

Memorandum

To: Ms. Colleen Conover, Lake Hopatcong Commission

From: Patrick Rose, Princeton Hydro

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

RE: 20 July 2023 – Cyanotoxin Testing – Lake Hopatcong

Pages: Six

Princeton Hydro conducted the first of two 2023 cyanobacteria / cyanotoxin testing events at Lake Hopatcong on 20 July 2023. The data collected as part of this effort are provided below.

Methodology

Princeton Hydro sampled at eight stations on 20 July 2023. 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 locations of the sample stations are shown in the figure attached to the end of this memo. Please note that from 2018 – 2022 B-3 was located along the western shoreline of Crescent Cove and B-8 was the mid-lake sampling station (ST-2). However, with the emphasis now on shoreline sites of direct water contact and shallow beach areas, B-3 is located off the shoreline of Witten Park in Byram Bay and B-8 is located in the swim area of Shore Hills Country Club in Landing Channel. An updated figure will be provided as an addendum to this memo. A figure with the original 8 sampling stations is provided with this memo; the only stations that are different are B3 and B8.

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	1.0 ppb	0.7 ppb
B5	Negative	Negative
B6	Negative	Negative
B7	Negative	Negative
B8	Negative	Negative

Table 2: In-situ Data

<i>In-Situ Data 7/20/23</i>							
Station	Depth (meters)		Temperature	Specific Conductance	Dissolved Oxygen		pH
	Secchi	Total	°C	mS/cm	mg/L	% Sat.	S.U.
B1	0.5+	0.5	27.83	0.369	9.55	125.4	8.33
B2	0.3+	0.3	27.58	0.339	8.48	110.8	8.03
B3	0.3+	0.3	27.59	0.418	9.43	123.2	8.57
B4	0.5	1.0	26.62	0.710	11.80	151.7	8.70
B5	0.3+	0.3	27.28	0.477	9.54	124.1	8.64
B6	0.3+	0.3	26.72	0.443	8.79	113.0	8.21
B7	0.3+	0.3	26.69	0.441	8.45	108.8	8.02
B8	0.3+	0.3	28.61	0.450	8.63	114.5	8.02

Table 3: Observations

Station	Observations
B1	Clear water, brown hue
B2	Slight brown hue, floating plant material
B3	Clear water, brown hue, floating plant material
B4	Green surface scum dense along beach, slightly lighter scums in waist deep water, dense particulates
B5	Slightly cloudy, slight brownish-green tint
B6	Fine particulates noted, brown/yellow hue, floating plant material
B7	Fine particulates noted, brown/yellow hue, floating plant material
B8	Brown hue, light surface scum among floating plants, moderate particulates

Table 4: Phycocyanin and Chlorophyll *a* Concentrations

Station	Phycocyanin	Chlorophyll <i>a</i>
	ppb	ppb
B1	27	19
B2	25	12
B3	35	10
B4	147	21
B5	27	10
B6	34	14
B7	34	13
B8	111	18

Table 5: Plankton Data

Cyanobacteria Community Composition Analysis								
Sampling Location: Lake Hopatcong	Sampling Date: 7/20/23				Examination Date: 7/21/23			
Cyanophyta (Blue-Green Algae)	B1	B2	B3	B4	B5	B6	B7	B8
<i>Aphanizomenon</i>	485	15,652	24,264	20,964	22,664	37,736	30,417	84,048
<i>Chroococcus</i>	194	429	78		302			
<i>Coelosphaerium</i>			11,259	265,549	11,332	26,609	31,561	121,069
<i>Dolichospermum</i>	6,794	9,863	9,900	142,558	12,616	16,449	11,664	21,512
<i>Merismopedia</i>						6,193		
<i>Microcystis</i>	10,676							
<i>Planktothrix</i>	0							8,005
<i>Pseudanabaena</i>	728	1,715	1,359		3,777		915	
<i>Woronichinia</i>								78,045
Total Cyanobacteria Cells/mL	18,878	27,659	46,859	429,071	50,692	86,986	74,557	312,679

Results

A total of nine cyanobacteria genera were identified in the near-shore samples. Cyanobacteria densities were variable throughout the lake, with three stations exceeding 80,000 cells/mL which would all fall under the “Advisory” HAB Alert Level; Stations B4, B6, and B8 all exceeded this threshold. Note, since these data were not developed by NJDEP, they can not be used for regulatory purposes. However, the data can be used for both educational and management purposes.

Stations B4 and B8, located at Crescent Cove Beach Club and Shore Hills Country Club, had significant cyanobacteria blooms during the sampling. Cyanobacteria cell counts ranged from a minimum of 18,878 cells/mL at B1 to a maximum of 429,071 cells/mL at B4. The dominant genus varied by station and included *Microcystis*, *Aphanizomenon*, and *Coelosphaerium*.

