

Stable aggregations of unattached perennial vegetation on Baltic infralittoral sand

Summary

This habitat occurs in all the sub-basins of the Baltic but is more typically found in sheltered areas. The unattached forms can coexist with attached forms and the characteristic rooted vegetation of bays, estuaries and lagoons. The algae provide shelter and surface for attachment of invertebrates however, if abundances of the unattached form are very high, the sediment below may become deoxygenated and the associated infauna may die.

There are distribution records for the characteristic species, some area estimates, but incomplete quantitative data to determine the overall area of the habitat in the Baltic. Eutrophication and its connected impacts/threats associated with decreased light penetration depth, massive growth of filamentous algae and increased sedimentation/siltation is a significant threat. Coastal construction (ditching, deepening of harbour access channels, leisure facilities) and increased tourism has led to a further degradation with the threat level particularly high in the Western and Southern Baltic Sea. In the future climate change (increasing exposure levels, temperatures) or increasing aquaculture in bays may be additional threats. Combating local sources of eutrophication (mainly from agriculture) as well as restrictions on aquaculture, coastal construction and dredging in shallow coastal lagoons and archipelago areas can prevent degradation of this habitat.

Synthesis

The biotope characterised by the 'typical' form of *Fucus*, which represents most of this habitat, is known to have suffered a decline in extent e.g. 20% over the past 50 years in some areas. The unattached *Fucus* dwarf form biotope is rare, and comparisons of historical records with the present distribution in German coastal lagoons give hints to a decline of >25% during the last 50 years. On the Swedish coast the decline is considerably larger. The third associated biotope is possibly under recorded but at the present time is thought to cover less than 1km².

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 unattached dwarf form of *Fucus* (AA.J1Q2) as Endangered (A1). The other biotopes (AA.J1Q1 and AA.J1Q3) were assessed as Least Concern (A1). The dwarf form biotope is believed to constitute less than 5% of this habitat consequently the overall assessment based on expert opinion is Least Concern 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

AA.J1Q2 Baltic photic sand dominated by stable aggregations of unattached *Fucus* spp. (dwarf form).

Habitat Type

Code and name

Stable aggregations of unattached perennial vegetation on Baltic infralittoral sand



Unattached ball-shaped *Fucus* dwarf form on sandy substrate. (© K.Fürhaupter, MariLim GmbH).



Unattached ball-shaped *Furcellaria* form (*Furcellaria*) on sandy substrate from Schlei Fjord, Germany (© K.Fürhaupter, MariLim GmbH).

Habitat description

This benthic Baltic Sea habitat occurs in the photic zone with at least 90% coverage of sand according to the HELCOM HUB classification. Stable aggregations of unattached perennial vegetation covers at least 10%, while perennial attached erect groups or *Mytilus* cover less than 10% of the bottom. This habitat is rare, but can be found in most of the Baltic Sea area where the salinity is <10 or 5 psu (depending on the area), the exposure is moderate to sheltered and the seabed is level over wide areas within the photic zone.

Three associated biotopes with different dominant species of vegetation (at least 50% of the biovolume of the unattached perennial vegetation) have been identified (*Fucus* spp. (typical or dwarf form) and *Furcellaria lumbricalis*). 'Baltic photic sand dominated by stable aggregations of unattached *Fucus* spp. (typical form)' (AA.J1Q1) is encountered down to a depth of 5 meters and 'Baltic photic sand dominated by stable aggregations of unattached *Furcellaria lumbricalis*' (AA.J1Q3) down to a depth of 10 meters. Unattached *Furcellaria lumbricalis* may occur in specific, ball-shaped morphology adapted to soft bottom conditions. For the biotope 'Baltic photic sand dominated by stable aggregations of unattached *Fucus* spp. (dwarf form)' (AA.J1Q2) the single plants can be loosely anchored in the sediment with its lower, dark brownish parts. Under more exposed conditions plants form a ball-shaped form, able to roll over the sea bottom. The *Fucus* dwarf forms coexist with attached *F. vesiculosus*, unattached *Furcellaria lumbricalis*, higher plants like *Ruppia* spp., *Zannichellia palustris*, *Stukenia pectinatus*, *Zostera* spp. and several charophytes. The unattached thalli can cover the sediment up to about 10 cm height and thus form a three-dimensional habitat comparable to the interstitial space in coarse sediments. Epifauna is seldom attached to the *Fucus* dwarf form, but inbetween the loose lying thalli mobile gastropods, amphipods and insects look for shelter and food. However, if abundances of the unattached form are very high, the sediment below becomes deoxygenated and the associated infauna below the *Fucus* layer may die. Presently this biotope is only known to occur in Sweden and Germany. In Germany it exists only in very few coastal lagoons with low to moderate eutrophication pressures and salinities of around 7-10 psu.

