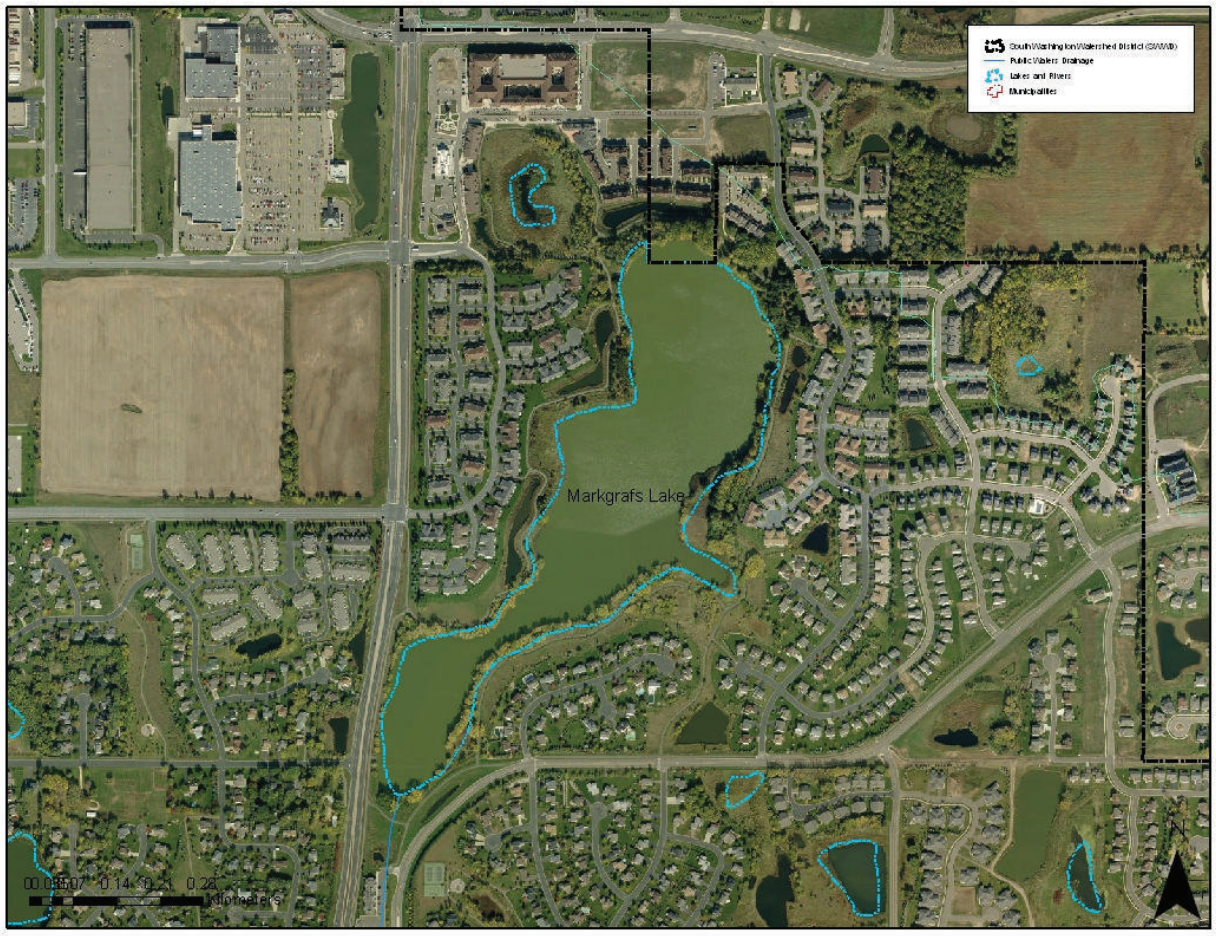
Markgrafs Lake

DNR ID #82-0089 Municipality: Woodbury
Surface Area: 46 Acres Watershed Area: 436 Acres
Mean Depth: 5 feet Maximum Depth: 8 feet
SWWD Maximum Allowable Phosphorus Load: 0.61 lbs/ac/yr
SWWD Trophic State Index (TSI) Goal: 66-70

Map 15: Markgrafs Lake



Markgrafs Lake (Map 15) is approximately 46 acres in surface area and has a contributing watershed of 413 acres. The lake is situated at the east boundary divide of the Northern subwatershed. The watershed is almost fully developed. Commercial land use dominates the upper part of the watershed. Dense residential units surround the lake but the shoreline remains wooded. Stormwater treatment ponds receive runoff from the developments prior to flowing into Markgrafs.

