2021 Marine Recap-VIMS

Marg-Yes, What no Alex? 🤔

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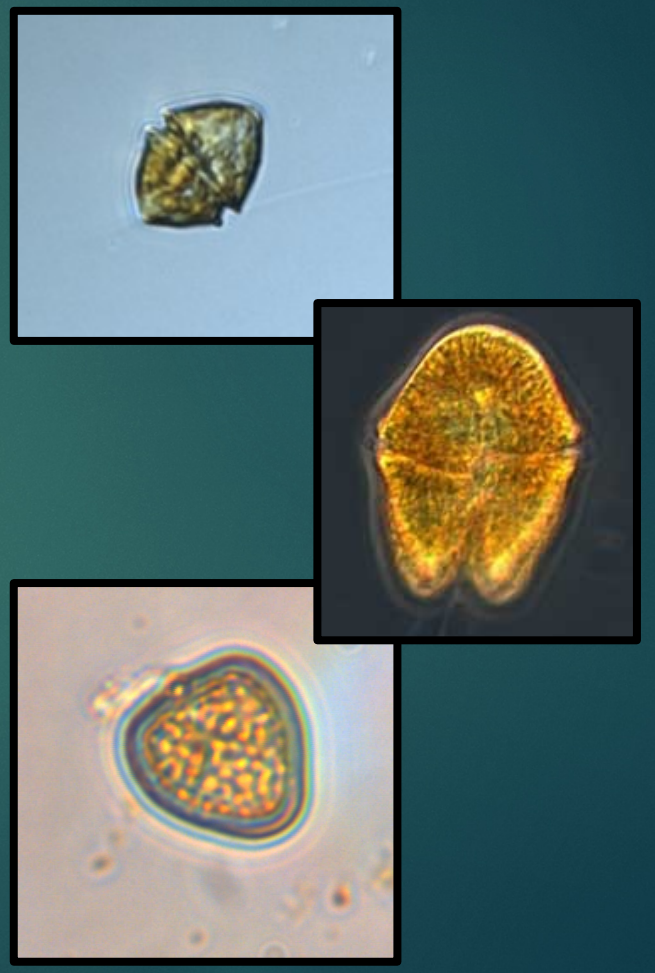
2021 Blooms: Spring & Early/Mid Summer

- *Heterocapsa spp.*
- *Akashiwo sanguinea*
- *Prorocentrum cordatum*



Heterocapsa spp.

Rappahannock River Bloom

mid – June *H. rotundata*–Samples up to 18,000 cells/ml

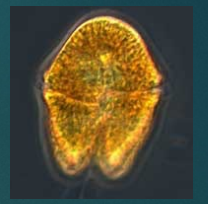
York River

April- *H. triquetra* with *P. cordatum* (ODU-Leah reported >12,000 cells/ml)

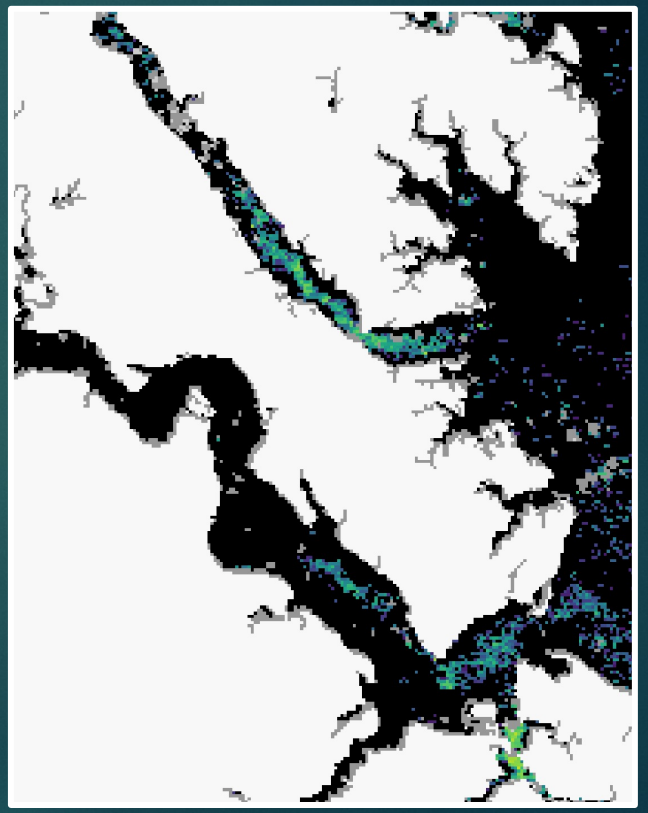
May-Mixed bloom samples *H. triquetra* with *Gyrodinium* sp. *P. cordatum*, *K. veneficum*

