Volunteer Lake Assessment Program Individual Lake Reports
DANFORTH POND, LOWER, FREEDOM, NH

MORPHOMETRIC DATA

Watershed Area (Ac.):	11,776	**Max. Depth (m):**	16.8	**Flushing Rate (yr^1)**	31.6
Surface Area (Ac.):	32	**Mean Depth (m):**	7.1	**P Retention Coef:**	0.07
Shore Length (m):	1,400	**Volume (m³):**	918,500	**Elevation (ft):**	408

TROPHIC CLASSIFICATION

Year	Trophic class
1983	MESOTROPHIC
2001	MESOTROPHIC

KNOWN EXOTIC SPECIES

Variable 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)	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	Good	Sampling data commonly meet water quality standards or thresholds for this 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	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.
	Chlorophyll-a	Good	Sampling data commonly meet water quality standards or thresholds for this parameter.

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	2.09	Barren Land	0.1	Grassland/Herbaceous	0.08
Developed-Open Space	2.61	Deciduous Forest	29.82	Pasture Hay	0.85
Developed-Low Intensity	0.26	Evergreen Forest	16.21	Cultivated Crops	0.41
Developed-Medium Intensity	0.03	Mixed Forest	40.01	Woody Wetlands	1.18
Developed-High Intensity	0	Shrub-Scrub	5.62	Emergent Wetlands	0.74

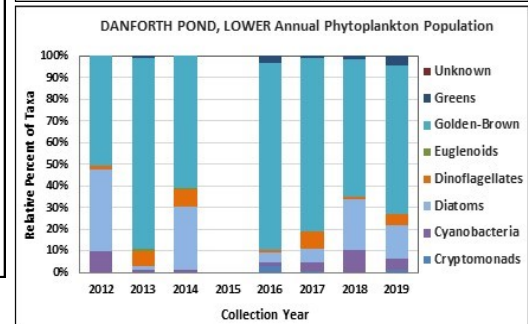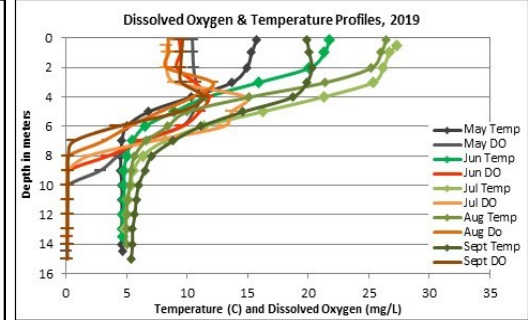# VOLUNTEER LAKE ASSESSMENT PROGRAM INDIVIDUAL LAKE REPORTS
LOWER DANFORTH POND, FREEDOM
2019 DATA SUMMARY

RECOMMENDED ACTIONS: Pond quality is generally representative of mesotrophic, or average conditions, with chlorophyll levels occasionally exceeding the threshold for mesotrophic lakes. The improving phosphorus levels in surface waters is a positive sign, however hypolimnetic waters experience internal loading of phosphorus which likely fuels periods of elevated algal and cyanobacteria growth. This highlights the importance of minimizing nutrient loads from the watershed, particularly from stormwater runoff. Consider partnering with the NH DES Soak Up the Rain program to implement stormwater management projects within the watershed. Increasing conductivity levels suggest winter de-icing materials may be negatively influencing the pond. Educate watershed residents on ways to reduce application of de-icing products containing sodium chloride on their walkways and driveways. The UNH Technology Transfer (T2) Center's Road Salt Reduction website contains helpful links and documents. Encourage winter maintenance companies that apply road salt to obtain Voluntary NH Salt Applicator license through UNH T2's Green SnowPro training program. Keep up the great work!

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

♦ **CHLOROPHYLL-A:** Chlorophyll level was low in May, decreased in June and July, increased to an elevated level in August, and then decreased to a moderate level in September. Average chlorophyll level increased from 2018, was slightly greater than the state median, and was approximately equal to the threshold for mesotrophic lakes. Historical trend analysis indicates relatively stable chlorophyll levels since monitoring began.

♦ **CONDUCTIVITY/CHLORIDE:** Epilimnetic (upper water layer) and Metalimnetic (middle water layer) conductivity levels were slightly greater than the state median, yet less than a level of concern. Hypolimnetic (lower water layer) conductivity levels remained elevated and much greater than the state median. Epilimnetic chloride levels were slightly greater than the state median yet much less than the state chronic chloride standard. However, historical trend analysis indicates significantly increasing (worsening) epilimnetic conductivity levels since monitoring began.

♦ **COLOR:** Apparent color measured in the epilimnion indicated the water was lightly tea colored, or light brown, in May and June, increased to a moderately tea colored range in August, and then decreased in September.

♦ **TOTAL PHOSPHORUS:** Epilimnetic phosphorus levels fluctuated within a low range from May through September. Average epilimnetic phosphorus level increased slightly from 2018 and was much less than the state median and the threshold for mesotrophic lakes. Historical trend analysis indicates significantly decreasing (improving) epilimnetic phosphorus levels since monitoring began. Metalimnetic phosphorus levels were low in May and July, and increased to a moderate range in June, August and September. Hypolimnetic phosphorus levels increased from moderate in May to elevated by September due to the release of phosphorus from bottom sediments under anoxic conditions.

♦ **TRANSPARENCY:** Transparency measured with (VS) and without (NVS) the viewscope was below average (worse) in May, increased (improved) to a good range in June, decreased slightly in July and August, and then increased again to a good range in September. Average NVS transparency decreased from 2018 and was slightly higher (better) than the state median. Historical trend analysis indicates relatively stable transparency since monitoring began.

♦ **TURBIDITY:** Epilimnetic turbidity levels fluctuated within a low range. Metalimnetic turbidity levels were slightly elevated in August when algal growth was elevated. Hypolimnetic turbidity levels were elevated on each sampling event indicating the formation and accumulation of organic compounds under anoxic conditions.

♦ **PH:** Epilimnetic pH levels fluctuated within the desirable range 6.5-8.0 units. Historical trend analysis indicates stable epilimnetic pH levels since monitoring began. Metalimnetic and Hypolimnetic pH levels were slightly less than desirable.

Dissolved Oxygen & Temperature Profiles, 2019

DANFORTH POND, LOWER Annual Phytoplankton Population

Station Name	Table 1. 2019 Average Water Quality Data for LOWER DANFORTH POND - FREEDOM									
	Alk. mg/l	Chlor-a ug/l	Chloride mg/l	Color pcu	Cond. us/cm	Total P mg/l	Trans. m NVS	Trans. m VS	Turb. ntu	pH
Epilimnion	8.5	4.95	11	38	61.3	7	3.78	3.94	0.41	6.67
Metalimnion					75.9	9			0.98	6.16
Hypolimnion					178.0	29			13.32	6.08

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	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)	Improving	Data significantly decreasing.

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