

A5.434 *Limaria hians* beds in tide-swept sublittoral muddy mixed sediment

Summary

The flame or gaping file shell *Limaria hians* creates nests by weaving together tough threads (byssus) with surrounding material such as seaweed, maerl, shells and detritus. Adjoining nests coalesce to form larger structures often with considerable numbers of flame shells buried within them. In some locations, where conditions allow, contiguous flame shell nests can carpet the bed for several hectares. The carpets create a unique habitat that stabilises the sediment and provides an attachment surface for many organisms including hydroids, bryozoans, ascidians and seaweeds.

Flame shell beds are highly vulnerable to seabed trawling and dredging together with other activities which abrade the seabed. There have been few studies on their resilience but they are believed to have a low recoverability when all nest material is removed. Other pressures include smothering, change in hydrological conditions and poor water quality. The control and management of the use of trawls and dredges for demersal fishing is the main measure required for the protection and maintenance of this habitat. In addition, local statutory or voluntary controls on water quality, such as prevention of discharges of contaminated water or the regulation of activities that causes increased turbidity and siltation.

Synthesis

This habitat has a restricted distribution in the North East Atlantic Region, with current known records confined to the west coast of Scotland and one sea lough in Ireland. There are no long term (>50 year) data sets, but more recent studies show that several known beds in Scotland have declined in extent and density of *L. hians* individuals since first studied in the late 1970's. In Ireland, the dense *L. hians* beds in Mulroy Bay reported in 1995 are no longer present in the southern section. Because of the decline in quantity and quality of this habitat in recent years, together with its narrow geographical distribution and the continuing threats, this habitat has been assessed as Vulnerable. As all current known beds are in the EU 28, the same assessment applies for the EU 28+.

Overall Category & Criteria			
EU 28		EU 28+	
Red List Category	Red List Criteria	Red List Category	Red List Criteria
Vulnerable	A2a,b, B1/B2, C/D2	Vulnerable	A2a,b, B1/B2, C/D2

Sub-habitat types that may require further examination

None.

Habitat Type

Code and name

A5.434 *Limaria hians* beds in tide-swept sublittoral muddy mixed sediment



Limaria hians nests forming a continuous bed overlaying muddy shelly gravel in Loch Alsh, Scotland (© G. Saunders).



Flame shell *Limaria hians* mantle protruding from a bed constructed by the mollusc from detritus and shell debris in Loch Alsh, Scotland (© G.Saunders).

Habitat description

The flame or gaping file shell *Limaria hians* creates nests by weaving together tough threads (byssus) with surrounding material such as seaweed, maerl, shells and detritus. Adjoining nests coalesce to form larger structures often with considerable numbers of flame shells buried within them. In some locations, where conditions allow, contiguous flame shell nests can carpet the bed for several hectares. The carpets create a unique habitat that stabilises the sediment and provides an attachment surface for many organisms including hydroids, bryozoans, ascidians and seaweeds. These organisms in turn add to the habitat complexity and provide shelter for other species such as cod and saithe. A rich diversity of fauna is also found within and below the flame shell bed. The habitat occurs on mixed muddy, sand and gravel bottoms at depths of 5-100m, in sheltered areas of moderate to strong currents. They have been found in tide-swept narrows such as the entrances or sills of sea lochs.

Indicators of quality:

Because this habitat has a very restricted distribution, it has only been described in detail from a few locations and shows considerable variation in characteristics between these locations, possibly influenced by geographical location, there is insufficient information on which to derive indicators of quality at the present time. Possibilities include the thickness of the bed, the abundance and diversity of the associated species and the spatial density of the characteristic species *Limaria hians*.

Characteristic species:

Modiolus modiolus sometimes occur at the same sites lying over the top of the *Limaria* bed. Other fauna associated with this biotope include echinoderms (*Ophiothrix fragilis*, *Ophiocomina nigra* and *Asterias rubens*), *Buccinum undatum*, mobile crustaceans (e.g. *Pagurus bernhardus*), *Alcyonium digitatum* and hydroids such as *Plumularia setacea*, *Kirchenpaueria pinnata* and *Nemertesia* spp. Sometimes red seaweeds such as *Phycodrys rubens* may be present if the beds are in shallow enough water.

