Coastal and Marine Ecological Classification Standard

CMECS
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CMECS Developers

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What Is CMECS?

- Common language for describing marine ecosystems
- Catalog of terms
- Framework for organizing observational information

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

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STRUCTURE: SETTINGS AND COMPONENTS

BIOGEOGRAPHIC SETTING

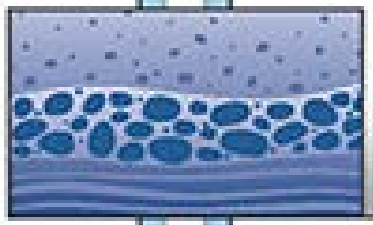
Ecoregions defined by climate, geology, and evolutionary history

Water Column Component

Structure and Characteristics of the Water Column

Geoform Component

Geomporphic 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

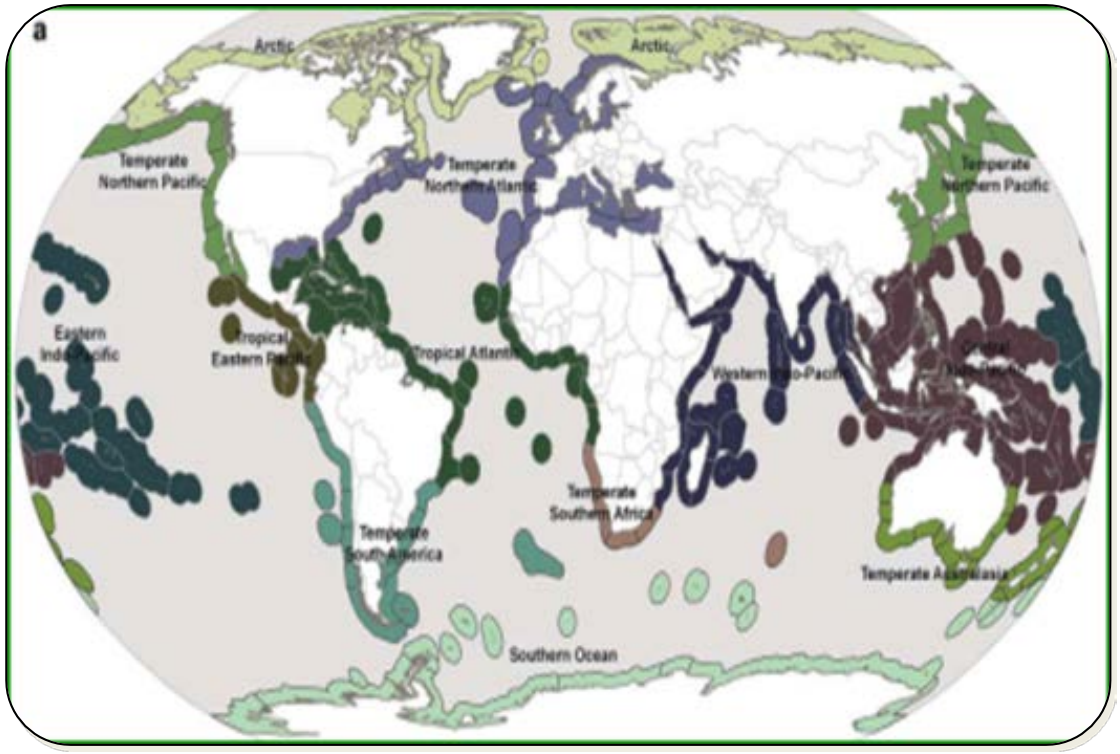
BIOTOPE

Combination of abiotic habitat and associated species

Biogeographic Setting

Reflects composition and characteristics of biological communities

- Marine Ecoregions of the World, Spalding et al. (2007)
  - Realms
  - Provinces
  - Ecoregions
- Global Open Oceans and Deep Seabed Biogeographic Classification, UNESCO (2009)



Aquatic Setting

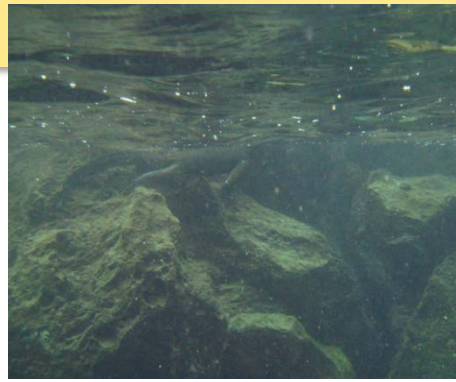
System	Subsystem	Tidal Zone
Marine	Nearshore Offshore Oceanic	*Supratidal* *Intertidal* *Subtidal* *(12 combinations)*
Estuarine	Coastal Open Water Tidal Riverine Coastal Tidal Riverine Open Water	
Lacustrine	Limnetic Littoral	

