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Revising the marine section of the EUNIS Habitat classification

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Report of a workshop held at the European Topic Centre on Biological Diversity, 12 & 13 May 2016

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Revising the marine section of the EUNIS Habitat classification – report of a workshop held at the European Topic Centre on Biological Diversity, 12 & 13 May 2016

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Introduction

The EUNIS habitats classification has been developed since the mid-1990s and has not changed significantly since 2004. In October 2011 the European Environment Agency held a meeting to discuss the classification and it was agreed that a revision was necessary, particularly for the marine component. An expert workshop held in November 2013 agreed the principles for a revision leading to a revised classification which was the subject of an EIONET based consultation with interested parties in summer 2015. The classification was further revised to take into account comments received during the consultation but for several issues there had been conflicting comments which needed resolving before the revision could be completed. To address these issues the ETC/BD organised a workshop on the 12 and 13 May 2016.

The meeting started with several short presentations summarising the results from the consultation and introducing a number of issues to be discussed, these are available on the EIONET forum.

Regions

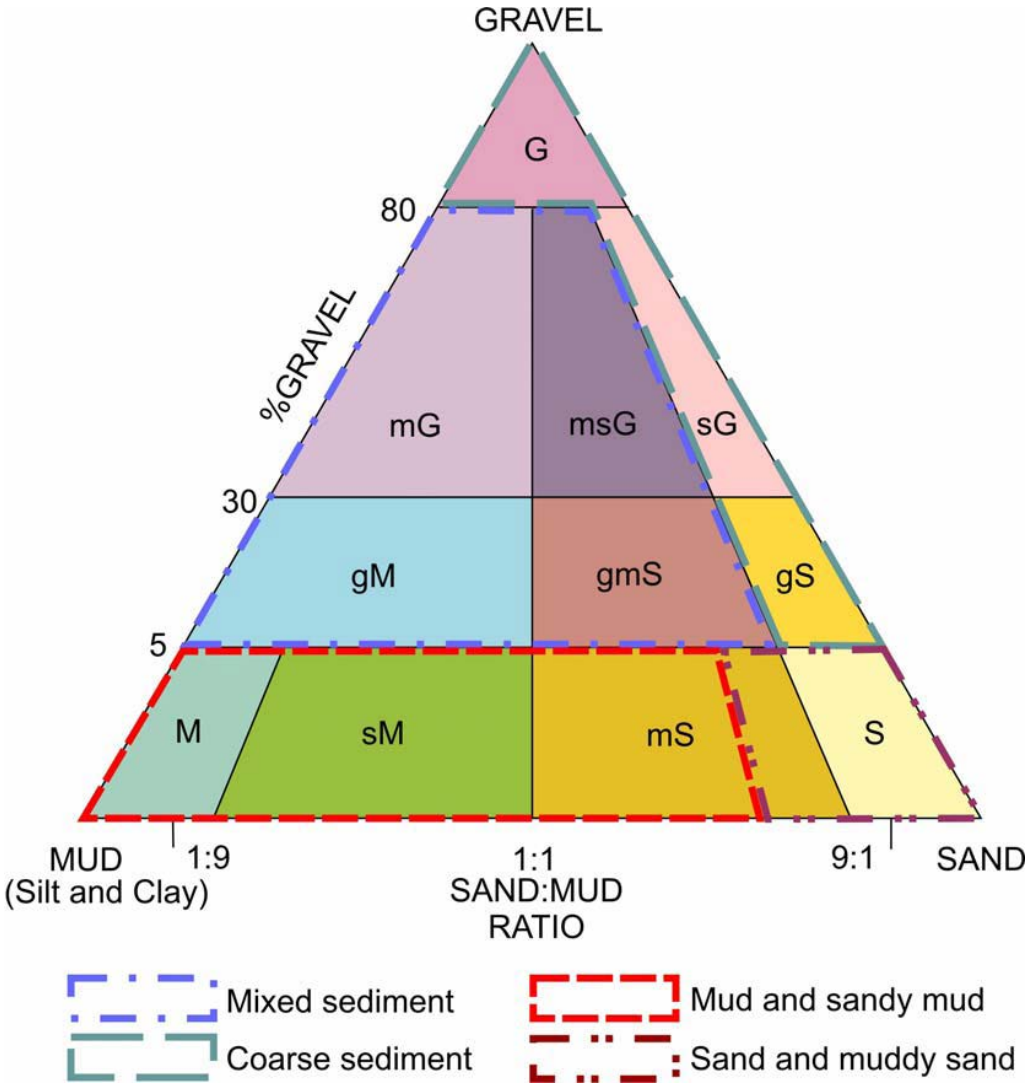
At present the classification recognises four regions at level 3 – Atlantic, Baltic, Black Sea and Mediterranean, each associated with a marine convention (Ospar, Helcom, Black Sea and Barcelona). However there were requests to also recognise a Macaronesian region to include seas around the Azores and Canary Islands arguing that it is a distinct biogeographical region.

