

Monthly Water Quality Report | July 2008

By: Corey Hanson, Water Quality Coordinator

For: August 14, 2008
RLWD Board Mtg.

Clearwater River Dissolved Oxygen and Fecal Coliform TMDL

Monitoring for this project was wrapped-up at the beginning of July. In order to meet the completion deadline at the end of the year, work for this project will have to focus on developing the SWAT model, identifying sources, analyzing data, and writing the report. All the continuous dissolved oxygen loggers and all but one (site #81) of the HOB0 water level loggers have been retrieved, along with stilling wells and posts. Flow was measured on the Clearwater River at sites 21, 37, and 105. A semi-annual report was submitted to the MPCA.

Stage data collected for the study using Onset HOB0 water level loggers was compiled and converted into flow records. Daily average flow data was used to create load duration curves for the E. coli sampling sites. The load duration curves plot pollutant loads (flow times concentration) against the percent of time that flow values are met or exceeded. A line is established on the plot based upon the official water quality standard that serves as a water quality target. Sample results are plotted as well. Samples plotted above the target value during high (rarely exceeded) flows are likely caused by nonpoint (storm runoff, erosion) sources and those exceeding the standard in low (often exceeded) flows are likely caused by point sources.

Sediment entering the Clearwater River from unstable ditch at the Trail Road crossing



A stakeholders' advisory meeting was held on August 30th in Clearbrook. Meeting Notes Follow:

Clearwater River (Ruffy Brook to Lost River) E. coli and Low Dissolved Oxygen Impairments

- Exceedances of the E. coli standard are occurring during low flows, which means something is acting like a point source.
- Small rains may also flush bacteria into stream – check high E. coli concentrations against rainfall record.
- Wild Rice Paddies
 - Waterfowl in paddies may be a source
 - Reuse water from the paddies
 - How do E. coli concentrations in surface drained paddy discharge compare to E. coli concentrations in main-line-tile drained paddy discharge?

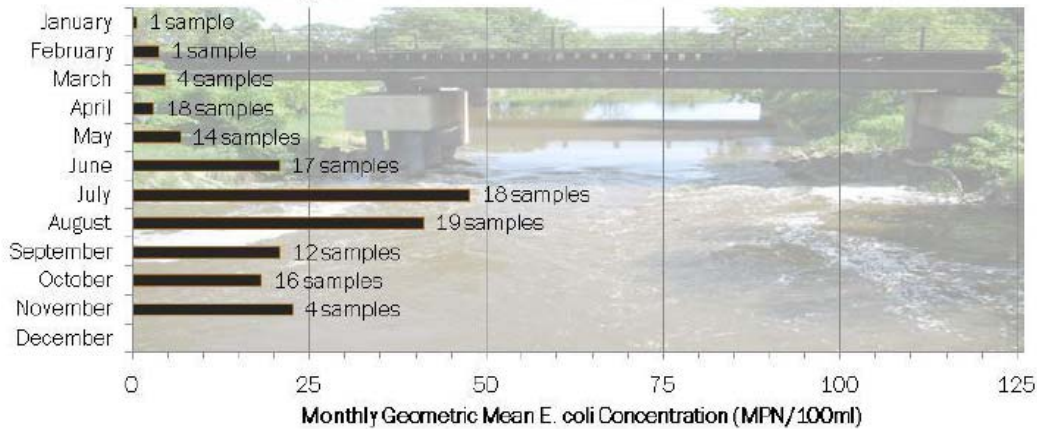
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- We need an inventory of which paddies are surface drained and which are tiled.
- In the model, the paddies will need to be treated as a point source, or as a small pond.

CLEARWATER RIVER E. COLI ASSESSMENT RESULTS

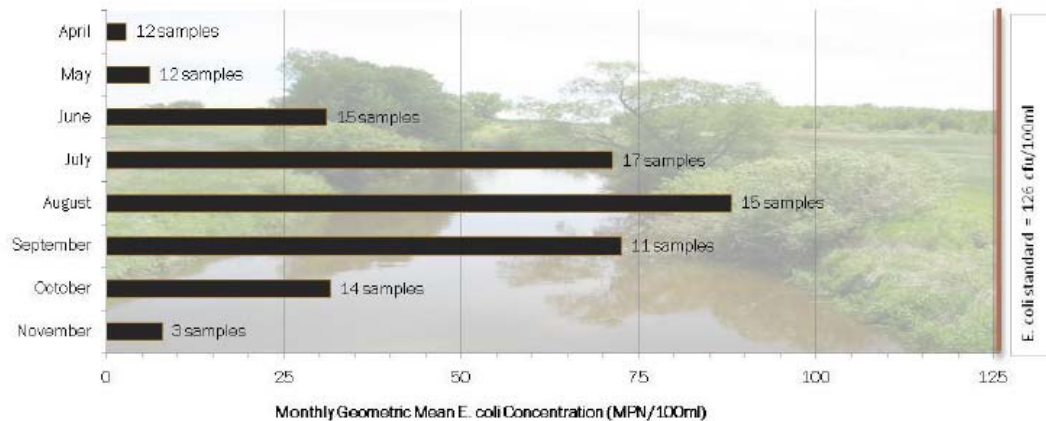
E. coli - Step 1			
	# of Measurements	# of Exceedances	% Exceedance
126 CFU/100ml	124	4	3.2%
1260 CFU/100ml	124	1	0.8%

