

A1.13: Communities of Mediterranean upper mediolittoral rock

Summary

The habitat occurs in the mediolittoral (surf zone) of the Mediterranean coast on areas of bedrock, boulders and stones. The associated species are adapted to long periods of emersion and form bands along the shore. They include barnacles, periwinkles and limpets and, and in the moister conditions of the lower shore, various species of algae can become established and dominate.

The main pressures and threats on this habitat are associated with substratum loss due to direct destruction by human modifications of the coastline from building and harbour development, and also from degraded water quality. The introduction of hard coastal-defence structures can also facilitate the expansion non-indigenous species. Further work is needed to identify management measures to support the conservation of this habitat.

Synthesis

This habitat has a wide geographical range but despite most of the Mediterranean coast being rocky, quantitative data on its extent are limited. Trends have been inferred in light of past development of harbours, dikes and others coastal structures which suggest that less than 20 % of this habitat has been lost over the last 50 years. This habitat has therefore been assessed as Least Concern for the EU 28.

For EU28+, the habitat has a large EOO, and therefore it qualifies as Least Concern under Criterion B. However, the habitat is assessed as Data Deficient at EU 28+ level given the lack of information on its trends in quantity and quality and the fact that its overall distribution is unknown.

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

Sub-habitat types that may require further examination

None.

Habitat Type

Code and name

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Upper mediolittoral rocks with *Chthamalus* spp along the Italian coast (© S. Mariani).



Upper mediolittoral rocks with *Pyropia elongata* along the Catalan coast, Spain (© E. Ballesteros).

Habitat description

This habitat occurs in the mediolittoral (surf zone) of the Mediterranean coast on areas of bedrock, boulders and stones. The associated species are adapted to long periods of emersion. In the upper mediolittoral the main species present are barnacles, periwinkles and limpets forming a belt which may be more than three meters in highly swashed coasts. In the lower part of this habitat, the moister conditions mean that algae can become established and dominate. The characteristic species include *Pyropia elongata*, *Bangia fuscopurpurea*, *Polysiphonia sertularioides*, *Rissoella verruculosa* and, on exposed shores of both calcareous and siliceous substrates, brown crusts of *Ralfsia verrucosa*.

Indicators of quality

Most of the species associated with this habitat are capable of withstanding rather high environmental pressures, even man-induced ones however *Rissoella verruculosa*, which is characteristic of one of the associated biotopes is sensitive to both pollution and human activities and may therefore be a potential quality indicator.

A "Quality of Rocky Bottoms index" (CFR by its Spanish acronym) used in Spanish Atlantic waters for the assessment of macroalgae communities on rocky shores may have some potentially application in assessment of quality of this habitat.

Characteristic species:

Rhodophyta (red algae)-*Rissoella verruculosa*, *Pyropia elongata*, *Themis ballesterosii*, *Nemalion helmintoides*, *Bangia fuscopurpurea*, *Hildenbrandia rubra*, *Polysiphonia sertularioides*, *Callithamnion granulatum*.

Phaeophyta (brown algae)-*Ralfsia verrucosa*, *Scytosiphon lomentaria*, *Hapalospongidion macrocarpum*.

Chlorophyta (green algae)-*Blidingia chadefaudii*, *Blidingia minima*.

Cyanophyta (blue-green algae)-*Rivularia atra*, *Rivularia mesenterica*, *Brachytrichia quoyi*, *Entophysalis granulosa*, *Lyngbya confervoides*, *Calothrix crustacea*.

Lichens-*Verrucaria amphibia*, *Pyrenocollema halodytes*.

Gastropoda- *Patella rustica*, *Melarhaphe neritoides*, *Echinolittorina punctata*, *Phorcus turbinatus*

Cirripedia- *Chthamalus stellatus*, *Chthamalus montagui*, *Euraphia depressa*.

Isopoda- *Ligia italica*.

Decapoda- *Pachygrapsus marmoratus*.

Insecta- *Fucellia sp.*

Classification

EUNIS (v1405).

Level 4. A sub-habitat of A1.1 High energy littoral rock

Annex 1:

1160 Large shallow inlets and bays

1170 Reefs

MAES-2:

Marine - inlets and transitional waters

Marine - coastal

MSFD:

Littoral rock and biogenic reef

EUSeaMap:

Not mapped

IUCN:

12.1 Rocky shoreline

Barcelona Convention (RAC/SPA):

