



# Strategic Habitat Areas in the APNEP Region of North Carolina



Christine Jensen  
Anne Deaton

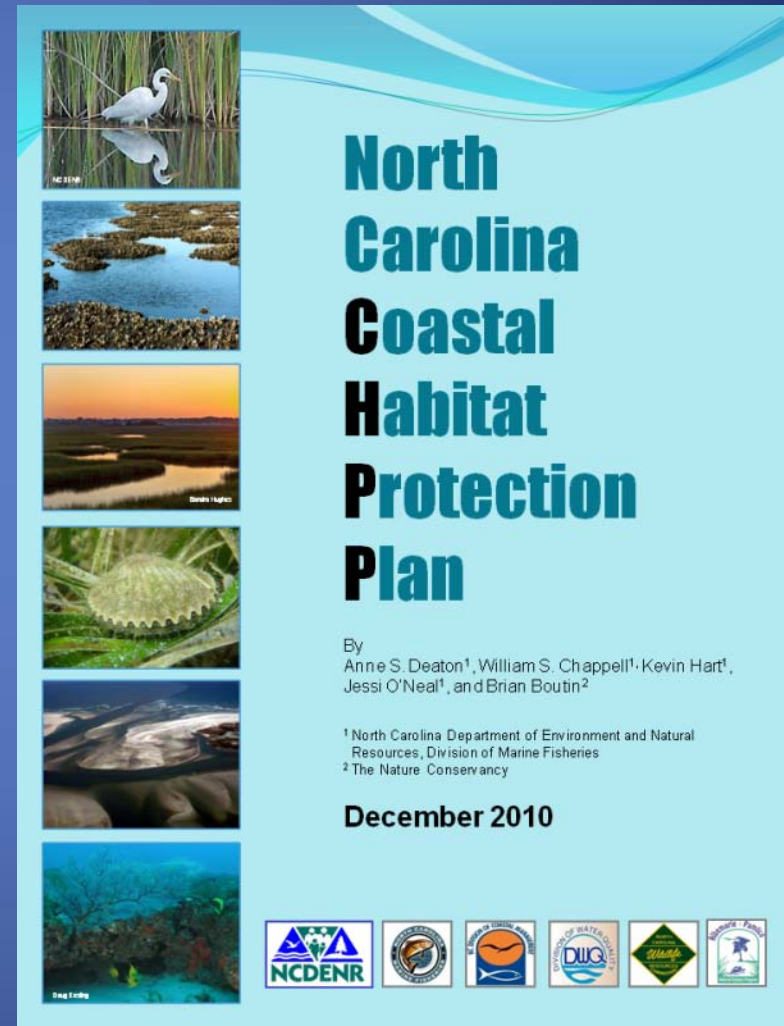
NC Division of Marine Fisheries

State of the Sounds Symposium  
November 17, 2011



# Coastal Habitat Protection Plan

- Arose out of frustration over habitat and water quality issues
- Mandated by the Fisheries Reform Act – 1997
- **Goal 2 – Identify, designate, and protect strategic habitat areas**



# What are Strategic Habitat Areas?

- Subset of the coastal ecosystem
- Best of the best
- Relatively unaltered
- Maintains biodiversity and ecological functions
- Network of habitat connections



# Strategic Habitat Areas (SHAs)

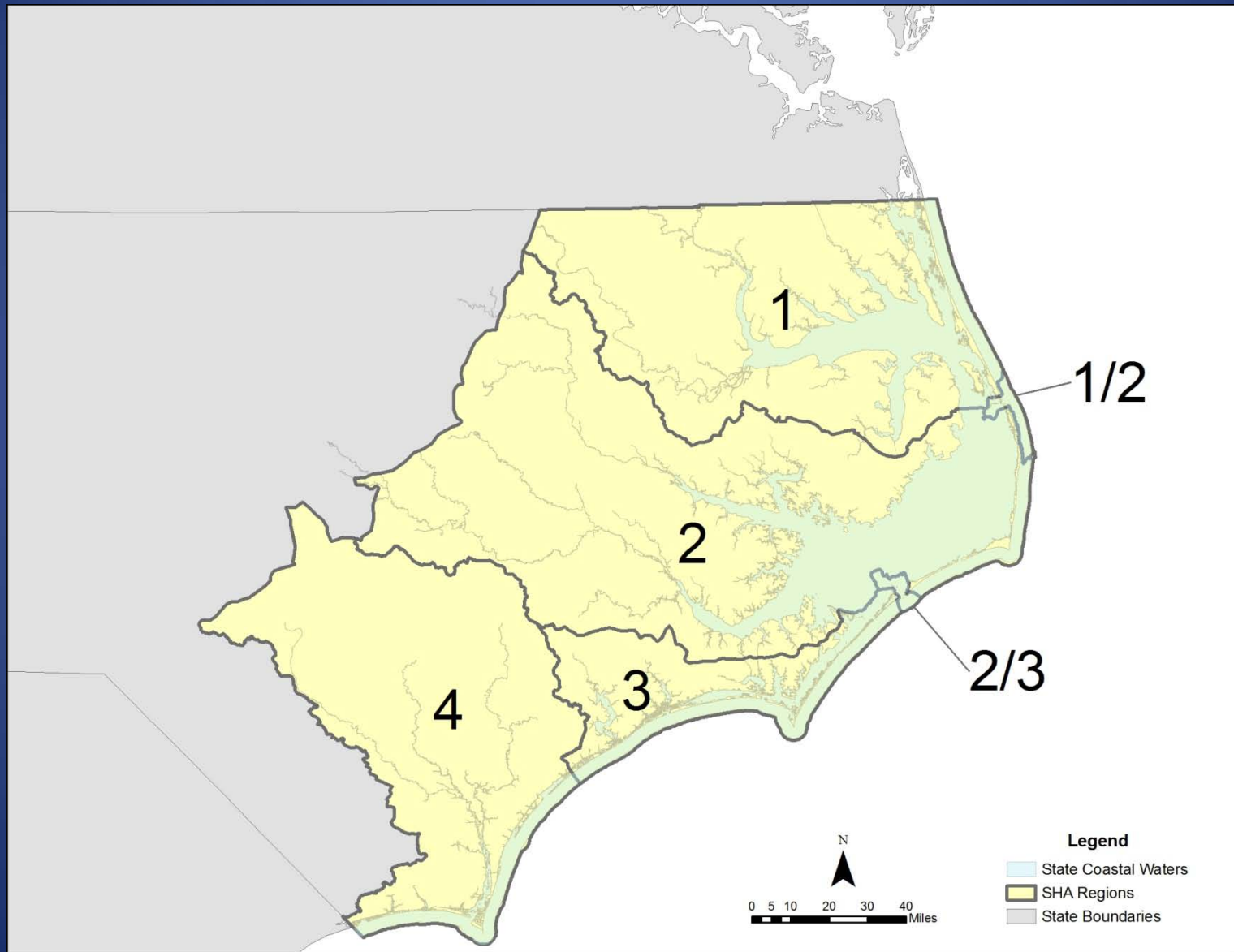
## Definition:

“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.”

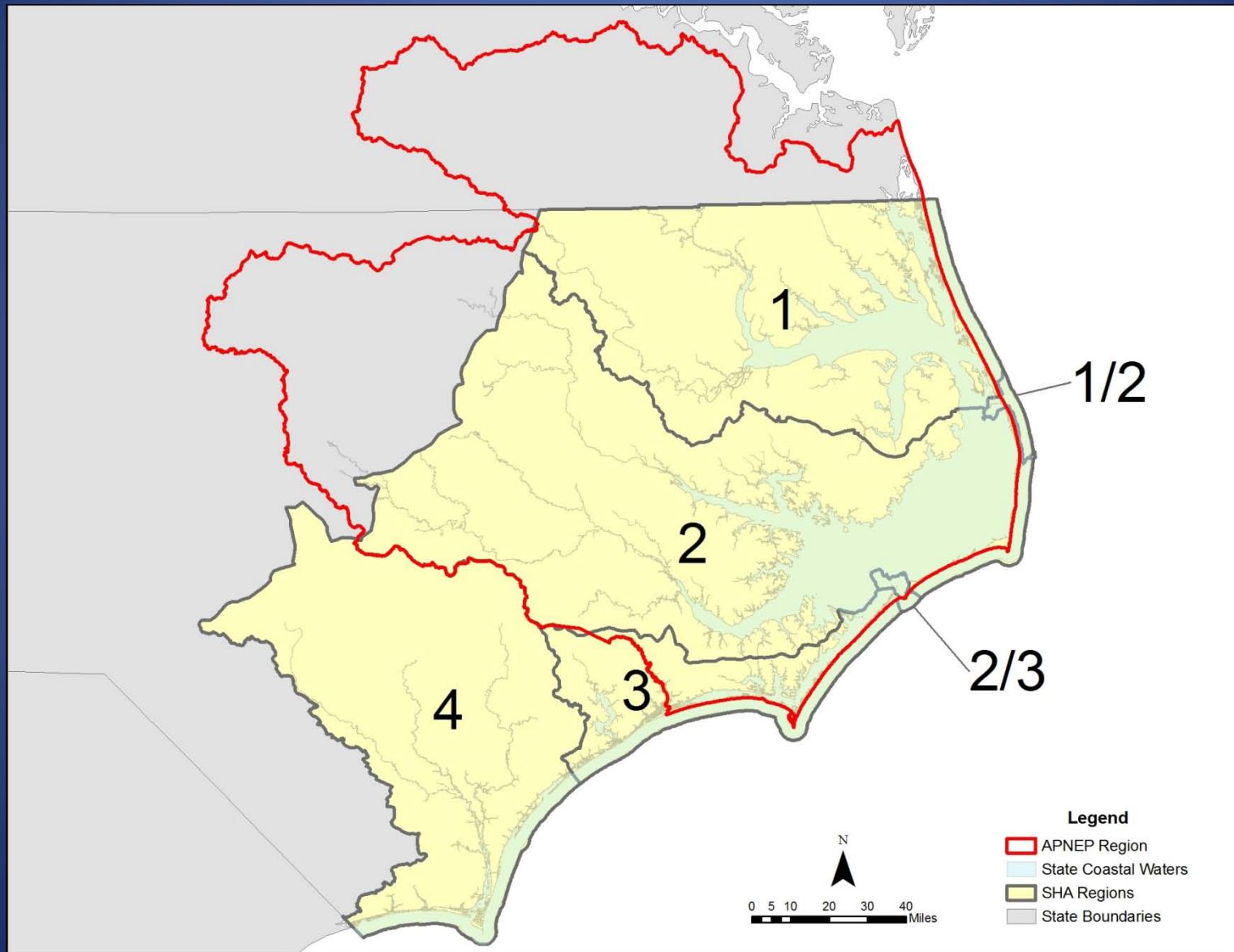




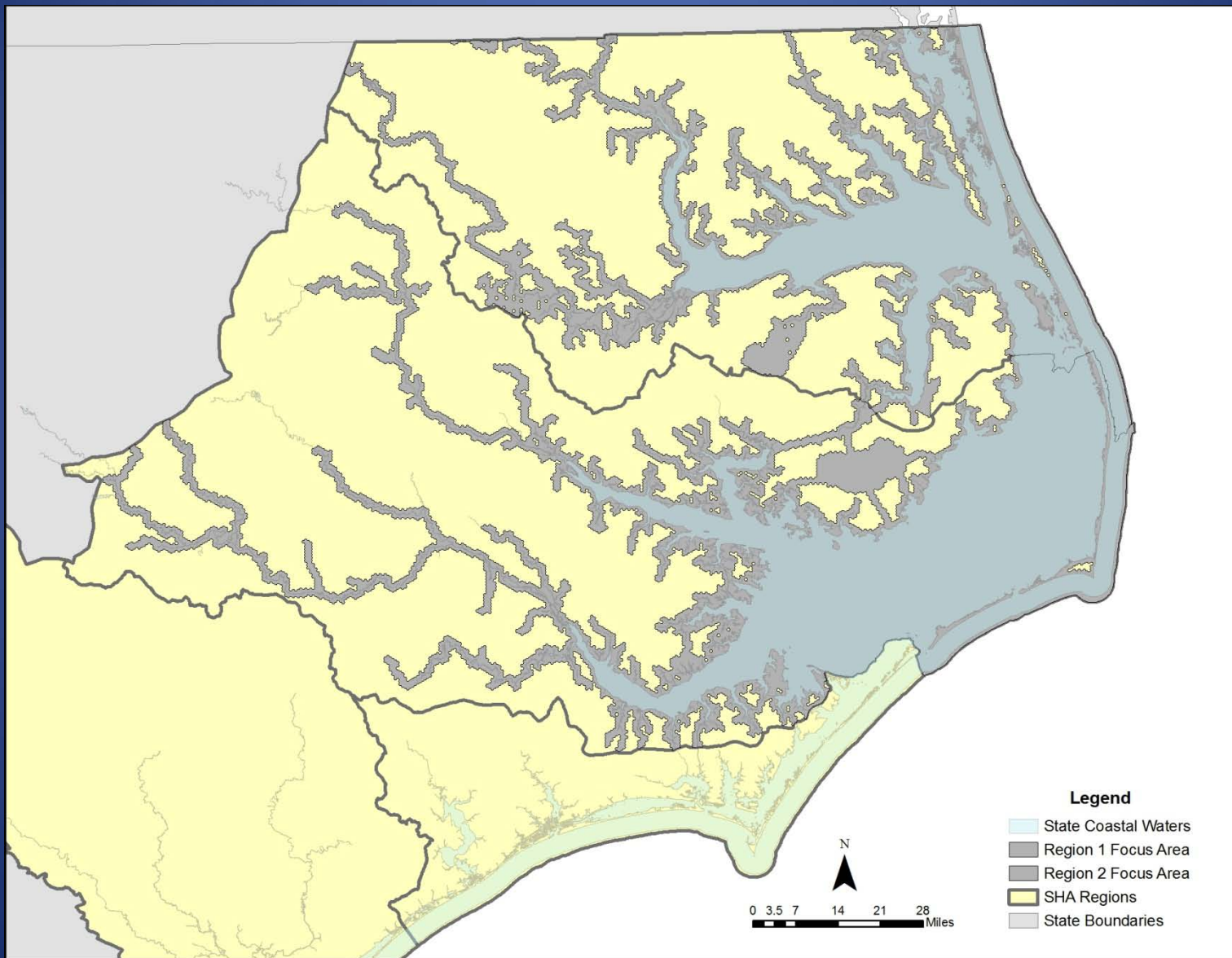
# SHA Regional Boundaries



# Regional Boundaries



# Focus Area



# Strategic vs. Non-strategic



Alteration Level



Ecological  
Function

	Low	Moderate
High	<b>SELECTED</b> <b>Exceptional</b> Protect	<b>SELECTED</b> <b>At Risk</b> Restore/Enhance
Low	<b>NOT SELECTED</b> <b>Status Quo</b> Rely on existing protections	

Ecological Function = Service provided to fish or environment (e.g., spawning/nursery area)

Alteration = disturbance by human activity





# How Do We Select SHAs?

- Goal is to protect and enhance coastal fisheries
  - Identify priority fisheries
  - Determine what habitats are important to those fisheries for their various life history stages  
(NATURAL RESOURCE TARGETS)
  - Determine how much of each habitat should be included in the SHA network  
(REPRESENTATION LEVEL)



# Priority Fisheries

- Region 1
  - Anadromous fish
  - River herring (blueback herring, alewife)
  - Striped bass
  - White perch
  - Spot
  - Atlantic Croaker
- Region 2
  - Oysters
  - Blue crab
  - Shrimp
  - Southern flounder
  - Red drum
  - Spotted seatrout
  - Anadromous fish
- Rare Species
  - Sea turtles

# Natural Resource Targets

Water column



Shell bottom



Hard bottom



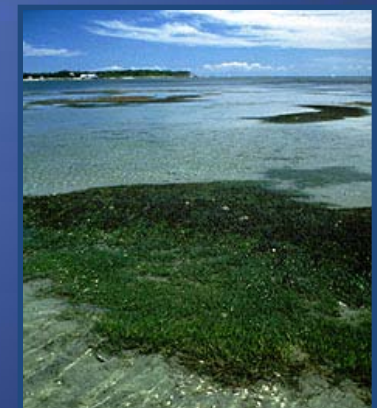
Wetlands



Soft bottom



Submerged  
Aquatic  
Vegetation



# Target Representation Levels

Selected based on functional importance, rarity, sensitivity, vulnerability, and/or historical losses of habitat.

## High representation (100-60%)

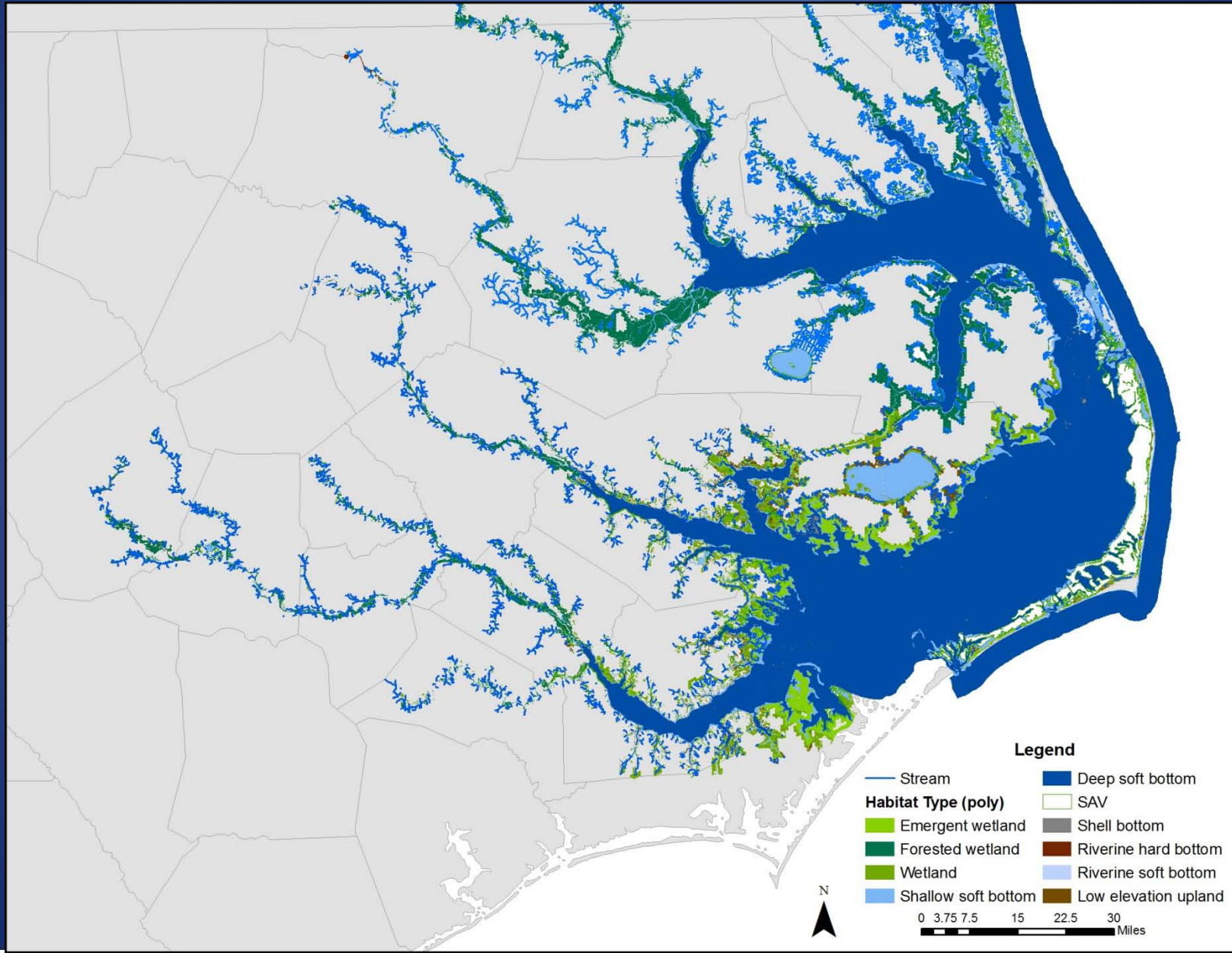
- Riverine hard bottom
- High salinity SAV
- Low salinity SAV
- Intertidal & subtidal shell bottom
- Ocean hard bottom

## Moderate rep. (20-15%)

- Freshwater forested wetlands (wet, mostly wet)
- Freshwater marsh (wet, mostly wet)
- Wetland edge
- Salt/brackish marsh
- Intertidal & subtidal shell bottom (low density)
- Freshwater, estuarine, and marine soft bottom (0-3 ft)
- Intertidal soft bottom
- Low elevation streams



