Field Validation of Strategic Habitat Areas: Carteret – Brunswick Counties

DEPARTMENT OF ENVIRONMENTAL QUALITY

Marine Fisheries

N.C. Marine Fisheries Commission | Anne Deaton | February 22, 2024

Acknowledgements

- Casey Knight – lead staff for the sampling program
- Charlie Deaton – data analysis
- Numerous temporary field technicians
- Yan Li – multi-metric analysis
- DMF staff that worked on SHA identification
- Strategic Habitat Area Advisory Committees
- Coastal Recreational Fishing License Grant Fund

"Teamwork makes the dream work!"

Strategic Habitat Areas - Background

Coastal Habitat Protection Plan

Goal 2. Identify, designate, and protect strategic habitat areas

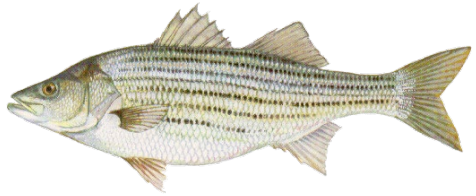
Definition:

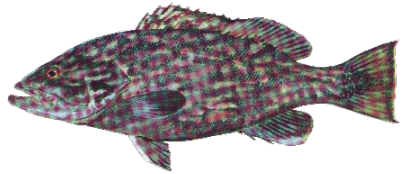
"Specific locations of individual fish habitats or systems of fish habitats that have been identified to provide exceptional habitat functions or that are particularly at risk due to imminent threats, vulnerability, or rarity."

Criteria:

- High ecological function
- Relatively unaltered
- Habitat landscape connections
- Lack protection

Strategic Habitat Area Identification Process



Priority Fisheries in Region

Habitat Condition (alteration)

Habitats (targets)

Landscape Connectivity

Strategic Habitat Areas

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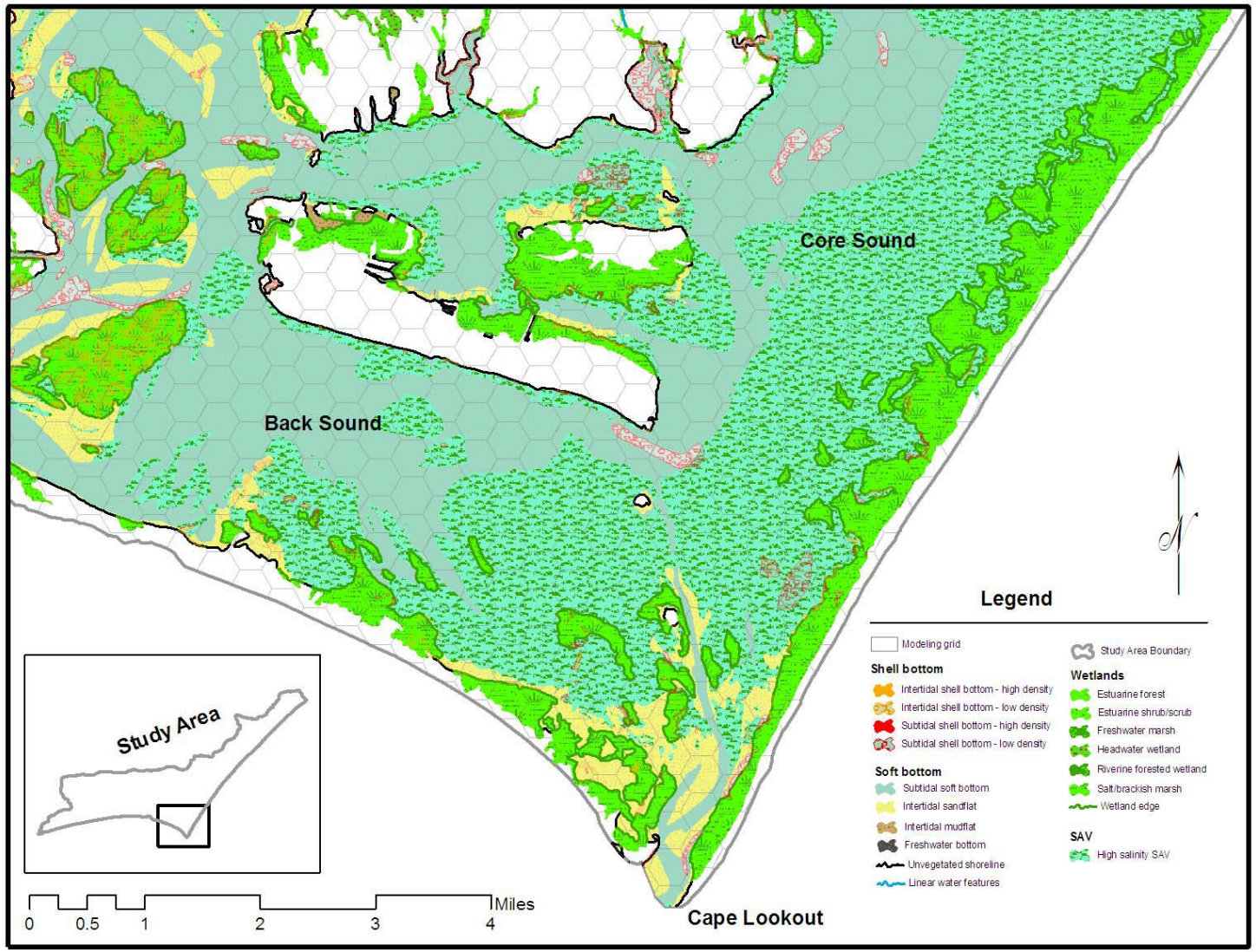
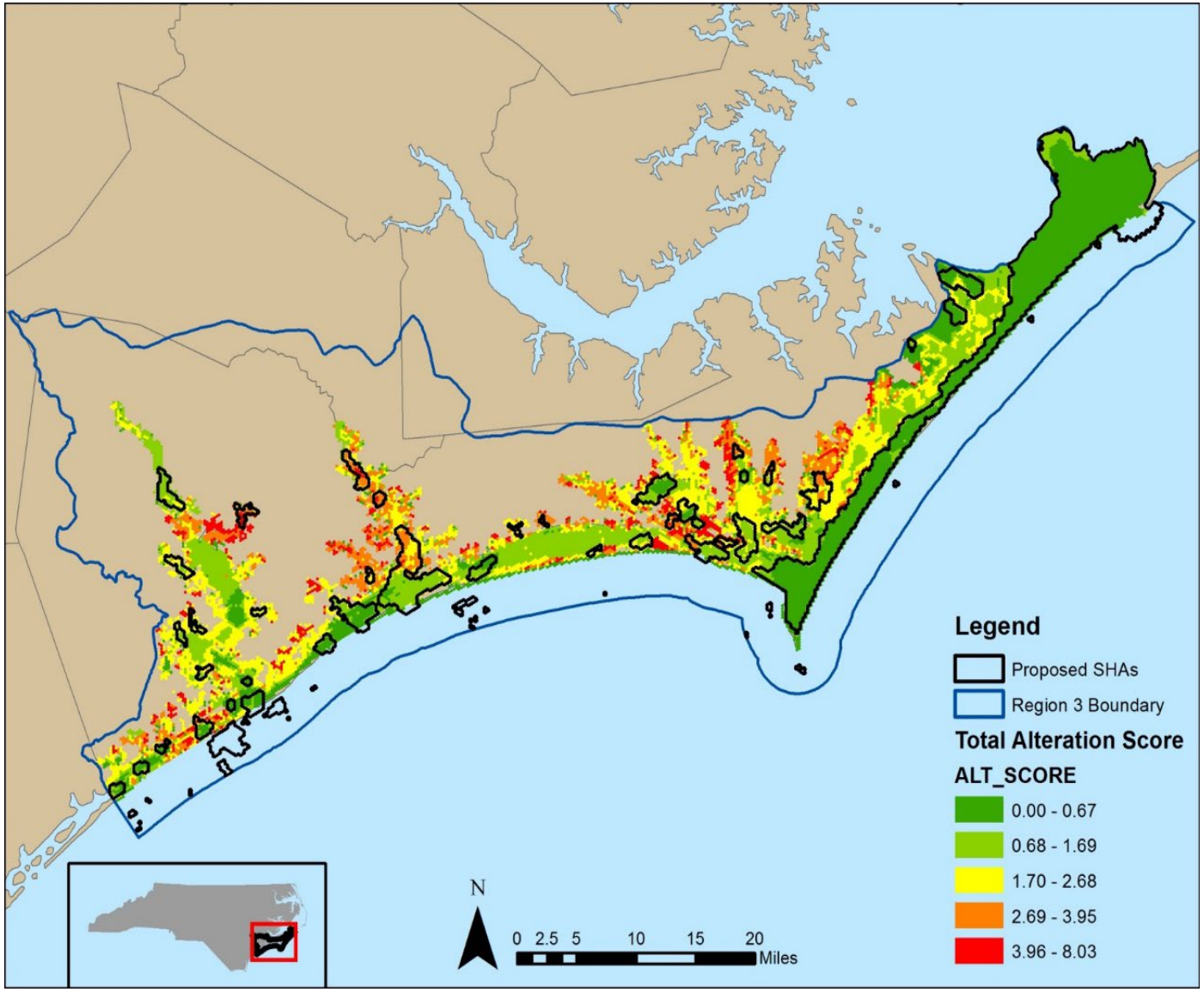
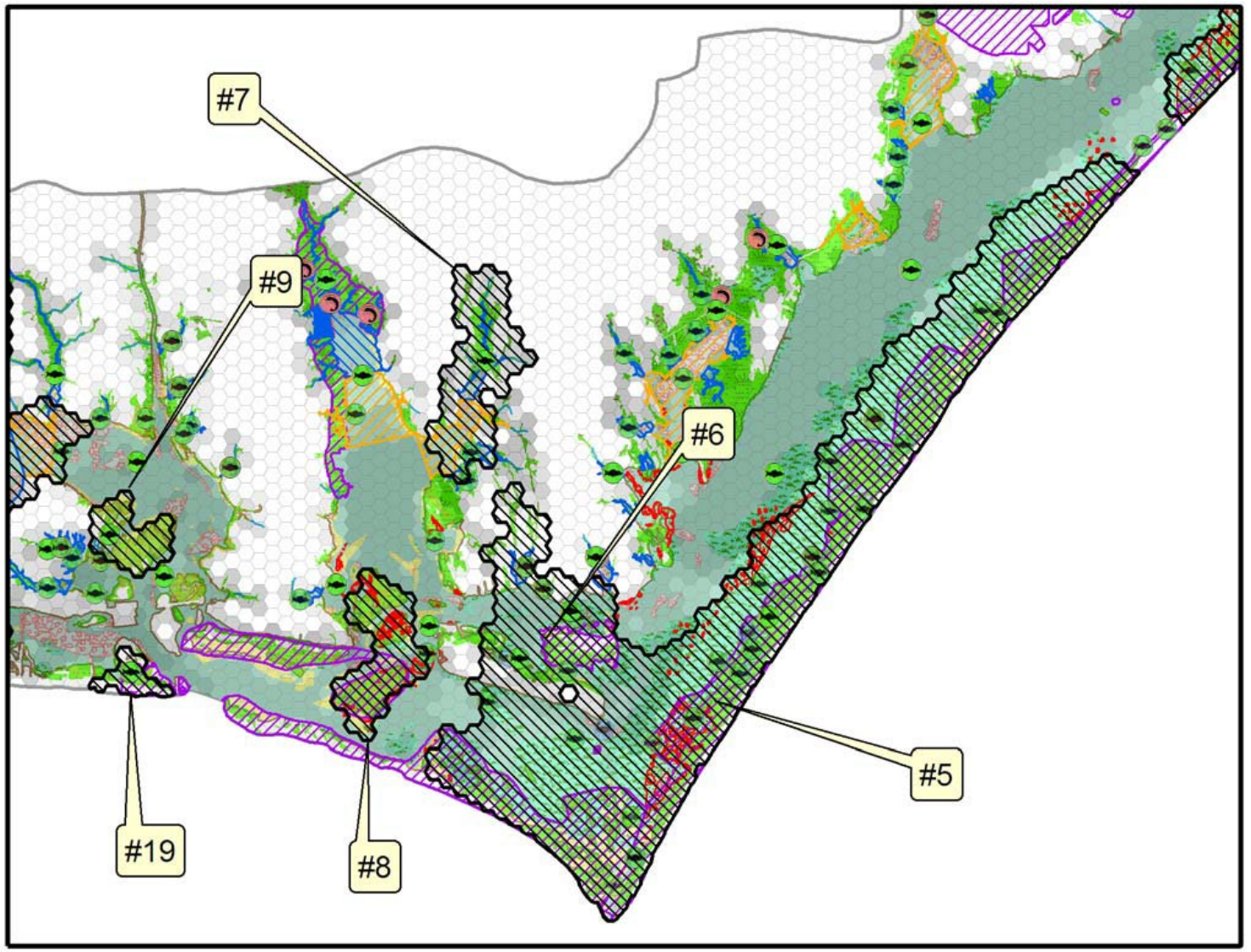
Strategic Habitat Area Identification Process – Habitat Selection



