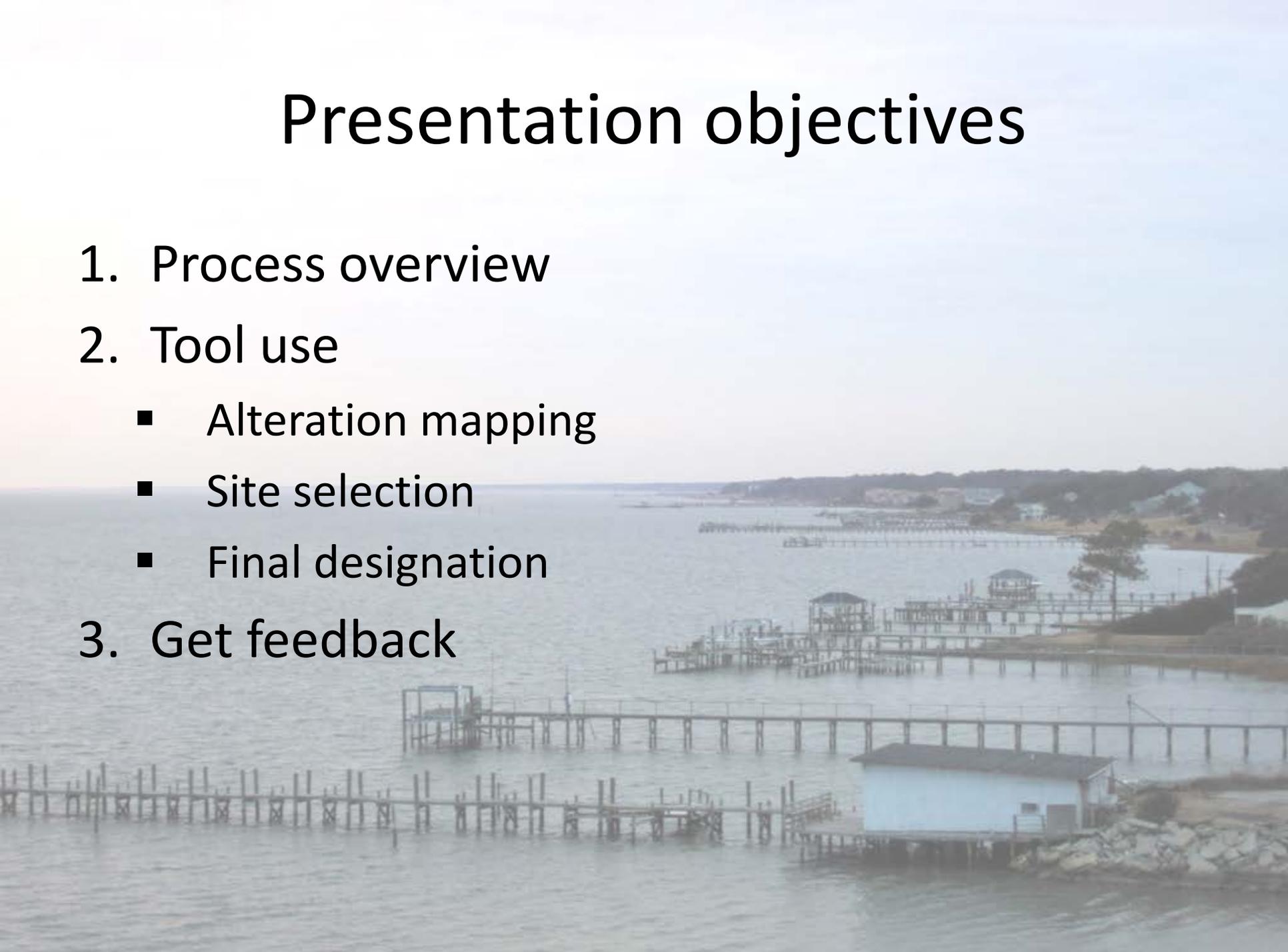
An aerial photograph of a coastal landscape. In the foreground, a sandy beach curves along the left side, with several small boats in the shallow, clear water. The middle ground is dominated by a large, flat area of green and brown vegetation, likely a marsh or wetland, extending towards the ocean. The ocean is a deep blue, meeting a sky filled with soft, white clouds. The overall scene is a mix of natural coastal habitats and recreational areas.

