Harmful Algal Blooms (HABs) in the Solomon River Basin

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Ted Harris – Kansas Biological Survey

Presentation Roadmap

Blooms and consequences

How to find long-term trends?

Webster cores + data

Waconda Preview (in progress)

Big picture summary

Collecting sediment cores on Kanopolis

Surface Waters of Kansas

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Sunset over Wilson

Surface Waters of Kansas

Many uses of surface water

1- Drinking water

2- Grow Crops

3- Livestock water

4- Recreation

Surface Waters of Kansas

Our waters have started to look a little different...

Surface Waters of Kansas

Our waters have started to look a little different…

A blue green foe started to emerge

Milford Military Marina 2017 bloom

Harmful Algal Blooms (HABs)

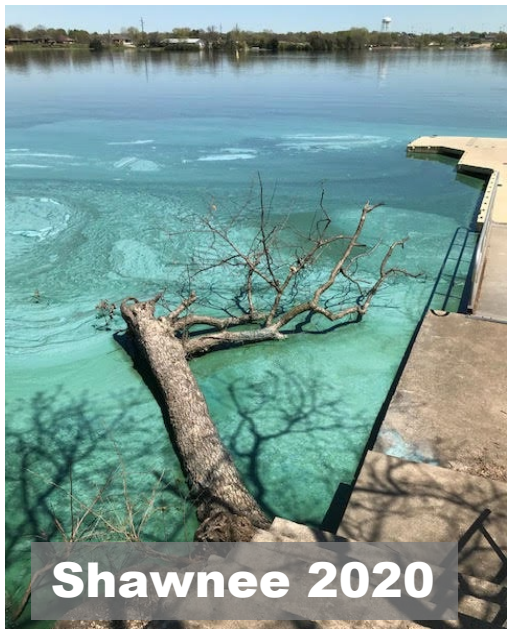
NOT your average pond scum

This blue-green goo is disrupting our waters

Cause serious costs

Harmful Algal Blooms in KS

- Made of “blue-green” algae = Cyanobacteria
- *Can* produce potent toxins (more potent than cobra!)
  - Blooms have poisoned dogs and cattle
- *Can* produce taste-and-odor compounds
  - HAB compounds increase drinking water cost by $1000/day
- But not always (we don’t know why)



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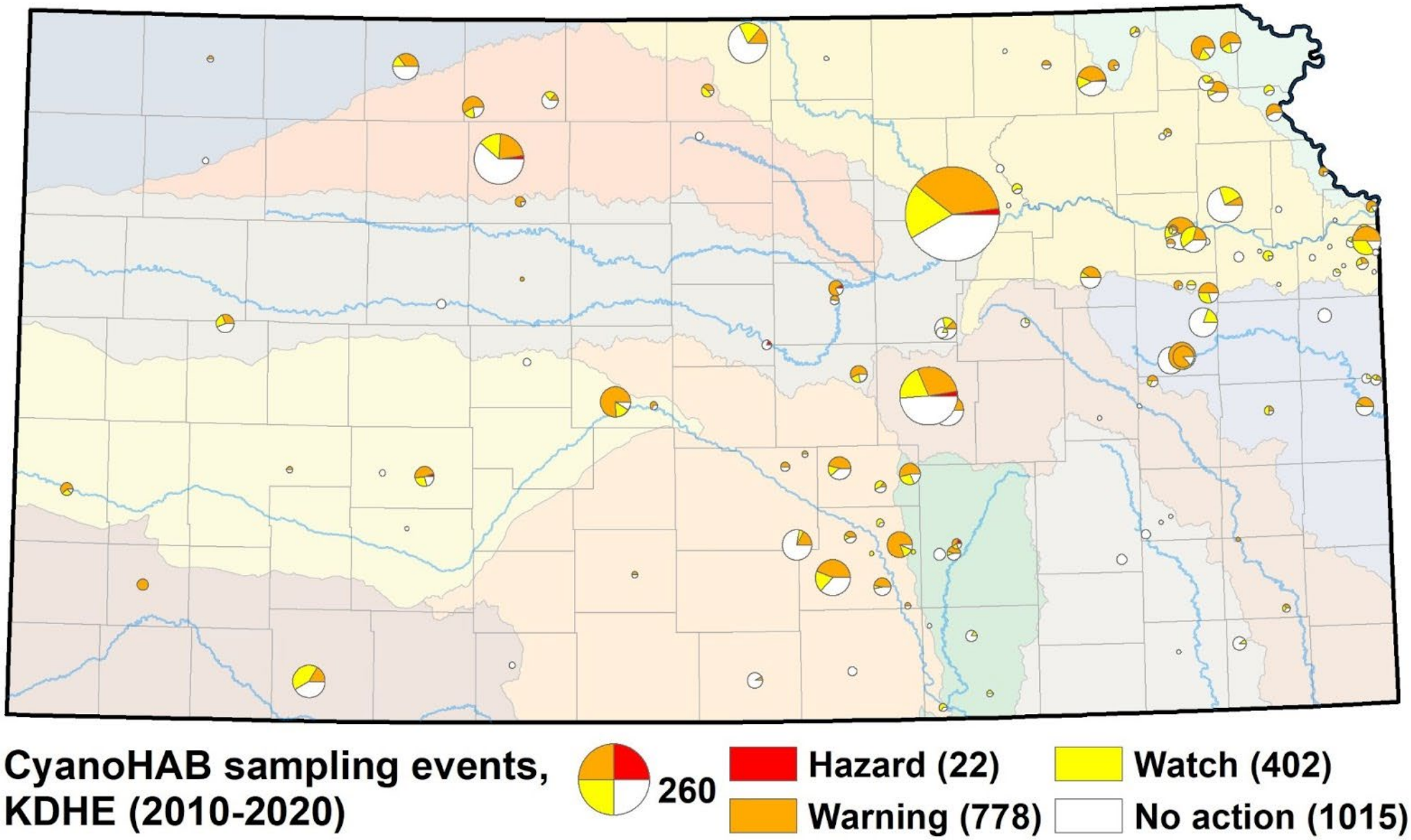
HABs happen in lakes large and small



