Coastal Ecological USA Stakeholder Meeting

Kathleen Goodin

Marine Program Director

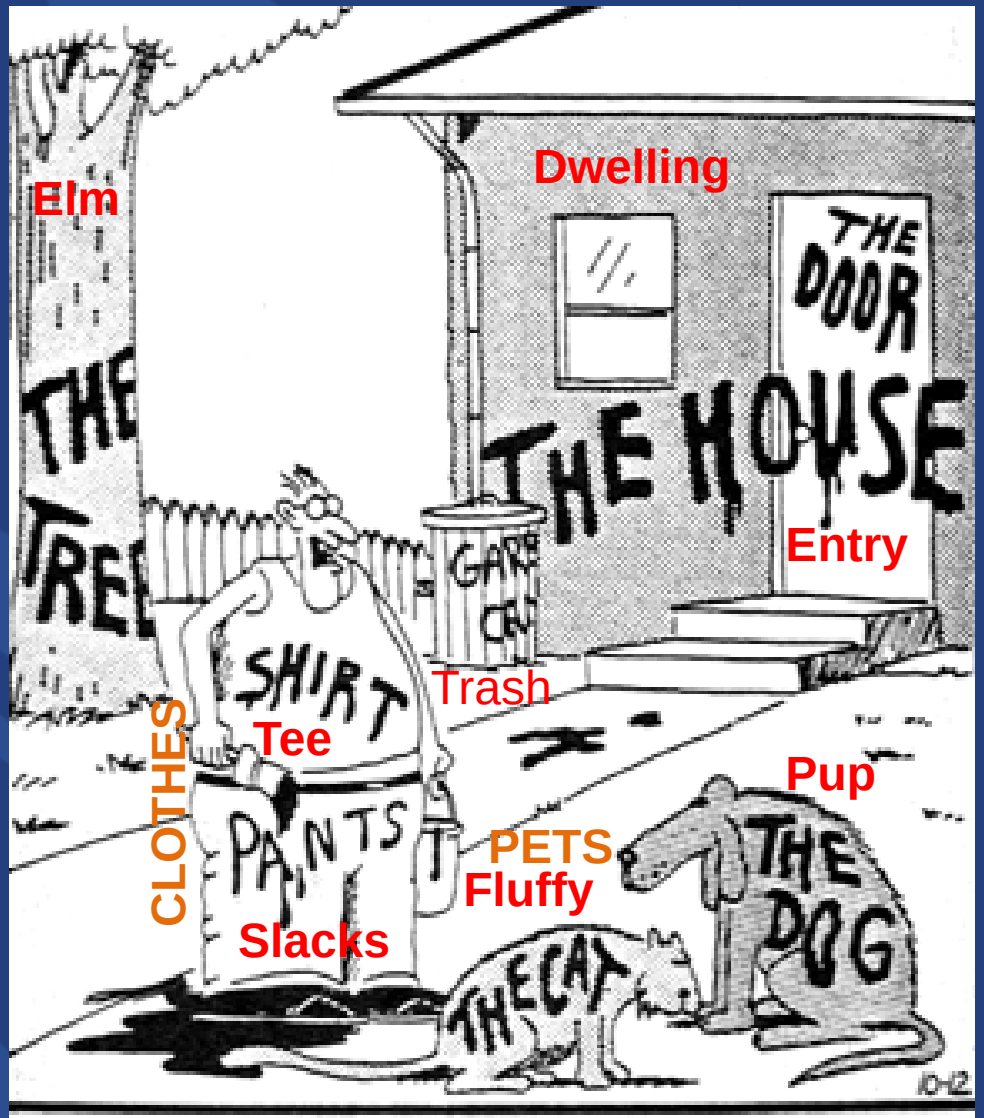
NatureServe

November 17, 2017

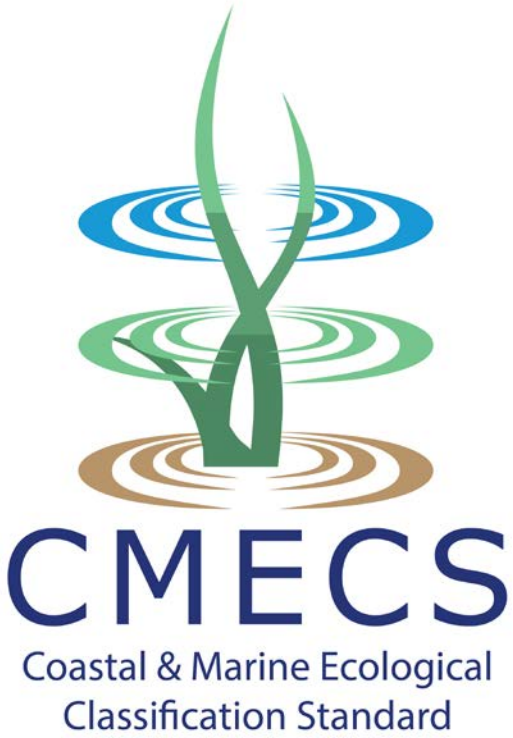
Outline

- US Federal Classification Standards
- Ecological Marine Units
- Ecosystem Data
- Abiotic Data
- At-Risk Species
- Coastal Landscape Condition Models
- Great Lakes

What's in a name?