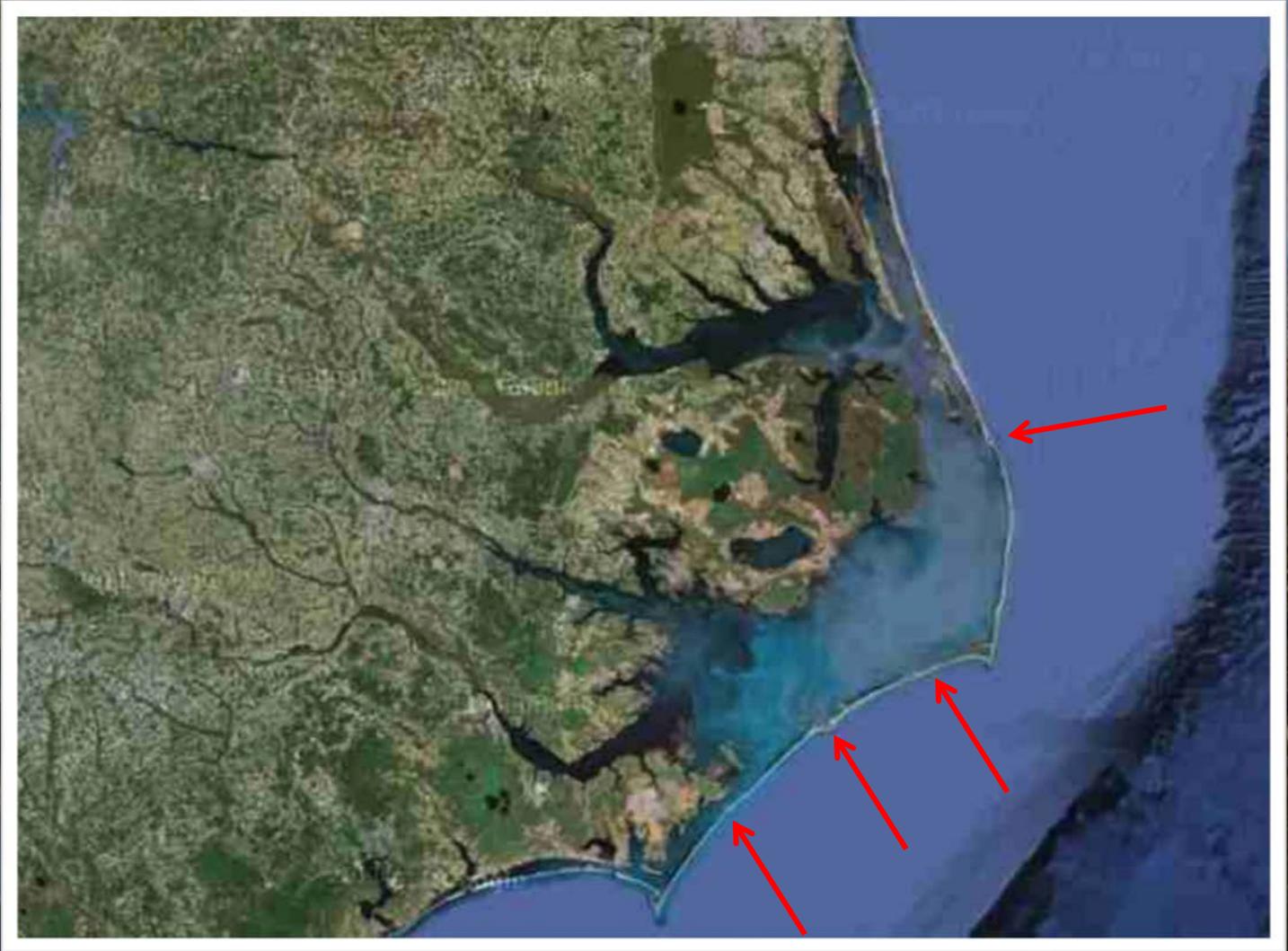
An Overview of North Carolina's Strategic Habitat Area designation process

Jennifer L. Weaver, W. Scott Chappell,
Anne S. Deaton, Katy West,
Jeff A. Buckel

Presentation objectives

1. Process overview
2. Tool use
 - Alteration mapping
 - Site selection
 - Final designation
3. Get feedback





Increasing Coastal Development



Strategic Habitat Areas (SHAs)

