

MARCHS POND

2019 SAMPLING HIGHLIGHTS

Station 1 Deep

New Durham, NH



Extension

Blue = Excellent =
Oligotrophic

Yellow = Fair =
Mesotrophic

Red = Poor = Eutrophic

Gray = No Data

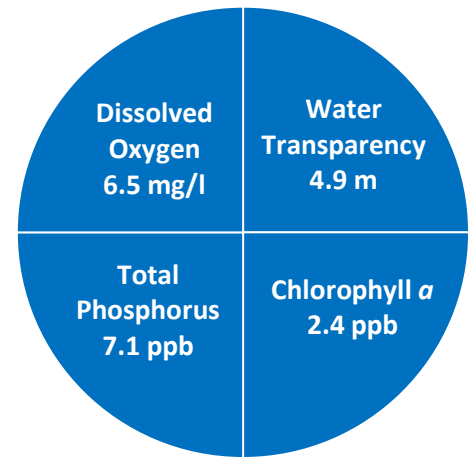


Figure 1. Marchs Pond Water Quality (2019)

Station 1 Deep (Figure 7) was used as a reference point to represent the overall Marchs Pond water quality. With the exception of the dissolved oxygen measurements, the water quality data displayed in Tables 1, 2 and 3 are surface water measurements.

Table 1. 2019 Marchs Pond Seasonal Averages and NH DES Aquatic Life Nutrient Criteria¹

Parameter	Oligotrophic "Excellent"	Mesotrophic "Fair"	Eutrophic "Poor"	Marchs Pond Average (range)	Marchs Pond Classification
Water Clarity (meters)	4.0 – 7.0	2.5 - 4.0	< 2.5	4.9 meters (3.8 – 6.5) *	Oligotrophic
Chlorophyll a ¹ (ppb)	< 3.3	> 3.3 – 5.0	> 5.0 – 11.0	2.4 ppb (1.8 – 3.3)	Oligotrophic
Total Phosphorus ¹ (ppb)	< 8.0	> 8.0 – 12.0	> 12.0 – 28.0	7.1 ppb (5.7 – 10.0)	Oligotrophic
Dissolved Oxygen (mg/L)	5.0 – 7.0	2.0 – 5.0	<2.0	6.5 mg/l (3.6 - 8.9) **	Oligotrophic

* Secchi Disk was intermittently visible on the lake bottom and thus likely underestimates water clarity.

**Dissolved oxygen data were measured in Marchs Pond on July 9, 2019 between 4.0 m to 6.0 m, in the layer of rapidly decreasing temperature.

Table 2. 2019 Marchs Pond Seasonal Average Accessory Water Quality Measurements

Parameter	Assessment Criteria					Marchs Pond Average (range)	Marchs Pond Classification
	< 10 uncolored	10 – 20 slightly colored	20 – 40 lightly tea colored	40 – 80 tea colored	> 80 highly colored		
Color (color units)	< 10 uncolored	10 – 20 slightly colored	20 – 40 lightly tea colored	40 – 80 tea colored	> 80 highly colored	8.8 color units (range: 6.6 – 10.9)	Uncolored
Alkalinity (mg/L)	< 0.0 acidified	0.1 – 2.0 extremely vulnerable	2.1 – 10 moderately vulnerable	10.1 – 25.0 low vulnerability	> 25.0 not vulnerable	4.7 mg/L (range: 4.6 – 4.8)	Moderately vulnerable
pH (std units)	< 5.5 suboptimal for successful growth and reproduction		6.5 – 9.0 optimal range for fish growth and reproduction			7.1 standard units (range: 7.0 – 7.2)	Optimal range for fish growth and reproduction
Specific Conductivity (uS/cm)	< 50 uS/cm Characteristic of minimally impacted NH lakes		50-100 uS/cm Lakes with some human influence	> 100 uS/cm Characteristic of lakes experiencing human disturbances		84.2 uS/cm (range: 82.2 – 85.2)	Characteristic of lakes with some human influence

