Volunteer Lake Assessment Program Individual Lake Reports

CRYSTAL LAKE, GILMANTON, NH

MORPHOMETRIC DATA

Watershed Area (Ac.):	17,627	**Max. Depth (m):**	16.2	**Flushing Rate (yr^1)**	3.8
Surface Area (Ac.):	441	**Mean Depth (m):**	5	**P Retention Coef:**	0.48
Shore Length (m):	7,600	**Volume (m^3):**	8,998,500	**Elevation (ft):**	623

TROPHIC CLASSIFICATION

Year	Trophic class
1989	OLIGOTROPHIC
2003	OLIGOTROPHIC

KNOWN EXOTIC SPECIES

The Waterbody Report Card tables are generated from the DRAFT 2014 305(b) report on the status of N.H. waters, and are based on data collected from 2004-2013. Detailed waterbody assessment and report card information can be found at www.des.nh.gov/organizations/divisions/water/wmb/swqa/index.htm

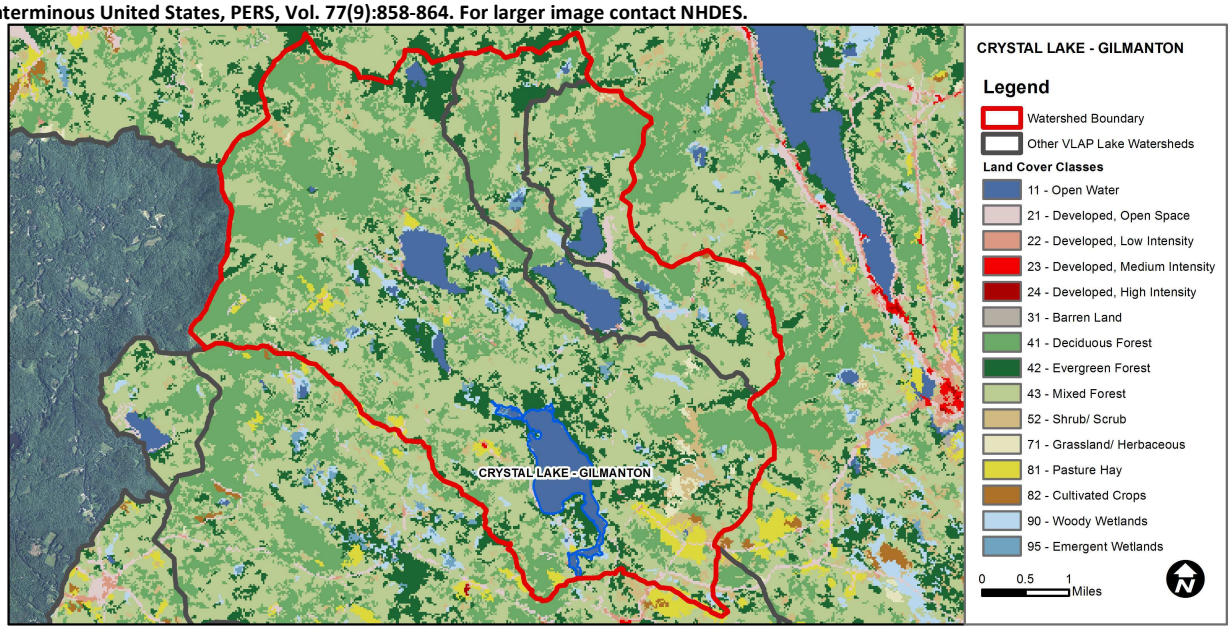
Designated Use	Parameter	Category	Comments
Aquatic Life	Phosphorus (Total)	Slightly Bad	The calculated median is from 5 or more samples and is > indicator and the chlorophyll a indicator is exceeded.
	pH	Bad	>10%, with a minimum of 2, samples exceed criteria, with 1 or more by a large margin.
	Oxygen, Dissolved	Encouraging	There are < 10 samples with 0 exceedances of criteria. More data needed.
	Dissolved oxygen satura	Encouraging	There are < 10 samples with 0 exceedances of criteria. More data needed.
	Chlorophyll-a	Slightly Bad	The calculated median is from 5 or more samples and is > indicator.
Primary Contact Recreation	Escherichia coli	Encouraging	There are no geometric means or there are > 2 single samples but those samples are within 75% of the geometric means criteria. More data needed.
	Chlorophyll-a	Very Good	There are a total of at least 10 samples with 0 exceedances of indicator.

