A3.1x Photophilic communities without canopy-forming algae in Mediterranean infralittoral and upper circalittoral rock

Summary

This habitat consists of rocky bottoms covered by erect macroalgae that do not form canopies. The structure includes bush-forming algae, turf forming algae, encrusting fauna and epiphytes. It is widely distributed in the Mediterranean in the shallow zone along the coastline. Predatory fishes and sea urchins can have a major role in determining the abundance of different algae and strongly modifying the ecosystem. Pressures and threats are related to warming, invasive species, pollution, sedimentation and grazing pressure and direct anthropogenic impacts like increasing coastal development. Although it may be impacted by anthropogenic impacts, the communities are adapted to rapidly changing conditions and could be fairly resilient to such impacts. However, more efforts are needed to know its complete distribution in the Mediterranean and its conservation status and potential recovery capacity. These are likely to include improving water quality, Marine Protected Areas (MPAs) and regulation of fisheries.

Synthesis

This is a widespread habitat in the Mediterranean Sea, however there is very little information available on its Area of Occupancy (AOO), impacts and trends in quantity and quality. Expert opinion is that the trends in quality are either stable or gradually decreasing but this cannot be quantified. Both quality and quantity decreases are expected to continue into the future.

The habitat has a large Extent of Occurrence (EOO) and AOO, and therefore it could potentially qualify as Least Concern under Criterion B but there is no information on any trends. However it has been assessed as Data Deficient for both the EU 28 and EU 28+ because of the lack of information on any 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

None.

Habitat Type

Code and name

A3.1x Photophilic communities without canopy-forming algae in Mediterranean infralittoral and upper circalittoral rock

Shallow water assemblage with *Halopteris scoparia,* Formentera, Spain (© E. Ballesteros).

Assemblage dominated by *Lobophora variegata* at 10 meters depth, Cabrera, Spain (© E. Ballesteros).

Habitat description

This habitat is present from the upper infralittoral zone to the upper circalittoral zone. Assemblages are always algal-dominated, although some invertebrates can be common in the understory and growing as epiphytes. It consists of rocky bottoms covered by erect macroalgae that do not form canopies. The structure includes bush-forming or turf forming algae, encrusting fauna and epiphytes. The coverage of the 'bush' and turf strata is usually higher than in an assemblage dominated by canopy algae. Assemblages are also highly miniaturized (less than 20 cm high) and very rich in species (up to 110 species in a 400 cm^2 area).

Species composition differs greatly depending on environmental conditions. Factors accounting for the variability on the assemblages include light availability, hydrodynamism, nutrient concentration in the seawater, substrate type, sedimentation, temperature, salinity, grazing intensity, predation, and frequency of disturbances. High densities of sea urchins (*Paracentrotus lividus*) can graze the algae, producing structurally less complex assemblages and even barren areas. Grazing by other fish species (*Sarpa salpa* or the exotic *Siganus rivulatus*, *S. luridus*) can modify the species composition. The habitat can be present both in good environmental conditions, and in rather degraded situations.

Several associated biotopes have been described, distinguished according to the dominant species. They include; *Padina pavonica* and similar species growing on well-lit shallow sheltered areas subjected to a moderate grazing by sea urchins; *Pterothamnion crispum and Compsothamnion thuyoides* growing on shallow, shaded sheltered to moderately exposed rocks; *Corallina elongata* growing on shallow exposed shores; *Halopteris scoparia* growing on well-lit sheltered areas down to 25 meters depth, mainly on northern areas, sometimes associated to the brown algae *Cladostephus spongiosus;* and *Codium bursa* on moderately lit infralittoral rock.

Indicators of quality:

This habitat is very variable according to the degree of anthropogenic disturbance. Indicators of quality can be measured by examining trends. The first signs of decline imply substitution of species, a decrease on diversity, an increase on invasive exotic species, and an increase in opportunistic, fast-growing species like some *Ulva* spp., *Cladophora* spp., *Acinetospora* spp., or stress resistant like *Corallina elongata* or *Lithophyllum incrustans*. Mussels can also replace the dominant algae in shallow waters when the charge of particulate organic matter is very high.

