

Appendix B: Water Quality Monitoring

2005 Lake Water Quality Study

***Northwood Lake, Sweeney Lake, and
Twin Lake***

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Executive Summary

Since 1970, water quality has been monitored in ten major lakes under the management of the Bassett Creek Watershed Management Commission (Commission). The main objective of this program is to detect changes or trends in lake water quality over time that will help determine the effects from changing land use patterns within the watershed as well as the Commission's efforts to maintain and improve water quality. The Bassett Creek Watershed Management Commission adopted its current watershed management plan in 2004. The second generation plan complies with the provisions of the Minnesota Rules Chapter 8410, the Metropolitan Surface Water Management Act, the Water Resources Management Policy Plan, and other regional plans. The Commission's Plan sets the vision and guidelines for managing surface water within the boundaries of the BCWMC.

This report summarizes the results of water quality monitoring during 2005 in Northwood Lake in New Hope and Sweeney and Twin Lakes in Golden Valley. The lakes were monitored for both chemical (Appendix A) and biological (Appendices B and C) water quality parameters, the latter including phytoplankton, zooplankton and macrophytes (aquatic plants). Monitoring results are summarized by lake and include a description of the results along with graphical representations of the data.

The conclusions from 2005 water quality monitoring are as follows:

Northwood Lake

- Water quality status of Northwood Lake was eutrophic (nutrient rich) to hypereutrophic (very nutrient rich) during the 2005 growing season. The lake was slightly degraded when compared to the 2000 monitoring period, but was within the range of variability seen since 2000. The lake was treated with barley straw during 2000 through 2003. Treatment was discontinued after the 2003 growing season.
- Secchi disc transparency reached the bottom of the lake at both sampling stations (1.25 m) during most of the season.
- Summer averages of chlorophyll *a* (47.1 $\mu\text{g/L}$) and total phosphorus (177.5 $\mu\text{g/L}$) were elevated when compared to 2000 (chlorophyll *a* of 17.4 $\mu\text{g/L}$ and total

phosphorus of 120 $\mu\text{g/L}$) but were well below historical highs detected in 1977 (chlorophyll *a* of 170 $\mu\text{g/L}$) and 1982 (total phosphorus of 437 $\mu\text{g/L}$).

- Based on average summer Secchi disc transparency, the recreational suitability index for Northwood Lake is 4, indicating recreational use impairment by algae in the lake.
- Similar to the 2000 macrophyte survey, macrophytes (aquatic plants) were detected throughout the lake in 2005. Macrophytes became established in the lake in 2000 when water clarity increased due to barley straw treatment. Although barley straw treatment was discontinued after the 2003 growing season, macrophytes continue to be present in the lake.
- Northwood Lake is classified as a Level II water body—appropriate for all recreational uses except full body contact activities. The level II goals are: (1) average summer total phosphorus concentration not to exceed 45 $\mu\text{g/L}$, (2) average summer chlorophyll *a* concentration not to exceed 20 $\mu\text{g/L}$, and (3) average Secchi disc transparency of at least 1.4 meters. In 2005, the average summer total phosphorus concentration was 177.5 $\mu\text{g/L}$, the average chlorophyll *a*, concentration was 47.1 $\mu\text{g/L}$, and the average Secchi disc transparency was 1.1 meters. Northwood Lake did not meet goals 1 and 2, but would have likely met goal 3, if the water depth at the sampling stations had been deep enough.
- Historical records indicate water quality declined during 2000 through 2005, but generally remains improved when compared to years previous to 2000.

Sweeney Lake

- According to the averages of the three nutrient related parameters (total phosphorus, chlorophyll *a*, and Secchi depth), the water quality status of Sweeney Lake was eutrophic (nutrient rich) during the 2005 growing season
- Both chlorophyll *a* and Secchi depth improved when compared to the 2000 sampling season whereas total phosphorus was slightly elevated
- Macrophytes (aquatic plants) were abundant on both sampling dates and curlyleaf pondweed (an exotic, invasive species) was present in heavy densities during the June

survey whereas purple loosestrife, another exotic, invasive species, was detected in the August survey

- Based on average summer Secchi disc transparency, the recreational suitability index for Sweeney Lake is 3, indicating slight recreational use impairment by algae in the lake.
- Despite improvements, Sweeney Lake did not meet Level I water quality goals for total phosphorus (average summer concentration not to exceed 30 µg/L), chlorophyll *a* (average summer concentration not to exceed 10 µg/L), or Secchi disc transparency (average summer depth of at least 2.2 meters) in 2005. The lake's average summer total phosphorus concentration was 52.6 µg/L, average summer chlorophyll *a* concentration was 19.4 µg/L, and average summer Secchi depth was 1.8 meters.
- Historical records indicate the lake's 2005 water quality was substantially better than the lake's 1982 water quality and was also better than the lake's 2000 water quality.

Twin Lake

- Water quality status for Twin Lake was in the mesotrophic range (i.e. moderate level of nutrients) during the summer of 2005. The lake has the best water quality of the lakes discussed in this report.
- Despite the lake's good water quality throughout the summer period, the lake noted a brief period of poor water quality during the spring of 2005. The lake's trophic status during April of 2005 ranged from eutrophic (nutrient rich) to hypereutrophic (very nutrient rich). Internal loading likely contributes to unusually poor water quality in spring due to mixing of water containing high levels of phosphorus during spring turnover. A spring algal bloom used up the lake's excess phosphorus and the lake's water quality was good by summer. Because the lake's goals are based upon average summer conditions, the lake's poor spring water quality did not prevent goal attainment. The lake's good water quality throughout the summer period met the lake's goals.
- Historical records back to 1972 indicate water quality has remained relatively constant since water quality improvement occurred between the 1982 and 1992 sampling seasons.

- Based on average summer Secchi disc transparency, the recreational suitability index for Twin Lake is 1, indicating no recreational use impairment by algae in the lake.
- A healthy macrophyte (aquatic plants) community was observed on both the June and August sampling dates. Curlyleaf pondweed, an undesirable, exotic, invasive species detected in 2000, was not found in 2005.
- Twin Lake water quality during summer 2005 met Level I water quality goals for total phosphorus (average summer concentration not to exceed 30 µg/L), chlorophyll *a* (average summer concentration not to exceed 10 µg/L), and Secchi disc transparency (average summer depth of at least 2.2 meters) in 2005. The lake's average summer total phosphorus concentration was 20.8 µg/L, average summer chlorophyll *a* concentration was 3.6 µg/L, and average summer Secchi depth was 3.7 meters.