

Memorandum

To: Ms. Colleen Conover, Lake Hopatcong Commission
From: Patrick Rose, Princeton Hydro
cc: Fred Lubnow, Ph.D., Princeton Hydro
RE: 15 July 2020 – Cyanotoxin Testing – Lake Hopatcong
Pages: Five

Princeton Hydro conducted the first of two cyanobacteria / cyanotoxin testing events in 2020 at Lake Hopatcong on 15 July 2020. The data collected as part of this effort are provided below.

Methodology

Princeton Hydro sampled at eight (8) stations on 15 July 2020. 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 also 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). *In-situ* phycocyanin and chlorophyll-*a* 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 samples during the previous year.

Results

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

Table 1: Cyanotoxin Data

Station	Microcystin (ppb)	Cylindrospermopsin (ppb)	Anatoxin (ppb)
B1	Negative	Negative	Negative
B2	Negative	Negative	Negative
B3	Negative	Negative	Negative
B4	Negative	Negative	Negative
B5	Negative	Negative	Negative
B6	Negative	Negative	Negative
B7	Negative	Negative	Negative
B8	Negative	Negative	Negative

Table 2: *In-situ* Data

In-Stu Data 7/15/20							
Station	Secchi	Temperature	Specific Conductance	Dissolved Oxygen		pH	Notes
	(m)	°C	mS/cm	mg/L	% Sat.	S.U.	
B1	0.9	26.39	0.337	8.90	110.7	8.60	Green, particulates noted, dense Eurasian watermilfoil (EWM) on bottom, some <i>Vallisneria</i> observed
B2	1.2	26.30	0.427	7.13	88.4	7.76	Slightly green in color/clear. <i>Vallisneria</i> and <i>Elodea</i> observed on bottom
B3	0.9	26.41	0.751	9.03	111.6	8.41	Dense mat algae present, tea stained water, slight green tint, particulates and EWM noted
B4	0.9	26.21	0.775	10.36	128.5	8.70	Slight green tint with particulates observed, EWM present, patches of mat algae along swim line
B5	1.3	26.36	0.441	7.50	93.1	7.93	Slightly green, Coontail and <i>Vallisneria</i> observed
B6	-	27.42	0.453	7.50	95.0	8.19	Clear, some floating plants
B7	-	27.45	0.453	7.41	94.3	8.12	Clear, some floating plants
B8	1.4	26.22	0.440	7.76	96.1	7.98	Yellow stained, particulates

Table 3: *In-situ* Phycocyanin and Chlorophyll *a* Concentrations.

Station	Phycocyanin (ppb)	Chlorophyll <i>a</i> (ppb)
B1	24	34
B2	9	12
B3	22	27
B4	19	30
B5	11	8
B6	17	18
B7	16	15
B8	11	9

