

A1.44 Communities of Atlantic littoral caves and overhangs

Summary

Intertidal cave habitats support a variety of biotopes depending on light levels, amount of scour, wave surge and sea spray. A natural cycle of erosion means that change in extent of this habitat is inevitable with both new caves forming and extending, as well as cave habitats being lost, for example following rock collapse. Some inventories of cave habitats have been carried out in the region but there is lack of comprehensive data on numbers and area of extent.

Anthropogenic pressures potentially leading to loss of habitat are those produced by coastal developments and construction work. Water quality issues will obviously have wider consequences and impacts will not be restricted to cave habitats so will also be apparent on the open coast. Climate change may have an effect as increased storminess could exacerbate erosion at the coast. This could both lead to reduction in caves as well as the formation of new caves. Localised disturbance e.g. where seals use caves as pupping or haul out sites may also be an issue.

Protected areas with codes of conduct regarding access (e.g. to avoid disturbance to seals), regulation of coast protection works and coastal development are some of the conservation management measures applicable to this habitat.

Synthesis

The presence of this habitat type in the North East Atlantic is well known. It is widespread and present in many locations. Although the geographical areas in which it occurs are known in general terms (cliffed coastlines) there is a lack of quantitative data on extent and quality. Threats and pressures on this habitat have been identified but the extent is considered to have been mostly stable over the last 50 years, with no substantial reduction in quality. The potential for future change due to changes in erosive processes, for example as a result of increased storminess associated with climate change is unknown.

The current Red List assessment is that this habitat qualifies as Least Concern in the EU 28 and EU 28+. This is because although changes will have taken place no significant trends in extent have been identified. The habitat also does not have a narrow geographical range and its distribution is such that the identified threats are unlikely to affect all localities at once.

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

Sub-habitat types that may require further examination

Where coastal rocks are formed from limestone there is potential for a connection between terrestrial karstic aquifers and the marine environment. The intertidal areas of these caves may support a specific specialised biota and would therefore benefit from further examination.

Habitat Type

Code and name

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Cave entrance, Papa Stour, Shetland, UK (© G.Saunders).



Intertidal cave surveying. Peticcowick, North Northumberland coast, UK (© G.Saunders).

Habitat description

Where caves and overhangs occur on rocky shores, the shaded nature of the habitat diminishes the amount of desiccation suffered by biota during periods of low tides, allowing certain species to proliferate. In addition, the amount of scour, wave surge, sea spray and penetrating light determines the unique community assemblages found in upper-, mid- and lower-shore caves and overhangs.

Intertidal cave systems may be a few meters long or may extend considerable distances inland, while supporting fully marine biological communities. The flooded lava tube of Cueva de los Verdes – Jameos del on Lanzarote, in the Canary Islands penetrates some 2 km into the island. Biotopes from the surrounding shore or any of the furoid communities occasionally extend into cave entrances and sometimes some distance beyond. Other open shore biotopes may also be found within caves, such as the that characterised by the green seaweed *Prasiola stipitata* on cave roofs favoured by roosting birds, and localised patches of green algae where freshwater seepage influences the rock. Rockpools containing encrusting coralline algae, furoids and kelp and hydroids and littorinid molluscs may occur also on the floor of cave entrances.

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:

In general, the biomass and diversity of algal species found in upper and mid-shore littoral caves decreases with increasing distance into the cave interior as the light levels diminish. Furoids are usually only found at the entrances to caves, but red algae, and filamentous and encrusting green algae are able to penetrate to lower light intensities towards the back of the cave, and mats of the turf forming red seaweed *Audouinella purpurea* and/or patches of the green seaweed *Cladophora rupestris* may occur on the upper walls. Brownish velvety growths of the brown algae *Pilinia maritima* occurring in mats with the red alga *A. purpurea* on cave walls and upper littoral levels of cliffs should not be confused with the green or golden brown algal stains often found above this zone on the ceilings of the caves. On the lower walls is

a zone of *Verrucaria mucosa* and/or *Hildenbrandia rubra* on the inner and outer reaches. Fauna usually only occur on the lower and mid walls of the caves and generally comprise barnacles, anemones and tube-forming polychaetes depending on the level of boulder scour or wave surge. Where the floors of caves consist of mobile cobbles and small boulders, few floral or faunal species occur due to the effects of scouring. Vertical or steeply sloping cave walls and overhangs on the mid- and lower-shore, subject to wave-surge but without scour, support a rich biota of sponges, hydroids, ascidians and shade-tolerant red algae.

In extensive cave systems such as the flooded lava tubes in the Canary Islands, 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*.

Classification

EUNIS (v1405)

Level 4 of the EUNIS classification. A sub-habitat of 'Atlantic littoral rock' (A1.4).

