Infaunal communities of Baltic upper circalittoral muddy sediment not dominated by bivalves

Summary

Large areas of aphotic muddy sediment characterised by infaunal polychaetes is a typical habitat in the Baltic Sea.The habitat is common throughout the Baltic Sea except for the most northern parts of the Bothnian Bay. Associated biotopes have differing distribution in the area. For example 'Baltic aphotic muddy sediment dominated by *Marenzelleria* spp.' (AB.H3M3) is common in the Baltic Proper, Gulf of Riga, Gulf of Finland and Bothnian Gulf, 'Baltic aphotic muddy sediment dominated by *Scoloplos (Scoloplos) armiger*' (AB.H3M1) occurs in the Baltic Proper and The Sound.

A major threat is eutrophication leading to anoxia on the deep soft sediment bottoms where it occurs. All actions to reduce the level of eutrophication on the scale of the whole Baltic Sea will benefit this habitat. The invasive polychaete *Marenzelleria* spp. has already had an effect in areas previously dominated by *Monoporeia affinis* and/or *Pontoporeia femorata*. *Marenzelleria* spp. and *M. affinis* are believed to compete for resources, and as *Marenzelleria* spp. is tolerant of anoxic conditions is has a competitive advantage if incidences of anoxia in the aphotic muddy sediments increases. At the same time it can be favourable to *M. affinis* by oxygenating sediments.

Synthesis

The presence of this habitat type in the Baltic is well established and it is known to occur in all the sub-basins. There have been various changes in the associated biotopes over the last 50 years. For example *M. affinis* and *P. femorata* decreased drastically in the late 1970s early 1980s in the northern Baltic. By early 1990s *P. femorata* vanished and *M. affinis* abundance was low. This decline was followed by increase in *M. balthica* and arrival of *Marenzellaria* in the 1992. There are a lack of quantitative data on current and historic trends relating to this habitat and no estimates have been made of future trends.

The overall assessment for this EUNIS level 4 habitat has been based on the HELCOM (2013) assessments f or the associated HELCOM HUB biotopes. Draft assessments were derived using a weighted approach whereby the HELCOM assessment outcomes were assigned a score. This was averaged across the relevant biotopes. The outcomes were reviewed by Baltic experts to reach a final conclusion. HELCOM assessed four associated biotopes (AB.H3M1, AB.H3M3, AB.H3M5 and AB.H3P1) as Least Concern (A1). Biotope AB.H3N1 was assessed as Near Threatened (A1). With no additional data available the current expert opinion is that this habitat should be 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

AB.H3N1 Baltic aphotic muddy sediment dominated by *Monoporeia affinis* and/or *Pontoporeia femorata.*

Habitat Type

Code and name

Infaunal communities of Baltic upper circalittoral muddy sediment not dominated by bivalves

Core sample of Baltic aphotic muddy sediment characterized by infaunal polychaetes (Subtype AB.H3M3: 'Baltic aphotic muddy sediment dominated by *Marenzelleria* spp.'), Stockholm Archipelago, Sweden (© J.Näslund, AquaBiota Water Research).

Habitat description

This habitat is distributed on Baltic aphotic bottoms with at least 90% coverage of muddy sediment according to the HELCOM HUB classification. Sessile/semi-sessile epibenthic macrofauna are generally not present and infaunal polychaetes/crustaceans/echinoderms/or insect larvae dominate in terms of biomass. This habitat typically occurs below approximately 20 m depth and is present in all energy exposure classes and in all the Baltic sub-basins. Four associated biotopes have been identified: these are characterized by infaunal polychaetes where species such as *Polydora ciliata, Lagis koreni, Capitella capitata, Scoloplos (Scoloplos) armiger* constitute at least 50% of the infaunal biomass; by infaunal crustaceans where the benthic amphipods *Monoporeia affinis* and/or *Pontoporeia femorata* dominate*;* or where insect larve where (Chironomidae) or echinoderms dominate the biomass. *M. affinis* is an important food source for several fish species, such as cod (*Gadus morhua*), herring (*Clupea harengus*), smelt (*Osmerus eperlanus*) and fourhorn sculpin (*Myoxocephalus quadricornis*). In favourable conditions, *M. affinis* and *Pontoporeia femorata* can occur in great abundances, even several thousand individuals per square meter.

