Volunteer Lake Assessment Program Individual Lake Reports

KEZAR LAKE, SUTTON, NH

MORPHOMETRIC DATA

Watershed Area (Ac.):	6,848	**Max. Depth (m):**	8.2	**Flushing Rate (yr^{-1})**	8.2
Surface Area (Ac.):	182	**Mean Depth (m):**	2.7	**P Retention Coef:**	
Shore Length (m):	3,400	**Volume (m^3):**	1,975,500	**Elevation (ft):**	906

TROPHIC CLASSIFICATION

Year	Trophic class
1984	MESOTROPHIC
2003	MESOTROPHIC

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

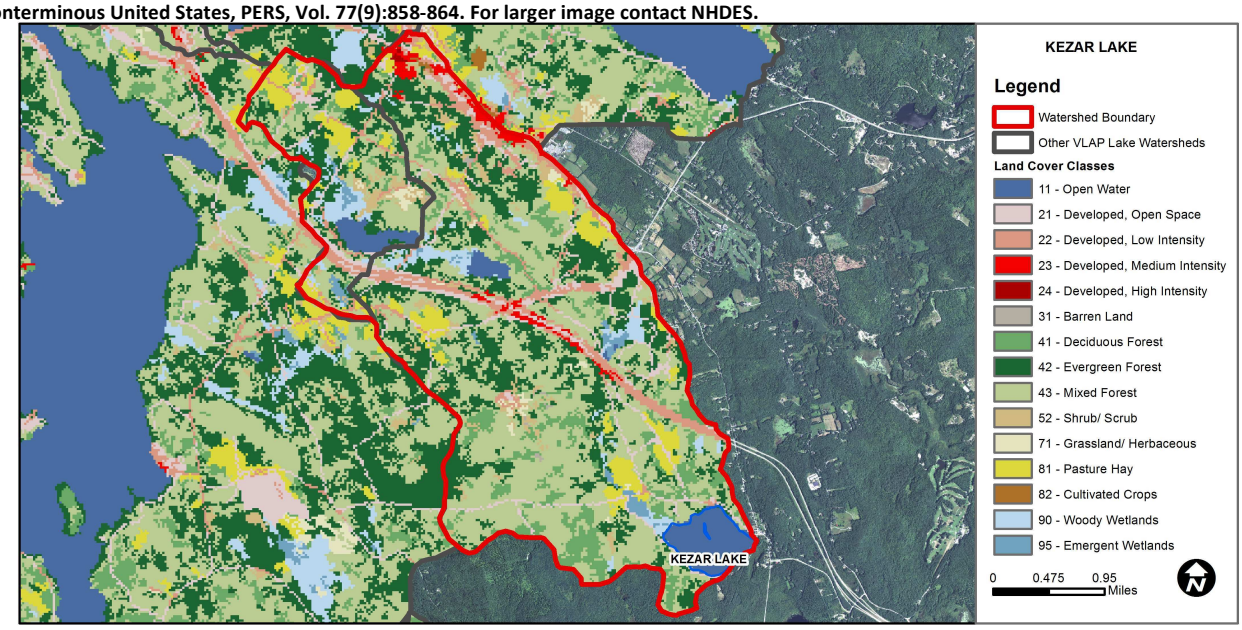
Designated Use	Parameter	Category	Comments
Aquatic Life	Phosphorus (Total)	Good	Sampling data is better than the water quality standards or thresholds for this parameter.
	pH	Slightly Bad	Data periodically exceed water quality standards or thresholds for a given parameter by a small margin.
	Oxygen, Dissolved	Good	Sampling data commonly 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	Very Good	All sampling data meet water quality standards or thresholds for this parameter.
	Cyanobacteria hepatoto	Slightly Bad	Cyanobacteria bloom(s).
	Chlorophyll-a	Very Good	All sampling data meet water quality standards or thresholds for this parameter.

BEACH PRIMARY CONTACT ASSESSMENT STATUS

KEZAR LAKE - WADLEIGH STATE PARK BEACH	Escherichia coli	Good	Sampling data commonly meet water quality standards or thresholds for this parameter.
KEZAR LAKE - WADLEIGH STATE PARK BEACH	Cyanobacteria	Slightly Bad	Cyanobacteria bloom(s).

