

**Memorandum**

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

**From:** Michael Hartshorne, Princeton Hydro

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

**RE:** 24 July 2018 – Cyanotoxin Testing – Lake Hopatcong

**Pages:** 5

Princeton Hydro conducted the first of two cyanobacteria / cyanotoxin testing events at Lake Hopatcong on 24 July 2018. The data collected as part of this effort are provided below.

*Methodology*

Princeton Hydro sampled at ten stations on 24 July 2018. At each station, plankton grab samples were collected, preserved with Lugol's and the plankton community identified to genus by Princeton Hydro. In addition, at each site, samples were collected in glass vials and analyzed the same day for the cyanotoxins Microcystin and Cylindrospermopsin utilizing ELISA based test kits from Abraxis. In addition, *in-situ* monitoring at each station was conducted utilizing a Hach MS5 water quality meter which was calibrated prior to use. Please note, the meter malfunctioned in the field following data collection at B1 and B2. The locations of the sample stations are listed in the table below (Table 1). A map depicting these stations will be provided shortly.

**Table 1: Sampling Locations**

Sampling Locations - 24 July 2018		
Station	Lat	Long
B1	40.9703	-74.6092
B2	40.9604	-74.6308
B3	40.9428	-74.6584
B4	40.9410	-74.6598
B5	40.9292	-74.6392
B6	40.9171	-74.6626
B7	40.9165	-74.6620
B8	40.9375	-74.6421
B9	40.9622	-74.6130
B10	40.9635	-74.6176

*Results*

The results of the sampling effort are listed in the following tables (Tables 2 through 5).

**Table 2: Cyanotoxin Data**

Cyanotoxin Results - 24 July 2018		
Station	Microcystin	Cylindrospermopsin
B1	negative	negative
B2	negative	negative
B3	negative	negative
B4	negative	negative
B5	negative	< 0.5 ppb
B6	negative	negative
B7	negative	negative
B8	negative	negative
B9	negative	negative
B10	< 1 ppb	negative
Draft EPA Criteria for Recreation	4 ppb	8 ppb

**Table 3: *In-situ* Data**

Lake Hopatcong - 24 July 2018 - Cyanotoxin Monitoring - <i>In-situ</i> Data							
	Secchi (m)	Temp (°C)	SpC (mS/cm)	DO (mg/L)	DO% (%)	pH (units)	Notes
B1	1.0	24.71	0.435	7.71	92.9	7.65	Light brown tint to water
B2	1.3	24.78	0.476	7.63	92.0	7.60	Tapegrass and slender naiad observed
B3	1.0	Water quality meter malfunctioned.					Mat algae present, greenish water coloration
B4	0.8						Benthic algae present
B5	1.4						Clear
B6	N/A						Clear
B7	N/A						Clear but some tapegrass floaters
B8	2.0						Clear

**Table 4: Plankton Data (1 of 2)**

Phytoplankton and Zooplankton Community Composition Analysis (1 of 2)											
Sampling Location: Lake Hopatcong					Sampling Date: 7/24/18						
Phytoplankton (cells/mL)					Examination Date: 8/2/18						
	B1	B2	B3	B4	B5		B1	B2	B3	B4	B5
<b>Bacillariophyta</b>						<b>Chlorophyta</b>					
<i>Melosira</i>	3,669	2,211	684	365		<i>Golenkria</i>	175		86		
<i>Tobellaria</i>	699					<i>Actinastrum</i>	699				
<i>Fragilaria</i>	874		10,606			<i>Scenedesmus</i>	1,398		342		
<i>Synedra</i>	524		342			<i>Chlamydomonas</i>	349		402	513	213
<i>Asterionella</i>	699					<i>Chlorella</i>	1,048	2,412	257	122	213
<i>Pinnularia</i>	349		171			<i>Pediastrum</i>	2,096		513	1,461	
						<i>Eudorina</i>		804			
						<i>Oocystis</i>		402			
						<i>Gloeocystis</i>	15,199				
						<i>Haematococcus</i>			171		
						<i>Staurastrum</i>					107
						<b>Eustigmatophyceans</b>					
						<i>Chlorobotrys</i>			86		
						<b>Cryptomonads</b>					
<b>Chrysoophyta</b>						<i>Cryptomonas</i>	524	804	6,158	852	107
						<b>Pyrrhophyta</b>					
<b>Sites:</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>Comments:</b>					
<b>Total Phytoplankton (cells/mL)</b>	221,698	41,607	26,345	3,287	30,145						

