

## Stable aggregations of unattached perennial vegetation on Baltic infralittoral muddy sediment

### Summary

This habitat occurs in all the sub-basins of the Baltic Sea but is more typically found in sheltered areas. 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. The unattached forms of associated algae can coexist with attached forms and the characteristic rooted vegetation of bays, estuaries and lagoons.

Decreased light penetration depth, massive growth of filamentous algae and increased sedimentation/siltation believed to be associated with eutrophication has led to massive alterations in the habitat conditions of sheltered coastal zones where this habitat occurs. 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 habitat. 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. Combating 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.

### Synthesis

There have been significant declines in the biotope dominated by the typical form of *Fucus* which is characteristic of most of this habitat e.g. an estimated 20% decline 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 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.H1Q2) as Endangered (A1). The other biotopes (AA.H1Q1, AA.JHQ3, AA.H1Q4 and AA.H1Q5) were assessed as Least Concern (A1). The dwarf form is believed to constitute perhaps 1% of this habitat, consequently the overall assessment for this habitat type is Least Concern for both the EU 28 and EU 28+ because although there have been declines, taken together these are not believed to have exceeded 25% over the last 50 years.

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.H1Q2 Baltic photic muddy dominated by stable aggregations of unattached *Fucus* spp. (dwarf form).

### Habitat Type

## Code and name

Stable aggregations of unattached perennial vegetation on Baltic infralittoral muddy sediment

No characteristic photographs of this habitat currently available.

## Habitat description

This benthic Baltic Sea habitat occurs in the photic zone with at least 90% coverage of muddy sediment according to the HELCOM HUB classification. Stable aggregations of unattached perennial vegetation cover at least 10%, while perennial attached erect groups or *Mytilus* cover less than 10% of the bottom. The habitat is encountered in areas with salinity below 10 or 5 psu (depending on the area) and can be found in most of the Baltic Sea area, where the seabed is level over wide areas within the photic zone. 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. The unattached forms of associated algae can coexist with attached forms and the characteristic rooted vegetation of bays, estuaries and lagoons.

Five associated biotopes have been described some of which have a more restricted distribution. These are variously dominated by unattached *Fucus* spp., *Furcellaria lumbricalis*, or by the dwarf form of *Fucus* species which coexists with attached *F. vesiculosus*, unattached *Furcellaria lumbricalis*, higher plants like *Ruppia* spp., *Zannichellia palustris*, *Stuckenia pectinatus* (formerly known as *Potamogeton pectinatus*), *Zostera* spp. and several charophytes. There are also biotopes dominated by stable aggregations of unattached rigid hornwort (*Ceratophyllum demersum*) and the unattached lake ball (*Aegagropila linnaei*).

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 vesiculosus* (typical and dwarf form), *Furcellaria lumbricalis*, *Ceratophyllum demersum*, *Aegagropila linnaei*

## **Classification**

EUNIS:

The closest correspondence in EUNIS (2004) level 4 is A5.52 Kelp and seaweed communities on sublittoral sediment and A5.31 Sublittoral mud 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:

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 mud

EUSeaMap:

Shallow muds

IUCN:

9.6 Sublittoral Muddy

9.7 Macroalgal/Kelp

9.10 Estuaries

Other relationships:

Level 5 of the HELCOM HUB classification (2013):

AA.H1Q Baltic photic muddy sediment characterized by stable aggregations of unattached perennial algae.

This habitat has five biotopes on HUB level 6;

'Baltic photic muddy sediment dominated by stable aggregations of unattached *Fucus* spp. (typical form)' (AA.H1Q1)

'Baltic photic muddy sediment dominated by stable aggregations of unattached *Fucus* spp. (dwarf form)' (AA.H1Q2).

'Baltic photic muddy sediment dominated by stable aggregations of unattached *Furcellaria lumbricalis*' (AA.H1Q3)

'Baltic photic muddy sediment dominated by stable aggregations of unattached rigid hornwort (*Ceratophyllum demersum*)' (AA.H1Q4)

'Baltic photic muddy sediment dominated by stable aggregations of unattached lake ball (*Aegagropila linnaei*)' (AA.H1Q5).

