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

TROPHIC CLASSIFICATION

Year	Trophic class
1993	MESOTROPHIC
2004	MESOTROPHIC

KNOWN EXOTIC SPECIES

The Waterbody Report Card tables are generated from the 2012 305(b) report on the status of N.H. waters, and are based on data collected from 2001-2011.

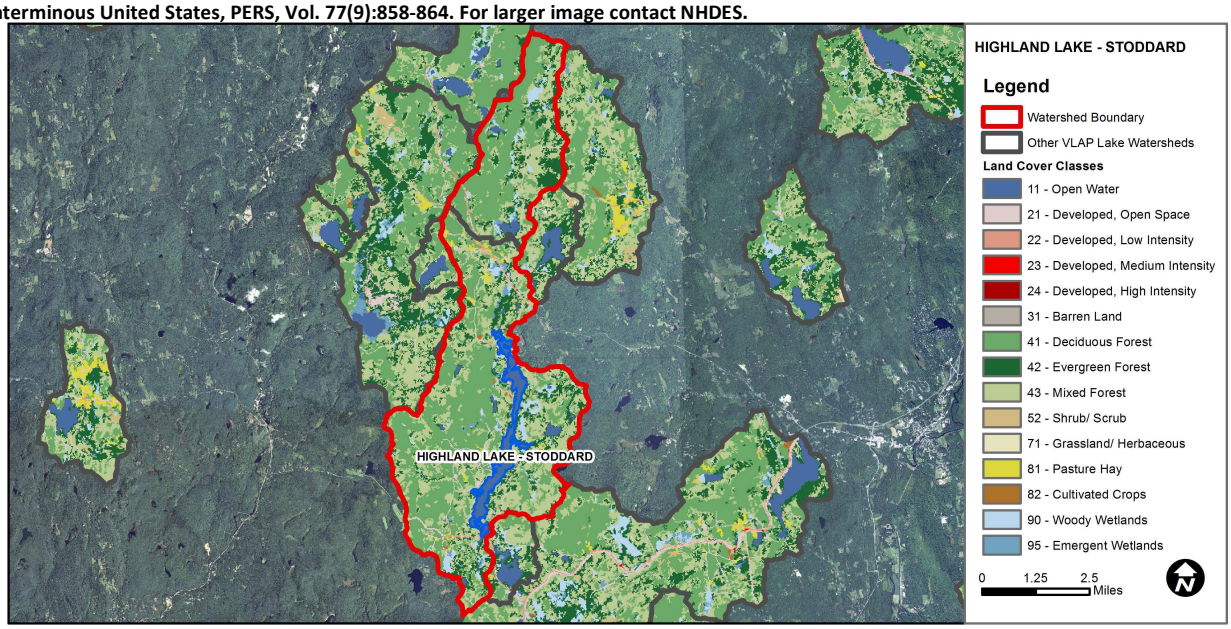
Designated Use	Parameter	Category	Comments
Aquatic Life	Phosphorus (Total)	Good	>/=5 samples and median is < threshold but > 1/2 threshold value.
	pH	Bad	>10%, with a minimum of 2, samples exceed criteria, with 1 or more by a large margin.
	D.O. (mg/L)	Very Good	At least 10 samples with 0 exceedances of criteria.
	D.O. (% sat)	Slightly Bad	>10% of samples exceed criteria by a small margin (minimum of 2 exceedances).
	Chlorophyll-a	Good	>/=5 samples and median is < threshold but > 1/2 threshold value.
Primary Contact Recreation	E. coli	Good	Geometric means < criteria; however at least 1 exceedance of the single sample criteria occurred.
	Chlorophyll-a	Very Good	At least 10 samples with 0 exceedances of criteria.

BEACH PRIMARY CONTACT ASSESSMENT STATUS

HIGHLAND LAKE-HIGHLAND LAKE BOAT LAUNCH	E. coli	Bad	>/=1 exceedance(s) of geometric mean criterion and/or >/=2 exceedances of single sample criterion, with 1 or more >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	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, NORTH STN., STODDARD, NH
2013 DATA SUMMARY

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

- **CHLOROPHYLL-A:** Chlorophyll levels were relatively low, less than the state median, and stable throughout the summer. Historical trend analysis indicates significantly decreasing (improving) chlorophyll since 2001. We hope to see this continue!
- **CONDUCTIVITY/CHLORIDE:** Conductivity and chloride were low at all stations and less than the state medians. Historical trend analysis indicates significantly decreasing (improving) epilimnetic conductivity since monitoring began. We hope to see this continue!
- **TOTAL PHOSPHORUS:** Epilimnetic phosphorus was slightly elevated in August. Stormwater runoff from a rain event prior to sampling may have contributed to the elevated phosphorus. Hypolimnetic phosphorus was slightly elevated in August and September and the turbidity was also elevated. Historically, hypolimnetic dissolved oxygen levels have been depleted by the end of the summer. This process can cause the release of phosphorus and other organic compounds from bottom sediments contributing to the elevated phosphorus. Historical trend analysis indicates relatively stable epilimnetic phosphorus with moderate variability between years. Tributary phosphorus levels were within average ranges for NH waterbodies and relatively stable throughout the summer.
- **TRANSPARENCY:** Transparency improved from 2012 and was stable throughout the summer, however remained less than the state median. Historical trend analysis indicates relatively stable transparency with high variability between years.
- **TURBIDITY:** Hypolimnetic turbidity was elevated in August and September likely due to the release of organic compounds from bottom sediments under anoxic conditions. Tributary turbidities were low throughout the summer.
- **PH:** Deep spot and tributary pH levels were less than desirable range 6.5 – 8.0 units and potentially critical to aquatic life. Historical trend analysis indicates significantly decreasing (worsening) epilimnetic pH since monitoring began.
- **RECOMMENDED ACTIONS:** Chlorophyll and conductivity levels have improved since monitoring began and we hope to see this continue! The more frequent high volume and high intensity storm events highlights the need to reduce stormwater runoff into local waterbodies. Educate lake and watershed residents on ways to reduce stormwater runoff from their properties utilizing DES' "Homeowner's Guide to Stormwater Management" tool. Stormwater runoff often contributes nutrients, sediment, bacteria and other harmful pollutants to nearby lakes and streams.

Table 1. 2013 Average Water Quality Data for HIGHLAND LAKE, NORTH STN.

Station Name	Alk.	Chlor-a	Chloride	Cond.	Total P	Trans.		Turb.	pH
	mg/l	ug/l	mg/l	uS/cm	ug/l	m		ntu	
						NVS	VS		
Barden Pond Brook			3	19.1	13			0.60	6.07
North Inlet			5	33.5	9			0.48	6.21
Pickerel Cove 2			3	20.8	12			0.79	5.85
Pickerel Cove Brook				17.6	15			0.59	5.67
Epilimnion	1.83	3.70	3	24.1	11	2.67	2.76	0.58	5.84
Hypolimnion				30.9	15			7.80	5.66
Metalimnion				25.5	10			1.02	5.55

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: 6.5-8.0 (unless naturally occurring)

HISTORICAL WATER QUALITY TREND ANALYSIS

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