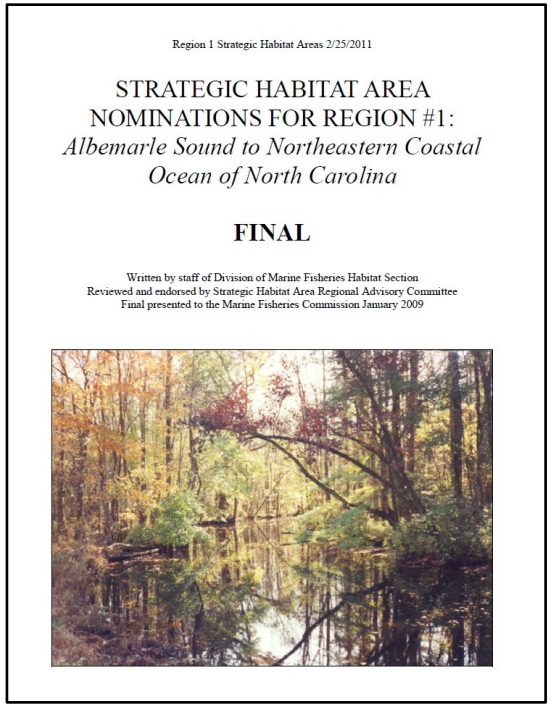
Strategic Habitat Area Identification Process - Alteration Layer



Strategic Habitat Area Identification Process - Polygons



SHA Nominations Approved by the MFC

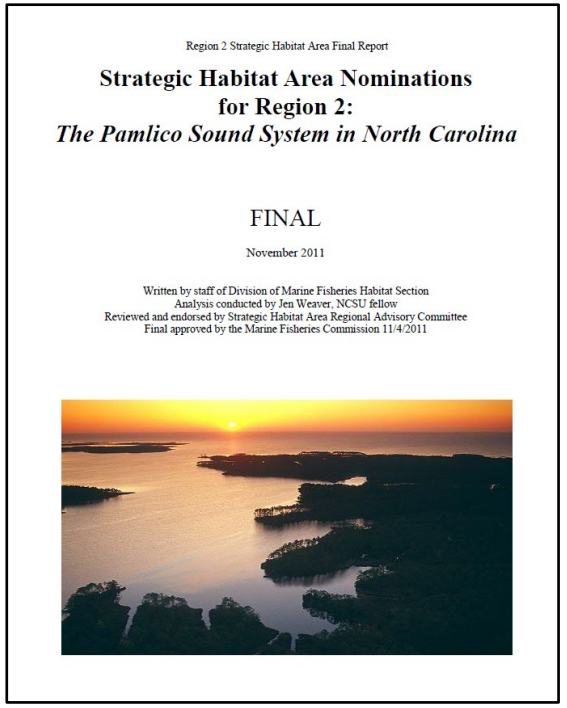

Region 1 Strategic Habitat Areas 2/25/2011

STRATEGIC HABITAT AREA NOMINATIONS FOR REGION #1:
Albemarle Sound to Northeastern Coastal Ocean of North Carolina

FINAL

Written by staff of Division of Marine Fisheries Habitat Section
Reviewed and endorsed by Strategic Habitat Area Regional Advisory Committee
Final presented to the Marine Fisheries Commission January 2009

2009
20 units
452,610 acres


Region 2 Strategic Habitat Area Final Report

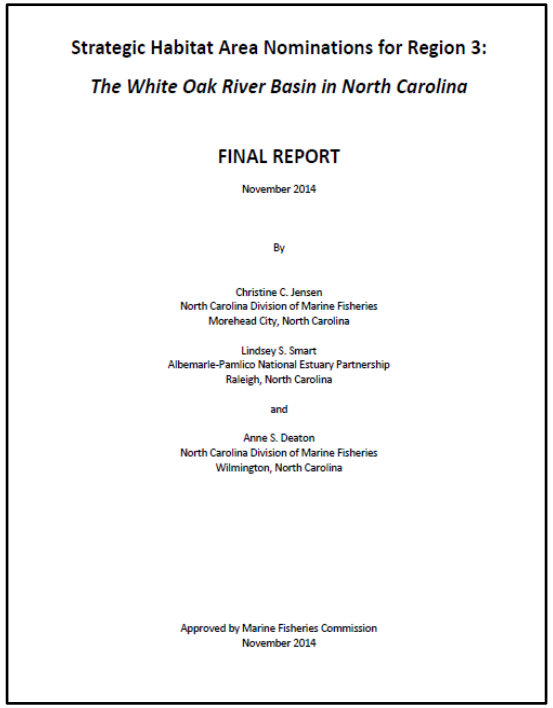
Strategic Habitat Area Nominations for Region 2:
The Pamlico Sound System in North Carolina

FINAL

November 2011

Written by staff of Division of Marine Fisheries Habitat Section
Analysis conducted by Jen Weaver, NCSU fellow
Reviewed and endorsed by Strategic Habitat Area Regional Advisory Committee
Final approved by the Marine Fisheries Commission 11/4/2011

2011
67 units
322,843 acres


Strategic Habitat Area Nominations for Region 3:

The White Oak River Basin in North Carolina

FINAL REPORT

November 2014

By

Christine C. Jensen
North Carolina Division of Marine Fisheries
Morehead City, North Carolina

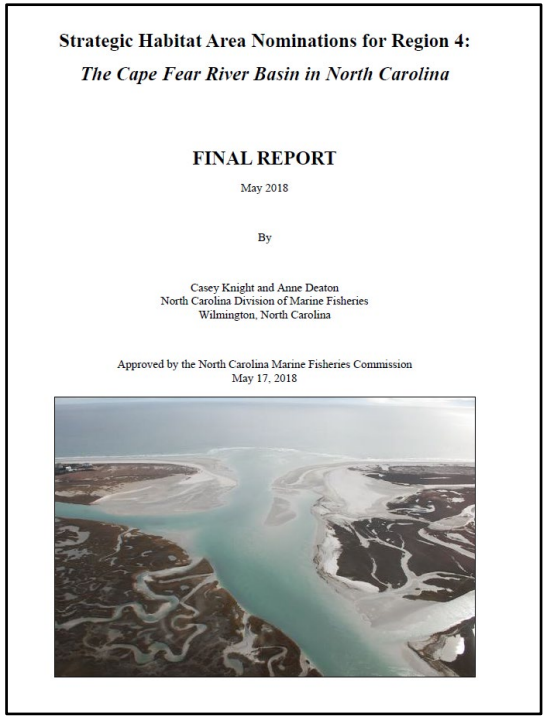
Lindsey S. Smart
Albemarle-Pamlico National Estuary Partnership
Raleigh, North Carolina

and

Anne S. Deaton
North Carolina Division of Marine Fisheries
Wilmington, North Carolina