II. 4. 1. Biocenosis of the upper mediolittoral rock

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

Unknown

Justification

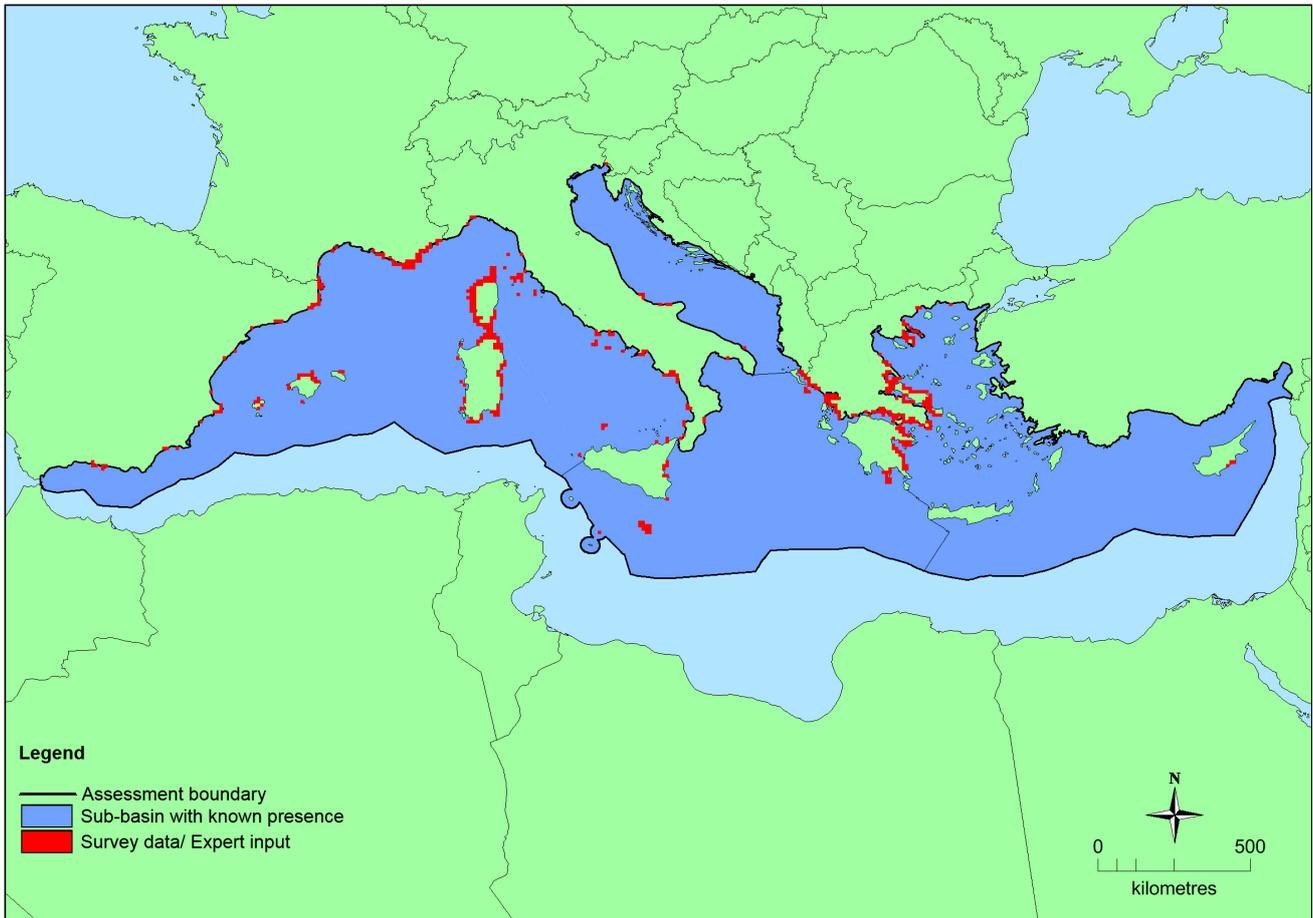
Geographic occurrence and trends

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

Extent of Occurrence, Area of Occupancy and habitat area

	Extent of Occurrence (EOO)	Area of Occupancy (AOO)	Current estimated Total Area	Comment
<i>EU 28</i>	2,001,791 Km ²	459	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.
<i>EU 28+</i>	>2,185,765 Km ²	>486	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



This map has been generated using data from IUCN and the European Environment Agency (EEA), and supplemented with expert opinion. 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 may not indicate the full distribution of the habitat.

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

It has been estimated that 54% of the Mediterranean coastline of the EU 28 is rocky. This habitat is also present in the EU 28+ but the percentage is unknown.

Trends in quantity

This habitat is common along Mediterranean shores and is widely distributed. Nevertheless, research and monitoring has only been carried out at a few sites. At present, there are no reports about the trends in loss of this habitat from individual countries. The quantity of loss of the habitat can be inferred from the amount of coastal construction (such as breakwaters, harbours, jetties and seawalls) since the second half of the 20th century.

