



Development of a Sponge Restoration Strategy for Florida Bay

**Florida Keys Marine Science
Conference & Workshop**

October 2025

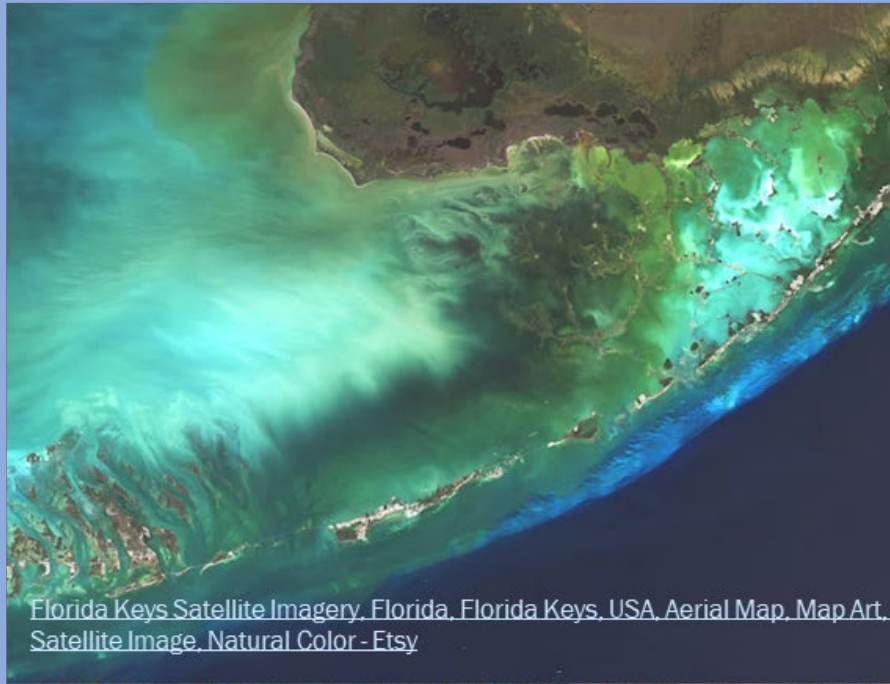
William C. Sharp, John H. Hunt, Rachel J. Harris

Florida Fish & Wildlife Conservation Commission

Fish & Wildlife Research Institute

South Florida Regional Laboratory





Hard-Bottom Communities of Florida Bay

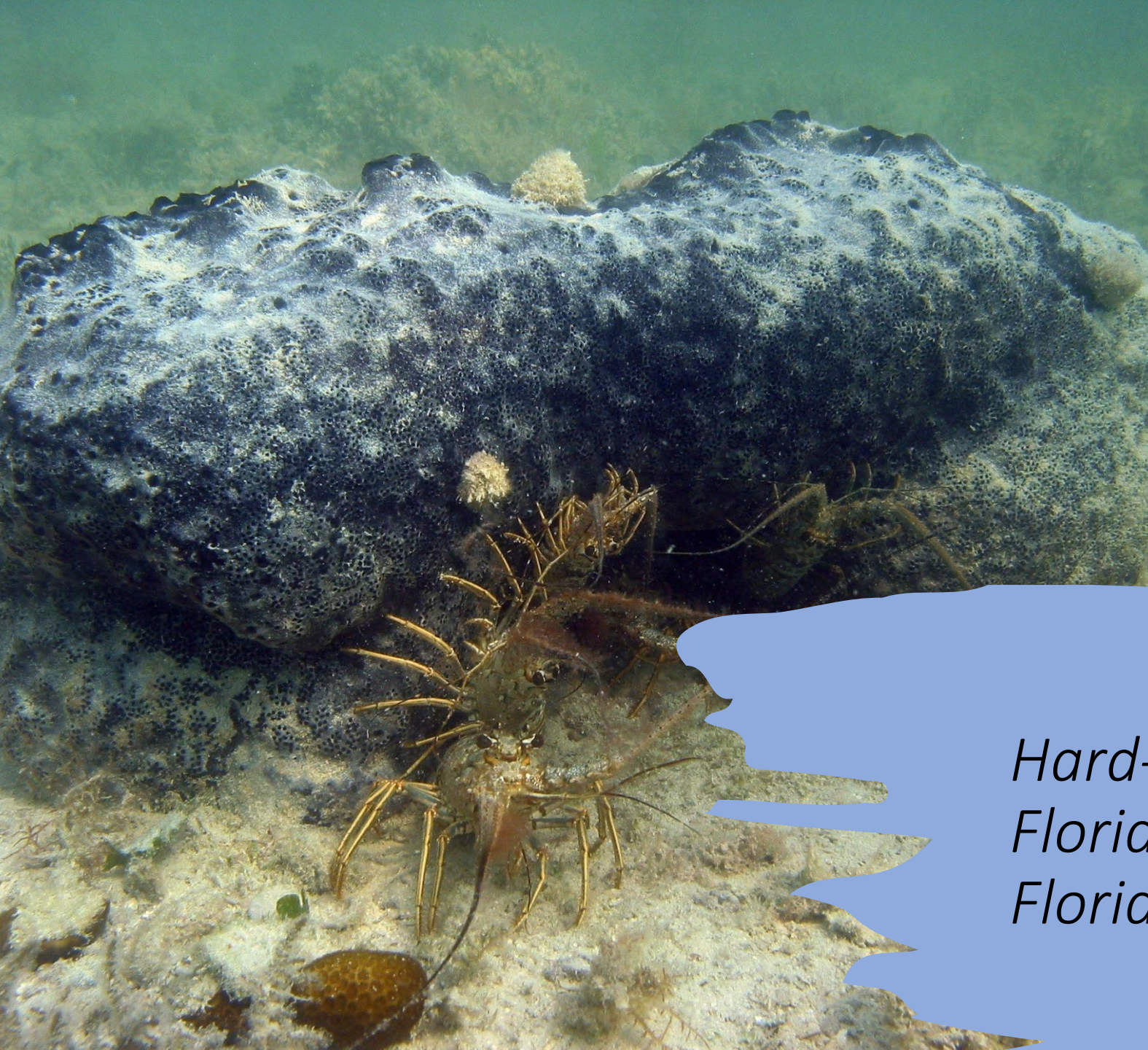
- Calcium carbonate bedrock overlain with a layer of unconsolidated sediment
- Community typified by sponges, octocorals, small scleractinian coral, algae
- Sponges historically dominated the heterotrophic biomass



