

Sponge Restoration Aquaculture



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UF/IFAS Monroe County Extension Service
& Florida Sea Grant





WQPP Science Symposium

- What is sponge restoration aquaculture?
- Are the sponge propagules (“cuttings”) reproducing in the FWC nurseries?
- 2023 Marine Heatwave, Lower Keys
- FWC Nursery in the Lower Keys
- Future EPA Funded Research

SPONGE RESTORATION AQUACULTURE

- FL Admin Code FAC § 18-21.003
 - Restoration aquaculture is the cultivation of plants and animals to increase declining wild populations and improve the health of coastal ecosystems
- FDEP Priority Sponge Restoration Zones
 - Sponge Density Targets - 2,210 sponges per hectare
- Sponge restoration is a nature-based solution that improves water quality, biodiversity, and essential fish habitat

FWC
sponge
nursery



Vase sponge propagules inside FWC-permitted nursery, Marathon, FL (Jennifer Stein)

Vase sponge 2 years later

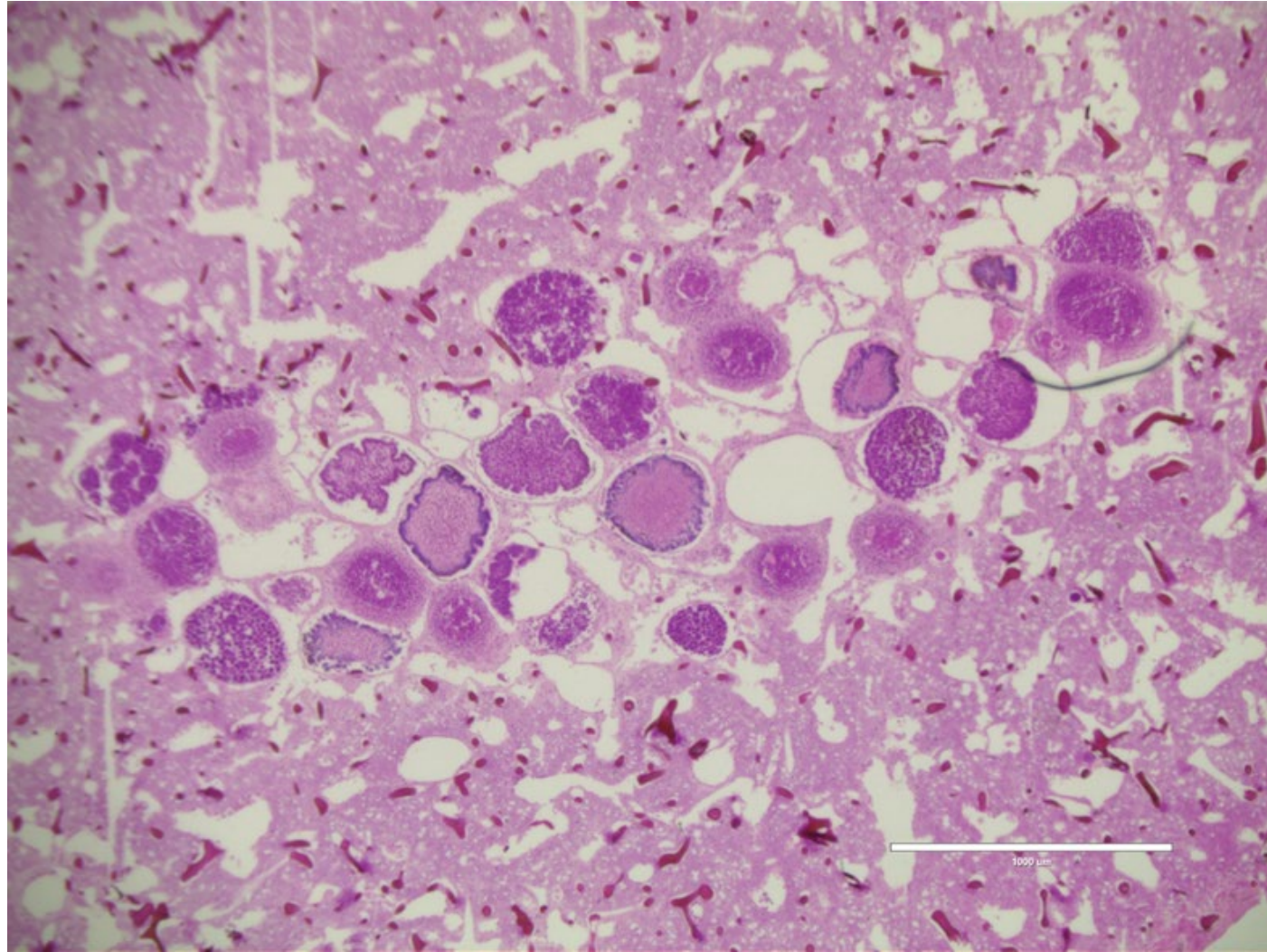


Vase sponge propagule 2-years later (Shelly Krueger)



