



Volunteer Lake Assessment Program Individual Lake Reports

WINONA, LAKE, NEW HAMPTON, NH

MORPHOMETRIC DATA

Watershed Area (Ac.):	3,328	Max. Depth (m):	14.6	Flushing Rate (yr ⁻¹)	1.6
Surface Area (Ac.):	154	Mean Depth (m):	6.6	P Retention Coef:	0.54
Shore Length (m):	5,000	Volume (m ³):	4,149,000	Elevation (ft):	540

TROPHIC CLASSIFICATION

Year	Trophic class
1987	MESOTROPHIC
2005	MESOTROPHIC

KNOWN EXOTIC SPECIES

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

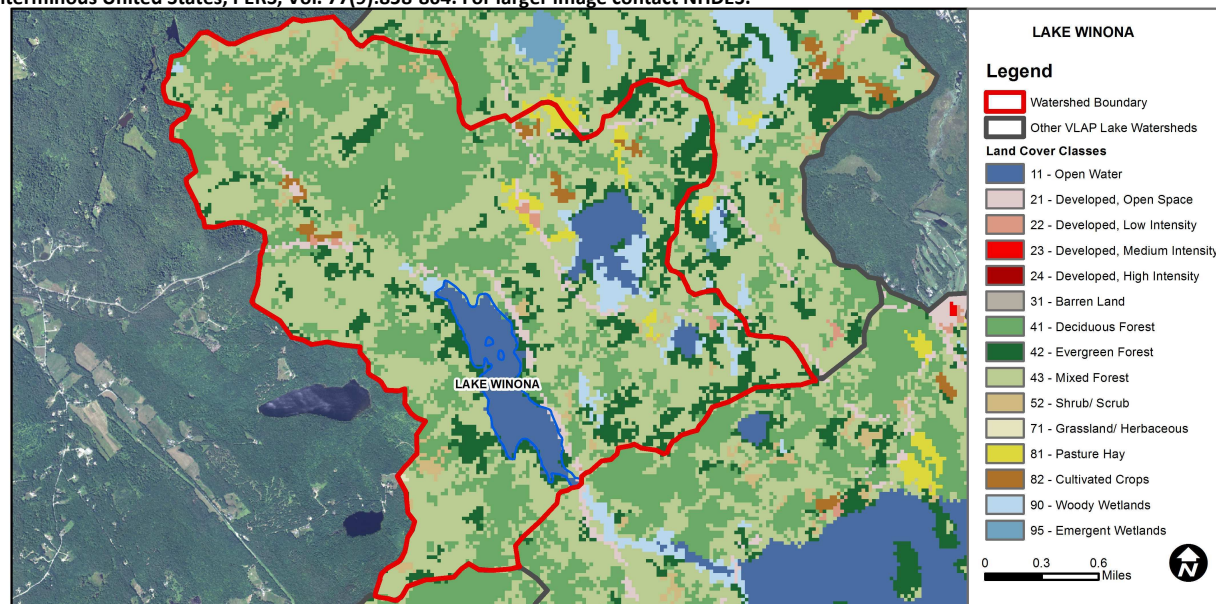
Designated Use	Parameter	Category	Comments
Aquatic Life	Phosphorus (Total)	Good	Sampling data is better than the water quality standards or thresholds for this parameter.
	pH	Slightly Bad	Data periodically exceed water quality standards or thresholds for this parameter by a small margin.
	Oxygen, Dissolved	Bad	Data periodically exceed water quality standards or thresholds for this parameter by a large margin.
	Dissolved oxygen saturation	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	Very Good	All sampling data meet water quality standards or thresholds for this parameter.
	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.
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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	7.09	Barren Land	0	Grassland/Herbaceous	0.04
Developed-Open Space	1.83	Deciduous Forest	30.07	Pasture Hay	1.16
Developed-Low Intensity	0.27	Evergreen Forest	10.89	Cultivated Crops	0.79
Developed-Medium Intensity	0	Mixed Forest	43.84	Woody Wetlands	2.3
Developed-High Intensity	0	Shrub-Scrub	1.58	Emergent Wetlands	0



VOLUNTEER LAKE ASSESSMENT PROGRAM INDIVIDUAL LAKE REPORTS

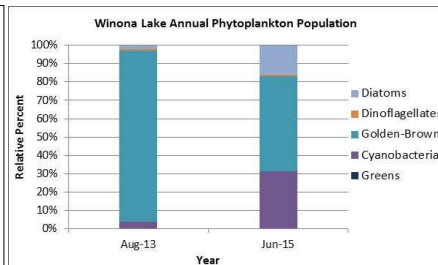
LAKE WINONA, NEW HAMPTON

2016 DATA SUMMARY

RECOMMENDED ACTIONS: The lake continued to experience a spike in algal growth in late summer/early fall. This tends to correlate with the period of fall turnover as nutrients (phosphorus) present in hypolimnetic waters is made available throughout the water column. Make note of any surface scums during this period and notify DES if present. Schedule a biologist visit for the fall sampling event in 2017 so a phytoplankton sample can be collected to determine the dominant algae. The elevated bacteria levels in August occurred after a significant storm event following a prolonged period of dry conditions. It is not unusual for bacteria to spike following these conditions. Continue to educate lake and watershed residents on ways to reduce nutrient loading and manage stormwater runoff from their properties. Keep up the great work!

