

CLEARWATER RIVER DISSOLVED OXYGEN AND FECAL COLIFORM TMDL STUDY



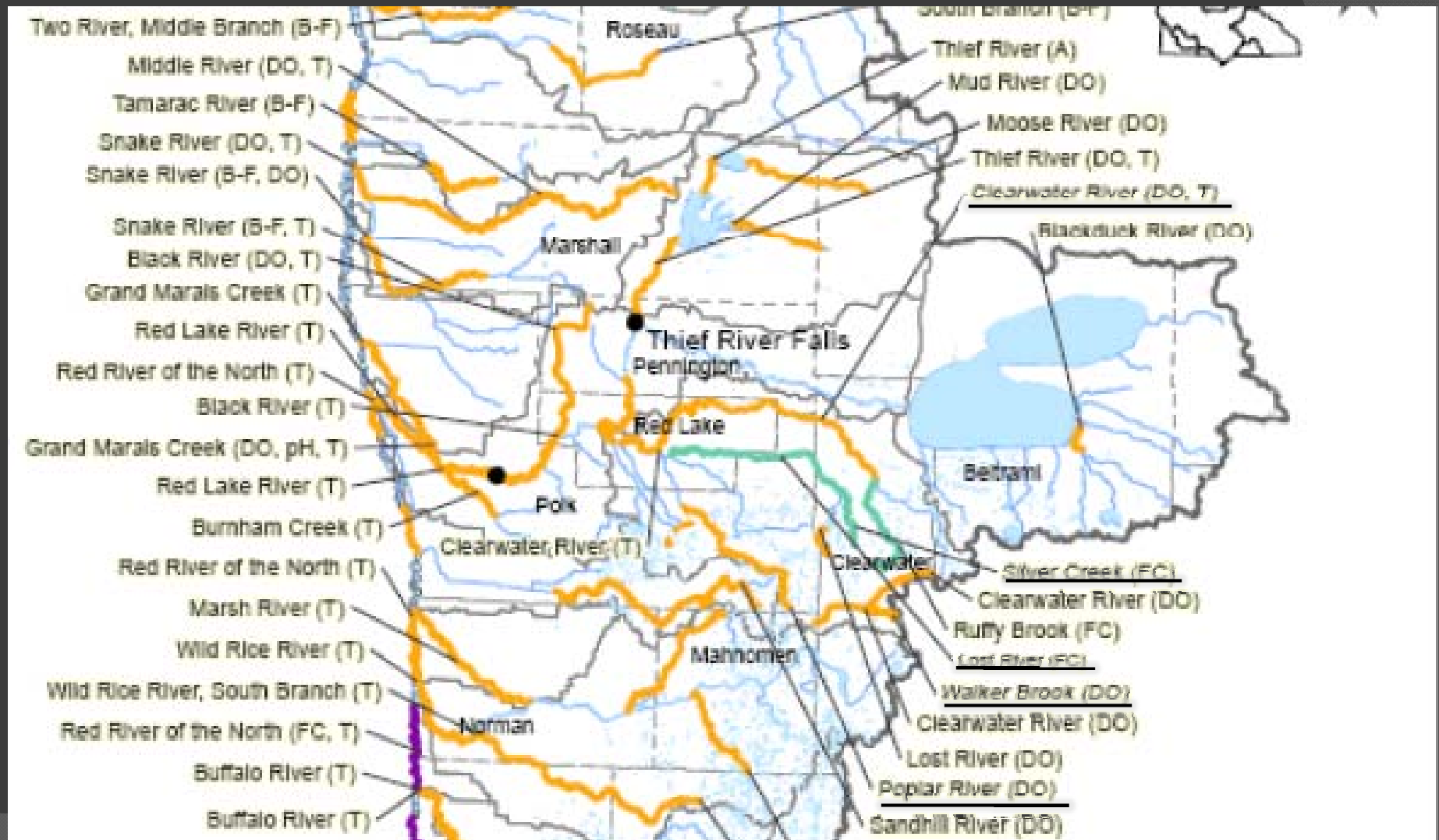
Red River Basin Water quality Team

December 15, 2008

Review Impaired Reaches of the TMDL Study

- ⦿ Clearwater River – high fecal coliform
- ⦿ Clearwater River – E. coli
- ⦿ Poplar River – low dissolved oxygen
- ⦿ Lost River – high fecal coliform
- ⦿ Silver Creek – high fecal coliform
- ~~⦿ Walker Creek – low dissolved oxygen~~

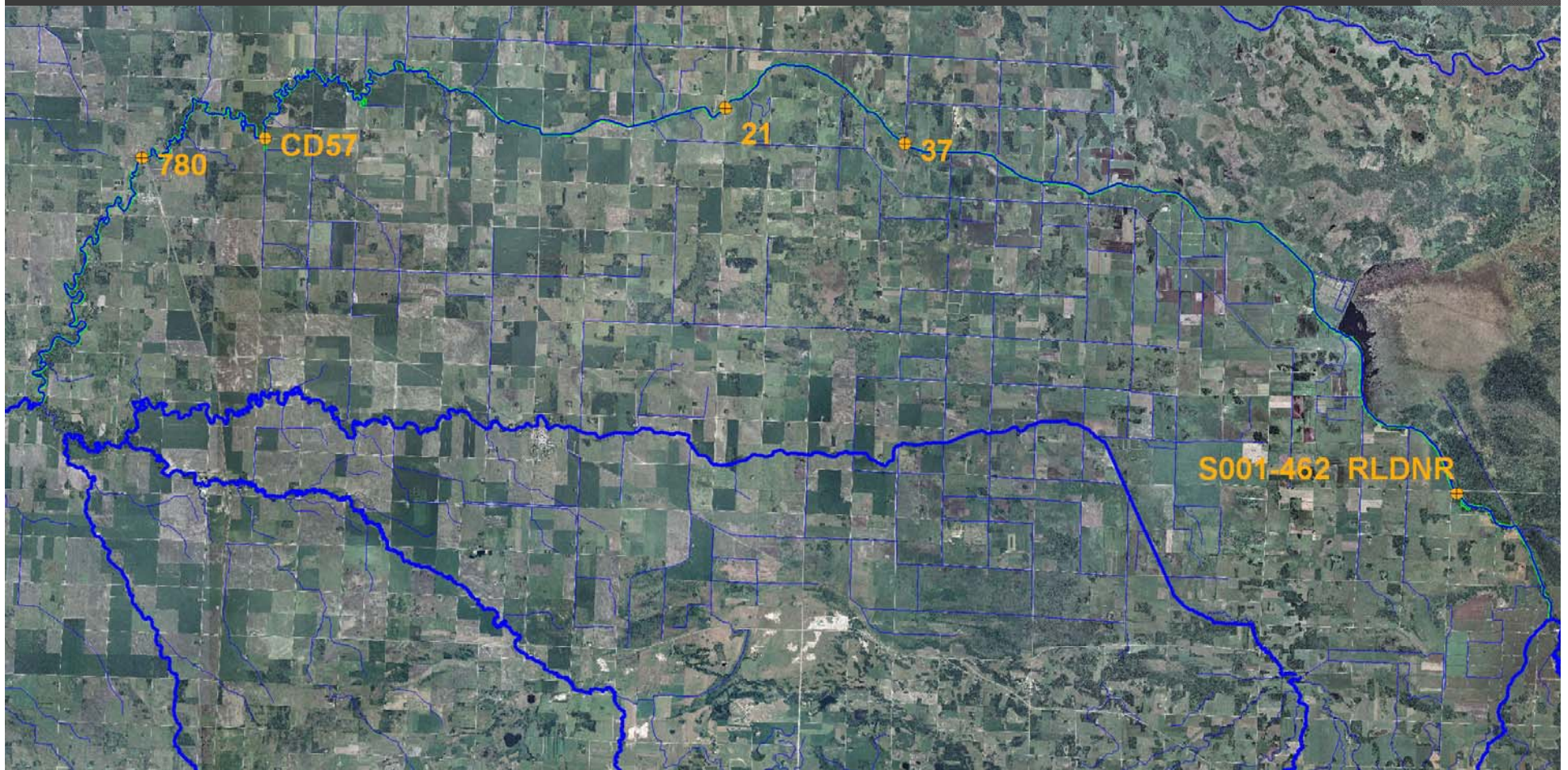
2008 Draft List of Impaired Waters



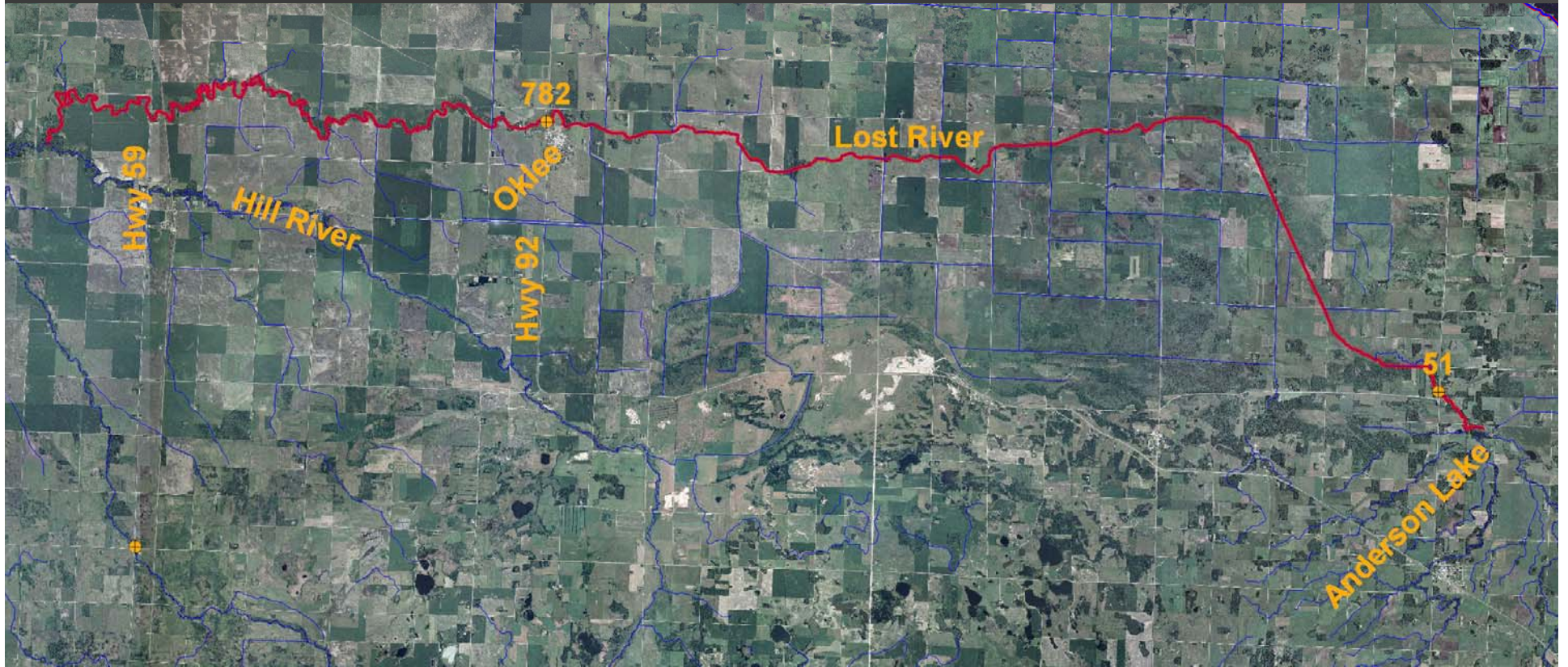
TMDLs Work Plan

1. Verify the impairment
2. Define Sources
3. Estimate loads and define desired loads
4. Recommend strategies to achieve desired loads

