The South Atlantic Conservation Blueprint: From planning to action

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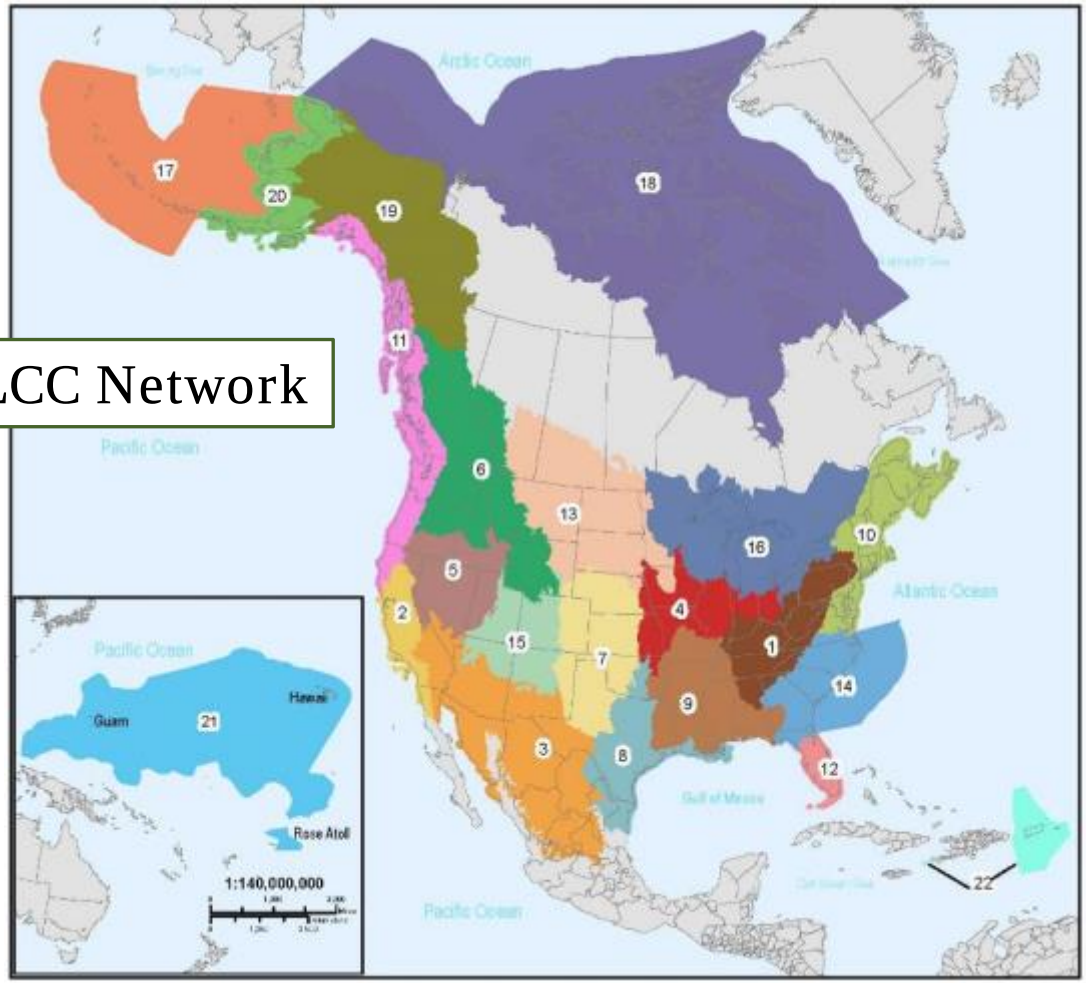
5-17-2017

SOUTH ATLANTIC
LANDSCAPE CONSERVATION COOPERATIVE

Plan for this morning

- Intro to South Atlantic Conservation Blueprint
- Discussion and review of:
  - Spatial priorities
  - Blueprint implementation strategy
- Break
- Ecopath progress
- Ecospace progress

Part of a larger network



Fish Habitat Partnerships

Estuary Partnerships

Bird Joint Ventures

Climate Science Centers

USDA Climate Hubs

NOAA RISAs

... and many more

How is your cooperative governed?

The Steering Committee

ncasi

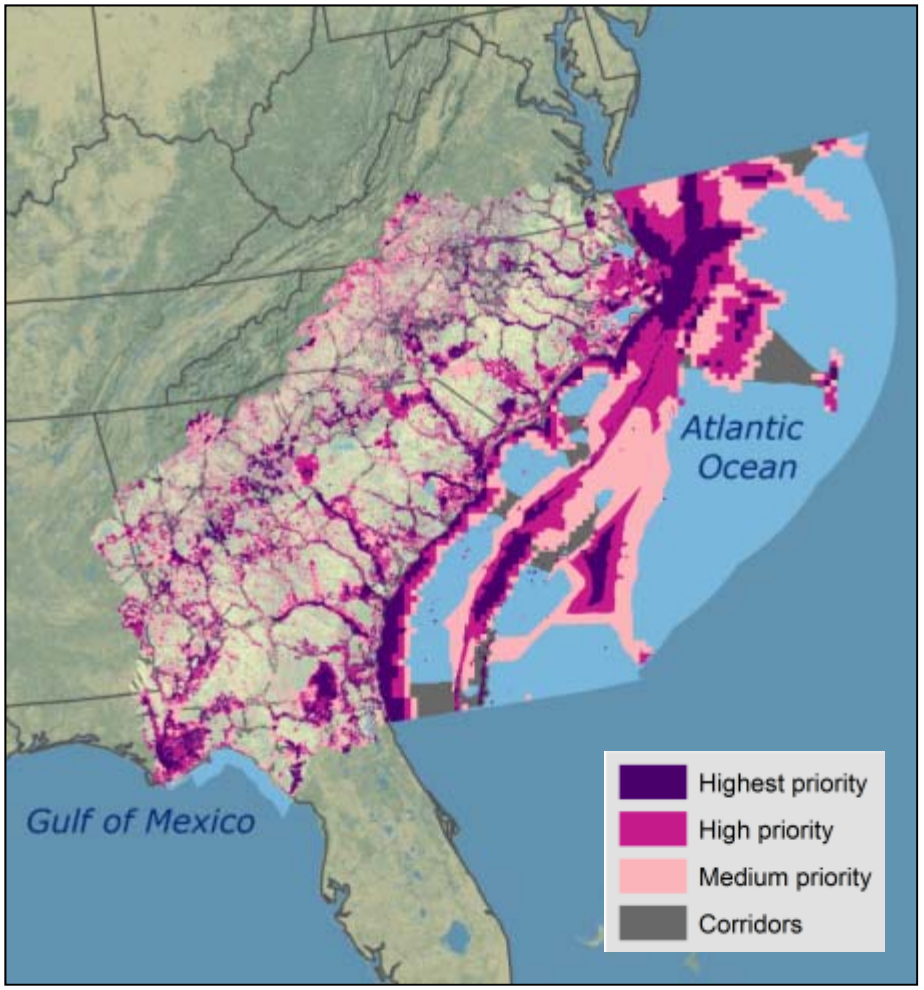
US Army Corps
of Engineers

Land Trust Alliance
Together, conserving the places you love

What does your cooperative do?

Our mission

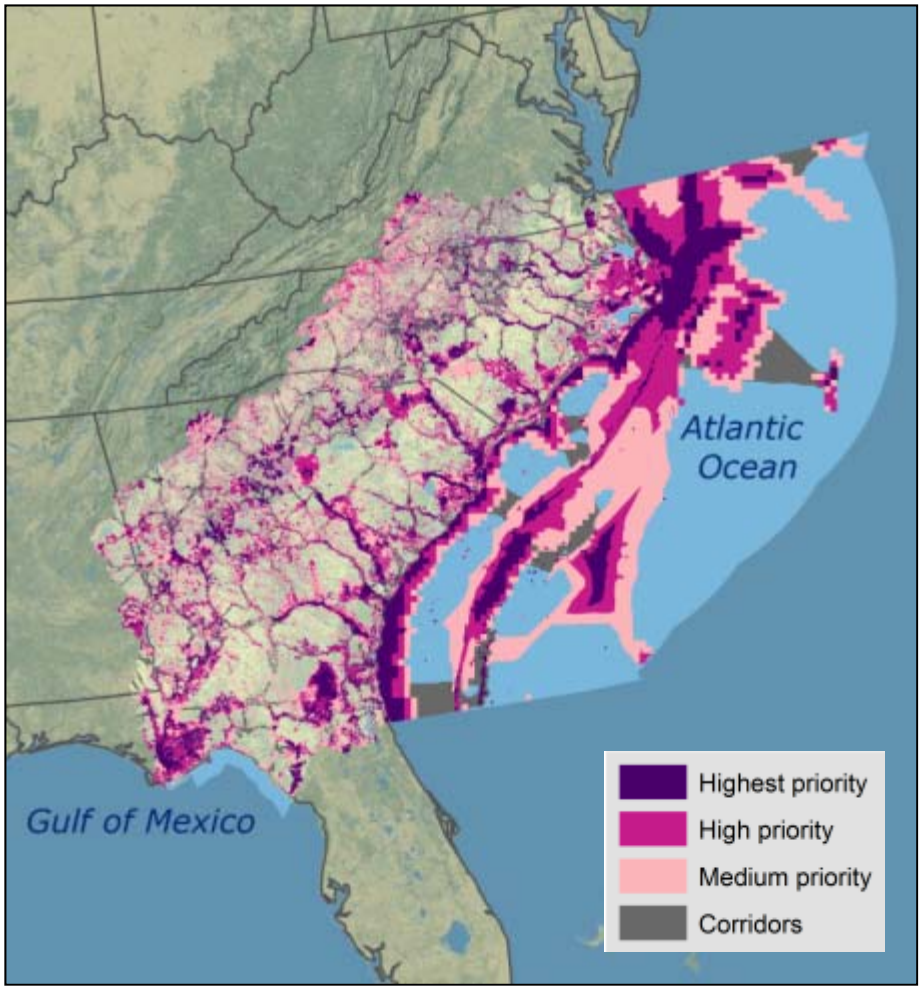
- To facilitate conservation actions that sustain natural and cultural resources, guided by a shared adaptive blueprint



What your cooperative do?

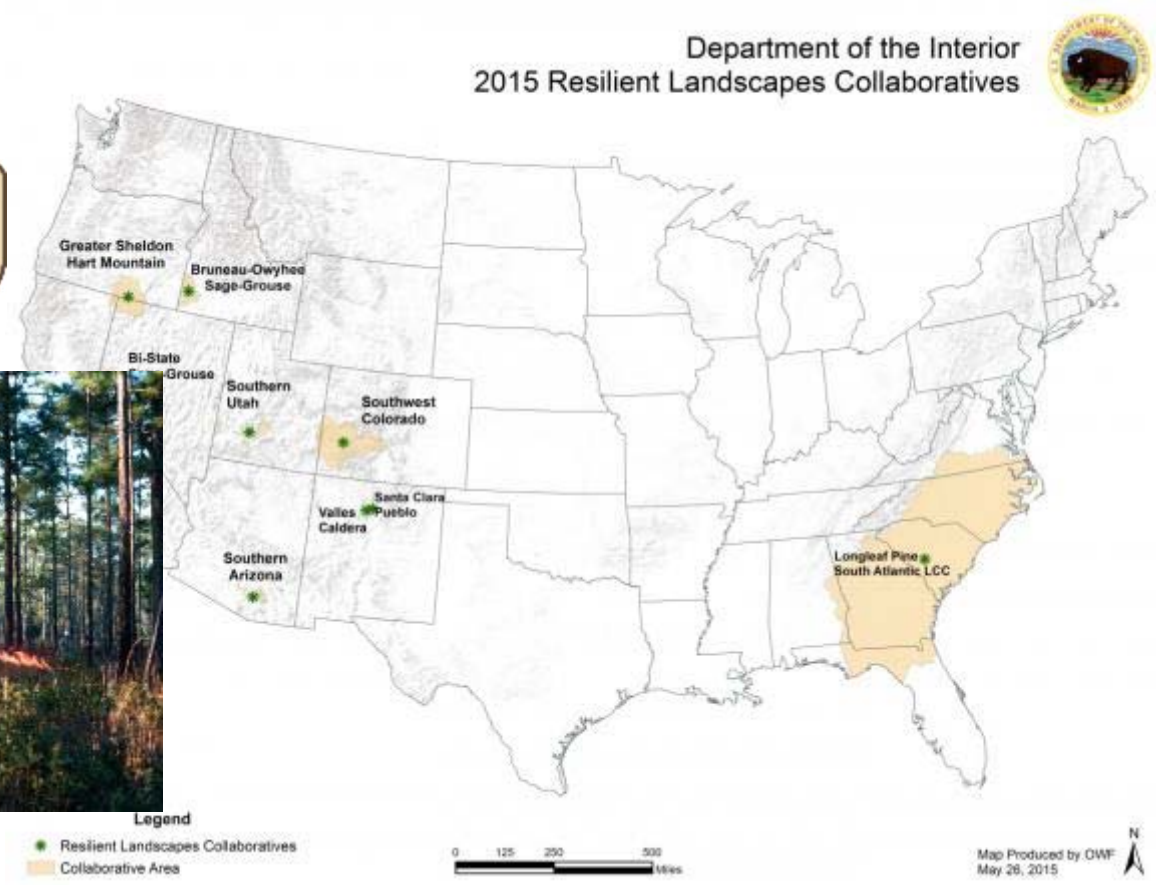
What is the Blueprint?

- A living spatial plan prioritizing opportunities for shared conservation action in the face of future change



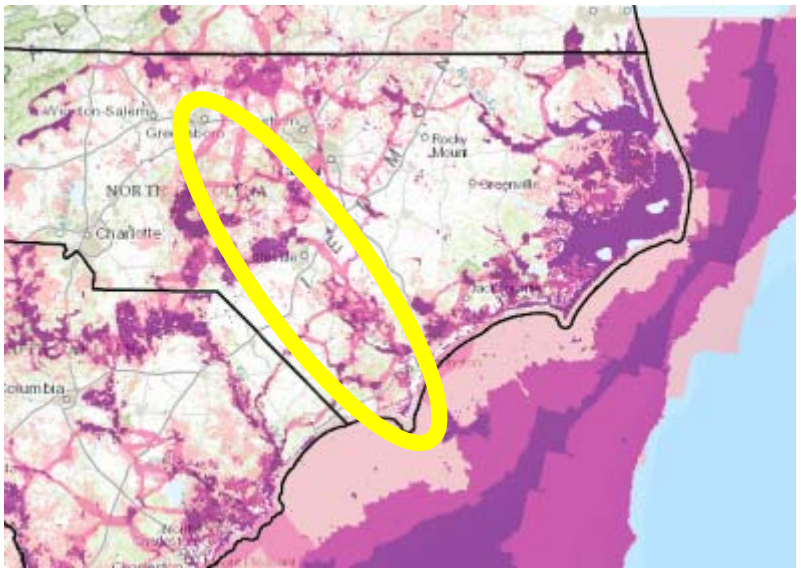
How is the Blueprint being used?

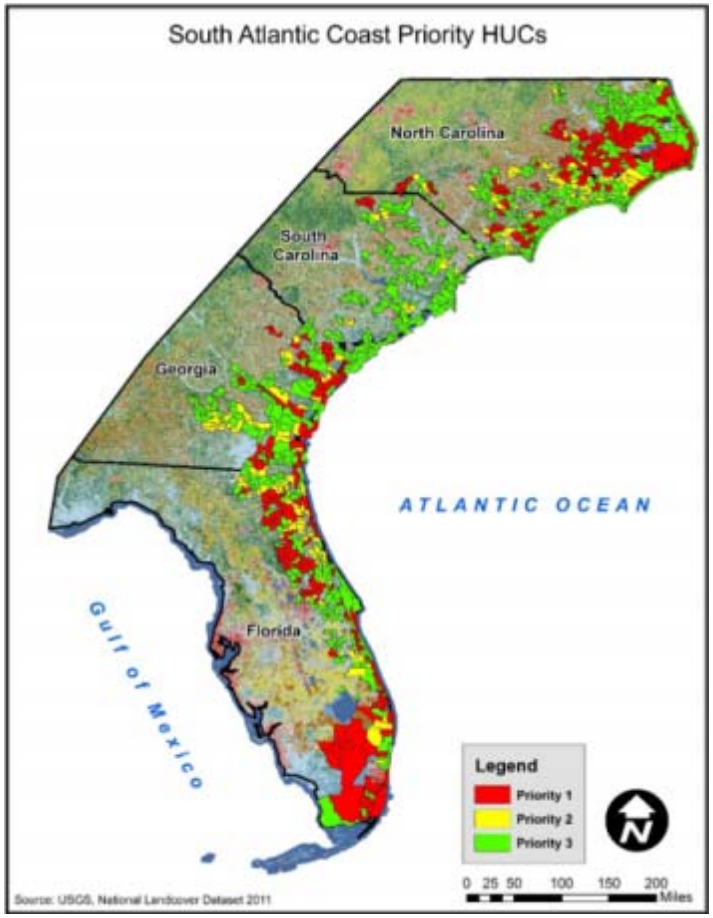
- **Amplify** the impact of existing efforts
  - Bring a landscape perspective to local actions
  - Compete for conservation dollars



How is the Blueprint being used?

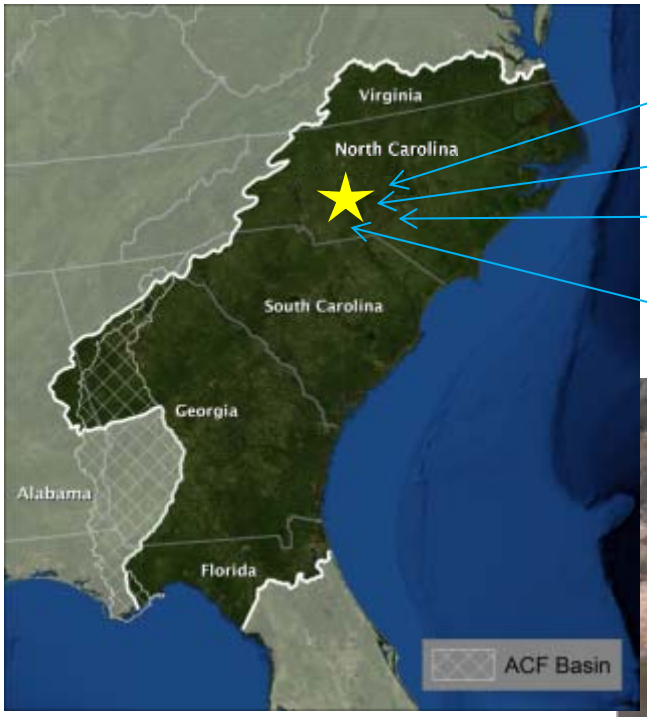
- **Anticipate** and plan for change
  - Preparing for major disasters
  - Land protection planning

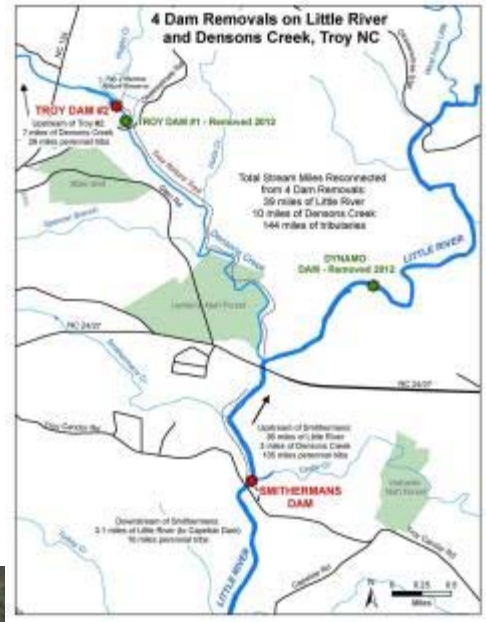




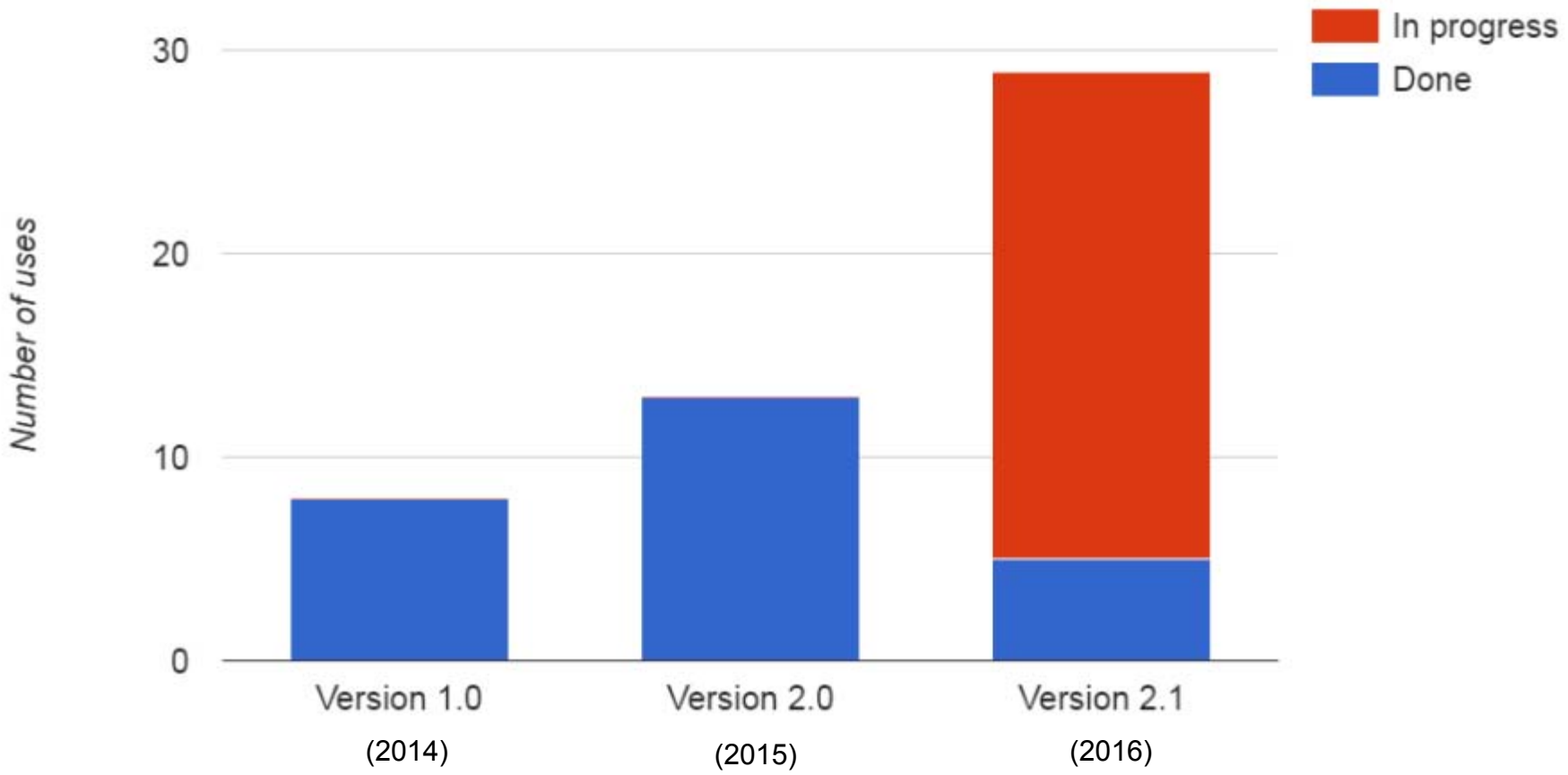
How is the Blueprint being used?

