

A1.11: *Mytilus edulis* and/or barnacle communities on wave-exposed Atlantic littoral rock

Summary

This habitat type is found in the mid- to upper eulittoral on shores that are moderately or very exposed to wave action. It is characterised by bedrock and boulders dominated by the mussel *Mytilus edulis*, barnacles *Chthamalus* spp. and/or *Semibalanus balanoides* and limpets *Patella* spp. There is much regional variation in the species and zonation of the barnacles. The habitat with its associated communities is naturally resilient but also subject to considerable natural variability (for example following storm damage) making trends difficult to distinguish. Although relatively robust it is vulnerable to pollution incidents such as oil spills on a local level and, on a regional sea level to climate change. It has been suggested that climate change may not lead to a simple poleward shift in the distribution of intertidal organisms on rocky shores but could cause localised extinctions in a series of hot-spots due to the inability of species to spread to suitable habitats.

There are limited opportunities and need for specific conservation and management measures to be directed at this habitat. More general beneficial measures include pollution control and regulation, development control and contingency plans to be followed in the event of a major pollution incident, representation in marine protected areas and measures to reduce global warming and sea level rise.

Synthesis

This habitat has a large natural range in the North East Atlantic region extending from the Canaries and Azores in the west to the Skagerrak coast of Sweden in the east. The precise extent is unknown but existing survey data indicate that the thresholds for a threatened category on the basis of restricted geographic distribution are exceeded. Expert opinion is that the quantity and quality of this habitat has most likely been stable over the last 50 years. Known threats are unlikely to affect all localities at once. This habitat has therefore been assessed as Least Concern 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 |
| Least Concern | - | Least Concern | - |

Sub-habitat types that may require further examination

None.

Habitat Type

Code and name

A1.11: *Mytilus edulis* and/or barnacle communities on wave-exposed Atlantic littoral rock



Mussel and barnacle habitat on the exposed north eastern coast of Fuerteventura, Canary Islands (© M. Viera, EcoAqua).

Habitat description

This habitat type is found in the mid- to upper eulittoral on shores that are moderately or very exposed to wave action. It is characterised by bedrock and boulders dominated by the mussel *Mytilus edulis*, barnacles *Chthamalus* spp. and/or *Semibalanus balanoides* and limpets *Patella* spp. There is much regional variation in the species and zonation of the barnacles. Amongst the mussels small red algae including *Ceramium shuttleworthianum*, *Corallina officinalis*, *Mastocarpus stellatus* and *Aglaothamnion* spp. can be found. Two red algae in particular, *Porphyra umbilicalis* and *Palmaria palmata*, are commonly found on the *Mytilus* itself and can form luxuriant growths. The abundance of the red algae generally increases down the shore and in the lower eulittoral they may form a distinct zone in which mussels or barnacles are scarce. The lichen *Lichina pygmaea* may be prominent, especially in the south, where it can form distinct patches or even a separate zone among the *Chthamalus* spp.

With decreasing wave exposure *F. vesiculosus* is able to survive, gradually replacing the barnacles and *P. vulgata* biotope. On such moderately exposed shores this habitat may occur on steep and vertical faces, while fucoids dominate the flatter areas. In areas of soft rock (e.g. shales), the barnacles may be scarce or absent and the rock dominated by *P. vulgata*.

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 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. Indicators which have been developed for the assessment of ecological quality of coastal water bodies for the Water Framework Directive (WFD) that are relevant to this habitat include a consideration of macroalgae species richness, proportions of different taxa of algae present, and the abundance and coverage of the rocky surfaces by typical species.

Characteristic species:

Some shores are characterised by dense bands of the barnacle *Semibalanus balanoides* and the limpet *Patella vulgata*. The barnacles may be covered by *Porphyra umbilicalis* on the upper shore of exposed sites. Cracks and crevices in the rock provide a refuge for small individuals of the mussel *M. edulis*, winkles

Littorina saxatilis and the whelk *Nucella lapillus*. Red seaweeds also frequently occupy damp crevices, particularly *Ceramium shuttleworthianum*, *Corallina officinalis*, *Osmundea pinnatifida* and encrusting coralline algae, but the non-vesiculate form of the wrack *Fucus vesiculosus* might be present. Large numbers of the winkle *Littorina littorea* often dominate fields of large boulders or shores with a more mixed substratum.

Classification

EUNIS (v1405)

Level 4. A sub-habitat of 'Atlantic littoral rock' (A1.1)

Annex 1:

1170 Reefs

MAES:

Marine - Marine inlets and transitional waters

Marine - Coastal

MSFD:

Littoral rock and biogenic reef

EUSeaMap:

Not mapped

IUCN:

12.1 Rocky shoreline

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

Yes

Regions

Atlantic

Justification

This habitat is very typical of exposed rocky shores in the North East Atlantic region.

