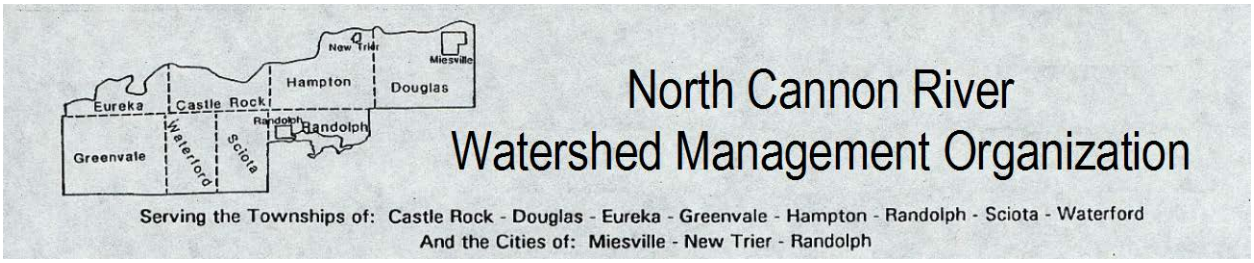
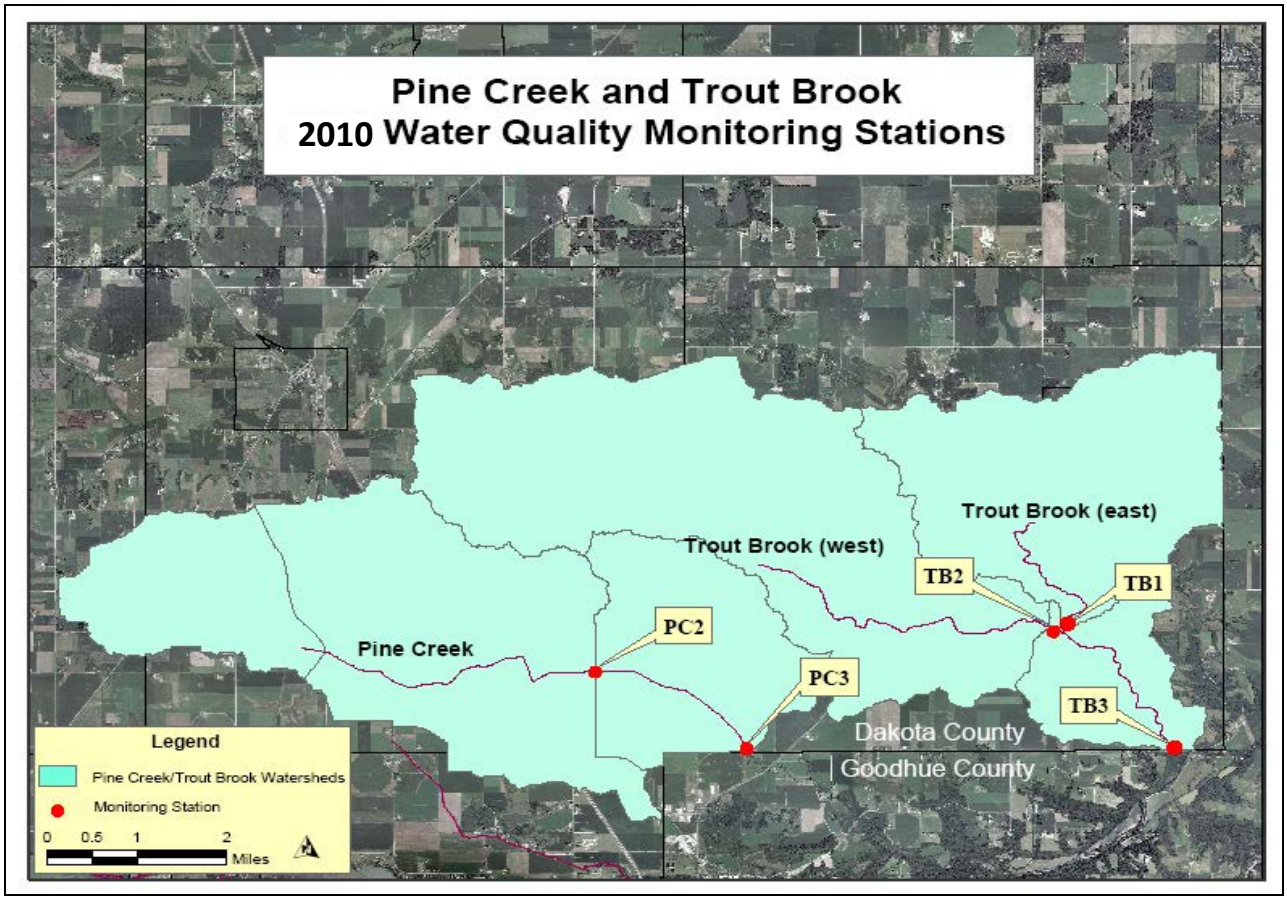


