Steel Lake Monitoring 2019

Steel Lake Management District

Prepared by Kevin Du

11/8/2019

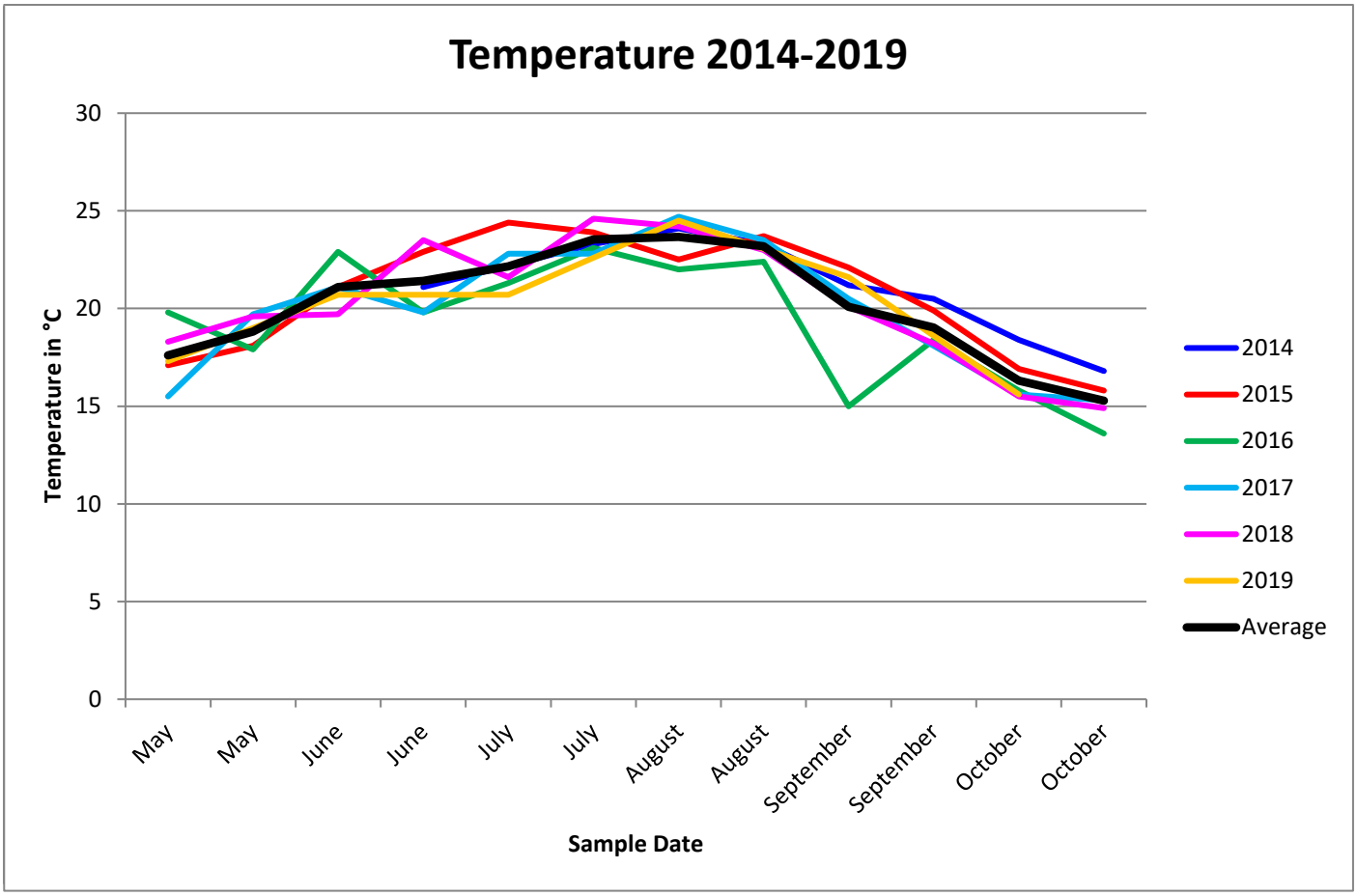

Figure 1: Temperatures are stable. No significant differences between average temperature and individual years. Largest difference would be 2016 September temperature of 15°C versus average temperature of 20.1°C. Temperature criteria is 18°C, however temperature measurements used in the graph is only surface temperature it is not representative of aquatic fish habitat.

