A5.47: Communities of Mediterranean lower circalittoral (shelf-edge) detritic bottoms or open-sea detritic bottoms

Summary

This habitat is found at depths between 90 and 250 m creating a belt at the level of the continental slope. The sediment is formed by a bioclastic mixture of gravel, sand and mud according to the historical factors and hydrodynamics of the area. This habitat hosts a biocenosis of great diversity and abundance. The high production of plankton at the shelf break makes it an important feeding ground for large shoals of fish and cetaceans. Some facies of the edge of the platform such as the one made by the crinoid *Leptometra phalangium*, increase the structural complexity of the habitat enhancing the abundance and species richness. They also host a high abundance of spawners of commercially important species, e.g. red mullet *Mullus barbatus*, hake *Merluccius merluccius,* blue whiting *Micromesistius poutassou* and *Trisopterus minutus capelanus.* Thus, the conservation of shelf-edge habitat is also important with a view to reducing the fish mortality in the sensitive phases (recruitment, spawning, postspawning) of the life cycle of demersal fish species.

Trawling and dredging fishing are the most important factors influencing the structure of both benthic and demersal assemblages of this habitat. The impact of towed gear is particularly heavy on some sub-habitats, such as the ones containing the crynoid *Leptometra phalangium*, a fragile organism that is easily removed by trawling. Other epibenthic organisms have shown reduced abundance in trawled areas. Conservation and management should include the establishment of Marine Protected Areas (MPAs) and regulation of fishing, particularlyt trawling with the establishment of closed areas over part of the distribution of this habitat to protect juvenile and spawning fish and fragile benthic communities. Further monitoring would also be beneficial to improve understanding of its distribution and abundance.

Synthesis

This is a very poorly studied habitat type and only few reports exist on its distribution, with only a description of the composing communities along some EU Mediterranean countries available. Moreover, data on quality or quantity is lacking and territorial data is not available for much of its distribution range. Several scientific reports highlighted however the impact due to demersal trawling activities. Althought this habitat has a large Extent of Occurrence (EOO) and Area of Occupancy (AOO), and therefore qualifies as Least Concern under criterion B, the habitat is assessed as Data Deficient both at the EU 28 and EU 28+ levels because of the lack of information on its trends in quantity and quality.

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

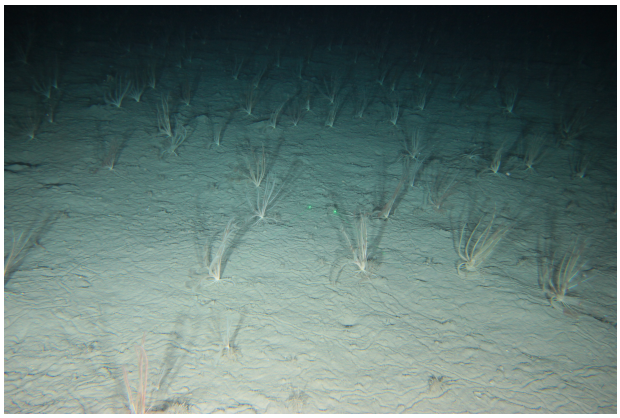
Sub-habitat types that may require further examination

Particular attention is needed for the sub-habitat with abundant *Leptometra phalangium*, which is increasingly perceived as the habitat of an exceptionally diverse benthic fauna that is easily disturbed by trawling.

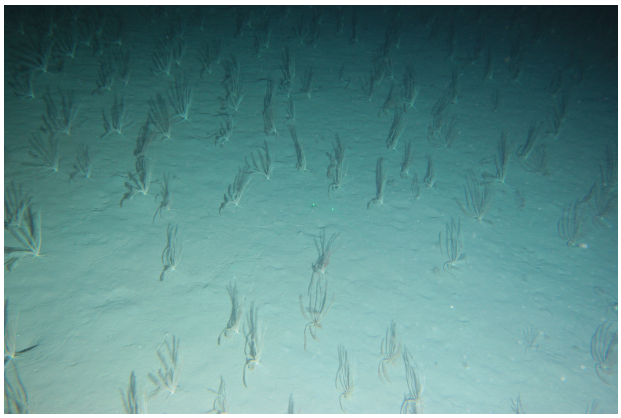
Habitat Type

Code and name

A5.47: Communities of Mediterranean lower circalittoral (shelf-edge) detritic bottoms or open-sea detritic bottoms



Leptometra phalangium. Canyon of Arma di Taggia, northwestern Ligurian Sea at 180 metres depth (©S.Canese/ISPRA - RAMOGE).



