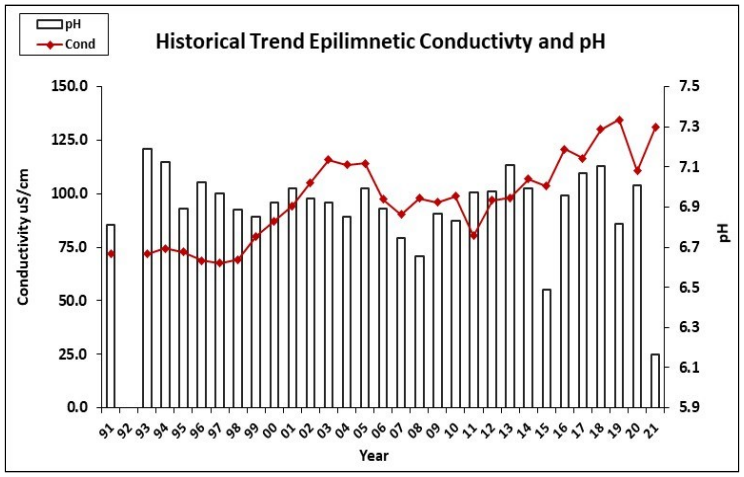
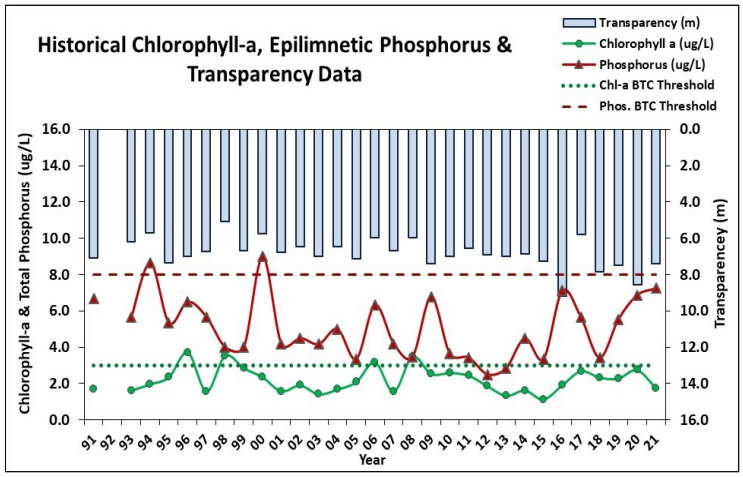
Volunteer Lake Assessment Program Individual Lake Reports
Lake Waukewan, Winona Stn., Meredith
2021 Data Summary

Recommended Actions: Great job sampling in 2021! 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. Nutrient levels were generally elevated in June following spring snowmelt and runoff. Clean up roadside ditches and culverts of any leftover sand/salt mixtures applied to roads during winter months. 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

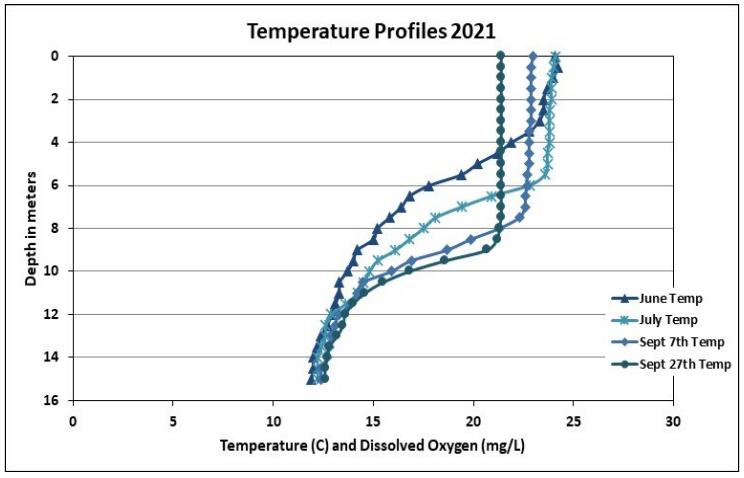
Parameter	Trend	Parameter	Trend
Conductivity	Worsening	**Chlorophyll-a**	Stable
pH (epilimnion)	Stable	**Transparency**	Improving
		Phosphorus (epilimnion)	Stable

