CLONet

Coastal Lakes Observing Network

Season 1 workshop

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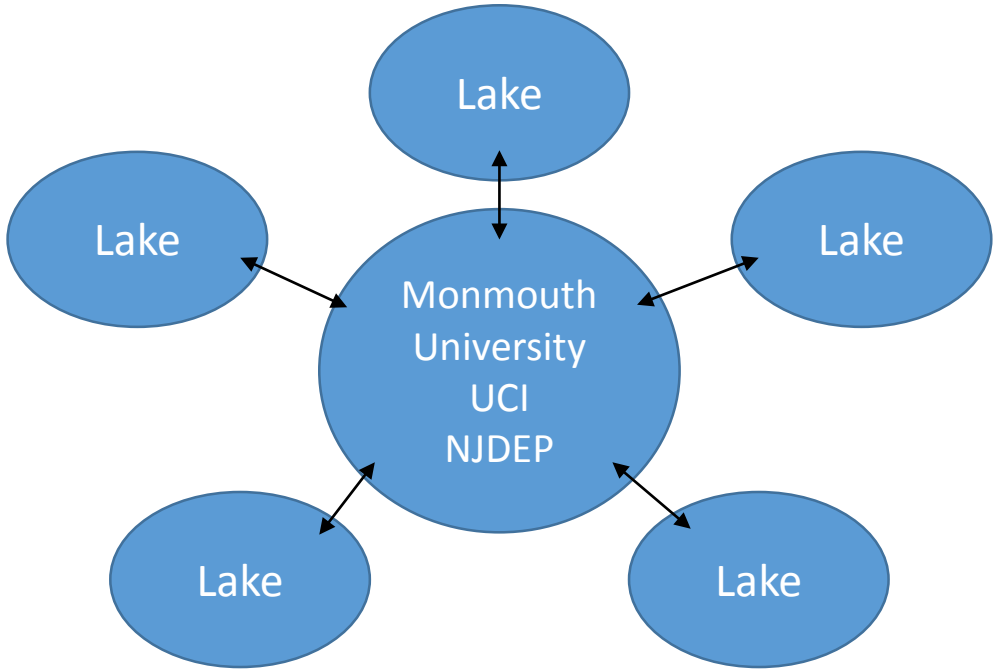
November 1, 2019

Outline

- Recap what CLONet is and why we do it
- How sampling ended up happening
  - Community training
  - Community sampling efforts
  - Monmouth PHABLab sampling
- Results / discussion of season 1 sampling
- Future directions

CLONet
Coastal Lakes Observing Network

- A community-based, participatory research and restoration group that will allow communities to address coastal lake issues *based on their own knowledge and use of the underlying scientific data*.



Coastal Lakes Summit 2019

Monmouth University

Asbury Park Press coverage…

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MONMOUTH UNIVERSITY URBAN COAST INSTITUTE BRINGS CLONET PROGRAM TO ASBURY PARK

Deal Lake, Sunset Lake and Wesley Lake to Benefit from Water Testing Program

6/12/19, Asbury Park, NJ – The Monmouth University Urban Coast Institute has partnered with citizens from coastal communities of Monmouth County and the New Jersey Department of Environmental Protection (NJDEP) to launch the Coastal Lakes Observing Network (CLONet) program to monitor and track the health of 10 Monmouth County Lakes including Deal Lake, Sunset Lake and Wesley Lake in Asbury Park. The community-based monitoring program, made possible by a grant from the Jules L. Plangere, Jr. Family Foundation, enlists local residents as citizen-scientists to collect water quality data


Coastal Lakes of Monmouth County, NJ
Lake Takanassee / Whale Pond Brook
Deal Lake
Sunset Lake
Wesley Lake
Fletcher Lake
Sylvan Lake
Silver Lake
Lake Como
Spring Lake
Wreck Pond
CLONet: Let's move from a piecemeal to a regional, community-driven approach
Google Earth
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
Image © 2019 TerraMetrics
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Training sessions: summer 2019

Photos by Maria Riley

Lake sampling plans and accomplishments…

A proposed sampling schedule per station

Time period	Frequency	Samples
Jan - Mar	2-week	6
Apr - Oct	Weekly	28
Nov - Dec	2-week	4
	Sum	**38**

Indicators
- Lake comparisons
- Changes over time

CLONet citizen scientist sampling accomplishments – Season 1

Lake	Stations	Samples	Time frame
Deal Lake	4	11	7/27/2019 - 9/28/2019
Lake Como	2	29	6/9/2019 - 9/30/2019
Lake Takanassee	3	27	6/4/2019-9/24/2019
Spring Lake	2	26	6/5/2019 - 9/18/2019
Sunset Lake	2	14	6/1/2019 - 8/25/2019
Sylvan Lake	1	8	8/1/2019 - 9/29/2019
Wesley Lake	2	37	5/24/2019 - 9/27/2019

What did we learn?

