BIOTOPE INFORMATION SHEET

English name: **Baltic photic mixed substrate, mud, coarse sediment or sand dominated by stable aggregations of unattached *Fucus* spp. (dwarf form)**		Code in HELCOM HUB: **AA.M1Q2, AA.H1Q2. AA.I1Q2, AA.J1Q2**	
Characteristic species: *Fucus vesiculosus* dwarf form			
Past and Current Threats (Habitat directive article 17): Eutrophication (H01.05), Contaminant pollution (local point source pollution H01.03, toxic substances H03.02)		Future Threats (Habitat directive article 17): Eutrophication (H01.05), Contaminant pollution (local point source pollution H01.03, toxic substances H03.02), Climate change (M)	
Red List Criteria: **A1**	Confidence of threat assessment: **L**	**HELCOM Red List Category:**	**EN Endangered**
Previous HELCOM Red List threat assessments			
BSEP 75 (HELCOM 1998): "2" Heavily endangered 2.5.2.2 Sublittoral level sandy bottoms dominated by macrophyte vegetation "3" Endangered 2.4.2.2 Sublittoral level gravel bottoms dominated by macrophyte vegetation 2.4.3.2 Hydrolittoral level gravel bottoms dominated by macrophyte vegetation 2.7.2.2. Sublittoral muddy bottoms dominated by macrophyte vegetation 2.7.3.2. Hydrolittoral muddy bottoms dominated by macrophyte vegetation 2.8.2.2 Sublittoral mixed sediment bottoms dominated by macrophyte vegetation 2.8.3.2. Hydrolittoral mixed sediment bottoms dominated by macrophyte vegetation		BSEP 113 (HELCOM 2007):	
Greater concern stated by:			

Habitat and Ecology

The biotope occurs on mixed substrate and all kinds of soft bottoms (coarse, sandy and muddy sediments) of the photic zone. It consists of submerged stable aggregations of unattached bladder wrack *Fucus vesiculosus* in a specific morphological dwarf form, which constitutes at least 50% of the biovolume.

This specific morphology lacks bladders and holdfasts; it is regularly dichotomous branched with branches of similar length resulting in a fan-shaped appearance of the thalli. The single plants can be loosely anchored in the sediment with its lower, dark brownish parts. The thalli are very fragile, break very easily into pieces and generate thus new thalli. (Bauch 1954). Under more exposed conditions plants form a ball-shaped form, able to roll over the sea bottom (Bauch 1954).

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 biotope exists in lower mesohaline salinities (7–10 psu) and moderately exposed to very sheltered conditions. It forms a characteristic biotope of shallow bays and lagoons between 0.25 and 2.5 m (Overbeck 1965).

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 in between the loose lying thalli mobile gastropods, amphipods and insects look for shelter and food (von Oertzen 1968). 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.

Note on taxonomical position: The *Fucus* spp. dwarf form has been historically descibed from several countries around the Baltic Sea (Sweden, Finland, Germany, Estonia, Poland). Authors have historically used different terms, e.g. *Fucus inflatus* f. *pygmea* (Sweden) or *Fucus vesiculosus* f. *balticus* (Germany). Nearly all descriptions mention the narrower thalli, the lack of bladders, the higher numbers of branches and the asexual reproduction. In Germany the dwarf form is reported to live unattached in salinities around 7–10 psu. The German descriptions seems to differ from the descriptions from other countries where it is described to live attached to the substrate parallel to attached *F. vesiculosus* at salinities lower than 5 psu (Bergström et al 2005, Tatarenkov et al. 2005, Johannesson et al. 2011). DNA-sequencing of attached "dwarf"-populations in Sweden, Finland and Estonia resulted in the description of a new, endemic *Fucus*-species for the Baltic: *Fucus radicans* (Bergström et al 2005). Looking to the descriptions given for *F. radicans*, the unattached forms establishing the above-mentioned biotope seem to differ from *F. radicans* in terms of morphology (no visible midrib, fan- or ball-shaped) and ecology (higher salinities, soft bottom substrate). Currently it is not scientifically proven, if the unattached dwarf forms are genetically related to *F. vesiculosus*, *F. radicans* or whether it even forms a separate endemic *Fucus* species.

The biotope occurs on mixed substrate and all kinds of soft bottoms (coarse, sandy and muddy sediments) of the photic zone. The *Fucus* spp. dwarf form constitutes at least 50% of the biovolume. It coexists with attached *F. vesiculosus* and possibly with *F. radicans*, unattached *Furcellaria lumbricalis*, higher plants like *Ruppia* spp., *Zannichellia palustris*, *Stukenia pectinatus*, *Zostera* spp. and several charophytes. The biotope exists in lower mesohaline salinities 5–10 psu (possibly lower) and moderatly exposed to very sheltered conditions. It forms a characteristic biotope of shallow bays and lagoons between 0.25 and 2 m.

