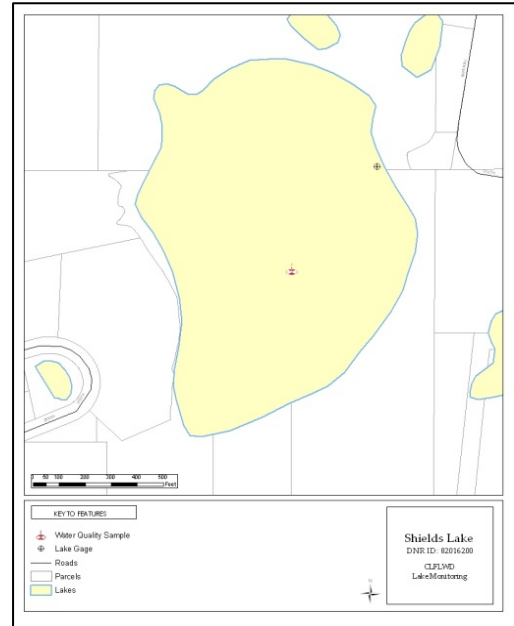


Shields Lake

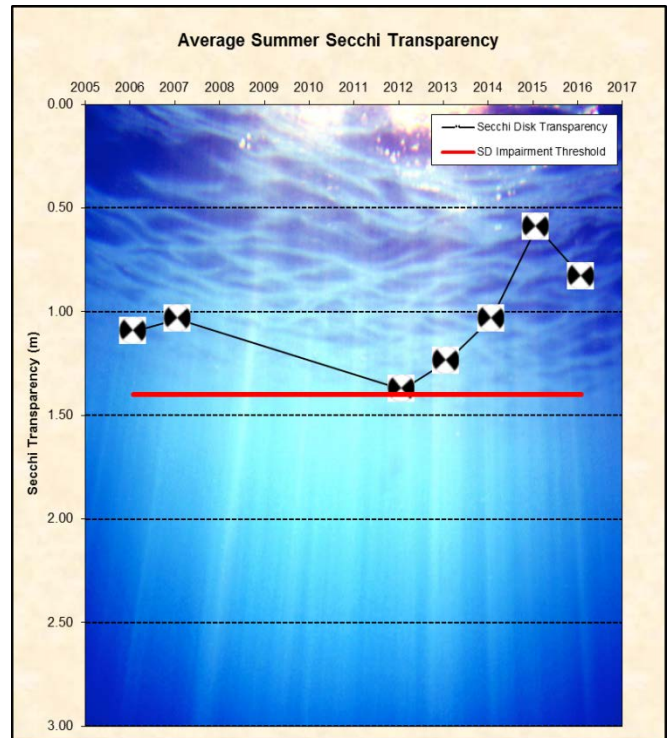
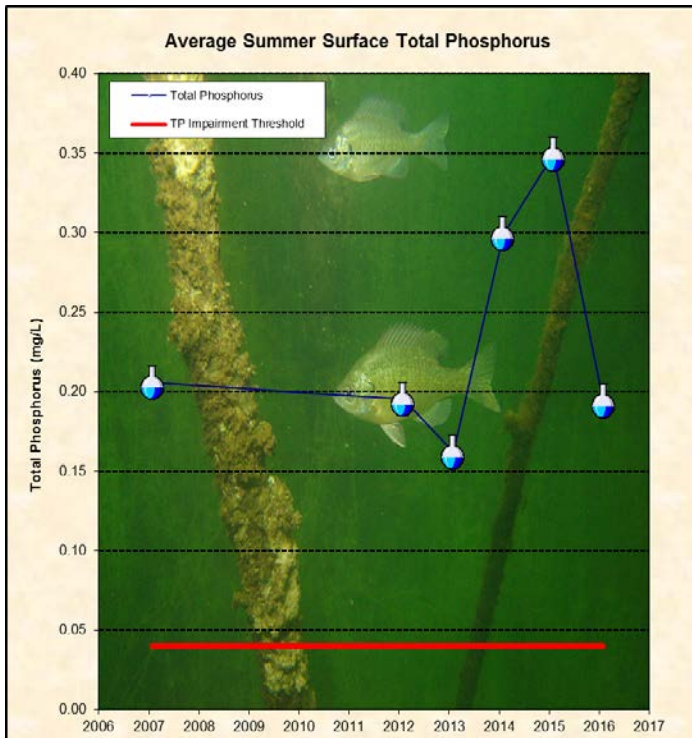
2016 Lake Grade: D-

- DNR ID #: 82016200
 - Municipality: City of Forest Lake
 - Location: NE^{1/4} Section 22 T32N-R21W
 - Lake Size: 29.58 Acres
 - Maximum Depth (2016): 27 ft.
 - Ordinary High Water Mark: 902.5 ft.
 - 74% 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 Shields 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 **declining** trend for the average total phosphorus and a statistically significant **declining** trend for the average Secchi transparency.
- The major land use is a mix of semi-urban and rural/agricultural.
- The lake stratified in 2016 with the thermocline varying between 2 and 4 meters.
- Shields 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 extensive in this lake.

