Volunteer Lake Assessment Program Individual Lake Reports

NORTHWOOD LAKE, NORTHWOOD, NH

MORPHOMETRIC DATA

Watershed Area (Ac.):	15,384	**Max. Depth (m):**	6.3	**Flushing Rate (yr^1)**	3.9
Surface Area (Ac.):	687	**Mean Depth (m):**	3.1	**P Retention Coef:**	0.53
Shore Length (m):	13,000	**Volume (m^3):**	8,488,000	**Elevation (ft):**	514

TROPHIC CLASSIFICATION

Year	Trophic class
2000	MESOTROPHIC
2000	MESOTROPHIC

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

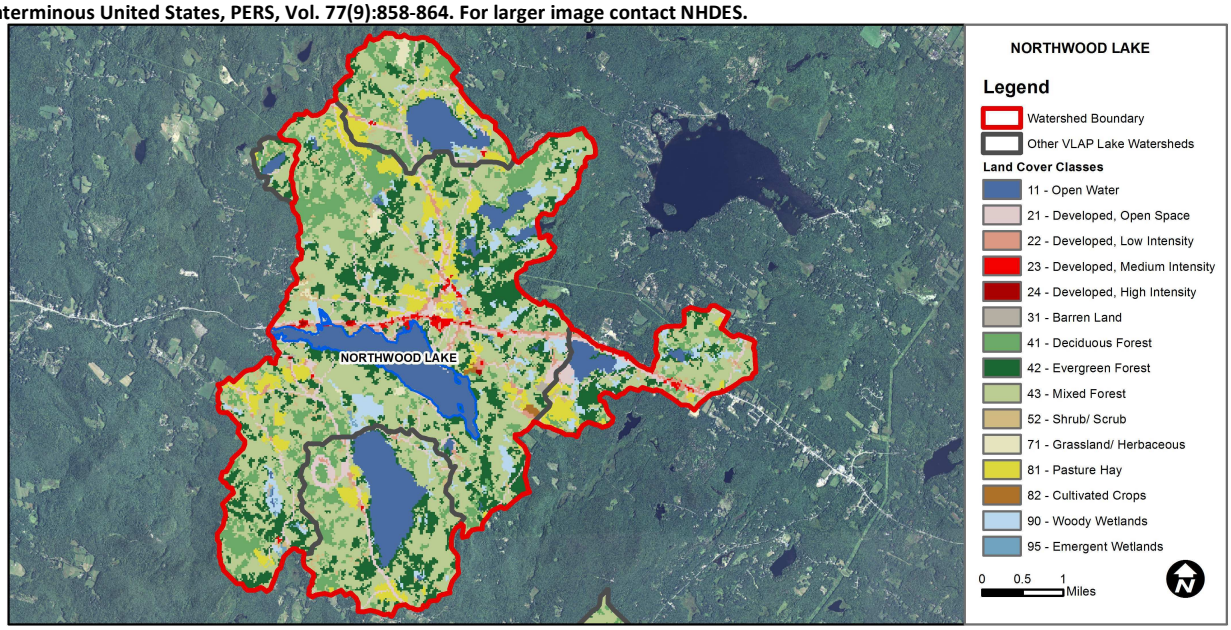
Designated Use	Parameter	Category	Comments
Aquatic Life	Phosphorus (Total)	Good	The calculated median is from 5 or more samples and is < indicator and > 1/2 indicator and the chlorophyll a indicator is okay.
	pH	Bad	>10%, with a minimum of 2, samples exceed criteria, with 1 or more by a large margin.
	Oxygen, Dissolved	Encouraging	There are < 10 samples with 0 exceedances of criteria. More data needed.
	Dissolved oxygen satura	Cautionary	There are < 10 samples with 1 exceedance of criteria. More data needed.
	Chlorophyll-a	Good	The calculated median is from 5 or more samples and is < indicator and > 1/2 indicator.
Primary Contact Recreation	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.
	Chlorophyll-a	Very Good	There are a total of at least 10 samples with 0 exceedances of indicator.