2010 North Cannon River Watershed Management Organization
Water Quality Monitoring Report

2010 Water Quality Monitoring Activities:

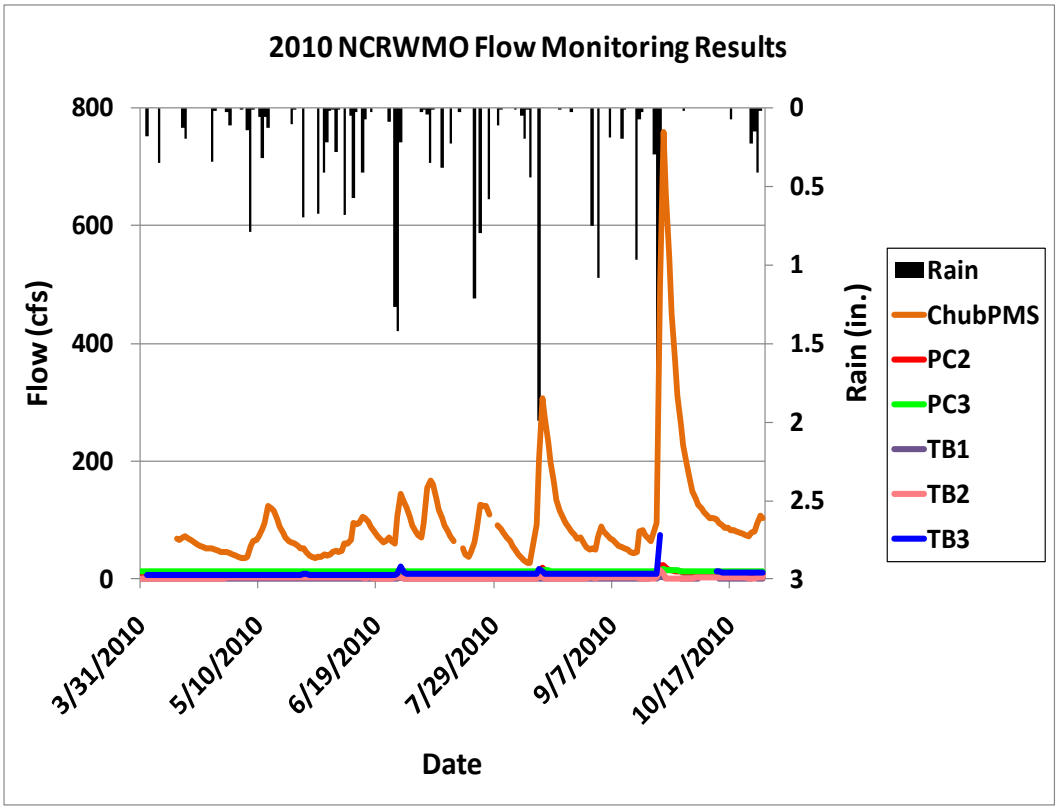
- Installed automated stage (depth) monitoring equipment at the Chub Creek Permanent Monitoring Station and historical Pine Creek and Trout Brook monitoring locations
- Purchased and replaced stage monitoring equipment at the Chub Creek Permanent Monitoring Station
- Continued to measure flow at all monitoring sites to allow for the conversion of stage data to flow data
- Began collecting monthly base flow & event flow grab samples from all monitoring sites on Pine Creek & Trout Brook
- All sampling data were submitted to the Minnesota Pollution Control Agency (MPCA) to be used for assessment purposes
- Continued to recruit citizen volunteers for the MPCA's Citizen Stream Monitoring Program
- Maintained staff gauges to assist citizen volunteers on Pine Creek and Trout Brook