Table 5: Plankton Data (2 of 2)

Phytoplankton and Zooplankton Community Composition Analysis (2 of 2)																		
Sampling Location: Lake Hopatcong					Sampling Date: 7/24/18					Examination Date: 8/2/18								
Phytoplankton (cells/ml)																		
	B6	B7	B8	B9	B10		B6	B7	B8	B9	B10		B6	B7	B8	B9	B10	
<b>Bacillariophyta</b>						<b>Chlorophyta</b>							<b>Cyanobacteria</b>					
<i>Melosira</i>	1,392	740			5,113	<i>Golenkinia</i>	278				128	<i>Aphanizomenon</i>						16,107
<i>Tabeellaria</i>	557	463			511	<i>Sphaerocystis</i>	2,227	802				<i>Anabaena</i>	27,838	4,597	4,943			34,259
<i>Fragilaria</i>		987				<i>Scenedesmus</i>	1,670	123				<i>Gloeoecapsa</i>	4,454					2,173
<i>Synedra</i>	139		154		256	<i>Chlamydomonas</i>		31		227		<i>Aphanocapsa</i>	62,635					104,183
<i>Asterionella</i>	1,531				383	<i>Chlorella</i>	557	185	309	113	1,534	<i>Synechococcus</i>	974		309	113		
<i>Pinularia</i>	278					<i>Pediastrum</i>	1,392	1,913			1,278	<i>Lynbya</i>		864				128
<i>Stephanodiscus</i>		31				<i>Eudorina</i>	1,670	247			2,045	<i>Raphidopsis</i>						
<i>Ceratoneis</i>		31				<i>Oocystis</i>	1,114	123	1,236		511	<i>Merismopedia</i>						2,045
<i>Navicula</i>			154			<i>Cucurbita</i>		2,314										
<i>Cyclotella</i>					128	<i>Coscinorium</i>		123										
						<i>Staurastrum</i>		123										
						<i>Coelastrum</i>	13,780	216										
						<i>Ankistrodesmus</i>		62										
						<i>Haematococcus</i>				113	128							
						<i>Microsteris</i>				113								
						<i>Staurodesmus</i>					1,023							
						<b>Euglenatophyceans</b>						<b>Euglenoids</b>						
						<i>Chlorobotrys</i>						<i>Trachelomonas</i>	139		154			128
												<i>Phacus</i>	139					
												<i>Euglena</i>	139					
<b>Chrysophyta</b>						<b>Cyptomonads</b>						<b>Pyrrhophyta</b>						
<i>Dinobryon</i>	835	1,697				<i>Cryptomonas</i>	1,949	185	618	1,928	1,023							
<i>Mallomonas</i>		123																
<b>Sites:</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>Comments:</b>												
<b>Total Phytoplankton (cells/ml)</b>	125,687	20,053	43,097	2,607	173,978													

Overall, the plankton communities were generally diverse with a mixture of diatoms, cryptomonads, greens and blue-greens. Cyanobacteria cell counts ranged from a minimum of 113 cells/mL at B9 to a maximum of 193,396 cells/mL at B1 which showed a large density of the very small celled *Aphanocapsa*. The nuisance producing *Aphanizomenon* and *Anabaena* were present at all stations with the exception of B9. These genera were particularly abundant at B1, B2, B6, B8 and B10.

Microcystis were negative at all stations with the exception of B10 which showed a concentration of  $< 1 \mu\text{g/L}$ . This value is well below the draft recreational threshold of  $4 \mu\text{g/L}$  set by the US EPA. Cylindrospermopsin was negative at all stations with the exception of a value of  $< 0.5 \mu\text{g/L}$  at B5 which is well below the draft criteria of  $8 \mu\text{g/L}$ .

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,

A handwritten signature in black ink that reads "Michael Hartshorne". The signature is written in a cursive style with a long horizontal flourish extending to the right.

Michael Hartshorne  
Senior Limnologist  
Princeton Hydro, LLC