Biotic Component

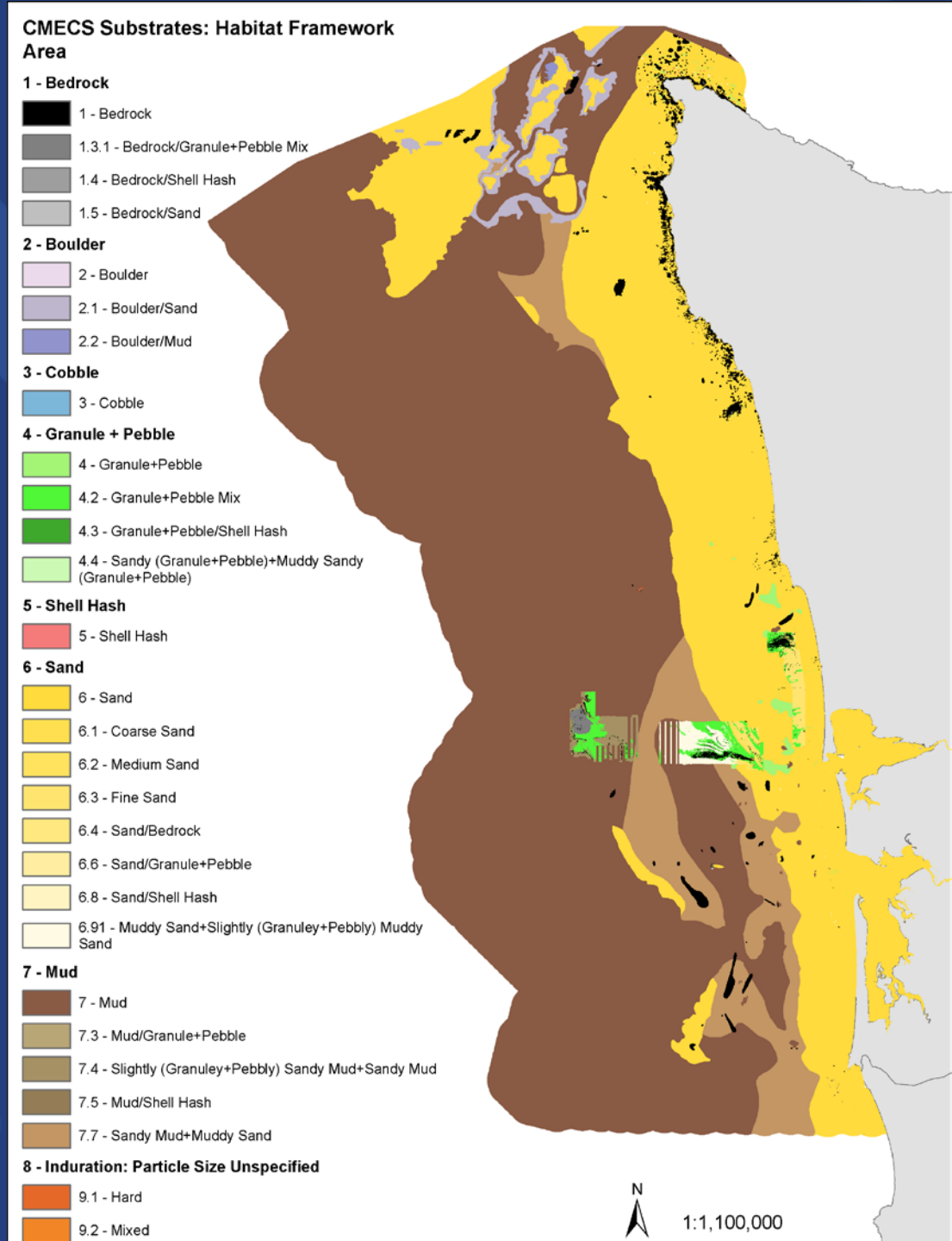
- Describes composition of biota
  - Benthos
  - Water Column
- Complements US Federal Standards
  - *US National Vegetation Classification*
  - *US National Wetland Inventory*
- Hierarchy
  - **Setting**: Benthic/Attached
  - **Class**: Reef Biota
  - **Subclass**: Shallow/Mesophotic Coral Reef Biota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

