Sanctuary Strategies for the Next Five Years

Facilitator: Erin Fleckenstein, N.C. Coastal Federation

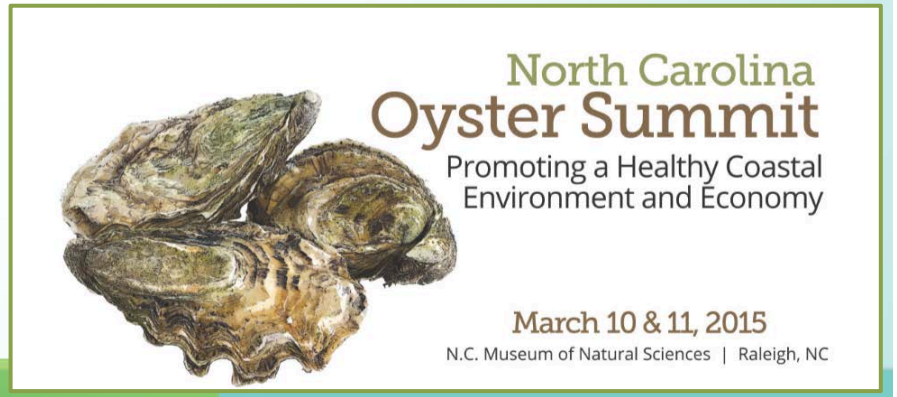
Panelists: Curt Weychert, N.C. Division of Marine Fisheries

Jason Peters, N.C. Division of Marine Fisheries

Justin Bashaw, U.S. Army Corps of Engineers

Troy Alphin, University of North Carolina Wilmington

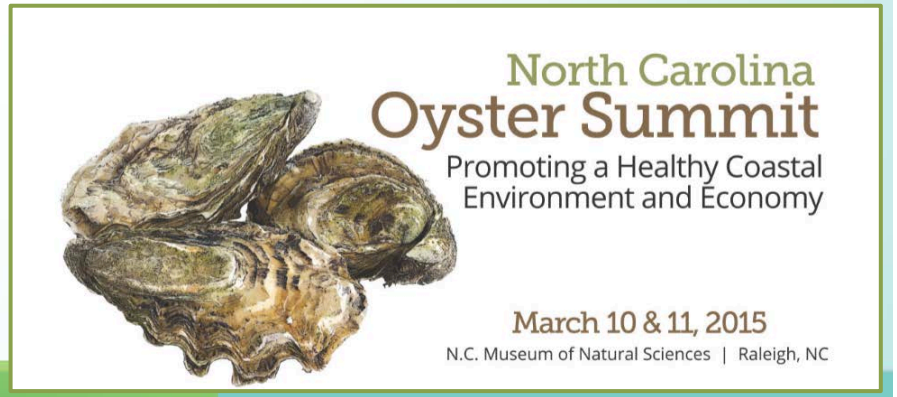
Dave Eggleston, NC State University, Center for Marine Sciences and Technology



Sanctuary Strategies for the Next Five Years

Questions Posed to the Panel

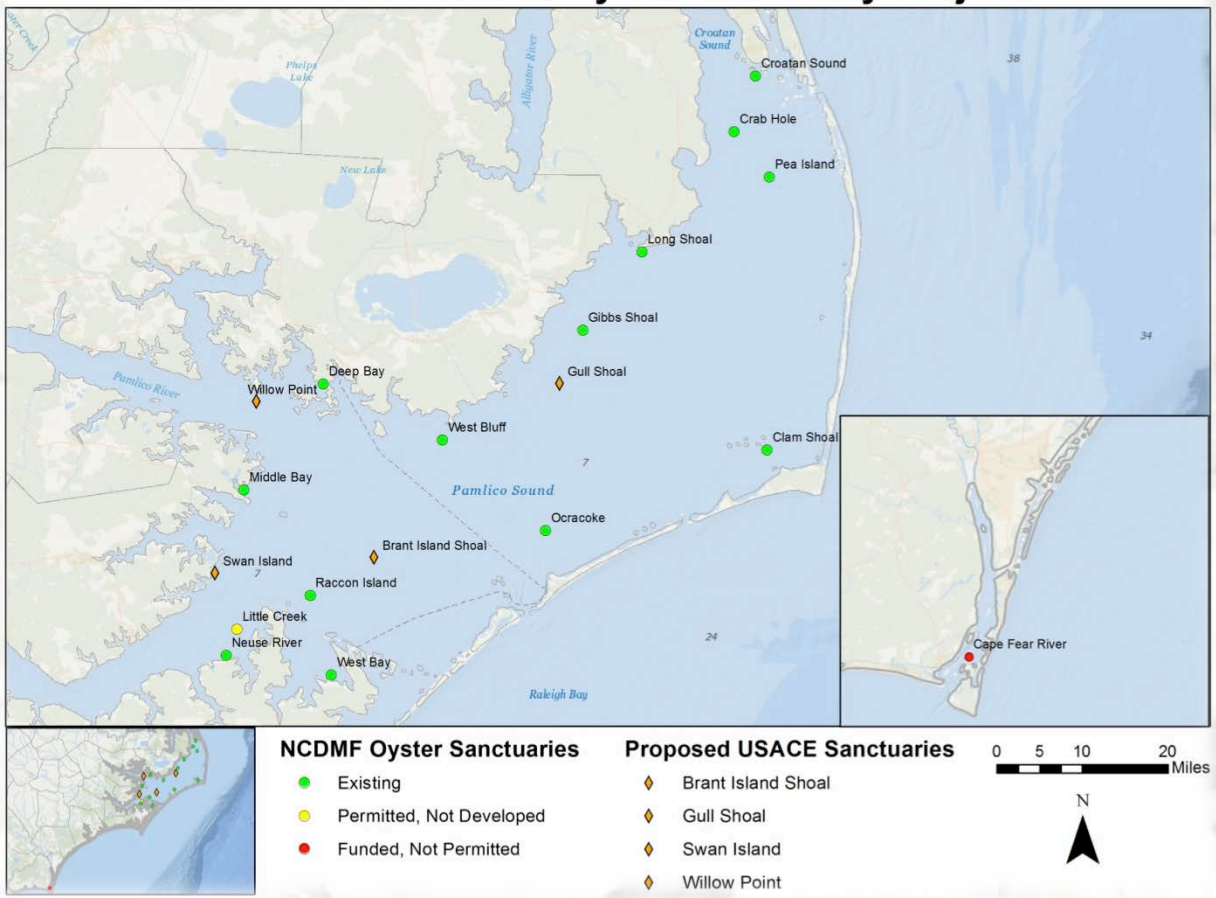
- Why are sanctuaries important?
- Where are they needed and how big should they be?
- What are the documented benefits (environmentally and economically) of sanctuaries?
- Can living shorelines and closed areas be considered de facto sanctuaries?
- What funding opportunities exist for constructing new sanctuaries?
- What are some of the Challenges and Opportunities to completing the sanctuary system?



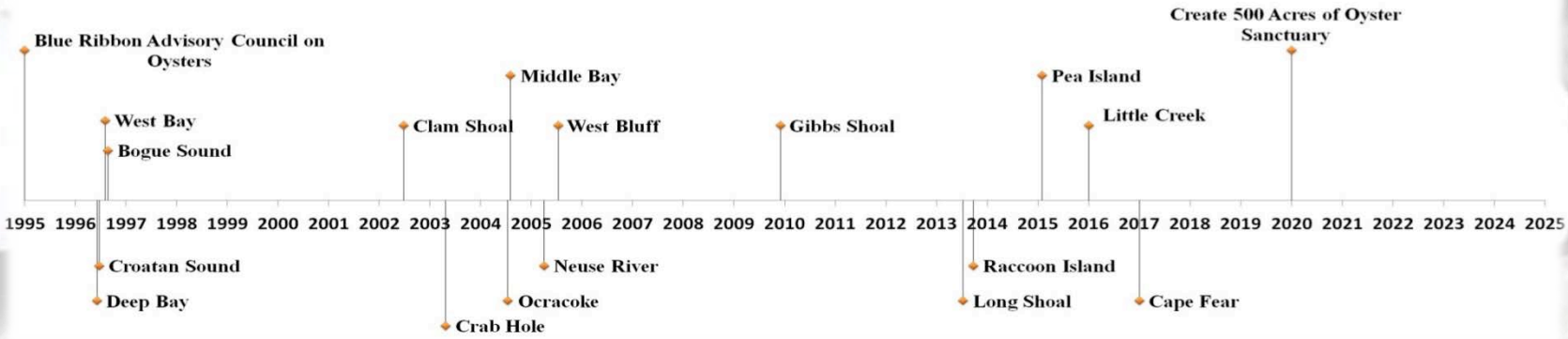
North Carolina Division of Marine Fisheries

