METROPOLITAN COUNCIL

Environmental Services

2013

Stream Water Quality Summary for the Twin Cities Metropolitan Area

This document is a summary of the 2013 results from the Metropolitan Council Environmental Services (MCES) Stream Monitoring program. The Metropolitan Council has a long history of leadership in protecting the quality of water in the seven-county Twin Cities metropolitan area (metro area). As the metro area population continues to grow, it is the job of the Council to plan for and oversee growth that helps maintain the region's environmental integrity.

MCES began monitoring metro area streams in 1989 to determine the extent of nonpoint-source pollution loading from tributaries to the Mississippi, Minnesota, and St. Croix Rivers, to assist in developing management objectives, and to evaluate the effectiveness of watershed management practices for reducing nonpoint-source pollution and improving water quality in metro area streams and rivers. To carry out this monitoring, MCES collaborates with various federal, state, and local groups including municipalities, counties, watershed management organizations and districts, and local soil and water conservation districts. In 2013, MCES and its partners operated monitoring stations at 22 sites on 21 streams in the metro area, as shown in Figure 1.

Figure 1: 2013 MCES Stream Monitoring Stations

What follows is a summary of the 2013 average annual concentrations of key water quality variables in MCES monitored streams. The streams are grouped by major river basin: Minnesota, Mississippi, and St. Croix. In general, streams in the same major river basin will have similar characteristics to each other because of predominant land uses and geology within the basin. However, even intra-basin, the monitored streams may have very different water quality, depending on a number of factors including watershed size, level of urbanization, and soil type.

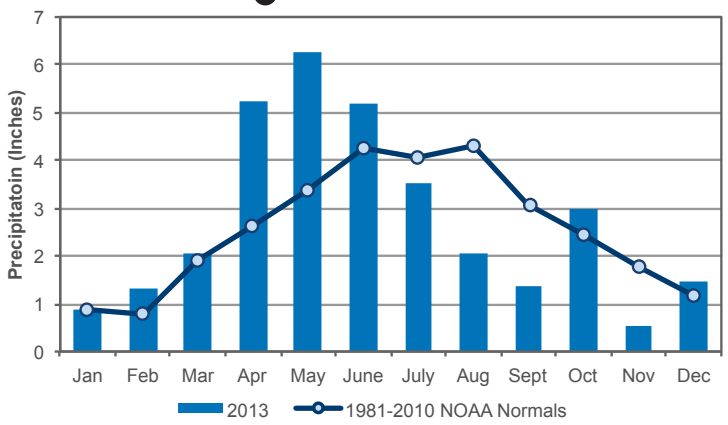
To provide a historical perspective, 2013 average values are compared to 10-year average values for the 2004-2013 time period. Whether a 2013 average concentration is higher or lower than the 10-year average should not be taken as an indication of an increasing or decreasing trend in water quality, but rather as a comparison to normal stream conditions. Concentration in any given year is highly affected by the timing and quantity of stream flow. Concentrations are also compared to state water quality standards where applicable. Table 1 (page 4) contains a summary of results by major river basin.

Precipitation

Description: Regional precipitation is measured at the Minneapolis-St. Paul International Airport, which is a good indicator of significant rainfall events because of its central location, even though actual precipitation varies throughout the metro area.

During wet periods, nonpoint source pollutants are carried through storm sewer systems and smaller streams to the rivers, and higher flows can also cause stream bank erosion, habitat destruction and flooding. During dry periods, flows may be too low to sufficiently dilute pollution, the deposition of sediment increases, and habitat quality may be adversely affected.

Annual Precipitation



2013 Results: Precipitation in the metro area during 2013 was about 2 inches above the NOAA 1981-2010 normal precipitation for the area (a data set updated once every 10 years), though deviations from normal differed greatly between the beginning and end of 2013. Precipitation in the metro area from January through June was 7 inches above normal. In May alone, the Twin Cities experienced over 6.2 inches of precipitation, an anomaly of nearly 3 inches. The second half of the year was a stark contrast, with a drought beginning in July that lasted into the fall, resulting in a July-December rainfall deficit of 5.2 inches.