Warning – lots of data coming…

Monmouth County coastal lakes showed a range of water quality

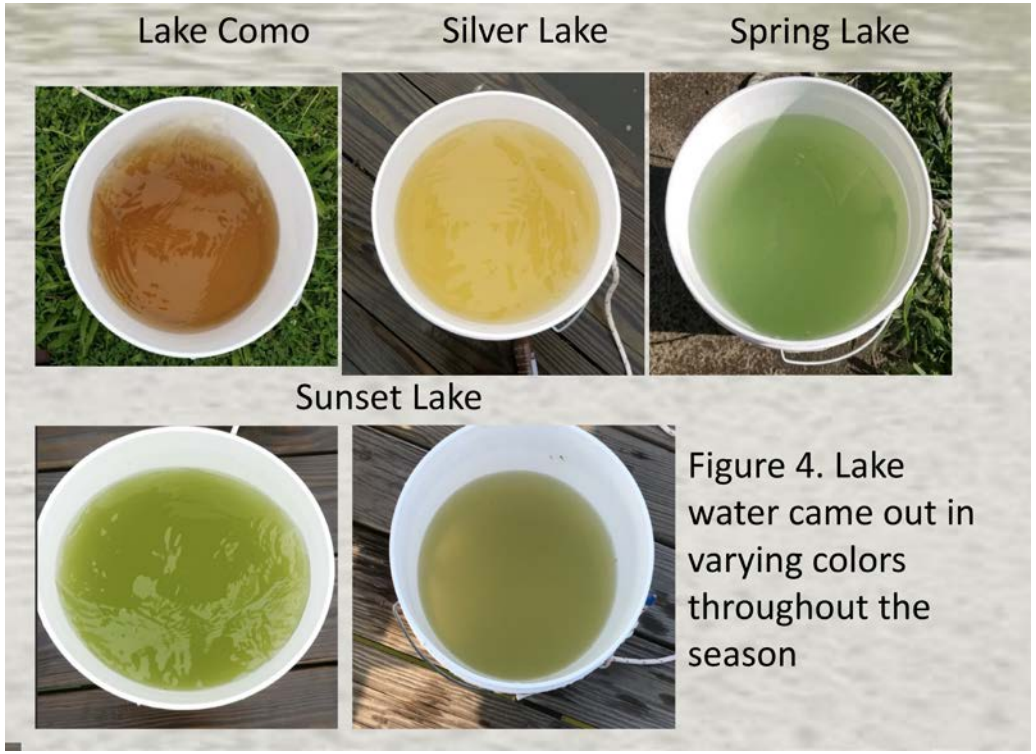
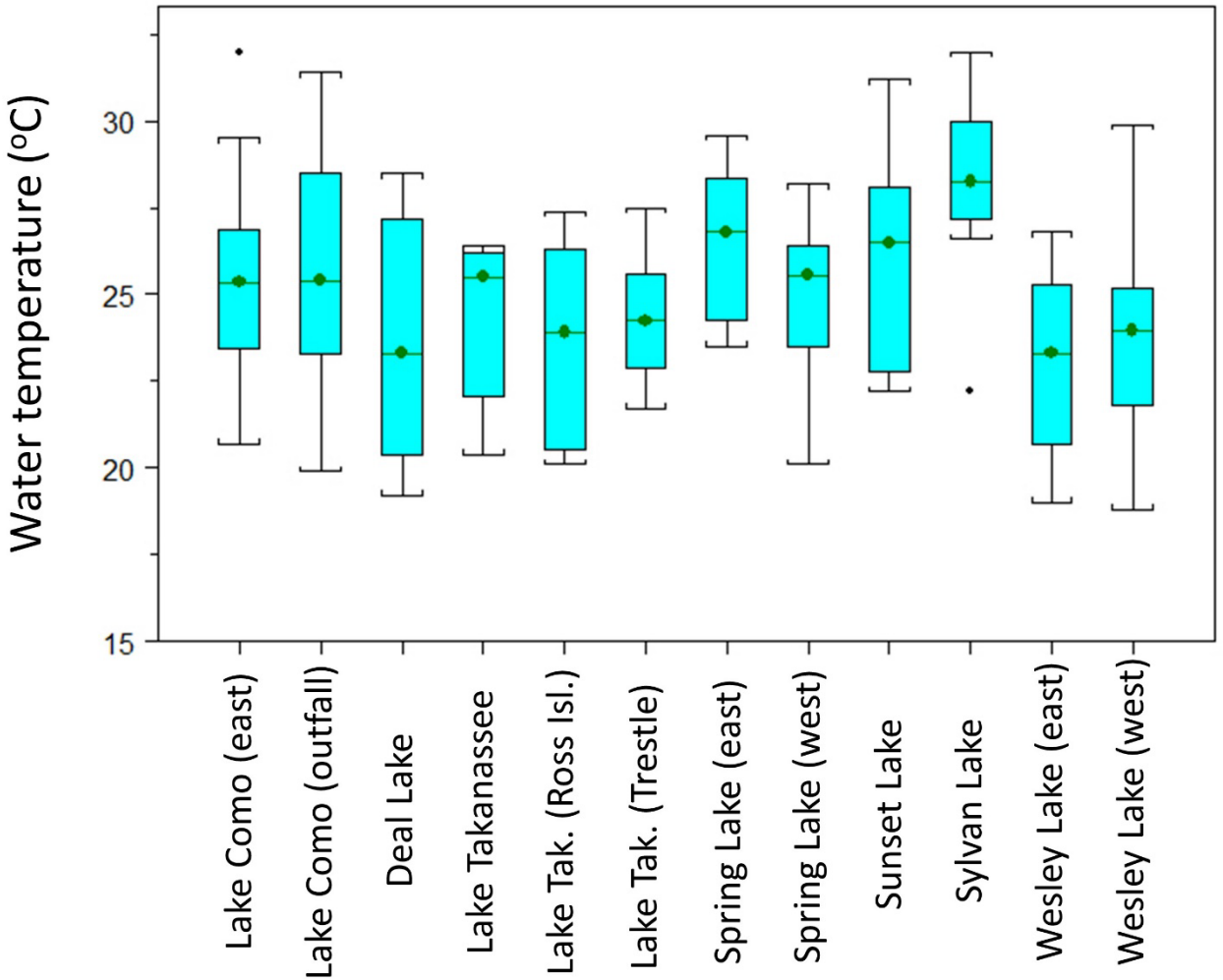
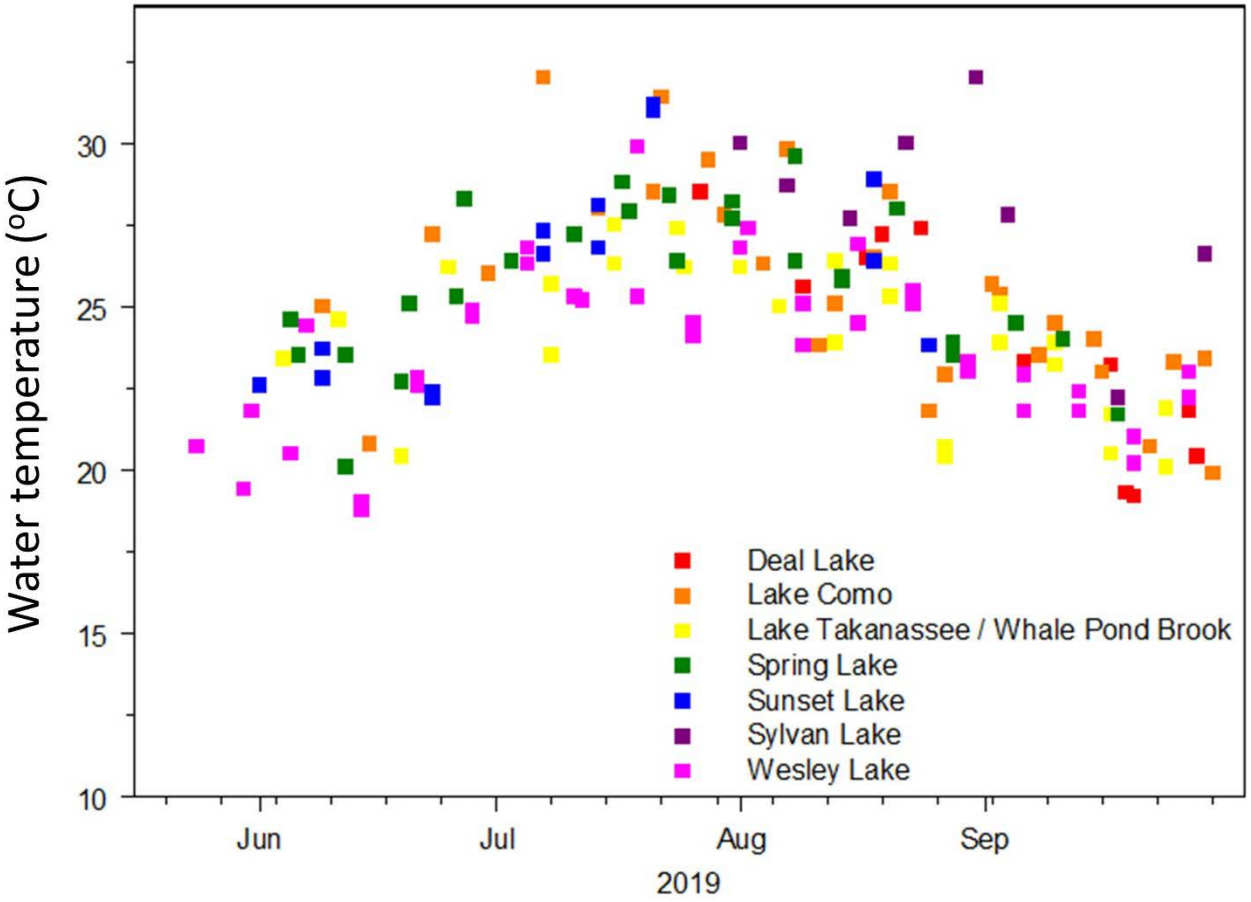


Figure 4. Lake water came out in varying colors throughout the season

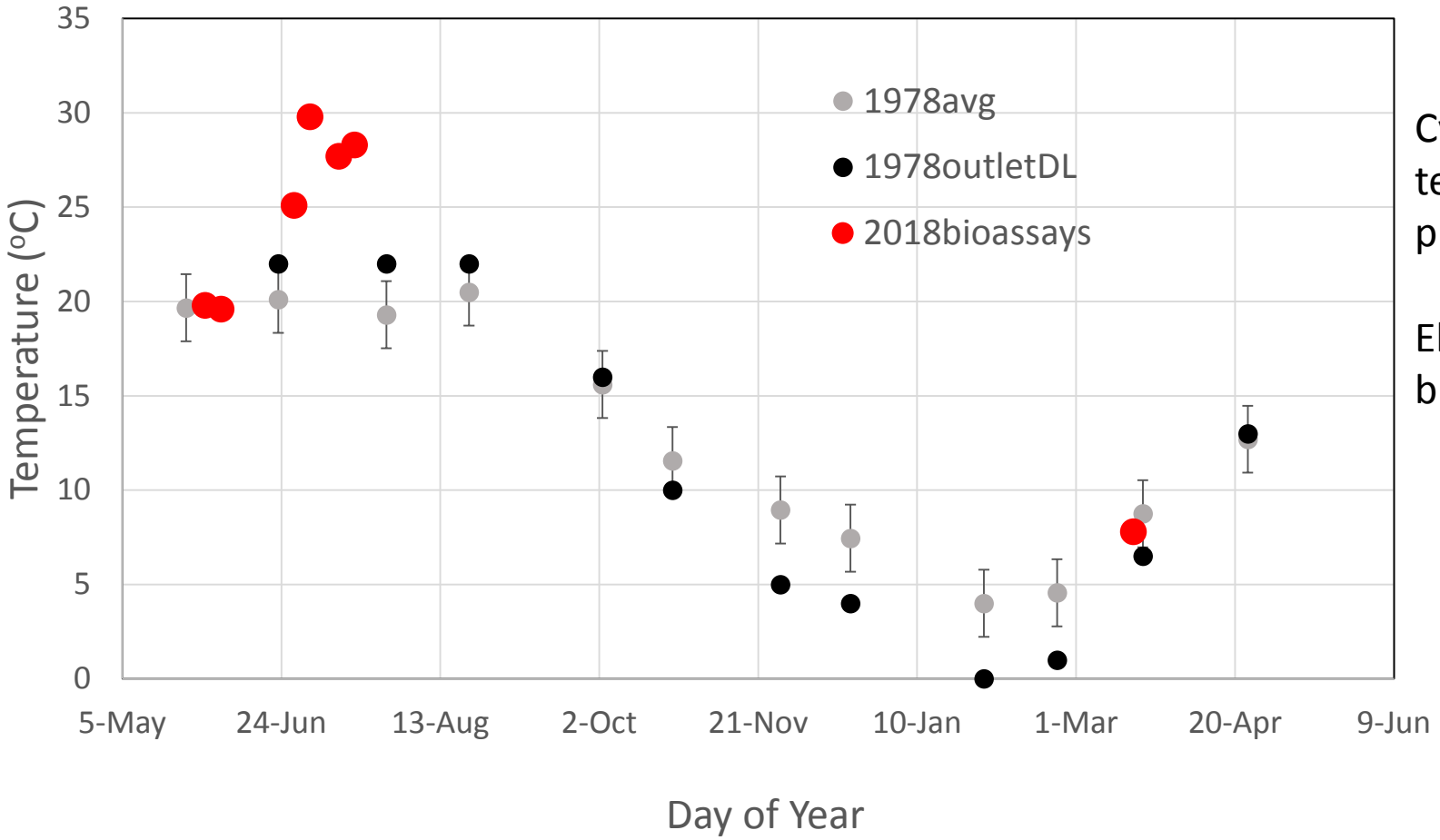
Lake temperatures – *warm water*

(your real data, and an example of how I have summarized it…)





