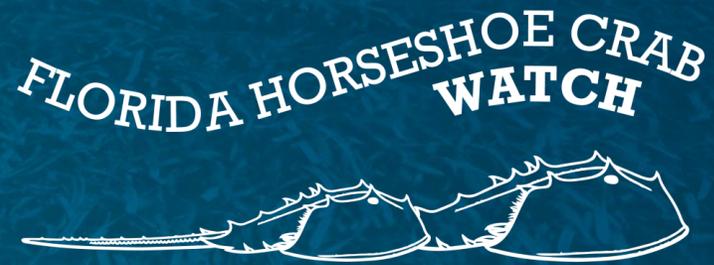


BEING AN AMBASSADOR BEYOND THE CLASSROOM

***AN OVERVIEW OF CITIZEN SCIENCE PROGRAMS OFFERED BY
FLORIDA SEA GRANT IN CHARLOTTE COUNTY & WHY THEY ARE
NECESSARY***



EYES ON SEAGRASS



Linked with Limulus

CHARLOTTE HARBOR AMBASSADOR TRAINING
FEBRUARY 18TH, 2026

FLORIDA SEA GRANT

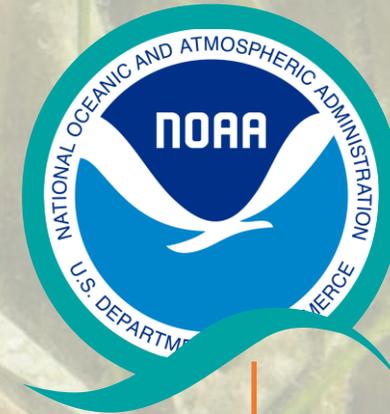
SCIENCE SERVING FLORIDA'S COASTS

1862- Land Grant University system established

- University of Florida Institute of Food and Agricultural Sciences (IFAS)

1975- Sea Grant

- 35 Programs in Coastal States and the Great Lakes
 - Including Puerto Rico



FLORIDA HORSESHOE CRAB WATCH



Linked with Limulus

Charlotte Harbor Ambassador Training

February 17th, 2026

FLORIDA HORSESHOE CRAB
WATCH



Linked with Limulus

UF UNIVERSITY of
FLORIDA

UF IFAS
UNIVERSITY of FLORIDA
NATURE COAST
FLORIDA

Sea Grant
Florida

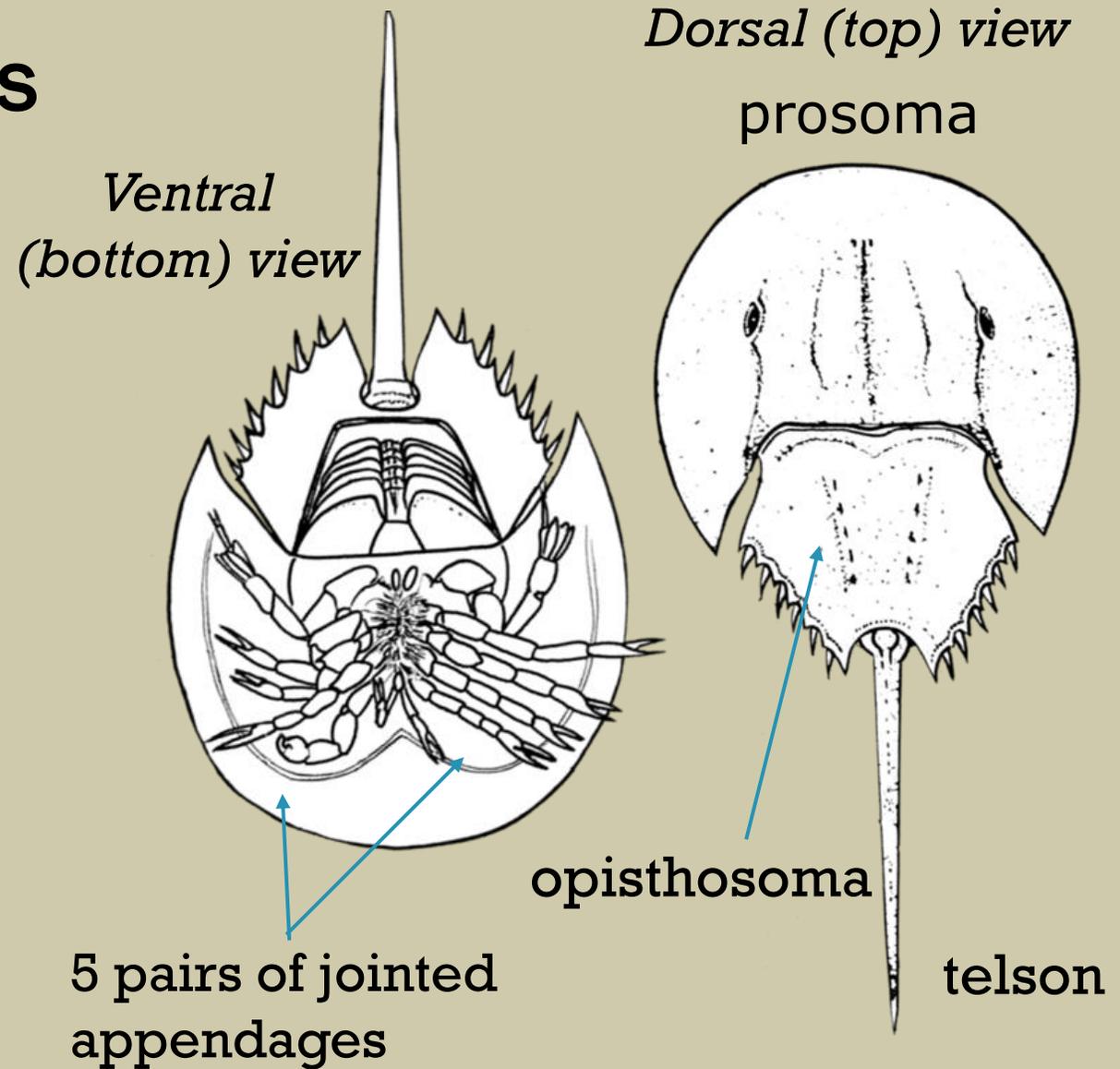


Horseshoe crabs are Arthropods

- Exoskeleton made of chitin
- Jointed appendages
- ***But they are not crustaceans or “crabs”***
 - *More closely related to spiders, ticks & scorpions*

Aren't they really ancient?

- Lineage arose in the Paleozoic, way before dinosaurs
- Horseshoe crabs have survived many mass extinctions!

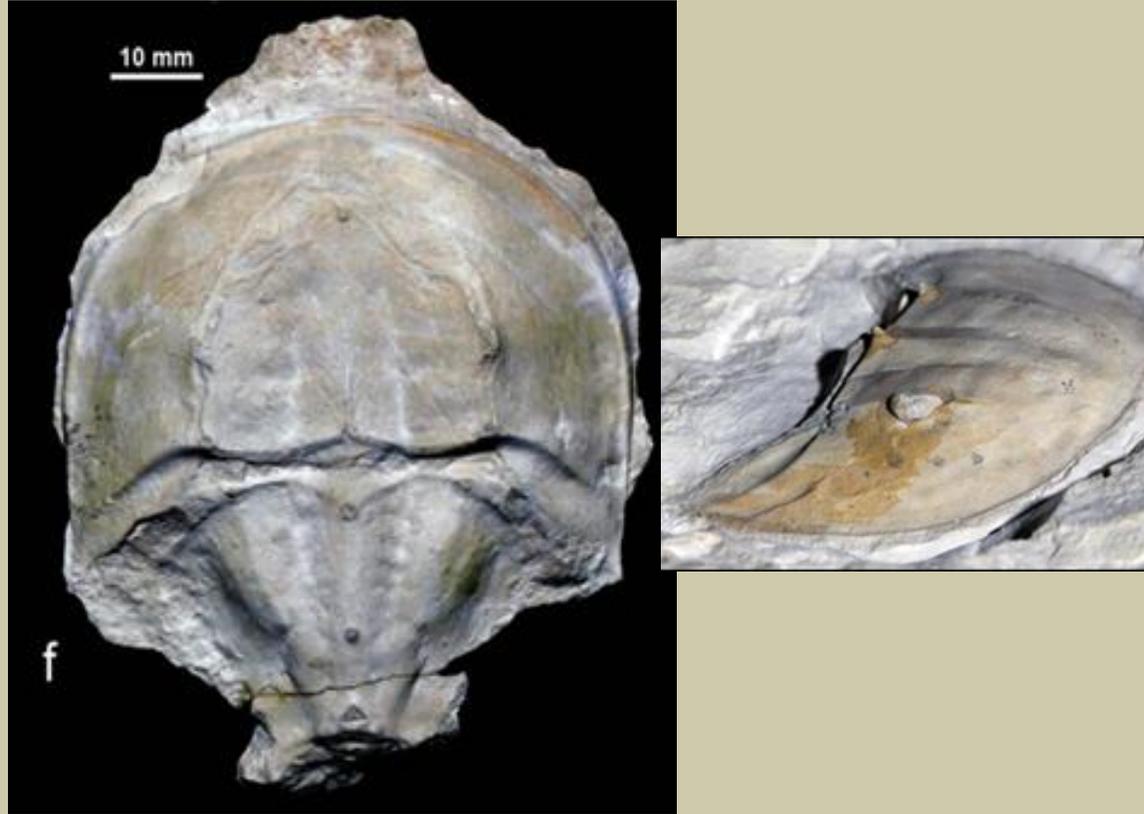


HSCs are “Living fossils”