History of the Oyster Sanctuary Program

Current North Carolina Oyster Sanctuary Projects

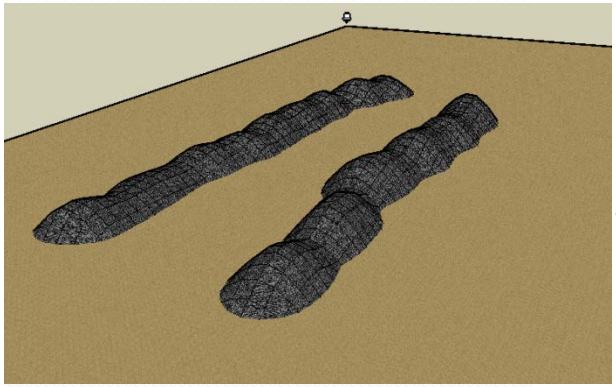


North Carolina Oyster Sanctuary Network Progression



Evolution of sanctuary design

- 1995-2001



- "Leg" Deployment
  - Long stretches of limestone marl
  - Low Vertical Profile
  - Overplanted with oyster & clam shell and

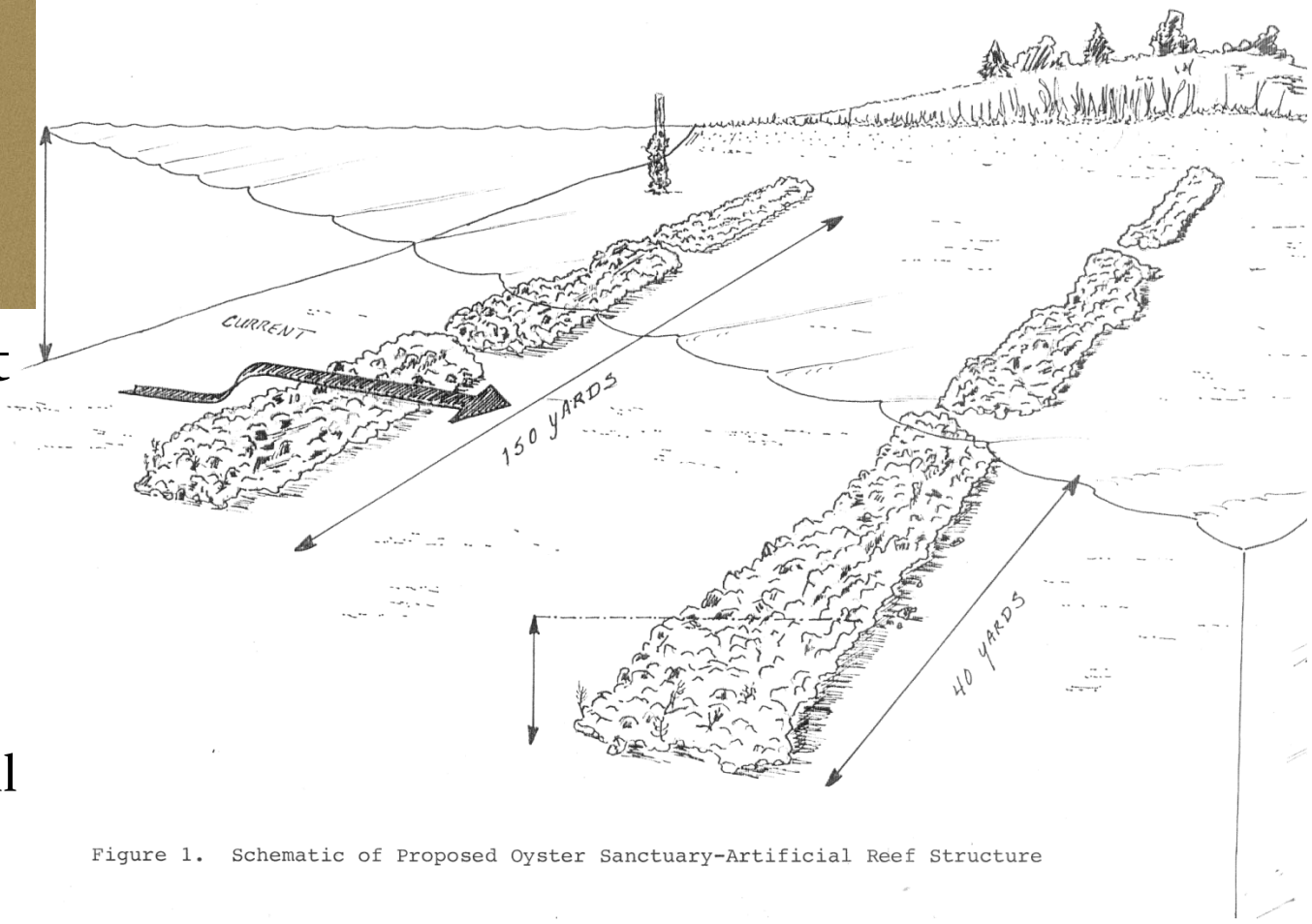
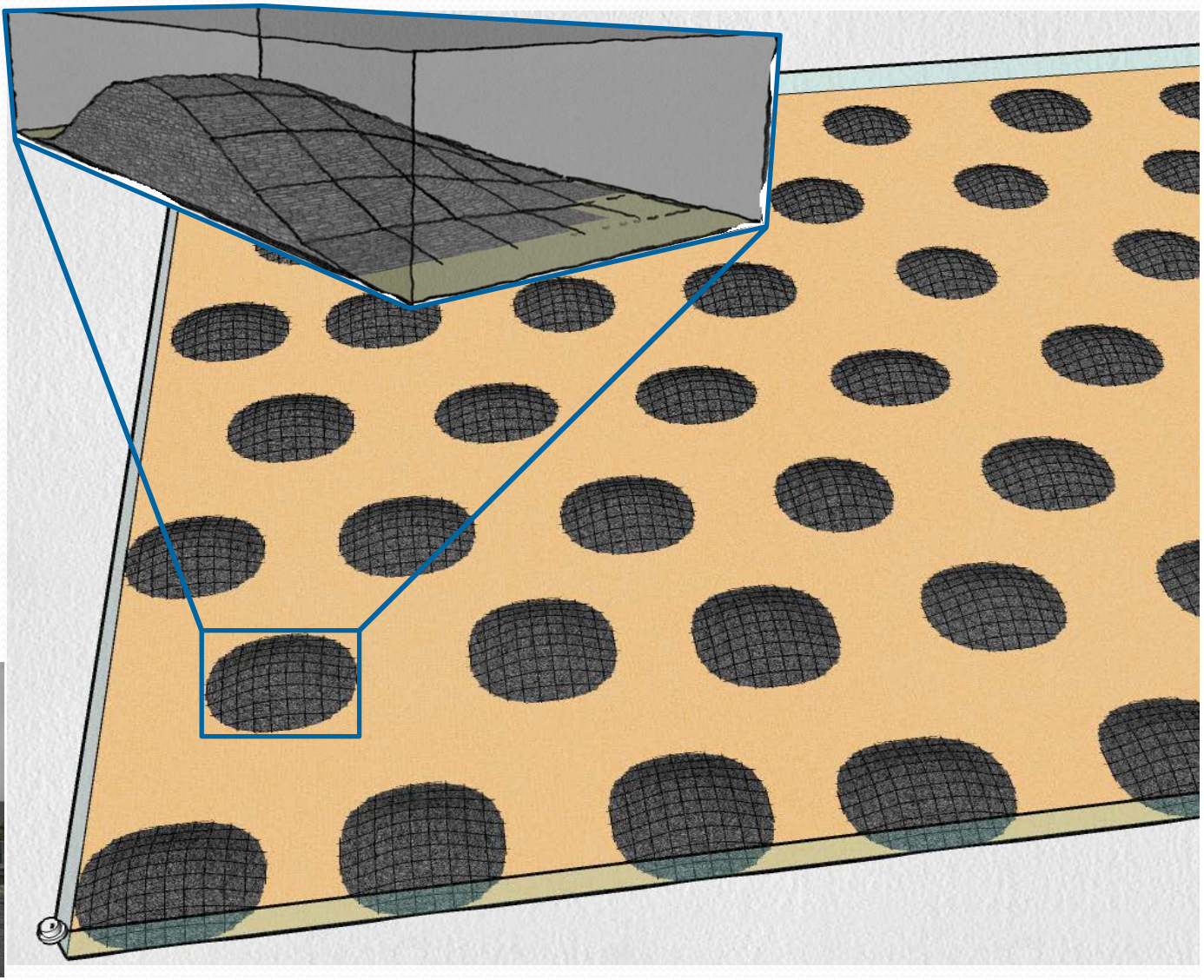


