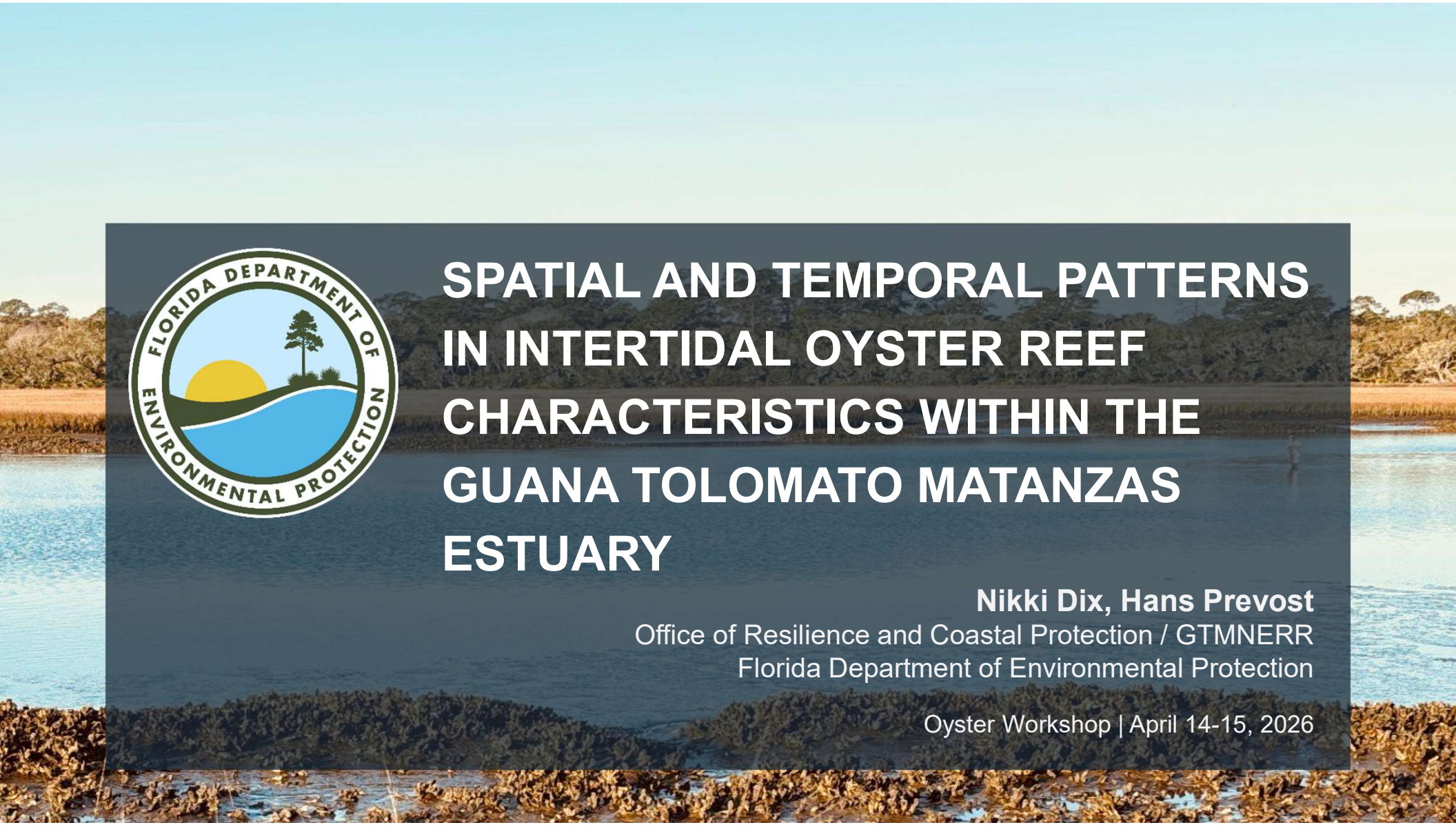
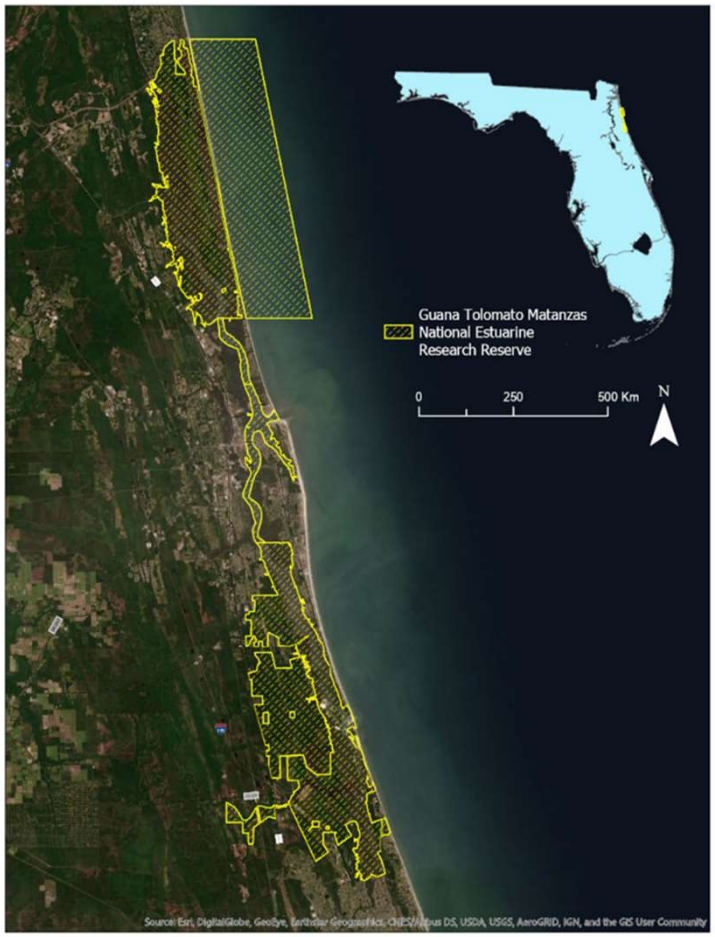


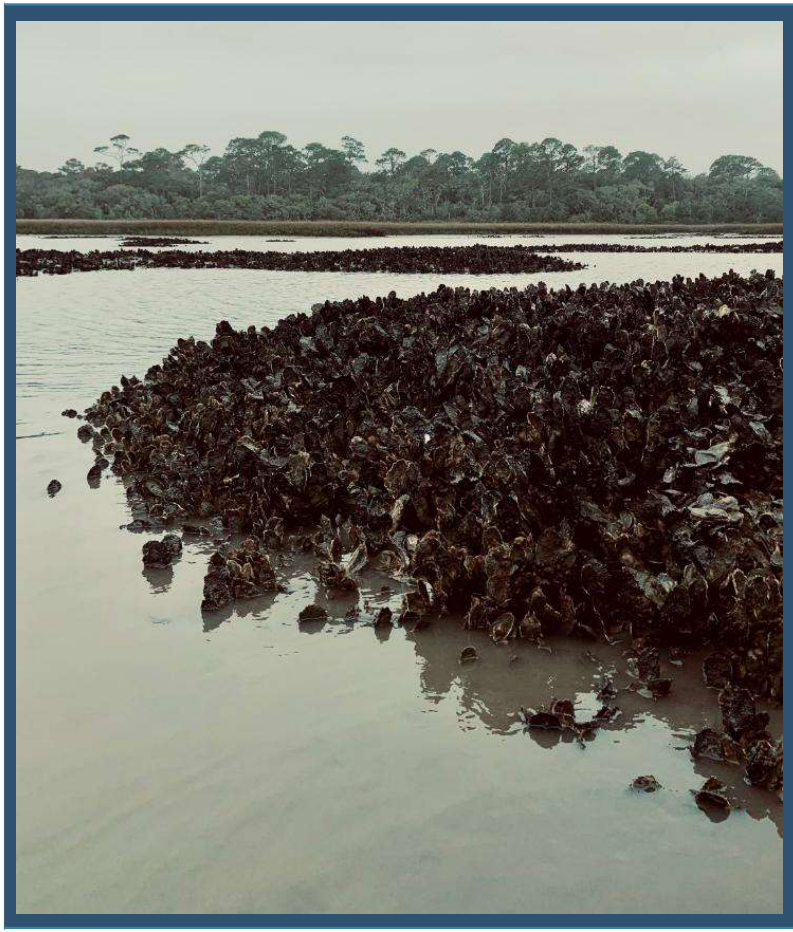
SPATIAL AND TEMPORAL PATTERNS IN INTERTIDAL OYSTER REEF CHARACTERISTICS WITHIN THE GUANA TOLOMATO MATANZAS ESTUARY

Nikki Dix, Hans Prevost
Office of Resilience and Coastal Protection / GTMNERR
Florida Department of Environmental Protection