# Natural Resource Targets



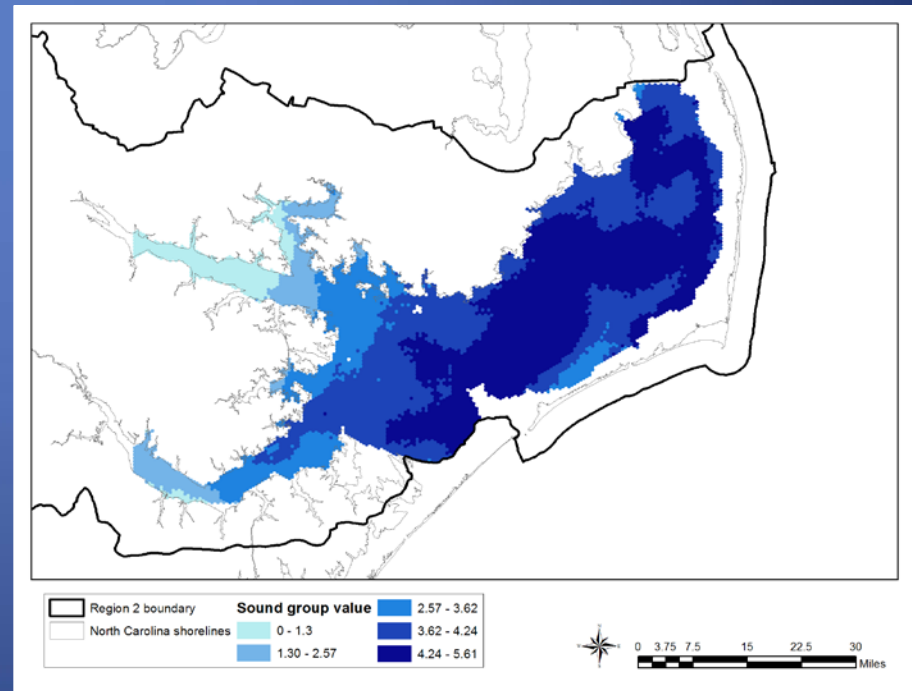
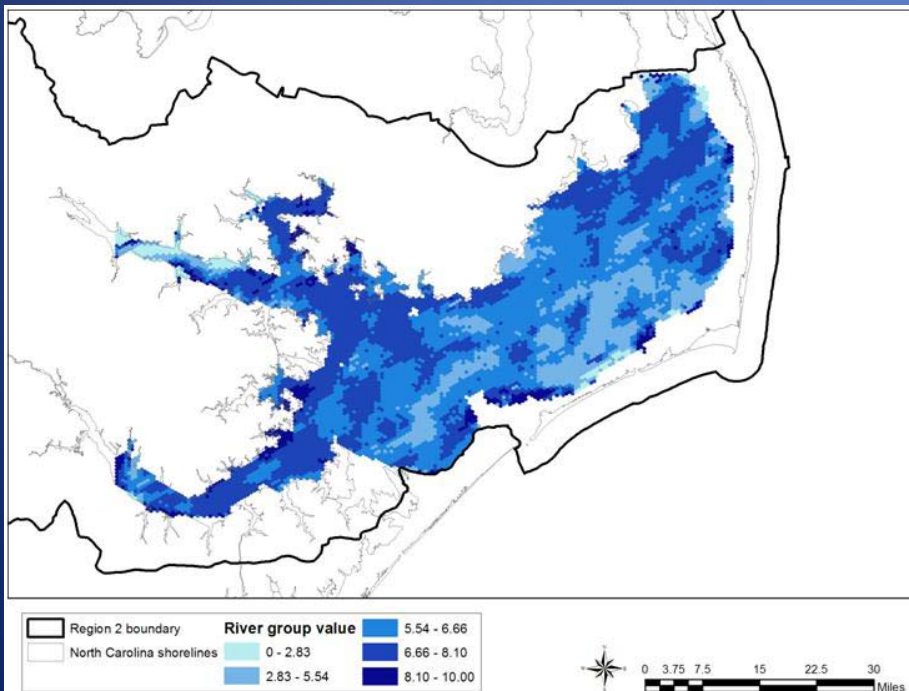
# Additional Target for Region 2

## River Group

Spot	Southern flounder
Croaker	White shrimp
Pinfish	Blue crab
Weakfish	Silver perch

## Sound Group

Spadefish  
Fringed flounder  
Southern kingfish  
Brown & pink shrimp  
Lizardfish



# Alteration Factors

Human activities that impact the coastal environment.

- Hydrology
  - Stream obstructions
  - Channelized streams
- Water quality
  - Marinas
  - Animal operations
- Physical
  - Bottom-disturbing fishing gear
  - Dredged channels



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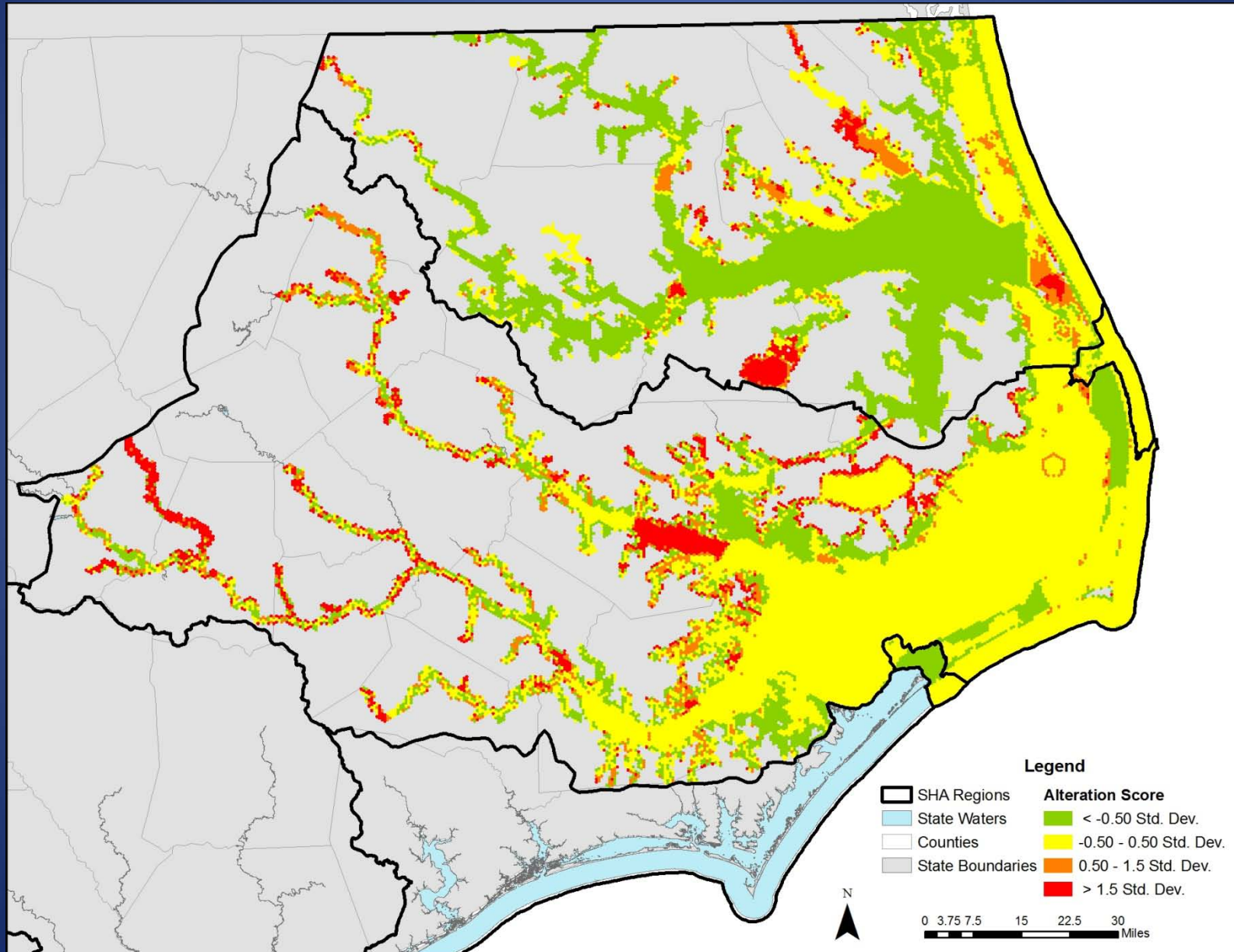
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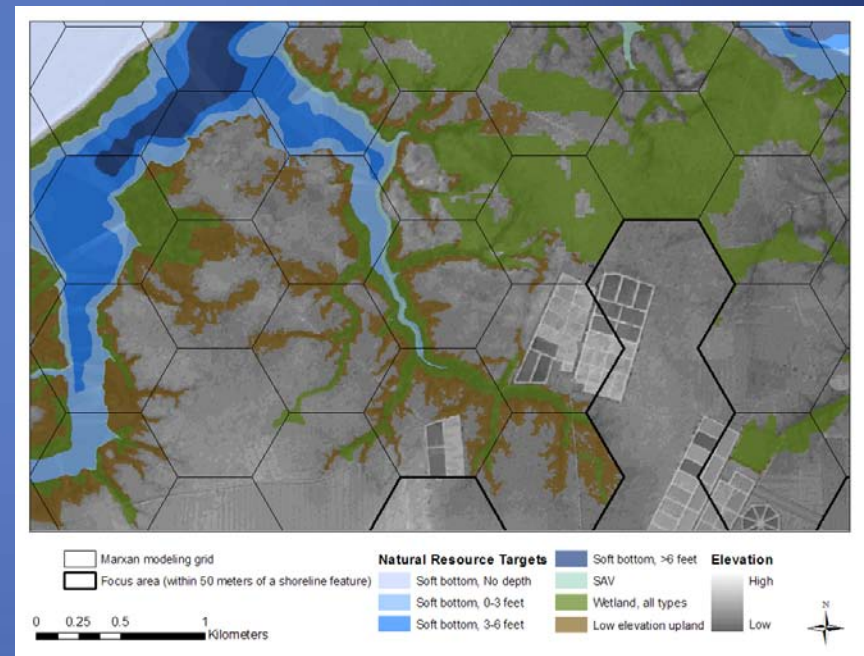


# Alteration Scores



# Computer Software - MARXAN

- TARGETS = Habitats and identified fish aggregations
- ALTERATIONS = Known threats/degradation
- Data put into computer maps (GIS)
- Hexagon grid overlay
- MARXAN (site selection software) run to get draft results

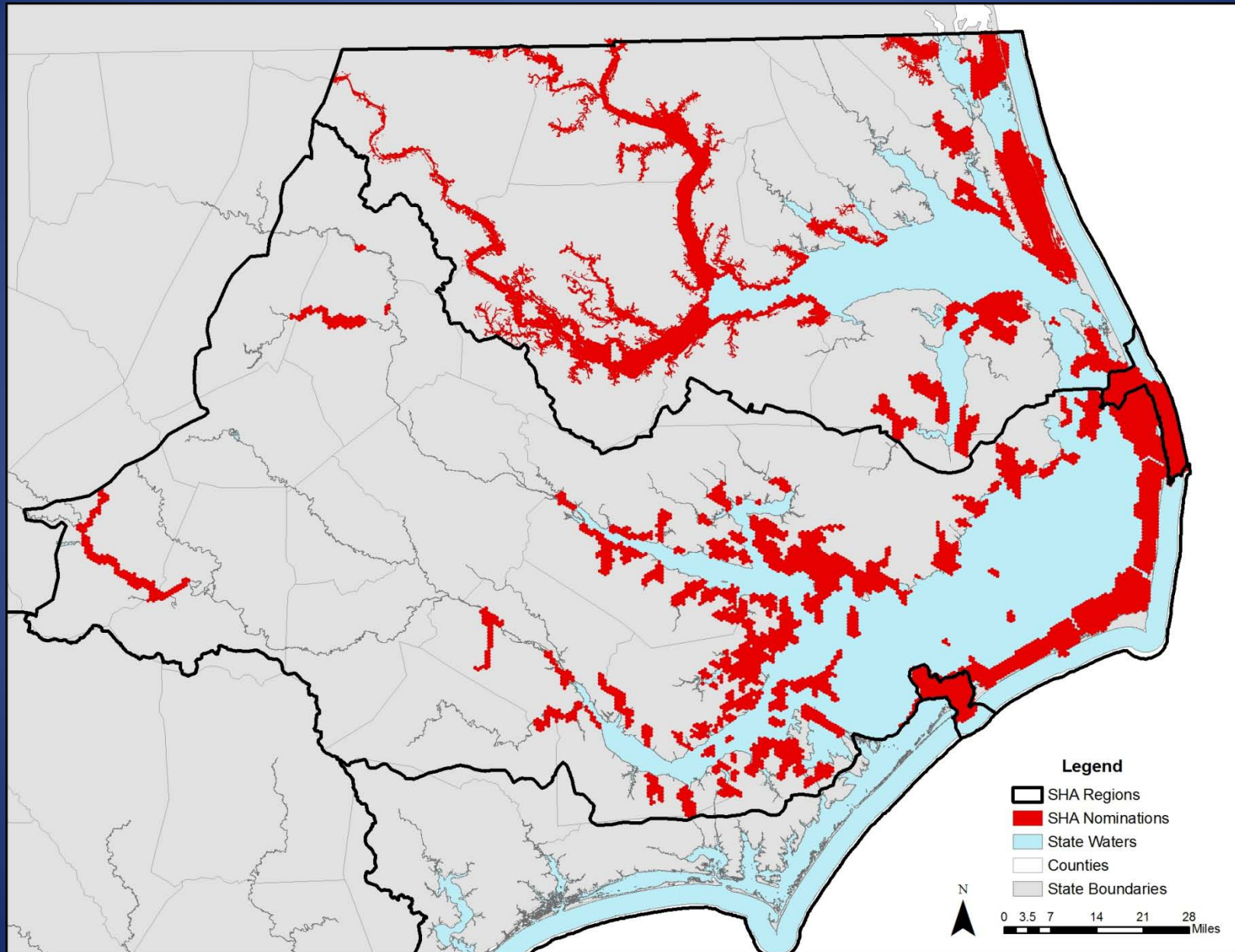




# Criteria for Expert Modification

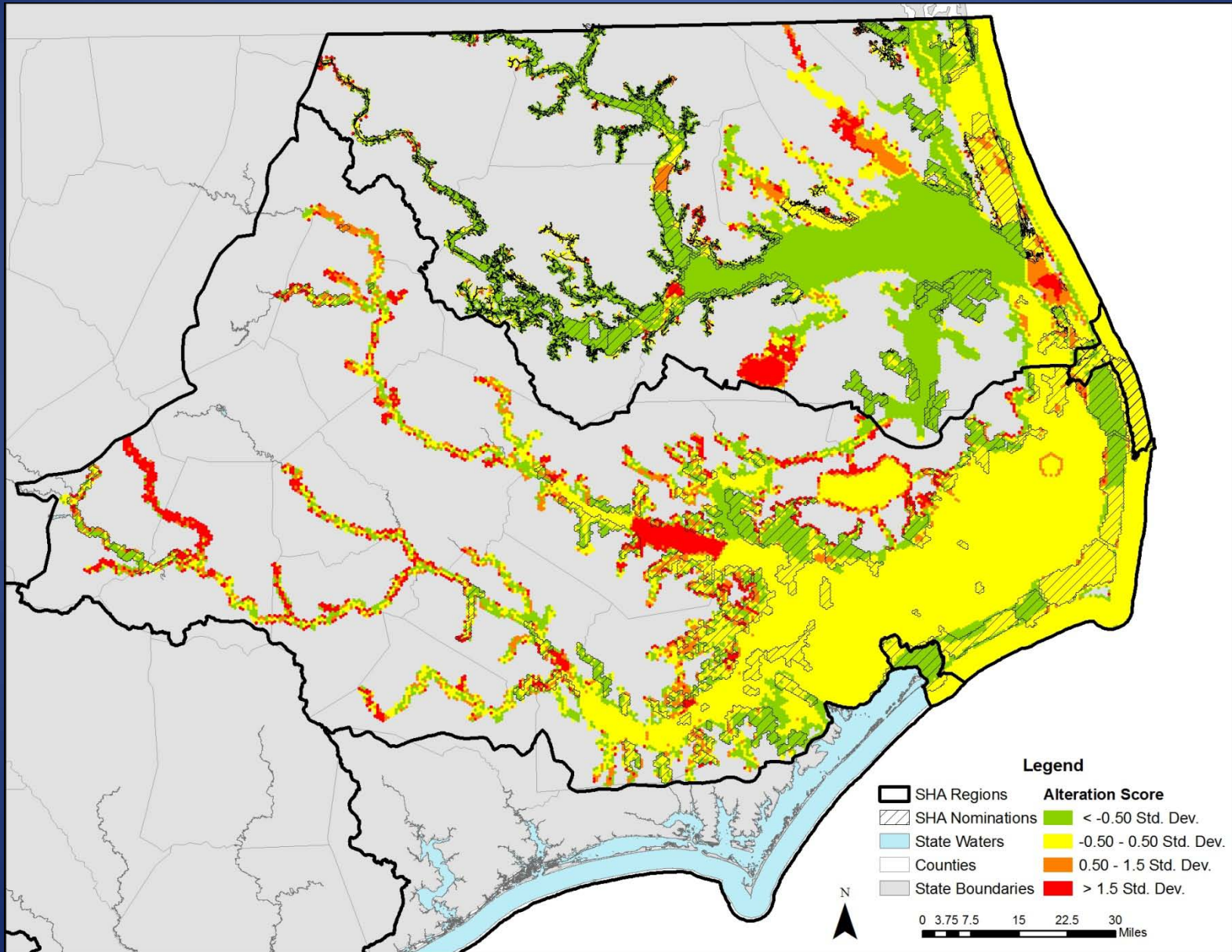
- Habitats present – rare, vulnerable, diverse
- Occurrence of ecological designations
- Alteration factors and ratings
- Selection frequency
- Fish data/information available (DMF or other)
- Water quality impairment status
- Size/isolation/connectivity/shape
- Regional importance of a functional area

