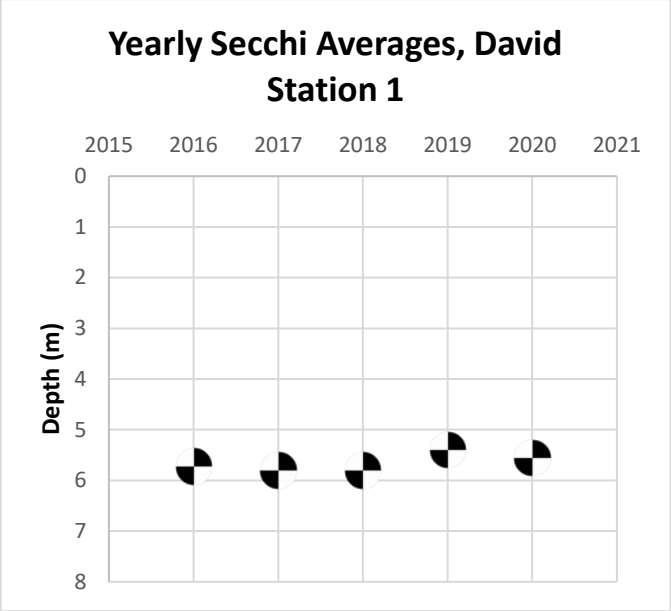
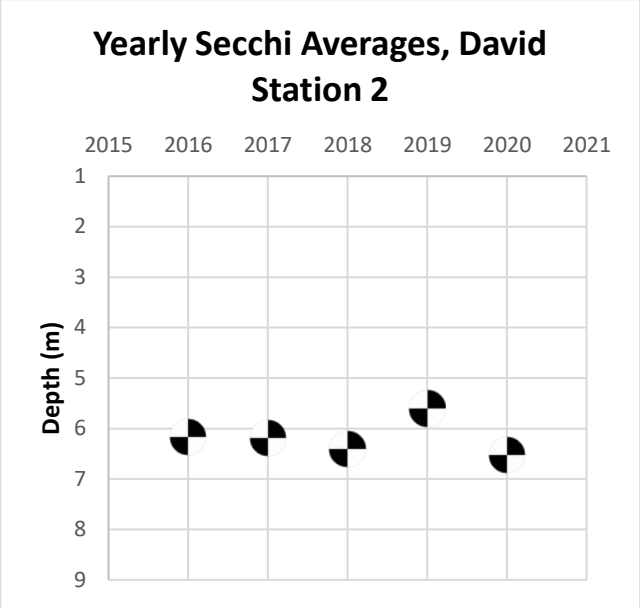
Overview

David Pond is a 282-acre pond with a mean depth of 10 feet and a maximum depth of 37 feet. In 2020, 30MRWA monitored David Pond nearly twice a month from May through September, for a total of eight visits to Station 2 and seven visits to Station 1. On each visit we collected **water clarity** readings and **dissolved oxygen / temperature** profiles. Twice during the late summer, water samples were collected and tested for **phosphorus** concentrations. Sampling visits this summer were performed less frequently than a typical season due to constraints of the COVID-19 pandemic, but the focus remained to keep eyes on the water, collecting the quality data necessary for monitoring water quality trends.

Water Clarity

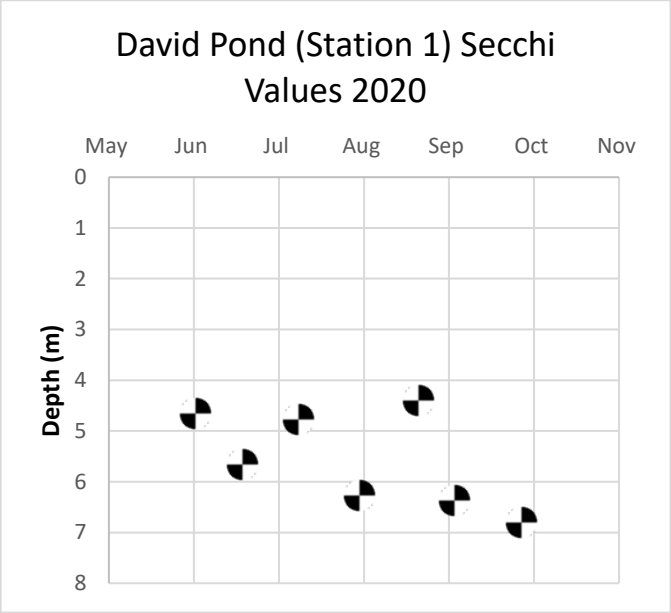
Secchi disk transparency (SDT)is an indicator of water clarity. A black and white disk is lowered in the water and the reading is taken at the depth at which it is no longer visible. Factors that affect transparency include algal growth, zooplankton, natural water color, and suspended silt or sediment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

