Infaunal communities in Baltic upper circalittoral coarse sediment and shell gravel not dominated by bivalves

Summary

This is a Baltic Sea benthic habitat in the upper circalittoral where the substrate is predominantly coarse sediment or shell gravel. Four associated biotopes have been described characterised by mixed infaunal macrocommunities with substrates ranging from coarse and well sorted shells and shell fragments to fine shell fragments, and also areas where the substrate is predominantly coarse and the biotope characterised by infaunal polychaetes (*Pygospio elegans, Streblospio* spp.) or amphipods (*Bathyporeia pilosa*). The habitat occurs in high energy areas, typically below 20m and for the coase sediments more usually below 30m. The biotopes on shell gravel have a restricted distribution in the Baltic, especially where the substrate is comprised of fine sand-like shell fragments as this has only been reported from The Belt Sea.

Eutrophication and increase in atmospheric CO_2 leading to ocean acidification, are seen as the major threats to this habitat. Measures to reduce eutrophication will benefit this habitat. The effects of changes in pH associated with climate change have still to be determined but may be a threat particularly in areas where the substrate is shell gravel.

Synthesis

This habitat is present in all the Baltic Sea sub-basins sub-basins.There has been a decline in quantity of the associated biotope which occurs on fine sand-like shell fragments but quantitative data are lacking. One other biotope is considered to be stable and the remaining two have not been evaluated. There is insufficient data on which to base a historic trend assessment and estimates of future trends in quantity or quality.

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.E3Y as Near Threatened (B1a(ii)) and AB.I3N3 as Least Concern (A1). Biotopes AB.E3X and AB.I3M were not evaluated. Current expert opinion is that as the associated biotope which has shown some decline is small in extent compared to the other components of the habitat the assessment is Least Concern (A1) 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.E3Y Baltic aphotic shell gravel characterized by mixed infaunal macrocommunity in fine sand-like shell fragments.

Habitat Type

Code and name

Infaunal communities in Baltic upper circalittoral coarse sediment and shell gravel not dominated by bivalves

No characteristic photographs of this habitat currently available.

Habitat description

This is a Baltic Sea benthic habitat in the upper circalittoral where at least 90% of the substrate is coarse sediment or shell gravel according to the HELCOM HUB classification. Four associated biotopes have been described characterised by mixed infaunal macrocommunities with substrates ranging from coarse and well sorted shells and shell fragments (AB.E3X) to fine shell fragments (AB.E3Y), and also areas where the substrate is predominantly coarse and the biotope characterised by infaunal polychaetes (AB.I3M) or infaunal crustaceans (AB.I3N). In the latter case a sub-habitat identified by a large representation of *Bathyporeia pilosa*, which constitutes at least 50% of the biomass of the infaunal crustacean has also been described.

The habitat occurs in high energy areas, typically below 20m and for the coase sediments more usually below 30m. The community composition of macroinfauna is presumed to be different in the sand like shell gravel sand compared to coarser shell gravel of mainly semi-intact shells. These substrates support many different animals including non-burrowing animals but where the interstitial space is smaller burrowing polychaetes and amphipods can build tunnels using the small grains. The biotopes on shell gravel have a restricted distribution in the Baltic, especially where the substrate is comprised of fine sand-like shell fragments as this has only been reported from The Belt Sea.

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 havebeen determined and applied on a location-specific basis. Diversity, abundance and biomass of the dominant. species and associated fauna are potential indicators of quality of this habitat

Characteristic species:

For the biotope AB.I3M: polychaetes mainly of the family Spionidae (*Pygospio elegans, Streblospio*

shrubsoli), and for the biotope AB.I3N *Bathyporeia pilosa.*

Classification

EUNIS:

The closest correspondence in EUNIS (2004) level 4 is A5.11 Infralittoral coarse sediment 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:

1110 Sandbanks slightly covered all the time

1160 Large shallow inlets and bays

1650 Boreal Baltic narrow inlets

MAES:

Marine - Marine inlets and transitional waters

Marine - Coastal

MSFD:

Shallow sublittoral coarse sediment

Shallow sublittoral mixed sediment

EUSeaMap:

Shallow coarse or mixed sediments

IUCN:

9.3 Subtidal Loose Rock/Pebble/Gravel

Other relationships:

Level 5 of the HELCOM HUB classification (2013):

AB.E3X Baltic aphotic shell gravel characterized by mixed infaunal macrocommunity in coarse and well sorted shells and shell fragments

AB.E3Y Baltic aphotic shell gravel characterized by mixed infaunal macrocommunity in fine sand-like shell fragments

AB.I3M Baltic aphotic coarse sediment characterized by infaunal polychaetes

AB.I3N Baltic aphotic coarse sediment characterized by infaunal crustaceans and a level 6 ‘Baltic aphotic

coarse sediment dominated by sand digger shrimp (Bathyporeia pilosa)' (AB.I3N3).