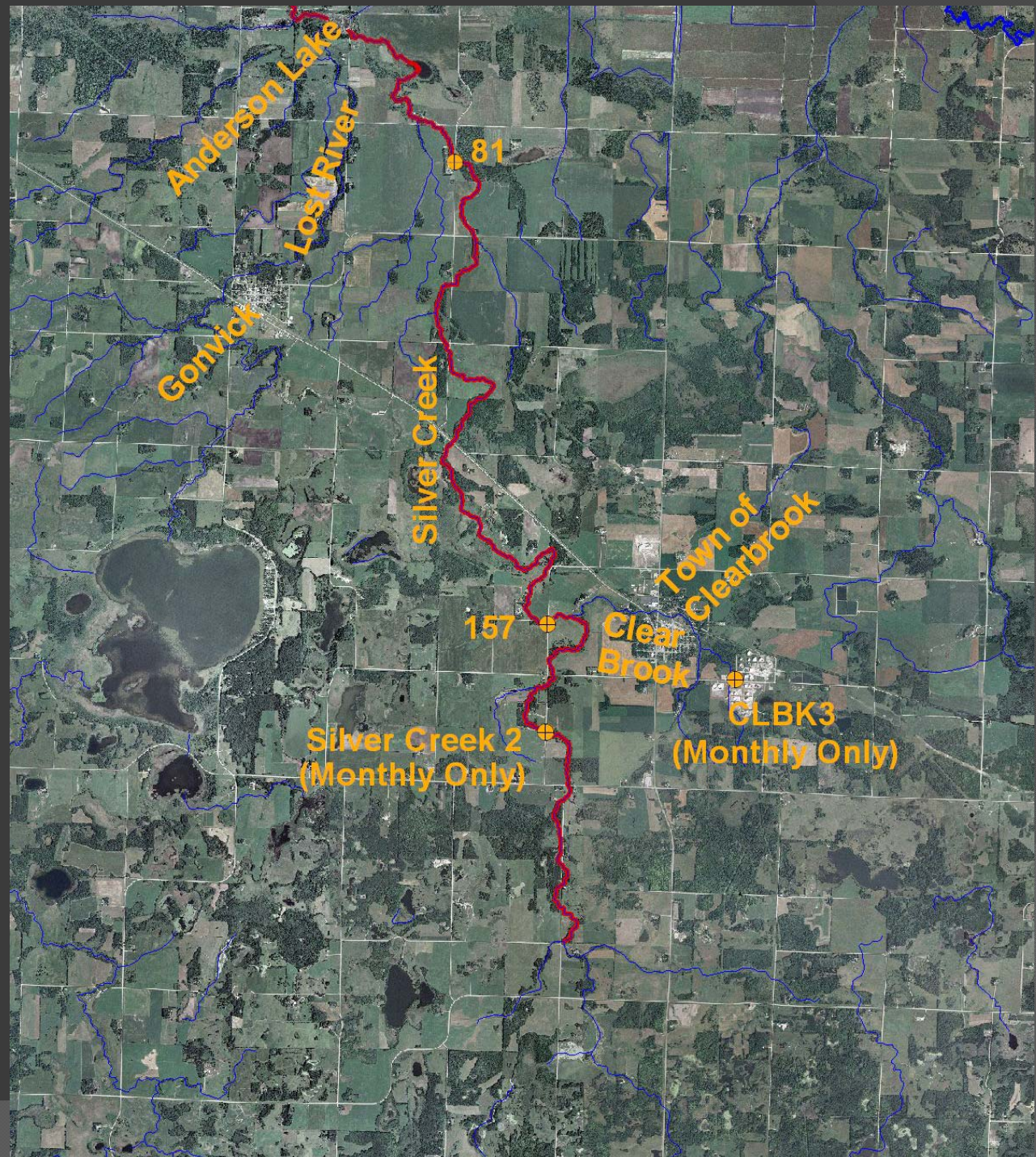
Clearwater River and CD57 Sites



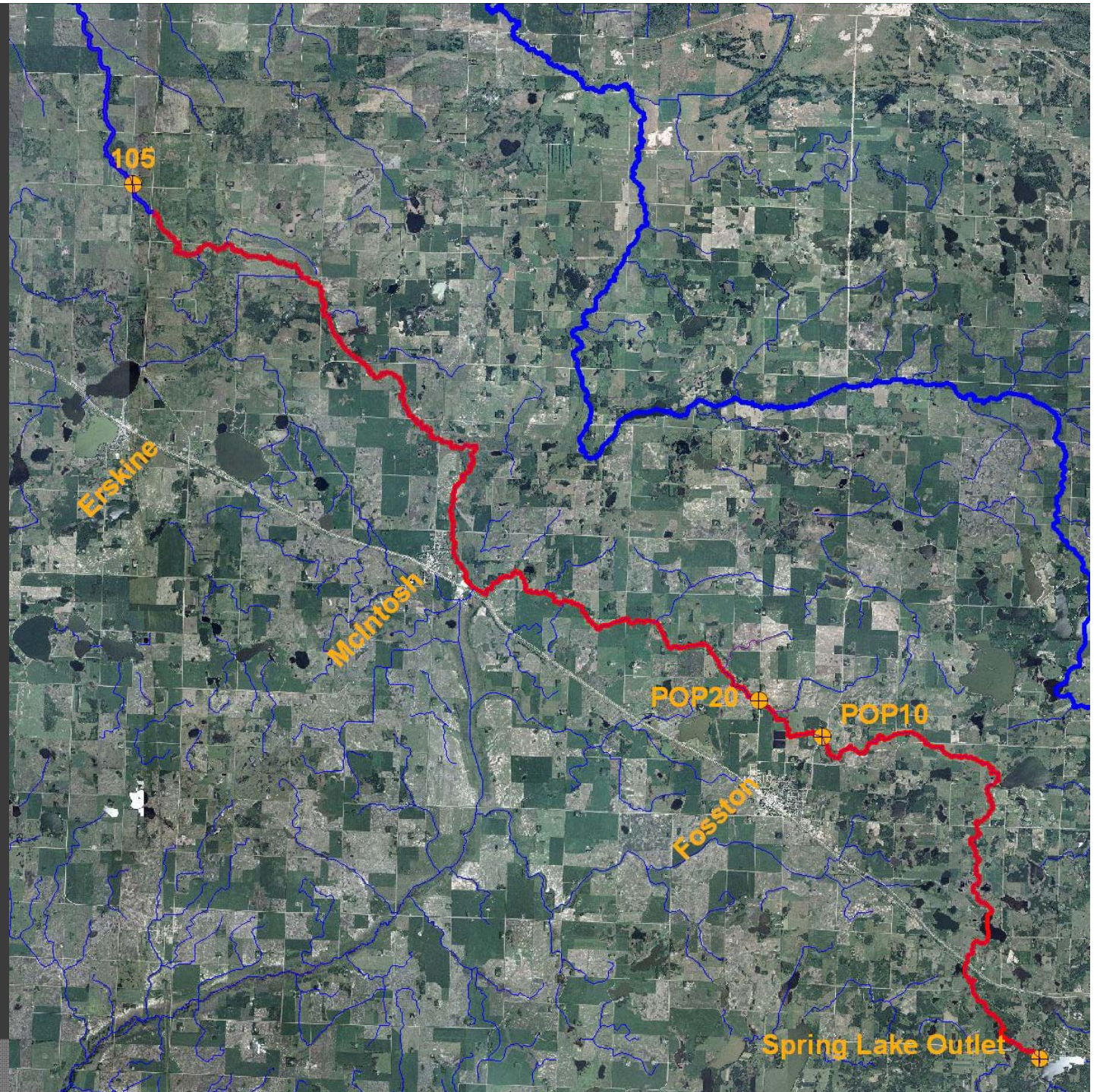
Lost River Sites



Silver Creek Sites



Poplar River Sites



Stakeholder Advisory Meetings

- Clearbrook Community Center
- Agencies, landowners, farmers, counties, cities
- Have met 6 times so far
- Great turnout and support

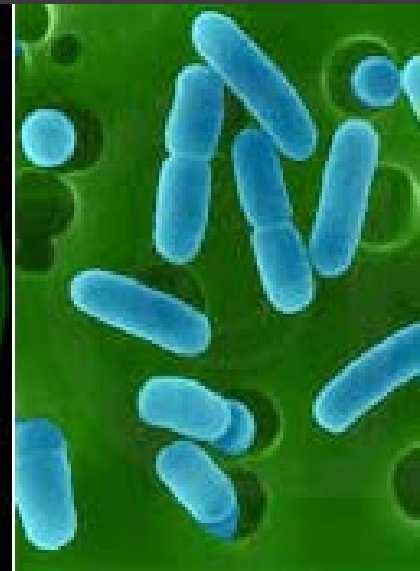
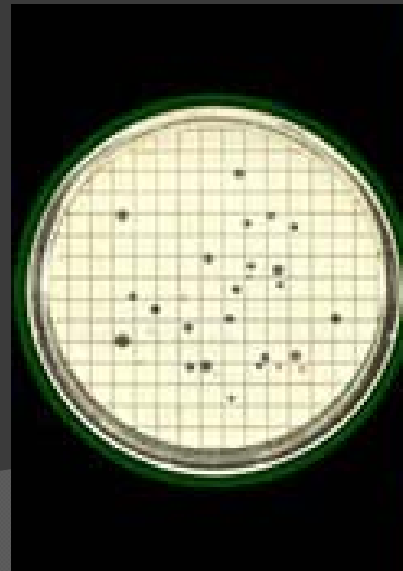
Monitoring Strategies

- Spot Measurements
- Continuous Monitoring
- Samples
- Longitudinal Surveys



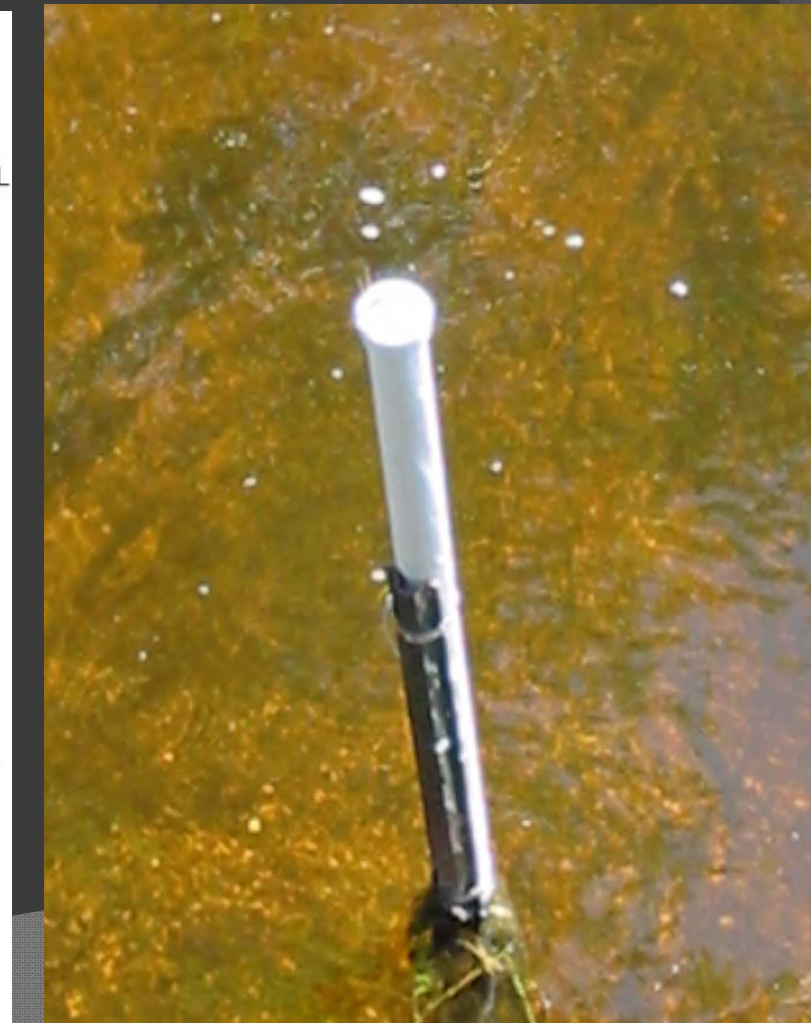
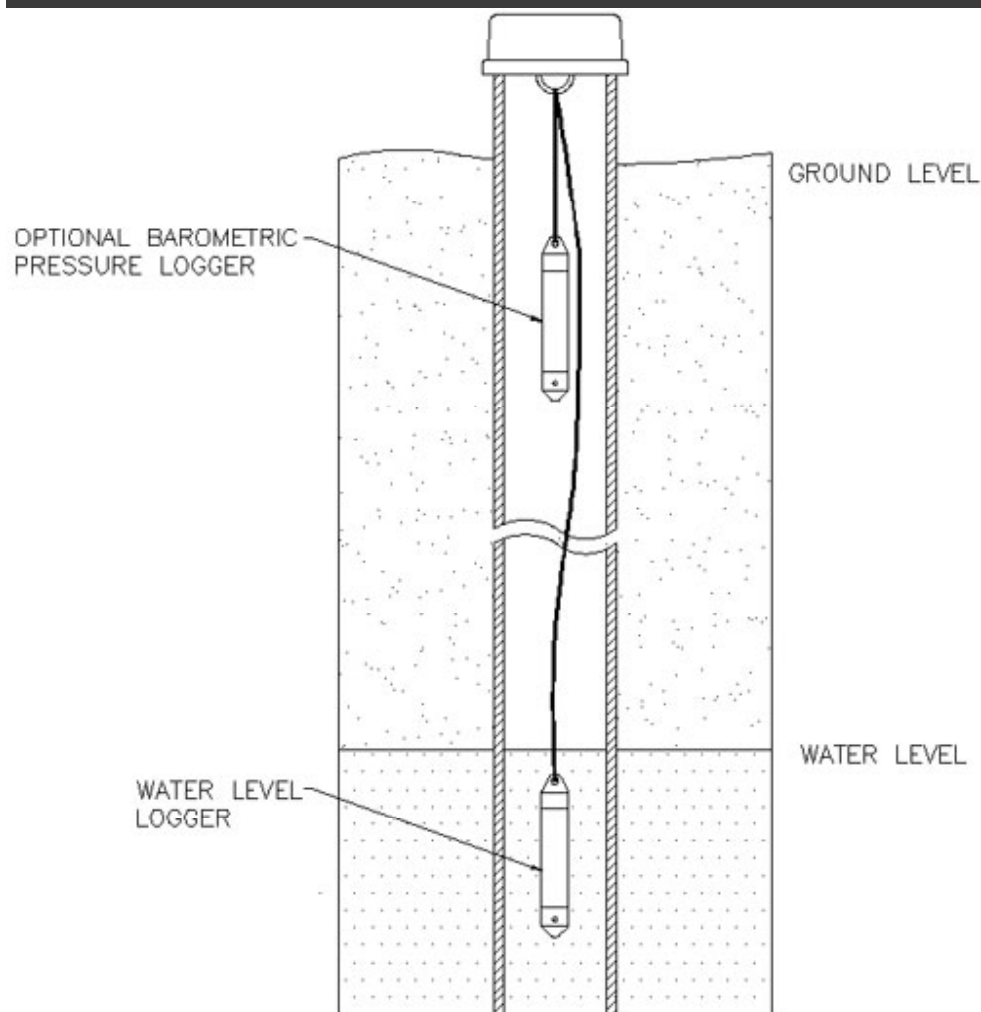
~~Fecal Coliform~~ E. coli Monitoring

- At least 5 samples/month for April – Oct.
- Limited amount of \$ for sample collection
- 2 sites per each of the 3 reaches
- Red Lake/Pennington SWCD Data also



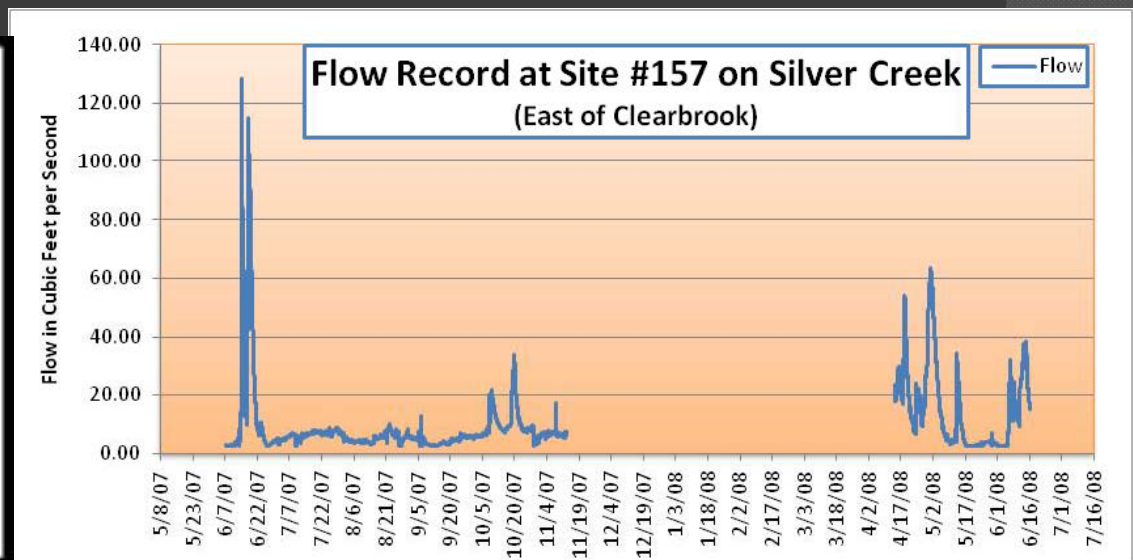
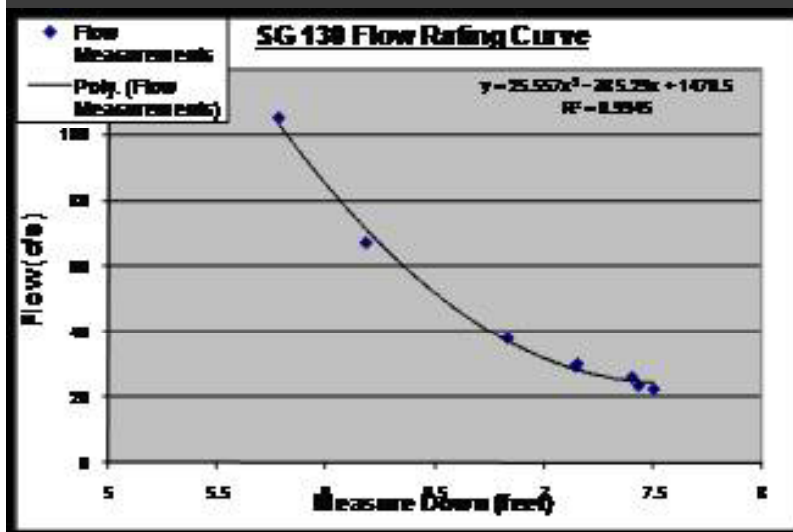
Water Level Monitoring

● HOBO Water Level Loggers



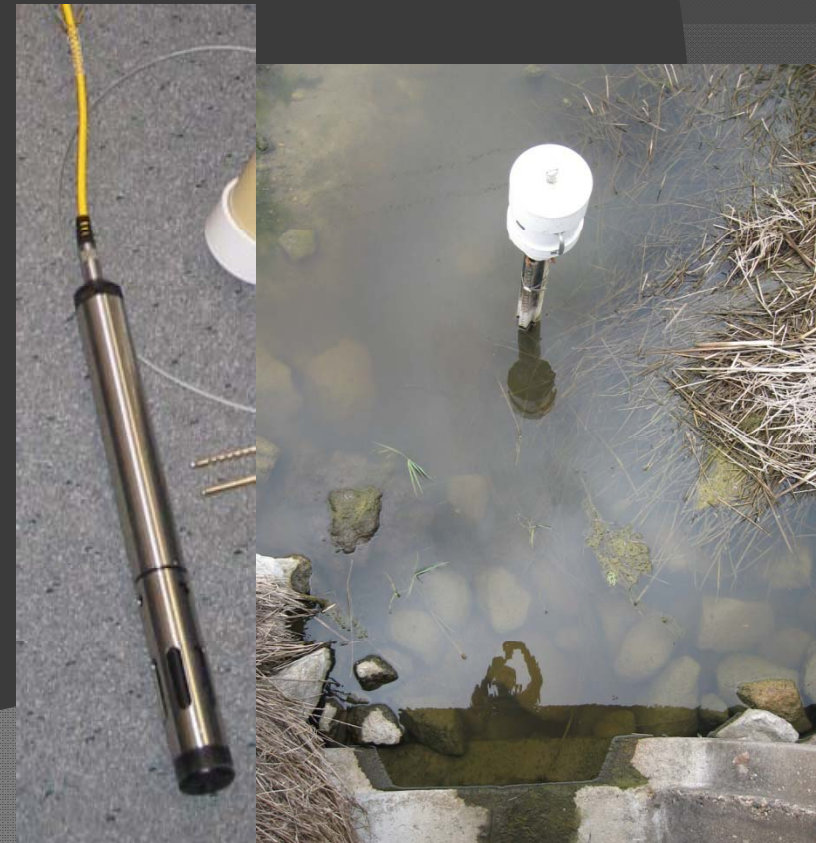
Flow Monitoring

- Continuous water levels at each continuous DO monitoring site and at each E. coli sampling site
- HOBO level loggers, In-Situ TROLL depth sensors
- USGS Gauges where possible
- Rating Curves

