2022 WATER QUALITY MONITORING REPORT

Kimball Pond (MIDAS 5330) – New Sharon, Vienna, ME

Background

Kimball Pond is a small 55-acre pond located in the towns of New Sharon and Vienna in Kennebec County, ME. Kimball Pond has a maximum depth of 6 m (19 ft) and an average depth of just 3 m (10 ft). The watershed area draining to the pond is roughly 0.2 square miles and includes the smaller drainages of several small intermittent and perennial streams that drain to the pond and form the headwaters of the 30 Mile River watershed. Water from Kimball Pond flows to a single outlet located at the south end of the pond that flows south into Mill Pond, which then flows into Flying Pond.

Water quality data have been collected from Kimball Pond since 1983 by Maine DEP, volunteers monitors certified through Lake Stewards of Maine, and more recently, 30 Mile River Watershed Association.

Figure 1. Station 01, Tilton Pond, Fayette, Maine.

Monitoring in 2022

In 2022, 30 Mile River staff Whitney Baker and Silas Mohlar visited Kimball Pond on 8/11/2022 to collect a secchi disk transparency (SDT), dissolved oxygen and temperature profile, and a water sample that was later analyzed for Total Phosphorus (TP) and Chlorophyll-a at the state lab in Augusta, ME. Monitoring on Kimball Pond takes place at the deepest spot in the lake - aka Station 01 (Figure 1). Volunteer water quality monitor, Carol Basset, collected an additional three (3) SDT readings between June and September in 2022, which are also presented in this report.

Secchi Disk Transparency (Water Clarity)

Secchi disk transparency (SDT) is an indicator of water clarity. To measure water clarity, a black and white disk is lowered into the water and the reading is taken at the depth at which it is no longer visible. Factors that affect water clarity include algal growth, zooplankton densities, natural water color, and suspended silt or sediment particles.

Water Clarity (m)	
2022 Water Clarity Average	5.1
Historical SDT Average	6.0
Maine Lakes SDT Average	4.8

Water clarity readings in 2022 ranged from 4.58 m (August 11th) to 5.63 m (June 11th) with an annual average of 5.1 m. 6 total readings were collected over 4 monitoring days in 2022 (Figure 2).

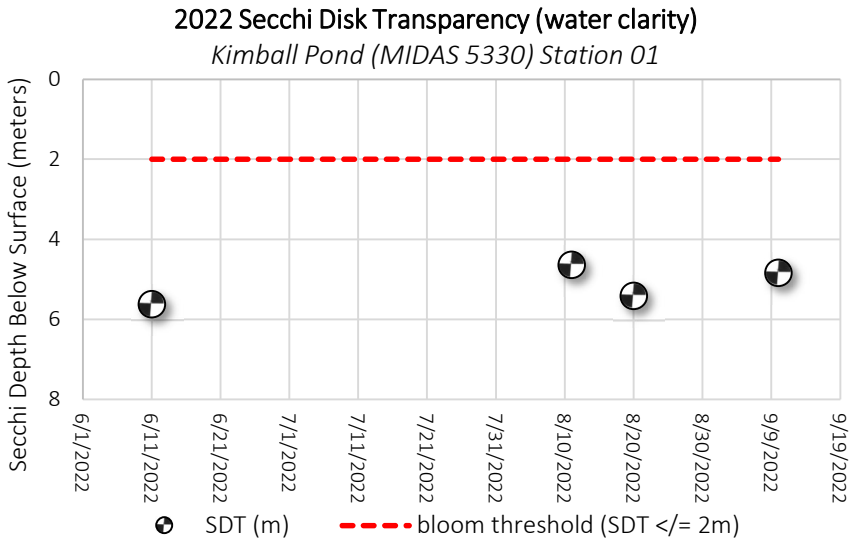

Figure 2. Secchi Disk Transparency (SDT) readings collected in Kimball Pond in 2022

Since 1983, SDT has ranged between 3.7 m (1999) and 6.8 m (2022) with an overall historical average of 6 m. Water clarity in 2022 was average when compared to Secchi readings collected since 1983 (Figure 3).

