A5.28: Faunal communities of sheltered Mediterranean infralittoral muddy sands

Summary

This habitat typically develops at closed or semi-closed brackish water lagoons, estuaries and sheltered bays on sandy and muddy bottoms of the upper sublittoral zone. It is widely distributed through the Mediterranean although its geographical distribution in the eastern Mediterranean is less known. The habitat is characterised by the dominance of different species, mostly opportunistic fauna and flora that is able to stand moderate to high organic loads from coastal areas.

Threats from a variety of human activities, particularly from construction and discharges but also associated changes in local water flow/chemistry and benthic dredging and fishing, are directly linked to some of the impacts observed on this habitat type. A decrease on the quality of the habitat due to industrial pollution has been reported at different environments accross the Mediterranean Sea. Nevertheless, the impact on the communities of this habitat needs to be further studied as relatively little is known about its ecology and trends.There are no specific conservation actions currently in place for this habitat. A wide survey to assess the distribution of this habitat is needed in order to better evaluate its conservation and management. The designation of reference sites for long monitoring trends and the continuation of those monitoring schemes already in place will assist to examine the trends in this habitat. Improving spatial and strategic planning of human activities, in particular to promote the wiser use of habitats where there are competing demands (e.g. fishing) and the reduction of coastal pollution and eutrophication and improvement of water quality are necessary to ensure the good conservation status of this habitat in the Mediterranean.

Synthesis

This is a relatively poorly studied habitat type and limited information exists regarding its distribution and habitat quantity across the Mediterranean Sea. Its wide distribution combined with the dominance by certain opportunistic and tolerant species, despite a slight decrease on habitat quality, seems to indicate the habitat could qualify for Least Concern under Criterion B. However given that the habitat has not been studied in enough detail in the past and that the territorial data does not provide information for most Mediterranean countries, the assessment of this habitat is assessed Data Deficient for both EU 28 and EU 28+

Overall Category & Criteria			
EU 28		EU 28+	
Red List Category	Red List Criteria	Red List Category	Red List Criteria
Data Deficient	-	Data Deficient	-

Sub-habitat types that may require further examination

None.

Habitat Type

Code and name

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Infralittoral muddy sediments with *Cerastoderma glaucum,* Alfacs Bay, Spain (© E. Ballesteros).

Infralittoral muddy sediments, Fangar Bay, Spain (© E. Ballesteros).

Habitat description

This habitat is situated in sheltered environments, such as embayments, with low hydrodynamic regime, and thus in stable sedimentary systems, at depths between 1-15 m. The substrate consists of a muddy-sandy sediment where the sand fraction is usually composed by mollusc shells. Organic matter and silt-clay contents are the primary driving factors determining species composition. The very variable environmental conditions of these shallow environments in terms of salinity and water temperature determine that these habitats are colonized by euryhaline and eurytherm organisms.

This habitat can be naturally colonized by seaweeds or seagrasses. When seaweeds and seagrasses are absent, polychaetes dominate the invertebrate assemblages, mainly *Neanthes caudata*, *Pseudomastus deltaicus*, *Notomastus latericeus*, *Ampharete finmarchica*, *Mediomastus fragilis, Aonides oxycephala* and *Heteromastus filiformis* together with some crustaceans (*Ampelisca brevicornis* and *Leucothoe incisa*). The phoronid *Phoronis psammophila* is also very abundant. The bivalves *Thracia papyracea* and *Cerastoderma glaucum* dominate amongst filter-feeding invertebrates although the presence of *Loripes lacteus* is also frequent. Holothurians and gastropods *Cyclope neritea* and *Nassarius reticulatus* are common deposit-feeders, sliding on the substrate. The presence of sensitive species such as the mollusc *Pinna nobilis* is not very frequent but it can be occasionally observed. The eel *Anguilla anguilla*, the Sea Bass *Dicentrarchus labrax*, the gobids *Gobius* spp. and soles (*Solea* spp.) are amongst the most common fishes. When macroalgal species are present, *Acetabularia calyculus*, *Ulva* spp. and *Cladophora* spp. are the most abundant. The main seagrasses are *Zostera noltii* and *Cymodocea nodosa*.

