2023 Pattison Lake Water Quality Report

Prepared by Thurston County Environmental Health Division

DESCHUTES RIVER WATERSHED

- **SHORELINE LENGTH**: 6.3 miles
- **LAKE SIZE:** 0.42 square miles (330 acres)
- **BASIN SIZE**: 3.8 square miles
- **MEAN DEPTH**: 4.0 meters (13 feet)
- **MAXIMUM DEPTH**: 6.7 meters (22 feet)
- **VOLUME**: 3,600 acre-feet

GENERAL TOPOGRAPHY:
Pattison Lake is a Puget Sound lowland lake at an elevation of 154 feet above mean sea level. It is divided into north and south basins by a railroad and is the second in a series of four lakes. Hicks Lake drains into Pattison, and Pattison drains to Long Lake. The outlet for Long Lake flows through Lois Lake and ultimately becomes Woodland Creek, a tributary to Henderson Inlet.

CYANOBACTERIA BLOOMS:
Pattison Lake was sampled 15 times for toxins produced by cyanobacteria. Six of those samples had toxin levels above state recreational guidelines. Notably, the longest sampled bloom of this season lasted from August 1st, 2023 to September 19th, 2023.

PRIMARY LAND USES:
The watershed is primarily suburban residential with some undeveloped forest cover primarily in wetland areas. The sample site SP1 is in the south basin, while NP1 is in the north basin.

PRIMARY LAKE USES:
Pattison Lake is used for fishing, swimming, and boating (under 5 mph).

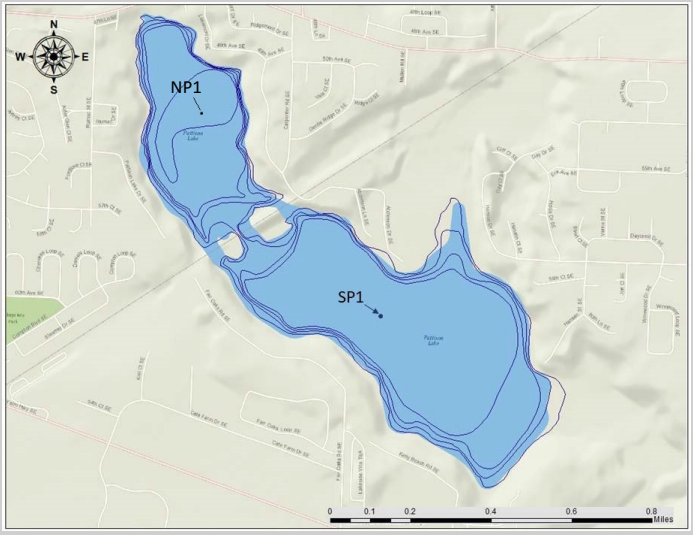


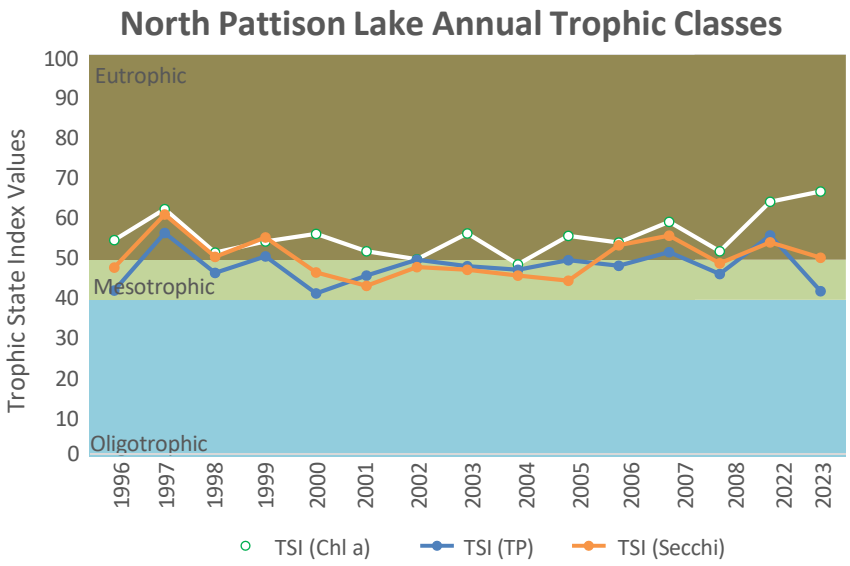
Figure 1. Pattison Lake map sample sites