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

- **CHLOROPHYLL-A:** Chlorophyll levels were low in June, increased to average levels in August, and then increased to slightly elevated levels in September. The 2016 average chlorophyll level decreased slightly from 2015 but remained greater than the state median. Historical trend analysis indicates stable chlorophyll levels with high variability between years.
- **CONDUCTIVITY/CHLORIDE:** Deep spot, Heights Brook Inlet, North Inlet, and Outlet conductivity and chloride levels were slightly greater than the state medians, however not above a level of concern. Historical trend analysis indicates significantly increasing (worsening) epilimnetic (upper water layer) conductivity levels since monitoring began. Hawkins Pond Inlet and North Cove East conductivity and/or chloride levels were higher than the other stations and were indicative of the impacts of road salt.
- **E. COLI:** Heights Brook E. coli levels were low in June. North Inlet and Outlet E. coli levels were low in June, increased in August following a significant storm event however remained below the state standard for surface waters, and then decreased to low levels in September. Hawkins Pond Inlet E. coli levels were elevated in August following the significant storm event flushing upstream waters. Lab data note colored water indicating potential wetland influences and/or beaver activity upstream which could influence E. coli levels.
- **TOTAL PHOSPHORUS:** Epilimnetic phosphorus levels were slightly above average in June yet remained within a low range, then decreased in August and September. Average epilimnetic phosphorus increased slightly from 2015 and was much less than the state median. Historical trend analysis indicates stable epilimnetic phosphorus levels with high variability between years. Metalimnetic (middle water layer) phosphorus levels were low from June through September. Hypolimnetic (lower water layer) phosphorus levels were average and stable from June to August and then increased in September. Heights Brook phosphorus levels were low. North Inlet and Outlet phosphorus levels were higher in June but decreased to low levels in August and September. Hawkins Pond Inlet phosphorus levels were slightly elevated in June and August and decreased to low levels in September. North Cove East phosphorus levels were greatly elevated in June and the turbidity of the sample was also slightly elevated.
- **TRANSPARENCY:** Transparency measured without the viewscope (NVS) was lower in June due to wind and wave conditions and then increased (improved) through September. Average NVS transparency increased slightly from 2015 and was higher (better) than the state median. Historical trend analysis indicates significantly decreasing (worsening) transparency since monitoring began. Viewscope transparency (VS) was much higher (better) than NVS transparency and likely a better measure of actual conditions.
- **TURBIDITY:** Epilimnetic, Metalimnetic, Heights Brook, North Inlet, and Outlet turbidity levels were slightly elevated in June and then decreased to low levels. Hypolimnetic turbidity levels were slightly elevated in June and September. Hawkins Pond Inlet turbidity levels were within a low to average range. North Cove East turbidity levels were slightly elevated.
- **pH:** Epilimnetic, Metalimnetic, North Inlet, Hawkins Pond Inlet, North Cove East, and Outlet pH levels were within the desirable range 6.5-8.0 units. Historical trend analysis indicates stable epilimnetic pH levels since monitoring began. Hypolimnetic and Heights Brook pH levels were slightly less than desirable.



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/m³

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 WINONA, LAKE-NEW HAMPTON									
	Alk. mg/l	Chlor-a ug/l	Chloride mg/l	Cond. uS/cm	E. Coli #/100ml	Total P ug/l	Trans. m		Turb. ntu	pH
							NVS	VS		
Epilimnion	7.0	5.68	12	73.0		7	5.51	6.90	0.95	6.95
Metalimnion				72.0		5			0.82	6.75
Hypolimnion				76.2		16			4.24	6.29
Hawkins Pond Inlet			28	148.8	970	15			1.13	6.82
Heights Brook Inlet			4	64.5	10	12			1.69	6.36
North Cove East				125.5		87			3.22	6.64
North Inlet			13	79.1	80	9			1.70	6.74
Outlet			13	76.7	85	8			0.83	6.68

HISTORICAL WATER QUALITY TREND ANALYSIS

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