Five different sub-habitats have been described for muddy sands habitat, with different dominant species and under slightly different conditions. These are the sub-habitat with *Caulerpa prolifera* on sheltered superficial muddy sands; and the sub-habitat with *Pestarella* (=*Callianassa*) *thyrrena* and *Kellia* sp. where the silt-clay fraction is >5% and the organic matter content reaches moderate to high values. There is a sub-habitat associated to freshwater discharge with *Cerastoderma glaucum* and *Cyathura carinata* in compact sediments which is characteristic of organically polluted environments in brackish waters; aub-habitat with *Loripes lacteus* and *Ruditapes* species in muddy sands on bays, estuaries, coastal lagoons and other sheltered environments, always at shallow zones that are highly influenced by seawater; and a sub-habitat of hydrothermal oozes with *Cyclope neritea* and nematodes which is only present in shallow waters (< 10m) with high sulfide concentrations, high sediment temperatures and high salinities.

Indicators of quality:

Most of the species included in the habitat description are bioindicators of environmental quality. The majority of bivalves are very sensitive to eutrophication, and more tolerant and opportunistic species tend to dominate with increasing eutrophication. Changes in abundance and richness of fauna composition are good indicators of trends in habitat quality. *Ruditapes decussatus* has been proposed as a pollution bioindicator in areas where mussels are not available. The accumulation of pollutants in *Ruditapes'* tissues

has been used to assess environmental quality.

Characteristic species:

Characteristic species include molluscs: *Cerastoderma glaucum, Thracia papyracea, Loripes lacteus, Cyclope neritea, Nassarius reticulatus, Pinna nobilis, Kellia* sp., *Scrobicularia plana, Abra* spp., *Ruditapes decussatus, Ruditapes philippinarum, Lentidium mediterraneum, Tellina tenuis, Venerupis aureus.*

Crustacea: *Ampelisca breviconis, Leucothoe incisa, Pestarella thyrrena, Corophium* spp., *Cyathura carinata, Psudolirius kroyeri, Idotea baltica, Iphinoe inermis, Upogebia pusilla.*

Seagrasses: *Zostera noltei, Cymodocea nodosa;* phoronidea: *Phoronis psammophila;* nematoda: *Oncholaimus campylocercoides,* annelida: *Neanthes caudata, Pseudomastus deltaicus, Notomastus latericeus, Ampharete finmarchica, Heteromastus filiformis, Nephthys* spp., *Streblospio shrubsolii, Nereis diversicolor, Cirrophorus furcatus, Platynereis dumerilii, Capitella capitata, Mediomastus fragilis, Harmothoe spinifera, Abarenicola claparedii, Chone collaris, Petaloproctus terricola;*

Chlorophyta (green algae): *Caulerpa prolifera, Acetabularia calyculus, Ulva spp., Cladophora* spp.

and fish species such as: *Anguilla anguilla, Dicentrarchus labrax, Gobius* spp., *Solea* spp.

Classification

EUNIS (v1405):

Level 4: A sub-habitat of 'Mediterranean sublittoral sands' (A5.2)

Annex 1:

1130 Estuaries

1160 Large shallow inlets and bays

MAES:

Marine – Coastal: Shallow Sublittoral Sediment

MSFD:

Shallow Sublittoral sands

EUSeaMap:

Infralittoral sands

IUCN:

9.5. Subtidal sandy mud

9.10. Estuaries

Does the habitat type present an outstanding example of typical characteristics of one or more biogeographic regions?
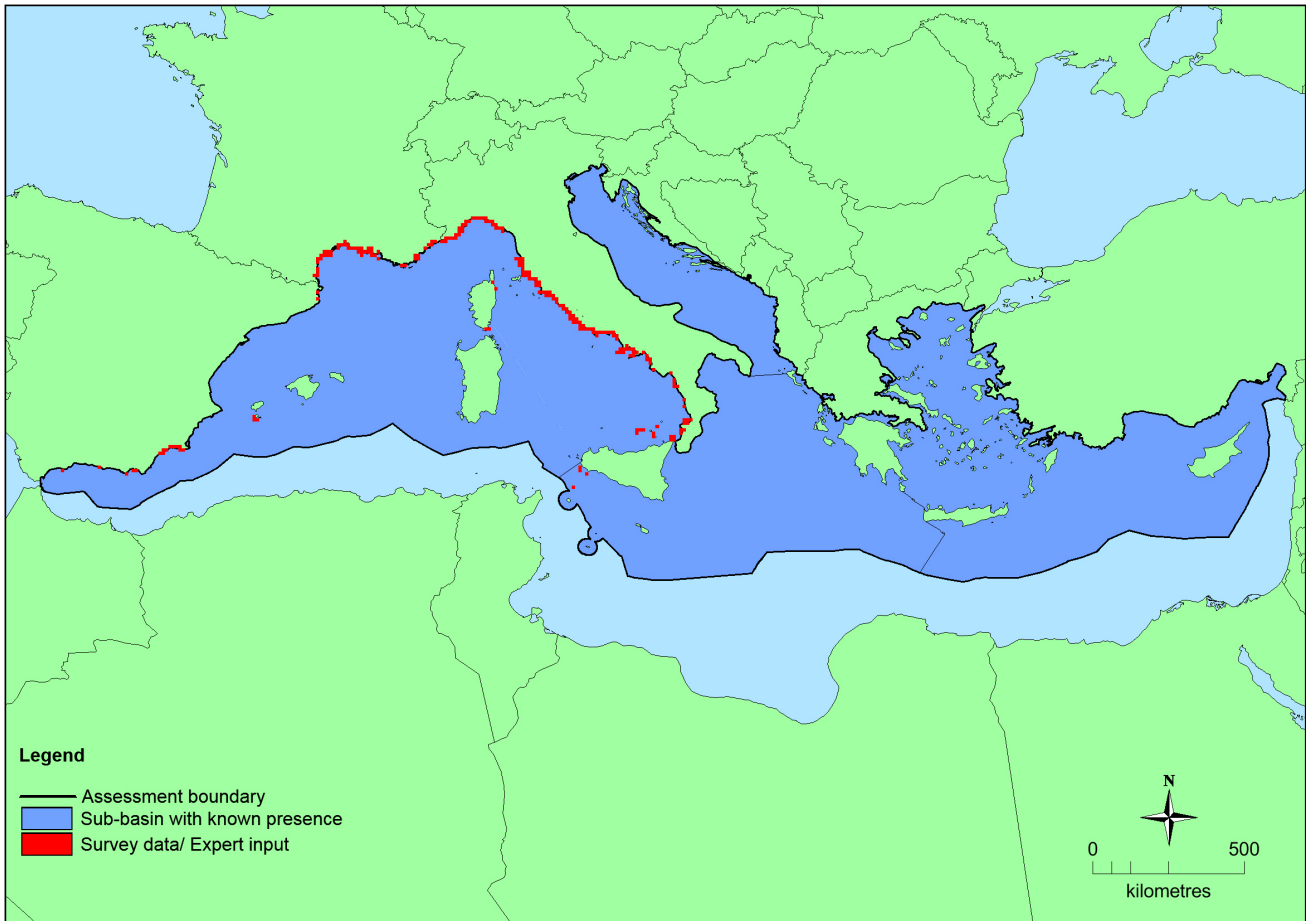
Unknown

Justification
Geographic occurrence and trends

Region	Present or Presence Uncertain	Current area of habitat	Recent trend in quantity (last 50 yrs)	Recent trend in quality (last 50 yrs)
Mediterranean Sea	Aegian-Levantine Sea: Present Adriatic Sea: Present Ionian Sea and the Central Mediterranean Sea: Present Western Mediterranean Sea: Present	Unknown Km^2	Unknown	Unknown

Extent of Occurrence, Area of Occupancy and habitat area

	Extent of Occurrence (EOO)	Area of Occupancy (AOO)	Current estimated Total Area	Comment
EU 28	>50000 Km^2	>50	Unknown Km^2	EOO and AOO have been calculated on the available data. Although this data set is known to be incomplete the figures exceed the thresholds for threatened status.
EU 28+	>50000 Km^2	>50	Unknown Km^2	EOO and AOO have been calculated on the available data. Although this data set is known to be incomplete the figures exceed the thresholds for threatened status.

Distribution map

Legend
— Assessment boundary
■ Sub-basin with known presence
■ Survey data/ Expert input

0 — 500
kilometres

There are insufficient data to provide a comprehensive and accurate map of the distribution of this habitat. This map has been generated using EMODnet data from modelled/surveyed records from the Mediterranean (and supplemented with expert opinion where applicable) (EMODnet, 2015). EOO and AOO have been calculated on the available data presented in this map however these should be treated with caution as expert opinion is that this is not the full distribution of the habitat.