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 tro phic 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. Diversity, abundance and biomass of fauna may be indicators of quality.

Characteristic species:

Polydora ciliata, Lagis koreni, Capitella capitata, Scoloplos (Scoloplos) armiger, Marenzelleria arctia, Marenzelleria viridis, Marenzelleria neglecta. In biotopes characterized by infaunal crustaceans – *Monoporeia affinis, Saduria entomon* and *Pontoporeia femorata*. In biotopes characterized by insect larvae Chironomidae and in biotopes characterized by infaunal echinoderms *Amphiura filiformis, Brissopsis lyrifera* and *Amphiura chiajei.* The isopod *Saduria entomon* often occurs in this biotope.

Classification

EUNIS:

The closest correspondence in EUNIS (2004) level 4 is A5.41 Sublittoral mud in low or reduced salinity.

Annex 1:

The relationship between HUB biotopes and Annex 1 habitats has not yet been mapped by HELCOM, however this habitat may occur in the following Annex 1 habitats:

1130 Estuaries

1160 Large shallow inlets and bays

1650 Boreal Baltic narrow inlets

MAES:

Marine - Marine inlets and transitional waters

Marine - Coastal

MSFD:

Shallow sublittoral mud

EUSeaMap:

Shallow muds

IUCN:

9.6 Subtidal Muddy

Other relationships:

Level 5 of the HELCOM HUB classification (2013):

AB.H3M: Baltic aphotic muddy sediment characterized by infaunal polychaetes

AB.H3N: Baltic aphotic muddy sediment characterized by infaunal crustaceans

AB.H3P: Baltic aphotic muddy sediment characterized by infaunal insect larvae

AB.H3O Baltic aphotic muddy sediment characterized by infaunal echinoderms

Level 6 of the HELCOM HUB classification;

'Baltic aphotic muddy sediment dominated by S*coloplos (Scoloplos) armiger*' (AB.H3M1),

'Baltic aphotic muddy sediment dominated by *Marenzelleria* spp.' (AB.H3M3)

'Baltic aphotic muddy sediment dominated by various opportunistic polychaetes' (AA.H3M5).

'Baltic aphotic muddy sediment dominated by *Monoporeia affinis* and/or *Pontoporeia femorata*' (AB.H3N1).

'Baltic aphotic muddy sediment dominated by midge larvae (Chironomidae)' (AB.H3P1).

'Baltic aphotic muddy sediment dominated by *Amphiura filiformis*' (AB.H3O1)

'Baltic aphotic muddy sediment dominated by *Brissopsis lyrifera* and *Amphiura chiajei*' (AB.H3O2)

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

Regions
Baltic

Justification
Large areas of aphotic muddy sediment characterized by infaunal polychaetes is a typical habitat in the Baltic Sea. *M. affinis* occurs in most parts of the Baltic Sea on soft bottoms, and is an ecologically important and dominant native species in the Baltic Sea benthic community at depths of 10–80 m.