Chloride (Cl)

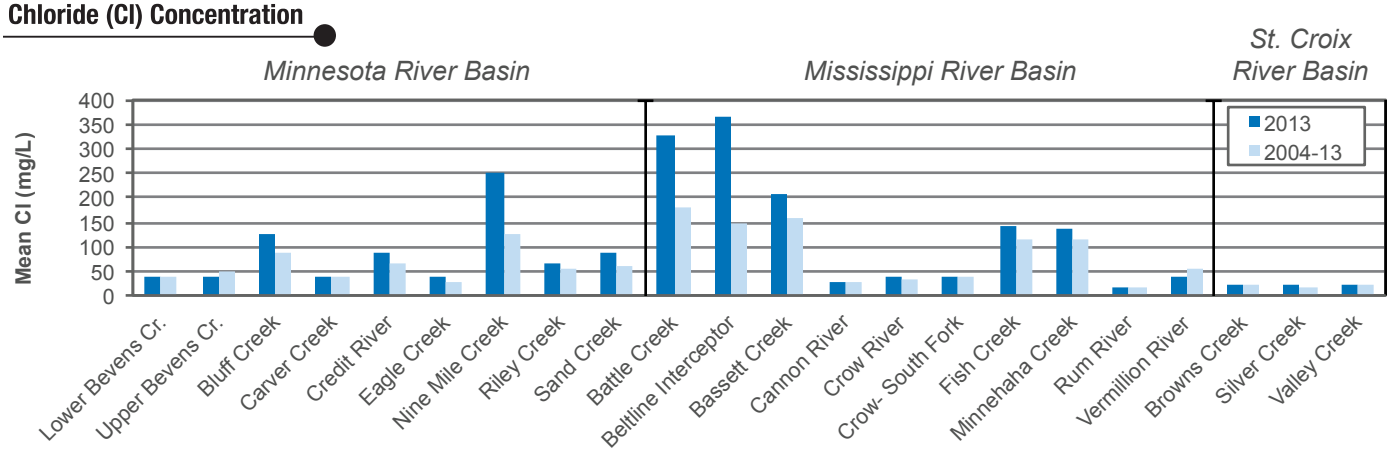
Description: Excess levels of chloride can be toxic to aquatic and terrestrial organisms. Although some chloride is derived from natural sources, the majority of chloride in the metro area is from urban sources such as road deicing and water softening.

Standard: Chloride concentration must not exceed a 4-day average of 230 mg/l or a one hour average of 860 mg/l.

2013 Results: The 2013 average chloride concentrations were generally above their 10-year averages in streams in all three basins. Within the Mississippi River Basin, the more urbanized streams had average concentrations above their 10-year averages, while the streams in larger and more agricultural/rural watersheds had concentrations at or below their 10-year averages.

The three streams in the St. Croix River Basin have traditionally had low average concentrations, and this was true again in 2013. The Beltline Interceptor in the Mississippi River Basin had the highest 2013 average concentration of MCES monitored streams. Although not directly comparable to the chloride standard, the following streams all had samples that exceeded 230 mg/L in 2013: Battle Creek (5 samples), Lower Bevens (1), Beltline Interceptor (3), Bluff Creek (1), Bassett Creek (4), Credit River (1), Fish Creek (1), Minnehaha Creek (4), Nine Mile Creek (4), and Sand Creek (4).

Chloride (Cl) Concentration



Turbidity and Total Suspended Solids (TSS)

Description: Particulate matter in the water may harm aquatic life by decreasing the light available for plant growth, increasing water temperature, clogging gills of aquatic inhabitants and covering habitat. Suspended solids can also negatively affect user perception of water quality and decrease swimmability.