By 2006, this coastal construction had occupied 2,622 km of habitats along the coast, (estimated using information provided by European Environment Agency on distribution of harbour areas, coastal embankments for construction purposes and artificial shoreline or shoreline with longitudinal protection works (dikes) without aerated strands). As only 54% of the Mediterranean coastline is occupied by rocky mediolittoral environments and assuming this also applied to the artificial construction of the coast, this means it possible that around 1,415km of the 2,622 km was constructed on upper rocky habitats.

The current distribution of mediolittoral rock occupies 5,402 km (based on EMODnet database). Hindcasting suggests that the original habitat occupied at least 6,817 km (current habitat distribution and

past lost habitat distribution) and of this, approx. 20,8 % has been lost in the EU countries up until 2006.

- Average current trend in quantity (extent)

EU 28: Decreasing

EU 28+: Decreasing

- Does the habitat type have a small natural range following regression?

No

Justification

The habitat does not have a small natural range as the EOO larger than 50,000 km².

- Does the habitat have a small natural range by reason of its intrinsically restricted area?

No

Justification

This habitat is widespread along the Mediterranean coast and does not have an intrinsically restricted area.

Trends in quality

There are few reports on trends in quality of this habitat. In general, it is believed that there is a slight loss of diversity and production in communities of Mediterranean upper mediolittoral rock, however more information is needed to determine any trends.

- Average current trend in quality

EU 28: Unknown

EU 28+: Unknown

Pressures and threats

The main pressures and threats on this habitat are associated with substratum loss due to direct destruction by human modifications of the coastline from building and harbour development, and also from degraded water quality. Urban and industrial wastes as well as wastewater are discharged directly into the sea in some countries and chemical contaminants that can lead to reduced growth of some of the associated species and general degradation of the habitat. The introduction of hard coastal-defence structures can also facilitate the expansion of a species associated with hard substrates including nonindigenous species.

List of pressures and threats

Urbanisation, residential and commercial development

Urbanised areas, human habitation

Industrial or commercial areas

Discharges

Pollution

Pollution to surface waters (limnic, terrestrial, marine & brackish)

Invasive, other problematic species and genes

Invasive non-native species

Conservation and management

This habitat is widespread and common and therefore likely to be present within some protected areas although it may not be subject to specific conservation measures. Beneficial actions include those which improve water quality and the regulation of coastal development in order to avoid both direct and

indirect damage. Further work is needed to identify management measures to support the conservation of this habitat.

List of conservation and management needs

Measures related to wetland, freshwater and coastal habitats

Restoring/Improving water quality

Measures related to spatial planning

Other spatial measures

Establish protected areas/sites

Conservation status

Annex 1:

1160: MMED XX

1170: MMED XX

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

Unknown although some of the dominant species of this habitat are particularly intolerant to various chemical and increases of nutrients with limited recovery capacity. Others such as those the red algae *Bangia fuscopurpurea* show greater capacity to some disturbance and recovery.

Effort required

Red List Assessment

Criterion A: Reduction in quantity

Criterion A	A1	A2a	A2b	A3
EU 28	20 %	unknown %	unknown %	unknown %
EU 28+	unknown %	unknown %	unknown %	unknown %

Based on the information available it is inferred that by 2015 at least 20% of this habitat has been lost over the last 50 years in the EU 28. This is primarily due to coastal development. This habitat has therefore been assessed as Least Concern under criteria A1 for EU 28 and DD for EU +28.

Criterion B: Restricted geographic distribution

Criterion B	B1			B2				B3	
	EOO	a	b	c	AOO	a	b		c
EU 28	>50,000 Km ²	No	No	no	>50	No	No	no	no
EU 28+	>50,000 Km ²	No	No	no	>50	Unknown	Unknown	no	no

This habitat has a widespread distribution in the Mediterranean Sea, with an EOO larger than 50,000 km² and an AOO larger than 50. This exceeds the thresholds for a threatened category. 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 B for the EU 28. For EU 28+, the habitat is assessed as Least Concern under criteria B, B2c and B3, and Data Deficient under B2a and B2b

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 %	moderate %	unknown %	moderate %	unknown %	unknown %
EU 28+	unknown %	moderate %	unknown %	moderate %	unknown %	unknown %

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

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

An assessment of reduction in abiotic and/or biotic quality is not possible due to the lack of studies and data on past state conditions. However, the increasing urbanization of the Mediterranean coast will continue have a slight to moderate impact of this habitat although the extent affected is unknown. Since there are no studies available on the past and current conditions to calculate the reductions in abiotic and/or biotic quality, the habitat type is assessed as Data Deficient under Criterion C/D, C and D.

