WATER & WETLAND
LAKE, POND & WETLAND MANAGEMENT

Biologist:
Grace Adams
888-493-8526
grace@waterandwetland.com

Call/Text With Any Questions!

FIELD NOTES SUMMARY

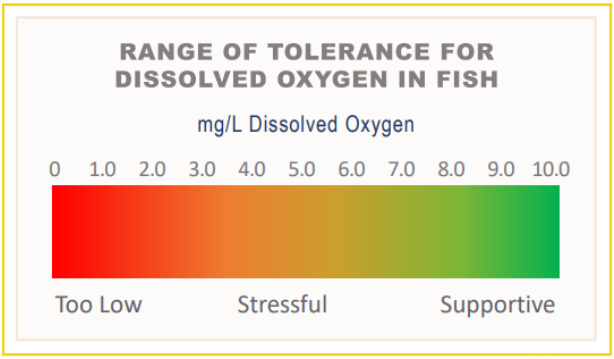
Customer: Hop Brook Protection Association
Pond Name: Carding Millpond
Site Location: Sudbury, MA
Date: 6/5/24

On 6/5/24, Aquatic Biologist, Grace Adams, and Aquatic Field Assistant, Harley Westgate, made a visit to Carding Millpond. The following services were completed during the visit:

Upon arrival to the site, a survey was conducted using visual observation paired with a standard throw-rake and handheld GPS/ArcGIS Field Maps, as applicable. Plants documented during the survey are documented in the table below. (*) denotes an invasive species. Invasive species are non-native to the ecosystem and are likely to cause economic harm, environmental harm, or harm to human health.

Species Identified	
Common Name	**Latin Name**
Duckweed	*Lemna*
Water Chestnut*	*Trapa natans*
Filamentous Algae	
Common Waterweed/Elodea	*Elodea canadensis*
Curly-Leaf Pondweed*	*Potamogeton crispus*
Common Waterweed	*Elodea canadensis*
Thin-Leaf Pondweed	*Potamogeton pusillus*
Coontail	*Ceratophyllum demersum*

While on-site, dissolved oxygen (DO) and temperature readings were collected using a calibrated YSI meter with optical sensor. Dissolved oxygen is the amount of oxygen in water that is available to aquatic organisms. DO is necessary to support fish spawning, growth, and activity. Tolerance varies by species, but the figure below provides a general range of fish tolerance (Source:



epa.gov). Dissolved oxygen can be affected by many outside factors, such as: temperature, time of day, and pollution. Dissolved oxygen levels are typically lowest early in the morning. Healthy water should generally have concentrations of about 6.5-8+ mg/L.

Results from the visit are included in the table below:

Temperature & Dissolved Oxygen		
Depth (Feet)	Temp (°C)	DO (mg/L)
Surface	27.4	10.3
1’	27.2	9.23
2’	26.0	8.81
3’	25.3	8.36
4’	24.9	8.26
Bottom	24.3	7.96

Secchi Disk Clarity	
Secchi Disk Depth (Feet)	4'8"

A Secchi disk is a disk with alternating black and white quadrants. It is lowered into the water of a lake until it can no longer be seen by the observer. This depth of disappearance, called the Secchi depth, is a measure of the transparency of the water.

Water Quality Parameters
pH, nitrate nitrogen, total kjeldahl nitrogen (TKN), ammonia, total phosphorus, dissolved phosphorus, algae ID and enumeration, E. coli enumeration, turbidity, true color, apparent color, alkalinity

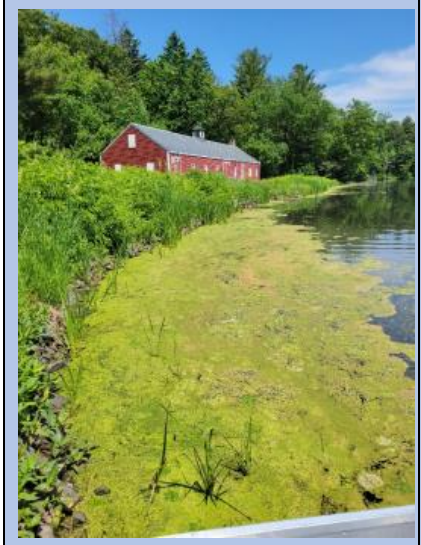
Additional samples were collected from the contracted locations. The samples were properly preserved, and shipped on-ice via FedEx Overnight, or transported directly to the most appropriate lab. The lab will analyze the samples for the contracted/required parameters which are listed in the table above. Results will be provided upon receipt from the lab or in the year end-summary report, as applicable. Any concerning results will immediately be brought to the attention of the Client.

Additional Notes from the Biologist
Green patches along the shoreline composed of dense populations of watermeal and duckweed, with water chestnut interspersed in a scattered fashion throughout the entirety of the pond (see included map). It was noted in small patches and even singular plants. Some filamentous algae was found floating along the shoreline. It should be noted that the shoreline also contained pollen floating which is not to be confused for microscopic algae. Sparse to moderate densities of elodea were documented

