



## **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  $\mu\text{m}$ , however, it most reliably tallies particulates 8-250  $\mu\text{m}$ . The average overall algal GALD across all phytoplankton analyzed at PhycoTech ( $n > 10\text{K}$ ) is approximately 50  $\mu\text{m}$ . 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. Taste and Odor (TO) functional group taxa are not consistent toxin producers and are not included in the Total HAB Concentration.
7. 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.
8. 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.
9. 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, & Chrysosporum	May produce microcystin, anatoxin A, and/or cylindrospermopsin.

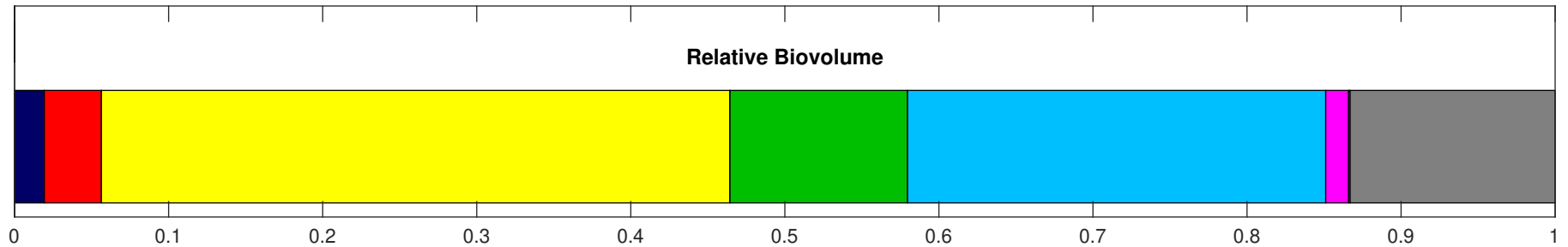
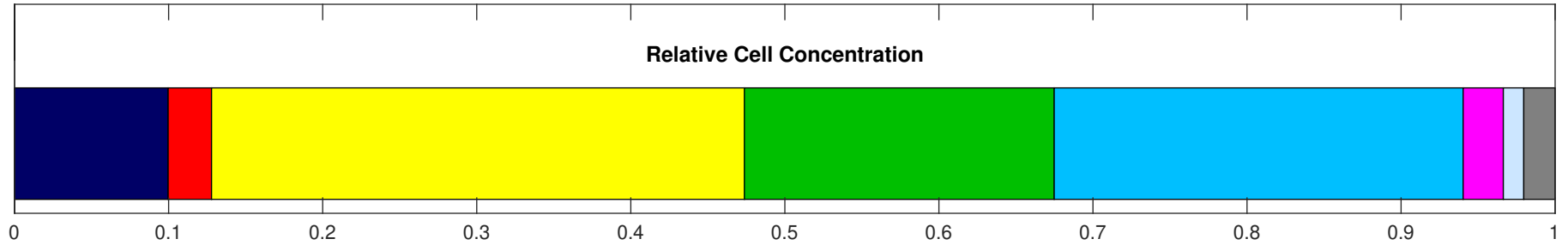
## Algal Functional Group Classifications:

	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: D20230620T143837  
Customer ID: 390  
Tracking Code: 230017-390  
Sample Info: S4

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

Date Sampled: 6/16/2023  
Date Received: 6/20/2023  
Date Analyzed: 6/20/2023



**Total Algal Concentration:** 10639 cells/mL  
**HAB Concentration:** 2824 cells/mL  
**HAB Relative Concentration:** 27%

**Total Biovolume:** 4626688  $\mu\text{m}^3/\text{mL}$   
**HAB Biovolume:** 1255899  $\mu\text{m}^3/\text{mL}$   
**HAB Relative Biovolume:** 27%

