Test feature dossiers compiled as part of the work on the identification of nationally important marine features in the Irish Sea (part 2)

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This document contains nine test feature dossiers that were compiled as part of the work on developing and testing the RMNC criteria on nationally important marine features, carried out as part of the Irish Sea Pilot in 2004. These nine dossiers were compiled by *MarLIN*/MBA under contract for the JNCC. Further details on the contract are contained in:

Hiscock, K Jones H (2003) Testing criteria for assessing 'national importance' of marine species, biotopes (habitats) and landscapes. *Report to Joint Nature Conservation Committee from the Marine Life Information Network (MarLIN).* Plymouth: Marine Biological Association of the UK. [JNCC Contract no. F90-01-681]

A further 16 dossiers were compiled by L. M. Lieberknecht (JNCC) and are also available to download on the Irish Sea Pilot website (www.jncc.gov.uk/irishseapilot). The dossiers should always be read in conjunction with the following report:

Lieberknecht, L. M., Vincent, M.A. and Connor, D. W., 2004. *The Irish Sea Pilot - Report on the identification of nationally important marine features in the Irish Sea.* JNCC, Peterborough. Available online at www.jncc.gov.uk/irishseapilot.

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Dossier for: The allis shad Alosa alosa (Linnaeus, 1758)

Basic information

Plate 1. *Alosa alosa* from the Plymouth fish market. January 2004. (Image: © Keith Hiscock)

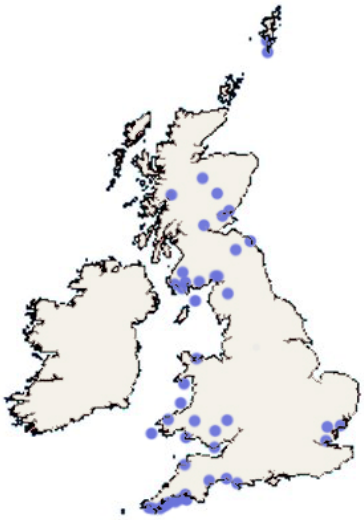

Figure 1: Recent records of *Alosa alosa* in the UK (adapted from Henderson 2003 and Potts and Swaby 1991)**.**

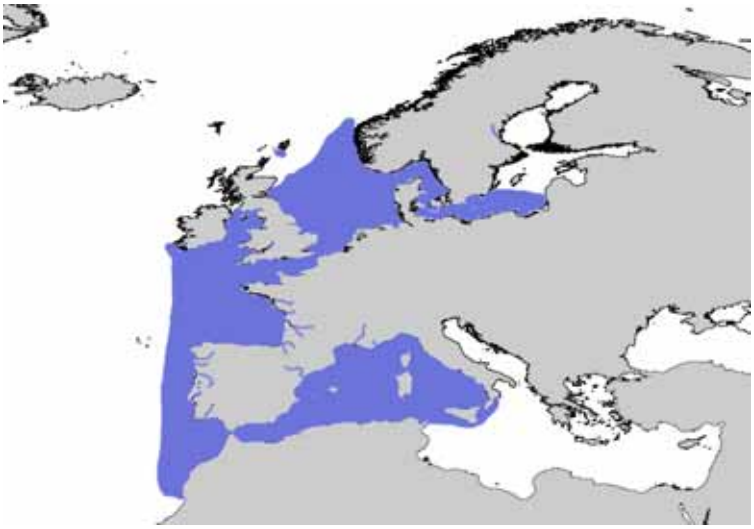

Figure 2: Recent records of *Alosa alosa* in Europe showing marine distribution and river spawning areas (rivers in blue)(adapted from Whitehead 1984, Swinney 2000, and Aprahamian et al. 2003)

The Allis Shad (*Alosa alosa*) is a member of the herring family. A deep bodied species with circular scales, a notched upperjaw in the mid-line, and a lower jaw of equal length that fit inside the upper jaw (Potts and Swaby 1991). This anadromous fish measures between 30-50cm (Potts and Swaby 1993) and closely resembles the Twaite shad (*Alosa fallax*), but may be separated by examining the gill-rakers, (*A. alosa* has between 90-130 gill-rakers on the first gill arch while *A. fallax* has only 40-60) (Wheeler 1969).

Reported distribution

Distribution is well-reported as the species is caught commercially and by recreational anglers.

