



**Cannon River Watershed Partnership
2011 Surface Water Assessment Project Report**

Introduction

Evidence collected via water sampling indicates that the lakes and streams in the Cannon River Watershed are unhealthy and under stress. Most of the lakes in our watershed experience nuisance algal blooms for much of the summer. The river and stream systems are filled with sediment, excessive nutrients and E. coli bacteria. Demand is growing for “something to be done” about these pollution problems. The first step to improving the water conditions is to do an accurate assessment of the pollutant sources by collecting water samples to determine which water bodies are impaired and what specific pollutants are causing the impairment. Establishing a water condition trends utilizing the water quality data collected is necessary in determining the restoration activity to be implemented. In addition, data collected from this project will enhance the existing water quality database for the region and help determine if the waters need to be added to the Minnesota Pollution Control Agency’s (MPCA) 303(d) Impaired Waters list.

Water Quality Standards

The MPCA defines a “Lake” as a enclosed basin filled or partially filled with standing fresh water with a maximum depth greater than 15 ft. Lakes may have no inlet or outlet, an inlet or outlet, or both an inlet and outlet. In contrast, the MPCA defines a “Shallow lake” as a enclosed basin filled or partially filled with standing fresh water with a maximum depth of 15 ft or less or with greater than 80 percent of the lake area shallow enough to support emergent and submerged rooted aquatic plants (the littoral zone). The quality of shallow lakes will permit the propagation and maintenance of a healthy indigenous aquatic community and they will be suitable for boating and other forms or aquatic recreation for which they may be usable. Below are the proposed nutrient state standards for shallow lakes in the ecoregions found in the Cannon River watershed.

Shallow Lakes in Western Corn Belt Plains Ecoregion

- Total Phosphorus (TP)= 90 µg/l
- Chlorophyll-a = 30 µg/l
- Secchi disk transparency = Not less than 0.7 meters

Shallow Lakes in North Central Hardwood Forest Ecoregion

- Total Phosphorus (TP)= 60 µg/l
- Chlorophyll-a = 20 µg/l
- Secchi disk transparency = Not less than 1.0 meters

Assessments for lakes require a minimum of 10 TP, 10 Chlorophyll-a and 10 Secchi measurements (with case-by-case exceptions) collected over the past 10 years for them to be considered “assessed”. No nutrient water quality standards have been developed by the MPCA for streams yet! However, these standards are in the process of being determined and established based on the eco-regions found within the State of Minnesota.

Water quality measurements

Streams

In 2011, thirteen stream sites were selected and monitored for a variety of water quality chemical parameters such as; transparency, total kjeldahl nitrogen, chlorophyll-a, nitrate-nitrogen, e. coli bacteria, hardness, sulfates, chloride, ammonia nitrogen, total suspended solids, total suspended volatile solids and total phosphorus. In addition to the water quality samples collected, all stream locations had field measurements collected for dissolved oxygen, temperature, conductivity and pH. These parameters give some indication of the stream condition during sampling. Dissolved oxygen is the amount of oxygen available for aquatic life. Water acidity is measured by pH. If the levels change significantly it could indicate some form of pollution in the stream (MPCA, 2003). Conductivity is a measure of the ability of water to pass an electrical current. Conductivity in water is affected by the presence of inorganic dissolved solids such as chloride, nitrate, sulfate, and phosphate anions (ions that carry a negative charge) or sodium, magnesium, calcium, iron, and aluminum cations (ions that carry a positive charge). Organic compounds like oil, phenol, alcohol, and sugar do not conduct electrical current very well and therefore have a low conductivity when in water. The chemical water quality information collected at these thirteen sites will be joined with biological data collected by MPCA field staff who have been collecting aquatic bug/fish information to get a clearer picture of the health of the streams and the organisms living within them.