Annex 1:

8830 Submerged or partially submerged sea caves

MAES:

Marine - Marine inlets and transitional waters

Marine - Coastal.

MSFD:

Littoral rock and biogenic reef

EUSeaMap:

Not mapped

IUCN ecosystem:

12.1 Rocky shoreline

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

Unknown

Justification

This habitat is present in all the sub-basins of the North East Atlantic where there are cliffed coastlines although the character of the habitat can be very different, depending on geology and development process (e.g. marine erosion or collapsed lava tubes).

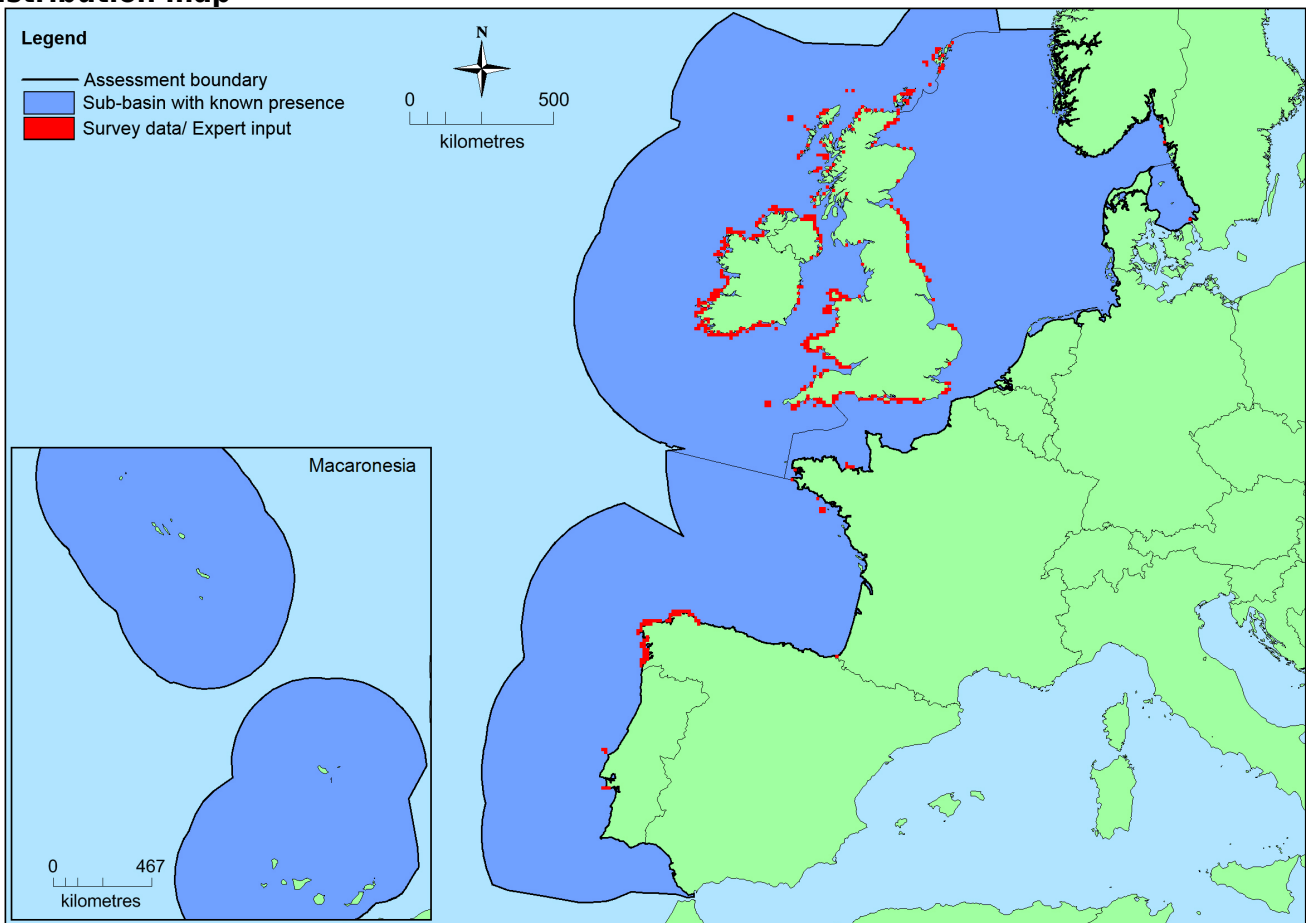
Geographic occurrence and trends

Region	Present or Presence Uncertain	Current area of habitat	Recent trend in quantity (last 50 yrs)	Recent trend in quality (last 50 yrs)
<i>North-East Atlantic</i>	Bay of Biscay and the Iberian Coast: Present Celtic Seas: Present Kattegat: Present Greater North Sea: Present Macaronesia: Present	unknown Km ²	Stable	Stable

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>	2,173,829 Km ²	672	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>	>2,173,829 Km ²	>672	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 for the North East Atlantic (and supplemented with expert opinion where applicable) (EMODnet 2010). 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.

