NEWFOUND LAKE

2019 SAMPLING HIGHLIGHTS

Station - Pasquaney 3

Blue = Excellent = Oligotrophic

Yellow = Fair = Mesotrophic

Red = Poor = Eutrophic

Light Gray = No Data

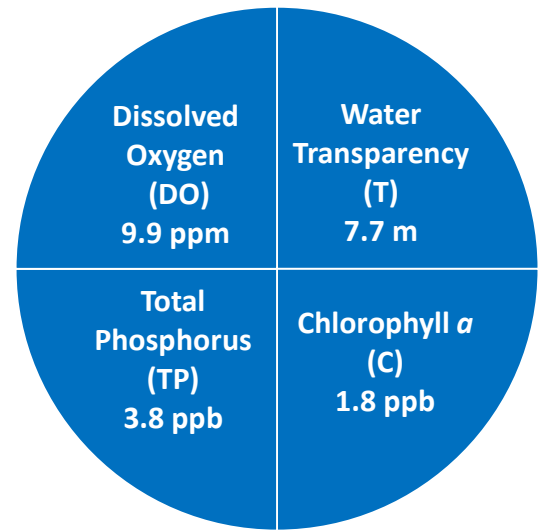| Dissolved Oxygen (DO) 9.9 ppm	Water Transparency (T) 7.7 m
Total Phosphorus (TP) 3.8 ppb	Chlorophyll *a* (C) 1.8 ppb

Figure 1. Station Pasquaney 3 Water Quality (2019)

Water quality data displayed in Tables 1, 2 and 3 are surface water measurements with the exception of the dissolved oxygen data that were collected in the bottom water layer.

Table 1. 2019 Station Pasquaney 3 Seasonal Averages and NH DES Aquatic Life Nutrient Criteria[1]

Parameter	Oligotrophic "Excellent"	Mesotrophic "Fair"	Eutrophic "Poor"	Station Pasquaney 3 Average (range)	Station Pasquaney 3 Classification
Water Clarity (meters)	4.0 – 7.0	2.5 - 4.0	< 2.5	**7.7** meters (range: 6.7 – 9.0)	**Oligotrophic**
Chlorophyll *a* [1] (ppb)	< 3.3	> 3.3 – 5.0	> 5.0 – 11.0	**1.8** ppb (range: 1.7 – 2.0)	**Oligotrophic**
Total Phosphorus [1] (ppb)	< 8.0	> 8.0 – 12.0	> 12.0 – 28.0	**3.8** ppb (range: 3.6 – 4.0)	**Oligotrophic**
Dissolved Oxygen (ppm)	5.0 – 7.0	2.0 – 5.0	<2.0	**9.9** ppm (range: 9.7 – 10.0)	**Oligotrophic**

* Dissolved oxygen concentrations measured on 8/15/19 between 12.5 and 15.0 meters in the bottom water layer.

Table 2. 2019 Station Pasquaney 3 Seasonal Average Accessory Water Quality Measurements.

Parameter	Assessment Criteria					Station Pasquaney 3 Average (range)	Station Pasquaney 3 Classification
Color (color units)	< 10 uncolored	10 – 20 slightly colored	20 – 40 lightly tea colored	40 – 80 tea colored	> 80 highly colored	**12.4** color units (range: 9.9 – 15.8)	**Slightly colored**
Alkalinity (ppm)	< 0.0 acidified	0.1 – 2.0 extremely vulnerable	2.1 – 10 moderately vulnerable	10.1 – 25.0 low vulnerability	> 25.0 not vulnerable	**3.8** ppm (range: 3.7 – 3.9)	**Moderately vulnerable**
pH (std units)	< 5.5 suboptimal for successful growth and reproduction		6.5 – 9.0 optimal range for fish growth and reproduction			**6.9** standard units (range: 6.9 – 7.0)	**Optimal range for fish growth and reproduction**
Specific Conductivity (*u*S/cm)	< 50 *u*S/cm Characteristic of minimally impacted NH lakes		50-100 *u*S/cm Lakes with some human influence	> 100 *u*S/cm Characteristic of lakes experiencing human disturbances		**40.0** *u*S/cm (range: 39.6 – 40.5)	**Characteristic of minimally impacted NH lakes**

Recommendations for Property Owners:

Implement Best Management Practices within the Newfound Lake watershed to minimize the adverse impacts of polluted runoff and erosion into the lake. Refer to "Landscaping at the Water's Edge: An Ecological Approach" and "New Hampshire Homeowner's Guide to Stormwater Management: Do-It-Yourself Stormwater Solutions for Your Home" for more information on how to reduce nutrient loading caused by overland run-off.

