Volunteer Lake Assessment Program Individual Lake Reports

PINE ISLAND POND, MANCHESTER, NH

MORPHOMETRIC DATA

Watershed Area (Ac.):	44,204	**Max. Depth (m):**	3	**Flushing Rate (yr^{-1}):**	326
Surface Area (Ac.):	42	**Mean Depth (m):**	1.5	**P Retention Coef:**	0
Shore Length (m):	3,385	**Volume (m^3):**	265,000	**Elevation (ft):**	151

TROPHIC CLASSIFICATION

Year	Trophic class
1980	EUTROPHIC
1997	EUTROPHIC

KNOWN EXOTIC SPECIES

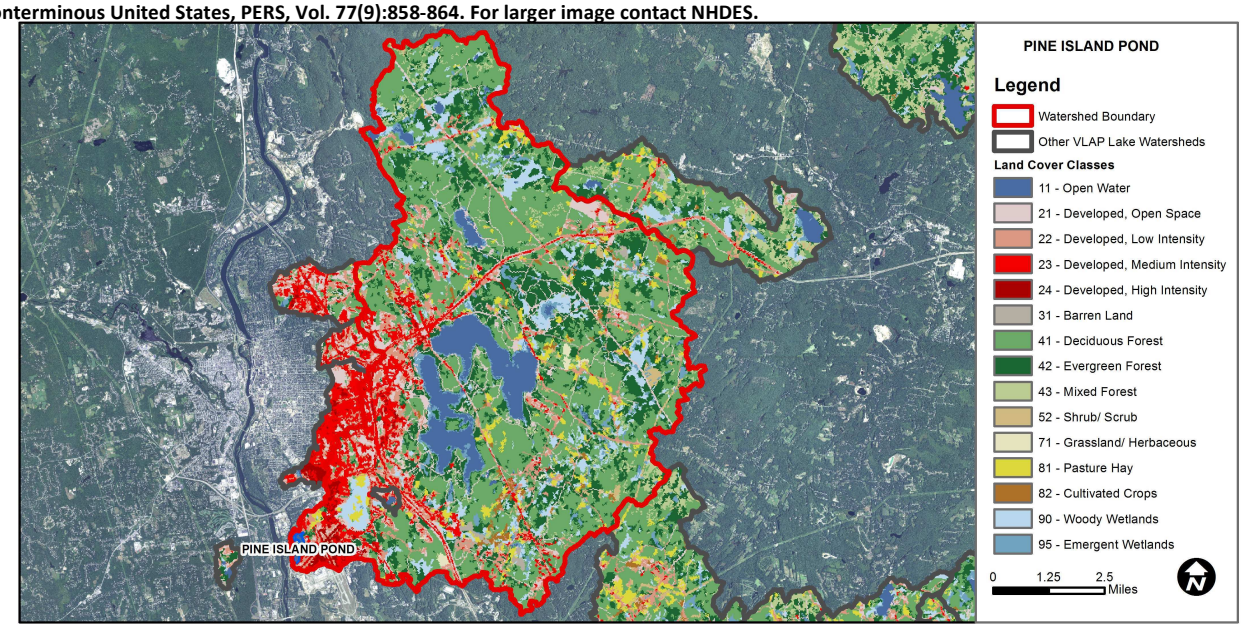
Variable Milfoil

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	Sampling data is better than the water quality standards or thresholds for this parameter.
	pH	Bad	Data periodically exceed water quality standards or thresholds for a given parameter by a large margin.
	Oxygen, Dissolved	Bad	Data periodically exceed water quality standards or thresholds for this parameter by a large margin.
	Dissolved oxygen satura	Slightly Bad	Data periodically exceed water quality standards or thresholds for this parameter by a small margin.
	Chlorophyll-a	Good	Sampling data is better than the water quality standards or thresholds for this parameter.
Primary Contact Recreation	Escherichia coli	No Data	No data for this parameter.
	Cyanobacteria hepatoto	Slightly Bad	Cyanobacteria bloom(s).
	Chlorophyll-a	Slightly Bad	Data periodically exceed water quality standards or thresholds for this parameter by a small margin.

