

The EUNIS Habitat Classification

SUMMARY

The EUNIS habitat classification has been developed on behalf of the European Environment Agency to facilitate description of marine and terrestrial European habitats through the use of criteria for habitat identification. It is a broadly-based hierarchical classification which provides an easily understood common language for habitats. It builds on earlier initiatives (CORINE and Palaeartic habitat classifications) and incorporates existing classifications used by European marine Conventions and the EU-funded BioMar project with cross-references to these and other systems. It is recognised that detailed biotopes from some marine regions are poorly represented and that EUNIS will need to be expanded to cover this wider geographic area. Most of the additions will probably be made at hierarchical level 5 (where the distinct BioMar and Mediterranean units are now held). Changes and additions to the classification will only be made following detailed consultation with experts. A key to the habitat units at each of the first three levels is incorporated and the classification is linked to a parameter-based database to describe specific habitats. The present draft of the EUNIS habitat classification was completed in November 1999 and is expected to remain stable for a time to allow validation and testing through field trials and descriptive parameters to be compiled.

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INTRODUCTION

The European Environment Agency (EEA) Topic Centre on Nature Conservation (ETC/NC) is developing a European Nature Information System, EUNIS, which has two main aims: to facilitate use of data by promoting harmonisation of terminology and definitions and to be a reservoir of information on European environmentally important matters. EUNIS consists of a central unit integrating data models on species, habitats and sites, several secondary databases which are managed by different partners and an increasing number of satellite databases. Since its inception, the EEA has worked towards developing a common parameter-based European habitat classification frame to describe European habitat types. The EUNIS Habitat classification is an integral part of the EUNIS nature information system..

The EUNIS habitat classification will provide an easily understood common language for the description of marine and terrestrial European habitats. Dictionary definitions of “habitat” stress the linking of abiotic and biotic features, for example, the New Shorter Oxford English Dictionary (1993) defines habitat as “an area distinguished by the set of organisms which occupy it”; and the Concise Oxford Dictionary of Ecology (1994) as “the living place of an organism or community (“any grouping of populations of different organisms found together in a particular environment”) characterised by its physical or biotic properties”. For legislative purposes, the Habitats Directive, (European Communities, 1992) defines natural habitats as “terrestrial or aquatic areas distinguished by geographic, abiotic and biotic features, whether entirely natural or semi-natural” and the habitat of a species as “an environment defined by specific abiotic and biotic factors, in which the species lives at any stage of its biological cycle”. These definitions imply that a habitat applies to each individual species or community. For practical purposes it is necessary to seek some generalisation since it is not useful to consider every possible species or community. The scale of organisms and of the environmental units in which they occur is intrinsic to the definition of habitat, which therefore is defined for the purposes of the EUNIS habitat classification as plant and animal communities as the characterising elements of the biotic environment, together with abiotic factors (e.g. in the marine environment, substrate, climatic factors, exposure and salinity etc.) operating together at a particular scale. The factors included in the definition should therefore all be addressed in the descriptive framework of the habitat classification.

The EEA made the decision in 1996 to base the habitat classification for EUNIS on the Palaearctic habitat classification (Devillers & Devillers-Terschuren, 1996) which had been developed as a successor to the CORINE habitat classification (European Communities, 1991). The EUNIS classification has developed through a number of revisions following experts’ working groups, and consultations with experts over the period June 1996 - September 1999. It was recognised that the classification of marine habitats in the Palaearctic classification was very poorly worked and this part of the classification has been supplemented (and largely superseded) with information derived from the BioMar project (Connor *et al* 1997) and Mediterranean units as defined for the Barcelona Convention marine habitat classification (UNEP, 1998). At the same time, the Oslo and Paris conventions on marine pollution (OSPAR) and the International Council for the Exploration of the Sea (ICES) had defined a need for a classification of marine habitats and subsequently agreed that this should be based on the EUNIS classification.

A major revision of the marine units and criteria was undertaken in November 1998. The present draft of the EUNIS habitat classification was completed in November 1999 and is expected to remain stable for a time to allow validation and testing through field trials and descriptive parameters to be compiled.

METHODS

Aims and requirements

The habitat classification:

- i) should provide a common and easily understood language for the description of all marine, freshwater and terrestrial habitats throughout Europe
- ii) should be objective and scientifically based, with clear definitions and principles
- iii) information should be held in a relational database allowing interrogation based on a number of parameters
- iv) should seek as far as possible to achieve a consensus amongst those concerned with habitat classification as developers or users
- v) should be comprehensive, but applicable at a number of hierarchical levels of complexity in recognition of the variety of its applications
- vi) should be flexible so as to evolve and allow the admission of new information, but also sufficiently stable to support users of its predecessors.

Geographical coverage

The geographical scope of the classification should be pan-Europe, defined in the same way as in the EEA's Dobris Report (Stanners & Bourdeau, 1995), i.e. the European mainland as far east as the Ural Mountains, including offshore islands (Cyprus; Iceland but not Greenland), and the archipelagos of the European Union Member States (Canary Islands, Madeira and the Azores). Anatolian Turkey and the Caucasus are included in most parts of Dobris and should be included in the classification. The marine area to be covered includes the North-east Atlantic Ocean including the North Sea, Denmark Strait, the Norwegian Sea and the western parts of the Barents Sea, and the Baltic, Mediterranean and Black Seas. The marine area should be extended to cover the whole OSPAR area.

Scale

The scale proposed 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 the Palaeartic habitat classification. Samples of between 1 m² and 100 m² will generally be adequate to categorise habitats. At the smaller scale, "microhabitats" (features generally occupying less than 1 m² which are characteristic of certain habitat types and important for some smaller invertebrates and lower plants) can be described. Examples are decaying wood, found on shore lines or occasional boulders lying on a sedimentary substrate. At the larger scale, habitats can be grouped as "habitat complexes", which are frequently occurring combinations or mosaics of individual habitat types, usually occupying at least 10 ha, which may be inter-dependent. Estuaries, combining tidal water, mud flats, saltmarshes and other littoral habitats, are a good example.

Principles of the classification

A number of principles were agreed at the start of the development of the classification, in particular that there should be clear biotic and abiotic criteria for each division, but that these should not be imposed uniformly across the classification. For marine units the primary criteria are the ecological or biogeographical factors determining plant and animal communities (such as substratum type, exposure and water depth) leading towards the dominant plant and/or animal communities. It was also agreed that habitats within a particular branch of the hierarchy should be

ordered following a logical sequence when possible, e.g. depending on levels of a particular abiotic factor such as salinity, exposure or depth.

Process of development

The method used to develop the EUNIS habitat classification has been to incorporate, and where necessary restructure and supplement, existing classifications following the criteria-based principles stated above and maintaining an hierarchical structure. Work completed prior to the end of 1998 chiefly concerned terrestrial habitats. The first main revision of marine units and criteria was based on the BioMar Classification and followed a marine experts' meeting in October 1998 (Davies & Moss, 1998). Subsequently the whole of the BioMar classification (Connor *et al*, 1997) was incorporated at appropriate points, consistently conserving the hierarchy found in BioMar. Confirmation of the links between the two classifications was sought through David Connor and amendments made where necessary. Mediterranean marine habitats units, as defined for the Barcelona Convention marine habitat classification (UNEP, 1998), were included in consultation with Denise Bellan-Santini and Gérard Bellan. These are additional to Mediterranean marine units from the Palaearctic habitat classification. Work has also been carried out to incorporate, where possible, units defined for the HELCOM Convention (Helsinki Commission, 1998).

In September 1999 a workshop was convened by the Joint Nature Conservation Committee (UK) on behalf of OSPAR, ICES and the EEA to discuss marine habitat classification and to agree a classification for use in the OSPAR region (OSPAR Commission, 1999). Significant amendments to the sublittoral parts of the EUNIS classification were suggested at the OSPAR workshop and have been incorporated where appropriate. The pelagic zone of marine waters was revised following discussions with individuals but this part of the classification was not validated by the workshop. It is recognised that detailed biotopes from some marine regions are poorly represented and that EUNIS will need to be expanded to cover the wider geographic area. Most additions to the classification will probably be made at hierarchical level 5 (where the distinct BioMar and Mediterranean units are now held) but these will only be made following detailed consultation with the relevant experts. A further workshop is planned for September 2000 to continue the process of development.

Criteria diagrams

In accordance with the principles outlined above, criteria for separating habitats at each hierarchical level from 1 to 3 have been defined to produce a key to habitat types. Criteria have been defined also for units at level 4 in the case of saltmarshes. The criteria are presented in the form of 'decision diagrams' with a visual representation for the paths to be followed. Each grey 'decision box' is accompanied by detailed explanatory notes to explain how the box is to be applied, and these form an integral and essential part of the criteria.

Web application

The Web-based application allows the classification to be accessed in a variety of ways. There is an interactive presentation of the criteria, allowing the user starting at the top level to step through the criteria box by box to the required unit, with the option of displaying information about the habitat type at each level or proceeding through the key to the next lower level. The user may also view the criteria boxes page by page. Alternatively, a user may enter the key at any point down the hierarchy. The criteria diagrams may also be accessed as static pages. The classification list may be viewed at the appropriate level of detail with the option to display information about the habitat units at each level. A glossary of terms is included to aid the interpretation of terminology in the classification.

