

### Otter Pond Water Quality Summary 2015

The following data table represents average water quality results for each station sampled at Otter Pond in 2015. If data exceeds state water quality standards, thresholds or are considered within an elevated range, the cells are highlighted in the table. Following the table are parameter explanations.

Station Name	Table 1. 2015 Average Water Quality Data for <b>Otter Pond</b>									
	Alk.	Chlor-a	Chloride	Cond.	E. Coli	Total P	Trans.		Turb.	pH
	mg/l	ug/l	mg/l	uS/cm	#/100ml	ug/l	NVS	VS	ntu	
Epilimnion	6.8	3.93	30	138.7		10	3.30	3.51	1.07	6.61
Hypolimnion				136.4		9			1.61	6.47
Baptist Brook			69	279.7		10			2.61	6.51
Beach					3					
Little Sunapee Brook			33	165.0		10			1.08	6.63
Outlet			25	138.7		7			0.94	6.75
Star Lake 2			50	220.0		20			5.09	6.35
Star Lake Inlet			75	167.6		18			2.36	6.28

Deep spot phosphorus levels were less than the threshold of 12 ug/L for mesotrophic lakes and within a low range. Baptist Bk., Little Sunapee Bk. and Outlet phosphorus levels were within a low range. Star Lake 2 and Star Lake Inlet phosphorus levels were higher than the rest of the stations, however within a average range for surface waters.

Conductivity levels at all sampling locations are higher than desirable (reference 100.0 uS/cm) for New Hampshire lakes. This is likely caused by impervious surfaces (roadways, walkways, driveways, parking lots) in the watershed where road salt is applied during the winter. This enters the lake through spring snow melt, groundwater and stormwater runoff. The chloride measurements do not exceed the state

acute and chronic chloride criteria of 860 and 230 mg/L respectively, which is good, however they are greater than the background level of 4 mg/L for undisturbed surface waters. Higher chloride values are generally associated with salted highways and, to a lesser extent, with septic inputs.

Transparency, or water clarity, is average for NH lakes, but has decreased (worsened) since monitoring began. Lake turbidity hovers around the median value of 1.0 NTU for most New Hampshire lakes. Turbidity was particularly high in the Star Lake 2 tributary.

pH was generally within the desirable range of 6.5-8.0 units. pH was slightly less than desirable in the Hypolimnion, and particularly lower in Star Lake 2 tributary and Star Lake Inlet.

E. coli at the beach was well below the standard of 88 cts/100 mL, which is great.

### **Acid Neutralizing Capacity (ANC) or Alkalinity (Alk.)**

**Definition:** Buffering capacity or Acid Neutralizing Capacity (ANC) describes the ability of a solution to resist changes in pH by neutralizing the acidic input to the lake. Historically, the waters of New Hampshire have had low ANC because of the prevalence of granite bedrock. The relatively low ANC values mean that New Hampshire surface waters are vulnerable to the effects of acid precipitation.

<b><u>ANC (mg/l as CaCO<sub>3</sub>)</u></b>	<b><u>Category</u></b>
<0	Acidified
0-2	Extremely Vulnerable
2.1-10	Moderately Vulnerable
10.1-25	Low Vulnerability
>25	Not Vulnerable

### **Chlorophyll-a**

**Definition:** VLAP measures chlorophyll-a, a pigment found in plants, as an indicator of algal abundance. Because algae is a plant and contains chlorophyll-a, the concentration of chlorophyll-a found in the water provides an estimation of the concentration of algae. New Hampshire lakes and ponds are assessed based on thresholds corresponding to the best trophic class assigned.