Figure 1. Schematic of Proposed Oyster Sanctuary-Artificial Reef Structure

Evolution of sanctuary design

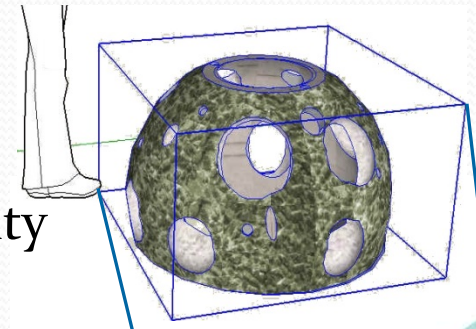
- 2002-2008

- "Mound" Deployment
  - Individual piles of limestone marl
  - 6-8ft of vertical profile off bottom
  - ~50ft diameter

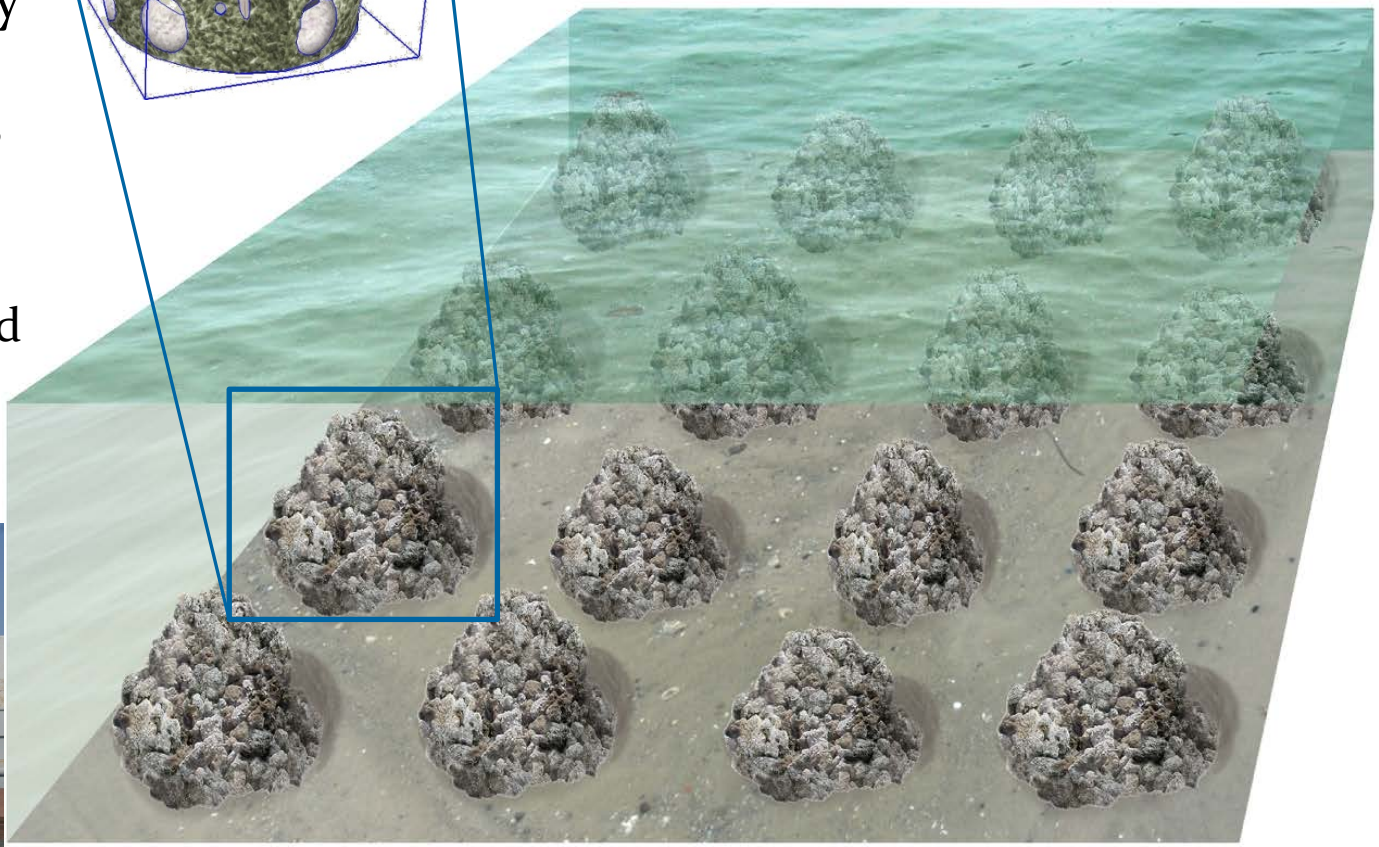


Evolution of sanctuary design

- 2009-Present

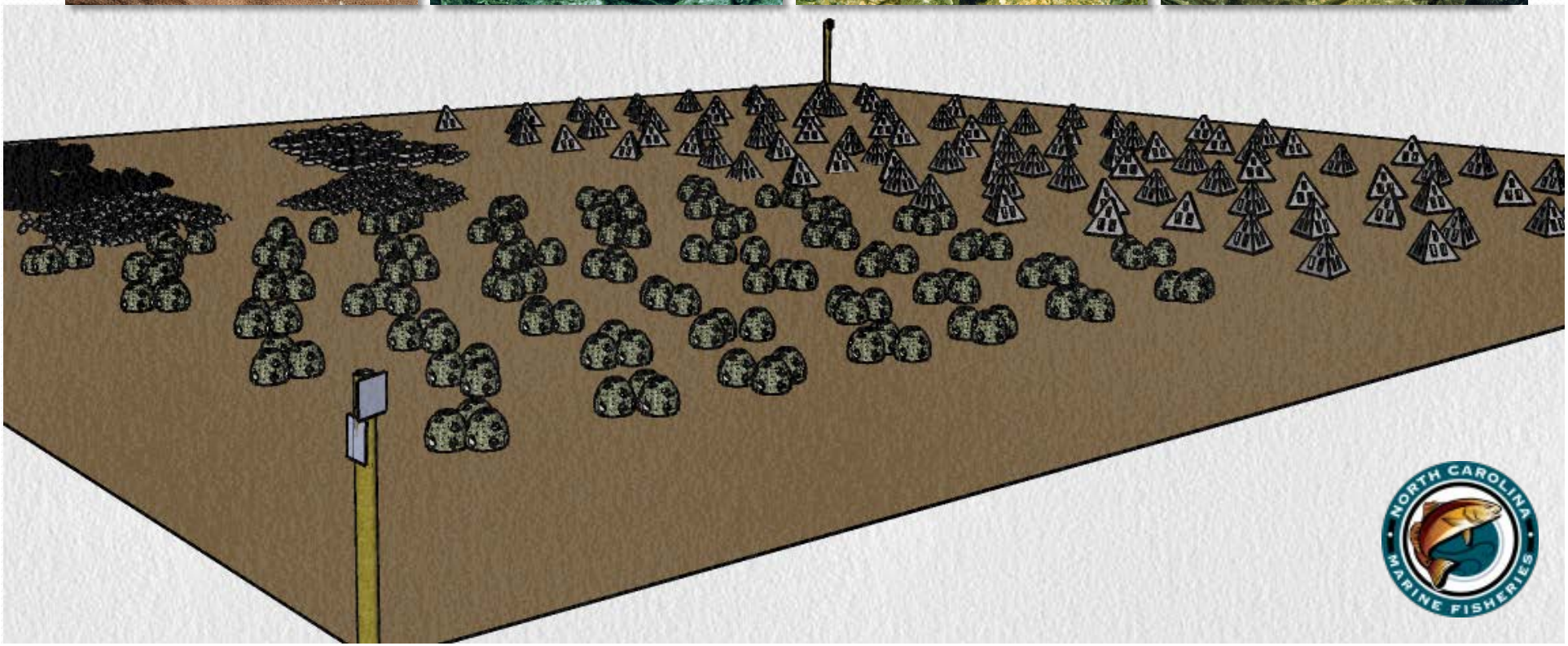


- Substrate variability
  - Purpose-built concrete modules
  - Various types of mined rock
  - Processed recycled concrete