**Sample ID:** D20230620T143837  
**Customer ID:** 390  
**Tracking Code:** 230017-390  
**Sample Info:** S4

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

**Date Sampled:** 6/16/2023  
**Date Received:** 6/20/2023  
**Date Analyzed:** 6/20/2023

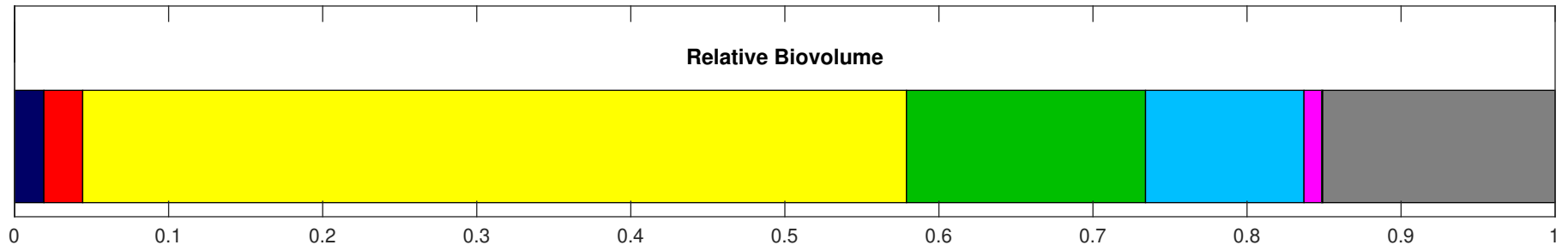
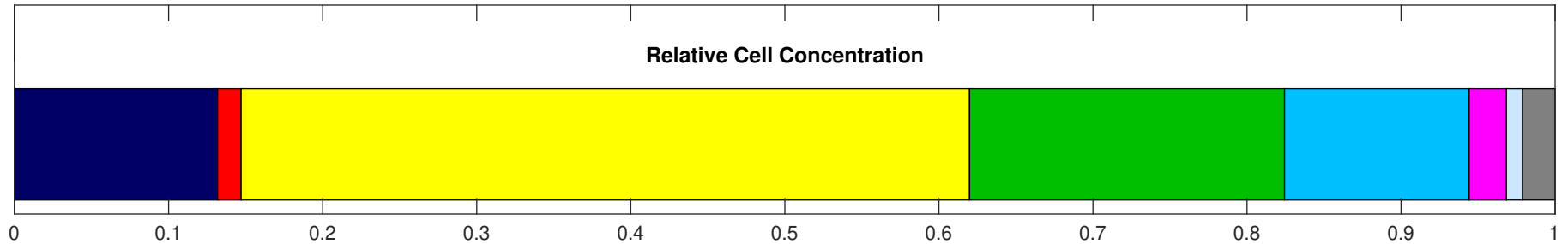
Taxa	Group	NU/mL	Cells/mL	Biovolume $\mu\text{m}^3$ /mL	Relative Biovolume %
Aphanocapsa-Aphanothece	BG	128	727	84049	1.82
Cyanogranis-Cyanocatena	BG	6	10	1130	0.02
Merismopedia	BG	10	324	4237	0.09
Cryptomonas	CP	128	128	122467	2.65
Gymnodinales	CP	2	2	2418	0.05
Rhodomonas	CP	170	170	46431	1
Asterionella	DY	79	273	227044	4.91
Aulacoseira	DY	298	2790	1191687	25.76
Centrics	DY	518	524	409534	8.85
Chaetoceros	DY	2	7	1036	0.02
Chrysophyta	DY	4	16	2179	0.05
Fragilaria	DY	47	47	43994	0.95
Navicula-Nitzschia	DY	2	2	1372	0.03
Pennate Diatoms	DY	20	20	11031	0.24
Protozoan	EXCLUDE	4	0	0	0
Zooplankton	EXCLUDE	2	0	0	0
Ankistrodesmus	G	2	8	1321	0.03
Chlorophytes	G	427	1409	315210	6.81
Coelastrum	G	12	97	16287	0.35
Crucigenia-Crucigniella	G	4	26	3021	0.07
Desmodesmus-Scenedesmus	G	32	194	12200	0.26
Micractinium	G	2	12	4397	0.1
Monoraphidium	G	10	10	14374	0.31
Oocystis	G	55	170	47887	1.04
Pediastrum	G	4	65	14541	0.31
Quadrigula-Elakatothrix	G	4	16	994	0.02
Schroederia	G	12	12	2031	0.04
Sphaerocystis	G	14	113	54819	1.18
Staurastrum	G	6	6	46173	1
Aph. gracile-Chrys.	HAB	6	119	12946	0.28
Aphanizomenon (Aph.)	HAB	121	1869	187449	4.05
Cuspidothrix	HAB	10	99	8190	0.18
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Sample ID: D20230620T150847  
Customer ID: 390  
Tracking Code: 230018-390  
Sample Info: S3

System: Indian Hills Lake  
Site: Cove 2  
Station: Center Cove  
Level: Epi

Date Sampled: 6/16/2023  
Date Received: 6/20/2023  
Date Analyzed: 6/20/2023



**Total Algal Concentration:** 12636 cells/mL  
**HAB Concentration:** 1515 cells/mL  
**HAB Relative Concentration:** 12%

