Volunteer Lake Assessment Program Individual Lake Reports
CLOUGH POND, LOUDON, NH

MORPHOMETRIC DATA

Watershed Area (Ac.):	230	Max. Depth (m):	18.2	Flushing Rate (yr¹)	0.4
Surface Area (Ac.):	46	Mean Depth (m):	5.9	P Retention Coef:	0.78
Shore Length (m):	1,600	Volume (m³):	1,045,000	Elevation (ft):	466

TROPHIC CLASSIFICATION

Year	Trophic class
1983	MESOTROPHIC
2002	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	Slightly Bad	>10% of samples exceed criteria by a small margin (minimum of 2 exceedances).
	Oxygen, Dissolved	Cautionary	There are < 10 samples with 1 exceedance of criteria. More data needed.
	Dissolved oxygen satura	Cautionary	There are < 10 samples with 1 exceedance of criteria. More data needed.
	Chlorophyll-a	Slightly Bad	The calculated median is from 5 or more samples and is > indicator.
Primary Contact Recreation	Escherichia coli	Encouraging	There are no geometric means or there are > 2 single samples but those samples are within 75% of the geometric means criteria. More data needed.
	Chlorophyll-a	Good	There are at least 10 samples with one, but < 10% of samples, exceeding indicator.

BEACH PRIMARY CONTACT ASSESSMENT STATUS

CLOUGH POND - TOWN BEACH	Escherichia coli	Encouraging	There are no geometric means or there are > 2 single samples but those samples are within 75% of the geometric means criteria. More data needed.

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.
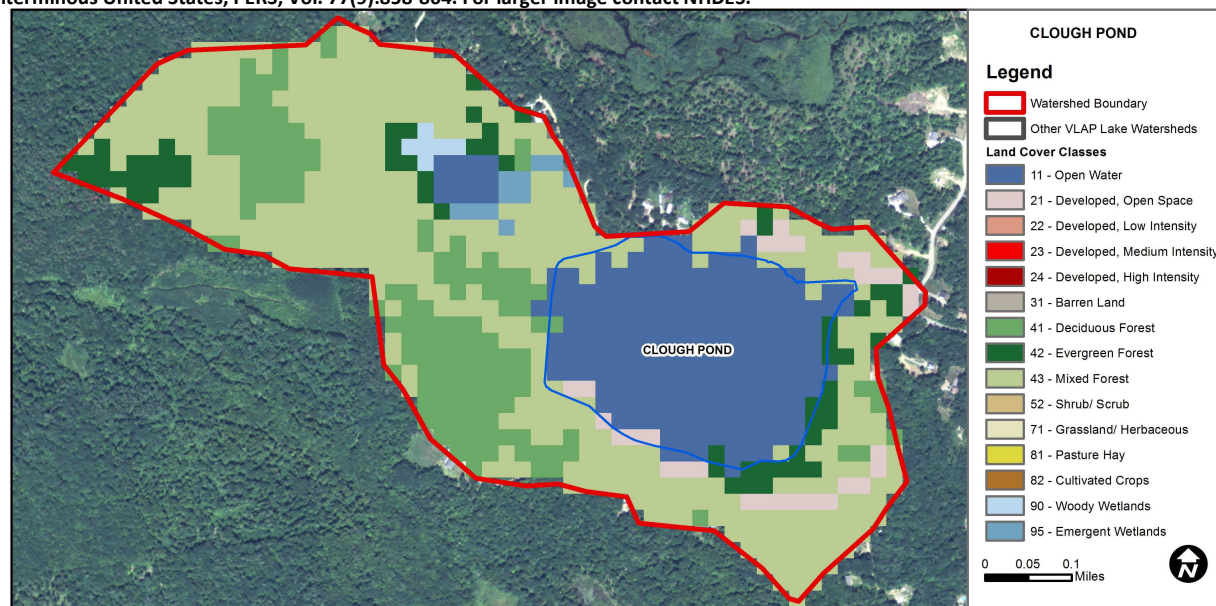
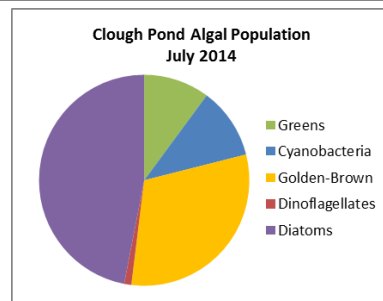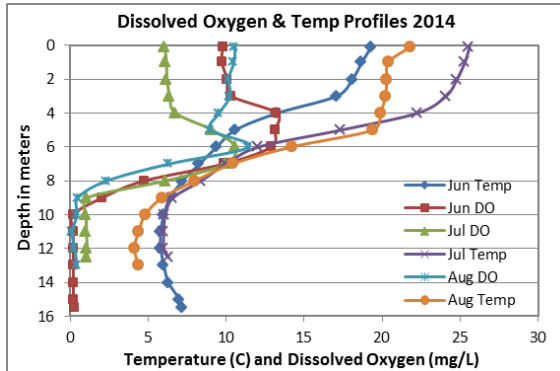| Land Cover Category	% Cover	Land Cover Category	% Cover	Land Cover Category	% Cover
Open Water	22.7	Barren Land	0	Grassland/Herbaceous	0
Developed-Open Space	3.52	Deciduous Forest	16.13	Pasture Hay	0
Developed-Low Intensity	0	Evergreen Forest	7.04	Cultivated Crops	0
Developed-Medium Intensity	0	Mixed Forest	48.4	Woody Wetlands	0.68
Developed-High Intensity	0	Shrub-Scrub	0	Emergent Wetlands	1.25