June- mixed bloom samples with *H. triquetra* with chlorophytes

Akashiwo sanguinea

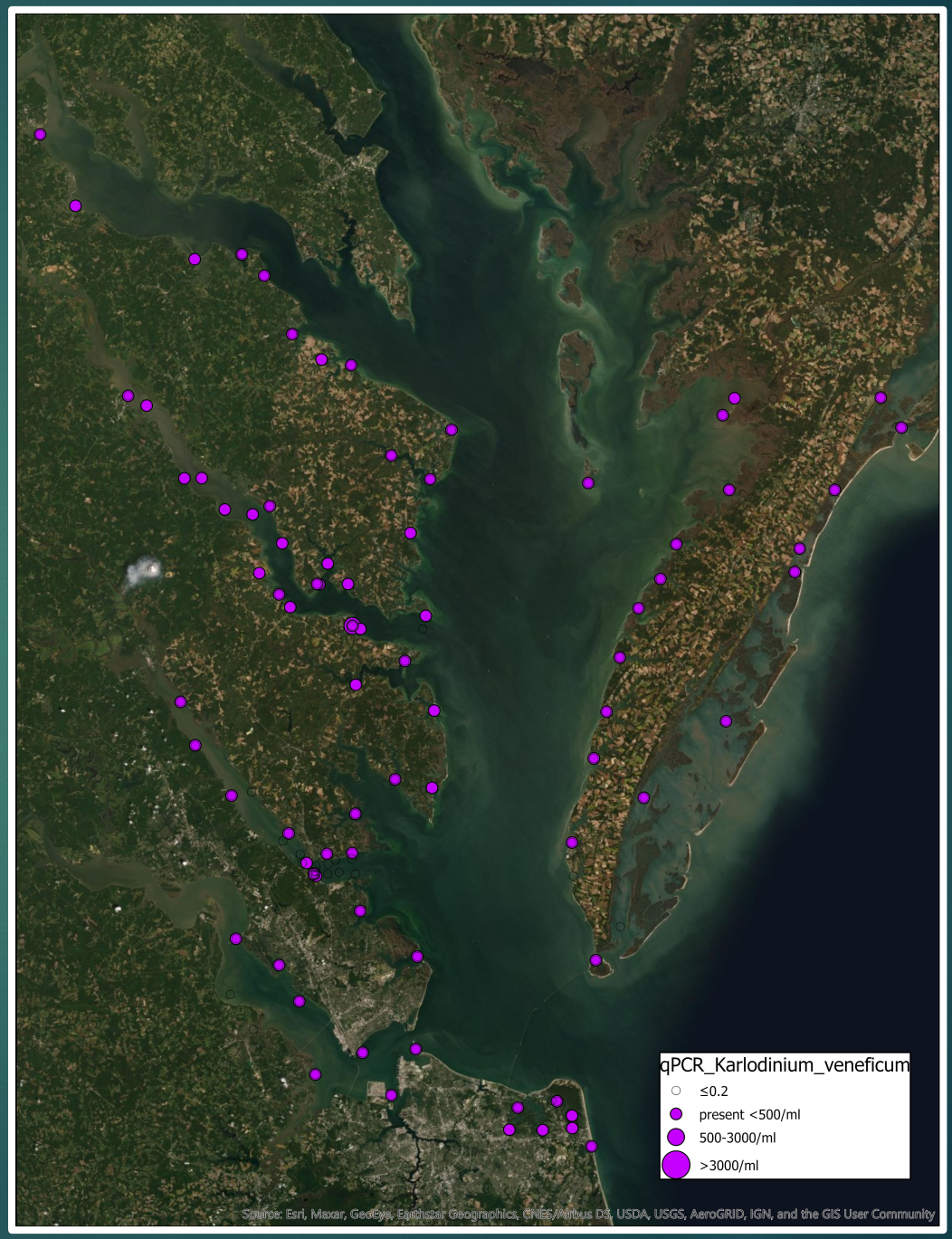


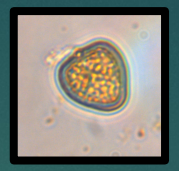
- York River- July – Bloom observed via satellite
- High levels in numerous samples throughout lower bay until early August
- Several samples mixed with high levels of *Scrippsiella trochoidea* and other organisms, diatoms
- Mixed with *Margalefidinium polykrikoides* in numerous early August samples