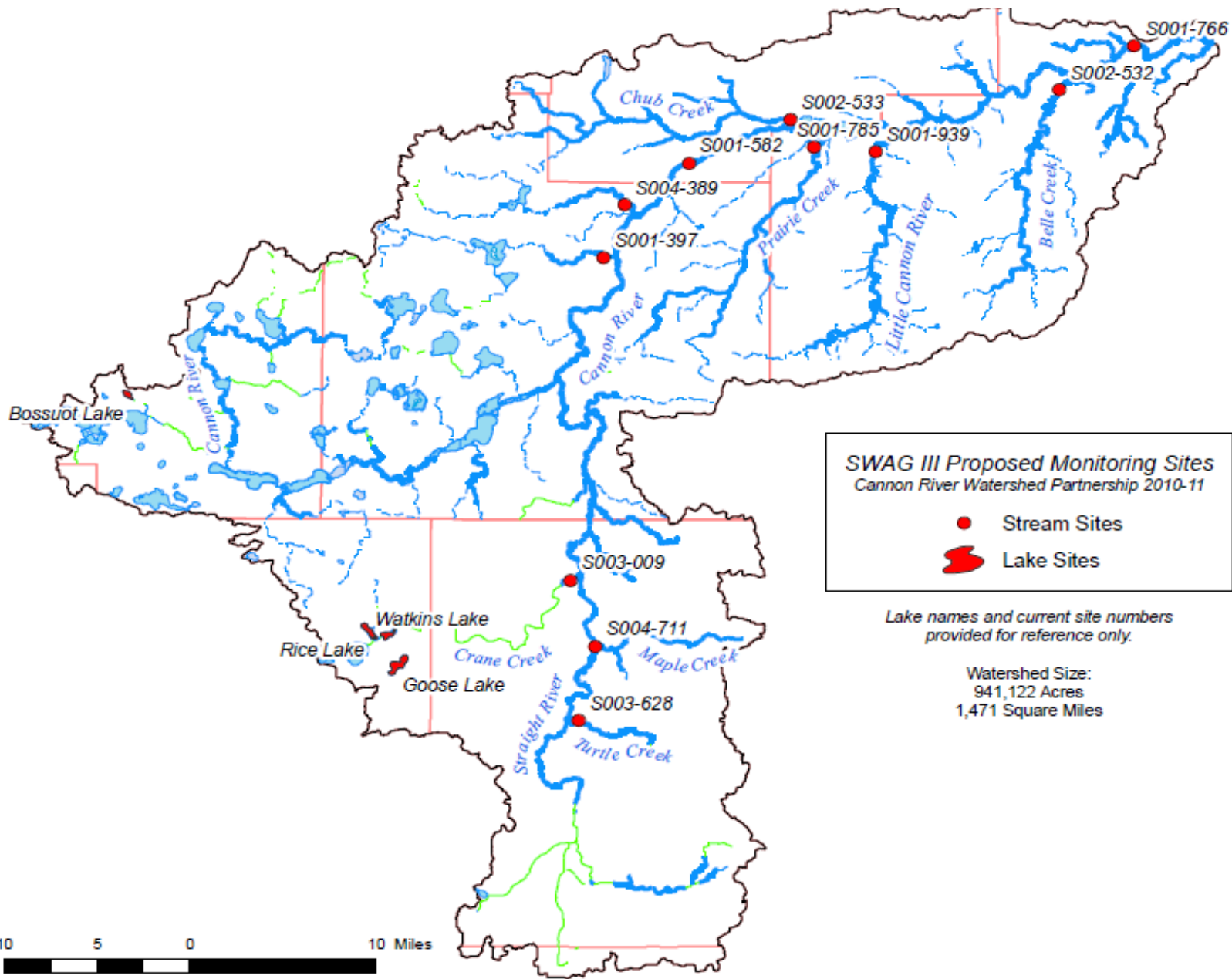
Lakes

In 2011, three lakes (Watkins, Rice and Goose) in Waseca County, Minnesota were monitored for total phosphorus, secchi depth, and chlorophyll-A. Phosphorus is an essential element needed for plant growth and crop production. Total phosphorus can be described as all phosphorus available in water solution regardless of its form. While nitrogen and phosphorus are needed for plant growth, phosphorus is usually the nutrient in short supply in freshwater systems and commonly called the limiting nutrient. Phosphorus in a lake system contributes to excessive algal growth and severe algal blooms that inhibit aquatic recreation. Secchi depth is a measurement used to describe how transparent the water is. The clearer the water is, the greater the Secchi value. Chlorophyll-a, is a plant pigment necessary for photosynthesis. It is used as a surrogate measure of algal biomass in water. Higher levels of chlorophyll-a, and thus more algal, typically result in lower Secchi and transparency as the dense algal growth blocks light in the water. This report includes the water quality results from lake and stream monitoring during the 2011 monitoring season. A map of the stream and lake sampling sites with the MPCA unique identification numbers are included below. Bossout Lake was not sampled due to restricted lake access. Current or past water quality results for each of these sites can be viewed at <http://www.pca.state.mn.us/data/eda/search.cfm> by entering in identification number in Site ID section.