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

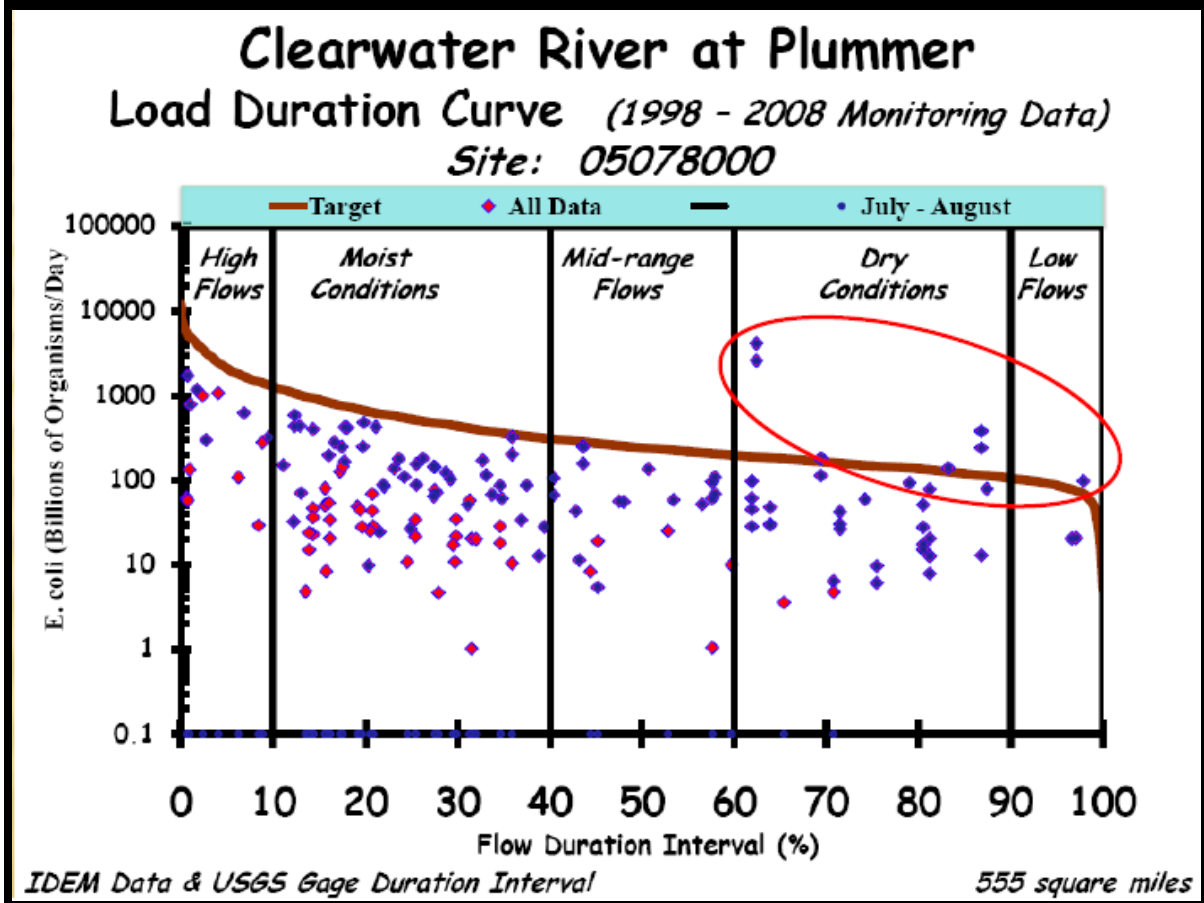
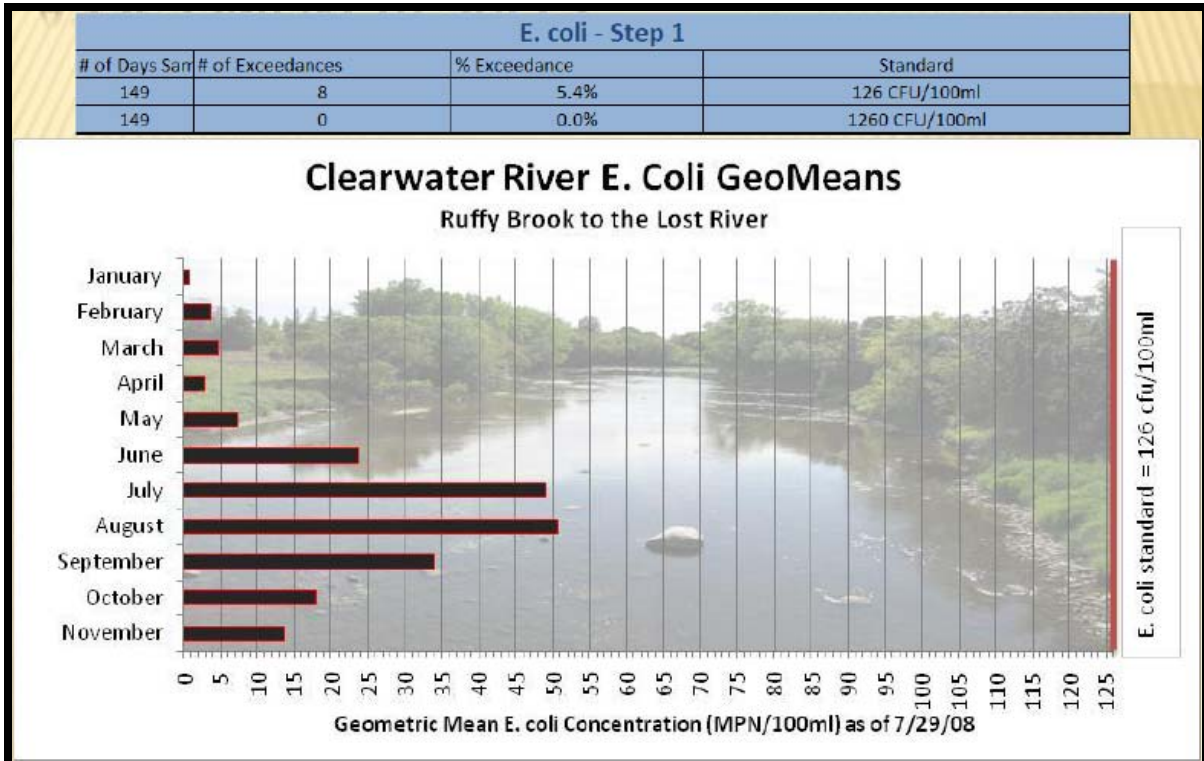


E. coli - Step 1			
# of Measurements	# of Exceedances	% Exceedance	Standard
99	15	15.2%	126 CFU/100ml
99	1	1.0%	1260 CFU/100ml

