Bantam Lake Management in 2023

Brawley Consulting Group

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William Henley David Macaskill

June 24, 2023

Today…

- *Water Quality 2022 and 2023*
- *Investigations into Bantam Watershed*
- *Planning for an Alum Treatment*
- *But first…*

A Look Back in Time…

Temporal Changes in Diatom Valve Diameter Indicate Shifts in Lake Trophic Status

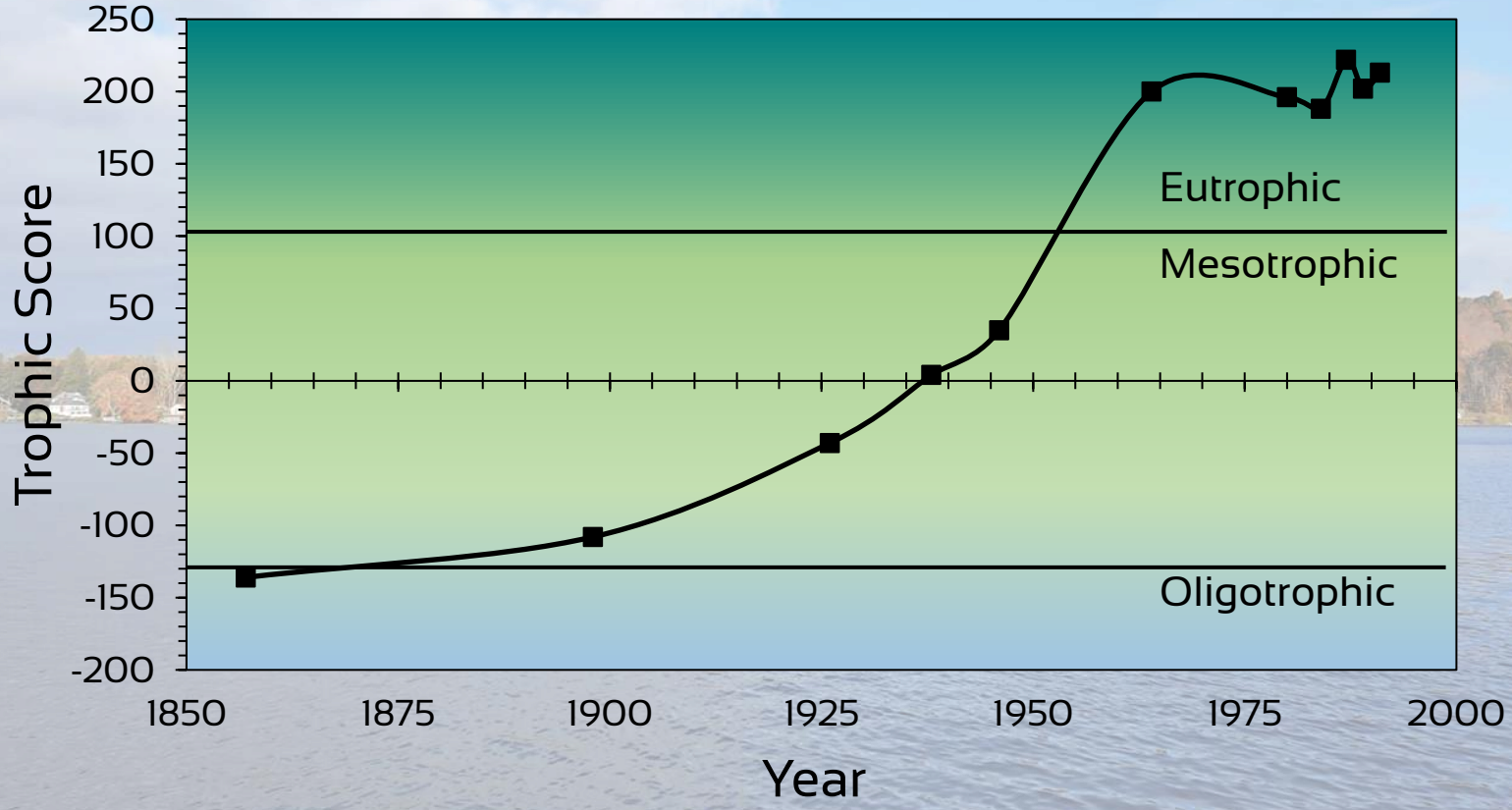
Peter A. Siver, Joel Sibley, Anne-Marie Lott, & Larry Marsicano

Journal of Paleolimnology

2021

Study based on Bantam Lake microalgae fossil record!