RESULTS

The EUNIS Habitat Classification to level 3 and relationship to other national and international habitat classifications

Ten level 1 habitat units have been defined and descriptions of these broad units compiled (Table 1).

The scope of the EUNIS classification at present is limited to its level 3. The intention is that the classification of marine habitats should be agreed to level 4 based on contributing units from other classifications, combined and supplemented as necessary. One of the principles of the classification is that cross-reference to other national and international habitat or vegetation classifications and other systems such as land cover will be established explicitly in the parameter framework. Where units from these classifications are lower than level 3 in the hierarchy they may also be listed at the next lower levels so as to clarify the scope of EUNIS level 3. An extract from the classification is presented in Annex A with 4-character EUNIS codes for Marine units (A), but it should be noted that the level 4 units are not as yet part of the EUNIS classification. Coastal habitats (B) are presented to level 3 and the remaining level 1 units to level 2. Examples of the correspondence, to level 4, between the EUNIS habitat classification (October 1999 version) and BioMar, Barcelona and HELCOM Classifications are appended (Annex B). The component level 4 units act as an indication of how EUNIS can combine other classification systems in a common framework. A full list of cross-references, including those at lower levels and those between EUNIS and other habitat classifications is published separately (Moss & Davies, 1999).

Key to the classification

Criteria diagrams for level 1 and for units A and B to level 2 are presented (figures 1 -3). Criteria are presented with additional detailed explanatory notes accompanying each grey 'decision box'. These notes explain how the box is to be applied, and form an integral and essential part of the criteria. For Levels 1 and 2, the notes follow the diagrams after each level and are numbered sequentially across levels 1 - 2. For Level 3 criteria, the notes are numbered sequentially within each Level 1 unit with the appropriate lower case letter preceding the number (e.g. a1 is the first note for criteria for Marine Level 3 units). Criteria have been developed for all units to level 3 and an example of a level 2 units is presented to level 3 (figure 4). Criteria have also been developed for salt marshes at level 4 (figure 5). The complete key is available on the Web pages and in Davies & Moss (1999). A glossary of terms to aid in the interpretation of terminology in the classification may be found in both these publications.

Table 1. Description of the content of level 1 habitat units

A Marine habitats

Marine habitats are directly connected to the oceans, i.e. part of the continuous body of water which covers the greater part of the earth's surface and which surround its land masses. Marine waters may be fully saline, brackish or almost fresh. Marine habitats include those below spring high tide limit (or below mean water level in non-tidal waters) and enclosed coastal saline or brackish waters, without a permanent surface connection to the sea but either with intermittent surface or sub-surface connections (as in lagoons). Rockpools in the supralittoral zone are considered as enclaves of the marine zone. Includes marine littoral habitats which are subject to wet and dry periods on a tidal cycle including tidal saltmarshes; marine littoral habitats which are normally water-covered but intermittently exposed due to the action of wind or atmospheric pressure changes; freshly deposited marine strandlines characterised by marine invertebrates. Waterlogged littoral zones above the mean water level in non-tidal waters or above the spring high tide limit in tidal waters are included with marine habitats. Includes constructed marine saline habitats below water level as defined above (such as in marinas, harbours, etc) which support a semi-natural community of both plants and animals. The marine water column includes bodies of ice.

B Coastal habitats

Coastal habitats are those above spring high tide limit (or above mean water level in non-tidal waters) occupying coastal features and characterised by their proximity to the sea, including coastal dunes and wooded coastal dunes, beaches and cliffs. Includes free-draining supralittoral habitats adjacent to marine habitats which are normally only affected by spray or splash, strandlines characterised by terrestrial invertebrates and moist and wet coastal dune slacks. Excludes dune slack pools and rockpools.

C Inland surface water habitats

Inland surface water habitats are non-coastal above-ground open fresh or brackish waterbodies (e.g. rivers, streams, lakes and pools, springs), including their littoral zones. Also includes dune slack pools. Includes constructed inland freshwater, brackish or saline waterbodies (such as canals, ponds, etc) which support a semi-natural community of both plants and animals; normally wet habitats which may be dry seasonally (temporary or intermittent rivers and lakes and their littoral zones). Freshwater littoral zones include those parts of banks or shores which are sufficiently frequently inundated to prevent the formation of closed terrestrial vegetation. Excludes permanent snow and ice. Note that habitats which intimately combine waterlogged habitats with pools of open water are considered as complexes.

D Mire, bog and fen habitats

Habitats which are saturated, with the water table at or above ground level for at least half of the year, dominated by herbaceous or ericoid vegetation e.g. bogs, marshes. Includes waterlogged habitats where the groundwater is frozen. Excludes waterlogged habitats dominated by trees or large shrubs. Note that habitats which intimately combine waterlogged habitats with pools of open water are considered as complexes.

E Grassland and tall forb habitats

Non-coastal habitats which are dry or only seasonally wet (with the water table at or above ground level for less than half of the year) with greater than 30% vegetation cover. The dominant vegetation is grasses and other non-woody vegetation (including moss-, lichen-, fern- and sedge-dominated communities). Includes successional weedy communities and managed grasslands such as recreation fields and lawns. Does not include regularly tilled habitats dominated by cultivated herbaceous vegetation such as arable fields.

F Heathland, scrub and tundra habitats

Non-coastal habitats which are dry or only seasonally wet (with the water table at or above ground level for less than half of the year) with greater than 30% vegetation cover. The dominant vegetation is shrubs or dwarf shrubs. Includes regularly tilled shrub orchards, hedges (which may have occasional tall trees) and habitats characterised by the presence of permafrost. Also includes dwarf trees and scrub (under 50cm, such as occur in extreme alpine conditions).

G Woodland and forest habitats and other wooded land

Habitats where the dominant vegetation is, or was until very recently, trees, typically single-stemmed, and with a canopy cover of at least 10%. Includes lines of trees, coppices, and very recently clear-felled areas with pre-existing ground cover, not yet re-stocked and with no succession to weedy vegetation. Trees are normally able to reach a height of 5m at maturity but this height may be lower at high latitudes or altitudes. Tall shrubs such as hazel (*Corylus*) and some willows (*Salix*) with a woodland-type structure are treated as woodland. Includes regularly tilled tree nurseries and tree-crop plantations. Excludes dwarf trees and scrub (under 50cm) such as occur in extreme alpine conditions. Note sparsely wooded areas with canopy less than 10% , including parkland, are included in complexes.

H Inland unvegetated and sparsely vegetated habitats

Non-coastal habitats with less than 30% vegetation cover (other than where the vegetation is chasmophytic or on scree and or cliff) which are dry or only seasonally wet (with the water table at or above ground level for less than half of the year). Subterranean non-marine caves and passages including underground waters. Habitats characterised by the presence of permanent snow and surface ice other than marine ice bodies.

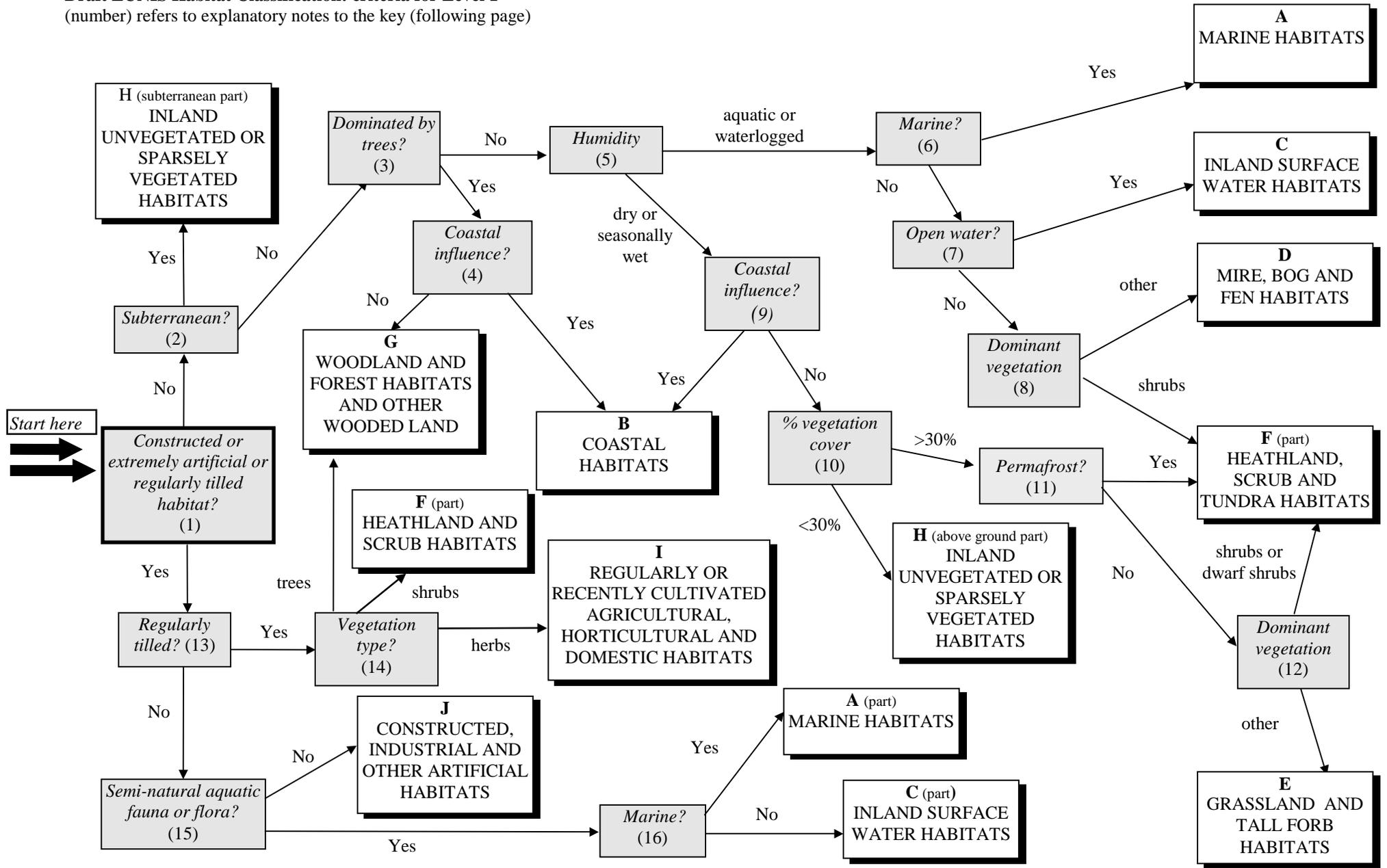
I Regularly or recently cultivated agricultural, horticultural and domestic habitats

