



Recommendations for Coastal and Marine Ecological Classification Standard (CMECS) Nomenclature

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Marine and Coastal Spatial Data Subcommittee

Federal Geographic Data Committee

<https://iocm.noaa.gov/cmecs/index.html>

<https://my.usgs.gov/confluence/display/CMECSIG/CMECS+Community+Forum+Home>

Background/Purpose	1
Reporting Format.....	2
Recommendations for Consistency	2

Background/Purpose

CMECS units describe discrete and specific biotic and abiotic features and elements of the environment. These units can be used individually; however, users may also combine units to more fully describe an area or as part of biotope¹ development. Aggregating individual units into more general landscape features can be helpful in both management and research applications. Unlike some classification systems, CMECS does not impose such features from the outset but rather lets meaningful landscape units emerge from observations and measurements. This ability to assemble units based on ecological relationships can result in multiple ways to describe the same feature, which could create confusion for users integrating data. A consistent syntax or “grammar” of aggregated CMECS classification units provides a common language, and a defined order of units supports the CMECS code structure.

The following recommendations provide a reporting format for aggregating CMECS units and more fully describing an observation or landscape feature at scales ranging from less than 100 cm² to more than 100 m².

Reporting Format

Arrange CMECS units in the following order to create a descriptive “sentence” that lets users consistently communicate any or all Components of interest -

Biogeographic Setting
 Aquatic Setting
 Biotic
 Substrate (used like an adjective that describes the geoform)
 Geoform
 Water Column

Modifiers go with the modified Component
 A semicolon separates Settings from Components in the sentence

Example: “Southern California Bight Marine Nearshore Subtidal; Pennatulid Bed with co-occurring Small Tube Building Fauna on Muddy Sand Flats in Euhaline Water”.

Recommendations for Consistency

1. Make names sound like normal English descriptions to the extent possible
2. Always use Biogeographic and Aquatic Settings, if possible. Use the components that are known or of interest.
3. Use lowest level of hierarchy available. Only include terms above in the hierarchy if the name of the lowest level occurs in more than one place in the hierarchy. (i.e. Nearshore Subtidal and Offshore Subtidal)
4. Reduce redundancy – don’t include terms that are obvious or implied by the hierarchy above (e.g., don’t include term “marine” if you are using Nearshore Subtidal), or are obvious because of the type definition (e.g., don’t use both Coral Reef Substrate and Patch Coral Reef in the name), or inherent in the definition of the setting (e.g., don’t include “Cold Water” if the Biogeographic Setting is “Cold Temperate”). Consider substituting the name of the wetland biotic group for “Herbaceous Vegetation” when biotic communities are being named.
5. Use the words “on” “with”, “in” or other “relational words” to improve description and readability
6. Include modifiers as needed. In general, descriptive modifiers (like “18% Cover of”) go before the modified component, but “additional information” modifiers (like co-occurring elements) go after the modified component.
7. Capitalize CMECS classifier units and modifier units

Examples from the CMECS Gallery of Images (CMECS document, Appendix I):

Appendix I of the CMECS document provides examples of how selected landscapes would be characterized using units from multiple CMECS components. Included with each example is how those individual units would be aggregated to a CMECS sentence. The CMECS Code (Version 20140619) is also included with the sentence.

Example 1: Key West, Florida



Image: C. Moses

Biogeographic Setting

Realm: Tropical Atlantic

Province: Tropical Northwestern Atlantic

Ecoregion: Floridian

Water Column Component:

Water Column Layer: Marine Nearshore
Lower Water Column

Salinity Regime: Euhaline Water

Temperature Regime: Warm Water

Aquatic Setting:

System: Marine

Subsystem: Marine Nearshore

Tidal Zone: Marine Nearshore Subtidal

Geoform Component:

Tectonic Setting: Passive Continental Margin

Physiographic Setting: Barrier Reef

Geoform Origin: Biogenic

Level 1 Geoform: Shallow/Mesophotic Coral Reef

Level 1 Geoform Type: Patch Coral Reef

Level 2 Geoform: Lagoon

Level 2 Geoform Type: Aggregate Patch Coral Reef

Biotic Component:

Biotic Setting: Benthic/Attached Biota

Biotic Class: Reef Biota

Biotic Subclass: Shallow/Mesophotic Coral Reef Biota

Biotic Group: Massive Coral Reef

Biotic Community: Massive *Montastraea* Reef

Substrate Component:

Substrate Origin: Biogenic Substrate

Substrate Class: Coral Substrate

Substrate Subclass: Coral Reef Substrate

Modifier: Layering: Sand Veneer

**CMECS Code and Sentence: E4.1.4|A3.1.1|B2.1.2.5.2|S2.2.1
Gg1.32g2.5.9|Ws5t7**

Floridian Nearshore Subtidal; Massive *Montastrea* Patch Coral Reef with Sand Veneer in a Lagoon in Euhaline Very Warm Water

Example 2: Narragansett Bay, Rhode Island



Image: G. Cicchetti

Biogeographic Setting:

Realm: Temperate North Atlantic

Province: Cold Temperate Northwest Atlantic

Ecoregion: Virginian

Water Column Component:

Water Column Layer: Estuarine Coastal Lower Water Column

Salinity Regime: Upper Polyhaline Water

Temperature Regime: Moderate Water

Aquatic Setting:

System: Estuarine

Subsystem: Estuarine Coastal

Tidal Zone: Estuarine Subtidal

Geoform Component:

Tectonic Setting: Passive Continental Margin

Physiographic Setting: Embayment/Bay

Geoform Origin: Geologic

Level 1 Geoform: Cove

Level 1 Geoform Type: Mainland Cove

Substrate Component:

Substrate Origin: Geologic Substrate

Substrate Class: Unconsolidated Mineral Substrate

Substrate Subclass: Fine Unconsolidated Substrate

Substrate Group: Sandy Mud

Biotic Component:

Biotic Setting: Benthic/Attached Biota

Biotic Class: Aquatic Vegetation Bed

Biotic Subclass: Benthic Macroalgae

Biotic Group: Filamentous Algal Bed

Biotic Community: Filamentous *Aghardiella* Communities

Co-occurring Element: Sheet Algal Bed: *Ulva* Communities

**CMECS Code and Sentence: E2.1.3|A2.1.1|B2.5.1.4.1
|S1.2.2.4|Gg1.11.2|Ws4t4 with co-occurring B2.5.1.7.4**

Virginian Estuarine Coastal Subtidal; Filamentous *Aghardiella* Communities with co-occurring *Ulva* Communities on Sandy Mud in a Mainland Cove in Upper Polyhaline Moderate Water.

Example 3: Punta Cana, Dominican Republic



Image: G. Cicchetti

Biogeographic Setting:

Realm: Tropical Atlantic

Province: Tropical Northwestern Atlantic

Ecoregion: Greater Antilles

Water Column Component:

Water Column Layer: Marine Nearshore
Lower Water Column

Salinity Regime: Euhaline Water

Temperature Regime: Very Warm Water

Aquatic Setting:

System: Marine

Subsystem: Marine Nearshore

Tidal Zone: Marine Nearshore Subtidal

Geoform Component:

Tectonic Setting: Passive Continental Margin

Physiographic Setting: Continental/Island Shore Complex

Geoform Origin: Geological/Anthropogenic

Level 1 Geoform: Shoal

Level 2 Geoform: Wreck

Biotic Component

Biotic Setting: Benthic/Attached Biota

Biotic Class: Aquatic Vegetation Bed

Biotic Subclass: Benthic Macroalgae

Biotic Group: Leathery/Leafy Algal Bed

Associated Taxa: Sergeant Majors (*Abudefduf saxatilis*)

Substrate Component:

Substrate Origin: Anthropogenic Substrate

Substrate Class: Metal

Substrate Subclass: Metal Reef Substrate

CMECS Code and Sentence: E4.1.2|A3.1.1|B2.5.1.5.1|S3.4.1|Gg3.38 |Ws5t7| with associated *Abudefduf saxatilis*

Greater Antilles Nearshore Subtidal; Leathery/Leafy Algal Bed on Metal Reef Wreck in Very Warm Euhaline Water with Associated Taxa *Abudefduf saxatilis*

Example 4: Long Beach Harbor, California



Image: G. Cicchetti

Biogeographic Setting:

Realm: Temperate Northern Pacific

Province: Cold Temperate Northeast Pacific

Ecoregion: Southern California Bight

Water Column Component:

Water Column Layer: Marine Nearshore
Lower Water Column

Salinity Regime: Euhaline Water

Temperature Regime: Cool Water

Aquatic Setting:

System: Marine

Subsystem: Marine Nearshore

Tidal Zone: Marine Nearshore Subtidal

Geoform Component:

Tectonic Setting: Convergent Active
Continental Margin

Physiographic Setting: Continental/Island
Shore Complex

Geoform Origin: Anthropogenic

Level 1 Geoform: Harbor

Biotic Component

Biotic Setting: Benthic/Attached Biota

Biotic Class: Faunal Bed

Biotic Subclass: Soft Sediment Fauna

Biotic Group: Larger Deep-Burrowing Fauna

Co-occurring Element: Small Surface-
Burrowing Fauna

Substrate Component:

Substrate Origin: Geologic Substrate

Substrate Class: Unconsolidated Mineral
Substrate

Substrate Subclass: Fine Unconsolidated
Substrate

Substrate Group: Sandy Mud

**CMECS Code and Sentence: E3.1.8|A3.1.1|B2.2.2.1|S1.2.2.4|G3.21|Ws5t4
with co-occurring B2.2.2.2**

**Southern California Bight Nearshore Subtidal; Larger Deep-Burrowing Fauna
with co-occurring Small Surface-Burrowing Fauna on Sandy Mud in a Harbor in
Euhaline Cool Water**

Example 5: York River, Lower Chesapeake Bay, Virginia



Image: G. Cicchetti

Biogeographic Setting:

Realm: Temperate North Atlantic

Province: Cold Temperate Northwest
Atlantic

Ecoregion: Virginian

Water Column Component:

Not Applicable in Intertidal Zone

Aquatic Setting:

System: Estuarine

Subsystem: Estuarine Coastal

Tidal Zone: Estuarine Coastal Intertidal

Geoform Component:

Tectonic Setting: Passive Continental Margin

Physiographic Setting: Riverine Estuary

Geoform Origin: Geologic

Level 1 Geoform: Marsh Platform

Level 2 Geoform: Channel

Level 2 Geoform Type: Tidal Creek

Biotic Component

Biotic Setting: Benthic/attached Biota

Biotic Class: Emergent Wetland

Biotic Subclass: Emergent Tidal Marsh

Biotic Group: Low and Intermediate Salt Marsh

Biotic Community: *Spartina alterniflora* Virginian Zone Herbaceous Vegetation

Substrate Component:

Substrate Origin: Geologic Substrate

Substrate Class: Unconsolidated Mineral Substrate

Substrate Subclass: Fine Unconsolidated Substrate

Substrate Group: Muddy Sand

CMECS Code and Sentence: E2.1.3|A2.1.2|B2.6.1.4.19|S1.2.2.3|Gg1.9.4

Estuarine Coastal Intertidal; *Spartina alterniflora* Virginian Zone* Herbaceous Vegetation on Muddy Sand Tidal Creek

* Biogeographic setting reflected in the name of the Biotic Community

Example 6: Buzzards Bay, Massachusetts



Image: G. Cicchetti

Biogeographic Setting:

Realm: Temperate North Atlantic

Province: Cold Temperate Northwest
Atlantic

Ecoregion: Virginian

Aquatic Setting:

System: Estuarine

Subsystem: Estuarine Coastal

Tidal Zone: Estuarine Intertidal

Water Column Component:

Not Applicable in Intertidal Zone

Geoform Component:

Tectonic Setting: Passive Continental Margin

Physiographic Setting: Embayment/Bay

Geoform Origin: Geologic

Level 1 Geoform: Cove

Level 1 Geoform Type: Mainland Cove

Level 2 Geoform: Beach

Level 2 Geoform Type: Wave-dominated Beach

Biotic Component:

Biotic Setting: Benthic/Attached Biota

Biotic Class: Faunal Bed

Biotic Subclass: Attached Fauna

Biotic Group: Barnacles

Biotic Community: *Semibalanus balanoides* Communities

Co-occurring Element: Mobile Gastropods: *Littorina littorea*

Substrate Component:

Substrate Origin: Geologic Substrate

Substrate Class: Unconsolidated Mineral Substrate

Substrate Subclass: Coarse Unconsolidated Substrate

Substrate Group: Gravel

Substrate Subgroup: Cobble

Co-occurring Element: Sand (< 20%)

CMECS Code and Sentence: E2.1.3|A2.1.2|S1.2.1.1.2|B2.2.1.6.1|Gg1.5.6 with co-occurring B2.2.1.18.2

Virginian Estuarine Coastal Intertidal *Semibalanus balandoides* Communities on Cobble Substrate Wave-Dominated Beach with co-occurring *Littorina* Communities (*Littorina littorea*)