2006 Pine Creek and Trout Brook Water Quality Monitoring Report

Prepared for:
North Cannon Watershed Management Organization

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Prepared by:
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Pine Creek Sub-watershed

Pine Creek is located within the North Cannon Watershed and drains 20.7 square miles (82% cropland) in Southeast Dakota County (NCRWMO Water Management Plan, 2003). Pine Creek eventually enters the Cannon River in Goodhue County, just outside of the City of Cannon Falls.

Two water quality monitoring stations are located on Pine Creek and are operated by the Dakota County Soil and Water Conservation District (DCSWCD) (Figure 1). In 2006, monthly low flow grab samples and event flow grab samples were collected from these water quality monitoring stations, between the months of May and November. Samples were analyzed for a suite of chemical and physical parameters including dissolved oxygen, temperature, total phosphorus, and turbidity.

Trout Brook Sub-watershed

Trout Brook is located within the North Cannon Watershed and drains 26.7 square miles (78.3% cropland) in southeast Dakota County (NCRWMO Water Management Plan, 2003). Most of the perennial flow is contained within the Miesville Ravine Park Reserve, and enters the Cannon River immediately after leaving the park.

Three water quality monitoring stations are located on Trout Brook and are operated by the DCSWCD (Figure 1). In 2006, monthly low flow grab samples and event flow grab samples were collected from these water quality monitoring stations, between the months of May and November. Samples were analyzed for a suite of chemical and physical parameters including dissolved oxygen, temperature, total phosphorus, and turbidity.

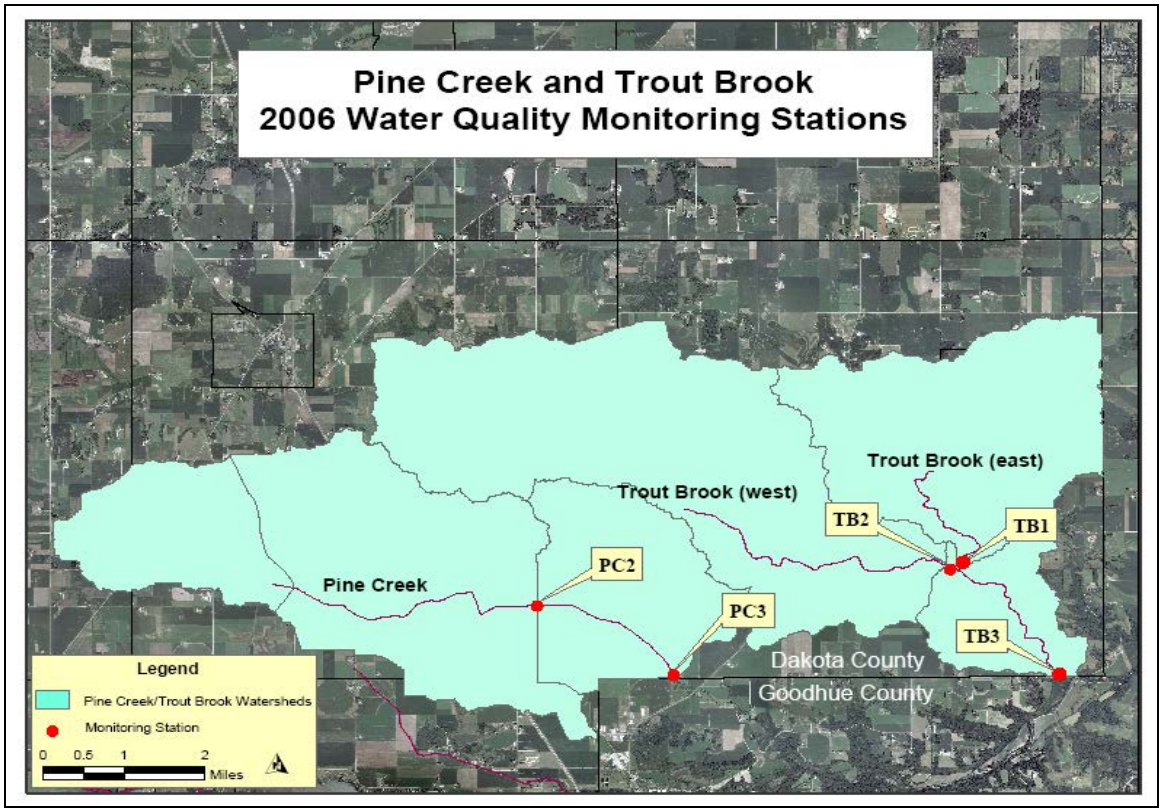

Figure 1.