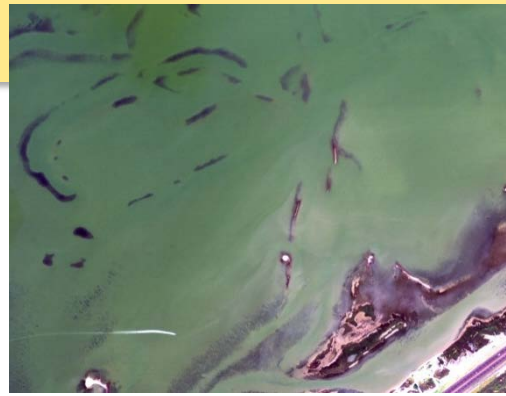


Olympic Coast Substrates

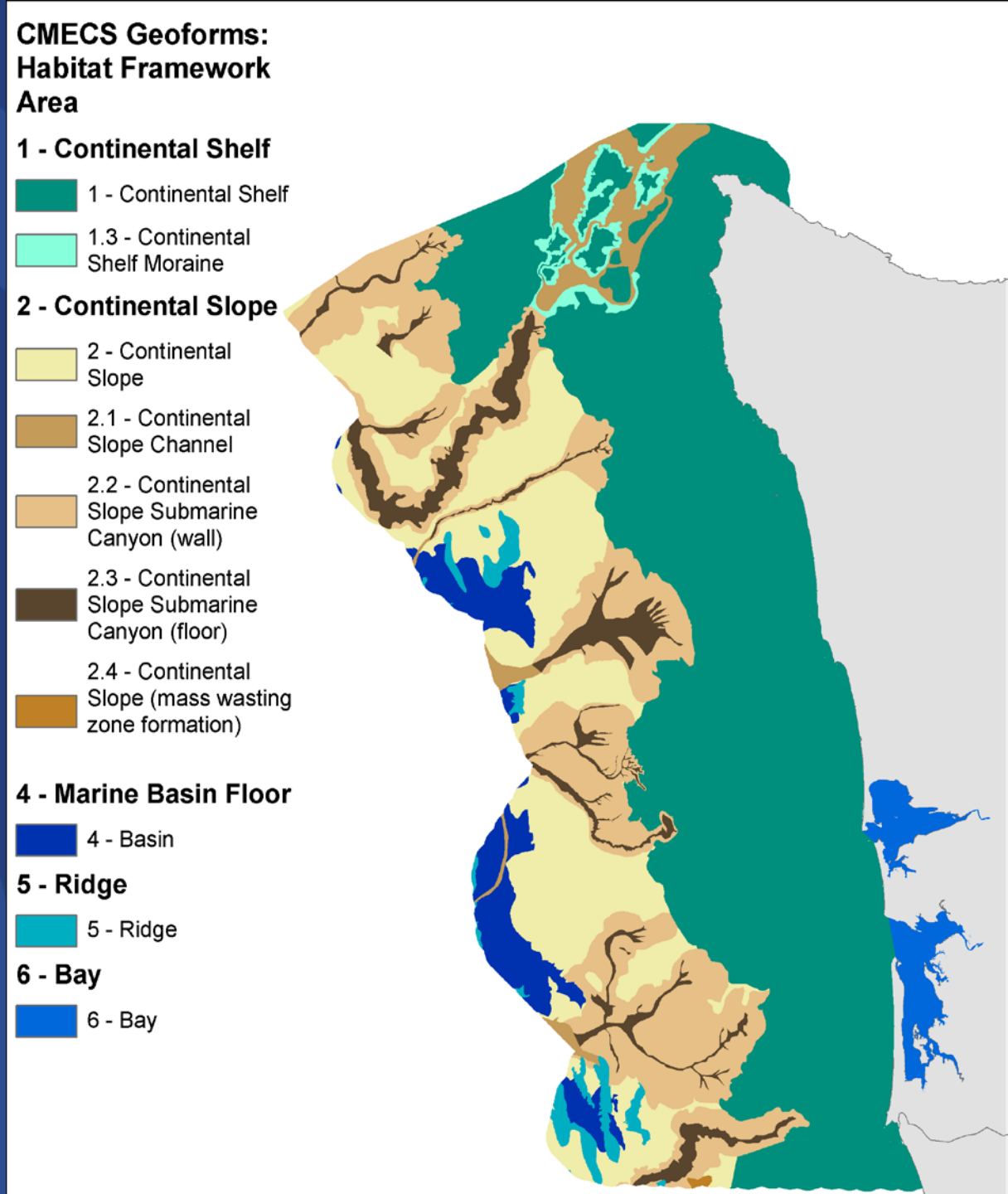


Geoform Component

- 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)



