

A5.27 Atlantic lower circalittoral sand

Summary

This habitat occurs in offshore (deep) circalittoral habitats with fine sands or non-cohesive muddy sands. It is more stable than areas of similar seabed sediments in shallow waters and is characterised by a diverse range of polychaetes, crustaceans, bivalves and echinoderms. These include dense populations of maldanid polychaetes, abundant ophiuroids and, in areas of slightly muddy sand high numbers of the tube building polychaete *Owenia fusiformis* often with the brittlestar *Amphiura filiformis*.

This habitat is vulnerable to mobile demersal fishing and other activities which can directly damage or remove epifauna and infauna or change the sediment structure and associated communities by altering hydrological conditions or sedimentary processes. These include dredging, dumping and offshore construction works. In addition, synthetic and non-synthetic compound contamination from dumped dredge spoil and local discharges could cause a decline in the species richness within this habitat. Beneficial management measures include control and restrictions on demersal fishing, dredging and offshore construction works. The regulation of effluent discharges can also support the conservation of this habitat.

Synthesis

This habitat has a widespread distribution. There are no precise figures on its extent of however a combination of survey data and modelling indicates that it does not have a restricted geographical distribution or occur in only a few locations in the North East Atlantic.

Most sedimentary benthic systems on the continental shelf of Europe have been modified by fishing activities in the last 100 years, particularly by mobile demersal gears, and this habitat remains under fishing pressure. Disturbance of the substratum due to intensive fishing activities using bottom trawls or dredges can damage or modify infaunal communities, with burrowing echinoderms and bivalves being particularly vulnerable. Loss of substrate is also likely to be detrimental particularly where the majority of the characterising species are interstitial polychaetes. Recent data for a single year (2013/2014) has revealed that over 80% of the estimated area of lower circalittoral sand habitat in the North Sea and Celtic Sea was subject to fishing pressure by bottom otter, beam and mid-water trawls. Much the same footprint of activity is likely each year and as this type of fishing pressure has been ongoing for many decades, there has most likely been a cumulative impact on habitat quality.

Expert opinion is that there has been a very substantial reduction in quality of this habitat, most likely an intermediate decline affecting more than 80% 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 Endangered 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
Endangered	C/D1	Endangered	C/D1

Sub-habitat types that may require further examination

None.

Habitat Type

Code and name

A5.27 Atlantic lower circalittoral sand

No characteristic photographs of this habitat currently available.

Habitat description

This habitat occurs in offshore circalittoral habitats with fine sands or non-cohesive muddy sands. They include areas in the Celtic Sea and areas of the Irish Sea, north of the Isle of Man, in Liverpool Bay and Cardigan Bay and also in St. George's Channel. The sediments are likely to be more stable than similar shallower counterparts and the associated communities are characterised by a diverse range of polychaetes, crustaceans, bivalves and echinoderms. In deep offshore sand or non-cohesive muddy sand dense populations of maldanid polychaetes such as *Maldane sarsi* as well as the cumacean *Eudorellopsis deformis* may be found. Accompanying these species are abundant ophiuroids, the amphipod *Harpinia antennaria* and the bivalves *Nuculoma tenuis* and *Parvicardium minimum*. Areas of slightly muddy sand may be characterised by high numbers of the tube building polychaete *Owenia fusiformis* often with the brittlestar *Amphiura filiformis*.

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.

Examples of indicators of "naturalness" that are potential indicators of quality for offshore sand habitats such as this are; typical populations of bivalves and epifaunal brittlestars; maintained presence of substratum; lack of smothering; typically diverse communities with no increase in hardy or opportunistic species; and maintenance of sediment characteristics with typical levels of diversity.

Characteristic species:

Maldane sarsi, *Eudorellopsis deformis*, *Amphiura filiformis*, polychaetes such as *Terebellidae* sp., *Chaetozone setosa*, *Levinsenia gracilis*, *Scoloplos armiger*, the amphipod *Harpinia antennaria* and the bivalves *Nuculoma tenuis* and *Parvicardium minimum*, the tube building polychaete *Owenia fusiformis* often with the brittlestar *Amphiura filiformis*, the polychaetes *Goniada maculata*, *Pholoe inornata*, *Diplocirrus glaucus*, *Chaetozone setosa* and *Spiophanes kroyeri* with occasional bivalves such as *Timoclea ovata* and *Thyasira equalis*, the sea cucumber *Labidoplax buski* and the cumacean *Eudorella truncatula*. In the Kattegat infaunal bivalves achieve the highest biomass, with infaunal polychaetes, crustaceans and insect larvae less dominant. Characteristic species are *Macoma balthica* *Arctica islandica*, *Cerastoderma* spp., *Mya arenaria*, *Astarte borealis*, *Macoma calcarea*, *Mya truncata*, *Astarte* spp., *Spisula* spp, *Chamelea gallina*.

Classification

EUNIS (v1405).:

Level 4. A sub-habitat of 'Atlantic circalittoral sand' (A5.2).