2010 Sample Locations:

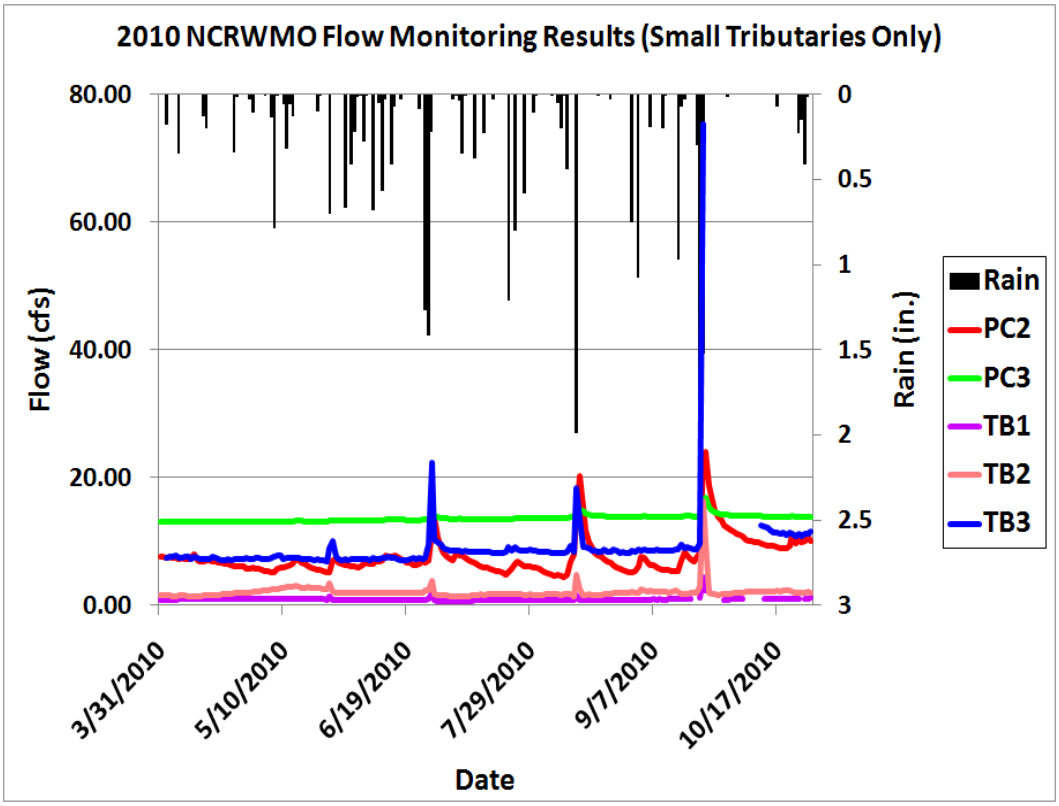


Water Quality/Quantity Monitoring Results:

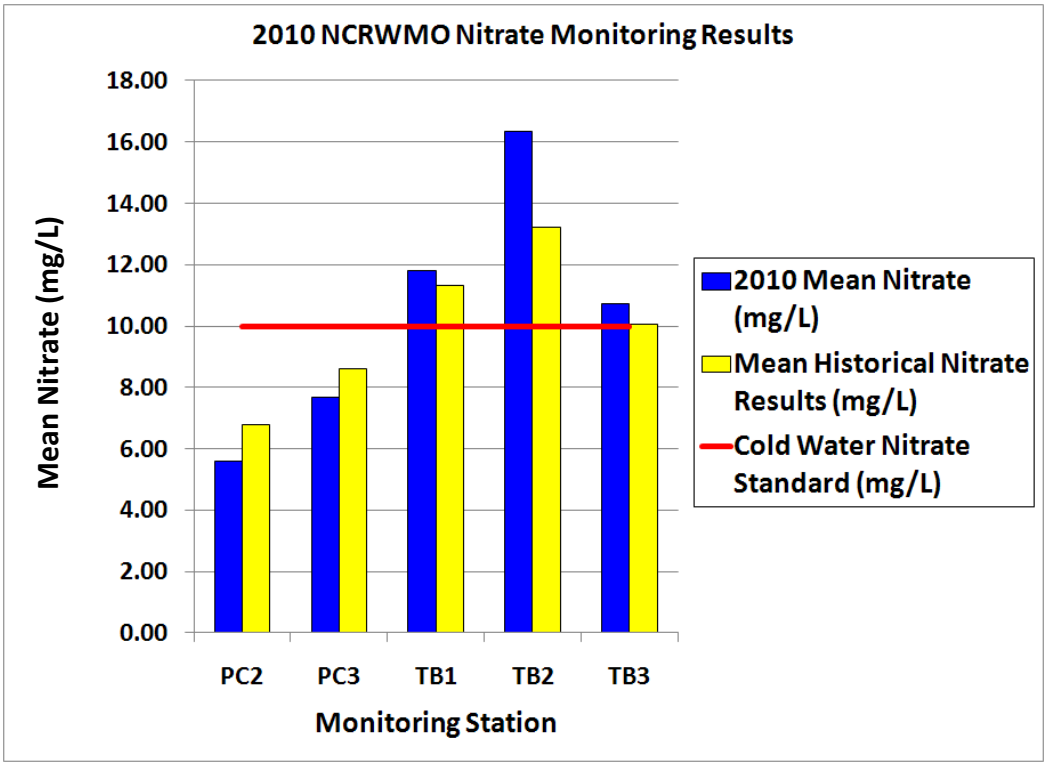
- Continuous stage (water level) data were collected with minimal interruptions at all 2010 monitoring stations.
- Following large rain events in August and September, flow on Chub Creek greatly exceeded flow on any of the smaller tributaries on Pine Creek and Trout Brook.
- Event flow conditions were very short lived, making event sampling on Pine Creek and Trout Brook difficult.



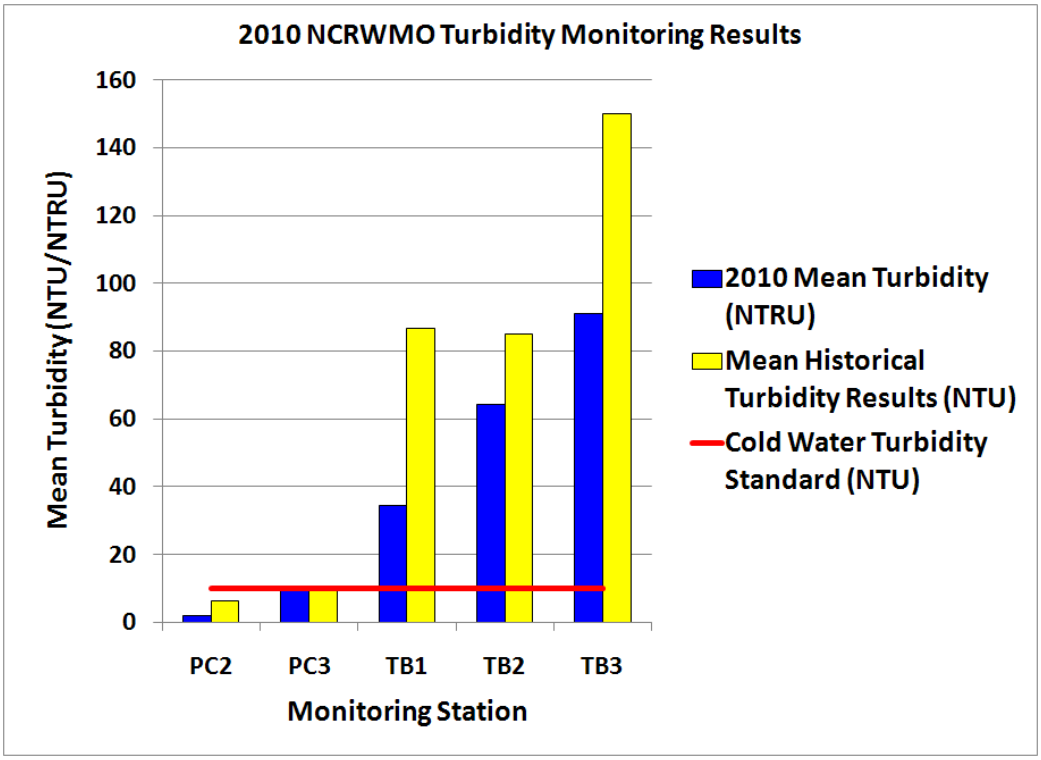
- The stage on all tributaries is surprisingly stable, suggesting large groundwater inputs.
- The spike in flow for site TB3 is likely due to backwater conditions from the Cannon River following the large September rain event.