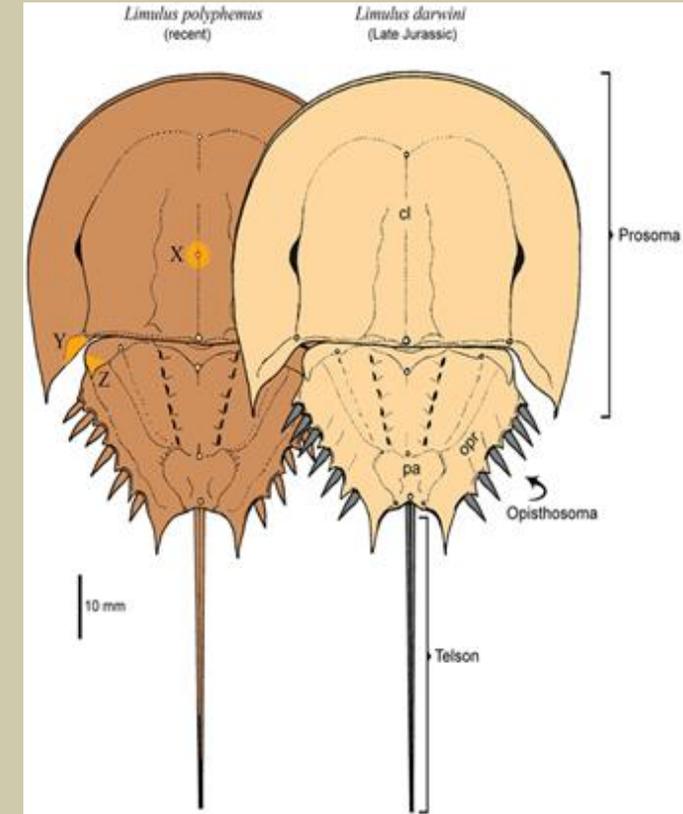
Very little external change in 200 million years



Oldest fossils
Paleozoic 445 myr



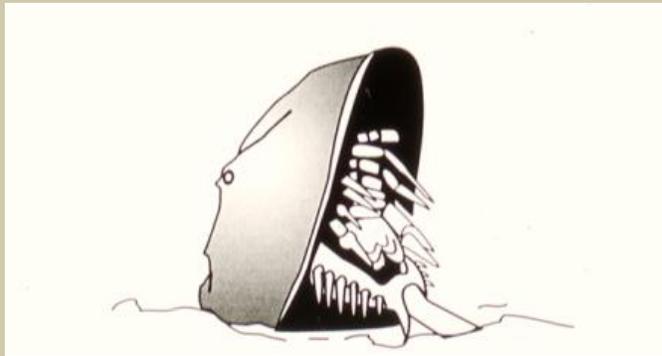
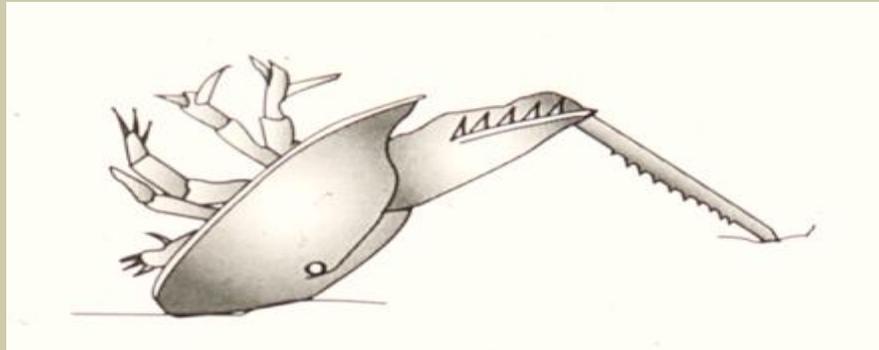
Limulus darwini, Jurassic 150 myr



Comparison of
L. polyphemus and *L. darwini*

Are they dangerous? No!

Crabs use their tails to right themselves when overturned



Stranded crabs after spawning



Never handle a crab by its tail!

Horseshoe Crab Management: Multiple Stakeholders



- Federal Fisheries Management Plan regulates the horseshoe crabs in Atlantic states
- Established maximum number for bait harvest (state limit)
- Since 2001, bait harvest stabilized, around 1 million/yr harvested
- Biomedical harvest has increased (But not in Florida)
- In Florida, the aquarium trade is a significant additional use

Economic Importance: Blood



- Horseshoe crabs are wild-collected
- Transported to the lab
- Scraped clean

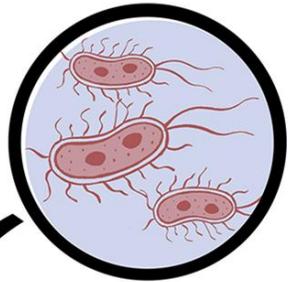
- Heart punctured
- $\frac{1}{3}$ - $\frac{1}{2}$ of blood removed
- Returned alive

- Blood cells (amebocytes) removed, broken open (lysed)
- Bottled: *Limulus* amebocyte lysate or "LAL"

What is the LAL Test for?

- Indicates presence of bacteria that cause infections and disease
- LAL Test is extremely sensitive
- LAL is the standard for testing *all* injectables (since 1987)
- Used in pharmaceuticals, implantable devices, also in space and computers
- 5 US companies: MA, NJ, MD, VA, SC
- Billion dollar industry \$\$\$

Everyone benefits from *Limulus*!



Gram Negative Bacteria

Such as E. Coli and Salmonella

Clotting Factors and Enzymes

Positive Gel Clot

Detects the presence of endotoxins

No Clot

Indicates the absence of endotoxins



FLORIDA HORSESHOE CRAB WATCH



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NATURE COAST
Florida

Sea Grant
Florida



A feeding bonanza for shorebirds!



The threatened Red Knot depends on HSC eggs during their 10,000 mile migration to breeding grounds in the high arctic. They double their weight in 2 weeks in DE Bay feeding on horseshoe crab eggs.



Spawning: Synchronized, high intertidal



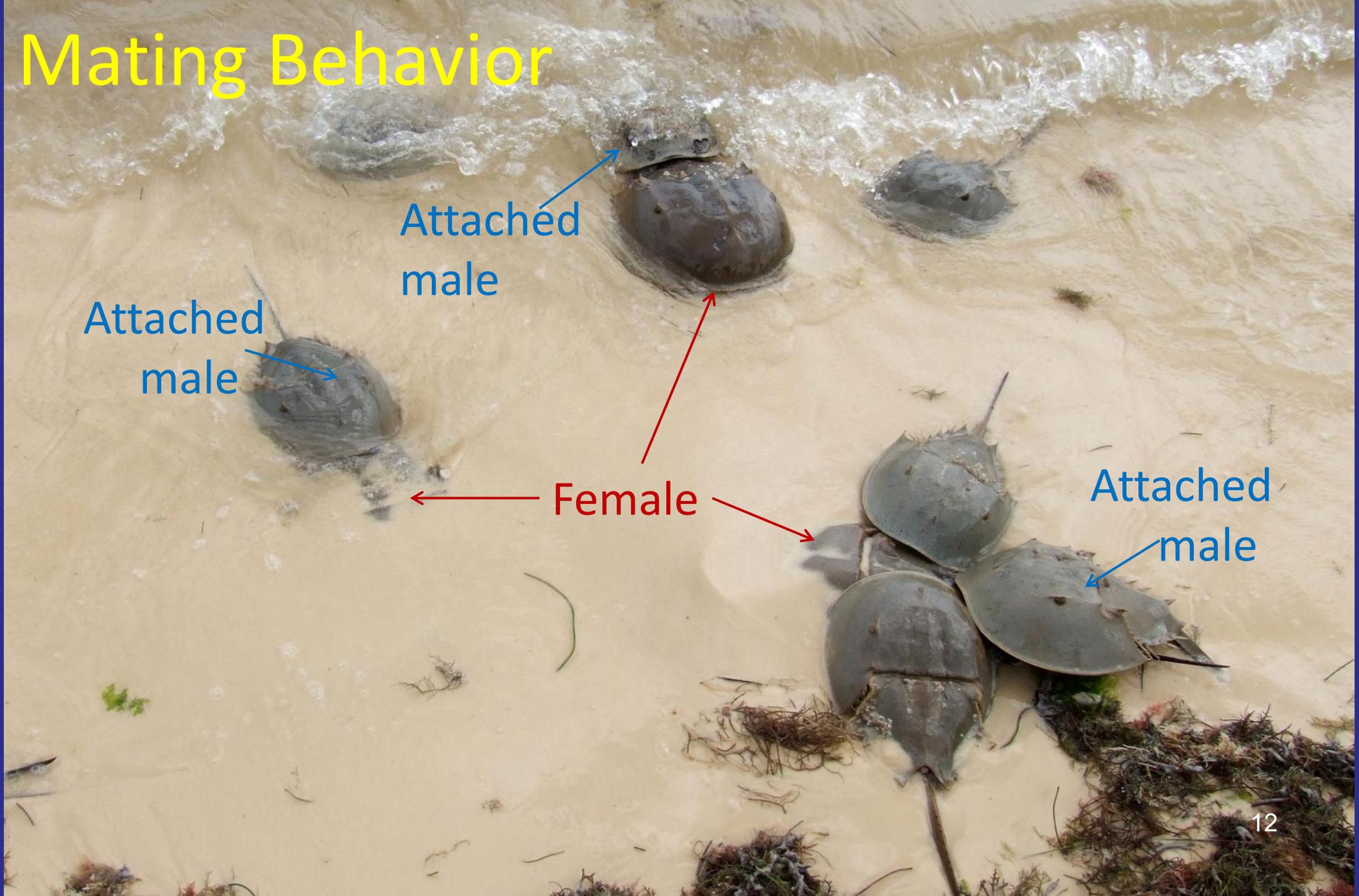
Delaware Bay



Cedar Key

- Mate and nest on high tides associated with the new and full moons, the highest tides of the month.
- Spawn at the top of the high tide line

