Infaunal communities of Baltic upper circalittoral sand dominated by bivalves

Summary

This habitat is common throughout the Baltic Sea occuring in all the sub-basins although some of the asociated biotopes have a more restricted distribution. It is threatened by eutrophication (increase in N, P and organic matter) and contaminant pollution as well as activities that cause direct damage to the seabed. The latter include sand extraction, oil and gas exploration and extraction, and bottom trawling, all of which are also envisaged to be future threats. Beneficial conservation management would include measures to reduce the diffuse run off of nutrients from agricultural land and tackling point source pollution by installation of waste water treatment plants, as well as restricting and prohibiting sand extraction from some locations.

Synthesis

The presence of this habitat type in the Baltic is well know.n It occurs in all the sub basins but quantitative data on the area covered are not available. There have been declines in both quantity and quality of this habitat particularly for those areas dominated by *Arctica islandica.*

The overall assessment for this EUNIS level 4 habitat has been based on the HELCOM (2013) assessments for 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 (2013) assessed AB.J3L4 as Least Concern (A1), AB.J3L10 and AB.J3L11 as Near Threatened (A1) and AB.J3L3 as Vulnerable (A1). Biotopes AB.J3L1 and AB.J3L9 were not evaluated. Expert opinion is that there have been significant declines in the extent of some of the associated biotopes and an overall reduction of more than 25%. This habitat has therefore been assessed as Near Threatened 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
Near Threatened	A1	Near Threatened	A1

Sub-habitat types that may require further examination

AB.J3L3 Baltic aphotic sand dominated by ocean quahog (*Arctica islandica*) AB.J3L10 Baltic aphotic sand domniated by multiple infaunal bivalve species

AB.J3L11 Baltic aphotic sand dominated by multiple infaunal polychaete species including *Ophelia spp*. and *Travisia forbesii*

Habitat Type

Code and name

Infaunal communities of Baltic upper circalittoral sand dominated by bivalves

No characteristic photographs of this
habitat currently available.

Habitat description

This Baltic Sea benthic habitat occurs in the aphotic zone in high energy exposure areas with at least 90% coverage of sand according to the HELCOM HUB classification. Typically no macrovegetation or epibenthic macrofauna are present and infaunal bivalves make up at least 10% of the biomass.

Seven associated biotopes with different dominant species (at least 50% of the biomass) of macrofauna have been identified. These include the Baltic tellin (*Macoma balthica*) the ocean quahog (*Arctica islandica)* and the sand gaper (*Mya arenaria).*The dominance structure might vary considerably between stations and the substrate contains different proportions coarse or medium sand, but may also contain finer or coarser sediment fractions. The associated biotopes may also have some differences in distribution. For example 'Baltic aphotic sand dominated by multiple infaunal polychaete species including *Ophelia* spp.' (AB.J3L11) is restricted to the Belt Sea (sandbanks) and parts of the 'submerged belt' of the Arkona Basin in the western Baltic Sea; the biotope 'Baltic aphotic sand dominated by multiple infaunal bivalve species: *Macoma calcarea*, *Mya truncata*, *Astarte* spp., *Spisula* spp.' (AB.J3L10) is encountered in the western Baltic Sea, from the Kiel Bight to Isle of Fehmarn, and might occasionally occur from Mecklenburg Bight to the Darss Sill.

Characteristic species:

Arctica islandica, *Macoma balthica*, *Cerastoderma* spp., *Mya arenaria*, *Astarte* spp. In the case of 'Baltica photic sand dominated by multiple infaunal bivalve species: *Macoma calcarea, Mya truncata*, *Astarte* spp., *Spisula spp.*' (AB.J3L10) *Macoma calcarea*, *Mya truncata, Astarte* spp. and *Spisula* spp., additionally other marine bivalves like *Thracia* spp, *Phaxas pellucidus* and *Arctica islandica*. In the case of 'Baltica photic sand dominated by multiple infaunal polychaete species (AB.J3L11) the dominating bivalve species *Arctica islandica* and *Astarte* spp. are characteristically accompanied by polychaete species like *Ophelia rathkei*, *Ophelia limacina, Travisia forbesii* and *Streptosyllis spp*.