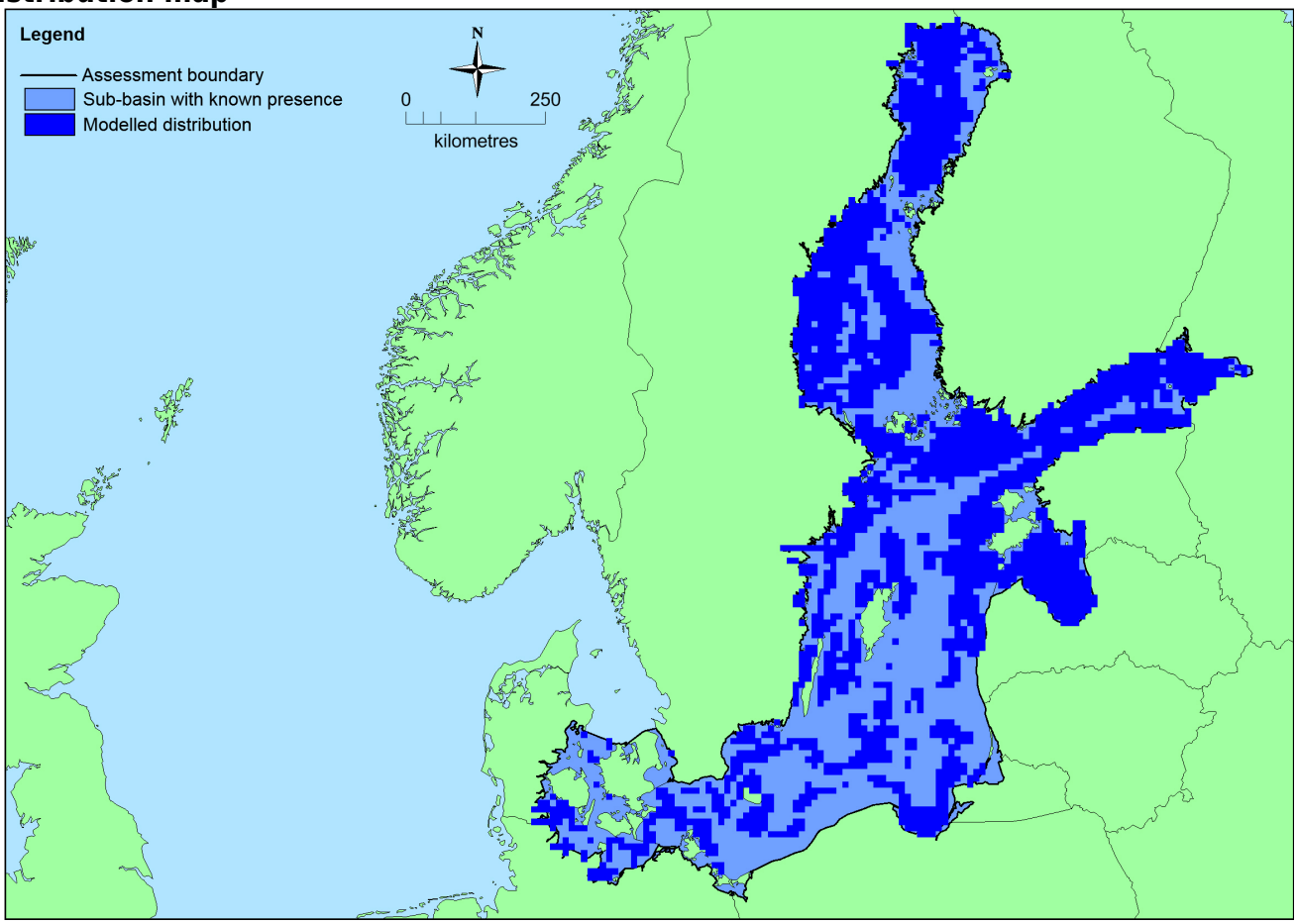
Geographic occurrence and trends

Region	Present or Presence Uncertain	Current area of habitat	Recent trend in quantity (last 50 yrs)	Recent trend in quality (last 50 yrs)
Baltic Sea	Baltic Proper: Present Belt Sea: Present Gulf of Bothnia: Present Gulf of Finland: Present Gulf of Riga: Present The Sound: Present	Unknown Km^2	Decreasing	Unknown

Extent of Occurrence, Area of Occupancy and habitat area

	Extent of Occurrence (EOO)	Area of Occupancy (AOO)	Current estimated Total Area	Comment
EU 28	>50,000 Km^2	>50	Unknown Km^2	This habitat is common and present in all the Baltic sub-basins.
EU 28+	>50,000 Km^2	>50	Unknown Km^2	This habitat is common and present in all the Baltic sub-basins.

Distribution map



There are insufficient data to provide a comprehensive and accurate map of the distribution of this habitat. This map has therefore been generated using the modelled data available on EMODnet for EUNIS level 3 habitats in the Baltic Sea (EMODnet, 2010). This means that it indicates potential areas in which this habitat may occur, not the actual distribution of this EUNIS level 4 habitat.