Characteristic species:

This community is characterized by the presence of many photophilic algae covering hard bottoms. The number of species is huge, and it can be completely different according to the bathymetric level, exposure and geographical region.

Rhodophyta (red algae)-*Liagora viscida, Liagora distenta, Amphiroa rigida, Corallina elongata, Haliptilon virgatum, Tricleocarpa fragilis, Ceramium virgatum, Wrangelia penicillata, Chylocladia verticillata, Chrysymenia ventricosa, Halymenia floresii, Gelidium spinosum, Predaea ollivieri, Chondracanthus acicularis, Jania rubens, Lithophyllum incrustans, Neogoniolithon brassica-florida, Mesophyllum alternans, Halopithys incurva, Lophocladia lallemandii, Peyssonnelia squamaria, Asparagopsis armata, Asparagopsis taxiformis, Sphaerococcus coronopifolius, Laurencia obtusa, Laurencia majuscula, Digenea simplex, Rytiphlaea tinctoria, Alsidium corallinum, Pterothamnion crispum, Compsothamnion thuyoides, Plocamium cartilagineum, Schottera nicaeensis, Pterocladiella capillacea, Botryocladia botryoides, Peyssonnelia squamaria, Palisada patentiramea*

Phaeophyta- *Dictyota fasciola, Colpomenia sinuosa, Taonia atomaria, Dictyota cf. dichotoma, Dictyota mediterranea, Stypopodium schimperi, Lobophora variegata, Dictyota spiralis, Zonaria tournefortii, Padina pavonicoides, Padina ditristromatica, Arthrocladia villosa, Sporochnus pedunculatus, Carpomitra costata, Acinetospora crinita, Hydroclathus clathratus, Dictyota dichotoma v. intricata, Sphacelaria cirrosa, Halopteris scoparia, Halopteris filicina, Padina pavonica, Cladostephus spongiosus, Dictyopteris polypodioides.*

Chlorophyta (green algae)- *Ulva rigida, Umbraulva olivascens, Dasycladus vermicularis, Flabellia petiolata, Acetabularia acetabulum, Parvocaulis parvulus, Caulerpa prolifera, Caulerpa cylindracea, Codium bursa, Anadyomene stellata, Cladophoropsis membranacea, Cladophora prolifera.*

Porifera- *Crambe crambe, Phorbas topsentii, Sarcotragus fasciculatus, Sarcotragus spinosulus, Hemimycale columella.*

Mollusca- *Bittium reticulatum, Conus ventricosus, Columbella rustica, Rissoa guerinii.*

Crustacea- *Macropodia longirostris, Maja crispata.*

Echinodermata- *Echinaster sepositus, Marthasterias glacialis, Paracentrotus lividus, Arbacia lixula, Holothuria tubulosa, Ophidiaster ophidianus, Ophiothrix fragilis.*

Fish- *Labrus merula, Coris julis, Serranus cabrilla, Serranus scriba, Symphodus ocellatus, Symphodus tinca, Scorpaena porcus, Epinephelus marginatus, Sciaena umbra, Diplodus sargus, Diplodus vulgaris, Diplodus cervinus, Diplodus puntazzo, Siganus rivulatus, Parablennius pilicornis, Trypterygion delaisi, Symphodus mediterraneus, Siganus luridus, Epinephelus costae, Sarpa salpa, Chromis chromis, Mullus surmuletus, Dentex dentex, Symphodus roissali, Sparisoma cretense.*

Classification

EUNIS (v1405):

Level 4. A sub-habitat of 'Mediterranean infralittoral rock' (A3.1).

