# Volunteer Lake Assessment Program Individual Lake Reports

## MASCOMA LAKE, ENFIELD, NH

**MORPHOMETRIC DATA**

| | | | | | |
|---|---|---|---|---|---|
| **Watershed Area (Ac.):** | 97,918 | **Max. Depth (m):** | 20.1 | **Flushing Rate (yr$^{-1}$):** | 4.6 |
| **Surface Area (Ac.):** | 1115 | **Mean Depth (m):** | 8.7 | **P Retention Coef:** | 0.39 |
| **Shore Length (m):** | 15,100 | **Volume (m$^3$):** | 39,458,000 | **Elevation (ft):** | 751 |

**TROPHIC CLASSIFICATION**

| Year | Trophic class |
|---|---|
| 2000 | MESOTROPHIC |
| 2008 | OLIGOTROPHIC |

**KNOWN EXOTIC SPECIES**

| |
|---|
| Eurasian Milfoil |

**The Waterbody Report Card tables are generated from the DRAFT 2018 305(b) report on the status of N.H. waters, and are based on data collected from 2008-2017. Detailed waterbody assessment and report card information can be found at www.des.nh.gov/organization/divisions/water/wmb/swqa/index.htm**

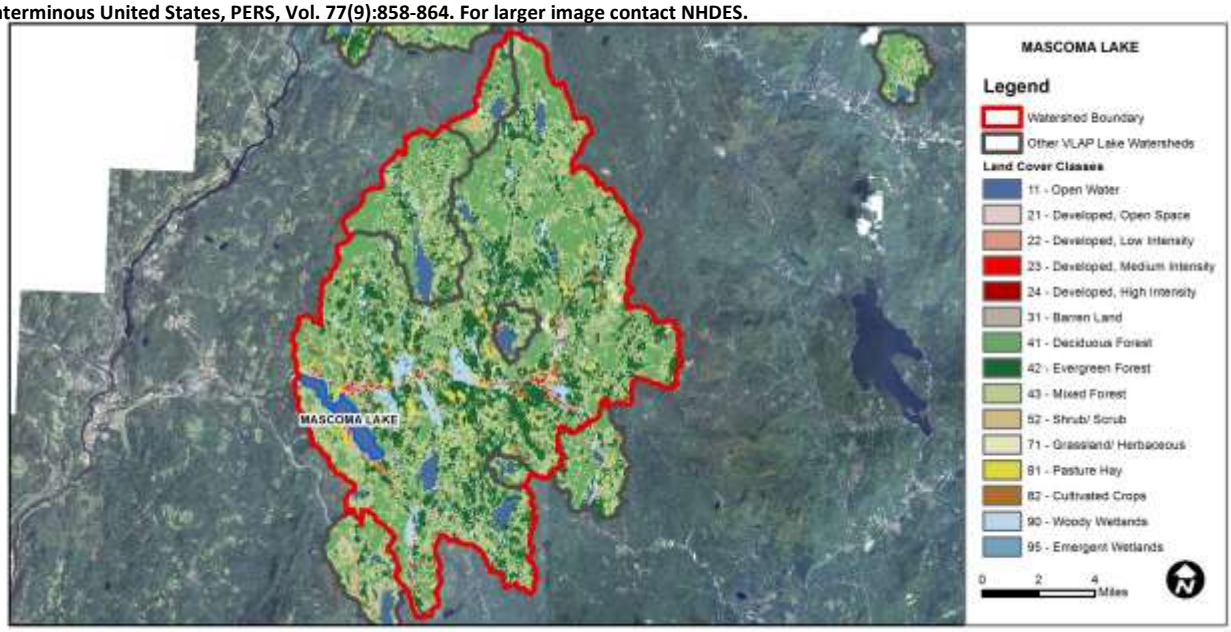
| Designated Use | Parameter | Category | Comments |
|---|---|---|---|
| Aquatic Life | Phosphorus (Total) | Slightly Bad | Data exceed water quality standards or thresholds for a given parameter by a small margin. |
| | pH | Slightly Bad | Data periodically exceed water quality standards or thresholds for a given parameter by a small margin. |
| | Oxygen, Dissolved | Good | Sampling data commonly meet water quality standards or thresholds for this parameter. |
| | Dissolved oxygen satura | Slightly Bad | Data periodically exceed water quality standards or thresholds for a given parameter by a small margin. |
| | Chlorophyll-a | Slightly Bad | Data exceed water quality standards or thresholds for a given parameter by a small margin. |
| Primary Contact Recreation | Escherichia coli | Very Good | All sampling data meet water quality standards or thresholds for this parameter. |
| | Cyanobacteria hepatoto | Slightly Bad | Cyanobacteria bloom(s). |
| | Chlorophyll-a | Very Good | All sampling data meet water quality standards or thresholds for this parameter. |

