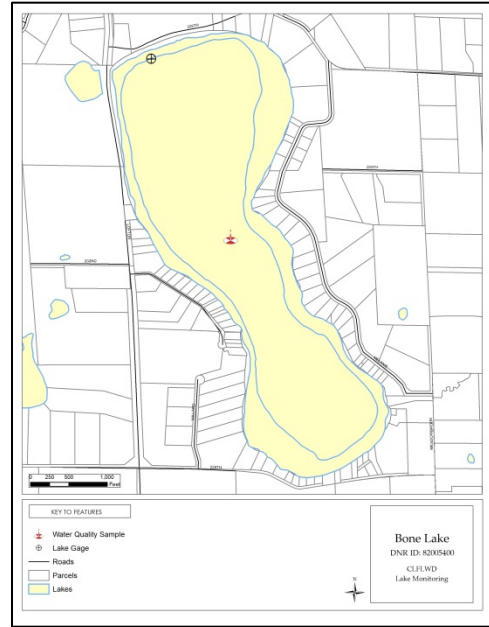


Bone Lake

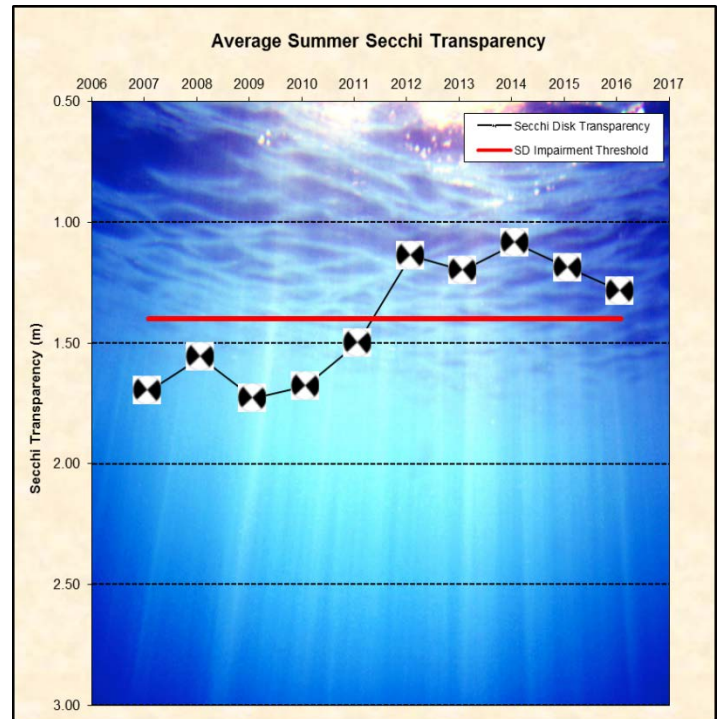
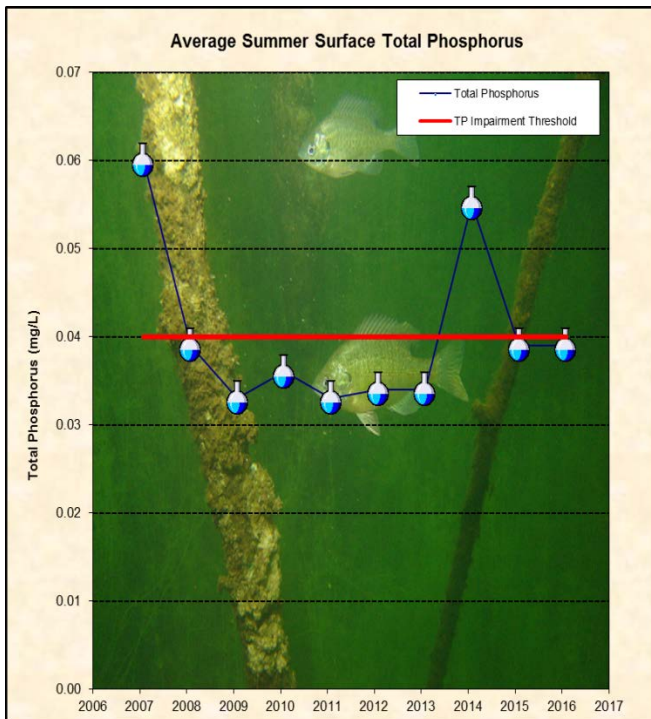
2016 Lake Grade: C

- DNR ID #: 82005400
 - Municipality: City of Scandia
 - Location: Section 5 T32N-R20W
 - Lake Size: 221.45 acres
 - Maximum Depth (2016): 31 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.