Vase sponge propagules 4-years later (Photo credit: Dr. Mark Butler)

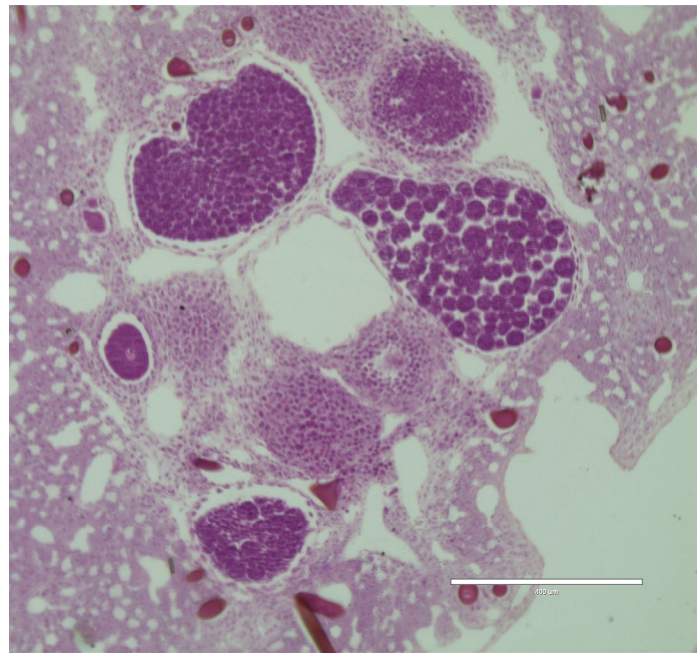
Are the sponge propagules reproducing in the FWC nurseries?



