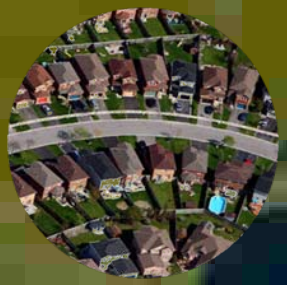
Atlantic Coast Ecosystem-based Management Initiatives

A sampling of TNC's integrated regional data and analysis

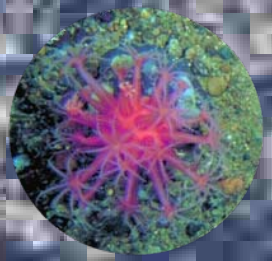












Mary Conley

APNEP STAC Meeting

July 22, 2009

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TNC Global and Southeast Strategies



- Coastal & Marine Ecosystem Restoration
- Climate Change Adaptation & Resilience
- Integrated Ocean & Coastal Management
- Sustainable Fisheries
- Watershed Planning

Imagine if there were no land-use planning.

Integrated Ocean/Coastal Management

Area Based Management & Planning – Why?

- New demands for ocean space & integrated information for regional decision making
- Conflicts
  - User vs. User
  - User vs. Nature
- Conflicts tend to outweigh compatibilities
- Lots of zoning (without planning) already in place

Integrated Ocean/Coastal Management

Ecosystem-based Management Approach

Efficiently consider multiple species and their habitats, human uses and economics

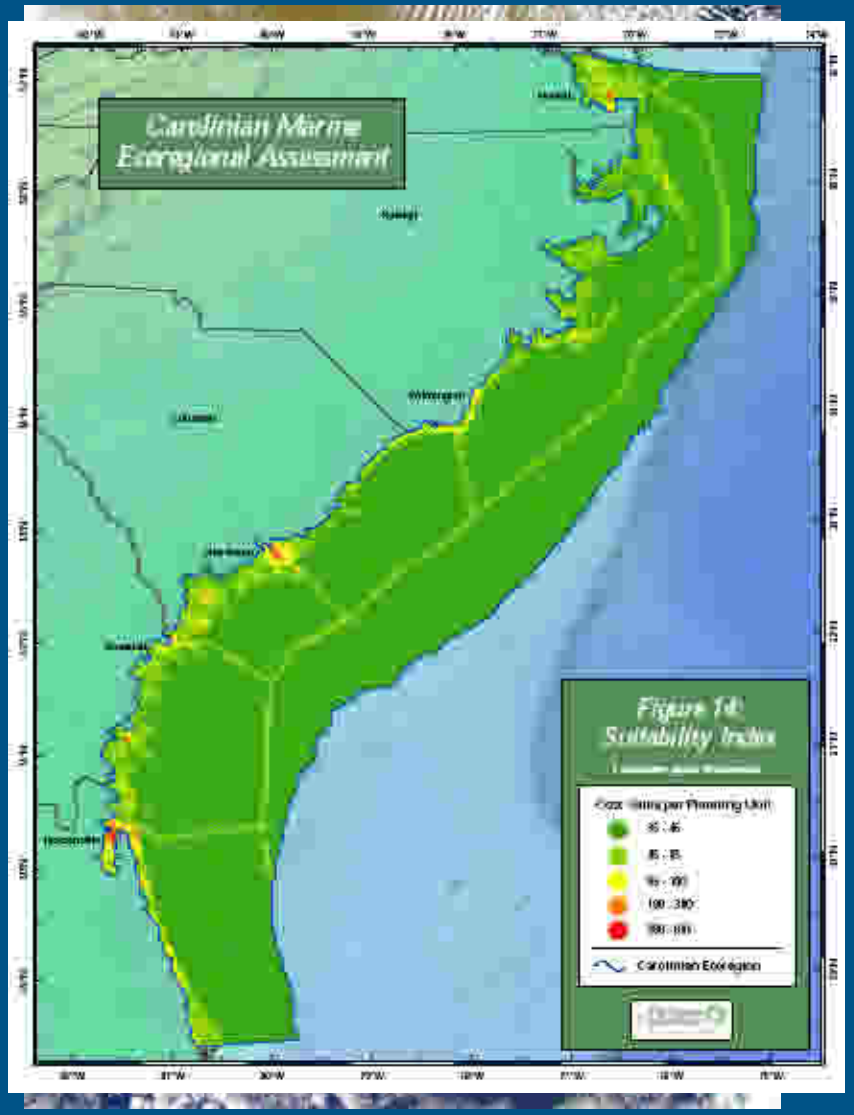
Baseline for partners or individual agencies to develop an ecosystem-based management framework

Integrating information at a regional and national level to inform decisions and strategies


Marine Ecoregional Assessments

Marine Ecoregional Assessment

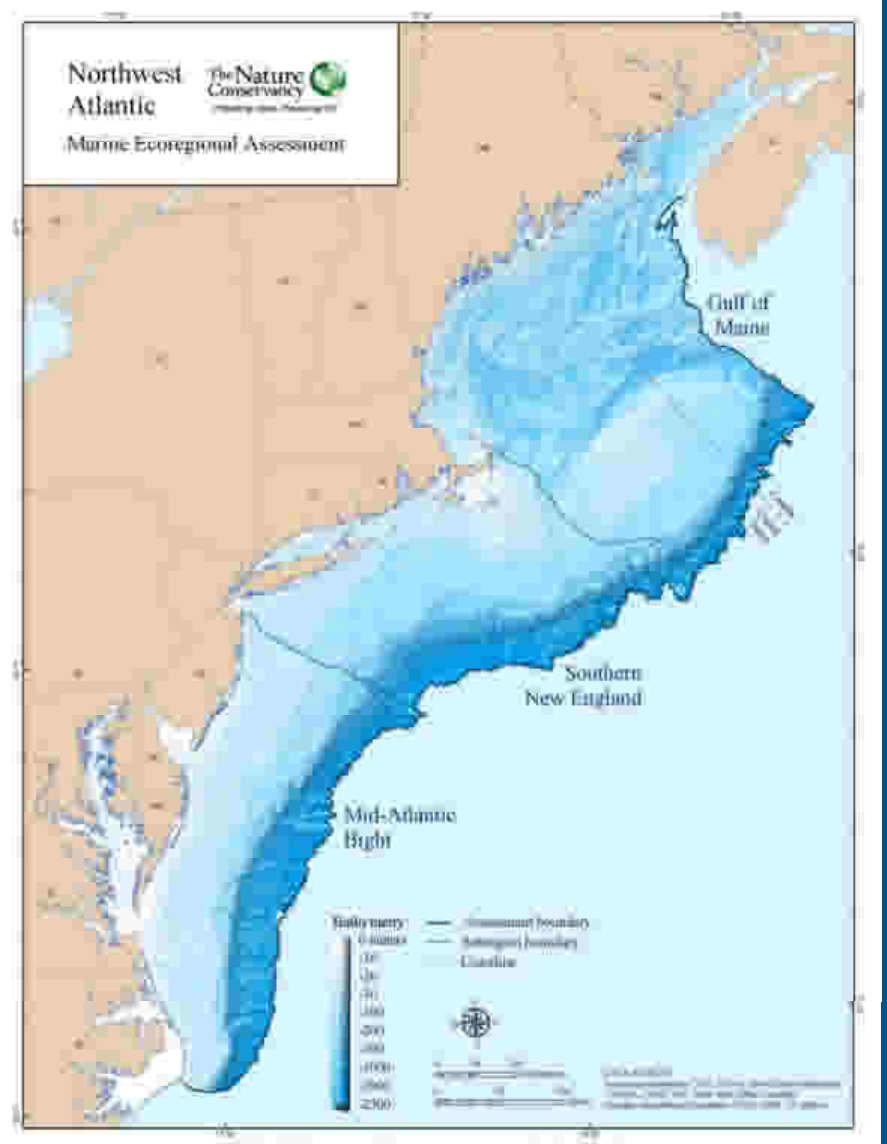
Carolinian Ecoregion



- Completed in 2005
- From the mouth of the Chesapeake Bay to Cape Canaveral
- Included 36 conservation targets
- Developed a suitability index using 10 cost factors
- Models used to identify conservation areas:
  - 41 areas, ~21 percent of the ecoregion (3.77 million hectares)
  - 10 sites were identified as an initial priorities

Marine Ecoregional Assessment

The Northwest Atlantic



Bay of Fundy to Cape Hatteras, NC

Three subregions

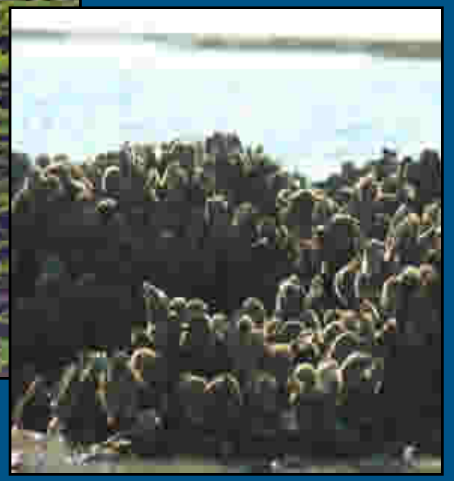
- Gulf of Maine
- Southern New England
- Mid Atlantic Bight

