

A5.13 Faunal communities in marine Atlantic infralittoral coarse sediment

Summary

This habitat has a widespread distribution. Locations where it is reported to be present in the North Sea include the Hinder Bank off the Thames estuary, the Dogger Bank, the Texel Rough, Cleaver Bank and Borkum Reef. This is a moderately exposed habitat comprising coarse sand, gravelly sand, shingle and gravel in the infralittoral, where it is subject to disturbance by tidal streams and wave action. Such habitats are found on the open coast or in tide-swept marine inlets. The faunal communities can be very abundant.

The habitat is vulnerable to trawling, dredging and aggregate extraction which will cause a loss in substratum and affect the hydrological regime. Additionally, this habitat is sensitive to synthetic compound contamination and changes in abiotic conditions due to climate change. Beneficial management measures for this habitat include the establishment of Marine Protected Areas, regulation of fishing methods, and the control of other activities such as dredging and aggregate extraction. Additionally, water quality improvement programmes to reduce the risk of toxic contamination and reconnecting sediment supplies should also be considered.

Synthesis

This habitat has a large natural range in the North East Atlantic. A combination of survey data and modelling indicates that it does not have a restricted geographical distribution nor occur in only a few locations in the North East Atlantic and therefore qualifies as Least Concern under criterion B.

Most sedimentary benthic systems on the continental shelf of Europe have been modified by fishing activities, particularly bottom trawls and dredging, in the last 100 years and this habitat remains under fishing pressure and subject to aggregate extraction. Data for 2013/2014 has revealed that more than 70% of this habitat in the North Sea and Celtic Sea was subject to fishing pressure by bottom otter, beam and mid-water trawls. Coarse sediment communities have greater resilience and faster recovery rates than those in fine sediments but given that this is based on a single year of data and that this type of pressure has been taking place for decades it is likely to be an underestimate of the total area of this habitat which has been subject to such pressure.

Expert opinion is that there has been a substantial reduction in quality of this habitat, most likely an intermediate decline affecting more than 50% of its extent although it is clear that in some locations there has also been a severe decline. The severity will depend on factors such as the intensity and frequency of disturbance. This habitat has therefore been assessed as Vulnerable for both the EU 28 and EU 28+ because of both past and likely continuing declines in quality.

Overall Category & Criteria			
EU 28		EU 28+	
Red List Category	Red List Criteria	Red List Category	Red List Criteria
Vulnerable	C/D1	Vulnerable	C/D1

Sub-habitat types that may require further examination

None.

Habitat Type

Code and name

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No characteristic photographs of this habitat are currently available.

Habitat description

This is a moderately exposed habitat with coarse sand, gravelly sand, shingle and gravel in the infralittoral, subject to disturbance by tidal streams and wave action. Such habitats found on the open coast or in tide-swept marine inlets. The faunal communities can be very abundant. In the case of the Dutch Borkum Reef Ground, for example, *Lanice conchilega* beds with estimated densities of >1500 individuals/m² have been recorded.

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:

A robust fauna of infaunal polychaetes such as *Chaetozone setosa* and *Lanice conchilega*, cumacean crustacea such as *Iphinoe trispinosa* and *Diastylis bradyi*, and venerid bivalves. Habitats with the lancelet *Branchiostoma lanceolatum* may also occur. This habitat includes the following biotopes characterised by particular species. Sparse fauna on highly mobile sublittoral shingle (cobbles and pebbles); characterised by *Halcompa chrysanthellum* and *Edwardsia timida* on sublittoral clean stone gravel; *Moerella* spp with venerid bivalves in infralittoral gravelly sand; *Hesionura elongata* and *Microphthalmus similis* with other interstitial polychaetes in infralittoral mobile coarse sand; *Glycera lapidum* in impoverished infralittoral mobile gravel and sand; *Cumaceans* and *Chaetozone setosa* in infralittoral gravelly sand.

Classification

EUNIS (v1405):

Level 4. A sub-habitat of 'Atlantic shallow/ infralittoral coarse sediment' (A5.1).

Annex 1:

1110 Sandbanks slightly covered with seawater all the time

1160 Large shallow inlets and bays

MAES:

Marine - Marine inlets and transitional waters

Marine - Coastal

MSFD:

Shallow sublittoral coarse sediment

EUSeaMap:

Shallow coarse or mixed sediments

IUCN:

9.4 Subtidal sandy

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

Unknown

Justification

There is insufficient information on the characteristics of this habitat (including its associated biotopes) or on its distribution and extent to determine whether it is typical of the North East Atlantic region.

