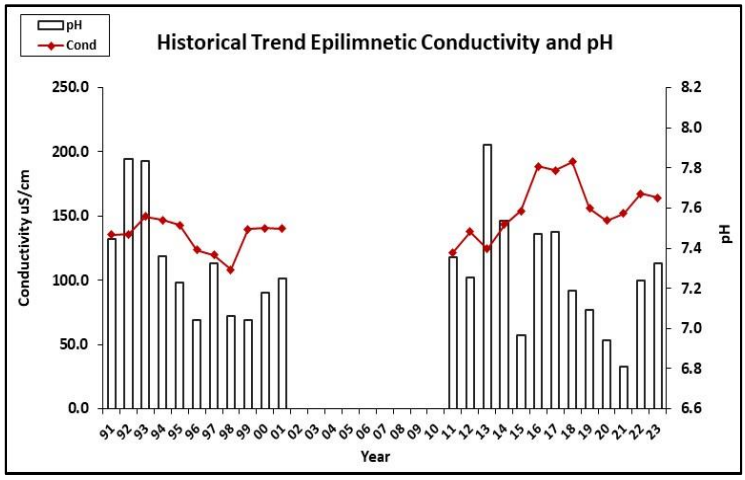
# 2023 VOLUNTEER LAKE ASSESSMENT PROGRAM INDIVIDUAL LAKE REPORTS
# FLINTS POND, HOLLIS

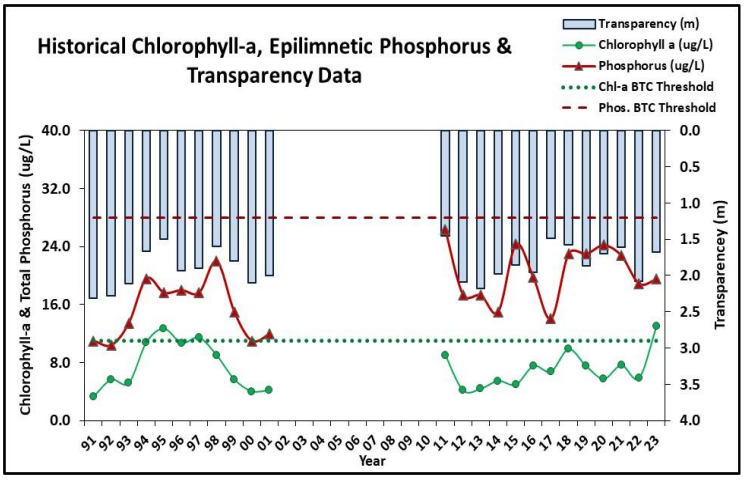
**Recommended Actions:** Great job sampling in 2023! Excessive summer rainfall and stormwater runoff resulted in an increase in nutrient levels which fueled excessive algal growth in August and resulted in poor water clarity (transparency). Boat Launch E. coli levels were elevated following storm events. Elevated bacteria levels could be a result of wildlife, waterfowl and domestic animal waste. Educate dog owners about proper disposal of pet waste in an and around the boat launch area. Pond conductivity levels have remained within a lower range from the elevated levels measured between 2016-2018 which is a positive sign. Continue working to educate local road agents and winter maintenance companies on the Green SnowPro Certification program and utilize companies that are certified when applying road salt within the watershed. Educate shorefront property owner's on becoming certified LakeSmart through NH LAKES' lake-friendly living program. Keep up the great work!

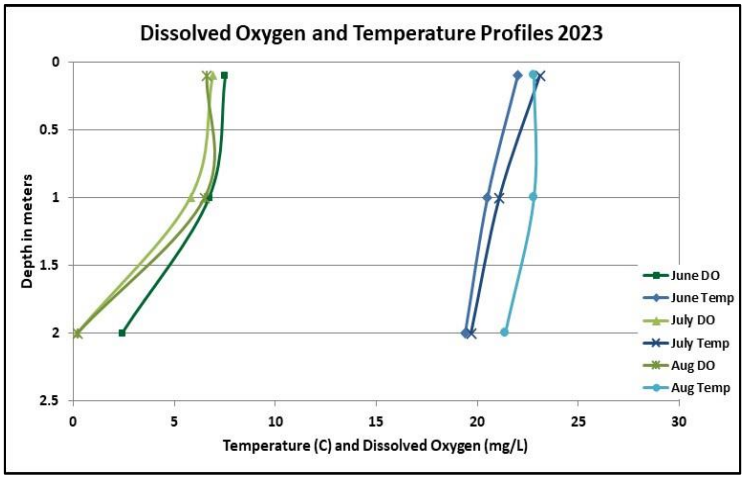
## HISTORICAL WATER QUALITY TREND ANALYSIS

