2025 Volunteer Lake Assessment Program

Individual Report: Lake Winona – Center Harbor

Water Quality Summary: Lake quality is generally representative of mesotrophic, or average, conditions, with low to moderate levels of phosphorus and algal growth. Algal growth (chlorophyll-a) has remained in an elevated, though fluctuating, range since 2012. Historical trend analysis indicates worsening (increasing) levels of chlorophyll and epilimnetic (upper water layer) conductivity, slightly worsening (decreasing) water clarity and stable levels of epilimnetic pH and epilimnetic phosphorus since monitoring began. On average, Lake Winona has similar or slightly lower (worse) water quality compared to the median NH lake and doesn't exceed any NH water quality standards.

Recommended Actions: 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. The increased intensity of storm events and fluctuating climate conditions resulting in shorter periods of ice cover, warmer water temperatures and longer periods of thermal stratification can impact pond quality over time and accelerate the eutrophication process. 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. Finally, return to sampling three times a summer, typically June, July and August and collect samples at each thermal layer (Epilimnion, Metalimnion, Hypolimnion) when the lake is stratified. Sampling methods can be reviewed in the VLAP Field Manual. Keep up the great work and thank you for your continued participation in VLAP!

Historical Water Quality Trend Analysis

Table 1. Historical Water Quality Trends for Lake Winona – Center Harbor

Parameter	Trend
Conductivity (Epilimnion)	Worsening
Chlorophyll-a (Composite)	Worsening
pH (Epilimnion)	Stable
Transparency	Slightly Worsening
Phosphorus (Epilimnion)	Stable

Historical Water Quality Graphics - Deep Spot

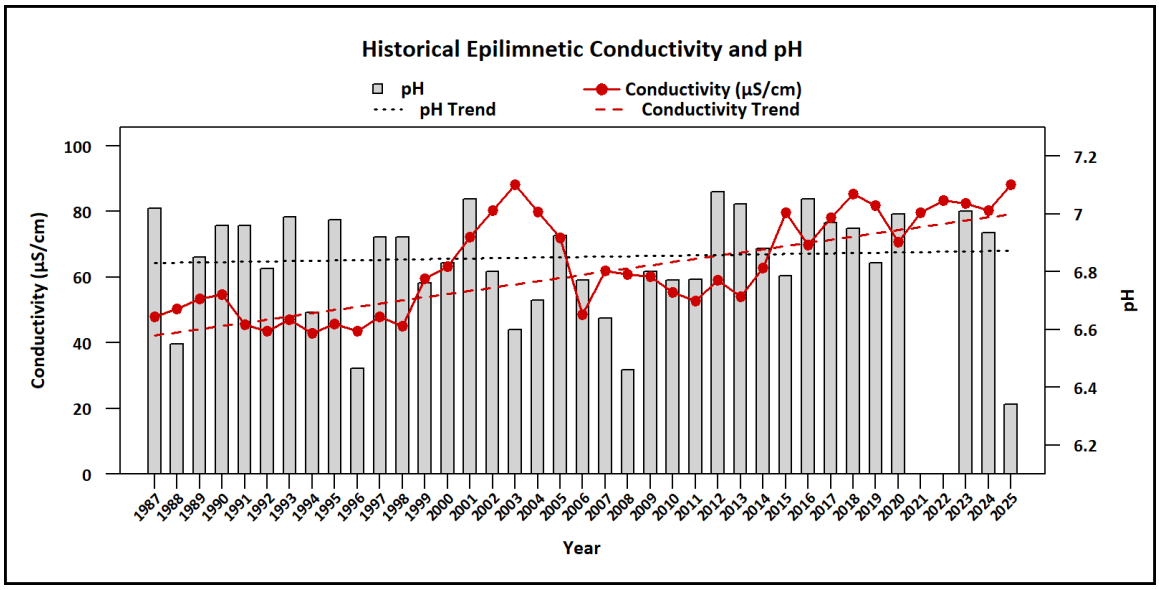

Figure 1. Median epilimnetic pH (red points) and conductivity (gray bars) by year, with corresponding trend lines shown as red and black dashed lines, respectively. Epilimnetic pH is stable and conductivity is worsening since monitoring began.

