Littoral caves and overhangs

MarLIN – Marine Life Information Network
Marine Evidence–based Sensitivity Assessment (MarESA) Review

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2002-11-23

A report from:
The Marine Life Information Network, Marine Biological Association of the United Kingdom.

Please note. This MarESA report is a dated version of the online review. Please refer to the website for the most up-to-date version [https://www.marlin.ac.uk/habitats/detail/242]. All terms and the MarESA methodology are outlined on the website (https://www.marlin.ac.uk)

This review can be cited as:
Hiscock, K. 2002. Littoral caves and overhangs. In Tyler-Walters H. and Hiscock K. (eds) *Marine Life Information Network: Biology and Sensitivity Key Information Reviews*, [on-line]. Plymouth: Marine Biological Association of the United Kingdom. DOI https://dx.doi.org/10.17031/marlinhab.242.1

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A well developed overhang community with pendulous polyclinid tunicates.
Photographer: Keith Hiscock
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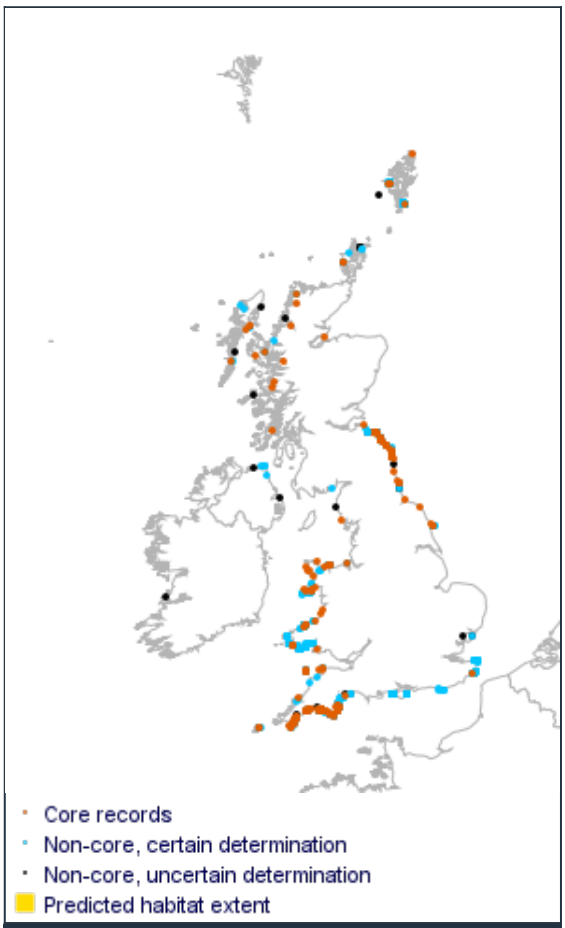

17-09-2018
Biotope distribution data provided by EMODnet Seabed Habitats (www.emodnet-seabedhabitats.eu)

Researched by Dr Keith Hiscock **Refereed by** This information is not refereed.

Summary

UK and Ireland classification

EUNIS 2008	A1.44	Communities of littoral caves and overhangs
JNCC 2015	LR.FLR.CvOv	Littoral caves and overhangs
JNCC 2004	LR.FLR.CvOv	Littoral caves and overhangs
1997 Biotope	LR.LR.Ov	Overhangs and caves

Description

Where overhangs occur on rocky shores there is a reduction in desiccation which allows certain species to proliferate, in particular, crusts of bryozoans (for example, *Umbonula littoralis*), sponges (such as *Halichondria panicea* and *Hymeniacidon perleve*), ascidians (such as *Botryllus schlosseri*), barnacles (*Perforatus perforatus* in the south-west) and spirorbid tubeworms (SLR.SByAs). Erect bryozoans may occur such as species of *Scrupocellaria* and *Bugula* sp. Pendulous species such as the ascidian *Morchellium argus* and the fleshy bryozoan *Alcyonidium diaphanum* may also occur. Shade-tolerant red seaweeds can also grow in such conditions (SLR.SR). Mobile species that occur include

the painted top shell *Calliostoma zizyphinum*, the cowrie, *Trivia* spp., the sting winkle *Ocenebra erinacea* and the cushion star *Asterina gibbosa*. On shady overhangs on the lowest shore, branching sponges such as *Stelligera stuposa* and corals (*Caryophyllia smithii* and sometimes *Balanophyllia regia*) may be found together with a range of sea anemone species. Adapted from Connor *et al.* (1997a).

