Volunteer Lake Assessment Program Individual Lake Reports

TODD LAKE, NEWBURY, NH

MORPHOMETRIC DATA

Watershed Area (Ac.):	384	**Max. Depth (m):**	6.1	**Flushing Rate (yr^{-1}):**	0.5
Surface Area (Ac.):	168	**Mean Depth (m):**	2.2	**P Retention Coef:**	0.88
Shore Length (m):	5,100	**Volume (m^3):**	1,466,500	**Elevation (ft):**	670

TROPHIC CLASSIFICATION

Year	Trophic class
1991	MESOTROPHIC
2009	MESOTROPHIC

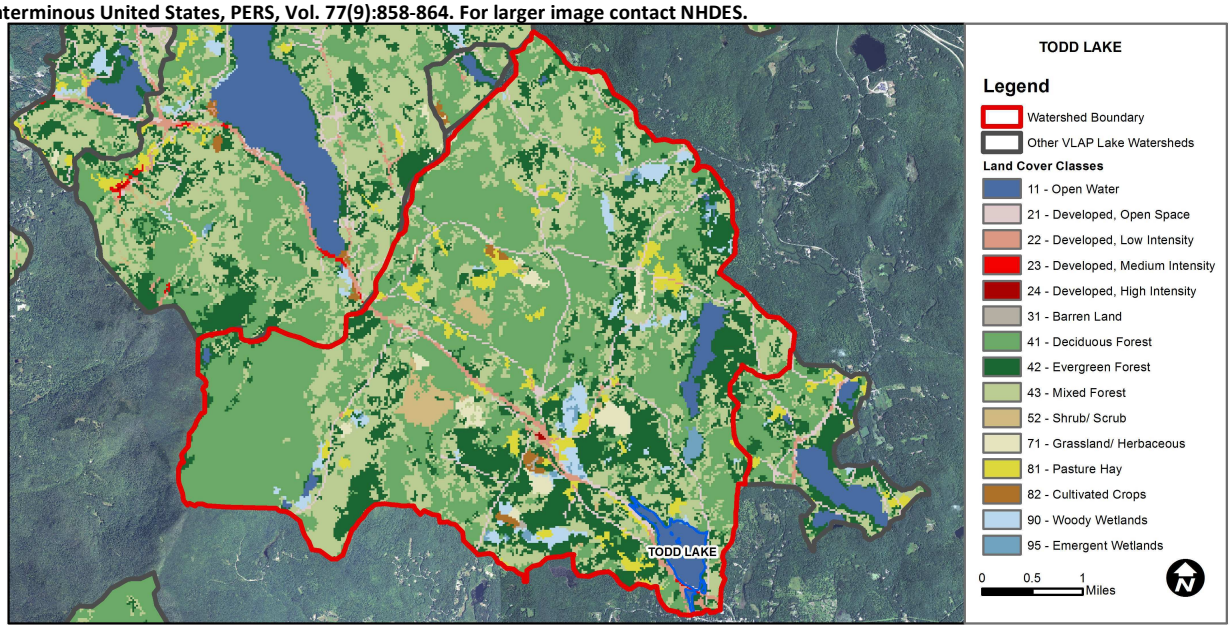
KNOWN EXOTIC SPECIES

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)	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	Very Good	There are a total of at least 10 samples with 0 exceedances of criteria.
	Dissolved oxygen satura	Good	There are at least 10 samples with one, but < 10% of samples, exceeding criteria.
	Chlorophyll-a	Good	The calculated median is from 5 or more samples and is < indicator and > 1/2 indicator.
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	Good	There are at least 10 samples with one, but < 10% of samples, exceeding indicator.

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	2.52	Barren Land	0.05	Grassland/Herbaceous	1.44
Developed-Open Space	2.83	Deciduous Forest	41.51	Pasture Hay	2.92
Developed-Low Intensity	1.03	Evergreen Forest	18.9	Cultivated Crops	0.31
Developed-Medium Intensity	0.04	Mixed Forest	23.99	Woody Wetlands	2.36
Developed-High Intensity	0.02	Shrub-Scrub	1.5	Emergent Wetlands	0.6

