Volunteer Lake Assessment Program Individual Lake Reports

SUNRISE LAKE, MIDDLETON, NH

MORPHOMETRIC DATA

Watershed Area (Ac.):	2,112	**Max. Depth (m):**	4.1	**Flushing Rate (yr^{1})**	2
Surface Area (Ac.):	257	**Mean Depth (m):**	1.9	**P Retention Coef:**	0.71
Shore Length (m):	5,500	**Volume (m^3):**	1,966,000	**Elevation (ft):**	666

TROPHIC CLASSIFICATION

Year	Trophic class
1977	OLIGOTROPHIC
1990	MESOTROPHIC

KNOWN EXOTIC SPECIES

Variable Milfoil

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

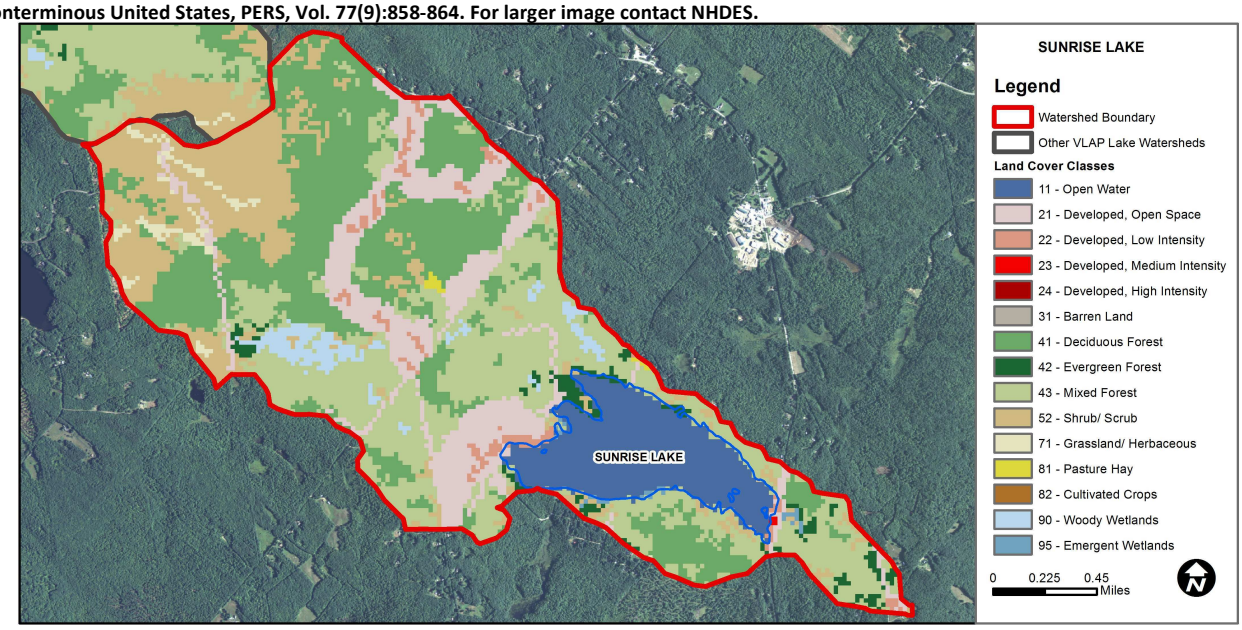
Designated Use	Parameter	Category	Comments
Aquatic Life	Phosphorus (Total)	Slightly Bad	Data exceed water quality standards or thresholds for a given parameter by a small margin.
	pH	Slightly Bad	Data periodically exceed water quality standards or thresholds for this parameter by a small margin.
	Oxygen, Dissolved	Encouraging	Limited data for this parameter predicts water quality standards or thresholds are being met; however more data are necessary to fully assess the parameter.
	Dissolved oxygen satura	Encouraging	Limited data for this parameter predicts water quality standards or thresholds are being met; however more data are necessary to fully assess the parameter.
	Chlorophyll-a	Slightly Bad	Data exceed water quality standards or thresholds for a given parameter by a small margin.
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

SUNRISE 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.