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Blooms have occurred across state in the last decade

Why HABs?

- **Plants need:**
  - **Light**
  - **Nutrients**
  - **Water**

Many other factors (temp, wind, season) underpin HAB formation and toxicity

Where do we find the answers to our HAB problem?

Long-term HAB changes

Sediment cores

Historical reconstruction using sediments

-Integrated timeline of events-

Compile historical data

Combine data from different agencies

Sediment coring

Sediment cores are like tree rings – historical record of HABs

Why cores *and* data?

Both give a view of a long (lake) story……

Analogy with a book: Cores are like cliff note version

Could also think “low resolution with full view”

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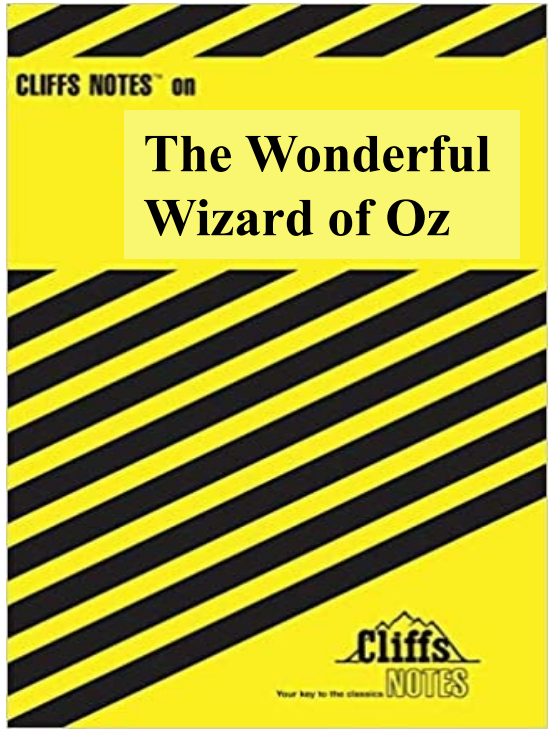


Note all important events, minor events missing, but give full story

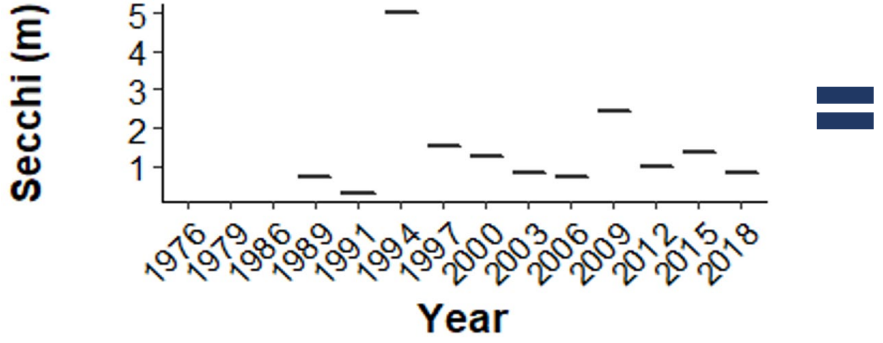
Why cores *and* data?

Analogy with a book:

Each datapoint like an individual page of a book

Could also think “High resolution but only for each sample”

Samples very limited (<< 1% of all days)



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Specific details on sample day; may or may not give long-term story

Why cores *and* data?

