Volunteer Lake Assessment Program Individual Lake Reports

JACKMAN RESERVOIR, HILLSBOROUGH, NH

MORPHOMETRIC DATA

Watershed Area (Ac.):	44,223	**Max. Depth (m):**	9.6	**Flushing Rate (yr^{-1})**	10.6
Surface Area (Ac.):	520	**Mean Depth (m):**	4.6	**P Retention Coef:**	0.36
Shore Length (m):	11,300	**Volume (m^3):**	9,008,500	**Elevation (ft):**	770

TROPHIC CLASSIFICATION

Year	Trophic class
1988	OLIGOTROPHIC
2005	OLIGOTROPHIC

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

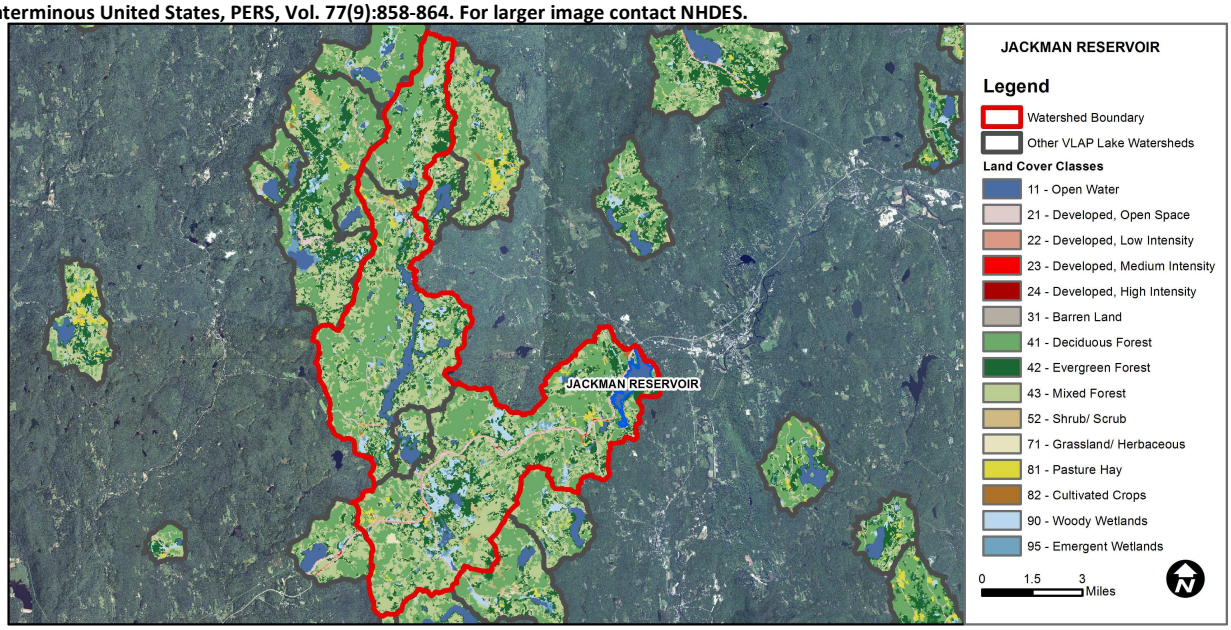
Designated Use	Parameter	Category	Comments
Aquatic Life	Phosphorus (Total)	Cautionary	The calculated median is fewer than 5 samples but > indicator and the chlorophyll a indicator is okay. More data needed.
	pH	Slightly Bad	>10% of samples exceed criteria by a small margin (minimum of 2 exceedances).
	Oxygen, Dissolved	Encouraging	There are < 10 samples with 0 exceedances of criteria. More data needed.
	Dissolved oxygen satura	Encouraging	There are < 10 samples with 0 exceedances of criteria. More data needed.
	Chlorophyll-a	Encouraging	The calculated median is fewer than 5 samples and is < indicator. More data needed.
Primary Contact Recreation	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.
	Chlorophyll-a	Encouraging	There are < 10 samples with 0 exceedances of indicator. More data needed.

BEACH PRIMARY CONTACT ASSESSMENT STATUS

JACKMAN RESERVOIR - MANAHAN PARK TOWN 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.