Annex 1:

1160 large shallow inlets and bays

1170 Reefs

MAES:

Marine - Marine inlets and transitional waters

Marine – Coastal

MSFD:

Shallow sublittoral rock and biogenic reef

EUSeaMap:

Shallow photic rock or biogenic reef

IUCN:

9.7 Macroalgal/kelp

Barcelona Convention:

III. 6. 1. Biocenosis of infralittoral algae

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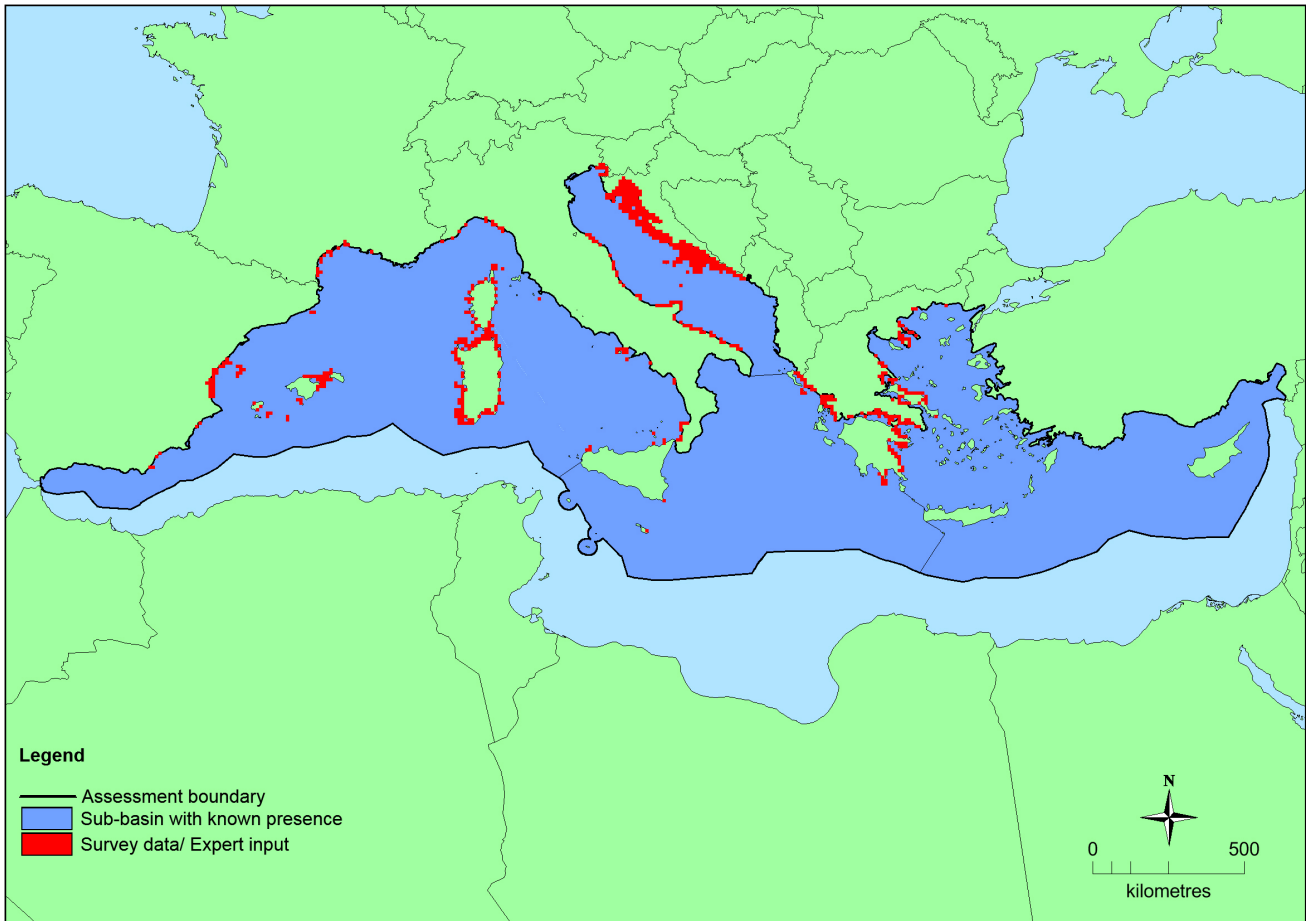Unknown

<u>Justification</u>
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	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	1,779,665 Km^2	704	1,219 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+	>1,779,665 Km^2	>704	>1,219 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

This map has been generated using data based on EMODNet Database, IUCN and the European Environment Agency. 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?

