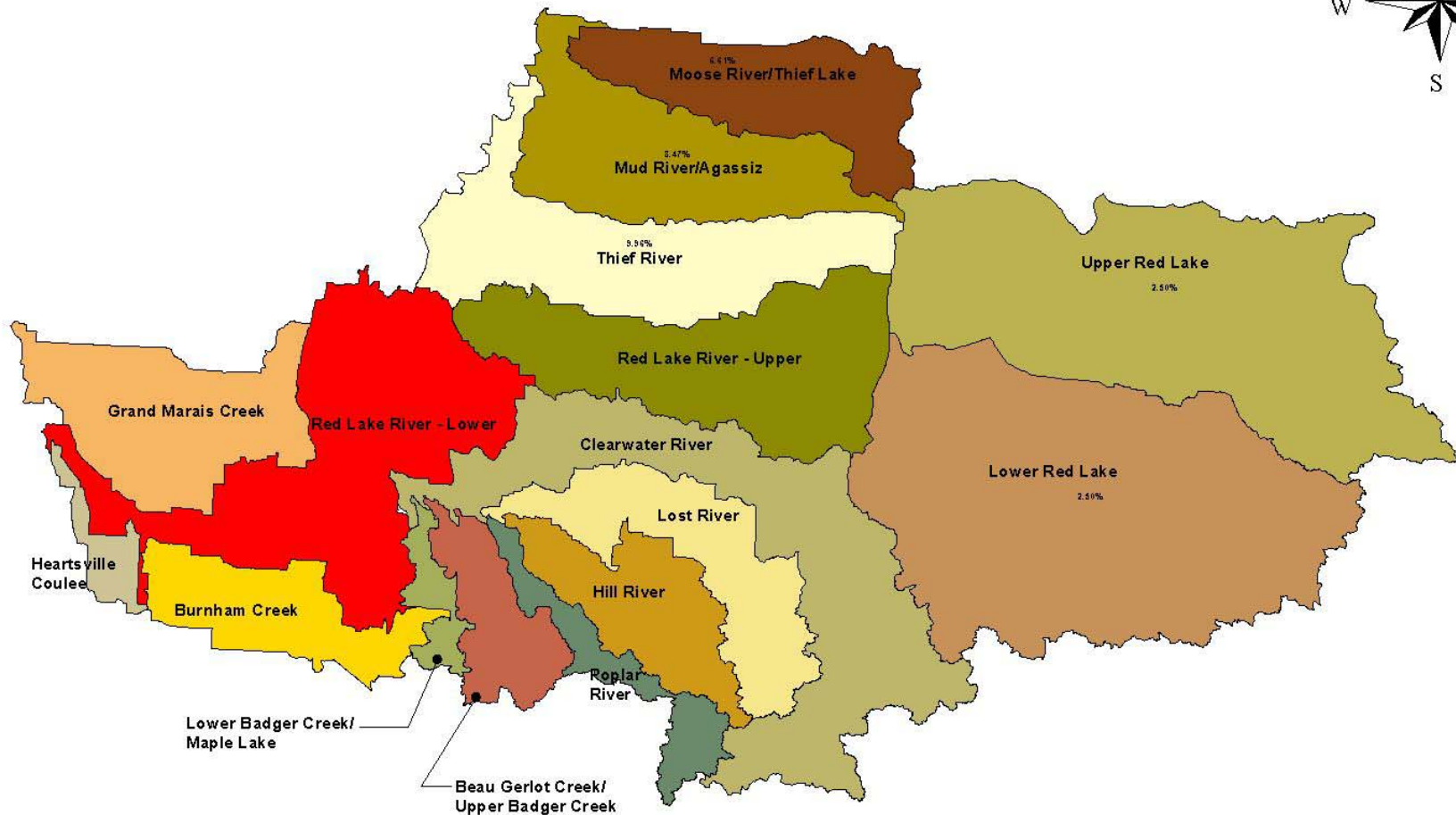
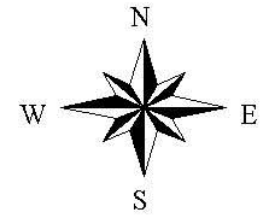


Red Lake Watershed District Water Quality Monitoring

Major Watersheds of the RLWD

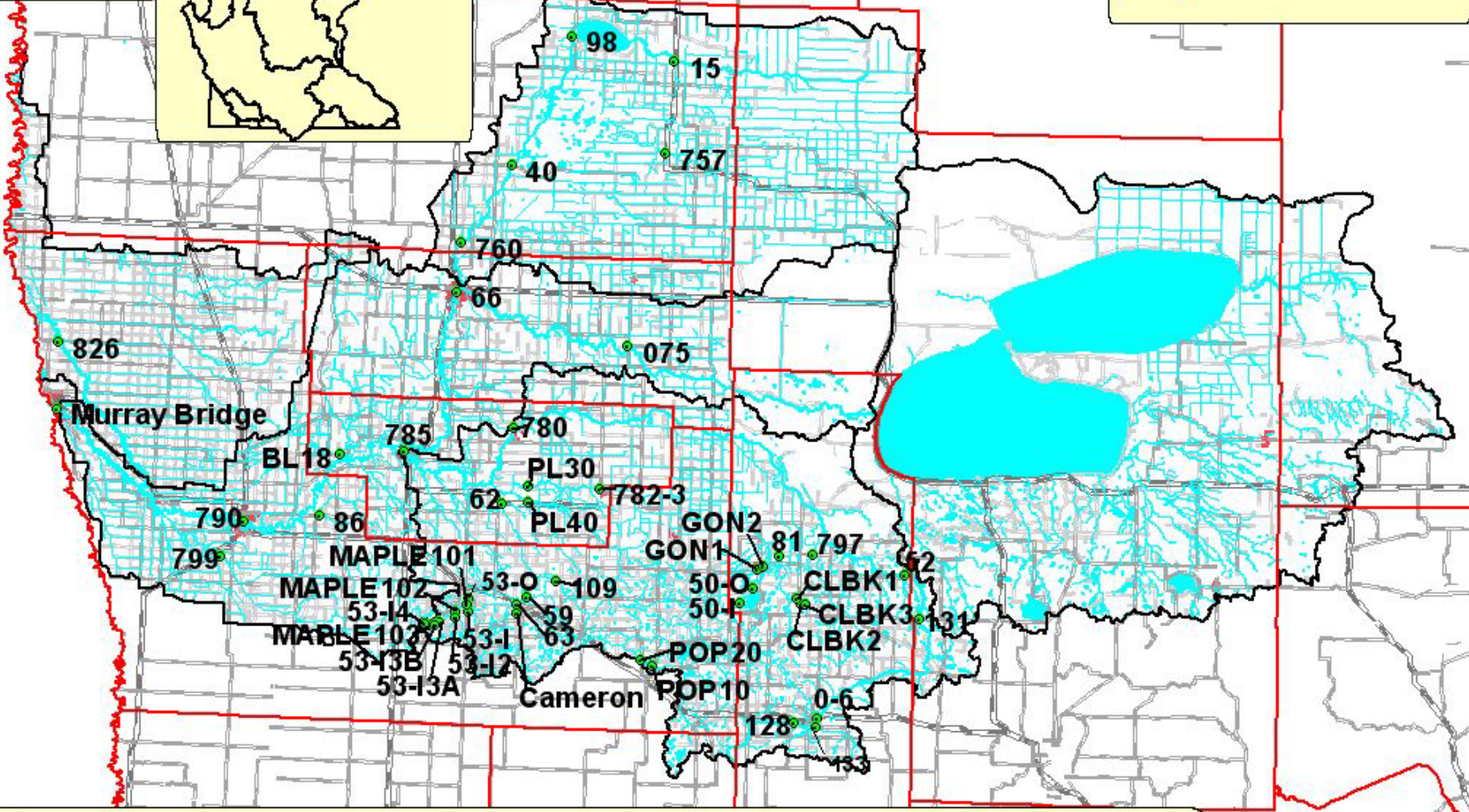


Water Quality Projects

- Water Quality Monitoring
 - Over 30 sites
 - At least 4 samples per year
 - Lake and Stream Monitoring
- Special Studies
 - Clearwater Lake Water Quality Model, Habitat/bioassessment, Tile Drainage Study
- Water Quality Improvement Projects
 - Erosion Control
 - BMP Implementation

2004 RLWD Monitoring Sites

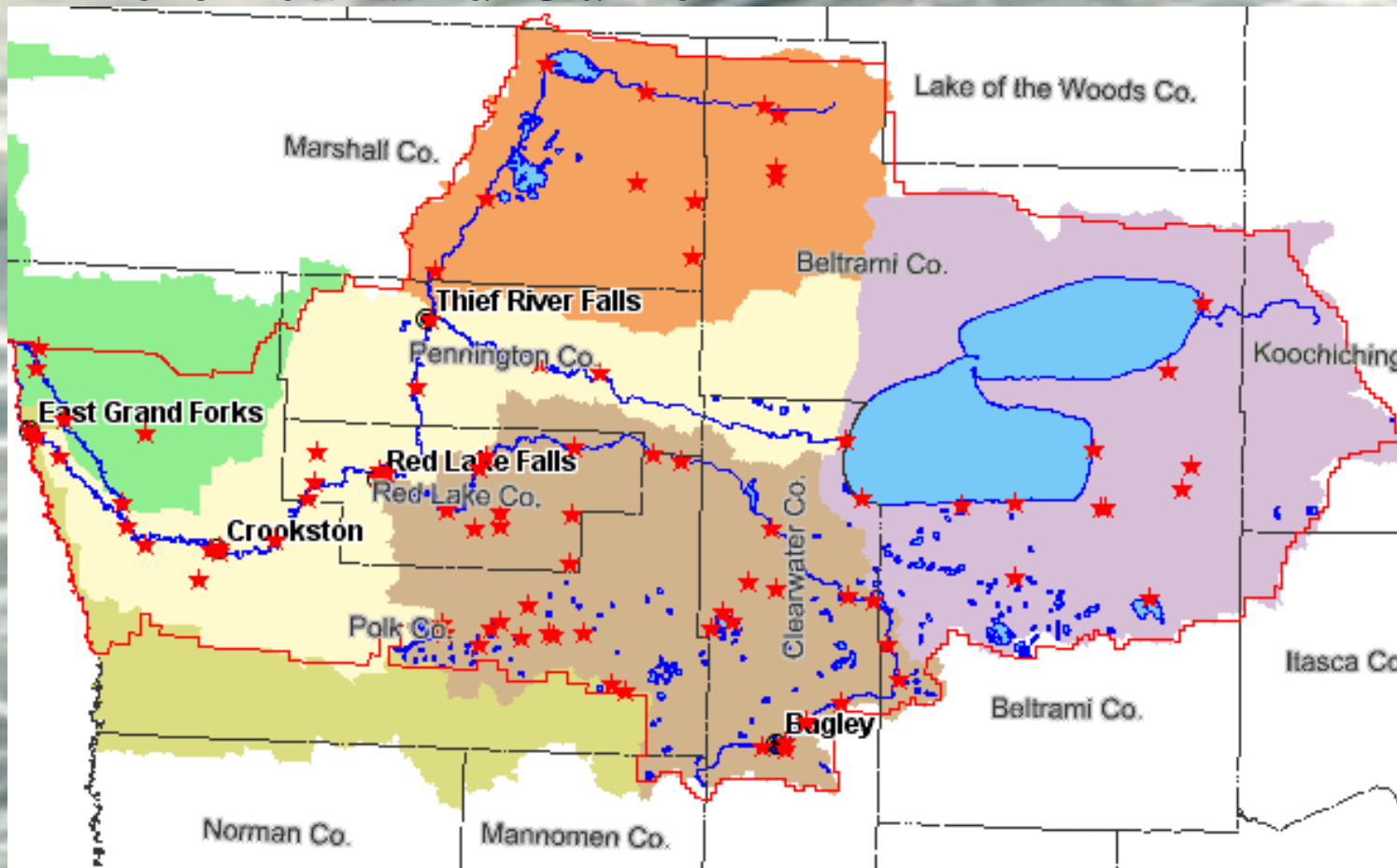
- 2004 monitoring sites
- ▭ Counties
- ▭ Major subwatersheds
- ▭ Hwy
- ▭ Lakes



0 10 20 30 40 50 Miles

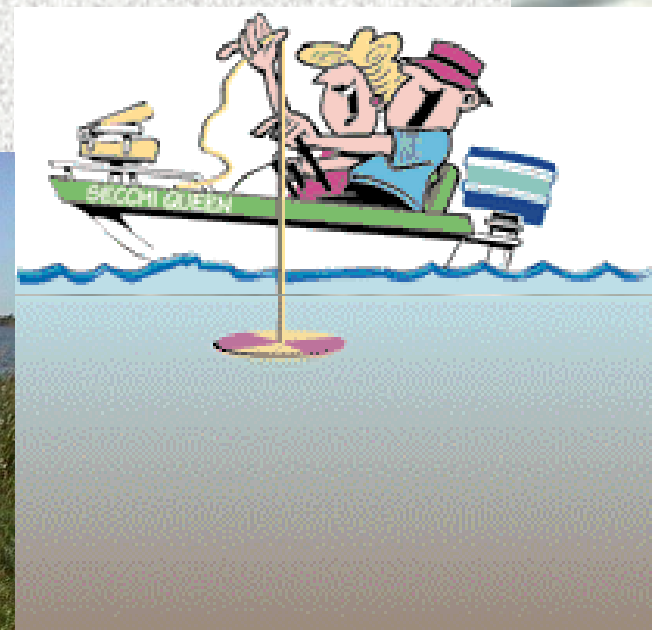
All Sites Within the RLWD

- Historical and Current



Lake Monitoring

- Clearwater Lake
 - Mesotrophic
- Maple Lake
 - Eutrophic
- Cameron Lake
 - Hypereutrophic



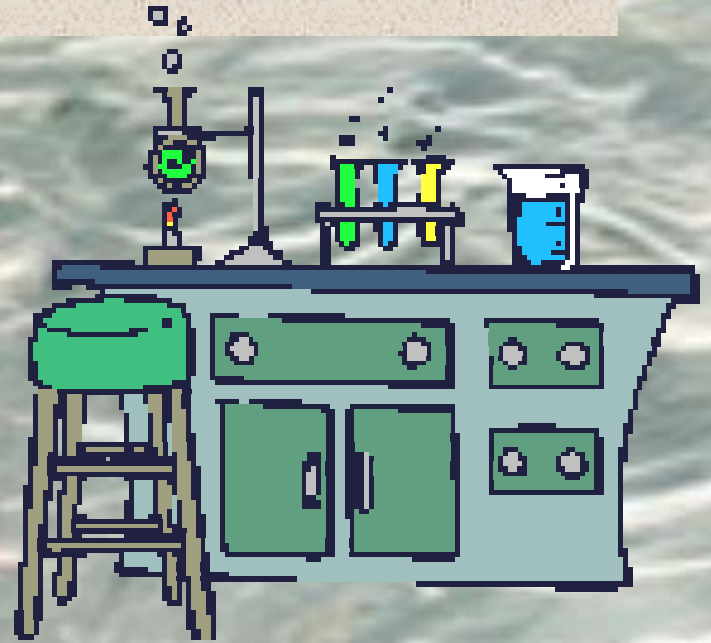
Field Measurements

- Dissolved Oxygen (mg/L)
- Water Temperature
- pH
- Conductivity
- Turbidity (NTUs)
- Transparency (cm)



