

A3.238: Communities of *Cladocora caespitosa* beds and reefbanks of moderately exposed or semi-exposed infralittoral rock

Summary

This habitat is only found in the Mediterranean Sea where the dominant species *Cladocora caespitosa* is broadly distributed. The habitat however, is developed on specific sites where it forms extensive beds and banks, particularly Mjlet National Park (Croatia, Adriatic Sea), Kotor Bay in Montenegro and in the Columbretes Islands Marine Reserve (Spain, NW Mediterranean). Severe declines have been reported from these sites where they have been impacted by a range of threats among them increasing seawater temperatures, eutrophication, coastal works and colonization of invasive algal species. Within these protected areas damage to the colonies by threats such as anchoring, fishing, recreational diving, dredging activities, should be controlled. Establishing a long-term monitoring program to follow its conservation status, particularly in the actual context of global change impacts should also be prioritised.

Synthesis

This is an scattered habitat mostly formed by an endemic dominant structural species, *Cladocora caespitosa*, with an area that does not seem to exceed more than 0,5km² and its presence in less than 34, 10 x 10km grid squares. The habitat is distributed in at least 10 localities where it forms large beds or reef banks. A continuous decline in habitat abundance has been observed in most sites, ranging between 19-80% over different periods at different sites. Long term monitoring has only been undertaken at one bank, and here there have been declines of up to 80% in the last 20 years. This has been attributed to an increase in seawater temperature. Because of its restricted geographical distribution and the continuing decline observed in its spatial extent, this habitat has been assessed as Endangered 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
Endangered	A2a, A2b	Endangered	A2a, A2b

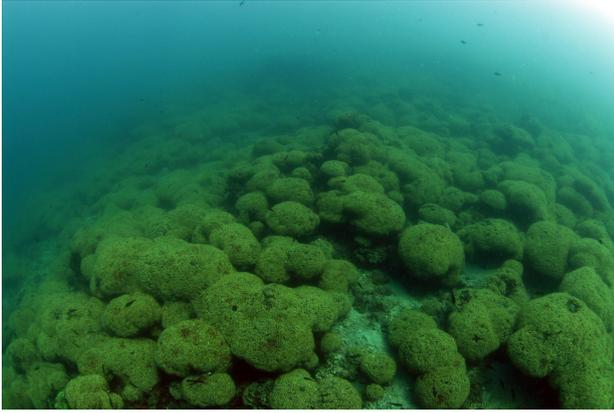
Sub-habitat types that may require further examination

None.

Habitat Type

Code and name

A3.238: Communities of *Cladocora caespitosa* beds and reefbanks of moderately exposed or semi-exposed infralittoral rock



Large banks of *Cladocora caespitosa* in Mljet National Park, Croatia (© P. Krucic).



Reef of *Cladocora caespitosa* (Illa Grossa, Columbretes, Spain (© D.K. Kersting).

Habitat description

The habitat formed by the zooxanthellate coral *Cladocora caespitosa* occurs on a wide range of substratum, a range of depths (commonly from 5 to 40 m depth), and hydrodynamic conditions. The colonies of this species, both dead and alive, provide a persistent biogenic structure or bioconstruction. Erect macroalgae can grow interspersed with the colonies or even overgrowing them.

Indicators of quality:

The status of habitat can be estimated based on the growth rates of the colonies of *C.caespitosa*, the cumulative cover area and population trends as well as rate of necrosis observed. Other indicators of quality of the habitat are macroalgal cover, including exotic species cover.

Characteristic species:

Rhodophyta (red algae)- *Amphiroa rigida*, *Laurencia obtusa*, *Haliptilon virgatum*, *Lithophyllum incrustans*, *Neogoniolithon brassica-florida*, *Peyssonnelia squamaria*.

Phaeophyta- *Dictyopteris polypodioides*, *Padina pavonica*, *Cystoseira sauvageauana*, *Dictyota dichotoma v. intricata*, *Zanardinia typus*.

Chlorophyta (green algae)- *Anadyomene stellata*, *Acetabularia acetabulum*, *Caulerpa cylindracea*, *Halimeda tuna*.

Cnidaria- *Cladocora caespitosa*

Classification

This habitat may be equivalent to, or broader than, or narrower than the habitats or ecosystems in the following typologies.

