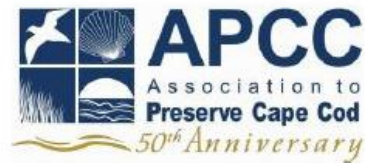


# Mill Ponds Cyanobacteria Monitoring Update

July 5, 2018

Bryan Horsley, Restoration Technician  
Association to Preserve Cape Cod

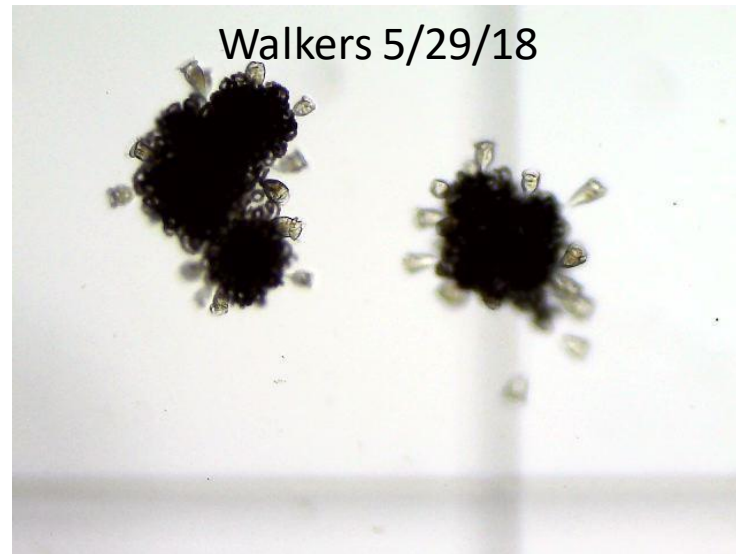


# What's been done so far

- Held training event for BPC volunteers on May 11, 2018
- Began collecting samples in Walkers, Upper Mill, and Lower Mill on May 4, 2018
- Been collecting and processing samples weekly for 10-weeks at all three ponds
- 270 samples processed and analyzed so far
- Working in Town NR garage – potentially moving to old fire station soon
- Work in Walkers and Upper Mill completed by APCC staff and interns (Bryan, Kevin, and Kathleen)
- Work in Lower Mill completed by APCC staff, interns, and Nancy Ortiz of BPC
- Met with Nancy Leland and Karen Malkus Tuesday this week for update and exchanged samples for toxin analysis at UNH.