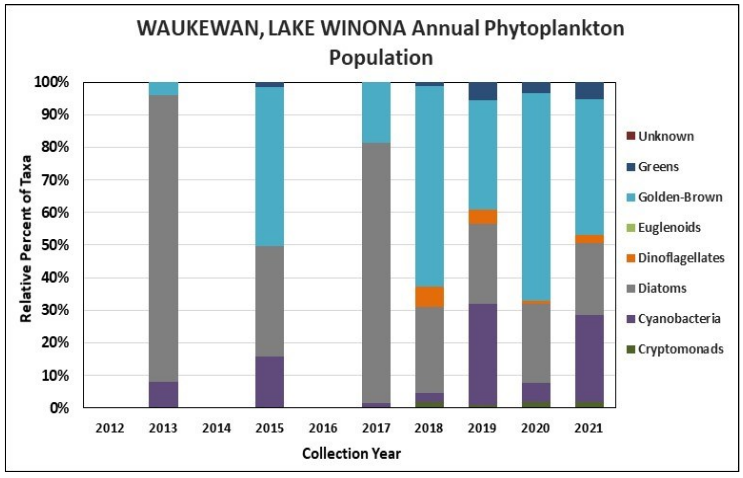




Dissolved Oxygen and Phytoplankton

(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 low in June, increased in July but remained within a low range, decreased in early September and remained stable through late September. Average chlorophyll level decreased from 2020 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.
- **Color:** Epilimnetic color data indicates the water was borderline clear to lightly tea colored, or light brown and was darkest in June.
- **Total Phosphorus:** Epilimnetic phosphorus level was within a low range in June, decreased slightly in July, increased slightly in early September and remained stable through late September. Average epilimnetic phosphorus level remained stable with 2020 and was less than the state median and the threshold for oligotrophic lakes. Historical trend analysis indicates relatively stable epilimnetic phosphorus levels since monitoring began. Metalimnetic phosphorus level was slightly elevated in June and July. Hypolimnetic phosphorus level was elevated, particularly in September, likely indicating release of phosphorus from bottom sediments under anoxic (no dissolved oxygen) conditions. Brookside Lane Stream phosphorus level was elevated for that station.
- **Transparency:** Transparency measured with (VS) and without (NVS) the viewscope was above average (good) in June, decreased (worsened) slightly in July but remained above average, decreased to below average range in early September, and then increased (improved) in late September. Average NVS transparency decreased slightly from 2020 but remained much higher (better) than the state median. Historical trend analysis indicates significantly increasing (improving) NVS transparency since monitoring began.
- **Turbidity:** Epilimnetic turbidity and Metalimnetic turbidity levels fluctuated within a low range. Hypolimnetic turbidity level was slightly elevated, particularly in late September and lab data noted an abundance of zooplankton in the sample. Brookside Lane Stream turbidity level was within a very low range.
- **pH:** Epilimnetic, Hypolimnetic and Brooksisde Lane Stream pH levels fluctuated within a slightly acidic range and were less than desirable 6.5-8.0 units. Historical trend analysis indicates stable epilimnetic pH levels since monitoring began. Metalimnetic pH level fluctuated around the low end of the desirable range.

Station Name	Table 1. 2021 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	8.3	1.77	34	22	130.9	7	7.39	7.66	0.38	6.16
Metalimnion					131.8	9			0.56	6.64
Hypolimnion					135.4	26			2.08	6.16
Brookside Lane Stream			65		212.0	16			0.18	6.35

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)