Phytoplankton Quality and Quantity in Shellfish Nurseries

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Sea Grant

UF | IFAS
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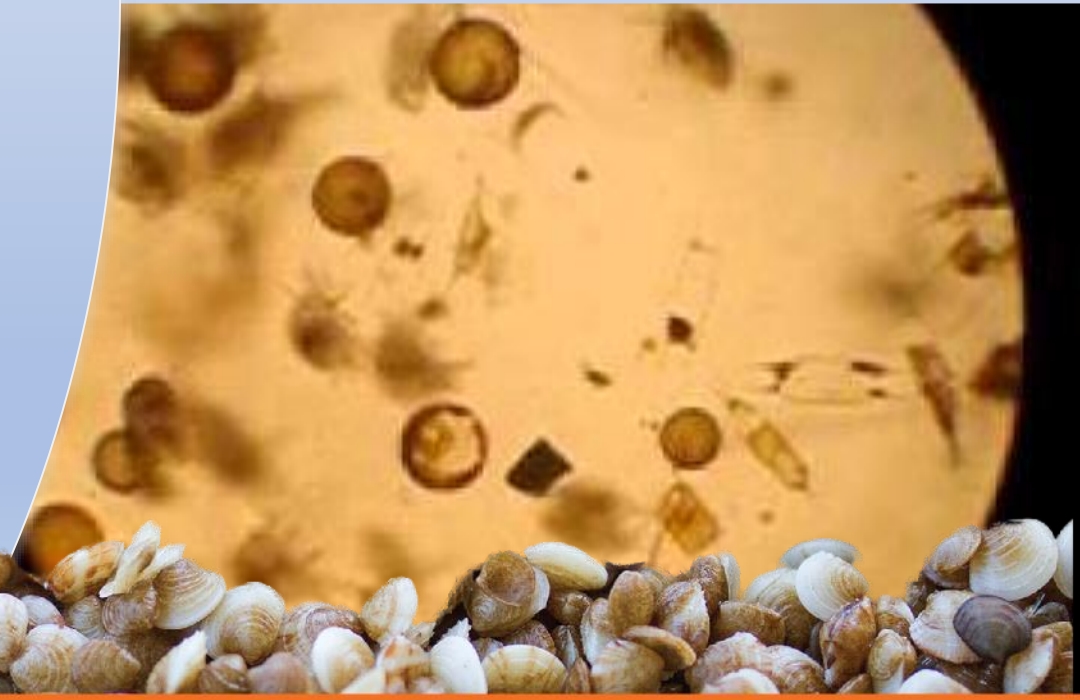
Phytoplankton sampling

- Weekly samples collected and preserved during nursery production
- 1-2 samples processed per month
- Up to 10 samples per facility per year

Sample processing

- Samples shipped to UF lab
- Samples settled in chambers
- Phytoplankton cells identified and counted
- Cell biovolumes estimated
- Phytoplankton biomass as carbon estimated



Dinoflagellates

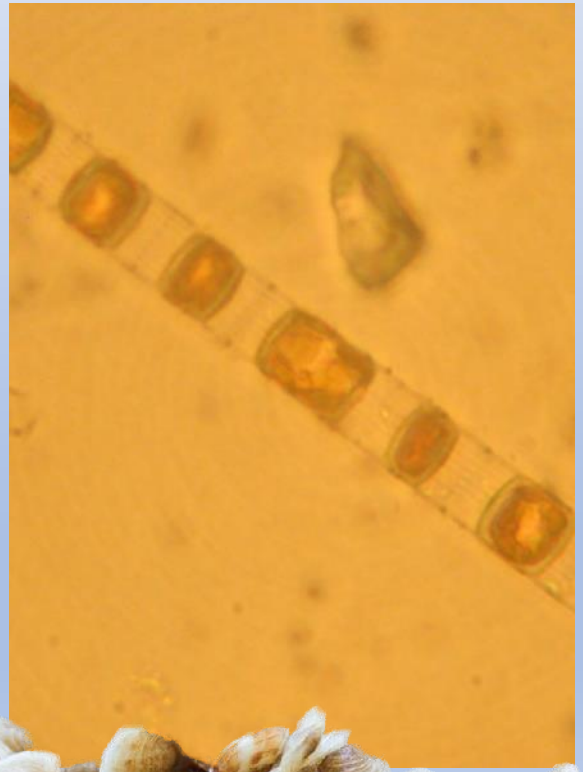
2 - > 200 µm

- Many species are food sources for shellfish
  - Store starches and lipids
- Some species produce toxins
  - Responsible for “red tides”