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

Unknown

Justification

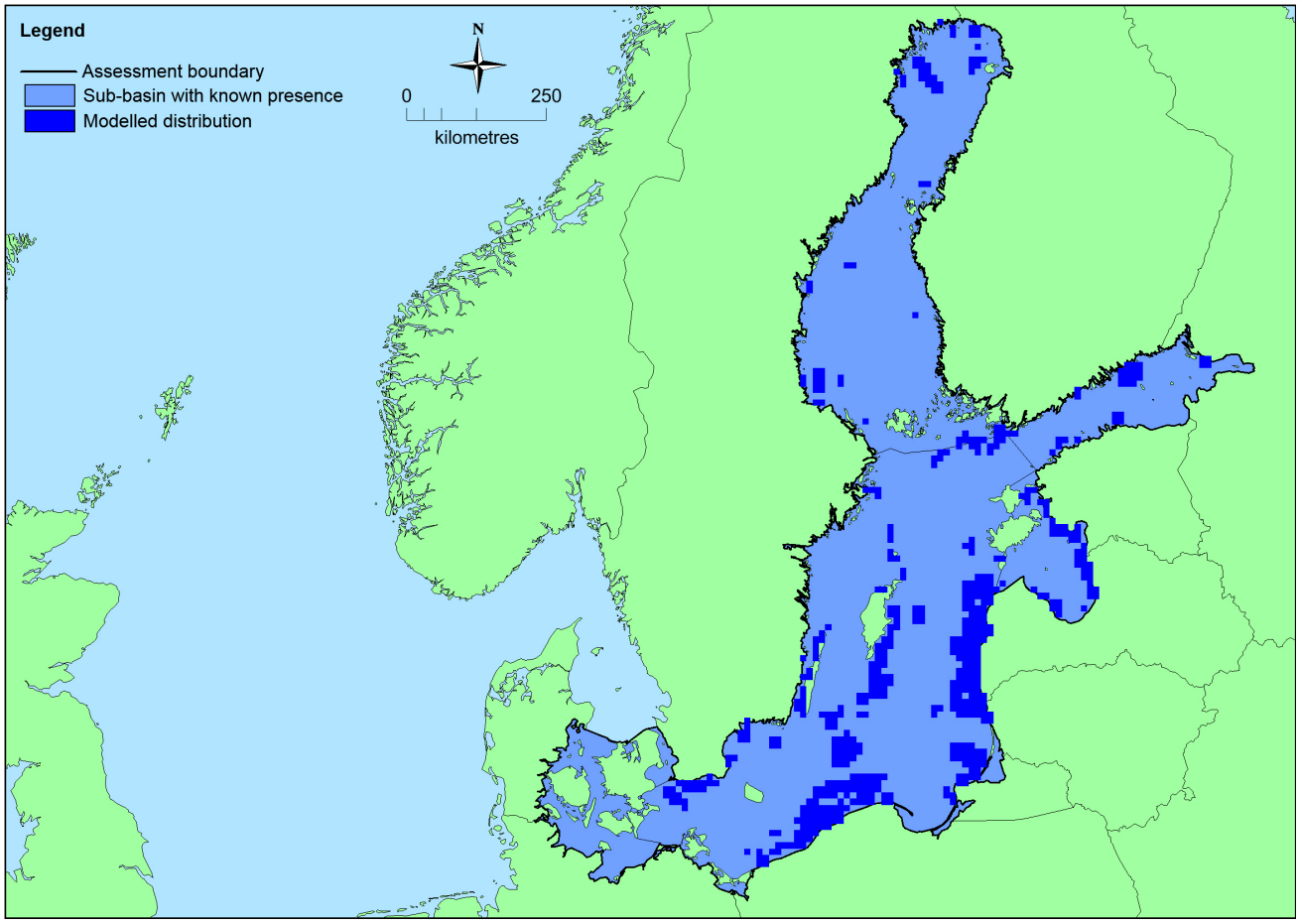
Geographic occurrence and trends

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	Unknown	Unknown Km^2	This habitat is present in all the Baltic sub-basins however there is insufficient information for accurate calculation of EOO and AOO.
EU 28+	>50,000 Km^2	Unknown	Unknown Km^2	This habitat is present in all the Baltic sub-basins however there is insufficient information for accurate calculation of EOO and AOO.

