MDSG Susquehanna Flats SAV:Lyngbya field update

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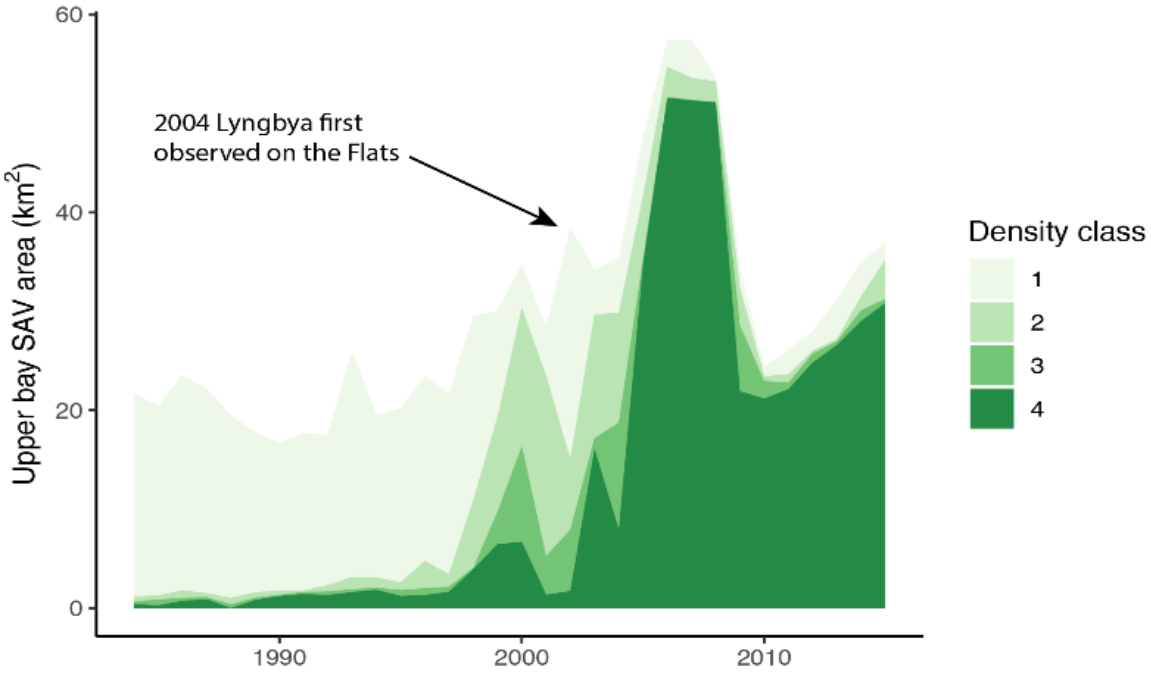
Sea Grant

