



2023 VOLUNTEER LAKE ASSESSMENT PROGRAM INDIVIDUAL LAKE REPORTS

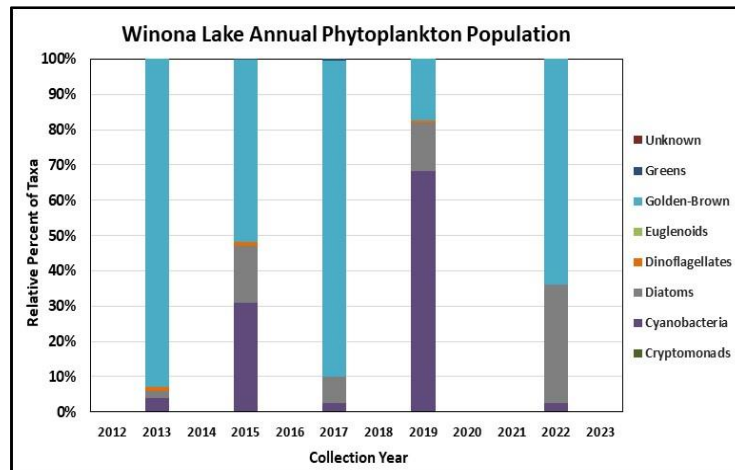
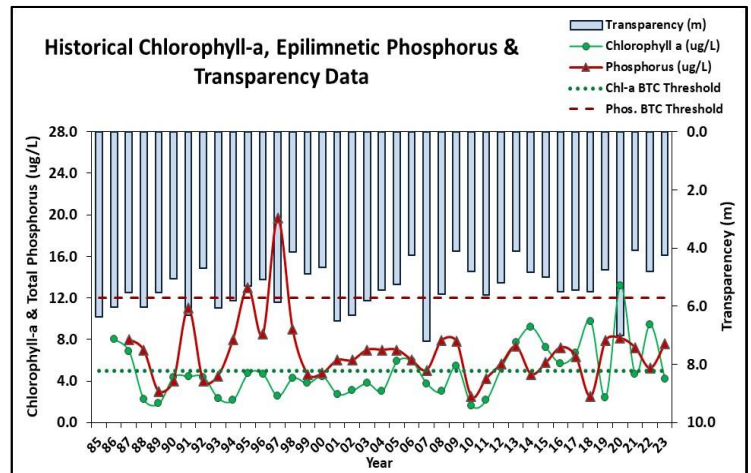
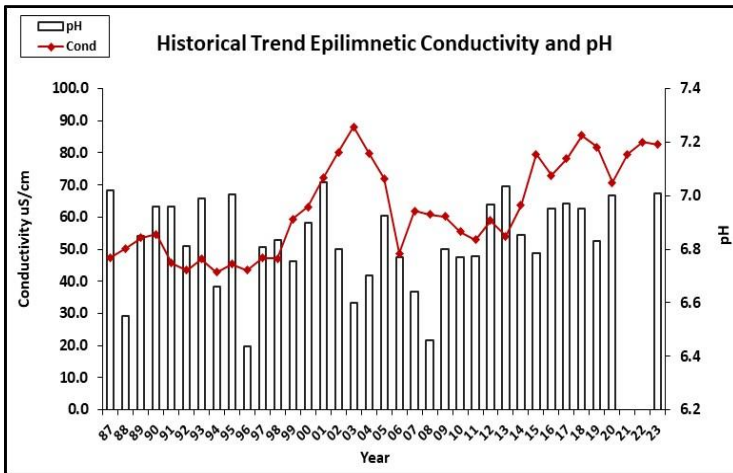
LAKE WINONA, NEW HAMPTON

Recommended Actions: Great job sampling in 2023! Algal growth (chlorophyll-a) has significantly increased in the lake, particularly since 2012 and levels have generally remained above the threshold for mesotrophic lakes. Similar to record summer rainfall amounts in 2021, the excessive summer rainfall in 2023 seemed to help flush nutrients out of the system resulting in lower levels of algal growth, however water clarity was poor, likely due to darker water color. Due to the history of cyanobacteria surface scums, keep an eye on the lake for any unusual signs of algal/cyanobacteria growth and [report](#) to NHDES' [Harmful Algal Bloom Program](#). Phosphorus levels have significantly increased in the Hypolimnion suggesting an organic layer on the lake bottom that depletes dissolved oxygen resulting in release of phosphorus bound in lake sediments. This highlights the importance of minimizing stormwater runoff, erosion, sedimentation, and deposition of organic material to the lake from the surrounding watershed. Encourage shoreline property owners to maintain a good vegetative buffer to help reduce stormwater runoff to the lake and minimize shoreline erosion from wave action. NHDES' [NH Homeowner's Guide to Stormwater Management](#) and UNH Cooperative Extension's [Landscaping at the Water's Edge](#) are good resources. Keep up the great work!

