



Habitat mapping: the EUNIS nomenclature

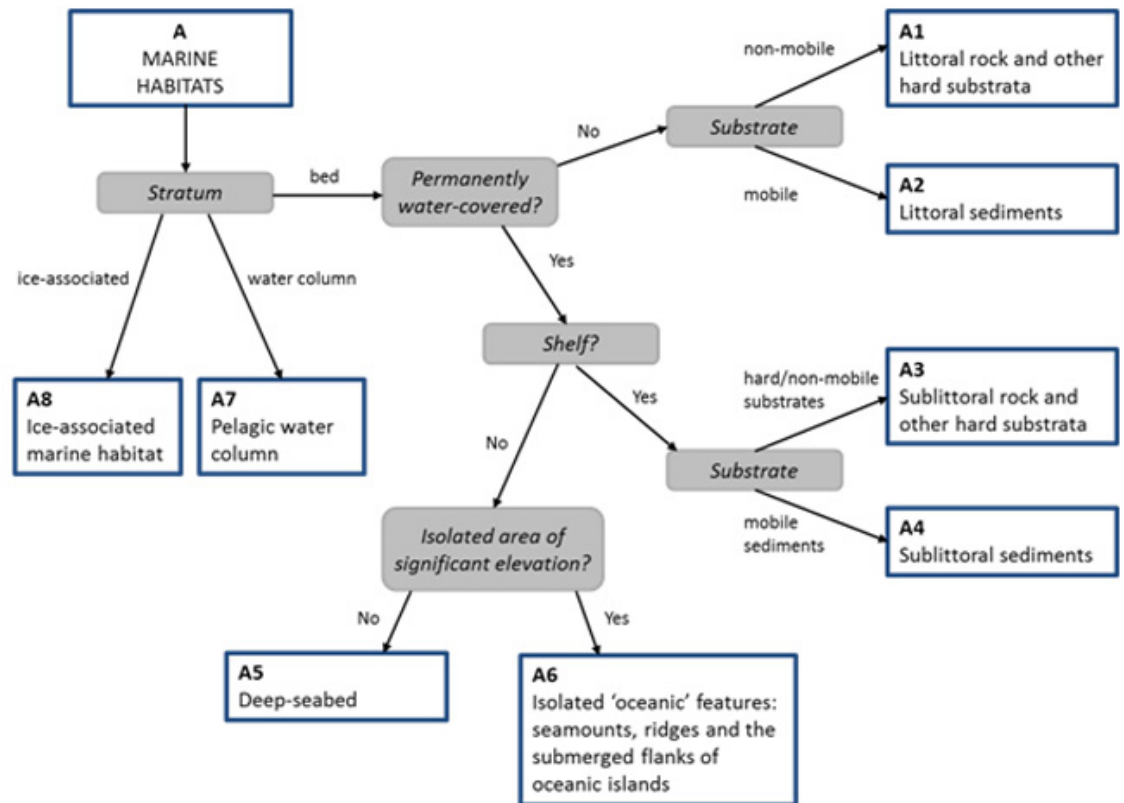
The European Nature Information System (EUNIS) habitat classification is a pan-European system, which covers all types of natural and artificial habitats, both aquatic and terrestrial; the system was developed through the collaboration of a wide range of scientists and conservation managers, by the analysis of empirical data sets, and the review of other classifications and scientific literature [Fraschetti, 2008].

EUNIS classification is organised into hierarchical levels: the current version of the classification starts at level 1, where 'Marine habitats' are defined and distinguished from different continental habitats, up to level 6 [Galparsoro et al., 2012]. The criteria for defining marine habitats up to level 2 are presented in Figure 1. Levels 2 and 3 are based only on physical features while biological assemblages are explicitly required to reach Level 4. This level allows for coupling marine habitats as previously defined with ecological functions and ecosystem services without including excessive details. ES assessment in VALMER should be based on EUNIS Level 4 classification as a tradeoff between the current knowledge on ecosystem functioning and marine habitats and the need to discriminate spatially the valuation of ecosystem services. As EUNIS typology is a hierarchical system, it can be used for habitat mapping at different spatial scales.



VALMER Interreg 4A Channel project (2012-2015).

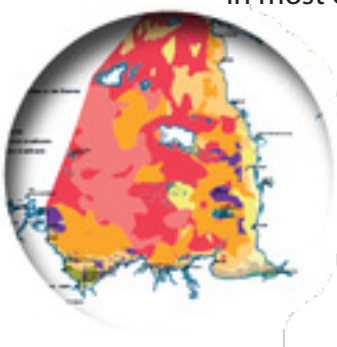
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EUNIS habitat classification: criteria to define marine habitats at Level 2.

- A. Marine habitats
- A2 Littoral sediment
 - A2.2 Littoral sand and muddy sand
 - A2.24 Polychaete/bivalve-dominated fine sand shore
 - A2.242 [*Cerastoderma edule*] and polychaetes in littoral muddy sand

Habitats-functions-services relationship assessment



In most cases, Marine Ecosystem Services Assessment is required in the context of a marine policy which may target the protection of marine habitats and biodiversity. Such policies are better informed by assessments which highlight the most important habitats or the key ecological functions for delivering ecosystem services.

However, even if it is often referred to in the 'cascade approach', the relationships between habitat, functions and services within marine ecosystems are not well known and understood.

A step forward in that direction was attempted in the Golfe Normand-Breton study site, which proposed a first overview of the services delivered by the diverse habitats of this site in the prospect of the creation of new Marine Protected Area.

