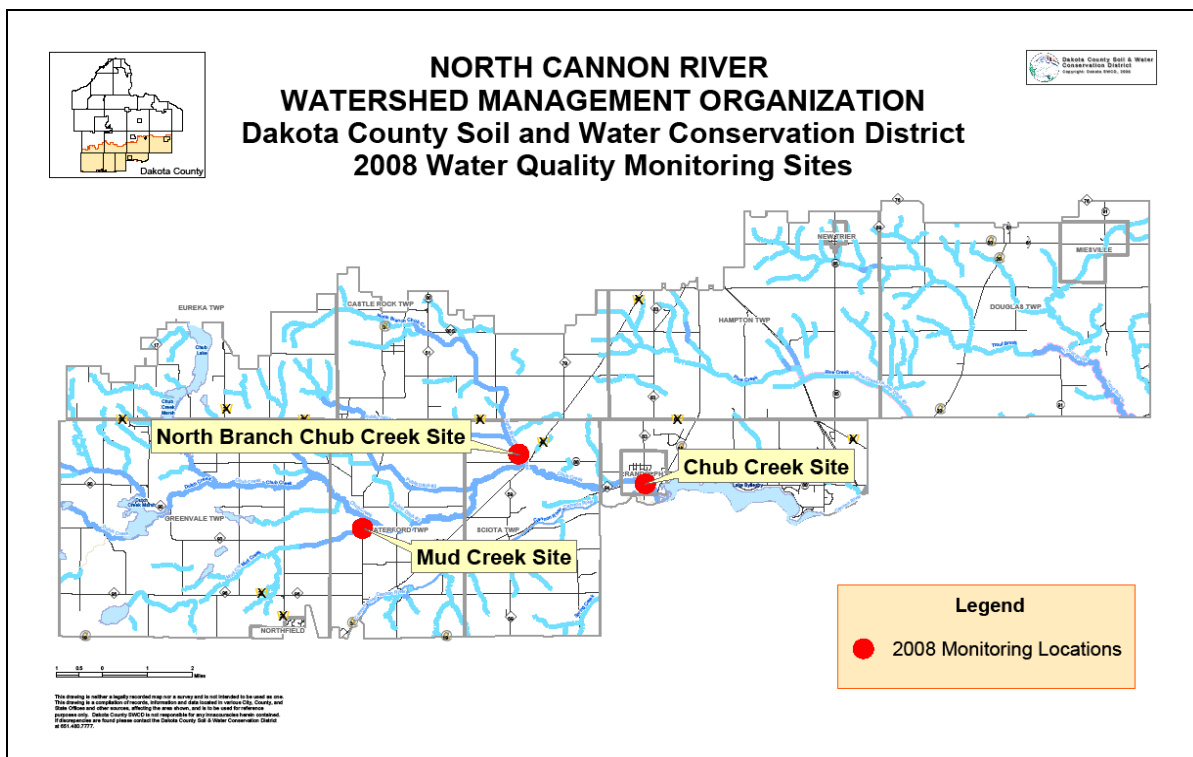


2008 North Cannon River Watershed Management Organization Water Quality Monitoring Report

1. 2008 Water Quality Monitoring Activities:

- SWCD staff installed automated stage (depth) monitoring equipment at three monitoring stations within the Chub Creek Watershed.
- Staff collected 11 water quality samples from each of the three monitoring locations during periods of low flow and runoff events. All chemistry results were formatted and submitted to the MPCA.
- Staff completed multiple flow measurements to build rating curves for each location.
- Staff continue to recruit citizen volunteers for the Minnesota Pollution Control Agency’s Citizen Stream Monitoring Program.
- Staff maintained staff gauges to assist citizen volunteers on Pine Creek and Trout Brook

2. Sample Locations:



3. Monitoring Results:

- Continuous flow data was collected at all sites. Flow results are presented here.
- Samples (marked with diamonds) were collected over the entire range of flows.
- There were few large rain events in 2008.
- Flow monitoring is essential for completing load calculations. Load calculations are sometimes required for grant applications and ALWAYS used in Total Maximum Daily Load (TMDL) studies.