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. Diversity, abundance and biomass of fauna my be indicators of quality for this habitat.

Classification

EUNIS:

The closest correspondence in EUNIS (2004) level 4 is

Annex 1:

1110 Sandbanks slightly covered all the time

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 sand

EUSeaMap:

Shallow sands

IUCN:

9.4. Subtidal sandy

Other relationships:

Level 5 of the HELCOM HUB classification (2013):

AB.J3L Baltic aphotic sand characterized by infaunal bivalves

This habitat has seven biotopes on HUB level 6,

AB.J3L1 Baltic aphotic sand dominated by Baltic tellin (*Macoma balthica*)

AB.J3L3 Baltic aphotic sand dominated by ocean quahog (*Arctica islandica)*

AB.J3L4 Baltic aphotic sand dominated by sand gaper (*Mya arenaria*)

AB.J3L9 Baltic aphotic sand dominated by multiple infaunal bivalve species: *Cerastoderma* spp*., Mya arenaria, Astarte borealis, Arctica islandica, Macoma balthica*

AB.J3L10 Baltic aphotic sand dominated by multiple infaunal bivalve species: *Macoma calcarea, Mya truncata, Astarte* spp., *Spisula* spp.

AB.J3L11 Baltic aphotic sand dominated by multiple infaunal polychaete species including Ophelia spp. and *Travisia forbesii*

AB.J3L7 Baltic aphotic sand dominated by striped venus (*Chamelea gallina)*, is only encountered in the Kattegat and is thus excluded from the Baltic Sea list of the European Red List of Habitats.

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

Regions
Baltic

Justification
Common, widespread and typical habitat of Baltic sandy bottoms.

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	Decreasing

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	Unknown	Unknown Km^2	This habitat is present in all the Baltic sub-basins.
EU 28+	>50,000 Km^2	Unknown	Unknown Km^2	This habitat is present in all the Baltic sub-basins