Oyster Workshop | April 14-15, 2026

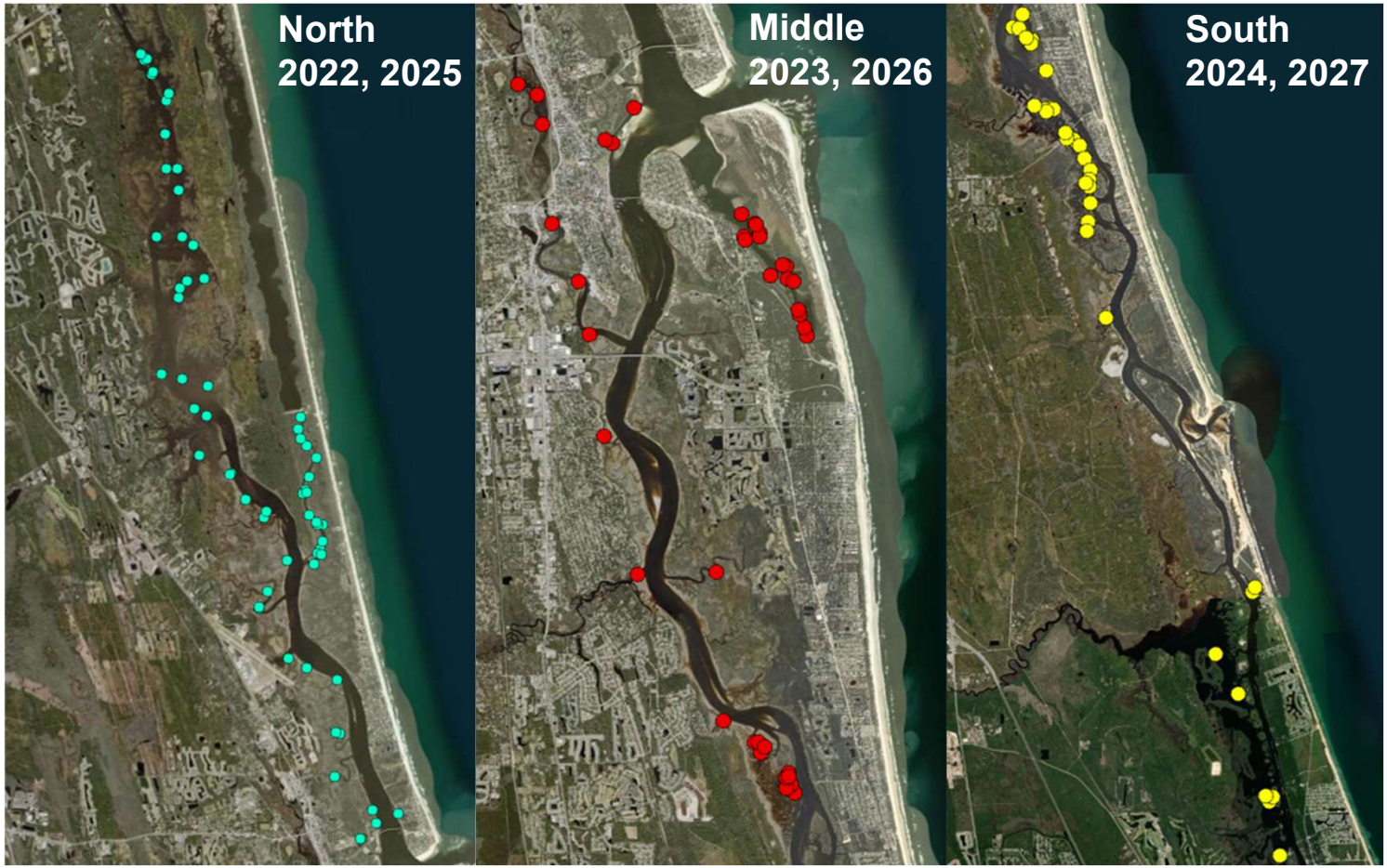
THE GUANA TOLOMATO MATANZAS ESTUARY





- Robust intertidal oyster populations
- ~4300 reefs

OYSTER MONITORING IN THE GTMNERR

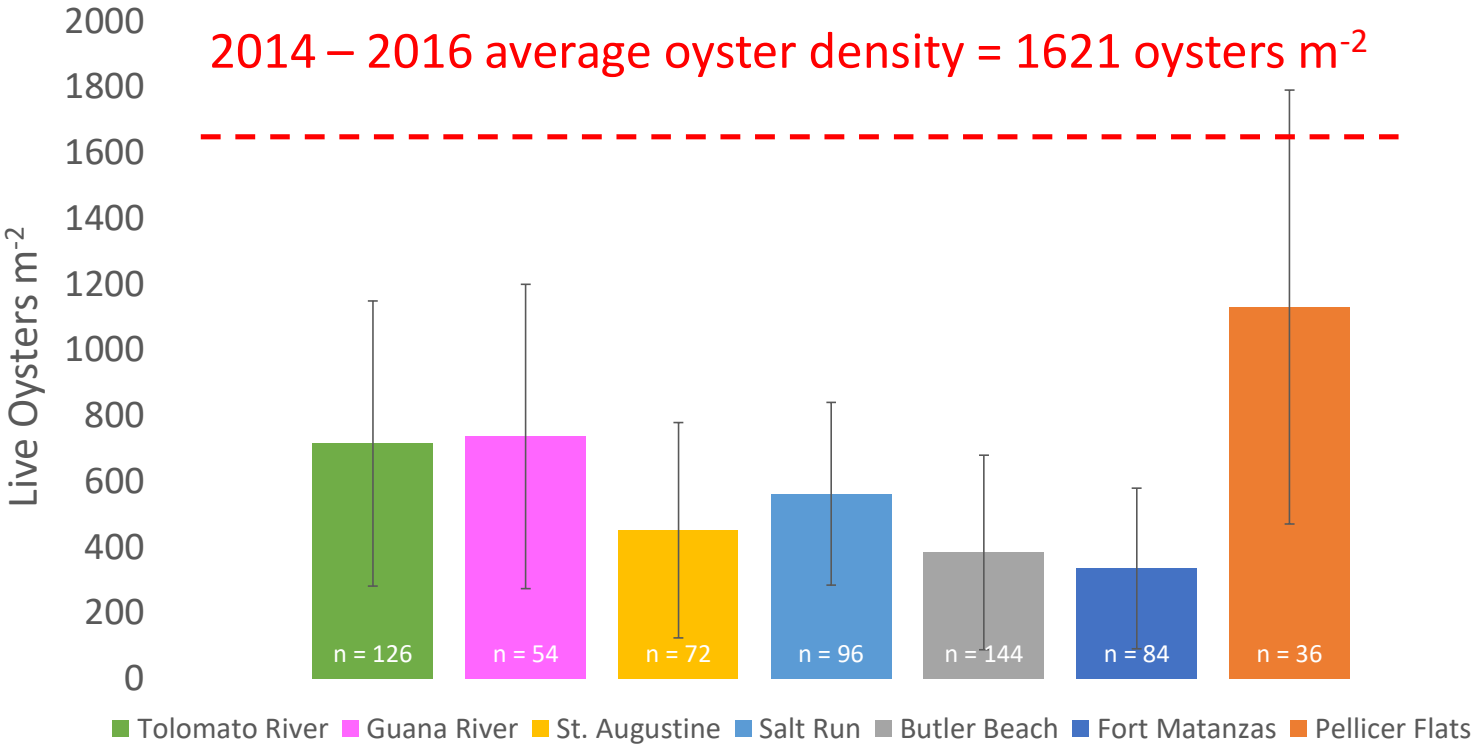


Given the importance of oysters in estuarine ecosystems, it is the goal of the GTMNERR to understand the status of local oyster populations and the reef habitats they build, and to track changes over time.

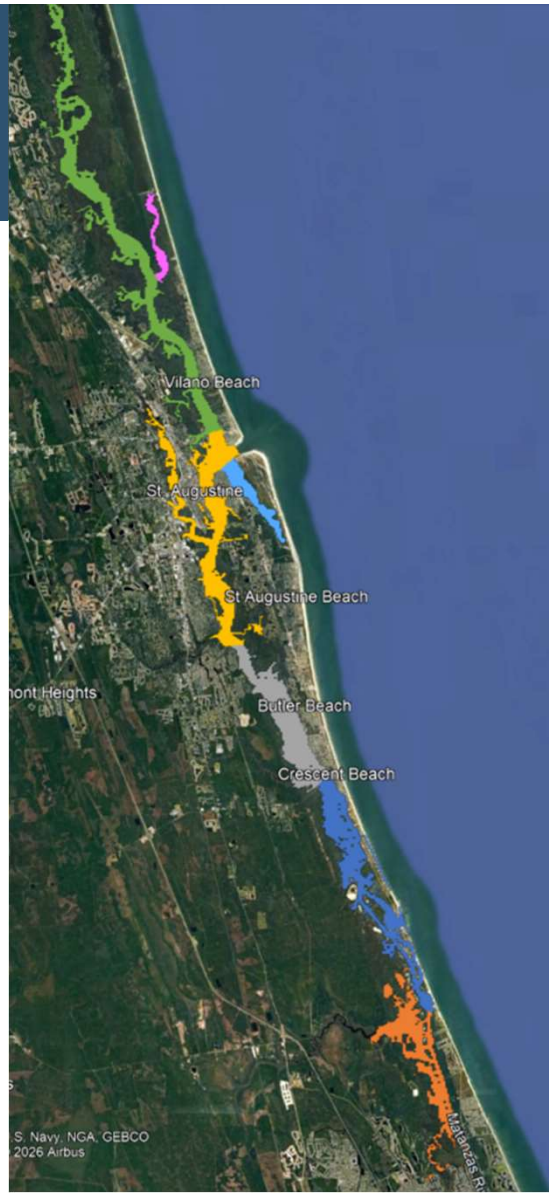
MONITORING METRICS

- Stratified random reef selection
- 6 plots/reef
- 1 m x 1 m:
  - Percent cover (live, shell, box, mud, other)
  - # predatory snails
  - # rooted mangroves
  - # oyster clusters
- 0.25 m x 0.25 m:
  - Abundance and shell height of live oysters (≥ 25 mm), mussels and clams
  - Abundance/presence of other fauna such as barnacles, crabs and gastropods
- Reef height and slope

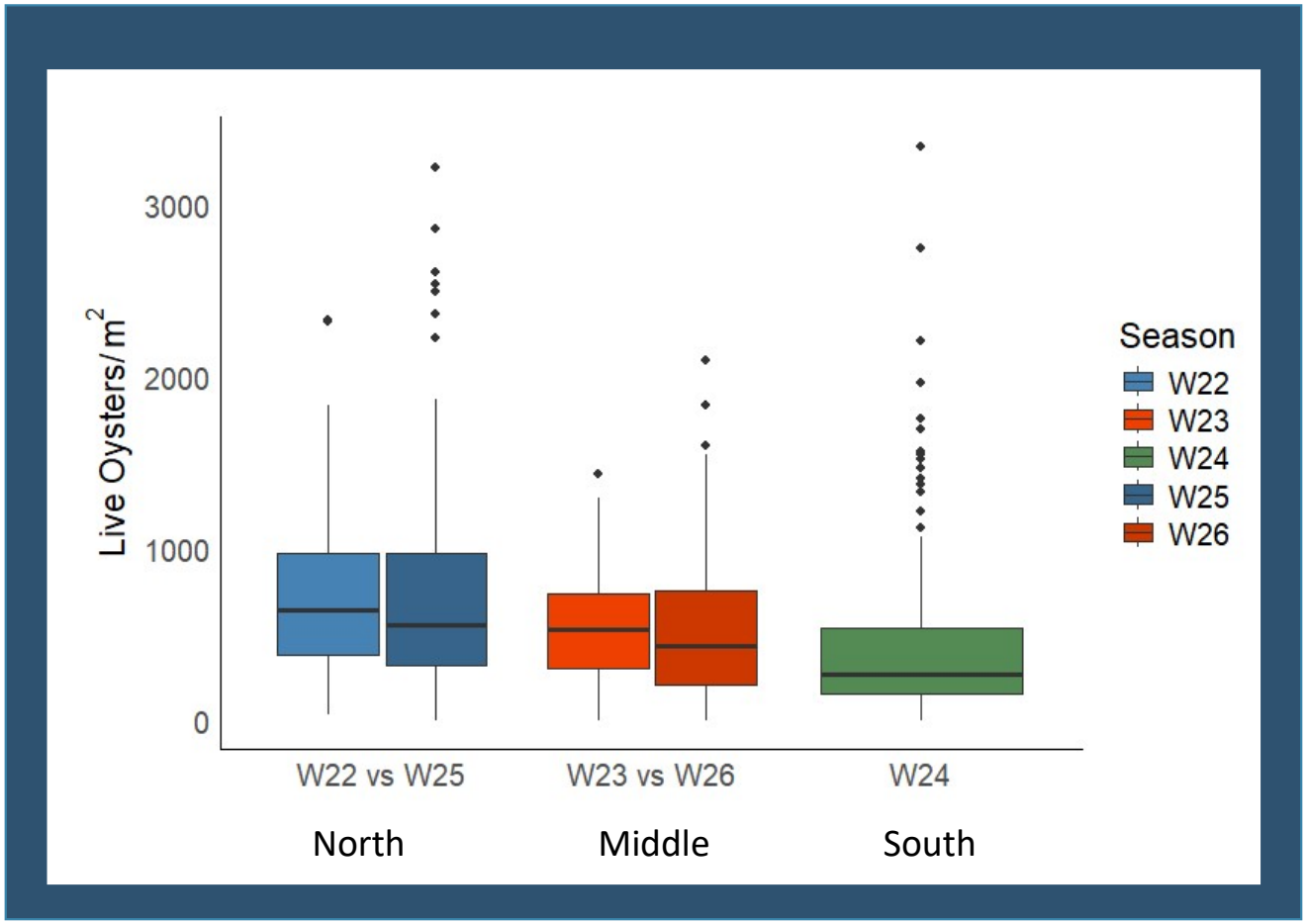
OYSTER DENSITY (2022 – 2024)



