Cyanobacteria in sediments of Harsha Lake

H.D. Alan Lindquist[1], Joel Allen[1], Kit Daniels[1], Mia Varner[1], Adam Balz[2], Jingrang Lu*[1]

[1]USEPA Office of Research and Development, Cincinnati, OH

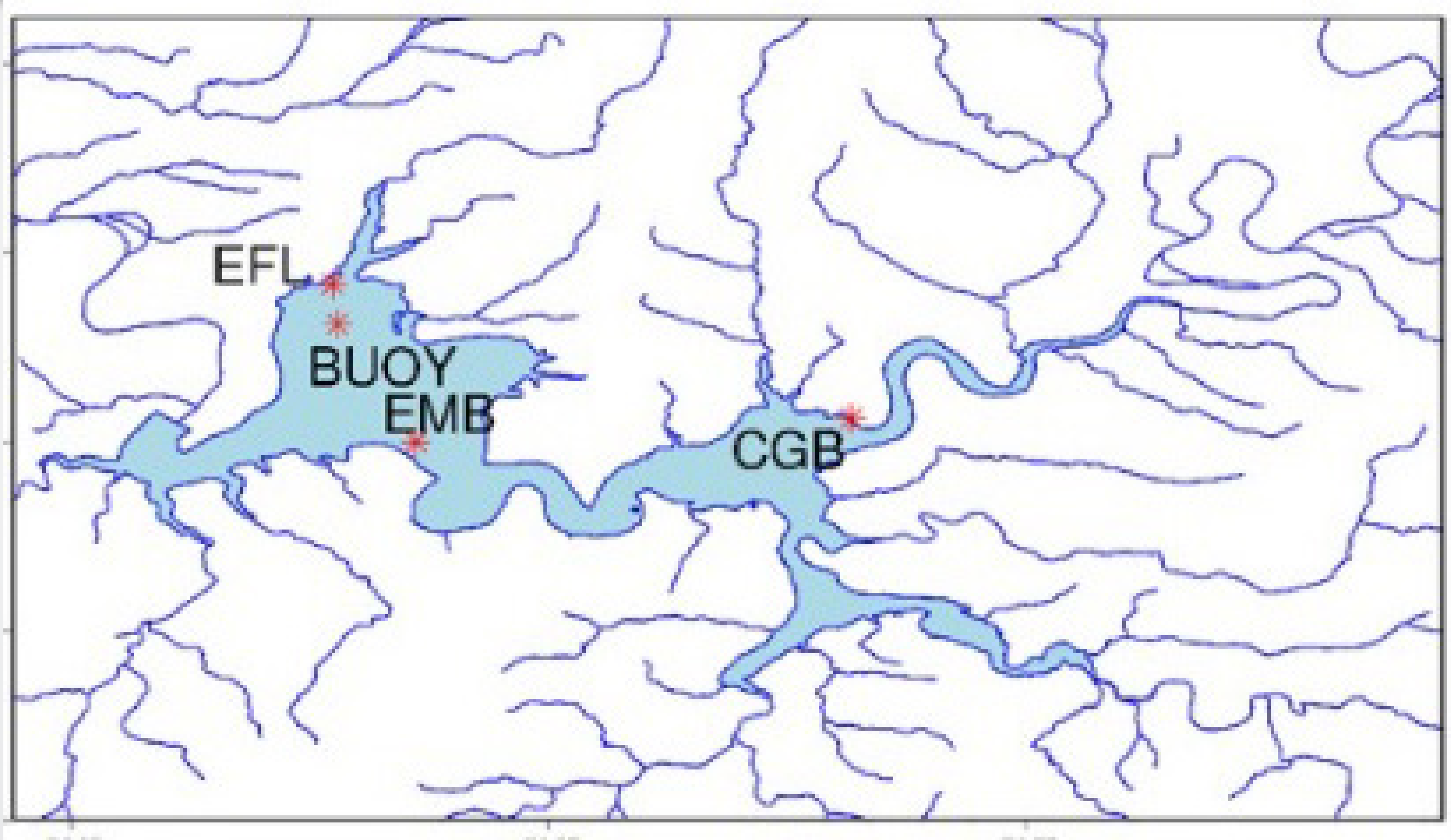
[2] Pegasus Technical Services, Inc.