How much of the current distribution of the habitat type lies within the EU 28?

Limited information regarding this habitat is available and much of its current distribution in the eastern Mediterranean is unknown or unavailable. Therefore, it is not possible to estimate how much of its current distribution lies within the EU 28.

Trends in quantity

There are very few reports that describe trends of this habitat in the Mediterranean Sea, and most of the scientific studies have focused on the descriptions of the communities or the ecological characteristics of some particular species at few sites. Episodes of *Caulerpa prolifera* proliferation have been reported in the western Mediterranean during the 1920s and within the Levantine basin during much of the first half of the 20th century. In several cases, the meadows produced by *Caulerpa* proliferated rapidly and then, for reasons that are not well understood, disappeared or declined appreciably in abundance. The information regarding trends on other sub-habitats is unavailable.

Given that most of this habitat is dominated by different opportunistic species that can stand or thrive under moderate to high organic loads, it is suggested that the habitat could be considered stable in the EU 28 but over all the trend is unknown. Its average current trend in quantity in the EU 28+ remains unknown.

- Average current trend in quantity (extent)
  EU 28: Unknown

EU 28+: Unknown
- <u>Does the habitat type have a small natural range following regression?</u>
  No
  Justification
  The habitat has a natural range >50,000 km^2.
- <u>Does the habitat have a small natural range by reason of its intrinsically restricted area?</u>
  No
  Justification
  The habitat is widespread along the Mediterranean coast.

Trends in quality

Most of the species included in the habitat description are bioindicators of environmental quality. The concentration of heavy metals and other pollutants found in the soft tissues of some species such as *Cerastoderma glaucum* or *Ruditapes decussatus* in Mediterranean shallow environments such as Ethang de Thau lagoon in France, Izmir Bay in Turkey or Mar Menor in Spain may indicate an overall tendency of decrease in the quality of the habitat. However, there is not enough information at present to determine trends in quality for this habitat.

- <u>Average current trend in quality</u>
  EU 28: Unknown
  EU 28+: Unknown

Pressures and threats

Pressures to sheltered infralittoral muddy sands communities include mainly pollution, eutrophication and bottom trawling. The species present in this habitat are very sensitive to eutrophication, and more tolerant and opportunistic species tend to dominate with increasing eutrophication. Other coastal human activities such as dumping or discharge of solid or liquid wastes at sea, dredged sediment disposal, untreated discharge and effluents from industrial plants, agriculture, aquaculture farms and building activities can affect directly or indirectly this habitat type.

Direct mechanical damage and habitat modification caused by construction of ports and marinas together with benthic fishing activities such as bivalve mollusc exploitation, particularly bottom-towed fishing gear, and beach seining are also important. This can cause physical disturbance and a decline in species richness.

List of pressures and threats

Urbanisation, residential and commercial development

    Discharges

Biological resource use other than agriculture & forestry

    Marine and Freshwater Aquaculture
        Professional active fishing
        Benthic or demersal trawling
        Benthic dredging

Pollution

        Diffuse pollution to surface waters via storm overflows or urban run-off
        Diffuse pollution to surface waters due to household sewage and waste waters
        Nutrient enrichment (N, P, organic matter)

Natural System modifications

Dredging/ Removal of limnic sediments

Conservation and management

There are no specific conservation actions currently in place for this habitat. The broad distribution of this habitat makes it likely that it occurs in protected areas, however detailed information is missing. A wide survey to assess the distribution of this habitat is needed in order to better evaluate its conservation and management. The designation of reference sites for long monitoring trends and the continuation of those monitoring schemes already in place will assist to examine the trends in this habitat.

Improving spatial and strategic planning of human activities, in particular to promote the wiser use of habitats where there are competing demands (e.g. fishing), and the reduction of coastal pollution and eutrophication and improvement of water quality are necessary to ensure the good conservation status of this habitat in the Mediterranean.

List of conservation and management needs

Measures related to wetland, freshwater and coastal habitats

Restoring/Improving water quality
Restoring coastal areas

Measures related to spatial planning

Other spatial measures
Establish protected areas/sites

Measures related to hunting, taking and fishing and species management

Regulation/Management of fishery in marine and brackish systems

Measures related to special resouce use

Regulating/Managing exploitation of natural resources on sea

Conservation status

Annex 1:

1130 MMED U2

1160 MMED XX

Listed as endangered natural habitat type in the Resolution no. 4 (1996): Sublittoral soft seabeds (code 11.22).