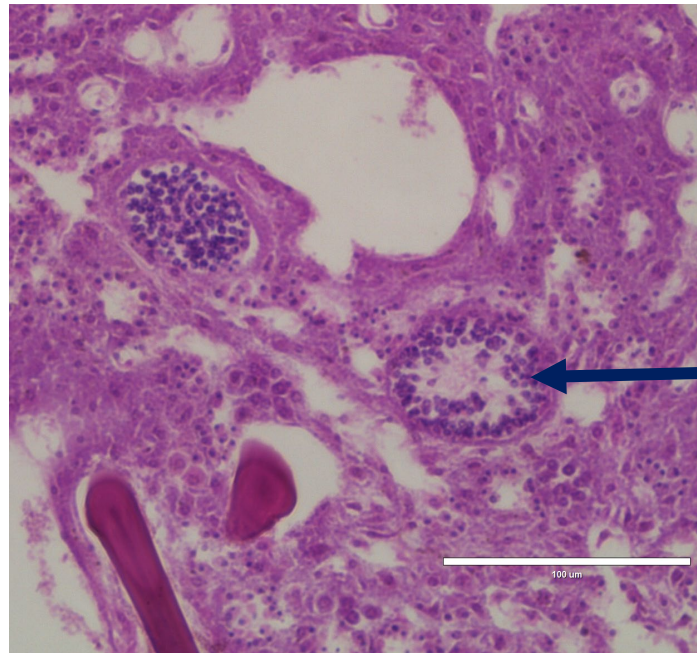
Determine spawning
months in

Sheepswool Sponge *H.*
lachne

Loggerhead Sponge *S.*
vesparium



Fertilized
eggs & larva



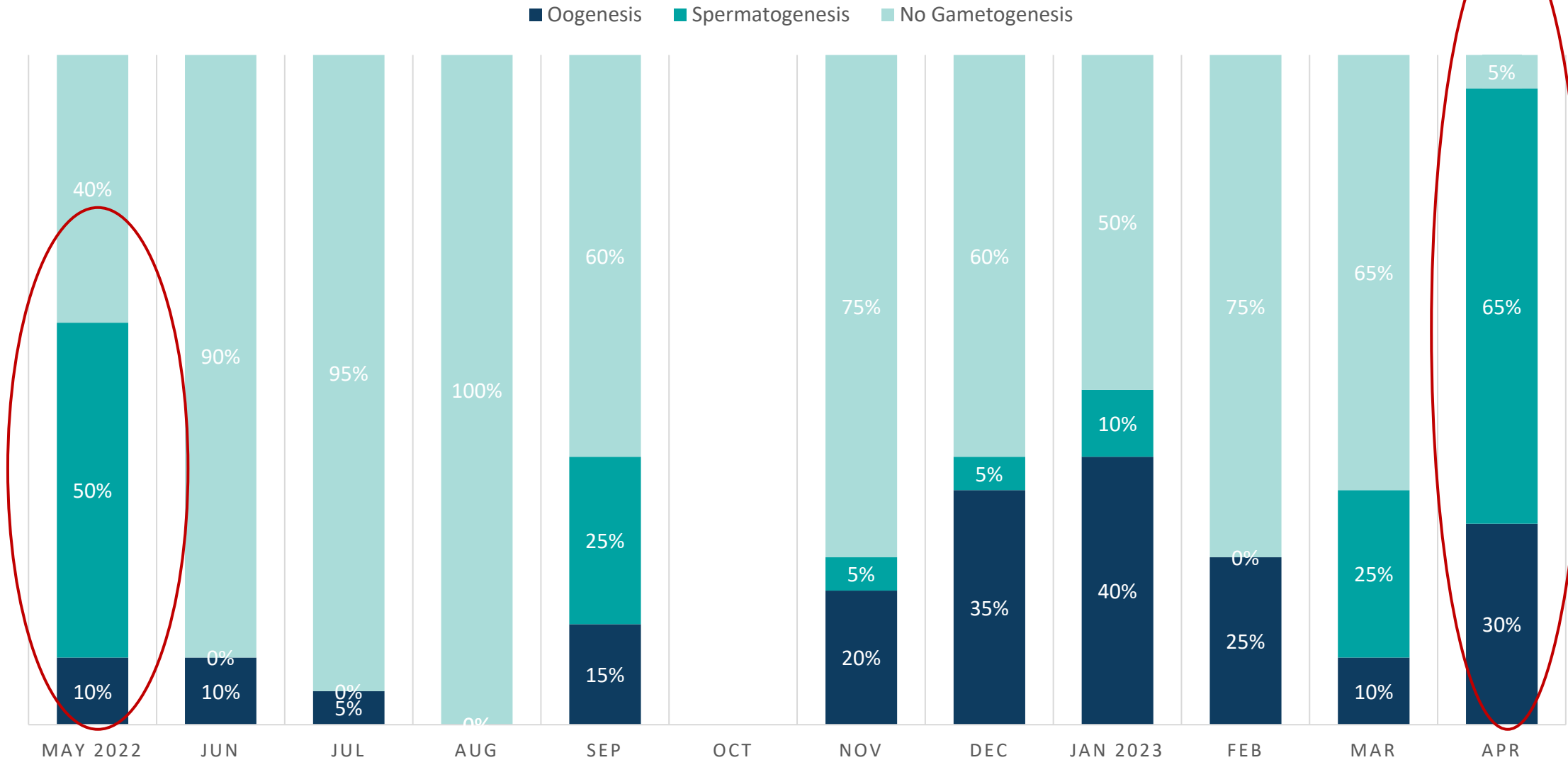
Spermatogenic
cyst





Sheepswool *H. lachne*

%gametogenesis by month (n=20/month)