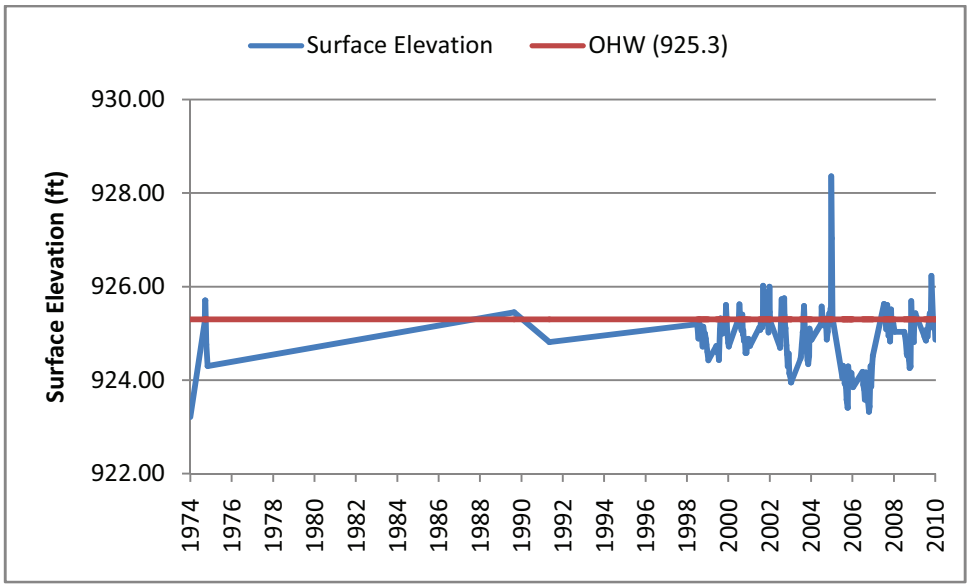
SWWD sets a TSI goal of 66-70 for Markgrafs Lake corresponding to an allowable watershed TP loading rate of 0.61 lbs/ac/yr. SWWD considers its goal to be an interim goal as it exceeds MnPCA eutrophication standards. When water quality consistently meets SWWD's interim goal, loading standards will be reexamined and modified to work toward meeting MnPCA's eutrophication standards.

Results

Lake level has been recorded at Markgrafs Lake since 1974. Lake level was recorded twice monthly during 2010. Historical lake surface elevations are shown in Figure 22.

Lake water quality was monitored twice in April and June through October and once in May. Water Quality results are below in Table 20. Annual growing season averages of total phosphorus, chlorophyll a, and secchi transparency are shown graphically in Figures 23-25. Markgrafs Lake's 2009 trophic status and historical lake grades are presented in Table 21.

Figure 22: Markgrafs Lake Surface Elevation, 1974 to 2010



Date	Secchi Transparency (m)	Water Temperature (°C)	Pheophytin a Corrected Chlorophyll a (ug/L)	Trichromatic Uncorrected Chlorophyll a (ug/L)	TKN (mg/L)	TP (mg/L)
04/18/10	0.3	17.8	86	87	3.3	0.189
05/02/10	0.3	17.7	64	67	3.3	0.147
05/16/10	0.3	17.7	41	42	2.7	0.166
05/27/10	0.41	27.1	46	47	3.6	0.19
06/07/10	0.41	17.9	49	51	3.5	0.232
06/27/10	0.25	26.7	580	590	3.5	0.2
07/10/10	0.25	27.8	140	140	3.5	0.19
07/23/10	0.25	26.4	170	160	3.6	0.227
08/08/10	0.25	27	160	150	3.7	0.266
08/20/10	0.25	27.1	81	84	2.7	0.138
09/05/10	0.25	27	88	91	3	0.152
09/16/10	0.25	17.3	100	110	5.3	0.316
09/28/10	0.25	17	170	180	5.2	0.287
10/20/10	0.25	13.5	23	30	3	0.18