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	5.63	Barren Land	0.47	Grassland/Herbaceous	0.28
Developed-Open Space	6.6	Deciduous Forest	37	Pasture Hay	3.09
Developed-Low Intensity	8.16	Evergreen Forest	16.64	Cultivated Crops	0.86
Developed-Medium Intensity	6.32	Mixed Forest	2.22	Woody Wetlands	7.2
Developed-High Intensity	1.01	Shrub-Scrub	1.25	Emergent Wetlands	2.99

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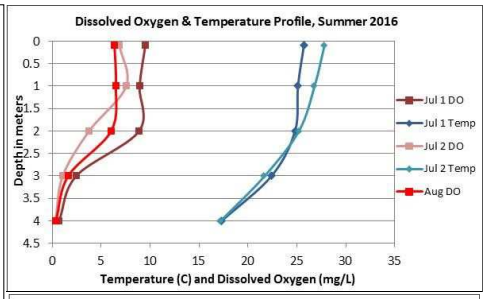
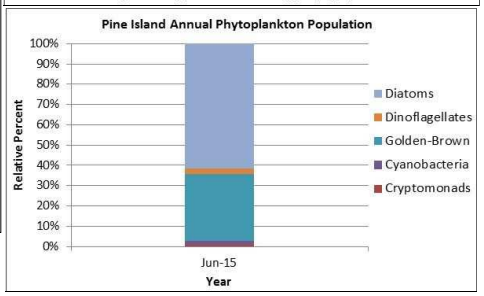
Pine Island Pond, Manchester
2016 Data Summary

Recommended Actions: Chloride levels continue to be elevated and although they do not exceed the state standard, they indicate the impacts of an urbanized watershed and the impacts of road salt. Continue to encourage the City and local winter maintenance companies to utilize best practices when applying salt to roadways, walkways and parking lots. Hypolimnetic phosphorus and turbidity levels have remained within an elevated range since 2010 indicating the potential impacts of depleted oxygen levels and the release of phosphorus from bottom sediments, a process called internal phosphorus loading. It is important to educate watershed residents on ways to reduce phosphorus inputs if an internal load exists. Utilizing phosphate free fertilizers, stabilizing steep slopes, and reducing stormwater runoff are ways to help reduce loading to the pond. A chemical treatment to control Variable milfoil was conducted in August. Keep up the great work!

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

- **Chlorophyll-a:** Chlorophyll levels were elevated and increased slightly from early July through August. The 2016 average chlorophyll level decreased from 2015 but remained much greater than the state median. Historical trend analysis indicates relatively stable chlorophyll levels since monitoring began.
- **Conductivity/Chloride:** Deep spot, Inlet and Outlet conductivity and chloride levels remained elevated and much greater than the state medians, however chloride levels did not exceed the state chronic chloride standard. Epilimnetic (upper water layer) conductivity was the highest measured since monitoring began and historical trend analysis indicates significantly increasing (worsening) epilimnetic conductivity levels since monitoring began.
- **Total Phosphorus:** Epilimnetic and Metalimnetic (middle water layer) phosphorus levels remained within an average range for the pond and were relatively stable from July through August. Average epilimnetic phosphorus level decreased slightly from 2015 but remained much greater than the state median. Historical trend analysis indicates relatively stable epilimnetic phosphorus levels since monitoring began. Hypolimnetic (lower water layer) phosphorus levels were elevated on each sampling event. Inlet phosphorus levels were low and Outlet phosphorus levels decreased from average to low levels as the summer progressed.
- **Transparency:** Transparency measured without the viewscope (NVS) decreased slightly as the summer progress and algal growth increased. Average NVS transparency decreased (worsened) slightly from 2015 and was the lowest (worst) measured since monitoring began. Historical trend analysis indicates relatively stable transparency with moderate variability between years. Transparency measured with the viewscope (VS) was generally higher (better) than that measured without and likely a better representation of actual conditions.
- **Turbidity:** Epilimnetic and Metalimnetic turbidity levels were slightly elevated in early July and August, but decreased to average levels in late July. Hypolimnetic turbidity levels were greatly elevated on each sampling event and have remained elevated since 2010. Inlet and Outlet turbidity levels were slightly elevated in early July and then decreased to low levels by August.
- **pH:** Deep spot and tributary pH levels were within the desirable range 6.5-8.0 units. Historical trend analysis indicates stable epilimnetic pH levels since monitoring began.





Station Name	Table 1. 2016 Average Water Quality Data for PINE ISLAND POND-MANCHESTER								
	Alk. mg/l	Chlor-a ug/l	Chloride mg/l	Cond. uS/cm	Total P ug/l	Trans. m		Turb. ntu	pH
						NVS	VS		
Epilimnion	34.4	12.33	143	634.0	20	1.40	1.93	2.67	7.16
Metalimnion				637.7	22			3.06	7.37
Hypolimnion				610.3	45			14.63	6.86
Inlet			163	757.3	12			1.32	7.32
Outlet			137	643.0	17			1.12	7.30

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: between 6.5-8.0 (unless naturally occurring)

Historical Water Quality Trend Analysis

Parameter	Trend	Explanation	Parameter	Trend	Explanation
Conductivity	Worsening	Data significantly increasing.	Chlorophyll-a	Stable	Trend not significant; data moderately 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 moderately variable.