Laboratory Analysis

- **Total Suspended Solids**
- **Total Dissolved Solids**
- **Total Phosphorus**
- **Orthophosphorus**
- **Nitrates and Nitrites**
- **Ammonia Nitrogen**
- **Total Kjeldahl Nitrogen**
- **Fecal Coliform**
- **Chemical Oxygen Demand**



Review of 2005 Pre-Assessment

- Use MPCA assessment methods on RLWD data to see if the available data supports the assessment
- Will focus on the supported uses of aquatic life and recreation (will not cover Hg Impairments)

State Standards

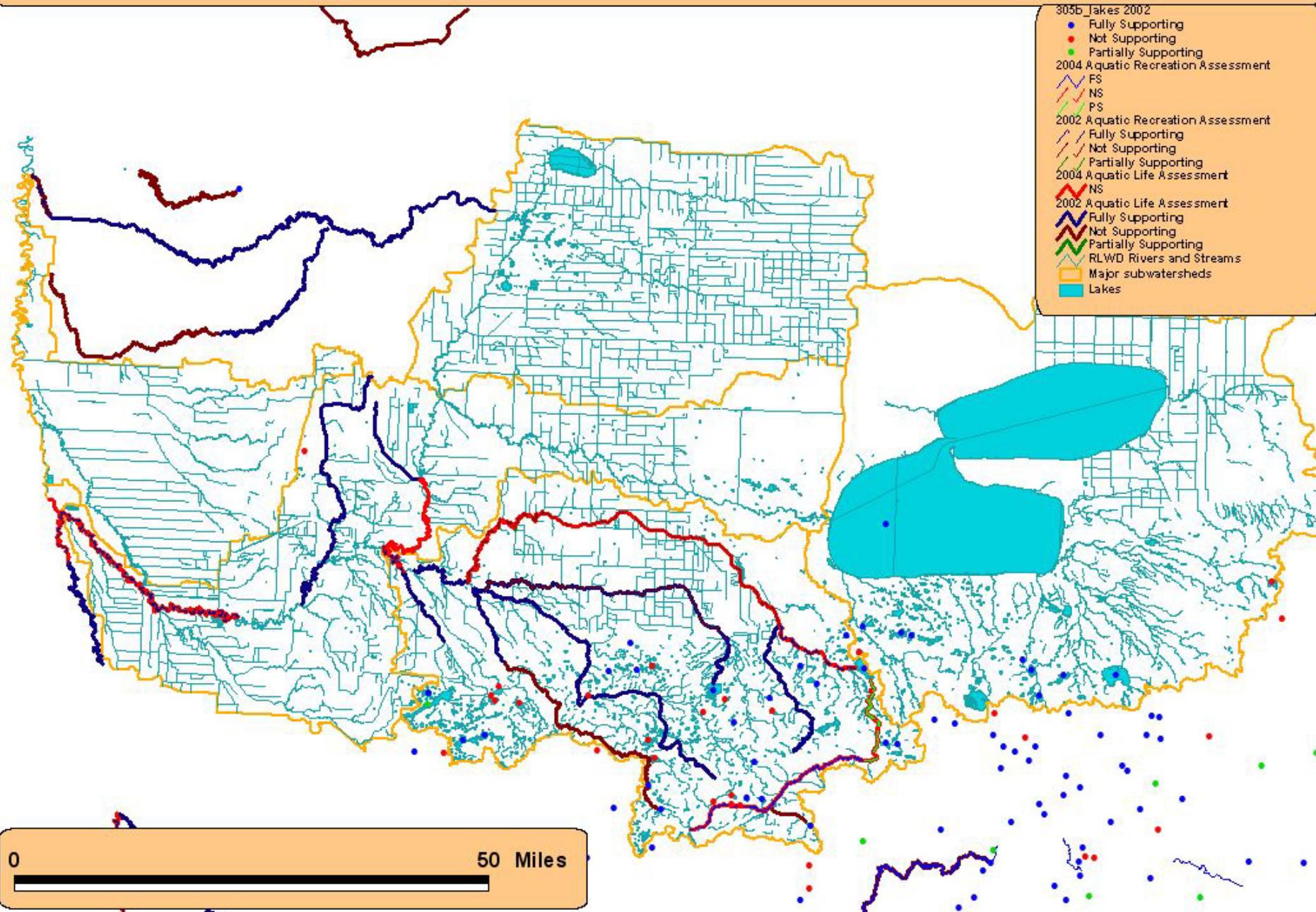
- Turbidity – 25 NTU
- Dissolved Oxygen – 5 mg/L (7 mg/L for Class 2A)
- Fecal Coliform - 200 col/100ml, no months with a geometric mean > 200
- pH – 6.5 – 8.5
- Conductivity – 1,000 mg/L
- Total Dissolved Solids – 500 mg/L

Ecoregion Values

75th Percentile of values within an ecoregion
(minimally impacted)

	NLF	NCH	RRV	NMW	NGP	WCB
Cond.	270	340	658	250	1100	790
pH	7.9	8.1	8.3	7.9	8.2	8.2
TSS	6.4	16.1	56.5	17.2	65.5	57.5
T.Ammon.	0.2	0.22	0.29	0.2	0.31	0.39
NO2NO3	0.09	0.29	0.2	0.08	0.52	5.62
T.Phosph.	0.052	0.17	0.322	0.092	0.271	0.34
Fec.Col.	20	330	230	50	700	790
TempC	17.6	20	19.9	17.2	20.5	19.2
Turbid.	4.3	8.5	23	10	23.7	22
BOD5	1.7	3.4	4.2	2.2	4.5	5.6

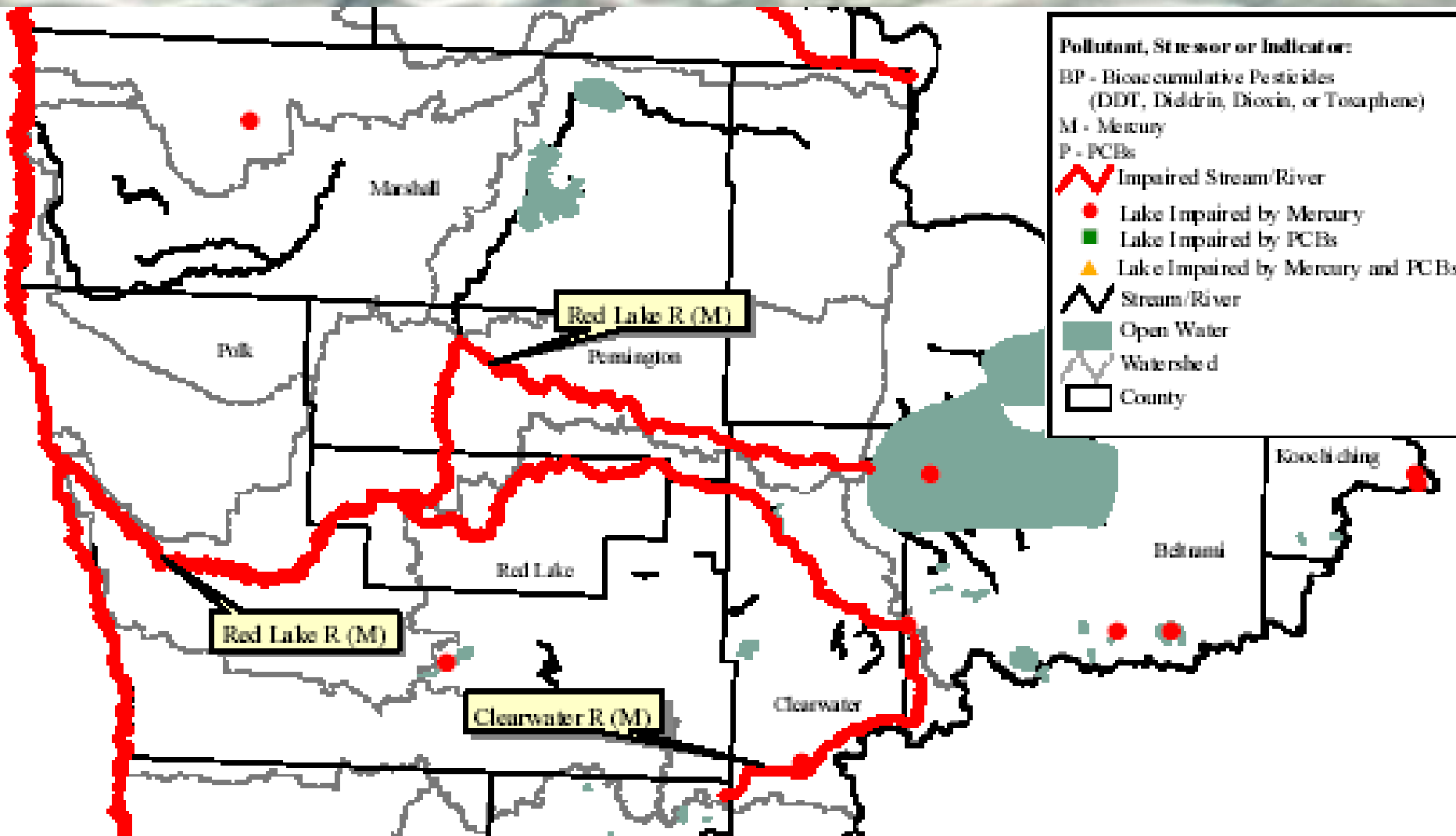
(2002, 2004) MPCA Assessment Results



2004 List Impaired Waters Within the RLWD



Waters Impaired by Mercury

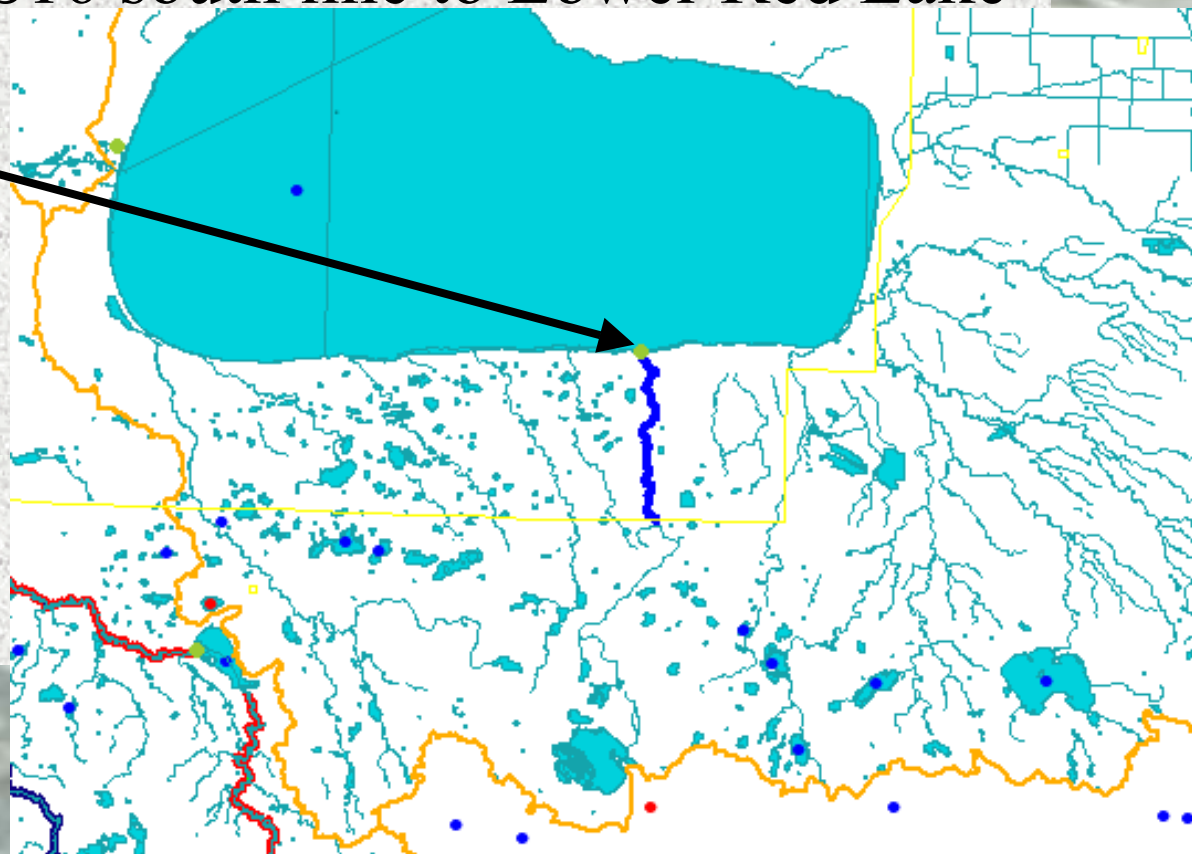


Current Impaired Waters in the RLWD

- o Red Lake River; Burnham Creek To Unnamed Creek (East Grand Forks) – Turbidity
- o Red Lake River; Unnamed Creek to Red River – Turbidity
- o Poplar River; Spring Lake to Hwy 59 – Low Oxygen
- o Clearwater River; Ruffy Brook to Lost River – Fecal Coliform, Low Oxygen
- o Lost River; Silver Creek to Hill River – Fecal Coliform
- o Clearwater River; Trout stream portion – Fecal Coliform
- o Walker Brook; Walker Brook Lake to Clearwater River

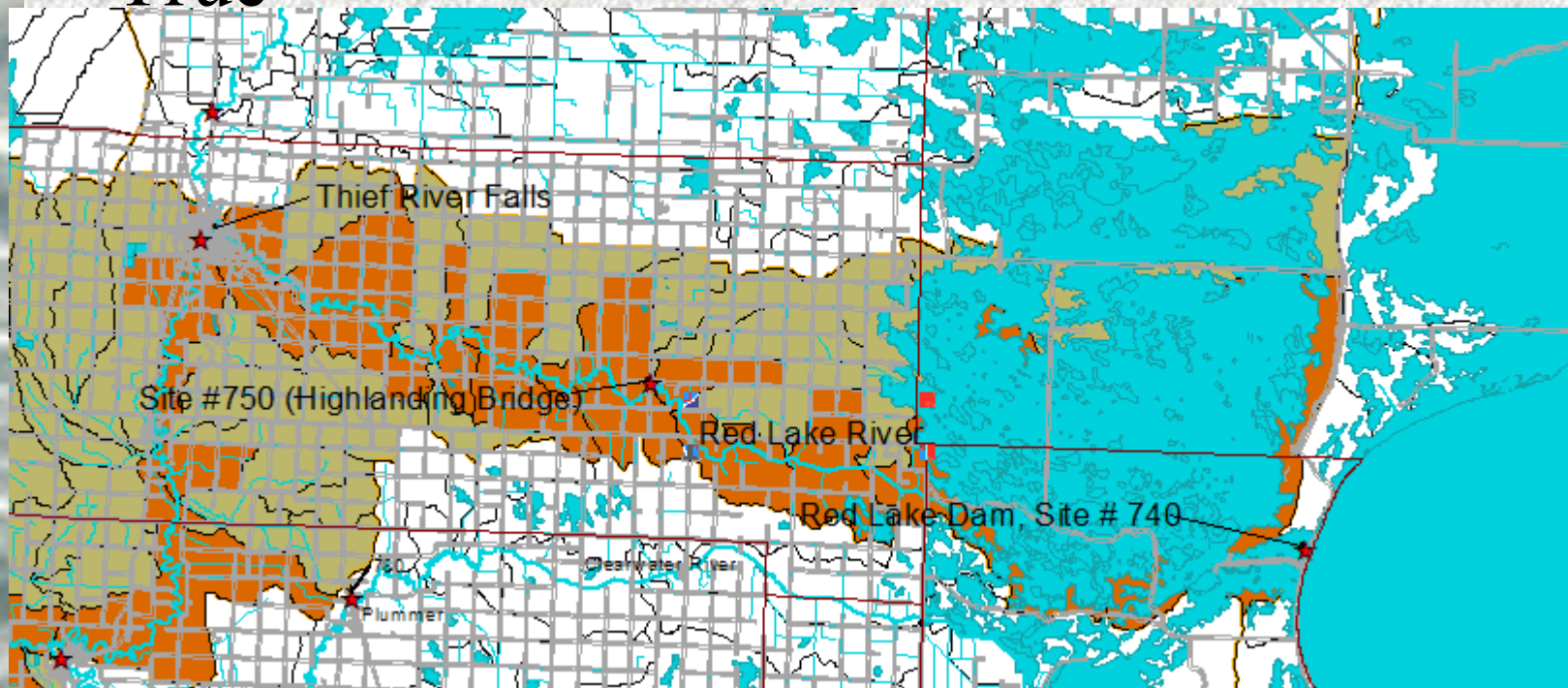
Fully Supporting Streams

- Mud River
 - T150 R33W S16 south line to Lower Red Lake
- NEB2
- Our Data Supports This Assessment