Approved by Marine Fisheries Commission
November 2014

2014
48 units
134,763 acres


Strategic Habitat Area Nominations for Region 4:

The Cape Fear River Basin in North Carolina

FINAL REPORT

May 2018

By

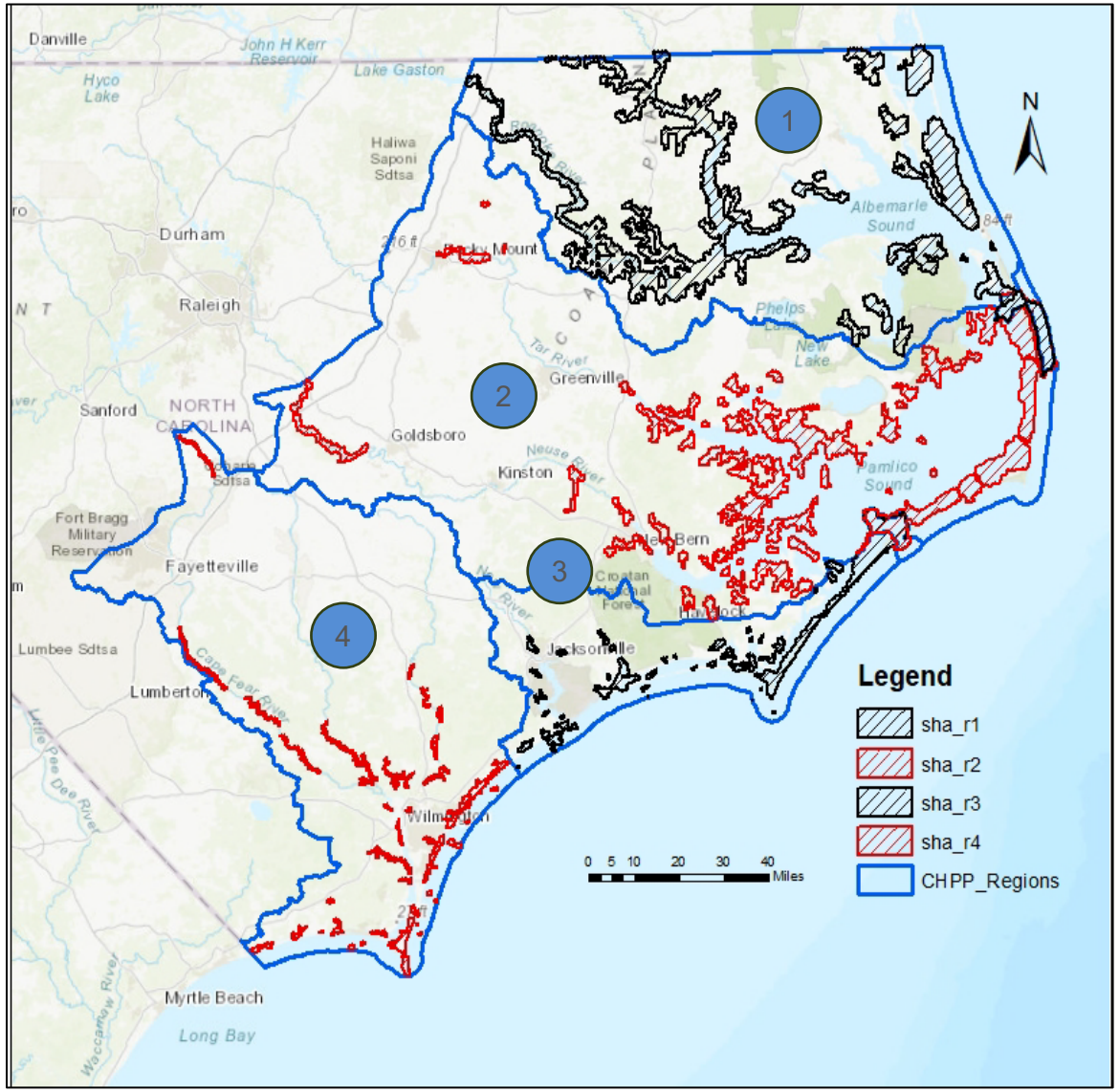
Casey Knight and Anne Deaton
North Carolina Division of Marine Fisheries
Wilmington, North Carolina