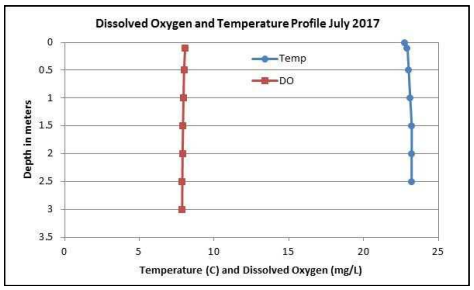
Land Cover Category	% Cover	Land Cover Category	% Cover	Land Cover Category	% Cover
Open Water	10.2	Barren Land	0	Grassland/Herbaceous	1.14
Developed-Open Space	13.2	Deciduous Forest	27.25	Pasture Hay	0.2
Developed-Low Intensity	1.75	Evergreen Forest	2.04	Cultivated Crops	0
Developed-Medium Intensity	0.04	Mixed Forest	26.96	Woody Wetlands	2.24
Developed-High Intensity	0	Shrub-Scrub	14.68	Emergent Wetlands	0.28

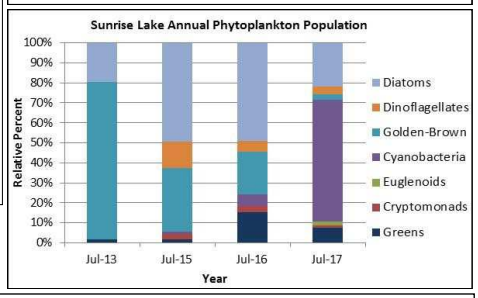
Volunteer Lake Assessment Program Individual Lake Reports
Sunrise Lake, Middleton
2017 Data Summary

Recommended Actions: Phosphorus levels increased slightly in 2017 and may have contributed to the increased algal growth highlighting the delicate balance of the lake ecosystem. The above average spring and early summer rainfall may have transported excess nutrients to the lake through stormwater runoff and erosion. Educate lake property owner's on ways to reduce stormwater runoff and erosion on their properties. DES' "NH Homeowner's Guide to Stormwater Management" and UNH Cooperative Extension's "Landscaping at the Water's Edge" are great resources. Epilimnetic conductivity levels have almost tripled in the 20 year monitoring history and indicates that the use of winter de-icing materials on roads, parking lots, driveways, and walkways is likely impacting lake quality. Encourage local road agents and private winter maintenance companies to obtain NH Voluntary Salt Applicator Licenses through UNH Technology Transfer Center's Green SnowPro Certification Program. Consider implementing low salt zones in residential areas closest to the water. Keep up the great work!

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

- **Chlorophyll-a:** Chlorophyll levels were elevated in July, increased from 2016, were greater than the state median, and greater than the threshold for oligotrophic lakes. Historical trend analysis indicates relatively stable chlorophyll levels with moderate variability between years.
- **Conductivity/Chloride:** Epilimnetic (upper water layer), Hypolimnetic (lower water layer), Pinkam Cove, and Tanglewood Bk. conductivity and/or chloride levels were slightly greater than the state medians and indicative of human influences. Epilimnetic conductivity decreased slightly from 2016 however 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 has a light tea or brown color.
- **E. coli:** Beach and tributary E. coli levels were very low and much less than the state standard of 88 cts/100 mL for public beaches.
- **Total Phosphorus:** Epilimnetic and Hypolimnetic phosphorus levels were within a low range. Epilimnetic phosphorus increased slightly from 2016 but remained much less than the state median and was approximately equal to the threshold for oligotrophic lakes. Historical trend analysis indicates relatively stable epilimnetic phosphorus levels with moderate variability between years. Pinkham Cove and Tanglewood Brook phosphorus levels were within a moderate range.
- **Transparency:** Transparency measured without the viewscope (NVS) was below average and decreased (worsened) from that measured in 2016. However, transparency measured with the viewscope (VS) was much better than NVS transparency and the Secchi disk was almost visible on the lake bottom. Historical trend analysis indicates highly variable NVS transparency since monitoring began.
- **Turbidity:** Deep spot and tributary turbidity levels were within a low range.
- **pH:** Deep spot and tributary pH levels were within the desirable range 6.5-8.0 units. However, epilimnetic pH has historically fluctuated below the desirable range. Historical trend analysis indicates highly variable epilimnetic pH levels since monitoring began.