Extends from the high tide mark in rivers and estuaries to continental shelf edge

Marine Ecoregional Assessment

Conservation Targets

COARSE FILTER TARGETS:
Shoreline types
Benthic habitats
Pelagic processes
Biologically significant areas
(e.g. nursery, breeding areas)



FINE FILTER TARGETS:
Species

Marine Ecoregional Assessment

Data Rich & Partner Engaged

1200 data files collected and analyzed for targets and threats

Included 800 spatial data files from 100 data stewards

- Benthic habitats (infauna)
- Shoreline habitats (beaches, dunes, salt ponds etc.)
- Estuarine habitats (wetlands, sea grasses, marshes etc.)
- Seabirds & Shorebirds
- Marine mammals
- Turtles
- Fish (demersal, small and large pelagic, diadromous)
- Deepwater corals
- Oceanographic data
- Shellfish
- Human Uses

Marine Ecoregional Assessment

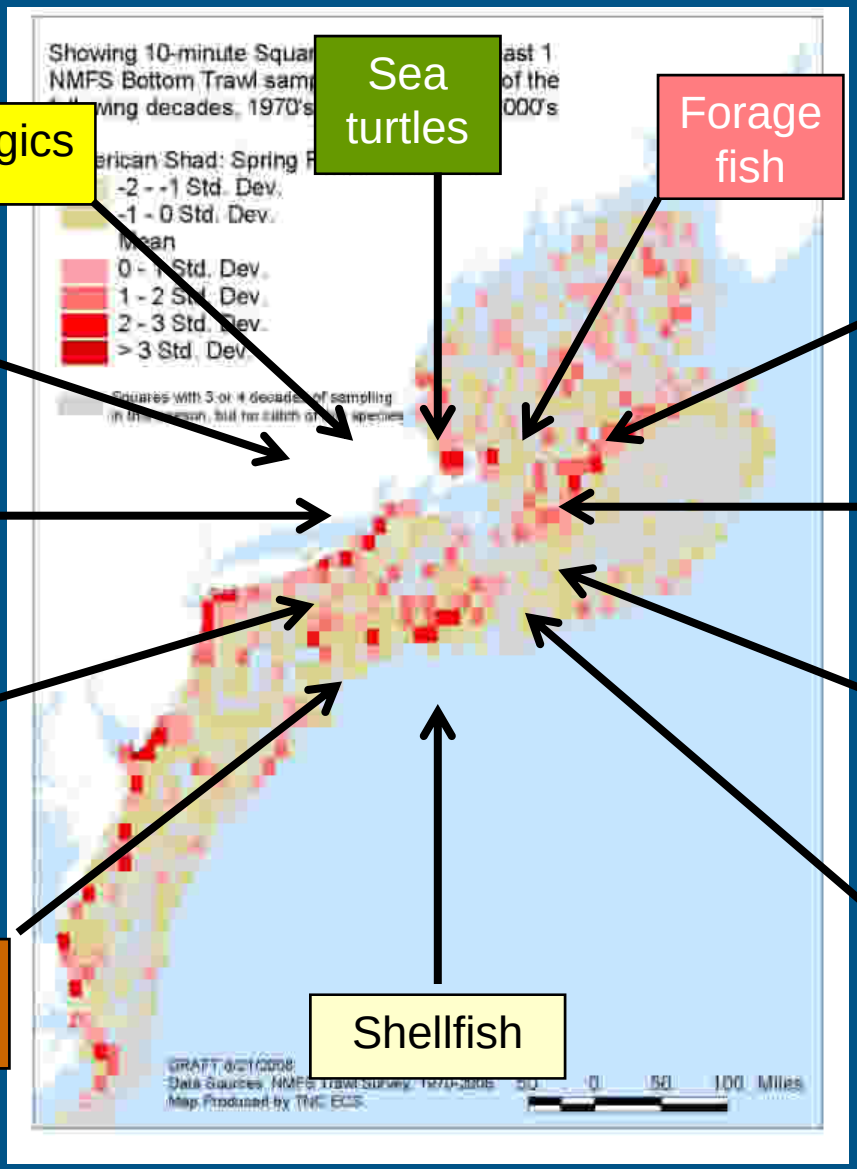
Human Uses

Examples -

- Energy siting
  - Wind
  - LNG
  - Oil
- Shipping Lanes
- Telecom Cables
- Sand mining
- Fishing
- Dredging
- Population density

NAM ERA Phase I: Data Analysis

Identifying Important Places for All Targets



Pelagics

Sea turtles

Forage fish

Special features

Sea birds

Coastal targets

Demersal fishes

Diad. fishes

Marine mammals

Benthic habitats

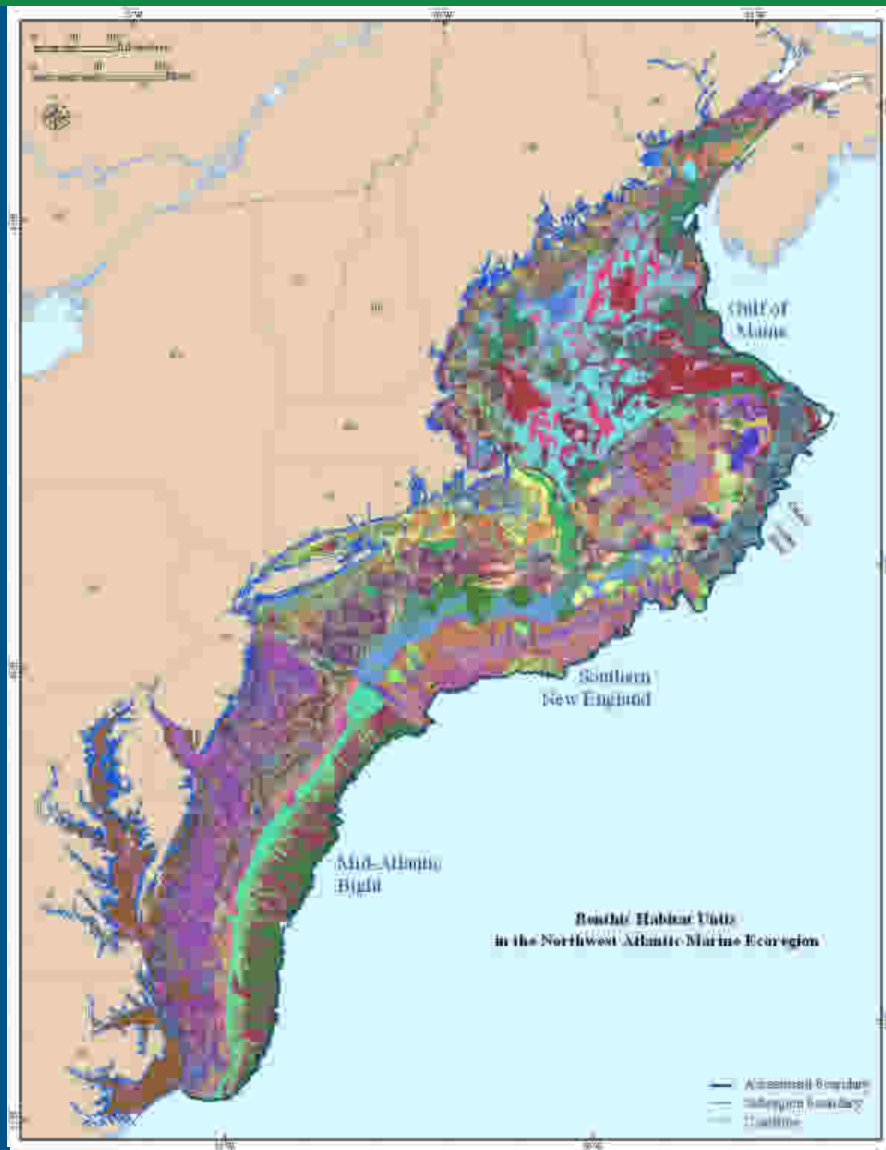
Shellfish

Corals

Marine Ecoregional Assessment

Data Analysis

- Used two techniques
  - Data that was used "*as is*" and data that was further analyzed
  - Example of data that was used "as is" - seabird and shorebird information
  - Example of data that was further analyzed or modeled - benthic habitats