Mating Behavior



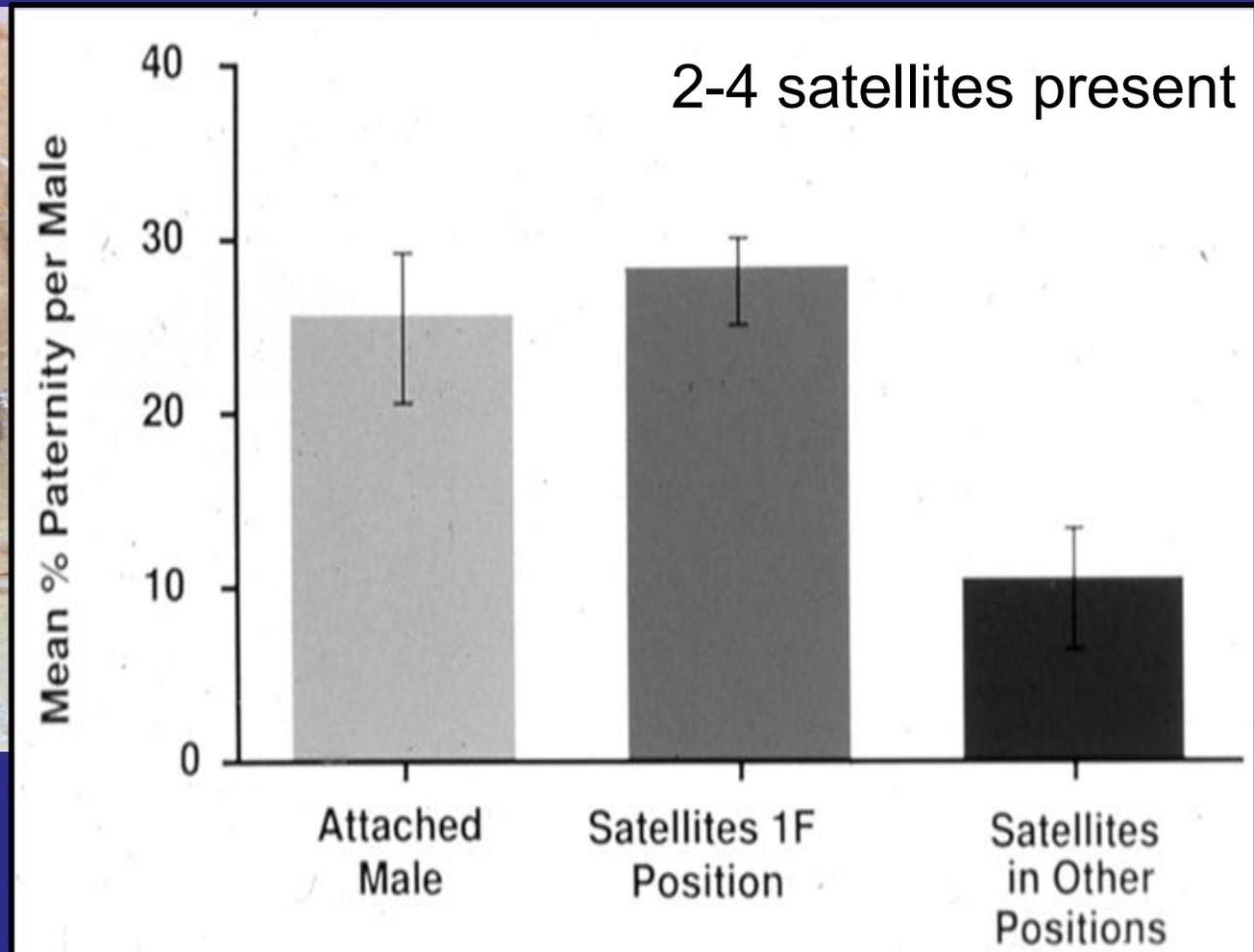
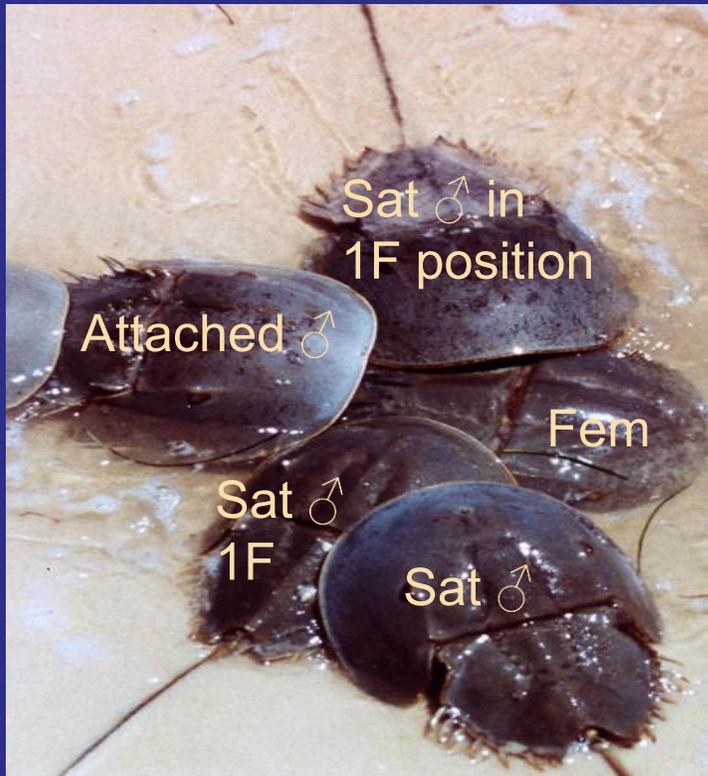
Attached male

Attached male

Female

Attached male

Satellite males fertilize eggs



Threats



Development



Shoreline Armoring - Seawalls and Rip rap



Aquarium trade



Beach driving



Sea-level rise



Shoreline erosion

Population Status



Region	Population Trend	
New England	↓	Evidence of significant declines
New York	↓	Evidence of significant declines
Delaware Bay	↑	Evidence of significant increase in juveniles & adult males
Southeast	↔	No evidence of declines; increases possible
Florida	?	Hint of declines on east coast; west coast not known

Enter: Citizen Scientists!!



In 2015, FWC, in conjunction with UF Biology and UF/IFAS Florida Sea Grant, created Florida Horseshoe Crab Watch to monitor HSC populations.

What Questions can Citizen Science Data Answer?

SHORT-TERM DATA

- Beach fidelity/movement
- Sex ratio (# males vs. females)
- Size differences in males and females
- Average age - using shell condition to hint at population status



What Questions can Citizen Science Data Answer?

LONG-TERM DATA:

- What are the spawning population trends?
- Are horseshoe crab numbers increasing, decreasing or stable within Florida populations?
- Does the mating status of female and male horseshoe crabs change over time?
- What are the environmental conditions that stimulate breeding?



What do we know about Charlotte County?

- Phone, email, survey monkey, and FWC Reporter App
- 126 reports in Charlotte county since 2002
- Brevard county has had 582, Sarasota has had 69

Most Common Terms	Count
Punta Gorda	11
Ponce De Leon Park	4
Gilchrist Park	4
Charlotte Harbor Bayshore	3
Peace River Bridge	3
Alligator Creek	2
Waterfront Hotel	2
Cattle Dock Point	2

Horseshoe Crab Nesting Beach Survey

The Fish and Wildlife Research Institute would like your help identifying horseshoe crab nesting beaches.

You can report online (MyFWC.com/horseshoecrabs), by email (horseshoe@myfwc.com), by phone (866-252-9326), or by using the FWC Reporter App (Google Play & App Store)