# SHA Nominations

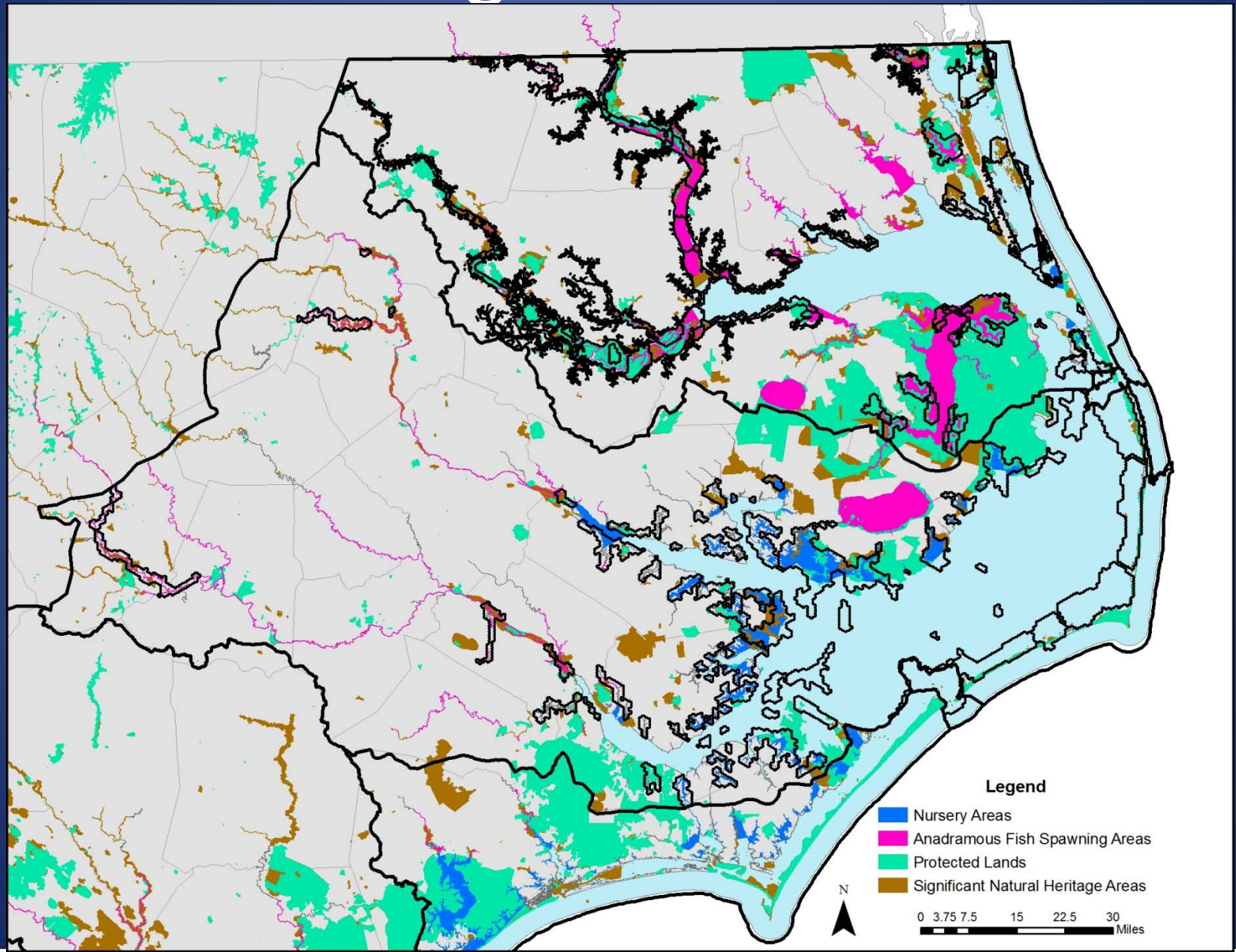




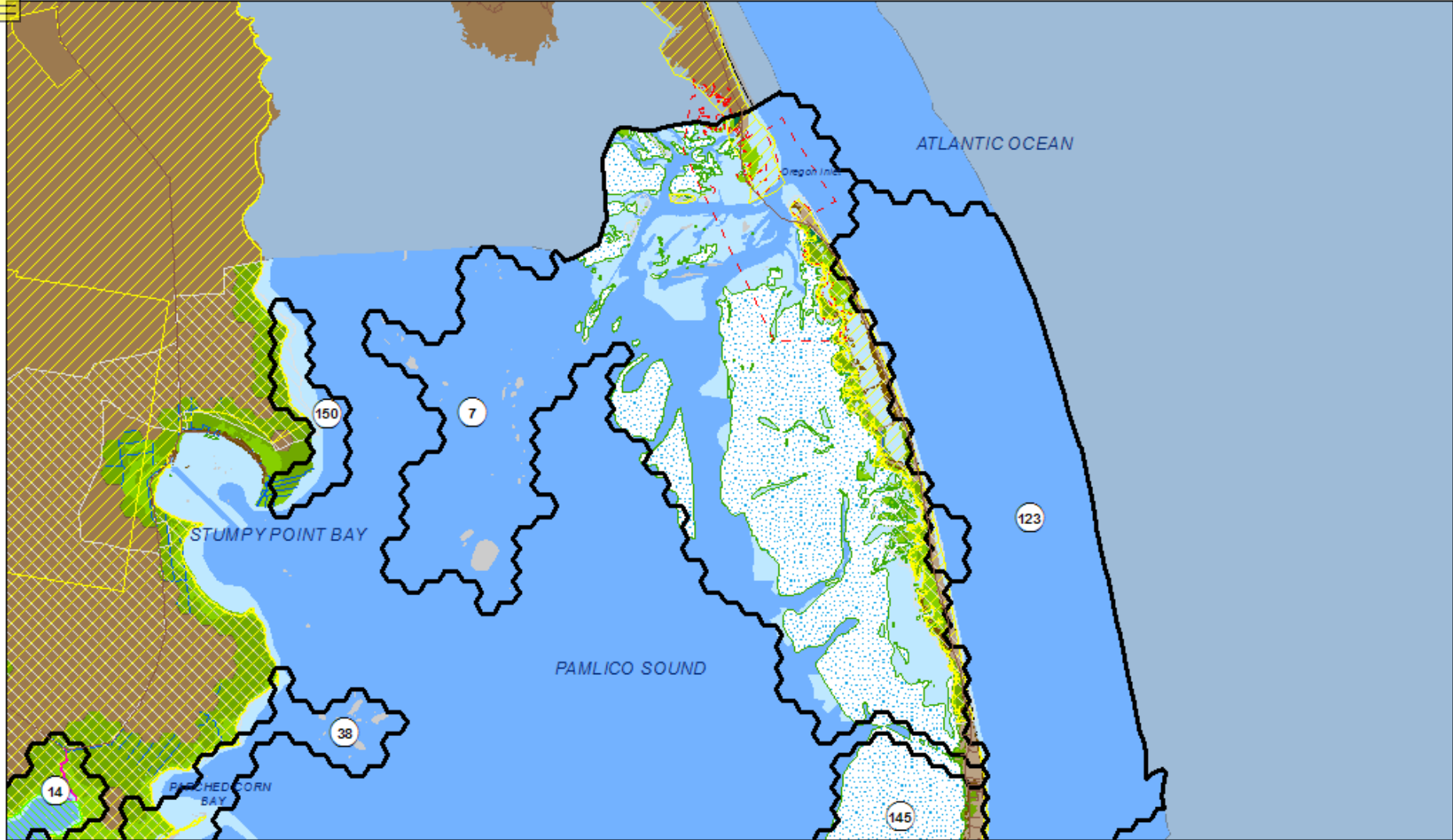
# Alteration vs. SHAs



# Designated Areas



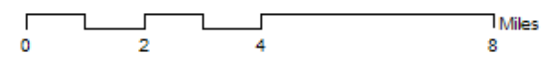


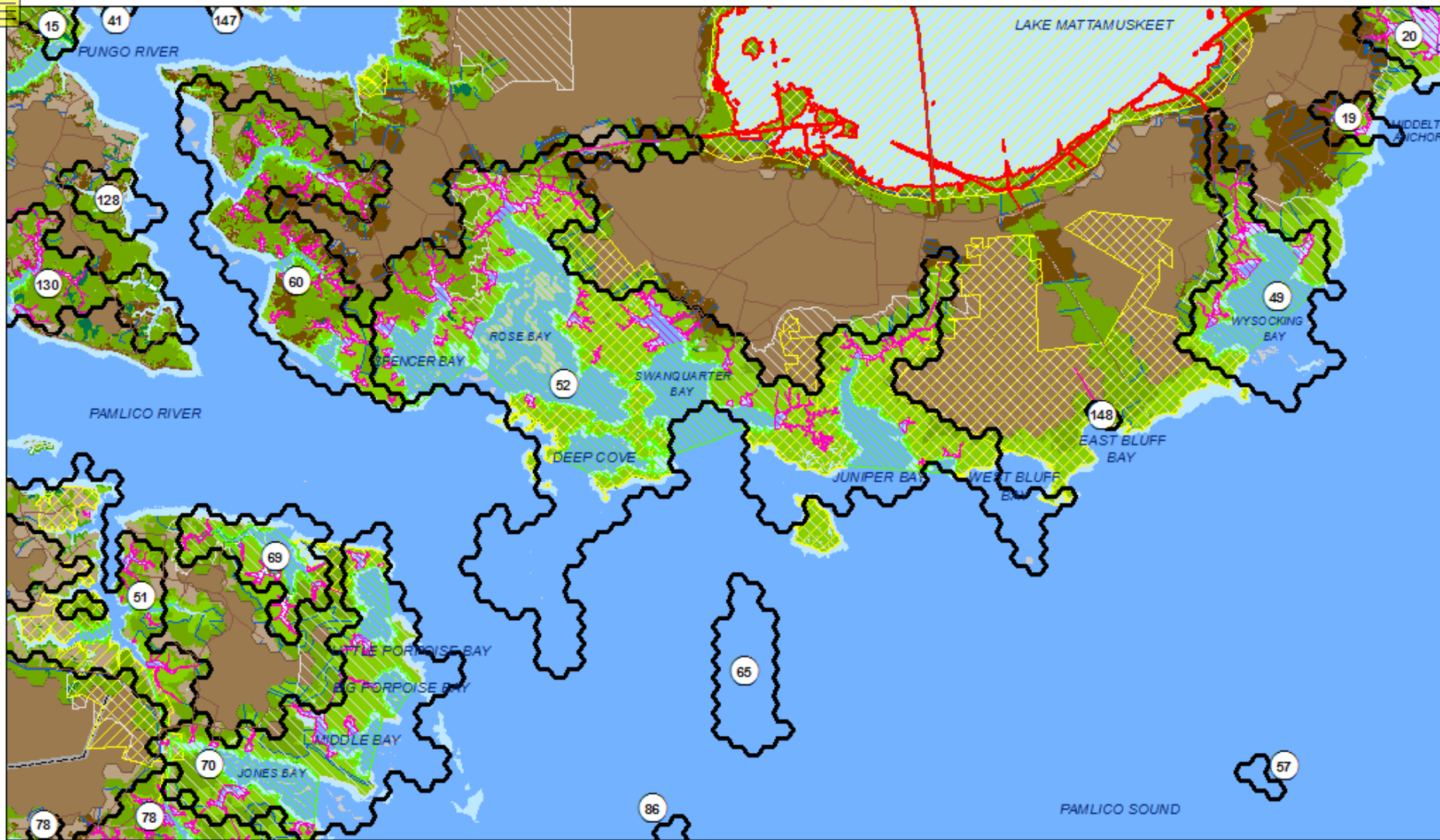


- Cities
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- ~ Stream
- ▭ SHA nominations
- ▭ County Boundaries
- ▭ Focus area
- ~ AFSA shorelines
- ▭ Primary Nursery Area
- ▭ Secondary Nursery Area
- ▭ Conservation lands
- ▭ Significant natural heritage areas
- ▭ Crab Spawning Sanctuaries

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- SAV
- Shell bottom
- Riverine hard bottom
- Riverine soft bottom
- Low elevation upland



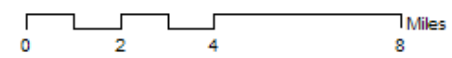


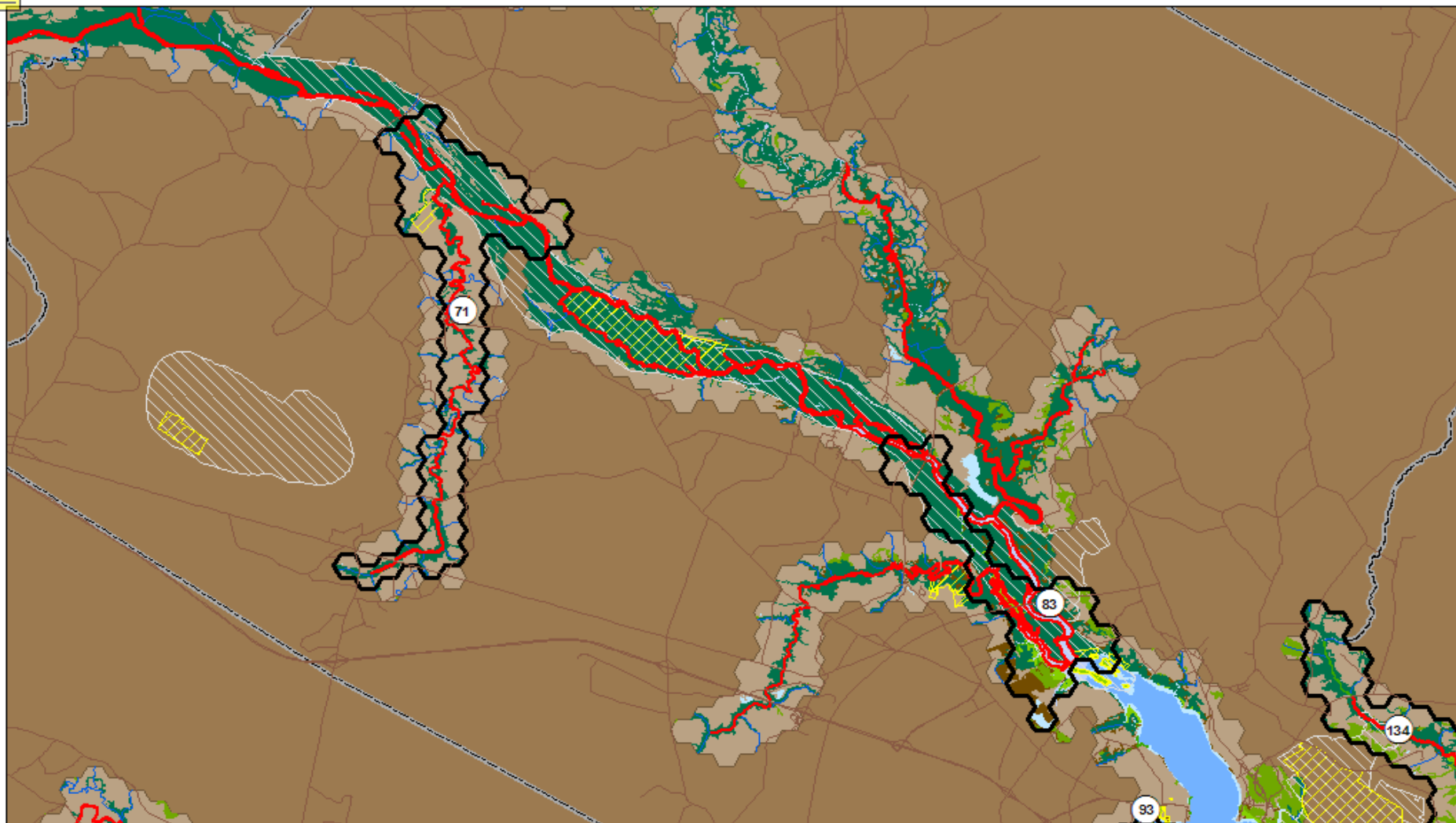
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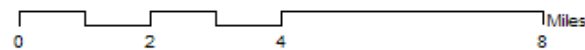




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# Potential Non-regulatory Actions

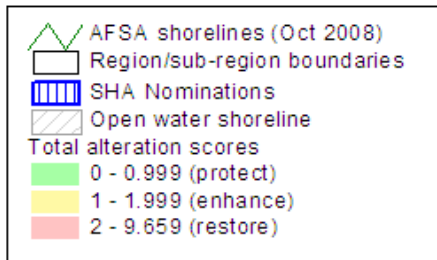
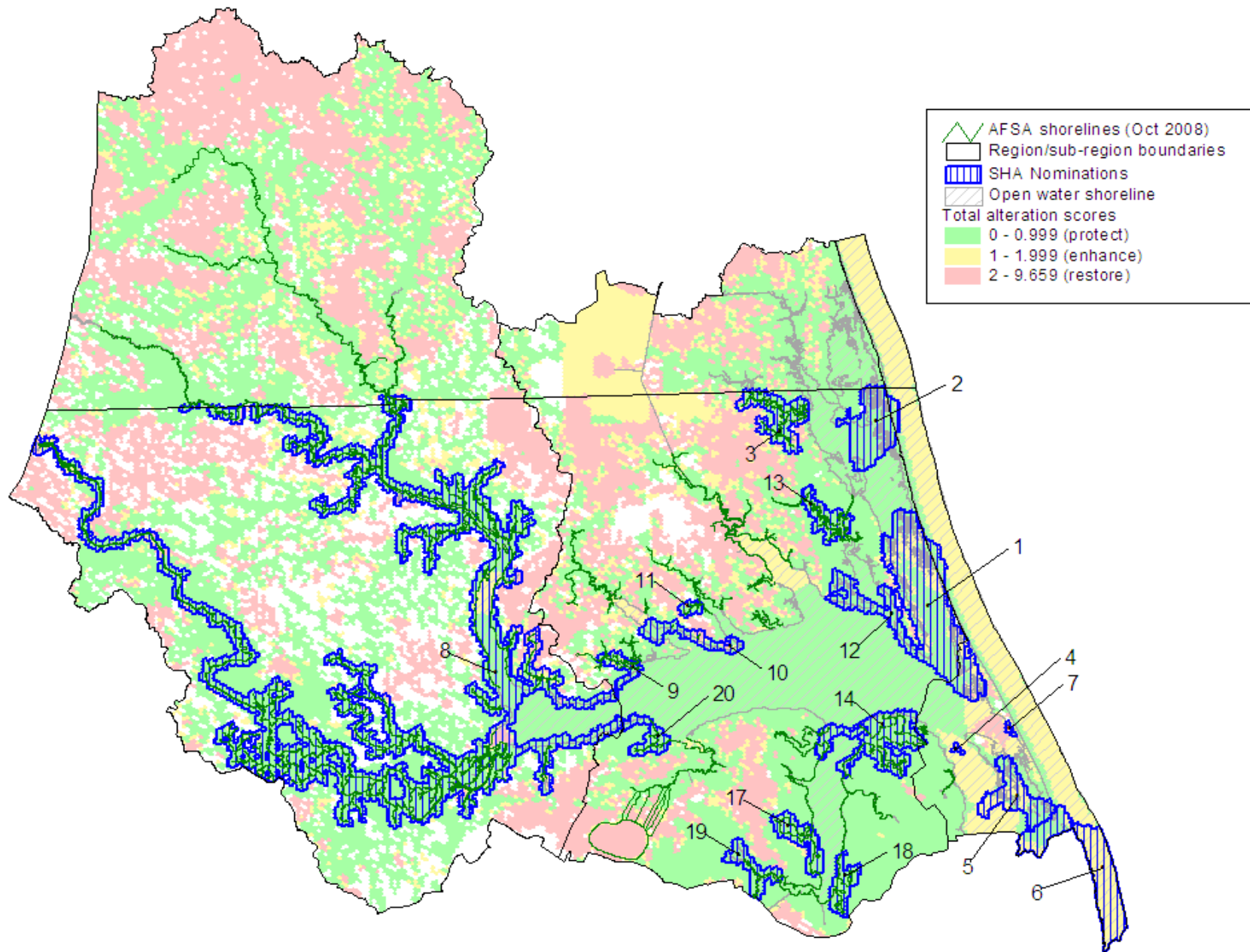
- Site specific based on area function, and type/severity of alteration
- Incorporate SHAs into land acquisition for conservation planning by environmental groups and federal, state, and local agencies
- Pursue restoration projects that would benefit SHAs
- Pursue funding for agriculture cost share programs to implement Best Management Practices near SHAs
- Utilize SHAs in local land use planning and permit reviews
- Prioritize funding for enhancement and restoration of fish passage, hydrology, and habitats
- Initiate monitoring of APNEP indicators within SHAs to assess trends

# Next Steps

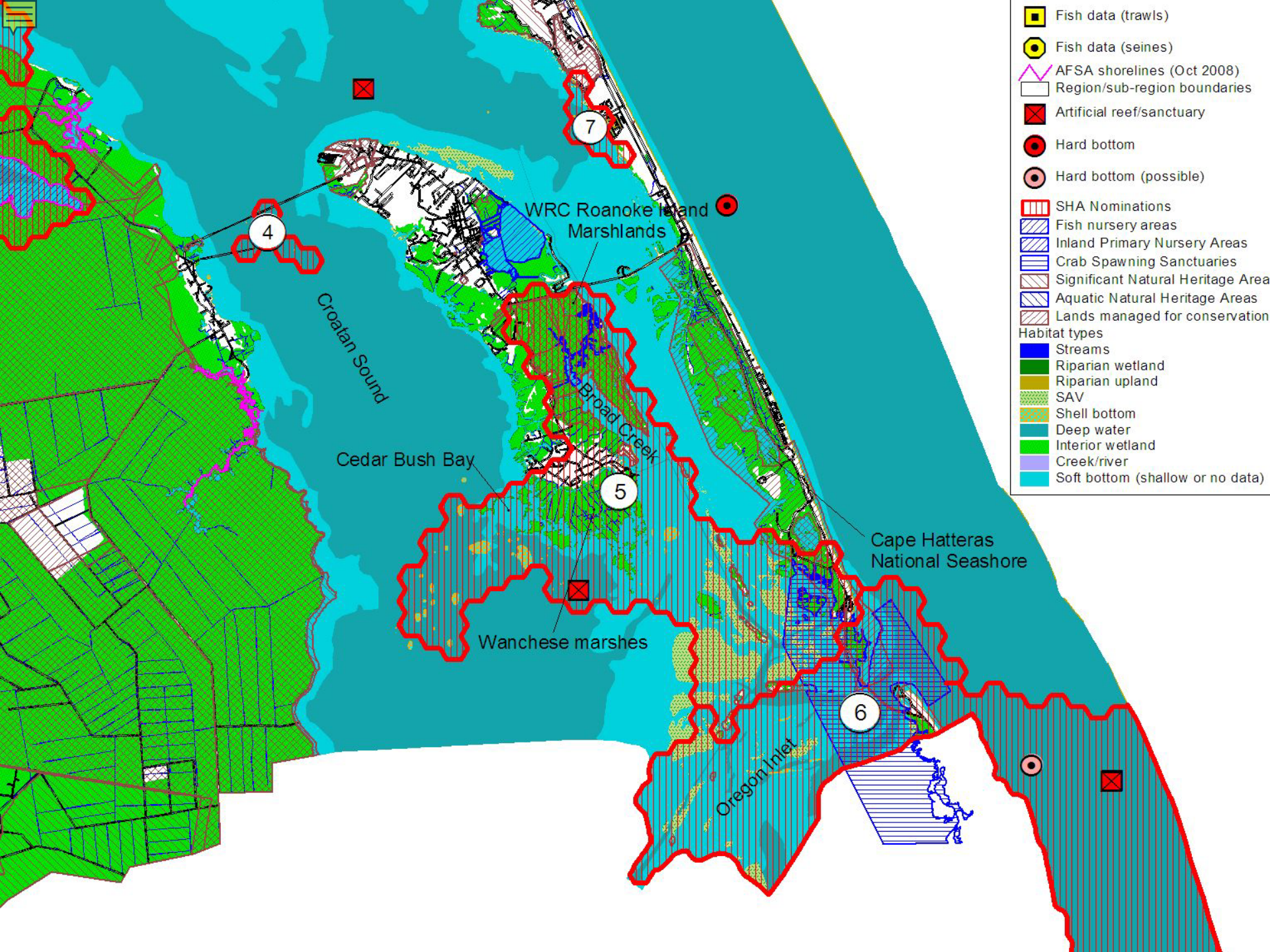
- No regulatory management measures proposed
- Ground truth sites
- Finish SHA analysis in regions 3&4

Questions?