Without the cliff notes - story isn't clear

With the cliff notes - pages make sense

Pages add to the story,
instead of trying to tell story alone

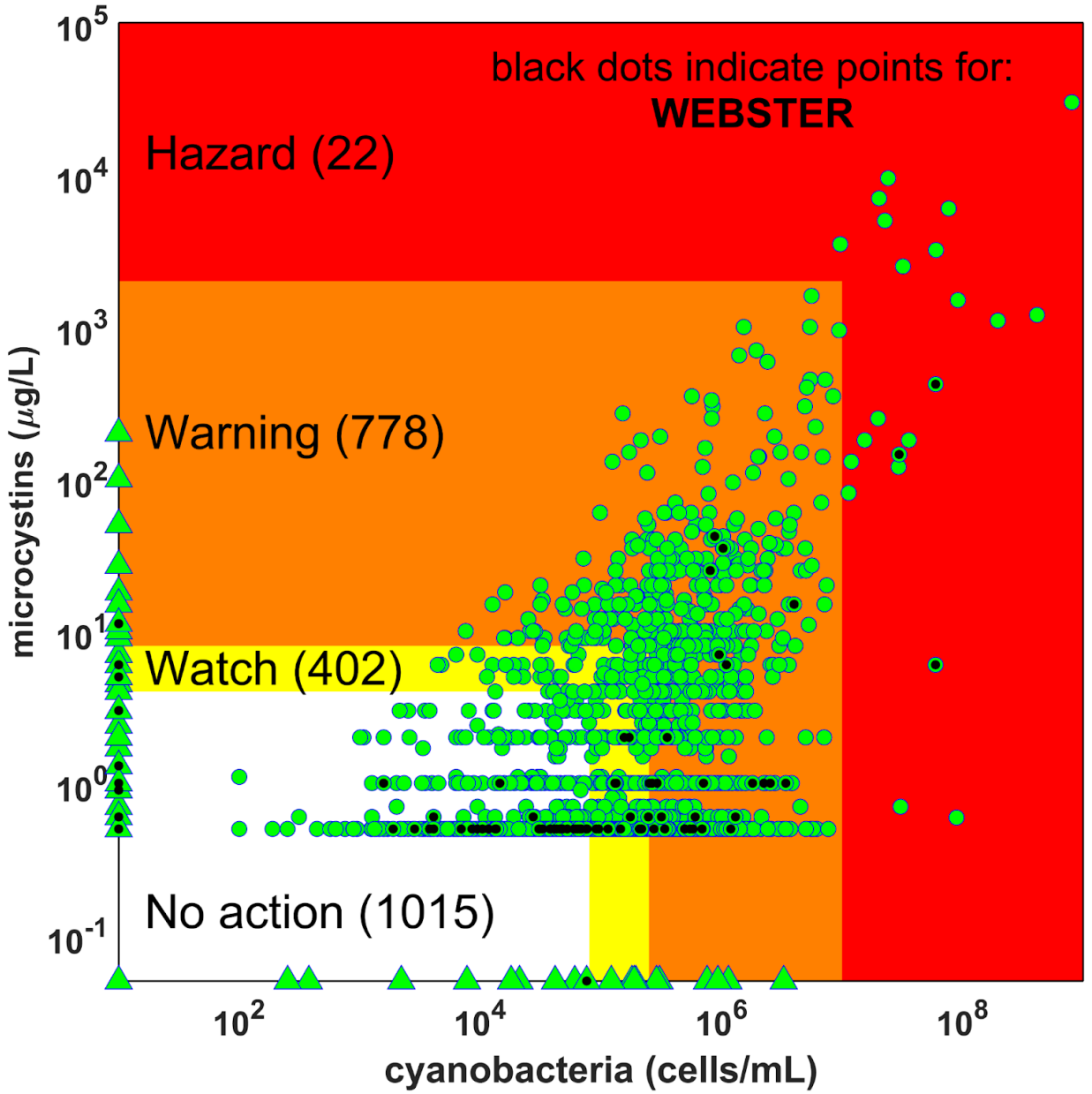
Webster

Impounded in 1956

Uses are flood control/irrigation

Impaired for nutrients

Multiple HABs since 2015



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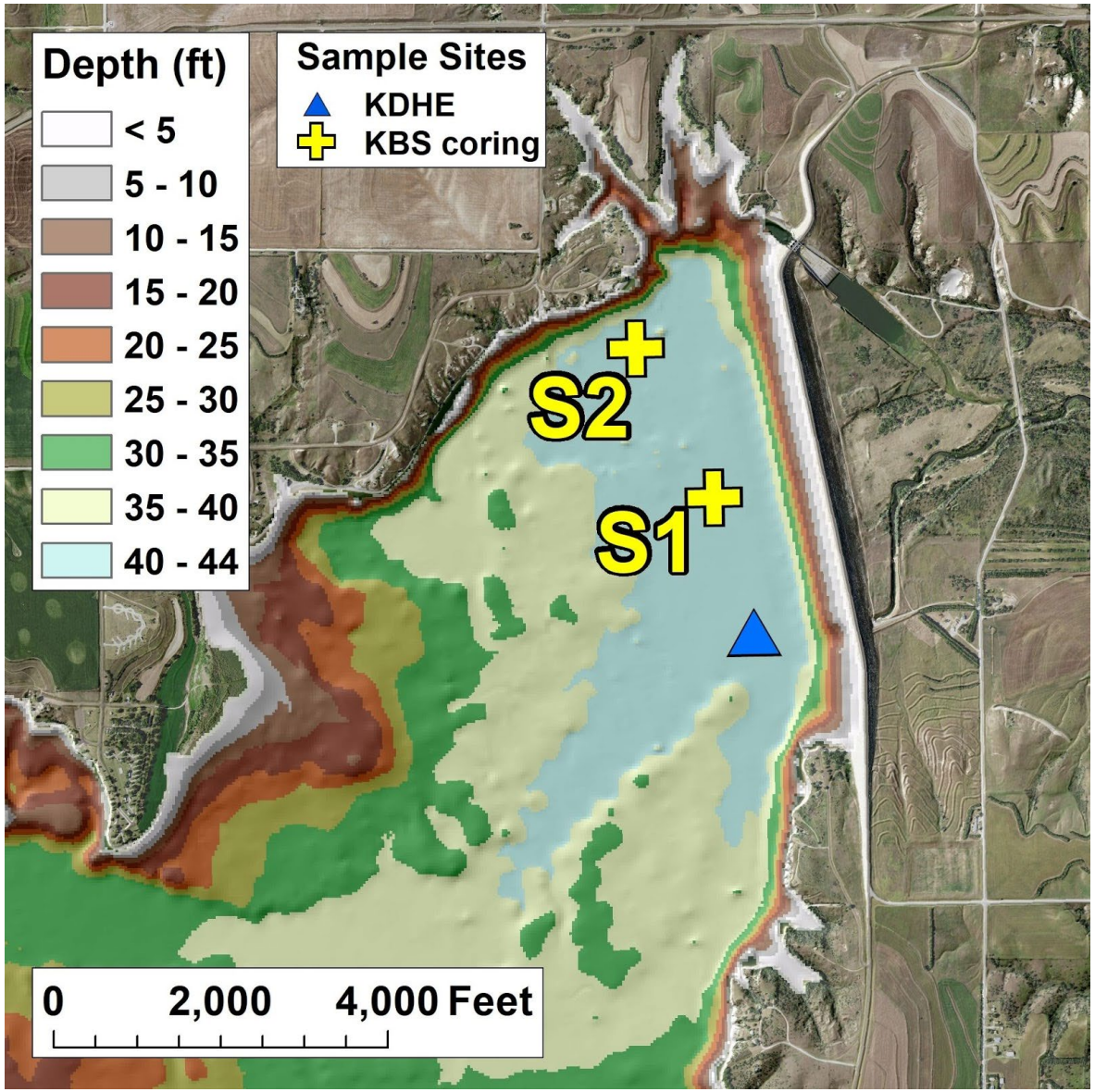
Webster HABs compared to all other KDHE HAB samples 2010-2020