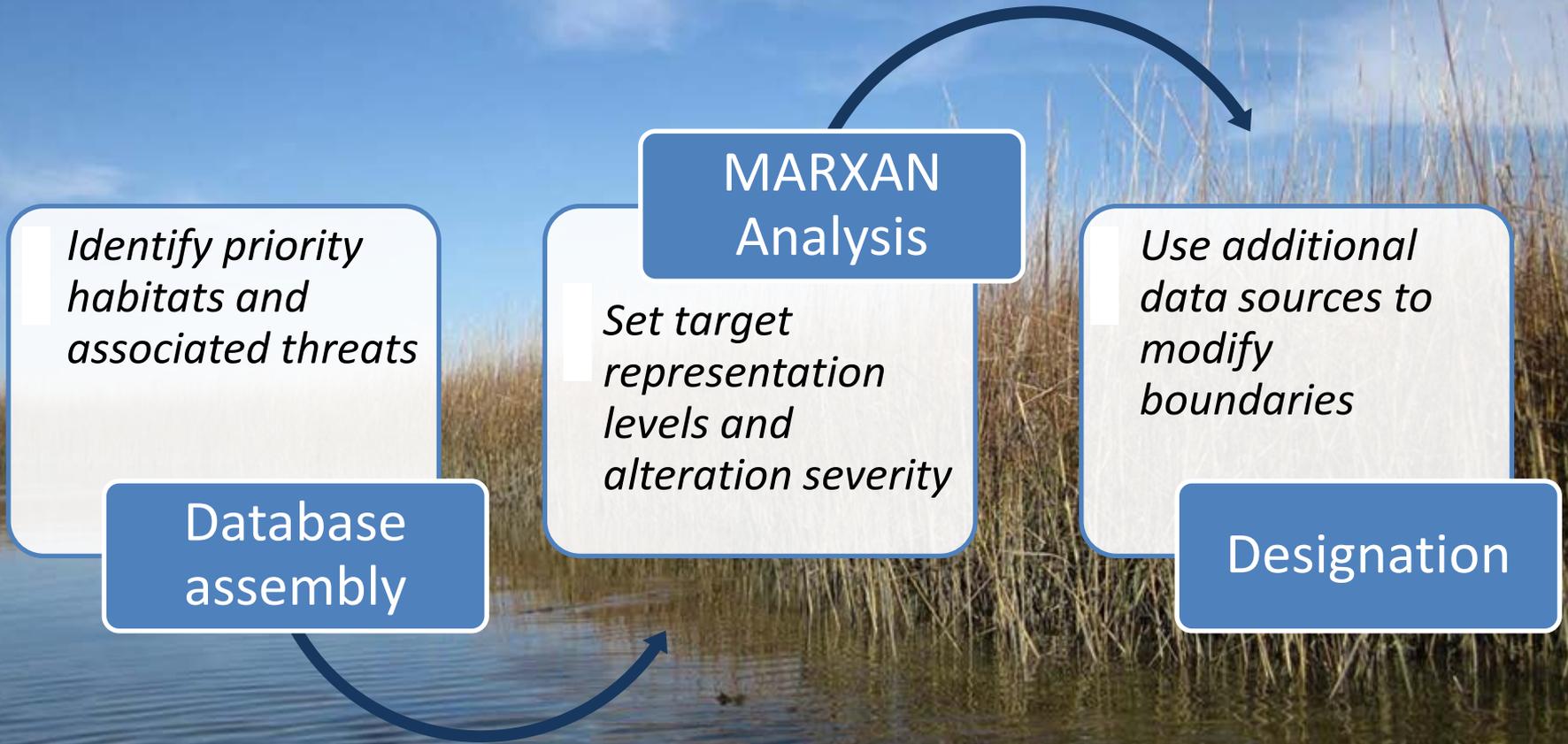
“specific locations of individual fish habitat or systems of habitats that have been identified to provide exceptional habitat functions or that are particularly at risk due to imminent threats, vulnerability, or rarity”

Goal: Designate a network of areas that include the fish habitats necessary to support NC fisheries

Regional Boundaries



SHA Process





Legend

Planning area boundary

Habitats

- Estuarine Emergent wetland
- Estuarine emergent wetland
- Estuarine forested wetland
- Estuarine shrub/scrub wetland
- Estuarine soft bottom (0-3ft)
- Estuarine soft bottom (3-6ft)
- Estuarine soft bottom (>6ft)
- Estuarine soft bottom (ND)
- Headwater wetland
- High salinity SAV
- Intertidal marine soft bottom
- Intertidal shell bottom (high density)
- Intertidal shell bottom (low density)
- Lacustrine soft bottom (ND)
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- Marine soft bottom (>6ft)
- Non-riparian emergent wetland
- Non-riparian forested wetland
- Non-riparian human impacted wetland
- Non-riparian shrub/scrub wetland
- Palustrine soft bottom (ND)
- Riparian emergent wetland
- Riparian forested wetland
- Riparian human impacted wetland
- Riverine soft bottom (0-3ft)
- Riverine soft bottom (3-6ft)
- Riverine soft bottom (>6ft)
- Riverine soft bottom (ND)
- Riverine soft bottom (ND) - lower
- Riverine soft bottom (ND) - middle
- Riverine soft bottom (ND) - upper
- Subtidal shell bottom (high density)
- Subtidal shell bottom (low density)
- low elevation upland

