Volunteer Lake Assessment Program Individual Lake Reports

CRYSTAL LAKE, MANCHESTER, NH

MORPHOMETRIC DATA

Watershed Area (Ac.):	200	**Max. Depth (m):**	6.4	**Flushing Rate (yr^{-1}):**	1.8
Surface Area (Ac.):	19	**Mean Depth (m):**	2.9	**P Retention Coef:**	0.66
Shore Length (m):	1,100	**Volume (m^3):**	217,000	**Elevation (ft):**	206

TROPHIC CLASSIFICATION

Year	Trophic class
1981	EUTROPHIC
1997	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

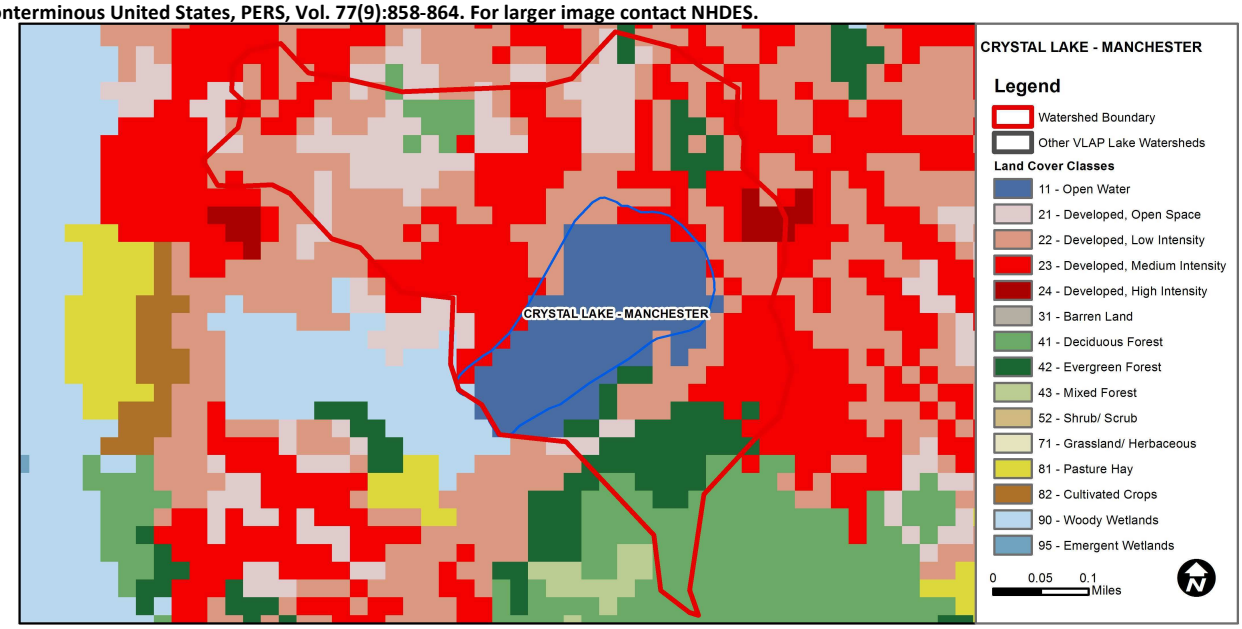
Designated Use	Parameter	Category	Comments
Aquatic Life	Phosphorus (Total)	Cautionary	Limited data for this parameter predicts exceedance of water quality standards or thresholds; however more data are necessary to fully assess the parameter.
	pH	Good	Sampling data commonly meet water quality standards or thresholds for this parameter.
	Oxygen, Dissolved	Very Good	All sampling data 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	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

CRYSTAL LAKE - MELODY PINES DAY CAMP BEACH	Escherichia coli	Good	Sampling data commonly meet water quality standards or thresholds for this parameter.
CRYSTAL LAKE-TOWN 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.