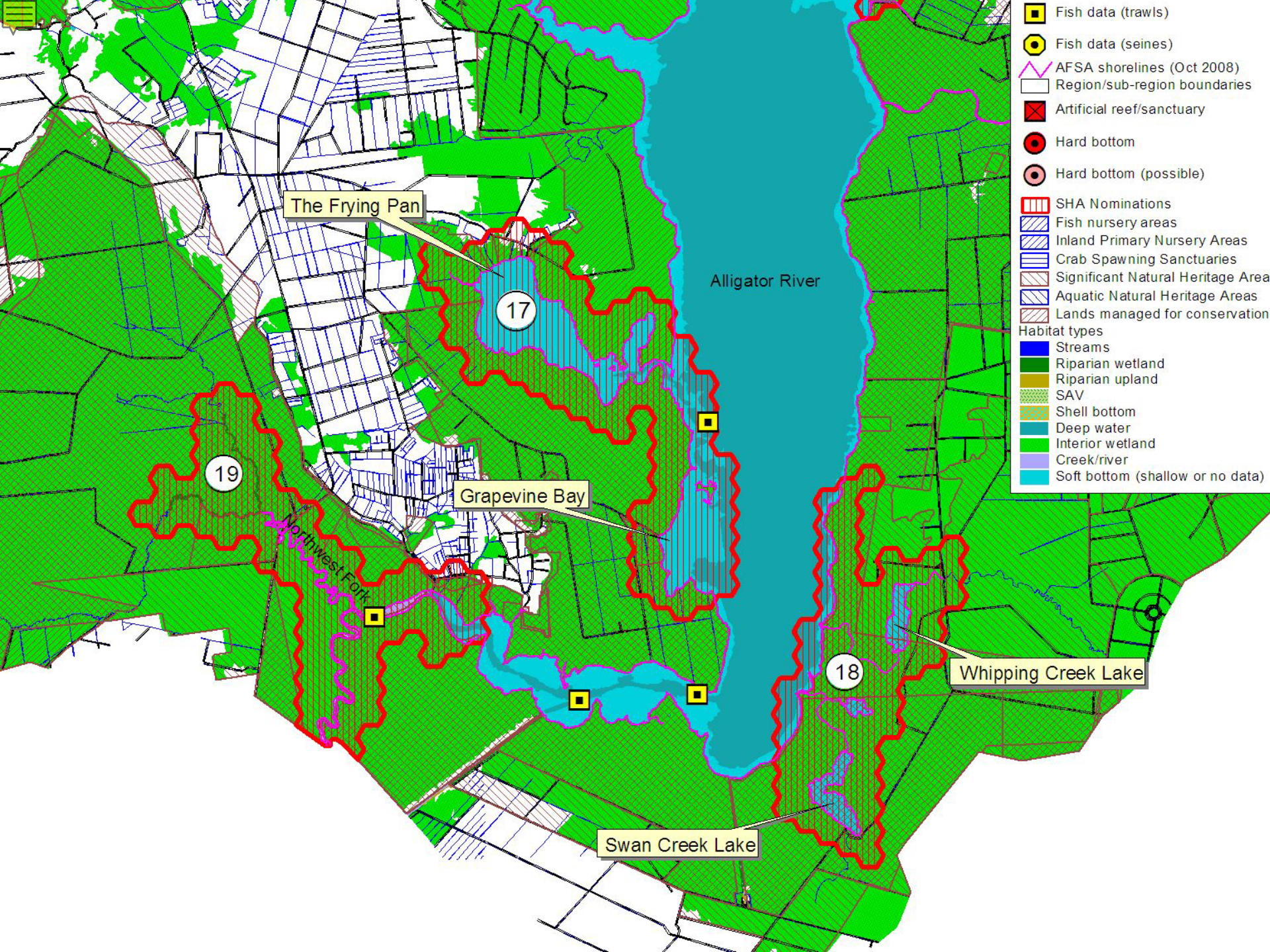




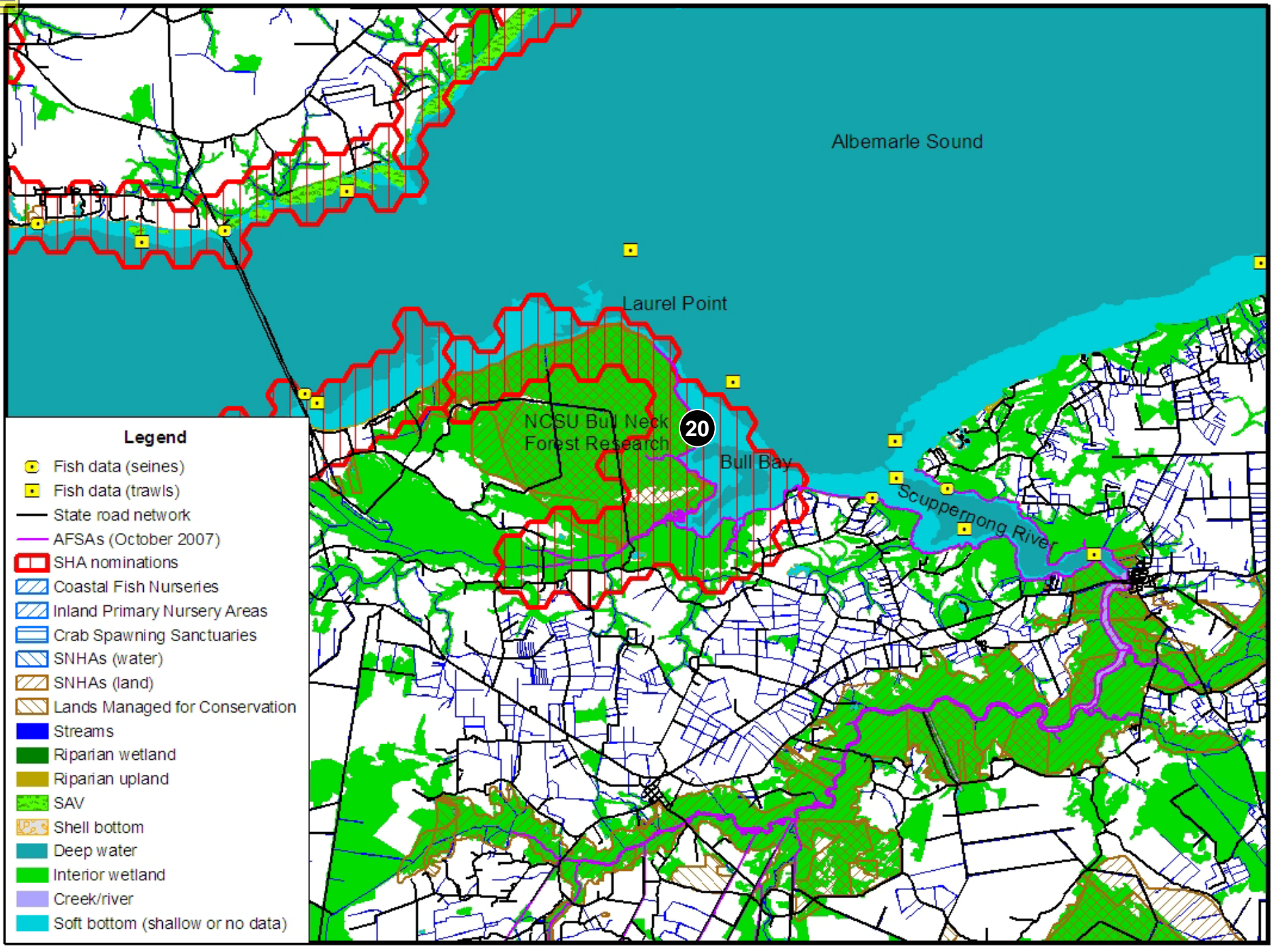












Albemarle Sound

Laurel Point

20

Bull Bay

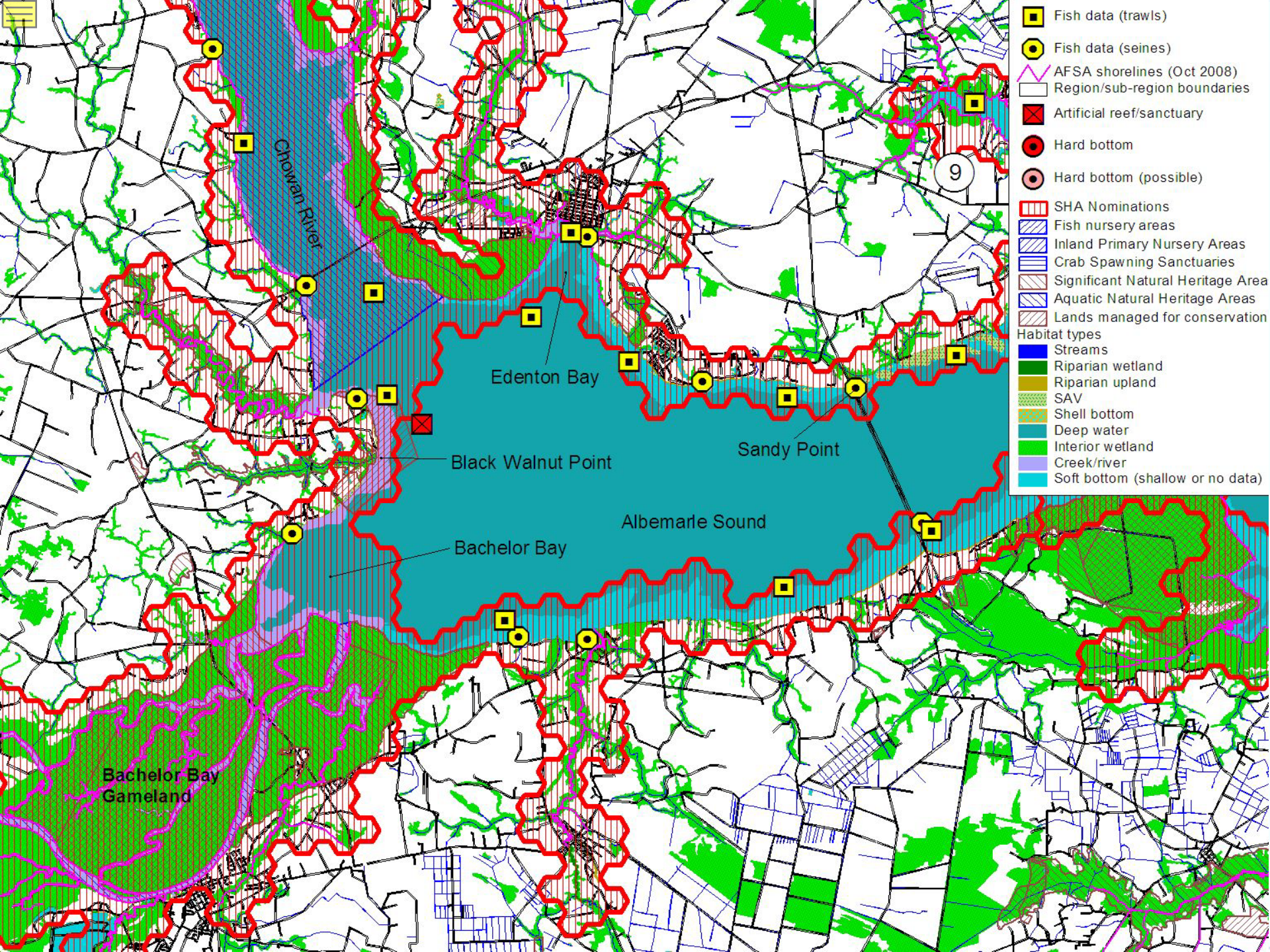
Scuppermong River

NCSU Bull Neck Forest Research

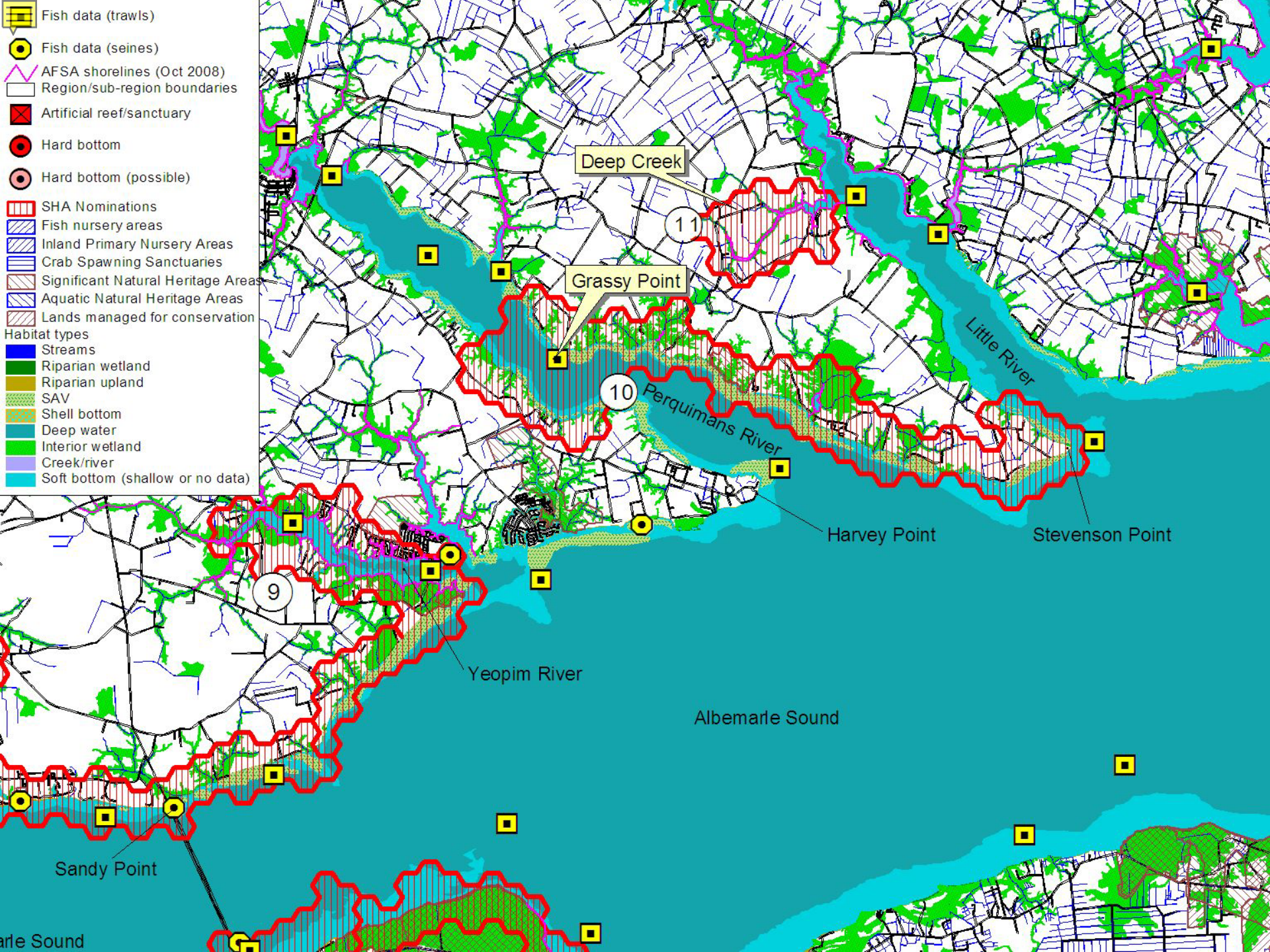
**Legend**

-  Fish data (seines)
-  Fish data (trawls)
-  State road network
-  AFSAs (October 2007)
-  SHA nominations
-  Coastal Fish Nurseries
-  Inland Primary Nursery Areas
-  Crab Spawning Sanctuaries
-  SNHAs (water)
-  SNHAs (land)
-  Lands Managed for Conservation
-  Streams
-  Riparian wetland
-  Riparian upland
-  SAV
-  Shell bottom
-  Deep water
-  Interior wetland
-  Creek/river
-  Soft bottom (shallow or no data)