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



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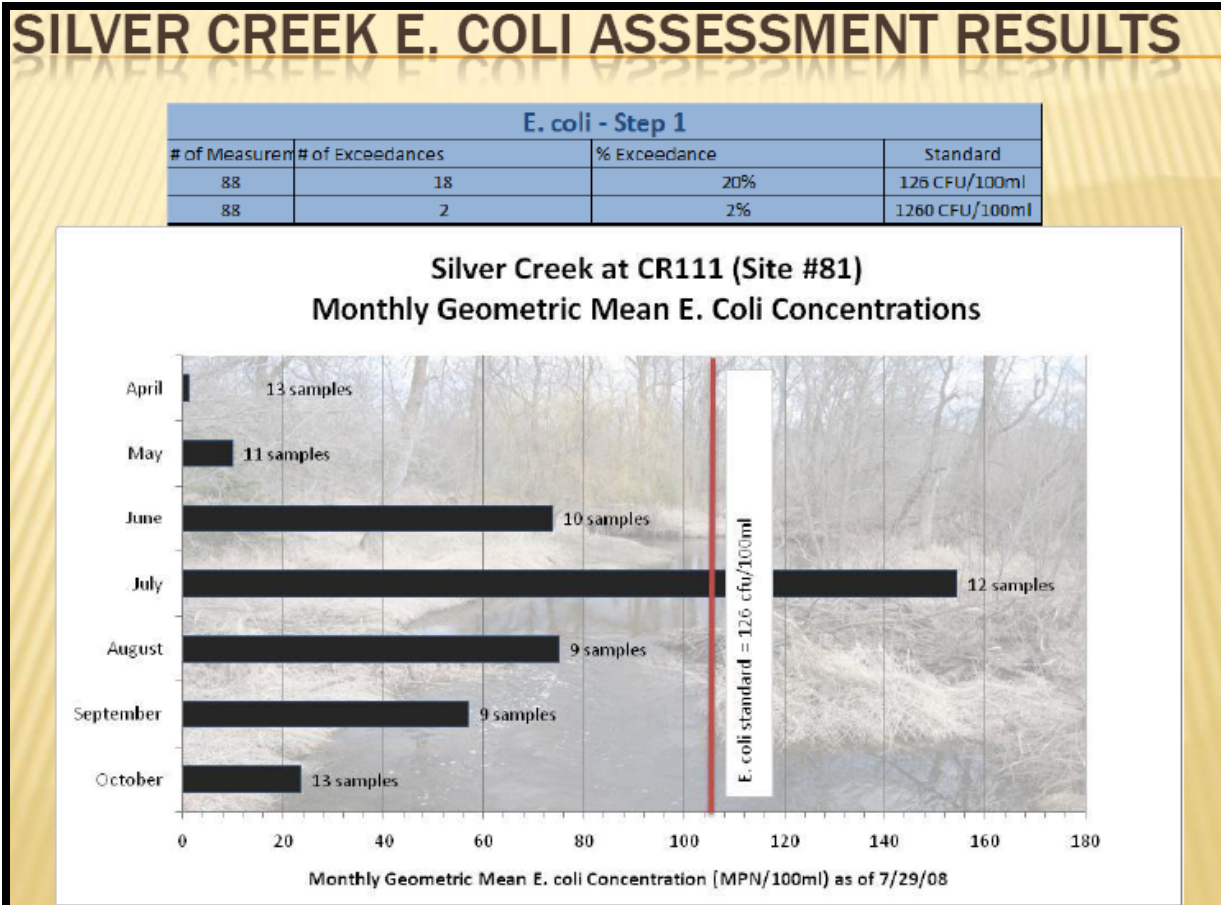


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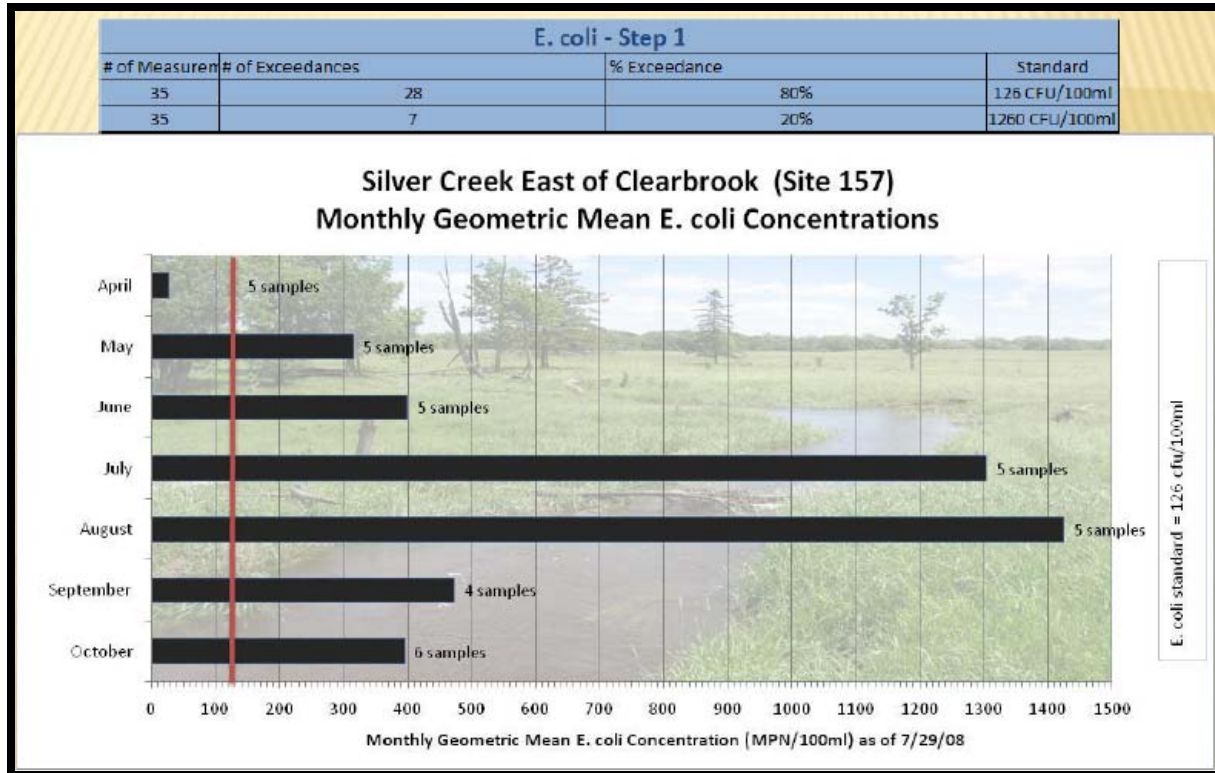
- Low dissolved oxygen impairment
 - Shows up only in part of the channelized reach.
 - Reach as a whole – only 5.3% of measured daily minimums fail to meet the standard.
 - Channelized reach monitoring sites – 13.16% and 8.57% of measurements at sites 21 (Roland) and 37 (Trail Road), respectively, fail to meet the standard for DO.
 - What is the gradient of the river? *Approximately 2 feet/mile*
 - Ditches entering the river likely act as low dissolved oxygen inputs.
 - More rock riffles may help with low dissolved oxygen problems and E. coli problems (exposure to air for DO and exposure to UV light for breaking down bacteria).