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2014 Data Summary

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

- **Chlorophyll-a:** Chlorophyll levels increased from low levels in June to average levels in September. The 2014 average chlorophyll level decreased from 2013 and was slightly less than the state median. Historical trend analysis indicates relatively stable chlorophyll levels with moderate variability between years.
- **Conductivity/Chloride:** Deep spot conductivity levels were average and approximately equal to the state median. Historical trend analysis indicates relatively stable epilimnetic (upper water layer) conductivity with moderate variability between years. Gillingham Dr. Inlet, Outlet and Reservoir Brook conductivity levels were low to average. Andrew Brook conductivity levels were slightly above average likely due to wetland influences.
- **E. coli:** The E. coli sample collected contained no bacteria.
- **Total Phosphorus:** Epilimnetic phosphorus remained stable from June to September and was approximately equal to the state median. Historical trend analysis indicates stable epilimnetic phosphorus since monitoring began. Hypolimnetic (lower water layer) phosphorus remained stable from June to July and then was slightly elevated in September potentially due to the release of phosphorus from bottom sediments when dissolved oxygen levels decreased below 1.0 mg/L, a process called internal phosphorus loading. Andrew Brook and Gillingham Dr. Inlet phosphorus levels were slightly elevated in September and lab notes indicate organic matter in the samples that likely contributed to the higher phosphorus levels. Outlet phosphorus levels were slightly elevated in June and lab notes indicate organic matter in the sample as well. Reservoir Brook phosphorus levels remained within an average range for that station.
- **Transparency:** Transparency was good in June, decreased (worsened) in July and then increased (improved) in September. The 2014 average transparency improved slightly from 2013 but remained slightly lower than the state median. Historical trend analysis indicates highly variable transparency since monitoring began. Transparency measured with the viewscope (VS) was generally better than that measured without (NVS) and likely a better representation of actual conditions.
- **Turbidity:** Epilimnetic turbidity was slightly elevated in July likely due to algal growth but remained within an average range for the station. Hypolimnetic turbidity was average for that station. Andrew Brook turbidity was slightly elevated on each sampling event and has increased since 2010 potentially due to the increased frequency and intensity of storm events and the flushing of wetland systems. Gillingham Dr. Inlet turbidity was elevated in September, Outlet turbidity was slightly elevated in June, and Reservoir Brook turbidity was slightly elevated in July. Low water levels and/or recent storm events may have contributed to these turbidities.
- **pH:** Epilimnetic and Hypolimnetic pH levels fluctuated below the desirable range 6.5-8.0 units and historical trend analysis indicates significantly decreasing (worsening) epilimnetic pH since monitoring began. Tributary pH levels were generally within the desirable range.
- **Recommended Actions:** Overall, water quality has generally remained within an average range for most NH lakes. However, the increased frequency and intensity of storm events may be increasing the flushing of wetland systems as well as the amount of stormwater runoff reaching the lake. This could result in more acidic and turbid waters, and lower lake transparency. This highlights the importance of managing stormwater runoff in the watershed. DES' "Homeowner's Guide to Stormwater Management" is a great resource for lake and watershed residents. Keep up the great work!

Station Name	Table 1. 2014 Average Water Quality Data for TODD LAKE								
	Alk. mg/l	Chlor-a ug/l	Cond. uS/cm	E. Coli #/100ml	Total P ug/l	Trans. m		Turb. ntu	pH
						NVS	VS		
Epilimnion	6.3	4.19	45.3		12	2.88	3.14	1.16	6.55
Hypolimnion			47.2		17			1.88	6.25
Andrew Brook			67.2		16			1.61	6.64
Generic				0					
Gillingham Dr. Inlet			29.6		18			1.49	6.36
Outlet			46.8		12			1.19	6.64
Reservoir Brook			29.1		14			1.00	6.65

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

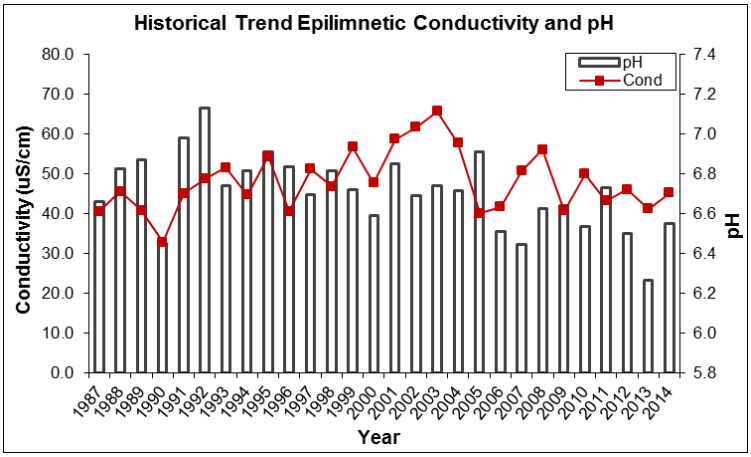
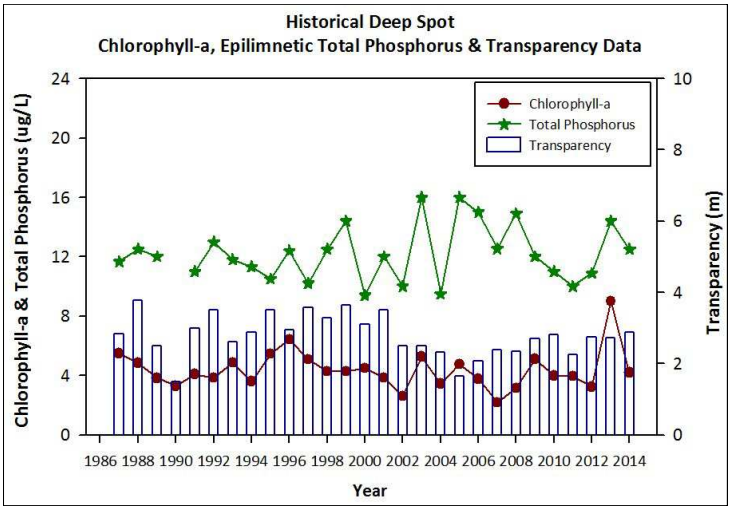
Conductivity: 40.0 uS/cm

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	Stable	Trend not significant; data moderately variable.	Chlorophyll-a	Stable	Trend not significant; data moderately variable.
pH (epilimnion)	Worsening	Data significantly decreasing.	Transparency	Stable	Trend not significant; data highly variable.
			Phosphorus (epilimnion)	Stable	Trend not significant; data show low variability.