Classification

EUNIS (v1405):

Level 5 of the EUNIS classification. A sub-habitat of 'Marine Atlantic infralittoral mixed sediment' (A5.43) and 'Atlantic shallow/infralittoral mixed sediment' (A5.4).

Annex 1:

1170 Reefs

MAES:

Marine - Marine inlets and transitional waters

Marine - Coastal MSFD relationships

Shallow coarse or mixed sediments

EUSeaMap:

Shallow coarse or mixed sediments

IUCN:

9.4 Subtidal sandy

9.5 Subtidal sandy-mud

9.6 Subtidal muddy

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

No

Justification

This habitat is known to occur in Ireland and the UK. Work is on-going to determine the full spatial extent of its distribution.

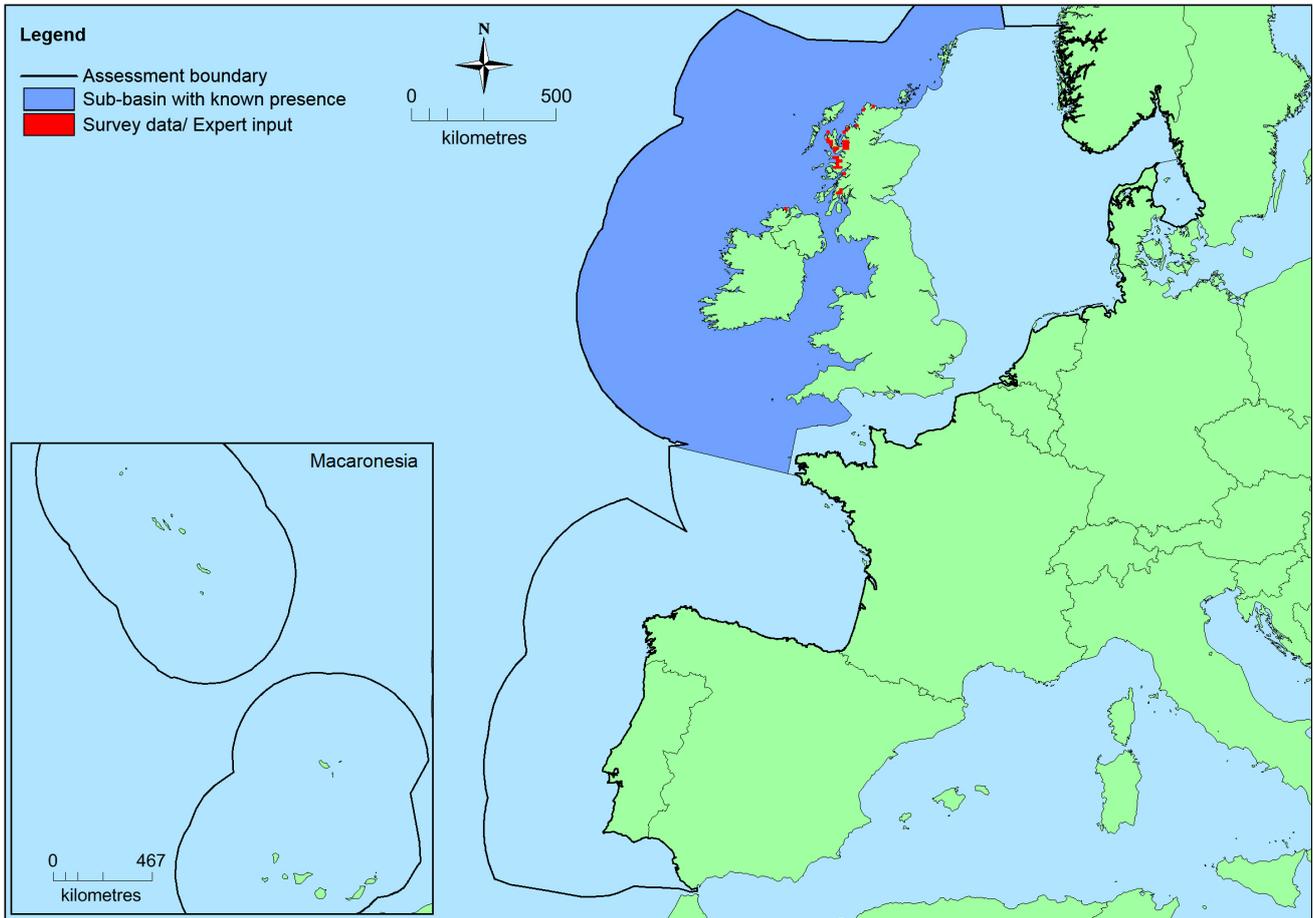
Geographic occurrence and trends

Region	Present or Presence Uncertain	Current area of habitat	Recent trend in quantity (last 50 yrs)	Recent trend in quality (last 50 yrs)
<i>North-East Atlantic</i>	Celtic Seas: Present Bay of Biscay and the Iberian Coast: Uncertain Kattegat: Uncertain Greater North Sea: Uncertain Macaronesia: Uncertain	Unknown Km ²	Decreasing	Decreasing

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>	38,357 Km ²	34	Unknown Km ²	
<i>EU 28+</i>	38,357 Km ²	34	Unknown Km ²	Present but not known if bed forming.

Distribution map



There are insufficient data to provide a comprehensive and accurate map of the distribution of this habitat. This map has been generated using EMODnet data from modelled/surveyed records for the North East Atlantic (and supplemented with expert opinion where applicable) (EMODnet 2010). EOO and AOO have been calculated on the available data presented in this map however these should be treated with caution as expert opinion is that may not represent the full distribution of the habitat.

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

L. hians does occur along the Norwegian coast but there are no reports of defined *L. hians* beds (except as reported by Høisæter historically). Based on current knowledge it is therefore likely that 100% of this habitat is hosted by EU 28 at the present time.

Trends in quantity

This habitat is very susceptible to damage from mobile demersal fishing gear. Historic changes are unknown as this habitat has been poorly investigated until recently. Substantial loss is reported to have occurred in (>90%) in Loch Linnhe, Scotland, in just over 10 years. A decrease in presence within Mulroy Bay, Ireland, has been reported. There is a confirmed loss of beds from an area studied around Straume, northern Norway, over the last 50 years. As all known beds are in the EU 28 and these are decreasing in quality, the overall trend for EU 28+ is also decreasing.

- 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