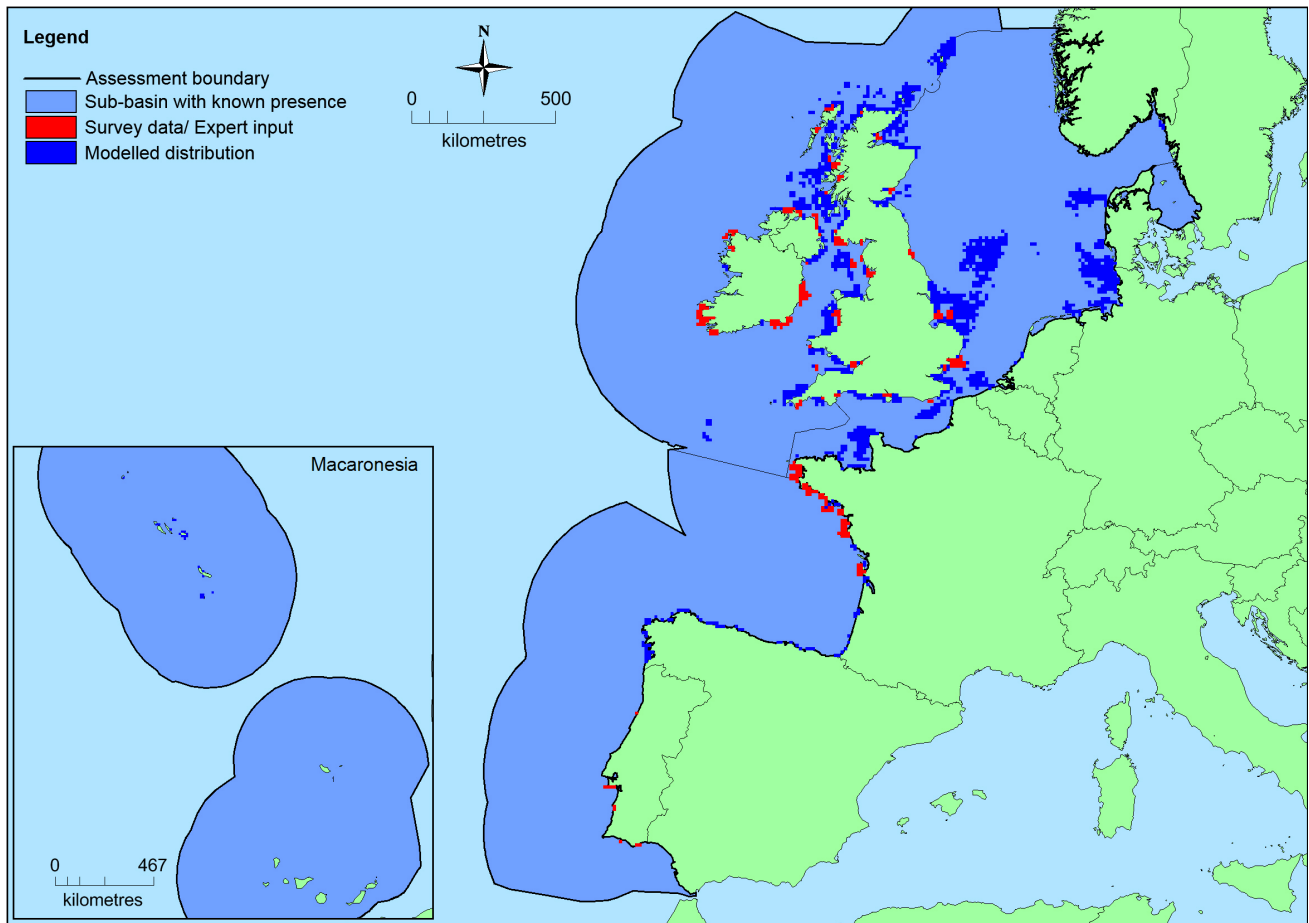
Geographic occurrence and trends

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

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>	4,560,913 Km ²	1,803	>27,113 Km ²	The area estimate for this habitat has been derived from a synthesis of EUNIS seabed habitat geospatial information for the European Seas but is recognised as being an underestimate. No precise figure
<i>EU 28+</i>	>4,560,913 Km ²	>1,803	>27,113 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