Silver Creek E. coli Impairment

- Exceedances of the E. coli standard are occurring across the spectrum of flows at the site located 1 mile West of Clearbrook. This means that the sources are likely both point and nonpoint in nature.



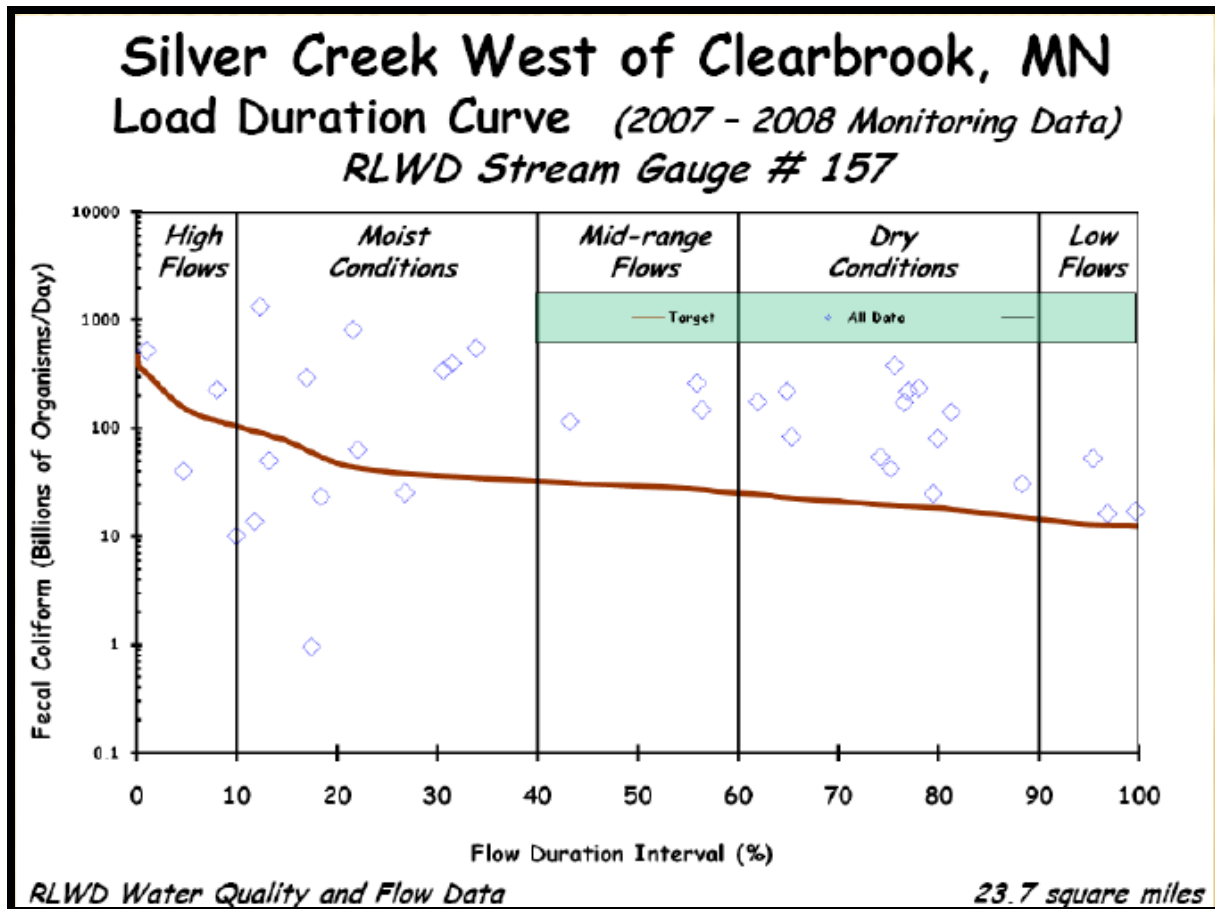
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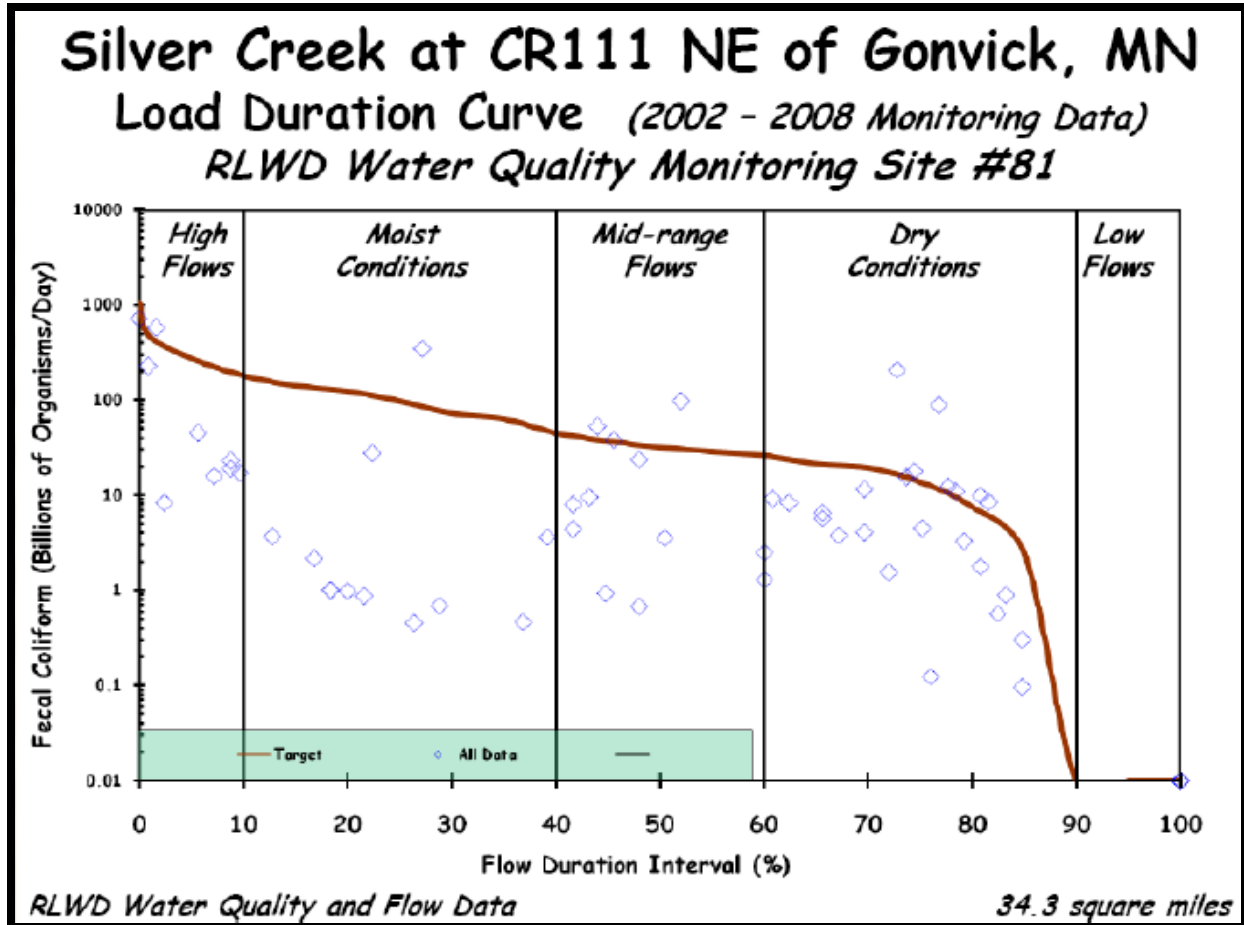