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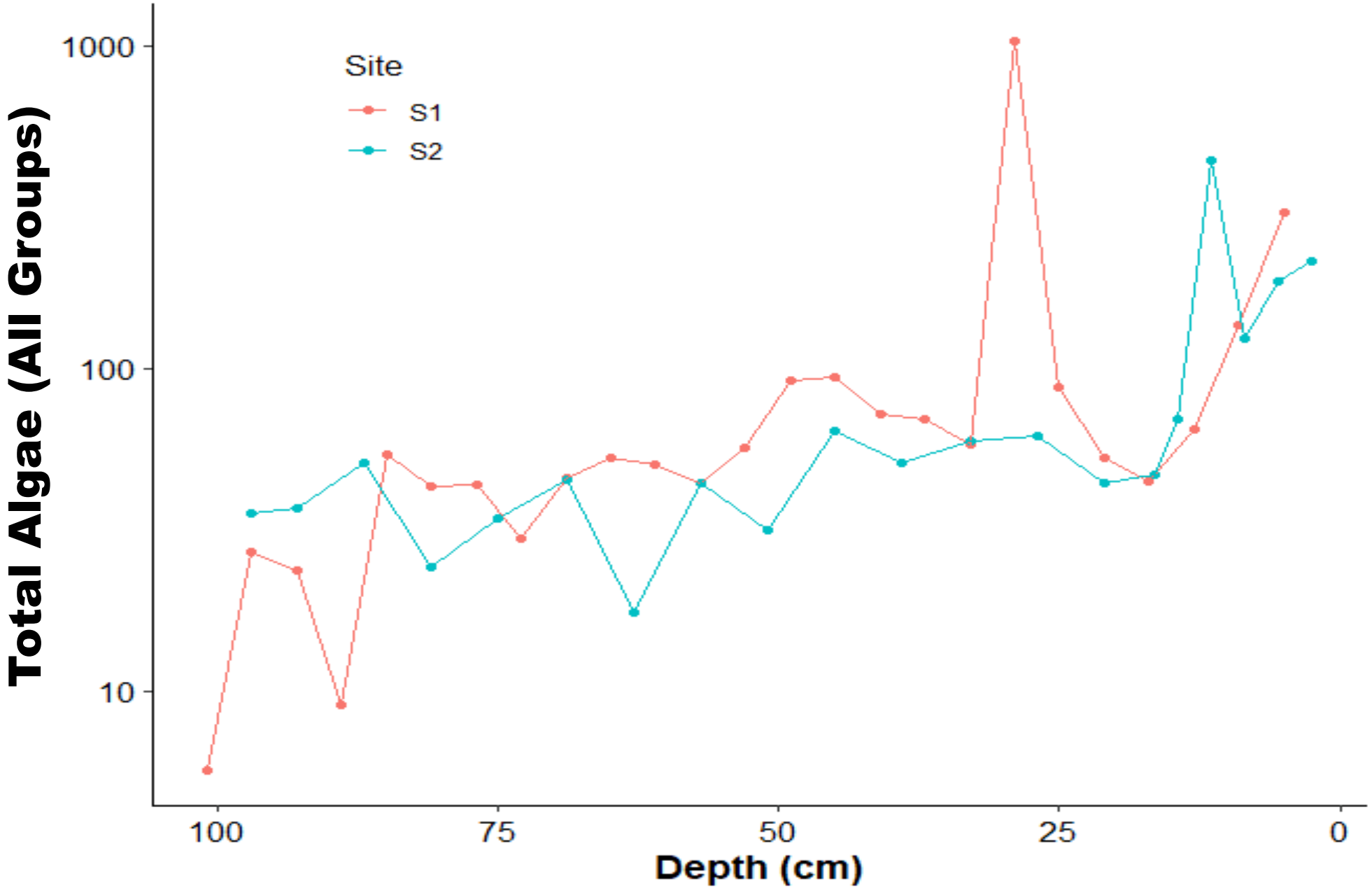
Core and data locations for Webster / Cores after collection

