



Volunteer Lake Assessment Program Individual Lake Reports

BERRY BAY, FREEDOM, NH

MORPHOMETRIC DATA

Watershed Area (Ac.):	230,326	Max. Depth (m):	11.6	Flushing Rate (yr ⁻¹)	254
Surface Area (Ac.):	145	Mean Depth (m):	3.7	P Retention Coef:	-0.01
Shore Length (m):	5,800	Volume (m ³):	2,147,000	Elevation (ft):	406

TROPIC CLASSIFICATION

Year	Trophic class
1987	OLIGOTROPHIC
2003	MESOTROPHIC

KNOWN EXOTIC SPECIES

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

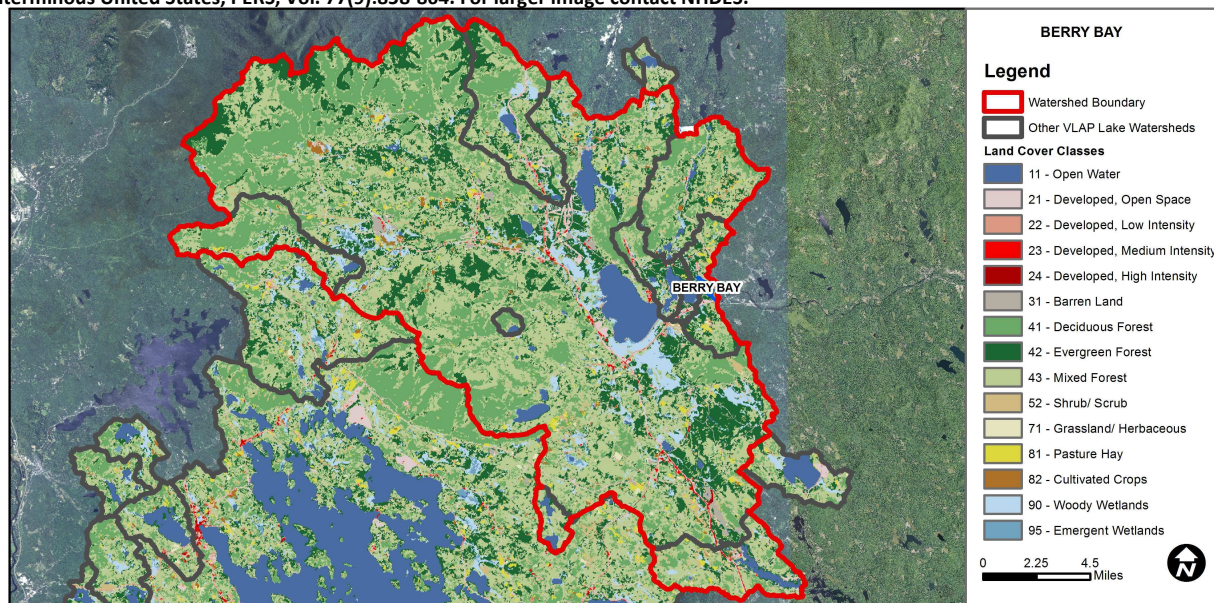
Designated Use	Parameter	Category	Comments
Aquatic Life	Phosphorus (Total)	Good	Sampling data is better than the water quality standards or thresholds for this parameter.
	pH	Slightly Bad	Data periodically exceed water quality standards or thresholds for this parameter by a small margin.
	Oxygen, Dissolved	Very Good	All sampling data meet water quality standards or thresholds for this parameter.
	Dissolved oxygen satura	Cautionary	Limited data for this parameter predicts exceedance of water quality standards or thresholds; 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	Very Good	All sampling data meet water quality standards or thresholds for this parameter.

BEACH PRIMARY CONTACT ASSESSMENT STATUS

BROAD BAY - CAMP HUCKINS BEACH	Escherichia coli	Cautionary	Limited data for this parameter predicts exceedance of water quality standards or thresholds; however more data are necessary to fully assess the parameter.
BROAD BAY - CAMP ROBIN HOOD BEACH	Escherichia coli	Very Good	All sampling data meet water quality standards or thresholds for this parameter.
LEAVITT BAY - CAMP MARIST BEACH	Escherichia coli	Very Good	All sampling data 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	3.63	Barren Land	0.63	Grassland/Herbaceous	0.36
Developed-Open Space	3.02	Deciduous Forest	23.03	Pasture Hay	0.93
Developed-Low Intensity	0.78	Evergreen Forest	20.56	Cultivated Crops	0.49
Developed-Medium Intensity	0.25	Mixed Forest	38.3	Woody Wetlands	4.62
Developed-High Intensity	0.04	Shrub-Scrub	2.7	Emergent Wetlands	0.6