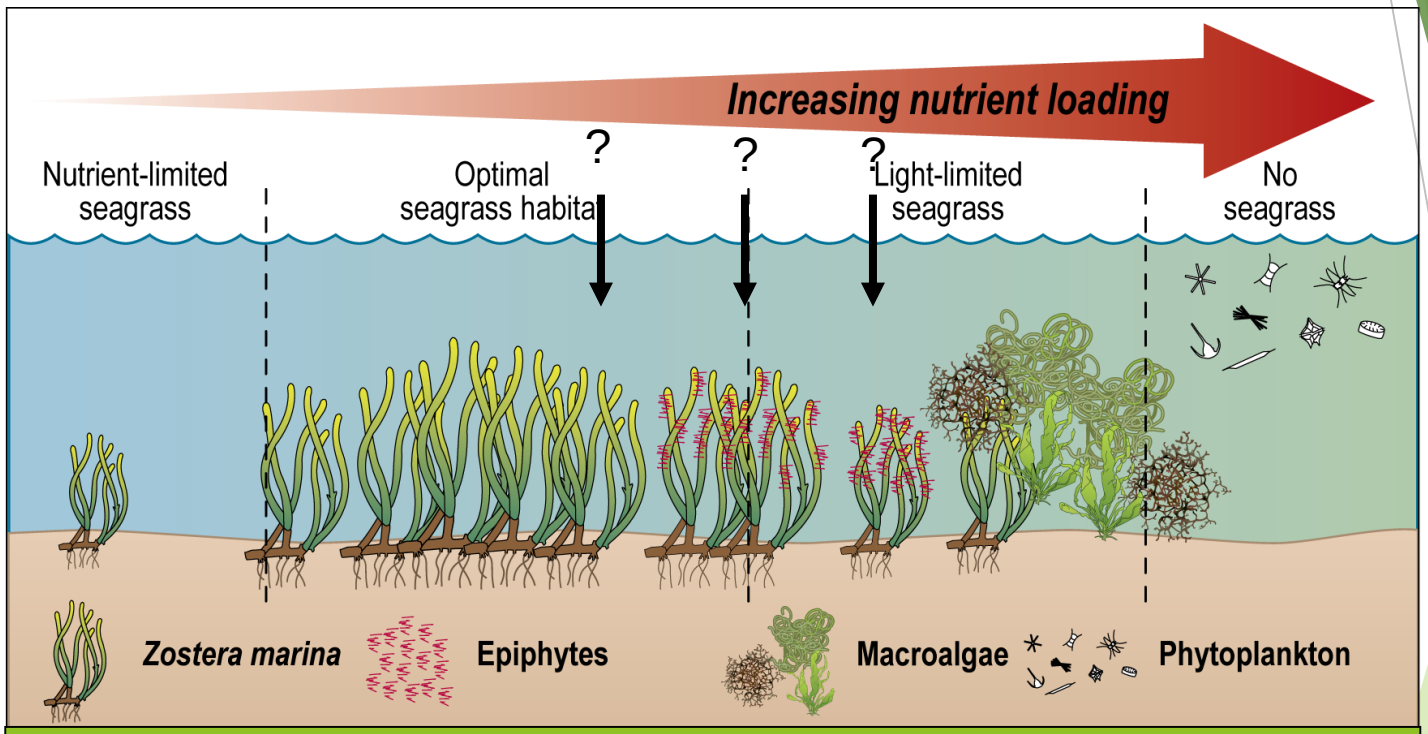
Background: SAV resurgence



- Recovery corresponded with enhanced water clarity during extended dry period and long- term reductions in nutrient loading
- Now largest and most diverse SAV bed in Chesapeake

Where are we in restoring SAV?

- Upper Bay SAV and benthic algae increases

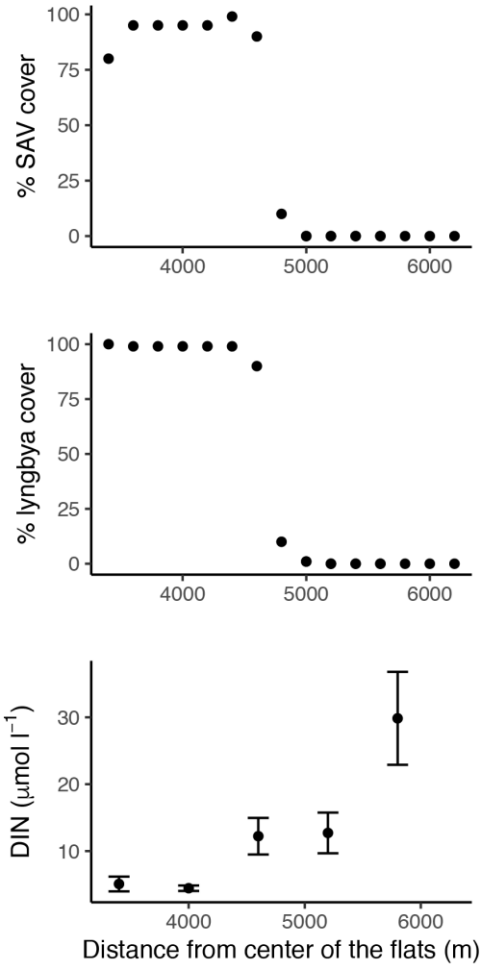


Are we at a tipping point between light limited and optimal seagrass conditions in the upper bay? Where high flow years push us to have higher loads and higher benthic algae??

Background: Increasing benthic cyanobacteria

- **2004**: *Lyngbya latissima* bloom believed to be caused by unusually high clarity in upper bay. Impacted crabbing!
- **2010: May- July, Impacting fishing gear earlier**
  - **Mill Creek/ furnace bay**
  - July 28: algae survey, Peter Bergstrum survey
  - No microcystin toxin detected
  - Die off in September
- 2011:Winter impacts to fishing gear (Feb); poor clarity
- 2018-2020: UMD Cassie Phd work, SAV sink
  - DIN lower in center of beds
  - P low -Lyngbya likely taking it up
- Pre-2020: Watermen chlorine to clean nets/gear
- 2020: bleach shortages
  - started boiling water on vessels to clean gear

Increases in Lyngbya, N fix?



(Gurbisz, 2014 unpub)

- Data showing increased *Lyngbya* coverage on the inside of SAV bed;
- Low-N area in center of the SF SAV bed compared to outer edges of the bed

Why cyanobacteria in the center?