EUNIS (v1405):

Level 5 of the EUNIS classification. A sub-habitat of A3.2 Mediterranean moderate energy infralittoral rock.

Annex 1:

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

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

Yes

Regions

Mediterranean

Justification

The community formed by the dominant species *Cladocora caespitosa* is found only in the Mediterranean Sea. Here, the species is widespread and can be locally abundant, however, only a particular equilibrium between hydrodynamic protection and high water exchange through strong currents seems to allow the development of extensive *C. caespitosa* habitats in few locations in the Mediterranean.

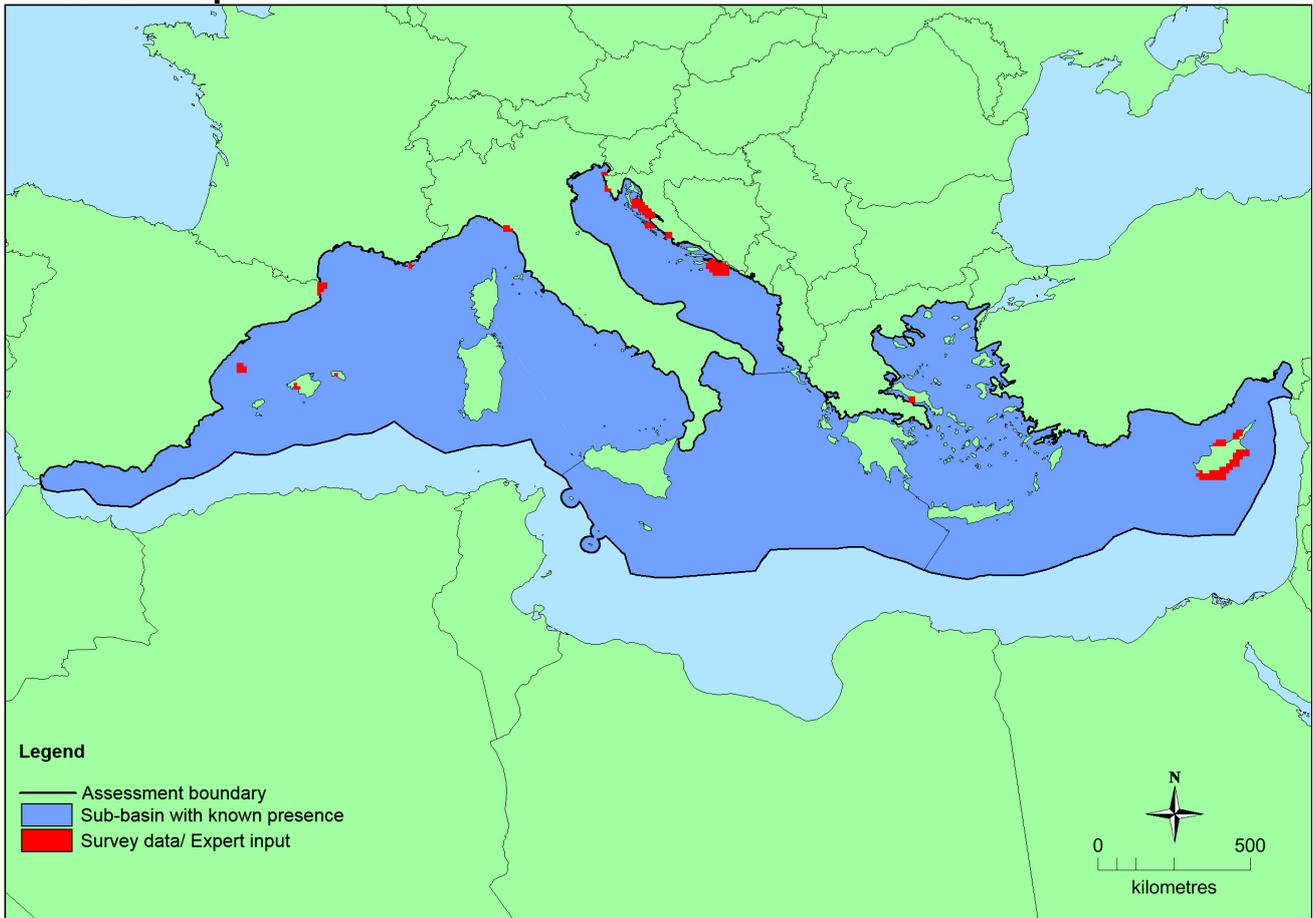
Geographic occurrence and trends

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	0.5 Km ²	Decreasing	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	76,605 Km ²	32	0.5 Km ²	
EU 28+	1,062,166 Km ²	34	0.5 Km ²	

Distribution map



This map has been generated using data from IUCN 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?

