



2023 VOLUNTEER LAKE ASSESSMENT PROGRAM INDIVIDUAL LAKE REPORTS

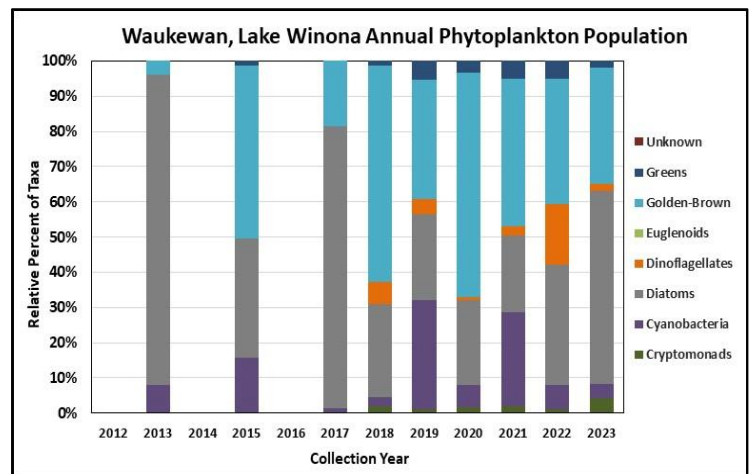
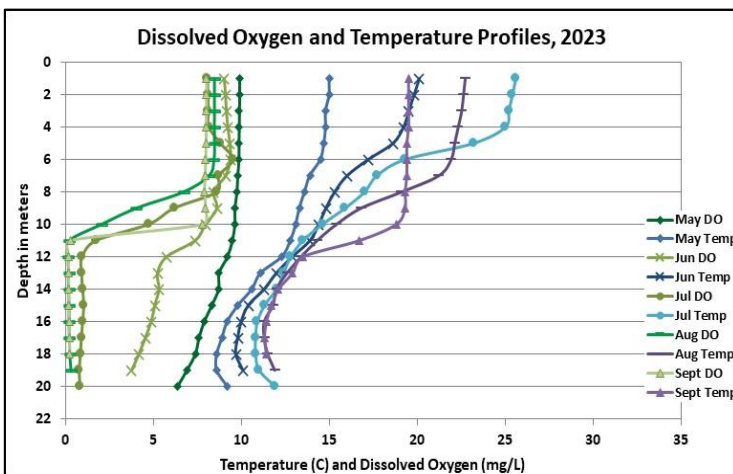
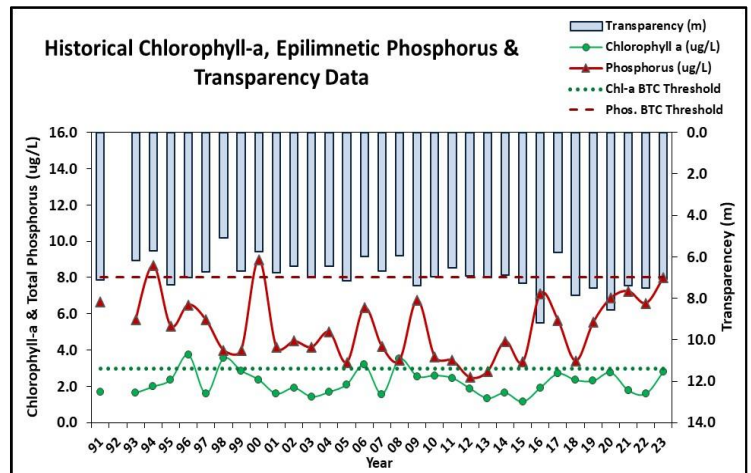
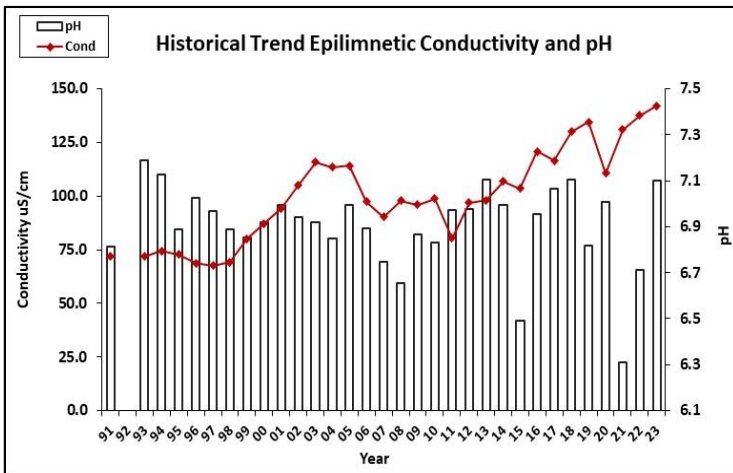
LAKE WAUKEWAN, WINONA STN., MEREDITH

