

## Memorandum

**To:** Ms. Colleen Lyons, Lake Hopatcong Commission

**From:** Michael Hartshorne, Princeton Hydro

**cc:** Fred Lubnow, Ph.D., Princeton Hydro

Pat Rose, Princeton Hydro

**RE:** 6 August 2021 – Cyanotoxin Testing – Lake Hopatcong

**Pages:** 8

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Princeton Hydro conducted the second of two 2021 cyanobacteria / cyanotoxin testing events at Lake Hopatcong on 6 August 2021. The data collected as part of this effort are provided below.

### *Methodology*

Princeton Hydro sampled at eight (8) stations on 6 August 2021. At each station, plankton grab samples were collected, preserved with Lugol's. The cyanobacteria community was identified to genus by Princeton Hydro and densities were quantified as cells / mLs. In addition, at each site samples were collected in glass vials and analyzed the same day for the cyanotoxins microcystins, cylindrospermopsin, and anatoxin-a 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 concentrations were also measured at each station with a Turner fluoroprobe. The locations of the sample stations are shown in the Figure attached to the end of this memo. Please note that only stations B1-B8 were sampled during this event, as B9 and B10 were supplemental stations that were sampled during previous years. Photos of the sampling stations are also attached at the end of this memo.

### *Results*

The results of the sampling effort are listed in the following Tables (Tables 1 through 4).



**Table 1: Cyanotoxin Data**

Lake Hopatcong - Cyanotoxin - 8/6/21			
Station	Microcystin (ppb)	Cylindrospermopsin (ppb)	Anatoxin (ppb)
B1	Negative	Negative	Negative
B2	Negative	Negative	Negative
B3	Negative	Negative	<0.4
B4	Negative	Negative	1.0
B5	Negative	Negative	Negative
B6	Negative	Negative	Negative
B7	Negative	Negative	Negative
B8	Negative	Negative	Negative

**Table 2: In-situ Data**

Lake Hopatcong - In-Situ Data 8/6/21							
Station	Secchi	Temperature	Specific Conductance	Dissolved Oxygen		pH	Notes
	(m)	(°C)	(mS/cm)	(mg/L)	(% Sat.)	(S.U.)	
B1	1.0	24.49	0.354	9.50	117.0	8.25	Greenish, some particulates, Eurasian watermilfoil (EWM), naiad sp., elodea and <i>Vallisneria</i>
B2	1.2	24.53	0.421	9.21	113.1	8.36	Clear, green tint, some EWM, <i>Vallisneria</i> , naiad sp., nitella
B3	0.5	25.11	0.874	10.40	129.3	8.46	Dense EWM and mat algae present, Green
B4	0.5	24.30	0.966	10.76	131.4	8.38	Greenish brown, turbid. Dense particulates, EWM present.
B5	1.7	25.23	0.420	8.44	105.0	7.87	Clear, green tint, moderate particulates, Coontail, EWM, naiad and <i>Vallisneria</i> noted.
B6/Outlet	0.8	24.39	0.426	8.60	105.4	7.91	Green brown hue, Moderate particulates
B7	-	24.63	0.425	8.56	105.5	7.90	Clear
B8	2.0	25.17	0.421	8.49	105.5	7.87	Clear, slight green tint

Table 3: Phycocyanin Concentrations

Lake Hopatcong - Phycocyanin - 8/6/21	
Station	Phycocyanin (ppb)
B1	7
B2	7
B3	39
B4	32
B5	6
B6	13
B7	11
B8	5

