

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 Loca	ntions - 24 J	luly 2018
Station	Lat	Long
B1	40.9703	-74.6092
B2	40.9604	-74.6308
В3	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
В9	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

Cyanoto	xin Results -	24 July 2018
Station	Microcystin	Cylindrospermopsin
B1	negative	negative
B2	negative	negative
В3	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	z - 24 July 2	2018 - Cyan	otoxin Mo	nitoring - <i>In-situ</i> Data
	Secchi	Temp	SpC	DO	DO%	рН	Notes
	(m)	(°C)	(mS/cm)	(mg/L)	(%)	(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
В3	1.0						Mat algae present, greenish water coloration
B4	0.8						Benthic algae present
B5	1.4	14/				ام	Clear
В6	N/A	VV	ater quality	meter ma	airunctione	ea.	Clear
B7	N/A						Clear but some tapegrass floaters
B8	2.0						Clear

Table 4: Plankton Data (1 of 2)

Sampling Location: Lake Hopatcong	n: Lake F	lopatcon	σœ			Sampling Date: 7/24/18 Examin	1/18						tion Date: 8/2/18	8			
Phytoplankton (cells/mL)	cells/mL)																
Bacillariophyta B1		B2	B3	B4	В5	Chlorophyta	B1	B2	B3	B 4	B5	Cyanobacteria B1		B2 I	B3 F	B4 I	В5
Melosira	3,669	2,211	684	365		Golenkinia	175		86		Ţ	Aphanizomenon	6,946	16,884	2,053		8,947
Tabellaria	699					Actinastrum	699				,	Anabaena		12,060		487	10,651
Fragilaria	874		10,606		2,663	2,663 Scendesmus	1,398		342		_	Gloeocapsa	6,464	3,618			1,811
Synedra	524		342			Chlamydomonas	349	402	513		213,	213 Aphanocapsa	135,570	2,010	4,277		5,326
Asterionella	699					Chlorella	1,048	2,412	257	122	213 /	213 Raphidiopsis					107
Pinnularia	349		171			Pediastrum	2,096		513	1,461							
						Eudorina		804									
						Oocystis		402									
						Gloeocystis	15,199										
						Haematococcus			171								
						Staurastrum					107						
																>=>=	
						Eustigmatophyceans						Euglenoids					
						Chlorobotrys			86			Trachelomonas			86		
Chrysophyta						Cryptomonads						Pyrrophyta					
					000000000000000000000000000000000000000	Cryptomonas	524	804	6,158	852	107						000000000000000000000000000000000000000
Sites:	1	2	3	4	5	Comments:											
Total Phytoplankton (cells/mL)	221,698 41,607	41,607	26,345	3,287	30,145												
			_														

Table 5: Plankton Data (2 of 2)