# What we've found so far (who's there)

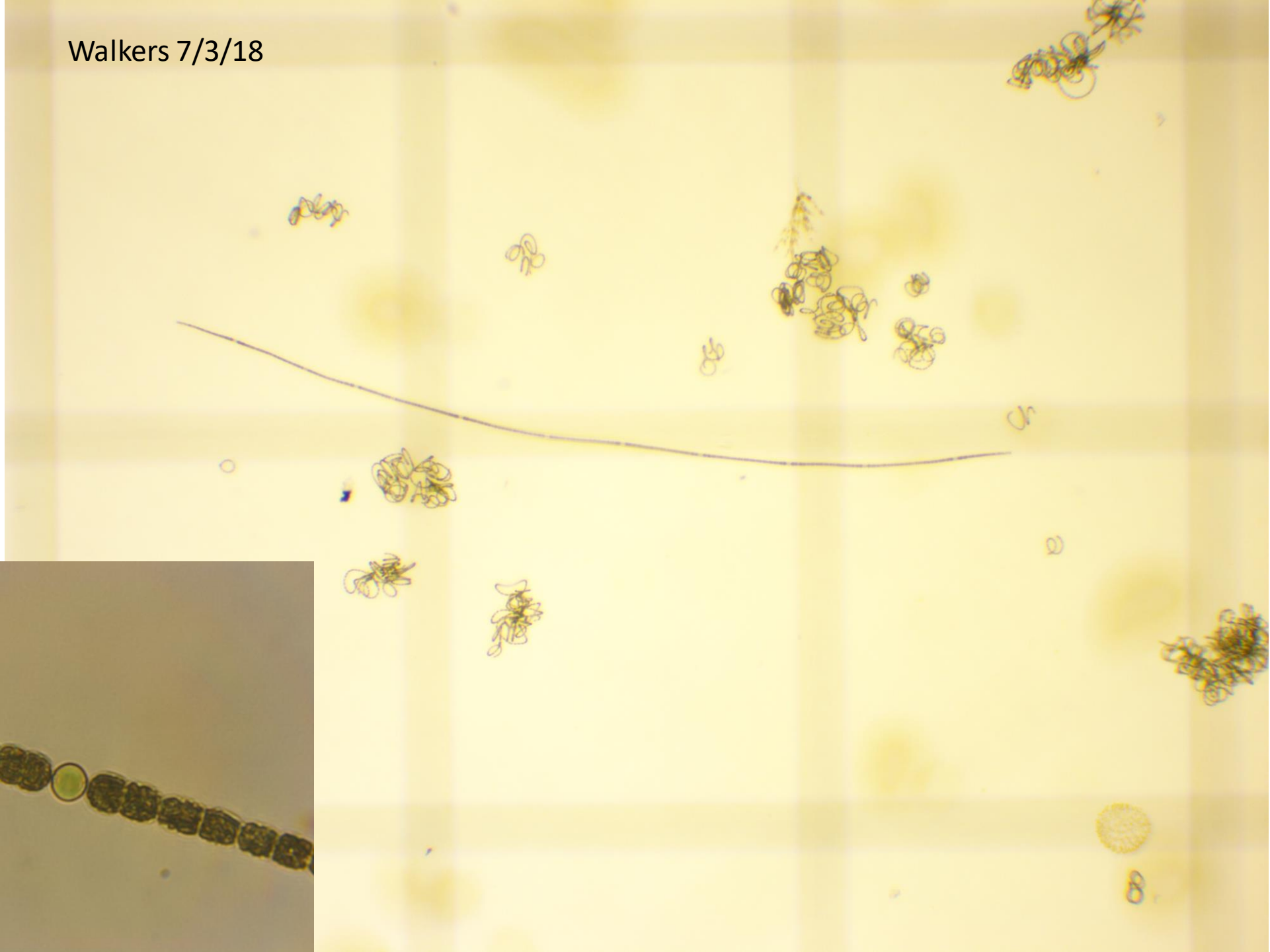
- Scope images weekly at each pond using gridded slide to measure cyano genera dominance (*Dolichospermum* vs. *Microcystis* so far)
- All three ponds are *Dolichospermum* dominant



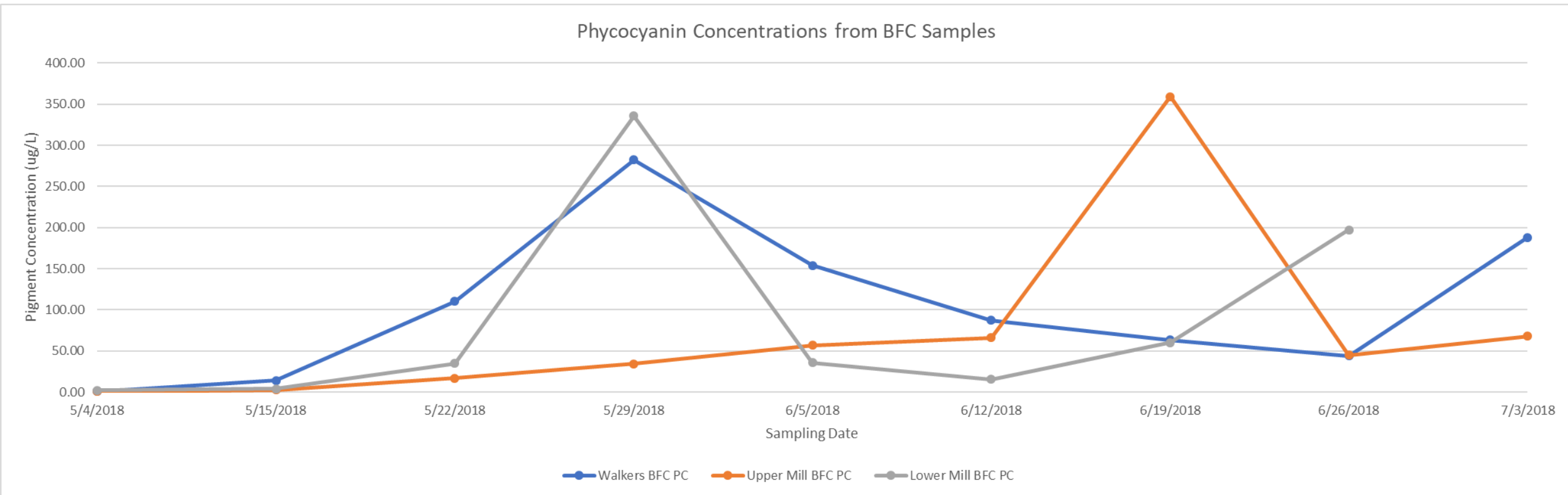
# What we've found so far (who's there now)