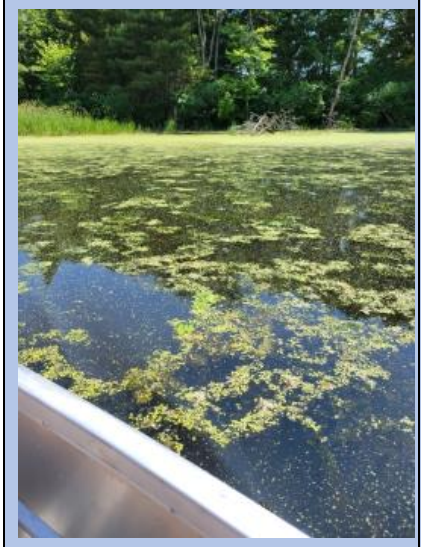
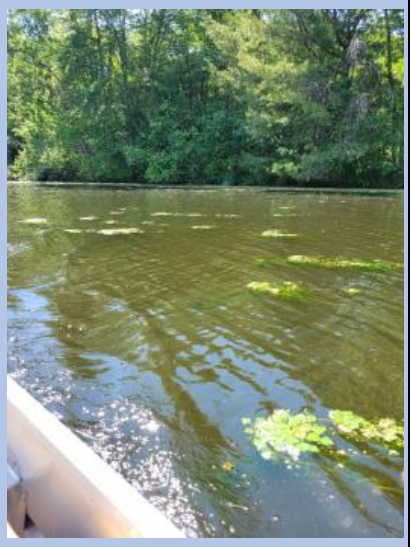
predominantly along the southeastern shoreline; however, it was observed growing throughout the majority of the pond. Coontail was also mixed within the elodea. Curly leaf pondweed (invasive) was spotted in varying densities throughout the pond. It was predominantly scattered in trace densities with an area of moderate density along the southeastern shoreline. The southern coves predominantly contained dense populations of elodea and watermeal. Thin-leaf pondweed appeared in the southwestern cove in low densities. The southwestern cove also contained trace densities of water chestnut. The other species previously noted decreased to sparse densities in this cove, with the exception of elodea which remained moderate. Algae was most dominant around the southwestern island and the western shoreline.

Water chestnut treatment has been scheduled for Tuesday, July 2nd (weather pending).

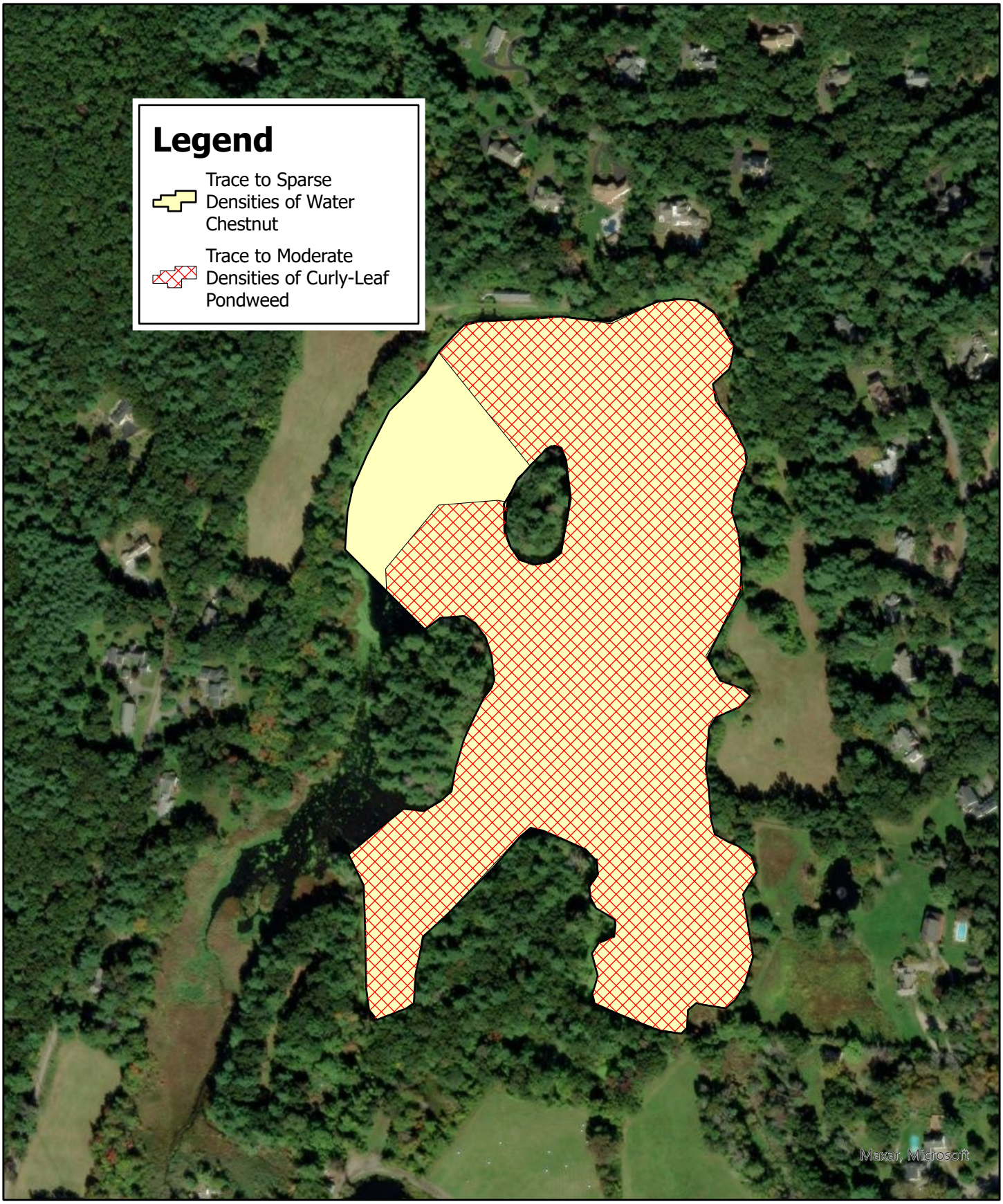
As always, we will notify you prior to any upcoming visits, as applicable. Please feel free to reach out to us directly with any questions.