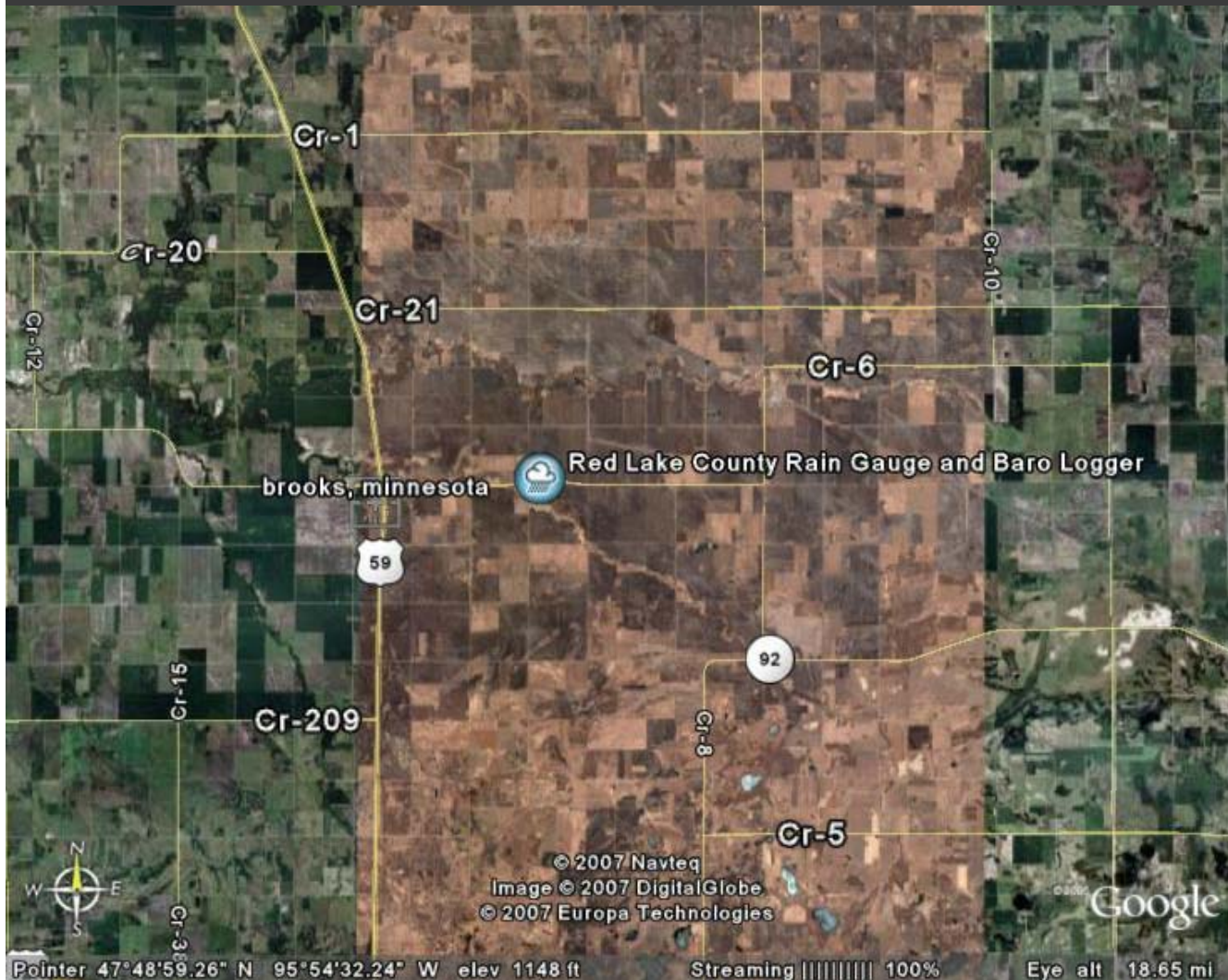


Continuous Dissolved Oxygen

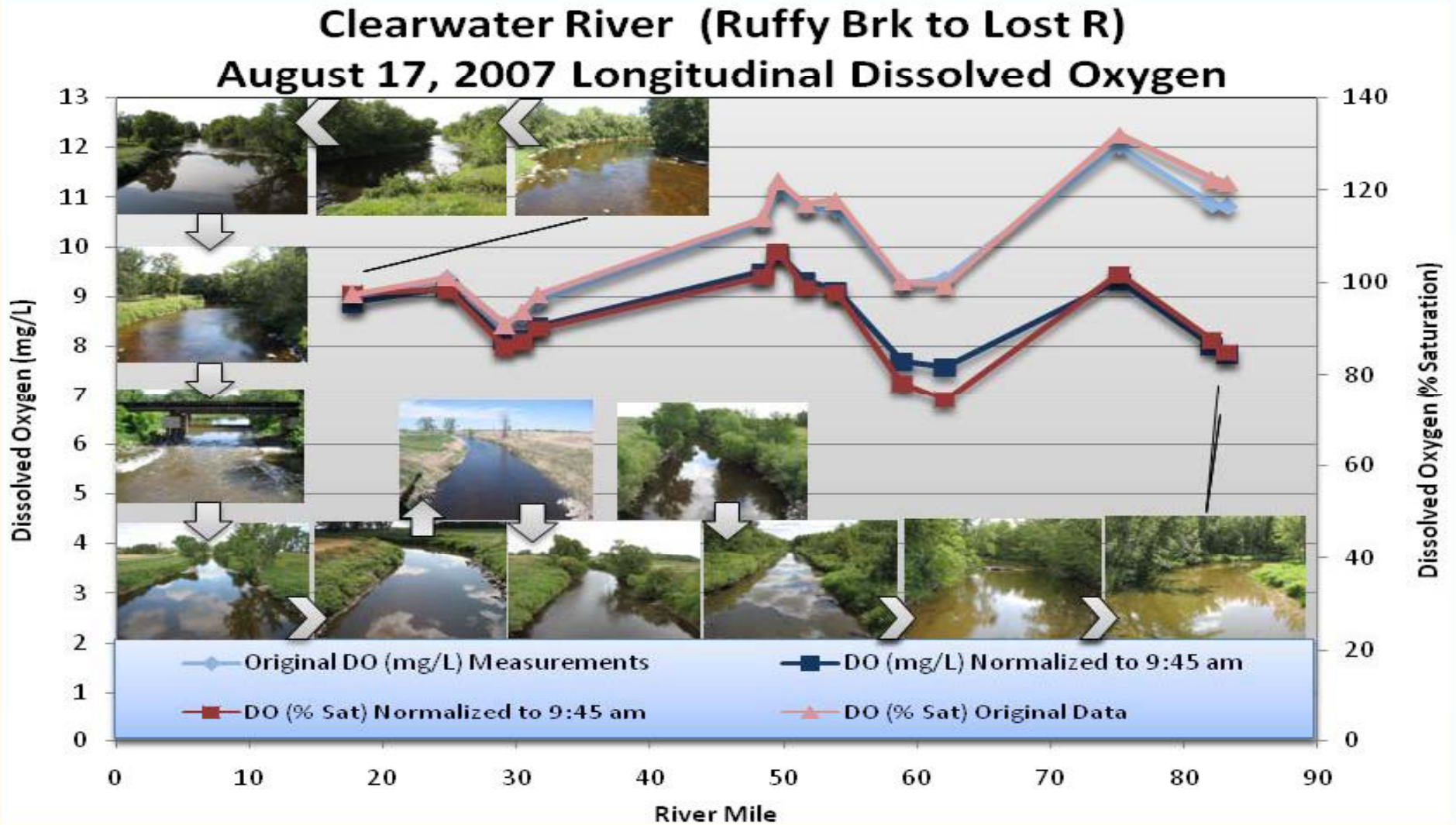
- Eureka Midge Dissolved Oxygen Logger
 - 5 purchased by the MPCA for this project
- In-Situ TROLL 9000 Multiparameter Logging sonde



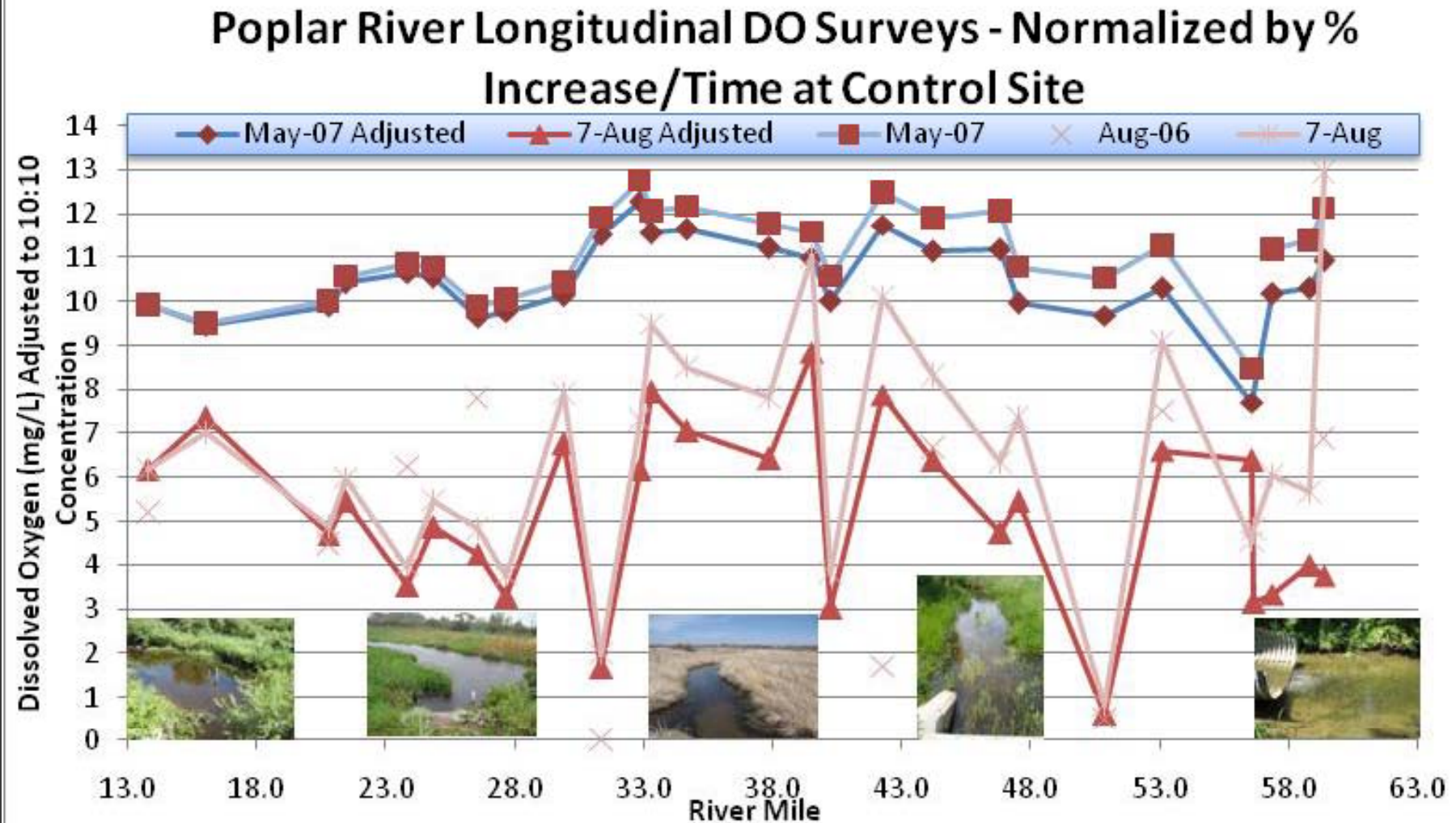
Weather Monitoring



Longitudinal D0 – Clearwater River



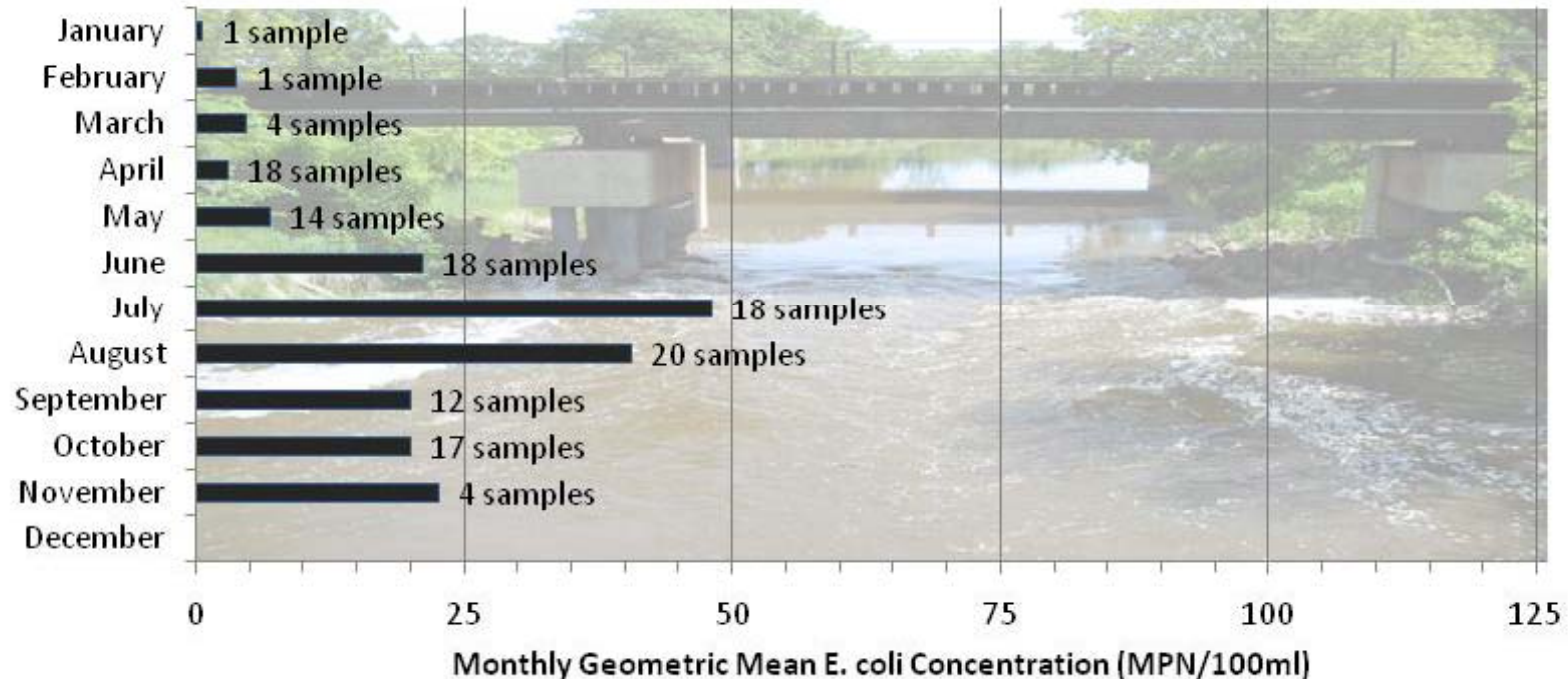
Longitudinal DO – Poplar River



CLEARWATER RIVER E. COLI ASSESSMENT RESULTS

E. coli - Step 1			
Standard	# of Measurements	# of Exceedances	% Exceedance
126 CFU/100ml	127	4	3.1%
1260 CFU/100ml	127	1	0.8%