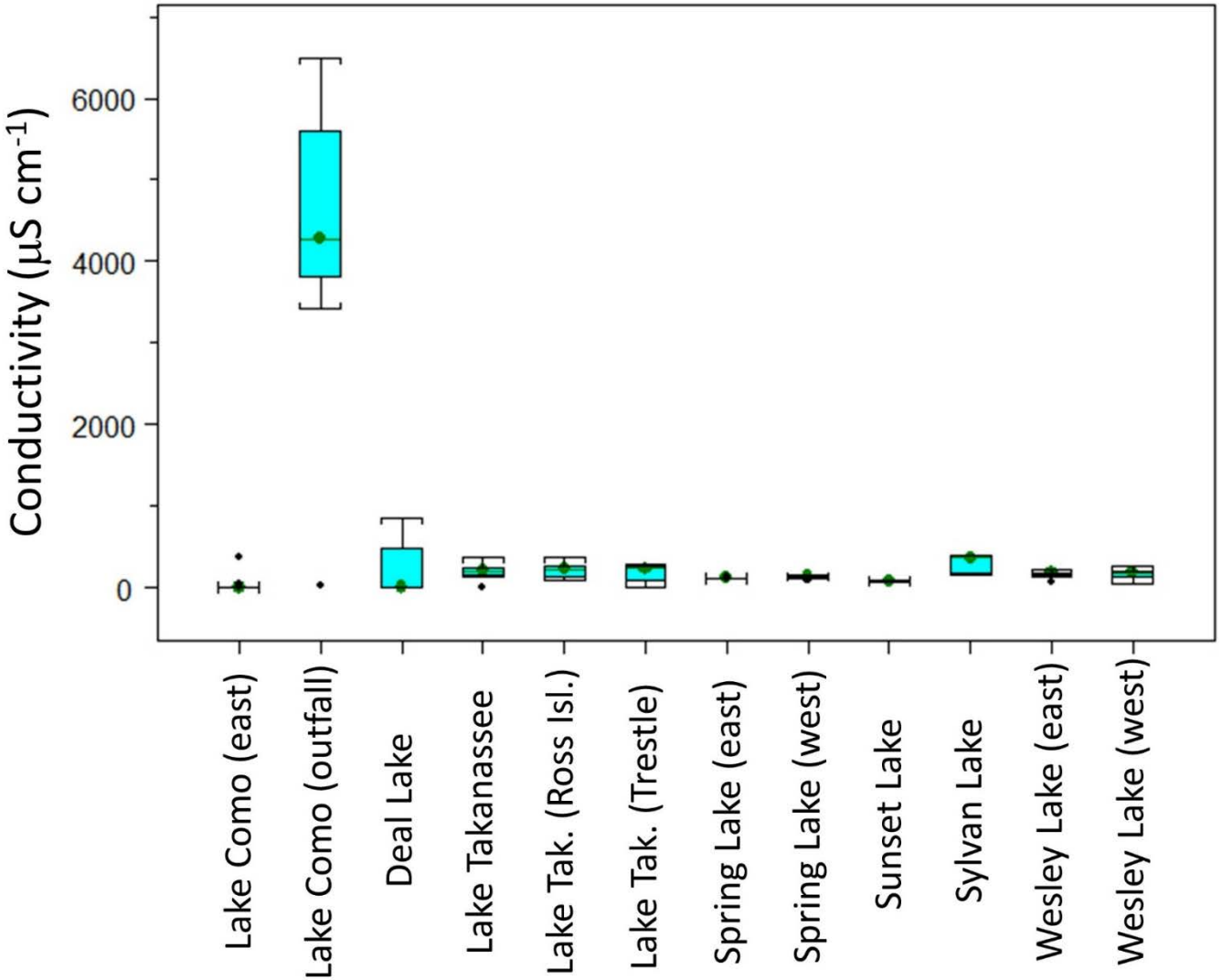
Our ‘18-’19 records of lake temperature are high compared to a 1978 study of Deal Lake



Cyanos have high optimum growth temperatures (>25 °C) relative to competing phytoplankton (Visser et al. 2015)

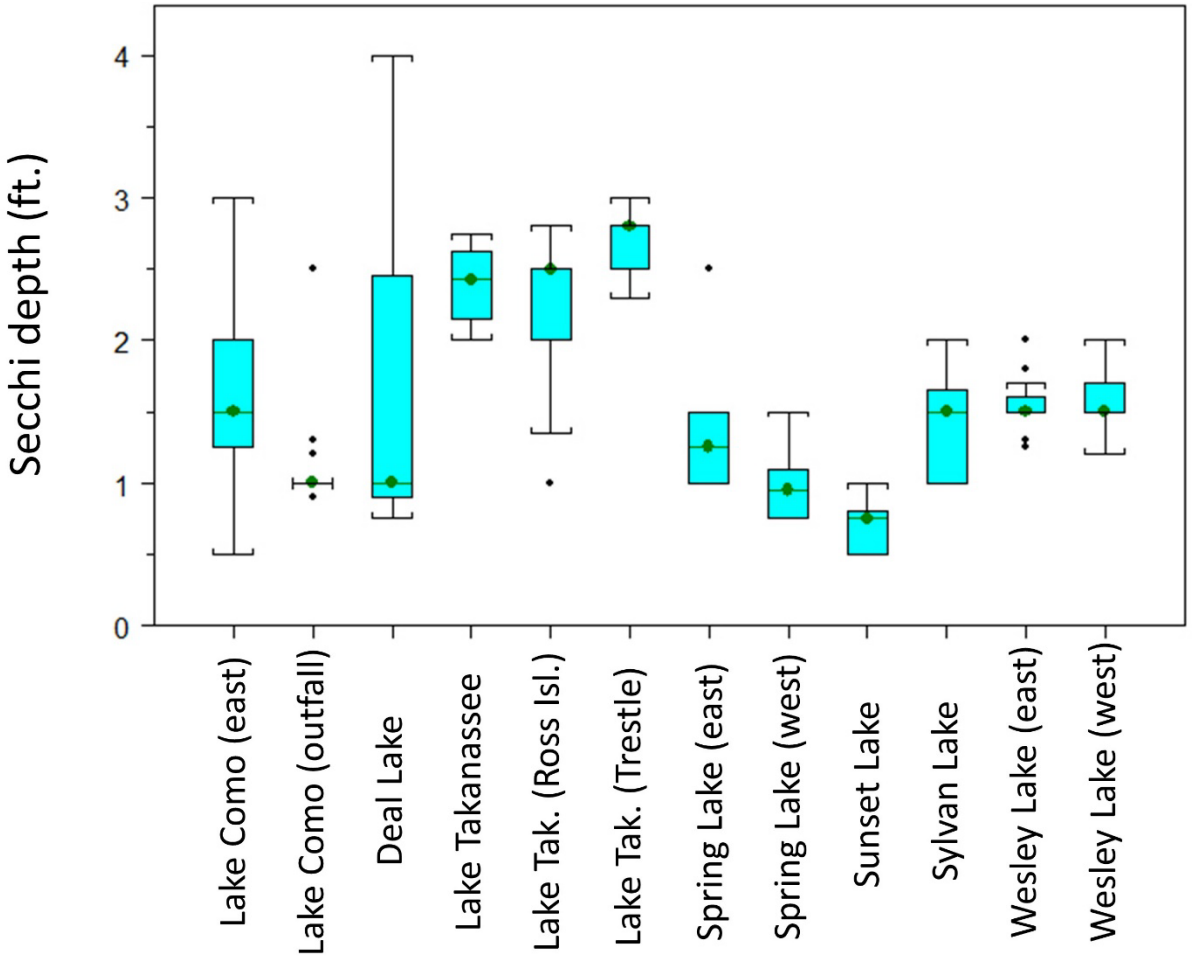
Elevated CO_2 may favor cyanobacteria blooms (Visser et al. 2015)