**Total Biovolume:** 5803635  $\mu\text{m}^3/\text{mL}$   
**HAB Biovolume:** 596913  $\mu\text{m}^3/\text{mL}$   
**HAB Relative Biovolume:** 10%

**Sample ID:** D20230620T150847  
**Customer ID:** 390  
**Tracking Code:** 230018-390  
**Sample Info:** S3

**System:** Indian Hills Lake  
**Site:** Cove 2  
**Station:** Center Cove  
**Level:** Epi

**Date Sampled:** 6/16/2023  
**Date Received:** 6/20/2023  
**Date Analyzed:** 6/20/2023

Taxa	Group	NU/mL	Cells/mL	Biovolume $\mu\text{m}^3$ /mL	Relative Biovolume %
Aphanocapsa-Aphanothece	BG	110	892	99582	1.72
Merismopedia	BG	24	773	10978	0.19
Cryptomonas	CP	90	90	111994	1.93
Peridinales	CP	2	2	9190	0.16
Rhodomonas	CP	101	101	24914	0.43
Asterionella	DY	136	532	524194	9.03
Aulacoseira	DY	532	4556	1894852	32.65
Centrics	DY	771	778	524228	9.03
Chrysophyta	DY	2	13	2456	0.04
Dinobryon	DY	2	2	1508	0.03
Fragilaria	DY	59	59	100405	1.73
Mallomonas	DY	2	2	4583	0.08
Navicula	DY	2	2	2653	0.05
Navicula-Nitzschia	DY	11	11	4327	0.07
Pennate Diatoms	DY	15	15	10869	0.19
Ulnaria	DY	4	4	33236	0.57
Protozoan	EXCLUDE	11	0	0	0
Botryococcus	G	2	35	12542	0.22
Chlorophytes	G	369	1628	400529	6.9
Closterium	G	2	2	789	0.01
Coelastrum	G	20	158	21675	0.37
Crucigenia-Crucigniella	G	4	33	2872	0.05
Desmodesmus-Scenedesmus	G	31	185	10639	0.18
Monoraphidium	G	4	4	6986	0.12
Oocystis	G	15	35	11301	0.19
Pediastrum	G	9	141	199970	3.45
Quadrigula-Elakatothrix	G	29	101	29311	0.51
Schroederia	G	7	7	1053	0.02
Sphaerocystis	G	31	246	166796	2.87
Staurastrum	G	7	7	35223	0.61
Tetraedon	G	2	2	970	0.02
Aphanizomenon (Aph.)	HAB	83	965	99628	1.72
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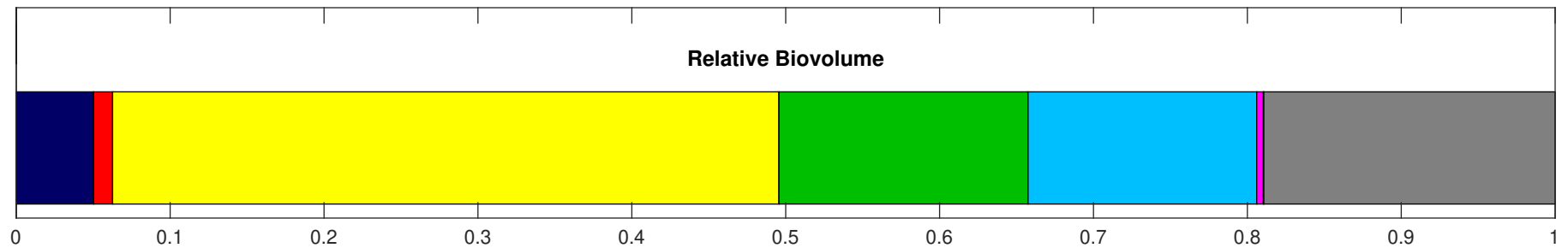
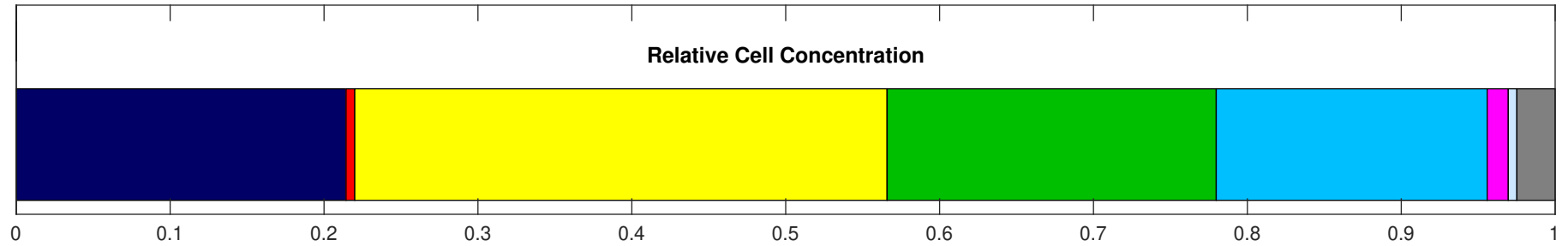




