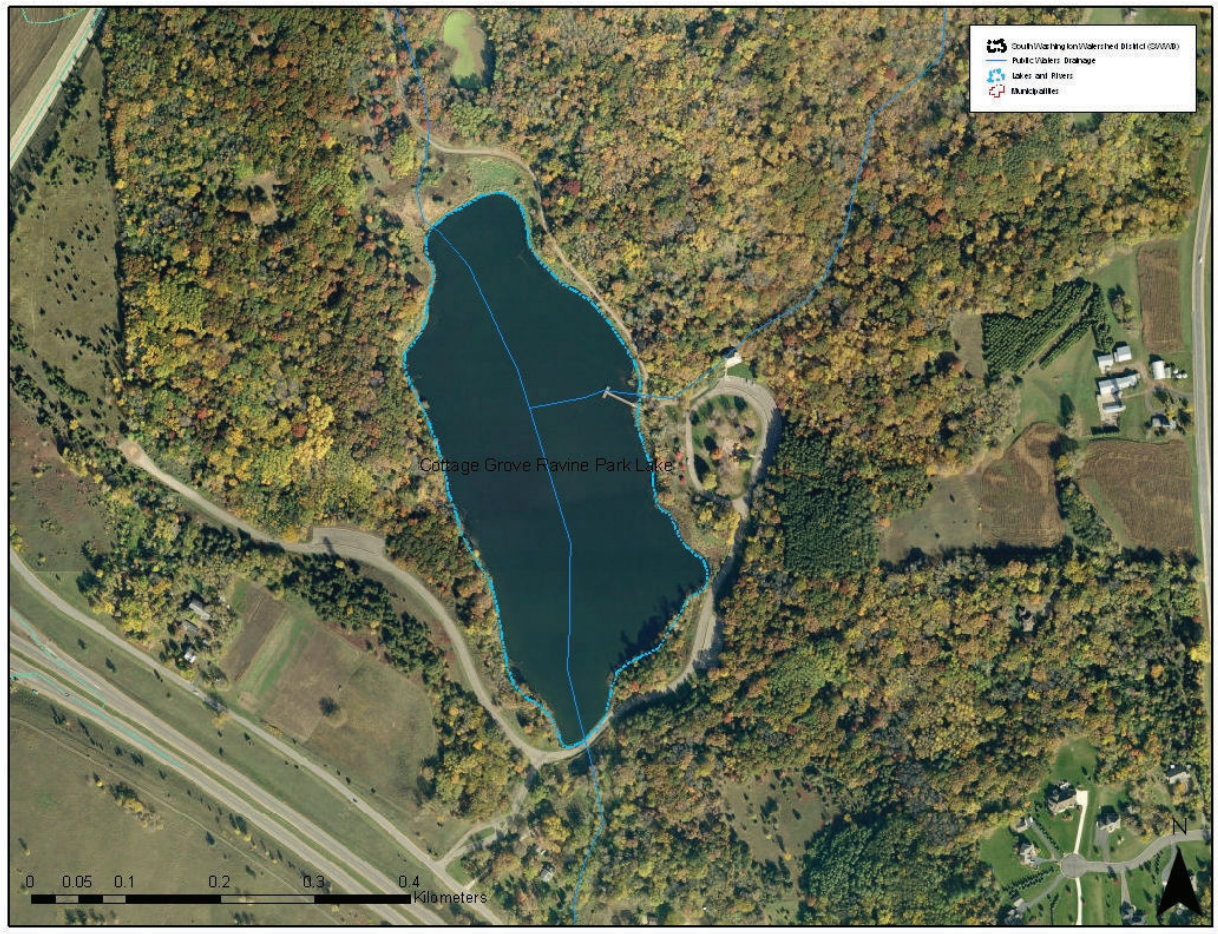
## *Ravine Lake*

DNR ID #82-0087 Municipality: Cottage Grove
Surface Area: 25 Acres Watershed Area: 802 Acres
Mean Depth: 7 feet Maximum Depth: 16 feet
SWWD Maximum Allowable Phosphorus Load: 0.04 lbs/ac/yr
SWWD Trophic State Index (TSI) Goal: 63-66