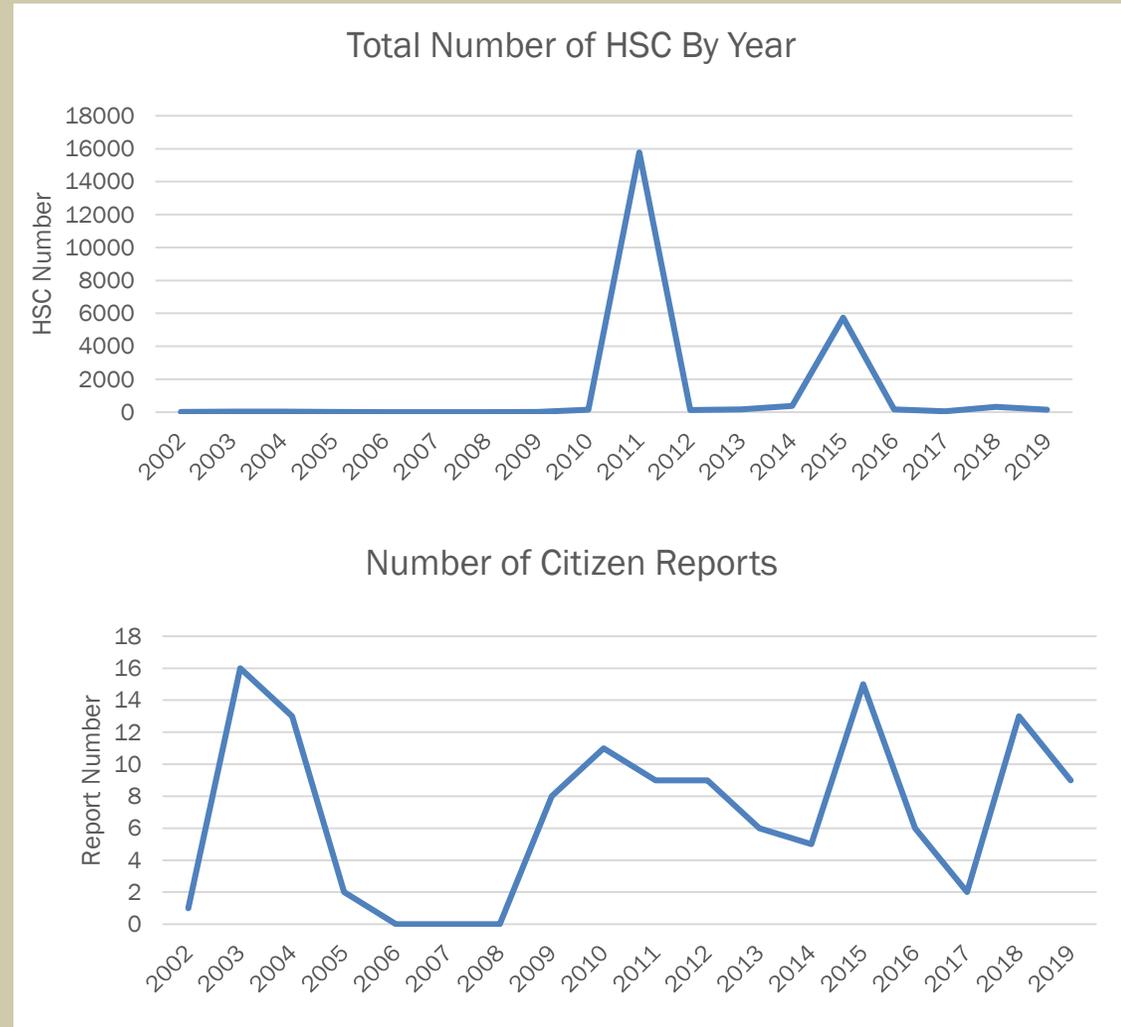


Please include the following information in your report:

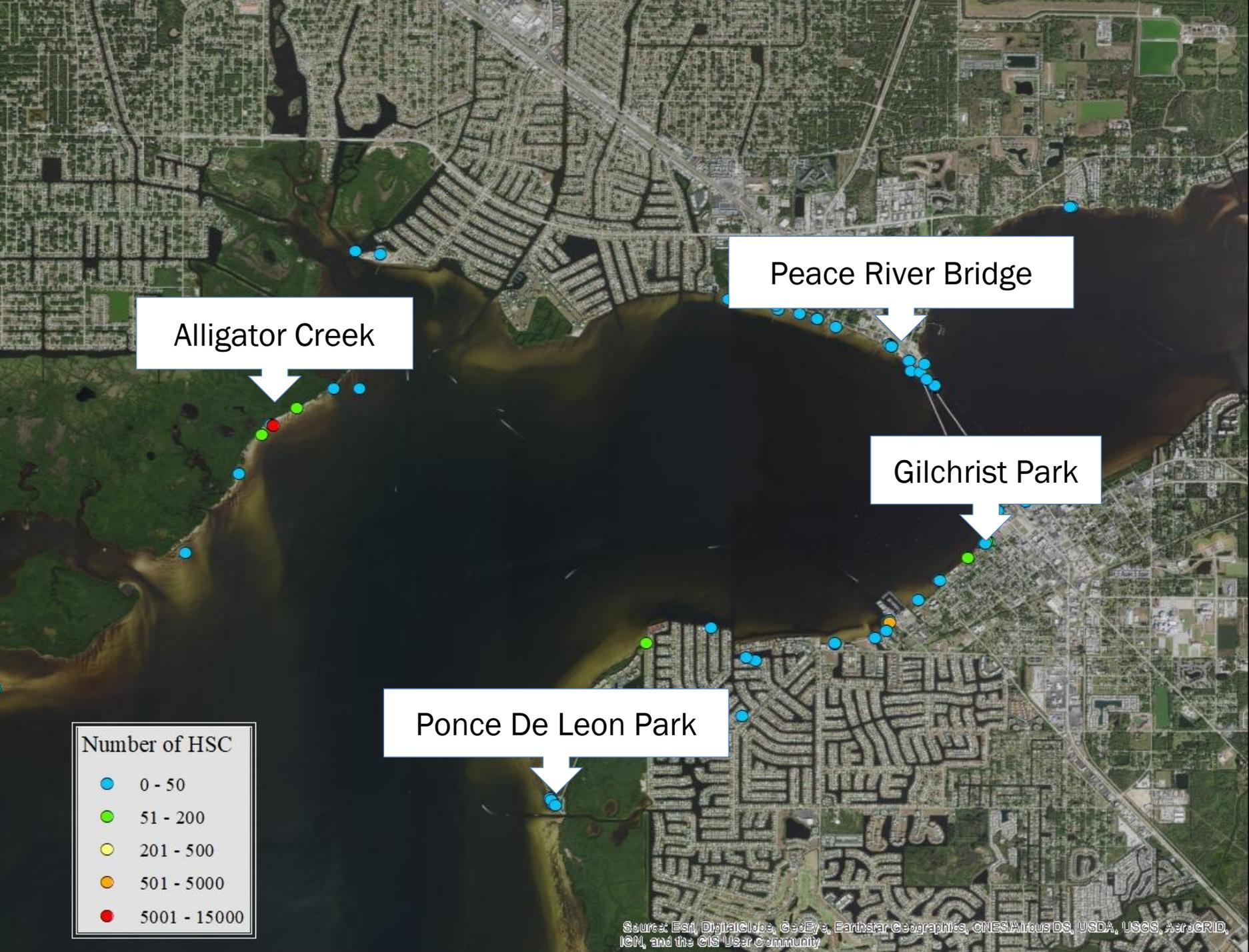
- Date, time, and location of your sighting
- Approximate number of crabs
- Presence of mating activity (see pictures)
- Presence of juveniles (4 inches wide or smaller)



What do we know about Charlotte County?



Charlotte Harbor Sightings



Where have the horseshoe crabs gone?

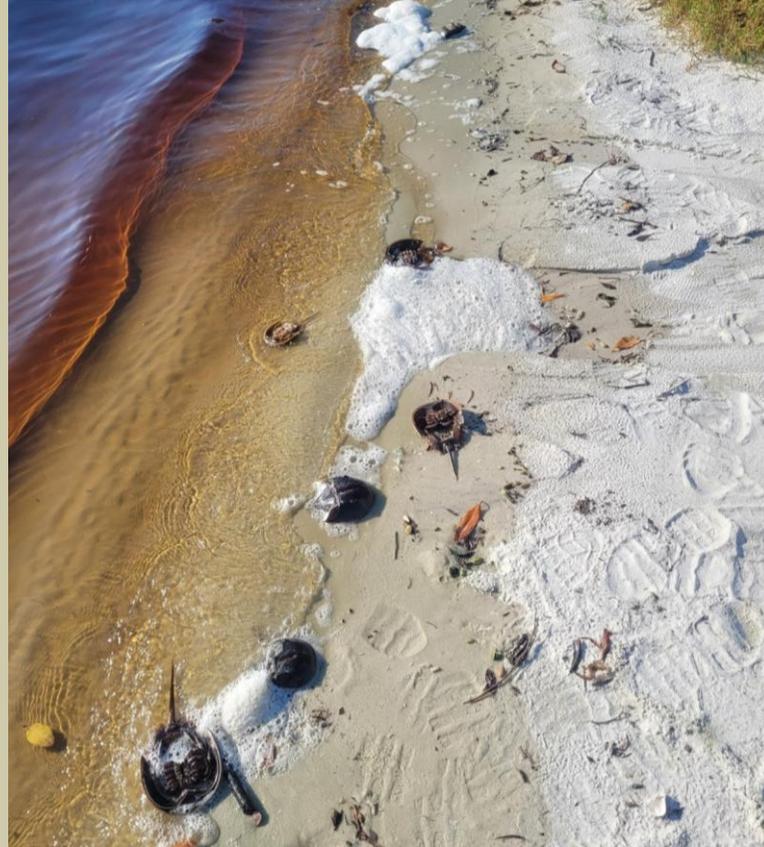
Volunteers needed for a population survey

September 12, 2024



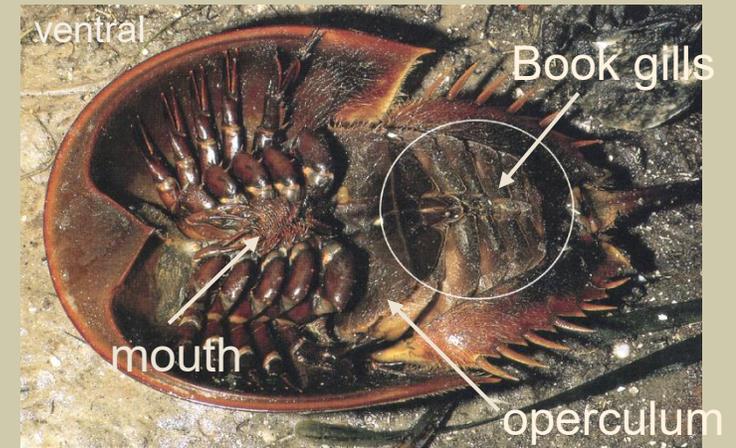
Dead horseshoe crabs at Bayshore Live Oak Park, Port Charlotte

Dave Schutz



Possible Die Off Drivers

- Low oxygen conditions
 - Unlikely but water wars, summer algae blooms, rain, lined up with a mating event may be the perfect storm
- Red Tide
- Large tidal variation



A few key findings from other sites

- Male horseshoe crabs are resighted more often than females
- Horseshoe crabs are usually resighted 8-10% of the time
- Horseshoe crabs usually stay in the same area, but some have been found 50 miles from their original tag site.
- Citizen scientists are vital for collecting resighting data, but the public also have an important role

Attention

Beachgoers:

Help us collect data on nesting horseshoe crabs by reporting tagged animals



If you see a tagged crab (like the ones in the photo on the left):

- 1) Snap a picture of the tag or record the tag # (number is on the bottom of the tag, shown in the photo on the right).
- 2) Note the date, location, and general condition of the crab (alive or dead)
- 3) Report data using the online form at (www.fws.gov/crabtag/) or by calling 1-888-546-8587 (1-888-LIMULUS).

