

## Memorandum

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

**From:** Katie Walston, Princeton Hydro

**cc:** Lake Hopatcong Foundation

NJDEP

Fred Lubnow, Ph.D., Princeton Hydro

Jack Szczepanski, Ph.D., Princeton Hydro

**RE:** 2 July 2019 – Cyanotoxin Testing Sampling Event – Lake Hopatcong

**Pages:** Seven

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Princeton Hydro conducted the first of two cyanobacteria / cyanotoxin testing events at Lake Hopatcong on 2 July 2019. While this sampling event was originally scheduled to be conducted later in July, it was pushed up to the first week in July in order to obtain some data on the existing cyanobacterial algal blooms experienced in Lake Hopatcong prior to the 4<sup>th</sup> of July Holiday weekend. The data collected as part of this effort are provided below.

### *Methodology*

Princeton Hydro sampled at eight (8) stations on 2 July 2019. At each station, plankton grab samples were collected, preserved with Lugol's and the plankton community 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 microcystin, 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 addition, *in-situ* monitoring at each station was conducted utilizing a Hach MS5 water quality meter which was calibrated prior to use; Princeton Hydro is State certified in its use of field meters (#10006). The locations of the sample stations are shown in the figure included with this memo. Please note that only stations B1-B8 were sampled during this event, as B9 and B10 were supplemental sites utilized during the previous year. In addition, anatoxin-a was added to the sampling program. Photos of the sampling stations are also included with this memo.

## Results

The results of the sampling effort are listed in the following tables (Tables 1 through 3).

**Table 1: Cyanotoxin Data**

Lake Hopatcong Cyanotoxin Results 7/2/19			
Station	Microcystin	Cylindrospermopsin	Anatoxin-a
B1	Negative	Negative	Negative
B2	Negative	Negative	Negative
B3	Negative	Negative	Invalid
B4	Negative	Negative	Invalid
B5	Negative	Negative	Negative
B6	Negative	Negative	Negative
B7	Negative	Negative	Negative
B8	Negative	Negative	Negative
NJDEP Recreational Health Advisory	3 ppb	8 ppb	27 ppb

**Table 2: In-situ Data**

Lake Hopatcong In-situ 7/2/19							
Station	Secchi	Temperature	Specific Conductance	Dissolved Oxygen		pH	Notes
		°C	mS/cm	mg/L	% Sat.	units	
B1	1.0	26.25	0.324	7.68	98.5	8.12	Water brownish-green by dock, water relatively clear along beach shore, floating Eurasian watermilfoil (EWM) on shore
B2	0.4	26.21	0.377	8.29	106.3	7.97	Water clear at beach with green tint, Secchi bottomed out, floating EWM and broadleaf pondweed
B3	0.6	25.58	0.823	7.75	98.3	7.75	Dense mat algae and EWM floating at station, Secchi bottomed out
B4	1.0	25.67	0.888	10.59	134.5	8.46	Beach clear, slightly brown/greener in deeper waters, Secchi bottomed out, some floating EWM
B5	1.5	26.64	0.448	8.19	105.8	8.37	Beach clear, deeper water greener, floating EWM and coontail
B6	0.3	25.89	0.432	8.31	105.9	7.99	Clear, Secchi bottomed out
B7	0.3	26.18	0.426	8.36	107.2	8.13	Clear, Secchi bottomed out
B8	1.7	24.89	0.416	9.29	116.3	8.55	Water green, particulates in water column