Depth range

Upper shore, Mid shore, Lower shore

Additional information

None

Listed By

- none -

Further information sources

Search on:

G G JNCC

Habitat review

Ecology

Ecological and functional relationships

Species living under overhangs are mainly active suspension feeders relying on water-borne food and are not generally interacting. However, overgrowth of one species by another may occur (cf. Turner, 1988) and some overhangs become dominated by one species especially *Dendrodoa grossularia*. A small number of species feed on the encrusting fauna including, for example, *Doris pseudoargus* on sponges, the cowrie *Trivia monacha* spp on compound ascidians, and the dog whelk *Nucella lapillus* on barnacles.

Seasonal and longer term change

Changes are probably similar to those described by Foster-Smith (1989) for under-boulders where many encrusting ascidians increased in abundance by late summer on the Northumbrian coast.

Habitat structure and complexity

Overhangs vary greatly in their 'openness' and their aspect. They can be deeply overhanging and be more like small shallow caves with downward facing surfaces to being almost vertical surfaces. Also, rock type is important in determining the community that develops. Where soft rock (for instance, limestone or chalk) is present there is likely to be a high proportion of boring species in the rock.

Productivity

Not researched

Recruitment processes

Mainly from planktonic larvae.

Time for community to reach maturity

Settlement panels, which attract similar communities to overhang habitats, may be fully colonized within about 18 months of being placed into the environment (extrapolated from Sutherland & Karlson 1977; Todd 1994). Development of 'mature' communities under overhangs is likely to occur within two years and there will be dynamic stability where the same species are always present but individuals and colonies die and recruit with time.

Additional information

No studies were found that specifically describe overhang and intertidal cave communities.

Preferences & Distribution

Habitat preferences

Depth Range	Upper shore, Mid shore, Lower shore
Water clarity preferences	
Limiting Nutrients	Not relevant
Salinity preferences	Full (30-40 psu), Variable (18-40 psu)
Physiographic preferences	Open coast
Biological zone preferences	Eulittoral, Infralittoral
Substratum/habitat preferences	
Tidal strength preferences	
Wave exposure preferences	Exposed, Moderately exposed, Sheltered, Very exposed, Very sheltered
Other preferences	No text entered

Additional Information

Overhanging surfaces and small caves occur especially where rocks are stratified and angled so that downward facing surfaces are present. Caves may form where basalt dykes erode and collapse amongst other harder igneous rocks. Soft rock such as chalk and limestone may also erode as a result of wave action to form caves. Cave habitats do not differ greatly in the communities present from those of overhangs or, on wave exposed coasts, surge gullies. Particularly well-developed examples of caves occur around Papa Stour in Shetland and St Kilda with intertidal cave habitats in chalk substrata especially well developed in Kent.

Species composition

Species found especially in this biotope

Rare or scarce species associated with this biotope

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Additional information

No text entered

Sensitivity review

Explanation

Overhang and cave communities are colonised especially by encrusting animal species. The species identified as indicative of sensitivity are characteristic species and represent species that, if lost from the biotope, it would no longer be that biotope.

In undertaking this assessment of sensitivity, account is taken of knowledge of the biology of all characterizing species in the biotope. However, 'indicative species' are particularly important in undertaking the assessment because they have been subject to detailed research.

Species indicative of sensitivity

Community Importance	Species name	Common Name
Important structural	*Botryllus schlosseri*	Star ascidian
Important characterizing	*Morchellium argus*	A compound ascidian
Important structural	*Umbonula littoralis*	An encrusting bryozoan

Physical Pressures

	Intolerance	Recoverability	Sensitivity	Richness	Confidence
Substratum Loss	High	Moderate	Moderate	Major decline	Moderate

Removal of the substratum will remove the associated community. The majority of species characteristic of the community have planktonic larvae that are produced once a year so that settlement will be rapid. However, successional change will occur before the community reaches a dynamic stability similar to that before destruction.