Benthic Habitat Analysis

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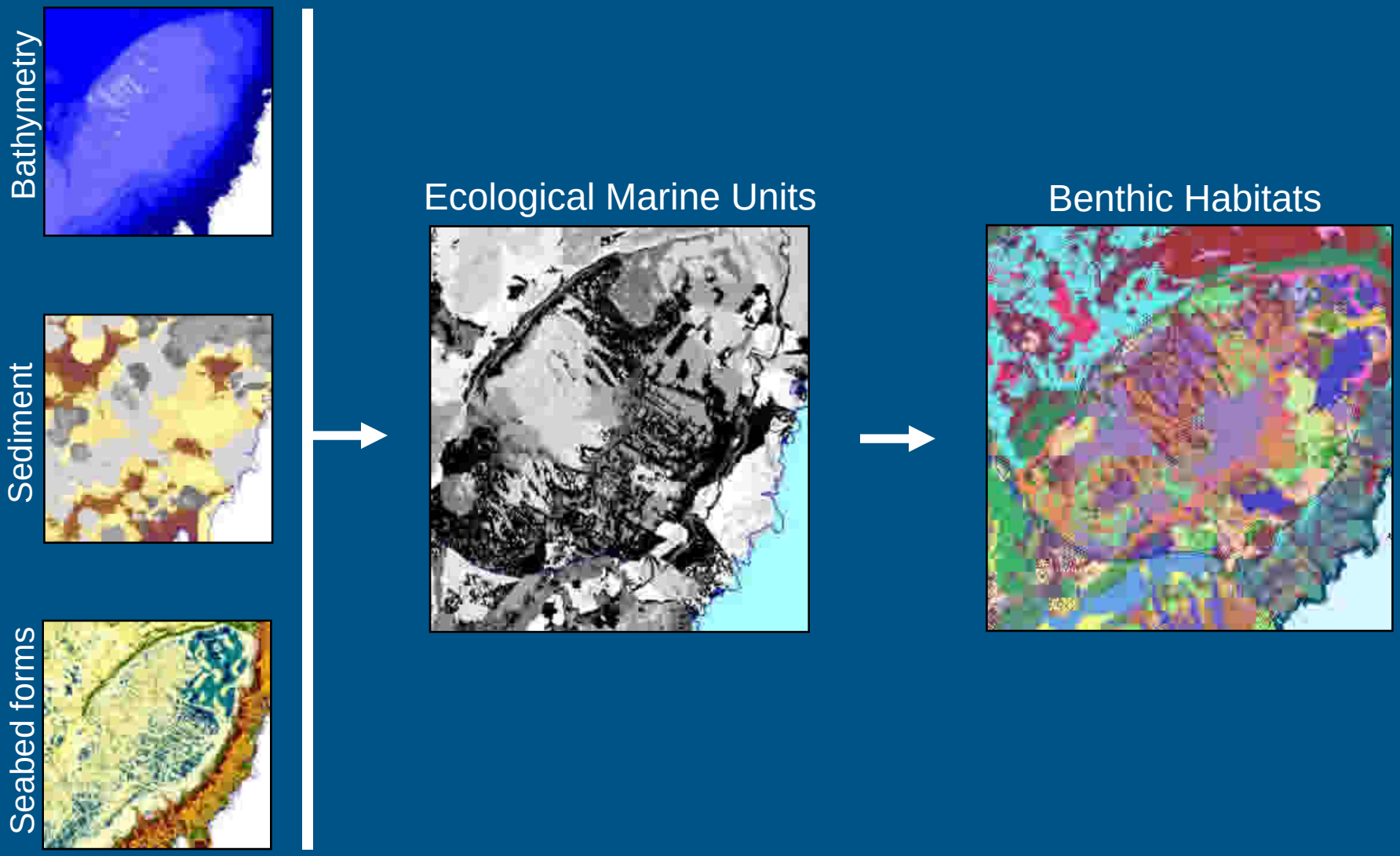
Ecological Marine Units (EMUs)



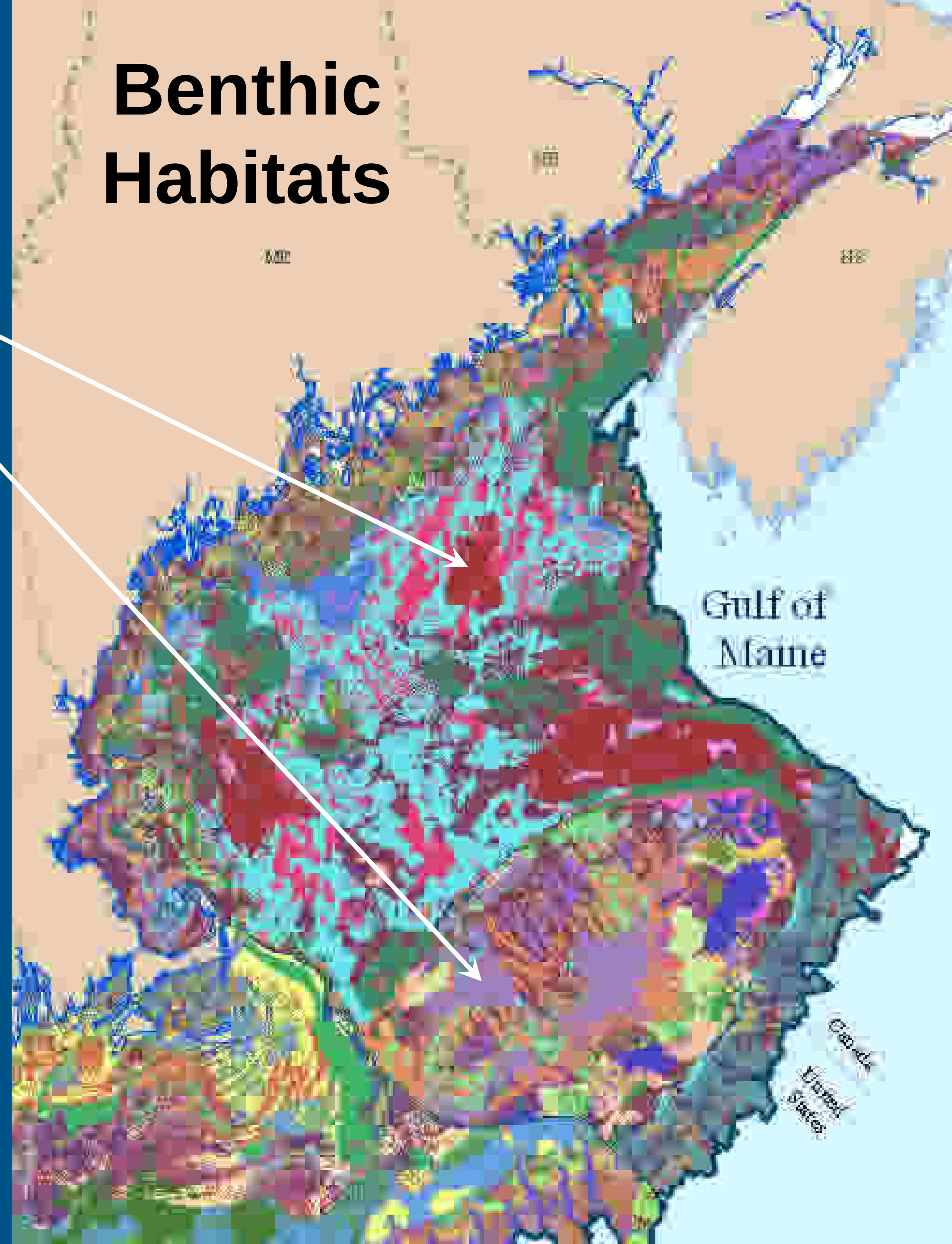
Benthic Habitats

Habitat 1 (red):
A widespread diverse community of twelve bivalves *(Brevinucula spp., Corbula spp., Crenella spp., etc.)*, four gastropods *(Alvania spp., Cylichna spp.)*, two cumaceans and three polychaete worms.

Gentle slopes on silts and fine sand

Habitat 549 (purple):
Sea mouse *(Aphrodita spp.)*, sand dollar *(Echinarachnius spp.)*, true oyster *(Ostreidae spp.)*, ponderous whelks *(Buccinum spp., Busycon spp., Colus spp., Nassarius spp., Neptunea spp.)*, moon shell *(Lunatia spp.)*, moon snail *(Euspira spp.)*, surf clam *(Spisula spp.)*.