Table 3: Plankton Data

Phytoplankton and Zooplankton Community Composition Analysis																															
Sampling Location: Lake Hopatcong														Sampling Date: 7/15/20								Examination Date: 7/16/20									
Phytoplankton																															
Bacillariophyta (Diatoms)								Chlorophyta (Green Algae)								Cyanophyta (Blue-Green Algae)															
B1	B2	B3	B4	B5	B6	B7	B8	B1	B2	B3	B4	B5	B6	B7	B8	B1	B2	B3	B4	B5	B6	B7	B8								
<i>Melosira</i>			2230	5439				<i>Sphaerocystis</i>			515	4759		6328		<i>Aphanizomenon</i>	5475	3145	9005	6233		15041	34514								
<i>Fragilaria</i>	730		3431			726		<i>Pediastrum</i>		183			227		104	<i>Dolichospermum</i>	12593	13836	9949			17022	13174	9251	13093						
<i>Navicula</i>				113				<i>Chlorella</i>	913	1730	2144	3606		1245	534	647	<i>Aphanocapsa</i>	16790	12893	3087	11899	7793	45745	23840	35884						
<i>Synedra</i>	183		172	340		104	356	323	<i>Pandorina</i>	7118	2673			8614	9785	970	<i>Oscillatoria</i>	12755	3145	343		2051									
<i>Tabellaria</i>	7665	943						970	<i>Mougeotia</i>	1095	2201					1131	<i>Chroococcus</i>	17520			1586	7383	8817	16012	2586						
									<i>Scenedesmus</i>	2190	629	1029			415	712	<i>Snowella</i>	548											970		
									<i>Coenocystis</i>	6935						9073															
									<i>Quadrigula</i>		1258																				
Chrysophyta (Golden Algae)																															
<i>Mallomonas</i>			7862			104		<i>Chlamydomonas</i>	913	472	600	793	615	104	356	1131	Cryptomonads														
<i>Dinobryon</i>						104		<i>Staurastrum</i>						622		<i>Crhroomonoas</i>	1460	1101	1887	2720	410	622	534	1778							
									<i>Spondyliosium</i>	7665	629	172	907	410	830	1423	808	Pyrrhophyta (Dinoflagellates)													
									<i>Spinoclostreium</i>		157	343	680	205	104	178															
									<i>Oocystis</i>			172	453		726	534	162														
									<i>Closterium</i>			86																			
									<i>Actinastrum</i>				680																		
									<i>Selenastrum</i>				3400				Euglenophyta (Euglenoids)														
																	<i>Trachelomonas</i>	183		1029	1360	410	415		162						
																	<i>Lepocinclis</i>	183			1020		311	356							
																	<i>Euglena</i>				340			356							
Sites:	B1	B2	B3	B4	B5	B6	B7	B8	Comments:																						
Total Cells/mL	103097	52674	36194	46555	44913	95641	107814	60615																							
Total Cyanobacteria Cells/mL	65681	33019	22384	19718	34249	82777	83617	52533																							
Sample Volume (mL)									Phytoplankton Key: Bloom (B), Common (C), Present (P), and Rare (R)																						

Summary:

The plankton communities were diverse with an abundance of green algae, diatoms, and cyanobacteria. However, the overall plankton counts were generally dominated by cyanobacteria. Only station B4 had a cyanobacteria cell count under the 20,000 cells/mL threshold which triggers a “Watch” under the NJDEP HAB Alert System. Stations B2, B3, and B5 had cyanobacteria cell counts between 20,000 cells/mL – 40,000 cells/mL which classifies a “Watch” under the NJDEP Alert System. Stations B1 and B8 had cyanobacteria cell counts between 40,000 cells/mL – 80,000 cells/mL which triggers an “Alert”. Finally, stations B6 and B7 had cyanobacteria cell counts that exceeded 80,000 cells/mL and triggers an “Advisory.”

A total of six genera of cyanobacteria were identified in the near-shore samples. Total cyanobacteria cell counts ranged from a minimum of 19,718 cells/mL at B4 to a maximum of 83,617 cells/mL at B7 which was dominated by *Aphanizomenon* and *Aphanocapsa*. Phycocyanin concentrations varied by station and ranged from a minimum of 9 ppb at B2 to a maximum of 24 ppb at B1. These phycocyanin concentrations are relatively low to moderate which may be a result of the smaller-celled genera of *Aphanocapsa* and *Aphanizomenon* dominating many of the samples.

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 all eight stations. 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).

Finally, most of the near-shore sampling sites appeared to be visually acceptable with some slightly green water and particulates observed. Although cyanobacteria cell counts were elevated at some sites, visual appearances out in the field did not indicate extensive cyanobacteria blooms. Based on these results, cyanobacteria cell counts were elevated at some of the stations but all cyanotoxin tests were negative indicating no active HABs during the time of sampling.