- The 2010 mean nitrate concentrations exceeded state water quality standards at all three Trout Brook monitoring sites.
- The 2010 mean nitrate concentrations are exceeding mean historical nitrate concentrations at all Trout Brook sites. This may suggest that nitrate concentrations are increasing in this sub-watershed.
- High nitrate levels are frequently observed in southeast Minnesota's groundwater. This likely accounts for a portion of the elevated nitrate levels in Trout Brook.



- 2010 mean turbidity results exceed state water quality standards at all three Trout Brook monitoring sites.
- 2010 mean turbidity results are substantially less than historical mean turbidity results for all sites.



Discussion:

The 2010 water quality monitoring results for the Trout Brook and Pine Creek monitoring sites should be considered fair. The majority of parameters were found to be below state water quality standards or Minnesota Pollution Control Agency (MPCA) recommended eco-region mean concentrations (Appendix 1). However, several issues can be observed in these findings.

Dissolved oxygen concentrations on Pine Creek, at site PC2 specifically, were routinely below state standards in 2010. Historical results have been in the 6.0-8.0 mg/L range. No obvious explanation for these results is available. However, the channel at this location is relatively wide and stagnant and may be functioning more as a wetland than as a small trout stream. As velocity decreases, organic material may be breaking down by microbial activity, which can consume large amounts of dissolved oxygen. Regardless, 2010 dissolved oxygen monitoring results will likely result in an impairment for this reach of Pine Creek.

Nitrate concentrations at all Trout Brook sites frequently exceed state water quality standards. These results appear to corroborate the historical monitoring results that resulted in a nitrate impairment for both Trout Brook and Pine Creek. The 2010 nitrate results exceed even historical means, which may indicate that nitrate issues are becoming worse within the Trout Brook sub-watershed. In addition, MPCA staff believe that nitrate levels are consistently higher on Trout Brook than on any other monitored stream in SE Minnesota (J. Watkins, personal communication, January 26, 2011). The karst topography found in this region leads to a high degree of inter-connectivity between surface water and groundwater. Nitrate rich groundwater is likely the source of elevated nitrate levels in the surface waters of these sub-watersheds.

Although Trout Brook has been listed as impaired for turbidity, the 2010 turbidity results appear to be slightly less problematic than those observed in the historical record. Several large rain events occurred in 2010, as can be observed in the flow monitoring results shown above. However, these events were relatively short lived. As a result, a small number of event samples were collected. This sampling bias may account for the slightly lower turbidity levels observed in 2010.

Future Monitoring Strategy:

The MPCA is adopting a new, intensive, watershed wide approach to water quality monitoring throughout the state. Using this new approach, the MPCA will monitor watersheds for a variety of parameters every 10 years. These parameters will include traditional chemical endpoints (“stressors”) as well as biological endpoints. By utilizing this strategy, the MPCA hopes to gain a more comprehensive understanding of what is occurring within the watershed. In 2011, state and local agencies will use this new approach to monitor in the Cannon River Watershed. However, this may impact how the NCRWMO chooses to operate its own monitoring program in the future.