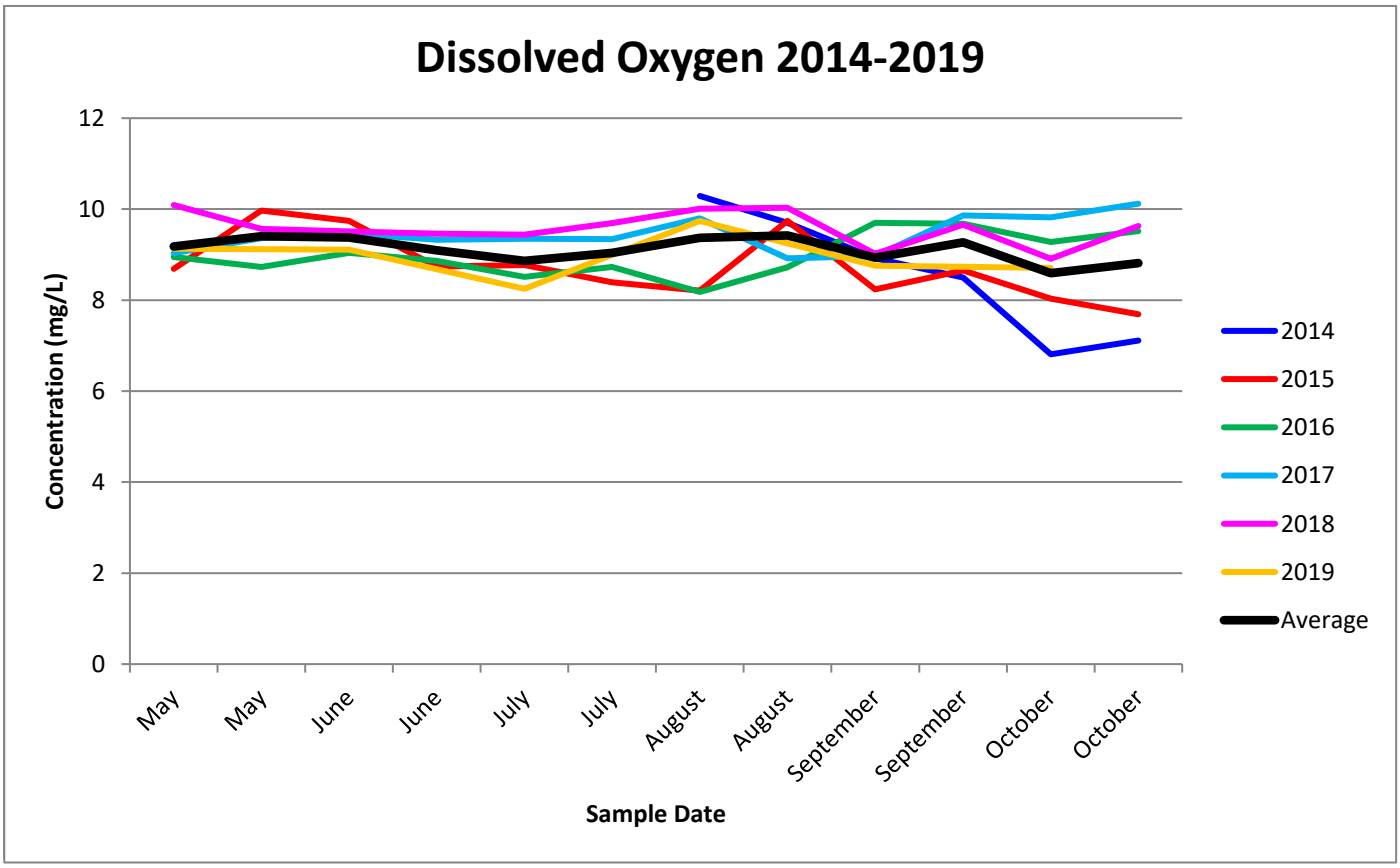

Figure 2: Dissolved oxygen is relatively stable. Steel Lake supports Redband Trouts a subspecies of rainbow trout which means the lakes DO criteria is 8 mg/L. Throughout summer the concentration of DO does not fall under 8 mg/L except for few instances during 2014 and 2015. For 2019 concentrations stayed above the criteria.