- Potential sources
 - Feedlot along Clear Brook
 - Wade Robinson of the Clearwater SWCD is currently working with the landowner to move the feedlot, move fences, install berms to capture runoff, and install a CRP buffer along the stream. It may take a couple of years to complete the projects. The landowner is willing to fix the problem, but money is a limiting factor.
 - Pasture along Clear Brook and Silver Creek
 - Cattle will spend more time in the water during the warmest times of the summer (which also have the lowest flows – less dilution).
 - Septic systems of houses along the north side of Clear Brook
 - All it would take is one straight pipe to cause the problem in low flows
 - Stormwater from the town of Clearbrook
 - Ultraviolet light would kill E. coli within 2 weeks
 - Latent bacteria in storm sewer sediment can be flushed into the stream with rainfall
 - Bacteria will thrive where it is dark and there isn't any breakdown from UV light.
 - Fish kills along the Red River have occurred when there have been simultaneous low DO concentrations and high fecal coliform concentrations

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- Nonpoint sources upstream of the town of Clearbrook
- Illegal dumping
- How much does it cost to differentiate bacteria between cattle and human sources
 - A cheap, but questionably acceptable method would be flourometric detection of optical brighteners. 97% of household detergents use optical brighteners so their presence in Silver Creek would indicate human wastewater as a probable source. These brighteners can still show up in treated water, but the Clearbrook WWTP discharges to Ruffy Brook, not Silver Creek, so the results of flourometry should still be a fairly reliable test for Silver Creek to see if there potentially are human sources of bacteria.
 - Microbial Source Tracking – expensive (Hundreds of \$ per sample)





Poplar River Low Dissolved Oxygen

- Impaired at each monitoring site throughout the watershed, gets more severe from upstream to downstream
 - 11% at Spring Lake
 - 40% downstream of Fosston
 - 47% downstream of McIntosh
 - 53% near Highway 59
- Potential sources
 - Fosston WWTP
 - Organic soils in wetlands and fens along the stream
 - Areas of low gradient
 - Mats of blue green algae or milfoil
 - Beaver dams
 - Poplar Lake appears to be highly eutrophic – lots of nutrient inputs
 - Ag and Hydrology

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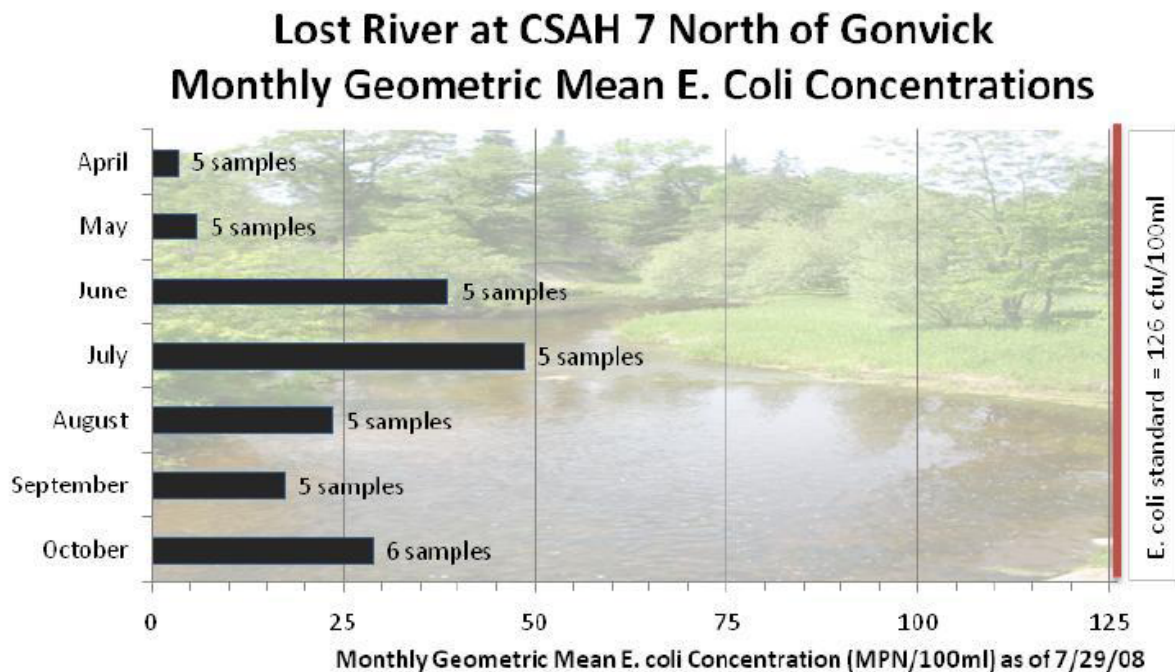
Lost River E. coli