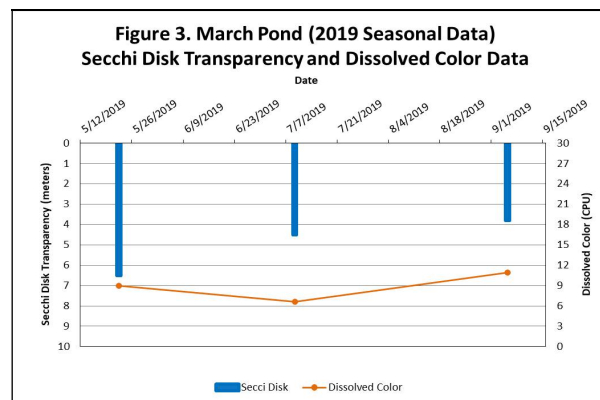
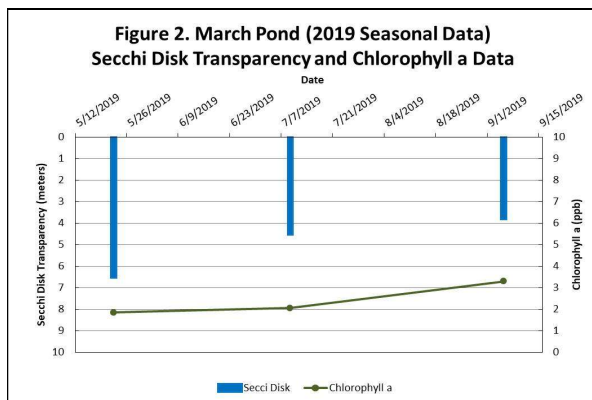
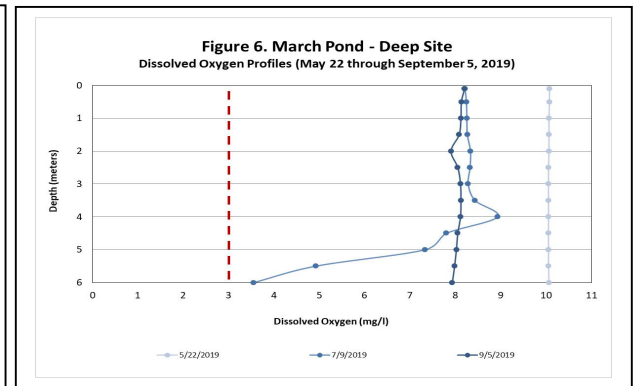
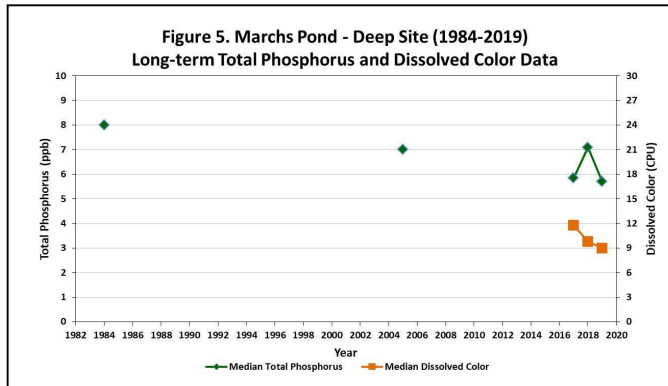
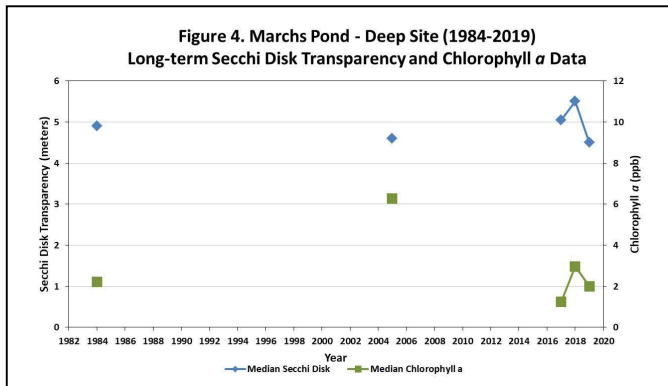


Figure 2 and 3. Seasonal Secchi disk transparency, chlorophyll a changes and dissolved color concentrations. Figures 2 and 3 illustrate the interplay among Secchi Disk transparency, chlorophyll a and dissolved color. Shallower water transparency measurements oftentimes correspond to increases in chlorophyll a and/or color concentrations. Note, the Secchi Disk was intermittently visible on the lake bottom and thus likely underestimates the Marchs Pond water clarity.