Sensitivity assessment

Sensitivity assessments involve the collation of existing information on key characteristics of a species or habitat and its response to environmental change, and

the presentation of this information in a format that is accessible to decision makers [Hiscock and Tyler-Waters, 2006]. Certain key concepts are fundamental to the sensitivity assessment approach, as defined by Tillin et al. [2010]

Term	Definition
Sensitivity	A measure of tolerance (or intolerance) to changes in environmental conditions
Resistance	Response to change whether element can absorb disturbance or stress without changing character
Resilience	The ability of a system to recover from disturbance or stress
Vulnerability	A measure of the degree of exposure of a receptor to a pressure to which it is sensitive
Pressure	The mechanism through which an activity has an effect on any part of the ecosystem. The nature of the pressure is determined by the activity type, intensity and distribution
Impact	The effects (or consequences) of a pressure on a component
Exposure	The action of a pressure on a receptor, with regard to the extent, magnitude and duration of the pressure

Key definitions in sensitivity assessment (from Tillin et al., 2010)

Sensitivity assessments are widely used to evaluate the expected extent to which changes in certain pressures will affect particular species or habitats. Various methods for sensitivity assessments may be carried out: a synthesis of existing research, empirical approaches or a mix of both approaches.

One approach to assessing the sensitivity of marine ecosystem services to pressure changes is to build on existing work that has described both the ecosystem services, goods and benefits provided by marine and coastal habitats, and also on the sensitivity of these habitats to pressures. This is appropriate for a broad-based assessment that aims to provide an indication of the sensitivity of a suite of services to a range of pressures at generic levels of intensity.

The limitations of the synthesis approach may require a more empirical assessment in order to determine the sensitivity of particular marine ecosystem services in a specific situation. Two further empirical approaches to marine ecosystem services sensitivity assessment may be therefore suggested:

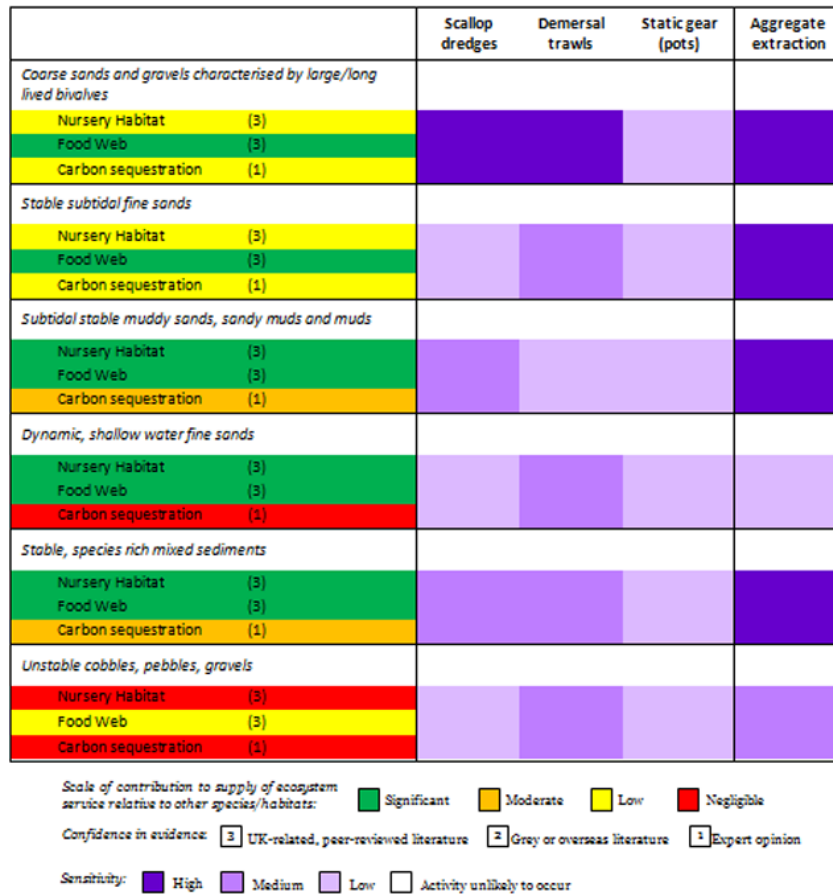
- **a habitat-based approach**, which follows a broadly similar method to the synthesis approach but is more specific to a local context and mix together expert and scientific knowledge;
- **a benefit-based approach** for situations in which there is no suitable existing information, such as when the direct linkages between certain habitats or species and a particular benefit are not clear. However, the benefit-based approach does not longer rely on ecological knowledge but on social demand.

The empirical approach for habitats and marine ecosystem services sensitivity assessment was applied in the North Devon Biosphere Reserve , Golfe Normand-Breton and Poole Harbour case study sites.

The following table provides an example of a matrix which presents for a series of habitats, the sensitivity of three regulation services to fishing gears and aggregate extraction in North Devon Biosphere

If marine ecosystem services assessments are to become widely used in decision making, then the approach must provide information to help decision makers understand how changing levels of pressure affect the delivery of particular services and benefits.

Reserve. Of course, interpreting the results requires a precautionary principle as the scientific knowledge is not always suitable for the case and the expert judgments not comprehensive.



The sensitivity of selected subtidal sedimentary habitats of the North Devon Biosphere Reserve to different fishing gears and to aggregate extraction

A similar approach was undertaken in the Golfe Normand-Breton study site [Cabral et al., 2014]. In the Poole Harbour case study site (see <https://participatory-assessment.eu/case-studies/>), the focus was on cultural service (recreation) for which linkages between habitats/species and service provision were not clear. In this case, a **benefit-based approach** was chosen where sensitivity was assessed in terms of how user participation might be affected by changes to the environment within Poole Harbour. The approach required data generated by surveys (social science methods).