Steel Lake Monitoring 2024

Steel Lake Management District

Prepared by Kristyn Armitage

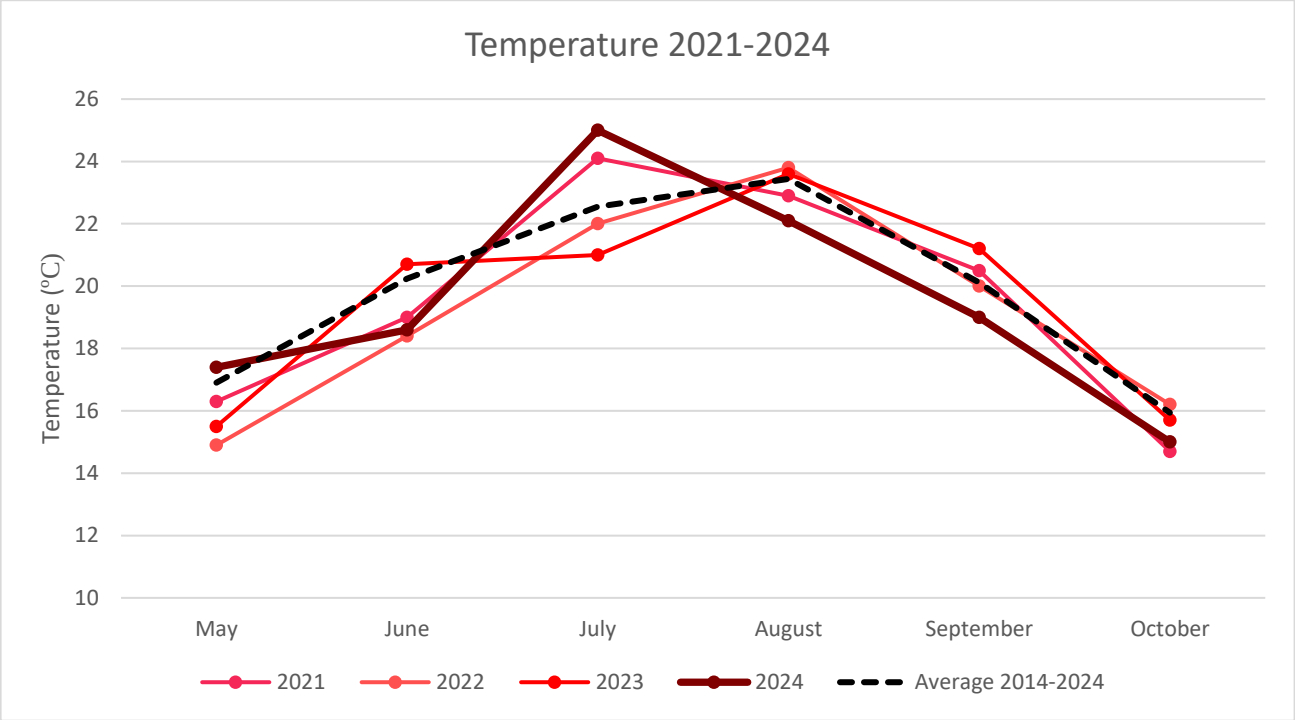

Figure 1: Temperature measurements 2021-2024.There were no significant changes overall for 2024. July 2024 had a higher temperature than average due to higher ambient temperatures ranging from 23.3-37.7 °C for 24 days consecutively. 2020 data was not shown due to the dissolved oxygen and temperature probe malfunctioning most of the sampling period. Temperature criteria is 18 °C however temperature measurements were taken at the surface level and not representative of aquatic fish habitat.

