6 DIAMOND LAKE

HISTORY

Diamond Lake is a small, shallow water body classified as a Type 5 wetland and surrounded by residential neighborhoods and parkland. Before human impact, the wetland would dry up during dry summer months and become a marsh. Diamond Lake and surrounding park areas were donated to the MPRB between 1926 and 1936. Pearl Lake (now Pearl Park) was connected to the north end of Diamond Lake before it was filled in 1937. Todd Park, originally a wetland area connected to the east side of Diamond, was also filled to use as parkland. A drain from Pearl Park was installed to divert water to Diamond Lake and prevent flooding in the park.

In 1940, the City of Minneapolis installed storm sewers and by 1941, 800 acres of watershed were draining into Diamond Lake causing drastic water elevation fluctuations. In 1942, the Works Progress Administration (WPA) constructed an overflow to control water elevation and an outflow pipe that carried water from the northeast shore to Minnehaha Creek. In 1953, the Minnesota Department of Natural Resources (MDNR) completed a water quality survey (MDNR, 1953) and determined that the lake could not be considered a fish supporting lake due to the lack of oxygen during the winter months. The construction of Interstate 35W, in the 1960s, added several miles of highway runoff to Diamond Lake.

In 1991, the MPRB placed a weir at 822.00 feet (112.2 feet above city datum) at the outlet, raising the water level from 110.3 feet above city datum. The increase in water elevation was done to re-establish aquatic plants and restore important wildlife habitat. Table 6A shows the morphometric data.

Diamond Lake provides diverse wildlife habitat. With a relatively undeveloped shoreline, it provides activities such as bird watching and other outdoor recreation. Water lily flowers floating in Diamond Lake also offer appealing aesthetics.

Table 6A. Diamond Lake morphometric data. * Littoral area was defined as less than 15 feet deep.

Surface Area (acres)	Mean Depth (m)	Maximum Depth (m)	Littoral Area*	Volume (m^3)	Watershed Area (acres)	Watershed: Lake Area (ratio)
41	0.9	2.1	100%	7.15×10^4	669	16.3

WATER QUALITY TRENDS (TSI)

A detailed explanation of TSI can be found in Section 1. Figure 6A shows the TSI scores and trend from 1992–2006.

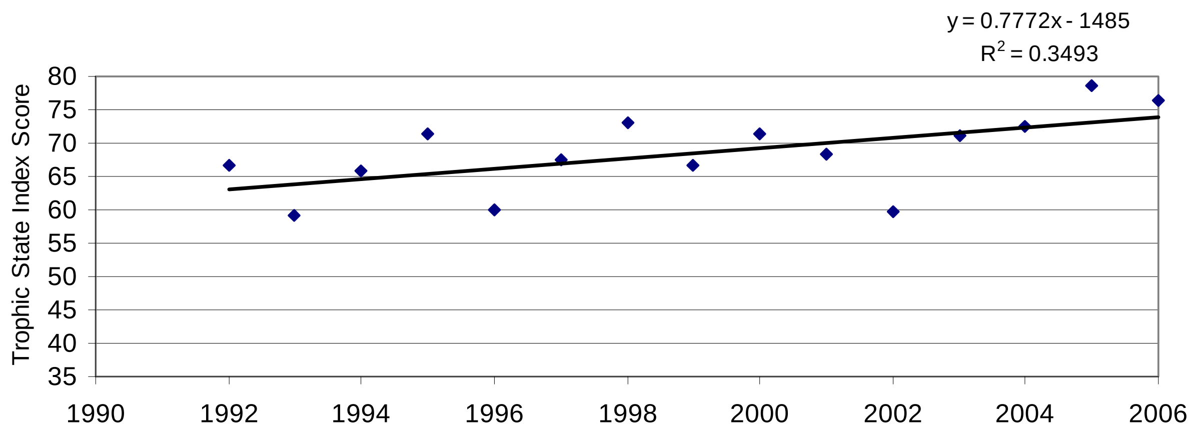

Figure 6A. Diamond Lake TSI scores and regression analysis from 1992 to 2006.

The increasing trend points to a slight degradation in water quality. This may be due to the continuing impacts of stormwater on this urban, shallow wetland. Diamond Lake would be categorized as a eutrophic lake, but Carlson's TSI is not a valid tool for examining a Type 5 wetland. Carlson's index was developed for lakes without nonalgal turbidity and with low macrophyte populations. Diamond Lake is a fertile, shallow lake with high, nonalgal turbidity and extensive macrophyte populations. Total phosphorus data appear to vary markedly from year to year. Phosphorus variation may also be inherent to this shallow Type 5 wetland. Secchi depth is difficult to assess in Diamond Lake since it is so shallow.

Historically, grab samples were taken from the northeast floating dock. In 2004, the sampling location moved to the deepest area in the south bay.