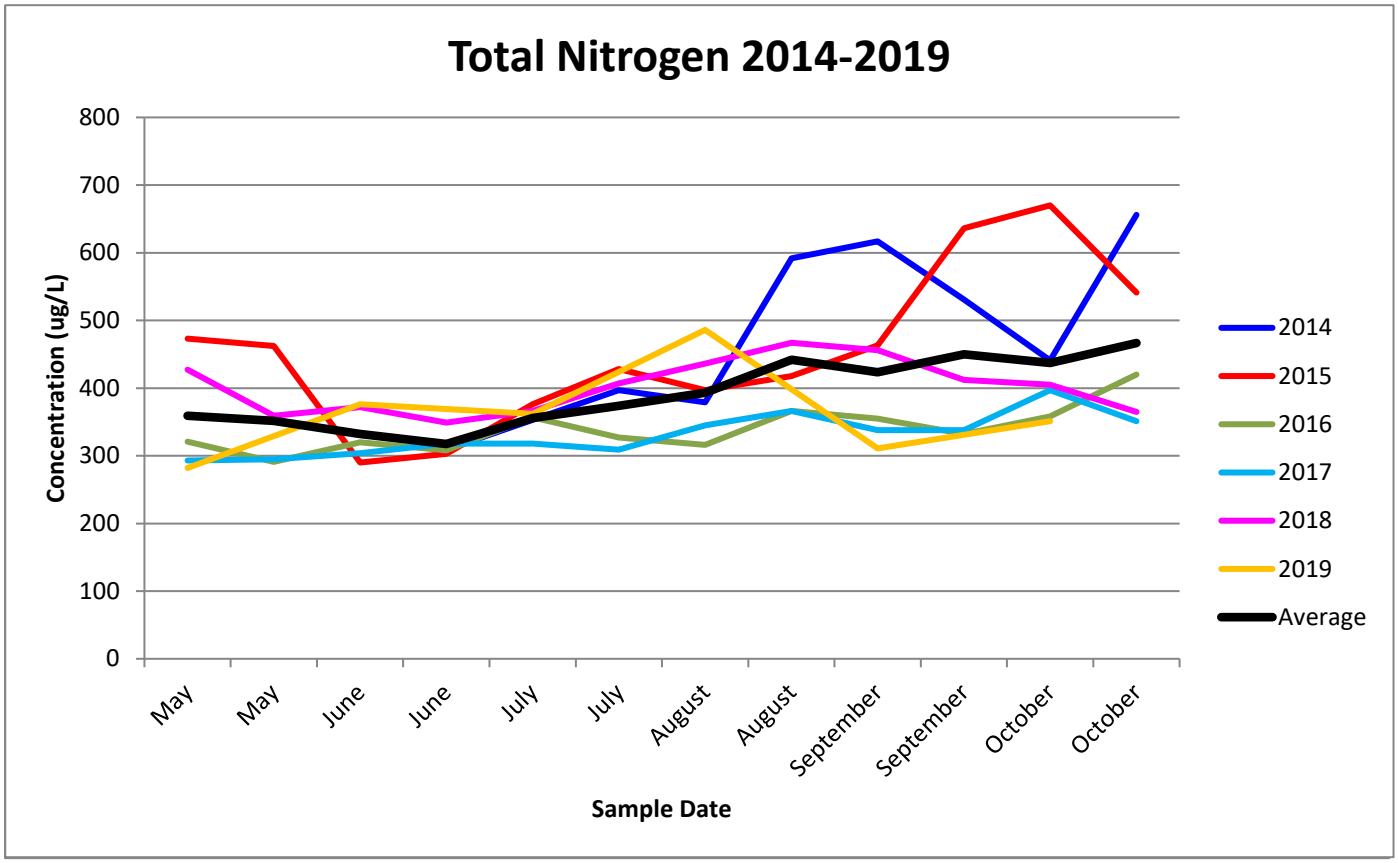

Figure 3: No WA criteria for total nitrogen. Majority of data follows the average trend line except for a few data point during 2014 and 2015. Generally, the lower the concentration the better.

