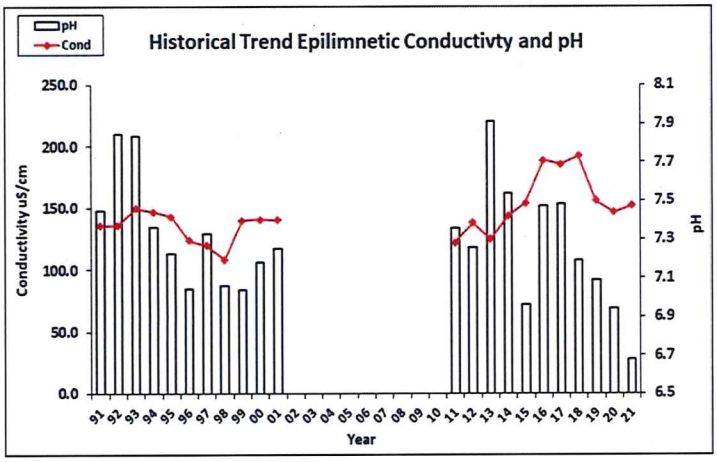
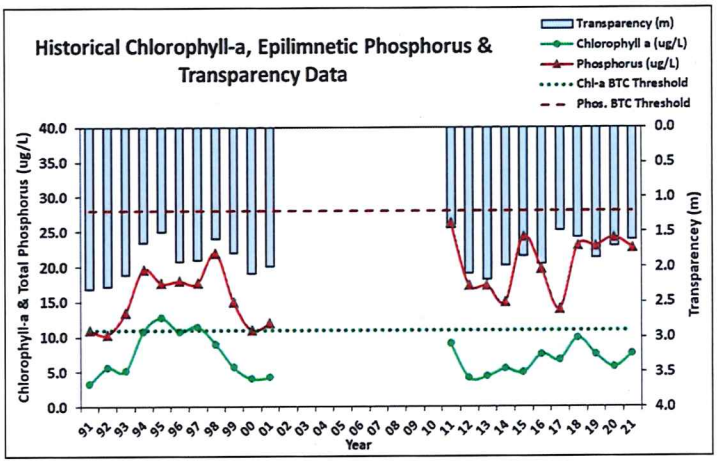
VOLUNTEER LAKE ASSESSMENT PROGRAM INDIVIDUAL LAKE REPORTS
FLINTS POND, HOLLIS
2021 DATA SUMMARY

RECOMMENDED ACTIONS: Great job sampling in 2021! Pond phosphorus and chlorophyll levels have remained within the acceptable thresholds for a eutrophic waterbody and record summer rainfall amounts did not seem to negatively impact pond quality, with the exception of more acidic conditions. The increased frequency and intensity of storm events results in flushing of waters rich in dissolved organic matter that impart a tea, or brown, color to the water. Continue to evaluate the relationship between water color and water clarity (transparency). Pond conductivity levels have remained lower 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

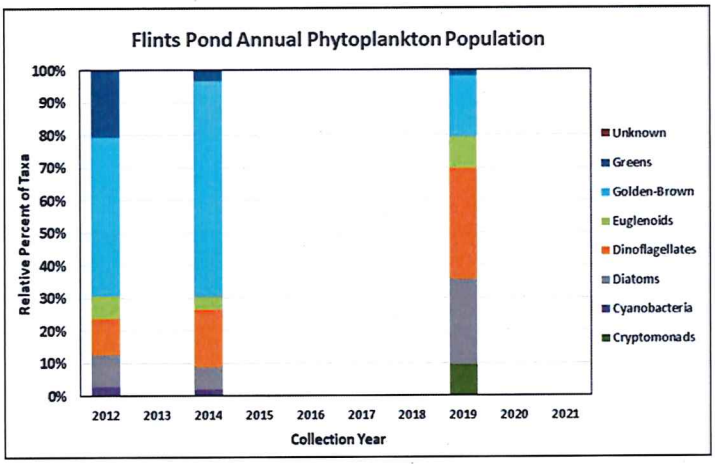
Parameter	Trend	Parameter	Trend
Conductivity	Stable	Chlorophyll-a	Stable
pH (epilimnion)	Worsening	Transparency	Stable
		Phosphorus (epilimnion)	Stable





DISSOLVED OXYGEN AND PHYTOPLANKTON

(Note: Information may not be collected annually)