Approved by the North Carolina Marine Fisheries Commission
May 17, 2018

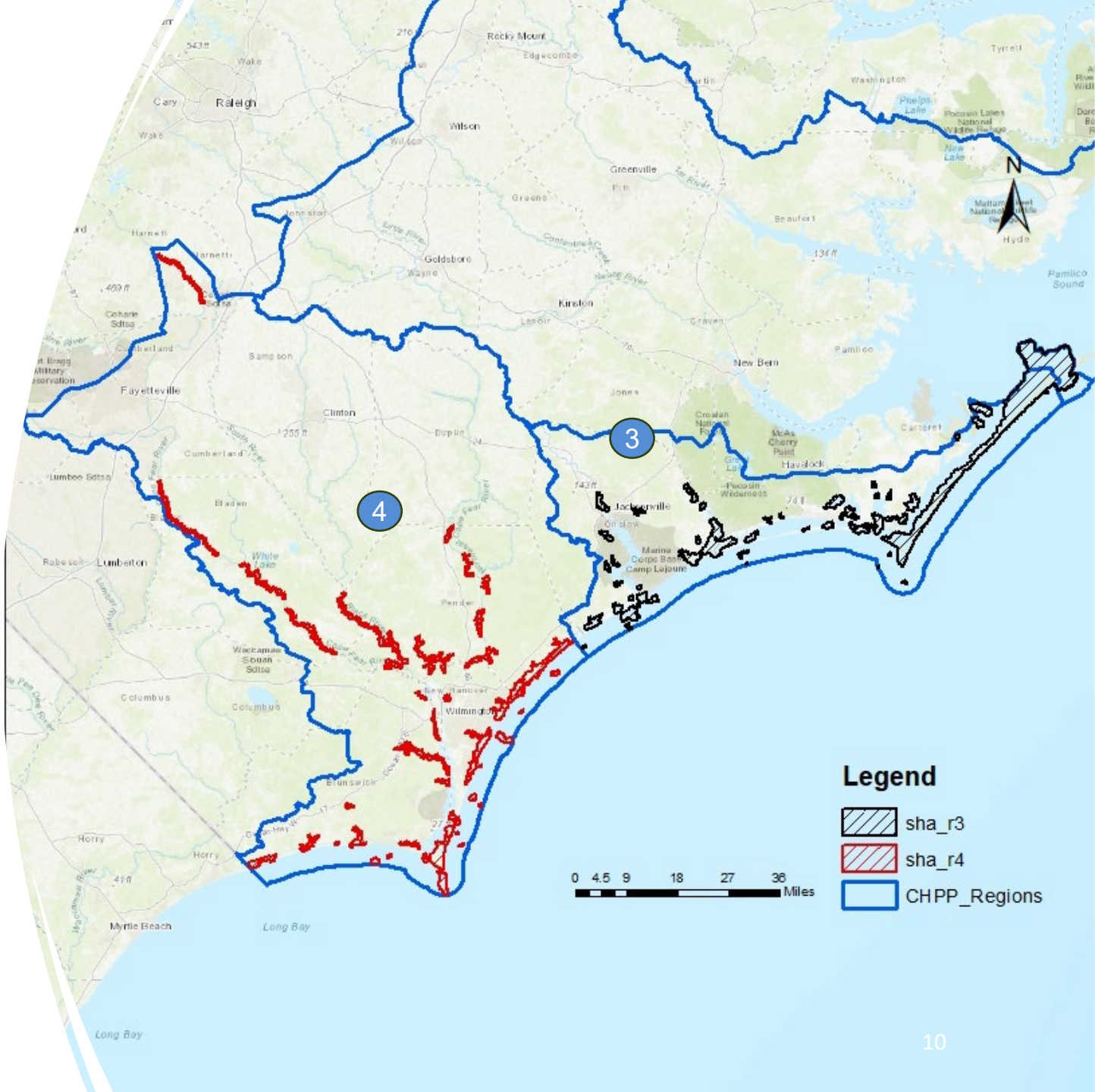
2018
43 units
74,451 acres

Strategic Habitat Area Nominations

Regions 1 - 4



Strategic Habitat Area Nominations Regions 3 - 4

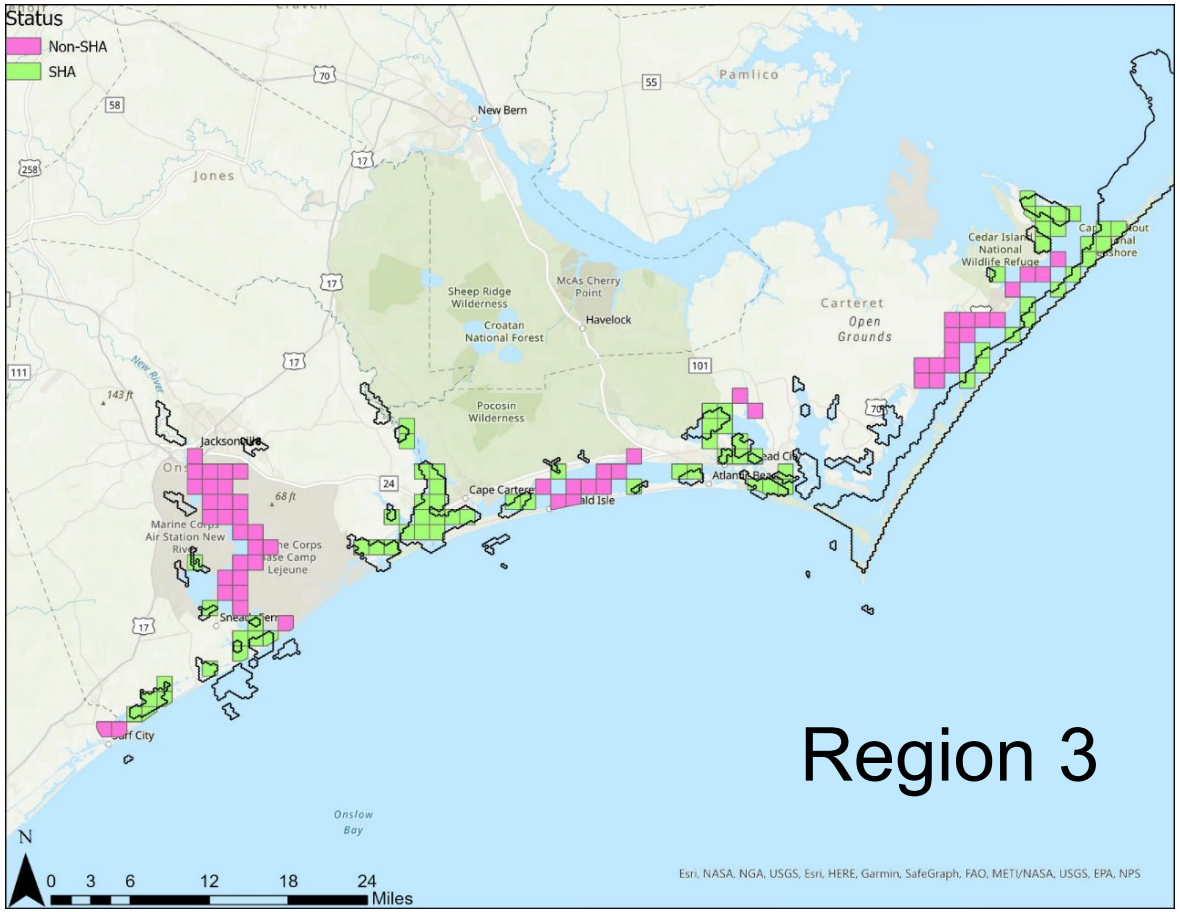


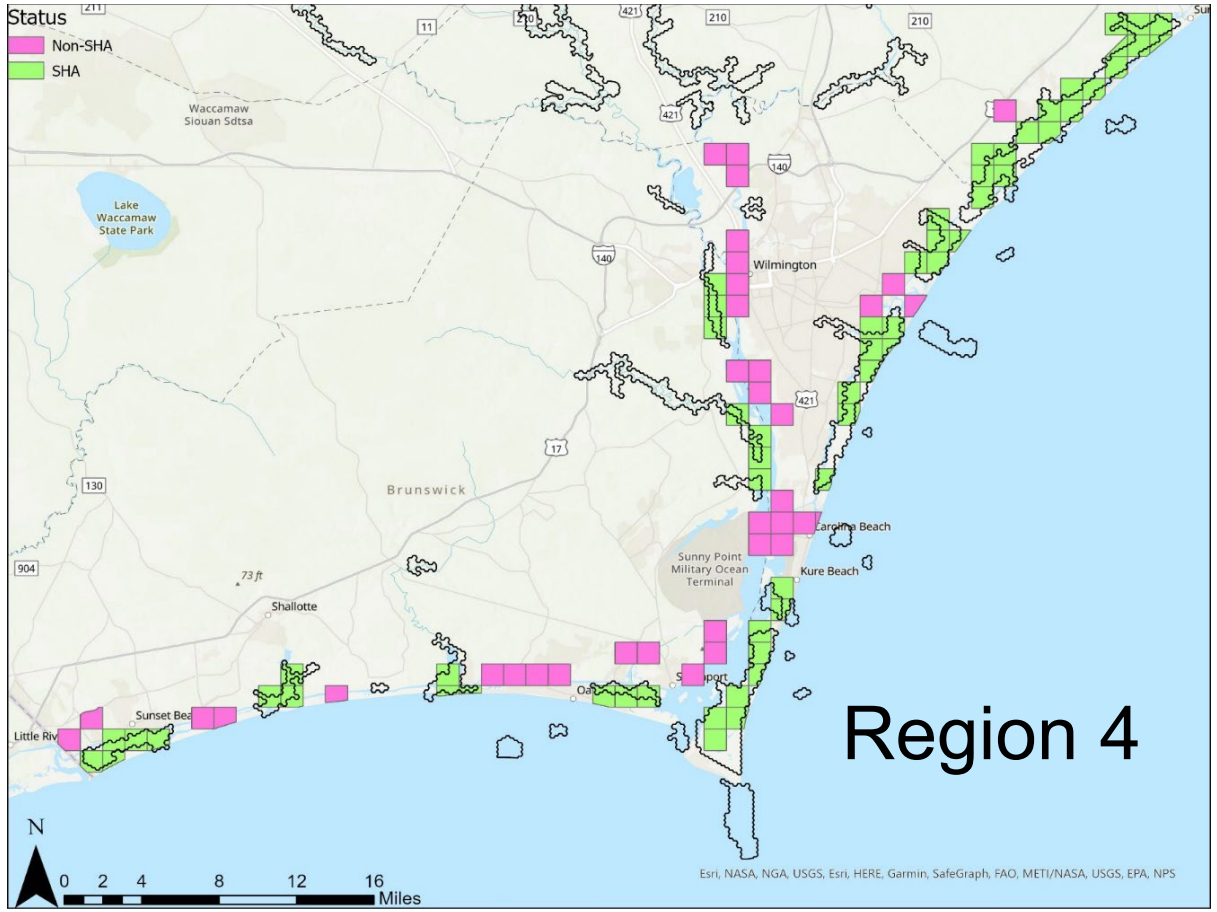
Study Objectives

1) Conduct field sampling of target species in/near different habitats inside and outside of SHAs to verify habitat condition and biological productivity
2) Develop indicator metrics for validating SHAs
3) Produce monitoring protocol and potentially modifying SHAs in the future based on indicator performance



Sampling Grids





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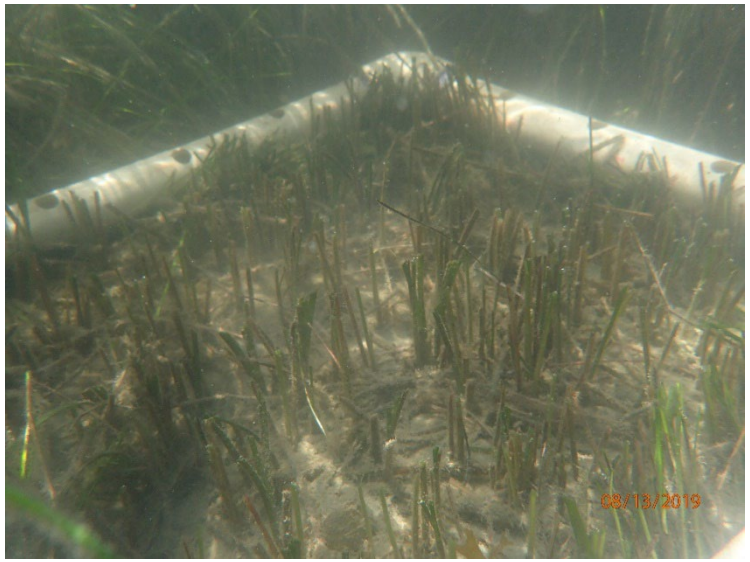
Sample Design and Methodology

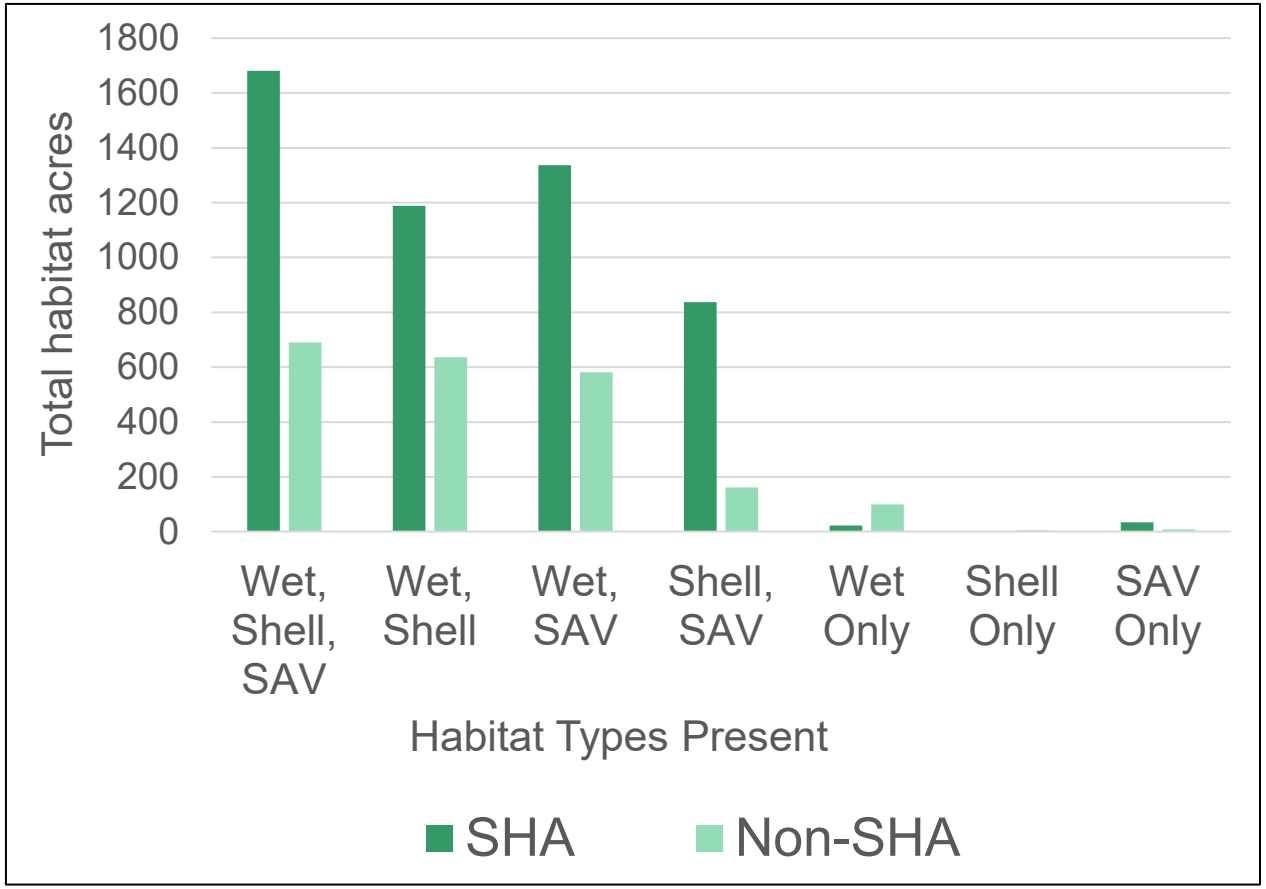
- Trawls – Juvenile Trawl Survey protocol (DMF Program 120)
- Gill nets – Fisheries Independent Gill Net Survey protocol (DMF Program 915)
- Breder traps – Four traps set in each habitat