Shallow (0-97 meters) flats and gentle slopes on fine silt and very fine sand



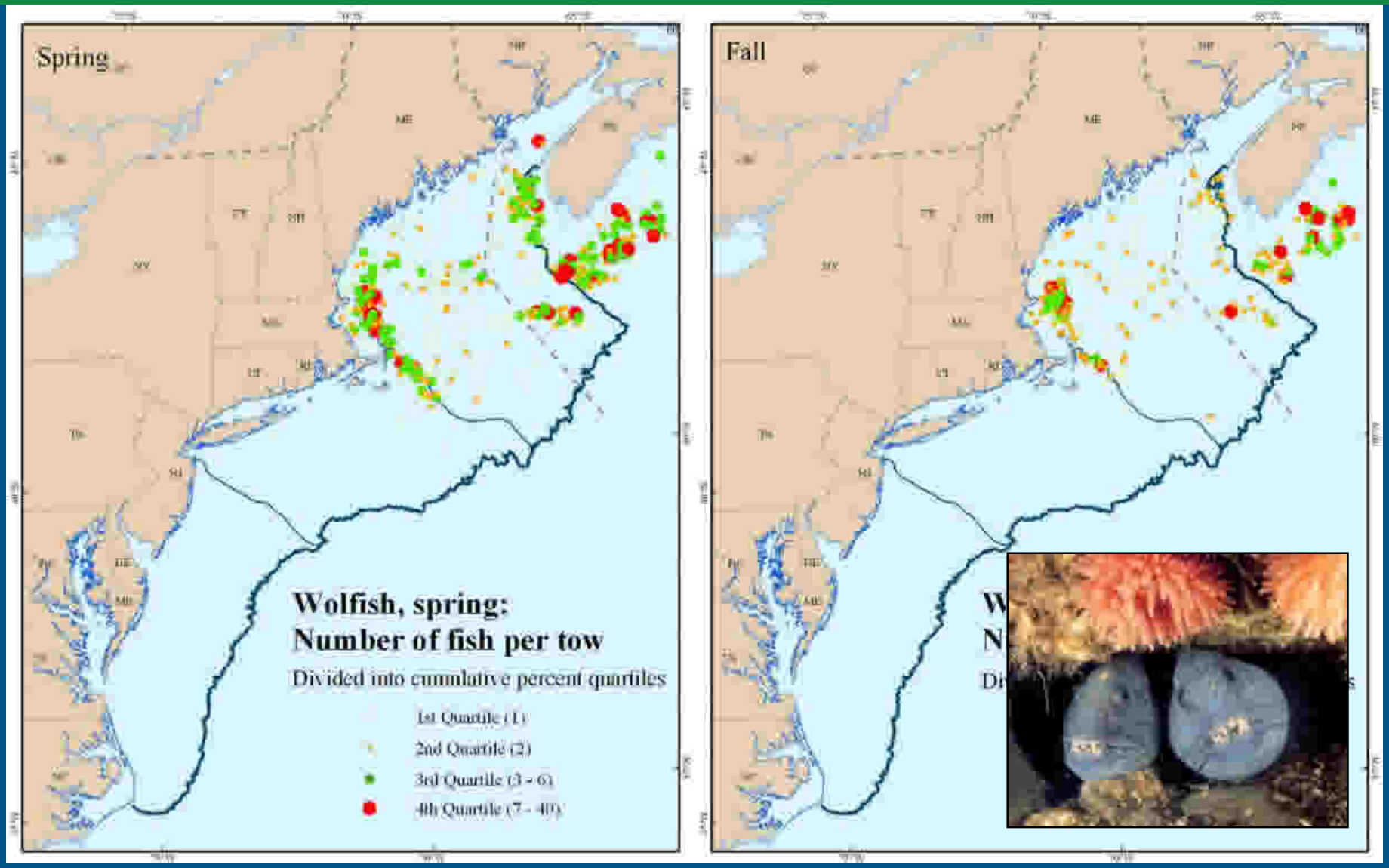
Fisheries Analysis

Overview

- Obtained NMFS Trawl Survey data from earliest records through 2007
- ~ 80,000 tows, 800,000 records
- Converted to ArcMap format
- Created tools to simplify summaries
- Added full “family tree” information
- Corrected using NMFS criteria to account for trawl & vessel differences

Fisheries Analysis

Wolffish - Relative Abundance



Fisheries Analysis

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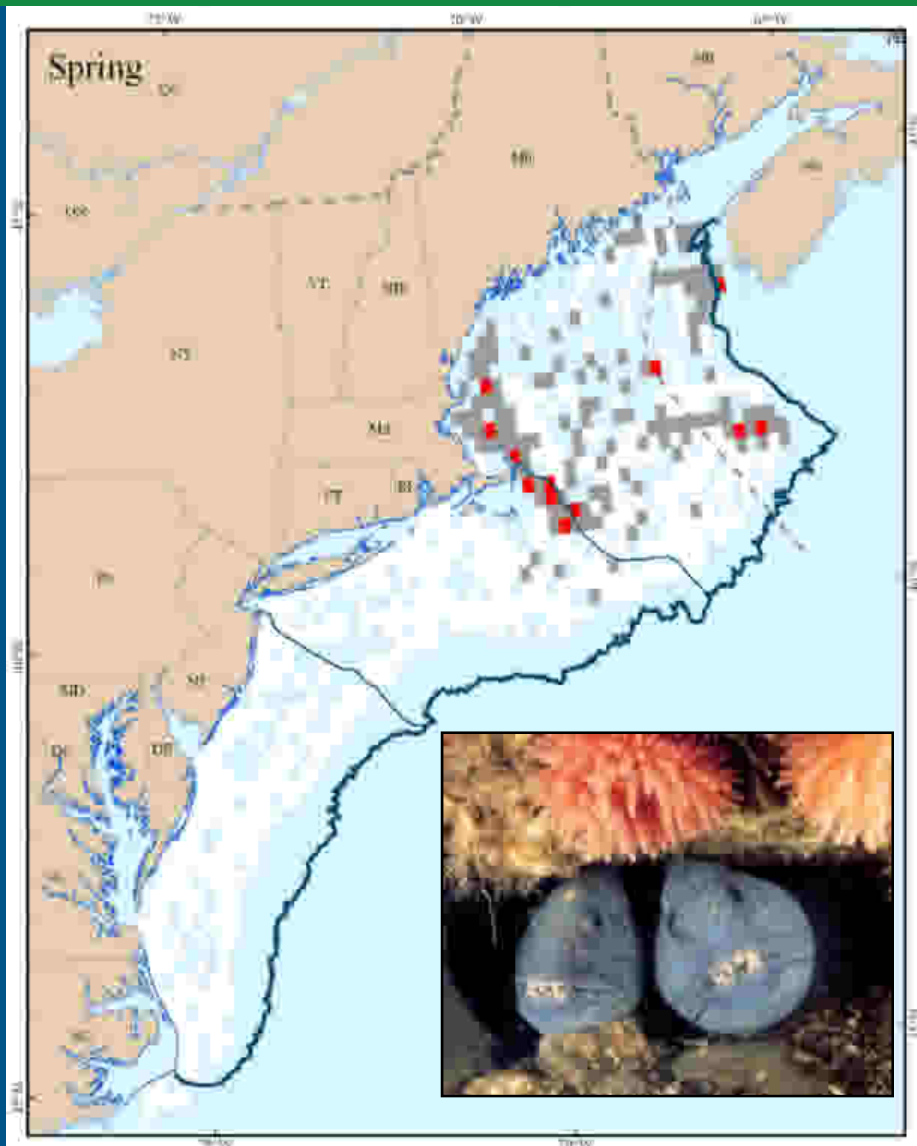
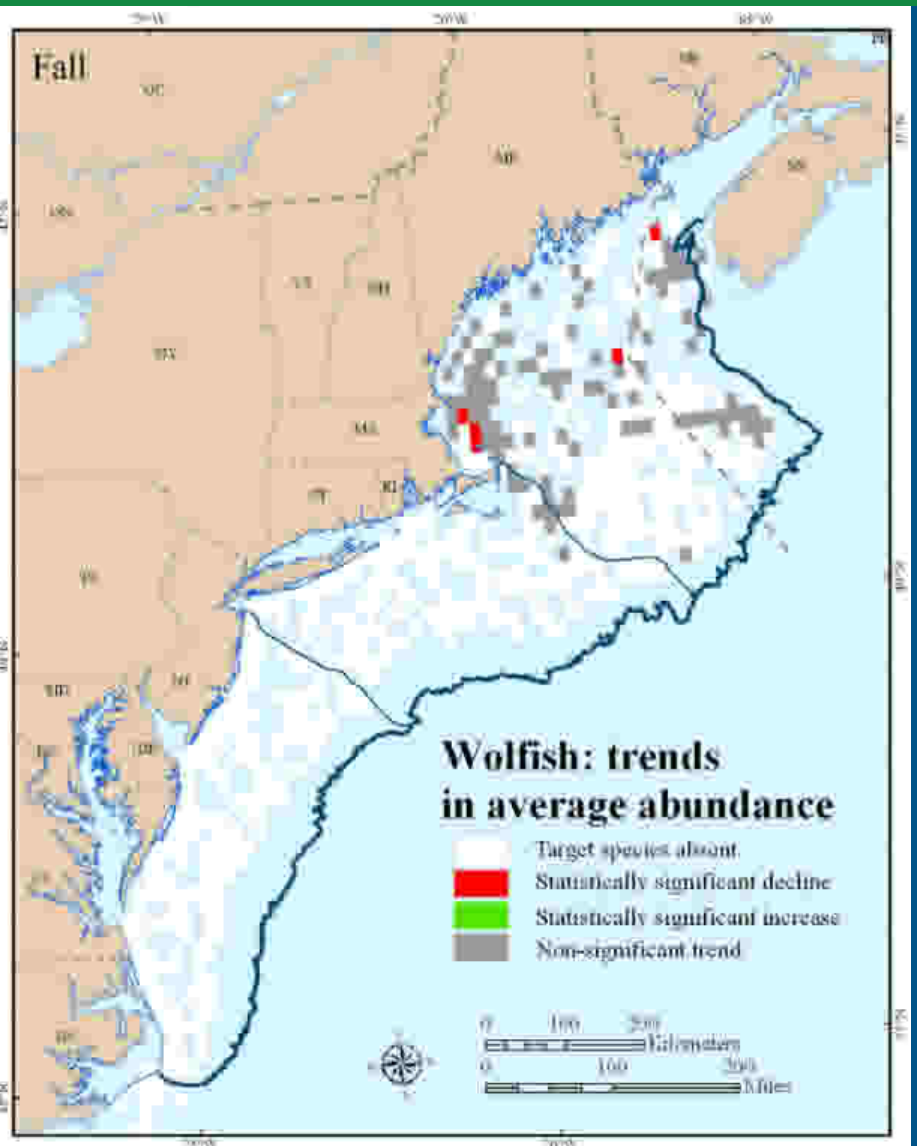
Wolffish - Trends in Average Abundance





