

A5.35 Atlantic upper circalittoral sandy mud

Summary

This habitat is generally found in water depths of over 10m, in bays and marine inlets or offshore from less wave exposed coasts. The sediment is a cohesive sandy mud and the epifauna sparse and scattered with mounds, burrows, and tubes indicating the presence of an infaunal community that is dominated by echinoderms, polychaetes and bivalves.

The main pressures and threats are associated with demersal fisheries, aquaculture, and coastal constructions such as bridges and barrages that may affect the local hydrodynamic and sediment transport regimes. The infaunal communities of this habitat are extremely vulnerable to substratum loss, abrasion and physical disturbance from dredging and trawling activities. Such activity, which is known to degrade the quality of habitats associated with fine sandy mud, has been widespread, for more than a century across the North East Atlantic region and particularly intensive in the North Sea and Celtic Sea. Nutrient enrichment leading to eutrophication can lead to changes in the structure and composition of the associated communities.

This habitat can benefit from the regulation of the use of fishing gears that damage or disturb seabed communities. This may be spatial and temporal controls as well as regulation of gear design and deployment. Marine Protected Areas and spatial planning (including zoning) can be used to address potential threats from coastal development and fish farming, while the regulation of discharges and run off from agricultural land to the marine environment can be used to avoid eutrophication effects associated with nutrient enrichment.

Synthesis

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 such fishing pressure which can damage or modify infaunal and epifaunal communities. Data for a single year (2013/2014) has revealed that over 60% of this habitat in the North Sea and Celtic Sea was subject to fishing pressure by bottom otter, beam and mid-water trawls. In the German part of the Greater North Sea, more than 80% of the extent of this habitat is believed to have suffered an intermediate decline in quality over the last 50 years.

The extent of the likely impact of bottom fishing gears on this habitat throughout the North East Atlantic region is also apparent from other 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. In the case of benthic habitats on sandy mud substrate for just 2013 this has shown that more than 80% of its occurrence across the shelf area has been subject to abrasion disturbance. 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+

Overall Category & Criteria			
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

A5.35 Atlantic upper circalittoral sandy mud



Sandy mud sediment. Arms of brittlestars *Amphiura* spp. are visible, extended into the water column to filter feed. West Hoe, Plymouth, UK (© K.Hiscock).



Upper circalittoral fine muddy sands with *Turitella* communities. UK (© K.Hiscock)

Habitat description

The substrate of this benthic habitat is predominantly cohesive sandy mud, typically with over 20% silt/clay content. It usually occurs in water depths of over 10 m, in areas with weak or very weak tidal streams. It is also present in deeper areas of bays and marine inlets or offshore from less wave exposed coasts. The epifauna may be sparse and scattered characterised by Sea pens such as *Virgularia mirabilis* and brittlestars such as *Amphiura* spp. (e.g. *Amphiura filiformis*). Mounds, burrows, and tubes indicate the presence of infauna.

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. Examples of indicators of "naturalness" that are potential indicators for quality identified for offshore sands 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:

Sea pens such as *Virgularia mirabilis* and brittlestars such as *Amphiura* spp. (e.g. *Amphiura filiformis*) are particularly characteristic for this habitat associated by infaunal species including the tube building polychaetes *Lagis koreni* and *Owenia fusiformis*, and deposit feeding bivalves such as *Mysella bidentata* and *Abra* spp. (e.g. *Abra nitida*). Other species which may frequently be present and/or in moderate abundance include *Cerianthus lloydii*, *Nephtys incisa*, *Diplocirrus glaucus*, *Pagurus bernhardus*, *Liocarcinus depurator*, *Asterias rubens*, *Ophiura albida*, *O. ophiura*, *Pholoe inornata*, *Pariambus typicus* and *Nuculoma tenuis*. Where this habitat occurs off the coast of mainland Portugal it may be dominated by the polychaetes *Galathowenia oculata*, *Terebellides stroemii*, *Monticellina* spp. e.g. *M. dorsobranchialis*, *Ampharete finmarchica*, *Maldane glebifex*, *Chaetozone cf. setosa*, *Scoloplos armiger*, *Abyssoninoe hibernica*, *Mediomastus fragilis*, *Gallardonneris iberica*, *Ninoe armoricana*; the bivalve *Thyasira flexuosa*, the amphipod *Ampelisca tenuicornis*; the cumacean *Iphinoe serrata* and Nemertina.

Classification

EUNIS (v1405):

Level 4 . A sub-habitat of 'Atlantic circalittoral mud' (A5.3).

