Volunteer Lake Assessment Program Individual Lake Reports

WHITE OAK POND, HOLDERNESS, NH

MORPHOMETRIC DATA

Watershed Area (Ac.):	3,008	**Max. Depth (m):**	10.7	**Flushing Rate (yr^{-1}):**	1.3
Surface Area (Ac.):	291	**Mean Depth (m):**	4	**P Retention Coef:**	0.66
Shore Length (m):	5,100	**Volume (m^3):**	4,697,500	**Elevation (ft):**	583

TROPHIC CLASSIFICATION

Year	Trophic class
1979	MESOTROPHIC
1990	MESOTROPHIC

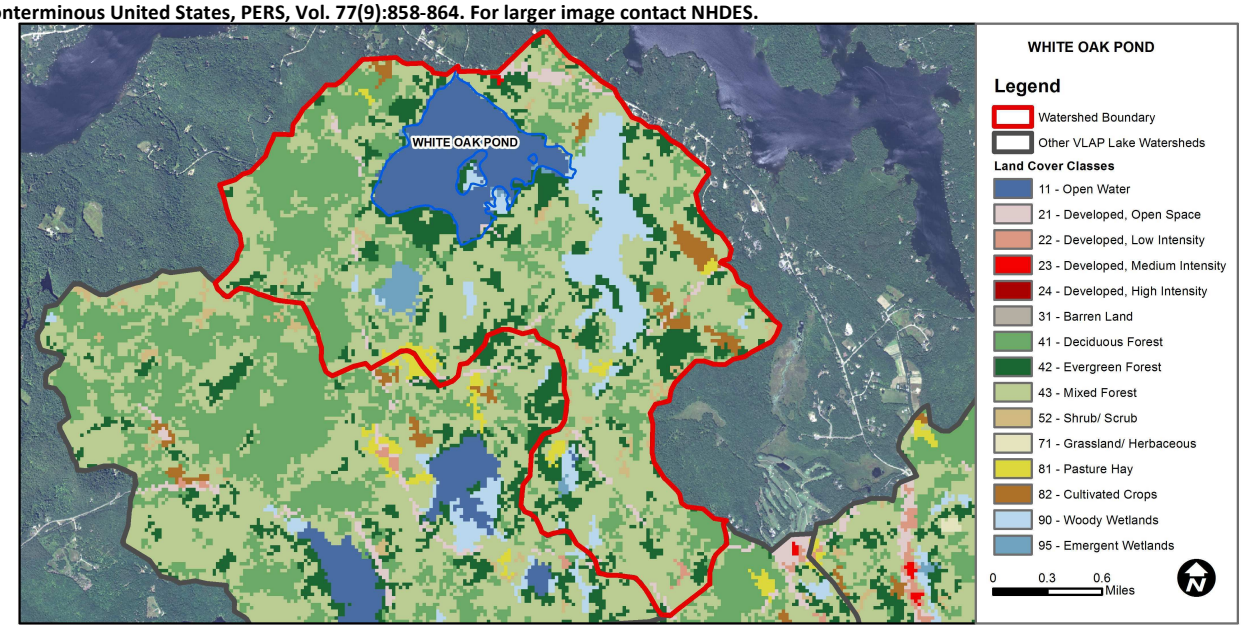
KNOWN EXOTIC SPECIES

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)	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	Cautionary	Limited data for this parameter predicts exceedance of water quality standards or thresholds; however more data are necessary to fully assess the 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	No Data	No data for this parameter.
	Chlorophyll-a	Very Good	All sampling data meet water quality standards or thresholds for this parameter.

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.



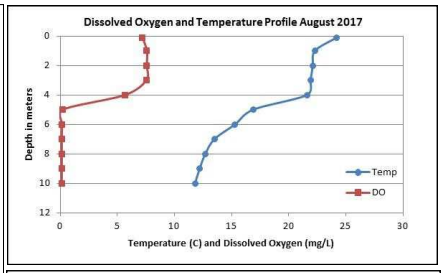
Land Cover Category	% Cover	Land Cover Category	% Cover	Land Cover Category	% Cover
Open Water	9.79	Barren Land	0	Grassland/Herbaceous	0
Developed-Open Space	1.52	Deciduous Forest	19.95	Pasture Hay	0.9
Developed-Low Intensity	0.14	Evergreen Forest	13.33	Cultivated Crops	1.7
Developed-Medium Intensity	0.04	Mixed Forest	42.43	Woody Wetlands	7.71
Developed-High Intensity	0	Shrub-Scrub	1.26	Emergent Wetlands	1.3

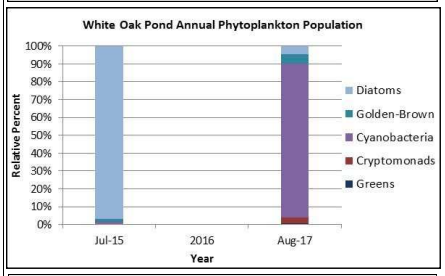
Volunteer Lake Assessment Program Individual Lake Reports
White Oak Pond, Holderness
2017 Data Summary

