

Infaunal communities in Baltic upper circalittoral coarse sediment and shell gravel dominated by bivalves

Summary

This is a Baltic Sea benthic habitat in the upper circalittoral. The substrate is usually poorly sorted with different proportions of gravel, coarse or medium sand, but may also contain finer sediment fractions. Macrovegetation and epibenthic macrofauna are generally absent and the biomass is typically dominated by infaunal bivalves. The habitat is only present in the southern and western Baltic and the characteristic species vary along a salinity gradient and include the bivalves *Macoma calcarea*, *Mya truncata*, *Astarte* spp. *Spisula* spp., *Mya arenaria* and *Cerastoderma* spp. and polychaete species such as *Ophelia* spp. and *Travisia forbesii*.

Eutrophication, bottom trawling, water traffic, construction, sand extraction, dredging, dumping, contaminant pollution and coastal works have all been identified as past and current threats to this habitat. These are also likely to be threats in the future. Further mapping of the extent of this habitat is needed and bottom trawling and sediment extraction should be restricted in areas where it occurs. Measures to reduce eutrophication (and therefore associated oxygen depletion and sedimentation) will also benefit this habitat.

Synthesis

This habitat has a limited distribution in the Baltic, being confined to areas of high salinity where coarse sediments or shell gravel is also present. There is insufficient information on which to base a quantitative assessment of current area, and changes in quality and extent, however, expert opinion is that it has declined in area by approximately 25% during the past 50 years and that a continuing decline is likely. The quality of the habitat has in some areas shown moderate to severe reduction of 10-15% over the past 50 years and a further qualitative reduction of 10% is estimated over the next 50 years.

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 the two biotopes AB.I3L10 and AB.I3L11 as Near Threatened (A1).

Current expert opinion is that this habitat should be assessed as Vulnerable under Criterion B for both the EU 28 and EU 28+ because of its restricted distribution and predicted continuing decline although, because it is present in very few 'locations' (defined by the extent of the main threats), it could also be considered Endangered. This assessment should be reviewed when more detailed mapping of the extent of this habitat has been undertaken because the EOO and AOO calculations used to apply Criterion B are based on data derived from a general mapping exercise.

Overall Category & Criteria			
EU 28		EU 28+	
Red List Category	Red List Criteria	Red List Category	Red List Criteria
Vulnerable	B1,2,3	Vulnerable	B1,2,3

Sub-habitat types that may require further examination

AB.I3L10 Baltic aphotic coarse sediment dominated by multiple infaunal bivalve species: *Macoma calcarea*, *Mya truncata*, *Astarte* spp. *Spisula* spp.

AB.I3L11 Baltic aphotic coarse sediment dominated by multiple infaunal polychaete species including *Ophelia* spp.

Habitat Type

Code and name

Infaunal communities in Baltic upper circalittoral coarse sediment and shell gravel 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. The substrate is usually poorly sorted with different proportions of gravel, coarse or medium sand, but may also contain finer sediment fractions. Macrovegetation and epibenthic macrofauna are generally absent and the biomass is typically dominated by infaunal bivalves. This habitat occurs in high energy exposure areas and two associated biotopes with different dominant species of macrofauna (at least 50% of the biomass) have been described.

'Baltic aphotic coarse sediment dominated by multiple infaunal bivalve species: *Macoma calcaria*, *Mya truncata*, *Astarte* spp., *Spisula* spp.' (AB.I3L10) is mainly restricted to small patches between hard substrates on ridges formed by lag sediment and till (e.g. Fehmarnbelt) in the photic and aphotic zone. It supports a high species diversity and high biomass and only occurs in areas where the salinity exceeds 18 psu as all characteristic bivalve species are eumarine. For this reason it has only been reported from the Kiel Bight to Isle of Fehmarn, and occasionally present from Mecklenburg Bight to the Darss Sill.

'Baltic aphotic coarse sediment dominated by multiple infaunal polychaete species including *Ophelia* spp.' (AB.I3L11) is an associated biotope where biomass of bivalves still dominates but due to the large variety of interstitial space there is a specialised infauna, e.g., the polychaetes *Ophelia limacina*, *O. rathkei* and *Travisia forbesii*. This biotope is restricted to the Belt Sea (sandbanks) and parts of the 'submerged belt' of the Arkona Basin in the south-western Baltic 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 have been 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:

Depending on the biotope '*Macoma calcarea*, *Mya truncata*, *Astarte* spp., *Spisula* spp.' *Ophelia rathkei*, *Ophelia limacina*, *Travisia forbesii*, *Tanaissus* spp. and *Streptosyllis* spp.

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.I3L Baltic aphotic coarse sediment characterised by infaunal bivalves This habitat has two biotopes on HUB level 6; 'Baltic photic coarse sediment dominated by multiple infaunal bivalve species: *Macoma calcarea*, *Mya truncata*, *Astarte* spp., *Spisula* spp.' (AB.I3L10) and 'Baltic photic coarse sediment dominated by multiple infaunal polychaete species including *Ophelia* spp.' (AB.I3L11).

