Volunteer Lake Assessment Program Individual Lake Reports

HILLS POND, ALTON, NH

MORPHOMETRIC DATA

Watershed Area (Ac.):	1,472	**Max. Depth (m):**	13.4	**Flushing Rate (yr^1)**	1.6
Surface Area (Ac.):	138	**Mean Depth (m):**	5	**P Retention Coef:**	0.58
Shore Length (m):	2,700	**Volume (m^3):**	1,894,000	**Elevation (ft):**	809

TROPHIC CLASSIFICATION

Year	Trophic class
1985	MESOTROPHIC
2005	MESOTROPHIC

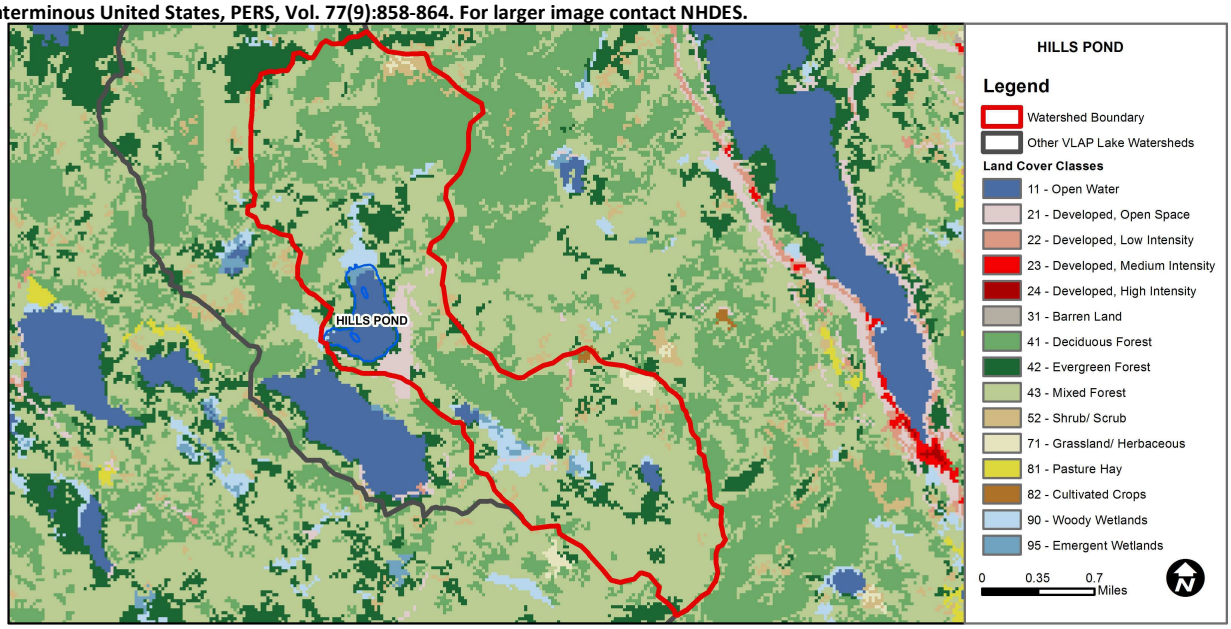
KNOWN EXOTIC SPECIES

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)	Slightly Bad	The calculated median is from 5 or more samples and is > indicator and the chlorophyll a indicator is exceeded.
	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	Slightly Bad	There are >10% of samples (minimum of 2), exceeding criteria.
	Chlorophyll-a	Slightly Bad	The calculated median is from 5 or more samples and is > 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	Good	There are at least 10 samples with one, but < 10% of samples, exceeding indicator.

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	3.94	Barren Land	0	Grassland/Herbaceous	0.73
Developed-Open Space	2.25	Deciduous Forest	29.6	Pasture Hay	0
Developed-Low Intensity	0.11	Evergreen Forest	8.51	Cultivated Crops	0.12
Developed-Medium Intensity	0	Mixed Forest	48.39	Woody Wetlands	3.24
Developed-High Intensity	0	Shrub-Scrub	2.36	Emergent Wetlands	0.75

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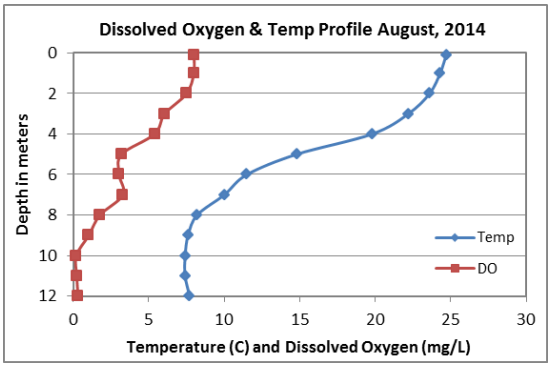
2014 Data Summary

