

# Lake Trophic Survey Reports 2013 – 2015

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August 2016

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Lake Francis is a man-made hydropower reservoir in the town of Pittsburg. The shoreline is very rocky and the water level fluctuates drastically, which is not conducive for rooted plant growth. Lake Francis was previously surveyed in 1983 and 1999, and both surveys rated the lake as oligotrophic. Lake trophic survey sampling protocol changed in 2013, shifting from one deep spot summer and winter sample to three summer deep spot samples over the course of three years with no winter sampling. Although sampling protocol was modified, Lake Francis was still rated as oligotrophic in this most recent survey. Lake Francis remained well oxygenated in the entire water column throughout the summer, and chemical and biological parameters are generally comparable or better than state medians. Parameters are virtually unchanged from the previous 1999 survey; however, total phosphorus has increased approximately 5 ug/L, placing the parameter on the cusp of the NHDES mesotrophic / oligotrophic threshold (8 ug/L).

2015 NHDES Trophic Rating:

**Oligotrophic**

1999 NHDES Trophic Rating:

**Oligotrophic**

### What is a lake trophic survey?

A lake trophic survey evaluates physical, biological and chemical parameters in lakes or ponds greater than 10 acres, to assess a lake's overall productivity, a.k.a. trophic status. Oligotrophic, mesotrophic and eutrophic are the most common trophic classifications. Oligotrophic lakes are nutrient-poor, with few plants and very clear water. Eutrophic lakes are highly productive, with lots of plants and/or algae and less clear water. Mesotrophic lakes are in-between. Trophic surveys provides a record and catalog of water quality parameters, serve as a basis for understanding environmental impacts and help inform water quality management polices. For additional explanations of lake terminology, please visit <http://des.nh.gov/organization/divisions/water/wmb/vlap/glossary.htm>



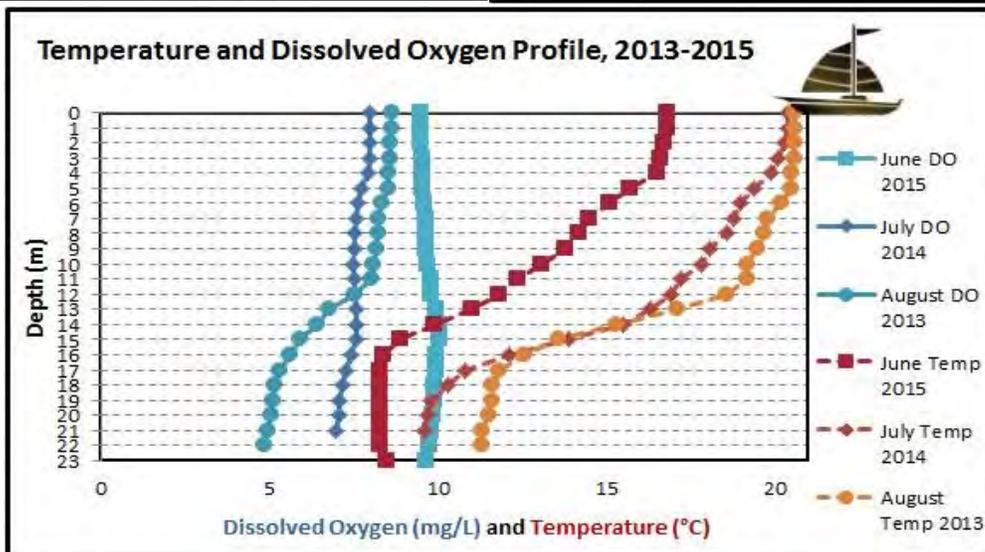
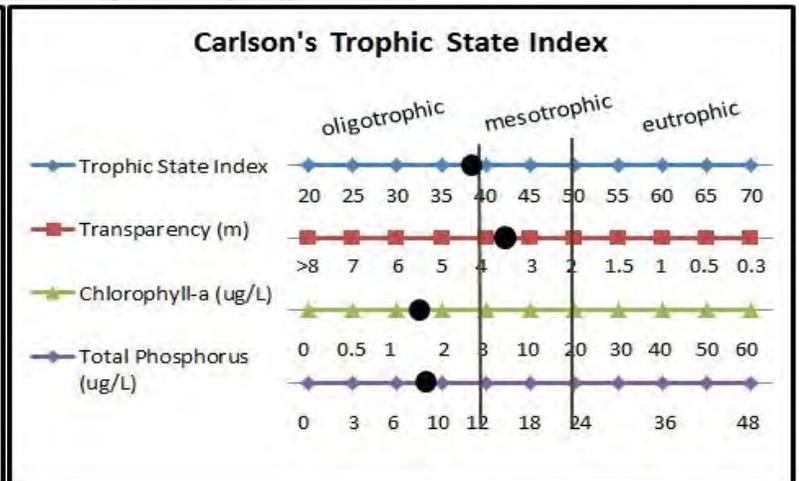
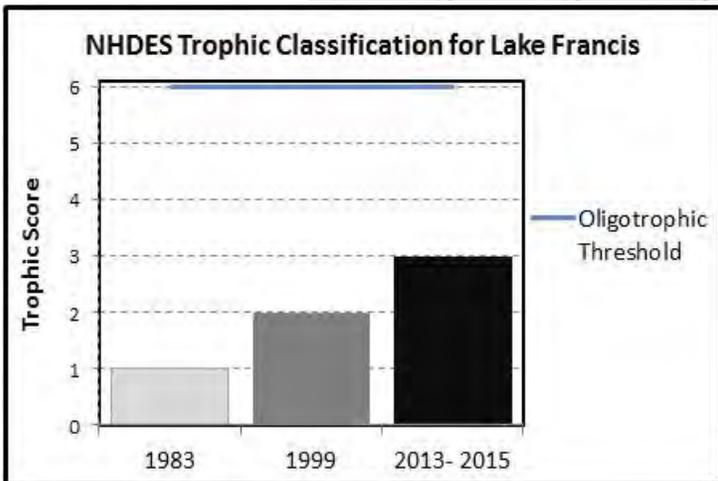
### Physical Characteristics

Elevation:	422 m (1385 ft)	Lake area:	0.0842 km <sup>2</sup>
Mean depth:	12.2 m	Total Volume:	95,220,000 m <sup>3</sup>
Maximum depth:	23 m	Average Hypolimnion Volume:	11,303,000 m <sup>3</sup>
Flushing rate:	2.6 / yr <sup>-1</sup>	Maximum Hypolimnion Volume:	14,502,000 m <sup>3</sup>
P retention coeff:	0.42	Anoxic Volume:	none
% Watershed Poned:	4.30%	Areal water load:	31.73 m/ yr
Shore Length:	23,800 m	Watershed area:	44.03 km <sup>2</sup>
Lake type:	Artificial	Shore Configuration:	2.31

*Trophic Classification*

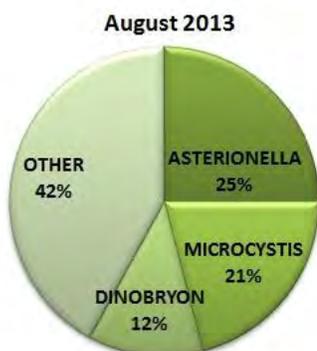
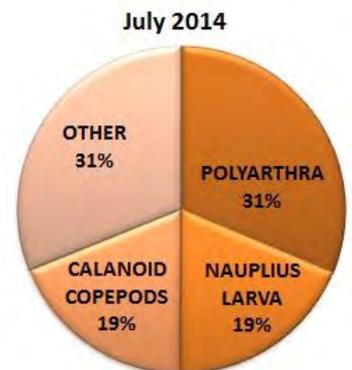
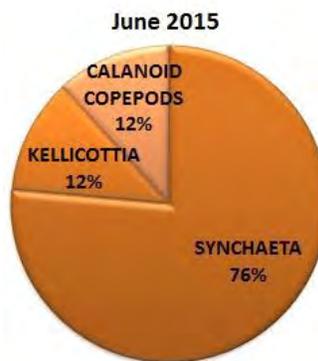
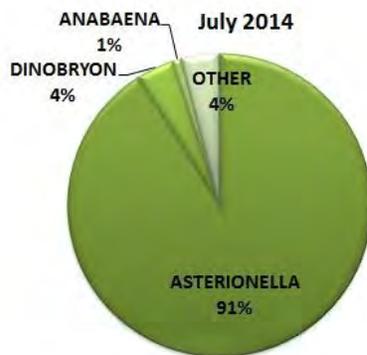
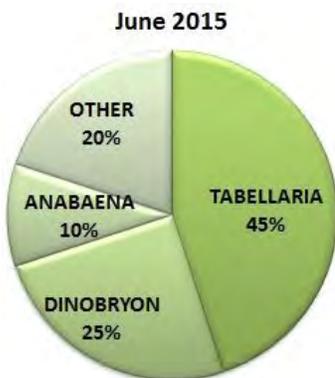
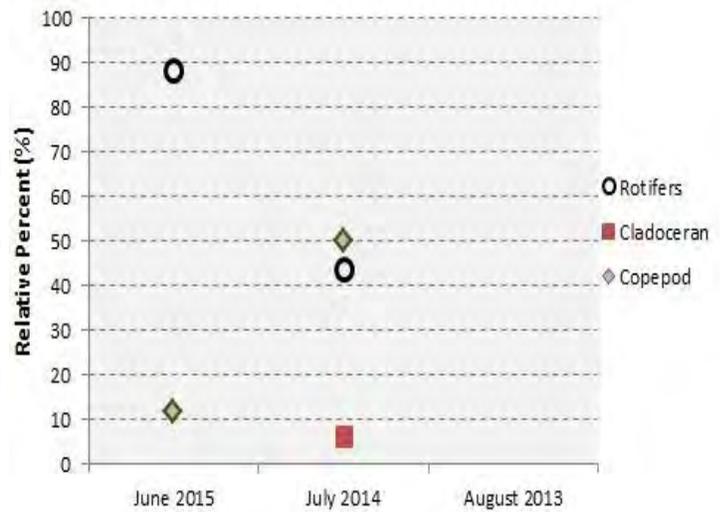
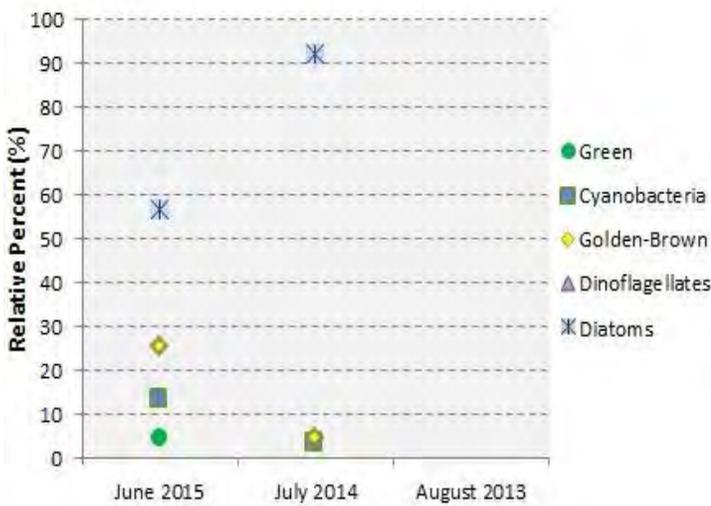
The NHDES Trophic Classification System was initiated in the early 1970s and revised in 1989. This index assigns a numeric values to summer bottom dissolved oxygen (D.O.), Secchi disk transparency (S.D.), aquatic vascular plant abundance (Plant), and epilimnetic chlorophyll-*a* concentration (Chl-*a*), which sum to a final score that determines a lake's trophic status. For stratified lakes, 0-6 points signifies a lake is oligotrophic, 7-12 points for mesotrophic, and 13-24 points for eutrophic. This index allows for direct comparisons to be made to historic data, which better track changes in trophic status. The NHDES Trophic Classification System is one of many ways to determine a lake's trophic status. The Carlson's Trophic State Index (TSI) is a more broadly used trophic assessment tool that considers Secchi disk transparency, chlorophyll-*a* concentration, and total phosphorus (TP); however, the results are less comparable to historic NHDES data. For a more in-depth explanation of the NHDES classification methodology, please visit: [http://des.nh.gov/organization/divisions/water/wmb/lakes/documents/data\\_sources\\_explanation.pdf](http://des.nh.gov/organization/divisions/water/wmb/lakes/documents/data_sources_explanation.pdf)

NHDES Trophic Classification: 2013 - 2015					
Lake Francis, Pittsburg, NH					
D.O.	S.D.	Plant	Chl-a	Total	Class
0	2	1	0	3	Oligotrophic



**Phytoplankton** are photosynthetic plants that contain chlorophyll-*a* but do not have true roots, stems or leaves. They grow on rocks, vascular plants, the lake bottom or free-floating in the water column and are a food source for zooplankton and mussels. As nutrients in the water increase, phytoplankton abundance also increases. Phytoplankton populations undergo natural succession throughout the summer, due to changes in light, nutrient availability, predation and temperature.

**Zooplankton** are microscopic animals that naturally inhabit New Hampshire lakes. They feed on phytoplankton, bacteria and other zooplankton while being an important food source for fish and mussels. Zooplankton also undergo natural succession throughout the summer, due to changes in light, nutrient availability, predation and temperature.

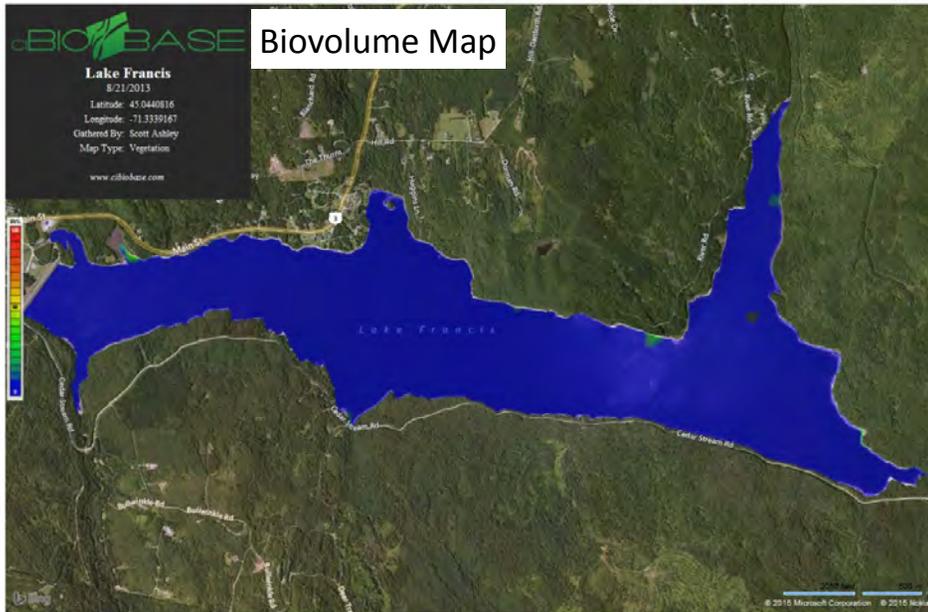


Chemical and Biological Characteristics	Mean	Standard Deviation	Median	Units	NH Median Values
<i>Epilimnetic Depth</i>	6.67	0.58	7.00	meter	x
pH	6.63	0.27	6.71	Units	6.60
Acid Neutralizing Capacity (ANC)	9.40	0.26	9.50	mg/L	4.90
Apparent Color	27.33	8.02	28.00	CPU	28.00
Secchi Depth	3.54	0.74	3.38	meter	3.20
Secchi Depth - Scope	4.37	0.61	4.50	meter	unk
Specific Conductance	33.00	0.85	33.10	µs/ cm	40
Total Kjeldahl Nitrogen (TKN)	0.12	0.16	0.03	mg/L	0.35
Nitrate + Nitrite Nitrogen	0.14	0.04	0.16	mg/L	<0.05
Total Phosphorus	8.39	1.05	7.87	ug/L	12.00
Chloride	3.00	0.00	3.00	mg/L	4.00
Sulfate	1.90		1.90	mg/L	4.00
Calcium	3.95		3.95	mg/L	2.60
Magnesium	0.76		0.76	mg/L	0.54
Potassium	0.31		0.31	mg/L	0.50
Sodium	1.15		1.15	mg/L	3.10
<i>Metalimnetic Depth</i>	8.00	5.20	5.00	meter	x
Chlorophyll-a	1.88	0.30	1.94	ug/L	4.58

The Waterbody Report Card table (below) is generated from the 2014 305(b) report on the status of NH waters and are based on data collected from 2001-2013. Additional information can be found at <http://des.nh.gov/organization/divisions/water/wmb/swqa/index.htm>

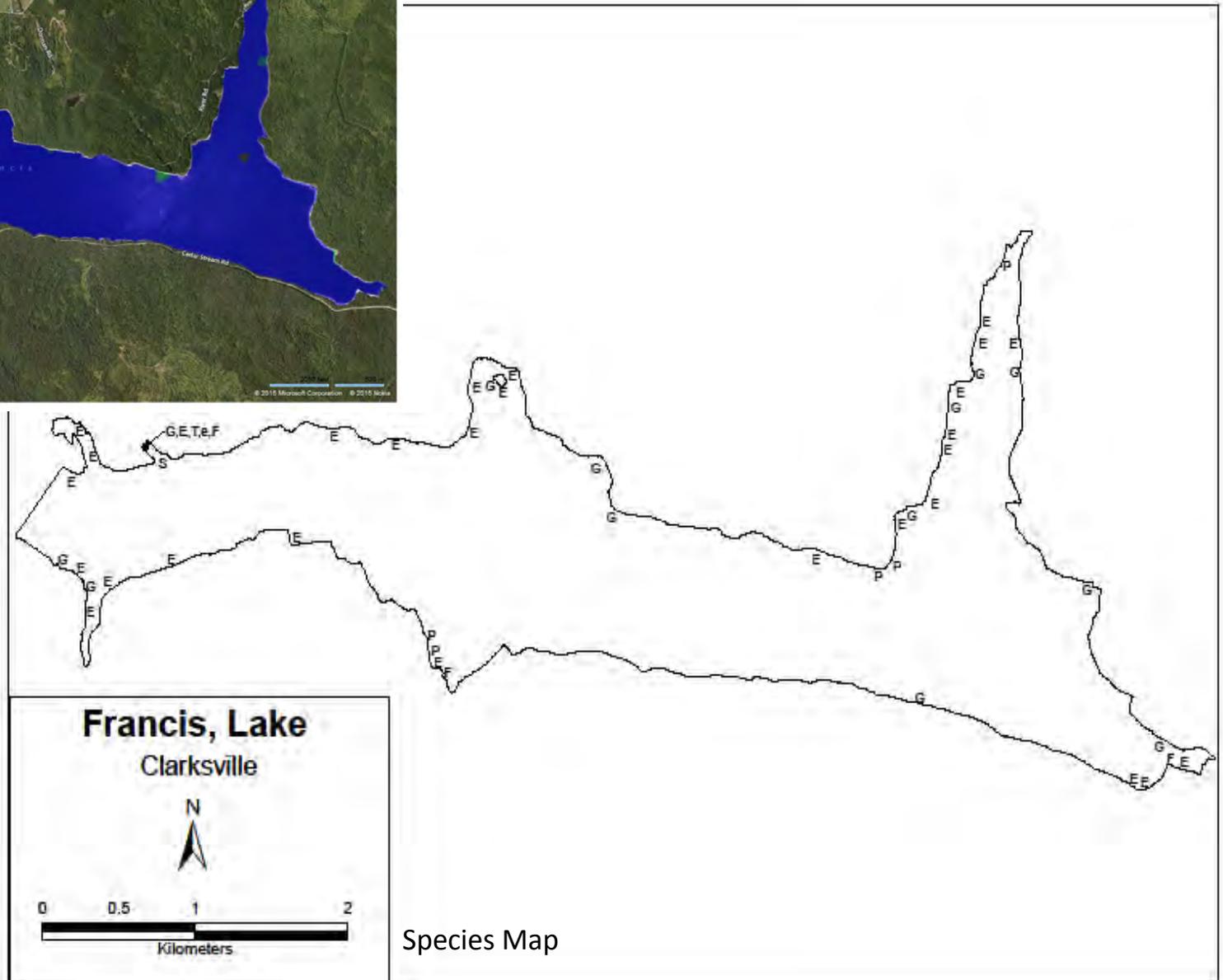
Designated Use	Parameter	Category
Aquatic Life	ANC	Likely Good
	Chloride	Likely Good
	Chl-a	Likely Good
	DO	Likely Good
	DO Saturation	Likely Good
	TP	Likely Good
	Turbidity	Likely Good
	pH	Likely Good
Drinking Water	E. Coli	Likely Bad
	Potassium	No data
	Sulfates	Likely Good
Fish Consumption	Mercury	Poor
Primary Contact Recreation	Chl-a	Likely Good
	E. Coli	Good
Secondary Contact Recreation	E. Coli	Good
Wildlife	Wildlife	No data

2013 - 2015



## Aquatic Plant Maps

The aquatic plant biovolume map indicates the percentage of the water column occupied by aquatic plants. High percentages are indicated by the color red and low percentages are indicated by the color blue. The aquatic plant species map identifies surface aquatic plants, shoreline plants and submerged plants that were visible during the survey. Please see the next page for the species key.

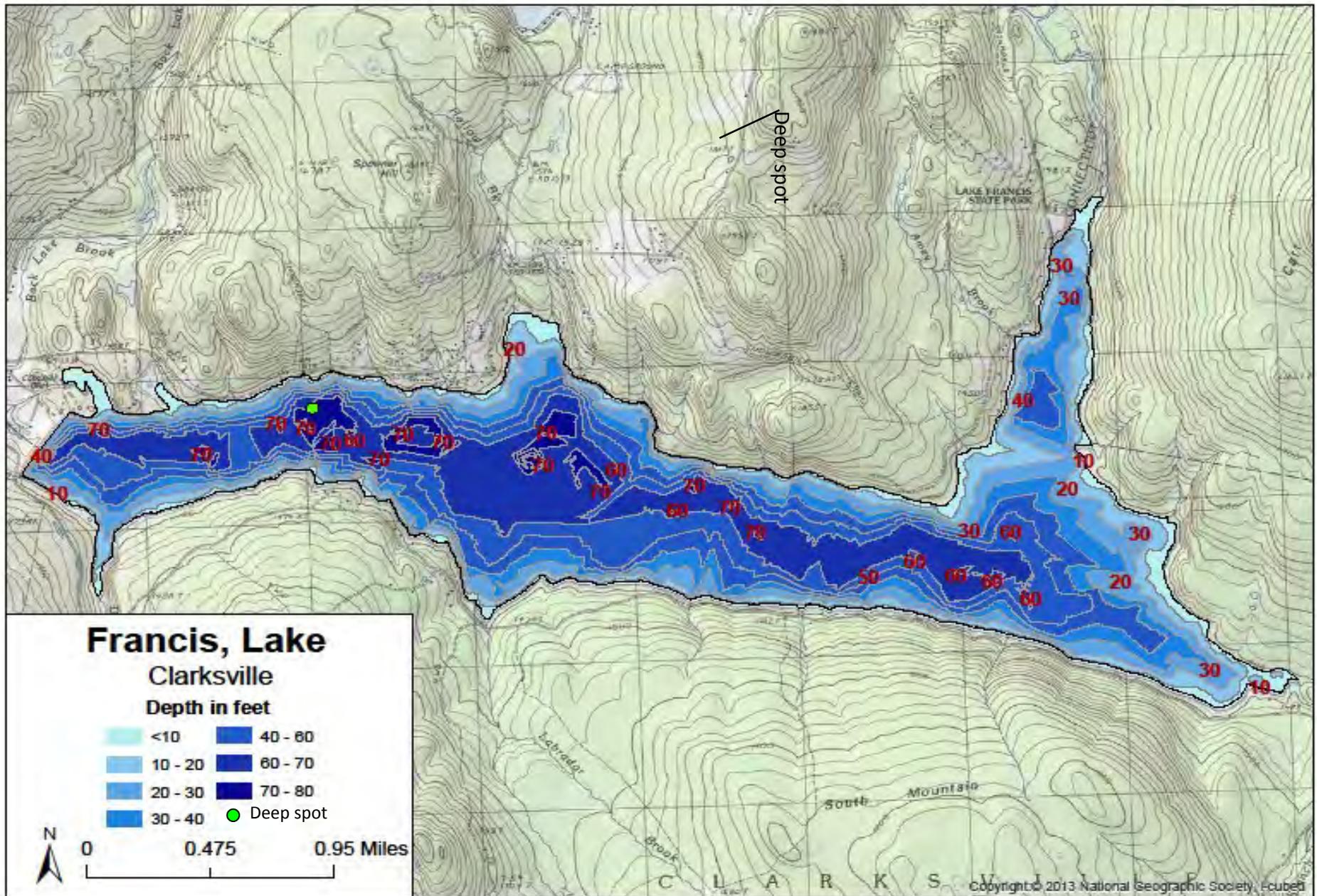


## Aquatic Plant Species Key

LAKE: FRANCIS, LAKE		TOWN: CLARKSVILLE		DATE: 8/21/2013
KEY	PLANT NAME		ABUNDANCE	
	SCIENTIFIC	COMMON		
E	Eleocharis	Spike rush	Scattered	
e	Eriophorum	Cotton grass	Sparse	
F	Fontinalis	Water moss	Sparse	
G	Gramineae	Grass family	Sparse	
P	Polygonum	Smartweed	Scattered	
S	Sparganium	Bur reed	Sparse	
T	Typha	Cattail	Sparse	
<b>OVERALL ABUNDANCE: Scattered</b>				

Abundance	Points	Description
Sparse	0	Few emergent plants observed; generally < 10% overall cover.
Scattered	1	Several small patches or one to two large patches or much of the shoreline with a sparsely growing plant; Generally 11-20% coverage.
Scattered/Common	2	Plants covering approximately 21-35% of lake.
Common	3	Plants around most of the shoreline but not a problem to navigation or several large patches of plants. 36-55% cover.
Common/ Abundant	4	Intermediate between Common and Abundant. 56-74% cover.
Abundant	5	Plants around the entire shoreline and with large patches in several areas; submerged plants visible, ranging 75-89% cover.
Very Abundant	6	At least ½ of the surface with emergent, floating leaf or submerged plants; navigation and swimming is impaired in areas, 80-100% cover.

### Lake Bathymetry and Depth Contours



## Watershed Land Use Map



Lake Cover Category	Percent (%) Cover	Lake Cover Category	Percent (%) Cover	Lake Cover Category	Percent (%) Cover	Lake Cover Category	Percent (%) Cover
Open Water	33.67	Developed, High Intensity	0.02	Grassland/ Herbaceous	0.15	Emergent Wetlands	0.24
Developed, Open Space	2.98	Barren Land	2.48	Pasture Hay	0.00	Shrub/ Shrub	2.30
Developed, Low Intensity	0.72	Deciduous Forest	30.89	Cultivated Crops	0.00	Mixed Forest	19.85
Developed, Medium Intensity	0.13	Evergreen Forest	4.90	Woody Wetlands	1.83		

Homer, C.G., Dewitz, J.A., Yang, L., Jin, S., Danielson, P., Xian, G., Coulston, J., Herold, N.D., Wickham, J.D., and Megown, K., 2015, Completion of the 2011 National Land Cover Database for the conterminous United States - Representing a decade of land cover change information. *Photogrammetric Engineering and Remote Sensing*, v. 81, no. 5, p. 345 - 354.

[Click here for an interactive map of all historic and current lake trophic survey reports.](#)

Island Pond is a man-made pond in the town of New Ipswich. There is no public access, as the land around the pond is owned by Hampshire Country School. Permission is required from the school to access the pond. Island Pond was surveyed under the LTSP once before in 1982. Despite changes in sampling protocol, the pond was rated as mesotrophic following both surveys. The pond is weakly stratified. Bladderwort was found to be abundant during the 1982 and 2013 plant surveys. When comparing biochemical values, parameters showed little change with the exception of total phosphorus, which doubled from 7 µg/L in 1982 to an average of 14.63 µg/L from 2013 to 2015. However, this increase could be due to the change in sampling protocol, which switched from one winter and one summer sampling event to three summer sampling events over three consecutive years. The 1982 value of 7 µg/L was collected in late summer, and the late summer 2013 TP value was 8.99 µg/L, suggesting conditions are similar.

2015 NHDES Trophic Rating:

**Mesotrophic**

1982 NHDES Trophic Rating:

**Mesotrophic**

### *What is a lake trophic survey?*

A lake trophic survey evaluates physical, biological and chemical parameters in lakes or ponds greater than 10 acres, to assess a lake's overall productivity, a.k.a. trophic status. Oligotrophic, mesotrophic and eutrophic are the most common trophic classifications. Oligotrophic lakes are nutrient-poor, with few plants and very clear water. Eutrophic lakes are highly productive, with lots of plants and/or algae and less clear water. Mesotrophic lakes are in-between. Trophic surveys provides a record and catalog of water quality parameters, serve as a basis for understanding environmental impacts and help inform water quality management polices. For additional explanations of lake terminology, please visit <http://des.nh.gov/organization/divisions/water/wmb/vlap/glossary.htm>

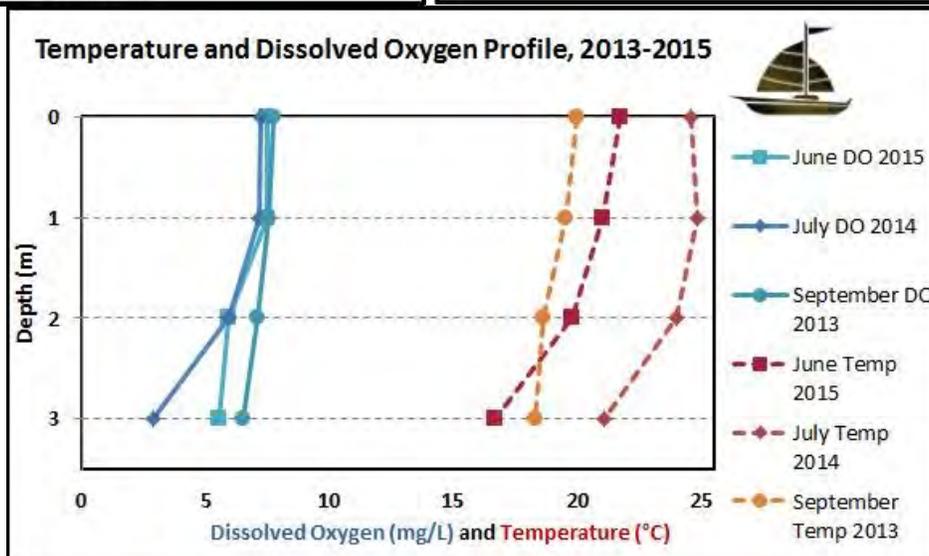
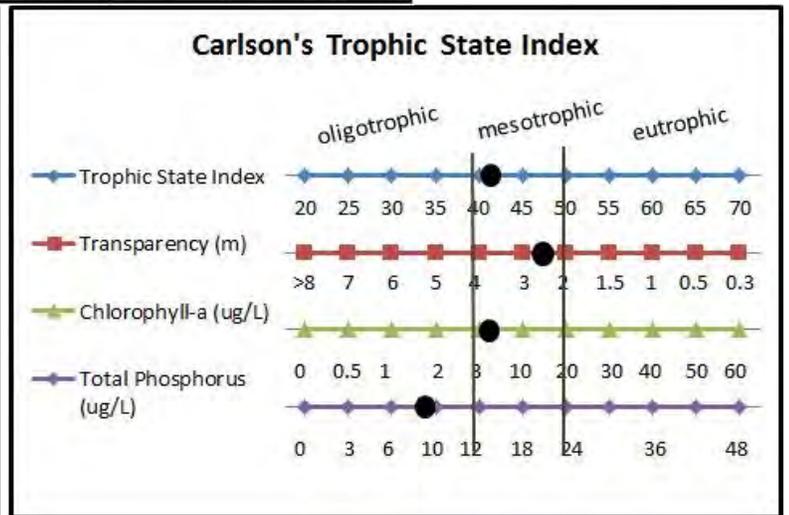
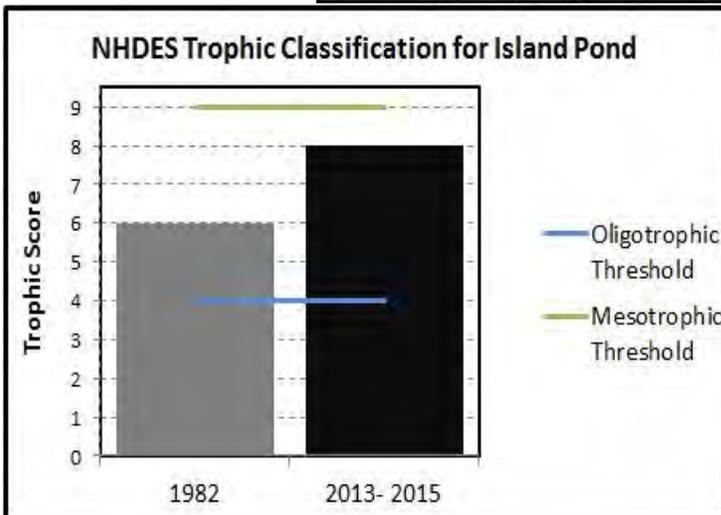


Physical Characteristics			
Elevation:	372 m (1219 ft)	Lake area:	0.1574 km <sup>2</sup>
Mean depth:	1.6 m	Total Volume:	169,100 m <sup>3</sup>
Maximum depth:	3.5 m	Average Hypolimnion Volume:	none
Flushing rate:	10.8 / yr <sup>-1</sup>	Maximum Hypolimnion Volume:	none
P retention coeff:	0.49	Areal water load:	17.75 m/ yr
% Watershed Ponged:	2.70%	Watershed area:	4.61 km <sup>2</sup>
Shore Length:	3,100 m	Shore Configuration:	2.2
Lake type:	Artificial		

### Trophic Classification

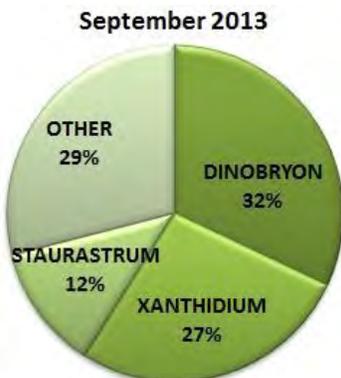
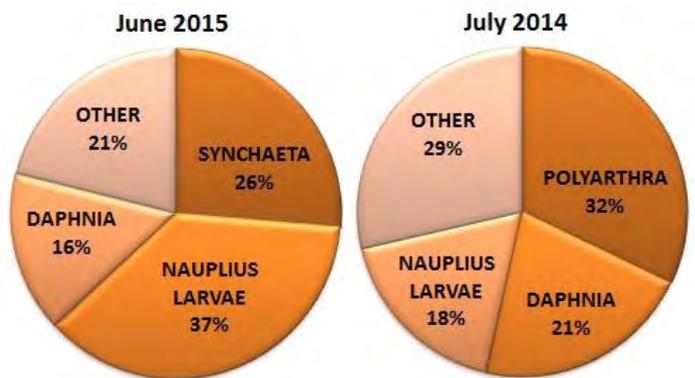
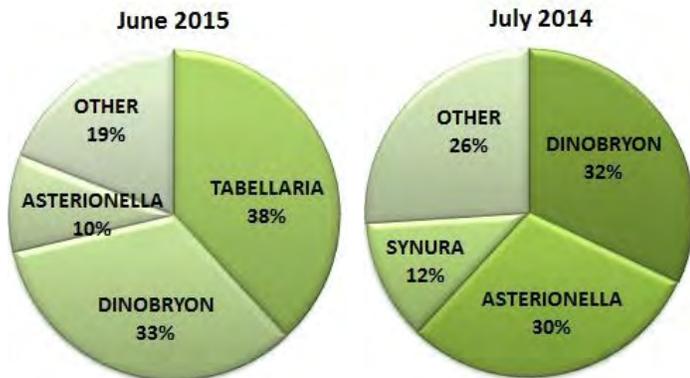
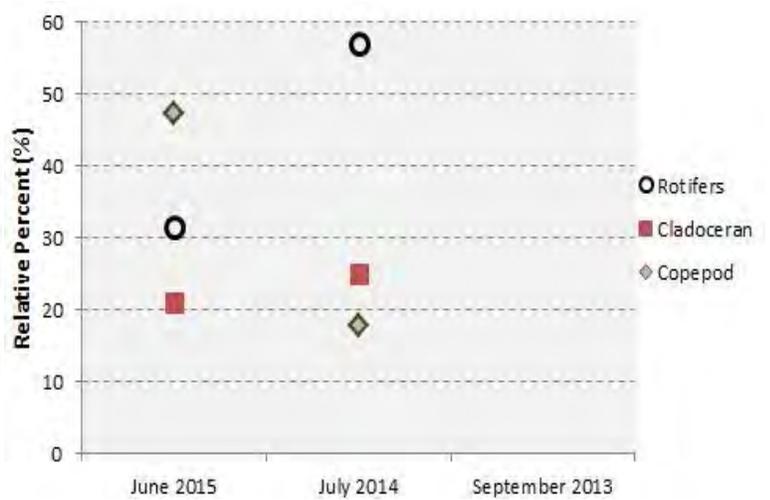
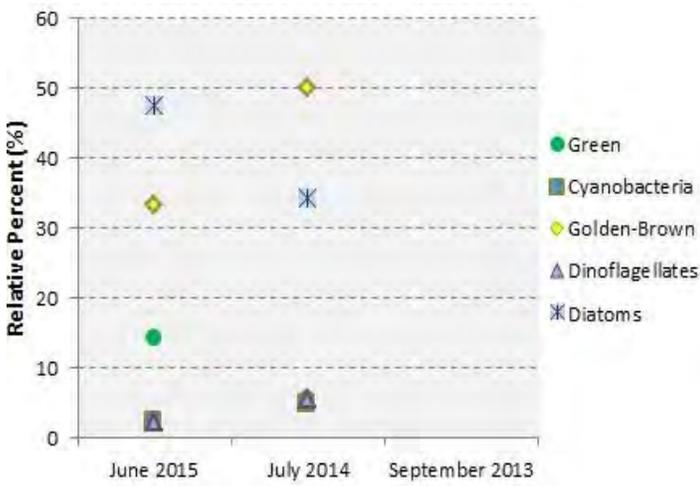
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NHDES Trophic Classification: 2013 - 2015					
Island Pond, New Ipswich, NH					
D.O.	S.D.	Plant	Chl-a	Total	Class
*	3	5	0	8	Mesotrophic



**Phytoplankton** are photosynthetic plants that contain chlorophyll-*a* but do not have true roots, stems or leaves. They grow on rocks, vascular plants, the lake bottom or free-floating in the water column and are a food source for zooplankton and mussels. As nutrients in the water increase, phytoplankton abundance also increases. Phytoplankton populations undergo natural succession throughout the summer, due to changes in light, nutrient availability, predation and temperature.