Coastal and Marine Ecological Classification Standard (CMECS)



- Common language for describing marine ecosystems
- Catalog of terms
- Framework for organizing observational information
- US Federal Geographic Data Committee Standard (2012)

CMECS Domain

- All waters, substrates, benthos and sub-benthos of the coastal marine realm extending:
- **Landward** to tidal splash zone of coasts, intertidal euhaline and brackish wetlands, and waters of Great Lakes
- **Up river/estuary** to head of tide, where tide > 0.2 ft (0.06 m) for at least part of month
- **Seaward** to deep ocean, including all continental and ocean waters and bottom

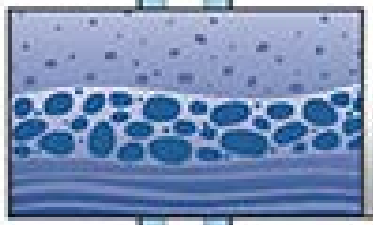
Coastal and Marine Ecological Classification Standard

STRUCTURE: SETTINGS AND COMPONENTS

BIOGEOGRAPHIC SETTING
Ecoregions defined by climate, geology, and evolutionary history

Water Column Component
Structure and Characteristics of the Water Column

Geoform Component
Geomorphic Structural Character of the Coast or Seafloor



Substrate Component
Character and Composition of Surface and Near-Surface Substrates

Biotic Component
Assemblages of Benthic or Suspended/Floating Biota

AQUATIC SETTING
Zones defined by salinity, coastal proximity, and tidal regime

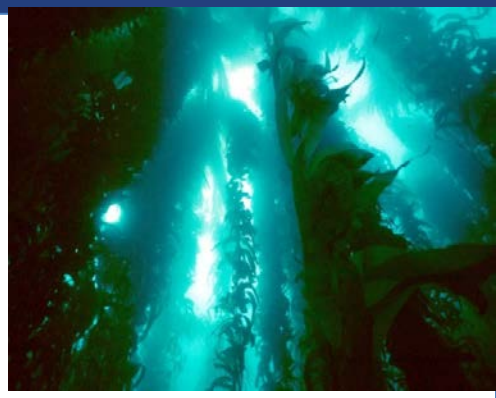
Ecological Marine Units – Combination of units across components

Aquatic Setting

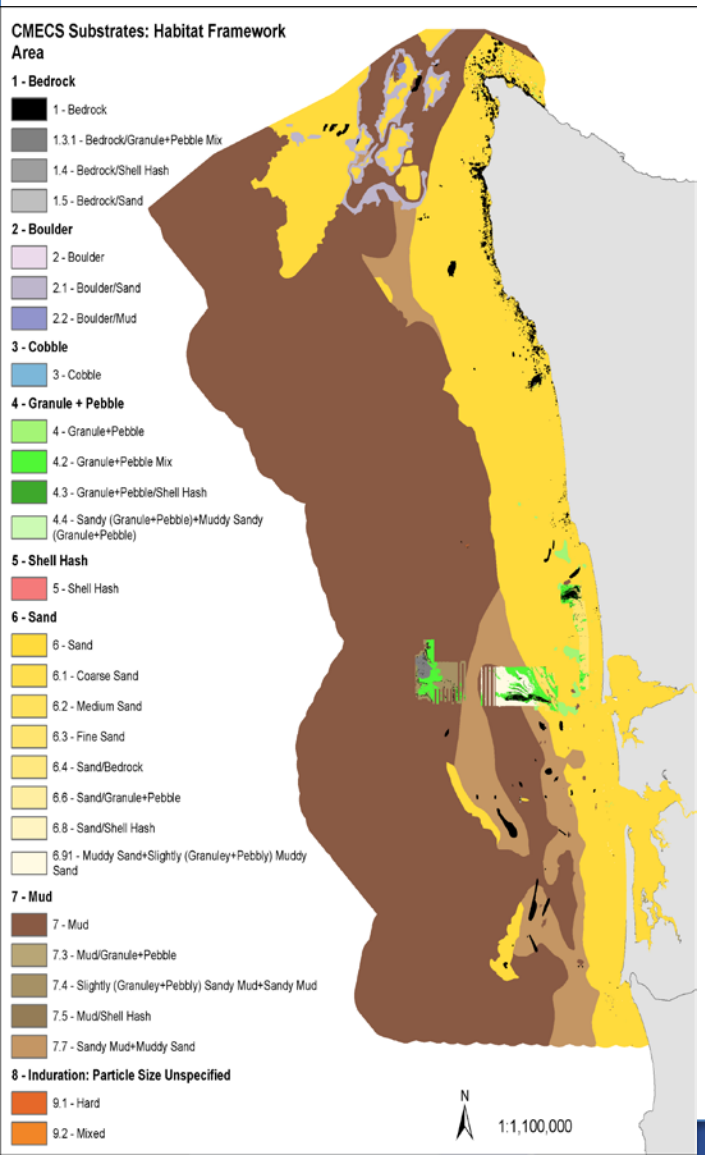
System	Subsystem	Tidal Zone
Marine	Nearshore Offshore Oceanic	*Supratidal* *Intertidal* *Subtidal*
Estuarine	Coastal Open Water	
Lacustrine	Limnetic Littoral	

Biotic Component

- Describes composition of biota
  - Benthos
  - Water Column
- Complements US Federal Standards
  - *US National Vegetation Classification*
  - *US National Wetland Inventory*
- Hierarchy
  - **Setting**: Benthic/Attached
  - **Class**: Reef Biota
  - **Subclass**: Shallow/Mesophotic Coral Reef Biota
  - **Group**: Massive Coral Reef
  - **Community**: Massive Monstastraea Reef



