

# Atlantic Area Eunis Habitats

Adding new habitat types from European Atlantic coast  
to the EUNIS Habitat Classification

MeshAtlantic Technical Report N° 3/2013  
September 2013



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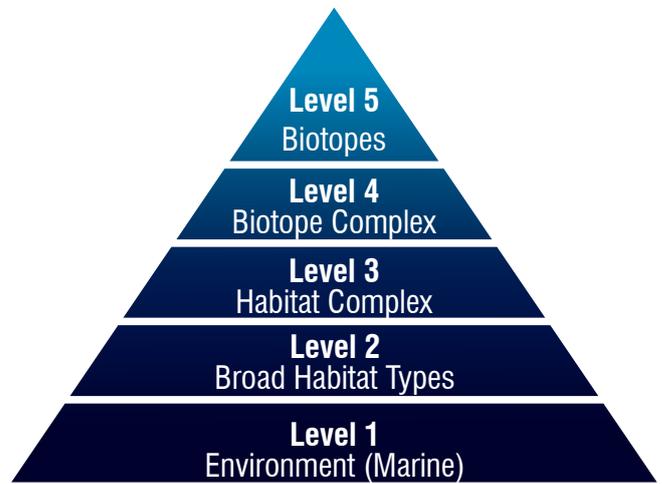
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## SUMMARY

This report provides full documentation of the new proposals for EUNIS habitats up to level 5 for marine habitats found under the MeshAtlantic project. Three case studies were presented in detail, the Algarve region and the Southwestern Coast in Portugal and the Basque Country in Spain, plus other contributions from Brittany (France). Overall, there were 45 new habitat proposals. This represents a contribution to a comprehensive typology for the marine habitats of the European Atlantic coast.

## INTRODUCTION

Marine protection has been emphasized through global and European conventions which highlighted the need for the establishment of special areas of conservation. Classification and habitat mapping have been developed to enhance the assessment of marine environment and improve spatial and strategic planning of human activities and to help on the implementation of ecosystem based management. European Nature Information System (EUNIS) is a comprehensive habitat classification system to facilitate the harmonised description and collection of habitat and biotopes that has been developed by the European Environment Agency (EEA) in collaboration with experts from institutions throughout Europe. The EUNIS system is a hierarchical classification which comprises at least five levels of complexity depending on the substrate type, ecological zones (e.g. infralittoral, circalittoral), coastal wave exposure and biological communities (Connor *et al.*, 2004) (Figure 1).



**Figure 1.** EUNIS hierarchical system for the marine habitat classification

- *BIOTOPE: A biotope is defined as the combination of a habitat and its associated community of species (Olenin and Ducrottoy, 2006).*

## OBJECTIVES

Under the MeshAtlantic project, partners committed to identify habitats and biotopes at a broad and fine scale based on historical and new surveys data. Surveys were to assess Marine Protected Areas (MPAs) and others natural areas with great potential to integrate the marine Natura 2000 network sites. These campaigns were carried out in a concerted manner to produce habitat maps compliant with best practices and operational procedures developed by previous Interreg projects (Mesh, Balance). This project will also allow to improving the EUNIS classification for southern Atlantic Area regions. The present report aimed to prepare the MeshAtlantic proposal of new habitat types found for the EUNIS classification in the European Atlantic coast.

## CASE STUDIES

### CASE STUDY 1 Portugal - Algarve

Algarve – Universidade do Algarve - CCMAR

**Authors:** Pedro Monteiro, Frederico Oliveira, Carlos Afonso, Mafalda Rangel, Luís Bentes and Jorge Gonçalves

#### INTRODUCTION

The EUNIS classification has been applied to the North-East Atlantic and Mediterranean coast but still excludes most of the south Atlantic coast of Europe. Thus it is important to test its application and effectiveness in the European south coast where it remains less used. The EUNIS application to this region should lead to an improvement of the classification as a whole.

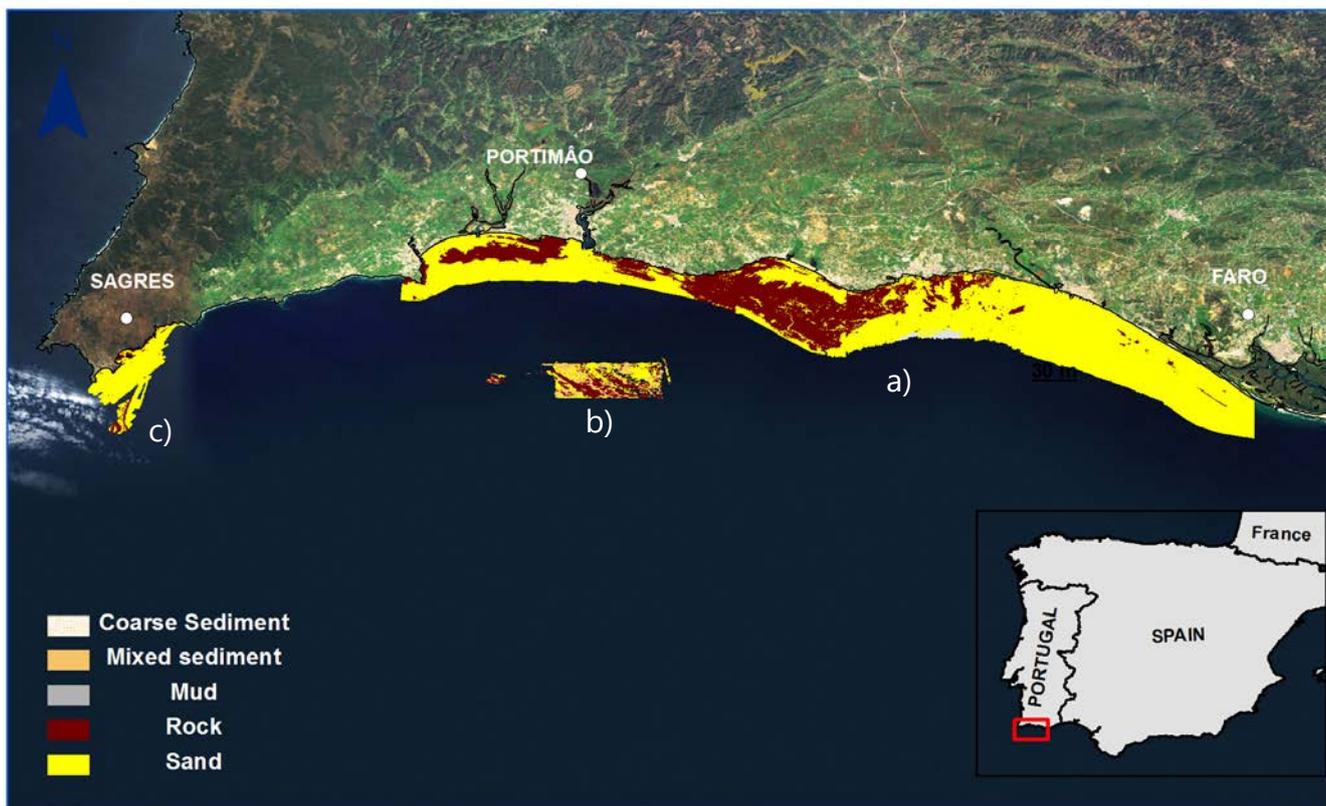
Since 2003 several surveys have been planned and focused on the characterization and mapping of marine habitats and biotopes of the south coast of Portugal (e.g. Gonçalves *et al.*, 2010). These surveys were designed to produce new habitat maps that could facilitate the execution of the Habitats Directive and future implementation of the Water and Marine Strategy Framework Directives. Those historical data and more recent biological data that derived from the new MeshAtlantic surveys were used for the implementation of the EUNIS habitat classification for the Algarve coast.

The objective of this case study is to illustrate the classification process of marine habitats of the south coast of Portugal in view of new biological data available. Seven provisional biotopes for the classification are also presented in detail as a case study of a new proposal for the EUNIS classification from the south coast of Portugal (Algarve).

#### APPLICATION OF THE EUNIS CLASSIFICATION

##### STUDY AREA

Historical data and new surveys have been used for habitat characterization and EUNIS classification of the south coast of Portugal (Algarve). The main biological data set and study area were derived from the previous RENSUB project (Gonçalves *et al.*, 2004, 2007, 2008, 2010). The most recent biological data came from the new surveys carried out under the MeshAtlantic assignment (Monteiro *et al.*, 2012a; Monteiro *et al.*, 2013; unpubl. data). Sampling was stratified by depth and bottom substrate, and used underwater visual census, Van Veen grab, beam trawl and quadrates method to estimate fauna densities and macroalgae coverage. Important additional data was obtained by ROV surveys carried out by UALG/CCMAR or in cooperation with the NGO OCEANA. The Rensub project (2003-2010) was carried out at the central off Algarve coast between an area close to the cape of Santa Maria (Faro) and the Ponta da Piedade cape (Lagos) at west side. This marine area is part the National Underwater Ecological Reserve that extends from the coastline to 30 metre depth and is 3 km wide in the west and over 10 km wide in the eastern part (Figure 2). On the other hand, new surveys within the MeshAtlantic framework were carried out in the coast of Sagres, between 0 and 90 m depth and in an offshore area of Portimão between 60 and 90 m (Figure 2). Both surveys began with a previous acoustic survey of the seabed by means of Side Scan Sonar and Multi-beam, followed with sediment type classification and ground truthing validation using grab sampling, Beam trawl and ROV surveys (Figure 2).



**Figure 2.** Study area within Rensub Project (a) and under the MeshAtlantic project: Portimão area (b) and Sagres area (c).

### DATA ANALYSIS AND MAPPING

The upper EUNIS hierarchy classifications (EUNIS levels 1, 2 & 3 or 4) were based on the commonly referred to as the top-down approach. Upper classifications were computed on the Raster Calculator (ArcMap/ESRI Spatial Analyst extension) and were basically driven by combining environmental raster variables required by the EUNIS classification (Connor *et al.*, 2004), such as: bottom type (e.g. rock, sand, and mud), biological zone (e.g. infralittoral, circalittoral) and energy level (e.g. high energy).

Environmental variables:

**Bottom Type:** information of the type of substrate present at the seabed is essential for marine communities and for the EUNIS classification. Before computation habitat classification substrate type was classified according to the Folk (1974) simplified classification used in the MeshAtlantic project (Rock, Sand, Sandy mud, Muddy sand, Mud, Mixed sediment and Coarse sediment).

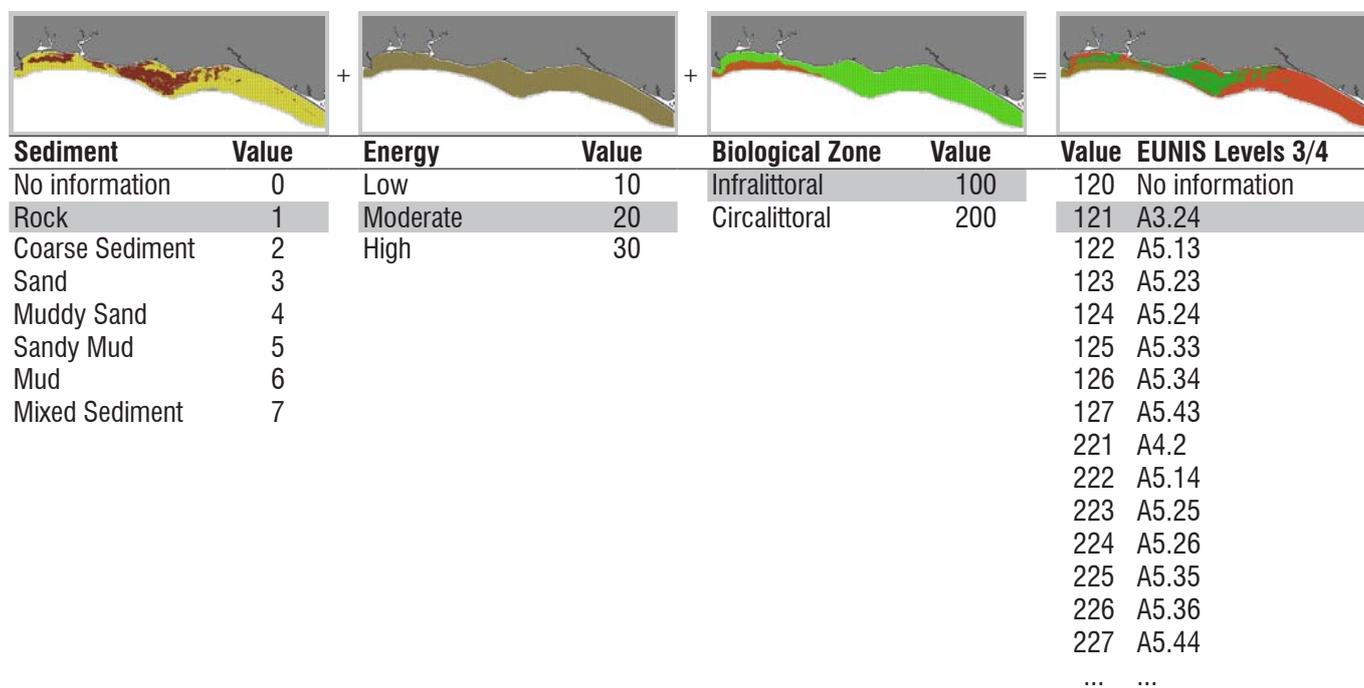
**Biological Zone:** The fraction of light reaching the seabed was used to define the limit between ecological zones. This fraction of light is one of the main physical factors commonly correlated to the abundance of macrophytes and macroalgae species (e.g. Peres and Picard, 1964). Studies have stated that the value of 1% of surface light is required for kelp and *Posidonia oceanica* for the North Sea and Mediterranean sea, respectively (Ballesta *et al.*, 2000; McBreen and Askew,

2011). Following previous assessment of the macroalgae distribution in the Algarve coast under MeshAtlantic (Monteiro *et al.*, 2012b) the value of 1% was adopted as a proxy to define the lower infralittoral limit given the broad scale of the classification.

**Energy level:** Following an analysis of the wave energy and currents data the almost entire Algarve shelf coast was considered moderately exposed. These sites generally include open coasts facing away from prevailing winds and without a long fetch but where strong winds can be frequent (Connor *et al.*, 2004).

To predict upper habitat classification level both raster variables were assigned to a set of code values (Table I). These code values make easier the computation method of combining environmental raster variables required by the EUNIS classification. After the addition the combined resulted code was renamed by the actual EUNIS habitat classification.

**Table I.** Example of the method of combining required environmental variables on raster calculator to achieve the final EUNIS hierarchical classification.



#### Level 4 (and lower) habitat classification

To set up the lower level of the classification, a statistical analysis of species records were made. Biological data set falling in the upper levels (Level 3 or 4) were analysed using the analytical techniques available in the PRIMER 6 package (Clarke & Warwick, 2001). CLUSTER (Hierarchical cluster analysis) and nMDS (Non-metric Multi-Dimensional Scaling) analysis based on species matrices listing individual counts on each sampling were carried out. The similarity/dissimilarity among data sets from every provisional typologies or habitat was assessed by using the ANOSIM (Analysis of similarities) (Clarke & Warwick, 2001).

The total species composition of each habitat derived from previous data analysis was then checked using SIMPER analysis. Particular attention was given to the set of species contributing to the similarity and dissimilarity. Following Connor *et al.* (2004), species contributing with more than 1% to the overall similarity of the records within the data set were defined as characterising the habitat. Characteristic or indicator species of each biotope were also determined in our case study

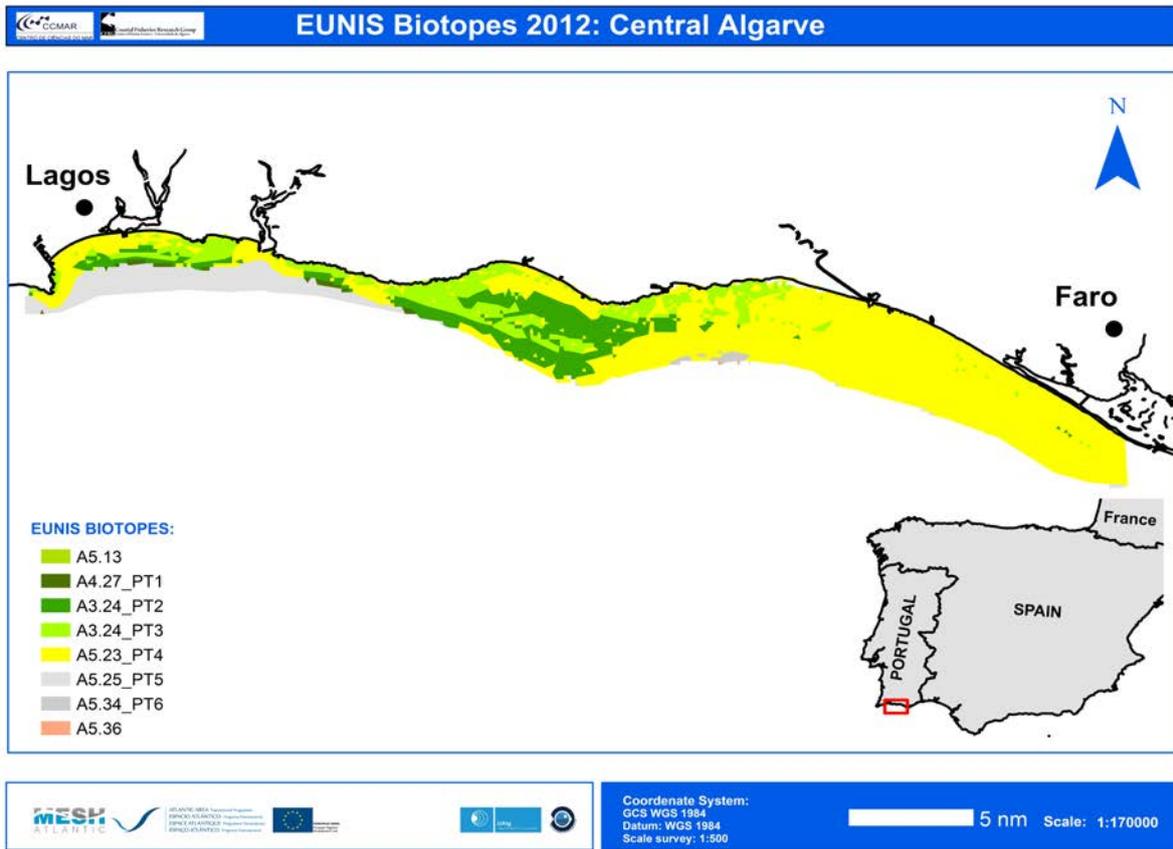
by the IndVal method proposed by Dufrêne and Legendre (1997). According to these authors a good indicator species should be found predominantly in a single habitat and be present in most of the sampled sites belonging to that habitat. This method emphasizes this aspect and was especially used when defining the name of the proposed habitat.

## RESULTS AND DISCUSSION

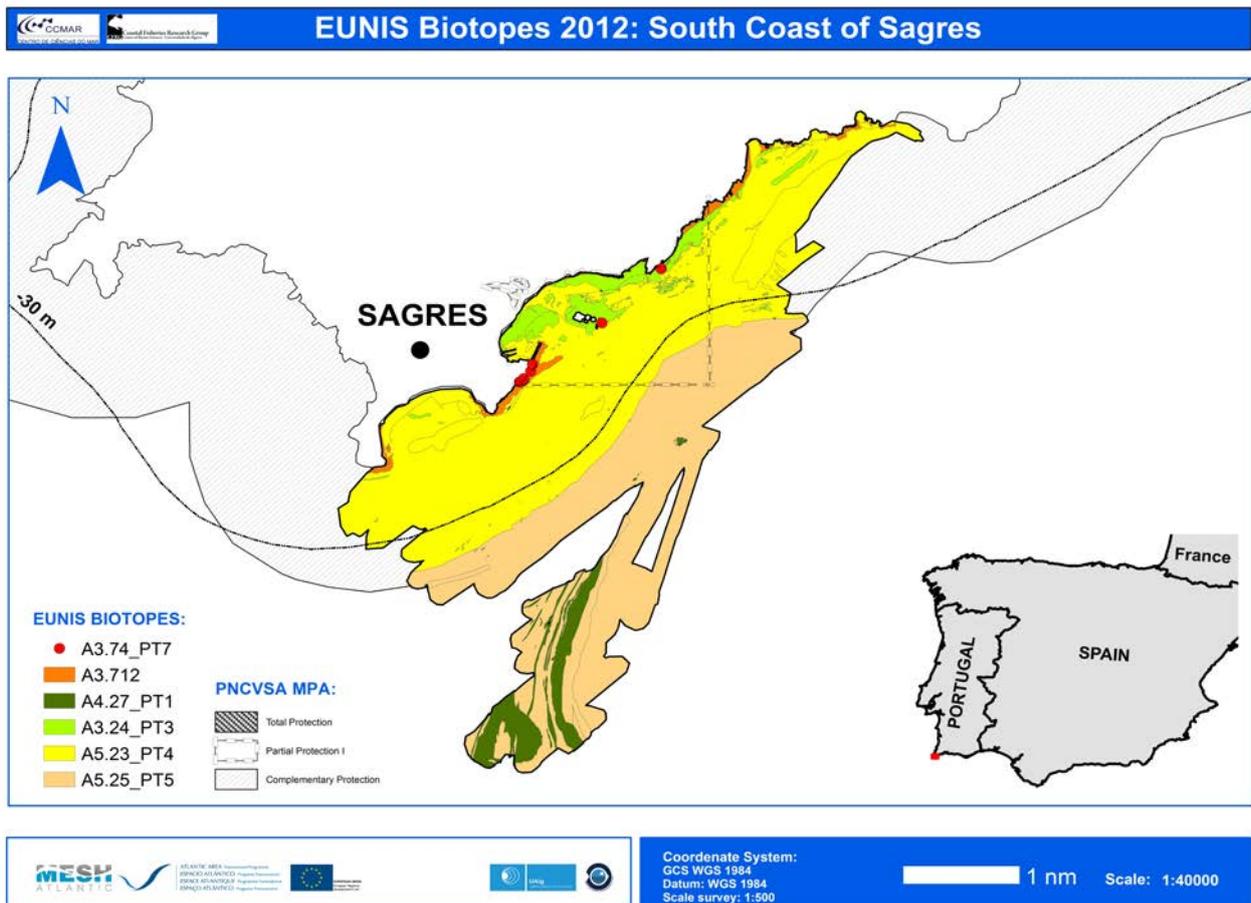
The present study allowed the identification of seven habitats on rocky and soft bottom. These habitats are present on the infralittoral and circalittoral biological zones of the Algarve coast between the shoreline and 30 meter depth (Figures 3 and 4). According to the statistical analysis there are confidently typology differences and therefore, from our point of view, these habitats are distinctive and in need of proper classification. Besides that, when these habitats were compared to those existing on the EUNIS habitat database, it was possible to verify the existence of considerable differences in the characteristics species. This is not surprising since most of the current EUNIS classification is based on data collected from the Northern European Coast (North Sea and Baltic Sea). The list of the EUNIS habitats identified in the south coast of Portugal (Algarve) as well as the new propositions for the EUNIS classification scheme are presented in table II.

**Table II.** List of the EUNIS habitats identified on the south coast of Portugal (Algarve).

EUNIS Code	Level	Name
A3.24_PT2	5	Proposed new EUNIS unit: [Bolma rugosa] and [Myriapora truncata] in association with [Lithophyllum incrustans]
A3.24_PT3	5	Proposed new EUNIS unit: [Anemonia sulcata] and [Paracentrotus lividus] in association with [Dictyota dichotoma]
A3.74_PT7	5	Proposed new EUNIS unit: Atlantic caves dominated by sponges and scleractinian corals
A4.27_PT1	5	Proposed new EUNIS unit: Mixed gorgonian gardens with [Parazoanthus axinellae] and sponges species
A5.23_PT4	5	Proposed new EUNIS unit: [Ophiura spp.] in infralittoral fine sand
A5.25_PT5	5	Proposed new EUNIS unit: [Ophiura texturata] and ermit crab communities in circalittoral fine sand
A5.34_PT6	5	Proposed new EUNIS unit: [Ophiocomina nigra] and [Suberites domuncula] in circalittoral fine mud
A3.712	5	Anemones, including [Corynactis viridis,] crustose sponges and colonial ascidians on very exposed or wave surged vertical infralittoral rock
A5.13	4	Infralittoral coarse sediment
A5.14	4	Circalittoral coarse sediment
A5.26	4	Circalittoral muddy sand
A5.36	4	Circalittoral fine mud
A5.44	4	Circalittoral mixed sediments
A5.511	5	Maerl beds
A5.5312	6	Lusitanian [Cymodocea] beds



**Figure 3.** Location of the new proposed biotopes from the Central Algarve coast (Portugal) for the EUNIS habitat classification.



**Figure 4.** Location of the new proposed biotopes from the Algarve coast (Sagres, Portugal) for the EUNIS habitat classification.