It was agreed not to accept an additional region at level 3 but to recognise the region at level 4 where appropriate.

Sediment classes

The sediment classes in the EUNIS classification are 'coarse', 'sand & muddy sand', 'mud' and 'mixed' and these are defined in footnotes to the level 3 criteria for A2 and A5[1]. For mapping projects such as EUSeaMap these have been mapped onto the widely used Folk triangle as in Figure 1. There have been suggestions to change the sediment classes (e.g. Coggan, Pearce & James 2012) but these are based on limited studies and it is not clear they are valid across all European seas and it was agreed not to change the sediment classes or their definitions. Further work may justify a change in the future.

Figure 1: Modified Folk triangle and sediment classes for the EUNIS habitats classification



Source: Long 2006

[1] "Habitats are divided on the basis of the dominating particle size of the substrate. **Gravel or coarse sand** > 1 mm grain size (including shingle and mobile cobbles); **fine sand or muddy sand** <= 1 mm with <=30% silt (less than 0.063 mm grain size); **mud** >30% less than 0.063 mm grain size; **combination of substrates** – veneers or intimate mixtures of mobile substrates with different particle size" (Davies, Moss & Hill 2004)

Depth zones

Biogenic habitats

These are habitats where animals, or more rarely plants, form a hard substrate for other organisms are included with rocky substrates in a 'hard/firm' group. It was agreed that such habitats only occur when other organisms are effectively growing on the substrate forming species rather than the underlying sediment. Typical examples would include mussel beds, corralligenous concretions and *Posidonia* meadows. Maerl beds, formed by red algae such as *Phymatolithon calcareum* and *Lithothamnion glaciale do not form a hard continuous layer and are considered as sediments.*

As with other habitat types, scale is important and the following text from Davies, Hill & Moss (2004) is relevant here

"In general, the scale selected for the EUNIS habitat classification is that occupied by small vertebrates, large invertebrates, and vascular plants. It is the same as that generally adopted by other European-scale typologies, for example by the Palaearctic habitat classification (Devillers & Devillers-Terschuren, 1996) and is comparable to the scale applied to the classification of vegetation in traditional phytosociology. All but the smallest EUNIS habitats occupy at least 100 m2; there is no upper limit to the scale of the largest."

Mixed hard and soft substrates

Helcom have asked that a substrate class for mixed hard and soft substrates is added, citing problems with habitat mapping as a reason. However it seems that this is a mosaic of habitats rather than a distinct habitat in its own right and should be considered as a subset of rocky substrates. There are similar issues with scale and how best to map mosaics with other habitats including terrestrial and freshwater.

Other habitats

The current structure of EUNIS at level 2 includes an 'Other habitats' class which includes seamounts, canyons and other geomorphological features together with anoxic zones. It was agreed that geomorphological features are not habitats in the sense of the EUNIS habitats classification although they could possibly be included in section X Habitat complexes (Estuaries are already included as X01).

The structure of level 2

It had been agreed in Copenhagen that level 2 of the marine classification should be based on biological zone and substrate type.

Each combination of depth zone and substrate type (e.g. MC5-circalittoral sand) supports a characteristic suite of plant and/or animal communities. The change in biological characteristics across these depth zones is strongly influenced by a variety of physical and hydrological factors, such as light penetration, wave action, temperature regime and salinity regime, which can be used to characterise and model the distribution of each zone; the relevant factors typically differ between rock and sediment habitats, and may differ between marine regions of Europe.

However the comments received during the consultations showed that there are disagreements about which zones to include at level 2 and how to define them. The scheme shown in table 1 was agreed as the best way forward due to it being compatible with the

largest number of approaches to benthic habitat classification already in use at both national and regional scale.