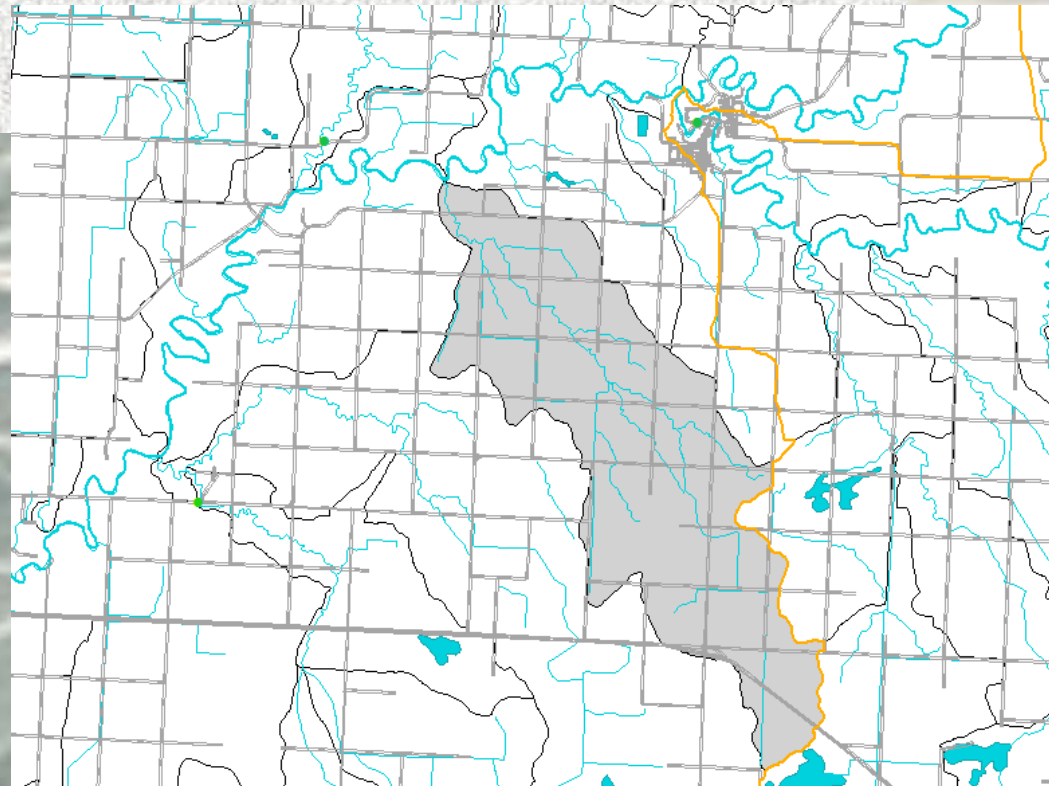
Fully Supporting Streams

- Red Lake River – Headwaters to Thief River
- True



Fully Supporting Streams

- Cyr Creek – Headwaters to Red Lake River
 - Could not find supporting data
 - No RLWD sites

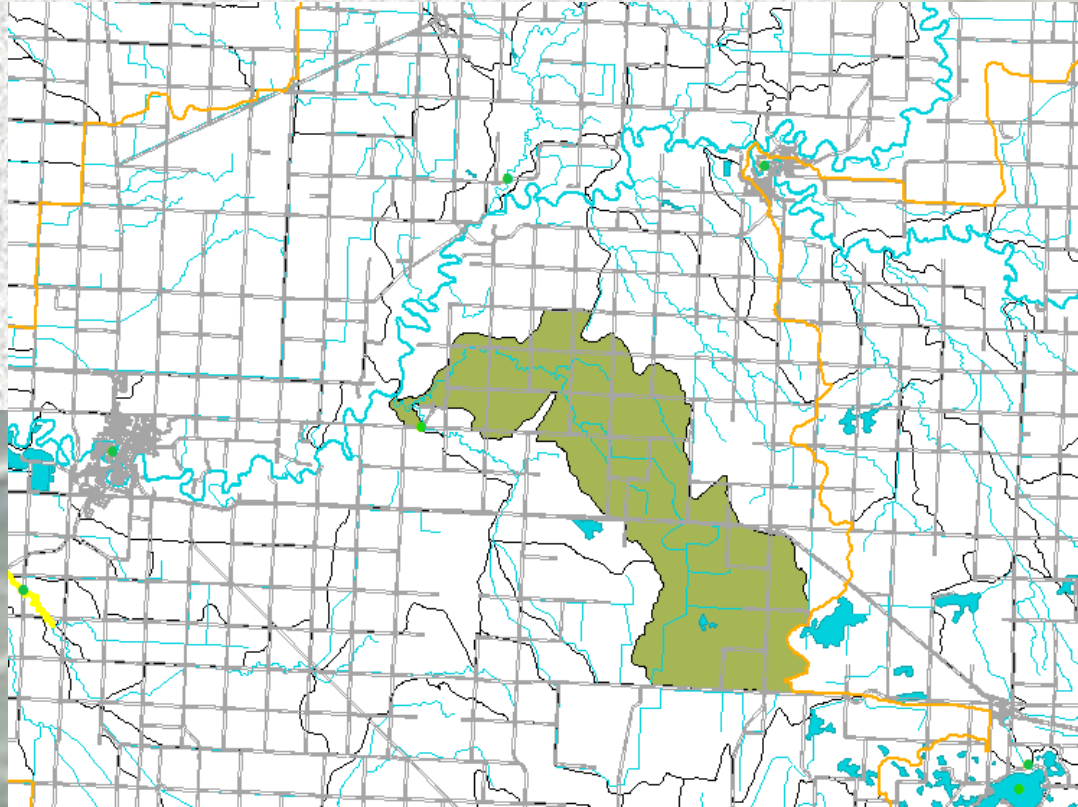


Fully Supporting Streams?

- Burnham Creek – Unnamed Creek to Unnamed Creek
 - Great Description (Where is the reach?)
 - No other water quality monitoring sites on Burnham Creek are shown on the EDA website.
 - This assessment may or may not be true, but it seems that it is not based upon any data, unless they are using some data that is not yet entered into STORET.

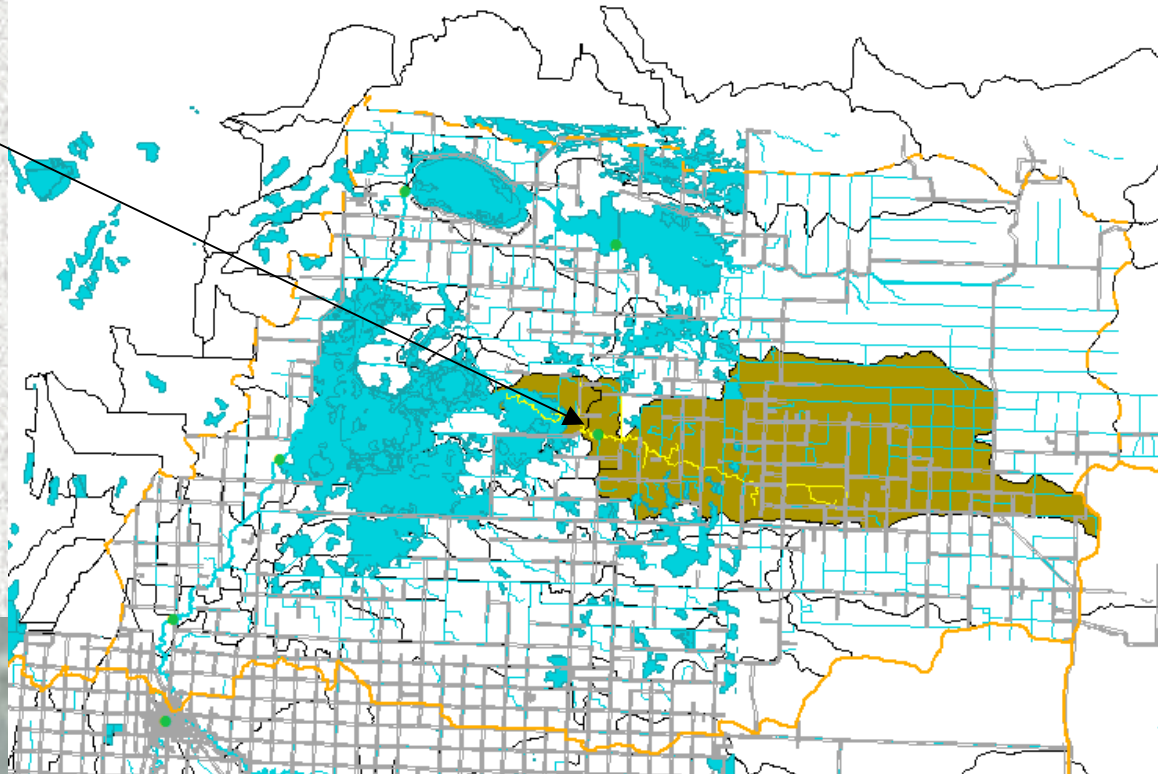
Fully Supporting Streams?

- Kripple Creek – Unnamed Ditch to Unnamed Creek
- Once again, a very helpful description
- No data available from RLWD, River Watch, or EDA



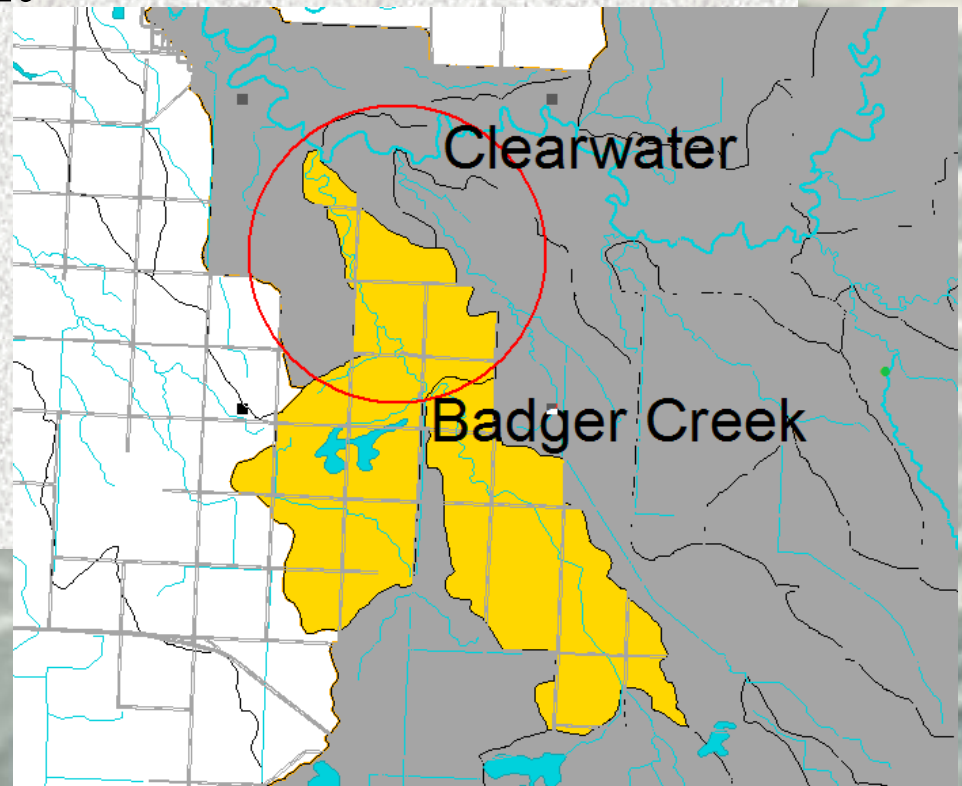
Fully Supporting Streams

- Mud River – Headwaters to Agassiz Pool
- RLWD data supports this assessment
- Site #757



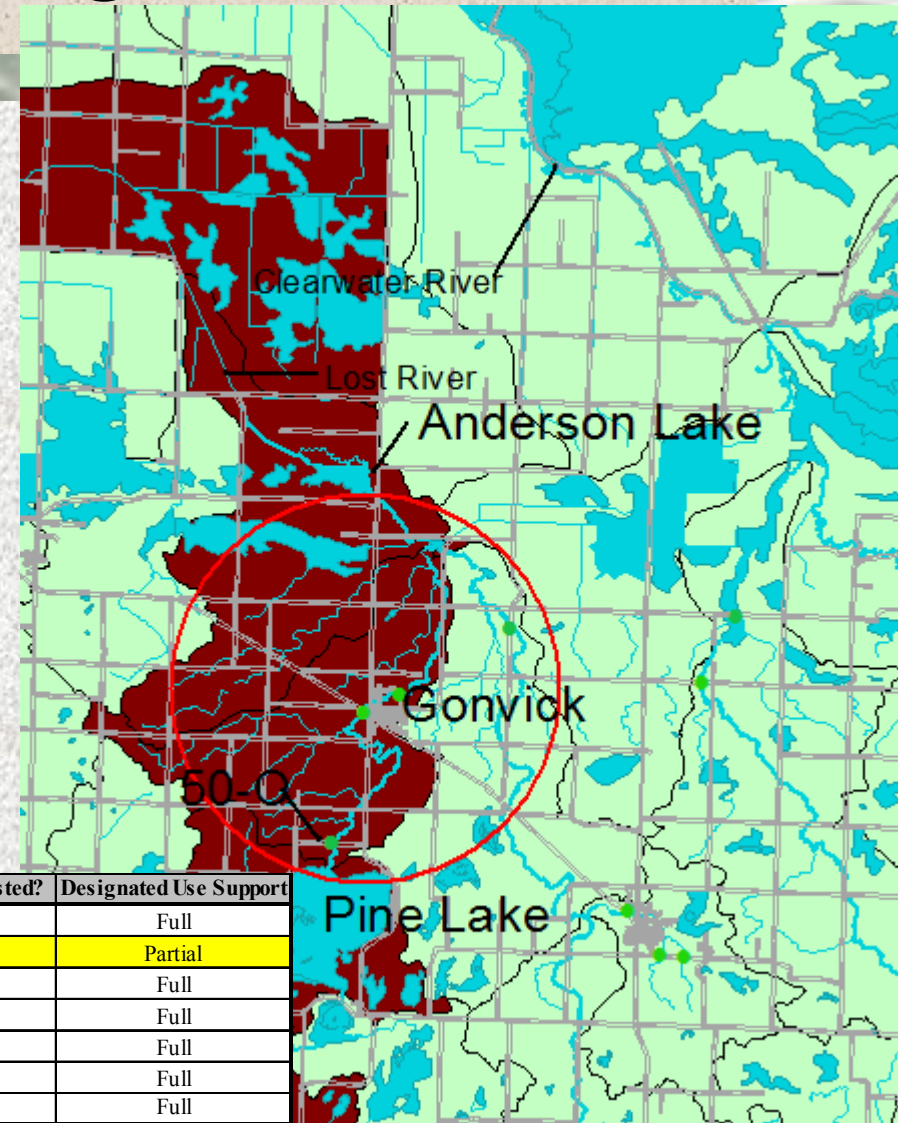
Fully Supporting Streams

- Lower Badger –CD 14 to Clearwater River
- Sampled during Clearwater River Habitat/Bioassessment
 - Good habitat