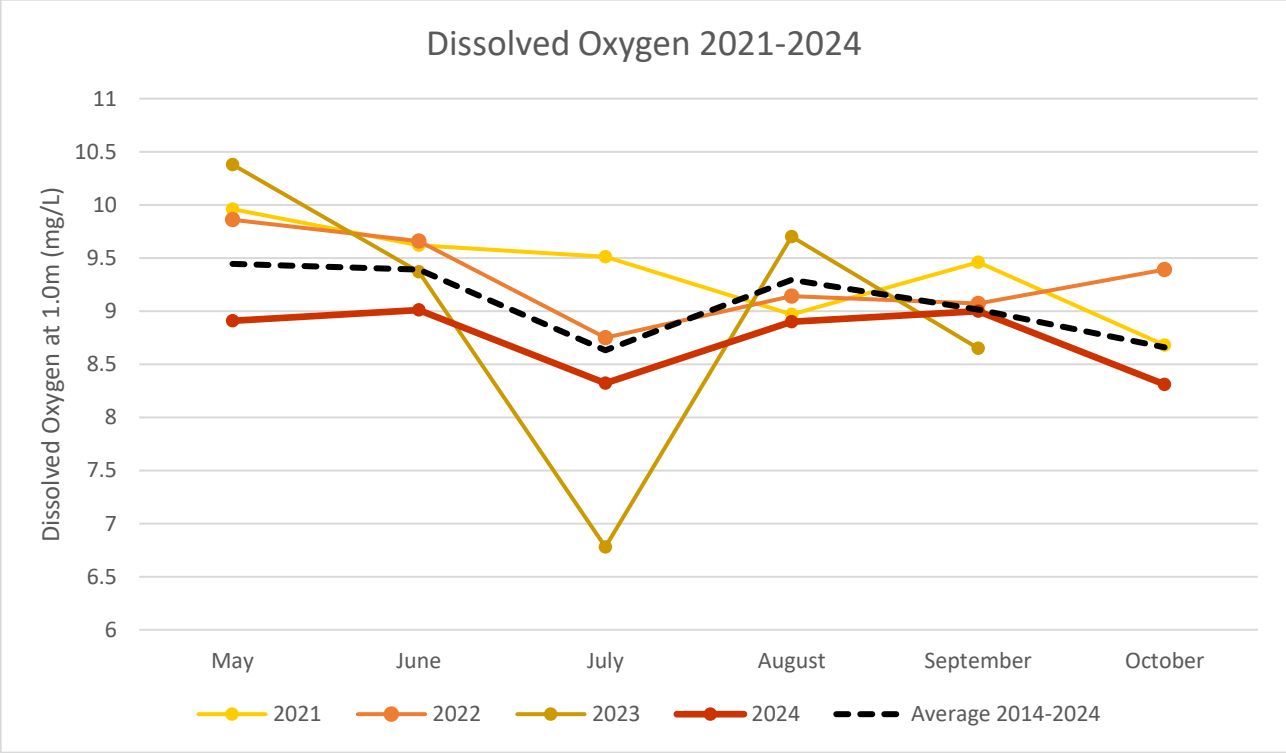

Figure 2: Dissolved Oxygen measurements 2021-2024. Dissolved oxygen levels were below the 10-year average in 2024. However, the measurements were above the 8.0 mg/L criteria and supports Redband Trout which is a subspecies of rainbow trout. 2020 data was not shown due to the dissolved oxygen and temperature probe malfunctioning most of the sampling period.

