Volunteer Lake Assessment Program Individual Lake Reports

SUNAPEE LAKE, SUNAPEE, NH

MORPHOMETRIC DATA

Watershed Area (Ac.):	28,863	**Max. Depth (m):**	31.9	**Flushing Rate (yr^{1})**	0.3
Surface Area (Ac.):	4090	**Mean Depth (m):**	11.4	**P Retention Coef:**	0.7
Shore Length (m):	47,600	**Volume (m^{3}):**	188,150,000	**Elevation (ft):**	1092

TROPHIC CLASSIFICATION

Year	Trophic class
1995	OLIGOTROPHIC
2006	OLIGOTROPHIC

KNOWN EXOTIC SPECIES

Variable Milfoil

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

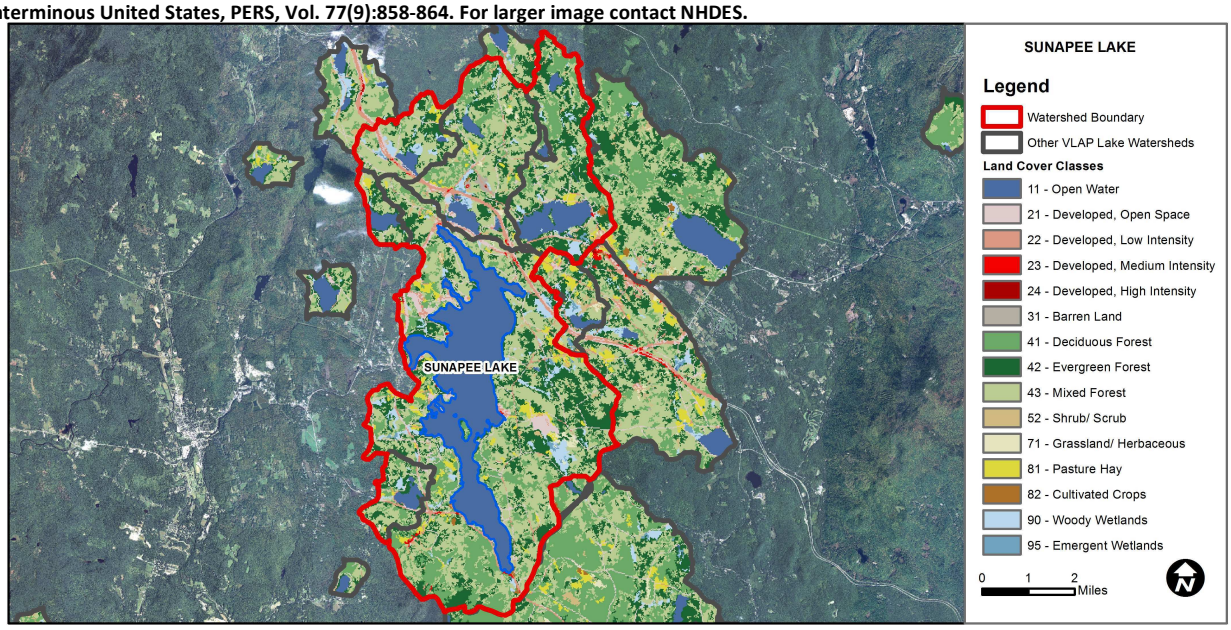
Designated Use	Parameter	Category	Comments
Aquatic Life	Phosphorus (Total)	Good	The calculated median is from 5 or more samples and is < indicator and > 1/2 indicator and the chlorophyll a indicator is okay.
	pH	Slightly Bad	>10% of samples exceed criteria by a small margin (minimum of 2 exceedances).
	Oxygen, Dissolved	Bad	There are >10% of samples (minimum of 2), exceeding criteria with one or more samples considered large exceedance.
	Dissolved oxygen satura	Slightly Bad	There are >10% of samples (minimum of 2), exceeding criteria.
	Chlorophyll-a	Very Good	The calculated median is from 5 or more samples and is <= 1/2 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

SUNAPEE LAKE - DEPOT BEACH	Escherichia coli	Very Good	Where there are no geometric means, all bacteria samples are < 75% of the geometric mean. Where there are geometric means all single bacteria samples are < the SSMC and all geometric means are < geometric mean criteria.
SUNAPEE LAKE - GEORGES MILL TOWN BEACH	Escherichia coli	Very Good	Where there are no geometric means, all bacteria samples are < 75% of the geometric mean. Where there are geometric means all single bacteria samples are < the SSMC and all geometric means are < geometric mean criteria.
SUNAPEE LAKE - SUNAPEE STATE PARK 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.
SUNAPEE LAKE - BLODGETT'S LANDING 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.
SUNAPEE LAKE - DEWEY (TOWN) BEACH	Escherichia coli	Slightly Bad	There are >=1 exceedance(s) of the geometric mean and/or >=2 single sample criterion exceedances. Exceedances are <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.