Particulate matter in the water has a variety of sources, including sediment eroded from stream banks or carried into a river with urban or agricultural runoff or organic particulate such as decaying matter or algae. The amount of particulate matter in a river can be measured as turbidity or total suspended solids. Turbidity is an easier measurement that can be done in the field, but is harder to compare between sites because readings can be

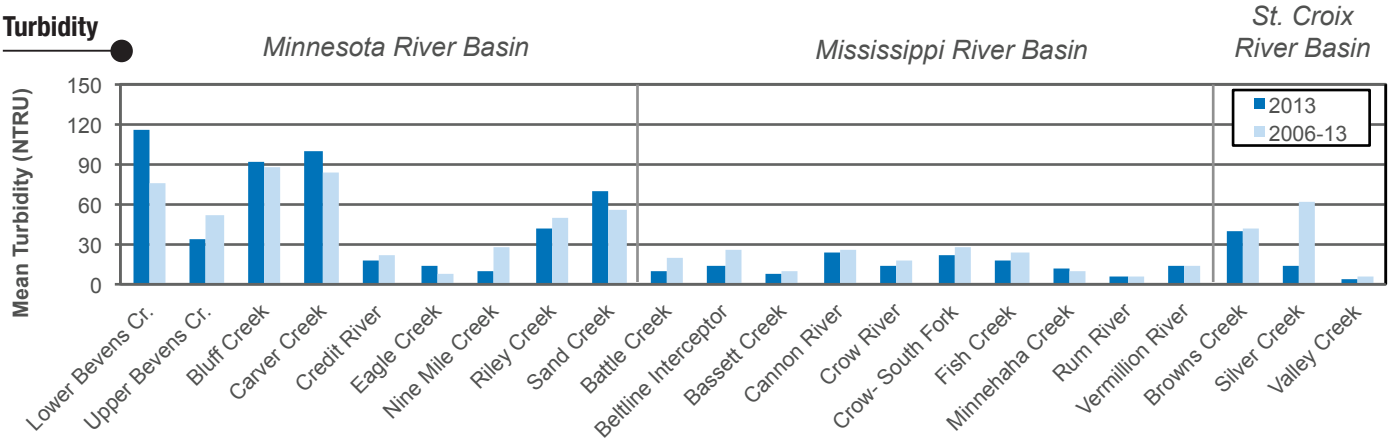
influenced by the presence of dissolved matter, temperature, and the shape of the particles. The MCES lab has measured turbidity in Nephelometric Turbidity Ratio Units (NTRUs) since 2006.

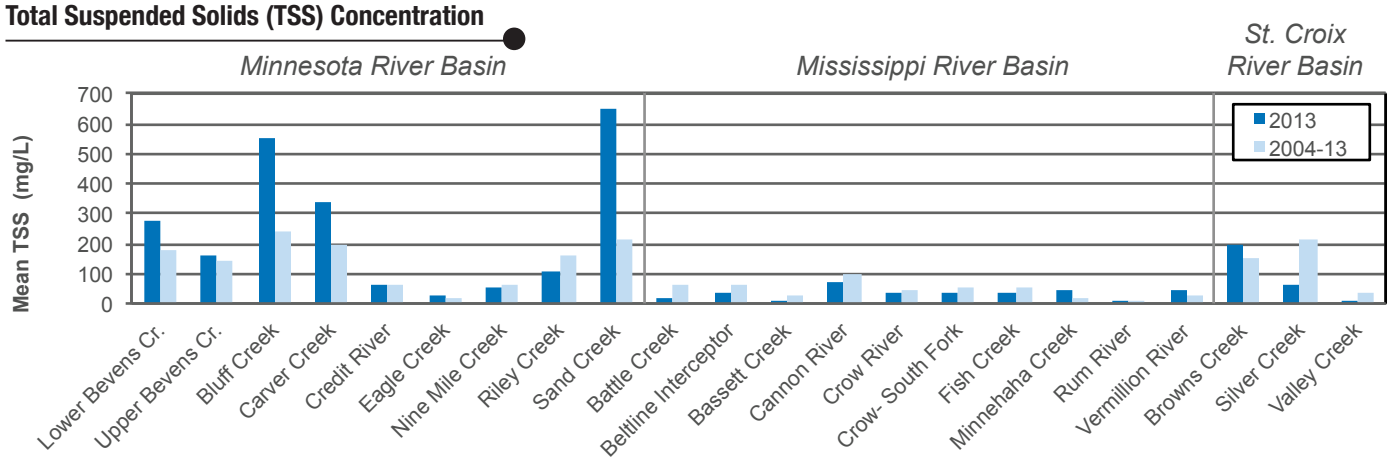
Standard: The state recently adopted a TSS standard that may be 10, 30, or 65 mg/l for MCES monitored streams based on location and whether a stream is classified as a cold water fishery. A turbidity standard no longer exists.