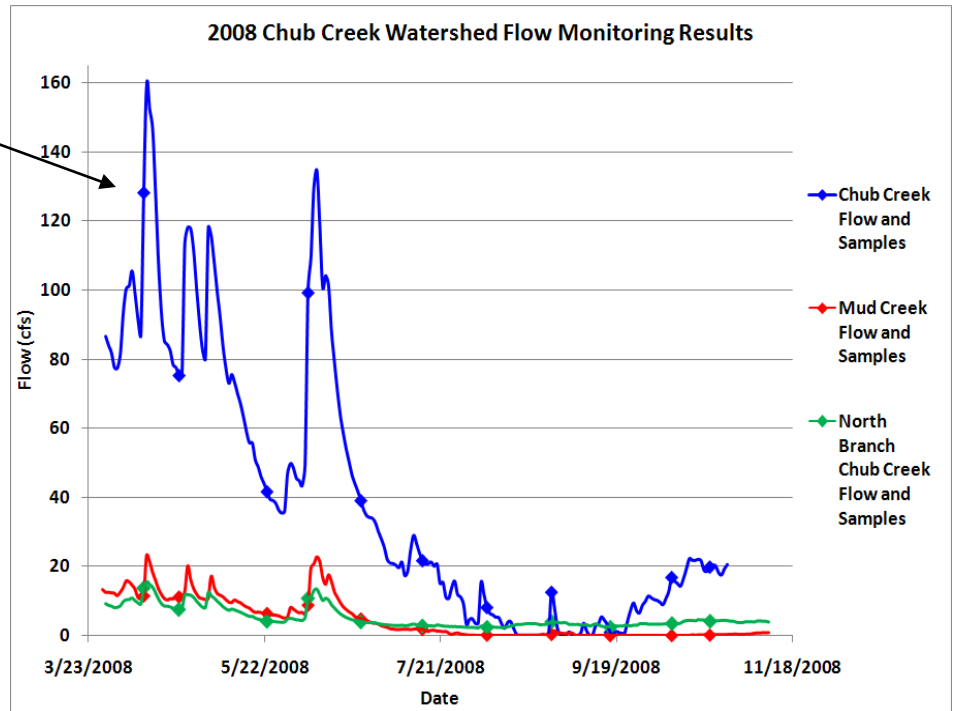


Figure 1. 2008 Flow Results

- Total phosphorus is commonly used as general indicator of water quality. Historical results are presented here.
- Total phosphorus concentrations are generally below the eco-region mean for southern Minnesota.
- 2008 total phosphorus concentrations are lower than historical averages. Possible decreasing trend for North Branch Chub Creek sites.