Box and Whisker Plots

The box and whisker plots show the scatter in more detail, within the years data set, for the Secchi, chlorophyll-*a* and total phosphorus data. Long-term lake monitoring is necessary to evaluate the seasonal and year-to-year variations seen in each lake and predict trends. A detailed explanation of box and whisker plots can be found in Section 1. Figure 6B shows box and whisker plots from 1992-2006. Diamond Lake has limited Secchi transparency data due to the shallowness of the lake. Outliers in TP and chl-*a* in 2005 may be due to large particulate organic matter. Box and whisker plot data from Diamond Lake appears to be more variable and contain more scatter than other lakesr. The increased scatter could be influenced by seasonal and water level changes, inherent to the nature of a wetland.

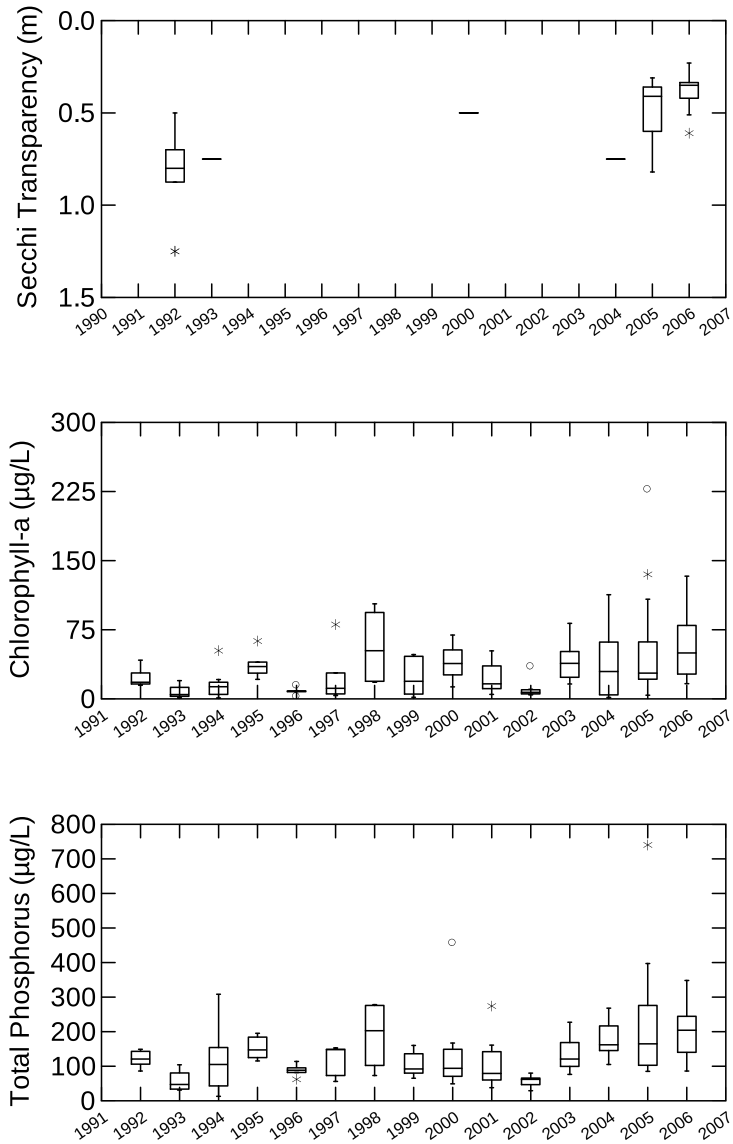

Figure 6B. Box and whisker plots of Diamond Lake data from 1990 to 2006. 2005 outliers in TP and chl-*a* may be due to large particulate organic matter.

WINTER ICE COVER

In the spring, ice came off Diamond Lake on April 5, 2006, which is just five days later than the mean and median day of ice off. Ice came on to Diamond Lake on December 1, 2006 which is just about average. See Section 1 for details on winter ice cover records and Section 18 for a comparison with other lakes.

Phytoplankton and Zooplankton

Phytoplankton and zooplankton are the microscopic plant and animal life that form the basic food web of lake ecology. The greenness of a lake is measured by chlorophyll-*a* (chl-*a*) as an expression of the phytoplankton present. In 2006, phytoplankton were sampled monthly throughout the growing season. Zooplankton sampling was not done at Diamond Lake because of the shallow depth. Figure 6C shows the relative abundance of phytoplankton over the sampling season. In early spring, pyrrhophytes (dinoflagellates), euglenophytes (euglenas), and chrysophytes (golden algae) were able to dominate. The community shifts to chlorophytes (green algae) and cyanobacteria (blue-green algae) in spring. After ice-off, cyanobacteria (blue-green algae) dominate the phytoplankton community for the remainder of the year. Figure 6D shows the chlorophyll-*a* data throughout 2006. Highest concentrations of chlorophyll-*a* correspond to the period when blue-green algae are dominant. Diamond lake also has extensive macrophyte beds which contribute chl-*a* as they die off and breakdown.