- **Adapt** to change through conservation action
  - Find the best places to work and partner
  - Implement systems-level solutions





Blueprint use by version

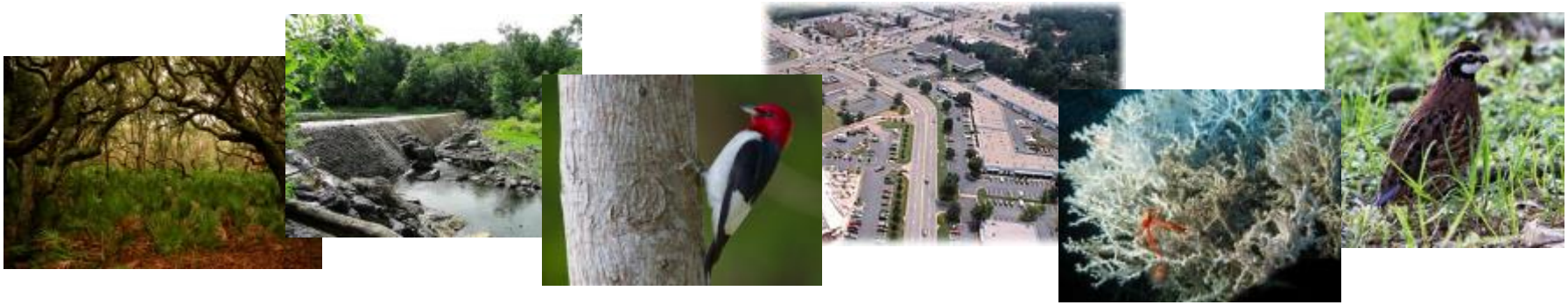


Steps in the Blueprint

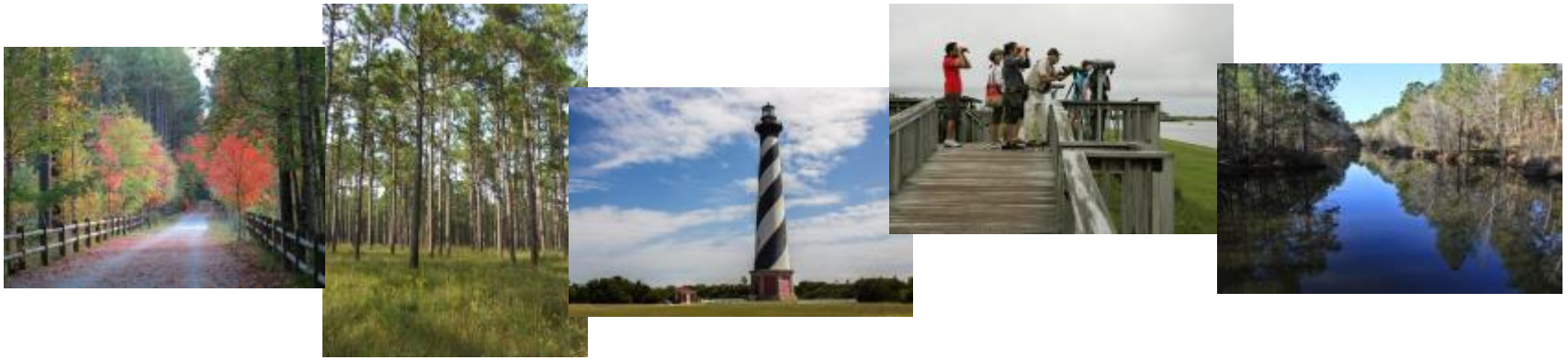
- Indicators
- The State of the South Atlantic
- The Blueprint

Indicators

- Integrity of natural resources



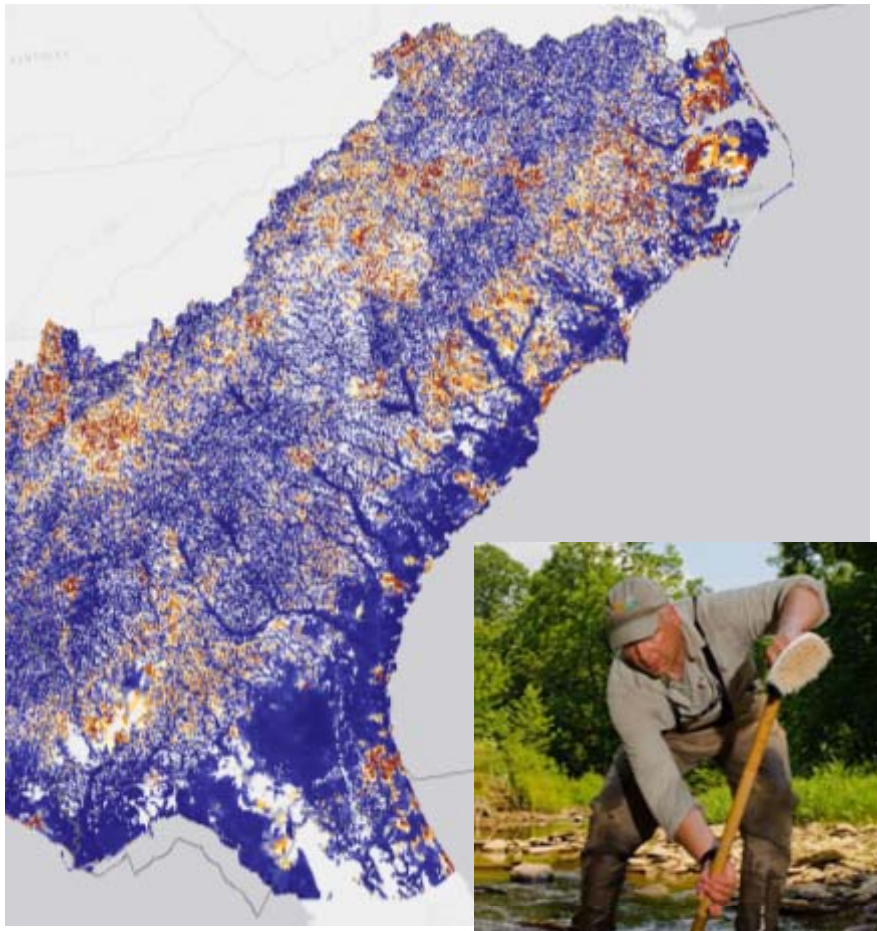
- Integrity of cultural resources

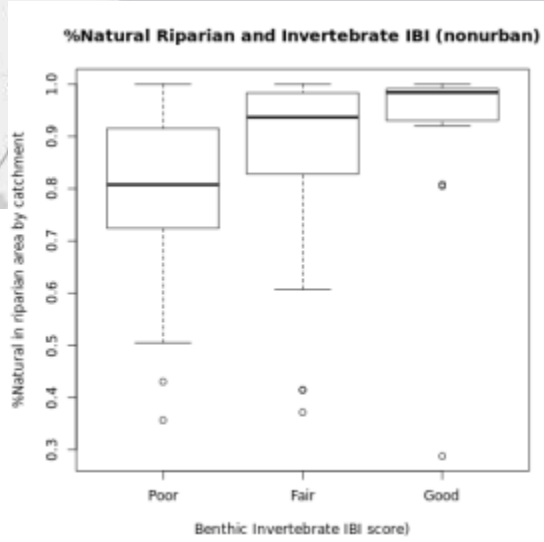


Indicator criteria

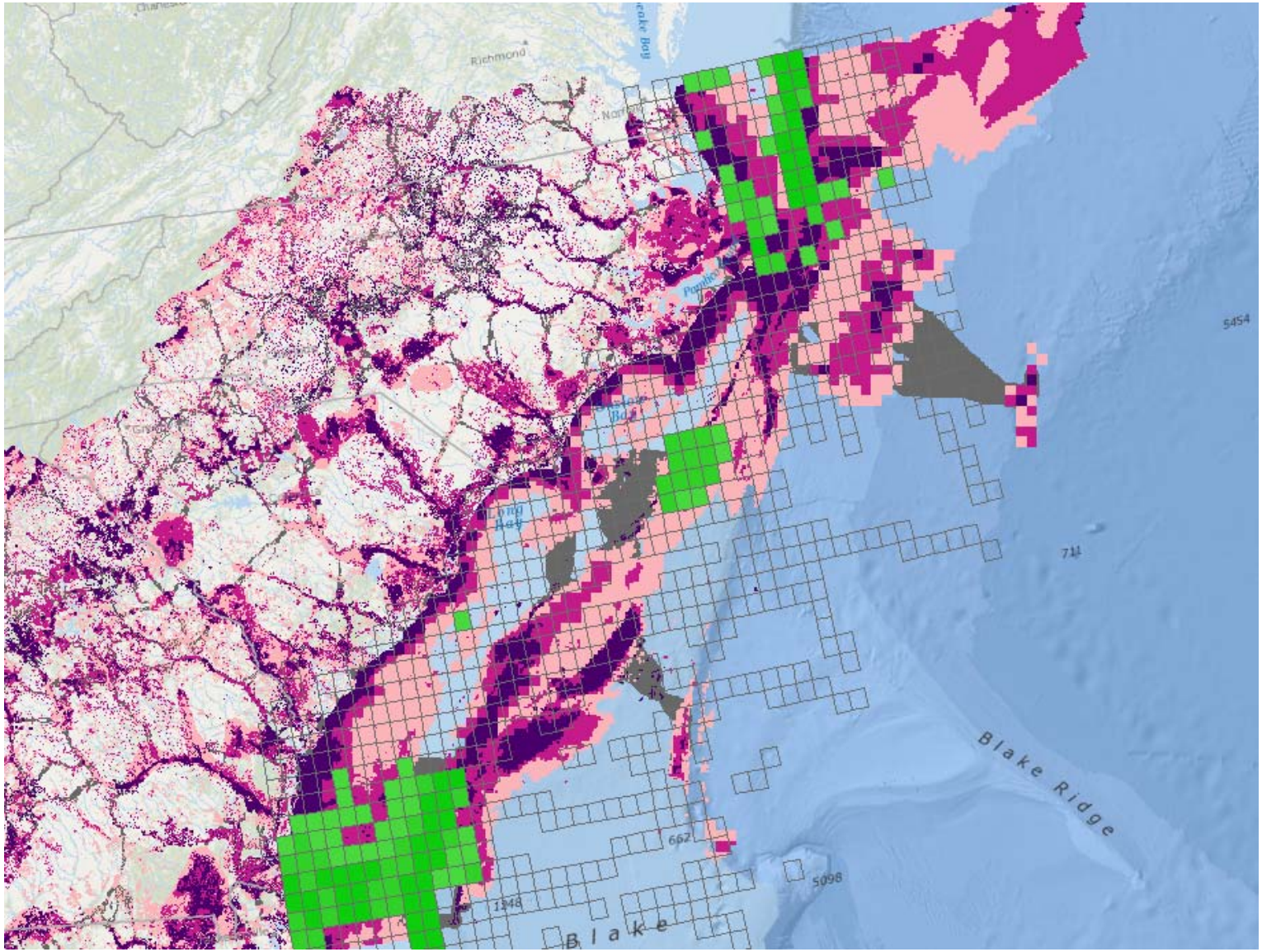
- Ecological
- Practical
- Social

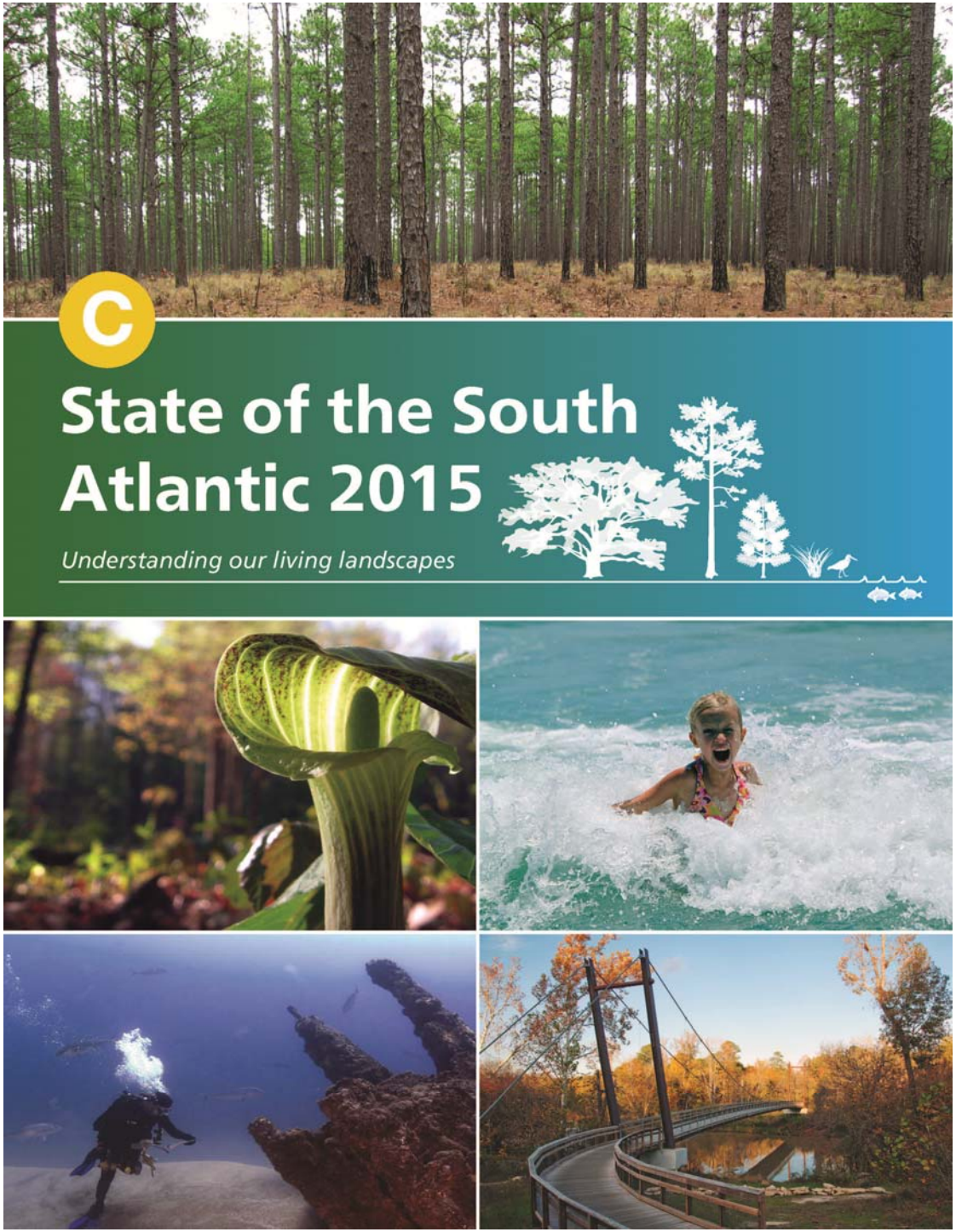
Testing indicators





Spring sea turtle sightings vs Blueprint 2.2





The State of the South Atlantic

State of the South Atlantic

South Atlantic ecosystem health scores

Overall, the South Atlantic scored a **C**. Piedmont areas scored the lowest, likely due to impacts from their major urban megaregions. The Marine region scored the highest; however, it did not include fishing impacts. The Coastal Plain scores were in the middle. These scores show that, while the South Atlantic is not completely healthy, there's hope for making future improvements.

North Piedmont: D Home to Charlotte, Raleigh, and large areas of upland hardwood forest. People who live and work in urban areas will help decide the future of this region.

South Piedmont: D Home to Atlanta and diverse watersheds draining into the Atlantic and Gulf. Balancing water needs for people and species continues to be a challenge.

North Coastal Plain: C Home to the Outer Banks and extensive estuaries. Sea-level rise is predicted to heavily impact this particularly flat region.

Central Coastal Plain: C Home to Wilmington, Myrtle Beach, and large protected wetland areas. Sea-level rise, tourism, and changing agricultural practices continue to influence ecosystem health.

South Coastal Plain: C Home to Savannah, Jacksonville, and a network of protected barrier islands. Partnerships are working to conserve this region's largest river floodplains.

Gulf Coastal Plain: C Home to rural Southwest Georgia and extensive conservation lands in the Big Bend of Florida. Sea-level rise and upstream agriculture continue to impact coastal protected areas.

Marine: B- Home to rich fisheries, deepwater coral, diverse seabirds, and important migratory fish, whales, and turtles. Ocean acidification and increased energy development are major emerging threats.

A snapshot in time

This assessment evaluates the ecological integrity of the South Atlantic using natural and cultural resource indicators. The indicators are scored across the entire region, for individual ecosystems, and within subregions following watershed and ecoregional boundaries. All indicators are regularly tested and revised, and this first report uses the best metrics available today.

Toward conservation action

Measuring these indicators communicates the status of the region's land and waters, helping develop a more unified vision for thriving ecosystems that support communities and economies. People and organizations are working together on cross-boundary conservation actions through the South Atlantic LCC to improve ecosystem health in the face of unprecedented changes to the natural world.

Scoring & level of confidence

Each data-driven indicator score is based on the percent of an area in good condition, according to the best available science. Though all indicators were measured, some scores were omitted to provide a baseline for future comparison. Confidence values are qualitative estimates of uncertainty based on known issues with indicators and data sources.

- A 100-80% in good condition
- B 79-60% in good condition
- C 59-40% in good condition
- D 39-20% in good condition
- F 19-0% in good condition
- ○ Not scored; baseline for future

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The State of the South Atlantic

The State of the South Atlantic

ECOSYSTEM

forested wetland

C

Confidence

Floodplain forests, pocosins, & bays

These frequently flooded swamp forests occur across the region on both organic soils, like peatland pocosins and Carolina Bays, and mineral soils, like bottomland hardwood and floodplain forests. Though historically drained for timber production and agriculture, intact forested wetlands support ecological diversity and enhance water quality by filtering polluted runoff.

Interpreting the score

Overall, this ecosystem scored a C. Piedmont areas scored the lowest, mostly driven by poor scores on low road density, the bird index, and aquatic connectivity. The North Coastal Plain scored the highest, mostly driven by better scores on low road density and aquatic connectivity. These results underscore the importance of efforts to restore the altered hydrology of forested wetlands in the South Atlantic.

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○ Forested wetland extent	D Low road density	○ Resilient biodiversity hotspots
B- Forested wetland birds	A Low-urban historic landscapes	D Fresh & saltwater connectivity
○ Forested wetland amphibians	C Structural connectivity	D Resident fish connectivity

- Floodplain forests
- Pocosin wetlands
- Forest birds and waterfowl
- Large mammals
- Native cane
- Temporal flooding
- Saltwater intrusion

Restoring ancient soils

Thirty years ago, the Eastern North Carolina wetlands that now comprise Pocosin Lakes National Wildlife Refuge were drained for peat mining and agriculture. Catastrophic wildfires burned away feet of the resulting dry organic soil. The Refuge has since restored natural hydrology on nearly 30,000 acres, improving habitat quality, protecting against future fires, and sequestering carbon by rebuilding the soil.

Steve Hillebrand/U.S. Fish and Wildlife Service

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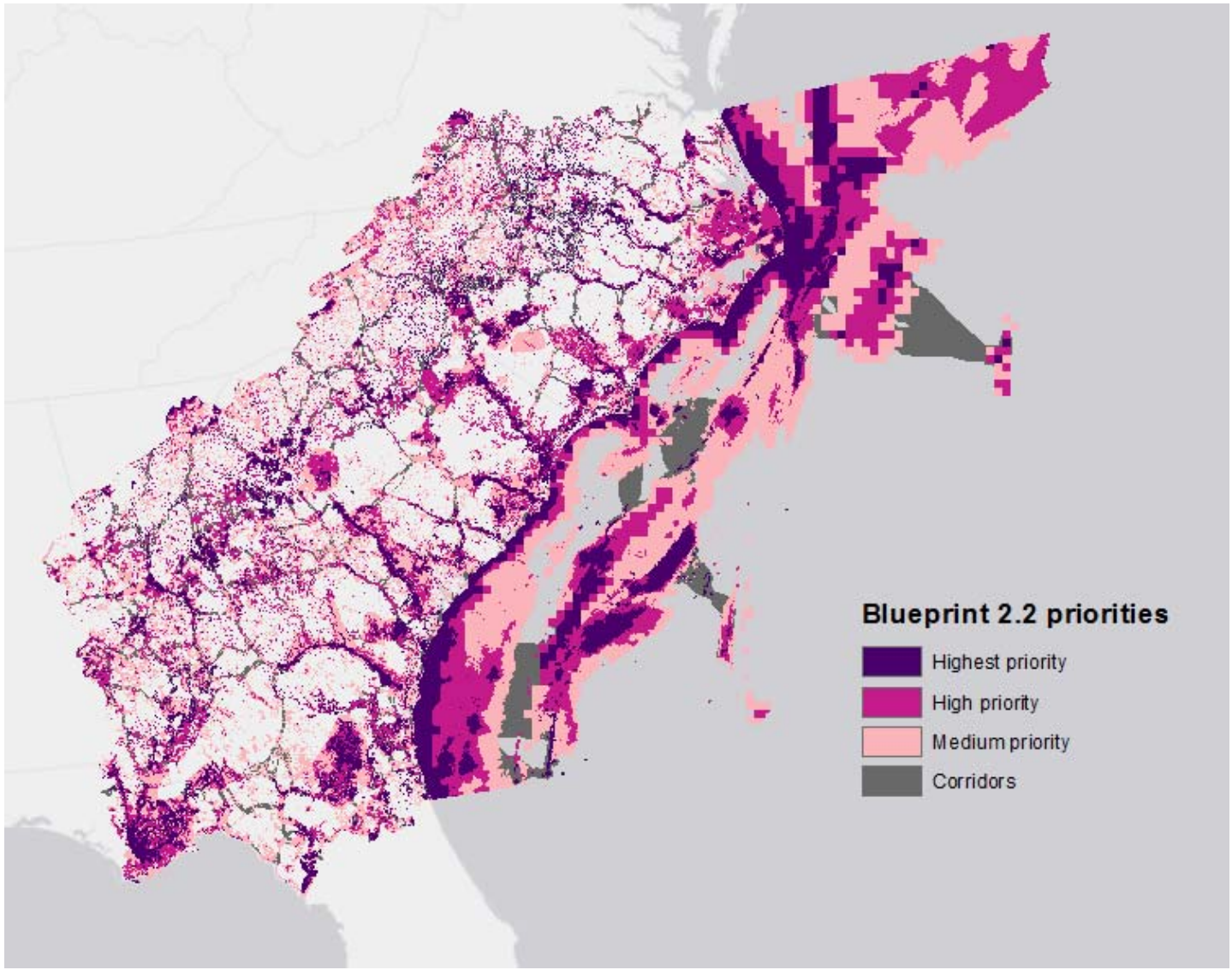
South Atlantic Conservation Blueprint



How was the Blueprint developed?