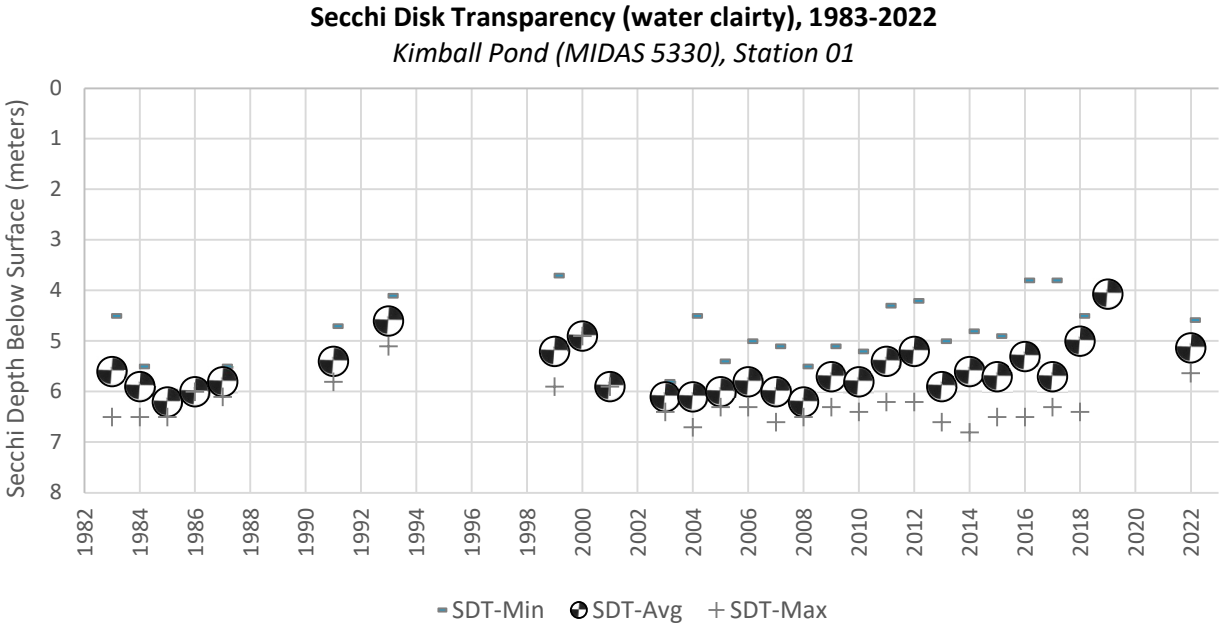

Figure 3. Annual minimum, average, and maximum Secchi Disk Transparency (SDT) readings, 1983-2022

Dissolved Oxygen (DO) and Tempertaure

Dissolved oxygen (DO) is a critical indicator of the health of the lake system. DO is produced through photosynthesis, consumed during respiration and decomposition, and is influenced by wind, wave action, weather events, and lake productivity. A good supply of oxygen is essential for fish and other aquatic species, with most fish species requiring a DO concentration of 5 ppm (parts per million) or more. As lakes become more biologically productive in the summer, oxygen can decline as decomposition occurs in deep areas of the lake. Loss of oxygen may indicate a stressed and changing ecosystem. Understanding the pattern and extent of oxygen loss in deep areas of Flying Pond is important to understanding changes between the years and through a single season and is particular concerning for lakes that may be more vulnerable for internal phosphorus loading due to unique lake sediment chemistry.

As lake water is warmed during the summer, deep lakes will form three distinct temperature layers. There is a warm layer at the surface (epilimnion), a thin transitional layer (metalimnion), In 2022, on August 11, DO <2 ppm was seen at 6m (Figure 4).