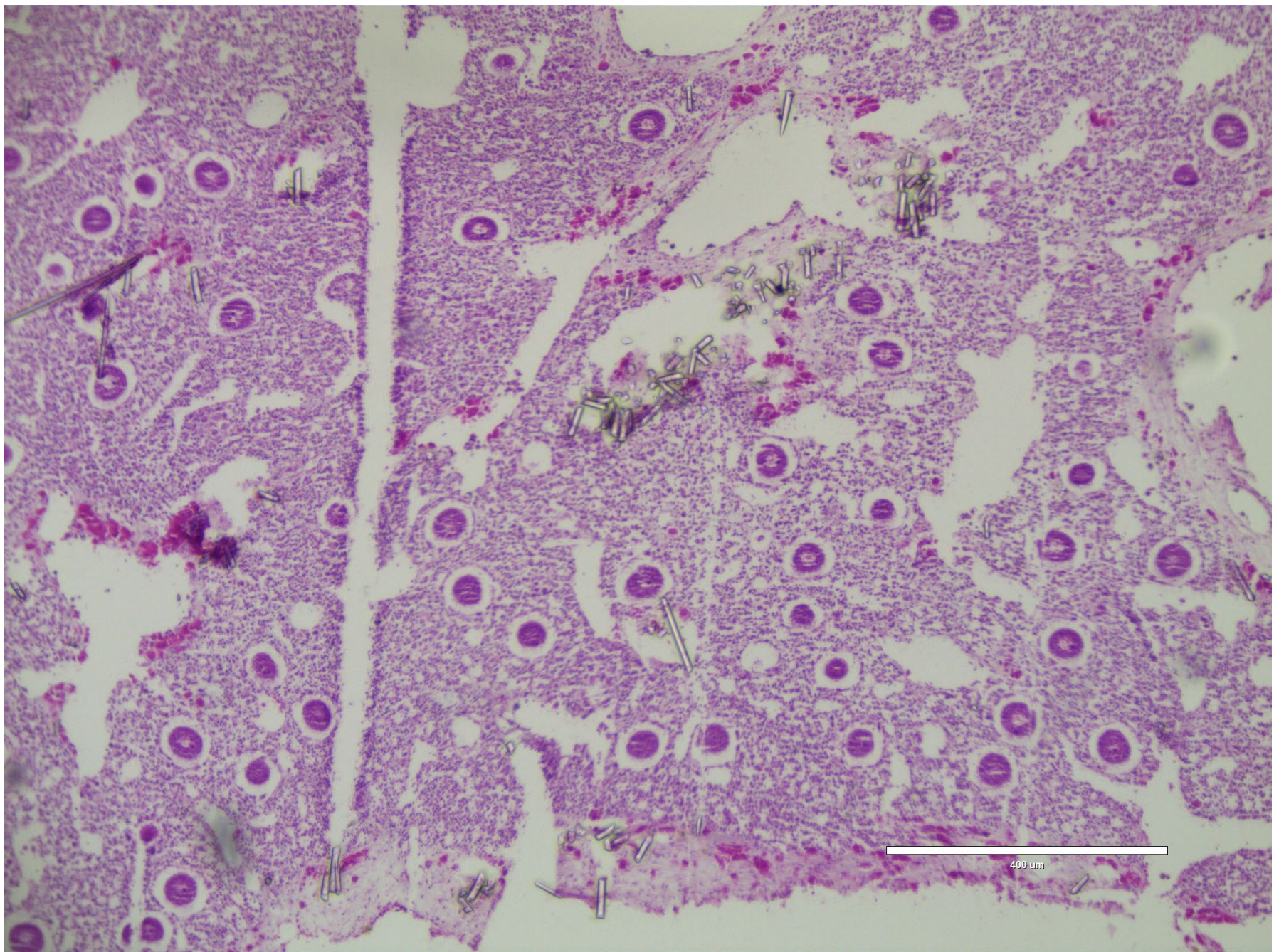
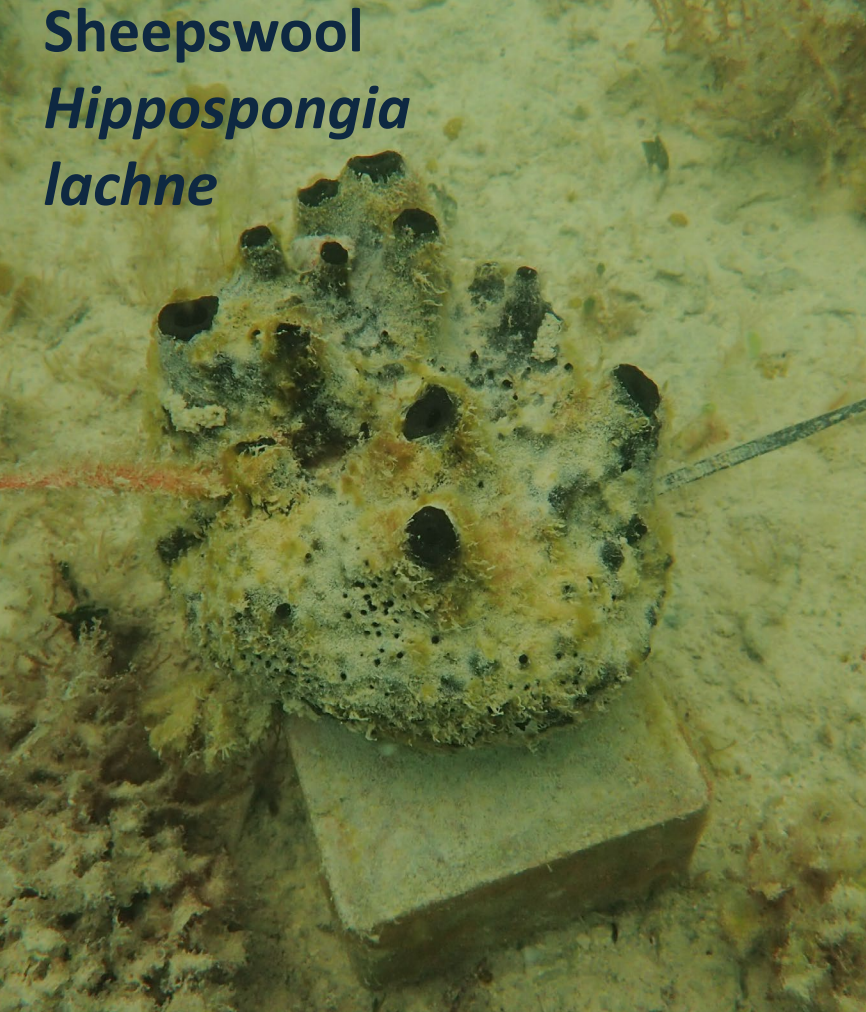


Fig. 4. May 2023: Slide 18 Loggerhead *S. vesparium* eggs (1 of out 211 sponges). Scale bar 400 μm.