BEACH PRIMARY CONTACT ASSESSMENT STATUS

CRYSTAL LAKE-TOWN BEACH	Escherichia coli	Bad	There are >=1 exceedance(s) of the geometric mean and/or >=2 single sample criterion exceedances. One or more exceedance is >2X criteria.

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	6.31	Barren Land	0	Grassland/Herbaceous	0.65
Developed-Open Space	1.27	Deciduous Forest	27.82	Pasture Hay	1.57
Developed-Low Intensity	0.13	Evergreen Forest	12.1	Cultivated Crops	0.1
Developed-Medium Intensity	0.01	Mixed Forest	44.52	Woody Wetlands	2.22
Developed-High Intensity	0	Shrub-Scrub	2.8	Emergent Wetlands	0.52

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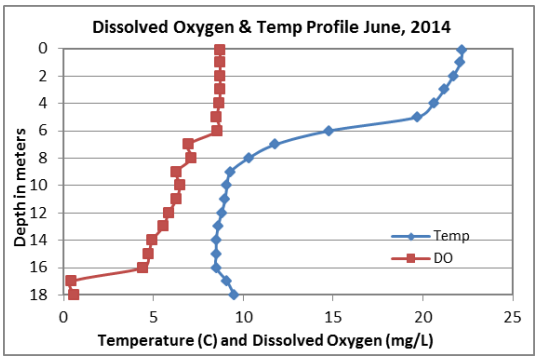
Crystal Lake, Gilmanton

2014 Data Summary

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

- **Chlorophyll-a:** Chlorophyll levels were low and stable from June to July and increased slightly in August. Average chlorophyll levels were low and less than the state median. Historical trend analysis indicates significantly decreasing (improving) chlorophyll levels since monitoring began. We hope to see this continue!
- **Conductivity/Chloride:** Deep spot and tributary conductivity levels remained low and less than the state median. Historical trend analysis indicates stable epilimnetic (upper water layer) conductivity since monitoring began.
- **Total Phosphorus:** Epilimnetic phosphorus levels decreased steadily from June through September and were much less than the state median. Epilimnetic phosphorus levels have generally remained between 7 and 10 ug/L since 2006 and historical trend analysis indicates relatively stable epilimnetic phosphorus with moderate variability between years. Metalimnetic (middle water layer) and Hypolimnetic (lower water layer) phosphorus levels also decreased from June to September and were low and less than the state median. Covered Bridge Bk., Wood Bridge Bk. and Outlet phosphorus levels also decreased from June to September and were low and less than 2013 phosphorus levels. Nat's Bridge Bk. phosphorus levels were slightly elevated in June and turbidity was also slightly elevated, and then decreased to average levels in July and September. The Brook phosphorus levels were stable and average on each sampling event. Nat's Bridge Bk., The Brook and Woodbridge Bk. phosphorus levels have significantly decreased (improved) since monitoring began. We hope to see this continue!
- **Transparency:** Transparency decreased slightly from June to July, but improved in September. The 2014 average transparency was much better than 2013 and the state median. Historical trend analysis indicates stable transparency since monitoring began.
- **Turbidity:** Epilimnetic, metalimnetic, Covered Bridge Bk., The Brook, Wood Bridge Bk., and Outlet turbidities were stable and low throughout the summer. Hypolimnetic turbidity increased as the summer progressed likely due to the accumulation of organic compounds as the summer progresses and dissolved oxygen levels decrease. Nat's Bridge Bk. turbidity was slightly elevated in June.
- **pH:** Epilimnetic pH was within the desirable range of 6.5-8.0 units, however metalimnetic and hypolimnetic pH levels were less than desirable and potentially critical to aquatic life. Historical trend analysis indicates significantly decreasing (worsening) epilimnetic pH since monitoring began, however epilimnetic pH seems to have recovered in recent years.
- **Recommended Actions:** The significantly decreasing chlorophyll levels and tributary phosphorus levels are a great sign! This highlights the importance of long-term monitoring and education and outreach to maintain and improve water quality, and implement corrective measures if data indicate potential problems. Continue to educate lake and watershed residents, and work with the town on pollution prevention measures. Keep up the great work!