Future of sanctuary design



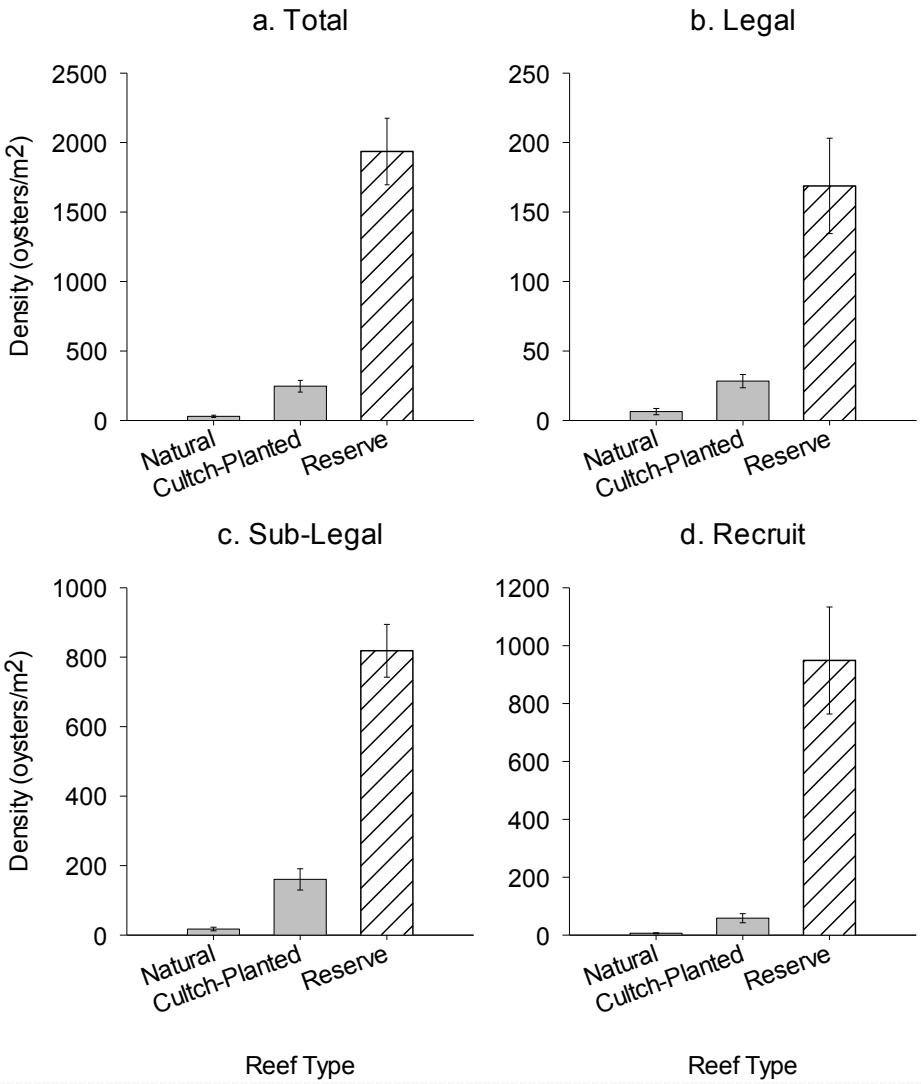



Future of sanctuary design

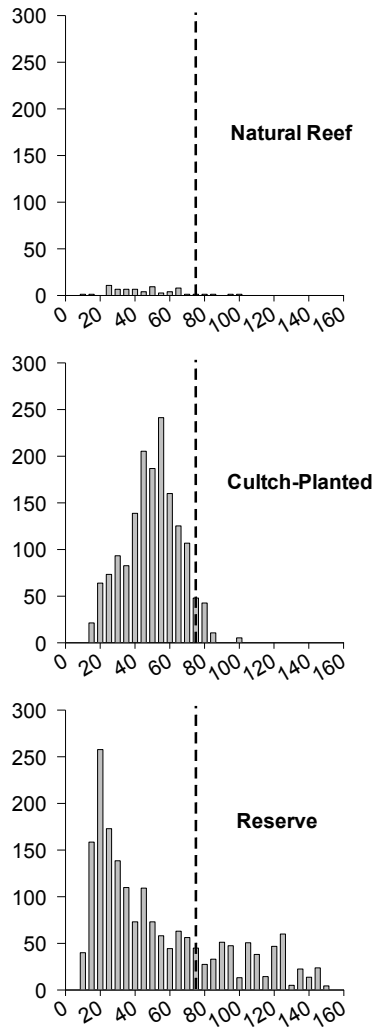
- Wave attenuators
- Intertidal oyster sanctuaries
- Shoreline stabilization
- Land-based fishing opportunities

Do sanctuaries work?

Density

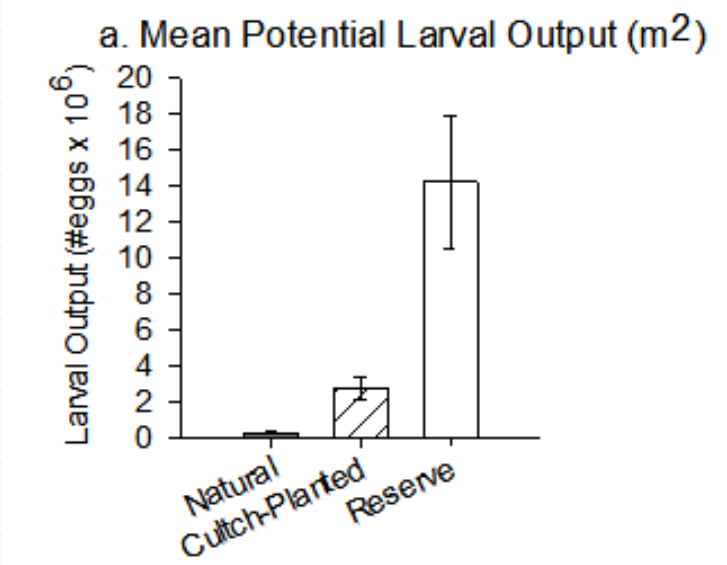


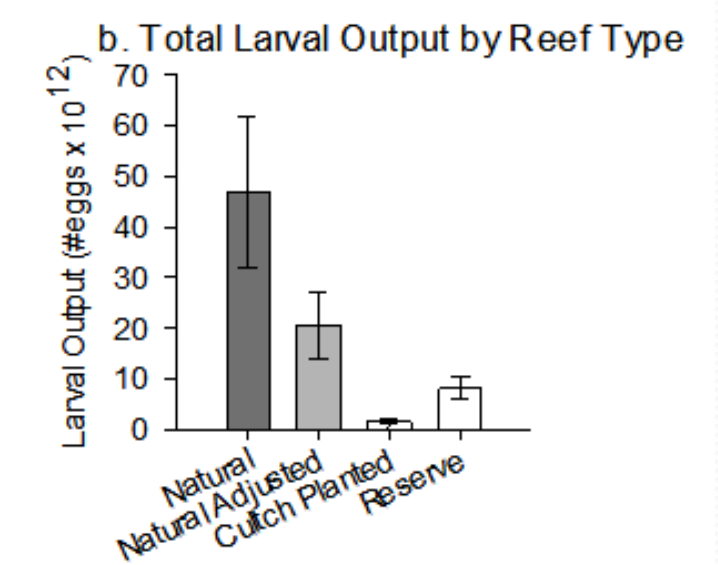
Size Structure



Do sanctuaries work?