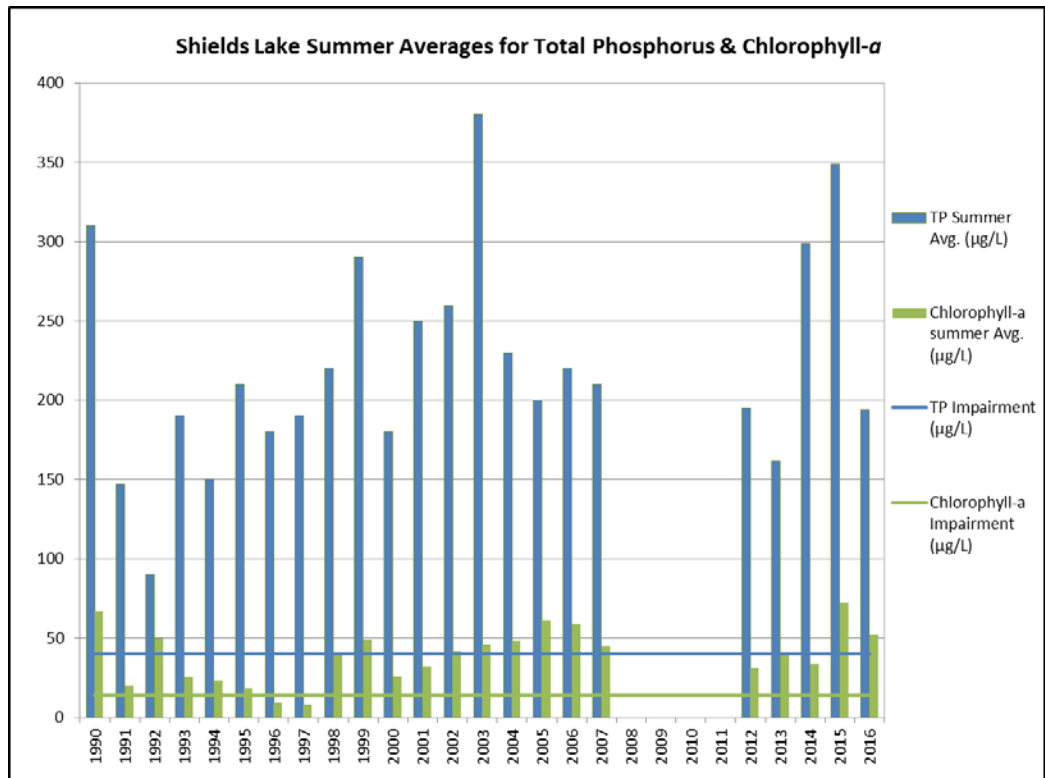


Date/Time	Total Phosphorus (mg/L)	Uncorrected Trichromatic Chlorophyll-a (µg/L)	Pheophytin-Corrected Chlorophyll-a (µg/L)	Total Kjeldahl Nitrogen (mg/L)	Secchi Disk Depth (m)	Surface Temperature (Celsius)	Surface Dissolved Oxygen (mg/L)
4/18/2016 13:49	0.060	19.0	17.0	1.30	1.37	17.0	13.59
5/2/2016 13:56	0.051	11.0	9.0	1.20	1.52	14.5	11.77
5/17/2016 12:51	0.075	9.7	8.8	1.20	1.37	14.1	10.75
6/1/2016 11:38	0.121	24.0	22.0	1.40	1.52	20.1	7.42
6/14/2016 12:40	0.238	40.0	37.0	2.40	0.91	22.8	7.70
6/27/2016 13:11	0.317	79.0	76.0	3.40	0.76	25.5	9.29
7/12/2016 10:48	0.241	86.0	82.0	2.80	0.76	25.2	4.85
7/26/2016 10:39	0.153	65.0	59.0	2.30	0.61	27.8	9.42
8/9/2016 13:54	0.128	48.0	41.0	1.70	0.46	26.8	6.30
8/23/2016 11:11	0.190	58.0	51.0	2.20	0.76	23.2	4.50
9/7/2016 14:24	0.168	75.0	65.0	1.70	1.07	23.1	7.13
9/20/2016 13:49	0.188	42.0	37.0	2.00	0.61	20.6	7.52
10/4/2016 13:34	0.214	90.0	86.0	2.20	0.76	17.8	9.17
10/17/2016 9:03	0.295	41.0	36.0	3.00	1.22	13.8	6.01
2016 Average	0.174	49.1	44.8	2.06	0.98	20.9	8.24
2016 Summer Average	0.194	57.4	52.2	2.21	0.83	23.9	7.13

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
	902.04	7/26/2016	901.00	7/12/2016	901.42

*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)	F	F	F	F	F	NA	NA	NA	NA	F
Chlorophyll-a (µg/L)	D	D	C	C	C	NA	NA	NA	NA	C
Secchi depth (ft)	D	F	D	C	C	NA	NA	NA	NA	D
Overall	D-	F+	D	D+	D+	NA	NA	NA	NA	D

Shields Lake Water Surface Elevation Statistics

Outlet Elevation (culvert): 900.0 ft.

Ordinary High Water Level (OHW) Elevation: 902.5 ft.

100 Year Flood Elevation (FEMA): 904.5 ft.

Highest Recorded Elevation: 903.99 ft. (06/27/2003)

Lowest Recorded Elevation: 899.77 ft. (10/02/2006)

Datum: NGVD 29 (ft.)