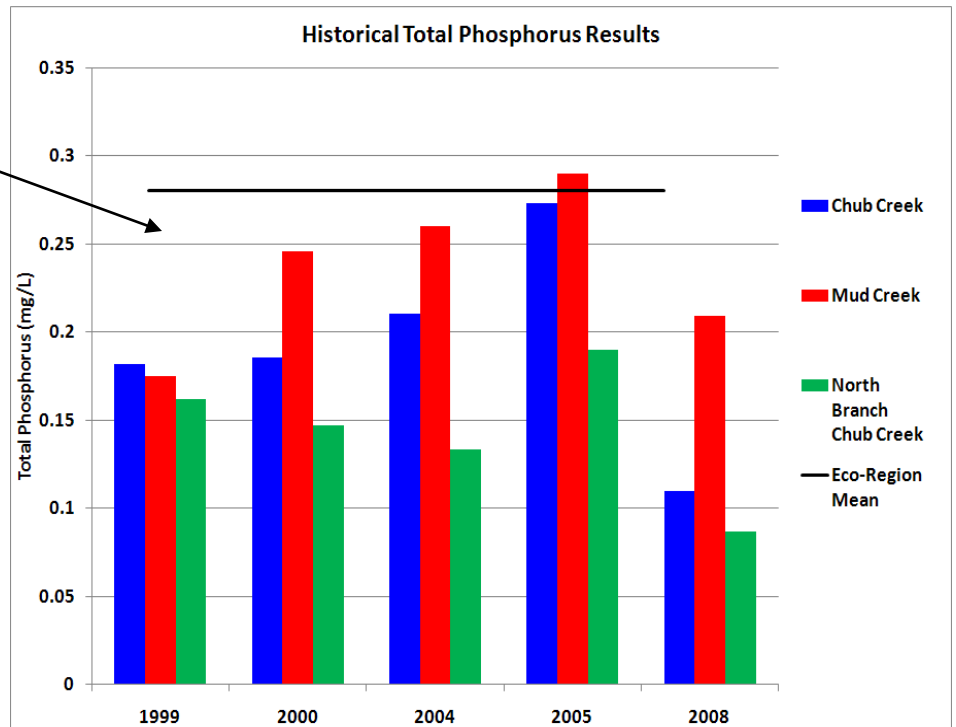


Figure 2. Historical Phosphorus Data

- Chub Creek is listed as impaired for bacteria. The 2008 bacteria monitoring results are presented here.
- Bacteria results remain consistently elevated at all sites.
- Possible decreasing bacteria trend.
- *1999-2005 samples were analyzed for fecal coliform concentrations, while 2008 samples were analyzed for *E. coli* concentrations (change in state standard).

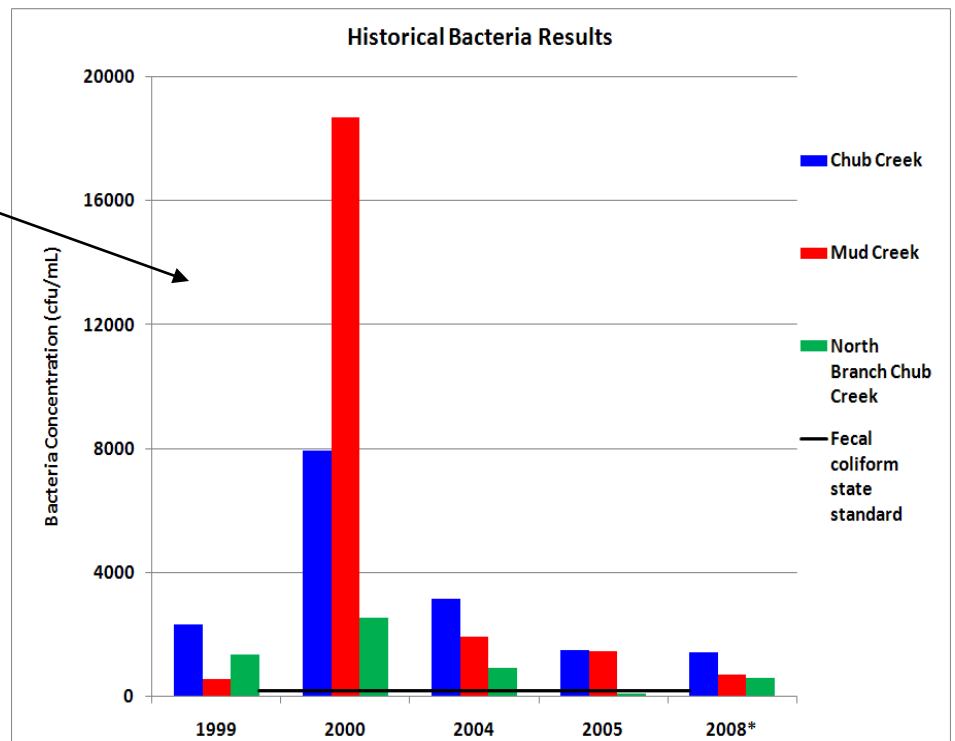


Figure 3. Historical Bacteria Data

4. Summary:

Water quality monitoring in the Chub Creek watershed was highly successful in 2008. Automated equipment collected continuous stage data from all three sites, with very few interruptions (battery failure/equipment malfunction). Several flow measurements were completed at each site to improve and refine existing rating curves and subsequent flow data. Base flow and rain event grab samples were collected across a range of flow regimes, representative of 2008 water quality conditions. All grab sample data were processed by SWCD staff and submitted to the MPCA for storage in STORET. Complete chemical results are available on the MPCA's Environmental Data Access system (<http://www.pca.state.mn.us/data/edaWater/index.cfm>).

Water quality within the Chub Creek watershed is considered fair, with most parameters below state water quality standards/eco-region means (Appendix A). A complete trend analysis is not possible, due to a very brief data set, but 2008 results are generally less than those observed in the past and may be a reflection of improving conditions within the watershed (Appendix A).