HISTORICAL WATER QUALITY TREND ANALYSIS

PARAMETER	TREND	PARAMETER	TREND
Conductivity	Worsening	Chlorophyll-a	Worsening
pH (epilimnion)	Stable	Transparency	Worsening
Phosphorus (hypolimnion)	Worsening	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 and increased slightly in August but remained within a low range. Average chlorophyll level decreased from 2022 and was less than the state median and the threshold for mesotrophic lakes. Historical trend analysis indicates significantly increasing (worsening) chlorophyll levels since monitoring began.
- ◆ **CONDUCTIVITY/CHLORIDE:** Epilimnetic (upper water layer), Metalimnetic (middle water layer), Hypolimnetic (lower water layer), Heights Brook, North Inlet, and Outlet conductivity and chloride levels were slightly greater than the state medians, yet not above a level of concern. However, historical trend analysis indicates significantly increasing (worsening) epilimnetic conductivity levels since monitoring began. York Brook conductivity and chloride levels were very low and less than the state medians. Chutes Cove and Hawkins Pond Inlet conductivity and chloride levels were elevated and greater than the state medians, however chloride levels did not exceed the state chronic chloride standard.
- ◆ **COLOR:** Apparent color measured in the epilimnion indicates the water was lightly tea colored, or light brown.
- ◆ **E. COLI:** Chutes Cove, Hawkins Pond Inlet, Heights Brook Inlet, North Inlet, Outlet, and York Brook E. coli levels were within low ranges and much less than the state standards for public beaches and surface waters.
- ◆ **TOTAL PHOSPHORUS:** Epilimnetic phosphorus level was low in June and remained stable in August. Average epilimnetic phosphorus level increased from 2022 but remained less than the state median and the threshold for mesotrophic lakes. Historical trend analysis indicates stable, yet variable, epilimnetic phosphorus levels since monitoring began. Metalimnetic phosphorus level was low. Hypolimnetic phosphorus level was slightly elevated in August likely due to release of phosphorus from bottom sediments under anoxic (low dissolved oxygen) conditions. Historical trend analysis indicates significantly increasing (worsening) hypolimnetic phosphorus levels since monitoring began. All tributary phosphorus levels were low except for the Chutes Cove phosphorus level which was slightly elevated.
- ◆ **TRANSPARENCY:** Transparency measured with (VS) and without (NVS) the viewscope was below average (worse) in June and increased (improved) to an average range in August. Average NVS transparency decreased from 2022 but remained higher (better) than the state median. Historical trend analysis indicates significantly decreasing (worsening) NVS transparency since monitoring began.
- ◆ **TURBIDITY:** Epilimnetic and Metalimnetic turbidity levels fluctuated within a low range. Hypolimnetic turbidity level was slightly elevated in August potentially due to formation and accumulation of organic compounds under anoxic conditions. Hawkins Pond Inlet, Heights Brook, North Inlet, Outlet, and York Brook turbidity levels were low. Chutes Cove turbidity level was elevated in August and lab data noted organic matter in the sample.
- ◆ **pH:** Epilimnetic and tributary pH levels were within the desirable range of 6.5-8.0 units. Historical trend analysis indicates relatively stable epilimnetic pH levels since monitoring began. Metalimnetic and Hypolimnetic pH levels were slightly acidic and less than desirable.

Table 1. 2023 Average Water Quality Data for LAKE WINONA - CENTER HARBOR

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	6.6	4.19	15	27	82.6	-	8	4.25	4.68	0.51	7.01
Metalimnion	-	-	-	-	85.2	-	9	-	-	0.80	6.31
Hypolimnion	-	-	-	-	93.1	-	13	-	-	1.70	6.13
Chutes Cove	-	-	59	-	214.4	39	24	-	-	1.78	6.63
Hawkins Pond Inlet	-	-	26	-	121.8	30	12	-	-	0.70	6.83
Heights Brook Inlet	-	-	11	-	71.5	6	13	-	-	0.99	6.62
North Inlet	-	-	15	-	83.5	19	9	-	-	0.70	6.87
Outlet	-	-	16	-	87.0	13	9	-	-	1.08	6.86
York Brook	-	-	2	-	23.5	60	6	-	-	0.15	6.89

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)