Fisheries Analysis

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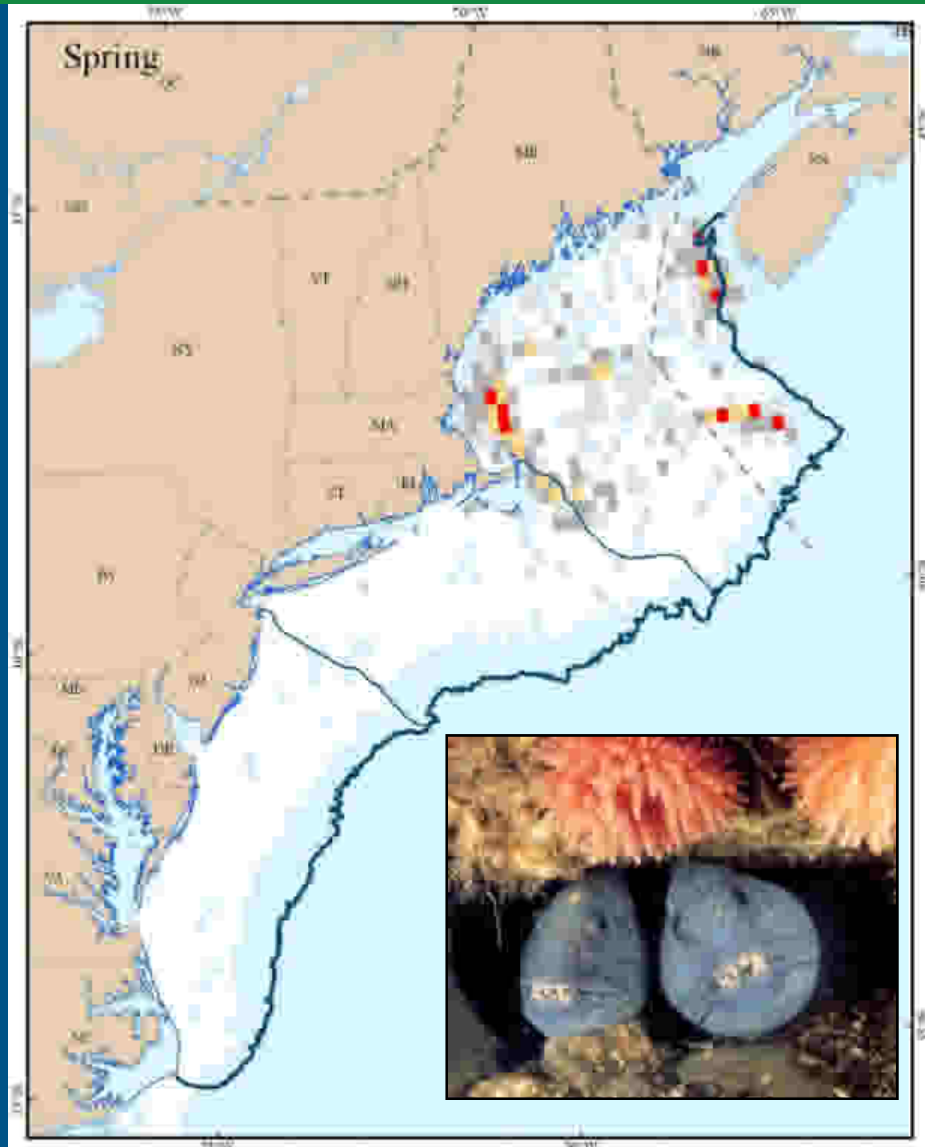
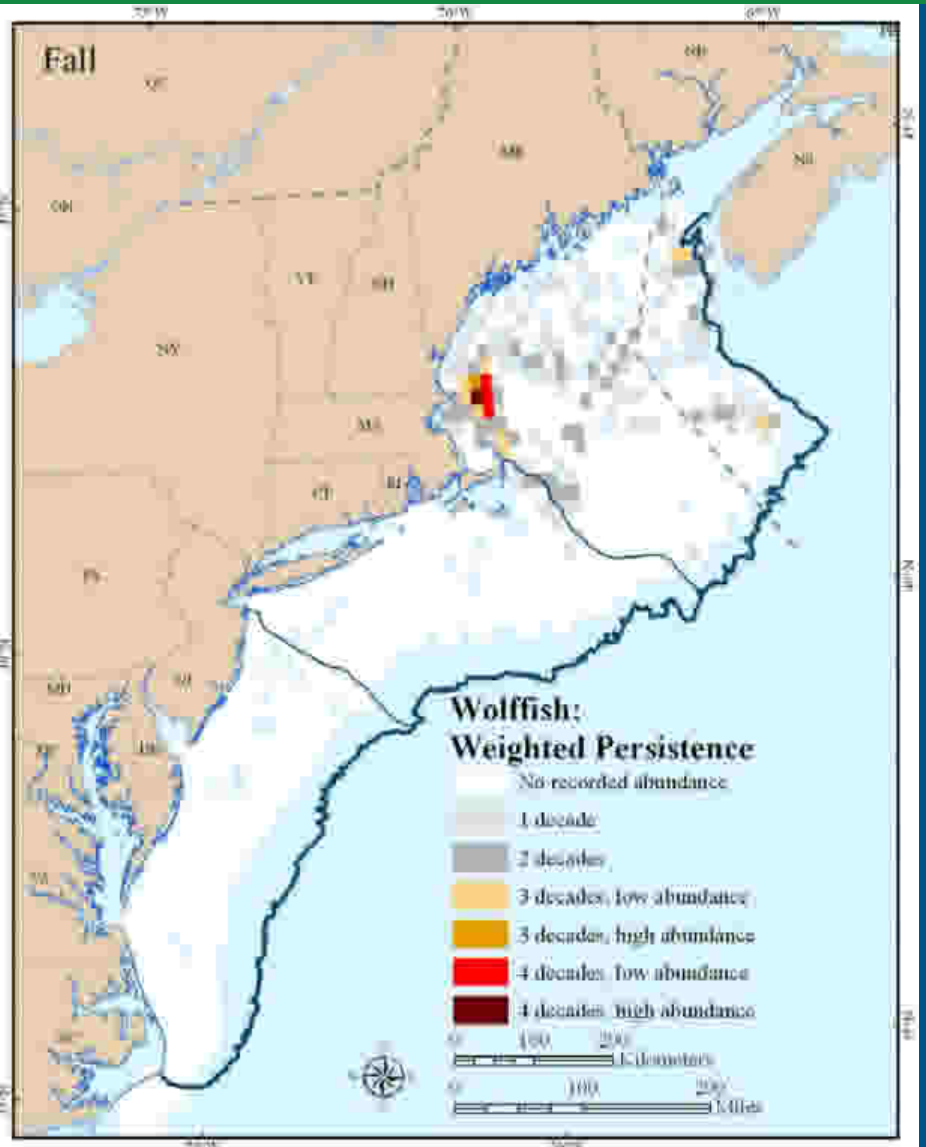
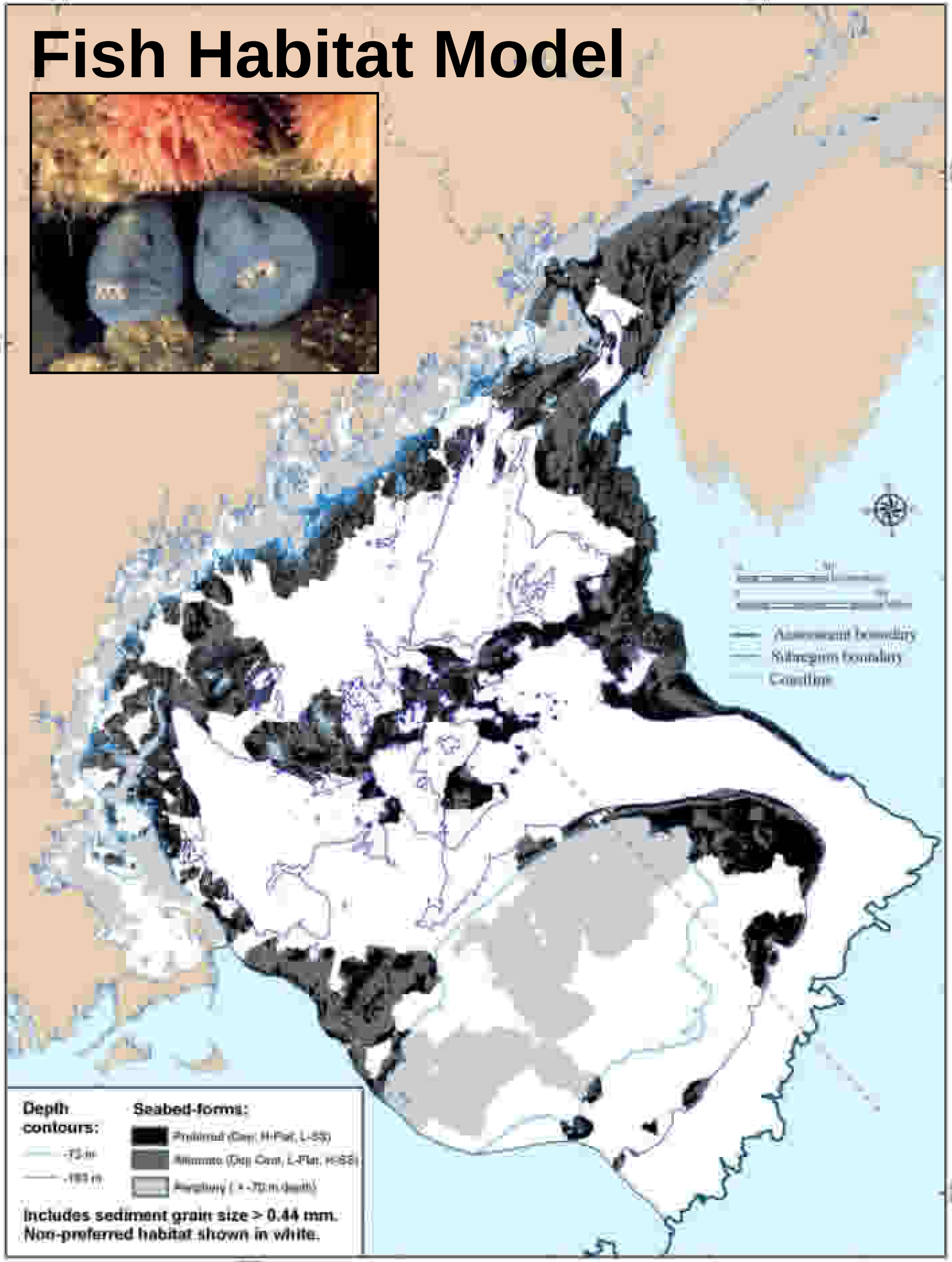
Fisheries - Weighted Persistence





