A4.71: Communities of Atlantic circalittoral caves and overhangs

Summary

The composition and spatial extent of cave communities varies considerably, depending on the physical structure and extent of the cave system, its degree of submergence, exposure to scour and surge, and the nature of its geology. Marine caves and overhangs can support a rich and at times exceptional biodiversity. Some studies on the marine cave and other crevicular fauna have revealed the existence of unique communities characterised by high endemism, relict species and other unusual characteristics.

This habitat is sensitive to physical damage for example by processes such as increased silitation, abrasion or selective extraction of associated species. Air-bubble accumulation from sport diving can smother organisms attached to the cave roof. There are few conservation and management measures specifically aimed at this habitat. They include limitations on access and on the collection of marine life, as well as general measures such as monitoring which may be part of a scheme of management of Marine Protected Areas.

Synthesis

Sublittoral cave systems have not been extensively studied, and those which have been investigated in any detail are generally in shallow waters (diving depths). There are no consistently applied common metrics to describe the 'quantity' of this habitat type, which may include linear extent, volume, depth, wall height and floor width. Caves are highly dynamic and their extent is likely to fluctuate over time, particularly in friable rock where erosion or collapse processes are likely to occur. Because of the lack of quantitative data on extent and condition, no assessment of trends in quantity and quality can be made at the present time. The current Red List assessment for this habitat is therefore Data Deficient for both the 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

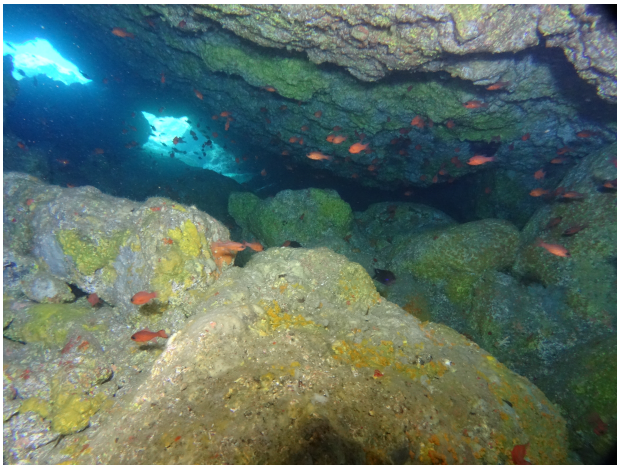
None.

Habitat Type

Code and name

A4.71: Communities of Atlantic circalittoral caves and overhangs

Sponges and anthozoans on the walls of a circalittoral cave, Puerto del Carmen, Lanzarote, Canary Islands, Spain (© F. Otero).



Circalittoral cave habitat. Puerto del Carmen, Lanzarote, Canary Islands, Spain (© F. Otero).

Habitat description

Caves and overhanging rock in the circalittoral zone, away from significant influence of strong wave action. This habitat generally occurs in open coast waters or on wave sheltered coasts with moderate tidal flow. Caves and overhangs display a wide range of structural and ecological variation, depending on the prevailing physical and geological conditions. Those which have extensive areas of vertical and overhanging rock, and those that extend deeply into the rock, generally support the widest range and highest diversity of species. In the circalittoral zone these are characterised by sponges and anthozoans. Resident, seasonal and occasional species of fish are also present in sublittoral caves. Extensive cave systems, such as the flooded lava tubes in the Canary Islands, may become anchialine at their innermost extents because of the long residence time (months to years) of seawater. In such systems, the extent of saltwater intrusion, its stratification and the residence time of seawater (which can be from months to years) has resulted in a specialised fauna with pronounced morphological, physiological, biochemical and behavioural adaptations, such as the blind crab *Munidopsis polymorpha.*

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 ma yface; 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 overtime.

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.

Cave biotopes can be broadly divided into those characterised by long lived species and those characterise d by ephemeral and scour tolerant species. Long lived species such as cup corals and sponges may be targ eted as indicators that a cave system has remained undisturbed. Individuals or individual colonies of such species might represent suitable for monitoring change.