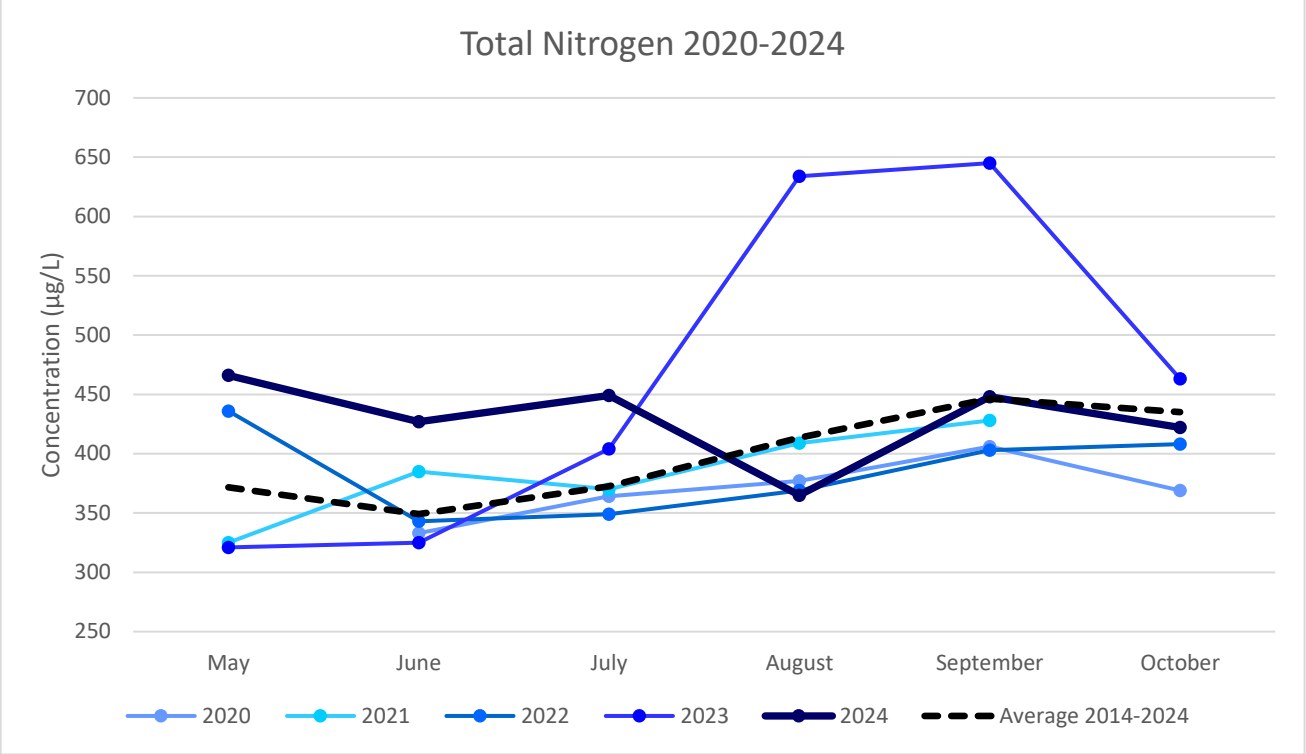

Figure 3: Total nitrogen concentrations 2020-2024. 2024 concentrations were above the 10-year average from May-July and decreased through the following months. Higher concentrations can lead to excessive algal growth therefore, the lower the concentration the better. There is currently no criteria for total nitrogen in WA.