BEACH PRIMARY CONTACT ASSESSMENT STATUS

NORTHWOOD LAKE - LYNN GROVE ASSOCIATION BEACH	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.
NORTHWOOD LAKE - CAMP WAH-TUT-CA BEACH	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.
NORTHWOOD LAKE - 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	11.4	Barren Land	0.13	Grassland/Herbaceous	0.57
Developed-Open Space	5.57	Deciduous Forest	11.28	Pasture Hay	5.87
Developed-Low Intensity	1.69	Evergreen Forest	15.9	Cultivated Crops	0.13
Developed-Medium Intensity	0.71	Mixed Forest	39.73	Woody Wetlands	4.04
Developed-High Intensity	0.09	Shrub-Scrub	2.48	Emergent Wetlands	0.29

Volunteer Lake Assessment Program Individual Lake reports
Northwood Lake, Northwood
2014 Data Summary

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

- **Chlorophyll-a:** Chlorophyll levels were stable from June to August and approximately equal to the state median. Historical trend analysis indicates stable chlorophyll levels since monitoring began.
- **Conductivity/Chloride:** Deep spot and tributary conductivity levels were generally greater than the state medians, however most conductivity values were less than the level of concern (100 uS/cm). However, conductivity levels at Flat Meadows Bk., Horse Farm, Rt. 4 E Inlet, and Tasker Shore Dr. were elevated indicating potential pollution sources. Historical trend analysis indicates relatively stable epilimnetic conductivity with moderate variability between years. Deep spot and tributary chloride levels were generally greater than the state median indicating the influence of road salting, however the levels did not approach the chronic chloride standard of 230 mg/L.
- **E. coli:** E. coli levels at Rt. 107 Inlet, Pleasant Pond Inlet, Horse Farm, Rt. 4 E Inlet, Flat Meadows Bk., Bridge Inlet, and Lower WTC Inlet were all greatly elevated and exceeded the state standard for surface waters (406 cts/100 mL) during a significant storm event. Tributary flows were moderate to high and water color was noted as brown in Bridge Inlet and Lower WTC Inlet which flow through a youth camp. Wildlife, septic systems and agriculture could have contributed to the elevated E. coli levels, as well as stagnant tributary conditions prior to sampling and the flushing of this stagnant water. Samples collected in August during dry weather had generally fallen back to low levels and were less than the state standard. However, the elevated E. coli levels at these stations warrant further investigation.
- **Total Phosphorus:** Epilimnetic (upper water layer) and hypolimnetic (lower water layer) phosphorus levels decreased from June to August, were less than the state median, and were the lowest measured since 2004. Historical trend analysis indicates stable epilimnetic phosphorus since monitoring began. Rt. 4 East and West Inlet, Flat Meadows Bk., Town Beach, Rt. 107 Inlet, Outlet, and Old Dump Rd. phosphorus levels were low to average for those stations. Pleasant Pond Inlet, Bridge Inlet and Lower WTC Inlet phosphorus levels were slightly elevated in June likely due to low flow conditions. Pleasant Pond Inlet, Horse Farm, Bridge Inlet, and Lower WTC Inlets experienced elevated phosphorus levels in July following the storm event.
- **Transparency:** Transparency measured without the viewscope (NVS) was low in June but improved to average levels in August and the 2014 average transparency improved from 2013. Historical trend analysis indicates relatively stable transparency with moderate variability between years. Transparency measured with the viewscope (VS) was much better in June and likely a better representation of actual conditions.
- **Turbidity:** Deep spot turbidity was elevated in June potentially due to high water levels, and then decreased to low levels in August. Pleasant Pond Inlet, Horse Farm, Rt. 4 E Inlet, Flat Meadows Bk., Bridge Inlet, Lower WTC Inlet, and Rt. 107 Inlet experienced elevated turbidities following the July storm event. Horse Farm also experienced elevated turbidity in August. Tasker Shore Dr. turbidity was greatly elevated in July and this is an ongoing investigation at DES.
- **pH:** Epilimnetic and hypolimnetic pH levels decreased below the desirable range 6.5-8.0 units in August and have historically fluctuated below the desirable range. Lower WTC Inlet and Rt. 4 W Inlet also experienced lower pH levels due to wetland influences.
- **Recommended Actions:** Contact the N.H. Dept. of Agriculture to conduct site inspections of agricultural properties located along the tributary systems with elevated E. coli to ensure best management practices for manure storage and disposal are being followed; as well as to identify areas of stormwater runoff on these properties. Geese feces were noted at the Horse Farm and could potentially be the source of elevated E. coli and phosphorus. The July sampling event provides insight into what occurs in the watershed during and after significant storm events. High levels of nutrients, bacteria and sediments enter the lake through numerous tributary systems and potentially from shorefront properties as well. This would be a good opportunity to educate residents about the impacts of stormwater and how to manage stormwater runoff. Contact the DES Soak Up the Rain NH Program www.soaknh.org for assistance with stormwater management activities. Keep up the great work!