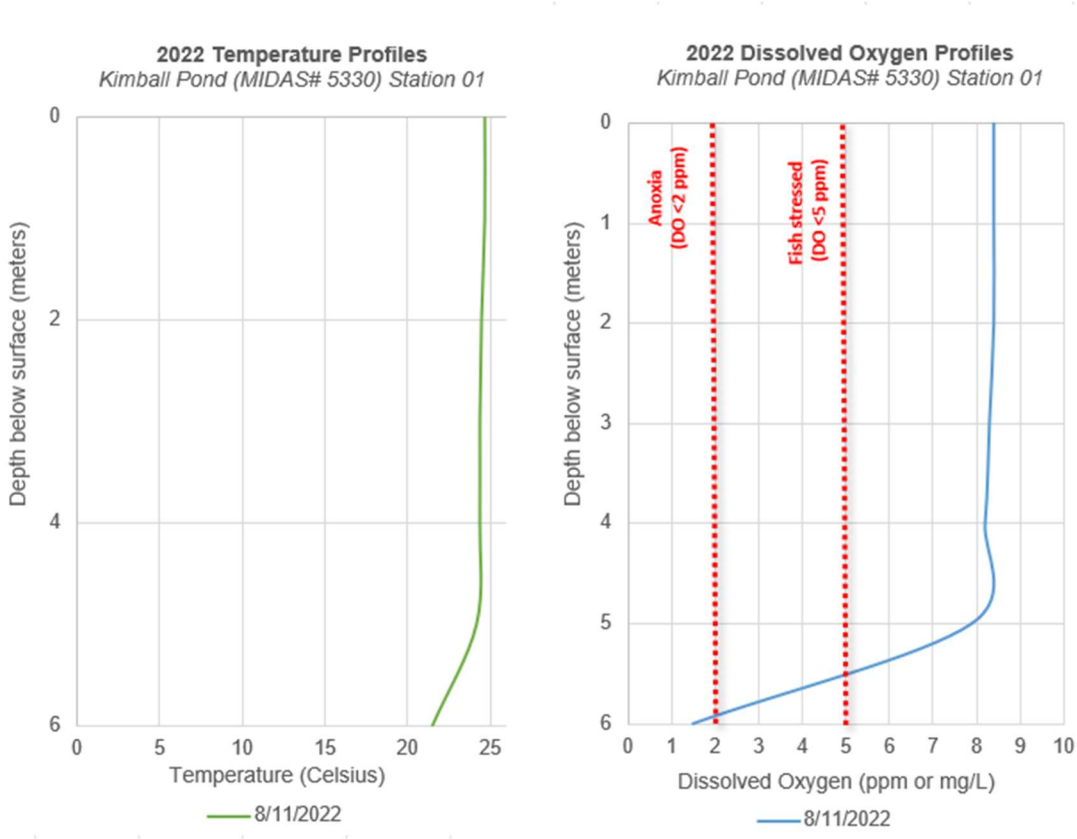

Figure 4. 2022 Dissolved Oxygen and Temperature Profiles, Station 1

Total Phosphorus (TP)

Total Phosphorus (ppb)	
2022 TP Average	7
Historical TP Average	8
Maine Lakes TP Average	12

Phosphorus is the nutrient that most influences the growth of algae in lakes. Because its natural occurrence in lakes is very small, phosphorus "limits" the growth of algae in lake ecosystems. Even small increases in phosphorus in lake water can cause substantial increases in algal growth, which hinders not only the overall health of the lake system, but also the economic, recreational, and aesthetic values. Tracking in-lake phosphorus levels over time is another way of monitoring change in lake water quality trends. Generally speaking, in-lake phosphorus concentrations less than 10-12 ppb are ideal. Lakes with in-lake phosphorus concentrations of 13 ppb or more are known to sustain algal blooms, and blooms become more frequent as average concentrations approach 20 ppb.

TP samples have been collected from the upper waters of the lake (epilimnion) since 1983 during 10 of the past 29 years. Annual average phosphorus concentrations have ranged from 4 ppb (1986) to 15 ppb (2000) with an overall historical average of 7 ppb. The result of the single epilimnetic core sample collected in 2022 was 6 ppb (Figure 5).

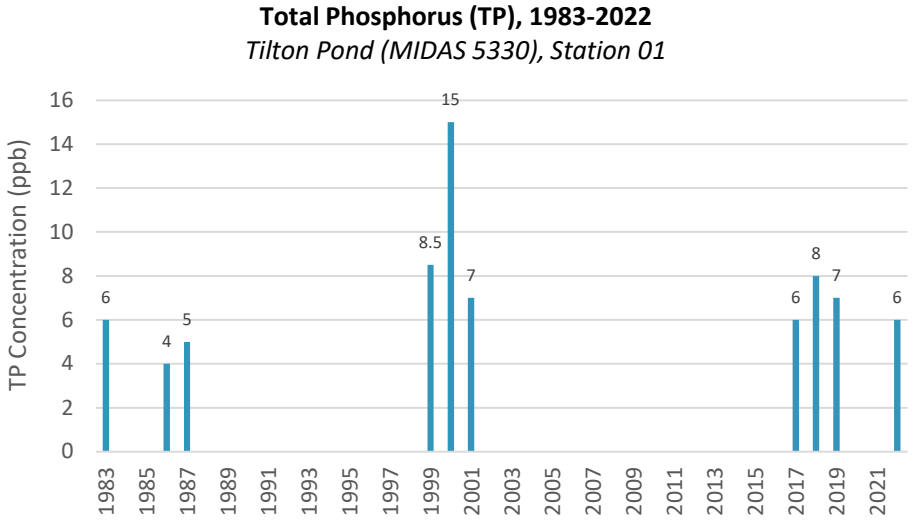

Figure 5. Annual Average Total Phosphorus (TP), Kimball Pond, Station 01.