Under the Barcelona Convention, species such as the mollusc *Pinna nobilis,* and the seagrasses *Zostera marina* and *Cymodocea nodosa* are listed in the Annex 2 of Endangered or Threatened species.

When severely damaged, does the habitat retain the capacity to recover its typical character and functionality?

Unknown.

Effort required

Red List Assessment

Criterion A: Reduction in quantity

Criterion A	A1	A2a	A2b	A3
EU 28	Unknown %	Unknown %	Unknown %	Unknown %
EU 28+	Unknown %	Unknown %	Unknown %	Unknown %

There is insufficient information regarding the historical, present or future reduction of this habitat in the Mediterranean Sea, and there are no country monitoring programs in place to examine past and future trends. Therefore, the habitat type is assessed as Data Deficient under Criterion A.

Criterion B: Restricted geographic distribution

Criterion B	B1				B2				B3
	EOO	a	b	c	AOO	a	b	c	
EU 28	>50000 Km^2	Unknown	Unknown	no	>50	Unknown	Unknown	no	no
EU 28+	>50000 Km^2	Unknown	Unknown	no	>50	Unknown	Unknown	no	no

This habitat has a large natural range in the Mediterranean region. The precise extent is unknown however as EOO >50,000km^2 and AOO >50, this exceeds the thresholds for a threatened category on the basis of restricted geographic distribution. Trends in quality and quantity are unknown. The distribution of the habitat is such that the identified threats are unlikely to affect all localities at once. This habitat has therefore been assessed as Least Concern under criteria B1(c) B2 (c) and B3 and Data Deficient for all other criteria.

Criterion C and D: Reduction in abiotic and/or biotic quality

Criteria C/D	C/D1		C/D2		C/D3	
	Extent affected	Relative severity	Extent affected	Relative severity	Extent affected	Relative severity
EU 28	Unknown %	Uknown %	Unknown %	Unknown %	Unknown %	Unknown %
EU 28+	Unknown %	Unknown %	Unknown %	Unknown %	Unknown %	Unknown %

Criterion C	C1		C2		C3	
	Extent affected	Relative severity	Extent affected	Relative severity	Extent affected	Relative severity
EU 28	Unknown %	Unknown %	Unknown %	Unknown %	Unknown %	Unknown %
EU 28+	Unknown %	Unknown %	Unknown %	Unknown %	Unknown %	Unknown %

Criterion D	D1		D2		D3	
	Extent affected	Relative severity	Extent affected	Relative severity	Extent affected	Relative severity
EU 28	Unknown %	Unknown%	Unknown %	Unknown%	Unknown %	Unknown%
EU 28+	Unknown %	Unknown%	Unknown %	Unknown%	Unknown %	Unknown%

The assessment of reduction in abiotic and/or biotic quality is difficult due to the lack of studies and data on past and present state conditions. Nonetheless, slight changes have been reported in the abiotic conditions (increase of heavy metals and eutrophication) of this habitat across its eastern and western Mediterranean distribution over last 50 years. However, the extent of this decline is unknown. Therefore, the habitat type is assessed as Data Deficient under Criterion C/D1.

Criterion E: Quantitative analysis to evaluate risk of habitat collapse

Criterion E	Probability of collapse
EU 28	Unknown
EU 28+	Unknown

There is no quantitative analysis available to estimate the probability of collapse of this habitat type. Therefore, it is assessed as Data Deficient under Criterion E.

Overall assessment "Balance sheet" for EU 28 and EU 28+

	A1	A2a	A2b	A3	B1	B2	B3	C/D1	C/D2	C/D3	C1	C2	C3	D1	D2	D3	E
EU28	DD	DD	DD	DD	DD	DD	DD	LC	DD	DD	DD	DD	DD	DD	DD	DD	DD
EU28+	DD	DD	DD	DD	DD	DD	DD	LC	DD	DD	DD	DD	DD	DD	DD	DD	DD

Overall Category & Criteria			
EU 28		EU 28+	
Red List Category	Red List Criteria	Red List Category	Red List Criteria
Data Deficient	-	Data Deficient	-

Confidence in the assessment
Low (mainly based on uncertain or indirect information, inferred and suspected data values, and/or limited expert knowledge)

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