- Assessment results no longer show impairment, although there still is a high rate of exceedance of the 126 cfu/100 ml E. coli standard. Load Duration Curve shows that the exceedances of the standard mainly occur during high flows, indicating nonpoint sources as the main source of the impairment.
- Need to ID locations of feedlots – many have been GPS'd and photographed - need to get this information to Beth for the SWAT model calibration
 - Red Lake County may have a GIS file of feedlot information
- Rice paddies north of Gully

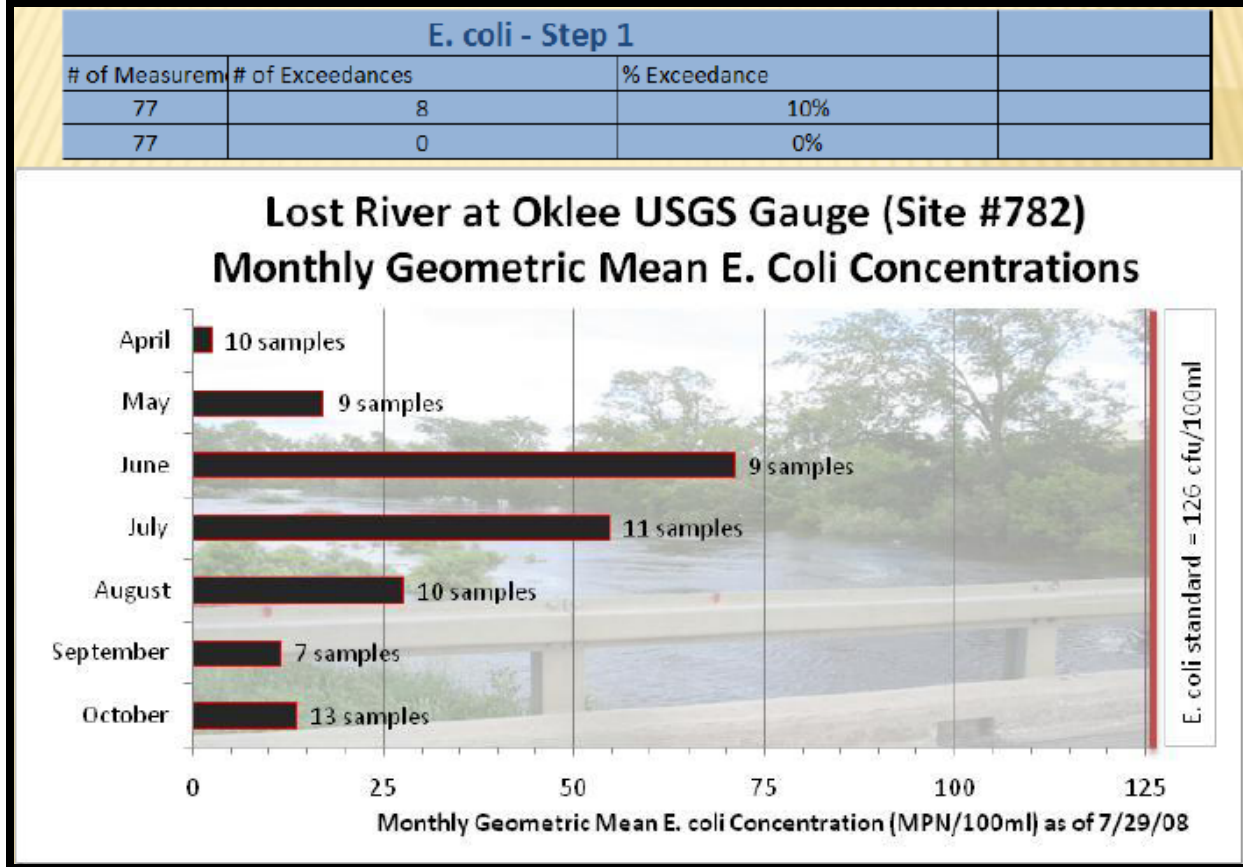
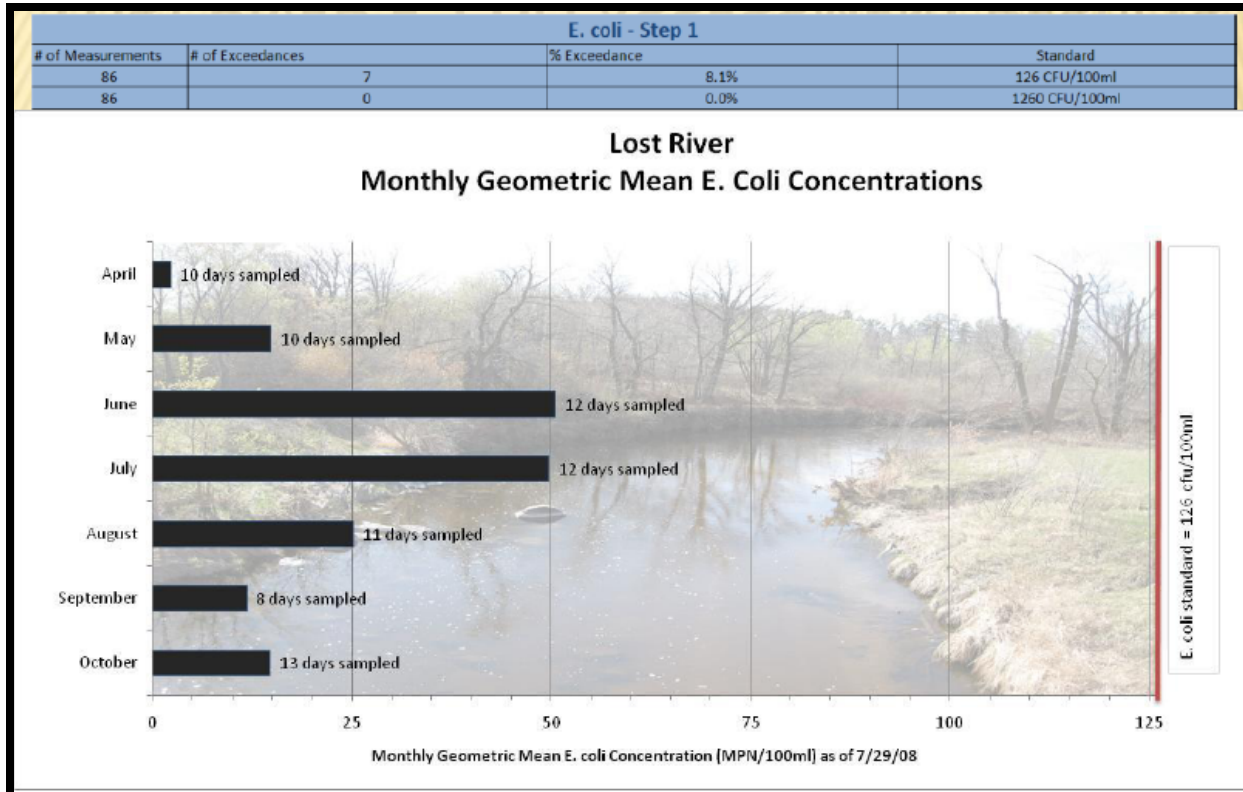