Phycocyanin concentrations were extremely elevated at B4 and B8, with respective concentrations of 147 and 111 ppb (Table 4). Outside of these two stations, phycocyanin readings varied from 25 ppb at B2 to 35 ppb at

B3. Based on these results, cyanobacteria densities are moderate around most of the lake, with a few localized blooms in the two shallow, cove areas of Crescent Cove and Landing Channel.

Microcystins and anatoxin-A were negative at all stations besides B4, indicating that concentrations at these stations were absent or well below the detection limit for these tests. Microcystin and anatoxin-a concentrations at B4 were 1.0 ppb and 0.7 ppb, respectively. Both of these toxins are below the New Jersey Health Advisory Guidance levels. 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 is typically the two most common group 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.

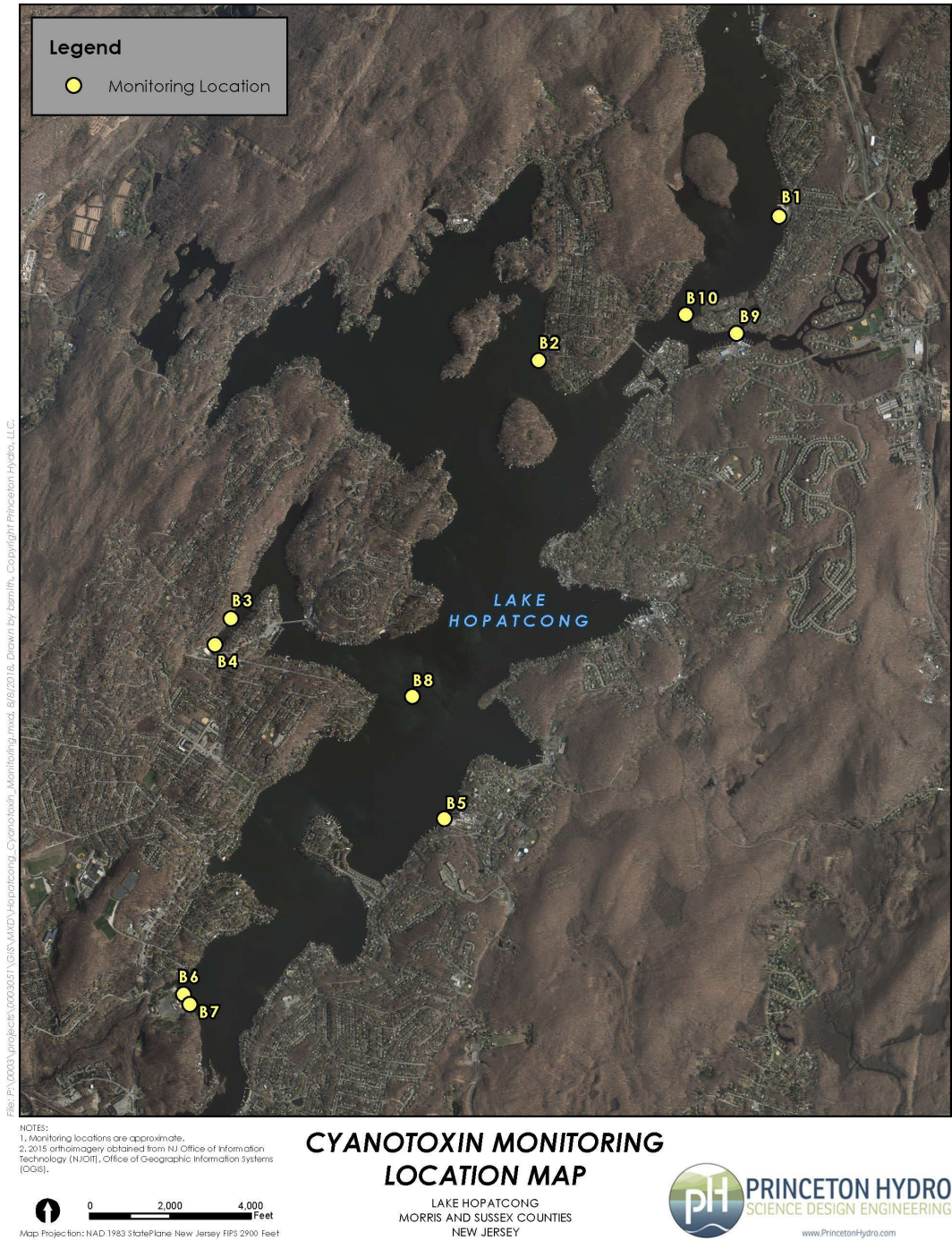
Photos of all stations can be found at the end of this document. Overall, clarity at stations outside of Crescent Cove was good and visual conditions were normal for this period of the year.

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

Sincerely,

Patrick Rose
Project Manager
Princeton Hydro, LLC

Site Location Map



Photographs of Near-Shore Sampling Sites

B1



B2



B3



B4



B5



B6



B7



B8

