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:

IFCB Taxa ID	Taxa included	Notes
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.

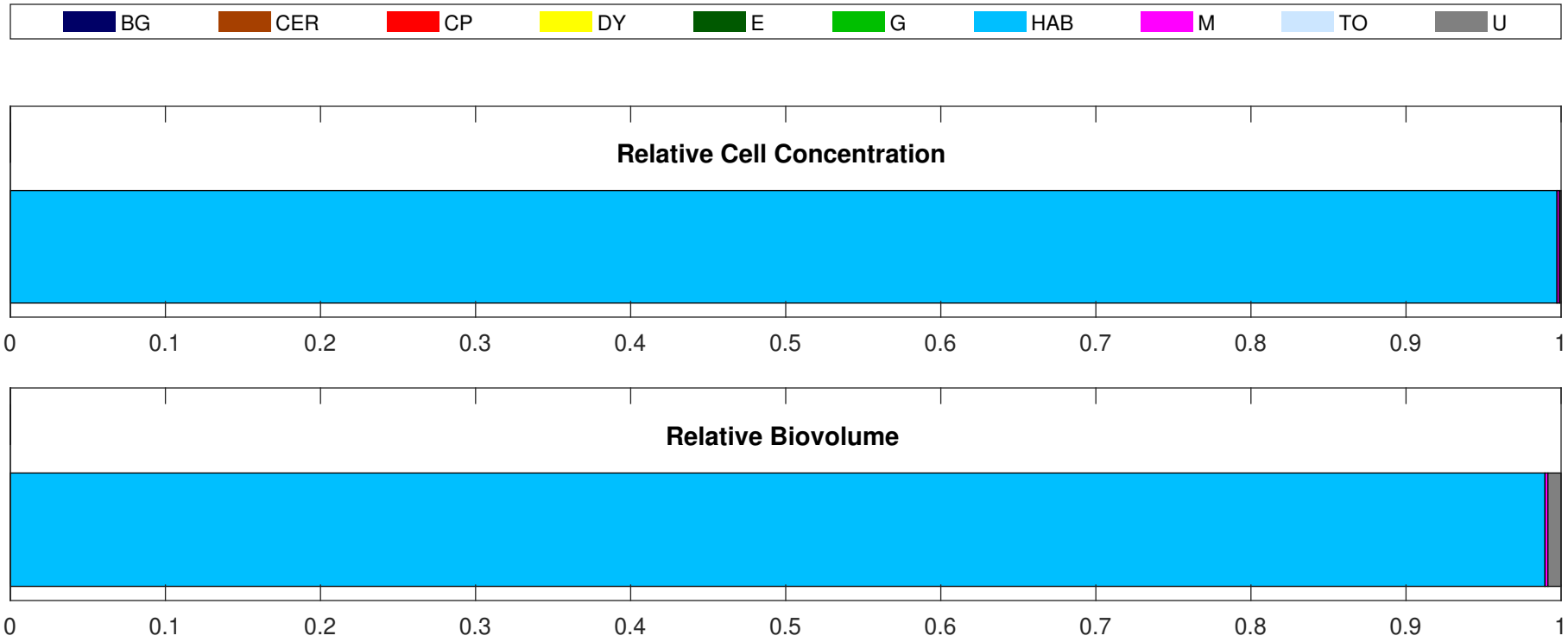
Algal Functional Group Classifications:

	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: D20220525T122052
Customer ID: 390
Tracking Code: 220007-390
Sample Info: CF1

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

Date Sampled: 5/19/2022
Date Received: 5/23/2022
Date Analyzed: 5/25/2022



Total Algal Concentration: 452049 cells/mL
HAB Concentration: 450862 cells/mL
HAB Relative Concentration: 100%

Total Biovolume: 37368683 um^3/mL
HAB Biovolume: 36981120 um^3/mL
HAB Relative Biovolume: 99%

! WARNING !

HAB concentration is high - Toxin testing recommended.

