

Communities on Baltic infralittoral clay and other hard substrata

Summary

This habitat is typified by epibenthic communities in the photic zone, including those created by mussels, that occur on hard clay, marlstone rock, ferromanganese concretions and peat. It occurs in all the Baltic Sea sub-basins but the distribution and abundance of the associated biotopes varies. Hard clay is the most widespread whereas submerged peat, formed some 8,000 years ago as sea levels rose, is the rarest and only reported from the southern Baltic off the coasts of Germany and Denmark. Areas where the seabed is comprised of ferromanganese concretions do not occur in the Belt Sea while areas of marlstone rock occur in the Baltic Proper, Belt Sea and The Sound. Activities causing physical disturbance to bottom sediments (bottom trawling, construction work, sand and gravel extraction, mineral extraction and coastal defence works), are both current and future threats to this habitat. Restoring/improving water quality and introducing controls on damaging activities, including regulation in protected areas would be beneficial.

Synthesis

This habitat is present in all sub-basins of the Baltic Sea and therefore EOO exceeds 50,000km². There is a lack of data on quality and extent of this habitat although there has been an estimate of decline of the peat biotope of more than 25% over the last 50 years and overall a significant decline (>25%) over the last 50 years. The lack of quantitative data on extent, quality and trends over time means that accurate calculations of EOO and AOO are not possible at the present time. This Red List assessment has therefore been based on expert opinion.

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 three relevant associated biotopes (AA.B1E1, AA.C and AA.F) as Least Concern (A1), Baltic peat bottoms (AA.G) (which is rare and restricted to a comparably small area of the Baltic) was assessed as Vulnerable (B2b) and three other biotopes were not evaluated (AA.B1V, AA.B2T and AA.B4U). All the associated biotopes are considered to have declined to some extent over the last 50 years therefore expert opinion is that overall the habitat is Near Threatened for 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

AA.G Baltic photic peat bottoms because of the rarity of the substrate “peat bottom” and the spatial restriction to a specific and comparably small area of the Baltic. AOO of this habitat is less than 50 as the environmental conditions (subfossil bottom morphology and currents) to enable peat bottoms exist only within very few and spatially restricted localities.

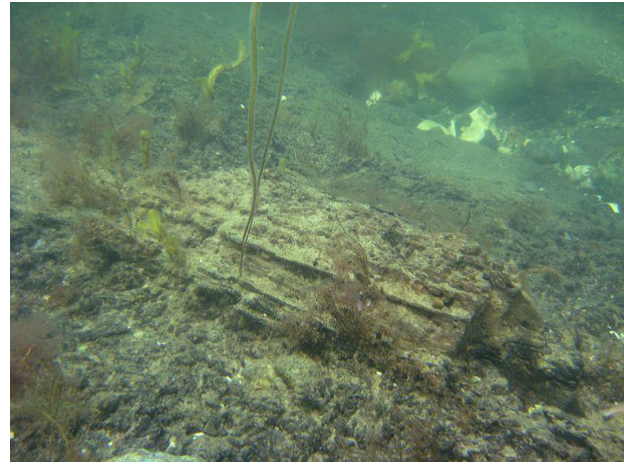
Habitat Type

Code and name

Communities on Baltic infralittoral clay and other hard substrata



Protruding peat bottom rim/edge at Zingst, Mecklenburg- Western Pomerania (© K.Fürhaupter, MariLim GmbH).



Peat bottom with enclosed wood piece and attached juvenile *Fucus* spp., *Chorda filum* and filamentous algae (© K.Fürhaupter, MariLim GmbH).

Habitat description

This is a Baltic Sea benthic habitat in the photic zone with at least 90% coverage of hard clay, marlstone rock, ferromanganese concretions and/or peat according to the HELCOM HUB classification. Sessile/semi-sessile epibenthic bivalves cover of at least 10% of the seabed and no perennial attached erect group has more than 10% coverage. In some cases macrovegetation or macrofauna may be absent. The habitat is typically encountered in high energy exposure areas. Seven associated biotopes have been identified. Four of these are associated with areas of hard clay and may be dominated (at least 50% of the biomass) by Mytilids (*Mytilus* spp., *Modiolus modiolus*), have a mixed epibenthic macrocommunity, a sparse epibenthic macrocommunity or have no dominant macrocommunity (AA.B1E1, AA.B1V, AA.B2T and AA.B4U). The marlstone rock habitat 'AA.C: Baltic photic marl' is only present in the Baltic proper, Belt Sea and the Sound and 'AA.F: Baltic photic ferromanganese concretion bottoms' which is typically found below 10m occurs in Baltic proper, Gulf of Bothnia, Gulf of Finland, Gulf of Riga. 'AA.G: Baltic photic peat bottoms' which occurs in the Baltic proper and Belt Sea, has developed where marine erosion processes along the German and Danish coastline have laid these subfossil substrates bare. It is found salinity ranges between 7 and 18 psu, at all exposure classes and at depths from 0-20m. Knowledge about the latter biotope is scarce but the surface can be covered by filamentous annual algae and single juvenile *Fucus* spp. or *Chorda* spp. specimens. Normally peat bottom lacks epibenthic communities and only some specialised burrowing bivalves like *Barnea candida* or *Zirfaea crispata* may penetrate into the peat.