for the:

CyanoSed: A Workshop on Benthic Cyanobacteria and Cyanotoxins

*-Presenter

Lake William H. Harsha Sampling Locations



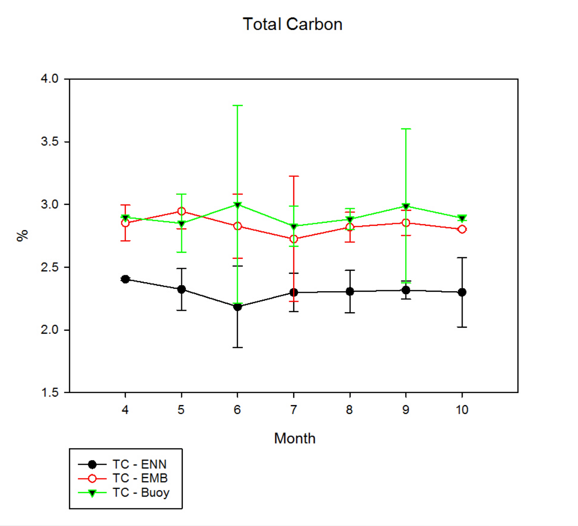
Sample collection and processing

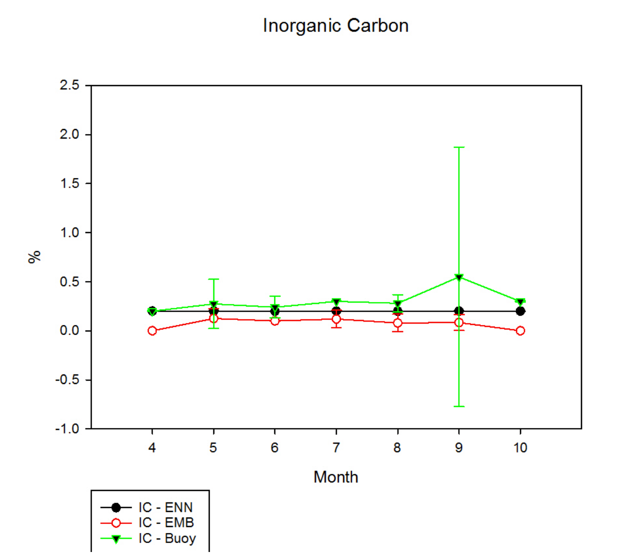
•Samples were collected using sediment sampler.
•Samples were placed in a cooler with ice packs and immediately store in a freezer after brought to the lab.
•DNA was extracted using PowerSoil® DNA Isolation Kit - Mo Bio
•A 10-fold dilution of DNA from the neat extracts were prepared for testing their inhibitions.
•All DNA samples were stored at -80 °C until use for qPCR

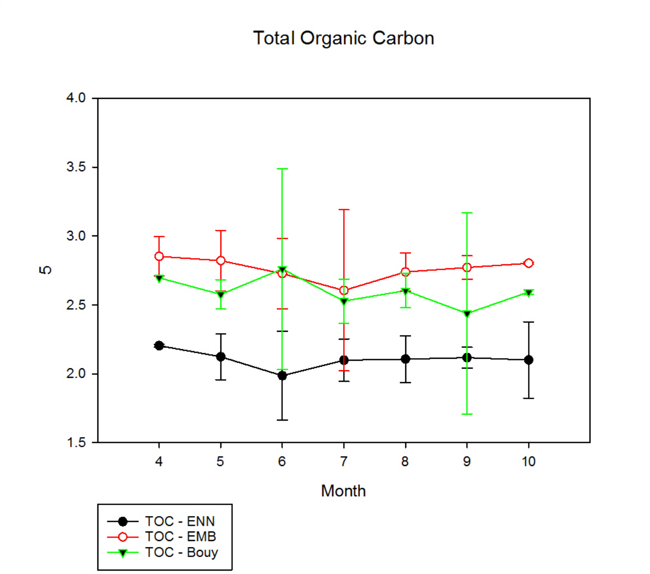
Table 1. Assays used for qPCR and RT-qPCR in this study

