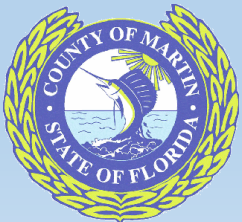


Martin County Seagrass Restoration Project



TETRA TECH EC, INC.



Presentation to ECERT
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Purpose

- **What conditions in estuaries contribute to seagrass health or decline**
- **Consider water column and sediment characteristics in seagrass meadows**
- **Develop strategies that result in higher success of seagrass restoration projects**



Seagrass Decline



- 2005-2011 expanding seagrass populations in the IRL
 - Coincided with several years of drought conditions
- Decade long decline that started in 2012 but accelerated in 2016-2020
 - Lake releases, higher rainfall periods and tropical cyclones
 - Almost complete disappearance of seagrass by 2017

Water Quality



- **Low salinity periods**
 - **Poor water clarity in the estuary**
- **Algae and cyanobacteria (Lyngbya) blooms**
 - **Sedimentation from wind/wave energy**

Lake Okeechobee Releases

- Several years of releases from Lake Okeechobee in 2013, 2015, 2016, 2017
- Poor water clarity
- Low salinity levels over extended time periods
- Algal blooms
- Often during the summer “growing” season



Cyanobacteria (Lyngbya)



- Comes on in spring and die back in winter months
 - Benthic (Lyngbya) carpeting seagrass meadows
- Link to nitrogen enrichment (possibly septic systems)
 - More research needed to link to seagrass decline

Seagrass Comeback Attempt



- In spring 2022 seagrass populations expanded in Southern IRL
- By August-September summer dense populations emerged including of more late succession species like *Thalassia*
 - Coincided with drought conditions in the estuary
 - Thick concentrations of benthic cyanobacteria (*Lyngbya*)
 - Gone by October of 2022



Project Components

- Map and document seagrass status
- Monitoring of water quality and conditions in the sediments
- Clam restoration (hard clams and clams from Lucinid family)
 - Seedbank analysis
 - Cyanobacteria removal plots
- Experimental design and out plantings

Cyanobacteria Removal



- **Remove Lyngbya from seagrass meadows to compare seagrass survival in areas with/without treatment**
 - **Possibly do source tracking to determine causal relationship with seagrass**
- **Develop methodology for removal in these meadows**

Seedbank Analysis



- Understudied area throughout the IRL
- Is there still an intact seedbank in these areas?
- What species of grass remain?
- Recent seagrass expansion in Southern IRL indicates that there is still an extensive seedbank
- Hope to quantify that with this project

Water Quality Sampling

- Look at host of variables including
 - Nutrients
 - Dissolved oxygen
 - Light attenuation
 - Salinity