- Recently noticed changes in morphology - initially very dense *Dolichospermum lemmermannii* clumps appear to be becoming less dense, breaking apart
- Recent appearance of new species *D. planctonicum*.
- Appearance of this new species appears to coincide with early season spike and crash in biomass of *D. lemmermannii*, possibly allowing for succession of new species, *D. planctonicum*.

Walkers 7/3/18



# What we've found so far (how much is there)

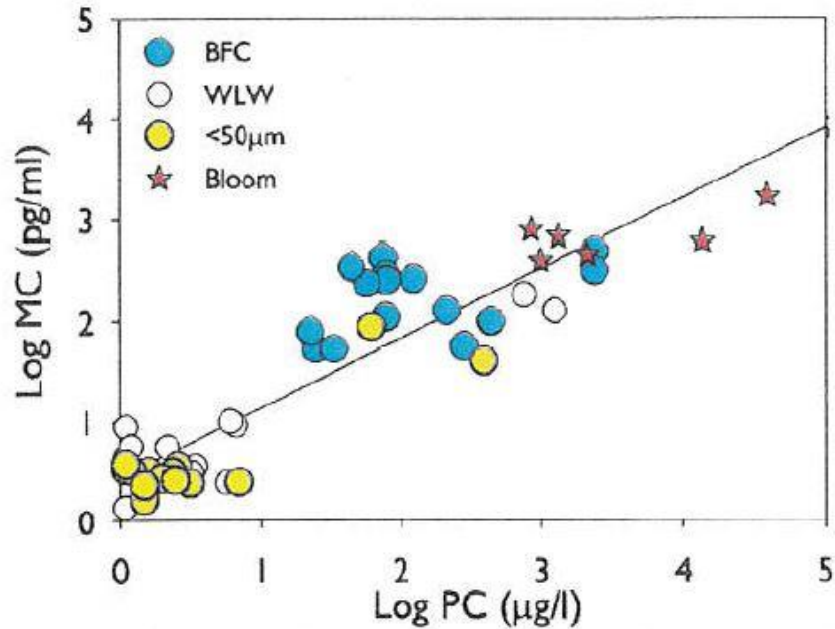


# What's this mean

- Rise and fall of phycocyanin likely due to succession of species/genus.
- We likely have some level of toxicity in all three ponds.
- Based on last year's data its not yet exceeding OHA dog standard for microcystis toxin (0.2ug/L), but close to it (expected at 500ug/L PC).
- If microcystis becomes dominant things could change quickly (higher toxicity per pigment concentration).

