



## **IFCB Algal Analysis Report - Full Assemblage**

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## ***PLEASE READ ALL INFORMATION BEFORE INTERPRETING DATA***

### **IFCB Analysis Overview:**

The Imaging FlowCytobot (IFCB, McLane Research Laboratories, Inc.) is an automated submersible imaging flow cytometer that generates high-resolution images of suspended particles in-flow. At PhycoTech, Inc. we use the IFCB as a bench instrument to provide a rapid, high-level picture of algal assemblage. The IFCB can trigger on image particulates between 2-250 µm, however, it most reliably tallies particulates 8-250 µm. The average overall algal GALD across all phytoplankton analyzed at PhycoTech (n>10K) is approximately 50 µm. IFCB captured images are classified using a random forest classifier model that we are constantly building and improving.

### **Important Analysis Information:**

1. Live samples are tallied more accurately than preserved samples.
2. Unpreserved samples received more than 24 hours after sampling will provide unreliable results.
3. 'Unclassified' images (see below) are included in 'Total Algae' counts (1 NU as 1 cell per image).
4. Picoplankton may be entrained in 'Detritus'. These cells are not counted and biovolume is not calculated.
5. Although not included in the Taste and Odor (TO) functional group, some diatoms may cause taste and odor events.
6. IFCB data is semi-quantitative. Concentration and total biovolume have not yet been fully compared to manual measurements for validation or calibration for all systems and system types. The data produced has the most utility comparing dominant taxa groups, functional class and thresholds of critical water quality indicators.
7. The processing of your sample with the IFCB produces an abundant number of images, more than a manual counter would be able to see. Due to differences in counting methods, the data in this report cannot be directly compared to a manual count.
8. IFCB images for your samples are archived at PhycoTech, Inc., and are available via a 'box' link upon request (please allow 7 business days for delivery).

### **NOTE - Aphanizomenon taxa abbreviations:**

<b><u>IFCB Taxa ID</u></b>	<b><u>Taxa included</u></b>	<b><u>Notes</u></b>
Aph. flos-aquae	Aphanizomenon flos-aquae	May produce saxitoxin.
Aph. gracile-Sphaero.-Chrys.	Aphanizomenon gracile, Sphaerospermopsis, & Chrysochlorum	May produce microcystin, anatoxin A, and/or cylindrospermopsin.

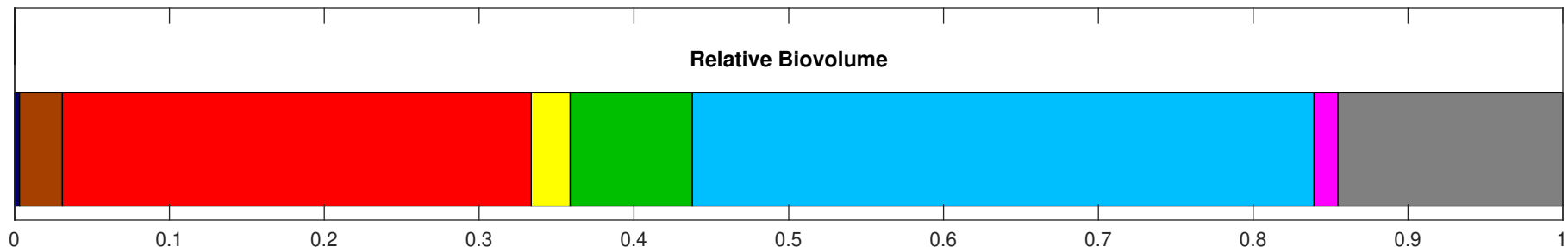
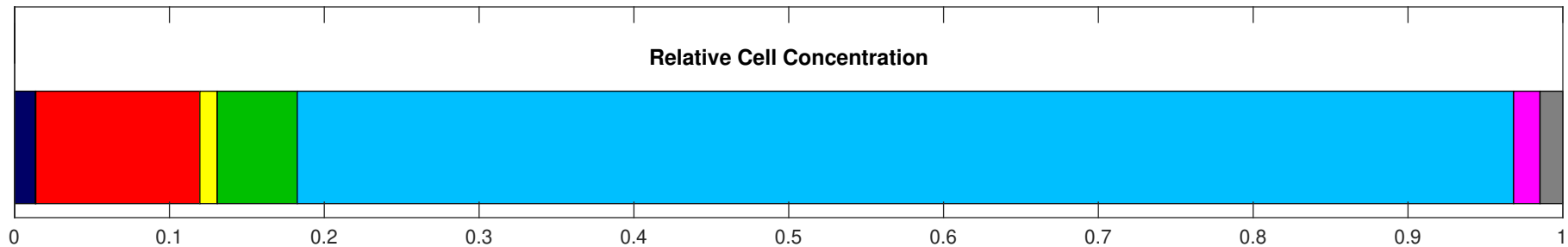
## Algal Functional Group Classifications:

	Functional Group	What does it indicate?
BG	Non-harmful Cyanobacteria	Generally benign and indicative of good water quality.
CER	Ceratium	Often present in tannic/high organic content water bodies. Active migrator in the water column. May cause significant taste and odor at high densities.
CP	Cryptophytes & Dinoflagellates	Often dominate in spring, or in tannic/high organic content water bodies. Generally indicate good water quality.
DY	Chrysophytes, Haptophytes & Diatoms	Generally indicate good water quality. If high densities, can cause significant taste and odor.
E	Euglenophytes	Often present in high organic content water bodies. Co-occurs with Cryptophytes and non-coliform bacteria. High densities can be indicative of poor water quality.
G	Chlorophytes	Generally indicate good water quality. If very high densities, indicates high nitrate concentrations.
TO	Taste and Odor Producers	Algae that often produce taste and odor issues. Diatoms that can produce taste and odor problems, but do so less often, are not included in this group.
HAB	Harmful Cyanobacteria	May produce toxins, but not always producing. Toxins are generally detectable above 5000 cells/mL. Indicative of poor water quality often with high phosphate or low TN:TP ratios.
M	Miscellaneous	All other groups, generally neutral. Includes small Chlorophytes or Cyanobacteria less than 9um in diameter.
U	Unclassified	Images that the classifier cannot confidently identify. Includes small flagellates entrained in detritus, taxa not yet included in the classifier, partial images and images with multiple taxa.

Sample ID: D20220627T130205  
Customer ID: 390  
Tracking Code: 220017-390  
Sample Info: CF1

System: Indian Hills Lake  
Site: Dam  
Station: Center of Lake  
Level: Epi

Date Sampled: 6/16/2022  
Date Received: 6/20/2022  
Date Analyzed: 6/27/2022



**Total Algal Concentration:** 8109 cells/mL  
**HAB Concentration:** 6371 cells/mL  
**HAB Relative Concentration:** 79%

**Total Biovolume:** 2846093  $\mu\text{m}^3/\text{mL}$   
**HAB Biovolume:** 1142727  $\mu\text{m}^3/\text{mL}$   
**HAB Relative Biovolume:** 40%

**! WARNING !**

HAB concentration is high - Toxin testing recommended.