7/12/21

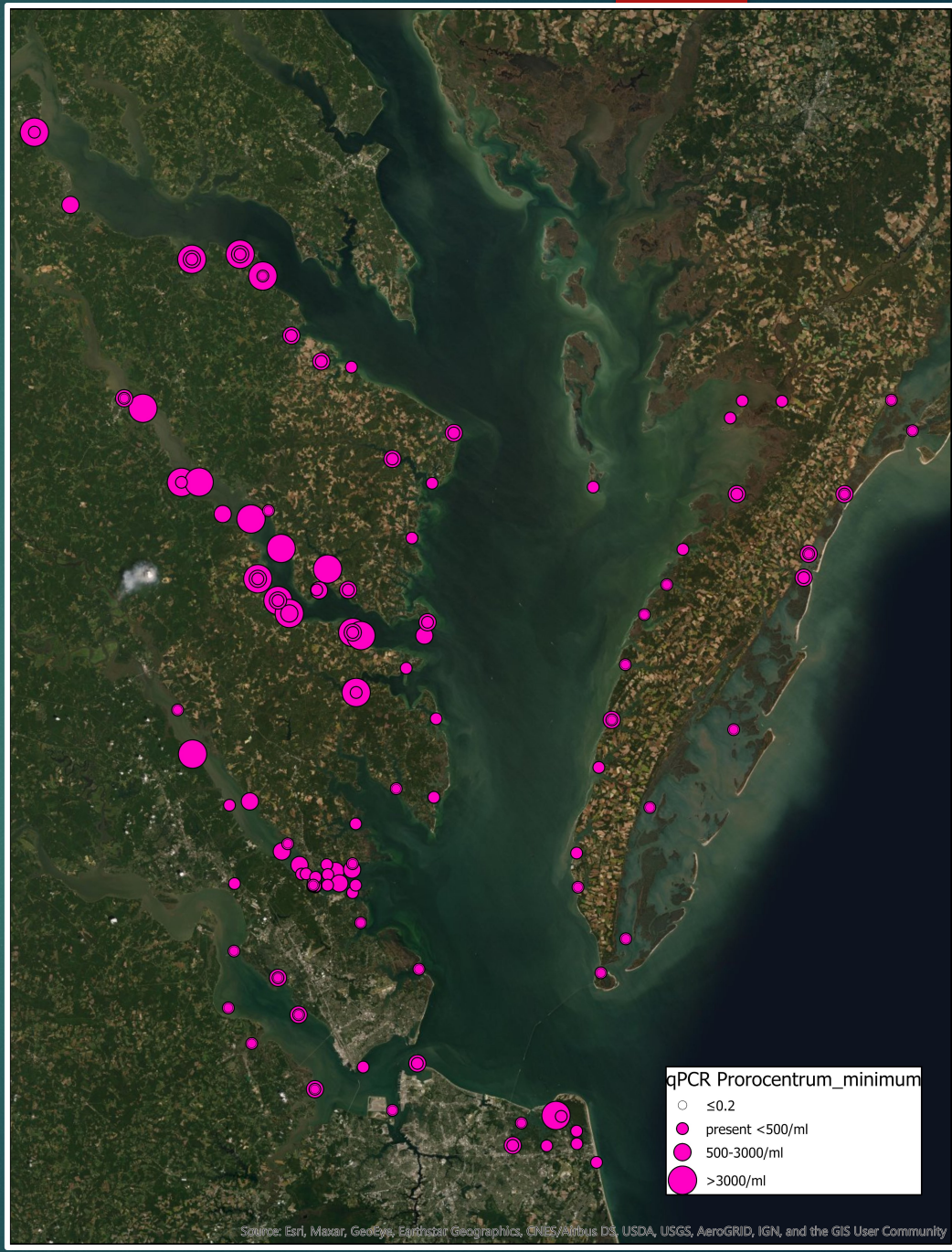
Karlodinium veneficum





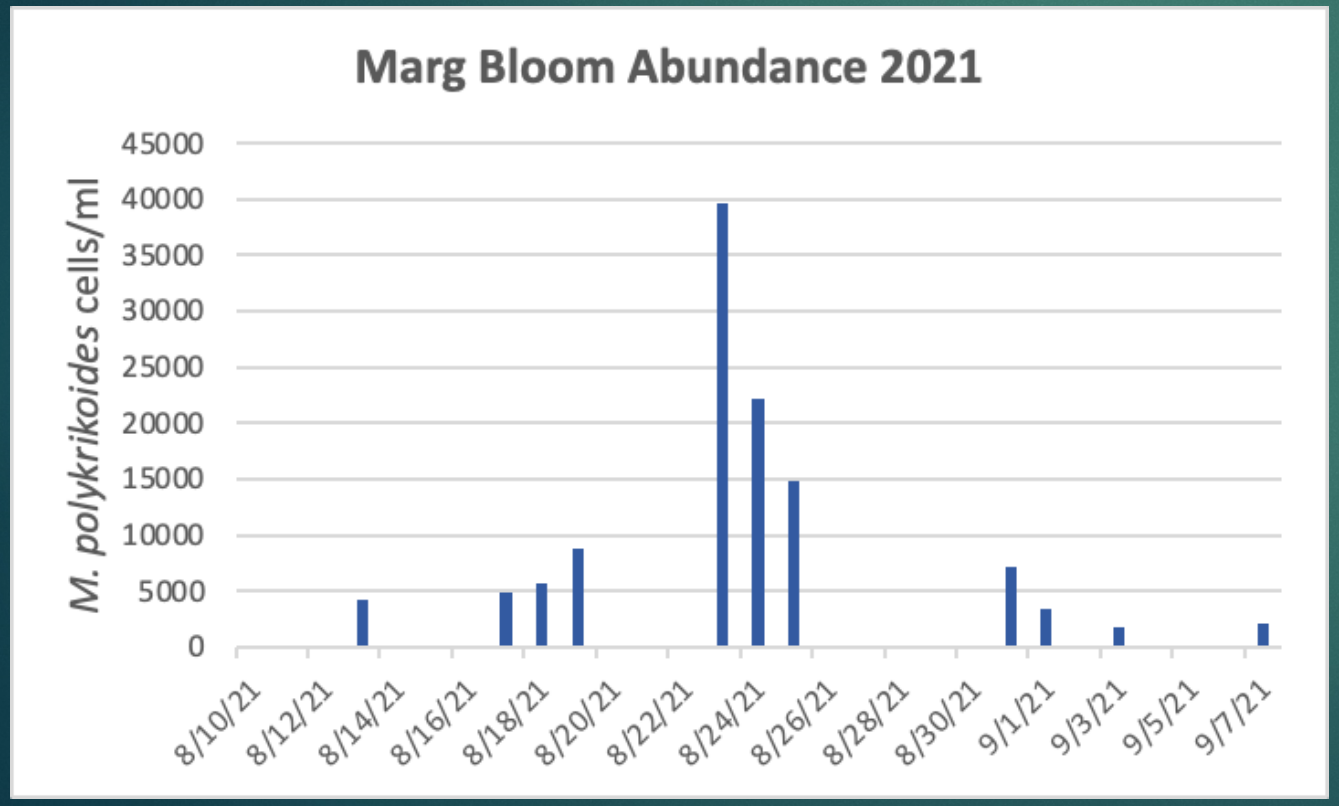
Prorocentrum cordatum

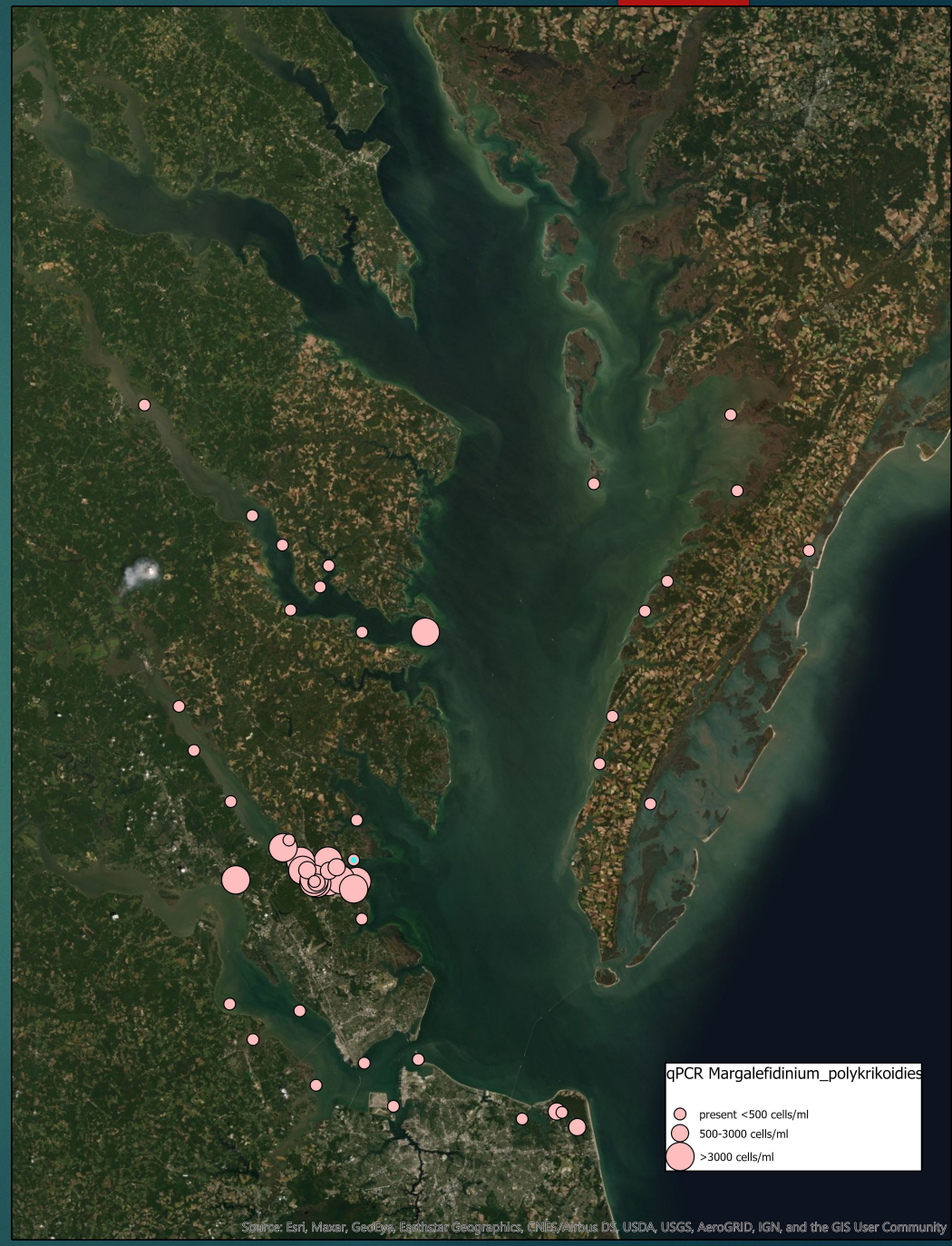
- First bloom level sample in Feb from the Potomac
- Many bloom samples, particularly from the Rappahannock and York beginning April
- Elevated levels continued into August with Marg