Reproductive Potential

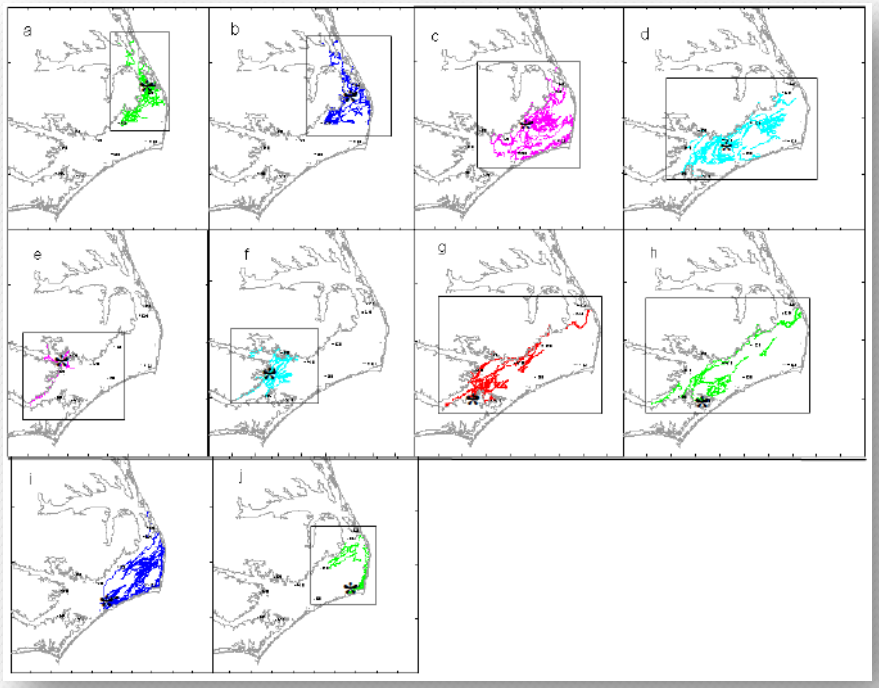


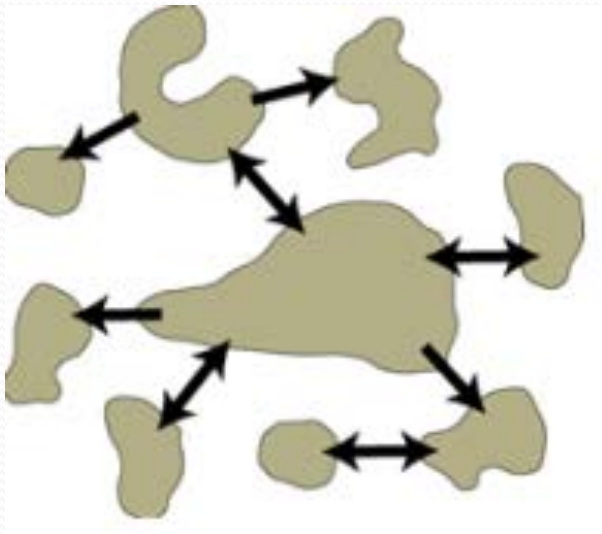


YES

Can we improve?

Sustainable but *not* self sustaining network





Focus on strengthening connectivity and larval supply through reef network enhancement

Oyster Reef Construction & Aquatic Ecosystem Restoration

Justin Bashaw

Biologist

US Army Corps of Engineers, Wilmington District

March 11, 2015

U.S.ARMY

US Army Corps of Engineers
BUILDING STRONG®

Oyster Reef Construction

- 42 acres of oyster reefs will be constructed as mitigation for wetland losses resulting from development of Wanchese Harbor and Seafood Park, within existing or future NCDMF oyster sanctuary areas.
- Oyster reef construction will be incremental and is anticipated at multiple NCDMF sanctuary sites as funding becomes available.

Oyster Reef Construction

- In the near future, 5 of 42 acres are expected to be constructed at the West Bluff area in compliance with current NCDMF methods.

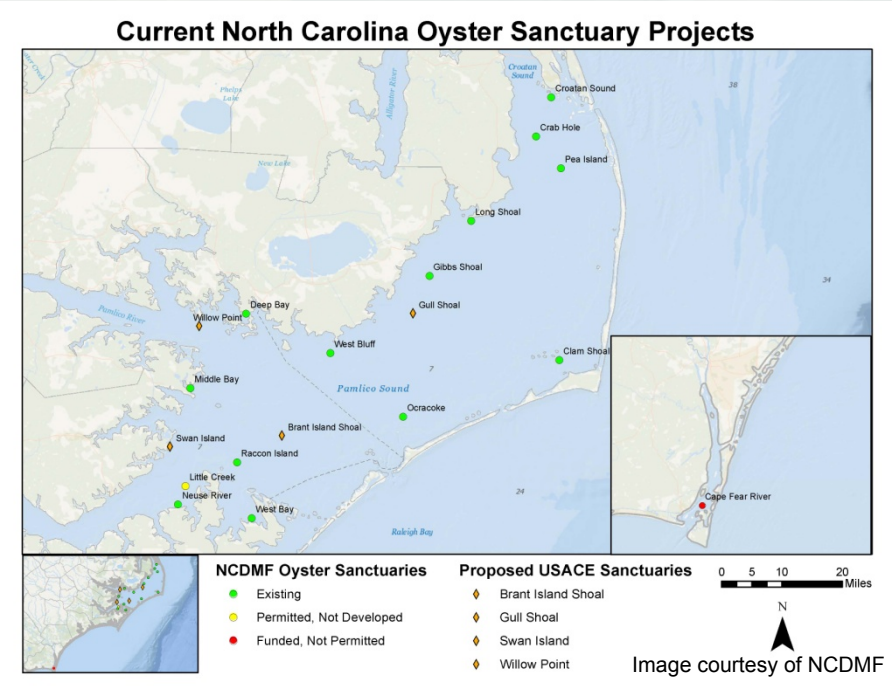


Image courtesy of NCDMF

Roanoke Island, Festival Park, NC

Section 206 Aquatic Ecosystem Restoration

- Recipient of multiple environmental construction awards, the project protects ~2 acres of existing coastal marsh and wooded wetlands, restored ~1 acre of shallow water area, and enhanced ~1 acre of estuarine habitat to include oyster cultch placement between marsh and sea grass planting areas.
- This project also provided economical and environmentally sound shoreline protection for public facilities located at Festival Park.

Roanoke Island, Festival Park, NC

Section 206 Aquatic Ecosystem Restoration

BUILDING STRONG®

Wanchese Marsh

Section 204 Beneficial Use of Dredged Material

- Nominated for a Coastal America Award, the project is a ~10 acre ecosystem restoration and protection project.
- The project made beneficial use of dredged material to construct wetlands and shallow water estuarine habitat, and incorporated 1 acre of oyster reef offering further benefits in terms of habitat creation.