South Atlantic ecosystem

South Atlantic ecosystem

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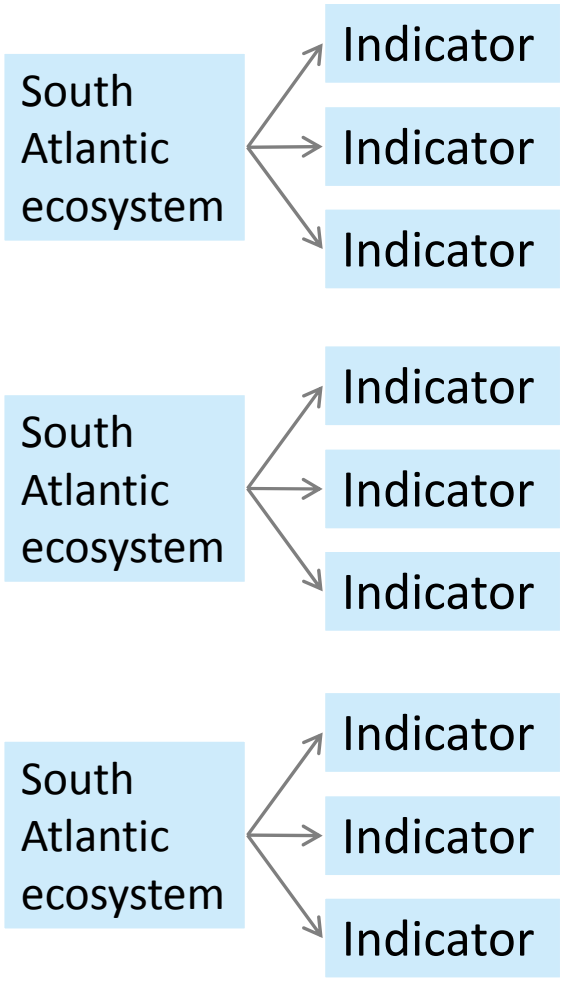

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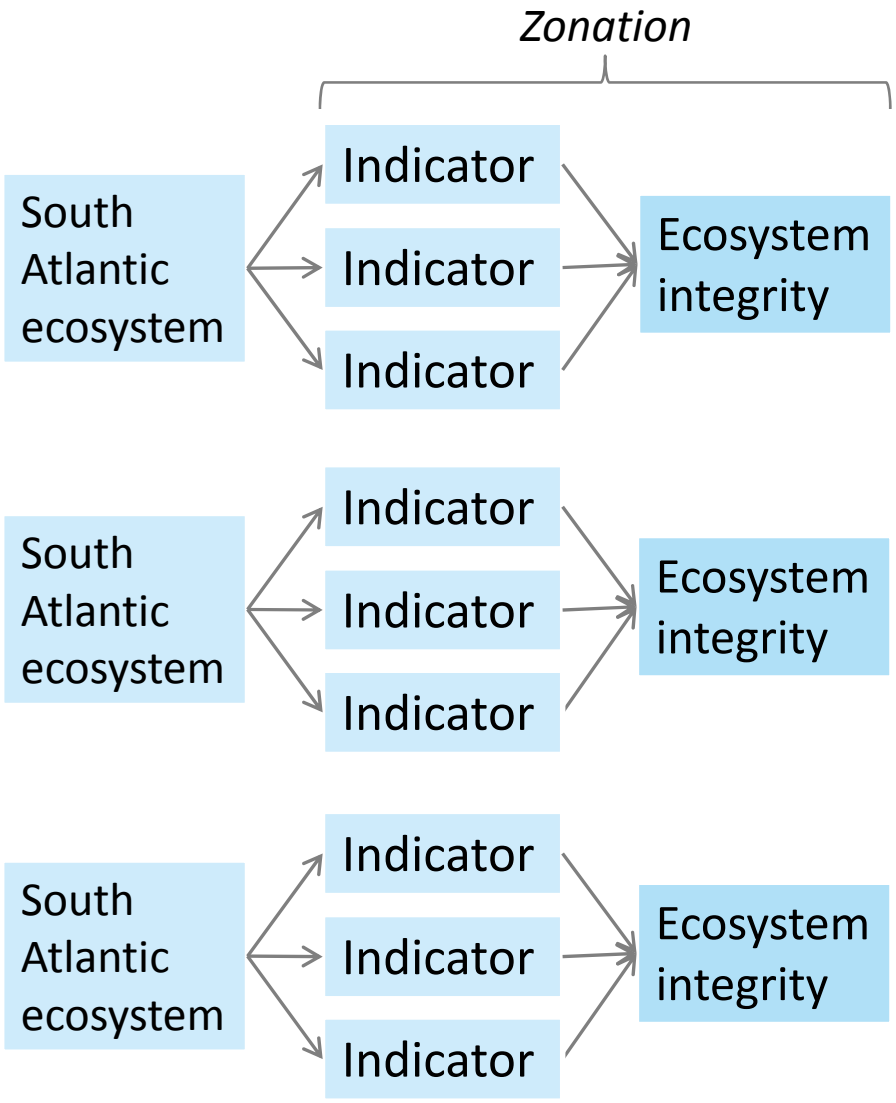
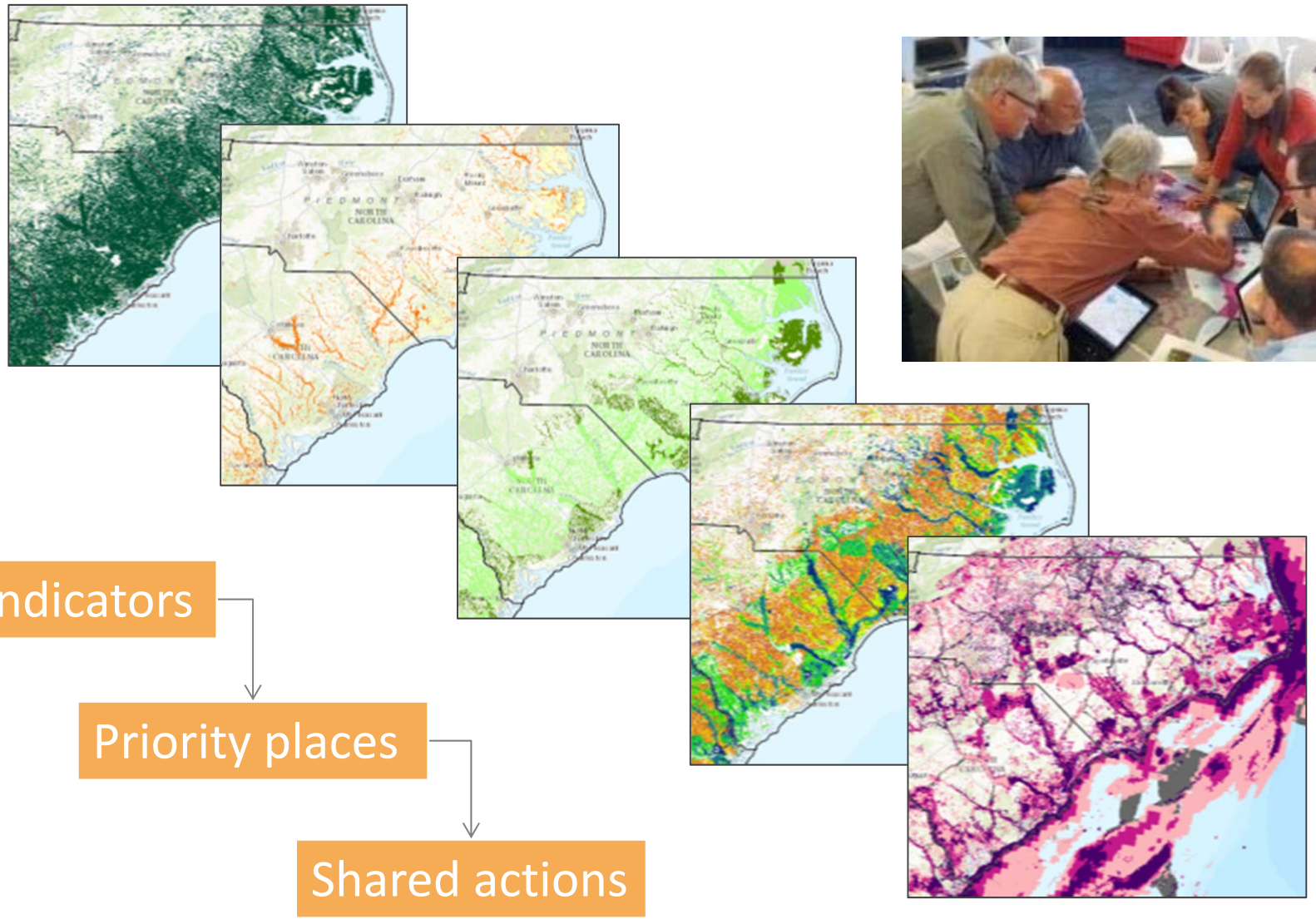


Combining layers



Combining layers with Zonation

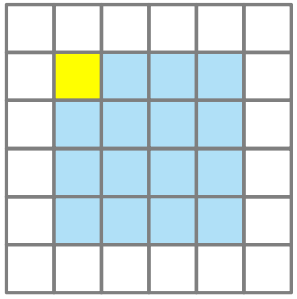
Combining layers with Zonation

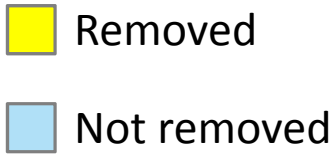
- Objective: Conserve high quality representations of all indicators

- Approach: Zonation iteratively removes pixels that will do the least harm to the full set of indicators

Combining layers with Zonation

- *If all else is equal, removes pixels from layers that are:*
  - Closer to the edge





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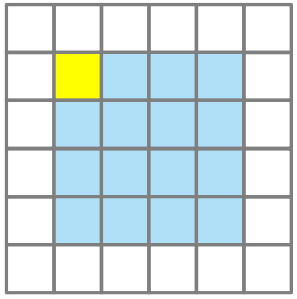
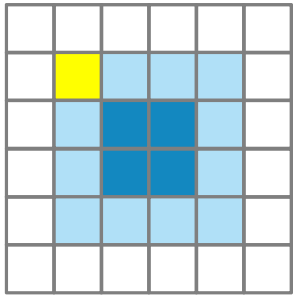
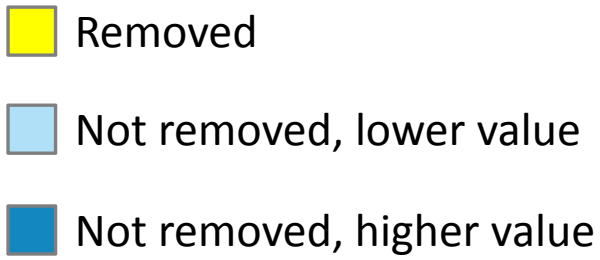


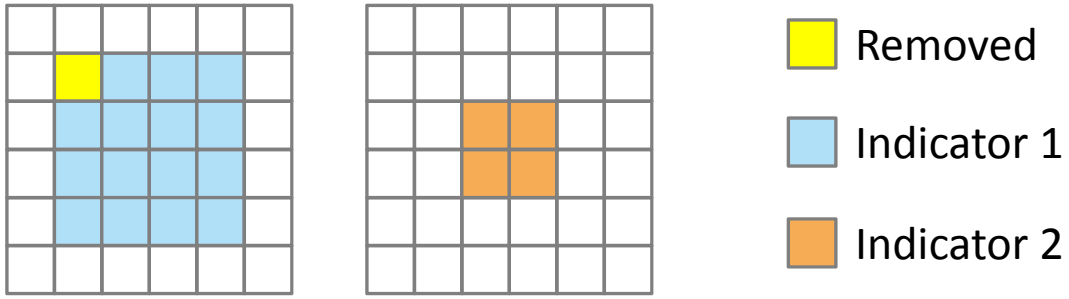
  - Lower value





Combining layers with Zonation

- *If all else is equal, removes pixels from layers that have:*
  - Larger distributions



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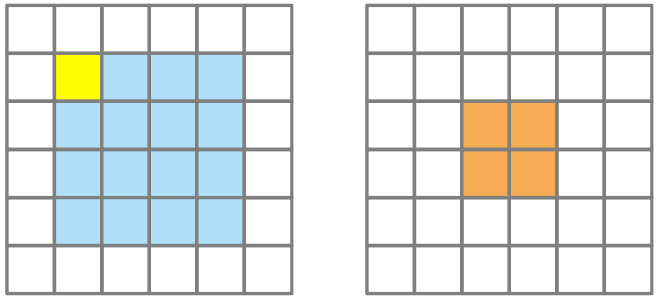
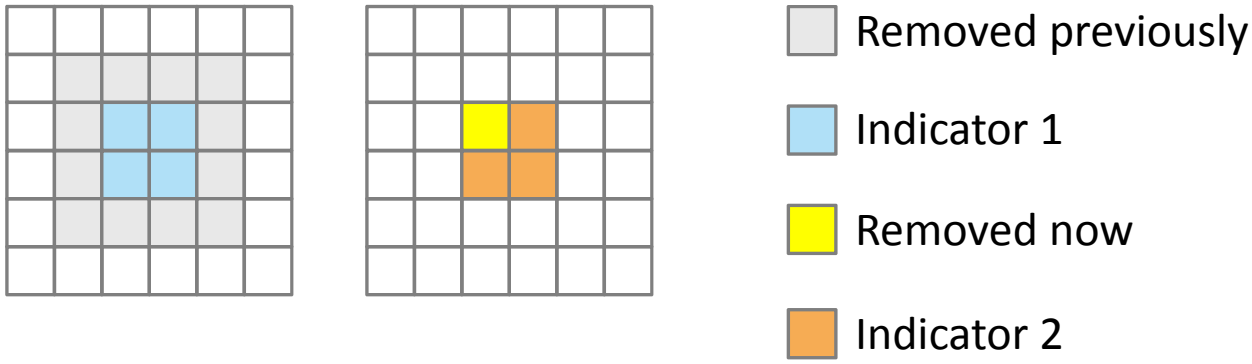
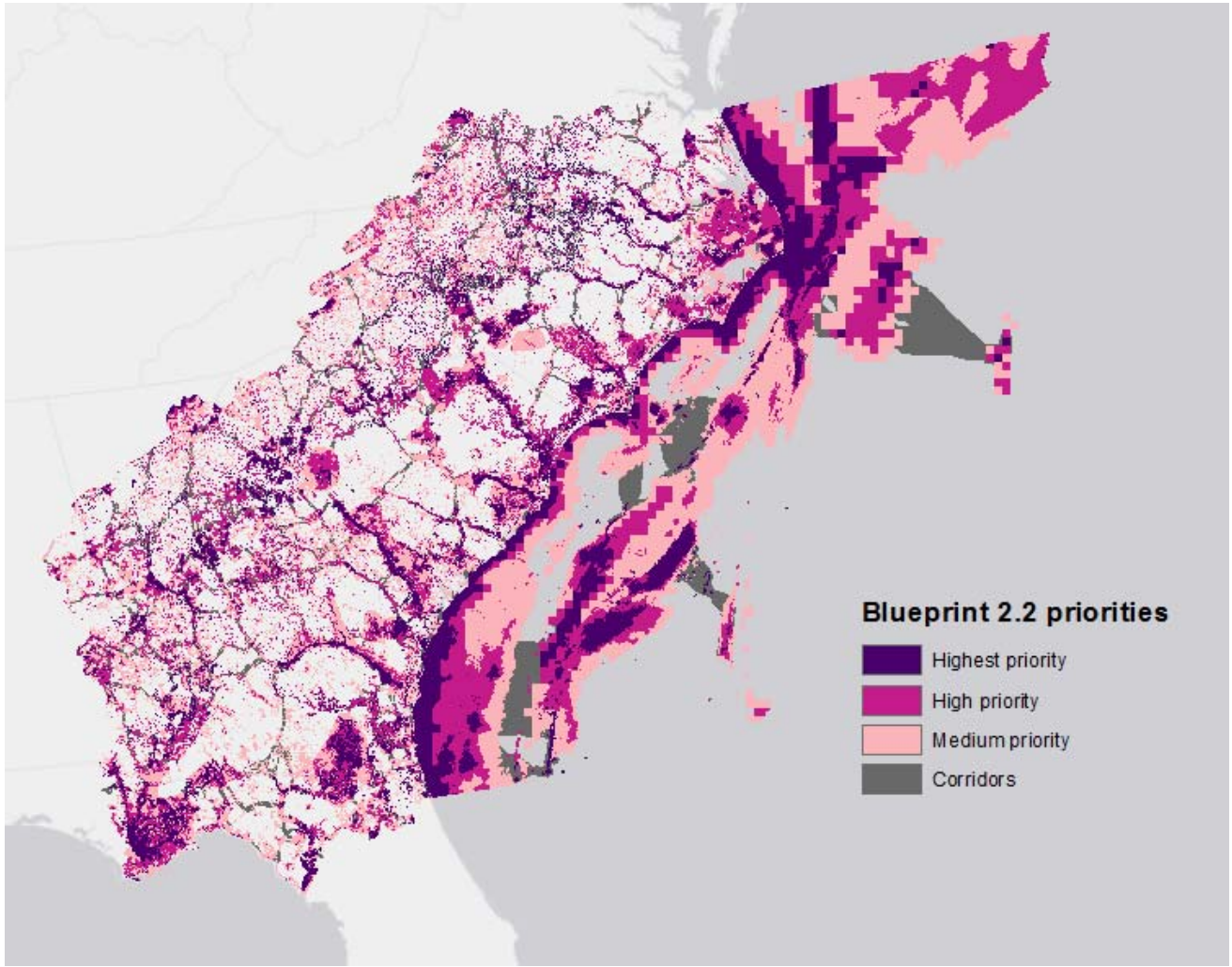


  - Less loss



What that means – marine example



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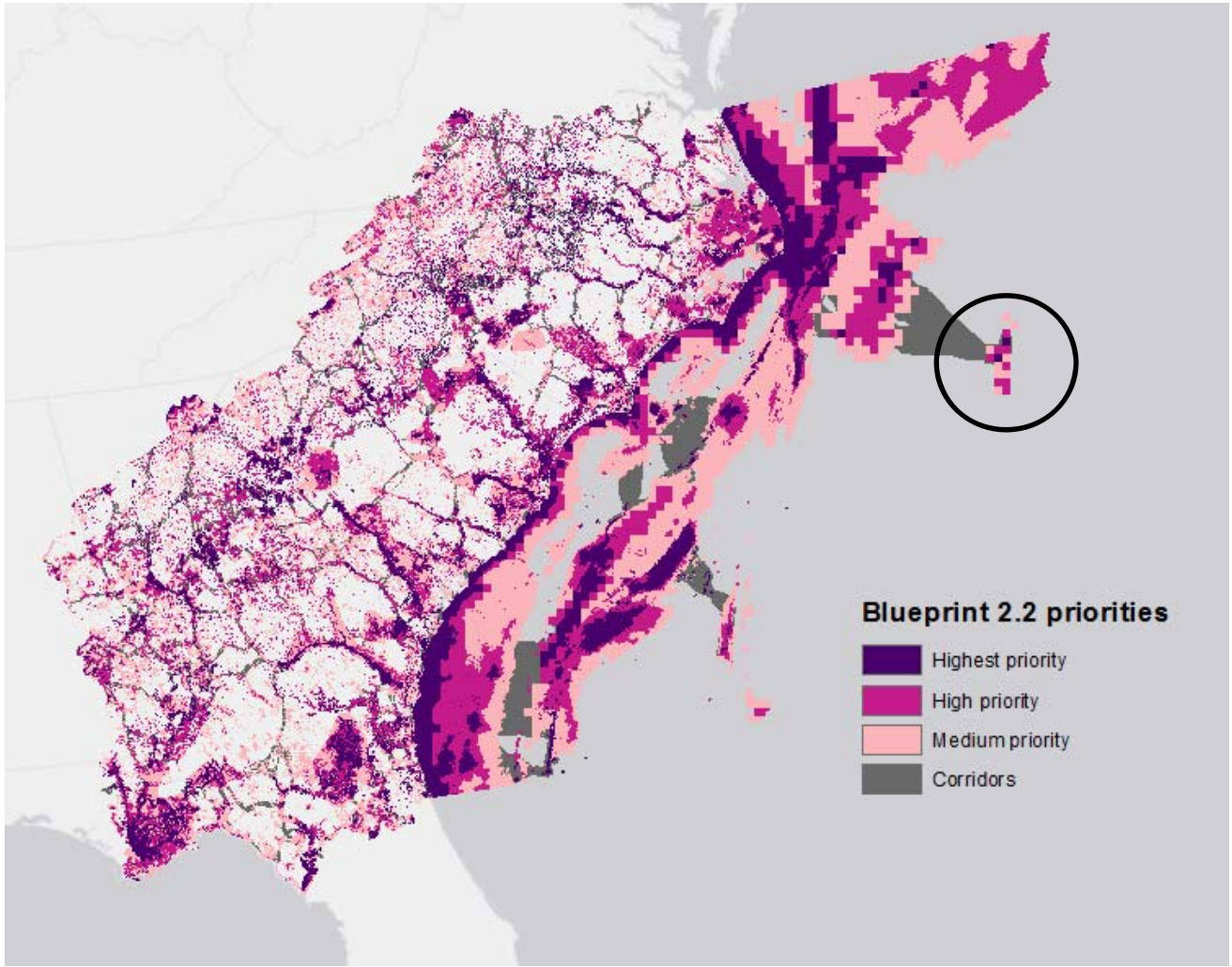