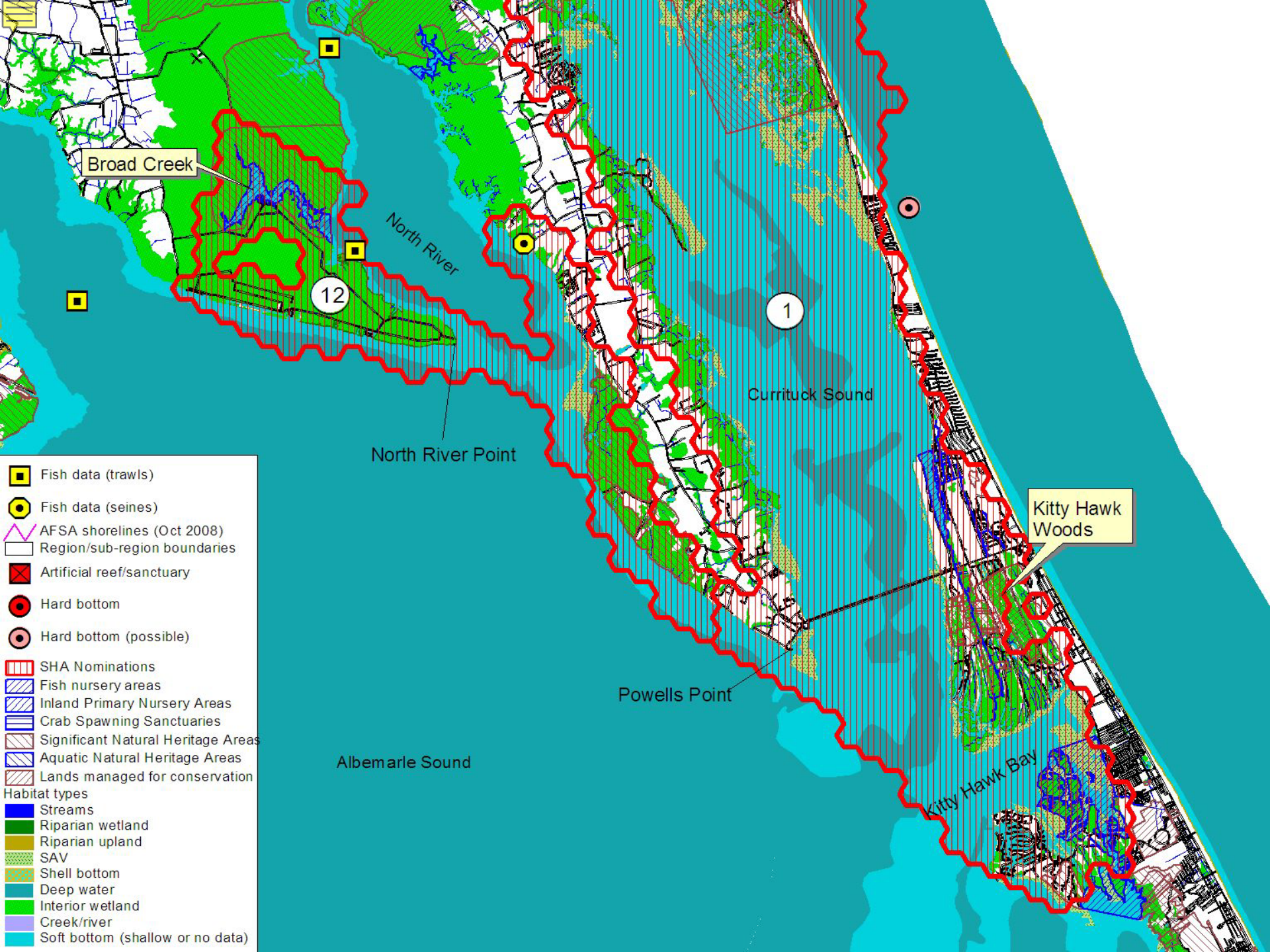












Broad Creek

North River

12

1

Currituck Sound

North River Point

Powells Point

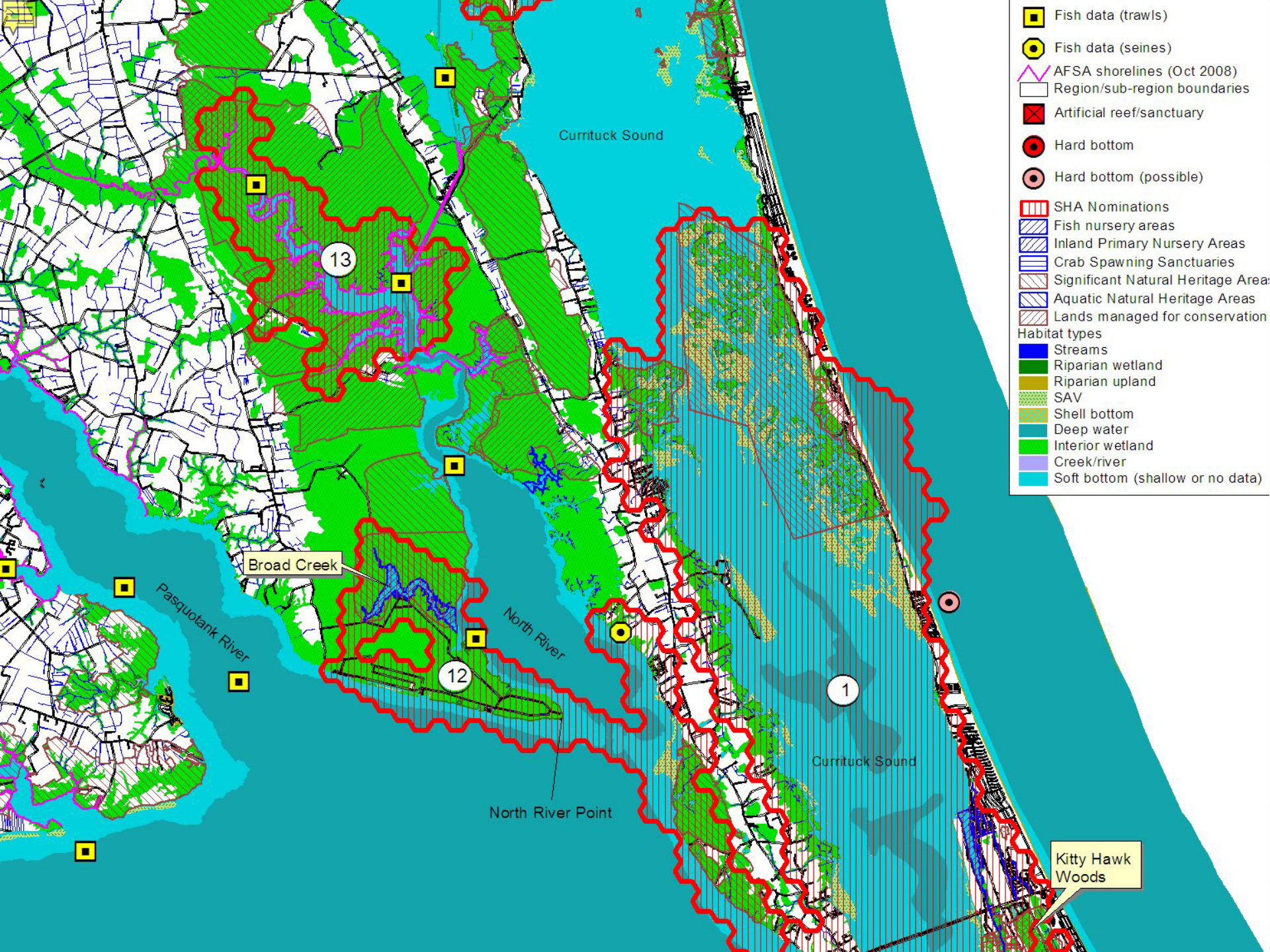
Albemarle Sound

Kitty Hawk Bay

Kitty Hawk Woods

- Fish data (trawls)
- Fish data (seines)
- AFSA shorelines (Oct 2008)
- Region/sub-region boundaries
- Artificial reef/sanctuary
- Hard bottom
- Hard bottom (possible)
- SHA Nominations
- Fish nursery areas
- Inland Primary Nursery Areas
- Crab Spawning Sanctuaries
- Significant Natural Heritage Areas
- Aquatic Natural Heritage Areas
- Lands managed for conservation
- Habitat types**
- Streams
- Riparian wetland
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Broad Creek

Pasquotank River

North River

North River Point

Currituck Sound

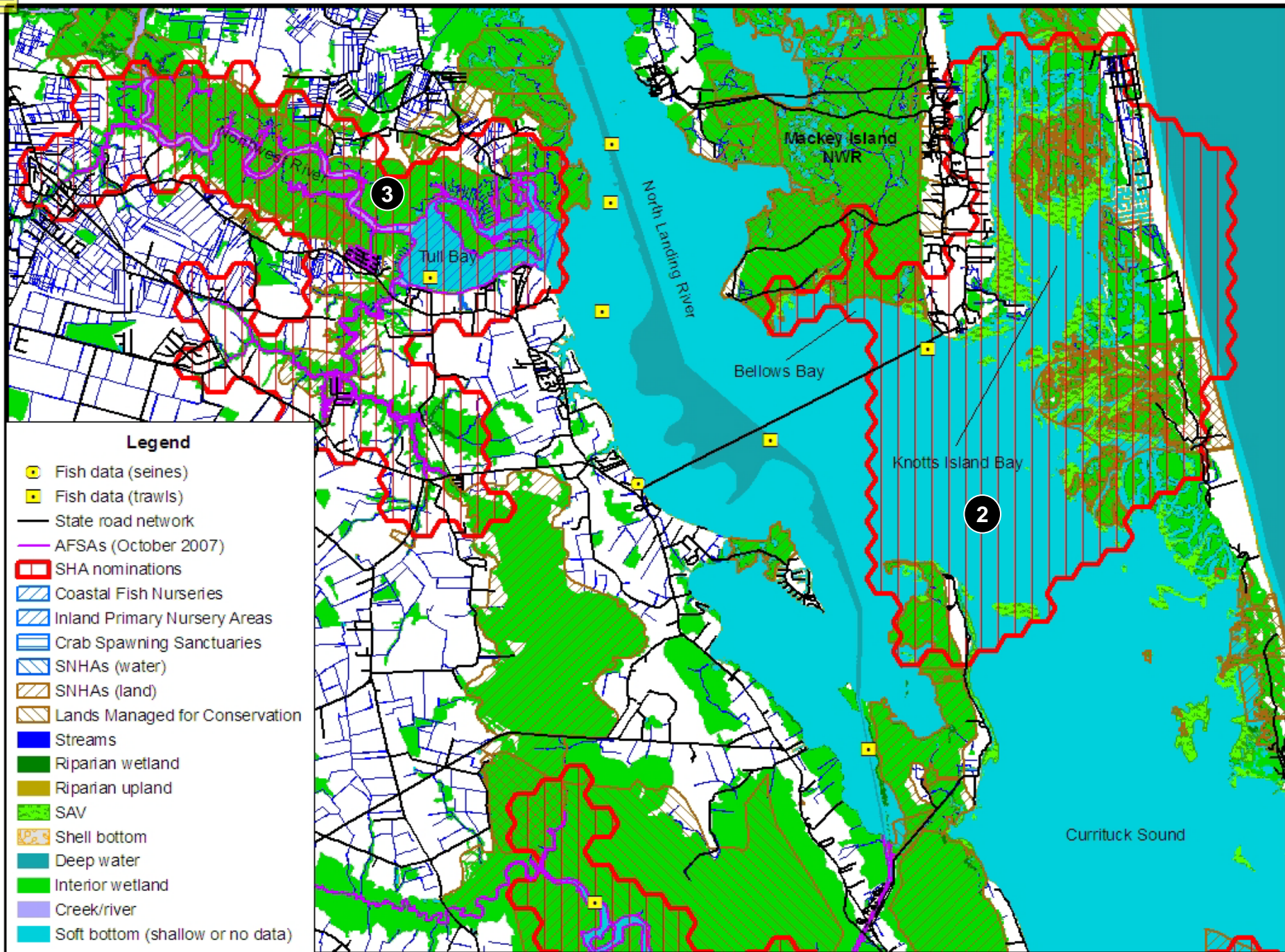
Kitty Hawk Woods

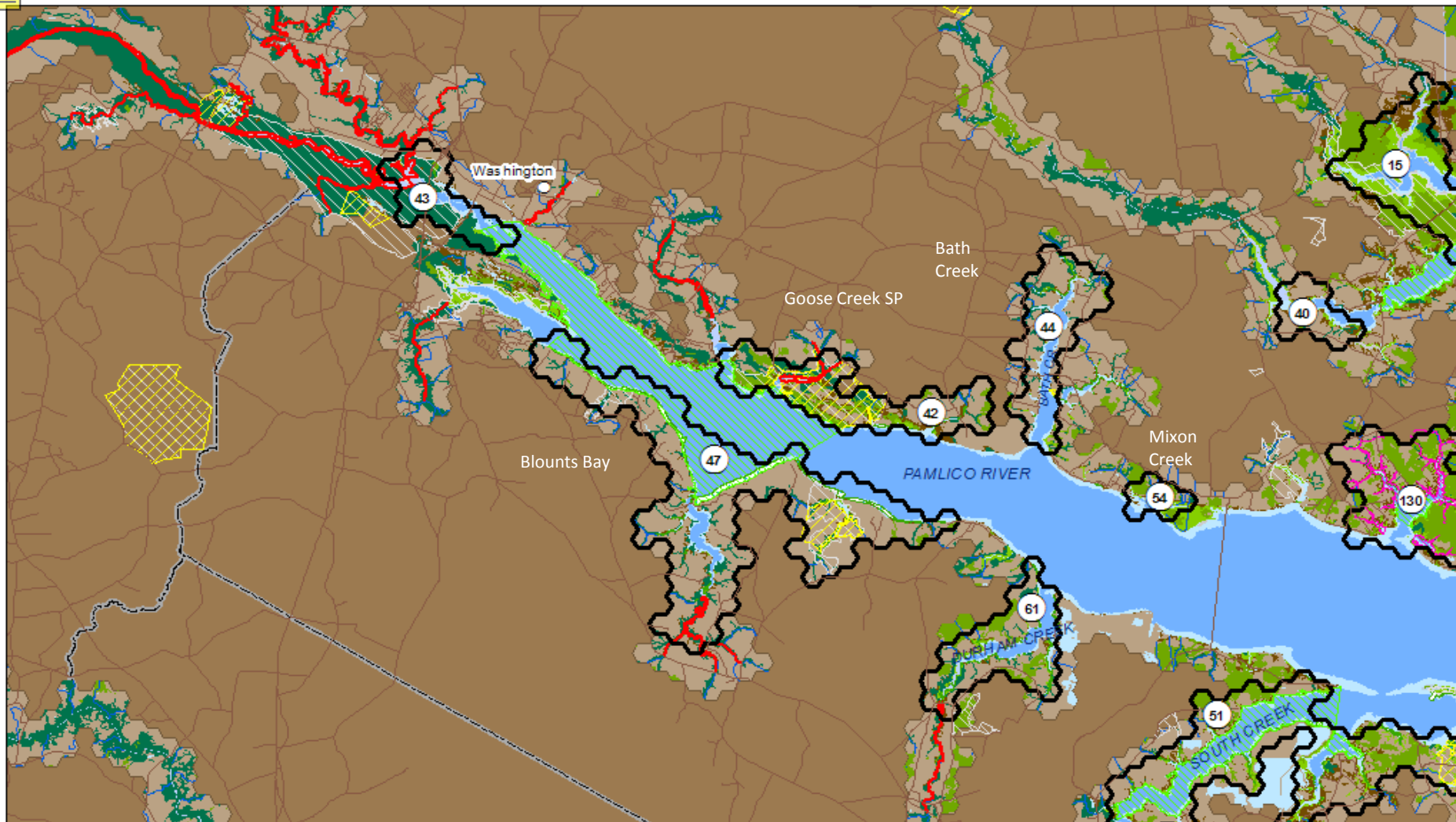
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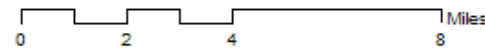


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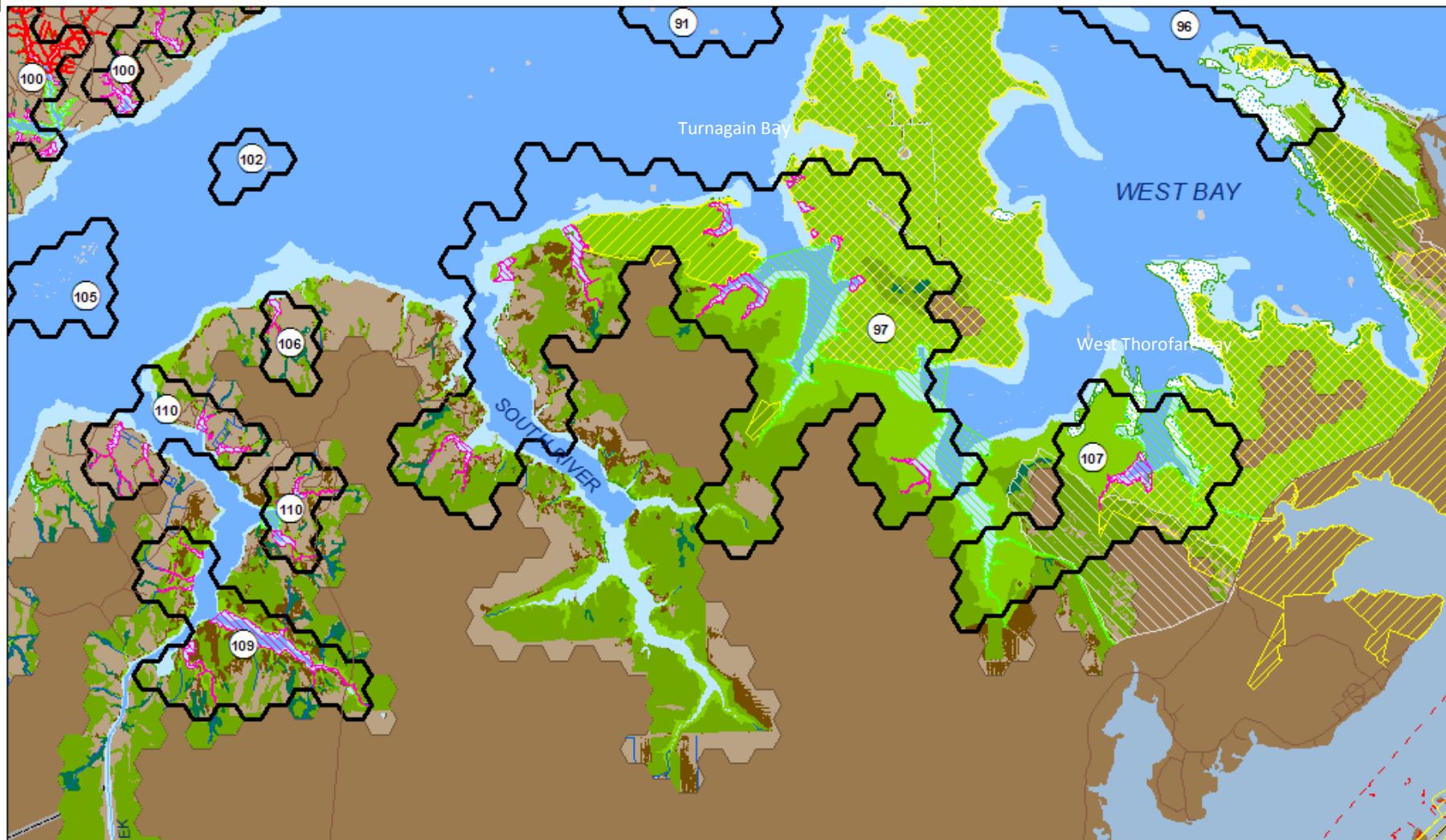
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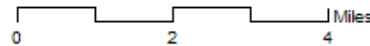
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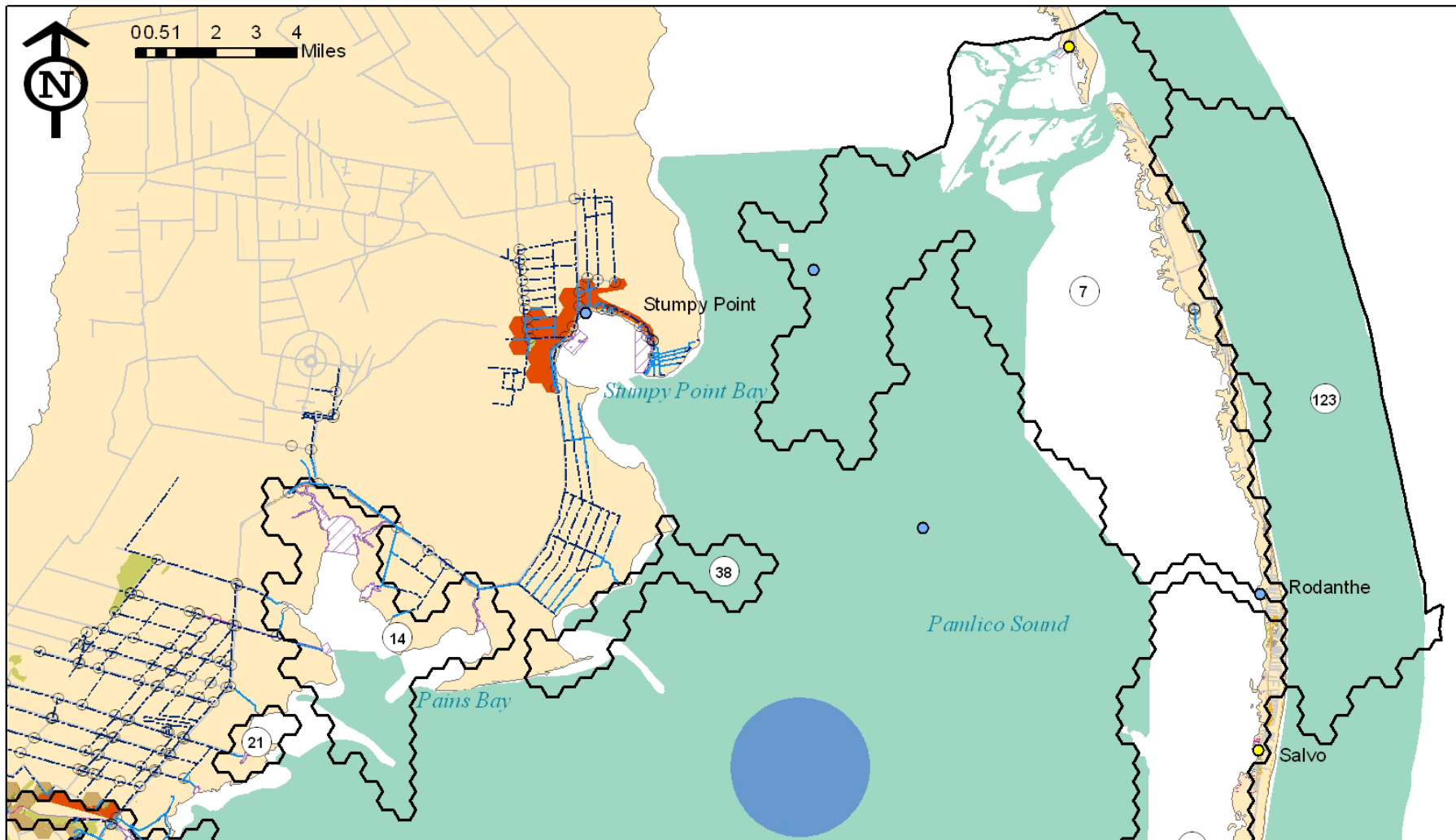
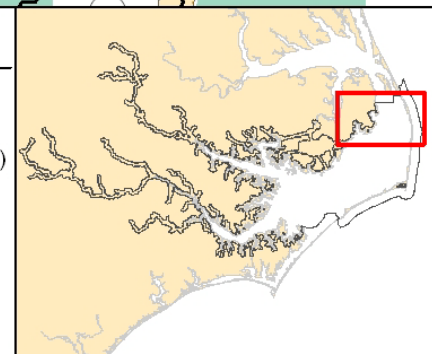


Figure 3. Region 2 SHAs with alteration factors.