Recommended Actions: Pond phosphorus and chlorophyll levels were elevated following above average spring and early summer rainfall indicating spring snow-melt and stormwater runoff transports excess nutrients to the pond. While phosphorus levels have slightly improved at some stations, data indicates phosphorus and chlorophyll levels have also increased steadily since 2013. This highlights the importance of managing nutrient sources and controlling stormwater runoff from shoreline and watershed properties. Inventory shoreline areas and roads adjacent to the pond to identify sites prone to stormwater runoff and erosion, and then prioritize implementation of best management practices to reduce stormwater impacts. Educate watershed residents on properly maintaining septic systems, best management practices for agricultural activities, best boating practices, and maintaining vegetative buffers. Conductivity levels have increased and it appears that the Dump Trib. and E. Holderness Rd. sites are contributing the most load when it comes to chloride. Make sure salt storage piles are covered properly to reduce runoff and infiltration into soils. Encourage road agents to obtain NH Voluntary Salt Applicator Licenses through UNH Technology Transfer Center's Green SnowPro Certification program. Keep up the great work!

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

- **Chlorophyll-a:** Chlorophyll levels were elevated in June and approached levels indicative of an algal bloom. Chlorophyll decreased to a moderate level in July and remained stable in August. Average chlorophyll level remained stable with 2016 and was slightly greater than the state median and the threshold for mesotrophic lakes. Historical trend analysis indicates relatively stable chlorophyll levels with moderate variability between years.
- **Conductivity/Chloride:** Epilimnetic (upper water layer), Metalimnetic (middle water layer), Hypolimnetic (lower water layer), #2, #4, and #6 conductivity and/or chloride levels were within an average range and only slightly greater than the state median. #3 Dump Inlet conductivity and chloride levels were moderate but upstream #3 Dump Trib. levels were slightly elevated. #9 conductivity and chloride levels were also slightly elevated. Historical trend analysis indicates significantly increasing (worsening) epilimnetic conductivity levels since monitoring began.
- **Color:** Apparent color was measured in the epilimnion in July and indicates the pond water is moderately tea colored or brown.
- **Total Phosphorus:** Epilimnetic phosphorus levels were slightly elevated in June and then decreased to a low level as the summer progressed. Average epilimnetic phosphorus increased from 2016 but remained slightly less than the state median and the threshold for mesotrophic lakes. Historical trend analysis indicates significantly decreasing (improving) epilimnetic phosphorus levels since monitoring began. Metalimnetic phosphorus levels were also slightly elevated in June and then decreased to a moderate level and remained stable. Hypolimnetic phosphorus levels increased as the summer progressed and were within an average range for that station. Tributary phosphorus levels were generally higher in June and slightly elevated in #3 Inlet and Trib., and #9. Phosphorus levels generally decreased to low levels in all tributaries as the summer progressed.
- **Transparency:** Transparency measured with (VS) and without (NVS) the viewscope was below average (worse) in June and July when surface conditions were unfavorable for viewing, and then increased (improved) to a higher level in August. Average transparency decreased slightly from 2016 and was approximately equal to the state median. Historical trend analysis indicates stable transparency since monitoring began.
- **Turbidity:** Epilimnetic turbidity levels were higher in June when algal growth was highest but remained within a low range. Metalimnetic turbidity levels were slightly elevated in August. Hypolimnetic turbidity levels were elevated in July and August likely due to the formation and accumulation of organic compounds under anoxic conditions. Tributary turbidity levels generally fluctuated within a low range, however were slightly elevated in #9 in July and August potentially due to naturally colored waters.
- **pH:** Epilimnetic, #2, #3 Dump Inlet, #4, #6, and #9 pH levels were within the desirable range 6.5-8.0 units. Epilimnetic pH has historically fluctuated below the desirable range and historical trend analysis indicates relatively stable epilimnetic pH levels with moderate variability between years. Metalimnetic, Hypolimnetic, and #3 Dump Trib. pH levels were slightly acidic and 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)

Station Name	Table 1. 2017 Average Water Quality Data for WHITE OAK POND-HOLDERNESS									
	Alk. mg/l	Chlor-a ug/l	Chloride mg/l	Color PCU	Cond. uS/cm	Total P ug/l	Trans. m		Turb. ntu	pH
							NVS	VS		
Epilimnion	5.6	6.95	10	50	54.8	10	3.27	3.68	0.72	7.06
Metalimnion					57.0	13			1.50	6.25
Hypolimnion					62.7	17			5.20	6.25
#2 Lamb Swamp Inlet			8		59.3	9			0.61	6.66
#3 Dump Inlet			20		97.9	15			0.80	6.54
#3 Dump Trib.			50		224.0	26			0.40	6.36
#4 Outlet (Dam)					55.4	7			0.56	6.72
#6 Stone Bridge Inlet			10		53.7	8			0.92	6.71
#9 E Holderness Rd. Trib.			27		141.4	21			1.96	6.56

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 moderately variable.	Transparency	Stable	Trend not significant; data show low variability.
			Phosphorus (epilimnion)	Improving	Data significantly decreasing.