Error bars = std dev
n = # quadrats

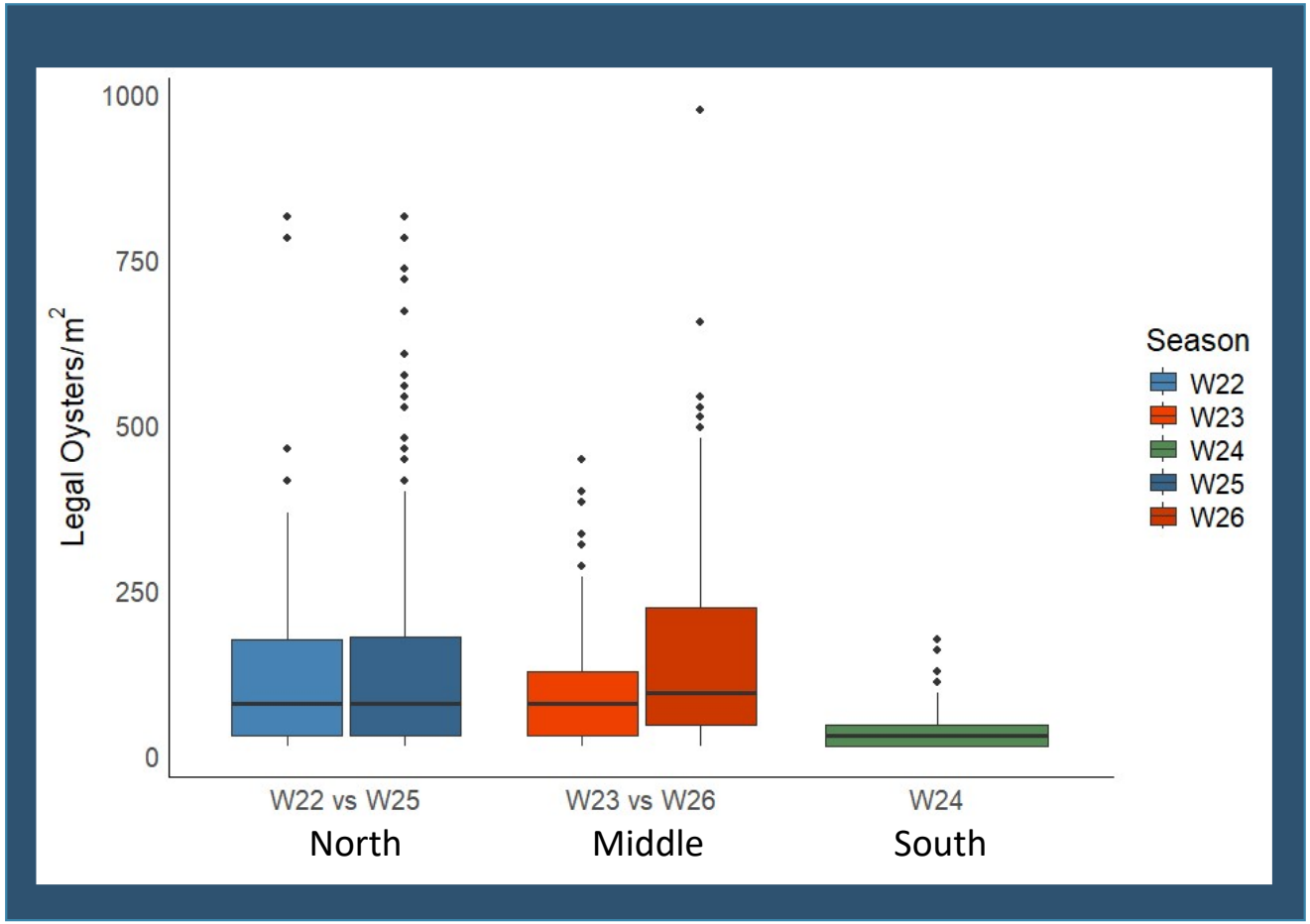


OYSTER DENSITY BY REGION OVER TIME

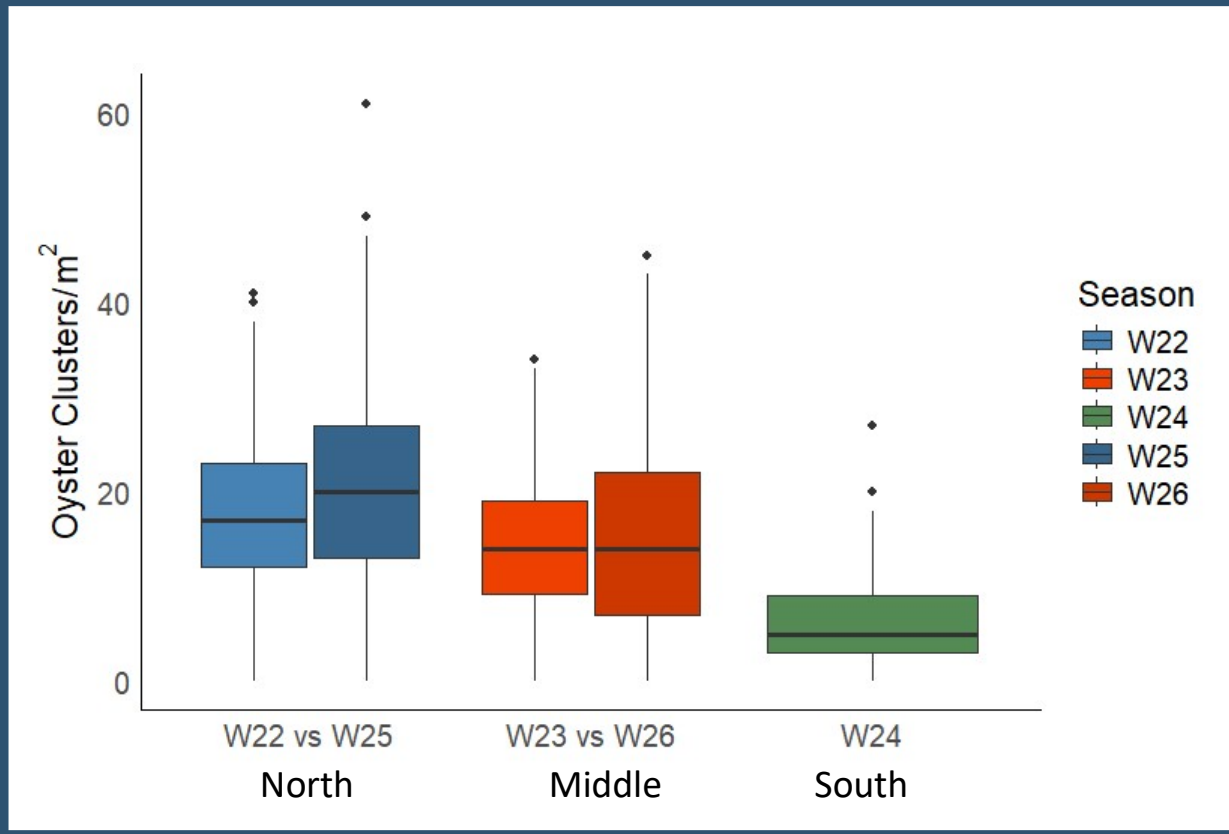


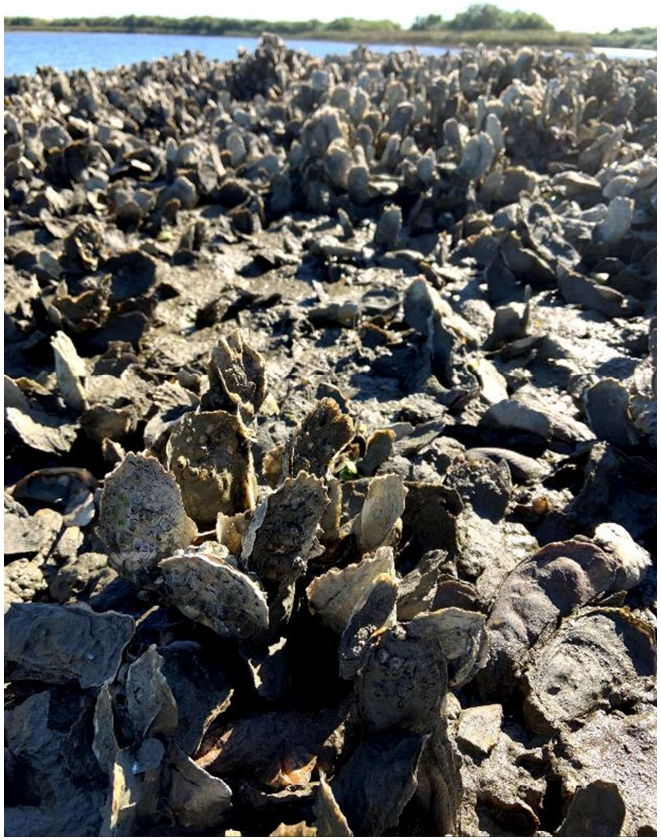
LEGAL OYSTER DENSITY

Legal = > 75 mm



CLUSTERS


60
40
20
0
Oyster Clusters/m2
W22 vs W25
W23 vs W26
W24
North
Middle
South
Season
W22
W23
W24
W25
W26



DATA APPLICATIONS

DATA APPLICATIONS

Ecological Engineering 158 (2020) 106071

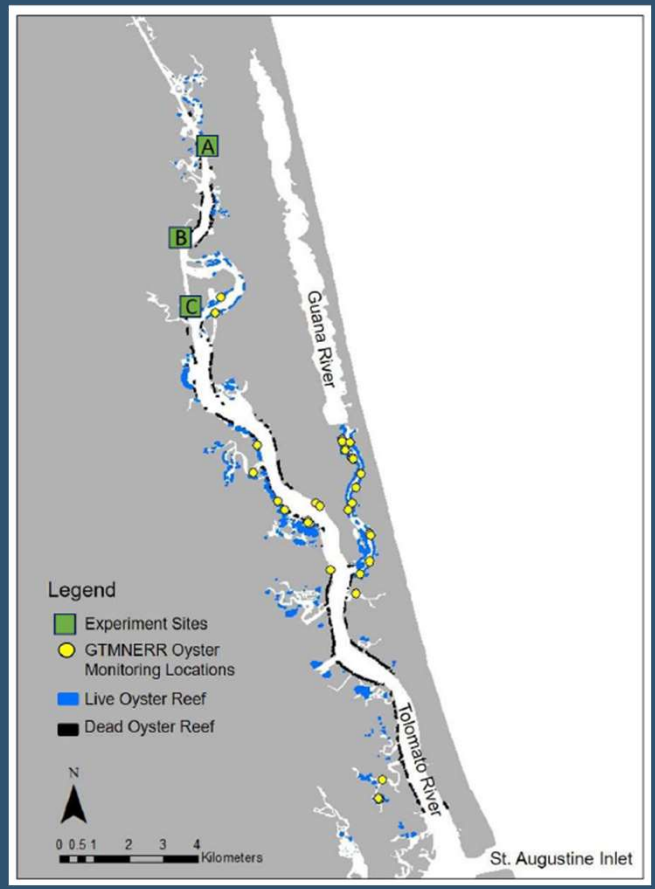
Contents lists available at ScienceDirect

Ecological Engineering

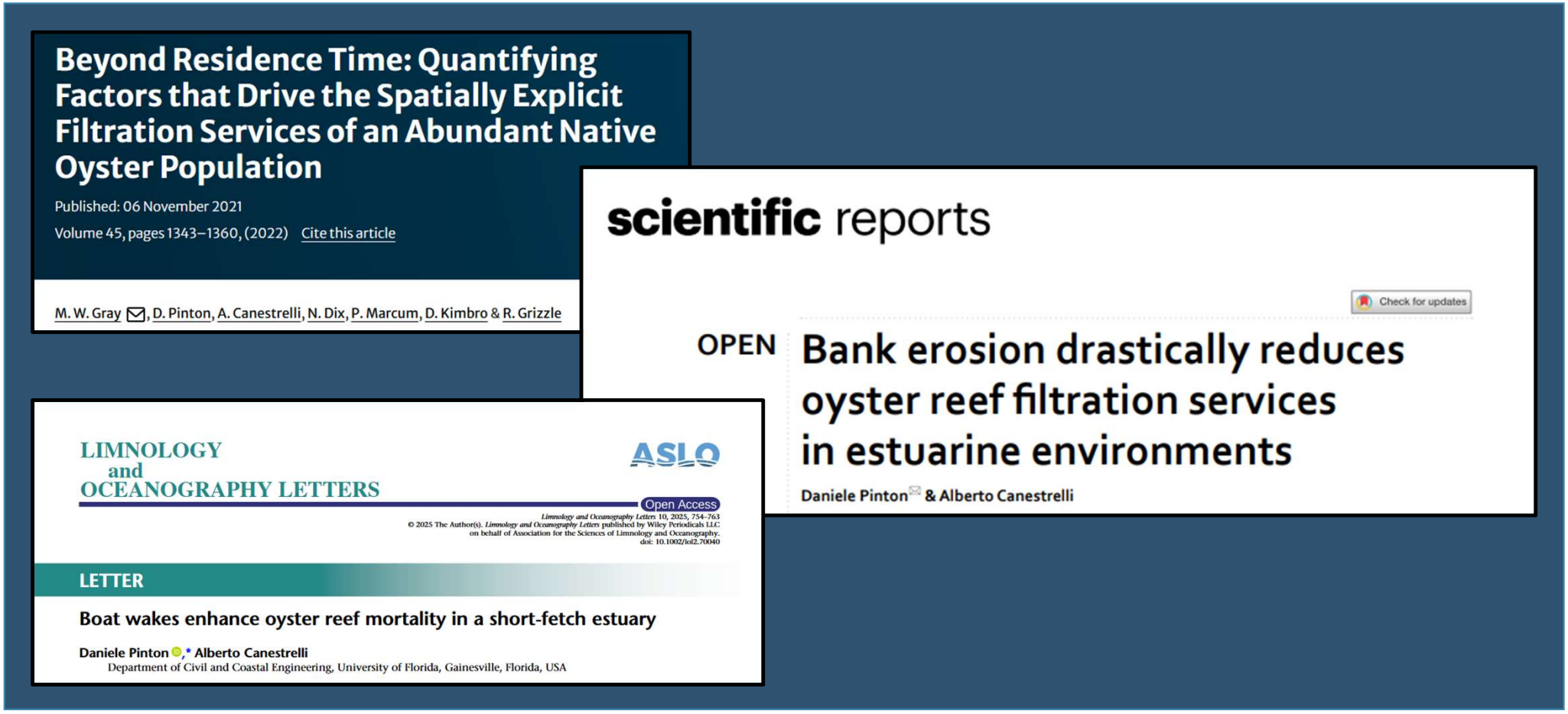
journal homepage: www.elsevier.com/locate/ecoleng