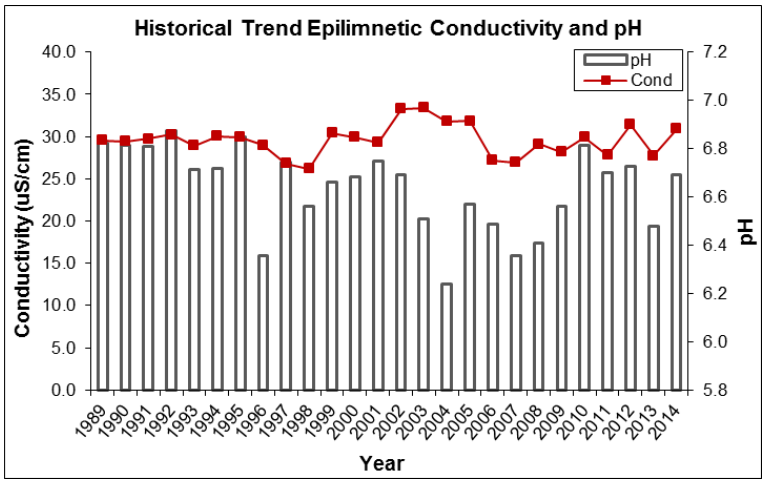
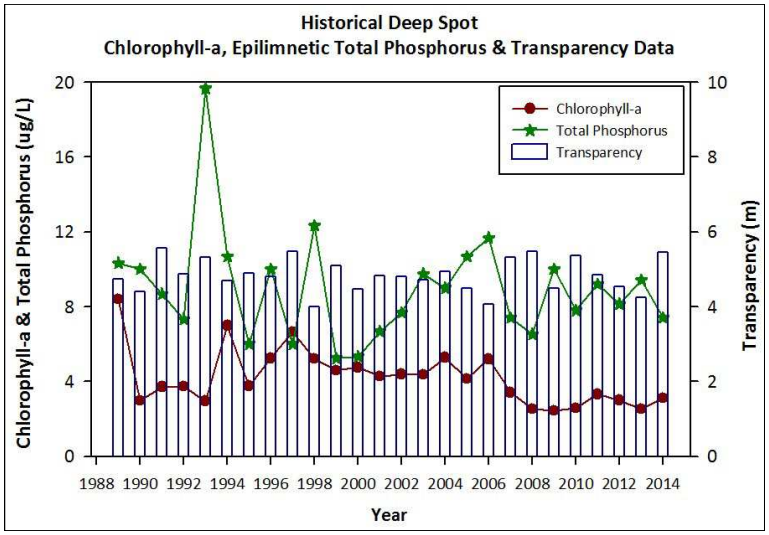


NH Water Quality Standards: Numeric criteria for specific parameters. Results exceeding criteria are considered a water quality violation.
Chloride: > 230 mg/L (chronic)
E. coli: > 88 cts/100 mL – public beach
E. coli: > 406 cts/100 mL – surface waters
Turbidity: > 10 NTU above natural level
pH: between 6.5-8.0 (unless naturally occurring)

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

Table 1. 2014 Average Water Quality Data for CRYSTAL LAKE

Station Name	Alk. mg/l	Chlor-a ug/l	Cond. uS/cm	Total P ug/l	Trans. m NVS	Trans. m VS	Turb. ntu	pH
Epilimnion	4.43	3.12	30.9	7	5.45	5.33	0.65	6.69
Metalimnion			26.3	9			1.06	6.37
Hypolimnion			31.0	11			2.74	6.1
Covered Bridge Brook			30.5	8			0.43	6.81
Nats Bridge Brook (Nelson Brook)			31.9	19			2.24	6.41
Outlet			32.9	9			1.08	6.67
The Brook			22.0	19			0.56	6.57
Wood Bridge Brook			24.1	9			0.49	6.76

Historical Water Quality Trend Analysis

Parameter	Trend	Explanation	Parameter	Trend	Explanation
Conductivity	Stable	Trend not significant; data show low variability.	Chlorophyll-a	Improving	Data significantly decreasing.
pH (epilimnion)	Worsening	Data significantly decreasing.	Transparency	Stable	Trend not significant; data show low variability.
			Phosphorus (epilimnion)	Stable	Trend not significant; data moderately variable.