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 dominate species and associated fauna are potential indicators of quality of this habitat.

Characteristic species:

Mytilus spp., and *Modiolus modiolus* in hard clay dominated areas. *Barnea candida*, *Zirfaea crispata*, and macrophytes on peat dominated areas.

Classification

EUNIS:

The closest correspondence in EUNIS (2004) level 4 is A3.4 Baltic exposed infralittoral rock, A3.5 Baltic moderately exposed infralittoral rock and A3.6 Baltic sheltered infralittoral rock .

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:

1160 Large shallow inlets and bays

1170 Reefs

1650 Boreal Baltic narrow inlets

MAES:

Marine - Marine inlets and transitional waters

Marine - Coastal

MSFD:

Shallow sublittoral rock and biogenic reef

EUSeaMap:

Shallow photic rock or biogenic reef

IUCN:

9.2 Subtidal rock and rocky reefs

Other relationships:

Level 6 of the HELCOM HUB classification (2013):

AA.B1E1 Baltic photic hard clay dominated by Mytilidae

AA.B1V Baltic photic hard clay characterized by mixed epibenthic macrocommunity

AA.B2T Baltic photic hard clay characterized by sparse epibenthic macrocommunity

AA.B4U Baltic photic hard clay characterized by no macrocommunity

Level 3 of the HELCOM HUB classification (2013):

AA.C: Baltic photic marl (marlstone rock) only present in the Baltic proper, Belt Sea and the Sound

AA.F: Baltic photic ferromanganese concretion bottoms

AA.G: Baltic photic peat bottom

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

No

Justification

One of the associated biotopes, hard clay with epibenthic bivalves, typically *Mytilus* spp. or *Modiolus modiolus*, may be characteristic of the Baltic Sea, but the other types (marlstone rock, ferromanganese concretions and peat) do occur in other regional seas.