Leptometra phalangium. Canyon of Arma di Taggia, northwestern Ligurian Sea at 180 metres depth (©S.Canese/ISPRA - RAMOGE).

Habitat description

This habitat develops on a mixture of gravel sediments, sand and mud. The fine part of the mix appears in a greater proportion than in the sediments that support the coastal detritic biocenosis. The gravel, mainly organogenic, is largely formed by calcareous debris of quaternary thanatocenoses. The open-water detritic bottoms normally belong to the lower circalittoral and constitute the deepest layer of the circalittoral zone on soft bottoms. These communities are present in detritic bottoms with abundance of dead shells, bryozoans and coral skeletons. This habitat hosts a biocenosis of great diversity and abundance. The high production of plankton at the shelf break makes it an important feeding ground for large shoals of fish and cetaceans. Some facies of the edge of the platform, such as the one made by the crinoid *Leptometra phalangium*, increase the structural complexity of the habitat enhancing the abundance and species richness. They also host a high abundance of spawners of commercially important species, e.g. Red Mullet (*Mullus barbatus*), Hake (*Merluccius merluccius*), Blue Whiting (*Micromesistius poutassou*) and *Trisopterus minutus capelanus.* Thus, the conservation of shelf-edge habitat is also important with a view to reducing the fish mortality in the sensitive phases (recruitment, spawning, postspawning) of the life cycle of demersal fish species.

Indicators of quality:

Both biotic and abiotic indicators have been used to describe marine habitat quality. These include: the presence of characteristic species as well as those which are sensitive to the pressures the habitat may face; water quality parameters; levels of exposure to particular pressure, and more integrated indices which describe habitat structure and function, such as trophic index, or successional stages of development in habitats that have a natural cycle of change over time.

There are no commonly agreed indicators of quality for this habitat, although particular parameters may have been set in certain situations, e.g. protected features within Natura 2000 sites, where reference values have been determined and applied on a location-specific basis.

Characteristic species:

Characteristic species include: Pelecypoda: *Pinna rudis, Astarte sulcata, Chlamys clavata, Pseudamussium clavatum;* Scaphopoda: *Dentalium panormitanum, Antalis panorma;* Bivalve: *Limopsis aurita;* Decapoda: *Ebalia granulosa;* Malacostraca: *Lophogaster typicus;* Amphipoda: *Haploops dellavallei;* and Echinoderms: *Ophiura carnea* and *Thyone gadeana.* Species present also

include *Holothuria forskali*, the teleost *Gobius quadrimaculatus* and the brachiopod *Gryphus vitreus*. Sometimes the following species can also be found: the bivalve *Venus casina, Pseudamussium clavatum* and *Astarte sulcata,* the irregular sea urchin *Spatangus purpureus*, and the brittle star *Ophiacantha setosa*. Some species of filter feeders like the sea pen *Funiculina quadrangularis* or the actinian *Actinauge richardii* are also very abundant in this type of community.

Classification

EUNIS (v1405):

Level 4. A sub-habitat of 'Mediterranean circalittoral mixed sediment' (A5.4)

Annex 1:

No relationships.

