



Volunteer Lake Assessment Program Individual Lake Reports

PINE ISLAND POND, MANCHESTER, NH

MORPHOMETRIC DATA

TROPHIC CLASSIFICATION

KNOWN EXOTIC SPECIES

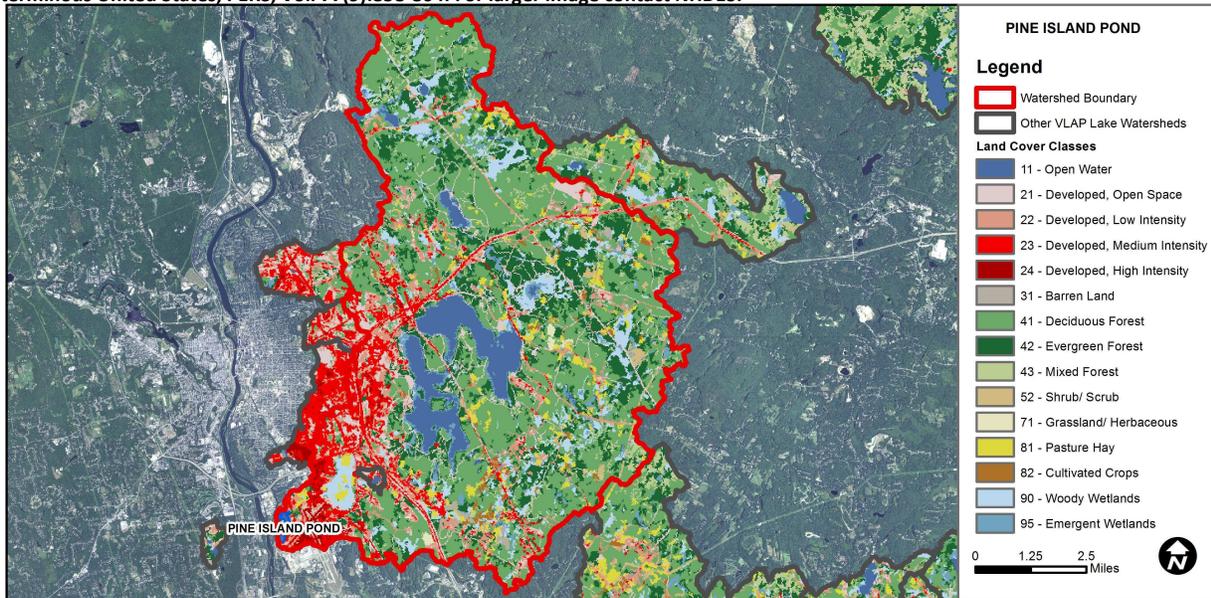
| | | | | | | | | |
|-----------------------|--------|---------------------------|---------|----------------------------------|-----|------|---------------|------------------|
| Watershed Area (Ac.): | 44,204 | Max. Depth (m): | 3 | Flushing Rate (yr ¹) | 326 | Year | Trophic class | Variable Milfoil |
| Surface Area (Ac.): | 42 | Mean Depth (m): | 1.5 | P Retention Coef: | 0 | 1980 | EUTROPHIC | |
| Shore Length (m): | 3,385 | Volume (m ³): | 265,000 | Elevation (ft): | 151 | 1997 | EUTROPHIC | |

The Waterbody Report Card tables are generated from the DRAFT 2016 305(b) report on the status of N.H. waters, and are based on data collected from 2006-2015. Detailed waterbody assessment and report card information can be found at www.des.nh.gov/organization/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 |



VOLUNTEER LAKE ASSESSMENT PROGRAM INDIVIDUAL LAKE REPORTS

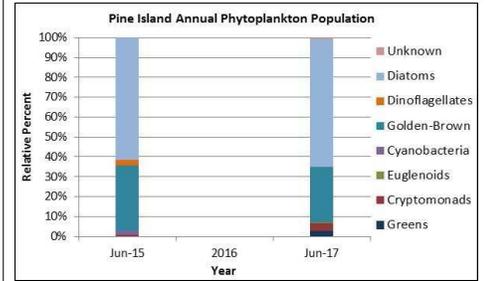
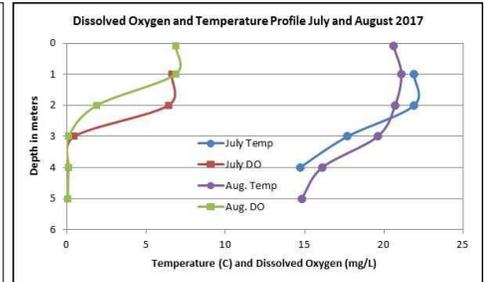
PINE ISLAND POND, MANCHESTER