Identify priority habitats



*Spawning
Recruitment
Migration*

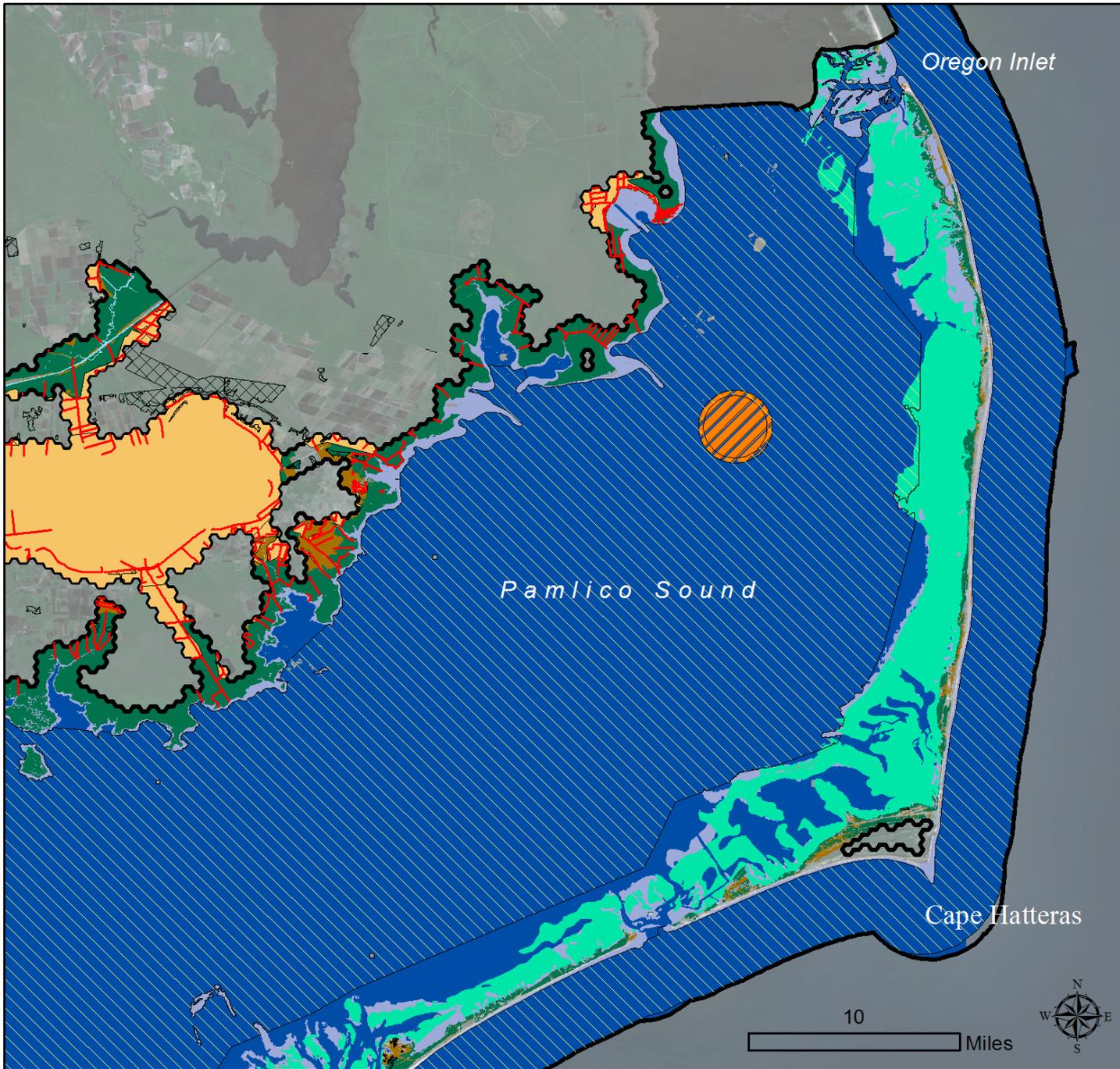


Identify anthropogenic stressors

Direct or indirect

- Hydrologic modification (i.e. dams, dredging)
- Physical (i.e. shoreline modification)
- Land use alteration, non point source pollution (i.e. extent of agricultural operations)





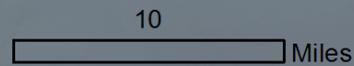
Legend

Alterations

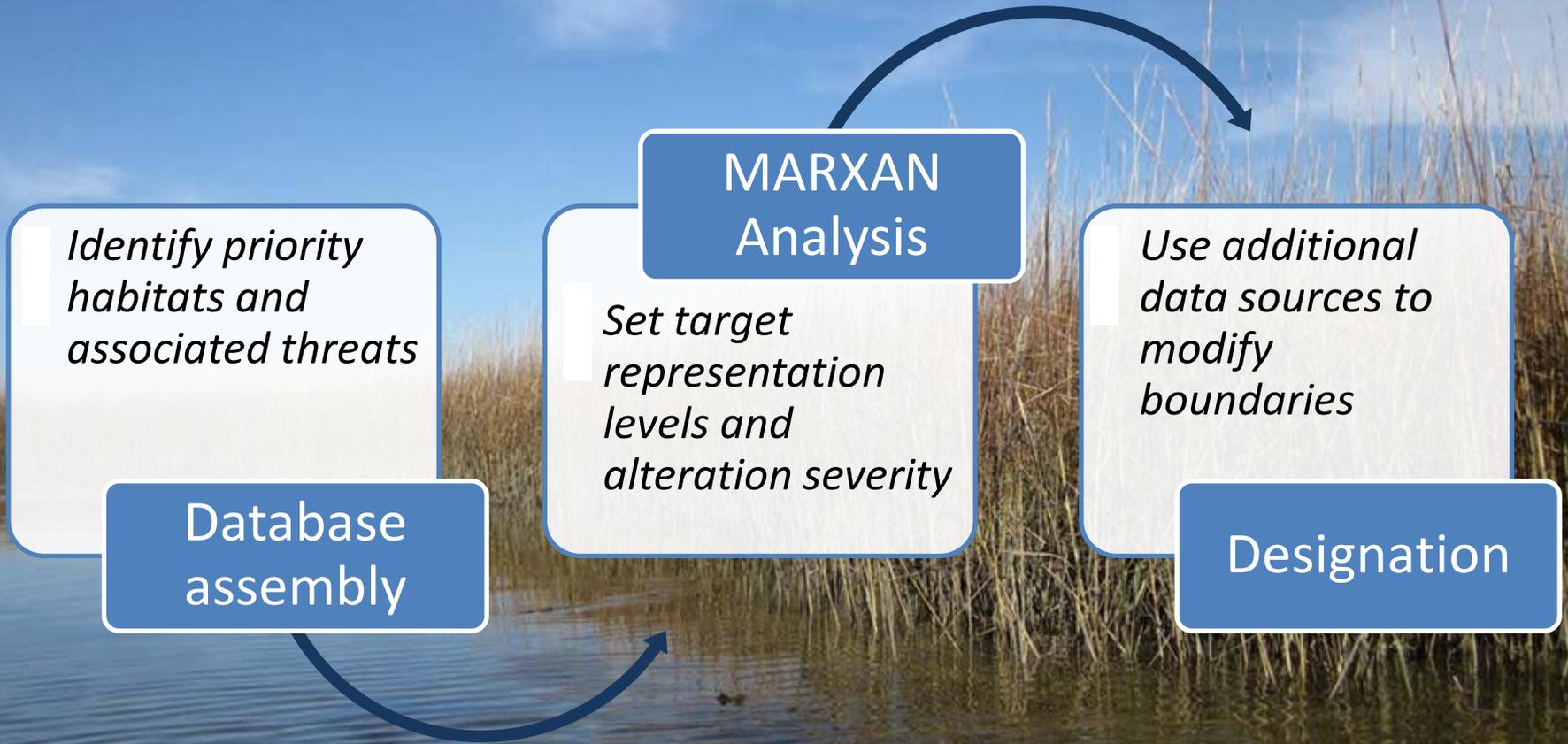
- Ditched
- Trawling
- Drained
- Obstructed for fish passage
- Military restricted areas
- Planning area boundary