Substrate Component



Particle size and composition of substrate

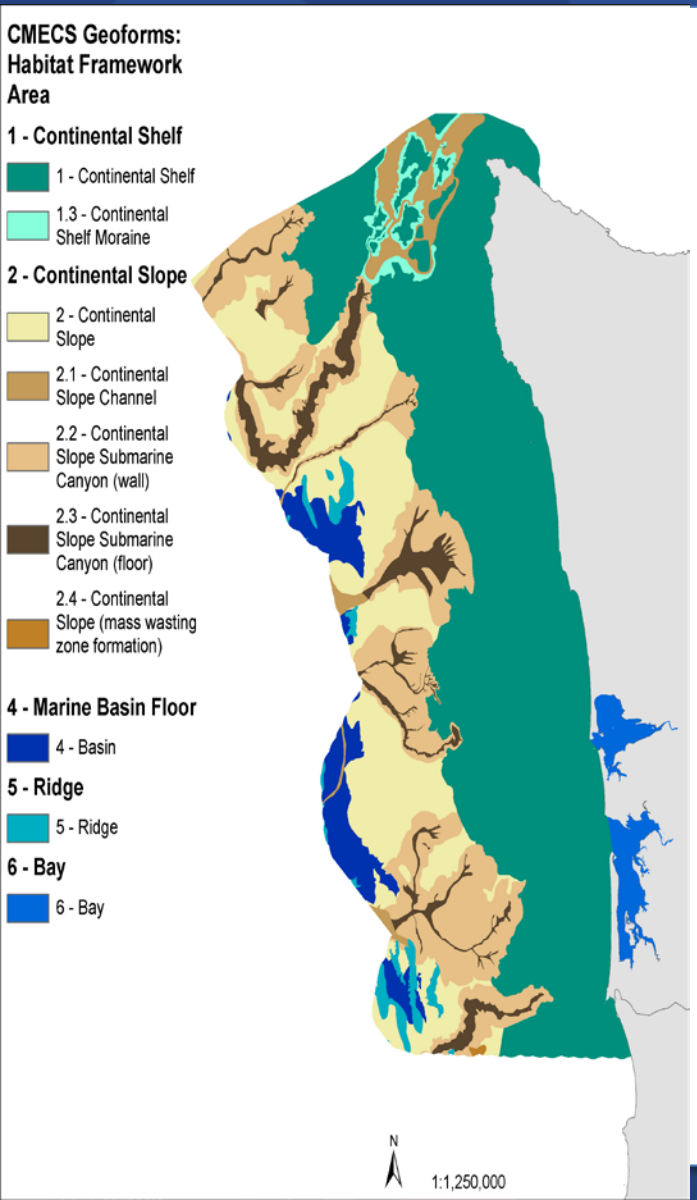
- To extent of penetration by multicellular biota

Substrates: geologic, biogenic, anthropogenic

Hierarchy

- **Origin**: Geologic
- **Class**: Unconsolidated Substrate
- **Subclass**: Coarse Unconsolidated Substrate
- **Group**: Gravel
- **Subgroup**: Pebble

Geoform Component



- Major geomorphic or structural characteristics
- Geologic, biogenic, anthropogenic features
- Spatial hierarchy, 3 subcomponents
  - **Tectonic Setting**: Global tectonic features (e.g., abyssal plain, mid-ocean ridge)
  - **Physiographic Setting**: Landscape level geomorphological features (e.g., fjord, submarine canyon, bay)
  - **Geoform**: Coastal and seafloor structures (e.g., beach, terminal moraine, tide pool)

Water Column Component

- Water column structure and features
- Five subcomponents; no-hierarchy
  - **Vertical layers**
  - **Temperature**
  - **Salinity**
  - **Hydroforms** (e.g., current, front, wave, water mass)
  - **Biogeochemical features** (e.g., oxygen minima, chlorophyll maxima, neustonic layer)

Putting it Together: Ecological Marine Units

Biogeographic Setting:
Floridian

Aquatic Setting:
Marine Nearshore Subtidal

Biotic Component (BC):
Class: Aquatic Vegetation Bed
Subclass: Rooted Vascular Vegetation
Biotic Group: Seagrass Bed
Biotic Community: *Thalassia Seagrass*
Co-Occurring Element: Leathery or Leafy Macroalgae

Substrate Component (SC):
Class: Unconsolidated Mineral Substrate
Subclass: Fine Unconsolidated Substrate
Group: Sand

Geoform Component (GC):
Physiographic Setting: Coastal Complex
Level 1 Geoform: Lagoon

Olympic EMU's

10 - Continental Shelf: Bedrock

- 1 - Continental Shelf; 1 - Bedrock
- 1 - Continental Shelf; 1.3.1 - Bedrock/Granule+Pebble Mix
- 1 - Continental Shelf; 1.4 - Bedrock/Shell Hash
- 1 - Continental Shelf; 1.5 - Bedrock/Sand

11 - Continental Shelf: Boulder

- 1 - Continental Shelf; 2 - Boulder
- 1 - Continental Shelf; 2.1 - Boulder/Sand
- 1 - Continental Shelf; 2.2 - Boulder/Mud

12 - Continental Shelf: Cobble

- 1 - Continental Shelf; 3 - Cobble

13 - Continental Shelf: Granule + Pebble

- 1 - Continental Shelf; 4 - Granule+Pebble
- 1 - Continental Shelf; 4.2 - Granule+Pebble Mix
- 1 - Continental Shelf; 4.3 - Granule+Pebble/Shell Hash
- 1 - Continental Shelf; 4.4 - Sandy (Granule+Pebble)+Muddy Sandy (Granule+Pebble)

14 - Continental Shelf: Shell Hash

- 1 - Continental Shelf; 5 - Shell Hash

15 - Continental Shelf: Sand

- 1 - Continental Shelf; 6 - Sand
- 1 - Continental Shelf; 6.1 - Coarse Sand
- 1 - Continental Shelf; 6.2 - Medium Sand
- 1 - Continental Shelf; 6.3 - Fine Sand
- 1 - Continental Shelf; 6.6 - Sand/Granule+Pebble
- 1 - Continental Shelf; 6.7 - Sand/Mud
- 1 - Continental Shelf; 6.8 - Sand/Shell Hash
- 1 - Continental Shelf; 6.91 - Muddy Sand+Slightly (Granuley+Pebbly) Muddy Sand

16 - Continental Shelf: Mud

- 1 - Continental Shelf; 7 - Mud
- 1 - Continental Shelf; 7.3 - Mud/Granule+Pebble
- 1 - Continental Shelf; 7.4 - Slightly (Granuley+Pebbly) Sandy Mud+Sandy Mud
- 1 - Continental Shelf; 7.5 - Mud/Shell Hash
- 1 - Continental Shelf; 7.7 - Sandy Mud+Muddy Sand