Note Early Part	Sampling Location: Lake Hopatcong	n: Lake F	lopatcon	ga		y copian	Sampling Date: 7/24/18 Examin	4/18		y comp		Allalys.	Examination Date: 8/2/18	te: 8/2/1	8			
Diamidon Cells/ml.																		
Introphytal Bota	Phytoplankton (c	cells/mL)																
ino 1,392 740 5,113 Golenkinio 278 4,073 4,073 4,073 orio 557 463 5113 Golenkinio 2,227 80.2 128 Aphanizonerion 2,838 4,597 orio 1,39 154 2,566 Chlamydomonas 557 183 2,27 383 Aphanizoness 4,454 4,597 orio 1,531 333 Chloring 1,572 1,913 309 113 1,534 4,6535 4,653 orio 278 31 2,566 Chlamydomonas 557 1,913 309 113 1,534 4,6635 62,635 62,635 62,635 62,635 62,635 62,635 62,635 62,635 62,635 80,4 noolisus 278 31 2,546 Chlamit 1,124 2,123 1,234 1,234 1,234 1,234 1,234 1,234 1,234 1,234 1,234 1,234 1,234 1,234 1,234 <th></th> <th></th> <th></th> <th></th> <th>В9</th> <th>B10</th> <th>Chlorophyta</th> <th>В6</th> <th></th> <th></th> <th></th> <th></th> <th>Cyanobacteria</th> <th></th> <th></th> <th>B8 I</th> <th>В9</th> <th>B10</th>					В9	B10	Chlorophyta	В6					Cyanobacteria			B8 I	В9	B10
	,	1,392	740			113	Golenkinia					128	Aphanizomenon		4,073	5,220		16,107
	Tabellaria	557	463			511	Sphaerocystis	2,227	802				Anabaena	27,838	4,597	4,943		34,259
ora 139 154 256 Oltanyadamonas 31 227 383 Aphanocapso 62.635 omelia 1.531 383 Olterilia 557 185 399 113 1.534 Synechooccus 974 omaliscus 278 31 Eudorina 1.392 1.913 30 113 1.534 Synechooccus 974 nodiscus 31 Eudorina 1.922 1.913 30 113 1.534 Synechooccus 974 nodiscus 31 Eudorina 1.670 247 2.045 Raphidiagasis 2.045 Raphidiagasis nodiscus 31 1.54 Occystis 1.114 123 1.236 511 Merismopedia elilo 1.54 Decigerio 1.114 123 2.26 31 Merismopedia elilo 1.28 1.23 2.16 31 128 31 2.21 1.02 1.28 1.23 2.16 31 1.28 31 31 31 31 32 1.02 1.	Fragilaria		987				Scendesmus	1,670	123				Gloeocapsa	4,454				2,173
nnella 1,531 383 Chlore/la 557 185 309 113 1,534 Synechococus 974 ora 278 31 Eediostrum 1,392 1,133 1,278 Lygabya 4 neiss 31 Eudorina 1,670 247 2045 Raphidopsis 1 neiss 31 Ocystis 1,114 123 1,236 511 Merismopedia neila 154 Crucigenia 1,114 123 1,236 511 Merismopedia ella 124 Crucigenia 1,114 123 1,236 511 Merismopedia ella 125 Crucigenia 1,114 123 1,236 511 Merismopedia ella 128 Crucigenia 1,114 123 1,236 511 Merismopedia ella 128 Ankistrodesmus 1,231 231 3 4 4 Alla Ankistrodesmus 13,780 216 113 128 1,023 4 Luglenoids 1,023 1,023	Synedra	139		154			Chlamydomonas		31		227		Aphanocapsa	62,635				104,183
orio 278 January Pediastrum 1,392 1,913 1,278 Lygnbyo medisus 31 Logodrino 1,679 247 2,043 Rophidopsis 2,043 Rophidopsis medis 31 Logodrino 1,174 123 1,236 511 Merismopedia lia 1,54 Coclegnia 1,214 123 1,236 511 Merismopedia lib 1,54 Cuclegnia 1,213 2,34 51 Merismopedia lib 1,54 Cuclegnia 1,23 2,34 51 Merismopedia ella 1,54 1,28 31 2,314 31 31 31 31 ella 1,54 1,28 31	Asterionella	1,531					Chlorella	557	185	309	113	1,534	Synechococcus	974		309	113	
modiscus 31 Eudorina 1,670 247 2,045 Raphidopsis nneis 31 1,54 Occystis 1,114 123 1,236 511 Merismopedia nneis 31 1,54 Occystis 1,114 2,314 511 Merismopedia nneis 1,114 123 1,236 511 Merismopedia 511 Merismopedia ella 1,114 123 1,236 511 Merismopedia 511 Merismopedia ella 1,114 123 1,236 511 Merismopedia 123 hella 1,114 1,123 1,23 1,23 1,24 hella 1,124 1,23 1,23 1,24 1,23 hella 1,124 1,13 1,28 1,23 1,23 1,24 hella 1,124 1,13 1,28 1,23 1,23 1,23 hella 1,124 1,13 1,23 1,23 1,23 1,23 hella 1,123 1,13 1,13 1,13	Pinnularia	278					Pediastrum	1,392	1,913			1,278	Lygnbya		864			
nneis 31 Oocystis 1,114 123 1,236 511 Merismopedia Illa 154 128 Cosmirum 2,314 23,14 511 Merismopedia ella 1,23 Coccessivim 1,23 Coc	Stephanodiscus		31				Eudorina	1,670	247			2,045	Raphidiopsis			******		128
	Ceratoneis		31				Oocystis	1,114	123	1,236			Merismopedia					2,045
	Navicula			154			Crucigenia		2,314							>======		
Staurastrum 123	Cyclotella						Cosmarium		123									
Coelastrum 13,780 216							Staurastrum		123									
Ankistrodesmus							Coelastrum	13,780	216									
Haematococcus							Ankistrodesmus		62									
Microsterias 113 1,023 1,023							Haematococcus				113	128						
							Micrasterias				113							
Eustigmatophyceans							Staurodesmus					1,023						
cophyta 835 1697 20053 4 5 Comments: Comments: Eustigmatophyceans Euglenoids Fuglenoids F																		
Chlorobotrys							Eustigmatophyceans						Euglenoids					
Phacus P							Chlorobotrys						Trachelomonas	139		154		128
cophyta 835 1697 Cryptomonads 1,949 185 618 1,928 1,023 monas 123 4 5 Comments:													Phacus	139				
tophyta Cryptomonads 1,949 185 618 1,928 1,023 monas 123 Comments: 1 2 3 4 5 Comments: pplankton 125,687 20053 43,097 2,607 173,978 Comments:													Euglena	139		*******		
tophyta Cryptomonads 4 Cryptomonads 1,949 185 618 1,928 1,023 monas 123 Comments: 1 2 3 4 5 Comments:																		
ryon 835 1697 Cryptomonas 1,949 185 618 1,928 1,023 monas 123 4 5 Comments:	Chrysophyta						Cryptomonads						Pyrrophyta					
123	Dinobryon	835	1697				Cryptomonas	1,949	185	618	1,928	_						
1 2 3 4 5 plankton 125.687 20.053 43.097 2.607 173.978	Mallomonas		123															
1 2 3 4 5 plankton 125.687 20.053 43.097 2.607 173.978										Quantum Control				·-				
plankton 125.687 20.053 43.097 2.607					4	5	Comments:											
125.687 20.053 43.097 2.607	Total																	
		125,687	20,053		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 μ g/L. This value is well below the draft recreational threshold of 4 μ g/L set by the US EPA. Cylindrospermopsin was negative at all stations with the exception of a value of < 0.5 μ g/L at B5 which is well below the draft criteria of 8 μ g/L.