Diatoms

5 - 200 µm

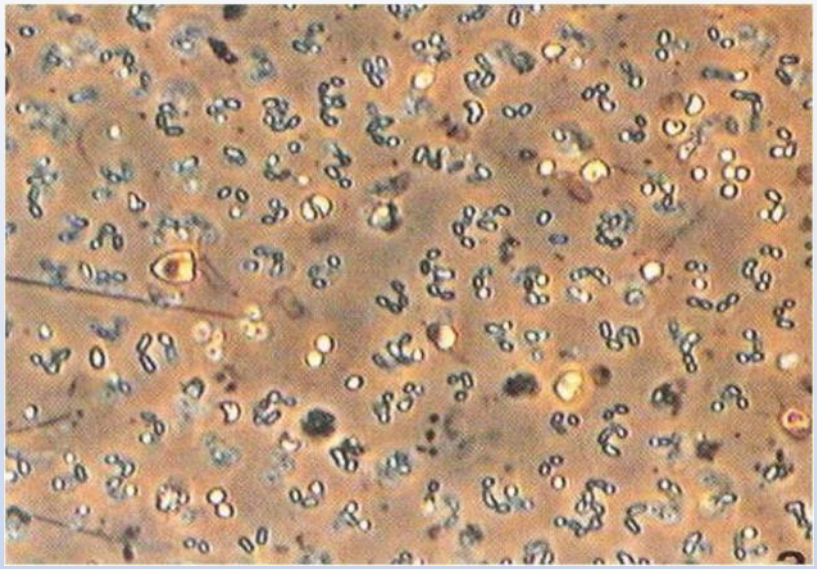
- Many species are food sources for shellfish
  - High concentrations of lipids
- Some species have long spines or form long colonies
  - May be difficult for shellfish to filter

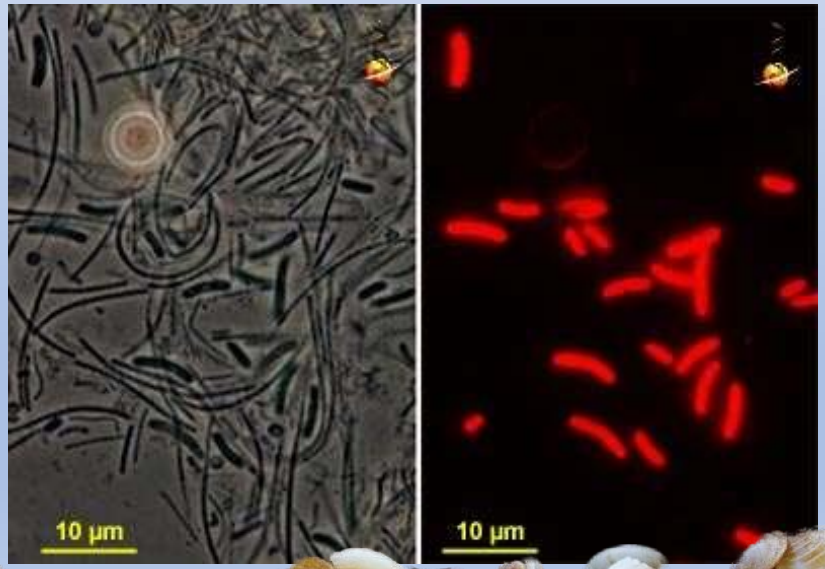


Cyanobacteria

- Many species are food sources for shellfish
  - High protein content
- Some freshwater species produce toxins