Wanchese Marsh

Section 204 Beneficial Use of Dredged Material

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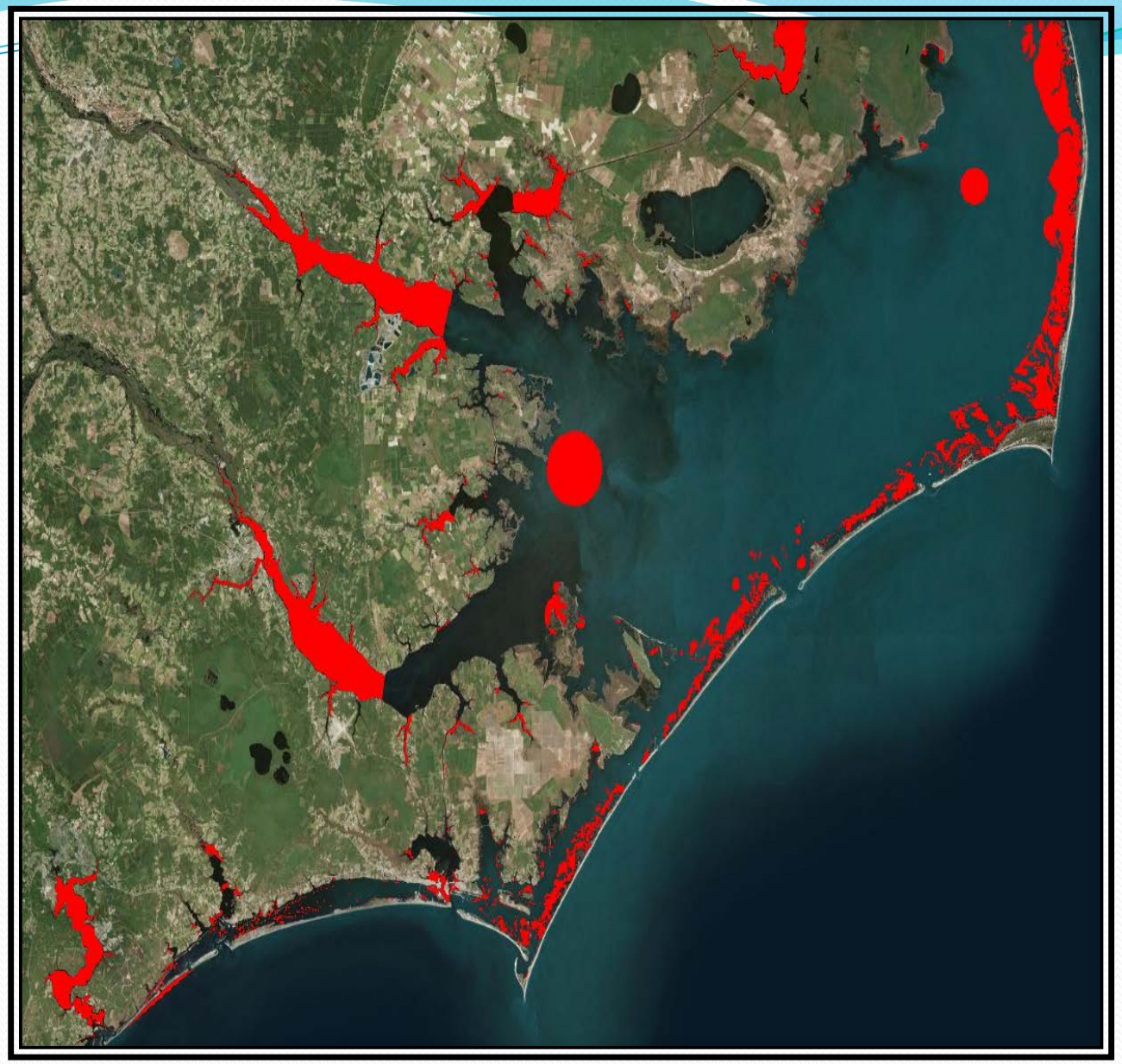
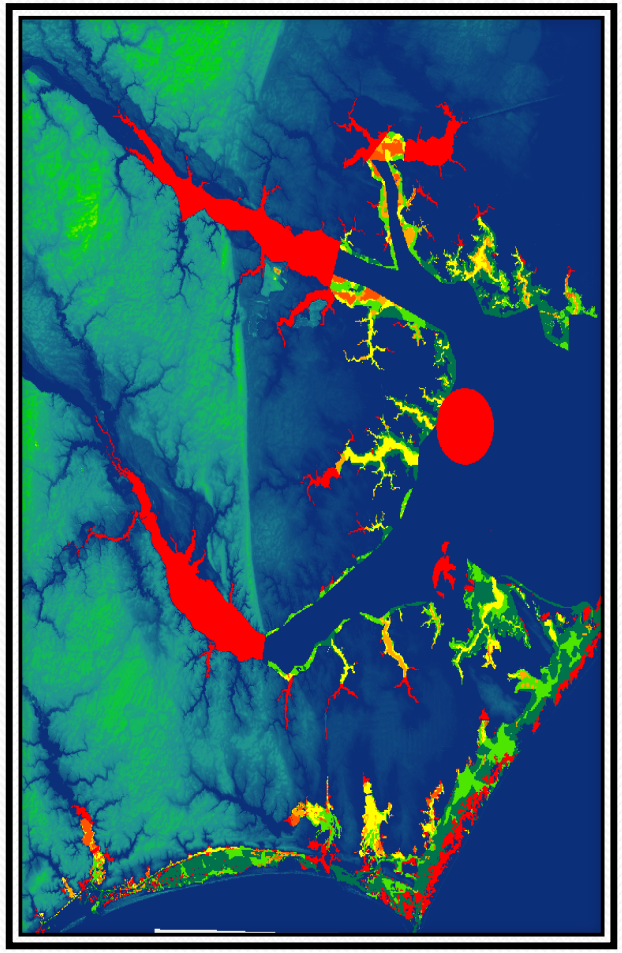
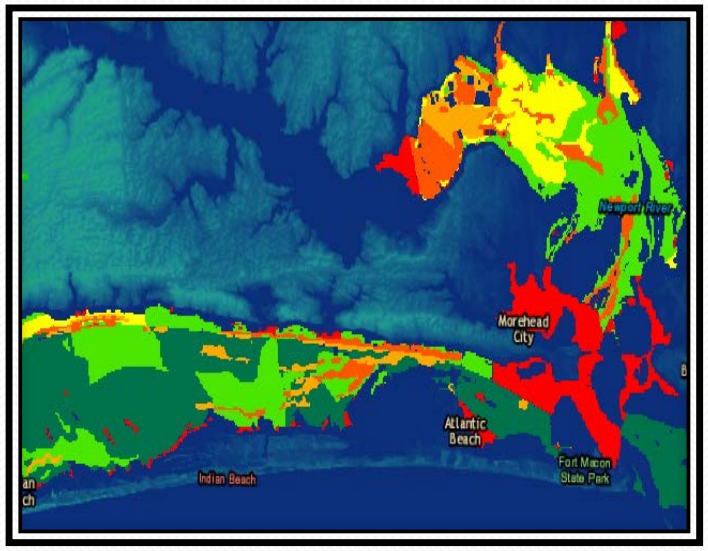
Opportunities and Challenges: Oyster Restoration, Sanctuaries, Living Shoreline

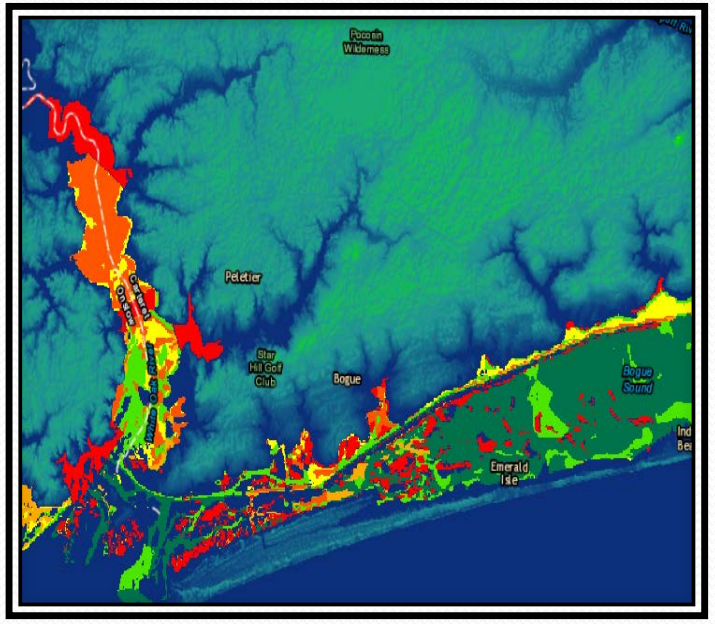
Troy Alphin

Oyster Biologist and Researcher UNCW






Morehead City
Atlantic Beach
Fort Macon State Park
Indian Beach


Pocosin Wilderness
Peletier
Star Hill Golf Club
Bogue
Bogue Sound
Emerald Isle

Opportunities

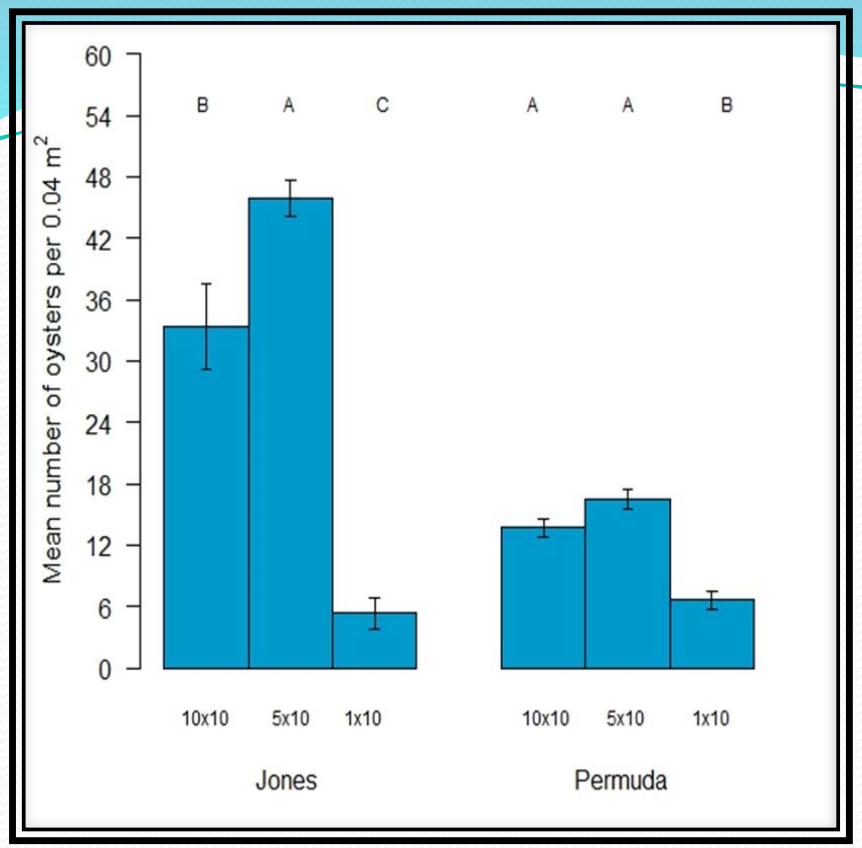
- Healthy Sanctuaries provide a series of ecosystem services
- Re-establish/maintain remnant populations, enhance the fishery.
- Water body specific design and placement
- Act as indicators of background conditions that may show age- specific or community development responses.