MAES:

Marine - Shelf

MSFD:

Shelf sublittoral mixed sediment

Shelf sublittoral coarse sediment

EUSeaMap:

Shelf coarse of mixed sediments

IUCN:

9.4 Subtidal sandy

9.5 Subtidal sandy-mud

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

Unknown

Justification

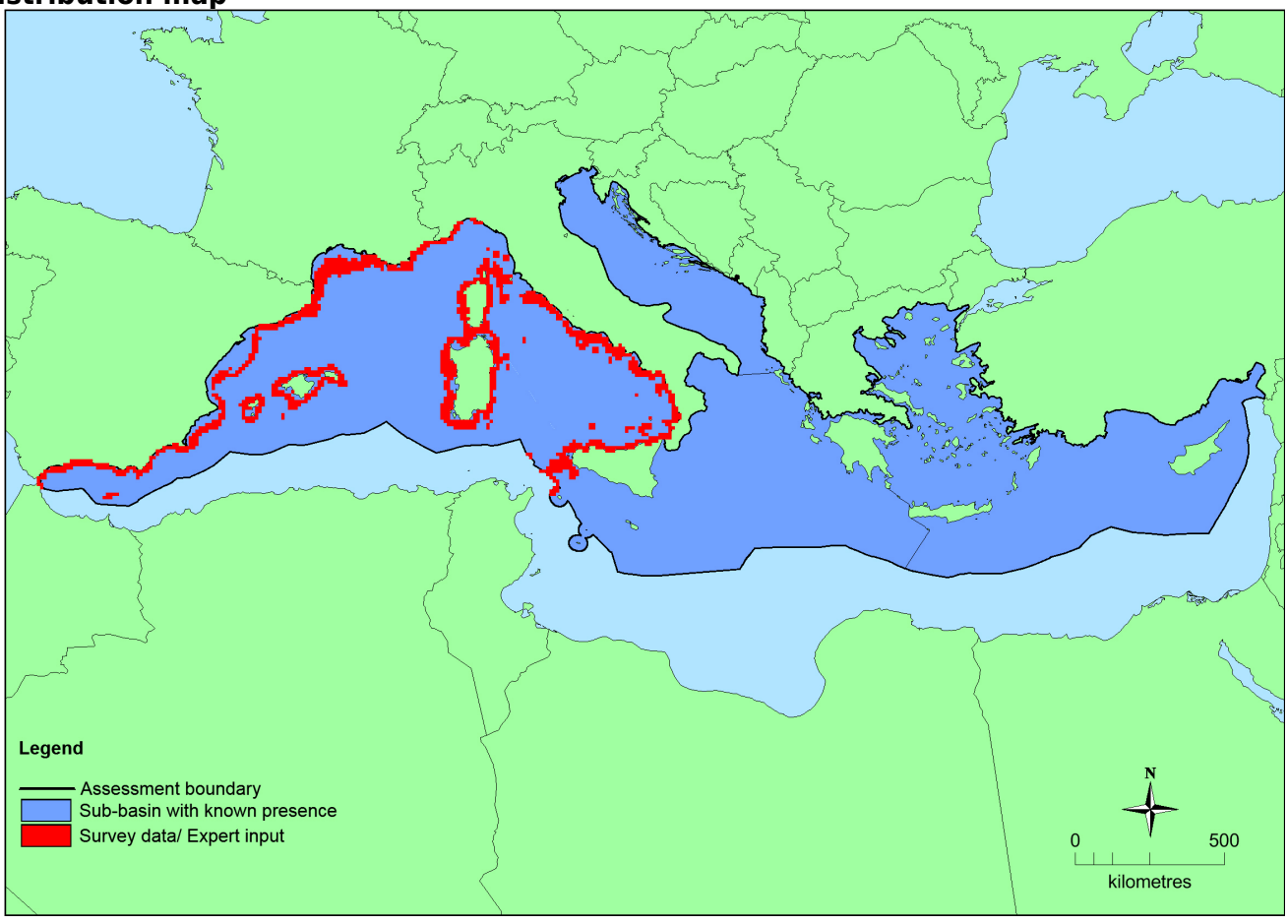
Geographic occurrence and trends

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	Adriatic Sea: Present Aegian-Levantine Sea: Present Ionian Sea and the Central Mediterranean Sea: Present Western Mediterranean Sea: Present	Unknown Km^2	Unknown	Decreasing

Extent of Occurrence, Area of Occupancy and habitat area

	Extent of Occurrence (EOO)	Area of Occupancy (AOO)	Current estimated Total Area	Comment
EU 28	1,038,660 Km^2	1,242	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+	>1,038,660 Km^2	>1,242	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



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. Distribution information is available only from the western Mediterranean although the habitat type is known to be widespread in the Mediterranean Sea.