Fully Supporting Streams

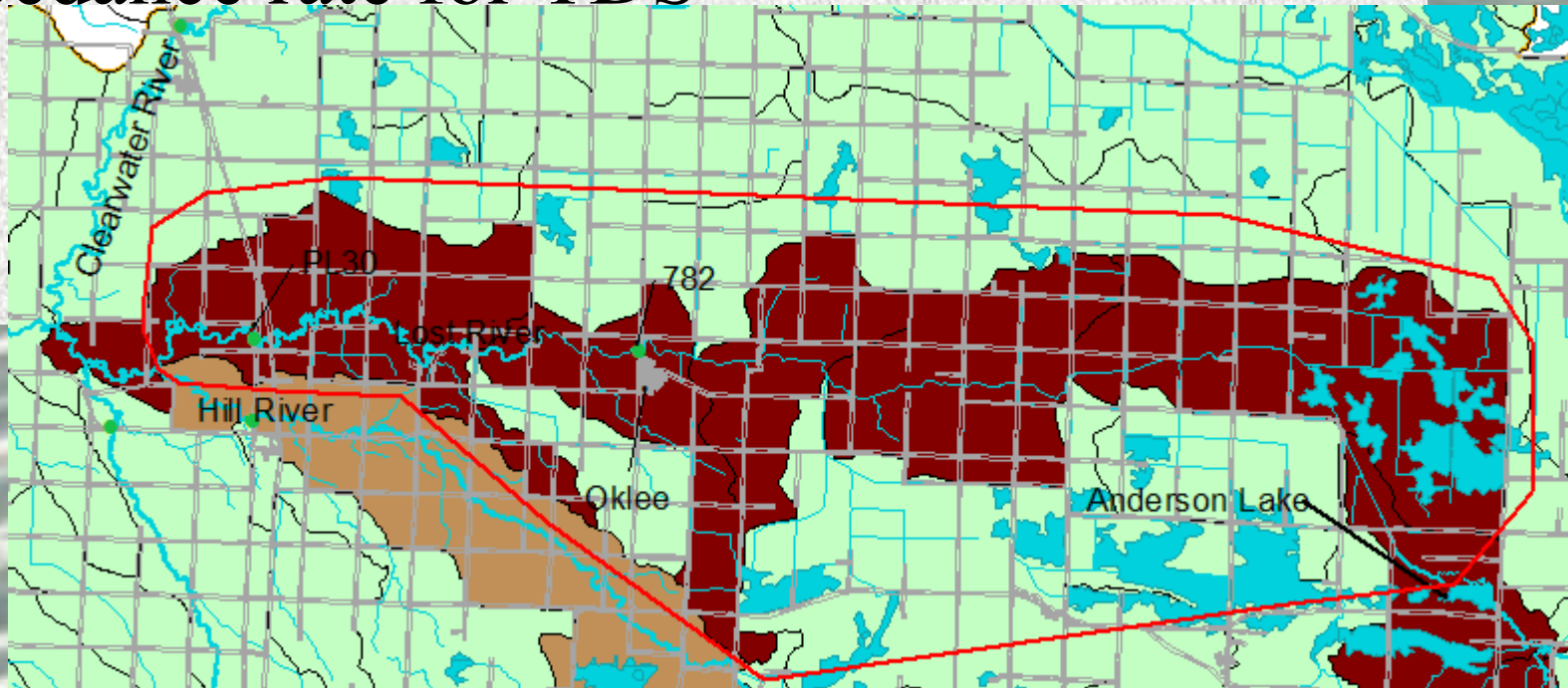
- Lost River – Pine Lake to Anderson Lake
- RLWD Data supports this assessment



Parameter	# Samples	Exceedances	% Exceedances	Would it be Listed?	Designated Use Support
Dissolved Oxygen	34	0	0.00%	No	Full
pH	33	11	33.33%	Yes	Partial
Conductivity	37	0	0.00%	No	Full
Total Suspended Solids - 6.4 mg/L	37	3	8.11%	No	Full
Turbidity	21	0	0.00%	No	Full
Total Dissolved Solids	14	0	0.00%	No	Full
Fecal Coliform	33	3	9.09%	No	Full

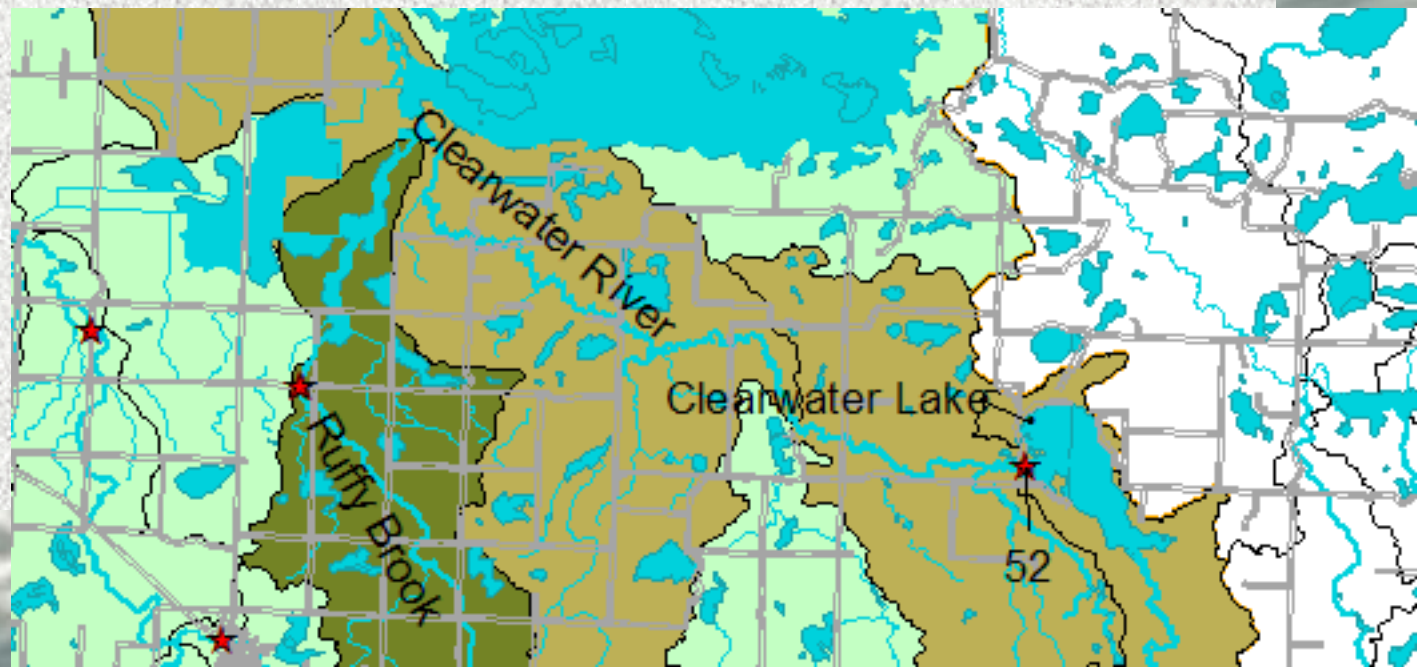
Fully Supporting Streams

- Lost River – Anderson Lake to Hill River
- 782 – Supports assessment but doesn't meet TDS or pH standards (pH basic)
- PL30 – No impairment other than 25% exceedance rate for TDS



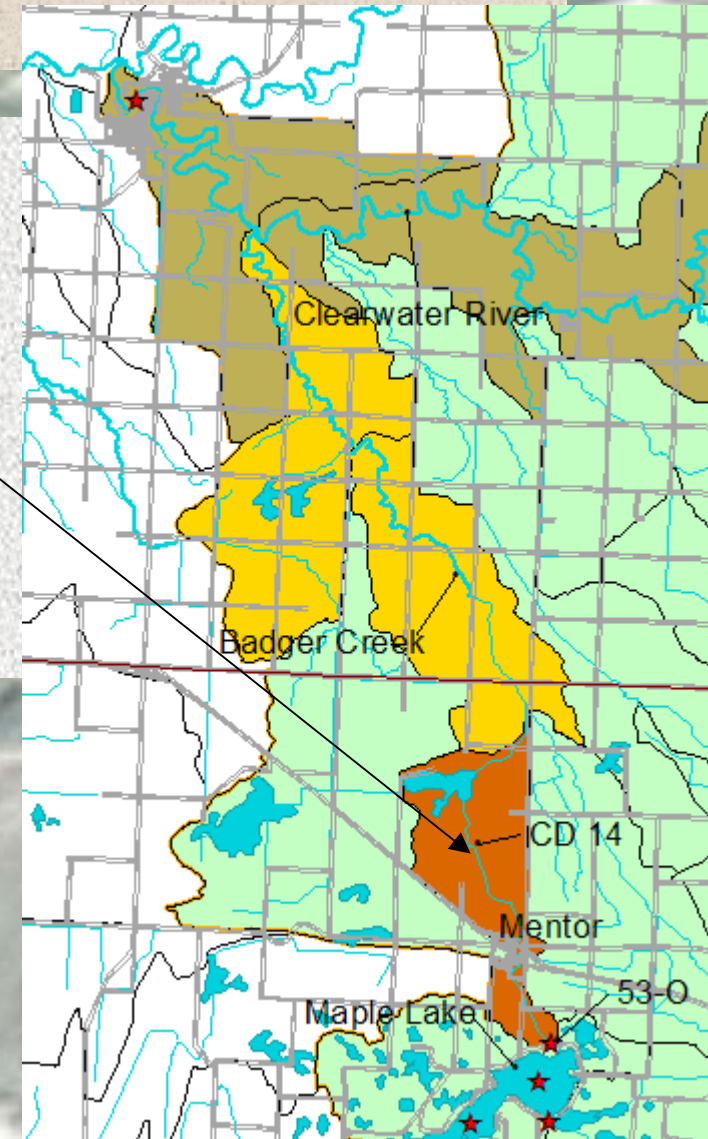
Fully Supporting Streams

- Clearwater River – Clearwater Lake to Ruffy Brook
- Very good water quality @ Clearwater Lake Outlet



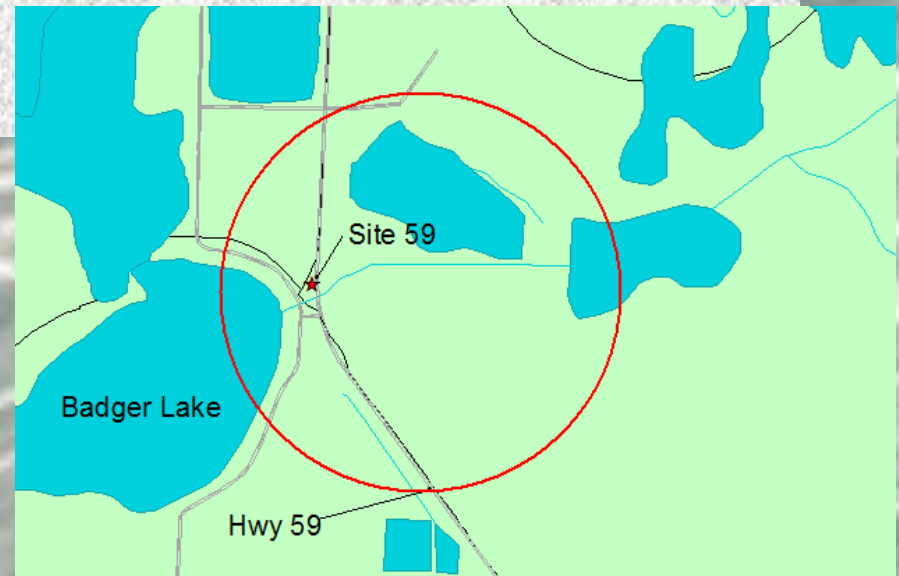
Fully Supporting Streams

- CD 14 – Headwaters to Lower Badger Creek
- RLWD data from the beginning of this reach supports this assessment



Fully Supporting Streams

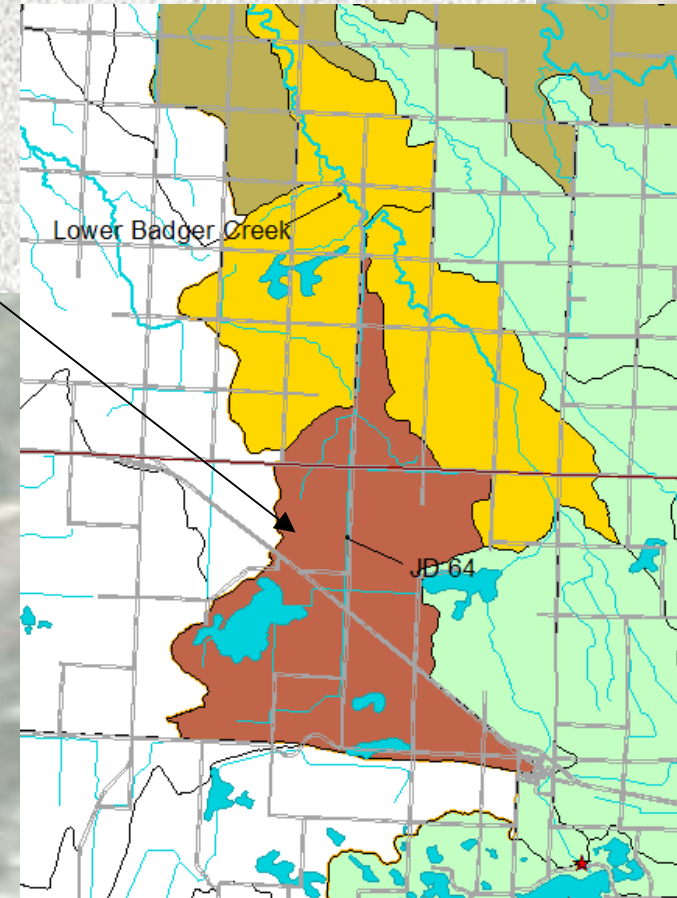
- Poplar River (Diversion) – Pond to Badger Creek
- RLWD data shows that it is Not Supporting for DO



