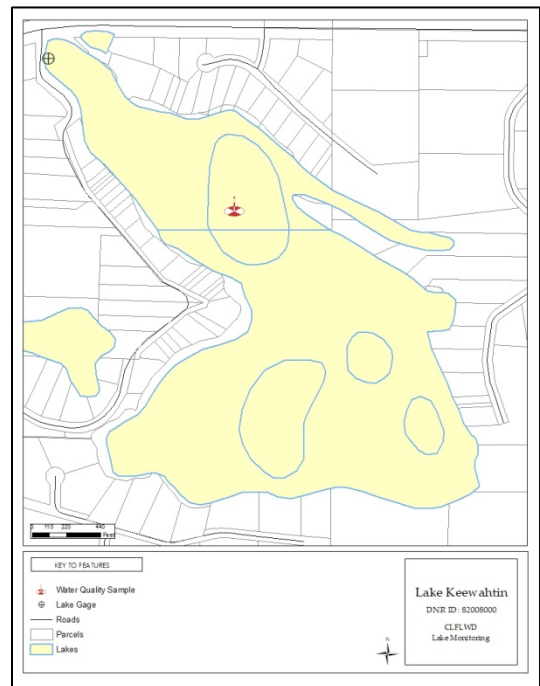


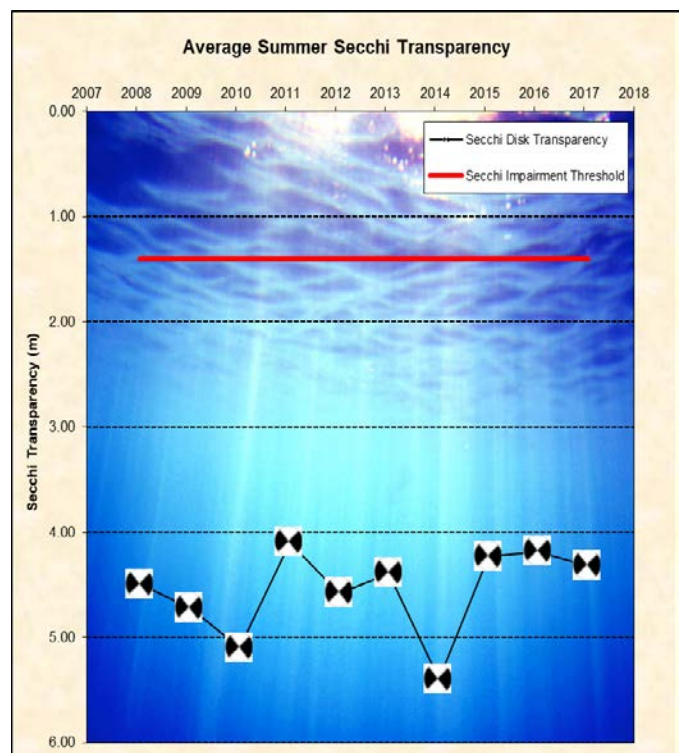
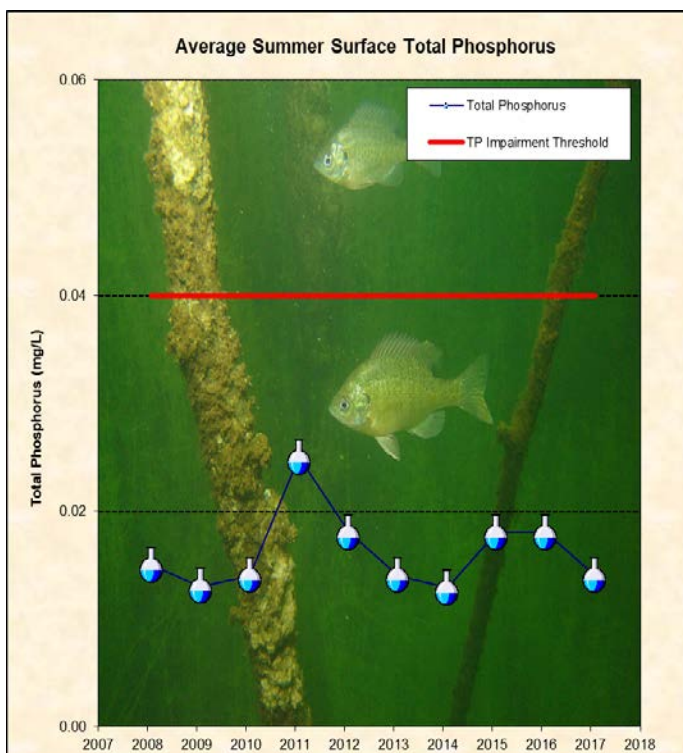
## Lake Keewahtin 2017 Lake Grade: A

- DNR ID #: 82008000
- Municipality: City of Forest Lake
- Location: Section 24 T32N-R21W
- Lake Size: 74.50 acres
- Maximum Depth (2017): 42 ft.
- Ordinary High Water Mark: 937.1 ft.
- 90% Littoral  
Note: Littoral area is the portion of the lake <15 ft. and dominated by aquatic vegetation.