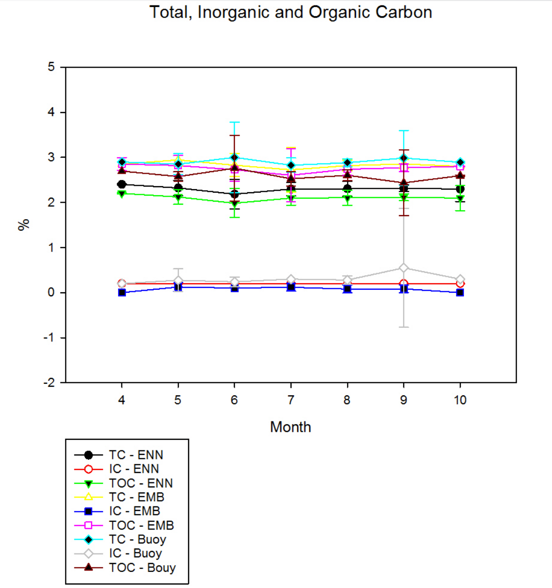
Assay	Target gene	Organism	Reference
CYAN	16S rRNA	Cyanobacteria	Nubel et al., 1997
MIC	16S rRNA	*Microcystis*	Neilan et al. 1997
CD1	mcyA	Microcystin producing cyanobacteria	Hisbergues 2003
HEP	mcyE	Microcystin producing cyanobacteria	Jungblut and Neilan, 2006
McyG	mcyG	Microcystin producing *Microcystis*	This study
MS2R	mcyE	Microcystin producing *Microcystis*	Furukawa et al. 2006, Tillett et al. 2001

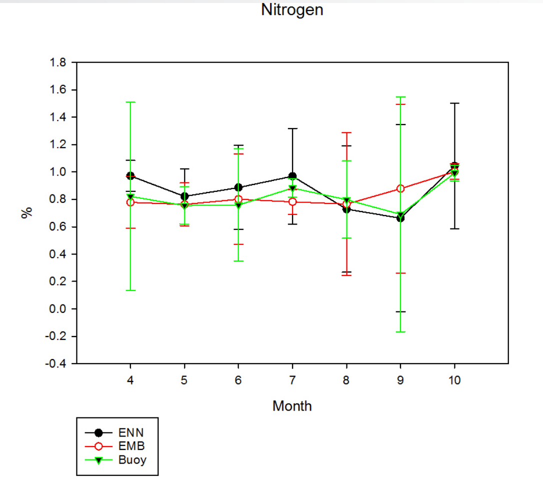
Physico-chemical Parameters averaged from 2015 and 2016