Characteristic species:

Characteristic species include sponges (*Stryphnus ponderosus, Dercitus bucklandi, Chelonaplysilla noevus, Pseudosuberites* spp. and *Spongosorites* spp.,)*;* tunicates (*Clavelina lepadiformis),* anemones and anthozoans *(Parazoanthus* spp.*, Corynactis viridis*, *Parerythropodium coralloides, Caryophyllia smithii, Caryophyllia inornatus, and Hoplangia durotrix)*.

Classification

EUNIS (v1405).

Level 4. A sub-habitat of ‘Atlantic circalittoral rock’.

Annex 1:

8330 Submerged or partially submerged sea caves

MAES:

Marine - Marine inlets and transitional waters

Marine - Coastal

MSFD:

Shallow sublittoral rock and biogenic reef

EUSeaMap:

Shallow photic rock or biogenic reef

IUCN:

9.2 Subtidal rock and rocky reefs

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

Unknown

Justification

Present in all the sub-basins of the North East Atlantic regional sea where there are sublittoral rock walls or boulder slopes although form can be very different, depending on geology and formation (e.g. marine erosion or collapsed lava tubes).

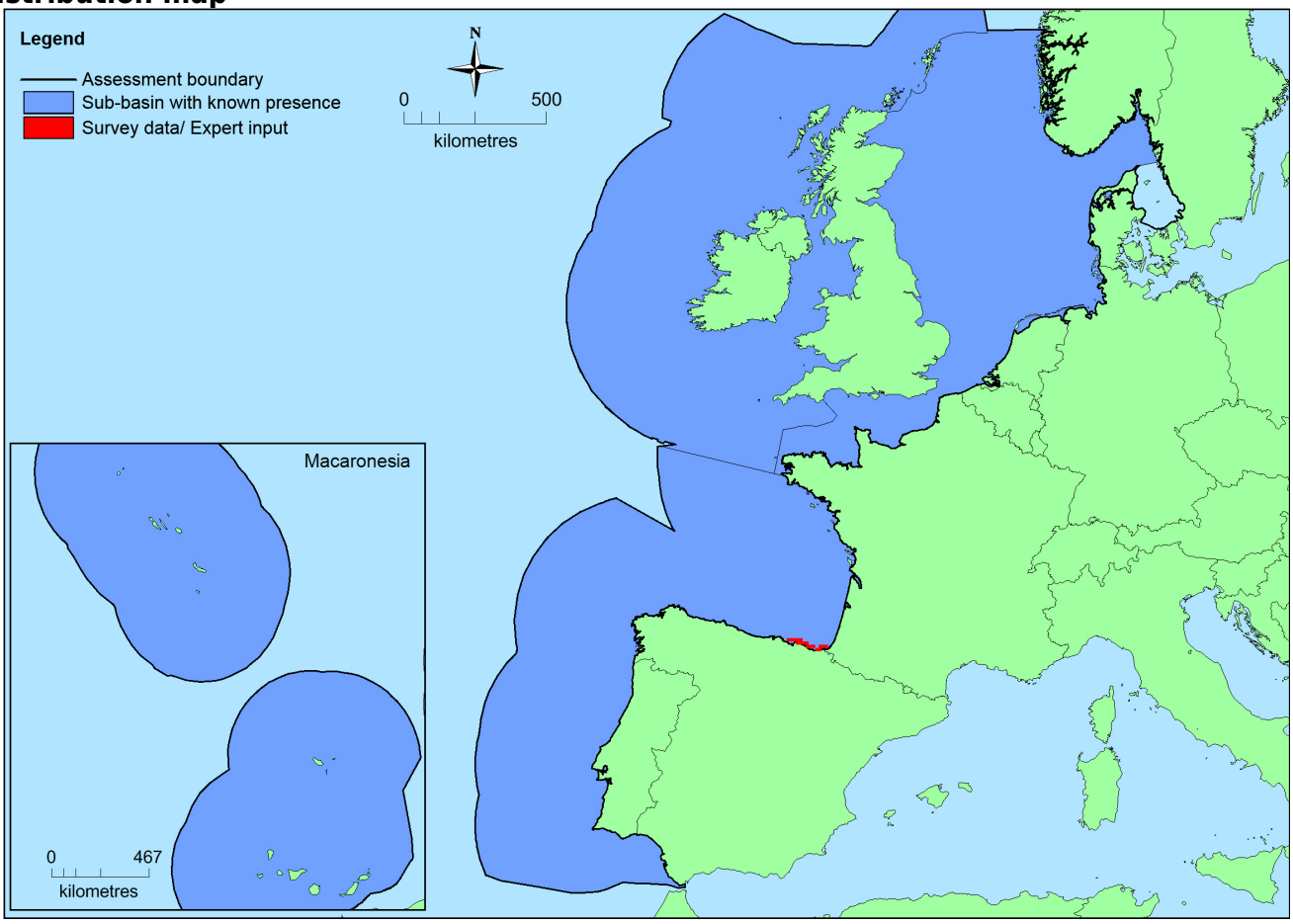
Geographic occurrence and trends

Region	Present or Presence Uncertain	Current area of habitat	Recent trend in quantity (last 50 yrs)	Recent trend in quality (last 50 yrs)
North-East Atlantic	Bay of Biscay and the Iberian Coast: Present Celtic Seas: Present Kattegat: Uncertain Greater North Sea: Present Macaronesia: 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	unknown Km^2	unknown	Unknown Km^2	There is insufficient quantiative data to make an accurate estimate of EOO and AOO however this habitat is widespread.
EU 28+	unknown Km^2	unknown	Unknown Km^2	here is insufficient quantiative data to make an accurate estimate of EOO and AOO however this habitat is widespread.

Distribution map



This map has been generated using EMODnet data from modelled/surveyed records for the North East Atlantic (and supplemented with expert opinion where applicable) (EMODnet 2010). There are insufficient data to provide a comprehensive and accurate map of the distribution of this habitat or for calculation of EOO and AOO.

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

This habitat occurs in the EU 28+ (e.g. Norway, Isle of Man, Channel Islands). The percentage hosted by the EU 28 is likely to be between 85-90% but there is insufficient information to establish the exact figure.

Trends in quantity

Sublittoral cave systems have not been extensively studied. The associated biotopes can be broadly divided into those characterised by long-lived species and those characterised by ephemeral and scour-tolerant species. Natural loss and re-recruitment should be expected in the latter case and would need to be recognised in any trend analysis. The information which is available is generally limited to caves in shallow waters at diving depths.

