

Epifaunal communities on Baltic upper circalittoral coarse sediment and shell gravel

Summary

This is a Baltic Sea benthic habitat in the aphotic zone where at least 90% of the substrate is shell gravel or coarse sediment. The habitat typically occurs below 20m and is mostly encountered in high energy exposure areas. In offshore areas shell gravel bottoms are mainly found permanently at the same location whereas closer inshore they are more likely to shift dynamically from one location to another. Areas of shell gravel dominated by Mytilidae are restricted to the Baltic Proper and the Belt Sea and areas dominated by the vase tunicate (*Ciona intestinalis*) have only been reported from the Belt Sea. Sessile/semi-sessile epibenthic bivalves/epibenthic chordates cover at least 10% of the seabed and more than other perennial attached erect groups.

Oxygen depletion and increased siltation caused by eutrophication are believed to be main pressures on this habitat while bottom trawling threatens the physical integrity of the habitat. The predicted ocean acidification caused by the increasing atmospheric CO₂ is a potential future threat as the natural degradation process of the calcium-carbonate shell gravel may accelerate. Additional threats are the effects of hazardous substances on the associated communities, and physical disturbance of the seabed associated with offshore installations and sand or gravel extraction. Improved mapping of the distribution of this habitat is needed to improve understanding of its environmental requirements. The area where the biotopes associated with shell gravel occur should be protected by prohibiting bottom trawling and other seabed disturbing activities. The oxygen conditions of the habitat need to be improved by reducing activities which lead to eutrophication.

Synthesis

The overall extent of this habitat is unknown although some biotopes are considered to have been stable over the last 50 years (aphotic shell gravel dominated by Mytilidae) and others (aphotic shell gravel dominated by vase tunicate) to have reduced in quantity by more than 25%. There is insufficient information on the quality of this habitat at the present time or over the last 50 years to reach a view on potential trends in 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 biotopes AB.E1E1 and AB.I1E1 as Least Concern (A1). Biotope AB.E1F1 was assessed as Vulnerable (B1aii) . Three biotopes (AB.E1V, AB.E2T and AB.I1V) were not evaluated. There is no quantitative data on the decline of the associated biotopes but given the past and predicted future pressures, most specifically where the substrate is comprised of shell gravel, expert opinion is that this habitat should be assessed as Near Threatened (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
Near Threatened	A1	Near Threatened	A1

Sub-habitat types that may require further examination

AB.E1F1 Baltic aphotic shell gravel dominated by vase tunicate (*Ciona intestinalis*)

Habitat Type

Code and name

Epifaunal communities on Baltic upper circalittoral coarse sediment and shell gravel

No characteristic photographs of this habitat currently available.

Habitat description

This is a Baltic Sea benthic habitat in the aphotic zone where at least 90% of the substrate is coarse sediment or shell gravel according to the HELCOM HUB classification. Sessile/semi-sessile epibenthic bivalves/epibenthic chordates cover at least 10% of the seabed and more than other perennial attached erect groups. The habitat typically occurs below 20m and is mostly encountered in high energy exposure areas. In offshore areas shell gravel bottoms are mainly found permanently at the same location whereas closer inshore they are more likely to shift dynamically from one location to another.

Six associated biotopes have been described; 'Baltic aphotic shell gravel dominated by epibenthic bivalves (AB.E1E) where there is one sub-habitat with a large representation (at least 50% of the biomass) of Mytilidae' (AB.E1E1) and 'Baltic photic shell gravel characterised by epibenthic chordates (AB.E1F) with a sub-habitat dominated by vase tunicate (*Ciona intestinalis*) (AB.E1F1)'. The latter, which is only, present in the Belt Sea, occurs in areas where the bottom consists largely of mollusc shells or small shell fragments, often in small patches along with other sediments. Due to the combination of the extended interstitial space and the presence of biotic hard substrates, it is inhabited by a unique combination of endobenthic and epibenthic species, such as the vase tunicate (*Ciona intestinalis*). In these habitats coverage of epibenthic chordates is at least 10% of the sea floor, of which vase tunicate (*Ciona intestinalis*), which is largely annual in the Baltic, often constitutes at least 50% of the biomass. The tunicates might be overgrown by *Ectocarpus* spp. or *Desmarestia* spp. during summer in the photic zone.

There are also associated aphotic shell gravel and coarse sediment biotopes characterised by mixed epibenthic communities (AB.I1V & AB.E1V) by epibenthic bivalves (AB.I1E) and shell gravel characterised by a sparse epibenthic macrocommunities (AB.E2T).