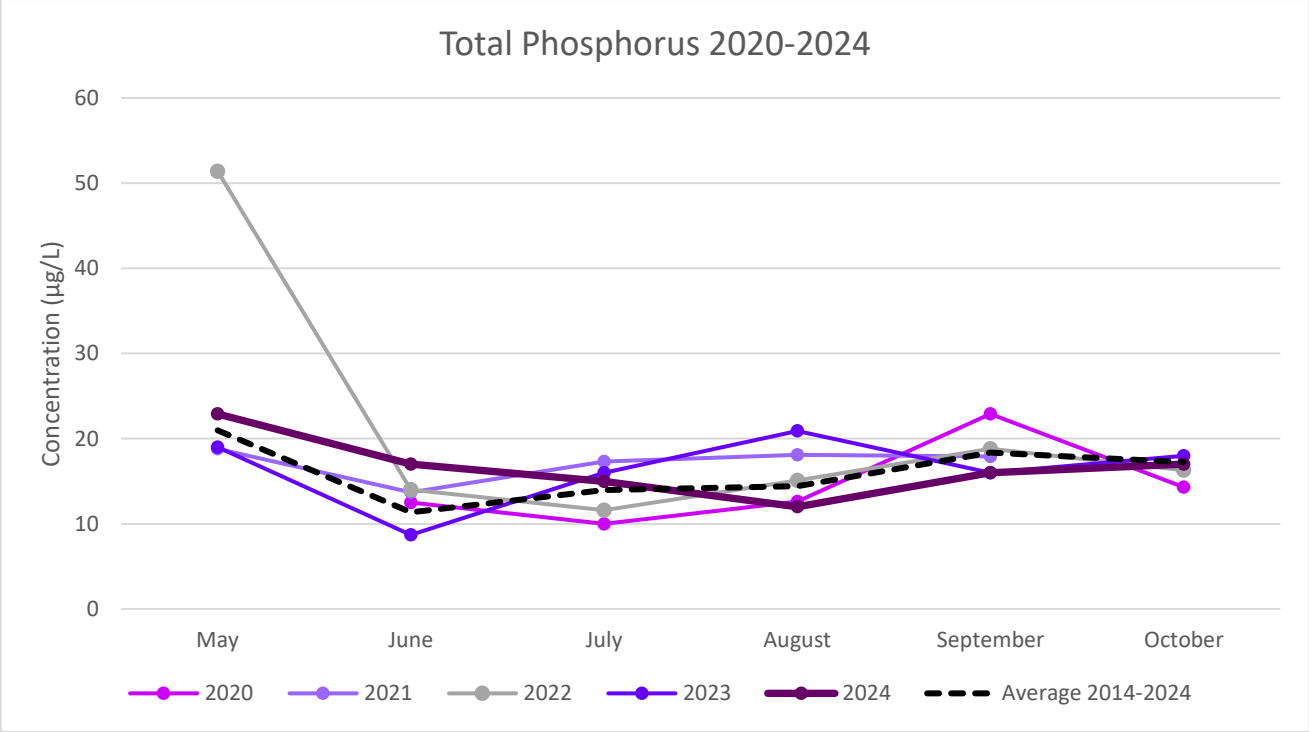

Figure 4: Total phosphorus concentrations 2020-2024. Steel Lake is located within the Puget Lowlands and it is recommended to create a study if concentrations exceed 20 µg/L but it does not constantly exceed. There are multiple samples where the concentration exceeded that limit in 2024 and previous years. In late July, Eutrosorb was added to decrease phosphorus levels within the lake. A slight decrease in concentration occurred showing some effectiveness with the treatment.