Ecological Importance of Sponges

- Nutrient cycling
- Remove organic particulate matter
- Habitat for animals that live around sponges
- Habitat for many commensal organisms



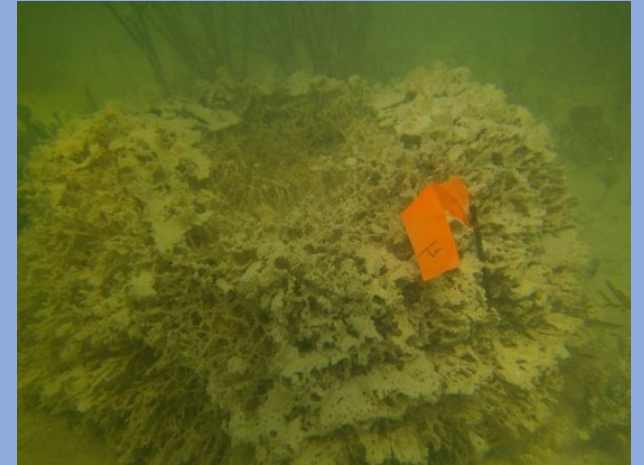


*Hard-Bottom Communities of
Florida Bay – Connectivity to
Florida's Coral Reef*

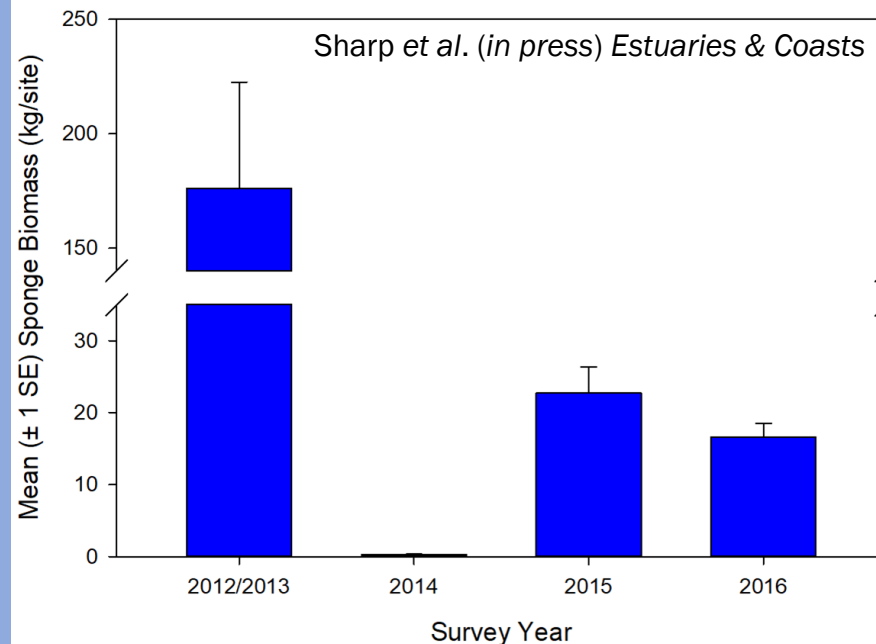


Blooms of Cyanobacterial -- Mortality of Sponges