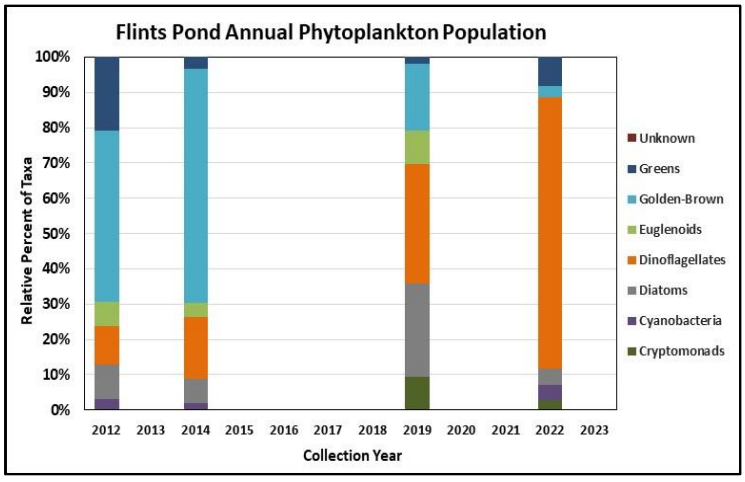
| PARAMETER | TREND | PARAMETER | TREND |
|---|---|---|---|
| **Conductivity** | Stable | **Chlorophyll-a** | Stable |
| **pH (epilimnion)** | Stable | **Transparency** | Stable |
| | | **Phosphorus (epilimnion)** | Stable |

## HISTORICAL WATER QUALITY GRAPHICS



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## OBSERVATIONS *(Refer to Table 1 and Historical Deep Spot Data Graphics)*

- **CHLOROPHYLL-A:** Chlorophyll level was within a low range in June, increased to a moderate level in July, and increased to an elevated level indicative of an algal bloom in August. Average chlorophyll level increased sharply from 2022, was much greater than the state standard and threshold for eutrophic lakes, and was the highest measured since monitoring began. Historical trend analysis indicates stable, yet variable, chlorophyll levels since monitoring began.
- **CONDUCTIVITY/CHLORIDE:** Epilimnetic (deep spot) conductivity level remained slightly elevated and greater than the state median. Epilimnetic chloride level was also greater than the state median, yet much less than the state chronic chloride standard. Historical trend analysis indicates stable, yet variable, epilimnetic conductivity levels since 2011.
- **COLOR:** Apparent color measured in the epilimnion indicates the water was highly tea colored, or dark brown.
- **E. COLI:** Boat Launch E. coli level was elevated in June and July following storm events and exceeded the state standard for surface waters in June.
- **TOTAL PHOSPHORUS:** Epilimnetic phosphorus level was low in June, increased to a moderate level in July, and decreased slightly in August. Average epilimnetic phosphorus level increased slightly from 2022, was greater than the state median, and was less than the threshold for eutrophic lakes. Historical trend analysis indicates stable, yet variable epilimnetic phosphorus levels since 2011.
- **TRANSPARENCY:** Transparency measured with (VS) and without (NVS) the viewscope was average (good) in June and then decreased (worsened) as the summer progressed. Average NVS transparency decreased from 2022 and historical trend analysis indicates relatively stable NVS transparency since monitoring began. VS transparency was slightly higher (better) than NVS transparency and likely a better measure of conditions.
- **TURBIDITY:** Epilimnetic turbidity level was low in June and increased to elevated levels in July and August following excessive summer rainfall.
- **PH:** Epilimnetic pH level was within the desirable range 6.5-8.0 units. Historical trend analysis indicates stable, yet variable, epilimnetic pH levels since 2011.