### 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.

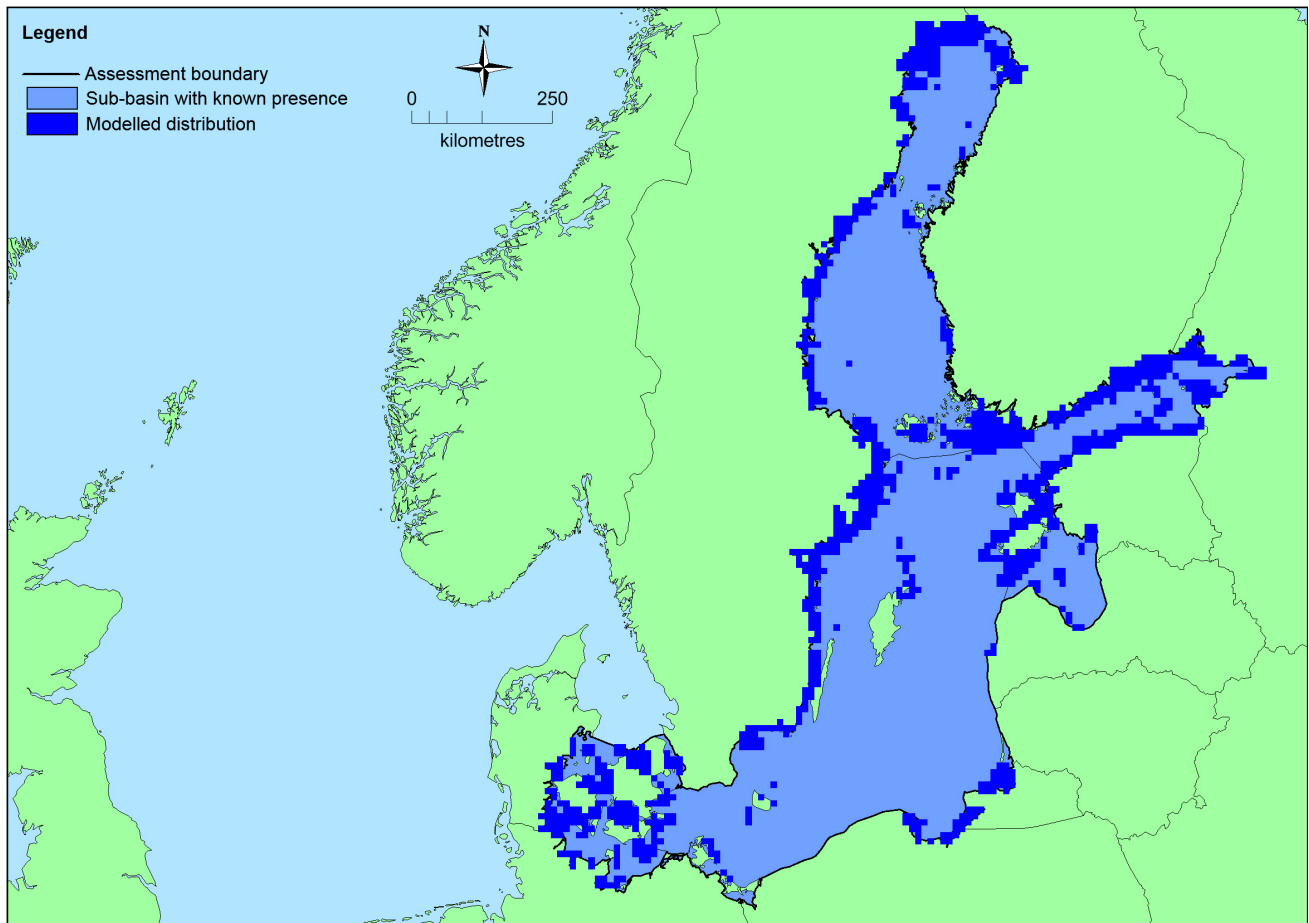
### Geographic occurrence and trends

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 <sup>2</sup>	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>	>50000 Km <sup>2</sup>	Unknown	Unknown Km <sup>2</sup>	This habitat is present in all the Baltic sub-basins.
<i>EU 28+</i>	>50000 Km <sup>2</sup>	Unknown	Unknown Km <sup>2</sup>	This habitat is present in all the Baltic sub-basins