Dissolved Oxygen Results

Dissolved oxygen measurements were made in-stream throughout the summer, under low flow conditions as well as during event flows. Dissolved oxygen measurements were completed using a Hydrolab Quanta water quality sensor package.

The dissolved oxygen state standard (Minnesota Statute 7050) for designated trout streams, such as the monitored portions of Pine Creek and Trout Brook, is 7 mg/L. At all of the Pine Creek and Trout Brook sites, mean dissolved oxygen concentrations exceeded the state standard (Figure 2). However, during the warm summer months, dissolved oxygen concentrations briefly fell below the state standard at sites PC3 and TB1. Dissolved oxygen concentrations greater than 7 mg/L are generally considered oxygen rich and are high enough to support healthy fish populations.

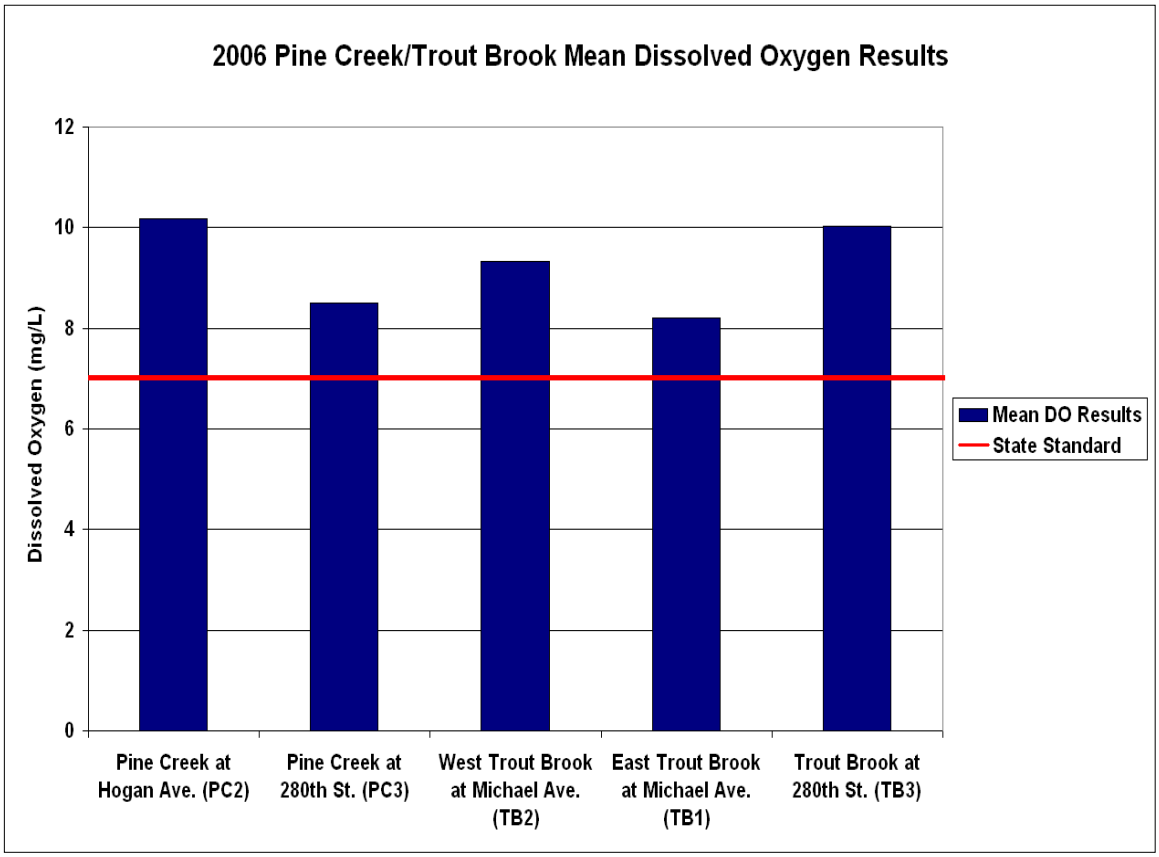

Figure 2.

