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 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

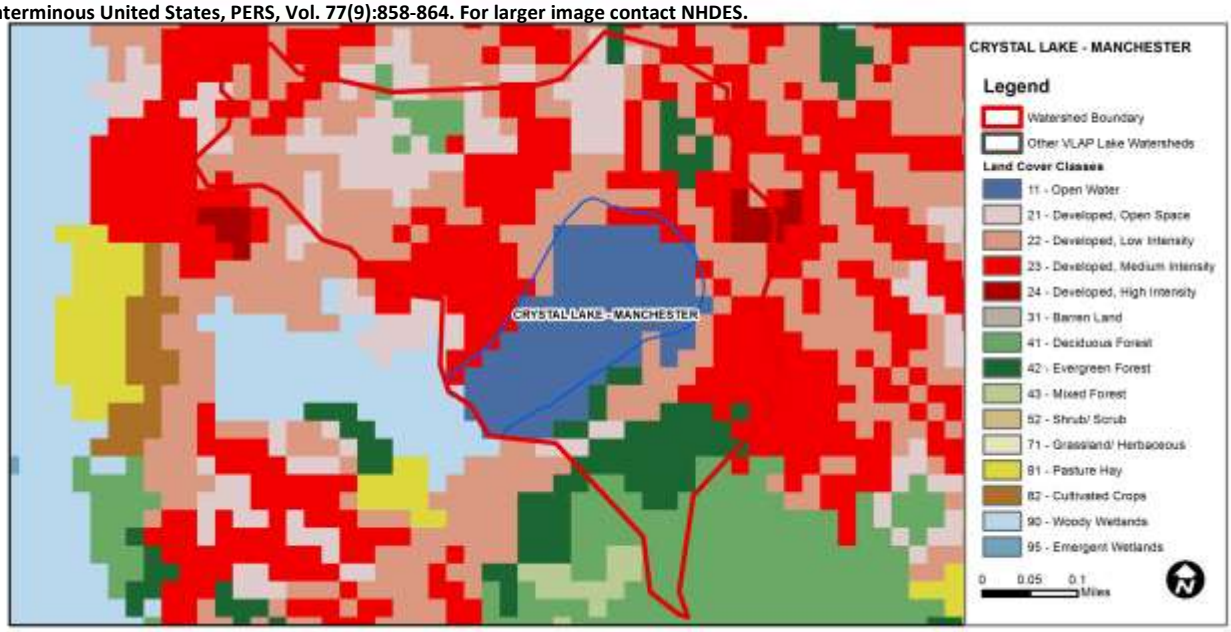
Designated Use	Parameter	Category	Comments
Aquatic Life	Phosphorus (Total)	Cautionary	Limited data for this parameter predicts exceedance of water quality standards or thresholds; however more data are necessary to fully assess the parameter.
	pH	Good	Sampling data commonly meet water quality standards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



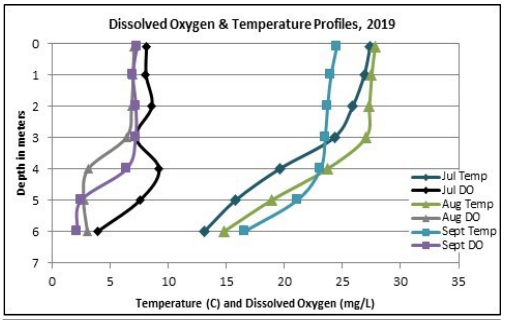
Land Cover Category	% Cover	Land Cover Category	% Cover	Land Cover Category	% Cover
Open Water	18.4	Barren Land	0	Grassland/Herbaceous	0
Developed-Open Space	12.1	Deciduous Forest	5.74	Pasture Hay	0
Developed-Low Intensity	26.8	Evergreen Forest	9.18	Cultivated Crops	0
Developed-Medium Intensity	26.8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

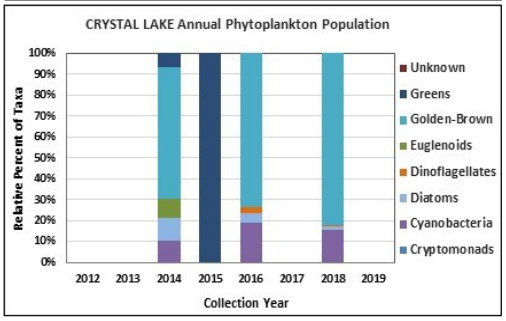
Volunteer Lake Assessment Program Individual Lake Reports
Crystal Lake, Manchester
2019 Data Summary

Recommended Actions: Lake quality was representative of mesotrophic, or average conditions, and the stable water quality trends are a positive sign. Nutrient levels and algal growth have remained below the thresholds for mesotrophic lakes since 2016 which is encouraging. The main concern is the increasing epilimnetic conductivity levels, and in particular, the elevated levels measured since 2016. 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 winter maintenance companies to utilize best practices when applying de-icing materials on roads, parking lots, driveways and walkways. Encourage private winter maintenance companies 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 fluctuated within a low range and were highest in August. Average chlorophyll level remained stable with 2018 and was slightly less than the state median and the threshold for mesotrophic lakes. Historical trend analysis indicates relatively stable chlorophyll levels since monitoring began.
- **Conductivity/Chloride:** Epilimnetic (upper water layer), Metalimnetic (middle water layer) and Hypolimnetic (lower water layer) conductivity and chloride levels remained elevated and much greater than the state medians. Historical trend analysis indicates significantly increasing (worsening) epilimnetic conductivity levels since monitoring began.
- **Color:** Apparent color measured in the epilimnion indicates water color decreased from moderately to lightly tea colored as the summer progressed.
- **Total Phosphorus:** Epilimnetic phosphorus levels were slightly elevated in July and then decreased to low levels in August and September. Average epilimnetic phosphorus level decreased slightly from 2018, was approximately equal to the state median, and was slightly less than the threshold for mesotrophic lakes. Historical trend analysis indicates stable epilimnetic phosphorus levels since monitoring began. Metalimnetic phosphorus levels were stable and low from July to September. Hypolimnetic phosphorus levels were moderate in July, increased to an elevated level in August when algal growth was highest, and then decreased to a moderate level in September.
- **Transparency:** Transparency measured with (VS) and without (NVS) the viewscope was slightly below average (worse) in June and increased (improved) to within a high (good) range in September. Average NVS transparency decreased slightly from 2018 and was slightly higher (better) than the state median. Historical trend analysis indicates relatively stable transparency since monitoring began.
- **Turbidity:** Epilimnetic, Metalimnetic and Hypolimnetic turbidity levels decreased from moderate to low as the summer progressed. Hypolimnetic turbidity levels fluctuated within a moderate range.
- **pH:** Epilimnetic, Metalimnetic and Hypolimnetic pH levels were within the desirable range 6.5-8.0 units. Historical trend analysis indicates stable epilimnetic pH levels since monitoring began.





Station Name	Table 1. 2019 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 mg/l	Trans. m		Turb. ntu	pH
							NVS	VS		
Epilimnion	19.7	4.16	126	40	475.7	11	3.58	3.42	1.05	6.95
Metalimnion					471.7	11			1.22	7.04
Hypolimnion					471.7	17			1.62	6.84

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)	Stable	Trend not significant; data show low variability.