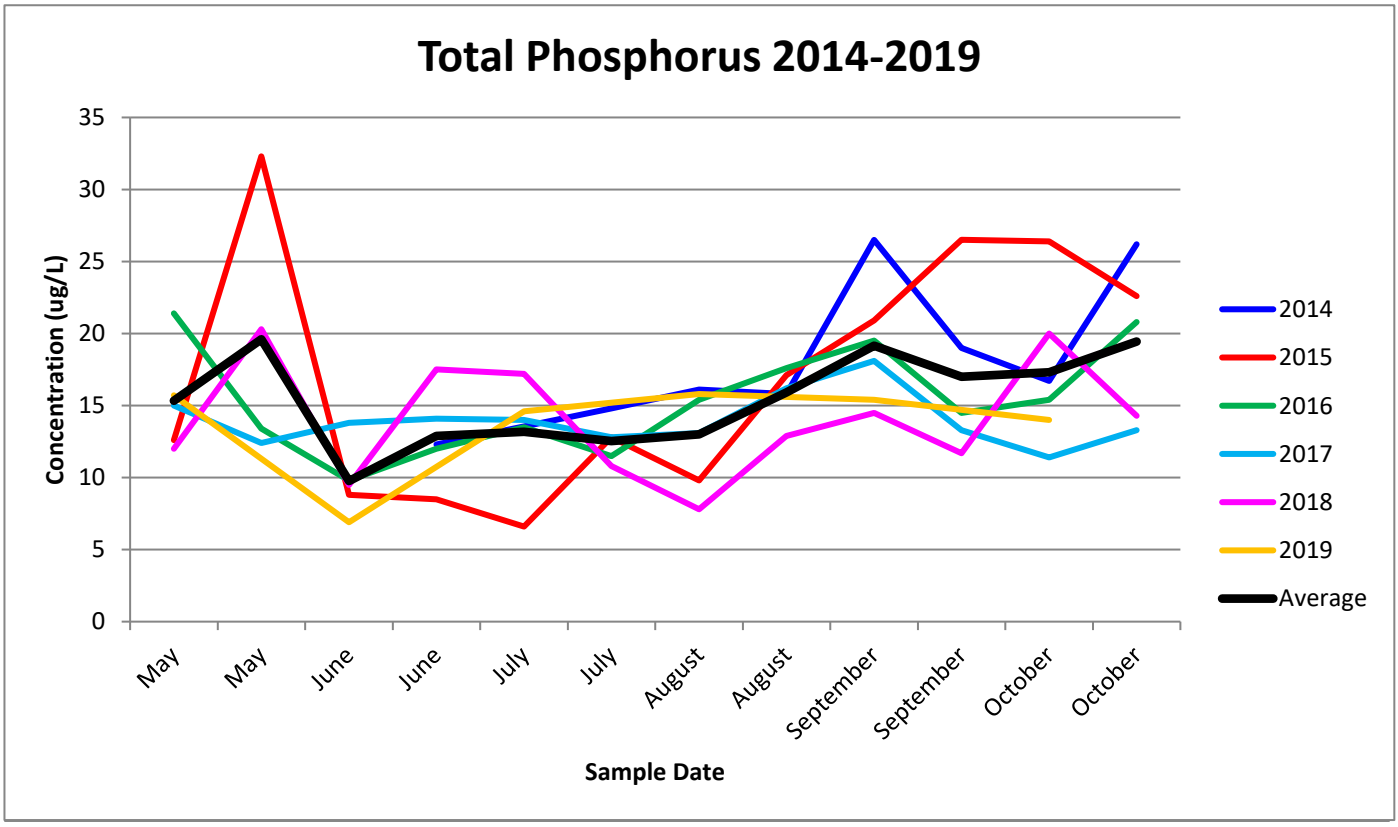

Figure 4: Steel Lake is a lake within the Puget Lowlands therefore its recommend to take action to study the lake if concentrations are greater than 20 ug/L. There are a few instances where this threshold is breach during 2014 and 2015. Otherwise values are fairly stable. For 2019 all values were below the criteria.