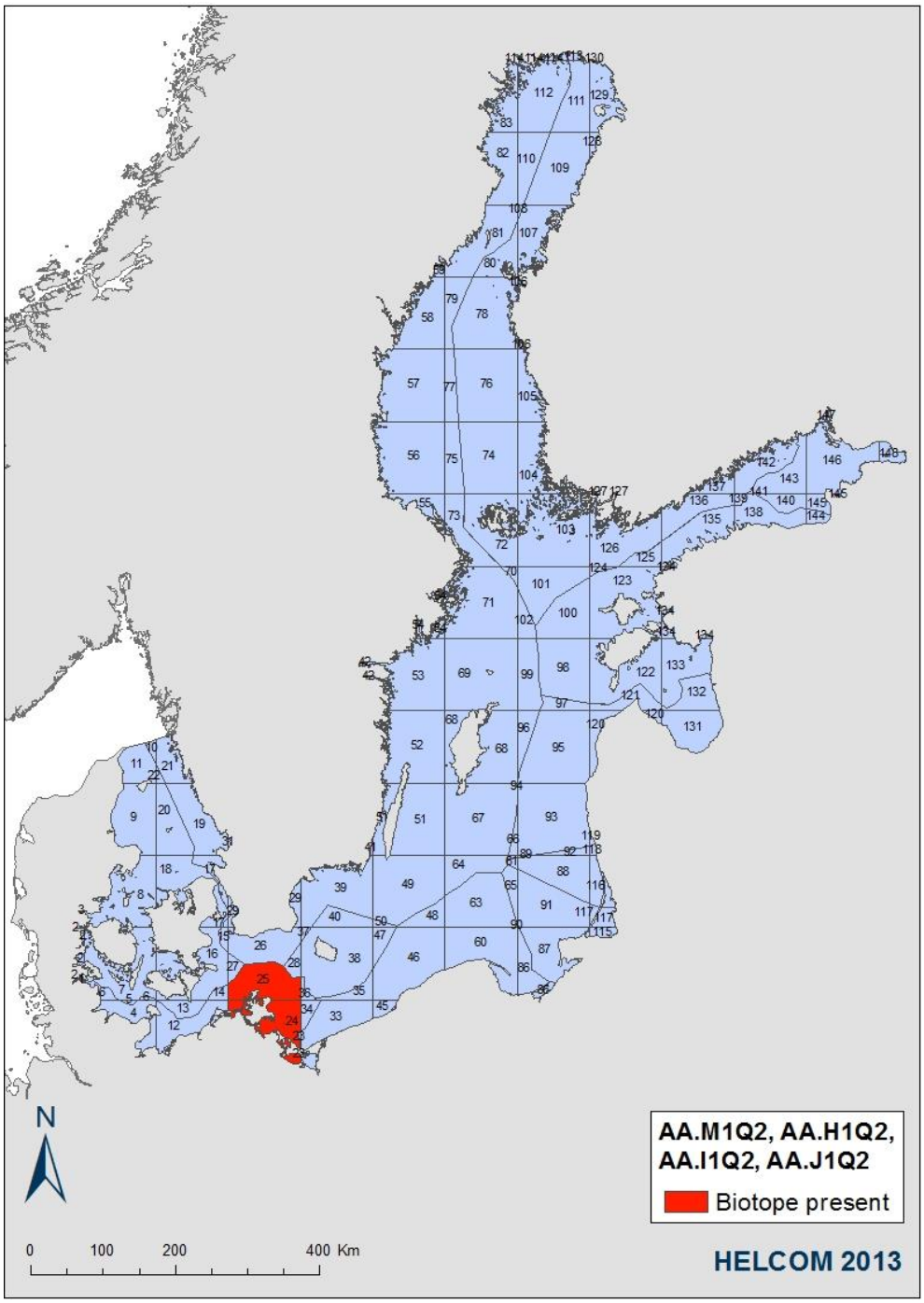
Unattached ball-shaped *Fucus* dwarf form on sandy substrate (left) and fan-shaped of different size on sandy bottom (right) (Photo: Karin Fürhaupter, MariLim GmbH)

The unattached thalli can cover the sediment up to about 10 cm height and thus form a very special three-dimensional habitat comparable to the interstitial space in coarse sediments. Epifauna is seldom attached to the Fucus spp. dwarf form. But in between 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.

BIOTOPE INFORMATION SHEET

Distribution and status in the Baltic Sea region

The *Fucus* spp. dwarf form is known from Sweden, Finland, Germany and Estonia. In all countries plus Poland also unattached *Fucus* spp. occurs widespread in sheltered areas. But it is not clear for each of those countries, if these unattached forms are built of the typical *F. vesiculosus* morphology, the dwarf form or both forms. In Poland the unattached *Fucus* biotope has disappeared from the Puck Lagoon, so it might be difficult to clear this question. 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 (Vitter Bodden, Kubitzer Bodden, Wieker Bodden. Distribution map indicates the area in the 100 x 100 km grid where biotope is known to occur



BIOTOPE INFORMATION SHEET

Description of Major threats

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 constructions (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 (OCEANA 2011). In the future climate change (increasing exposure levels, temperatures) or increasing aquaculture in bays may cause additional threats.

Assessment justification

A1

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. As mentioned before for other “Lagoon”-Biotopes, the decline could vary in extent in different Baltic Sea regions with strongest declines in the Western and Southern Baltic Sea. In some bays and lagoons conditions have changed so intensively that the biotope has disappeared completely.

Recommendations for actions to conserve the biotope

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 the biotope from further decline (HELCOM Website).

Common names

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References

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von Oertzen J.-A. 1968. Untersuchungen über die Besiedlung der Fucusvegetation der Gewässer um Hiddensee. Z. Fischerei NF Bd. 16, 34: 253-277.