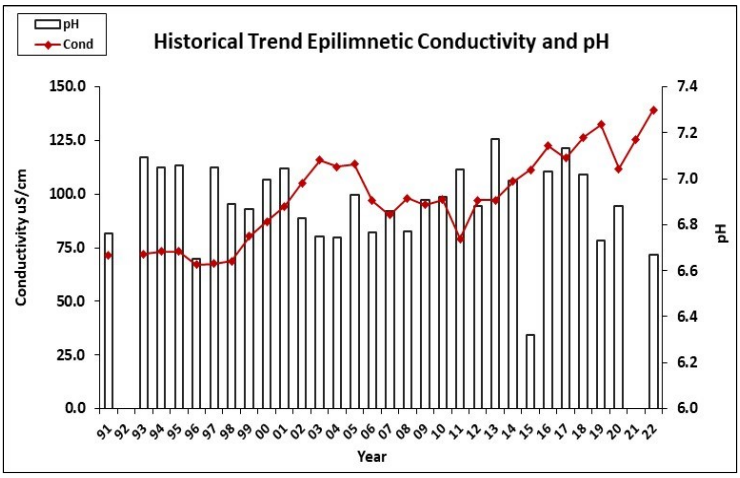
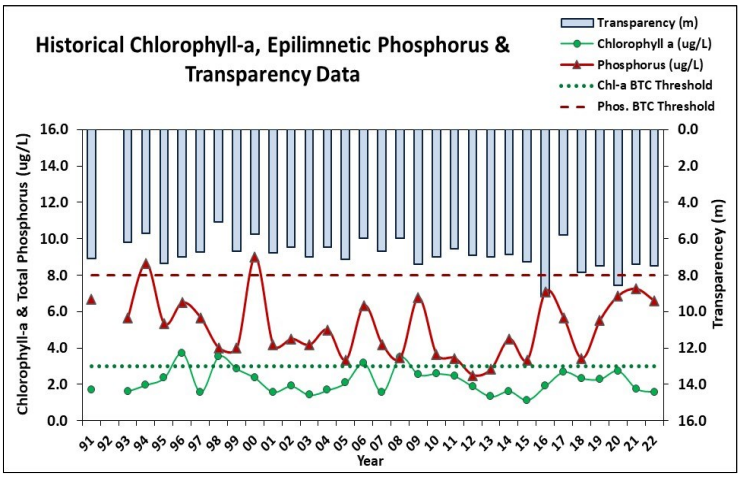
Volunteer Lake Assessment Program Individual Lake Reports
Lake Waukewan, Winona Stn., Meredith
2022 Data Summary

Recommended Actions: Great job sampling in 2022! 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 as the summer progresses. 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. Consider adding additional tributary sampling to the summer monitoring program. 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 affects on cyanobacteria growth. Keep up the great work!

Historical Water Quality Trend Analysis

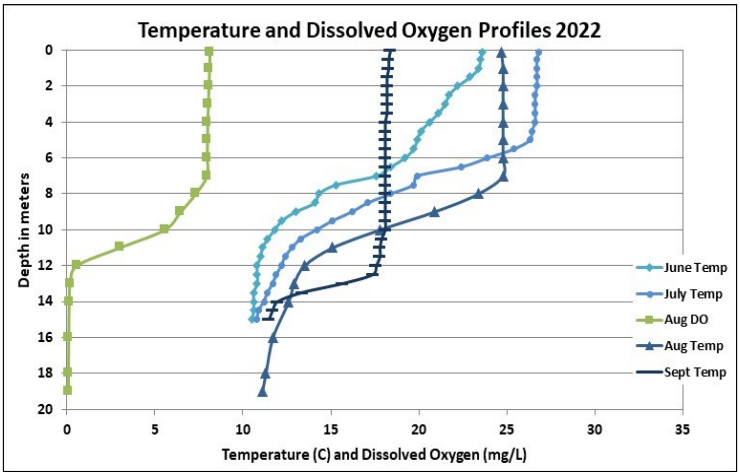
Parameter	Trend	Parameter	Trend
Conductivity	Worsening	**Chlorophyll-a**	Stable
pH (epilimnion)	Stable	**Transparency**	Improving
		Phosphorus (epilimnion)	Stable