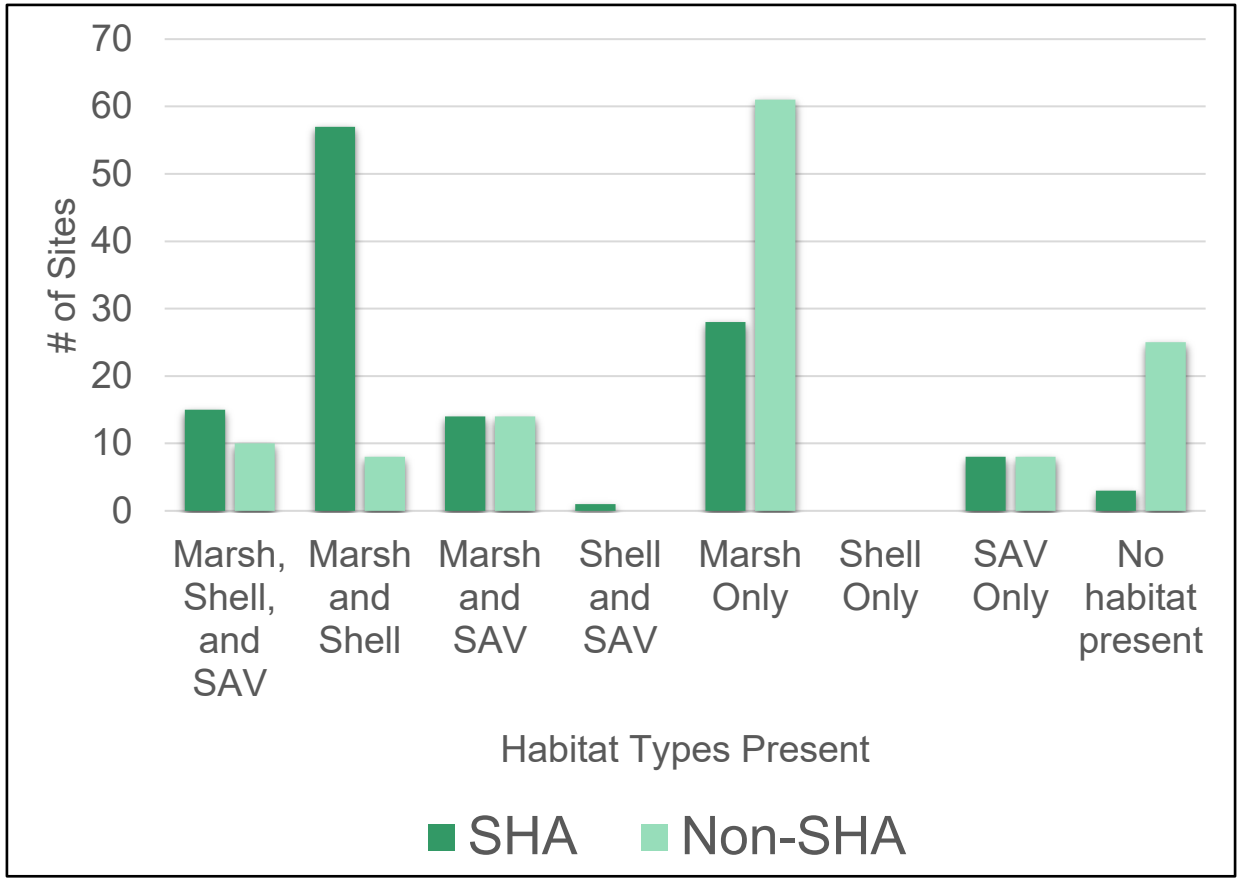
Habitat Metrics – Wetlands, Oyster Reef, SAV

Habitat type (fringe or isolated)	Plant height (wetlands, SAV)
Connectivity to other habitats	Shoot density (SAV)
Species present	Live shellfish abundance
Percent cover	Size frequency (live shellfish)
Visible erosion	Shoreline alterations



Results – Region 3
Structured Habitat in SHAs and Non-SHAs





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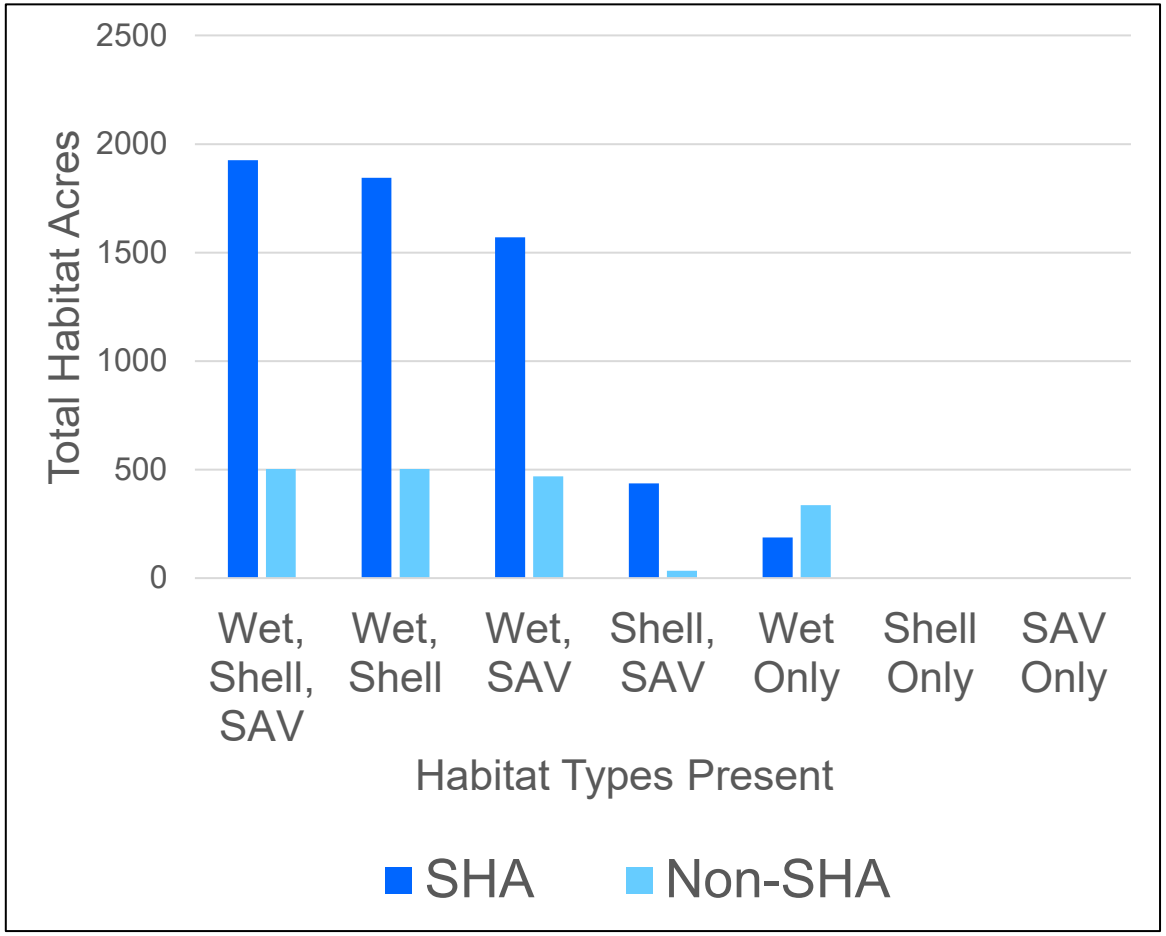
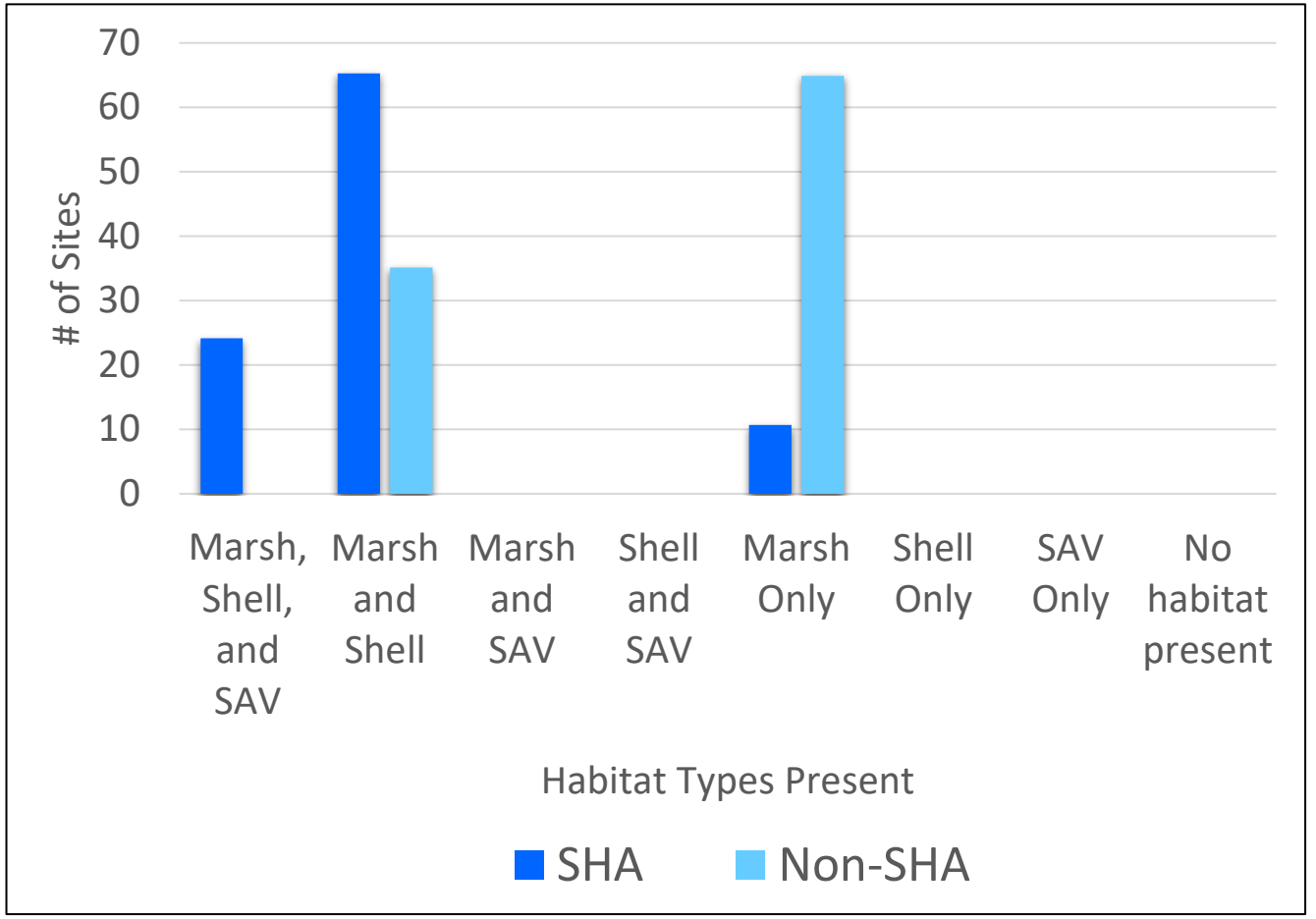
Results – Region 4
Structured Habitat in SHAs and Non-SHAs