SHAs streams roads

**Alterations**

- |                      |                         |                           |                         |
|----------------------|-------------------------|---------------------------|-------------------------|
| ----- Ditches        | ▭ Dredged channels      | ▨ Prohibited shellfishing | ▬ Seawalls              |
| — Channelized str.   | ▭ Drained wetlands      | ▨ Bottom disturbing gear  | ● Aquaculture           |
| □ Dams               | ▭ Wetlands lost to Dev. | ▨ MPRA restricted         | ● Marinas (>10 slips)   |
| ○ Culverts           | ▭ Wetlands lost to Agr. | ▨ Impounded               | ● NPDES discharge sites |
| ▭ Canals/boat basins | ▭ Riparian upland dev.  | ▨ Culvert obstructed      | ● Major                 |
| ▭ Ind. waste ponds   | ▭ Riparian Upland Agr.  | ▨ Storm gate obstructed   | ● Minor                 |





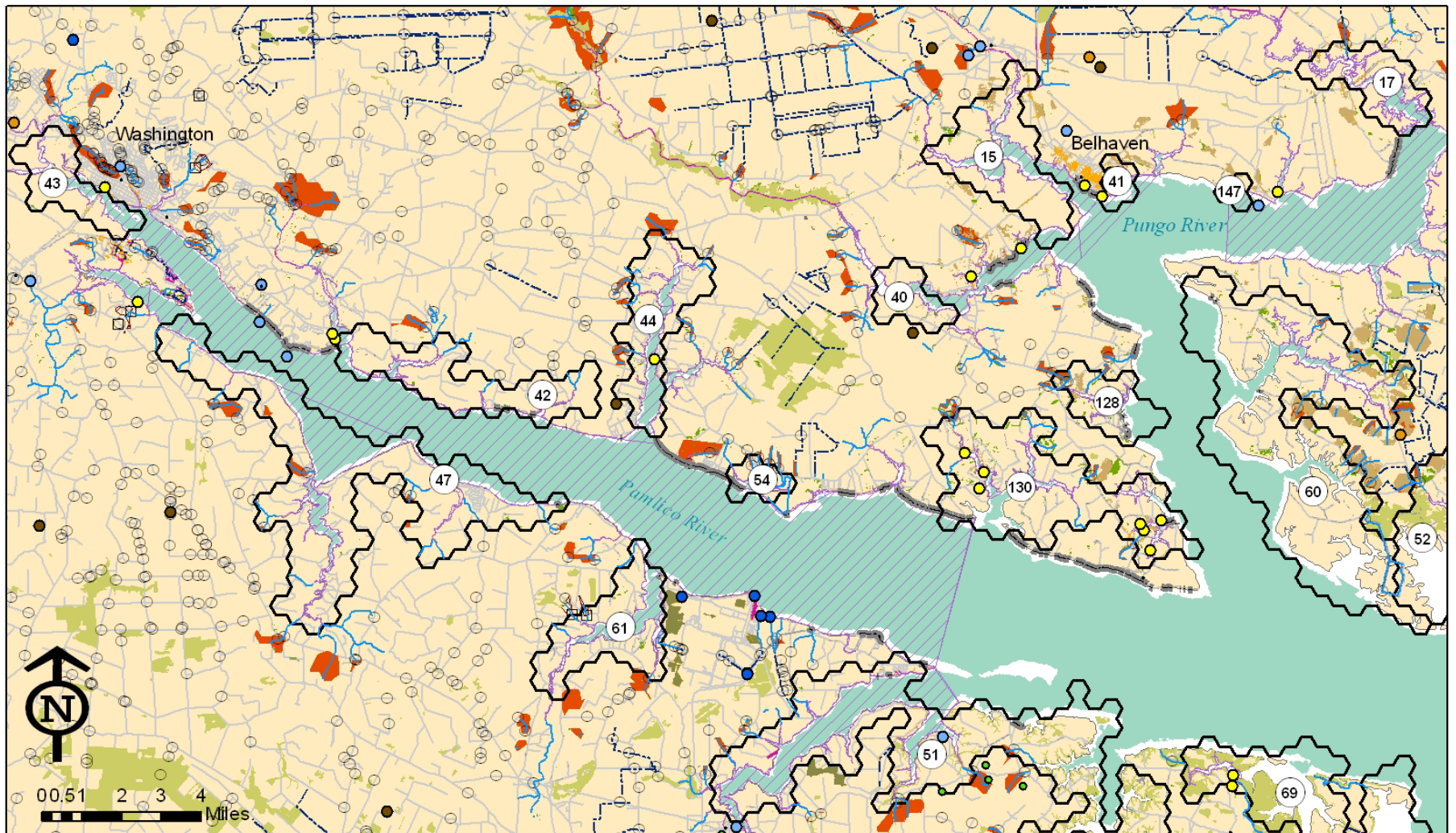
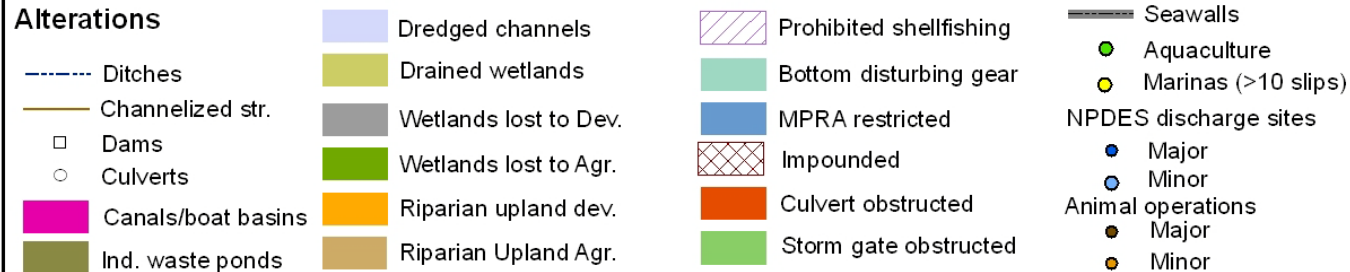


Figure 1. Region 2 SHAs with alteration factors.

**Alterations**





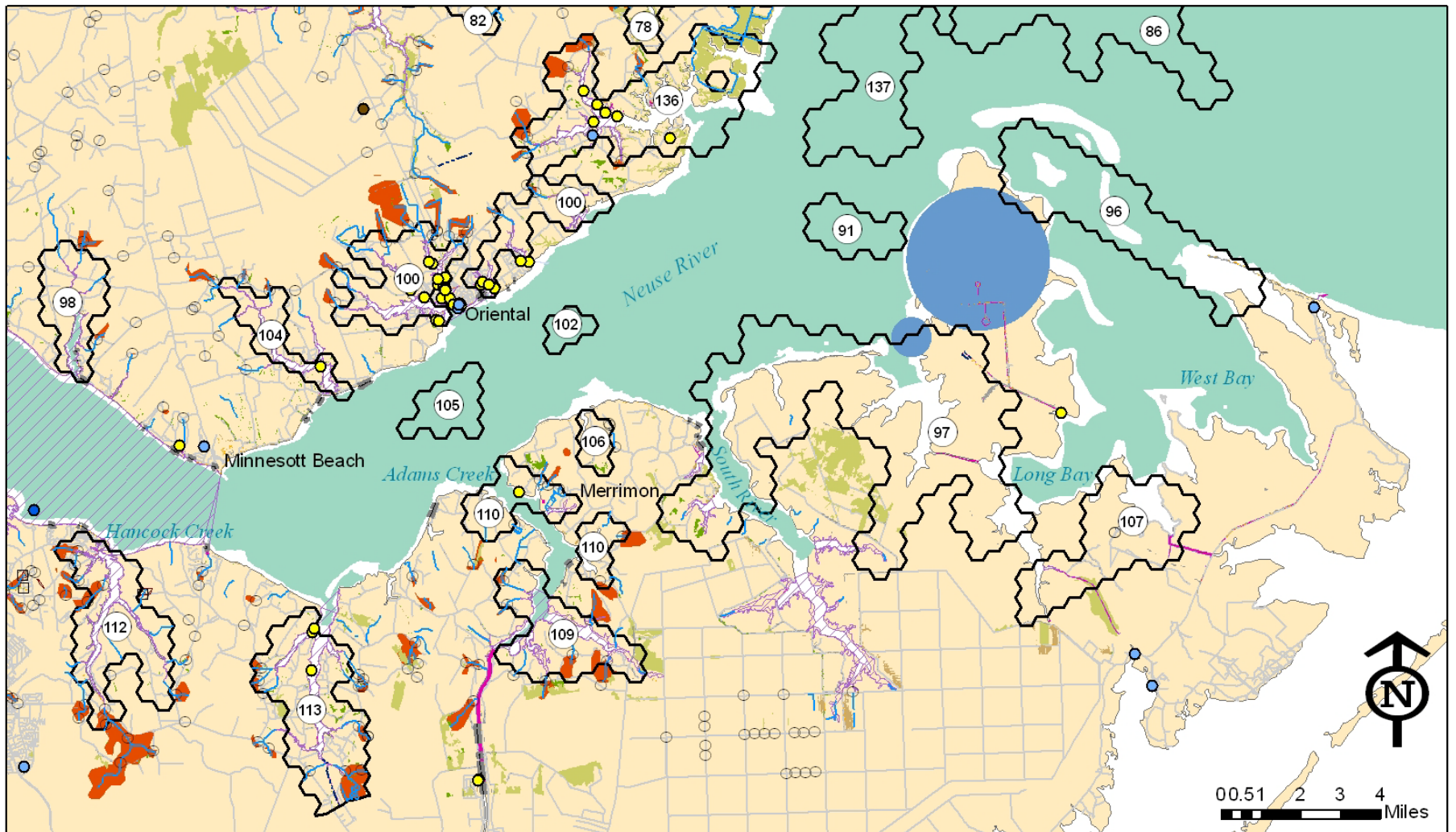


Figure 7. Region 2 SHAs with alteration factors.

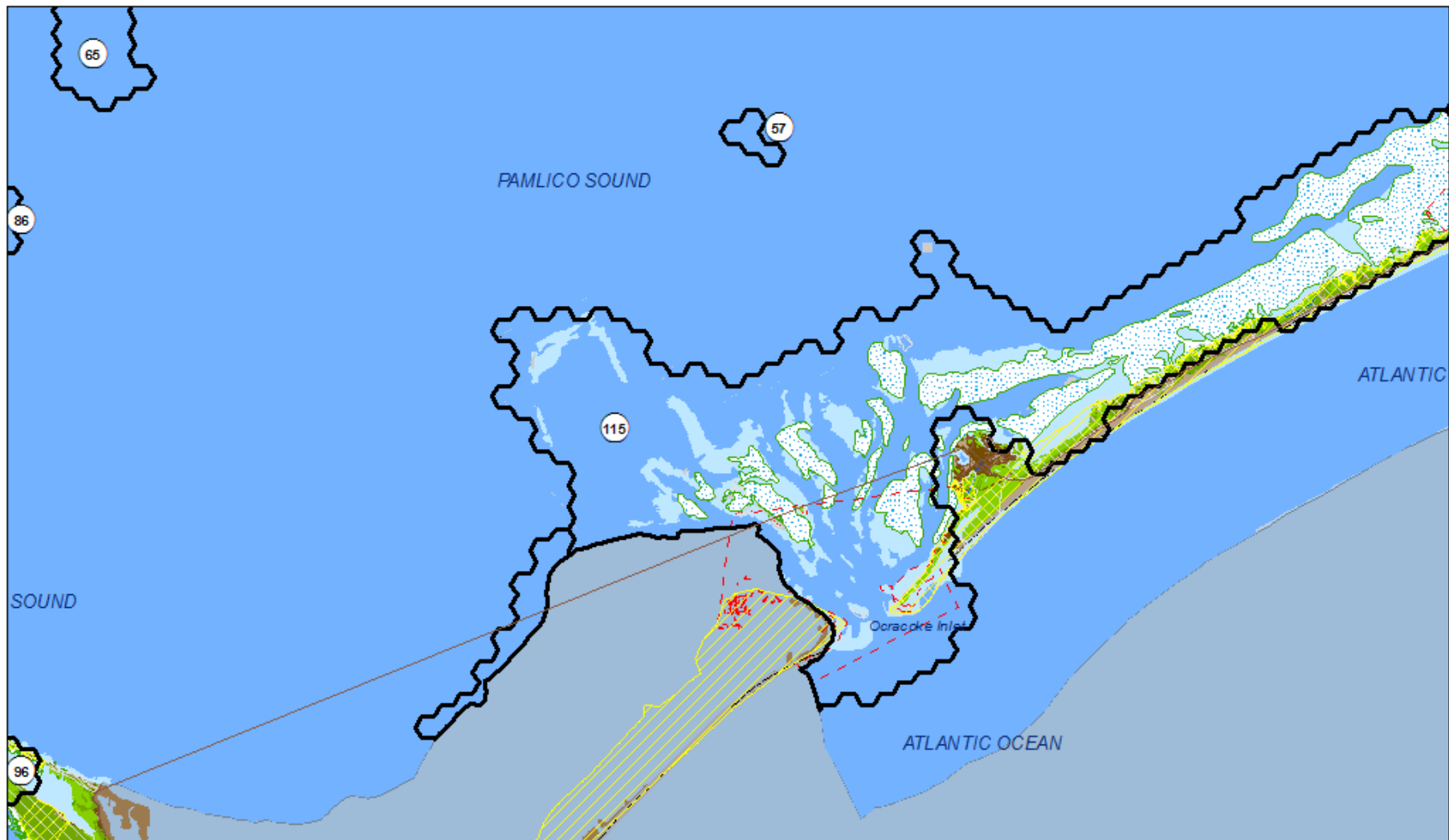
SHAs
 — streams
 — roads

**Alterations**

- |   |  |  |   |
|---|--|--|---|
| <ul style="list-style-type: none"> <li>----- Ditches</li> <li>— Channelized str.</li> <li>□ Dams</li> <li>○ Culverts</li> <li>█ Canals/boat basins</li> <li>█ Ind. waste ponds</li> </ul> | <ul style="list-style-type: none"> <li>█ Dredged channels</li> <li>█ Drained wetlands</li> <li>█ Wetlands lost to Dev.</li> <li>█ Wetlands lost to Agr.</li> <li>█ Riparian upland dev.</li> <li>█ Riparian Upland Agr.</li> </ul> | <ul style="list-style-type: none"> <li>▨ Prohibited shellfishing</li> <li>█ Bottom disturbing gear</li> <li>█ MPRA restricted</li> <li>▨ Impounded</li> <li>█ Culvert obstructed</li> <li>█ Storm gate obstructed</li> </ul> | <ul style="list-style-type: none"> <li>— Seawalls</li> <li>● Aquaculture</li> <li>● Marinas (&gt;10 slips)</li> <li>NPDES discharge sites</li> <li>● Major</li> <li>● Minor</li> <li>Animal operations</li> <li>● Major</li> <li>● Minor</li> </ul> |
|---|--|--|---|





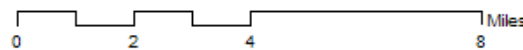


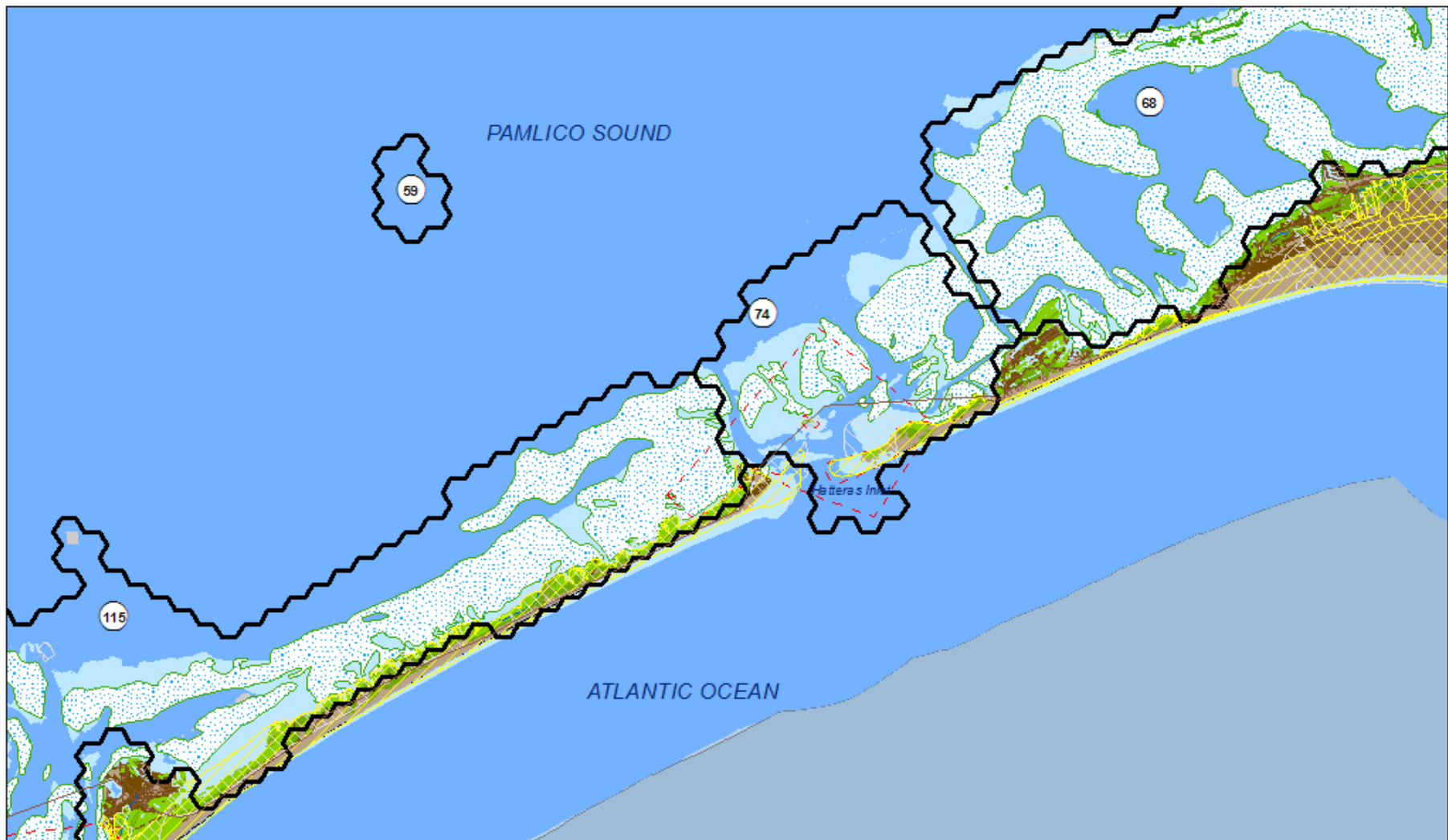
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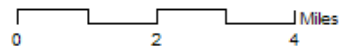


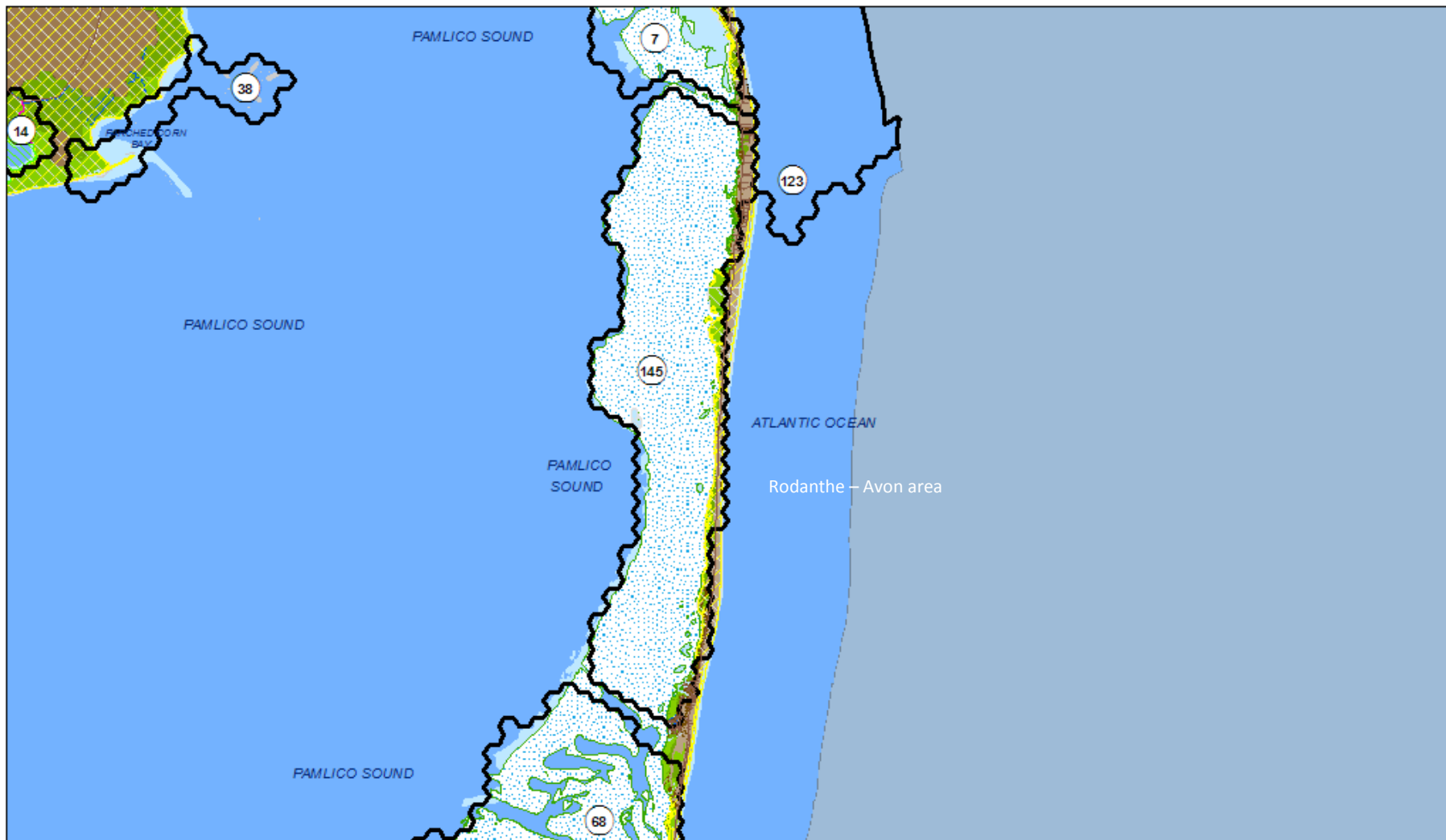


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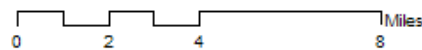