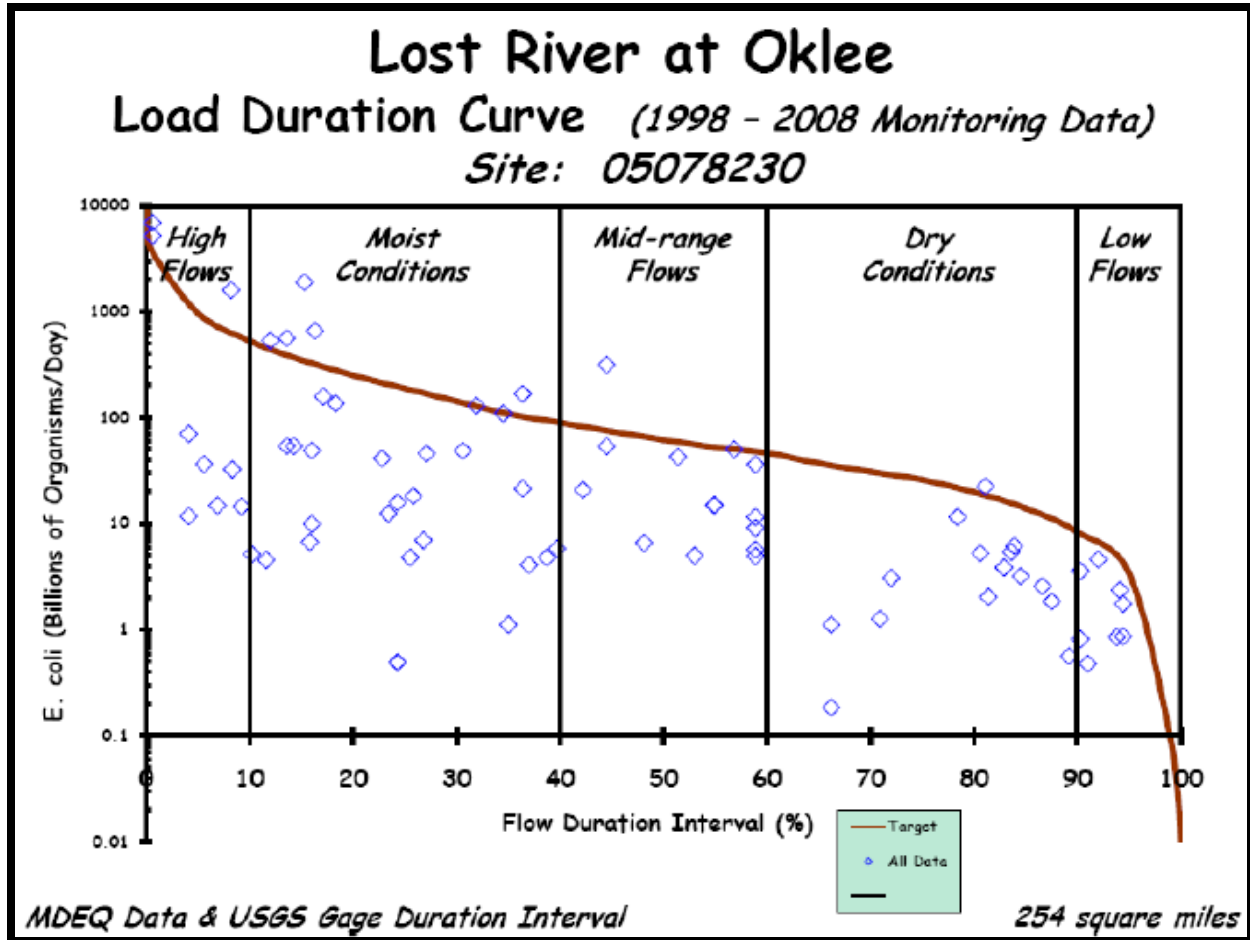
LOST RIVER E. COLI ASSESSMENT RESULTS

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



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Walker Brook Low Dissolved Oxygen

- 34% of RLWD DO measurements from 2002 through June 2008 fail to meet the 5 mg/L standard.
- Teleconference on August 4th to determine the MPCA State Office's wishes for the Walker Brook TMDL Study
- A feedlot has been identified as a source of water quality problems. Although feedlots have a BOD discharge limit of zero (FLEval), this one appears to be discharging to a ditch that flows to Walker Brook.