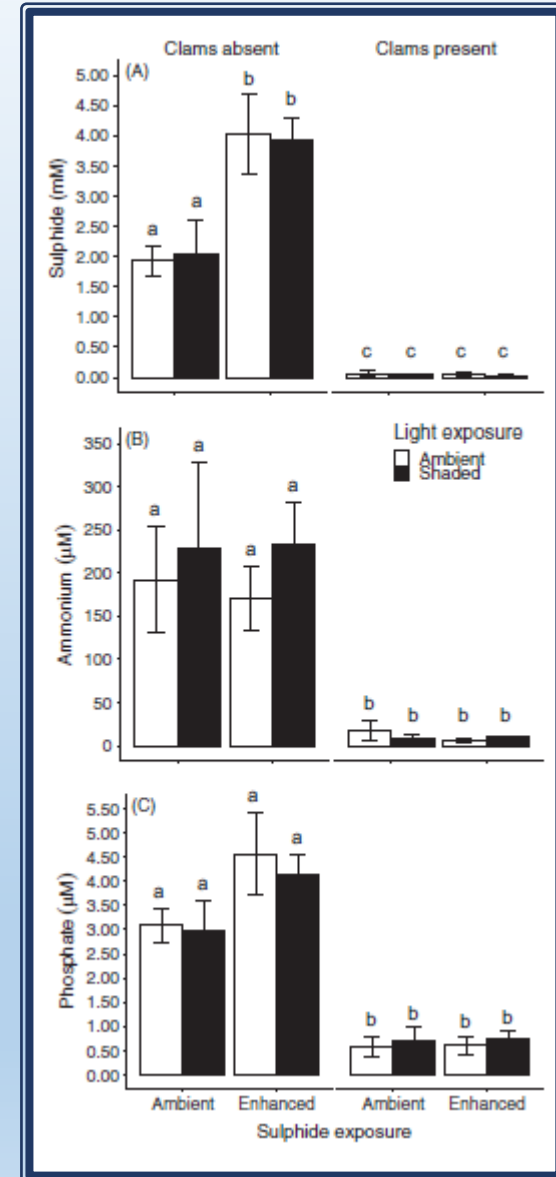
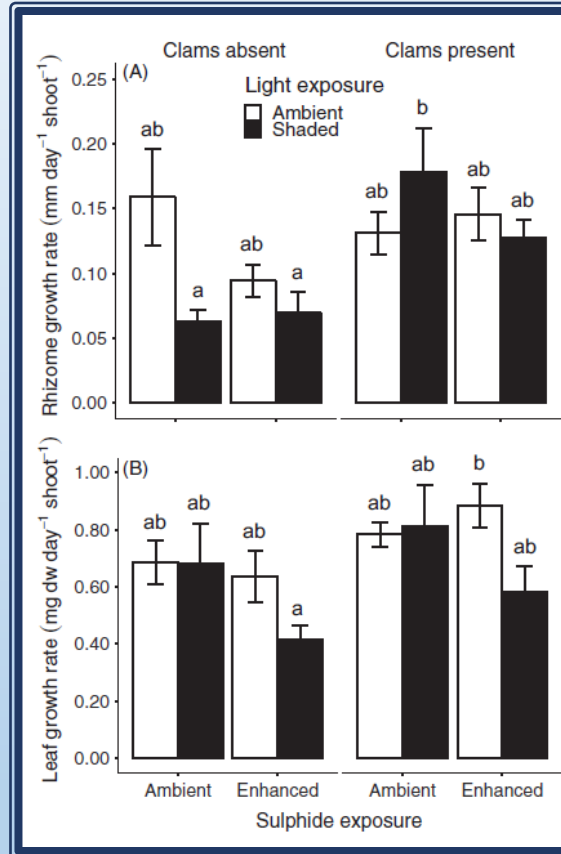


Porewater Sampling

- Better understand conditions in the sediments
- The role of sediment chemistry in seagrass decline is only starting to be understood
- Oxygen
- Hydrogen sulfide

Lucinid Clams

- Research completed by Diana Chin
- Lucinids found in estuary environments often in association with seagrass
- Symbiont bacteria uses H₂S from sediments
- Studies showed improved survival and growth of seagrass under low light conditions
- Has not been explored as an option for seagrass restoration