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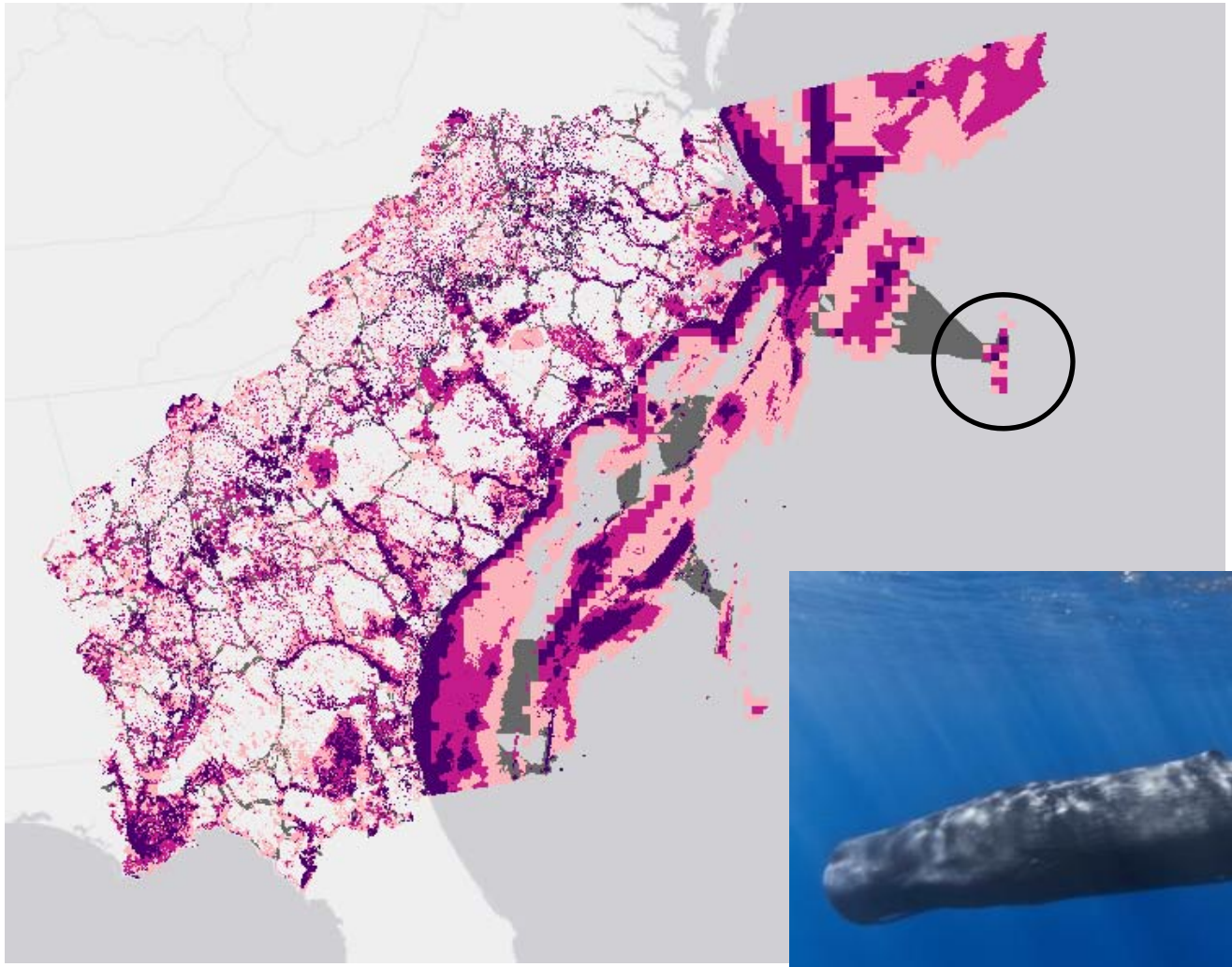
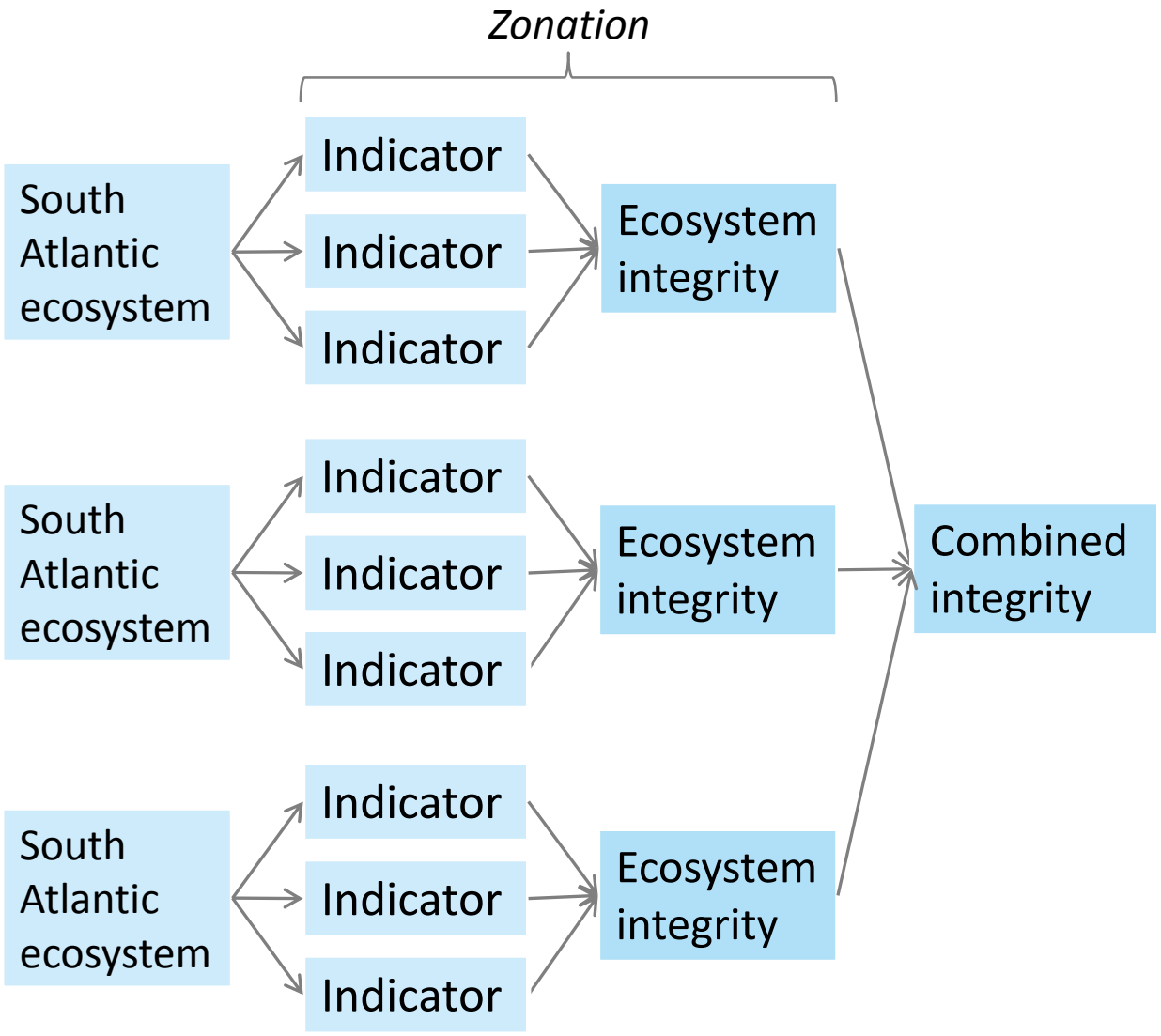


How was the Blueprint developed?



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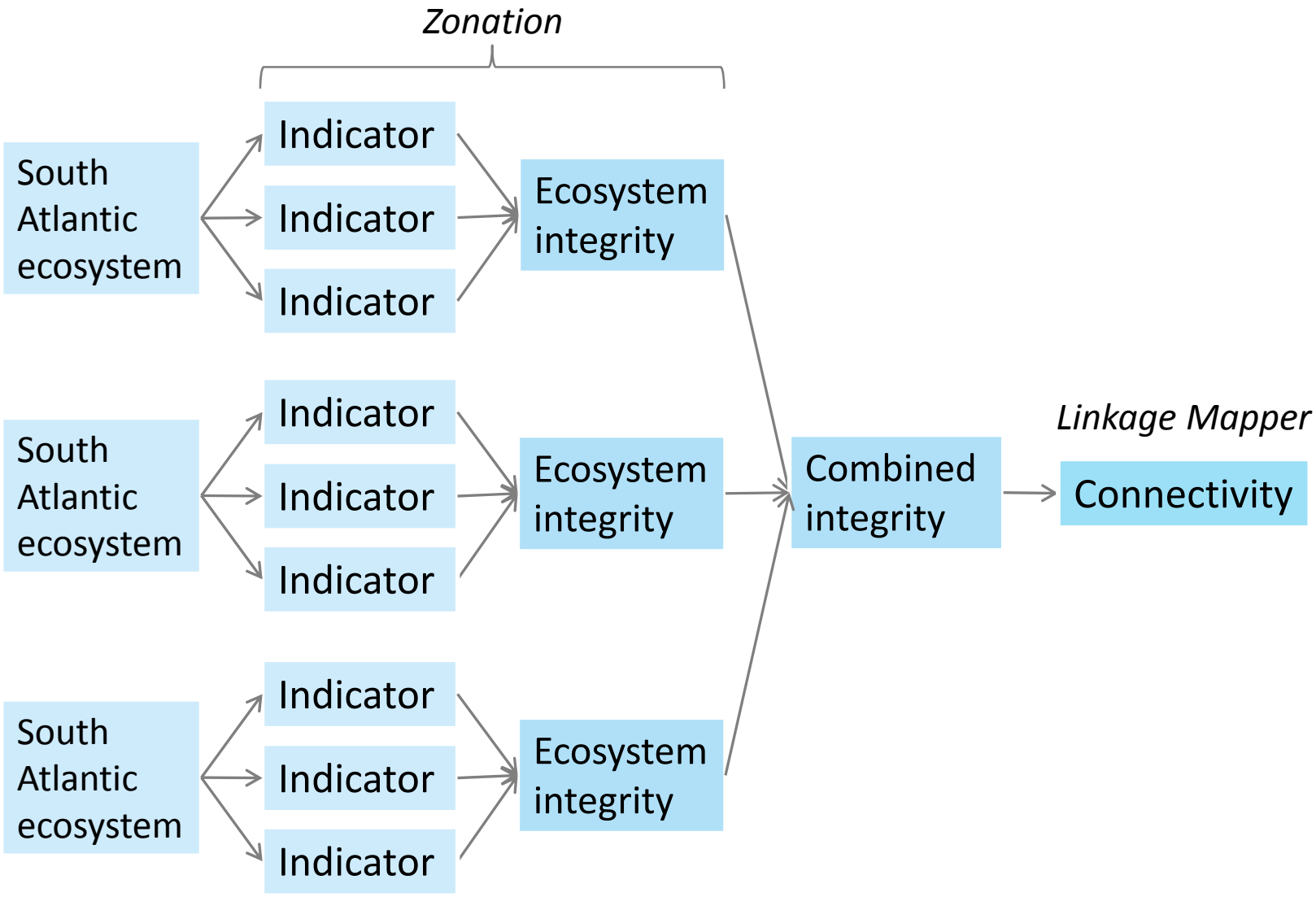

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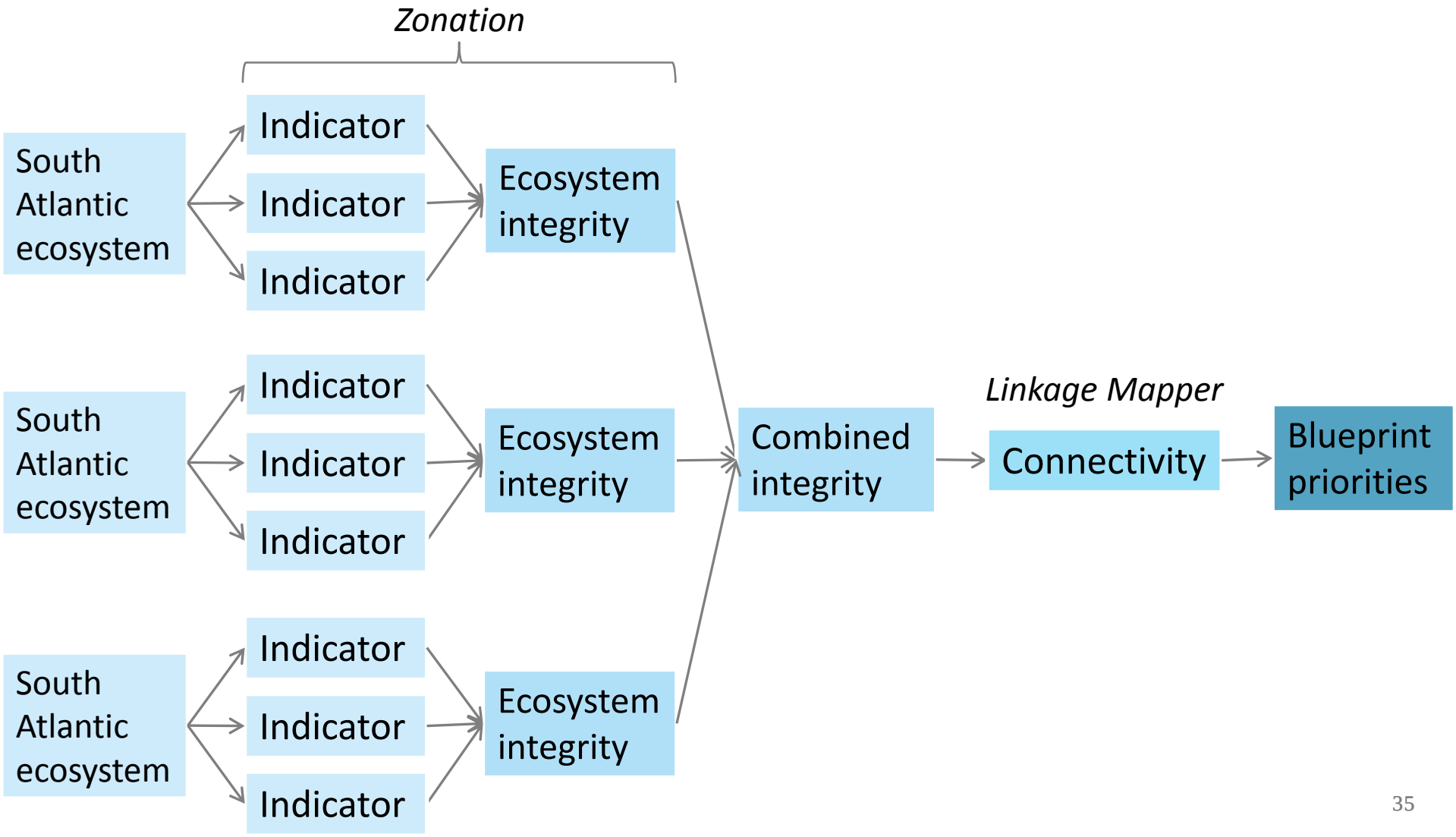
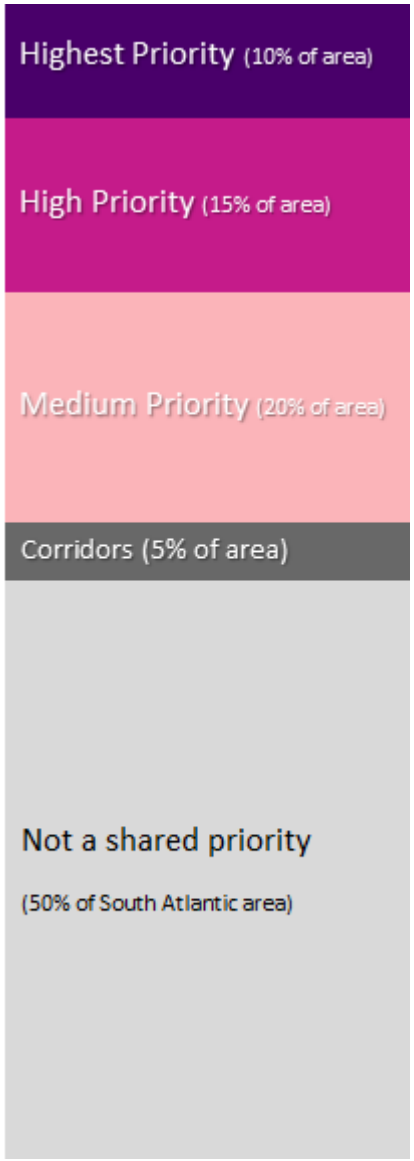
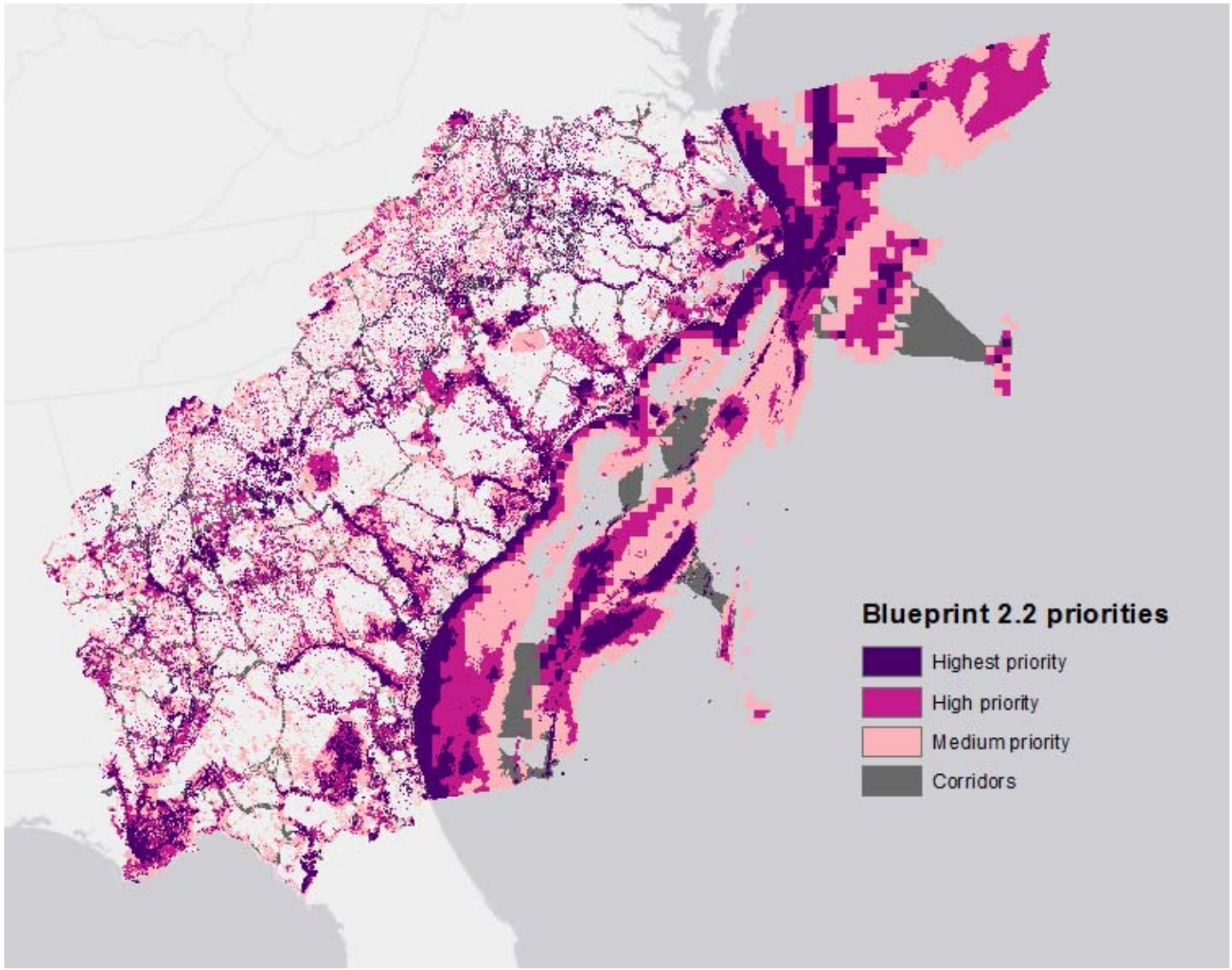


Blueprint priorities

- Each blueprint priority class covers a set amount of the South Atlantic area
- Percentages come from the literature and planning documents seeking to balance conservation and human use



South Atlantic Conservation Blueprint



Blueprint major known issues (latest draft)

Blueprint major known issues (latest draft)

- Some aquatic areas, particularly smaller rivers and streams, are over-prioritized
- Some aquatic areas important for migratory fish are being under-prioritized in areas far upstream due to issues in the migratory fish connectivity indicator
- Piedmont prairie areas are under-prioritized
- Urban open space is poorly captured in Georgia and South Carolina
- Congaree National Park is under-prioritized. This is likely due to the forested wetland bird indicator under-predicting Swainson's warbler in the area
- The low-urban historic landscapes indicator affects corridors too strongly in some areas

Lean startup

A few improvements in the works

- Finer resolution
- Corridor feasibility using parcel data
- Better models connecting actions and indicators
- Improving indicators for:
  - Estuarine and marine ecosystems
  - Urban areas
  - Historic and other cultural landscapes
- Improving and using targets

