



Volunteer Lake Assessment Program Individual Lake Reports

HIGHLAND LAKE, STODDARD, NH

MORPHOMETRIC DATA

Watershed Area (Ac.):	19,008	Max. Depth (m):	9.6	Flushing Rate (yr ⁻¹)	10.3
Surface Area (Ac.):	712	Mean Depth (m):	1.6	P Retention Coef:	0.49
Shore Length (m):	25,300	Volume (m ³):	4,721,000	Elevation (ft):	1294

TROPIC CLASSIFICATION

Year	Trophic class
1993	MESOTROPHIC
2004	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

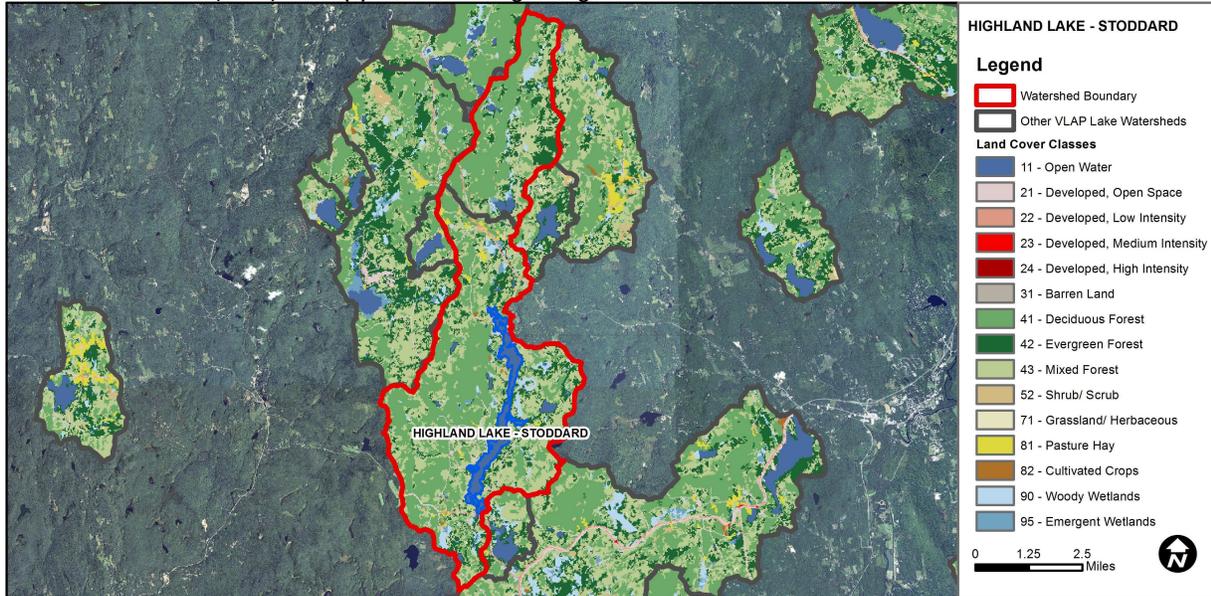
Designated Use	Parameter	Category	Comments
Aquatic Life	Phosphorus (Total)	Good	The calculated median is from 5 or more samples and is < indicator and > 1/2 indicator and the chlorophyll a indicator is okay.
	pH	Bad	>10%, with a minimum of 2, samples exceed criteria, with 1 or more by a large margin.
	Oxygen, Dissolved	Very Good	There are a total of at least 10 samples with 0 exceedances of criteria.
	Dissolved oxygen satura	Slightly Bad	There are >10% of samples (minimum of 2), exceeding 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	Good	There are geometric means and all geometric means are < geometric mean criteria; and there has been a single sample exceedance.
	Chlorophyll-a	Very Good	There are a total of at least 10 samples with 0 exceedances of indicator.

BEACH PRIMARY CONTACT ASSESSMENT STATUS

HIGHLAND LAKE-HIGHLAND LAKE BOAT LAUNCH	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.
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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	5.2	Barren Land	0	Grassland/Herbaceous	0.05
Developed-Open Space	2.58	Deciduous Forest	39.23	Pasture Hay	0.92
Developed-Low Intensity	0.59	Evergreen Forest	15.01	Cultivated Crops	0.1
Developed-Medium Intensity	0.01	Mixed Forest	31.25	Woody Wetlands	3.49
Developed-High Intensity	0	Shrub-Scrub	0.58	Emergent Wetlands	0.91