**NEW HABITATS**

<b>MIXED GORGONIAN GARDENS WITH [PARAZOANTHUS AXINELLAE] AND SPONGES SPECIES</b>			
<b>(EUNIS Habitat Type - A4.27_PT1)</b>			
<b>Habitat type</b>	Mixed gorgonian gardens with <i>Parazoanthus axinellae</i> and sponges species		
<b>EUNIS habitat type code</b>	A4.27_PT1		
<b>Level</b>	5		
<b>Change in definition of higher type</b>	<b>Why proposed habitat differs from other types?</b>		
A new level 4 is required. Faunal communities in shallow circalittoral	Consistently different assemblages of species; occurs below 20 meters depth on rocky bottom with mud sediment cover.		
<b>DESCRIPTION</b>			
	<p>This habitat is located in circalittoral rocky areas at depths of 20 metres and markedly goes on to greater depths. The rocky areas are predominantly regular and are clearly different from other coastal habitats. The mud sediment that in some extent covers the seabottom is one of the main reasons. This habitat also differs from other coastal habitats due to the density of several seafans species, especially six gorgonian species (<i>Eunicella labiata</i>, <i>Eunicella verrucosa</i>, <i>Eunicella gazella</i>, <i>Leptogorgia sarmentosa</i> and <i>Leptogorgia lusitanica</i>). It is also characterised by large density of others species such as cnidarians (<i>Parazoanthus axinellae</i>, <i>Actinothoe sphyrodeta</i>) and sponges (<i>Axinella polypoides</i>, <i>Axinella damicornis</i>, <i>Crella fusifera</i>, <i>Crella elegans</i>, <i>Cliona celata</i>, <i>Adreus fascicularis</i> and <i>Phorbas fictitius</i>). Some bryozoans species (e.g <i>Adeonella calveti</i>, <i>Pentapora foliacea</i>), ascideans (<i>Stolonica socialis</i>, <i>Smithia cervicornis</i>) and gastropodes (<i>Bolma rugosa</i>, <i>Hexaplex trunculus</i>) are also indicator species. Two fish species are also characteristic of this habitat (<i>Gobius gasteveni</i> and <i>Serranus hepatus</i>) and only few coralline algae species can be found (e.g. <i>Lithophyllum incrustans</i> and <i>Mesophyllum lichenoides</i>). According to the IUCN (2013) the gorgonian <i>Eunicella verrucosa</i> is facing a high risk of extinction in the wild in the medium-term future. The sand goby <i>Pomatoschistus minutus</i> under protection by the Bern Convention can be found in this habitat.</p> <p>Observed facies            Several distinctive facies were detected and are on assessments:            Facies of <i>Paramuricea clavata</i> and <i>Alcyonium acaule</i>            Facies of <i>Dendrophyllia ramea</i> and <i>Astrospartus mediterraneus</i>            Facies of <i>Corallium rubrum</i></p>		
<b>Links to available maps</b>	References: Gonçalves, J.M.S., Monteiro, P., Afonso, C., Almeida, C., Oliveira, F., Rangel, M., Ribeiro, J., Machado, M., Veiga, P., Abecasis, D., Pires, F., Fonseca, L., Erzini, K. & Bentes, L. 2008. Cartography and characterization of the marine communities off the National Underwater Ecological Reserve between Galé and the Arade river. Final Report. CCDR Algarve. University of Algarve, CCMAR, Faro, 144 pp. + Annexes.		
<b>Correspondence to conservation and protection status</b>			
	<b>Habitat directive/Natura 2000</b>	<b>OSPAR</b>	<b>OTHER</b>
1170	1170 : Reefs		
<b>Sensitivity to human activities</b>			
Mainly fishing activity and discharges of dredged sediments. Marine Pollution. Climate change and global warming			
<b>Persons / Institute responsible for the Habitat proposal</b>			
Pedro Monteiro, Frederico Oliveira, Carlos Afonso, Luís Bentes, Mafalda Rangel and Jorge Gonçalves/CCMAR-UALG			

**[BOLMA RUGOSA] AND [MYRIAPORA TRUNCATA] IN ASSOCIATION WITH [LITHOPHYLLUM INCRUSTANS]**

(EUNIS Habitat Type - A3.24\_PT2)

Habitat type	<i>Bolma rugosa</i> and <i>Myriapora truncata</i> in association with <i>Lithophyllum incrustans</i>	
EUNIS habitat type code	A3.24_PT2	
Level	5	
Change in definition of higher type	Why proposed habitat differs from other types?	
Not required	Consistently different assemblages of species; occurs between 15 and 30 meters depths on rocky bottom	

**DESCRIPTION**



This habitat can be found on infralittoral rocky areas at depths between 15 and 30 meters. The rocky bottom is predominantly regular in terms of rugosity but rocky slopes between one and two meters are often distinguishable. Near the rocky slope and overhang it is possible to find the highest diversity of this habitat. The epifauna community is extremely diverse and characterized by large assemblages of epifauna species where two indicator species, the turban snail *Bolma rugosa* (Gastropoda) and the false coral *Myriapora truncata* (Bryozoa). Other important characteristic species are sponges (*Phorbas fictitius* and *Cliona viridis*), molluscs (e.g. *Hexaplex trunculus*), echinoderms (*Holothuria mammata*, *Sphaerechinus granularis*, *Paracentrotus lividus* and *Pawsonia saxicola*), cnidarians (*Aiptasia diaphana* and *Anemonia sulcata*), bryozoan (*Pentapora foliacea* and *Schizobrachiella sanguinea*) and ascidians (*Didemnum* spp. and *Phallusia fumigata*). Several fish species (*Gobius xanthocephalus*, *Diplodus vulgaris*, *Coris julis*, *Ctenolabrus rupestris*, *Parablennius pilicornis* and *Serranus cabrilla*) and algae species (*Lithophyllum incrustans*, *Mesophyllum lichenoides*, *Halopteris filicina*, *Dictyota dichotoma* and *Cystoseira usneoides*) are also indicators of this habitat. Although in lower density *Eunicella verrucosa* and other gorgonian species can be found here too. *E. verrucosa* is also an indicator in this biotope and is according to the IUCN facing a high risk of extinction in the wild in the medium-term future.

Observed facies:  
 Facies of *Lithophyllum incrustans* and *Mesophyllum lichenoides*  
 Facies *Corynactis viridis*  
 Facies of *Cystoseira* spp.

**Links to available maps**

References: Gonçalves, J.M.S., Monteiro, P., Afonso, C., Almeida, C., Oliveira, F., Rangel, M., Ribeiro, J., Machado, M., Veiga, P., Abecasis, D., Pires, F., Fonseca, L., Erzini, K. & Bentes, L. 2008. Cartography and characterization of the marine communities off the National Underwater Ecological Reserve between Galé and the Arade river. Final Report. CCDR Algarve. University of Algarve, CCMAR, Faro, 144 pp. + Annexes.

**Correspondence to conservation and protection status**

Habitat directive/Natura 2000	OSPAR	OTHER
1170	1170 : Reefs	

**Sensitivity to human activities**

Mainly fishing activity and discharges of dredged sediments. Marine Pollution. Climate change and global warming

**Persons / Institute responsible for the Habitat proposal**

Pedro Monteiro, Frederico Oliveira, Carlos Afonso, Luís Bentes, Mafalda Rangel and Jorge Gonçalves/CCMAR-UALG

**[ANEMONIA SULCATA] AND [PARACENTROTUS LIVIDUS] IN ASSOCIATION WITH [DICTYOTA DICHOTOMA]**

**(EUNIS Habitat Type - A3.24\_PT3)**

<b>Habitat type</b>	<i>Anemonia sulcata</i> and <i>Paracentrotus lividus</i> in association with <i>Dictyota dichotoma</i>	
<b>EUNIS habitat type code</b>	A3.24_PT3	
<b>Level</b>	5	
<b>Change in definition of higher type</b>	<b>Why proposed habitat differs from other types?</b>	
Not required	Consistently different assemblages of species; occurs between 0 and 15 meters depths on rocky bottom	

**DESCRIPTION**

	<p>This habitat may be found on infralittoral rocky areas at depths between 0 and 30 meters. The rocky bottom is characterized by a low rugosity although rocky slopes, between one and two meters high, are commonly seen here. The wave energy and currents effect, as well as the fraction of light that reaches the sea bottom are very important ecological features for this habitat. The algae species are predominant here (<i>Plocamium cartilagineum</i>, <i>Lithophyllum incrustans</i>, <i>Halopteris filicina</i>, <i>Mesophyllum lichenoides</i>, <i>Sphaerococcus coronopifolius</i>, <i>Peyssonnelia rubra</i>), especially two species: <i>Dictyota dichotoma</i> and <i>Cystoseira usneoides</i>. This habitat is generally located near the coastal sheltered bays and small isles with distinct features. In general, this habitat is also characterized by a large abundance of invertebrates such as anemones (<i>Anemonia sulcata</i>, <i>Aiptasia diaphana</i>), echinoderms (<i>Paracentrotus lividus</i>, <i>Holothuria arguinensis</i>, <i>Holothuria mammata</i>, <i>Ophioderma longicauda</i>), molluscs (<i>Gibbula cineraria</i>, <i>Clavagella melitensis</i>) and bryozoa (<i>Schizobrachiella sanguinea</i> and <i>Pentapora foliacea</i>). Some fish species such as <i>Parablennius pilicornis</i>, <i>Diplodus vulgaris</i>, <i>Gobius xanthocephalus</i> and two wrasses species (<i>Coris julis</i>, <i>Symphodus bailloni</i>) are very common in this habitat and can be considered as good indicative species. According to the IUCN (2013), the sea fan <i>Eunicella verrucosa</i>, also presented in this habitat, is facing a high risk of extinction in the wild in the medium-term future. The sand goby <i>Pomatoschistus minutus</i> under protection by the Bern Convention may also be found in this habitat.</p> <p>Observed facies:                      Facies of <i>Anemonia sulcata</i> and <i>Paracentrotus lividus</i>;                      Facies of <i>Corallina elongata</i>;                      Facies of <i>Codium</i> spp.</p>
	
	

<b>Links to available maps</b>	References: Gonçalves, J.M.S., Monteiro, P., Afonso, C., Almeida, C., Oliveira, F., Rangel, M., Ribeiro, J., Machado, M., Veiga, P., Abecasis, D., Pires, F., Fonseca, L., Erzini, K. & Bentes, L. 2008. Cartography and characterization of the marine communities off the National Underwater Ecological Reserve between Galé and the Arade river. Final Report. CCDR Algarve. University of Algarve, CCMAR, Faro, 144 pp. + Annexes.
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**Correspondence to conservation and protection status**

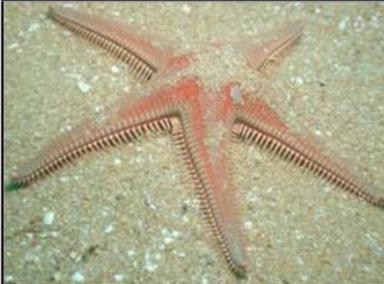
Habitat directive/Natura 2000	OSPAR	OTHER
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**Persons / Institute responsible for the Habitat proposal**

Pedro Monteiro, Frederico Oliveira, Carlos Afonso, Luís Bentes, Mafalda Rangel and Jorge Gonçalves/CCMAR-UALG

<b>[OPHIURA SPP.] IN INFRALITTORAL FINE SAND</b>			
<b>(EUNIS Habitat Type - A5.23_PT4)</b>			
<b>Habitat type</b>	<i>Ophiura</i> spp. in infralittoral fine sand		
<b>EUNIS habitat type code</b>	A5.23_PT4		
<b>Level</b>	5		
<b>Change in definition of higher type</b>	<b>Why proposed habitat differs from other types?</b>		
Not required	Consistently different assemblages of species; occurs between 0 and 30 meters depths on fine sand		
<b>DESCRIPTION</b>			
	<p>This habitat may be found on infralittoral soft bottom areas at depths between 0 and 30 meters. This soft bottom substrate can vary from fine sand to coarse sediment with <i>maerl</i> patches. The species richness in this habitat is characterised by large abundance and occurrence of equinoderms (<i>Ophiura albida</i>, <i>Ophiura texturata</i>, <i>Astropecten aranciacus</i>, <i>Psammechinus</i> cf. <i>microtuberculatus</i> and <i>Echinocardium cordatum</i>) and hermit crabs (<i>Diogenes pugilator</i>, <i>Anapagurus laevis</i> and <i>Spiropagurus elegans</i>) and others decapoda species (e.g. <i>Pisidia longicornis</i>, <i>Macropodia rostrata</i>, <i>Galathea intermedia</i> and <i>Eualus cranchii</i>). Amphipodes are also very frequent in this habitat (<i>Cerapopsis</i> cf. <i>takamado</i>, <i>Ampelisca typica</i>, <i>Leptocheirus pectinatus</i>, <i>Microdeutopus versiculatus</i>, <i>Leptocheirus hirsutimanus</i>, <i>Maera othonis</i> and <i>Atylus vedlomensis</i>). Several molluscs species like gastropods (<i>Gibbula magus</i>) and bivalve species (<i>Anomia ephippium</i> and <i>Corbula gibba</i>) as well the common cuttlefish (<i>Sepia officinalis</i>) find here their ecological niche. This habitat is also suitable for many flatfish species (<i>Arnoglossus thori</i>, <i>Microchirus boscanion</i>, <i>Buglossidium luteum</i> and <i>Arnoglossus laterna</i>), gobies (e.g. <i>Gobius gasteveni</i>, <i>Gobius roulei</i> and <i>Deltentosteus quadrimaculatus</i>) and dragonet fish (e.g. <i>Callionymus risso</i> and <i>Callionymus reticulatus</i>). The brown comber (<i>Serranus hepatus</i>) also finds a favourable ecological niche here. This habitat is very similar to the deeper and contiguous one which is differentiated mainly due to the EUNIS classification mandatory rules (e.g. Biological zoning: infralittoral vs. circalittoral).</p> <p>Observed facies No distinctive facies was detected</p>		
			
			
<b>Links to available maps</b>	References: Gonçalves, J.M.S., Monteiro, P., Afonso, C., Almeida, C., Oliveira, F., Rangel, M., Ribeiro, J., Machado, M., Veiga, P., Abecasis, D., Pires, F., Fonseca, L., Erzini, K. & Bentes, L. 2008. Cartography and characterization of the marine communities off the National Underwater Ecological Reserve between Galé and the Arade river. Final Report. CCDR Algarve. University of Algarve, CCMAR, Faro, 144 pp. + Annexes.		
<b>Correspondence to conservation and protection status</b>			
	<b>Habitat directive/Natura 2000</b>	<b>OSPAR</b>	<b>OTHER</b>
1110	1110 : Sandbanks which are slightly covered by sea water all the time		
<b>Sensitivity to human activities</b>			
Mainly fishing activity such as clam dredging, sand extraction and Marine Pollution. Climate change and global warming			
<b>Persons / Institute responsible for the Habitat proposal</b>			
Pedro Monteiro, Frederico Oliveira, Carlos Afonso, Luís Bentes, Mafalda Rangel and Jorge Gonçalves/CCMAR-UALG			

[OPHIURA TEXTURATA] AND ERMIT CRAB COMMUNITIES IN CIRCALITTORAL FINE SAND (EUNIS Habitat Type - A4.25_PT5)			
Habitat type	<i>Ophiura texturata</i> and ermit crab communities in circalittoral fine sand		
EUNIS habitat type code	A5.25_PT5		
Level	5		
Change in definition of higher type	Why proposed habitat differs from other types?		
Not required	Consistently different assemblages of species; occurs between 20 and 30 meters depths on fine sand		
<b>DESCRIPTION</b>			
	<p>This habitat may be found on circalittoral soft bottom areas at depths between 20 and 30 meters. This soft bottom substrate can vary from fine sand to coarse sediment with maer deposits. The characteristics species found in this habitat are very similar to the ones found on infralittoral soft bottoms. This habitat includes a large abundance and occurrence of the brittlestar <i>Ophiura texturata</i> and hermit crabs (<i>Paguristes eremita</i>, <i>Pagurus cuanensis</i> and <i>Diogenes pugilator</i>) as well as other decapoda species (e.g. <i>Pisidia longicornis</i>, <i>Macropodia rostrata</i>, <i>Galathea intermedia</i> and <i>Pontocaris cataphracta</i>). The brittlestar <i>Ophiura ophiura</i> and the parasitic anemone <i>Calliactis parasitica</i> are also considered as indicator species of this habitat. This habitat is equally suitable for many flatfish species (<i>Buglossidium luteum</i>, <i>Arnoglossus thori</i>, <i>Microchirus boscanion</i>, <i>Arnoglossus laterna</i>, <i>Citharus linguatula</i> and <i>Microchirus azevia</i>), and also for the the brown comber (<i>Serranus hepatus</i>). This habitat differs from the shallower habitat (A5.23_PT4) mainly due to the EUNIS classification mandatory rules (e.g. Biological zoning: infralittoral vs. circalittoral). The sand gobies <i>Pomatoschistus minutus</i> and <i>Pomatoschistus microps</i> under protection by the Bern Convention can be found here. The habitat A5.23_PT5 is very important for the undulate ray <i>Raja undulata</i> which is considered endangered and facing a very high risk of extinction in the wild by the IUCN (2013).</p> <p>Observed facies No distinctive facies was detected</p>		
			
			
Links to available maps	References: Gonçalves, J.M.S., Monteiro, P., Afonso, C., Almeida, C., Oliveira, F., Rangel, M., Ribeiro, J., Machado, M., Veiga, P., Abecasis, D., Pires, F., Fonseca, L., Erzini, K. & Bentes, L. 2008. Cartography and characterization of the marine communities off the National Underwater Ecological Reserve between Galé and the Arade river. Final Report. CCDR Algarve. University of Algarve, CCMAR, Faro, 144 pp. + Annexes.		
<b>Correspondence to conservation and protection status</b>			
	<b>Habitat directive/Natura 2000</b>	<b>OSPAR</b>	<b>OTHER</b>
1110	1110 : Sandbanks which are slightly covered by sea water all the time		
<b>Sensitivity to human activities</b>			
Mainly fishing activity and Marine Pollution. Climate change and global warming			
<b>Persons / Institute responsible for the Habitat proposal</b>			
Pedro Monteiro, Frederico Oliveira, Carlos Afonso, Luís Bentes, Mafalda Rangel and Jorge Gonçalves/CCMAR-UALG			

[OPHIOCOMINA NIGRA] AND [SUBERITES DOMUNCULA] IN CIRCALITTORAL FINE MUD (EUNIS Habitat Type - A5.34_PT6)		
Habitat type	<i>Ophiocomina nigra</i> and <i>Suberites domuncula</i> in circalittoral fine mud	
EUNIS habitat type code	A5.34_PT6	
Level	5	
Change in definition of higher type	Why proposed habitat differs from other types?	
Not required	Consistently different assemblages of species; occurs between 20 and 30 meters depths on muddy bottom	
<b>DESCRIPTION</b>		
	<p>This habitat normally occurs on circalittoral muddy bottom areas at depths between 20 and 30 meters. The community of epifauna is similar to the one found for the surrounding fine sand habitats. However, the typical species of these muddy areas should be highlighted such as brittle stars (<i>Ophiocomina nigra</i> and <i>Ophiothrix fragilis</i>) and others echinoderms (e.g. <i>Psammechinus cf. microtuberculatus</i>). The hermit crabs (<i>Paguristes eremita</i>, <i>Pagurus cuanensis</i> and <i>Anapagurus laevis</i>) as well others decapoda species (e.g. <i>Pisidia longicornis</i>, <i>Pilumnus hirtellus</i>, <i>Eualus cranchii</i> and <i>Ascidonia flavomaculata</i>) also find a favourable ecological niche here. Several bivalves species (e.g. <i>Gregariella petagna</i>, <i>Chlamys varia</i> and <i>Striarca lactea</i>), the white sea-squirt (<i>Phallusia mammillata</i>) and the sponge <i>Suberites domuncula</i> are clear indicator species of this habitat. The sand gobies <i>Pomatoschistus minutus</i> and <i>Pomatoschistus microps</i> under protection by the Bern Convention make use of this habitat. This habitat is also very important for the undulate ray <i>Raja undulata</i> which is considered endangered and facing a very high risk of extinction in the wild by the IUCN (2013).</p> <p>Observed facies No distinctive facies was detected</p>	
		
		
Links to available maps	References: Gonçalves, J.M.S., Monteiro, P., Afonso, C., Almeida, C., Oliveira, F., Rangel, M., Ribeiro, J., Machado, M., Veiga, P., Abecasis, D., Pires, F., Fonseca, L., Erzini, K. & Bentes, L. 2008. Cartography and characterization of the marine communities off the National Underwater Ecological Reserve between Galé and the Arade river. Final Report. CCDR Algarve. University of Algarve, CCMAR, Faro, 144 pp. + Annexes.	
<b>Correspondence to conservation and protection status</b>		
Habitat directive/Natura 2000	OSPAR	OTHER
1110	1110 : Sandbanks which are slightly covered by sea water all the time	
<b>Sensitivity to human activities</b>		
Mainly fishing activity and Marine Pollution. Climate change and global warming		
<b>Persons / Institute responsible for the Habitat proposal</b>		
Pedro Monteiro, Frederico Oliveira, Carlos Afonso, Luís Bentes, Mafalda Rangel and Jorge Gonçalves/CCMAR-UALG		

## ATLANTIC CAVES DOMINATED BY SPONGES AND SCLERACTINIAN CORALS

(EUNIS Habitat Type - A3.74\_PT7)

Habitat type	Atlantic caves dominated by sponges and scleractinian corals		
EUNIS habitat type code	A3.74_PT7		
Level	5		
Change in definition of higher type	Why proposed habitat differs from other types?		
Not required	Consistently different assemblages of species; Their opening occurs in shallow water between 6 and 18 meters depth and are mostly exposed to the swell and tidal movements.		

### DESCRIPTION

	<p>This biotope is located on infralittoral rocky area at depths between 6 and 18 meters, distributed on the cliffs and islets of Sagres. The submerged caves and tunnels could vary from merely a few meters to more complex structures of hundreds of meters and have one or more entrances. The rocky area is predominantly unregular with the presence of several large boulders clearly different from outside. The cave entrances are covered by cobble while mud sediment covers the inside bottom. The encrusting fauna communities are located mainly on the overhangs and vertical surfaces changing considerably from the entrance to the inside of the cave system. The entrance and the semiobscure areas are characterized mostly by species found outside of the caves and tunnels, while the inner part and completely obscure area is characterized by the occurrence of scleractinian coral species (e.g. <i>Astroides calycularis</i>, <i>Balanophyllia</i> (<i>Balanophyllia</i>) <i>regia</i>, <i>Caryophyllia inornata</i>, <i>Caryophyllia smithii</i>, <i>Phyllangia mouchezii</i>, <i>Paracyathus pulchellus</i> and <i>Polycyathus muellerae</i>) and many sponges (e.g. <i>Aaptos aaptos</i>, <i>Terpios gelatinosa</i>, <i>Hymedesmia versicolor</i>, <i>Condrosia reniformis</i>, <i>Corticium candelabrum</i>, <i>Crambe crambe</i> and <i>Pleraplysilla spinifera</i>), bryozoans (e.g. <i>Chartella papyracea</i>, <i>Puellina cassidainsis</i> and <i>Puellina saldanhai</i>) and ascideans species (e.g. <i>Didemnum</i> spp. and <i>Phallusia fumigata</i>). The sea cucumber <i>Holothuria forskali</i> and the crinoides <i>Antedon bifida</i> are also very common here. The octocoral <i>Alcyonium coralloides</i> and the Hexacoral <i>Dendrophyllia ramea</i> are two very conspicuous anthozoarian species that can be found only in a few caves. Some fish species have also been recorded but only one is a typical inhabitant of darkness (<i>Apogon imberbis</i>). Important and highly prized commercial species are very uncommon in the infralittoral surroundings, but can be also registered in this cave habitats, particularly crustacean species (<i>Homarus gammarus</i>, <i>Palinurus elephas</i> and <i>Scyllarus arctus</i>). The gorgonian species <i>Eunicella verrucosa</i> is vulnerable for the International Union for Conservation of Nature (IUCN, 2013) and is present on the entrance and semi-obscure cave area.</p>
	<p>Observed facies Three distinctive facies were detected but not yet perfectly described.</p>
<p><b>Links to available maps</b></p>	<p>References: Monteiro, P., Bentes L., Oliveira, F., Rangel O. M., Afonso, C., Rodrigues, J., Gonçalves, J.M.S. (2013). An overview of the submerged sea caves of Sagres (South of Portugal-Algarve). Technical Report No. 2/2013 - MeshAtlantic. Universidade do Algarve, CCMAR, Faro, 19 pp. Boury-Esnault, N., J.-G. Harmelin, M. Ledoyer, L. Saldanha and H. Zibrowius (2001) Peuplement benthique des grottes sous-marines de Sagres (Portugal, Atlantique nord-oriental). Bol. Mus. Mun. Funchal, Sup. 6: 15-38. Harmelin J.-G. (2001). <i>Puellina saldanhai</i> n. sp., a new cribrimorph cheilostome (Bryozoa: Gymnolaemata) from dark cave environment of southern Portugal. Boletim do Museu Municipal do Funchal (Historia Natural) Suppl. 6: 37-49.</p>

### Correspondence to conservation and protection status

Habitat directive/Natura 2000	OSPAR	OTHER
1170	1170 : Reefs	

### Sensitivity to human activities

Recreational scuba diving (confined and smaller caves). Marine Pollution. Climate change and global warming

### Persons / Institute responsible for the Habitat proposal

Pedro Monteiro, Frederico Oliveira, Carlos Afonso, Luís Bentes, Mafalda Rangel and Jorge Gonçalves/CCMAR-UALG

## **CONCLUSION**

Although the analyses presented above allowed the description of seven different habitat propositions for the EUNIS classification it should be noted that it is very likely that more could be described if a fine scale is applied. The lower EUNIS level (level 6) could be reached with a set of new surveys for the already known facies mentioned above. A more accurate description of the present habitats can be achieved as new data is acquired. The main problem we faced was the discrimination between the two sandy bottom habitats proposed. As noted above, the difference between the shallower and deeper sandy habitats might be only differentiated due to the EUNIS classification mandatory rules. Thus, these results lead us to think that a new amendment is possible for the actual EUNIS classification scheme.

## **CASE STUDY 2 Spain- Basque Country**

Basque Country – AZTI-Tecnalia

**Authors:** Ibon Galparsoro, Iratxe Menchaca, J. Germán Rodríguez and Ángel Borja

### **INTRODUCTION**

The increase in intensity and diversity of pressures in marine environment and the inclusion of new marine activities, such as marine renewable energy production, have resulted in the need of better environmental information to implement informed management plans in the Basque Country (Galparsoro *et al.*, 2012d). In this sense, marine habitat mapping is being recognized not only as a highly useful source of information for integrated coastal management but also in the implementation of several European Directives seeking good environmental status, management and protection: i.e. Habitats Directive (Council Directive 92/43/EEC), Water Framework Directive (Council Directive 2000/60/EC) and European Marine Strategy Framework Directive (Council Directive 2008/56/EC); and other approaches to management such as goods and services valuation and human activities management, and its application in the Marine Spatial Planning process (European Commission, 2008, 2013).

Within this context, in 2005, a seafloor mapping programme, funded by the Basque government, commenced with the aim of seafloor characterisation and benthic habitat mapping of the Basque continental shelf (Galparsoro *et al.*, 2009). After this, in 2010 the MeshAtlantic project was launched, including a case study for the Basque continental shelf.

The objectives of this case study were (i) to characterize those habitats with little information (i.e. rocky habitats), (ii) to improve the EUNIS habitat classification, suggesting adaptations to fit with the characteristics of this region, (iii) to propose new habitats of ecological importance to be included in the EUNIS classification, and (iv) to contribute to a broad-scale habitat map for the Atlantic area.

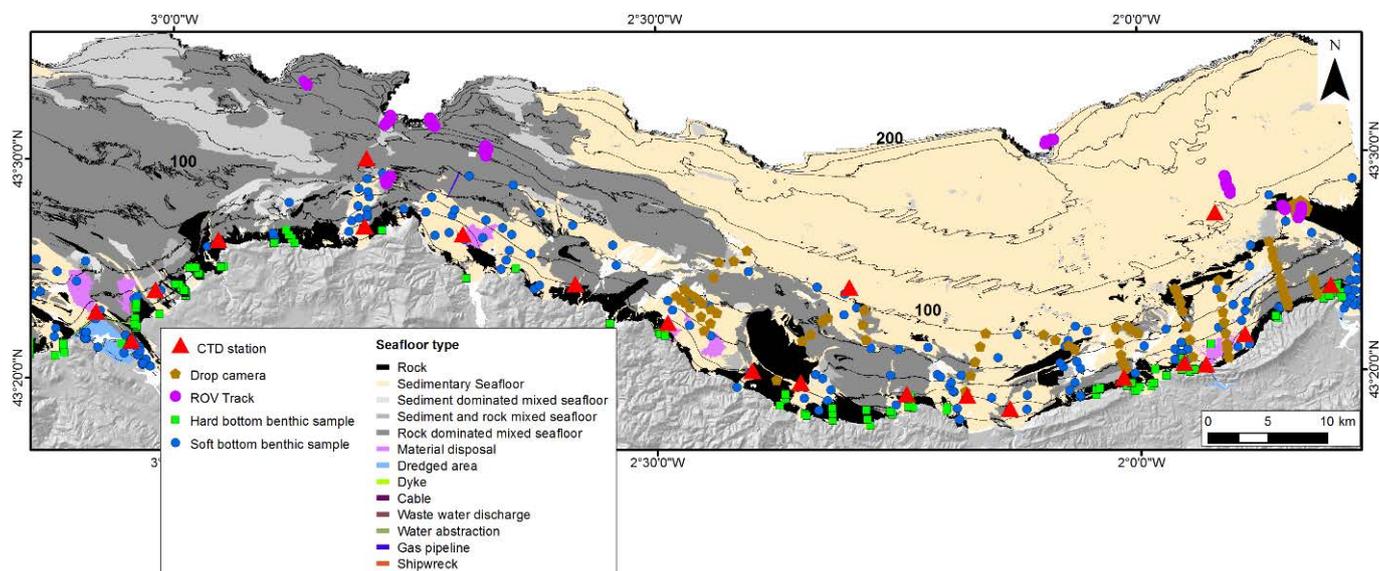
For these purposes, this investigation integrates different remote sensing and in situ sampling techniques to cover a continuum from land to circalittoral marine environments.