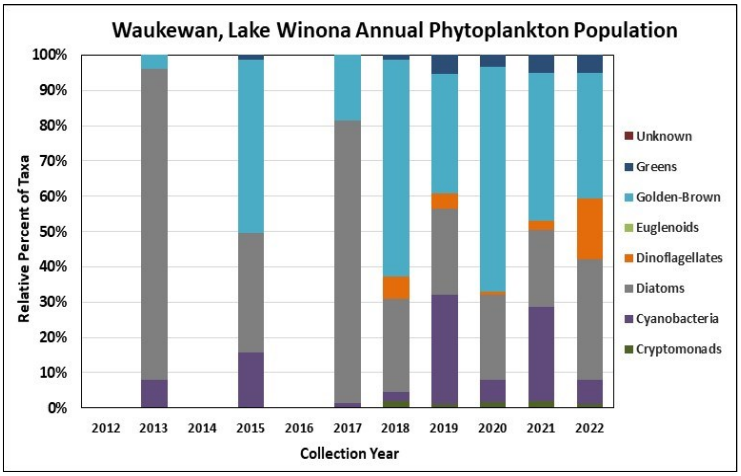




Dissolved Oxygen and Phytoplankton

(Note: Information may not be collected annually)





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

- **Chlorophyll-a:** Chlorophyll level was within a very low range in June, remained stable in July, increased to an average level in August, and decreased in September. Average chlorophyll level decreased slightly from 2021 and was 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 levels remained slightly elevated and greater than the state median. Epilimnetic chloride level was also greater than the state median, yet less than the state chronic chloride standard. Historical trend analysis indicates significantly increasing (worsening) epilimnetic conductivity levels since monitoring began. Brookside Lane Stream conductivity and chloride levels were elevated and much greater than the state medians. Boat Launch conductivity level was greatly elevated and chloride level was approximately equal to 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 levels fluctuated within a low range and were lowest in August and highest in September. Average epilimnetic phosphorus level remained stable with 2021 and was less than the state median and threshold for oligotrophic lakes. Historical trend analysis indicates relatively stable epilimnetic phosphorus levels since monitoring began. Metalimnetic phosphorus level also fluctuated within a low range. Hypolimnetic phosphorus level increased from moderate to elevated at the summer progressed and the turbidity of the August and September samples was also elevated indicating a potential internal load of nutrients from bottom sediments under anoxic (low dissolved oxygen) conditions. Boat Launch phosphorus level was elevated but within an average range for that station. Brookside Lane Stream phosphorus level was very low.
- **Transparency:** Transparency measured with (VS) and without (NVS) the viewscope was above average (good) in June, increased (improved) through August, and decreased (worsened) in September. Average NVS transparency increased slightly from 2021 and was much higher (better) than the state median. Historical trend analysis indicates significantly increasing (improving) NVS transparency since monitoring began.
- **Turbidity:** Epilimnetic and Metalimnetic turbidity levels fluctuated within a low range. Hypolimnetic turbidity levels were slightly elevated in August and September and the phosphorus levels were also elevated. Boat Launch turbidity level was elevated during spring sampling and lab data noted colored water with iron precipitation. Brookside Lane Stream turbidity level was within a low range.
- **pH:** Epilimnetic, Metalimnetic and Brookside Lane Stream pH levels were within the desirable range 6.5-8.0 units. Historical trend analysis indicates stable, yet variable, epilimnetic pH levels since monitoring began. Hypolimnetic and Boat Launch pH levels were slightly less than desirable.

Station Name	Table 1. 2022 Average Water Quality Data for LAKE WAUKEWAN, WINONA STN.									
	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	8.9	1.59	34	15	137.5	7	7.50	7.92	0.41	6.71
Metalimnion					137.5	7			0.55	6.85
Hypolimnion					141.9	16			1.55	6.38
Boat Launch			218		860.0	32			30.60	6.45
Brookside Lane Stream			68		264.0	3			0.30	6.58

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)