Habitats maintained solely by frequent tilling or arising from recent abandonment of previously tilled ground such as arable land and gardens. Includes tilled ground subject to inundation. Excludes shrub orchards, tree nurseries and tree-crop plantations.

J Constructed, industrial and other artificial habitats

Primarily human settlements, buildings, industrial developments, the transport network, waste dump sites. Includes highly artificial saline and non-saline waters with wholly constructed beds or heavily contaminated water (such as industrial lagoons and saltworks) which are virtually devoid of plant and animal life.

Figure 1
Draft EUNIS Habitat Classification: criteria for Level 1
 (number) refers to explanatory notes to the key (following page)



Explanatory notes to the key: Level 1

Note: Complex habitats may not readily be located as an entity, as they comprise combinations of a number of different habitat units.

1. Is the habitat highly artificial, i.e. either constructed or with a man-made substrate; industrial; maintained solely by frequent tilling; or arising from recent abandonment of previously tilled or constructed habitats (path = *Yes*)? All other habitats follow path = *No*. Note that habitats which originated through extractive industries (quarries, mines etc) but which have been colonised by natural or semi-natural plant and/or animal communities (other than pioneer or ruderal communities) follow path = *No*.
2. The criterion separates subterranean non-marine caves and passages and underground waters (path = *Yes*).
3. Habitats where the dominant vegetation is, or was until very recently, trees, typically single-stemmed, and with a canopy cover of at least 10% are distinguished (path = *Yes*) from habitats dominated by other types of vegetation or without vegetation or dominated by animal communities. Lines of trees, coppices, and very recently clear-felled areas with pre-existing ground cover, not yet re-stocked and with no succession to weedy vegetation follow path = *Yes*. Note that successional weedy communities follow path = *No* and are categorised under E, Grassland and tall forb habitats. Hedges which may have occasional tall trees follow path = *No*, and are categorised under F, Heathland, scrub and tundra. Note also that sparsely wooded areas with canopy less than 10% , including parkland, are included in complexes. Trees are normally able to reach a height of 5m at maturity but this height may be lower at high latitudes or altitudes. Note that dwarf trees and scrub (under 50cm such as occur in extreme alpine conditions) follow path = *No*. Occasionally tall shrubs such as hazel (*Corylus*) and some willows (*Salix*) may have a woodland-type structure and follow path = *Yes*. Canopy cover 10% and height 5m are taken from the FAO TBFRA 2000 definitions (Temperate and Boreal Forest Resource Assessment 2000). It should be noted that in some areas e.g. the Boreal zone, the normal dividing point is 30%. Statistics produced at a regional scale might reflect this divergence.
4. Habitats occupying coastal features and characterised by their proximity to the sea (path = *Yes*), including coastal dunes and wooded coastal dunes, beaches and cliffs, are separated from other terrestrial habitats (path = *No*).
5. The criterion separates habitats which are either *aquatic* or *waterlogged* from those which are always *dry*, or are only *seasonally wet*. Note that the term '*aquatic*' includes: marine and fresh open water habitats; marine littoral habitats which are subject to wet and dry periods on a tidal cycle; marine littoral habitats which are normally water-covered but intermittently exposed due to the action of wind or atmospheric pressure changes; freshly deposited marine strandlines characterised by marine invertebrates; normally wet habitats which may be dry seasonally (rivers and lakes and their littoral zones); freshwater littoral zones include those parts of banks or shores which are sufficiently frequently inundated to prevent the formation of closed terrestrial vegetation. '*Waterlogged*' refers to: habitats which are saturated, with the water table at or above ground level for at least half of the year, e.g. bogs, marshes; those parts of the geolittoral zone (i.e. above the between the mean and high water mark of non-tidal marine waters) which have a high water table. The *dry or seasonally wet* path should be followed in the case of: habitats which are regularly but infrequently flooded or occasionally flooded by extreme weather conditions but which are free-draining; free-draining supralittoral habitats adjacent to marine habitats normally only affected by spray or splash; old strandlines characterised by terrestrial invertebrates; damp heaths and grasslands; moist and wet coastal dune slacks; and permanent snow and surface ice.
6. Marine habitats (path = *Yes*) are distinguished from inland saline, brackish and freshwater aquatic or waterlogged habitats, and inland artificial habitats with semi-natural fauna or flora (path = *No*). Note that marine habitats are directly connected to the oceans, i.e. part of the continuous body of water which covers the greater part of the earth's surface and which surround its land masses. Marine waters may be fully saline, brackish or almost fresh. Marine habitats include those below spring high tide limit (or below mean water level in non-tidal waters), tidal saltmarshes, and also enclosed coastal saline or brackish waters, without a permanent surface connection to the sea but either with intermittent surface or sub-surface connections (as in lagoons). Waterlogged littoral zones above the mean water level in non-tidal waters or above the spring high tide limit in tidal waters are included with marine habitats (path = *Yes*). Note also that rockpools in the supralittoral zone are considered as enclaves of the marine zone and follow the marine path.
7. Habitats with open water (e.g. rivers, streams, lakes and pools), including the littoral zones of the waterbodies (path = *Yes*), are separated from habitats with the water table permanently at or near the surface, but normally without free-standing water. Note that waterlogged habitats with integral pools of open water are considered as complexes.

8. Waterlogged terrestrial habitats are divided according to the type of dominant vegetation: *shrubs*; or *other*. Note that shrubs refers to larger species such as some willows (*Salix* spp.) but dwarf shrub species (for example ericoïd species) follow path = *other*. Note also that habitats dominated by trees (G) are separated earlier (note 3).
9. Habitats occupying coastal features and characterised by their proximity to the sea (path = *Yes*), including coastal dunes, beaches and cliffs, are separated from other terrestrial habitats (path = *No*).
10. Habitats with *less than 30%* vegetation cover are separated from those with *greater than 30%* vegetation cover. Note that chasmophytic, scree and cliff vegetation follow path = *<30%*.
11. Habitats characterised by the presence of permafrost are distinguished (path = *Yes*).
12. Dry terrestrial habitats with greater than 30% vegetation cover are divided according to the type of dominant vegetation: *shrubs or dwarf shrubs*; or *other* grasses and non-woody vegetation. Note that habitats dominated by trees (G) are separated earlier (note 3).
13. Habitats maintained solely by frequent tilling or arising from recent abandonment of previously tilled ground such as arable land and gardens (path = *Yes*) are distinguished from completely artificial habitats (path = *No*), which are primarily human settlements, industrial developments, transport or waste dump sites or highly artificial waters with wholly constructed beds or heavily contaminated water.
14. Regularly tilled habitats are separated according to dominant vegetation type: *shrub* orchards; *tree* nurseries and tree-crop plantations; and habitats dominated by cultivated herbaceous vegetation (path = *herbs*).
15. Constructed habitats which support a semi-natural aquatic fauna and flora are separated from all others. Constructed marine saline habitats below water level (such as in marinas, harbours, etc) which support a semi-natural community of both plants and animals follow path = *Yes*, but highly artificial saline habitats such as industrial lagoons and saltworks which are virtually devoid of plant and animal life follow path = *No*. Constructed inland freshwater, brackish or saline waterbodies (such as canals, ponds, etc) which support a semi-natural community of both plants and animals follow path = *Yes*, but highly artificial waters with heavily contaminated water or which are virtually devoid of plant and animal life follow path = *No*. Constructed terrestrial habitats including buildings and the transport network follow path = *No*.
16. Constructed marine habitats with semi-natural fauna or flora (path = *Yes*), are separated from inland constructed non-marine surface water habitats with semi-natural fauna or flora (path = *No*). (See note 6 for definition of marine).