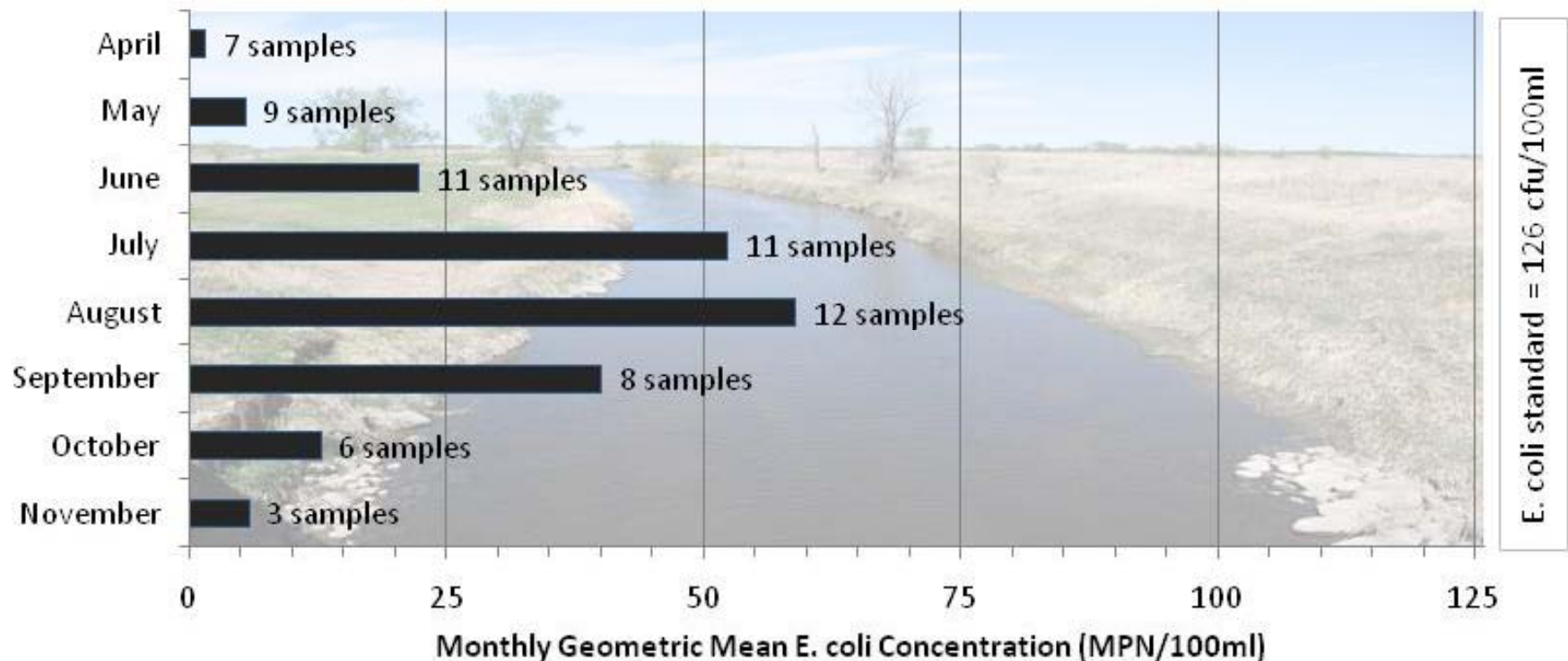
Clearwater River at Plummer USGS Gauge (Site 780) Monthly Geometric Mean E. Coli Concentrations



CLEARWATER RIVER E. COLI ASSESSMENT RESULTS

E. coli - Step 1			
# of Measurements	# of Exceedances	% Exceedance	Standard
67	3	4%	126 CFU/100ml
67	1	1%	1260 CFU/100ml

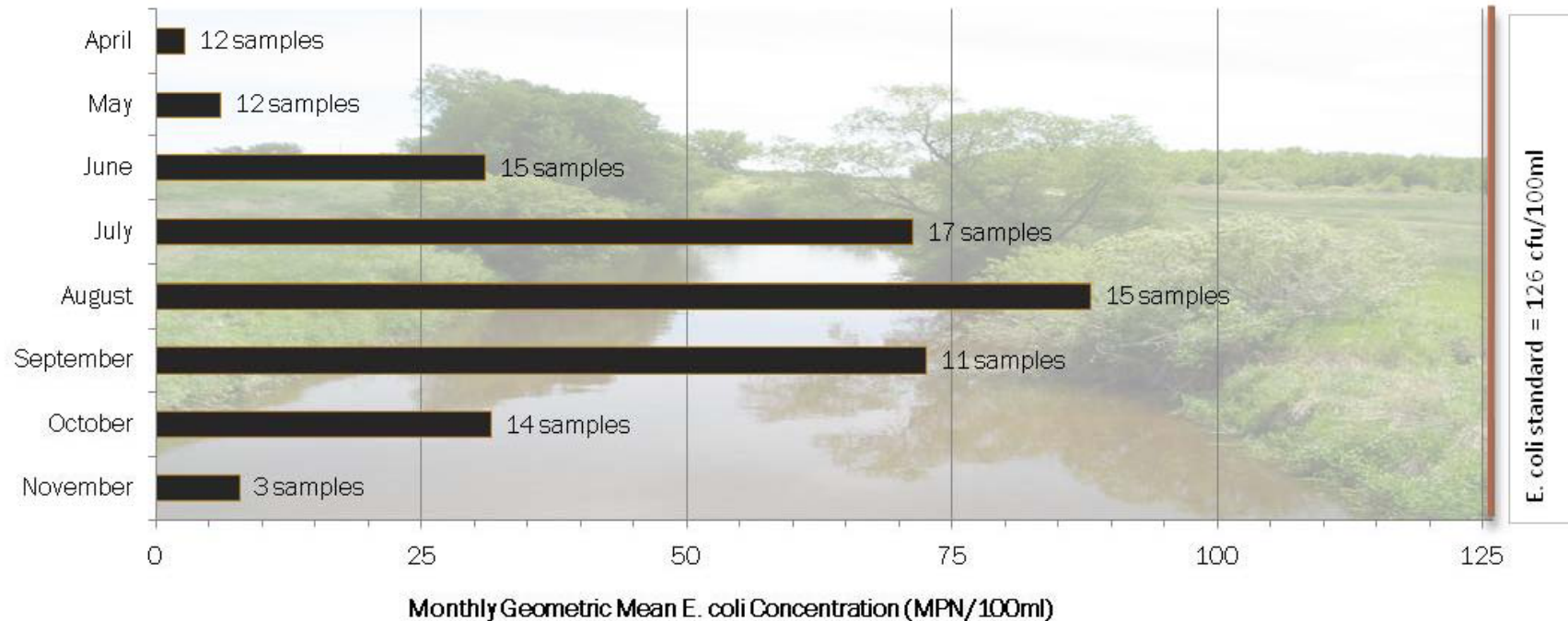
Clearwater River at the Roland Bridge (CSAH 10) Monthly Geometric Mean E. Coli Concentrations



CLEARWATER RIVER E. COLI ASSESSMENT RESULTS

E. coli - Step 1			
# of Measurements	# of Exceedances	% Exceedance	Standard
102	10	9.8%	126 CFU/100ml
102	0	0.0%	1260 CFU/100ml

Clearwater River at the Trail Road (260th St NE, Site # 37) Monthly Geometric Mean E. Coli Concentrations

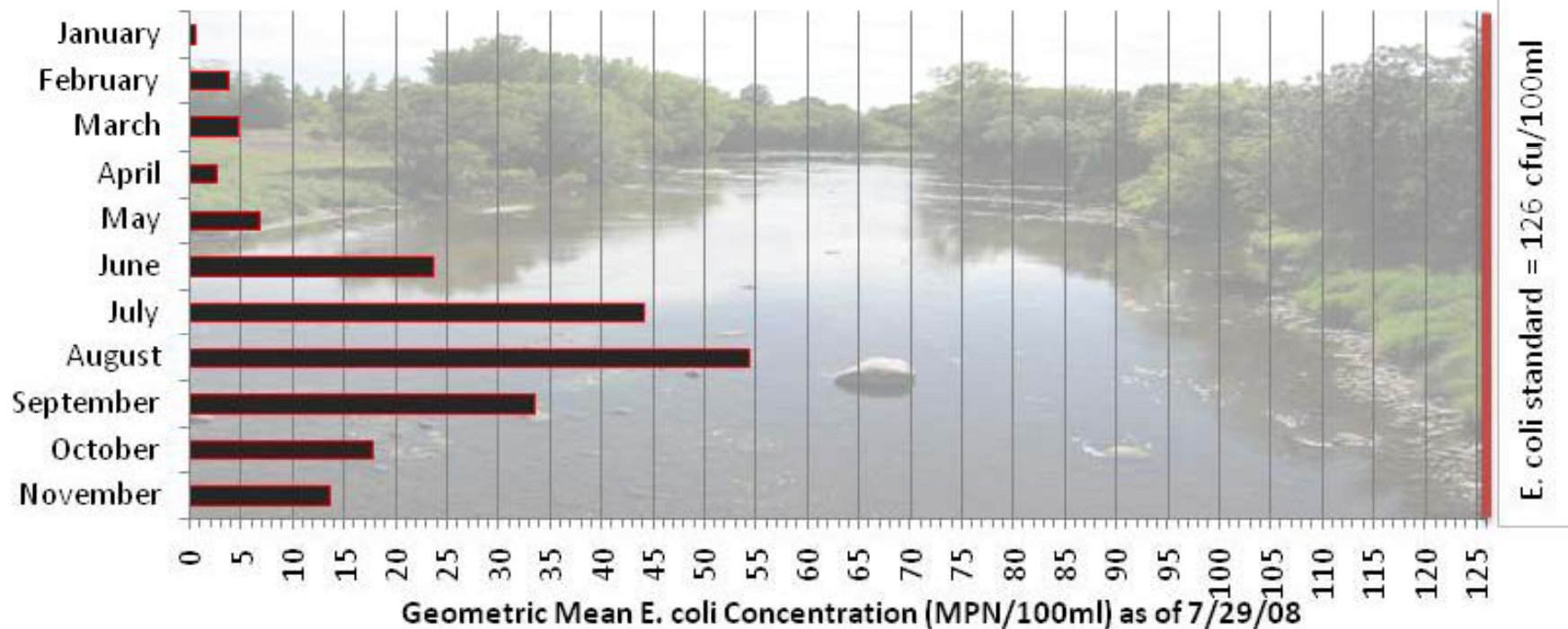


CLEARWATER RIVER E. COLI ASSESSMENT RESULTS

E. coli - Step 1			
# of Days Sampled	# of Exceedances	% Exceedance	Standard
154	8	5.2%	126 CFU/100ml
154	0	0.0%	1260 CFU/100ml

Clearwater River E. Coli GeoMeans

Ruffy Brook to the Lost River

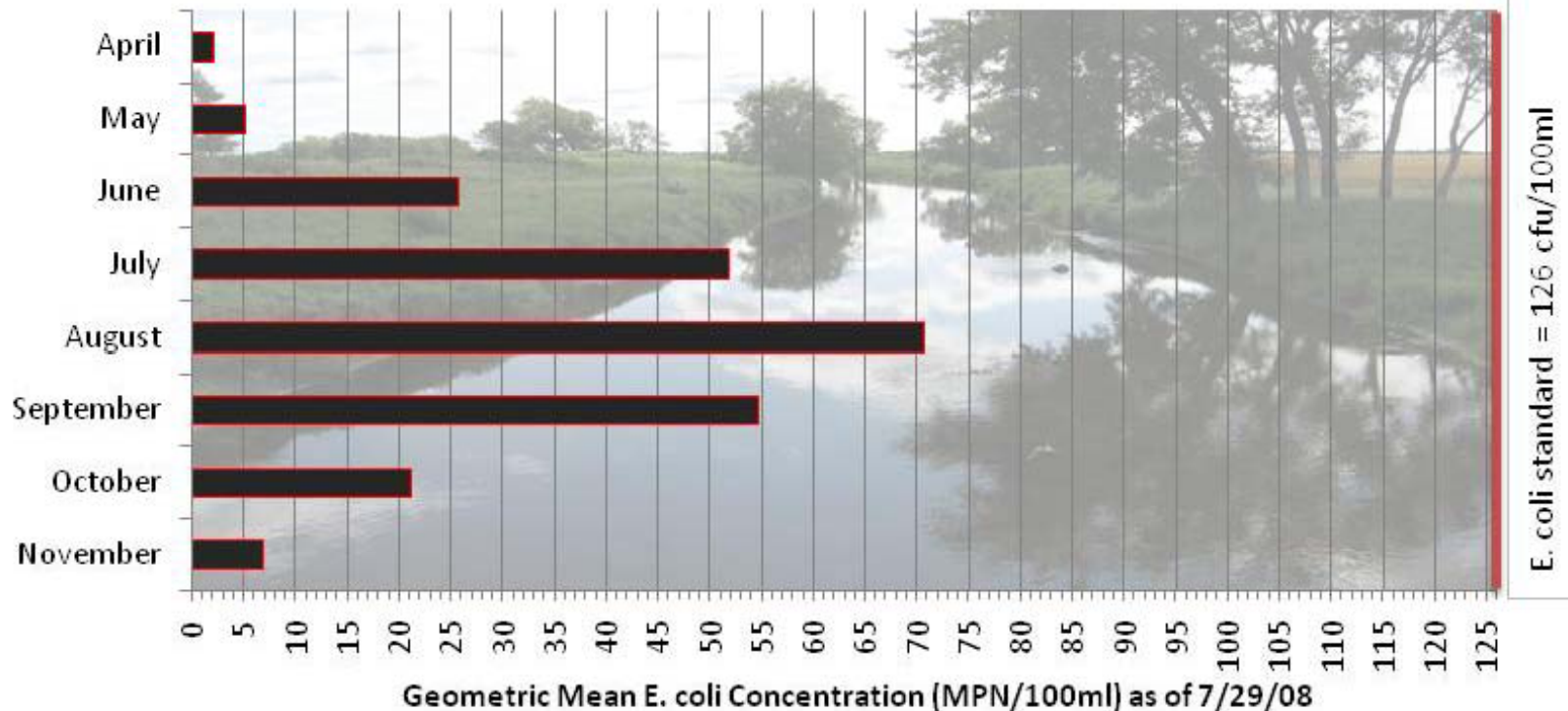


CLEARWATER RIVER E. COLI ASSESSMENT RESULTS

E. coli - Step 1			
# of Days Sampled	# of Exceedances	% Exceedance	Standard
118	10	8.5%	126 CFU/100ml
118	1	0.8%	1260 CFU/100ml