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:

Mytilus spp., *Modiolus modiolus*, *Ciona intestinalis*, *Hediste diversicolor*

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.E1E-Baltic aphotic shell gravel characterized by epibenthic bivalves. This habitat has one sub-habitat on HUB level 6; 'Baltic aphotic shell gravel dominated by Mytilidae' (AB.E1E1).

AB.E1F-Baltic aphotic shell gravel characterized by epibenthic chordates. This habitat has one sub-habitat on HUB level 6; Baltic photic shell gravel dominated by vase tunicate (*Ciona intestinalis*) (AB.E1F1).

AB.E1V-Baltic aphotic shell gravel characterized by mixed epibenthic macrocommunity.

AB.E2T-Baltic aphotic shell gravel characterized by sparse epibenthic macrocommunity

AB.I1E-Baltic aphotic coarse sediment characterized by epibenthic bivalves One sub-biotope has been identified: 'Baltic aphotic coarse sediment dominated by Mytilidae' (AB.I1E1).

AB.I1V-Baltic aphotic coarse sediment characterized by mixed epibenthic macrocommunity.

OSPAR list of threatened biotopes: *Modiolus modiolus* beds. The habitat occurs in the OSPAR Region II (including Kattegat) and is listed threatened and/or declining in this region.

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

Unknown

Justification

One of the associated biotopes Baltic aphotic shell gravel dominated by Mytilidae is considered a special habitat in the Baltic Sea. It is currently not possible to determine if the other associated biotopes or whether the habitat is typical of the Baltic.

