

Howard Lake (02-0016) Rice Creek Watershed District

Howard Lake is a 436-acre lake located within Columbus Township (Anoka County). The maximum depth is 1.1 m (4.5 ft). The entire lake is considered littoral area (area of aquatic plant dominance) and it does not maintain a thermocline (a density gradient created by changing water temperatures in the lakes water column).

In 2001 and 2002, an aquatic plant survey was conducted on Howard Lake. It was found that the lake has a recovering plant community (RCWD 2001 and 2002 Howard Lake Macrophyte report). The strength of the aquatic plant community helps to reduce the algae abundance. Aquatic plants and algae compete for the same nutrients during the growing season. Strong aquatic plant communities will tie up nutrients and store them during the growing season preventing or reducing nuisance algal blooms. Prior to 2001 there were virtually no rooted aquatic plants in Howard Lake. During that period black bullheads and carp heavily populated the lake. These two fish species were suspending bottom sediment through their feeding mechanics. The suspension of bottom sediment led to reduced water clarity. The reduced water clarity was responsible for reduced plant communities and increased algal productivity. The suspension of bottom sediment also led to high amounts of Total Phosphorus (TP). The winter of 2000, Howard Lake experienced a partial fish-kill that reduced the number of fish in the lake and allowed for aquatic plants to reestablish. In the fall of 2005, MDNR along with its partners conducted a chemical fish kill of the lake to eradicate the remaining rough fish population. This treatment used a chemical called rotenone and was targeting gilled vertebrates such as fish. The treatment appeared to be a success as no fish were visible observed during the 2005 monitoring season.

As part of the RCWD monitoring program Howard Lake was sampled 11 times in 2005. Surface samples were collected for Chlorophyll-a (CLA), (TP), and Total Kjeldahl Nitrogen (TKN). Surface Dissolved Oxygen, Temperature, Specific Conductivity, pH, and secchi transparency were also recorded.

Historical monitoring of Howard Lake occurred in 1991, 1993, and 1998-2004. The mean TP concentrations are presented in Figure 1 and the CLA concentrations along with the secchi transparency are presented in Figure 2. After to the 2001 season the secchi reading was to the lake bottom during each reading.

The 2005 water quality data shows that the TP average was 77 ug/L, CLA concentration was 19.8 ug/L, and the secchi transparency was >1 m. Lake water quality ranking is based on the lake water quality report card developed by the Metropolitan Council (Osgood 1989b). With this method a lake is ranked against other lakes in the metropolitan area following the same methodology. Lakes receiving an A can be deemed exceptional with no recreational impairments. A "B"-grade lake is considered to have good water quality and some recreational impairment, while lakes receiving a "C"-grade are considered to have average water quality and are recreationally impaired. A "D"-grade lake has a very poor ranking (severely impaired), and an "F"-grade would mean extremely poor water quality with little to no recreational use. The lakes are ranked based on Secchi Depth, TP and CLA concentrations. For lakes greater than 10 feet deep the three parameters work fairly well to assess a lakes water quality, however in lakes less than 10 feet deep the secchi transparency may give an underestimated water clarity grade. For lakes less than 10 feet deep, RCWD does not factor in the Secchi reading if readings go all the way to the bottom. We feel that this is more representative of the true water quality of the shallow lake.

Conclusion

The water chemistry in Howard Lake is in excellent condition and deserves protection and enhancement when possible. The lake experienced a spike in TP and CLA concentrations in 2005. This increase is probably caused from the short term reduction in the macroinvertebrate community. Macroinvertebrate populations (such as mayfly, diptera larvae and snails) that would feed on peryphyton were reduced during the rotenone treatment. We expect the population to fully recover in 2006 and a corresponding decrease in CLA and TP concentrations. Monitoring of the lake will continue in 2006 for water quality, aquatic plant abundance and diversity, and zooplankton communities. The current lakeshore is undeveloped and is in good condition. The riparian area

should have a buffer regulation placed on it of at least 150 feet to insure that it remains in good condition. The private drainage ditches leading into the lake should have buffer strips placed on them of at least 15 feet to maintain the channel characteristics and prevent bank erosion.