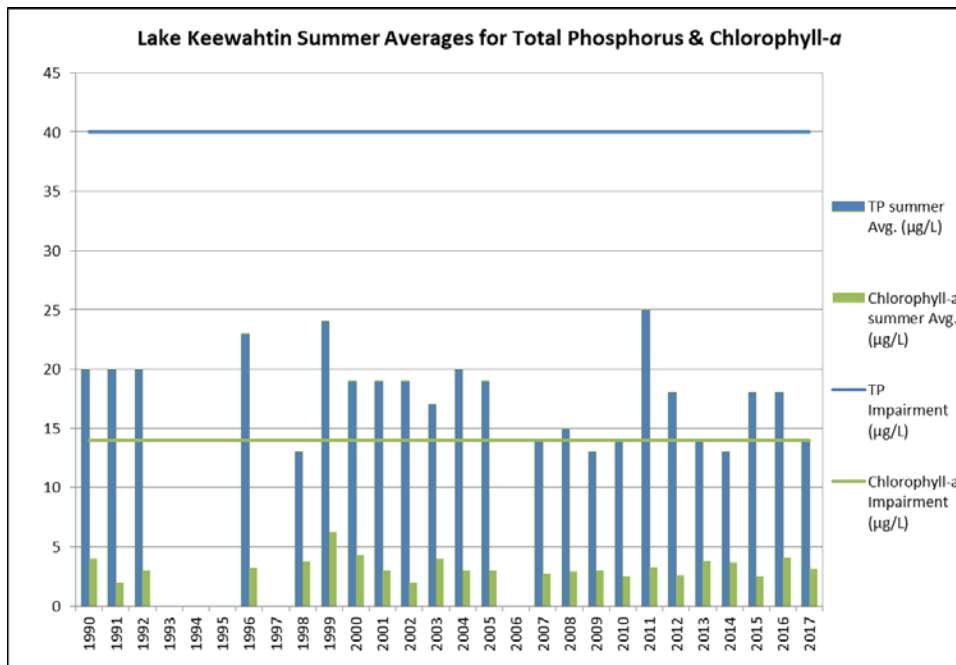


### Summary Points

- Based on the chlorophyll-*a* results Lake Keewahtin was considered mesotrophic in 2017, 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 a statistically significant **improving** trend for the average Secchi transparency and no trend for chlorophyll-*a* at this time.
- The major land use is semi-urban and rural/agricultural.
- The lake stratified in 2017 with the thermocline varying between 5 and 7 meters.
- 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)
4/19/2017 13:45	0.018	3.4	2.7	0.50	3.66	12.4	9.41
5/3/2017 11:17	0.015	1.9	1.3	0.43	5.18	10.9	9.85
5/17/2017 10:43	NA	3.0	2.6	NA	4.27	19.8	8.26
6/1/2017 8:23	0.012	3.0	2.9	0.51	4.72	17.7	8.64
6/15/2017 9:24	0.021	2.9	2.9	0.64	3.96	24.6	7.22
6/28/2017 11:17	0.011	3.5	2.7	0.50	3.96	20.6	8.35
7/12/2017 11:10	0.007	2.6	2.5	0.36	3.96	26.2	7.93
7/26/2017 9:43	0.015	2.9	2.3	0.59	4.27	26.0	7.57
8/9/2017 8:15	0.015	2.5	2.6	0.83	4.57	23.5	8.76
8/21/2017 12:05	0.017	2.3	1.7	0.54	4.57	23.7	8.42
9/7/2017 10:54	0.017	4.9	3.8	0.61	4.42	18.6	7.26
9/20/2017 13:43	0.012	8.7	6.7	0.54	4.42	20.1	7.31
10/4/2017 10:19	0.010	5.5	4.7	0.51	4.27	16.7	7.48
10/19/17 13:45	0.014	5.7	5.1	0.49	4.11	12.8	8.56
<b>2017 Average</b>	0.014	3.8	3.2	0.54	4.31	19.5	8.22
<b>2017 Summer Average</b>	0.014	3.7	3.1	0.57	4.32	22.3	7.94
<b>Volunteer Data</b>							
5/3/2017 15:00	0.009	2	1.8	0.4	6.2	12.6	NA
5/14/2017 11:00	0.012	2.4	1.3	0.44	4	18.4	NA
6/20/2017 8:35	0.006	4.4	3.7	0.46	4.9	22.5	NA
7/15/2017 15:10	0.014	2.1	1.6	0.45	5	25.4	NA
8/1/2017 12:40	0.019	1.6	1.3	0.46	4.3	27.6	NA
8/8/2017 11:50	0.011	3.1	2.5	0.46	5.8	17.8	NA
8/14/2017 15:40	0.009	1.5	1.2	0.49	5.3	22.8	NA
9/27/2017 14:00	0.013	2.9	2.7	0.45	4.9	19.8	NA
<b>2017 Average</b>	0.012	2.5	2.0	0.45	5.05	20.9	NA
<b>2017 Summer Average</b>	0.012	2.6	2.2	0.46	5.03	22.7	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*							
	<b>High</b>	<b>High Date</b>	<b>Low</b>	<b>Low Date</b>	<b>Average</b>		
<b>2017 Elevation (ft)</b>	937.39	6/1/2017	936.79	9/20/2017	937.09		
*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."							



<b>Lake Water Quality Summary</b>										
	<b>Lake Grades</b>									
	2017	2016	2015	2014	2013	2012	2011	2010	2009	2008
Total Phosphorus (mg/L)	A	A	A	A	A	A	B	A	A	A
Chlorophyll-a (µg/L)	A	A	A	A	A	A	A	A	A	A
Secchi depth (ft)	A	A	A	A	A	A	A	A	A	A
<b>Overall</b>	<b>A</b>	<b>A</b>	<b>A</b>	<b>A</b>	<b>A</b>	<b>A</b>	<b>A-</b>	<b>A</b>	<b>A</b>	<b>A</b>

## Lake Keewahtin Water Surface Elevation Statistics

Outlet Elevation: N/A (landlocked)

Ordinary High Water Level (OHW) Elevation: 937.1 ft.

Highest Recorded Elevation: 938.00 ft. (07/03/2003)

Lowest Recorded Elevation: 934.52 ft. (11/22/1990)

Datum: NGVD 29 (ft.)