The NCRWMO’s dedication to water quality and quantity monitoring has been instrumental in providing data to the MPCA for assessment purposes. Without these monitoring efforts, many impairments would have gone undetected. However, the utility of the existing monitoring strategy has reached its limit. Additional monitoring, similar to what the NCRWMO has funded in the past, is unlikely to uncover new impairments. Staff recommends that routine monitoring on Mud Creek, North Branch Chub Creek, Pine Creek, and Trout Brook be discontinued.

In contrast to this sampling, the monitoring at the Chub Creek Permanent Monitoring Station in Randolph remains highly effective and relevant. The efforts to characterize water quality and quantity at this site should be continued and expanded. Routine, annual sampling would better quantify pollutant concentrations here. Chub Creek is an important resource within the watershed, and it contributes large pollutant loads to both the Cannon River and Lake Byllesby. Improving monitoring at this location will not only provide high quality data for TMDL and assessment purposes, but will also provide better long term trend data for the sub-watershed. For this reason, staff recommends continued annual flow monitoring and adding monthly grab samples to the monitoring strategy at the Chub Creek Permanent Monitoring Station.

As results from state sponsored monitoring become available in the winter of 2012, Dakota County Soil and Water Conservation District staff will coordinate with state and local agencies to identify where future NCRWMO monitoring efforts should be focused. This may include additional monitoring projects to further identify problems initially detected by the state’s watershed wide monitoring approach.

Appendix 1.

Site	Parameter	Historical Mean Results	2010 Mean Results	Notes – 2010 Results
PC2	Dissolved Oxygen	7.39	3.77	In violation of state standard
PC2	*E. coli*	na	115	Meets state standard
PC2	Nitrate (mg/L)	6.78	5.97	Meets state standards. However individual samples are approaching the state standard.
PC2	Phosphorus, Total	0.08	0.05	Below ecoregion mean, less than historical average
PC2	Suspended Solids	8.30	1.8	Below ecoregion mean, less than historical average
PC2	Turbidity	6.4	1.8	Below state standard
PC3	Dissolved Oxygen	8.32	6.26	Meets state standards
PC3	*E. coli*	na	54	Meets state standards
PC3	Nitrate (mg/L)	8.60	7.80	One sample exceeds state standard
PC3	Phosphorus, Total	0.17	0.06	Below ecoregion mean, less than historical average
PC3	Suspended Solids	26.4	5.5	Below ecoregion mean, less than historical average
PC3	Turbidity	9.5	7.8	Below state standard
TB1	Dissolved Oxygen	8.70	7.95	Meets state standard
TB1	E. coli	na	44	Meets state standard
TB1	Nitrate (mg/L)	11.34	11.35	Exceeds state standard
TB1	Phosphorus, Total	0.80	0.14	Below ecoregion mean, less than historical average
TB1	Suspended Solids	272.8	21.5	Below ecoregion mean, less than historical average
TB1	Turbidity	86.6	28.5	Exceeds standard, due to one elevated sample
TB2	Dissolved Oxygen	10.16	9.23	Meets state standards
TB2	E. coli	na	166	Exceeds state standard
TB2	Nitrate (mg/L)	13.2	15.80	Exceeds state standard
TB2	Phosphorus, Total	0.76	0.16	Below ecoregion mean, less than historical average
TB2	Suspended Solids	239.4	30.9	Below ecoregion mean, less than historical average
TB2	Turbidity	83.5	52.8	Exceeds standard, due to one elevated sample
TB3	Dissolved Oxygen	10.39	10.14	Meets state standards
TB3	E. coli	na	241	Exceeds state standard
TB3	Nitrate (mg/L)	10.05	9.79	Individual samples exceed state standard
TB3	Phosphorus, Total	0.84	0.25	Below ecoregion mean, less than historical average
TB3	Suspended Solids	488.5	84.5	Greater than ecoregion mean
TB3	Turbidity	148.2	76.3	Exceeds standard, due to one elevated sample