**Zooplankton** are microscopic animals that naturally inhabit New Hampshire lakes. They feed on phytoplankton, bacteria and other zooplankton while being an important food source for fish and mussels. Zooplankton also undergo natural succession throughout the summer, due to changes in light, nutrient availability, predation and temperature.



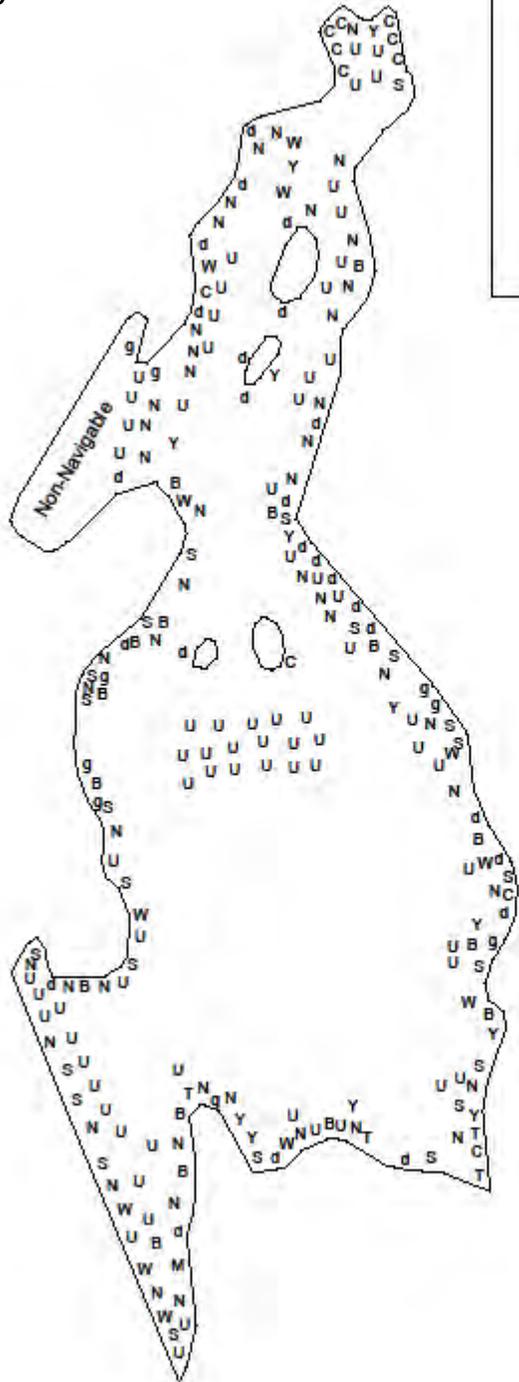
Chemical and Biological Characteristics	Mean	Standard Deviation	Median	Units	NH Median Values
<i>Epilimnetic Depth</i>	1.33	0.29	1.50	meter	x
pH	5.65	0.48	5.57	Units	6.60
Acid Neutralizing Capacity (ANC)	1.00	0.75	0.90	mg/L	4.90
Apparent Color	39.33	6.03	40.00	CPU	28.00
Secchi Depth	2.78	0.30	2.75	meter	3.20
Secchi Depth - Scope	3.03	0.12	3.10	meter	unk
Specific Conductance	19.73	0.14	19.75	µs/ cm	40
Total Kjeldahl Nitrogen (TKN)	0.58	0.45	0.58	mg/L	0.35
Nitrate + Nitrite Nitrogen	0.03	0.00	0.03	mg/L	<0.05
Total Phosphorus	14.63	8.25	10.80	ug/L	12.00
Chloride	< 3.00	0.00	< 3.00	mg/L	4.00
Sulfate	3.10		3.10	mg/L	4.00
Calcium	1.32		1.32	mg/L	2.60
Magnesium	0.30		0.30	mg/L	0.54
Potassium	0.13		0.13	mg/L	0.50
Sodium	1.92		1.92	mg/L	3.10
Total Organic Carbon	4.70		4.70	mg/L	3.10
<i>Metolimnetic Depth</i>	3.00	0.00	3.00	meter	x
Chlorophyll-a	3.17	0.79	2.86	ug/L	4.58

The Waterbody Report Card table (below) is generated from the 2014 305(b) report on the status of NH waters and are based on data collected from 2001-2013. Additional information can be found at <http://des.nh.gov/organization/divisions/water/wmb/swqa/index.htm>

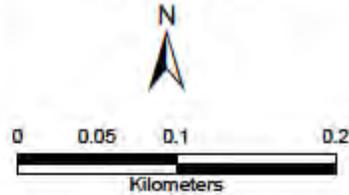
Designated Use	Parameter	Category
Aquatic Life	Chloride	Likely Good
	Chl-a	Likely Good
	DO	No data
	DO Saturation	No data
	TP	Likely Good
	pH	Likely Bad
Drinking Water	Sulfates	Likely Good
Fish Consumption	Mercury	Poor
Primary Contact Recreation	Chl-a	Likely Good
	E. Coli	No data
Secondary Contact Recreation	E. Coli	No data
Wildlife	Wildlife	No data

## Aquatic Plant Maps

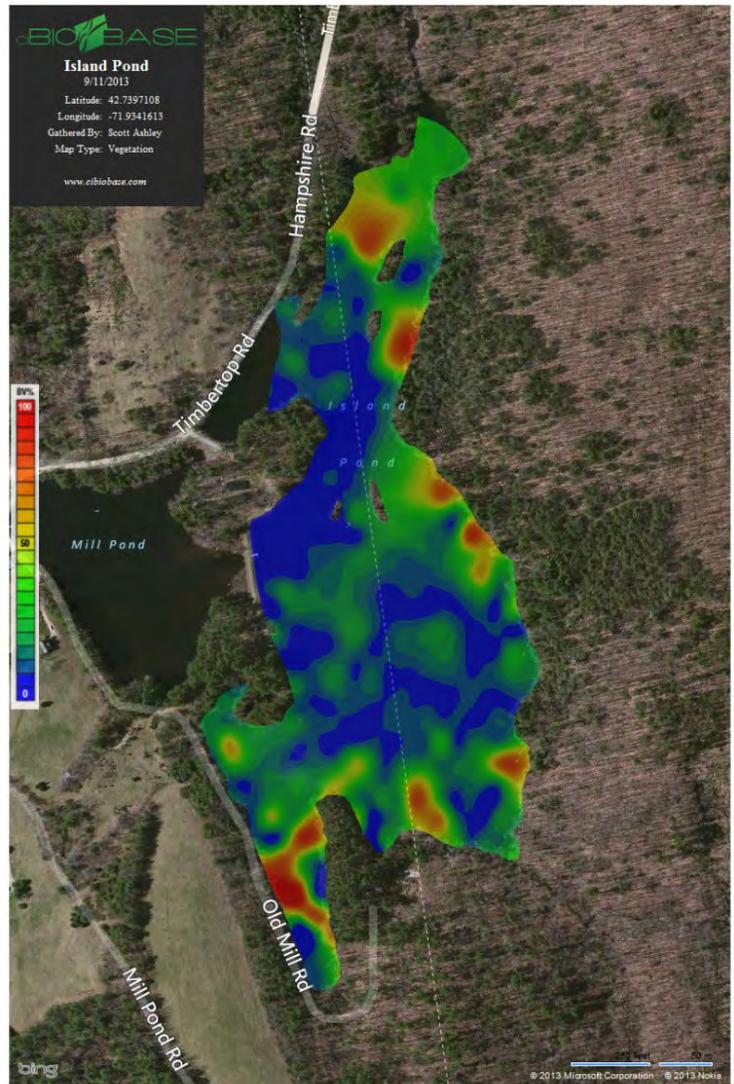
Species Map



Island Pond  
New Ipswich



Biovolume Map



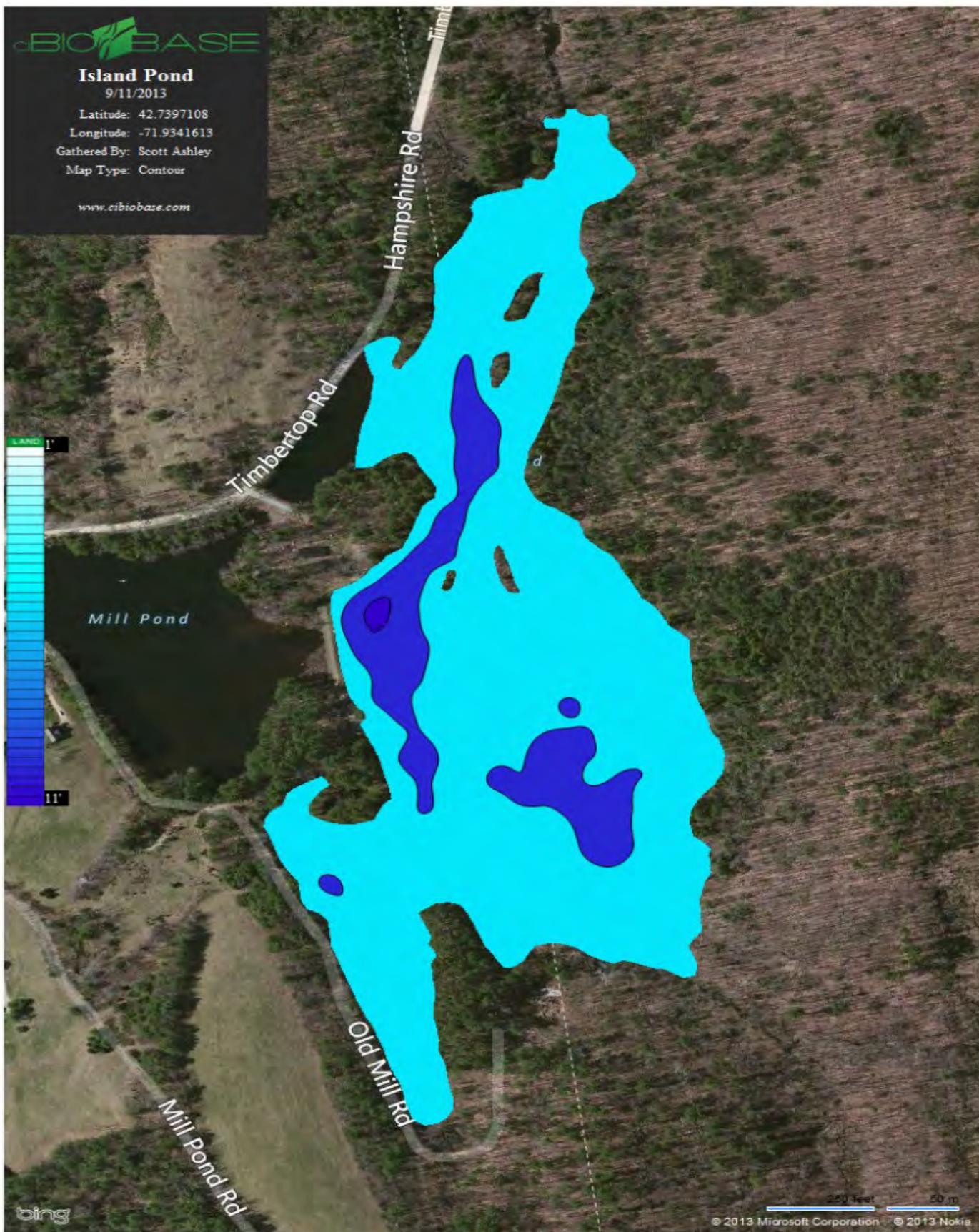
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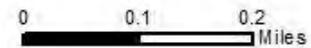
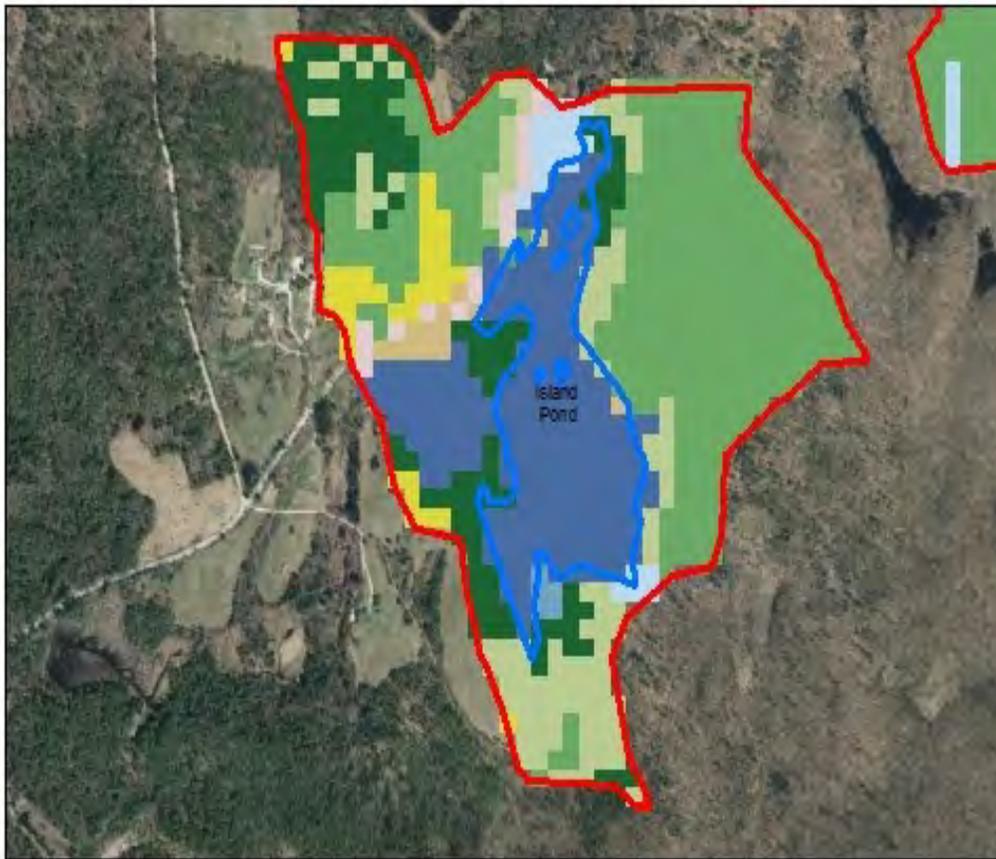
## Aquatic Plant Species Key

LAKE: ISLAND POND		TOWN: NEW IPSWICH		DATE: 9/11/2013
KEY	PLANT NAME		ABUNDANCE	
	SCIENTIFIC	COMMON		
B	Brasenia schreberi	Water shield	Scat/Common	
C	Cyperaceae	Non-flowering sedge	Scattered	
d	Dulichium arundinaceum	Three-way sedge	Scattered	
g	Myrica gale	Sweet gale	Scattered	
M	Myriophyllum humile	Water milfoil	Scattered	
N	Nymphaea	White water lily	Common	
S	Sparganium	Bur reed	Scat/Common	
T	Typha	Cattail	Scat/Common	
U	Utricularia	Bladderwort	Abundant	
W	Potamogeton	Pondweed	Scat/Common	
Y	Nuphar	Yellow water lily	Scat/Common	
<b>OVERALL ABUNDANCE: Abundant</b>				

Abundance	Points	Description
Sparse	0	Few emergent plants observed; generally < 10% overall cover.
Scattered	1	Several small patches or one to two large patches or much of the shoreline with a sparsely growing plant; Generally 11-20% coverage.
Scattered/Common	2	Plants covering approximately 21-35% of lake.
Common	3	Plants around most of the shoreline but not a problem to navigation or several large patches of plants. 36-55% cover.
Common/ Abundant	4	Intermediate between Common and Abundant. 56-74% cover.
Abundant	5	Plants around the entire shoreline and with large patches in several areas; sub-merged plants visible, ranging 75-89% cover.
Very Abundant	6	At least ½ of the surface with emergent, floating leaf or submerged plants; navigation and swimming is impaired in areas, 80-100% cover.

### Lake Bathymetry and Depth Contours





Lake Cover Category	Percent (%) Cover	Lake Cover Category	Percent (%) Cover	Lake Cover Category	Percent (%) Cover
Open Water	24.17	Barren Land	0.00	Grassland/ Herbaceous	0.00
Developed, Open Space	2.11	Deciduous Forest	37.06	Pasture Hay	4.34
Developed, Low Intensity	0.00	Evergreen Forest	14.26	Cultivated Crops	0.00
Developed, Medium Intensity	0.00	Mixed Forest	13.64	Woody Wetlands	2.48
Developed, High Intensity	0.00	Shrub/ Shrub	1.61	Emergent Wetlands	0.62

Homer, C.G., Dewitz, J.A., Yang, L., Jin, S., Danielson, P., Xian, G., Coulston, J., Herold, N.D., Wickham, J.D., and Megown, K., 2015, Completion of the 2011 National Land Cover Database for the conterminous United States - Representing a decade of land cover change information. *Photogrammetric Engineering and Remote Sensing*, v. 81, no. 5, p. 345 - 354.

[Click here for an interactive map of all historic and current lake trophic survey reports.](#)

Lily Pond is a natural, shallow, unstratified pond in Gilford, NH. It has abundant littoral vegetation, but low epilimnetic chlorophyll-a concentrations. A fire tower practice area is located at the northern end. Lily Pond was surveyed under the Lake Trophic Survey Program once previously in 1987, and the pond was classified as mesotrophic. Sampling methodology has been modified since Lily Pond was last sampled; however, the pond was still found to be mesotrophic with this latest assessment. When comparing 1987's chemical and biological parameters to current findings, acid neutralizing capacity (ANC) has increased by approximately 4 mg/L and is much higher than New Hampshire's median ANC. Total phosphorus (TP) has also decreased slightly since the 1987 assessment and is similar to the state median. Increasing ANC and decreasing TP are positive improvements for the pond. However, specific conductance increased since the 1987 assessment and is very high compared to the state median. Additionally, while chloride and sodium values are similar to the 1987 values, they are also much higher than the state medians. This suggests Lily Pond is likely being negatively influenced by development and human activity within the watershed.

2015 NHDES Trophic Rating:

**Mesotrophic**

1987 NHDES Trophic Rating:

**Mesotrophic**

### *What is a lake trophic survey?*

A lake trophic survey evaluates physical, biological and chemical parameters in lakes or ponds greater than 10 acres, to assess a lake's overall productivity, a.k.a. trophic status. Oligotrophic, mesotrophic and eutrophic are the most common trophic classifications. Oligotrophic lakes are nutrient-poor, with few plants and very clear water. Eutrophic lakes are highly productive, with lots of plants and/or algae and less clear water. Mesotrophic lakes are in-between. Trophic surveys provides a record and catalog of water quality parameters, serve as a basis for understanding environmental impacts and help inform water quality management polices. For additional explanations of lake terminology, please visit <http://des.nh.gov/organization/divisions/water/wmb/vlap/glossary.htm>

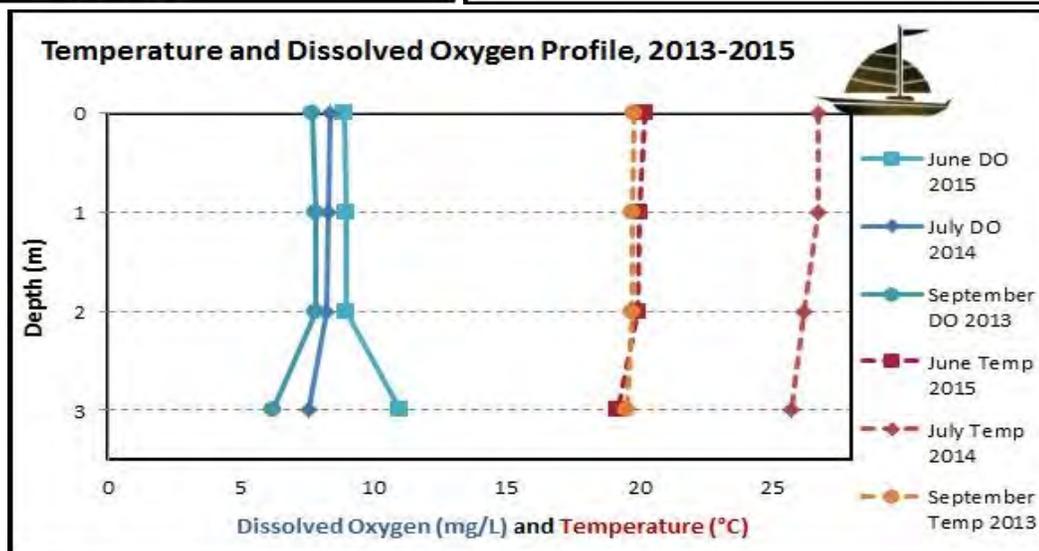
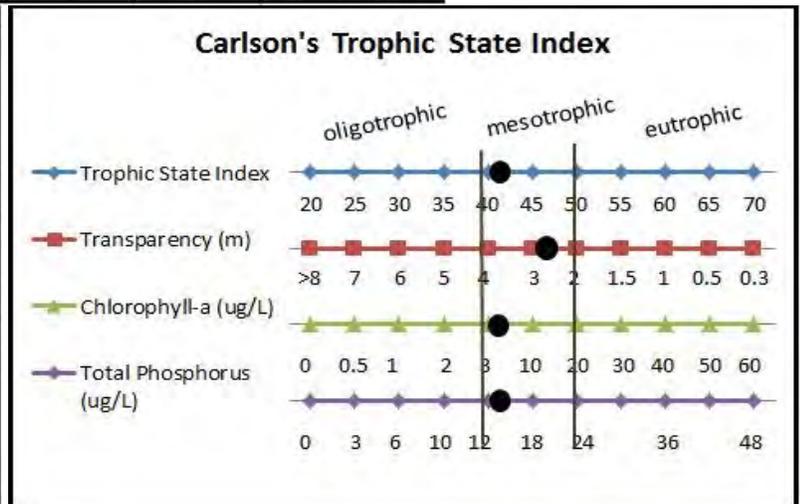
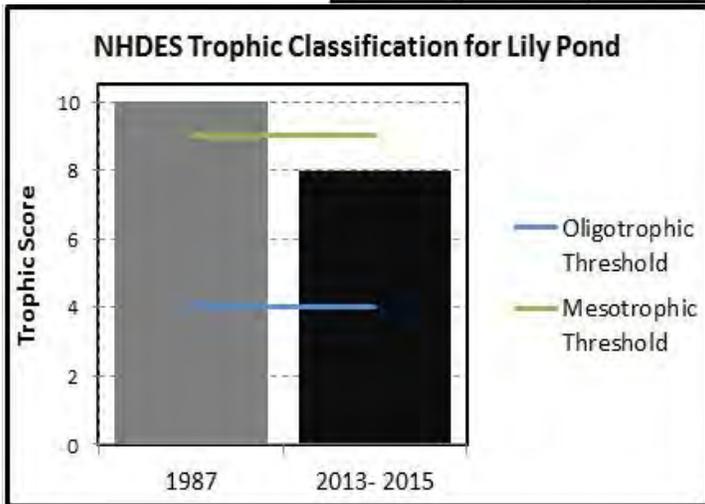


Physical Characteristics			
Elevation:	162 m (531 ft)	Lake area:	0.191 km <sup>2</sup>
Mean depth:	1.8 m	Total Volume:	199,000 m <sup>3</sup>
Maximum depth:	3.2 m	Average Hypolimnion Volume:	none
Flushing rate:	2.1 / yr <sup>-1</sup>	Maximum Hypolimnion Volume:	none
P retention coeff:	0.71	Anoxic Volume:	none
% Watershed Ponged:	0.00%	Areal water load:	3.76 m/ yr
Shore Length:	1400 m	Watershed area:	1.612 km <sup>2</sup>
Lake type:	Natural	Shore Configuration:	---

### Trophic Classification

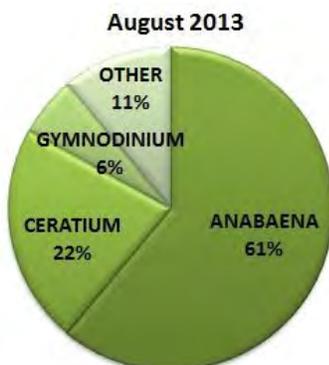
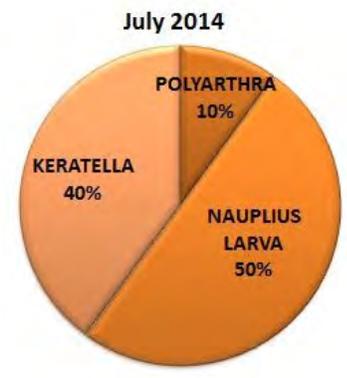
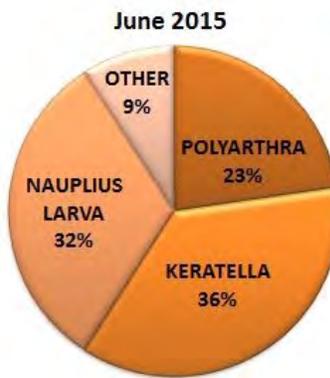
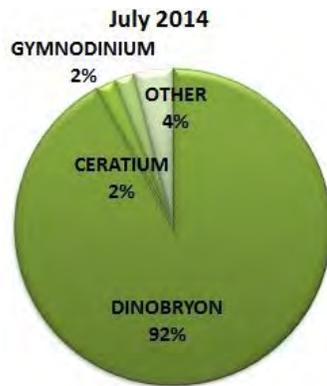
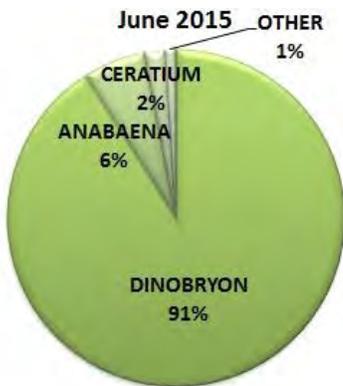
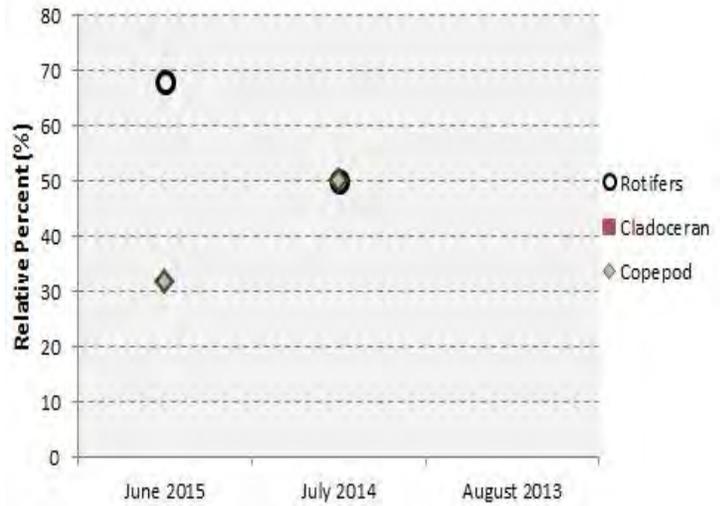
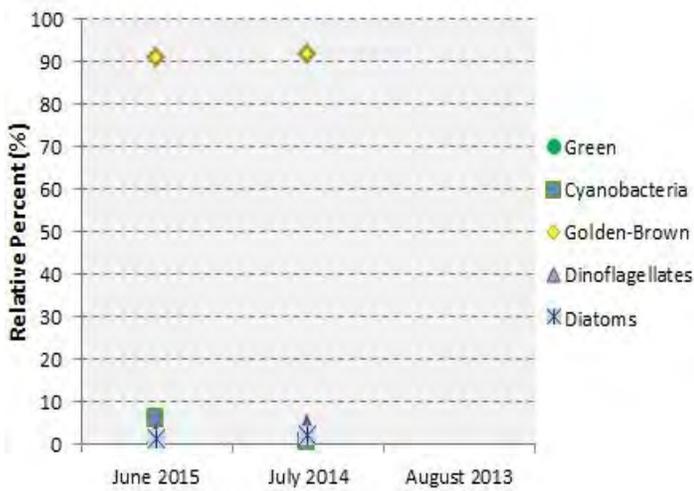
The NHDES Trophic Classification System was initiated in the early 1970s and revised in 1989. This index assigns a numeric values to summer bottom dissolved oxygen (D.O.), Secchi disk transparency (S.D.), aquatic vascular plant abundance (Plant), and epilimnetic chlorophyll-*a* concentration (Chl-*a*), which sum to a final score that determines a lake's trophic status. For stratified lakes, 0-6 points signifies a lake is oligotrophic, 7-12 points for mesotrophic, and 13-24 points for eutrophic. This index allows for direct comparisons to be made to historic data, which better track changes in trophic status. The NHDES Trophic Classification System is one of many ways to determine a lake's trophic status. The Carlson's Trophic State Index (TSI) is a more broadly used trophic assessment tool that considers Secchi disk transparency, chlorophyll-*a* concentration, and total phosphorus (TP); however, the results are less comparable to historic NHDES data. For a more in-depth explanation of the NHDES classification methodology, please visit: [http://des.nh.gov/organization/divisions/water/wmb/lakes/documents/data\\_sources\\_explanation.pdf](http://des.nh.gov/organization/divisions/water/wmb/lakes/documents/data_sources_explanation.pdf)

NHDES Trophic Classification: 2013 - 2015					
Lily Pond, Gilford, NH					
D.O.	S.D.	Plant	Chl-a	Total	Class
*	3	5	0	8	Mesotrophic



**Phytoplankton** are photosynthetic plants that contain chlorophyll-*a* but do not have true roots, stems or leaves. They grow on rocks, vascular plants, the lake bottom or free-floating in the water column and are a food source for zooplankton and mussels. As nutrients in the water increase, phytoplankton abundance also increases. Phytoplankton populations undergo natural succession throughout the summer, due to changes in light, nutrient availability, predation and temperature.

**Zooplankton** are microscopic animals that naturally inhabit New Hampshire lakes. They feed on phytoplankton, bacteria and other zooplankton while being an important food source for fish and mussels. Zooplankton also undergo natural succession throughout the summer, due to changes in light, nutrient availability, predation and temperature.