Survey propagule reproduction in FWC-nursery using histology

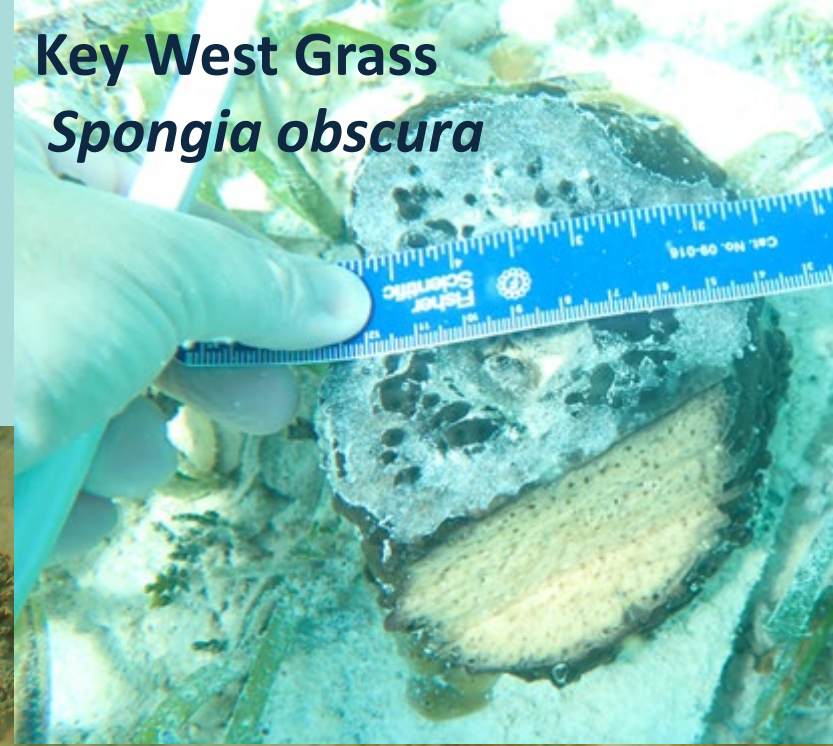
Sheepswool
Hippospongia
lachne



Glove
Spongia
graminea



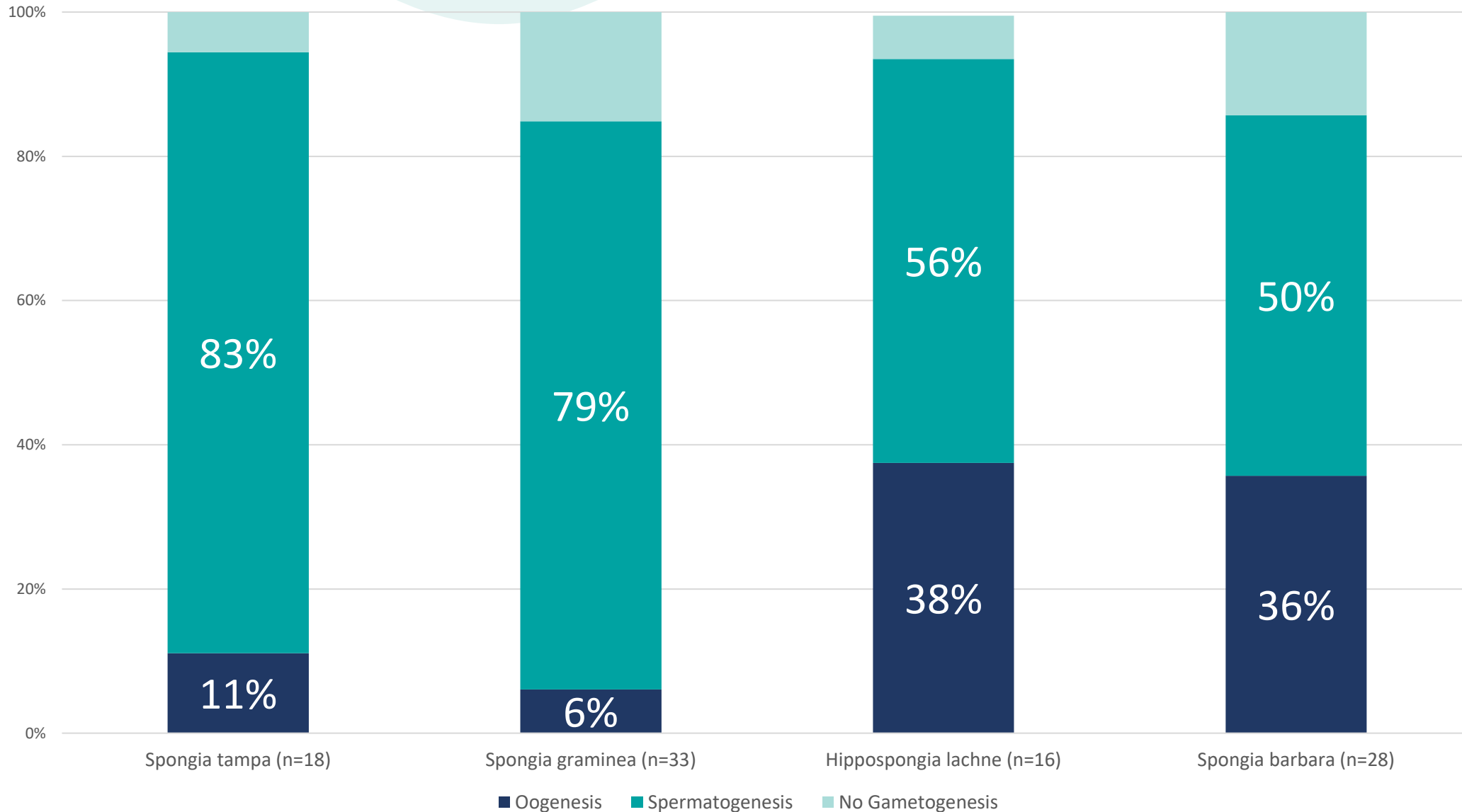