Fish Habitat Model

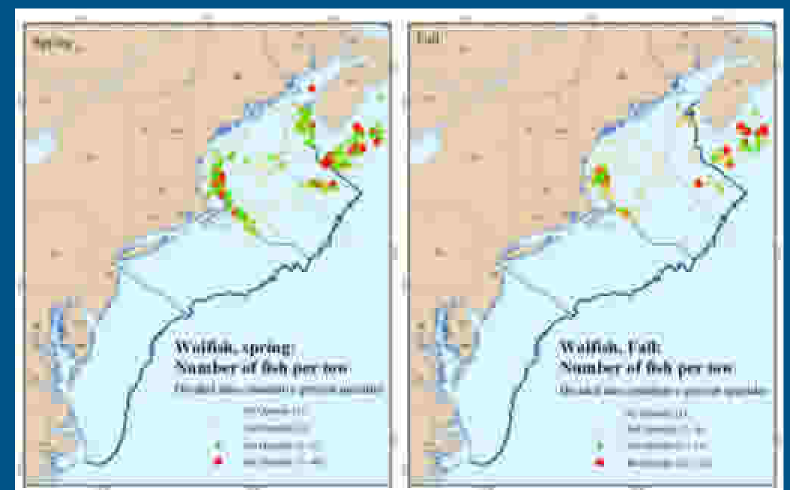


Wolffish habitat in the Gulf of Maine

Dark Gray & Black
58% of all Wolffish
76% of high abundance

Light Gray
19% of all Wolfish
7% of high abundance

Grain size > 0.44 mm
Depth > 70 & <193 m
Seabed: high flat (black)
other (gray)



NAM ERA Phase II: Decision Support and Priority Areas

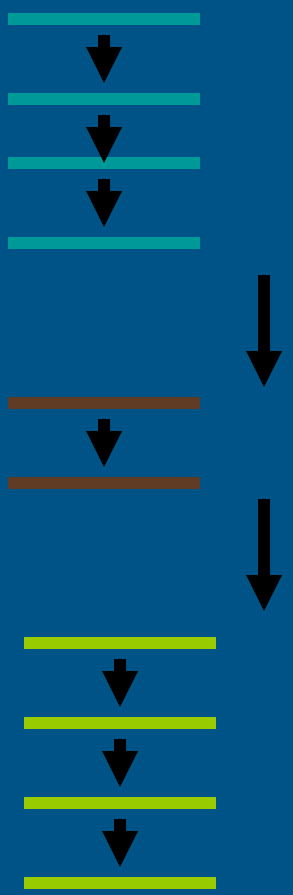
Marine Ecoregional Assessment

Phase 2: starts with overlay across all targets

-Coastlines & Estuaries
-Nearshore shellfish
-Diadromous fish
-Shore birds

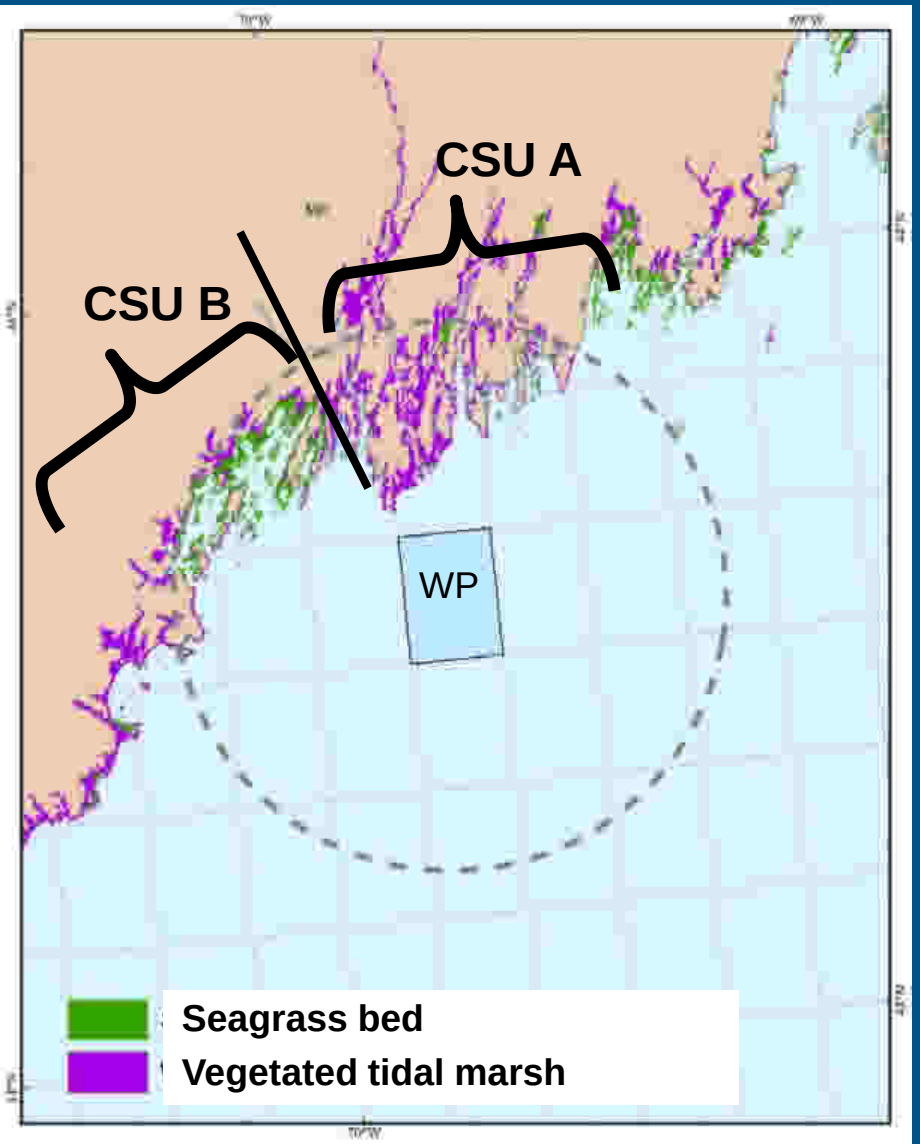
-Benthic habitats
-Demersal (ground) fish

