

Memorandum

To: Ms. Colleen Lyons, Lake Hopatcong Commission

From: Patrick Rose, Princeton Hydro

CC: Fred Lubnow, Ph.D., Princeton Hydro

RE: 19 August 2025 – Cyanotoxin Testing – Lake Hopatcong

Pages: Five

Princeton Hydro conducted the second of two 2025 cyanobacteria / cyanotoxin testing events at Lake Hopatcong on 19 August 2025. The data collected as part of this effort are provided below.

Methodology

Princeton Hydro sampled at nine stations on 19 August 2025. Plankton grab samples were collected at each station, and the cyanobacteria community was identified to genus and densities were quantified as cells / mL. In addition, at each site samples were collected in glass vials and analyzed the same day for the cyanotoxins microcystins and anatoxin-a. The cyanotoxin analyses were performed utilizing Abraxis Algal Toxin Test Strip Kits and read with an Abraxis Field Meter. It should be noted that this analytical methodology is not NJ-State certified; however, the resulting data can be used for informational and management purposes. *In-situ* monitoring was also conducted at each station utilizing an In-Situ AquaTROLL 500 water quality meter which was calibrated prior to use; Princeton Hydro is State certified in its use of field meters (#10006). *In-situ* phycocyanin and chlorophyll-*a* concentrations were also measured at each station with Turner fluoroprobes. The monitoring program was modified in 2023 to concentrate on the assessment of cyanobacteria and cyanotoxins in near-shore areas, directly from the shoreline of the lake. Sampling from the shoreline of the beaches allows for the collection of samples directly where people are recreating in the water.

The nine sampling stations are listed below:

- Hopatcong State Park Beach – northern end (B1)
- Hopatcong State Park Beach – southern end (B2)
- Hopatcong State Park – downstream of dam near fountain (B3)
- Landing Channel (B4)
- Memorial Beach in Mount Arlington (B5)
- Lake Forest Yacht Club Beach in Jefferson Township (B6)
- Byram Bay Community Club in the Borough of Hopatcong (B7)
- Witten Park in Byram Bay (B8)
- Northwest Shoreline of Crescent Cove (B9)

A figure with the sampling locations is provided at the end of the memo.



Results

The results of the sampling effort are listed in the following tables (Tables 1 through 5).

Table 1: Cyanotoxin Data

Station	Microcystins	Anatoxin-A
B1	Negative	Negative
B2	Negative	Negative
B3	Negative	Negative
B4	Negative	Negative
B5	Negative	Negative
B6	Negative	Negative
B7	Negative	Negative
B8	Negative	Negative
B9	Negative	Negative

Table 2: In-situ Data

Cyanotoxin Monitoring <i>In-Situ</i> Data 2025.08.19							
Station	Depth (meters)		Temperature	Specific Conductance	Dissolved Oxygen		pH
	Secchi	Total	°C	µS/cm	mg/L	% Sat.	S.U.
B1	0.3+	0.3	24.66	469.4	8.62	103.8	8.16
B2	0.4+	0.3	24.76	469.2	8.22	99.2	7.92
B3	0.3+	0.3	24.75	467.7	8.09	97.6	7.91
B4	0.3+	0.3	25.23	476.1	8.35	101.6	7.85
B5	0.3+	0.3	26.53	501.0	8.61	107.3	8.03
B6	0.3+	0.3	26.04	437.4	8.46	104.5	7.81
B7	0.3+	0.3	26.18	461.4	8.59	106.4	8.10
B8	0.3+	0.3	25.81	462.3	8.12	99.8	7.83
B9	0.3+	0.3	25.30	505.0	11.16	135.9	8.97

Table 3: Observations

Station	Observations
B1	Clear water with greenish tint, no surface accumulations of cyanobacteria, suspended particulates observed
B2	Clear water with greenish tint, no surface accumulations of cyanobacteria, suspended particulates observed
B3	Clear water with greenish tint, no surface accumulations of cyanobacteria, suspended particulates observed
B4	Brown water with moderate particulates, no surface accumulations of cyanobacteria
B5	Brown water with small quantities of fine particulates, no surface accumulations of cyanobacteria
B6	Very clear water with very slight green tint, no surface accumulations of cyanobacteria, suspended particulates observed
B7	Clear water with greenish tint, no surface accumulations of cyanobacteria, suspended particulates observed
B8	Cloudy water with green brown coloration, no surface accumulations of cyanobacteria, suspended particulates observed
B9	Clear water with greenish brown tint, no surface accumulations of cyanobacteria, suspended particulates observed

Table 4: Phycocyanin and Chlorophyll *a* Concentrations

Station	Phycocyanin	Chlorophyll <i>a</i>
	ppb	ppb
B1	35	11
B2	45	18
B3	43	22
B4	31	14
B5	24	6
B6	55	24
B7	34	8
B8	24	6
B9	26	17