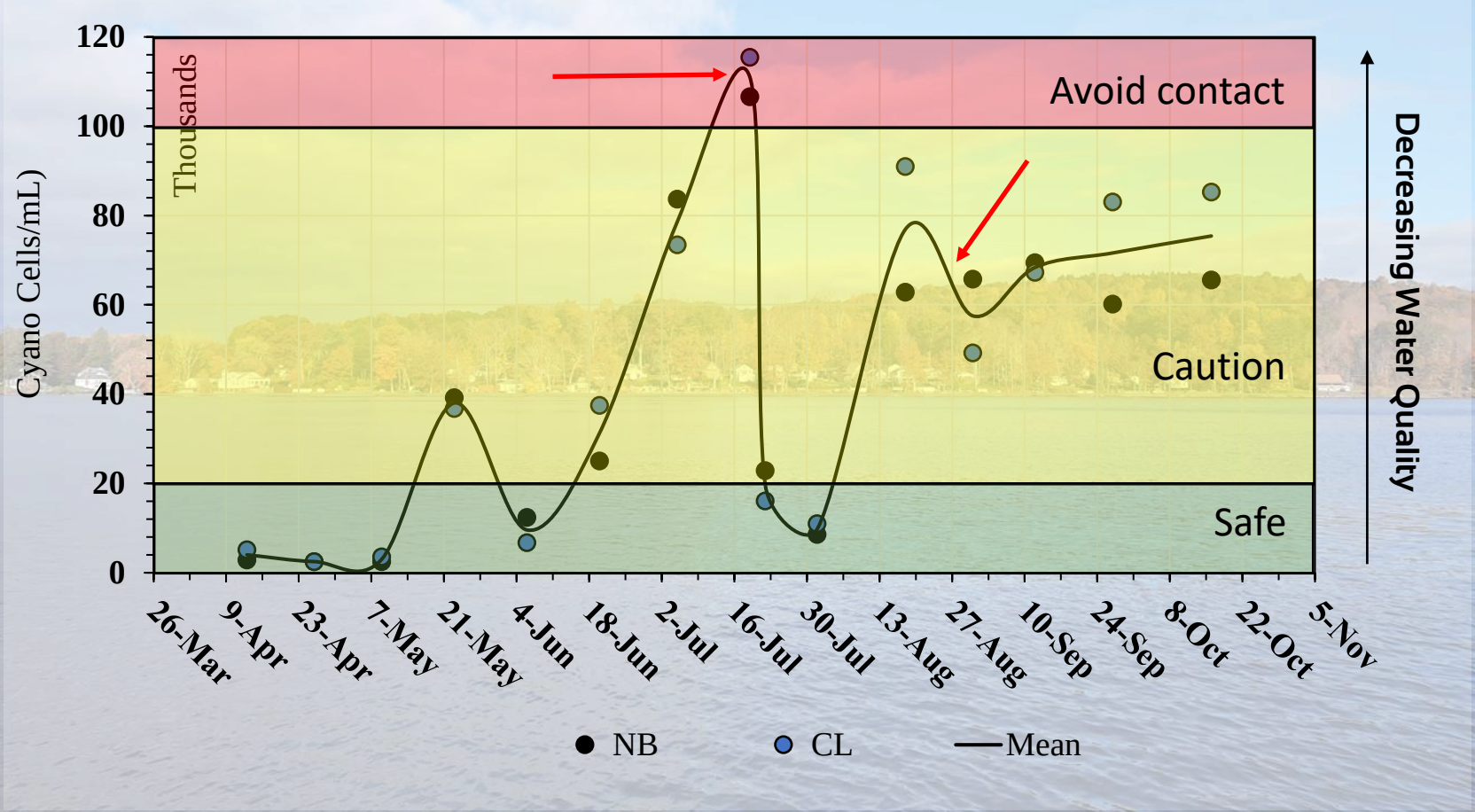
A Look Back in Time…



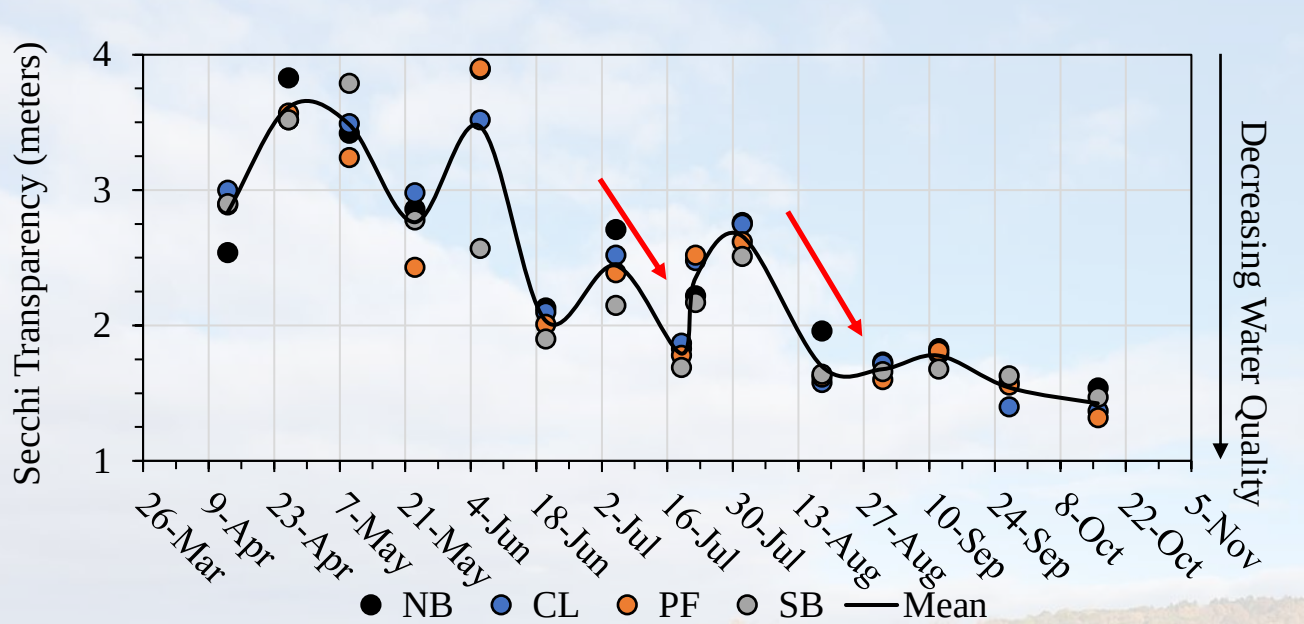
Siver et.al. 2021

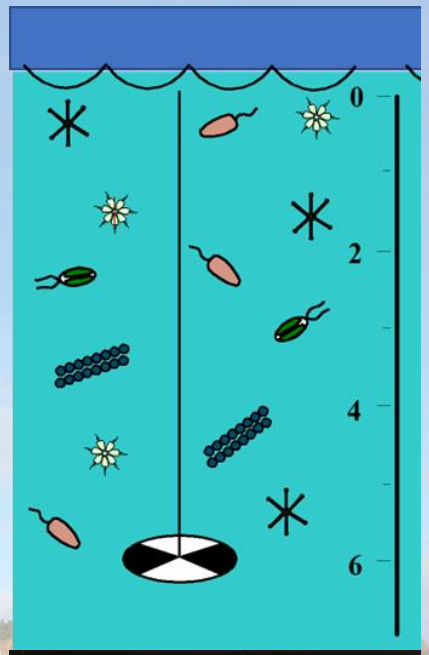
Lake shifts from oligotrophic to eutrophic over the course of 175 years.

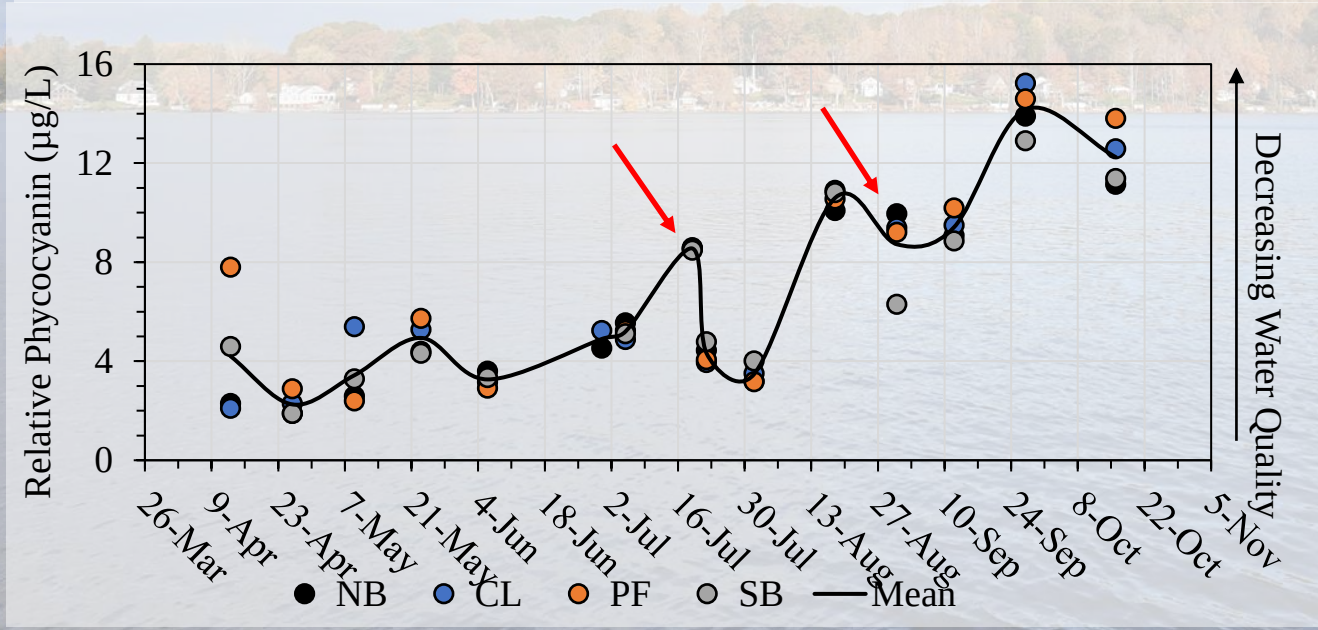
Cyanobacteria (aka blue-green algae) Cell Concentrations in 2022

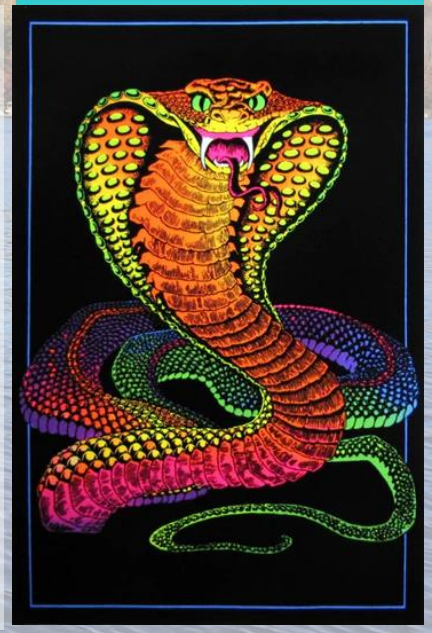


Colors correspond to the CT DEEP Visual Ranking System (CT DPH & CT DEEP 2021)