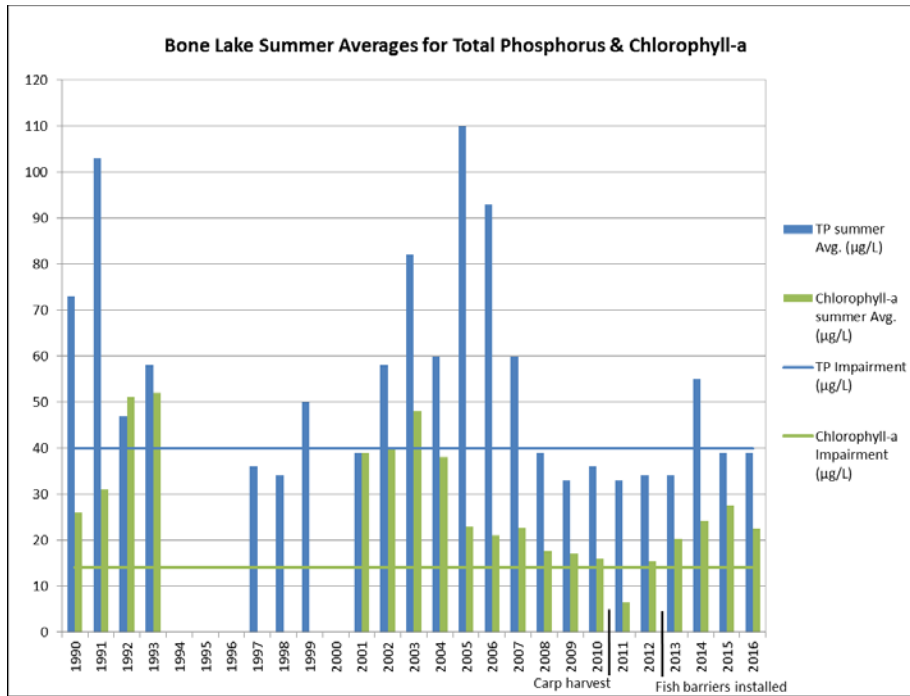
Summary Points

- Based on the chlorophyll-*a* results Bone Lake was considered eutrophic in 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 5 and 7 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)
4/20/2016 14:57	0.036	17.0	15.0	1.40	1.68	13.2	12.14
5/3/2016 13:55	0.029	8.5	6.8	1.70	2.29	14.1	10.50
5/17/2016 11:33	0.026	24.0	22.0	1.40	1.37	15.4	12.42
6/2/2016 11:45	0.032	21.0	19.0	1.30	1.22	19.8	8.99
6/16/2016 11:00	0.035	29.0	26.0	1.10	1.07	21.9	8.16
6/28/2016 11:11	0.037	23.0	20.0	1.30	1.22	24.4	8.31
7/12/2016 11:28	0.058	30.0	27.0	1.10	1.37	25.0	8.17
7/26/2016 10:44	0.031	22.0	21.0	1.30	1.07	27.2	8.49
8/10/2016 10:47	0.051	33.0	24.0	1.20	1.07	26.1	9.41
8/25/2016 11:03	0.028	16.0	15.0	1.00	1.68	23.3	6.82
9/8/2016 11:00	0.041	19.0	17.0	1.30	1.68	22.3	7.19
9/19/2016 11:04	0.042	34.0	33.0	1.30	1.22	20.1	6.98
10/6/2016 9:15	0.034	24.0	22.0	1.50	1.37	16.8	8.10
10/20/2016 9:41	0.044	21.0	18.0	1.90	1.83	13.2	9.58
2016 Average	0.037	23.0	20.4	1.34	1.44	20.2	8.95
2016 Summer Average	0.039	25.2	22.4	1.21	1.29	23.3	8.06
Volunteer Data							
4/24/2016 10:30	0.028	14.0	13.0	1.00	1.70	14.2	NA
5/8/2016 19:55	0.025	10.0	9.0	1.20	1.90	17.8	NA
5/19/2016 14:30	0.031	17.0	15.0	1.20	1.30	14.5	NA
6/2/2016 15:00	0.023	16.0	15.0	1.10	1.20	22.2	NA
6/18/2016 15:00	0.032	19.0	18.0	1.20	1.20	25.9	NA
7/2/2016 13:00	0.029	18.0	16.0	0.98	1.20	27.0	NA
7/11/2016 10:00	0.033	19.0	17.0	0.96	1.10	27.0	NA
7/29/2016 14:00	0.033	23.0	21.0	1.00	1.00	27.0	NA
8/14/2016 15:00	0.037	25.0	23.0	0.96	1.00	28.4	NA
8/27/2016 16:00	0.030	16.0	14.0	1.00	1.20	24.5	NA
9/19/2016 14:00	0.042	38.0	36.0	1.20	0.90	21.7	NA
10/9/2016 12:00	0.034	21.0	18.0	1.20	0.70	15.0	NA
2016 Average	0.031	19.7	17.9	1.08	1.20	22.1	NA
2016 Summer Average	0.032	21.8	20.0	1.05	1.10	25.5	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*							
	High	High Date	Low	Low Date	Average		
2016 Elevation (ft)	909.45	9/8/2016	908.77	4/20/2016	909.09		

*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)	C	C	C	C	C	C	C	C	C	C
Chlorophyll-a (µg/L)	C	B	C	C	B	A	B	B	B	B
Secchi depth (ft)	C	D	D	C	D	C	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.)