Chemical and Biological Characteristics	Mean	Standard Deviation	Median	Units	NH Median Values
<i>Epilimnetic Depth</i>	1.67	0.29	1.50	meter	x
pH	6.66	0.41	6.49	Units	6.60
Acid Neutralizing Capacity (ANC)	14.27	1.29	14.80	mg/L	4.90
Apparent Color	34.67	5.03	34.00	CPU	28.00
Secchi Depth	2.93	0.23	2.80	meter	3.20
Secchi Depth - Scope	3.13	0.06	3.10	meter	unk
Specific Conductance	222.73	29.56	234.00	µs/ cm	40
Total Kjldahl Nitrogen (TKN)	0.38	0.07	0.36	mg/L	0.35
Nitrate + Nitrite Nitrogen	0.03	0.00	0.03	mg/L	<0.05
Total Phosphorus	13.97	4.44	12.70	ug/L	12.00
Chloride	27.43	27.13	18.10	mg/L	4.00
Sulfate	2.90		2.90	mg/L	4.00
Calcium	7.42		7.42	mg/L	2.60
Magnesium	2.13		2.13	mg/L	0.54
Potassium	0.13		0.13	mg/L	0.50
Sodium	22.40		22.40	mg/L	3.10
Total Organic Carbon	6.10		6.10	mg/L	3.10
<i>Metalimnetic Depth</i>	3.00	0.00	3.00	meter	x
Chlorophyll-a	3.32	1.49	4.15	ug/L	4.58

The Waterbody Report Card table (below) is generated from the 2014 305(b) report on the status of NH waters and are based on data collected from 2001-2013. Additional information can be found at <http://des.nh.gov/organization/divisions/water/wmb/swqa/index.htm>

Designated Use	Parameter	Category
Aquatic Life	Chloride	Likely Good
	Chl-a	No data
	DO	No data
	DO Saturation	No data
	pH	Likely Bad
Drinking Water	Sulfates	Likely Good
Fish Consumption	Mercury	Poor
Primary Contact Recreation	Chl-a	Likely Good
	E. Coli	No data
Secondary Contact Recreation	E. Coli	No data
Wildlife	Wildlife	No data

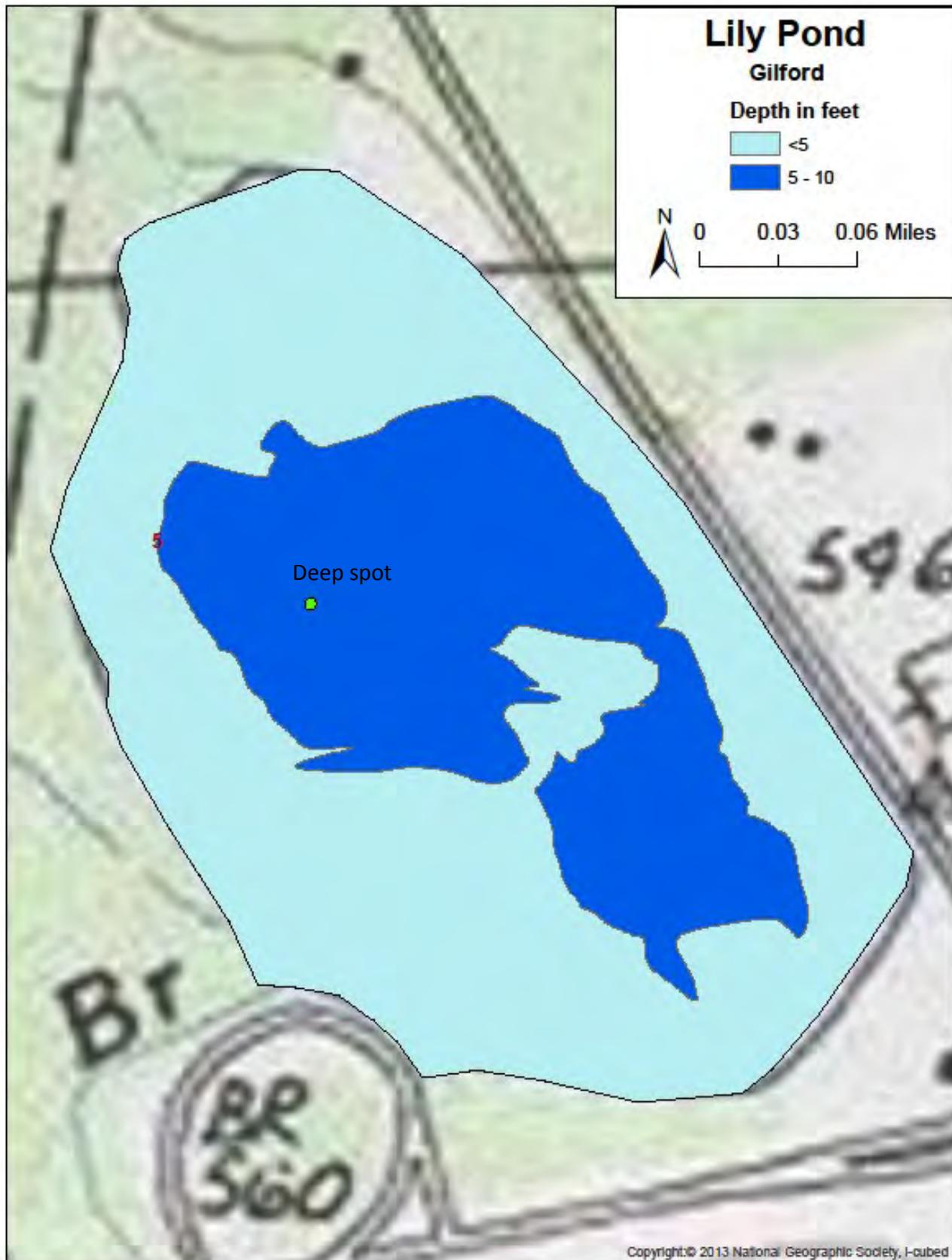


## Aquatic Plant Species Key

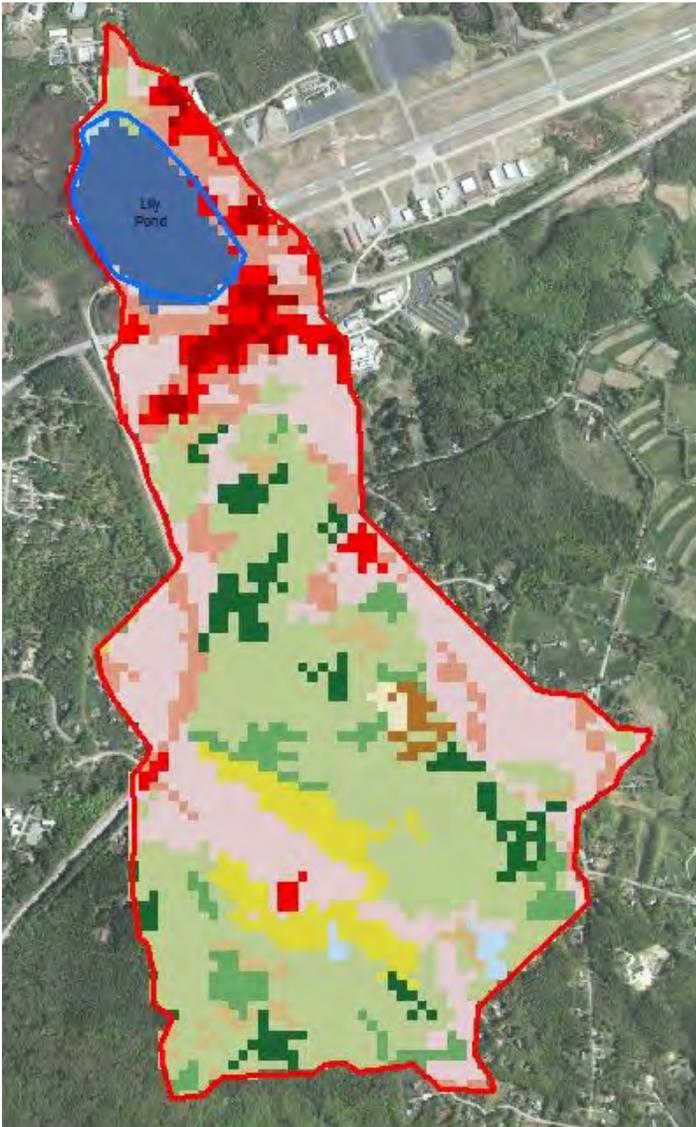
LAKE: LILY POND		TOWN: GILFORD		DATE: 9/16/2013
KEY	PLANT NAME		ABUNDANCE	
	SCIENTIFIC	COMMON		
B	Brasenia schreberi	Water shield	Abundant	
b	Scirpus	Bulrush	Scattered	
D	Decodon verticillatus	Swamp loosestrife	Common	
N	Nymphaea	White water lily	Abundant	
P	Pontederia cordata	Pickernelweed	Common	
S	Sparganium	Bur reed	Common	
T	Typha	Cattail	Common	
W	Potamogeton	Pondweed	Scattered	
Y	Nuphar	Yellow water lily	Scattered	
<b>OVERALL ABUNDANCE: Abundant</b>				

Abundance	Points	Description
Sparse	0	Few emergent plants observed; generally < 10% overall cover.
Scattered	1	Several small patches or one to two large patches or much of the shoreline with a sparsely growing plant; Generally 11-20% coverage.
Scattered/Common	2	Plants covering approximately 21-35% of lake.
Common	3	Plants around most of the shoreline but not a problem to navigation or several large patches of plants. 36-55% cover.
Common/ Abundant	4	Intermediate between Common and Abundant. 56-74% cover.
Abundant	5	Plants around the entire shoreline and with large patches in several areas; submerged plants visible, ranging 75-89% cover.
Very Abundant	6	At least ½ of the surface with emergent, floating leaf or submerged plants; navigation and swimming is impaired in areas, 80-100% cover.

### Lake Bathymetry and Depth Contours



## Watershed Land Use Map



### Lily Pond

#### Legend

-  Lake Boundaries
-  Watershed Boundaries
- Land Cover Classes**
-  11 - Open Water
-  21 - Developed, Open Space
-  22 - Developed, Low Intensity
-  23 - Developed, Medium Intensity
-  24 - Developed, High Intensity
-  31 - Barren Land
-  41 - Deciduous Forest
-  42 - Evergreen Forest
-  43 - Mixed Forest
-  52 - Shrub/ Scrub
-  71 - Grassland/ Herbaceous
-  81 - Pasture Hay
-  82 - Cultivated Crops
-  90 - Woody Wetlands
-  95 - Emergent Wetlands



Lake Cover Category	Percent (%) Cover	Lake Cover Category	Percent (%) Cover	Lake Cover Category	Percent (%) Cover
Open Water	6.46	Barren Land	0.00	Grassland/ Herbaceous	0.42
Developed, Open Space	24.78	Deciduous Forest	4.79	Pasture Hay	5.28
Developed, Low Intensity	8.67	Evergreen Forest	5.18	Cultivated Crops	0.75
Developed, Medium Intensity	4.27	Mixed Forest	34.01	Woody Wetlands	0.98
Developed, High Intensity	1.92	Shrub/ Shrub	2.67	Emergent Wetlands	0.00

Homer, C.G., Dewitz, J.A., Yang, L., Jin, S., Danielson, P., Xian, G., Coulston, J., Herold, N.D., Wickham, J.D., and Megown, K., 2015, Completion of the 2011 National Land Cover Database for the conterminous United States - Representing a decade of land cover change information. *Photogrammetric Engineering and Remote Sensing*, v. 81, no. 5, p. 345 - 354.

[Click here for an interactive map of all historic and current lake trophic survey reports.](#)

Little Pond, also known as Couch Pond, in Webster, NH is a small, shallow, weedy pond surrounded by wetlands. It is located along Beaverdam Brook about one mile upstream from Walker Pond. Little Pond is accessed only by canoe via a tributary from the road. Little Pond was surveyed under the Lake Trophic Survey Program once previously in 1994. The pond was considered stratified and rated as eutrophic. The most recent round of sampling determined that Little Pond was weakly stratified, categorizing it as an unstratified waterbody. Unstratified waterbodies are not rated for summer bottom dissolved oxygen levels, regardless of the presence of anoxia. Secchi depth improved by approximately 0.5 meters and total phosphorus improved by approximately 35% since the 1994 survey; however, chlorophyll-*a* concentrations increased by approximately 30%. Due to the improvement in Secchi depth, and considering Little Pond to be unstratified rather than stratified, the 2013-2015 Lake Trophic Survey determined that the lake rated as mesotrophic. It should be noted that the trophic score of nine is only one point away from being listed as eutrophic. Other chemical and biological parameters were similar to values found in 1994. Specific conductance, apparent color, ANC and chloride are all high compared to New Hampshire median values.

2015 NHDES Trophic Rating:

**Mesotrophic**

1994 NHDES Trophic Rating:

**Eutrophic**

### What is a lake trophic survey?

A lake trophic survey evaluates physical, biological, and chemical parameters in lakes or ponds greater than 10 acres, to assess a lake's overall productivity, a.k.a. trophic status. Oligotrophic, mesotrophic and eutrophic are the most common trophic classifications. Oligotrophic lakes are nutrient-poor, with few plants and very clear water. Eutrophic lakes are highly productive, with lots of plants and/or algae and less clear water. Mesotrophic lakes are in-between. Trophic surveys provides a record and catalog of water quality parameters, serve as a basis for understanding environmental impacts and help inform water quality management policies. For additional explanations of lake terminology, please visit <http://des.nh.gov/organization/divisions/water/wmb/vlap/glossary.htm>

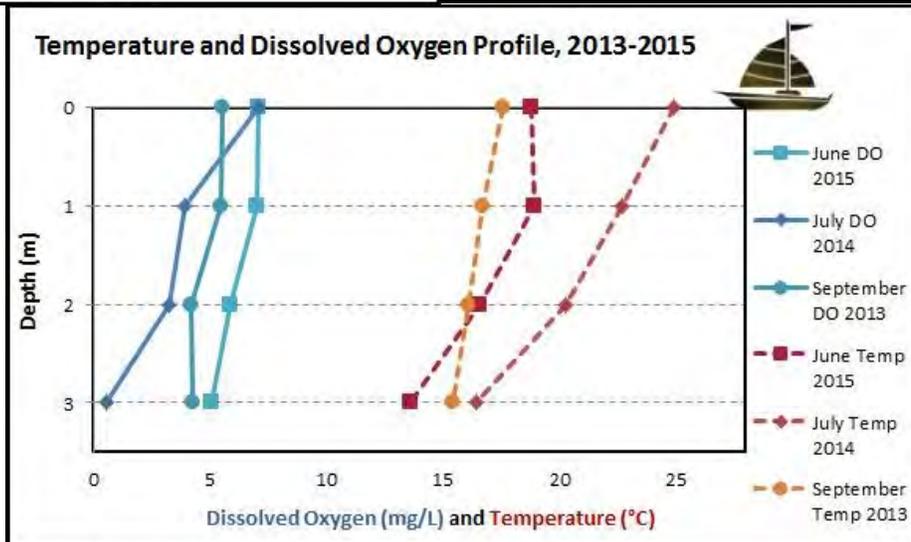
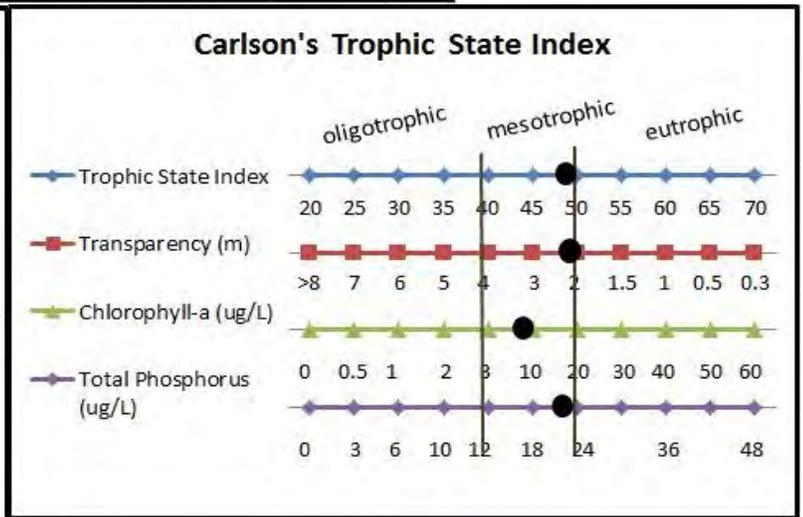
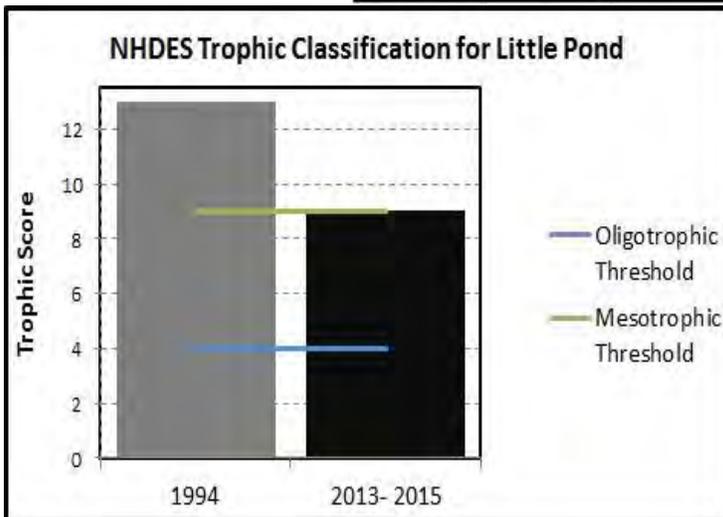


Physical Characteristics			
Elevation:	155 m (510 ft)	Lake area:	0.09 km <sup>2</sup>
Mean depth:	2.5 m	Total Volume:	305,000 m <sup>3</sup>
Maximum depth:	3.4 m	Average Hypolimnion Volume:	none
Flushing rate:	11.6 / yr <sup>-1</sup>	Average Anoxic Volume:	73350 m <sup>3</sup>
P retention coeff:	0.44	Maximum Anoxic Volume:	220,000 m <sup>3</sup>
% Watershed Ponged:	0.00%	Areal water load:	3.76 m/ yr
Shore Length:	800 m	Watershed area:	1.612 km <sup>2</sup>
Lake type:	Natural	Shore Configuration:	---

### Trophic Classification

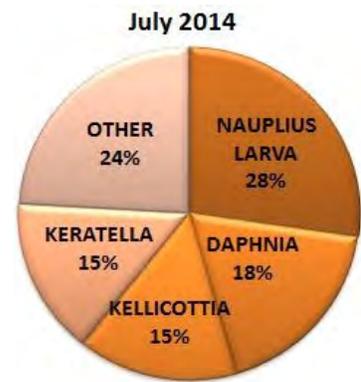
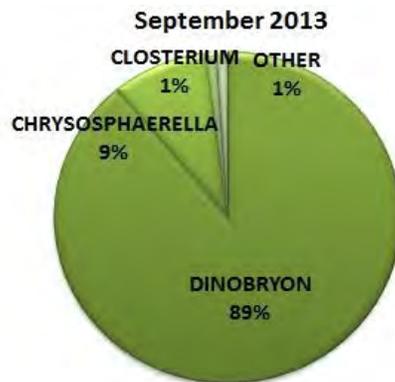
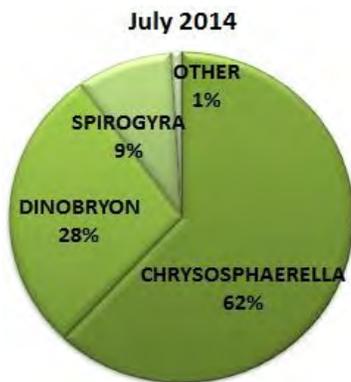
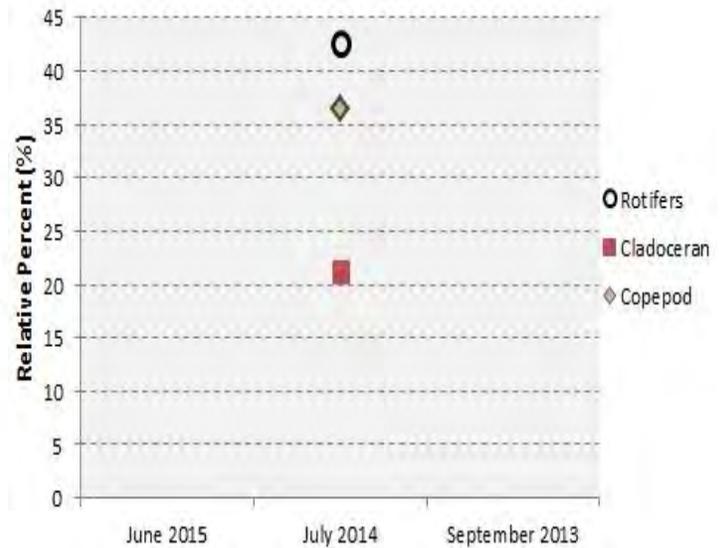
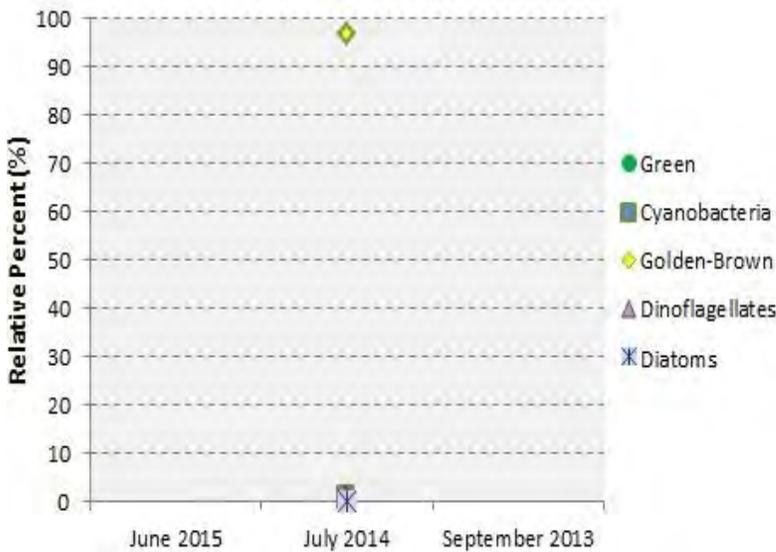
The NHDES Trophic Classification System was initiated in the early 1970s and revised in 1989. This index assigns a numeric values to summer bottom dissolved oxygen (D.O.), Secchi disk transparency (S.D.), aquatic vascular plant abundance (Plant), and epilimnetic chlorophyll-*a* concentration (Chl-*a*), which sum to a final score that determines a lake's trophic status. For stratified lakes, 0-6 points signifies a lake is oligotrophic, 7-12 points for mesotrophic, and 13-24 points for eutrophic. This index allows for direct comparisons to be made to historic data, which better track changes in trophic status. The NHDES Trophic Classification System is one of many ways to determine a lake's trophic status. The Carlson's Trophic State Index (TSI) is a more broadly used trophic assessment tool that considers Secchi disk transparency, chlorophyll-*a* concentration, and total phosphorus (TP); however, the results are less comparable to historic NHDES data. For a more in-depth explanation of the NHDES classification methodology, please visit: [http://des.nh.gov/organization/divisions/water/wmb/lakes/documents/data\\_sources\\_explanation.pdf](http://des.nh.gov/organization/divisions/water/wmb/lakes/documents/data_sources_explanation.pdf)

NHDES Trophic Classification: 2013 - 2015					
Little Pond, Webster, NH					
D.O.	S.D.	Plant	Chl-a	Total	Class
*	3	4	2	9	Mesotrophic



**Phytoplankton** are photosynthetic plants that contain chlorophyll-*a* but do not have true roots, stems or leaves. They grow on rocks, vascular plants, the lake bottom or free-floating in the water column and are a food source for zooplankton and mussels. As nutrients in the water increase, phytoplankton abundance also increases. Phytoplankton populations undergo natural succession throughout the summer, due to changes in light, nutrient availability, predation and temperature.

**Zooplankton** are microscopic animals that naturally inhabit New Hampshire lakes. They feed on phytoplankton, bacteria and other zooplankton while being an important food source for fish and mussels. Zooplankton also undergo natural succession throughout the summer, due to changes in light, nutrient availability, predation and temperature.



Chemical and Biological Characteristics	Mean	Standard Deviation	Median	Units	NH Median Values
<i>Epilimnetic Depth</i>	1.17	0.29	1.00	meter	x
pH	6.45	0.35	6.53	Units	6.60
Acid Neutralizing Capacity (ANC)	12.97	2.63	11.50	mg/L	4.90
Apparent Color	74.67	15.50	75.00	CPU	28.00
Secchi Depth	2.03	0.35	2.00	meter	3.20
Secchi Depth - Scope	2.53	0.49	2.30	meter	unk
Specific Conductance	90.83	8.61	88.00	µs/ cm	40
Total Kjeldahl Nitrogen (TKN)	0.41	0.07	0.41	mg/L	0.35
Nitrate + Nitrite Nitrogen	0.03	0.00	0.03	mg/L	<0.05
Total Phosphorus	22.25	3.20	22.70	ug/L	12.00
Chloride	14.33	3.06	15.00	mg/L	4.00
Sulfate	2.30		2.30	mg/L	4.00
Calcium	4.19		4.19	mg/L	2.60
Magnesium	0.05		0.05	mg/L	0.54
Potassium	0.13		0.13	mg/L	0.50
Sodium	9.46		9.46	mg/L	3.10
Total Organic Carbon	7.00		7.00	mg/L	3.10
<i>Metalimnetic Depth</i>	2.67	0.58	3.00	meter	x
Chlorophyll-a	9.68	9.89	6.36	ug/L	4.58

The Waterbody Report Card table (below) is generated from the 2014 305(b) report on the status of NH waters and are based on data collected from 2001-2013. Additional information can be found at <http://des.nh.gov/organization/divisions/water/wmb/swqa/index.htm>

Designated Use	Parameter	Category
Aquatic Life	Chloride	Likely Good
	Chl-a	No data
	DO	No data
	DO Saturation	No data
	pH	Likely Bad
Drinking Water	Sulfates	Likely Good
Fish Consumption	Mercury	Poor
Primary Contact Recreation	Chl-a	Likely Good
	E. Coli	No data
Secondary Contact Recreation	E. Coli	No data
Wildlife	Wildlife	No data

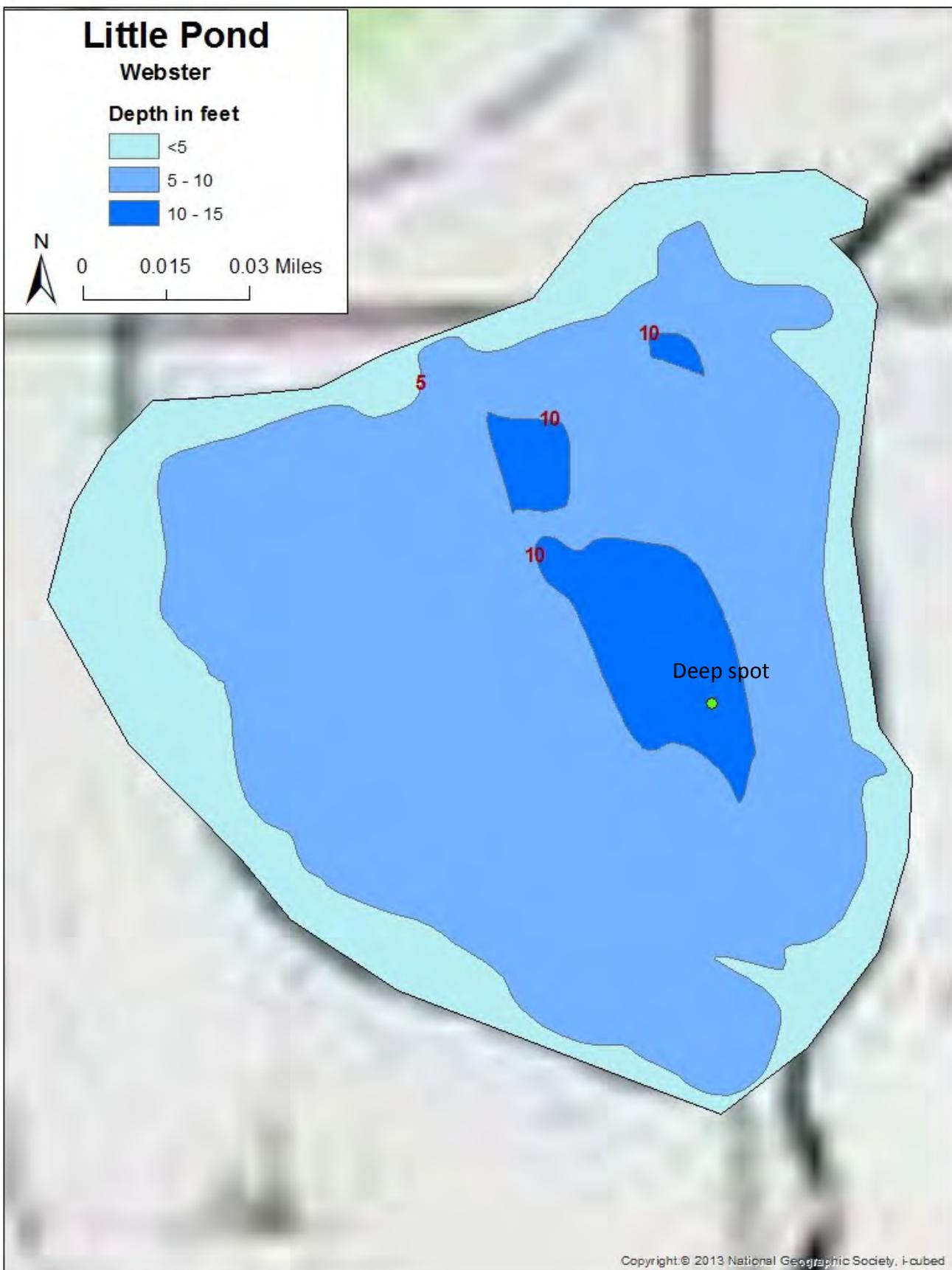


## Aquatic Plant Species Key

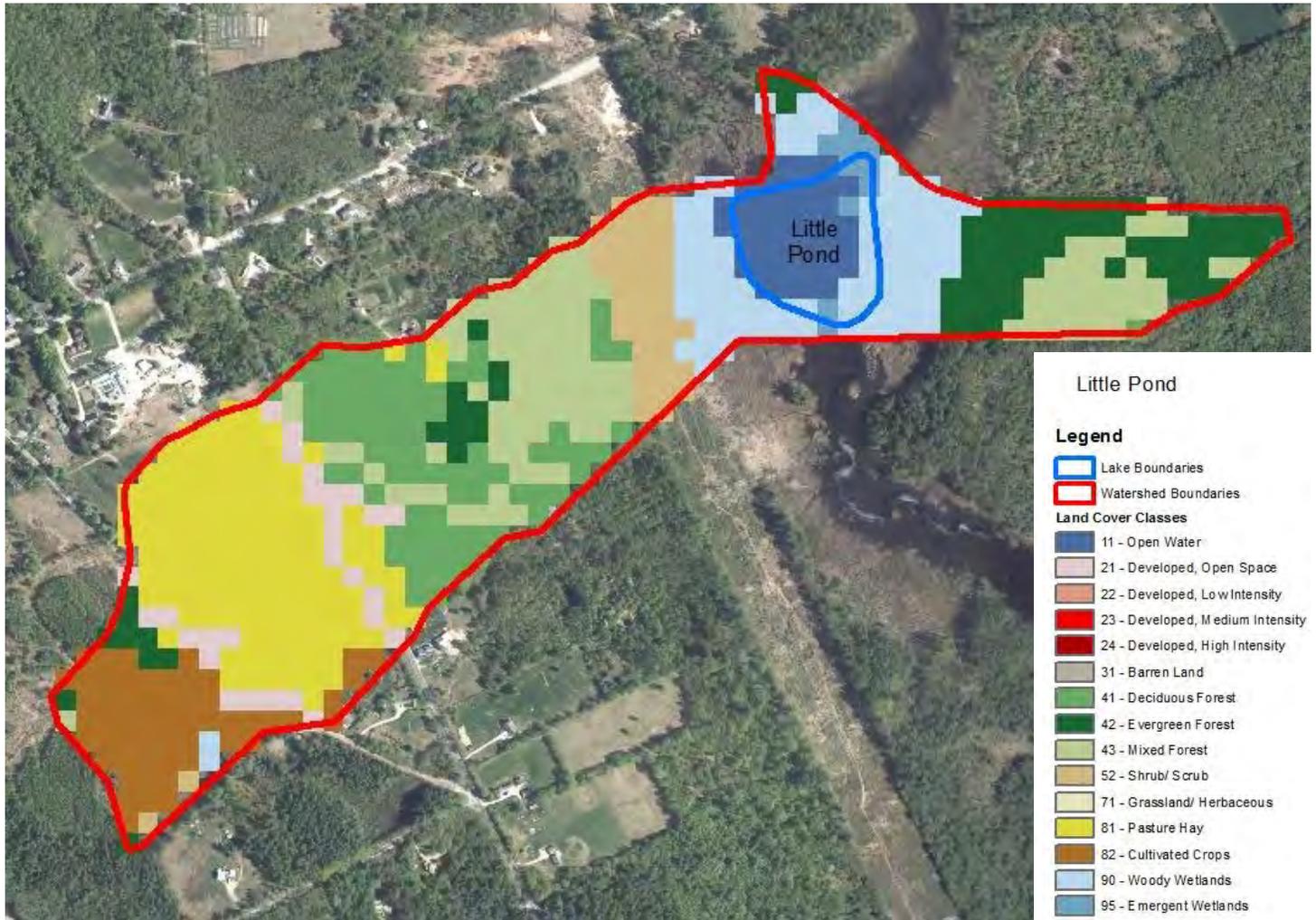
LAKE: LITTLE POND		TOWN: WEBSTER		DATE: 9/19/2013
KEY	PLANT NAME		ABUNDANCE	
	SCIENTIFIC	COMMON		
A	Peltandra virginica	Arrow arum	Scattered	
B	Brasenia schreberi	Water shield	Common	
D	Decodon verticillatus	Swamp loosestrife	Scattered	
J	Juncus	Rush	Scattered	
N	Nymphaea	White water lily	Scat/Common	
P	Pontederia cordata	Pickerelweed	Scat/Common	
R	Sarracenia purpurea	Pitcher-plant	Sparse	
T	Typha	Cattail	Scattered	
U	Utricularia	Bladderwort	Common	
W	Potamogeton	Pondweed	Scattered	
Y	Nuphar	Yellow water lily	Common	
<b>OVERALL ABUNDANCE: Common/Abundant</b>				

Abundance	Points	Description
Sparse	0	Few emergent plants observed; generally < 10% overall cover.
Scattered	1	Several small patches or one to two large patches or much of the shoreline with a sparsely growing plant; Generally 11-20% coverage.
Scattered/Common	2	Plants covering approximately 21-35% of lake.
Common	3	Plants around most of the shoreline but not a problem to navigation or several large patches of plants. 36-55% cover.
Common/ Abundant	4	Intermediate between Common and Abundant. 56-74% cover.
Abundant	5	Plants around the entire shoreline and with large patches in several areas; submerged plants visible, ranging 75-89% cover.
Very Abundant	6	At least ½ of the surface with emergent, floating leaf or submerged plants; navigation and swimming is impaired in areas, 80-100% cover.

### Lake Bathymetry and Depth Contours



## Watershed Land Use Map



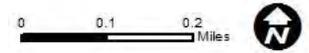
Little Pond

**Legend**

- Lake Boundaries
- Watershed Boundaries

**Land Cover Classes**

- 11 - Open Water
- 21 - Developed, Open Space
- 22 - Developed, Low Intensity
- 23 - Developed, Medium Intensity
- 24 - Developed, High Intensity
- 31 - Barren Land
- 41 - Deciduous Forest
- 42 - Evergreen Forest
- 43 - Mixed Forest
- 52 - Shrub/ Shrub
- 71 - Grassland/ Herbaceous
- 81 - Pasture Hay
- 82 - Cultivated Crops
- 90 - Woody Wetlands
- 95 - Emergent Wetlands



Lake Cover Category	Percent (%) Cover	Lake Cover Category	Percent (%) Cover	Lake Cover Category	Percent (%) Cover
Open Water	5.95	Barren Land	0.00	Grassland/ Herbaceous	0.00
Developed, Open Space	4.38	Deciduous Forest	13.15	Pasture Hay	19.41
Developed, Low Intensity	0.00	Evergreen Forest	12.21	Cultivated Crops	8.61
Developed, Medium Intensity	0.00	Mixed Forest	17.06	Woody Wetlands	12.99
Developed, High Intensity	0.00	Shrub/ Shrub	5.79	Emergent Wetlands	1.57

Homer, C.G., Dewitz, J.A., Yang, L., Jin, S., Danielson, P., Xian, G., Coulston, J., Herold, N.D., Wickham, J.D., and Megown, K., 2015, Completion of the 2011 National Land Cover Database for the conterminous United States - Representing a decade of land cover change information. *Photogrammetric Engineering and Remote Sensing*, v. 81, no. 5, p. 345 - 354.