Table 4: Plankton Data

Cyanobacteria Community Composition Analysis								
Sampling Location: Lake Hopatcong		Sampling Date: 8/6/21			Examination Date: 8/16/21			
Phytoplankton								
Cyanophyta (Blue-Green Algae)	B1	B2	B3	B4	B5	B6	B7	B8
<i>Aphanizomenon</i>	11,950	894	154,757	141,656		7,776	8,233	
<i>Dolichospermum</i>		7,379	11,240	2,088	13,703	2,516	12,509	4,139
<i>Merismopedia</i>	9,686							
<i>Pseudanabaena</i>	5,157	1,677			8,564	12,007	1,069	1,150
<i>Chroococcus</i>	755				428			
<i>Microcystis</i>			1,645					
<i>Raphidiopsis</i>	126			232		343		
<i>Cylindrospermopsis</i>				116				
<i>Oscillatoria</i>								11,497
Sites:	B1	B2	B3	B4	B5	B6	B7	B8
Total Cyanobacteria Cells/mL	27,674	9,950	167,642	144,092	22,695	22,642	21,811	16,786

**Summary:**

Microcystins were negative at all eight stations, indicating that concentrations were absent or well below the detection limit, < 1 ppb, for these tests (Table 1). The NJDEP draft recreational health advisory set up for microcystins is 3 ppb. Thus, all eight stations had concentrations below this threshold of concern.

Similar to the microcystins, cylindrospermopsin values were negative at all eight stations, meaning concentrations were well below 0.5 ppb or absent from the sample (Table 1). Thus, measurements of cylindrospermopsin were below the NJDEP draft recreational health advisory of 8 ppb.

Anatoxin-a values were < 0.4 ppb at B3 (along the western shoreline of Crescent Cove), 1.0 ppb at B4 (along Crescent Cove Beach Club), and negative at the other six (6) stations (Table 1). Since the NJDEP draft recreational health advisory for anatoxin-a is 27 ppb, there was no concern for all eight stations, relative to anatoxin-a on the day of sampling.

Near-shore dissolved oxygen concentrations were supersaturated (> 100%), indicating high rates of photosynthesis by both algae and aquatic plants (Table 2). Phycocyanin, a pigment almost exclusively produced by cyanobacteria, were measured *in-situ* at all eight sampling stations as well (Table 2). The highest phycocyanin readings were found in the two Crescent Cove sampling stations, B3 and B4 (Table 3).

A total of nine (9) cyanobacteria genera were identified in the near-shore samples. Cyanobacteria densities were variable throughout the lake with six (6) stations having cyanobacteria cell counts that exceeded 20,000 cells/mL (Table 4). Stations B1, B5, B6, and B7 would fall under the “Watch” HAB Alert Level while stations B3 and B4 would be classified under any HAB “Alert” Tier. Stations B2 and B8 had cyanobacteria cell densities less than 20,000 cells/mL. Cyanobacteria cell counts ranged from a minimum of 9,950 cells/mL at B2 to a maximum of 167,642 cells/mL at B3. The dominant genus varied by station and included *Aphanizomenon*, *Dolichospermum*, *Pseudanabaena*, and *Oscillatoria*. The dominant genus at the two Advisory level stations was *Aphanizomenon*. Phycocyanin concentrations were relatively low to moderate with a maximum concentration of 39 ppb at B3, which correlates well with the cyanobacteria cell counts.

Observational data collected at the near shore stations showed some greenish hues and particulates noted at the majority of stations.

Thank you for your review of this summary report. Please feel free to contact me or Dr. Fred Lubnow with any questions or concerns.