Cladocora caespitosa reefs and beds have been found mostly in EU 28 countries (Cyprus, Spain, Croatia, and Italy) and also in the EU 28+ in Montenegro. Its current estimated area is approx. 0.5km² based on total area of bank or accumulated colony area.

Trends in quantity

There are very few cases where *Cladocora caespitosa* habitats have been described in terms of the cover, distribution, health status and population dynamics of the main dominant species and its communities. From this information, it can be inferred that there has been a general decrease of the quantity of the habitat as its key species cover is reduced. In Spain, habitat loss of between 55 % and 80 % due to recurrent mortalities has been observed over last 10 years. Similarly, in the Adriatic more than 90% of *Cladocora caespitosa* colonies from the bank near Iz Island died during 2001-2005 and recurrent mortalities has also been observed last years in the Mljet banks. Climate change acting with other pressures is considered to be the main caused the reduction of the habitat by more than 50% in areas such as Gulf of La Spezia (northern Tyrrhenian Sea).

- 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 is very restricted in size but large banks occur in the western basin and the Adriatic Sea and the EOO exceeds 50,000km².

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

No

Justification

Cladocora caespitosa reefs and large beds are known only from very few locations, however the structural main species is widely distributed in the Mediterranean.

Trends in quality

A decrease of the habitat quality constituted mainly by *Cladocora caespitosa* banks and beds has been widely observed. Bleaching, necrosis, change on species composition because of invasive species colonization has been reported in Italy, Spain and Croatia. It has been observed that infralitoral photophilic algal communities changed to communities with a high presence of invasive alga species.

- Average current trend in quality

EU 28: Decreasing

EU 28+: Decreasing

Pressures and threats

Illegal trawling and dredging are probably the most destructive impacts currently affecting the communities formed with the coral *Cladocora caespitosa*. Mass mortalities related to seawater warming and summer heat waves have also been reported in several Mediterranean sites and will increase with climate change. Negative impacts resulting from eutrophication (N, P and organic matter) and industrial and sewage discharges have also been reported affecting the community composition such as increasing the macroalgae cover. Sub-lethal effects from exotic algal invasion can also affect the growth of colonies and therefore the communities within it.

List of pressures and threats

Biological resource use other than agriculture & forestry

Intensive fish farming, intensification
Benthic or demersal trawling
Benthic dredging

Pollution

Nutrient enrichment (N, P, organic matter)
Toxic chemical discharge from material dumped at sea

Invasive, other problematic species and genes

Invasive non-native species

Natural biotic and abiotic processes (without catastrophes)

Accumulation of organic material

Climate change

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

Conservation and management

The communities of *Cladocora caespitosa* are present within protected areas in the Mediterranean, such as

the Columbretes Islands and Mljet Islands and the species is known to occur in other protected sites. Additional conservation actions to protect and manage this habitat should include: extending the current knowledge on the distribution and community composition and trends of this habitat, especially at known localities where the information is lacking and to ensure the protection of the main and larger communities of *C. caespitosa* identified to date. At these locations, damage to the colonies by threats such as anchoring, fishing, recreational diving, dredging activities, should be controlled. Establishing a long-term monitoring program to follow its conservation status, particularly in the actual context of global change impacts should also be prioritised.

List of conservation and management needs

Measures related to wetland, freshwater and coastal habitats

Restoring/Improving water quality

Measures related to marine habitats

Other marine-related measures

Restoring marine habitats

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

Conservation status

Annex 1:

1170: MMED XX.

Cladocora caespitosa appears in the Annex 2 of the Barcelona Convention. Large beds and colonies forming reefs could be considered to be included in the Annex 1 of Habitats Directive (Directive 92/43/CEE) under Habitat 1170 "Reefs" and listed on CITES Appendix II.

The species is listed as Endangered by IUCN Red list (2015).