Project Goals: Interaction of SAV and benthic cyanobacteria

- conditions that support cyanobacteria growth
- determine the effects of environmental variables (nutrients, light) on cyanobacteria production, nutrient uptake, N2 fixation, and potential toxin production
- effects of cyanobacteria on biogeochemical rate processes and SAV
- Cyanotoxins

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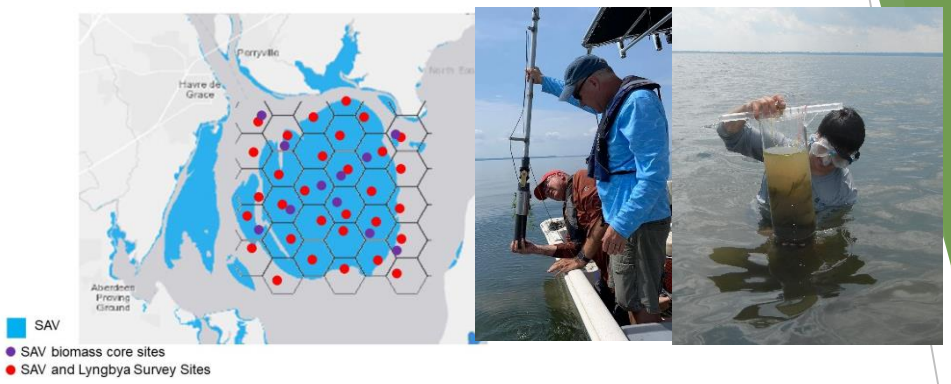
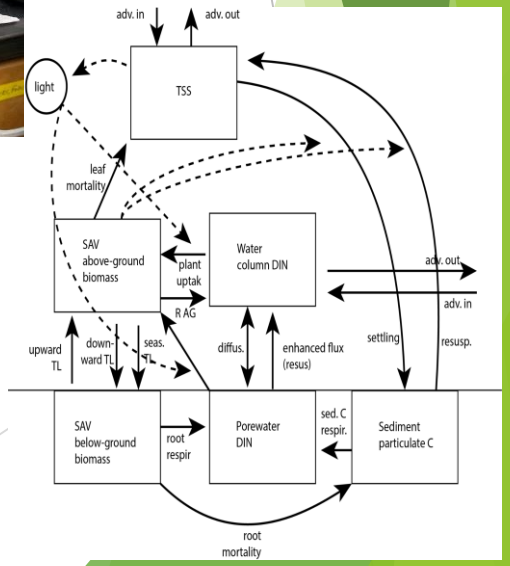
3 prong approach:

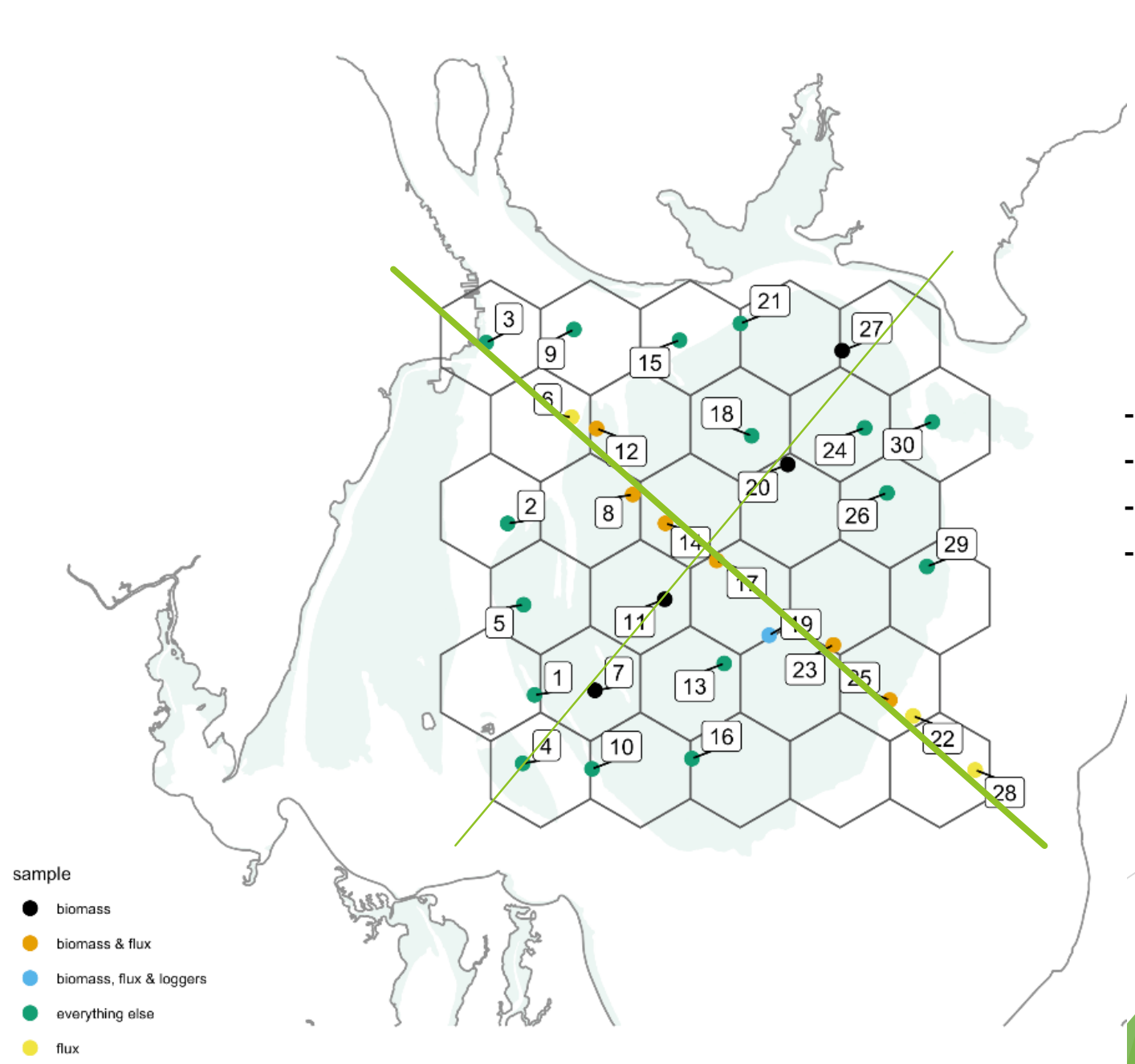
1. Field surveys



2. Laboratory experiments
   - bioassays
   - fluxes

3. Ecosystem simulation modeling



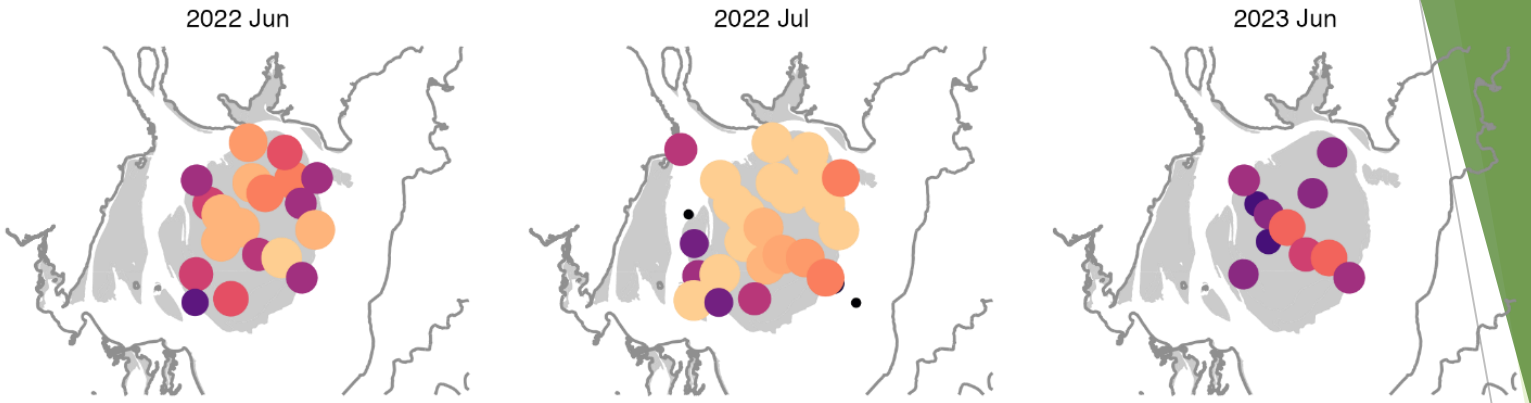


- percent cover
- Hydrolab
- Nutrients and chl
- Mat sample

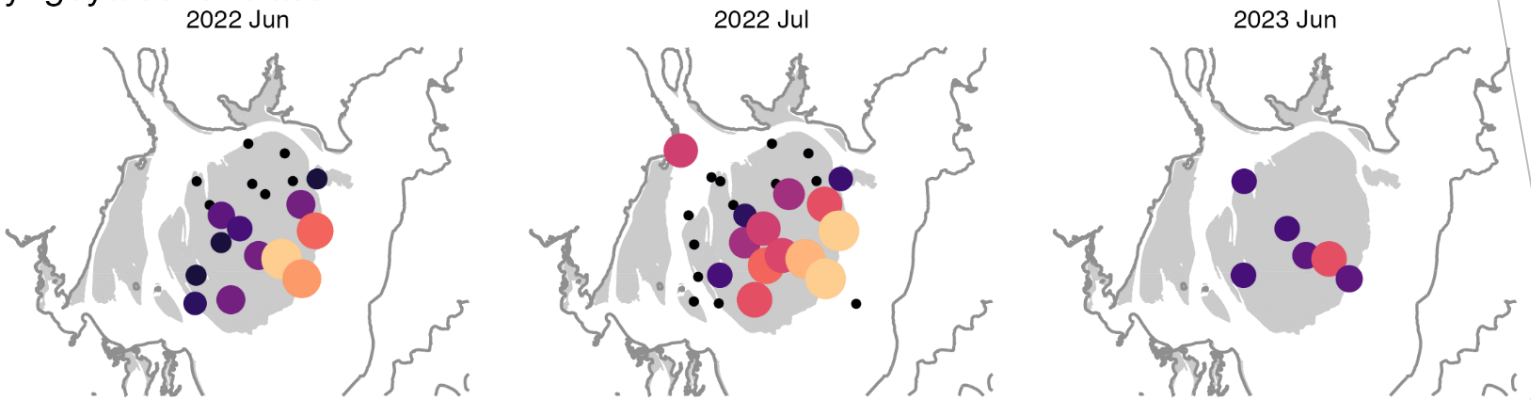
2022 Methods

- Percent coverage at 30 random stations.
  - four quadrants/ site
  - Species id (SAV and benthic algae)
  - 2023 evaluating rake method from Australia
- Fluxes and Biomass Cores at transect sites
  - Above ground: separate out the filamentous algae
    - Abundance by volumetric displacement
    - Patted dry and weighed
    - Dry weight after 24 hrs in oven
  - Below ground
    - Double washed and weighed
- Cyanotoxins on filaments
  - Greg Boyer, SUNY
  - Microcystin, cylindrospermopsin, saxitoxins
  - Filament chlorophyll a (found to be indicator of toxin in NY study)