This habitat has a small natural range at the present time. Given its susceptibility to fishing, it might

have been much more extensive 50 years ago but no firm conclusions can be drawn due to the lack of historical information.

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

Yes

Justification

Although the species *L. hians* is widely distributed, there are very few known examples of *L. hians* beds.

Trends in quality

Trend in quality follows trend in extent. There has been confirmed damage to this habitat in Loch Fyne, Scotland, including reduction in density of *L. hians*. A decline in density has also been reported from beds in Mulroy Bay, Ireland, over the last 20 years. As all known beds are in the EU 28 and these are decreasing in quality, the overall trend for EU 28+ is also decreasing.

- Average current trend in quality

EU 28: Decreasing

EU 28+: Decreasing

Pressures and threats

Flame shell beds are likely to be sensitive to substratum loss, smothering, increased wave action, changes in water flow, physical disturbance, synthetic contaminants, increased nutrients, decreased salinity, and extraction. Flame shell beds are highly vulnerable to seabed trawling and dredging, evidence of this is found in the destruction of the once large beds in the Firth of Clyde, Scotland. Other threats include coastal developments and coastal defences, disturbance by mooring chains and anchors and contamination by Tributyl Tin (TBT) a component of antifouling paint.

List of pressures and threats

Biological resource use other than agriculture & forestry

Fishing and harvesting aquatic resources

Professional passive fishing

Potting

Professional active fishing

Benthic or demersal trawling

Pollution

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

Input of contaminants (synthetic substances, non-synthetic substances, radionuclides) - diffuse sources, point sources, acute events

Natural System modifications

Human induced changes in hydraulic conditions

Modification of hydrographic functioning, general

Wave exposure changes

Siltation rate changes, dumping, depositing of dredged deposits

Other human induced changes in hydraulic conditions

Conservation and management

This habitat has been included in Marine Protected Areas in Scotland with zoning schemes to limit the potential for damage from activities such as creeling.

In general, the control and management of the use of trawls and dredges for demersal fishing is the main measure required for the protection and maintenance of this habitat. In addition, local statutory or voluntary controls on water quality, such as prevention of discharges of contaminated water or the regulation of activities that causes increased turbidity and siltation.