IMPORTANT:

-DO NOT remove the tag. When recording the tag #, try to limit disturbance to the crab (try not to pick it up and if you must pick it up, NEVER pick it up by the tail).

Data goes into a national database maintained by the US Fish and Wildlife Service and contributes to knowledge about horseshoe crab movements and population numbers.



Florida Horseshoe Crab Watch



- Beach nesting surveys at Ponce de Leon Park at full moons in Spring & Fall
 - In-person training annually in summer/fall
 - Online training available year round
- Collect information on sex, size, age
 - Tag for mark recapture study

BREAK

Kate Rose
Florida Sea Grant
Charlotte County

kate.rose0210@ufl.edu

FLORIDA HORSESHOE CRAB
WATCH



Linked with Limulus



SUBMERGED AQUATIC VEGETATION IN CHARLOTTE COUNTY



PLANTS



Katherine "Kate" Rose, M.S.
Florida Sea Grant Extension Agent
Charlotte County

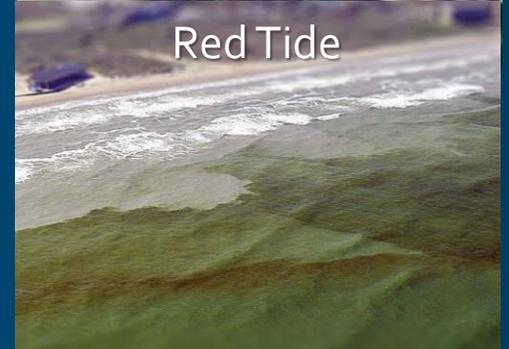
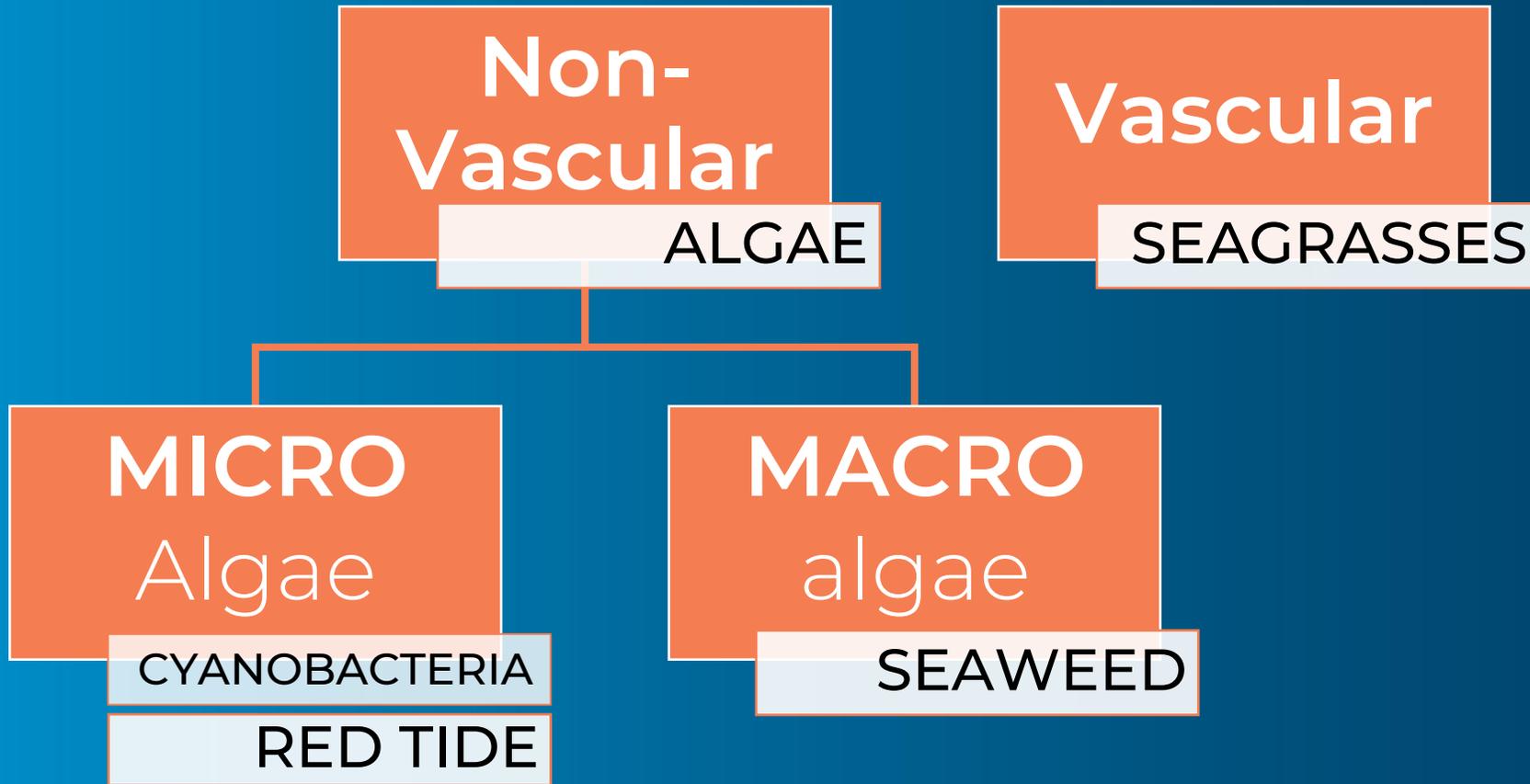


THAT
LIVE
UNDER-
WATER

UF | IFAS Extension
UNIVERSITY of FLORIDA


Sea Grant
FLORIDA

SUBMERGED AQUATIC VEGETATION





Seagrass Ecosystem Services

In the early 2000's, Florida's seagrasses contributed \$180 billion annually to the state's economy with recreational & commercial fishing, nutrient cycling and aquaculture
(UF/IFAS Department of Soil & Water Sciences)

Service	Description
Habitat	More than 70% of all commercial and recreational species in Florida rely on seagrass meadows at some point in their lives (FWC) .
	According to the Smithsonian Marine Station at Fort Pierce (2002) , one acre of seagrass can sustain upwards of 40,000 fish and 50 million invertebrates.
Food Supply	The organisms present in seagrass meadows AND the seagrasses themselves serve as a food source.
Improve water quality	One acre of restored successfully restored seagrass provides a median of about \$3,500 in nitrogen removal (Smyth et al 2024) .
	Coral reefs near seagrass see less coral & fish diseases than those that exist in isolation (Lamb et al 2017) .
Carbon sink	Seagrasses hold 336 metric tons of carbon per square kilometer. The average terrestrial forest holds 121 (Forquean et al 2012) .
Shoreline stabilization	One acre of restored successfully seagrass provides a median of \$33,893 per year in shoreline stabilization (Smyth et al 2024) .

ALGAE

Ecologically Essential

- Oxygen Production
 - 50-80% Earth's Oxygen
- Food Web Link
- Nutrient and Pollutant Removal

plants making oxygen:



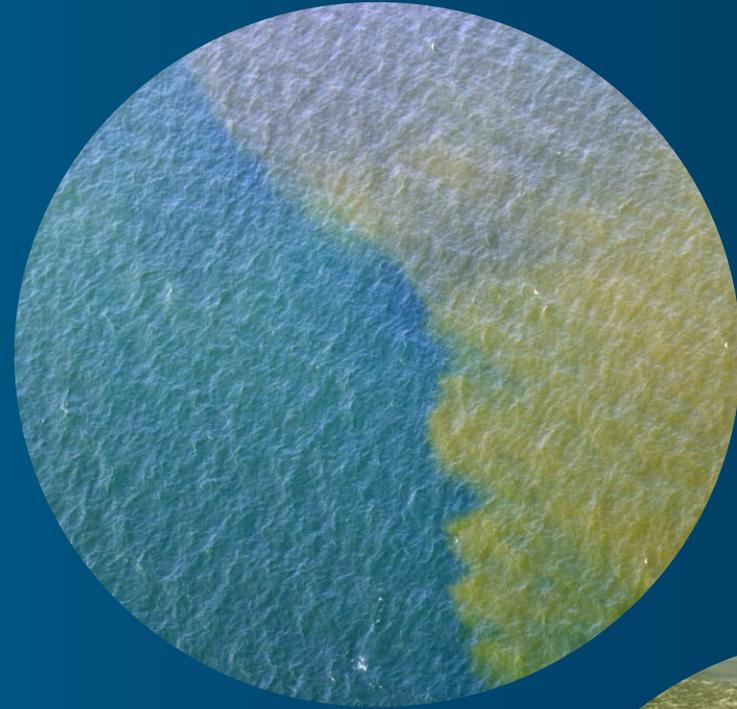
ALGAL BLOOMS

ALGAL BLOOM: rapid and substantial increase in algae biomass in an aquatic system

HARMFUL ALGAL BLOOM (HAB): algal bloom that produces harmful effects on human health or aquatic ecosystems

- Toxins
- Low Oxygen Zones
- Shading

} Not all blooms are the same, or toxic



Seagrass coverage is declining globally at a rate of 7% per year...