[Click here for an interactive map of all historic and current lake trophic survey reports.](#)

Loon Pond in Lincoln, NH, also known as Big Loon Pond, is a deep, acidic, alpine pond located in the White Mountain National Forest. This pond has been subject to water level fluctuations as a public water supply for the Town of Lincoln. It was proposed, but denied, to be used as a water source for snow making at the Loon ski area. The pond was partially surveyed in 1980 as part of a cooperative survey effort in conjunction with NH Fish & Game, and a full survey was conducted in 1997. Loon Pond was rated oligotrophic in both surveys. This most recent assessment found the pond to be mesotrophic. The change in trophic status is largely due to changes in dissolved oxygen concentration, as anoxic conditions were measured below 15 meters during the 2013 sampling event. While the average anoxic volume was small compared to the overall hypolimnetic and total volumes, the presence of anoxia greatly increases a waterbody's score when trophic classification is calculated. The source for the change in trophic status is unknown as Loon Pond has an undeveloped, forested watershed. Loon Pond has lower pH and ANC values than the median for New Hampshire ponds, but were similar to past assessments. Secchi depth clarity has decreased by approximately a meter and chlorophyll-*a* concentration has doubled since the 1997 survey. Total phosphorus was lower by an order of magnitude; however, the 1997 results were considered suspect. Total phosphorus levels in the hypolimnion were approximately four times greater than total phosphorus levels in the epilimnion.

2015 NHDES Trophic Rating:

**Mesotrophic**

1997 NHDES Trophic Rating:

**Oligotrophic**

### *What is a lake trophic survey?*

A lake trophic survey evaluates physical, biological and chemical parameters in lakes or ponds greater than 10 acres, to assess a lake's overall productivity, a.k.a. trophic status. Oligotrophic, mesotrophic and eutrophic are the most common trophic classifications. Oligotrophic lakes are nutrient-poor, with few plants and very clear water. Eutrophic lakes are highly productive, with lots of plants and/or algae and less clear water. Mesotrophic lakes are in-between. Trophic surveys provides a record and catalog of water quality parameters, serve as a basis for understanding environmental impacts and help inform water quality management polices. For additional explanations of lake terminology, please visit <http://des.nh.gov/organization/divisions/water/wmb/vlap/glossary.htm>

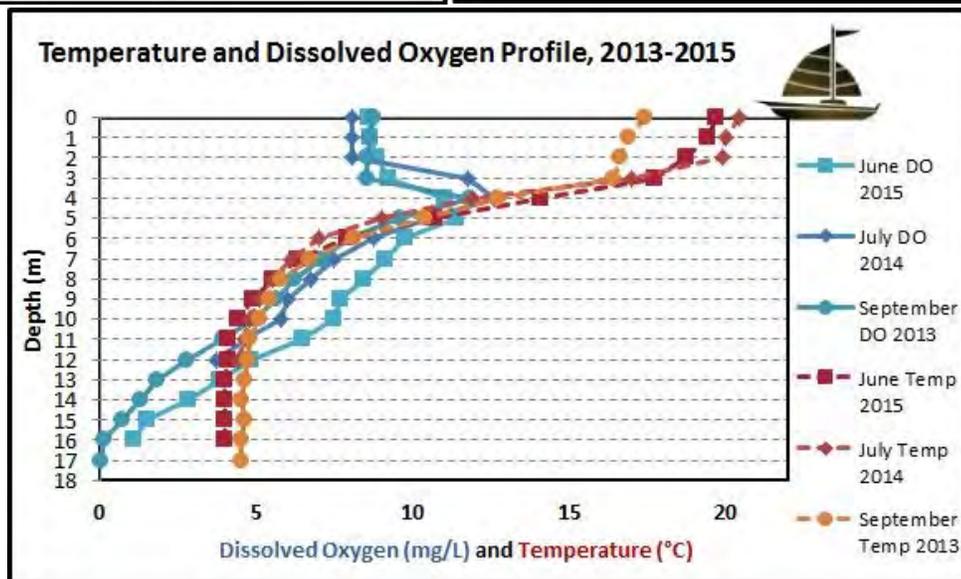
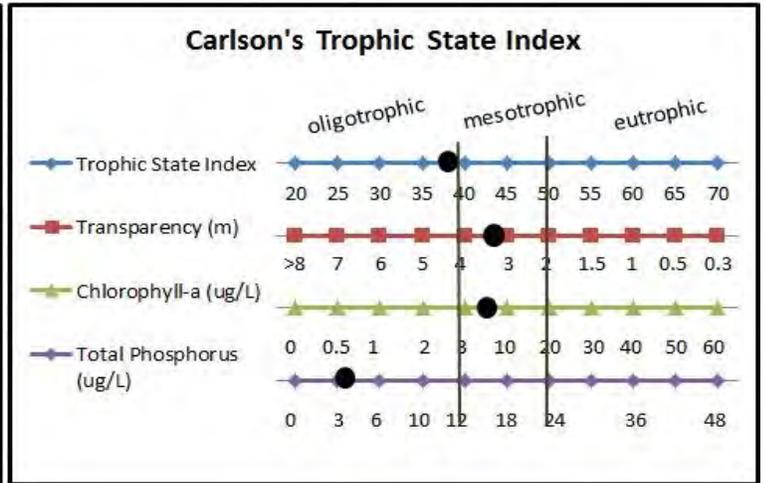
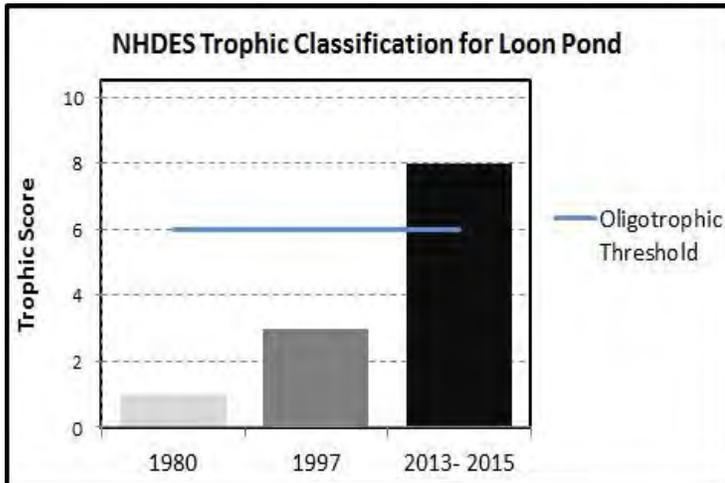


Physical Characteristics			
Elevation:	735 m (2410 ft)	Lake area:	0.075 km <sup>2</sup>
Mean depth:	6.1 m	Total Volume:	533000 m <sup>3</sup>
Maximum depth:	19 m	Average Hypolimnion Volume:	198000 m <sup>3</sup>
Flushing rate:	9.7 / yr <sup>-1</sup>	Maximum Anoxic Volume:	17600 m <sup>3</sup>
P retention coeff:	0.33	Average Anoxic Volume:	5900 m <sup>3</sup>
% Watershed Poned:	0.00%	Areal water load:	58.95 m/ yr
Shore Length:	1450 m	Watershed area:	6.216
Lake type:	Natural w/ dam	Shore Configuration:	1.49

### Trophic Classification

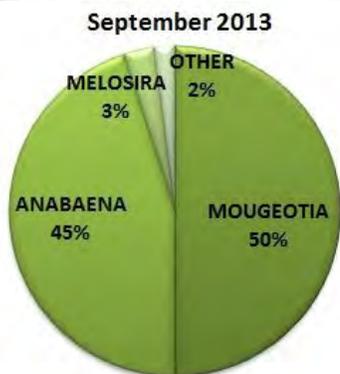
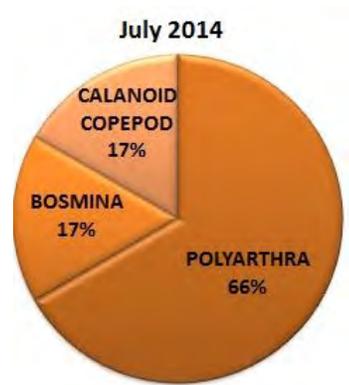
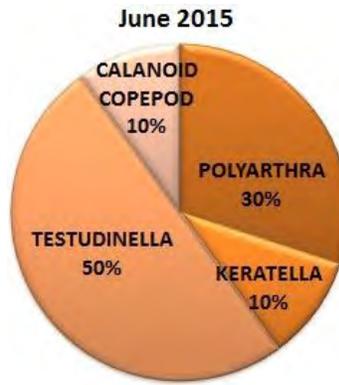
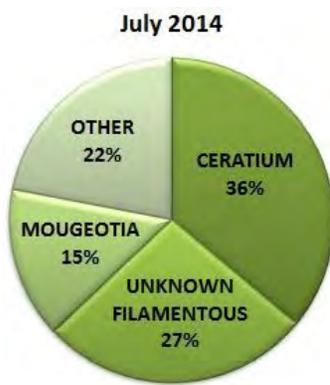
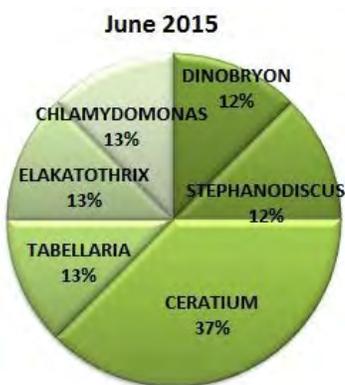
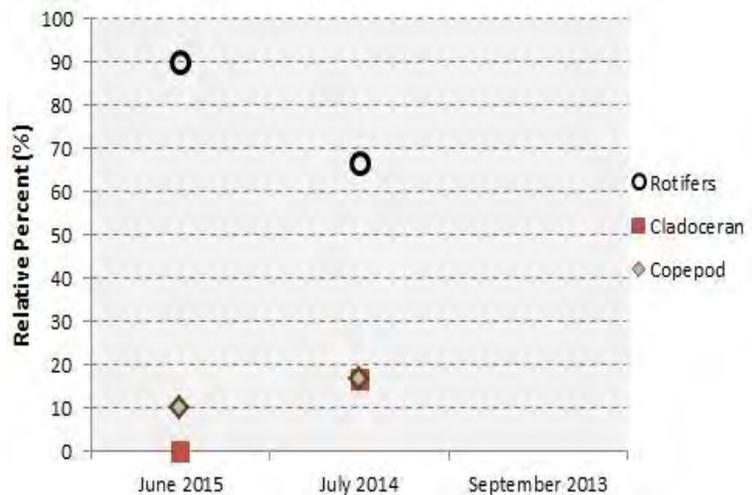
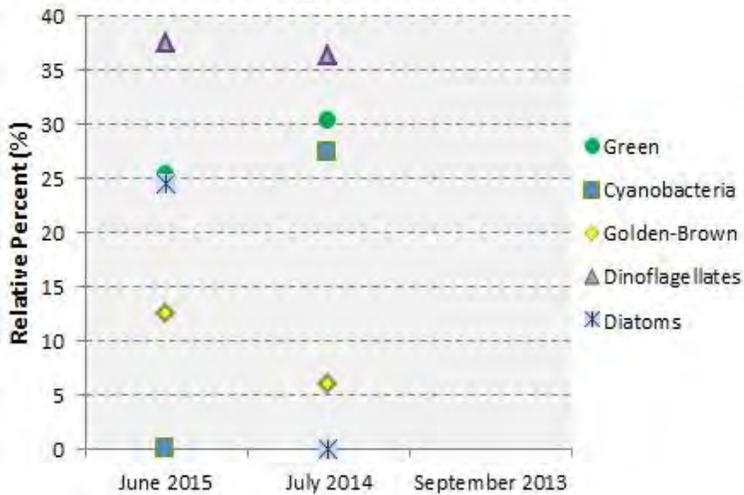
The NHDES Trophic Classification System was initiated in the early 1970s and revised in 1989. This index assigns a numeric values to summer bottom dissolved oxygen (D.O.), Secchi disk transparency (S.D.), aquatic vascular plant abundance (Plant), and epilimnetic chlorophyll-*a* concentration (Chl-*a*), which sum to a final score that determines a lake's trophic status. For stratified lakes, 0-6 points signifies a lake is oligotrophic, 7-12 points for mesotrophic, and 13-24 points for eutrophic. This index allows for direct comparisons to be made to historic data, which better track changes in trophic status. The NHDES Trophic Classification System is one of many ways to determine a lake's trophic status. The Carlson's Trophic State Index (TSI) is a more broadly used trophic assessment tool that considers Secchi disk transparency, chlorophyll-*a* concentration, and total phosphorus (TP); however, the results are less comparable to historic NHDES data. For a more in-depth explanation of the NHDES classification methodology, please visit: [http://des.nh.gov/organization/divisions/water/wmb/lakes/documents/data\\_sources\\_explanation.pdf](http://des.nh.gov/organization/divisions/water/wmb/lakes/documents/data_sources_explanation.pdf)

NHDES Trophic Classification: 2013 - 2015					
Loon Pond, Lincoln, NH					
D.O.	S.D.	Plant	Chl-a	Total	Class
5	2	0	1	8	Mesotrophic



**Phytoplankton** are photosynthetic plants that contain chlorophyll-*a* but do not have true roots, stems or leaves. They grow on rocks, vascular plants, the lake bottom or free-floating in the water column and are a food source for zooplankton and mussels. As nutrients in the water increase, phytoplankton abundance also increases. Phytoplankton populations undergo natural succession throughout the summer, due to changes in light, nutrient availability, predation and temperature.

**Zooplankton** are microscopic animals that naturally inhabit New Hampshire lakes. They feed on phytoplankton, bacteria, and other zooplankton while being an important food source for fish and mussels. Zooplankton also undergo natural succession throughout the summer, due to changes in light, nutrient availability, predation and temperature.

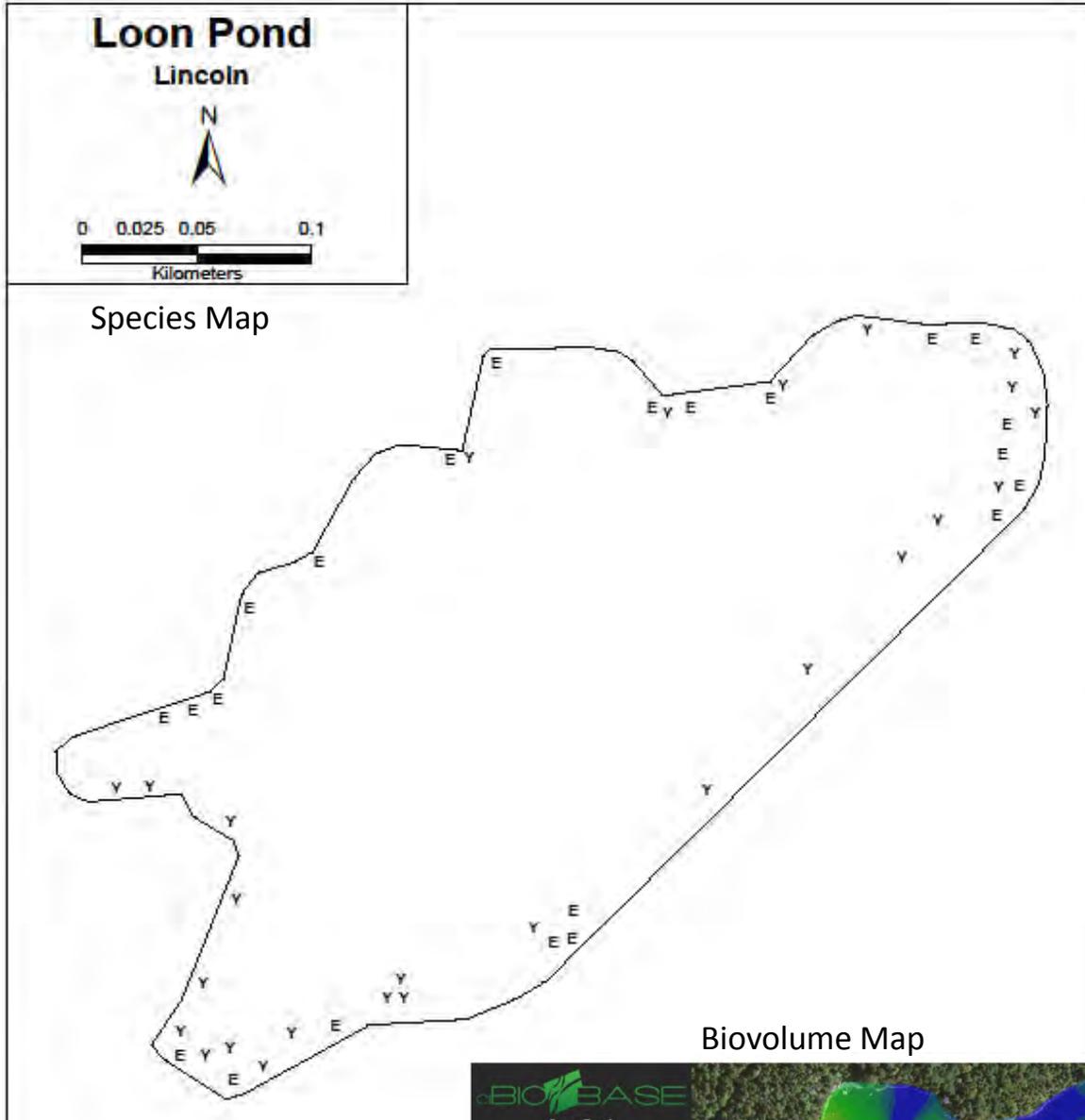


Chemical and Biological Characteristics	Mean	Standard Deviation	Median	Units	NH Median Values
<i>Epilimnetic Depth</i>	1.33	0.58	1.00	meter	x
pH	5.63	0.16	5.72	Units	6.60
Acid Neutralizing Capacity (ANC)	0.23	0.40	0.30	mg/L	4.90
Apparent Color	25.50	2.12	25.50	PCU	28.00
Secchi Depth	3.20	0.10	3.20	meter	3.20
Secchi Depth - Scope	3.70	0.62	3.50	meter	unk
Specific Conductance	14.31	0.60	14.30	µs/cm	40
Total Kjeldahl Nitrogen (TKN)	0.30	0.29	0.13	mg/L	0.35
Nitrate + Nitrite Nitrogen	0.03	0.00	0.03	mg/L	<0.05
Total Phosphorus	3.39	1.54	2.50	ug/L	12.00
Chloride	1.50	0.00	1.50	mg/L	4.00
Sulfate	2.40		2.40	mg/L	4.00
Calcium	0.50		0.50	mg/L	2.60
Magnesium	0.17		0.17	mg/L	0.54
Potassium	0.13		0.13	mg/L	0.50
Sodium	1.18		1.18	mg/L	3.10
Total Organic Carbon	4.60		4.60	mg/L	3.10
<i>Metalimnetic Depth</i>	4.83	1.04	4.50	meter	x
Chlorophyll-a	5.83	1.29	5.87	ug/L	4.58
<i>Hypolimnetic Depth</i>	16.50		16.50	meter	x
Total Phosphorus	12.20		12.20	µg/L	unk

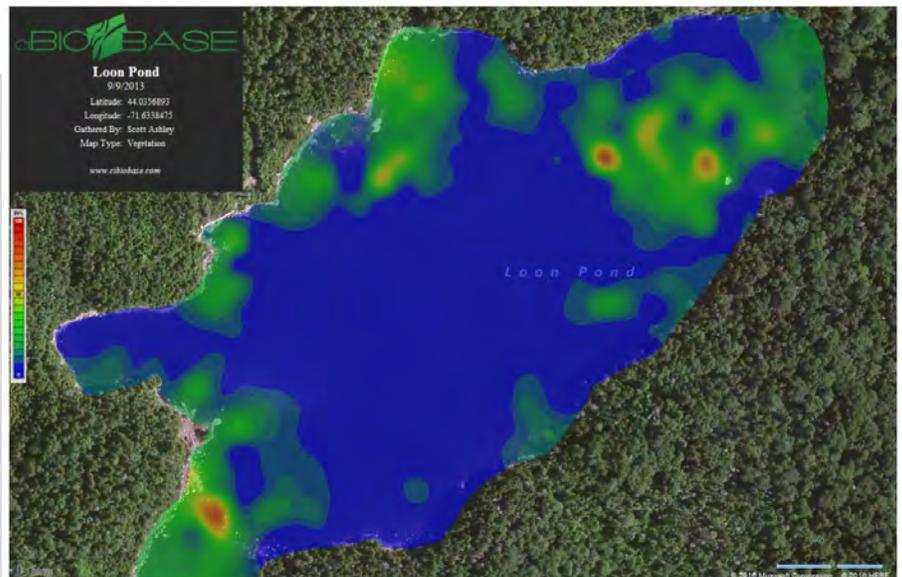
The Waterbody Report Card table (below) is generated from the 2014 305(b) report on the status of NH waters and are based on data collected from 2001-2013. Additional information can be found at <http://des.nh.gov/organization/divisions/water/wmb/swqa/index.htm>

Designated Use	Parameter	Category
Aquatic Life	Chloride	Likely Good
	Chl-a	Likely bad
	DO	No data
	DO Saturation	No data
	pH	Severe
Drinking Water	Sulfates	Likely Good
Fish Consumption	Mercury	Poor
Primary Contact Recreation	Chl-a	Likely Good
	E. Coli	No data
Secondary Contact Recreation	E. Coli	No data
Wildlife	Wildlife	No data

## Aquatic Plant Maps



The aquatic plant biovolume map indicates the percentage of the water column occupied by aquatic plants. High percentages are indicated by the color red and low percentages are indicated by the color blue. The aquatic plant species map identifies surface aquatic plants, shoreline plants and submerged plants that were visible during the survey. Please see the next page for the species key.

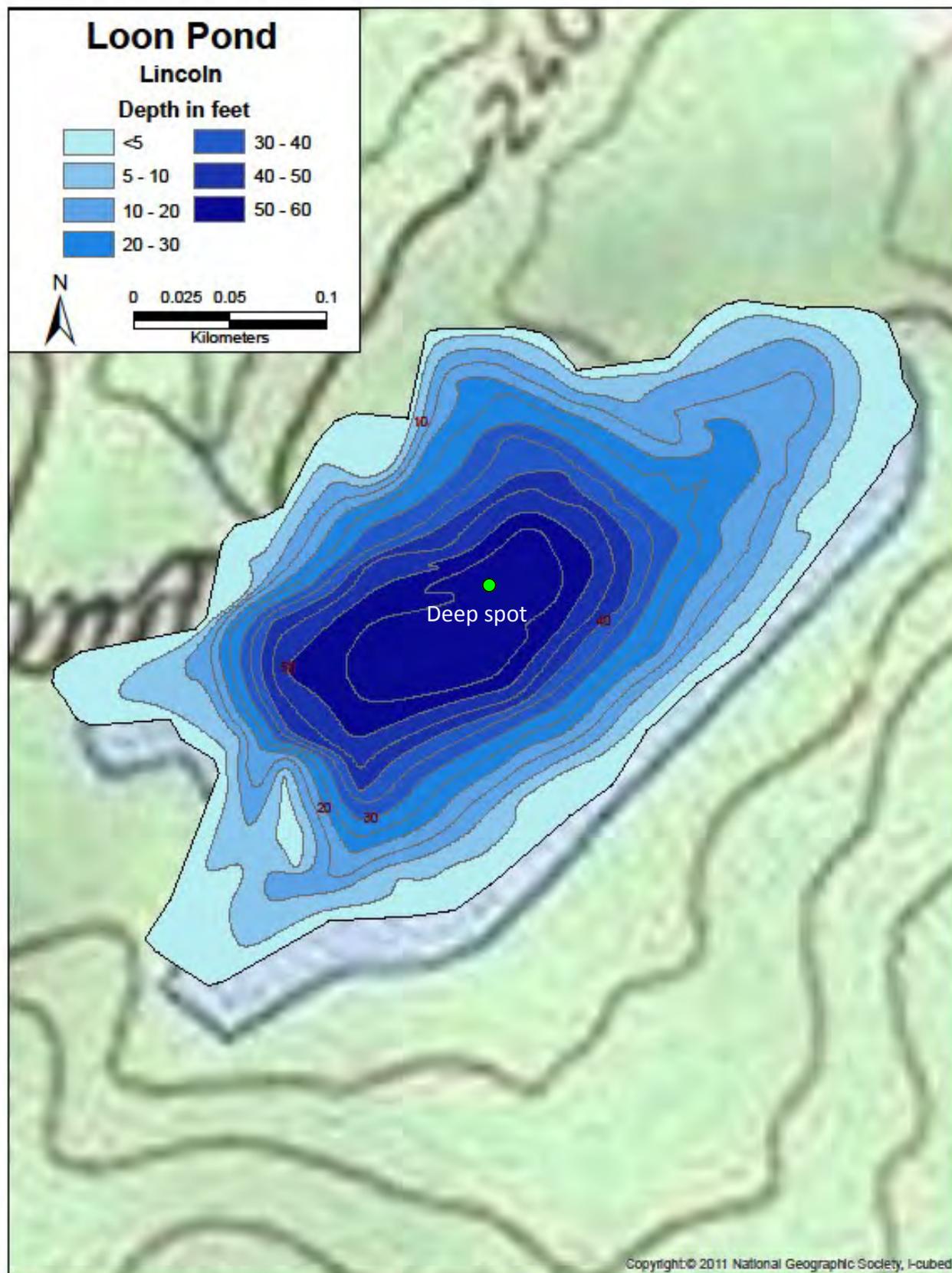


## Aquatic Plant Species Key

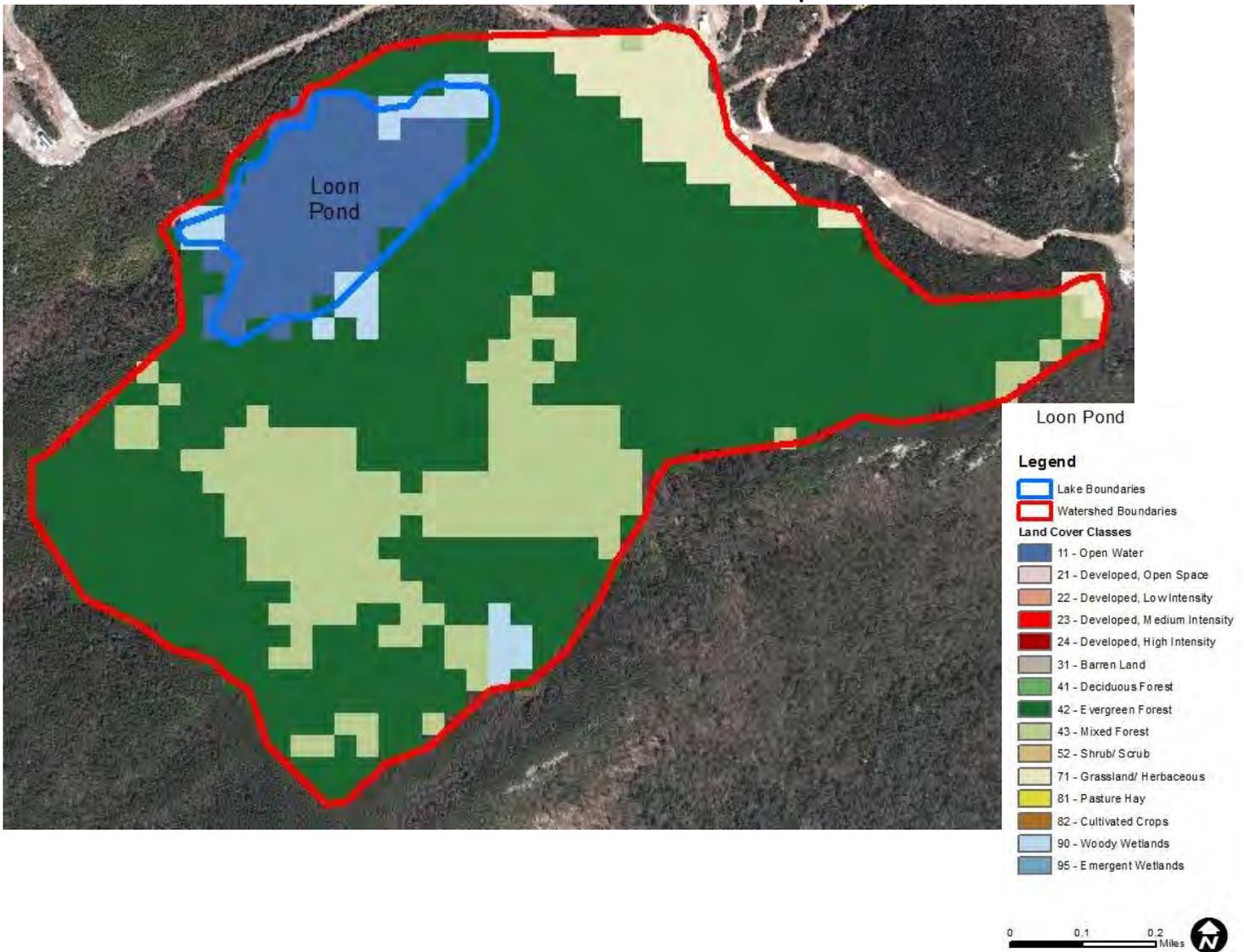
<b>LAKE: LOON POND</b>		<b>TOWN: LINCOLN</b>		<b>DATE: 9/9/2013</b>
<b>KEY</b>	<b>PLANT NAME</b>		<b>ABUNDANCE</b>	
	<b>SCIENTIFIC</b>	<b>COMMON</b>		
E	Eriocaulon septangulare	Pipewort	Sparse	
Y	Nuphar	Yellow water lily	Sparse	
<b>OVERALL ABUNDANCE: Sparse</b>				

<b>Abundance</b>	<b>Points</b>	<b>Description</b>
Sparse	0	Few emergent plants observed; generally < 10% overall cover.
Scattered	1	Several small patches or one to two large patches or much of the shoreline with a sparsely growing plant; Generally 11-20% coverage.
Scattered/Common	2	Plants covering approximately 21-35% of lake.
Common	3	Plants around most of the shoreline but not a problem to navigation or several large patches of plants. 36-55% cover.
Common/ Abundant	4	Intermediate between Common and Abundant. 56-74% cover.
Abundant	5	Plants around the entire shoreline and with large patches in several areas; submerged plants visible, ranging 75-89% cover.
Very Abundant	6	At least ½ of the surface with emergent, floating leaf or submerged plants; navigation and swimming is impaired in areas, 80-100% cover.

## Lake Bathymetry and Depth Contours



## Watershed Land Use Map



Lake Cover Category	Percent (%) Cover	Lake Cover Category	Percent (%) Cover	Lake Cover Category	Percent (%) Cover
Open Water	9.06	Barren Land	0.00	Grassland/ Herbaceous	5.58
Developed, Open Space	0.00	Deciduous Forest	0.00	Pasture Hay	0.00
Developed, Low Intensity	0.00	Evergreen Forest	64.12	Cultivated Crops	0.00
Developed, Medium Intensity	0.00	Mixed Forest	18.58	Woody Wetlands	2.79
Developed, High Intensity	0.00	Shrub/ Shrub	0.00	Emergent Wetlands	0.00

Homer, C.G., Dewitz, J.A., Yang, L., Jin, S., Danielson, P., Xian, G., Coulston, J., Herold, N.D., Wickham, J.D., and Megown, K., 2015, Completion of the 2011 National Land Cover Database for the conterminous United States - Representing a decade of land cover change information. *Photogrammetric Engineering and Remote Sensing*, v. 81, no. 5, p. 345 - 354.

[Click here for an interactive map of all historic and current lake trophic survey reports.](#)

**M**ountain Pond in New Ipswich, NH was surveyed once previously in 1989 and was rated mesotrophic. This most recent survey found the pond still rated as mesotrophic. There is no public access to the pond. All the land around the pond is owned by the New England Forestry Foundation, and a locked gate is across the only road to the pond. A native milfoil species, *Myriophyllum humile*, is present. Both total phosphorus and chlorophyll-a concentration have decreased by roughly one third since the 1989 survey, and Secchi depth has improved. Apparent color is much lower than the 1989 survey. The reason for the large decrease in apparent color is unknown and an error in the previous survey cannot be ruled out. Overall the chemical parameters are similar between the two surveys. Acid neutralizing capacity and pH are lower than median New Hampshire values.