Biology and Key Sensitivity Information Review

There is no MarLIN Biology and Sensitivity Key Information Review for *Alosa alosa*. The species is likely to be intolerant of extraction but have a high recovery potential because of its very high fecundity so that it would be ranked as of Low sensitivity to extraction. However, it seems that the high recovery potential cannot be achieved because access to historical spawning areas has been blocked by construction or rivers are too polluted. Sensitivity to extraction must therefore be considered Very High in the case of stocks from now blocked rivers. Since fish may be faithful to the river in which they were born, local extinction may have occurred.

Application of the criteria for special importance

Proportional importance

Alosa alosa occurs along the eastern-Atlantic seaboard from Norway to North Africa (approximately 20^{o}N) and also in the western Mediterranean (Whitehead 1984). The only reported spawning population in the UK is that of the River Tamar (Maitland and Hatton-Ellis 2003), although the appearance of sub-adults and mature adults near the Solway Firth may indicate a spawning site (Potts and Swaby 1991) and adults have also been recorded in the English and Bristol Channels (Maitland and Hatton-Ellis 2003). The most important spawning rivers in northern Europe are the Loire and Gironde, and its possible British caught specimens are part of the Loire-Gironde population (Henderson 2003). Evidence from France indicating recolonisation of north-west rivers may suggest recovery of geographical range (Henderson 2003). Overall, the current UK population is not of regional importance as much larger spawing populations occur elsewhere.

Verdict: Does not meet criterion

Rarity

Criteria for assessing rarity of marine species and for coastal areas and are not directly applicable to anadromous species such as allis shad. Records from within coastal areas (see Henderson 2003 and Potts and Swaby 1991) identify the species as nationally scarce.

Verdict: Unlikely to meet criterion

Application of the criteria for threatened/declined features

Decline

Alosa alosa is known to have declined significantly throughout its range on the western coasts of Europe, from southern Norway to Spain, and in the Mediterranean eastwards to northern Italy. The most successful breeding populations are thought to be in a few rivers in western France and Portugal.

Alosa alosa was once abundant in the River Severn and supported a commercial fishery (Day 1890 cited in Henderson 2003). By the 1970s there was no indication that a spawning population still existed in either the Severn or other rivers in that region (Henderson 2003). The report by Henderson (2003) is mirrored for many northern European rivers (River Rhine (De Groot 1990), Seine, Thames, Elbe, Meuse, (Maitland and Hatton-Ellis 2003)), and Norway and Finland (Aprahamian et al. 2003)). Southern European populations have also shown decline (River Minho, Mondego, Douro, and Tagus (Maitland and Hatton-Ellis 2003)).

The decline has been attributed to overfishing, barriers to their migration (dam construction) (Maitland and Hatton-Ellis 2003) and destruction of spawning habitat (Aprahamian 2003). Pollution and deterioration of water quality in rivers may also be important (Potts and Swaby 1993).

Verdict: Meets criterion

Threat of significant decline

Threat of significant further decline is difficult to assess. It might be that the current population is 'in balance' with fishing effort and, without removal of physical barriers to migration is unlikely to increase or, indeed, decline further in abundance. Populations 'faithful' to a particular river may already be extinct. It is not expected that any further construction will affect the one known spawning stock in the UK, in the Tamar where improvement in water quality may encourage recovery. Similarly, for the Loire and Gironde populations (which may be the source of much of the UK population), improvement rather than further degradation seems likely.

Verdict: Does not meet criterion

Overall Verdict

Meets 'Decline' criterion, unlikely to meet 'Rarity' criterion and does not meet other criteria: should be on list of nationally important features

Other relevant information

Table 1: Summary of the European Conservation Designations for *Alosa alosa*. (Adapted from Elliott and Hemmingway 2002).

European Protection Designation	**Level of Protection**
Habitats Directive	II (Conservation requires the designation of SACs)
Habitats Directive	V (Exploitation subject to management measures)
Berne Convention	III (Exploitation shall be regulated)
UK Wildlife & Countryside Act 1981	Schedule 5 Section 9.1 (killing/injuring)
UK Wildlife & Countryside Act 1981	Schedule 5 Section 9.1 (taking)
UK Wildlife & Countryside Act 1981	Schedule 5 Section 9.4a
UK Biodiversity Action Plan	Short List – Priority
France Red Data Book	Vulnerable
Ireland Red Data Book	Vulnerable
Denmark	Extinct
Poland	Extinct
Spain Red Data Book 1992	Vulnerable, Extinct
Flanders Red Data Book	Endangered
Italy	Extinct

Acknowledgements

Our thanks to Douglas Herdson (National Marine Aquarium) for locating a specimen at the Plymouth fish market to illustrate this dossier.