Annex 1:

No relationship

MAES:

Marine - Marine inlets and transitional waters

Marine - Coastal

MSFD:

Shallow sublittoral sand

EUSeaMap:

Shallow sands

IUCN:

9.4 Subtidal sandy

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

Yes

Regions

Atlantic

Justification

This habitat is common and widespread in the North East Atlantic region.

Geographic occurrence and trends

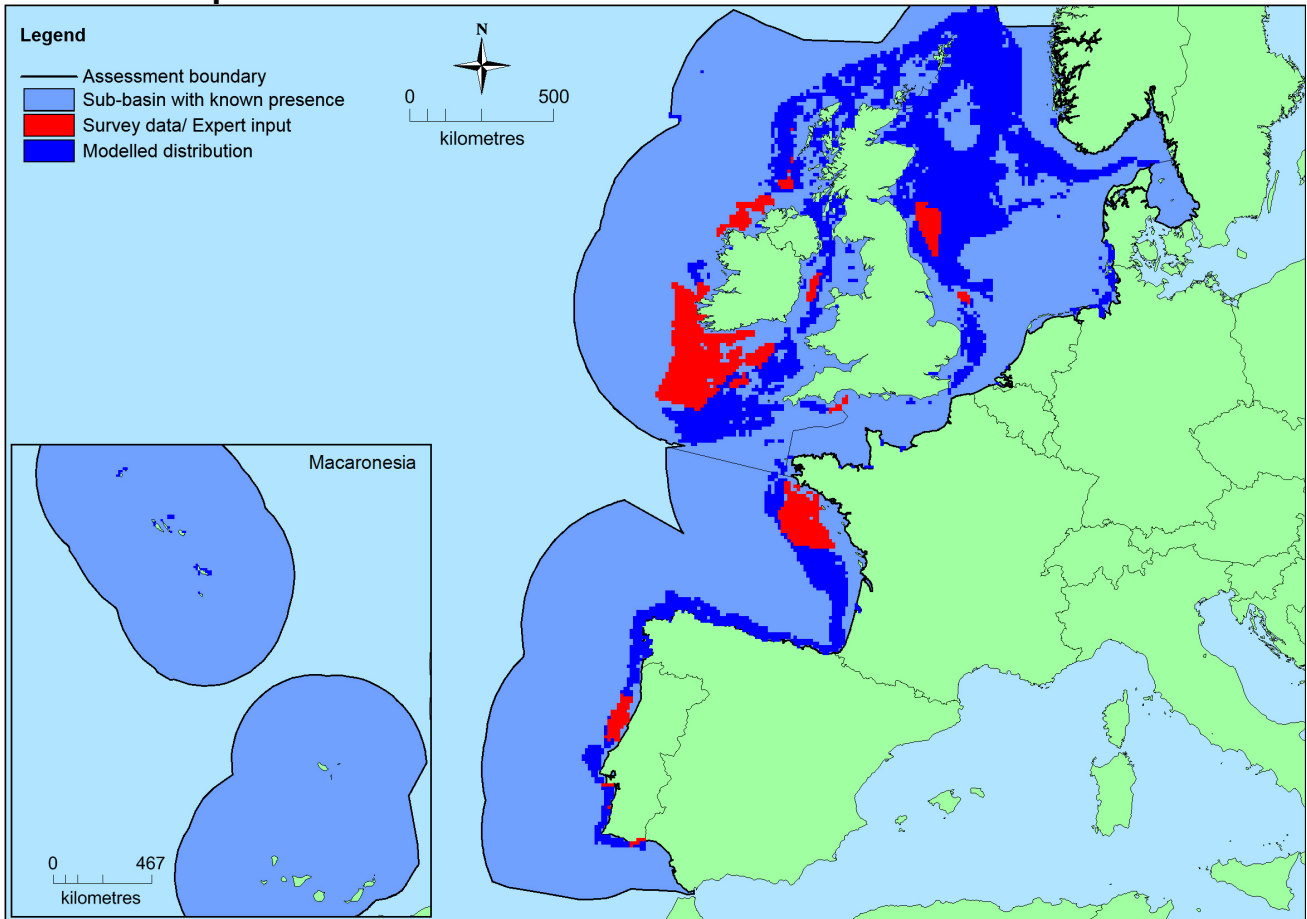
Region	Present or Presence Uncertain	Current area of habitat	Recent trend in quantity (last 50 yrs)	Recent trend in quality (last 50 yrs)
<i>North-East Atlantic</i>	Bay of Biscay and the Iberian Coast: Present Celtic Seas: Present Kattegat: Present Greater North Sea: Present Macaronesia: Present	255,226 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>	5,012,574 Km ²	6,236	>255,226 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.

	Extent of Occurrence (EOO)	Area of Occupancy (AOO)	Current estimated Total Area	Comment
EU 28+	>5,012,574 Km ²	>6,236	>255,226 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 EU 28 is therefore less than 100% but there is insufficient information to establish the proportion

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. 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.

- 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 does not have a small natural range.