<1 µm (cells) - 100 µm (colonies)

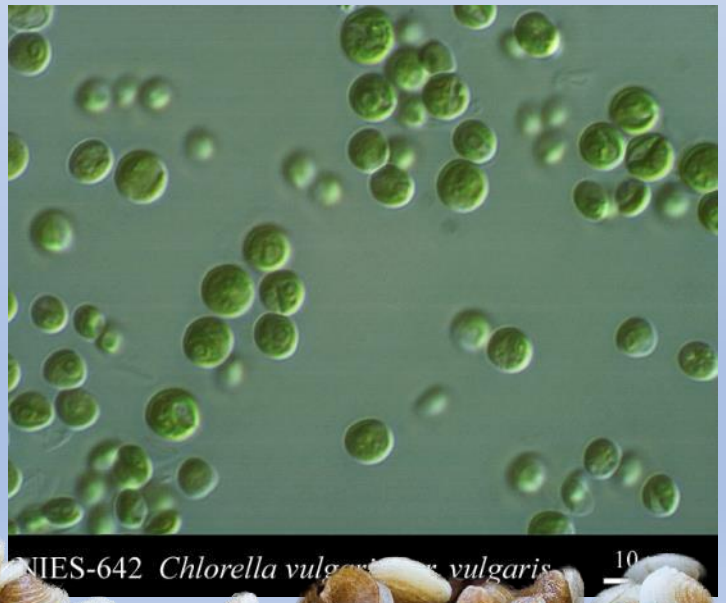




Other

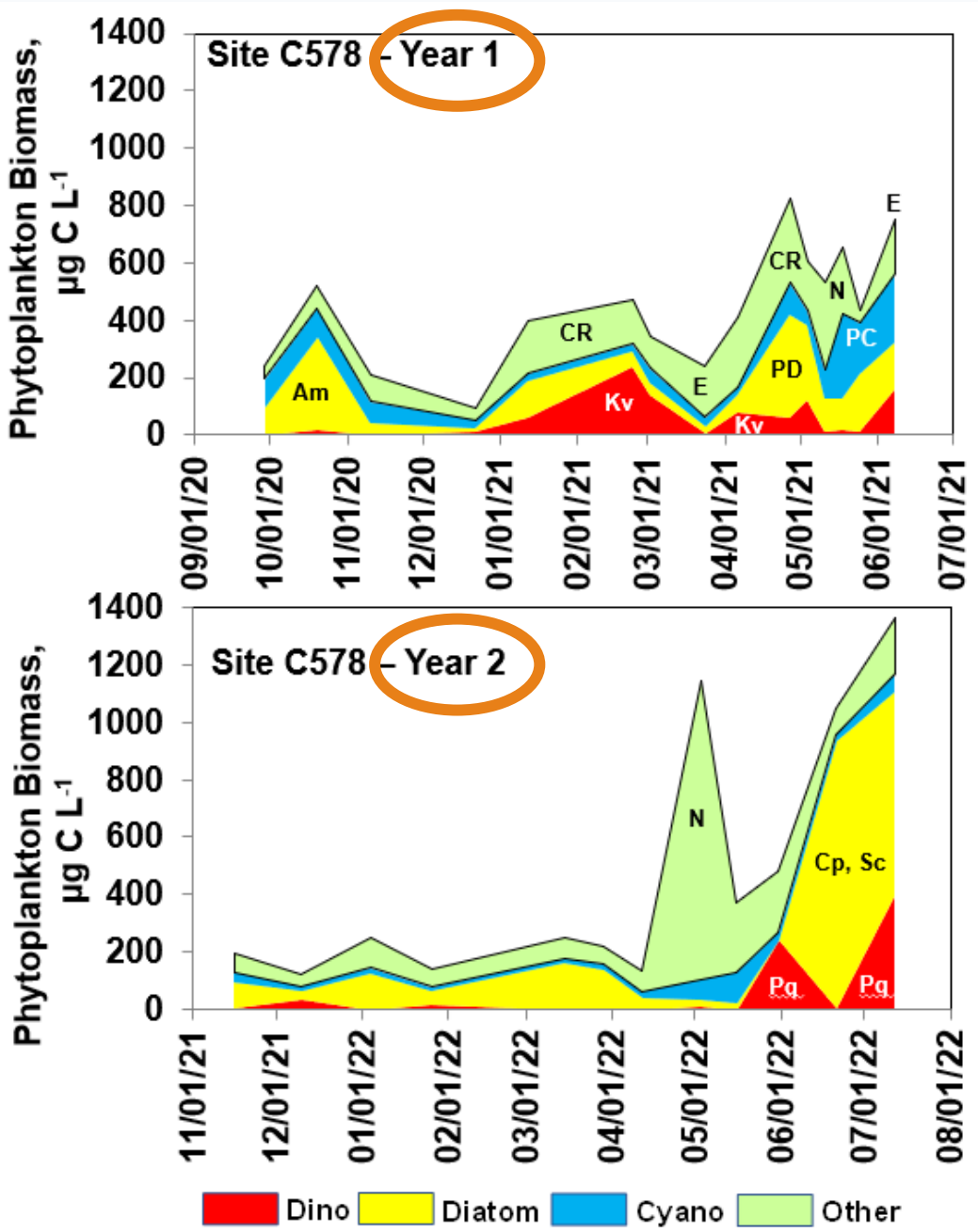
< 25 µm

- Chlorophytes, cryptophytes, chrysophytes, euglenophytes
- Many species are food sources for shellfish