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

The habitat is widely distributed in the Mediterranean Sea but it is not possible to provide an estimation of the habitat area that lies within the EU 28.

Trends in quantity

The distribution of this habitat is still poorly known, and the studies conducted have mostly focused on the description of the benthic assemblages in relation to sediment characteristics. There are a few reports that have highlighted a reduction in the abundance of epibenthic organisms of this habitat, particularly on beds with *L. phalangium* such as those on the north coast of Crete (Greece), at Heraklion Bay in the southern Aegean or in the southern Tyrrhenian Sea as a result of otter- and other fishing trawling impacts.
In Heraklion Bay for example, a 80% reduction of the beds of *L. phalangium* over last 60 years has been estimated. However, trends in other regions are unknown.

- Average current trend in quantity (extent)
  EU 28: Unknown
  EU 28+: Unknown
- Does the habitat type have a small natural range following regression?
  No
  Justification
  The habitat has an EOO larger than 50,000 km^2.

- Does the habitat have a small natural range by reason of its intrinsically restricted area?
  No
  Justification
  The habitat is widespread along the Mediterranean coast.

Trends in quality

There are no concrete studies that evaluate the trends in quality over the last 50 years, and no information on past and future trends has been given by territorial experts. Nonetheless, expert opinion indicates a decrease in the habitat quality from slight to moderate in the western Mediterranean, Adriatic and Italian Central Mediterranean area. At fishing trawled sites in the Sicilian Channel or the Thryrrenian Sea, different species and abundance of fauna has been found in comparison with nearby untrawled areas, with a higher abundance of epifaunal scavengers and motile burrowing infauna, and lower abundance levels of structuring fauna such as crinoids and ophiuroids in those areas where trawling has been occurring. Thus, a reduction in the quality of the habitat has occurred at some sites.

- Average current trend in quality
  EU 28: Decreasing
  EU 28+: Decreasing

Pressures and threats

Trawling and dredging fishing are the most important factors influencing the structure of both benthic and demersal assemblages of this habitat. The impact of towed gear is particularly heavy on some sub-habitats, such as the ones containing the crynoid *Leptometra phalangium*, a fragile organism that is easily removed by trawling. Other epibenthic organisms have shown reduced abundance in trawled areas.

List of pressures and threats

Biological resource use other than agriculture & forestry

Professional active fishing
Benthic or demersal trawling
Benthic dredging

Conservation and management

Basic knowledge on the habitat and its distribution in the Mediterranean, its species assemblages, its species biology (distribution, abundance, habitat preferences, life cycles) and monitoring data on trends is needed to improve spatial planning in general, and strategic planning of particular human activities. Monitoring of spatial distribution of fishing effort is also recommended.

Designation of Marine Protected Areas (MPA) and Fisheries Restricted Areas (FRAs) in sites where this habitat occurs, particularly where *Leptometra phalangium, Neolampas rostellata* and *Ophiacantha setosa* occur, should be established to create a representative network of Mediterranean MPAs. This will also help to control the fishing effort, especially the establishment of closed areas over part of the distribution of this habitat to protect juvenile and spawning fish and fragile benthic communities.

List of conservation and management needs

Measures related to spatial planning

Establish protected areas/sites
Legal protection of habitats and species

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:

No relationships.

Included in the Council of Europe Bern Convention Res. No. 4 1996 as Sublittoral soft seabed (code 11.22).

Included in the Barcelona Convention (1998) as Biocenosis of shelf-edge detritic bottom (code IV.2.3).

Leptometra beds is one of the 14 habitats selected by the Scientific Advisory Committee of the General Fisheries Commission for the Mediterranean as criteria for identifying Essential Marine Habitats (EMH) of relevance for the management of priority species (General Fisheries Commission for the Mediterranean 2009).