Geographic occurrence and trends

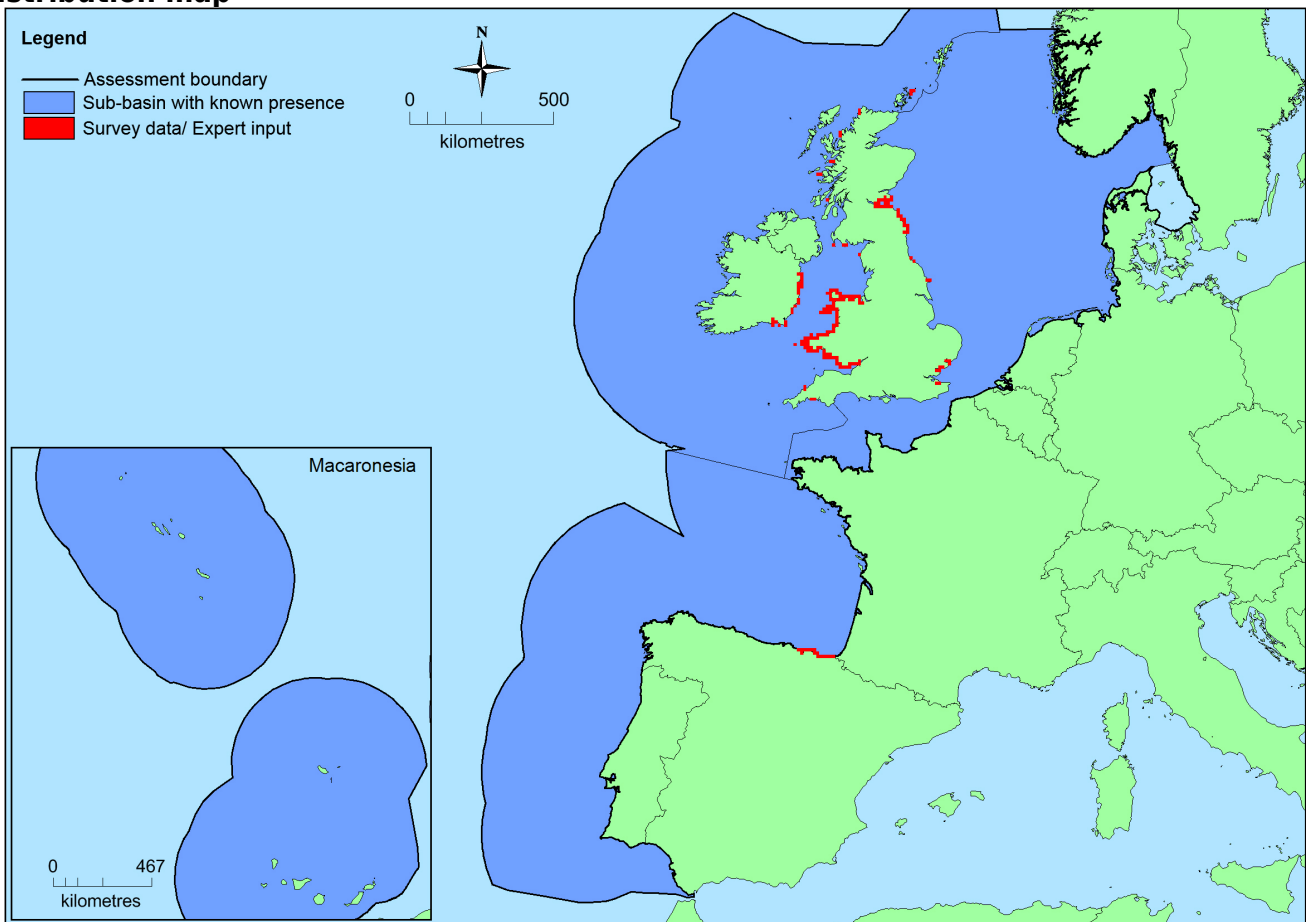
| Region | Present or Presence Uncertain | Current area of habitat | Recent trend in quantity (last 50 yrs) | Recent trend in quality (last 50 yrs) |
|--------|-------------------------------|-------------------------|--|---------------------------------------|
| | | | | |

| 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 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> | 644,989 Km ² | 603 | 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> | 644,989 Km ² | 603 | 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 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

The extent of wave-exposed littoral rock is unlikely to have changed significantly (>25%) in extent over the last 50 years however change is a key feature of the associated communities. Even when considered stable, the abundance of the barnacle/mussel component can fluctuate significantly within seasons and inter-annually, as well as spatially. Severe winters and extreme events such as El Nino result in the most rapid changes. There have been localised losses/damage to this habitat e.g. following oil spills, as well as recovery. This pattern is likely to continue.