# Estimating toxin concentration using 2017 results

*Dolichospermum* dominated system

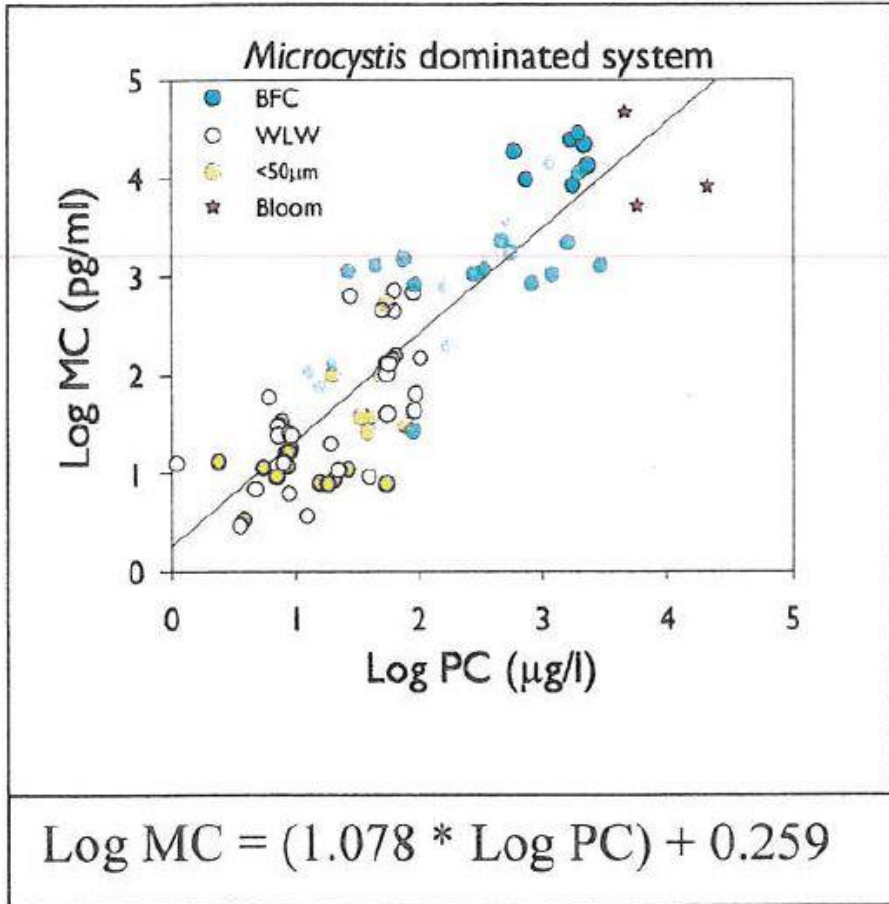


$$\text{Log MC} = (0.694 * \text{Log PC}) + 0.445$$

*Dolichospermum* dominated system

PC ( $\mu\text{g l}^{-1}$ )	Total microcystins ( $\mu\text{g l}^{-1}$ )			PC ( $\mu\text{g l}^{-1}$ )	Total microcystins ( $\mu\text{g l}^{-1}$ )			PC ( $\mu\text{g l}^{-1}$ )	Total microcystins ( $\mu\text{g l}^{-1}$ )		
<50 $\mu\text{m}$				WLW				BFC			
	Mean	C.I.(-)	C.I.(+)	Mean	C.I.(-)	C.I.(+)	Mean	C.I.(-)	C.I.(+)		
5	<b>0.009</b>	0.007	0.011	5	<b>0.009</b>	0.007	0.011	250	<b>0.129</b>	0.101	0.164
10	<b>0.014</b>	0.011	0.017	10	<b>0.014</b>	0.011	0.017	500	<b>0.208</b>	0.158	0.274
15	<b>0.018</b>	0.015	0.022	20	<b>0.022</b>	0.018	0.027	750	<b>0.275</b>	0.205	0.370
20	<b>0.022</b>	0.018	0.027	30	<b>0.030</b>	0.024	0.036	1000	<b>0.337</b>	0.247	0.459
30	<b>0.030</b>	0.024	0.036	40	<b>0.036</b>	0.030	0.044	2000	<b>0.545</b>	0.384	0.771
50	<b>0.042</b>	0.034	0.051	50	<b>0.042</b>	0.034	0.051	5000	<b>1.028</b>	0.685	1.539
				60	<b>0.048</b>	0.039	0.058				
				100	<b>0.068</b>	0.055	0.084				