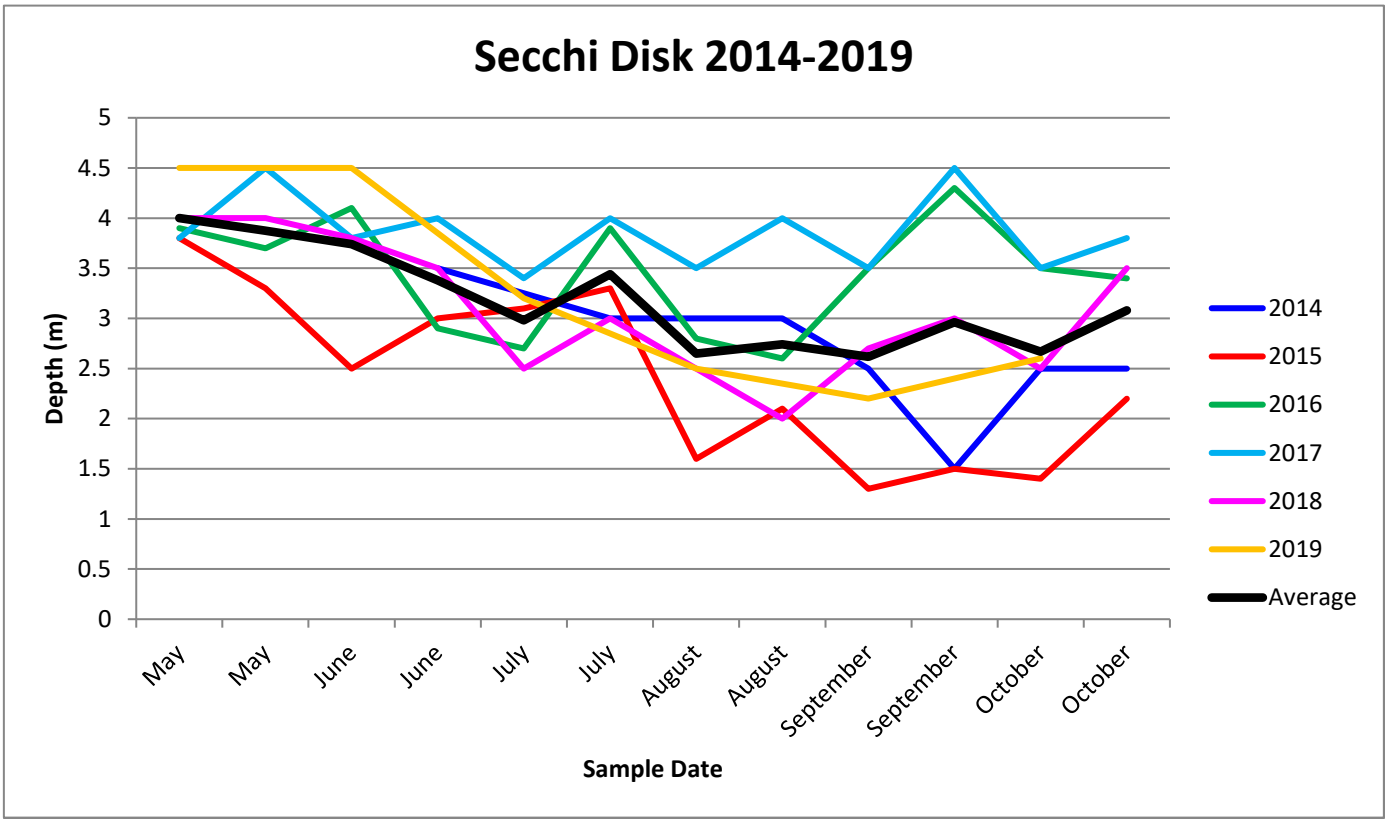

Figure 5: Clarity of the lake is slightly stable. As a shallow lake it's more likely to see unstable results. Lakes clarity decreases slightly going into the summer, likely due to algae growth and recreational use, and clarity increases going into the fall.