Table 3. New Durham Ponds inter-comparison (2019 Data)

Lake	Average (range) Secchi Disk Transparency (meters)	Average (range) Chlorophyll <i>a</i> (ppb)	Average (range) Total Phosphorus (ppb)	Average (range) Dissolved Color (CPU)	Average (range) Dissolved Oxygen (mg/l)
Merrymeeting Lake	10.2 meters (range: 8.2 – 12.5)	0.7 ug/l (range: 0.1 – 1.0)	3.7 ug/l (range: 2.6 – 6.5)	4.2 CPU (range: 1.4 – 7.4)	10.9 mg/l (range: 8.7 – 12.2)
Marsh Pond	2.8 meters (range: 2.1 – 3.6)	14.2 ug/l (range: 4.8 – 24.6)	48.4 ug/l (range: 19.8 – 80.8)	19.3 CPU (range: 12.7 – 22.2)	2.0 mg/l (range: 0.0 – 4.7)
Jones Pond	2.7 meters (range: 2.1 – 3.5)	10.5 ug/l (range: 4.0 – 13.8)	29.0 ug/l (range: 18.2 – 34.8)	29.6 CPU (range: 24.3 – 35.6)	0.2 mg/l (range: 0.0 – 0.3)
Downing Pond	2.7 meters (range: 2.2 – 3.0)	8.0 ug/l (range: 4.1 – 12.2)	28.7 ug/l (range: 19.0 – 37.4)	35.2 CPU (range: 25.7 – 41.1)	-----
Chalk Pond	3.3 meters (range: 3.0 – 3.5)	2.1 ug/l (range: 1.5 – 2.6)	9.1 ug/l (range: 8.6 – 9.8)	12.6 CPU (range: 9.9 – 15.2)	-----
Marchs Pond	4.9 meters (range: 3.8 – 6.5)	2.4 ug/l (range: 1.8 – 3.3)	7.1 ug/l (range: 5.7 – 10.0)	8.8 CPU (range: 6.6 – 10.9)	6.5 mg/l (range: 3.6 – 8.9)
Shaws Pond	3.8 meters (range: 3.6 – 4.1)	4.4 ug/l (range: 3.3 – 6.0)	8.8 ug/l (range: 8.4 – 9.5)	28.8 CPU (range: 24.6 – 33.4)	6.2 mg/l (range: 2.0 – 8.9)

- Water quality data are reported for a deep reference sampling location in each lake/pond.
- Dissolved oxygen measurements were collected in the summer (mid to late July) in the bottom water layer (hypolimnion or metalimnion).
- Chalk, Marchs, and Downing Ponds Secchi Disk transparency measurements intermittently reached the lake bottom before disappearing from view and likely underestimate the water transparency.
- ----- Indicates the site is too shallow to form a stable deep water layer (hypolimnion or metalimnion) during the summer months.



Figures 4 and 5. Changes in the Marchs Pond water clarity (Secchi Disk depth), chlorophyll *a*, dissolved color and total phosphorus concentrations measured between 1984 and 2019. **Total phosphorus data are also displayed and are oftentimes correlated with the amount of plant growth.** Long-term trends are based on the analysis of annual median values

Figure 6. Marchs Pond profile of temperature and dissolved oxygen concentrations collected between May 22 and September 5, 2019.