It is difficult to establish the quantity of this habitat as it often has a patchy distribution, grading into other soft sediment habitats, or interspersed amongst rocky areas. In the case of the Danish Borkum Reef the dense polychaete beds of *L. conchilega* are estimated to cover around 74km². Even where the extent of this habitat or its associated biotopes has been mapped in detail (e.g. as part of resource assessments for sand and gravel extraction or within marine protected areas) there is a lack of information on trends in extent. Changes in the occurrence of the underlying substrate have been reported in some locations e.g. from coarse sediments and stones in the 1950s to fine sand in 1992 on parts of the Dogger Bank and in some cases these changes may occur naturally. In *Lanice* beds, for example, the fine sediment fraction increases over time and the presence of *L. conchilega* alters the community structure of the benthic fauna, even when present at low densities.

- 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 widespread distribution. In the North Sea locations where it has been reported include the Hinder Bank off the Thames estuary, the Dogger Bank, the Texel Rough, Cleaver Bank and Borkum Reef.

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

No

Justification

This habitat has a widespread distribution. In the North Sea locations where it has been reported include the Hinder Bank off the Thames estuary, the Dogger Bank, the Texel Rough, Cleaver Bank and Borkum Reef.

Trends in quality

The substantial extent of the likely impact of bottom fishing gears on this habitat throughout the North East Atlantic region is apparent from many studies including analyses which have combined VMS data with sensitivity maps of benthic habitats and disturbance caused by surface abrasion for the continental shelf area of the North East Atlantic. Most recently, an analysis of the fishing intensity of EU trawlers (bottom otter, beam and mid-water trawls) using Automatic Identification System (AIS) ship tracking data over one year (2013/2014) shows high coverage in all European coastal waters and over the continental shelf. When combined with the modelled distribution of EUNIS marine habitat types it is possible to examine the extent of likely impact on a particular benthic habitat. For example, over this time period around 70% of the area of infralittoral coarse sediment habitat was subject to such fishing pressure in the North Sea and Celtic Sea.

Scientific evidence, supplemented with expert judgement to develop fisheries measures in protected areas for the Dutch sector of the North Sea, indicated that the most significant threat to the conservation status of the Dogger Bank comes from bottom gear, notably from beam trawling with tickler chains. The main effect is on abiotic conditions, hence on structure and function, which results in reduction of the abundance of typical species. This initial effect is greater in sandy than muddy bottom however this is compensated somewhat by shorter recovery times where the seabed is predominantly sandy.

Impacts associated with aggregate extraction are the direct removal of the substratum and the benthic communities. The significance of this impact depends largely on the extent and depth of dredging activity. Research has shown reductions in species diversity and biomass in dredged areas but also recovery, which is quicker for communities typical of mobile sublittoral habitats than that of more stable environments.

- Average current trend in quality

EU 28: Decreasing

EU 28+: Decreasing

Pressures and threats

Mobile demersal fishing gears have a direct impact on the substratum and its associated fauna by disturbing the upper layers of the substrate and damaging both the associated epifauna and shallow infaunal communities. Associated increases in suspended sediments can have a smothering effect on filter feeders. The degree of any damage will depend on the gear, frequency of use and species present. Aggregate extraction has a more localised effect through a loss in substratum and the associated infauna. This activity can also affect the hydrological regime, also affecting species richness.

Synthetic compound contamination due to waste spoil dumping will also have an affect on the benthic communities.

Changes in abiotic conditions due to climate change will cause changes in water flow and wave exposure.

Increase in water flow rate could remove species attached to the substratum, while a decrease in water flow is likely to reduce food supply for passive suspension feeders and allow deposition of fine sediment.