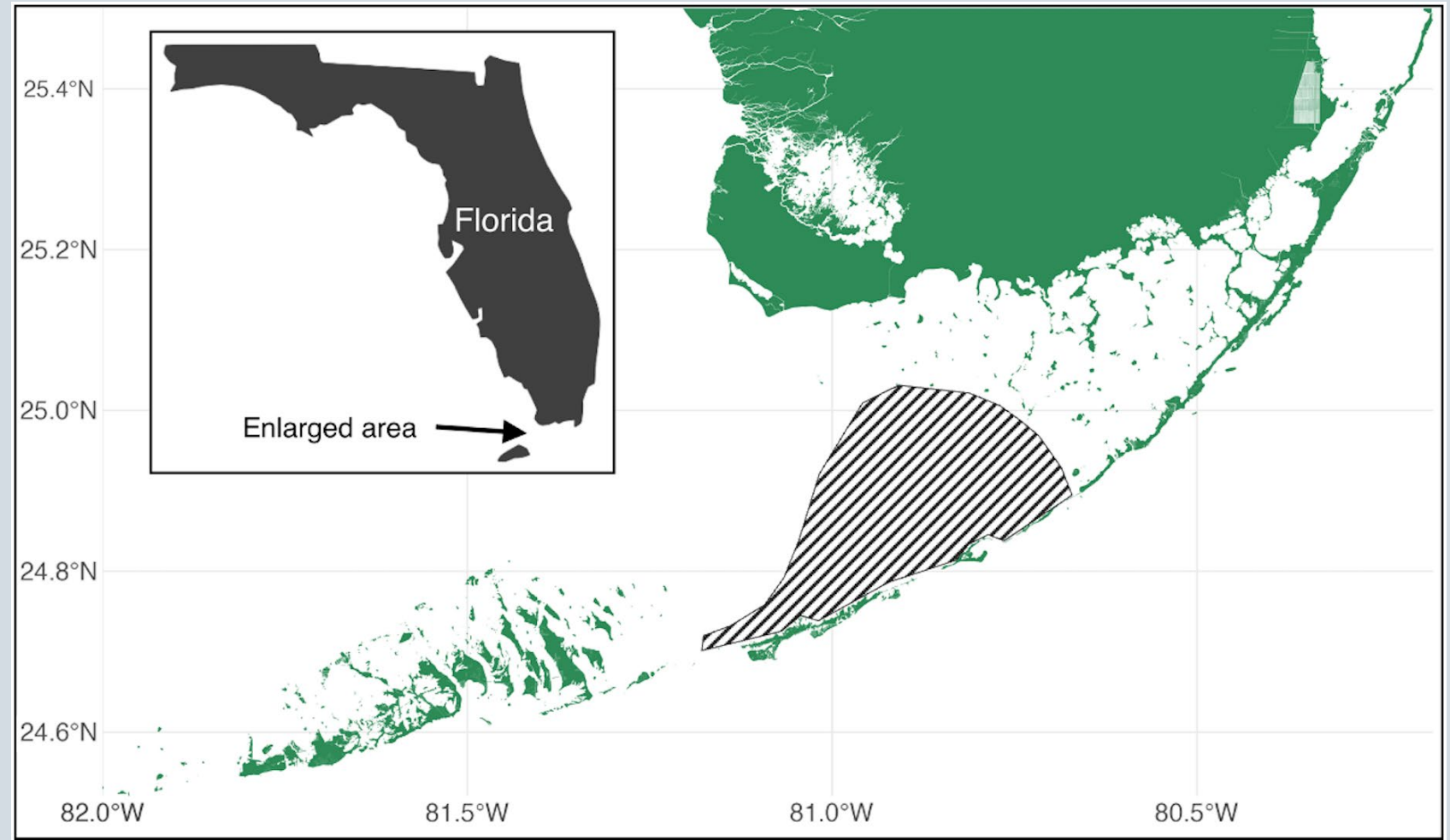
- First documented in 1991



- 2013 bloom in central Florida Bay
- Complete loss of most sponge species; all the larger structure-forming species



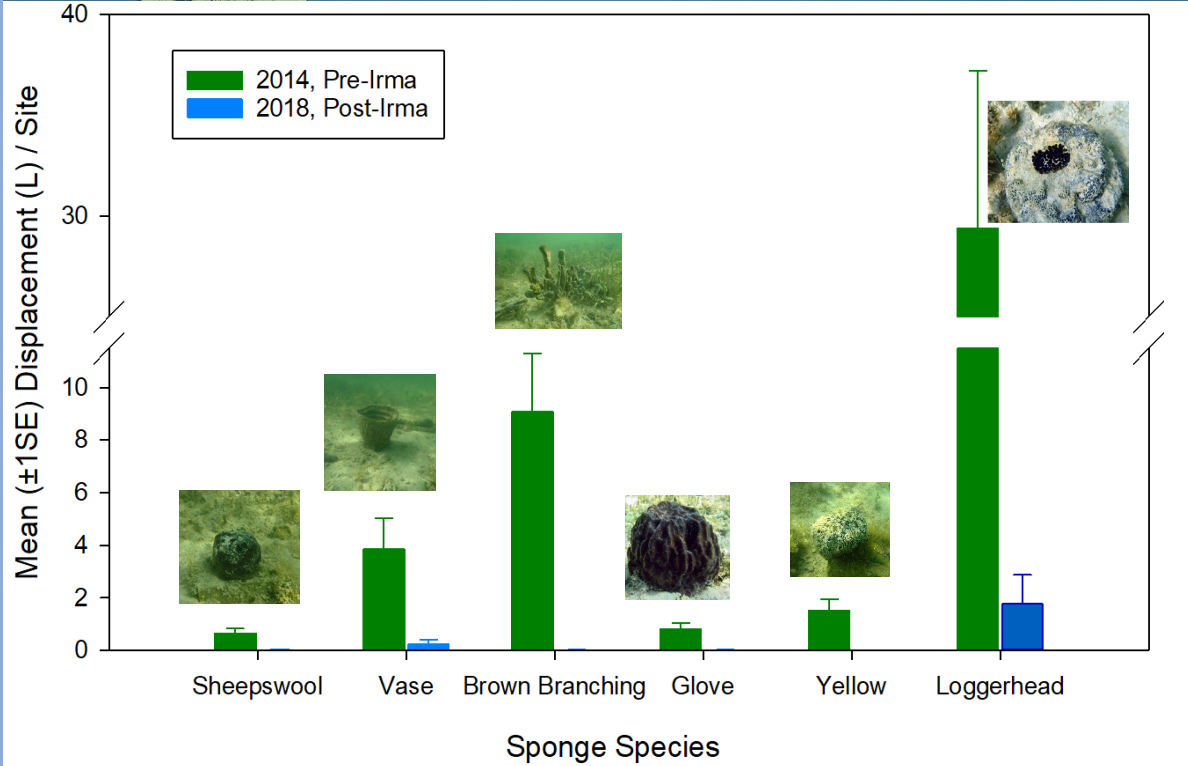
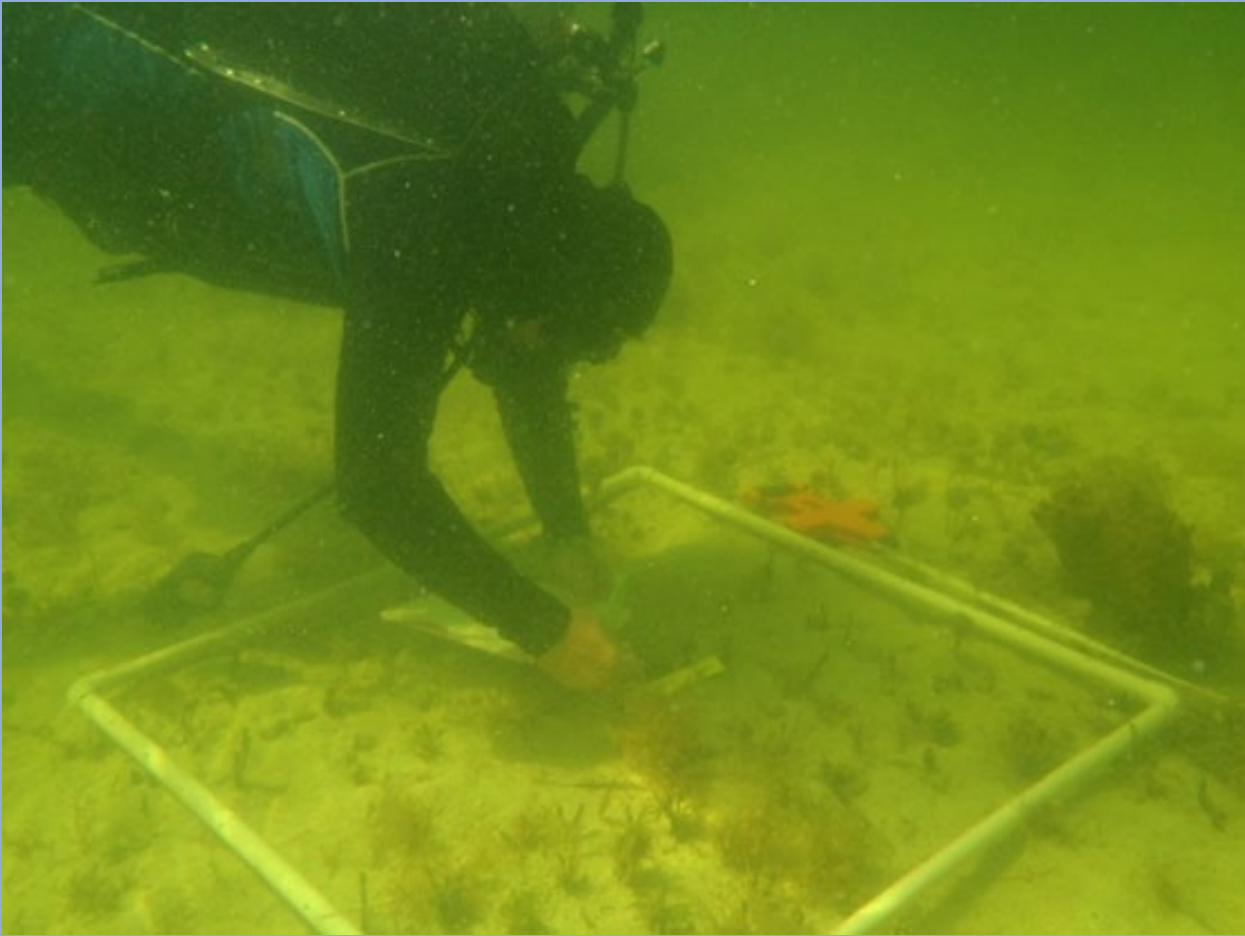
Repeated periodic blooms of cyanobacteria have caused sponge die-offs throughout the Bay

