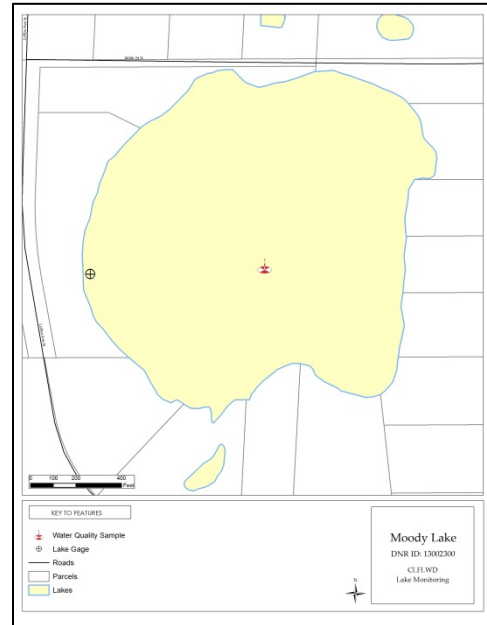


Moody Lake

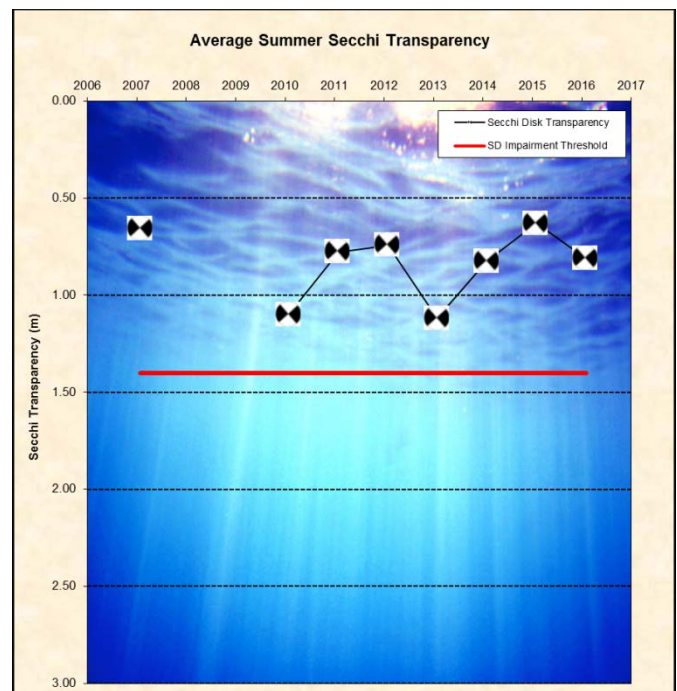
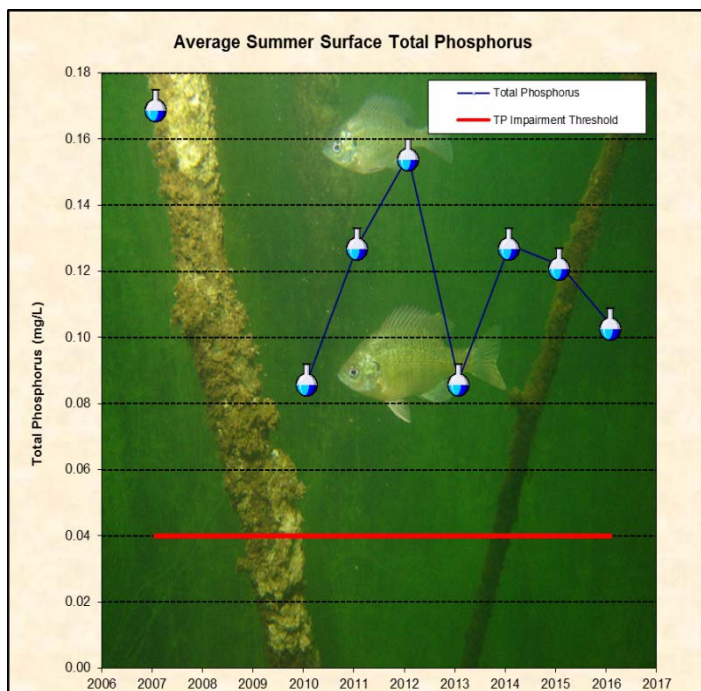
2016 Lake Grade: D+

- DNR ID #: 13002300
 - Municipality: Chisago Lakes Township
 - Location: SW^{1/4} Section 32 T33N-R20W
 - Lake Size: 45.33 acres
 - Maximum Depth (2016): 47 ft.
 - Ordinary High Water Mark: N/A
 - 49% Littoral
- Note: Littoral area is the portion of the lake <15 ft. and dominated by aquatic vegetation.

