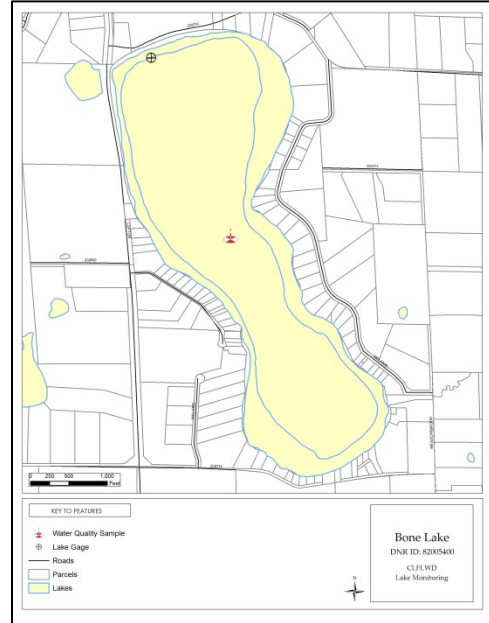


Bone Lake

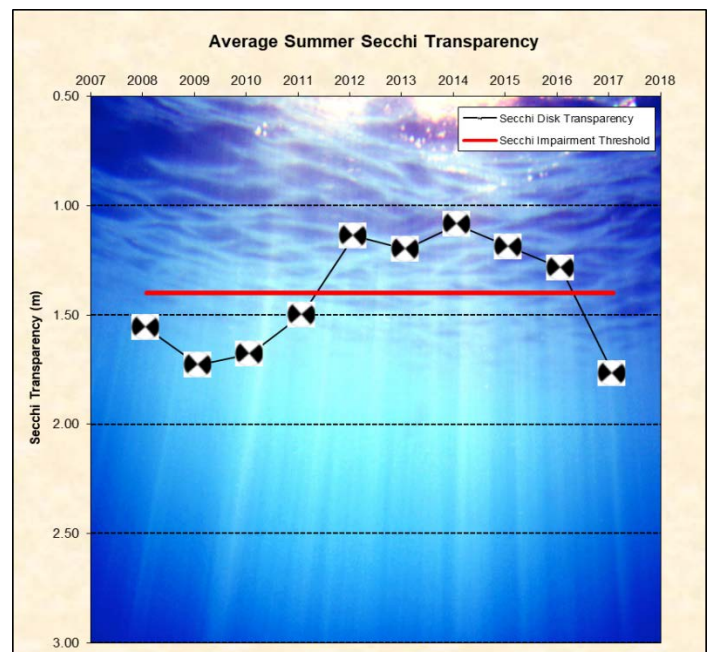
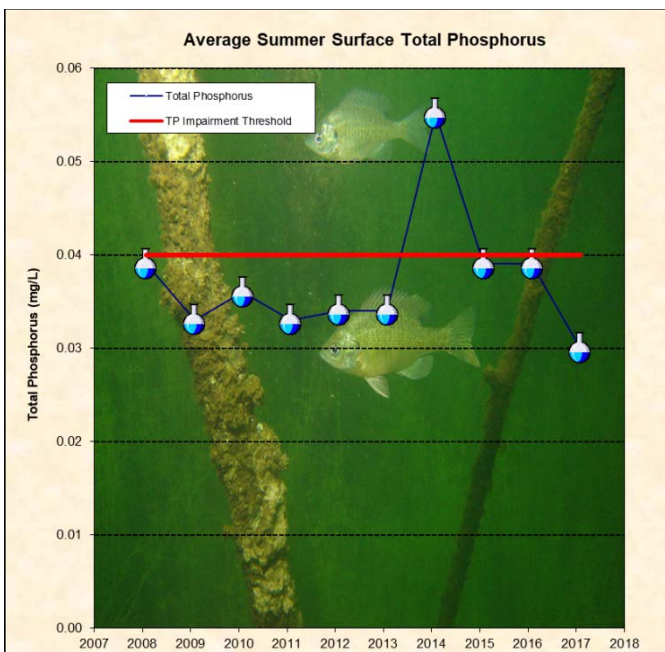
2017 Lake Grade: C+

- DNR ID #: 82005400
- Municipality: City of Scandia
- Location: Section 5 T32N-R20W
- Lake Size: 221.45 acres
- Maximum Depth (2017): 32 ft.
- Ordinary High Water Mark: 909.1 ft.
- 56% Littoral
Note: Littoral area is the portion of the lake <15 ft. and dominated by aquatic vegetation.

