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

MORPHOMETRIC DATA

						TROPHIC CLASSIFICATION	KNOWN EXOTIC SPECIES

						Year	Trophic class
Watershed Area (Ac.):	389	Max. Depth (m):	13.1	Flushing Rate (yr¹)	1	1984	MESOTROPHIC
Surface Area (Ac.):	27	Mean Depth (m):	6.7	P Retention Coef:			
Shore Length (m):	1,600	Volume (m³):	733,500	Elevation (ft):	481	2004	MESOTROPHIC

The Waterbody Report Card tables are generated from the DRAFT 2020 305(b) report on the status of N.H. waters, and are based on data collected from 2010-2019. Detailed waterbody assessment and report card information can be found at **NHDES' Water Quality Assessment Website.**

Designated Use	Parameter	Category	Comments
Aquatic Life	Phosphorus (Total)	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.
	pH	Slightly Bad	Data periodically exceed water quality standards or thresholds for a given 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	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.
	Chlorophyll-a	Cautionary	Limited data for this parameter predicts exceedance of water quality standards or thresholds; however more data are necessary to fully assess the parameter.
Primary Contact Recreation	Escherichia coli	No Data	No data for this parameter.
	Cyanobacteria hepatoto	Slightly Bad	Cyanobacteria bloom(s).
	Chlorophyll-a	Cautionary	Limited data for this parameter predicts exceedance of water quality standards or thresholds; however more data are necessary to fully assess the parameter.

VLAP SAMPLE STATION MAP: This map depicts the location of routine sampling stations discussed on page two of the report.

HOTHOLE POND
LOUDON
VOLUNTEER LAKE ASSESSMENT PROGRAM

STATIONID	STATION NAME
HOTLOUD	DEEP SPOT

Source: The data layers are derived from NHDES data and are under constant revision. NHDES is not responsible for the use or interpretation of this information. Not intended for legal use. NHDES Watershed Management Bureau   Date: 2/17/2021

Recommended Actions: Great job sampling in 2020! Drought conditions and the lack of stormwater runoff and groundwater input likely resulted in lower nutrient (phosphorus) levels in surface waters and lower levels of algal (chlorophyll) growth with no detectable cyanobacteria blooms. Pond nutrient levels and algal growth generally exceed the thresholds for mesotrophic lakes, however as monitoring continues we will learn more about pond dynamics and how levels fluctuate seasonally and annually. The pond experiences severe dissolved oxygen depletion through the Hypolimnion and into Metalimetic waters. This implies a dense organic layer on the pond bottom and decomposition of the organic material depletes dissolved oxygen which results in phosphorus normally bound in the sediments to be released into Hypolimnetic waters creating an internal load of phosphorus. This internal load drives cyanobacteria growth within the pond. This highlights the importance of minimizing external nutrient loads within the watershed. Continue working with NHDES' Soak Up the Rain NH and utilizing the "NH Homeowner's Guide to Stormwater Management" to reduce stormwater runoff from shoreline properties. Encourage shoreline properties to be certified LakeSmart through NHLAKES lake-friendly living program www.nhlakes.org/lakesmart/. Keep up the great work!

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

♦ **Chlorophyll-a:** Chlorophyll level was within a low range in June and then increased to a slightly elevated level in August. Average chlorophyll level decreased slightly from 2019 and was slightly greater than the state median and the threshold for mesotrophic lakes.

♦ **Conductivity/Chloride:** Epilimnetic (upper water layer) and Metalimnetic (middle water layer) conductivity levels were within a low range and slightly greater than the state median. Epilimnetic chloride level was also low and slightly greater than the state median. Hypolimnetic (lower water layer) conductivity level was slightly higher than epilimnetic and metalimnetic conductivity levels and indicates the formation and accumulation of organic compounds under anoxic (no dissolved oxygen) conditions.

♦ **Color:** Apparent color measured in the epilimnion indicates the water was moderately tea colored, or brown, in June and then lightened to within a lightly tea colored, or light brown range in August.

♦ **Total Phosphorus:** Epilimnetic phosphorus level was within a low range in June and decreased slightly in August. Average epilimnetic phosphorus level decreased from 2019, was less than the state median and the threshold for mesotrophic lakes, and was the lowest measured since monitoring began. Metalimnetic phosphorus level was low in June and increased to an elevated level in August when algal growth was higher and potentially due to phosphorus loading from hypolimnetic waters. Hypolimnetic phosphorus level was greatly elevated in June and increased in August due to the release of phosphorus from bottom sediments under anoxic (no dissolved) oxygen conditions, a process called internal loading.

♦ **Transparency:** Transparency measured with (VS) and without (NVS) the viewscope was slightly below average (worse) in June when water color was darker, and then increased (improved) in August. Average NVS transparency increased from 2019, was slightly lower (worse) than the state median, however was the highest (best) measured since monitoring began. VS transparency was higher (better) than NVS transparency and likely a better measure of actual conditions.

♦ **Turbidity:** Epilimnetic and Metalimnetic turbidity levels were within a very low range. Hypolimnetic turbidity levels were slightly elevated due to the formation and accumulation of organic compounds under anoxic conditions.

♦ **pH:** Epilimnetic pH level was within the desirable range 6.5-8.0 units, however Metalimnetic and Hypolimnetic pH levels were slightly acidic and less than desirable.

Dissolved Oxygen & Temperature Profiles 2020

HOTHOLE POND Annual Phytoplankton Population
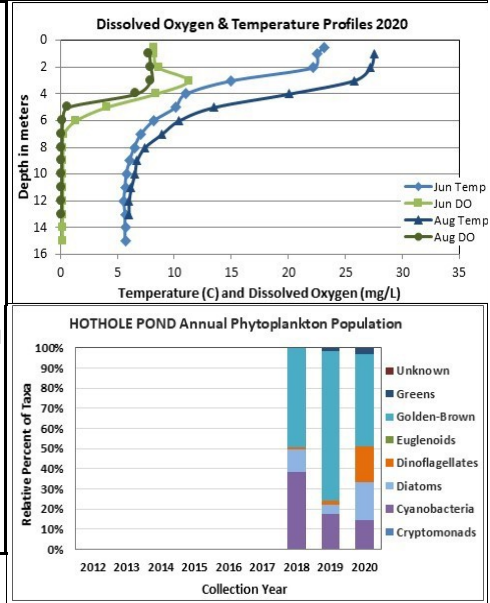
Station Name	Table 1. 2020 Average Water Quality Data for HOTHOLE POND - LOUDON									
	Alk. (mg/L)	Chlor-a (ug/L)	Chloride (mg/L)	Color (pcu)	Cond. (us/cm)	Total P (ug/L)	Trans. (m)		Turb. (ntu)	pH
							NVS	VS		
Epilimnion	6.8	5.42	11	40	54.4	10	2.90	3.45	0.20	7.01
Metalimnion					53.8	20			0.42	6.08
Hypolimnion			13		73.2	196			3.01	6.12

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

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	N/A	Ten years of data necessary for analysis.	Chlorophyll-a	N/A	Ten years of data necessary for analysis.
pH (epilimnion)	N/A	Ten years of data necessary for analysis.	Transparency	N/A	Ten years of data necessary for analysis.
			Phosphorus (epilimnion)	N/A	Ten years of data necessary for analysis.

Historical Trend Epilimnetic Conductivty and pH

Historical Chlorophyll-a, Epilimnetic Phosphorus & Transparency Data