Table 3: Plankton Data

Phytoplankton and Zooplankton Community Composition Analysis																									
Phytoplankton										Zooplankton															
Sampling Location: Lake Hopatcong	Examination Date: 7/3/19																								
Sampling Date: 7/2/19	B1	B2	B3	B4	B5	B6	B7	B8	B1	B2	B3	B4	B5	B6	B7	B8	B1	B2	B3	B4	B5	B6	B7	B8	
<b>Bacillariophyta (Diatoms)</b>																									
<i>Melosira</i>	893	2332	1161	211					446	1391	1316	916	200	2158	1537	1081	Cyanophyta (Blue-Green Algae)	1514	271	1268	1517				
<i>Fragilaria</i>	3814	327	851	1268			210		654	2043		2043			2027	1284	<i>Aphanizomenon</i>	893	6545	3058	18089	5756	5031	15744	
<i>Navicula</i>	81	41	39	70	40			68	81	41	271	317	359	392	140	338	<i>Anabaena</i>	5275	5318		1198	9644	270		
<i>Synedra</i>	122	116		211			65	68	41	194	70	70		65			<i>Coelosphaerium</i>	3408			6788	458	608		
<i>Tabellaria</i>	2840	614			240				162	41	774	1479	479	523	140	68	<i>Pseudonabaena</i>					3205	1188	8446	
<i>Asterionella</i>	122	39						68	568	245							<i>Alphanacapsa</i>			82	1127	1570			
									122				80	40	65	68	<b>Cryptomonads</b>								
																	<i>Cryptomonas</i>	41	82	310	2184	80	131	489	203
<b>Chrysophyta (Golden Algae)</b>																									
<i>Mallomonas</i>																	<i>Pyrrhophyta (Dinoflagellates)</i>								
																	<i>Gymnodium</i>	41							
<b>Sites:</b>																									
<b>Total Cells/ml</b>	20128	24373	12619	12678	33503	19947	33476	32571																	
<b>Sample Volume (mL)</b>																									

Phytoplankton Key: Bloom (B), Common (C), Present (P), and Rare (R)

Comments:

Overall, the plankton communities were generally diverse with a mixture of diatoms, cryptomonads, greens and blue-greens (cyanobacteria). A total of six genera of blue-green algae were identified in the near-shore samples. Total cyanobacteria cell counts ranged from a minimum of 2,935 cells/mL at B4 to a maximum of 29,309 cells/mL at B5 which showed larger densities of *Dolichospermum* (formally known as *Anabaena*). Similarly, B8 also had elevated densities of *Dolichospermum*. It should be noted of the eight nearshore sampling sites, only two had cyanobacterial cell densities that exceeded the NJ Health Advisory Guidance Levels of > 20,000 cells / mLs. These were B5 with 29,309 cells / mLs and B8 with 25,068 cells / mLs.

Microcystins were negative at all stations, indicating that concentrations were well below the detection limit for these tests (<1 ppb). Similarly, cylindrospermopsin values were also negative at all eight stations, meaning concentrations were well below 0.5 ppb. Anatoxin-a values were negative (<0.4 ppb) at six of the eight stations, with invalid results observed at B3 and B4. All values were below the draft recreational health advisories set by the NJDEP for each of the cyanotoxins tested (Microcystin: 3 ppb; Cylindrospermopsin: 8 ppb; Anatoxin: 27 ppb). It should be noted that two of the anatoxin-a samples registered as “invalid” on the Abraxis meter so they were visually determined to be low.

Finally, most of the near-shore sampling sites appeared to be visually acceptable, based on the photographs. Potential issues of concern may be the large amount of mat algae and associated plant growth at B3 and the greenish appearance of the water at B8, the mid-lake sampling station. Note, B8 had the second highest density of blue-green algae of the eight sites. However, overall most of the near-shore sampling sites and a generally acceptable appearance relative to recreational use.