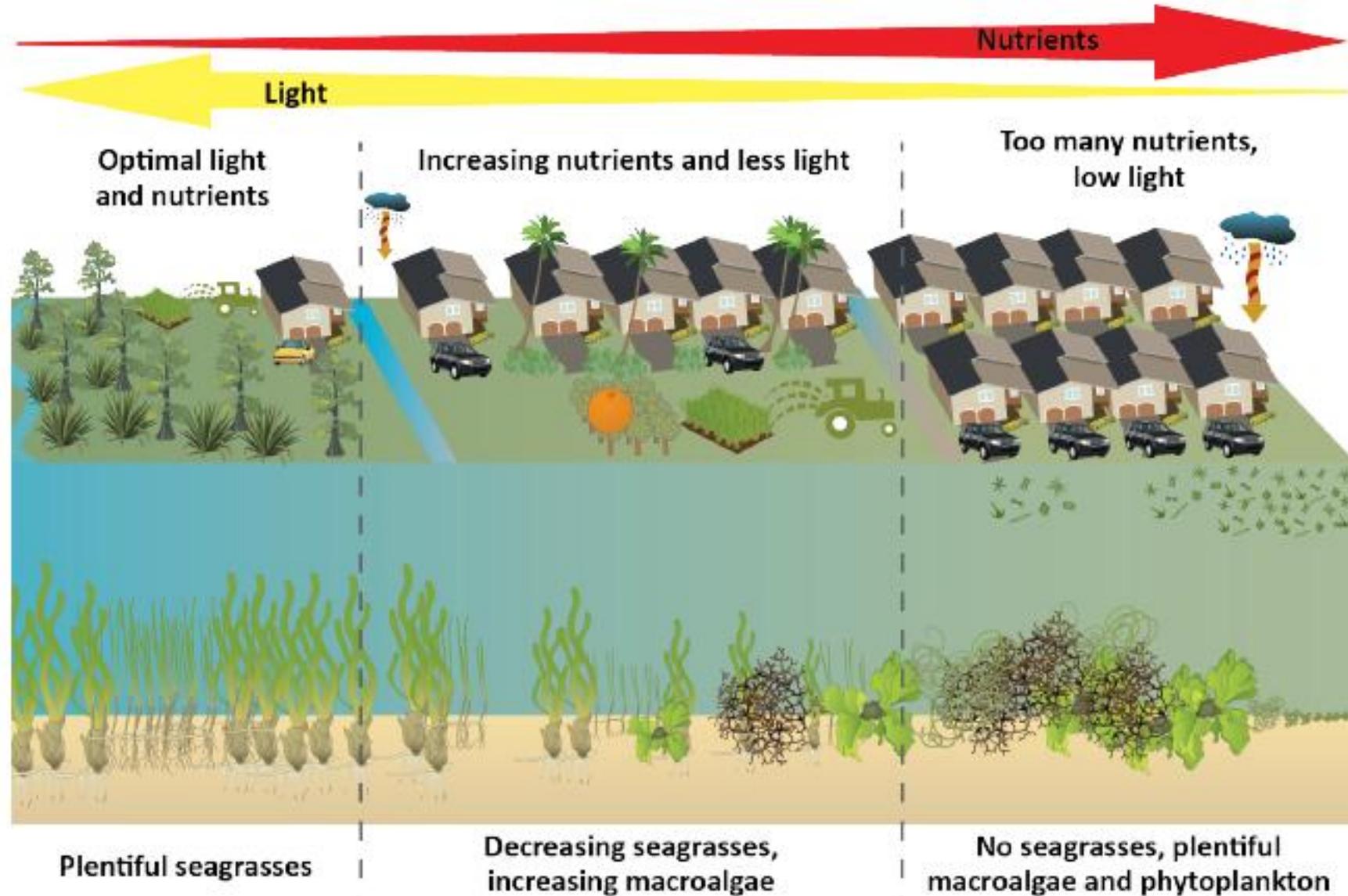
Thousands of acres of seagrass gone in Charlotte Harbor

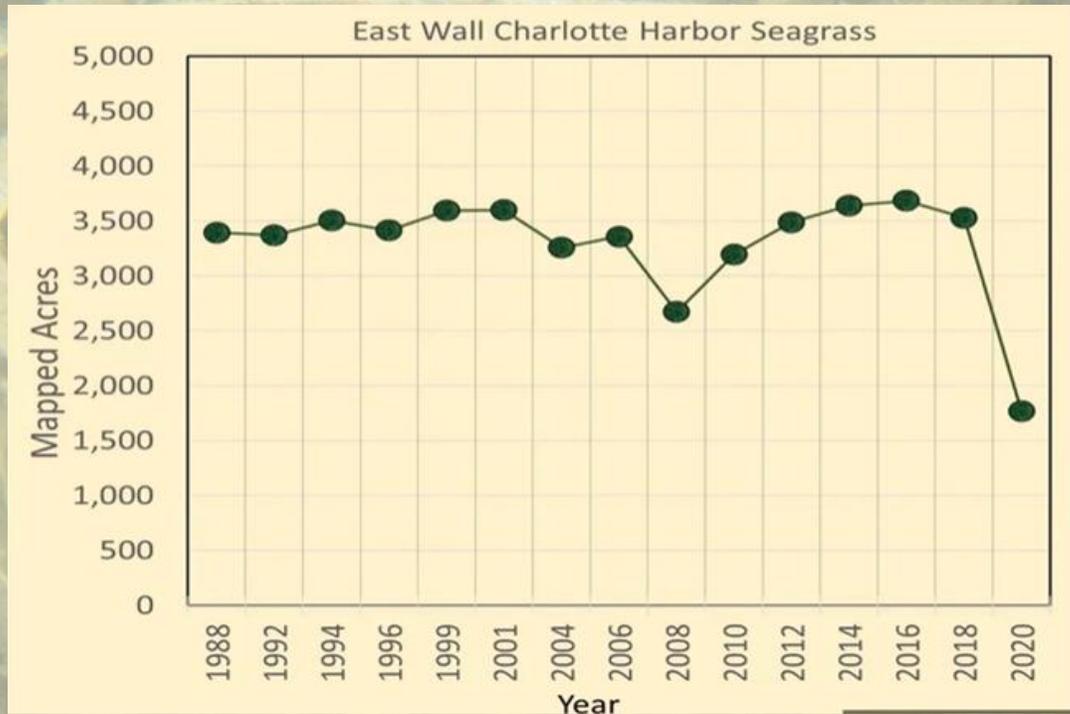
By BETSY CALVERT Staff Writer Jun 11, 2021 Updated Jul 17, 2022 0



...because of algae*

2021 SWFL Macroalgae Workshop Report

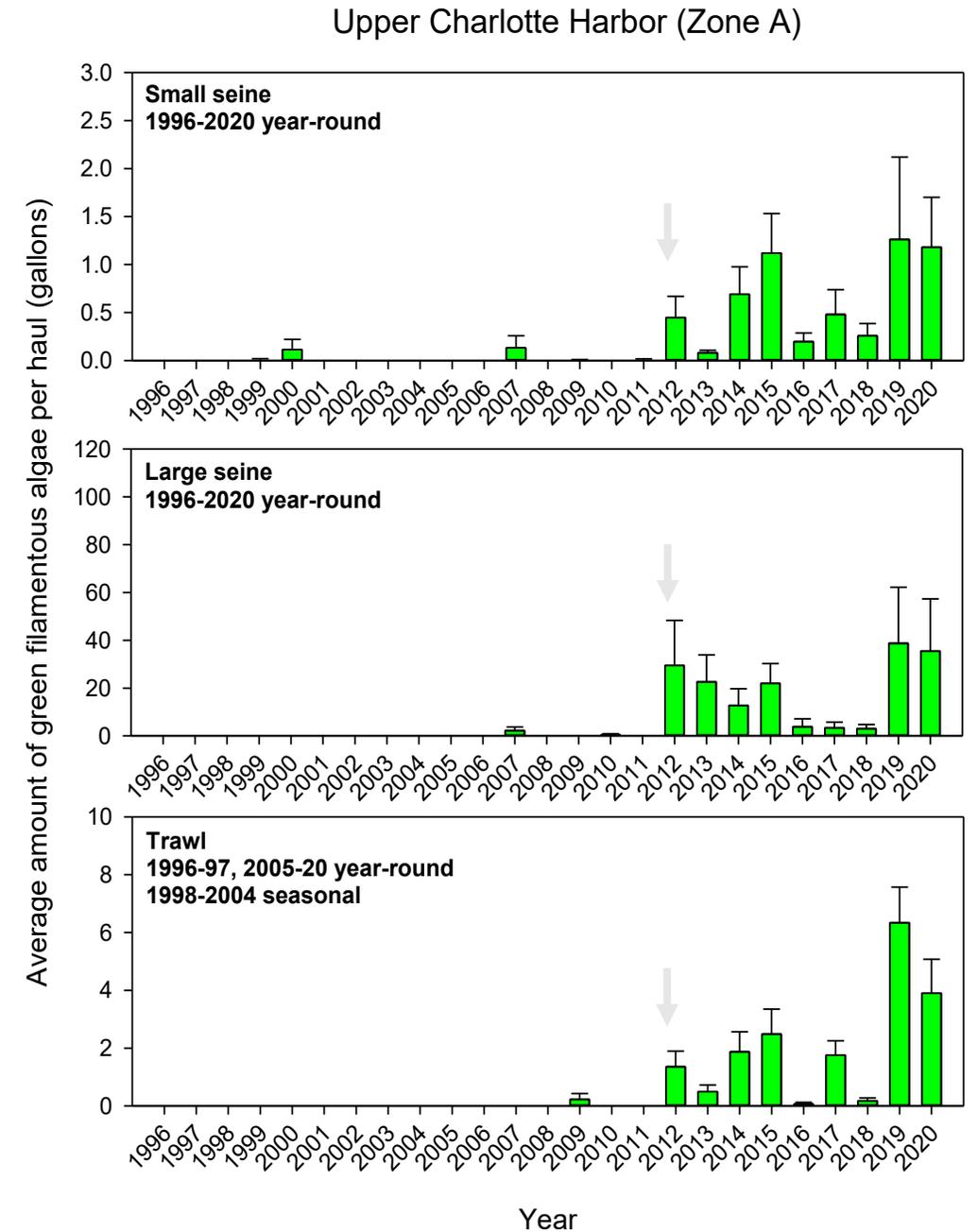




Anastasiou, C. (2022). *The Hangover Effect: Seagrass Loss and Macroalgal Growth in Charlotte Harbor Following the 2017-2018 Red Tide Event*