- 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 extending from the Canaries and Azores in the west to the Skagerrak coast of Sweden in the east.

- 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 extending from the Canaries and Azores in the west to the Skagerrak coast of Sweden in the east.

Trends in quality

Change is a key feature of this habitat and even when considered stable, the abundance of the barnacle/mussel component can fluctuate significantly within seasons and interannually, as well as spatially. Hindcasting indicates shifts in ecologically dominant species e.g. the southern limit of the barnacle *S. balanoides* has shifted around 300 km northwards since the 1870s.

There have been localised reductions in quality of this habitat e.g. following oil spills, as well as recovery. This pattern is likely to continue.

- Average current trend in quality

EU 28: Stable

EU 28+: Stable

Pressures and threats

This is a relatively robust habitat as it develops on wave exposed rocky shores although it is vulnerable to a number of pressures. The two which are mostly likely to have an impact are pollution incidents, such as oil spills, and climate change. In the latter case it has been suggested that climate change may not lead to a simple poleward shift in the distribution of intertidal organisms on rocky shores but could cause localised extinctions in a series of hot-spots due to the inability of species to spread to suitable habitats.

Coastal development including coast protection works which can alter the degree of exposure, shore collection, trampling and chronic effects of chemical contamination, e.g. from Tributyl tin, are also potential pressures but likely to be less of an issue than for more sheltered rocky shores.

List of pressures and threats

Pollution

- Marine water pollution
- Oil spills in the sea

Climate change

- Changes in abiotic conditions
 - Temperature changes (e.g. rise of temperature & extremes)
 - Wave exposure changes
 - Sea-level changes
- Changes in biotic conditions
 - Habitat shifting and alteration
 - Migration of species (natural newcomers)

Conservation and management

There are limited opportunities and need for specific conservation and management measures directed at this habitat.

More general beneficial measures include pollution control and regulation, development control and contingency plans to be followed in the event of a major pollution incident, survey and monitoring programmes, raised public awareness of their ecological value and vulnerability, representation in marine protected areas and measures to reduce global warming and sea level rise.

List of conservation and management needs

Measures related to marine habitats

- Other marine-related measures

Measures related to spatial planning

- Other spatial measures

Conservation status

Annex 1:

1170 MATL U2, MMAC FV

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

This is a very dynamic habitat. Generally, the effects of chronic impacts on this habitat are reversible provided the disturbance is stopped. Recovery from acute impacts is also possible but may take much longer depending on the scale of the impact. Some of the characteristic species (mussels and barnacles) are adept at colonising empty space. Recovery on bare rock can take place rapidly with succession on rocky shores occurring over relatively short time scales in the order of less than 5-10 years depending on the availability of larvae and successful spatfalls. Longer time scales may be needed for recovery for species with low dispersal rates and in certain situations, e.g. oil spills, especially if the rock surface remains contaminated. If limpet population structure and barnacle densities are used as criteria then 15 years may be a more realistic time scale for recovery following oil spills even on exposed rocky shores. Timescales for recovery following the severe winter of 1962-3, where some species and associated communities on rocky shores took almost 40 years to reoccupy their previous range limits indicates that recovery may take even longer.

Effort required

| |
|-----------|
| 10 years |
| Naturally |

Red List Assessment

Criterion A: Reduction in quantity

| Criterion A | A1 | A2a | A2b | A3 |
|-------------|-------|-----------|-----------|-----------|
| EU 28 | <25 % | unknown % | unknown % | unknown % |
| EU 28+ | <25 % | unknown % | unknown % | unknown % |

The general distribution of this habitat is well known and its extent has been mapped in detail in some locations (e.g. some Marine Protected Areas). There are studies showing short and long term trends in some locations, for example following oil spills, but no overview of trends in quantity for the North East Atlantic. Expert opinion is that this habitat has declined by less than 25% and most likely been stable over the last 50 years. It has therefore been assessed as 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 extending from the Canaries and Azores in the west to the Skagerrak coast of Sweden in the east. EOO >50,000 km² and AOO >50. It is considered to have been stable over the last 50 years. The nature and size of threats to this habitat and the distribution data which are available suggest that known threats are unlikely to affect all localities at once. This habitat has therefore been assessed as Least Concern 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 % | slight % | unknown % | unknown % | unknown % | unknown % |
| EU 28+ | unknown % | slight % | 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 % |

| 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% |

Experts consider the quality of this habitat to have largely been stable over the last 50 years although cyclical and localised changes do occur. This habitat has been assessed as Least Concern under 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 | LC | DD | DD | DD | DD | DD | DD | DD | DD | DD |
| EU28+ | LC | DD | DD | DD | LC | LC | LC | LC | 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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Contributors

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Reviewers

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Date of assessment

18/08/2015

Date of review

08/01/2016

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