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. For this habitat the density of unattached *Fucus* spp. (typical and dwarf forms), lower limit of *Furcellaria* belt, amount of epiphytic algae, and density of *Furcellaria* are potential indicators of quality.

Characteristic species:

Fucus spp., *Furcellaria lumbricalis* with morphologically typical forms and specific soft bottom, ball-shaped morphologies.

Classification

EUNIS:

The closest correspondence in EUNIS (2004) level 4 is A5.21 Sublittoral sand in low or reduced salinity or A5.52 Kelp and seaweed communities on sublittoral sediment

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:

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 sediment - sand

EUSEaMap:

Shallow sands

IUCN:

9.4 Subtidal sandy

9.7 Macroalgal/Kelp

9.10 Estuaries

Other relationships:

Level 5 of the HELCOM HUB classification (2013).

AA.J1Q Baltic photic sand characterized by stable aggregations of unattached perennial algae

This habitat has three sub-habitats on HUB level 6;

'Baltic photic sand dominated by stable aggregations of unattached *Fucus* spp. (typical form)' (AA.J1Q1)

'Baltic photic sand dominated by stable aggregations of unattached *Fucus* spp. (dwarf form)' (AA.J1Q2)

'Baltic photic sand dominated by stable aggregations of unattached *Furcellaria lumbricalis*' (AA.J1Q3)

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

Yes

Regions

Baltic

Justification

The typical species may be found in other regional seas but the unattached forms for soft bottom habitats, especially the ball-shaped morphologies of *Fucus* and *Furcellaria* that are characteristic of this habitat, are unique to the Baltic Sea.