  - High lipid content
- Some species form harmful blooms
  - Linked to fish mortalities



Examples

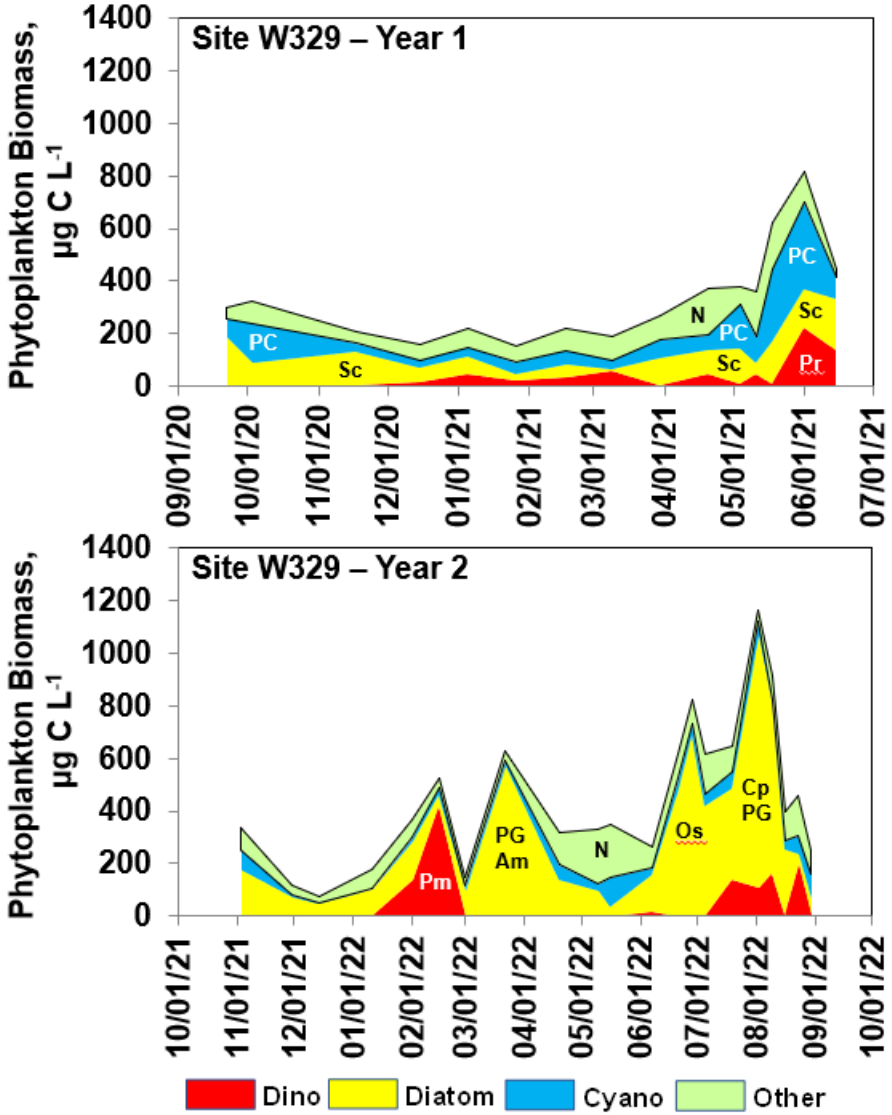
- **Phytoplankton varies**
  - Monthly
  - Annually