Figure 1 Average TP and CLA Concentrations for Howard Lake

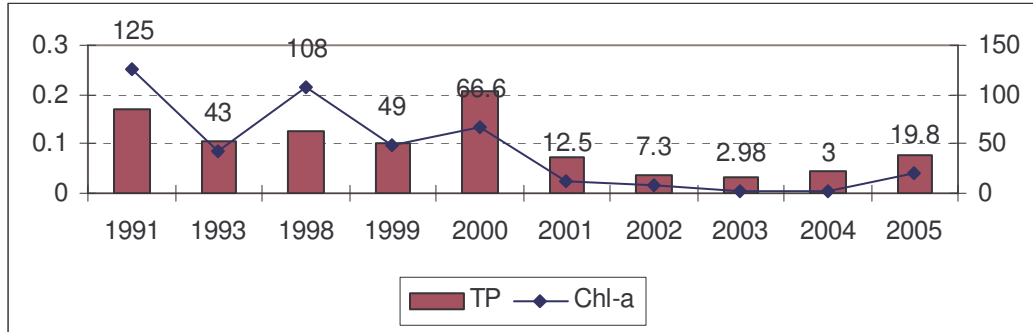


Figure 2 Average CLA and Secchi Depth Readings for Howard Lake

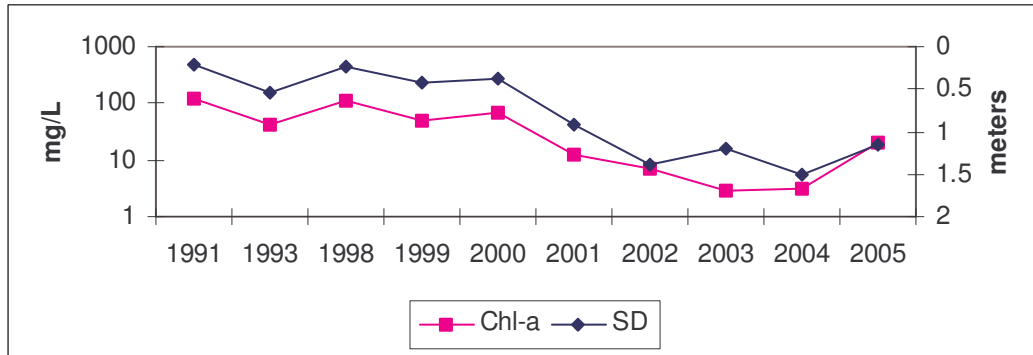


Table 1
2005 water quality data for Howard Lake

DATE	COND	TEMP	DO	Chl-a	TP	SECCHI
1/7/2005		0.2	19.2	5.9	0.039	2.00
1/11/2005	586	1.88	22.8	12.5	0.036	1.50
4/27/2005					0.048	
5/16/2005	408	13.3	12.03	0.5	0.02	1.50
6/3/2005	390	22	8.6	9.1	0.04	
6/22/2005	436	26.9	10.39	7	0.053	
7/18/2005	487	25.21	4.23			1.50
7/27/2005	484	23.29	6.37	15.8	0.085	0.70
8/11/2005	504	24.85	5.7	60.9	0.15	0.55
8/22/2005	502	22.4	4.62	2.9	0.061	1.50
9/20/2005	486	20.58	8.7	23.1	0.078	1.50
Average				19.8	0.0778333	1.15

Lake Water Quality Grades Based on Averages

Year	2000	2001	2002	2003	2004	2005
Total Phosphorus	F	C	B	B	B	C
Chlorophyll a	F	A	A	A	A	B
Secchi Depth	D	NA	NA	NA	NA	NA
Overall	F	B	A	A	A	B

NA= Not Applicable