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Wheeler, A (1969). *The fishes of the British Isles and North-West Europe.* Macmillan, London

Whitehead, P J P Bauchot, M L Hureau, J C Nielsen, J and Tortonese, E (1984). *Fishes of the north-eastern Atlantic and the Mediterranean, vol. I.* Unesco, Paris

Dossier for: Bearded Anotrichium *Anotrichium barbatum* (C Agardh) Nägeli, 1862

Basic information

Plate 1: Laboratory specimen of *Anotrichium barbatum*. Plant width ca 3 cm. **Image:** Christine Campbell / Culture Collection of Algae and Protozoa

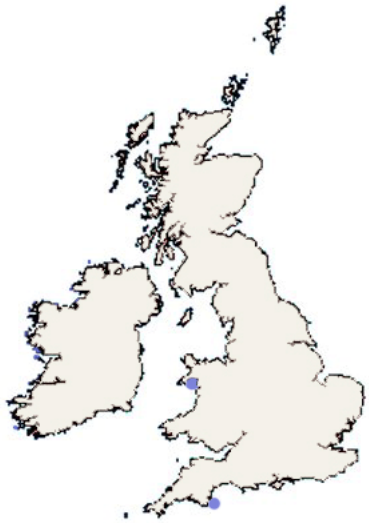

Figure 1. *Anotrichium barbatum* recorded and expected distribution in Britain and Ireland. (from Wilson 2003 based on Hardy and Guiry 2003).

A small, filamentous, rose-pink seaweed forming much-branched, extremely delicate tufts 2-6cm high. The whorl of branched hair-like filaments on younger vegetative cells, later bear the reproductive structures (Wilson 2003).

Reported distribution

Herbarium specimens in the Natural History Museum in London (Dr Ian Tittley, pers. Comm.) are from eight locations along the south coast of England from Cornwall to Sussex and from the recent record in North Wales. Hardy and Guiry (2003) report that the species was recorded from southern England in the nineteenth century, but was unknown in the 20th century until it was discovered in North Wales between Pwllheli and Abersoch. The record shown on Figure 1 for Lower Noss Point, Dart Estuary in South Devon was recorded during Nature Conservancy Council commissioned surveys in 1987 and is plotted from Hardy and Guiry (2003). It may be the record that they note as "The Cornish record here is probably a misidentification …". Maggs and Hommersand (1993) suggest that the report of *Anotrichium barbatum* at Lower Noss Point is possibly a misidentification of *Anotrichium furcellatum,* as are all other recent reports of *A. barbatum.*

Biology and sensitivity key information

There is no *MarLIN* Biology and Sensitivity Key Information Review for *Anotrichium barbatum* only a basic information review, principally due to lack of data.

Application of the criteria for special importance

Proportional importance

Known with certainty from only one extant location in the U.K. (Cardigan Bay between Pwillheli and Abersoch) (Anon. 1999).

Reported distribution from The NE Atlantic (Britain and Canary Islands) through the Mediterranean (Spain, Balearic Islands, Sardinia, Italy, Sicily, Malta, Adriatic, Greece, Turkey, Libya and Algeria) and into the SE Atlantic (Sierra Leone) (Guiry and Nic Dhonncha 2003). Tittley (2002) specifically comments on the fact that *Anotrichium barbatum* is a member of a genus that is common in the warmer waters of the Atlantic and a family (Ceramiaceae) globally widespread.

Verdict: Does not meet criterion

Rarity

Anotrichium barbatum is registered as a Nationally Rare Marine Species and is listed as a UK Biodiversity Action Plan Species (Plowman 1995).

Verdict: Meets criterion

Application of the criteria for threatened/declined features

Decline

Plowman (1995) indicates a decline in *A. barbatum* of between 50-100% in numbers/range in the UK in the last 25 years. A large number of *A. barbatum* herbarium specimens were collected in England and the Channel Islands from 1807 to 1900, with the majority of them dating from the 1890's. Most of them came from a few favourite collecting sites (Studland, Swanage and Jersey). Clearly this rare alga was highly desirable for collecting at the small number of sites where it could be found intertidally and affected U.K. populations (Anon 1999).