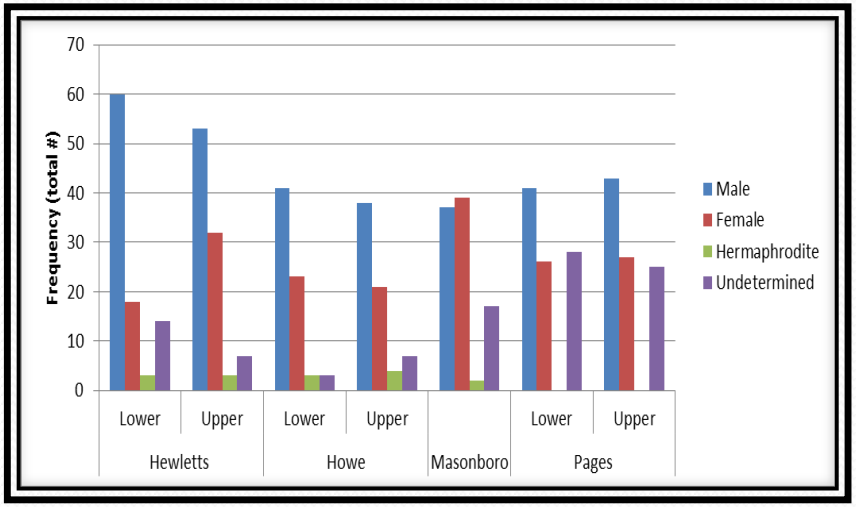
Opportunities

- Living Shorelines provide an excellent means of stabilizing shorelines, protecting upland communities and development and mitigating erosion, but may also provide some of the same functions as sanctuaries
- May not cover as much area
- Tend to be in impacted areas

Challenges

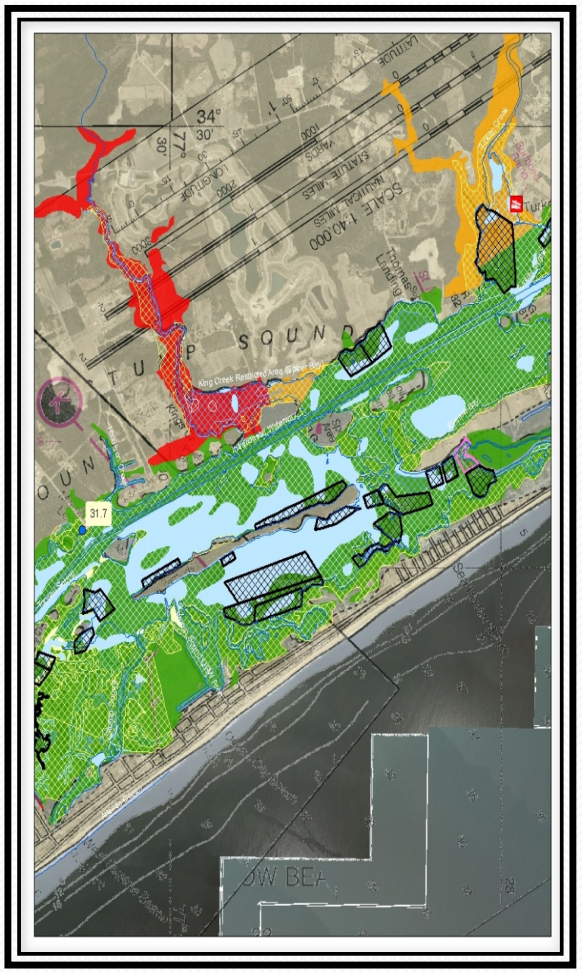
- One size fits all may not work- Need to utilize watershed specific approach
- Scale maybe very important- for large water bodies a series of sanctuaries or source areas makes more sense
- For smaller areas a complex of reefs in various locations may be feasible.
- Utilize both small sanctuaries and living shorelines in confined estuaries
- Many acres of bottom are closed to shellfish harvest





- Some of these areas may provide sanctuary function, however data suggests that impaired areas may not function as a healthy sanctuary.
- Consideration of local and regional impacts to water quality and how those may influence oyster response is important.

- Siting, designing, and implementing sanctuaries is a big task but with clear benefits to the estuary, the shellfishing industry, and the public.
- Data Gaps identified and filled
- Community engagement



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Sanctuary Strategies for the Next 5 Years

Recommendations:

1). Use Science to help guide restoration

2). Optimize restoration locations among different management goals

3). Develop a decision-support tool to guide restoration

4). Support for monitoring

-Test if restoration goals have been met

- Refine decision support tool

Marine, Earth & Atmospheric Sciences

David Eggleston

NC STATE UNIVERSITY

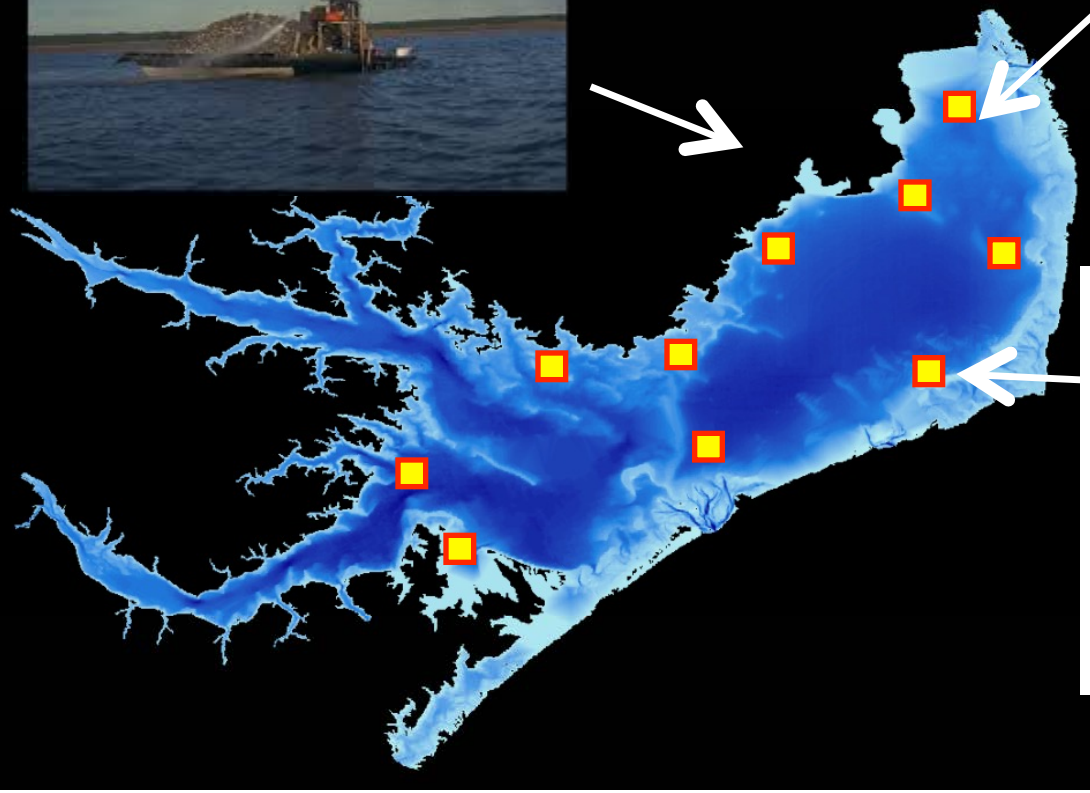
NC STATE UNIVERSITY

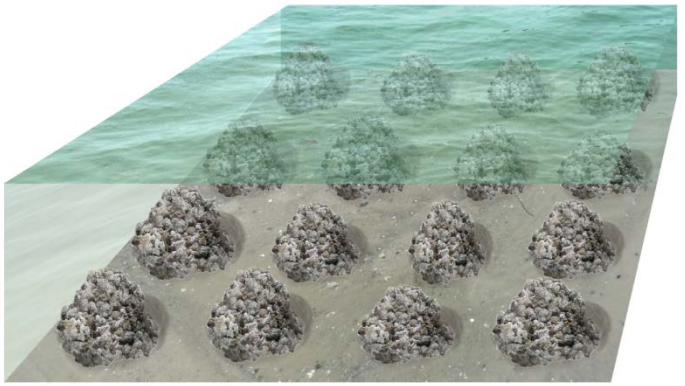
CMAST

The Center for Marine Sciences and Technology

Science Guiding Restoration:

- Fished areas interact with sanctuaries via larvae
- Footprint of fished areas 2 orders magnitude > sanctuaries
- 2-5 times greater larval output (J. Peters)
- Role of intertidal reefs? (S. Theurekauf)





Science Guiding Restoration

- Use concrete for restoration substrates in high salinity

(credit: R. Dunn, D. Eggleston and N. Lindquist 2013, 2014)