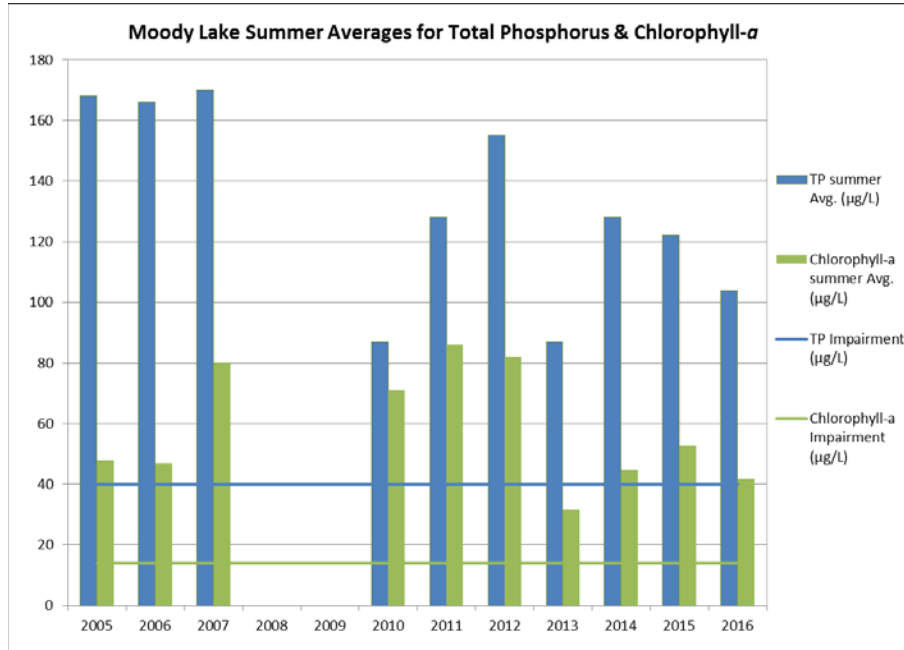


Summary Points

- Based on the chlorophyll-*a* results Moody Lake was considered eutrophic in 2016, according to the Carlson Trophic State Index.
- Using the 2-tailed Kendall Tau correlation test ($p < 0.05$) there is a statistically significant **improving** trend for the average total phosphorus and no trend for the average Secchi transparency at this time.
- The major land use is rural/agricultural.
- The lake stratified in 2016 with the thermocline varying between 3 and 5 meters.
- Moody Lake is listed as impaired for nutrients on the Minnesota Pollution Control Agency's Impaired Waters List.
- Curly-leaf pondweed (an invasive aquatic plant) is present in this lake.