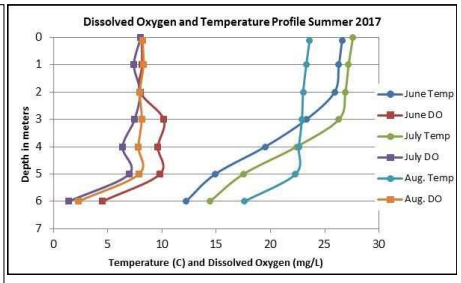
Land Cover Category	% Cover	Land Cover Category	% Cover	Land Cover Category	% Cover
Open Water	18.4	Barren Land	0	Grassland/Herbaceous	0
Developed-Open Space	12.1	Deciduous Forest	5.74	Pasture Hay	0
Developed-Low Intensity	26.8	Evergreen Forest	9.18	Cultivated Crops	0
Developed-Medium Intensity	26.8	Mixed Forest	0	Woody Wetlands	0.19
Developed-High Intensity	0.96	Shrub-Scrub	0	Emergent Wetlands	0

VOLUNTEER LAKE ASSESSMENT PROGRAM INDIVIDUAL LAKE REPORTS
CRYSTAL LAKE, MANCHESTER
2017 DATA SUMMARY

RECOMMENDED ACTIONS: Lake quality was good in 2017 with phosphorus and chlorophyll levels representative of mesotrophic conditions. Chlorophyll levels have significantly decreased and have remained below the mesotrophic threshold since 2010 and phosphorus levels have decreased steadily since 2013. We hope to see these improvements continue! The main concern is the increasing epilimnetic conductivity levels, and in particular, the elevated levels measured in 2016 and 2017. Chloride levels are also elevated and are approaching the state chronic chloride standard. If possible, salt reduction and mitigation efforts should be a priority. Work with local officials and private winter maintenance companies to utilize best practices when applying de-icing materials on roads, parking lots, driveways and walkways. Encourage parties to obtain a NH Voluntary Salt Applicator License through UNH Technology Transfer Center's Green SnowPro Certification program at www. t2.unh.edu/road-salt-reduction. Keep up the great work!

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

- **CHLOROPHYLL-A:** Chlorophyll levels were low in June, decreased slightly in July, and then increased to moderate levels in August. Average chlorophyll level remained stable with 2016 and was much less than the state median and the threshold for mesotrophic lakes. Historical trend analysis indicates significantly decreasing (improving) chlorophyll levels since monitoring began. We hope to see this continue!
- **CONDUCTIVITY/CHLORIDE:** Epilimnetic (upper water layer), Metalimnetic (middle water layer) and Hypolimnetic (lower water layer) conductivity and/or chloride levels were elevated and much greater than the state medians. Epilimnetic chloride levels are approaching the state chronic chloride standard and historical trend analysis indicates significantly increasing (worsening) epilimnetic conductivity levels since monitoring began.
- **COLOR:** Apparent color was measured in the epilimnion and indicates the lake water is lightly to moderately tea colored or brown.
- **TOTAL PHOSPHORUS:** Epilimnetic phosphorus levels were slightly elevated in June and then decreased to low levels as the summer progressed. Average epilimnetic phosphorus decreased slightly from 2016 and was slightly less than the state median and threshold for mesotrophic lakes. Historical trend analysis indicates stable epilimnetic phosphorus levels since monitoring began. Metalimnetic and Hypolimnetic phosphorus levels were moderate in June, increased to elevated levels in July, and then decreased to a low level in August.
- **TRANSPARENCY:** Transparency measured with (VS) and without (NVS) the viewscope was good in June, increased (improved) in July, and then decreased slightly in August likely due to the increased algal growth. Average transparency decreased slightly from 2016 but remained higher (better) than the state median. Historical trend analysis indicates relatively stable transparency with moderate variability between years.
- **TURBIDITY:** Epilimnetic, Metalimnetic and Hypolimnetic turbidity levels were within a moderate range in June and July and increased to a slightly elevated range in August.
- **PH:** Epilimnetic, Metalimnetic and Hypolimnetic pH levels were within the desirable range 6.5-8.0 units. However, epilimnetic pH levels have historically fluctuated below the desirable range. Historical trend analysis indicates stable epilimnetic pH levels since monitoring began.



Station Name	Table 1. 2017 Average Water Quality Data for CRYSTAL LAKE-MANCHESTER									
	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	26.0	2.87	135	40	546.3	11	3.71	3.89	1.22	7.21
Metalimnion					542.7	14			1.10	7.04
Hypolimnion					535.3	14			1.45	6.97

NH Median Values: Median values for specific parameters generated from historic lake monitoring data.
Alkalinity: 4.9 mg/L
Chlorophyll-a: 4.58 mg/m^3
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	Worsening	Data significantly increasing.	Chlorophyll-a	Improving	Data significantly decreasing.
pH (epilimnion)	Stable	Trend not significant; data show low variability.	Transparency	Stable	Trend not significant; data moderately variable.
			Phosphorus (epilimnion)	Stable	Trend not significant; data show low variability.