Volunteer Lake Assessment Program Individual Lake Reports

WAUKEWAN, LAKE, NEW HAMPTON, NH

MORPHOMETRIC DATA

Watershed Area (Ac.):	7,551	**Max. Depth (m):**	21.4	**Flushing Rate (yr^{-1}):**	0.6
Surface Area (Ac.):	913	**Mean Depth (m):**	6.7	**P Retention Coef:**	0.7
Shore Length (m):	13,000	**Volume (m^3):**	24,809,000	**Elevation (ft):**	539

TROPHIC CLASSIFICATION

Year	Trophic class
1982	OLIGOTROPHIC
1994	OLIGOTROPHIC

KNOWN EXOTIC SPECIES

Variable Milfoil

The Waterbody Report Card tables are generated from the DRAFT 2014 305(b) report on the status of N.H. waters, and are based on data collected from 2004-2013. Detailed waterbody assessment and report card information can be found at www.des.nh.gov/organizations/divisions/water/wmb/swqa/index.htm

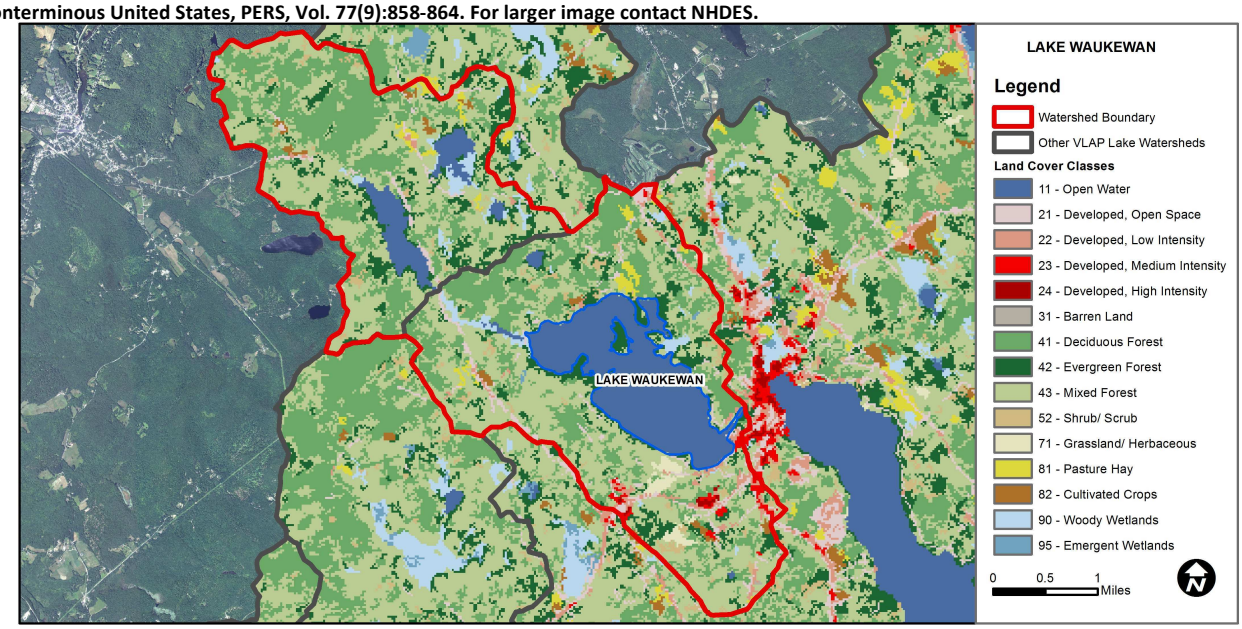
Designated Use	Parameter	Category	Comments
Aquatic Life	Phosphorus (Total)	Good	Sampling data is better than the water quality standards or thresholds for this parameter.
	pH	Slightly Bad	Data periodically exceed water quality standards or thresholds for this parameter by a small margin.
	Oxygen, Dissolved	Bad	Data periodically exceed water quality standards or thresholds for this parameter by a large margin.
	Dissolved oxygen satura	Slightly Bad	Data periodically exceed water quality standards or thresholds for a given parameter by a small margin.
	Chlorophyll-a	Good	Sampling data is better than the water quality standards or thresholds for this parameter.
Primary Contact Recreation	Escherichia coli	Encouraging	Limited data for this parameter predicts water quality standards or thresholds are being met; however more data are necessary to fully assess the parameter.
	Cyanobacteria hepatoto	Slightly Bad	Cyanobacteria bloom(s).
	Chlorophyll-a	Very Good	All sampling data meet water quality standards or thresholds for this parameter.