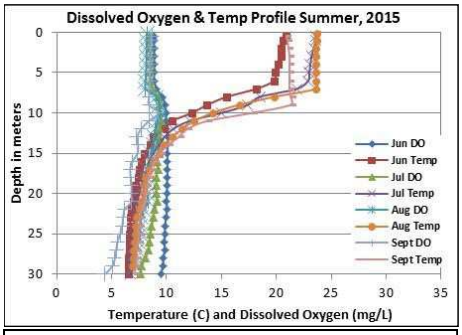
Land Cover Category	% Cover	Land Cover Category	% Cover	Land Cover Category	% Cover
Open Water	17.9	Barren Land	0.18	Grassland/Herbaceous	0.44
Developed-Open Space	4.66	Deciduous Forest	12.49	Pasture Hay	2.59
Developed-Low Intensity	2.83	Evergreen Forest	21.94	Cultivated Crops	0.15
Developed-Medium Intensity	0.24	Mixed Forest	31.84	Woody Wetlands	3.2
Developed-High Intensity	0.01	Shrub-Scrub	1.14	Emergent Wetlands	0.3

Volunteer Lake Assessment Program Individual Lake Reports
Lake Sunapee 210, Sunapee
2015 Data Summary

Recommended Actions: Lake conductivity has increased however has become more stable since 2006. Continue to encourage local and state road agents and winter maintenance companies to obtain NH Voluntary Salt Applicator licenses through UNH Technology Transfer Center's Green SnowPro Certification. Add chloride monitoring to the regular sampling program to establish a baseline data set and help determine how much of the conductivity is influence by chloride. The dry weather in 2015 may have led to the lowest epilimnetic turbidity measurements since monitoring began. This indicates that storm events may influence turbidity either through stormwater runoff transporting suspended particles or from flushing of wetland systems high is dissolved organic matter that give the water a dark or tea color. Consider adding apparent color analyses to deep and near shore stations to help track monthly and annual variations in water color.

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

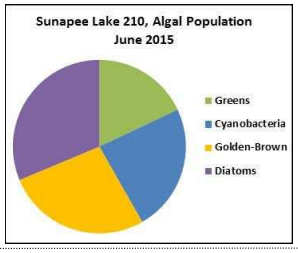
- **Chlorophyll-a:** Chlorophyll levels were low in June, increased slightly in July, decreased slightly in August, and increased slightly in September but remained within low levels. The 2015 average chlorophyll level decreased from 2014 and was much less than the state median. Historical trend analysis indicates stable chlorophyll levels since monitoring began.
- **Conductivity/Chloride:** Conductivity remained slightly elevated and was stable from June through September at all stations. Average epilimnetic conductivity increased from 2014 and was much greater than the state median. Historical trend analysis indicates significantly increasing (worsening) epilimnetic (upper water layer) conductivity since monitoring began.
- **Total Phosphorus:** Epilimnetic phosphorus was stable and very low from June through September. Average epilimnetic phosphorus decreased slightly from 2014 and was much less than the state median. Historical trend analysis indicates stable epilimnetic phosphorus since 1993. Metalimnetic (middle water layer) and Hypolimnetic (lower water layer) phosphorus levels also remained stable and low.
- **Transparency:** Transparency was high (good) in June despite the storm event and surface debris. Transparency decreased (worsened) in July and again in August, but then increased (improved) to a high level in September. Average transparency improved from 2014 and was much better than the state median. Historical trend analysis indicates stable transparency since monitoring began.
- **Turbidity:** Epilimnetic turbidity was stable and low from June through September and average epilimnetic turbidity was the lowest measured since monitoring began. Metalimnetic turbidity was low from June through August and then increased to slightly elevated levels in September potentially due to algal/cyanobacteria growth. Hypolimnetic turbidity was also low from June to August but also increased in September but remained within an average range for that station.
- **pH:** Epilimnetic pH was within the desirable range 6.5-8.0 units on each sampling event, however historical trend analysis indicates significantly decreasing (worsening) epilimnetic pH since monitoring began. Metalimnetic pH fluctuated below the desirable range in September. Hypolimentic pH was less than desirable.

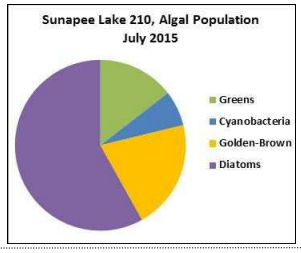


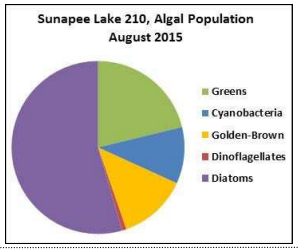
NH Water Quality Standards: Numeric criteria for specific parameters. Results exceeding criteria are considered a water quality violation.
Chloride: > 230 mg/L (chronic)
E. coli: > 88 cts/100 mL – public beach
E. coli: > 406 cts/100 mL – surface waters
Turbidity: > 10 NTU above natural level
pH: between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

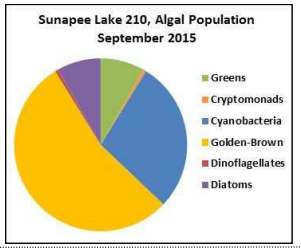
NH Median Values: Median values for specific parameters generated from historic lake monitoring data.
Alkalinity: 4.9 mg/L
Chlorophyll-a: 4.58 mg/m^3
Conductivity: 40.0 uS/cm
Chloride: 4 mg/L
Total Phosphorus: 12 ug/L
Transparency: 3.2 m
pH: 6.6

Station Name	Table 1. 2015 Average Water Quality Data for SUNAPEE LAKE-STN 210						
	Alk. mg/l	Chlor-a ug/l	Cond. uS/cm	Total P ug/l	Trans. m VS	Turb. ntu	pH
Epilimnion	5.7	2.02	95.2	5	8.90	0.33	6.72
Metalimnion			94.1	5		0.84	6.61
Hypolimnion			95.2	5		0.53	6.38









Historical Water Quality Trend Analysis

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