Sample ID: D20220525T122052
Customer ID: 390
Tracking Code: 220007-390
Sample Info: CF1

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

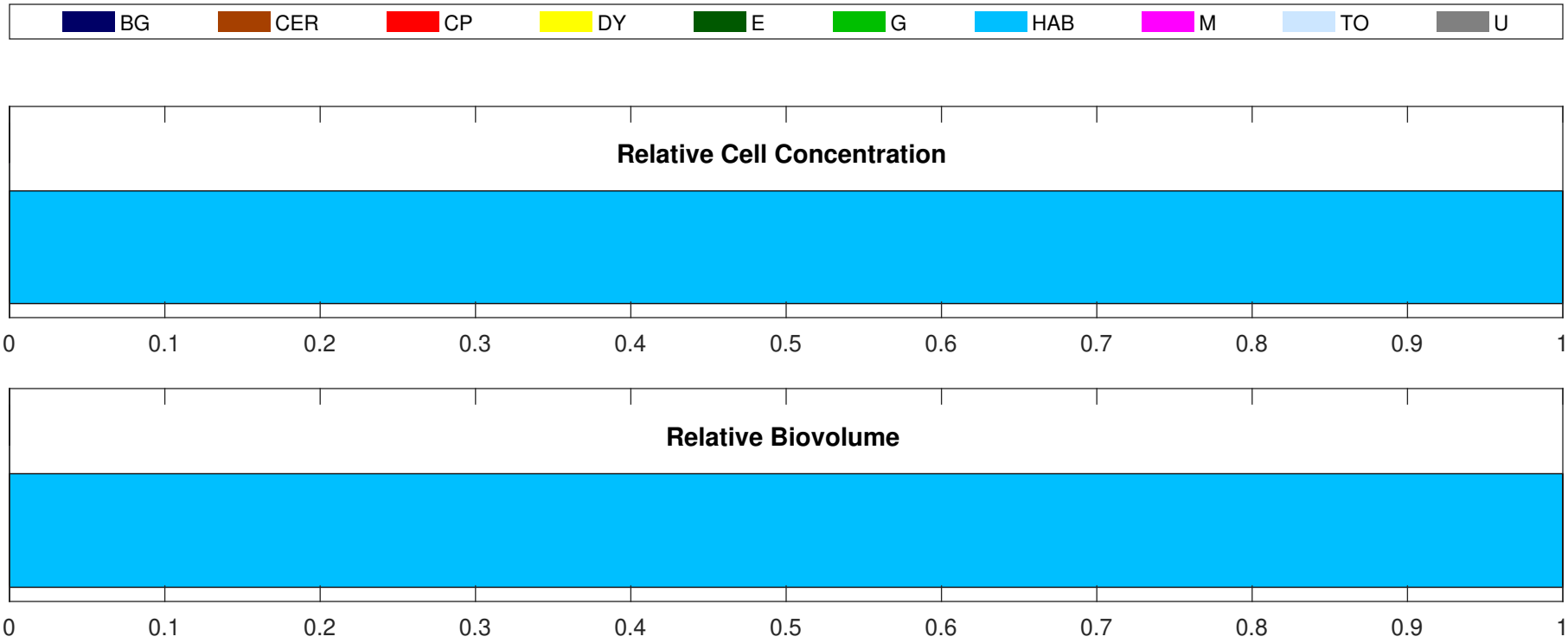
Date Sampled: 5/19/2022
Date Received: 5/23/2022
Date Analyzed: 5/25/2022

Taxa	Group	NU/mL	Cells/mL	Biovolume um^3/mL	Relative Biovolume %
Aphanizomenon (Aph.)	HAB	21189.73	450592.16	36944894.59	98.87
Dolichospermum	HAB	8.99	269.7	36224.92	0.1
Taxa below 9um	M	728.2	728.2	70269.3	0.19
unclassified	U	458.5	458.5	317294.58	0.85

Sample ID: D20220525T130843
Customer ID: 390
Tracking Code: 220008-390
Sample Info: CF2

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

Date Sampled: 5/19/2022
Date Received: 5/23/2022
Date Analyzed: 5/25/2022



Total Algal Concentration: 10142237 cells/mL
HAB Concentration: 10142237 cells/mL
HAB Relative Concentration: 100%

Total Biovolume: 887686695 um^3/mL
HAB Biovolume: 887686695 um^3/mL
HAB Relative Biovolume: 100%

! WARNING !

HAB concentration is high - Toxin testing recommended.

Sample ID: D20220525T130843
Customer ID: 390
Tracking Code: 220008-390
Sample Info: CF2