Smothering	High	High	Moderate	Decline	Low

Smothering on overhangs and in caves is likely to occur as a result of overgrowth by dominating species (and not by siltation). Some overgrown species will survive (cf. Turner 1988) but a thick growth of *Dendrodoa grossularia* is likely to kill encrusting organisms below. Assuming that some living individuals remain and allowing for settlement of planktonic larvae, recovery is likely to be fairly rapid.

Increase in suspended sediment	Low	High	Low	Minor decline	Very low

The vertical and overhanging nature of surfaces means that siltation is unlikely to occur. Therefore, although component species may be highly intolerant of siltation, the biotope as a whole is not.

Decrease in suspended sediment

Dessication	Intermediate	High	Low	Minor decline	Low

Species present under overhangs and in intertidal caves are emersed and subject to some drying for significant lengths of time and so withstand some desiccation. Changes of time immersed equivalent to one zonal height may not be significant providing that the communities are shaded. Recovery would occur from surviving colonies and individuals and new settlement from larval sources.

Increase in emergence regime	Intermediate	High	Low	Minor decline	Low

The main threat to species is if emersion time increases, in which case, intolerance is similar to that for desiccation, i.e. changes of time immersed equivalent to one zonal height may not be significant providing that the communities are shaded. However, during emersion they will be unable to feed so that some decline is probable. Recovery would occur from surviving colonies and individuals and new settlement from larval sources.

Decrease in emergence regime

Increase in water flow rate	Intermediate	High	Low	No change	Low

Where an overhang or cave is subject to flowing water (for instance, where it is in a tunnel or gully open at both ends), the character of the community is likely to change as species characteristic of stronger or weaker water flows predominate. However, many of the key characteristic species occur in a broad range of water flow types and the biotope will remain the same. Recovery would occur from surviving colonies and individuals and new settlement from larval sources.

Decrease in water flow rate

Increase in temperature	Intermediate	High	Low	Minor decline	Low

In the case of higher temperatures, some species that are predominantly sublittoral are likely to suffer higher rates of desiccation and drying. In the case of lower temperatures, some species may be subject to exposure to cold conditions although this is uncertain. Crisp (1964) recorded some adverse effects on compound ascidians in North Wales following the severe winter of 1962-63.

Decrease in temperature

Increase in turbidity	Low	High	Low	No change	Moderate

The communities that occur under overhangs are similar in areas where high turbidity occurs (e.g. the entrance to estuaries) to those on the open coast, suggesting a tolerance to changing or different conditions of turbidity. Moore (1973b) found that *Umbonula littoralis*, one of the characterizing species, was ubiquitous in relation to a turbidity factor. Recovery would occur from surviving colonies and individuals and new settlement from larval sources.

Decrease in turbidity

Increase in wave exposure	Intermediate	High	Low	Not relevant	Low

The communities that occur under overhangs are different on wave exposed and wave sheltered coasts - generally having a wider range of species on wave exposed sites compared to wave sheltered sites. However, many of the key characteristic species occur in a broad range of wave exposure types and the biotope is likely to remain the same even with a change of two exposure categories. Change in species richness has to be identified as "not relevant" because it is likely to increase with greater wave exposure and decrease with decline in wave exposure. Return to a previous species composition would occur from surviving colonies and individuals and new settlement from larval sources.

Decrease in wave exposure

Noise	Tolerant	Not relevant	Not relevant	Not relevant	Not relevant

The characteristic species of the biotope are unlikely to detect noise.

Visual Presence	Tolerant	Not relevant	Not relevant	Not relevant	Not relevant

The characteristic species of the biotope do not have visual organs and will not therefore detect visual presence.