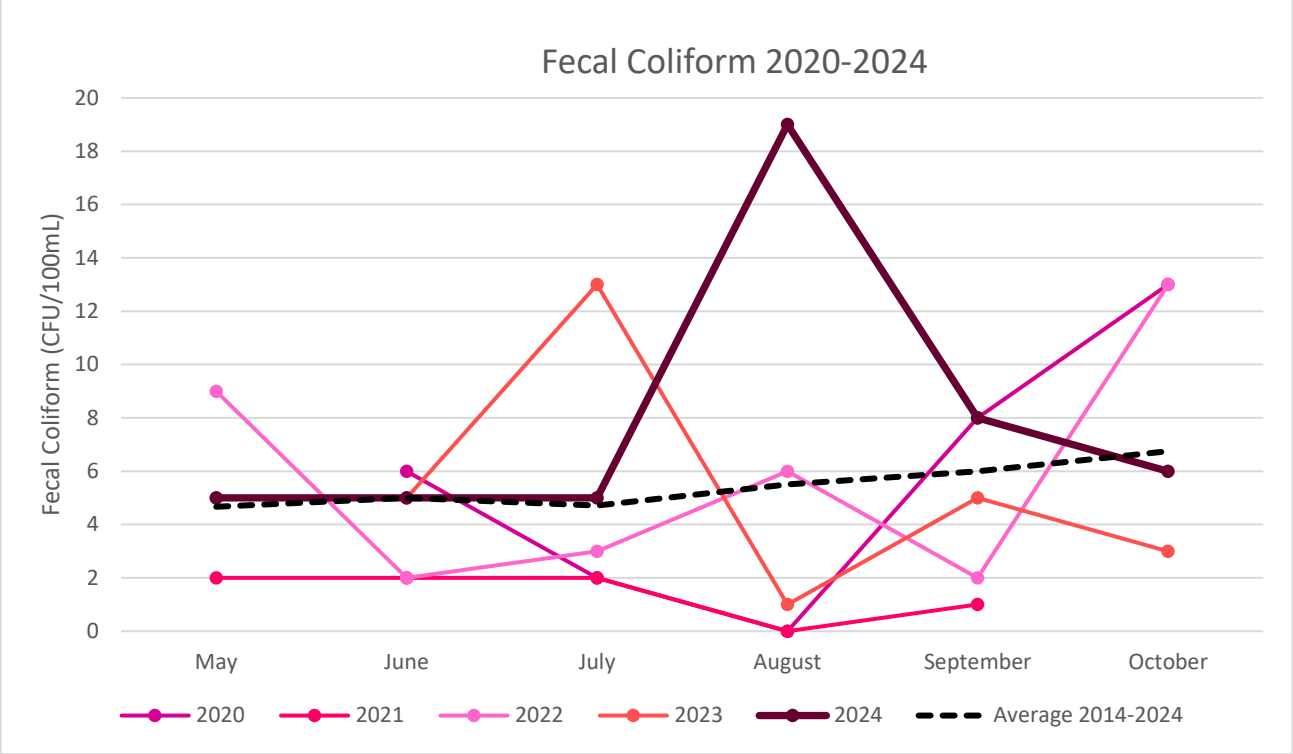

Figure 5: Fecal coliform units 2020-2024. Currently the state of WA has a contact recreation criterion of 100 CFU/100mL. The highest sample was in August 2024 with 19 CFU/100mL which was well below the criteria. The criterion for fecal coliform criteria expired on 12/31/2020 and replaced with *E. coli*.