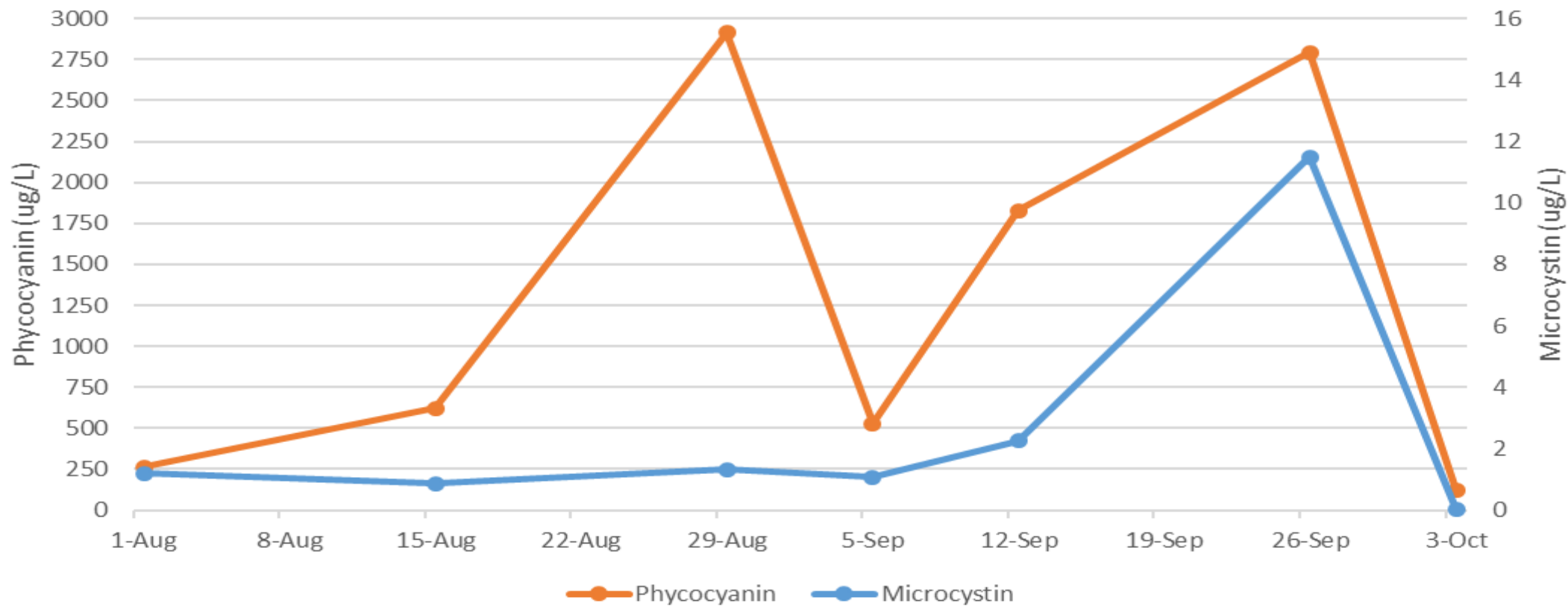


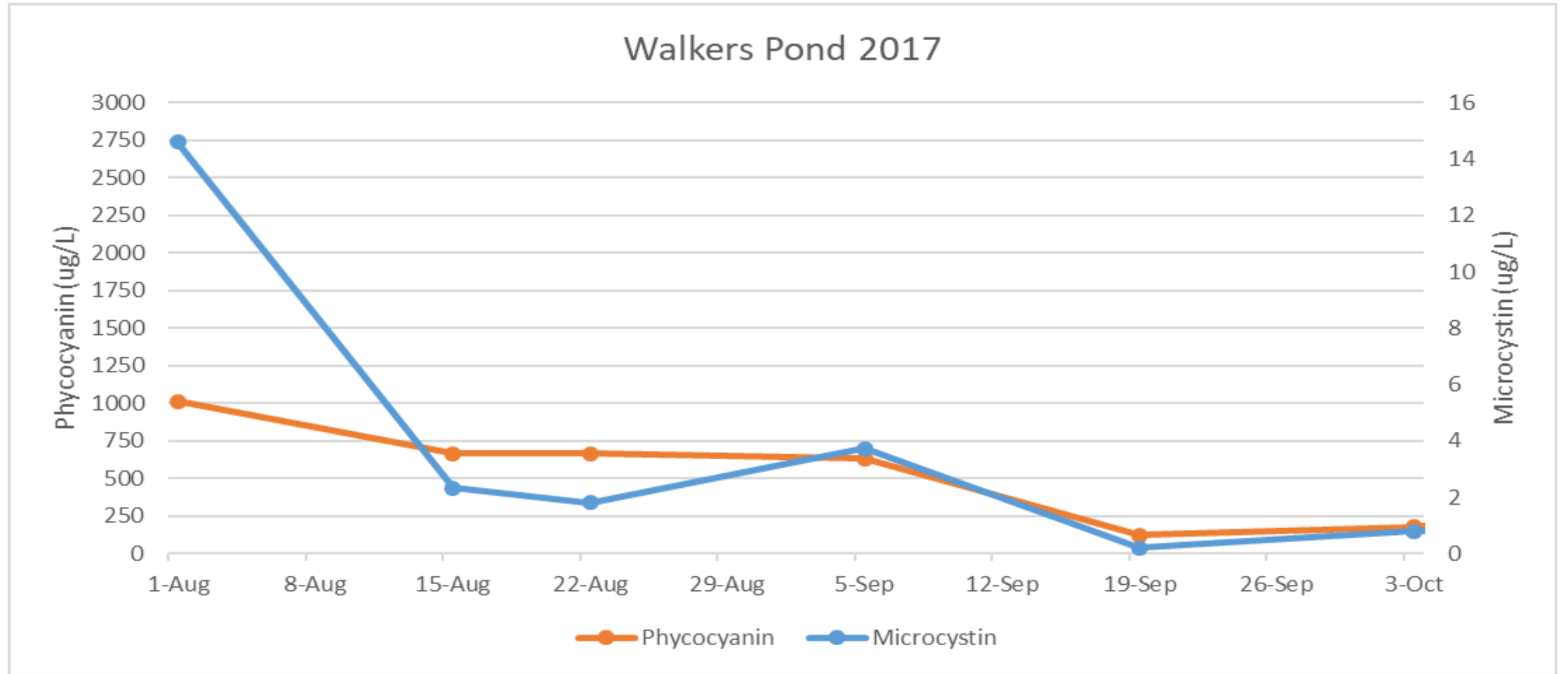


*Microcystis* dominated system

PC ( $\mu\text{g l}^{-1}$ )	Total microcystins ( $\mu\text{g l}^{-1}$ )			PC ( $\mu\text{g l}^{-1}$ )	Total microcystins ( $\mu\text{g l}^{-1}$ )			PC ( $\mu\text{g l}^{-1}$ )	Total microcystins ( $\mu\text{g l}^{-1}$ )		
<50 $\mu\text{m}$				WLW				BFC			
	Mean	C.I.(-)	C.I.(+)	Mean	C.I.(-)	C.I.(+)		Mean	C.I.(-)	C.I.(+)	
10	0.022	0.016	0.030	10	0.022	0.016	0.030	500	1.47	1.09	1.99
20	0.046	0.035	0.061	20	0.046	0.035	0.061	1000	3.11	2.19	4.42
30	0.071	0.055	0.092	25	0.058	0.045	0.076	2000	6.58	4.35	9.89
40	0.097	0.076	0.124	50	0.123	0.097	0.157	3000	10.16	6.50	15.88
50	0.123	0.097	0.157	75	0.191	0.151	0.241	5000	17.62	10.75	28.88
75	0.191	0.151	0.241	100	0.260	0.206	0.328	8000	29.31	17.06	50.13
100	0.260	0.206	0.328	125	0.330	0.261	0.419	10000	37.24	21.23	65.15
				150	0.403	0.316	0.512				

### Upper Mill Pond 2017





What happened in July 2017? Likely a spike in PC and bloom prior to August 1.

# Next steps

- Stay the course (sampling, tracking data, alerting town when needed)
- Would like to have some more BPC involvement with sample collection, processing, analysis, perhaps photography
- Call for volunteers on Tuesdays 9am to 2pm (BH to reach out to group)
- Visual inspection of ponds in early morning (photograph scums on shore or surface of water, send to me and upload to Bloomwatch app).
- Updates on toxin analysis to Town and BPC asap
- End of season update

Bryan Horsley

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