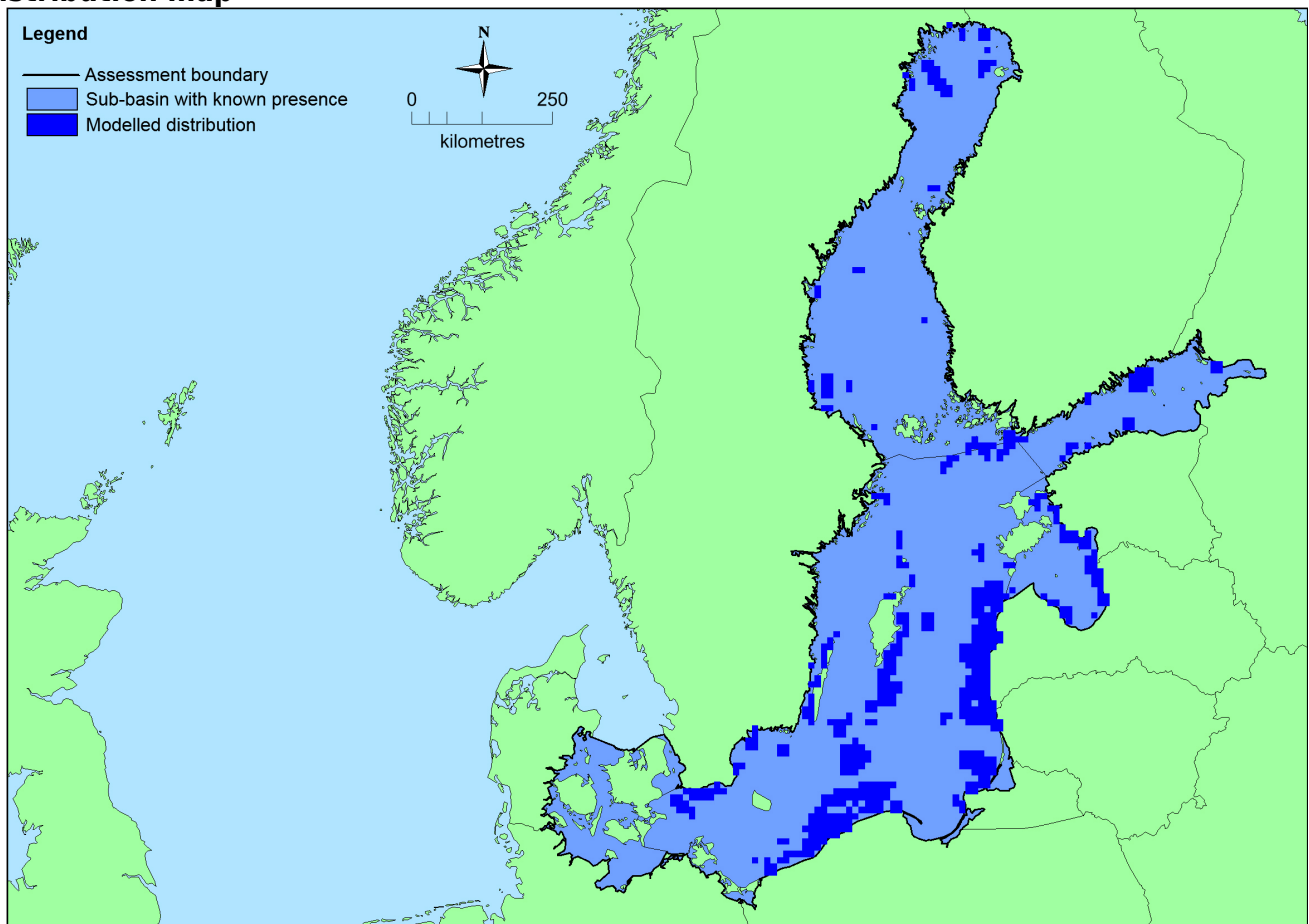
Geographic occurrence and trends

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 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
<i>EU 28</i>	>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.
<i>EU 28+</i>	>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?

Overall unknown, although one associated biotope (shell gavel dominated by the vase tunicate) only occurs in areas hosted by EU 28.

Trends in quantity

Overall the extent of this habitat is unknown. Some biotopes are considered to have been stable over the last 50 years (aphotic shell gravel dominated by Mytilidae) and others (aphotic shell gravel dominated by vase tunicate) to have reduced in quantity by more than 25%.

- 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

At least one of the associated biotopes (shell gravel dominated by vase tunicate) is believed to have a small natural range (<50,000km²) and reduced in distribution. Overall this habitat does not have a small natural range and current trend considered to be stable.

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

No

Justification

This habitat does not have a small natural range.

Trends in quality

There is insufficient information on the quality of this habitat at the present time or over the last 50 years to reach a view on potential trends in quality.

- Average current trend in quality

EU 28: Unknown

EU 28+: Unknown

Pressures and threats

Oxygen depletion and increased siltation caused by eutrophication are believed to be main pressures on this habitat. Bottom trawling also threatens the physical integrity of the habitat. The predicted ocean acidification caused by the increasing atmospheric CO₂ is a potential future threat as the natural degradation process of the calcium-carbonate shell gravel may accelerate if the water becomes more acidic. Additional threats are the effects of hazardous substances on the associated communities introduced to the Baltic Sea via pollution, and physical disturbance of the seabed associated with offshore installations and sand or gravel extraction. The effects of these are however assumed to be smaller than that posed by eutrophication.

List of pressures and threats

Mining, extraction of materials and energy production

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

Natural System modifications

Human induced changes in hydraulic conditions

Removal of sediments (mud...)

Extraction of sea-floor and subsoil minerals (e.g. sand, gravel, rock, oil, gas)

Siltation rate changes, dumping, depositing of dredged deposits

Dumping, depositing of dredged deposits

Climate change

Changes in abiotic conditions

pH-changes

Conservation and management

The distribution of this habitat should be mapped to gain better understanding of its environmental requirements. The area where the biotopes associated with shell gravel occur should be protected by prohibiting bottom trawling and other seabed disturbing activities. The oxygen conditions of the habitat need to be improved by reducing activities which lead to eutrophication.

List of conservation and management needs

Measures related to wetland, freshwater and coastal habitats

Restoring/Improving water quality

Measures related to hunting, taking and fishing and species management

Regulation/Management of fishery in marine and brackish systems

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) assessed biotopes AB.E1E1 and AB.I1E1 as LC(A1). Biotope AB.E1F1 was assessed as VU (B1a(ii)). Three biotopes (AB.E1V, AB.E2T and AB.I1V) were not evaluated.

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 %

There is considered to have been a decline in extent of more than 25% one of the six associated biotopes. Two others were also considered to have declined, but by less than 25% and three were not evaluated in the HELCOM (2013) red list assessment. This habitat has therefore been assessed as Near Threatened under criterion 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

Present in all the Baltic sea basins therefore EOO exceeds 50,000km² 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.

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	LC	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	LC	DD	DD	DD	DD

Overall Category & Criteria	
EU 28	EU 28+

Overall Category & Criteria			
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)

Assessors

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Contributors

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Reviewers

A. Darr.

Date of assessment

13/07/2015

Date of review

29/01/2016

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