How much of the current distribution of the habitat type lies within the EU 28?

This habitat occurs in the EU 28+ (Russia). The percentage hosted by EU 28 is therefore less than 100% but there is insufficient information to establish the proportion.

Trends in quantity

Most of the associated biotopes are considered to have been stable over the last 50 years with the exception of muddy sediment dominated by *Monoporeia affinis* and/or *Pontoporeia femorata* which is believed to have shown a decline of approximately 25% over the last 50 years. There are insufficient data on historic trends and no estimates of future trends.

- 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 occurs in all the Baltic Sea sub-basins so 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 occurs in all the Baltic Sea sub-basins so does not have a small natural range.

Trends in quality

There is insufficient information on current quality and historic trends relating to this habitat and no future estimates have been made.

- Average current trend in quality
  EU 28: Unknown
  EU 28+: Unknown

Pressures and threats

This habitat is common throughout the Baltic Sea except for the most northern parts of the Bothnian Bay. A major threat is eutrophication leading to anoxia on the deep soft sediment bottoms where it occurs. The crustacean dominated biotope may also be threatened by accumulation of various persistent hazardous substances in the soft sediments of the deep accumulation bottoms. The further spread of the invasive polychaete species *Marenzelleria* spp. in the Baltic Sea threatens the future persistence of biotope dominated by *M. affinis*. *Marenzelleria* spp. and *M. affinis* are believed to compete for resources, and as *Marenzelleria* spp. is tolerant of anoxic conditions is has a competitive advantage if incidences of anoxia in the aphotic muddy sediments increases. At the same time it can be favourable to *M. affinis* by oxygenating sediments.

List of pressures and threats

Pollution

Pollution to surface waters (limnic, terrestrial, marine & brackish)
Nutrient enrichment (N, P, organic matter)
Input of contaminants (synthetic substances, non-synthetic substances, radionuclides) - diffuse sources, point sources, acute events

Conservation and management

All actions to reduce the level of eutrophication on the scale of the whole Baltic Sea will benefit this habitat. The invasive polychaete *Marenzelleria* spp. has already had an effect in areas previously dominated by *Monoporeia affinis* and/or *Pontoporeia femorata* and unfortunately very little can be done to reduce the population of the polychaete worms in the Baltic Sea. Measures can however be taken to hinder the spread of new invasive species into the Baltic Sea.

List of conservation and management needs

Measures related to wetland, freshwater and coastal habitats

Restoring/Improving water quality

Measures related to marine habitats

Other marine-related measures
Restoring marine habitats

Conservation status

Annex 1:

1110: MBAL U1

1160: MBAL U2

1650: MBAL U2

HELCOM (2013) assessments:

1110 VU C1

1160 VU C1

1650 VU C1

HELCOM (2013) have assessed AB.H3M1, AB.H3M3, AB.H3M5, AB.H3O1, AB.H3O2 and AB.H3P1 as LC(A1). Habitat AB.H3N1 was assessed as NT(A1).

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

Unknown

Effort required

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 %

There have been declines in the extent of some of the associated biotopes but overall this habitat is not considered to have declined by more than 25% over the last 50 years. habitat has therefore been assessed as Least Concern 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	Unknown	Unknown	unknown	>50	Unknown	Unknown	unknown	unknown
EU 28+	>50,000 Km^2	Unknown	Unknown	unknown	>50	Unknown	Unknown	unknown	unknown

A lack of a comprehensive of quantitative data on the area covered by this habitat in the Baltic means that precise figures for EOO and AOO could not be calculated however as it is present in all Baltic sea sub-basins and is common throughout the Baltic the EOO is likely to exceed 50,000 km^2 and the AOO to exceed 50. Future trends have not been determined. Expert opinion is therefore that this habitat should be assessed as Data Deficient 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	unknown %	unknown %	unknown %	unknown %	unknown %	unknown %
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 %
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%

Experts considered there to be insufficient data on which to assess 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	DD	DD	DD	DD	DD	DD	DD	DD	DD	DD	DD	DD	DD
EU28+	LC	DD	DD	DD	DD	DD	DD	DD	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)

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Reviewers
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