Algal Diversity



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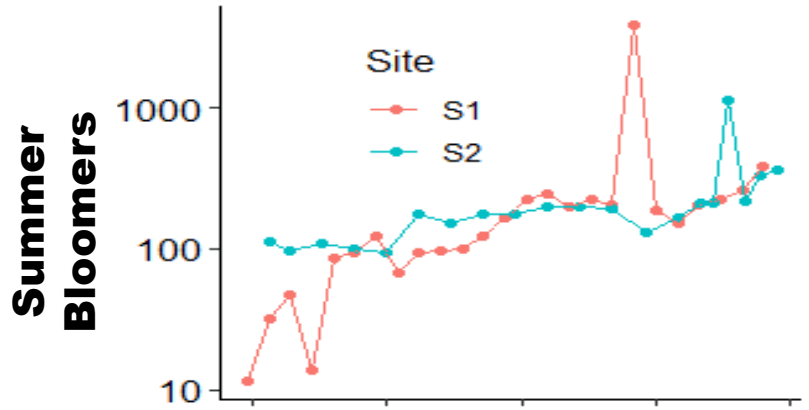
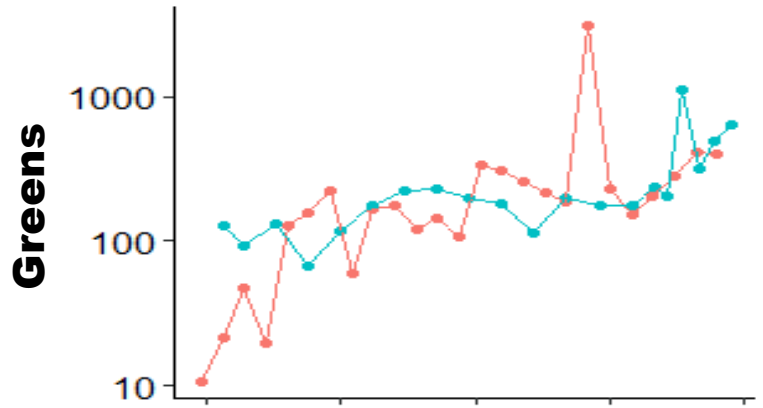
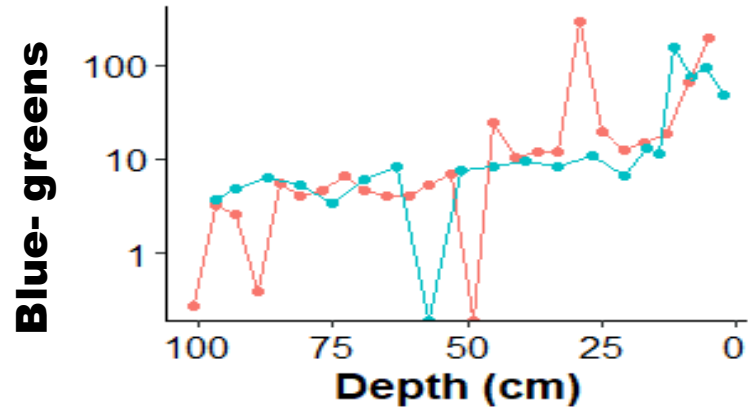
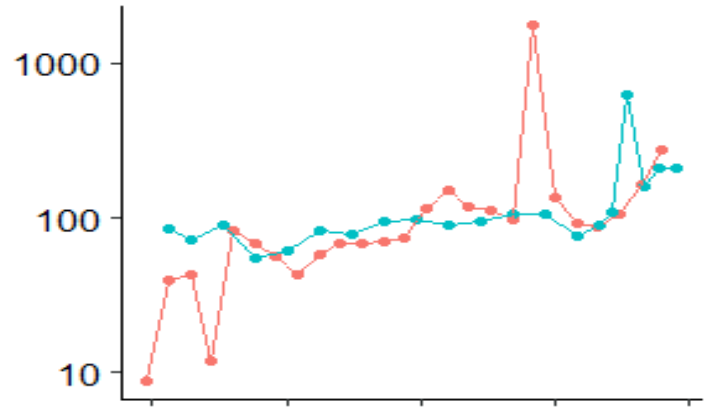
Phyto increase in shallowest (recent) sediment / estimated year = 2010