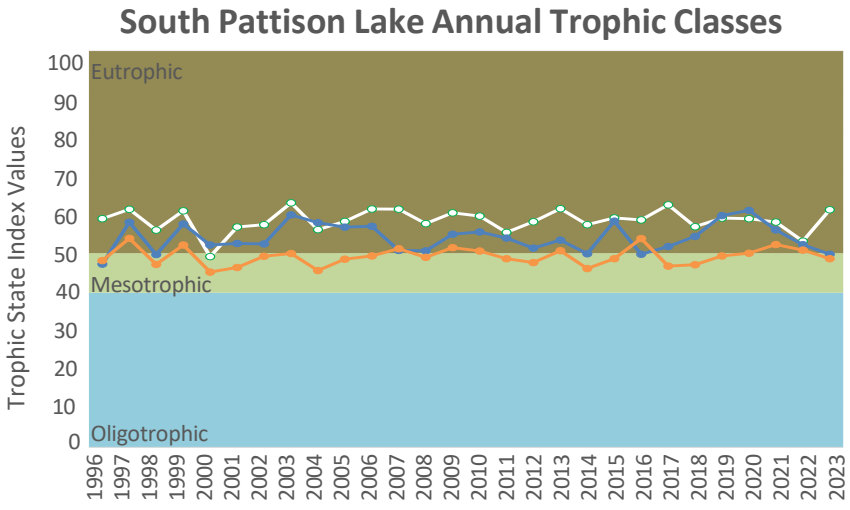
WATER QUALITY SUMMARY

In 2023, Thurston County Environmental Health (TCEH) conducted monthly monitoring of Pattison Lake from May through October. The 2023 results are similar to previous years, an indication that there has been no notable change in water quality.

All water quality data was collected at the deepest basins of the lake and sampling methods utilized were consistent with previous reported years. The south basin has been constantly monitored since 1996 while the north basin was not monitored from 2009 through 2021.

The most popular biomass related method of classifying the trophic state of lakes is Carlson's Trophic State Index (TSI) (Carlson, 1977). Using this method, both basins have fluctuated between a classification of mesotrophic and eutrophic depending on characteristic and year.





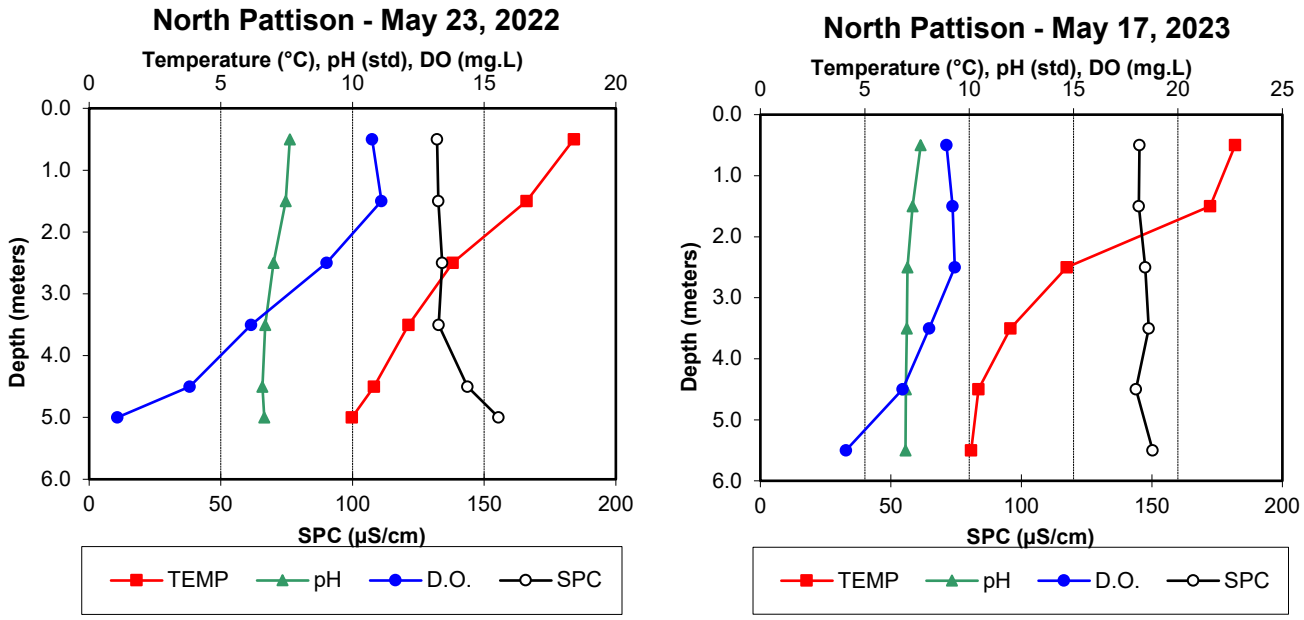


Figure 4. Vertical water quality profiles collected at NP1 for May 2022 and 2023

Temperature, pH, dissolved oxygen, and specific conductivity measurements were collected to determine the stratification of both basins in Pattison Lake. In 2022 and 2023 the north basin of Pattison lake showed the onset of lake stratification in May, with a relatively high dissolved oxygen at the surface and a relatively low level of dissolved oxygen at the bottom. The lake then remained stratified throughout the summer, showing either a clear clinograde or positive heterograde dissolved oxygen profile. In October, both 2022 and 2023 show North Pattison Lake is still stratified, but is beginning to show change, indicating that the lake layers would most likely mix soon after.