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	LC	DD	DD	DD	LC	LC	LC	DD	DD	DD	DD	DD	DD	DD	DD	DD	DD
EU28+	DD	DD	DD	DD	LC	DD	LC	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
Least Concern	-	Data Deficient	-

Confidence in the assessment

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

Assessors

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Reviewers

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References

- Ballesteros, E. 1984. Els estatges supralitoral i mediolitoral de les Illes Medes. In: *Els sistemes naturals de les Illes Medes* (eds. J. Ros, I. Olivella & J.M. Gili). *Arxius Secció Ciències*, 73: 647-659. IEC. Barcelona.
- Ballesteros, E. 1991. Structure and dynamics of the community of *Rissoella verruculosa* (Bertoloni) J. Agardh (Gigartinales, Rhodophyceae) in the North-Western Mediterranean. *Scientia Marina*, 55: 439-451.
- Ballesteros, E. 1992. *Els vegetals i la zonació litoral: espècies, comunitats i factors que influeixen en la seva distribució*. Arxius Secció Ciències, 101. Institut d'Estudis Catalans. Barcelona. 616 pp.
- Ballesteros, E., S. Mariani, M. E. Cefalì, M. Terradas & E. Chappuis. 2014. *Manual dels hàbitats litorals a Catalunya*. Generalitat de Catalunya. Departament de Territori i Sostenibilitat, Barcelona. 251 pp.
- Ballesteros, E. & J. Romero. 1988. Zonation patterns in tideless environments (Northwestern Mediterranean): looking for discontinuities in species distributions. *Investigación Pesquera*, 52(4): 595-616.
- Boudouresque, C. F. 1971. Contribution à l'étude phytosociologique des peuplements algaux des côtes varoises. *Vegetatio*, 22: 83-184.
- Chappuis, E., M. Terradas, M. E. Cefalì, S. Mariani & E. Ballesteros. 2014. Vertical zonation is the main distribution pattern of littoral assemblages on rocky shores at a regional scale. *Estuarine, Coastal and Shelf Science*, 147: 113-122.
- Curcó, A., A. Ferré, J. Font, J. Gestí, L. Vilar & E. Ballesteros. 2008. *Manual dels Hàbitats de Catalunya. Vol II. 1 Ambients litorals i salins*. (Eds. J. Vigo, J. Carreras & A. Ferré). Departament de Medi Ambient i Habitatge. Generalitat de Catalunya. Barcelona. 312 pp.
- EEA, 1999. State and pressures of the marine and coastal Mediterranean environment. ISBN: 92-9167-187-8. 43pp.
- Feldmann, J. 1937. Recherches sur la végétation marine de la Méditerranée: la côte des Albères. *Revue Algologique*, 10: 1-339.
- Giaccone, G., G. Alongi, A. Cossu, R. Di Geronimo & D. Serio. 1993. La vegetazione marina bentonica del Mediterraneo: I. Sopralitorale e mesolitorale. Proposte di aggiornamento. *Boll. Accad. Gioenia Sci. Nat. Catania*, 26 (341): 145-172.
- Menconi, M., Benedetti-Cecchi, L., Cinelli, F. 1999. Spatial and temporal variability in the distribution of algae and invertebrates on rocky shores in the northwest Mediterranean, *Journal of Experimental Marine Biology and Ecology*, 233: 1-23.

- Molinier, R. 1960. Étude des biocoenoses marines du Cap Corse. *Vegetatio*, 9: 120-192.
- Pérès, J. M. & J. Picard. 1964. Nouveau manuel de bionomie benthique de la Mer Méditerranée. *Recueil des Travaux Statione Marine d'Endoume*, 31(47): 3-137.
- Piante C., Ody D., 2015. Blue Growth in the Mediterranean Sea: the Challenge of Good Environmental Status. MedTrends Project. WWF-France. 192 pages.
- Pons, A. and Rullan, O. 2013. Artificialization and Islandness in Coastal Areas of Western Mediterranean Europe With special attention to the Spanish tourist coast. International Geographical Union. Commission on Islands Proceedings of the International Conference on 'Island Development. Local Economy, Culture, Innovation and Sustainability', 1 - 5 October 2013, Penghu Archipelago, Taiwan. P71- P7-12.
- Templado, J., E. Ballesteros, I. Galparsoro, A. Borja, A. Serrano, L. Marín & A. Brito. 2012. *Guía interpretativa: Inventario español de hábitats marinos. Inventario español de hábitats y especies marinos*. Ministerio de Agricultura, Alimentación y Medio Ambiente. 229 pp.
- Vaselli, S., Bulleri, F. & Benedetti-Cecchi, L. 2008. Hard coastal-defence structures as habitats for native and exotic rocky-bottom species. *Marine Environmental Research*, 66, 395-403.
- UNEP/MAP, 2012. State of the Mediterranean Marine and Coastal Environment, UNEP/MAP - Barcelona Convention, Athens.