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Results – Shoreline Alterations

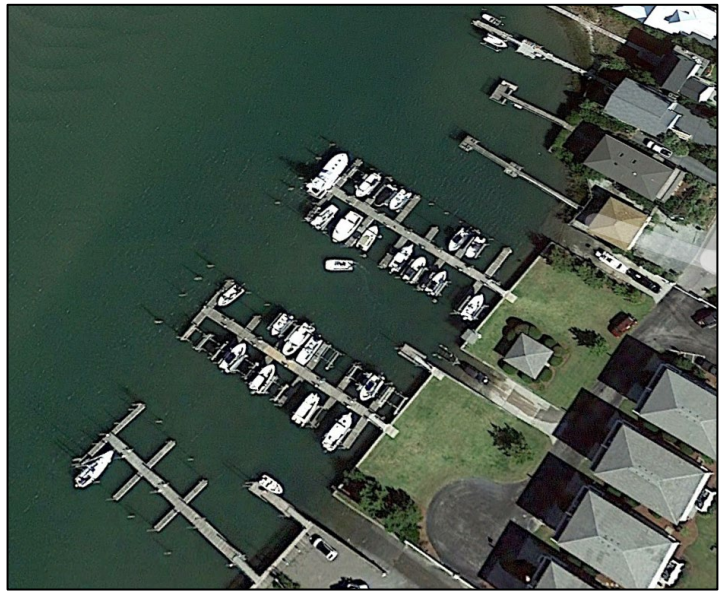
Extent of eroded edge

R3 and R4 – Non-SHAs had more sites with moderate to extensive eroded edge

Extent of shoreline hardening

R3 – Non-SHAs had more sites with >50%hardened

R4 – Non-SHAs had more sites with 26-100% hardened



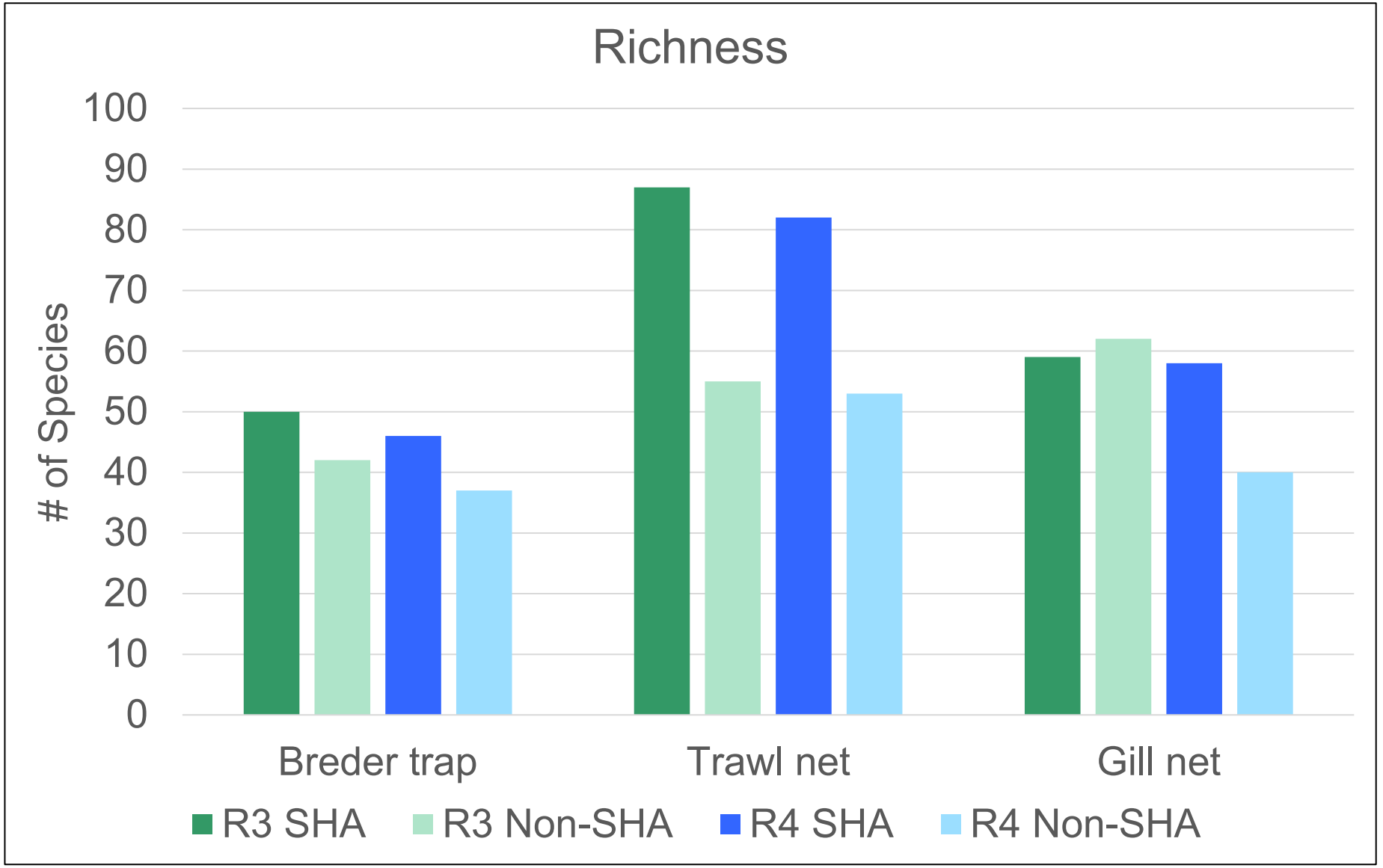
Extent of docking structures

R3 and R4 –SHAs slightly more docking structures than Non-SHAs

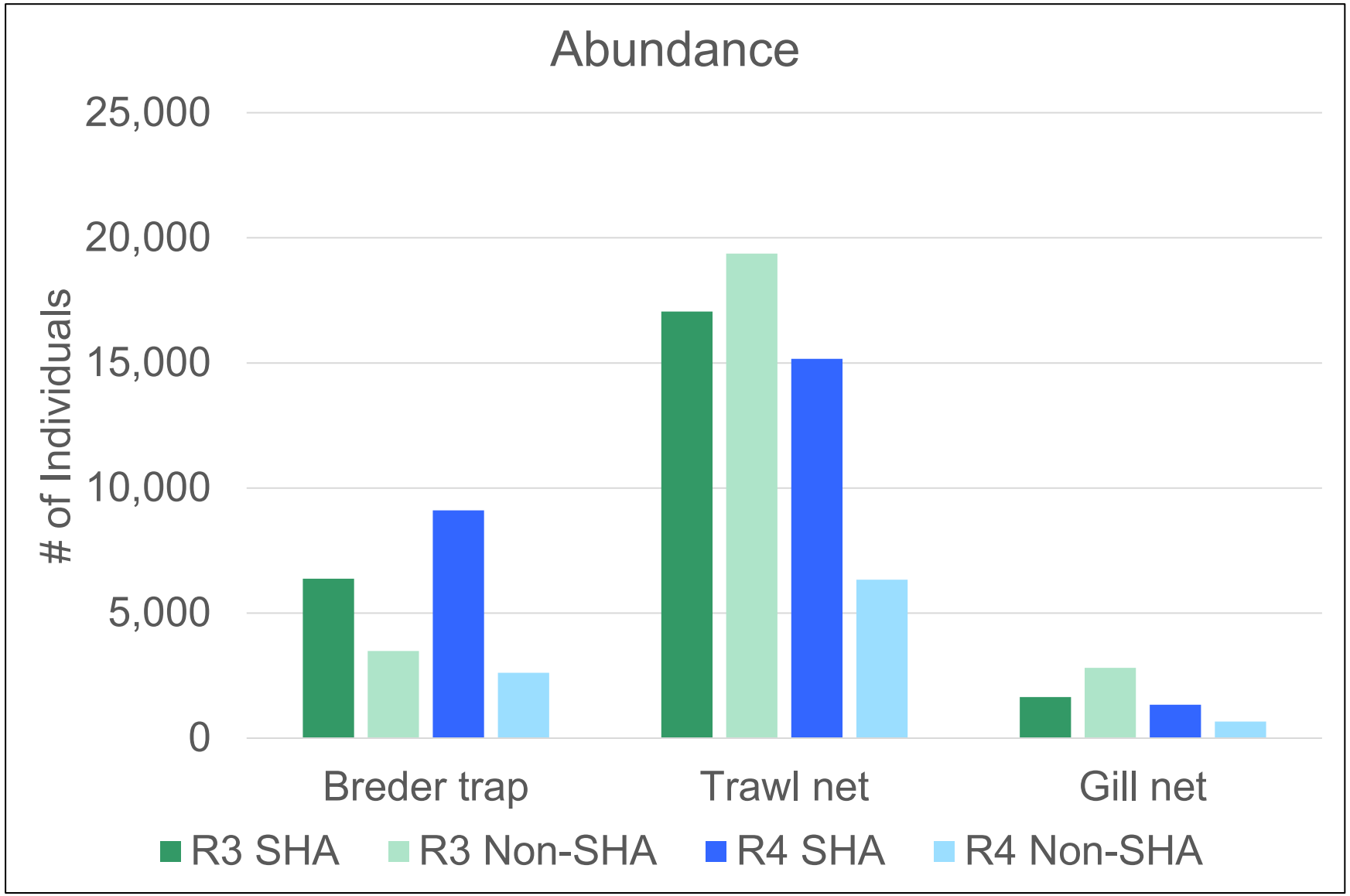
Results – Species Collected by Gear

Breder trap → Trawl → Gill net

Results - Species Richness by Gear



Results - Species Abundance by Gear



Results - Community Diversity Indices by Gear

		Region 3		Region 4	
Diversity Index	Expected Response	SHA	Non-SHA	SHA	Non-SHA
Richness	⬇	130	108	126	84
Evenness	⬇	0.57	0.56	0.56	0.68
Total MSC[1]	⬇	161.49	147.61	190.86	71.14
Hill-Shannon Diversity	⬇	16.27	13.82	15.21	20.12
Simpson Dominance	⬆	0.12	0.13	0.13	0.08