- Cities
- ~ Roads
- ~ Stream
- ▭ SHA nominations
- ▭ County Boundaries
- ▭ Focus area

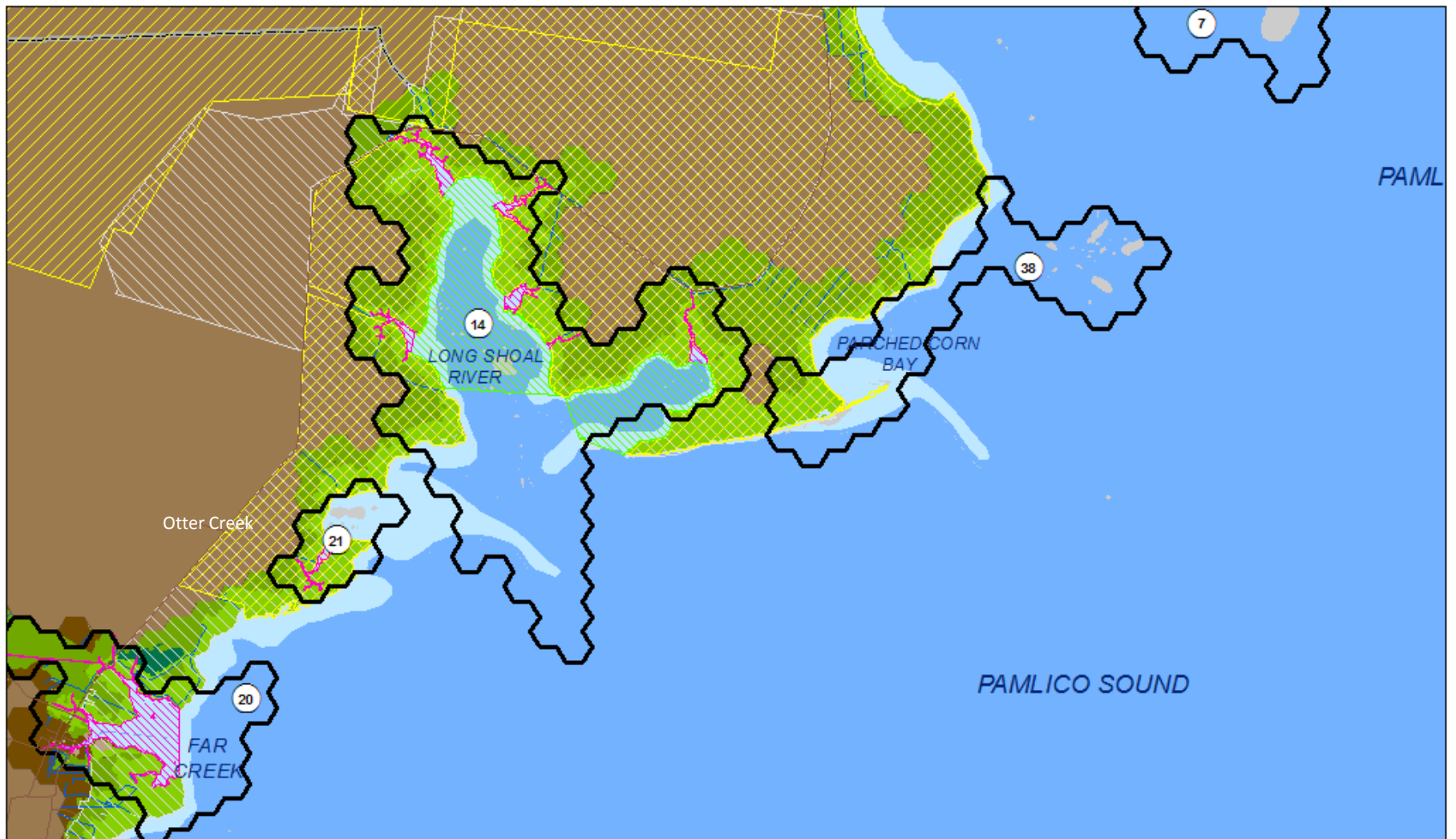
- ~ AFSA shorelines
- ▨ Primary Nursery Area
- ▨ Secondary Nursery Area
- ▨ Conservation lands
- ▨ Significant natural heritage areas
- ▨ Crab Spawning Sanctuaries

**Habitat type**

- Emergent wetland
- Forested wetland
- Wetland
- Shallow soft bottom
- Deep soft bottom
- SAV
- Shell bottom
- Riverine hard bottom
- Riverine soft bottom
- Low elevation upland





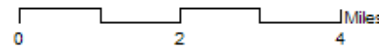


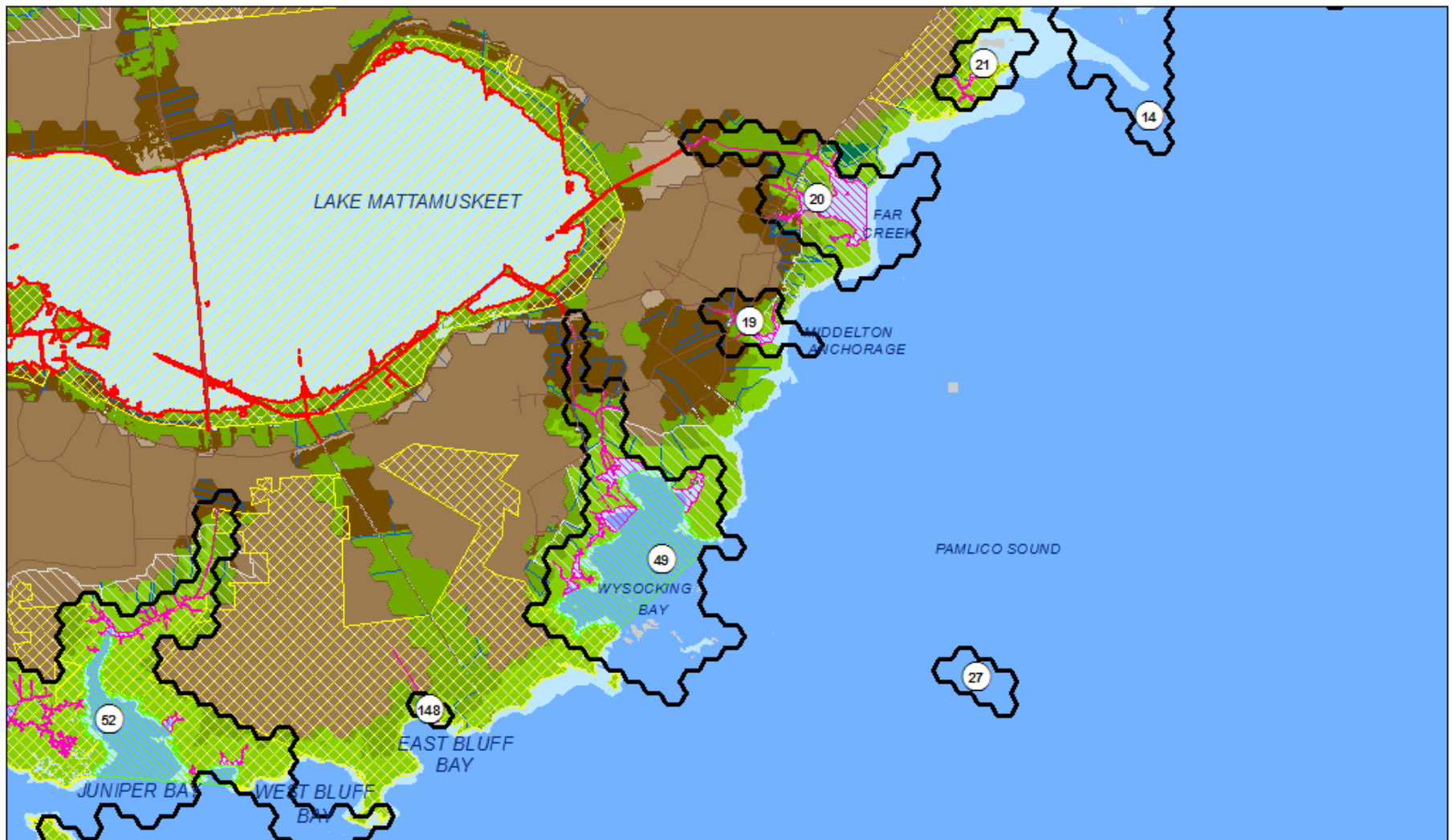
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- ▭ Shell bottom
- ▭ Riverine hard bottom
- ▭ Riverine soft bottom
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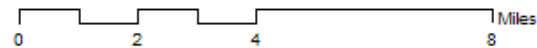




- |                     |                                      |
|---------------------|--------------------------------------|
| ○ Cities            | ~ AFSA shorelines                    |
| ~ Roads             | ▨ Primary Nursery Area               |
| ~ Stream            | ▨ Secondary Nursery Area             |
| ▭ SHA nominations   | ▨ Conservation lands                 |
| ▭ County Boundaries | ▨ Significant natural heritage areas |
| ▭ Focus area        | ▨ Crab Spawning Sanctuaries          |

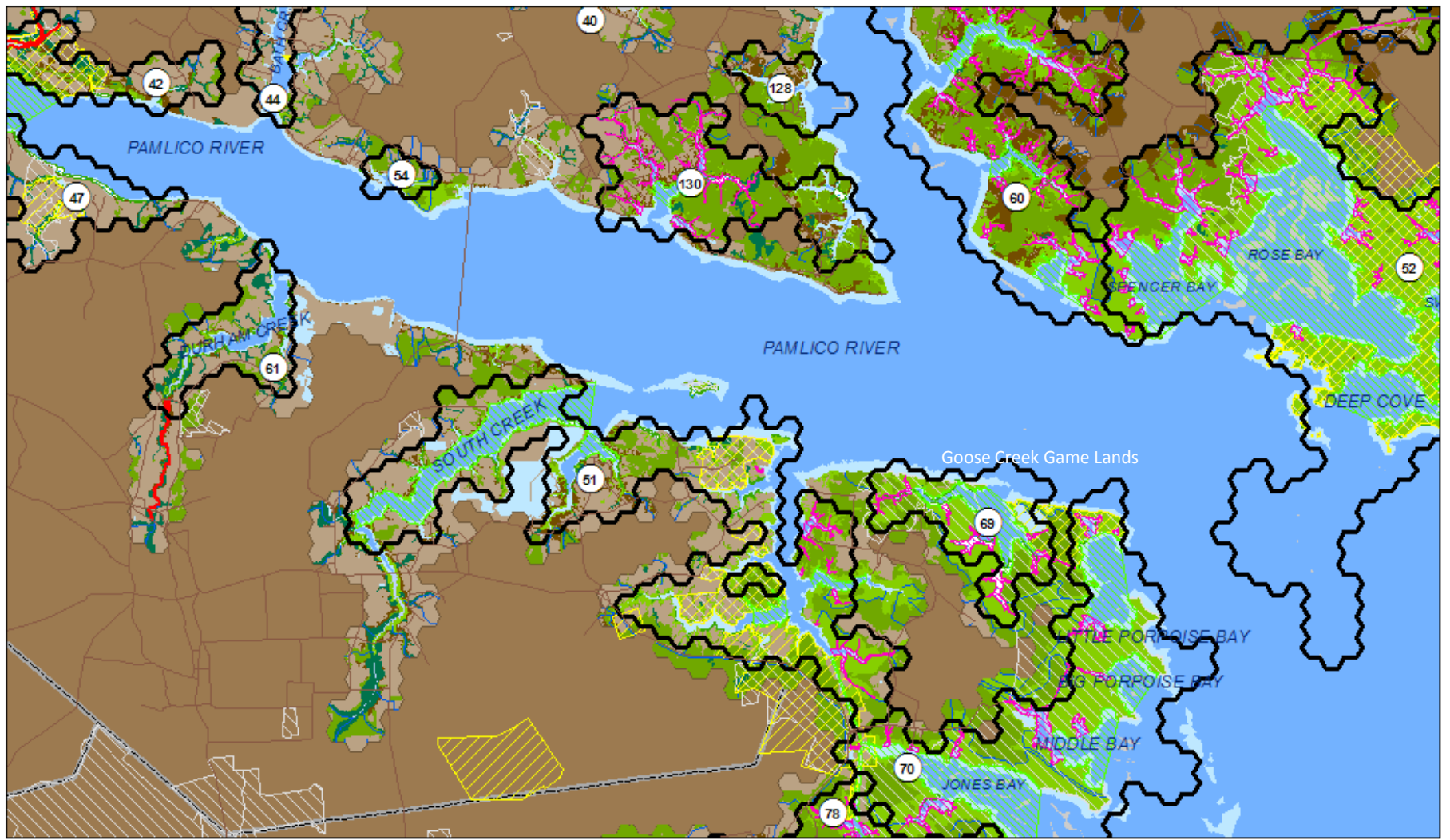
#### Habitat type

- |                       |                        |
|-----------------------|------------------------|
| ■ Emergent wetland    | ▨ SAV                  |
| ■ Forested wetland    | ■ Shell bottom         |
| ■ Wetland             | ■ Riverine hard bottom |
| ■ Shallow soft bottom | ■ Riverine soft bottom |
| ■ Deep soft bottom    | ■ Low elevation upland |







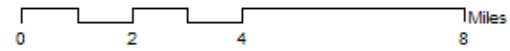


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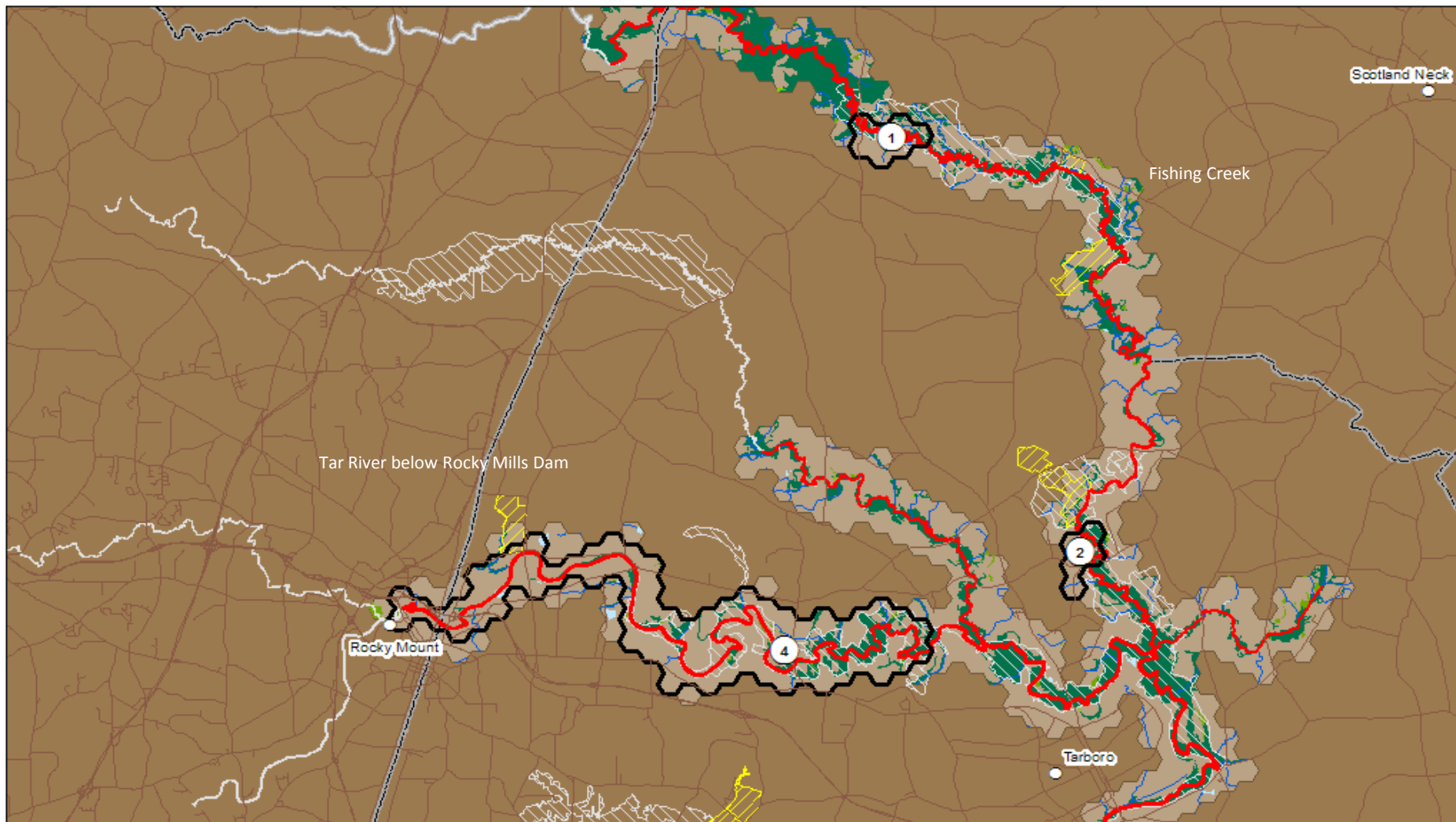
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  - ▭ Deep soft bottom

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- ▭ Shell bottom
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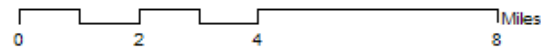
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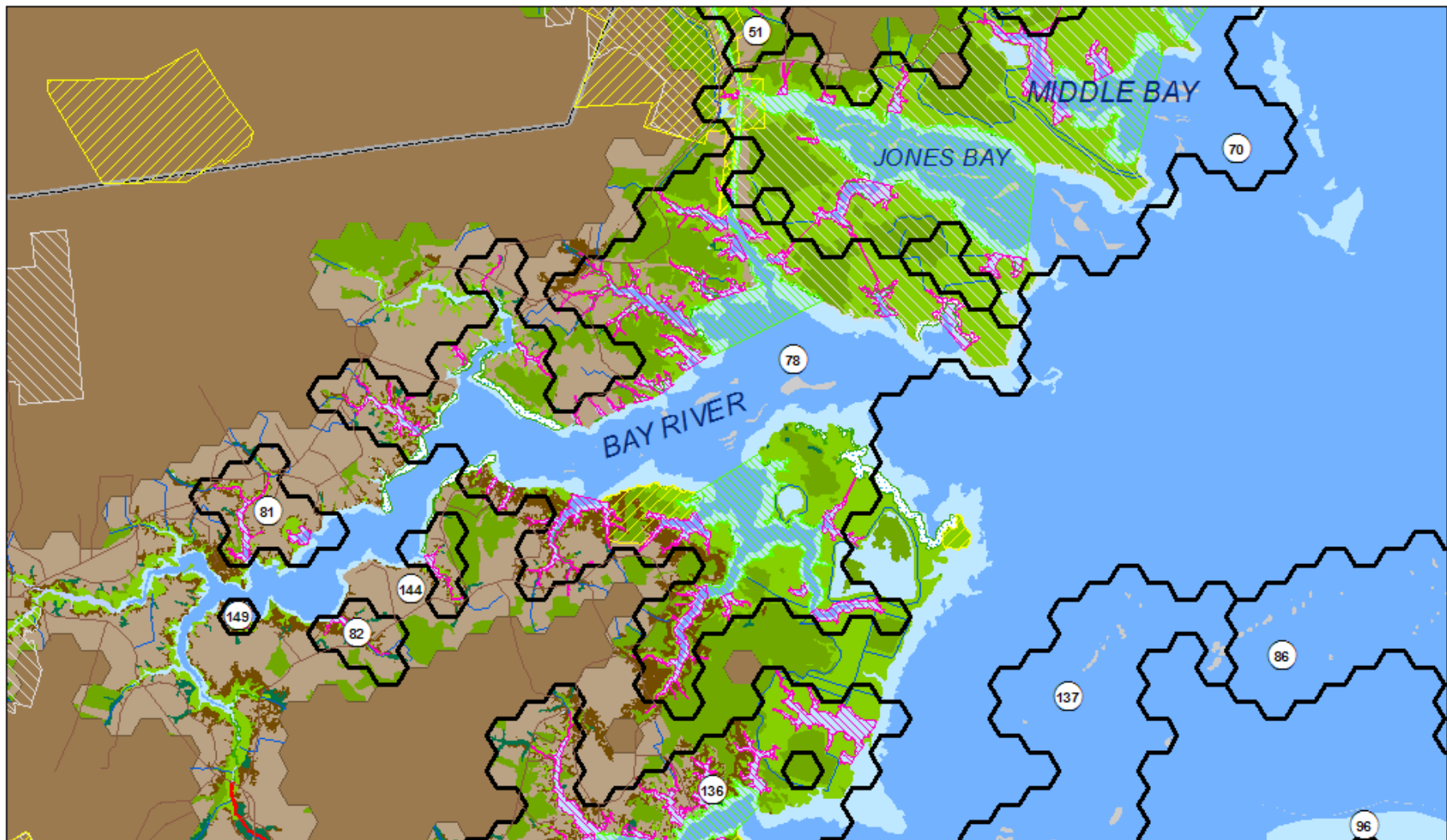
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**Habitat type**