Coupling breakwalls with oyster restoration structures enhances living shoreline performance along energetic shorelines

I. Safak[a,*], P.L. Norby[b], N. Dix[c], R.E. Grizzle[d], M. Southwell[e], J.J. Veenstra[e], A. Acevedo[e], T. Cooper-Kolb[e], L. Massey[e], A. Sheremet[f], C. Angelini[b,f]



DATA APPLICATIONS



Beyond Residence Time: Quantifying Factors that Drive the Spatially Explicit Filtration Services of an Abundant Native Oyster Population

Published: 06 November 2021

Volume 45, pages 1343–1360, (2022) Cite this article

M. W. Gray, D. Pinton, A. Canestrelli, N. Dix, P. Marcum, D. Kimbro & R. Grizzle

scientific reports

Check for updates

OPEN

Bank erosion drastically reduces oyster reef filtration services in estuarine environments

Daniele Pinton & Alberto Canestrelli

LIMNOLOGY and OCEANOGRAPHY LETTERS

ASLO

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Limnology and Oceanography Letters 10, 2025, 754–763

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doi: 10.1002/lol2.70040

LETTER

Boat wakes enhance oyster reef mortality in a short-fetch estuary

Daniele Pinton,* Alberto Canestrelli

Department of Civil and Coastal Engineering, University of Florida, Gainesville, Florida, USA

YOU CAN USE IT TOO!

- The GTMNERR will continue monitoring oysters.
- This extensive dataset can serve as a baseline for anyone wanting to do oyster research or management (available to the public).

https://data.florida-seacar.org/

DATA APPLICATIONS

Journal of Shellfish Research, Vol. 44, No. 3, 465–477, 2025.

EFFECTS OF LOCATION AND HAND HARVEST OF INTERTIDAL OYSTER (*CRASSOSTREA VIRGINICA*) REEFS ON OYSTER POPULATIONS AND HABITAT CHARACTERISTICS

NICOLE DIX,[1,2]* HANS J. PREVOST,[1] PAMELA MARCUM,[1,3] OLIVIA M. ESCANDELL,[1,4] SILAS TANNER[1,2,5] AND JULIA LANOUE[1,6]

[1]Florida Department of Enivronmental Protection, Guana Tolomato Matanzas National Estuarine Research Reserve, 505 Guana River Road, Ponte Vedra Beach, FL; [2]University of North Florida, 1 UNF Drive, Jacksonville, FL; [3]South Carolina Department of Natural Resources, 217 Fort Johnson Road, Charleston, SC; [4]Florida Fish and Wildlife Conservation Commission, 1220 Prospect Avenue, Melbourne, FL; [5]Matanzas Riverkeeper, 291 Cubbedge Road, St. Augustine, FL; [6]Brown University, 198 Dyer Street, Providence, RI

OYSTER HARVEST - SUBTIDAL

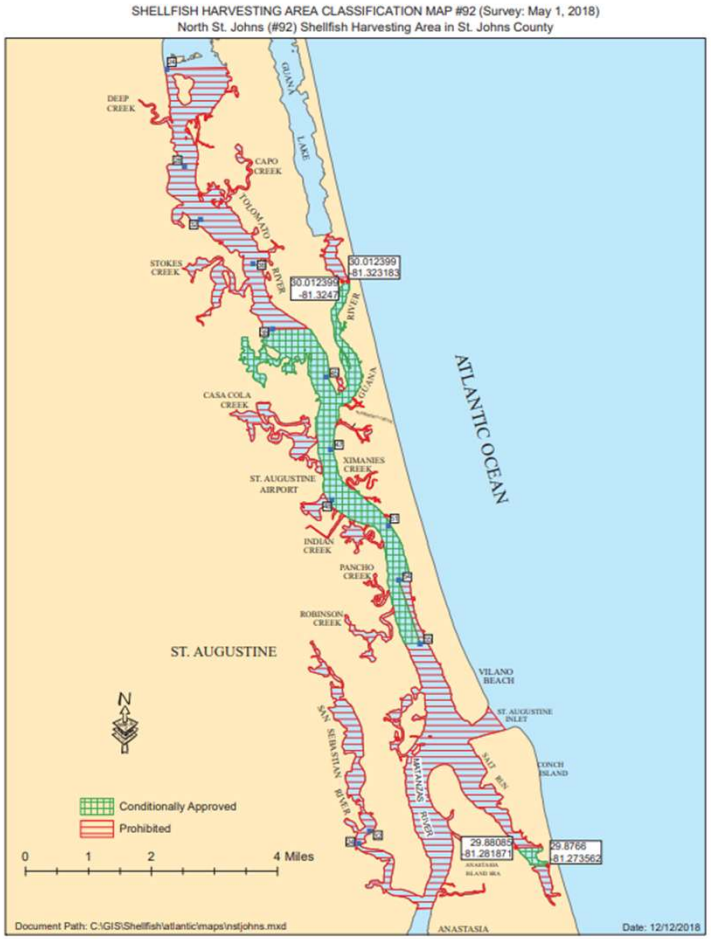

Russel Sparkman

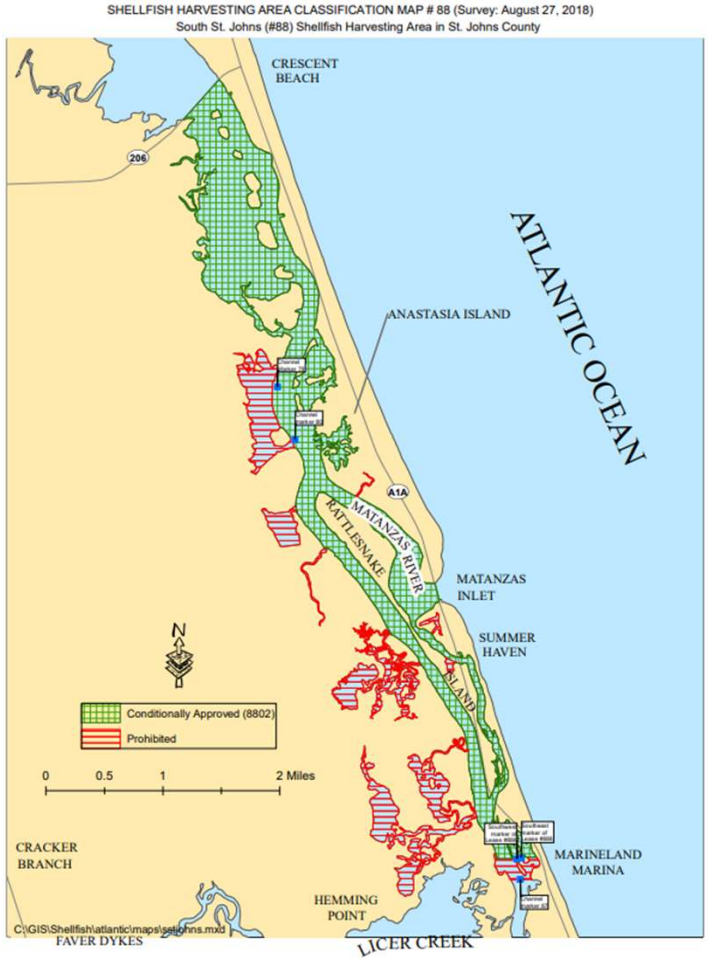
- Oyster populations declining globally.
- Known harvest impacts on subtidal reefs:
  - Can reduce oyster population size.
  - Reduces reef structure which provides habitat and other functions.
  - Removes available substrate for larval settlement.

OYSTER HARVEST - INTERTIDAL

Photos donated by local resident.

OYSTER HARVEST IN GTM ESTUARY

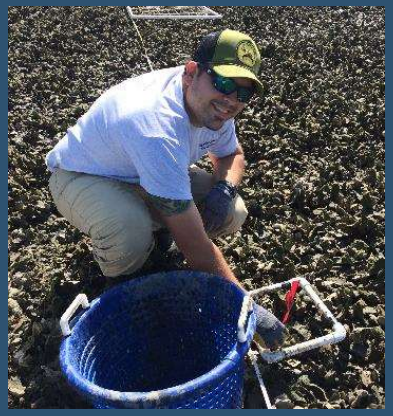




COMPARISON METRICS (2015-2016)

107 reefs
(52 harvested, 55 control)

1 m x 1 m



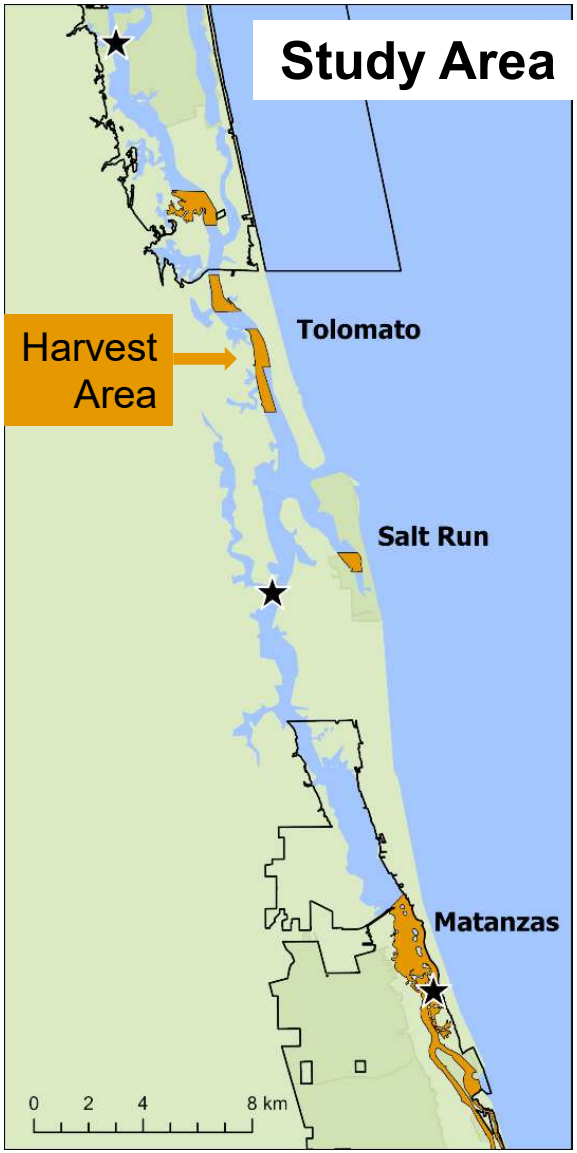
0.25 m x 0.25 m

1 m x 1 m (n = 6/reef):