Table 20: Markgrafs Lake 2010 water quality results from the Met Council Citizen Assisted Monitoring Program (CAMP)

Figure 23: Markgrafs Lake Historical Mean Growing Season Total Phosphorus Concentrations

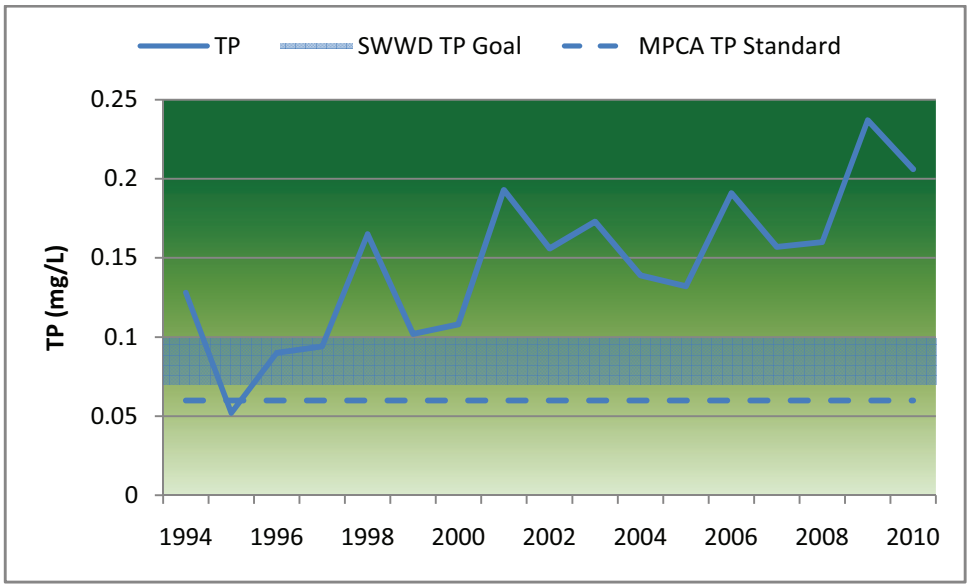
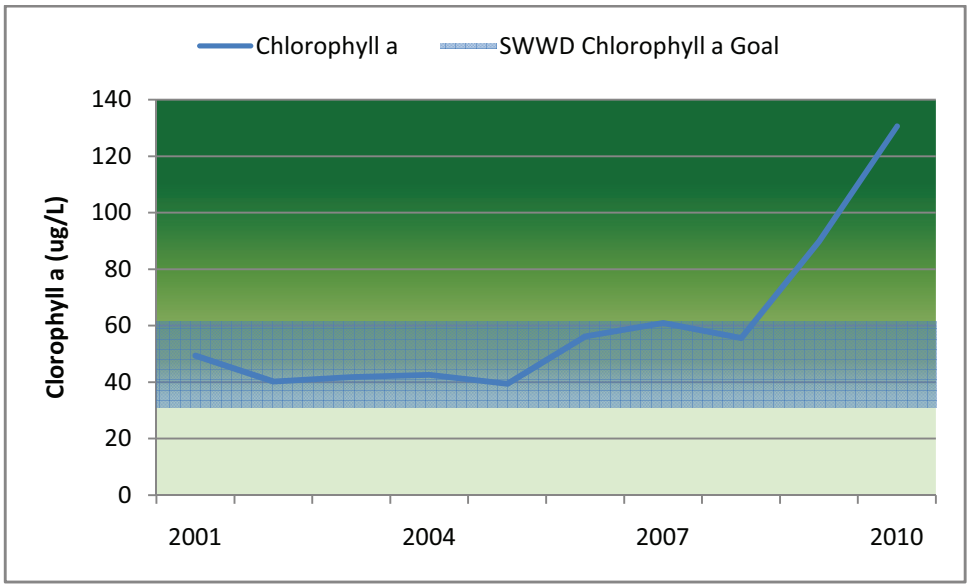
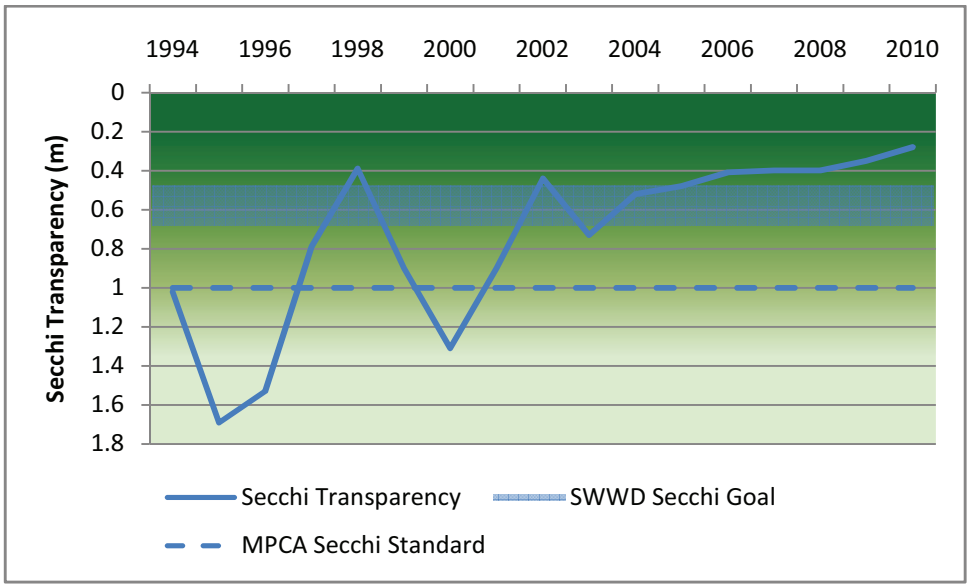