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

The populations of the dominant species of this habitat can recover from the mortality events through recruitment of new individuals to existing colonies and the establishment of new colonies, however the recruitment rate for this long-lived species is extremely low and not able to compensate for the increasing mortality rates. It has an estimated generation time of 30 years.

Effort required

50+ years
Naturally

Red List Assessment

Criterion A: Reduction in quantity

Criterion A	A1	A2a	A2b	A3
EU 28	35 %	>50 %	>50 %	unknown %
EU 28+	35 %	>50 %	>50 %	unknown %

There is limited long term monitoring data of this habitat except from one location where a reduction in the banks of between 50-80% has been observed. At other sites, the information is fragmented but shows declines in quantity of between 14% to 90%. Expert opinion is that losses in recent years have been around 35%. Based on these observations and that its main pressure, increase seawater temperature, will continue over the next 50 years, it is inferred an intermediate decline affecting more than 50% of the habitat. The habitat has therefore been assessed as Vulnerable under Criterion A1 for both the EU 28 and EU 28+ and as Endangered under criteria A2a A2b. It is Data Deficient for A3.

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	Yes	10	32	Yes	Yes	10	no
EU 28+	>50,000 Km ²	Yes	Yes	10	34	Yes	Yes	10	no

Reefs and large beds are known only from 10 locations, and the AOO is less than 50. This habitat has shown a continuing decline in its spatial extent in the last 50 years and this trend is expected to continue as seawater temperatures rise.

This habitat has therefore been assessed as Least Concern under B1 and B3 and Vulnerable under Criterion B2 (a,b,c) for the EU 28 and EU 28+.

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 %	50 %	intermediate %	unknown %	unknown %
EU 28+	unknown %	unknown %	50 %	intermediate %	unknown %	unknown %

Criterion C	C1		C2		C3	
	Extent affected	Relative severity	Extent affected	Relative severity	Extent affected	Relative severity
EU 28	unknown %	unknown %	50 %	intermediate %	unknown %	unknown %
EU 28+	unknown %	unknown %	50 %	intermediate %	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 colonization of algae invasive species such as *Womerslrella setacea*, *Caulerpa cylindracea* and *Lophocladia lamellandi* has been reported in several of the largest reef banks known (Montenegro, Croatia and Spain) although there are not estimations on the percentage of change in community composition by these species. In Montenegro, recent studies also mentioned a large

proportion of the reefs banks found dead and there are some informal reports of historical regressions from the coastal areas.

Based on a decrease on the abiotic quality (seawater temperature) that is affecting all colonies, it is inferred that there has been an intermediate decline affecting more than 50% of the populations from the past 20 years to the future. Based on this substantial reduction, the habitat type is assessed as Vulnerable under Criterion C2 and C/D2.

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	VU	EN	EN	DD	LC	VU	LC	DD	VU	DD	DD	VU	DD	DD	DD	DD	DD
EU28+	VU	EN	EN	DD	LC	VU	LC	DD	VU	DD	DD	VU	DD	DD	DD	DD	DD

Overall Category & Criteria			
EU 28		EU 28+	
Red List Category	Red List Criteria	Red List Category	Red List Criteria
Endangered	A2a, A2b	Endangered	A2a, A2b

Confidence in the assessment

Medium (evenly split between quantitative data/literature and uncertain data sources and assured expert knowledge)