VOLUNTEER LAKE ASSESSMENT PROGRAM INDIVIDUAL LAKE REPORTS

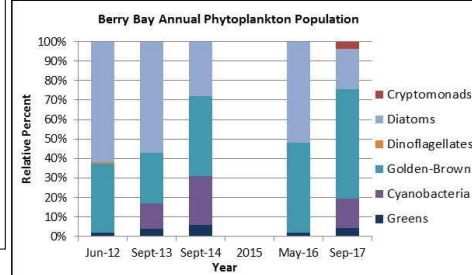
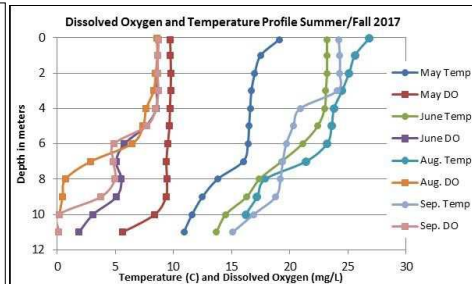
BERRY BAY, FREEDOM

2017 DATA SUMMARY

RECOMMENDED ACTIONS: Berry Bay water quality was again representative of oligotrophic, or high quality, conditions. However water clarity (transparency) was below average for the majority of the summer season. Above average spring and early summer rainfall and resulting stormwater runoff and flushing of waters rich in dissolved organic matter may have influenced water clarity as well as boating activities. Educate boaters about responsible lake stewardship and the importance of following boating regulations. The DES fact sheet WD-WMB-25 "Impacts of Motorized Craft on New Hampshire's Waterbodies" is a good resource. Continue measuring apparent color to evaluate relationships between water color and water clarity. Color data collected this year indicated that the water was almost three times darker than when measured in 2003. Continue watershed management activities and the development and implementation of a watershed management plan. Keep up the great work!

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

- **CHLOROPHYLL-A:** Chlorophyll levels fluctuated within a low range from May through September. Average chlorophyll level remained stable with 2016, was much less than the state median, and was slightly less than the threshold for oligotrophic lakes.
- **CONDUCTIVITY/CHLORIDE:** Epilimnetic (upper water layer), Metalimnetic (middle water layer) and Hypolimnetic (lower water layer) conductivity and/or chloride levels increased slightly as the summer progressed and were slightly greater than the state median, however not above a level of concern. Historical trend analysis indicates stable epilimnetic conductivity levels since monitoring began.
- **COLOR:** Apparent color water measured in the epilimnion and indicates the lake water is moderately tea colored, or brown.
- **TOTAL PHOSPHORUS:** Epilimnetic phosphorus levels were slightly higher in May and decreased to low levels as the summer progressed. Average epilimnetic phosphorus remained stable with 2016, was much less than the state median, and slightly less than the threshold for oligotrophic lakes. Historical trend analysis indicates stable epilimnetic phosphorus levels since monitoring began. Metalimnetic phosphorus levels were stable and low. Hypolimnetic phosphorus levels fluctuated within a low to moderate range.
- **TRANSPARENCY:** Transparency measured with (VS) and without (NVS) the viewscope was below average (worse) from May through August and then increased (improved) greatly in September. Average NVS transparency decreased from 2016 and was approximately equal to the state median. Historical trend analysis indicates highly variable transparency since monitoring began.
- **TURBIDITY:** Epilimnetic turbidity levels were low in May, increased to slightly elevated levels in June potentially due to pollen and recent rainfall, and then decreased to low levels in August and September. Metalimnetic turbidity levels were slightly elevated in May potentially due to above average spring rainfall and stormwater runoff, decreased in June and then increased slightly in August and September. Hypolimnetic turbidity levels increased from low to elevated levels as the summer progressed and as dissolved oxygen levels decreased in the hypolimnion.
- **pH:** Epilimnetic pH levels were within the desirable range 6.5-8.0 units and historical trend analysis indicates stable epilimnetic pH levels since monitoring began. Metalimnetic and Hypolimnetic pH levels were slightly less than desirable.



Station Name	Table 1. 2017 Average Water Quality Data for BERRY BAY-FREEDOM									
	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	5.5	1.55	9	55	50.7	7	3.20	3.73	0.83	6.76
Metalimnion					56.1	6			1.26	6.38
Hypolimnion					57.7	10			3.42	6.26

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

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