NEW HAMPSHIRE DEPARTMENT OF Environmental Services

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

- **CHLOROPHYLL-A:** Chlorophyll levels were slightly elevated on each sampling event and spiked in July. The 2014 average chlorophyll level was greater than the state median, and approximately equal to that measured in 2013. Historical trend analysis indicates highly variable chlorophyll levels since 2002.
- **CONDUCTIVITY/CHLORIDE:** Deep spot and tributary conductivity and chloride levels continue to be slightly elevated and greater than the state medians. Historical trend analysis indicates significantly increasing (worsening) epilimnetic (upper water layer) conductivity since 2002.
- **TOTAL PHOSPHORUS:** Epilimnetic and metalimnetic (middle water layer) phosphorus levels were low in June and July and increased slightly in August. Average levels remained less than the state median and epilimnetic phosphorus has remained fairly low since 2006. Historical trend analysis indicates variable epilimnetic phosphorus levels since 2002. Hypolimnetic (lower water layer) phosphorus was elevated and increased steadily as the summer progressed. This is due to the release of phosphorus into the water column from bottom sediments when dissolved oxygen levels decrease below 1.0 mg/L, a process called internal phosphorus loading. This internal load can then provide nutrients that feed algal growth. Inlet and Outlet phosphorus levels remained low throughout the summer. Inlet phosphorus levels have decreased greatly since 2006.
- **TRANSPARENCY:** Transparency worsened from June to July when algal levels spiked and then improved in August when algal levels decreased. Average transparency was slightly better than the state median and approximately equal to 2013. Historical trend analysis indicates relatively stable transparency with moderate variability since 2002.
- **TURBIDITY:** Epilimnetic turbidity increased slightly in July potentially due to a significant storm event prior to sampling, and was slightly above the average range for that station. Metalimnetic turbidity was slightly higher in June and August likely due to algal growth, but was within the average range for that station. Hypolimnetic turbidity increased steadily from June to August due to the release and accumulation of organic compounds under anoxic conditions. Inlet turbidity was slightly above average for that station, but decreased from June to August. Outlet turbidity was slightly elevated in July, again potentially due to a significant storm event prior to sampling.
- **PH:** Epilimnetic and metalimentic pH levels were within the desirable range of 6.5—8.0 units however hypolimnetic pH was below the desirable range. Historical trend analysis indicates stable epilimnetic pH since 2002.
- **DISSOLVED OXYGEN/TEMP:** Dissolved oxygen levels were less than 1.0 mg/L in the hypolimnion on each sampling event. This caused the release of phosphorus from bottom sediments into hypolimnetic waters. Dissolved oxygen levels also spiked in the metalimnion between 4 and 6 meters on each sampling event and this typically indicates a layer of algae.
- **RECOMMENDED ACTIONS:** The lower Epilimnetic and Inlet phosphorus levels measured since 2006 are a positive sign! We encourage lake and watershed residents to continue implementing stormwater best management practices (BMP) on their properties to help reduce stormwater impacts on water quality. The Epilimnetic and Outlet turbidity levels did increase slightly after a significant storm event in July indicating there are likely more areas in need of stormwater BMP installation. Conductivity has increased in the pond likely due to winter de-icing practices and road salt application on roads and driveways. Educate and encourage local road agents, winter maintenance companies, and homeowners to reduce winter salt use and obtain a Voluntary NH Salt Applicator License through UNH's Technology Transfer Center's Green SnowPro Certification. Keep up the great work!

Dissolved Oxygen & Temp Profiles 2014

Clough Pond Algal Population July 2014

Legend: Greens, Cyanobacteria, Golden-Brown, Dinoflagellates, Diatoms

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

Station Name	Table 1. 2014 Average Water Quality Data for CLOUGH POND								
	Alk. mg/l	Chlor-a ug/l	Chloride mg/l	Cond. uS/cm	Total P ug/l	Trans. m NVS	Trans. m VS	Turb. ntu	pH
Epilimnion	7.1	7.01	17	90.2	7	3.65	3.84	1.24	6.97
Metalimnion				87.7	11			1.67	6.72
Hypolimnion				111.7	37			6.75	6.34
Inlet			17	89.2	8			1.40	6.83
Outlet			17	90.4	7			1.25	6.95

HISTORICAL WATER QUALITY TREND ANALYSIS

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

Historical Trend Epilimnetic Conductivity and pH

Historical Deep Spot Chlorophyll-a, Epilimnetic Total Phosphorus & Transparency Data