Annex 1:

1160 Large shallow inlets and bays

MAES:

Marine - Marine inlets and transitional waters

Marine - Coastal

MSFD:

Shallow sublittoral mud

EUSeaMap:

Shallow mud

IUCN:

9.6 Subtidal muddy

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

Yes

Regions

Atlantic

Justification

There are extensive areas of sandy mud habitat in circalittoral zones in both sheltered inlets and offshore regions of North East Atlantic.

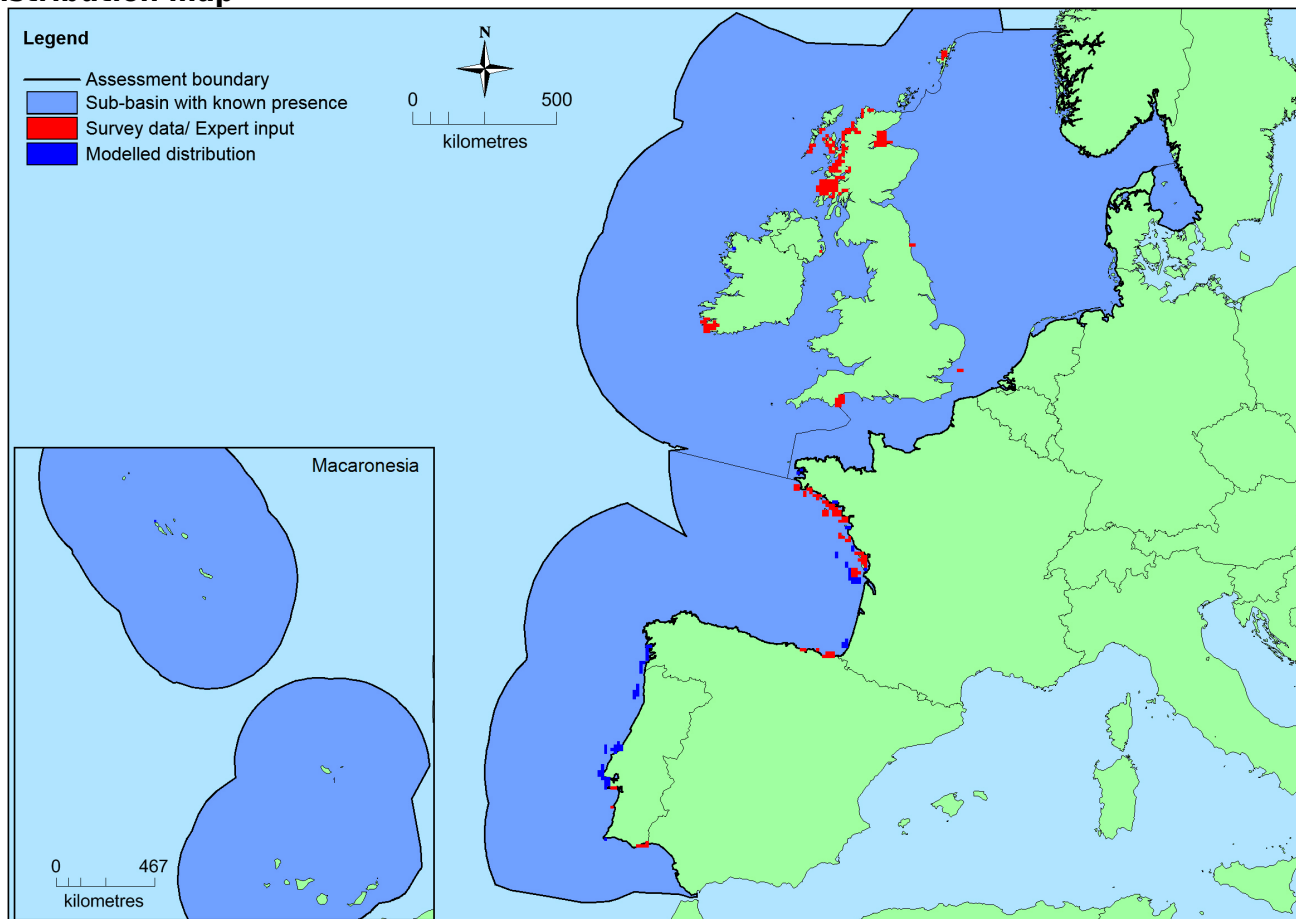
Geographic occurrence and trends

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	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>	3,320,427 Km ²	337	>1,082 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.
<i>EU 28+</i>	>3,320,427 Km ²	>337	>1,082 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 has a large natural range in the North East Atlantic region.

- 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.

Trends in quality

Most sedimentary benthic systems on the continental shelf of Europe have been modified by fishing activities in the last 100 years, particularly by bottom trawls and dredging.