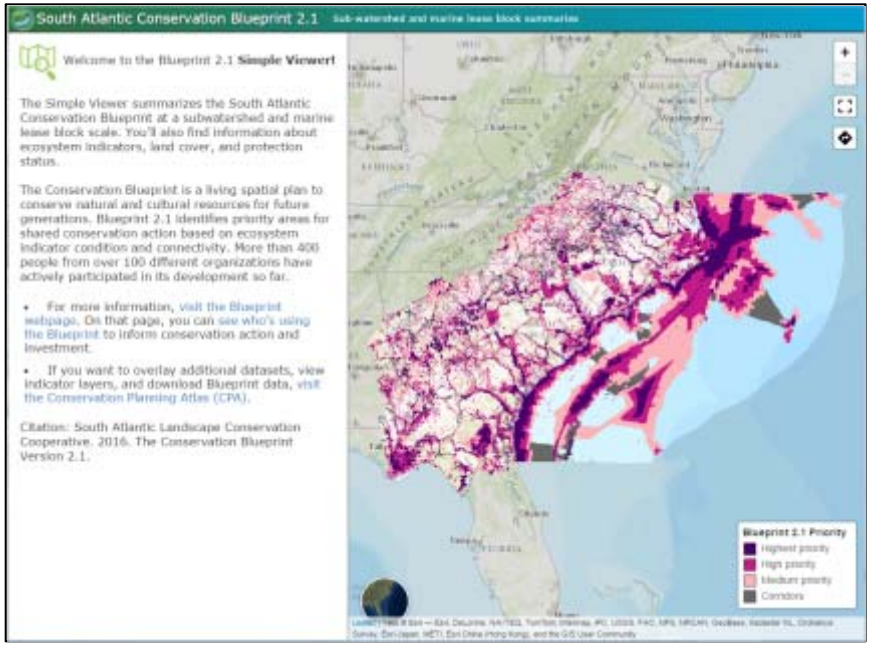
Accessing Data

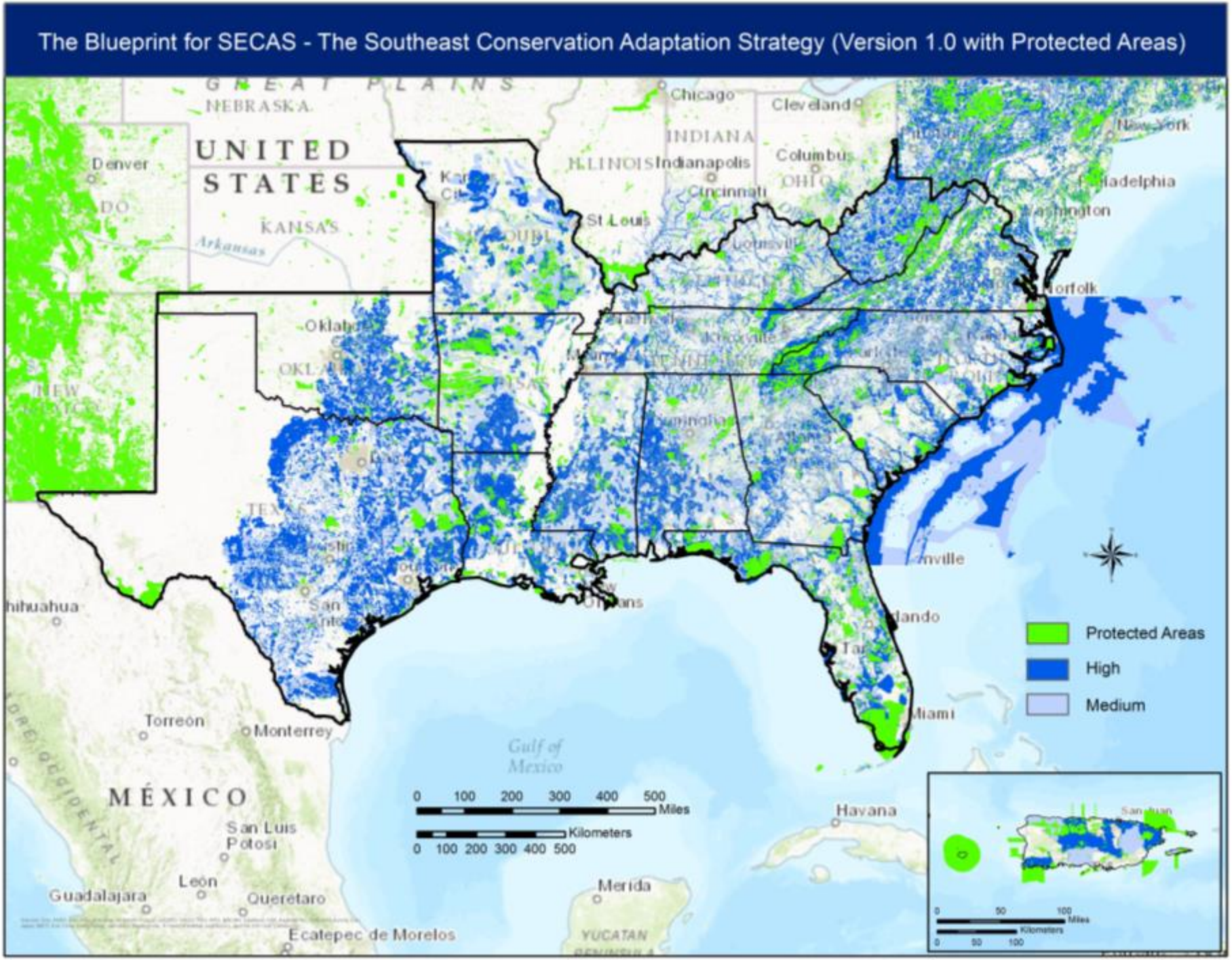
The Conservation Planning Atlas

- http://salcc.databasin.org

The Simple Viewer

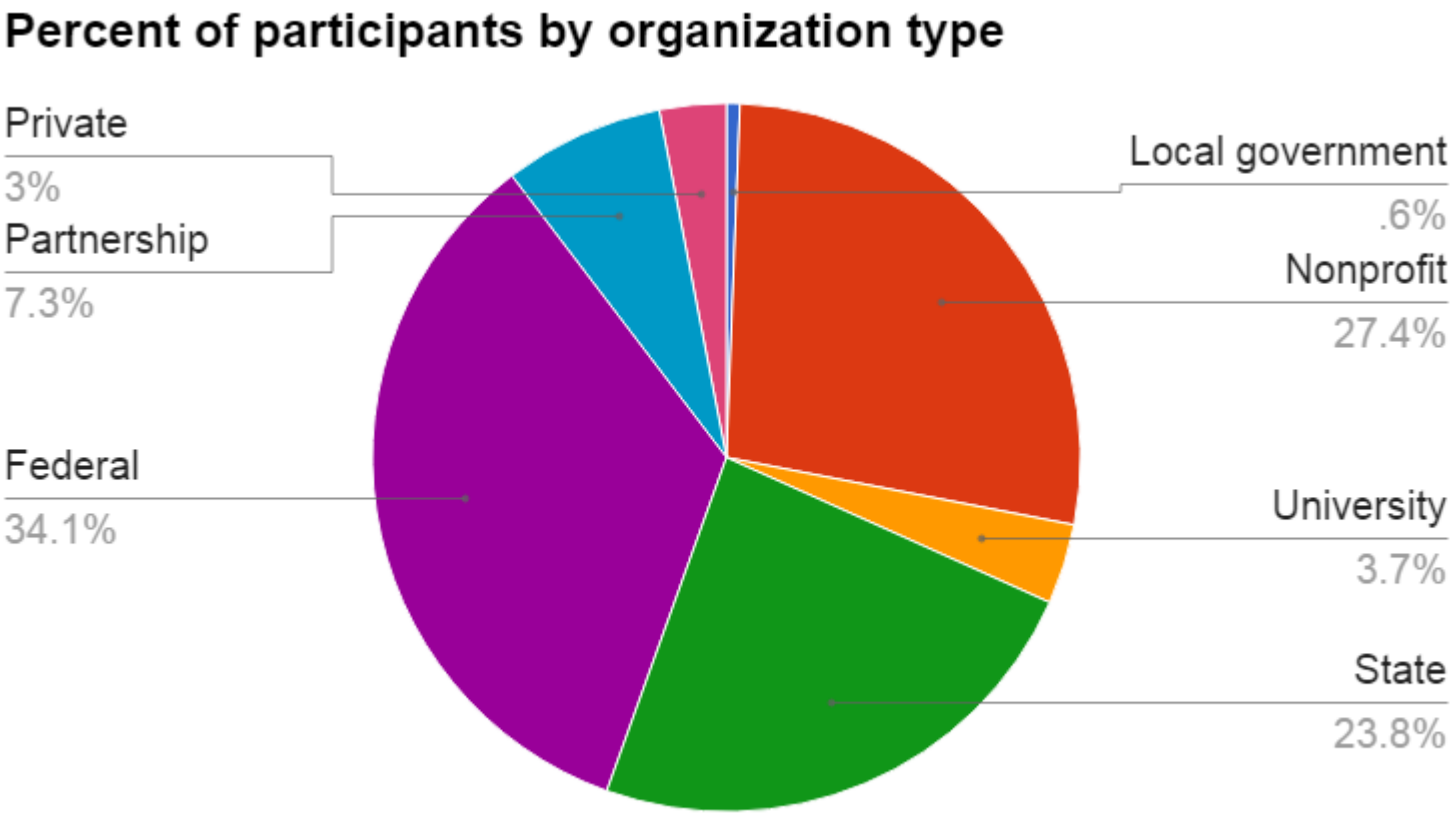
- http://blueprint.southatlanticlcc.org



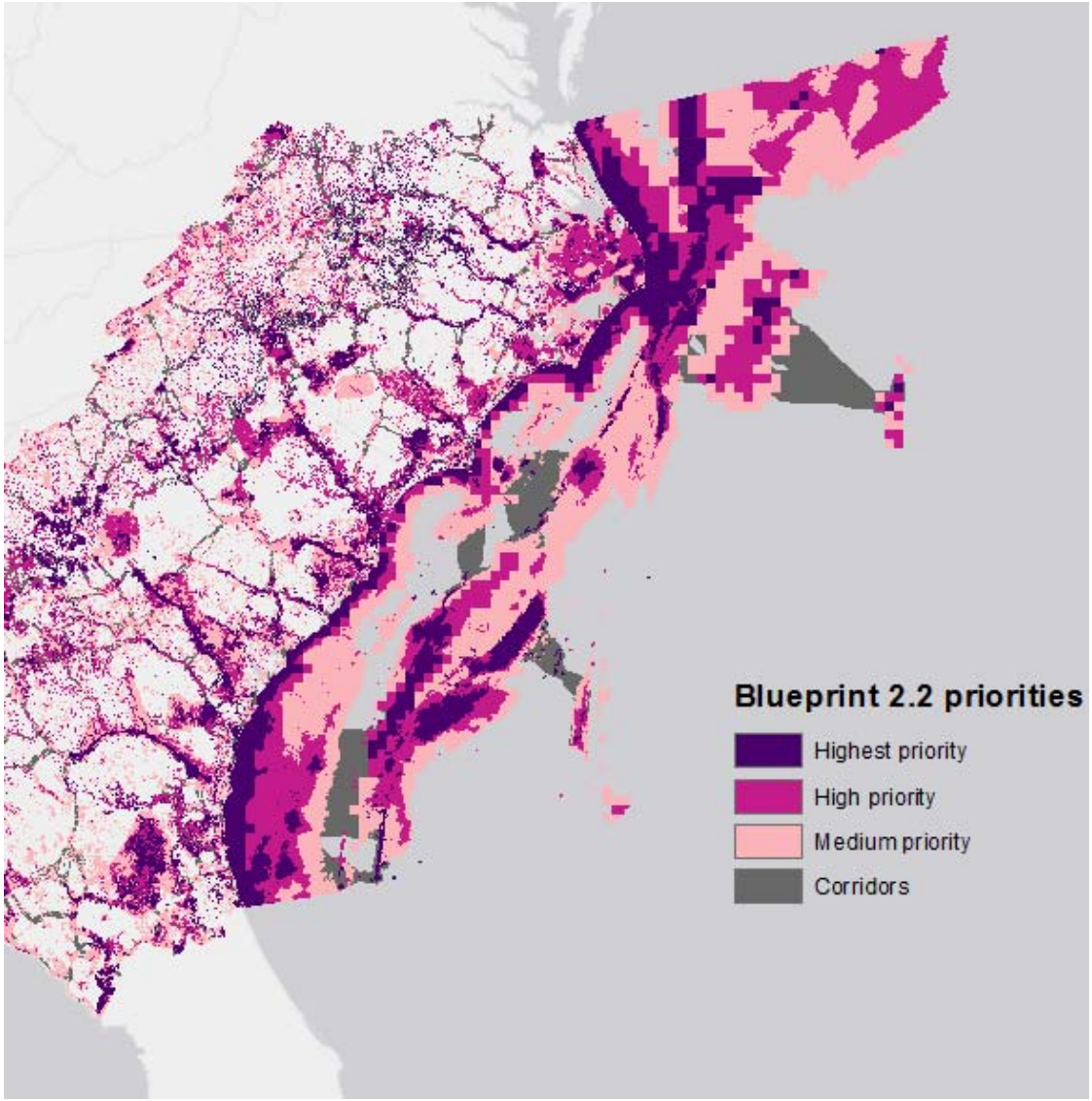

The Blueprint for SECAS - The Southeast Conservation Adaptation Strategy (Version 1.0 with Protected Areas)
GREAT PLAINS
NEBRASKA
UNITED STATES
KANSAS
Arkansas
Denver
Chicago
Cleveland
INDIANA
ILLINOIS
Indianapolis
Columbus
OHIO
Cincinnati
St Louis
Norfolk
Oklahoma
OKLAHOMA
NEW MEXICO
TEXAS
Orlando
Miami
Protected Areas
High
Medium
Chihuahua
Torreon
Monterrey
Gulf of Mexico
MÉXICO
San Luis Potosi
León
Guadalajara
Queretaro
Ecatepec de Morelos
Merida
YUCATAN PENINSULA
Havana
0 100 200 300 400 500 Miles
0 100 200 300 400 500 Kilometers
San Juan
0 50 100 Miles
0 50 100 Kilometers

Workshop participants

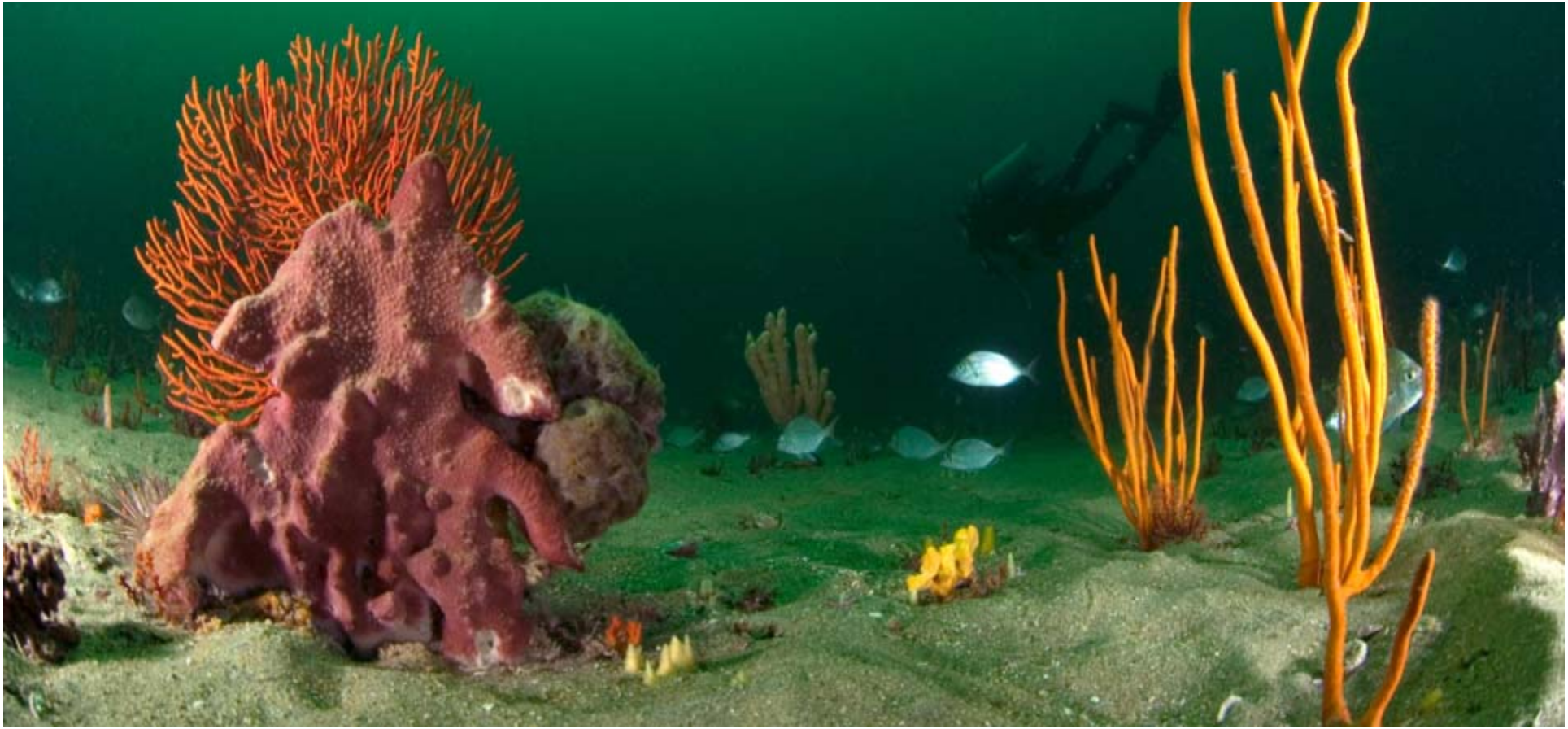
- > 150 participants
- > 60 different organizations



Discussion on spatial priorities

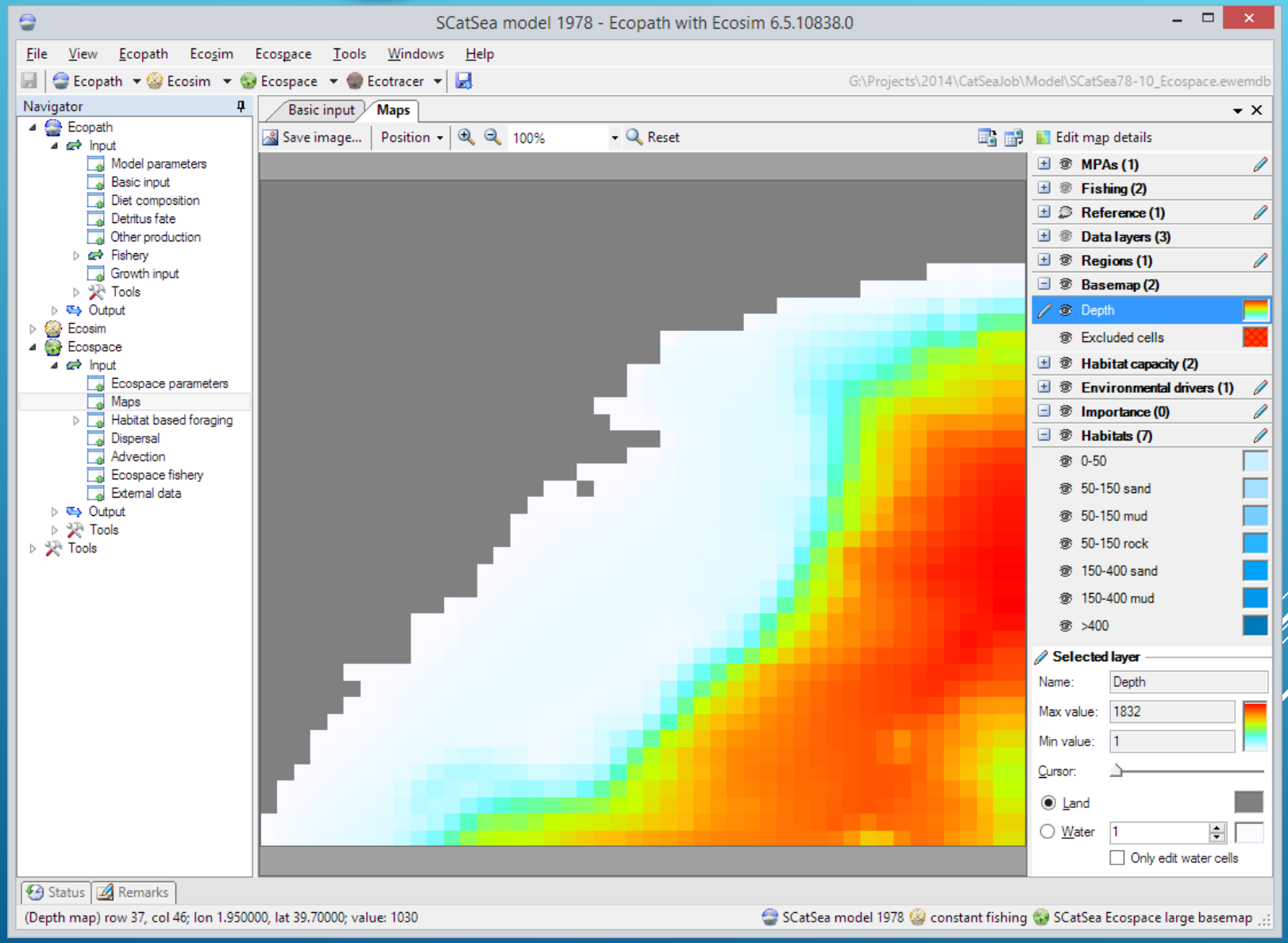


- What areas should be higher priority?
- What areas should be lower priority?
- Other thoughts?



Habitat models for Ecospace

ECOSPACE

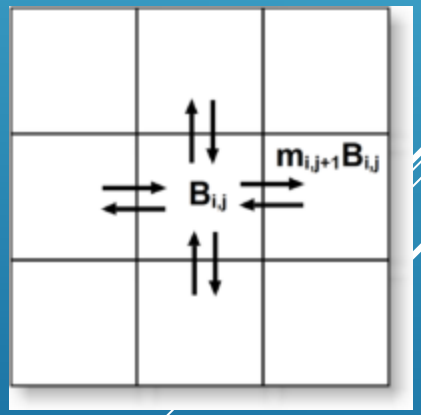

SCatSea model 1978 - Ecopath with Ecosim 6.5.10838.0
File View Ecopath Ecosim Ecospace Tools Windows Help
Ecopath Ecosim Ecospace Ecotracer
G:\Projects\2014\CatSeaJob\Model\SCatSea78-10_Ecospace.ewemdb
Navigator
Ecopath
Input
Model parameters
Basic input
Diet composition
Detritus fate
Other production
Fishery
Growth input
Tools
Output
Ecosim
Ecospace
Input
Ecospace parameters
Maps
Habitat based foraging
Dispersal
Advection
Ecospace fishery
External data
Output
Tools
Tools
Basic input
Maps
Save image...
Position
100%
Reset
Edit map details
MPAs (1)
Fishing (2)
Reference (1)
Data layers (3)
Regions (1)
Basemap (2)
Depth
Excluded cells
Habitat capacity (2)
Environmental drivers (1)
Importance (0)
Habitats (7)
0-50
50-150 sand
50-150 mud
50-150 rock
150-400 sand
150-400 mud
>400
Selected layer
Name: Depth
Max value: 1832
Min value: 1
Cursor:
Land
Water 1
Only edit water cells
Status
Remarks
(Depth map) row 37, col 46; lon 1.950000, lat 39.70000; value: 1030
SCatSea model 1978
constant fishing
SCatSea Ecospace large basemap