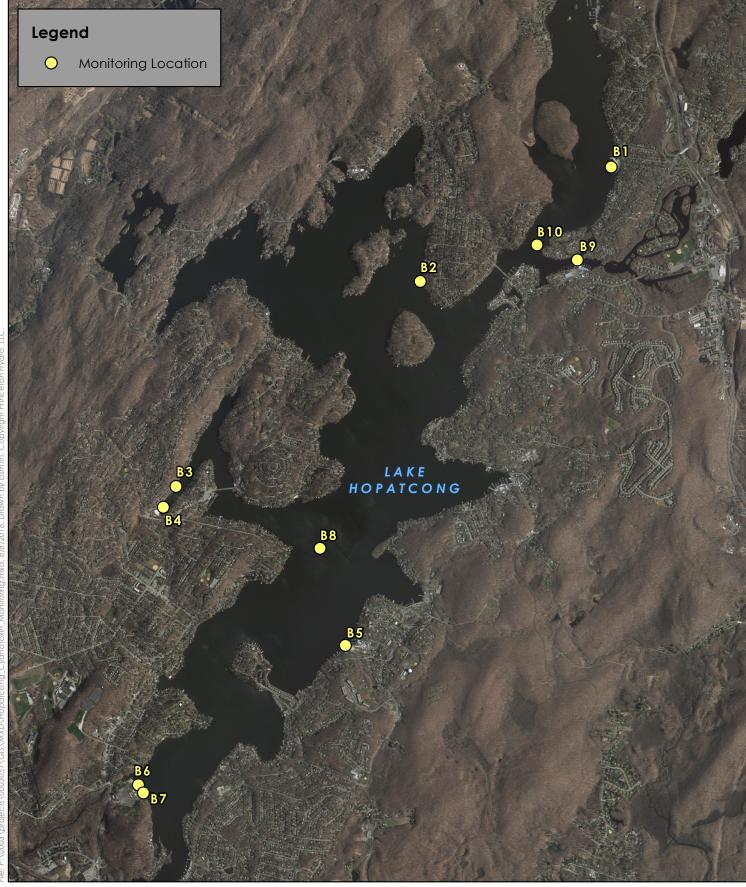
Thank you for your review of this brief summary. Please feel free to contact me or Dr. Fred Lubnow with any questions or concerns.

Sincerely,

Michael Hartshorne Senior Limnologist

Michael Starthan

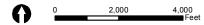
Princeton Hydro, LLC



NOTES:

1. Monitoring locations are approximate.

2. 2015 orthoimagery obtained from NJ Office of Information Technology (NJOIT), Office of Geographic Information Systems (OGIS).



CYANOTOXIN MONITORING LOCATION MAP

LAKE HOPATCONG MORRIS AND SUSSEX COUNTIES
NEW JERSEY