2015 NHDES Trophic Rating:  
**Mesotrophic**  
1989 NHDES Trophic Rating:  
**Mesotrophic**

*What is a lake trophic survey?*

A lake trophic survey evaluates physical, biological and chemical parameters in lakes or ponds greater than 10 acres, to assess a lake's overall productivity, a.k.a. trophic status. Oligotrophic, mesotrophic and eutrophic are the most common trophic classifications. Oligotrophic lakes are nutrient-poor, with few plants and very clear water. Eutrophic lakes are highly productive, with lots of plants and/or algae and less clear water. Mesotrophic lakes are in-between. Trophic surveys provides a record and catalog of water quality parameters, serve as a basis for understanding environmental impacts and help inform water quality management polices. For additional explanations of lake terminology, please visit <http://des.nh.gov/organization/divisions/water/wmb/vlap/glossary.htm>

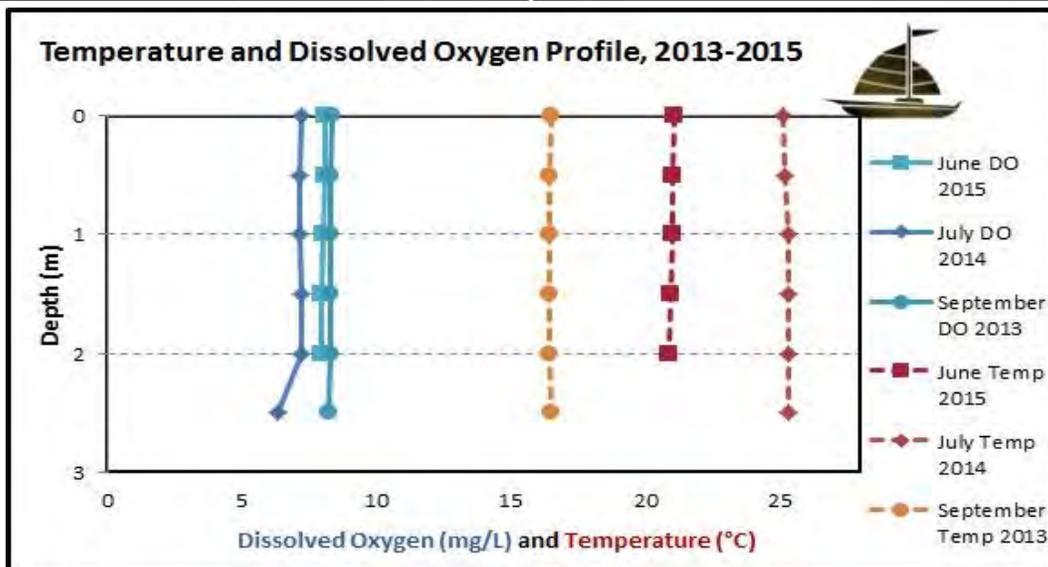
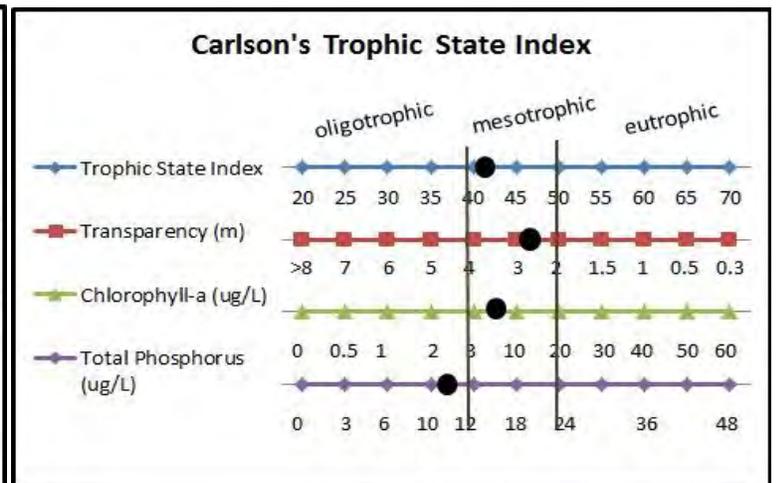
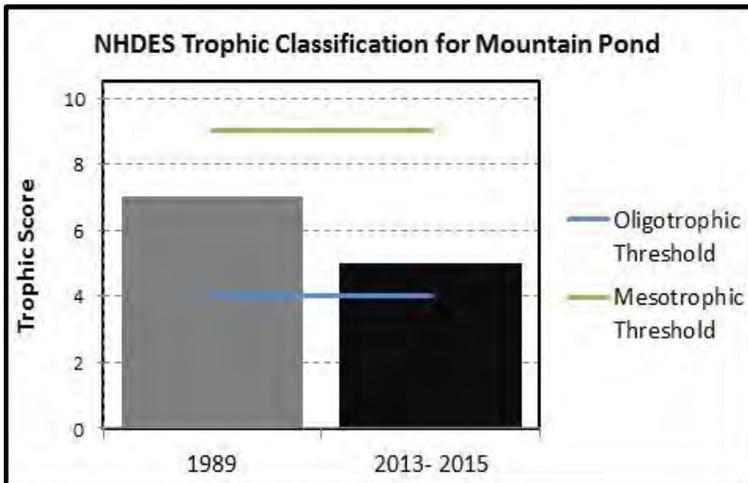


Physical Characteristics			
Elevation:	382 m (1252 ft)	Lake area:	0.101 km <sup>2</sup>
Mean depth:	1.5 m	Total Volume:	147,000 m <sup>3</sup>
Maximum depth:	2.8m	Average Hypolimnion Volume:	none
Flushing rate:	10.3 / yr <sup>-1</sup>	Average Anoxic Volume:	none
P retention coeff:	0.51	Areal water load:	14.89 m/ yr
% Watershed Poned:	0.00%	Watershed area:	2.49 km <sup>2</sup>
Shore Length:	--- m	Shore Configuration:	---
Lake type:	Natural w/ dam		

### Trophic Classification

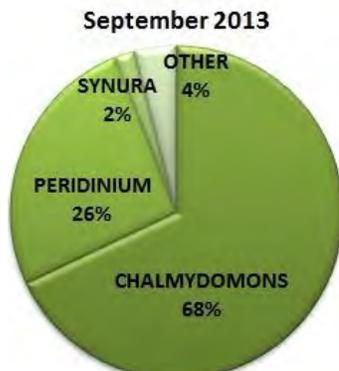
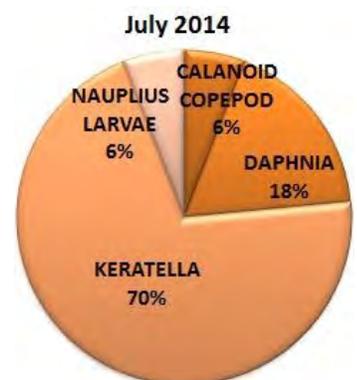
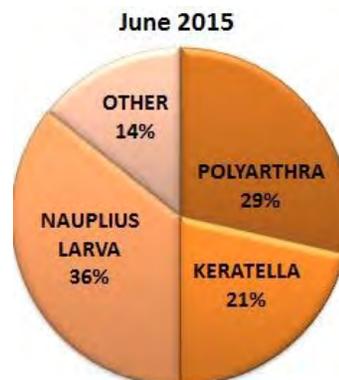
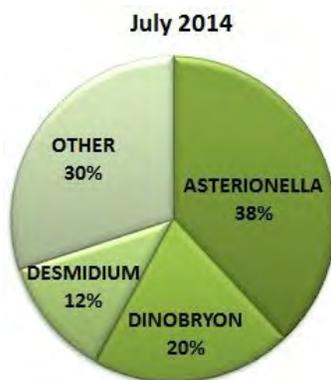
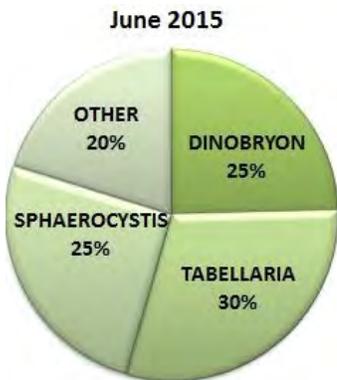
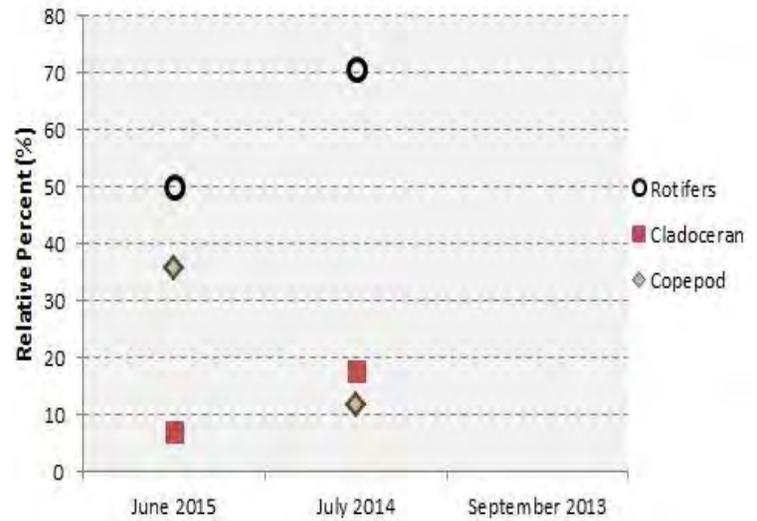
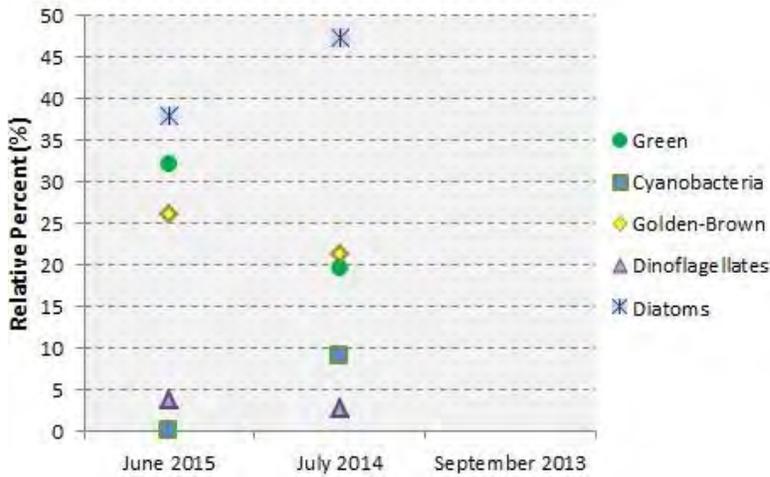
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NHDES Trophic Classification: 2013 - 2015					
Mountain Pond, New Ipswich, NH					
D.O.	S.D.	Plant	Chl-a	Total	Class
*	2	2	1	5	Mesotrophic



**Phytoplankton** are photosynthetic plants that contain chlorophyll-*a* but do not have true roots, stems or leaves. They grow on rocks, vascular plants, the lake bottom or free-floating in the water column and are a food source for zooplankton and mussels. As nutrients in the water increase, phytoplankton abundance also increases. Phytoplankton populations undergo natural succession throughout the summer, due to changes in light, nutrient availability, predation and temperature.

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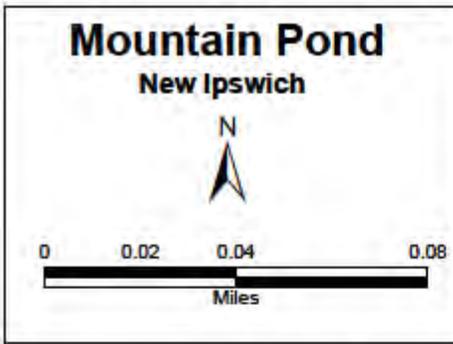


Chemical and Biological Characteristics	Mean	Standard Deviation	Median	Units	NH Median Values
<i>Epilimnetic Depth</i>	1.50	0.50	1.50	meter	x
pH	6.00	0.12	6.04	Units	6.60
Acid Neutralizing Capacity (ANC)	1.63	0.21	1.70	mg/L	4.90
Apparent Color	25.67	8.08	27.00	CPU	28.00
Secchi Depth	VOB*	VOB*	VOB*	meter	3.20
Secchi Depth - Scope	VOB*	VOB*	VOB*	meter	unk
Specific Conductance	16.62	0.63	16.63	µs/ cm	40
Total Kjeldahl Nitrogen (TKN)	0.24	0.10	0.28	mg/L	0.35
Nitrate + Nitrite Nitrogen	0.03	0.00	0.03	mg/L	<0.05
Total Phosphorus	10.47	3.23	8.68	ug/L	12.00
Chloride	1.50	0.00	1.50	mg/L	4.00
Sulfate	2.30		2.30	mg/L	4.00
Calcium	1.21		1.21	mg/L	2.60
Magnesium	0.28		0.28	mg/L	0.54
Potassium	0.26		0.26	mg/L	0.50
Sodium	1.38		1.38	mg/L	3.10
Total Organic Carbon	4.10		4.10	mg/L	3.10
<i>Metalimnetic Depth</i>	2.00	0.00	2.00	meter	x
Chlorophyll-a	5.10	3.69	4.09	ug/L	4.58

\*VOB - Visible on bottom

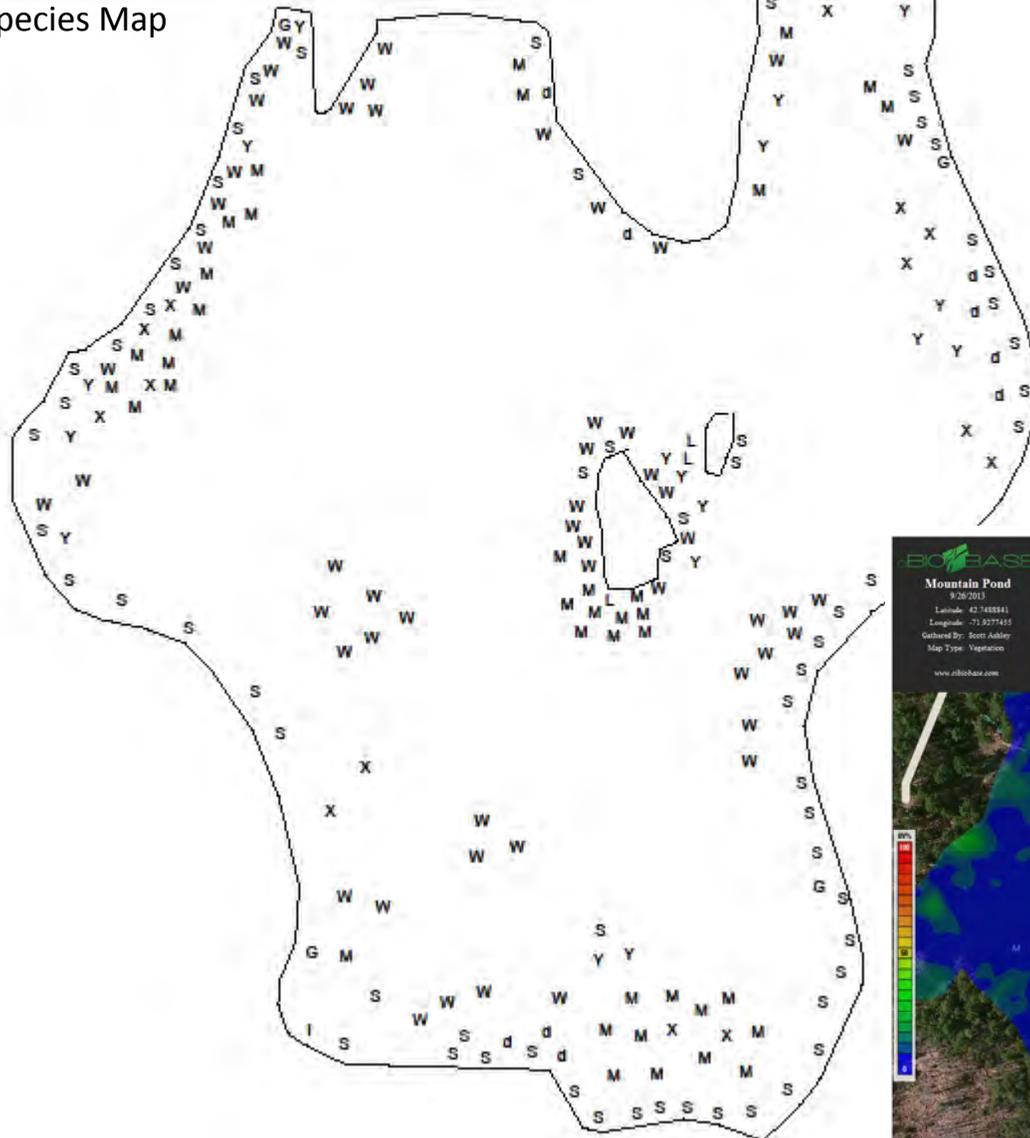
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Designated Use	Parameter	Category
Aquatic Life	Chloride	Likely Good
	Chl-a	No data
	DO	No data
	DO Saturation	No data
	pH	Likely Bad
Drinking Water	Sulfates	Likely Good
Fish Consumption	Mercury	Poor
Primary Contact Recreation	Chl-a	Likely Good
	E. Coli	No data
Secondary Contact Recreation	E. Coli	No data
Wildlife	Wildlife	No data

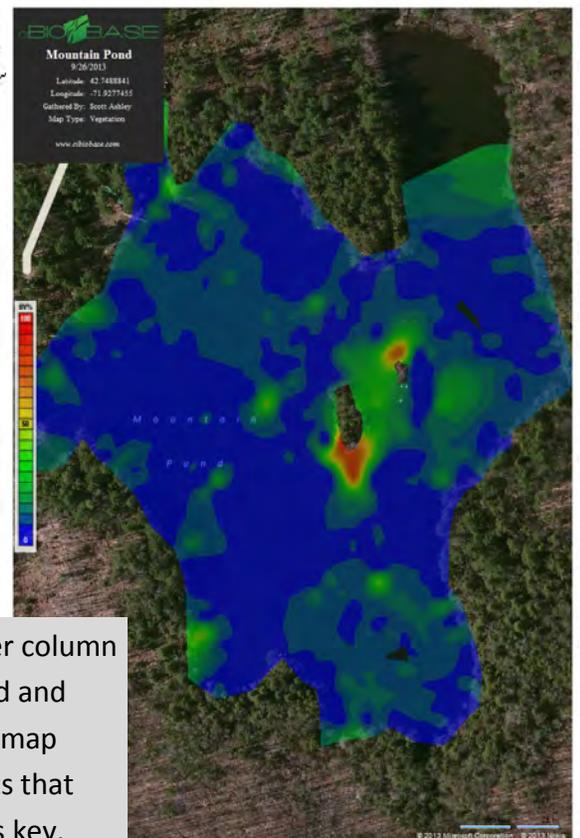


## Aquatic Plant Maps

Species Map



Biovolume Map



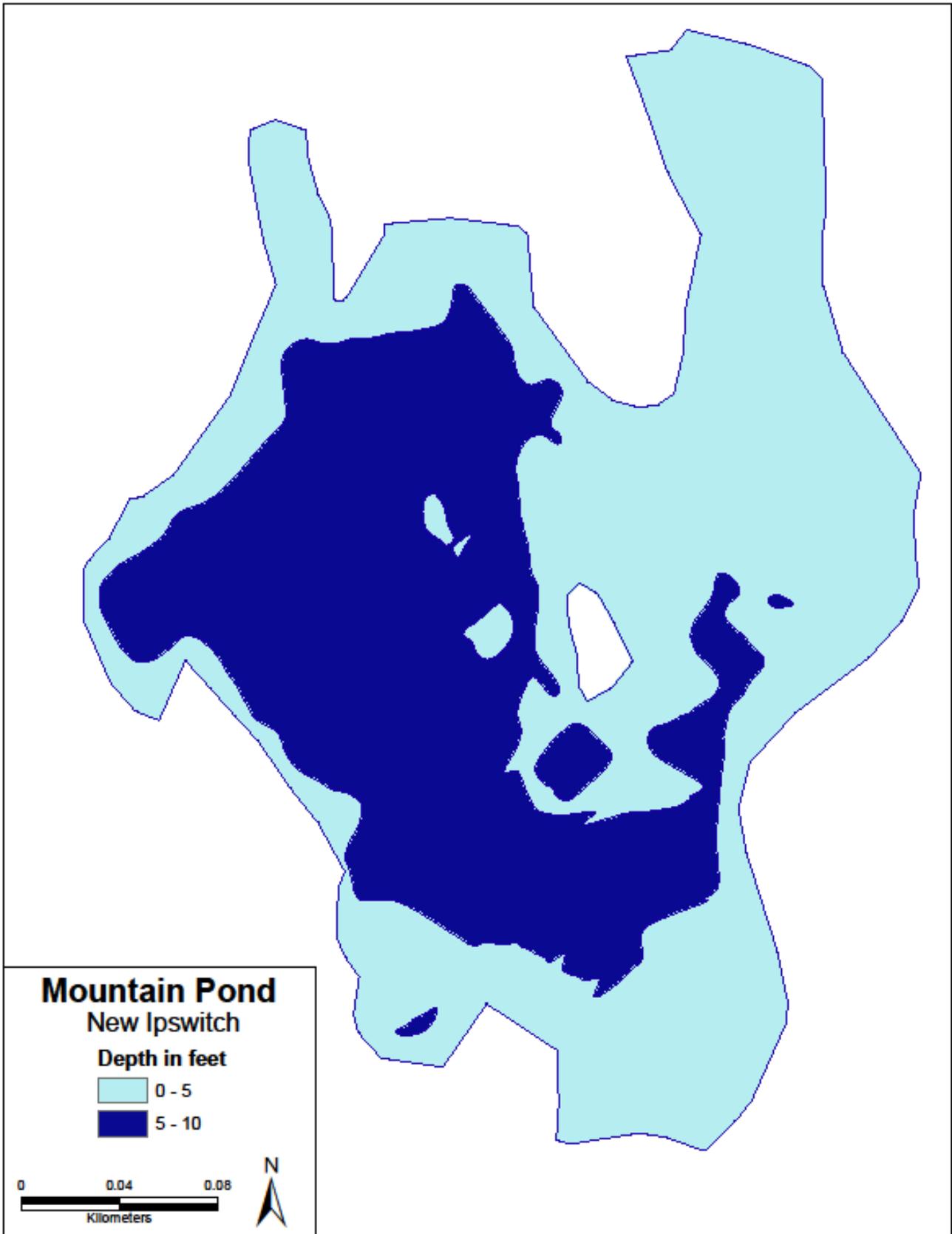
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## Aquatic Plant Species Key

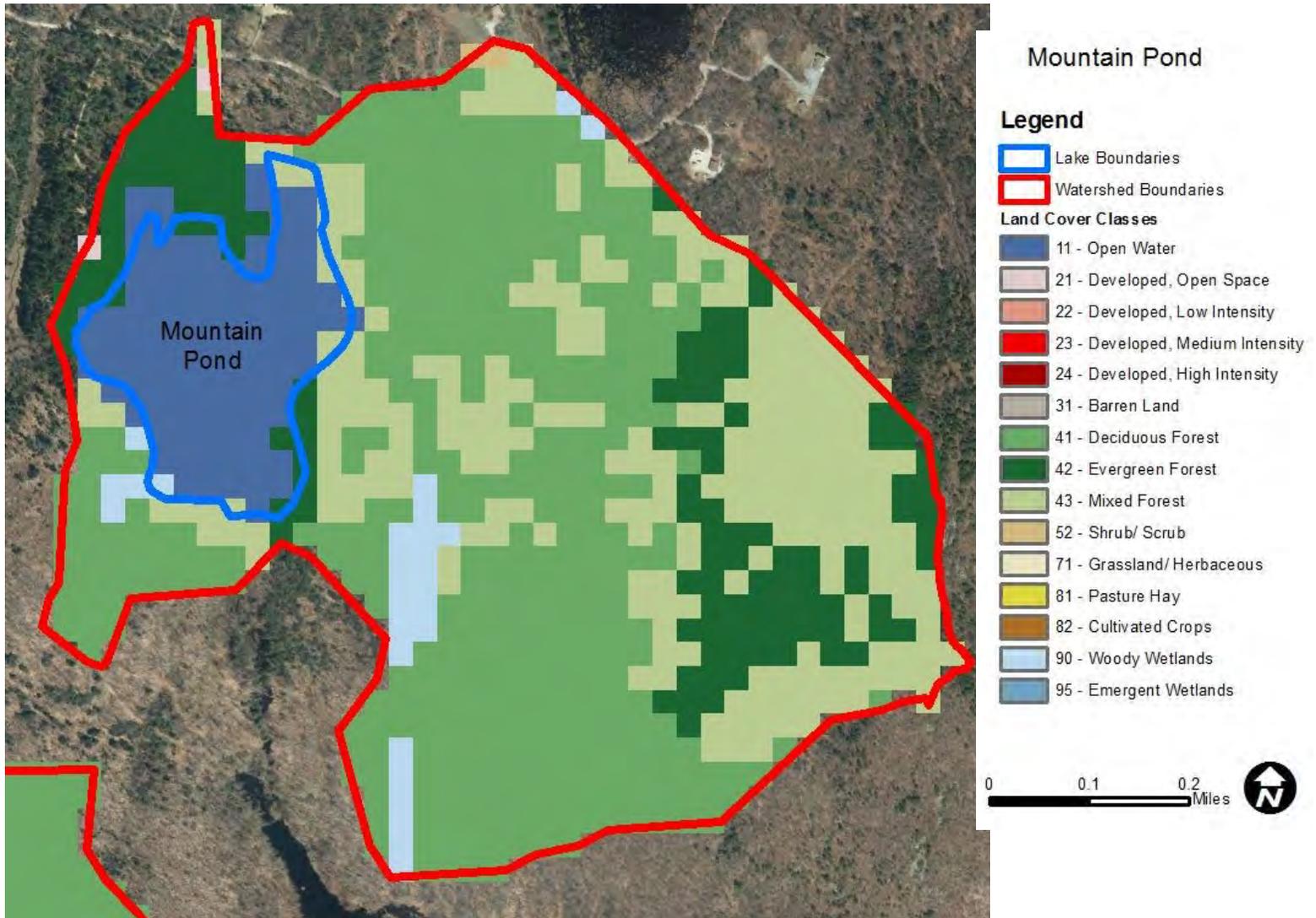
LAKE: MOUNTAIN POND		TOWN: NEW IPSWICH		DATE: 9/26/2013
KEY	PLANT NAME		ABUNDANCE	
	SCIENTIFIC	COMMON		
d	Dulichium arundinaceum	Three-way sedge	Scattered	
G	Myrica gale	Sweet gale	Sparse	
I	Iris	Iris	Sparse	
L	Chamaedaphne calyculata	Leatherleaf	Scattered	
M	Myriophyllum humile	Water milfoil	Scat/Common	
S	Sparganium	Bur reed	Scat/Common	
W	Potamogeton	Pondweed	Scat/Common	
X		Sterile thread-like leaf	Scattered	
Y	Nuphar	Yellow water lily	Scattered	
<b>OVERALL ABUNDANCE: Scattered/ Common</b>				

Abundance	Points	Description
Sparse	0	Few emergent plants observed; generally < 10% overall cover.
Scattered	1	Several small patches or one to two large patches or much of the shoreline with a sparsely growing plant; Generally 11-20% coverage.
Scattered/Common	2	Plants covering approximately 21-35% of lake.
Common	3	Plants around most of the shoreline but not a problem to navigation or several large patches of plants. 36-55% cover.
Common/ Abundant	4	Intermediate between Common and Abundant. 56-74% cover.
Abundant	5	Plants around the entire shoreline and with large patches in several areas; submerged plants visible, ranging 75-89% cover.
Very Abundant	6	At least ½ of the surface with emergent, floating leaf or submerged plants; navigation and swimming is impaired in areas, 80-100% cover.

### Lake Bathymetry and Depth Contours



## Watershed Land Use Map



Lake Cover Category	Percent (%) Cover	Lake Cover Category	Percent (%) Cover	Lake Cover Category	Percent (%) Cover
Open Water	11.37	Barren Land	0.00	Grassland/ Herbaceous	0.00
Developed, Open Space	0.23	Deciduous Forest	44.10	Pasture Hay	0.00
Developed, Low Intensity	0.00	Evergreen Forest	14.04	Cultivated Crops	0.00
Developed, Medium Intensity	0.00	Mixed Forest	27.27	Woody Wetlands	3.13
Developed, High Intensity	0.00	Shrub/ Shrub	0.23	Emergent Wetlands	0.00

Homer, C.G., Dewitz, J.A., Yang, L., Jin, S., Danielson, P., Xian, G., Coulston, J., Herold, N.D., Wickham, J.D., and Megown, K., 2015, Completion of the 2011 National Land Cover Database for the conterminous United States - Representing a decade of land cover change information. *Photogrammetric Engineering and Remote Sensing*, v. 81, no. 5, p. 345 - 354.

[Click here for an interactive map of all historic and current lake trophic survey reports.](#)

**O**liverian Brook Pond in Benton, NH was sampled once previously in 1982. The pond was rated as eutrophic; however, it was noted that a diatom bloom was occurring at the time of summer sampling. During the 2013-2015 monitoring, no blooms occurred, and the pond rated as mesotrophic. Oliverian Brook Pond is a shallow, manmade impoundment constructed by the Soil Conservation Service. It is located in the White Mountain National Forest and is a designated recreational area. A cement boat ramp is present. Likely attributed to the 1982 diatom bloom, the 2013-2015 monitoring found that the Secchi depth has increased and total phosphorus and chlorophyll-a concentration have greatly decreased. Acid neutralizing capacity and pH have also decreased since the 1982 assessment, but are still equal to or higher than the state median. The pond is weakly stratified.

2015 NHDES Trophic Rating:  
**Mesotrophic**  
1982 NHDES Trophic Rating:  
**Eutrophic**

*What is a lake trophic survey?*

A lake trophic survey evaluates physical, biological and chemical parameters in lakes or ponds greater than 10 acres, to assess a lake's overall productivity, a.k.a. trophic status. Oligotrophic, mesotrophic and eutrophic are the most common trophic classifications. Oligotrophic lakes are nutrient-poor, with few plants and very clear water. Eutrophic lakes are highly productive, with lots of plants and/or algae and less clear water. Mesotrophic lakes are in-between. Trophic surveys provides a record and catalog of water quality parameters, serve as a basis for understanding environmental impacts and help inform water quality management polices. For additional explanations of lake terminology, please visit <http://des.nh.gov/organization/divisions/water/wmb/vlap/glossary.htm>

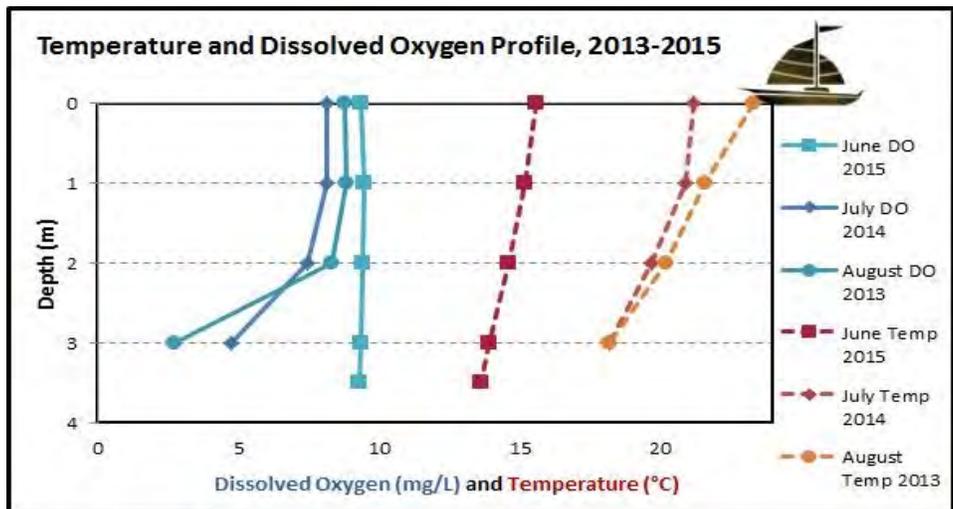
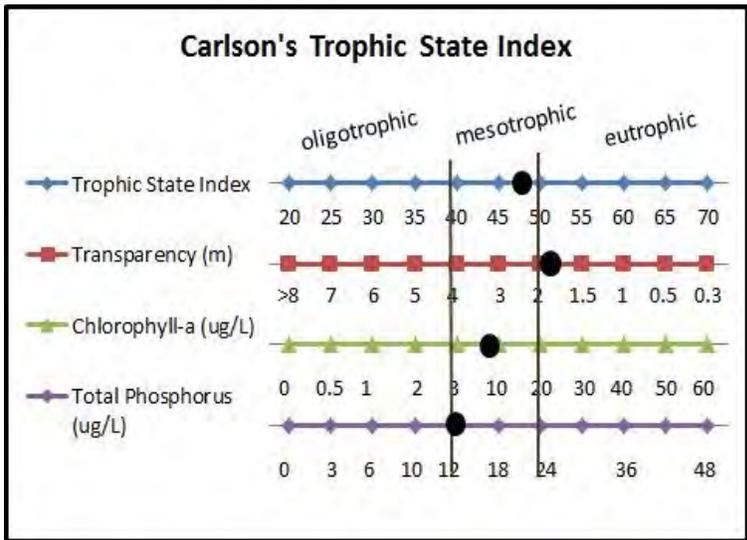
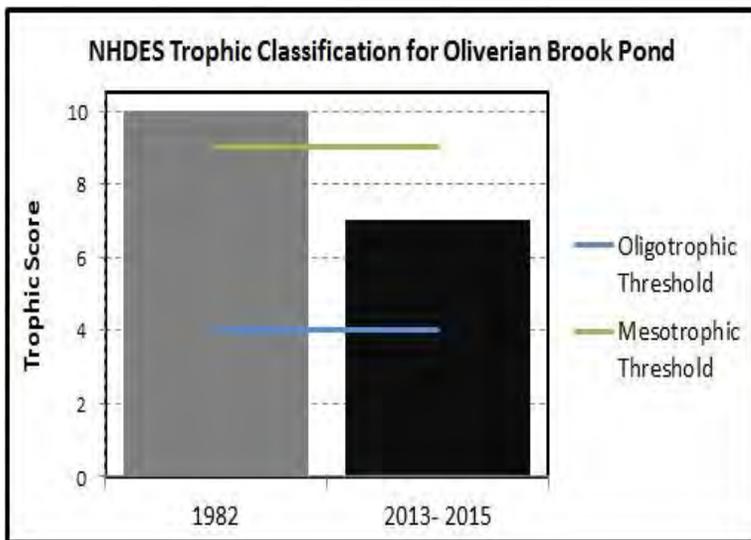


Physical Characteristics			
Elevation:	260 m (850 ft)	Lake area:	0.096 km <sup>2</sup>
Mean depth:	2.2 m	Total Volume:	159800 m <sup>3</sup>
Maximum depth:	4 m	Average Hypolimnion Volume:	none
Flushing rate:	64.6 / yr <sup>-1</sup>	Average Anoxic Volume:	none
P retention coeff:	0.15	Areal water load:	138.64 m/ yr
% Watershed Ponged:	0.00%	Watershed area:	18.78 km <sup>2</sup>
Shore Length:	--- m	Shore Configuration:	---
Lake type:	Artificial		

### Trophic Classification

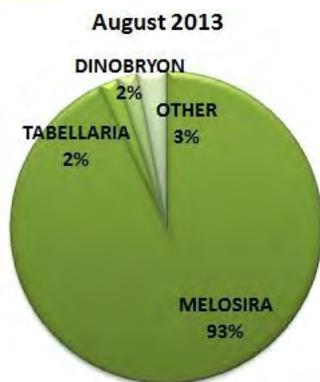
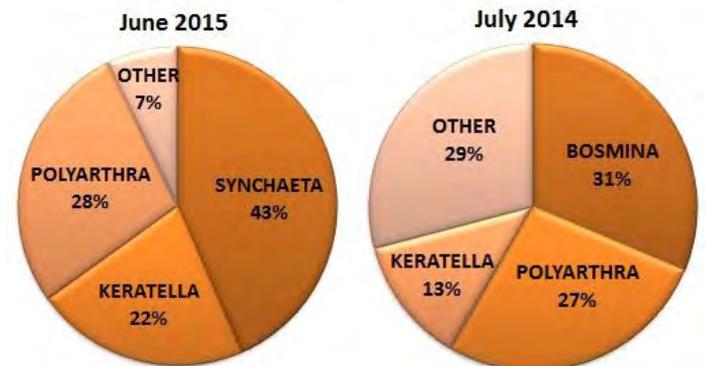
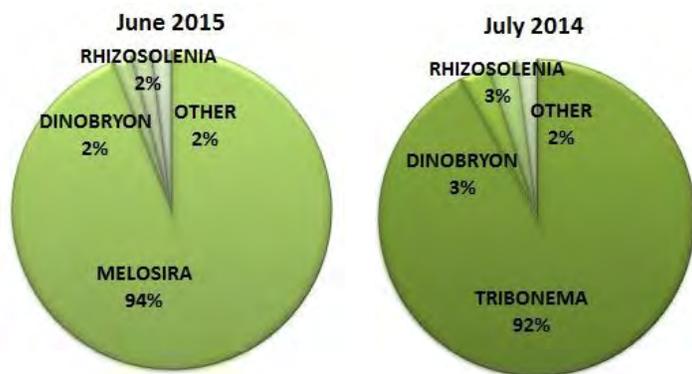
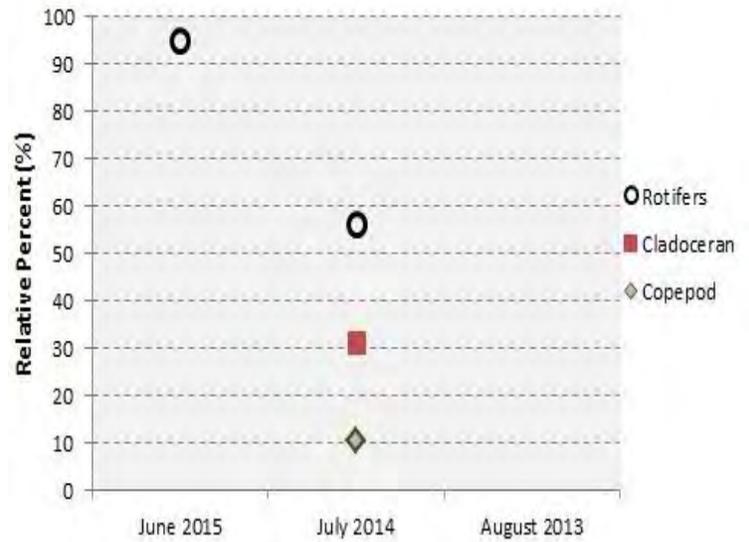
The NHDES Trophic Classification System was initiated in the early 1970s and revised in 1989. This index assigns a numeric values to summer bottom dissolved oxygen (D.O.), Secchi disk transparency (S.D.), aquatic vascular plant abundance (Plant), and epilimnetic chlorophyll-*a* concentration (Chl-*a*), which sum to a final score that determines a lake's trophic status. For stratified lakes, 0-6 points signifies a lake is oligotrophic, 7-12 points for mesotrophic, and 13-24 points for eutrophic. This index allows for direct comparisons to be made to historic data, which better track changes in trophic status. The NHDES Trophic Classification System is one of many ways to determine a lake's trophic status. The Carlson's Trophic State Index (TSI) is a more broadly used trophic assessment tool that considers Secchi disk transparency, chlorophyll-*a* concentration, and total phosphorus (TP); however, the results are less comparable to historic NHDES data. For a more in-depth explanation of the NHDES classification methodology, please visit: [http://des.nh.gov/organization/divisions/water/wmb/lakes/documents/data\\_sources\\_explanation.pdf](http://des.nh.gov/organization/divisions/water/wmb/lakes/documents/data_sources_explanation.pdf)

NHDES Trophic Classification: 2013 - 2015					
Oliverian Brook Pond, Benton, NH					
D.O.	S.D.	Plant	Chl-a	Total	Class
*	4	1	2	7	Mesotrophic



**Phytoplankton** are photosynthetic plants that contain chlorophyll-*a* but do not have true roots, stems or leaves. They grow on rocks, vascular plants, the lake bottom or free-floating in the water column and are a food source for zooplankton and mussels. As nutrients in the water increase, phytoplankton abundance also increases. Phytoplankton populations undergo natural succession throughout the summer, due to changes in light, nutrient availability, predation and temperature.