2013 Results: The 2013 average turbidity and TSS concentrations in streams in all three basins showed no particular trend in comparison with their multi-year averages (8-year average for turbidity, 10-year average for TSS). At some sites, turbidity and TSS had similar relationships to their multi-year averages but not at other sites.

In the Minnesota River basin, Lower Bevens Creek, Carver Creek, and Sand Creek had 2013 averages that were much higher than their multi-year averages for both turbidity and TSS. Bluff Creek's 2013 average TSS concentration was significantly above its 10-year average, but average turbidity was only slightly above its 8-year average. Nine Mile Creek's 2013 average turbidity was significantly below its 8-year average, but average TSS concentration was only slightly below its 10-year average.

In the Mississippi River basin, the majority of streams had turbidity and TSS concentrations below their multi-year averages. Minnehaha Creek is an exception where both turbidity and TSS concentrations were above the multi-year averages. In the St. Croix basin, Silver Creek had significantly lower 2013 average turbidity and TSS concentration than its multi-year averages. Only Bassett Creek and Rum River did not have a sample above the TSS standard appropriate to that stream in 2013.





Nutrients

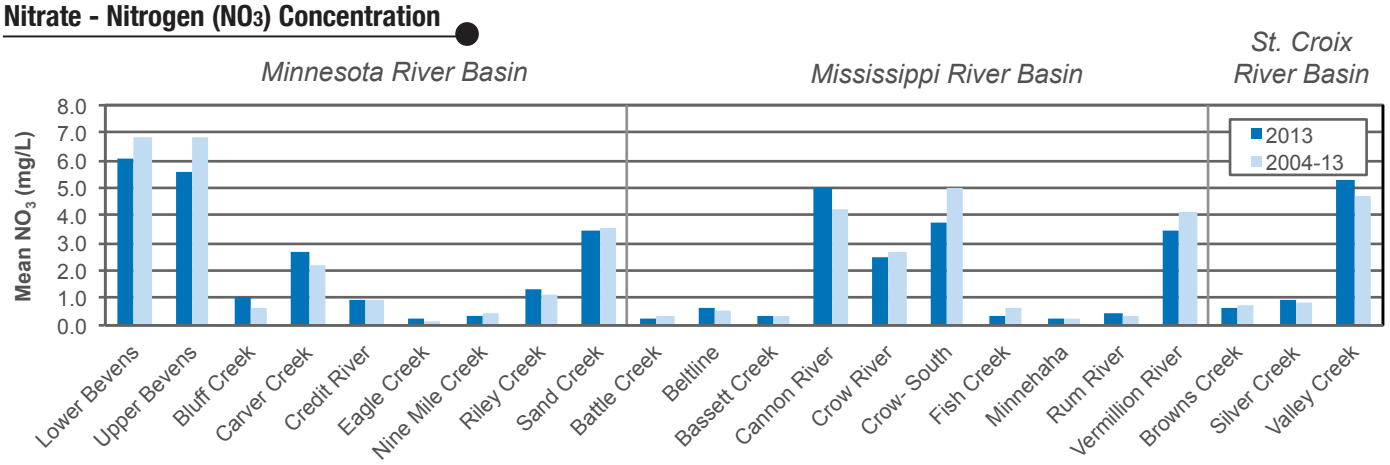
Description: Aquatic plants provide food, oxygen and habitat for river organisms. However, an excess of nutrients (eutrophication) can lead to unsightly algae blooms, oxygen depletion, and odor upon decaying, making the water unpleasant for recreational activities and unsuitable for aquatic life. Nitrogen and phosphorus are essential nutrients for plant growth and individually or combined are often the limiting nutrient(s) for growth in aquatic systems. Nitrogen and phosphorus are common components of wastewater treatment plant discharges and urban and agricultural runoff. They can stimulate excessive plant growth when levels in rivers are too high.