-Ocean processes
-Small pelagic fish
-Marine mammals
-Sea turtles

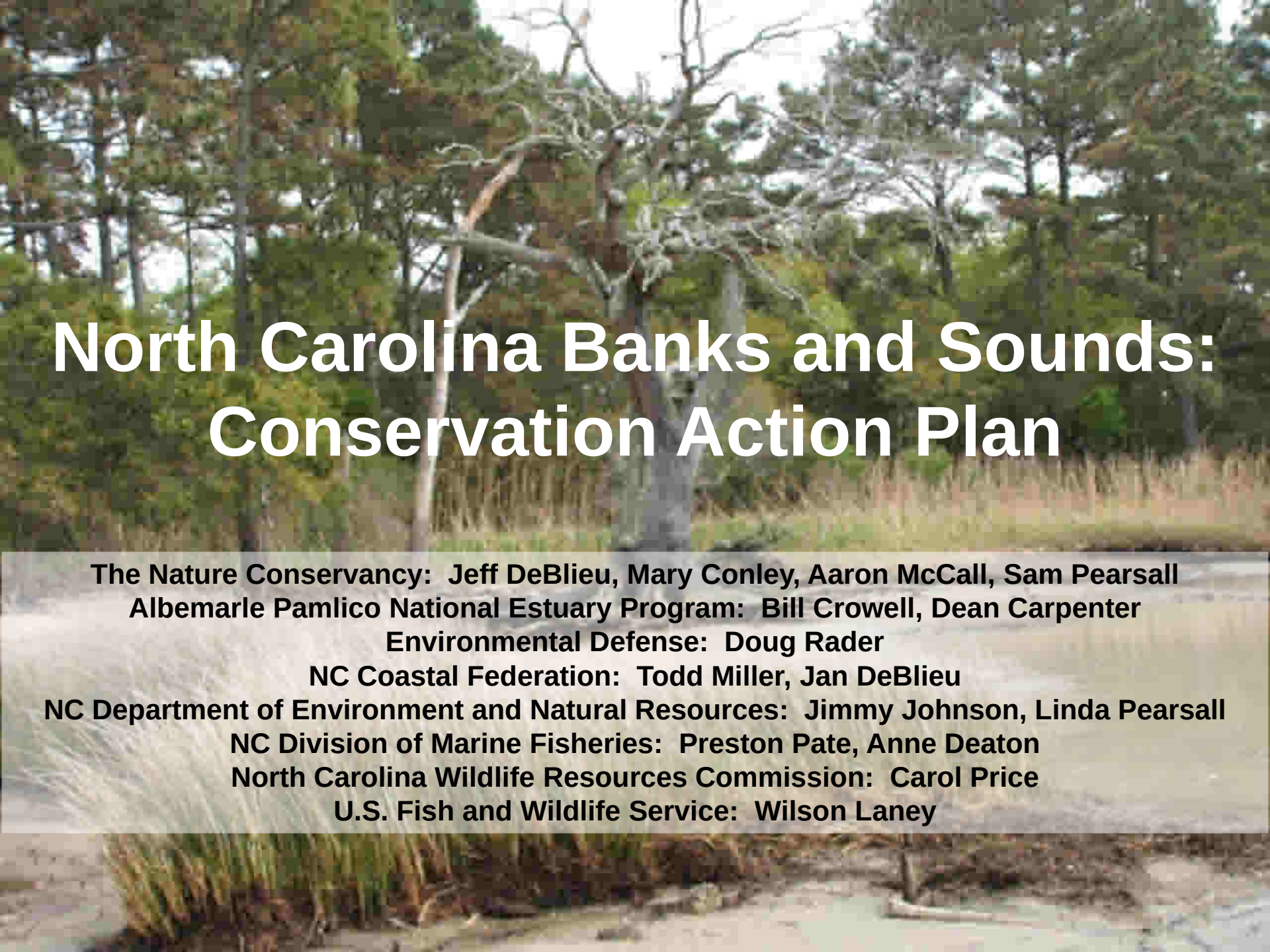


Phase II

Linking the coast to the marine…



Species	Season Tested	Higheste R2	Emergent Marsh (EM) pval	Seagrass (SG) pval
Alewife	spring	0.05	< 0.0001	NS
	fall	0.1	0.0098	< 0.0001
American Shad	spring	0.13	< 0.0001	0.13
Butterfish	fall	0.09	< 0.0001	0.007
	spring	0.07	0.001	< 0.0001
Bluebackherring	spring	0.3	< 0.0001	0.0004
Atlantic Herring*	spring	0.08	< 0.0001	NS
Atlantic Menhaden*	spring	0.28	NS	< 0.0001
Atlantic Croaker	fall	0.2	< 0.0001	0.0003
	spring	0.65	NS	< 0.0001
Spot	fall	0.34	< 0.0001	< 0.0001
	spring	0.83	NS	< 0.0001
Scup	fall	0.28	< 0.0001	< 0.0001
	spring	0.06	0.0017	ns
Black Sea Bass	fall	0.09	< 0.0001	0.05
Summer Flounder	fall	0.33	< 0.0001	0.0033
	spring	0.06	< 0.0001	0.0019
Weakfish	fall	0.35	< 0.0001	< 0.0001
	spring	0.57	< 0.0001	< 0.0001
White_Hake	spring	0.04	0.0008	0.007
Windowpane Flounder*	spring	0.12	< 0.0001	0.39
	fall	0.05	< 0.0001	0.37
Winter Flounder	fall	0.06	0.0035	<0.0001
	spring	0.09	0.11	< 0.0001
Horseshoe Crab*	fall	0.33	< 0.0001	NS
	spring	0.1	< 0.0001	NS
Blue Crab*	fall	0.15	0.0002	0.0097



North Carolina Banks and Sounds: Conservation Action Plan

The Nature Conservancy: Jeff DeBlieu, Mary Conley, Aaron McCall, Sam Pearsall
Albemarle Pamlico National Estuary Program: Bill Crowell, Dean Carpenter
Environmental Defense: Doug Rader
NC Coastal Federation: Todd Miller, Jan DeBlieu
NC Department of Environment and Natural Resources: Jimmy Johnson, Linda Pearsall
NC Division of Marine Fisheries: Preston Pate, Anne Deaton
North Carolina Wildlife Resources Commission: Carol Price
U.S. Fish and Wildlife Service: Wilson Laney

Conservation Action Planning

Conservation Targets

- Mesohaline submerged aquatic vegetation habitat
- Oligohaline submerged aquatic vegetation habitat
- Shellfish reefs and shell bottom habitat
- Tidal marshes and creeks
- Coastal tributary wetlands
- Anadromous fish species (particularly the alosine guild)
- Primary and secondary nursery areas
- Barrier island inlet and landforms
- Sustainable fishing communities

Conservation Planning - Threats

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Table 2 Threats Across Systems Project-specific threats (Common taxonomy)		*Mesohaline SAV Habitat*	*Oligohaline SAV Habitat*	*Shellfish Reef and Shell Bottom Habitat*	*Tidal Marshes and Creeks*	*Coastal Tributary Wetlands*	*Anadromous Fish*	*Functional Primary and Secondary Nursery Areas*	*Barrier Island and Inlet Landforms*	*Sustainable Fishing Communities*	Overall Threat Rank
		1	2	3	4	5	6	7	8	9	
1	Sea-Level Rise (Habitat Shifting and Alteration)	Low	High	Very High	Very High	Very High	-	Very High	Very High	Very High	Very High
2	Housing and urban development and associated activities (wastewater treatment, stormwater runoff, nutrient loads, construction activity, gentrification) (Housing and Urban Areas)	Medium	High	High	Very High	Very High	Very High	High	Very High	Very High	Very High
3	Increased hurricane frequency and intensity (Storms and Flooding)	Medium	High	Very High	Very High	Very High	High	Very High	Very High	-	Very High
4	Construction of roads, culverts, bridges, shoreline infrastructure, associated dredging, stormwater runoff (including nutrient loading from these) (Roads and Railroads)	Low	Medium	High	Very High	Very High	Very High	Very High	Very High	-	Very High
5	Dam operations, ditching, draining (Dams and Water Management/Use)	Low	Medium	Very High	Very High	Very High	Very High	Very High	-	-	Very High
6	Agriculture, including concentrated animal operations and nutrient loads from these activities (Annual and Perennial Non-Timber Crops)	Medium	High	High	-	Very High	Very High	Very High	-	-	Very High
7	Incompatible fishing practices; overfishing (Fishing and Harvesting Aquatic Resources)	Low	Medium	Very High	-	-	Very High	-	-	Very High	Very High
8	Shoreline hardening and beach renourishment (Other Ecosystem Modifications)	Medium	High	High	High	Very High	-	-	-	-	Very High
9	Ocean acidification (Habitat Shifting and Alteration)	Medium	-	Very High	-	-	Very High	-	-	Medium	Very High
10	Invasive Species (Invasive Non-Native/Alien Species)	Low	High	High	Very High	High	-	-	-	Low	Very High