**BEACH PRIMARY CONTACT ASSESSMENT STATUS**

| | | | |
|---|---|---|---|
| MASCOMA LAKE - DARTMOUTH COLLEGE BEACH | Escherichia coli | Good | Sampling data commonly meet water quality standards or thresholds for this parameter. |
| MASCOMA LAKE - SHAKOMA BEACH | Escherichia coli | Good | Sampling data commonly meet water quality standards or thresholds for this parameter. |
| MASCOMA LAKE - CRESCENT BEACH | Escherichia coli | No Data | No data for this parameter. |
| MASCOMA LAKE - DARTMOUTH COLLEGE BEACH | Cyanobacteria | Slightly Bad | Cyanobacteria bloom(s). |
| MASCOMA LAKE - SHAKOMA BEACH | Cyanobacteria | Slightly Bad | Cyanobacteria bloom(s). |

**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 | 3.57 | Barren Land | 0.2 | Grassland/Herbaceous | 0.77 |
| Developed-Open Space | 2.03 | Deciduous Forest | 24.1 | Pasture Hay | 1.91 |
| Developed-Low Intensity | 0.73 | Evergreen Forest | 25.43 | Cultivated Crops | 0.85 |
| Developed-Medium Intensity | 0.3 | Mixed Forest | 33.58 | Woody Wetlands | 4.2 |
| Developed-High Intensity | 0.04 | Shrub-Scrub | 2.03 | Emergent Wetlands | 0.18 |

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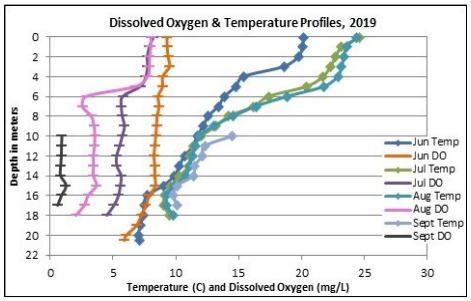
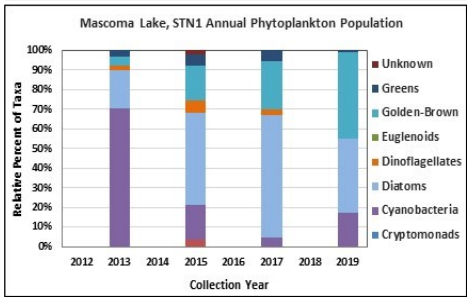
# Mascoma Lake, Stn. 1, Enfield
# 2019 Data Summary

**Recommended Actions:** A flood event within the watershed in July resulted in significant erosion and runoff to the lake causing elevated phosphorus and turbidity levels at the deep spot and Outlet, a significant decline in water clarity, and an increase in algal growth in August. The positive sign is that water quality had generally returned to normal in September, however the increased frequency of these types of events highlights the importance of evaluating watersheds for flood potential, and to ensure stream crossings and culverts are properly sized. Continue to conduct advanced sampling for conductivity and chloride in 2019. Browns Bk. continued to experienced elevated phosphorus and conductivity levels worthy of further investigation. Keep up the great work!