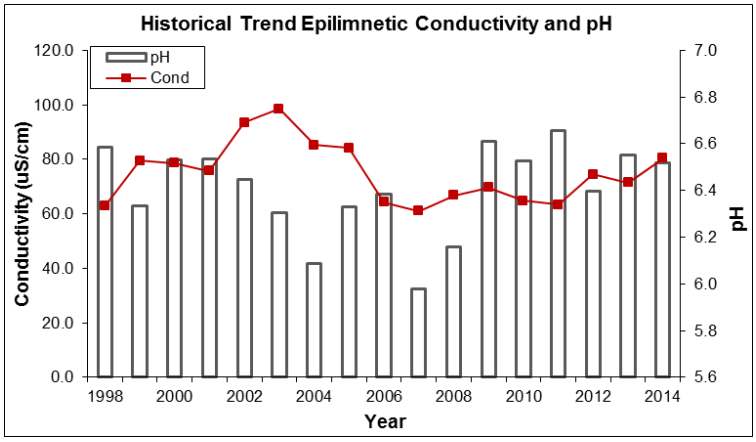
Station Name	Table 1. 2014 Average Water Quality Data for NORTHWOOD LAKE									
	Alk. mg/l	Chlor-a ug/l	Chloride mg/l	Cond. uS/cm	E. Coli #/100ml	Total P ug/l	Trans. m		Turb. ntu	pH
							NVS	VS		
Epilimnion	4.55	4.32	16	80.4		9	2.93	3.96	1.68	6.52
Hypolimnion				80.7		9			1.19	6.50
Bridge Inlet			12	69.2	1010	51			3.94	6.22
Flat Meadows Bk. Inlet				103.7	1030	27			4.69	6.19
Horse Farm			21	238.8	243	44			6.09	7.14
Lower WTC Inlet			3	23.2	1050	53			3.41	5.61
Old Dump Rd.			16	82.8	30	10			1.52	6.92
Outlet			16	81.8	10	10			1.53	6.67
Pleasant Pd. Inlet			16	88.3	730	20			3.06	6.69
Rt. 107 Inlet			20	88.6	1025	15			1.12	6.20
Rt. 4 E Inlet			26	126.5	1025	27			4.88	6.50
Rt. 4 W Inlet				84.4	60	13			1.38	5.94
Tasker Shore Dr.				149.3					551.0	7.54
Town Beach				82.1	35	13			1.39	6.63

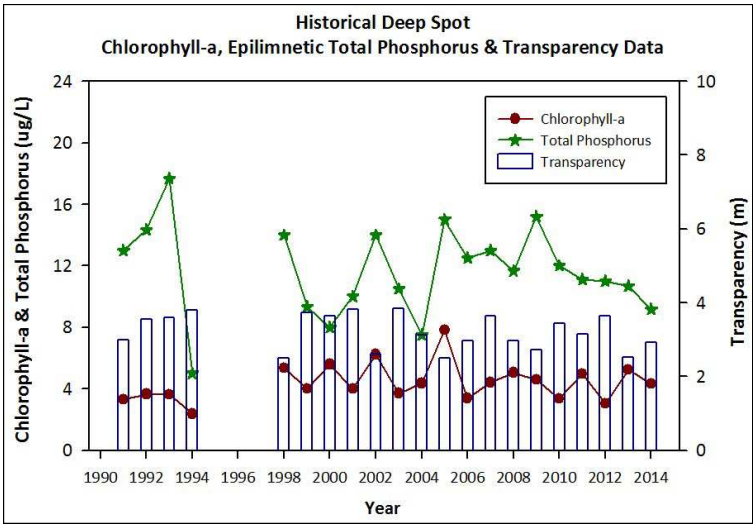
NH Water Quality Standards: Numeric criteria for specific parameters. Results exceeding criteria are considered a water quality violation.
Chloride: > 230 mg/L (chronic)
E. coli: > 88 cts/100 mL – public beach
E. coli: > 406 cts/100 mL – surface waters
Turbidity: > 10 NTU above natural level
pH: between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

Historical Water Quality Trend Analysis

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





This report was generated by the NH DES Volunteer Lake Assessment Program (VLAP). For more information contact VLAP at (603) 271-2658 or sara.steiner@des.nh.gov