17 - Continental Shelf: Mixed

- 1 - Continental Shelf; 9.2 - Mixed

18 - Continental Shelf: Channel

- 1.2 - Continental Shelf Channel; 6 - Sand
- 1.2 - Continental Shelf Channel; 9.1 - Hard

19 - Continental Shelf: Moraine

- 1.3 - Continental Shelf Moraine; 2.1 - Boulder/Sand

20 - Continental Slope: Bedrock

- 2 - Continental Slope; 1 - Bedrock

22 - Continental Slope: Granule + Pebble

- 2 - Continental Slope; 4.2 - Granule+Pebble Mix

24 - Continental Slope: Mud

- 2 - Continental Slope; 7 - Mud
- 2 - Continental Slope; 7.4 - Slightly (Granuley+Pebbly) Sandy Mud+Sandy Mud

25 - Continental Slope: Channel

- 2.1 - Continental Slope Channel; 6 - Sand
- 2.1 - Continental Slope Channel; 7 - Mud

26 - Continental Slope: Submarine Canyon - Wall

- 2.2 - Continental Slope Submarine Canyon (wall); 1 - Bedrock
- 2.2 - Continental Slope Submarine Canyon (wall); 1.3.1 - Bedrock/Granule+Pebble Mix
- 2.2 - Continental Slope Submarine Canyon (wall); 4.2 - Granule+Pebble Mix
- 2.2 - Continental Slope Submarine Canyon (wall); 7 - Mud
- 2.2 - Continental Slope Submarine Canyon (wall); 7.4 - Slightly (Granuley+Pebbly) Sandy Mud+Sandy Mud
- 2.2 - Continental Slope Submarine Canyon (wall); 9.1 - Hard
- 2.2 - Continental Slope Submarine Canyon (wall); 9.2 - Mixed

27 - Continental Slope: Submarine Canyon - Floor

- 2.3 - Continental Slope Submarine Canyon (floor); 1 - Bedrock
- 2.3 - Continental Slope Submarine Canyon (floor); 1.3.1 - Bedrock/Granule+Pebble Mix
- 2.3 - Continental Slope Submarine Canyon (floor); 4.2 - Granule+Pebble Mix
- 2.3 - Continental Slope Submarine Canyon (floor); 7 - Mud
- 2.3 - Continental Slope Submarine Canyon (floor); 7.4 - Slightly (Granuley+Pebbly) Sandy Mud+Sandy Mud