Table 1. 2023 Average Water Quality Data for FLINTS POND - HOLLIS

| Station Name | Alk. (mg/L) | Chlor-a (ug/L) | Chloride (mg/L) | Color (pcu) | Cond. (us/cm) | E. coli (mpn/100mL) | Total P (ug/L) | Trans. (m) | | Turb. (ntu) | pH |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | NVS | VS | | |
| Epilimnion | 37.5 | 13.04 | 23 | 121 | 164.4 | - | 20 | 1.68 | 1.87 | 2.24 | 7.32 |
| Boat Launch | - | - | - | - | - | 247 | - | - | - | - | - |

**NH Median Values**

*Median values generated from historic lake monitoring data.*

**Alkalinity:** 4.5 mg/L
**Chlorophyll-a:** 4.39 ug/L
**Conductivity:** 42.3 uS/cm
**Chloride:** 5 mg/L
**Total phosphorus:** 11 ug/L
**Transparency:** 3.3 m
**pH:** 6.6

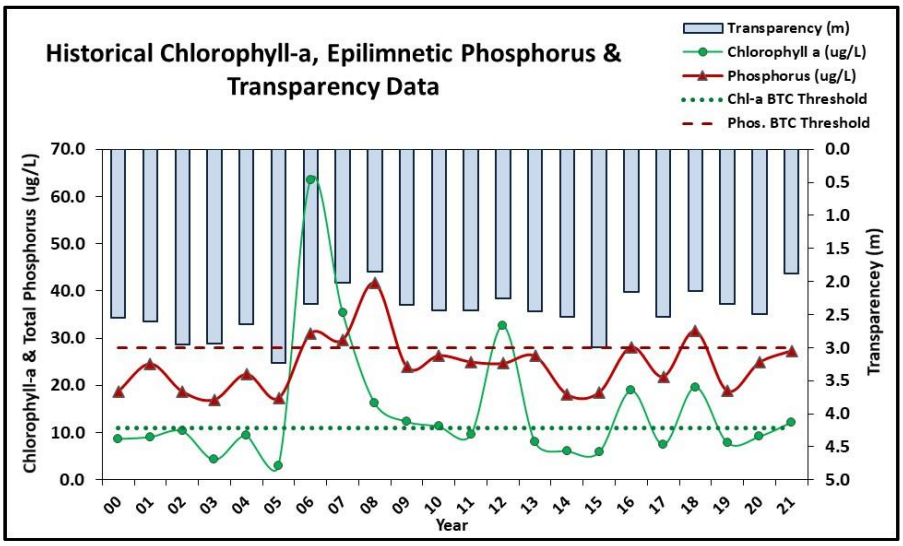
**NH Water Quality Standards**

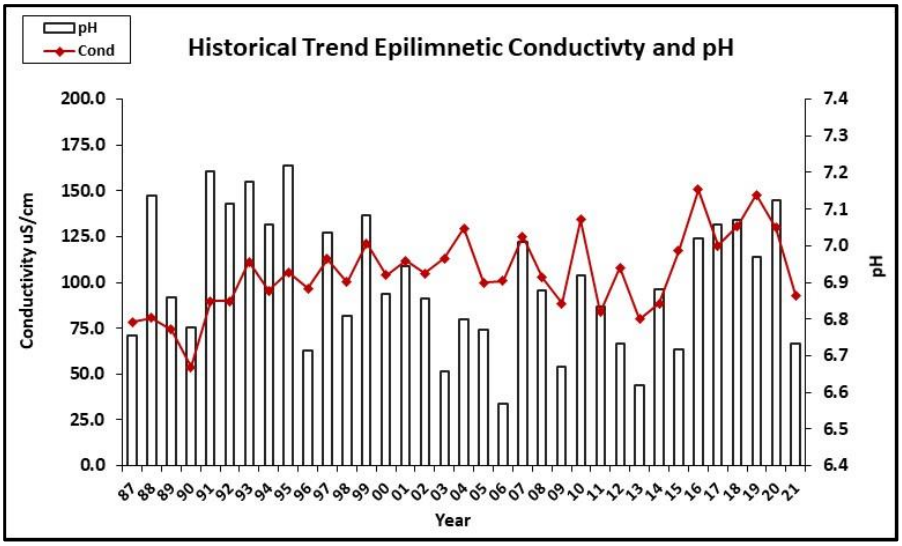
*Numeric criteria for specific parameters. Water quality violation if thresholds exceeded.*

**Chloride:** > 230 mg/L (chronic)
**Turbidity:** > 10 NTU above natural
**E. coli:** > 88 cts/100 mL (beach)
**E. coli:** > 406 cts/100 mL (surface waters)
**pH:** between 6.5-8.0 (unless naturally occurring)