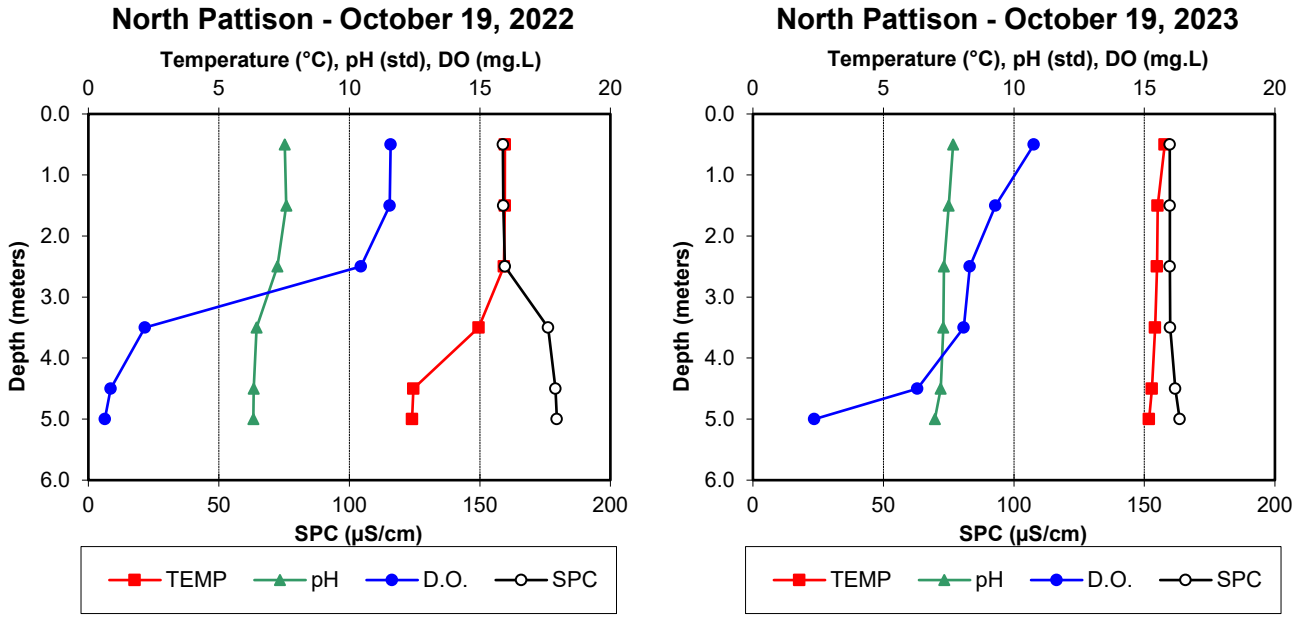


Figure 5. Vertical water quality profiles collected at NP1 for October 2022 and 2023