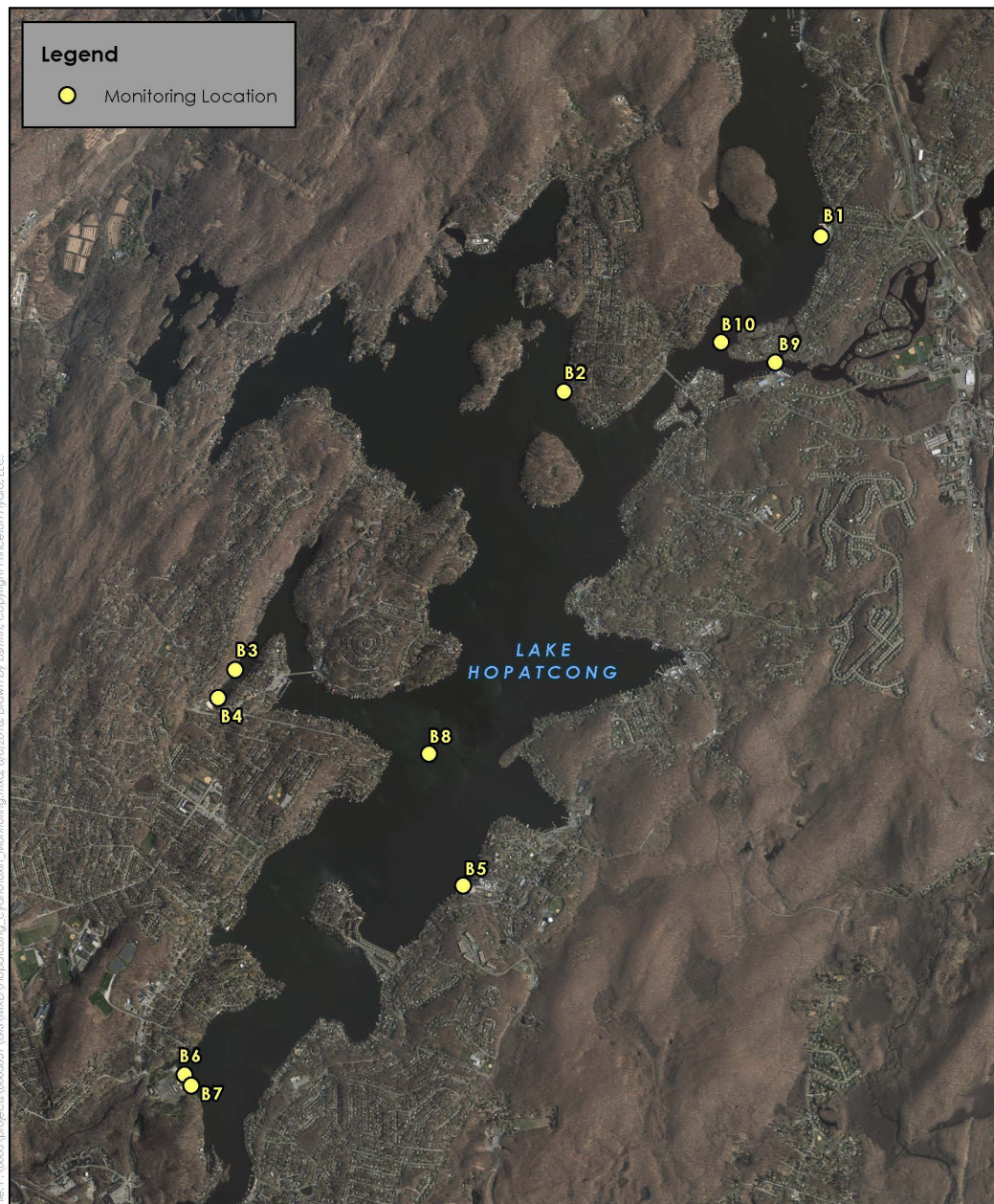
Sincerely,

A handwritten signature in black ink that reads "Michael Hartshorne". The signature is fluid and cursive, with a long horizontal stroke at the end.

Michael P. Hartshorne  
Senior Project Manager – Aquatics, Senior Aquatic Ecologist  
Princeton Hydro, LLC



## Site Location Map



NOTES:  
1. Monitoring locations are approximate.  
2. 2015 orthomage obtained from NJ Office of Information Technology (NJOTI), Office of Geographic Information Systems (OGIS).