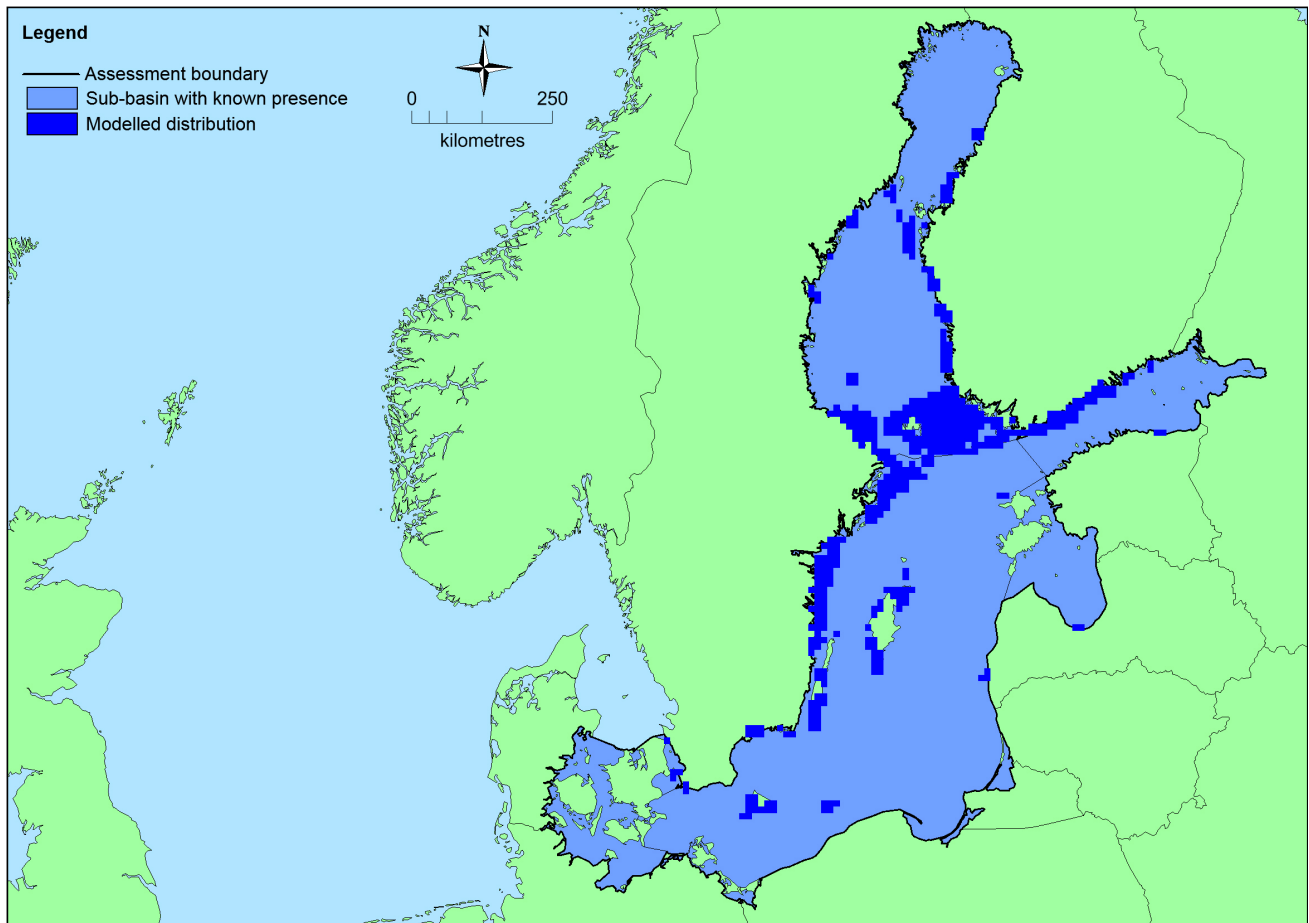
Geographic occurrence and trends

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 sub-basins.

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

There are some differences in distribution of the associated biotopes. For example modelling suggests that around 70% of the hard clay biotope is hosted by EU28 in the Baltic while distribution records show all the peat biotope is hosted by EU28. A minimum estimate is therefore that 70% of this habitat is hosted by EU28. Similar habitats do occur in other European regional seas.

Trends in quantity

There is a lack of quantitative data on the area covered by this habitat but some estimates have been made on the basis of modelling work (e.g. an area estimate for photic clay in the Baltic of 3,557km²). All the associated biotopes are considered to have declined to some extent over the last 50 years (more than 25% in the case of the peat biotopes and in the case of hard clay approximately 10% in some areas of the Belt Sea and southern Baltic Proper).

- 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

The associated peat biotope is spatially very restricted but overall this habitat is widely distributed occurring in all the Baltic sub-basins therefore with an estimated EOO of >50,000km².

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

No

Justification

This habitat is present in all the Baltic Sea sub-basins therefore does not have a small natural range.

Trends in quality

There is a lack of quantitative data on which to determine any trends in quality of this habitat over the last 50 years.

- Average current trend in quality

EU 28: Unknown

EU 28+: Unknown

Pressures and threats

Coastal and offshore construction works which increase the suspended sediment load in the water column can smother benthic communities associated with this habitat. Similar effects may result from eutrophication (through increase in N, P and organic matter loads). Dredging can cause more direct damage and the development of an industry for the extraction of ferromanganese concretions from the seabed is a possible future threat.

List of pressures and threats

Biological resource use other than agriculture & forestry

Fishing and harvesting aquatic resources

Benthic or demersal trawling

Benthic dredging

Pollution

Pollution to surface waters (limnic, terrestrial, marine & brackish)

Nutrient enrichment (N, P, organic matter)

Natural System modifications

Human induced changes in hydraulic conditions

Removal of sediments (mud...)

Estuarine and coastal dredging

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

Other human induced changes in hydraulic conditions

Conservation and management

Restoring/improving water quality and establishing protected areas can benefit this habitat as can introducing controls on activities such as bottom trawling, sand, gravel and mineral extraction which cause direct damage to the substrate and the associated communities.

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

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:

1160: MBAL U2

1650: MBAL U2

1170: MBAL U1

HELCOM (2013) assessments:

1160 (VU,C1)

1170 (VU,C1)

1650 (VU,C1)

HELCOM (2013) assessed three of seven relevant Baltic biotopes (AA.B1E1, AA. C and AA.F) as LC (A1). AA.G Baltic photic peat bottoms was assessed as VU(B2b). A further three biotopes (AA.B1V, AA.B2T and AA.B4U) were not evaluated by HELCOM. This habitat includes *Modiolus modiolus* beds which is on the OSPAR list of threatened biotopes. It is encountered in the OSPAR Region II (including Kattegat) where it is listed threatened and/or declining.

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

Not where the underlying substrate (peat, marlstone rock, ferromanganese concretions) have been removed, however this habitat is not well studied therefore capacity to recover is largely 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 %

All the biotopes associated with this habitat are considered to have declined to some extent over the last 50 years. Expert opinion is that the overall decline has been between 25-30% therefore this habitat has been assessed as Near Threatened under Criteria A.

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 sub-basins therefore EOO exceeds 50,000 km². Accurate calculation of EOO and AOO is not possible at the present time therefore this habitat has been assessed as Data Deficient under criteria 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 consider 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

Overall Category & 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

T.A. Haynes.

Date of assessment

03/07/2015

Date of review

17/12/15

References

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