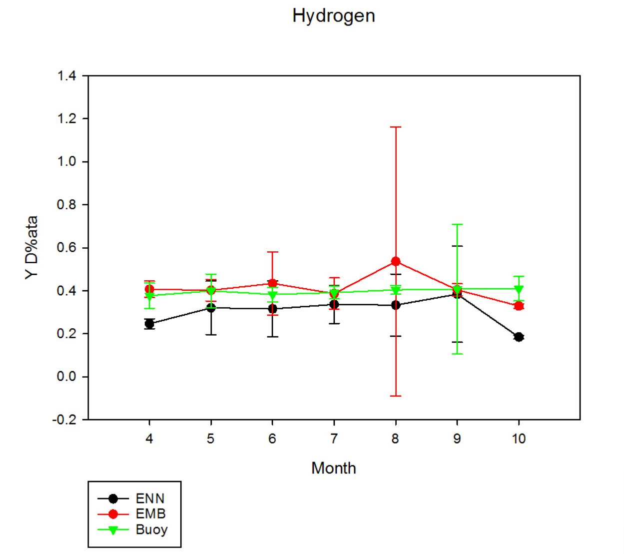


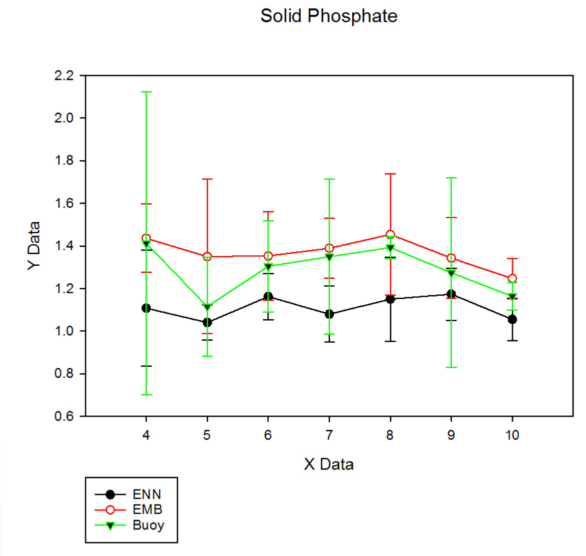


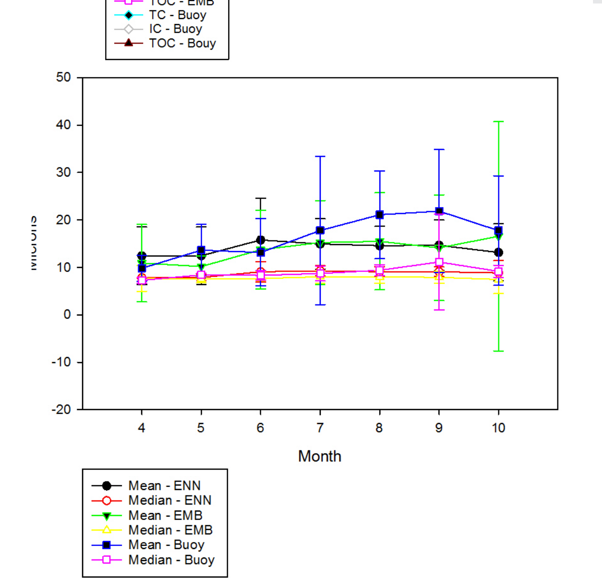


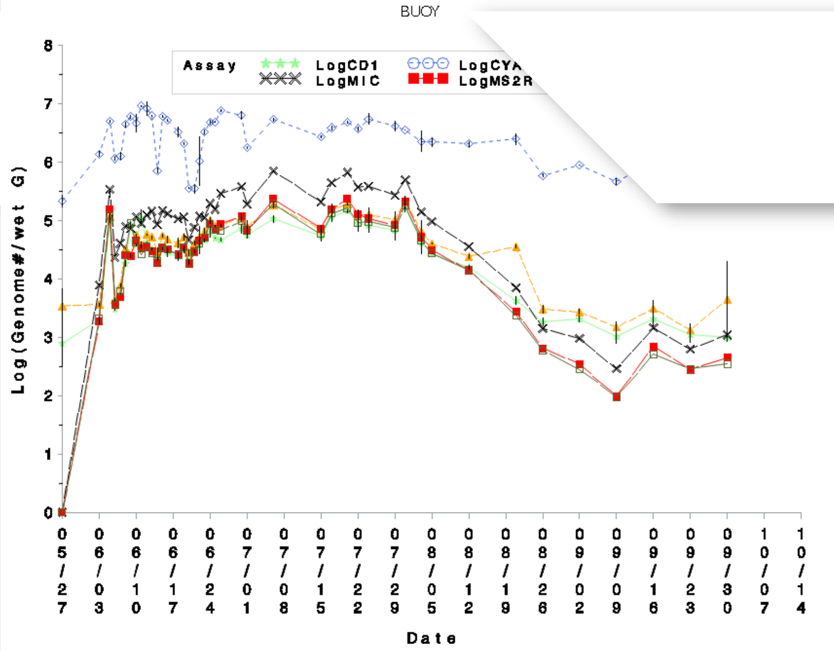








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Assay LogCD1 LogCYA LogMIC LogMS2R
Log(Genome#/wet G)