Parameter	# Samples	Exceedances	% Exceedances	Would it be Listed?	Designated Use Support
Oxygen	38	13	34.21%	Yes	Not

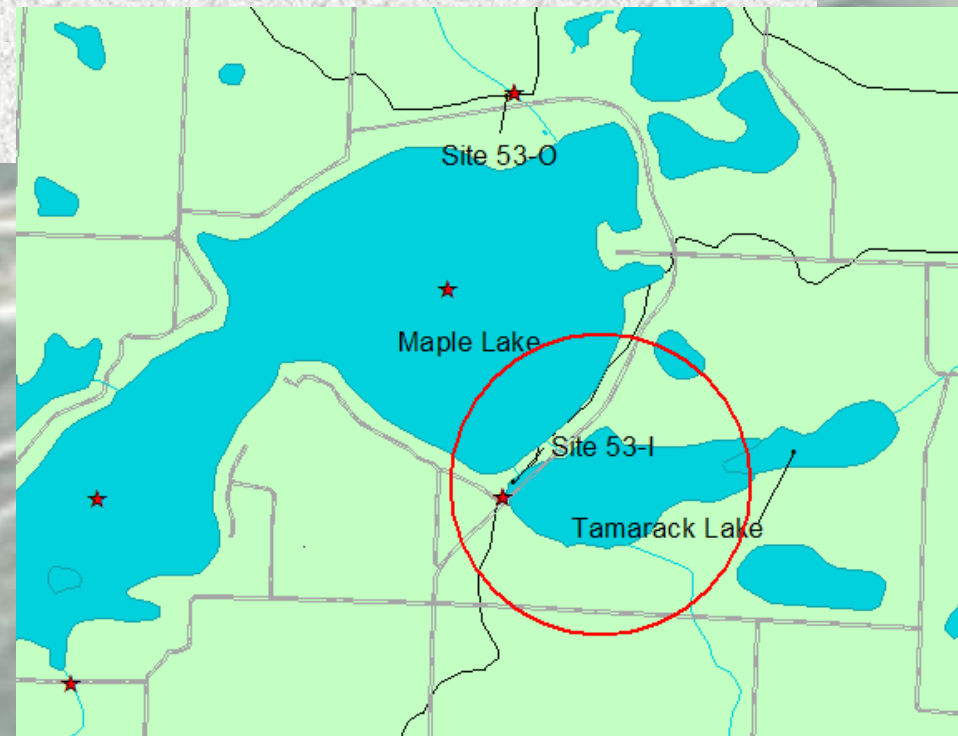
Fully Supporting Streams

- Judicial Ditch 64 – Unnamed Ditch to Lower Badger Creek
- Data?



Fully Supporting Streams

- Unnamed Creek (JD73/Poplar River Diversion/Maple Lake Inlet) – Tamarack Lake to Maple Lake
- True



Red Lake River – Burnham Creek to Unnamed Creek

- Currently Listed
- Turbidity
- We Currently Have No Sites Within This Reach

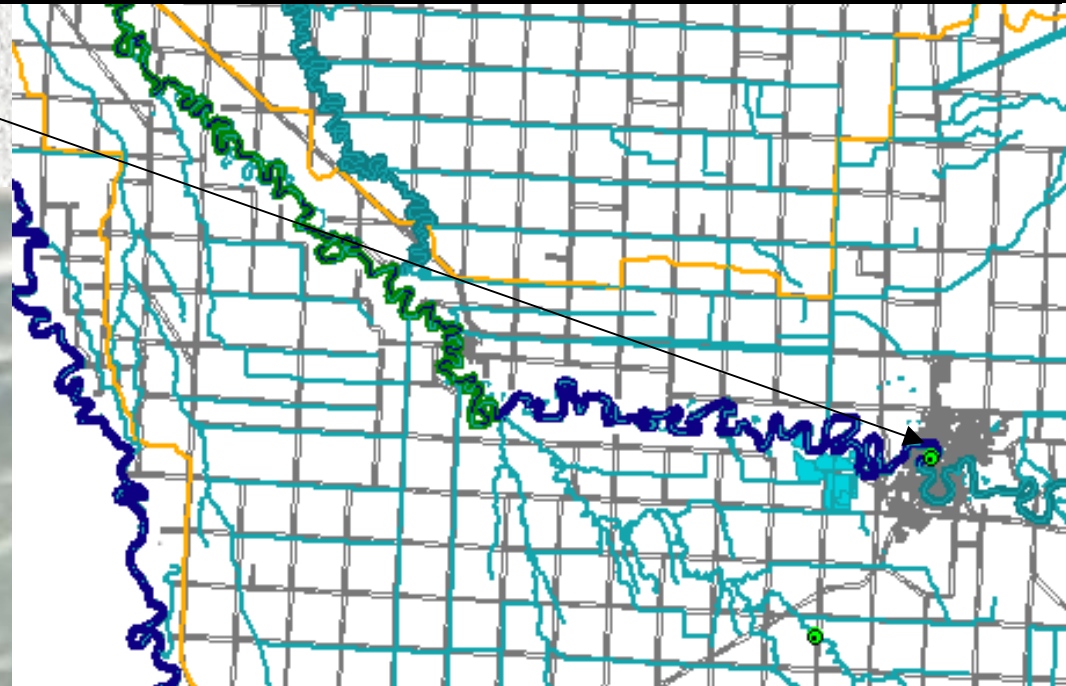


Red Lake River – Crookston Dam to Burnham Creek

- Excess Sediment – List?

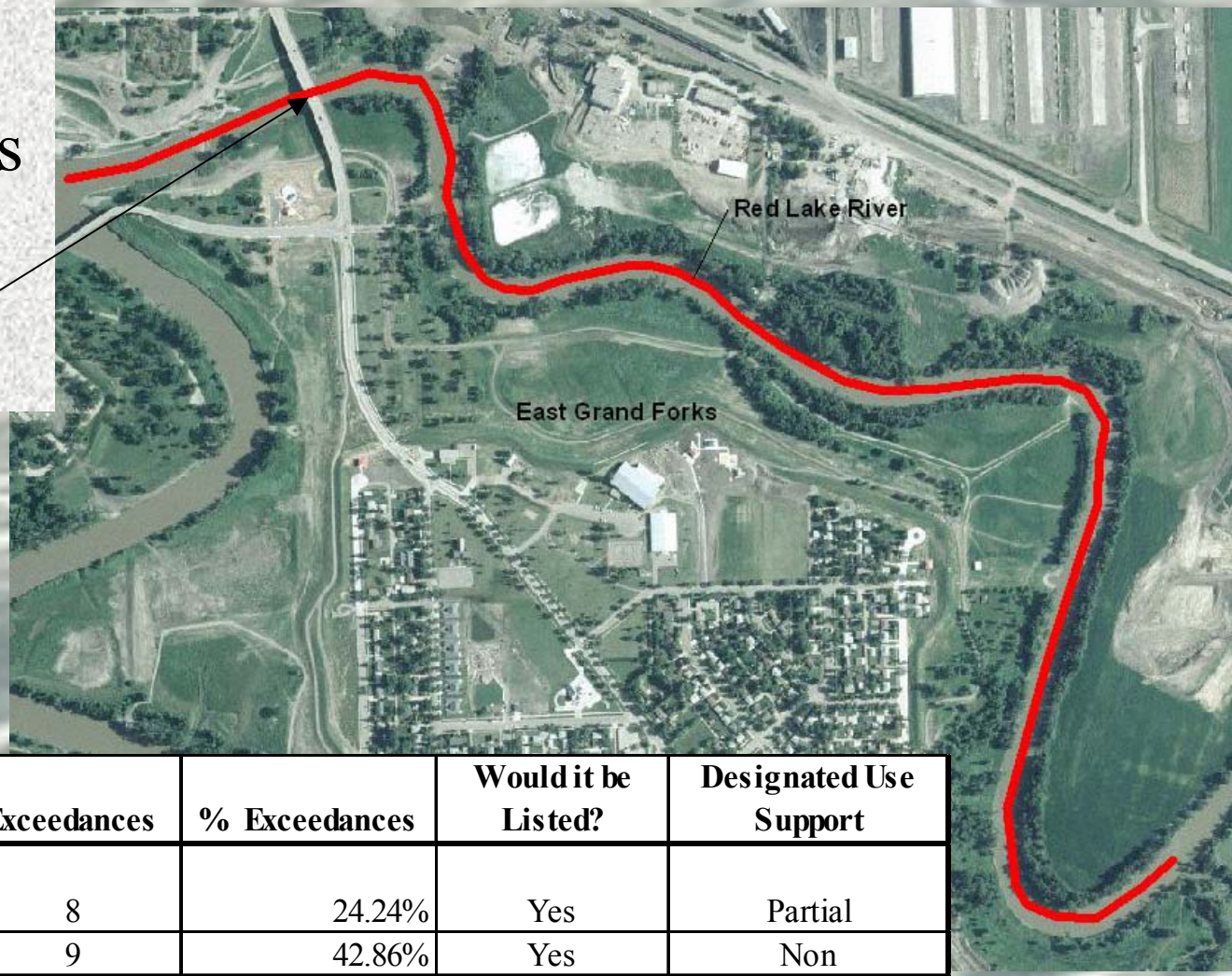
Parameter	# Samples	Exceedances	% Exceedances	Would it be Listed?	Designated Use Support
Total Suspended Solids	38	5	13.16%	Yes	Partial
Turbidity	25	7	28.00%	Yes	Non

- 790 – Crookston



Red Lake River; Unnamed Creek to Red River

- Turbidity
- Our data supports this listing
- Murray Bridge



Parameter	# Samples	Exceedances	% Exceedances	Would it be Listed?	Designated Use Support
Total Suspended Solids - 56.5 mg/L	33	8	24.24%	Yes	Partial
Turbidity	21	9	42.86%	Yes	Non

Red Lake River – Thief River to Thief River Falls Dam

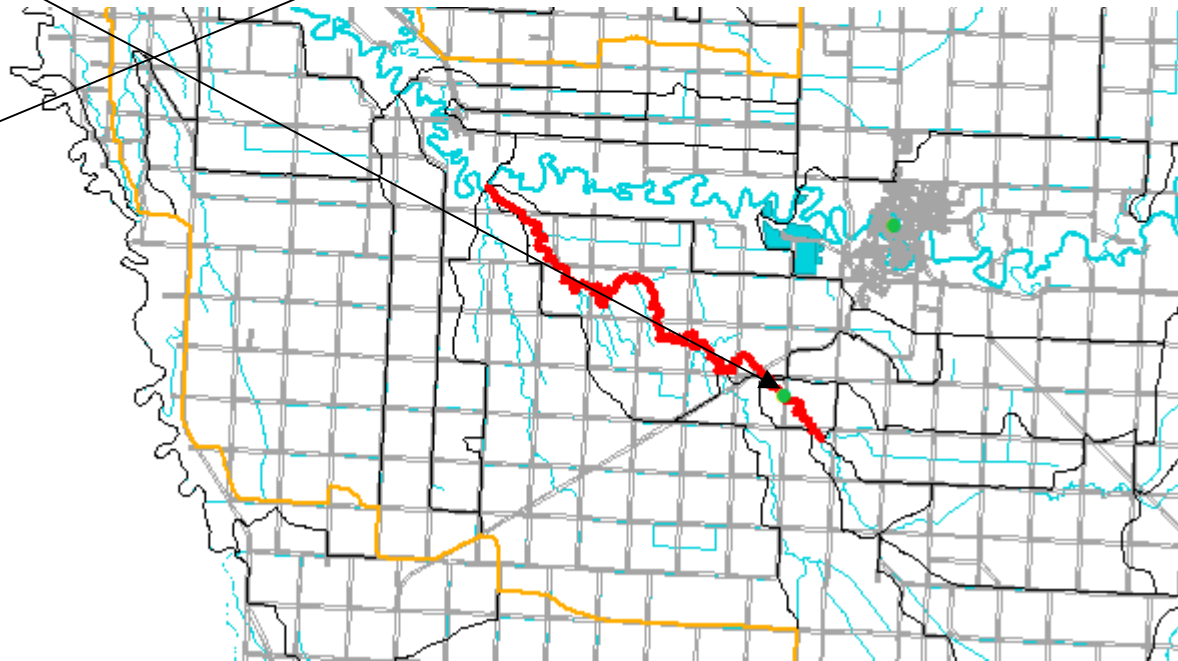
- Fecal Coliform – Partially Supporting
- Our data doesn't show an impairment
- No data in STORET that supports this impairment according to the MPCA Environmental Data Access (EDA) website

Parameter	# Samples	Exceedances	% Exceedances	Would it be Listed?	Designated Use Support
Dissolved Oxygen	38	1	2.63%	No	Fu
pH	38	1	2.63%	No	Fu
Conductivity	39	0	0.00%	No	Fu
Total Suspended Solids - 56.5	35	0	0.00%	No	Fu...
Turbidity	25	0	0.00%	No	Full
Total Dissolved Solids	15	1	6.67%	No	Full
Fecal Coliform	34	2	5.88%	No	Full

Burnham Creek – Unnamed Creek to Red Lake River

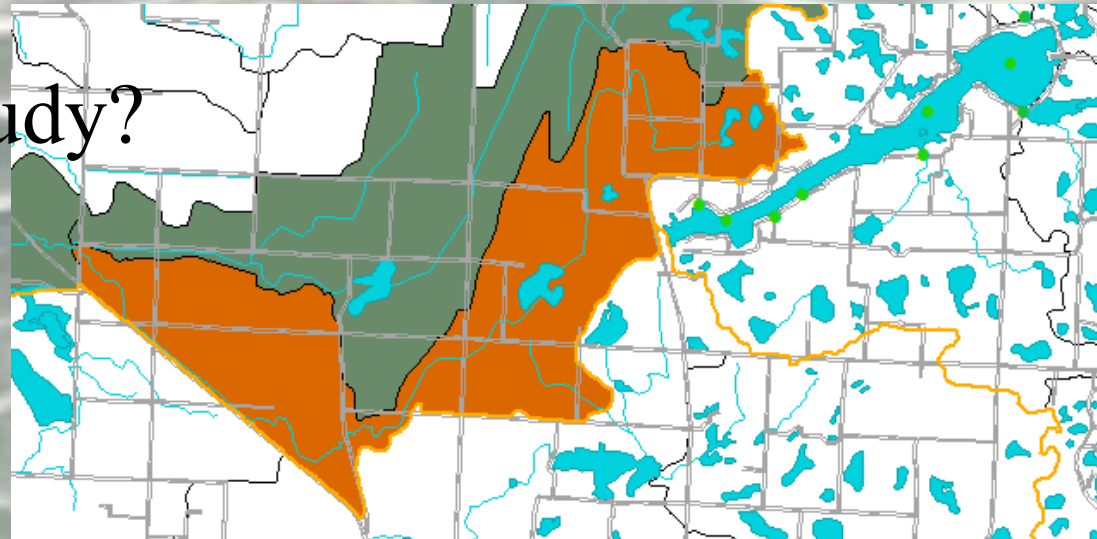
- Sediment, Nitrogen
- Site #799
- NO₃+NO₂
 - 75th = .438 mg/l vs. .20 (RRV ecoregion)
- RLWD Data Supports Sediment Listing