Assessors

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Date of assessment

13/10/2015

Date of review

07/01/2016

References

- Casado de Amezua, P., Kersting, D., Linares, C. L., Bo, M., Caroselli, E., Garrabou, J., Cerrano, C., Ozalp, B., Terrón-Sigler, A. and Betti, F. 2015. *Cladocora caespitosa*. The IUCN Red List of Threatened Species. Version 2015.2. Available at: www.iucnredlist.org (Access: 25 August 2015)
- Cerrano, C., Bavestrello, G., Bianchi, C. N., Cattaneo-Vietti, R., Bava, S., Morganti, C. Morri, C., Picco, P., Sara, G., Schiaparelli, S., Siccardi, A. and Sponga, F. 2000. A catastrophic massmortality episode of gorgonians and other organisms in the Ligurian Sea (northwestern Mediterranean), summer 1999. *Ecology Letters* 3: 284-293.
- Jímenez, C., Hadjioannou, L., Petrou, A., Nikolaidis A., Evriviadou, M. and Lange, M. A. 2014. Mortality of the scleractinian coral *Cladocora caespitosa* during a warming event in the Levantine Sea (Cyprus). . *Reg Environ Change* DOI 10.1007/s10113-014-0729-2.
- Kersting, D. K. and Linares, C. 2012. *Cladocora caespitosa* bioconstructions in the Columbretes Islands Marine Reserve (Spain, NW Mediterranean): distribution, size structure and growth. *Marine Ecology* 33: 427-436 pp.
- Kersting, D. K., Bensoussan, N. and Linares, C. 2013. Long-Term Responses of the Endemic Reef-Builder *Cladocora caespitosa* to Mediterranean Warming. *PLoS ONE* 8(8): e70820.
- Kersting, D. K., Teixidó, N. and Linares, C. 2014. Recruitment and mortality of the temperate coral *Cladocora caespitosa*: implications for the recovery of endangered populations. *Coral Reefs*. : DOI: 10.1007/s00338-014-1144-3.
- Kružić, P. and Benkovic, L. 2008. Bioconstructional features of the coral *Cladocora caespitosa* (Anthozoa, Scleractinia) in the Adriatic Sea (Croatia). *Marine Ecology* 29(1): 125-139.
- Kružić, P., Lipej, L., Mavrič, B. and Rodić, P. 2014. Impact of bleaching on the coral *Cladocora caespitosa* in the eastern Adriatic Sea. *Mar Ecol Prog Ser* 509: 193-202
- Kružić, P., Sršen, P. and Benković, L. 2012. The impact of seawater temperature on coral growth parameters of the colonial coral *Cladocora caespitosa* (Anthozoa, Scleractinia) in the Eastern Adriatic Sea. . *Facies* 58: 477-491.
- Lumare F. 1965/6. Sulla scogliera a *Cladocora* di Crotone e le sue biocenosi. *Rendiconti Accademia Nazionale dei XL*, ser.IV^o: 1-17.
- Peirano, A., Abate, M., Cerrati, G., Difesca, V., Peroni, C. and Rodolfo-Metalpa, R. 2005. Monthly variations in calyx growth, polyp tissue, and density banding of the Mediterranean scleractinian *Cladocora caespitosa* (L.). *Coral Reefs* 24: 404-409.
- Peirano, A., Morri, C., Bianchi, C.N., Aguirre, J., Antonioli, F., Calzetta, G., Carobene, L., Mastronuzzi, G. and Orru, P. 2004. The Mediterranean coral *Cladocora caespitosa*: a proxy for past climate fluctuations ? *Global and planetary Change* 40: 195-200.
- Peirano, A., Morri, C., Bianchi, C. N. and Rodolfo-Metalpa, R. 2001. Biomass, carbonate standing stock and production of the Mediterranean coral *Cladocora caespitosa* (L.) *Facies* 44: 75-80.
- Pitacco, V., Orlando-Bonaco, M., Mavric, B and Lipej, L. 2014. Macrofauna associated with a bank of *Cladocora caespitosa* (Anthozoa, Scleractinia) in the gulf of Trieste (N Atlantic). *ANNALES · Ser. hist. nat.* 24(1): 1-14.
- Rodolfo-Metalpa, R., Nike Bianchi, C., Peirano. A. and Morri, C. 2005. Tissue necrosis and mortality of the temperate coral *Cladocora Caespitosa*, *Italian Journal of Zoology*, 72:4, 271-276, DOI: 10.1080/11250000509356685

- Rodolfo-Metalpa, R., Bianchi, C.N., Peirano, A. and Morri, C. 2000. Coral Mortality in NW Mediterranean. *Coral Reefs* 19:24-24.
- Schiller, Ch. 1993. Ecology of the symbiotic coral *Cladocora caespitosa* (L.) (Faviidae, Scleractinia) in the Bay of Piran (Adriatic Sea): I. Distribution and Biometry. *Marine Ecology* 14: 205-219 pp.
- Stjepcevic, J. and Parenzan, P. 1980. Il Golfo delle Bocche di Cattaro. Condizioni generali e biocenosi bentoniche con carta ecologica delle sue due baie interne. *Studia Marina* 3: 9-10.
- Zibrowius, H. 1980. *Les scleractiniaires de la mediterranee et de l'atlantique nordoriental. Memoires de l'Institut Oceanographique.*