- o https://extension.unh.edu/resources/files/Resource004159_Rep5940.pdf
- o http://des.nh.gov/organization/commissioner/pip/publications/wd/documents/wd-11-11.pdf

LONG TERM WATER QUALITY

Site Pasquaney 3 is located in an easterly bay (Figure 4) that receives water input from Dick Brown Brook, Whittemore Brook and other shoreline and upstream sources. The condition of site Pasquaney 3 is a reflection of the nearby lakeshore development, as well as, the various inputs that enter the lake through the stream inlets. Further review of water quality measurements at the other Newfound Lake sampling locations will provide a better assessment of more localized pollutant inputs that impact the other sampling locations (refer to the 2019 summary data contained in Table 3).

WATER CLARITY: The site Pasquaney 3 water clarity display a trend of decreasing water clarity over the past thirty-four years of sampling (1986–2019).

CHLOROPHYLL: The site Pasquaney 3 chlorophyll *a* data display a trend of increasing chlorophyll *a* concentrations over the thirty-four years of sampling (1986–2019).

COLOR: The site Pasquaney 3 color data display a trend of increasing color concentrations over the thirty-three years of sampling (1987–2019).

TOTAL PHOSPHORUS: The site Pasquaney 3 total phosphorus concentrations do not display a trend over the past thirty-one years of sampling (1987-2019).

In summary, site Pasquaney 3 continues to show good water quality conditions. However, there are some indications of a slight decrease in the site Pasquaney 3 Lake water quality. The long-term water clarity has decreased while the chlorophyll *a* concentrations have increased. On the other hand, the long-term total phosphorus (nutrient) data do not display a trend. One should be aware that total phosphorus data have not been collected on an annual basis and that data gaps exist among years (Figure 3).
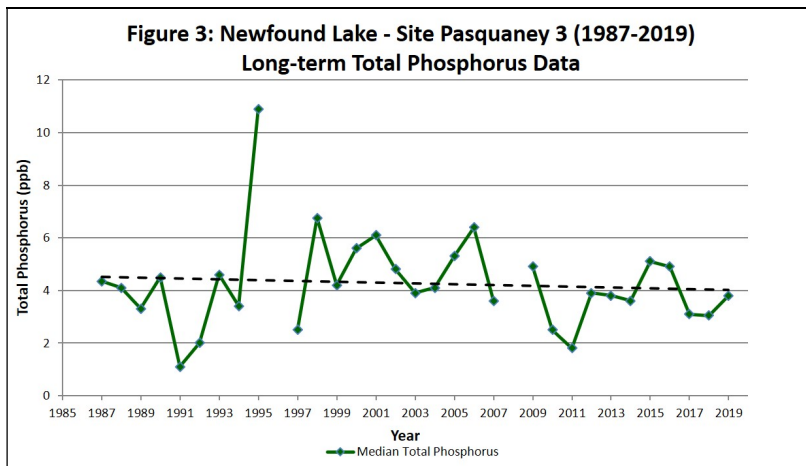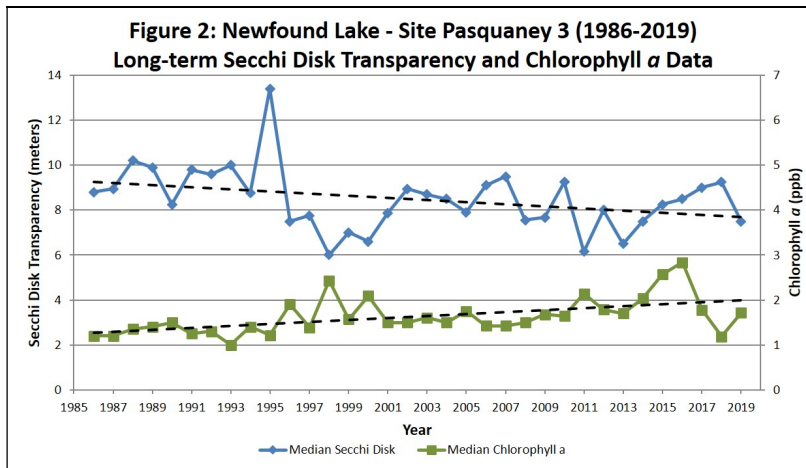

Figure 2: Newfound Lake - Site Pasquaney 3 (1986-2019) Long-term Secchi Disk Transparency and Chlorophyll *a* Data

Figure 3: Newfound Lake - Site Pasquaney 3 (1987-2019) Long-term Total Phosphorus Data

Table 3. Seasonal Average Water Quality by Sampling Location (2019)