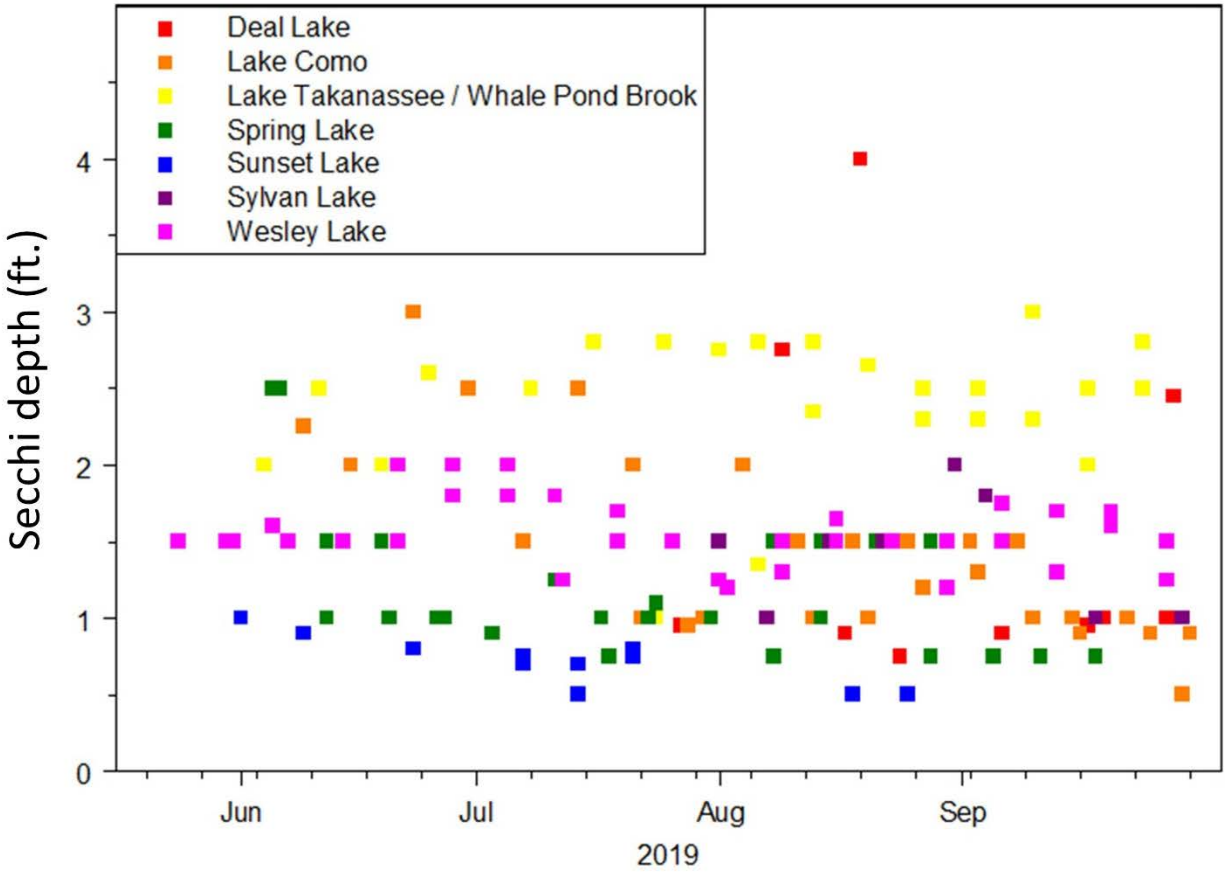
Coastal Lakes (sampling sites) are predominantly fresh water



Ocean conductivity would be >40,000

Secchi depth varied among lakes but were all generally low





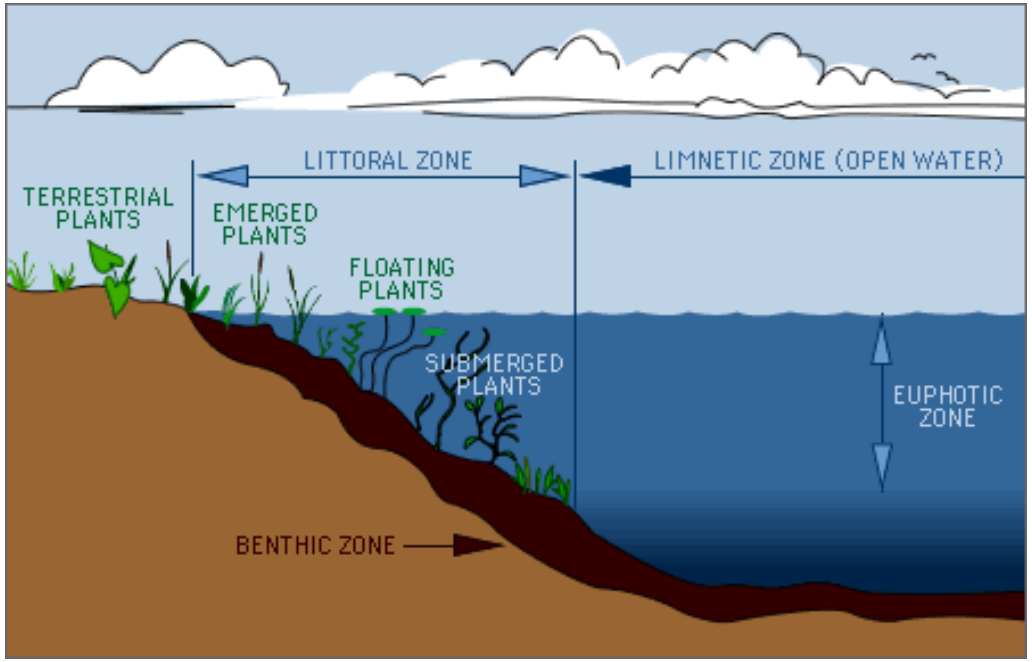
Secchi depth is an indicator of Lake trophic status

- Carlson Lake classifications by trophic status

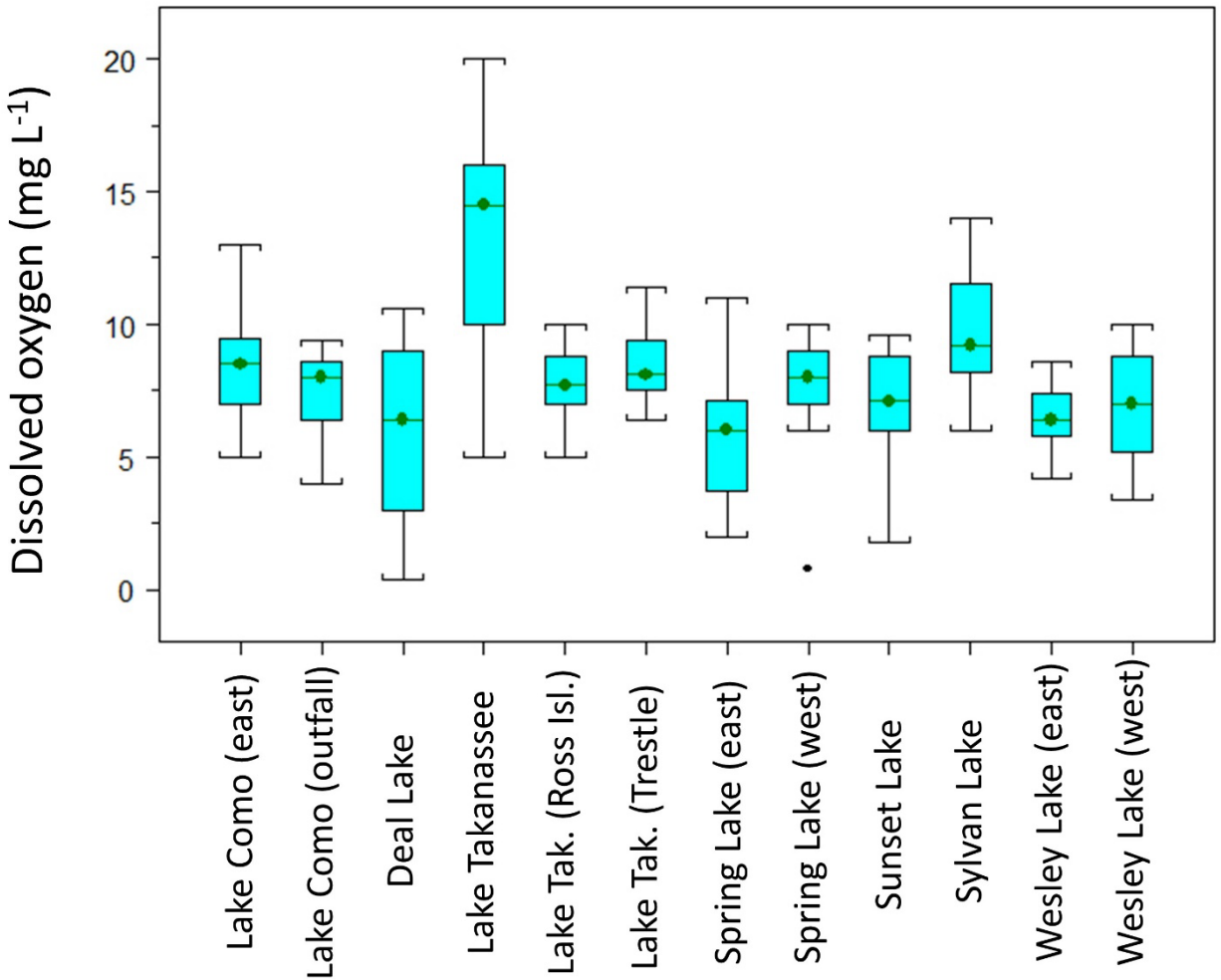
Table 1. Completed trophic state index and its associated parameters.