Margalefidinium polykrikoides

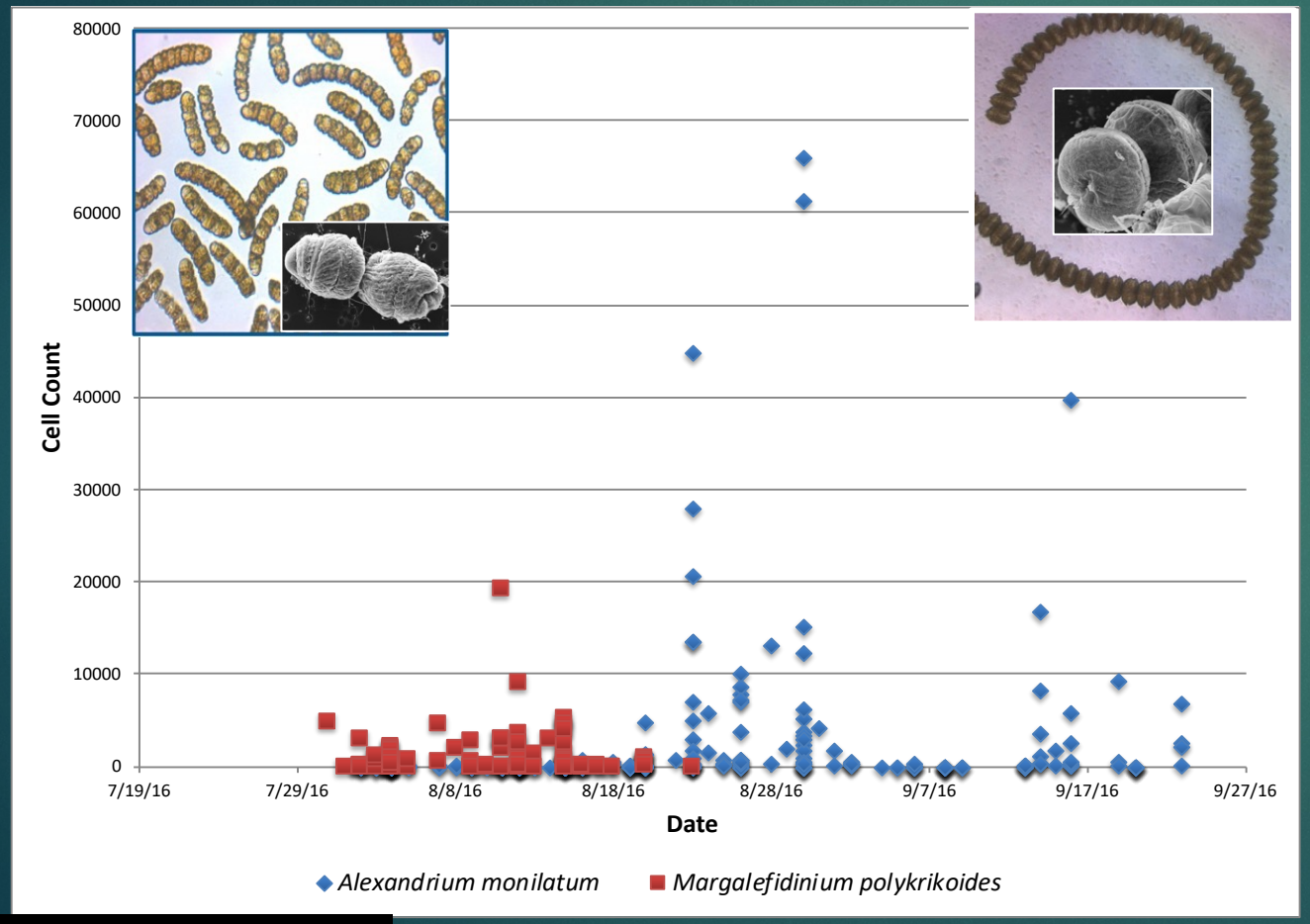

W. Jones_VIMS





Late Summer CB Blooms

- Marg typically starts blooming in July through early-mid August in lower Chesapeake Bay.
- Marg blooms usually followed by Alex in "bloom years"
- Alex blooms August into September, even into October some years.



Data from Egerton and Reece

SO…This did NOT happen in 2021!! WHY?

Stay tuned—

Savannah Mapes is looking at the role of overwintering temperatures and cysts

Are there other factors involved?

Late Summer Bloom and Non-Bloom Years?

- Heavy blooms in:

- 2007, 2008, 2009, 2012, 2013, 2015, 2016, 2020 and… 2021 (BUT… no Alex in 2021)

- No blooms in:

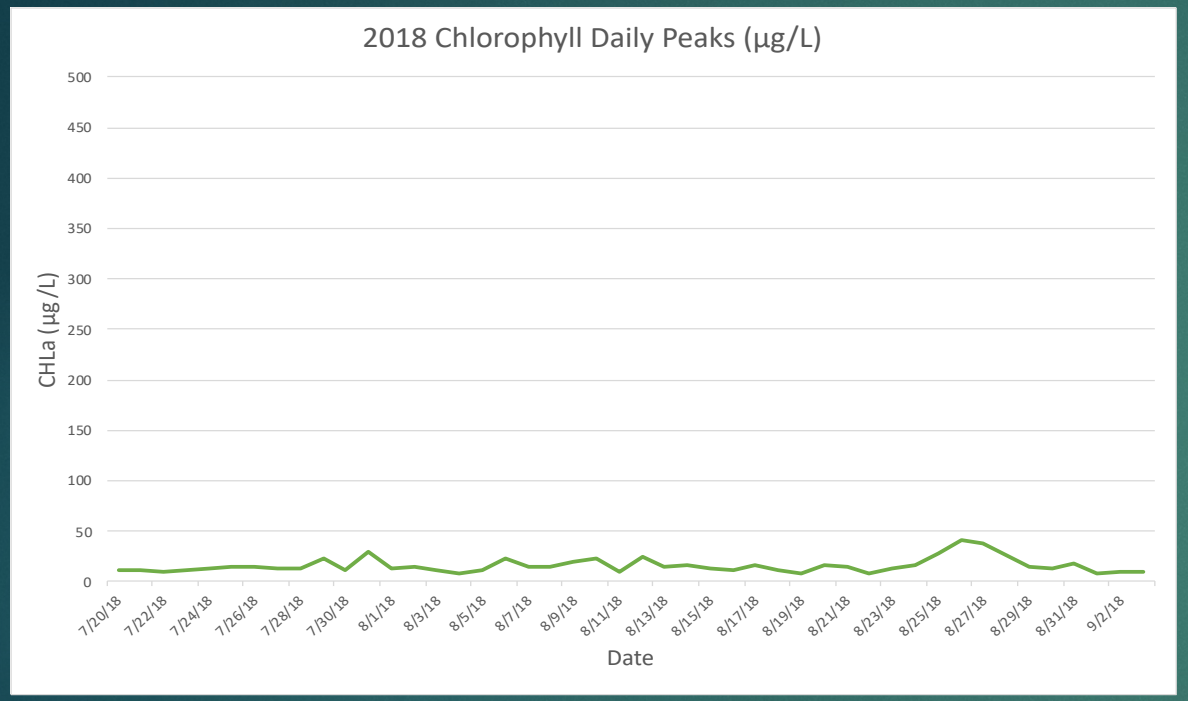
- 2014 or 2019

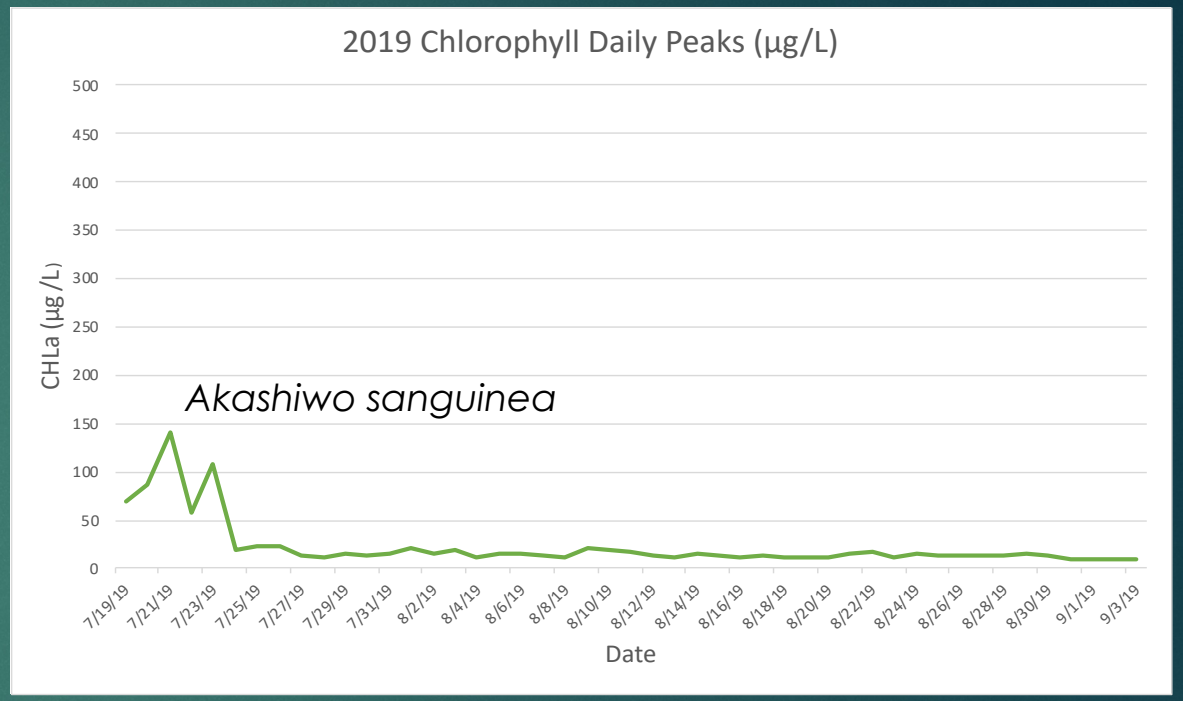
- Blooms of Marg only in the York 2010, 2011, 2021