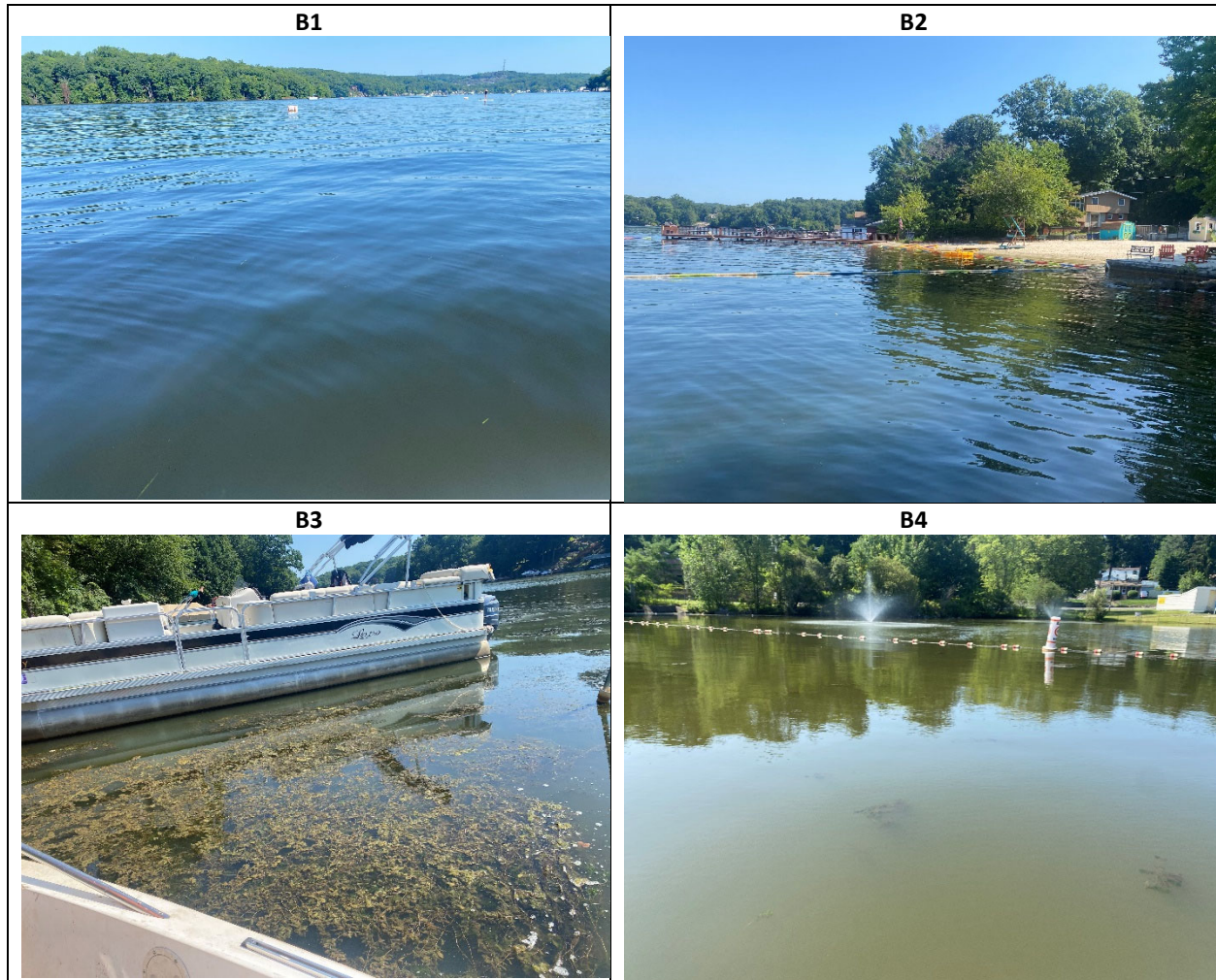
0 2,000 4,000 Feet  
Map Projection: NAD 1983 StatePlane New Jersey FIPS 2900 Feet

## CYANOTOXIN MONITORING LOCATION MAP

LAKE HOPATCONG  
MORRIS AND SUSSEX COUNTIES  
NEW JERSEY



Photographs of Near-Shore Sampling Sites



B5



B6



B7



B8