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County Ditch 57 Low Dissolved Oxygen

- 78.74% of daily minimums fail to meet the 5 mg/L standard, especially once flow stops in mid-June.
- Teleconference on August 4th to find out what the State Office MPCA personnel would like to see done with this reach
- Delist
 - Will be addressed as part of the Clearwater River (Ruffy Brook to Lost River) TMDL Study
 - CD57 and others like it will need to be addressed as potential sources of sediment, nutrients, etc. for the Clearwater River
 - Can use flow and other data from CD57 to help calibrate the model.
- Delisting simply due to difficulty wouldn't be the right approach
- Is it a warm water fishery? Naturally? Currently?
- Is there any tile drainage in the watershed?
- Historical flows – any historical natural channels in the CD57 watershed?
- Take DO measurements from pool downstream of rocks (when there is flow).

Other Comments

- Need better groundwater flow pattern data and knowledge of fens for the SWAT model.
 - DNR ob wells
 - Phil Gerla and Bob Merritt have done work on fen studies
 - The BSU fen study has found that there is a very strong (.1) vertical groundwater gradient along the headwaters of the Clearwater River by First Lake.
- We need to more confidently and specifically identify the sources within the watershed than what we have been able to accomplish so far.
 - Paddies are not definitively identified as sources of low dissolved oxygen
 - Impacts of ditches – they have a big impact throughout the basin
 - Have maps with sources pointed out, get agreement from the stakeholder group
- Need a dataset with delineation of ditches (gradients) for the SWAT model
 - Get RLWD ditch layer to Beth
 - NRCS as a dataset of legal systems

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RLWD Long-Term Monitoring Program

The second round of the RLWD long-term monitoring program was completed in the first week of July (16 sets of samples in July). High levels of turbidity were found in the Red Lake River at East Grand Forks and Crookston. Ruffy Brook had high levels of E. coli.

Construction continues along the Red Lake R. in Crookston (installation of flood wall).



Kripple Creek had high levels of turbidity, despite having low flow.



Thief River Watershed Sediment Investigation

- ❖ Collected 4 flow measurements for this study in the month of July.
- ❖ Deployed Eureka Manta multi-parameter sondes were retrieved (twice in July) for data downloading, cleaning, and re-calibration.
- ❖ A semi-annual report for the project's Clean Water Partnership Grant was submitted to the MPCA.

Tile Drainage Study

- ❖ Downloaded water level data
- ❖ Gave a tour of the flow measurement structures to Roxanne Johnson of NDSU.
- ❖ Replaced the rain gauge's 12V battery

Other Notes

- ❖ Purchased 8 foot wading rod for taking high flow measurements from the top of box culverts (specifically, the Moose River at CSAH 54).
- ❖ Completed the second round of Surface Water Assessment Grant sampling.
- ❖ Submitted final report for the Brandt Channel Restoration Challenge Grant via eLink
- ❖ Began compiling the information collected for the Red Lake River Erosion Assessment
- ❖ Provided stage and flow data from Walker Brook to Tim Kroeger of Bemidji State University, who is conducting a study of fens in the upper Clearwater River watershed by Bagley.

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August Tasks

- Provide information and data to the EERC for calibration of the SWAT model.
- Inventory of pollution sources for the Clearwater River Dissolved Oxygen and Fecal Coliform TMDL study.
- Regularly maintain and calibrate continuous monitoring equipment that is deployed.
- Monthly maintenance of continuous stage monitoring equipment.
- Monthly maintenance of the Brandt Channel Outlet Restoration Project continuous stage and turbidity monitoring equipment.
- Flow measurements for the Thief River Watershed Sediment Investigation
- Maintenance of continuous monitoring equipment once it's installed.
- 3rd round of sampling at long-term monitoring and SWAG sites.
- Vacation

July Meetings and Events

- **July 9th** - Marshall County Water Resources Advisory Committee, 9:30am
 - Moose River road repair project – stabilize bank or move road?
 - 12 elk permits are being issued in Marshall County – crop damage from Grygla herd.
 - Snake River and Grand Marais Creek TMDL reports need to be completed by the end of the year. Local project teams will need to be formed. The Wild Rice River TMDL study has been completed.
 - Jan has found high pH levels at some of her monitoring sites.
- **July 30, 2008** – Clearwater River Dissolved Oxygen and Fecal Coliform TMDL Study Stakeholders' Advisory Group meeting, Clearbrook Community Center, 9:30 am

Future Meetings/Events

- **August 1, 2008** – Semi Annual Reports to the MPCA are due for the Thief River Watershed Sediment Investigation and the Clearwater River Dissolved Oxygen and Fecal Coliform TMDL Study.
- **August 14, 2008** – Maple Lake Improvement District Meeting. 7PM, Mentor Community Center
- **August 25, 2008** – Red River Basin Water Quality Team Meeting at the RLWD, 10am
- **Early September** - Clearwater River Dissolved Oxygen and Fecal Coliform TMDL Study Stakeholders' Advisory Group meeting, Clearbrook Community Center
 - Model calibration results
 - Specific inventory of sources
 - Approval of BMP strategies
 - Guest speaker (fens or wild rice paddies)
- **September 10, 2008** – Pennington County Outdoor Education Day
- **September 16 and 17, 2008** – Northwest Minnesota Water Festival
- **September 22, 2008** – Red River Basin Water Quality Team Meeting in Moorhead
- **October 8, 2008** – Marshall County Water Resources Advisory Committee, 9:30am
- **October 27, 2008** – Red River Basin Water Quality Team Meeting at the RLWD, 10am
- **November 5, 2008** - Marshall County Water Resources Advisory Committee, 9:30am
- **November 24, 2008** – Red River Basin Water Quality Team Meeting in Moorhead, 10am
- **December 22, 2008** - Red River Basin Water Quality Team Meeting at the RLWD