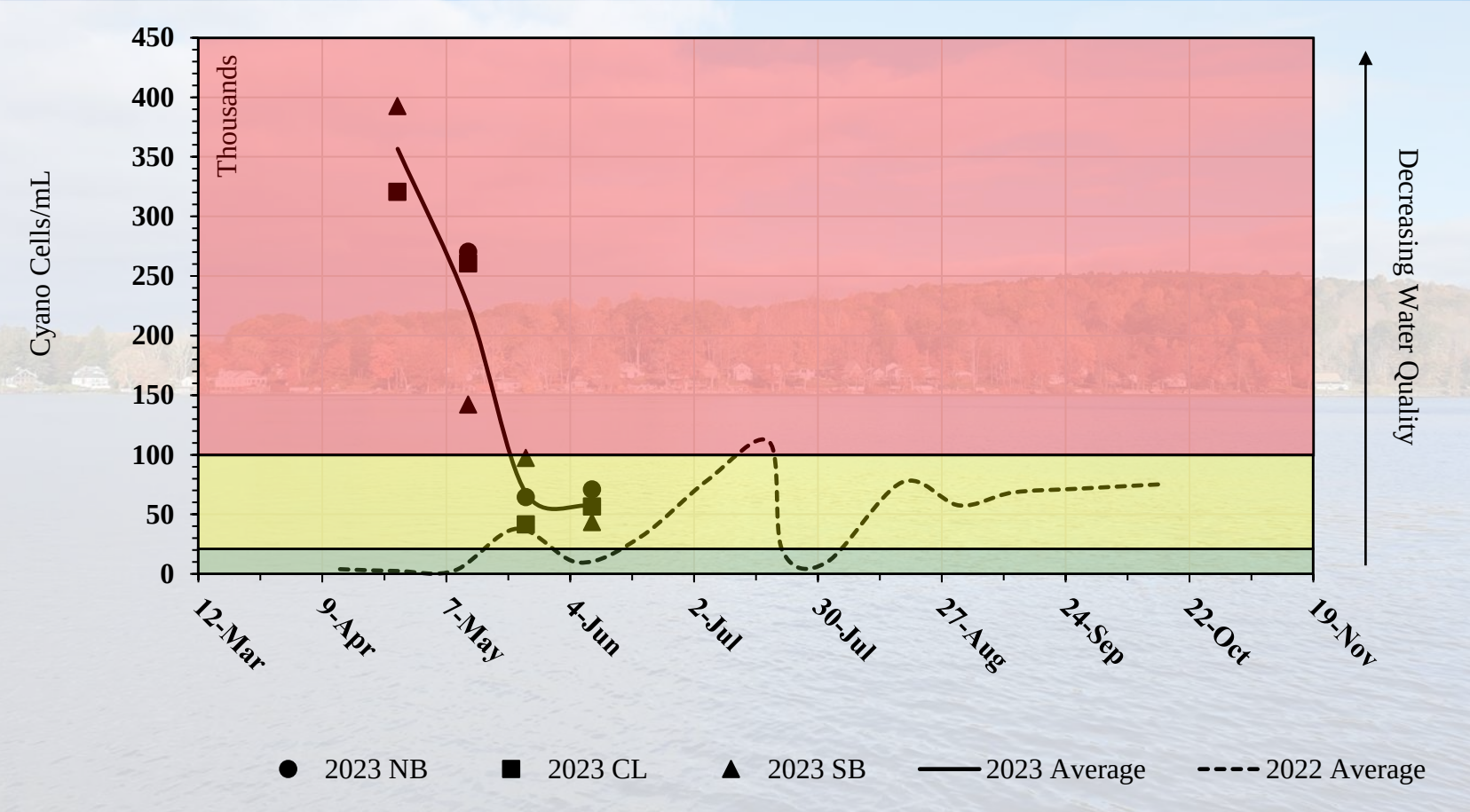


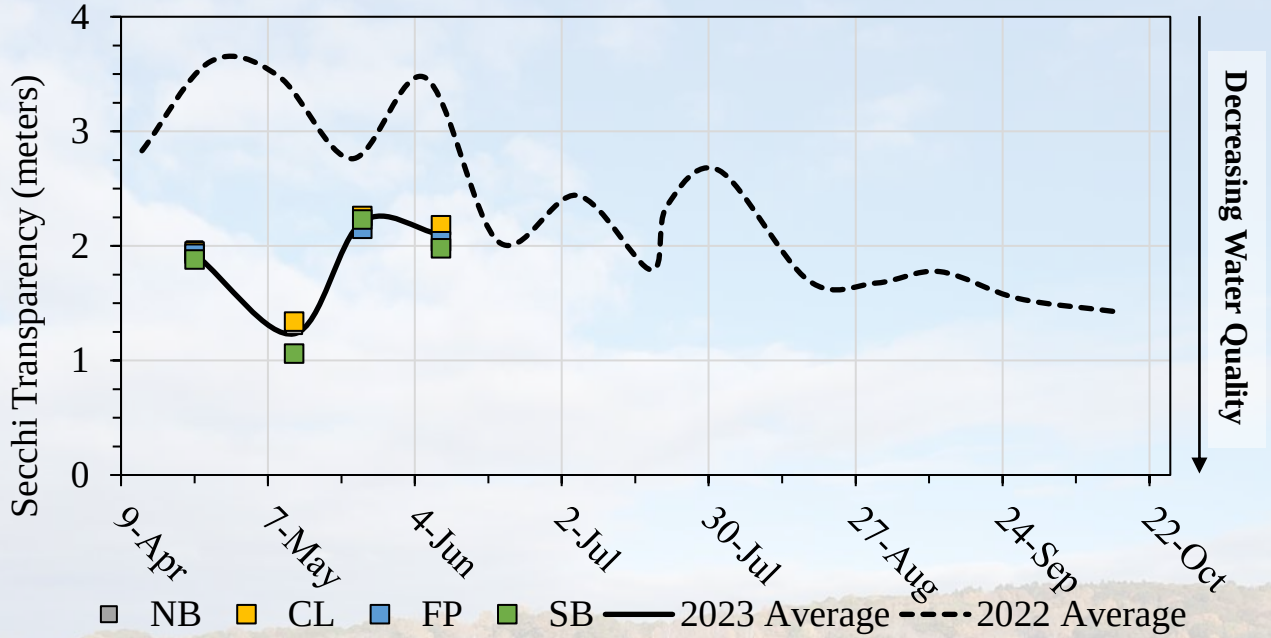


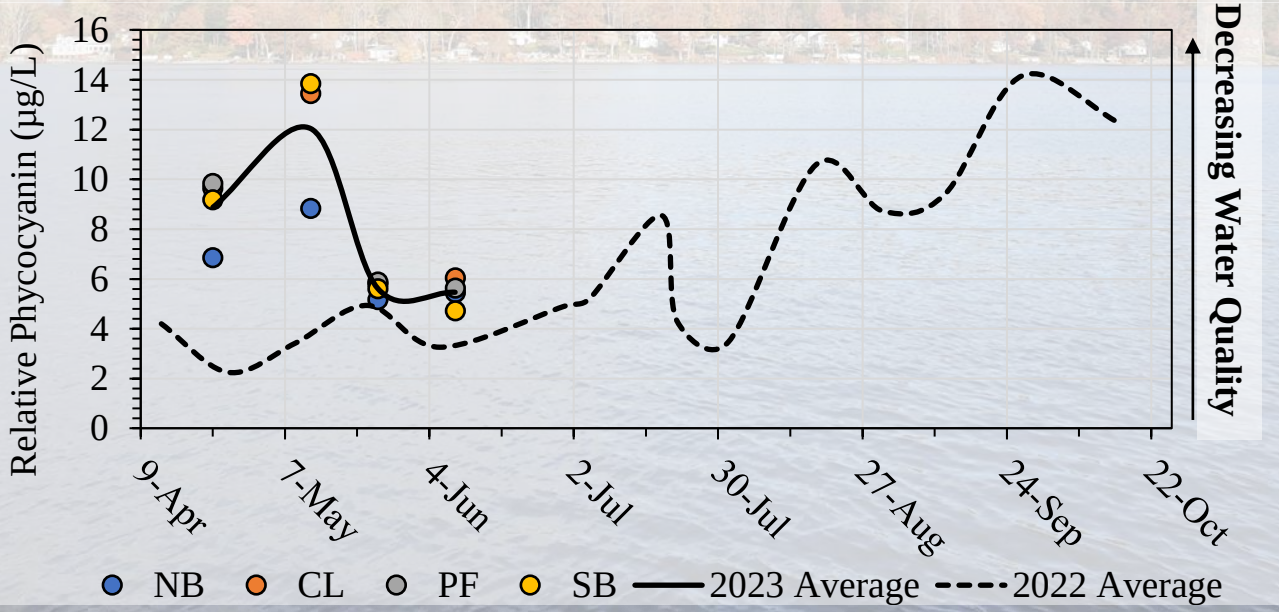
Corroborating lines of data collected at Bantam.

Blacklight poster!