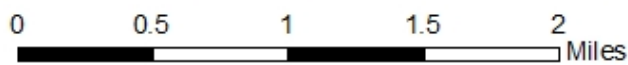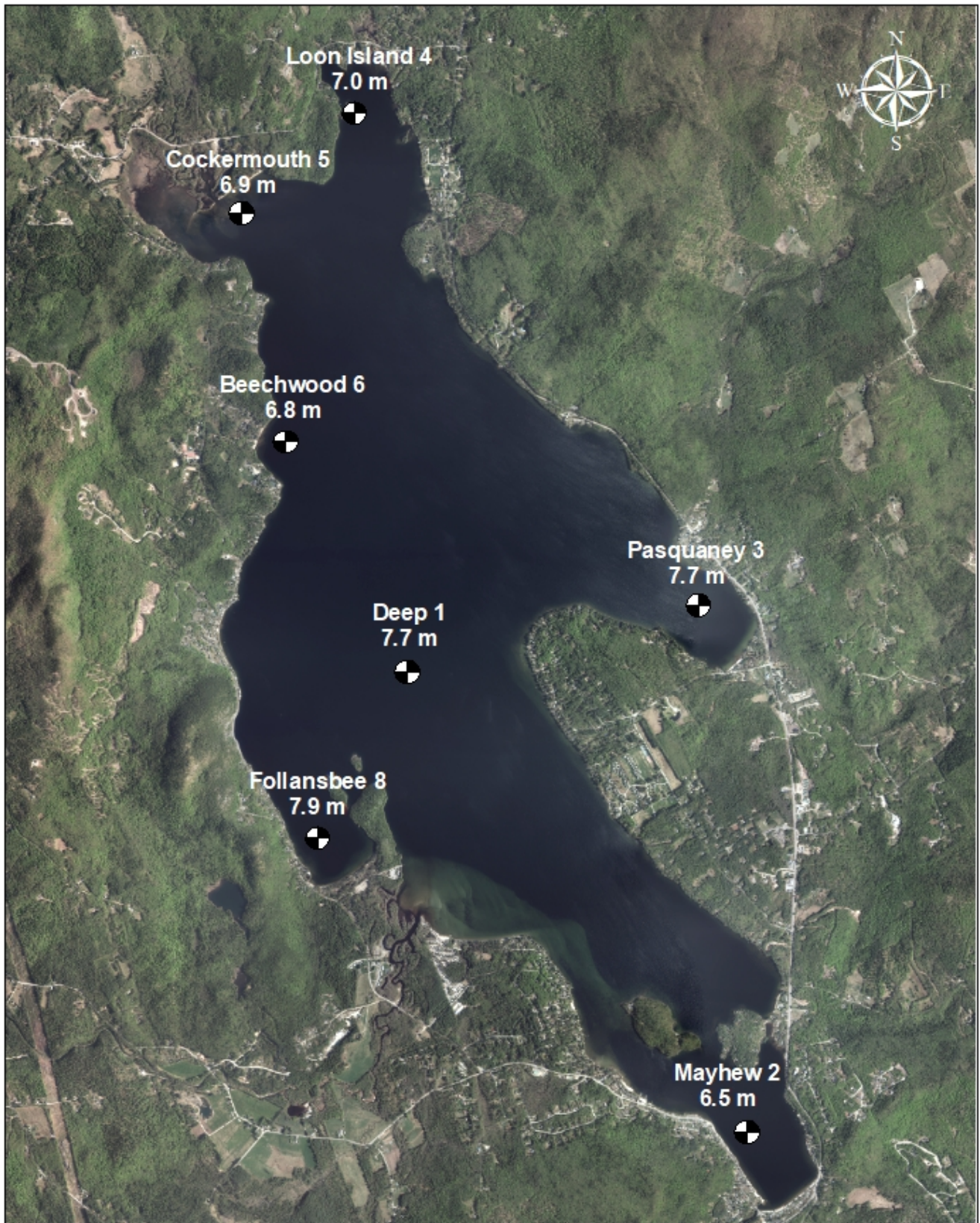| Site	Average Secchi Disk Transparency (meters)	Average Chlorophyll *a* (ppb)	Average Total Phosphorus (ppb)	Average Dissolved Oxygen (ppm)
Deep 1	7.7	1.5	4.2	10.4
Mayhew 2	6.5	1.6	4.5	3.0
Pasquaney 3	7.7	1.8	3.8	9.9
Loon Island 4	7.0	1.6	4.9	XXXX
Cockermouth 5	6.9	1.9	4.2	9.3
Beechwood 6	6.8	2.1	4.2	10.0
Follansbee 8	7.9	1.3	3.7	10.0

XXXX indicates site is too shallow to collect comparable oxygen data.

Figures 2 and 3. Changes in the Newfound Lake water clarity (Secchi Disk depth), chlorophyll *a* and total phosphorus concentrations measured between 1986 and 2019 at site Pasquaney 3. **These data indicate the relationship between plant growth and water clarity. Total phosphorus data are also displayed and are oftentimes correlated with the amount of plant growth.** Note: due to personnel limitations and budgetary constraints, there are years between 1986 and 2019 when incomplete data were collected at site Pasquaney 3. Median trend graphs are developed using median annual values to minimize the impact of outlier data.

Figure 4. Newfound Lake
Bristol, Alexandria, Bridgewater & Hebron, NH
2019 Deep sampling sites with seasonal average water clarity

Loon Island 4
7.0 m

Cockermouth 5
6.9 m

Beechwood 6
6.8 m

Pasquaney 3
7.7 m

Deep 1
7.7 m

Follansbee 8
7.9 m

Mayhew 2
6.5 m

0   0.5   1   1.5   2
Miles

NH | Extension