[1] MSC = Mean Standardized Catch, added across all gears

Results – Species and Habitat Indicators

Ecological Indices

- Total abundance (mean standardized catch, CPUE)
- Richness
- Evenness
- Hill-Shannon Diversity
- Abundance of invertebrate feeding species
- Eroded edge

GIS Index

- Acreage/presence of structured habitat within a system
- Mean alteration score (an index of alterations)

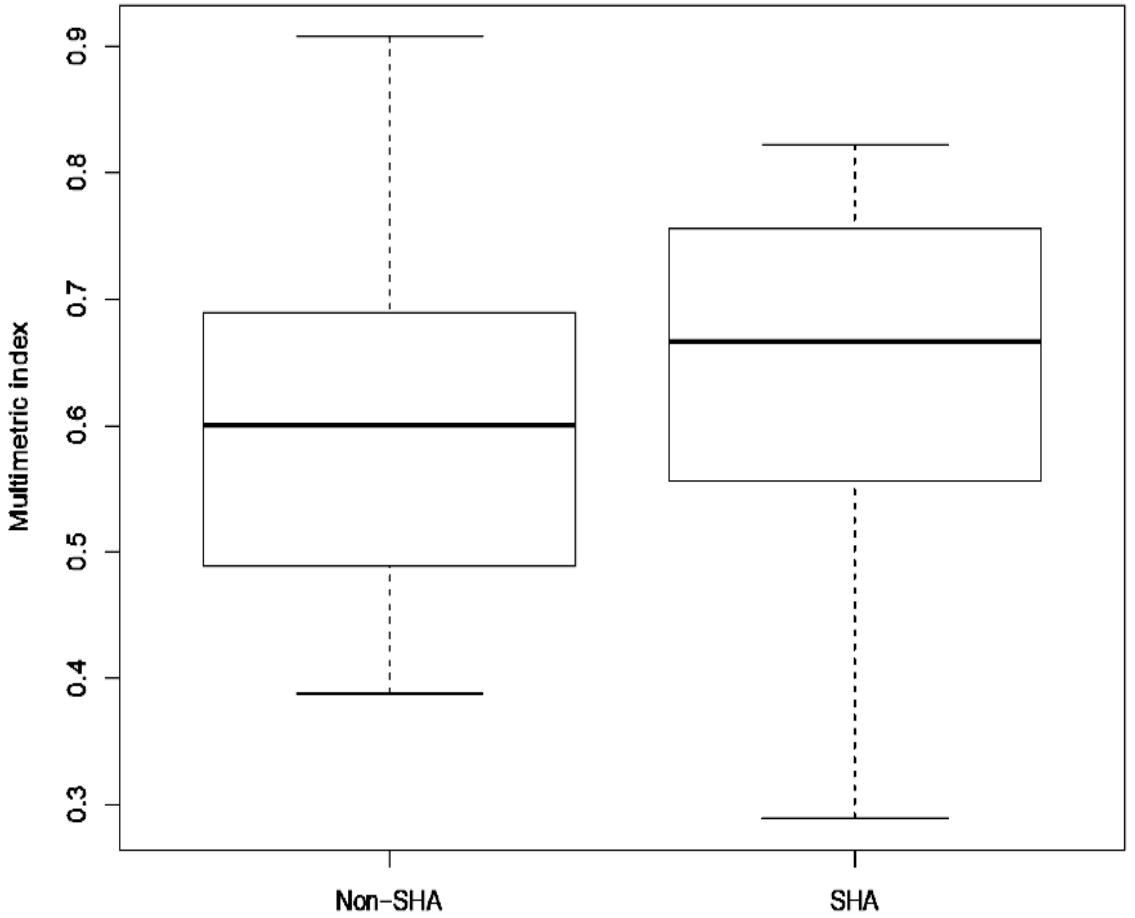
Multi-metric Index

- Combination of fish and habitat metrics

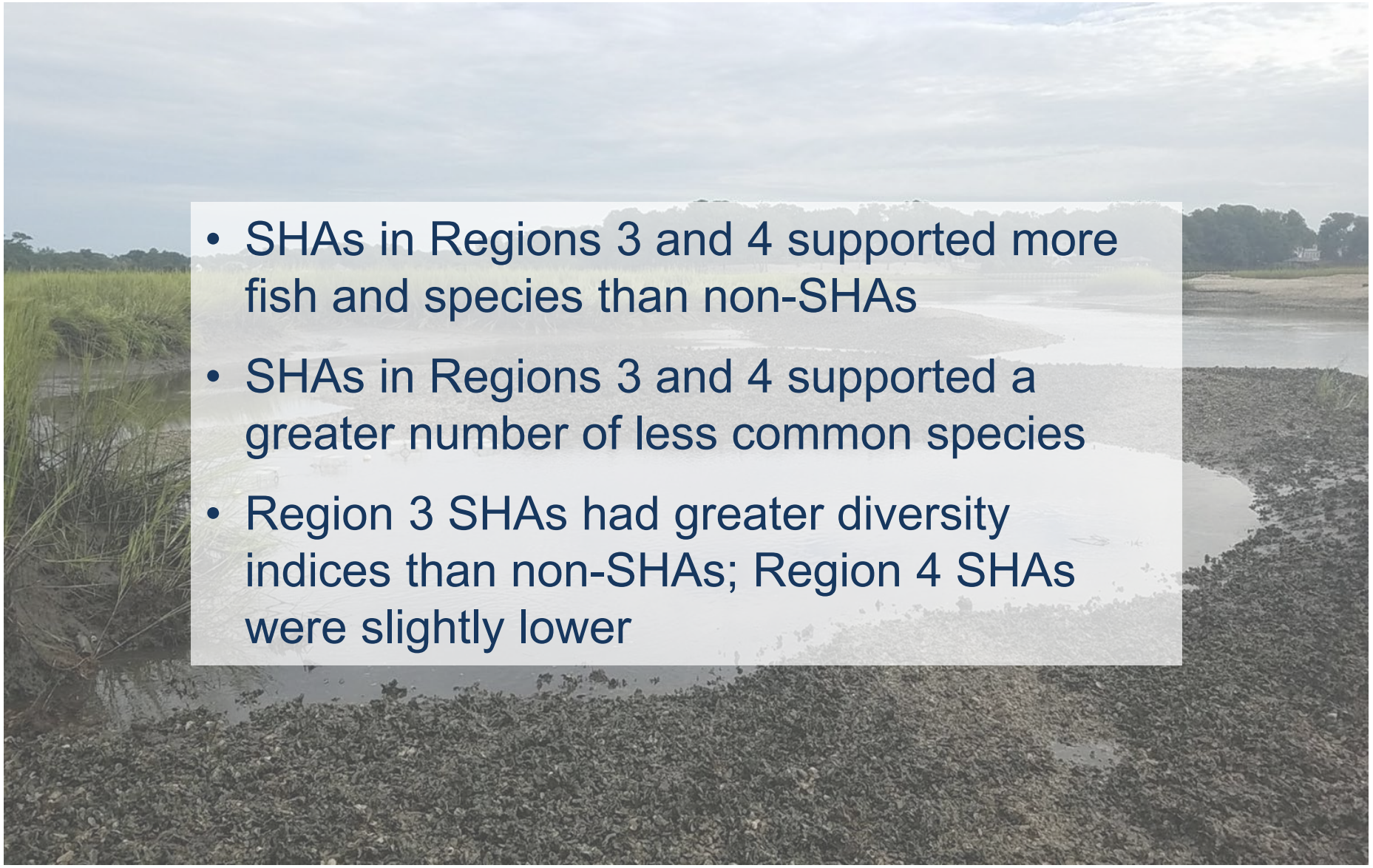
Results - Multi-metric Index, Region 3

Selected Candidate Metric	Response
Habitat Conditions	
Presence of shoreline boating features (marinas, boat ramps, docks)	↑
Presence of riprap or sill structure parallel to shore	↑
Presence of bulkheads	↑
Extent of hardened shoreline	↑
Extent of eroded edge	↑
Habitat Extent	
Presence of shell habitat	↓
Presence of marsh habitat	↓
Presence of submerged aquatic vegetation	↓
Feeding Guilds	
Abundance of invertebrate feeding species	↓