Cyanobacteria Cell Concentrations in 2022 and 2023




Secchi Transparency (meters)
0
1
2
3
4
9-Apr
7-May
4-Jun
2-Jul
30-Jul
27-Aug
24-Sep
22-Oct
Decreasing Water Quality
NB
CL
FP
SB
2023 Average
2022 Average


Relative Phycocyanin (µg/L)
0
2
4
6
8
10
12
14
16
9-Apr
7-May
4-Jun
2-Jul
30-Jul
27-Aug
24-Sep
22-Oct
Decreasing Water Quality
NB
CL
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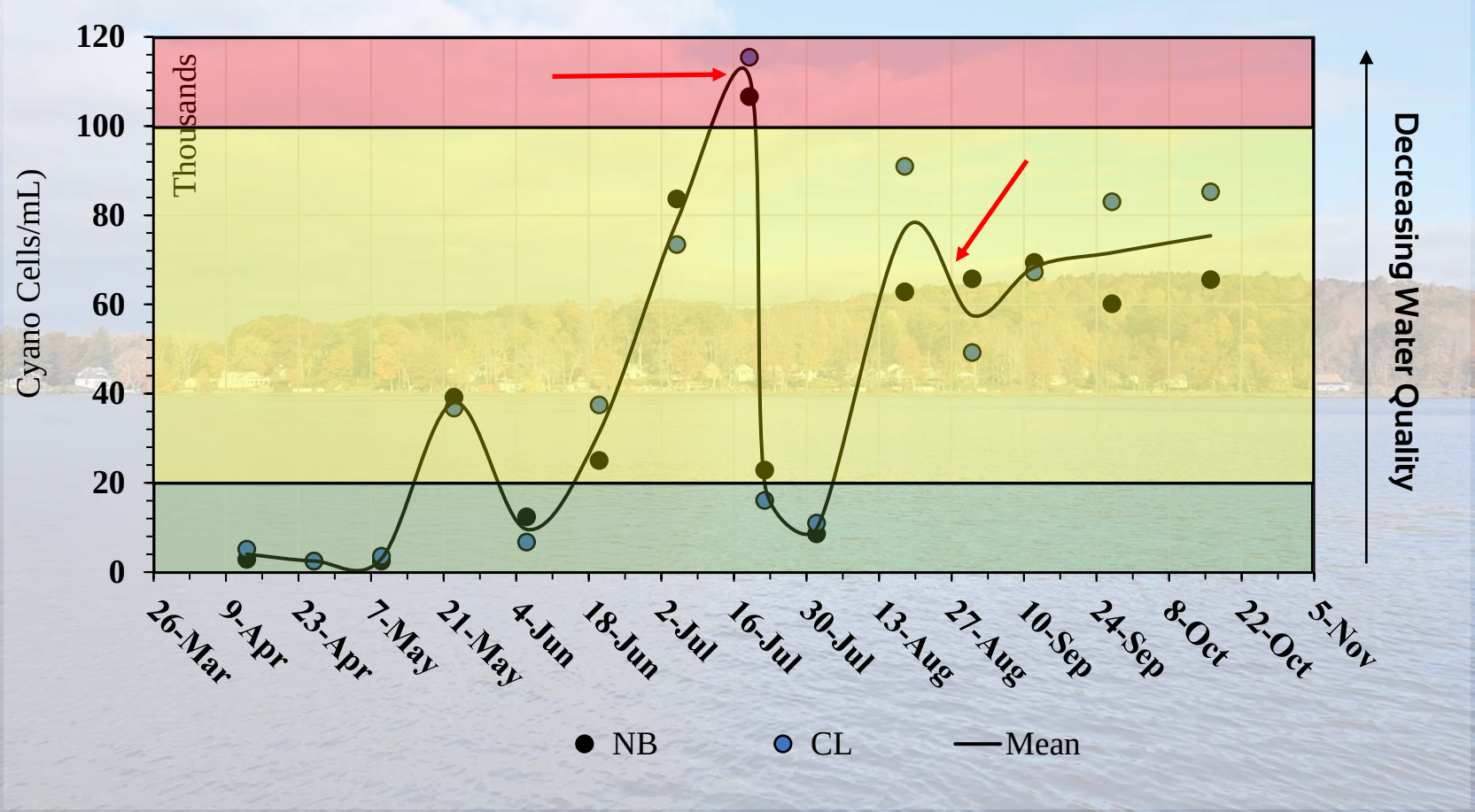
2023 Average
2022 Average

Cyanobacteria Cell Concentrations in 2022



Red arrows are when copper sulfate treatments occurred. Reactive management.

Reactive vs Proactive Treatment

ERDC/EL TR-22-10

Environmental Laboratory

US Army Corps of Engineers®
Engineer Research and Development Center

ERDC

Aquatic Nuisance Species Research Program

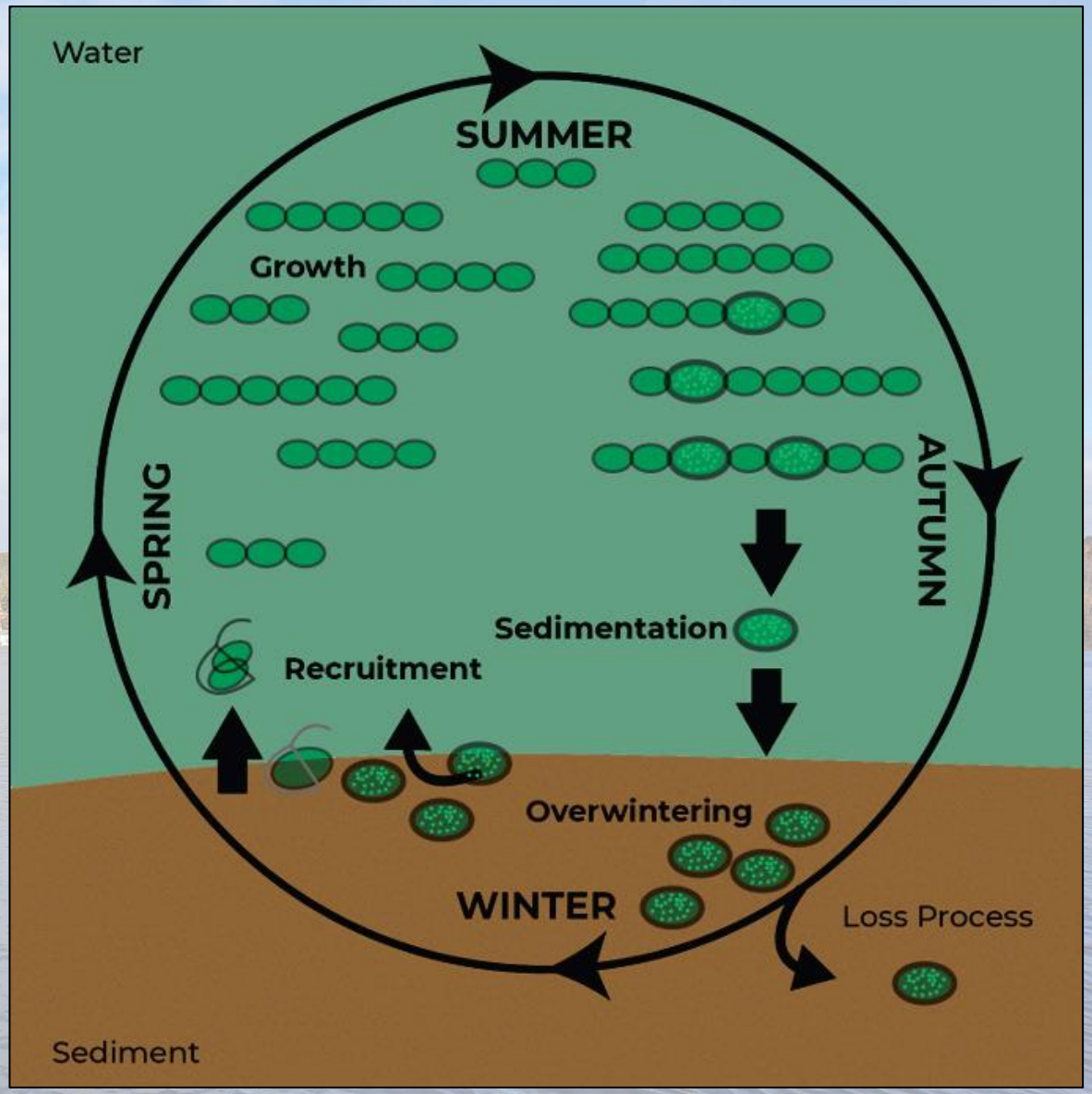
Identification and Preventative Treatment of Overwintering Cyanobacteria in Sediments