Key West Grass
Spongia
obscura



Yellow
Spongia
barbara



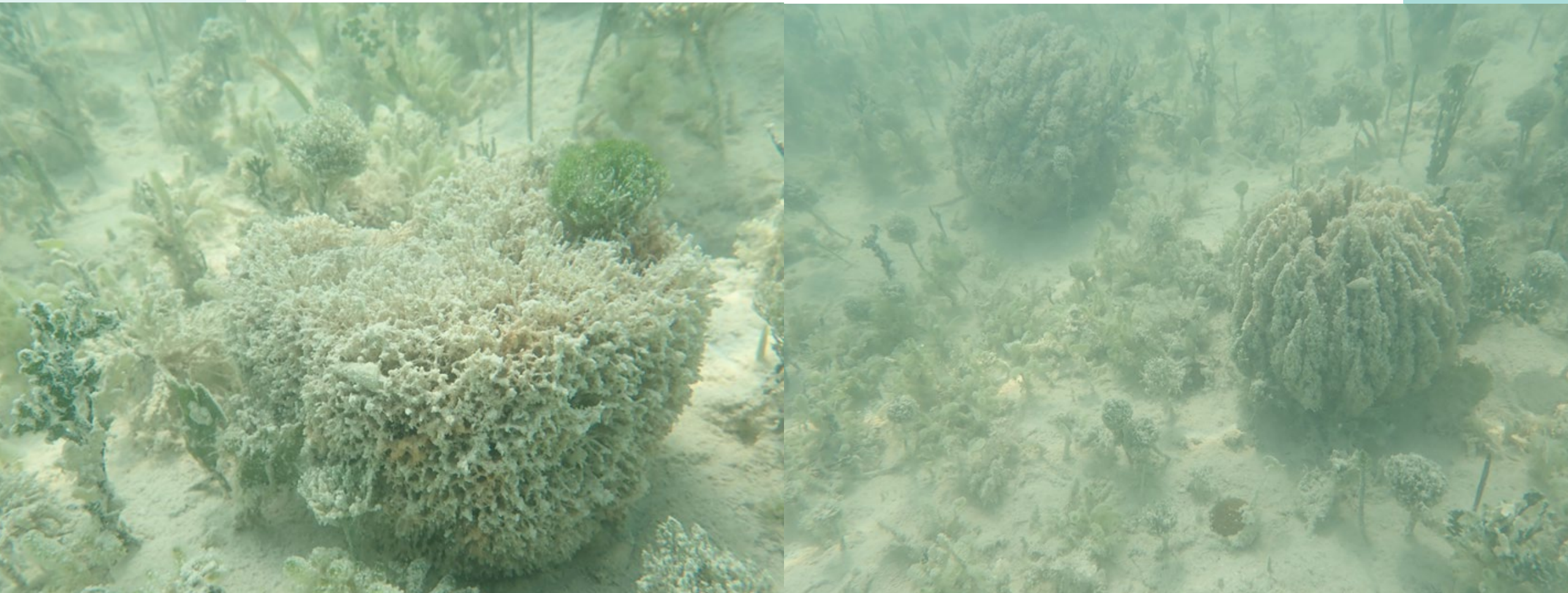
Propagule gametogenesis in 4 Spongiid species, April-June (90% of n=95)