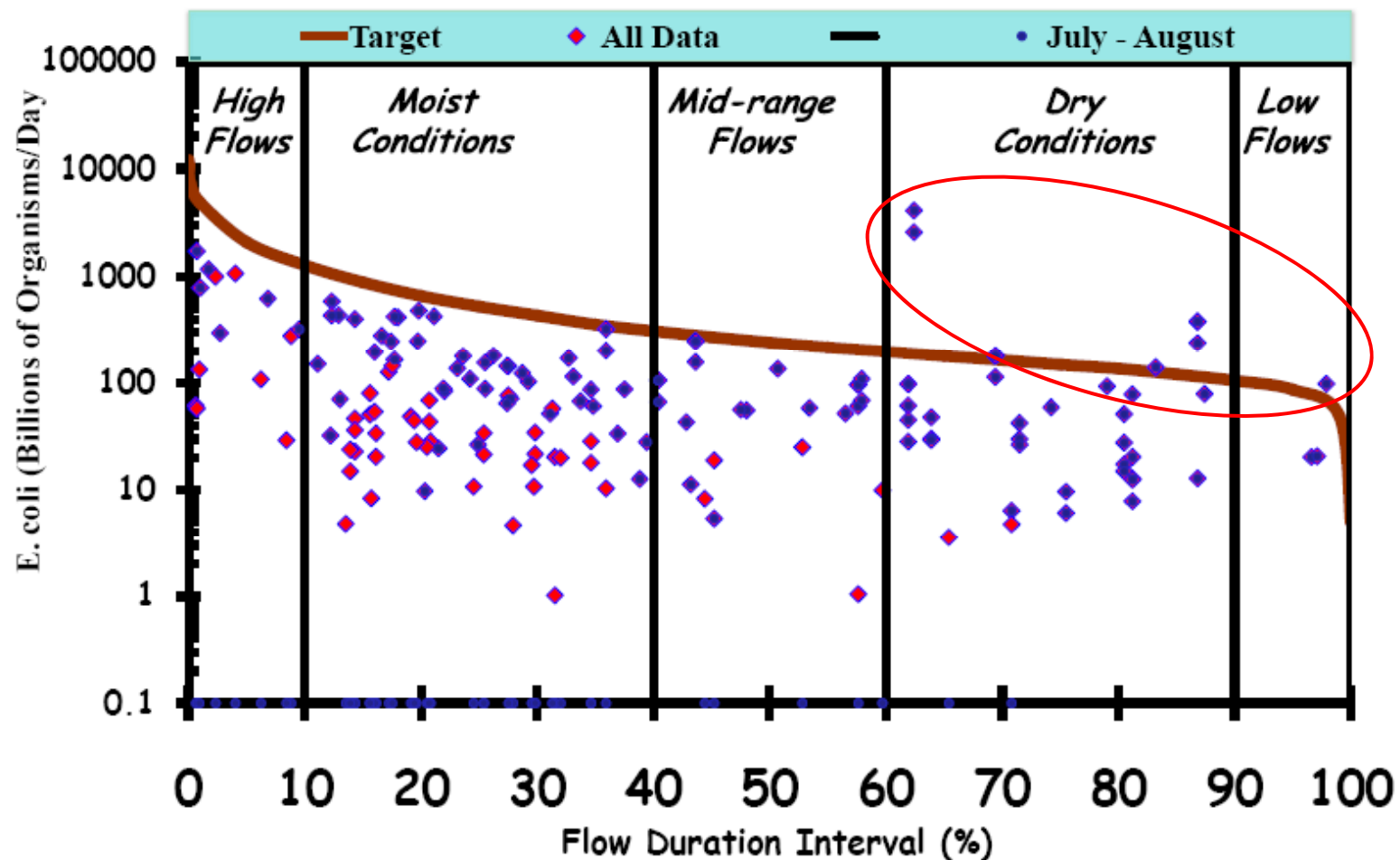
Channelized Clearwater River E. Coli GeoMeans

Roland Bridge and Trail Road Monitoring Sites



CLEARWATER RIVER E. COLI

Clearwater River at Plummer
Load Duration Curve (1998 - 2008 Monitoring Data)
Site: 05078000

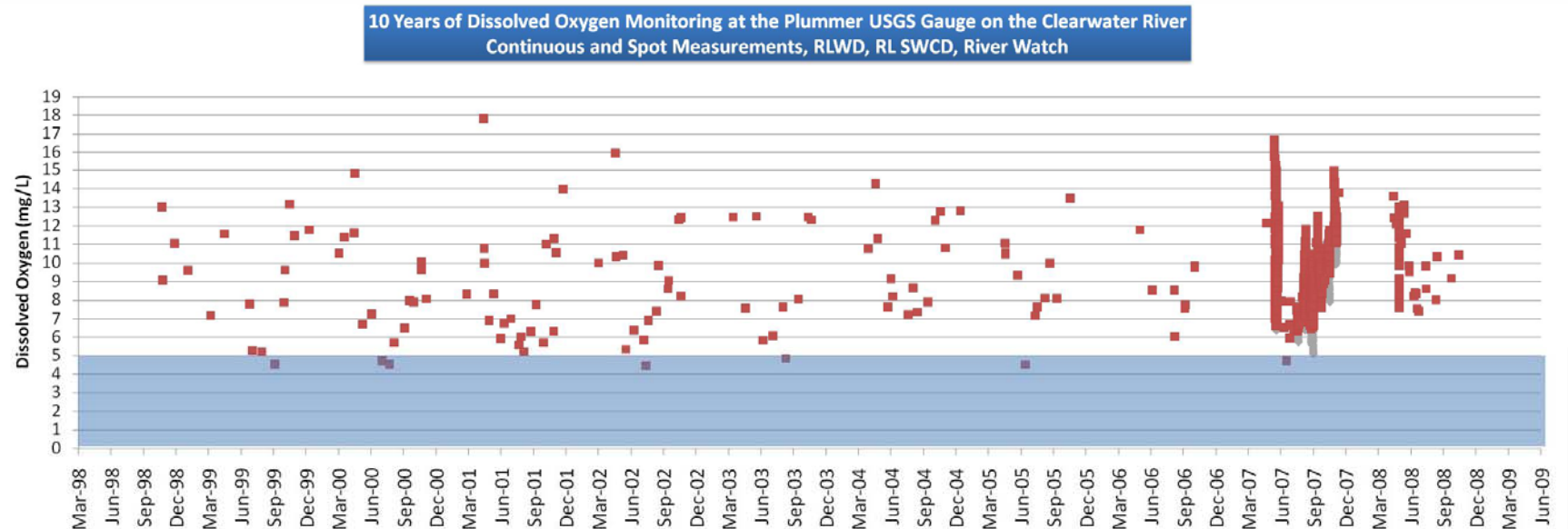


IDEM Data & USGS Gage Duration Interval

555 square miles

Clearwater River Low Dissolved Oxygen Assessment Results

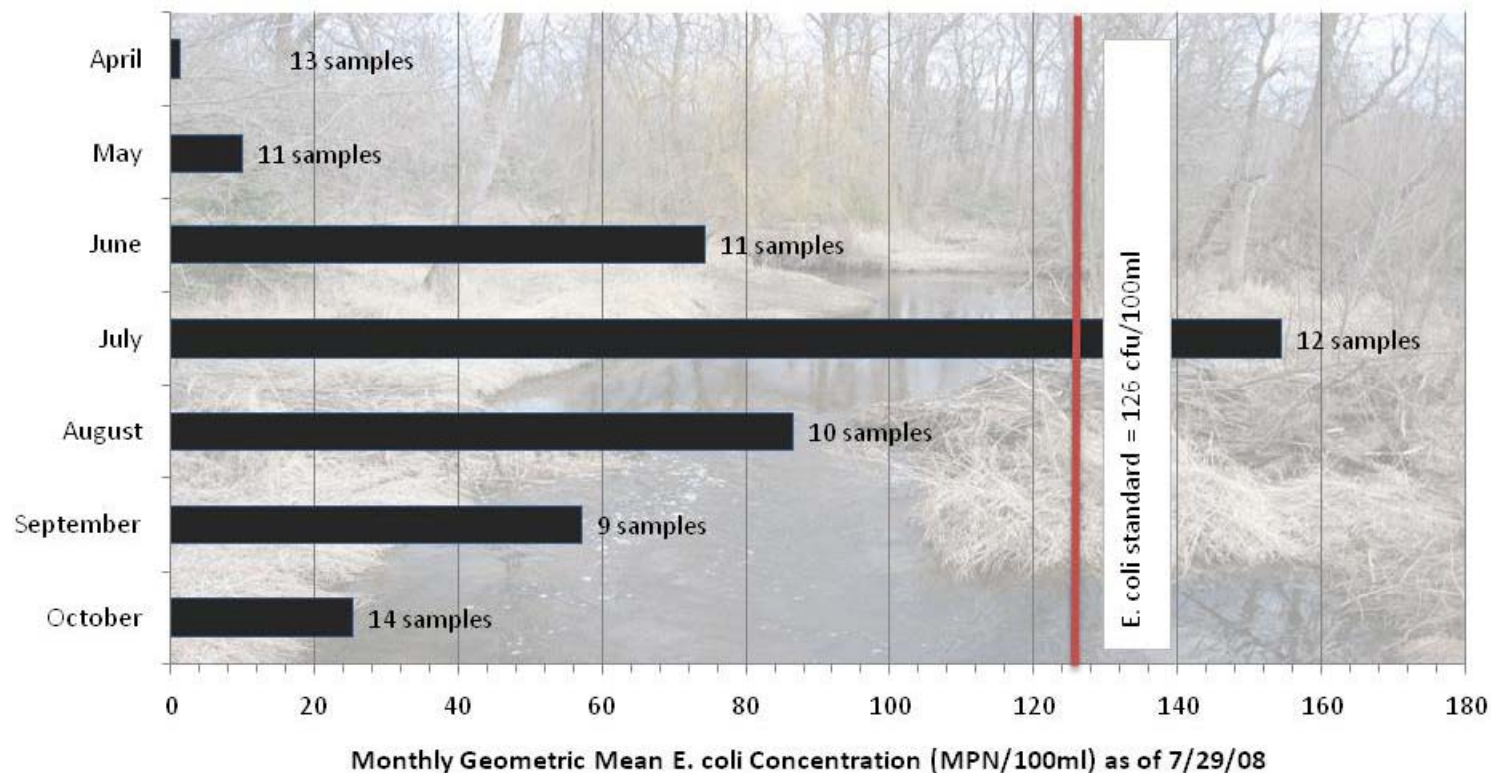
- Entire reach, all sites
 - 5.1% of Daily Minimums are below the 5mg/L
- Sites 21 and 37 in the channelized reach
 - 12.5% and 3.81% of daily minimums are below 5 mg/L, respectively



Silver Creek E. coli Assessment Results

E. coli - Step 1			
# of Measurements	# of Exceedances	% Exceedance	Standard
91	19	21%	126 CFU/100ml
91	2	2%	1260 CFU/100ml

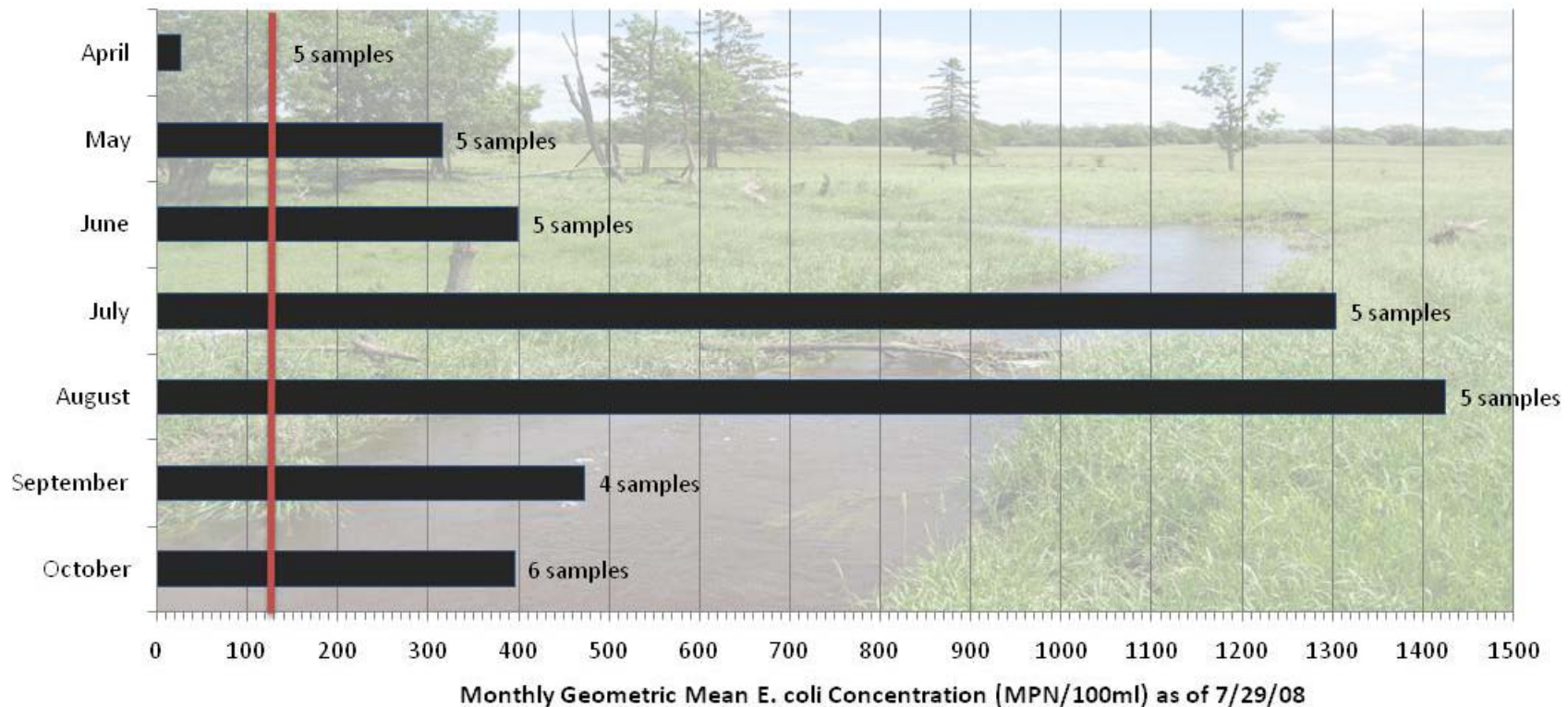
Silver Creek at CR111 (Site #81)
Monthly Geometric Mean E. Coli Concentrations



Silver Creek E. coli Assessment Results

E. coli - Step 1			
# of Measurements	# of Exceedances	% Exceedance	Standard
35	28	80%	126 CFU/100ml
35	7	20%	1260 CFU/100ml

Silver Creek East of Clearbrook (Site 157)
Monthly Geometric Mean E. coli Concentrations