**Map 17: Ravine Lake**



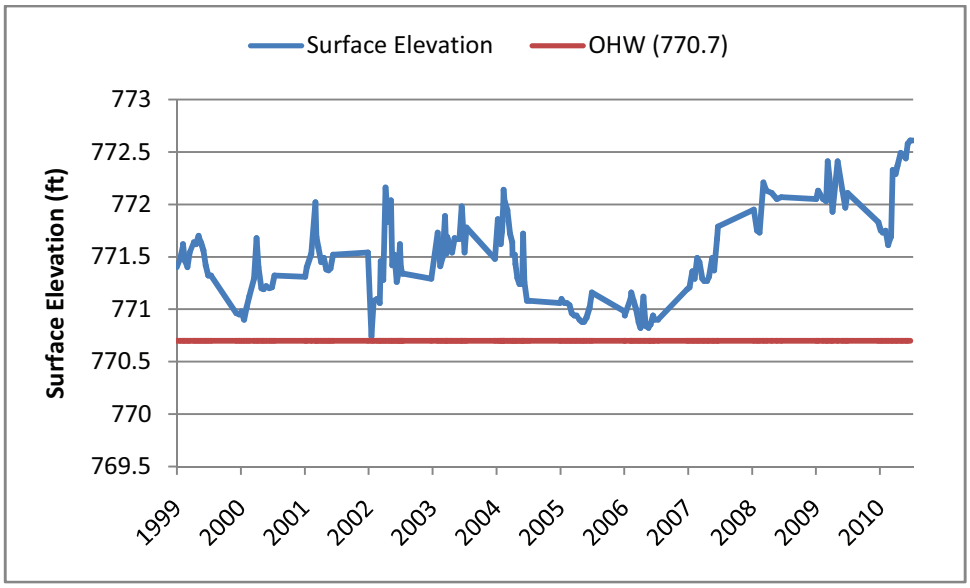

Ravine Lake (Map 17) is located in the East Ravine subwatershed and is situated in the Cottage Grove Regional Park. A lake management plan was completed for this lake in 2003. The watershed is predominantly wooded / park or agricultural land. As noted in the management plan, the lake has a contributing watershed of about 800 acres but planned urbanization will increase this watershed to about 3,400 total acres (Map 4.9). Further, the SWWD is pursuing a watershed overflow conveyance which will route through this system. The lake has a strong groundwater influx in addition to surface inputs. SWWD set a TSI goal of 63-66 for Ravine Lake, corresponding to a watershed TP loading rate of 0.04 lbs/ac/yr based on 3,400 acres. SWWD considers its goal an interim one as it does not meet MnPCA standards.

## Results

Lake level has been recorded at Ravine Lake since 1999. Lake levels from 1999 through 2010 are displayed in Figure 30.

Lake water quality was monitored monthly during the 2010 growing season. Water Quality results are below in Table 24. Annual growing season averages of total phosphorus, chlorophyll a, and secchi transparency are shown graphically in Figures 31-33. Ravine Lake's 2010 trophic status and historical lake grades are summarized in Table 25.

**Figure 30: Ravine Lake Surface Elevation, 1999 to 2010**



| Date | Secchi Depth (m) | Water Temperature °C | Surface Elevation (ft) | Chloride (mg/L) | Pheophytin a Corrected Chlorophyll a (ug/L) | Trichromatic Uncorrected Chlorophyll a (ug/L) | TKN (mg/L) | TP (mg/L) |
|---|---|---|---|---|---|---|---|---|
| **5/3/2010** | 1.52 | 15.2 | 6.06 | | 24 | 26 | 0.84 | 0.048 |
| **5/19/2010** | 3.35 | 20.4 | 6.08 | 20 | 4.6 | 5.8 | 0.83 | 0.045 |
| **6/28/2010** | 0.76 | 24.9 | 6.66 | | 67 | 68 | 1.1 | 0.103 |
| **7/26/2010** | 2.59 | 28 | 6.7 | 17 | 7.4 | 8.4 | 0.88 | 0.049 |
| **8/23/2010** | 1.52 | 27.3 | 6.8 | 17 | 23 | 25 | 1.3 | 0.063 |
| **9/20/2010** | 0.98 | 16.4 | 6.91 | 19 | 16 | 17 | 1.5 | 0.074 |
| **10/18/2010** | 2.9 | 14 | 6.94 | 18 | 7 | 7.7 | 2 | 0.076 |