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

This habitat develops on cliffed coastlines. It is not present in all EU Member States of the North East Atlantic (e.g. it is absent from Germany and the Netherlands), but it is present in the EU 28+ (e.g. in Norway, Isle of Man, Channel Islands). The percentage hosted by the EU 28 is therefore less than 100% but there is insufficient information to establish the proportion.

Trends in quantity

Natural change in the extent of this habitat is inevitable with both increases and decreases occurring, for example with wave erosion extending caves or conversely causing rock collapse and subsequent loss. There are some inventories of caves in the region, but a lack of comprehensive data on the numbers and extent. Monitoring of cave habitats within *Natura* 2000 sites will provide data for future analysis however at the present time, current expert opinion is that there are no particular trends in quantity of this habitat.

- Average current trend in quantity (extent)

EU 28: Stable

EU 28+: Stable

- 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 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 and the Shetland Islands.

Trends in quality

There are some long-term monitoring programmes in intertidal caves (e.g. within Marine Protected Areas) and, more recently, site condition monitoring programmes to detect trends because this habitat is listed in Annex 1 of the Habitats Directive. One such programme has compared cave biotopes at Papa Stour, Scotland between 1988 and 2003 showing that most of the surge gully biotopes and some of the scoured substrata biotopes were maintained across the time period.

The lack of adequate data (either current or historical) precludes certainty but current expert opinion is that there are no particular trends in quality of this habitat.

- Average current trend in quality

EU 28: Stable

EU 28+: Stable

Pressures and threats

Anthropogenic pressures potentially leading to changes in the extent of this habitat are those resulting from coastal developments and construction works because they may change the hydrodynamic regime and consequently the rates of erosion which both create and lead to loss of cave habitat (e.g. the western part of the island of Helgoland).

Harvesting of shellfish and disturbance of wildlife sheltering in caves are more localised pressures and likely to be limited to readily accessible sites. Severe pollution events such as oil spills are an additional pressure that may affect habitat quality.

List of pressures and threats

Urbanisation, residential and commercial development

Urbanised areas, human habitation

Biological resource use other than agriculture & forestry

Fishing and harvesting aquatic resources

Professional passive fishing

Leisure fishing

Human intrusions and disturbances

Outdoor sports and leisure activities, recreational activities

Nautical sports

Recreational cave visits

Scuba diving, snorkelling

Disturbance of species

Pollution

Marine water pollution

Oil spills in the sea

Conservation and management

Intertidal cave habitats are present within some coastal and marine protected areas. Conservation and management measures include codes of conduct on access (e.g. to avoid disturbance to seals), regulation of coast protection works and coastal development. Oil spill contingency plans may specify actions to be taken in the event of intertidal cave habitats being affected.

List of conservation and management needs

Measures related to marine habitats

Other marine-related measures

Measures related to spatial planning

Establish protected areas/sites

Legal protection of habitats and species

Measures related to special resource use

Regulating/Managing exploitation of natural resources on sea

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?

This is a naturally dynamic habitat with associated communities able to recover relatively rapidly if the

cave structure remains present.

Effort required

10 years
Naturally

Red List Assessment

Criterion A: Reduction in quantity

Criterion A	A1	A2a	A2b	A3
EU 28	0 %	Unknown %	Unknown %	Unknown %
EU 28+	0 %	Unknown %	Unknown %	Unknown %

Natural change in the extent of this habitat is inevitable with both increases and decreases occurring, Current expert opinion is that there are no particular trends in quantity of this habitat. It is therefore considered to be Least Concern 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	>50,000 Km ²	No	No	No	>50	No	No	No	No
EU 28+	>50,000 Km ²	No	No	No	>50	No	No	No	No

This habitat has a large natural range in the North East Atlantic region. EOO >50,000 km² and AOO >50, and it is not limited to a few locations. The precise extent of this habitat is unknown but it is considered most likely to have been stable over the last 50 years. This habitat has therefore been assessed as Least Concern under criteria B1, B2 & B3.

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%

There is limited data on quality and although changes will have taken place, no significant trends have

been detected. 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	LC	DD	DD	DD	LC	LC	LC	DD	DD	DD	DD	DD	DD	DD	DD	DD	DD
EU28+	LC	DD	DD	DD	LC	LC	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	-	Least Concern	-

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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Date of review

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