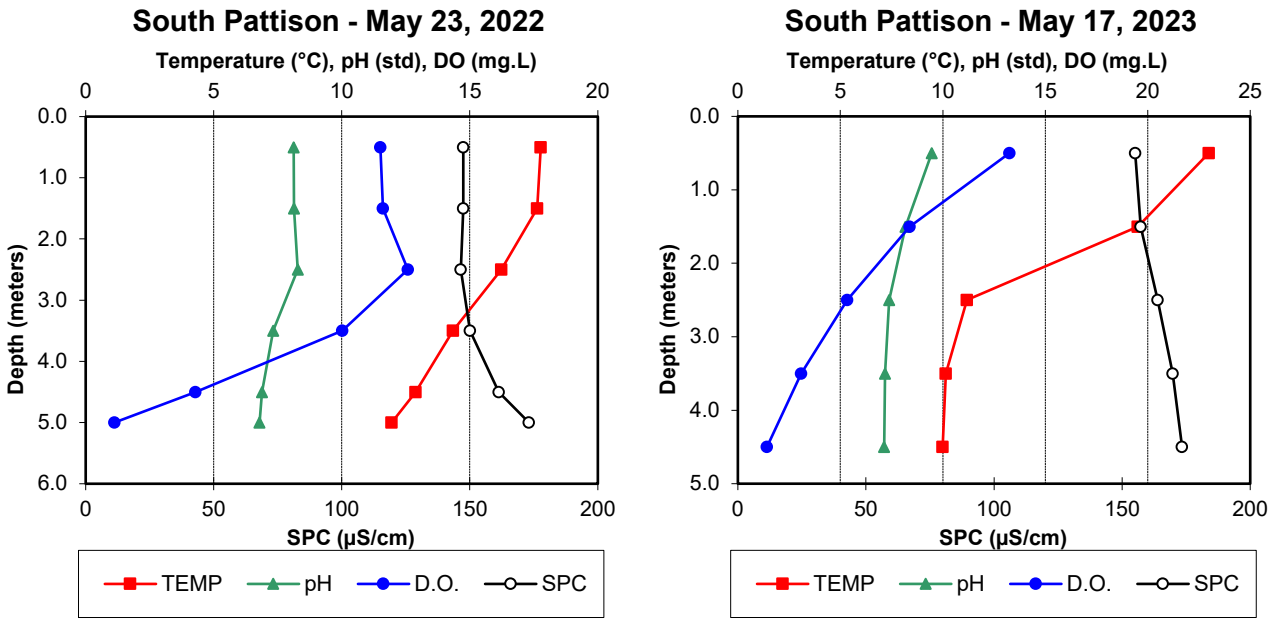


Figure 6. Vertical water quality profiles collected at SP1 for May 2022 and 2023

South Pattison Lake demonstrated similar behavior in terms of the onset of stratification. May of 2022 and 2023 repeated trends similar to previous years monitored, showing a relatively high level of dissolved oxygen at the surface and relatively low levels at the bottom. Stratification also remained clear throughout the summer. The difference in stratification is that the lake appears mostly mixed in the south basin during the October sampling events. Lake mixing, for at least the past two years, has happened first in the south basin, with the north basin appearing to follow after our monthly sampling period ends in October.

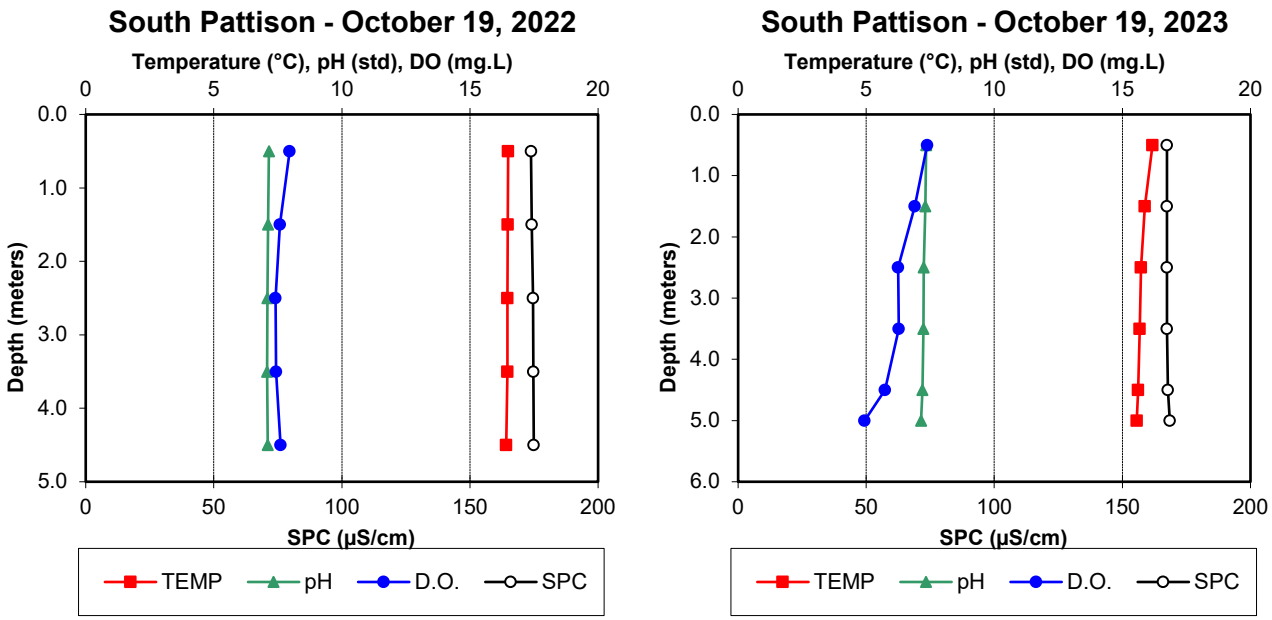


Figure 7. Vertical water quality profiles collected at SP1 for October 2022 and 2023