Burnham Creek #799, near City of Crookston					
Parameter	# Samples	Exceedances	% Exceedances	Would it be Listed?	Designated Use Support
Dissolved Oxygen	23	1	4.35%	No	Full
pH	27	3	11.11%	Yes	Partial
Conductivity	28	4	14.29%	Yes	Partial
Total Suspended Solids	24	4	16.67%	Yes	Partial
Total Dissolved Solids	9	2	22.22%	No	Insufficient Data
Fecal Coliform	26	1	3.85%	No	Full



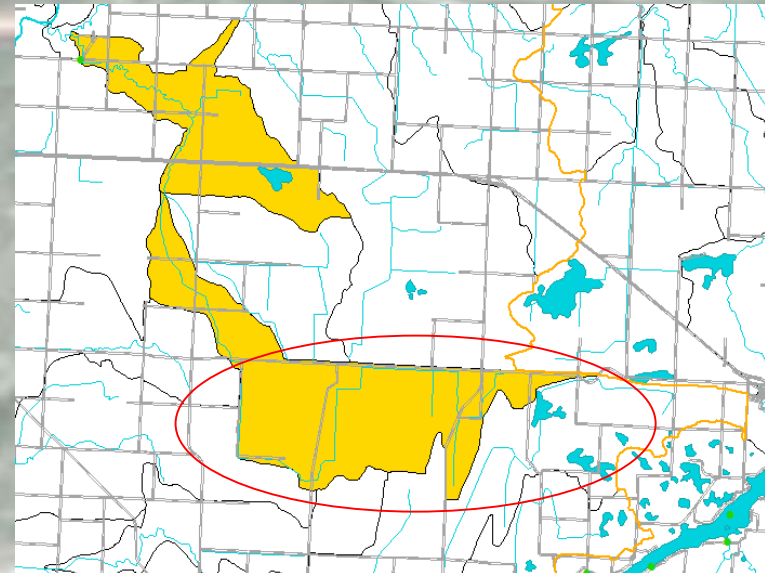
County Ditch 65 – Unnamed Lk (60-0317) To Burnham Creek

- Partially Supporting – Dissolved Oxygen
- What data is this based upon?
- No RLWD or River Watch data
- No data in STORET according to MPCA EDA site
- Glacial Ridge Study?

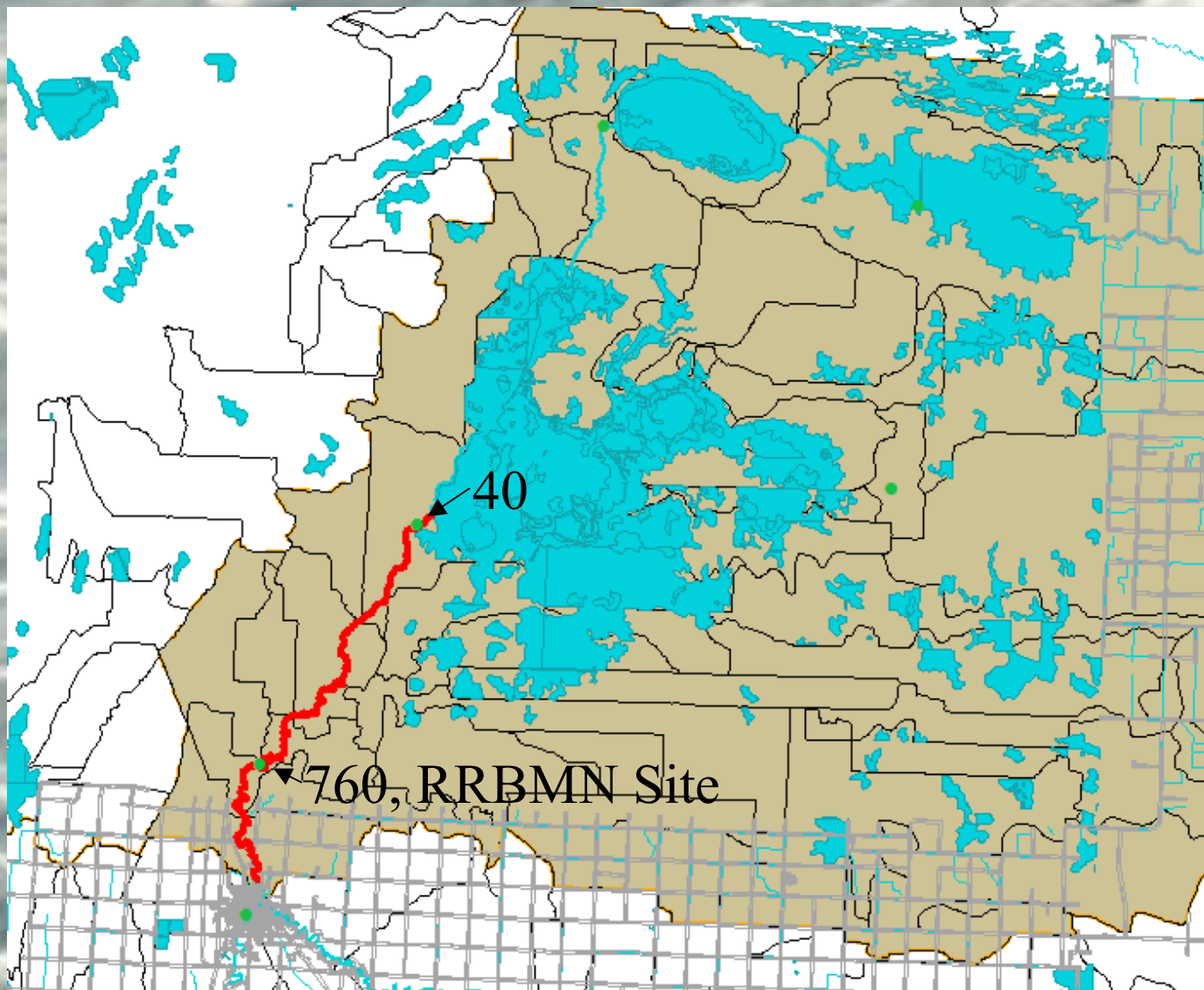


County Ditch 140 – Unnamed Ditch to Gentilly Creek

- Exceeds Phosphorus
- No data from RLWD or Riverwatch
- No data on the EDA website
- Data from USGS Glacial Ridge Water Quality Study? – ditch is near/within the study area



Thief River – Agassiz Pool to Red Lake River



Thief River – Agassiz Pool to Red Lake River

- Partially Supporting – Dissolved Oxygen
- Not Supporting – Turbidity
- Data from RLWD and RRB Monitoring Network

Thief River – Agassiz Pool to Red Lake River

- RLWD Data

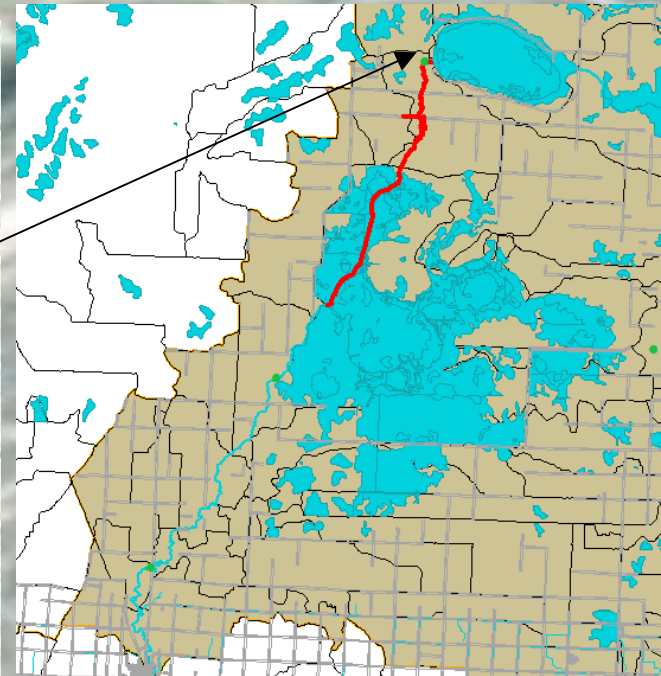
Site 40 - Thief River Near Agassiz Outlet	Parameter	# Samples	Exceedances	% Exceedances	Would it be Listed?	Use Support
	Dissolved Oxygen	42	7	16.67%	Yes	Partial
	pH	43	5	11.63%	Yes	Partial
	Conductivity	44	3	6.82%	No	Full
	Turbidity	30	6	20.00%	Yes	Partial
	Total Suspended Solids - 56.5 mg/L	31	4	12.90%	Yes	Partial
	Total Dissolved Solids	19	4	21.05%	Yes	Partial
	Fecal Coliform	33	1	3.03%	No	Full

Site 760 - Thief River N of Thief River Falls	Parameter	# Samples	Exceedances	% Exceedances	Would it be Listed?	Designated Use Support
	Dissolved Oxygen	39	8	20.51%	Yes	Partial
	pH	40	2	5.00%	No	Full
	Conductivity	41	5	12.20%	Yes	Partial
	Total Suspended Solids - 56.5 mg/L	37	1	2.70%	No	Full
	Turbidity	25	8	32.00%	Yes	Non
	Total Dissolved Solids	14	3	21.43%	Yes	Partial
	Fecal Coliform	38	5	13.16%	Yes	Partial

- Fecal Coliform Exceedances found after last STORET submission

Thief River – Thief Lake to Agassiz Pool

- Fully Supporting
- RLWD Data Shows Impairments
- 1 low DO reading since 2002



Site 98 - Thief Lake
Outlet

Parameter	# Samples	Exceedances	% Exceedances	Would it be Listed?	Designated Use Support
Dissolved Oxygen	38.00	4	10.53%	Yes	Partial
pH	39.00	6	15.38%	Yes	Partial
Conductivity	40.00	1	2.50%	No	Full
Total Suspended Solids - 56.5 mg/L	36.00	1	2.78%	No	Full
Turbidity	25.00	3	12.00%	Yes	Non
Total Dissolved Solids	11.00	0	0.00%	No	Full
Fecal Coliform	36.00	3	8.33%	No	Full

Moose River – Headwaters to Thief Lake

- Partially Supporting – Dissolved Oxygen
- Exceeds Sediment
 - Not supported by RLWD data, River Watch?



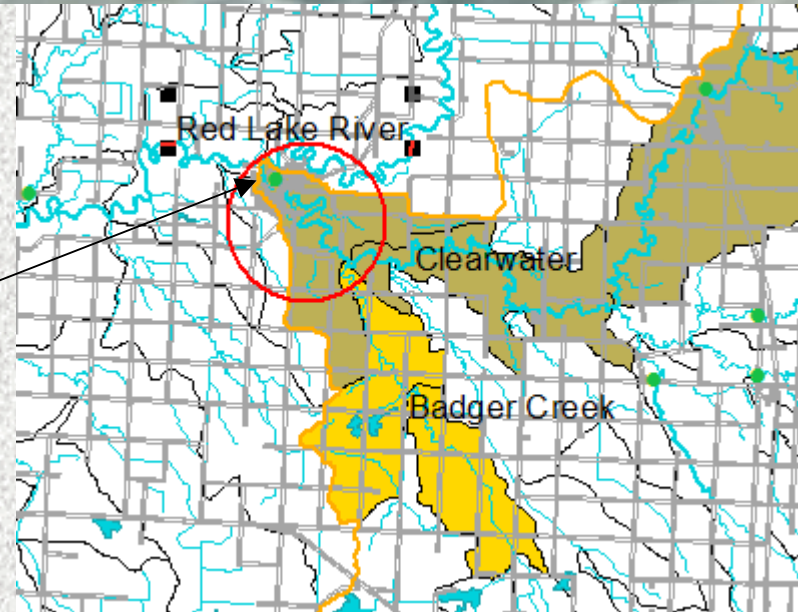
Site 15 - Moose River @

Hwy 89

Parameter	# Samples	Exceedances	Exceedance	Would it be Listed?	Use Support
Dissolved Oxygen	38	8	21.05%	Yes	Partial
pH	40	1	2.50%	No	Full
Conductivity	40	0	0.00%	No	Full
Total Suspended Solids - 56.5 mg/L	37	0	0.00%	No	Full
Turbidity	25	1	4.00%	No	Full
Total Dissolved Solids	13	0	0.00%	No	Full
Fecal Coliform	37	0	0.00%	No	Full

Clearwater River – Lower Badger Creek to Red Lake River

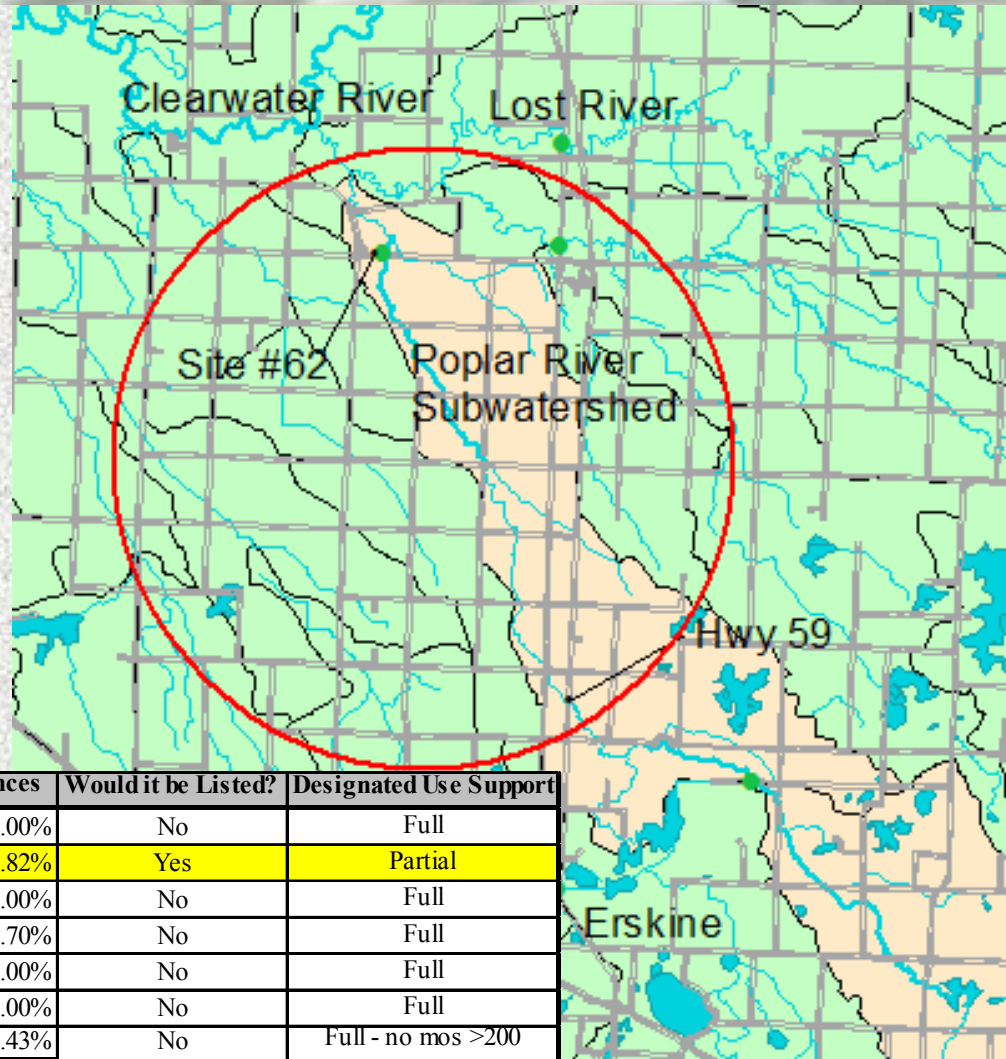
- Not Supporting – Turbidity
- Exceeds sediment
- Site 785 – also a River Watch and RRBMN site
- RLWD data supports Turbidity Impairment + High TSS levels