There is insufficient data to provided an accurate and comprehensive record of the extent of this habitat. Listing under the Habitats Directive has meant that surveys of sublittoral cave habitats are being undertaken by Member States but trend analysis is not possible at the present time.

- 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 in the North East Atlantic region with examples as widely separated as the Canary Islands, the Azores and the Shetland Islands.
- Does the habitat have a small natural range by reason of its intrinsically restricted area?
  No
  Justification
  This habitat has a large natural range in the North East Atlantic region with examples as widely separated as the Canary Islands, the Azores and the Shetland Islands.

Trends in quality

Sublittoral cave systems have not been extensively studied. With some exceptions in shallow waters there is limited information on the associated communities and therefore possible indicators of quality. Natural loss and re-recruitment of ephemeral species should be expected and would need to be recognised in any trend analysis.

Listing under the Habitats Directive has meant that surveys of sublittoral cave habitats are being undertaken by Member States but there is insufficient information to determine any overall trends in quality of this habitat across the North East Atlantic region at the present time.

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

Pressures and threats

This habitat is sensitive to physical damage for example by processes such as increased silitation, abrasion or selective extraction of associated species. Sedimentation can be an issue where the associated biotopes are dominated by sessile filter feeders. Sport-diving may produce negative effects either directly by mechanical disturbance or indirectly as a result of air-bubble accumulation smothering organisms attached to the cave roof.

List of pressures and threats

Human intrusions and disturbances

Outdoor sports and leisure activities, recreational activities
Scubadiving, snorkelling

Natural System modifications

Human induced changes in hydraulic conditions
Siltation rate changes, dumping, depositing of dredged deposits

Conservation and management

There are few conservation and management measures specifically directed at this habitat although some are within designated protected areas. Codes of Conduct which provide guidance on avoiding damage to these habitat are promoted in some areas where cave diving takes place.

List of conservation and management needs

Measures related to marine habitats

Other marine-related measures

Measures related to spatial planning

Establish protected areas/sites

Conservation status

Annex 1:

8330: MATL XX, MMAC XX.

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

Caves are highly dynamic and their extent is likely to fluctuate over time, particularly in friable rock where erosion or collapse processes are likely to occur.