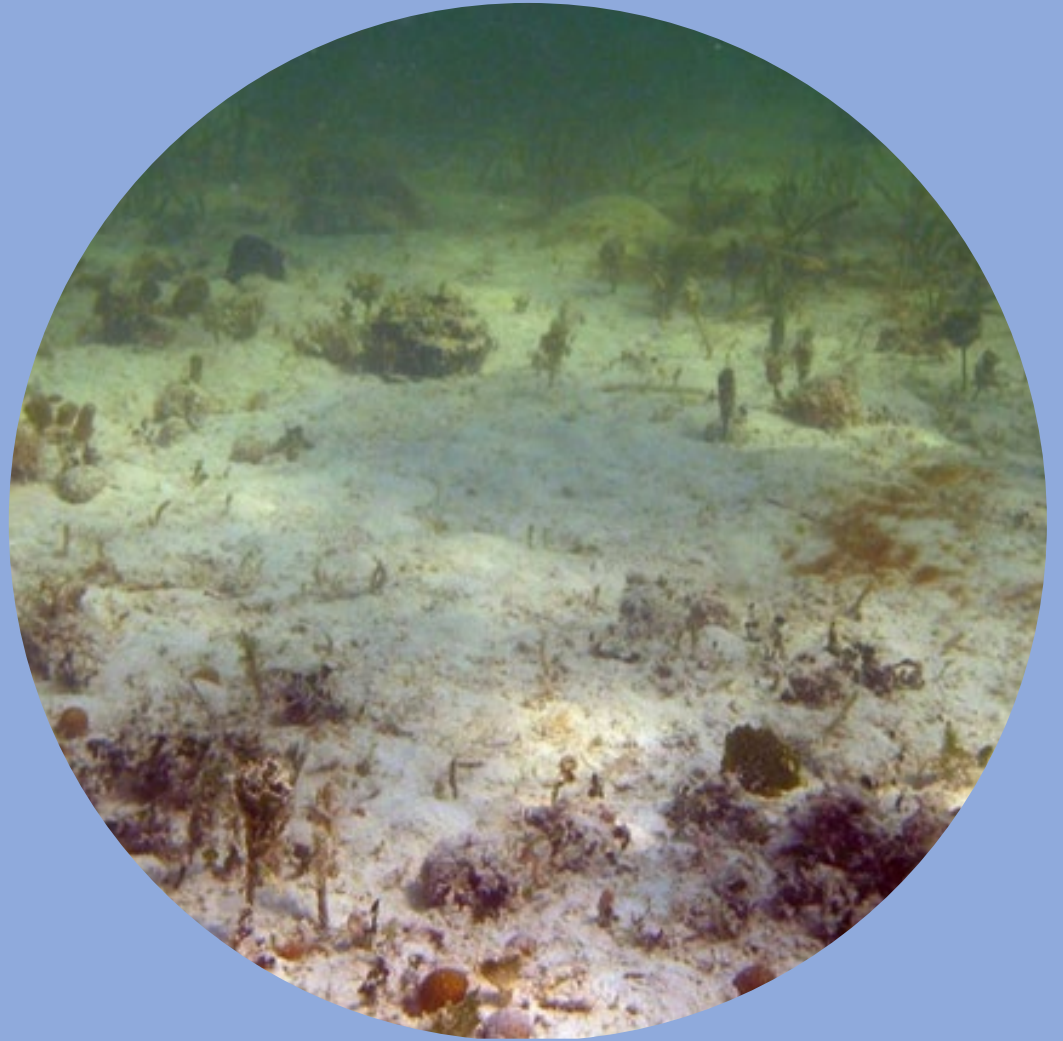


Butler et al. 2021. Setting the foundation for renewal: restoring sponge communities aids the ecological recovery of Florida Bay. *Ecosphere* 12 (12), e01502



...But not just blooms.....





Beginnings of Sponge Restoration Research

- Grounded in sponge biology and ecology
 - Sponge propagation
 - Identifying amenable species
 - Timing of transplants
 - Effect of transplants on ecosystem processes

esa

ECOSPHERE

SPECIAL FEATURE:
HONORING CHARLES H. PETERSON, ECOLOGIST