BEACH PRIMARY CONTACT ASSESSMENT STATUS

LAKE WAUKEWAN - TOWN BEACH	Escherichia coli	Very Good	All sampling data meet water quality standards or thresholds for this parameter.

WATERSHED LAND USE SUMMARY

Fry, J., Xian, G., Jin, S., Dewitz, J., Homer, C., Yang, L., Barnes, C., Herold, N., and Wickham, J., 2011. Completion of the 2006 National Land Cover Database for the Conterminous United States, PERS, Vol. 77(9):858-864. For larger image contact NHDES.



Land Cover Category	% Cover	Land Cover Category	% Cover	Land Cover Category	% Cover
Open Water	14.6	Barren Land	0.02	Grassland/Herbaceous	0.79
Developed-Open Space	3	Deciduous Forest	25.15	Pasture Hay	1.08
Developed-Low Intensity	1.29	Evergreen Forest	9.6	Cultivated Crops	0.74
Developed-Medium Intensity	0.56	Mixed Forest	39.35	Woody Wetlands	1.81
Developed-High Intensity	0.14	Shrub-Scrub	1.83	Emergent Wetlands	0.05

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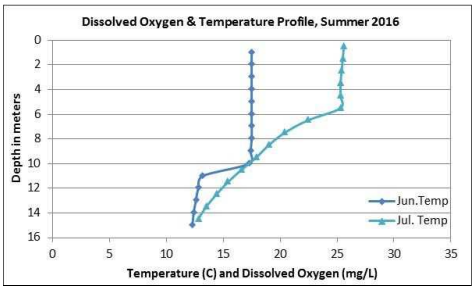
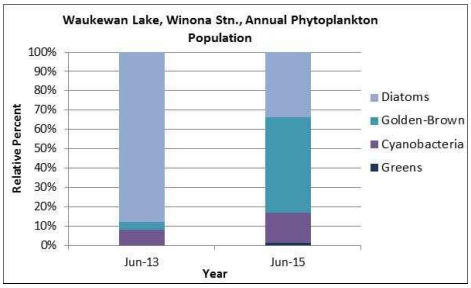
Waukewan Lake, Winona Stn., Meredith
2016 Data Summary

Recommended Actions: Lake water quality is representative of Oligotrophic, or high quality water, conditions. The drought conditions in 2016 and lack of stormwater runoff and wetland influence likely helped to improve water clarity as it was the best measured since monitoring began. This highlights the importance of managing stormwater runoff from areas vulnerable to erosion, steep slopes, shoreline, dirt/gravel roads, and impervious surfaces. Conductivity has increased in the lake likely due to winter road, parking lot, driveway, and walkway maintenance. Encourage local road agents and winter maintenance companies to obtain a NH Voluntary Salt Applicators License through UNH Technology Transfer Center's Green SnowPro Certification program. Encourage road agents and homeowner's to clean up roadside ditches and culverts of any leftover sand/salt mixtures applied during winter months. Boat Launch water quality was concerning following spring runoff sampling indicating elevated conductivity, chloride, phosphorus, and turbidity levels. Consider hiring an engineering firm to address runoff from culverts, roadside ditches and storm drains to minimize pollutant loading in the spring. Keep up the great work!