VOLUNTEER LAKE ASSESSMENT PROGRAM INDIVIDUAL LAKE REPORTS
FLINTS POND, HOLLIS
2021 DATA SUMMARY

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

- **CHLOROPHYLL-A:** Chlorophyll level was within a very low range in June, and then increased to moderate levels in July and August. Average chlorophyll level increased slightly from 2020, was greater than the state median, and was less than the threshold for eutrophic lakes. Historical trend analysis indicates stable chlorophyll levels since 2011.
- **CONDUCTIVITY/CHLORIDE:** Epilimnetic (deep spot) conductivity and chloride levels remained slightly elevated and greater than the state medians, however chloride levels were much less than the state chronic chloride standard. Average epilimnetic conductivity level remained stable with 2020 and was less than the elevated levels measured between 2016-2018. Historical trend analysis indicates stable, yet variable, epilimnetic conductivity levels since 2011.
- **COLOR:** Epilimnetic color data indicates the water was borderline moderate to highly tea colored, or brown, in June, and then darkened steadily to highly tea colored conditions in July and August.
- **E. COLI:** Devlin Beach E. coli levels were very low and much less than the state standard for public beaches.
- **TOTAL PHOSPHORUS:** Epilimnetic phosphorus level was within a moderate range in June, increased slightly in July, and then increased to slightly elevated level in August when water levels were high following record summer rainfall amounts. Average epilimnetic phosphorus level decreased slightly from 2020, was greater than the state median, and was less than the threshold for eutrophic lakes. Historical trend analysis indicates stable epilimnetic phosphorus levels since 2011.
- **TRANSPARENCY:** Transparency measured with (VS) and without (NVS) the viewscope was high (good) in June when algal growth and color were low, and then decreased steadily through August as algal growth increased and water color darkened. Average NVS transparency decreased slightly from 2020 and historical trend analysis indicates relatively stable transparency since 2011.
- **TURBIDITY:** Epilimnetic turbidity level was low in June and increased as the summer progressed but remained within a low range for the pond.
- **PH:** Epilimnetic pH level fluctuated within the desirable range 6.5-8.0 units. Historical trend analysis indicates significantly decreasing (worsening) epilimnetic pH levels since 2011.

Station Name	Table 1. 2021 Average Water Quality Data for FLINTS POND - HOLLIS										
	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	36.1	7.62	24	143	152.1		23	1.61	1.83	1.57	6.68
Devlin Beach						14					

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)

VLAP CHEMICAL PARAMETER EXPLANATIONS

pH

Definition: pH is measured on a logarithmic scale of 0 to 14. Lake pH is important to the survival and reproduction of fish and other aquatic life. A pH below 5.5 severely limits the growth and reproduction of fish.

pH (units)	Category
<5	Acidified
5.0-5.4	Critical
5.5-6.4	Endangered
6.5-8.0	Satisfactory

Acid Neutralizing Capacity (ANC)

Definition: Buffering capacity or Acid Neutralizing Capacity (ANC) describes the ability of a solution to resist changes in pH by neutralizing the acidic input to the lake. Historically, the waters of NH have had low ANC because of the prevalence of granite bedrock. The relatively low ANC values mean that NH surface waters are vulnerable to the effects of acid precipitation.

ANC (mg/l as $CaCO_3$)	Category
<0	Acidified
0-2	Extremely Vulnerable
2.1-10	Moderately Vulnerable
10.1-25	Low Vulnerability
>25	Not Vulnerable

Turbidity

Definition: 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. High turbidity readings are often found in water adjacent to construction sites. Also, improper sampling techniques (such as hitting the bottom sediments or sampling streams with little flow) may also cause high turbidity readings. The Class B standard for a water quality violation is 10 NTUs over the lake background level.

Statistical Summary of Turbidity Values for NH Lakes and Ponds:

Turbidity (NTUs)	Category
<0.1	Minimum
22.0	Maximum
1.0	Median

Total Phosphorus

***Note:** The phosphorus results during the summer are reported by the DES State Chemistry lab with the units **"mg/L"**. To convert to **"ug/L"**, move the decimal point over **three** places to the right.*

Definition: Phosphorus is the most important water quality parameter measured in our lakes. It is the nutrient that limits algae's ability to grow and reproduce. Phosphorus sources around a lake typically include septic systems, animal waste, lawn fertilizer, erosion from roads and construction sites, and natural wetlands.

Total Phosphorus (TP) Ranges for New Hampshire Lakes and Ponds:

TP (ug/L)	Category
1-10	Low (good)
11-20	Average
21-40	High
>40	Excessive

Conductivity

Definition: Conductivity is the numerical expression of the ability of water to carry an electrical current. It is determined by the number of ionic particles present. The soft waters of New Hampshire have traditionally had low conductivity values. High conductivity may indicate pollution from such sources as road salting, septic systems, wastewater treatment plants, or agriculture runoff.