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

- **Chlorophyll-a:** Chlorophyll levels were low in June and July, increased to slightly elevated in August, and then decreased to a low level in September. Average chlorophyll level increased slightly from 2018 and was less than the state median and the threshold for oligotrophic lakes. Historical trend analysis indicates relatively stable chlorophyll levels since monitoring began.
- **Conductivity/Chloride:** Deep spot, Outlet, Knox River, and Mascoma River conductivity and chloride levels were slightly greater than the state medians, yet less than a level of concern. LaSalette Brook conductivity and chloride levels were low. Browns Bk., Manchester Dr. Culvert, Pump Station Culvert, and Shaker Bk. conductivity and chloride levels were elevated and much greater than the state medians. Chloride levels at Pump Station Culvert and Shaker Bk. approached the state chronic chloride standard but did not exceed it. Historical trend analysis indicates significantly increasing (worsening) epilimnetic (upper water layer) conductivity levels since monitoring began.
- **Color:** Apparent color measured in the epilimnion indicated the lake water was moderately tea colored in June, August and September, and increased to highly tea colored in July following a flood event.
- **E. coli:** Knox River and Mascoma River E. coli levels were much less than the state standard of 406 cts/100 mL for surface waters.
- **Total Phosphorus:** Epilimnetic phosphorus levels were low in June, increased to elevated levels in July following a flood event, decreased to slightly elevated levels in August, and then decreased to a low level by September. Average epilimnetic phosphorus level increased greatly from 2018 and was greater than the state median and the threshold for oligotrophic lakes. Historical trend analysis indicates relatively stable epilimnetic phosphorus levels since monitoring began. Metalimnetic (middle water layer) phosphorus levels were also slightly elevated in July and August. Hypolimnetic (lower water layer) phosphorus levels fluctuated within a moderate range for that station and increased gradually as the summer progressed. Browns Bk. phosphorus levels were elevated on each sampling event and lab data noted colored water and organic matter. Outlet and Knox River phosphorus levels were elevated in July following the flood event. LaSalette Bk., Mascoma River and Shaker Bk. phosphorus levels fluctuated within an average range for those stations.
- **Transparency:** Transparency measured with (VS) and without (NVS) the viewscope was within an average range in June, decreased (worsened) significantly in July, and then increased to a high (good) range through September. Average NVS transparency decreased from 2018 and was less than the state median. Historical trend analysis indicates relatively stable transparency since monitoring began.
- **Turbidity:** Epilimnetic and Outlet turbidity levels were greatly elevated in July following the flood event. Metalimnetic turbidity levels were elevated in July, and in August when algal growth was higher. Hypolimnetic turbidity levels were elevated in September. Browns Bk. turbidity levels were elevated in August likely due to organic matter. Knox River, LaSalette Bk., Mascoma River, and Shaker Bk. turbidity levels fluctuated within a low to moderate range for those stations.
- **pH:** Epilimnetic and tributary pH levels were within the desirable range 6.5-8.0 units. Historical trend analysis indicates relatively stable epilimnetic pH level since monitoring began. Metalimnetic and Hypolimnetic pH levels were slightly less than desirable.