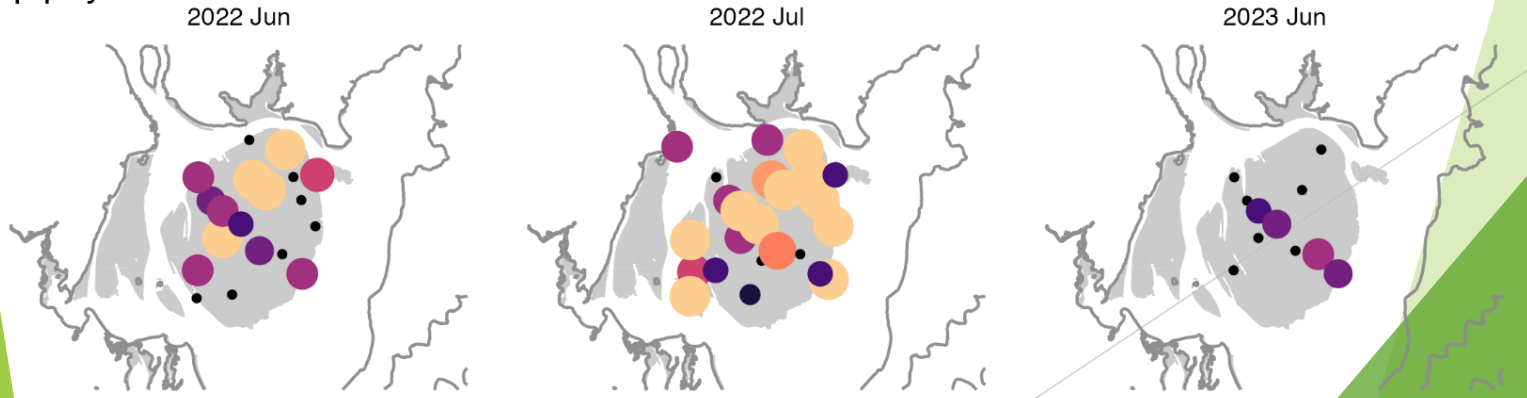
SAV cover class



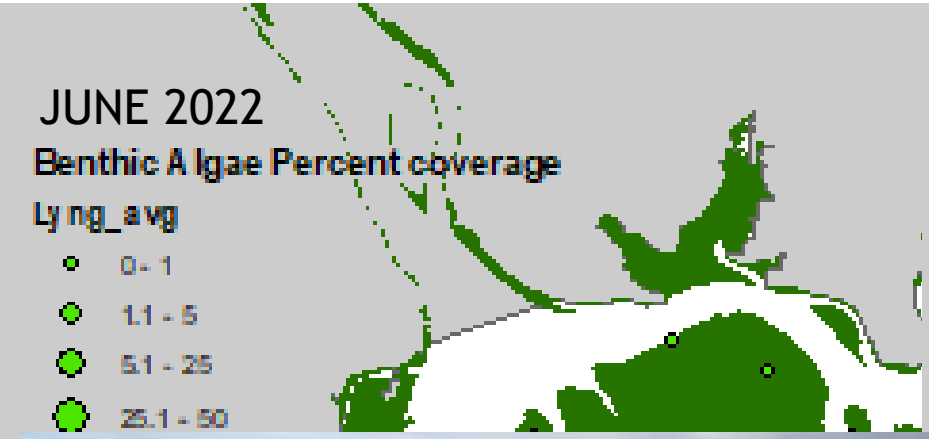
Lyngbya cover class

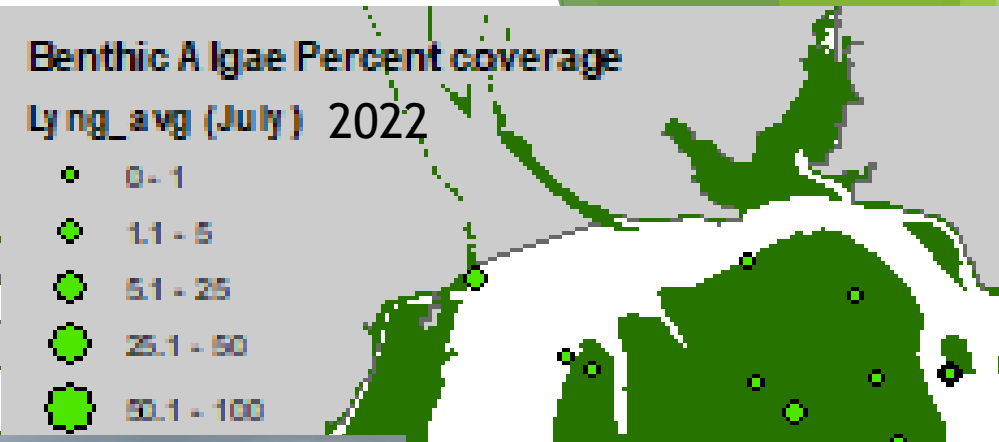


Epiphyte index

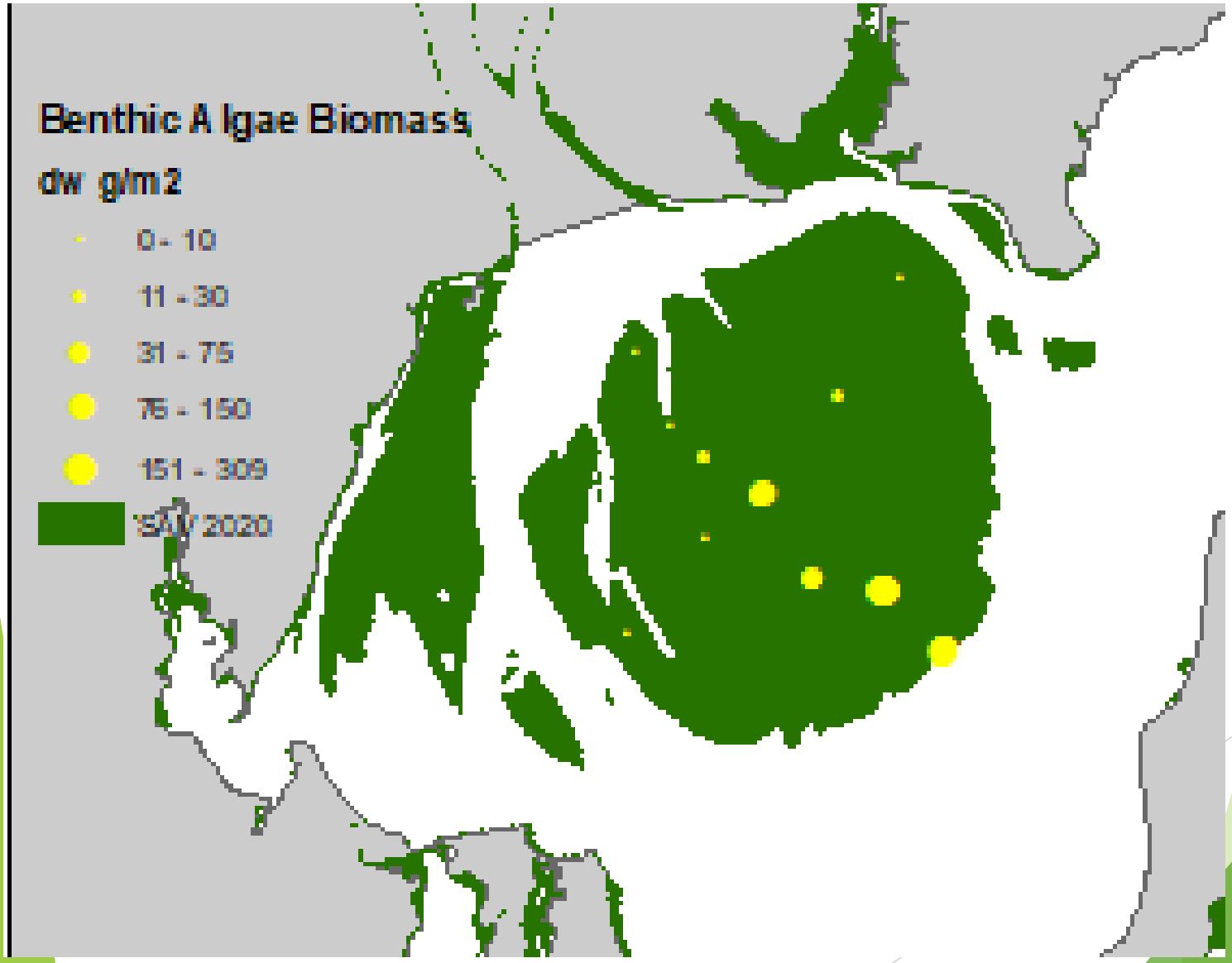