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	4.46	Barren Land	0.14	Grassland/Herbaceous	0.73
Developed-Open Space	5.86	Deciduous Forest	8.25	Pasture Hay	6.39
Developed-Low Intensity	6.24	Evergreen Forest	22.37	Cultivated Crops	0.07
Developed-Medium Intensity	1.39	Mixed Forest	36.49	Woody Wetlands	3.22
Developed-High Intensity	0.07	Shrub-Scrub	3.27	Emergent Wetlands	1.11

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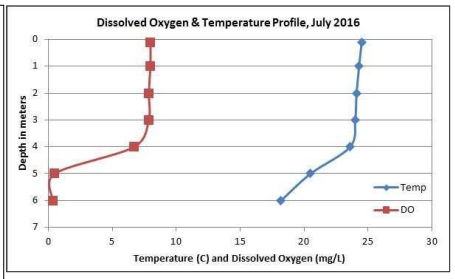
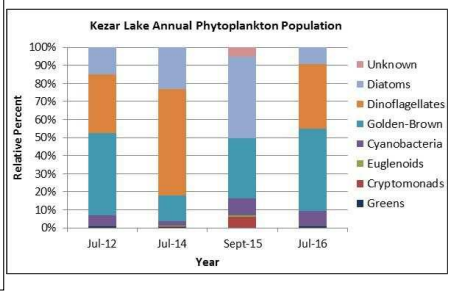
Kezar Lake, North Sutton
2016 Data Summary

Recommended Actions: Lake water quality remained good in 2016 with low phosphorus levels, average algal growth and good clarity (transparency). The drought conditions in 2016 likely helped to reduce phosphorus loading through stormwater runoff and flushing of wetland systems. This highlights the importance of managing stormwater runoff from dirt/gravel roads, sandy beaches, steep slopes, and impervious surfaces such as paved roads and driveways. DES' "NH Homeowner's Guide to Stormwater Management" is a great resource. Conductivity and chloride levels in Lyon Brook are elevated and chloride levels approach the state standard for chronic chloride exposure. Winter road salt application on state and local roads, parking lots, driveways, and walkways is likely impacting the brook. Conduct spring runoff sampling for chloride in the Inlet and Lyon Brook to assess spring concentrations during snowmelt. Encourage local road agents and winter maintenance companies to obtain NH Voluntary Salt Applicator License through UNH Technology Transfer Center's Green SnowPro Certification. Keep up the great work!

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

- **Chlorophyll-a:** Chlorophyll levels were average in July and then decreased to low levels in August. The 2016 average chlorophyll level increased slightly from 2015 yet remained 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 Outlet conductivity and chloride levels remained slightly elevated and greater than the state medians, however chloride levels did not approach the state chronic chloride standard of 230 mg/L. Historical trend analysis indicates significantly increasing (worsening) epilimnetic (upper water layer) conductivity levels since monitoring began. Inlet conductivity and chloride levels were elevated. Lyon Brook at Trussel Ridge conductivity and chloride levels were greatly elevated.
- **Total Phosphorus:** Epilimnetic phosphorus levels were within an average range in July and then decreased to a low level in August. Average epilimnetic phosphorus remained stable with 2015 and was slightly less than the state median. Historical trend analysis indicates stable epilimnetic phosphorus levels with moderate variability between years. Hypolimnetic (lower water layer) phosphorus was slightly elevated in July and decreased to a low level in August. Inlet and Lyon Bk. phosphorus levels were higher in July and then decreased in August, however levels remained within an average range for those stations. Outlet phosphorus levels were low.
- **Transparency:** Transparency measured without the viewscope (NVS) was good and was slightly above average for the lake, and remained stable from July to August. Average NVS transparency remained stable with 2015 and was slightly less than the state median. Historical trend analysis indicates highly variable transparency since monitoring began. Transparency measured with the viewscope (VS) was generally higher (better) than NVS transparency and likely a better measure of actual conditions.
- **Turbidity:** Epilimnetic turbidity was slightly elevated in July when algal growth was higher, and then decreased to a low level in August. Hypolimnetic turbidity was elevated in July and August potentially due to the accumulation of dissolved organic compounds as the summer progresses and dissolved oxygen levels decrease below 1.0 mg/L. Inlet turbidity was slightly elevated in July and August and field data note low flow conditions. Lyon Brook turbidity was low. Outlet turbidity was slightly elevated in July and low in August.
- **pH:** Epilimnetic, Lyon Brook and Outlet pH levels were within the desirable range 6.5-8.0 units, however epilimnetic pH has historically fluctuated below the desirable range. Hypolimnetic and Inlet pH levels fluctuated below the desirable range in 2016. Historical trend analysis indicates significantly decreasing (worsening) epilimnetic pH levels since monitoring began.





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)

Table 1. 2016 Average Water Quality Data for KEZAR LAKE-NORTH SUTTON

Station Name	Alk. mg/l	Chlor-a ug/l	Chloride mg/l	Cond. uS/cm	Total P ug/l	Trans. m		Turb. ntu	pH
						NVS	VS		
Epilimnion	9.4	3.78	36	175.2	10	3.05	3.74	1.19	6.95
Hypolimnion				177.0	14			5.63	6.54
Inlet			70	311.0	17			2.10	6.46
Lyon Brook At Trussel Ridge			120	518.0	12			0.51	7.14
Outlet			36	176.4	8			1.29	7.12

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

Historical Water Quality Trend Analysis

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