Nitrate (NO_3)/Nitrite (NO_2) Results

Nitrate/nitrite samples were collected under low flow conditions as well as during event flows. Samples were submitted for analysis to the Metropolitan Council water quality laboratory.

The Minnesota Pollution Control Agency (MPCA) suggests that ideal nitrate/nitrite mean concentration for streams in the Western Corn Belt Plains eco-region is 4.8 mg/L (McCollar and Heiskary, 1993). At all of the Pine Creek and Trout Brook sites, nitrate/nitrite concentrations were well in excess of the eco-region mean, with concentrations at the west Trout Book site (TB2) highest (Figure 3). Potential nitrogen sources within these watersheds include, but are not limited to, individual septic treatment systems, urban runoff, agricultural runoff, and groundwater inputs.

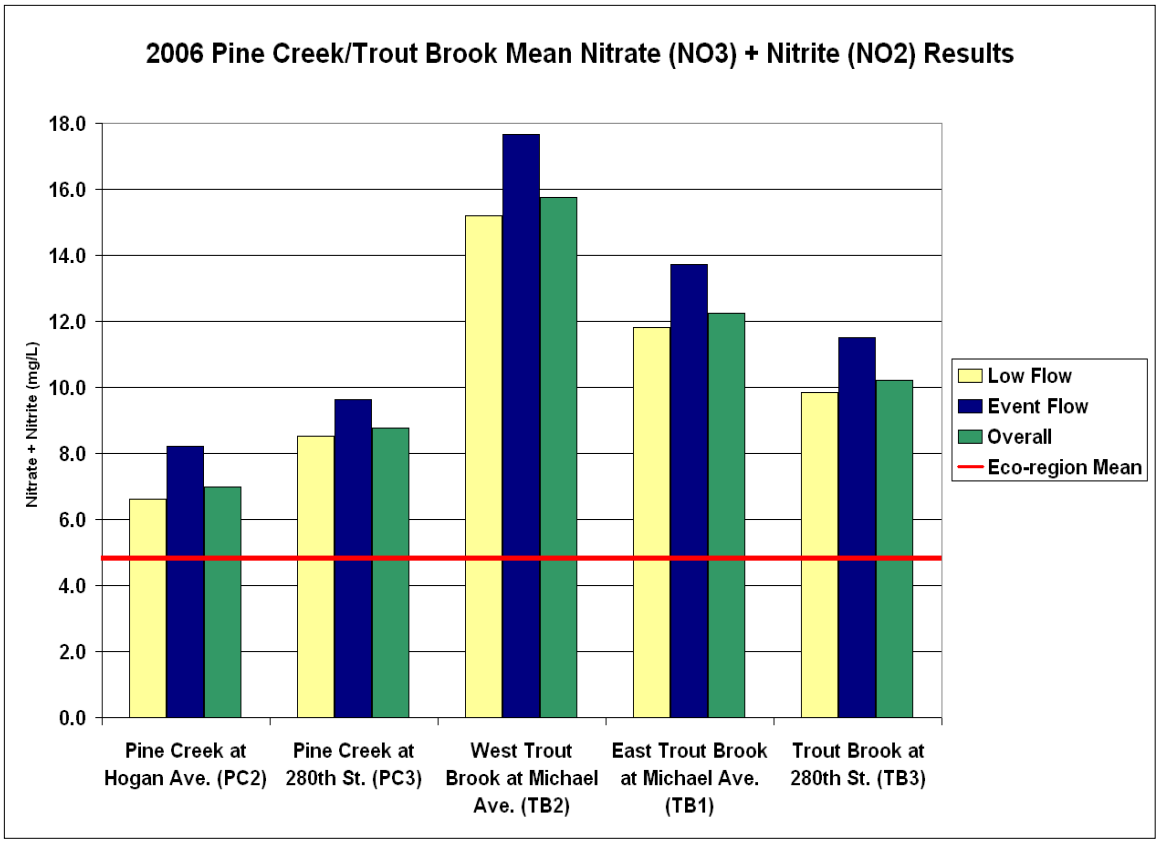

Figure 3.