List of conservation and management needs

Measures related to wetland, freshwater and coastal habitats

Restoring/Improving water quality

Measures related to spatial planning

Other spatial measures

Establish protected areas/sites

Legal protection of habitats and species

Conservation status

Annex 1:

1170: MATL U2, MMAC FV.

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

Unknown. There have been few studies on recovery rates but regrowth following simulated dredging showed that half treatment plots had less than 25% nest cover after 12 months and none contained nests of comparable thickness to the surrounding bed. Regrowth rates calculated from this study were 3.2 cm per year. This suggests potentially slow recovery rates. Disturbances that remove vast quantities of bed take far longer to recover than instances where considerable bed material remains. If nest material remains after disturbance it has been shown that *L. hians* quickly recolonises these areas. Damage of the epifaunal communities will likely recover rapidly once cessation of the damaging activity occurs.

Effort required

20 years	50+ years	200+ years
Naturally	Naturally	Naturally

Red List Assessment

Criterion A: Reduction in quantity

Criterion A	A1	A2a	A2b	A3
EU 28	unquantified %	>30 %	>30 %	Unknown %
EU 28+	unquantified %	>30 %	>30 %	Unknown %

There are no firm data from which a numerical value can be derived for a change in quantity of the entire *Limaria* habitat resource, but expert opinion indicates that a relatively recent loss of greater than 30% is probable, while recent and future losses could reach 50%. In some areas studied there have been significant (>90%) reduction in quantity over the last 10 years. Expert opinion is that this habitat is at risk of future decline in quantity. This habitat has therefore been assessed as Vulnerable under Criterion 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	38,357 Km ²	Yes	Yes	Unknown	34	Yes	Yes	Unknown	Unknown
EU 28+	38,357 Km ²	Yes	Yes	Unknown	34	Yes	Yes	Unknown	Unknown

This habitat has a small natural range, is present in a small number of 10 x 10 km grid squares, and has declined in extent in recent years.

The mapping data are vulnerable to misinterpretation, with the possibility of the EMODnet-derived data over-estimating the distribution and number of locations where this habitat occurs. Expert-submitted data indicates eight confirmed locations where this habitat had been observed and recorded. The additional EMODnet data may reflect observations of the presence of the species, but not necessarily the required density of *Limaria* sufficient to form the distinct dominating nest coverage that is characteristic of this habitat.

On balance, the combined application of the EOO and AOO values to the intrinsically uncertain spatial distribution would suggest that the habitat is at least Vulnerable but if the expert observations prove to be accurate and the threat from fishing activities is as damaging as the localised reports suggest, then there are grounds for considering the habitat to be Endangered.

Based on current expert opinion this habitat has been assessed as Vulnerable under Criterion B1 (a,b) and B2 (a,b) and Data Deficient under all other criteria 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 %	30-50 %	substantial reductio %	Unknown %	Unknown %
EU 28+	Unknown %	Unknown %	30-50 %	substantial reductio %	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%

A decline in quality, associated with loss of extent has been reported from the few beds for which there is information dating back to the late 1970's but it is not possible to quantify this decline. Expert opinion is that this habitat is at risk of future decline in quality. Extrapolating the sparse information that is available might suggest that either an intermediate decline affecting $\geq 50\%$ of the habitat extent, or a severe decline affecting 30% of the habitat extent may have occurred. This habitat is therefore assessed as Vulnerable under Criteria C/D1 for both the EU 28 and EU 28+.

Criterion E: Quantitative analysis to evaluate risk of habitat collapse

Criterion E	Probability of collapse
EU 28	Unknown
EU 28+	Unknown

In one location significant decline suggests high vulnerability and risk of collapse but no quantitative analysis has been undertaken.

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	VU	VU	VU	DD	VU	VU	DD	DD	VU	DD	DD	DD	DD	DD	DD	DD	DD
EU28+	VU	VU	VU	DD	VU	VU	DD	DD	VU	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
Vulnerable	A2a,b, B1/B2, C/D2	Vulnerable	A2a,b, B1/B2, C/D2

Confidence in the assessment

Medium (evenly split between quantitative data/literature and uncertain data sources and assured expert knowledge)

Assessors

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Contributors

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Reviewers

J.Forde.

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06/08/2015

Date of review

22/12/15

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