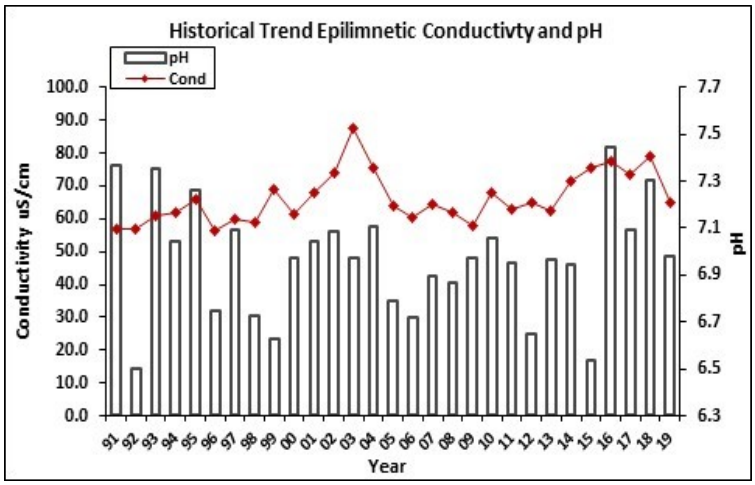
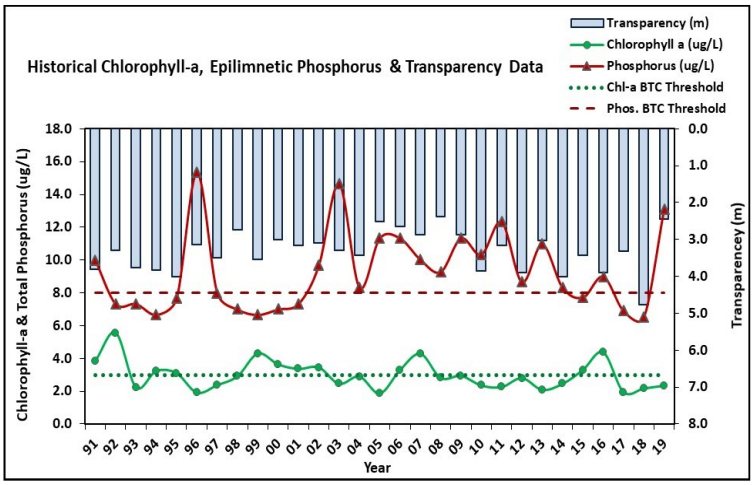

**NH Water Quality Standards:** Numeric criteria for specific parameters. Results exceeding criteria are considered a water quality violation.

**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)

| Station Name | Table 1. 2019 Average Water Quality Data for MASCOMA LAKE - ENFIELD | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Alk. mg/l | Chlor-a ug/l | Chloride mg/l | Color pcu | Cond. us/cm | E. coli #/100ml | Total P mg/l | Trans. m | | Turb. ntu | pH |
| | | | | | | | | NVS | VS | | |
| Epilimnion | 11.0 | 2.34 | 10 | 95 | 65.1 | | 13 | 2.44 | 3.20 | 3.53 | 6.98 |
| Metalimnion | | | 8 | | 60.5 | | 10 | | | 1.86 | 6.44 |
| Hypolimnion | | | 8 | | 62.4 | | 18 | | | 2.74 | 6.29 |
| Browns Brook | | | 62 | | 254.6 | | 54 | | | 4.63 | 6.52 |
| Dam Outlet | | | 16 | | 57.9 | | 16 | | | 5.89 | 7.06 |
| Knox River Inlet | | | 22 | | 99.1 | 103 | 13 | | | 1.08 | 7.16 |
| LaSalette Brook | | | 3 | | 33.6 | | 8 | | | 0.41 | 7.21 |
| Manchester Dr. Culvert | | | 118 | | 274.0 | | | | | | |
| Mascoma River Inlet | | | 15 | | 85.4 | 41 | 14 | | | 2.32 | 7.17 |
| Pump Station Culvert | | | 168 | | 421.5 | | | | | | |
| Shaker Brook | | | 113 | | 472.9 | | 14 | | | 0.58 | 7.30 |

**NH Median Values:** Median values for specific parameters generated from historic lake monitoring data.

**Alkalinity:** 4.5 mg/L
**Chlorophyll-a:** 4.39 ug/L
**Conductivity:** 42.3 uS/cm
**Chloride:** 5 mg/L
**Total Phosphorus:** 11 ug/L
**Transparency:** 3.3 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 moderately variable. |
| pH (epilimnion) | Stable | Trend not significant; data moderately variable. | Transparency | Stable | Trend not significant; data moderately variable. |
| | | | Phosphorus (epilimnion) | Stable | Trend not significant; data moderately variable. |