Temperature Results

Temperature measurements were made in-stream throughout the summer, under low flow conditions as well as during event flows. Temperature measurements were completed using a Hydrolab Quanta water quality sensor package.

A recent literature review suggests that the maximum temperature at which brown trout thrive is approximately 64°F (Bell, 2006). This is the standard by which 2006 temperature results for Pine Creek and Trout Brook are compared. Mean temperature results for 2006 were well below the 64° F guideline, oftentimes 10° F colder (Figure 4). This suggests that the water temperatures of both Pine Creek and Trout Brook are cold enough to support trout populations.

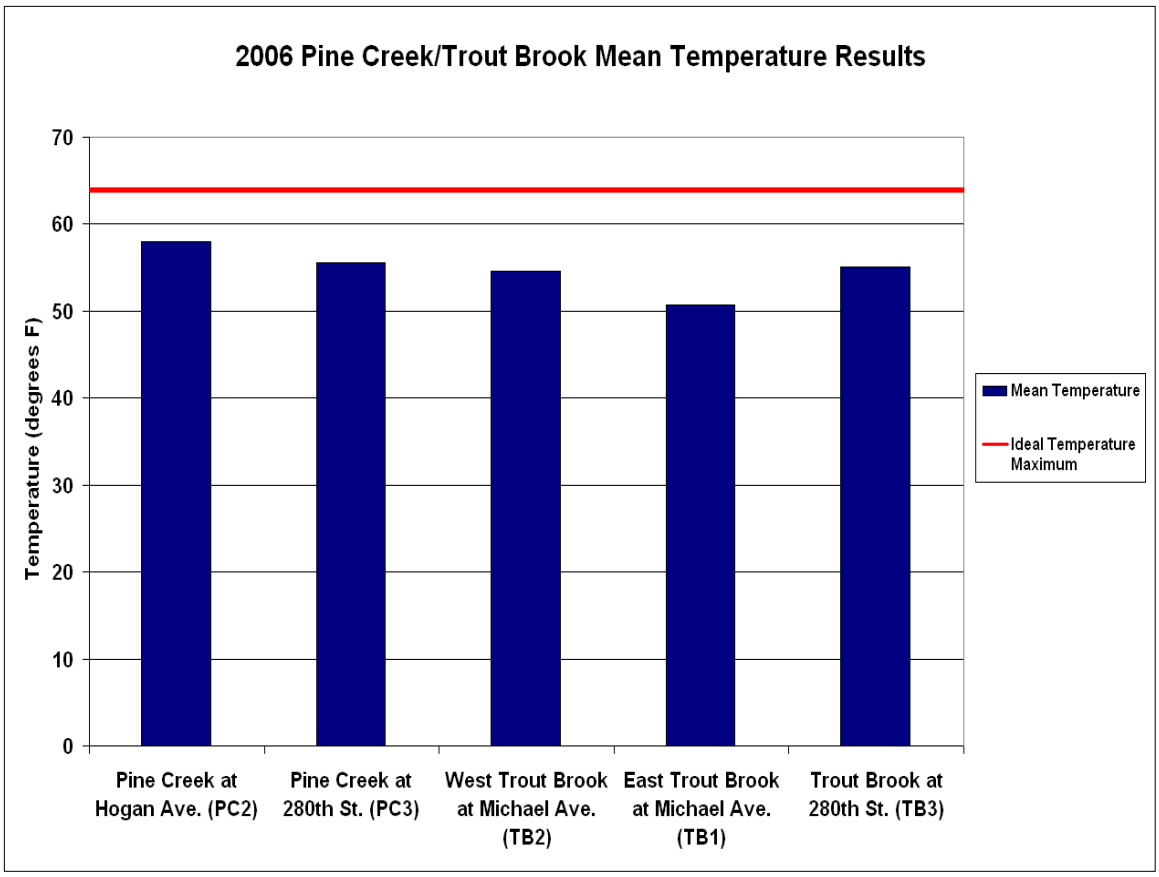

Figure 4.

Total Phosphorus Results

Total phosphorus samples were collected under low flow conditions as well as during event flows. Samples were submitted for analysis to the Metropolitan Council water quality laboratory.