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

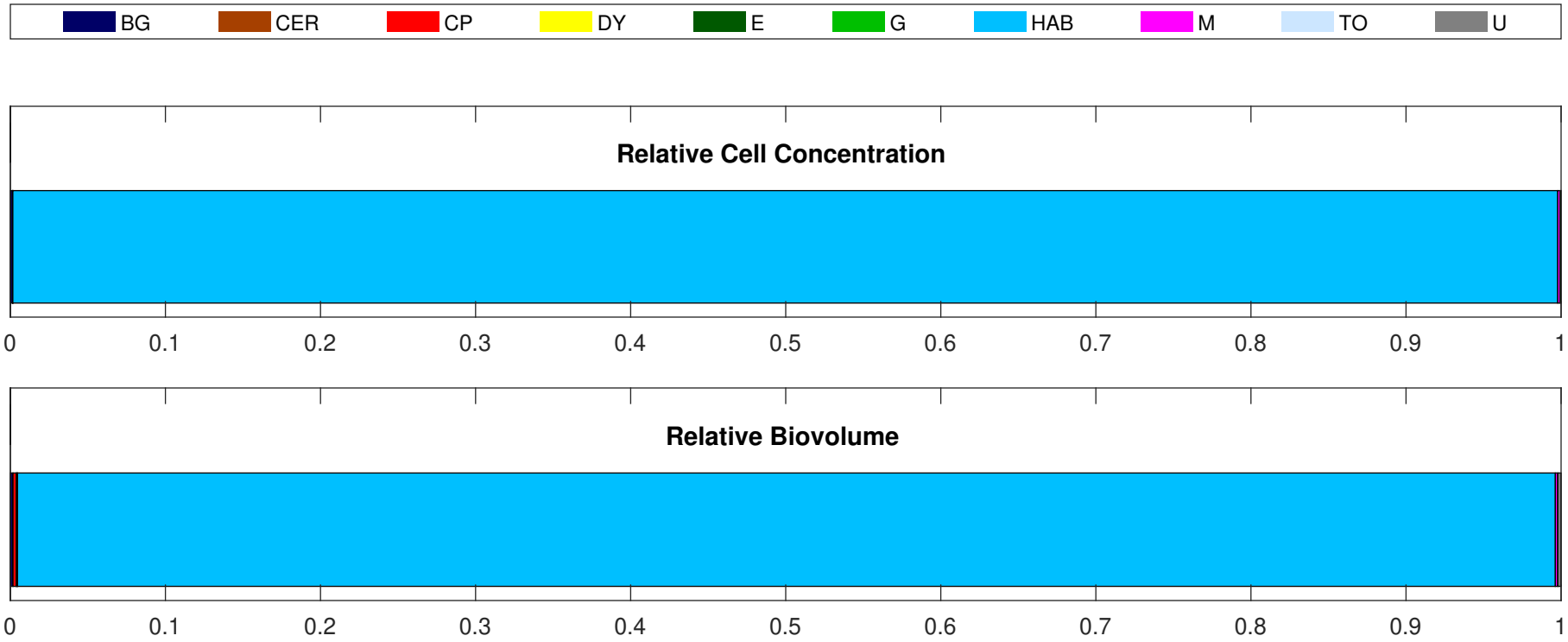
Date Sampled: 5/19/2022
Date Received: 5/23/2022
Date Analyzed: 5/25/2022

Taxa	Group	NU/mL	Cells/mL	Biovolume um^3/mL	Relative Biovolume %
Aphanizomenon (Aph.)	HAB	485583.3310	142236.56	887686694.64	100

Sample ID: D20220525T133344
Customer ID: 390
Tracking Code: 220009-390
Sample Info: CF3

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

Date Sampled: 5/19/2022
Date Received: 5/23/2022
Date Analyzed: 5/25/2022



Total Algal Concentration: 213416 cells/mL
HAB Concentration: 212613 cells/mL
HAB Relative Concentration: 100%

Total Biovolume: 19919920 um^3/mL
HAB Biovolume: 19753936 um^3/mL
HAB Relative Biovolume: 99%

! WARNING !

HAB concentration is high - Toxin testing recommended.

Sample ID: D20220525T133344
Customer ID: 390
Tracking Code: 220009-390
Sample Info: CF3

