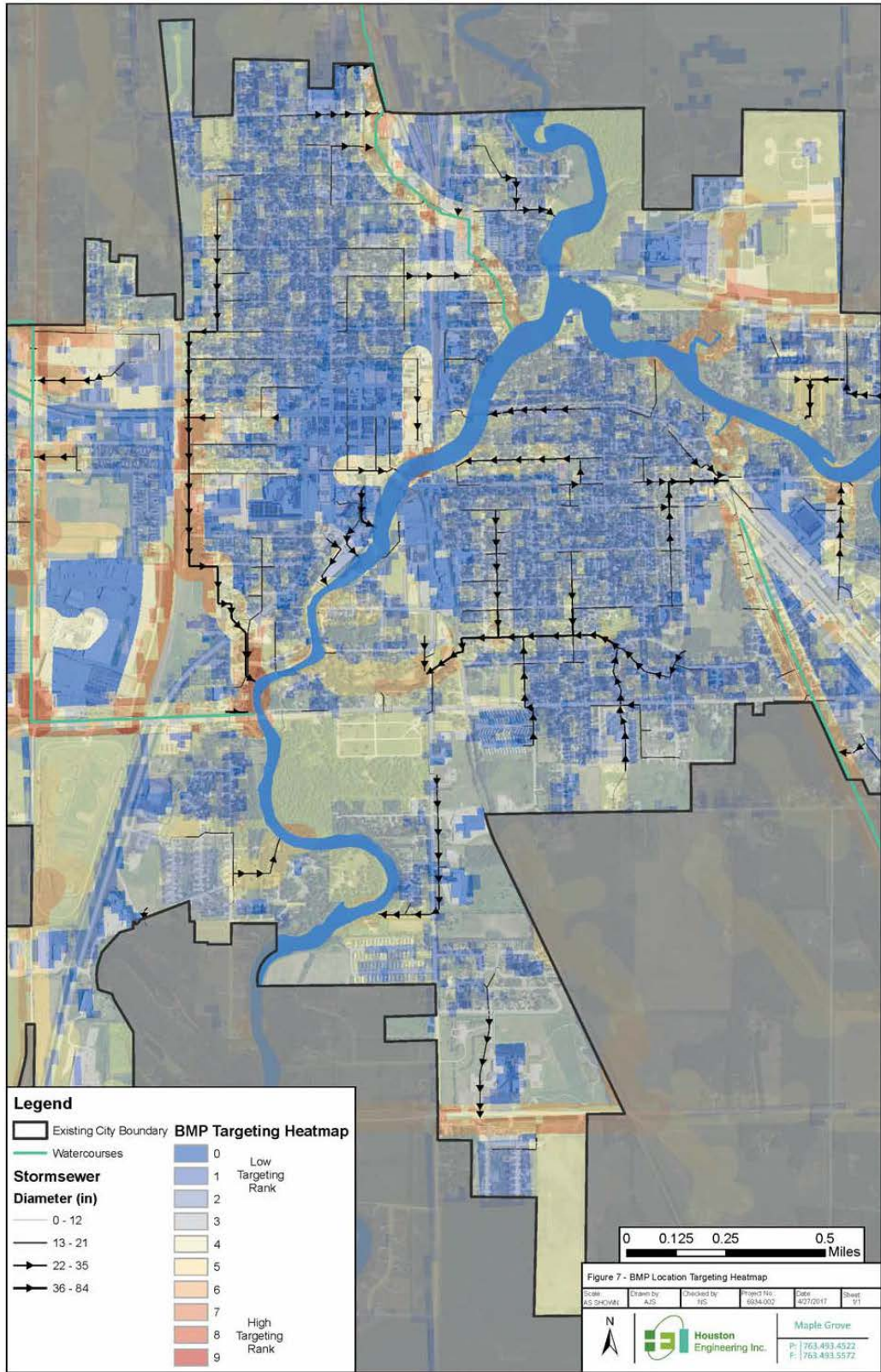
Figure 3: Existing average annual TSS delivered yield



RED LAKE WATERSHED DISTRICT MONTHLY WATER QUALITY REPORT

March 2018

Figure 7: BMP Location Targeting Heatmap and Potential BMP's



Thief River One Watershed One Plan (1W1P)

- A meeting of the policy committee, advisory committee, and the project work group was held on March 14, 2018.
- District staff reviewed and commented on the rough draft Strategies and Actions tables.
- District staff reviewed a draft Section 2 of the Thief River 1W1P.

Other Notes

- A water quality report for November – December 2017 was completed.
 - <http://www.redlakewatershed.org/waterquality/MonthlyWQReport/2017%2011%2012%20Nov-Dec%20Water%20Quality%20Report.pdf>
- Water quality related notes from the March 13, 2018 Red Lake Watershed District Board of Mangers meeting:
 - Administrator Jesme stated that the District and Agassiz National NWR received the signed grant agreement for a Conservation Partners Legacy Grant in the amount of \$242,000 for cattail management to enhance wildlife habitat and increase biodiversity in more than 26,000 acres of non-forested wetlands. Work will also consist of repairs to water control structures.
 - Manager Dwight stated that he attended a meeting regarding the Bartlett Lake near Northome. Dwight indicated that the MPCA completed a sediment study and has hired Emmons and Olivier Resources, Inc. to identify projects for implementation to help the lake recover.
- District staff provided MPCA staff with additional information and photos about the Poplar River Diversion channel. The Polar River Diversion between the Poplar River and Badger Lake was listed as impaired by low dissolved oxygen on the Draft 2018 List of Impaired Waters. The MPCA has decided to change the classification of the reach so that it is still listed as impaired but will not require a TMDL. The impairment is caused by non-pollutant factors.
- Articles were written for the 2017 Red Lake Watershed District Annual Report.
- Contract extension amendments for the Thief River WRAPS and Red Lake River WRAPS were received from the MPCA and signed by the District Administrator. The MPCA is preparing the Thief River WRAPS and TMDL for the public notice process. The MPCA will then finish a review of the Red Lake River WRAPS so that it can also progress to the public notice phase.
- District staff reviewed the Thief River Falls (Stormwater) Water Quality Study that was completed by the Pennington SWCD and the City of Thief River Falls.