- Charts from Chin et. Al. 2021

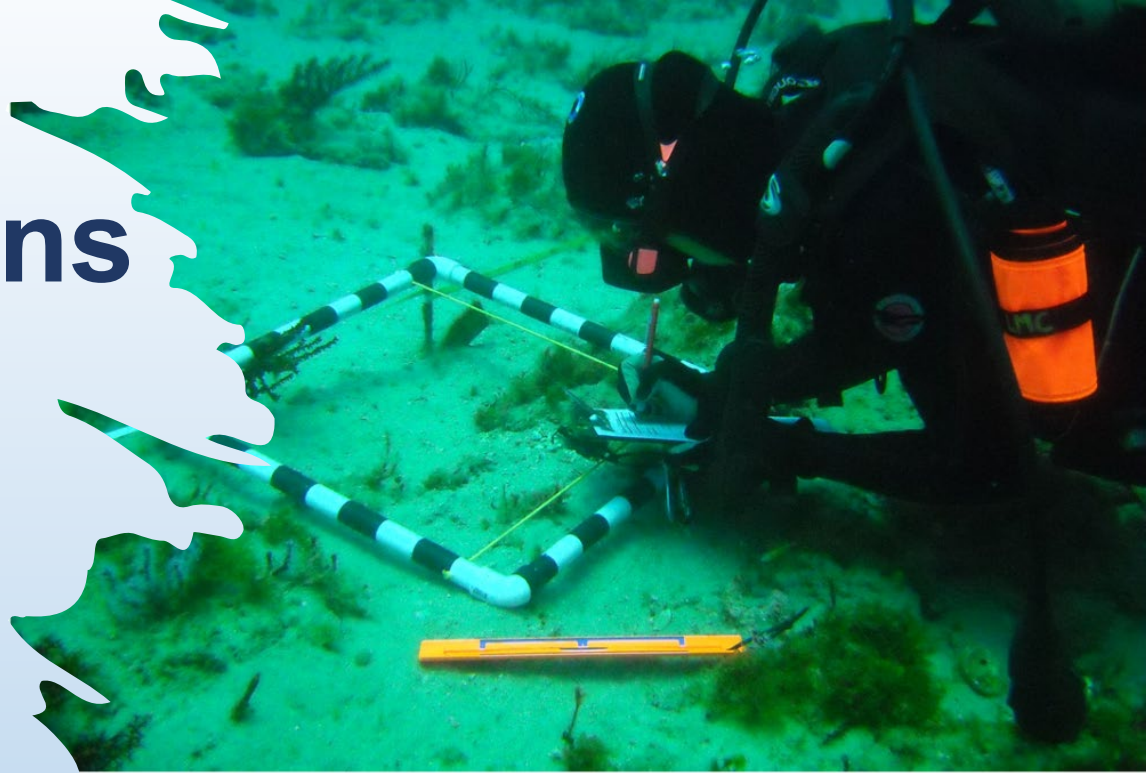
Lucinid Collection events



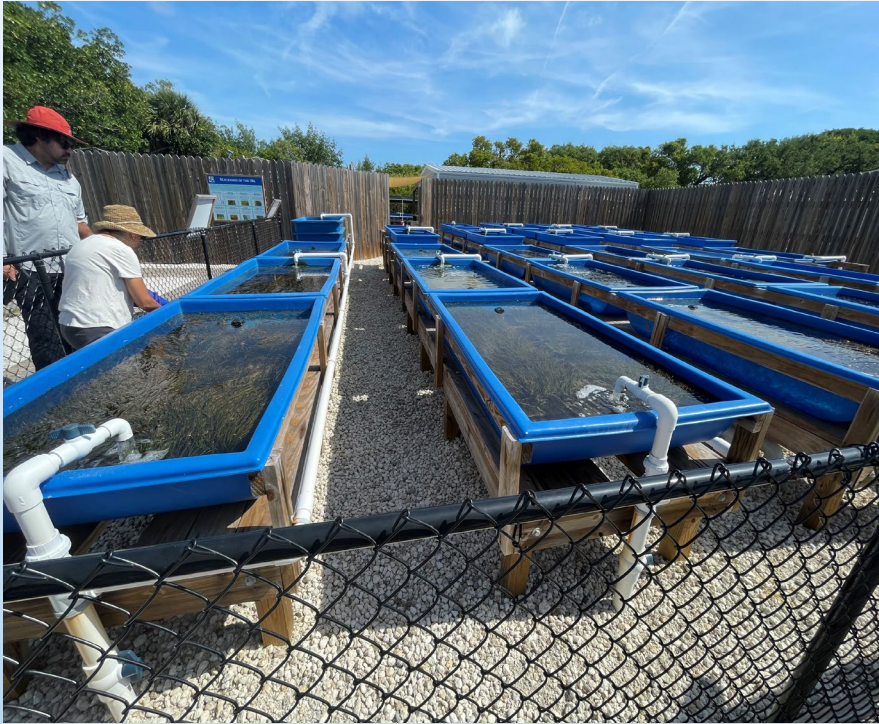
- Completed reconnaissance
- Found several species including *Divalinga quadrisculata* in seagrass meadows
 - They have not been spawned, reared and released from aquaculture facilities
- County is working with an aquaculture facility and FOS to propagate and spawn to support seagrass restoration

Design Considerations

- Design still a work in progress
- Compare different planting scenarios
- Cyanobacteria removal versus non-removal
- Lucinid clams
- Mercenaria clams
- Herbivore exclusion devices