VOLUNTEER LAKE ASSESSMENT PROGRAM INDIVIDUAL LAKE REPORTS

HIGHLAND LAKE, SOUTH STN., STODDARD

2015 DATA SUMMARY

RECOMMENDED ACTIONS: The improving phosphorus and chlorophyll trends are a great sign! Water quality is generally representative of Mesotrophic conditions. The significant storm event in June caused elevated phosphorus and turbidity at Carr Bk. Identify potential areas of stormwater erosion and runoff in the sub-watershed and implement stormwater best practices to reduce erosion and nutrient pollution. DES' "N.H. Homeowner's Guide to Stormwater Management" and UNH Cooperative Extension's "Landscaping at the Water's Edge are great references for property owners. Kennedy Bk. phosphorus levels were elevated throughout the summer. Educate residents within the sub-watershed on ways to reduce nutrient pollution and eliminate fertilizer use. Keep up the great work!

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

- **CHLOROPHYLL-A:** Chlorophyll levels were slightly elevated in June and August. The 2015 average chlorophyll level decreased slightly from 2014 and was greater than the state median. Historical trend analysis indicates significantly decreasing (improving) chlorophyll levels since monitoring began. We hope to see this continue!
- **CONDUCTIVITY/CHLORIDE:** Epilimnetic (upper water layer), Carr, Kennedy, and Rice Brook conductivity and chloride levels were low and less than the state median. Historical trend analysis indicates highly variable epilimnetic conductivity since monitoring began. Dead Bk. conductivity and chloride were slightly greater than the state medians however not above a level of concern.
- **E. COLI:** Dead Bk. E. coli levels were low and much less than the state standards of 88 cts/100 mL for public beaches and 406 cts/100 mL for surface waters.
- **TOTAL PHOSPHORUS:** Epilimnetic phosphorus levels were within an average range and decreased from June through August. Average epilimnetic phosphorus increased slightly from 2014 and was slightly less than the state median. Historical trend analysis indicates significantly decreasing (improving) epilimnetic phosphorus since monitoring began. We hope to see this continue! Carr Bk. phosphorus levels were elevated following a significant storm event in June and phosphorus levels decreased to a low range in July and August. Dead Bk. and Rice Bk. phosphorus levels were within an average range for those stations. Kennedy Bk. phosphorus levels were slightly elevated on each sampling event and the turbidity was also slightly elevated.
- **TRANSPARENCY:** Transparency measured without the viewscope (NVS) was above average (good) in June despite the significant storm event, decreased in July and remained stable in August. Average NVS transparency increased (improved) from 2014 and was slightly less than the state median. Historical trend analysis indicates relatively stable transparency with moderate variability between years. Transparency measured with the viewscope (VS) was good in June, decreased in July, and then increased (improved) to a good level in August. Transparency measured with the viewscope was generally much better than NVS transparency and likely a better representation of actual conditions.
- **TURBIDITY:** Epilimnetic turbidity was slightly elevated on each sampling event and the above average algal growth may have contributed to turbidity. Carr Bk. turbidity was elevated in June following a significant storm event and then decreased to low levels in July and August. Dead Bk. turbidity was also slightly elevated June and August. Kennedy Bk. turbidity was elevated in June and remained slightly elevated in July and August. Rice Bk. turbidity was also slightly elevated on each sampling event. A significant storm event in June, low tributary flows, and colored water from wetland influences likely influenced tributary turbidities.
- **pH:** Epilimnetic and tributary pH levels were less than the desirable range 6.5-8.0 units and slightly acidic. Historical trend analysis indicates relatively stable epilimnetic pH with moderate variability between years.

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

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)

Station Name	Table 1. 2015 Average Water Quality Data for HIGHLAND LAKE, SOUTH STN.									
	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	3.8	5.04	3	26.9		11	2.99	3.29	1.32	6.09
Carr Brook			3	27.6		12			1.56	6.19
Dead Brook			10	54.2	30	16			1.42	6.11
Kennedy Brook			3	22.6		22			2.29	6.20
Rice Brook			3	25.1		16			1.35	6.12

HISTORICAL WATER QUALITY TREND ANALYSIS

Parameter	Trend	Explanation	Parameter	Trend	Explanation
Conductivity	Stable	Trend not significant; data highly variable.	Chlorophyll-a	Improving	Data significantly decreasing.
pH (epilimnion)	Stable	Trend not significant; data moderately variable.	Transparency	Stable	Trend not significant, data moderately variable.
			Phosphorus (epilimnion)	Improving	Data significantly decreasing.