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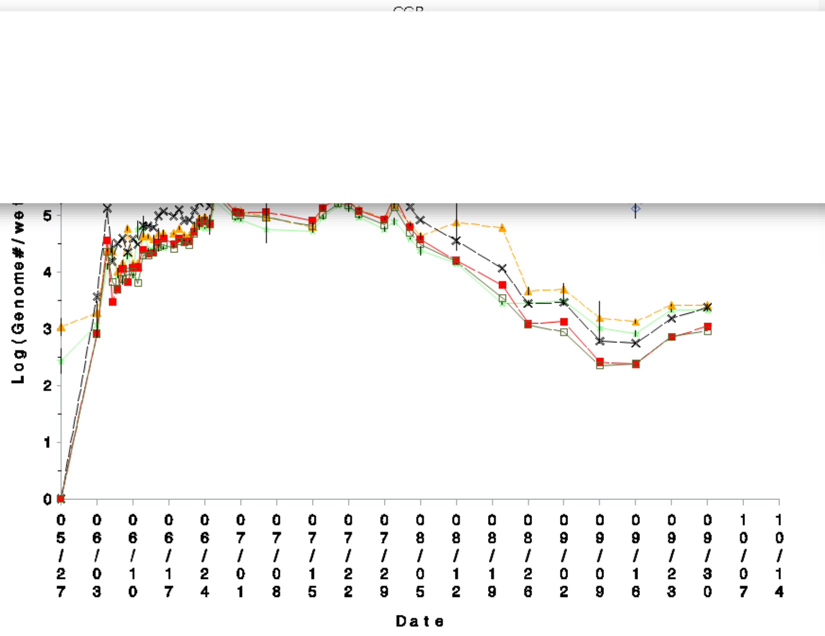
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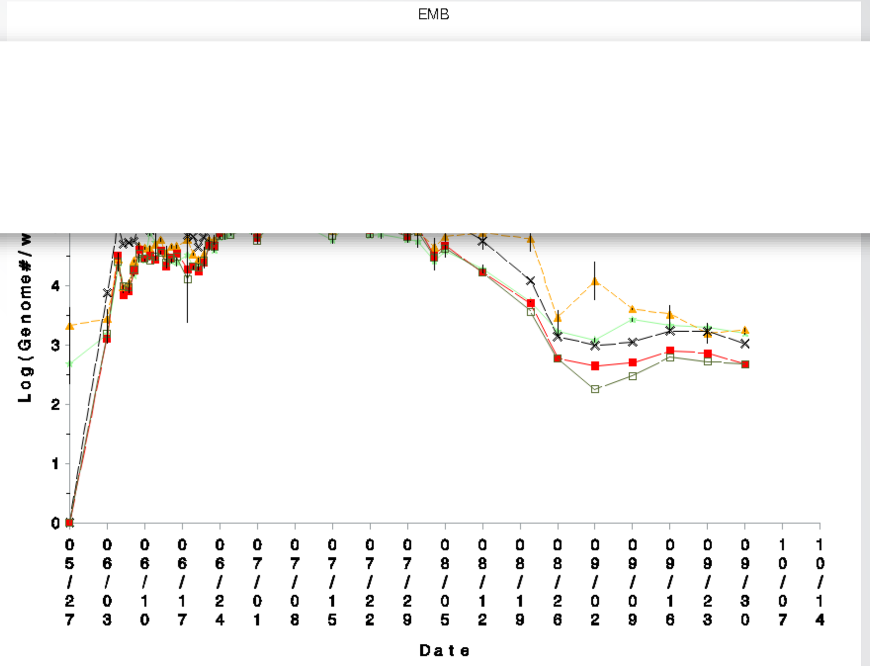
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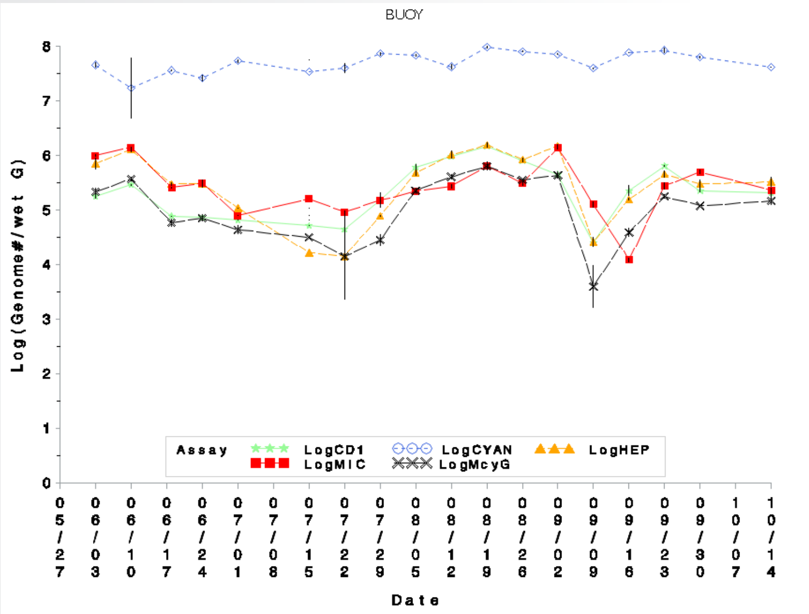