### **APPLICATION OF THE EUNIS CLASSIFICATION**

#### **STUDY AREA**

The Basque continental shelf is located in the south-eastern part of the Bay of Biscay (Figure 1). It is very narrow, ranging from 7 to 20 km, being the total length of the coastline of ca. 150 km. The marine habitats in this sector are related to geomorphology and hydrography (Galparsoro *et al.*, 2010a; Galparsoro *et al.*, 2012b). Sandy banks are distributed from beaches and river mouths down to muddy depths; meanwhile, rocky bottoms are dominant along the shore, reaching the outer part of the continental shelf. In terms of oceanographic characteristics, waves from the northwest direction (swell) are dominant over the region and the recorded periods range from 5 to 22 s, with the most frequent being between 8 and 12 s (Castaing, 1981). The tidal wave is semi-diurnal but despite the importance of tidally-induced surface water fluctuations, the contribution of the tides to the generation of currents is somewhat modest (except within the estuaries) (Fontán *et al.*, 2009).

The Basque coast presents some unique biogeographical characteristics. The differences are based mainly upon the scarcity, or absence, of several large brown algae (fucoids and laminarians), due to the summer water temperatures (up to 25°C). Thus, the dominance of several warm-temperate red algae, together with a minor presence of large brown algae typical of cold waters, shape a particular zonation; which resembles more the zonation at southern latitudes (Borja *et al.*, 2004).



**Figure 1.** Study area location and available data. Modified from (Galparsoro *et al.*, 2012a).

## DATA ANALYSIS AND MAPPING

Seafloor mapping was based on remote sensing techniques. Multibeam echosounder (MBES) (operating up to 200 m water depth), topographic LiDAR (terrestrial land to mid-intertidal zone), bathymetric LiDAR (up to 20 m water depth) (Galparsoro *et al.*, 2010b), and aerial photography (Chust *et al.*, 2007; Chust *et al.*, 2008) techniques were used. A total of 2,323 grab samples, were collated for ground-truthing and sediment characterisation. Biological benthic data included 405 grabs from soft-bottom, 50 samples from rocky seafloor taken by divers, 83 underwater image recordings at circalittoral zone (survey date 2010 and 2011 (Martínez & Galparsoro, 2013a)) and 9 km of ROV track records (survey date 2012 (Martínez & Galparsoro, 2013b)). Oceanographic data were obtained from 21 CTD stations (sampled since 1998 at each season of the year), within a monitoring network (Borja *et al.*, 2004). Moreover, data from 3 offshore oceanographic buoys (from January 2007 to March 2009 period), and 6 littoral ocean-meteorological stations (from 2001 to 2009) were analysed (Galparsoro, 2011).

The approach used in this investigation is based on a mixed top-down and bottom-up approach. High resolution information recorded with remote sensing techniques was used for the preliminary physiographic or seascapes classification (Roff *et al.*, 2003). Then, sedimentological and wave energy on the seafloor was integrated, which resulted in the level 3 (rock substratum) and level 4 (sedimentary substratum) of EUNIS abiotic habitat map. The assessment of rocky seafloor habitat characterisation was carried out by the interpretation of underwater images and video analysis by an expert benthologist. Information on physical characteristics and species lists were extracted and linked to geographical location of the images.

On the other hand, the assessment of soft-bottom benthos was based upon a BIO-ENV

analysis of PRIMER (Clarke & Gorley, 2001; Clarke & Warwick, 1994). It was carried out to relate the sedimentological and oceanographic conditions to species distribution. Then, LINKTREE routine was used to take the combination of variables that were identified as 'best' in BIO-ENV together with the faunal inter-station similarities to find the most effective way of describing the biological-environment relationships relative to the successive use of single environmental variables.

The aforementioned information was then used for habitat classification and mapping by environmental information layer combination in a GIS environment. The habitat classification (Davies *et al.*, 2004) was based on EUNIS, but it was adapted to the specific characteristics of the Basque continental shelf habitats (Galparsoro *et al.*, 2009). Apart from this, the Habitats of Community Interest according to Natura2000 were identified and habitats of interest in the Basque area were finally identified and mapped.

## RESULTS AND DISCUSSION

A total of 39 habitat classes were identified (Figure 2 and Table I): 4 of them were classified as littoral, 29 as infralittoral (from which 11 were of rocky substratum and 12 sedimentary substratum), 2 were coastal habitats, 3 artificial habitats and 1 habitat class was used for estuaries (complex habitats). The statistical analysis of BIO-ENV analysis of PRIMER for sedimentary habitats resulted in that the sedimentological characteristics, the wave energy, the annual temperature and the annual near-bottom chlorophyll concentration were the environmental variables that most explained the sedimentary communities' composition. Taking this into account, it could be stated that the environmental variables used in the lower levels of the EUNIS classification fit well with the obtained analytical results. In comparison to similar studies carried out in other biographic locations (Shumchenia & King, 2010). In our study area, seawater showed relatively constant oxygen saturation, with values permanently over 80%. Near-bottom salinity was also not found to be an important factor structuring benthic communities in open coast (mean annual value of  $35.4 \pm 0.1$  UPS). In fact, the Bay of Biscay is located in a temperate zone with no extreme oceanographic changes during the year, which is translated to a moderately stable in terms of oceanographic characteristics (Valencia *et al.*, 2004).

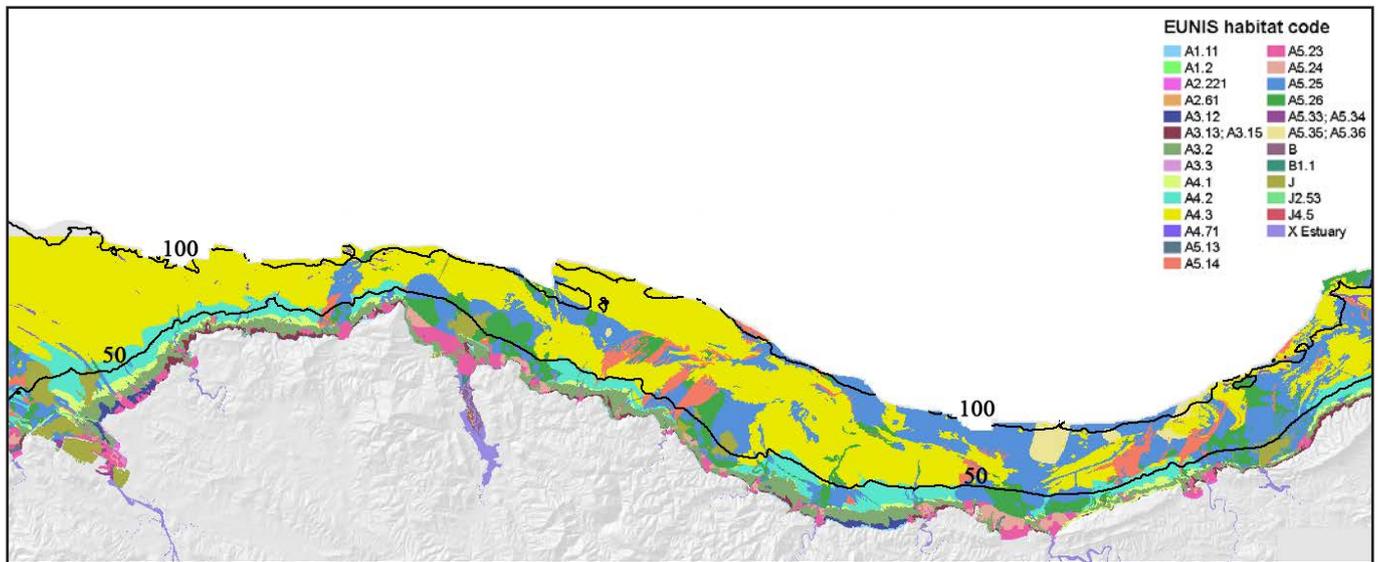
In this sense, as the hydrographical parameters are quite stable, the wave energy action and the sediment dynamics could be found to be the most important factors explaining the spatial variability in sedimentary benthic assemblages (Galparsoro *et al.*, Submitted), and probably, for rocky substrata habitats.

Rocky substratum habitat statistical analysis was not conducted due to the inherent difficulty of extracting quantitative information from underwater videos. Nevertheless, information on rocky substratum habitats and their communities is scarce in this sector and the information collated in this investigation demonstrated the presence of species and Community of Interest Habitats which were not cited before in this area (for details, see New Habitats section).

Specific biological composition was taken into account in the description of habitats. Thus, EUNIS habitat classes were maintained but new structuring and characteristic species were included in the description to fit with the results obtained from statistical analysis (for details, see New Habitats section). In some cases, the habitat description was found to be in between two habitat classes, especially for habitat classes which were divided by slight difference of grain

**Table I.** List of the EUNIS habitats identified

EUNIS Code	Level	Name
A1.11	4	Mussel and/or barnacle communities
A1.2	3	Moderate energy littoral rock
A2.221	5	Barren littoral coarse sand
A2.61	4	Seagrass beds on littoral sediments
A3.12	3	Sediment-affected or disturbed kelp and seaweed communities
A3.13	4	Mediterranean and Pontic communities of infralittoral algae very exposed to wave action
A3.15	4	Frondose algal communities (other than kelp)
A3.2	3	Atlantic and Mediterranean moderate energy infralittoral rock
A3.226	5	[Halopteris filicina] with coralline crusts on moderately exposed infralittoral rock
A3.3	3	Atlantic and Mediterranean low energy infralittoral rock
A4	2	Circalittoral rock and other hard substrata
A4.1	3	Atlantic and Mediterranean high energy circalittoral rock
A4.12	4	Sponge communities on deep circalittoral rock
A4.13	4	Mixed faunal turf communities on circalittoral rock
A4.121	5	[Phakellia ventilabrum] and axinellid sponges on deep, wave-exposed circalittoral rock
A4.2	3	Atlantic and Mediterranean moderate energy circalittoral rock
A4.212	5	[Caryophyllia smithii], sponges and crustose communities on wave-exposed circalittoral rock
A4.214	5	Faunal and algal crusts on exposed to moderately wave-exposed circalittoral rock
A4.22	3	[Sabellaria] reefs on circalittoral rock
A4.3	3	Atlantic and Mediterranean low energy circalittoral rock
A4.71	4	Communities of circalittoral caves and overhangs
A5.13	4	Infralittoral coarse sediment
A5.14	4	Circalittoral coarse sediment
A5.23	4	Infralittoral fine sand
A5.24	4	Infralittoral muddy sand
A5.25	4	Circalittoral fine sand
A5.26	4	Circalittoral muddy sand
A5.33	4	Infralittoral sandy mud
A5.34	4	Infralittoral fine mud
A5.35	4	Circalittoral sandy mud
A5.36	4	Circalittoral fine mud
A5.37	4	Deep circalittoral mud
A5.44	4	Circalittoral mixed sediments
B	1	Coastal habitats
B1.1	3	Sand beach driftlines
J	1	Constructed, industrial and other artificial habitats
J2.53	4	Sea walls
J4.5	3	Hard-surfaced areas of ports
X0.1	1	Habitat complexes



**Figure 2.** Benthic habitat map according to EUNIS habitat classification codes.

size: i.e. infralittoral sandy mud and infralittoral fine mud. In those cases, the habitat has been classified by both habitat classes. For rocky substratum the difficulty was associated to the quantity and quality of information for an appropriate habitat classification and characterisation. Thus, oceanographic and physiographic information, were used for mapping, and the habitat biological characterisation was based on interpretation of underwater images and on expert judgement.

**NEW HABITATS**

[GELIDIUM CORNEUM] ON VERY EXPOSED INFRALITTORAL BEDROCK AND BOULDERS	
(EUNIS Habitat Type- A3.151_BC1)	
Habitat type	Infralittoral bedrock and boulders
EUNIS habitat type code	A3.151_BC1
Level	5
Change in definition of higher type	Why proposed habitat differs from other types?
A new level 4 is required. Faunal communities in shallow circalittoral	The seaweed <i>Gelidium corneum</i> is not cited in other EUNIS classes (only red seaweeds). It shows an important ecological value in the Cantabrian sea
DESCRIPTION	
	<p>In the southern Bay of Biscay and the Iberian coasts (until Morocco, in the south), communities such as <i>Gelidium corneum</i> or <i>Cystoseira baccata</i>, have been reported [2-4]. The most complex structural level was represented, within this study area, by the communities of <i>Gelidium corneum</i> and that of <i>Pterosiphonia complanata</i> in unpolluted waters. According to Borja [5-9] the eastern Basque coast (Gipuzkoa) presents a homogenous vegetation composed mainly of extensive beds of <i>Gelidium corneum</i>, extending from 0 to 10-15 m water depth (sometimes reaching 25 m, mixed with <i>Cystoseira baccata</i> [3, 10]. This community is favored by the predominance of bedrock, little to moderate sand sedimentation and high exposure to wave action. This vegetation type utilizes the space through its complex vertical layering, consisting of a well-developed crustose layer of <i>Mesophyllum lichenoides</i> and <i>Zanardinia typus</i>, a poor underlying layer of <i>Pterosiphonia complanata</i>, <i>Corallina</i> spp., <i>Rhodymenia pseudopalmata</i> and <i>Cryptopleura ramosa</i>, a well-developed canopy of <i>Gelidium corneum</i>, and a poor summer epiphytic layer of <i>Plocamium cartilagineum</i> and <i>Dictyota dichotoma</i> (well developed in late spring). The fauna consists of mollusks, such as <i>Gastrochaena dubia</i> and <i>Aplysia punctata</i>; sponges (<i>Clathrina coriacea</i> and <i>Sycon ciliatum</i>); cnidaria (<i>Laomedea flexuosa</i> and <i>Gymnangium montagui</i>); crustacea (<i>Cymodoce truncata</i> and <i>Apherusa jurinei</i>); bryozoa (<i>Crisia eburnea</i>, etc.) [3]. In this community <i>Gelidium corneum</i> and <i>Mesophyllum lichenoides</i> account for 72% of the overall algal cover. For the remainder, <i>Plocamium cartilagineum</i>, <i>Pterosiphonia complanata</i>, <i>Asparagopsis armata</i> (<i>Falkenbergia</i> phase), <i>Cystoseira baccata</i>, <i>Halopitys incurvus</i>, and <i>Corallina</i> species were the most abundant macrophytes [5].</p> <p>At a deeper water depth fringe, the <i>Halopteris filicina</i> community appears in water depths ranging from 25 to 50 m [3, 11]. The algae are mixed frequently with other rhodophyceae, such as <i>Phyllophora crispa</i> and <i>Peyssonnelia rubra</i>. The fauna consists of a cover of the cirripede <i>Verruca stroemia</i>, the sipuncula <i>Aspidosiphon muelleri</i>, the bivalve <i>Modiolus barbatus</i> and the cnidaria <i>Sertularella ellisi</i>, among others [3, 11]. In the Mediterranean province, in sunlit water and at strong or medium wave exposures in the upper sublittoral zone, one finds sun-adapted species of <i>Cystoseira</i>. This canopy algae form the greatest part of the algal biomass in this subzone. This biocenosis has been named after <i>C. stricta</i>, which occurs at the Côte d'Azur and is replaced by <i>C. mediterranea</i> as a variant (morphologically similar but geographically distant) species near Banyuls, the Balearic Islands, and along the coast of western Italy. Below the dense canopy of <i>Cystoseira</i> numerous smaller understory algae grow, for example, the red algae <i>Laurencia pinnatifida</i>, <i>Schottera</i> (= <i>Petrogossium</i>) <i>nicaeensis</i>, and the green alga <i>Valonia utricularis</i>. At locations where there is no light-protecting canopy of <i>Cystoseira</i>, biocenoses develop that are dominated by, for example, the green alga <i>Acetabularia acetabulum</i> and the mussel <i>Mytilus galloprovincialis</i>. In the eastern Mediterranean the crustose coralline algae <i>Tenaea tortuosa</i> (= <i>undulos</i>) and <i>Lithophyllum byssoides</i> are dominant. In warmer parts of the Mediterranean (Corsica, Balearic Islands, Algeria, Sicily, and Lebanon) the sessile vermet snail <i>Vermetus cristatus</i> forms a second protruding belt in the upper sublittoral zone below the trottoir of <i>Lithophyllum lichenoides</i> (= <i>tortuosum</i>; [12]) [13].</p> <p>List and Description of Associated Biotopes at Level 5 A3.151 [<i>Cystoseira</i> spp.] on exposed infralittoral bedrock and boulders.</p>

	Observed facies No distinctive facies was detected		
<b>Links to available maps</b>	References:		
	<p>[1] Connor DW, Allen JH, Golding N, Howell KL, Lieberknecht LM, Northen KO, Reker JB. 2004. Marine Habitat Classification for Britain and Ireland Version 04.05. JNCC, Peterborough. <a href="http://www.jncc.gov.uk/MarineHabitatClassification">www.jncc.gov.uk/MarineHabitatClassification</a>.</p> <p>[2] Limia JM, Gorostiaga JM. (1987) Flora marina bentónica sublitoral del tramo de costa comprendido entre Pta. Covarón y Pta. Muskes (Vizcaya, N.E. España). Act.VI Simp.Nac.Bot. Cript.:81-88.</p> <p>[3] Borja A, Valencia V, García L, Arresti A. (1995) Las comunidades bentónicas intermareales y submareales de San Sebastián - Pasajes (Guipúzcoa, norte de España). Actas del IV coloquio internacional sobre oceanografía del Golfo de Vizcaya:165-81.</p> <p>[4] Díez I, Santolaria A, Secilla A, Gorostiaga JM (2000). Comunidades fitobentónicas submareales de la zona exterior de la Reserva de la Biosfera de Urdaibai. Consideraciones sobre su estado ecológico. Vitoria: Gobierno Vasco (Ed.), 151-57 pp.</p> <p>[5] Gorostiaga JM, Santolaria A, Secilla A, I. Díez. (1998) Sublittoral benthic vegetation of the eastern Basque coast (N. Spain): structure and environmental factors. Botánica Marina, 41:455-65.</p> <p>[6] Díez I, Santolaria A, Gorostiaga JM. (2003) The relationship of environmental factors to the structure and distribution of subtidal seaweed vegetation of the western Basque coast (N Spain). Estuarine Coastal and Shelf Science, 56(5-6):1041-54.</p> <p>[7] Borja A. (1987) Cartografía, evaluación de la biomasa y arribazones del alga <i>Gelidium sesquipedale</i> (Clem.) Born. et Thur. en la costa guipuzcoana (N España). Inv.Pesq., 51(2):199-224.</p> <p>[8] Borja A. 1987. El alga <i>Gelidium</i> en la costa guipuzcoana, Report 2. pp 17.</p> <p>[9] Borja A. 1987. El alga <i>Gelidium</i> en la costa vizcaína, Report 10. pp 57.</p> <p>[10] Borja Á, Valencia V, Castro R, Franco J, Bald J, Uriarte A, Mendizabal M, Aguirrezabalaga F. 2000. Establecimiento de las bases técnicas de conocimiento del área de San Juan de Gaztelugatxe con vistas a su posible declaración como reserva marina. Informes Técnicos (Departamento de Agricultura y Pesca, Gobierno Vasco), Report 87. pp 152.</p> <p>[11] Borja A, Franco J, Belzunce MJ, Valencia V. 2000. La red de vigilancia y control de la calidad de las aguas litorales del País Vasco: años 1998-1999, Report 55. pp 94.</p> <p>[12] Pérés JM. (1967) The Mediterranean benthos. Oceanogr. Mar. Biol. Annu. Rev. 5, 449-533.</p> <p>[13] Luning K. 1990. Seaweeds. Their environment, biogeography and ecophysiology, pp 527.</p> <p>[14] Díez I, Santolaria A, Gorostiaga JM. (2003) The relationship of environmental factors to the structure and distribution of subtidal seaweed vegetation of the western Basque coast (N Spain). Estuarine, Coastal and Shelf Science, 56(5-6):1041-54.</p> <p>[15] Borja, Á., A. Fontán, I. Muxika, 2013. Interactions between climatic variables and human pressures upon a macroalgae population: Implications for management. Ocean &amp; Coastal Management, 76: 85-95.</p>		
<b>Correspondence to conservation and protection status</b>			
	<b>Habitat directive/Natura 2000</b>	<b>OSPAR</b>	<b>OTHER</b>
1170	1170 : Reefs		Bern Convention 11.24: Sublittoral rocky seabeds and kelp forests
<b>Sensitivity to human activities</b>			
<p>This habitat is especially sensitive to pollution, suspended load, eutrophication and climate change. Under moderate pollution, the vegetation assemblages consisted of species such as <i>Drachiella minuta</i>, <i>Aglaothamnion cordatum</i>, <i>Codium decorticatum</i>, <i>Nitophyllum punctatum</i> and <i>Zanardinia typus</i>. At slightly polluted habitats, <i>Pterosiphonia complanata</i>, <i>Saccorhiza polyschides</i> and <i>Callophyllis laciniata</i> were more abundant [14]</p> <p>This habitat is also sensitive to any human activities producing physical damage or alteration of the substratum and also to climate change [15]</p>			
<b>Persons / Institute responsible for the Habitat proposal</b>			
Ibon Galparsoro-AZTI-Tecnalia			

**[PHAKELLIA VENTILABRUM] AND BRACHIOPODS ON CIRCALITTORAL ROCK  
(ESPECIALLY [MEGERLIA TRUNCATA])**

(EUNIS Habitat Type- A4.121\_BC2)

Habitat type	Sponge communities on deep circalittoral rock	
EUNIS habitat type code	A4.121_BC2	
Level	5	
Change in definition of higher type	Why proposed habitat differs from other types?	
Not required	Consistently different assemblages of species	

**DESCRIPTION**



Typically occurs on the upper faces of deep (commonly below 30m depth), wave-exposed circalittoral rock subject to negligible tidal streams. Although it occurs in exposed and very exposed conditions, at such depth, the turbulent wave action appears to have a much-attenuated effect on the fauna compared with shallower depths. As the majority of records are from depths between 30-50 m, slightly deeper than the depths of most surveys, it is possible that this biotope is more widespread than EUNIS indicates. For example in the South-Eastern Bay of Biscay, *Phakellia ventilabrum* facies expands widely occupying the rocky seabed at depths that range between 50 and 100 m. It mainly occupies crests and exposed sides of the rock subjects. In that area, *Phakellia ventilabrum* shares space with different sponges and several encrusting sponges (mostly from the Class Demospongiae), the yellow coral *Dendrophyllia cornigera*; the gorgonian *Swiftia pallida*; the hexacoral *Caryophyllia* sp.; the zoanthario *Alcyonium glomeratum*; the sea urchins *Echinus acutus* and *Echinus melo*; the crinoid *Antedon bifida*; the brittle star *Ophiactis balli*; the foraminifera *Miniacina miniacea*; the brachiopods *Megerlia truncata*, *Nocovrania anomala* and *Terebratulina retusa*; and the oyster *Pycnodonta cochlear*. Due to the fact that the brachiopods populations, especially of *Megerlia truncata*, occupy large areas of the blocks, it should be considered creating a new EUNIS code for *Phakellia* and brachypods on deep, wave-exposed circalittoral rock that would apply in this study area. Despite two EUNIS categories considers brachypods (A4.313 and A4.314), none of them suit the habitats found in this area. Finally, the oyster *Neopycnodonte cochlear* is abundant in some locations and therefore, a new facies *Phakellia ventilabrum* and *Neopycnodonte cochlear* on circalittoral rock could be considered for inclusion.

Observed facies:

Facies of *Phakellia ventilabrum* and *Neopycnodonte cochlear* on circalittoral rock

Links to available maps	References: Martínez, J., I. Galparsoro, 2012. Caracterización de las comunidades circalitorales de la plataforma continental de la Costa Vasca mediante la interpretación de imágenes submarinas. MeshAtlantic Technical Report. 181 pp. Martínez, J., I. Galparsoro, 2013. Caracterización de los fondos circalitorales profundos frente a las costas de Bermeo y Pasaia mediante la interpretación de imágenes submarinas. MeshAtlantic Technical Report. 140 pp.
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**Correspondence to conservation and protection status**

Habitat directive/Natura 2000	OSPAR	OTHER
1170	1170 : Reefs	Deep-sea sponge aggregations
		Bern Convention 11.24: Sublittoral rocky seabeds and kelp forests

**Sensitivity to human activities**

This habitat is especially sensitive to fishing activity. Set gillnet, and especially, bottom trawling producing mechanical disturbance and abrasion can produce physical damage to structuring species.

**Persons / Institute responsible for the Habitat proposal**

Ibon Galparsoro-AZTI-Tecnalia

**[NEOPYCNODONTE COCHLEAR] AND OTHER EMBED COMMUNITIES ON DEEP CIRCALITTORAL ROCK**

(EUNIS Habitat Type-A4.28\_BC3)

<b>Habitat type</b>	Atlantic and Mediterranean moderate energy circalittoral rock	
<b>EUNIS habitat type code</b>	A4.28_BC3	
<b>Level</b>	4	
<b>Change in definition of higher type</b>	<b>Why proposed habitat differs from other types?</b>	
Not required	Consistently different dominant species	

**DESCRIPTION**



Deep circalittoral rock at depth of 96-228 metres dominated by oyster *Neopycnodonte cochlear*, yellow coral *Dendrophyllia cornigera* and brachiopod *Novocrania anomala*.

Observed facies  
No distinctive facies was detected

<b>Links to available maps</b>	References: Martínez, J., I. Galparsoro, 2013. Caracterización de los fondos circalitorales profundos frente a las costas de Bermeo y Pasaia mediante la interpretación de imágenes submarinas. MeshAtlantic Technical Report. 140 pp.
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**Correspondence to conservation and protection status**

	Habitat directive/Natura 2000	OSPAR	OTHER
1170	1170 : Reefs		Bern Convention 11.24: Sublittoral rocky seabeds and kelp forests

**Sensitivity to human activities**

This habitat is especially sensitive to fishing activity. Set gillnet, and especially, bottom trawling producing mechanical disturbance and abrasion can produce physical damage structuring species.