Table 24: Ravine Lake 2010 Water Quality Data Collected for Met Council's Citizen Assisted Monitoring Program (CAMP)

Figure 31: Ravine Lake Historical Mean Growing Season Total Phosphorus Concentrations

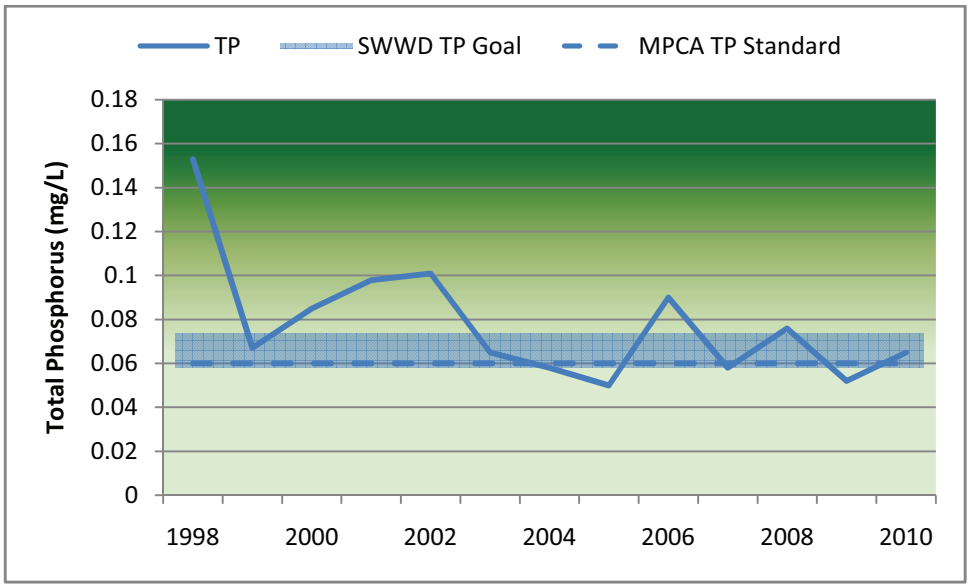
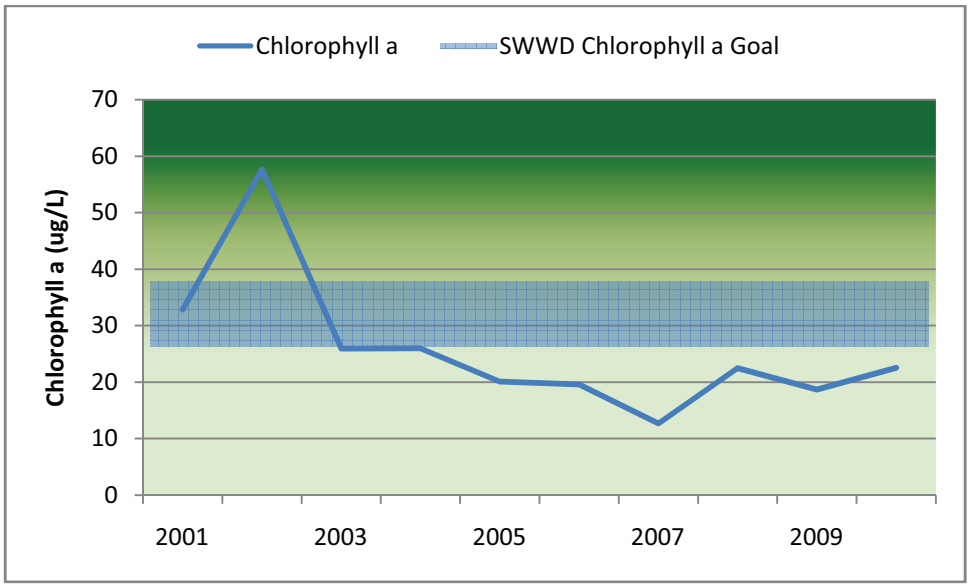
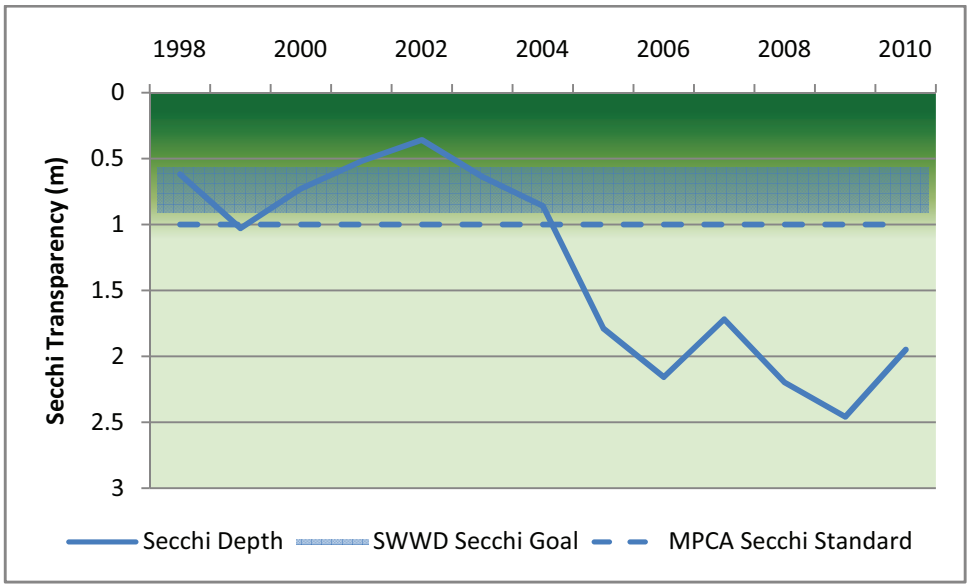