**Sample ID:** D20220627T130205  
**Customer ID:** 390  
**Tracking Code:** 220017-390  
**Sample Info:** CF1

**System:** Indian Hills Lake  
**Site:** Dam  
**Station:** Center of Lake  
**Level:** Epi

**Date Sampled:** 6/16/2022  
**Date Received:** 6/20/2022  
**Date Analyzed:** 6/27/2022

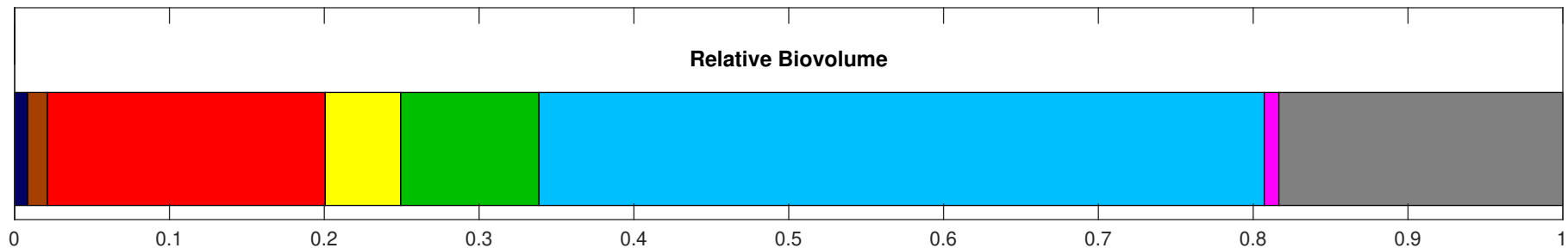
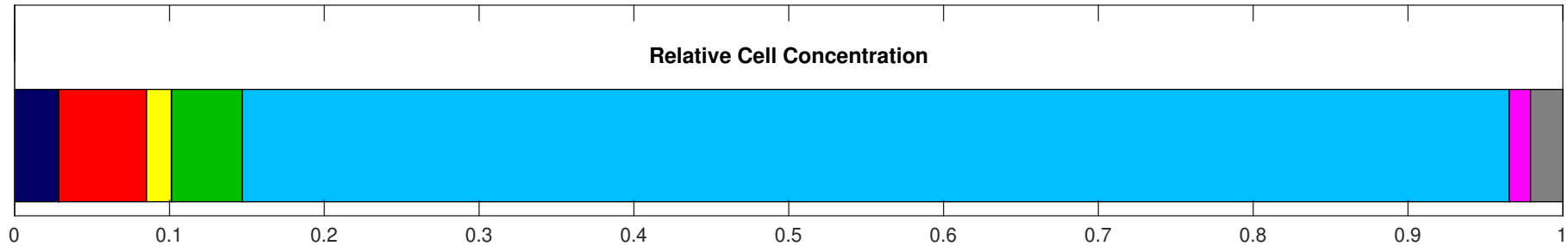
Taxa	Group	NU/mL	Cells/mL	Biovolume $\mu\text{m}^3$ /mL	Relative Biovolume %
Aphanocapsa-Aphanothece	BG	14	70	6604	0.23
Merismopedia	BG	1	38	2410	0.08
Ceratium	CER	2	2	78758	2.77
Cryptomonas	CP	536	587	720750	25.32
Peridinales	CP	4	4	21740	0.76
Rhodomonas	CP	268	268	119492	4.2
Aulacoseira	DY	4	62	31768	1.12
Centrics	DY	5	7	5957	0.21
Fragilaria	DY	2	2	2468	0.09
Mallomonas	DY	14	14	28118	0.99
Navicula-Nitzschia	DY	2	2	2771	0.1
Skeletonema	DY	1	3	557	0.02
Protozoan	EXCLUDE	27	0	0	0
Zooplankton	EXCLUDE	1	0	0	0
Chlorophytes	G	122	227	138190	4.86
Closterium	G	10	10	13459	0.47
Coelastrum	G	2	19	3477	0.12
Crucigenia-Crucigniella	G	1	12	1387	0.05
Desmodesmus-Scenedesmus	G	14	86	6951	0.24
Micractinium	G	2	14	3444	0.12
Monoraphidium	G	5	5	1553	0.05
Oocystis	G	7	21	6850	0.24
Quadrigula-Elakatothrix	G	2	10	1727	0.06
Schroederia	G	2	2	733	0.03
Staurastrum	G	8	8	38616	1.36
Tetraedon	G	4	4	6264	0.22
Tetraselmis-Pyramichlamys	G	1	1	1957	0.07
Aphanizomenon (Aph.)	HAB	765	5004	446705	15.7
Cuspidothrix	HAB	1	51	7368	0.26
Dolichospermum	HAB	27	678	227870	8.01
Microcystis	HAB	126	163	35799	1.26
Planktothrix	HAB	1	47	4861	0.17
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Sample ID: D20220627T134357  
Customer ID: 390  
Tracking Code: 220018-390  
Sample Info: CF2