40 - Marine Basin Floor

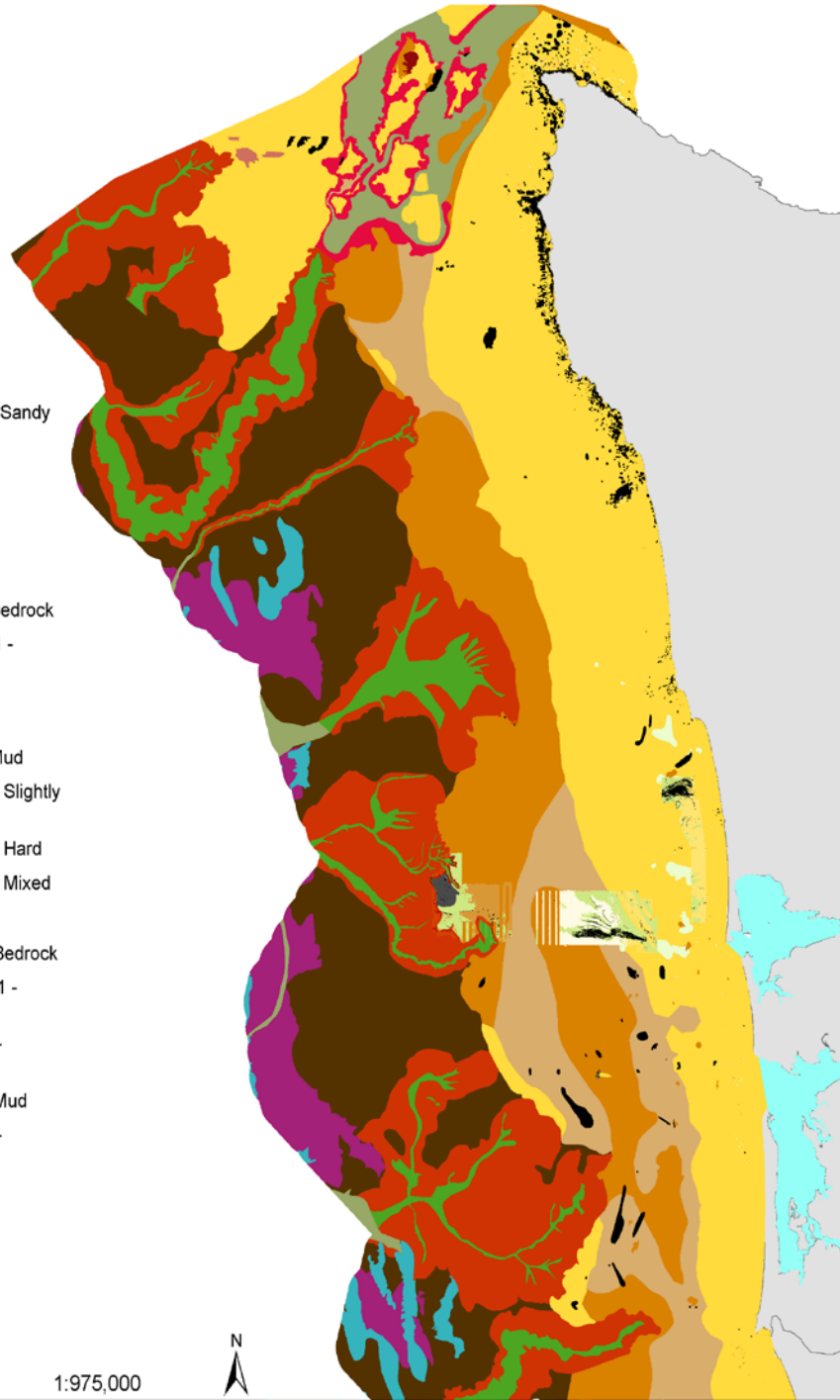
- 4.1 - Basin; 7 - Mud

50 - Ridge

- 4.2 - Ridge; 7 - Mud

60 - Bay

- 6 - Bay; 6 - Sand



CMECS Resources

CMECS Web Site

https://ocs-iocm-web-ocs-iocm-dev.azurewebsites.net/index.html

CMECS Unit Catalog

www.cmecscatalog.org

Contact

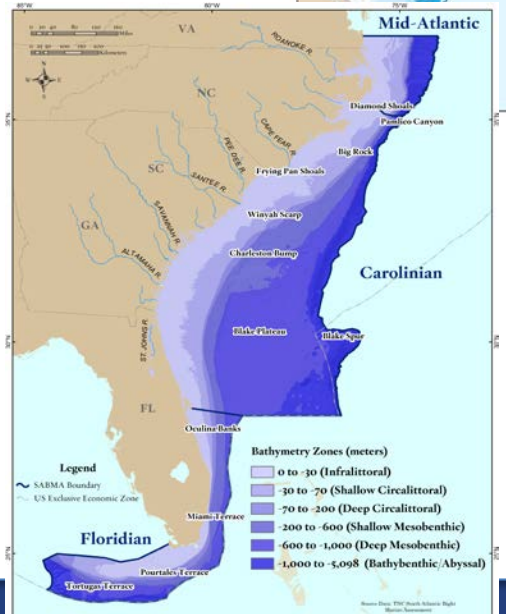
OCM.CMECS-IG@noaa.gov

CMECS

Coastal & Marine Ecological Classification Standard

CMECS Benthic EMUs

- Northern Pacific Coast
- Northwest Atlantic
- South Atlantic Bight



Additional Ecosystem Data

Council on Environmental Cooperation

- Blue Carbon: Seagrass, Salt Marsh, Mangrove
- Not CMECS Compliant, but could be crosswalked

http://www.cec.org/tools-and-resources/map-files/north-american-blue-carbon-2015

NOAA Marine Cadastre

- Seagrass
- Coastal wetlands - on the way
- CMECS Compliant
- https://marinecadastre.gov/viewers/

Shoreline Character Data

Environmental Sensitivity Index

- Shoreline character
  - Could pull out beach and shore types
  - CMECS Crosswalk Available

  https://response.restoration.noaa.gov/maps-and-spatial-data/environmental-sensitivity-index-esi-maps.html

National Wetlands Inventory

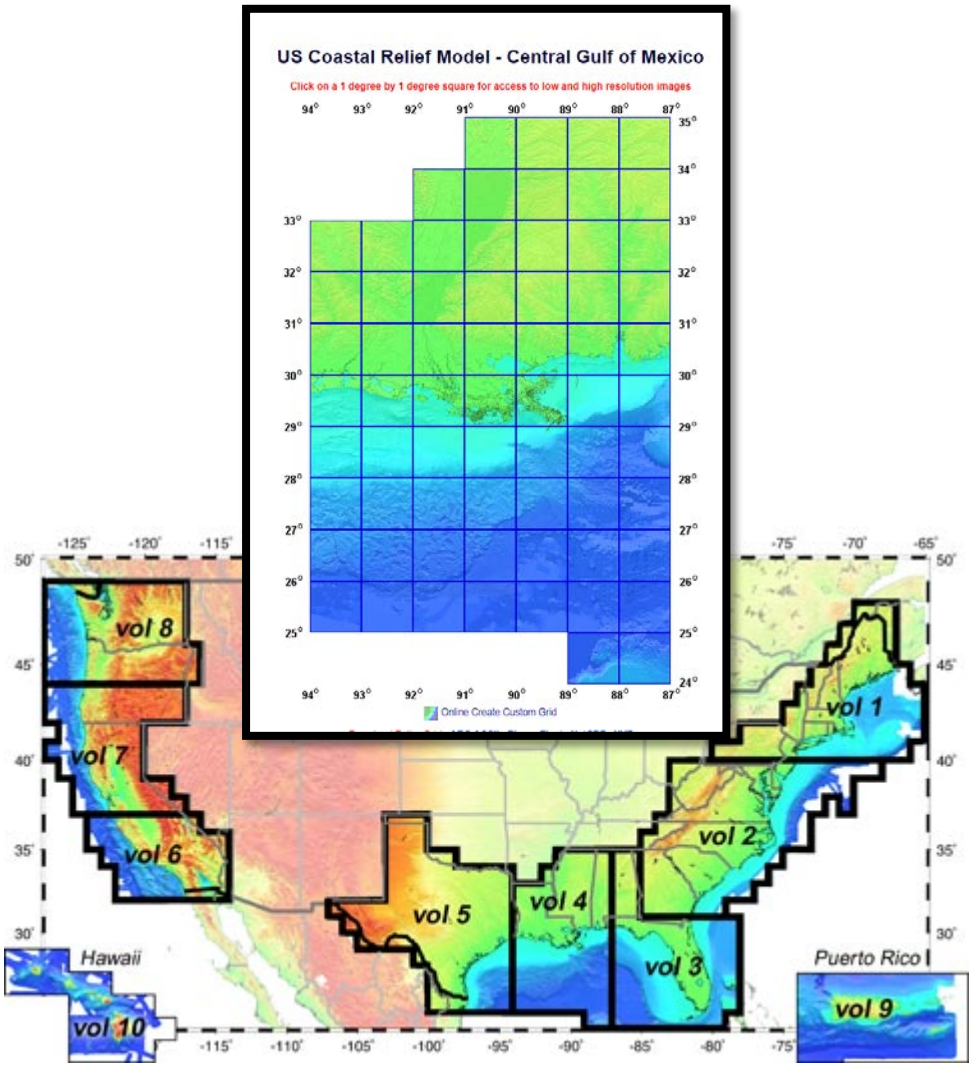
  - Unconsolidated Shore Class – Beaches
  - CMECS Compliant
- https://www.arcgis.com/home/item.html?id=8adef46d09304946a2f112a232de19b1

