Volunteer Lake Assessment Program Individual Lake Reports
DEERING RESERVOIR, DEERING, NH

MORPHOMETRIC DATA

Watershed Area (Ac.):	2,816	Max. Depth (m):	11.3	Flushing Rate (yr^{-1})	1.3	
Surface Area (Ac.):	315	Mean Depth (m):	3.5	P Retention Coef:	0.67	
Shore Length (m):	8,850	Volume (m³):	4,442,500	Elevation (ft):	921	

TROPHIC CLASSIFICATION

Year	Trophic class
1980	MESOTROPHIC
1997	OLIGOTROPHIC

KNOWN EXOTIC SPECIES

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)	Good	Sampling data is better than the water quality standards or thresholds for this parameter.
	pH	Slightly Bad	Data periodically exceed water quality standards or thresholds for this parameter by a small margin.
	Oxygen, Dissolved	Encouraging	Limited data for this parameter predicts water quality standards or thresholds are being met; however more data are necessary to fully assess the parameter.
	Dissolved oxygen satura	Slightly Bad	Data periodically exceed water quality standards or thresholds for a given 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	Very Good	All sampling data meet water quality standards or thresholds for this parameter.
	Chlorophyll-a	Very Good	All sampling data meet water quality standards or thresholds for this parameter.

BEACH PRIMARY CONTACT ASSESSMENT STATUS

DEERING RESERVOIR - HOPKINTON INDEPENDENT SCHOOL BEACH	Escherichia coli	No Data	No data for this parameter.
DEERING RESERVOIR - DEERING LAKE BEACH	Escherichia coli	Bad	Data periodically exceed water quality standards or thresholds for this parameter by a large 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.
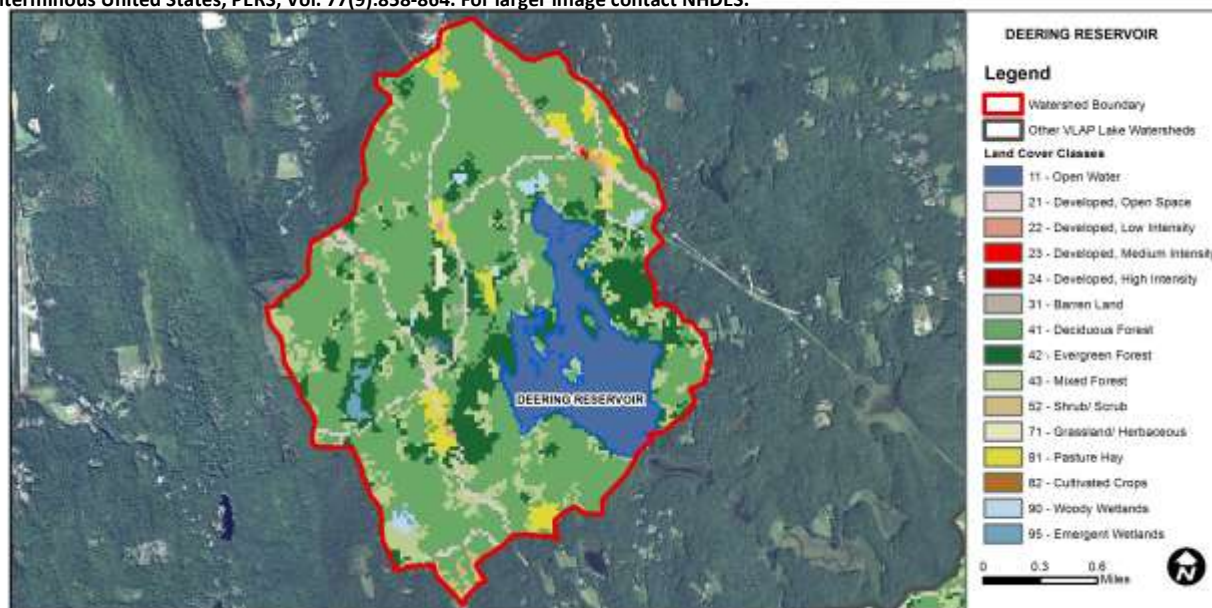
Land Cover Category	% Cover	Land Cover Category	% Cover	Land Cover Category	% Cover
Open Water	11.9	Barren Land	0.06	Grassland/Herbaceous	0.25
Developed-Open Space	4.22	Deciduous Forest	54.05	Pasture Hay	3.36
Developed-Low Intensity	0.71	Evergreen Forest	13.72	Cultivated Crops	0
Developed-Medium Intensity	0.03	Mixed Forest	9.69	Woody Wetlands	0.87
Developed-High Intensity	0	Shrub-Scrub	0.55	Emergent Wetlands	0.52

RECOMMENDED ACTIONS: Lake quality remained representative of oligotrophic conditions. Chlorophyll levels have remained below the threshold for oligotrophic lakes since 2015 and hypolimnetic phosphorus levels have improved since monitoring began which is encouraging and we hope to see these trends continue. Main Inlet phosphorus levels have also significantly decreased since monitoring began and we hope to see this continue! Chloride levels suggest negative impacts of road salting activities and/or application of dust suppressants in the sub-watershed. Efforts should focus on stormwater management, dirt/gravel road stabilization, and reduced road salt/sand application within the watershed. Encourage winter maintenance companies to obtain a NH Voluntary Salt Applicator License through UNH Technology Transfer Center's Green SnowPro Certification program. Encourage the town to conduct spring cleaning of roadside ditches and catch-basins to remove excess sand/salt that accumulated over the winter to reduce runoff into tributaries and the lake. Keep up the great work!