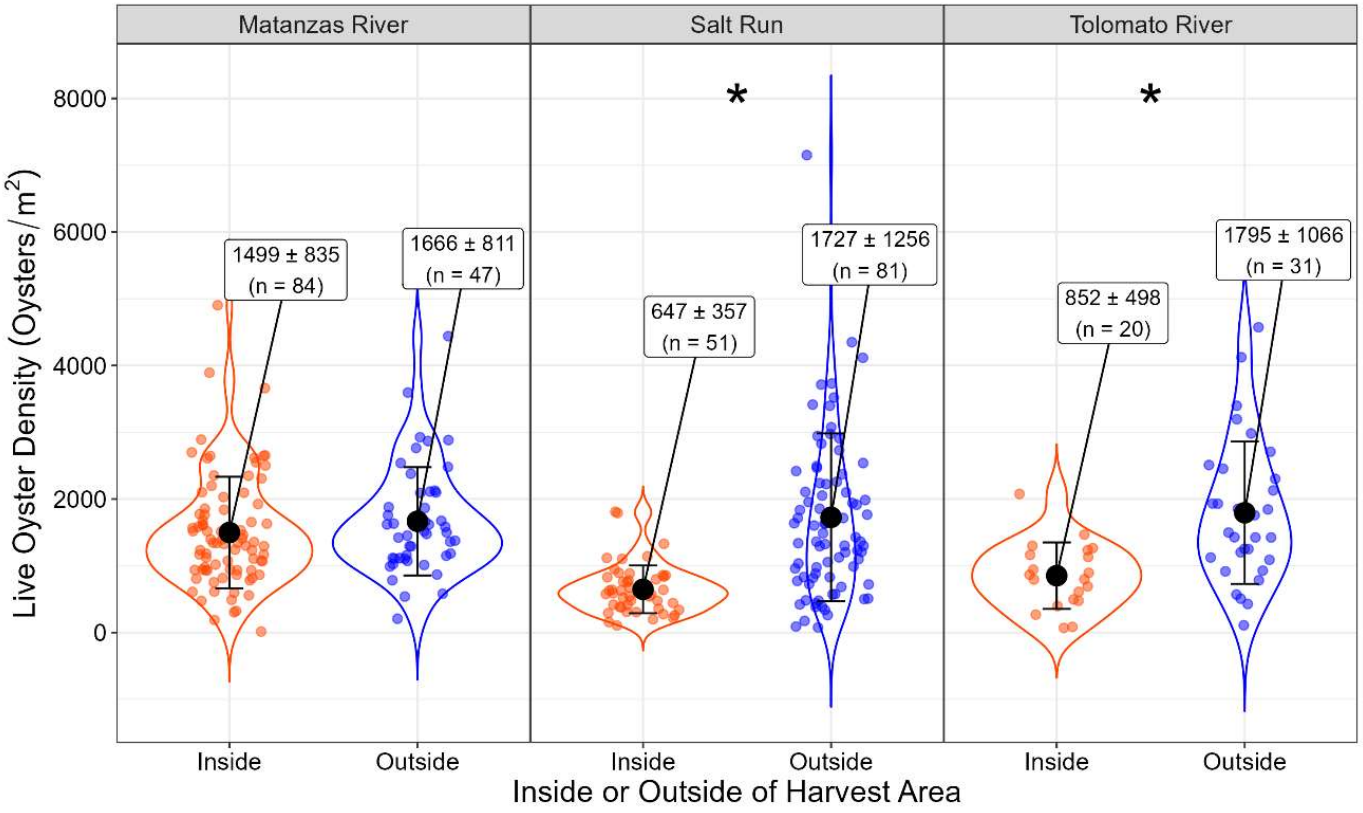
- # oyster clusters (≥ 5 attached oysters)

0.25 m x 0.25 m (n = 3/reef):

- Counts of live oysters, mussels and barnacles
- Shell heights of oysters
- Cultch mass

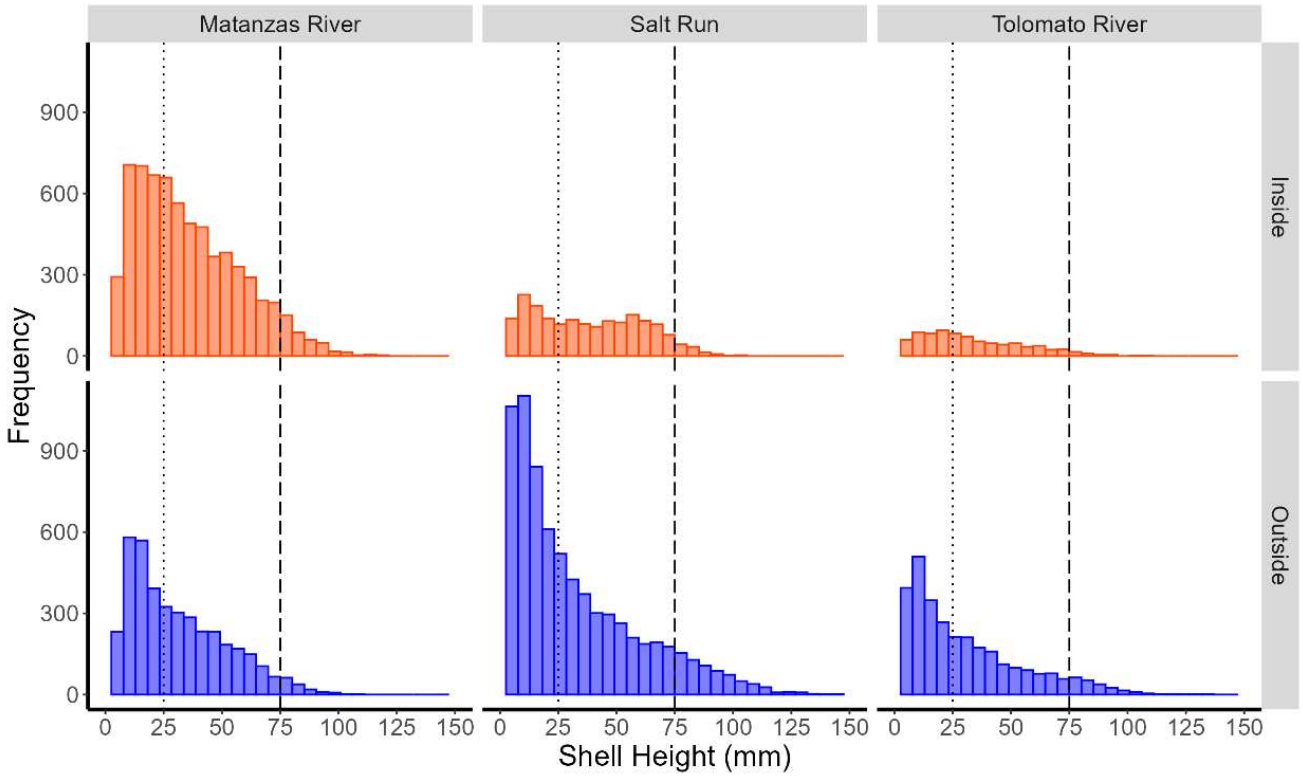

Study Area
Harvest Area
Tolomato
Salt Run
Matanzas
0 2 4 8 km

RESULTS: OYSTER DENSITY



*GLM $p < 0.05$

RESULTS: SHELL HEIGHT



CONCLUSIONS

Results were region specific.

Region	Oyster Density	Oyster Clusters	Cultch Mass	Mussels	Barnacles
Matanzas	N.S.	N.S.	N.S.	Harvest > Control	N.S.
Salt Run	Harvest < Control	Harvest < Control	Harvest < Control	Harvest < Control	Harvest < Control
Tolomato	Harvest < Control	N.S.	-	N.S.	N.S.

CONCLUSIONS

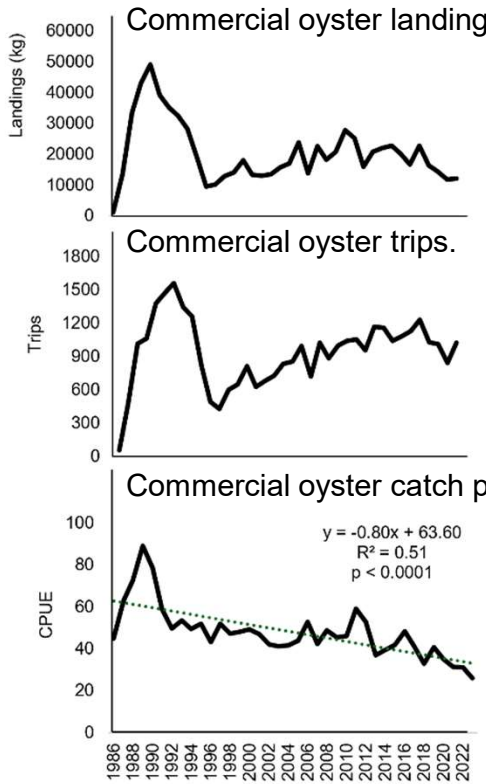
Tolomato and Matanzas results inconsistent:

- Area size diluting impact
- Proximity to Intracoastal Waterway
- More difficult access for harvest

CONCLUSIONS

In Salt Run:

- Low cultch and high harvest pressure could prevent oyster recruitment and impact long-term sustainability



Data from St. Johns County, Florida from 1986 to 2023 (http://myfwc.com/research/saltwater/fishstats/commercial-fisheries/landings-in-florida/).

CONCLUSIONS

In Salt Run:

- Reduced oyster and mussel abundances could alter filtration services.
- Reduced cluster abundance could diminish habitat quality.

Management options?