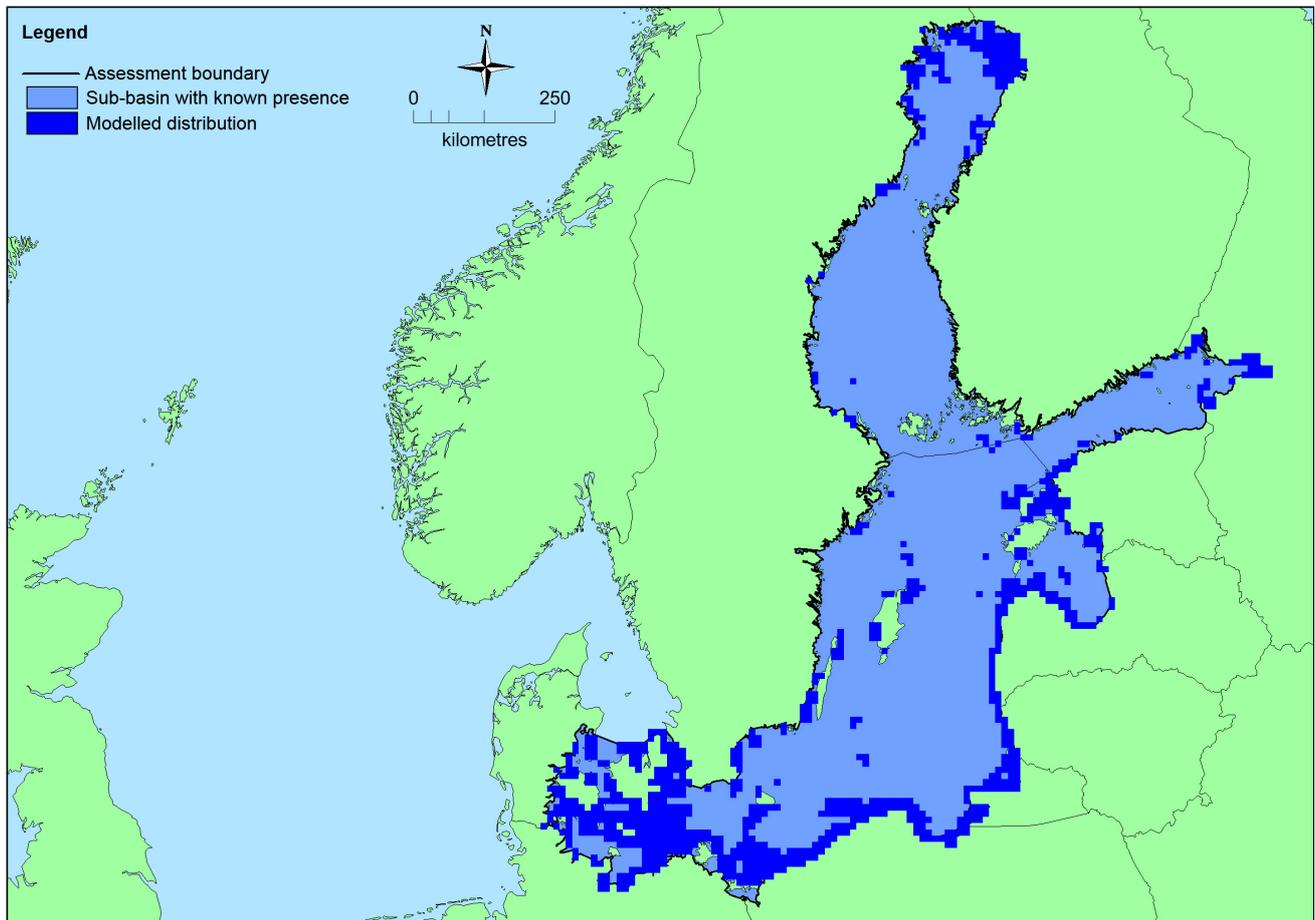
Geographic occurrence and trends

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
EU 28	> 50,000 Km ²	Unknown	Unknown Km ²	
EU 28+	>50,000 Km ²	Unknown	Unknown Km ²	

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) supplemented with expert input. 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

The habitat is present in all the Baltic Sea sub-basins but is rare and the associated biotopes have a more limited distribution. AA.J1Q1 'Baltic photic sand dominated by stable aggregations of unattached *Fucus* spp. (typical form)' can be found in northern Bothnian Sea. AA.J1Q2 'Baltic photic sand dominated by stable aggregations of unattached *Fucus* spp. (dwarf form)' can only be found in the southern Baltic Proper in the German coast. AA.J1Q3 'Baltic photic sand dominated by stable aggregations of unattached *Furcellaria lumbricalis*' can be found in the Belt Sea and the German part of the southern Baltic Proper. AA.J1Q2 'Baltic photic sand dominated by stable aggregations of unattached *Fucus* spp. (dwarf form)' is estimated to have reduced more than 50% over the past 50 years. The same changes in the environment have an effect on all the other associated biotopes. Historical trends are unknown and it can be expected that the potential area of occurrence will be reduced in the future due to eutrophication and climate change.

- 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 this habitat does not have a small range, but one of the associated biotopes (where the dwarf form of *Fucus* spp. dominates) does have a small range following regression.

- 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 and therefore does not have a small natural range.