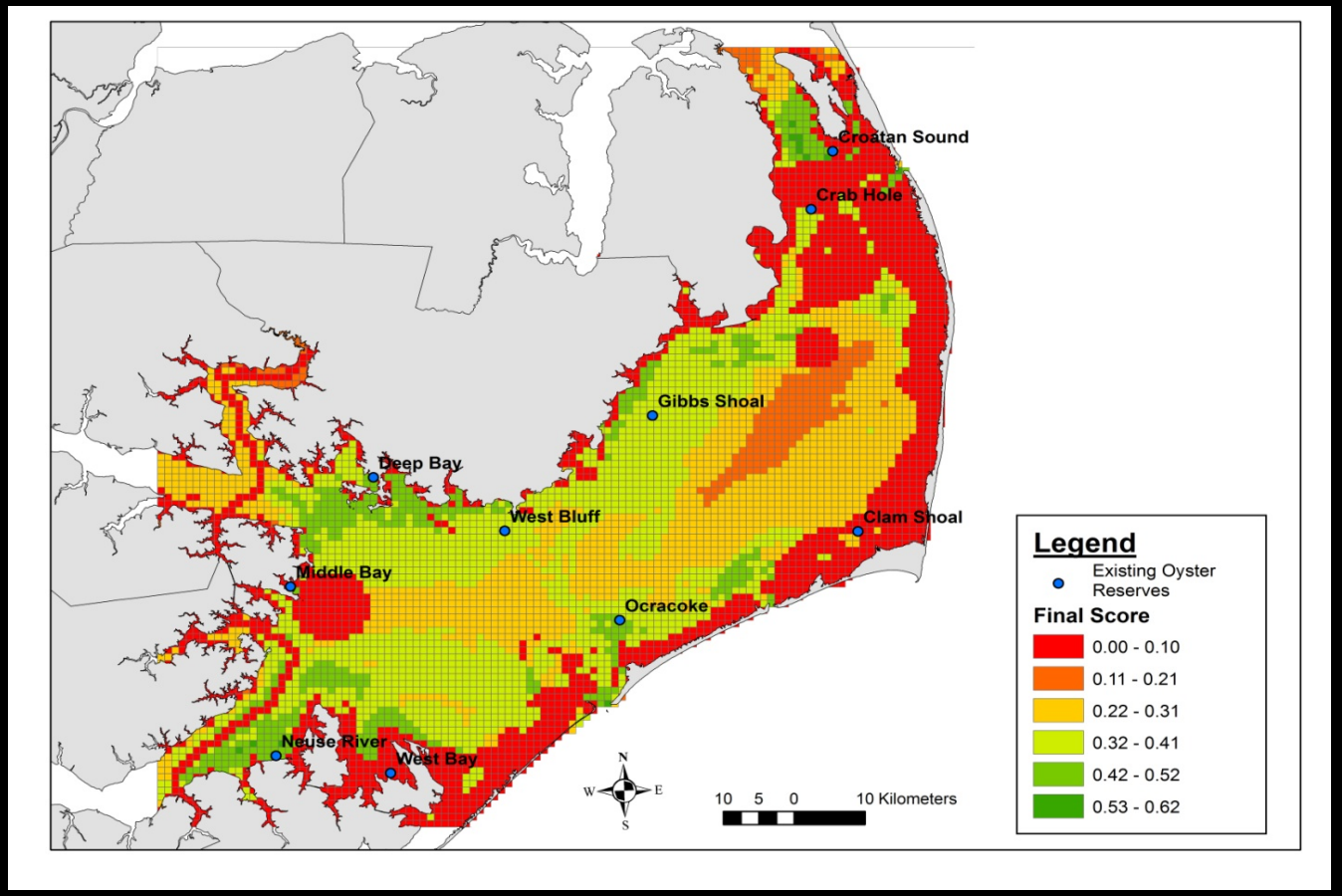
Carbonate

Non-carbonate

Where should reserves be built?

Credit: B. Puckett & R. Guajardo

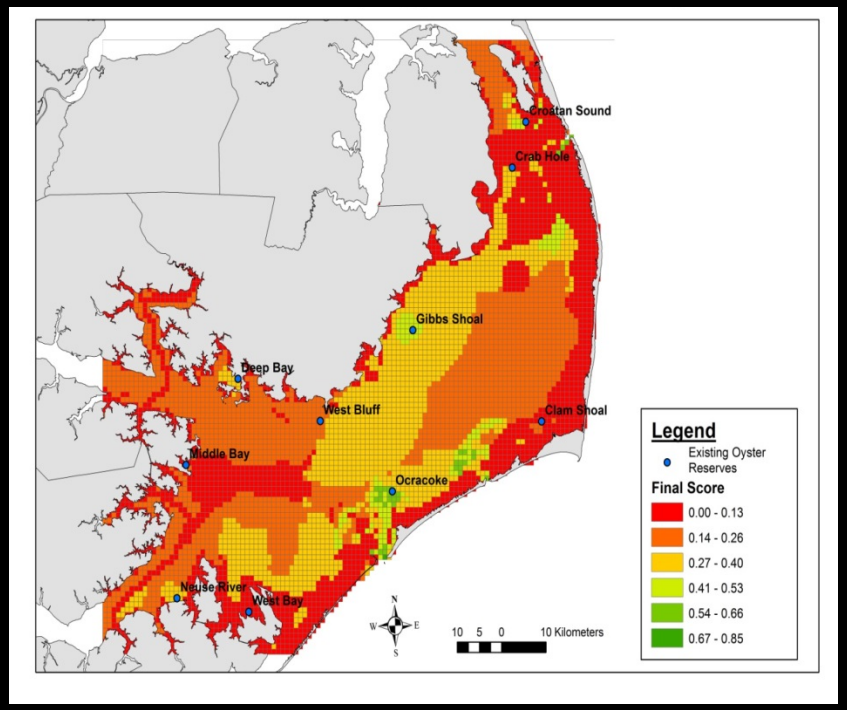
Reserve Suitability



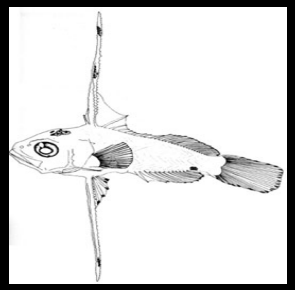
- 37% of Pamlico Sound unsuitable
- Optimal sites clustered in SW and NE portions of PS
- Integrates biological & economic considerations
- Must ground-truth & know biology

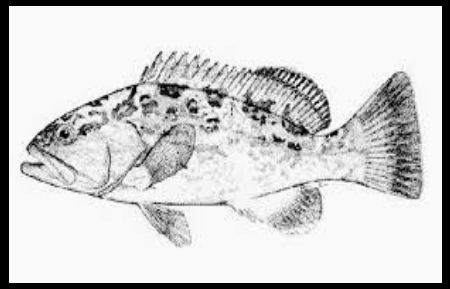
Can we optimize restoration locations among different management goals?

Essential Fish Habitat

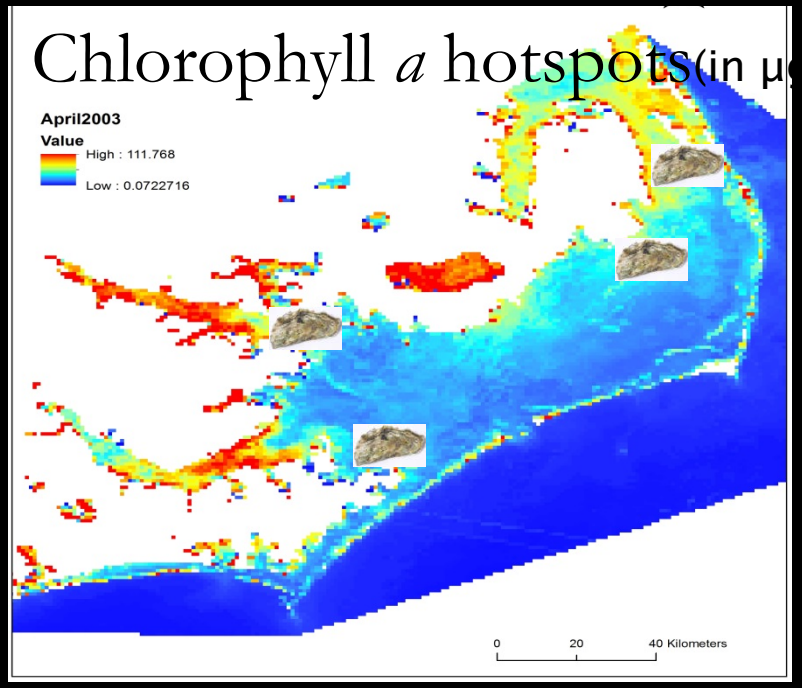


Credit: B. Puckett & R. Guajardo





Water quality



Credit: B. Shaeffer & S. Theurekauf

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Sea Grant North Carolina

North Carolina Coastal Federation

North Carolina Marine Fisheries

NSF

Recovery.gov