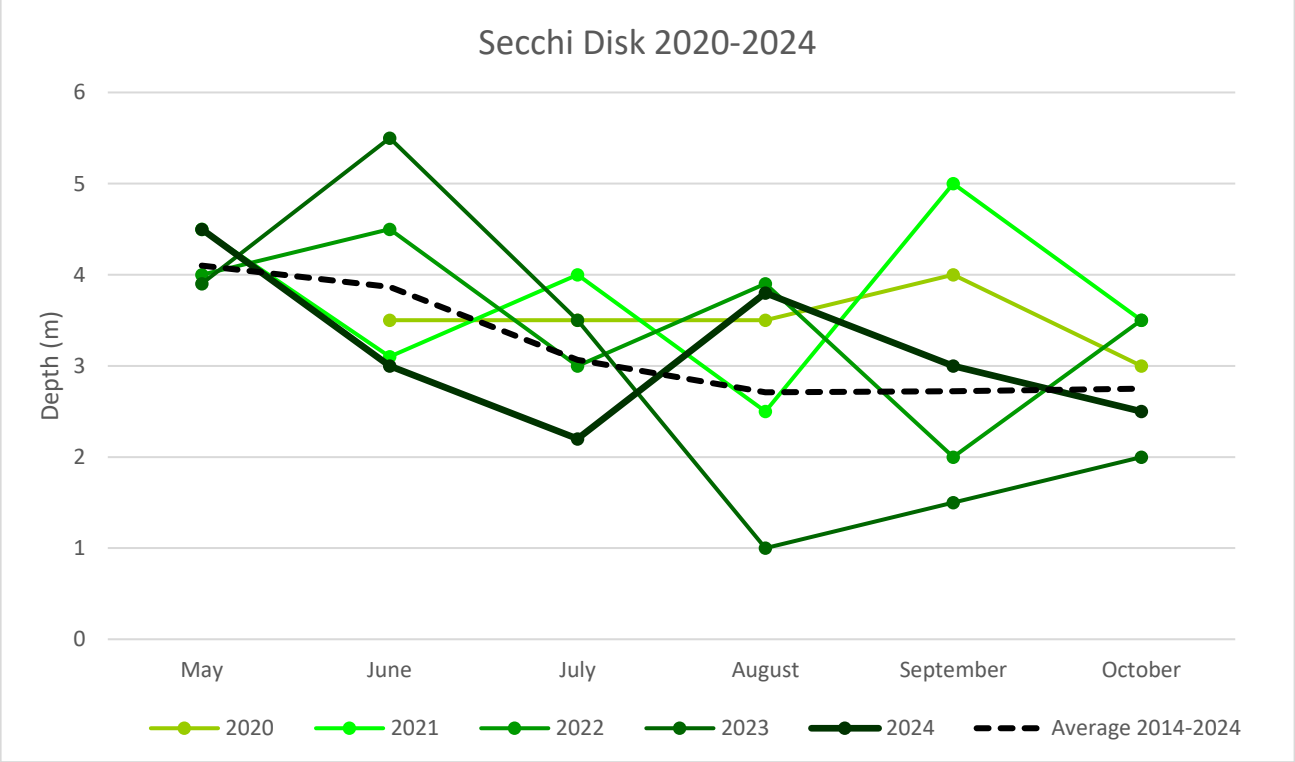

Figure 6: Secchi Disk readings 2020-2024. Secchi disk measurements are used to determine the turbidity of waterbodies. The clarity decreased leading into the summer months due to algae growth and human activity. After the Eutrosorb treatment application, turbidity decreased from July to August of 2024.