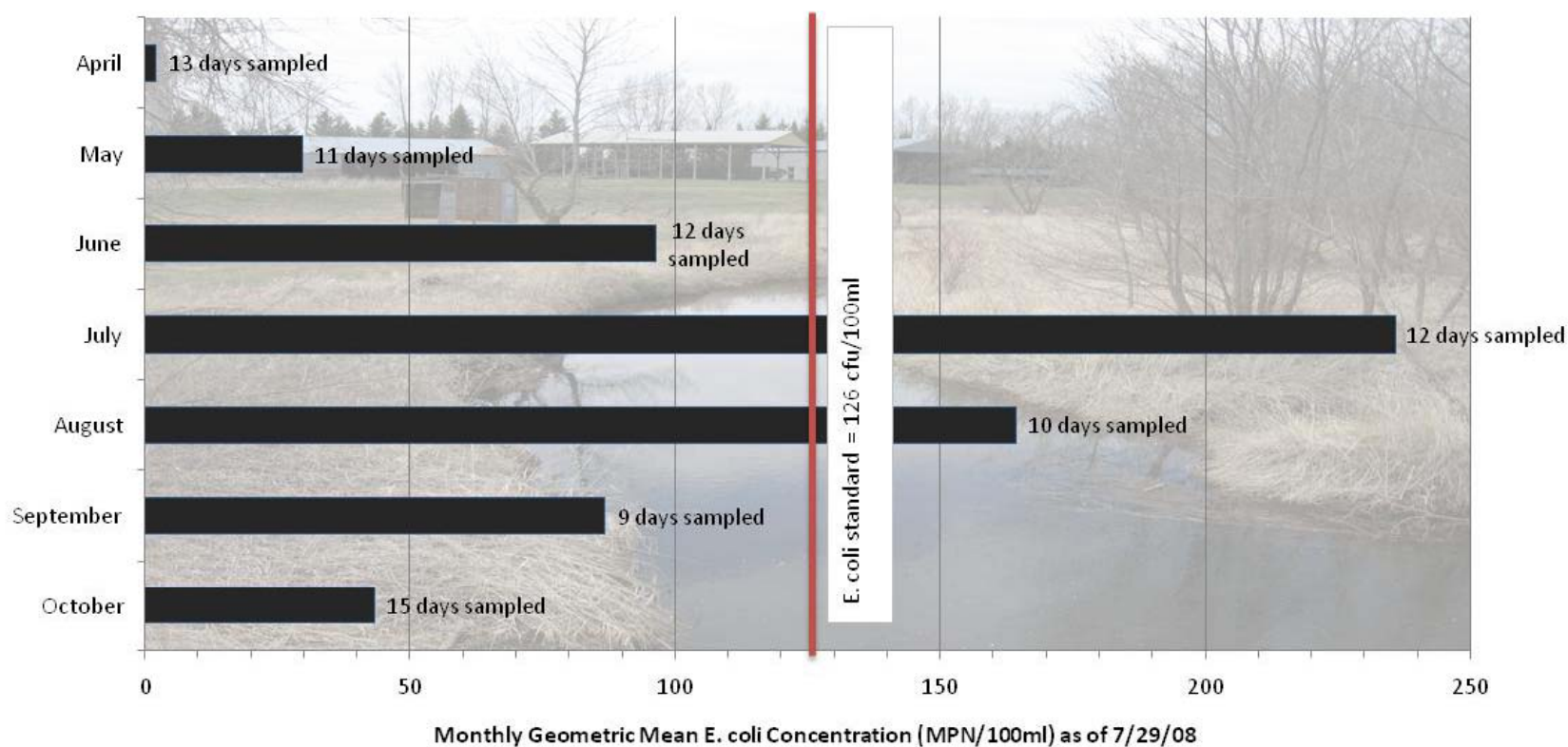


E. coli standard = 126 cfu/100ml

Silver Creek E. coli Assessment Results

E. coli - Step 1			
# of Days	# of Exceedances	% Exceedance	Standard
93	29	31.2%	126 CFU/100ml
93	1	1.1%	1260 CFU/100ml

Silver Creek - Combined
Monthly Geometric Mean E. Coli Concentrations

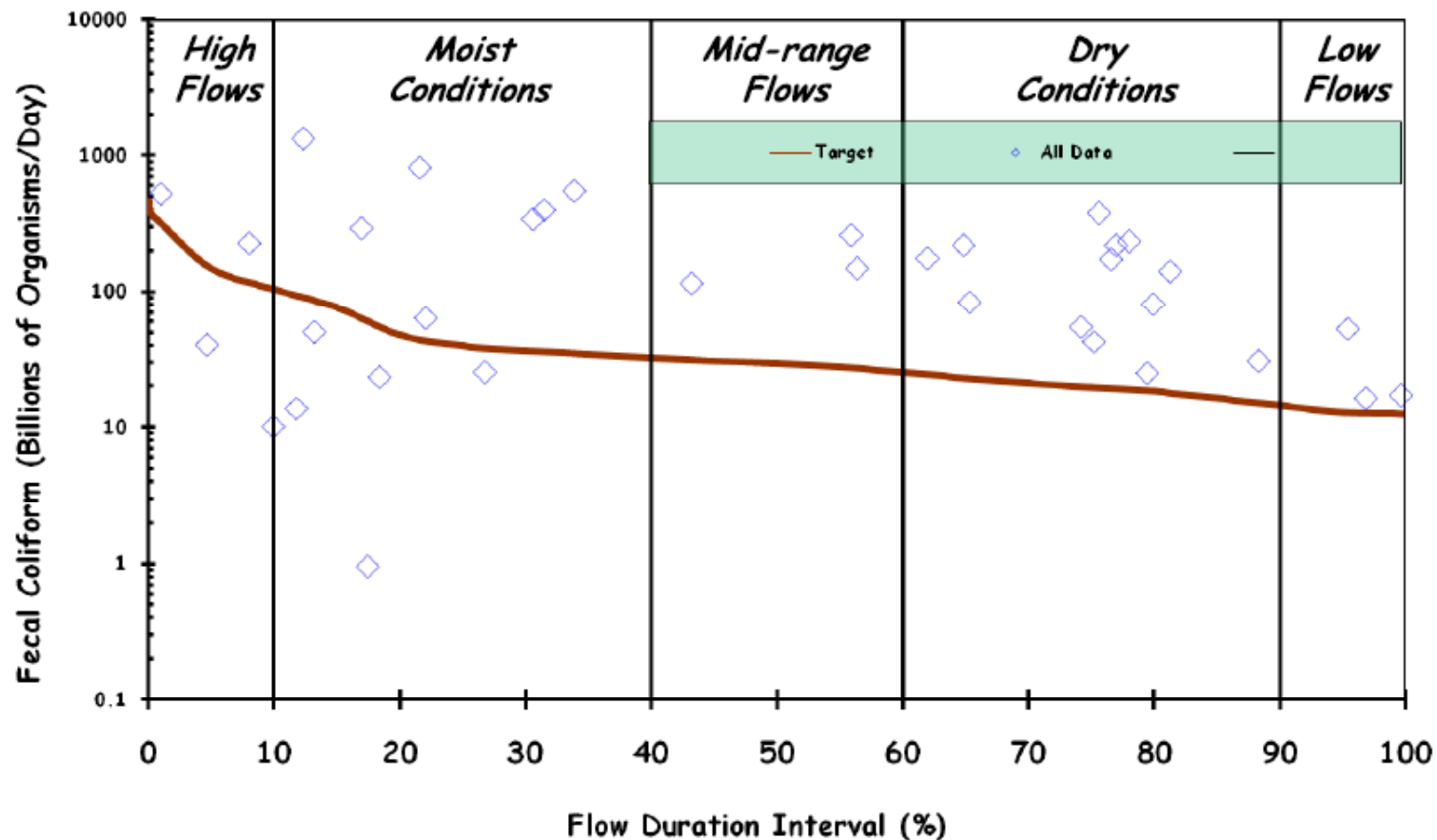


Silver Creek E. COLI LOAD DURATION

Silver Creek West of Clearbrook, MN

Load Duration Curve (2007 - 2008 Monitoring Data)

RLWD Stream Gauge # 157

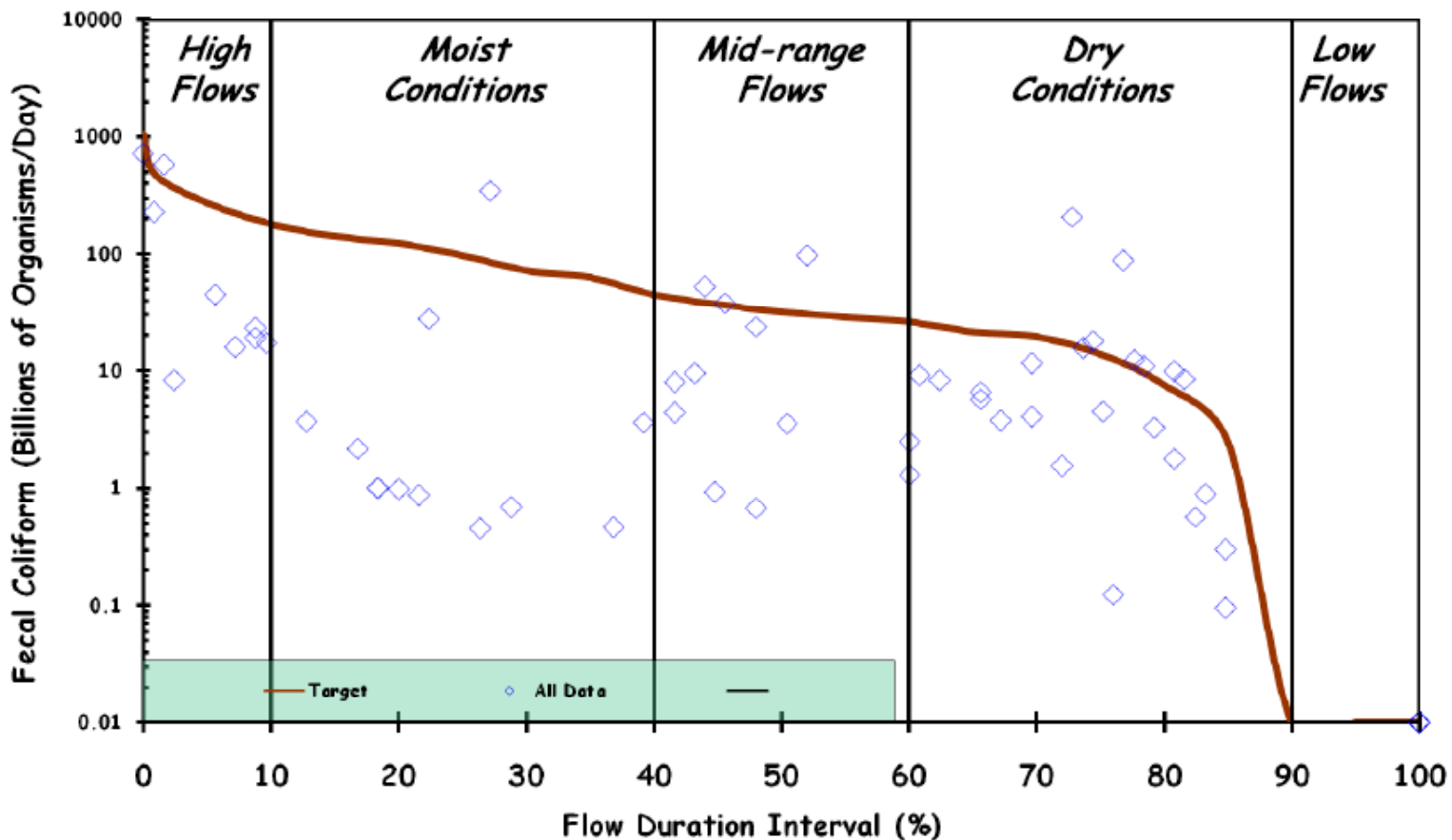


Silver Creek E. coli Load Duration

Silver Creek at CR111 NE of Gonvick, MN

Load Duration Curve (2002 - 2008 Monitoring Data)

RLWD Water Quality Monitoring Site #81

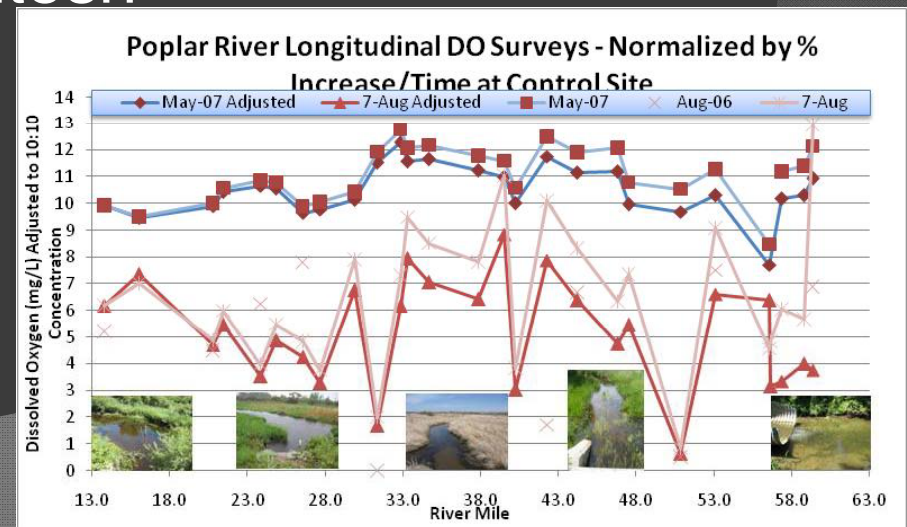


RLWD Water Quality and Flow Data

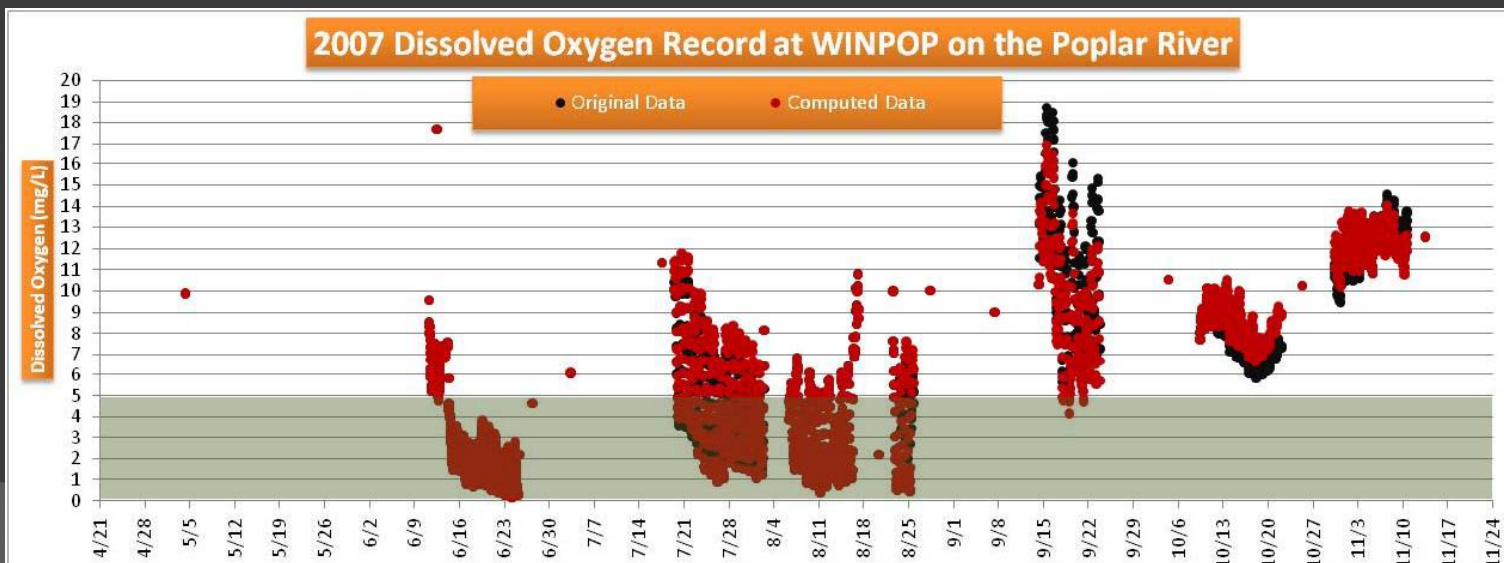
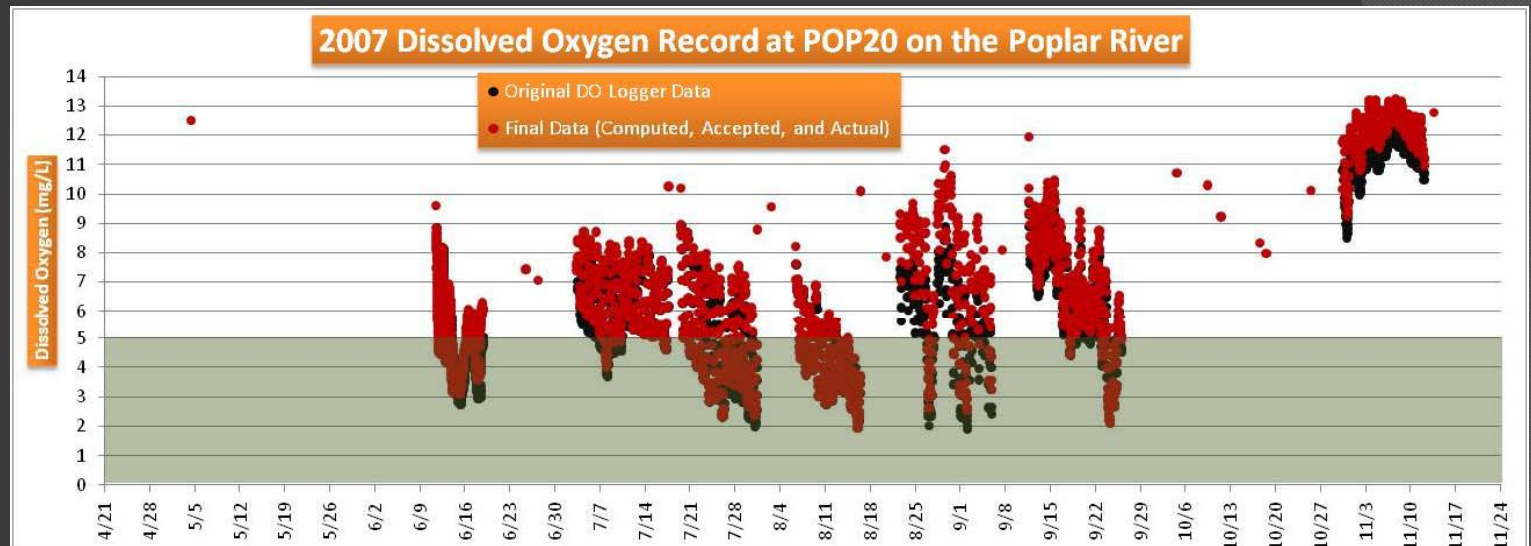
34.3 square miles