Water Filtration

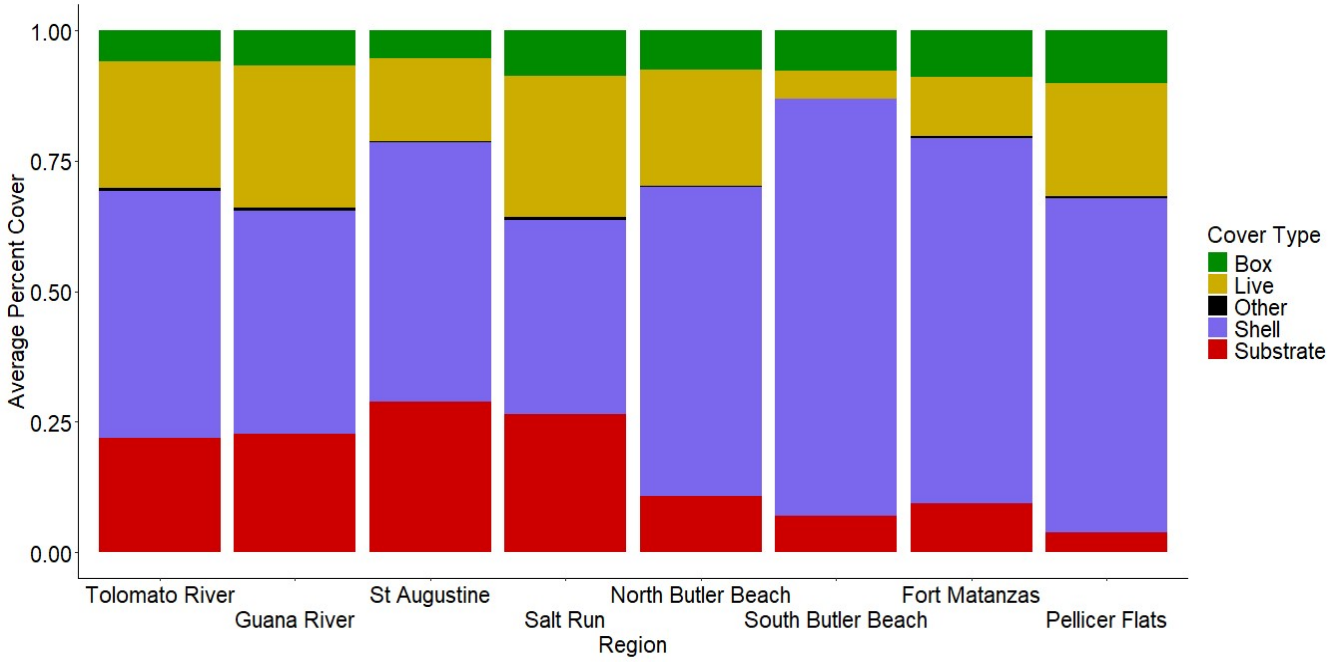
Habitat

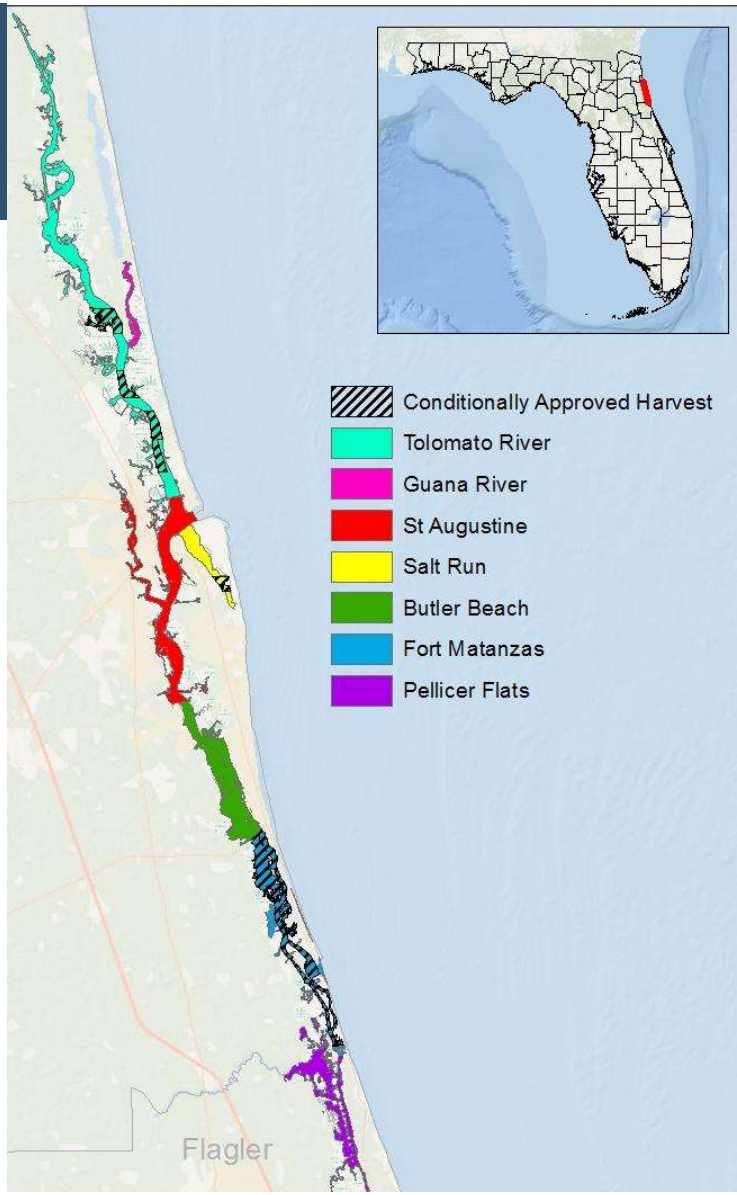
THANK YOU

Nikki Dix, Ph.D., Research Director
Guana Tolomato Matanzas National Estuarine Research Reserve
Florida Department of Environmental Protection
Office of Resilience and Coastal Protection

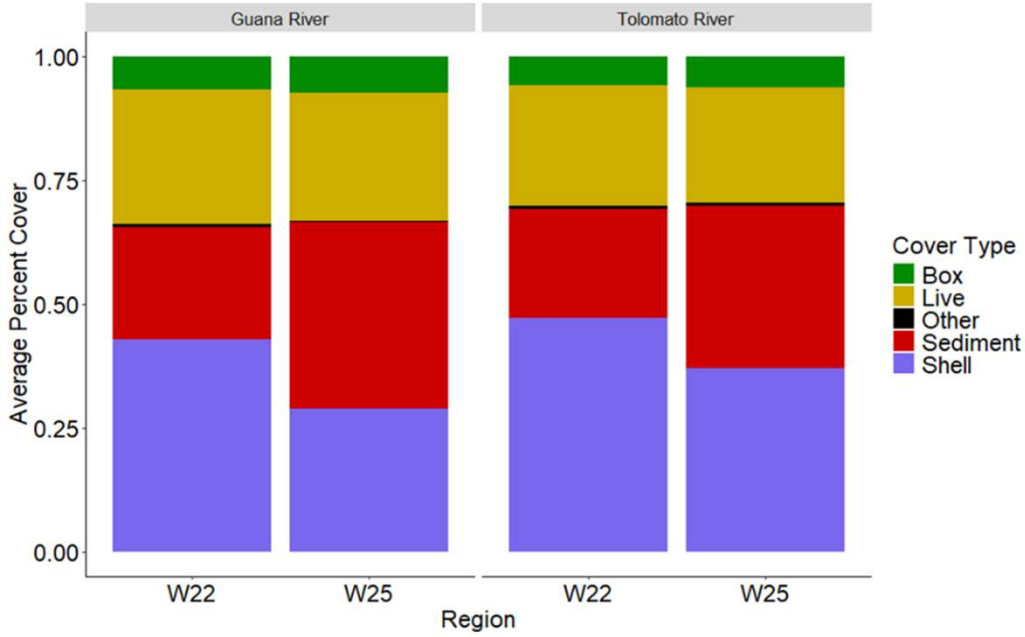
Contact Information:
Nikki.Dix@FloridaDEP.gov