The 2008 results suggest that bacteria concentrations in the watershed may be beginning to decrease. However, bacteria levels continue to exceed the state standard. Caution should be exercised when considering recent bacteria results since the state bacteria standard changed in 2008 from fecal coliform to *E. coli*, and the apparent decrease in 2008 may be due to this change in parameters. Also, turbidity results for the Chub Creek and Mud Creek sites slightly exceeded the state standard and could result in a new impaired waters listing for those creeks.

Appendix A

Site	Parameter	Historical Mean Results	2008 Mean Results	Notes – 2008 Results
Chub Creek	Alkalinity	219 mg/L CaCO ₃	238 mg/L CaCO ₃	Typical for freshwater; higher during periods of low flow, near historical average
Chub Creek	<i>E. coli</i>	na	836 mpn/100mL	Exceeds state standard
Chub Creek	Nitrogen, Ammonia	6.6 ug/L	13 ug/L	Below ecoregion mean, near historical average
Chub Creek	Nitrogen, Total Kjeldahl	1.10 mg/L	0.79 mg/L	Less than historical average
Chub Creek	Phosphorus, Dissolved	10.7 mg/L	0.06 mg/L	Less than historical average
Chub Creek	Phosphorus, Total	0.20 mg/L	0.13 mg/L	Below ecoregion mean, less than historical average
Chub Creek	Suspended Solids	49.5 mg/L	30.8 mg/L	Below ecoregion mean, less than historical average
Chub Creek	Turbidity	11.5 NTU	14.5 NTRU	Slightly exceeding state standard
Chub Creek	Volitile Suspended Solids	9.53 mg/L	10.75 mg/L	Near historical average
Site	Parameter	Historical Mean Results	2008 Mean Results	Notes – 2008 Results
Mud Creek	Alkalinity	235 mg/L CaCO ₃	256 mg/L CaCO ₃	Typical for freshwater; higher during periods of low flow
Mud Creek	<i>E. coli</i>	na	311 mpn/100mL	Exceeds state standard
Mud Creek	Nitrogen, Ammonia	12 ug/L	10 ug/L	Below ecoregion mean, less than historical average
Mud Creek	Nitrogen, Total Kjeldahl	1.14 mg/L	0.97 mg/L	Less than historical average
Mud Creek	Phosphorus, Dissolved	0.19 mg/L	0.12 mg/L	Less than historical average
Mud Creek	Phosphorus, Total	0.24 mg/L	0.21 mg/L	Below ecoregion mean, less than historical average
Mud Creek	Suspended Solids	22.8 mg/L	16.1 mg/L	Below ecoregion mean, less than historical average
Mud Creek	Turbidity	8.6 NTU	10.9 NTRU	Slightly exceeding state standard
Mud Creek	Volitile Suspended Solids	5.63 mg/L	4.45 mg/L	Less than historical average
Site	Parameter	Historical Mean Results	2008 Mean Results	Notes – 2008 Results
North Branch Chub Creek	Alkalinity	169 mg/L CaCO ₃	198 mg/L CaCO ₃	Typical for freshwater; higher during periods of low flow
North Branch Chub Creek	<i>E. coli</i>	na	239 mpn/100mL	Exceeds state standard
North Branch Chub Creek	Nitrogen, Ammonia	13 ug/L	4 ug/L	Below ecoregion mean, less than historical average
North Branch Chub Creek	Nitrogen, Total Kjeldahl	0.97 mg/L	0.58 mg/L	Less than historical average
North Branch Chub Creek	Phosphorus, Dissolved	0.09 mg/L	0.05 mg/L	Less than historical average
North Branch Chub Creek	Phosphorus, Total	0.16 mg/L	0.09 mg/L	Below ecoregion mean, less than historical average
North Branch Chub Creek	Suspended Solids	28.0 mg/L	9.2 mg/L	Below ecoregion mean, less than historical average
North Branch Chub Creek	Turbidity	9.2 NTU	7.7 NTRU	Below state standard
North Branch Chub Creek	Volitile Suspended Solids	5.96 mg/L	2.27 mg/L	Less than historical average