- Blooms in the York: 2017

- Blooms of Marg only in the southernmost Bay tribs (James, Lafayette): 2018

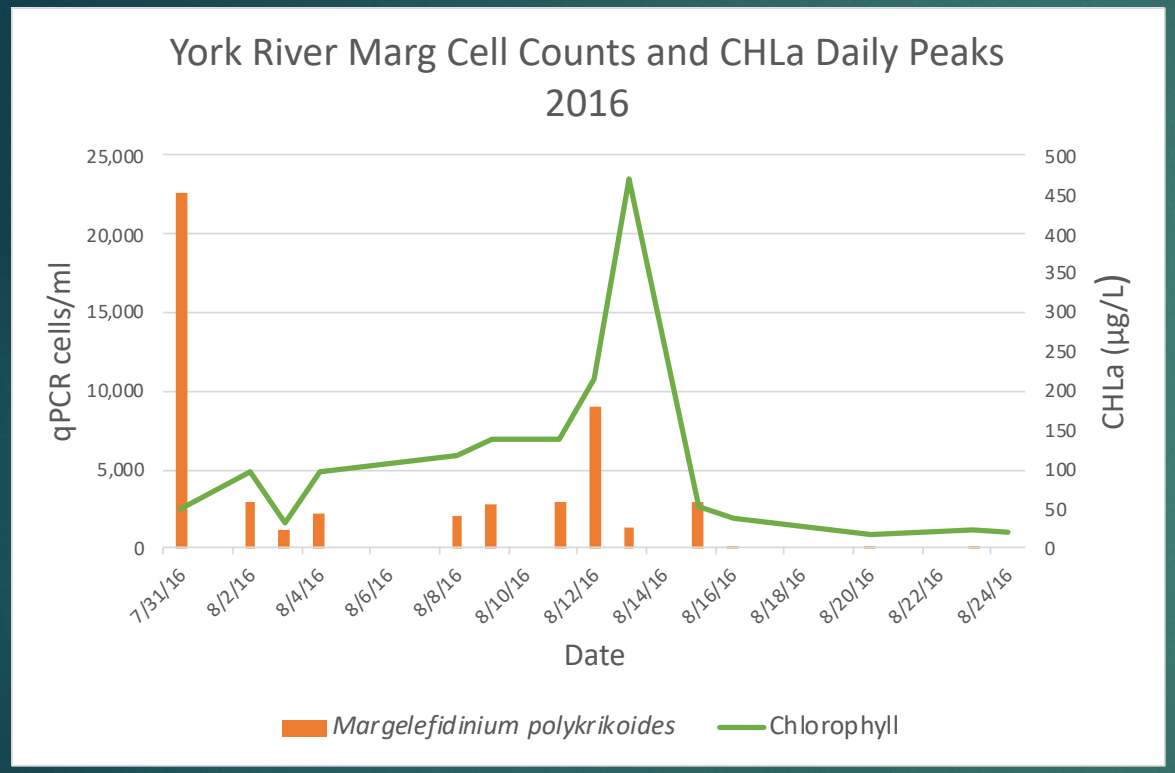
“Non-Bloom” Years *Chla*

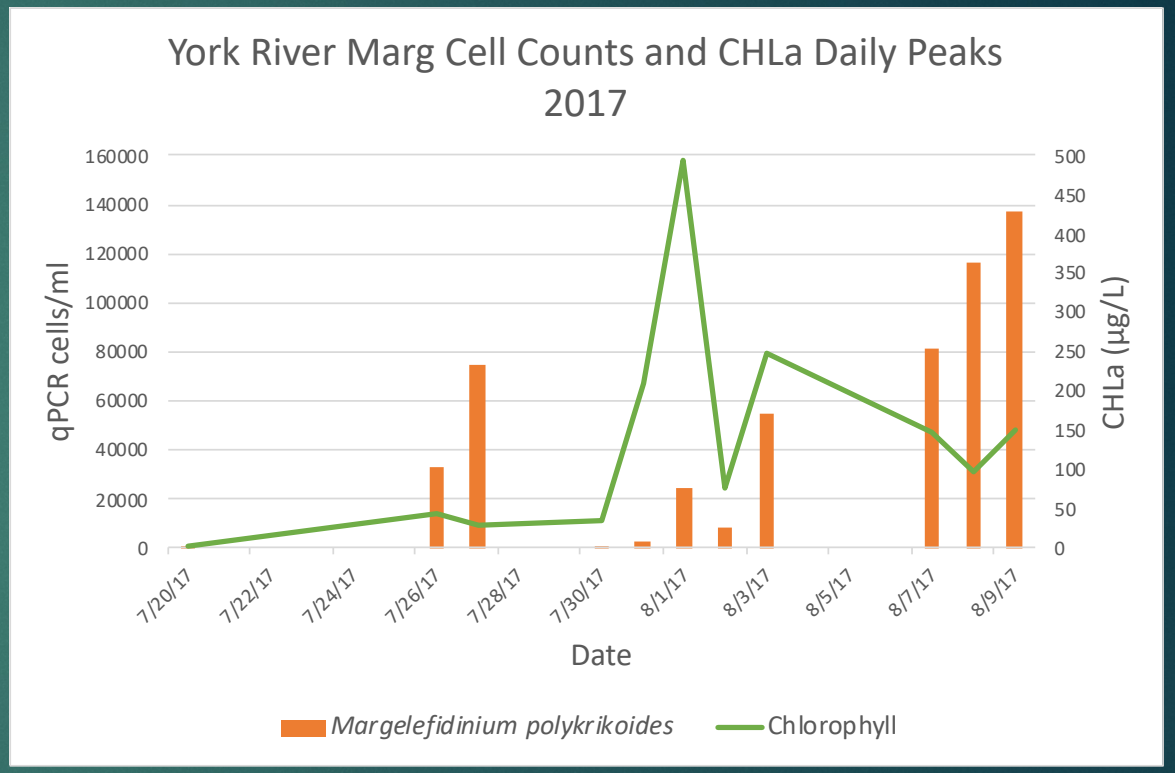




Basically--Boring

