Volunteer Lake Assessment Program Individual Lake Reports

HALFMOON LAKE, ALTON, NH

MORPHOMETRIC DATA

Watershed Area (Ac.):	4,352	**Max. Depth (m):**	8.2	**Flushing Rate (yr^{-1}):**	2
Surface Area (Ac.):	253	**Mean Depth (m):**	4.4	**P Retention Coef:**	0.57
Shore Length (m):	6,000	**Volume (m^3):**	4,545,000	**Elevation (ft):**	640

TROPHIC CLASSIFICATION

Year	Trophic class
1978	OLIGOTROPHIC
1992	MESOTROPHIC

KNOWN EXOTIC SPECIES

Variable Milfoil

The Waterbody Report Card tables are generated from the 2012 305(b) report on the status of N.H. waters, and are based on data collected from 2001-2011.

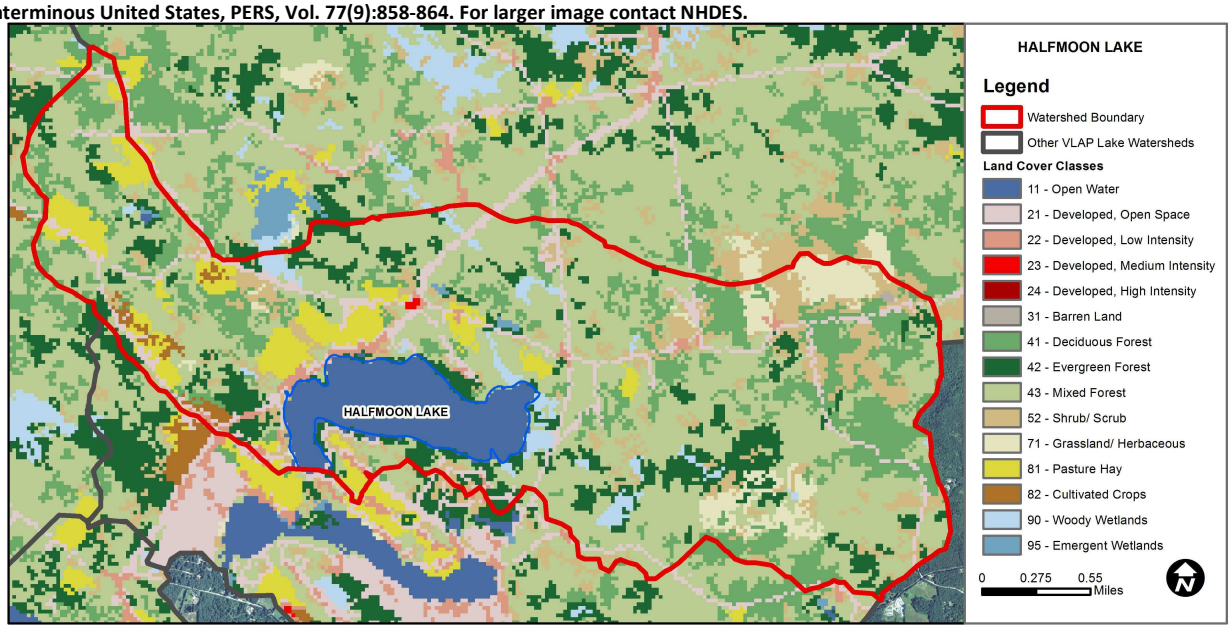
Designated Use	Parameter	Category	Comments
Aquatic Life	Phosphorus (Total)	Slightly Bad	>/=5 samples and median is >threshold.
	pH	Slightly Bad	>10% of samples exceed criteria by a small margin (minimum of 2 exceedances).
	D.O. (mg/L)	Encouraging	< 10 samples and no exceedance of criteria. More data needed.
	D.O. (% sat)	Slightly Bad	>10% of samples exceed criteria by a small margin (minimum of 2 exceedances).
	Chlorophyll-a	Slightly Bad	>5 samples and median is > threshold.
Primary Contact Recreation	E. coli	Very Good	All bacteria samples <75% of geometric mean criteria, but not enough to calculate geometric mean. Or, all bacteria samples are < single sample criteria and calculated Geometric means are less than geometric mean criteria.
	Cyanobacteria	Slightly Bad	Cyanobacteria bloom(s).
	Chlorophyll-a	Very Good	At least 10 samples with 0 exceedances of criteria.