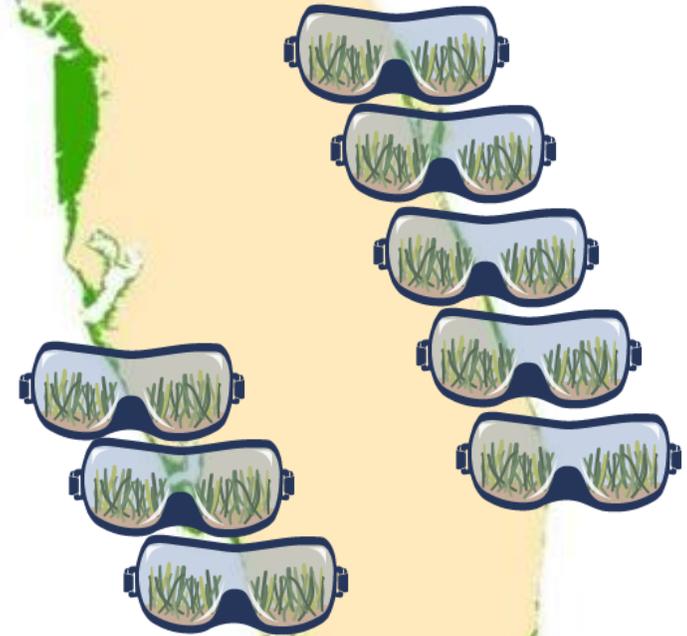


FWC - FIM





Eyes on Seagrass



Volunteer Responsibilities

A Charlotte County Volunteer completing her seagrass survey with her children (UF/IFAS)



Provide your own...

- ❖ Transportation to assigned sites via boat, kayak/canoe/SUP or wading
- ❖ Snorkeling equipment
- ❖ Responsible boating equipment (Sun protection, water, swimming aides)

Survey your assigned sites during the designated period

Return completed datasheet & equipment

While participatory science can involve physically demanding field work, our goal is the make the program as accessible as possible.

- ❖ We recommend at least one strong swimmer per group for safety

Eyes on Seagrass Procedure



EYES ON SEAGRASS

- | | | | | | |
|----------------------|----------------------|-----------|----------------------|----------------------|----------------------|
| ✓ Depth | ✓ Depth | | ✓ Depth | ✓ Depth | ✓ Depth |
| ✓ Sediment | ✓ Sediment | | ✓ Sediment | ✓ Sediment | ✓ Sediment |
| ✓ Algae | ✓ Algae | | ✓ Algae | ✓ Algae | ✓ Algae |
| Thickness | Thickness | | Thickness | Thickness | Thickness |
| ✓ Seagrass thickness | ✓ Seagrass thickness | | ✓ Seagrass thickness | ✓ Seagrass thickness | ✓ Seagrass thickness |
| ✓ Seagrass species | ✓ Seagrass species | | ✓ Seagrass species | ✓ Seagrass species | ✓ Seagrass species |
| ✓ Blade height | ✓ Blade height | + Collect | ✓ Blade height | ✓ Blade height | ✓ Blade height |
| ✓ Epibiota | ✓ Epibiota | Algae | ✓ Epibiota | ✓ Epibiota | ✓ Epibiota |



0 m

10 m

20 m

30 m

40 m

50 m





Scientific Impact

Prong 1



EYES ON SEAGRASS



Eyes on Seagrass



Eyes on Seagrass



State Agencies

More than 150 sites monitored in 10 counties in Florida

- Volunteers contribute roughly \$150,000 annually in time

Statewide Reach, Local Flexibility

- Local Report Cards
- Restoration Evaluation
- Disaster Response



Sarasota Bay Ecosystem Health Report Card

Year	Palma Sola	Upper Bay	Roberts	Little Sarasota	Blackburn
2006	3.67	3.50	3.50	3.75	3.75
2007	3.00	3.25	4.00	3.75	3.75
2008	3.67	3.00	3.00	3.25	3.25
2009	3.67	3.25	3.25	3.50	3.00
2010	3.67	3.50	3.00	2.75	2.75
2011	4.00	3.50	3.00	2.75	2.50
2012	3.00	3.25	3.25	3.00	3.00
2013	3.67	3.00	2.50	2.00	2.00
2014	4.00	3.50	2.50	2.25	2.25
2015	3.67	2.75	2.00	2.00	2.00
2016	3.67	2.75	1.75	1.75	2.25
2017	3.67	2.75	2.00	2.00	2.00
2018	4.00	2.25	2.00	1.25	1.75
2019	4.00	2.75	3.25	1.50	1.50
2020	4.00	3.00	3.00	2.25	2.00
2021	3.75	3.75	3.75	2.75	3.00
2022	4.00	3.25	2.75	2.25	2.75
2023	3.75	3.50	3.50	3.00	3.25



Stewardship

Prong II

2023 Charlotte County Volunteer Survey



EYES ON SEAGRASS



Only 26% of participants identified as seagrass stewards before participating

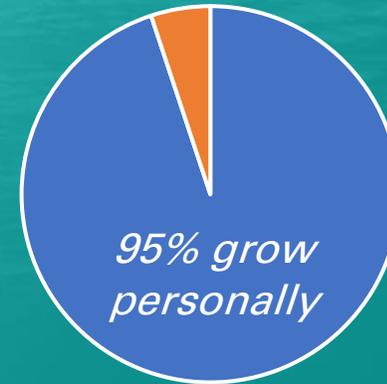
100% of training participants demonstrate proficiency in survey techniques



Using **Seagrass Safe** boating techniques to avoid creating prop scars

Volunteer with another organization

Investigated/implemented **Florida Friendly Landscaping** principles for their yard



Improved mental and physical health

Increased confidence in using new technology

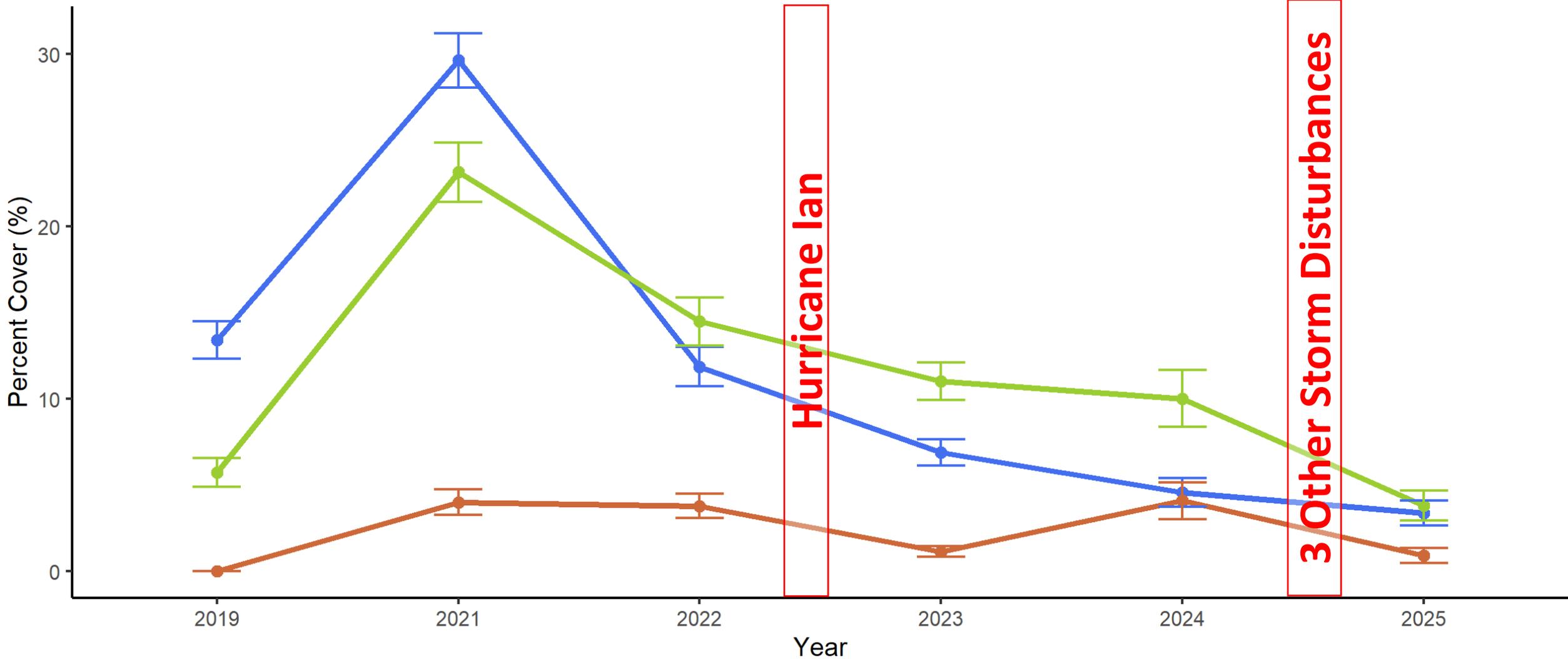
Provided high-quality social relationships