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

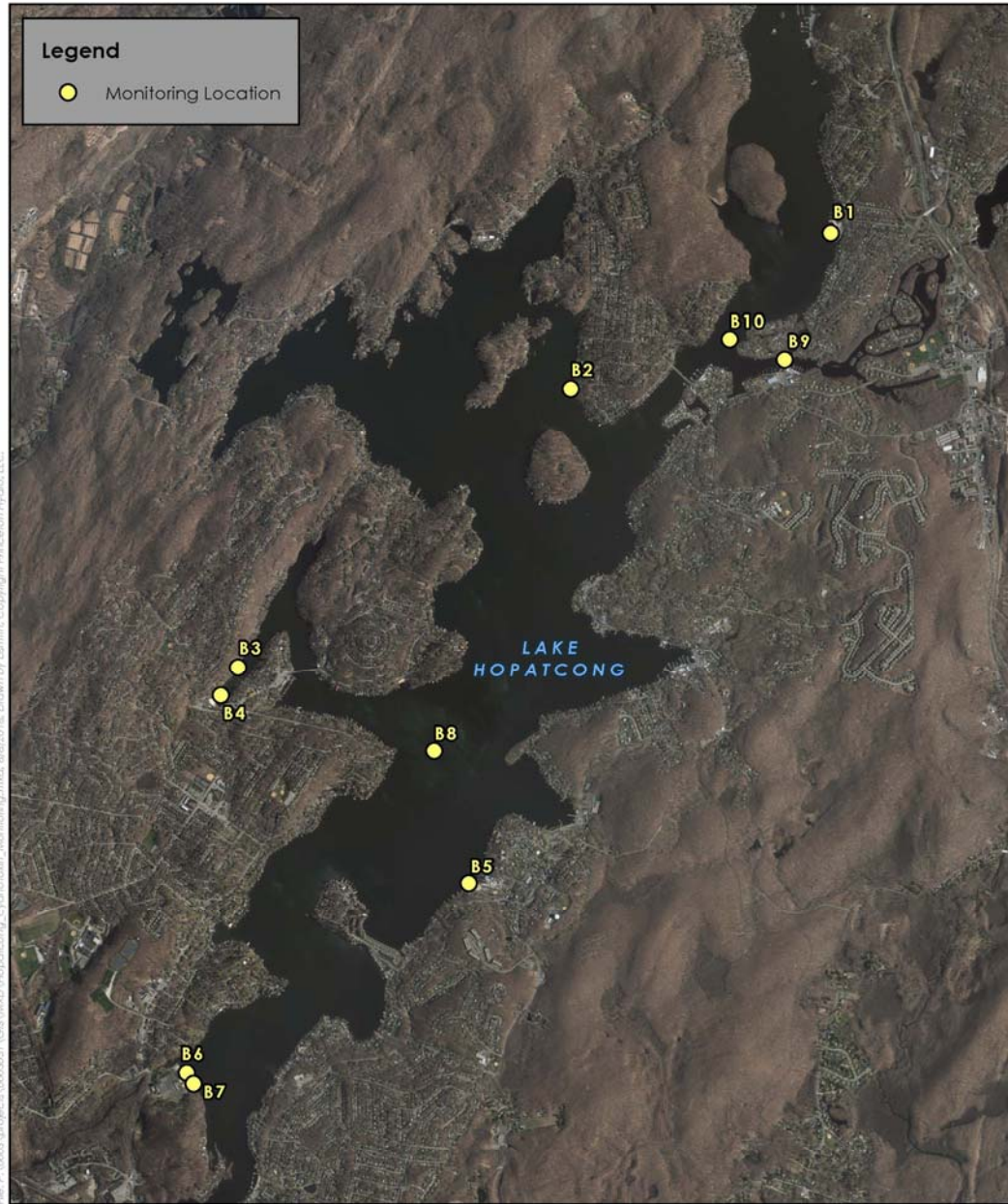
Sincerely,



Katie Walston  
Senior Scientist  
Princeton Hydro, LLC

cc: F. Lubnow, Ph.D., Princeton Hydro, LLC  
J. Szczepanski, Ph.D., Princeton Hydro, LLC

Site Location Map



File: P:\0003\unclassified\GIS\Map\Hopatcong\_Cyanotoxin\_Monitoring.mxd, 6/6/2018, Drawn by lamill, Copyright Princeton Hydro, LLC.

NOTES:  
1. Monitoring locations are approximate.  
2. 2015 orthoimagery obtained from NJ Office of Information Technology (NJ OIT), 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