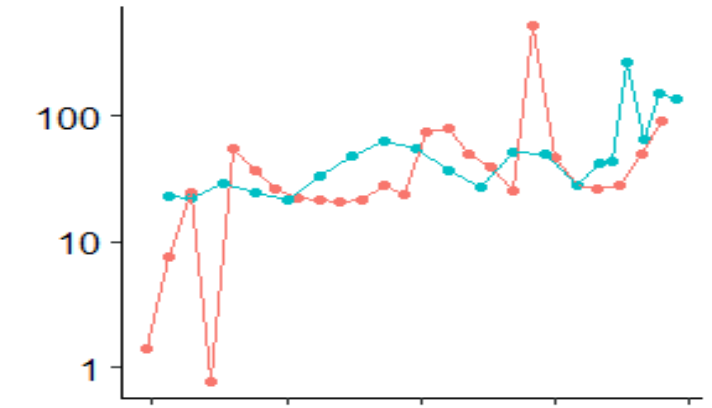
+

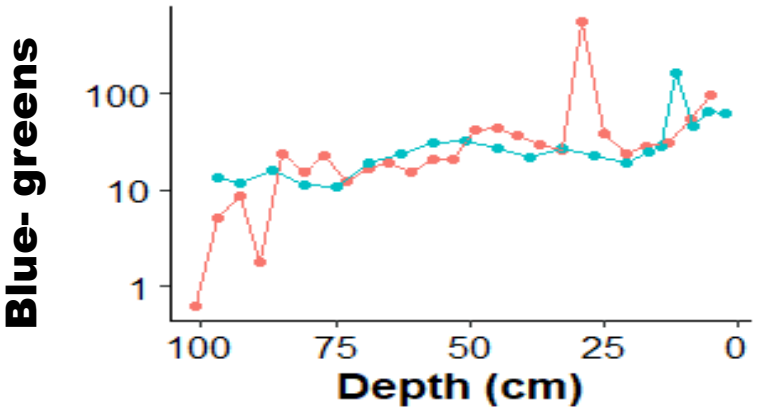


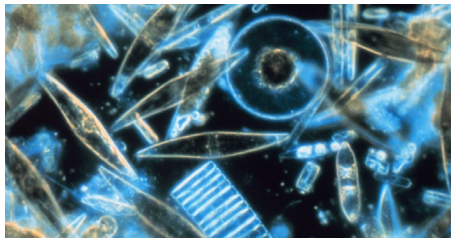












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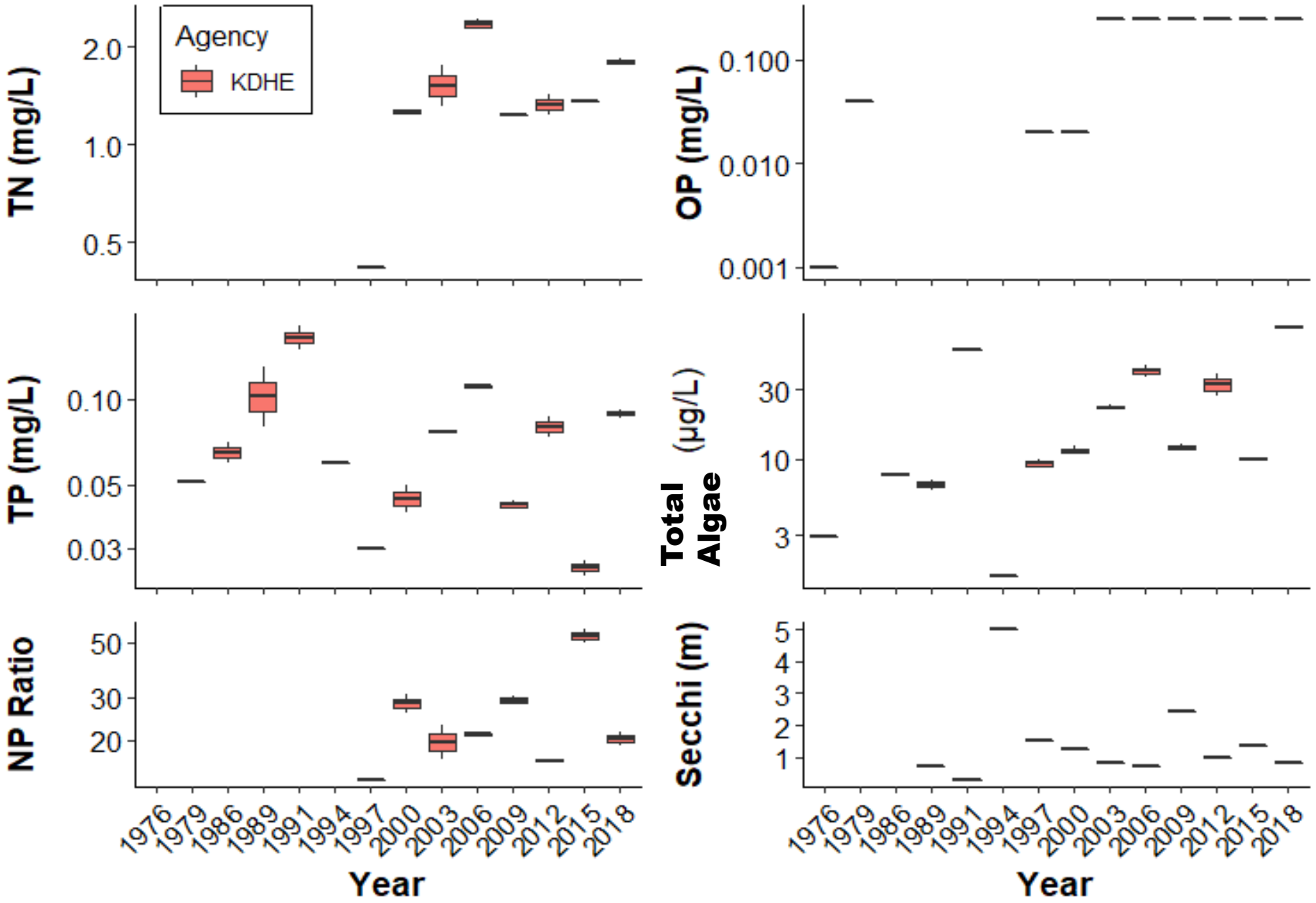
Phyto groups over time in Webster. All show recent increase.