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

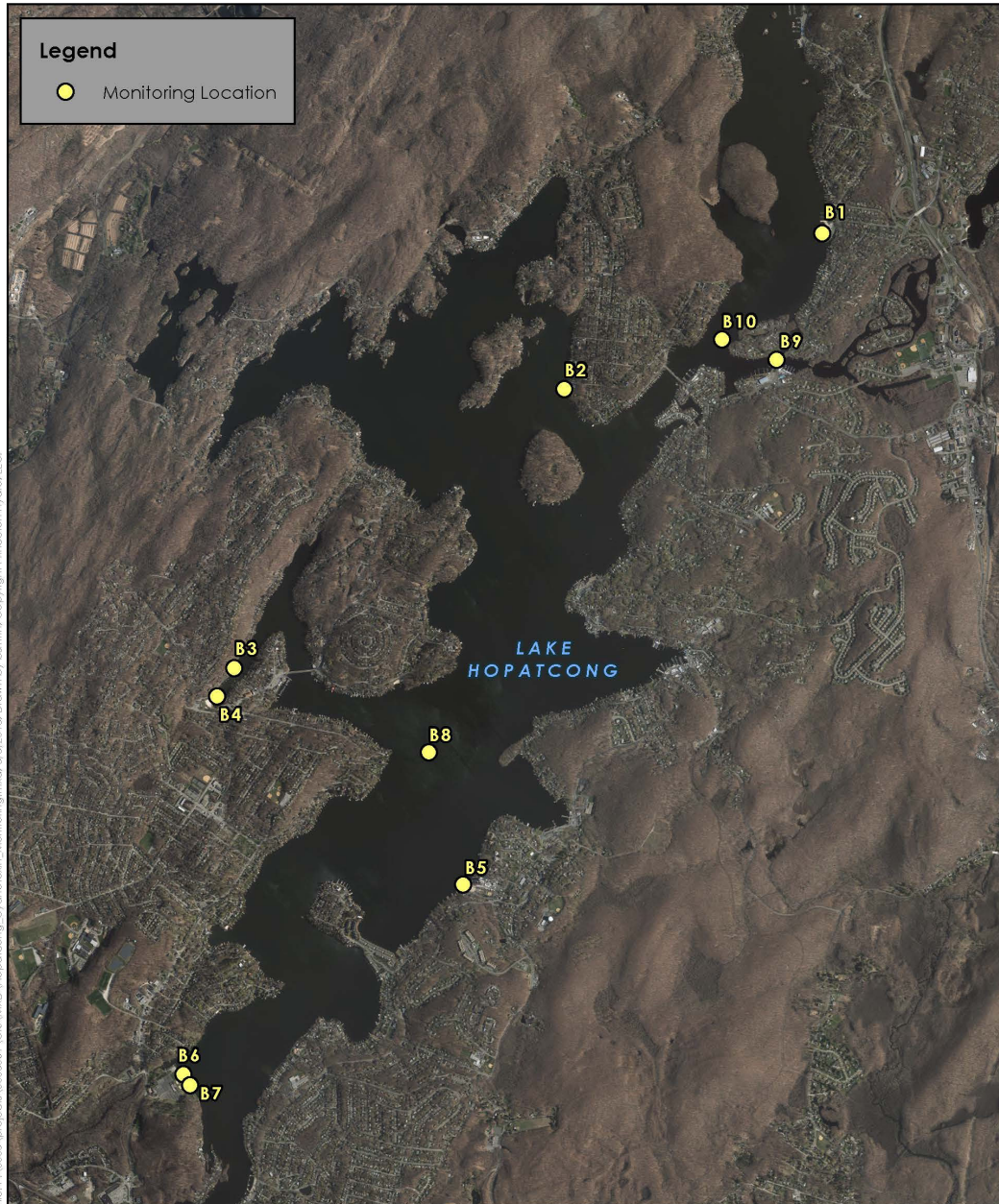
Sincerely,

Patrick Rose

Staff Scientist

Princeton Hydro, LLC

Site Location Map



File: P:\0003\projects\0003057\GIS\MXD\Hopatcong_Cyanotoxin_Monitoring.mxd, 8/6/2018, Drawn by bernif, 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