Setting the foundation for renewal: restoring sponge communities aids the ecological recovery of Florida Bay

JACK BUTLER,^{1,†} WILLIAM C. SHARP,² JOHN H. HUNT,² AND MARK J. BUTLER IV¹



Scaling-up Sponge Community Restoration

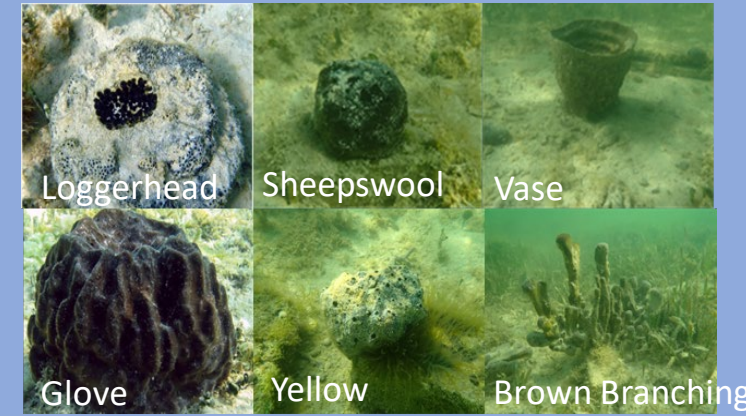


Sandfly Key Sponge
Nursery
2020



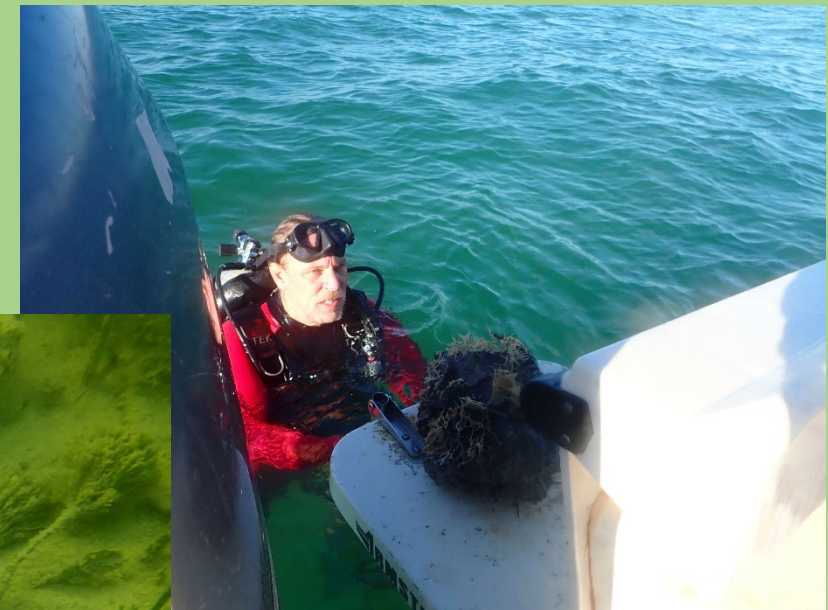
“Scaling-up Sponge Community Restoration”

- Produced ~18,000 sponges of 6 species
- Created four 0.25 Ha sponge restoration plots at sites damaged by Irma
- Estimated restoration costs on a per sponge basis 

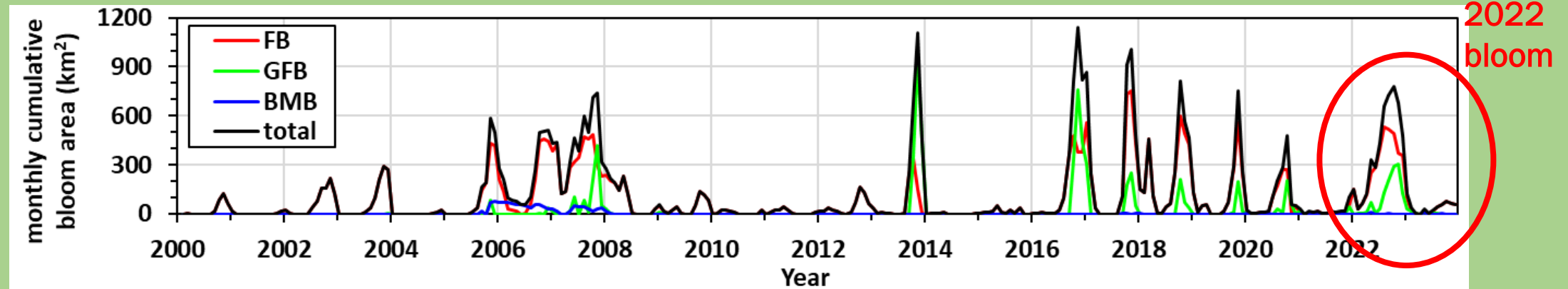


But the hits keep comin'...