JUNE 2022


Benthic Algae Percent coverage
Lyng_avg
0 - 1
1.1 - 5
5.1 - 25
25.1 - 50

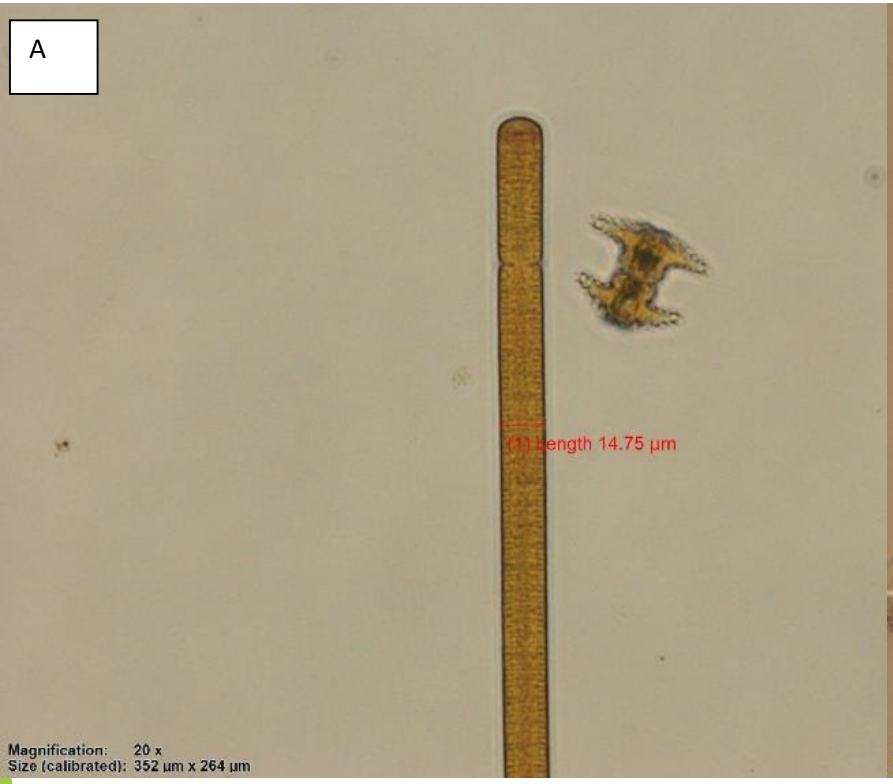

Benthic Algae Percent coverage
Lyng_avg (July) 2022
0 - 1
1.1 - 5
5.1 - 25
25.1 - 50
50.1 - 100