**Persons / Institute responsible for the Habitat proposal**

Ibon Galparsoro-AZTI-Tecnalia

[MEGERLIA TRUNCATA] AND OTHER COMMUNITIES ON CIRCALITTORAL ROCK (EUNIS Habitat Type- A4.31_BC4)			
Habitat type	Atlantic and Mediterranean low energy circalittoral rock		
EUNIS habitat type code	A4.31_BC4		
Level	4		
Change in definition of higher type	Why proposed habitat differs from other types?		
Not required	Existing modified habitat		
<b>DESCRIPTION</b>			
	Circalittoral bedrock with holes characterised by brachiopod <i>Megerlia truncata</i> . Colonies of sponges <i>Geodia barretti</i> , <i>Geodia</i> cf. <i>macandrewii</i> , <i>Petrosia ficiformis</i> , <i>Phakellia</i> sp., colonies of zooids <i>Parazoanthus anguicomus</i> , polychaeta serpulidae, sea urchins <i>Echinus acutus</i> , <i>Echinus melo</i> , <i>Echinus esculentus</i> and <i>Sphaerochinus granularis</i> and the crinoid <i>Antedon bifida</i> have all been recorded within and among the brachiopod. Mobile species present include the fishes <i>Serranus cabrilla</i> , <i>Diplodus cervinus</i> and <i>Pollachius pollachius</i> .		
	Observed facies No distinctive facies was detected		
Links to available maps	References: Martínez, J., I. Galparsoro, 2013. Caracterización de los fondos circalitorales profundos frente a las costas de Bermeo y Pasaia mediante la interpretación de imágenes submarinas. MeshAtlantic Technical Report. 139 pp.		
<b>Correspondence to conservation and protection status</b>			
	Habitat directive/Natura 2000	OSPAR	OTHER
1170	1170 : Reefs		Bern Convention 11.24: Sublittoral rocky seabeds and kelp forests
<b>Sensitivity to human activities</b>			
This habitat is especially sensitive to pollution, fishing or other activities that can produce physical disturbance.			
<b>Persons / Institute responsible for the Habitat proposal</b>			
Ibon Galparsoro-AZTI-Tecnalia			

**[GRANIA] SP., [SPHAEROSYLLIS BULBOSA], [POLYGORDIUS APPENDICULATUS], [PISIONE REMOTA] AND NEMERTINA IN CIRCALITTORAL COARSE SEDIMENT**

(EUNIS Habitat Type- A5.14\_BC5)

<b>Habitat type</b>	Circalittoral coarse sediment	
<b>EUNIS habitat type code</b>	A5.14_BC5	
<b>Level</b>	4	
<b>Change in definition of higher type</b>	<b>Why proposed habitat differs from other types?</b>	
Not required	Existing modified habitat	

**DESCRIPTION**



Coarse sand with gravels, at depths of 44-77 metres, with very weak or no current, dominated by the polychaetes *Polygordius appendiculatus*, *Pisione remota*, *Sphaerosyllis bulbosa*, *Goniadella gracilis*, *Mediomastus fragilis*, *Glycera lapidum*, *Protodrilus*; ophiuroid *Amphipholis squamata*, oligochaete *Grania*; Nematoda and Nemertina.

Observed facies  
No distinctive facies was detected

<b>Links to available maps</b>	References: Galparsoro, I., G. Rodríguez, Á. Borja, 2009. Elaboración de mapas de hábitats y caracterización de fondos marinos de la plataforma continental vasca. Informe elaborado por AZTI-Tecnalia para el Dirección de Biodiversidad; Viceconsejería de Medio Ambiente; Departamento de Medio Ambiente, Planificación Territorial, Agricultura y Pesca del Gobierno Vasco. 74 pp. <a href="http://www.geo.euskadi.net/s69geodir/es/contenidos/ds_geograficos/habitats_marinos/es_opendata/adjuntos/InformeHabitats2009.pdf">http://www.geo.euskadi.net/s69geodir/es/contenidos/ds_geograficos/habitats_marinos/es_opendata/adjuntos/InformeHabitats2009.pdf</a>
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**Correspondence to conservation and protection status**

Habitat directive/Natura 2000	OSPAR	OTHER
		Council of Bern Convention, 1996: Sublittoral soft seabeds (code 11.22)

**Sensitivity to human activities**

This habitat is especially sensitive to fishing activity. Set gillnet, and especially, bottom trawling producing mechanical disturbance and abrasion can produce physical damage of the habitat.

**Persons / Institute responsible for the Habitat proposal**

Ibon Galparsoro-AZTI-Tecnalia

[MACTRA STULTORUM], [ECHINOCARDIUM CORDATUM], [MAGELONA JOHNSTONI], [MEDIOMASTUS FRAGILIS], [OWENIA FUSIFORMIS] AND [SPIOPHANES BOMBYX] IN CIRCALITTORAL FINE SAND

(EUNIS Habitat Type- A5.25\_BC6)

Habitat type	Circalittoral fine sand	
EUNIS habitat type code	A5.25_BC6	
Level	4	
Change in definition of higher type		Why proposed habitat differs from other types?
Not required		Existing modified habitat

**DESCRIPTION**

	<p>Non-cohesive muddy sands (typically 2-6% silt/clay) at depths of 20-37 metres, with moderately strong current, characterised by the sea urchin <i>Echinocardium cordatum</i>, bivalve <i>Maetra stultorum</i>, polychaetes <i>Magelona johnstoni</i>, <i>Mediomastus fragilis</i>, <i>Owenia fusiformis</i> and <i>Spiophanes bombyx</i>.</p> <p>Observed facies No distinctive facies was detected</p>
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<b>Links to available maps</b>	<p>References: Galparsoro, I., G. Rodríguez, Á. Borja, 2009. Elaboración de mapas de hábitats y caracterización de fondos marinos de la plataforma continental vasca. Informe elaborado por AZTI-Tecnalia para la Dirección de Biodiversidad; Viceconsejería de Medio Ambiente; Departamento de Medio Ambiente, Planificación Territorial, Agricultura y Pesca del Gobierno Vasco. 74 pp. <a href="http://www.geo.euskadi.net/s69geodir/es/contenidos/ds_geograficos/habitats_marinos/es_opendata/adjuntos/InformeHabitats2009.pdf">http://www.geo.euskadi.net/s69geodir/es/contenidos/ds_geograficos/habitats_marinos/es_opendata/adjuntos/InformeHabitats2009.pdf</a></p>
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**Correspondence to conservation and protection status**

Habitat directive/Natura 2000	OSPAR	OTHER
		Council of Bern Convention, 1996: Sublittoral soft seabeds (code 11.22)

**Sensitivity to human activities**

This habitat is especially sensitive to fishing activity. Set gillnet, and especially, bottom trawling producing mechanical disturbance and abrasion can produce physical damage to this habitat. Due to its environmental characteristics (i.e. with very stable conditions), and species biological traits (i.e. long life-span, low reproduction capacity, fragility, etc.), the recovery capacity after physical damage is very limited.

**Persons / Institute responsible for the Habitat proposal**

Ibon Galparsoro-AZTI-Tecnalia

[GALATHOWENIA OCULATA], [CHAETOZONE GIBBER], [SPIOPHANES BOMBYX], [PECTINARIA KORENI], [SPIOPHANES KROYERI] AND [PRIONOSPPIO FALLAX] IN CIRCALITTORAL MUDDY SAND

(EUNIS Habitat Type- A5.26\_BC7)

Habitat type	Circalittoral muddy sand	
EUNIS habitat type code	A5.26_BC7	
Level	4	
Change in definition of higher type		Why proposed habitat differs from other types?
Not required		Existing modified habitat

**DESCRIPTION**

	<p>Non-cohesive muddy sands (typically 17-42% silt/clay) at depths of 44-77 metres, with weak current, characterised by polychaetes <i>Chaetozone gibber</i>, <i>Galathowenia oculata</i>, <i>Spiophanes bombyx</i>, <i>Prionospio fallax</i>, <i>Spiophanes kroyeri</i>, <i>Pectinaria koreni</i>, <i>Myriochele danielsseni</i>, <i>Lumbrineris lusitana</i>, <i>Nephtys hombergii</i>, <i>Paradoneis ilvana</i>, <i>Phyllodoce rosea</i> and the amphipod <i>Harpinia antennaria</i>.</p> <p>Observed facies No distinctive facies was detected</p>
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<b>Links to available maps</b>	References: Galparsoro, I., G. Rodríguez, Á. Borja, 2009. Elaboración de mapas de hábitats y caracterización de fondos marinos de la plataforma continental vasca. Informe elaborado por AZTI-Tecnalia para la Dirección de Biodiversidad; Viceconsejería de Medio Ambiente; Departamento de Medio Ambiente, Planificación Territorial, Agricultura y Pesca del Gobierno Vasco. 74 pp. <a href="http://www.geo.euskadi.net/s69geodir/es/contenidos/ds_geograficos/habitats_marinos/es_opendata/adjuntos/InformeHabitats2009.pdf">http://www.geo.euskadi.net/s69geodir/es/contenidos/ds_geograficos/habitats_marinos/es_opendata/adjuntos/InformeHabitats2009.pdf</a>
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**Correspondence to conservation and protection status**

Habitat directive/Natura 2000	OSPAR	OTHER
		Council of Bern Convention, 1996: Sublittoral soft seabeds (code 11.22)

**Sensitivity to human activities**

This habitat is especially sensitive to fishing activity. Set gillnet, and especially, bottom trawling producing mechanical disturbance and abrasion can produce physical damage to this habitat. Due to its environmental characteristics (i.e. with very stable conditions), and species biological traits (i.e. long life-span, low reproduction capacity, fragility, etc.), the recovery capacity after physical damage is very limited.

**Persons / Institute responsible for the Habitat proposal**

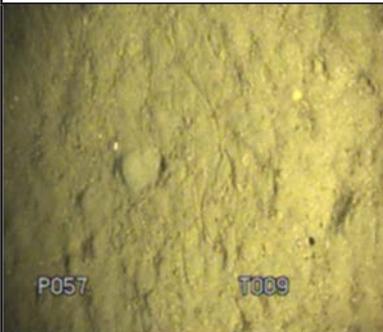
Ibon Galparsoro-AZTI-Tecnalia

[GALATHOWENIA OCULATA], [AMPELISCA TENUICORNIS], [TEREBELLIDES STROEMII], [MONTICELLINA DORSOBRANCHIALIS], [THYASIRA FLEXUOSA] AND [AMPHARETE FINMARCHICA] IN CIRCALITTORAL SANDY MUD

(EUNIS Habitat Type- A5.35\_BC8)

Habitat type	Circalittoral sandy mud
EUNIS habitat type code	A5.35_BC8
Level	4
Change in definition of higher type	Why proposed habitat differs from other types?
Not required	Existing modified habitat

**DESCRIPTION**

	<p>Sandy mud (typically 37-78% silt/clay) at depths of 70-100 metres, with very weak or no current, dominated by the polychaetes <i>Galathowenia oculata</i>, <i>Terebellides stroemii</i>, <i>Monticellina dorsobranchialis</i>, <i>Ampharete finmarchica</i>, <i>Maldane glebifex</i>, <i>Monticellina</i> sp., <i>Chaetozone</i> cf. <i>setosa</i>, <i>Scoloplos armiger</i>, <i>Abyssoninoe hibernica</i>, <i>Mediomastus fragilis</i>, <i>Gallardonis iberica</i>, <i>Ninoe armoricana</i>; the bivalve <i>Thyasira flexuosa</i>, the amphipod <i>Ampelisca tenuicornis</i>; the cumacean <i>Iphinoe serrata</i> and Nemertina.</p> <p>Observed facies No distinctive facies was detected</p>
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<b>Links to available maps</b>	References: Galparsoro, I., G. Rodríguez, Á. Borja, 2009. Elaboración de mapas de hábitats y caracterización de fondos marinos de la plataforma continental vasca. Informe elaborado por AZTI-Tecnalia para la Dirección de Biodiversidad; Viceconsejería de Medio Ambiente; Departamento de Medio Ambiente, Planificación Territorial, Agricultura y Pesca del Gobierno Vasco. 74 pp. <a href="http://www.geo.euskadi.net/s69geodir/es/contenidos/ds_geograficos/habitats_marinos/es_opendata/adjuntos/InformeHabitats2009.pdf">http://www.geo.euskadi.net/s69geodir/es/contenidos/ds_geograficos/habitats_marinos/es_opendata/adjuntos/InformeHabitats2009.pdf</a>
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**Correspondence to conservation and protection status**

Habitat directive/Natura 2000	OSPAR	OTHER
		Council of Bern Convention, 1996: Sublittoral soft seabeds (code 11.22)

**Sensitivity to human activities**

This habitat is especially sensitive to fishing activity. Set gillnet, and especially, bottom trawling producing mechanical disturbance and abrasion can produce physical damage to this habitat. Due to its environmental characteristics (i.e. with very stable conditions), and species biological traits (i.e. long life-span, low reproduction capacity, fragility, etc.), the recovery capacity after physical damage is very limited.

**Persons / Institute responsible for the Habitat proposal**

Ibon Galparsoro-AZTI-Tecnalia

CIRCALITTORAL FINE SEDIMENTS WITH [EPIZOANTHUS INCRUSTATUS]			
(EUNIS Habitat Type- A5.357_BC9)			
Habitat type	Circalittoral muddy sand		
EUNIS habitat type code	A5.357_BC9		
Level	5		
Change in definition of higher type	Why proposed habitat differs from other types?		
Not required	Consistently different dominant species		
DESCRIPTION			
	Sandy mud at depths of 70-100 metres with superficial trails, plenty of small superficial holes (polychaeta and mollusca bivalva) with cnidaria <i>Epizoanthus incrustatus</i> .		
	Observed facies No distinctive facies was detected		
Links to available maps	References: Martínez, J., I. Galparsoro, 2012. Caracterización de las comunidades circalitorales de la plataforma continental de la Costa Vasca mediante la interpretación de imágenes submarinas. MeshAtlantic Technical Report. 181 pp		
Correspondence to conservation and protection status			
Habitat directive/Natura 2000	OSPAR	OTHER	
		Council of Bern Convention, 1996: Sublittoral soft seabeds (code 11.22)	
Sensitivity to human activities			
This habitat is especially sensitive to fishing activity. Set gillnet, and especially, bottom trawling producing mechanical disturbance and abrasion can produce physical damage to this habitat. Due to its environmental characteristics (i.e. with very stable conditions), and species biological traits (i.e. long life-span, low reproduction capacity, fragility, etc.), the recovery capacity after physical damage is very limited.			
Persons / Institute responsible for the Habitat proposal			
Ibon Galparsoro-AZTI-Tecnalia			

# CIRCALITTORAL SANDY MUD WITH [CALLIANASSA SUBTERRANEA] AND OTHER DIGGER MEGAFUNA

(EUNIS Habitat Type- A5.358\_BC10)

Habitat type	Circalittoral sandy mud		
EUNIS habitat type code	A5.358_BC10		
Level	5		
Change in definition of higher type			Why proposed habitat differs from other types?
Not required			Consistently different dominant species

## DESCRIPTION

	<p>Sandy mud at depths of 70-100 metres with superficial trails, plenty of small superficial holes (polychaeta and mollusca) and big holes (<i>Callianassa subterranea</i>)</p> <p>Observed facies No distinctive facies was detected</p>		
	<p>Observed facies No distinctive facies was detected</p>		

Links to available maps	References: Martínez, J., I. Galparsoro, 2012. Caracterización de las comunidades circalitorales de la plataforma continental de la Costa Vasca mediante la interpretación de imágenes submarinas. MeshAtlantic Technical Report. 181 pp
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## Correspondence to conservation and protection status

Habitat directive/Natura 2000	OSPAR	OTHER
		Council of Bern Convention, 1996: Sublittoral soft seabeds (code 11.22)

## Sensitivity to human activities

This habitat is especially sensitive to fishing activity. Set gillnet, and especially, bottom trawling producing mechanical disturbance and abrasion can produce physical damage to this habitat. Due to its environmental characteristics (i.e. with very stable conditions), and species biological traits (i.e. long life-span, low reproduction capacity, fragility, etc.), the recovery capacity after physical damage is very limited.

## Persons / Institute responsible for the Habitat proposal

Ibon Galparsoro-AZTI-Tecnalia

## FACIES WITH [LEPTOMETRA CELTICA] ON SUBLITTORAL MIXED SEDIMENTS

(EUNIS Habitat Type- A5.48\_BC11)

Habitat type	Sublittoral mixed sediments	
EUNIS habitat type code	A5.48_BC11	
Level	4	
Change in definition of higher type		Why proposed habitat differs from other types?
Not required		Consistently different dominant species

### DESCRIPTION



Muddy sands with small stones at depths of 250 m. This facies is characterised by the high abundance of the crynoid *Leptometra celtica*.

Observed facies  
No distinctive facies was detected

Links to available maps	References: Martínez, J., I. Galparsoro, 2013. Caracterización de los fondos circalitorales profundos frente a las costas de Bermeo y Pasaia mediante la interpretación de imágenes submarinas. MeshAtlantic Technical Report. 139 pp.
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### Correspondence to conservation and protection status

Habitat directive/Natura 2000	OSPAR	OTHER

### Sensitivity to human activities

This habitat is especially sensitive to fishing activity. Set gillnet, and especially, bottom trawling producing mechanical disturbance and abrasion can produce physical damage to this habitat. Due to its environmental characteristics (i.e. with very stable conditions), and species biological traits (i.e. long life-span, low reproduction capacity, fragility, etc.), the recovery capacity after physical damage is very limited.

### Persons / Institute responsible for the Habitat proposal

Ibon Galparsoro-AZTI-Tecnalia

[DENDROPHYLLIA CORNIGERA] ON DEEP CIRCALITTORAL ROCK (EUNIS Habitat Type- A5.632_BC12)		
Habitat type	Circalittoral coral reefs	
EUNIS habitat type code	A5.632_BC12	
Level	5	
Change in definition of higher type	Why proposed habitat differs from other types?	
Not required	Consistently different dominant species	
<b>DESCRIPTION</b>		
	<p>Muddy sand coral reefs with small stones and blocks, at depths of 150 m, dominated by the yellow coral <i>Dendrophyllia cornigera</i>. The oysters <i>Neopycnodonte cochlear</i>, brachiopod <i>Novocrania anomala</i> and <i>Megerlia truncata</i>, isolated regular sea urchin <i>Echinus acutus</i> and the holothurian <i>Parastichopus regalis</i> have all been recorded within and among the corals. Sponges cf. <i>Axinella infundibuliformis</i>, <i>Hymedesmia paupertas</i>, <i>Antho dichotoma</i>, <i>Tethya citrina</i>, <i>Mycale lingua</i>, <i>Axinella</i> sp., <i>Geodia barretti</i> and <i>Geodia</i> sp., the hydrozoo <i>Polyplumaria flabellata</i>, gorgonias <i>Eunicella verrucosa</i>, the black coral <i>Parantipathes larix</i>, the hydrozoa <i>Stephanoscyphus simplex</i>, the polychaeta serpulidae <i>Filograna implexa</i>, the sea star <i>Marthasterias glacialis</i>, the sea urchin <i>Echinus melo</i> may also be present. Mobile species present include the boar fish <i>Crapos aper</i>, the cuckoo wrasse <i>Labrus mixtus</i>, the fish <i>Scorpaena scrofa</i>, the fish <i>Scorpaena</i> sp., the hake <i>Merluccius merluccius</i> and the fish <i>Acantholabrus palloni</i>.</p> <p>Observed facies No distinctive facies was detected</p>	
Links to available maps	<p>References: Altuna, A. 1994. Estudio faunístico, ecológico y biogeográfico de los cnidarios bentónicos de la costa vasca. Tesis Doctoral. Universidad de Navarra, 769 pp.</p> <p>Martínez, J., I. Galparsoro, 2013. Caracterización de los fondos circalitorales profundos frente a las costas de Bermeo y Pasaia mediante la interpretación de imágenes submarinas. MeshAtlantic Technical Report. 139 pp.</p>	
<b>Correspondence to conservation and protection status</b>		
Habitat directive/Natura 2000	OSPAR	OTHER
1170	1170 : Reefs	Coral Gardens
<b>Sensitivity to human activities</b>		
<p>This habitat is especially sensitive to fishing activity. Set gillnet, and especially, bottom trawling producing mechanical disturbance and abrasion can produce physical damage to this habitat. Due to its environmental characteristics (i.e. with very stable conditions), and species biological traits (i.e. long life-span, low reproduction capacity, fragility, etc.), the recovery capacity after physical damage is very limited.</p>		
<b>Persons / Institute responsible for the Habitat proposal</b>		
Ibon Galparsoro-AZTI-Tecnalia		

**[FUNICULINA QUADRANGULARIS] AND [CERIANTHUS MEMBRANACEUS] WITH OTHER  
DIGGER MEGAFUNA ON DEEP-SEA MUD**

(EUNIS Habitat Type A6.53\_BC13)

Habitat type	Deep-sea mud	
EUNIS habitat type code	A6.53_BC13	
Level	4	
Change in definition of higher type	Why proposed habitat differs from other types?	
Not required	Consistently different dominant species	

**DESCRIPTION**



Deep-sea mud (100-279 metres) with superficial trails, plenty of small superficial holes (polychaeta and mollusca), big holes (*Nephrops norvegicus* and *Goneplax rhomboides*) and with the tall sea pen *Funiculina quadrangularis* and the tube anemone *Cerianthus membranaceus*.

Observed facies  
No distinctive facies was detected

Links to available maps	References: Martínez, J., I. Galparsoro, 2013. Caracterización de los fondos circalitorales profundos frente a las costas de Bermeo y Pasaia mediante la interpretación de imágenes submarinas. MeshAtlantic Technical Report. 139 pp
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**Correspondence to conservation and protection status**

Habitat directive/Natura 2000	OSPAR	OTHER
		Council of Bern Convention, 1996: Sublittoral soft seabeds (code 11.22)

**Sensitivity to human activities**

This habitat is especially sensitive to fishing activity. Set gillnet, and especially, bottom trawling producing mechanical disturbance and abrasion can produce physical damage to this habitat. Due to its environmental characteristics (i.e. with very stable conditions), and species biological traits (i.e. long life-span, low reproduction capacity, fragility, etc.), the recovery capacity after physical damage is very limited.

**Persons / Institute responsible for the Habitat proposal**

Ibon Galparsoro-AZTI-Tecnalia

## CONCLUSION

Taking into account the results obtained during the investigations in the Basque continental shelf, it could be concluded that EUNIS hierarchical structure could be used at lower levels, as the environmental parameters used for habitat classification fit well with the ones observed in this region. Nevertheless, habitats descriptions improvements are required at higher levels in order to facilitate its application at this region (Galparsoro *et al.*, 2012c).

In that sense, the hierarchical structure of EUNIS leaves an open door to the incorporation of new habitat classes. For the Basque continental shelf, new habitats were identified such as the *Gelidium corneum* habitat in the infralittoral high energy rock (Borja, 1987; Borja, 1988). This habitat is important in terms of ecological value and will be proposed for its inclusion in the classification. Nevertheless, this type of proposals for new habitat inclusion in the classification requires of scientific community discussion in order to get commonly agreed new habitat classes. Moreover, present or potential ecological goods and services provided by habitats, could also be integrated in the EUNIS classification; as this information could be of great value for management approaches (Pascual *et al.*, 2011; Salomidi *et al.*, 2012).

## **CASE STUDY 3 Portugal – SW Coast**

Lisboa - Instituto Português do Mar e da Atmosfera - IPMA

**Authors:** Miriam Tuaty Guerra, Maria José Gaudêncio, Beatriz Mendes, Victor Henriques

### **INTRODUCTION**

The need for a better knowledge of the marine environment in order to give support to management actions has been increasingly acknowledged in Portugal. In that sense, marine habitat mapping has been recognized as a useful tool to provide integrated information in an accessible manner for decision makers and stakeholders in general, as well as for the implementation of several EU Directives aiming at the protection and management of the marine environment (e.g. Habitats Directive, WFD and MSFD). For that reason, IPMA is developing work leading to the classification and mapping of seabed habitats in Portugal mainland using the EUNIS system. Two case studies are presented in this report:

1. The Luiz Saldanha Marine Park, a Marine Protected Area located the Arrábida Natural Park (SW Portugal). The soft substrate data were obtained during the sampling surveys carried out within the framework of the LIFE/BIOMARES project "Restoration and Management of Biodiversity in the Marine Park Site Arrábida-Espichel PTCON0010 (2007-2010)", that took place from 2007 to 2010, as well as other former projects, while for hard substrate, the communities formerly identified and classified by Saldanha (1984) were reclassified according to EUNIS.

2. The coastal area south of Sines (SW Portugal), which is partly included in the Special Protection Area (PTZPE0015) of the Natural Park of Sudoeste Alentejano e Costa Vicentina. The data were obtained during the new survey that took place in 2011 within the framework of the MeshAtlantic Project.

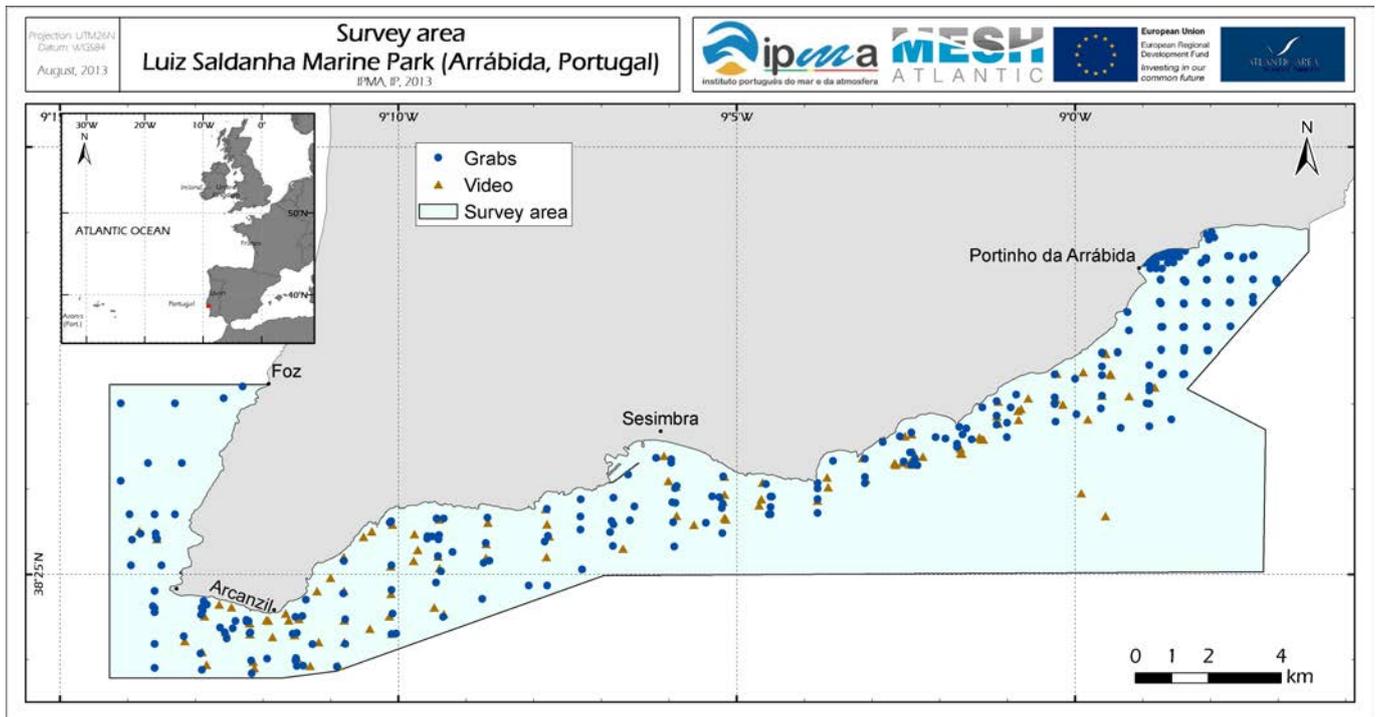
Two level 4 units and fourteen level 5 units are proposed as new habitats for inclusion in the EUNIS system, as well as amendments to three units (two level 4 and one level 5).