### 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**

This habitat is present in all the Baltic Sea sub-basins although the distribution of the associated biotopes varies. For example AA.H1Q1 'Baltic photic muddy sediment dominated by stable aggregations of unattached *Fucus* spp. (typical form)' can be found in northern Bothnian Sea. AA.H1Q2 'Baltic photic muddy sediment dominated by stable aggregations of unattached *Fucus* spp. (dwarf form)' can only be found in the southern Baltic Proper at the German and Swedish coast. AA.H1Q3 'Baltic photic muddy sediment dominated by stable aggregations of unattached *Furcellaria lumbricalis*' can be found in the Estonian west coast, Belt Sea and the German part of the southern Baltic Proper. AA.H1Q4 Baltic photic muddy sediment dominated by stable aggregations of unattached rigid hornwort (*Ceratophyllum demersum*) can be found in sheltered bays and inlets all around the Baltic Sea. AA.H1Q5 Baltic photic muddy sediment dominated by stable aggregations of unattached lake ball (*Aegogrophila linnaei*) can be found in sheltered bays and inlets all around the Baltic Sea.

The biotope dominated by stable aggregations of unattached *Fucus* spp. (dwarf form)' is estimated to have reduced in extent by more 50% over the past 50 years. Similar pressures appear to have led to a reduction in extent of the other associated biotopes (e.g. *Furcellaria* in Puck Bay) but there is insufficient quantifiable data on which to make an assessment. Historical trends are unknown and it can be expected that 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. is the dominant species) 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 an intrinsically restricted area.

## **Trends in quality**

One of the associated biotopes AA.H1Q2 'Baltic photic muddy sediment 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 to determine quality changes in the habitat dominated by other species of unattached perennial vegetation.

- Average current trend in quality

EU 28: Unknown

EU 28+: Unknown

## **Pressures and threats**

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Past and current threats are eutrophication, contaminant pollution and the introduction of toxic substances. 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 this habitat. The threat level is particularly high in the Western and Southern Baltic Sea. There has also been some commercial exploitation of the unattached macroalgae in Poland and there is still commercial exploitation of the *Furcellaria* biotope in Estonia.

Future threats are climate change (increasing exposure levels and temperatures) and increasing aquaculture in bays and sheltered areas where this habitat occurs.

## **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

Habitat shifting and alteration

## **Conservation and management**

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Combatting local sources of eutrophication (mainly agriculture) as well as restrictions on coastal construction and dredging in and around shallow coastal lagoons and archipelago areas can prevent decline in this habitat type.

### **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

1160 VU C1

1650 VU C1

HELCOM (2013) have assessed the associated biotopes AA.H1Q2 as EN(A1) and AA.H1Q1, AA.H1Q2, AA.H1Q3, AA.H1Q4 and AA.H1Q5 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 reproductive cycle of 1-2 years, but they take several years to reach full size. If 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, but there has been some recovery. 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 <sup>2</sup>	Unknown	Unknown	unknown	unknown	Unknown	Unknown	unknown	unknown
EU 28+	>50,000 Km <sup>2</sup>	Unknown	Unknown	unknown	unknown	Unknown	Unknown	unknown	unknown

Comprehensive quantitative data on the extent and area covered by this habitat is not available but there are some relevant data such as an estimated 189km<sup>2</sup> of the *Fucus* biotopes off the coast of Finland. Some localised loss has been reported (e.g. Puck Bay, Poland) particularly for the dwarf form of unattached *Fucus* spp. but the habitat as a whole is widely distributed, therefore EOO exceeds 50,000km<sup>2</sup>. Future trends have not been predicted. 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%



The biotope AA.H1Q2 'Baltic photic muddy sediment dominated by stable aggregations of unattached *Fucus* spp. (dwarf form)' has shown a severe decline in quality in 20% of the area but this is considered to comprise less than 5% of the habitat overall. There is a lack of information on quality changes in the habitat dominated by other species of unattached perennial vegetation therefore 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

S. Gubbay and N. Sanders.

### Contributors

HELCOM RED LIST Biotope Expert Team 2013 and Baltic Sea Working Group for the European Red List of Habitats 2014 and 2015.

### Reviewers

K. Fürhaupter.

### Date of assessment

10/07/2015

### Date of review

07/01/2016

### References

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HELCOM website 2

<http://helcom.fi/Red%20List%20of%20biotopes%20habitats%20and%20biotope%20complexe/HELCOM%20>

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