March 2018 Meetings and Events

- **March 1, 2018** – Thief River 1W1P Planning Work Group conference call
- **March 12, 2018** – Pennington County Water Resources Advisory Committee meeting
 - SSTS Grants: The Pennington SWCD is working to get a homeowner with septic issues hooked up to the city sewer.

- Ditch Inventory Grant: RLWD staff will be working on the Polk County ditch inventory.
- City of Thief River Falls Stormwater Assessment: SWCD staff shared the results (Table 11 and the maps shown earlier in this report).
- The SWCD is working on a gully control and buffer implementation in the CD 96, CD 221, and CD 16 drainage systems. They will be starting with the CD 16 system and working with the county (drainage authority).
- Ditch outlet analysis with drones: Weather complications prevented the completion of the flyovers last year. Many days were too windy to fly the drones.
- Thief River PTMApp: Ashley Hitt reported that PTMApp is running and generating output data (catchments, loading, BMP suitability, and cost analysis).
- Updates on the Thief River and Red Lake River One Watershed One Plans
- An Ecofootprint Grant will be used to install side water inlets in Pennington County.
- The SWCD is getting ready for tree planting and 12,000 trees have been ordered.
- The Annual Pennington SWCD Banquet is scheduled for April 12.
- BWSR has hired someone to conduct compliance work in the northern part of the state that did not elect to take jurisdiction over implementation of the Buffer Law.
- The next meeting was scheduled for June 11, 2018 at the RLWD meeting room.
- **March 14, 2018** – Thief River 1W1P Advisory Committee, Policy Committee, and Project Work Group Meeting(s)
- **March 15, 2018** – East Polk Soil and Water Conservation District Board Meeting
 - District staff attended the meeting to discuss potential projects in the Clearwater River Watershed. The board chose to focus on initiating projects to improve water quality within Cameron Lake and to install sediment basins in the Clearwater River Watershed portion of the county (as they have recently done in the Sand Hill River Watershed).
- **March 19, 2018** – Red Lake Watershed District Overall Advisory Committee meeting
- **March 28, 2018** – Polk County Water Resources Advisory Committee Meeting
 - A Minnesota Conservation Corps crew will be cleaning out the Sand Hill River in 2017 (clearing and snagging).
 - Jenilynn Marchand gave a presentation on Wellhead Protection Plans.
 - The aquifer that supplies drinking water for the City of Crookston is recharged in the Maple Lake area.
 - Cameron Lake is part of the Erskine Drinking Water Supply Management Area (DWSMA). Even though it is downstream of the town in terms of surface runoff, seepage from Cameron Lake recharges the aquifer that supplies the town's drinking water. Maybe historical residents of the city would have thought differently about disposing wastewater into the lake if they knew it would eventually be recycled into their drinking water.
 - Crookston used to get its drinking water from surface water.
 - Most public wells were old railroad water stop wells. Early steam engine trains had to stop to get water for steam once every 7-10 miles.
 - Polk County groundwater generally follows the path of Highway 2 (or vice-versa)

- The Minnesota Well Index can be viewed online. Wells can be located using an interactive map. <http://www.health.state.mn.us/divs/eh/cwi/>
- The Polk County Wellhead Protection Plan is almost done.
- The “age” of drinking water (how long it has been underground in an aquifer) varies by location. The water used by the towns of Beltrami and Shelly has been in the ground for more an estimated 10,000 years.
- Grants are available from the Minnesota Department of Health for source water protection and well management. Those grants can be used to help fund educational water festivals.
- It is important to attend public hearings and information meetings for source water protection plans. Local protection teams are created from the attendees of those meetings.
- The different levels of well vulnerability were discussed. Wells that are protected by at least 50 feet of clay are considered to have a low level of vulnerability. Water supplies that are shallow and have interaction between surface and groundwater are considered have a high vulnerability.
- Water within the Erskine wellhead protection area takes 10 years to reach the well. That is a relatively short period of time. The Erskine water supply is considered to be very vulnerable.
- Nicole Bernd provided an update on the “We are Water” traveling exhibit. The exhibit is currently on display at the Hjemkomst Center in Moorhead, MN.
- Sarah Mielke is the Lakes Program Coordinator for the East Polk SWCD and will be collecting monthly (May through September) lakes samples during the summer of 2018.
- The next meeting was scheduled for June 12, 2018.
- **March 29, 2018** - Thief River 1W1P Planning Work Group conference call

Quote of the Month:

“The common denominator for success is work.”
- John D. Rockefeller

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

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

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

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