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

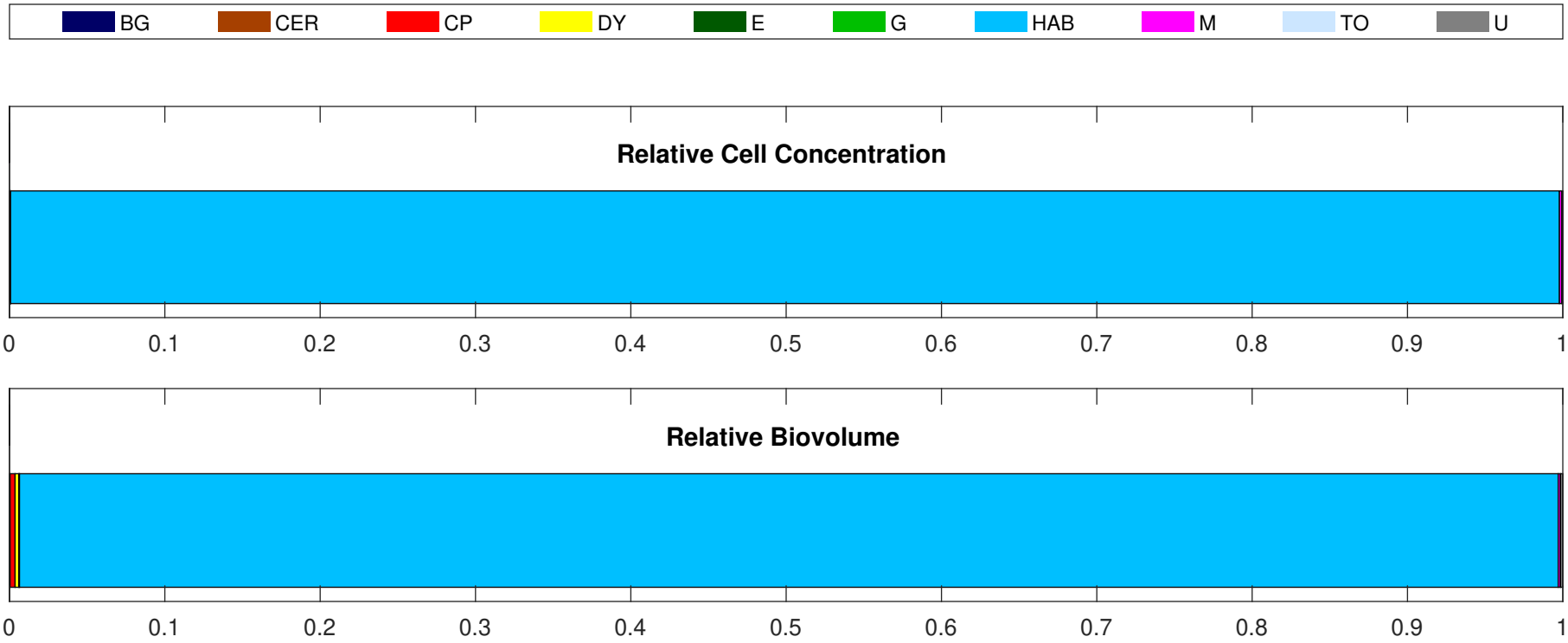
Date Sampled: 5/19/2022
Date Received: 5/23/2022
Date Analyzed: 5/25/2022

Taxa	Group	NU/mL	Cells/mL	Biovolume um^3/mL	Relative Biovolume %
Aphanocapsa-Aphanothece	BG	23.47	309.79	33716.12	0.17
Cryptomonas	CP	9.39	9.39	40904.67	0.21
Centrics	DY	4.69	4.69	12256.83	0.06
Chlorophytes	G	18.77	18.77	5219.39	0.03
Aphanizomenon (Aph.)	HAB	9612.77	211880.84	18384247.73	92.29
Dolichospermum	HAB	4.69	23.47	5321.49	0.03
Woronchinia	HAB	9.39	708.75	1364367.08	6.85
Taxa below 9um	M	323.87	323.87	31521.3	0.16
unclassified	U	136.12	136.12	42364.96	0.21

Sample ID: D20220525T135454
Customer ID: 390
Tracking Code: 220010-390
Sample Info: CF4

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

Date Sampled: 5/19/2022
Date Received: 5/23/2022
Date Analyzed: 5/25/2022



Total Algal Concentration: 181075 cells/mL
HAB Concentration: 180551 cells/mL
HAB Relative Concentration: 100%

Total Biovolume: 16329664 um^3/mL
HAB Biovolume: 16175839 um^3/mL
HAB Relative Biovolume: 99%

! WARNING !

HAB concentration is high - Toxin testing recommended.

Sample ID: D20220525T135454
Customer ID: 390
Tracking Code: 220010-390
Sample Info: CF4