Am, *Amphora*; Cp, *Cerataulina pelagica*; CR, cryptophytes; E, Euglena; Kv, *Karlodinium veneficum*; N, nanoeukaryote; PC, picocyanobacteria; PD, pennate diatom; Pq, *Peridinium quadridentatum*; Sc, *Skeletonema costatum*.

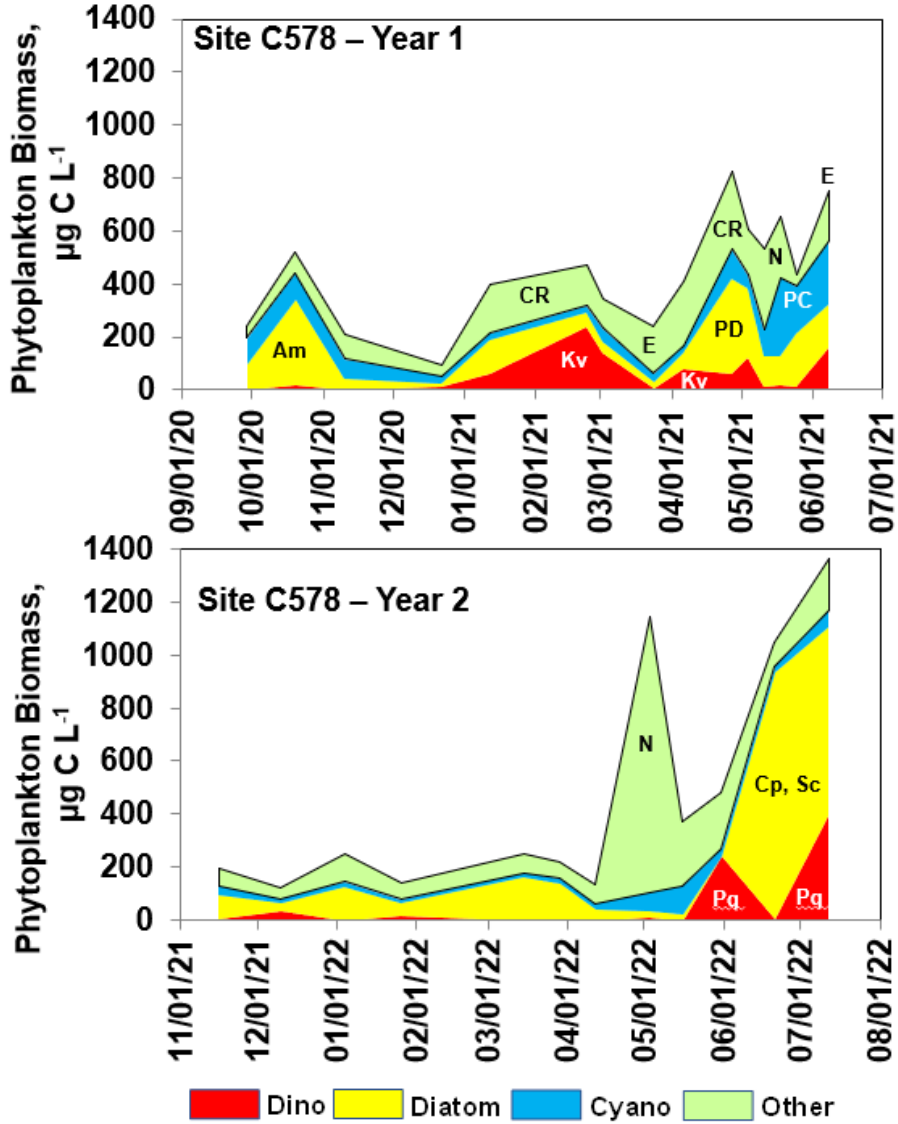
• Phytoplankton varies by facility

Site W329



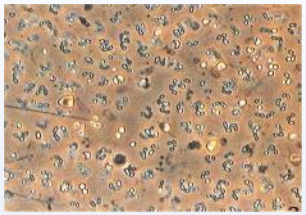
Am, *Amphora*; Cp, *Cerataulina pelagica*; N, nanoeukaryote; Os, *Odentella sinensis*; PC, picocyanobacteria; PG, *Pleurosigma-Gyrosigma*; Pm, *Prorocentrum minimum*; Pr, *Protoperidinium*; Sc, *Skeletonema costatum*

Site C578



Am, *Amphora*; Cp, *Cerataulina pelagica*; CR, cryptophytes; E, Euglena; Kv, *Karlodinium veneficum*; N, nanoeukaryote; PC, picocyanobacteria; PD, pennate diatom; Pq, *Peridinium quadridentatum;* Sc, *Skeletonema costatum*.