Recommendations

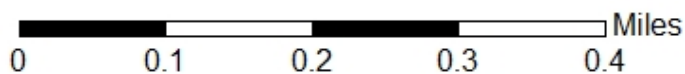
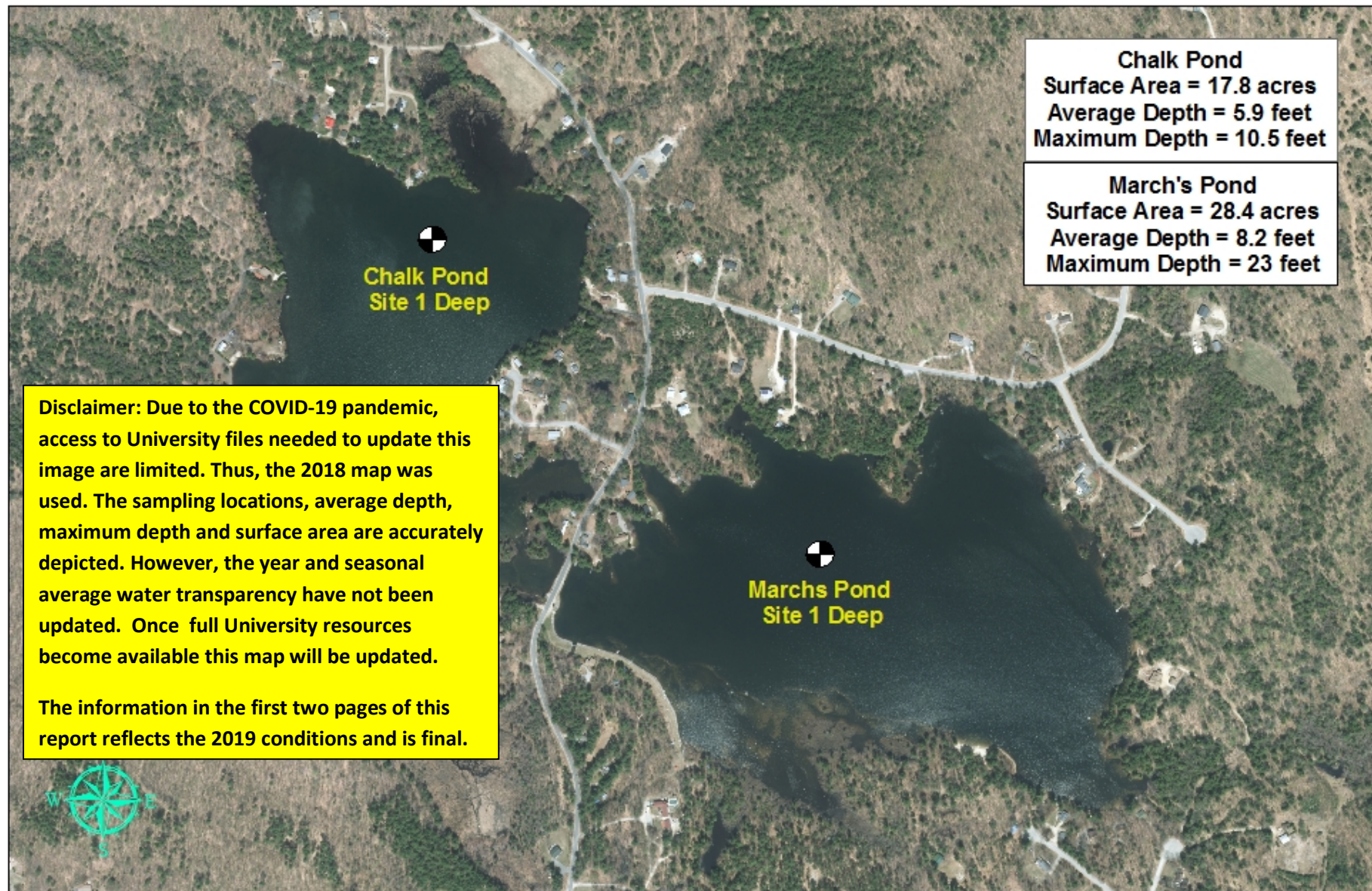
Implement Best Management Practices within the Marchs Pond watershed to minimize the adverse impacts of polluted runoff and erosion into Marchs Pond. Refer to “Landscaping at the Water’s Edge: An Ecological Approach” and “New Hampshire Homeowner’s Guide to Stormwater Management: Do-It-Yourself Stormwater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

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

Figure 7. Chalk Pond and Marchs Pond

New Durham, NH

2018 Deep water sampling sites



Aerial Orthophoto Source: NH GRANIT
GPS Coordinates collected by the UNH Center for Freshwater Biology



Extension