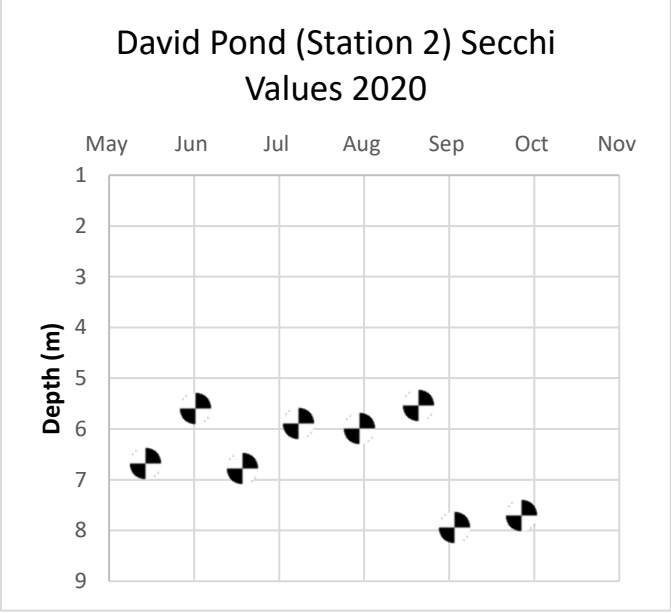




In 2020 the average reading at Station 1 was 5.56m (18.2ft). This is higher than last year's average of 5.4m (17.7ft). The minimum Secchi reading was 4.40m (14.4ft) and the maximum reading was 6.81m (22.3ft), recorded on the last visit of the monitoring season. These readings are good considering Station 1 has a maximum depth of around 7 meters.

The average reading at Station 2 was 6.52m (21.4ft), the maximum: 7.95m (26.1ft) and the minimum: 5.54m (18.2ft). This is much better than last year's average of 5.6m. Station 2 is the deepest point of the pond and has a maximum depth of around 11 meters.

