A4.22 *Sabellaria* reefs on moderate energy Atlantic circalittoral rock

Summary

The species *Sabellaria spinulosa* is widely distributed in the North East Atlantic, but densely aggregated reef structures are believed to be relatively rare and are typically restricted to areas with high levels of suspended sediment in the North Sea and Celtic Sea.This habitat occurs on moderately wave-exposed, circalittoral bedrock, boulders and cobbles subject to moderately strong tidal streams and is characterised by dense crusts on the upper faces of the hard surfaces formed by the sandy tubes of the polychaete worm *S. spinulosa*. In some cases the *S.spinulosa* may completely cover the rock, binding gravel and pebbles together.

This habitat is senstive to physical pressures, most particularly the removal of substratum, abrasion, penetration and sub-surface disturbance. Changes in siltation rates may result in sub-lethal and lethal damage to worms through smothering while reduced water flows can reduction in the supply of suspended food and particles that are integral for growth and repair. Management of marine activities and, in particular, bottom gears will be important in preventing further threat and decline of this habitat. Known and former reef areas could be protected through site safeguard. Zoning to ensure that aggregate extraction does not take place on reef habitats is another management option. Management proposals need to reflect the dynamic nature of reefs which can colonise, evolve and degrade rapidly. Research into the stability, rate of establishment, and recovery of damaged reefs will also be important as will better knowledge of the environmental conditions under which they do so and natural variation in extent, density and population structure of *S.spinulosa* reefs.

Synthesis

The difficulty in detecting and categorising *S. spinulosa* reef structures, their spatially patchy distribution and their temporal instability all add to uncertainty about the current distribution, quantity and quality of this habitat in the North East Atlantic. The current area of reef has been estimated in some locations but not necessarily distinguishing between the occurrence of *S.spinulosa* on predominantly soft sediment and where it is associated with pebbles, cobbles, boulders and rock. An added complication is that trends and longevity can be related to the stability of the substratum. Longer lasting reefs might be limited to more stable substrata while thin crust like forms are probably annual or transitent features and may break up during winter storms.

There is insufficient information to provide an overall estimate of the extent of this habitat and any historical, recent and possible future trends in quantity and quality. For the purposes of Red List assessment this habitat is therefore considered to be Data Deficient 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
Data Deficient	-	Data Deficient	-

Sub-habitat types that may require further examination

None.

Habitat Type

Code and name

A4.22 *Sabellaria* reefs on moderate energy Atlantic circalittoral rock

No characteristic photograph for this habitat is currently available.

Habitat description

This habitat occurs on moderately wave-exposed, circalittoral bedrock, boulders and cobbles subject to moderately strong tidal streams and is characterised by dense crusts on the upper faces of the hard surfaces formed by the sandy tubes of the polychaete worm *Sabellaria spinulosa*. In some cases the *S.spinulosa* may completely cover the rock, binding gravel and pebbles together. A diverse fauna may be found attached to and sometimes obscuring the crust, often reflecting the character of surrounding biotopes. There is usually no significant raised reef area.

Indicators of quality:

The condition of *S. spinulosa* reefs can be judged in different ways. For instance: the areal extent of the reef, its spatial patchiness, temporal stability, or number of associated species. Categorisation of condition may also consider a combination of these parameters. At present there is no consensus of approach or accepted yardstick against which to compare condition of individual reefs. Further to this, evidence suggests that *S. spinulosa* reefs may repeatedly develop and decline in a regular succession, through resettlement and demise of successive generations. An apparent deterioration in condition may therefore be natural and not necessarily reflective of an anthropogenic impact. The apparently ephemeral nature of *S. spinulosa* reefs is such that the condition of *S. spinulosa* reef habitat should be considered at a wider scale than individual reefs.

Characteristic species:

S.spinulosa. Other fauna present in many cases reflects the biotopes found on nearby rock, Infauna typically comprises polychaete species such as *Protodorvillea kefersteini, Scoloplos armiger, Harmothoe spp., Mediomastus fragilis, Lanice conchilega* and cirratulids together with the bivalves *Abra alba* and *Nucula* spp. and tube-building amphipods such as *Ampelisca* spp. Epifauna comprise calcareous tubeworms, pycnogonids, hermit crabs, amphipods, hydroids, bryozoans, sponges and ascidians. Species typically present include the bryozoans *Flustra foliacea, Alcyonidium diaphanum* and *Pentapora foliacea*, the hydroid *Nemertesia antennina*, the sponges *Tethya aurantium* and *Phorbas fictitius*, the anemones *Urticina felina* and *Sagartia elegans*, and the ascidians *Distomus variolosus, Polycarpa pomaria* and *Polycarpa scuba*. The barnacle *Balanus crenatus*, the polychaetes *Pomatoceros triqueter* and *Salmacina dysteri*, the starfish *Crossaster papposus,* and *Alcyonium digitatum* may also be recorded. The porcelain crab *Pisidia longicornis* can be very dominant on *S.spinulosa* reefs.