A Literature Review

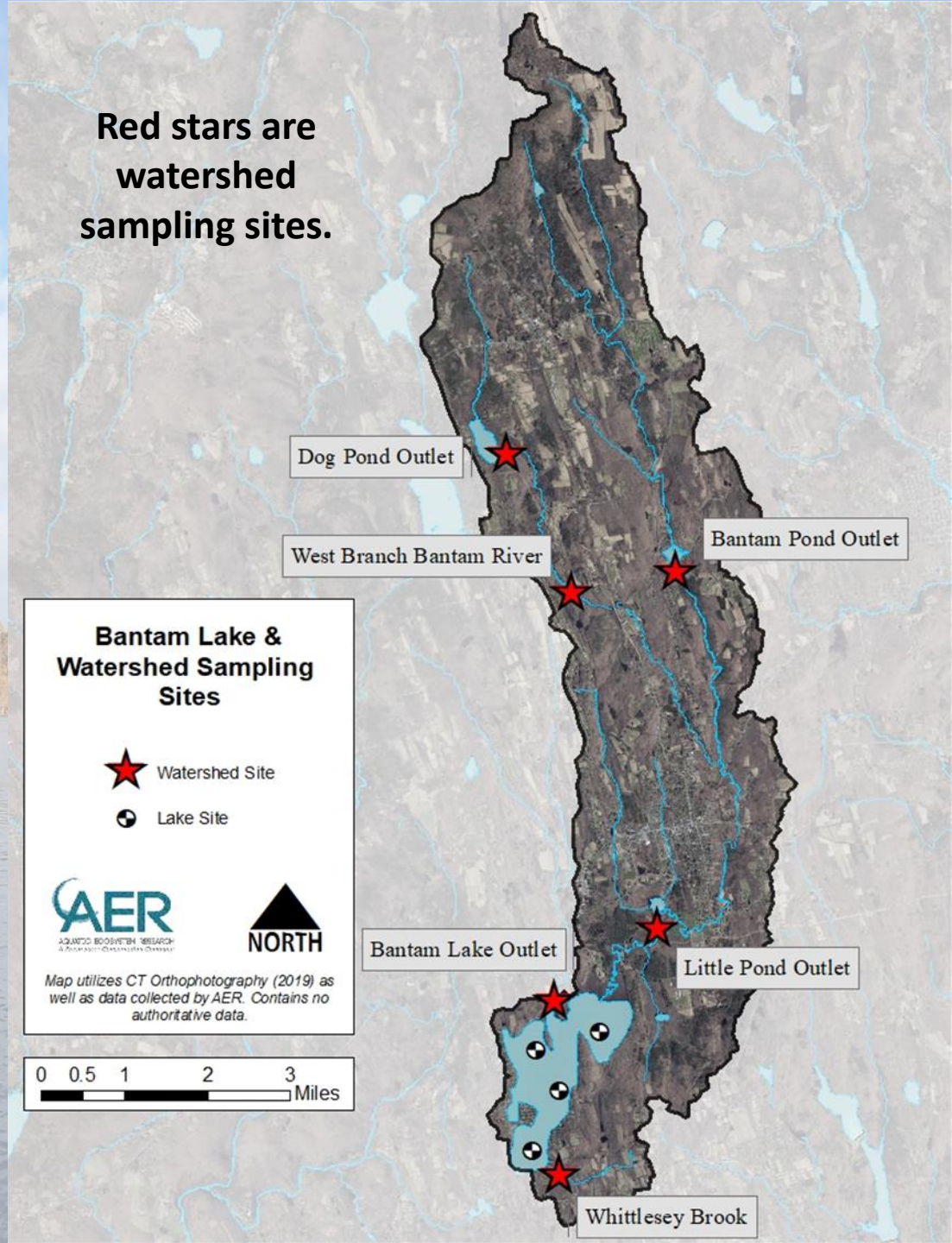
Alyssa J. Calomeni, Andrew D. McQueen, Ciera M. Kinley-Baird, and Gerard A. Clyde, Jr.

August 2022

Approved for public release; distribution is unlimited.



TMDL and Bantam Watershed Monitoring

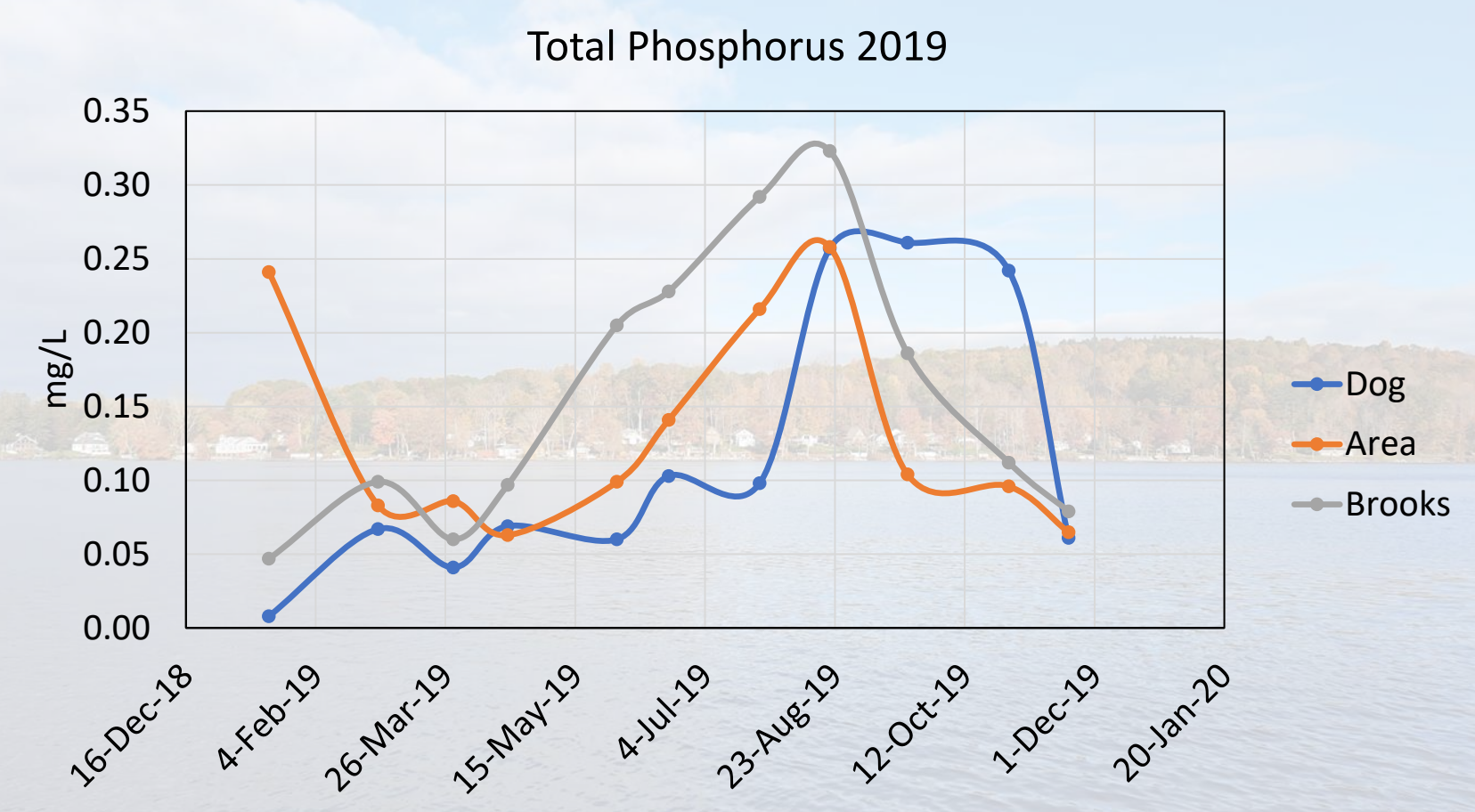


Connecticut Statewide Lake Nutrient TMDL
Appendix 1: **Bantam Lake Watershed TMDL**

Table 2: Recent total phosphorus and total nitrogen loading from Woodridge Lake WPCF.