BEACH PRIMARY CONTACT ASSESSMENT STATUS

HALFMOON LAKE - CAMP MI-TE-NA BEACH	E. coli	Very Good	All bacteria samples <75% of geometric mean criteria, but not enough to calculate geometric mean. Or, all bacteria samples are < single sample criteria and calculated Geometric means are less than geometric mean 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	7.29	Barren Land	0.05	Grassland/Herbaceous	3.4
Developed-Open Space	6.06	Deciduous Forest	14.96	Pasture Hay	5.88
Developed-Low Intensity	1.06	Evergreen Forest	10.21	Cultivated Crops	0.67
Developed-Medium Intensity	0.05	Mixed Forest	39.34	Woody Wetlands	2.08
Developed-High Intensity	0	Shrub-Scrub	8.77	Emergent Wetlands	0.16

VOLUNTEER LAKE ASSESSMENT PROGRAM INDIVIDUAL LAKE REPORTS
HALFMOON LAKE, BARNSTEAD, NH
2013 DATA SUMMARY

OBSERVATIONS AND RECOMMENDATIONS (*Refer to Table 1 and Historical Deep Spot Data Graphics)*

- **CHLOROPHYLL-A:** Chlorophyll levels were slightly elevated in June potentially due to nutrients associated with stormwater runoff from significant storm events, and decreased slightly as the summer progressed. Historical trend analysis indicates stable chlorophyll with low variability between years.
- **CONDUCTIVITY/CHLORIDE:** Deep spot and tributary conductivity levels were slightly greater than the state median except Fern Hill Inlet which was slightly less than the state median. Historical trend analysis indicates significantly increasing (worsening) epilimnetic conductivity since monitoring began.
- **E. COLI:** E. coli levels were much less than state standards for public beaches and surface waters at all stations.
- **TOTAL PHOSPHORUS:** Epilimnetic phosphorus was slightly elevated in July and average levels increased from 2012, however remained below the state median. Historical trend analysis indicates stable epilimnetic phosphorus with low variability between years. Hypolimnetic phosphorus was elevated in July and August and above average for this station. The turbidity of the samples was also elevated indicating potential sediment and/or organic material. Rt. 28 Inlet phosphorus was elevated in August during low flow. Fern Hill Inlet phosphorus was elevated in July and August.
- **TRANSPARENCY:** Transparency was lower in 2013 potentially due to significant early summer storm events, the resulting stormwater runoff and higher water levels. Historical trend analysis indicates relatively stable transparency with moderate variability between years.
- **TURBIDITY:** Epilimnetic turbidity was slightly elevated in June potentially due to algal growth and stormwater runoff from significant storm events. Hypolimnetic turbidity was elevated in July and August and much greater than normal. Bottom sediment, organic material and/or organic compounds released from bottom sediment under anoxic (no oxygen) conditions. Tributary turbidity was generally elevated in August during low flow conditions.
- **PH:** Hypolimnetic and tributary pH were less than desirable range 6.5 – 8.0 units. Historical trend analysis indicates highly variable epilimnetic pH between years.
- **RECOMMENDED ACTIONS:** The above average rainfall resulted in higher water levels and slightly elevated algal growth in June and lower transparency in June and July. The increased frequency and intensity of storm events highlights the importance of managing stormwater runoff in the watershed. Work with summer camps to develop a youth program to install stormwater BMPs at lake front properties. DES' "Homeowner's Guide to Stormwater Management" is a great resource. The increasing conductivity trend is concerning; add chloride monitoring to routine sampling program to assess impacts of winter maintenance activities. Keep up the great work!

Table 1. 2013 Average Water Quality Data for HALFMOON LAKE

Station Name	Alk.	Chlor-a	Cond.	E. Coli	Total P	Trans.		Turb.	pH
	mg/l	ug/l	uS/cm	#/100ml	ug/l	m		ntu	
						NVS	VS		
Boys Camp				13					
Crescent Beach				2					
Dalton Beach				5					
Dugans Inlet			73.4		21			1.62	6.42
Epilimnion	5.17	4.25	50.2		11	3.00	3.63	1.05	6.68
Hypolimnion			63.3		25			7.32	6.22
Fern Hill Inlet			32.1		30			1.58	6.43
Hollywood Beach				7					
Horse Farm Inlet			77.0		23			2.92	6.11
Public Beach				5					
Rt 28 Inlet			66.8		52			3.79	6.36
Rustic Shores				17					

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

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: 6.5-8.0 (unless naturally occurring)

HISTORICAL WATER QUALITY TREND ANALYSIS

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