Sample ID: D20230620T155509  
Customer ID: 390  
Tracking Code: 230019-390  
Sample Info: S2

System: Indian Hills Lake  
Site: Cove 5  
Station:  
Level: Epi

Date Sampled: 6/16/2023  
Date Received: 6/20/2023  
Date Analyzed: 6/20/2023



**Total Algal Concentration:** 11925 cells/mL  
**HAB Concentration:** 2100 cells/mL  
**HAB Relative Concentration:** 18%

**Total Biovolume:** 4980066  $\mu\text{m}^3/\text{mL}$   
**HAB Biovolume:** 739871  $\mu\text{m}^3/\text{mL}$   
**HAB Relative Biovolume:** 15%

**Sample ID:** D20230620T155509  
**Customer ID:** 390  
**Tracking Code:** 230019-390  
**Sample Info:** S2

**System:** Indian Hills Lake  
**Site:** Cove 5  
**Station:**  
**Level:** Epi

**Date Sampled:** 6/16/2023  
**Date Received:** 6/20/2023  
**Date Analyzed:** 6/20/2023

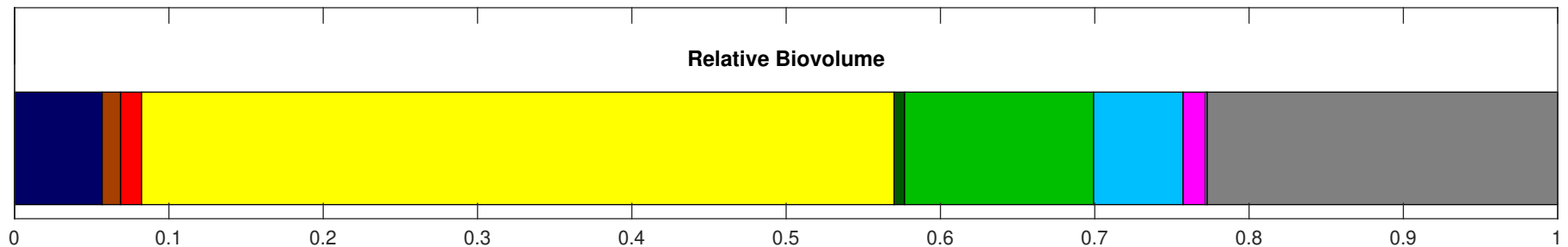
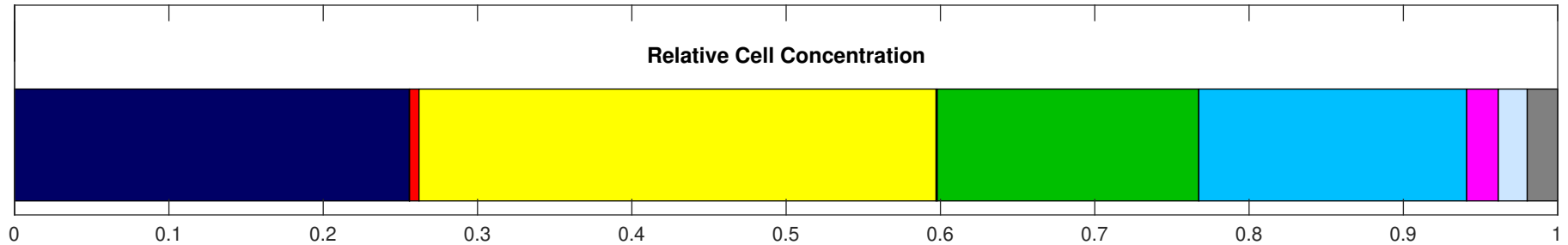
Taxa	Group	NU/mL	Cells/mL	Biovolume $\mu\text{m}^3$ /mL	Relative Biovolume %
Aphanocapsa-Aphanothece	BG	152	1715	240366	4.83
Merismopedia	BG	26	841	10090	0.2
Cryptomonas	CP	45	45	45356	0.91
Peridinales	CP	2	2	5756	0.12
Rhodomonas	CP	21	21	10185	0.2
Asterionella	DY	94	375	335929	6.75
Aulacoseira	DY	351	3202	1337057	26.85
Centrics	DY	494	494	412628	8.29
Fragilaria	DY	43	43	57442	1.15
Navicula-Nitzschia	DY	2	2	1944	0.04
Pennate Diatoms	DY	8	8	4111	0.08
Ulnaria	DY	2	2	7570	0.15
Protozoan	EXCLUDE	9	0	0	0
Zooplankton	EXCLUDE	2	0	0	0
Ankistrodesmus	G	2	8	1356	0.03
Botryococcus	G	2	24	57764	1.16
Chlorophytes	G	261	1723	401482	8.06
Coelastrum	G	23	180	53532	1.07
Cosmarium	G	6	6	8987	0.18
Crucigenia-Crucigniella	G	9	62	8027	0.16
Desmodesmus-Scenedesmus	G	13	79	2814	0.06
Oocystis	G	49	139	28391	0.57
Pediastrum	G	4	60	68151	1.37
Quadrigula-Elakatothrix	G	13	36	4725	0.09
Sphaerocystis	G	28	225	132731	2.67
Staurastrum	G	9	9	37959	0.76
Aph. gracile-Chrys.	HAB	2	33	4892	0.1
Aphanizomenon (Aph.)	HAB	113	1469	156000	3.13
Cuspidothrix	HAB	23	217	18121	0.36
Dolichospermum	HAB	6	43	11490	0.23
Microcystis	HAB	24	69	50834	1.02
Woronchinia	HAB	21	268	498534	10.01
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Sample ID: D20230620T162350  
Customer ID: 390  
Tracking Code: 230020-390  
Sample Info: S1