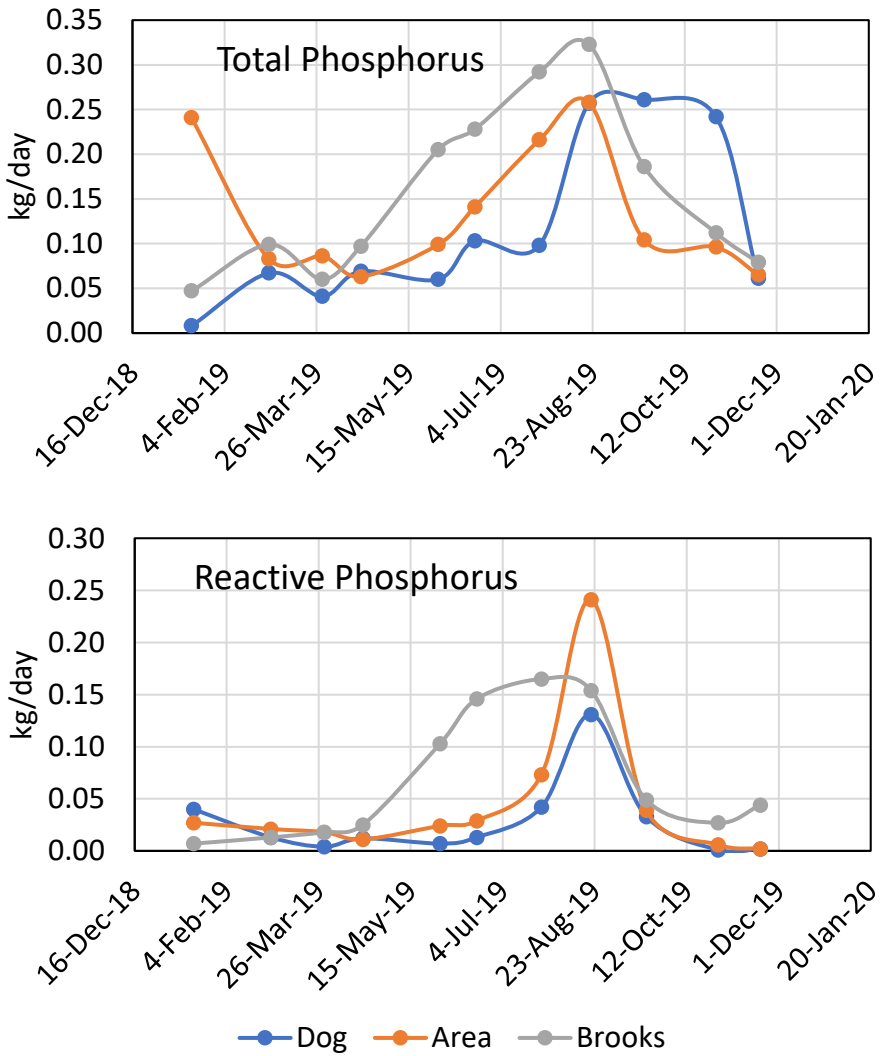
	Total Phosphorus			Total Nitrogen		
Year	**Total Load** (kg/yr)	**Attenuation Factor**	**Delivered Load to Bantam Lake** (kg/yr)	**Total Load** (kg/yr)	**Attenuation Factor**	**Delivered Load to Bantam Lake** (kg/yr)
2011	335.23	0.648	217.23	1,485.55	0.648	962.64
2012	394.64	0.648	255.73	1,344.09	0.648	870.97
2013	375.09	0.648	243.06	1,584.86	0.648	1,026.99
2014	436.93	0.648	283.13	1,705.80	0.648	1,105.36
2015	434.77	0.648	281.73	1,473.45	0.648	954.80
2016	402.93	0.648	261.10	1,438.55	0.648	932.18
2017	315.04	0.648	204.14	1,265.57	0.648	820.09
2018	383.07	0.648	248.23	1,475.28	0.648	955.98
2019	395.44	0.648	256.24	1,437.76	0.648	931.67
2020	662.76	0.648	429.47	2,350.44	0.648	1,523.09

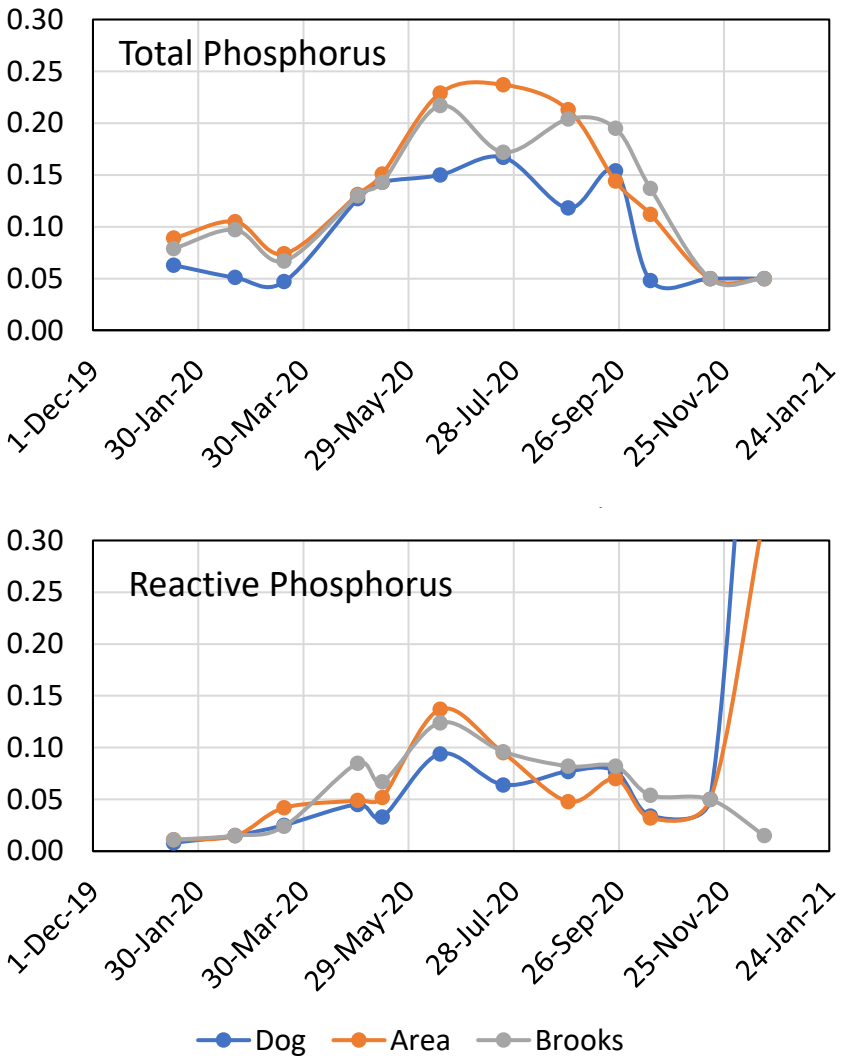
West Branch Bantam River



Data nutrient data collected and shared by the Woodridge Lake WPCF from the West Branch of the Bantam River