Classification

EUNIS (v1405):

Level 4. A sub-habitat of ‘Atlantic circalittoral rock’ (A4.2).

Annex 1:

1170 Reefs

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

9.3 Subtidal loose rock/pebble/gravel

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

Justification
There is insufficient information on the characteristics of this habitat or on its distribution and extent to determine whether it is typical of North East Atlantic region.

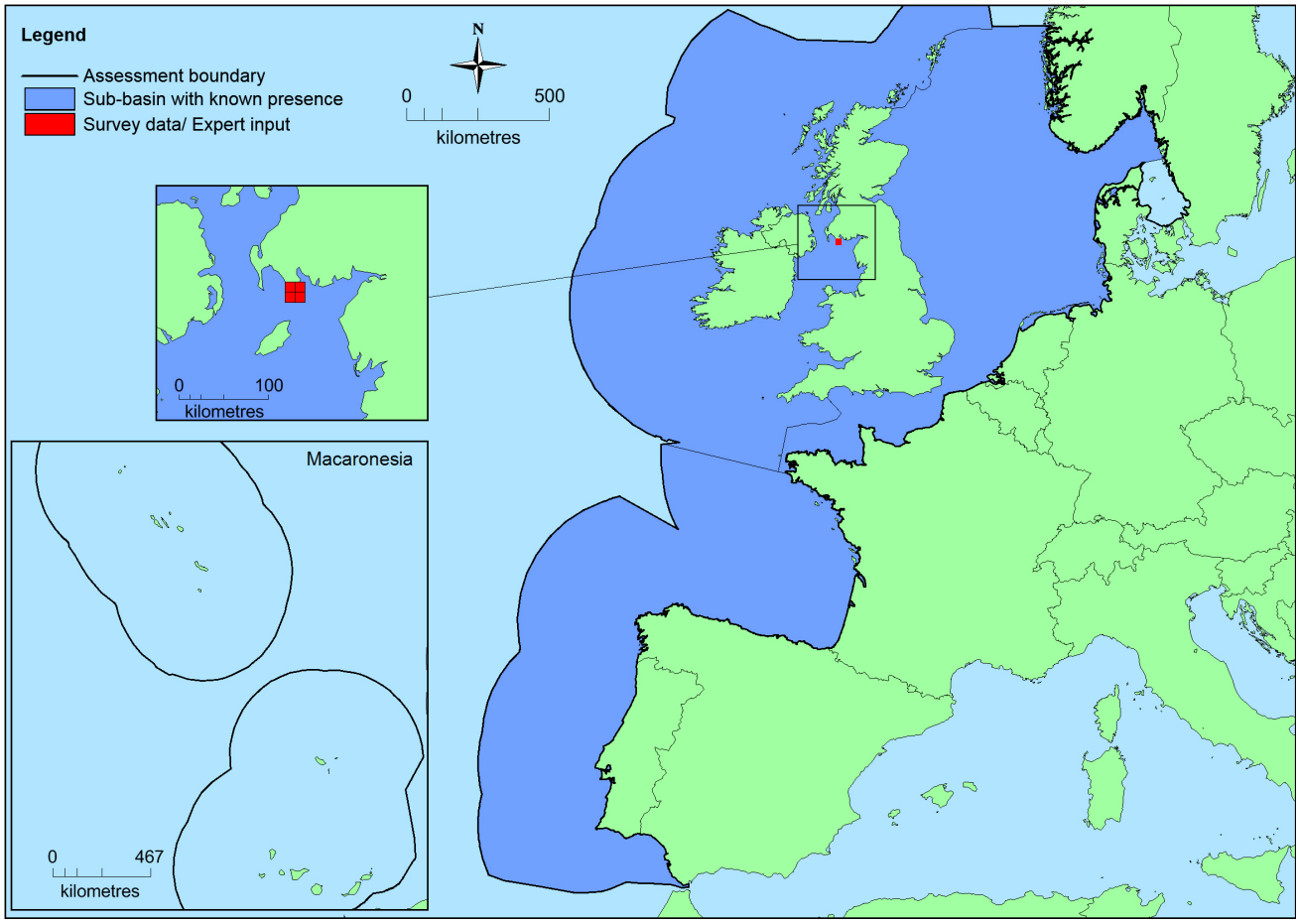
Geographic occurrence and trends

Region	Present or Presence Uncertain	Current area of habitat	Recent trend in quantity (last 50 yrs)	Recent trend in quality (last 50 yrs)
North-East Atlantic	Bay of Biscay and the Iberian Coast: Present Celtic Seas: Present Greater North Sea: Present Kattegat: Uncertain Macaronesia: Uncertain	Unknown Km^2	Unknown	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	unknown Km^2	Unknown	Unknown Km^2	There is insufficient information for accurate calculation of EOO and AOO.
EU 28+	unknown Km^2	Unknown	Unknown Km^2	There is insufficient information for accurate calculation of EOO and AOO.