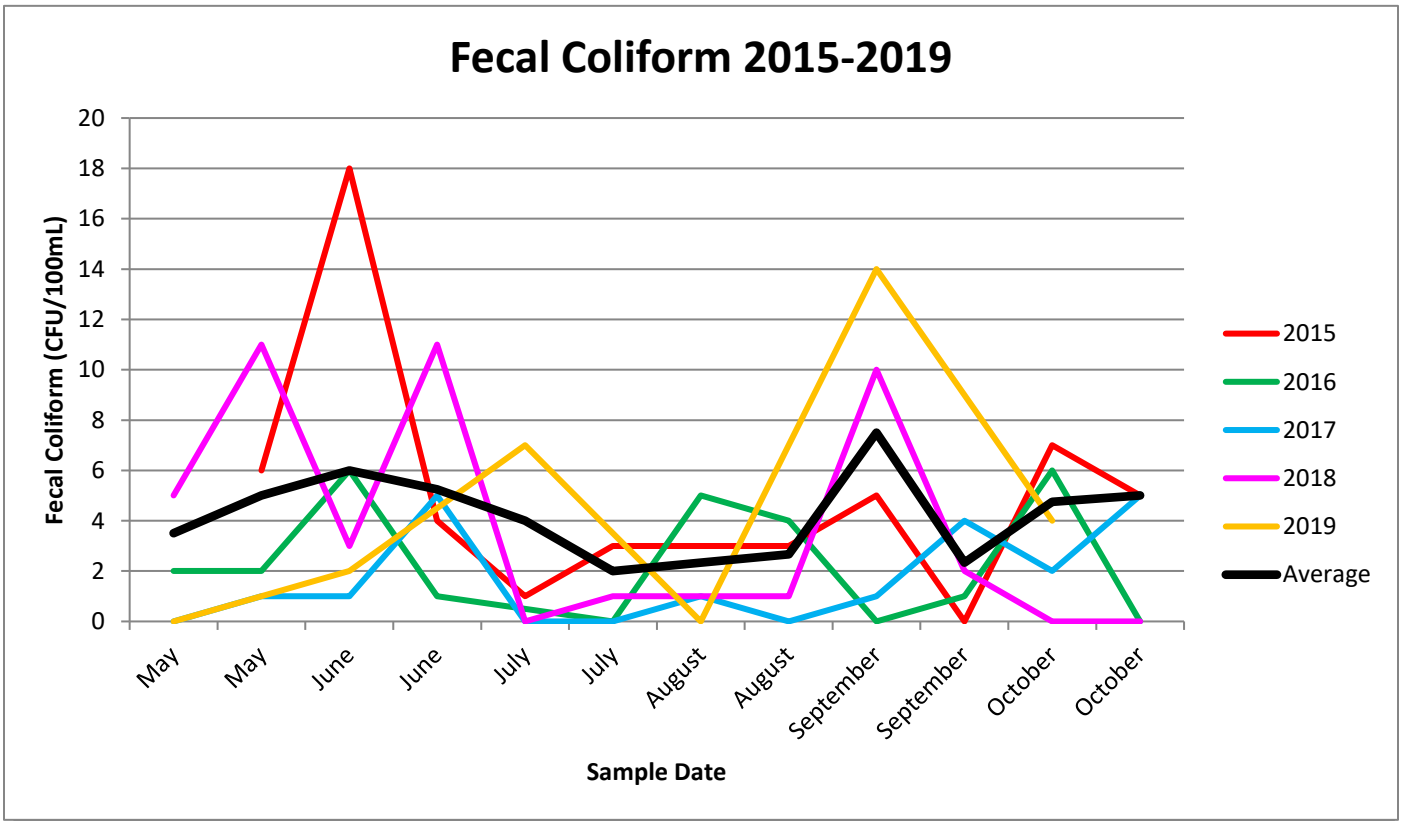

Figure 6: Fecal coliform criteria expires 12/31/2020 replaced with E. coli criteria. As it still stands the criteria is 100 CFU/100mL and results above are not close to reaching the 100 CFU/100mL threshold.

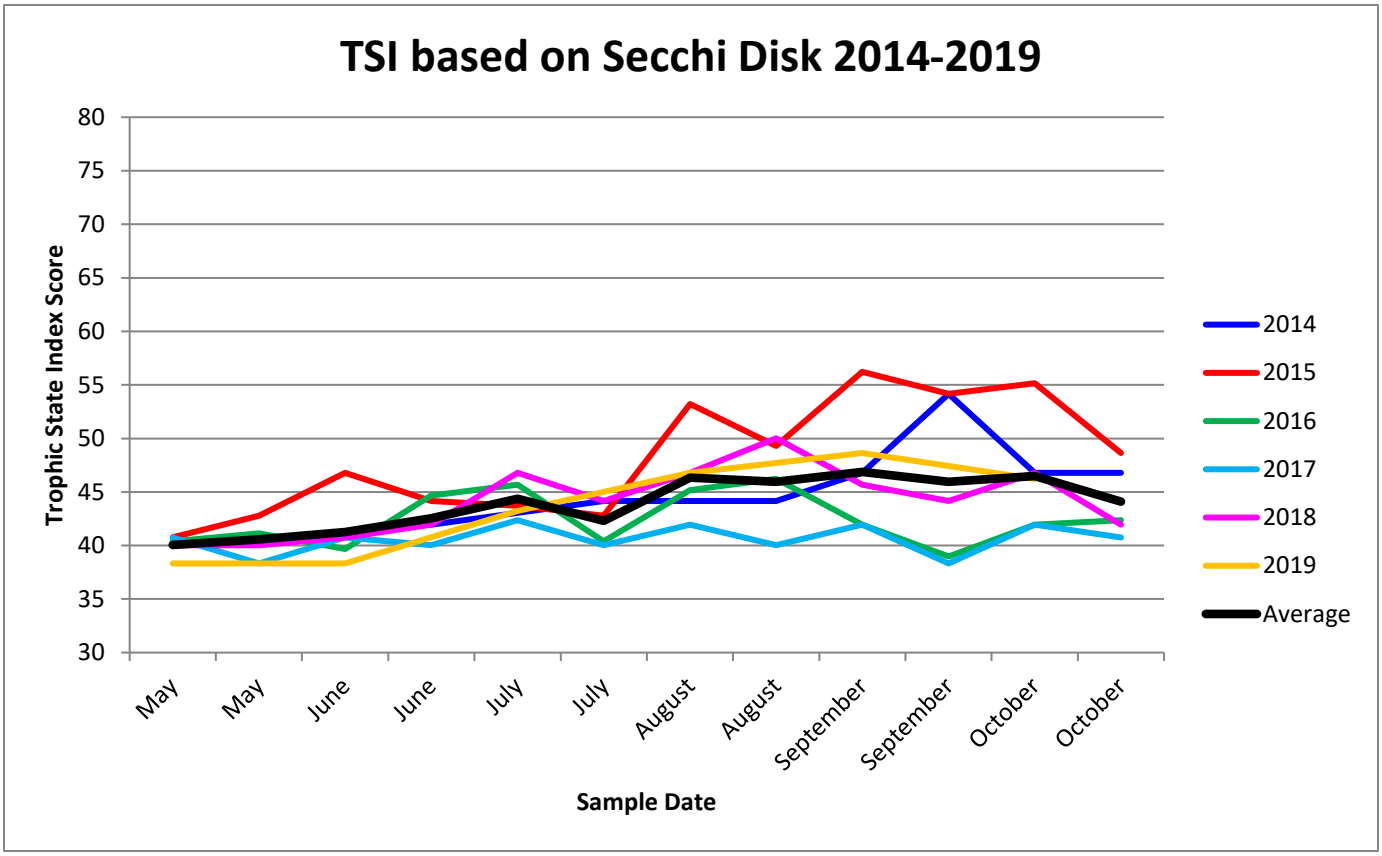

Figure 7: TSI based on secchi disk measurements. Average score ranges from 40-50 which means the lake is mesotrophic. Meaning the lake is fairly clear and has potential to become eutrophic. 2019 TSI values stayed within the same range as the average.