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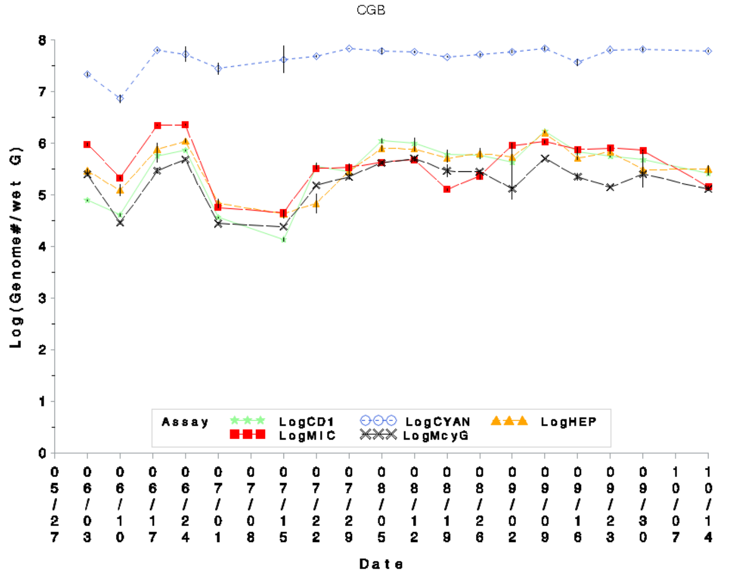
Assay LogCD1 LogCYAN LogHEP
LogMIC LogMcyG
Date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Log(Genome#/wet G)
Assay LogCD1 LogCYAN LogHEP
LogMIC LogMcyG
Date