Parameter	# Samples	Exceedances	% Exceedances	Would it be Listed?	Designated Use Support
Dissolved Oxygen	38	0	0.00%	No	Full
pH	34	5	14.71%	Yes	Partial
Conductivity	37	0	0.00%	No	Full
Total Suspended Solids - 56.5 mg/L	35	5	14.29%	Yes	Partial
Turbidity	24	4	16.67%	Yes	Partial
Total Dissolved Solids	13	0	0.00%	No	Full
Fecal Coliform	35	2	5.71%	No	Full

Poplar River – Highway 59 to Lost River

- Phosphorus
- Ecoregion TP 75th:
.322 mg/L (RRV)
- RLWD 75th: .173
mg/L

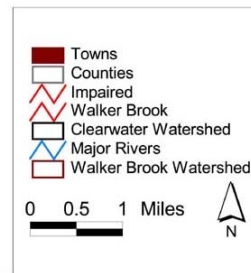
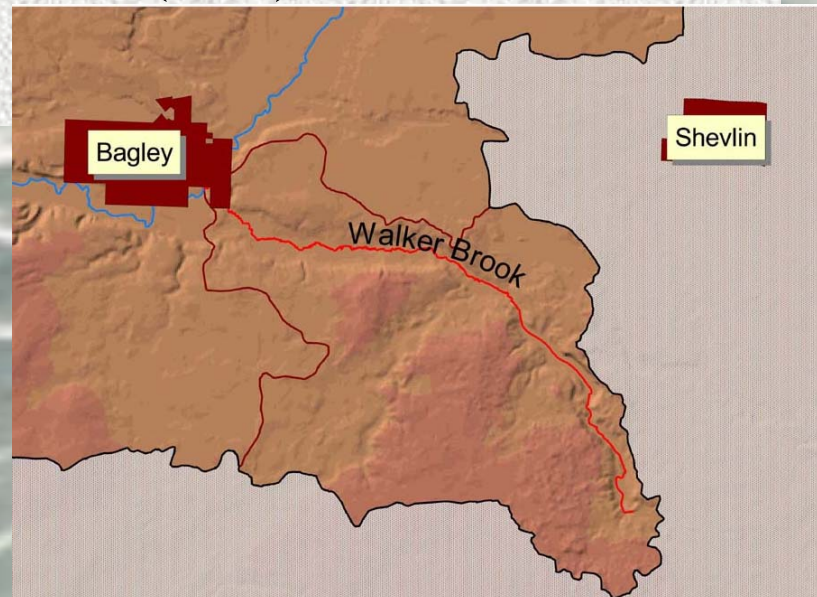


Site 62 - Poplar River
at CR 92

Parameter	# Samples	Exceedances	Exceedances	Would it be Listed?	Designated Use Support
Dissolved Oxygen	39	0	0.00%	No	Full
pH	39	5	12.82%	Yes	Partial
Conductivity	40	0	0.00%	No	Full
Total Suspended Solids - 56.5 mg/L	37	1	2.70%	No	Full
Turbidity	25	1	4.00%	No	Full
Total Dissolved Solids	13	0	0.00%	No	Full
Fecal Coliform	35	4	11.43%	No	Full - no mos >200

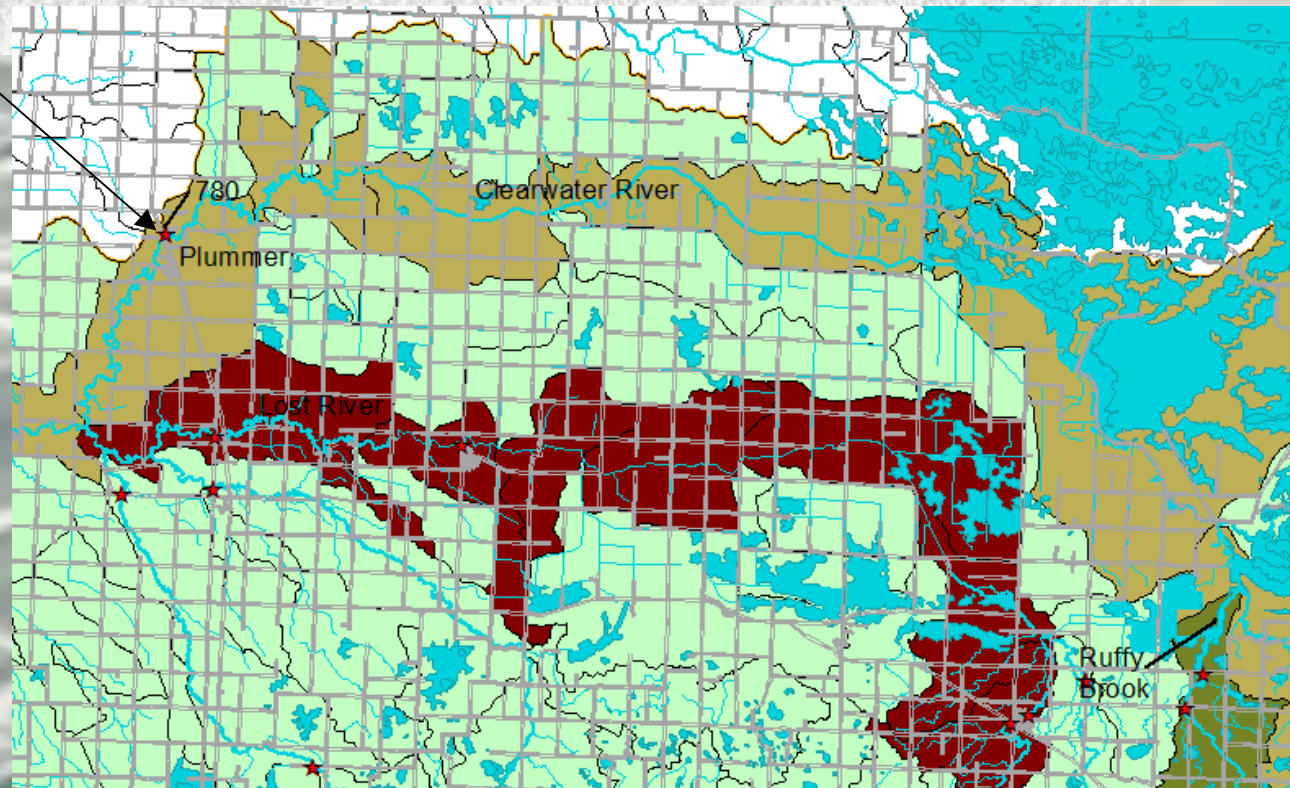
Walker Brook – Walker Brook Lake to Clearwater River

- Not Supporting – Dissolved Oxygen
- TMDLs on the Clearwater River Study
- Impairment is due to natural factors
 - Groundwater, organic soils (fens), low flow
- Being reclassified



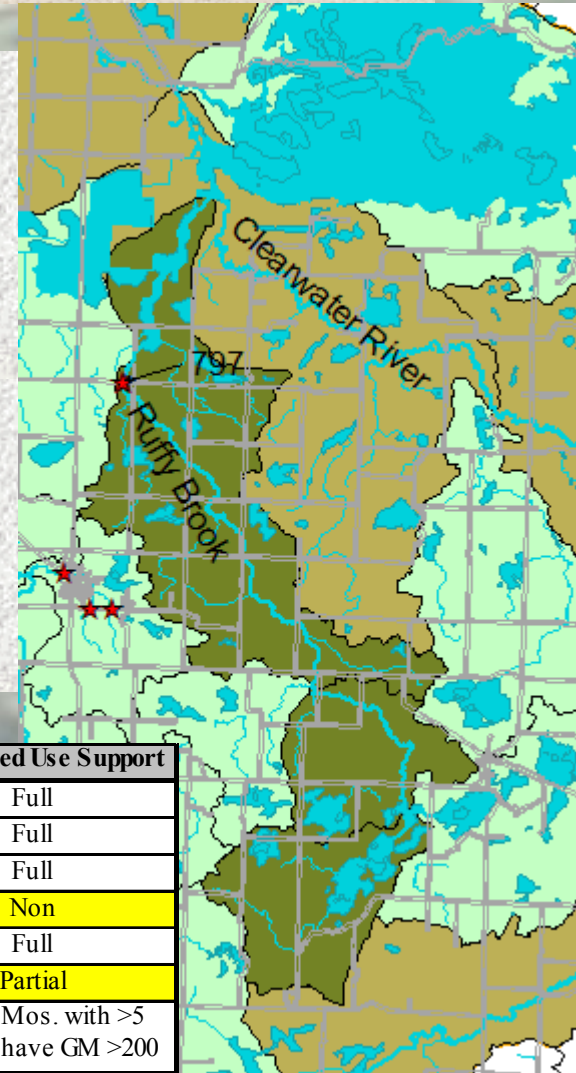
Clearwater River – Ruffy Brook to Lost River

- Exceeds Phosphorous
- pH = 12.82% Exceedance
- TP 75th = .131 mg/L (Ecoreg 75th = .322)
- Site #780



Ruffy Brook – Headwaters to Clearwater River

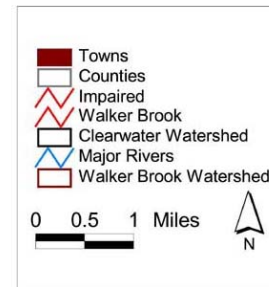
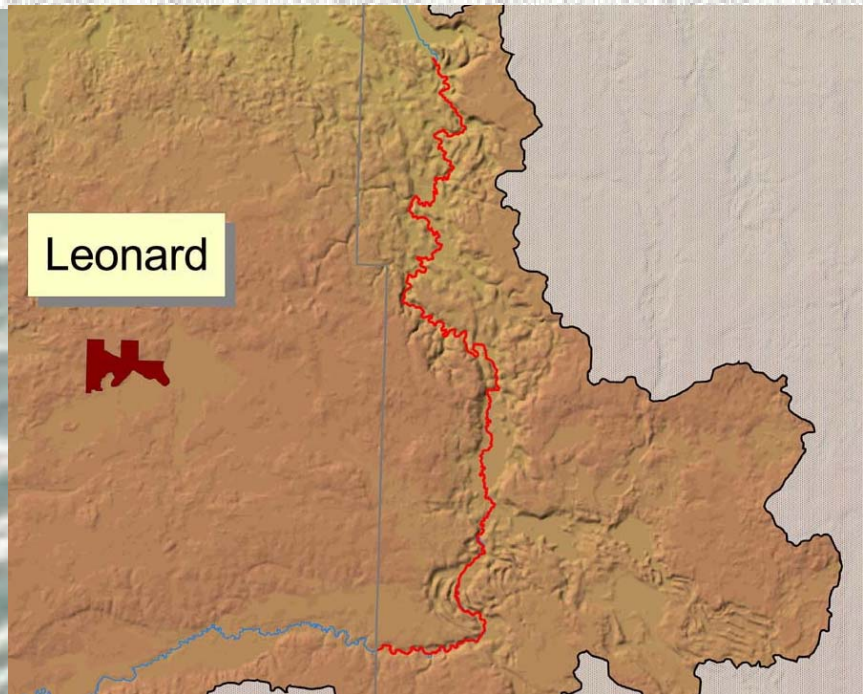
- Partially Supporting – Fecal Coliform
 - 27.27% exceedance in RLWD data
 - July and September have >200 col/100ml G.M., but <5 samples



Parameter	# Samples	Exceedances	% Exceedances	Would it be Listed?	Designated Use Support
Dissolved Oxygen	37	0	0.00%	No	Full
pH	34	0	0.00%	No	Full
Conductivity	38	0	0.00%	No	Full
Total Suspended Solids - 6.4 mg/L	28	10	35.71%	Yes	Non
Turbidity	23	0	0.00%	No	Full
Total Dissolved Solids	14	2	14.29%	Yes	Partial
Fecal Coliform	33	9	27.27%	No?	Full - 0 Mos. with >5 samples have GM >200

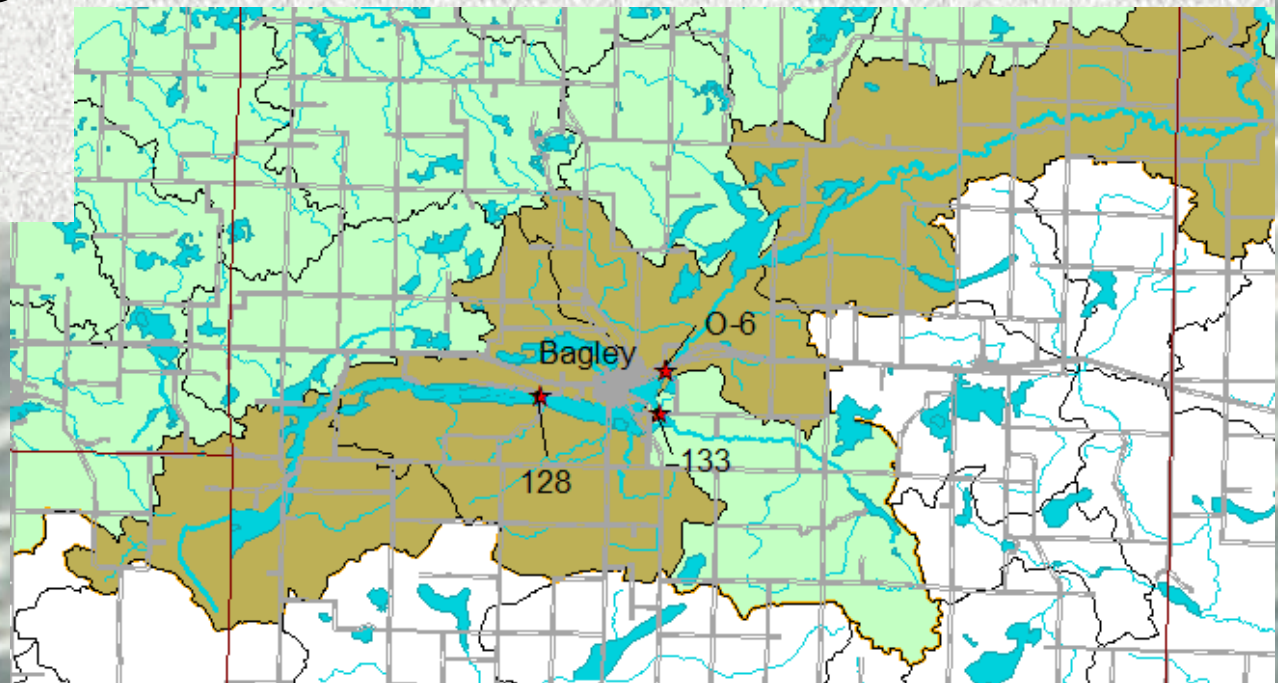
Clearwater River – T148 R35W S31 west line to Clearwater Lake (Trout Stream Reach)