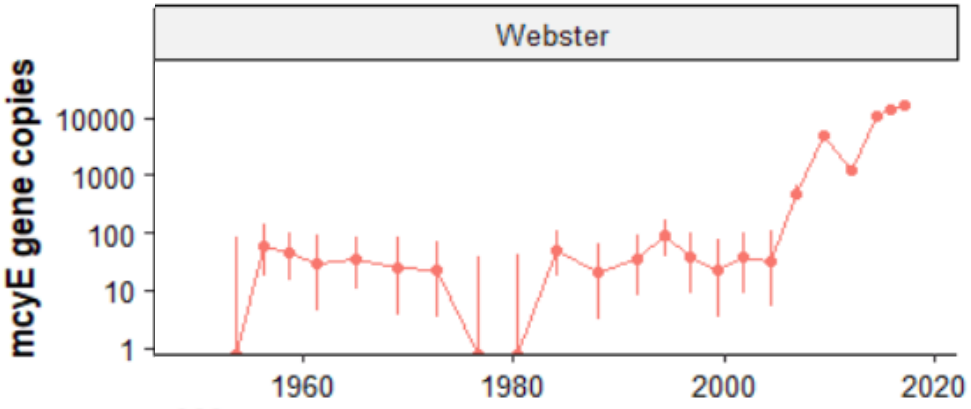
Long-term WQ Data at Webster / few temporal trends observed

Webster Summary

Sediment cores:

-Variable algae over time, recent increase late 2000s

-Toxic cyano increase late 2000s



Long-term data:

-Highly variable over time

Dynamic hydrology → dynamic water quality

Waconda – In Progress

Waconda HAB patterns completed Fall 2022, Kirwin will be cored Fall 22 or 23

Big Picture Summary

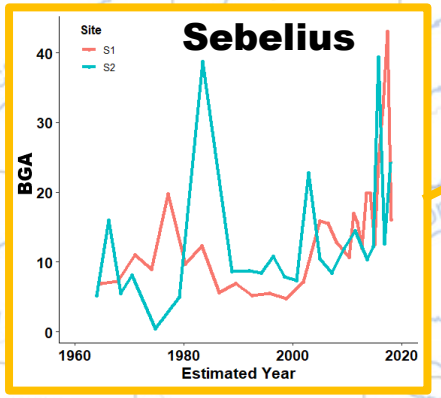
Webster: Few pattens observed – dynamic hydro.

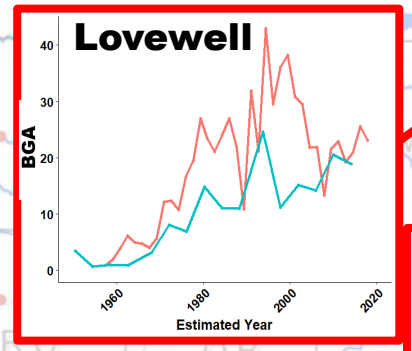
-Clear increase in toxic cyano in late 2000s

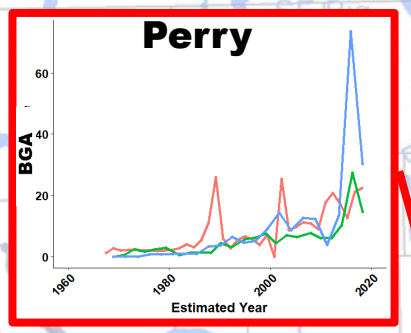
-Dynamic hydrology/weather + nutrients → HABs

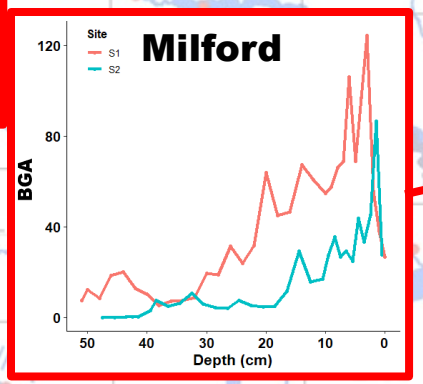
What about in other large lakes in the state?