Habitats

- Creeks/ivers
- Deep soft bottom
- Interior wetland
- SAV
- Shallow soft bottom
- Shell bottom
- Soft bottom (ND)
- Upland



SHA Process



Set habitat representation levels

Determined by importance to priority fisheries

Habitat	Summer spawning	Winter spawning	Anadromous	Shellfish
Seagrass	X	X		X
Shell bottom	X	X		X
Riverine wetlands			X	

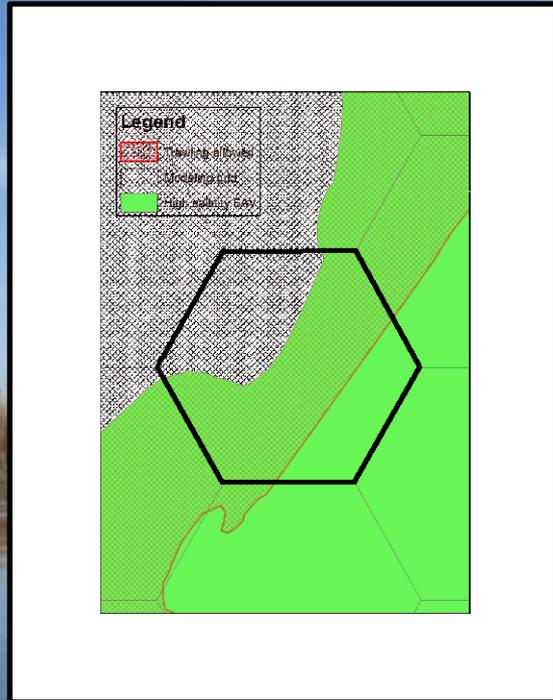
Adjusted based on:

- Habitat rarity within region and across state
- Indirect effects (wetlands to water quality)
- Data quality