2017 DATA SUMMARY

RECOMMENDED ACTIONS: Pond chlorophyll levels have remained within an elevated range since 2014. Record milfoil management activities and be attentive to how these may impact pond nutrient and chlorophyll levels as well as water clarity (transparency). Conductivity and chloride levels remain elevated, particularly since 2015, and indicate the impacts of an urbanized watershed and the application 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. Keep up the great work!

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

- ◆ **CHLOROPHYLL-A:** Chlorophyll levels were within a moderate range in June and increased to an elevated level indicative of an algal bloom by August. Average chlorophyll level increased slightly from 2016, was much greater than the state median, and was slightly greater than the threshold for eutrophic lakes. Historical trend analysis indicates highly variable 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. Chloride levels also approached the state chronic chloride standard of 230 mg/L. Historical trend analysis indicates significantly increasing (worsening) epilimnetic (upper water layer) conductivity levels since monitoring began.
- ◆ **COLOR:** Apparent color was measured in the epilimnion and indicates the pond water is highly tea colored, or dark brown.
- ◆ **TOTAL PHOSPHORUS:** Epilimnetic phosphorus levels were elevated in June and then decreased to a moderate level as the summer progressed. Average epilimnetic phosphorus increased slightly from 2016, was much greater than the state median, and was slightly less than the threshold for eutrophic lakes. Historical trend analysis indicates relatively stable epilimnetic phosphorus levels with moderate variability between years. Metalimnetic (middle water layer) phosphorus levels fluctuated within a slightly elevated range but were average for that station. Hypolimnetic (lower water layer) phosphorus levels were elevated and likely impacted by internal phosphorus loading from bottom sediments under anoxic conditions. Inlet and Outlet phosphorus levels were slightly elevated in June and decreased to a moderate level in August.
- ◆ **TRANSPARENCY:** Transparency measured without the viewscope (NVS) was lower (worse) in June when phosphorus and turbidity levels were higher, and then increased (improved) in July and remained stable in August. Average NVS transparency increased (improved) slightly from 2016 but remained lower (worse) than the state median. Historical trend analysis indicates significantly decreasing (worsening) transparency since monitoring began. Transparency measured with the viewscope (VS) was generally higher (better) than NVS transparency and likely a better measure of actual conditions.
- ◆ **TURBIDITY:** Epilimnetic, Inlet and Outlet turbidity levels fluctuated within a slightly elevated range but were normal for those stations. Metalimnetic turbidity levels were slightly elevated and highest in August when algal growth was highest. Hypolimnetic turbidity levels were elevated on each sampling event.



| Station Name | Table 1. 2017 Average Water Quality Data for PINE ISLAND POND-MANCHESTER | | | | | | | | | |
|--------------|--|--------------|---------------|-----------|-------------|--------------|----------|------|-----------|------|
| | Alk. mg/l | Chlor-a ug/l | Chloride mg/l | Color PCU | Cond. uS/cm | Total P ug/l | Trans. m | | Turb. ntu | pH |
| | | | | | | | NVS | VS | | |
| Epilimnion | 27.0 | 12.96 | 134 | 120 | 510.0 | 24 | 1.70 | 2.05 | 1.94 | 7.31 |
| Metalimnion | | | | | 480.0 | 27 | | | 2.71 | 6.83 |
| Hypolimnion | | | | | 419.0 | 37 | | | 8.52 | 6.64 |
| Inlet | | | 181 | | 562.3 | 19 | | | 1.95 | 7.10 |
| Outlet | | | 133 | | 520.7 | 23 | | | 1.54 | 7.17 |

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/m³

Conductivity: 40.0 uS/cm

Chloride: 4 mg/L

Total Phosphorus: 12 ug/L

Transparency: 3.2 m

pH: 6.6

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 moderately variable. | Transparency | Worsening | Data significantly decreasing. |
| | | | Phosphorus (epilimnion) | Stable | Trend not significant; data moderately variable. |