Figure 2

Draft EUNIS Habitat Classification: criteria for marine habitats to Level 2

Note that the key to Level 1 shows two pathways to reach habitat type A: these are recombined here.
(number) refers to explanatory notes to the key

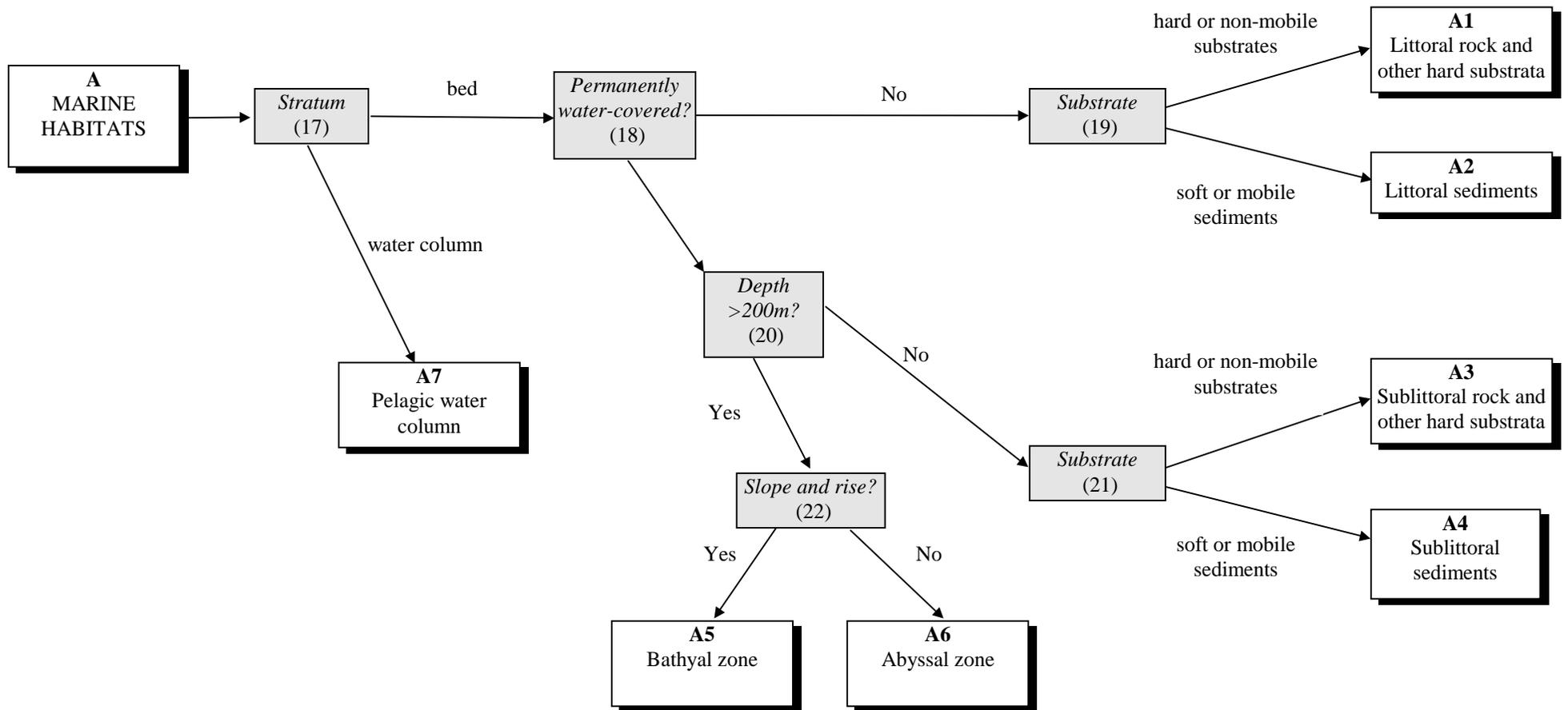


Figure 3

Draft EUNIS Habitat Classification: criteria for coastal habitats to Level 2

Note that the key to Level 1 shows two pathways to reach habitat type B: these are recombined here.

(number) refers to explanatory notes to the key (following page)

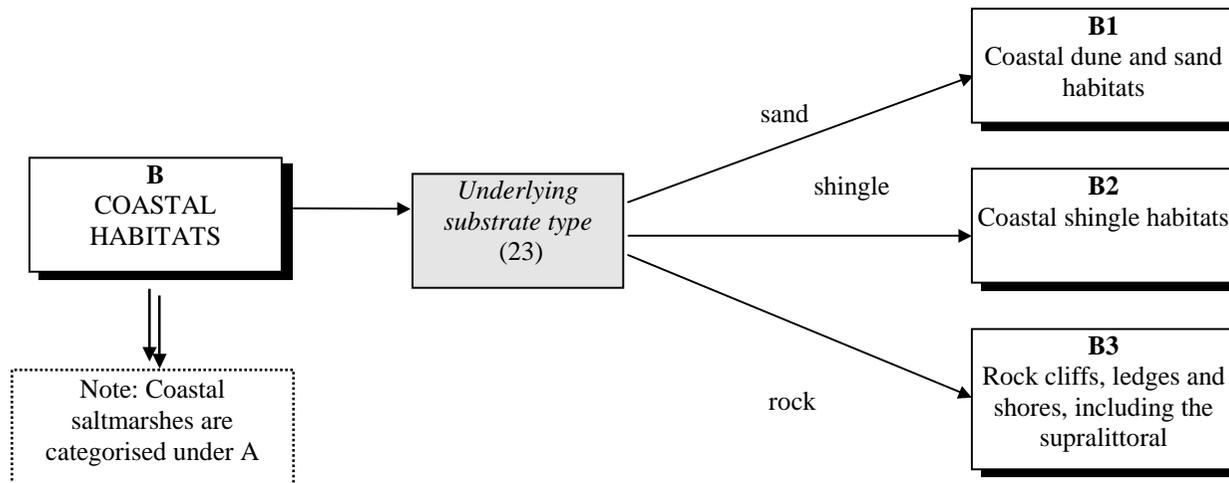


Figure 4
Draft EUNIS Habitat Classification: criteria for littoral sediments (A2) to Level 3
 (number) refers to explanatory notes to the key