<b>Best Trophic Class</b>	<b>Numeric Threshold</b>
Oligotrophic	< 3.3 ug/L
Mesotrophic	</= 5.0 u/gL
Eutrophic	</= 11 ug/L

## Chloride

**Definition:** The chloride ion (Cl<sup>-</sup>) is found naturally in some surface ground waters and in high concentrations in seawater. Research has shown that elevated chloride levels can be toxic to freshwater aquatic life. In order to protect freshwater aquatic life in New Hampshire, the state has adopted acute and chronic chloride criteria of 860 and 230 mg/L respectively. The chloride content in New Hampshire lakes is naturally low, generally less than 2 mg/L in surface waters located in remote areas away from habitation. Higher values are generally associated with salted highways and, to a lesser extent, with septic inputs.

Water Quality Standard Description	Numeric Criteria
Acute Chloride Standard	< 860 mg/L
Chronic Chloride Standard	< 230 mg/L

## Conductivity

**Definition:** Conductivity is the numerical expression of the ability of water to carry an electrical current. It is determined by the number of ionic particles present. The soft waters of New Hampshire have traditionally had low conductivity values. High conductivity may indicate pollution from such sources as road salting, septic systems, wastewater treatment plants, or agriculture runoff.

*Note: Specific categories of good and bad levels cannot be constructed for conductivity, because variations in watershed geology can result in natural fluctuations in conductivity. However, values in New Hampshire lakes exceeding 100 uMhos/cm generally indicate human disturbance.*

## Bacteria (E. coli)

**Definition:** *E. coli* is a natural component of the intestines in humans and other warm-blooded animals. *E. coli* is used as an indicator organism for bacteriological monitoring because it is easily cultured and its presence in the water in defined amounts indicates that sewage MAY be present. If sewage is present in the water, potentially harmful pathogens may also be present.

Water Quality Standard Description	Numeric Criteria – Single Sample	Numeric Criteria – Geometric Mean
Public Beaches	88 cts/100 mL	47 cts/100 mL
Surface Waters	406 cts/100 mL	126 cts/100 mL

## Total Phosphorus

**Definition:** Phosphorus is the most important water quality parameter measured in our lakes. It is the nutrient that limits algae's ability to grow and reproduce. Phosphorus sources around a lake typically include septic systems, animal waste, lawn fertilizer, erosion from roads and construction sites, and natural wetlands. New Hampshire lakes and ponds (deep spot data) are assessed based on thresholds corresponding to the best trophic class assigned.

Best Trophic Class	Numeric Threshold
Oligotrophic	< 8.0 ug/L
Mesotrophic	<= 12.0 u/gL
Eutrophic	<= 28 ug/L

Tributary and nearshore phosphorus levels are generally evaluated based upon these ranges. Anything above average is highlighted in the table above.

TP (ug/L) Range	Category
1-10	Low (good)
11-20	Average
21-40	High
> 40	Excessive

### Water Clarity (Secchi-Disk Transparency)

**Definition:** The Secchi-disk is a 20cm disk with alternating black and white quadrants used to measure water clarity (how far a person can see into the water). Transparency, a measure of water clarity, is affected by the amount of algae, color, and particulate matter within a lake. **The New Hampshire Median value for lakes is 3.2 m.**

Water Clarity (m)	Category
< 2.0	Poor
2.0 – 4.5	Good
> 4.5	Exceptional

### Turbidity

**Definition:** Turbidity in the water is caused by suspended matter (such as clay, silt, and algae) that cause light to be scattered and absorbed, not transmitted in straight lines through water. High turbidity readings are often found in water adjacent to construction sites. Also, improper sampling techniques (such as hitting the bottom sediments or sampling streams with little flow) may also cause high turbidity readings. **The Class B standard for a water quality violation is 10 NTUs over the lake background level.**

### pH

**Definition:** pH is measured on a logarithmic scale of 0 to 14. Lake pH is important to the survival and reproduction of fish and other aquatic life. **A pH below 5.5 severely limits the growth and reproduction of fish.**

pH (units)	Category
< 5.0	Acidified
5.0 – 5.4	Critical
5.5 – 6.4	Endangered

6.5 – 8.0	Satisfactory
-----------	--------------