Coastal Relief Model

NOAA National Environmental Information Center

- Coastal Relief Model
  - Can be used to derive CMECS depth classes

https://www.ngdc.noaa.gov/mgg/coastal/crm.html



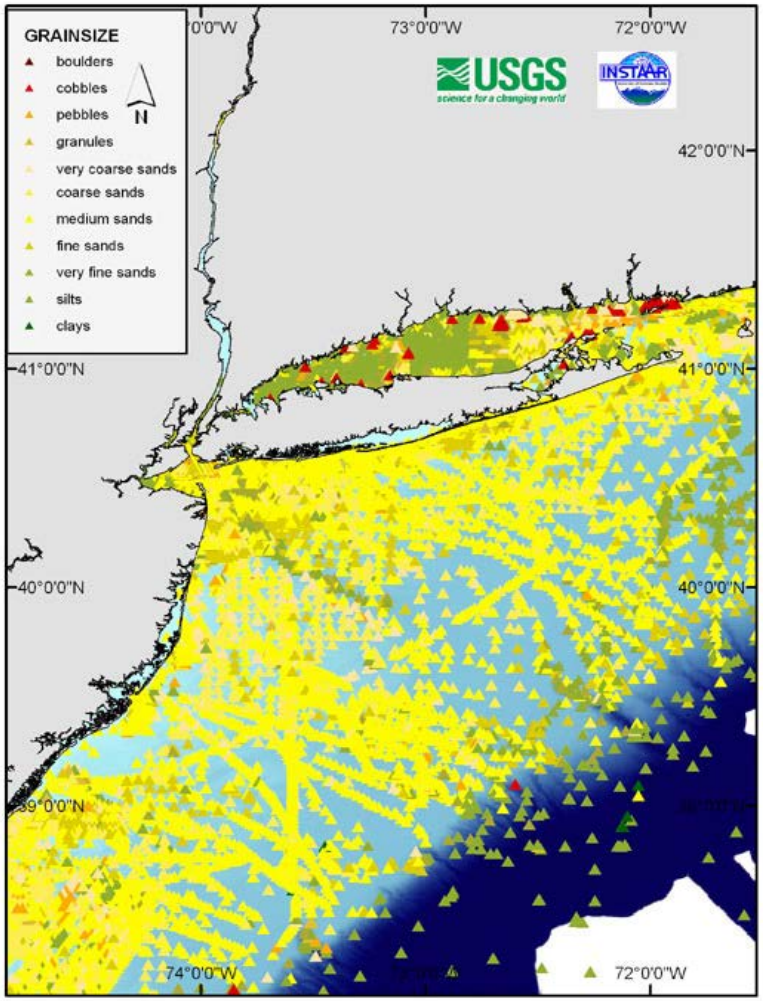
Sediment Data

- US SEABED
  - includes surficial and sub-bottom information on grain size, composition, and applied-properties
- https://walrus.wr.usgs.gov/usseabed/about.html#examples