- Partially Supporting – Fecal Coliform
- TMDLs on the Clearwater River Study found that there is no longer an impairment



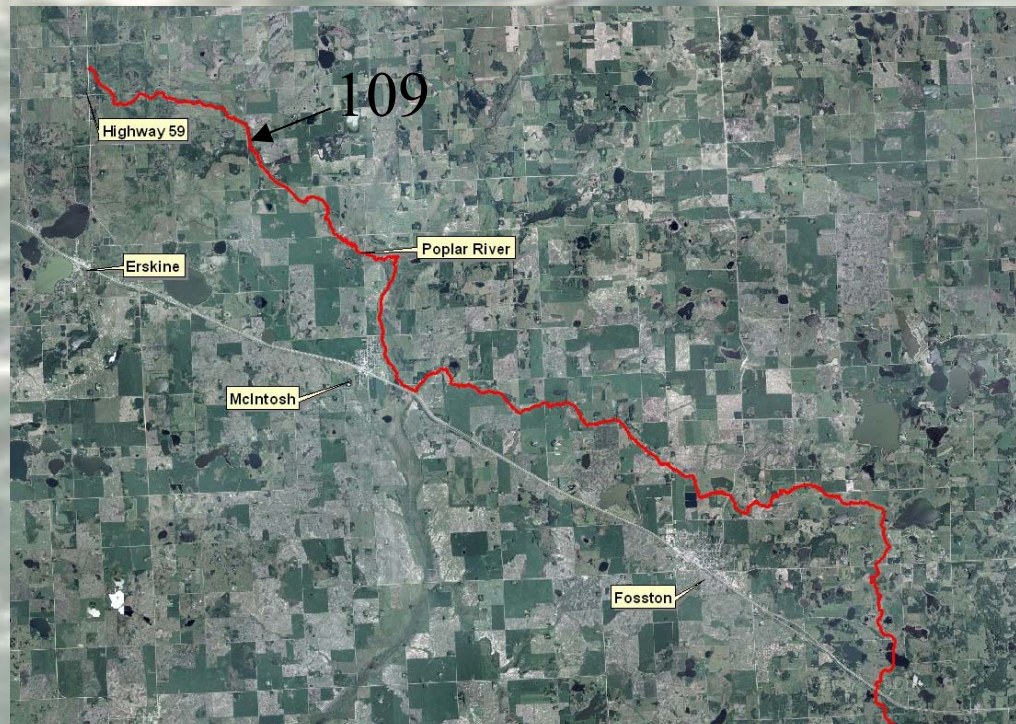
Clearwater River – Headwaters to T148 R36W S36 East Line

- Not Supporting – Dissolved Oxygen
- Exceeds Phosphorus
- DO: Partially Supporting @128, Non @ 0-6
- TP 75th = .05 @ 128
- TP 75th = .091 @ 0-6
- NLF Ecoregion
 - 75th = .052



Poplar River; Spring Lk to Hwy 59

- Partially Supporting - Dissolved Oxygen - Yes
- Exceeds Phosphorus - Yes
- TP 75th % = .2 mg/L vs .17 mg/L for NCH



Parameter	# Samples	Exceedances	% Exceedances	Would it be Listed?	Designated Use Support
Dissolved Oxygen	39	4	10.26%	Yes	Partial

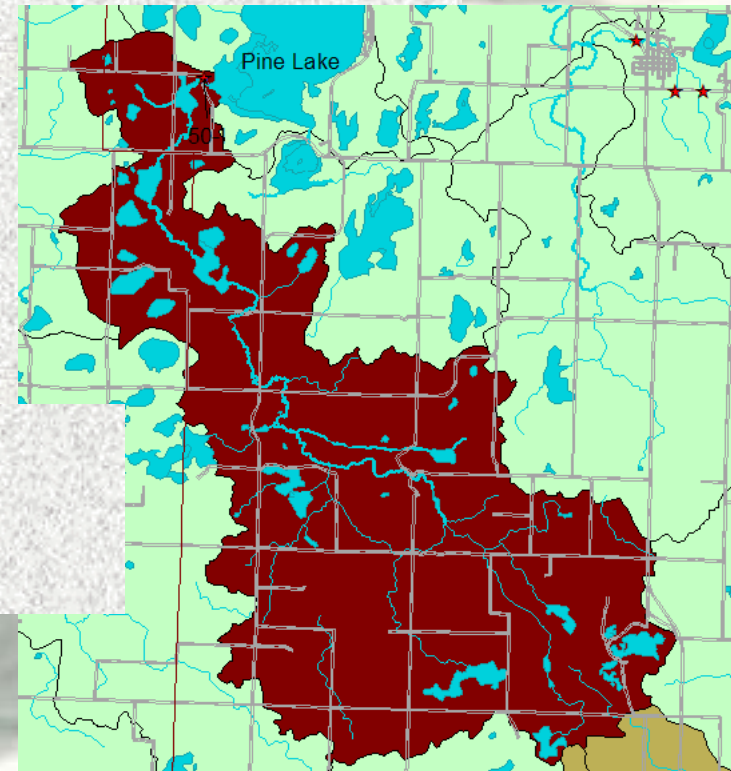
Silver Creek – Headwaters to Anderson Lake

- Partially Supporting – Fecal Coliform
- RLWD data supports this
- Stormwater study found very high levels on Clear Brook (tributary that flows through the town of Clearbrook)



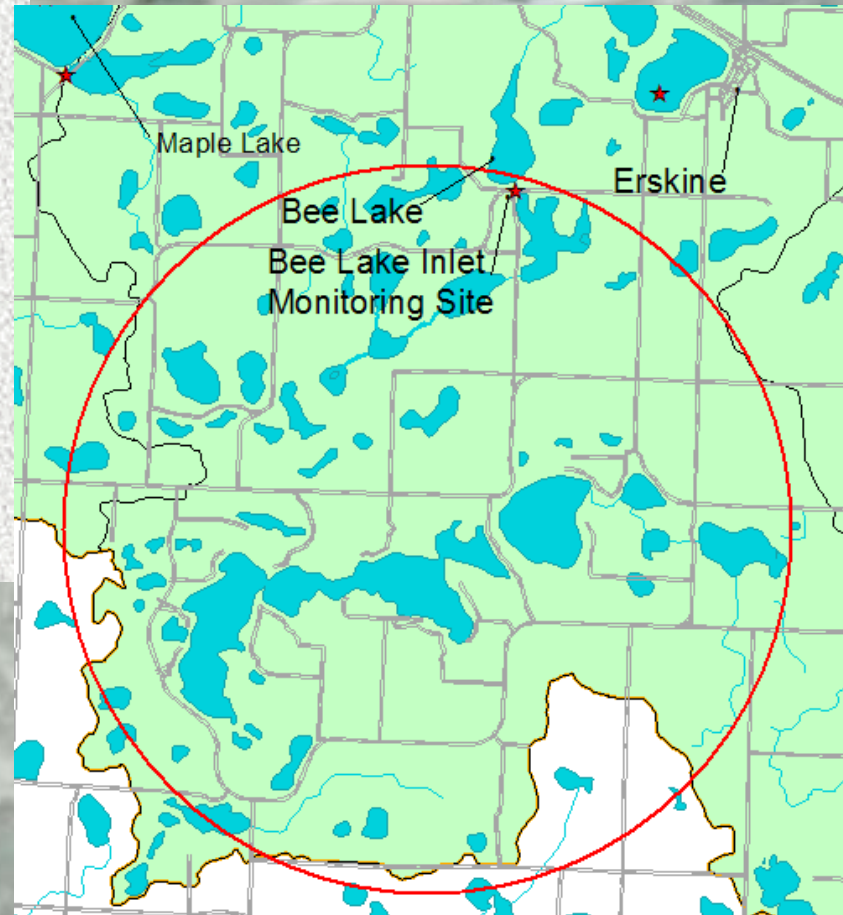
Lost River –T148 R38W S17 South Line to Pine Lake

- Partially Supporting – Dissolved Oxygen
- Partially Supporting – Fecal Coliform
- Dissolved Oxygen – Yes
- Impaired by Fecal Coliform?
 - Step 1 = 12.5%
 - Step 2 = No



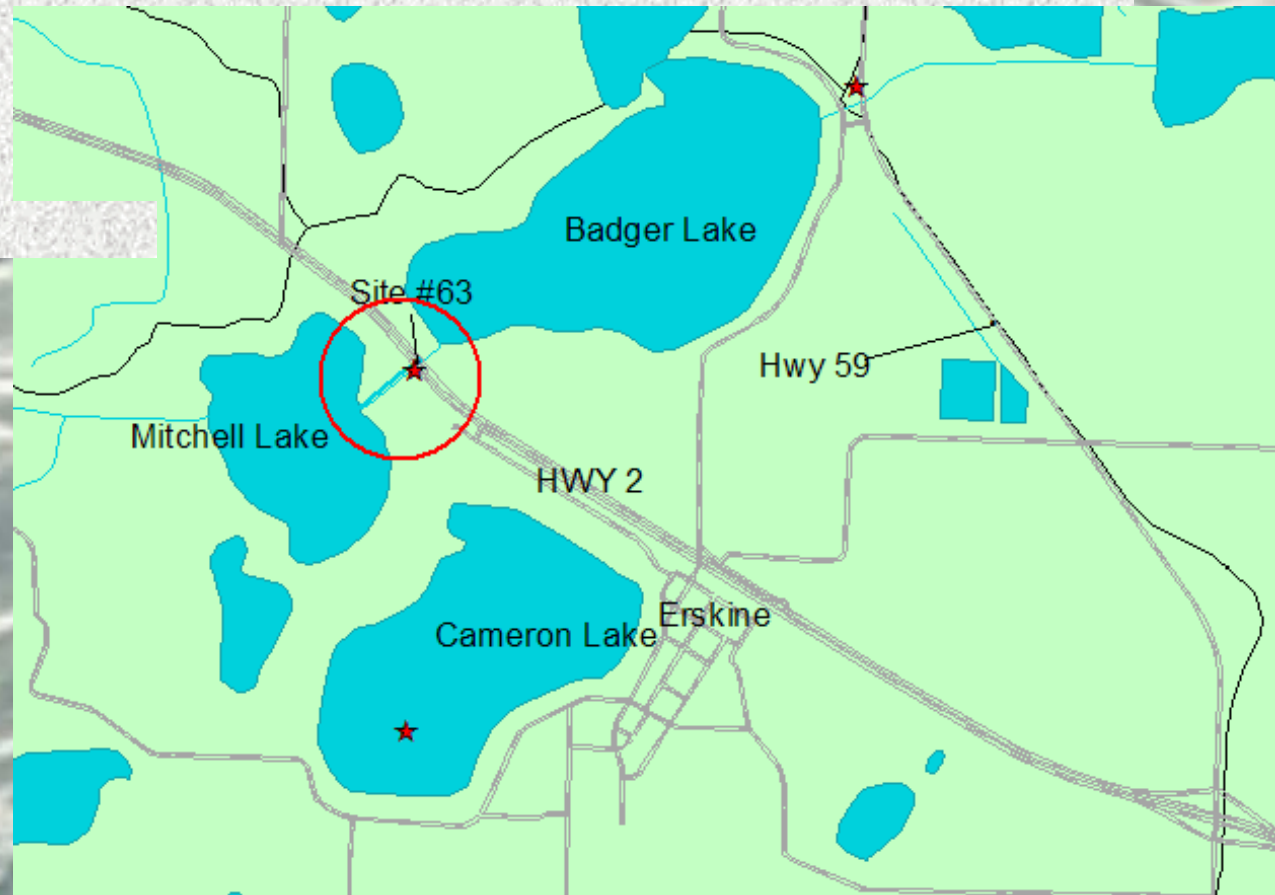
Unnamed Creek – Eighteen Lake to Bee Lake

- Not Supporting –
Dissolved Oxygen
- True
- Win-E-Mac River Watch
is now monitoring this site



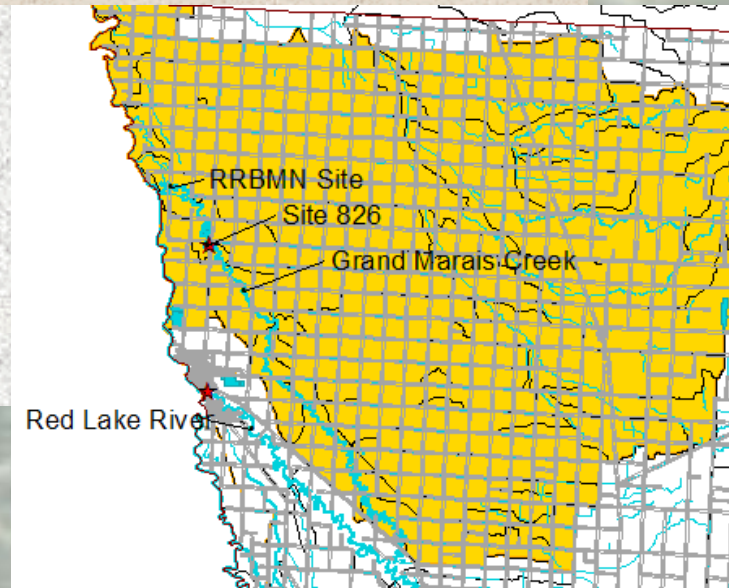
Unnamed Creek – Mitchell Lake to Badger Lake

- Partially Supporting – Dissolved Oxygen
- True
- Low Flow



Grand Marais Creek

- Unnamed Cr to Red River
- Headwaters to Unnamed Cr
- Exceeds sediment, nutrients



Site 826 - Grand Marais
Creek @ Hwy 220

Parameter	# Samples	Exceedances	% Exceedances	Would it be Listed?	Designated Use Support
Dissolved Oxygen	31	6	19.35%	Yes	Partial
pH	34	2	5.88%	No	Full
Conductivity	34	4	11.76%	Yes	Partial
Total Suspended Solids - 56.5 mg/L	32	7	21.88%	Yes	Partial
Turbidity	19	10	52.63%	Yes	Not
Total Dissolved Solids	14	6	42.86%	Yes	Not
Fecal Coliform	29	2	6.90%	No	Full

Grand Marais Creek

- Nutrients

- 75th% @ Site 826 vs. Ecoregion 75th %

- TP

- .735 mg/L (826) vs. .322 mg/L (RRV)

- Ammonia

- .24 mg/L (826) vs. .29 mg/L (RRV)

- Nitrates and Nitrites

- .428 mg/L (826) vs. .20 mg/L (RRV)

Water Quality Report

- o Comprehensive report about stream and lake monitoring conducted through the RLWD long-term district monitoring program.
- o Results from long-term monitoring program through 2003
- o Biennial
- o Assessments, trend analysis, data interpretation, recommendations, modeling results, etc.
- o <http://www.redlakewatershed.org/projects.html>

The End