Water quality summary

Lake sampling occurred on three lakes in our watershed for the 2011 monitoring season (June-September). The total number of samples analyzed for total phosphorus and Chlorophyll-A was 5, respectively. The total number of Secchi depth observations at each lake was also 5. The phosphorus standard for shallow lakes was exceeded for all samples collected at all three lakes! This indicates a major problem for these particular lakes. In addition, Chlorophyll-A concentrations for these three lakes were exceeded three times for Goose lake, one time for Watkins lake and four times for Rice lake. A summary of the lake results are presented below. Secchi depth measurements were below the standard of 0.7 meters three times for Watkins and Goose Lake. Rice lake had secchi measurements lower than the standard in 4 out of the 5 samples collected.

A total of 1,483 water quality samples were collected at 13 stream locations within the Cannon River watershed utilizing CRWP staff and citizen stream volunteers. In addition to the water quality samples collected, another 2,097 physical stream measurements were collected at these locations. Since there is no state water quality standard for streams these concentrations do not indicate impairments. However, the concentrations in bold indicate the highest average concentration for that given chemical parameter of the thirteen stream sites sampled. Concentrations in italic indicate the lowest given chemical concentration for the thirteen sites sampled in 2011.



Total Phosphorus (µg/l) for all lakes in 2011 (June – September)

Lake name	MPCA Site ID number	Average (µg/L)	Maximum (µg/L)	Minimum (µg/L)	Samples collected	Exceedances of Standard
Goose Lake	(81-0016)	362	1040	44	5	4
Watkins Lake	(81-0013)	175	227	124	5	5
Rice Lake	(81-0022)	263	345	137	5	5

Chlorophyll-a (µg/l) for all lakes in 2011 (June – September)

Lake name	Site Location	Average (µg/L)	Maximum (µg/L)	Minimum (µg/L)	Samples collected	Exceedances of Standard
Goose Lake	(81-0016)	58	115	4	5	3
Watkins Lake	(81-0013)	41	164	6	5	1
Rice Lake	(81-0022)	87	267	9	5	4

Secchi Depth (m) for all lakes in 2011 (June - September)

Lake name	Site Location	Average (ft)	Maximum (ft)	Minimum (ft)	Samples collected	Exceedances of Standard
Goose Lake	(81-0016)	2	3.5	1	5	3
Watkins Lake	(81-0013)	2.2	3	1	5	3
Rice Lake	(81-0022)	1.8	3	1	5	4

Sampling results for stream sites in 2011 (April – October)

Stream name (MPCA Station #)	Average TSS (mg/L)	Average TSVS (mg/L)	Average Chloride (mg/L)	Average Nitrate (mg/L)	Average E. Coli (# per 100 mL)	Average TP (mg/L)	Average Sulfate (mg/L)	Average Hardness (mg/L)
*Heath Creek (S006-521)	28.3	7.3	32	1.7	304	0.32	22.6	253.9
*Little Cannon River (S004-512)	350	23	20.9	5.6	1,333	0.14	26.7	291
*Cannon River (S001-766)	87.7	14.5	24.8	4.3	392	0.20	25.5	244.8
*Wolf Creek (S001-397)	26.9	9.3	16	2.6	836	0.21	22.7	236.8
*Belle Creek (S002-532)	51.5	8.7	22.9	4.6	1,681	0.15	19.2	286.2
Crane Creek (S003-009)	27.5	6.2	22.6	4.1	269	0.14	43	293
Turtle Creek (S003-628)	12.6	3.8	18.1	4.8	398	0.15	19.3	285
Cannon River (S000-545)	30	6.6	17.9	0.7	443	0.17	15.8	199
*Chub Creek (S002-533)	21.6	6.1	22.6	4.8	806	0.15	22.3	265.7
*Prairie Creek (S001-785)	78.3	12.6	17.5	6.4	2,088	0.12	30.5	271
*Straight River (S006-527)	23.4	4.7	34.3	5.7	261	0.17	43.2	291.1
*Straight River (S001-343)	26.1	6.1	20	4.1	439	0.13	46.7	308.4
*Cannon River (S003-818)	15.4	6.6	76	2.8	17	0.14	19.6	208.8

*Location monitored by citizen stream volunteers