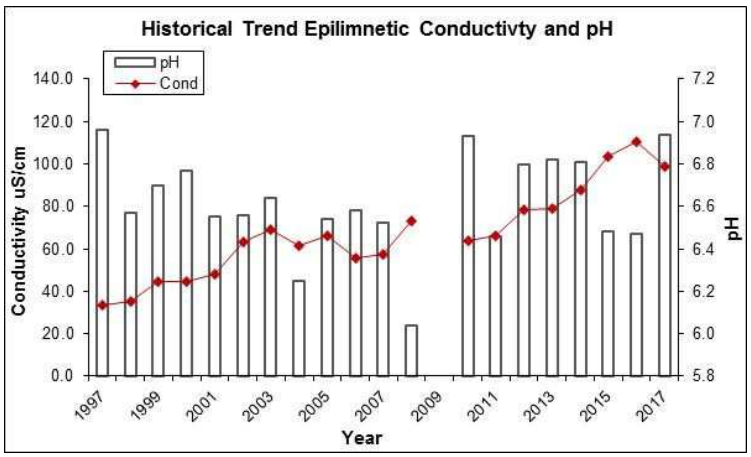
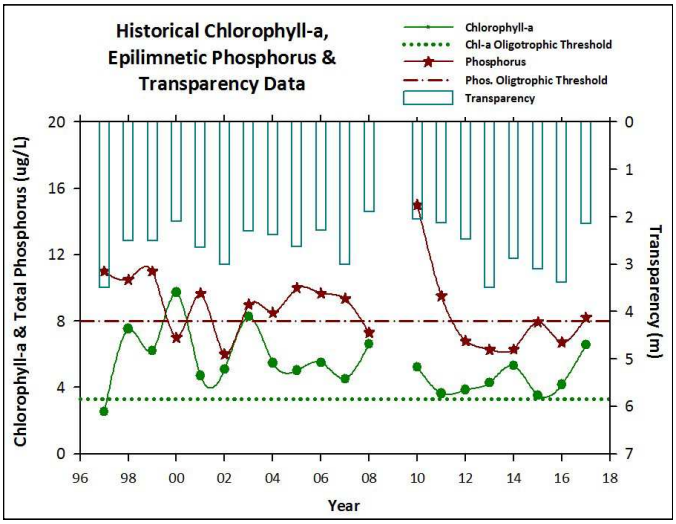




Station Name	Table 1. 2017 Average Water Quality Data for SUNRISE LAKE-MIDDLETON										
	Alk. mg/l	Chlor-a ug/l	Chloride mg/l	Color PCU	Cond. uS/cm	E. Coli MPN/100ML	Total P ug/l	Trans. m		Turb. ntu	pH
								NVS	VS		
Epilimnion	5.9	6.57	22	40	99.1		8	2.15	3.50	0.82	6.94
Hypolimnion					98.2		9			1.06	6.55
Hampshire Shores						1					
Main Beach						23					
Nicola Beach						4					
Nicola Beach 1						1					
Pinkham Cove			24		102.9	3	13			1.25	6.53
Tanglewood Brook			22		99.0	2	15			1.09	6.56
Town Beach						8					

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

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 highly variable.	Transparency	Stable	Trend not significant; data highly variable.
			Phosphorus (epilimnion)	Stable	Trend not significant; data moderately variable.