Verdict: Meets criterion

Threat of significant decline

It is not known whether there are any current causes of decline because only one, previously unknown, population has been located to date, and it has been examined on only one occasion. However, its Oyster Bank site is subject to several potential threats.

The most serious of these is the possible dumping of spoil from channel dredging operations. As the population occupies a fairly small area, it could be entirely eliminated by spoil dumping. Bottom trawling is potentially damaging, but the shallow depth makes this unlikely. Pwllheli is being developed as a centre of harbour and watersports facilities, and the Oyster Bank will need appropriate protection (Anon 1999).

Verdict: Meets criterion

Overall Verdict:

Does not meet criterion for proportional importance but meets criteria for rarity, decline and threat of significant decline: should be on list of nationally important features.

Acknowledgements

Thanks to Dr Gavin Hardy and Henry Arnold for helping to track-down the Dart Estuary record and to Ian Tittley for information from the Natural History Museum herbarium database.

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Dossier for: The fan mussel *Atrina fragilis* (Pennant, 1777)

Basic information

Plate 1: *Atrina fragilis* in soft mud in Plymouth Sound. (Image: © Keith Hiscock)

Plate 1: *Atrina fragilis* removed from soft mud in Plymouth Sound. Scale is 20 cm. (Image: © Keith Hiscock)

Figure 1: Recorded and expected distribution of *Atrina fragilis* for the UK and Ireland (Tyler-Walters 2003). (Many of the records shown here are historical and there are few recent records of live individuals).

Figure 2: Recorded Distribution of *Atrina fragilis* in European waters.(Adapted from Tyler-Walters 2003 and Simunovic et al. 2001). (Whilst ascribed to *Atrina fragilis*, the Mediterranean records may be of *Pinna nobilis.*)

Large (30-48 cm long) triangular, thin, shell tapering to a point, light yellow- brown to dark brown in colour. Fan-mussels live with their pointed end embedded in sediment,

attached by abundant fine byssal threads. The posterior (broad) end protrudes from the surface. Often solitary but populations occur as small groups or patches of individuals forming small beds. (Tyler-Walters 2003)

Reported distribution

Northern UK to the Iberian Peninsula and the Adriatic Sea.

Biology and sensitivity key information

The *MarLIN* Biology and Sensitivity Key Information Review provides a full sensitivity review for *Atrina fragilis* (see http://www.marlin.ac.uk/species/Atrfra.htm). *A.fragilis* shows 'high' sensitivity to many physical disturbance factors, in particular substratum loss, smothering and displacement. The documented impact of dredging on *A. fragilis* populations combined with the long-lived, low gamete production mean that this species population cannot be compensated for by an immediate reproductive response and recruitment (Tyler-Walters 2003).

This species has no ability to burrow upwards, or re-burrow themselves following a disturbance incident. The fragile shell is another reason for the susceptibility of *Atrina fragilis* to physical disturbance.

Atrina fragilis is therefore recorded as having 'high' intolerance to 'physical disturbance' 'substratum loss' 'smothering' and 'displacement' and a 'low' recoverability making this species 'high' sensitivity (see www.marlin.ac.uk for definitions of Intolerance and Recoverability and Sensitivity).

Application of the criteria for special importance

Proportional importance

In the UK, *Atrina fragilis* is recorded predominantly off southern and western shores (Seaward 1990). Global distribution is from northern Scotland to the Iberian Peninsula, including the Channel Isles and the Adriatic Sea (Seaward 1982, 1990, Turk and Seaward 1997, Woodward 1985, Simunovic et al. 2001). However, further investigation of records from the Mediterranean is required to ensure that the observations are of *Atrina fragilis*.

Atrina fragilis also had a reported distribution along the Atlantic coast of Africa, the Caribbean Islands and off of Madeira (Nobre 1938-1940 cited in Simunovic et al. 2001).

The UK population appears to be at the northern limits of the distributional range and populations are / have been much larger further south. For instance, populations exist in deep mud in the Bay of Concarneau where they are dredged to sell as curio shells (Dr J. Grall, pers. comm.). Given the wide distribution of *Atrina fragilis* and the likely greater abundance elsewhere in the north-east Atlantic, it is unlikely to meet this criterion.

Verdict: Does not meet criterion

Rarity

Protected under Schedule 5 of the Wildlife and Countryside Act 1981,and Wildlife (NI) Order 1985. *Atrina fragilis* is also recorded as a nationally scarce marine species, and is a UK Biodiversity Action Plan Species.