Results - Multi-metric Index

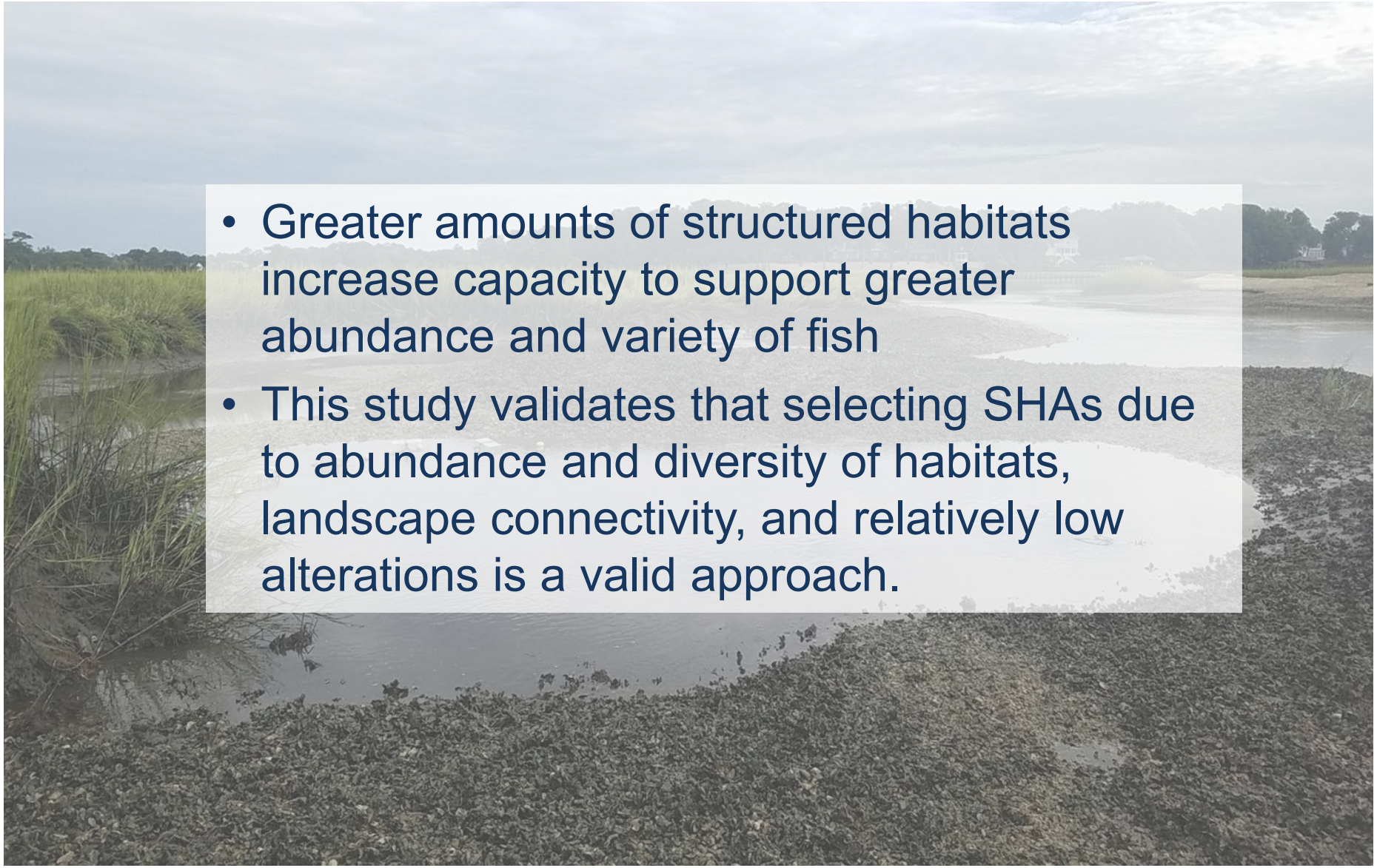


Conclusions



- SHAs in Regions 3 and 4 supported more fish and species than non-SHAs
- SHAs in Regions 3 and 4 supported a greater number of less common species
- Region 3 SHAs had greater diversity indices than non-SHAs; Region 4 SHAs were slightly lower

Conclusions

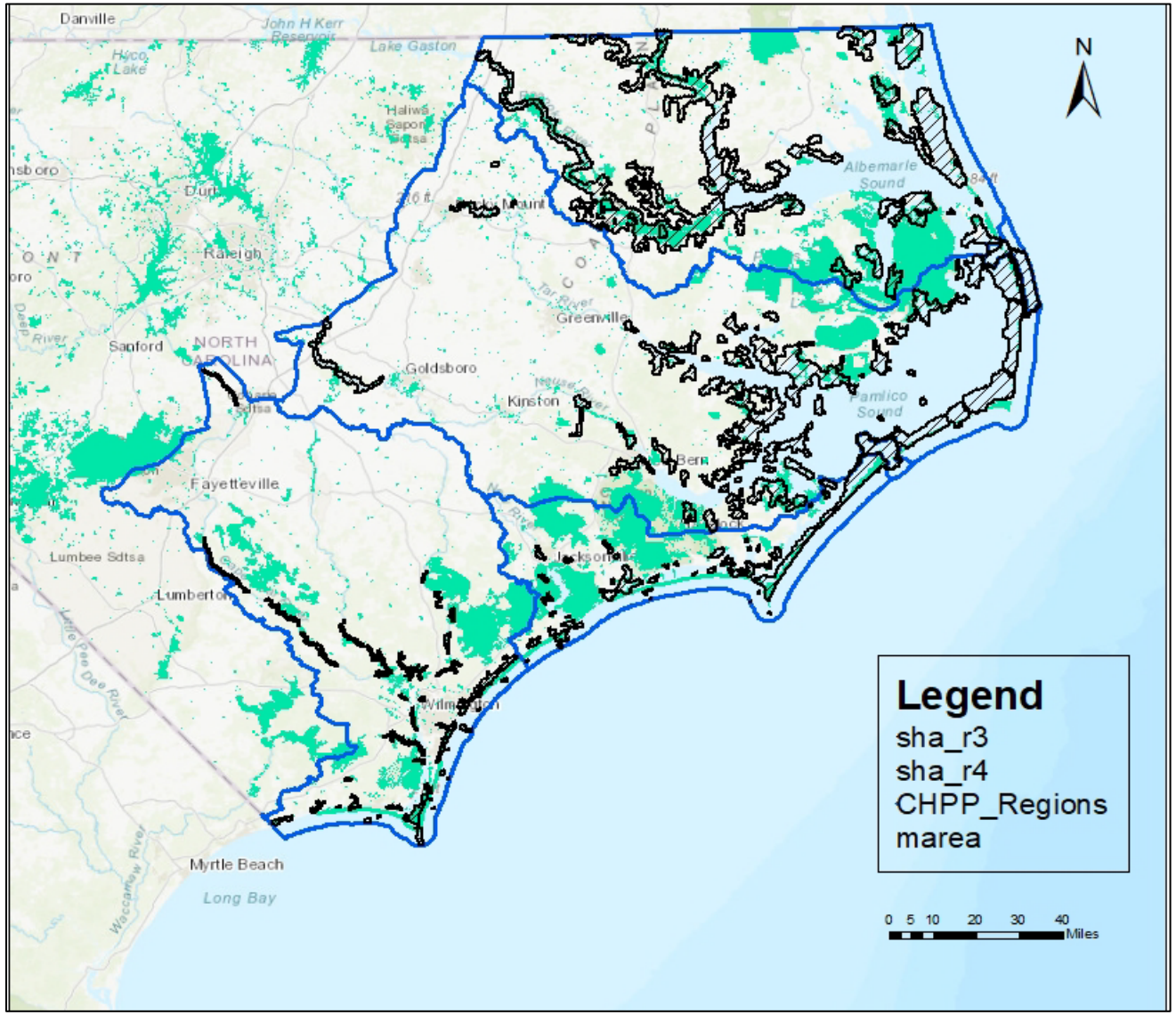


- Greater amounts of structured habitats increase capacity to support greater abundance and variety of fish
- This study validates that selecting SHAs due to abundance and diversity of habitats, landscape connectivity, and relatively low alterations is a valid approach.

Next Steps

- Conduct additional statistical analysis
- Conduct multi-metric index for Region 4
- Examine individual SHAs – determine if there are indicator thresholds that trigger management actions
- Work with other agencies to initiate management actions
- Conduct modified SHA field validation process in Regions 1 and 2
- **Protect wetlands, oyster reefs, and SAV!!!**

Next Steps - SHAs and Conservation Lands



QUESTIONS ?

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