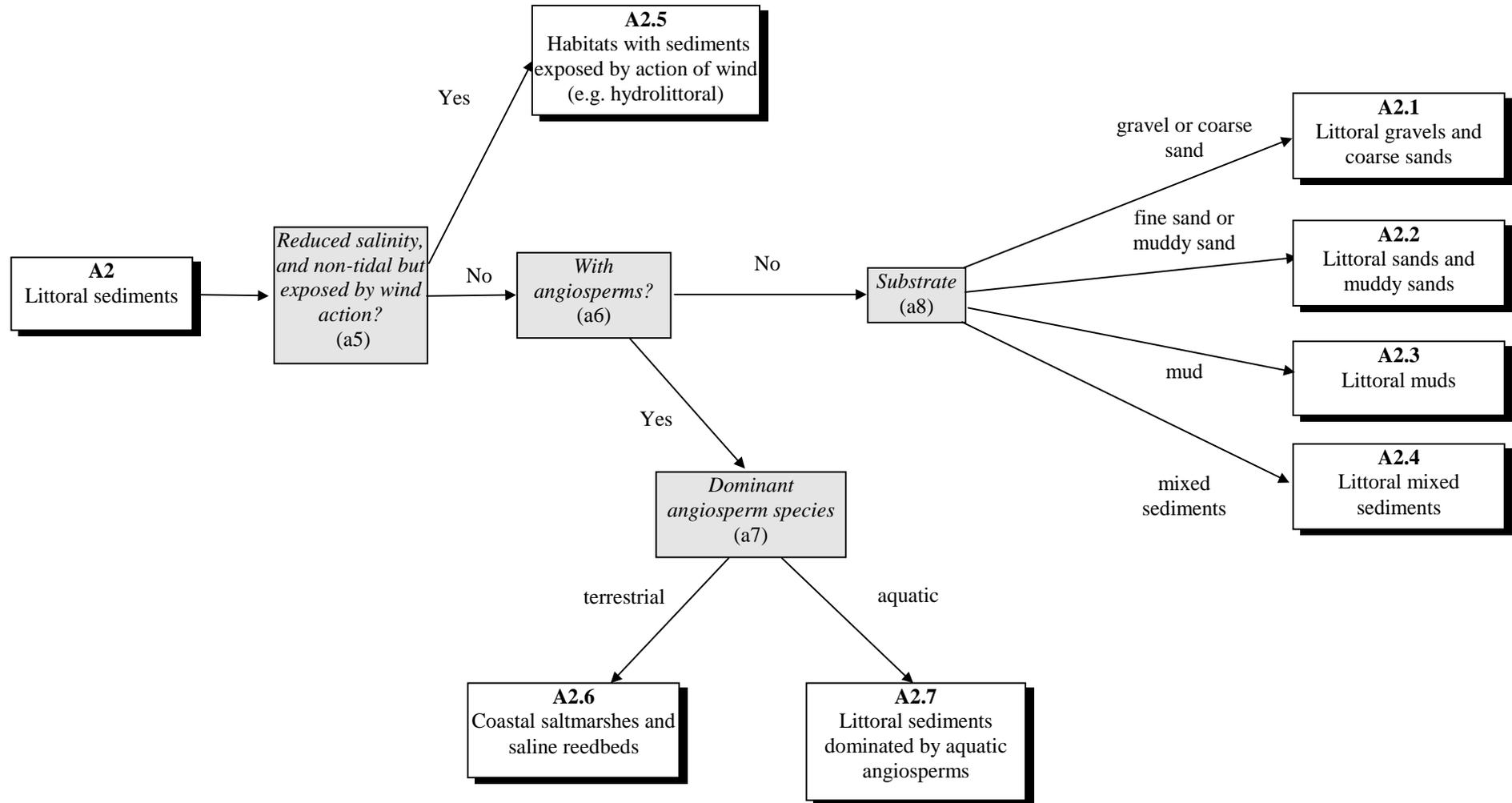
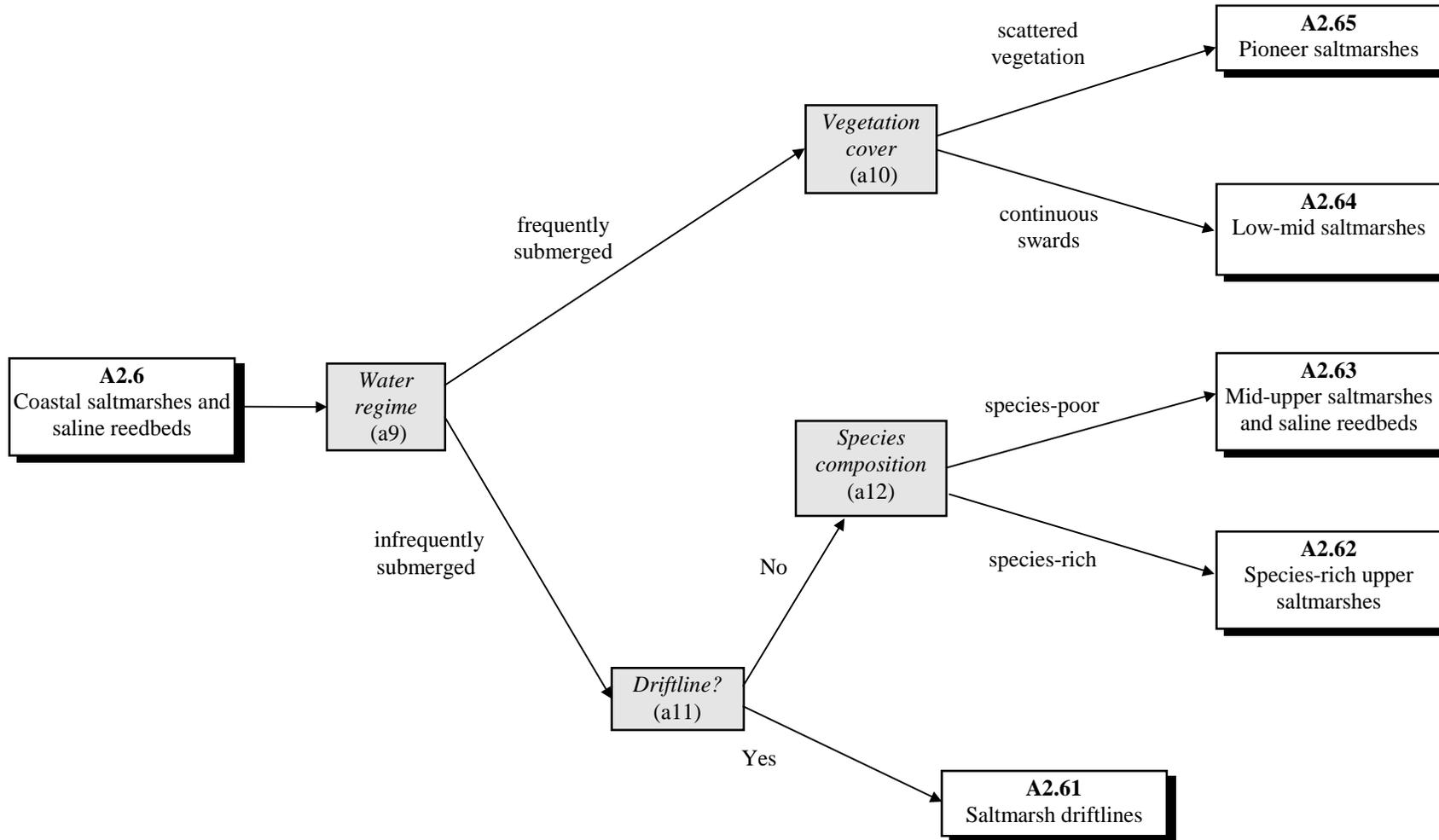


Figure 5
Draft EUNIS Habitat Classification: criteria for coastal saltmarshes and saline reedbeds (A2.6) to Level 4
 (number) refers to explanatory notes to the key



Explanatory notes to the key: Level 2, A, marine habitats

17. The criterion distinguishes between vertical strata: the sea *bed* (non-tidal, inter-tidal and sub-tidal) from the *water column* (in shallow or deep sea, or enclosed coastal waters). Note that the water column includes bodies of ice.
18. Is the bed permanently covered by water (path = *Yes*), or either regularly exposed at some stage in the tidal cycle (littoral / inter-tidal), subjected to frequent non-tidal change in water level or above the high water mark but with a high water table (path = *No*)? Note that under extreme conditions the uppermost fringe of the 'permanently water-covered' zone may be exposed.
19. *Hard or non-mobile substrates* include continuous hard and soft bedrock and also non-mobile boulders, rocks and cobbles, non-mobile artificial substrates and compacted substrates such as clay and peat.; *soft or mobile sediments* include mobile or soft substrates such as cobbles, pebbles, sand and mud. Note that consolidated cobbles follow path = *Hard or non-mobile substrates*. Note also that mixed substrata comprising a mixture of cobble, pebble, gravel, sand and mud are categorised under *soft or mobile sediments*.
20. This criterion separates the deep seabed, beyond the shelf break and generally over 200 metres in depth (path = *Yes*), from sublittoral zones (including infralittoral and circalittoral zones) (path = *No*).
21. *Hard or non-mobile substrates* include continuous hard and soft bedrock and also non-mobile boulders, rocks and cobbles, non-mobile artificial substrates and compacted substrates such as clay and peat; *soft or mobile sediments* include mobile or soft substrates such as cobbles, pebbles, sand and mud. Note that consolidated cobbles follow path = *Hard or non-mobile substrates*. Note also that mixed substrata comprising a mixture of cobble, pebble, gravel, sand and mud are categorised under *soft or mobile sediments*.
22. The oceanic zone (bathyal zone) at depths of approximately 200 - 2000m, lying to seaward of the shallower neritic zone, and landward of the deeper abyssal zone (beyond the continental slope) is distinguished (path = *Yes*). The bathyal zone is the region of the continental slope and rise and its upper limit is marked by the edge of the continental shelf.

Explanatory notes to the key: Level 2, B, coastal habitats

23. Non-aquatic coastal habitats are divided on the basis of underlying substrate (which may be overlain with superficial deposits): *sand* substrates form coastal dune and sand habitats; *shingle* substrates form mobile or stable shingle beaches and banks; *rock* substrates (which include non-mobile boulders) comprise sea and coastal lagoon cliffs and rocky sea shores including the supra-littoral spray zone.

Extract from Explanatory notes to the key: Level 3 (Habitat type A)

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- a5. Sedimentary shores of non-tidal, reduced salinity waters which are either: below the mean water level and normally water-covered, but regularly or occasionally exposed by the action of wind, (hydrolittoral); or waterlogged shores between the mean and high water level (parts of the geolittoral e.g. in the Baltic) (path = *Yes*) are separated from littoral habitats in full salinity waters below the high water mark (path = *No*).
 - a6. Habitats dominated by aquatic (e.g. *Zostera* spp.) or terrestrial (e.g. *Salicornia* spp.) angiosperms, (path = *Yes*) are distinguished from those dominated by animal communities, with or without algae.
 - a7. Angiosperm-dominated habitats are differentiated between those whose dominant species are entirely *aquatic* but which can tolerate occasional emersion (e.g. *Zostera* spp., *Ruppia* spp., *Posidonia* sp.), and those which are primarily *terrestrial* but can tolerate varying amounts of immersion (e.g. *Salicornia* spp., *Spartina* spp.).
 - a8. Habitats are divided on the basis of the dominating particle size of the substrate. *Gravel or coarse sand* > 1 mm grain size (including shingle); *fine sand or muddy sand* <= 1mm with <=30% silt (less than 0.063 mm grain size); *mud* >30% less than 0.063mm grain size; or *mixed sediments* intimate mixtures of the above.
 - a9. Saltmarsh habitats are separated according to the water regime (determined by the position on the shore), between those *frequently submerged*, with soil moisture and salinity relatively constant, and *infrequently submerged*, with soil moisture and salinity variable.
 - a10. Habitats with pioneer vegetation dominated by annual or perennial species with <30% vegetation cover (path = *scattered vegetation*) are separated from those with more-or-less *continuous swards*.
 - a11. Driftline vegetation of saltmarshes (the highest zone, characterised by annual nitrophiles) is separated (path = *Yes*).
 - a12. *Species-poor* saltmarshes and reedbeds (pure stands or those dominated by a few species) are distinguished from those which are *species-rich*, with a wide range of communities, and a rich flora, not dominated by any one species.
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DISCUSSION

Applications

A number of applications of relevance to the marine environment of a European habitat classification can be identified. In particular it will provide support to marine conventions including OSPAR and the Barcelona Convention to enable mapping of habitats at a broad scale and will facilitate an overview of habitat distribution at European level.