Unknown, although this habitat is present in the EU 28+.

Trends in quantity

No information on extent or reduction have been reported for this habitat. However, it can be expected that some reduction have taken place in relation to anthropogenic disturbances mostly in association with coastal development.

- 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
  This habitat has a large natural range extending throughout the Mediterranean Sea.
- Does the habitat have a small natural range by reason of its intrinsically restricted area?
  No
  Justification
  The extent of occurrence (EOO) exceeds 50,000 km^2 therefore this habitat does not show a small natural range although it is likely that some of the associated biotopes might have a more restricted natural range.

Trends in quality

There is little information on the quality status of this habitat. However, there could be a reduction in quality related to warming, pollution, sedimentation, invasive species and changes in grazing pressure. It has to be noted that this habitat is notably impacted by invasive algae, such as *Lophocladia lallemandii* and *Caulerpa cylindracea*, over many 'unknown' kilometers of coast line. Quality decreases are expected to continue in the future.

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

Pressures and threats

Pollution, introduced species and climate change together with land use changes that produce changes in nutrients and sedimentation are the cause of loss of this habitat. Presently it is difficult to evaluate their magnitude in EU and non-EU countries because there is no rigorous historical baseline for the abundance of these habitats in the Mediterranean.

List of pressures and threats

Urbanisation, residential and commercial development

Urbanised areas, human habitation

Pollution

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

Invasive, other problematic species and genes

Invasive non-native species

Natural biotic and abiotic processes (without catastrophes)

Species composition change (succession)
Accumulation of organic material
Eutrophication (natural)

Climate change

Temperature changes (e.g. rise of temperature & extremes)

Conservation and management

Currently, there are no specific conservation actions in place for this habitat. Its broad distribution suggests that it occurs in protected areas, however detailed information is missing. A wide survey to assess the habitat is needed in order to better evaluate its conservation status. Thereafter, the definition of sites for monitoring the habitat quality and quantity will help to conduct an assessment and identify appropriate management measures. These are likely to include improving water quality, Marine Protected Areas (MPAs) and regulation of fisheries.

List of conservation and management needs

Measures related to wetland, freshwater and coastal habitats

Restoring/Improving water quality

Measures related to spatial planning

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:

1160: MMED XX

1170: MMED XX

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

Unknown. Examples of successful recovery of this habitat are rare for the Mediterranean and are linked to the presence of marine protected areas (MPAs). There is also large variation in the structure of these habitats. Therefore, the time lapse for recovery will be determined according to the different stressors, communities and conditions.

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 no quantitative information on the reduction in quantity for this habitat. Expert knowledge from different Mediterranean countries suggests that this habitat is mostly stable although some level of reduction is most probably happening due to coastal development. The habitat is therefore 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	Unknown	Unknown	Unknown	>50	Unknown	Unknown	Unknown	Unknown
EU 28+	>50,000 Km^2	Unknown	Unknown	Unknown	>50	Unknown	Unknown	Unknown	Unknown

It is estimated that both the EOO and AOO largely exceed the thresholds for a threatened category and there is no information available on whether there is a continuing decline in the spatial extent or the biotic and abiotic quality, on whether a threatening process will likely cause continuing declines in the future. Therefore, the habitat type is assessed as Data Deficient Criterion B.

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 %	Unknown %	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%

Based on the countries that have provided data, a slight reduction in abiotic quality has been reported for the habitat. The current trend regarding the biotic and abiotic quality of the habitat is stable to gradually decreasing. This is related to warming, pollution and sedimentation, while reduction in biotic quality is related to invasive species (invasive algae such as *Lophocladia lallemandii* and *Caulerpa cylindracea* have invaded this habitat in many sites) and changes in grazing pressure.

Both abiotic and biotic quality decreases are expected to continue in the future. Based on lack of information to calculate the reductions in abiotic and/or biotic quality, the habitat type is assessed as Data Deficient under Criterion C/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, which is therefore 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	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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