System: Indian Hills Lake  
Site: Cove 1  
Station: none  
Level: Epi

Date Sampled: 6/16/2022  
Date Received: 6/20/2022  
Date Analyzed: 6/27/2022



**Total Algal Concentration:** 8364 cells/mL  
**HAB Concentration:** 6843 cells/mL  
**HAB Relative Concentration:** 82%

**Total Biovolume:** 2347064  $\mu\text{m}^3/\text{mL}$   
**HAB Biovolume:** 1099428  $\mu\text{m}^3/\text{mL}$   
**HAB Relative Biovolume:** 47%

**! WARNING !**

HAB concentration is high - Toxin testing recommended.

**Sample ID:** D20220627T134357  
**Customer ID:** 390  
**Tracking Code:** 220018-390  
**Sample Info:** CF2

**System:** Indian Hills Lake  
**Site:** Cove 1  
**Station:** none  
**Level:** Epi

**Date Sampled:** 6/16/2022  
**Date Received:** 6/20/2022  
**Date Analyzed:** 6/27/2022

Taxa	Group	NU/mL	Cells/mL	Biovolume $\mu\text{m}^3$ /mL	Relative Biovolume %
Aphanocapsa-Aphanothece	BG	32	171	17063	0.73
Chroococcus	BG	5	8	1535	0.07
Merismopedia	BG	2	58	1213	0.05
Ceratium	CER	1	1	29908	1.27
Cryptomonas	CP	250	273	339468	14.46
Rhodomonas	CP	201	201	81716	3.48
Aulacoseira	DY	5	108	52077	2.22
Centrics	DY	4	4	5269	0.22
Fragilaria	DY	2	15	45199	1.93
Haptophyta	DY	2	2	925	0.04
Mallomonas	DY	7	7	10991	0.47
Protozoan	EXCLUDE	34	0	0	0
Zooplankton	EXCLUDE	1	0	0	0
Chlorophytes	G	111	197	120527	5.14
Closterium	G	6	6	5858	0.25
Coelastrum	G	3	22	5378	0.23
Cosmarium	G	1	1	1649	0.07
Crucigenia-Crucigniella	G	1	2	848	0.04
Desmodesmus-Scenedesmus	G	12	71	7353	0.31
Micractinium	G	4	22	6978	0.3
Monoraphidium	G	5	5	1993	0.08
Oocystis	G	4	9	2822	0.12
Pediastrum	G	2	29	34925	1.49
Quadrigula-Elakatothrix	G	1	4	374	0.02
Schroederia	G	6	6	1465	0.06
Staurastrum	G	2	2	11218	0.48
Tetraedon	G	2	2	735	0.03
Tetraselmis-Pyramichlamys	G	5	5	7512	0.32
Aph. gracile-Chrys.	HAB	1	20	3096	0.13
Aphanizomenon (Aph.)	HAB	877	5494	511390	21.79
Cuspidothrix	HAB	3	108	15104	0.64
Dolichospermum	HAB	27	891	308037	13.12
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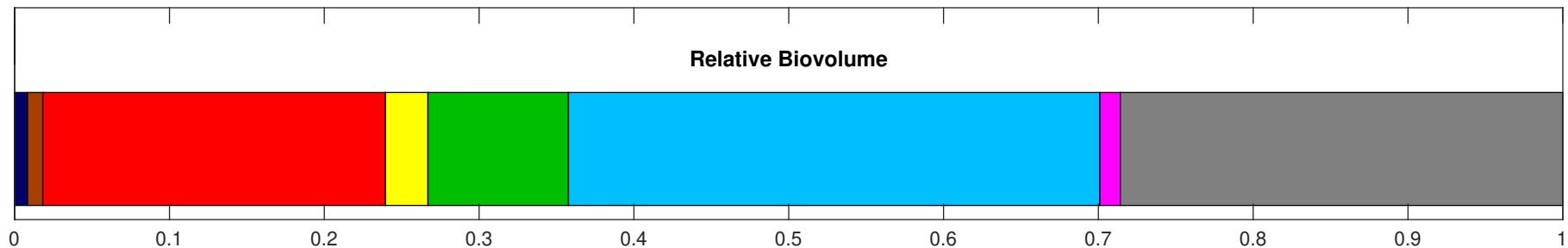
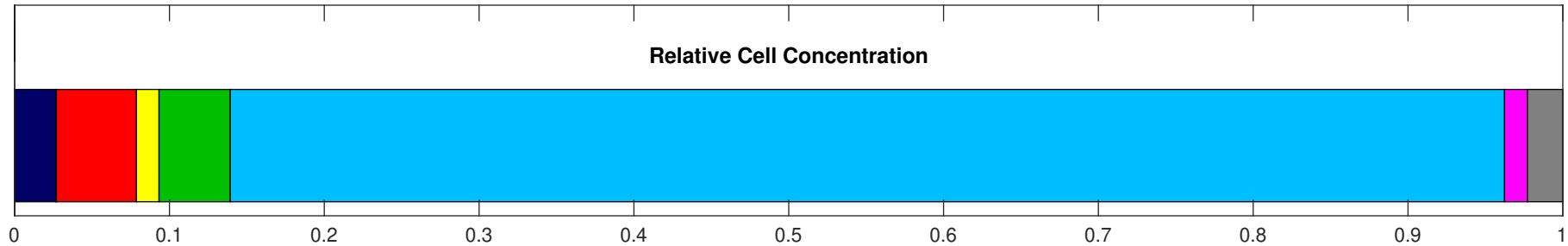