| Date/Time | Total Phosphorus (mg/L) | Uncorrected Trichromatic Chlorophyll-a (µg/L) | Pheophytin-Corrected Chlorophyll-a (µg/L) | Total Kjeldahl Nitrogen (mg/L) | Secchi Disk Depth (m) | Surface Temperature (Celsius) | Surface Dissolved Oxygen (mg/L) |
|---|-------------------------|---|---|--------------------------------|-----------------------|-------------------------------|---------------------------------|
| 4/19/2016 11:01 | 0.046 | 25.0 | 22.0 | 1.20 | 1.37 | 14.0 | 9.61 |
| 5/3/2016 14:05 | 0.044 | 7.0 | 5.4 | 1.10 | 1.83 | 14.4 | 9.84 |
| 5/17/2016 14:06 | 0.041 | 3.6 | 2.7 | 1.10 | 2.74 | 15.4 | 9.05 |
| 6/1/2016 13:31 | 0.059 | 30.0 | 28.0 | 1.40 | 1.22 | 20.8 | 8.24 |
| 6/16/2016 9:14 | 0.072 | 42.0 | 38.0 | 1.50 | 0.91 | 21.7 | 6.39 |
| 6/27/2016 9:58 | 0.130 | 52.0 | 48.0 | 1.80 | 0.61 | 24.7 | 6.71 |
| 7/12/2016 12:32 | 0.106 | 35.0 | 30.0 | 1.80 | 0.76 | 24.8 | 6.02 |
| 7/26/2016 9:16 | 0.091 | 54.0 | 47.0 | 1.60 | 0.61 | 27.4 | 9.60 |
| 8/10/2016 8:21 | 0.117 | 78.0 | 74.0 | 1.80 | 0.46 | 26.3 | 6.70 |
| 8/23/2016 12:38 | 0.162 | 48.0 | 44.0 | 2.30 | 0.91 | 22.9 | 5.17 |
| 9/8/2016 9:57 | 0.091 | 36.0 | 33.0 | 1.60 | 0.91 | 21.9 | 5.24 |
| 9/20/2016 10:57 | 0.108 | 38.0 | 33.0 | 1.40 | 0.91 | 20.5 | 6.46 |
| 10/4/2016 10:31 | 0.104 | 41.0 | 39.0 | 1.80 | 0.91 | 16.9 | 9.41 |
| 10/17/2016 12:37 | 0.105 | 25.0 | 23.0 | 1.60 | 1.07 | 13.9 | 7.11 |
| 2016 Average | 0.091 | 36.8 | 33.4 | 1.57 | 1.09 | 20.4 | 7.54 |
| 2016 Summer Average | 0.104 | 45.9 | 41.7 | 1.69 | 0.81 | 23.4 | 6.73 |
| Volunteer Data | | | | | | | |
| 5/8/2016 9:00 | 0.031 | 3.1 | 2.7 | 1.10 | 2.8 | 16.6 | NA |
| 5/22/2016 9:30 | 0.043 | 8.5 | 7.5 | 1.20 | 2.9 | 20.6 | NA |
| 6/19/2016 19:00 | 0.082 | 33.0 | 30.0 | 1.50 | 0.9 | 27.4 | NA |
| 7/3/2016 14:30 | 0.104 | 140.0 | 130.0 | 2.40 | 0.4 | 25.1 | NA |
| 7/17/2016 19:00 | 0.068 | 57.0 | 52.0 | 1.50 | 0.5 | 23.7 | NA |
| 7/31/2016 19:30 | 0.103 | 58.0 | 49.0 | 1.40 | 0.6 | 26.7 | NA |
| 8/14/2016 19:00 | 0.103 | 130.0 | 120.0 | 2.00 | 0.4 | 28.3 | NA |
| 8/28/2016 16:00 | 0.109 | 64.0 | 60.0 | 1.70 | 0.8 | 24.3 | NA |
| 9/11/2016 16:00 | 0.086 | 32.0 | 28.0 | 1.40 | 1.2 | 21.8 | NA |
| 9/25/2016 18:45 | 0.065 | 31.0 | 26.0 | 1.30 | 1.1 | 18.9 | NA |
| 10/9/2016 17:00 | 0.084 | 34.0 | 29.0 | 1.50 | 1.1 | 13.9 | NA |
| 10/23/2016 15:30 | 0.101 | 15.0 | 11.0 | 1.40 | 1.3 | 11.6 | NA |
| 2016 Average | 0.082 | 50.5 | 45.4 | 1.53 | 1.17 | 21.6 | NA |
| 2016 Summer Average | 0.090 | 68.1 | 61.9 | 1.65 | 0.74 | 24.5 | NA |
| Water quality thresholds are 0.04 mg/L TP, 14 µg/L CL-a, 1.4 m Secchi depth* | | | | | | | |
| Shallow lake water quality thresholds are 0.06 mg/L TP, 20 µg/L CL-a, 1.0 m Secchi depth* | | | | | | | |
| 2016 Elevation (ft) | High | High Date | Low | Low Date | Average | | |
| | 912.47 | 4/13/2016 | 911.45 | 9/8/2016 | 912.09 | | |
| *Data requirements and determinations of use assessment according to the MPCA's Guidance Manual for Assessing the Quality of Minnesota Surface Waters: "Samples must be collected over a minimum of 2 years and data used for assessments must be collected from June to September. Typically, a minimum of 8 individual data points for TP, corrected chlorophyll-a (chl-a corrected for pheophytin), and Secchi are required. Data used for phosphorus and chlorophyll-a calculations are limited to those collected from the upper most 3 meters of the water column (surface). If more than one sample is collected in a lake per day, these values are averaged to yield a daily average value. Following this step, all June to September data for the 10-year assessment window are averaged to determine summer-mean values for TP, corrected chl-a, and Secchi depth. These values are then compared to the standards and the assessment is made." | | | | | | | |



| Lake Water Quality Summary | | | | | | | | | | |
|----------------------------|-------------|-----------|-----------|-----------|-----------|-----------|----------|-----------|-----------|----------|
| | Lake Grades | | | | | | | | | |
| | 2016 | 2015 | 2014 | 2013 | 2012 | 2011 | 2010 | 2009 | 2008 | 2007 |
| Total Phosphorus (mg/L) | D | D | D | D | F | D | D | NA | NA | F |
| Chlorophyll-a (µg/L) | C | D | C | C | F | F | D | NA | NA | F |
| Secchi depth (ft) | D | F | D | D | D | D | D | NA | NA | F |
| Overall | D+ | D- | D+ | D+ | F+ | D- | D | NA | NA | F |

Moody Lake Water Surface Elevation Statistics

Ordinary High Water Level (OHW) Elevation: N/A

100 Year Flood Elevation (CLFLWD): 892.1 ft.

Highest Recorded Elevation: 913.32 ft. (09/22/2015)

Lowest Recorded Elevation: 911.78 ft. (10/10/2013)

Datum: NGVD 29 (ft.)