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

No

Justification

The habitat has a restricted range in the Baltic Sea and it mostly found in small patches surrounded by finer substrates.

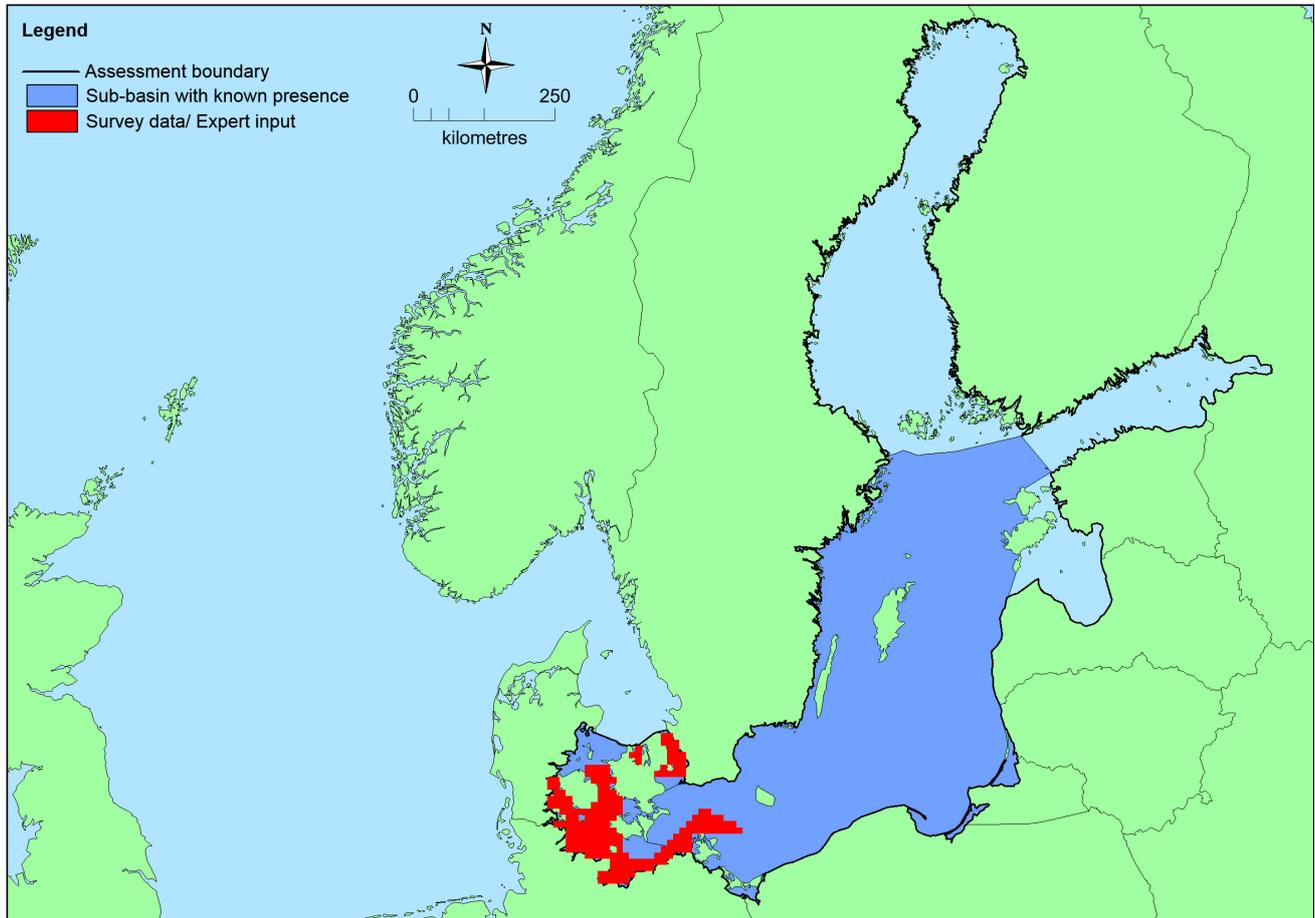
Geographic occurrence and trends

Region	Present or Presence Uncertain	Current area of habitat	Recent trend in quantity (last 50 yrs)	Recent trend in quality (last 50 yrs)
<i>Baltic Sea</i>	Baltic Proper: Present Belt Sea: 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
<i>EU 28</i>	49,150 Km ²	199	Unknown Km ²	Based on presence in 100 x 100km grid squares therefore maximum potential EOO and AOO
<i>EU 28+</i>	49,150 Km ²	199	Unknown Km ²	This habitat is only present in the EU28

Distribution map



This map is based on HELCOM mapping of the presence of this habitat in 100 x 100km cells that were converted to 10 x 10 km cells. The calculated EOO and AOO values therefore represent a maximum based on current information as the habitat may not occur in all these 10 x 10 km cells.

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

This habitat type does not occur in the Russian Baltic Sea area therefore 100% is hosted by EU 28. The habitat may occur in other European Regional Seas.