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

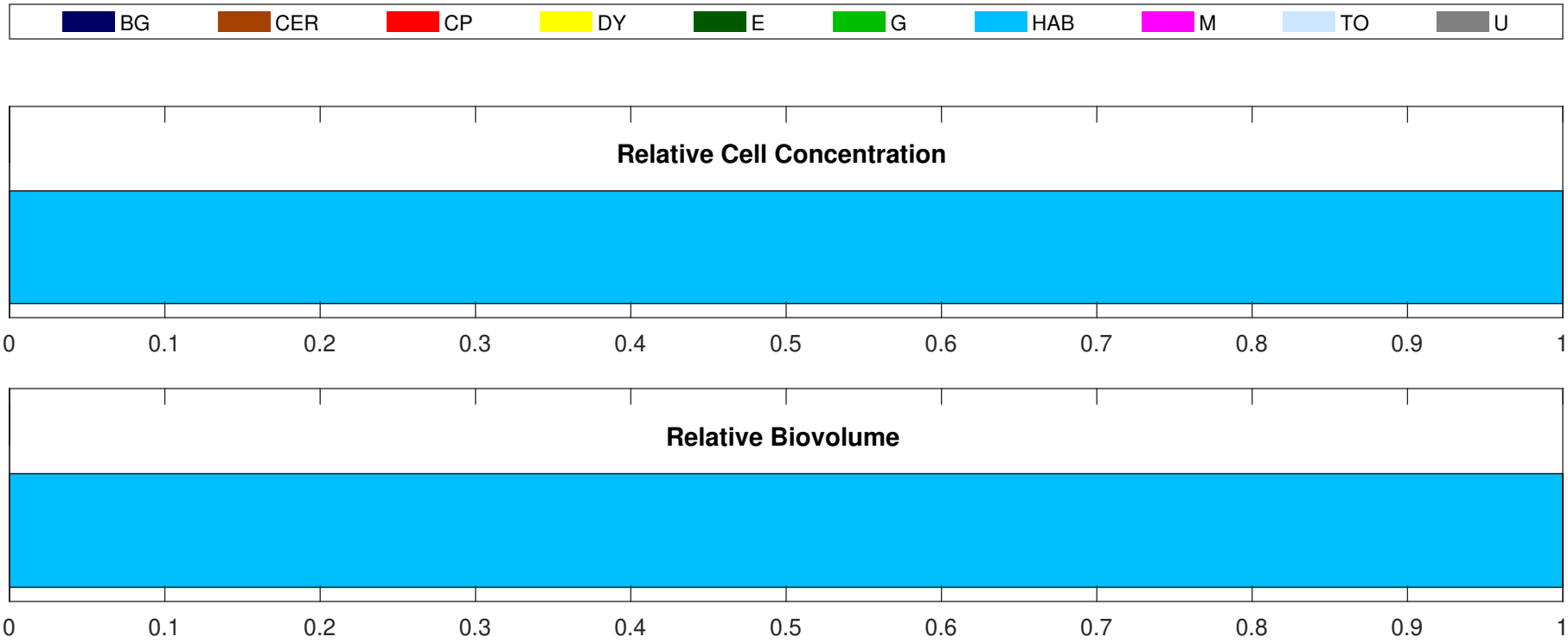
Date Sampled: 5/19/2022
Date Received: 5/23/2022
Date Analyzed: 5/25/2022

Taxa	Group	NU/mL	Cells/mL	Biovolume um^3/mL	Relative Biovolume %
Aphanocapsa-Aphanothece	BG	16.61	91.36	6829.26	0.04
Cryptomonas	CP	16.61	16.61	49911.34	0.31
Rhodomonas	CP	8.31	8.31	1945.94	0.01
Mallomonas	DY	4.15	4.15	39236.81	0.24
Chlorophytes	G	8.31	8.31	7216.02	0.04
Aphanizomenon (Aph.)	HAB	8130.91	180347.94	15929789.05	97.55
Dolichospermum	HAB	4.15	78.9	12235.3	0.07
Woronchinia	HAB	4.15	124.58	233814.4	1.43
Taxa below 9um	M	269.92	269.92	24411.54	0.15
unclassified	U	124.58	124.58	24273.99	0.15

Sample ID: D20220525T141936
Customer ID: 390
Tracking Code: 220011-390
Sample Info: CF5

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

Date Sampled: 5/19/2022
Date Received: 5/23/2022
Date Analyzed: 5/25/2022



Total Algal Concentration: 9271157 cells/mL
HAB Concentration: 9271157 cells/mL
HAB Relative Concentration: 100%

Total Biovolume: 869897866 um^3/mL
HAB Biovolume: 869897866 um^3/mL
HAB Relative Biovolume: 100%

! WARNING !

HAB concentration is high - Toxin testing recommended.

Sample ID: D20220525T141936
Customer ID: 390
Tracking Code: 220011-390
Sample Info: CF5

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

Date Sampled: 5/19/2022
Date Received: 5/23/2022
Date Analyzed: 5/25/2022

Taxa	Group	NU/mL	Cells/mL	Biovolume um^3/mL	Relative Biovolume %
Aphanizomenon (Aph.)	HAB	409959.16	9253066.67	830253185.37	95.44
Woronchinia	HAB	556.63	18090.53	39644680.59	4.56