PERCENT COVER

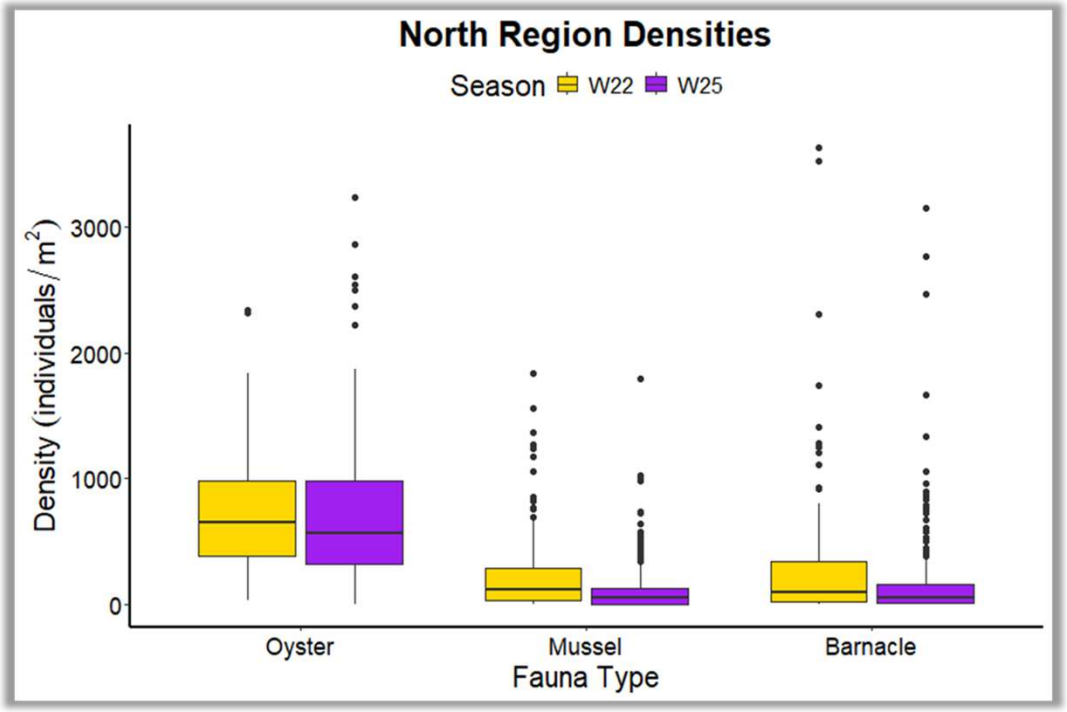




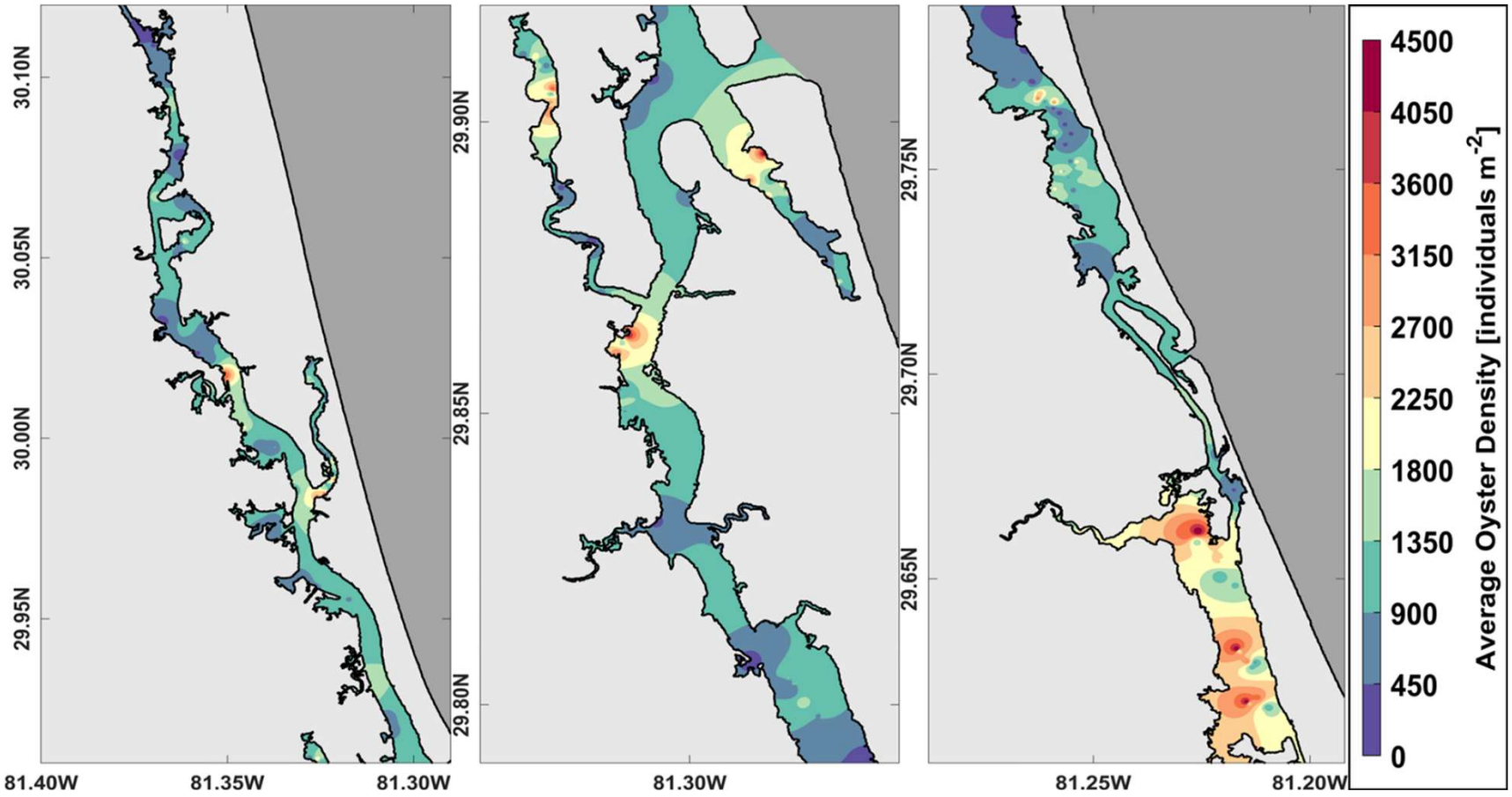
2022 VS. 2025 NORTH REGION



2022 VS. 2025 NORTH REGION

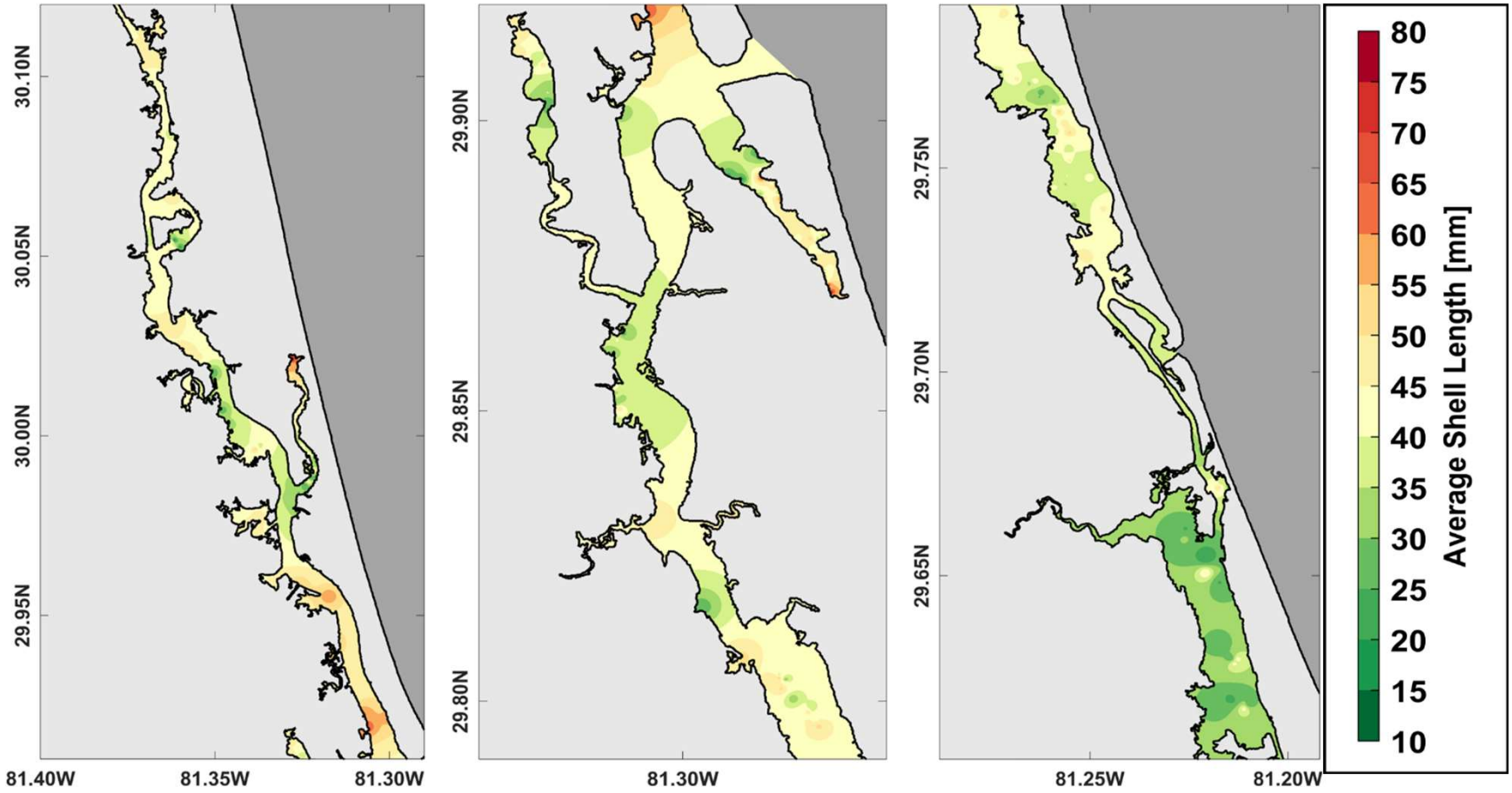


OYSTER DENSITY

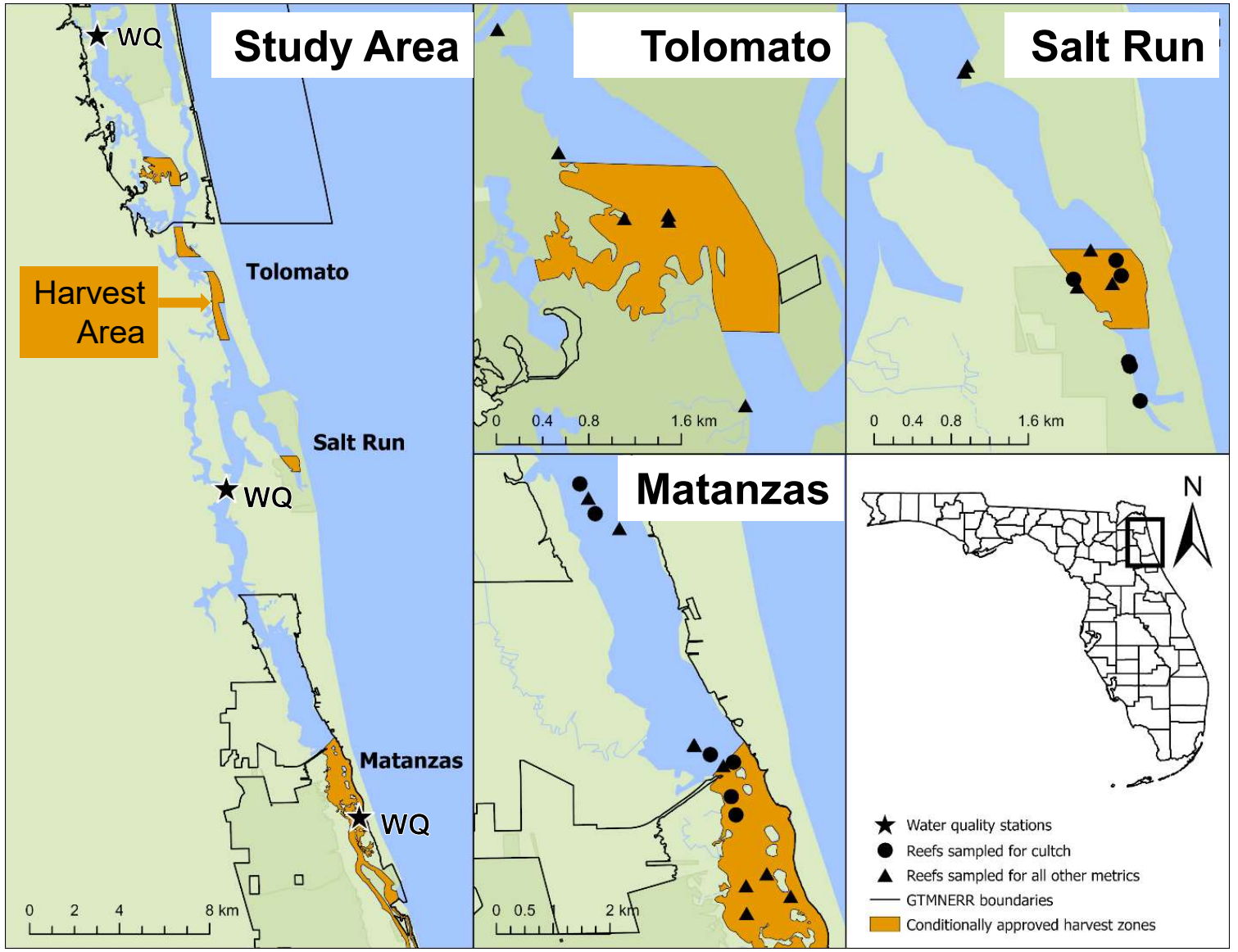


Maps created by Daniele Pinton, University of Florida.

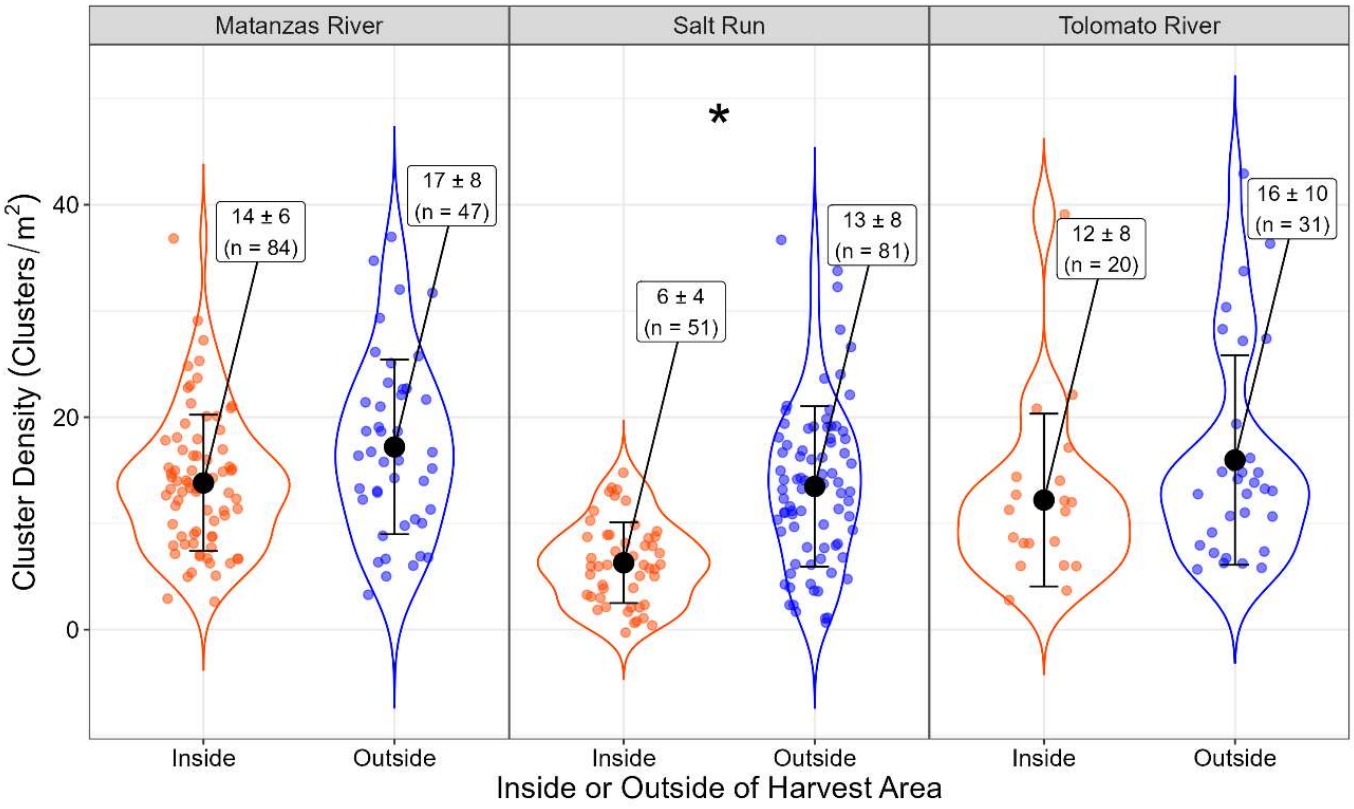
SHELL HEIGHT



Maps created by Daniele Pinton, University of Florida.

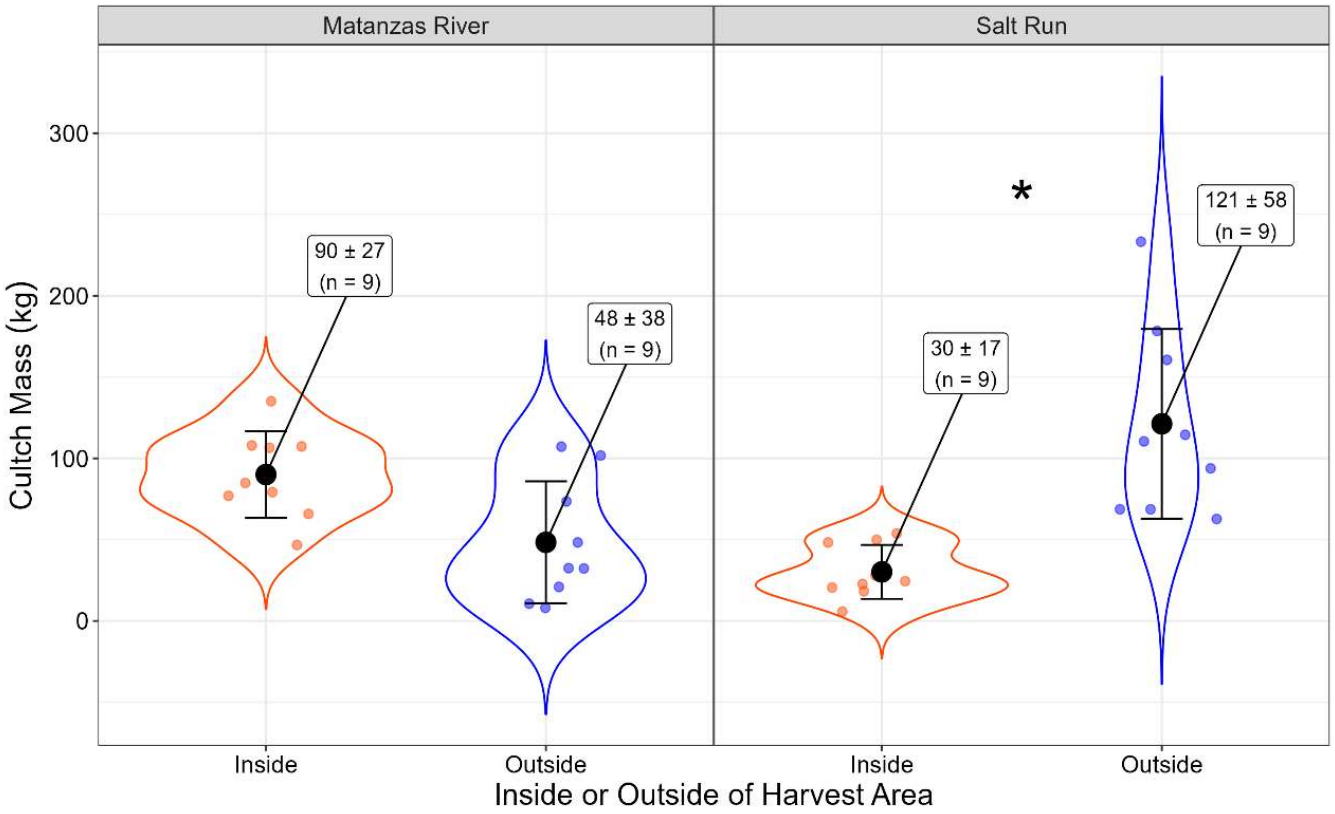

Study Area
Tolomato
Salt Run
Matanzas
WQ
WQ
WQ
Harvest Area
0 2 4 8 km
Tolomato
0 0.4 0.8 1.6 km
Salt Run
0 0.4 0.8 1.6 km
Matanzas
0 0.5 1 2 km
N
Water quality stations
Reefs sampled for cultch
Reefs sampled for all other metrics
GTMNERR boundaries
Conditionally approved harvest zones