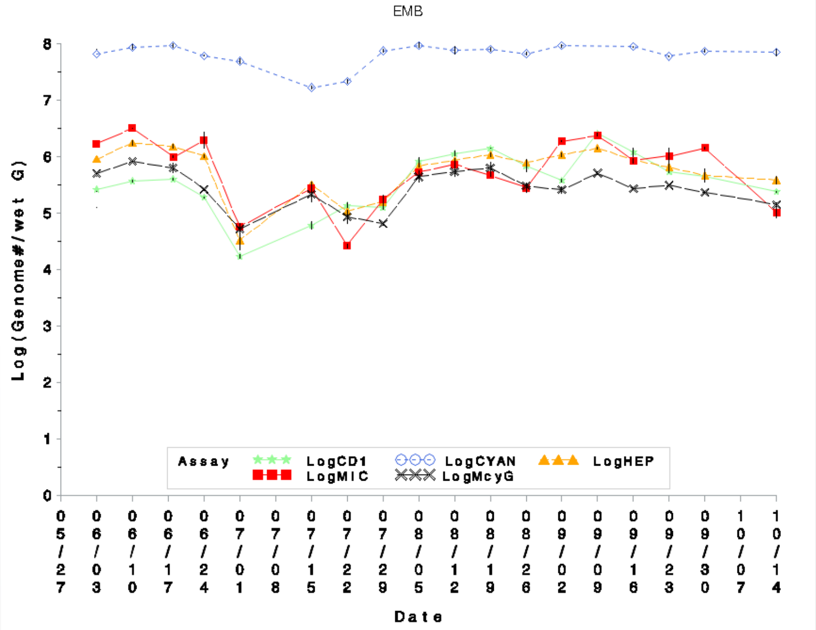
EMB
Log(Genome#/wet G)
Assay LogCD1 LogCYAN LogHEP
LogMIC LogMcyG
Date

Table 2. Comparison of Cyanobacteria in sediments and surface water (genomic copy numbers per wet gram or per liter)

	Surface water				Sediment			
Variable	N	Mean	Minimum	Maximum	N	Mean	Minimum	Maximum
Cyanobacteria	392	2.95×10^{6}	24230	1.46×10^{7}	106	5.25×10^{7}	4.80×10^{6}	1.14×10^{8}
Microcystiis	392	1.48×10^{5}	0	1.22×10^{6}	106	3.77×10^{5}	1.11×10^{4}	3.16×10^{6}
HEP	392	5.63×10^{4}	53	3.95×10^{5}	106	3.78×10^{5}	2.27×10^{3}	1.92×10^{6}
cd1	392	4.02×10^{4}	0	3.50×10^{5}	106	2.84×10^{5}	1.26×10^{4}	2.59×10^{6}
MS	392	5.10×10^{4}	0	4.85×10^{5}	106			
mcyG	392	4.39×10^{4}	0	4.11×10^{5}	106	1.67×10^{5}	1.60×10^{3}	8.24×10^{5}

Table 3. Ratios among qPCR targets

Variable	N	Mean	Minimum	Maximum	N	Mean	Minimum	Maximum
Microcystiis:Cyanobacteria	155	0.02	0.00	0.19	58.00	0.01	0.00	0.06
mcyG:Microcystiis	111	0.33	0.15	0.56	58.00	0.42	0.01	0.98
mcyG:HEP	155	0.28	0.00	0.82	58.00	0.38	0.08	0.81
mcyG:CD1	147	0.40	0.00	1.00	58.00	0.48	0.07	0.89

Take home messages

- There are differences between the eastern and western basins.
- There are small, or subtle seasonal differences.
- A more complete statistical analysis shows many correlations.
  - Causality in these relationships is not yet understood.
  - Some of the relationships may be due to the hydrologic factors.
  - For example, sedimentation and migration of materials down the historic channel of the river may cause correlations that do not represent the distribution of cyanobacteria, or the contribution of nutrients to that distribution.