Photo 1	Photo 2	Photo 3
		

Water & Wetland, LLC
Upton, MA
(888) 4WETLAN(D)
www.waterandwetland.com

Photo 4	Photo 5	Photo 6
		

Water & Wetland, LLC
Upton, MA
(888) 4WETLAN(D)
www.waterandwetland.com



WATER & WETLAND
LAKE POND & WETLAND MANAGEMENT

Carding Millpond
Invasive Species Distribution
Sudbury, MA

Survey Date
6/05/2024
Map Date
6/20/2024

N

WATER & WETLAND
LAKE, POND & WETLAND MANAGEMENT

Biologist:
Grace Adams
888-493-8526
grace@waterandwetland.com

Call/Text With Any Questions!

FIELD NOTES SUMMARY

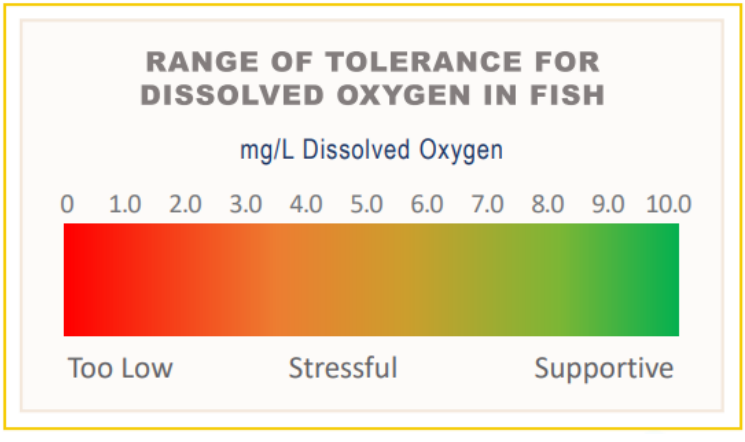
Customer: Hop Brook Protection Association
Pond Name: Grist Millpond
Site Location: Sudbury, MA
Date: 6/5/24

On 6/5/24, Aquatic Biologist, Grace Adams, and Aquatic Field Assistant, Harley Westgate, made a visit to Grist Millpond. The following services were completed during the visit:

Upon arrival to the site, a survey was conducted using visual observation paired with a standard throw-rake and handheld GPS/ArcGIS Field Maps, as applicable. Plants documented during the survey are documented in the table below. (*) denotes an invasive species. Invasive species are non-native to the ecosystem and are likely to cause economic harm, environmental harm, or harm to human health.

Species Identified	
Common Name	**Latin Name**
Watermeal	*Wolffia*
Duckweed	*Lemna*
Water Chestnut*	*Trapa natans*
Thin-leaf Pondweed	*Potamogeton pusillus*
Curly-Leaf Pondweed*	*Potamogeton crispus*
Common Waterweed	*Elodea canadensis*

While on-site, dissolved oxygen (DO) and temperature readings were collected using a calibrated YSI meter with optical sensor. Dissolved oxygen is the amount of oxygen in water that is available to aquatic organisms. DO is necessary to support fish spawning, growth, and activity. Tolerance varies by species, but the figure below provides a general range of fish tolerance (Source: epa.gov). Dissolved oxygen can be affected by



many outside factors, such as: temperature, time of day, and pollution. Dissolved oxygen levels are typically lowest early in the morning. Healthy water should generally have concentrations of about 6.5-8+ mg/L.

Results from the visit are included in the table below:

Temperature & Dissolved Oxygen		
Depth (Feet)	Temp (°C)	DO (mg/L)
Surface	27.9	9.02
1’	27.9	8.96
2’	25.8	8.92
3’	25.2	8.46
Bottom	24.8	8.21

Secchi Disk Clarity	
Secchi Disk Depth (Feet)	3'5"

A Secchi disk is a disk with alternating black and white quadrants. It is lowered into the water of a lake until it can no longer be seen by the observer. This depth of disappearance, called the Secchi depth, is a measure of the transparency of the water.

Water Quality Parameters
pH, nitrate nitrogen, total kjeldahl nitrogen (TKN), ammonia, total phosphorus, dissolved phosphorus, algae ID and enumeration, E. coli enumeration, turbidity, true color, apparent color, alkalinity

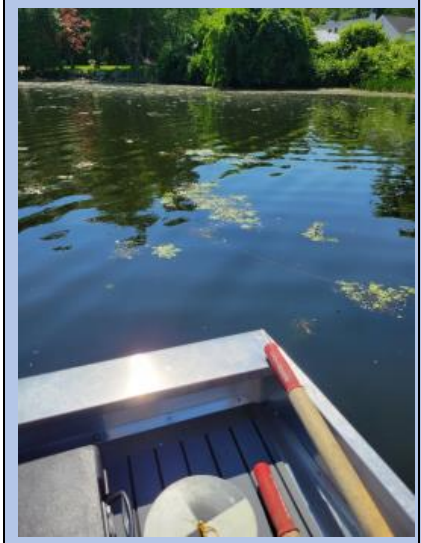
Additional samples were collected from the contracted locations. The samples were properly preserved, and shipped on-ice via FedEx Overnight, or transported directly to the most appropriate lab. The lab will analyze the samples for the contracted/required parameters which are listed in the table above. Results will be provided upon receipt from the lab or in the year end-summary report, as applicable. Any concerning results will immediately be brought to the attention of the Client.