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

Leptometra phalangium is typical of the most productive and species-rich shelf-edge environments and easily disturbed by trawling. Individuals are fragile and suffer a strong impact due to demersal trawling (by removal and death). Their reduction might also affect other components of the community and increase fish mortality rates in crucial life history stages of fishes, such as juveniles and spawners. It is

unknown how easily these communities can recover, particularly if fishing activities do not stop.

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 not information available on past and future trends of this habitat type. Therefore, this habitat has been 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	>50,000 Km^2	Yes	Unknown	no	>50	Yes	Unknown	no	no
EU 28+	>50,000 Km^2	Unknown	Unknown	no	>50	Unknown	Unknown	no	no

This habitat has a large natural range in the Mediterranean. 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 quantity are unknown but it is thought that there are some declines in quality in the EU 28 at least and there is no information on whether a threatening process is likely to cause declines in the next 20 years and it is not possible to calculate locations. 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(a, c) B2 (a, 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 %	Slight-moderate %	Unknown %	Unknown %	Unknown %	Unknown %
EU 28+	Unknown %	Slight-moderate %	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%

Trawling is affecting this habitat at different locations and expert opinion indicates a slight to moderate decline on the quality of the habitat in the last 50 years, although the extent of the degradation is unknown. As there is insufficient data from most Mediterranean regions, 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 the habitat type 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	LC	LC	LC	DD	DD	DD	DD	DD	DD	DD	DD	DD	DD
EU28+	DD	DD	DD	DD	DD	DD	DD	DD	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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16/12/2015

Date of review
15/03/2016

References

Ardizzone, G. 2006. *An introduction to Sensitive and Essential Fish Habitats identification and protection in the Mediterranean Sea, Rome*

Bellan-Santini, D., Bellan, G., Bitar, G., Harmelin, J. G. and Pergent, G. 2002. *Handbook for interpreting types of marine habitat for the selection of sites to be included in the national inventories of natural sites of conservation interest, United Nations Environmental Programm*, 217pp

Colloca, F., Carpentieri, P., Balestri, E. and Ardizzone, G. D. 2004. A critical habitat for Mediterranean fish

resources: shelf-brak areas with *Leptometra phalangium* (Echinodermata: Crinoidea). *Marine Biology* 145: 1129-1142.

De Juan, S., Thrush, S.F. and Demestre, M. 2007. Functional changes as indicators of trawling disturbance on a benthic community located in a fishing ground (NW Mediterranean Sea). *Marine Ecology Progress Series* 334: 117–129.

Emig, C. C. 1985. Distribution et syndicologie des fonds a Gryphus vitreus (Brachiopoda) en Corse. *Marine Biology* 90: 139-146.

Gofas, S., Salas, C., Rueda, J.L., Canoura, J., Farias, C. and Gil, J. 2011. Mollusca from a species-rich deepwater Leptometra community in the Alboran Sea. *Scientia Marina* 78(4).

Mangano, M. C., Kaiser, M. J., Porporato, E. M. D. and Spanò, N. 2013. Evidence of trawl disturbance on mega-epibenthic communities in the Southern Tyrrhenian Sea. *Marine Ecology Progress Series* 475: 101-117.

Smith, C. J., Papadopoulou, K. N. and Diliberto, S. 2000. Impact of otter trawling on an eastern Mediterranean commercial trawl fishing ground. ICES *J. Mar. Sci.: J. Cons.* 57 (5): 1340–1351.

Smith, C.J., Banks, A.C., and Papadopoulou, K.-N. 2007. Improving the quantitative estimation of trawling impacts from side scan sonar and underwater video imagery. *ICES Journal of Marine Science*, 64: 1692-1701

Terribile, K., Evans, J., Knittweis, L. and Schembri, P. J. 2016. Maximising MEDITS: Using data collected from trawl surveys to characterise the benthic and demersal assemblages of the circalittoral and deeper waters around the Maltese Islands (Central Mediterranean). *Regional Studies in Marine Science*, 3, 163-175.

Tunesi L. and Diviacco G. 1997. Observations by submersible on the bottoms off shore Portofino Promontory (Ligurian Sea), Atti XII Congr. A.I.O.L. (Isola di Vulcano, 18-21 Settembre 1996), Vol.1, 61-74.