ECOSPACE

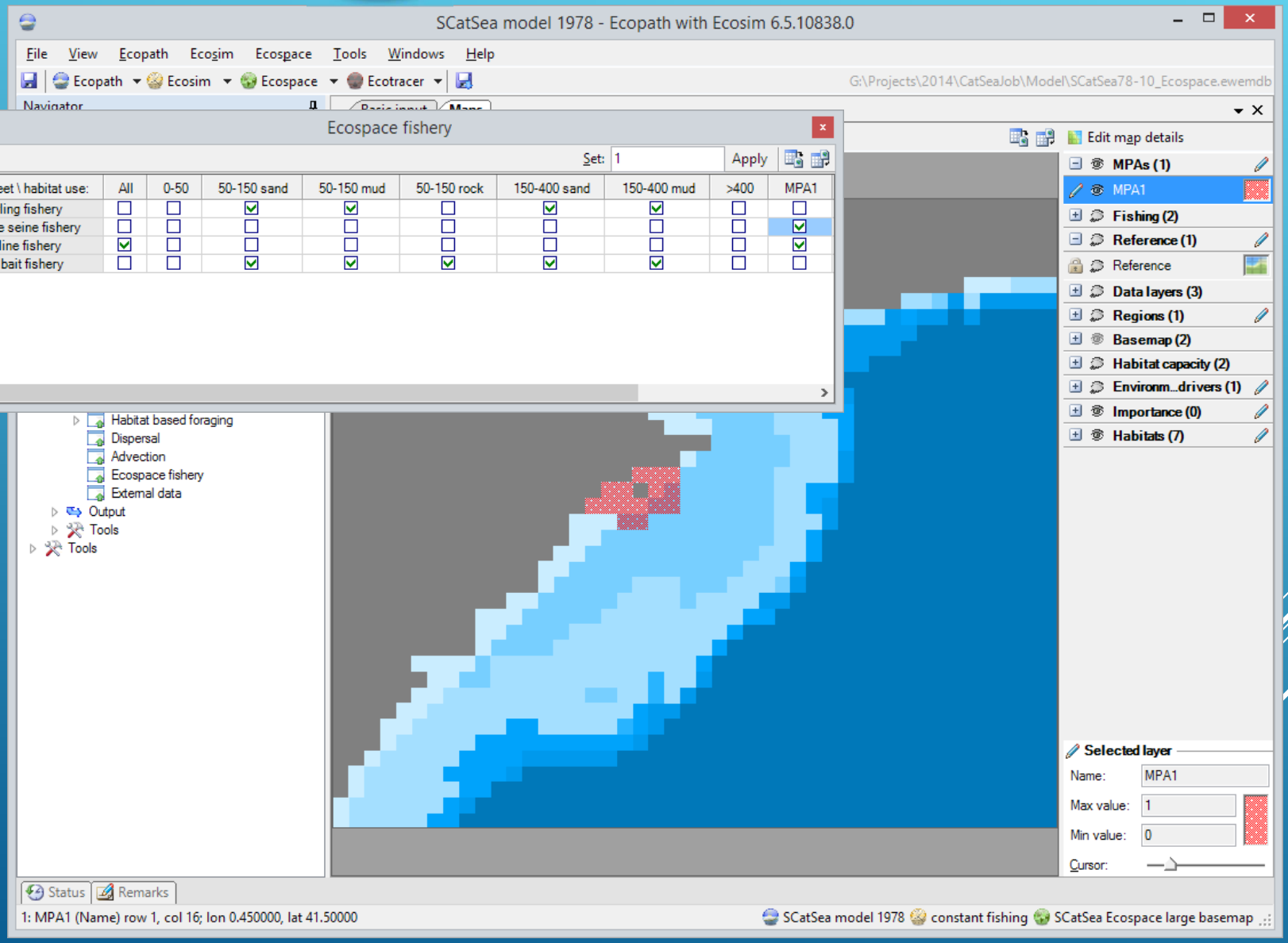
Spatial temporal component of EwE, executes Ecosim for every ‘water’ cell in a grid

Requires extra inputs, related to movement, habitat, fishing, environment

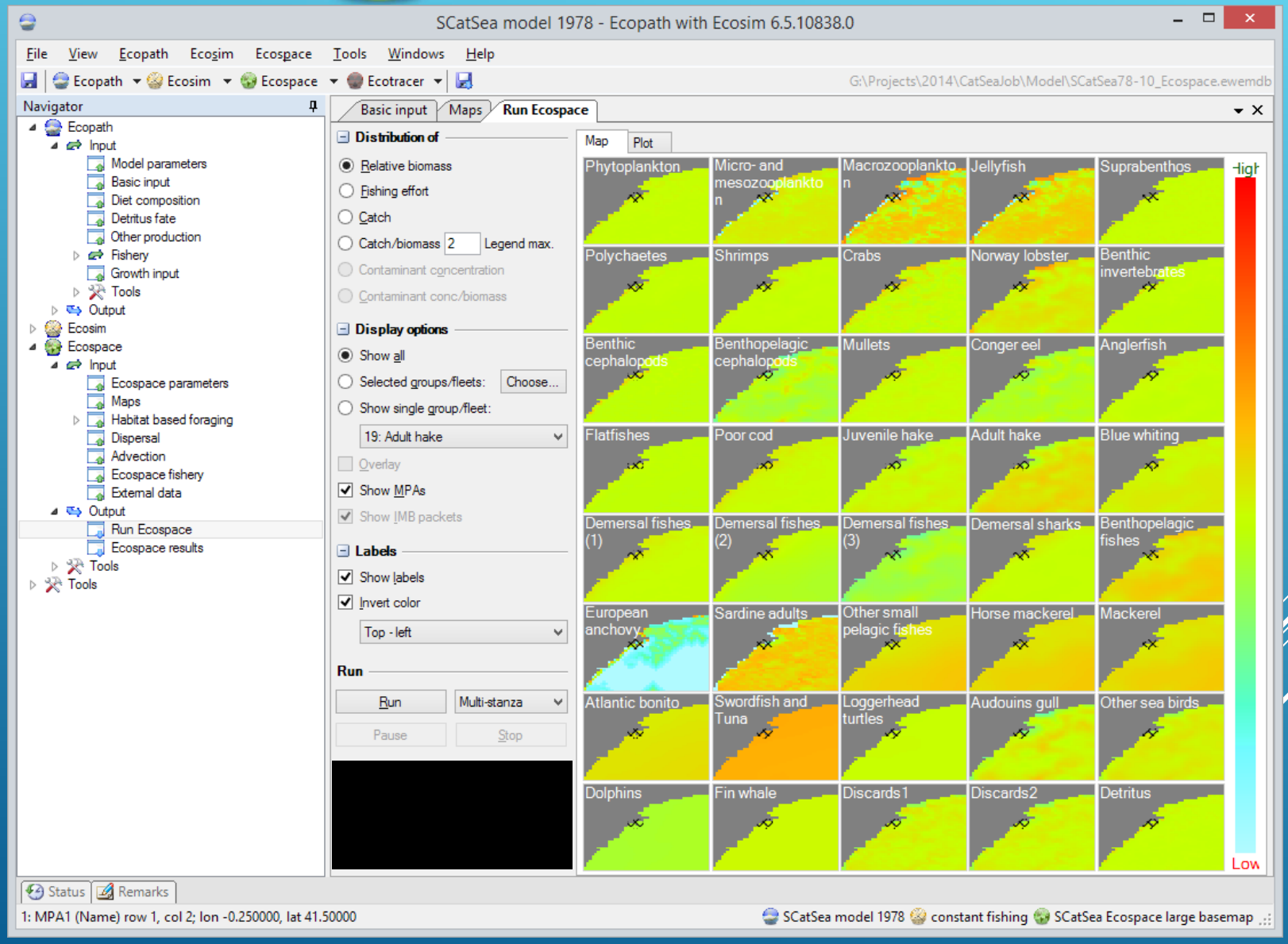
Groups and fleets try to move to nearby optimal conditions



ECOSPACE


SCatSea model 1978 - Ecopath with Ecosim 6.5.10838.0
File View Ecopath Ecosim Ecospace Tools Windows Help
Ecopath Ecosim Ecospace Ecotracer
G:\Projects\2014\CatSeaJob\Model\SCatSea78-10_Ecospace.ewemdb
Navigator
Ecospace fishery
Set: 1 Apply
Fleet \ habitat use: All 0-50 50-150 sand 50-150 mud 50-150 rock 150-400 sand 150-400 mud >400 MPA1
1 Trawling fishery
2 Purse seine fishery
3 Longline fishery
4 Troll bait fishery
Habitat based foraging
Dispersal
Advection
Ecospace fishery
External data
Output
Tools
Tools
Edit map details
MPAs (1)
MPA1
Fishing (2)
Reference (1)
Reference
Data layers (3)
Regions (1)
Basemap (2)
Habitat capacity (2)
Environm...drivers (1)
Importance (0)
Habitats (7)
Selected layer
Name: MPA1
Max value: 1
Min value: 0
Cursor:
Status
Remarks
1: MPA1 (Name) row 1, col 16; lon 0.450000, lat 41.50000
SCatSea model 1978
constant fishing
SCatSea Ecospace large basemap

ECOSPACE


SCatSea model 1978 - Ecopath with Ecosim 6.5.10838.0
File View Ecopath Ecosim Ecospace Tools Windows Help
Ecopath Ecosim Ecospace Ecotracer
G:\Projects\2014\CatSeaJob\Model\SCatSea78-10_Ecospace.ewemdb
Navigator
Ecopath
Input
Model parameters
Basic input
Diet composition
Detritus fate
Other production
Fishery
Growth input
Tools
Output
Ecosim
Ecospace
Input
Ecospace parameters
Maps
Habitat based foraging
Dispersal
Advection
Ecospace fishery
External data
Output
Run Ecospace
Ecospace results
Tools
Tools
Basic input
Maps
Run Ecospace
Distribution of
Relative biomass
Fishing effort
Catch
Catch/biomass 2 Legend max.
Contaminant concentration
Contaminant conc/biomass
Display options
Show all
Selected groups/fleets: Choose...
Show single group/fleet:
19: Adult hake
Overlay
Show MPAs
Show IMB packets
Labels
Show labels
Invert color
Top - left
Run
Run
Multi-stanza
Pause
Stop
Map
Plot
Phytoplankton
Micro- and mesozooplankton
Macrozooplankton
Jellyfish
Suprabenthos
Polychaetes
Shrimps
Crabs
Norway lobster
Benthic invertebrates
Benthic cephalopods
Benthopelagic cephalopods
Mullets
Conger eel
Anglerfish
Flatfishes
Poor cod
Juvenile hake
Adult hake
Blue whiting
Demersal fishes (1)
Demersal fishes (2)
Demersal fishes (3)
Demersal sharks
Benthopelagic fishes
European anchovy
Sardine adults
Other small pelagic fishes
Horse mackerel
Mackerel
Atlantic bonito
Swordfish and Tuna
Loggerhead turtles
Audouins gull
Other sea birds
Dolphins
Fin whale
Discards1
Discards2
Detritus
High
Low
Status
Remarks
1: MPA1 (Name) row 1, col 2; lon -0.250000, lat 41.50000
SCatSea model 1978
constant fishing
SCatSea Ecospace large basemap

ECOSPACE

Used, among others, to assess

- Distribution of marine species and fishing effort
- Spatial impact of fishing
- Management options, e.g. impact of MPAs
- Impact of environmental change (EwE version 6.3+)

Running model has been linked to Marxan & Atlantis

Includes an IBM approach

RECENT DEVELOPMENTS IN ECOSPACE

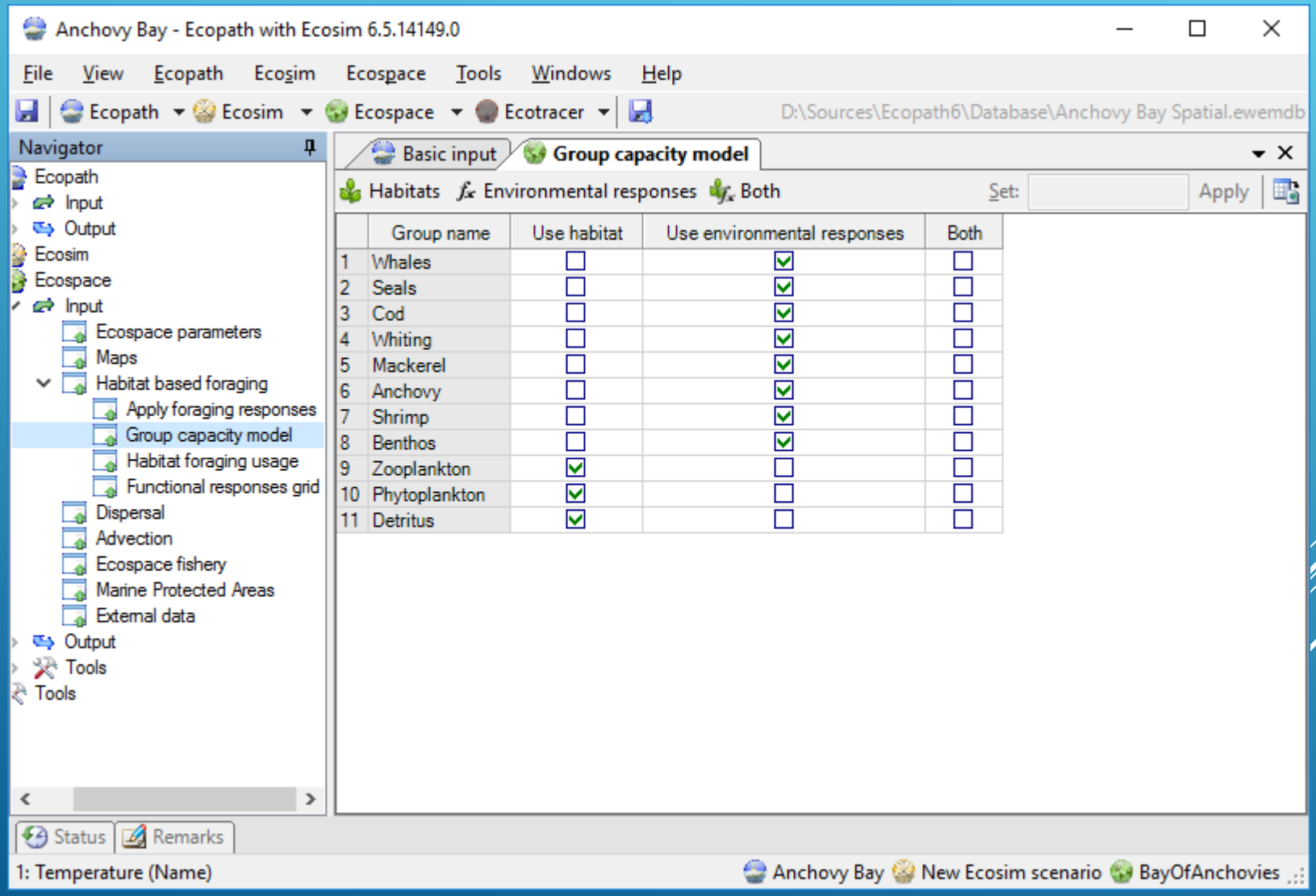
2011 Ecospace had three major limitations

1. Unable to represent sub-cell features
2. Unable to explicitly incorporate environmental effects on species: “why are the species where they are?”
3. Limited facilities to exchange data with the outside world, thus unable to include environmental variability

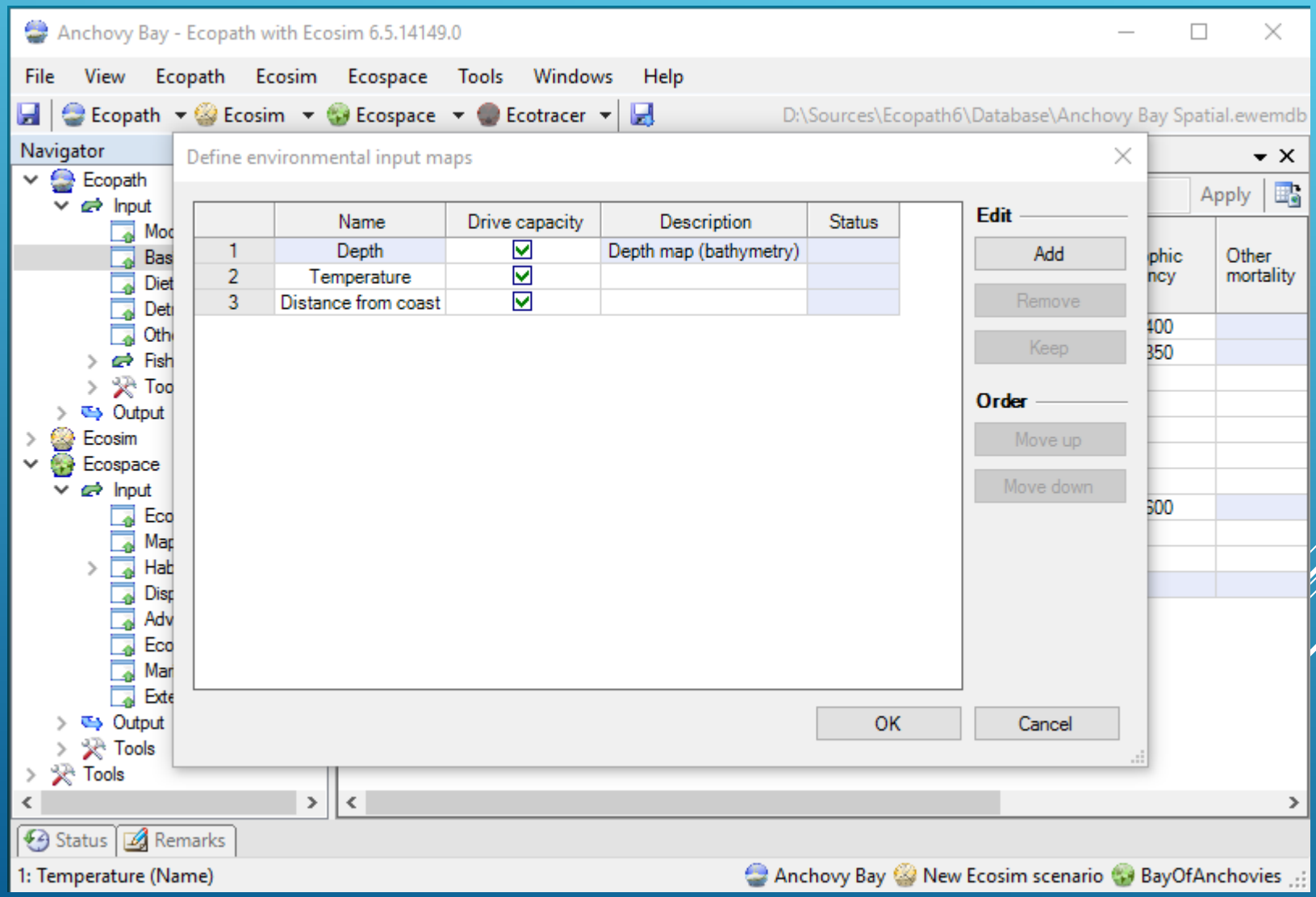
WHY ARE SPECIES WHERE THEY ARE?