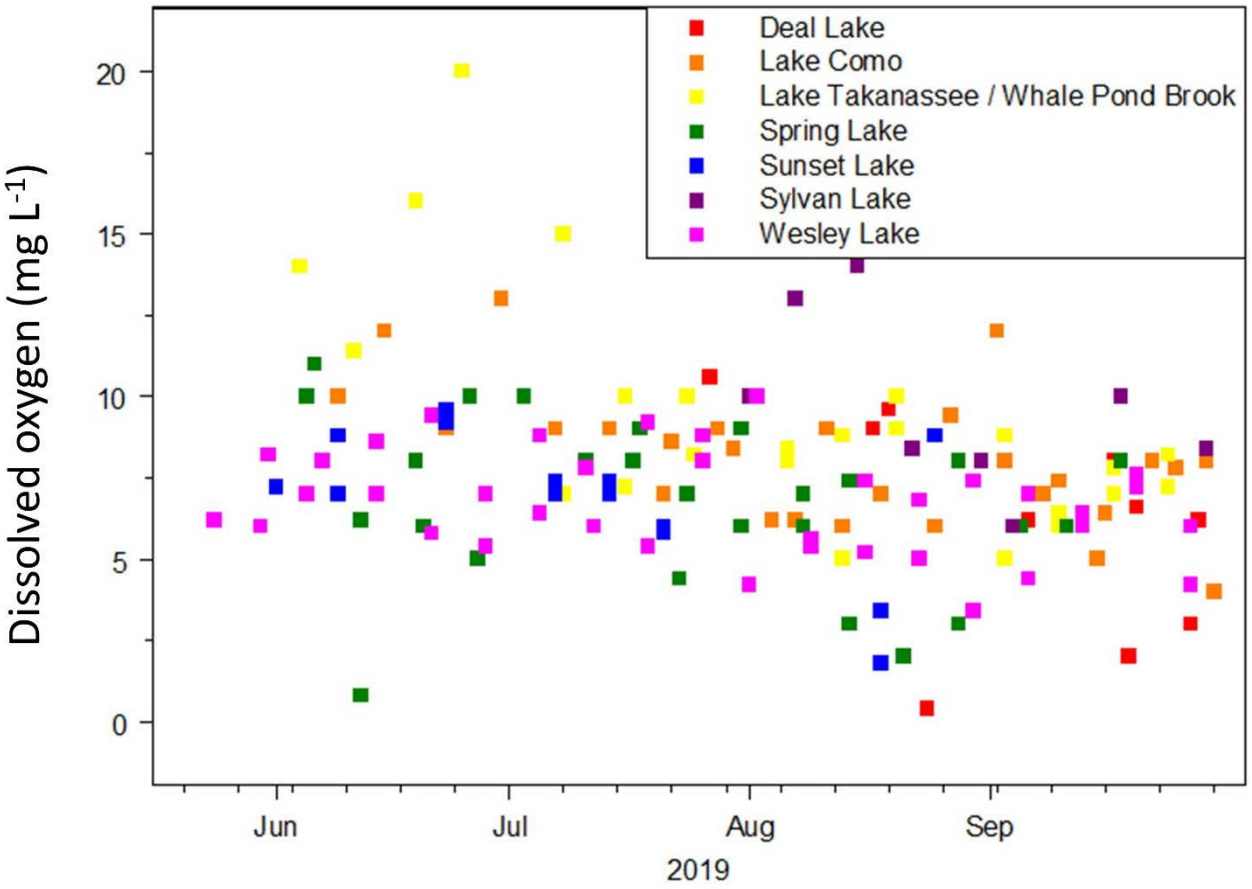
TSI	Secchi disk (m)	Surface phosphorus (mg/m^3)	Surface chlorophyll (mg/m^3)
0	64	0.75	0.04
10	32	1.5	0.12
20	16	3	0.34
30	8	6	0.94
40	4	12	2.6
50	2	24	6.4
60	1	48	20
70	0.5	96	56
80	0.25	192	154
90	0.12	384	427
100	0.062	768	1183

Our Secchi measurements indicate light penetrates about 2 – 6 ft in the lakes

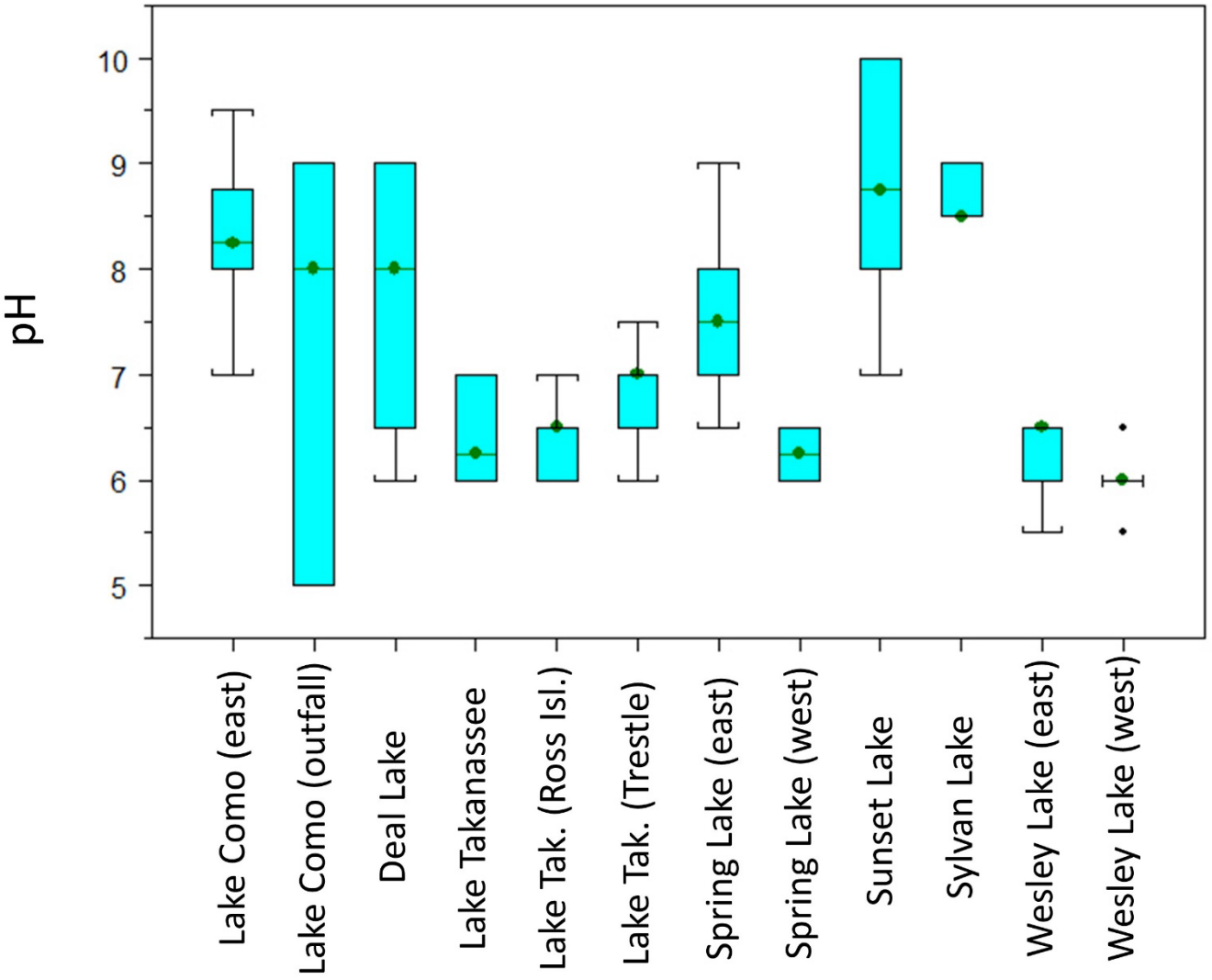


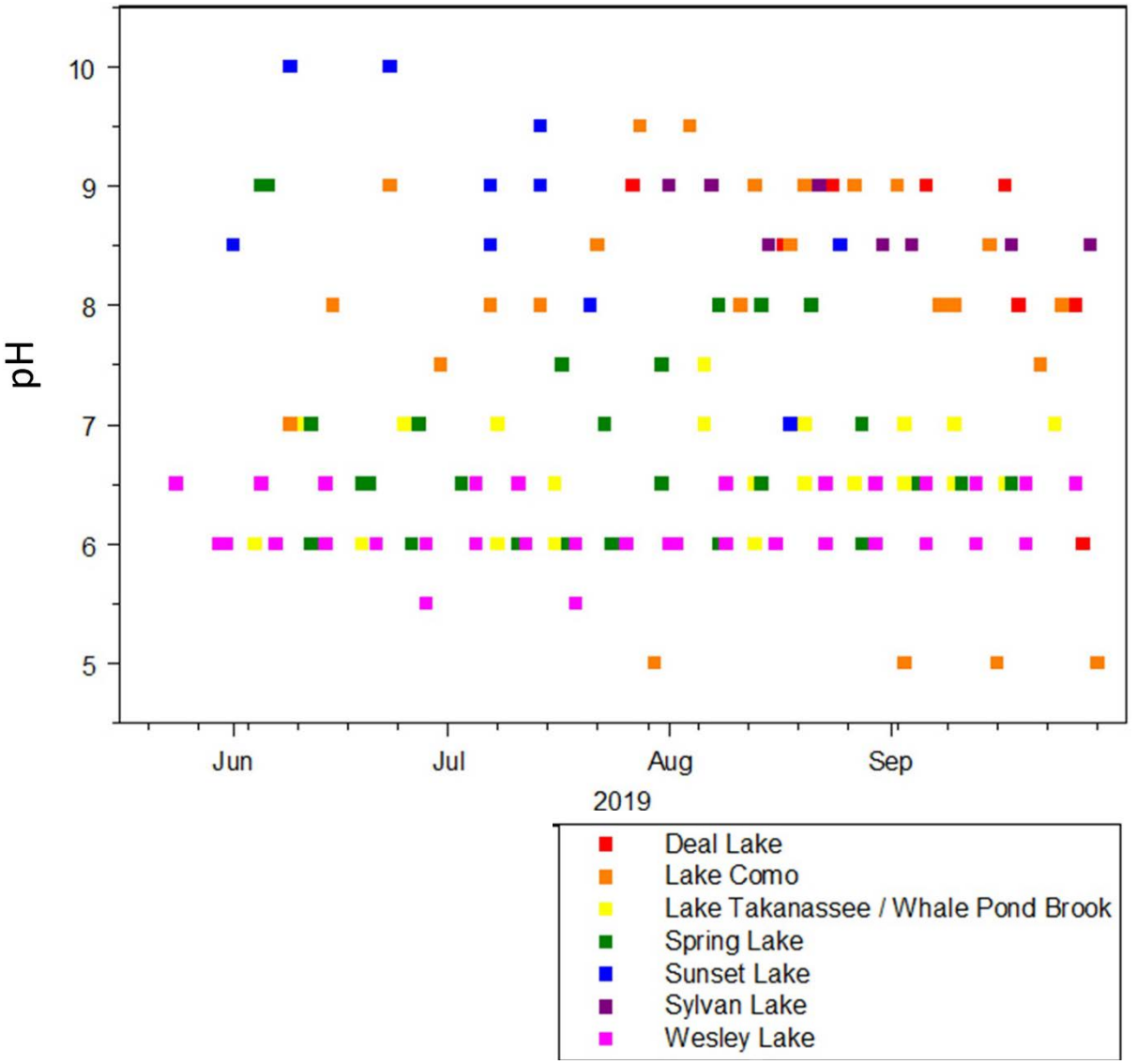
Daytime dissolved oxygen was generally OK