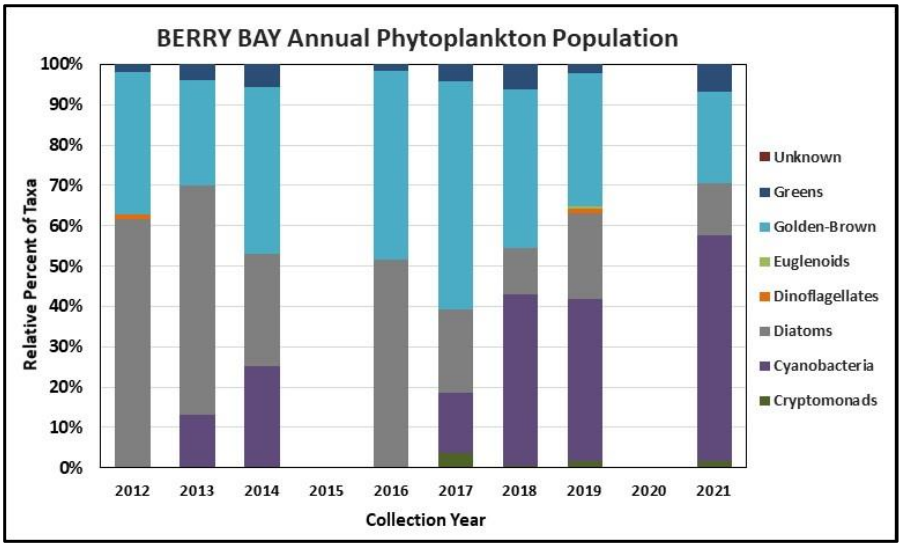
# HOW TO READ YOUR VLAP REPORT

**WATER QUALITY TREND ANALYSIS:** Understanding how lake water quality has changed over time can identify potential problems and help guide watershed management activities. Statistical analyses are conducted on various parameters where ten or more consecutive years of data are available. Specifically, linear regression analyses are utilized to determine if the annual mean value of a parameter has changed significantly, increased or decreased, over time. A parameter has significantly changed if the significance value is less than 0.05, meaning there is 95% confidence that the values have increased or decreased. If there is not a significant change, then we look at the coefficient of variation to determine how stable or variable are the data. The graphics depict the average annual value for chlorophyll-a, transparency, and Epilimnetic total phosphorus, pH and conductivity. A significant increase in chlorophyll-a, total phosphorus and conductivity means that data are degrading or worsening over time; while a significant decrease means the data are improving over time. The opposite holds true for pH and transparency; a significant increase means the data are improving, while a significant decrease means the data are degrading or worsening. Total phosphorus and chlorophyll data are compared with the threshold associated with the lake's best trophic classification (BTC). Values above the thresholds are generally considered poor, while values below the thresholds are considered good (see page 1 for parameter thresholds).