SETTING UP THE HABITAT FORAGING CAPACITY MODEL

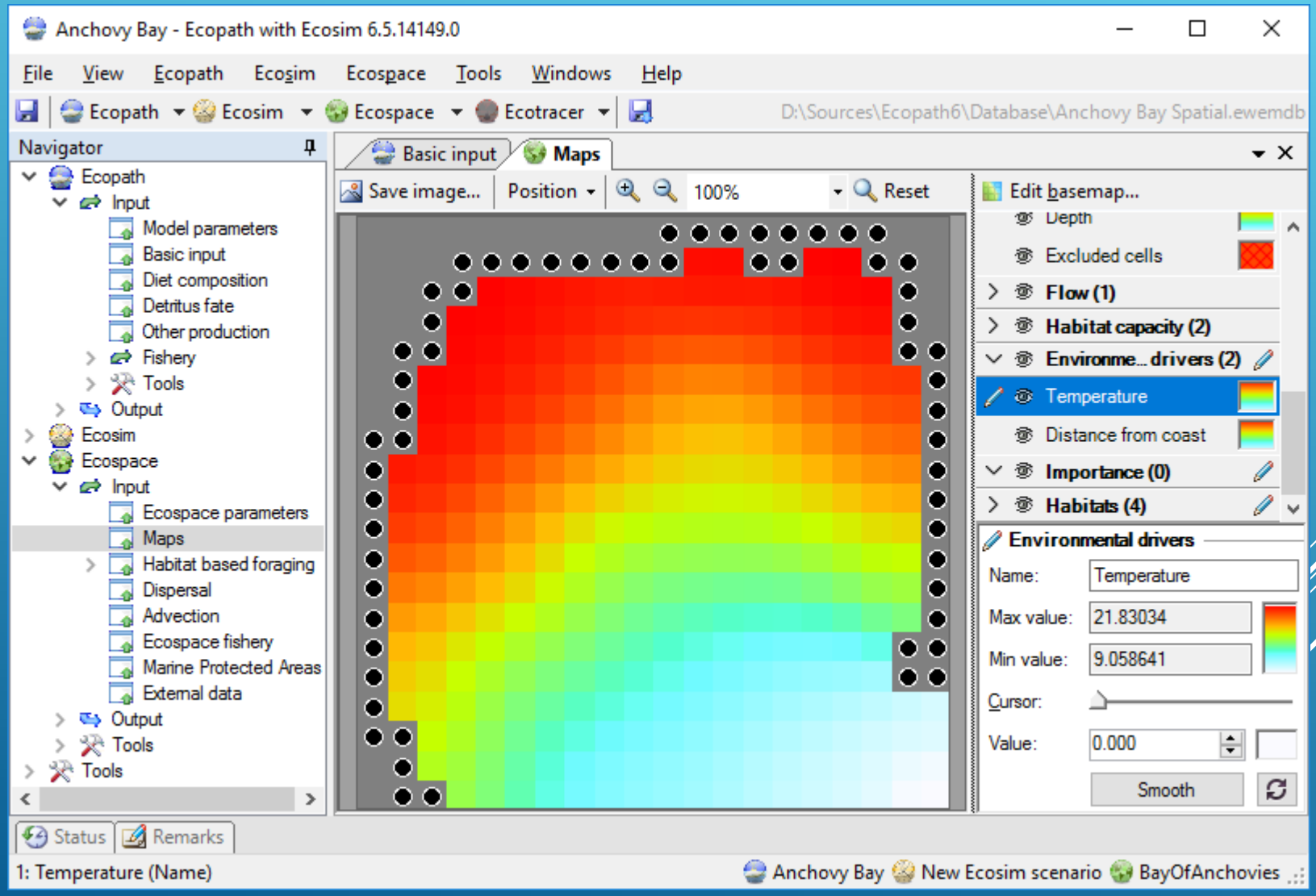
1. SELECT GROUP CAPACITY MODEL



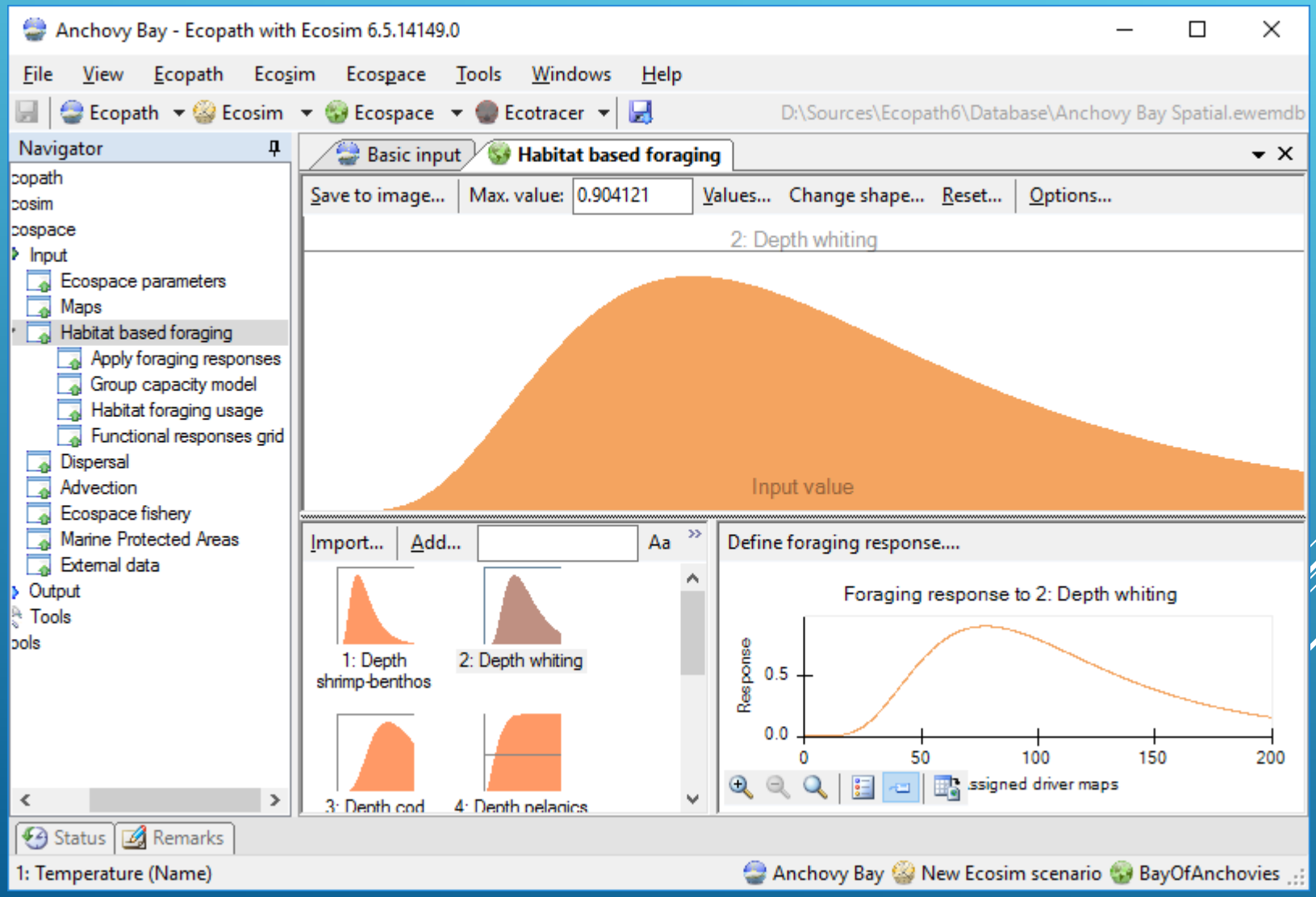
2. DEFINE ENVIRONMENTAL DRIVERS



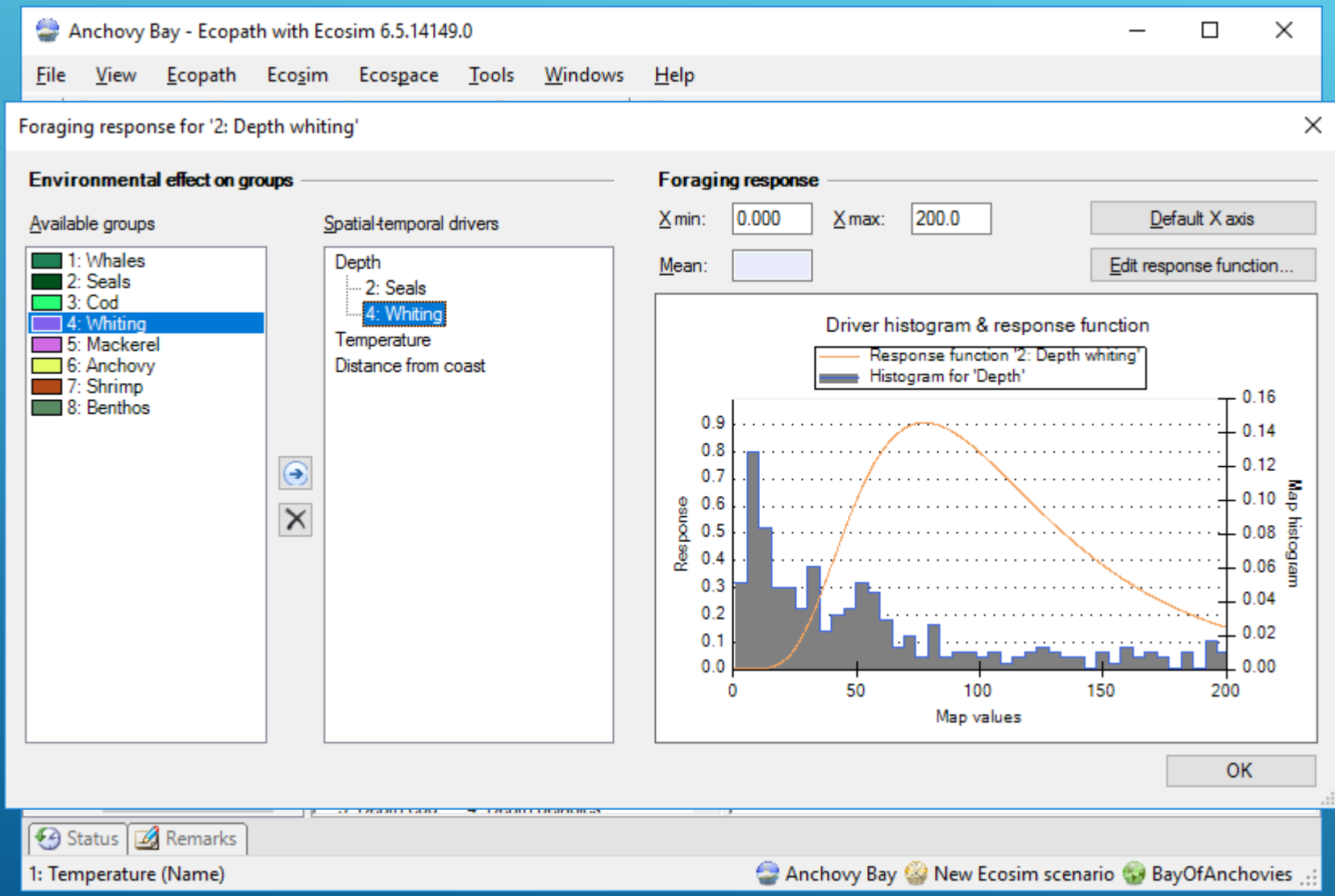
3. POPULATE ENV. DRIVER MAPS



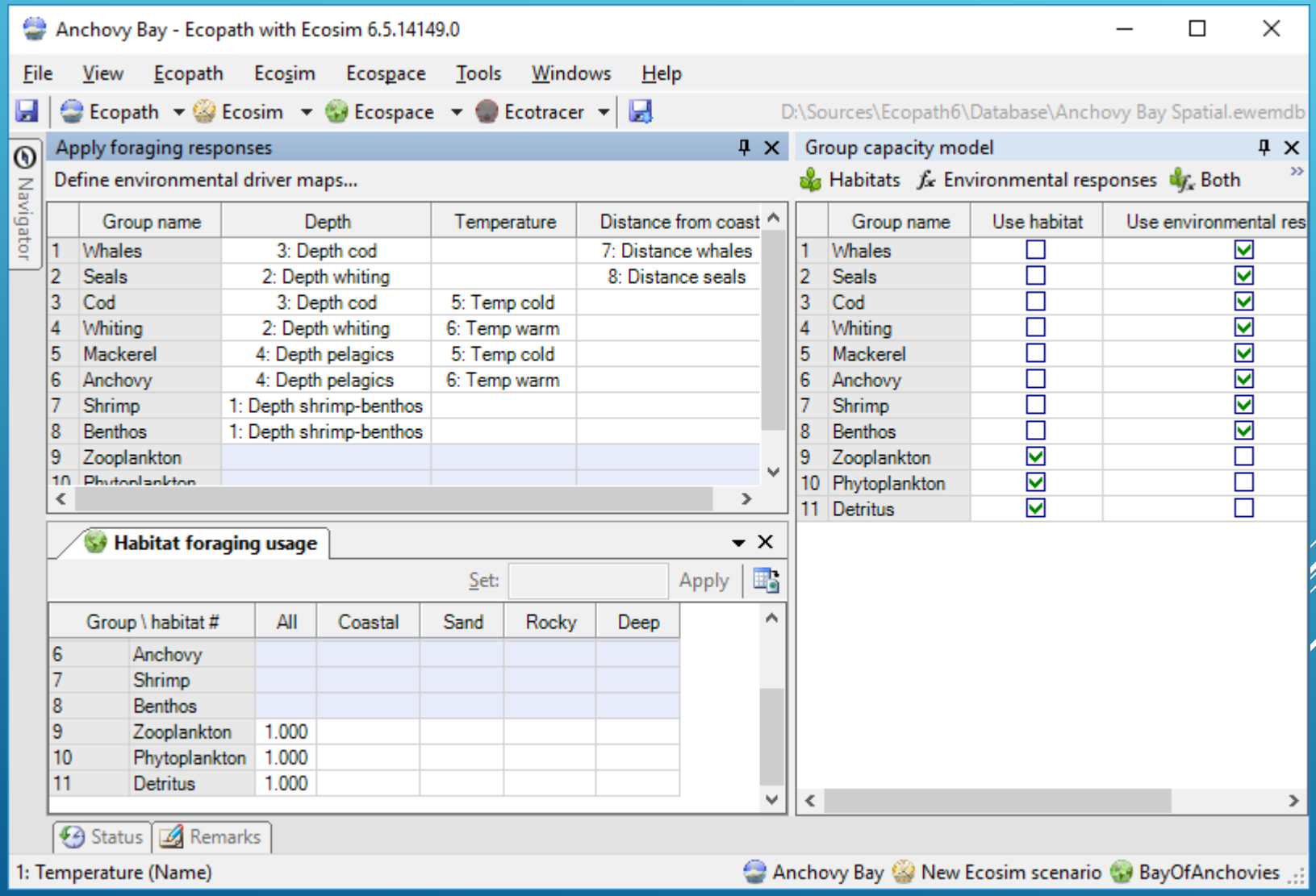
4. DEFINE ENV. RESPONSE CURVES



5. CONNECT GROUPS, DRIVERS AND RESPONSES



6. CHECK SET-UP AND RUN



HAB. CAP. CASE STUDY

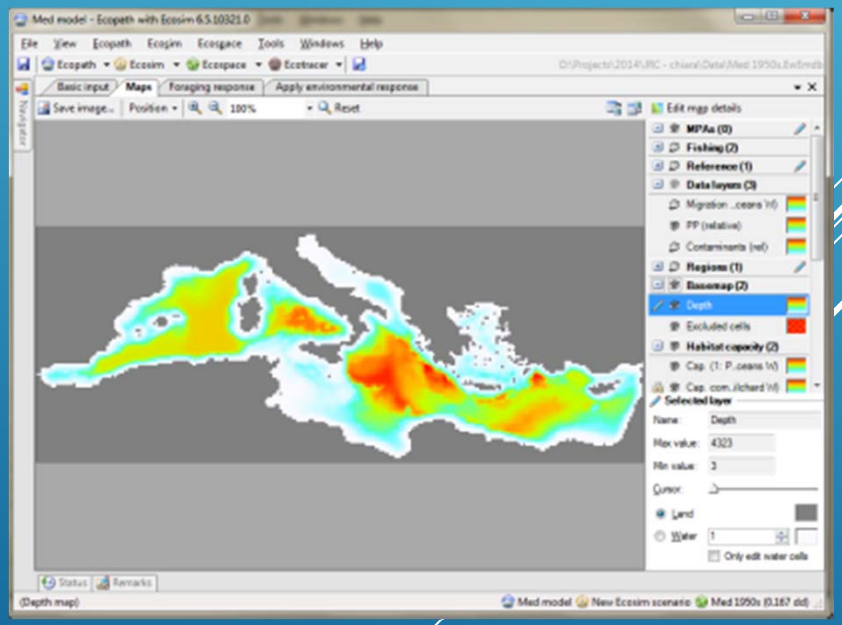
Foraging habitat capacity model case study

Full Mediterranean EwE model

90+ functional groups, assigned to 4 MSFD zones

Time frame 1950 – 2010

Entire basin at 0.167 dd grid



Piroddi et al (in progress)

HAB. CAP. CASE STUDY

1. Define environmental drivers

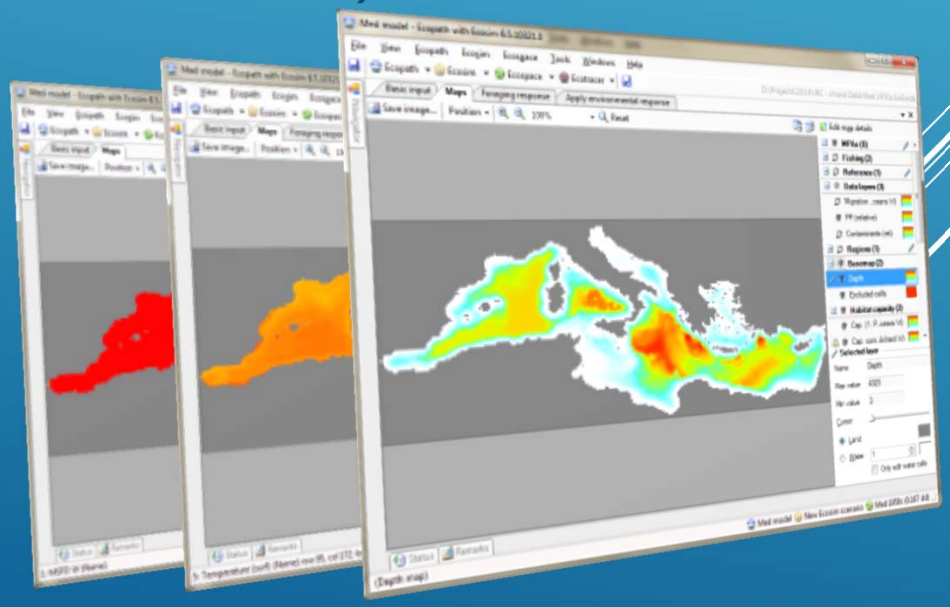
Primary production

Salinity (surface and bottom)

Temperature (surface and bottom)

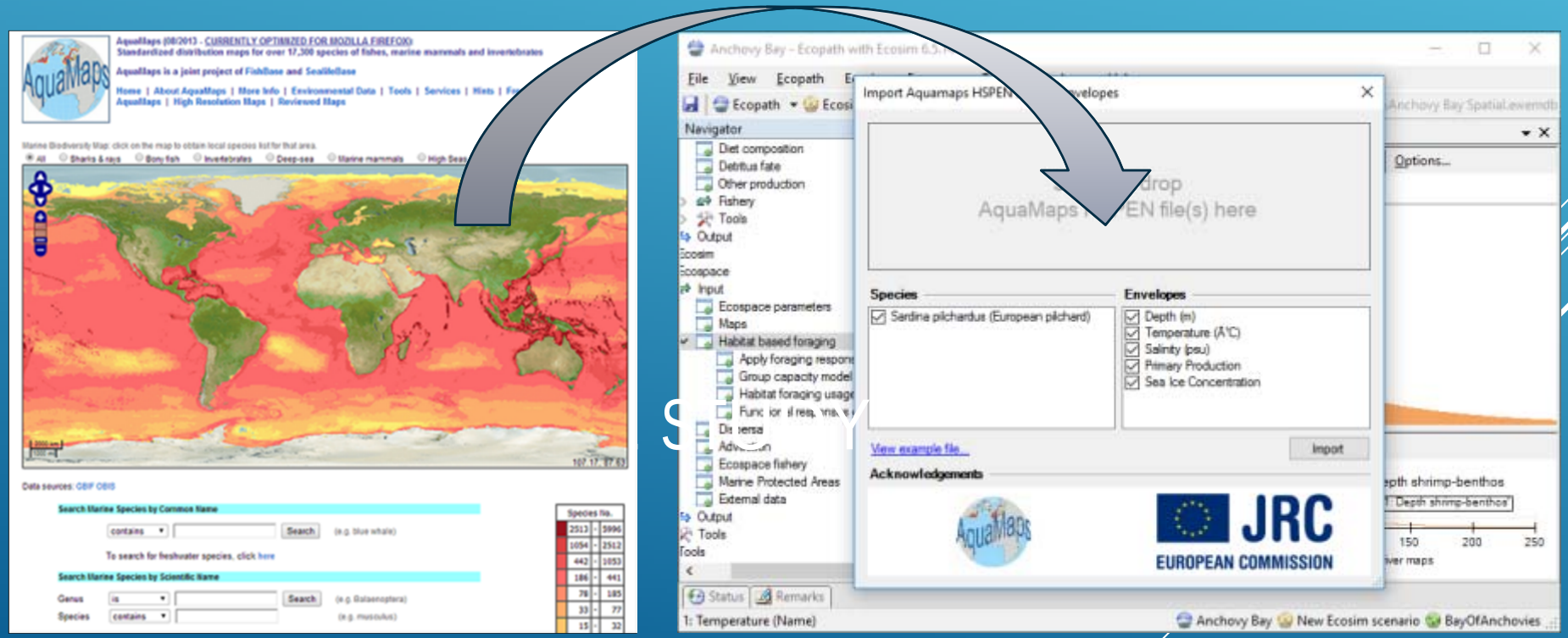
Depth

MSFD area restrictions



2. Define environmental responses

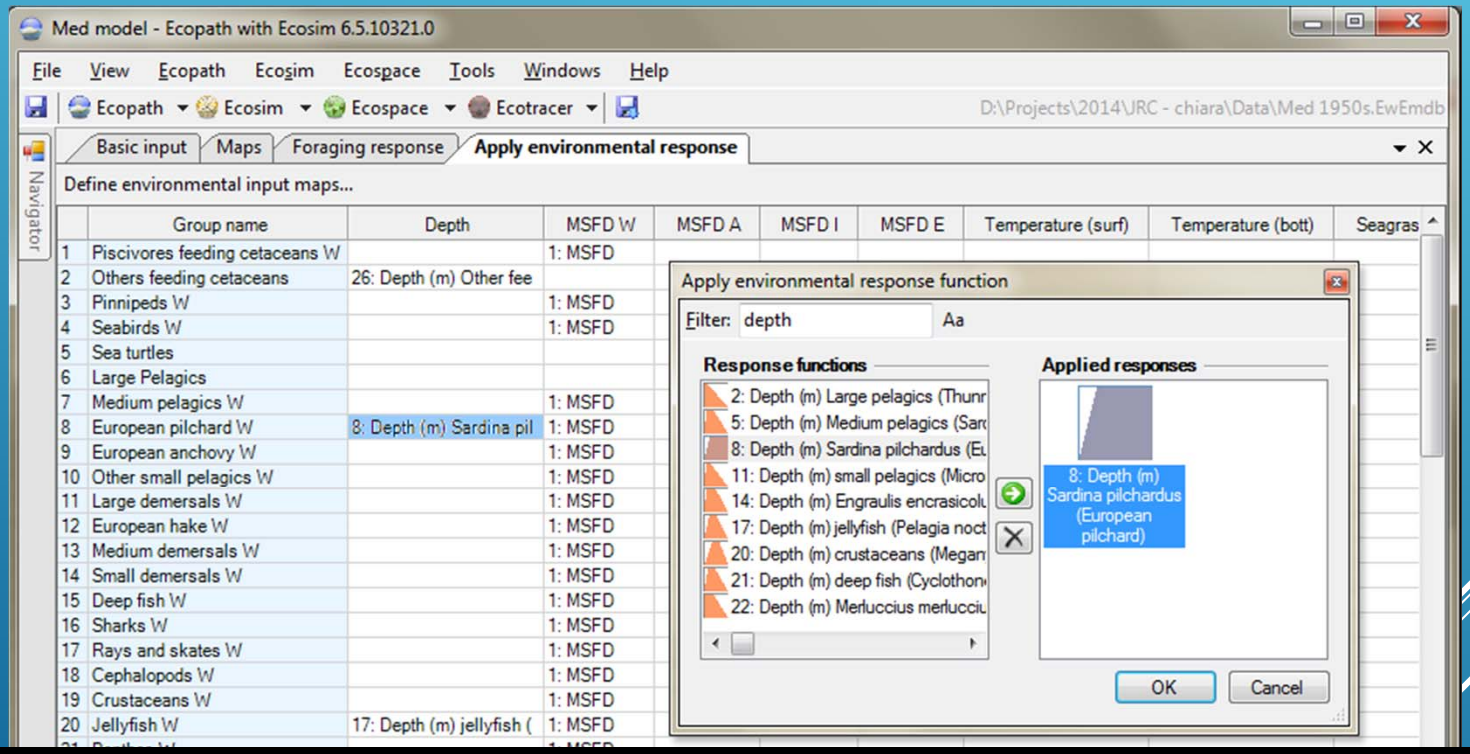
Here we are using a plug-in to import environmental responses from AquaMaps species envelopes



Piroddi et al (in progress)