Distribution map



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). There are insufficient data to provide a comprehensive and accurate map of the distribution of this habitat or for calculation of EOO and AOO.

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

Unknown. Typically limited to areas with very high levels of suspended sediment.

Trends in quantity

The difficulty in detecting and categorising *S. spinulosa* reef structures, their spatially patchy distribution and their temporal instability all add to uncertainty about the current distribution and quantity of this habitat in the North East Atlantic. The current area of reef has been estimated in some locations (e.g. off the Norfolk coast of the UK), but these figures do not distinguish between the occurrence of *S.spinulosa* on predominantly soft sediment and this habitat where it is associated with pebbles, cobbles, boulders and rock. An added complication is that trends and longevity can be related to the stability of the substraturm. Longer lasting reefs might be limited to more stable substratum while thin crust like forms are probably annual or transient features and may break up during winter storms.

- Average current trend in quantity (extent)
  EU 28: Unknown
  EU 28+: Unknown
- Does the habitat type have a small natural range following regression?
  No
  Justification
  The species *S.spinulosa* is widely distributed in the North East Atlantic however densely aggregated reef structures are relatively rare according to OSPAR , and are typically restricted to areas with high levels of

suspended sediment in the North Sea and Celtic Sea. In the UK records include locations on the west and east coasts of Scotland, the east coast of England and north and west Wales which confirms it has a large natural range (EOO >50,000km^2).

- Does the habitat have a small natural range by reason of its intrinsically restricted area?
  No
  Justification
  The species *S.spinulosa* is widely distributed in the North East Atlantic. However densely aggregated reef structures are relatively rare according to OSPAR, and are typically restricted to areas with high levels of suspended sediment in the North Sea and Celtic Sea. In the UK records include locations on the west and east coasts of Scotland, the east coast of England and north and west Wales which confirms it has a large natural range (EOO >50,000km^2).

Trends in quality

There is a lack of information on any trends in quality of this habitat because of the difficulty in detecting and categorising *S. spinulosa* reef structures, no widely agreed quality indicators, their spatially patchy distribution and their temporal instability.

- Average current trend in quality
  EU 28: Unknown
  EU 28+: Unknown

Pressures and threats

This habitat is sensitive to physical pressures, most particularly the removal of substratum, abrasion, penetration and sub-surface disturbance. These actions can lead to physical loss of habitat, as well as damage to the worm tubes which cannot reattach once dislodged, or rebuild their tubes if removed from them. Changes in siltation rates may result in sub-lethal and lethal damage to worms through smothering.

A long-term decrease in water flow may reduce the viability of populations by limiting growth and tube development because under such circumstances, *S. spinulosa* is likely to suffer a reduction in the supply of suspended food and particles that are integral for growth and repair

List of pressures and threats

Mining, extraction of materials and energy production

Mining and quarrying
Sand and gravel extraction
Exploration and extraction of oil or gas
Renewable abiotic energy use

Biological resource use other than agriculture & forestry

Fishing and harvesting aquatic resources
Professional active fishing
Benthic or demersal trawling

Natural System modifications

Human induced changes in hydraulic conditions
Modification of hydrographic functioning, general

Conservation and management

Management of marine activities and, in particular, certain fishing practices will be important in preventing further threat and decline of this habitat. Known reef areas could be protected through site safeguard. It should also be noted that as the larvae are strongly stimulated to metamorphose and settle on the tubes of both living and dead worms, conservation management could usefully be directed towards the protection of both living and dead reefs. Zoning to ensure that aggregate extraction does not take place on reef habitats is another management option and will depend on sufficient knowledge of the distribution of reef habitat.

Management proposals need to reflect the dynamic nature of reefs which can colonise, evolve and degrade rapidly. Research into the stability, rate of establishment, and recovery of damaged reefs will also be important as will better knowledge of the environmental conditions under which they do so and natural variation in extent, density and population structure of *S.spinulosa* reefs.

List of conservation and management needs

Measures related to spatial planning

Other spatial measures
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 resouce use

Regulating/Managing exploitation of natural resources on sea

Conservation status

Annex 1:

1170: MATL U2, MMAC FV

OSPAR have listed *S.spinulosa* reefs as a threatened and/or declining habitat in Regions II and III (North Sea and Celtic Sea)

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

There is limited information on reef longevity, stability and recovery however *S.spinulosa* is known to be a fast growing species which can recolonise quickly. Recruitment rates are high and recovery could be quite rapid as this species is often one of the first to settle on newly exposed surfaces. Existing tubes strongly stimulate settlement.