Sample ID: D20220627T141505  
Customer ID: 390  
Tracking Code: 220019-390  
Sample Info: CF3

System: Indian Hills Lake  
Site: Thom  
Station:  
Level: Epi

Date Sampled: 6/16/2022  
Date Received: 6/20/2022  
Date Analyzed: 6/27/2022



Total Algal Concentration: 8944 cells/mL  
HAB Concentration: 7362 cells/mL  
HAB Relative Concentration: 82%

Total Biovolume: 2509135  $\mu\text{m}^3/\text{mL}$   
HAB Biovolume: 861220  $\mu\text{m}^3/\text{mL}$   
HAB Relative Biovolume: 34%

**! WARNING !**

HAB concentration is high - Toxin testing recommended.

**Sample ID:** D20220627T141505  
**Customer ID:** 390  
**Tracking Code:** 220019-390  
**Sample Info:** CF3

**System:** Indian Hills Lake  
**Site:** Thom  
**Station:**  
**Level:** Epi

**Date Sampled:** 6/16/2022  
**Date Received:** 6/20/2022  
**Date Analyzed:** 6/27/2022

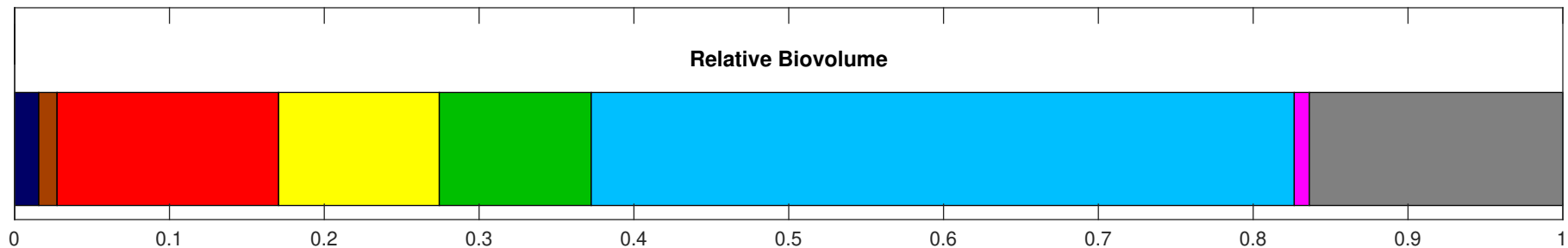
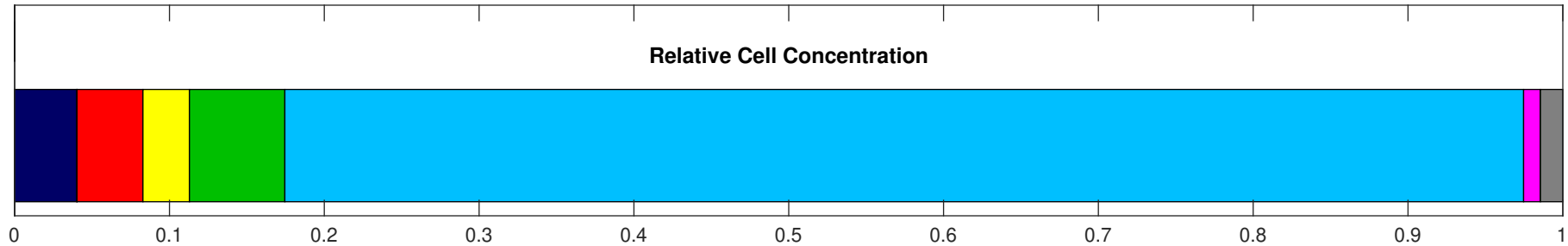
Taxa	Group	NU/mL	Cells/mL	Biovolume $\mu\text{m}^3$ /mL	Relative Biovolume %
Aphanocapsa-Aphanothece	BG	21	209	20599	0.82
Merismopedia	BG	1	31	378	0.02
Ceratium	CER	1	1	24596	0.98
Cryptomonas	CP	289	304	456022	18.17
Peridinales	CP	5	5	6463	0.26
Rhodomonas	CP	153	153	92969	3.71
Aulacoseira	DY	5	93	40090	1.6
Centrics	DY	9	9	9843	0.39
Chrysophyta	DY	1	7	1502	0.06
Fragilaria	DY	1	13	4874	0.19