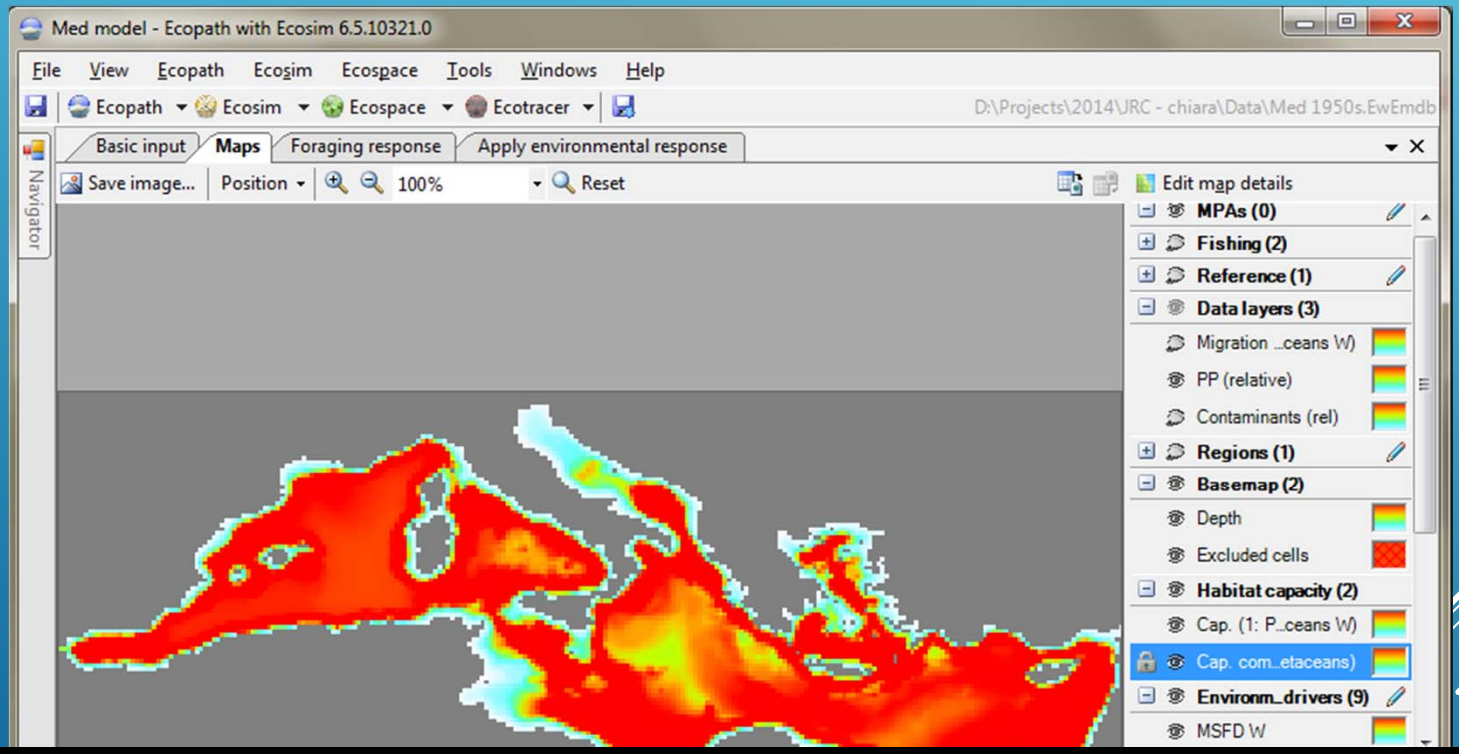
HAB. CAP. CASE STUDY

3. Apply drivers and responses



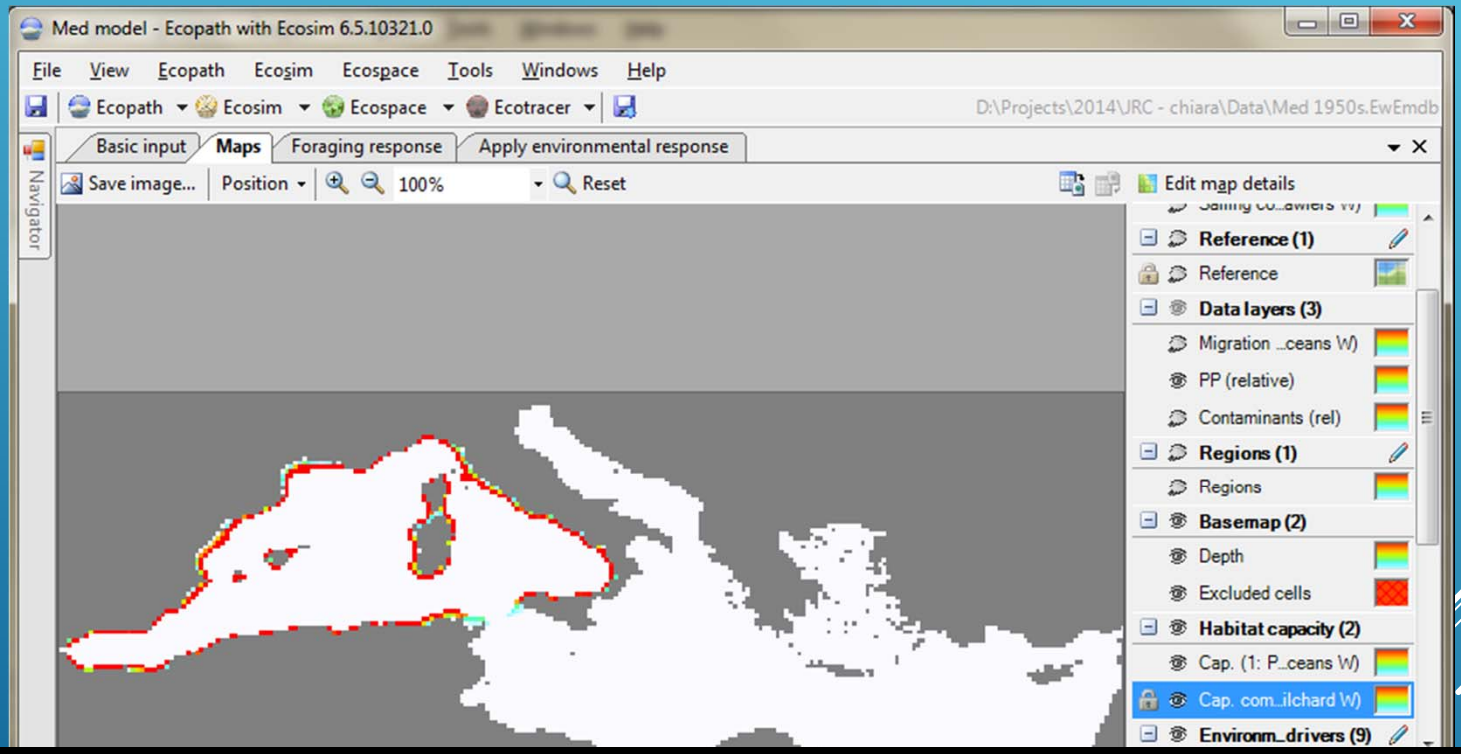
HAB. CAP. CASE STUDY

4. Ecospace computes capacity (cetaceans - depth)



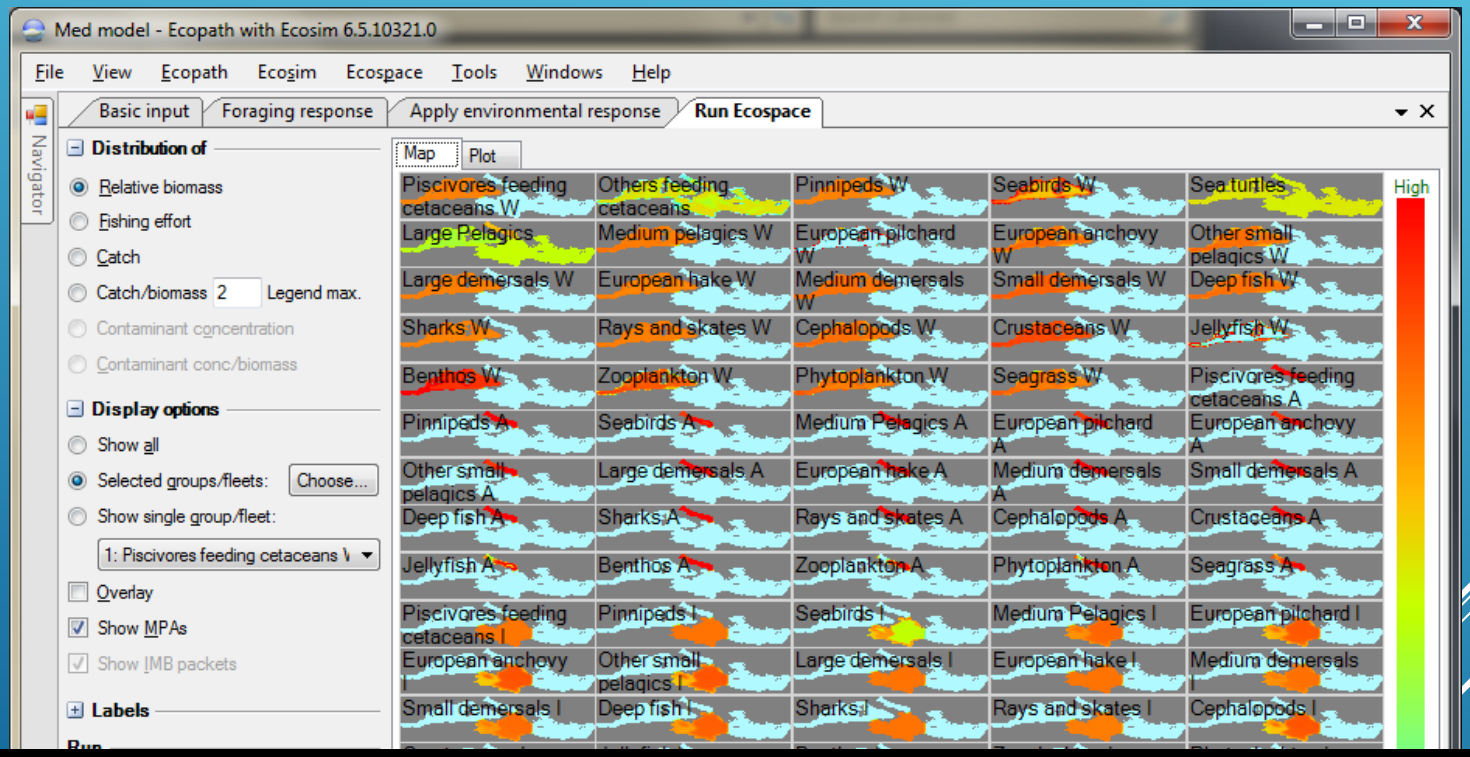
HAB. CAP. CASE STUDY

4. More capacity (Western sardine - depth, MSFD W)



HAB. CAP. CASE STUDY

4. Run



GIS DATA FOR MANY ECOSPACE LAYERS

Connected to existing Ecospace driver layers

- Primary production
- Environmental drivers
- Habitats
- Fishing cost
- MPA layouts
- Contaminants
- Migration
- Computed foraging capacity

Coming soon

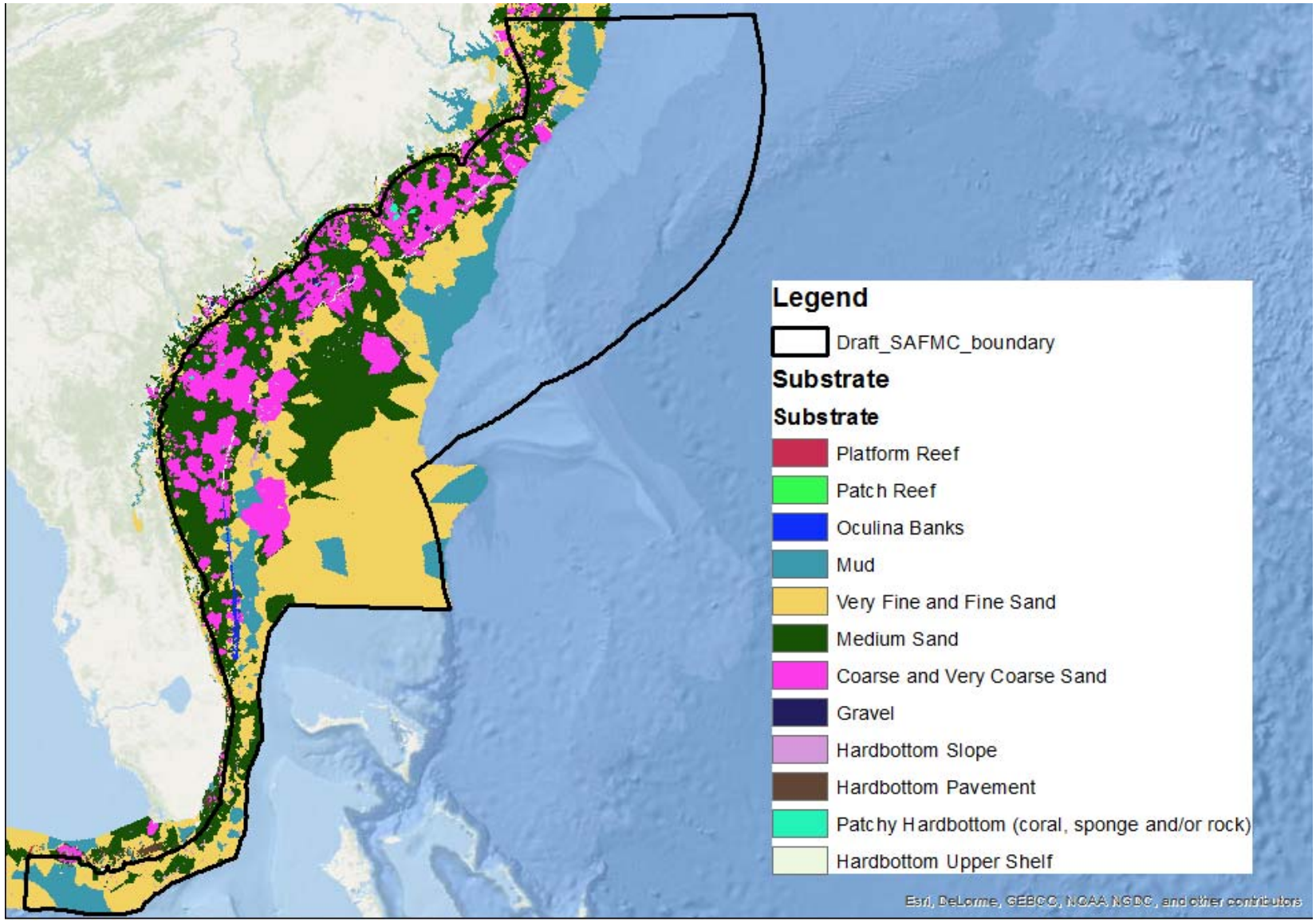
- Advection

Initial input data

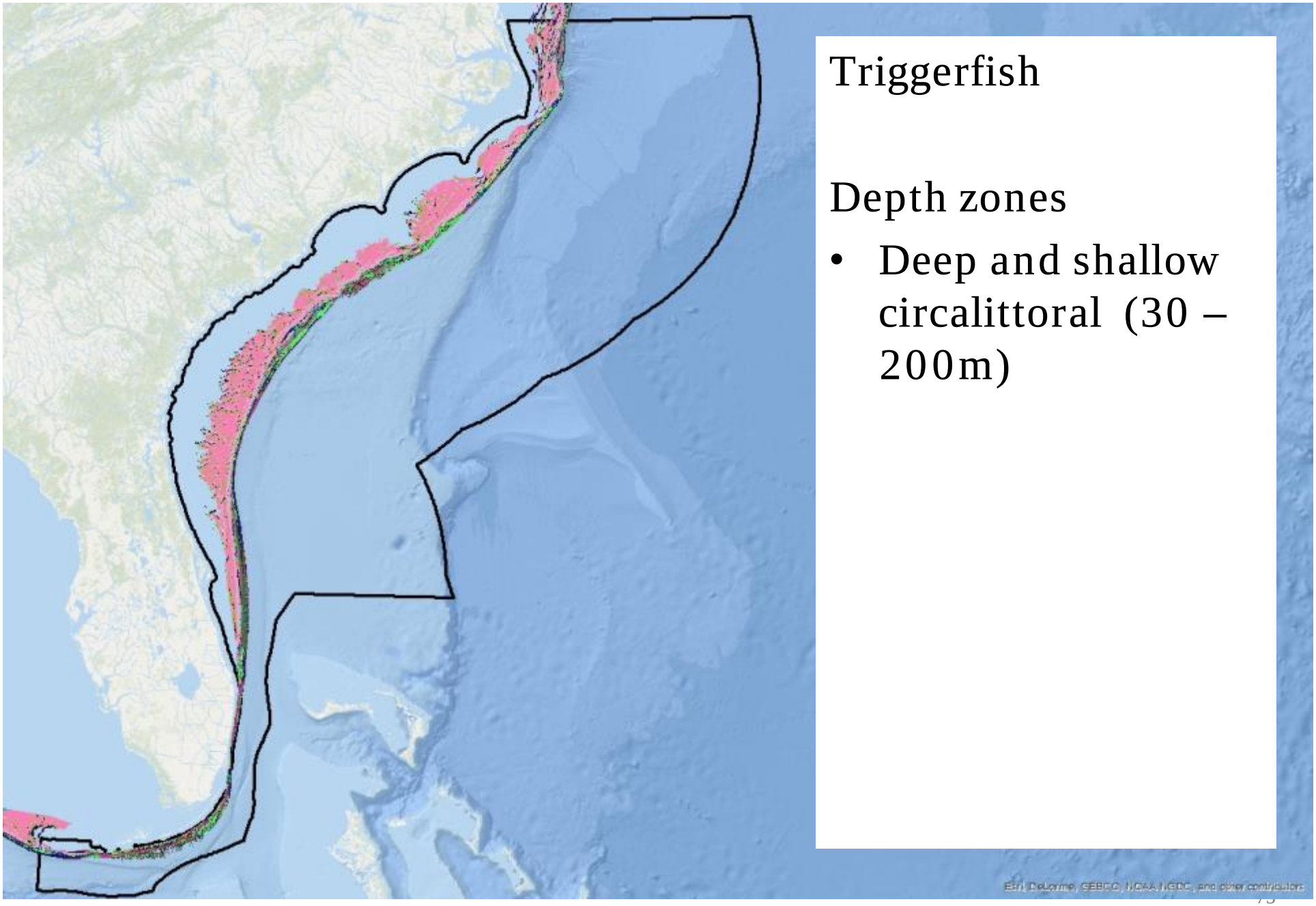
- South Atlantic Marine Bight Assessment (SABMA) project synthesized info on substrate and depth zones

- Does not cover entire council area
  - Should work for most groups
  - Will extend with other datasets for groups that need it

Data coverage



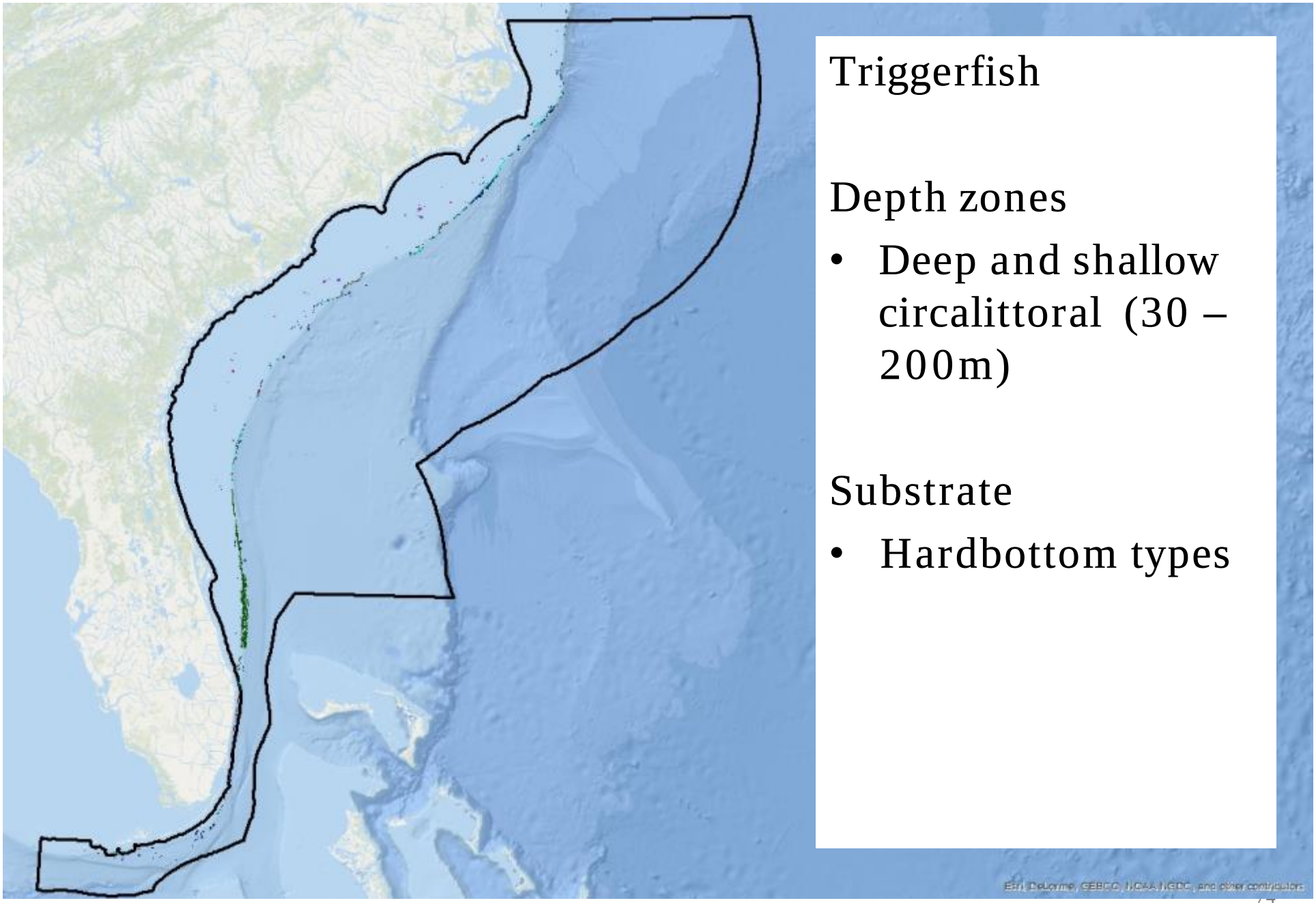
		Depth	
		Zone	Taxa (Examples to 350 m based on USFWS Vessel Survey)
Depth (meters)	0-30	Infralittoral (Nearshore Shelf and Estuaries)	**Fish: (215 species / 99 restricted)** lookdown, Atlantic bumper, northern sennet, moonfish, southern stargazer, gaff topsail catfish, southern flounder, American shad, Atlantic menhaden Invertebrates: Atlantic brief squid, blue crab, fire sponge, green sea urchin, notched sand dollar, banded sea star, penaeid shrimp
	30-70	Shallow Circalittoral (Mid Shelf)	**Fish: (232 species / 71 restricted)** Examples: polka-dot Batfish, grey Trigger fish, flame fish, black grouper, sharp nose puffer, flying gurnard, black-winged sea robin, tom-tate Invertebrates: arrow squid, Atlantic surf clam, crusting bryzoan, hydranths, sponges, and mantis shrimp
	70-200	Deep Circalittoral (Outer Shelf & Shelf Edge)	**Fish: (185 species /40 restricted)** yellowfin bass, jambeau, broad flounder, highfin scorpionfish, spiny flounder, three-eye flounder, big-eyed frogfish, spiny searobin Invertebrates: Atlantic rock crab, boreal asterias, brown rock shrimp, Cancer crab coarsehand lady crab, *Oculina*, brown-striped brittlestar
	200-600	Shallow Mesobenthic (Shelf/Slope break - Charleston Bump)	**Fish: (251 species /152 restricted)** offshore hake, white hake, freckled skate, deepwater dab, fourbeard rockling, goosefish, slim flounder, fawn cusk-eel, spotted hake Invertebrates: northern shortfin squid, Jonah crab, cancer crab, rock shrimp, squat lobsters, *Lophelia pertusa*, black corals, glass sponges
	600-1000	Deep Mesobenthic (Blake Plateau)	**Fish: (56 species / 17 restricted)** Cuban pygmy skate, smooth-head, scaleless dragonfish, duckbill eel, lightfish, snake mackerel Invertebrates: Polychaetes , deepwater corals (*Lophelia* and *Enallopsammia)*
	1000 - 5000	Bathybenthic/Abyssal	**Fish: (11/0)** Not well sampled. Species with some proportion caught in this zone include: Pacific snake-eel, dusky flounder, spotted hake, dolphin



Triggerfish

Depth zones

- Deep and shallow circalittoral (30 – 200m)



Triggerfish

Depth zones

- Deep and shallow circalittoral (30 – 200m)

Substrate

- Hardbottom types

Spreadsheet for functional groups

- Now building a spreadsheet to filter all functional groups based on habitat variables (substrate, depth zones, temperature, etc)

- Will get that out to larger group for review before running models