**Zooplankton** are microscopic animals that naturally inhabit New Hampshire lakes. They feed on phytoplankton, bacteria and other zooplankton while being an important food source for fish and mussels. Zooplankton also undergo natural succession throughout the summer, due to changes in light, nutrient availability, predation and temperature.

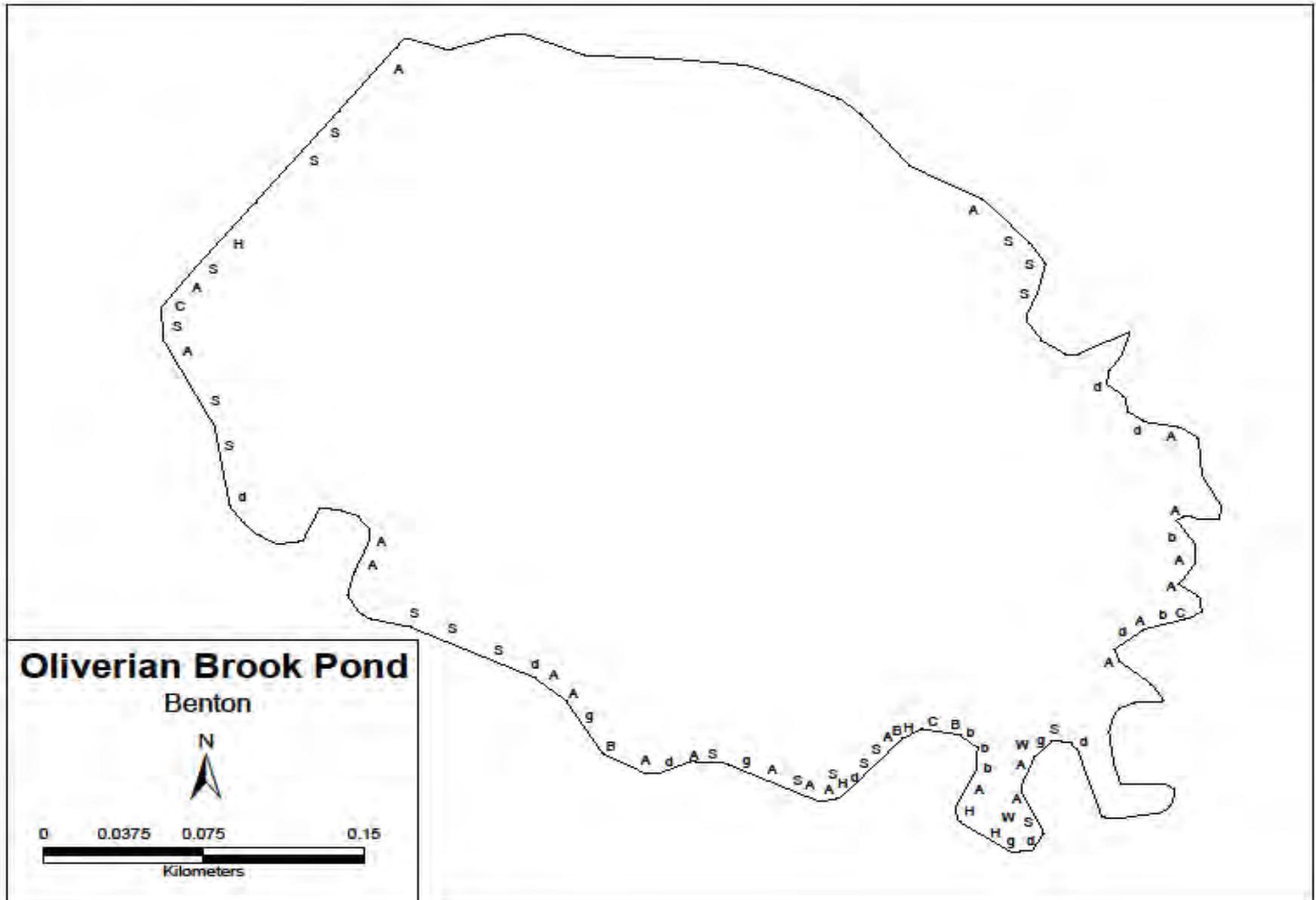


Chemical and Biological Characteristics	Mean	Standard Deviation	Median	Units	NH Median Values
<i>Epilimnetic Depth</i>	1.67	0.58	2.00	meter	x
pH	6.60	0.08	6.57	Units	6.60
Acid Neutralizing Capacity (ANC)	7.40	0.95	7.30	mg/L	4.90
Apparent Color	38.33	6.11	37.00	CPU	28.00
Secchi Depth	1.92	0.29	1.80	meter	3.20
Secchi Depth - Scope	2.25	0.49	2.25	meter	unk
Specific Conductance	59.03	10.42	64.90	µs/ cm	40
Total Kjldahl Nitrogen (TKN)	0.13	0.00	0.13	mg/L	0.35
Nitrate + Nitrite Nitrogen	0.03	0.00	0.03	mg/L	<0.05
Total Phosphorus	12.53	2.78	11.40	ug/L	12.00
Chloride	9.00	2.65	10.00	mg/L	4.00
Sulfate	3.00		3.00	mg/L	4.00
Calcium	3.53		3.53	mg/L	2.60
Magnesium	0.78		0.78	mg/L	0.54
Potassium	0.13		0.13	mg/L	0.50
Sodium	7.05		7.05	mg/L	3.10
Total Organic Carbon	2.80		2.80	mg/L	3.10
<i>Metolimnetic Depth</i>	2.83	0.76	3.00	meter	x
Chlorophyll-a	9.95	4.85	9.34	ug/L	4.58

The Waterbody Report Card table (below) is generated from the 2014 305(b) report on the status of NH waters and are based on data collected from 2001-2013. Additional information can be found at <http://des.nh.gov/organization/divisions/water/wmb/swqa/index.htm>

Designated Use	Parameter	Category
Aquatic Life	Chloride	Likely Good
	Chl-a	Likely Good
	DO	No data
	DO Saturation	No data
	TP	Likely Good
	pH	Likely Good
Drinking Water	Sulfates	Likely Good
Fish Consumption	Mercury	Poor
Primary Contact Recreation	Chl-a	Likely Good
	E. Coli	No data
Secondary Contact Recreation	E. Coli	No data
Wildlife	Wildlife	No data

### Aquatic Plant Species Map

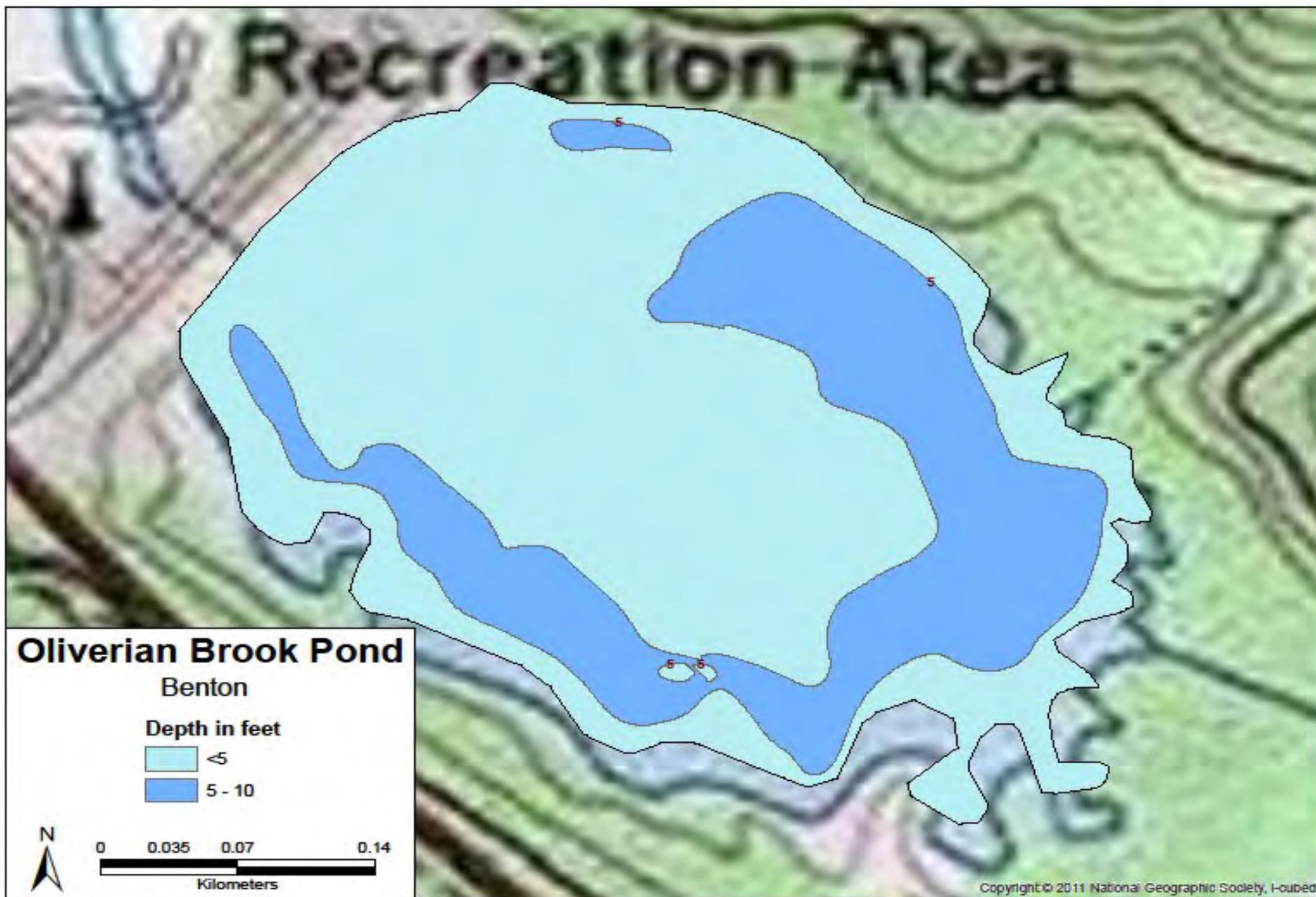


## Aquatic Plant Species Key

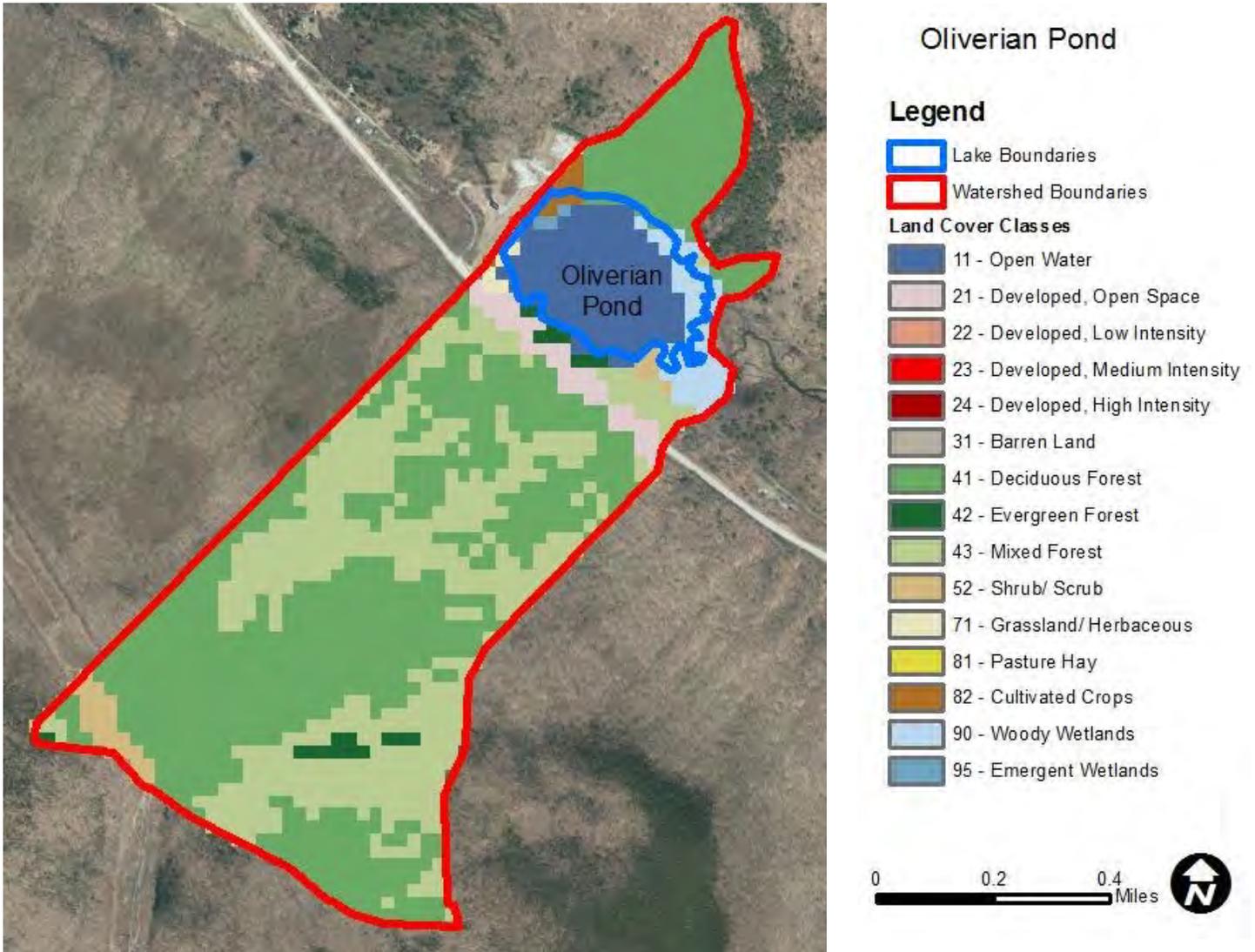
LAKE: OLIVERIAN BROOK POND		TOWN: BENTON		DATE: 8/28/2013
KEY	PLANT NAME		ABUNDANCE	
	SCIENTIFIC	COMMON		
A	Sagittaria	Arrowhead	Scattered	
b	Scirpus	Bulrush	Scattered	
C	Lysimachia	Loosestrife	Scattered	
d	Dulichium arundinaceum	Three-way sedge	Scattered	
E	Equisetum	Horsetail	Sparse	
g	Sagittaria graminea	Grassy arrowhead	Sparse	
S	Sparganium	Bur reed	Scattered	
W	Potamogeton epihydrus	Leafy pondweed	Sparse	
<b>OVERALL ABUNDANCE: Scattered</b>				

Abundance	Points	Description
Sparse	0	Few emergent plants observed; generally < 10% overall cover.
Scattered	1	Several small patches or one to two large patches or much of the shoreline with a sparsely growing plant; Generally 11-20% coverage.
Scattered/Common	2	Plants covering approximately 21-35% of lake.
Common	3	Plants around most of the shoreline but not a problem to navigation or several large patches of plants. 36-55% cover.
Common/ Abundant	4	Intermediate between Common and Abundant. 56-74% cover.
Abundant	5	Plants around the entire shoreline and with large patches in several areas; submerged plants visible, ranging 75-89% cover.
Very Abundant	6	At least ½ of the surface with emergent, floating leaf or submerged plants; navigation and swimming is impaired in areas, 80-100% cover.

### Lake Bathymetry and Depth Contours



## Watershed Land Use Map



Lake Cover Category	Percent (%) Cover	Lake Cover Category	Percent (%) Cover	Lake Cover Category	Percent (%) Cover
Open Water	8.02	Barren Land	0.00	Grassland/ Herbaceous	0.39
Developed, Open Space	2.52	Deciduous Forest	50.72	Pasture Hay	0.00
Developed, Low Intensity	0.00	Evergreen Forest	1.42	Cultivated Crops	0.97
Developed, Medium Intensity	0.00	Mixed Forest	30.41	Woody Wetlands	3.36
Developed, High Intensity	0.00	Shrub/ Shrub	1.88	Emergent Wetlands	0.26

Homer, C.G., Dewitz, J.A., Yang, L., Jin, S., Danielson, P., Xian, G., Coulston, J., Herold, N.D., Wickham, J.D., and Megown, K., 2015, Completion of the 2011 National Land Cover Database for the conterminous United States - Representing a decade of land cover change information. *Photogrammetric Engineering and Remote Sensing*, v. 81, no. 5, p. 345 - 354.

[Click here for an interactive map of all historic and current lake trophic survey reports](#)

Sondogardy Pond, also known as Northfield Pond, in Northfield, NH is a weakly stratified pond with some anoxia that was surveyed twice previously in 1982 and 1998. The 1982 survey rated Sondogardy Pond as mesotrophic, whereas the 1998 survey found the pond was eutrophic, but noted that in 1998, it was one point away from being considered mesotrophic. The 2013-2015 survey has once again determined the pond to be mesotrophic. While the change in trophic classification may be related to changes in sampling protocol, Sondogardy Pond also had increased Secchi depth readings by approximately a meter and chlorophyll-a concentration was less than half of the 1998 value, and much more similar to the 1982 value, suggesting the pond is truly mesotrophic. There is no boat launch site and the town beach was used to launch. Sondogardy Pond dropped out of the Volunteer Lake Assessment Program (VLAP) in 2011. Acid neutralizing capacity has slightly improved and apparent color has decreased since the previous trophic surveys. Since 1998, chloride concentrations and specific conductance have increased by 30-40%, suggesting road salt may be affecting the pond.

2015 NHDES Trophic Rating:  
**Mesotrophic**  
 1998 NHDES Trophic Rating:  
**Eutrophic**

*What is a lake trophic survey?*

A lake trophic survey evaluates physical, biological and chemical parameters in lakes or ponds greater than 10 acres, to assess a lake's overall productivity, a.k.a. trophic status. Oligotrophic, mesotrophic and eutrophic are the most common trophic classifications. Oligotrophic lakes are nutrient-poor, with few plants and very clear water. Eutrophic lakes are highly productive, with lots of plants and/or algae and less clear water. Mesotrophic lakes are in-between. Trophic surveys provides a record and catalog of water quality parameters, serve as a basis for understanding environmental impacts and help inform water quality management polices. For additional explanations of lake terminology, please visit <http://des.nh.gov/organization/divisions/water/wmb/vlap/glossary.htm>

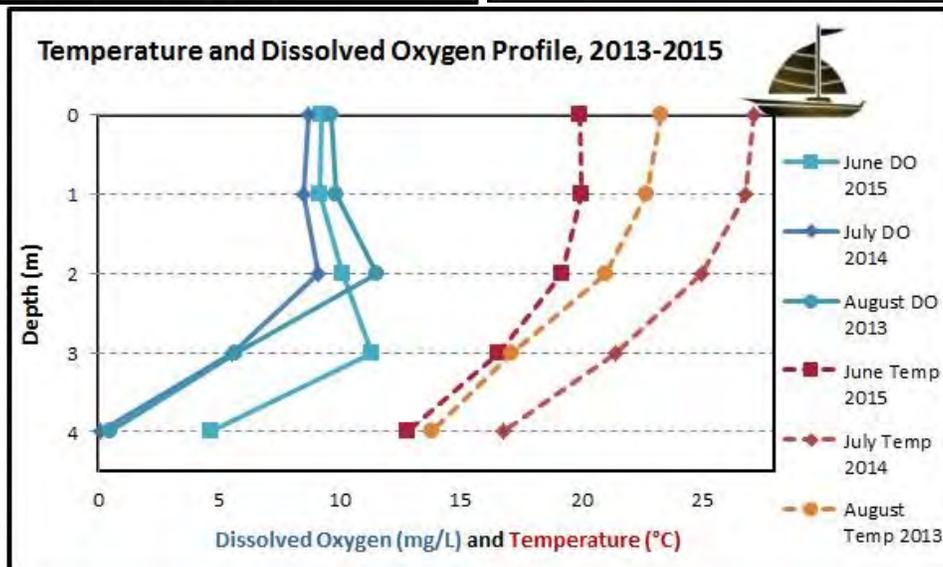
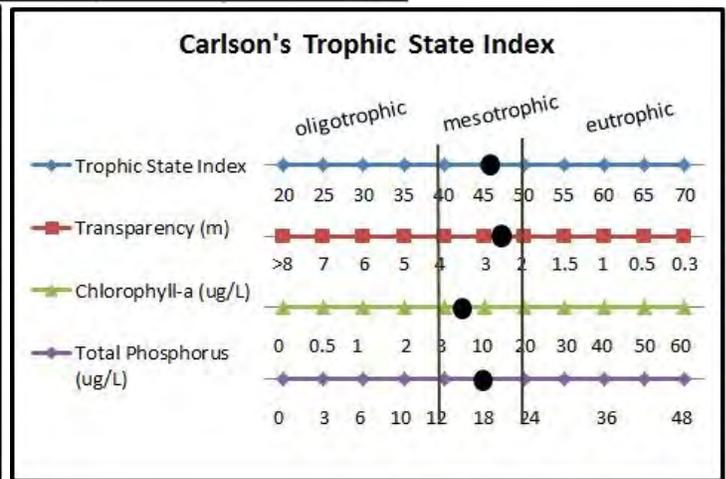
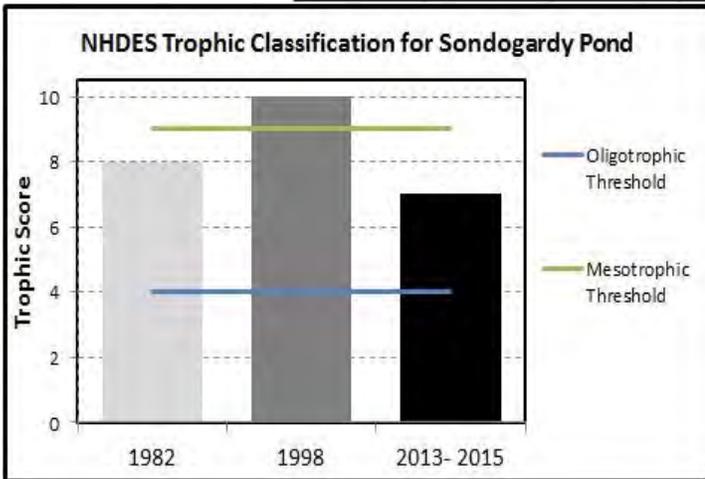


Physical Characteristics			
Elevation:	121 m (397 ft)	Lake area:	0.1651 km <sup>2</sup>
Mean depth:	2.7 m	Total Volume:	277,400 m <sup>3</sup>
Maximum depth:	4.4 m	Average Hypolimnion Volume:	none
Flushing rate:	11.1 / yr <sup>-1</sup>	Average Anoxic Volume:	770 m <sup>3</sup>
P retention coeff:	0.43	Maximum Anoxic Volume:	1,154 m <sup>3</sup>
% Watershed Poned:	0.00%	Areal water load:	29.79 m/ yr
Shore Length:	1300 m	Watershed area:	11.396 km <sup>2</sup>
Lake type:	Natural	Shore Configuration:	1

### Trophic Classification

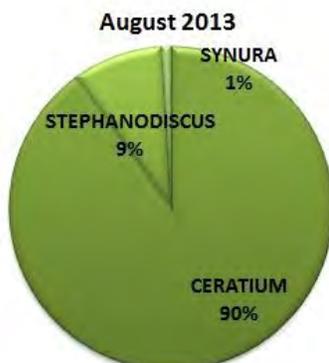
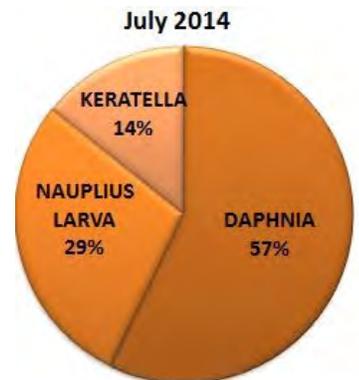
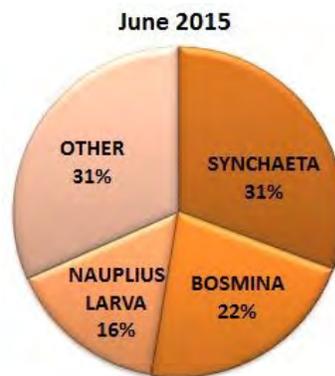
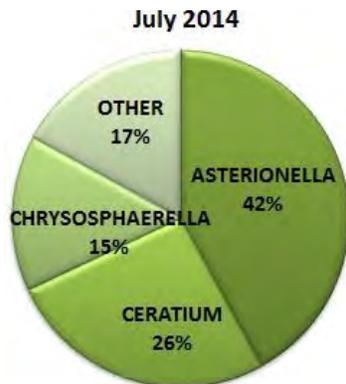
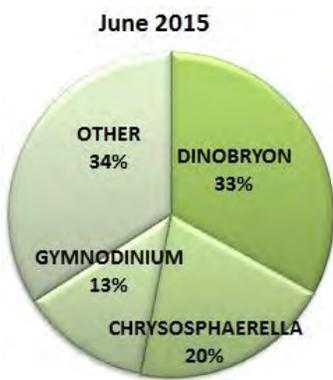
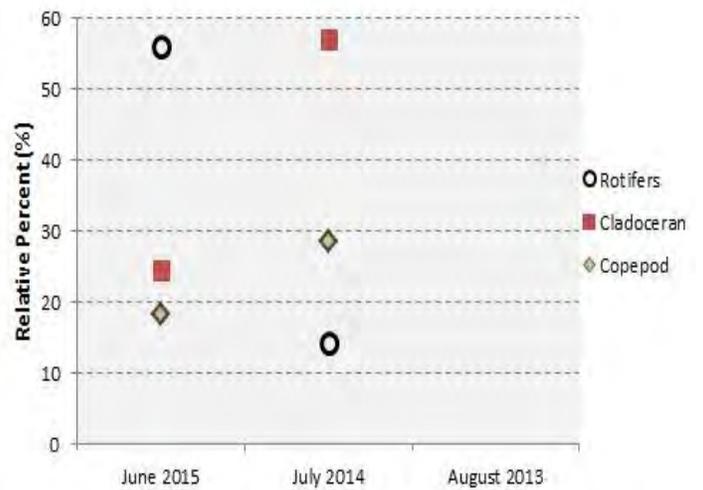
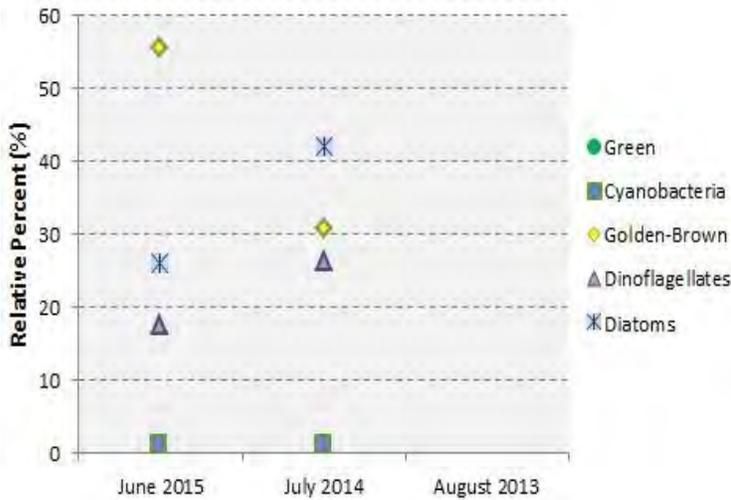
The NHDES Trophic Classification System was initiated in the early 1970s and revised in 1989. This index assigns a numeric values to summer bottom dissolved oxygen (D.O.), Secchi disk transparency (S.D.), aquatic vascular plant abundance (Plant), and epilimnetic chlorophyll-*a* concentration (Chl-*a*), which sum to a final score that determines a lake's trophic status. For stratified lakes, 0-6 points signifies a lake is oligotrophic, 7-12 points for mesotrophic, and 13-24 points for eutrophic. This index allows for direct comparisons to be made to historic data, which better track changes in trophic status. The NHDES Trophic Classification System is one of many ways to determine a lake's trophic status. The Carlson's Trophic State Index (TSI) is a more broadly used trophic assessment tool that considers Secchi disk transparency, chlorophyll-*a* concentration, and total phosphorus (TP); however, the results are less comparable to historic NHDES data. For a more in-depth explanation of the NHDES classification methodology, please visit: [http://des.nh.gov/organization/divisions/water/wmb/lakes/documents/data\\_sources\\_explanation.pdf](http://des.nh.gov/organization/divisions/water/wmb/lakes/documents/data_sources_explanation.pdf)

NHDES Trophic Classification: 2013 - 2015					
Sondogardy Pond, Northfield, NH					
D.O.	S.D.	Plant	Chl-a	Total	Class
*	3	3	1	7	Mesotrophic



**Phytoplankton** are photosynthetic plants that contain chlorophyll-*a* but do not have true roots, stems or leaves. They grow on rocks, vascular plants, the lake bottom or free-floating in the water column and are a food source for zooplankton and mussels. As nutrients in the water increase, phytoplankton abundance also increases. Phytoplankton populations undergo natural succession throughout the summer, due to changes in light, nutrient availability, predation and temperature.

**Zooplankton** are microscopic animals that naturally inhabit New Hampshire lakes. They feed on phytoplankton, bacteria and other zooplankton while being an important food source for fish and mussels. Zooplankton also undergo natural succession throughout the summer, due to changes in light, nutrient availability, predation and temperature.