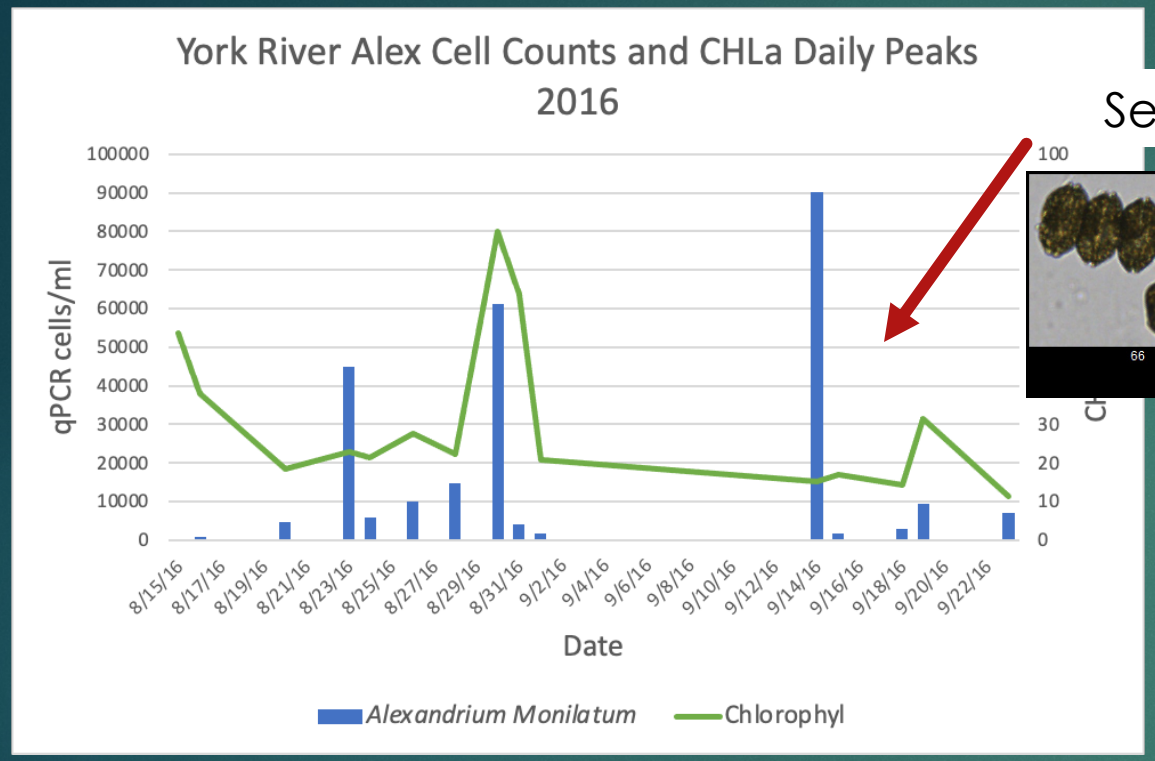
Late Summer Bloom Years: Marg



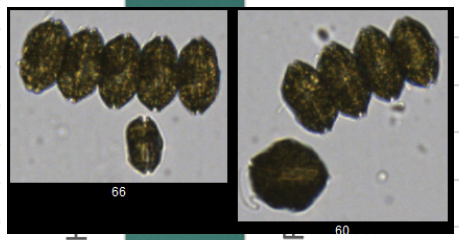


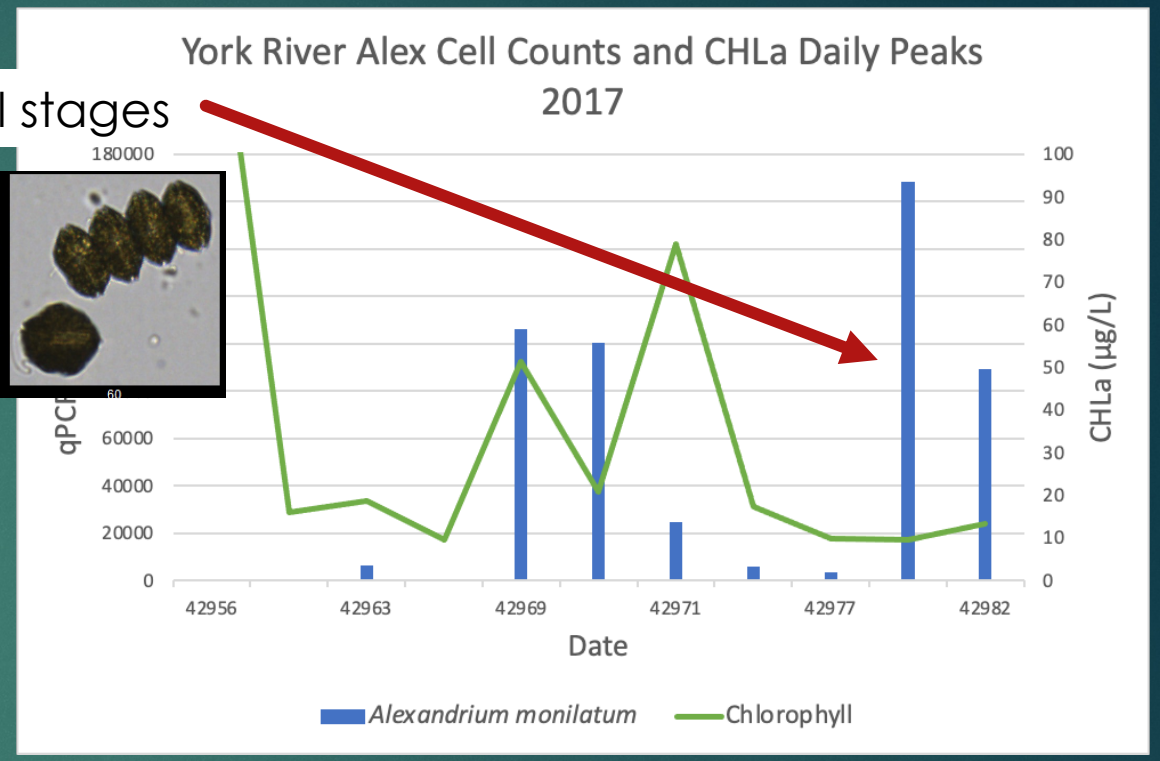
Chl*a* levels in Marg samples usually correlate well with cell counts