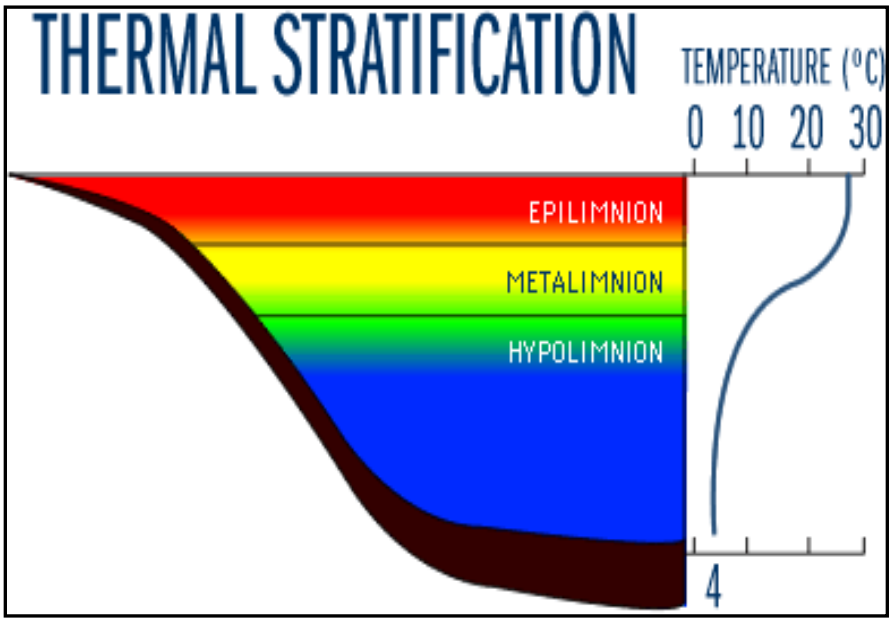




**PHYTOPLANKTON:** Microscopic plants, or algae, form the basis of the lake's food chain. They need sunlight and nutrients to grow and are typically found in the warmer Epilimnetic and Metalimnetic waters. The type of phytoplankton present in a lake can be used as an indicator of general lake quality and shifts in the dominant algal population over time can be an early warning to shifts in the aquatic ecosystem. Diatoms and golden-brown algae are typically found in the spring and fall, while green algae and cyanobacteria are more common in mid to late summer. An abundance or shift to cyanobacteria dominance over time may indicate excessive phosphorus or that the lake ecology is out of balance. Diatoms and golden-brown algae are typical of NH's less productive lakes. ***Note: Phytoplankton graphics are not included in all lake reports.***



# HOW TO READ YOUR VLAP REPORT

**DISSOLVED OXYGEN AND TEMPERATURE PROFILE:** Depicts the amount of oxygen dissolved in water at various temperatures from the lake's surface to bottom. Dissolved oxygen (DO) in lake water is used by all forms of aquatic life and can help to assess the "health" of the lake ecosystem. NH's lakes typically mix twice annually; spring and fall. Spring turnover of lake water occurs after ice out as warmer air temperatures heat up surface waters. Eventually, the lake becomes thermally stratified with a layer of warm surface water overlying layers of dense cold water. Eventually three distinct layers form called the Epilimnion, Metalimnion, and Hypolimnion, and waters in these layers do not mix freely during summer months. Layers can be determined by looking at the DO/Temperature profile and graphic. Typically, DO is greater in the epilimnion due to wind and wave action mixing atmospheric oxygen into surface waters, as well as algal growth producing oxygen as a by-product of photosynthesis. As you move into the Metalimnion and Hypolimnion, DO can decrease to low levels as these layers do not get re-oxygenated and microbial activity utilizes DO to break down organic matter in bottom sediments. When fall arrives and colder air temperatures cool surface waters, fall turnover occurs, mixing the thermal layers until they are a uniform temperature and DO levels recover at deeper depths. Understanding DO and temperature patterns is important to lake management. These patterns reflect and influence lake productivity, physical properties, phosphorus cycling, and fish and aquatic animal populations. ***Note: Dissolved oxygen and temperature profiles are not included in all lake reports.***




## OBSERVATIONS AND RECOMMENDATIONS SECTION

**Chlorophyll-a:** A photosynthetic pigment found in plants, including algae, and measured to estimate amount of algal growth in a lake system. Elevated chl-a levels indicate excessive algal growth typically caused by too many nutrients (phosphorus).

**Conductivity/Chloride:** Conductivity measures the ability of water to carry an electrical current. It is determined by the number of ions and minerals present. Chloride ion is naturally occurring in seawater, but less so in freshwaters. NH's soft water has naturally low conductivity and chloride values. Elevated conductivity and chloride may indicate pollution from such sources as road salting, septic systems, wastewater treatment plants, or agriculture runoff.

**Color:** A visual measure of the color of water. This color is generally caused by decaying organic matter or by naturally occurring metals in the soils, such as iron and manganese. A highly colored lake generally has extensive wetlands along the shore or within the watershed, and often a mucky bottom, conditions often associated with eutrophic waters.

**E. coli:** *E. coli* is a natural component of the large intestines of humans and other warm-blooded animals. *E. coli* is used as an indicator organism for bacteriological monitoring because it is easily cultured and its presence in the water in defined amounts indicates that fecal matter MAY be present.

**Total Phosphorus:** Total phosphorus is a measure of all the phosphorus forms present in the water, including both inorganic and organic forms. In freshwater, it is the limiting nutrient that determines the amount of algal growth that can occur. Too much phosphorus can lead to excessive algal and cyanobacteria populations.

**Transparency:** Transparency, a measure of water clarity, is affected by the amount of algae, color, and particulate matter within a lake. It is measured using a 20 cm black and white Secchi disk.

**Turbidity:** Turbidity in the water is caused by suspended matter (such as clay, silt, and algae) that cause light to be scattered and absorbed, not transmitted in straight lines through water.

**pH:** pH is a measure of the hydrogen ions in the water or, in general terms, the acidity. New Hampshire lakes historically have slightly acidic pH levels due to acid rain and granite bedrock lacking in minerals that counteract inputs of the acid rain. Lake pH is important to the survival and reproduction of fish and other aquatic life.