RESULTS: CLUSTER DENSITY



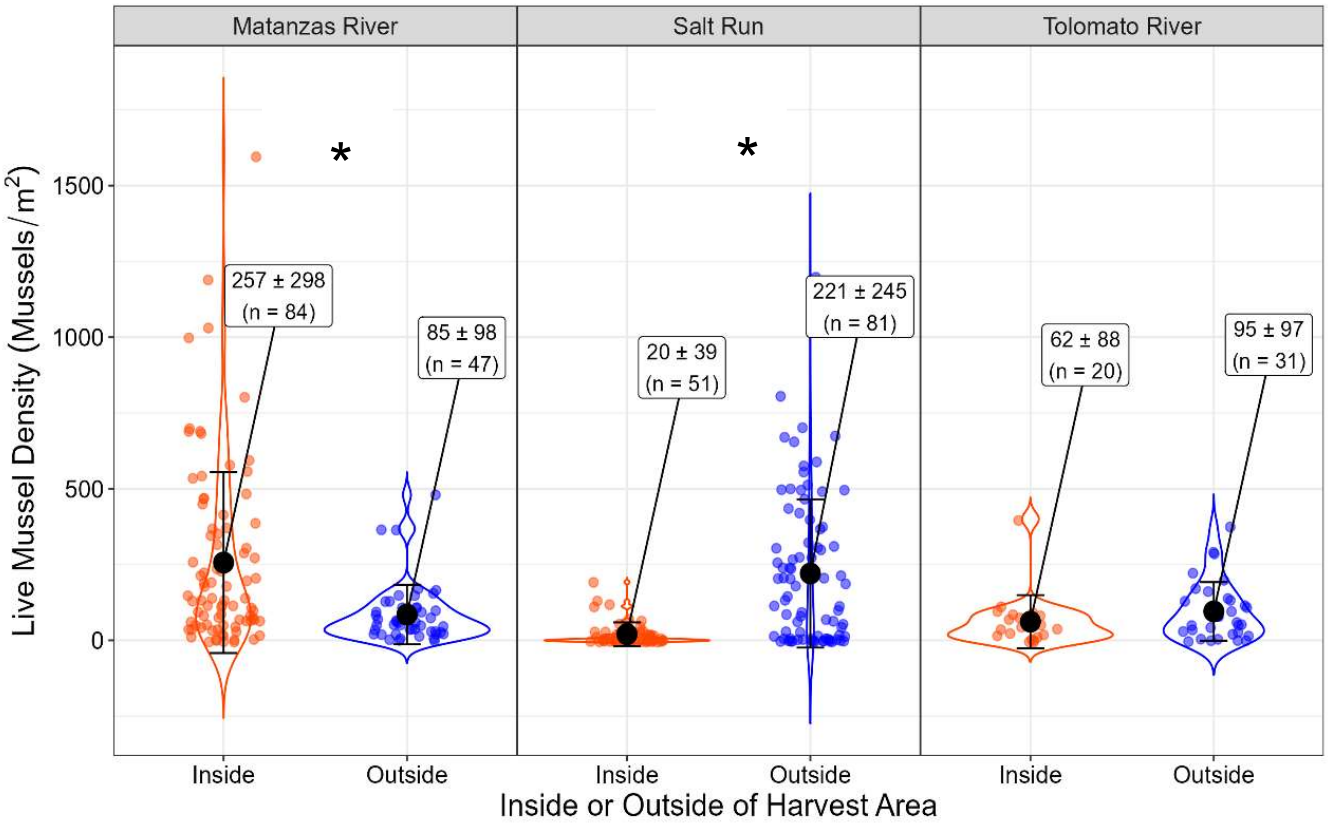
*GLM $p < 0.05$

RESULTS: CULTCH MASS



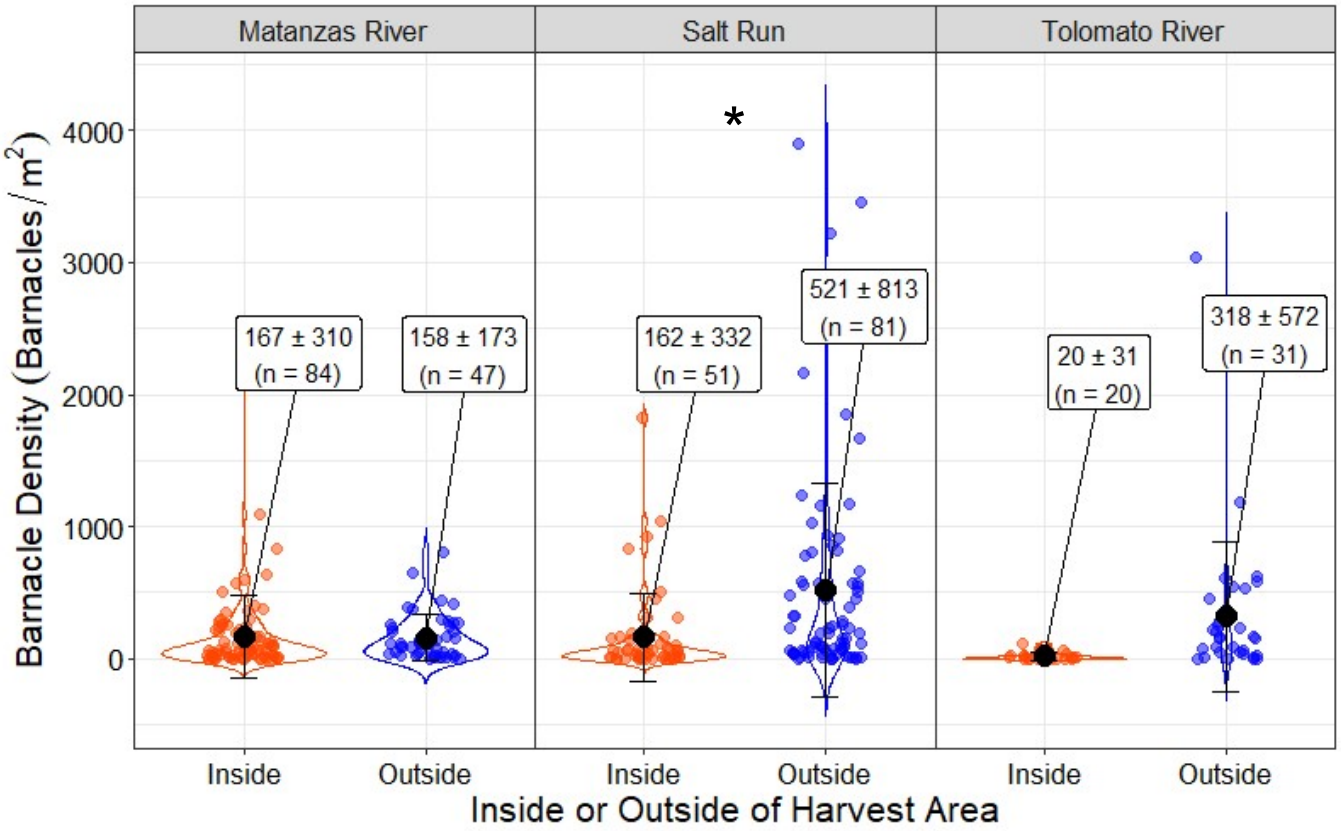
*GLM $p < 0.05$

RESULTS: MUSSELS



*GLM $p < 0.05$

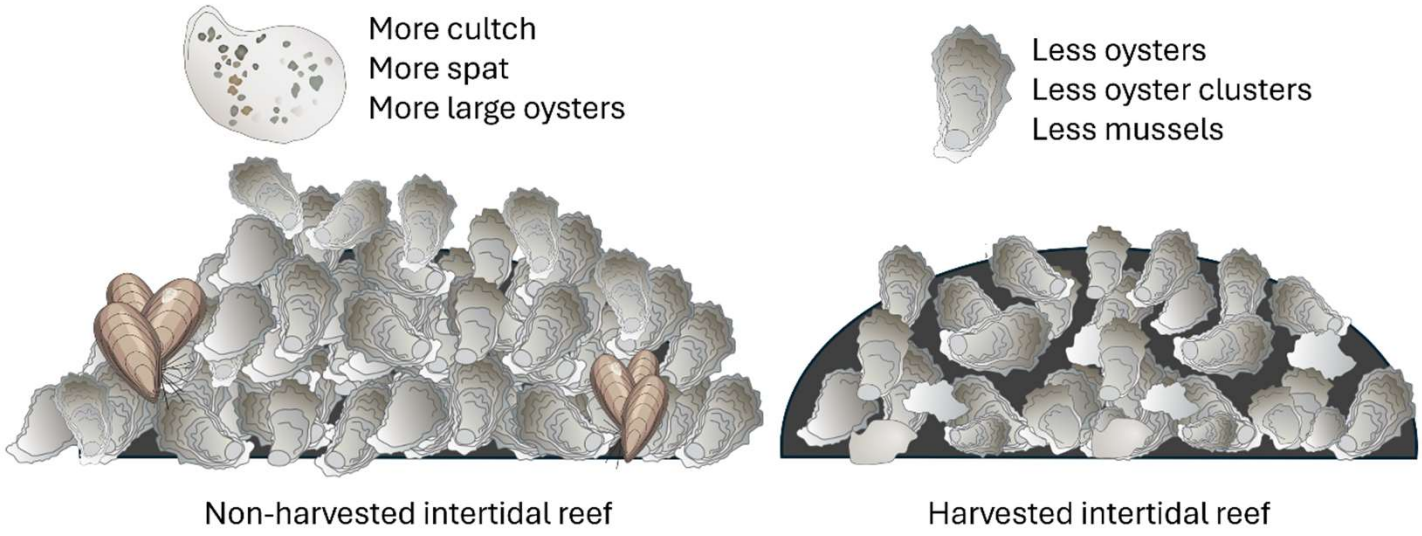
RESULTS: BARNACLES



*GLM $p < 0.05$

CONCLUSIONS

In Salt Run - consistent differences inside and outside of harvest zones

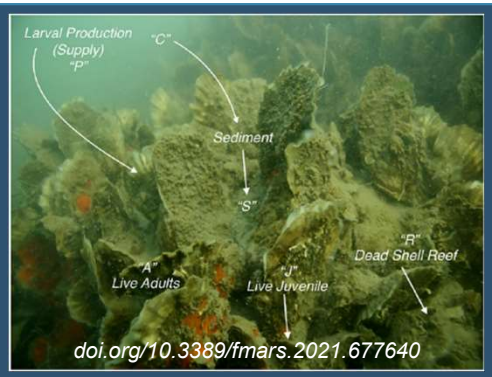


OYSTERS ARE ESTUARY HEROES

Food Source

Habitat

Water Filtration



Sediment Trapping

Shoreline Protection

Cultural Importance