The Minnesota Pollution Control Agency (MPCA) suggests that ideal total phosphorus mean concentration for streams in the Western Corn Belt Plains eco-region is 0.28 mg/L (McCollar and Heiskary, 1993). At all of the Pine Creek and Trout Brook sites, total phosphorus concentrations were well below the ideal eco-region mean under all flow conditions (Figure 5). Furthermore, concentrations during event flows were very near those collected under low flow conditions. This may suggest that what little runoff entered Pine Creek and Trout Brook, contained low quantities of phosphorus. However, 2006 was a dry summer, and it is possible that runoff was not reaching the channel but was being infiltrated by the relatively dry soils of 2006.

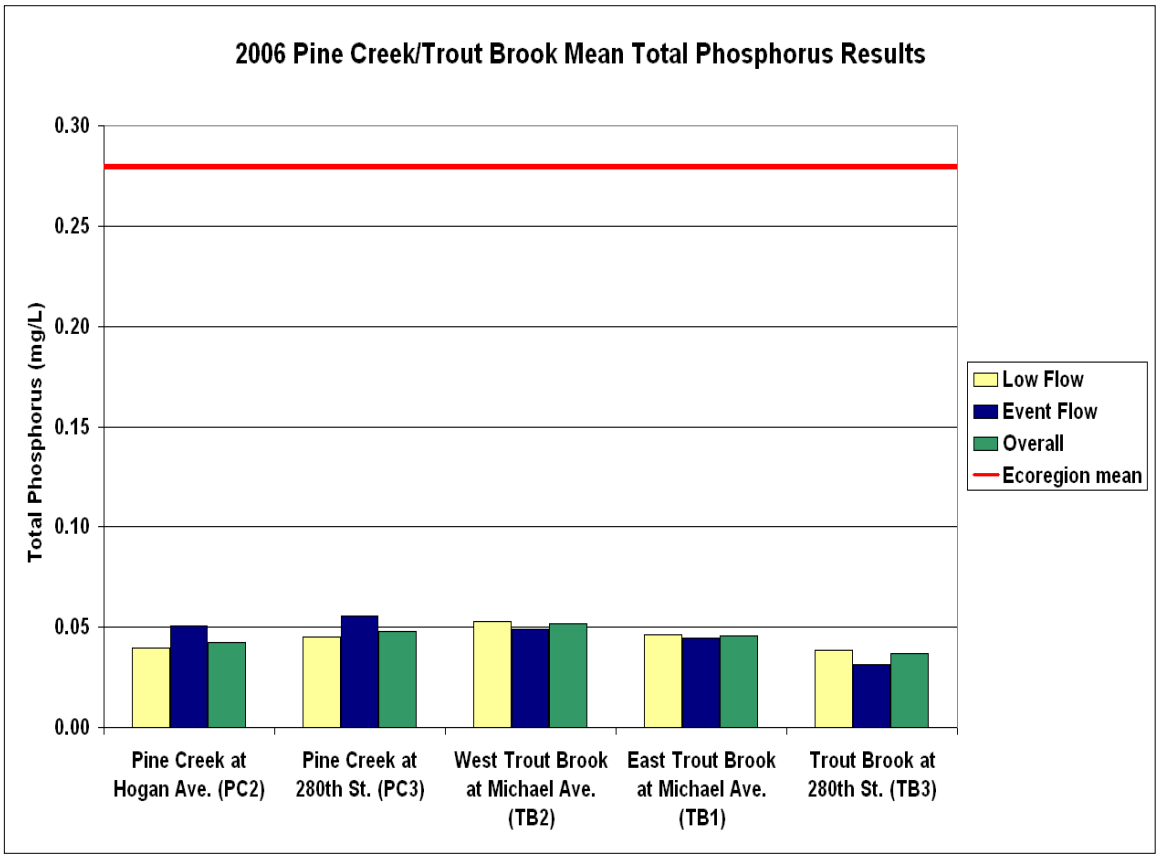

Figure 5.

Turbidity Results

Turbidity samples were collected under low flow conditions as well as during event flows. Samples were submitted for analysis to the Metropolitan Council water quality laboratory.

