Volunteer Lake Assessment Program Individual Lake Reports

WINNISQUAM, LACONIA, NH

MORPHOMETRIC DATA

Watershed Area (Ac.):	291,649	**Max. Depth (m):**	53	**Flushing Rate (yr^{-1})**	2.2
Surface Area (Ac.):	4264	**Mean Depth (m):**	15.2	**P Retention Coef:**	
Shore Length (m):	45,400	**Volume (m^3):**	262,306,500	**Elevation (ft):**	482

TROPHIC CLASSIFICATION

Year	Trophic class
1984	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

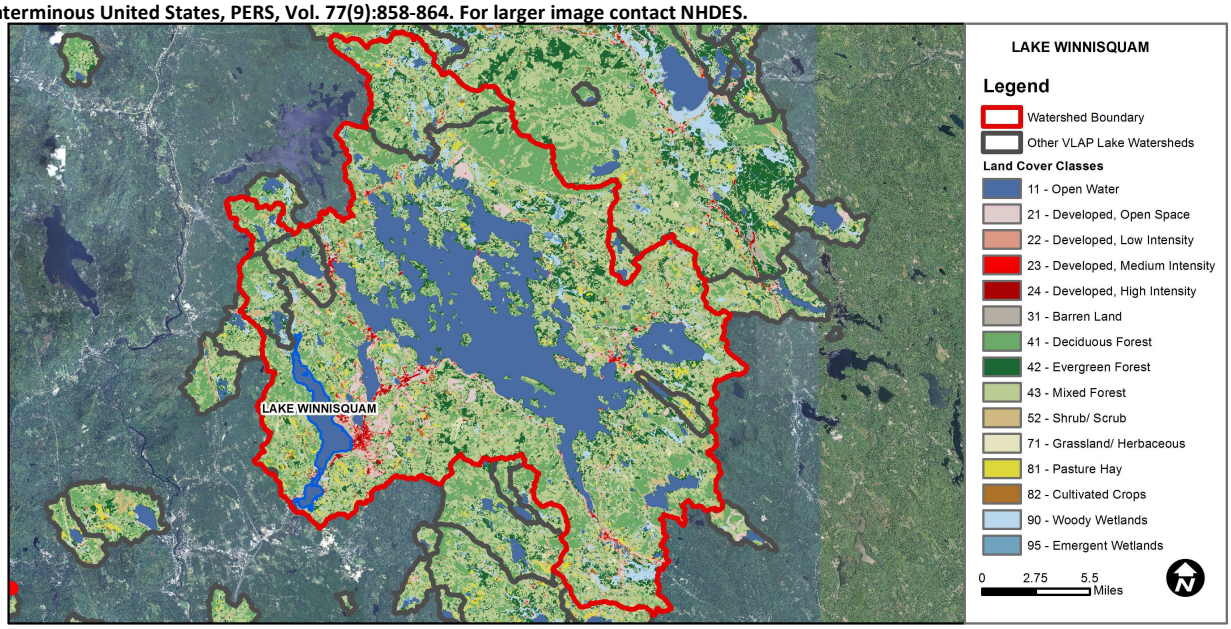
Designated Use	Parameter	Category	Comments
Aquatic Life	Phosphorus (Total)	Good	The calculated median is from 5 or more samples and is < indicator and > 1/2 indicator and the chlorophyll a indicator is okay.
	pH	Slightly Bad	>10% of samples exceed criteria by a small margin (minimum of 2 exceedances).
	Oxygen, Dissolved	Very Good	There are a total of at least 10 samples with 0 exceedances of criteria.
	Dissolved oxygen satura	Very Good	There are a total of at least 10 samples with 0 exceedances of criteria.
	Chlorophyll-a	Good	The calculated median is from 5 or more samples and is < indicator and > 1/2 indicator.
Primary Contact Recreation	Escherichia coli	Very Good	Where there are no geometric means, all bacteria samples are < 75% of the geometric mean. Where there are geometric means all single bacteria samples are < the SSMC and all geometric means are < geometric mean criteria.
	Chlorophyll-a	Very Good	There are a total of at least 10 samples with 0 exceedances of indicator.