Standards: Class 2Bd drinking waters cannot exceed 10 mg/l nitrate-nitrogen. The state recently adopted a TP standard that may be 0.1 or 0.15 mg/l for MCES monitored streams based on location.

Nitrate – Nitrogen (NO3)

2013 Results: The 2013 average nitrate concentrations in all three basins were generally close to their 10-year averages. The Bevens Creek sites (upper and lower) in the Minnesota River Basin had significantly lower average nitrate concentrations compared to their 10-year averages. Additionally, the Crow-South Fork average concentration was significantly lower than its 10-year average.

Nitrate - Nitrogen (NO_3) Concentration



Total Phosphorus (TP)

2013 Results: The 2013 average phosphorus concentrations in all three basins showed no particular trend in comparison with their 10-year averages. In the Minnesota River Basin, Bluff, Carver and Sand Creek's 2013 average concentrations were significantly higher than their 10-year averages. In the Mississippi River Basin, Battle Creek, Beltline Interceptor and the Vermillion River had 2013 average concentrations significantly below their 10-year averages. In the St. Croix River Basin, Silver and Valley Creeks also had 2013 average concentrations significantly below their 10-year averages. All monitored MCES streams had at least one sample above the TP standard appropriate for that stream in 2013.

Total Phosphorus (TP) Concentration

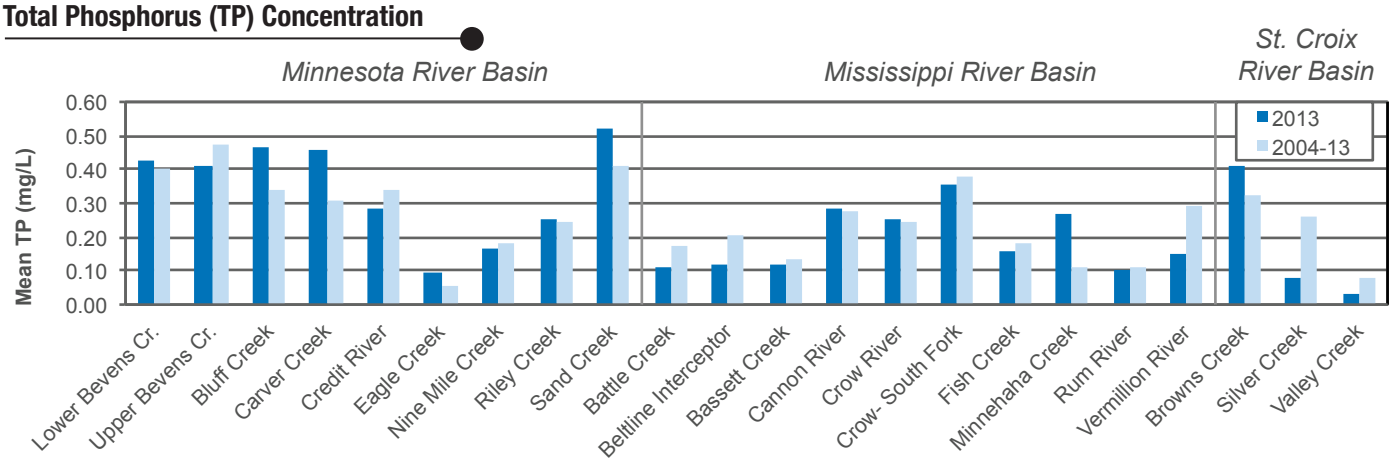


Table 1: 2013 water quality by river basin as compared to the 10-year average (2004 – 2013)

Basin	Chloride	Turbidity[a]	TSS	Nitrate	Phosphorus
Minnesota River	Higher	Varies	Higher	Varies	Higher
Mississippi River	Higher	Lower	Lower	Varies	Lower
St. Croix River	Higher	Lower	Lower	Higher	Lower

"Higher" or "Lower" indicate that a large majority of sites in the basin were either higher or lower than the 10-year average by more than a 1% difference. "Varies" indicates no clear majority.

[a]Average is based on data from 2006 – 2013.

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