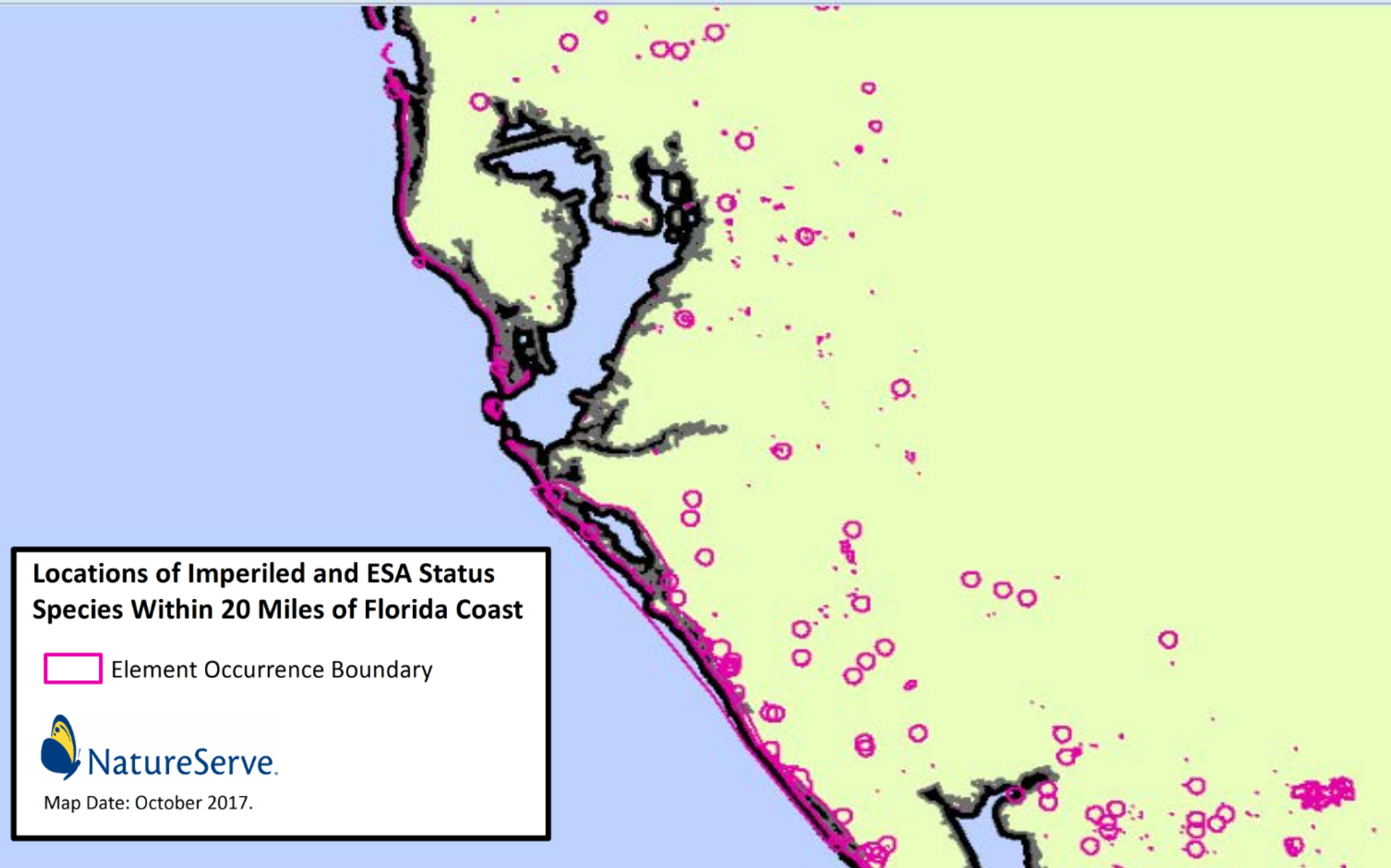
usSEABED Example Maps

Fig. 3: Variations in grain size, New York Bight. [back]