October 2022



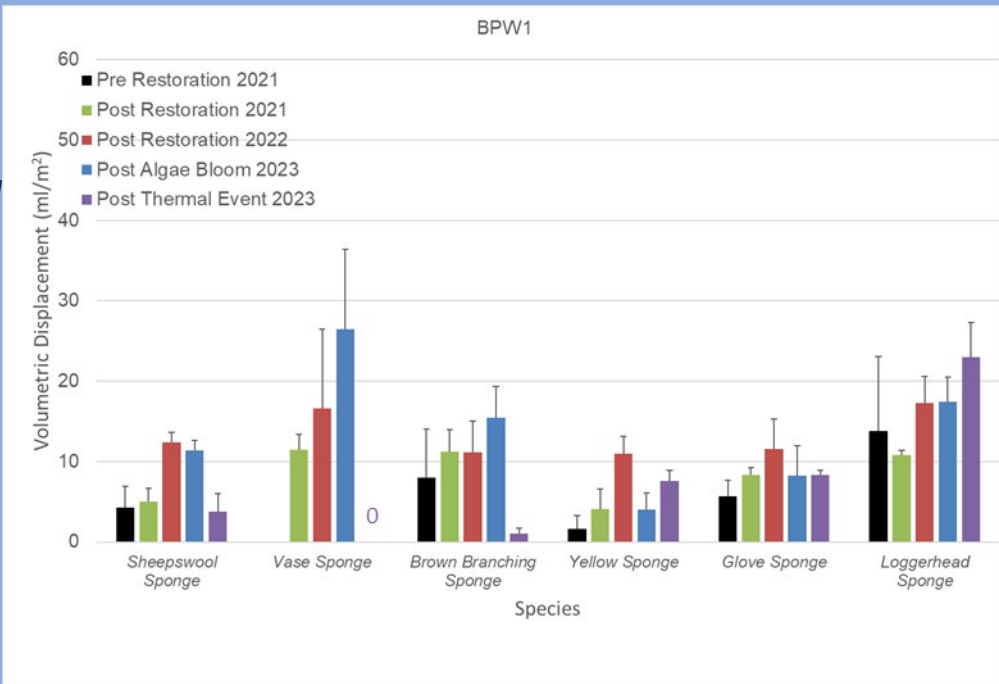
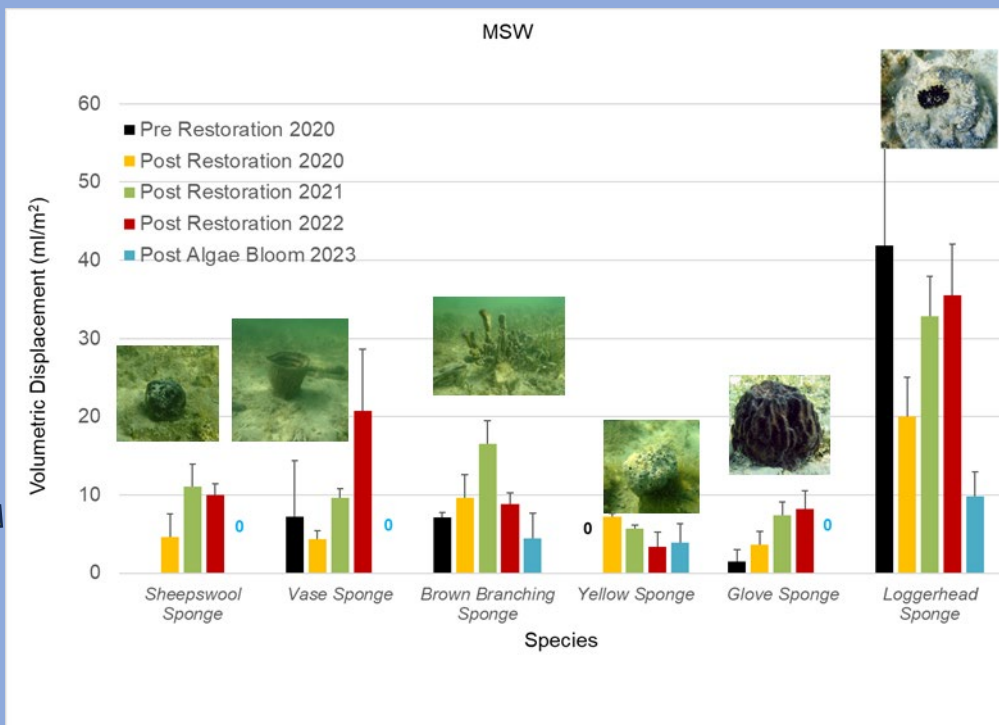
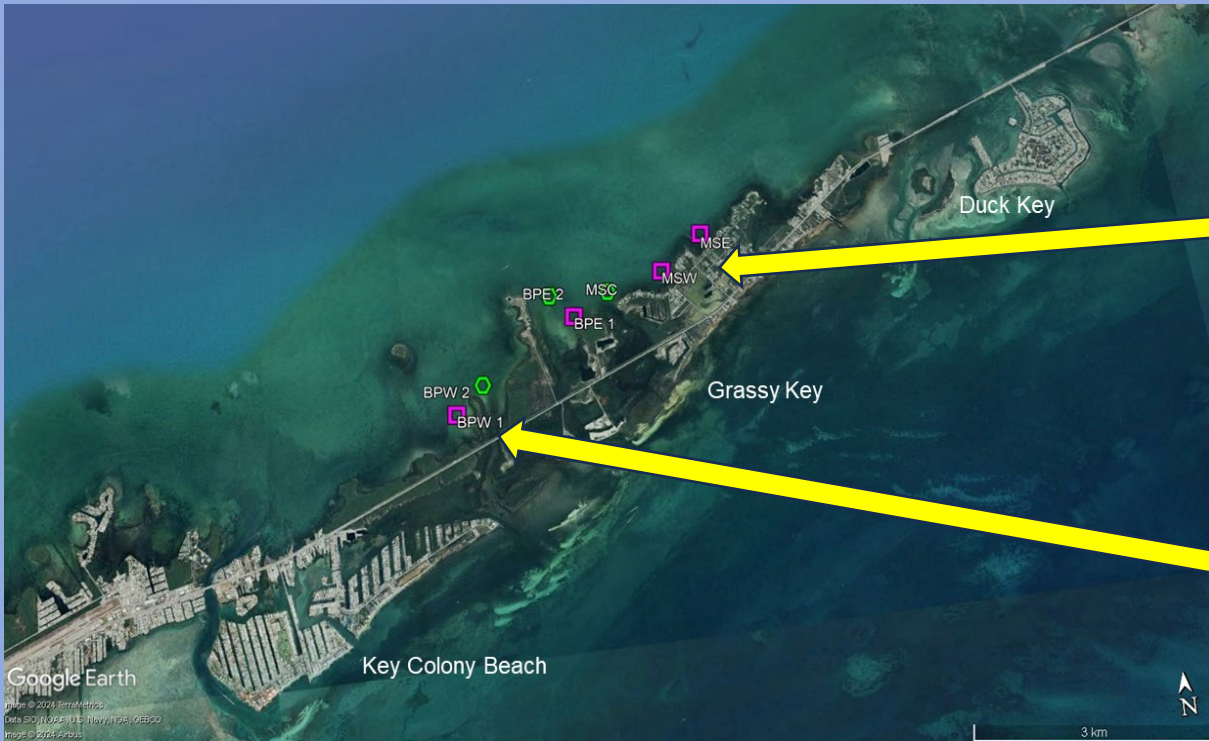
 UNIVERSITY OF
SOUTH FLORIDA
College of MARINE SCIENCE