Chemical and Biological Characteristics	Mean	Standard	Median	Units	NH Median
<i>Epilimnetic Depth</i>	1.67	0.58	2.00	meter	x
pH	6.96	0.10	6.94	Units	6.60
Acid Neutralizing Capacity (ANC)	9.90	1.05	9.80	mg/L	4.90
Apparent Color	33.00	9.17	35.00	CPU	28.00
Secchi Depth	2.67	0.06	2.70	meter	3.20
Secchi Depth - Scope	2.97	0.15	3.00	meter	unk
Specific Conductance	133.60	16.09	140.00	µs/ cm	40
Total Kjldahl Nitrogen (TKN)	0.24	0.15	0.24	mg/L	0.35
Nitrate + Nitrite Nitrogen	0.03	0.00	0.03	mg/L	<0.05
Total Phosphorus	18.41	5.54	16.22	ug/L	12.00
Chloride	30.67	0.58	31.00	mg/L	4.00
Sulfate	3.20		3.20	mg/L	4.00
Calcium	3.36		3.36	mg/L	2.60
Magnesium	1.34		1.34	mg/L	0.54
Potassium	0.83		0.83	mg/L	0.50
Sodium	14.80		14.80	mg/L	3.10
Total Organic Carbon	4.30		4.30	mg/L	3.10
<i>Metalimnetic Depth</i>	3.00	0.00	3.00	meter	x
Chlorophyll-a	6.42	3.32	6.99	ug/L	4.58

The Waterbody Report Card table (below) is generated from the 2014 305(b) report on the status of NH waters and are based on data collected from 2001-2013. Additional information can be found at <http://des.nh.gov/organization/divisions/water/wmb/swqa/index.htm>

Designated Use	Parameter	Category
Aquatic Life	Chloride	Likely Good
	ANC	Likely Good
	Chl-a	Poor
	DO	Likely Good
	DO Saturation	Poor
	TP	Poor
	Turbidity	Likely Good
	pH	Poor
Drinking Water	Sulfates	Likely Good
	E. Coli	Likely Bad
Fish Consumption	Mercury	Poor
Primary Contact Recreation	Chl-a	Good
	Cyanobacteria	Poor
	E. Coli	Likely Good
Secondary Contact Recreation	E. Coli	Likely good
Wildlife	Wildlife	No data

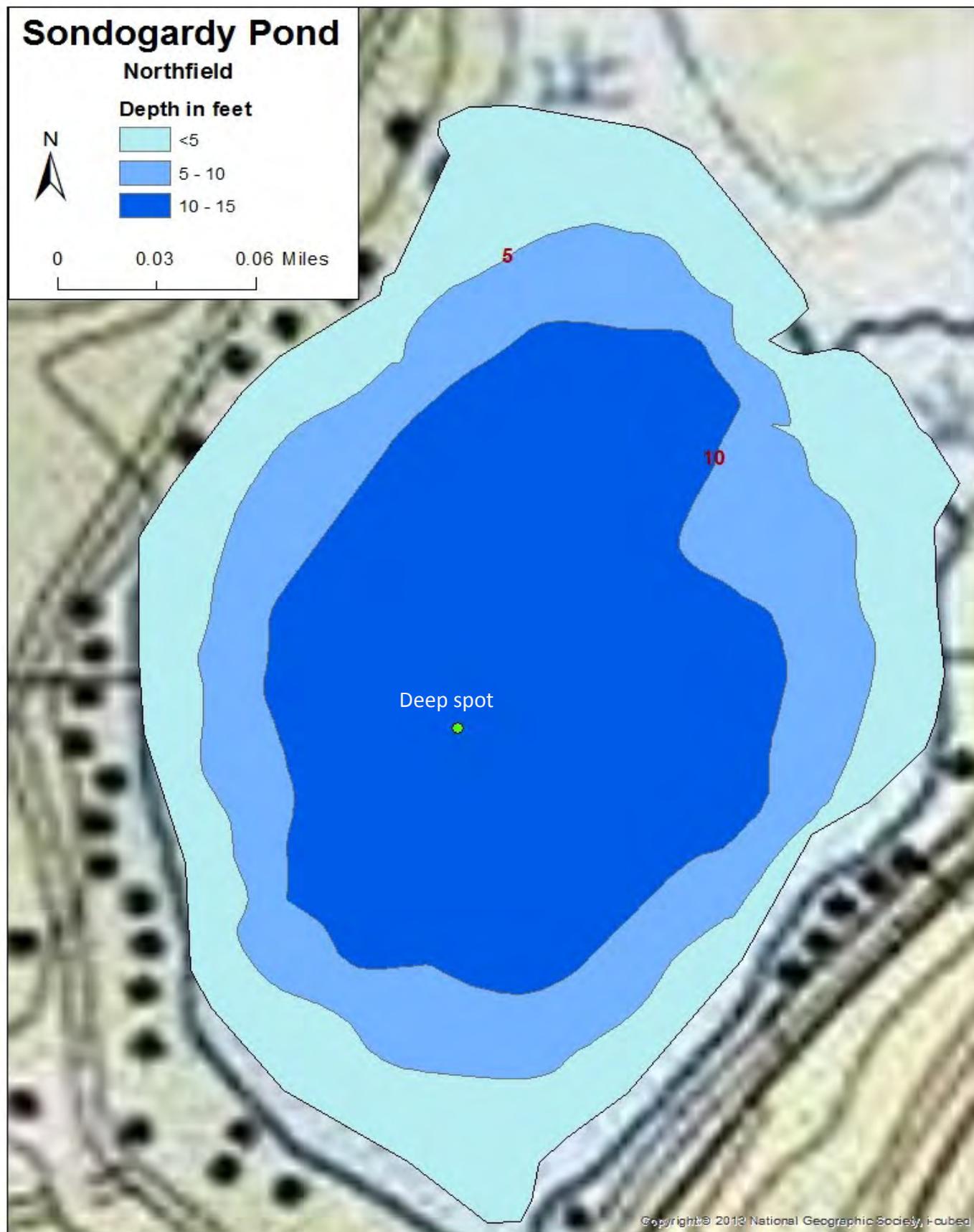


## Aquatic Plant Species Key

LAKE: SONDOGARDY POND		TOWN: NORTHFIELD		DATE: 8/26/2013
KEY	PLANT NAME		ABUNDANCE	
	SCIENTIFIC	COMMON		
A	Potamogeton amplifolius	Bass weed	Scattered	
b	Cephalanthus occidentalis	Buttonbush	Sparse	
B	Brasenia schreberi	Water shield	Common	
C	Callitriche	Water starwort	Sparse	
D	Potamogeton	Pondweed	Sparse	
e	Eleocharis	Spike rush	Scattered	
E	Eriocaulon septangulare	Pipewort	Sparse	
F	Nymphoides cordatum	Floating heart	Common	
G	Sagittaria graminea	Grassy arrowhead	Scattered	
J	Juncus effusus	Soft stem rush	Scattered	
L	Lysimachia	Swamp candle	Scattered	
N	Nymphaea	White water lily	Scat/ Common	
O	Elodea	Waterweed	Sparse	
P	Pontederia cordata	Pickereelweed	Common	
R	Potamogeton robbinsii	Robbins pondweed	Scat/ Common	
S	Sparganium	Bur reed	Common	
T	Typha	Cattail	Scattered	
U	Utricularia purpurea	Purple bladderwort	Common	
V	Utricularia vulgans	Large bladderwort	Common	
W	Potamogeton natans	Floating-leaf pondweed	Scat/ Common	
Y	Nuphar	Yellow water lily	Common	
<b>OVERALL ABUNDANCE: Common</b>				

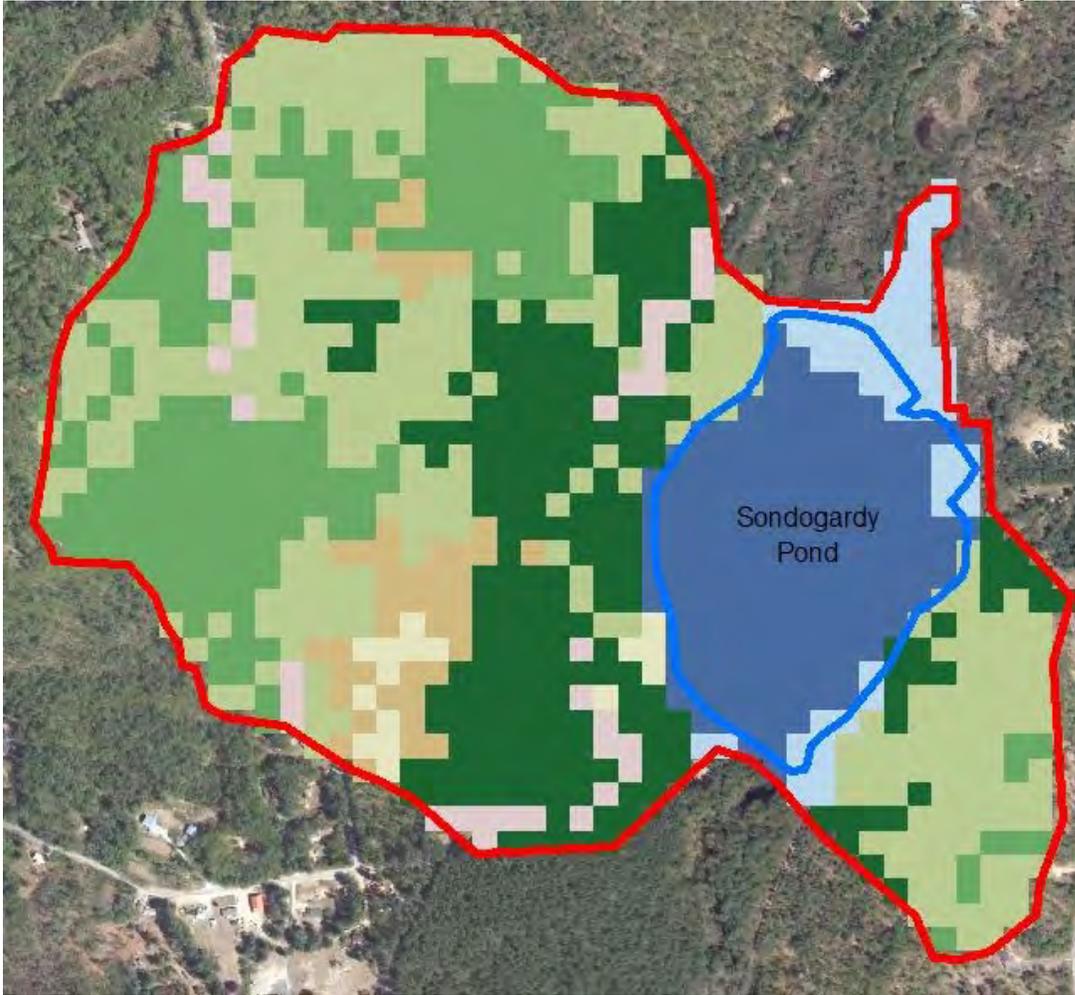
Abundance	Points	Description
Sparse	0	Few emergent plants observed; generally < 10% overall cover.
Scattered	1	Several small patches or one to two large patches or much of the shoreline with a sparsely growing plant; Generally 11-20% coverage.
Scattered/Common	2	Plants covering approximately 21-35% of lake.
Common	3	Plants around most of the shoreline but not a problem to navigation or several large patches of plants. 36-55% cover.
Common/Abundant	4	Intermediate between Common and Abundant. 56-74% cover.
Abundant	5	Plants around the entire shoreline and with large patches in several areas; submerged plants visible, ranging 75-89% cover.
Very Abundant	6	At least ½ of the surface with emergent, floating leaf or submerged plants; navigation and swimming is impaired in areas, 80-100% cover.

### Lake Bathymetry and Depth Contours



## Watershed Land Use Map

### Sondogardy Pond



#### Legend

-  Lake Boundaries
-  Watershed Boundaries
- Land Cover Classes**
-  11 - Open Water
-  21 - Developed, Open Space
-  22 - Developed, Low Intensity
-  23 - Developed, Medium Intensity
-  24 - Developed, High Intensity
-  31 - Barren Land
-  41 - Deciduous Forest
-  42 - Evergreen Forest
-  43 - Mixed Forest
-  52 - Shrub/ Scrub
-  71 - Grassland/ Herbaceous
-  81 - Pasture Hay
-  82 - Cultivated Crops
-  90 - Woody Wetlands
-  95 - Emergent Wetlands

0 0.1 0.2 Miles



Lake Cover Category	Percent (%) Cover	Lake Cover Category	Percent (%) Cover	Lake Cover Category	Percent (%) Cover
Open Water	14.84	Barren Land	0.00	Grassland/ Herbaceous	1.53
Developed, Open Space	3.64	Deciduous Forest	20.01	Pasture Hay	0.00
Developed, Low Intensity	0.00	Evergreen Forest	20.10	Cultivated Crops	0.00
Developed, Medium Intensity	0.00	Mixed Forest	30.16	Woody Wetlands	4.98
Developed, High Intensity	0.00	Shrub/ Shrub	4.31	Emergent Wetlands	0.00

Homer, C.G., Dewitz, J.A., Yang, L., Jin, S., Danielson, P., Xian, G., Coulston, J., Herold, N.D., Wickham, J.D., and Megown, K., 2015, Completion of the 2011 National Land Cover Database for the conterminous United States - Representing a decade of land cover change information. *Photogrammetric Engineering and Remote Sensing*, v. 81, no. 5, p. 345 - 354.

[Click here for an interactive map of all historic and current lake trophic survey reports.](#)

**T**hird Connecticut Lake, also known as Third Lake, in Pittsburg, NH is a deep, clear lake that was surveyed twice previously in 1983 and 1994 and was rated as oligotrophic for both surveys. The most recent 2013-2015 trophic survey also determined the lake to be oligotrophic. The lake has good boat access. Acid neutralizing capacity and pH have declined slightly from the previous surveys, which may be related to declines in calcium, magnesium, and potassium concentrations. Secchi depth has declined by approximately one meter and dissolved oxygen in the hypolimnion is reduced compared to the previous survey; however, total phosphorus and chlorophyll-*a* concentration continue to be low.

2015 NHDES Trophic Rating:  
**Oligotrophic**  
1994 NHDES Trophic Rating:  
**Oligotrophic**

*What is a lake trophic survey?*

A lake trophic survey evaluates physical, biological and chemical parameters in lakes or ponds greater than 10 acres, to assess a lake's overall productivity, a.k.a. trophic status. Oligotrophic, mesotrophic and eutrophic are the most common trophic classifications. Oligotrophic lakes are nutrient-poor, with few plants and very clear water. Eutrophic lakes are highly productive, with lots of plants and/or algae and less clear water. Mesotrophic lakes are in-between. Trophic surveys provides a record and catalog of water quality parameters, serve as a basis for understanding environmental impacts and help inform water quality management polices. For additional explanations of lake terminology, please visit: <http://des.nh.gov/organization/divisions/water/wmb/vlap/glossary.htm>

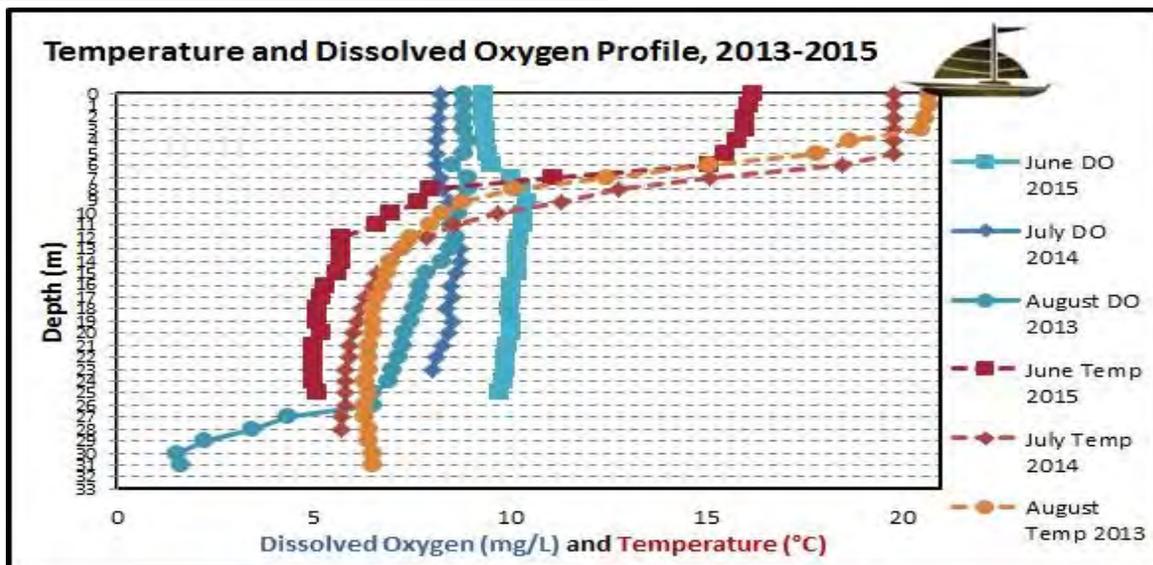
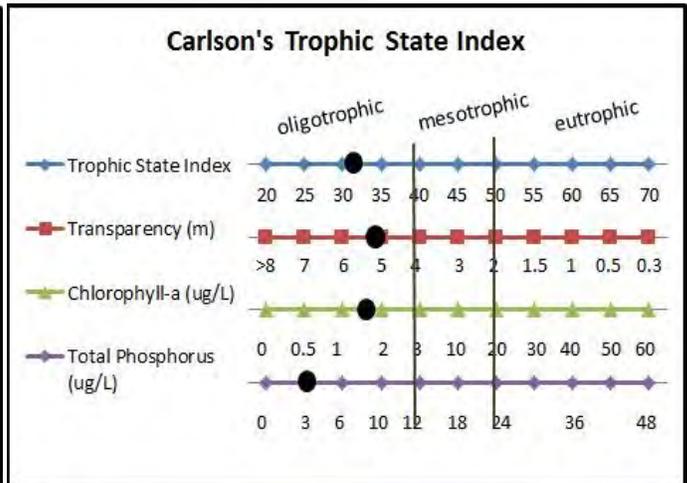
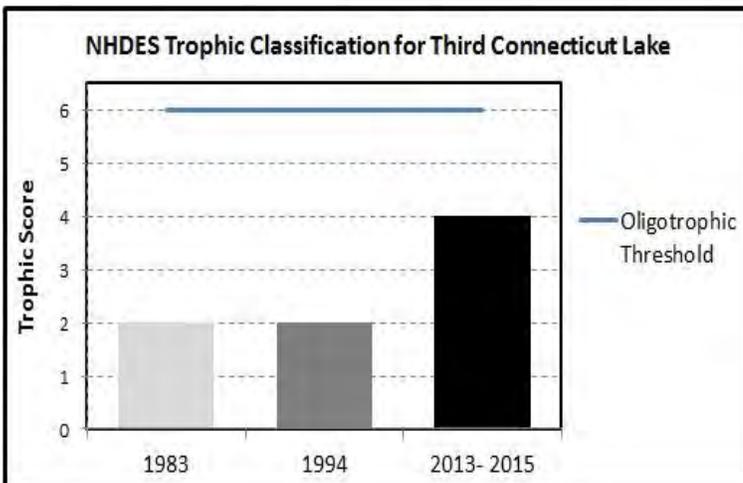


Physical Characteristics			
Elevation:	668 m (2191 ft)	Lake area:	1.17 km <sup>2</sup>
Mean depth:	12.8 m	Total Volume:	14,010,900 m <sup>3</sup>
Maximum depth:	33 m	Average Hypolimnion Volume:	7,137,000 m <sup>3</sup>
Flushing rate:	0.3 / yr <sup>-1</sup>	Maximum Hypolimnion Volume:	8,019,000 m <sup>3</sup>
P retention coeff:	0.72	Average Anoxic Volume:	none
% Watershed Poned:	0.40%	Areal water load:	3.47 m/ yr
Shore Length:	4500 m	Watershed area:	4.989 km <sup>2</sup>
Lake type:	Natural	Shore Configuration:	1.17

### Trophic Classification

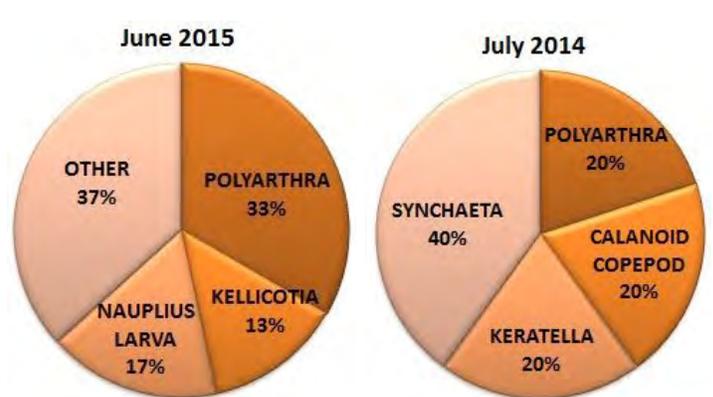
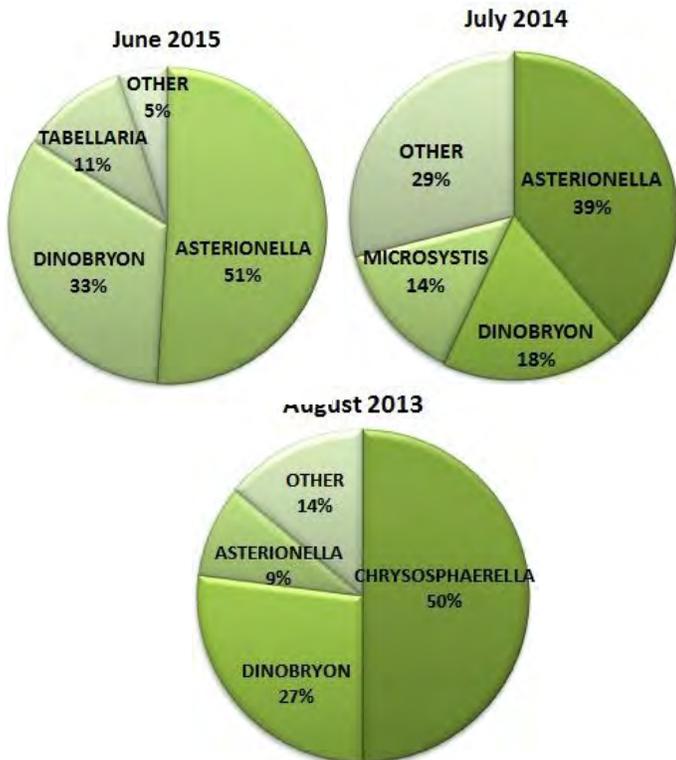
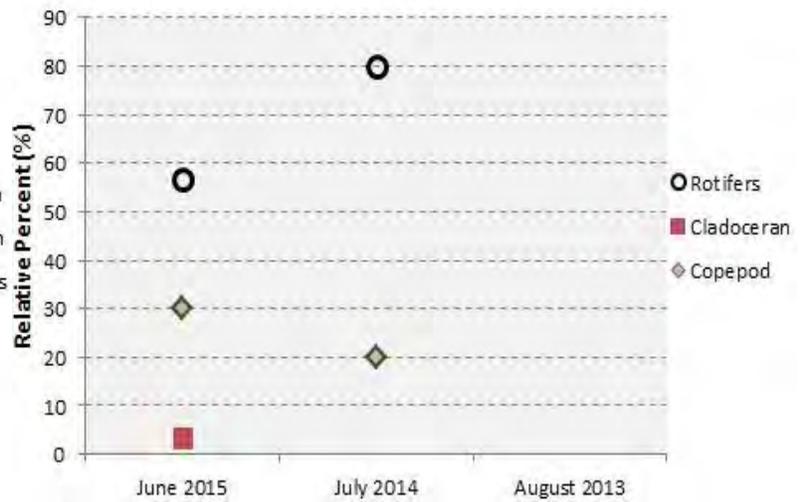
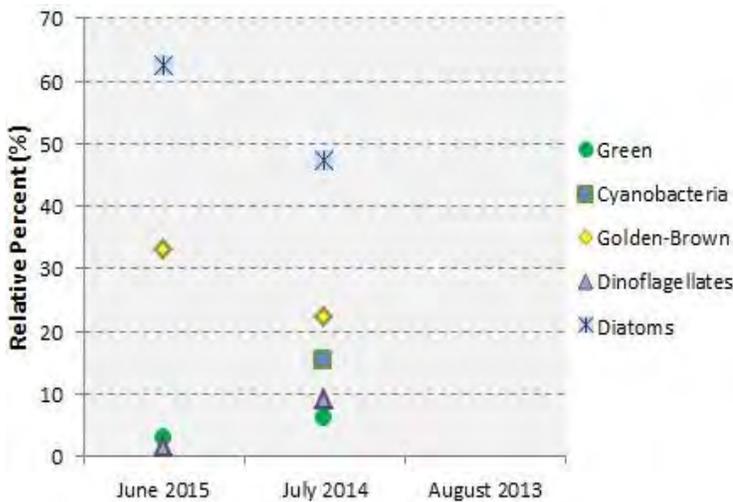
The NHDES Trophic Classification System was initiated in the early 1970s and revised in 1989. This index assigns a numeric values to summer bottom dissolved oxygen (D.O.), Secchi disk transparency (S.D.), aquatic vascular plant abundance (Plant), and epilimnetic chlorophyll-*a* concentration (Chl-*a*), which sum to a final score that determines a lake's trophic status. For stratified lakes, 0-6 points signifies a lake is oligotrophic, 7-12 points for mesotrophic, and 13-24 points for eutrophic. This index allows for direct comparisons to be made to historic data, which better track changes in trophic status. The NHDES Trophic Classification System is one of many ways to determine a lake's trophic status. The Carlson's Trophic State Index (TSI) is a more broadly used trophic assessment tool that considers Secchi disk transparency, chlorophyll-*a* concentration, and total phosphorus (TP); however, the results are less comparable to historic NHDES data. For a more in-depth explanation of the NHDES classification methodology, please visit: [http://des.nh.gov/organization/divisions/water/wmb/lakes/documents/data\\_sources\\_explanation.pdf](http://des.nh.gov/organization/divisions/water/wmb/lakes/documents/data_sources_explanation.pdf)

NHDES Trophic Classification: 2013 - 2015					
Third Connecticut Lake, Pittsburg, NH					
D.O.	S.D.	Plant	Chl-a	Total	Class
2	1	1	0	4	Oligotrophic



**Phytoplankton** are photosynthetic plants that contain chlorophyll-*a* but do not have true roots stems, or leaves. They grow on rocks, vascular plants, the lake bottom or free-floating in the water column and are a food source for zooplankton and mussels. As nutrients in the water increase, phytoplankton abundance also increases. Phytoplankton populations undergo natural succession throughout the summer, due to changes in light, nutrient availability, predation and temperature.

**Zooplankton** are microscopic animals that naturally inhabit New Hampshire lakes. They feed on phytoplankton, bacteria and other zooplankton while being an important food source for fish and mussels. Zooplankton also undergo natural succession throughout the summer, due to changes in light, nutrient availability, predation and temperature.

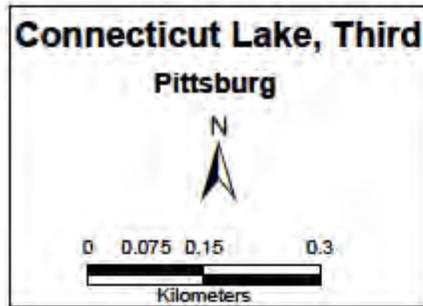


Chemical and Biological Characteristics	Mean	Standard	Median	Units	NH Median
<i>Epilimnetic Depth</i>	3.33	0.58	3.00	meter	x
pH	6.59	0.31	6.64	Units	6.60
Acid Neutralizing Capacity (ANC)	7.73	2.04	8.20	mg/L	4.90
Apparent Color	19.33	4.93	17.00	CPU	28.00
Secchi Depth	5.11	0.70	4.88	meter	3.20
Secchi Depth - Scope	6.90	0.21	6.90	meter	unk
Specific Conductance	26.97	0.96	26.80	µs/ cm	40
Total Kjldahl Nitrogen (TKN)	0.13	0.00	0.13	mg/L	0.35
Nitrate + Nitrite Nitrogen	0.33	0.53	0.03	mg/L	<0.05
Total Phosphorus	3.36	1.50	2.50	ug/L	12.00
Chloride	1.50	0.00	1.50	mg/L	4.00
Sulfate	1.60		1.60	mg/L	4.00
Calcium	3.64		3.64	mg/L	2.60
Magnesium	0.35		0.35	mg/L	0.54
Potassium	0.13		0.13	mg/L	0.50
Sodium	0.50		0.50	mg/L	3.10
Total Organic Carbon				mg/L	3.10
<i>Metolimnetic Depth</i>	6.67	1.15	6.00	meter	x
Chlorophyll-a	1.72	0.29	1.76	ug/L	4.58
<i>Hypolimnetic Depth</i>	22.00		22.00	meter	x
Total Phosphorus	5.75		5.75	ug/L	unk

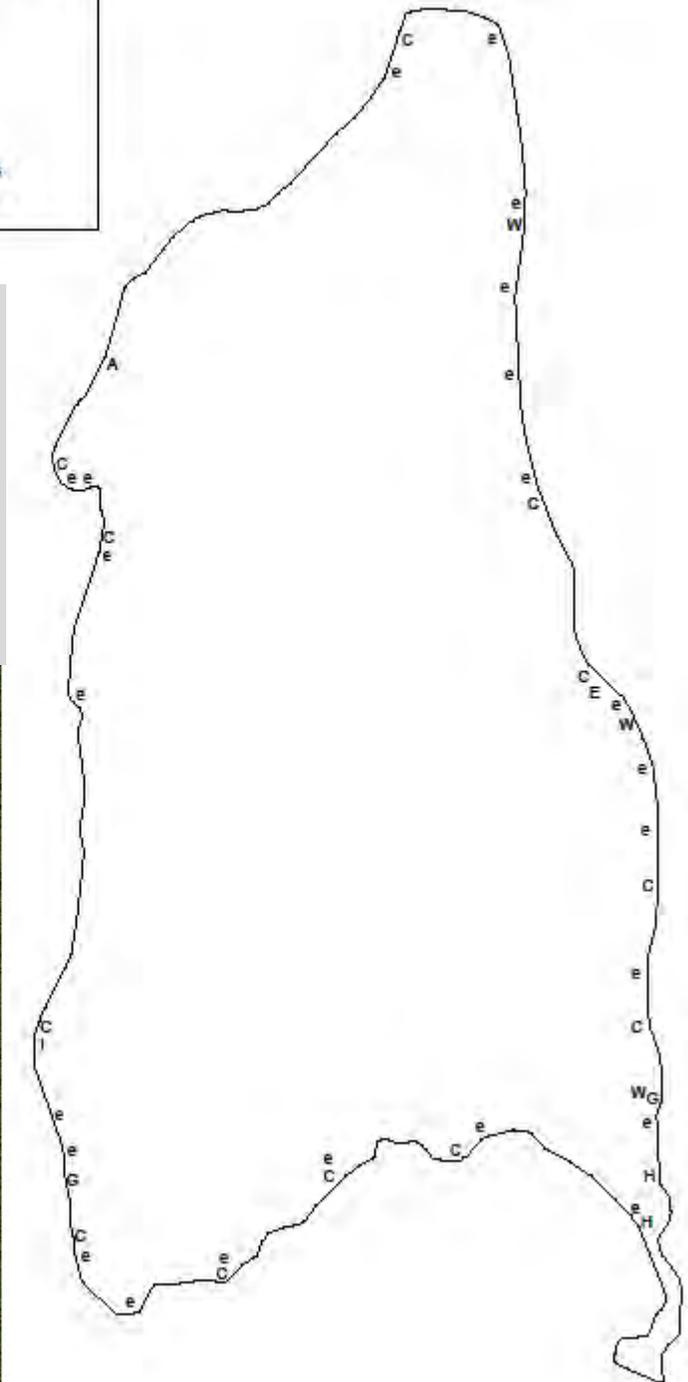
The Waterbody Report Card table (below) is generated from the 2014 305(b) report on the status of NH waters and are based on data collected from 2001-2013. Additional information can be found at <http://des.nh.gov/organization/divisions/water/wmb/swqa/index.htm>

Designated Use	Parameter	Category
Aquatic Life	Chloride	Likely Good
	Chl-a	Likely Good
	DO	Likely Good
	DO Saturation	Likely Good
	pH	Poor
Drinking Water	E. Coli	Likely Bad
	Sulfates	Likely Good
Fish Consumption	Mercury	Poor
Primary Contact Recreation	Chl-a	Likely Good
	E. Coli	Good
Secondary Contact Recreation	E. Coli	Good
Wildlife	Wildlife	No data

## Aquatic Plant Maps

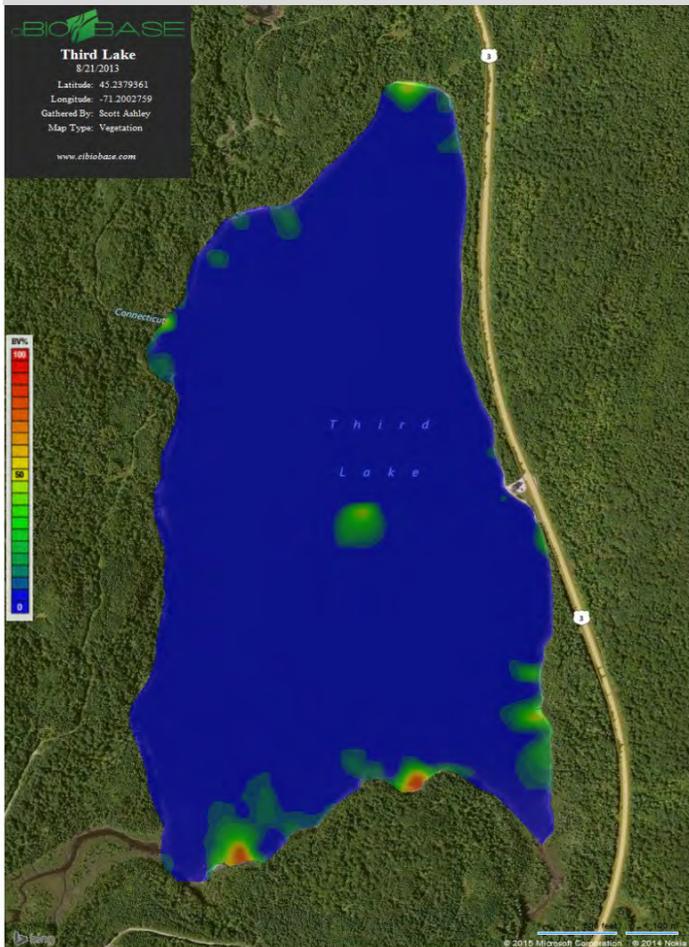


Aquatic Plant Species Map



Aquatic Plant Biovolume Map

The aquatic plant biovolume map indicates the percentage of the water column occupied by aquatic plants, with high percentages indicated by the color red and low percentages indicated by the color blue. The aquatic plant species map identifies surface aquatic plants, shoreline plants and submerged plants that were visible during the survey. Please see the next page for the species key.