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	4.77	Barren Land	0.02	Grassland/Herbaceous	0.22
Developed-Open Space	3.15	Deciduous Forest	34.97	Pasture Hay	1.13
Developed-Low Intensity	0.91	Evergreen Forest	15.8	Cultivated Crops	0.16
Developed-Medium Intensity	0.04	Mixed Forest	31.84	Woody Wetlands	4.52
Developed-High Intensity	0	Shrub-Scrub	1.24	Emergent Wetlands	1.08

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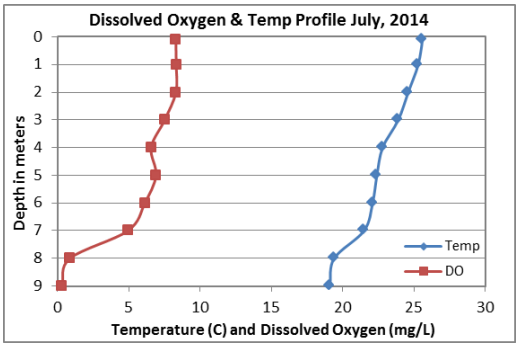
Franklin Pierce Lake, Hillsborough

2014 Data Summary

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

- **Chlorophyll-a:** Chlorophyll levels were slightly elevated in June, and then decreased to average levels in July and August. The 2014 average chlorophyll level decreased from that measured in 2013 but remained slightly greater than the state median.
- **Conductivity/Chloride:** Deep spot and North Branch conductivity and chloride levels were low and approximately equal to the state medians.
- **Total Phosphorus:** Epilimnetic (upper water layer) phosphorus levels were slightly elevated in June and August but low in July. The 2014 average epilimnetic phosphorus levels were slightly less than the state median and remained stable from 2013. Hypolimnetic (lower water layer) phosphorus levels were low in June and increased to slightly elevated levels as the summer progressed. This could indicate phosphorus was released from bottom sediments as dissolved oxygen levels decreased below 1.0 mg/L as the summer progressed. North Branch phosphorus levels were elevated in June following a significant storm event and during high flows.
- **Transparency:** Transparency measured without the viewscope (NVS) remained fairly stable from June to August, but was lower than normal and less than the state median. The slightly above average chlorophyll levels may have contributed to the lower transparency. Transparency measured with the viewscope (VS) was better than without and may be a better representation of actual conditions.
- **Turbidity:** Epilimnetic turbidity was slightly elevated in August and Hypolimnetic turbidity increased as the summer progressed further supporting the idea that as the summer progressed and dissolved oxygen levels were depleted, organic compounds accumulated in the hypolimnion. North Branch turbidity was elevated in June following a significant storm event and slightly elevated in July.
- **pH:** Deep spot and North Branch pH levels were less than desirable range 6.5-8.0 units.
- **Recommended Actions:** As the summer progresses, microbial activity in bottom sediments uses dissolved oxygen and therefore dissolved oxygen levels in the hypolimnion decrease. When dissolved oxygen levels decrease below 1.0 mg/L, phosphorus typically bound in sediments can be released into the water column. This can increase nutrients available for algal growth. Therefore, it is important to minimize nutrient inputs to the lake from the surrounding watershed. North Branch phosphorus levels were elevated following a significant storm even in June. This indicates stormwater runoff may be an issue. The increased frequency and intensity of storm events highlights the importance of managing stormwater runoff for lake and watershed properties. DES' "NH Homeowner's Guide to Stormwater Management" is a great resource for homeowners. Maintain the increased monitoring frequency during the summer as it helps to better assess seasonal and historical water quality trends. Keep up the great work!



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. 2014 Average Water Quality Data for JACKMAN RESERVOIR								
	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	2.5	4.62	5	33.2	10	2.82	3.41	1.12	6.37
Hypolimnion				31.5	11			1.73	6.09
North Branch			5	32.3	17			2.07	6.35

Historical Water Quality Trend Analysis

Parameter	Trend	Explanation	Parameter	Trend	Explanation
Conductivity	N/A	Ten consecutive years of data necessary for analysis.	Chlorophyll-a	N/A	Ten consecutive years of data necessary for analysis.
pH (epilimnion)	N/A	Ten consecutive years of data necessary for analysis.	Transparency	N/A	Ten consecutive years of data necessary for analysis.
			Phosphorus (epilimnion)	N/A	Ten consecutive years of data necessary for analysis.