System: Indian Hills Lake  
Site: Cove 9  
Station:  
Level: Epi

Date Sampled: 6/16/2023  
Date Received: 6/20/2023  
Date Analyzed: 6/20/2023



**Total Algal Concentration:** 12330 cells/mL  
**HAB Concentration:** 2141 cells/mL  
**HAB Relative Concentration:** 17%

**Total Biovolume:** 4232555  $\mu\text{m}^3/\text{mL}$   
**HAB Biovolume:** 245514  $\mu\text{m}^3/\text{mL}$   
**HAB Relative Biovolume:** 6%

**Sample ID:** D20230620T162350  
**Customer ID:** 390  
**Tracking Code:** 230020-390  
**Sample Info:** S1

**System:** Indian Hills Lake  
**Site:** Cove 9  
**Station:**  
**Level:** Epi

**Date Sampled:** 6/16/2023  
**Date Received:** 6/20/2023  
**Date Analyzed:** 6/20/2023

Taxa	Group	NU/mL	Cells/mL	Biovolume $\mu\text{m}^3$ /mL	Relative Biovolume %
Aphanocapsa-Aphanothece	BG	155	1460	226348	5.35
Cyanogranis-Cyanocatena	BG	4	4	622	0.01
Merismopedia	BG	53	1690	13244	0.31
Ceratium	CER	2	2	50762	1.2
Cryptomonas	CP	53	53	44508	1.05
Peridinales	CP	2	2	7640	0.18
Rhodomonas	CP	21	21	5213	0.12
Asterionella	DY	25	92	64240	1.52
Aulacoseira	DY	402	3475	1453760	34.35
Centrics	DY	489	494	482074	11.39
Chrysophyta	DY	2	6	1079	0.03
Dinobryon	DY	6	19	3210	0.08
Fragilaria	DY	28	28	41146	0.97
Navicula-Nitzschia	DY	6	6	12854	0.3
Pennate Diatoms	DY	11	11	5552	0.13
Euglena	E	2	2	4474	0.11
Lepocinclis	E	6	6	20890	0.49
Trachelomonas	E	2	2	3576	0.08
Protozoan	EXCLUDE	19	0	0	0
Ankistrodesmus	G	2	8	668	0.02
Chlorophytes	G	253	1269	302003	7.14
Closterium	G	2	2	632	0.01
Coelastrum	G	23	181	46751	1.1
Cosmarium	G	4	4	5732	0.14
Crucigenia-Crucigniella	G	25	219	26663	0.63
Desmodesmus-Scenedesmus	G	13	79	7418	0.18
Monoraphidium	G	9	9	4033	0.1
Oocystis	G	51	130	35392	0.84
Pediastrum	G	6	91	6921	0.16
Quadrigula-Elakatothrix	G	4	15	2026	0.05
Sphaerocystis	G	9	75	41613	0.98
Staurastrum	G	6	6	28598	0.68
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