BEACH PRIMARY CONTACT ASSESSMENT STATUS

LAKE WINNISQUAM - BELMONT TOWN BEACH	Escherichia coli	Good	There are geometric means and all geometric means are < geometric mean criteria; and there has been a single sample exceedance.
LAKE WINNISQUAM - AHERN STATE PARK	Escherichia coli	Bad	There are >=1 exceedance(s) of the geometric mean and/or >=2 single sample criterion exceedances. One or more exceedance is >2X criteria.
LAKE WINNISQUAM - BARTLETTS BEACH	Escherichia coli	Bad	There are >=1 exceedance(s) of the geometric mean and/or >=2 single sample criterion exceedances. One or more exceedance is >2X criteria.
LAKE WINNISQUAM - SANBORNTON TOWN BEACH	Escherichia coli	Bad	There are >=1 exceedance(s) of the geometric mean and/or >=2 single sample criterion exceedances. One or more exceedance is >2X criteria.

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	21.4	Barren Land	0.11	Grassland/Herbaceous	0.51
Developed-Open Space	4.8	Deciduous Forest	17.08	Pasture Hay	1.83
Developed-Low Intensity	1.65	Evergreen Forest	11.12	Cultivated Crops	0.52
Developed-Medium Intensity	0.7	Mixed Forest	32.34	Woody Wetlands	3.2
Developed-High Intensity	0.23	Shrub-Scrub	2.67	Emergent Wetlands	0.57

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2015 Data Summary

Recommended Actions: Increase monitoring frequency to once per month during the summer; typically June, July and August, to better assess seasonal and historical trends. The improving epilimnetic phosphorus trend is encouraging and we hope to see this continue! Water quality was good in 2015 and indicative of oligotrophic conditions. However, the significantly worsening conductivity levels in the epilimnion and tributaries is a concern and likely a result of winter deicing practices on roadways, parking lots, driveways, and walkways. Educate and encourage local road agents and winter maintenance companies to obtain a NH Voluntary Salt Applicator license through the UNH Technology Transfer Center's Green SnowPro Certification program. Visit http://www.t2.unh.edu/road-salt-reduction for more information on road salt reduction and training schedules.

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

- **Chlorophyll-a:** The chlorophyll level was low in August, much less than the state median, and representative of oligotrophic or high quality water conditions. Historical trend analysis indicates relatively stable chlorophyll with moderate variability between years.
- **Conductivity/Chloride:** Deep spot, Black Bk. and Winnipesaukee River conductivity and chloride levels remained slightly greater than the state medians. Historical trend analysis indicates significantly increasing (worsening) epilimnetic (upper water layer) conductivity since monitoring began. Black Bk. and Winnipesaukee River have also experienced significant increases in conductivity since monitoring began.
- **Total Phosphorus:** Deep spot, Black Bk. and Winnipesaukee River phosphorus levels were low in August. Epilimnetic phosphorus levels were much less than the state median and representative of oligotrophic conditions. Historical trend analysis indicates significantly decreasing (improving) epilimnetic phosphorus since monitoring began.
- **Transparency:** Transparency was high (good) in August and was much better than the state median. Historical trend analysis indicates stable transparency since monitoring began. Transparency measured with the viewscope (VS) was better than that measured without (NVS) and it generally a better representation of actual conditions.
- **Turbidity:** Deep spot, Black Bk. and Winnipesaukee River turbidities were within low to average ranges for those stations.
- **pH:** The 2015 Epilimnetic pH value was invalidated due to a laboratory instrument error and we apologize for the inconvenience. Historical trend analysis indicates stable epilimnetic pH with moderate variability since monitoring began. Metalimnetic (middle water layer), Black Bk. and Winnipesaukee River pH levels were within the desirable range 6.5-8.0 units. Hypolimnetic (lower water layer) pH was approximately equal to the low end of the desirable range, however has fluctuated below the desirable range historically.

Table 1. 2015 Average Water Quality Data for Lake Winnisquam, Pot Island Stn.

Station Name	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	9.6	1.95	19	84.4	3	7.75	8.25	0.47	
Metalimnion				86.3	6			0.62	6.73
Hypolimnion				85.9	6			0.85	6.49
Black Bk.			19	87.5	6			1.05	6.89
Winnipesaukee River			16	78.2	6			0.95	6.96

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

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)

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 moderately variable.	Transparency	Stable	Trend not significant; data show low variability.
			Phosphorus (epilimnion)	Improving	Data significantly decreasing.