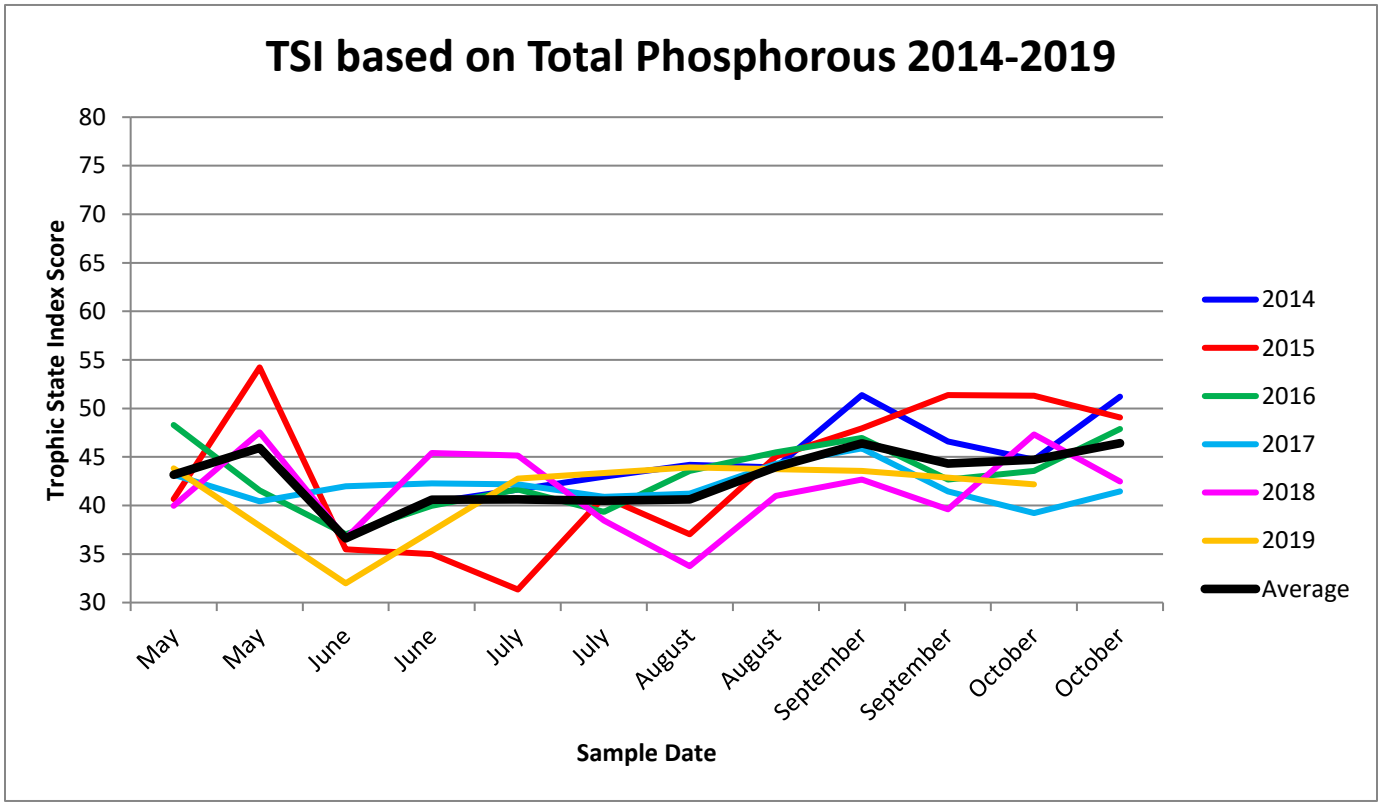

Figure 8: TSI based on total phosphorous. Average score ranges from 35-50 which means the lake is mesotrophic. 2019 TSI value stayed below 45 which is slightly better than TSI score based on Secchi disk seen in Figure 7.