Poplar River Low Dissolved Oxygen Assessment Results

- Rate at which daily minimums fail to meet the 5 mg/L standard increases from upstream to downstream
 - 11% at Spring Lake
 - 40% downstream of Fosston
 - 47% downstream of McIntosh
 - 53% near Highway 59



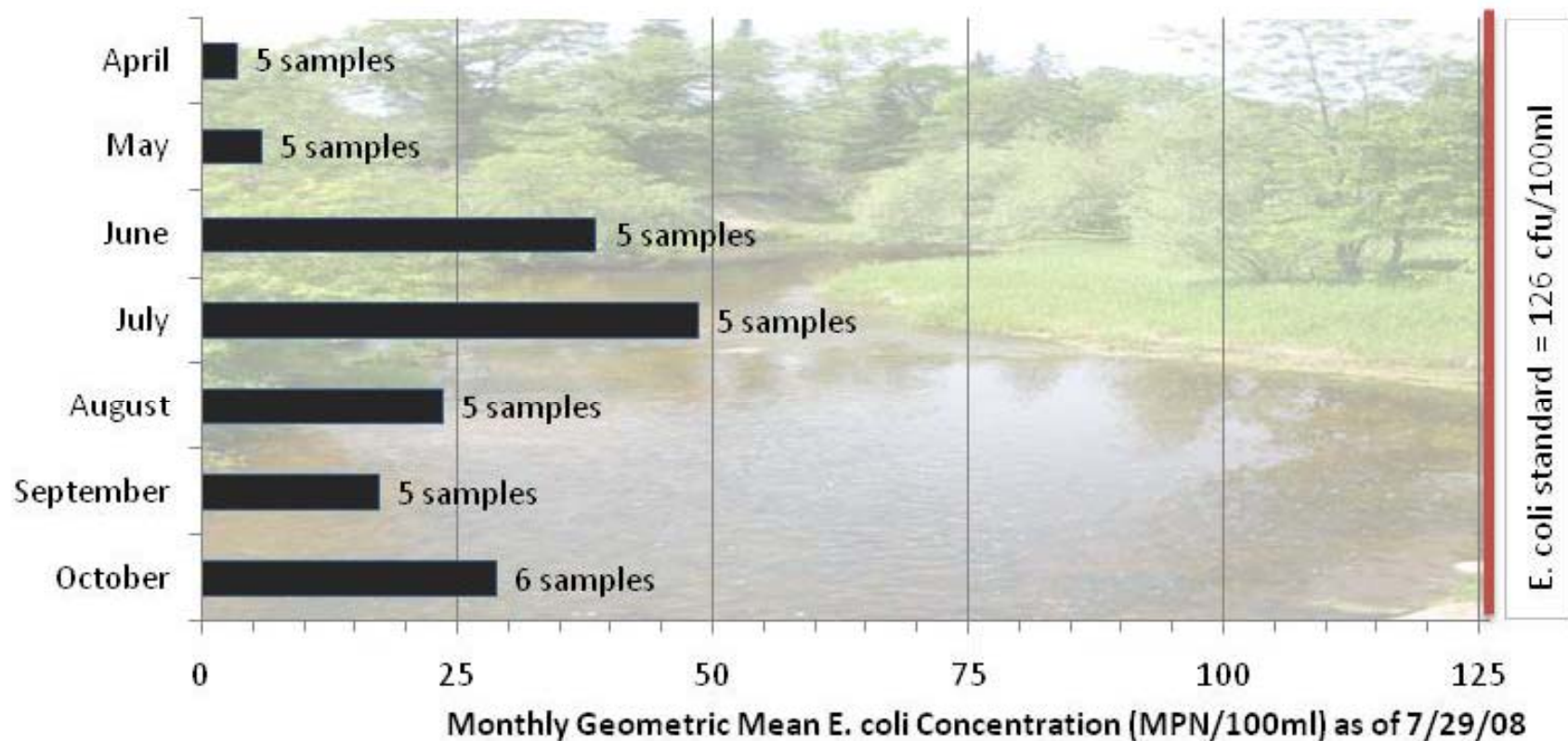
Poplar River Low Dissolved Oxygen Assessment Results



Lost River E. coli Assessment Results

E. coli - Step 1			
# of Days Samp	# of Exceedances	% Exceedance	Standard
36	2	6%	126 CFU/100ml
36	0	0%	1260 CFU/100ml

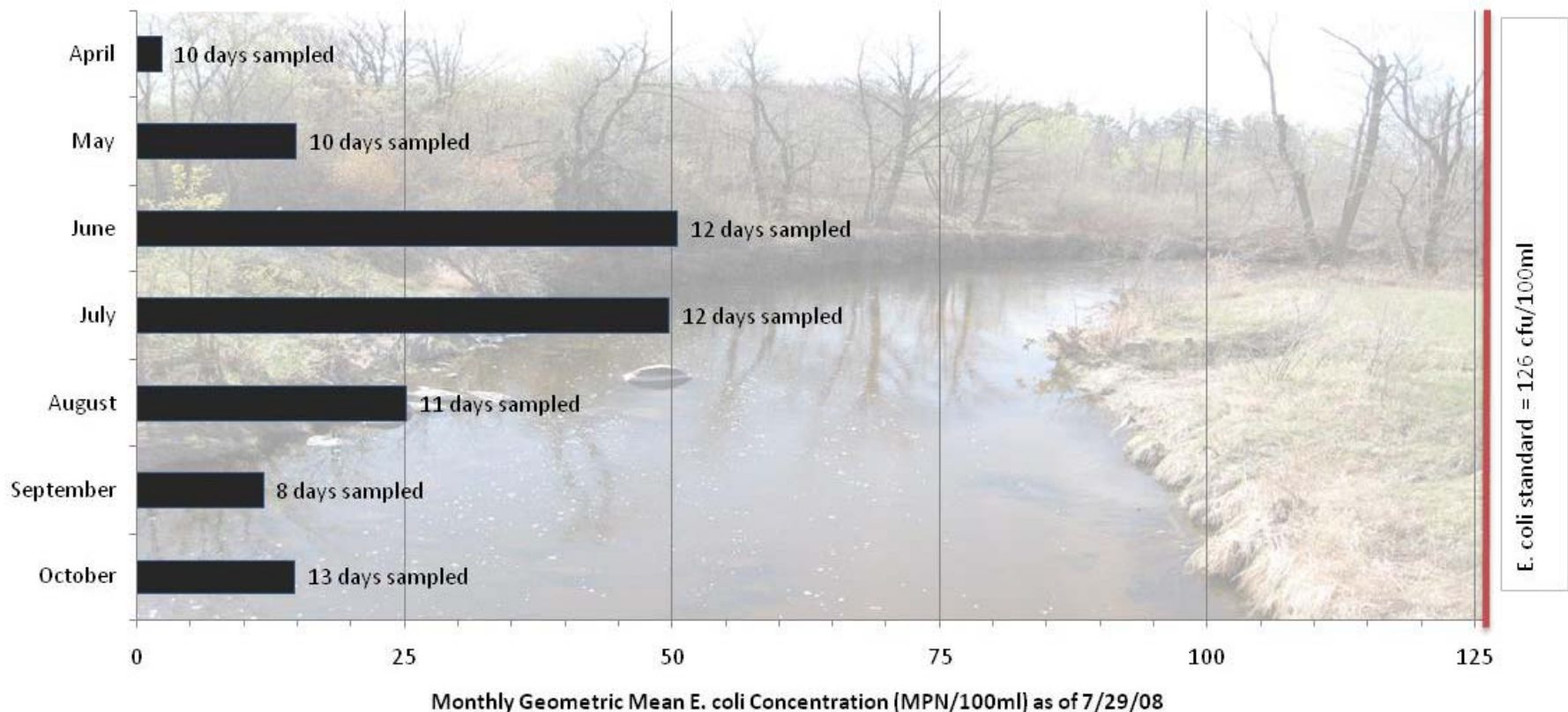
Lost River at CSAH 7 North of Gonvick Monthly Geometric Mean E. Coli Concentrations



Lost River E. coli Assessment Results

E. coli - Step 1			
# of Measurements	# of Exceedances	% Exceedance	Standard
86	7	8.1%	126 CFU/100ml
86	0	0.0%	1260 CFU/100ml

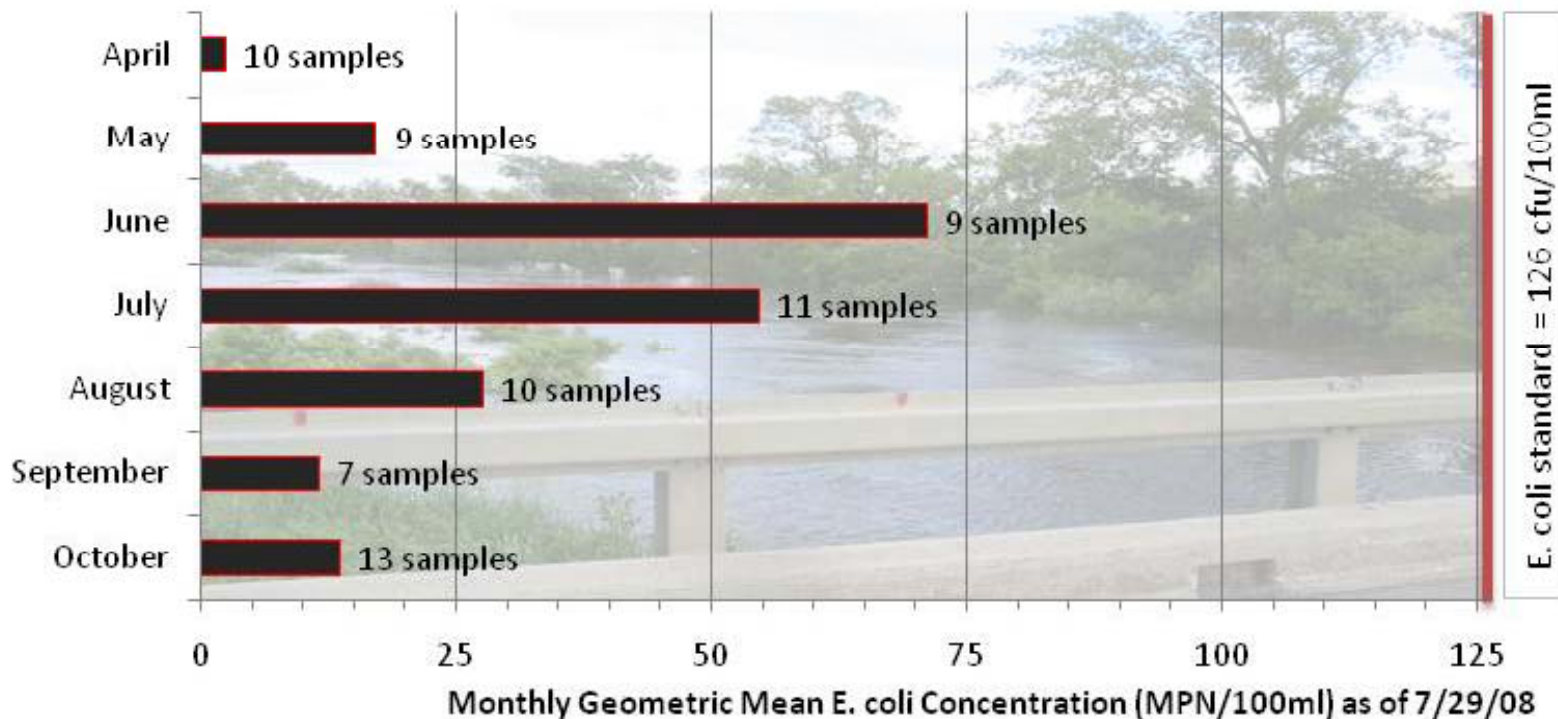
Lost River Monthly Geometric Mean E. Coli Concentrations



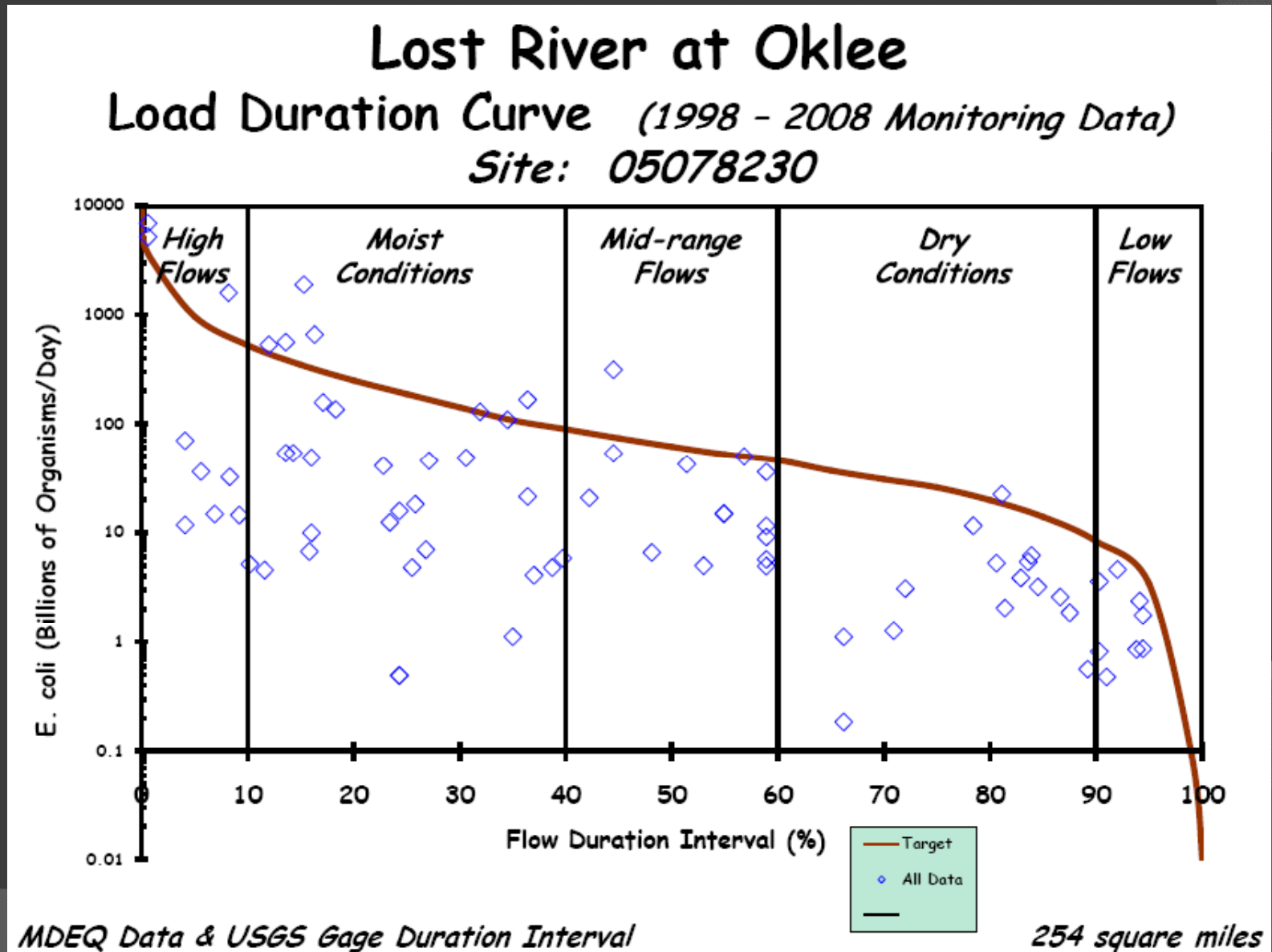
Lost River E. coli Assessment Results

E. coli - Step 1			
# of Measurements	# of Exceedances	% Exceedance	
77	8	10%	
77	0	0%	

Lost River at Oklee USGS Gauge (Site #782) Monthly Geometric Mean E. Coli Concentrations