Additional Notes from the Biologist
Duckweed and watermeal were growing around the edges of the pond, most prominently along the northeastern shoreline. Water chestnut was growing both on surface and throughout water column across the entirety of the pond but grew less dense moving southwest. Densities varied throughout, with much of the water chestnut being in the water column during the survey. Overall, it appeared reduced from previous years and was found in small patches or even as single plants. Curly leaf pondweed, another invasive species, was growing interspersed with thin-leaf pondweed, a native species, across the entire pond. At the north end, curly leaf pondweed contained epiphytic algae which indicates the plants are dying/decaying/unhealthy. Towards the southwestern portion of the pond, thin-leaf pondweed

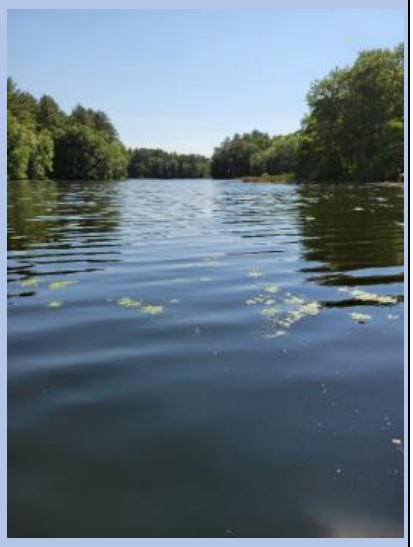
became denser. Both thin-leaf and curlyleaf pondweed contained epiphytic algae at the southern end. Elodea could be seen growing in shallow portions of the pond. Overall, thin-leaf pondweed and elodea were the most prominent natives. Boat maneuverability was limited due to shallow water and vegetation density. Water sampling, clarity testing, and dissolved oxygen profile were taken.

Water chestnut treatment has been scheduled for Tuesday, July 2nd (pending weather).

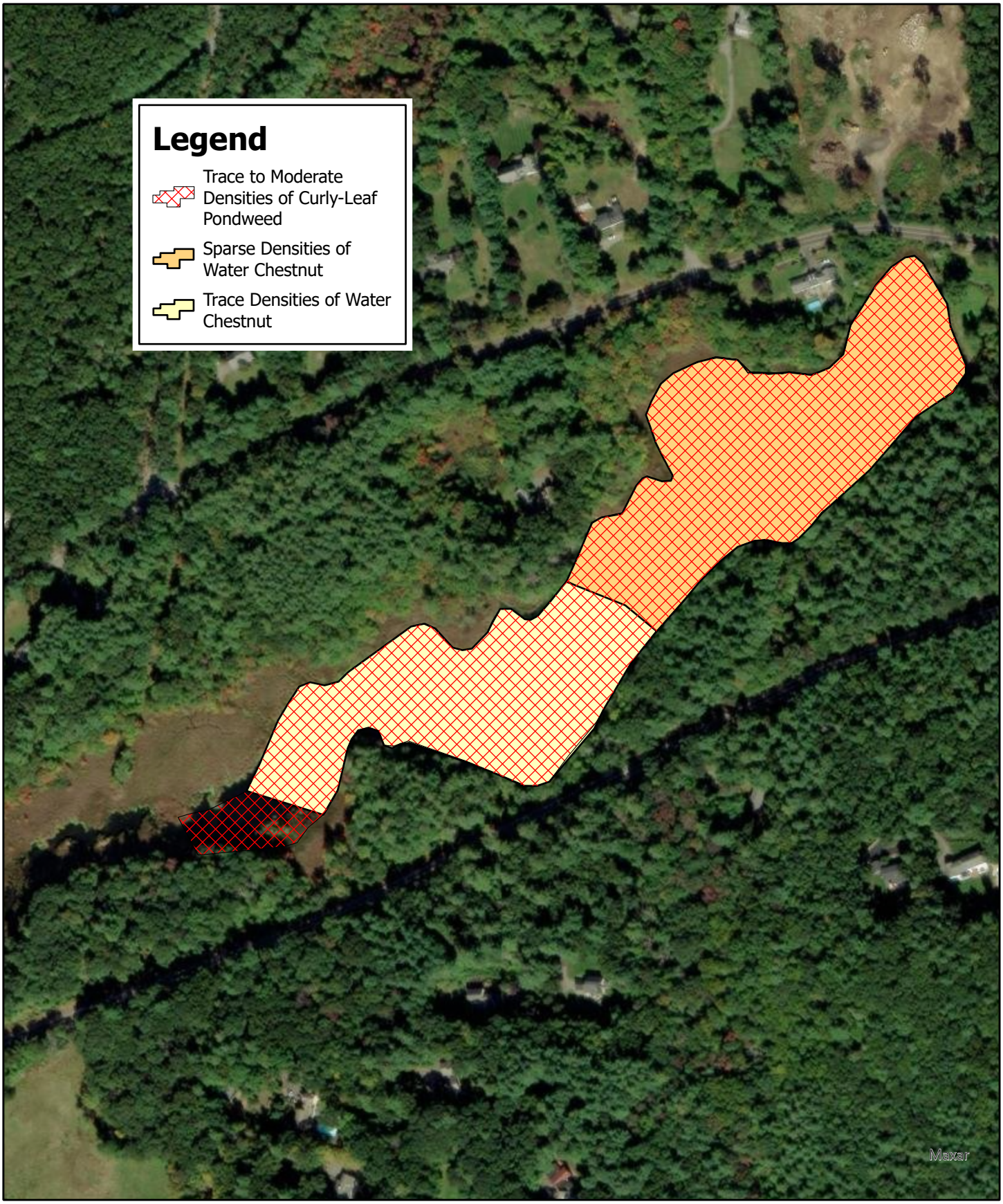
As always, we will notify you prior to any upcoming visits, as applicable. Please feel free to reach out to us directly with any questions.