The trout stream portion of Trout Brook was officially listed as impaired for turbidity by the MPCA in 2006. Due in large part to this impairment, considerable interest has been focused on turbidity conditions in the Pine Creek and Trout Brook sub-watersheds. The turbidity state standard (Minnesota Statute 7050) for designated trout streams, such as the monitored portions of Pine Creek and Trout Brook, is 10 nephelometric units (NTU). Turbidity results under all flow conditions were well below the state standard (Figure 6). These results are similar to those generated in 2006 by citizen volunteers who collect transparency tube data at these same locations (MPCA, 2007). However, it should be mentioned that 2006 was a relatively dry year. As a consequence, little overland runoff occurred, which is the likely source of elevated turbidity levels in these sub-watersheds. Had these watersheds received more precipitation, turbidity levels may have been substantially higher.

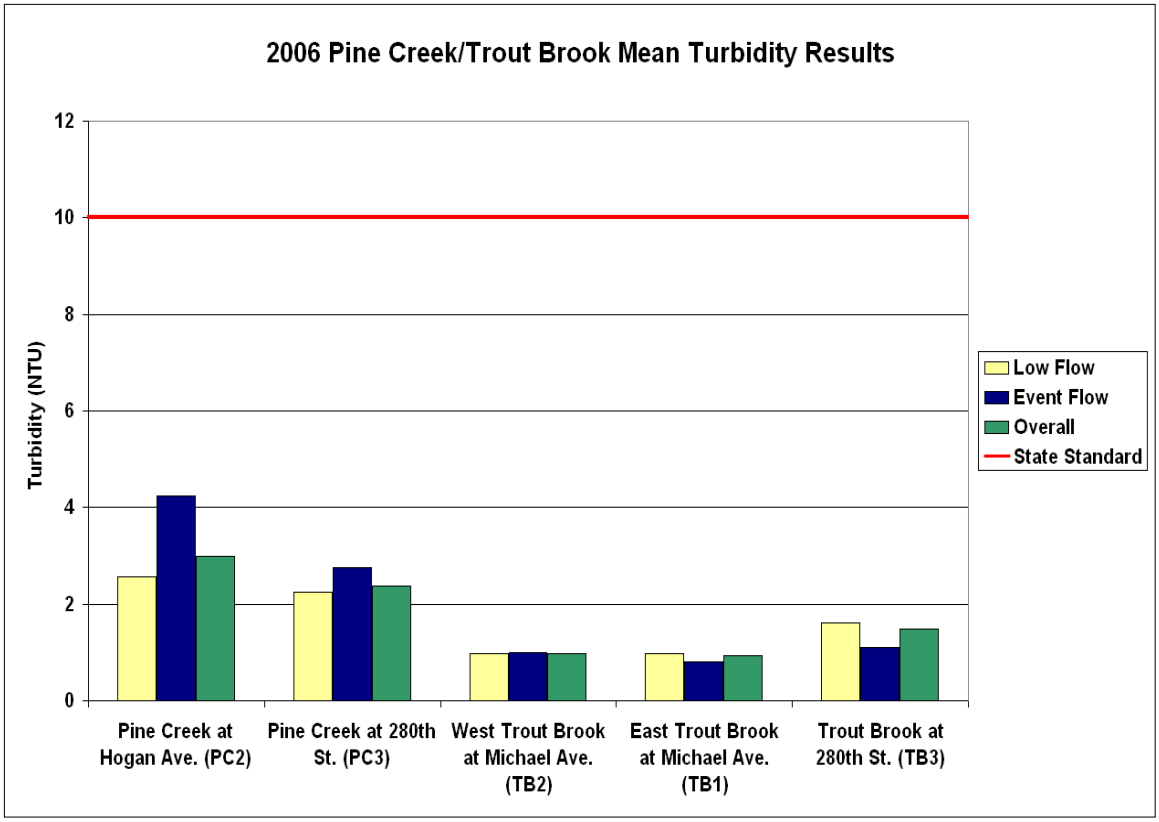

Figure 6.

References

Bell J.M., 2006. The Assessment of Thermal Impacts on Habitat Selection, Growth, Reproduction, and Mortality in Brown Trout (*Salm trutta* L): A Review of the Literature. Prepared for the Vermillion River EPA Grant #WS 97512701-0 and the Vermillion River Joint Powers Board. Applied Ecological Services, Inc.

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