Relationship to legislative lists

The EUNIS habitat classification has important distinctions from lists of habitats designated in international legislation, which should be clear to all users. Two lists included in the legislation are relevant: the EU Habitats Directive Annex I and the Bern Convention Resolution No. 4. Both these lists derived from the CORINE/Palaeartic classification, but because of their fixed place in legal frameworks, they have not continued to evolve, while their parent classifications have developed further. The other important distinction is that neither legislative list is in itself a complete classification, but only an extract at a particular time from the classification of the habitats most in need of protection through designation. All habitats included in the legislative frameworks can be located through cross-references in the EUNIS classification.

Future

The classification is expected to remain stable for a time to allow validation and testing through field trials and descriptive parameters to be compiled. During this time comments relating to the structure, key and additional/revised units will be collated. While for terrestrial habitats it is not envisaged developing EUNIS beyond level 3 in the immediate future, the principle is to develop marine units to level 4 in order to classify habitats in terms of their biological components. The geographic scope of the existing classification will be expanded by incorporating units from other existing classifications and by defining new units at an appropriate level to combine geographical variants or to fill in identified gaps. New units must be compared with existing units to ensure there is no duplication and must also follow the hierarchical and criteria based principles outlined above. ecologically distinct habitat types supporting different plant and animal communities should be differentiated; habitats described from different locations but not differing ecologically should not be separated

The next phase of work is to compile descriptions of the habitat units using information from the contributing classifications and through consultation with relevant experts. The parameter frame in the database will also begin to be completed which will ultimately enable units to be selected on the basis of a number of different criteria specified by the user.

The full classification may be obtained from the authors or accessed on the internet (<http://mrw.wallonie.be/dgrne/sibw/EUNIS/home.html>). Comments relating to the classification in general, to specific units or to the key should be sent to the authors either via the feedback form on the web pages or by post.

REFERENCES

- Connor, D.W., Brazier, D.P., Hill, T.O., & Northen, K.O. 1997. Marine Nature Conservation Review: Marine biotope classification for Britain and Ireland. Version 97.06. Peterborough, Joint Nature Conservation Committee.
- Davies C.E. & Moss, D. 1998. EUNIS Habitat Classification. Final Report to the European Topic Centre on Nature Conservation, European Environment Agency, with further revisions to marine habitats. November 1998. 204pp.
- Davies C.E. & Moss, D. 1999. EUNIS Habitat Classification. Final Report to the European Topic Centre on Nature Conservation, European Environment Agency. November 1999. 214pp.
- Devillers, P. & Devillers-Terschuren, J. 1996. A classification of Palaearctic habitats. Council of Europe, Strasbourg: Nature and environment, No 78.
- European Communities. 1991. Habitats of the European Community. CORINE biotopes manual, Volume 2. Luxembourg: Commission of the European Communities.
- European Communities. 1992. Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora. Official Journal of the European Communities, L206.
- Helsinki Commission 1998. Red list of marine and coastal biotopes and biotope complexes of the Baltic Sea, Belt Sea and Kattegat - including a comprehensive description and classification system for all Baltic marine and coastal biotopes. Baltic Sea Environment Proceedings No. 75, Helsinki.
- Moss D., Davies C.E., (1999). EUNIS habitat classification. Cross references between the EUNIS habitat classification, lists of habitats included in legislation, and other European habitat classifications. European Environment Agency European Topic Centre for Nature Conservation.
- New Shorter Oxford English Dictionary. 1993. Ed. Brown, L. Clarendon Press.
- OSPAR Commission. 1999. OSPAR/ICES/EEA Workshop on Habitat classification and Biogeographic Regions. Oban: 6 – 10 September 1999. Summary Record CLAS 99/71 - E. OSPAR Convention for the Protection of the Marine Environment of the North-east Atlantic.
- Stanners, D. & Bourdeau, P. 1995. Europe's Environment: The Dobbris Assessment. Copenhagen: European Environment Agency.
- The Concise Oxford Dictionary of Ecology. 1994. Ed Allaby, M. Oxford University Press.
- UNEP. 1998. Annex III. Revised classification of benthic marine habitat types for the Mediterranean region. In: WG. 149/5: Report: Meeting of experts on marine habitat types in the Mediterranean region. SPA/RAC, Tunis.

Annex A

EUNIS habitat classification (A to level 4, B to level 3, C-J top level 2)

Code	Scientific name	Code	Scientific name
A	Marine habitats	A2.65	Pioneer saltmarshes
A1	Littoral rock and other hard substrata	A2.7	Littoral sediments dominated by aquatic angiosperms
A1.1	Littoral rock very exposed to wave action	A2.71	<i>Zostera</i> beds on littoral sediments
A1.11	Mussels and barnacles on very exposed littoral rock	A2.72	<i>Eleocharis</i> beds
A1.12	Robust fucoids or red seaweeds on very exposed littoral rock	A2.73	<i>Ruppia</i> beds on littoral sediments
A1.13	Biocenosis of the upper mediolittoral rock	A3	Sublittoral rock and other hard substrata
A1.14	Biocenosis of the lower mediolittoral rock very exposed to wave action	A3.1	Infralittoral rock very exposed to wave action and/or currents and tidal streams
A1.2	Littoral rock moderately exposed to wave action	A3.11	Kelp with cushion fauna, foliose red seaweeds or coralline crusts (exposed rock)
A1.21	Fucoids and barnacles on moderately exposed littoral rock	A3.12	Fauna and seaweeds on vertical exposed infralittoral rock
A1.22	Red seaweeds on moderately exposed littoral rock	A3.13	Biocenosis of infralittoral algae very exposed to wave action
A1.23	Ephemeral green or red seaweeds (freshwater- or sand-influenced) on moderately exposed littoral rock	A3.2	Infralittoral rock moderately exposed to wave action and/or currents and tidal streams
A1.24	Mussels and fucoids on moderately exposed littoral rock	A3.21	Kelp and red seaweeds on moderately exposed infralittoral rock
A1.25	<i>Sabellaria</i> reefs on littoral rock	A3.22	Grazed kelp with algal crusts on moderately exposed infralittoral rock
A1.26	Biocenosis of the lower mediolittoral rock moderately exposed to wave action	A3.23	Sand-tolerant or disturbed kelp and seaweed on moderately exposed infralittoral rock
A1.3	Littoral rock sheltered from wave action	A3.24	Fauna and seaweeds on vertical moderately exposed infralittoral rock
A1.31	Dense fucoids on sheltered littoral rock	A3.25	Biocenosis of infralittoral algae moderately exposed to wave action
A1.32	Fucoids, barnacles or ephemeral seaweeds on sheltered littoral mixed substrata	A3.26	Baltic brackish water sublittoral biocenoses of hard substrata influenced by varying salinity
A1.33	Mussel beds on sheltered littoral mixed substrata	A3.3	Infralittoral rock sheltered from wave action and currents and tidal streams
A1.34	Biocenosis of the lower mediolittoral rock sheltered from wave action	A3.31	Silted kelp communities on sheltered infralittoral rock
A1.4	Rock habitats exposed by action of wind (e.g. hydrolittoral)	A3.32	Estuarine faunal communities on shallow rock or mixed substrata
A1.41	Hydrolittoral soft rock	A3.33	Submerged fucoids, green and red seaweeds on reduced/low salinity infralittoral rock
A1.42	Hydrolittoral solid rock (bedrock)	A3.34	Biocenosis of infralittoral algae sheltered from wave action
A1.43	Hydrolittoral hard clay	A3.4	Caves, overhangs and surge gullies in the infralittoral zone
A1.44	Hydrolittoral <i>Mytilus edulis</i> beds	A3.41	Robust fauna on infralittoral surge gullies and cave walls
A1.45	Hydrolittoral peat	A3.5	Circalittoral rock very exposed to wave action or currents and tidal streams
A1.5	Rockpools	A3.51	Faunal crusts or short turfs on exposed circalittoral rock
A1.51	Communities of littoral rockpools	A3.52	<i>Alcyonium</i> -dominated communities on tide-swept circalittoral rock
A1.52	Communities of rockpools in the supralittoral zone	A3.53	Barnacle, cushion sponge and <i>Tubularia</i> communities on very tide-swept circalittoral rock
A1.53	Brackish permanent pools in the geolittoral zone	A3.6	Circalittoral rock moderately exposed to wave action or currents and tidal streams
A1.6	Littoral caves and overhangs	A3.61	Mixed faunal turf communities on moderately exposed circalittoral rock
A1.61	Communities of littoral caves and overhangs	A3.62	Sand-influenced bryozoan and hydroid turfs on moderately exposed circalittoral rock
A2	Littoral sediments	A3.63	<i>Sabellaria spinulosa</i> communities on circalittoral rock
A2.1	Littoral gravels and coarse sands	A3.64	Mussel beds on moderately exposed circalittoral rock
A2.11	Shingle and gravel shores	A3.65	Brittlestar beds on circalittoral rock or mixed substrata
A2.12	Estuarine coarse sediment shores	A3.66	Grazed faunal communities on moderately exposed or sheltered circalittoral rock
A2.13	Biocenosis of the mediolittoral coarse detritic bottoms	A3.67	Silt-influenced ascidian communities on moderately exposed circalittoral rock
A2.2	Littoral sands and muddy sands	A3.68	Communities on soft moderately exposed circalittoral rock
A2.21	Sand shores	A3.69	Faunal turfs on vertical circalittoral rock
A2.22	Muddy sand shores	A3.6A	Coralligenous biocenosis moderately exposed to hydrodynamic action
A2.3	Littoral muds	A3.7	Circalittoral rock sheltered from wave action and currents including tidal streams
A2.31	Sandy mud shores	A3.71	Brachiopods and solitary ascidian communities on sheltered circalittoral rock
A2.32	Soft mud shores	A3.72	Sheltered <i>Modiolus</i> beds
A2.33	Saltmarsh creeks	A3.73	Coralligenous biocenosis sheltered from hydrodynamic
A2.34	Saltmarsh pools		
A2.4	Littoral mixed sediments		
A2.41	Mollusc and polychaete communities of littoral mixed sediments		
A2.42	Biogenic features (scars) on littoral mixed sediments		
A2.43	Sheltered mixed sediment shores		
A2.5	Habitats with sediments exposed by action of wind (e.g. hydrolittoral)		
A2.51	Hydrolittoral stony substrates		
A2.52	Hydrolittoral gravel substrates		
A2.53	Hydrolittoral sandy substrates		
A2.54	Hydrolittoral muddy substrates		
A2.55	Hydrolittoral mixed sediment substrates		
A2.56	Geolittoral wetlands and meadows: reed, rush and sedge stands		
A2.6	Coastal saltmarshes and saline reedbeds		
A2.61	Saltmarsh driftlines		
A2.62	Species-rich upper saltmarshes		
A2.63	Mid-upper saltmarshes and saline reedbeds		
A2.64	Low-mid saltmarshes		