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

- **Chlorophyll-a:** Chlorophyll levels were stable and low from June to September. The 2016 average chlorophyll level increased slightly from 2015 and was much less than the state median. Historical trend analysis indicates relatively stable chlorophyll levels since monitoring began.
- **Conductivity/Chloride:** Deep spot conductivity and chloride levels were slightly elevated and greater than the state medians. Historical trend analysis indicates significantly increasing (worsening) epilimnetic conductivity levels since monitoring began. Boat Launch and Brookside Lane Stream conductivity and chloride levels were elevated and much greater than the state medians. Boat Launch conductivity and chloride levels were much higher in April during spring snow melt and then decreased to non-concerning levels by August.
- **Total Phosphorus:** Epilimnetic (upper water layer) phosphorus levels were low in June and July and slightly elevated in September. A recent storm event and wind and wave conditions at the deep spot may have affected September phosphorus levels. Metalimnetic (middle water layer) phosphorus levels were low. Hypolimnetic (lower water layer) phosphorus levels were low in June and July and elevated in September potentially due to low water levels and the sample being collected immediately off the lake bottom. Boat Launch phosphorus levels were elevated in April during spring runoff sampling and the turbidity was also elevated, and then decreased to low levels in August. Brookside Lane Stream phosphorus levels were low.
- **Transparency:** Transparency measured with the viewscope (VS) was below average in June due to wind and wave conditions, then increased (improved) in July and again in September. Transparency was measured without the viewscope (NVS) in July and was high (good). Average transparency improved from 2015 and was much higher (better) than the state median. Historical trend analysis indicates significantly increasing (improving) transparency since monitoring began.
- **Turbidity:** Epilimnetic, Metalimnetic and Brookside Lane Stream turbidity levels were low. Hypolimnetic turbidity levels were slightly higher but remained within an average range for that station. Boat Launch turbidity level was greatly elevated in April during spring runoff sampling.
- **pH:** Epilimnetic, Metalimnetic, Boat Launch, and Brookside Lane Stream pH levels were within the desirable range 6.5-8.0 units. Hypolimnetic pH levels fluctuated below the desirable range in July. Historical trend analysis indicates stable epilimnetic pH levels since monitoring began.





NH Water Quality Standards: Numeric criteria for specific parameters. Results exceeding criteria are considered a water quality violation.
Chloride: > 230 mg/L (chronic)
E. coli: > 88 cts/100 mL – public beach
E. coli: > 406 cts/100 mL – surface waters
Turbidity: > 10 NTU above natural level
pH: between 6.5-8.0 (unless naturally occurring)

NH Median Values: Median values for specific parameters generated from historic lake monitoring data.
Alkalinity: 4.9 mg/L
Chlorophyll-a: 4.58 mg/m^3
Conductivity: 40.0 uS/cm
Chloride: 4 mg/L
Total Phosphorus: 12 ug/L
Transparency: 3.2 m
pH: 6.6

Station Name	Table 1. 2016 Average Water Quality Data for WAUKEWAN LAKE, WINONA STN.								
	Alk. mg/l	Chlor-a ug/l	Chloride mg/l	Cond. uS/cm	Total P ug/l	Trans. m		Turb. ntu	pH
						NVS	VS		
Epilimnion	9.2	1.92	23	120.8	7	9.17	8.33	0.60	6.96
Metalimnion				121.1	4			0.44	7.15
Hypolimnion				125.2	15			1.56	6.54
Boat Launch			41	234.1	25			19.84	6.64
Brookside Lane Stream			43	197.6	6			0.16	6.63

Historical Water Quality Trend Analysis

Parameter	Trend	Explanation	Parameter	Trend	Explanation
Conductivity	Worsening	Data significantly increasing.	Chlorophyll-a	Stable	Trend not significant; data moderately variable.
pH (epilimnion)	Stable	Trend not significant; data show low variability.	Transparency	Improving	Data significantly increasing.
			Phosphorus (epilimnion)	Improving	Data significantly decreasing.