Mallomonas	DY	9	9	12113	0.48
Pennate Diatoms	DY	1	1	474	0.02
Protozoan	EXCLUDE	36	0	0	0
Zooplankton	EXCLUDE	3	0	0	0
Ankistrodesmus	G	2	8	7203	0.29
Botryococcus	G	1	12	6966	0.28
Chlorophytes	G	107	248	109662	4.37
Closterium	G	7	7	8067	0.32
Coelastrum	G	3	23	8243	0.33
Cosmarium	G	1	1	1885	0.08
Desmodesmus-Scenedesmus	G	10	58	4763	0.19
Micractinium	G	3	17	7726	0.31
Monoraphidium	G	4	4	1976	0.08
Oocystis	G	1	4	1627	0.06
Pediastrum	G	1	15	36965	1.47
Schroederia	G	6	6	1998	0.08
Staurastrum	G	7	7	27399	1.09
Tetraselmis-Pyramichlamys	G	2	2	3200	0.13
Aphanizomenon (Aph.)	HAB	1039	6144	533080	21.25
Cuspidothrix	HAB	2	86	9234	0.37
Dolichospermum	HAB	26	925	248343	9.9
Microcystis	HAB	69	128	40290	1.61
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Sample ID: D20220627T144308  
Customer ID: 390  
Tracking Code: 220020-390  
Sample Info: CF4

System: Indian Hills Lake  
Site: Beach  
Station: none  
Level: Epi

Date Sampled: 6/16/2022  
Date Received: 6/20/2022  
Date Analyzed: 6/27/2022



**Total Algal Concentration:** 8280 cells/mL  
**HAB Concentration:** 6625 cells/mL  
**HAB Relative Concentration:** 80%

**Total Biovolume:** 2295875  $\mu\text{m}^3/\text{mL}$   
**HAB Biovolume:** 1042508  $\mu\text{m}^3/\text{mL}$   
**HAB Relative Biovolume:** 45%

**! WARNING !**

HAB concentration is high - Toxin testing recommended.