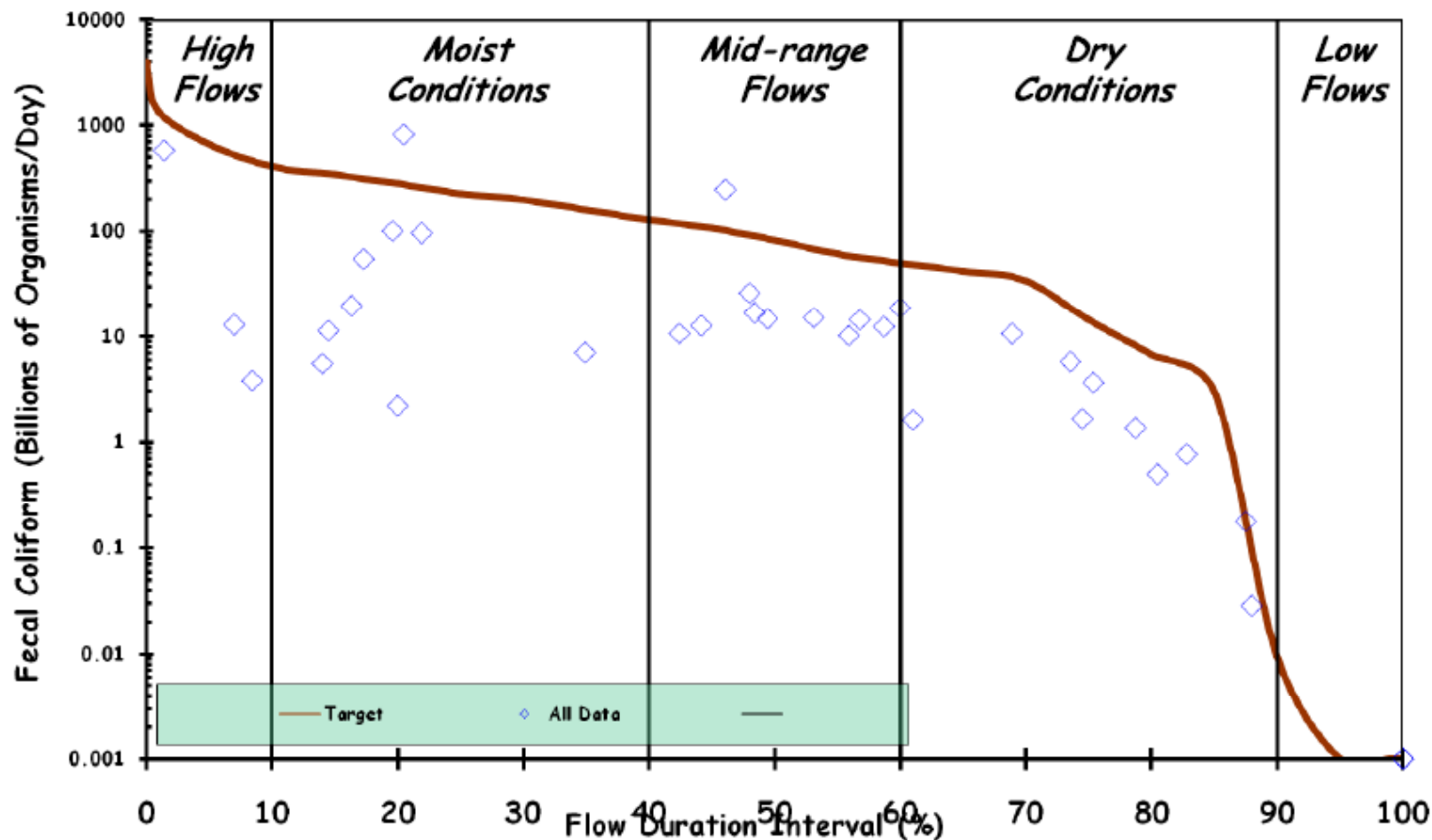


Lost River E. COLI LOAD DURATION CURVE



Lost River E. COLI LOAD DURATION CURVE

Lost River at CR7, North of Gonvick, MN Load Duration Curve (2007 - 2008 Monitoring Data) RLWD Monitoring Site #51

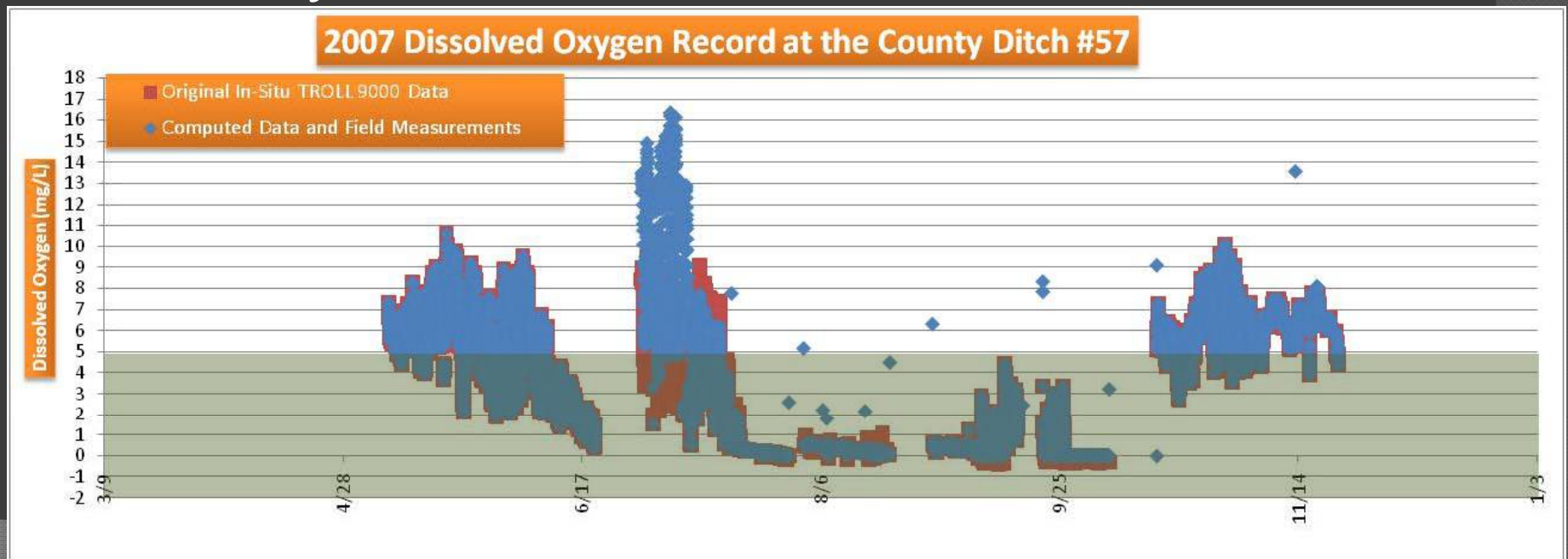


RLWD Water Quality and Flow Data

105.7 square miles

County Ditch 57 Low Dissolved Oxygen

- 78.74% of daily minimums fail to meet the 5 mg/L standard
- Should a road ditch meet warm water fishery standards?

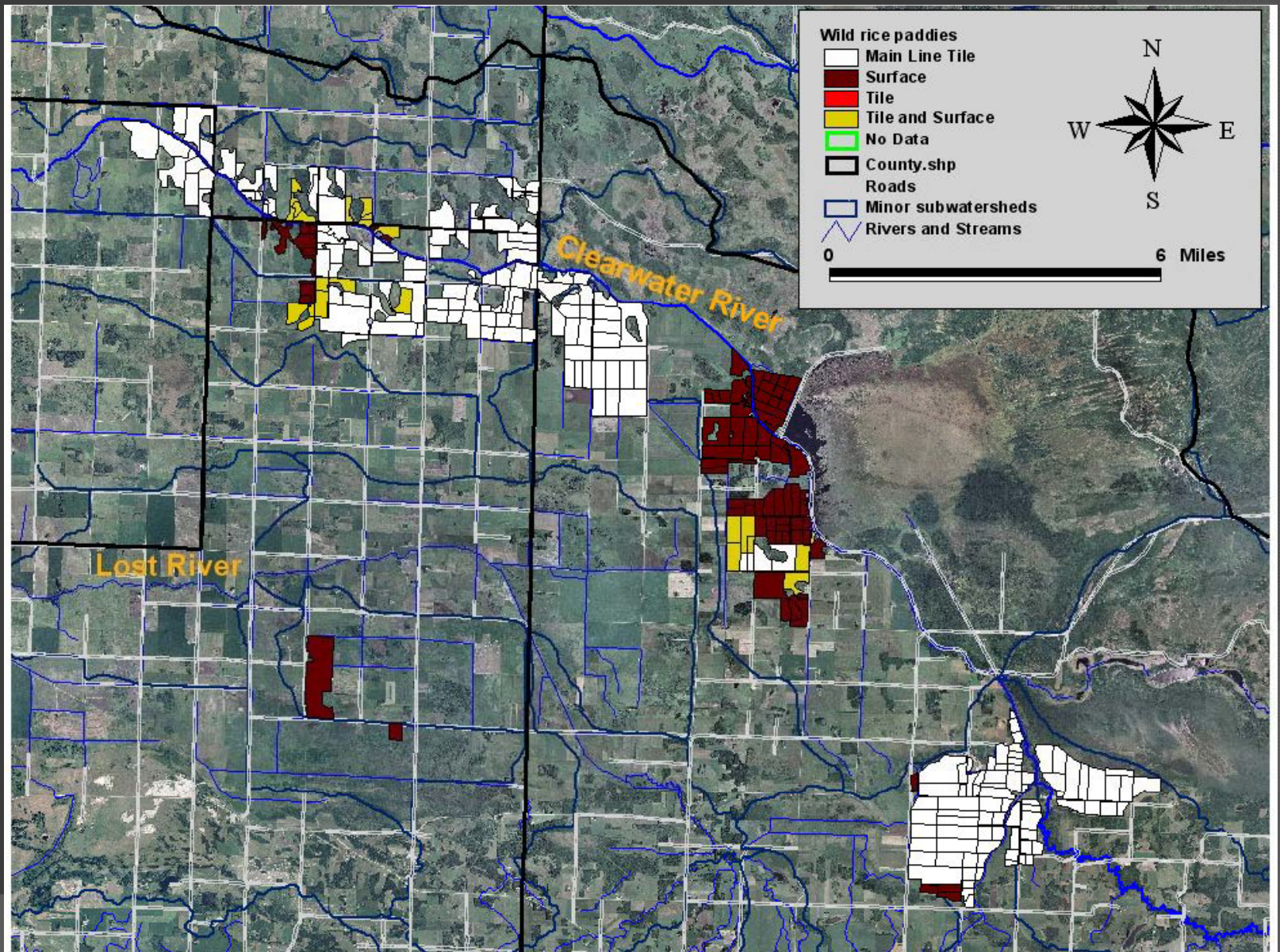


Address Lack of Shade

- Implement/Improve Riparian Buffers



Wild Rice Paddies

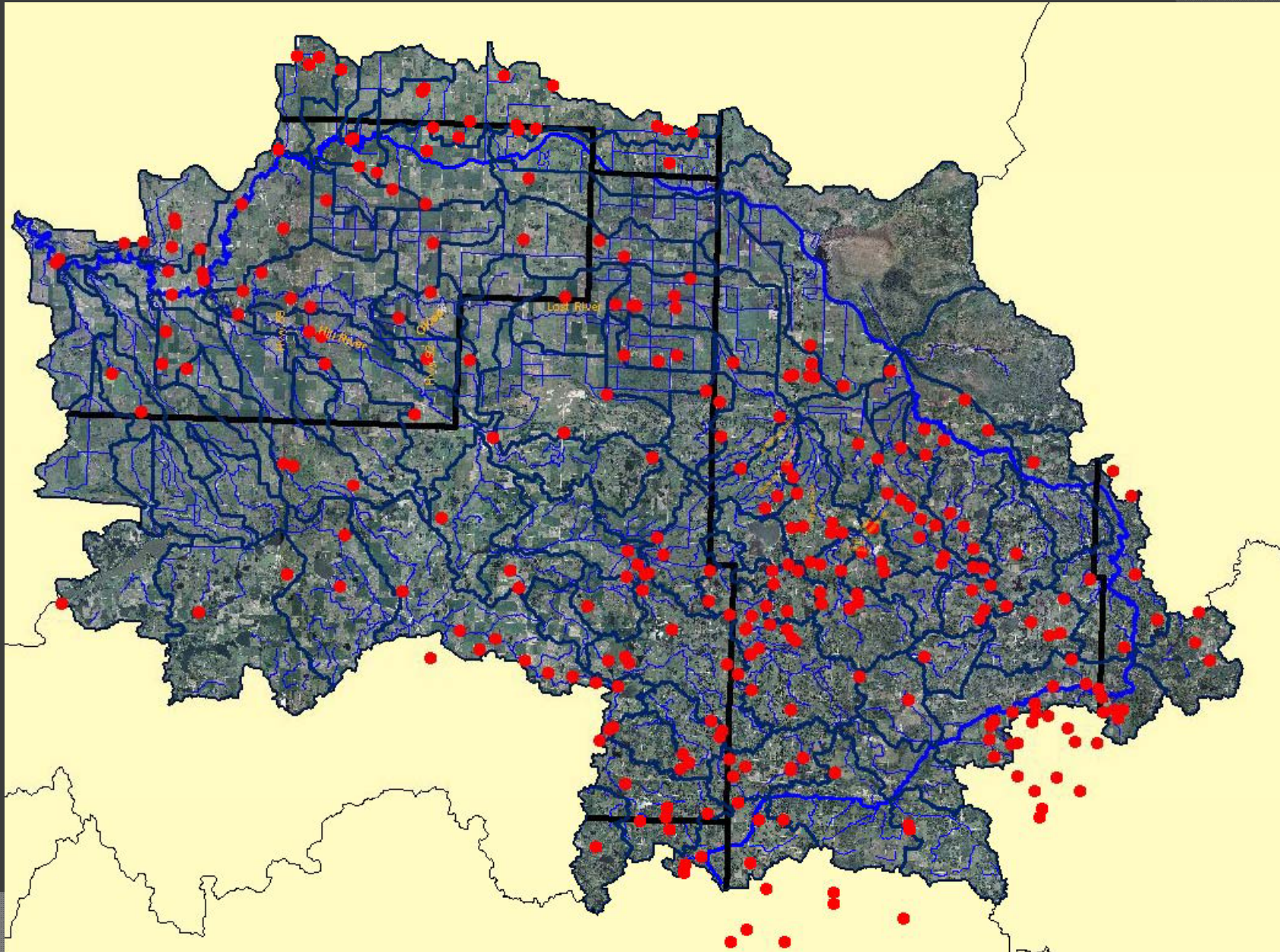


Wild Rice Paddy BMPs

- Main Line Tile
 - Fecal coliform data
- Catch Basins
- Keeping a buffer on the river
- Stabilizing outlets with rock
- Fords acting as riffles



Feedlots and Heavily Pastured Areas



Direction of TMDL Reports

- ◉ Walker Brook
 - MPCA will take over in 2012, do nothing for now
- ◉ CD57
 - Part of the Clearwater River DO TMDL Study
- ◉ Clearwater River Fecal Coliform
 - Write report, few reductions needed, show success
- ◉ Clearwater River Dissolved Oxygen
 - Continue with report, minimal pollutant reductions
- ◉ Lost River Fecal Coliform
 - Continue with report, few reductions needed (high flow)
- ◉ Poplar River Dissolved Oxygen and Silver Creek Fecal Coliform
 - Continue with reports – significant pollutant reductions needed

Next Steps in the TMDL Process

- ⦿ Resume and Complete SWAT model
- ⦿ Allocation of loads and reductions
 - Present results to the Stakeholders' Group
- ⦿ Six month extension