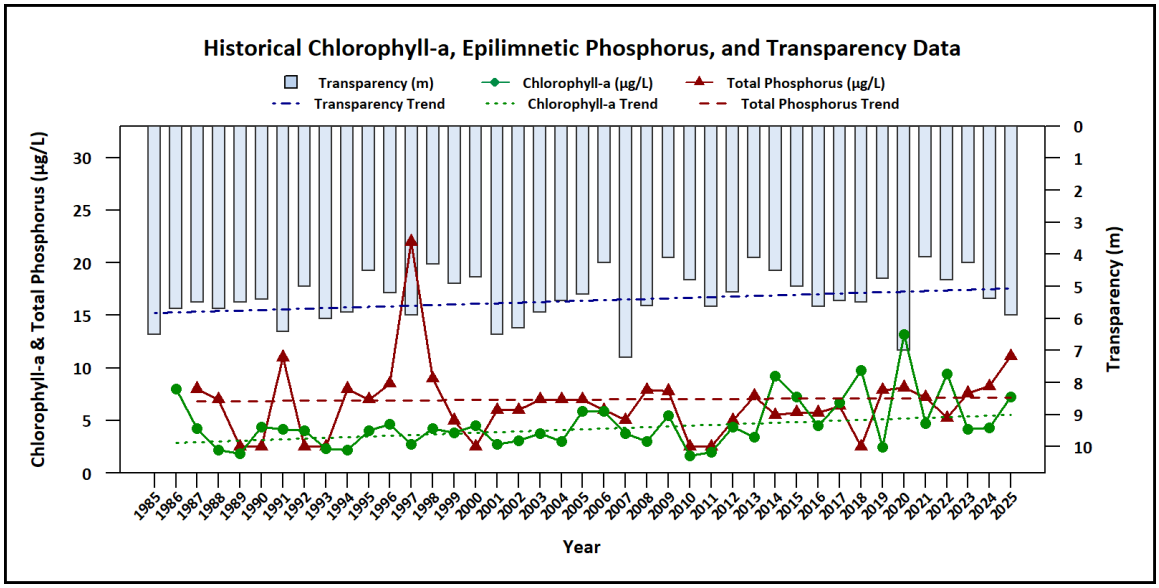

Figure 2. Median Secchi disk transparency (blue bars), epilimnetic phosphorus (red triangles), and chlorophyll-a (green points) by year, with corresponding trend lines shown as blue, red, and green dashed lines, respectively. Water transparency is slightly worsening, phosphorus is stable, and chlorophyll-a is worsening since monitoring began.

Table 2. 2025 Average Water Quality Data for Lake Winona – Center Harbor

Station	Alk. (mg/L)	Chlor-a (µg/L)	Chloride (mg/L)	Color (pcu)	Cond. (µS/cm)	Total P (µg/L)	Trans. NVS (m)	Trans. VS (m)	Turb. (ntu)	pH	E. coli (mpn/ 100 mL)
Epilimnion	8	7.26	12.70	43	88.13	11.10	5.9	6.3	1.78	6.34	4.1
Chutes Cove	No Value	No Value	61.70	No Value	239.70	18.10	No Value	No Value	0.52	6.44	No Value
Hawkins Pond Inlet	No Value	No Value	36.10	No Value	185.35	23.85	No Value	No Value	1.17	6.89	137.6
Heights Brook Inlet	No Value	No Value	5.86	No Value	43.88	21.20	No Value	No Value	0.88	6.46	No Value
North Inlet	No Value	No Value	14.80	No Value	74.44	10.60	No Value	No Value	1.35	6.82	No Value
Outlet	No Value	No Value	14.50	No Value	87.50	10.15	No Value	No Value	0.75	6.68	16.9
York Brook	No Value	No Value	1.50	No Value	19.80	5.60	No Value	No Value	1.12	6.53	No Value

Observations *(Refer to Table 2 and Historical Deep Spot Data Graphics)*:

- **Chlorophyll-a (Chlor-a):** Chlorophyll level was elevated in June and increased in September. The median chlorophyll level decreased from 2024 and was greater than the state median and the threshold for mesotrophic lakes. Historical trend analysis indicates significantly worsening (increasing) chlorophyll levels since monitoring began.
- **Conductivity (Cond.)/Chloride:** Epilimnetic, Chutes Cove, Hawkins Pond Inlet, North Inlet and Outlet conductivity and chloride levels were greater than the state medians, yet not above a level of concern. However, historical trend analysis indicates significantly worsening (increasing) epilimnetic conductivity levels since monitoring began. York Brook conductivity and chloride levels were low.
- **Color**: Apparent color measured in the epilimnion indicates the water was lightly tea colored, or light brown, in September.
- **Total Phosphorus (Total P):** Epilimnetic phosphorus level was slightly elevated in September. The median epilimnetic phosphorus level increased from 2024, was approximately equal to the state median and was less than the threshold for mesotrophic lakes. Historical trend analysis indicates stable, yet variable, epilimnetic phosphorus levels since monitoring began. Chutes Cove, Hawkins Pond Inlet and Heights Brook Inlet had elevated phosphorus levels in June. North Inlet, Outlet and York Brook phosphorus levels were low.
- **Transparency (Trans.):** Transparency measured with (VS) and without (NVS) the viewscope was average in September. The median NVS transparency improved from 2024 and was higher (better) than the state median. Historical trend analysis indicates slightly worsening (decreasing) NVS transparency since monitoring began.
- **Turbidity (Turb.):** Epilimnetic, Hawkins Pond Inlet, North Inlet and York Brook turbidity levels were slightly elevated. Chutes Cove, Heights Brook Inlet and Outlet turbidity levels were low.
- **pH:** Hawkins Pond Inlet, North Inlet and Outlet pH levels were within the desirable range of 6.5-8.0 units. Epilimnetic, Chutes Cove and Heights Brook Inlet pH levels were slightly less than desirable. Historical trend analysis indicates relatively stable epilimnetic pH levels since monitoring began.

- **E. coli:** Epilimnetic and Outlet E. coli levels were low. Hawkins Pond Inlet E. coli levels were elevated but did not exceed state standard for surface waters.

How does your lake compare to New Hampshire lakes and water quality standards?

Table 3. New Hampshire Median Lake Water Quality Values. Median values generated from historic lake monitoring data.

Parameter	Median Value
Alkalinity	4.5 mg/L
Chlorophyll-a	4.39 µg/L
Chloride	5 mg/L
Conductivity	42.3 µS/cm
Total Phosphorus	11 µg/L
Transparency	3.3 m
pH	6.6

Table 4. New Hampshire Water Quality Standards. Numeric criteria for specific parameters. Water quality violation occurs if thresholds are exceeded.

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