**Bloom definition: Cyanobacterial Chl-a (Chl_{cl}; Cannizzaro et al., 2019) > 5 mg m⁻³



"Scaling-up Sponge Community Restoration"



Sponge Restoration Under Continued Environmental Stress

- *“Scaling-Up Sponge Restoration in Florida Bay”*



- Develop a risk-adverse strategy to guide sponge restoration in Florida Bay



A Sponge Restoration Strategy That Mitigates Risk

- A strategy that incorporates:
 - Documenting historic blooms of cyanobacteria
 - Historic surveys of the sponge community
 - Sponge life history characteristics
 - Costs associated with sponge restoration



A Sponge Restoration Strategy That Mitigates Risk

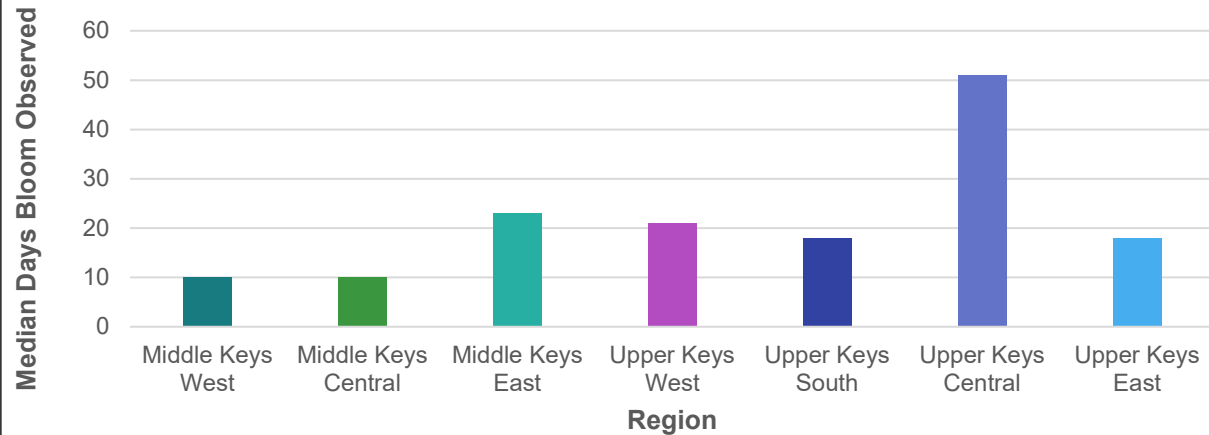
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Documenting Historic Blooms of Cyanobacteria