**Sample ID:** D20220627T144308  
**Customer ID:** 390  
**Tracking Code:** 220020-390  
**Sample Info:** CF4

**System:** Indian Hills Lake  
**Site:** Beach  
**Station:** none  
**Level:** Epi

**Date Sampled:** 6/16/2022  
**Date Received:** 6/20/2022  
**Date Analyzed:** 6/27/2022

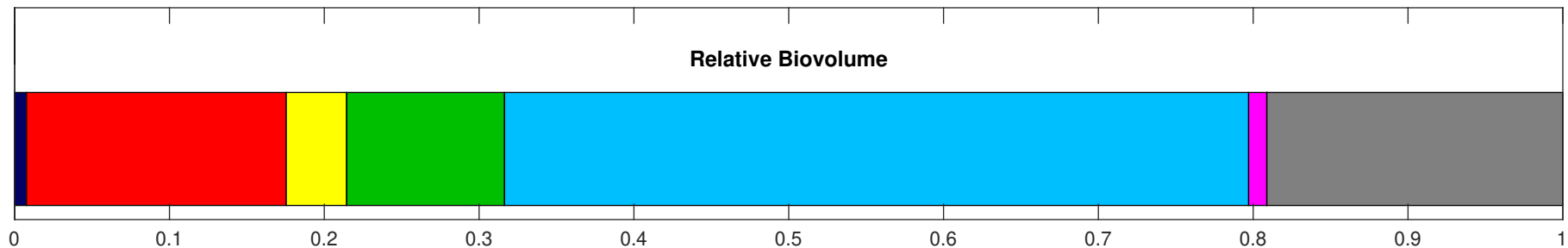
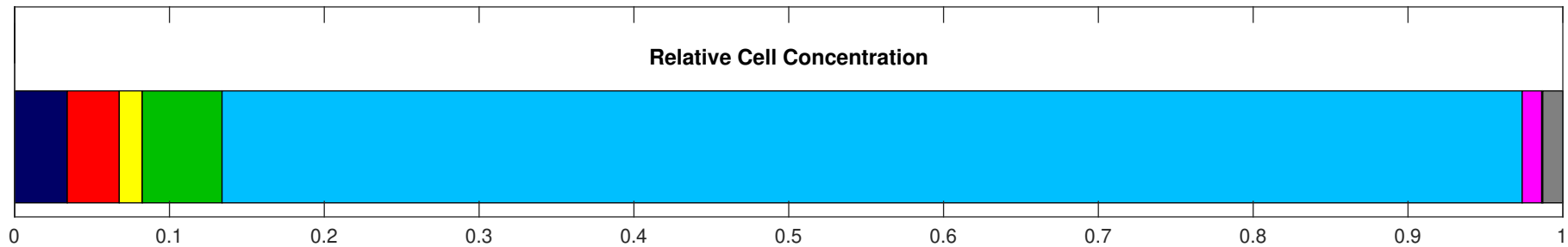
Taxa	Group	NU/mL	Cells/mL	Biovolume $\mu\text{m}^3$ /mL	Relative Biovolume %
Aphanocapsa-Aphanothece	BG	36	296	31874	1.39
Chroococcus	BG	5	10	3628	0.16
Merismopedia	BG	1	27	282	0.01
Ceratium	CER	1	1	27133	1.18
Cryptomonas	CP	182	230	273326	11.91
Peridinales	CP	1	1	1220	0.05
Rhodomonas	CP	121	121	54040	2.35
Aulacoseira	DY	8	147	72815	3.17
Centrics	DY	4	4	3968	0.17
Fragilaria	DY	7	85	148411	6.46
Haptophyta	DY	1	1	270	0.01
Mallomonas	DY	10	10	11881	0.52
Navicula-Nitzschia	DY	1	1	469	0.02
Pennate Diatoms	DY	1	1	390	0.02
Protozoan	EXCLUDE	12	0	0	0
Zooplankton	EXCLUDE	2	0	0	0
Ankistrodesmus	G	2	7	1913	0.08
Botryococcus	G	1	10	5264	0.23
Chlorophytes	G	98	275	157648	6.87
Closterium	G	13	13	14250	0.62
Coelastrum	G	3	20	4207	0.18
Cosmarium	G	2	2	2849	0.12
Crucigenia-Crucigniella	G	3	34	5272	0.23
Desmodesmus-Scenedesmus	G	14	87	11674	0.51
Micractinium	G	6	36	8424	0.37
Monoraphidium	G	8	8	2228	0.1
Oocystis	G	2	7	1625	0.07
Quadrigula-Elakatothrix	G	1	3	558	0.02
Schroederia	G	6	6	1372	0.06
Staurastrum	G	2	2	5521	0.24
Tetraselmis-Pyramichlamys	G	2	2	2554	0.11
Aphanizomenon (Aph.)	HAB	820	5215	483630	21.07
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Sample ID: D20220627T151836  
Customer ID: 390  
Tracking Code: 220021-390  
Sample Info: CF5