	action	A4.8	Seeps and vents in sublittoral sediments
A3.8	Caves and overhangs in the circalittoral zone	A4.81	Freshwater seeps in sublittoral sediments
A3.81	Communities of circalittoral caves and overhangs	A4.82	Methane seeps in sublittoral sediments
A3.9	Deep circalittoral rock habitats	A4.83	Oil seeps in sublittoral sediments
A3.91	Animal communities of deep circalittoral rock habitats	A4.84	Vents in sublittoral sediments
A3.92	Baltic soft rock bottoms of the aphotic zone	A5	Bathyal zone
A3.93	Baltic solid bedrock of the aphotic zone	A5.1	Bathyal zone hard substrates
A3.94	Baltic stony bottoms of the aphotic zone	A5.11	Communities of bathyal zone bedrock or artificial substrates
A3.95	Baltic hard clay bottoms of the aphotic zone	A5.12	Communities of allochthonous material in the bathyal zone
A3.97	Baltic peat bottoms of the sublittoral zone	A5.13	Biocenosis of deep sea corals
A3.A	Vents and seeps in sublittoral rock	A5.2	Bathyal zone mixed substrates
A3.A1	Bubbling reefs in the sublittoral euphotic zone	A5.21	Lag deposits in the bathyal zone
A3.A2	Bubbling reefs in the aphotic zone	A5.22	Biogenic gravels (shells, coral debris) in the bathyal zone
A3.A3	Freshwater seeps in sublittoral rock	A5.23	Calcareous pavements in the bathyal zone
A3.A4	Oil seeps in sublittoral rock	A5.3	Bathyal zone sand
A3.A5	Vents in sublittoral rock	A5.31	Biocenosis of bathyal detritic sands with <i>Grypheus vitreus</i>
A4	Sublittoral sediments	A5.4	Bathyal zone muddy sand
A4.1	Sublittoral mobile cobbles, gravels and coarse sands	A5.5	Bathyal zone mud
A4.11	Seaweeds and maerl on coarse shallow-water sediments	A5.51	Biocenosis of bathyal muds
A4.12	Animal communities in shallow-water gravels	A5.6	Seeps in the bathyal zone
A4.13	Animal communities in shallow-water coarse sands	A5.7	Caves in the bathyal zone
A4.14	Animal communities of circalittoral mobile cobbles, gravels and sands	A5.71	Caves and ducts in total darkness (including caves without light or water movement at upper levels)
A4.15	Baltic brackish water sublittoral biocenoses of gravel and coarse sand influenced by varying salinity	A6	Abyssal zone
A4.2	Sublittoral sands and muddy sands	A6.1	Hard substrates on the abyssal plain
A4.21	Animal communities in fully marine shallow clean sands	A6.11	Boulders on the abyssal plain
A4.22	Biocenosis of fine sands in very shallow waters	A6.12	Artificial substrates on the abyssal plain
A4.23	Biocenosis of well sorted fine sands	A6.13	Cetacean carcasses on the abyssal plain
A4.24	Animal communities in variable or reduced salinity shallow clean sands	A6.2	Soft substrates on the abyssal plain
A4.25	Baltic brackish water sublittoral biocenoses of sands influenced by varying salinity	A6.21	Biocenosis of abyssal muds
A4.26	Animal communities in fully marine shallow-water muddy sands	A6.3	Tectonic ridges
A4.27	Animal communities in variable or reduced salinity muddy sands	A6.31	Oceanic ridge with hydrothermal effects
A4.28	Animal communities of circalittoral muddy sands	A6.32	Oceanic ridge without hydrothermal effects
A4.29	Biocenosis of the muddy detritic bottom	A6.4	Seamounts
A4.3	Sublittoral muds	A6.5	Abyssal hills
A4.31	Shallow marine mud communities	A6.6	Hadal zone (deep ocean trenches)
A4.32	Variable or reduced salinity non-mobile sublittoral muds	A6.61	Cold seep benthic communities of hadal zone
A4.33	Variable or reduced salinity shallow-water fluid mobile mud	A6.62	Hadal zone without cold seeps
A4.34	Biocenosis of superficial muddy sands in sheltered waters	A6.7	Caves in the abyssal zone
A4.35	Baltic brackish water sublittoral muddy biocenoses influenced by varying salinity	A6.8	Anoxic deep seabed habitats below anoxic water
A4.36	Animal communities of circalittoral muds	A7	Pelagic water column
A4.37	Biocenosis of coastal terrigenous muds	A7.1	Enclosed coastal saline or brackish water
A4.38	Periodically anoxic sublittoral muds	A7.11	Water body of Baltic mesotrophic glo-lakes
A4.4	Sublittoral mixed sediments	A7.12	Water body of Baltic eutrophic glo-lakes
A4.41	Kelp and seaweeds on shallow-water mixed sediments	A7.13	Water body of Baltic mesotrophic coastal lakes
A4.42	Maerl beds on shallow-water muddy mixed sediments	A7.14	Water body of Baltic eutrophic coastal lakes
A4.43	Oyster beds	A7.2	Partially enclosed coastal water
A4.44	Animal communities in mixed shallow-water sediments	A7.21	Estuarine water
A4.45	Variable and reduced salinity sublittoral mixed sediments	A7.22	Fjord waters (with a sill)
A4.46	Baltic shell gravel bottoms in the infralittoral photic zone	A7.3	Unenclosed mixed shallow water
A4.47	Baltic <i>Mytilus edulis</i> beds in the infralittoral photic zone	A7.31	Inshore shallow water
A4.48	Biogenic beds on sublittoral mixed sediments	A7.32	Water over submerged shoals and reefs
A4.49	Animal communities of circalittoral mixed sediments	A7.4	Unenclosed seasonally stratified coastal water
A4.4A	Biocenosis of the coastal detritic bottom	A7.41	Inner unenclosed seasonally stratified coastal water
A4.5	Shallow-water sediments dominated by angiosperms (other than <i>Posidonia</i>)	A7.42	Outer unenclosed seasonally stratified coastal water
A4.51	<i>Cymodocea</i> beds	A7.5	Euphotic zone in non-coastal water
A4.52	<i>Halophila</i> beds	A7.51	Neustal zone
A4.53	<i>Zostera</i> beds in infralittoral sediments	A7.52	Euphotic zone over continental shelf
A4.54	<i>Ruppia</i> and <i>Zannichellia</i> communities	A7.53	Upwelling from continental shelf
A4.55	Aquatic macrophyte beds of coastal brackish waters	A7.54	Euphotic zone beyond continental shelf
A4.6	<i>Posidonia</i> beds	A7.55	Upwelling into euphotic zone beyond continental shelf
A4.61	Association with <i>Posidonia oceanica</i>	A7.56	Low-salinity water overlying full-salinity water
A4.7	Deep circalittoral sediment habitats	A7.6	Reduced-salinity water below the euphotic zone
A4.71	Animal communities of deep circalittoral sediments	A7.61	Low-salinity water without or above halocline and below euphotic zone
A4.72	Biocenosis of shelf-edge detritic bottom	A7.62	Low-salinity water below halocline
A4.73	Baltic gravel bottoms of the aphotic zone	A7.7	Water over continental shelf below euphotic zone
A4.74	Baltic sandy bottoms of the aphotic zone	A7.71	High Arctic offshore waters
A4.75	Baltic shell gravel bottoms of the aphotic zone	A7.72	Low Arctic offshore waters
A4.76	Baltic muddy bottoms of the aphotic zone	A7.73	Boreal, temperate and subarctic offshore waters
A4.77	Baltic mixed sediment bottoms of the aphotic zone	A7.74	Mediterranean and Macaronesian subtropical offshore waters
		A7.8	Water below euphotic zone over seabed beyond continental slope break