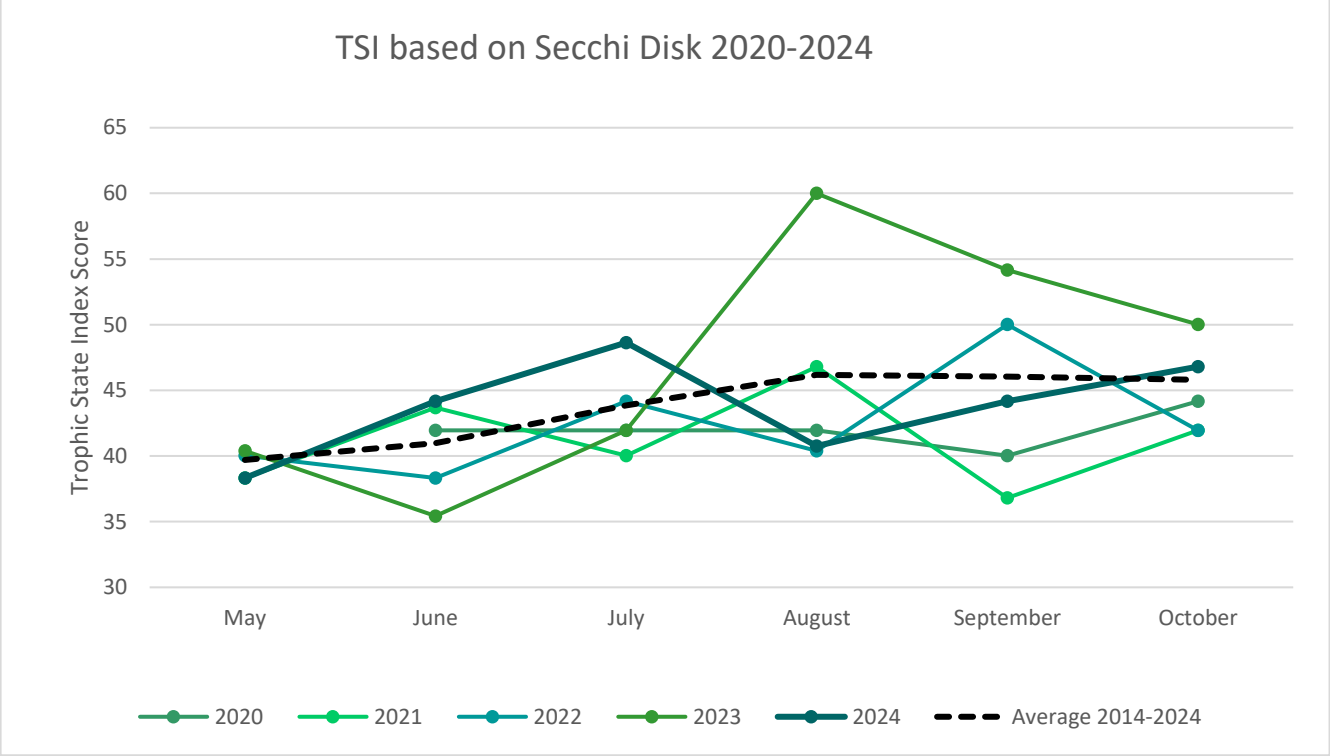

Figure 7: Trophic State Index Score based on secchi disk readings 2020-2024. The average TSI score for 2024 was 43.8 which indicates that the lake is mesotrophic and fairly clear. The 10-year average was 43.7 which is within mesotrophic range but can become eutrophic if algae and turbidity increases over time.

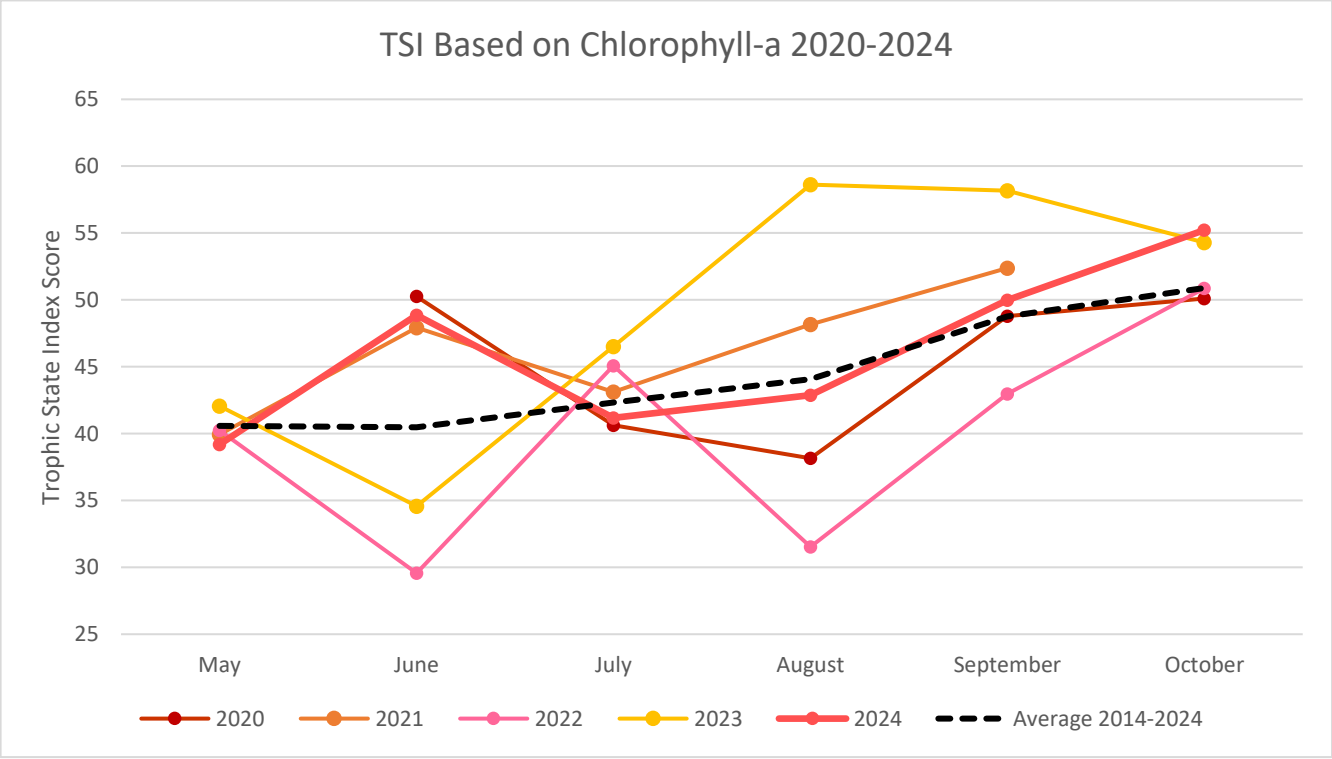

Figure 8: Trophic State Index Score based on Cholophyll-a abundance 2020-2024. For 2024, the TSI average was 46.2 which is categorically mesotrophic but has the potential to become eutrophic. In comparison to the 10-year average which was lower at 44.5. Chlorophyll-a readings are the most accurate method to represent TSI during the summer months according to Carlson, the author and developer of the TSI scale.