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

- **CHLOROPHYLL-A:** Chlorophyll level was low in June and decreased as the summer progressed. Average chlorophyll level remained stable with 2018 and was much less than the state median and the threshold for oligotrophic lakes. Historical trend analysis indicates stable, yet variable, chlorophyll levels since monitoring began.
- **CONDUCTIVITY/CHLORIDE:** Epilimnetic (upper water layer), Metalimnetic (middle water layer), Hypolimnetic (lower water layer), and Outlet conductivity and/or chloride levels were slightly greater than the state medians, yet less than a level of concern. Historical trend analysis indicates relatively stable epilimnetic conductivity levels since monitoring began. Main Inlet and Zowski Inlet conductivity and chloride levels were also slightly elevated and chloride levels indicate potential influence from road salt and/or dust suppressants. Morotta Inlet conductivity and chloride levels were elevated and much greater than the other tributaries.
- **COLOR:** Apparent color measured in the epilimnion indicates the water was clear with little to no tea (brown) coloring.
- **TOTAL PHOSPHORUS:** Epilimnetic and Metalimnetic phosphorus levels fluctuated within a low range. Average epilimnetic phosphorus level increased from 2018, was less than the state median, and was approximately equal to the threshold for oligotrophic lakes. Historical trend analysis indicates stable epilimnetic phosphorus levels since monitoring began. Hypolimnetic phosphorus levels were low in June and increased to a moderate level in July and August but remained within a low range for that station. Historical trend analysis indicates significantly decreasing (improving) hypolimnetic phosphorus levels since monitoring began. Main Inlet phosphorus levels were low in June and August and moderate in July during low flows and when the turbidity of the sample was also elevated. Morotta Inlet phosphorus levels were within a low range for that station. Outlet phosphorus levels were slightly elevated in June when water levels and flows were high. Zowski Inlet phosphorus levels were elevated in August.
- **TRANSPARENCY:** Transparency measured without the viewscope (NVS) was good in June, increased (improved) slightly in July, and then decreased slightly in August. Average NVS transparency decreased slightly from 2018 but was much higher (better) than the state median. Historical trend analysis indicates stable transparency since monitoring began. Viewscope transparency (VS) was higher (better) than NVS transparency and a better measure of actual conditions.
- **TURBIDITY:** Epilimnetic, Metalimnetic, Hypolimnetic, and Outlet turbidity levels were within a low range those stations. Main Inlet turbidity level was elevated in August during low flows. Morotta Inlet turbidity level was slightly elevated in June during high flows and during a rain event. Zowski Inlet turbidity levels were slightly higher in June and August but were within a moderate range.
- **PH:** Epilimnetic, Metalimnetic, Main Inlet, Morotta Inlet, Outlet, and Zowski Inlet pH levels were within the desirable range 6.5-8.0 units. Historical trend analysis indicates stable epilimnetic pH levels since monitoring began. Hypolimnetic pH levels were slightly acidic and less than desirable.

Temperature Profile, June 2019

DEERING LAKE Annual Phytoplankton Population
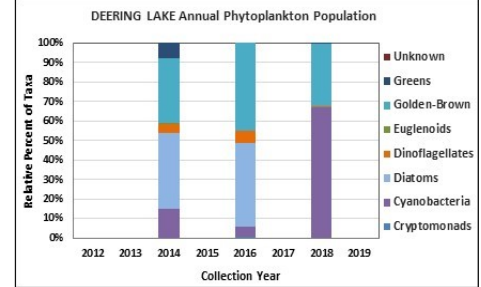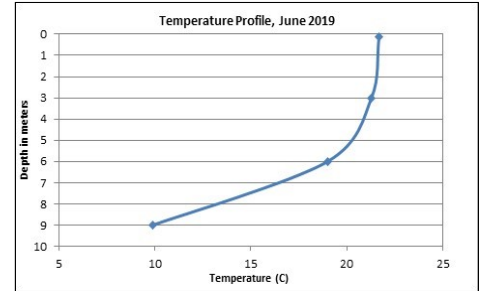
NH Water Quality Standards: Numeric criteria for specific parameters. Results exceeding criteria are considered a water quality violation.

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 DEERING RESERVOIR - DEERING								
	Alk.	Chlor-a	Chloride	Color	Cond.	Total P	Trans.	Turb.	pH
	mg/l	ug/l	mg/l	pcu	us/cm	mg/l	m	ntu	
							NVS	VS		
Epilimnion	6.8	1.72	15	20	70.6	8	5.27	6.00	0.37	6.80
Metalimnion					70.2	6			0.50	6.87
Hypolimnion					69.9	13			0.84	6.22
Main Inlet			34		142.0	10			4.15	6.46
Morotta Inlet			96		343.0	11			1.33	6.92
Outlet			16		72.1	8			0.43	6.91
Zowski Inlet			25		121.8	17			1.31	7.02

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	Stable	Trend not significant; data moderately variable.	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 show low variability.
			Phosphorus (epilimnion)	Stable	Trend not significant; data show low variability.

Historical Trend Epilimnetic Conductivty and pH

Historical Chlorophyll-a, Epilimnetic Phosphorus & Transparency Data

This report was generated by the NHDES Volunteer Lake Assessment Program (VLAP). For more information contact VLAP at (603) 271-2658 or sara.steiner@des.nh.gov