System: Indian Hills Lake  
Site: Cove 7  
Station:  
Level: Epi

Date Sampled: 6/16/2022  
Date Received: 6/20/2022  
Date Analyzed: 6/27/2022



Total Algal Concentration: 8387 cells/mL  
HAB Concentration: 7044 cells/mL  
HAB Relative Concentration: 84%

Total Biovolume: 1830208  $\mu\text{m}^3/\text{mL}$   
HAB Biovolume: 879608  $\mu\text{m}^3/\text{mL}$   
HAB Relative Biovolume: 48%

**! WARNING !**

HAB concentration is high - Toxin testing recommended.



**Sample ID:** D20220627T151836  
**Customer ID:** 390  
**Tracking Code:** 220021-390  
**Sample Info:** CF5

**System:** Indian Hills Lake  
**Site:** Cove 7  
**Station:**  
**Level:** Epi

**Date Sampled:** 6/16/2022  
**Date Received:** 6/20/2022  
**Date Analyzed:** 6/27/2022

Taxa	Group	NU/mL	Cells/mL	Biovolume $\mu\text{m}^3$ /mL	Relative Biovolume %
Aphanocapsa-Aphanothece	BG	11	81	9153	0.5
Chroococcus	BG	3	8	1778	0.1
Merismopedia	BG	6	196	3124	0.17
Cryptomonas	CP	179	209	270595	14.78
Peridinales	CP	1	1	4145	0.23
Rhodomonas	CP	72	72	32310	1.77
Aulacoseira	DY	7	95	42969	2.35
Centrics	DY	5	5	7065	0.39
Fragilaria	DY	1	11	5666	0.31
Gomphonema	DY	1	1	1762	0.1
Haptophyta	DY	1	1	365	0.02
Mallomonas	DY	7	7	6364	0.35
Navicula	DY	1	1	553	0.03
Navicula-Nitzschia	DY	3	3	1717	0.09
Pennate Diatoms	DY	1	1	810	0.04
Ulnaria	DY	1	1	4208	0.23
Protozoan	EXCLUDE	19	0	0	0
Zooplankton	EXCLUDE	2	0	0	0
Chlorophytes	G	115	259	117768	6.43
Closterium	G	9	9	6996	0.38
Coelastrum	G	1	7	14714	0.8
Cosmarium	G	2	2	2373	0.13
Crucigenia-Crucigniella	G	2	19	2643	0.14
Desmodesmus-Scenedesmus	G	10	58	6511	0.36
Micractinium	G	4	26	7497	0.41
Monoraphidium	G	2	2	516	0.03
Oocystis	G	7	20	7672	0.42
Pediastrum	G	1	14	6530	0.36
Schroederia	G	6	6	1808	0.1
Sphaerocystis	G	1	7	5529	0.3
Staurastrum	G	2	2	5392	0.29
Tetraedon	G	2	2	619	0.03
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