Late Summer Bloom Years: Alex



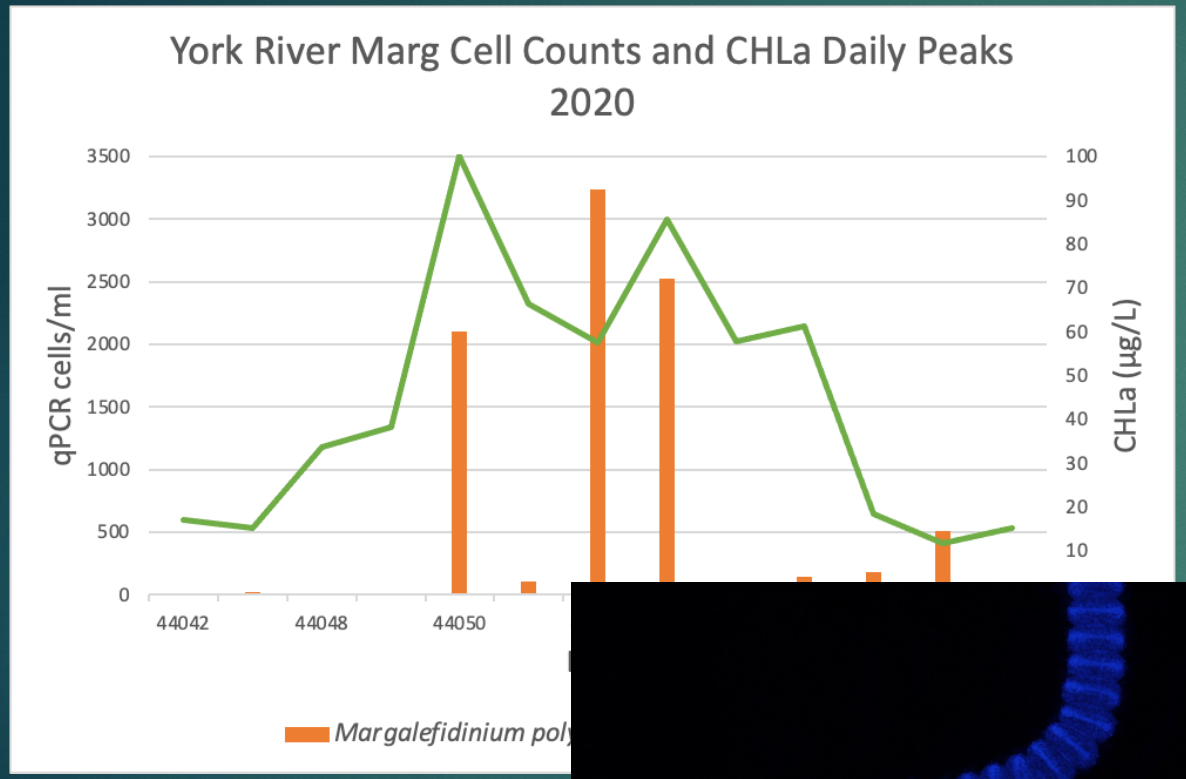
Sexual stages

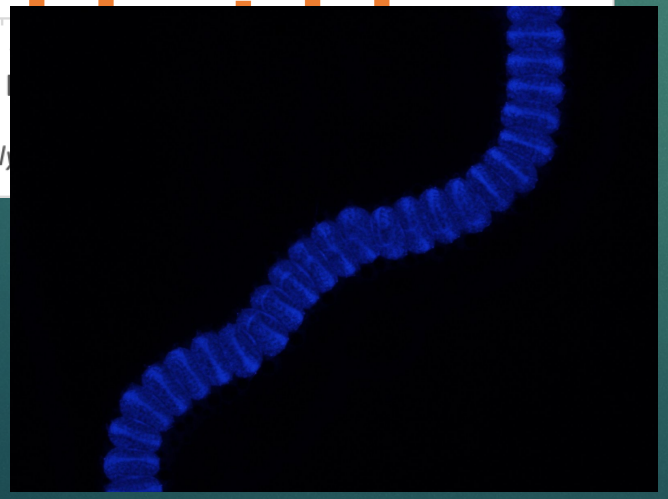


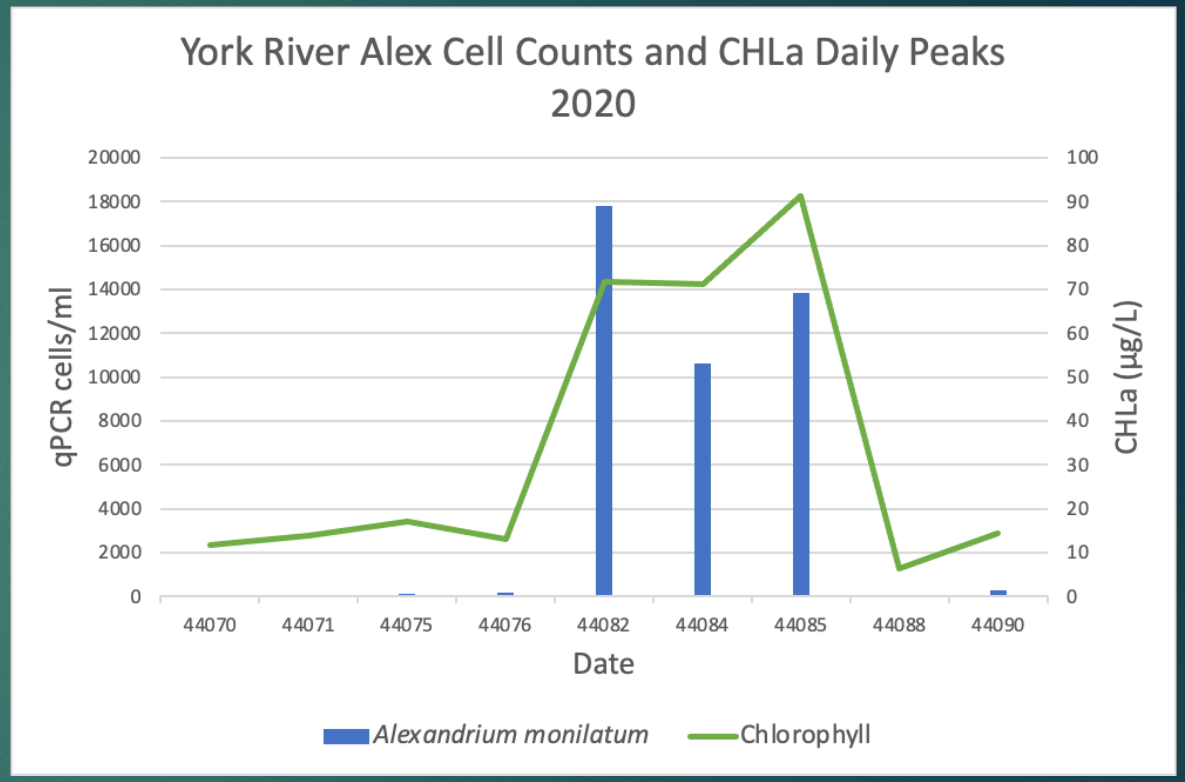


Often Chl*a* levels in Alex samples does not correlate with cell counts

Late Summer Bloom Years: Marg & Alex







Primarily long chains- asexual stage observed

Azadinium sp. Cultures

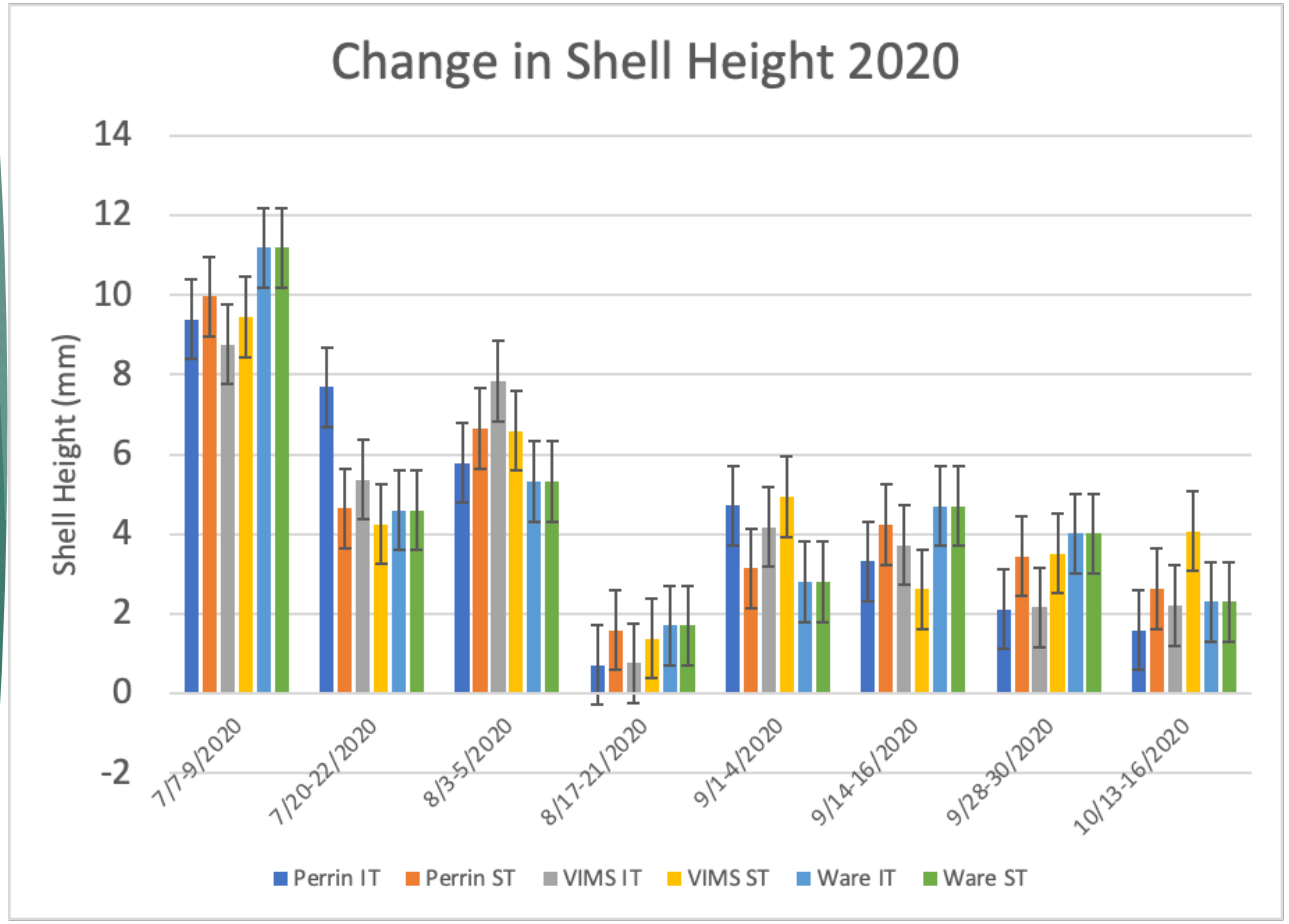
Chesapeake Bay Sediments collected from 3 sites where Azaspiracids had been detected (Onofrio et al. 2021)
  - Wise Point
  - Lynnhaven River
  - York River
- Sent to Urban Tillman in Germany to attempt isolation of cysts and establishment of cultures
- 4 cultures were established
- Cultures AND filters of cells for DNA isolation were returned to VIMS
- DNA was extracted, PCR amplified a fragment, sequenced for species identification
- Species identity = *Azadinium obesum*-all 4 cultures

HOWEVER:

The 4 cultures are growing very differently at VIMS - **Being re-sequenced to confirm identity**

Impacts of Late Summer Blooms:

Models indicate that oyster growth rate is higher when Marg or Alex concentrations are lower when growth rate lags cell count by 2 weeks.



Summary

- Blooms of *Heterocapsa*, *Prorocentrum*, and *Akashiwo* earlier in 2021
- Late summer bloom of *Margalefidinium,* but no *Alexandium* in 2021
- Sequencing of *Azadinium* sp. cultures isolated in Germany from CB sediments – *Azadinium obesum*, but resequencing now because of growth differences among cultures
- Oysters exposed to Marg and Alex blooms in the field demonstrated slowed growth