2022 Benthic Algae Abundance



A: *Oscillatoria*

B) Lyngbya found at site SQH17



Toxins Produced: Microcystin

fw Saxitoxins, microcystins, peptides

*Also found green filamentous algae at several sites

De
Sa

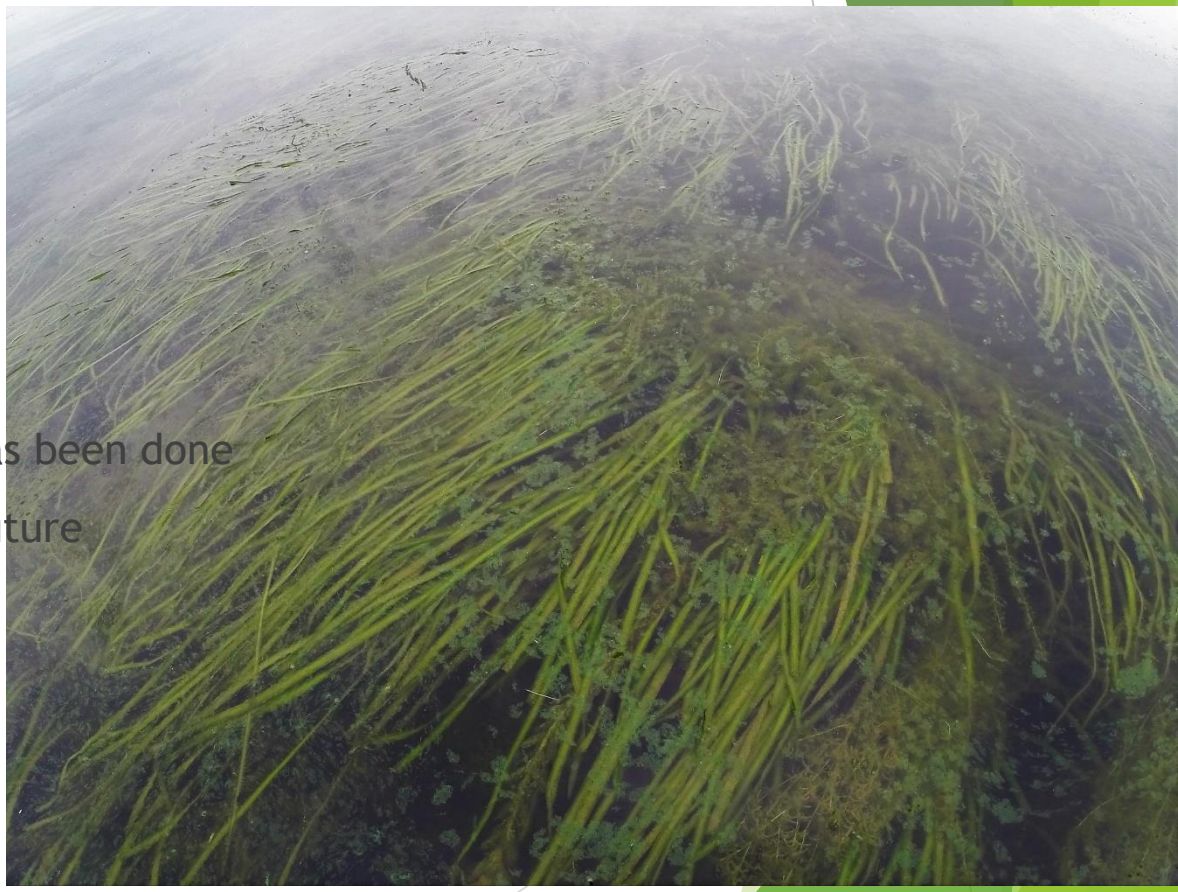
Lyngbya tiss

Tox. (µg g
80
60
40
20

2023

2022 Summary

- Missed peak cyano abundance in mid-August
  - (early june; late july)
- Water column blooms
- N fixation
- P low where Lyngbya high
- SAV biomass
- Saxitoxins detected:
  - No water toxin testing has been done
  - Samples are frozen for future



2023 Field Work

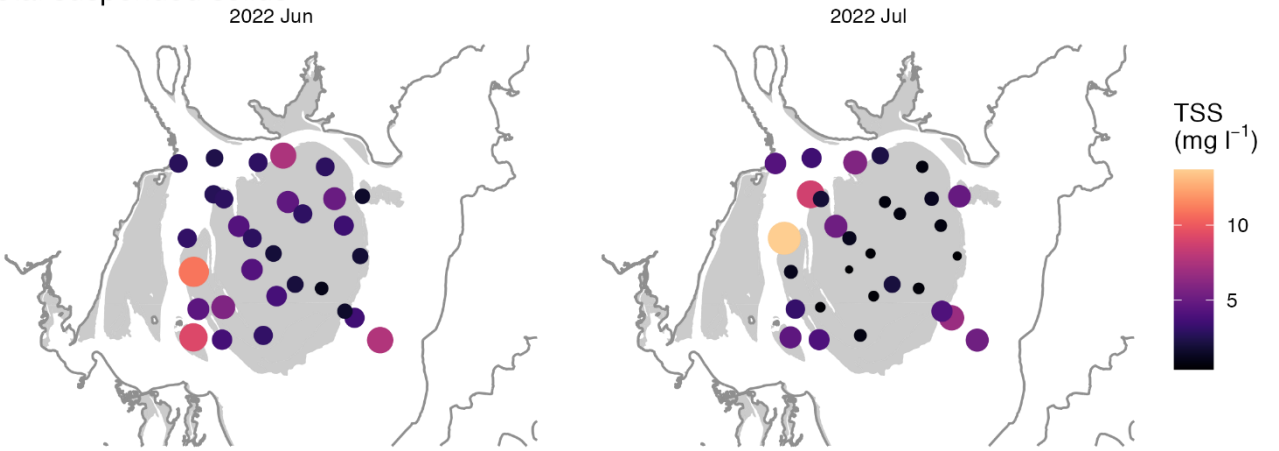
- Focus on transects
- Biogeochem for models
- Rake method
- Collect water column phyto
- Bioassays
- PC:CHL fluorescence in field
- Molecular ID

Climate Change

Thank you!

Water Quality

Total suspended solids



% light at 1 m