### **APPLICATION OF THE EUNIS CLASSIFICATION**

#### **STUDY AREA**

The Luiz Saldanha Marine Park (Figure 1) is located in the Setúbal peninsula, between the Arrábida Mountain and Cape Espichel. It is 38 km long, from Praia da Figueirinha to Praia da Foz, and covers an area of 52 Km<sup>2</sup>. The coast line is steep and rocky. Hard substrate can be found up to 15-20 m depth. In deeper waters the hard substrate gives place to soft substrate, mostly sandy (up to 50-60 m depths in the east side and to 90-100 m in the extreme west side). It is characterized by strong hydrodynamism due to wave action and tidal currents, especially in the extreme east and west sides. It is recognized as a hotspot of biodiversity (more than 1100 species reported, from which several southern ones) and includes two habitats of the Natura 2000 network (habitats 1110 and 1170). It is classified as an MPA since 1998. The sampling surveys were carried out in 141 sites between 5 and 100 m depth.

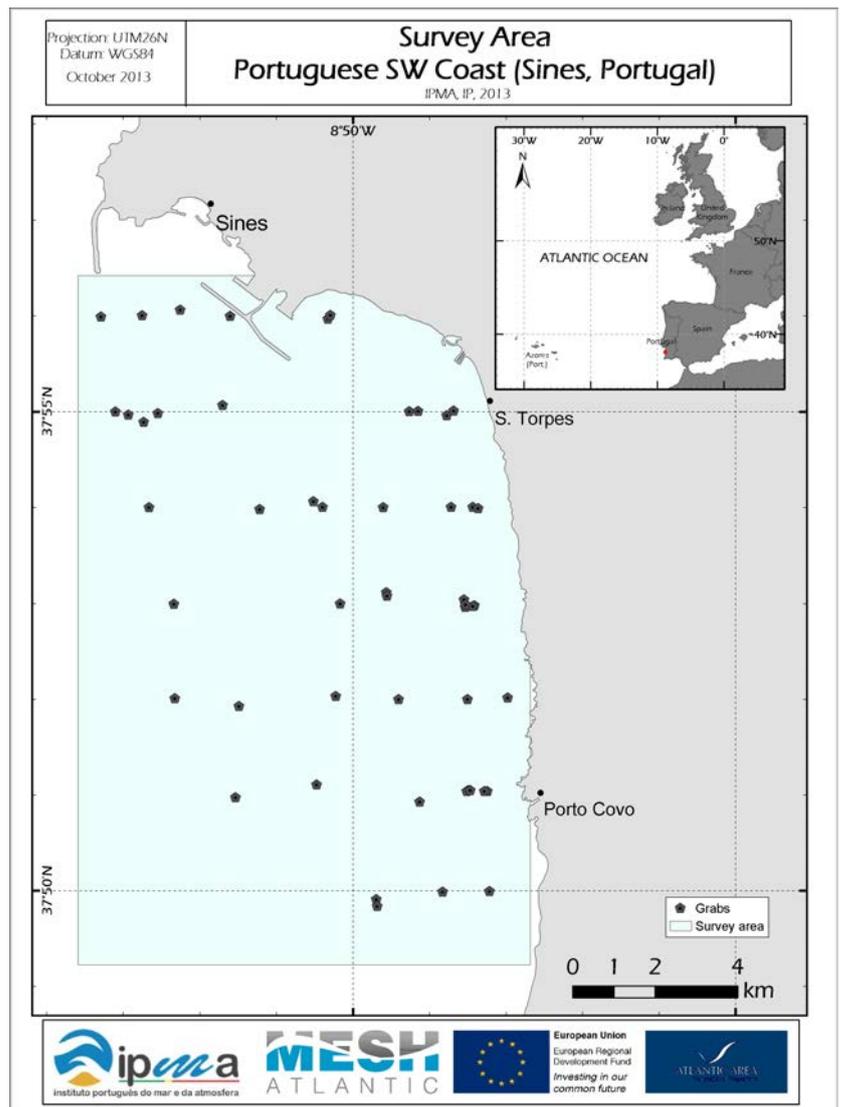
The survey area south of Sines (Figure 2) is about 13 km long and occupies an area of 88 km<sup>2</sup>, part of which is included in the Special Protection Area (PTZPE0015) of the Natural Park



**Figure 1.** The survey area and sampling sites in the Luiz Saldanha Marine Park (SW Portugal).

of Sudoeste Alentejano e Costa Vicentina. It is an area of moderate energy under the influence of wave action and tidal currents. The seabed is covered by rock platforms and mosaics of sandy sediments in between. The northern near shore area is exposed to the outfalls of a thermoelectric powerplant. The sampling survey was carried out in 33 sites between 5 and 50 m depth.

In both study areas, soft substrate data for sediment type classification and biological analysis derived from samples collected with a Smith-McIntyre grab covering an area of 0.1 m<sup>2</sup>. In each sampling site four sediment samples were collected, one for grain size analysis and three for benthic macrofauna analysis. In the Luiz Saldanha Marine Park, additional information was obtained by underwater video imaging.



**Figure 2.** The survey area and sampling sites south of Sines (SW Portugal)

## DATA ANALYSIS AND MAPPING

Sediment types were classified according to Folk (1974) simplified classification agreed in the MeshAtlantic project.

Bathymetry layers were obtained by interpolating depth data collected across the study areas. Seabed energy and light levels were obtained using cut-off values defined by MeshAtlantic partners. Fractions of light reaching the seabed as well as wave-base ratio were used to set boundaries between biological zones. Whenever necessary, the values were adjusted by expert judgement based on well known affinities of species with sediment type light and energy.

Macrofauna species assemblages were defined by multivariate analysis using PRIMER v6 software (Clarke & Gorley, 2001). Clustering and MDS were performed on a square root transformed species density matrix, in order to identify assemblage structure. Species composition of each assemblage was defined by SIMPER analysis (species contributing to 90% intra-group similarity). Characterising/typical species were defined according to their contributions to similarity and dissimilarity within and between assemblages. The Indicator value method (Dufrêne & Legendre, 1997) and classical indices of constancy, frequency and representativity were also employed. The BEST procedure was used to assess relationships between assemblages distribution and seabed physical attributes. The combined information on species assemblages, energy and biological zones boundaries, was used to produce EUNIS-type units.

Maps were constructed using GIS map algebra in order to combine layers of physical attributes (bathymetry, light, seabed energy and substrate type) and communities distribution.

## RESULTS AND DISCUSSION

In the Luiz Saldanha Marine Park a total of 35 EUNIS units were identified on hard and soft substrate (Table I and Figure 3), from which 17 units are proposed as new habitats for inclusion in the EUNIS system:

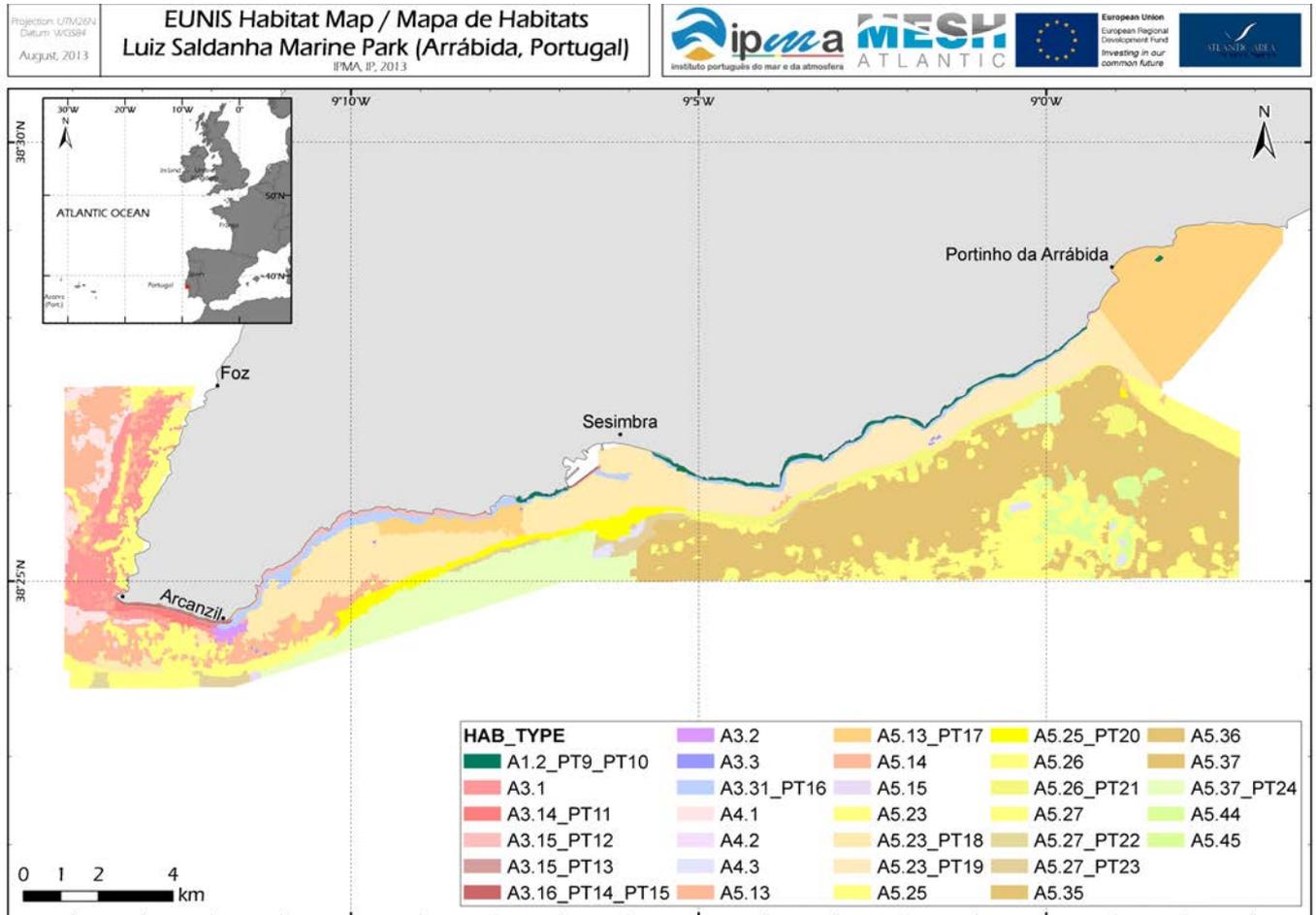
- Two new level 4 units are proposed to accommodate level 5 units on hard substrate, one in the littoral zone and one in the infralittoral zone.
- Eight new level 5 units are proposed on hard substrate: two on littoral rock and six on infralittoral rock.
- Seven new level 5 units are proposed for soft substrate: two in infralittoral sand, one in circalittoral sand, one in circalittoral muddy sand, two in deep circalittoral muddy sand and one in deep circalittoral sandy mud.
- Amendments to units A5.23 and A5.25 are proposed in order to comply with all the sand classes included in both units.
- Renaming and replacement of unit A5.246 with unit A5.13\_PT17 in order to comply with the biotope typical distribution in coarse sediment.

**Table I.** List of the EUNIS habitats identified in the Luiz Saldanha Marine Park (SW Portugal)

<b>EUNIS Code</b>	<b>Level</b>	<b>Name</b>
A1.11_PT8	5	Proposed new EUNIS unit: [ <i>Mytilus galloprovincialis</i> ] on exposed littoral rock
A1.2_PT9	4	Proposed new EUNIS unit: Seaweeds on moderately exposed shores
A1.2_PT9_PT10	5	Proposed new EUNIS unit: [ <i>Condracanthus acicularis</i> ] on moderately exposed lower littoral rock
A3.1	3	Atlantic and Mediterranean high energy infralittoral rock
A3.14_PT11	5	Proposed new EUNIS unit: [ <i>Lithophyllum incrustans</i> ] on infralittoral rock
A3.15_PT12	5	Proposed new EUNIS unit: [ <i>Corallina elongata</i> ] on infralittoral rock
A3.15_PT13	5	Proposed new EUNIS unit: [ <i>Gelidium corneum</i> ] and [ <i>Asparagopsis armata</i> ] on infralittoral rock
A3.1_PT14	4	Proposed new EUNIS unit: Faunal communities on high energy infralittoral rock
A3.1_PT14_PT15	5	Proposed new EUNIS unit: [ <i>Mytilus galloprovincialis</i> ] on infralittoral rock
A3.2	3	Atlantic and Mediterranean moderate energy infralittoral rock
A3.3	3	Atlantic and Mediterranean low energy infralittoral rock
A3.31_PT16	5	Proposed new EUNIS unit: [ <i>Saccorhyza polyschides</i> ] on infralittoral rock
A4.1	3	Atlantic and Mediterranean high energy circalittoral rock
A4.2	3	Atlantic and Mediterranean moderate energy circalittoral rock
A4.3	3	Atlantic and Mediterranean low energy circalittoral rock
A5.13	4	Infralittoral coarse sediment
A5.13_PT17	5	Proposed renaming and replacement of unit A5.246 to "[ <i>Ervilia castanea</i> ] beds in infralittoral coarse sand"
A5.14	4	Circalittoral coarse sediment
A5.15	4	Deep circalittoral coarse sediment
A5_23	4	Proposed renaming of unit A5_23 to "Infralittoral sand"
A5.23_PT18	5	Proposed new EUNIS unit: Faunal communities in highly mobile clean sand
A5.23_PT19	4	Proposed new EUNIS unit: Infralittoral sand with peracarid crustaceans and bivalves
A5.25	4	Proposed renaming of unit A5_25 to "Circalittoral sand"
A5.25_PT20	5	Proposed new EUNIS unit: Circalittoral sand with polychaetes [ <i>Aponuphis bilineata</i> ] and bivalves [ <i>Moerella donacina</i> ]
A5.26	4	Circalittoral muddy sand
A5.26_PT21	5	Proposed new EUNIS unit: Circalittoral muddy sand with peracarid and decapod crustaceans, polychaetes, ophiurids and bivalves
A5.27	4	Deep circalittoral sand
A5.27_PT22	5	Proposed new EUNIS unit: [ <i>Nephtys hombergii</i> ] and [ <i>Laevicardium crassum</i> ] in deep circalittoral muddy sand
A5.27_PT23	5	Proposed new EUNIS unit: Deep circalittoral muddy sand with [ <i>Chloeia viridis</i> ], [ <i>Panthalis oerstedii</i> ] and [ <i>Owenia fusiformis</i> ]
A5.35	4	Circalittoral sandy mud
A5.36	4	Circalittoral mud
A5.37	4	Deep circalittoral mud

**Table I (continued).** List of the EUNIS habitats identified in the Luiz Saldanha Marine Park (SW Portugal)

EUNIS Code	Level	Name
A5.37_PT24	5	Proposed new EUNIS unit: Deep circalittoral sandy mud with [ <i>Maldane glebifex</i> ]
A5.44	4	Circalittoral mixed sediments
A5.45	4	Deep circalittoral mixed sediments



**Figure 3.** EUNIS seabed habitat map of the Luiz Saldanha Marine Park (Arrábida, Portugal) with proposed new units (PT)

In the coastal area south of Sines a total of 18 EUNIS units were identified on hard and soft substrate (Table II and Figure 4), from which 4 units are proposed as new habitats for inclusion in the EUNIS system:

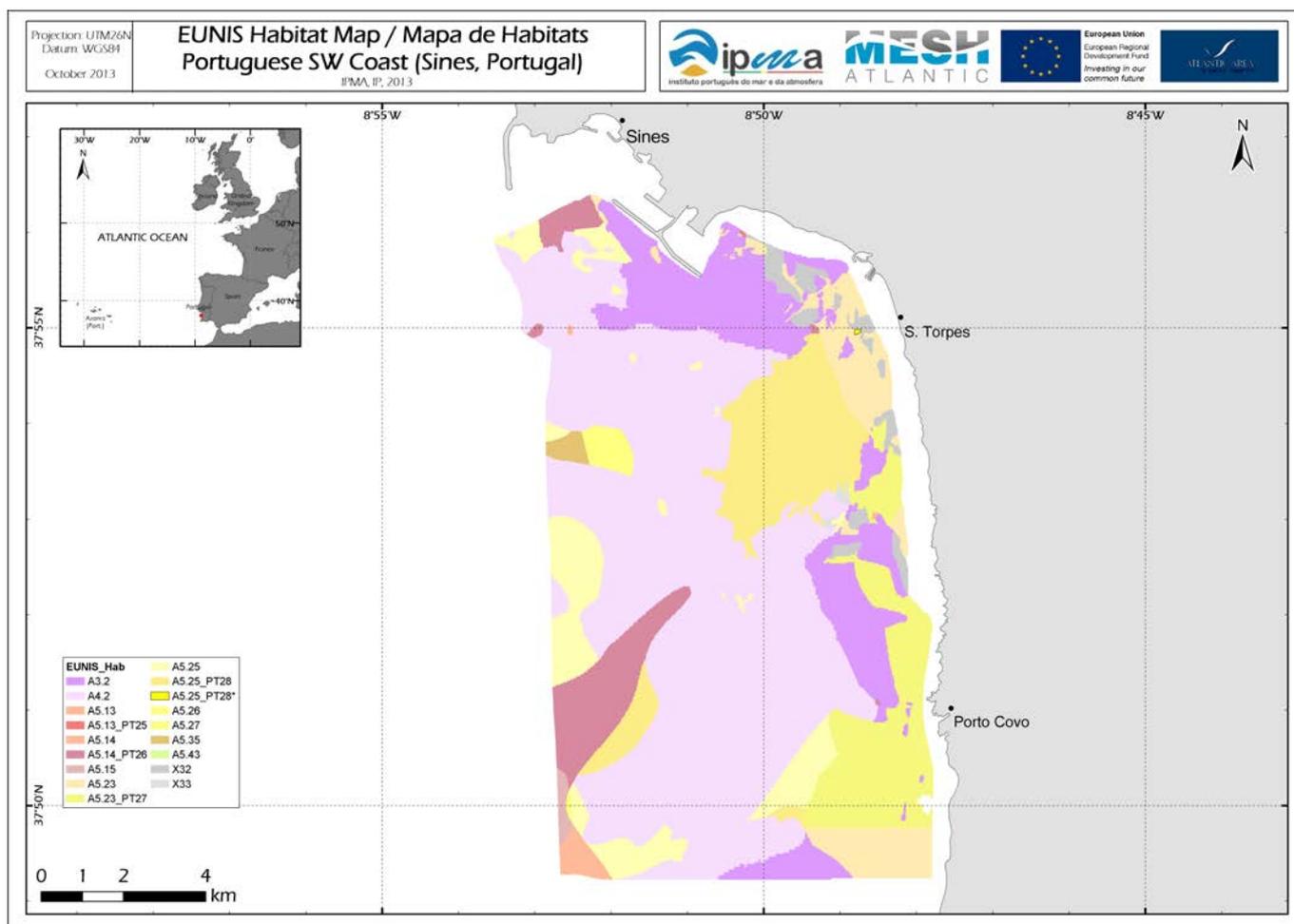
- Two new level 5 units in coarse sediment, one infralittoral and one circalittoral.
- Two new level 5 units in very fine sand, one infralittoral and one circalittoral.

**Table II.** List of the EUNIS habitats identified in the coastal area south of Sines (SW Portugal)

EUNIS Code	Level	Name
A3.1	3	Atlantic and Mediterranean high energy infralittoral rock
A3.2	3	Atlantic and Mediterranean moderate energy infralittoral rock
A4.2	3	Atlantic and Mediterranean moderate energy circalittoral rock
A5.13	4	Infralittoral coarse sediment
A5.13_PT25	5	Proposed new EUNIS unit: [ <i>Cheirocratus sundevalli</i> ] and [ <i>Spio cf. symphyta</i> ] in infralittoral gravelly sand

**Table II (continued).** List of the EUNIS habitats identified in the coastal area south of Sines (SW Portugal)

EUNIS Code	Level	Name
A5.14	4	Circalittoral coarse sediment
A5.14_PT26	5	Proposed new EUNIS unit: Circalittoral coarse sand with [Branchiostoma lanceolatum], [Eurydice grimaldii] and [Malmgreniella castanea]
A5.15	4	Deep circalittoral coarse sediment
A5_23	4	Proposed renaming of unit A5_23 to "Infralittoral sand"
A5.23_PT27	5	Proposed new EUNIS unit: Infralittoral very fine sand with burrowing amphipods, polychaetes and bivalves
A5.25	4	Proposed renaming of unit A5_25 to "Circalittoral sand"
A5.25_PT28	5	Proposed new EUNIS unit: Circalittoral very fine sand with burrowing polychaetes, bivalves [Spisula subtruncata], amphipods and echinoderms
A5_26	4	Circalittoral muddy sand
A5_27	4	Deep circalittoral sand
A5.35	4	Circalittoral sandy mud
A5.43	4	Infralittoral mixed sediments
X32	2	Mosaics of mobile and non-mobile substrata in the infralittoral zone
X33	2	Mosaics of mobile and non-mobile substrata in the circalittoral zone



**Figure 4.** EUNIS seabed habitat map of the coastal area south of Sines (SW Portugal) with proposed new units (PT). The unit marked with \* indicate a circalittoral habitat extending into the infralittoral zone.

In both case studies the BIOENV results showed good agreement between species distribution and seabed physical attributes, in particular sediment type and depth (used as a proxy of energy and light penetration), which is in line with the EUNIS classes up to levels 3 and the majority of level 4. Concerning level 5, the statistical analysis revealed consistently different species associations and sometimes broader species distribution across sediment types and depth, when compared to level 5 units in the present EUNIS classification. This is not surprising since the EUNIS system is primarily based on northern European communities. Moreover the position of Portugal as an ecotone between northern and southern regions favours the existence of a great number of species (northern and southern ones) with tolerance to diverse environmental conditions. In that sense, the biological composition as well as the physical attributes of each new habitat proposed is described in detail. In some cases difficulties were found to include one habitat in one single EUNIS class due to the observed wide distributional range of the species found across sediment types and biological zones. In those cases the new habitat was classified according to the dominant physical attributes, with reference to the entire range observed. In the coastal area south of Sines one circalittoral habitat extends into the infralittoral in an area close to the outfalls of a thermoelectric powerplant. The outfalls may cause sediment disturbance and consequently turbidity increase and reduction of light penetration into the water. Those conditions are likely to favour the establishment communities with circalittoral affinities in the infralittoral zone.

## **CONCLUSION**

These results may be regarded as a contribution to adapt and update the EUNIS system to southern European marine habitats. Moreover, in view of the observed incompatibilities with other regional habitats in the EUNIS system, we believe that level 5 units should be adapted to the specific characteristics of the study regions.

**NEW HABITATS**

[MYTILUS GALLOPROVINCIALIS] ON EXPOSED EULITTORAL ROCK		
(EUNIS Habitat Type – A1.11_PT8)		
Habitat type	<i>Mytilus galloprovincialis</i> on exposed eulittoral rock	
EUNIS habitat type code	A1.11_PT8	
Level	5	
Change in definition of higher type	Why proposed habitat differs from other types?	
Not required	Consistently different species assemblages. Occurs in the mid and lower eulittoral zone.	
DESCRIPTION		
	<p>This biotope was observed in the Luiz Saldanha Marine Park (SW Portugal) (Saldanha 1974). It occurs on highly to moderately exposed mid and lower eulittoral rock, on horizontal and sub-horizontal surfaces. It is absent from vertical surfaces since strong wave action prevents specimens settlement. Generally this biotope is separated from its infralittoral counterpart by the <i>Corallina elongata</i> biotope. The eulittoral specimens have smaller sizes and the populations are not as dense as the infralittoral ones, forming no more than one or two layers on the rock. The associated fauna is essentially infralittoral, since the seawater retained between the mussel shells and bissuses favours the prevalence of infralittoral conditions. Nevertheless there are several eulittoral faunal elements present, from which the most frequent ones are: the cirripeds <i>Chthamalus stellatus</i> and <i>Pollicipes pollicipes</i>, the cnidarian <i>Actinia equina</i>, the molluscs <i>Onchidella celtica</i>, <i>Siphonaria pectinata</i>, <i>Patella vulgata</i>, <i>Patella rustica</i>, <i>Patella depressa</i>, <i>Lasaea adansoni</i> (between the mussel bissuses), <i>Tectura virginea</i>, <i>Littorina obtusata</i> and <i>Callochiton septemvalvis</i>, and the brachyuran <i>Pachygrapsus marmoratus</i>. Other common species in this habitat are: the bryozoan <i>Scruparia chelata</i> on the mussel bissuses, and the molluscs <i>Hiatella arctica</i> and <i>Musculus costulatus</i> in cavities. <i>Corallina elongata</i> and <i>Lithophyllum incrustans</i> are the algae present in this habitat.</p> <p>Observed facies The biotope was originally described as facies of <i>Mytilus galloprovincialis</i> (Saldanha, 1974).</p>	
Links to available maps	References: Henriques, V., Guerra, M.T., Mendes, B., Gaudêncio, M.J. & Fonseca, P., 2013. Map of seabed habitats and associated communities in the Luiz Saldanha Marine Park, Portugal according to the EUNIS classification. PT010000. Instituto Português do Mar e da Atmosfera (IPMA), Lisboa, Portugal. Available at: <a href="http://www.searchMESH.net/geonetwork">www.searchMESH.net/geonetwork</a> .	
Correspondence to conservation and protection status		
Habitat directive/Natura 2000	OSPAR	OTHER
	Site "Arrábida-Espichel" (PTCON0010)	
Sensitivity to human activities		
Trampling. Pollution.		
Persons / Institute responsible for the Habitat proposal		
Miriam Tuaty Guerra, Maria José Gaudêncio, Beatriz Mendes, Victor Henriques		

**SEaweEDS ON MODERATELY EXPOSED SHORES****(EUNIS Habitat Type – A1.2\_PT9)**

<b>Habitat type</b>	Seaweeds on moderately exposed shores	
<b>EUNIS habitat type code</b>	A1.2_PT9	
<b>Level</b>	4	
<b>Change in definition of higher type</b>	<b>Why proposed habitat differs from other types?</b>	
Not required	Consistently different species assemblages.	