Conservation Action Planning

Conservation Strategies

Five overarching conservation objectives (with 41 associated strategic actions):

- Shape and support comprehensive ecosystem management to enhance and sustain resilience, water flows and water quality, fire regimes, coastal habitats and living resources of the Banks and Sounds system.
- Ensure funding and public support for comprehensive ecosystem management that sustains target viability and ecological integrity.
- Protect keystone areas and buffers.
- Implement land and water management and restoration.
- Ensure that regulations and permitting processes sustain target viability and ecological integrity.

Conservation Action Planning

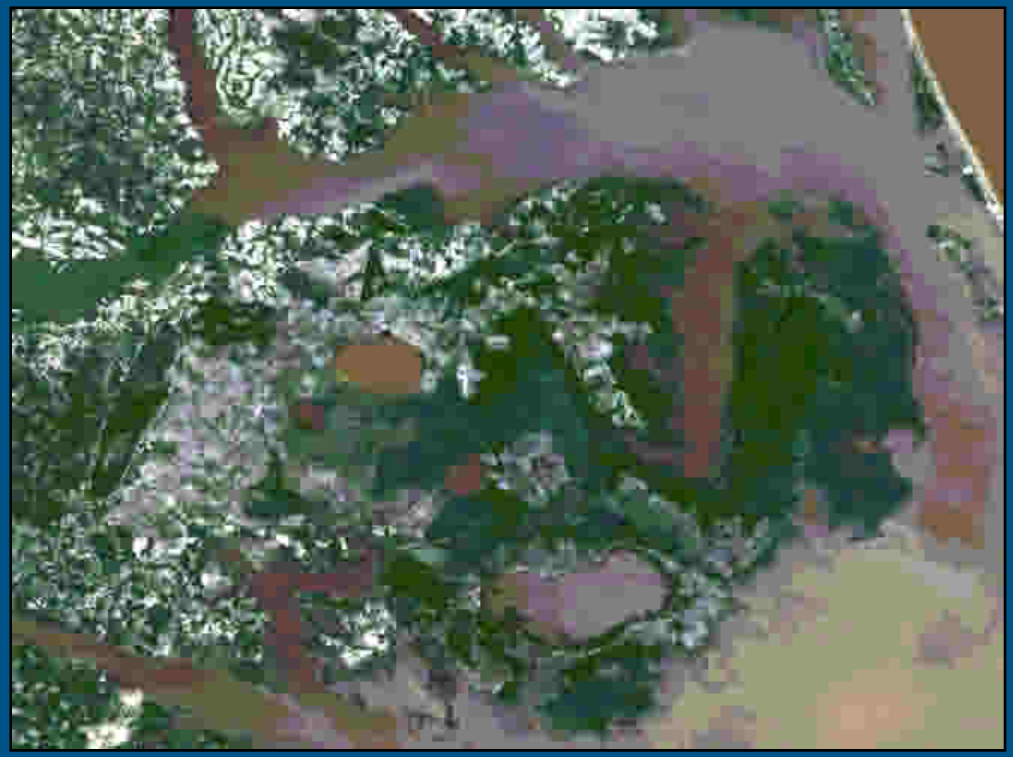
Implementation – Alligator River Pilot Project

Three Primary Threats:

- Salt intrusion into the interior via ditches
- Higher energy currents, waves, and storms
- Rising water outpacing habitat and species movement

Adaptation Strategies:

- Understand the system
- Hydrologic restoration
- Oyster restoration to buffer shorelines
- Land conservation
- Marsh plantings

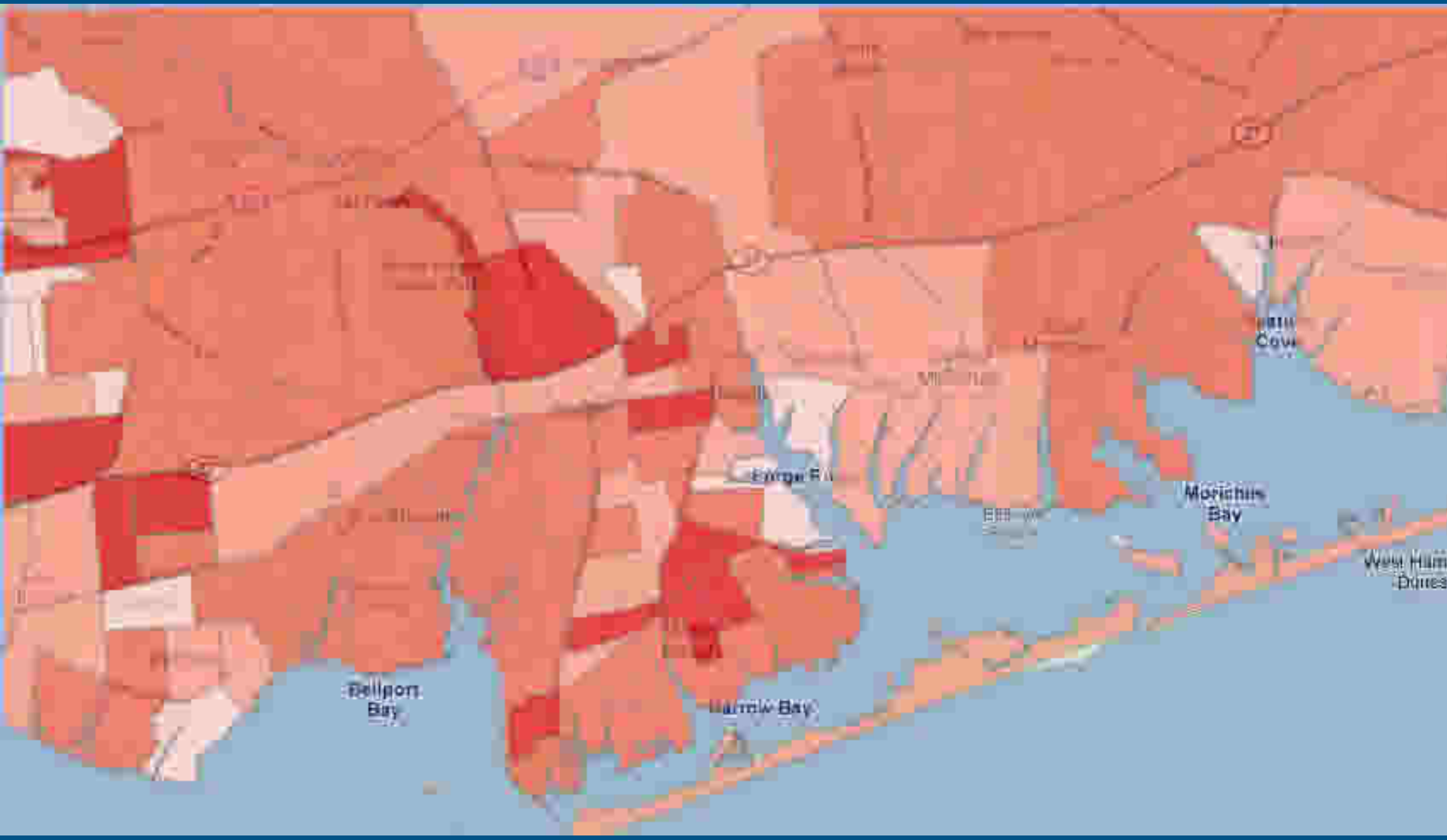


Long Island Coastal Resilience Project

2020s SLR with 20% annual chance flood
Current Conditions - Google

Wetlands – Long-Term Viability Index

Community Vulnerability Analysis



Local Implementation

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Regulatory Approaches

- Standard buffers/setbacks;
- Rolling easements/setbacks;
- Priority areas for protection based on current conditions;
  - Priority areas for acquisition
  - Bulkhead-free zones
- Priority areas for protection based on future conditions;
  - Upland buffer areas.

Future Work: Strategies and Implementation

Support State Approaches and Laws

Regional and National Ocean Governance

Regional Marine Spatial Planning Workshop

Southeast Data Collection and Analysis

Questions?