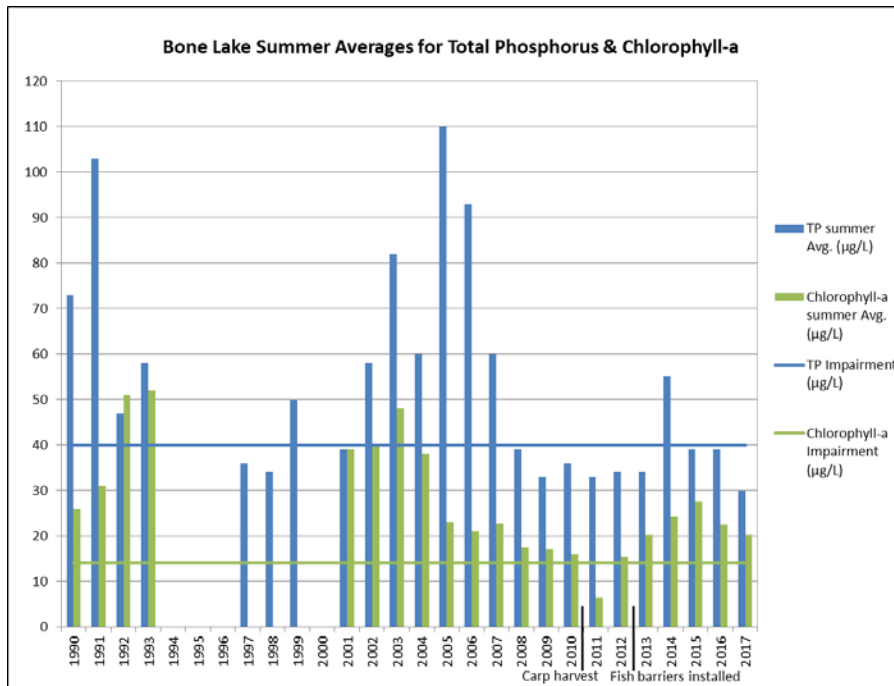


Summary Points

- Based on the chlorophyll-*a* results Bone Lake was considered eutrophic 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 chlorophyll-*a* and no trend for the average Secchi transparency at this time.
- The major land use is rural/agricultural.
- The lake stratified in 2017 with the thermocline varying between 4 and 6 meters.
- Bone Lake is listed as impaired for nutrients on the Minnesota Pollution Control Agency's Impaired Waters List.
- Eurasian watermilfoil and Curly-leaf pondweed (invasive aquatic plants) are present in this lake.
- Carp removal was performed in the winter of 2010.
- Low velocity fish barriers were installed at Bone Lake north inlet and Bone Lake outlet in the fall of 2012.



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)
4/17/2017 10:57	0.024	19.0	16.0	1.10	1.98	10.6	11.69
5/4/2017 10:02	0.045	16.0	14.0	1.30	2.90	11.4	11.10
5/15/2017 10:47	0.025	20.0	19.0	1.10	1.68	18.7	11.49
5/31/2017 10:30	0.018	28.0	26.0	0.60	1.52	16.3	8.99
6/13/2017 10:26	0.035	62.0	59.0	1.60	0.76	23.1	9.34
6/27/2017 11:03	0.041	16.0	15.0	1.40	1.37	20.8	7.97
7/13/2017 10:37	0.038	28.0	26.0	1.20	1.07	24.7	7.51
7/27/2017 10:28	0.028	14.0	12.0	1.00	1.37	25.6	7.42
8/8/2017 10:32	0.020	11.0	11.0	1.00	1.98	24.0	7.65
8/22/2017 10:42	0.023	9.3	7.0	0.87	2.90	22.3	7.08
9/7/2017 11:11	0.026	9.5	8.5	1.10	2.59	18.9	6.64
9/19/2017 10:11	0.023	17.0	17.0	0.95	2.13	19.4	8.42
10/5/2017 11:06	0.034	29.0	27.0	1.20	1.37	17.1	6.66
10/26/17 11:30	0.038	28.0	26.0	1.20	1.52	11.5	9.77
2017 Average	0.030	21.9	20.3	1.12	1.80	18.9	8.70
2017 Summer Average	0.030	21.8	20.3	1.15	1.77	22.4	7.75
Volunteer Data							
4/22/2017 11:45	0.019	5.9	5.0	0.81	2.40	12.6	NA
5/6/2017 16:00	0.027	9.3	9.9	0.98	2.20	15.0	NA
5/21/2017 10:00	0.031	19.0	17.0	1.00	1.40	14.4	NA
6/1/2017 10:00	0.023	23.0	21.0	1.00	1.30	19.0	NA
6/17/2017 11:00	0.030	48.0	46.0	1.30	0.90	24.7	NA
6/30/2017 13:00	0.040	20.0	18.0	0.95	1.20	22.6	NA
7/16/2017 10:00	0.061	17.0	15.0	1.00	1.20	25.0	NA
7/30/2017 12:00	0.077	9.3	8.3	0.94	1.60	28.0	NA
8/12/2017 18:00	0.023	6.6	5.3	0.86	1.70	25.5	NA
8/24/2017 18:00	0.024	6.3	5.1	0.77	1.90	23.0	NA
9/9/2017 15:00	0.024	6.4	5.2	1.00	2.30	19.4	NA
10/6/2017 10:00	0.029	27.0	26.0	1.00	1.20	17.0	NA
10/18/2017 14:00	0.024	23.0	22.0	1.10	1.70	14.3	NA
2017 Average	0.033	17.0	15.7	0.98	1.62	20.0	NA
2017 Summer Average	0.038	17.1	15.5	0.98	1.51	23.4	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*							
	High	High Date	Low	Low Date	Average		
2017 Elevation (ft)	910.11	5/23/2017	908.47	8/8/2017	909.07		
*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									
	2017	2016	2015	2014	2013	2012	2011	2010	2009	2008
Total Phosphorus (mg/L)	B	C	C	C	C	C	C	C	C	C
Chlorophyll-a (µg/L)	C	C	B	C	C	B	A	B	B	B
Secchi depth (ft)	C	C	D	D	C	D	C	C	C	C
Overall	C+	C	C	C-	C	C	C+	C+	C+	C+

Bone Lake Water Surface Elevation Statistics

Outlet Elevation (culvert): 907.3 ft.

Ordinary High Water Level (OHW) Elevation: 909.1 ft.

100 Year Flood Elevation (CLFLWD): 910.6 ft.

Highest Recorded Elevation: 910.97 ft. (07/07/1975)

Lowest Recorded Elevation: 906.7 ft. (11/07/1966)

Datum: NGVD 29 (ft.)