Distribution map
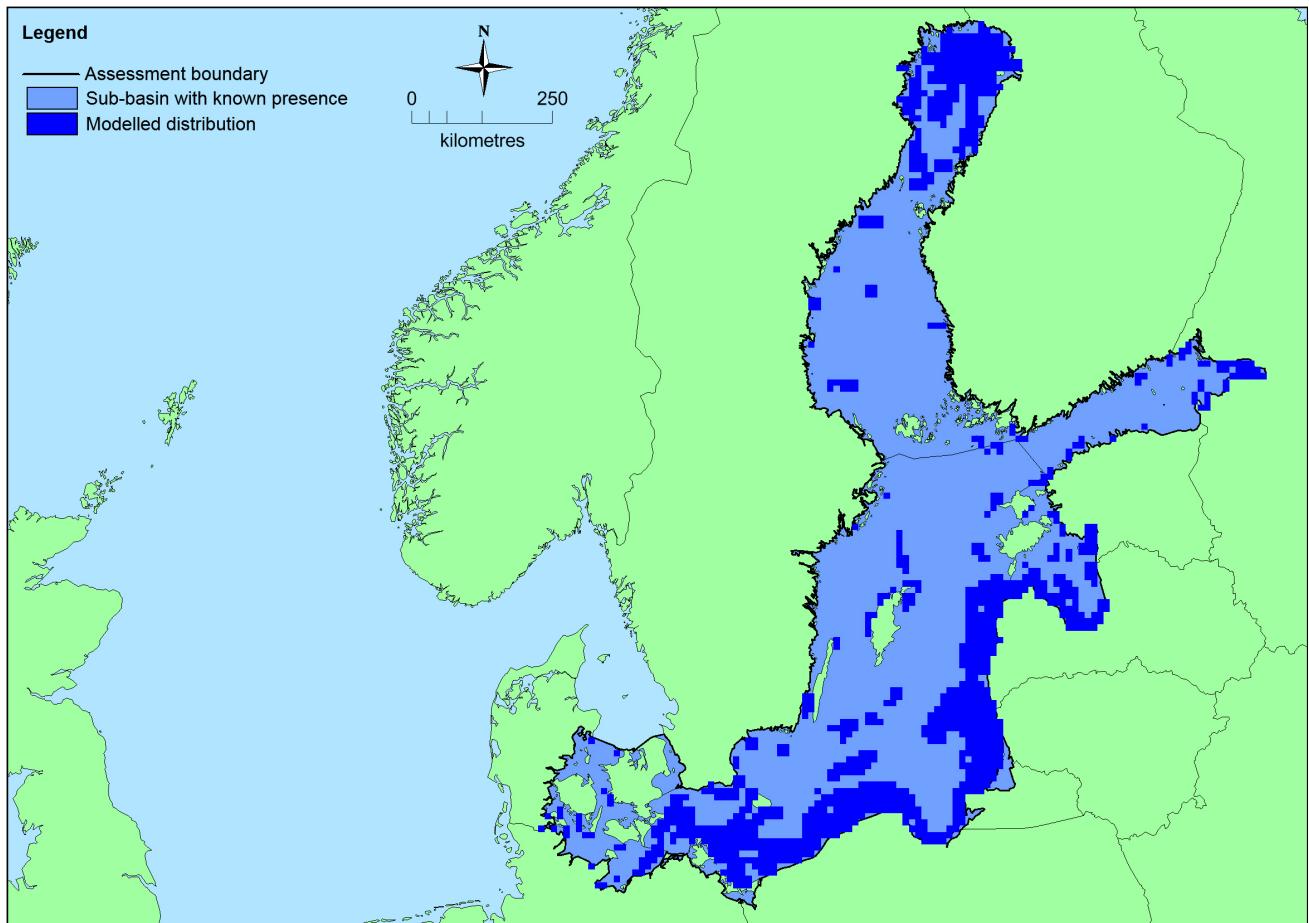
There are insufficient data to provide a comprehensive and accurate map of the distribution of this habitat. This map has therefore been generated using the modelled data available on EMODnet for EUNIS level 3 habitats in the Baltic Sea (EMODnet, 2010). This means it indicates potential areas in which 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

Different trends in quantity have been estimated for the 6 associated biotopes which occur in this regional sea area. No signs for a decline were reported for Baltic aphotic sand dominated by Baltic tellin (*Macoma balthica)* (AB.J3L1), Baltic aphotic sand dominated by sand gaper (*Mya arenaria)* (AB.J3L4) and Baltic aphotic sand dominated by multiple infaunal bivalve species: *Cerastoderma* spp., *Mya arenaria, Astarte borealis, Arctica islandica, Macoma balthica* (AB.J3L9). The biotope Baltic aphotic sand dominated by ocean quahog (*Arctica islandica*) (AB.J3L3) was inferred to have declined by more than 30% during the past 50 years and the quantity of biotope Baltic aphotic sand dominated by multiple infaunal bivalve species: *Macoma calcarea, Mya truncata, Astarte* spp*., Spisula* spp. (AB.J3L10) and Baltic aphotic sand dominated by multiple infaunal polychaete species including *Ophelia* spp. and *Travisia forbesii* (AB.J3L11) are inferred to have declined by 25-30% during the past 50 years. There are no quantitative historic data or estimates of future trends.

- Average current trend in quantity (extent)
  EU 28: Decreasing
  EU 28+: Decreasing
- Does the habitat type have a small natural range following regression?
  No

Justification
Overall no but the associated biotopes Baltic aphotic sand dominated by ocean quahog (*Arctica islandica*) (AB.J3L3), Baltic aphotic sand dominated by multiple infaunal bivalve species: *Macoma calcarea, Mya truncata, Astarte* spp., *Spisula* spp. (AB.J3L10) and Baltic aphotic sand dominated by multiple infaunal polychaete species including *Ophelia* spp. and *Travisia forbesii* (AB.J3L11) have a smaller range following regression.