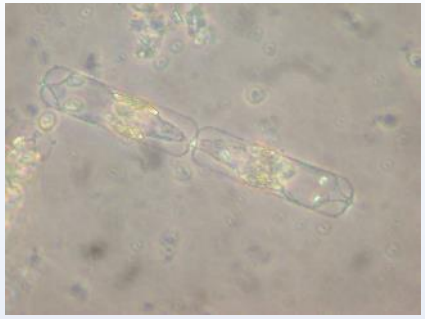
PC = picocyanobacteria

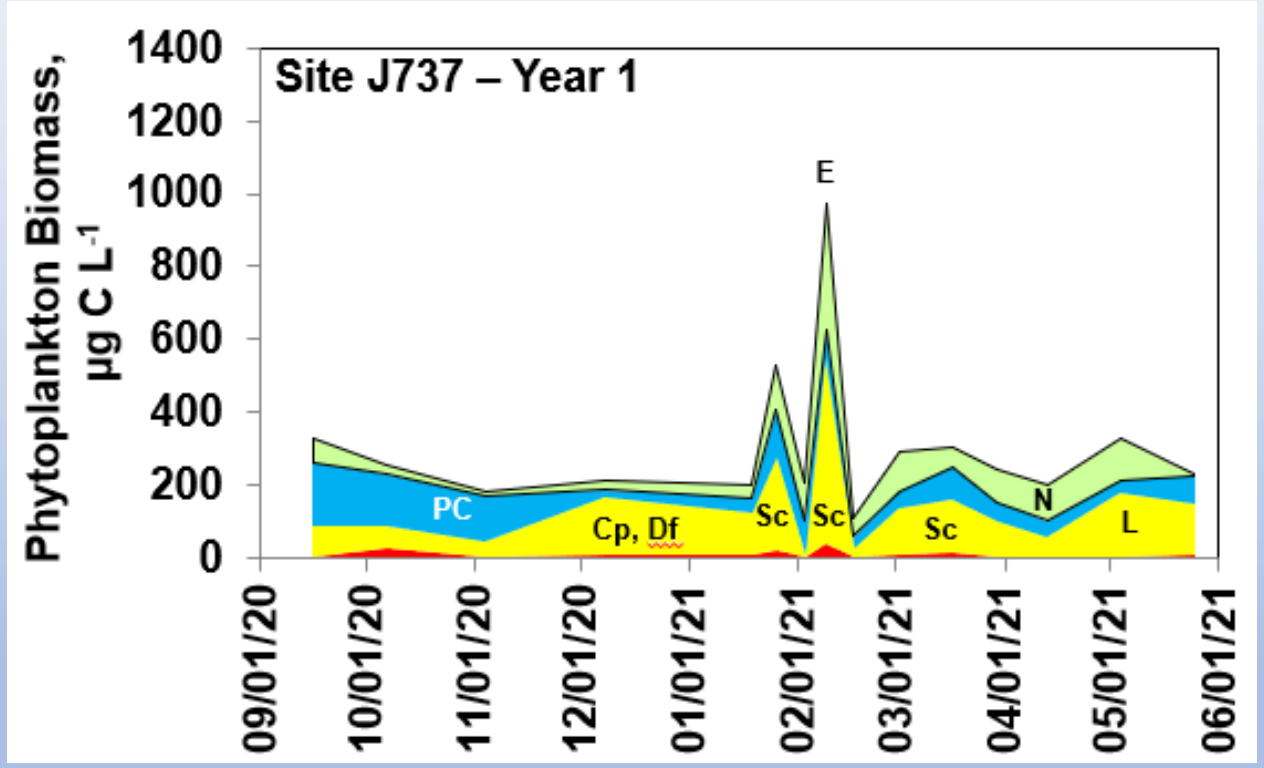


May be too small

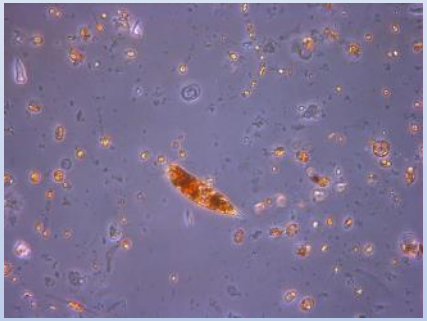
Cp = *Ceratualina pelagica*
Df = *Dactyliosolen fragilissiumus*
Sc = *Skeletonema costatum*
L = *Leptocylindrus*