Recommended Actions: Great job sampling in 2023! Lake quality remained representative of oligotrophic, or high-quality conditions, however Epilimnetic (upper water layer) phosphorus (nutrient) levels have increased steadily since 2018, and Hypolimnetic (lower water layer) phosphorus levels indicate a potential internal load of nutrients released from bottom sediments under anoxic (no dissolved oxygen) conditions. This internal load could fuel algal/cyanobacteria growth, and the lake has experienced historical [cyanobacteria](#) blooms. Keep an eye out for cyanobacteria blooms in late summer/early fall and notify NHDES' [Harmful Algal Bloom Program](#) if observed. Spring tributary sampling has historically indicated elevated nutrient levels following spring snowmelt and runoff. Clean up roadside ditches and culverts of any leftover sand/salt mixtures applied to roads during winter months. Great job adding two new tributary stations to the monitoring program. Excessive summer rainfall did not appear to have long-term negative impacts to water quality. Continue watershed management efforts to reduce nutrient loads and [stormwater runoff](#). Monitor the increasing conductivity and chloride trends as chloride can negatively impact drinking water and aquatic life. Encourage local and private winter maintenance companies to obtain [Green SnowPro](#) Certification. Continue efforts to monitor water quality in spring, fall and winter to better understand nutrient dynamics and effects on cyanobacteria growth. Keep up the great work!

HISTORICAL WATER QUALITY TREND ANALYSIS

PARAMETER	TREND	PARAMETER	TREND
Conductivity	Worsening	Chlorophyll-a	Stable
pH (epilimnion)	Stable	Transparency	Improving
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 very low in May, increased gradually through August, and decreased slightly in September. Average chlorophyll level increased from 2022 but remained less than the state median and the threshold for oligotrophic lakes. Historical trend analysis indicates relatively stable chlorophyll levels since monitoring began.
- ◆ **CONDUCTIVITY/CHLORIDE:** Epilimnetic (upper water layer), Metalimnetic (middle water layer) and Hypolimnetic (lower water layer) conductivity and/or Chloride levels remained slightly elevated and greater than the state median. Historical trend analysis indicates significantly increasing (worsening) epilimnetic conductivity levels since monitoring began. Brookside Lane Stream, Monkey Pond Culvert and Reservoir Brook conductivity and chloride levels were elevated and much greater than the state medians. Boat Launch conductivity and chloride levels were greatly elevated but chloride levels remained less than the state chronic chloride standard.
- ◆ **COLOR:** Apparent color measured in the epilimnion indicates the water was clear with little to no tea, or brown, coloring.
- ◆ **TOTAL PHOSPHORUS:** Epilimnetic phosphorus level was low in May, increased to a slightly elevated level in June, decreased in July and remained low through September. Average epilimnetic phosphorus level increased from 2022, was less than the state median, and was approximately equal to the threshold for oligotrophic lakes. Metalimnetic phosphorus level was elevated in June and September. Hypolimnetic phosphorus level was slightly elevated in August and elevated in September due to release of phosphorus from bottom sediments under anoxic conditions. Historical trend analysis indicates stable epilimnetic phosphorus levels and significantly increasing (worsening) hypolimnetic phosphorus levels since monitoring began. Boat Launch phosphorus level was slightly elevated but within a low range for that station. Brookside Ln., Monkey Pond Culvert, and Reservoir Brook phosphorus levels were low.
- ◆ **TRANSPARENCY:** Transparency measured with (VS) and without (NVS) the viewscope was average in May, remained stable in June, increased (improved) in July, decreased in August due to wave conditions, and remained stable in September. Average NVS transparency decreased slightly from 2022 but remained higher (better) than the state median. Historical trend analysis indicates significantly increasing (improving) NVS transparency since monitoring began.
- ◆ **TURBIDITY:** Epilimnetic, Brookside Ln., Monkey Pond Culvert, and Reservoir Brook turbidity levels fluctuated within a low range. Metalimnetic turbidity level was elevated in September potentially due to a layer of algal growth. Hypolimnetic turbidity level was slightly elevated in July and gradually increased through September indicating formation and accumulation of organic compounds under anoxic conditions.
- ◆ **PH:** Epilimnetic, Metalimnetic, Monkey Pond Culvert, and Reservoir Brook pH levels were within the desirable range of 6.5-8.0 units. Historical trend analysis indicates stable, yet variable, epilimnetic pH levels since monitoring began. Hypolimnetic and Brookside Ln. pH levels were slightly less than desirable.

Table 1. 2023 Average Water Quality Data for LAKE WAUKEWAN, WINONA - MEREDITH

Station Name	Alk. (mg/L)	Chlor-a (ug/L)	Chloride (mg/L)	Color (pcu)	Cond. (us/cm)	Total P (ug/L)	Trans. (m)		Turb. (ntu)	pH
							NVS	VS		
Epilimnion	8.7	2.82	32	15	142.0	8	7.08	7.48	0.38	7.10
Metalimnion	-	-	-	-	145.3	11	-	-	1.62	6.93
Hypolimnion	-	-	30	-	150.3	24	-	-	2.18	6.47
Boat Launch	-	-	158	-	610.0	22	-	-	8.34	6.38
Brookside Lane Stream	-	-	72	-	260.0	3	-	-	0.35	6.47
Monkey Pond Culvert	-	-	121	-	458.0	3	-	-	0.38	6.92
Reservoir Brook	-	-	122	-	458.0	8	-	-	0.29	6.94

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)