Alteration by habitat

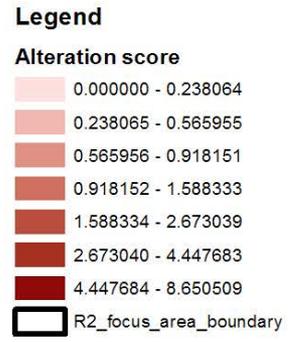
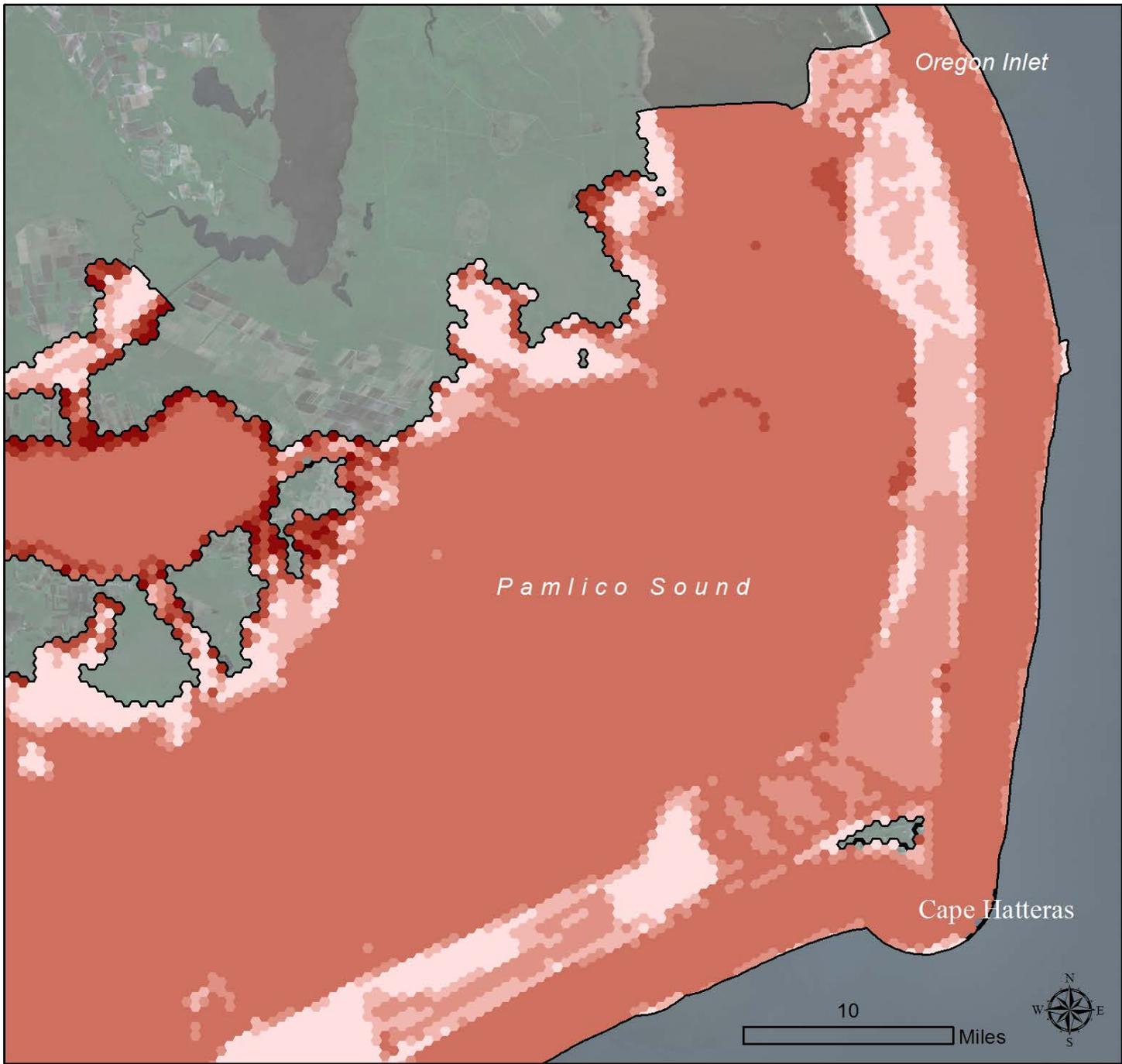
Habitat type	Agricultural land use
Creeks, rivers	2
SAV	2
Shell bottom	1
Soft bottom, deep	1
Soft bottom, shallow	1
Non-wetland shoreline	1
Wetland, riparian	0
Wetland, interior	0
Streams	2