West Branch Bantam River





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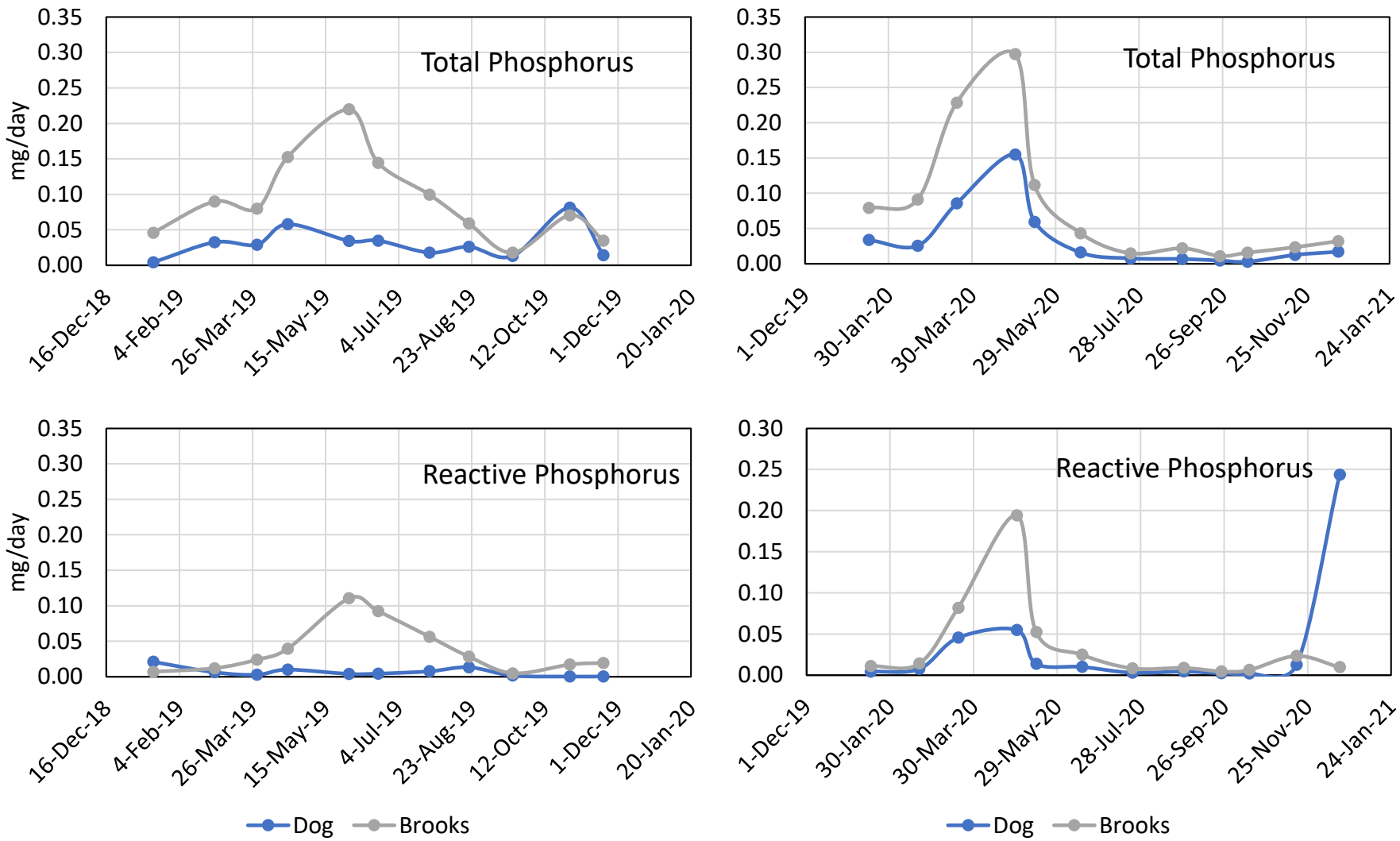
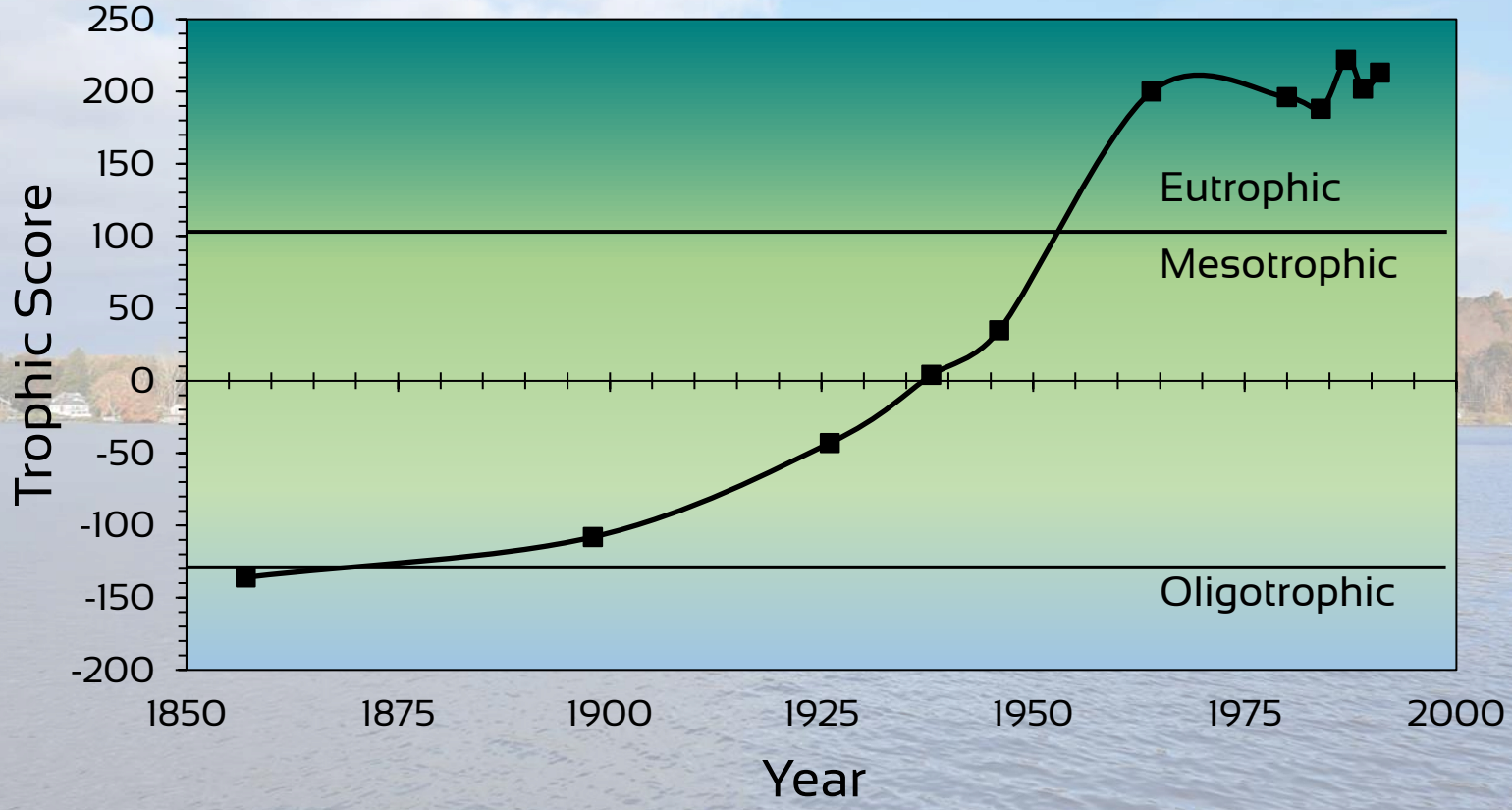


Data nutrient data collected and shared by the Woodridge Lake WPCF from the West Branch of the Bantam River. Concentration X volume of water yields a daily loading upstream and downstream of WPCF