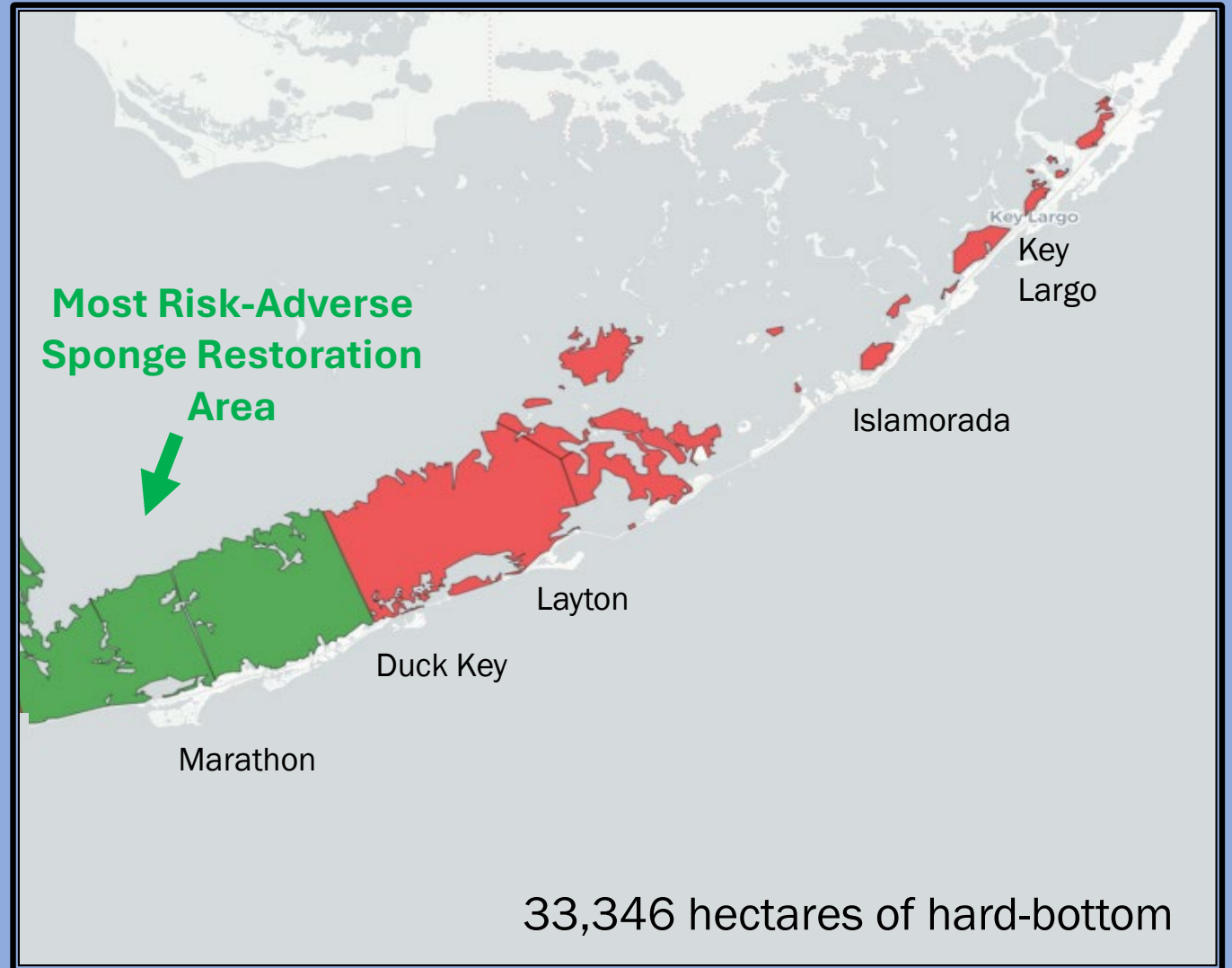
- Historic MODIS-Aqua Satellite Imagery for Cyanobacteria

2003 -2023 MODIS-Aqua Satellite Imagery for Cyanobacteria



Documenting Historic Blooms of Cyanobacteria

- Most risk-adverse as a starting point for sponge restoration
- Marathon down to the western side of the 7-mile bridge – outer Florida Bay



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Sponge Restoration Sites

Historic Surveys & Sponge Life History Characteristics

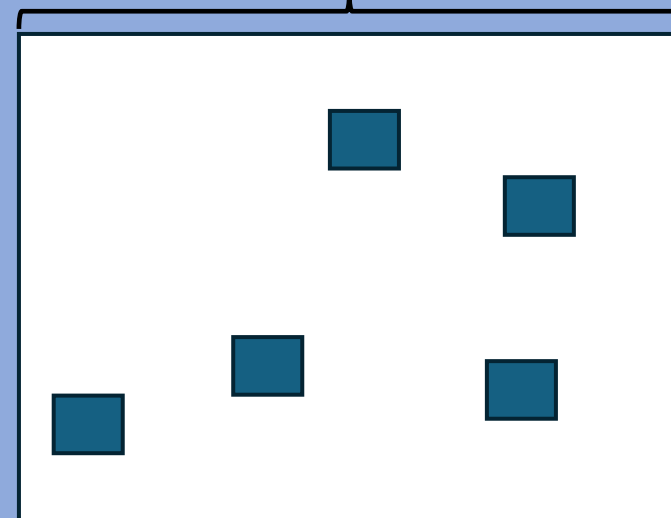
- Mean sponge density from the 2002 sponge surveys as a target



- Outplanting to optimize recruitment of sexually-produced larvae

2002 Sponge Surveys	
Species	1 Ha. Restoration Area
Loggerhead	750
Yellow	150
Glove	150
Sheepswool	150
Vase	710
Brown Branching	300
Total	2,210

1 HA



A Sponge Restoration Strategy That Mitigates Risk

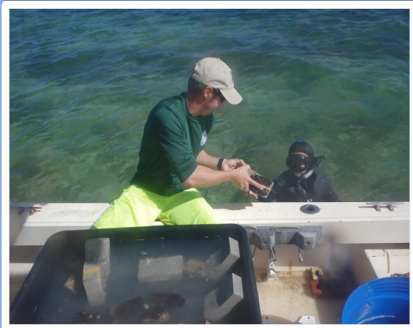
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Costs associated with sponge restoration



Estimated Cost per Ha			
Cost per sponge propagation	Cost per sponge - outplanting	Total cost per sponge	Cost per ha (2,210 sponges/ha)
\$8.54	\$3.84	\$12.38	\$27,360



Next Steps...

- Complete sponge restoration strategy document
- Submit to south Florida resource managers for comment: mid 2026 target
- Continue sponge ecologically-based research to refine sponge restoration practices



Summary

- The sponge communities have been drastically affected during the past several decades
- A risk-adverse sponge restoration strategy is fundamental to preserve the Bay's ecological function
- But we must temper expectations



Acknowledgments

DEP's Florida Coastal Management Program



Florida Keys National Marine Sanctuary

Permit # FKNMS-2024-144