Chlorophyll-a (Chl-a)

Chl-a (ppb)	
2022 Chl-a Average	3
Historical Chl-a Average	3
Maine Lakes' Chl-a Average	5.4

Chlorophyll is found in plants, including algae, and is used to convert sunlight into energy. Measuring the concentration of Chlorophyll in lake water helps us estimate the algae population in the lake. Chlorophyll was measured once in 2022.

Chl-a samples have been collected from the upper waters of the lake (epilimnion) since 1983 during 8 of the past 29 years. Annual average chl-a concentrations have ranged from 1.9 ppb (1987 and 1999) to 8 ppb (2017) with an overall historical average of 4.6 ppb. The result of the single epilimnetic core sample collected in 2022 was 3 ppb (Figure 6).

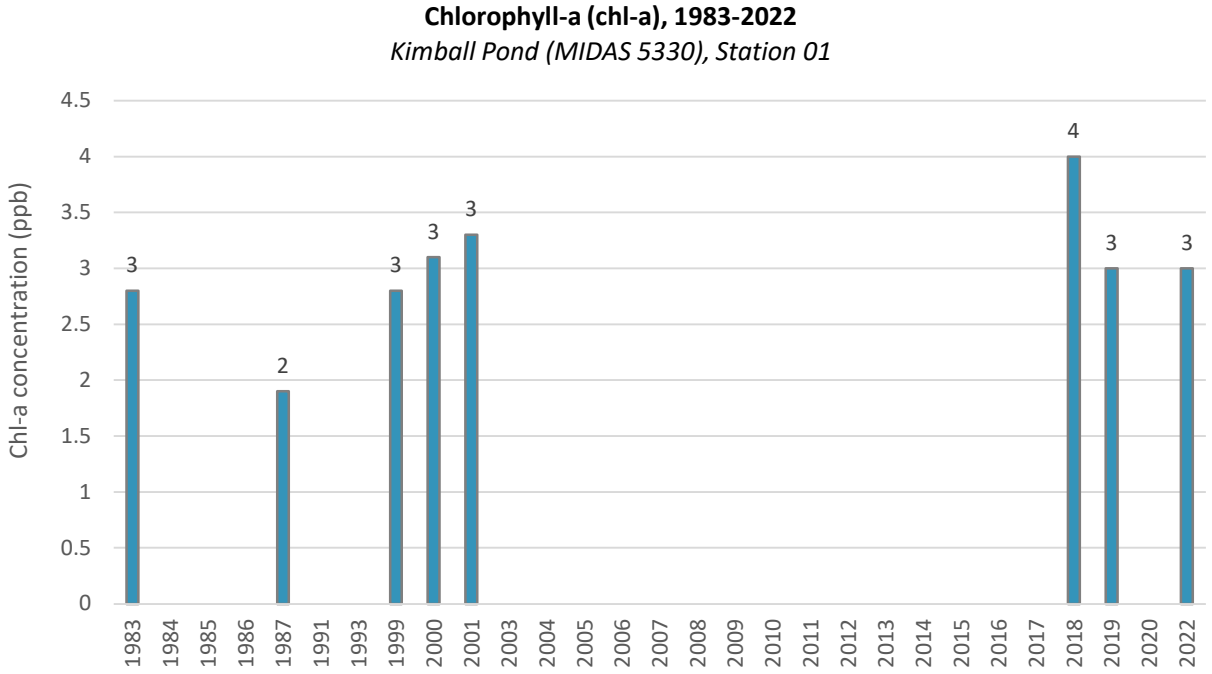

Figure 6. Annual Average Chl-a, 1997-2022, Kimball Pond, Station 01.

More about the data presented in this report

2022 was 30 Mile's fourth year of monitoring Kimball Pond after a two-year hiatus following the Covid pandemic and changes in staffing. Data presented in this report includes all monitoring data collected on Kimball Pond through 2018, submitted to Maine DEP by both volunteer monitors and state agencies, that has undergone a thorough QA/QC process. 2019 data presented here is from 30 Mile only. All other data collected in 2019, 2020, and 2021 is currently in holding at Maine DEP for QA/QC and will be included in the next annual water quality report, if available at that time.

Five years of regular data collection for any given parameter will provide a baseline condition of the lake. 10 years of regular data collection is needed to meet the minimum data thresholds for determining trends over time. This effort will continue to develop a robust dataset that can help the community identify and address water quality trends.