Figure 32: Ravine Lake Historical Mean Growing Season Chlorophyll a[1] Concentrations




[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 33: Ravine Lake Historical Mean Growing Season Secchi Transparency




| Parameter | Trophic Status | Lake Grades | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 98 | 99 | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 |
| **Total Phosphorus** | Eutrophic | F | D | D | D | D | C | C | C | D | C | D | C | C |
| **Chlorophyll a** | Eutrophic | | | | C | D | C | C | C | B | B | C | B | C |
| **Secchi Transparency** | Meso-trophic | F | D | D | F | F | F | D | C | C | C | B | B | C |
| **Overall** | Eutrophic | F | D | D | D | D | D | C | C | C | C | C | B | C |

Table 25: Ravine Lake 2010 Trophic Status and Historical Lake Grades

## Discussion

Historically, water levels in the Regional Park water body (Ravine Lake) have risen, changing the system from a wetland-like system to more of a lake system. That trend continued in 2010 with the lake reaching some of its highest recorded levels, partially due to a crushed culvert at the lake outlet. The lake outlet was temporarily repaired in the fall of 2010, and will be addressed again during construction of SWWD's Central Draw Overflow.

Accompanying the increase in water level has been an increase in water quality. Ravine Lake has shown steady water quality improvement since monitoring began and is close to meeting MPCA eutrophication standards for shallow lakes in the North Central Hardwood Forest. The Lake does meet standards for shallow lakes in the Cornbelt Plains which encompasses a portion of the Ravine Lake watershed. While all eutrophication measures have improved, secchi depth is consistently better than expected based on TP and chlorophyll levels. That relationship combined with a periodic musty odor of the lake may indicate a dominance of blue green algae that should be watched in the future.