Acceptable food items





E = *Euglena*
N = nanoeukaryote

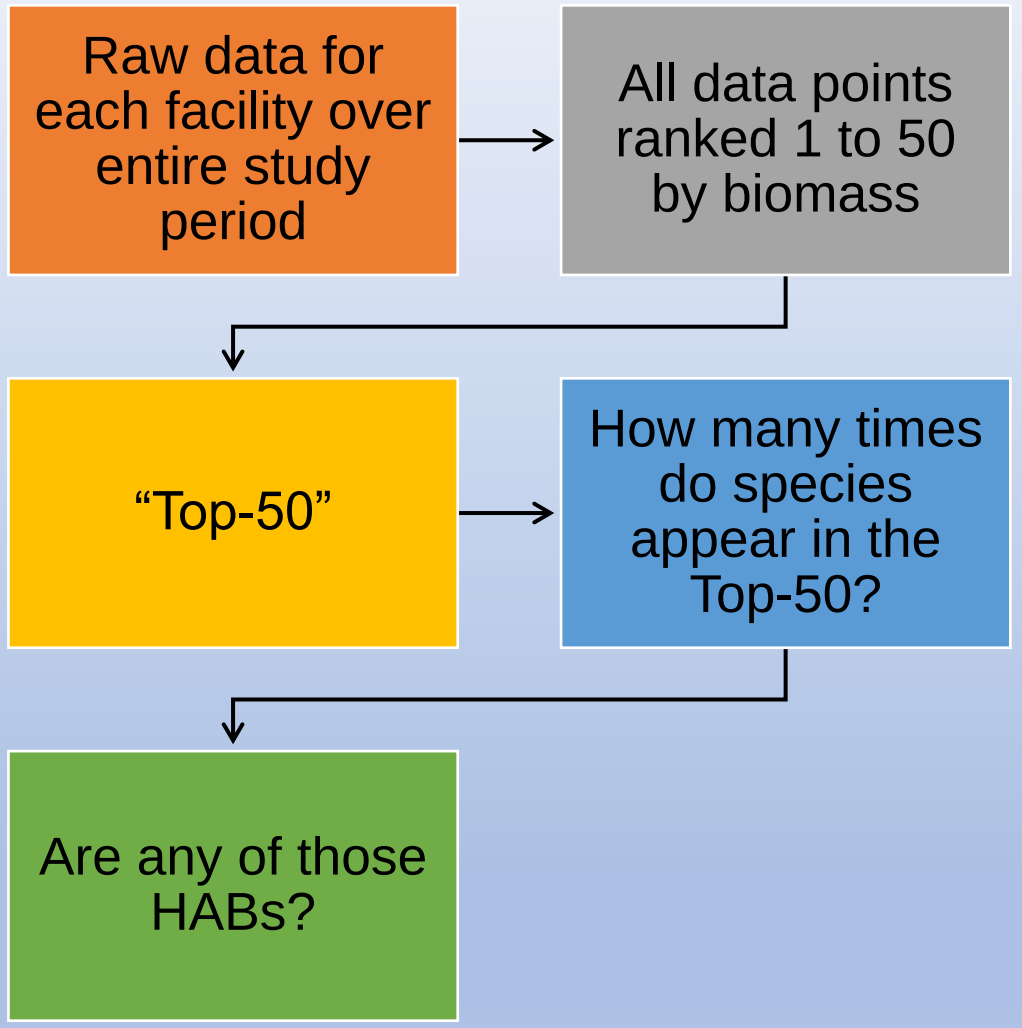


Acceptable food item
Some too small

Dino Diatom Cyano Other

Am, *Amphora*; Cp, *Cerataulina pelagica*; Df, *Dactyliosolen fragilissimus*; E, Euglena; L, *Leptocylindrus*; N, nanoeukaryote; PC, picocyanobacteria; PG, *Pleurosigma-Gyrosigma*; Pq, *Peridinium quadridentatum*, Sc, *Skeletonema costatum*

Another way to look at it…..



EXAMPLE: At Site J737:

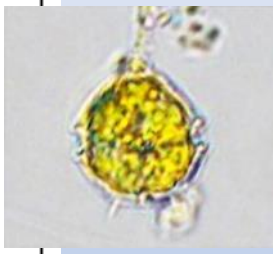
- Picocyanobacteria were in the “Top-50” by biomass 9 times over study period
- Potential HABS were in the “Top-50” bio biomass 5 times over study period

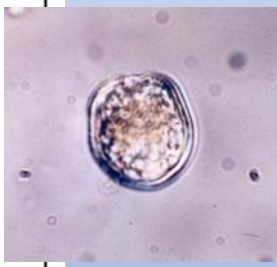
Site J737				
Species	Group	Frequency in Top-50	Biomass Range µg C L^{-1}	Max. Density 10^3 Cells L^{-1}
ia	Cyanobacteria	9	42-113	642009
D	Eukaryote	8	45-89	28661
	Diatom	6	41-407	8526
	Cyanobacteria	6	47-67	194548
Peridinium quadridentatum	Dinoflagellate	3	193-385	363
Pleurosigma/Gyrosigma sp.	Diatom	3	81-323	725
Cerataulina pelagica	Diatom	2	55-263	181
Eutreptia sp.	Euglena	2	59-235	726
Prorocentrum minimum	Dinoflagellate	2	46-93	363
Thalassiosira	Diatom	2	73-89	5260
Nanoplankto	ote	2	64-75	1270
Amphora/E	m	2	43-47	399
Leptocylin	m	1	79	363
Leptocylin	m	1	75	5079
Dactyliosolen fragilissimus	Diatom	1	50	464
	Overall biomass range: 41 - 407 µg C L^{-1}			

Red text - HAB issues with bivalves; Blue text - HAB sp.; Brown - Possible HAB

Associated with harmful algal blooms elsewhere

Associated with shellfish mortalities in Chesapeake Bay





Resources

- **UF Algal Physiology & Ecology Lab**

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