Figure 24: Markgrafs Lake Historical Mean Growing Season Chlorophyll a[1] Concentrations



[1]Uncorrected trichromatic chlorophyll a concentrations are displayed in this figure and are the basis of the Met Council lake grading system. MnPCA standards apply to Pheophytin a corrected chlorophyll a concentrations.

Figure 25: Markgrafs Lake Historical Mean Growing Season Secchi Transparency



Parameter	Trophic Status	Lake Grades 94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10
Total Phosphorus	81;Hyper-eutrophic	D	C	D	D	F	D	D	F	F	F	D	D	F	F	F	F	F
Chlorophyll a	78;Hyper-eutrophic								D	C	C	C	C	D	D	D	F	F
Secchi Transparency	78;Hyper-eutrophic	F	D	D	F	F	F	D	F	F	F	F	F	F	F	F	F	F
Overall	Hyper-eutrophic	D	D	D	D	F	D	D	F	D	D	D	D	F	F	F	F	F

Table 21: Markgrafs Lake 2010 Trophic Status and Historical Lake Grades

Discussion

The surface elevation of Markgrafs Lake has historically fluctuated rapidly, but within a small range. That dynamic is representative of its relatively small watershed and outlet at 924.94, just below the OHW.

Water quality has always rated fairly poor at Markgrafs Lake based on the Met Council CAMP grading system with long term trends showing continued declines. In 2010, all indicators remained high. Secchi transparency is likely at or near its lower limit. None of the water quality parameters meet SWWD's TSI goal for the Lake and all far exceed MnPCA eutrophication standards. Additional study is necessary to determine the historical background condition of the lake. Dramatic action will be needed to achieve even modest gains in water quality.