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

- **Chlorophyll-a:** Chlorophyll levels were elevated in July and much greater than the state median, but decreased to low levels in August. Average chlorophyll levels were elevated in 2014 but decreased slightly from 2013 levels. Historical trend analysis indicates highly variable chlorophyll levels since monitoring began.
- **Conductivity/Chloride:** Deep spot and tributary conductivity levels were low and approximately equal to the state medians. Historical trend analysis indicates relatively stable epilimnetic (upper water layer) conductivity with moderate variability between years.
- **E. coli:** Tributary and Main Beach E. coli levels were low in July 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:** Deep spot phosphorus levels were low in July and then increased to average levels in August. Historical trend analysis indicates stable epilimnetic phosphorus since monitoring began. Metalimnetic (middle water layer) and Hypolimnetic (lower water layer) phosphorus levels increased from July to August but remained within an average range. East Inlet, Outlet and South Inlet phosphorus levels were slightly elevated in July but all decreased to low levels in August. East Inlet Upstream phosphorus was stable from July to August and was the lowest measured since monitoring began. The East Inlet tributary system has experienced decreased phosphorus levels since 2007 and we hope to see this continue. North Inlet phosphorus was elevated in August and the turbidity was also elevated following a storm event and flushing of wetland systems.
- **Transparency:** Transparency was low in July due to the elevated algal growth and improved in August. Transparency measured with the viewscope (VS) was much better than without and likely a more accurate representation of pond turbidity. Historical trend analysis indicates significantly decreasing (worsening) transparency since monitoring began, however pond transparency appears to have improved since 2012.
- **Turbidity:** Epilimnetic turbidity was low in July and August; metalimnetic turbidity was slightly higher in July likely due to the algal bloom but decreased to lower levels in August. Hypolimnetic turbidity was within an average range for that station. Tributary turbidities were slightly higher in July likely due to lower stream flows, but were low in August, however North Inlet turbidity was elevated in August.
- **pH:** Epilimnetic pH was within the desirable range of 6.5—8.0 units, however metalimnetic and hypolimnetic pH levels were less than desirable and potentially critical to aquatic life. Historical trend analysis indicates significantly decreasing (worsening) epilimnetic pH since monitoring began.
- **Recommended Actions:** The worsening transparency trend was due to the period 2006—2011 where pond clarity was lower, however clarity seems to have improved since 2011. During that period, NH experienced frequent and intense storm events that may have decreased pond transparency by increasing suspended sediments and/or the color of the water from wetland flushing. The increased intensity and frequency of storm events highlights the importance of managing stormwater runoff in the watershed to minimize its impact on the pond. DES' "NH Homeowner's Guide to Stormwater Management" is a great resource for residents. Keep up the great work!

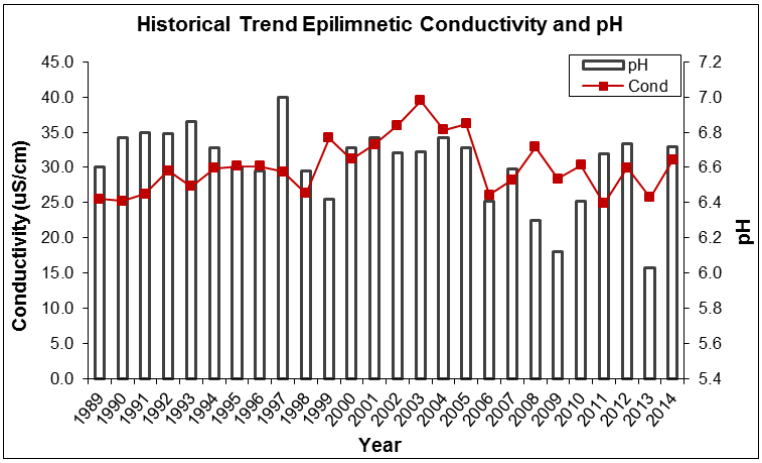
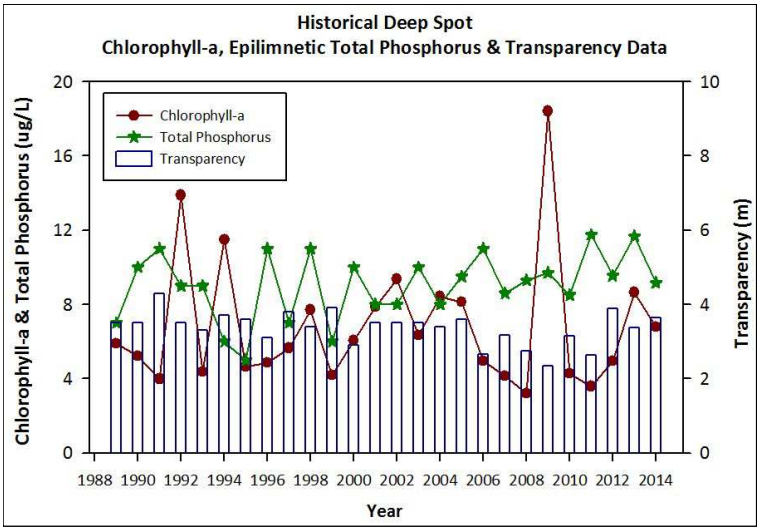


NH Water Quality Standards: Numeric criteria for specific parameters. Results exceeding criteria are considered a water quality violation.
Chloride: > 230 mg/L (chronic)
E. coli: > 88 cts/100 mL – public beach
E. coli: > 406 cts/100 mL – surface waters
Turbidity: > 10 NTU above natural level
pH: between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

Table 1. 2014 Average Water Quality Data for HILLS POND

Station Name	Alk. mg/l	Chlor-a ug/l	Chloride mg/l	Cond. uS/cm	E. Coli #/100ml	Total P ug/l	Trans. m NVS	Trans. m VS	Turb. ntu	pH
Epilimnion	5.25	6.79	3	31.0		9	3.63	4.53	0.89	6.72
Metalimnion				33.8		11			1.00	5.91
Hypolimnion				34.5		13			2.05	5.98
East Inlet				31.9	10	11			0.83	6.66
East Inlet Upstream				31.8	10	15			0.55	6.77
Main Beach					2					
North Inlet				27.8		28			3.59	6.17
Outlet				24.8		11			0.75	6.24
South Inlet				26.6	30	11			0.71	6.42

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 highly variable.
pH (epilimnion)	Worsening	Data significantly decreasing.	Transparency	Worsening	Data significantly decreasing.
			Phosphorus (epilimnion)	Stable	Trend not significant; data show low variability.