- Does the habitat have a small natural range by reason of its intrinsically restricted area?
  No
  Justification
  Sandy bottoms are common in the aphotic zone of the Baltic, but the biotopes Baltic aphotic sand dominated by ocean quahog (Arctica islandica) (AB.J3L3), Baltic aphotic sand dominated by multiple infaunal bivalve species: (AB.J3L10) and Baltic aphotic sand dominated by multiple infaunal polychaete species including *Ophelia* spp. and *Travisia forbesii* (AB.J3L11) are restricted to The Sound and the Belt Sea.

Trends in quality

Areas dominated by ocean quahog (*Arctica islandica*)' are considered to have declined in quality over 10-20% of their extent over the last 50 years and the biotope Baltic aphotic sand dominated by multiple infaunal bivalve species: *Macoma calcarea, Mya truncata, Astarte* spp., *Spisula* spp. (AB.J3L10) is believed to have suffered a decline in quality over 20% of its area. No information on changes in quality is available for the other associated biotopes.

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

Pressures and threats

This habitat is threatened by eutrophication (increase in N, P and organic matter) and contaminant pollution as well as activities which cause direct damage to the seabed. These include sand extraction, oil and gas exploration and extraction and bottom trawling. All of these are also envisaged to be future threats.

List of pressures and threats

Mining, extraction of materials and energy production

Mining and quarrying
Sand and gravel extraction
Exploration and extraction of oil or gas

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)
Input of contaminants (synthetic substances, non-synthetic substances, radionuclides) - diffuse sources, point sources, acute events

Conservation and management

All actions that reduce the level of eutrophication in the Baltic Sea will benefit this habitat. These include measures to reduce the diffuse run off of nutrients from agriculture and tackling point source pollution by installation of waste water treatment plants. The aphotic sandy substrates may increasingly be used for mineral extraction. Restricting or prohibiting sand extraction from some areas will support the persistence of this habitat.

List of conservation and management needs

Measures related to wetland, freshwater and coastal habitats

Restoring/Improving water quality

Measures related to spatial planning

Establish protected areas/sites
Legal protection of habitats and species

Measures related to hunting, taking and fishing and species management

Regulation/Management of fishery in marine and brackish systems

Measures related to special resouce use

Regulating/Managing exploitation of natural resources on sea

Conservation status

Annex 1:

1110: MBAL U1

1130: MBAL U2

1160: MBAL U2

1650: MBAL U2

HELCOM (2013) assessments:

1110 VU C1

1130 CR C1

1160 VU C1

1650 VU C1

HELCOM (2013) assessed AB.J3L4 as LC (A1), AB.J3L10 and AB.J3L11 as NT(A1) and AB.J3L3 as VU(A1). biotopes AB.J3L1 and AB.J3L9 were not evaluated.

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

For the biotope with the highest threat category (VU, A1), AB.J3L3 'Baltic aphotic sand dominated by ocean quahog (*Arctica islandica*)', the habitat forming species is the most long-lived species in the world and has a long generation time. It is likely to be difficult to undertake a re-establishment programme for this species as this would require a commitment of more than 50 years. No information exist on the capacity for recovery of the other associated biotopes.

Effort required

50+ years	200+ years
Naturally	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 %

Expert opinion is that there have been significant declines in the extent of some of the associated biotopes and an overall reduction of more than 25%. This habitat has therefore been assessed as Near Threatened 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	unknown	Unknown	Unknown	unknown	unknown
EU 28+	>50,000 Km^2	Unknown	Unknown	unknown	unknown	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 the EOO is likely to exceed 50,000 km^2. Future trends have not been predicted. This habitat has therefore been assessed as Data Deficient 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 %	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	NT	DD	DD	DD	DD	DD	DD	DD	DD	DD	DD	DD	DD	DD	DD	DD	DD
EU28+	NT	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
Near Threatened	A1	Near Threatened	A1

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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Contributors
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Reviewers
G. Saunders.

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