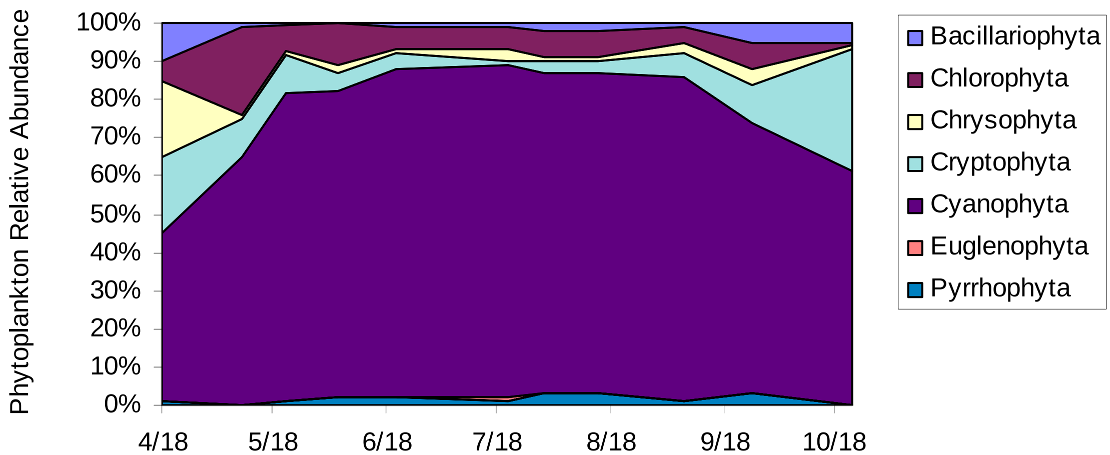

Figure 6C. Relative abundance of phytoplankton during the 2006 Diamond Lake sampling season. Cyanobacteria (blue-green algae) dominate the open water season.

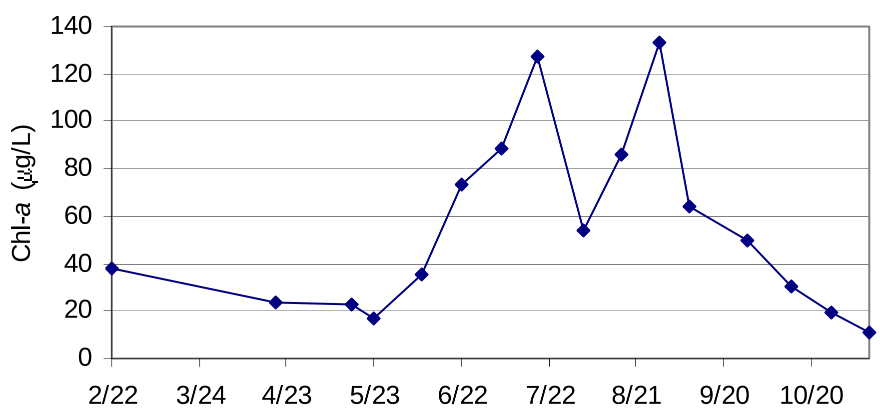

Figure 6D. Diamond Lake 2006 chlorophyll-*a* data. Highest chlorophyll-*a* concentrations correspond to largest blooms of algae, and highest plant biomass within the lake.

WATER QUALITY PROJECTS

See Section 6B for the Diamond Lake vegetation survey.

WETLAND HEALTH EVALUATION PROJECT (WHEP)

WHEP uses trained citizen volunteers to sample wetlands for vegetation and invertebrates. This information is then used to evaluate the wetland's biological health based on metrics developed by the Minnesota Pollution Control Agency. For quality assurance purposes, spot checks and quality control checks are conducted by other citizen teams and by a technical expert. The program is administered by Hennepin County – Environmental Services.

Diamond Lake has been monitored three times through this program. The results are somewhat inconsistent but give an overall picture of poor wetland quality (Table 6B). The poor ratings in 2002 and 2005 are a direct result of low diversity in the sampled plots and traps. Poor vegetation scores are caused by the cattail monoculture that greatly limits the diversity of the emergent plant community. The invertebrate score has been increasing since 2002 with increasing diversity. In 2006, one dragonfly and two damselfly species were sampled. This site is in an urban setting with a large urban watershed and is providing valuable bird habitat.

Table 6B. WHEP scores at Diamond Lake.

Year	Invertebrate Score	Invertebrate Quality Rating	Vegetation Score	Vegetation Quality Rating
2002	8	poor	13	poor
2005	14	poor	7	poor
2006	16	moderate	13	poor