Effort required

10 years
Naturally

Red List Assessment

Criterion A: Reduction in quantity

Criterion A	A1	A2a	A2b	A3
EU 28	unknown %	unknown %	unknown %	unknown %

Criterion A	A1	A2a	A2b	A3
EU 28+	unknown %	unknown %	unknown %	unknown %

The difficulty in detecting and categorising *S. spinulosa* reef structures, their spatially patchy distribution and their temporal instability all add to uncertainty about the current distribution and trends in quantity of this habitat in the North East Atlantic. An added complication is that trends and longevity can be related to the stability of the substraturm. Longer lasting reefs might be limited to more stable substrata while thin crust like forms are probably annual or transitent features and may break up during winter storms. This habitat has been assessed as Data Deficient 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	unknown Km^2	Unknown	Unknown	unknown	unknown	Unknown	Unknown	unknown	Unknown
EU 28+	unknown Km^2	Unknown	Unknown	unknown	unknown	Unknown	Unknown	unknown	Unknown

The species *S.spinulosa* is widely distributed in the North East Atlantic however densely aggregated reef structures are believed to be relatively rare and are typically restricted to areas with high levels of suspended sediment in the North Sea and Celtic Sea. Significant shortcomings in available mapping data mean that reliable figures for EOO and AOO cannot be derived at the present time. There is also a lack of information on trends. 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%

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	DD	DD	DD	DD	DD	DD	DD	DD	DD	DD	DD	DD	DD	DD	DD	DD	DD
EU28+	DD	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
Data Deficient	-	Data Deficient	-

Confidence in the assessment
Low (mainly based on uncertain or indirect information, inferred and suspected data values, and/or limited expert knowledge)

Assessors
North East Atlantic Working Group: S. Gubbay, G. Saunders, H. Tyler-Walters, N. Dankers, F.Otero-Ferrer, J. Forde, K. Fürhaupter, R. Haroun Tabraue, N. Sanders.

Contributors
North East Atlantic Working Group: S. Gubbay, G. Saunders, H. Tyler-Walters, N. Dankers, F.Otero-Ferrer, J. Forde, K. Fürhaupter, R. Haroun Tabraue, N. Sanders.

Reviewers
J.Leinikki.

Date of assessment
05/11/2015

Date of review
15/01/2016

References

European Environment Agency. 2014. EUNIS habitat type hierarchical view. Available at: http://eunis.eea.europa.eu/habitats-code-browser.jsp. (Accessed: 22/08/2014).

Gibb, N., Tillin, H., Pearce, B. and Tyler-Walters, H. 2014. Assessing the sensitivity of *Sabellaria spinulosa* reef biotopes to pressures associated with marine activities. JNCC Report No. 504.

Gubbay, S. 2007. *Defining and managing Sabellaria spinulosa reefs: Report of an inter-agency workshop*. JNCC report No.405.

Hendrick, V. J. & Foster-Smith, R. L. 2006. *Sabellaria spinulosa* reef: a scoring system for evaluating 'reefiness' in the context of the Habitats Directive. *J.Mar.Biol.Ass.UK*. 86: 665-677.

Holt, T.J.Hartnoll, R.G. and Hawkins, S.J. 1997. *Sensitivity and vulnerability to man-induced changes of selected communities. Intertidal Brown Algal Shrubs, Zostera beds and Sabellaria spinulosa reefs*. English

Nature Research Report 234.

Holt, T.J., Rees, E.I.,Hawkins,S.J. & Seed, R. 1998. Biogenic reefs (Volume IX). An overview of dynamic and sensitivity characteristics for conservation management of marine SACs. Scottish Association for Marine Science (UK Marine SACs Project), p.170.

Limpenny, D. S., Foster-Smith, R. L., Edwards, T. M., et al. 2010. *Best methods for identifying andevaluating Sabellaria spinulosa and cobble reef.* Aggregate Levy Sustainability Fund Project.

MAL. 2008. *Joint Nature Conservation Committee, Peterborough*, 134 pp., ISBN - 978 0 907545 33 0.

OSPAR. 2013. Background document of *Sabellaria spinulosa* reefs. Southampton: OSPAR Commission 614/2013. 24pp. Availiable at: http://www.ospar.org/documents?v=7342. (Accessed: 13/08/2014).

Pearce, B., Hill, J. Wilson,C. *et al.* 2013. *Sabellaria spinulosa* Reef Ecology and Ecosystem Services. London: The Crown Estate, p.118.