Table 5: Plankton Data

Cyanobacteria Community Composition Analysis									
Sampling Location: Lake Hopatcong	Sampling Date: 8/19/25					Examination Date: 8/21/25			
Cyanophyta (Blue-Green Algae)	B1	B2	B3	B4	B5	B6	B7	B8	B9
<i>Aphanizomenon</i>	27,736	17,405	27,092	24,081	15,184	12,949	22,993	13,082	3,208
<i>Dolichospermum</i>		3,072	3,870	963	6,619	8,262	3,104	4,906	
<i>Merismopedia</i>		6,553					11,037	15,698	
<i>Microcystis</i>		3,072			1,557	4,933	4,599		
<i>Planktothrix</i>	6,164		1,935	1,926	9,733		6,323		3,208
<i>Pseudanabaena</i>	440			1,926	1,557	4,316			2,138
<i>Raphidiopsis</i>	105,660	125,932	103,532	105,955	77,868	75,225	91,973	79,308	110,126
Akinetes	528		194	1,156	234	493	460		321
Total Cyanobacteria Cells/mL	140,000	156,033	136,430	134,852	112,519	105,685	140,028	112,994	118,679
NJDEP HAB Alert Level	ADVISORY	ADVISORY	ADVISORY	ADVISORY	ADVISORY	ADVISORY	ADVISORY	ADVISORY	ADVISORY

Discussion

A total of seven cyanobacteria genera were identified in the near-shore samples. Cyanobacteria densities were elevated and exceeded 80,000 cells/mL at each station which would all fall under the “Advisory” HAB Alert Level threshold (Table 5). Note, since these data were not developed by NJDEP, they cannot be used for regulatory purposes. However, the data can be used for both educational and management purposes.

Cyanobacteria cell counts ranged from a minimum of 105,685 cells/mL at B6 to a maximum of 156,033 cells/mL at B2. *Raphidiopsis* was the dominant genera at all stations, representing at least 65% of each sample. *Raphidiopsis* is a sub-tropical species of cyanobacteria that has been appearing in Lake Hopatcong in increasing numbers in recent years. It should be noted that *Raphidiopsis* are extremely small in size.

Phycocyanin concentrations were elevated at all stations, ranging from 24 ppb at B5 and B8 to 55 ppb at B6. Chlorophyll *a* densities were lower than phycocyanin but still moderately elevated, ranging from 6 ppb at B5 and B8 to 24 ppb at B6.

Cyanotoxin concentrations were non-detectable at all stations (Table 1). Thus, all stations had microcystins and anatoxin-a concentrations below the New Jersey Health Advisory Guidance levels for recreational waterbodies. For reference, these thresholds are 2.0 ppb and 15.0 ppb for microcystins and anatoxin-a, respectively. Please note that while microcystins and anatoxin-a are typically the two most common groups of cyanotoxins found in freshwater systems, they are only two groups. Other cyanotoxins that NJDEP has recommended thresholds for include cylindrospermopsin and saxitoxin. However, these other cyanotoxins tend to be rare in New Jersey lakes and reservoirs.

Although cyanobacteria densities were elevated and higher than the July concentrations at all stations except for B4 and B8, phycocyanin concentrations were lower at all stations besides B6. This is likely because the samples collected in August were dominated by *Raphidiopsis* rather than *Aphanizomenon* and *Dolichospermum*, as they were in July. *Raphidiopsis* have extremely small cells and very fine filaments, resulting in much less biomass than *Aphanizomenon* and *Dolichospermum*. All of the akinetes observed in the samples were present on *Raphidiopsis* filaments, allowing them to overwinter in the sediments and periodically bloom during the late summer months. Although all microcystins and anatoxin-a concentrations were non-detectable, *Raphidiopsis* is known to produce cylindrospermopsin and saxitoxin. Thus, because of the increasing prevalence of *Raphidiopsis*, it would be prudent to test for these toxins next summer.

Please feel free to contact myself or Dr. Fred Lubnow with any questions or concerns.

Sincerely,



Patrick Rose
Project Manager
Princeton Hydro, LLC

File: P:\0003\Projects\00030829\GIS\APRX\Lake Hopatcong - 2024 Cyanotoxin Monitoring.aprx Layout: Cyanotoxin Monitoring Location Map Exported: 7/24/2024. Drawn by: Hopper. Copyright Princeton Hydro, LLC.



NOTES:
1. Cyanotoxin monitoring locations are approximate.
Monitoring was conducted from July through August 2024 by Princeton Hydro.
2. 2020 orthoimagery, streams, and roads obtained from the New Jersey Geographic Information Network.

 0 1,500 3,000 Feet
Spatial Reference: NAD 1983 2011 StatePlane New Jersey FIPS 2900 Ft US

CYANOTOXIN MONITORING LOCATION MAP

LAKE HOPATCONG
MORRIS AND SUSSEX COUNTIES
NEW JERSEY



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