Alteration score calculation

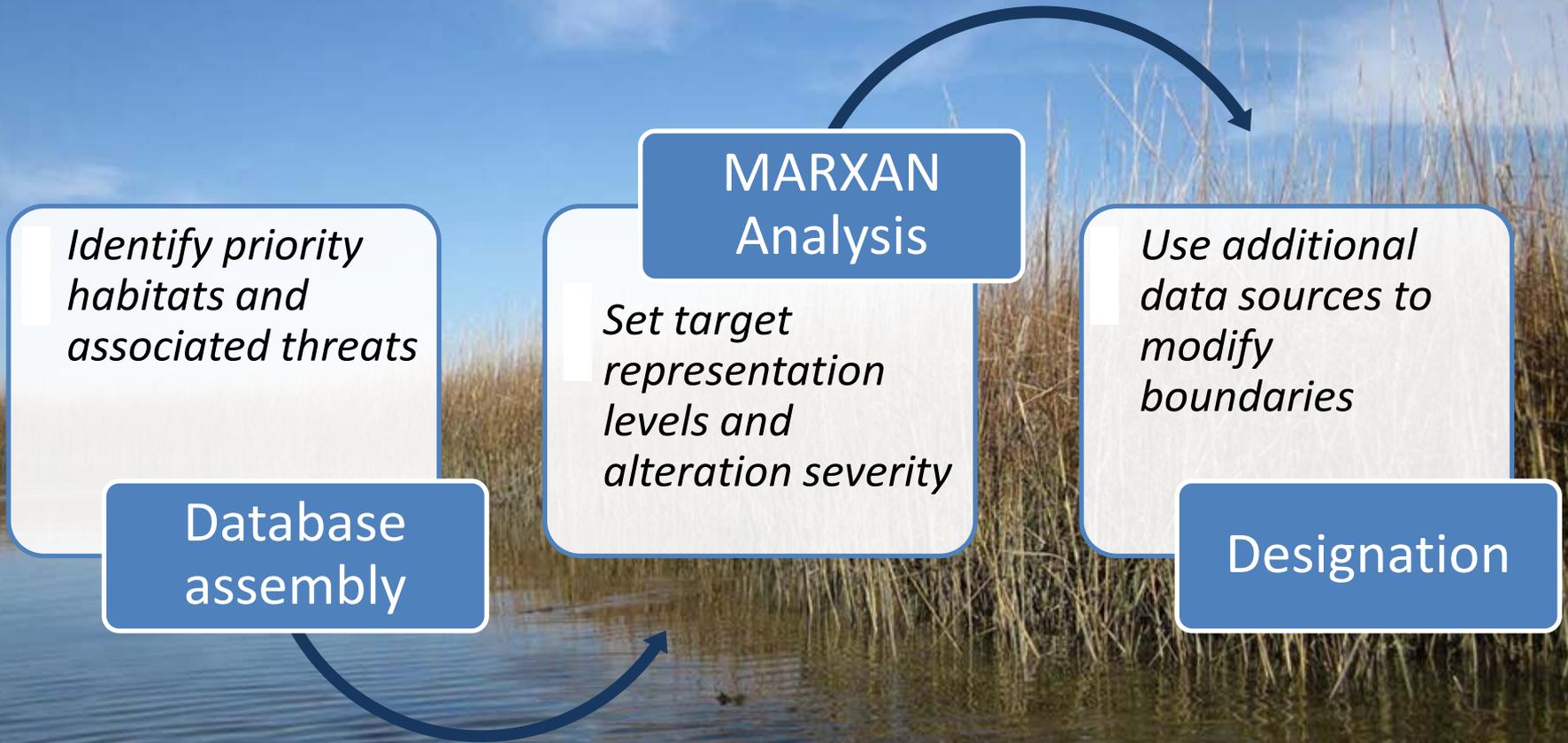


Habitat	Total area	Severity	Extent	Portion	S x E x P	Alteration score
SAV	70	2	0.60	0.70	0.84	1.14
Soft bottom	30	1	1.00	0.30	0.30	

$$\sum severity * extent * portion$$

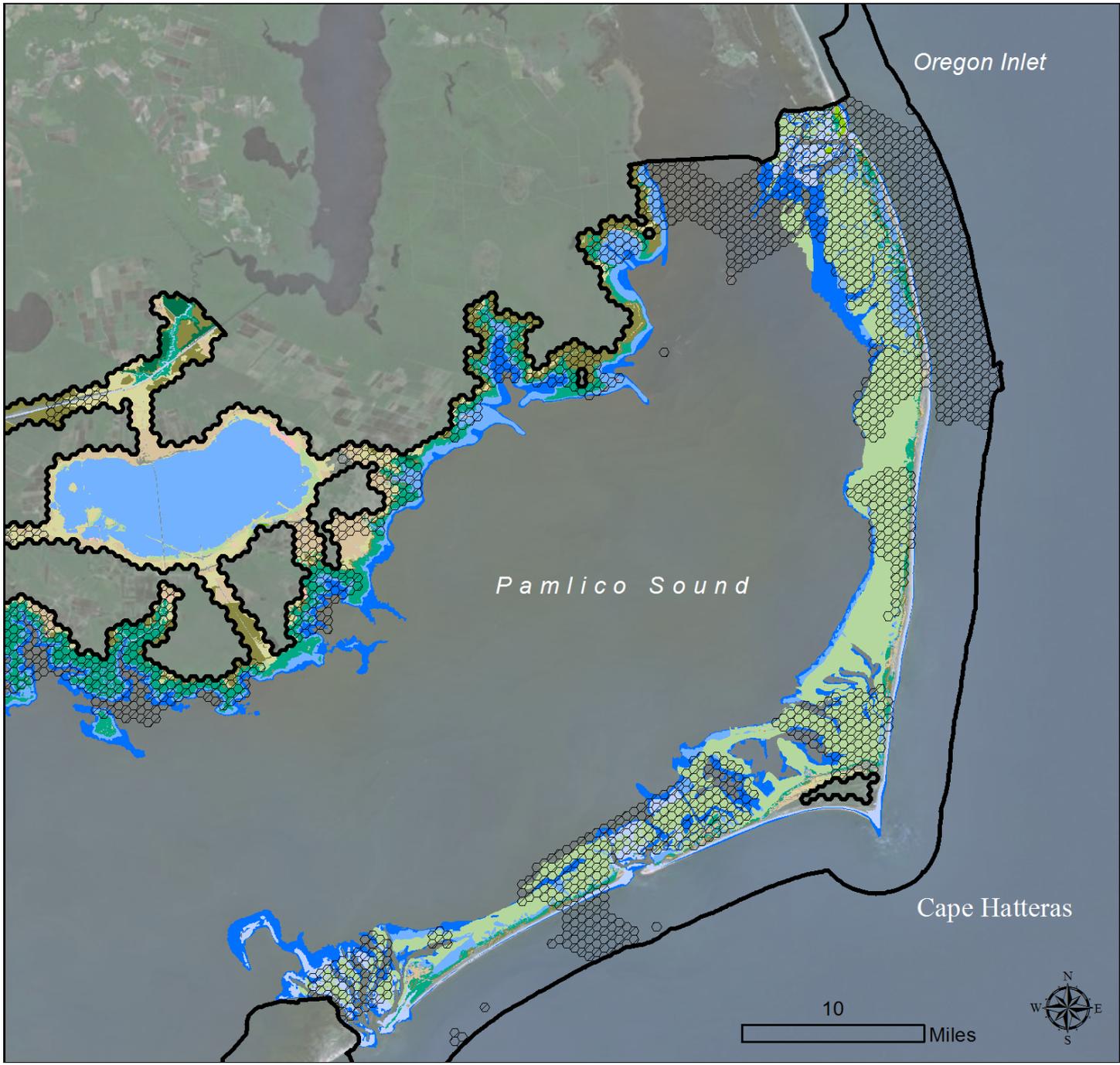


SHA Process



Designation

- Corroborating information
 - Fish abundance data
 - Other designations not included in MARXAN analysis
 - Sources of information that cannot be mapped
- Committee input for final selections