**DESCRIPTION**

	<p>This habitat type is proposed to accommodate level 5 seaweed units on moderately exposed eulittoral rock.</p> <p>Observed facies No distinctive facies was detected</p>	
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<b>Links to available maps</b>	References: Henriques, V., Guerra, M.T., Mendes, B., Gaudêncio, M.J. & Fonseca, P., 2013. Map of seabed habitats and associated communities in the Luiz Saldanha Marine Park, Portugal according to the EUNIS classification. PT010000. Instituto Português do Mar e da Atmosfera (IPMA), Lisboa, Portugal. Available at: <a href="http://www.searchMESH.net/geonetwork">www.searchMESH.net/geonetwork</a> .
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**Correspondence to conservation and protection status**

Habitat directive/Natura 2000	OSPAR	OTHER
Site "Arrábida-Espichel" (PTCON0010)		

**Sensitivity to human activities**

Trampling. Pollution.

**Persons / Institute responsible for the Habitat proposal**

Miriam Tuaty Guerra, Maria José Gaudêncio, Beatriz Mendes, Victor Henriques

[CHONDRACANTHUS ACICULARIS] ON MODERATELY EXPOSED LOWER EULITTORAL ROCK (EUNIS Habitat Type – A1.2_PT9_PT10)		
Habitat type	<i>Chondracanthus acicularis</i> on moderately exposed lower eulittoral rock	
EUNIS habitat type code	A1.2_PT9_PT10	
Level	5	
Change in definition of higher type	Why proposed habitat differs from other types?	
Proposed new level 4 unit A1.2_PT8: Seaweeds on moderately exposed shores.	Consistently different species assemblages. Occurs on the lower level of the eulittoral zone.	
<b>DESCRIPTION</b>		
	<p>This biotope was observed in the east side of the Luiz Saldanha Marine Park (SW Portugal) (Saldanha (1974)). It occurs on horizontal and vertical surfaces throughout an area of 0.62 km<sup>2</sup>, on moderately exposed lower eulittoral rock. <i>Chondracanthus acicularis</i> is distributed along a 60-70 cm height strip. It forms an extremely dense herbaceous stratum together with other species such as <i>Chondracanthus teedei</i>, <i>Gelidium spinosum</i>, <i>Pterosiphonia complanata</i>, <i>Plocamium cartilagineum</i> and <i>Corallina elongata</i>, which helps preventing dissection during the emersion periods. Several epibionts occur on <i>C. acicularis</i>, such as the bryozoans <i>Aetea anguina</i>, <i>Scrupocellaria reptans</i>, <i>Celleporella hyalina</i> and <i>Walkeria uva</i>, and the cnidarian <i>Laomedea flexuosa</i>. These species are also present on the thalli of <i>C. teedei</i>, together with <i>Fenestrulina malusii</i>, <i>Haplopoma bimucronatum</i> and <i>Beania mirabilis</i>. <i>H. bimucronatum</i> and the foraminifere <i>Miniacina miniacea</i> occur on <i>C. elongata</i>. The cnidarians <i>Corynactis viridis</i> and <i>Cornularia cornucopiae</i> are present on the muscinal stratum, which is rather sparse. The encrusting stratum as well as the rock are perforated by several organisms while others occupy the existing cavities. Those are mainly sponges: <i>Cliona celata</i>, <i>Pione vastifica</i> and <i>Stelletta hispida</i>, polychaetes: <i>Dipolydora</i> cf. <i>coeca</i> and <i>Dodecaceria concharum</i>, molluscs: <i>Lithophaga lithophaga</i>, <i>Rocellaria dubia</i>, and sipunculids: <i>Phascolosoma (Phascolosoma) granulatum</i> and <i>Aspidosiphon (Aspidosiphon) muelleri muelleri</i>. The fronds of the algae provide habitat for several polychaetes, amphipods and molluscs, from which <i>Barleeia unifasciata</i>, <i>Hiatella arctica</i>, <i>Musculus costulatus</i> and juveniles of <i>Mytilus galloprovincialis</i> are the commonest ones. The sponge <i>Hymeniacion perlevis</i>, serpulid polychaetes such as <i>Spirorbis</i> sp. and <i>Spirobranchus</i> spp., and the cirriped <i>Perforatus perforatus</i>, occur attached on the rock together with <i>C. acicularis</i>.</p> <p>Observed facies The biotope was originally described as facies of <i>Gigartina acicularis</i> (Saldanha, 1974).</p>	
Links to available maps	References: Henriques, V., Guerra, M.T., Mendes, B., Gaudêncio, M.J. & Fonseca, P., 2013. Map of seabed habitats and associated communities in the Luiz Saldanha Marine Park, Portugal according to the EUNIS classification. PT010000. Instituto Português do Mar e da Atmosfera (IPMA), Lisboa, Portugal. Available at: <a href="http://www.searchMESH.net/geonetwork">www.searchMESH.net/geonetwork</a> .	
<b>Correspondence to conservation and protection status</b>		
Habitat directive/Natura 2000	OSPAR	OTHER
	Site "Arrábida-Espichel" (PTCON0010)	
<b>Sensitivity to human activities</b>		
Trampling. Pollution.		
<b>Persons / Institute responsible for the Habitat proposal</b>		
Miriam Tuaty Guerra, Maria José Gaudêncio, Beatriz Mendes, Victor Henriques		

[LITHOPHYLLUM INCRUSTANS] ON INFRA-LITTORAL ROCK		
(EUNIS Habitat Type - A3.14_PT11)		
Habitat type	<i>Lithophyllum incrustans</i> on infralittoral rock	
EUNIS habitat type code	A3.14_PT11	
Level	5	
Change in definition of higher type	Why proposed habitat differs from other types?	
Not required	Consistently different species assemblages. Occurs between 12 and 26-28 meters depth.	
<b>DESCRIPTION</b>		
  	<p>This biotope was identified in the Luiz Saldanha Marine Park (SW Portugal) (Saldanha, 1974). It occurs continuously throughout an area of 0.27 km<sup>2</sup>, on high energy infralittoral rock at depths ranging from 12 to 24 meters in the west area of the Park. However it may extend to 26-28 meters, in the upper circalittoral. Horizontal, vertical and sloping rocky surfaces are densely covered with <i>Lithophyllum incrustans</i> and other associated encrusting Corallinaceae, such as <i>Mesophyllum lichenoides</i>, <i>Phymatolithon lenormandii</i> and <i>Lithophyllum</i> sp.. The Corallinaceae concretions and thalli as well as rock cavities and galleries provide habitat for a diverse fauna. The most frequent and abundant species are the polychaetes <i>Lepidonotus clava</i>, <i>Syllis variegata</i>, <i>Syllis prolifera</i> and <i>Syllis gracilis</i>, the molluscs <i>Hiatella arctica</i>, <i>Rocellaria dubia</i> and <i>Lepidochitona (Lepidochitona) cinerea</i>, and the echinoderms <i>Ophiothrix fragilis</i> and <i>Paracentrotus lividus</i>. Other commonly observed species are the foraminifere <i>Miniacina miniacea</i>, the cnidarians <i>Corynactis viridis</i> and <i>Anemonia sulcata</i>, the polychaetes <i>Dodecaceria concharum</i> and <i>Dipolydora cf. coeca</i>, the spicunculids <i>Aspidosiphon (Aspidosiphon) muelleri muelleri</i> and <i>Phascolosoma (Phascolosoma) granulatum</i>, the amphipods <i>Lembos websteri</i>, <i>Caprella acanthifera</i> and <i>Gammaropsis maculata</i> and the sponges <i>Cliona celata</i>, <i>Stelletta hispida</i> and <i>Dercitus (Stoeba) plicatus</i>. Species with circalittoral affinities (less tolerance to light), such as the cnidarians <i>Leptogorgia setubalensis</i> and <i>Alcyonium coralloides</i>, are present on vertical surfaces. Rare specimens of foliose algae such as <i>Pterosiphonia complanata</i>, <i>Plocamium cartilagineum</i>, <i>Gelidium corneum</i> and <i>Asparagopsis armata</i> are observed. In cavities where some sedimentation occurs the bivalve <i>Abra alba</i> may be found.</p> <p>Observed facies No distinctive facies was detected</p>	
Links to available maps	References: Henriques, V., Guerra, M.T., Mendes, B., Gaudêncio, M.J. & Fonseca, P., 2013. Map of seabed habitats and associated communities in the Luiz Saldanha Marine Park, Portugal according to the EUNIS classification. PT010000. Instituto Português do Mar e da Atmosfera (IPMA), Lisboa, Portugal. Available at: <a href="http://www.searchMESH.net/geonetwork">www.searchMESH.net/geonetwork</a> .	
<b>Correspondence to conservation and protection status</b>		
Habitat directive/Natura 2000	OSPAR	OTHER
	Site "Arrábida-Espichel" (PTCON0010)	
<b>Sensitivity to human activities</b>		
Fishing activities. Pollution.		
<b>Persons / Institute responsible for the Habitat proposal</b>		
Miriam Tuaty Guerra, Maria José Gaudêncio, Beatriz Mendes, Victor Henriques		

**[CORALLINA ELONGATA] ON INFRA-LITTORAL ROCK**

(EUNIS Habitat Type - A3.15\_PT12)

Habitat type	<i>Corallina elongata</i> on infralittoral rock	
EUNIS habitat type code	A3.15_PT12	
Level	5	
Change in definition of higher type	Why proposed habitat differs from other types?	
Proposed new level 4 unit A1.2_PT8: Seaweeds on moderately exposed shores.	Consistently different species assemblages. Occurs from the lower eulittoral zone to 1-2 meters depth in the infralittoral.	

**DESCRIPTION**



This biotope was identified in the western area of the Luiz Saldanha Marine Park (SW Portugal) (Saldanha, 1974). It forms a dense, conspicuous strip over 0.6 km<sup>2</sup>, on high energy infralittoral rock up to 1-2 meters depth (starting from the lower eulittoral level where *Lithophyllum tortuosum* occurs). It occupies both vertical and horizontal rocky surfaces. Two distinct phisionomic aspects can be distinguished in this habitat: (i) in areas of very high energy *C. elongata* is distributed in patches, which are encircled by *Lithophyllum incrustans*; (ii) in areas of lower energy *C. elongata* covers almost entirely the rocky surfaces. *L. incrustans* is still present, but other algae species, such as *Chondracanthus acicularis*, *Pterosiphonia complanata* and *Plocamium cartilagineum* emerge. The habitat is mainly composed by an herbaceous stratum, formed by the thalli of *C. elongata*. The algae settle either directly on the rock, or on the encrusting layer of *Lithophyllum incrustans*. The community is dominated by algae. However, a diverse fauna is also present, mainly composed by the foraminifere *Miniacina miniacea*, the polychaetes *Lepidonotus clava*, *Platynereis dumerilii*, *Eulalia viridis*, *Syllis gracilis*, *S. prolifera* and *S. vittata*, small crustaceans such as *Perforatus perforatus*, *Tanais dulongii*, *Dynamene magnitorata* (inside empty *P. perforatus*), *Ischyromene lacazei*, *Caprella acanthifera*, *C. andreae*, *Elasmopus brasiliensis*, *Apherusa jurinei*, *Stenothoe tergestina*, *Podocerus variegatus* and *Parajassa pelagica*, the molluscs *Lepidochitona (Lepidochitona) cinerea*, *Acanthochitona crinita*, *Jujubinus striatus*, *Patella ulyssiponensis*, *Mytilus galloprovincialis*, *Hiatella arctica*, *Kellia suborbicularis* (inside empty *P. perforatus*), *Musculus costulatus* and *Anomia ehippium*, the bryozoans *Aetea anguina*, *Haplopoma bimucronatum* and *Celleporina caliciformis*, and the echinoderms *Paracentrotus lividus* and *Amphipholis squamata*.

**Observed facies**

The biotope was originally described as facies of *Corallina mediterranea* (Saldanha, 1974).

Links to available maps	References: Henriques, V., Guerra, M.T., Mendes, B., Gaudêncio, M.J. & Fonseca, P., 2013. Map of seabed habitats and associated communities in the Luiz Saldanha Marine Park, Portugal according to the EUNIS classification. PT010000. Instituto Português do Mar e da Atmosfera (IPMA), Lisboa, Portugal. Available at: <a href="http://www.searchMESH.net/geonetwork">www.searchMESH.net/geonetwork</a> .
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**Correspondence to conservation and protection status**

Habitat directive/Natura 2000	OSPAR	OTHER
Site "Arrábida-Espichel" (PTCON0010)		

**Sensitivity to human activities**

Trampling. Fishing activities. Pollution.

**Persons / Institute responsible for the Habitat proposal**

Miriam Tuaty Guerra, Maria José Gaudêncio, Beatriz Mendes, Victor Henriques

[GELIDIUM CORNEUM] AND [ASPARAGOPSIS ARMATA] ON INFRA-LITTORAL ROCK

(EUNIS Habitat Type - A3.15\_PT13)

Habitat type	<i>Gelidium corneum</i> and <i>Asparagopsis armata</i> on infralittoral rock	
EUNIS habitat type code	A3.15_PT13	
Level	5	
Change in definition of higher type	Why proposed habitat differs from other types?	
Not required	Consistently different species assemblages. Occurs between 6 and 12 meters depth.	

DESCRIPTION



This biotope was identified in the western area of the Luiz Saldanha Marine Park (SW Portugal) (Saldanha, 1974). *Gelidium corneum* and *Asparagopsis armata* occur on horizontal and vertical rocky surfaces throughout an area of 0.09 km<sup>2</sup>, on high energy infralittoral rock, between 6 and 12 meters depth. They display a mosaic distribution and similar community composition. The thalli are the habitat of several epibionts, such as the cirriped *Verruca stroemia* and the bryozoans *Haplopoma bimucronatum*, *Celleporina caliciformis* and *Tubulipora cf. plumosa*. The fronds host several polychaetes, caprellids, the isopods *Paranthurus nigropunctata* and *P. costana*, the bryozoans *Electra pilosa*, *Scrupocellaria reptans* and *Crisia* sp. and the bivalve *Monia patelliformis*. The main algae on the herbaceous strata are *Plocamium cartilagineum*, *Pterosiphonia complanata* and *Dictyota dichotoma* (on *A. armata*). The muscinal strata are very diverse: several small algae such as, *Cryptopleura ramosa*, bryozoans such as, *Nolella* sp., *Beania* sp., *Scruparia* sp., *Scrupocellaria* sp., hidrarians such as, *Sertularella* sp., *Aglaophenia* sp. and *Kirchenpaueria* sp., molluscs such as *Hiatella arctica*, *Musculus costulatus* and *Modiolula phaseolina*, the cirriped *Balanus spongicola*, pantopods, polychaetes, echinoderms, etc. Besides those taxa, the following species are also observed on the muscinal stratum of *A. armata*: *Filicrisia geniculata* and *Aetea anguina* (bryozoans), *Nitophyllum punctatum* and *Acrosorium uncinatum* (algae), *Cornularia cornucopiae* (cnidarian) and *Modiolus barbatus* (bivalve). The encrusting strata are dominated by *Lithophyllum incrustans* and *Mesophyllum lichenoides*. The associated fauna is composed by the foraminifere *Miniacina miniaeceae*, sponges such as *Cliona celata* and *Dercitus (Stoeba) plicatus*, serpulid polychaetes such as *Spirobranchus polytrema*, *Spirobranchus* spp. and *Serpula concharum*, the cirriped *Perforatus perforatus*, and the bryozoans *Celleporina caliciformis*, *Haplopoma bimucronatum*, *H. impressum*, *Pentapora ottomulleriana*, *Microporella ciliata*, etc. Empty serpulid tubes provide habitat for the isopod *Anthura gracilis*. The ophiurids *Ophiotrix fragilis* and *Amphipholis squamata* are common in the herbaceous, muscinal and encrusting strata. Deposition of fine sand favours the presence of the bivalve *Abra alba* and the echinoderm *Echinocyamus pusillus* on the encrusting stratum of *A. armata*. On vertical surfaces the algae *Plocamium cartilagineum*, *Nitophyllum punctatum* and *Acrosorium uncinatum* are common, while *G. corneum*, *A. armata* and encrusting corallinaceans are less abundant. The associated fauna is composed by several sponges, bryozoans, cirripeds, amphipods, serpulid polychaetes, cnidarians, in particular *Corynactis viridis*, and molluscs. The encrusting Corallinaceae *Mesophyllum expansum* is observed in areas less exposed to light.

Observed facies

The biotope was originally described as two related facies: facies of *Gelidium sesquipedale* and facies of *Asparagopsis armata* (Saldanha, 1974).

Links to available maps	References: Henriques, V., Guerra, M.T., Mendes, B., Gaudêncio, M.J. & Fonseca, P., 2013. Map of seabed habitats and associated communities in the Luiz Saldanha Marine Park, Portugal according to the EUNIS classification. PT010000. Instituto Português do Mar e da Atmosfera (IPMA), Lisboa, Portugal. Available at: <a href="http://www.searchMESH.net/geonetwork">www.searchMESH.net/geonetwork</a> .	
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Correspondence to conservation and protection status

Habitat directive/Natura 2000	OSPAR	OTHER
Site "Arrábida-Espichel" (PTCON0010)		

Sensitivity to human activities

Fishing activities. Pollution.

Persons / Institute responsible for the Habitat proposal

Miriam Tuaty Guerra, Maria José Gaudêncio, Beatriz Mendes, Victor Henriques

<b>FAUNAL COMMUNITIES ON HIGH ENERGY INFRA-LITTORAL ROCK</b>		
<b>(EUNIS Habitat Type - A3.1_PT14)</b>		
<b>Habitat type</b>	Faunal communities on high energy infralittoral rock	
<b>EUNIS habitat type code</b>	A3.1_PT14	
<b>Level</b>	4	
<b>Change in definition of higher type</b>	<b>Why proposed habitat differs from other types?</b>	
Not required	Consistently different species assemblages.	
<b>DESCRIPTION</b>		
	<p>This habitat type is proposed to accommodate level 5 faunal units on high energy infralittoral rock.</p> <p>Observed facies No distinctive facies was detected</p>	
<b>Links to available maps</b>	References: Henriques, V., Guerra, M.T., Mendes, B., Gaudêncio, M.J. & Fonseca, P., 2013. Map of seabed habitats and associated communities in the Luiz Saldanha Marine Park, Portugal according to the EUNIS classification. PT010000. Instituto Português do Mar e da Atmosfera (IPMA), Lisboa, Portugal. Available at: <a href="http://www.searchMESH.net/geonetwork">www.searchMESH.net/geonetwork</a> .	
<b>Correspondence to conservation and protection status</b>		
<b>Habitat directive/Natura 2000</b>	<b>OSPAR</b>	<b>OTHER</b>
	Site "Arrábida-Espichel" (PTCON0010)	
<b>Sensitivity to human activities</b>		
Fishing activities. Pollution.		
<b>Persons / Institute responsible for the Habitat proposal</b>		
Miriam Tuaty Guerra, Maria José Gaudêncio, Beatriz Mendes, Victor Henriques		

[MYTILUS GALLOPROVINCIALIS] ON INFRALITTORAL ROCK		
(EUNIS Habitat Type - A3.1_PT14_PT15)		
Habitat type	<i>Mytilus galloprovincialis</i> on infralittoral rock	
EUNIS habitat type code	A3.1_PT14_PT15	
Level	5	
Change in definition of higher type	Why proposed habitat differs from other types?	
Proposed new level 4 unit A3.1_PT13: Faunal communities on high energy infralittoral rock.	Consistently different species assemblages. Occurs in the upper infralittoral up to 6-8 meters depth.	
DESCRIPTION		
	<p>This biotope was identified in the western area of the Luiz Saldanha Marine Park (SW Portugal) (Saldanha, 1974). Infralittoral dense populations of <i>Mytilus galloprovincialis</i> occur throughout an area of 0.08 km<sup>2</sup>, on high energy rocky bottoms, up to 6-8 meters depth. The specimens are strongly attached to each other by the bissus threads, which makes them extremely enduring to rough sea. Several layers of mussels can occur on the rock. Under them the rock is covered by abundant [<i>Perforatus perforatus</i>] that can also be attached to the shells of the mussels. The associated fauna is very diverse, with several sessile and mobile species on the rock occupying the spaces between the mussels. Attached either to the barnacle shells or directly to the rock, abundant populations of the cnidarian <i>Corynactys viridis</i> occur, as well as serpulid polychaetes <i>Spirobranchus</i> spp., and the bryozan <i>Celleporina caliciformis</i>. The echinoderms <i>Ophiotrix fragilis</i> and <i>Amphipholis squamata</i> and the polychaetes <i>Lepidonotus clava</i> and <i>Platynereis dumerilii</i> are common species in this habitat. The flatworms <i>Stylochus neapolitanus</i> and <i>Emprostopharynx pallida</i> and the ascidean <i>Diplosoma listerianum</i> are frequent and abundant in this habitat. Crustaceans are also abundant, namely <i>Pilumnus hirtellus</i>, <i>Tanais dulongii</i>, <i>Ischyromene lacazei</i>, <i>Elasmopus brasiliensis</i>, <i>Stenothoe tergestina</i>, <i>Podocerus variegatus</i> and <i>Parajassa pelagica</i>. Regarding the molluscs, the most abundant one, besides <i>M. galloprovincialis</i>, is <i>Patella ulyssiponensis</i>; <i>Hiatella arctica</i> and the predator <i>Nucella lapillus</i> are present but in small numbers. Among equinoderms <i>Paracentrotus lividus</i>, <i>Amphipholis squamata</i> and <i>Ophiotrix fragilis</i> occur in this habitat, as well as the predator <i>Marthasterias glacialis</i>, which can cause periodic destruction of the mussel populations. Algae are not abundant in this habitat, the most frequent one is <i>Corallina elongata</i>, whose biotope occurs between the eulittoral and infralittoral populations of <i>Mytilus galloprovincialis</i>.</p> <p>Observed facies The biotope was originally described as facies of <i>Mytilus galloprovincialis</i> (Saldanha, 1974).</p>	
Links to available maps	References: Henriques, V., Guerra, M.T., Mendes, B., Gaudêncio, M.J. & Fonseca, P., 2013. Map of seabed habitats and associated communities in the Luiz Saldanha Marine Park, Portugal according to the EUNIS classification. PT010000. Instituto Português do Mar e da Atmosfera (IPMA), Lisboa, Portugal. Available at: <a href="http://www.searchMESH.net/geonetwork">www.searchMESH.net/geonetwork</a> .	
Correspondence to conservation and protection status		
Habitat directive/Natura 2000	OSPAR	OTHER
Site "Arrábida-Espichel" (PTCON0010)		
Sensitivity to human activities		
Fishing activities. Pollution.		
Persons / Institute responsible for the Habitat proposal		
Miriam Tuaty Guerra, Maria José Gaudêncio, Beatriz Mendes, Victor Henriques		

**[SACCORHIZA POLYSCHIDES] ON INFRALITTORAL ROCK**

(EUNIS Habitat Type - A3.31\_PT16)

Habitat type	<i>Saccorhiza polyschides</i> on infralittoral rock	
EUNIS habitat type code	A3.31_PT16	
Level	5	
Change in definition of higher type	Why proposed habitat differs from other types?	
Not required	Consistently different species assemblages. It occurs up to 19 meters depth.	

**DESCRIPTION**



This biotope was identified in the east side of the Luiz Saldanha Marine Park (SW Portugal) (Saldanha, 1974). It occupies an area of low energy throughout 1.73 km<sup>2</sup>, on horizontal and vertical rocky surfaces. Its upper limit is confluent with the lower limit of the *Corallina elongata* habitat (1-2 meters depth) or with that of *Chondracanthus acicularis* in the lower eulittoral zone, depending on the energy intensity, and it extends up to 19 metres depth. This depth normally coincides with higher sedimentation levels, responsible for the occurrence of soft sediment. However *Saccorhiza polyschides* can extend deeper, up to 24 meters in areas of lower sedimentation. Isolated specimens may occur in areas of higher energy, yet of smaller size than the specimens in low energy areas. The upper level of this habitat is usually exposed during low tide, but the community is typically infralittoral. The arborescent stratum is composed of dense *Saccorhiza polyschides* and *Cystoseira foeniculacea*. The thallus of *S. polyschides* provides habitat for several epibionts, such as the bryozoans *Membranipora membranacea* and *Scruparia chelata*, and the cnidarian *Obelia geniculata* on the fronds. The following fauna and flora occur on the bulbs: the bryozoans *Scrupocellaria scrupea*, *S. reptans*, *Celleporina caliciformis*, *Fenestulina malusii* and *Mollia patellaria*, the cirriped *Perforatus perforatus*, the cnidarian *Sertularia gracilis*, the molluscs *Anomia ephippium*, *Hiatella arctica*, *Acanthochitona crinita* and *Doris verrucosa*, and the algae *Pterosiphonia complanata* and *Asparagopsis armata*. A diverse fauna composed by echinoderms, *Ophiotrix fragilis* in particular, polychaetes, molluscs, etc., occurs inside the bulbs. The arbustive stratum is composed mainly by *Gelidium corneum* and *A. armata* with associated *Dictyota dichotoma*, *Dictyopteris polypodioides*, *Laminaria ochroleuca* and *Cystoseira compressa*. The cnidarians *Clytia hemisphaerica* and *Obelia geniculata* are present in this stratum. The composition of the herbaceous, muscinal and encrusting strata is essentially the same as in the *G. corneum* and *A. armata* habitat. Large mobile species, such as the echinoderms *Holothuria (Panningothuria) forskali* and *Ophioderma longicauda* and the mollusc *Charonia lampas* occur in this habitat, as well as species less tolerant to light such as the echinoderm *Sphaerechinus granularis*, and the cnidarians *Eunicella verrucosa* and *Leptogorgia* sp. On vertical surfaces the algae tend to be less abundant, while the number of sponge and ascidean species increase. The arborescent, arbustive and herbaceous strata are rather sparse. The muscinal and encrusting strata are dense, composed mainly by red algae, sponges, in particular Chalinidae species, ascidians such as *Aplidium* sp. and *Synoicum* sp., bryozoans and serpulid polychaetes, namely *Filograna implexa*.

Observed facies  
No distinctive facies was detected

Links to available maps	References: Henriques, V., Guerra, M.T., Mendes, B., Gaudêncio, M.J. & Fonseca, P., 2013. Map of seabed habitats and associated communities in the Luiz Saldanha Marine Park, Portugal according to the EUNIS classification. PT010000. Instituto Português do Mar e da Atmosfera (IPMA), Lisboa, Portugal. Available at: <a href="http://www.searchMESH.net/geonetwork">www.searchMESH.net/geonetwork</a> .	
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**Correspondence to conservation and protection status**

Habitat directive/Natura 2000	OSPAR	OTHER
Site "Arrábida-Espichel" (PTCON0010)		

**Sensitivity to human activities**

Fishing activities. Pollution.

**Persons / Institute responsible for the Habitat proposal**

Miriam Tuaty Guerra, Maria José Gaudêncio, Beatriz Mendes, Victor Henriques

**[ERVILIA CASTANEA] BEDS IN INFRALITTORAL SAND**

(EUNIS Habitat Type - A5.13\_PT17)

Habitat type	<i>Ervilia castanea</i> beds in infralittoral sand
EUNIS habitat type code	A5.13_PT17
Level	5
Change in definition of higher type	Why proposed habitat differs from other types?
Replacement of habitat type A5.246 with the proposed habitat type A5.13_PT17.	Consistently different sediment type. Habitat type occurs between 2 and 30 m depth. The biotope description is not available in the EUNIS Habitat Classification 2012.