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 more than 40% of this habitat type was subject to trawling fishing pressure in the North Sea, with over 20% of this being interpreted a high or moderate pressure. When combining data for the North Sea and Celtic Sea over 60% of this habitat type is considered to have been subject to such fishing pressure. In the German part of the Greater North Sea, more than 80% of the extent of this habitat is believed to have suffered an intermediate decline in quality over the last 50 years.

The extent of the likely impact of bottom fishing gears on this habitat throughout the North East Atlantic region is also apparent from other analyses which have combined Vessel Monitoring System (VMS) data with sensitivity maps of benthic habitats and disturbance caused by surface abrasion for the continental shelf area of the North East Atlantic. In the case of benthic habitats on upper circalittoral sandy mud habitats for just 2013 this has shown that more than 80% of its occurrence across the shelf area has been subject to abrasion disturbance. Given the evidence that the passage of the first trawls are the most damaging for epifauna, and that, depending on the frequency of demersal trawling and environmental conditions, shifts from benthic communities with large slowly reproducing species to small species with a high reproductive rate (e.g. polychaetes), have been reported several times independently, this is likely to

have been a substantial decline in quality of this habitat over at least the last 50 years.

- Average current trend in quality

EU 28: Decreasing

EU 28+: Decreasing

Pressures and threats

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. Frequent trawling may lead to a permanently altered community dominated by fast growing scavenger/predator species. Generally, studies have found that long-living, sessile and suspension-feeding organisms show the greatest declines in response to a given type and frequency of trawl disturbance while opportunistic species, e.g. short-lived polychaetes, are less affected. In the southern North Sea fishing is thought to have long been the main ecological structuring force on the benthos.

Near the coast marine fish farms may have direct effects on sandy mud communities, including smothering and increasing the Biological Oxygen Demand of the mud. Additional effects may result from the discharges of chemicals, some of which are especially toxic to crustaceans. The construction of roads, bridges and barrages may affect the local hydrodynamic and sediment transport regimes of inshore enclosed areas and consequently affect the substratum. Nutrient enrichment leading to eutrophication can lead to changes in the structure and composition of the associated communities.

List of pressures and threats

Urbanisation, residential and commercial development

Discharges

Disposal of industrial waste

Biological resource use other than agriculture & forestry

Fishing and harvesting aquatic resources

Professional active fishing

Demersal seining

Natural System modifications

Human induced changes in hydraulic conditions

Modification of hydrographic functioning, general

Conservation and management

This habitat can benefit from the regulation of the use of fishing gears that damage or disturb seabed communities. This may be achieved by spatial and temporal controls as well as gear design and deployment using fisheries management measures as well as conservation legislation in marine protected areas. Spatial planning (including zoning) can be used to address potential threats from coastal development and fish farming. The regulation of discharges and run off from agricultural land to the marine environment can be used to avoid eutrophication effects associated with nutrient enrichment.

List of conservation and management needs

Measures related to marine habitats

Other marine-related measures

Measures related to spatial planning

Other spatial measures

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:

1160: MATL U2, MMAC FV

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

Timescale between incidents of damaging activity, the type of damaging activity and the predominant species, influences recovery. Studies have shown that recovery times following dredging were significantly shorter for short-lived species (<1 - 3 years), free-living and tube-dwelling species and for scavenging or opportunistic species, than for medium-lived species (3 - 10 years), burrow-dwelling species and suspension feeders. Free living species are also likely to recolonise areas more quickly than those that grow attached to the substratum and have an erect or stalked body form such as seapens.

Differences in the recoverability of different species groups following fishing may result in changes in community composition and ecosystem functioning over the long term.

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 %

Estimates of the area and extent of this habitat show considerable variation and are recognised as being biased and an underestimate. No assessment of trends in quantity have therefore been made. This habitat is Data Deficient under criteria 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 demersal fishing gears in particular. 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	>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 %
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 in the last 100 years, particularly by bottom trawls and dredging.

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 more than 40% of this habitat type was subject to trawling fishing pressure in the North Sea, with over 20% of this being interpreted a high or moderate pressure. When combining data for the North Sea and Celtic Sea over 60% of this habitat type is considered to have been subject to such fishing pressure. The extent of the likely impact of bottom fishing gears on this habitat throughout the North East Atlantic region is also apparent from other 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. In the case of benthic habitats on upper circalittoral sandy mud substrate for just 2013 this has shown that more than 80% of its occurrence across the shelf area has been subject to abrasion disturbance. 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

21/12/2015

Date of review

21/01/16

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