Table 1: Level 2 units of the marine component of the revised EUNIS habitats classification, including proposed level 2 codes

			Hard/firm		Soft			
			Rock*	Biogenic habitat**	Coarse	Mixed	Sand	Mud
Depth Zones	Phytal gradient/ hydrodynamic gradient	Littoral	MA1	MA2	MA3	MA4	MA5	MA6
		Infralittoral	MB1	MB2	MB3	MB4	MB5	MB6
		Circalittoral	MC1	MC2	MC3	MC4	MC5	MC6
	Aphytal/ hydodynamic gradient	Offshore circalittoral	MD1	MD2	MD3	MD4	MD5	MD6
		Upper bathyal	ME1	ME2	ME3	ME4	ME5	ME6
		Lower bathyal	MF1	MF2	MF3	MF4	MF5	MF6
		Abyssal	MG1	MG2	MG3	MG4	MG5	MG6

* Includes soft rock, marls, clays, artificial hard substrata
** Biogenic habitat formed by plants or animals

Further divisions, for example into upper and lower circalittoral are possible at level 4.

However these zones haves been defined differently by various authors and there does not appear to be a single, agreed set of definitions which EUNIS can refer to which would be valid for all substrates and across all Europe's seas. The two factors most frequently used are light intensity and wave action.

The following are suggested for use by EUNIS, to varying extents they are simplifications but should be workable in most situations. It should be remembered that EUNIS is based on biological zones rather than physical zones.

Littoral – the shore area or intertidal zone, where periodic exposure and submersion by tides is normal, or in non-tidal marine ecosystems, habitats which are normally water-covered but

intermittently exposed due to the action of wind or atmospheric pressure changes (see hydrolittoral). It can include the splash zone, rockpools and (relatively) waterlogged saltmarshes (soft substrata) and saline or brackish pools found in the supralittoral zone above the mean water level in non-tidal waters or above the spring high tide limit in tidal waters. Since the precise physical limits of tidal range vary constantly, a biological definition of the zone, which essentially reflects typical physical conditions rather than more rarely experienced events, is generally more useful. Thus in Britain, for example, the littoral zone for rock and hard substrata includes the splash zone and is defined as the region between the upper limit of species of the seaweed *Laminaria* and the upper limit of *Littorina* (periwinkles) or of the lichen Verrucaria. (Taken from Davies, Moss & Hill 2004).

Infralittoral – Sufficient light for vascular plants such as *Posidonia oceanica* and *Zostera* spp and green algae to grow and they are often dominant. The lower limit has traditionally been considered to coincide with 1% light penetration.

"Shallow sub-tidal or non-tidal water below the mean water level, wave disturbed or algal dominated or within the euphotic zone" in Davies, Moss & Hill 2004

Circalittoral – Insufficient light for vascular plants and green algae but red and brown algae can grow and they may be dominant although usually this zone is dominated by fauna. The light penetration which coincides with the lower limit of the circalittoral, and which is marked by the growth limit of red crustose coralline algae, varies between authors and studies but is typically 0.01% or smaller.

"Sub-tidal or non-tidal water, with insufficient light penetration to allow algae to dominate. May have some wave action, and tidal currents may exert a strong influence" in Davies, Moss & Hill 2004.

Offshore circalittoral – In some classifications this is called 'Deep circalittoral' or 'Deep shelf'. Insufficient light for photosynthesis and with little variation in temperature.

Bathyal – This zone corresponds to the continental slope between the edge of continental shelf (typically at 180-200m depth) and the abyssal plain. The 'shelf break' is typically at 180-200 m depth. This zone has been subdivided into upper and lower

"The oceanic zone at depths of 200-2000 m, lying to seaward of the shallower neritic zone, and landward of the deeper abyssal zone. The upper limit of the bathyal zone is marked by the edge of the continental shelf. In marine ecology, it is the region of the continental slope and rise. It may be geologically active, and includes trenches and submarine canyons, with under-water erosion producing avalanches in" Davies, Moss & Hill 2004.

Abyssal – the plain below the continental shelf.

"Applied to the deepest part of the ocean, below about 2000 m. The abyssal zone lies seaward of, and deeper than, the bathyal zone, and covers approximately 75% of the ocean floor. It is the most extensive Earth environment, cold, dark, with slow-moving currents (less than a few centimetres per second), supporting fauna that are typically black or grey, delicately structures and not streamlined" in Davies, Moss & Hill 2004.

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