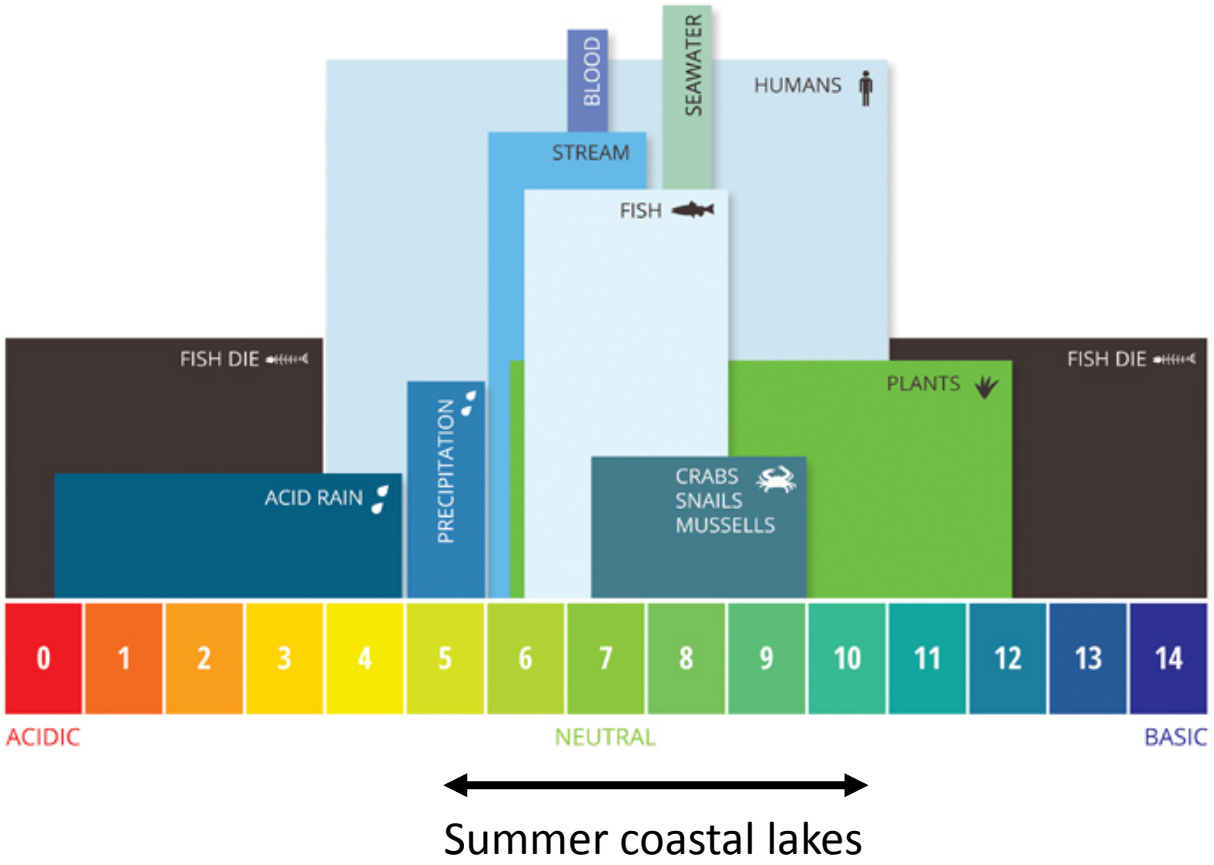


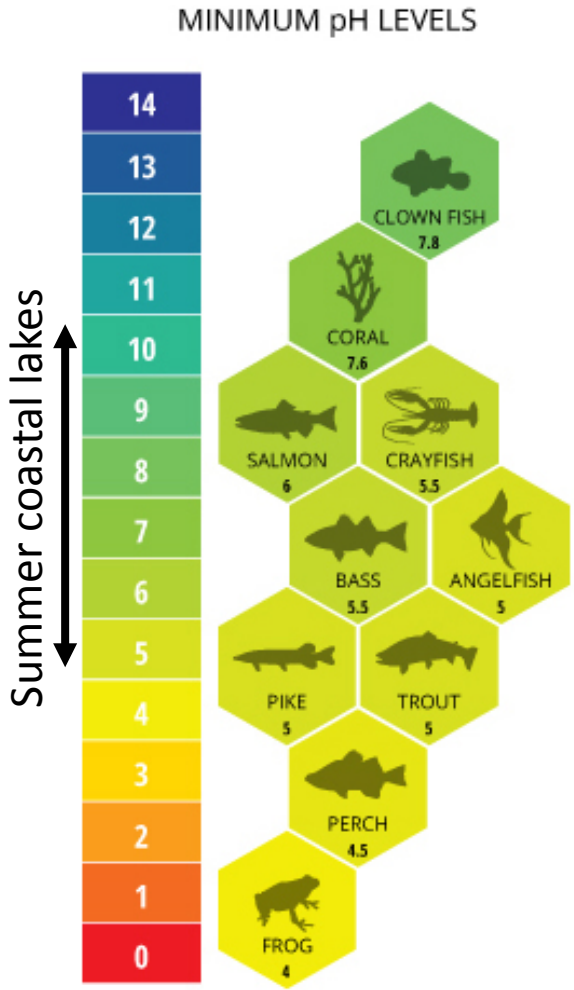
pH varied widely among lakes





pH is a habitat delimiter for organisms





These data set the stage for monitoring and understanding how lakes respond to events

Monmouth University / NJ DEP Coastal Lakes data

- Sampled 10 lakes weekly
  - Focused on water quality, nutrients, and HABs across lakes
- NJ DEP accepted 10 samples per week for a full suite of nutrient analyses (Leeds Point Lab, Galloway, NJ)