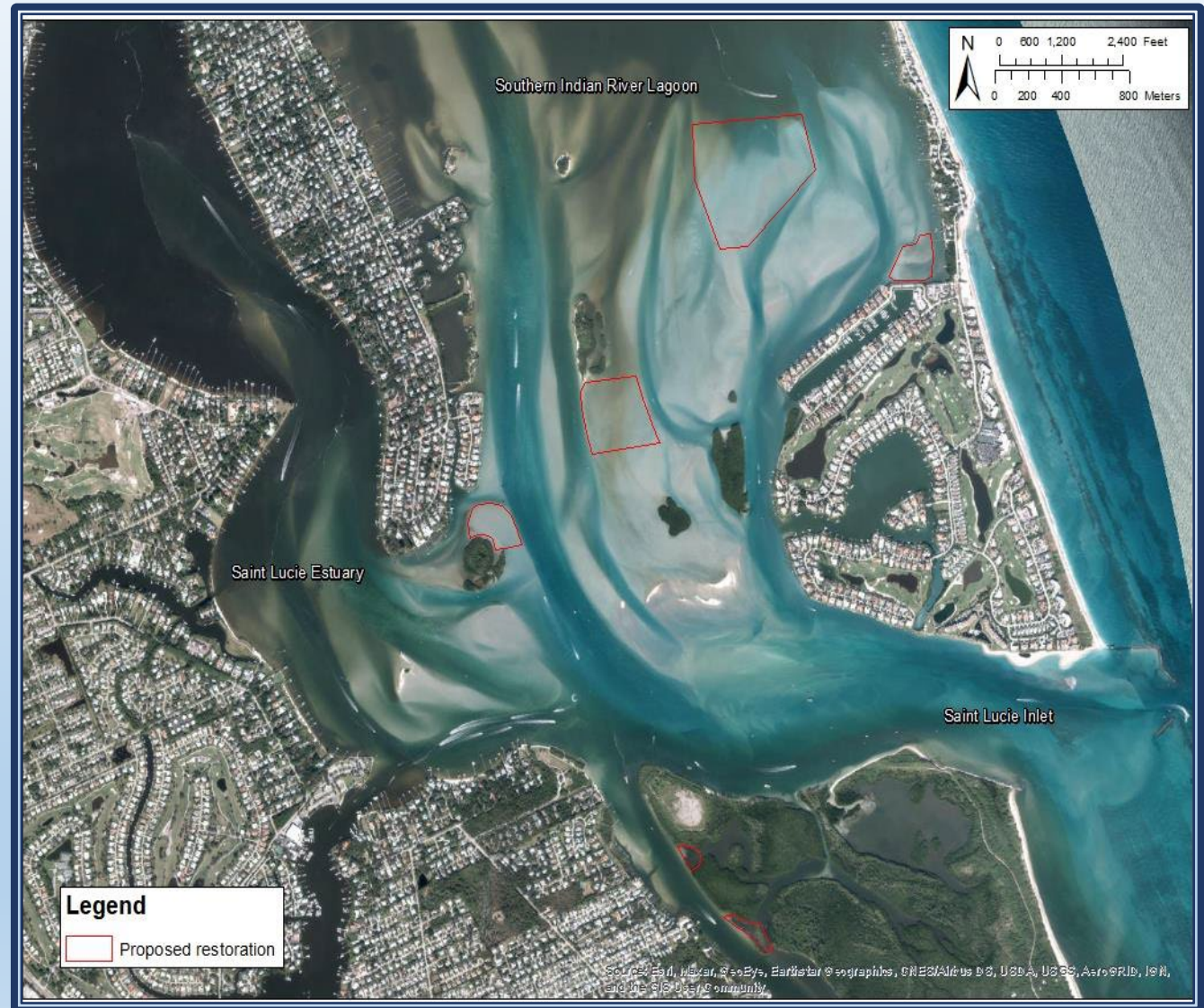
Seagrass Source



- Florida Oceanographic Society has a nursery operation
- Will use *Halodule Wrightii* (shoal grass)
- Seagrass blades grown in tanks
- Grown out in their game fish lagoon

More on planting project

- Broader scale planting across 4 areas
- Plantings spread out at lower densities
- Multiple planting events carried out over several different seasons
- Summer 2023, Winter and Spring 2024



Questions?