Photo 1	Photo 2	Photo 3
		

Water & Wetland, LLC
Upton, MA
(888) 4WETLAN(D)
www.waterandwetland.com

Photo 4	Photo 5	Photo 6
		

Water & Wetland, LLC
Upton, MA
(888) 4WETLAN(D)
www.waterandwetland.com



WATER & WETLAND
LAKE POND & WETLAND MANAGEMENT

Grist Mill Pond

Invasive Species Distribution

Sudbury, MA

Survey Date
6/05/2024
Map Date
6/20/2024

N

WATER & WETLAND
LAKE, POND & WETLAND MANAGEMENT

Biologist:
Grace Adams
888-493-8526
grace@waterandwetland.com

Call/Text With Any Questions!

FIELD NOTES SUMMARY

Customer: Hop Brook Protection Association
Pond Name: Stearns Millpond
Site Location: Sudbury, MA
Date: 6/5/24

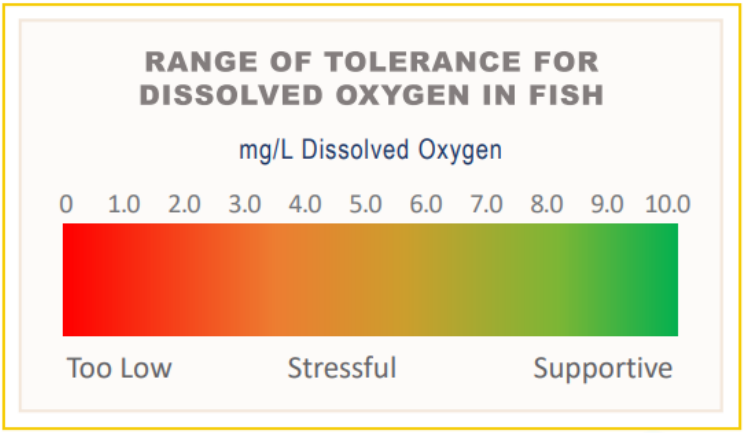
On 6/5/24, Aquatic Biologist, Grace Adams, and Aquatic Field Assistant, Harley Westgate, made a visit to Stearn Millpond. The following services were completed during the visit:

Upon arrival to the site, a survey was conducted using visual observation paired with a standard throw-rake and handheld GPS/ArcGIS Field Maps, as applicable. Plants documented during the survey are documented in the table below. (*) denotes an invasive species. Invasive species are non-native to the ecosystem and are likely to cause economic harm, environmental harm, or harm to human health.

Species Identified	
Common Name	**Latin Name**
Common Waterweed/Elodea	*Elodea canadensis*
Duckweed	*Lemna*
Water Chestnut*	*Trapa natans*
Curly-leaf Pondweed*	*Potamogeton crispus*
Coontail	*Ceratophyllum demersum*
Thin-leaf Pondweed	*Potamogeton pusillus*
Filamentous Algae	
Benthic Algae	
Burreed	*Sparganium*
Waterlilies	*Nymphaeaceae*
Common Reed*	*Phragmites australis*

WATER & WETLAND
LAKE, POND & WETLAND MANAGEMENT

While on-site, dissolved oxygen (DO) and temperature readings were collected using a calibrated YSI meter with optical sensor. Dissolved oxygen is the amount of oxygen in water that is available to aquatic organisms. DO is necessary to support fish spawning, growth, and activity. Tolerance varies by species, but the figure below provides a general range of fish tolerance (Source: epa.gov). Dissolved oxygen can be affected by many outside factors, such as: temperature, time of day, and pollution. Dissolved oxygen levels are typically lowest early in the morning. Healthy water should generally have concentrations of about 6.5-8+ mg/L.



Results from the visit are included in the table below:

Temperature & Dissolved Oxygen		
Depth (Feet)	Temp (°C)	DO (mg/L)
Surface	25.7	9.43
1’	22.5	8.77
2’	21.1	7.85
Bottom	24.8	7.62

A Secchi disk is a disk with alternating black and white quadrants. It is lowered into the water of a lake until it can no longer be seen by the observer. This depth of disappearance, called the Secchi depth, is a measure of the transparency of the water.

Secchi Disk Clarity	
Secchi Disk Depth (Feet)	3'1" - to the bottom

Water Quality Parameters
pH, nitrate nitrogen, total kjeldahl nitrogen (TKN), ammonia, total phosphorus, dissolved phosphorus, algae ID and enumeration, E. coli enumeration, turbidity, true color, apparent color, alkalinity

Additional samples were collected from the contracted locations. The samples were properly preserved, and shipped on-ice via FedEx Overnight, or transported directly to the most appropriate lab. The lab will analyze the samples for the contracted/required parameters which are listed in the table above. Results will be provided upon receipt from the lab or in the year end-summary report, as applicable. Any concerning results will immediately be brought to the attention of the Client.