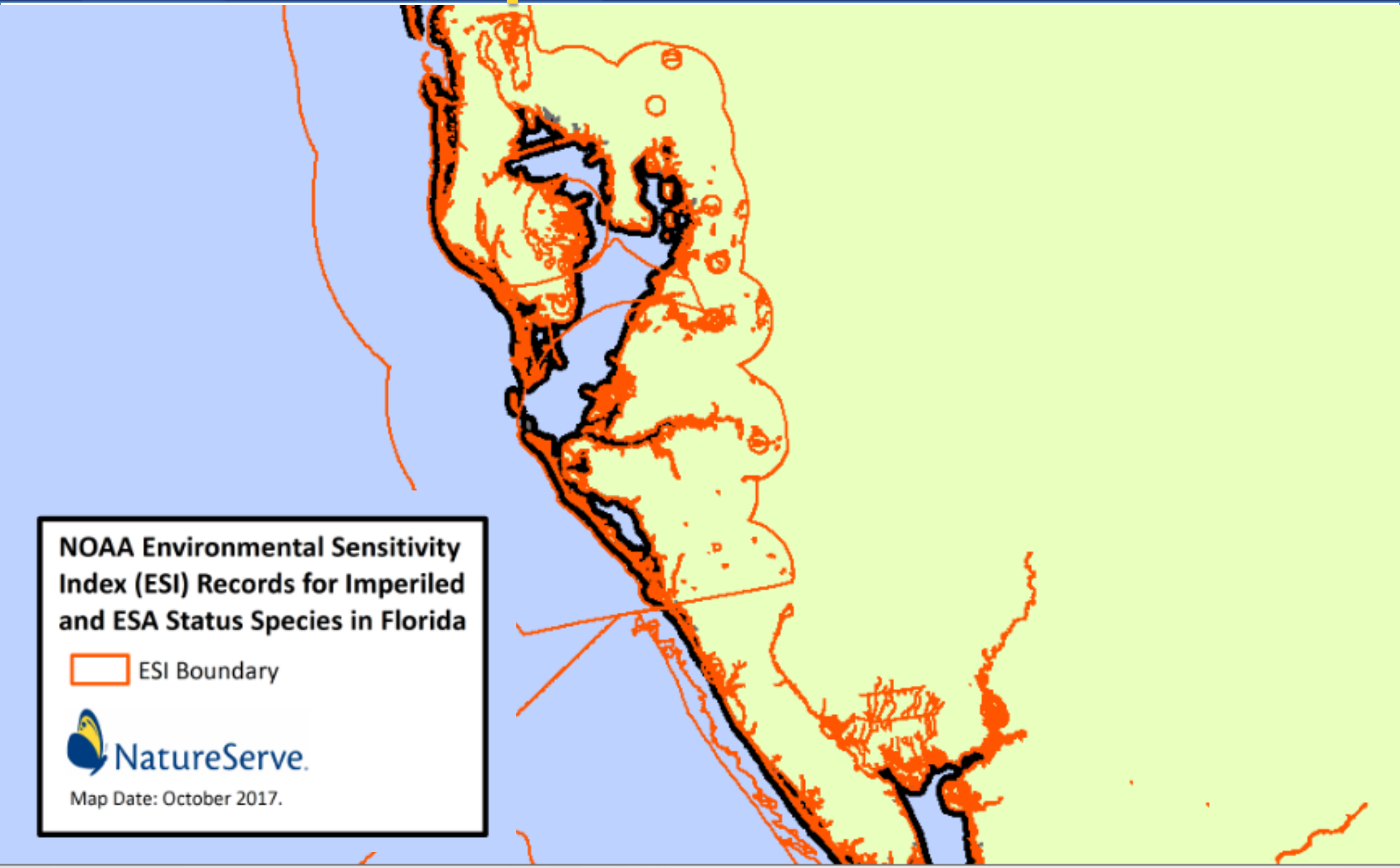
Image created in ArcView®.*



NatureServe
At Risk Species Occurrence Data

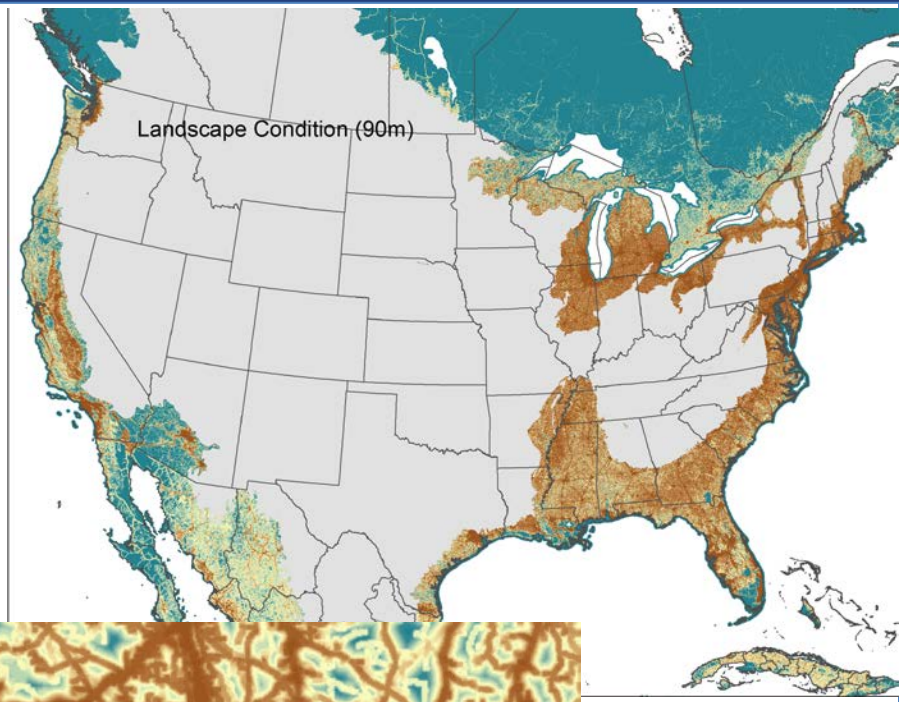


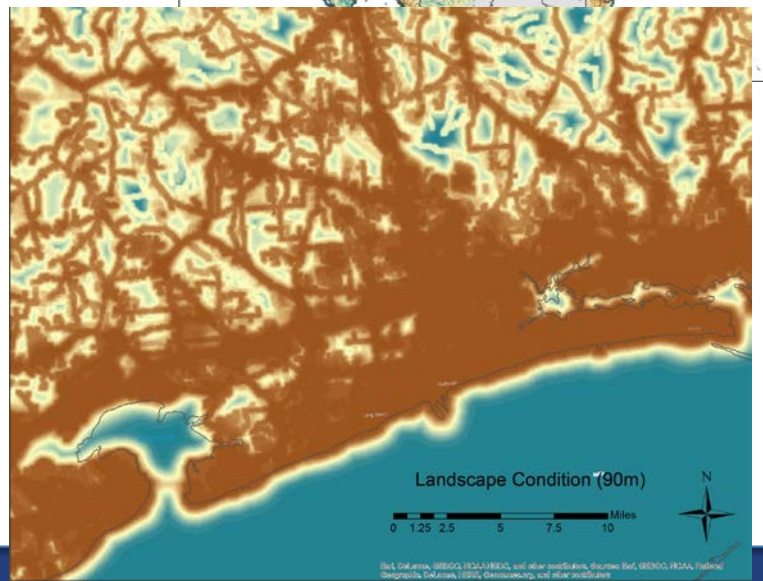
ESI
At Risk Species Occurrences



NatureServe Landscape Condition Model

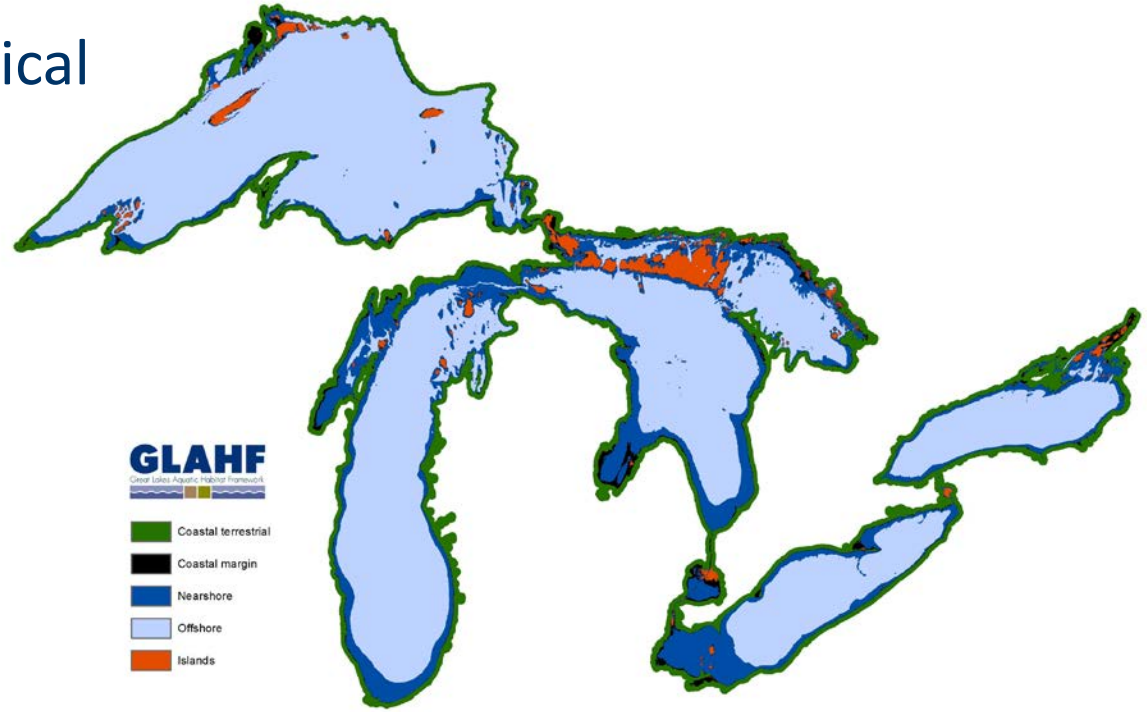
- Major coastal stressors
- 90 m resolution
- Informs watershed condition and potential impacts of land on coastal waters
- http://www.natureserve.org/conservation-tools/modeling-landscape-condition





Great Lakes Aquatic Habitat Framework

- Administrative
- Environmental & Chemical
- Geomorphology
- Biological
- Landscape
- Mechanical Energy
- Temperature Energy



- Contact Catherine Riseng criseng@umich.edu
- https://www.glahf.org/

Questions?