2023 MARINE HEATWAVE

- NILES CHANNEL TO BOCA GRANDE
- >99% DIE-OFF IN WALTZ KEY BASIN STUDY AREA



Loggerhead Sponge, before and after



Source: Dr. Mark Butler, Old Dominion University

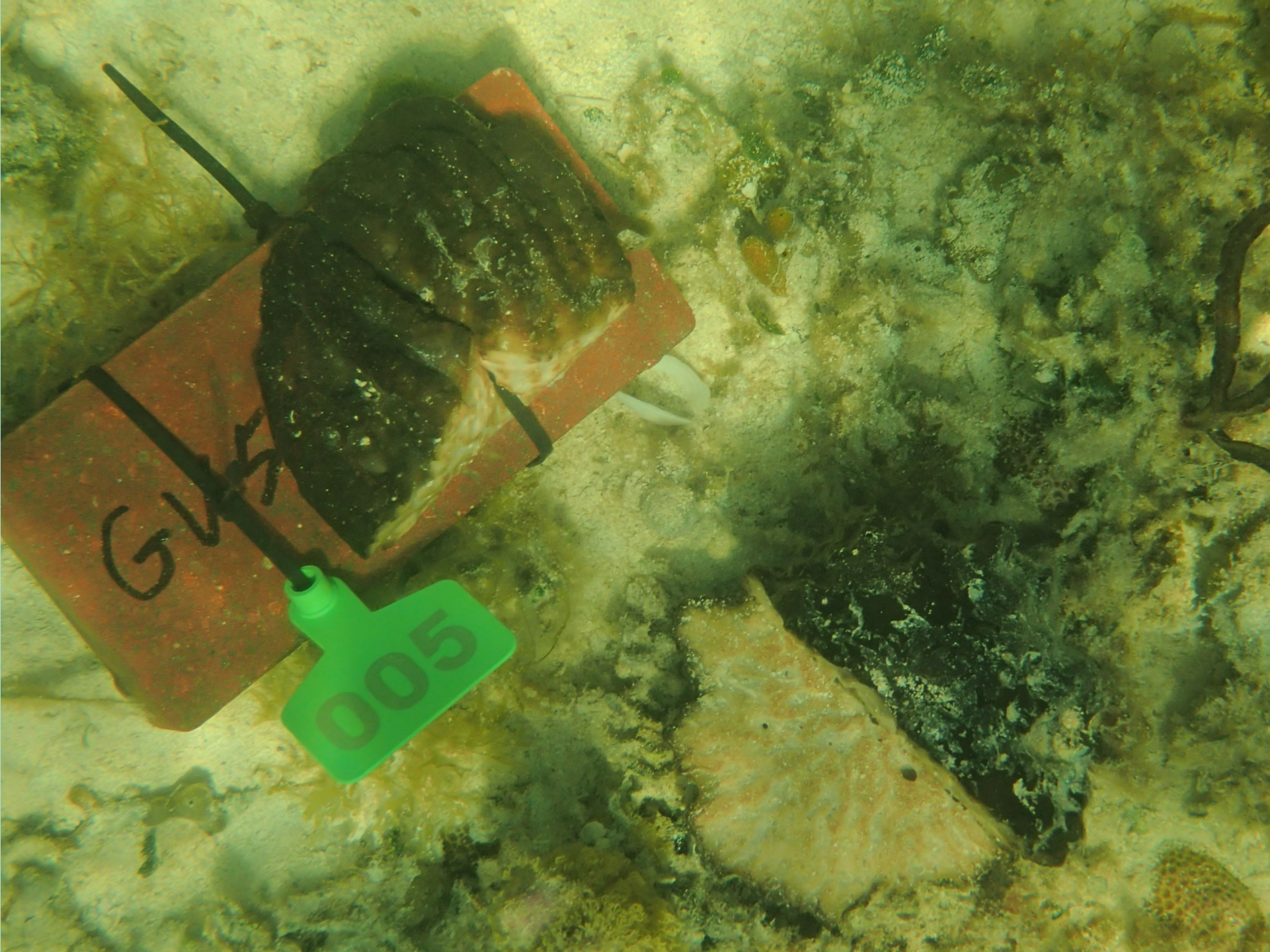


FWC Nursery in Lower Keys

- BEFORE-AFTER-CONTROL-IMPACT (BACI)

DESIGN

- 2025
 - 1,138 sponges
 - 4.6% mortality (n=53)
- 10 acres = 4 hectares (3,383 sponges)