Water & Wetland, LLC
Upton, MA
(888) 4WETLAN(D)
www.waterandwetland.com

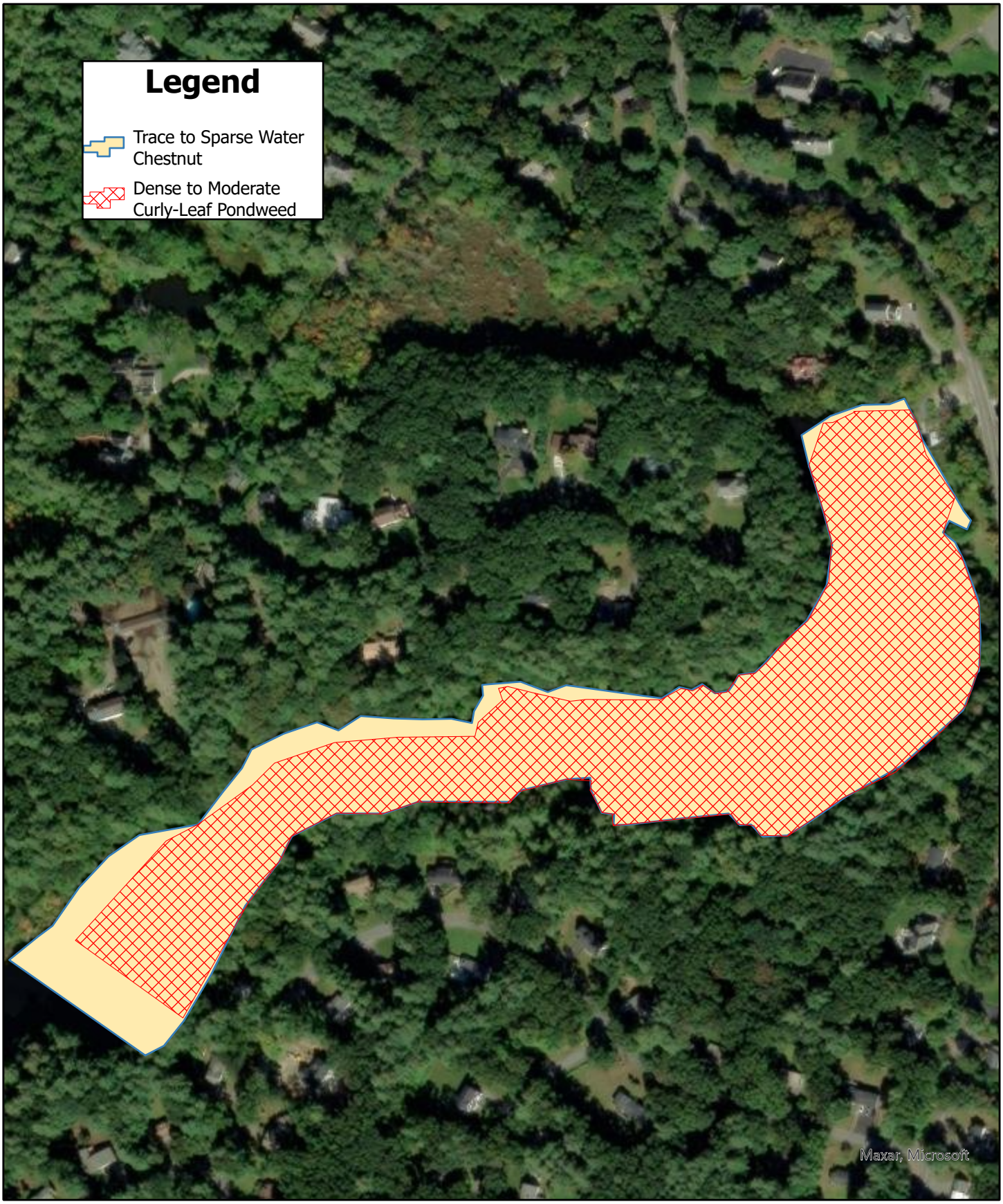
WATER & WETLAND
LAKE, POND & WETLAND MANAGEMENT

Additional Notes from the Biologist
During the survey, two invasive species were noted: sparse water chestnut at the north end of the pond and in scattered trace to sparse patches throughout the entirety of the pond. Curly-leaf pondweed was also found throughout nearly the entirety of the pond. Water chestnut was growing moderately within the water column toward the southern end of the pond, while curly leaf was mixed in with dense populations of elodea throughout. Coontail was also found in sparse to moderate densities across the entire pond, along with thin-leaf pondweed. No milfoil was found, though coontail could be mistaken for it. Filamentous algae was documented towards the south end of the pond, along with moderate densities of benthic algae. Occasional patches of waterlilies and burreed were documented at the southern end of the pond. Very shallow waters and dense vegetation prevented boat access, so the survey was performed by kayak. Dense elodea added to difficulties navigating, even in a kayak. Elodea decreased to sparse densities towards the southern end of the pond. Phragmites were spotted along one of the shorelines. Pollen was seen across the surface at windblown shorelines. Water samples, dissolved oxygen profile, and clarity measurements were taken. The water chestnut treatment has been scheduled for July 2nd (pending weather).

As always, we will notify you prior to any upcoming visits, as applicable. Please feel free to reach out to us directly with any questions.