Several of the species typically present in this habitat appear to have short-lived benthic larvae, e.g. the soft coral *Alcyonium hibernicum* which broods planulae larvae that are released at a late development phase and so probably has a short planktonic life. *Leptopsammia pruvoti* also seems to have short-lived planulae larvae which may settle immediately or very soon after release. In the case of cup corals (*Caryophyllia* spp. *Hoplangia* spp.), growth rates are smaller compared to other zoanthids colonising cave walls and roofs.

Sponges are likely to have a longer lived larva and others species, such as the zoanthid anemones *Parazoanthus axinellae* and *Parazoanthus dixoni*, reproduce asexually to produce large colonies so may become restablished relatively rapidly if a source population is present and conditions are favourable.

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 %

Sublittoral cave systems have not been extensively studied, nor are there consistently applied common metrics to describe 'quantity' of this habitat type which may include linear extent, volume, depth, wall height and floor width.

Listing under the Habitats Directive means that information gaps are starting to be addressed however there are insuffcient data to undertake a trend analysis of this habitat at the present time. This habitat has

therefore been assessed as Data Deficient under criterion A for both the EU 28 and EU 28+.

Criterion B: Restricted geographic distribution

Criterion B	B1				B2				B3
	EOO	a	b	c	AOO	a	b	c	
EU 28	unknown Km^2	Unknown	Unknown	unknown	unknown	Unknown	Unknown	unknown	unknown
EU 28+	unknown Km^2	Unknown	Unknown	unknown	unknown	Unknown	Unknown	unknown	unknown

This habitat has a large natural range in the North East Atlantic region with examples as widely separated as the Canary Islands, the Azores and the Channel coast of France. Significant shortcomings in available mapping data mean that reliable figures for EOO and AOO cannot be derived at the present time. This habitat has therefore been assessed as Data Deficient under criterion B for both 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 %	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%

Experts consider there to be insufficient data on which to assess criteria 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.

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)

Assessors
S.Gubbay.

Contributors
North East Atlantic Working Group: N. Sanders, N. Dankers, J. Forde, K. Fürhaupter, S. Gubbay, R. Haroun Tabraue, R.Herrera, F. Otero-Ferrer, G. Saunders and H. Tyler-Walters.

Reviewers
F. Otero-Ferrer.

Date of assessment
18/08/2015

Date of review
09/01/2016

References

Connor, D.W., Allen, J.H., Golding, N. *et al.* 2004. The Marine Habitat Classification for Britain and Ireland Version 04.05 JNCC. [online] Peterborough: ISBN 1 861 07561 8. Availiable at: http://jncc.defra.gov.uk/pdf/04_05_introduction.pdf. (Accessed: 30/08/2014).

European Environment Agency. 2014. EUNIS habitat type hierarchical view. Available at: http://eunis.eea.europa.eu/habitats-code-browser.jsp. (Accessed: 01/08/2014).

Joint Nature Conservation Committee. 2004. Common Standards Monitoring Guidance for Sea Caves. Version August 2004. Available at: http://jncc.defra.gov.uk/PDF/CSM_marine_sea_caves.pdf. (Accessed: 01/08/2014).

MESMA. 2010. Monitoring and Evaluation of Spatially Managed Areas. *Marine Policy* 37: 149-164.

Micael, J., Azevedo, J.M.N. and Costa, A.C. 2006. Biological characterisation of a subtidal tunnel in São Miguel island (Azores). *Biodiversity and Conservation* 15: 3675-3684.

Irving, R.A. 2005. *Lundy cSAC and MNR Literature Review*. Exeter: English Nature (Exeter) by Sea-Scope, Marine environmental Consultants.

Tempera, F., Atchoi, E., Amorim, P., Gomes-Pereira, J., and Gonçalves, J. 2013. *Atlantic Area Marine Habitats. Adding new Macaronesian habitat types from the Azores to the EUNIS Habitat Classification*. Horta: MeshAtlantic, IMAR/DOP-UAç, p.126.

Wilkens, H., Parzefall, J. and Iliffe, T.M. 1986. Origin and age of the marine Stygofauna of Lanzarote, Canary Islands. *Mitt. hamb. Zool. Mus. Inst* 83: 223-230