Olympic Coast Geoforms



Water Column Component

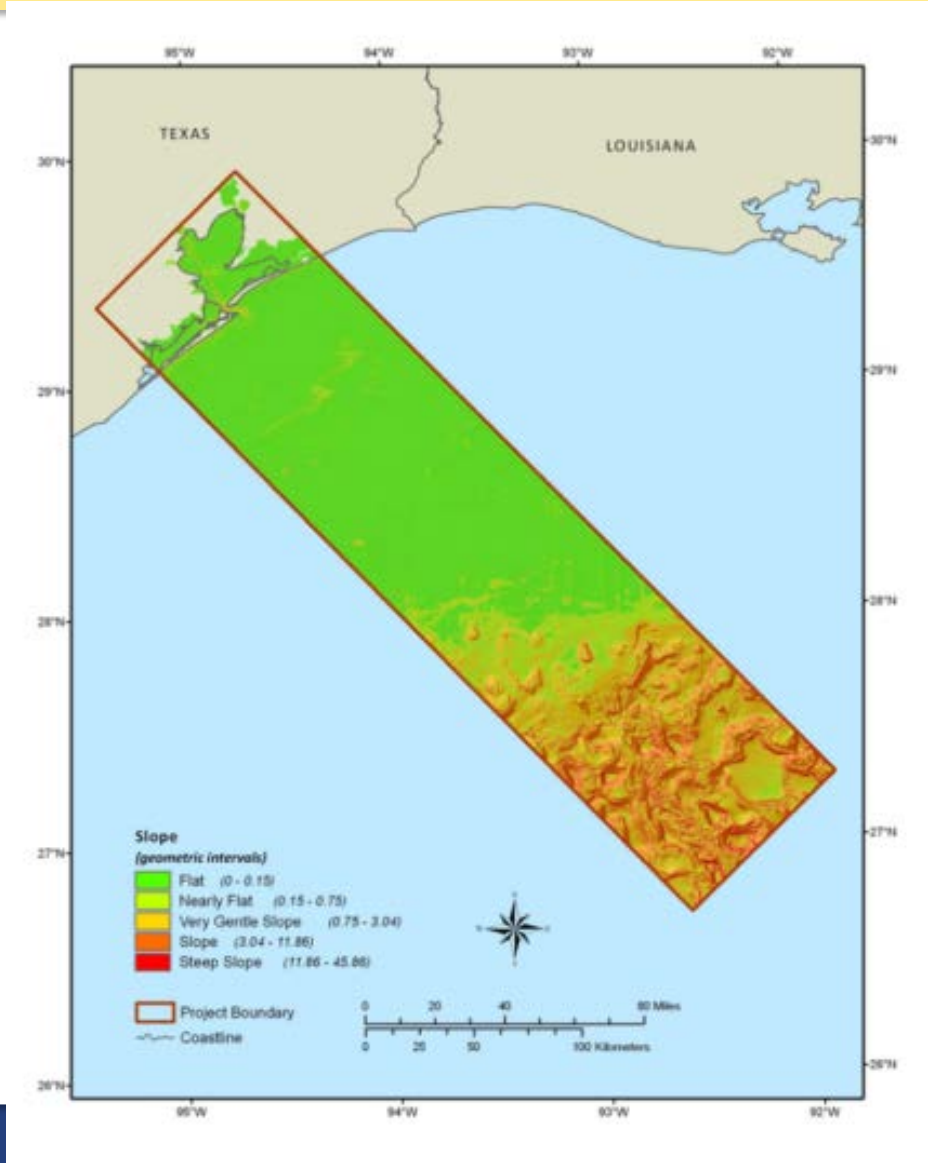
- Water column structure and features
- Five subcomponents; no-hierarchy
  - **Vertical layers**
  - **Temperature**
  - **Salinity**
  - **Hydroforms** (e.g., current, front, wave, water mass)
  - **Biogeochemical features** (e.g., oxygen minima, chlorophyll maxima, neustonic layer)

Modifiers

34 additional variables used to further describe standard units

Types:

- Spatial
- Anthropogenic
- Biological
- Biogeographic
- Temporal
- Physical
- Physico-Chemical



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

Floridian Nearshore Subtidal Euhaline; Thalassia Bed with co-occurring Leathery or Leafy Macroalgae on Sand in a 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