Photo 1	Photo 2	Photo 3
		

Water & Wetland, LLC
Upton, MA
(888) 4WETLAN(D)
www.waterandwetland.com



WATER & WETLAND
LAKE POND & WETLAND MANAGEMENT

Stearns Mill Pond
Invasive Species Distribution
Sudbury, MA

Survey Date
6/5/2024
Map Date
6/15/2024

N

SePRO Lab
Water Diagnostics for Lakes & Ponds
SeSCRIPT*
16013 Watson Seed Farm Road, Whitakers, NC 27891

LABORATORY REPORT

Chain of Custody: eCOC13312

Customer Contact Information

Company Name: Water and Wetland	Contact Person: Joe Onorato
Address: 134 Ferry St., South Grafton, MA 01560	E-mail Address: joe@waterandwetland.com
	Phone: 888-493-8526

Waterbody Information

Waterbody:	Hop Brook Ponds - MA
Waterbody size:	
Depth Average:	

Sample ID	Sample Location	Test	Method	Results	Sampling Date / Time
CTM53004-1	Carding Millpond	Turbidity (NTU)	EPA 180.1	6	06/05/2024
		Free Reactive Phosphorus (µg/L)	EPA 365.3	5.7	
		Total Phosphorus (µg/L)	EPA 365.3	75.5	
		Alkalinity (mg/L as CaCO3)	EPA 310.2	66.4	
		Total Nitrate (mg/L) and Nitrite (mg/L)	Campbell et al 2004	0.65	
		Nitrite (mg/L)	Campbell et al 2004	0.05	
		Nitrate (mg/L)	calculated	0.6	
		Total Kjeldahl Nitrogen (mg/L)	EPA 351.2	1.41	
		E. coli (CFU/100mL)	EPA 9223B	11.0	
		Total Coliforms (CFU/100mL)	EPA 9223B	>2419.6	
		Total Nitrogen (mg/L)	calculated	2.06	
		Ammonia (µg/L)	SESC 12	10.4	
		True Color (CU)	EPA 2120C	18	
		Apparent Color (CU)	EPA 2120B	78	
CTM53005-1	Grist Millpond	Turbidity (NTU)	EPA 180.1	7	06/05/2024
		Free Reactive Phosphorus (µg/L)	EPA 365.3	10.9	
		Total Phosphorus (µg/L)	EPA 365.3	167.1	
		Alkalinity (mg/L as CaCO3)	EPA 310.2	63.6	
		Total Nitrate (mg/L) and Nitrite (mg/L)	Campbell et al 2004	1.42	
		Nitrite (mg/L)	Campbell et al 2004	0.07	
		Nitrate (mg/L)	calculated	1.35	
		Total Kjeldahl Nitrogen (mg/L)	EPA 351.2	2.55	
		E. coli (CFU/100mL)	EPA 9223B	7.5	
		Total Coliforms (CFU/100mL)	EPA 9223B	>2419.6	
		Total Nitrogen (mg/L)	calculated	3.97	
		Ammonia (µg/L)	SESC 12	15.2	
		True Color (CU)	EPA 2120C	26	
		Apparent Color (CU)	EPA 2120B	70	
CTM53006-1	Stearns Millpond	Turbidity (NTU)	EPA 180.1	5.5	06/05/2024
		Free Reactive Phosphorus (µg/L)	EPA 365.3	10.1	

Total Phosphorus (µg/L)	EPA 365.3	91.4
Alkalinity (mg/L as CaCO3)	EPA 310.2	45.3
Total Nitrate (mg/L) and Nitrite (mg/L)	Campbell et al 2004	0.84
Nitrite (mg/L)	Campbell et al 2004	0.04
Nitrate (mg/L)	calculated	0.8
Total Kjeldahl Nitrogen (mg/L)	EPA 351.2	1.18
E. coli (CFU/100mL)	EPA 9223B	11.9
Total Coliforms (CFU/100mL)	EPA 9223B	>2419.6
Total Nitrogen (mg/L)	calculated	2.02
Ammonia (µg/L)	SESC 12	13.4
True Color (CU)	EPA 2120C	25
Apparent Color (CU)	EPA 2120B	95

ANALYSIS STATEMENTS:
SAMPLE RECEIPT /HOLDING TIMES: All samples arrived in an acceptable condition and were analyzed within prescribed holding times in accordance with the SRTC Laboratory Sample Receipt Policy unless otherwise noted in the report.
PRESERVATION: Samples requiring preservation were verified prior to sample analysis and any qualifiers will be noted in the report.
QA/QC CRITERIA: All analyses met method criteria, except as noted in the report with data qualifiers.
COMMENTS: No significant observations were made unless noted in the report.
MEASUREMENT UNCERTAINTY: Uncertainty of measurement has been determined and is available upon request.

Laboratory Information
Date / Time Received: 06/06/24 11:00 AM
Date Results Sent: Wednesday, June 12, 2024

Disclaimer: The results listed within this Laboratory Report relate only to the samples tested in the laboratory. The analyses contained in this report were performed in accordance with the applicable certifications as noted. All soil samples are reported on a dry weight basis unless otherwise noted in the report. This Laboratory Report is confidential and is intended for the exclusive use of SRTC Laboratory and its client. This report shall not be reproduced, except in full, without written permission from SRTC Laboratory. The Chain of Custody is included and is an essential component of this report.

This entire report was reviewed and approved for release.