Increased appreciation & understanding of science

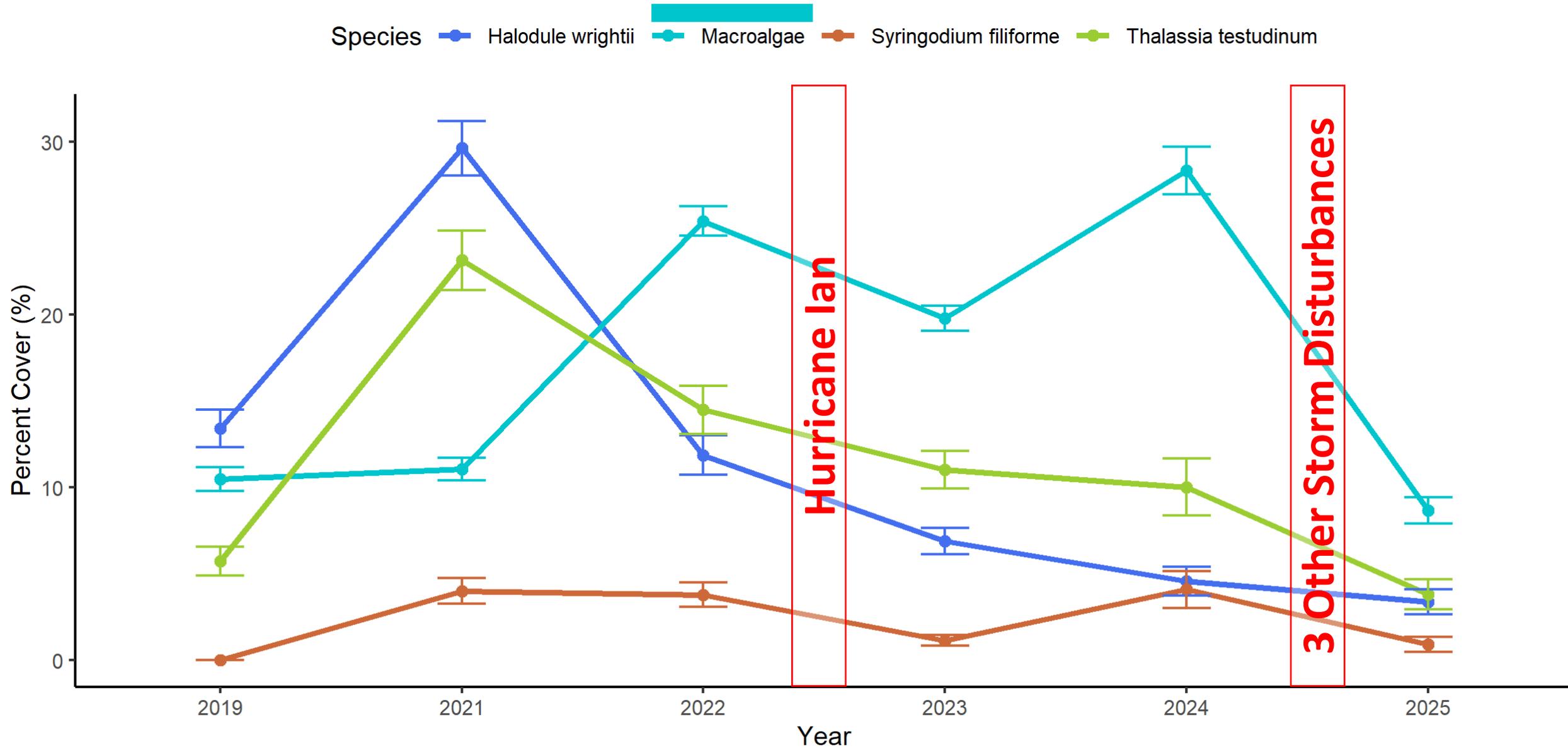


Seagrass Percent Cover from 2019 to 2025

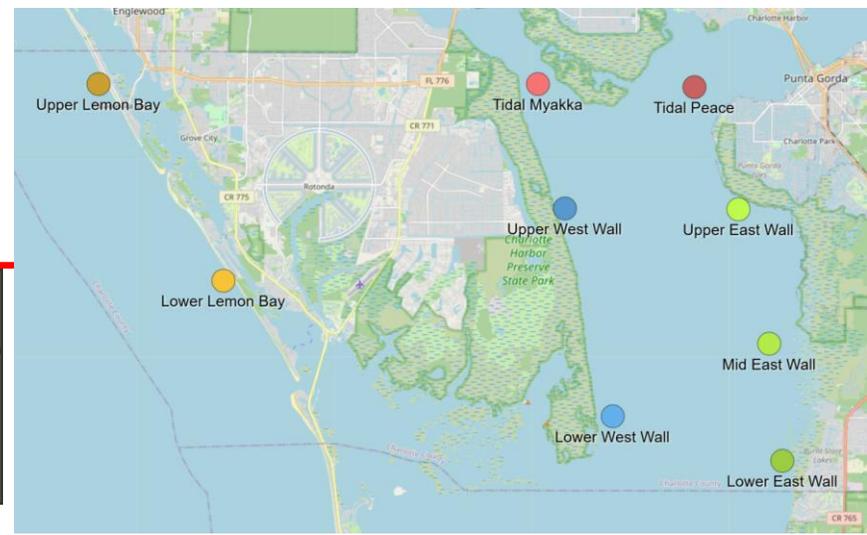
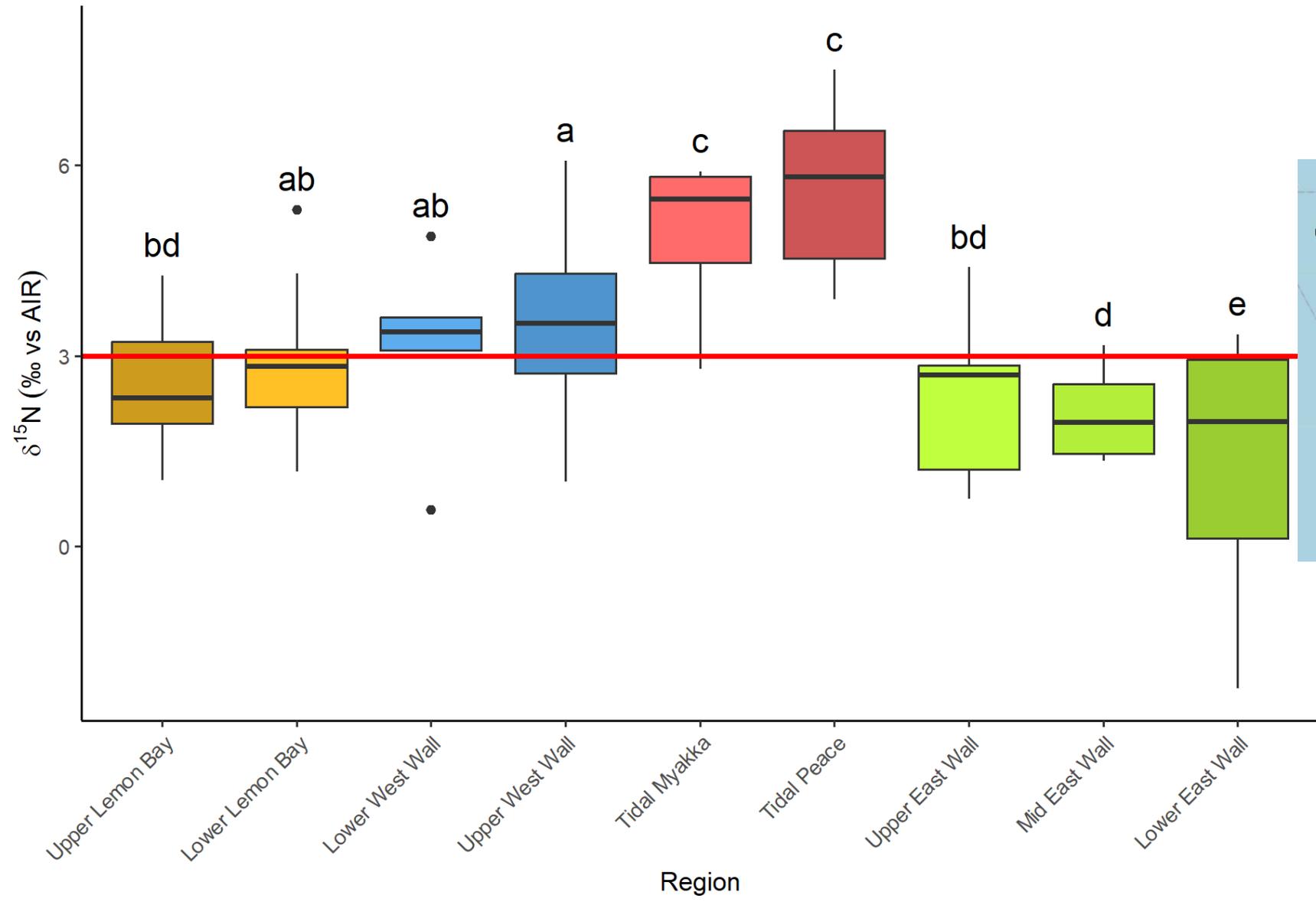
Species Halodule wrightii Syringodium filiforme Thalassia testudinum



Percent Cover from 2019 to 2025



$\delta^{15}\text{N}$ by Region



THANK YOU!



EYES ON SEAGRASS



**FLORIDA HORSESHOE CRAB
WATCH**



Linked with Limulus

**Florida Master Naturalist
Program Coastal Module**

Thursdays March 5th-April 12th, 2026

Englewood

CONSERVATION VS RESTORATION

Restoration is not effective

- Less than 30% of all seagrass restoration efforts succeed

Seagrass is resilient

- If we improve conditions, seagrass will likely return

Failed restoration may increase nutrient levels



Why don't we just take the seagrass...

...and put it back?