List of pressures and threats

Biological resource use other than agriculture & forestry

- Fishing and harvesting aquatic resources
 - Professional active fishing
 - Benthic dredging

Pollution

- Marine water pollution
 - Toxic chemical discharge from material dumped at sea
 - Synthetic compound contamination

Natural System modifications

- Human induced changes in hydraulic conditions
 - Removal of sediments (mud...)
 - Extraction of sea-floor and subsoil minerals (e.g. sand, gravel, rock, oil, gas)
 - Change of sea-floor substrate

Climate change

- Changes in abiotic conditions
 - Water flow changes (limnic, tidal and oceanic)
 - Wave exposure changes

Conservation and management

Beneficial management measures for this habitat could include the regulation of fishing methods which damage or disturb seabed communities and other activities such as dredging and aggregate extraction which cause loss of the substratum and affect the hydrographic regimes. Additionally, water quality improvement programmes to reduce the risk of toxic contamination and reconnecting sediment supplies should also be considered. Any of these measures may be incorporated into management schemes for Marine Protected Areas.

List of conservation and management needs

Measures related to wetland, freshwater and coastal habitats

- Restoring/Improving water quality
- Restoring/Improving the hydrological regime

Measures related to spatial planning

- Establish protected areas/sites

Measures related to hunting, taking and fishing and species management

- Regulation/Management of fishery in marine and brackish systems

Conservation status

Annex 1:

1110: MATL U2, MMAC U1

1160: MATL U2, MMAC FV

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

Naturally subject to disturbance therefore likely to recover character and functionality relatively quickly if the substrate and hydrographic conditions are the same.

Studies of recovery following aggregate extraction indicate that in areas of weak tidal stress physical recovery may take up to 20 years and biological recovery up to 12 years. These time scale are much reduced in areas of moderate or strong tidal stress and in the latter case may occur in less than 5 years.

Effort required

10 years
Naturally

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 %

There is insufficient information to determine any overall trends in quantity of this habitat in the North East Atlantic. 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	>50,000 Km ²	Yes	Yes	No	>50	Yes	Yes	No	No
EU 28+	>50,000 Km ²	Yes	Yes	No	>50	Yes	Yes	No	No

There has been a decline in quality of this habitat due to disturbance of benthic communities resulting from mobile demersal fishing gears in particular and localised effects on various timescales associated with aggregate dredging. This trend is considered likely to continue, however the distribution of the habitat is such that the identified threats are unlikely to affect all localities at once. Furthermore this habitat has a large natural range in the North East Atlantic region and as EOO >50,000 km² and AOO >50, this exceeds the thresholds for a threatened category on the basis of restricted geographic distribution.

This habitat has therefore been assessed as Least Concern under criteria 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	>50 %	Intermediate %	unknown %	unknown %	unknown %	unknown %
EU 28+	>50 %	Intermediate %	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 %

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 %

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%

Most sedimentary benthic systems on the continental shelf of Europe have been modified by fishing activity in the last 100 years and this remains a significant pressure. Mobile demersal fishing gears such as otter trawls and beam trawls, disturb the upper layers of the sediment and damage both the associated epifauna and shallow infaunal communities. Associated increases in suspended sediments may also have a smothering effect on filter feeders. The degree of any damage will depend on the gear, frequency of use and species present. A recent analysis of the fishing intensity of EU trawlers (bottom otter, beam and mid-water trawls) using Automatic Identification System (AIS) ship tracking data over one year (2013/2014) shows high coverage in all European coastal waters and over the continental shelf. When combined with the modelled distribution of EUNIS marine habitat types it is possible to examine the extent of likely impact on a particular benthic habitat. For example, over this time period around 70% of the estimated area of infralittoral coarse sediment was subject to such fishing pressure in the North Sea and Celtic Sea. Coarse sediment communities have greater resilience and faster recovery rates than those in fine sediments but given that this is based on a single year of data and that this type of pressure has been taking place for decades it is likely to be an underestimate of the total area of this habitat which has been affected. Aggregate extraction also has a localised effect on this habitat with the longevity of the effect depending on the local conditions and timescale.

Expert opinion is that there is likely to have been a substantial reduction in quality of this habitat - an intermediate decline in quality affecting more than 50% of this habitat in the North East Atlantic region although it is also possible that more than 30% has been subject to a severe decline. This will depend on factors such as the intensity and frequency of disturbance. This habitat has therefore been assessed as Vulnerable under criteria C/D for both the EU 28 and EU 28+.

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

Overall Category & Criteria	
EU 28	EU 28+

Overall Category & Criteria			
Red List Category	Red List Criteria	Red List Category	Red List Criteria
Vulnerable	C/D1	Vulnerable	C/D1

Confidence in the assessment

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

Assessors

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Reviewers

T. Haynes.

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Date of review

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