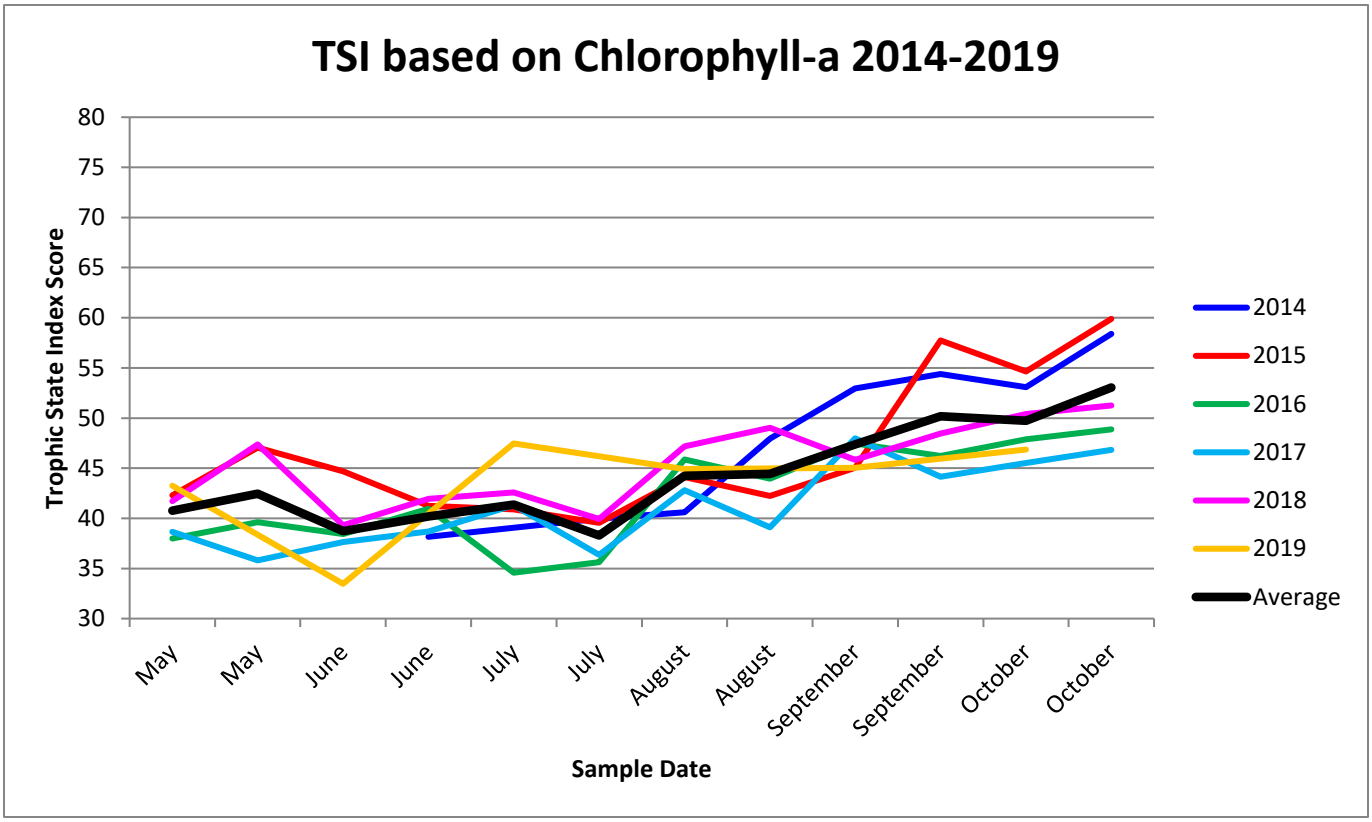

Figure 9: TSI score based on chlorophyll-a abundance. Chlorophyll-a is considered the most accurate representation of TSI during the summer as noted by Carlson, the developer of TSI value system. Average TSI value exceeds 50 during Sep-Oct. The 2019 TSI values are below 50 and range from 35-50 which means the lake is mesotrophic.

TSI Table (Carlson, 1977)		
TSI Value	**Attributes**	**Water Supply**
<30	Oligotrophy: Clear water, oxygen throughout the year in the hypolimnion.	Water may be suitable for an unfiltered water supply.
30-40	Hypolimnia of shallower lakes may become anoxic.	
40-50	Mesotrophy: Water moderately clear; increasing probability of hypolimnetic anoxia during summer.	Iron, manganese, taste, and odor problems worsen. Raw water turbidity requires filtration.
50-60	Eutrophy: Anoxic hypolimnia, macrophyte problems possible.	
60-70	Blue-green algae dominate, algal scums and macrophyte problems.	Episodes of severe taste and odor problem.
70-80	Hypereutrophy: (light limited productivity). Dense algae and macrophytes.	
>80	Algal scums, few macrophytes.	