CONTROL



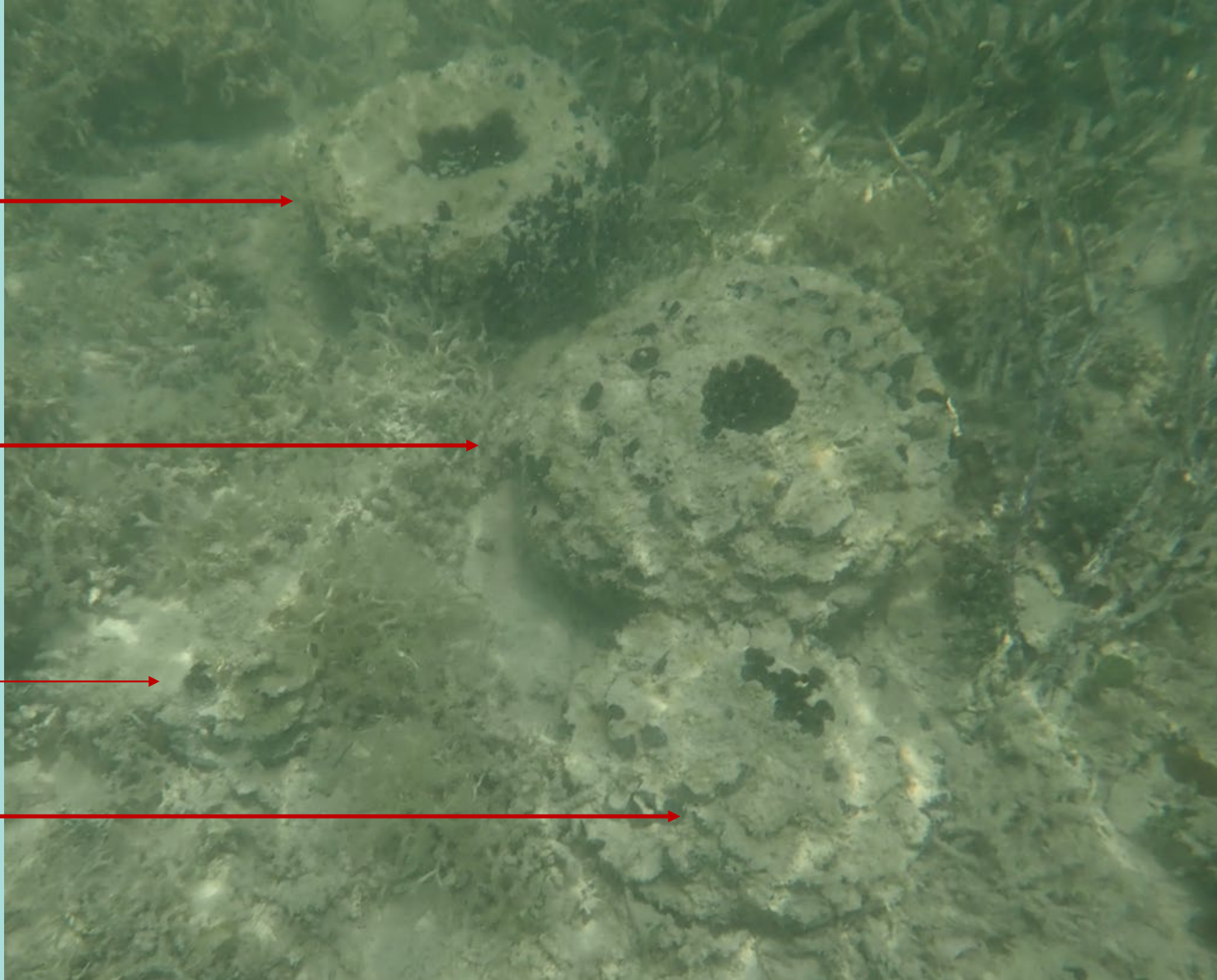
**VERTICAL CUTTING
(Donor)**



**VERTICAL PROPAGULE
ON BRICK**



**HORIZONTAL CUTTING
(Donor)**









Future EPA-funded Research

- New: Expansion into Biscayne National Park
- Adding 2,500+ sponges to meet FDEP density targets
- Resolving restoration species taxonomy via genetics (SNPs and COI)
- Ecosystem Services: filtration rates and effects on nutrient cycles
- Florida Sea Grant Sponge Restoration Workshops
 - Federal/state agency partners and practitioners
 - Summerland Key (2027)
 - Biscayne National Park (2028)

Acknowledgements

- EPA Region 4 Water Division, South Florida Program
- Florida Fish and Wildlife Conservation Commission
 - FWRI-Marathon Lab: Bill Sharp, Gabe Delgado, Kristene Parsons
- Drs. Josh Patterson, Shirley Pomponi, & Cristina Diaz
- Doug Gregory, Mimi & Simon Stafford

All research performed under Florida Keys National Marine Sanctuary
Permit

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WHAT IS EXTENSION?

Extension is a partnership between state, federal, and county governments to provide scientific knowledge and expertise to the public



In Florida, there is an Extension office in every county
Reach out and thank your County Commissioners for their support!

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