Abrasion & physical disturbance	High	High	Moderate	Major decline	High

Communities under overhangs and in caves which extend to a seabed that is of mobile substrata demonstrate a zonation from bare (abraded) rock adjacent to the bottom, through fast settling and growing species to abrasion tolerant species to the typical overhang community (that is nevertheless probably subject to abrasion and damage during storms). Whilst whole communities are destroyed by abrasion from coarse sediments including especially pebbles and cobbles, recovery would occur from surviving colonies and individuals and new settlement from larval sources. Abrasion by human activities might include anchoring and dredging (fisheries).

Displacement	High	High	Moderate	Major decline	Moderate

The most important species in characterizing this community are sessile and will be unable to reattach and killed if displaced. Recovery would occur from surviving colonies and individuals and new settlement from larval sources.

Chemical Pressures

	Intolerance	Recoverability	Sensitivity	Richness	Confidence
Synthetic compound contamination	Intermediate	Low	High	Minor decline	Low

Most sessile invertebrates have not been shown to have a high susceptibility to synthetic chemicals such as anti-fouling compounds. However, some mobile species that are a part of the community, such as *Ocenebra erinacea* and *Nucella lapillus* (Gibbs *et al.* 1990 & 1991) have been shown to be intolerant of some synthetic chemicals. More difficult-to-detect effects may occur to larval stages of a wide range of the species that occur under overhangs. The species of mollusc that have been shown to be adversely affected lay eggs on the shore and have a short or no planktonic phase so that recovery of those minority of species will be slow.

Heavy metal contamination	Not relevant		Not relevant	Not relevant

Insufficient information.

Hydrocarbon contamination	Low	Moderate	Low	Minor decline	Low

Ryland & de Putron (1998) found no detectable damage to under-boulder communities, which are similar to some overhang communities, in Watwick Bay, Pembrokeshire following the Sea Empress oil spill. Part of the resistance to effects might be because oil does not settle onto overhanging surfaces. However, some species, especially gastropods are likely to be narcotised and killed and some damage is likely. Return to a previous species composition would occur from new settlement from larval sources although some gastropods have no or only a short dispersal phase so that recovery will be slow.

Radionuclide contamination	Not relevant		Not relevant	Not relevant

Insufficient information.

Changes in nutrient levels	Tolerant	Not relevant	Not relevant	No change	Low

Similar overhang communities occur where nutrient levels are high (for instance at the entrance to estuaries) or normal (near to the open coast).

Increase in salinity	Intermediate	High	Low	Decline	Low

Overhang communities occurring near to the entrance to estuaries are probably subject to occasional lowered salinity and so appear tolerant of some reduction in salinity at least for short periods. However, some species characteristic of overhangs on the open coast do not extend into estuaries whilst the sea squirt *Dendrodoa grossularia* often becomes dominant into conditions of variable or low salinity. Thus change is likely to occur if salinity is lowered for a significant length of time (the benchmark is one salinity grade for one year). Recovery would occur from surviving colonies and individuals and new settlement from larval sources.

Decrease in salinity

Changes in oxygenation	High	High	Moderate	Decline	Low

Decaying marine life may be observed in the areas of overhangs and caves most sheltered from water movement. The species characteristic of the community therefore do seem to be adversely affected by de-oxygenation. Recovery would occur from surviving colonies and individuals and new settlement from larval sources.

Biological Pressures

	Intolerance	Recoverability	Sensitivity	Richness	Confidence
Introduction of microbial pathogens/parasites		Not relevant		Not relevant	Not relevant

Insufficient information.

Introduction of non-native species		Not relevant		Insufficient information	Not relevant

Any effects are dependant on the biology of the non-native species. Whilst those non-native species currently present in Britain and Ireland have not been observed to significantly affect overhang or cave biotopes, effects of future imports are unpredictable.

Extraction of this species	Not relevant	Not relevant	Not relevant	Not relevant	Not relevant

Crabs (*Cancer pagurus*) and lobster (*Homarus gammarus*) are taken from deep recesses at the backs of overhangs often using a metal hook. However, none of the species indicative of sensitivity are likely to be extracted and the removal of these crustaceans will not affect the recognisable biotope. Not relevant has been suggested.

Extraction of other species	Intermediate	High	Low	Minor decline	Very low

Additional information

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