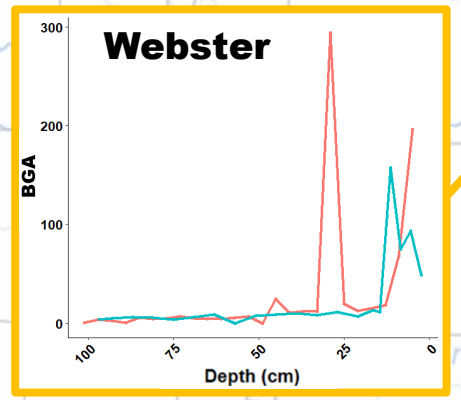
Long-Term Blue-Green Algae Trends

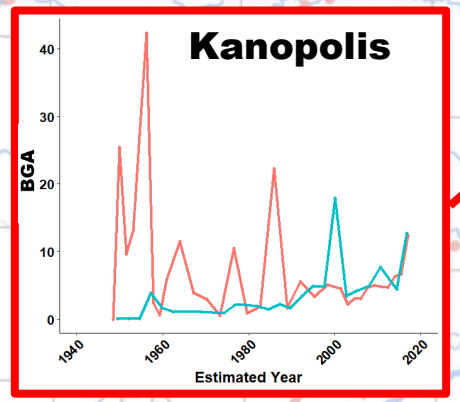


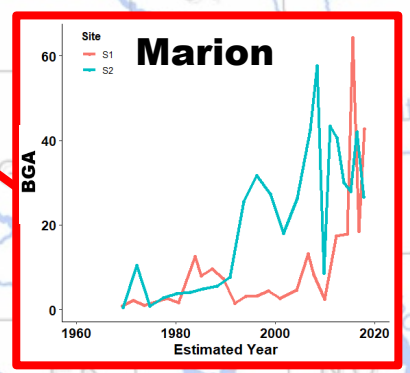












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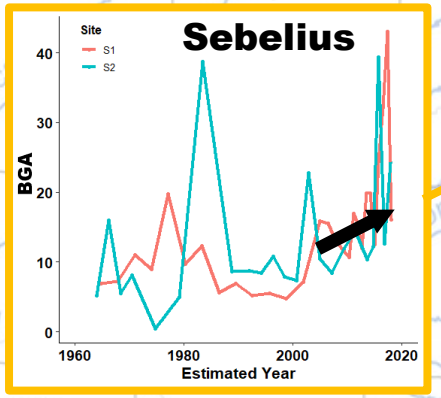
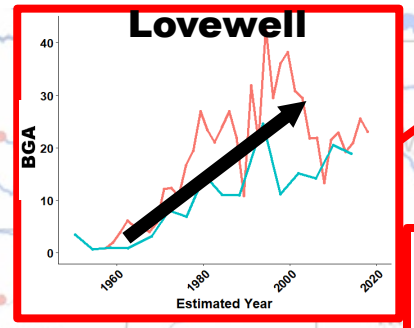
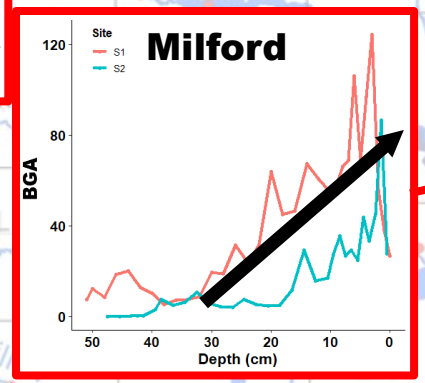
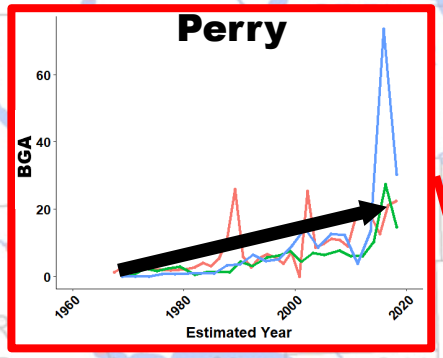
Blue-Green Algae (BGA) trends over time in KS River Basin + Marion

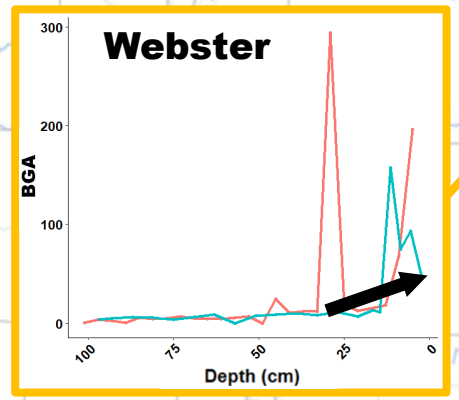
Long-Term Blue-Green Algae Trends

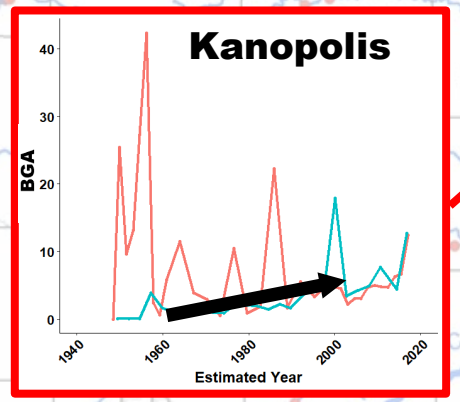


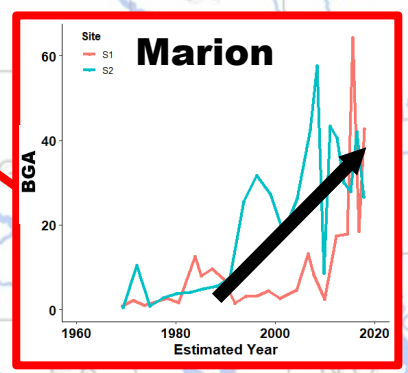












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Black Line: Blue-Green Algae increasing over time. Red - LT Yellow - ST

Big Picture Summary

Webster: Few pattens observed – dynamic hydro.

-Clear increase in toxic cyano in late 2000s

-Dynamic hydrology/weather + nutrients → HABs

What about in other large lakes in the state?

-Other lakes show long-term increases in HABs

-Milford, Marion, and Perry rapidly increase ~2000

In progress & next up: Waconda/Tuttle cored last Fall

-Clinton, Wilson, Kirwin, and Cedar Bluff cored this Fall or Fall 2023 at latest

- Goal is to project WQ throughout KS River Basin

Cores + Data made the long-term WQ patterns clearer!

Thank You!

Questions?