A7.81	Mesopelagial zone	G	Woodland and forest habitats and other wooded land
A7.82	Bathypelagial zone	G1	Broadleaved deciduous woodland
A7.83	Abyssopelagial zone	G2	Broadleaved evergreen woodland
A7.84	Benthopelagial zone	G3	Coniferous woodland
A7.9	Ice-dominated marine habitats	G4	Mixed deciduous and coniferous woodland
A7.91	Sea ice	G5	Lines of trees, small anthropogenic woodlands, recently felled woodland, early-stage woodland and coppice
A7.92	Icebergs and growlers		
A7.93	Polynya		
A7.A	Open ocean habitats with currents and eddies	H	Inland unvegetated or sparsely vegetated habitats
A7.A1	Water over continental slope with upwellings	H1	Terrestrial underground caves, cave systems, passages and waterbodies
A7.A2	Deep water with upwellings		
A7.A3	Open ocean fronts	H2	Screens
A7.A4	Open ocean eddies	H3	Inland cliffs, rock pavements and outcrops
A7.B	Anoxic water column	H4	Snow or ice-dominated habitats
		H5	Miscellaneous inland habitats with very sparse or no vegetation
B	Coastal habitats	H6	Recent volcanic features
B1	Coastal dune and sand habitats		
B1.1	Angiosperm communities of sand beach driftlines	I	Regularly or recently cultivated agricultural, horticultural and domestic habitats
B1.2	Sand beaches above the driftline	I1	Arable land and market gardens
B1.3	Shifting coastal dunes	I2	Cultivated areas of gardens and parks
B1.4	Coastal stable dune grassland (grey dunes)		
B1.5	Coastal dune heaths	J	Constructed, industrial and other artificial habitats
B1.6	Coastal dune scrub	J1	Buildings of cities, towns and villages
B1.7	Coastal dune woods	J2	Low density buildings
B1.8	Moist and wet dune slacks	J3	Extractive industrial sites
B1.9	Machair	J4	Transport networks and other constructed hard-surfaced areas
B2	Coastal shingle habitats	J5	Highly artificial man-made waters and associated structures
B2.1	Shingle beach driftline habitats	J6	Waste deposits
B2.2	Unvegetated mobile shingle beaches above the driftline		
B2.3	Upper shingle beaches with open vegetation		
B2.4	Fixed shingle beaches, with herbaceous vegetation		
B2.5	Shingle and gravel beaches with scrub vegetation		
B2.6	Shingle and gravel beach woodland		
B3	Rock cliffs, ledges and shores, including the supralittoral		
B3.1	Supralittoral rock (lichen or splash zone)		
B3.2	Unvegetated rock cliffs, ledges, shores and islets		
B3.3	Rock cliffs, ledges and shores, with halophytic angiosperms		
B3.4	Soft sea-cliffs, often vegetated		
C	Inland surface water habitats		
C1	Surface standing waters		
C2	Surface running waters		
C3	Littoral zone of inland surface waterbodies		
D	Mire, bog and fen habitats		
D1	Raised and blanket bogs		
D2	Valley mires, poor fens and transition mires		
D3	Aapa, palsa and polygon mires		
D4	Base-rich fens		
D5	Sedge and reedbeds, normally without free-standing water		
D6	Inland saline and brackish marshes and reedbeds		
E	Grassland and tall forb habitats		
E1	Dry grasslands		
E2	Mesic grasslands		
E3	Seasonally wet and wet grasslands		
E4	Alpine and subalpine grasslands		
E5	Woodland fringes and clearings and tall forb habitats		
E6	Inland saline grass and herb-dominated habitats		
F	Heathland, scrub and tundra habitats		
F1	Tundra		
F2	Arctic, alpine and subalpine scrub habitats		
F3	Temperate and mediterraneo-montane scrub habitats		
F4	Temperate shrub heathland		
F5	Maquis, matorral and thermo-Mediterranean brushes		
F6	Garrigue		
F7	Spiny Mediterranean heaths (phrygana, hedgehog-heaths and related coastal cliff vegetation)		
F8	Thermo-Atlantic xerophytic habitats		
F9	Riverine and fen scrubs		
FA	Hedgerows		
FB	Shrub plantations		

Annex B

Extract from cross-references between the EUNIS habitat classification and other marine classifications

EUNIS internal code	EUNIS combined code	Scientific name	BioMar97 Code	Helcom Code	Barcelona Code
A2	A2	Littoral sediments	LS		
A2.1	A2.1	Littoral gravels and coarse sands	LGS		II.3.
A2.11	A2.1/B-LGS.Sh	Shingle and gravel shores	LGS.Sh		
A2.12	A2.1/B-LGS.Est	Estuarine coarse sediment shores	LGS.Est		
A2.13	A2.1/M-II.3.1.	Biocenosis of the mediolittoral coarse detritic bottoms			II.3.1.
A2.2	A2.2	Littoral sands and muddy sands	LMS		II.1.
A2.2	A2.2	Littoral sands and muddy sands	LMS		II.2.
A2.21	A2.2/B-LGS.S	Sand shores	LGS.S		
A2.22	A2.2/B-LMS.MS	Muddy sand shores	LMS.MS		
A2.3	A2.3	Littoral muds	LMU		II.1.
A2.31	A2.3/B-LMU.SMu	Sandy mud shores	LMU.SMu		II.1.1.
A2.32	A2.3/B-LMU.Mu	Soft mud shores	LMU.Mu		II.1.1.
A2.33	A2.3/O-	Saltmarsh creeks			
A2.34	A2.3/O-	Saltmarsh pools			
A2.4	A2.4	Littoral mixed sediments	LMX		
A2.41	A2.41	Mollusc and polychaete communities of littoral mixed sediments			
A2.42	A2.4/O-	Biogenic features (scars) on littoral mixed sediments			
A2.43	A2.4/O-	Sheltered mixed sediment shores			
A2.5	A2.5	Habitats with sediments exposed by action of wind (e.g. hydrolittoral)			
A2.51	A2.5/H-02.02.03	Hydrolittoral stony substrates		02.02.03	
A2.52	A2.5/H-02.04.03	Hydrolittoral gravel substrates		02.04.03	
A2.53	A2.5/H-02.05.03	Hydrolittoral sandy substrates		02.05.03	
A2.54	A2.5/H-02.07.03	Hydrolittoral muddy substrates		02.07.03	
A2.55	A2.5/H-02.08.03	Hydrolittoral mixed sediment substrates		02.08.03	
A2.56	A2.5/H-03.07.01	Geolittoral wetlands and meadows: reed, rush and sedge stands		03.07.01	
A2.6	A2.6	Coastal saltmarshes and saline reedbeds	LMU.Sm		
A2.61	A2.6/B-LMU.Smdr	Saltmarsh driftlines	LMU.Smdr		
A2.62	A2.62	Species-rich upper saltmarshes			
A2.63	A2.6/B-LMU.Smm-u	Mid-upper saltmarshes and saline reedbeds	LMU.Smm-u		
A2.64	A2.64	Low-mid saltmarshes	LMU.Sml-m		
A2.65	A2.65	Pioneer saltmarshes	LMU.Smpio		
A2.7	A2.7	Littoral sediments dominated by aquatic angiosperms			II.1.1.1.
A2.71	A2.7/B-LMS.Zos	<i>Zostera</i> beds on littoral sediments	LMS.Zos		
A2.72	A2.7/P-11.42	<i>Eleocharis</i> beds			
A2.73	A2.73	<i>Ruppia</i> beds on littoral sediments			