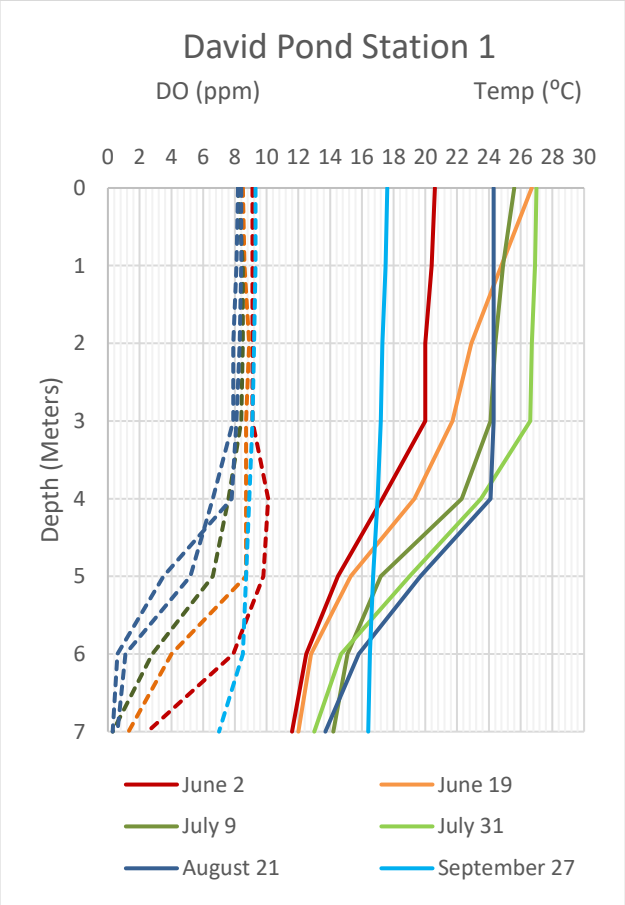


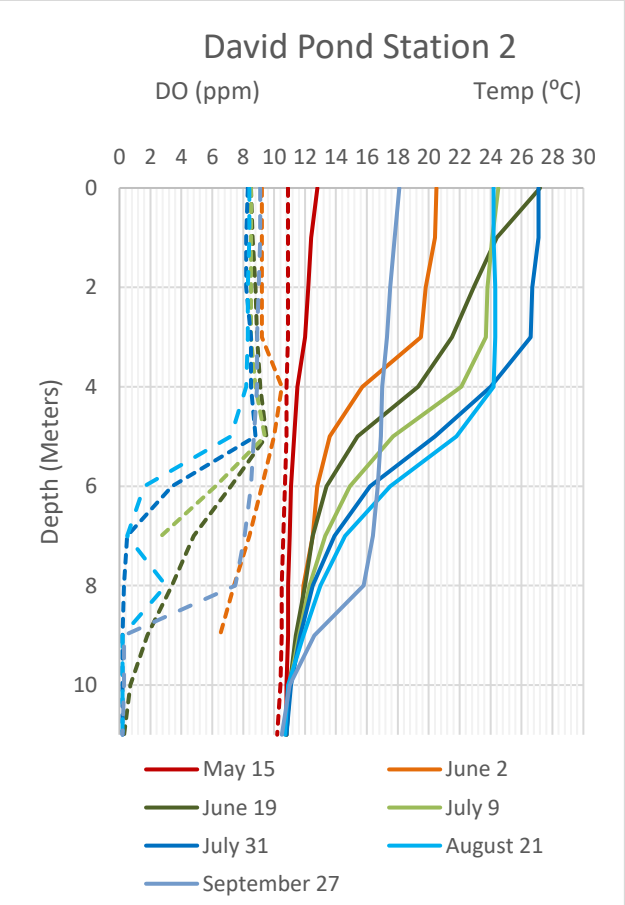


Dissolved Oxygen

As lake water is warmed during the summer months, many of Maine's lakes form three distinct temperature layers. There is a warm layer at the surface (epilimnion), a thin transitional layer (thermocline), and a deep cold layer (hypolimnion). As water layers become stratified, the deep water becomes isolated from surface water which prevents the oxygen supply from being replenished. Decomposition of organic material on the lake bottom consumes oxygen and depletes the oxygen supply. When oxygen levels are below 2 ppm at the bottom of the lake, it is considered "anoxic" and there is a greater likelihood that iron-bound phosphorus stored in bottom sediments will be released into the lake. In 2020, similar to the previous year, oxygen levels at the bottom at both stations dropped below 2 ppm from June through September. This long anoxic period is somewhat perplexing given the shallow nature of David Pond.

The data that 30 Mile has been collecting since 2016 shows that David Pond generally mixes and breaks down these layers before the end of October (fall turnover), which is important to understanding the natural processes of the pond. The high clarity measurements we are observing in October are likely linked to this mixing of the bottom and top layers of water.





Temperature

Mixing of the water layers generally occurs with the seasons and is influenced by a number of factors including wind events and the depth of the lake. Once the thermocline is eliminated, the deeper waters are able to mix with oxygenated surface waters. This mixing stops any internal phosphorus loading that is occurring in the bottom waters and often results in better clarity of the water body. The temperature in each basin of David Pond begins to stratify early in the season, generally forming distinct layers in June and remaining that way until October. Our data suggest the deep station, Station 2, tends to remain stratified longer into the fall. This is likely due to the additional depth of the basin at Station 2. We don't yet have enough historical information on David Pond to form conclusions about long-term temperature trends and wintertime monitoring may be necessary to establish exactly when the stratification is no longer present at Station 2.

Phosphorus

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. Phosphorus is found in sediments and enters lakes and streams during rain events that erode bare soils and transport that material to a water body. Our goal is to limit the phosphorus entering a water body, and thus limit algal growth. Small increases of phosphorus in lake water can cause substantial increases in algal growth. Algal blooms are harmful to fish and other organisms because they use up the available oxygen in a lake. Algal blooms also cause risks to human health and can decrease the economic, recreational, and aesthetic value of a lake and the properties around it.

It is important to note that extreme weather events associated with climate change typically produce higher volumes and velocity of stormwater runoff. This increases the likelihood that sediment and nutrients (primarily phosphorus) will be transported to lakes and cause substantial increases in the concentration of algae in lake water over a relatively short period of time.

In 2020, 30 Mile collected two water samples from Station 2 to test for Phosphorus concentrations. Laboratory results showed Phosphorus levels at 13 ppb (parts per billion) in July and 6 ppb in September. A reading of 13 ppb is high, but not uncommon. In 2019, the maximum concentration at Station 2 was 12 ppb. This concentration of phosphorus in the

water is concerning, but the phosphorus levels in David Pond also seem to fluctuate within a wider range than the other ponds of the 30 Mile Watershed. Continued monitoring is essential to understanding these fluctuations and the factors that influence them.

Monitoring of David Pond in 2020

2020 was our fifth year of monitoring David Pond's water quality. We began monitoring in late May and continued through the end of September, every two weeks. A big 'Thank You' to **Deborah Cayer**, a volunteer water quality monitor, for her support and time monitoring on Parker, David, and Basin ponds this summer. With her help, we were able to maintain more frequent monitoring visits to these ponds and create a more complete picture of the changes that occur throughout the season. The last five years has seen the most frequent water monitoring in David Pond's history in order to provide a greater understanding of the lake's dynamic processes. This effort will continue to develop a robust dataset that can help our community identify and address water quality concerns in David Pond.

Near real-time data for David Pond's clarity (Secchi depth), dissolved oxygen and temperature can be found online at http://30mileriver.org/programs/water-quality-monitoring/david-pond/, along with a link to historical data that includes the many other parameters including phosphorus, chlorophyll, pH, alkalinity, color, and conductivity.

Need for Sustained, Longer-Term Monitoring

Although there are no red flags yet, we have only five years of complete, consistent data on clarity, dissolved oxygen, temperature, phosphorous and chlorophyll. According to Maine DEP water quality staff, we will need ten years of data at our current monitoring schedule before we will have enough information to identify any trends. Therefore, our **continual and consistent monitoring of David Pond is critically important** in order for us to identify negative trends in water quality.

The **annual cost of water quality monitoring of David Pond is $5,000**. This includes staff time, lab fees, travel, and supplies over the six-month monitoring season. The **ongoing cost of water quality monitoring of David must be supported by donors to 30 Mile, including the Basin-David-Tilton Ponds Association.**