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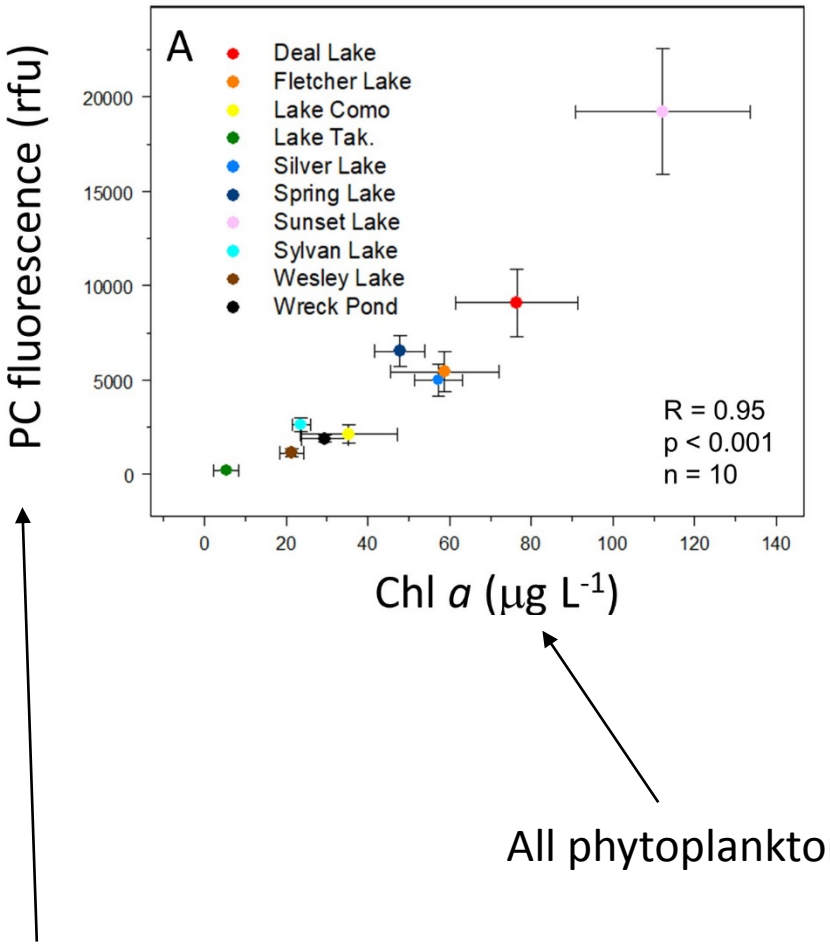
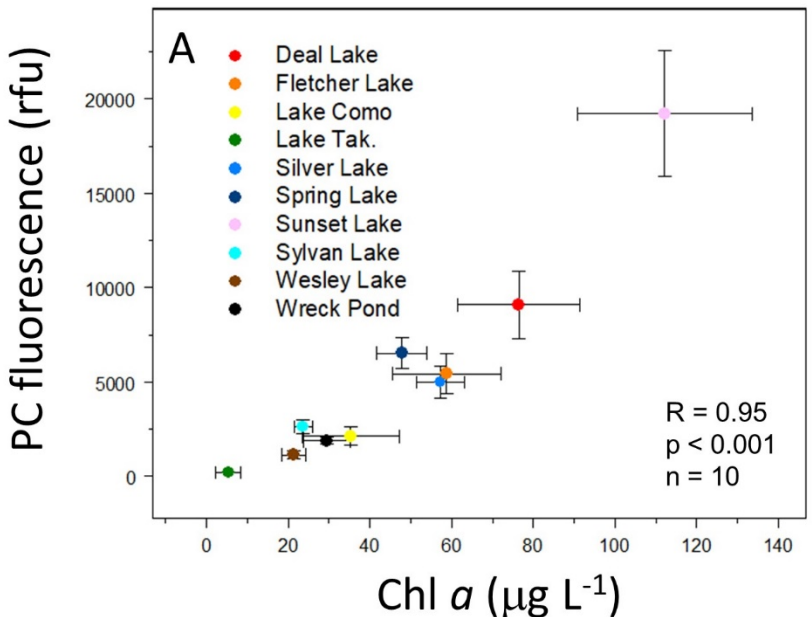
PHABLAB

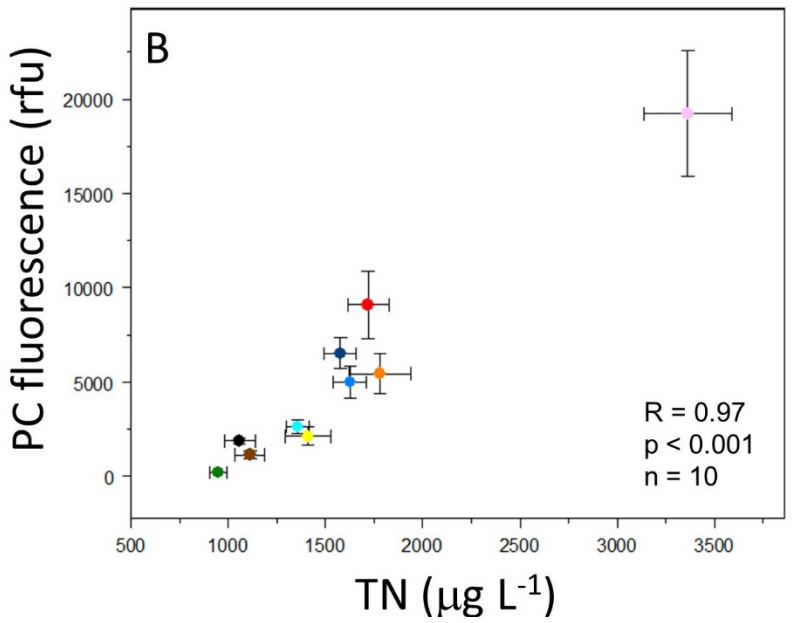


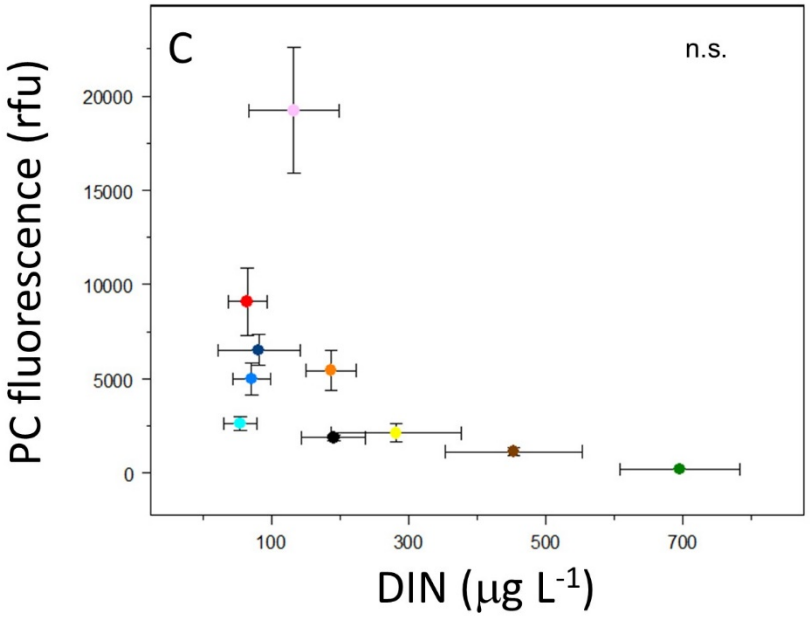
HABs were correlated with total phytoplankton across lakes