Trends in quantity

This habitat only occurs in the southern and western Baltic Sea, and the distribution of the two associated biotopes differs; 'Baltic aphotic coarse sediment dominated by multiple infaunal bivalve species: *Macoma calcarea*, *Mya truncata*, *Astarte* spp., *Spisula* spp.' (AB.I3L10) is found in the westernmost areas such as The Kattegat, The Belt Sea and The Sound. 'Baltic aphotic coarse sediment dominated by multiple infaunal polychaete species including *Ophelia* spp.' (AB.I3L11) is found in the southern areas of The Belt Sea and in a small area in the southern Baltic Proper. This habitat is considered to have declined by approximately 25% during the past 50 years. No quantitative historic data are available and no estimates have been made of future trends although continuing decline is predicted.

- Average current trend in quantity (extent)
EU 28: Decreasing
EU 28+: Decreasing
- Does the habitat type have a small natural range following regression?

Yes

Justification

This habitat has a small natural range and has decreased in quantity over the last 50 years.

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

Yes

Justification

Infralittoral shell gravel and coarse sediment areas are rare in the Baltic Sea.

Trends in quality

The quality of the habitat has in some areas shown moderate to severe reduction in quality of 10-15% over the past 50 years. A further reduction of around 10% is envisaged over the next 50 years.

- Average current trend in quality

EU 28: Decreasing

EU 28+: Decreasing

Pressures and threats

Eutrophication, bottom trawling, water traffic, construction, sand extraction, dredging, dumping, contaminant pollution and coastal works have all been identified as past and current threats to this habitat. These are also likely to be threats in the future.

The biotope 'Baltic aphotic coarse sediment dominated by multiple infaunal bivalve species: *Macoma calcarea*, *Mya truncata*, *Astarte* spp., *Spisula* spp.' (AB.I3L10) is threatened by oxygen deficiency often caused by eutrophication in combination with poor water exchange. Eutrophication also causes an increased growth rate in planktonic or annual algae which in turn causes an increase in organic load which threatens the habitat. An additional threat is increased siltation which can be caused by various construction activities such as dredging and dumping. This biotope occurs relatively close to land, and therefore an increased siltation rate can also be traced back to changes in land use, such as run-off from intensively farmed areas. 'Baltic aphotic coarse sediment dominated by multiple infaunal polychaete species including *Ophelia* spp.' (AB.I3L11) is mainly threatened by bottom trawling, oil and gas exploration and exploitation, pollution, offshore installations.

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)

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

Natural System modifications

Siltation rate changes, dumping, depositing of dredged deposits

Dumping, depositing of dredged deposits

Conservation and management

Bottom trawling and sediment extraction should be restricted in areas where this habitat occurs. All activities that can improve oxygen conditions through reduction of eutrophication will also support the conservation of the habitat. For the biotope 'Baltic aphotic coarse sediment dominated by multiple infaunal polychaete species including *Ophelia* spp.' (AB.I3L11) a Baltic-wide biotope inventory and a threat

assessment is needed. For the time being this biotope should be considered as highly sensitive and worthy of protection.

List of conservation and management needs

Measures related to spatial planning

Establish protected areas/sites

Measures related to special resource use

Regulating/Managing exploitation of natural resources on sea

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 the biotopes AB.I3L10 and AB.I3L11 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	25-30 %	unknown %	unknown %	unknown %
EU 28+	25-30 %	unknown %	unknown %	unknown %

This habitat only occurs in the southern and western Baltic and is therefore not present outside the EU 28 in the Baltic Sea. There is a lack of quantitative data on the area covered but it is considered to have reduced in extent by more than 25% in the last 50 years. This habitat has therefore been assessed as Near Threatened 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	49,150 Km ²	Yes	Yes	Yes	199	Yes	Yes	Yes	Yes

Criterion B	B1				B2				B3
	E00	a	b	c	A00	a	b	c	
EU 28+	49,150 Km ²	Yes	Yes	Yes	199	Yes	Yes	Yes	Yes

This habitat only occurs in the southern and western Baltic. E00 and A00 figures are maximums as they are based on presence in 100 x 100 km grid squares converted to 10 x 10km grid squares. Eutrophication and activities which disturb the seabed are threatening process which are considered likely to cause continuing declines in the quantity of this habitat within the next few years. This habitat has been assessed as Vulnerable under Criterion B for both the EU 28 and EU 28+ although because it is present in very few 'locations' (defined by threats) it could also be considered Endangered.

This assessment should be reviewed when more detailed mapping of the extent of this habitat has been undertaken because the E00 and A00 calculations are based on data derived from a general mapping exercise.

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	10-15 %	moderate to severe %	unknown %	unknown %	unknown %	unknown %
EU 28+	10-15 %	moderate to severe %	unknown %	unknown %	unknown %	u %

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%

The quality of the habitat has in some areas shown moderate to severe reduction of 10-15% over the past 50 years and a further qualitative reduction of 10% is estimated over the next 50 years however 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	VU	DD	DD	DD	DD	DD	DD	DD	DD	DD	DD	DD	DD
EU28+	NT	DD	DD	DD	VU	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
Vulnerable	B1,2,3	Vulnerable	B1,2,3

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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Date of review

29/01/2016

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