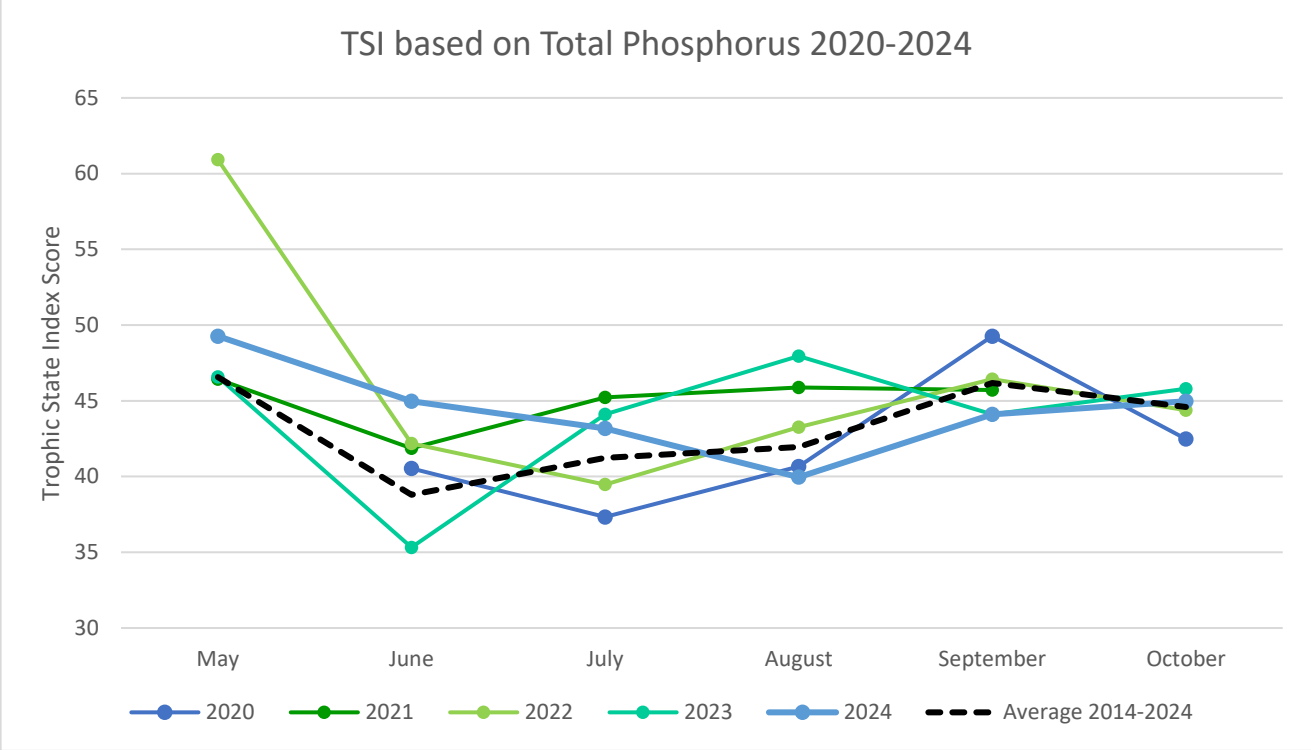

Figure 9: Trophic State Index Score based on total phosphorus 2020-2024. The average TSI score for 2024 was 44.4 which is within the mesotrophic range. The 10-year average was slightly less at 43.2 and also within the mesotrophic range.

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.	

Figure 10: Trophic State Index Table developed and authored by Carlson, 1977.