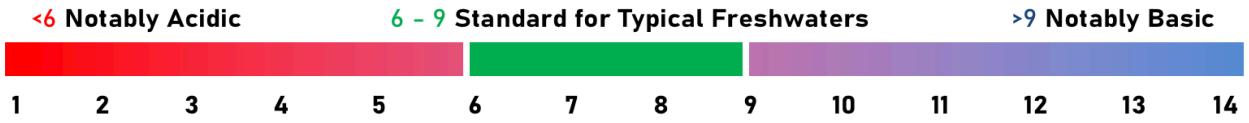
Reviewed By: Laboratory Supervisor

SePRO Lab
Water Diagnostics for Lakes & Ponds

Water Quality Analysis Explanation

These water quality parameters are essential to document the condition of a water body and design custom treatment prescriptions to achieve the desired management objective.

pH: Measure of how acidic or basic the water is (pH 7 is considered neutral).



Hardness: Measure of the concentration of divalent cations, primarily consisting of calcium and magnesium in typical freshwaters.
0-60 mg/L as CaCO3 soft; 61-120 mg/L as CaCO3 moderately hard; 121-180 mg/L as CaCO3 hard; > 181 mg/L as CaCO3 very hard

Alkalinity: Measure of the buffering capacity of water, primarily consisting of carbonate, bicarbonate, and hydroxide in typical freshwaters. Waters with lower levels are more susceptible to pH shifts.
< 50 mg/L as CaCO3 low buffered; 51-100 mg/L as CaCO3 moderately buffered; 101-200 mg/L as CaCO3 buffered; > 200 mg/L as CaCO3 high buffered

Conductivity: Measure of the waters ability to transfer an electrical current, increases with more dissolved ions.
< 50 µS/cm relatively low concentration may not provide sufficient dissolved ions for ecosystem health; 50-1500 µS/cm typical freshwaters; > 1500 µS/cm may be stressful to some freshwater organisms, though not uncommon in many areas

Phosphorus: Essential nutrient often correlating to growth of algae in freshwaters.

Total Phosphorus (TP): is the measure of all phosphorus in a sample as measured by persulfate strong digestion and includes: inorganic, oxidizable organic and polyphosphates. This includes what is readily available, potential to become available and stable forms. *<12 µg/L oligotrophic; 12-24 µg/L mesotrophic; 25-96 µg/L eutrophic; > 96 µg/L hypereutrophic*

Free Reactive Phosphorus (FRP): is the measure of inorganic dissolved reactive phosphorus (PO4-3, HPO4-2, etc). This form is readily available in the water column for algae growth.

Nitrogen: Essential nutrient that can enhance growth of algae.

Total N is all nitrogen in the sample (organic N+ and Ammonia) determined by the sum of the measurements for Total Kjeldahl Nitrogen (TKN) and ionic forms.

Nitrites and Nitrates are the sum of total oxidized nitrogen, often readily free for algae uptake.
< 1 mg/L typical freshwater; 1-10 mg/L potentially harmful; >10 mg/L possible toxicity, above many regulated guidelines

Chlorophyll a: primary light-harvesting pigment found in algae and a measure of the algal productivity and water quality in a system.
0-2.6µg/L oligotrophic; 2.7-20 µg/L mesotrophic; 21-56 µg/L eutrophic; > 56 µg/L hypereutrophic

Turbidity: Measurement of water clarity. Suspended particulates (algae, clay, silt, dead organic matter) are the common constituents impacting turbidity.
< 10 NTU drinking water standards and typical trout waters; 10-50 NTU moderate; > 50 NTU potential impact to aquatic life.


Fast.
Accurate.
Reliable.
SePRO Lab
Water Diagnostics for Lakes & Ponds

SePRO Lab
Water Diagnostics for Lakes & Ponds

SeSCRIPT Analysis Report: Hop Brook Ponds

Company: Water and Wetland
Address: 134 Ferry St. South Grafton, MA. 01560
Contact Person: Joe Onorato
Phone: (888)-493-8526
Email: joe ; info@waterandwetland.com

Project Name: Hop Brook Ponds
Surface Area: 20 acres
Average depth: 4 feet
Date Algae Sample Received: 6/6/2024
SeSCRIPT Analysis Performed: Algae ID

Algae ID Results

Hop Brook Ponds

Identification	Classification	Description	Density/Biomass (cells/mL)
Carding Millpond			
Tetraselmis sp.	Chlorophyta-Green algae	Single-celled, flagellated, planktonic	4,200
Planktosphaeria sp.	Chlorophyta-Green algae	Colonial, planktonic	2,100

Other algae observed at densities less than 40 cells/mL: *Chlamydomonas, Desmodesmus, Oocystis, Pandorina* (Chlorophyta); *Planktolyngbya* (Cyanophyta); *Gymnodinium* (Dinophyta)

Much particulate matter observed

Identification	Classification	Description	Density/Biomass (cells/mL)
Stearns Millpond			
Navicula sp.	Bacillariophyta-Diatoms	Single-celled, planktonic	220

Other algae observed at densities less than 40 cells/mL: *Cyclotella, Ulnaria* (Bacillariophyta); *Desmodesmus, Tetraselmis, Oocystis* (Chlorophyta); *Trachelomonas* (Euglenophyta)

Much particulate matter observed

Algae ID Results

Hop Brook Ponds

Identification	Classification	Description	Density/Biomass (cells/mL)
Grist Millpond			
Desmodesmus sp.	Chlorophyta-Green algae	Colonial, planktonic	3,200
Nitzschia sp.	Bacillariophyta-Diatoms	Single-celled, planktonic	1,400

Other algae observed at densities less than 40 cells/mL: *Aulacoseira, Cyclotella* (Bacillariophyta); *Planktosphaeria* (Chlorophyta)

Much particulate matter observed