**DESCRIPTION**



This habitat type was identified in the Luiz Saldanha Marine Park (SW Portugal), on clean coarse and medium sand. It is found mainly on the shallow infralittoral (2-12 m depth) clean coarse sand banks influenced by strong tidal currents in the east end of the Park (including the Habitat 1110 of the Habitat Directive). Some of these coarse sands are slightly gravelly. Occasionally this habitat type was observed on fine sand and gravel adjacent to the typical distribution areas. The typical species is the small bivalve *Ervilia castanea* that can reach very high densities (> 20000 specimens/m<sup>2</sup>). The shell fragments of dead *E. castanea* are the main constituents of the sediment. The main taxa associated with *E. castanea* are the cephalochordate *Branchiostoma lanceolatum*, the polychaetes *Pisione remota*, *Nephtys cirrosa*, *Mediomastus fragilis*, *Notomastus latericeus* and syllids, the amphipods *Photis longipes* and *Atylus vedlomensis*, nematods and oligochaetes. The habitat also occurs on clean medium sand down to the upper circalittoral level (30 m depth) in the exposed west area of the Park. *E. castanea* is still the typical species but with lower densities, and the main taxa associated with it are *N. cirrosa* and nematods. Large epifaunal species such as the brachyurans *Atelecyclus undecimdentatus* and *Liocarcinus vernalis* and the echinoid *Echinocardium cordatum*, are commonly observed. Frequent megafauna species are the arthropods *Inachus leptochirus* and *Polybius henslowi*, the echinoderms *Astropecten aranciacus*, *Echinaster (Echinaster) sepositus*, *Holothuria (Panningothuria) forskali* and *Paracentrotus lividus*, and the molluscs *Bolma rugosa*, *Calliostoma zizyphinum*, and *Cymbium olla*.

Observed facies  
No distinctive facies was detected

**Links to available maps**

References: Henriques, V., Guerra, M.T., Mendes, B., Gaudêncio, M.J. & Fonseca, P., 2013. Map of seabed habitats and associated communities in the Luiz Saldanha Marine Park, Portugal according to the EUNIS classification. PT010000. Instituto Português do Mar e da Atmosfera (IPMA), Lisboa, Portugal. Available at: [www.searchMESH.net/geonetwork](http://www.searchMESH.net/geonetwork).

**Correspondence to conservation and protection status**

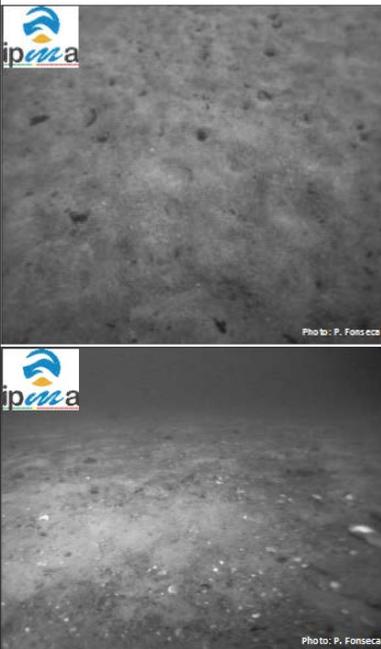
Habitat directive/Natura 2000	OSPAR	OTHER
1110	1110: Sandbanks which are slightly covered by sea water all the time Site "Arrábida-Espichel" (PTCON0010)	

**Sensitivity to human activities**

Fishing activities. Pollution.

**Persons / Institute responsible for the Habitat proposal**

Miriam Tuaty Guerra, Maria José Gaudêncio, Beatriz Mendes, Victor Henriques

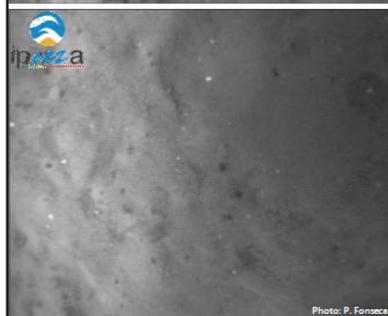
FAUNAL COMMUNITIES IN HIGHLY MOBILE CLEAN SAND		
(EUNIS Habitat Type - A5.23_PT18)		
Habitat type	Faunal communities in highly mobile clean sand	
EUNIS habitat type code	A5.23_PT18	
Level	5	
Change in definition of higher type	Why proposed habitat differs from other types?	
Renaming of habitat type A5.23 "Infralittoral fine sand" to "Infralittoral sand" (in agreement with the description of the habitat type in the EUNIS Habitat Classification 2012)..	Consistently different species assemblages It occurs on clean sand. Main depth range is 10 to 30 meters but may occur up to 50 meters.	
DESCRIPTION		
	<p>This habitat type was identified in the Luiz Saldanha Marine Park (SW Portugal). It occurs on infralittoral clean medium sands, but may extend to adjacent coarse and fine sand areas, in the east, west and north sides, in high energy areas, mainly between 10 and 30 meters depth. However its distribution reaches the upper circalittoral near the west and north boundaries of the Park, where high energy is still likely to cause significant mobility of deeper sediments. In these areas rock formations alternate with soft sediment patches. In more mobile conditions the polychaete <i>Nephtys cirrosa</i>, nematodes and nemertean are the most frequent taxa. In less mobile sediments the bivalve <i>Thracia phaseolina</i> is the most frequent species. Other common species are the polychaetes <i>Aglaophamus agilis</i>, <i>Sigalion squamosus</i>, <i>Glycera lapidum</i>, <i>Progoniada regularis</i>, <i>Pisione remota</i>, the echinoderm <i>Echinocardium cordatum</i> and oligochaetes. In less mobile conditions the infaunal polychaete <i>Aricidea simonae</i> and the bivalves <i>Chamelea striatula</i> and <i>Moerella donacina</i> are also frequent. The pagurid <i>Diogenes pugilator</i>, the brachyurans <i>Atelecyclus undecimdentatus</i> and <i>Thia scutellata</i> and the holothurian <i>Leptosynapta inhaerens</i> are common large epifaunal species. Megafauna species commonly observed in this habitat are the arthropods <i>Inachus leptochirus</i>, <i>Macropodia rostrata</i> and <i>Pisa nodipes</i>] the cnidarians <i>Calliactis parasitica</i> and <i>Veretillum cynomorium</i>, the echinoderms <i>Astropecten aranciacus</i>, <i>Echinaster (Echinaster) sepositus</i>, <i>Echinus esculentus</i>, <i>Holothuria (Panningothuria) forskali</i>, <i>Marthasterias glacialis</i>, <i>Paracentrotus lividus</i>, <i>Sphaerechinus granularis</i> and <i>Spatangus purpureus</i>, and the molluscs <i>Bolma rugosa</i>, <i>Calliostoma ziziphynum</i>, <i>Chaetopleura (Chaetopleura) angulata</i>, <i>Charonia lampas</i>, <i>Cymbium olla</i> and <i>Pecten maximus</i>. The imperial scaldfish <i>Arnoglossus imperialis</i> and the longfin gurnard <i>Chelidonichthys obscurus</i> occur frequently in this habitat type (Henriques <i>et al.</i> , 2011).</p> <p>Observed facies No distinctive facies was detected</p>	
Links to available maps	References: Henriques, V., Guerra, M.T., Mendes, B., Gaudêncio, M.J. & Fonseca, P., 2013. Map of seabed habitats and associated communities in the Luiz Saldanha Marine Park, Portugal according to the EUNIS classification. PT010000. Instituto Português do Mar e da Atmosfera (IPMA), Lisboa, Portugal. Available at: <a href="http://www.searchMESH.net/geonetwork">www.searchMESH.net/geonetwork</a> .	
Correspondence to conservation and protection status		
Habitat directive/Natura 2000	OSPAR	OTHER
Site "Arrábida-Espichel" (PTCON0010)		
Sensitivity to human activities		
Fishing activities. Pollution.		
Persons / Institute responsible for the Habitat proposal		
Miriam Tuaty Guerra, Maria José Gaudêncio, Beatriz Mendes, Victor Henriques		

## INFRALITTORAL SAND WITH PERACARID CRUSTACEANS AND BIVALVES

(EUNIS Habitat Type - A5.23\_PT19)

Habitat type	Infralittoral sand with peracarid crustaceans and bivalves
EUNIS habitat type code	A5.23_PT19
Level	5
Change in definition of higher type	Why proposed habitat differs from other types?
Renaming of habitat type A5.23 "Infralittoral fine sand" to "Infralittoral sand" (in agreement with the description of the habitat type in the EUNIS Habitat Classification 2012).	Consistently different species assemblages. Habitat type occurs between 10 and 30 meters depth, mainly on clean sand.

### DESCRIPTION



This habitat type was identified in the Luiz Saldanha Marine Park (SW Portugal). It occurs mainly on clean fine and medium sand in moderate to low energy areas, and may extend to vicinity areas of coarse sand, either clean, slightly gravelly or muddy. Typically distributed on the infralittoral, from 10 to 20 meters depth, the habitat may extend to the upper circalittoral up to 30 meters depth. It is composed of a diverse set of species, the most characteristic ones being peracarid crustaceans and bivalves. The amphipods *Photis longipes*, *Megamphopus cornutus* and *Ampelisca tenuicornis*, the bivalves *Dosinia lupinus* and *Thracia phaseolina* and the tanaidaceans *Diastylis rugosa* and *Apseudopsis latreillii* are the most representative species. Other taxa commonly occurring in this habitat are the amphipods *Atylus vedlomensis*, *Leptocheirus pectinatus*, *Leucothoe lilljeborgi*, the bivalves *Moerella donacina*, *Spisula subtruncata* and *Abra alba*, the polychaetes *Aponuphis bilineata* and syllids, nemertean and the cephalochordate *Branchiostoma lanceolatum*. The following large epifaunal species occur in this habitat: the pagurids *Diogenes pugilator* and *Anapagurus laevis*, the holothurian *Labidoplax digitata*, the echinoid *Echinocardium cordatum* and the ophiuroids *Ophiura albida* and *Amphiura chiajei*. Common megafauna species are: the arthropods *Atelecyclus undecimdentatus*, *Dynamene bidentata* and *Maja squinado*, the echinoderms *Asterias rubens*, *Astropecten aranciacus*, *Holothuria (Panningothuria) forskali*, *Marthasterias glacialis*, *Ophiocomina nigra* and *Sphaerechinus granularis*, the molluscs *Callista chione*, *Chaetopleura (Chaetopleura) angulata* and *Cymbium olla*. This habitat type may be closely related to A5.234. It is possible that this new unit is a variant of A5.234.

Observed facies  
No distinctive facies was detected

### Links to available maps

References: Henriques, V., Guerra, M.T., Mendes, B., Gaudêncio, M.J. & Fonseca, P., 2013. Map of seabed habitats and associated communities in the Luiz Saldanha Marine Park, Portugal according to the EUNIS classification. PT010000. Instituto Português do Mar e da Atmosfera (IPMA), Lisboa, Portugal. Available at: [www.searchMESH.net/geonetwork](http://www.searchMESH.net/geonetwork).

### Correspondence to conservation and protection status

Habitat directive/Natura 2000	OSPAR	OTHER
Site "Arrábida-Espichel" (PTCON0010)		

### Sensitivity to human activities

Fishing activities. Pollution.

### Persons / Institute responsible for the Habitat proposal

Miriam Tuaty Guerra, Maria José Gaudêncio, Beatriz Mendes, Victor Henriques

**CIRCALLITORAL SAND WITH POLYCHAETES [APONUPHIS BILINEATA] AND BIVALVES [MOERELLA DONACINA]**

(EUNIS Habitat Type - A5.25\_PT20)

<b>Habitat type</b>	Circalittoral sand with polychaetes <i>Aponuphis bilineata</i> and bivalves <i>Moerella donacina</i>
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<b>EUNIS habitat type code</b>	A5.25_PT20
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<b>Level</b>	5
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<b>Change in definition of higher type</b>	<b>Why proposed habitat differs from other types?</b>
Renaming of habitat type A5.25 "Circalittoral fine sand" to "Circalittoral sand" in order to accommodate new habitat types.	Consistently different species assemblages. Habitat type occurs on circalittoral sand mainly between 30 and 50 meters depth.

**DESCRIPTION**



This habitat type was identified in the Luiz Saldanha Marine Park (SW Portugal). It is distributed over areas of low and moderate energy, on medium and coarse sands, that may be slightly muddy in deeper waters (up to 11% silt/clay). The main depth range is 30 to 50 meters, but it may extend occasionally, either to shallower (20 meters) or deeper (90 meters) depths. It is characterised by a set of species, polychaetes and bivalves mainly, the most common ones being *Aponuphis bilineata* and *Moerella donacina*. Other taxa present in this habitat are: the polychaetes *Lygdamis muratus*, *Sthenelais boa*, *Prionospio fallax*, *Aglaophamus agilis*, *Mediomastus fragilis* and sabellids; the bivalves *Nucula sulcata*, *Ervilia castanea*, *Gouldia minima* and *Clausinella fasciata*. The cephalochardate *Branchiostoma lanceolatum* and the tanaidacean *Apseudes talpa* may be present also. Large epifaunal species such as the sea-urchin *Echinocardium cordatum*, the decapod *Parthenope massena* and the holothurian *Leptosynapta inhaerens* are commonly observed. Common megafauna species are: the arthropods *Atelecyclus undecimdentatus*, *Inachus leptochirus*, *Macropodia rostrata* and *Pisa nodipes*, the echinoderms *Astropecten aranciacus*, *Echinus esculentus*, *Holothuria (Panningothuria) forskali*, *Paracentrotus lividus*, *Spatangus purpureus* and *Sphaerechinus granularis* and the molluscs *Charonia lampas* *Chaetopleura (Chaetopleura) angulata*, *Cymbium olla* and *Pecten maximus*. The imperial scaldfish *Arnoglossus imperialis* and the longfin gurnard *Chelidonichthys obscurus* occur frequently in this habitat type (Henriques *et al.*, 2011).

Observed facies  
No distinctive facies was detected

<b>Links to available maps</b>	References: Henriques, V., Guerra, M.T., Mendes, B., Gaudêncio, M.J. & Fonseca, P., 2013. Map of seabed habitats and associated communities in the Luiz Saldanha Marine Park, Portugal according to the EUNIS classification. PT010000. Instituto Português do Mar e da Atmosfera (IPMA), Lisboa, Portugal. Available at: <a href="http://www.searchMESH.net/geonetwork">www.searchMESH.net/geonetwork</a> .
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**Correspondence to conservation and protection status**

Habitat directive/Natura 2000	OSPAR	OTHER
Site "Arrábida-Espichel" (PTCON0010)		

**Sensitivity to human activities**

Fishing activities. Pollution.

**Persons / Institute responsible for the Habitat proposal**

Miriam Tuaty Guerra, Maria José Gaudêncio, Beatriz Mendes, Victor Henriques

# CIRCALITTORAL MUDDY SAND WITH PERACARID AND DECAPOD CRUSTACEANS, POLYCHAETES, OPHIURIDS AND BIVALVES

(EUNIS Habitat Type - A5.26\_PT21)

Habitat type	Circalittoral muddy sand with peracarid and decapod crustaceans, polychaetes, ophiurids and bivalves	
EUNIS habitat type code	A5.26_PT21	
Level	5	
Change in definition of higher type	Why proposed habitat differs from other types?	
Not required	Consistently different species assemblages. Habitat occurs between 30 and 50 meters depth on muddy sand.	

## DESCRIPTION



This habitat type was identified in the Luiz Saldanha Marine Park (SW Portugal). It occurs on circalittoral muddy sand with silt/ clay content up to 48%, from 30 to 50 meters depth. Occasionally it may extend to vicinity sites in which the fines content of the sediment is slightly below 10%. It supports a diverse faunal community dominated by peracarid crustaceans such as the amphipods *Photis longipes*, *Ampelisca tenuicornis*, *Microdeutopus armatus*, *Urothoe elegans* and *Atylus vedlomensis*, the isopod *Eurydice pulchra*, the tanaidaceans *Bodotria arenosa* and *Iphinoe trispinosa*, the decapod *Processa macrophthalma*, the polychaetes *Glycera unicornis*, *Aricidea simonae*, *Scolaricia typica*, *Owenia fusiformis* and some syllids, the ophiurid *Amphiura chiajei* and the bivalves *Tellimya ferruginosa*, *Corbula gibba* and *Ervilia castanea*. This habitat type is close to A5.23\_PT13 in infralittoral sand. Both support diverse communities characterised by the same species and/or species belonging to the same faunal groups. The fauna appears to be tolerant to a wide range of sediment type and depth conditions. However changes in the abundances of the species common to both habitats and disappearance/appearance of other species occur, as sediment type and depth change. A population of the fan mussel *Atrina fragilis*, a very sensitive species to habitat degradation and bottom trawling, occurs in this habitat. Its density is higher at 30 meters depth and occasionally, isolated individuals were observed in adjacent sandy mud up to 70 meters depth (Henriques *et al.*, 2011). Common megafauna species are: the arthropods *Alpheus macrocheles*, *Inachus dorsettensis*, *Macropodia rostrata*, *Maja squinado*, *Nepinnotheres pinnotheres*, *Pagurus cuanensis* and *Palinurus elephas*, the ascidean *Phallusia mammillata*, the cnidarian *Veretillum cynomorium*, the echinoderms *Asterias rubens*, *Astropecten aranciatus*, *Holothuria (Panningothuria) forskali*, *Marthasterias glacialis*, *Ophiocomina nigra*, *Ophiothrix fragilis*, *Paracentrotus lividus* and *Sphaerechinus granularis*, the molluscs *Anomia ehippium*, *Chaetopleura (Chaetopleura) angulata*, *Cymbium olla* and *Mimachlamys varia*. The megrim *Lepidorhombus whiffiagonis*, the large-scaled gurnard *Lepidotrigla cavillone*, the spiny gurnard *Lepidotrigla dieuzeidei*, the Adriatic sole *Pegusa impar* and rays *Raja* spp. are common fish species in this habitat (Henriques *et al.*, 2011).

Observed facies  
No distinctive facies was detected

## Links to available maps

References: Henriques, V., Guerra, M.T., Mendes, B., Gaudêncio, M.J. & Fonseca, P., 2013. Map of seabed habitats and associated communities in the Luiz Saldanha Marine Park, Portugal according to the EUNIS classification. PT010000. Instituto Português do Mar e da Atmosfera (IPMA), Lisboa, Portugal. Available at: [www.searchMESH.net/geonetwork](http://www.searchMESH.net/geonetwork).

## Correspondence to conservation and protection status

Habitat directive/Natura 2000	OSPAR	OTHER
Site "Arrábida-Espichel" (PTCON0010)		

## Sensitivity to human activities

Fishing activities. Pollution.

## Persons / Institute responsible for the Habitat proposal

Miriam Tuaty Guerra, Maria José Gaudêncio, Beatriz Mendes, Victor Henriques

**[NEPHTYS HOMBERGII] AND [LAEVICARDIUM CRASSUM] IN DEEP CIRCALLITORAL MUDDY SAND**

(EUNIS Habitat Type - A5.27\_PT22)

Habitat type	<i>Nephtys hombergii</i> and <i>Laevicardium crassum</i> in deep circalittoral muddy sand	
EUNIS habitat type code	A5.27_PT22	
Level	5	
Change in definition of higher type	Why proposed habitat differs from other types?	
Not required	Consistently different species assemblages. Habitat occurs between 50 and 100 meters depth on muddy sand.	

**DESCRIPTION**

	<p>This habitat type was identified in the Luiz Saldanha Marine Park (SW Portugal). It occurs between 50 and 100 meters depth on non-cohesive muddy sand with up to 39% silt/clay content and, occasionally, a slight content in shell debris. The habitat type is typified by the polychaete <i>Nephtys hombergii</i> and the bivalve <i>Laevicardium crassum</i>. It shows affinities with its counterpart A5.244 in infralittoral muddy sand with regard the assemblage composition, having in common with it one of the characterizing species; some of the other important species, in spite of not being the same, belong to the same faunal groups: <i>Apseudopsis latreillii</i>, <i>Hippomedon massiliensis</i> and <i>Urothoe pulchella</i>. Moreover, it is close to the new proposed A5.27_PT18, having species in common with it, namely <i>Chloeia viridis</i>, <i>Owenia fusiformis</i> and <i>Hyalinoecia tubicola</i>. It is possible that this unit is not an established biotope.</p> <p>Observed facies No distinctive facies was detected</p>
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Links to available maps	References: Henriques, V., Guerra, M.T., Mendes, B., Gaudêncio, M.J. & Fonseca, P., 2013. Map of seabed habitats and associated communities in the Luiz Saldanha Marine Park, Portugal according to the EUNIS classification. PT010000. Instituto Português do Mar e da Atmosfera (IPMA), Lisboa, Portugal. Available at: <a href="http://www.searchMESH.net/geonetwork">www.searchMESH.net/geonetwork</a> .
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**Correspondence to conservation and protection status**

Habitat directive/Natura 2000	OSPAR	OTHER
Site "Arrábida-Espichel" (PTCON0010)		

**Sensitivity to human activities**

Fishing activities. Pollution.

**Persons / Institute responsible for the Habitat proposal**

Miriam Tuaty Guerra, Maria José Gaudêncio, Beatriz Mendes, Victor Henriques

**DEEP CIRCALLITORAL MUDDY SAND WITH [CHLOEIA VIRIDIS], [PANTHALIS OERSTEDI] AND [OWENIA FUSIFORMIS]**

(EUNIS Habitat Type - A5.27\_PT23)

<b>Habitat type</b>	Deep circalittoral muddy sand with <i>Chloeia viridis</i> , <i>Panthalis oerstedii</i> and <i>Owenia fusiformis</i>
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<b>EUNIS habitat type code</b>	A5.27_PT23
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<b>Level</b>	5
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<b>Change in definition of higher type</b>	<b>Why proposed habitat differs from other types?</b>
Not required	Consistently different species assemblages. Habitat occurs between 50 and 100 meters depth on muddy sand.

**DESCRIPTION**



This habitat type was identified in the Luiz Saldanha Marine Park (SW Portugal). It occurs between 50 and 100 meters depth, in areas of low to moderate energy, on non-cohesive muddy sand with up to 37% silt/clay content. It is dominated by polychaete species, the main ones being *Chloeia viridis*, *Panthalis oerstedii* and *Owenia fusiformis*. Other species important in this habitat are the polychaetes *Aponuphis fauveli*, *Terebellides stroemi*, *Nephtys hombergii*, *Lumbrineris* cf. *latreilli*, *Eunice vittata* and *Aponuphis bilineata*, *Euclymene lombricoides* and the bivalve *Moerella donacina*. The following megafauna taxa occur in this habitat: the arthropods *Inachus leptochirus* and *Macropodia rostrata*, the echinoderms *Holothuria (Panningothuria) forskali*, *Ophiothrix fragilis* and *Paracentrotus lividus* and the molluscs *Ampulla priamus*, *Chaetopleura (Chaetopleura) angulata*, *Mimachlamys varia* and *Ranella olearium*.

Observed facies  
No distinctive facies was detected

<b>Links to available maps</b>	References: Henriques, V., Guerra, M.T., Mendes, B., Gaudêncio, M.J. & Fonseca, P., 2013. Map of seabed habitats and associated communities in the Luiz Saldanha Marine Park, Portugal according to the EUNIS classification. PT010000. Instituto Português do Mar e da Atmosfera (IPMA), Lisboa, Portugal. Available at: <a href="http://www.searchMESH.net/geonetwork">www.searchMESH.net/geonetwork</a> .
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**Correspondence to conservation and protection status**

Habitat directive/Natura 2000	OSPAR	OTHER
Site "Arrábida-Espichel" (PTCON0010)		

**Sensitivity to human activities**

Fishing activities. Pollution.

**Persons / Institute responsible for the Habitat proposal**

Miriam Tuaty Guerra, Maria José Gaudêncio, Beatriz Mendes, Victor Henriques

DEEP CIRCALITTORAL SANDY MUD WITH [MALDANE GLEBIFEX]		
(EUNIS Habitat Type - A5.37_PT24)		
Habitat type	Deep circalittoral sandy mud with <i>Maldane glebifex</i>	
EUNIS habitat type code	A5.37_PT24	
Level	5	
Change in definition of higher type	Why proposed habitat differs from other types?	
Not required	Consistently different species assemblages. Occurs between 60 and 100 meters depth on sandy mud.	
<b>DESCRIPTION</b>		
	<p>This habitat type was identified in the Luiz Saldanha Marine Park (SW Portugal). It occurs from 60 to 100 meters depth on sandy mud with silt/clay content between 65 and 83%. Occasionally it extends to adjacent muddy sand sites. The main species in this habitat is the infaunal polychaete <i>Maldane glebifex</i>. Other important species are the polychaetes <i>Glycera unicornis</i>, <i>Chirimia biceps</i>, <i>Aponuphis bilineata</i>, <i>Lagis koreni</i> and <i>Amphitrite cirrata</i>, the bivalve <i>Diplodonta rotundata</i>, the gastropod <i>Nassarius ovoideus</i> and the ophiurid <i>Amphiura chiajei</i> and the echinoid <i>Brissopsis lyrifera</i>. This habitat type has affinities with the sandy muds of <i>Maldane glebifex</i>-<i>Clymene modesta</i> community defined by Glémarec (1973). Common megafauna species observed in this habitat are: the arthropods <i>Inachus leptochirus</i>, <i>Macropodia rostrata</i> and <i>Pagurus prideaux</i>, the cnidarian <i>Calliactis parasitica</i>, the echinoderms <i>Anseropoda placenta</i>, <i>Gracilechinus acutus</i>, <i>Holothuria (Panningothuria) forskali</i>, <i>Marthasterias glacialis</i>, <i>Ophiocomina nigra</i>, <i>Ophiothrix fragilis</i>, <i>Ophiura albida</i> and <i>Paracentrotus lividus</i> and the molluscs <i>Ampulla priamus</i>, <i>Anomia ephippium</i>, <i>Atrina fragilis</i>, <i>Chaetopleura (Chaetopleura) angulata</i>, <i>Ranella olearium</i> and <i>Mimachlamys varia</i>.</p> <p>Observed facies No distinctive facies was detected</p>	
Links to available maps	References: Henriques, V., Guerra, M.T., Mendes, B., Gaudêncio, M.J. & Fonseca, P., 2013. Map of seabed habitats and associated communities in the Luiz Saldanha Marine Park, Portugal according to the EUNIS classification. PT010000. Instituto Português do Mar e da Atmosfera (IPMA), Lisboa, Portugal. Available at: <a href="http://www.searchMESH.net/geonetwork">www.searchMESH.net/geonetwork</a> .	
<b>Correspondence to conservation and protection status</b>		
Habitat directive/Natura 2000	OSPAR	OTHER
	Site "Arrábida-Espichel" (PTCON0010)	
<b>Sensitivity to human activities</b>		
Fishing activities. Pollution.		
<b>Persons / Institute responsible for the Habitat proposal</b>		
Miriam Tuaty Guerra, Maria José Gaudêncio, Beatriz Mendes, Victor Henriques		

**[CHEIROCRATUS SUNDEVALLI] AND [SPIO cf. SYMPHYTA] IN INFRALITTORAL GRAVELLY SAND**

(EUNIS Habitat Type - A5.13\_PT25)

Habitat type	<i>Cheirocratus sundevalli</i> and <i>Spio cf. symphyta</i> in infralittoral gravelly sand	
EUNIS habitat type code	A5.13_PT25	
Level	5	
Change in definition of higher type	Why proposed habitat differs from other types?	
Not required	Consistently different species assemblages. Occurs between 8 and 10 meters depth on gravelly sand.	