Trends in quality

AA.J1Q2 'Baltic photic sand dominated by stable aggregations of unattached *Fucus* spp. (dwarf form)' has shown a severe decline in quality in 20% of the area. There is insufficient information on which to determine quality changes in the habitat dominated by other species of unattached perennial vegetation or of past or future trends in quality of this habitat.

- Average current trend in quality

EU 28: Unknown

EU 28+: Unknown

Pressures and threats

Past and current threats are eutrophication, contaminant pollution and the introduction of toxic substances. There has also been some commercial exploitation of the unattached macroalgae in Poland and there is still commercial exploitation from the *Furcellaria* biotope in Estonia.

Observed declines of the spatial distribution of the unattached *Fucus* spp. dwarf form biotopes are mainly caused by increased eutrophication and its connected impacts/threats. Decreased light penetration depth, massive growth of filamentous algae and increased sedimentation/siltation cause massive alterations in the habitat conditions of sheltered coastal zones. The enclosed characteristic of bays and lagoons intensify the eutrophication impacts. Coastal construction (ditching, deepening of harbour access channels, leisure facilities and increased tourism has led to a further degradation of the biotope. The threat level is particularly high in the Western and Southern Baltic Sea. In the future climate change (increasing exposure levels, temperatures) or increasing aquaculture in bays may cause additional threats.

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

Climate change

Changes in abiotic conditions

Temperature changes (e.g. rise of temperature & extremes)

Wave exposure changes

Sea-level changes

Changes in biotic conditions
Habitat shifting and alteration

Conservation and management

Combatting local sources of eutrophication (mainly agriculture) as well as conservation measures, such as restrictions on coastal constructions and dredging, in shallow coastal lagoons and archipelago areas can prevent further decline 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

Conservation status

Annex 1:

1130: MBAL U2

1160: MBAL U2

1650: MBAL U2

HELCOM (2013) assessments:

1130 CR C1

1150 CR C1

1160 VU C1

1650 VU C1

HELCOM (2013) have assessed the associated biotope AA.J1Q2 as EN(A1) and AA.J1Q1 and AA.J1Q3 as LC(A1).

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

The characteristic species *Fucus vesiculosus* and *Furcellaria lumbricalis* have a natural reproduction cycle of 1-2 years, but they take several years to reach full size. Given that the environmental conditions are favourable and there is a seed population available, the habitat can recover in the time from few years to a decade.

Effort required

10 years
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 %

Some localised loss has been reported (e.g. Puck Bay, Poland) particularly for the dwarf form of unattached *Fucus* spp. Although information about the unattached *Fucus* dwarf form biotopes is rare, comparisons of historical records with the present distribution in German coastal lagoons give hints to a decline of >25% during the last 50 years. On the Swedish coast the decline is considerably larger (>50%). The dwarf *Fucus* biotope is believed to make up less than 5% of this habitat type, therefore current expert opinion is that overall reduction in quantity is less than 25%. This habitat has therefore been assessed as Least Concern 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							
EU 28+	>50,000 Km ²	Unknown							

Comprehensive quantitative data on the extent and area covered by this habitat is not available but there are some relevant records such as quotas and landings from the commercial collection of unattached seaweed in Estonia, and modelling studies e.g. from the Asko area of Sweden. Some localised loss has been reported (e.g. Puck Bay, Poland) particularly for the dwarf form of unattached *Fucus* spp. Because it is present in all the Baltic sea sub-basins the EOO exceeds 50,000km². Although some potential trends have been identified, there is also a lack of information on which to base any estimation of future trends in geographical distribution or threatening processes. Experts therefore consider this habitat to be 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%

The biotope AA.J1Q2 'Baltic photic sand dominated by stable aggregations of unattached *Fucus* spp. (dwarf form)' has shown a severe decline in quality in 20% of the area where it occurs however, as there is insufficient information to determine changes in quality for the habitat overall, experts considered this habitat to be Data Deficient under 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	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

K. Fürhaupter.

Date of assessment

10/07/2015

Date of review

07/01/2016

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