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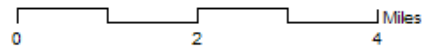




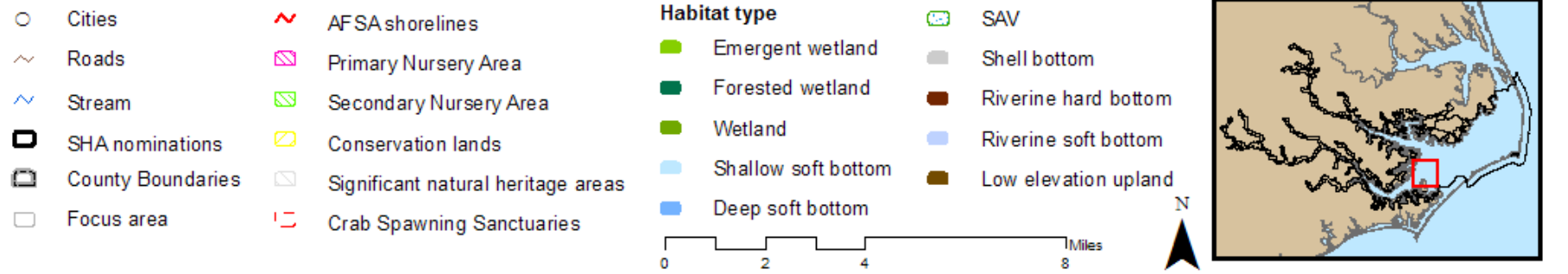
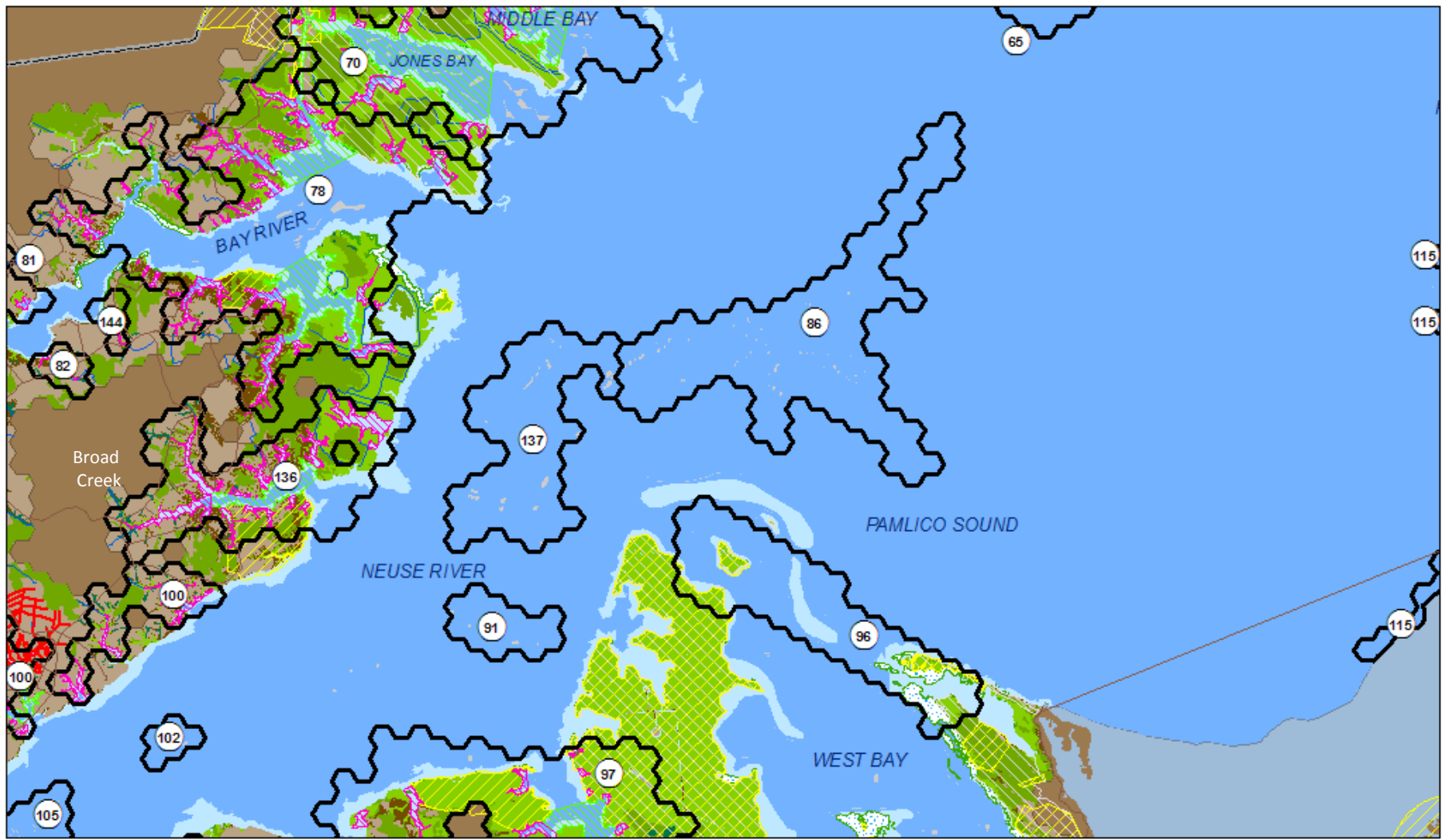
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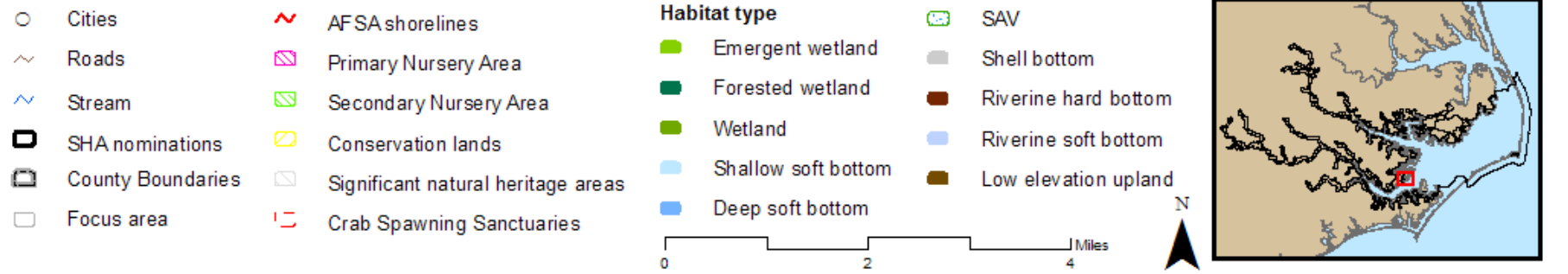
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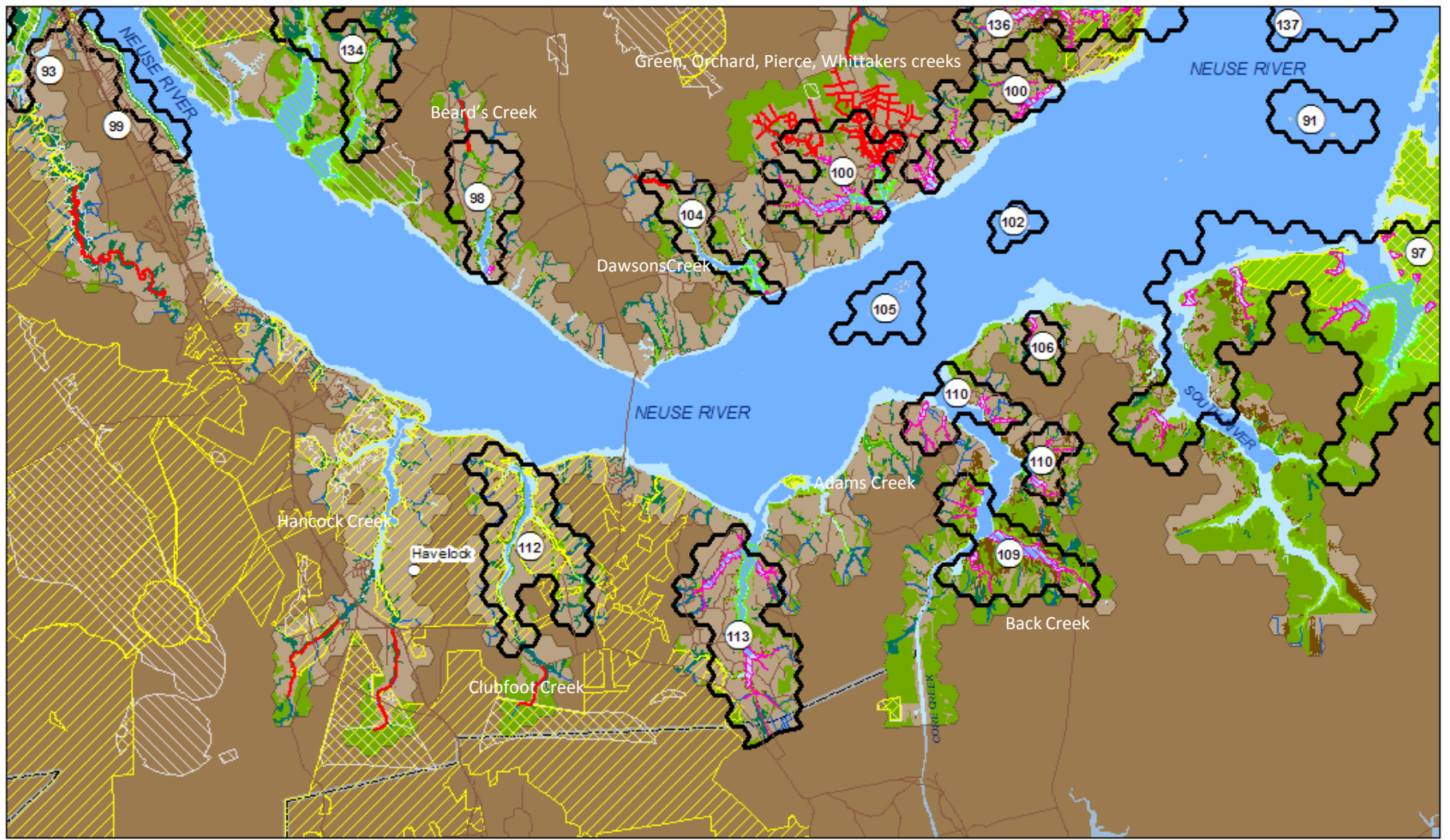










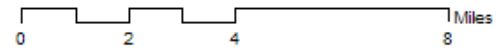


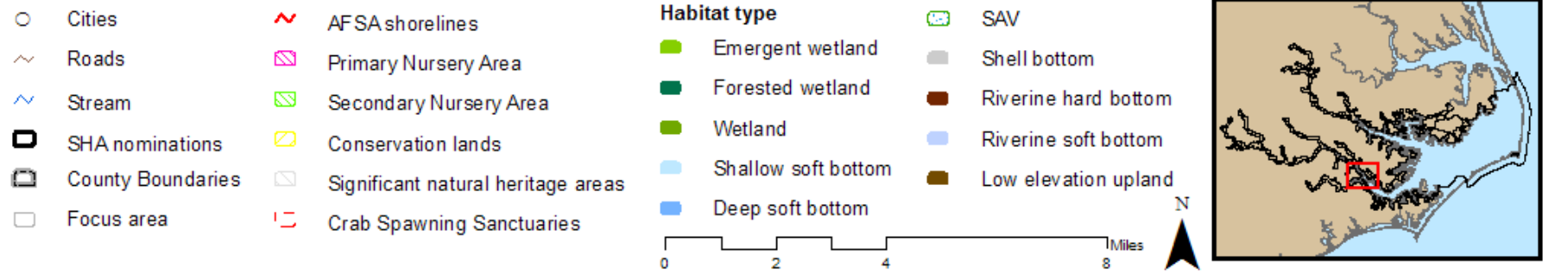
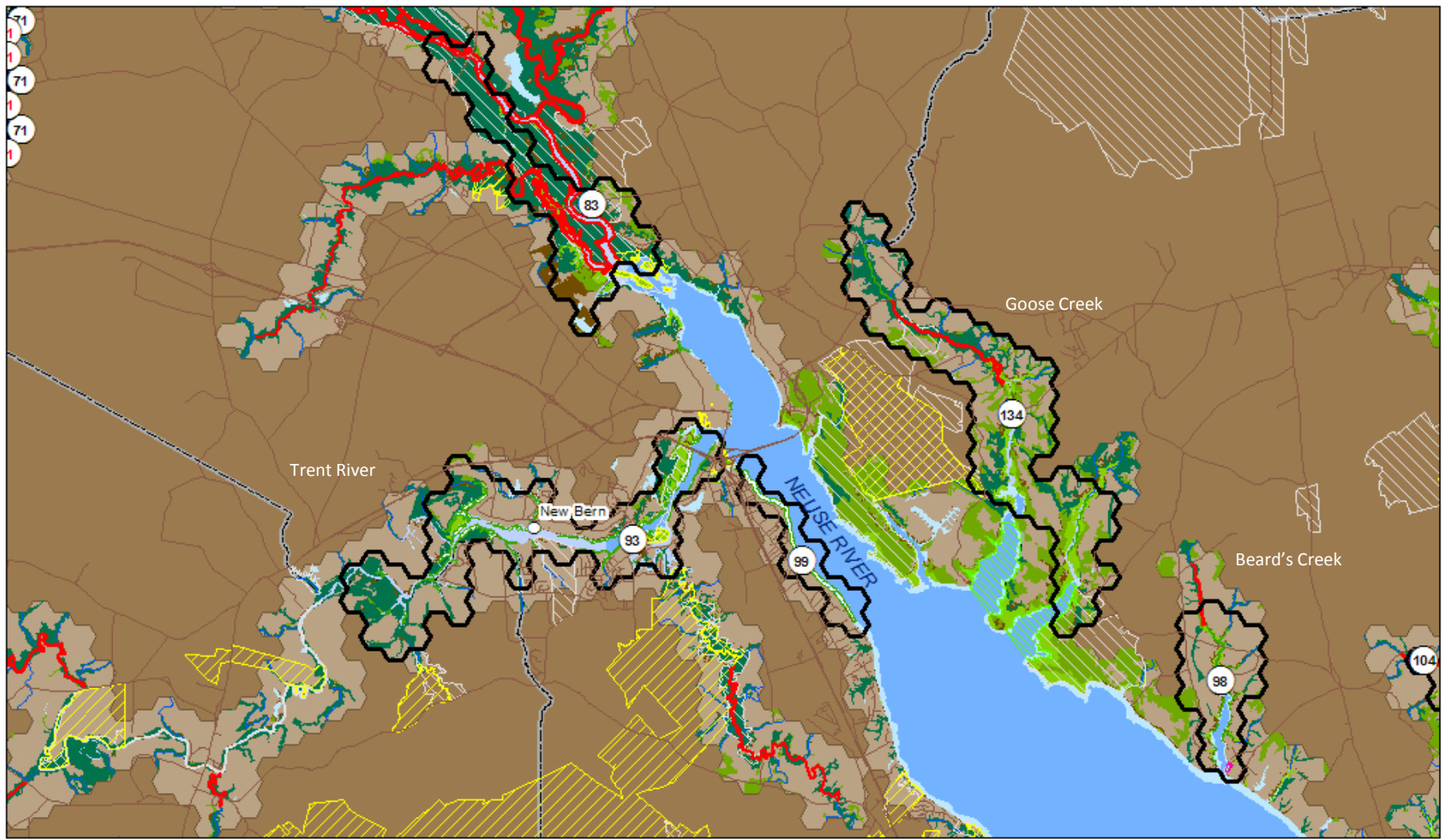
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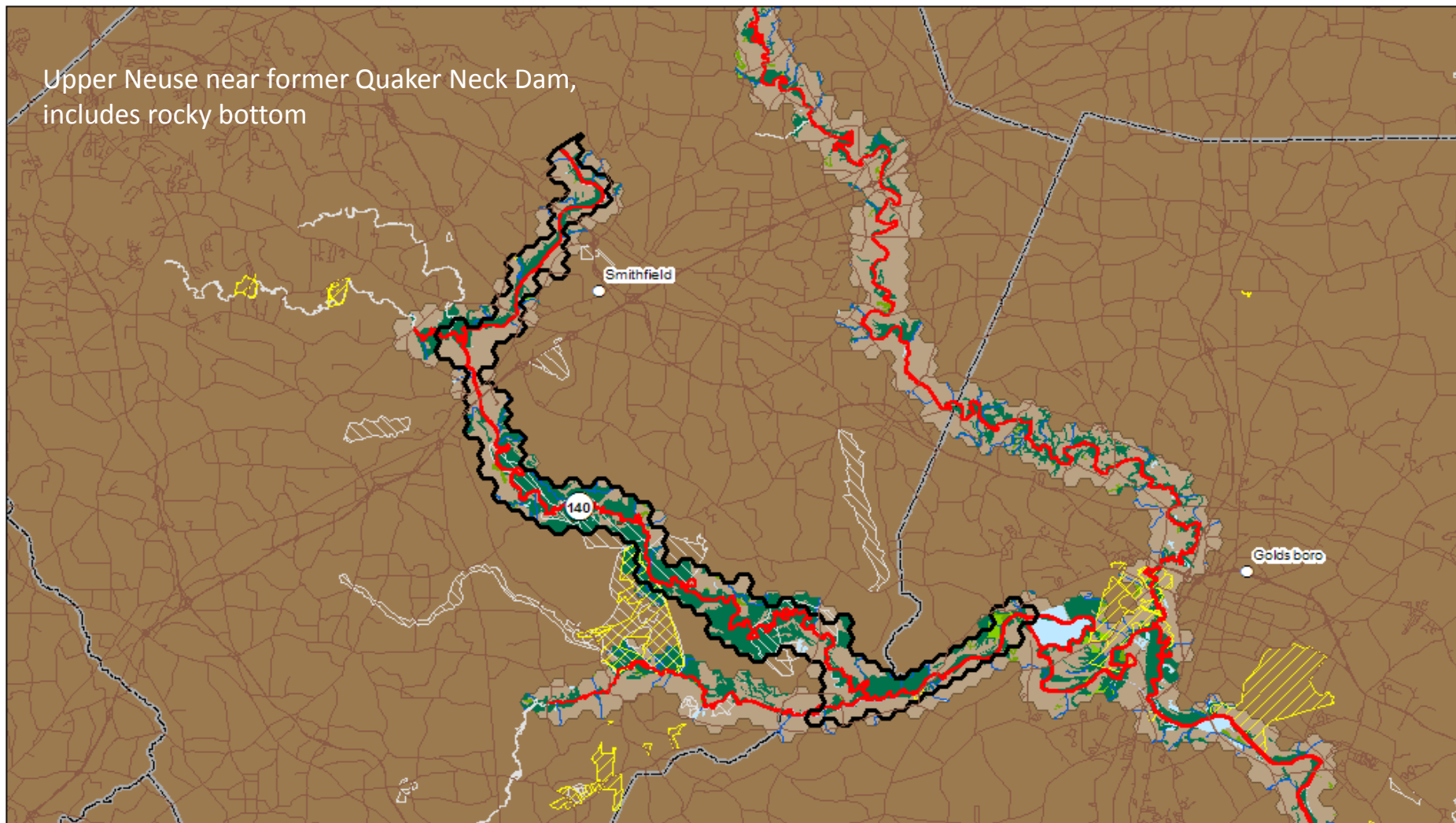
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Upper Neuse near former Quaker Neck Dam,  
includes rocky bottom



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