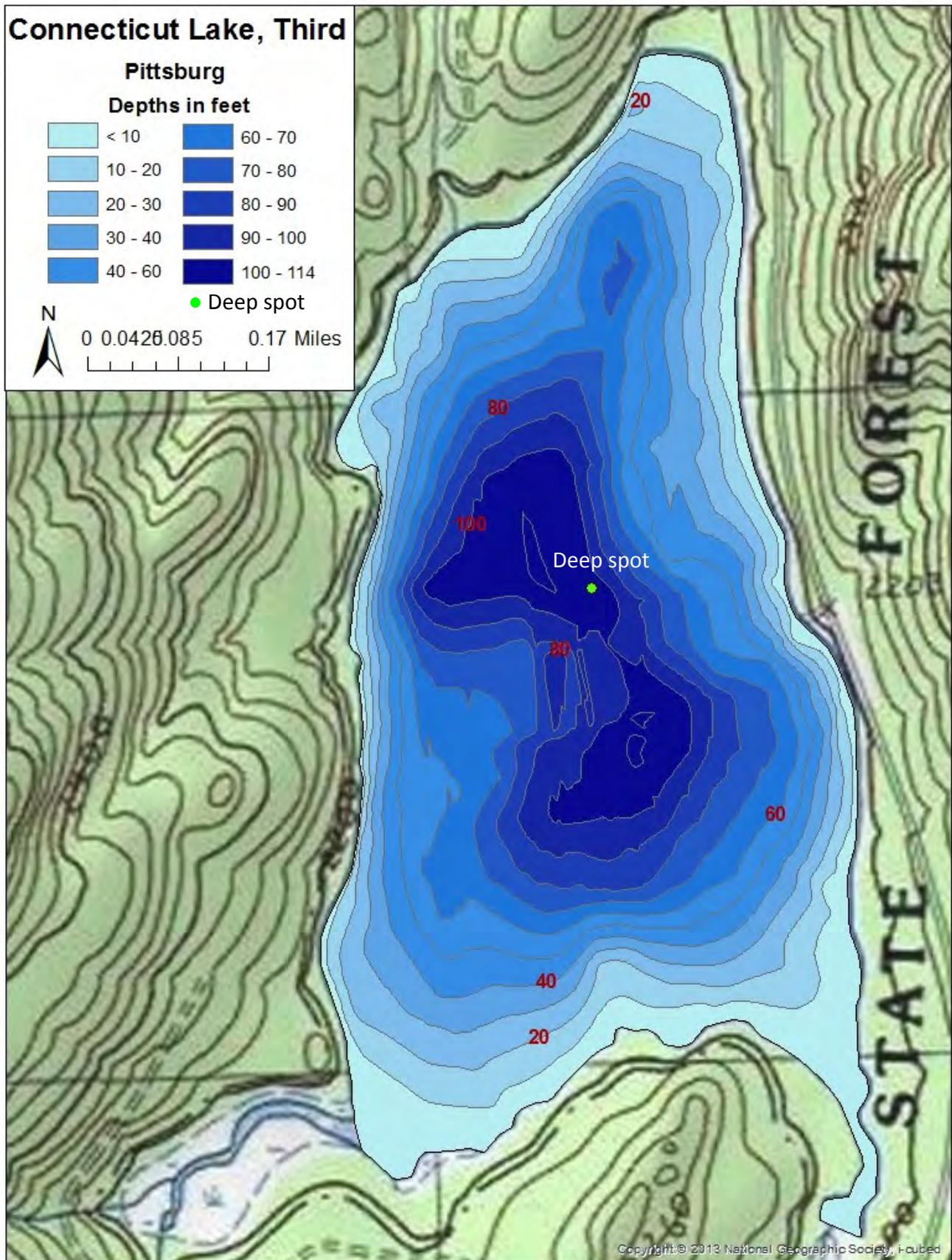


## Aquatic Plant Species Key

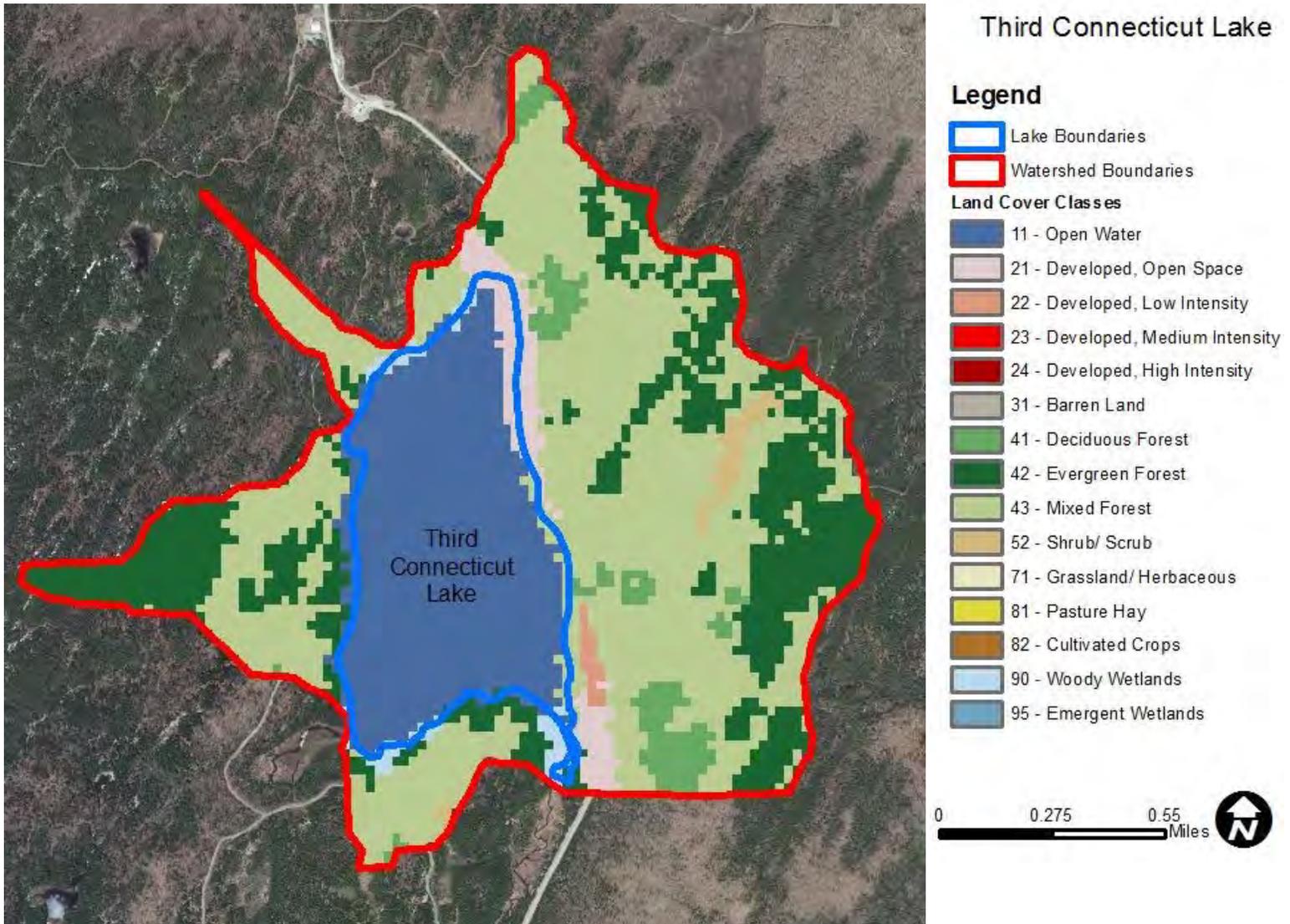
LAKE: THIRD CONNECTICUT		TOWN: PITTSBURG		DATE: 8/21/2013
KEY	PLANT NAME		ABUNDANCE	
	SCIENTIFIC	COMMON		
A	Sagittaria graminea	Grassy arrowhead	Sparse	
C	Carex	Sedge	Scattered	
E	Eleocharis	Spike rush	Sparse	
e	Eriocaulon septangulare	Pipewort	Scattered	
G	Gramineae	Grass family	Sparse	
H	Equisetum	Horsetail	Sparse	
I	Iris	Iris	Sparse	
W	Potamogeton amplifolius	Bass weed	Sparse	
<b>OVERALL ABUNDANCE: Scattered</b>				

Abundance	Points	Description
Sparse	0	Few emergent plants observed; generally < 10% overall cover.
Scattered	1	Several small patches or one to two large patches or much of the shoreline with a sparsely growing plant; Generally 11-20% coverage.
Scattered/Common	2	Plants covering approximately 21-35% of lake.
Common	3	Plants around most of the shoreline but not a problem to navigation or several large patches of plants. 36-55% cover.
Common/Abundant	4	Intermediate between Common and Abundant. 56-74% cover.
Abundant	5	Plants around the entire shoreline and with large patches in several areas; submerged plants visible, ranging 75-89% cover.
Very Abundant	6	At least ½ of the surface with emergent, floating leaf or submerged plants; navigation and swimming is impaired in areas, 80-100% cover.

## Lake Bathymetry and Depth Contours



## Watershed Land Use Map



Lake Cover Category	Percent (%) Cover	Lake Cover Category	Percent (%) Cover	Lake Cover Category	Percent (%) Cover
Open Water	22.73	Barren Land	0.00	Grassland/ Herbaceous	0.00
Developed, Open Space	3.79	Deciduous Forest	3.95	Pasture Hay	0.00
Developed, Low Intensity	0.48	Evergreen Forest	20.76	Cultivated Crops	0.00
Developed, Medium Intensity	0.00	Mixed Forest	44.33	Woody Wetlands	1.59
Developed, High Intensity	0.00	Shrub/ Shrub	1.14	Emergent Wetlands	0.00

Homer, C.G., Dewitz, J.A., Yang, L., Jin, S., Danielson, P., Xian, G., Coulston, J., Herold, N.D., Wickham, J.D., and Megown, K., 2015, Completion of the 2011 National Land Cover Database for the conterminous United States - Representing a decade of land cover change information. *Photogrammetric Engineering and Remote Sensing*, v. 81, no. 5, p. 345 - 354.

[Click here for an interactive map of all historic and current lake trophic survey reports](#)

**W**alker Pond is the former public water supply of the town of Boscawen. It is relatively undeveloped, with much of the surrounding land under conservation easements. A six horse-power limit exists for motorboats. Boat access is adjacent to the old pump house at the head of the eastern cove. A weir is located at the end of the outlet cove but is no longer maintained and contains no stop logs. Due to abundant macrophyte growth and bottom dissolved oxygen depletions, Walker Pond was rated eutrophic in a 1996 lake trophic survey. Sampling protocol changed in 2013, shifting from one deep spot summer and winter sample over the course of a year to three summer deep spot samples over the course of three years with no winter sampling. This change enabled NHDES to identify that bottom dissolved oxygen depletions were present only in August. In addition to fewer aquatic plants, the pond was reclassified as mesotrophic. Chemical and biological parameters are generally similar to state medians; however, acid neutralizing capacity, apparent color, chloride and sodium were higher than the state medians. Parameter values were largely unchanged from the previous 1996 survey, with the exception of total phosphorus, which increased by approximately 10 ug/L in both the epilimnion and the hypolimnion.

2015 NHDES Trophic Rating:  
**Mesotrophic**  
1996 NHDES Trophic Rating:  
**Eutrophic**

*What is a lake trophic survey?*

A lake trophic survey evaluates physical, biological and chemical parameters in lakes or ponds greater than 10 acres, to assess a lake's overall productivity, a.k.a. trophic status. Oligotrophic, mesotrophic and eutrophic are the most common trophic classifications. Oligotrophic lakes are nutrient-poor, with few plants and very clear water. Eutrophic lakes are highly productive, with lots of plants and/or algae and less clear water. Mesotrophic lakes are in-between. Trophic surveys provides a record and catalog of water quality parameters, serve as a basis for understanding environmental impacts and help inform water quality management polices. For additional explanations of lake terminology, please visit <http://des.nh.gov/organization/divisions/water/wmb/vlap/glossary.htm>



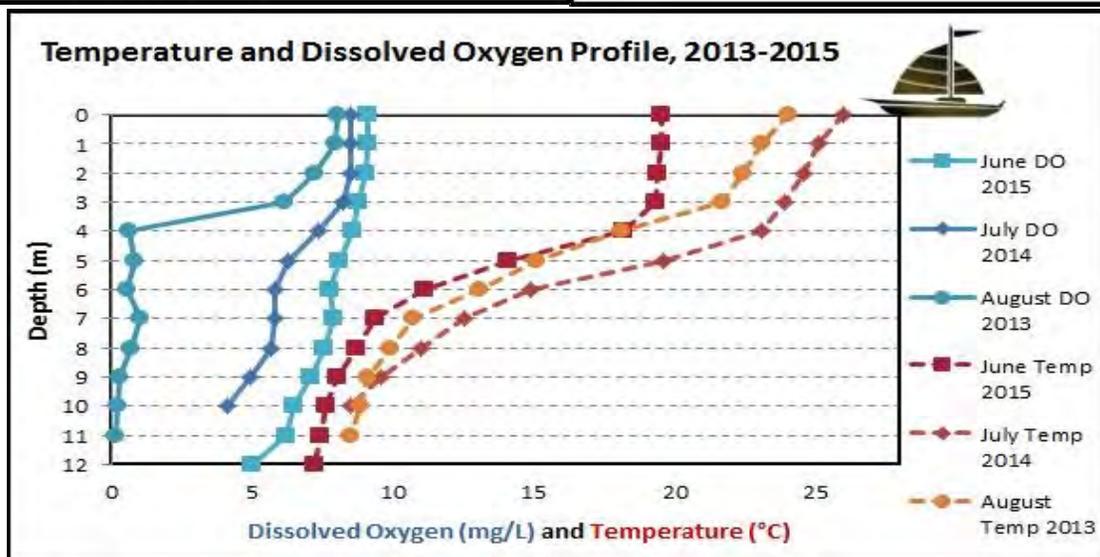
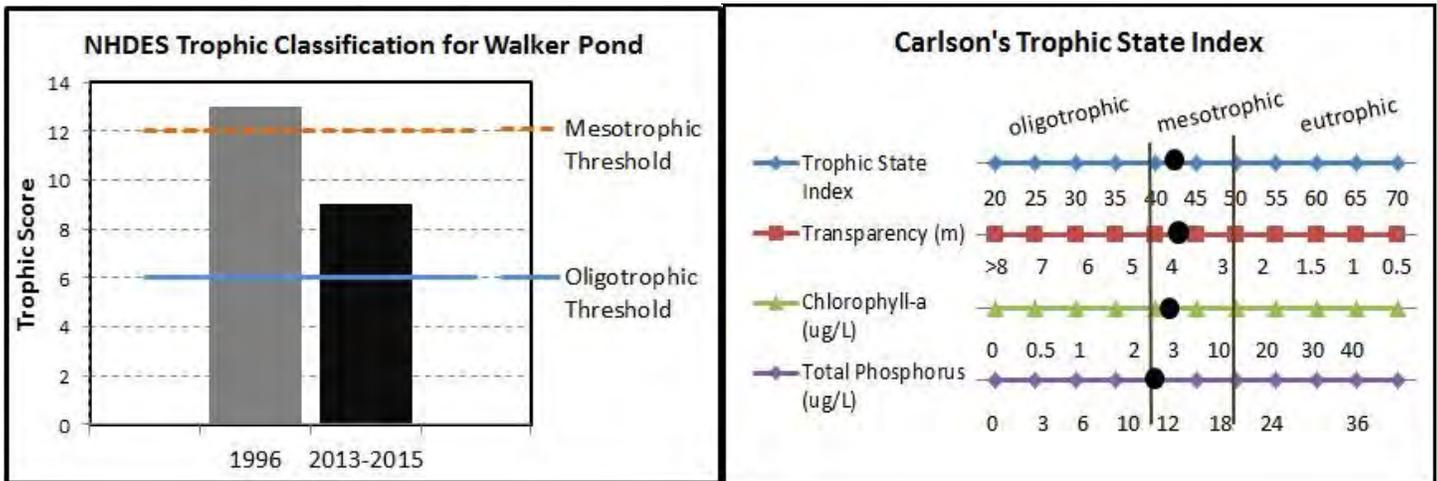
Physical Characteristics			
Elevation:	152.4 m (500 ft)	Lake area:	0.285 km <sup>2</sup>
Mean depth:	4.5 m	Volume:	3,984,500 m <sup>3</sup>
Maximum depth:	12.8 m	Average Hypolimnion Volume:	245,000 m <sup>3</sup>
Flushing rate:	3.2 / yr <sup>-1</sup>	Average Anoxic Volume:	109,000 m <sup>3</sup>
P retention coeff:	0.51	Maximum Anoxic Volume:	327,000 m <sup>3</sup>
% Watershed Poned:	0.20%	Areal water load:	14.61 m/ yr
Shore Length:	4000 m	Watershed area:	9.64 km <sup>2</sup>
Lake type:	Natural with a dam	Shore Configuration:	1.34

### Trophic Classification

The NHDES Trophic Classification System was initiated in the early 1970s and revised in 1989. This index assigns a numeric values to summer bottom dissolved oxygen (D.O.), Secchi disk transparency (S.D.), aquatic vascular plant abundance (Plant), and epilimnetic chlorophyll-*a* concentration (Chl-*a*), which sum to a final score that determines a lake's trophic status. For stratified lakes, 0-6 points signifies a lake is oligotrophic, 7-12 points for mesotrophic, and 13-24 points for eutrophic. This index allows for direct comparisons to be made to historic data, which better track changes in trophic status. The NHDES Trophic Classification System is one of many ways to determine a lake's trophic status. The Carlson's Trophic State Index (TSI) is a more broadly used trophic assessment tool; however, the results are less comparable to historic NHDES data. For a more in-depth explanation of NHDES classification methodology, please visit:

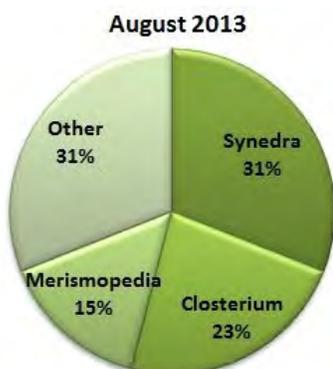
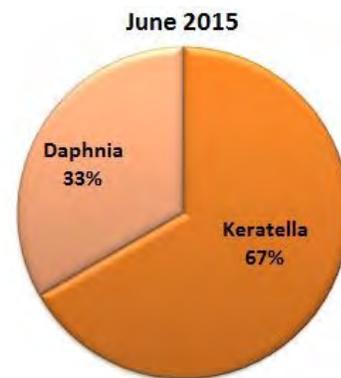
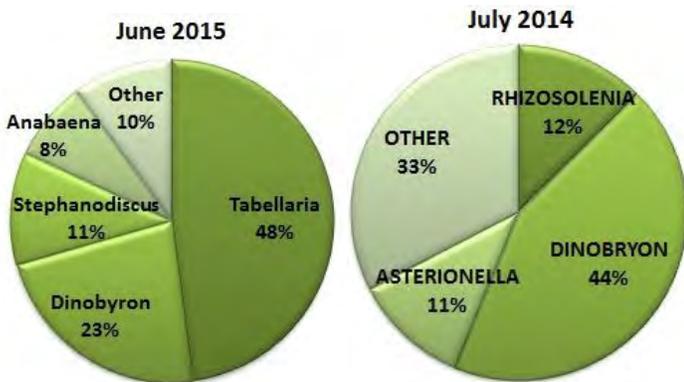
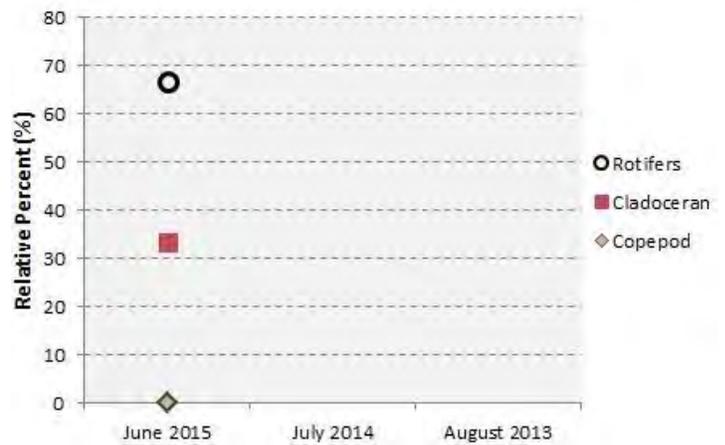
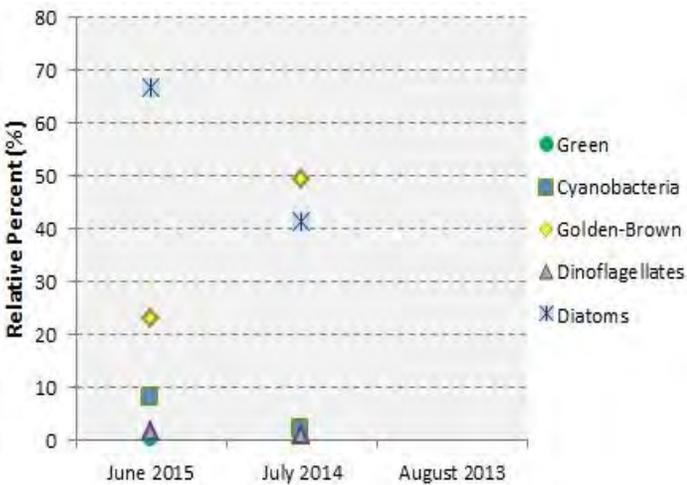
[http://des.nh.gov/organization/divisions/water/wmb/lakes/documents/data\\_sources\\_explanation.pdf](http://des.nh.gov/organization/divisions/water/wmb/lakes/documents/data_sources_explanation.pdf)

NHDES Trophic Classification: 2013 - 2015					
Walker Pond, Boscawen, NH					
D.O.	S.D.	Plant	Chl-a	Total	Class
1	3	4	1	9	Mesotrophic



**Phytoplankton** are photosynthetic plants that contain chlorophyll-*a* but do not have true roots, stems or leaves. They grow on rocks, vascular plants, the lake bottom or free-floating in the water column and are a food source for zooplankton and mussels. As nutrients in the water increase, phytoplankton abundance also increases. Phytoplankton populations undergo natural succession throughout the summer, due to changes in light, nutrient availability, predation and temperature.

**Zooplankton** are microscopic animals that naturally inhabit New Hampshire lakes. They feed on phytoplankton, bacteria and other zooplankton while being an important food source for fish and mussels. Zooplankton also undergo natural succession throughout the summer, due to changes in light, nutrient availability, predation and temperature.

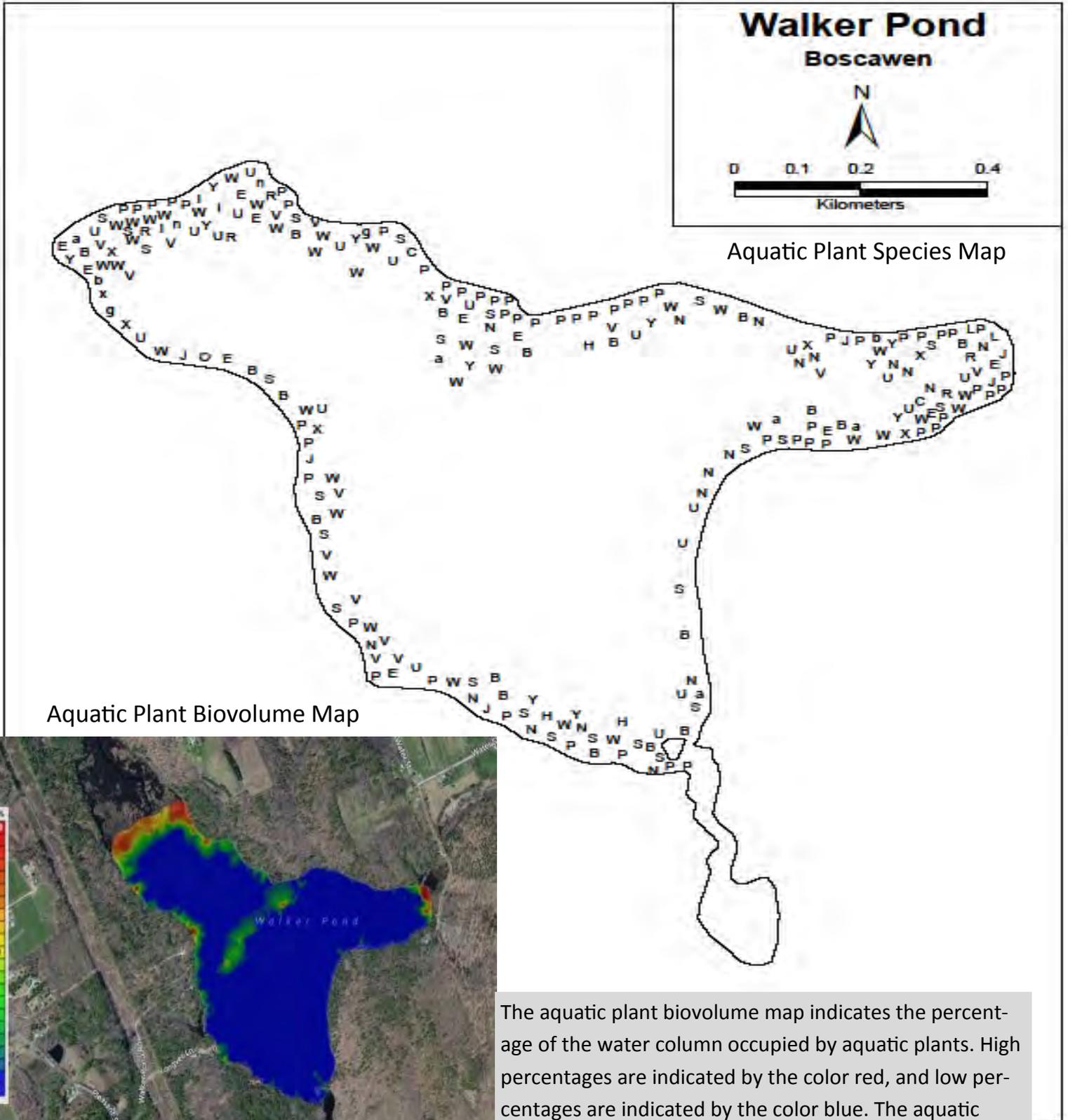


Chemical and Biological Characteristics	Mean	Standard Deviation	Median	Units	NH Median Values
Epilimnetic Depth	1.83	0.29	2.00	meter	x
pH	6.67	0.20	6.56	Units	6.60
Acid Neutralizing Capacity (ANC)	8.50	0.95	8.40	mg/L	4.90
Secchi Depth	3.75	3.30	2.90	meter	3.20
Apparent Color	41.00	12.17	35.00	PCU	28.00
Secchi Depth - Scope	4.23	0.04	4.23	meter	unk
Total Kjeldahl Nitrogen (TKN)	0.19	0.12	0.13	mg/L	0.35
Nitrate + Nitrite Nitrogen	0.03	0.00	0.03	mg/L	<0.05
Total Phosphorus	12.22	5.56	9.68	ug/L	12.00
Chloride	12.00	0.00	12.00	mg/L	4.00
Sulfate	2.15	0.49	2.15	mg/L	4.00
Calcium	3.15		3.15	mg/L	2.60
Magnesium	0.72		0.72	mg/L	0.54
Potassium	0.60		0.60	mg/L	0.50
Sodium	6.64		6.64	mg/L	3.10
Metalimnetic Depth	6.00	1	6.00	meter	x
Chlorophyll-a	4.81	0.37	4.60	ug/L	4.58
Hypolimnetic Depth	10.00		10.00	meter	x
Total Phosphorus	18.60		18.60	ug/L	unk

The Waterbody Report Card table (below) is generated from the 2014 305(b) report on the status of New Hampshire waters and are based on data collected from 2001-2013. Additional information can be found at <http://des.nh.gov/organization/divisions/water/wmb/swqa/index.htm>

Designated Use	Parameter	Category
Aquatic Life	Chloride	Likely Good
	Chl-a	Good
	DO	Bad
	DO Saturation	Poor
	TP	Good
	Turbidity	Likely Good
	pH	Poor
Drinking Water	E. Coli	Likely Good
	Potassium	No data
	Sulfates	Likely Good
Fish Consumption	Mercury	Poor
Primary Contact Recreation	Chl-a	Marginal
	E. Coli	Likely Good
Secondary Contact Recreation	E. Coli	Likely Good
Wildlife	Wildlife	No data

## Aquatic Plant Maps



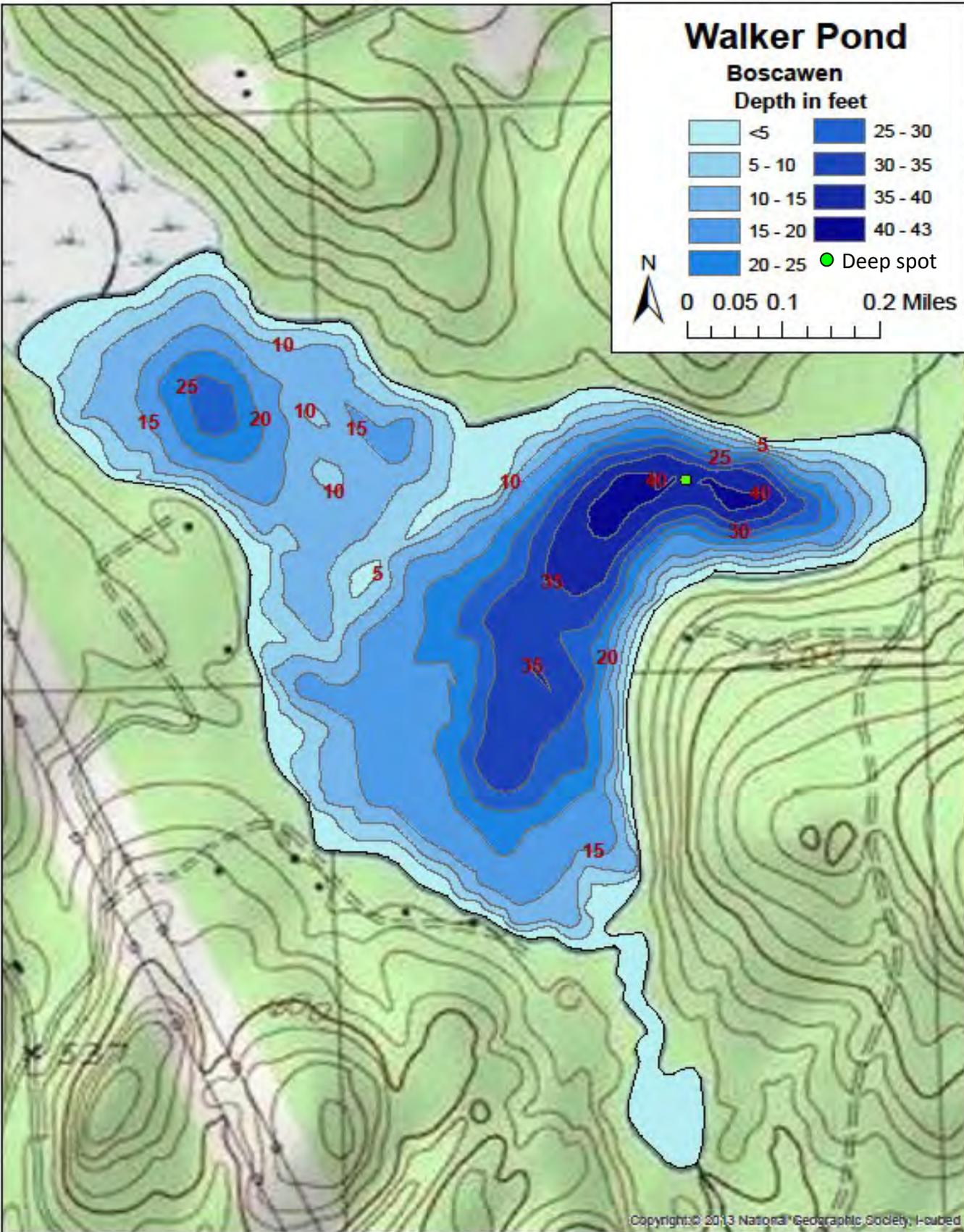
The aquatic plant biovolume map indicates the percentage of the water column occupied by aquatic plants. High percentages are indicated by the color red, and low percentages are indicated by the color blue. The aquatic plant species map identifies surface aquatic plants, shoreline plants and submerged plants that were visible during the survey. Please see the next page for the species key.

## Aquatic Plant Species Key

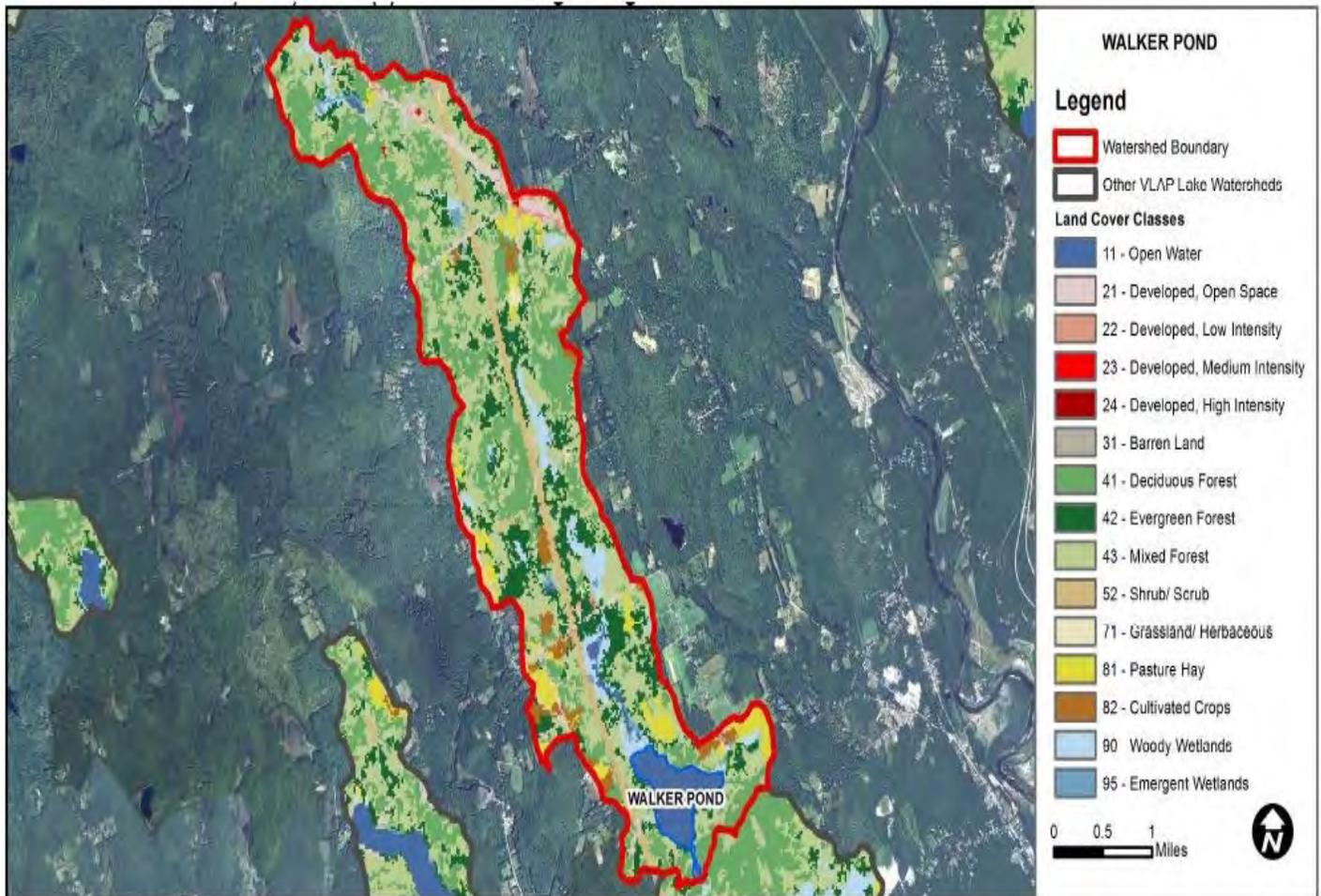
LAKE: WALKER POND		TOWN: BOSCAWEN		DATE: 8/19/2013
KEY	PLANT NAME		ABUNDANCE	
	SCIENTIFIC	COMMON		
a	Sagittaria graminea	Grassy arrowhead	Scattered	
b	Cephalanthus occidentalis	Buttonbush	Sparse	
B	Brasenia schreberi	Water shield	Common	
C	Ceratophyllum demersum	Coontail	Sparse	
E	Eleocharis	Spike rush	Scat/Common	
f	Potamogeton perfoliatus	Clasping-leaved pondweed	Sparse	
g	Sparganium	Bur reed (erect leaf)	Scattered	
H	Nymphoides cordatum	Floating heart	Sparse	
I	Utricularia	Bladderwort	Sparse	
J	Juncus effusus	Soft rush	Scattered	
L	Lythrum salicaria**	Purple loosestrife**	Sparse	
n	Potamogeton natans	Floating-leaf pondweed	Sparse	
N	Najas	Bushy pondweed	Common/Abund	
O	Lobelia cardinalis	Cardinal flower	Sparse	
P	Pontederia cordata	Pickerelweed	Common	
R	Potamogeton robbinsii	Robbins pondweed	Scattered	
S	Sparganium	Bur reed (floating leaf)	Common	
U	Utricularia purpurea	Purple bladderwort	Common/Abund	
V	Utricularia vulgaris	Common bladderwort	Common/Abund	
W	Nymphaea	White water lily	Common	
X	Potamogeton	Pondweed	Scattered	
Y	Nuphar	Yellow water lily	Scat/ Common	
** Exotic species			<b>OVERALL ABUNDANCE: Common/ Abundant</b>	

Abundance	Points	Description
Sparse	0	Few emergent plants observed; generally < 10% overall cover.
Scattered	1	Several small patches or one to two large patches or much of the shoreline with a sparsely growing plant; Generally 11-20% coverage.
Scattered/Common	2	Plants covering approximately 21-35% of lake.
Common	3	Plants around most of the shoreline but not a problem to navigation or several large patches of plants. 36-55% cover.
Common/ Abundant	4	Intermediate between Common and Abundant. 56-74% cover.
Abundant	5	Plants around the entire shoreline and with large patches in several areas; submerged plants visible, ranging 75-89% cover.
Very Abundant	6	At least ½ of the surface with emergent, floating leaf or submerged plants; navigation and swimming is impaired in areas, 80-100% cover.

Lake Bathymetry and Depth Contours



## Watershed Land Use Map



Lake Cover Category	Percent (%) Cover	Lake Cover Category	Percent (%) Cover	Lake Cover Category	Percent (%) Cover
Open Water	3.97	Barren Land	0.00	Grassland/ Herbaceous	0.29
Developed, Open Space	3.40	Deciduous Forest	22.58	Pasture Hay	4.64
Developed, Low Intensity	0.86	Evergreen Forest	15.00	Cultivated Crops	2.77
Developed, Medium Intensity	0.09	Mixed Forest	36.35	Woody Wetlands	4.64
Developed, High Intensity	0.02	Shrub/ Shrub	4.38	Emergent Wetlands	0.80

Homer, C.G., Dewitz, J.A., Yang, L., Jin, S., Danielson, P., Xian, G., Coulston, J., Herold, N.D., Wickham, J.D., and Megown, K., 2015, Completion of the 2011 National Land Cover Database for the conterminous United States - Representing a decade of land cover change information. *Photogrammetric Engineering and Remote Sensing*, v. 81, no. 5, p. 345 - 354.

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