**DESCRIPTION**



This unit was identified in the moderately exposed coastal area located south of Sines (SW Portugal), in the upper level of the infralittoral zone, between 8 and 10 meters depth, on gravelly medium sand subject to disturbance by tidal streams and wave action. It is typified by the interstitial amphipod *Cheirocratus sundevalli* and the infaunal polychaete *Spio cf. symphyta*. The associated fauna is mainly composed by amphipods, polychaetes and the lancelet *Branchiostoma lanceolatum*. Among the amphipods the most common are the burrowers *Bathyporeia guilliamsoniana*, *Hippomedon massiliensis*, *Monoculodes carinatus*, *Perioculodes longimanus*, and *Urothoe pulchella* and the tube-building *Ampelisca brevicornis* and *Photis longicaudata*. The most common polychaetes are the mobile species *Harmothoe* sp., *Glycera unicornis*, *Nephtys cirrosa*, *Pisione remota* and *Sigambra parva*, as well as the infaunal ones *Magelona johnstoni*, *Poecilochaetus serpens*, *Prionospio caspersi* and *Spio decoratus*. The bivalve *Moerella donacina*, the tanaidacean *Apeudopsis latreillii*, the pagurids *Anapagurus laevis* and *Diogenes pugilator*, the sipunculid *Aspidosiphon (Aspidosiphon) muelleri muelleri* and nemerteans are also common in this habitat.

Observed facies  
No distinctive facies was detected

Links to available maps	References: Henriques, V., Guerra, M.T., Mendes, B. & Gaudêncio, M.J., 2013. Map of seabed habitats and associated communities in Sines coastal area (SW Portugal) according to the EUNIS classification. PT010001. Instituto Português do Mar e da Atmosfera (IPMA), Lisboa, Portugal. Available at: <a href="http://www.searchMESH.net/geonetwork">www.searchMESH.net/geonetwork</a>	
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**Correspondence to conservation and protection status**

Habitat directive/Natura 2000	OSPAR	OTHER

**Sensitivity to human activities**

Fishing activities. Pollution.

**Persons / Institute responsible for the Habitat proposal**

Miriam Tuaty Guerra, Maria José Gaudêncio, Beatriz Mendes, Victor Henriques

**CIRCALITTORAL COARSE SAND WITH [BRANCHIOSTOMA LANCEOLATUM], [EURYDICE GRIMALDII] AND [MALMGRENIELLA CASTANEA]**

(EUNIS Habitat Type - A5.14\_PT26)

Habitat type	Circalittoral coarse sand with <i>Branchiostoma lanceolatum</i> , <i>Eurydice grimaldii</i> and <i>Malmgreniella castanea</i>	
EUNIS habitat type code	A5.14_PT26	
Level	5	
Change in definition of higher type	Why proposed habitat differs from other types?	
Not required	Consistently different species assemblages. Occurs between 24 and 53 meters depth on coarse sand.	

**DESCRIPTION**



This unit was identified in the moderately exposed coastal area south of Sines (SW Portugal). It is distributed in the circalittoral zone, up to 53 m depth. The scattered fauna occurs in mosaics of coarse sand with shell gravel up to 17%, and occasionally in adjacent sites with slightly gravelly medium sand. The lancelet *Branchiostoma lanceolatum*, the isopod *Eurydice grimaldii* and the mobile polychaete *Malmgreniella castanea* are the prevalent species. Other conspicuous fauna are the decapod *Galathea intermedia*, nematods, the bivalve *Ervilia castanea* and interstitial amphipod *Phtisica marina* and polychaete *Syllis cf. licheri*.

Observed facies  
No distinctive facies was detected

Links to available maps	References: Henriques, V., Guerra, M.T., Mendes, B. & Gaudêncio, M.J., 2013. Map of seabed habitats and associated communities in Sines coastal area (SW Portugal) according to the EUNIS classification. PT010001. Instituto Português do Mar e da Atmosfera (IPMA), Lisboa, Portugal. Available at: <a href="http://www.searchMESH.net/geonetwork">www.searchMESH.net/geonetwork</a>
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**Correspondence to conservation and protection status**

Habitat directive/Natura 2000	OSPAR	OTHER
SPart of this habitat is included in the Special Protection Area "costa sudoeste" PTZPE 0015		

**Sensitivity to human activities**

Fishing activities. Pollution.

**Persons / Institute responsible for the Habitat proposal**

Miriam Tuaty Guerra, Maria José Gaudêncio, Beatriz Mendes, Victor Henriques

## INFRALITTORAL VERY FINE SAND WITH BURROWING AMPHIPODS, POLYCHAETES AND BIVALVES

(EUNIS Habitat Type - A5.23\_PT27)

Habitat type	Infralittoral fine sand with burrowing amphipods, polychaetes and bivalves	
EUNIS habitat type code	A5.23_PT27	
Level	5	
Change in definition of higher type	Why proposed habitat differs from other types?	
Not required	Consistently different species assemblages. Occurs between 14 and 30 meters depth on very fine sand.	

### DESCRIPTION



This unit was identified in the moderately exposed coastal area south of Sines (SW Portugal). It is distributed in the infralittoral zone from 14 to 30 meters depth, on clean and well-sorted very fine sand, occasionally on fine sand. A diverse fauna dominated by burrowing species characterizes this habitat. Typical species are the amphipods *Urothoe pulchella*, *Bathyporeia guilliamsoniana*, *Hippomedon massiliensis* and *Ampelisca brevicornis*, the polychaetes *Spio decoratus* and *Nephtys cirrosa* and the bivalve *Macra stultorum*. Other conspicuous fauna are the polychaetes *Spiophanes bombyx*, *Magelona johnstoni* and *Prionospio* spp., the cumacean *Iphinoe trispinosa*, the amphipod *Urothoe grimaldii*, the pagurid *Diogenes pugilator* and nemerteans.

Observed facies  
No distinctive facies was detected

### Links to available maps

References: Henriques, V., Guerra, M.T., Mendes, B. & Gaudêncio, M.J., 2013. Map of seabed habitats and associated communities in Sines coastal area (SW Portugal) according to the EUNIS classification. PT010001. Instituto Português do Mar e da Atmosfera (IPMA), Lisboa, Portugal. Available at: [www.searchMESH.net/geonetwork](http://www.searchMESH.net/geonetwork)

### Correspondence to conservation and protection status

Habitat directive/Natura 2000	OSPAR	OTHER
Part of this habitat is included in the Special Protection Area "costa sudoeste" PTZPE 0015		

### Sensitivity to human activities

Fishing activities. Pollution.

### Persons / Institute responsible for the Habitat proposal

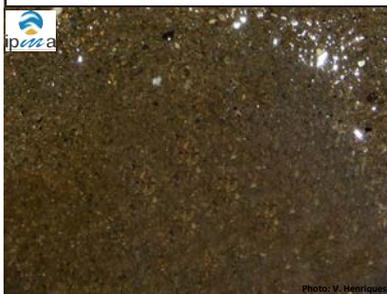
Miriam Tuaty Guerra, Maria José Gaudêncio, Beatriz Mendes, Victor Henriques

**CIRCALITTORAL VERY FINE SAND WITH BURROWING POLYCHAETES, BIVALVES [SPISULA SUBTRUNCATA], AMPHIPODS AND ECHINODERMS**

(EUNIS Habitat Type - A5.25\_PT28)

Habitat type	Circalittoral very fine sand with burrowing polychaetes, bivalves <i>Spisula subtruncata</i> , amphipods and echinoderms	
EUNIS habitat type code	A5.25_PT28	
Level	5	
Change in definition of higher type	Why proposed habitat differs from other types?	
Not required	Consistently different species assemblages. Occurs between 30 and 53 meters depth on very fine sand.	

**DESCRIPTION**



This unit was identified in the moderately exposed coastal area south of Sines (SW Portugal). It occurs in the circalittoral zone up to 53 meters depth, on well-sorted very fine clean sand or with fines content up to 28% in deeper waters. This habitat was also observed in the upper level of the infralittoral zone (12 m depth), in the vicinity of a thermoelectric powerplant outfall. The discharges are likely to cause turbidity increase and consequently reduction of light penetration into the water, which may favour the establishment of circalittoral conditions in the infralittoral zone. The habitat supports a diverse infaunal community from which the prevalent species are polychaetes: *Spiophanes bombyx*, *Spio decoratus*, *Prionospio* spp., *Magelona johnstoni*, *M. filiformis*, *Scolaricia typica*, *Poecilochaetus serpens*, the sand tube *Lygdamis muratus*, *Sigalion mathildae*, *Sthenelais limicola*, *Aponuphis bilineata*, *Glycera unicornis*, *G. tridactyla*, *Nephtys kersivalensis* and *Phyllodoce lineata*, the bivalve *Spisula subtruncata*, amphipods: *Ampelisca brevicornis* and *Urothoe grimaldii* and echinoderms: *Echinocardium cordatum* and *Ophiura albida*. Other common species are the polychaetes *Spiophanes kroyeri*, *Paradoneis armata*, *Onuphis eremita* and *Nephtys assimilis*, the amphipods *Bathyporeia guilliamsoniana* and *Hippomedon massiliensis*, the isopod *Cyathura carinata*, the ophiurid *Amphiura chiajei* and the bivalve *Chamelea striatula*.

Observed facies  
No distinctive facies was detected

Links to available maps	References: Henriques, V., Guerra, M.T., Mendes, B. & Gaudêncio, M.J., 2013. Map of seabed habitats and associated communities in Sines coastal area (SW Portugal) according to the EUNIS classification. PT010001. Instituto Português do Mar e da Atmosfera (IPMA), Lisboa, Portugal. Available at: <a href="http://www.searchMESH.net/geonetwork">www.searchMESH.net/geonetwork</a>
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**Correspondence to conservation and protection status**

Habitat directive/Natura 2000	OSPAR	OTHER
Part of this habitat is included in the Special Protection Area "costa sudoeste" PTZPE 0015		

**Sensitivity to human activities**

Fishing activities. Pollution.

**Persons / Institute responsible for the Habitat proposal**

Miriam Tuaty Guerra, Maria José Gaudêncio, Beatriz Mendes, Victor Henriques

[CRASSOSTREA GIGAS ] REEF ON EULITTORAL MUDS			
(EUNIS Habitat Type - A2.7_FR1_1)			
Habitat type	<i>Crassostrea gigas</i> reef on eulittoral mud Could be a subclass of A2. 7_FR1 Littoral oyster beds on sediment		
EUNIS habitat type code	A 2.7_FR1_1		
Level	5		
Change in definition of higher type	Why proposed habitat differs from other types?		
Not required	Consistently different assemblages of species; occurs mainly on mid shore mud or sandy mud subject to variable salinity on sheltered estuarine shores		
DESCRIPTION			
	<p>This habitat is a biogenic reef built by the exotic species <i>Crassostrea gigas</i> that was firstly introduced in Europe in oyster farms in the early 80's. Favoured by the climatic change, this species reproduces quickly and forms wild populations outside the oyster farms. It can also has an invasive behavior with a local proliferation, resulting in accumulations of oysters in three dimensional beds, forming reefs that shelter a large number of species of the eulittoral fauna and flora.</p> <p>Such biogenic reefs can grow on muddy banks of estuarines. They are identified when they are composed of more than one layer of oysters (i.e., oysters firstly fixe on a small hard sustratum like a gravel, a stone or a empty shell lying at the surface of the muddy bank, and are themselves covered by other oysters from younger generations, forming patches of three dimensional reefs of several meter square in surface). This accumulation of oysters formed by a mix of dead and living oysters, is home to many microhabitats in which species from the hard substratum and the soft sediment biotopes settle. Within the reef, the presence of calcareous fragments of <i>C. gigas</i> shells reduce the rate of muddy sediments (i.e., they are lower than inside muddy banks around). The infauna and epifauna species of the <i>C. gigas</i> reefs live in the soft sediment trapped between accumulations of oysters. The biocenosis of this habitat differs both in term of specific richness and relative abundance from the biocenosis of the habitat A2. 742 "<i>Crassostrea gigas</i> reefs on rocks and boulders". <i>C. gigas</i> is the main species of this habitat and can reach more than 40kg.m<sup>-2</sup> (total fresh biomass including shells).</p> <p>The associated species which characterize the biocenosis are mainly fixed species usually found in low eulittoral reefs: suspensit feeders such as the cirriped <i>Elminius modestus</i>, the bivalves <i>Chlamys varia</i>, <i>Anomia ephippium</i>, <i>Modiolus barbatus</i> and <i>Mytilus edulis</i> and the gastropod <i>Crepidula fornicata</i>. Some micrograzers such as the polyplacophora <i>Acanthochitona crinita</i> and gastropods <i>Rissoa parva</i>, <i>Turbonilla lactea</i> or <i>Bittium reticulatum</i>, are also common in the reef. In terms of endofauna species, the dominant bivalves are <i>Abra alba</i>, <i>Cerastoderma edule</i>, <i>Venerupis pullastra</i> and <i>Venerupis philippinarum</i>. <i>Melita palmata</i>, <i>Microdeutopus chelifera</i> can also be very abundant and the crab <i>Carcinus maenas</i> can be sheltered in the empty shells of <i>C. gigas</i> or in the mud. The macroalgae <i>Fucus vesiculosus</i> and <i>Ascophyllum nodosum</i> develop on the shells of living and dead oysters in the sites where low salinity is not a limiting factor. When the reef is lower on the shore, <i>Fucus serratus</i> is the dominant macroalgae. Finally, the green algae <i>Enteromorpha</i> spp. and <i>Ulva</i> spp can be locally abundant in sites concerned by eutrophication.</p> <p>Observed facies                      No distinctive facies was detected</p>		
	Links to available maps	References: Lejart M., Hily C. 2010 Differential response of benthic macrofauna to the formation of novel oyster reefs ( <i>Crassostrea gigas</i> , Thunberg) on soft and rocky substrate in the intertidal of the Bay of Brest, France. Journal of Sea Research 65(1): 84– 735	
Correspondence to conservation and protection status			
Habitat directive/Natura 2000	OSPAR	OTHER	
1130 or 1140	Estuaries or Mudflats and sandflats not covered by seawater at low tide		

<b>Sensitivity to human activities</b>
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This habitat is sensitive to both professional and recreational hand fishing activity. Due to its location on muddy banks, this habitat is often inaccessible. Consequently, <i>Crassostrea gigas</i> remain mostly exploited by professional who collect the juveniles to sell them to the oyster farmers. Because it is mainly located in estuaries, this habitat is also sensitive to continental run-off, including pollutants, oil pollution and eutrophication.
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<b>Persons / Institute responsible for the Habitat proposal</b>
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Christian Hily/Lemar/IUEM/UBO, Brest, France
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[DITRUPA ARIETINA] AND [ANTALIS ENTALIS] IN DEEP CIRCALITTORAL SANDS		
(EUNIS Habitat Type - A5.27.4)		
Habitat type	<i>Ditrupa arietina</i> and <i>Antalis entale</i> in deep circalittoral sands	
EUNIS habitat type code	A5.27.4	
Level	5	
Change in definition of higher type	Why proposed habitat differs from other types?	
Not required	Consistently different assemblages of species; occurs between 80 and 200 meters depth typically on medium calcareous sands	
DESCRIPTION		
	<p>This habitat type occurs on the fully saline deep circalittoral sediment (100m-200 depth) and is distributed off-shore along the margin of the continental shelf of the Bay of Biscay. The sediment consists of a medium calcareous sand (median 150-400µm) or a muddy sand (mud fraction remaining &lt;10%), often mixed with a fraction of coarse sediment mainly constituted by calcareous shells fragments. When <i>Ditrupa arietina</i> occurs in high densities, their empty tubes, associated with those of the scaphopod <i>Antalis entalis</i> are very abundant in the sediment, which facilitates the identification of this habitat.</p> <p>The habitat is characterised by animal communities dominated by high abundance of the suspensit feeding serpulid polychaeta <i>Ditrupa arietina</i> and the scaphopoda <i>Antalis entalis</i>. These two species live in calcareous tubes accumulated in the sediment. The bivalve <i>Astarte elliptica</i>, diverse polychaeta such as <i>Hyalinoecia tubicola</i>, <i>Dasybranchus gajolae</i> and <i>Aponuphis bilineata</i> or other species such as <i>Pandora pinna</i>, <i>Natica montagui</i> and <i>Scaphander lignarius</i> are also common in this habitat. A diverse epifauna associated with empty shells and scarce gravels can also be observed: <i>Caryophylla clavus</i>, bryozoans, the echinoderm <i>Porania pulvillus</i> and several pectinidae such as <i>Chlamys septemradiata</i>, <i>Chlamys striata</i>, <i>Chlamys tigerina</i> and <i>Similipecten similis</i>. The benthic fishes <i>Arnoglossus imperialis</i> and <i>Callionymus maculatus</i> can be abundant on the surface of this habitat. Dense beds of the crinoid <i>Leptometra celtica</i> occur locally, giving a specific feature of this biotope and increasing the specific richness. Other species associated with this habitat are <i>Pagurus prideaux</i>, <i>Inachus dorsettensis</i> or <i>Atelecyclus rotundatus</i>. When the mud fraction increases in the sediment, the tubicolous surface deposit feeding polychaete <i>Nothria britannica</i> and <i>Terebellides stroemi</i> with the amphipod <i>Ampelisca spinipes</i> become abundant while <i>D. arietina</i> and <i>A. entalis</i> present lower densities.</p> <p>Observed facies Facies of <i>Leptometra celtica</i></p>	
Links to available maps	References: (1) Glémarec M. 1971. L'endofaune du plateau continental Nord-Gascogne - Etude des facteurs écologiques. Vie et Milieu supp 22 - 1971 pp 93-108 (2) Glémarec M. 1973. The benthic communities of the european North Atlantic continental shelf. Oceanogr. Mar. Biol. Ann Rev. 1973 - 11 pp 263-289 (3) Le Loc'h F., 2004. Structure Fonctionnement évolution des communautés benthiques des fonds meubles exploités du plateau (4) continental Nord Gascogne Thèse doctorat Université de Bretagne occidentale. 326pp. (5) Hily C., Le Loc'h F. Grall J., Glémarec M., 2008. Soft bottom macrobenthic communities of North Biscay revisited: Long-term evolution under fisheries-climate forcing. Estuar. Coast. Shelf. Sci. 78 2008 pp 413-425.	
Correspondence to conservation and protection status		
Habitat directive/Natura 2000	OSPAR	OTHER
Sensitivity to human activities		
This habitat is very sensitive to trawling impacts. This activity is strong on the French continental shelf of the Bay of Biscay where this habitat occurs. Many epifaunal species as well as some endofaunal species living near the sediment surface (many tubicolous annelids) can be destroyed by trawling. Because this habitat is far from continental run-off, it is less exposed to eutrophication and chemical pollution.		
Persons / Institute responsible for the Habitat proposal		
Christian Hily/Lemar/IUEM/UBO, Brest, France		

## LOW COVERAGE OF FAUNA AND FLORA OF MEDIOLITTORAL ROCK AND BOULDERS

(EUNIS Habitat Type - A1.17)

Habitat type	Low coverage of fauna and flora of mediolittoral rock and boulders		
EUNIS habitat type code	A1.17		
Level	4		
Change in definition of higher type	Why proposed habitat differs from other types?		
Not required	In very exposed conditions, rocks and boulders may present a very low presence of fauna and flora composed of lichens, barnacles, limpets, mussels and fucoids not organized in communities.		

### DESCRIPTION

	<p>This habitat can be observed in very exposed conditions in upper, mid and lower mediolittoral.</p> <p>In upper mediolittoral, bedrock and boulders are characterised by high levels of bare rock, the rare presence of barnacles, including <i>Chthamalus montagui</i> and <i>Semibalanus balanoides</i>, limpets <i>Patella vulgata</i> and a few patches of the lichen <i>Verrucaria maura</i> and <i>Lichina pygmaea</i>. Damp cracks and crevices in the rock may provide a refuge for small individuals of the mussel <i>Mytilus edulis</i> or <i>Littorina saxatilis</i>. These crevices can also be occupied by few individuals of the anemone <i>Actinia equina</i>. Few scattered patches of <i>Pelvetia canaliculata</i> and/or <i>Fucus spiralis</i> can also be observed.</p> <p>In mid and lower mediolittoral zones, bare rock is also dominant and the same species of barnacles and limpets can be observed but lichens and fucoids characteristic of the upper eulittoral zone are replaced by patches of <i>Fucus vesiculosus</i>, <i>Fucus serratus</i> and the presence of mixed red algal turf <i>Mastocarpus stellatus</i>, <i>Caulacanthus ustulatus</i>, <i>Osmundea pinnatifida</i>. Damp cracks and crevices in the rock may provide a refuge for small individuals of the mussel <i>Mytilus edulis</i>, <i>Nucella lapillus</i>, <i>Littorina littorea</i>, <i>Littorina saxatilis</i> and a few individuals of <i>Actinia equina</i>.</p> <p>This habitat is characterized by its very low diversity but can cover large rock surfaces.</p> <p>Observed facies No distinctive facies was detected</p>
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Links to available maps	References:
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### Correspondence to conservation and protection status

Habitat directive/Natura 2000	OSPAR	OTHER
1170 3	La roche médiolittorale en mode exposé (façade atlantique)	

### Sensitivity to human activities

This habitat represents the most extreme life conditions with regard to the hydrodynamic conditions. Consequently, it has a very low sensitivity to human activities such as sewages or eutrophication. However, it can be directly threatened by hydrocarbon spills.

### Persons / Institute responsible for the Habitat proposal

Christian Hily/Lemar/IUEM/UBO, Brest, France

[CRASSOSTREA GIGAS ] REEF ON EULITTORAL ROCKS AND BOULDERS			
(EUNIS Habitat Type - A1.4_FRx)			
Habitat type	<i>Crassostrea gigas</i> reef on eulittoral rocks and boulders		
EUNIS habitat type code	A1.4_FRx		
Level	4		
Change in definition of higher type	Why proposed habitat differs from other types?		
Not required	Consistently different assemblages of species; occurs mainly on mid shore rocks and boulders.		
<b>DESCRIPTION</b>			
	<p>This habitat is a biogenic reef built by the exotic species <i>Crassostrea gigas</i> that was firstly introduced in Europe in oyster farms in the early 80's. Favoured by the climatic change, this species reproduces quickly and forms wild populations outside the oyster farms. <i>Crassostrea gigas</i> is the engineer species of these reefs, and can reach more than 40kg.m<sup>-2</sup> (total fresh biomass including shells). This gregarious species can also has an invasive behaviour with a local proliferation, resulting in accumulations of oysters in three dimensional beds, forming reefs that shelter a large number of species of the eulittoral fauna and flora. Such biogenic reefs grow on rocks and boulders which occur both under full and reduced salinities. This habitat occurs mainly in sheltered inlets, straits and embayments, and along rocky shores of some estuarine systems. This habitat is identified when it is composed of more than one layer of oysters (i.e., oysters firstly fixe on the rocky substratum, totally cover the rocky surface on a second step and finally are themselves covered by other oysters from younger generations). This accumulation of oysters formed by a mix of dead and living oysters, is home to many microhabitats in which species from the hard substratum and the soft sediment biotopes settle. The species living in the soft sediment are localized in the mud which sedimented between the oysters or whitin the empty shells. The biocenosis of this habitat differs both in terms of specific richness and relative abundance from that of the habitat A2. 741 "Crassostrea gigas reefs on eulittoral estuarine mud". The macrofaunal biocenosis of this habitat present a specific richness and an abundance five times more important than those of the bedrock biocenosis located at the same level on the shore. The species which characterize this habitat are mainly micrograzers, species living in the empty shells and species living between the shells such as <i>Terebella lapidaria</i> which can be considered as one of the main characteristic species of this habitat. The dominant suspensit feeding species are the cirriped <i>Balanus perforatus</i>, the bivalves <i>Mytilus edulis</i> and the serpulidae <i>Neodexiospira pseudocorrugata</i>. Micrograzers are particularly abundant in terms of species richness and abundance : gastropods such as <i>Gibbula umbilicalis</i>, <i>Littorina littorea</i>, <i>Littorina obtusata</i>, <i>Osilinus lineatus</i>, <i>Patella depressa</i>, <i>P. ulyssiponensis</i>, <i>P. vulgata</i> and polyplacophora such as <i>Leptochiton asellus</i> and <i>Acantochitona crinita</i>. Various isopods such as <i>Dynamene bidentatus</i>, <i>Gnathia maxillaris</i> and <i>G. varax</i> and polychaeta such as <i>Eulalia viridis</i>, <i>Malmgrenia arenicolae</i>, <i>Nephtys mariae</i> are also abundant. The gastropods <i>Nucella lapillus</i> and <i>Ocenebra erinacea</i> are predators of <i>Crassostrea gigas</i> juveniles. Oyster reefs can be partially covered by fucoids and green algae settled on living and dead oysters. Furoid species colonizing reefs depend on the level on the shore. <i>Ulva</i> spp. and <i>Enteromorpha</i> spp. can be abundant in sites concerned by eutrophication.</p> <p>Observed facies No distinctive facies was detected</p>		
Links to available maps	References: Lejart M., Hily C. 2010 Differential response of benthic macrofauna to the formation of novel oyster reefs ( <i>Crassostrea gigas</i> , Thunberg) on soft and rocky substrate in the intertidal of the Bay of Brest, France. Journal of Sea Research 65(1): 84– 735		
<b>Correspondence to conservation and protection status</b>			
	Habitat directive/Natura 2000	OSPAR	OTHER
1170	1170 : Reefs		
<b>Sensitivity to human activities</b>			
This habitat is sensitive to the hand-fishing activity. Some sites are heavily exploited by professional who collect the juveniles to sell them to the oyster farmers, but many others are exploited by recreational hand-fishermen. Because this habitat is mainly localised in sheltered situations, it is very sensitive to continental run-off, including pollutants, oil pollution and eutrophication.			
<b>Persons / Institute responsible for the Habitat proposal</b>			
Christian Hily/Lemar/IUEM/UBO, Brest, France			

## KEY POINTS

Overall, there were 45 new habitat proposals for the coastal areas of Portugal, Spain (Basque Country) and France. This is a step forward to a more comprehensive knowledge of the marine habitats of the European Atlantic coast.

From our study, it seems that the EUNIS hierarchical structure could be used at lower levels ( $\leq 4$ ), as the environmental parameters used for habitat classification fit well with the ones observed in the Atlantic region. For EUNIS level 5 and 6 a lot of improvements could be done in the future in order to increase and accommodate its application to this region. Some questionable divisions between habitats at different depths suggested that a new amendment could improve the actual EUNIS classification scheme.

However, the proposition of new habitats to include in a Pan-European classification requires a discussion process within the scientific community in order to harmonize the setting of new habitat classes.

Furthermore, ecological goods and services provided by habitats could be integrated in the EUNIS classification and a stronger linkage between EUNIS and the international conventions (e.g. OSPAR) and with the European policies (e.g. HD, WFD, MSFD), should be implemented with the purpose of promoting a better integrated coastal management and marine spatial planning.

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