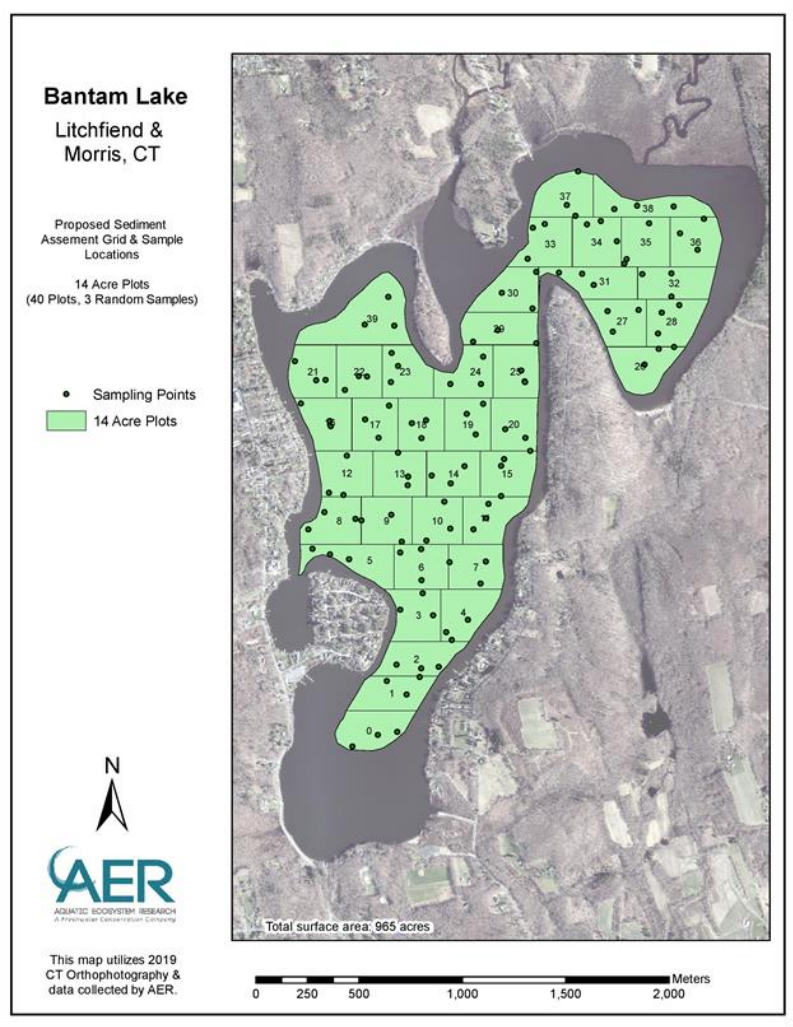
A Look Back in Time…

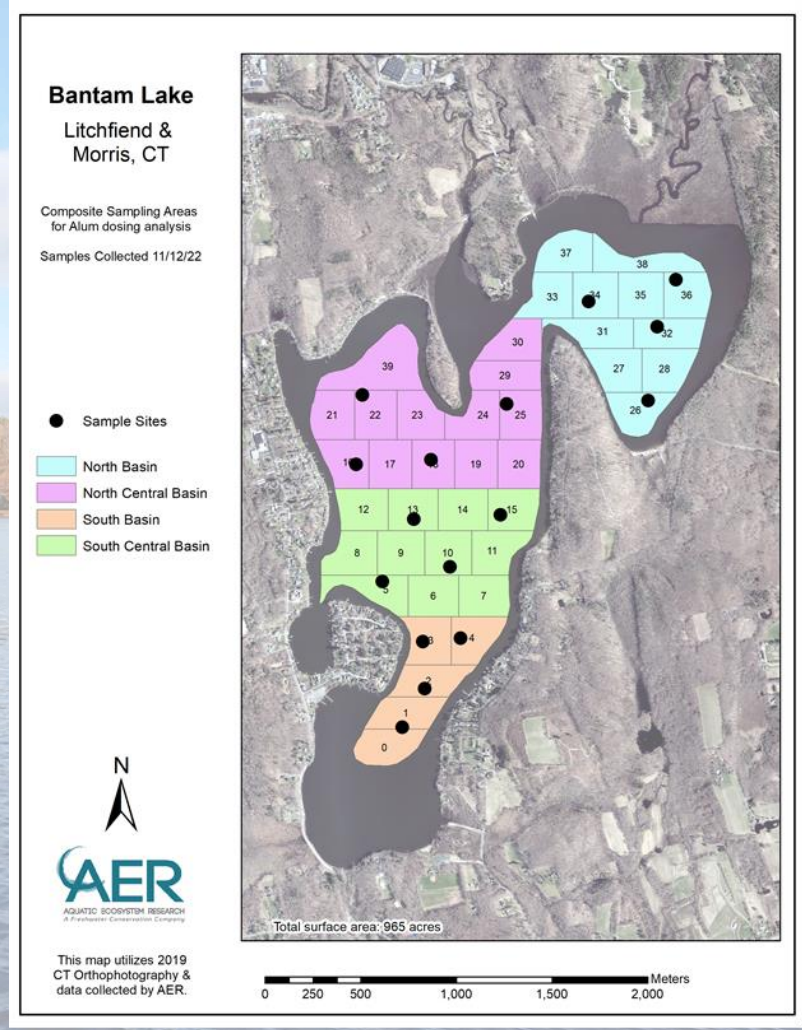


Siver et.al. 2021

Timing of inferred eutrophic conditions and permitting of treatment facility raises questions.

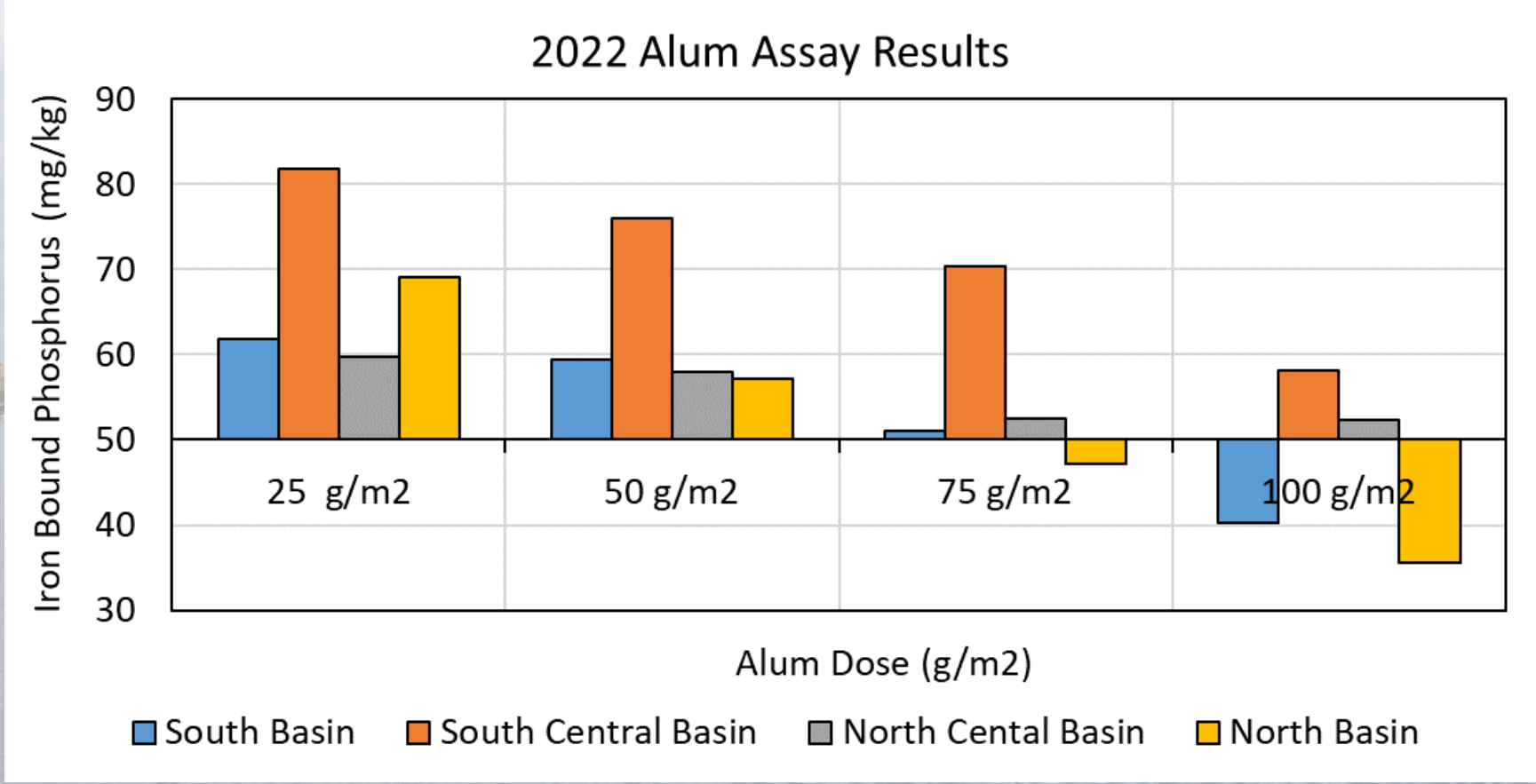
Planning for Alum Treatment





Lots of sediment samples collected over the last 3 years…

Planning for Alum Treatment



Different concentrations of alum were titrated to achieve 50 g/m2 – an important target threshold,

Planning for Alum Treatment

Sub Basin	Area (acres)	Area (m2)	Dose Year n (g/m2)	Dose Year n+2 (g/m2)	Alum Year n (kg)	Alum Year n+2 (kg)
South Basin	70.9	286,922	50	25	14,346	7,173
South Central Basin	155.9	630,905	75	25	47,318	15,773
North Central Basin	197.6	799,660	50	25	39,983	19,991
North Basin	156.7	634,143	50	25	31,707	15,854
Totals ----	581.1	2,351,630			133,354	58,791

The recommended two-treatment regime (Year n and Year n+2) extends longevity of treatment and provides fiscal flexibility.

Thank you.
Take it away Dom!