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. EOO and AOO cannot be calculated at the present time, although the habitat is known to occur in all the Baltic Sea sub-basins.

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. Similar habitats may occur in other European Regional Seas.

Trends in quantity

There has been a decline in quantity of the associated biotope which occurs on fine sand-like shell fragments. One other biotope is considered to be stable and the remaining two have not been evaluated. There is no data on which to base a historic trend assessment and estimates of future trends in quantity.

- Average current trend in quantity (extent)
  EU 28: Decreasing
  EU 28+: Decreasing
- Does the habitat type have a small natural range following regression?
  Unknown
  Justification
  The distribution of sand-like shell gravel bottoms in the Baltic Sea is largely unknown, with only a few small patches thought to be present in German waters. Known examples have declined due to degradation of the environmental quality caused by pollution and may degrade further in response to climate change.
- Does the habitat have a small natural range by reason of its intrinsically restricted area?

Unknown
Justification
The distribution of sand-like shell gravel bottoms in the Baltic Sea is largely unknown, only a few small patches thought to be present in German waters. The distribution of the habitat has declined due to degradation of the environmental quality caused by pollution and may degraded further in response to climate change.

Trends in quality

The distribution of sand-like shell gravel bottoms in the Baltic Sea is largely unknown, with only a few small patches thought to be present in German waters. Known examples have declined due to degradation of the environmental quality caused by pollution and may degrade further in response to climate change. There is insufficient information on which to determine any trends in overal quality of this habitat or any trends over the last 50 years.

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

Pressures and threats

Eutrophication and increase in atmospheric CO_2 leading to ocean acidification, are seen as the major threats to this habitat. Ocean acidification is assumed to increase the dissolving rate of the calcium carbonate in mollusc shells. It is however unclear how the process will affect the sand-like shell gravel. Due to higher acidity, shell gravel may be ground down to a sand-like substrate at increasing rates possibly making the sand like shell gravel more common. On the other hand, the increased acidity may also increase the dissolving rate of the grains thus decreasing the amount of sand-like shell gravel. Eutrophication affects the habitat adversely by increasing the organic load in the Baltic Sea. The increasing organic load can lead to local oxygen depletion.

List of pressures and threats

Pollution

Pollution to surface waters (limnic, terrestrial, marine & brackish)
Nutrient enrichment (N, P, organic matter)

Climate change

Changes in abiotic conditions
pH-changes

Conservation and management

The extent and occurrence of the biotope needs to be mapped in more detail to determine its environmental requirements. Measures to reduce eutrophication will benefit this habitat type.

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

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 associated biotopes AB.E3Y as NT(B1a(ii)) and AB.I3N3 as LC(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 are no qualitative estimates of the decline in this habitat but expert opinion is that in areas where shell gravel is the main substrate there have been declines of more than 25% in the last 50 years but overall the decline is not considered to reach the threshold for Near Threatened Status under Criterion A. This habitat has therefore been assessed as Least Concern 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	Unknown	Unknown	unknown	unknown	Unknown	Unknown	unknown	unknown
EU 28+	>50,000 Km^2	Unknown	Unknown	unknown	unknown	Unknown	Unknown	unknown	unknown

This habitat is present in all the Baltic sea basins therefore EOO exceeds 50,000km^2 however with no quantitative data on habitat extent or area, accurate calculation of EOO or AOO is not possible at the present time. 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 that estimates 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)

Assessors

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Contributors

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Reviewers
A.Darr.

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13/07/2015

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29/01/2016

References

HELCOM. 1998. Red List of marine and coastal biotopes and biotopes complexes of the Baltic Sea, Belt Sea and Kattegat. Baltic Sea Environmental Proceedings No. 75. Helsinki Commission, Helsinki. 115pp. Available at: http://www.helcom.fi/stc/files/Publications/Proceedings/bsep75.pdf

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