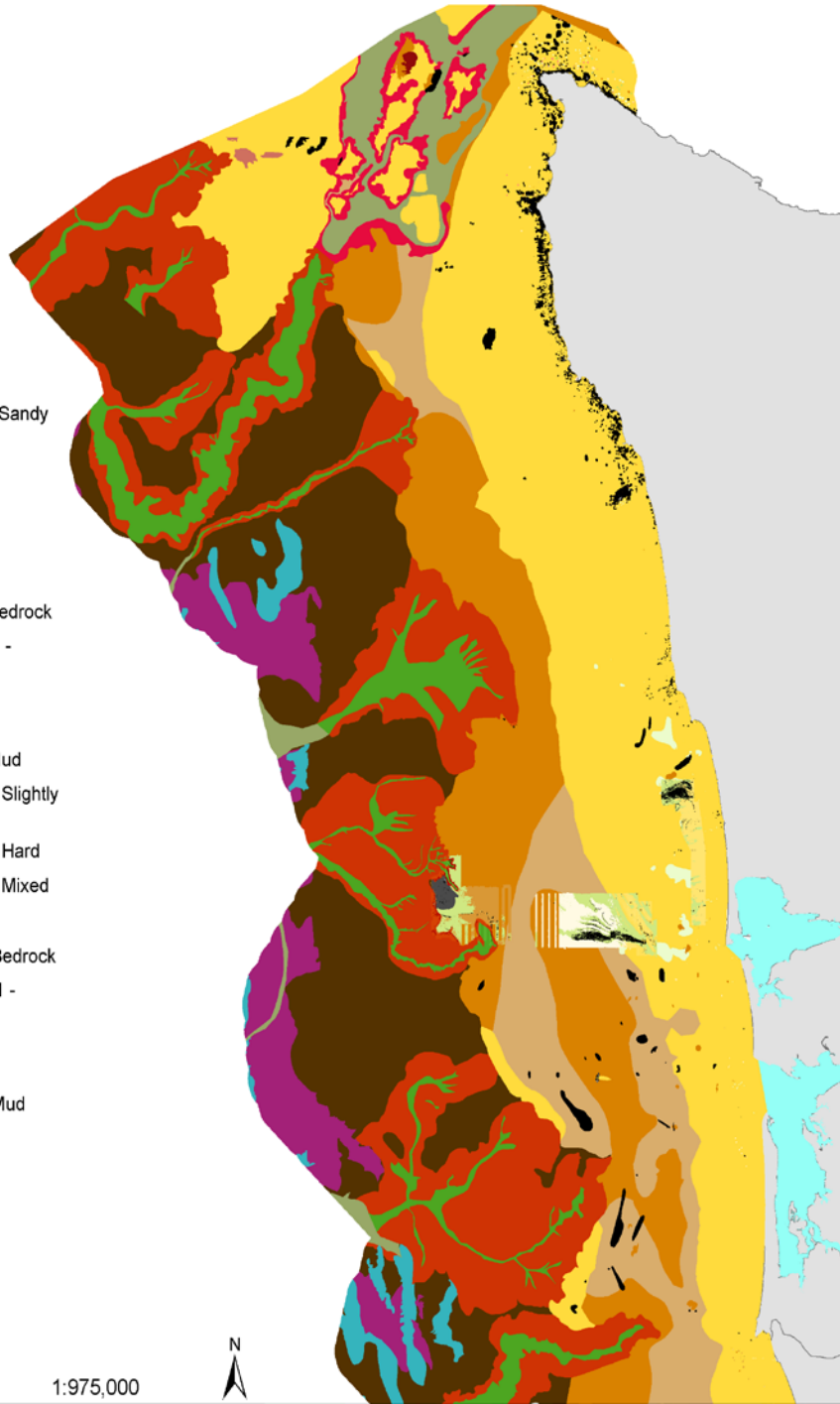
- 4.1 - Basin; 7 - Mud

50 - Ridge

- 4.2 - Ridge; 7 - Mud

60 - Bay

- 6 - Bay; 6 - Sand



CMECS

The Common Language for Marine Ecosystems

Coastal and Marine Ecological Classification Standard

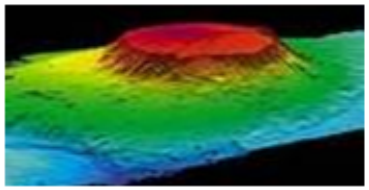
Catalog of Units

Welcome to the CMECS Catalog of Units!

Use this database to browse the CMECS classification and to get definitions for individual CMECS Units. This database contains the units that were published in the Coastal and Marine Ecological Classification Standard.

Water Column Component

Geoform Component



Substrate Component

Biotic Component

Search/Browse classification

About the classification

Download the CMECS Standard

Download the Data:

Excel

Access 2007

NEW: Propose update to classification
NEW: Search for proposals

www.cmecscatalog.org

Website design and maintenance by NatureServe

Resources

CMECS Web Site

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

CMECS Unit Catalog

www.cmecscatalog.org

Contact

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