Note: Specific categories of good and bad levels can not be constructed for conductivity, because variations in watershed geology can result in natural fluctuations in conductivity. However, values in NH lakes exceeding 100 uMhos/cm generally indicate human disturbance.

Chloride

The chloride ion (Cl^-) is found naturally in some surface ground waters and in high concentrations in seawater. Research has shown that elevated chloride levels can be toxic to freshwater aquatic life. In order to protect freshwater aquatic life in New Hampshire, the state has adopted acute and chronic chloride criteria of 860 and 230 mg/L respectively. The chloride content in New Hampshire lakes is naturally low, generally less than 2 mg/L in surface waters located in remote areas away from habitation. Higher values are generally associated with salted highways and, to a lesser extent, with septic inputs.

VLAP BIOLOGICAL PARAMETER EXPLANATIONS

CHLOROPHYLL-A

Definition: VLAP measures chlorophyll-a, a pigment found in plants, as an indicator of algal abundance. Because algae is a plant and contains chlorophyll-a, the concentration of chlorophyll-a found in the water provides an estimation of the concentration of algae.

Chlorophyll-a (ug/L)	Category
0-5	Good
5.1 – 15	More than desirable
>15	Nuisance Amounts

WATER CLARITY (SECCHI-DISK TRANSPARENCY)

Definition: The Secchi-disk is a 20cm disk with alternating black and white quadrants used to measure water clarity (how far a person can see into the water). Transparency, a measure of water clarity, is affected by the amount of algae, color, and particulate matter within a lake.

Water Clarity (m)	Category
< 2	Poor
2-4.5	Good
> 4.5	Exceptional

Note: Clarity may vary depending on the maximum depth of the lake/pond. For example, if the maximum depth of the pond is 3 meters, a good clarity reading would be 2-3 meters.

APPARENT COLOR

Definition: 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.

Color (PCU)	Category
0-25	clear
25-40	light tea color
40-80	tea color
>80	highly colored

DEFINITION OF UNITS

cts/100ml= Counts per 100 millileters. *E. coli* concentration.
m= meters. Used to measure Secchi disk depth.
mg/L = Milligrams per liter. Acid neutralizing capacity, chloride, and dissolved oxygen concentrations.
NTUs = Nephelometric turbidity unit.
ug/L = Micrograms per liter. Total phosphorus and Chlorophyll-a concentration.
uMhos/cm = Micromhos per centimeter. Conductivity measure.
PCU = Platinum cobalt unit. Apparent Color measure.

BACTERIA (*E. COLI*)

Definition: *E. coli* is a natural component of the intestines in 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 sewage MAY be present. If sewage is present in the water, potentially harmful pathogens may also be present.

The state standards for Class B waters specify no more than 406 *E. coli* cts /100mL in any one sample, or a geometric mean based on at least 3 samples obtained over a 60-day period be greater than 126 *E. coli* cts/100mL. For designated beach areas, more stringent standards apply: 88 *E. coli* cts/100 mL in any one sample, or a geometric mean of 3 samples over 60 days of 47 *E. coli* cts/100 mL.

PHYTOPLANKTON

(Note: Phytoplankton results will be included in the annual VLAP Report)

Definition: Phytoplankton are microscopic algae floating in the water column. The type of phytoplankton present in a lake can be used as an indicator of general lake quality. An abundance of cyanobacteria (such as *Anabaena, Aphanizomenon, Oscillatoria*, or *Microcystis*) may indicate excessive phosphorus concentrations or that the lake ecology is out of balance. Diatoms (such as *Asterionella, Melosira*, and *Tabellaria*) and golden-brown algae (such as *Dinobryon* or *Chrysosphaerella*) are typical of NH's less productive lakes.

DISSOLVED OXYGEN

Definition: Dissolved Oxygen or "DO" refers to the volume of oxygen contained within the water. Much of the DO in lakes comes from the atmosphere, inflowing streams and photosynthesis. Fish and other aquatic life depend on DO to survive. Seasonal changes can affect DO concentrations throughout the year. Warmer temperatures during the summer speed up the rates of photosynthesis and decomposition. When plants and algae die and decompose, oxygen is consumed. This decreases the amount of oxygen, especially in the un-circulated hypolimnion (lower) water layer. In the winter, under ice cover, the DO content can also deplete due to the lack of circulation from the atmosphere.

DO levels above 5.0 mg/L are considered sufficient for most aquatic life, although some cold water fish species require higher DO levels.