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

No

Justification

This habitat does not have a small natural range.

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 Vessel Monitoring Systems (VMS) data with sensitivity maps of benthic habitats and disturbance caused by surface abrasion for the continental shelf area of the North East Atlantic. Scientific evidence, supplemented with expert judgement to develop fisheries measures in protected areas for the Dutch sector of the North Sea, for example 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.

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 (September 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 more than 30% of lower circalittoral sand habitat was subject to trawling fishing pressure in the North Sea. When combining data for the North Sea and Celtic Sea just over 80% of this habitat type is considered to have been subject to such fishing pressure. 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 affected by mobile demersal fishing gears.

- Average current trend in quality

EU 28: Decreasing

EU 28+: Decreasing

Pressures and threats

Disturbance of the substratum due to intensive fishing activities using bottom trawls or dredges can damage or modify infaunal communities, with burrowing echinoderms and bivalves being particularly vulnerable. Loss of substrate is also likely to be detrimental particularly where the majority of the characterising species are interstitial polychaetes. Smothering is not likely to cause considerable mortality as most of the associated species are able to reposition themselves at their preferred depth relatively quickly or are infaunal species.

Polluted sediments may cause a change in the species composition through changes in the sedimentary environment. Inshore dredging or construction works can cause changes to sediments through altered hydrodynamics or sedimentary processes, resulting in an altered community structure. In addition, synthetic and non-synthetic compound contamination from dumped dredge spoil and local discharges is also a possible threat that could cause a decline in the species richness within this habitat.

Brittlestars associated with this habitat, *O. fusiformis* and *A. filiformis* are likely to benefit from the increased plankton production that occurs in areas of increased nutrient concentration, however, if enrichment leads to anoxia then reductions in growth rate and mass mortality may occur.

List of pressures and threats

Biological resource use other than agriculture & forestry

Fishing and harvesting aquatic resources

Professional active fishing

Benthic or demersal trawling

Benthic dredging

Pollution

Pollution to surface waters (limnic, terrestrial, marine & brackish)

Nutrient enrichment (N, P, organic matter)

Marine water pollution

Toxic chemical discharge from material dumped at sea

Synthetic compound contamination

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 include control or restriction of activities which damage or disturb seabed communities such as mobile demersal fishing, dredging and offshore construction works. The regulation of effluent discharge can also support the conservation of this habitat.

List of conservation and management needs

Measures related to marine habitats

Other marine-related measures

Restoring marine habitats

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

This habitat does not correspond directly to any Annex 1 type according to the Habitats Directive.

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

Large bodied, slow growing fauna such as bivalves which are associated with this habitat are sensitive to fishing disturbances and their populations may be slow to recover. Areas that are heavily fished may never fully recover because the seabed is re-disturbed before recovery has taken place. The timescales for recovery will depend on the individual area and the community present, bivalves of the genus *Thyasira*

occur in isolated populations, and due to the lack of a dispersing larval stage, and are unlikely to recover if lost.

Thyasirids, small burrowing bivalves which live in fine sediments, are thought to be fairly slow growing and recovery of a damaged population is likely to take up to 5 years and depends on direct recruitment from the same population due to the low dispersal potential of these species. Where they occur in isolated populations they are therefore unlikely to recover if lost. In comparison, the high fecundity and larval dispersal potential of many of the polychaetes associated with this habitat is likely to result in a population recovering quite quickly - in less than a year for *O. fusiformis* and in approximately 5-6 years for *A. filiformis* due to the later age at which it reaches sexual maturity

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 overall trends in the quantity of this habitat. It has therefore been assessed as Data Deficient under criterion A.

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

This habitat has a large natural range in the North East Atlantic region. The precise extent is unknown however as EOO >50,000 km² and AOO >50, this exceeds the thresholds for a threatened category on the basis of restricted geographic distribution. There has been a decline in the biotic quality of this habitat and the major threat (mobile demersal fisheries) is likely to cause continuing declines in quality within the next 20 years, however the distribution of the habitat is such that the identified threats are unlikely to affect all localities at once. This habitat has therefore been assessed as Least Concern under criterion B.

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	>80 %	Intermediate %	unknown %	Unknown %	unknown %	unknown %
EU 28+	>80 %	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 activities, particularly bottom trawls and dredging, in the last 100 years. For example, 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 (2103/2014) shows high coverage in all European coastal waters and over the continental shelf. Over this time period more than 30% of lower circalittoral sand habitat was subject to trawling fishing pressure in the North Sea. When combining data for the North Sea and Celtic Sea just over 80% of this habitat type is considered to have been subject to such fishing pressure. 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 is likely to have been a very substantial reduction in quality of this habitat - an intermediate decline in quality affecting more than 80% 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 Endangered 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	EN	DD	DD	DD	DD	DD	DD	DD	DD	DD
EU28+	DD	DD	DD	DD	LC	LC	LC	EN	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
Endangered	C/D1	Endangered	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

A. Darr.

Date of assessment

25/08/2015

Date of review

20/01/16

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