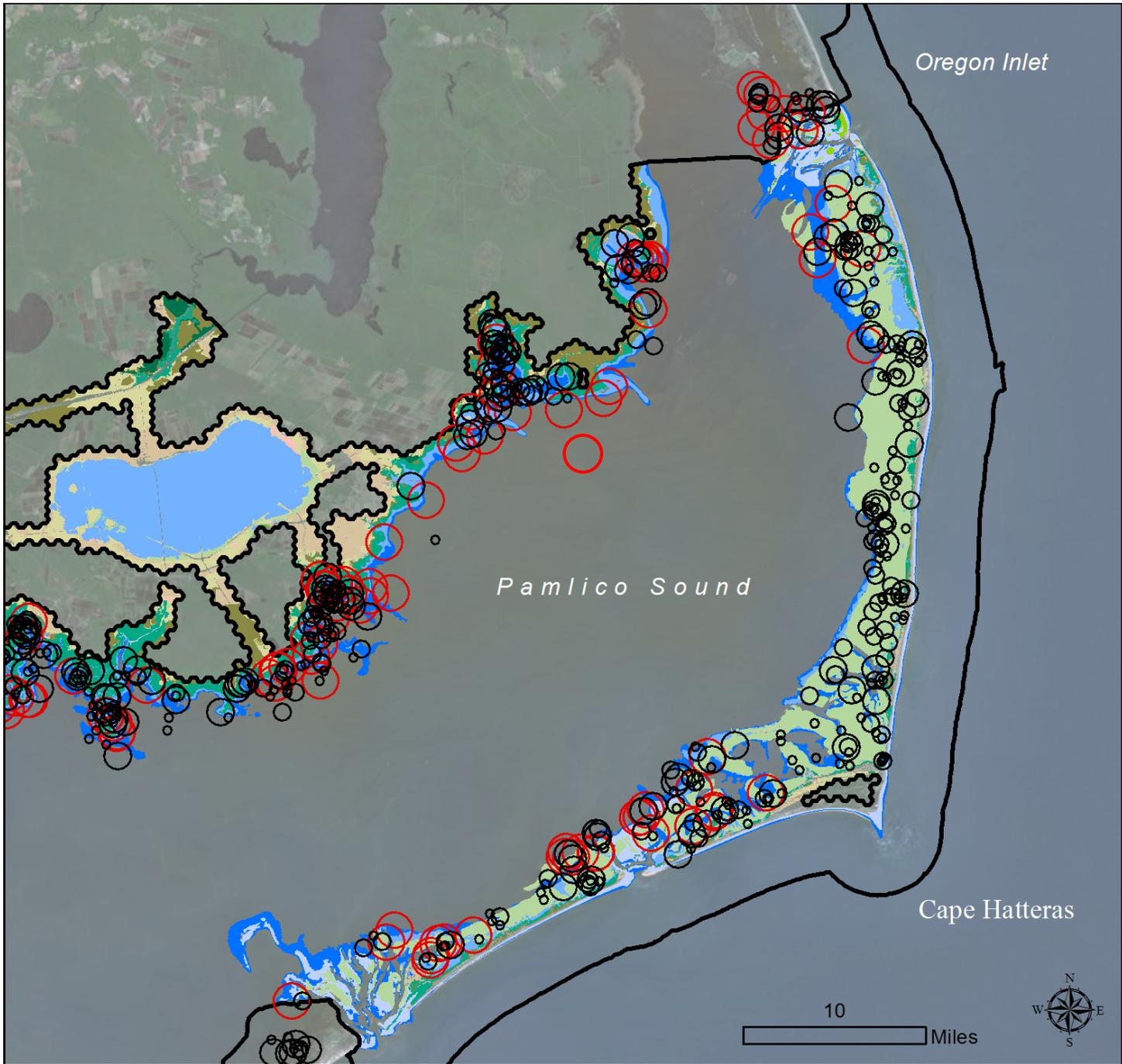


Legend

-  MARXAN best solution
-  Planning area boundary

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-  low elevation upland



Legend

Summer Blue Crab Abundance

- 0.000000 - 1.000000
- 1.000001 - 4.000000
- 4.000001 - 10.000000
- 10.000001 - 84.000000

▭ Planning area boundary

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Accomplishments

- Data assembly
 - Creation of habitat maps
 - Assess need for future mapping
 - Expert documentation
- Alteration mapping
- Designated areas



Challenges

- Lack of clear regulatory mandate
 - Difficult to guide selections
- Communication of technical aspects
- Incorporation of multiple data sources
 - Alteration
 - Habitat maps



Tools

- Stakeholder meetings:
 - ArcMap
 - Excel
- Analysis portions
 - ArcMap
 - MARXAN
 - R



Acknowledgements



More information

<http://www.ncfisheries.net/habitat/index.html>

[Region 1 report](#)

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[Marine Fisheries Fellowship](#)