All phytoplankton

HAB abundance

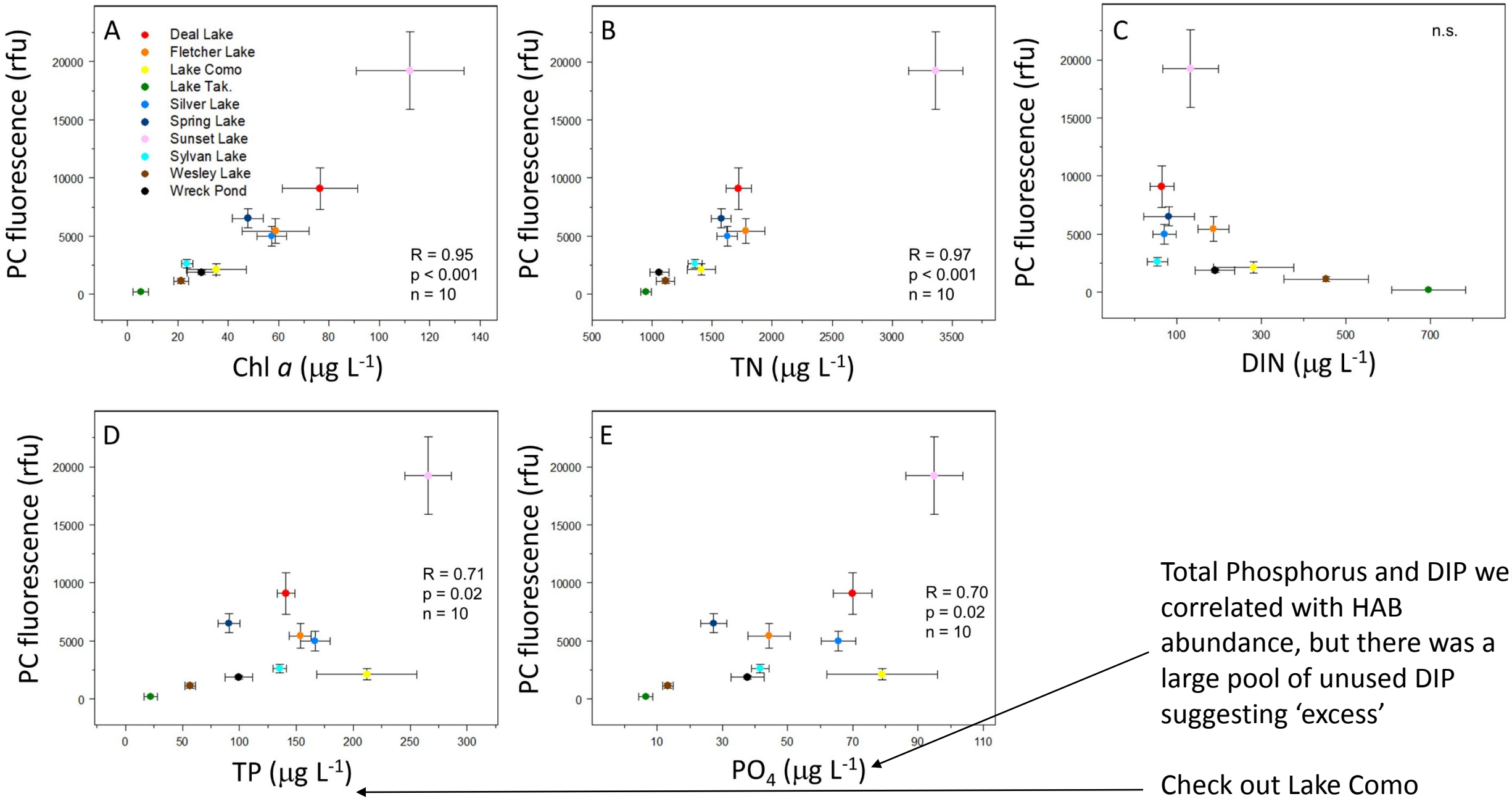






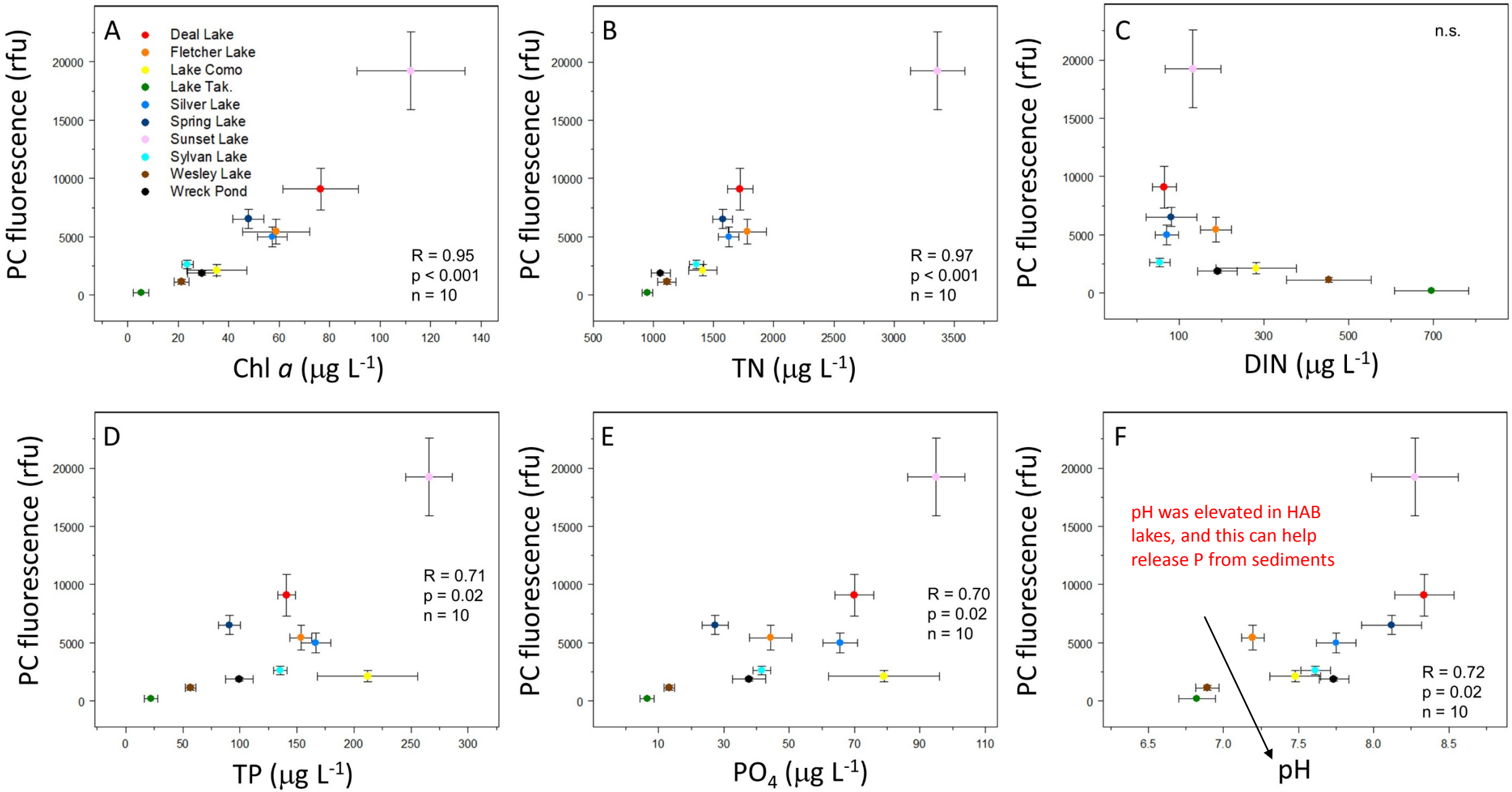
HAB abundance correlated strongly with Total Nitrogen…

…but available inorganic N was lower in HAB lakes

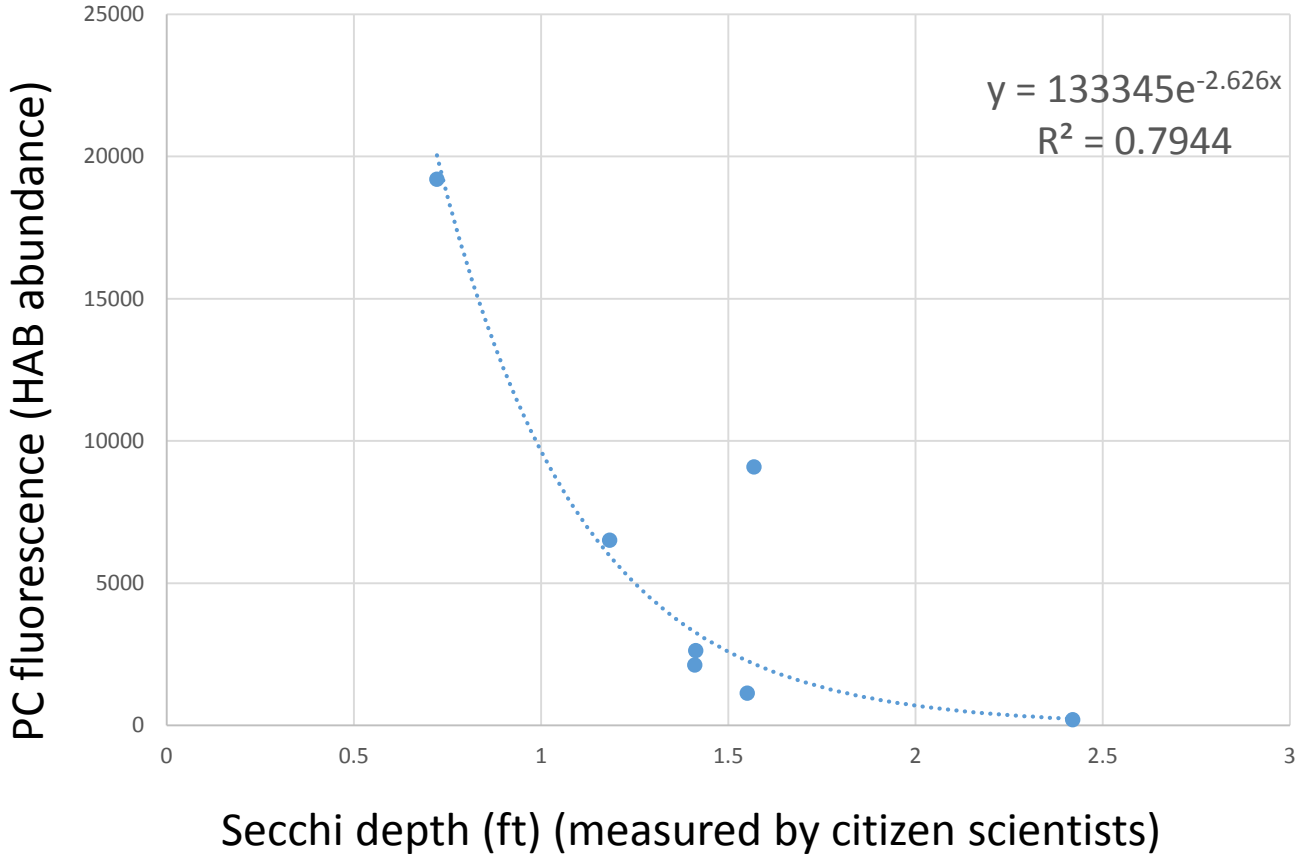


Total Phosphorus and DIP were correlated with HAB abundance, but there was a large pool of unused DIP suggesting 'excess'

Check out Lake Como


A
Deal Lake
Fletcher Lake
Lake Como
Lake Tak.
Silver Lake
Spring Lake
Sunset Lake
Sylvan Lake
Wesley Lake
Wreck Pond
R = 0.95
p < 0.001
n = 10
PC fluorescence (rfu)
Chl a (µg L-1)
B
R = 0.97
p < 0.001
n = 10
TN (µg L-1)
C
n.s.
DIN (µg L-1)
D
R = 0.71
p = 0.02
n = 10
TP (µg L-1)
E
R = 0.70
p = 0.02
n = 10
PO4 (µg L-1)
F
pH was elevated in HAB lakes, and this can help release P from sediments
R = 0.72
p = 0.02
n = 10
pH

Do the citizen scientist and MU / NJDEP data sets match up at all?



Secchi depth measured by citizen scientists was a good indicator of HAB abundance

Thinking ahead / future CLONet additions

- We’ve got a strong program here – let’s leverage it to address broader issues in coastal lakes
  - How do lakes respond to management / restoration efforts?
  - Turtles / HABs / urban ecology?
  - Fish restoration efforts?

Prof. Sean Sterret will be at lunch today – we’re interested in using Monmouth County coastal lakes to understanding how turtles get along in urban – aquatic environments

Acknowledgements

- Thank you to the **Jules L. Plangere, Jr. Family Foundation** for a grant to the Monmouth University Urban Coast Institute supporting our CLONet project!
- Thanks to all of you for your enthusiasm, support and participation!

Questions? Discussion?