Atrina fragilis is a highly 'recordable' species because of its attraction (historically) to shell collectors and its conspicuous appearance. Nevertheless, records of its occurrence in UK waters have been few since records were first made systematically starting in the middle of the 19th century. It therefore seems to be a naturally scarce species in UK waters and records post-1970 would most likely qualify it as nationally rare. Although specimens are most likely caught from time-to-time by scallop dredgers, exceptionally few records have been made in recent years despite an awareness amongst diving biologists to look-out for individuals. The extreme difficulty finding individuals or populations suggests that decline in occurrence has occurred and, taking post-1970 records, it would qualify as nationally rare.

Verdict: Meets criterion

Application of the criteria for threatened/declined features

Decline

Around the UK and Ireland, the numbers of *Atrina fragilis* found in scallop beds that have been dredged have declined and few specimens remain (Anon. 1999). Most recent *Atrina fragilis* specimens have been found adjacent to dredged scallop beds or in areas subject to little dredging (Anon. 1999). This species was more common in scallop areas in the early 1900s. Presumably trawling and dredging of these formerly populated regions is the reason for the decline of this species (Dr D. Minchin pers. comm. to Dr H. Tyler-Walters). Dredging of a *Pecten maximus* bed off Glengad Head, Ireland, after 1975, removed many live specimens of *A. fragilis* in scallop dredges and the population of fan mussels is thought to have been destroyed by subsequent dredging (Anon. 1999). *Atrina fragilis* was recorded in *Zostera* sp. beds in the Isles of Scilly, however specimens have not been found since the *Zostera* sp. beds were lost (Turk 1982; Turk & Seaward 1997). Records from south west England in the Environmental Records Centre for Cornwall and the Isles of Scilly have shown that recordings of fan mussels have declined from inshore waters, and that the most numerous abundances in the last 20 years have come from deep water trawls suggesting that the absence of inshore shells may point to trawler fishing damage since the 1950s (Jean-Luc Solandt, pers. comm.). Searches for fan mussels have been carried out in Plymouth Sound, at sites in Pembrokeshire and the Oberon Bank in Scotland during 2003 to specifically look for shells that have been seen by other divers: none were found (Jean-Luc Solandt, pers. comm.). Following his presentation on changes in the benthos of the 'Grand Vasière', Bay of Biscay at the 2003 European Marine Biology Symposium, Dr F. Le Loc'h replied to the question "have any species been made extinct in the area as a result of trawling and dredging?" by suggesting that *Pinna fragilis* was now extinct in the area. However, it seems that populations exist in deep mud in the Bay of Concarneau where they are dredged to sell as curio shells (Dr J. Grall, pers. comm.). Since populations off the coast of France may be the source of larvae for recruitment to UK waters (Professor A.J. Southward, pers. comm.), further decline is likely as a result of stock depletion off continental Europe. The location for an individual *Atrina fragilis* in Plymouth Sound

found in December 2003 (Dr K. Hiscock, own observations following report of several individuals being seen) is in an area of soft mud not subject to dredging.

Verdict: Meets criterion

Threat of significant decline

As *A. fragilis* is considered a long lived species and since aggregations are now very rarely encountered, this species is particularly vulnerable to future scallop dredging and possibly to demersal fishing.

Sand and gravel extraction may remove or damage this species and a number of environmental changes may affect *A. fragilis* such as increases in turbidity, sedimentation and pollutants (Anon 1999). Furthermore seawater temperature changes may affect recruitment patterns.

Verdict: Meets criterion

Overall Verdict:

Meets all of the criteria related to importance within UK waters: should be on the list of nationally important features.

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Dossier for: Deep Sponge Communities (CR.HCR.DpSp)

Basic information

Plate 1: The biotope CR.HCR.DPSP.PhaAxi (*Phakellia ventilabrum* and axinellid sponges on deep, wave-exposed circalittoral rock). (Image from: www.jncc.gov.uk/marine/biotopes/biotope.aspx?biotope=JNCCMNCR00002113)

Plate 2: The biotope MCR.ErSSwi (Erect sponges and *Swiftia pallida* on slightly tide-swept moderately exposed circalittoral rock) from the 1997 classification (Connor et al. 1997). MCR.ErSSwi is similar to CR.HCR.DpSp. (Image source: JNCC)

Plate 3: A deep sponge biotope photographed at 25m depth at Gap Point in the Isles of Scilly and most likely CR.HCR.DpSp. (Image: © Keith Hiscock)

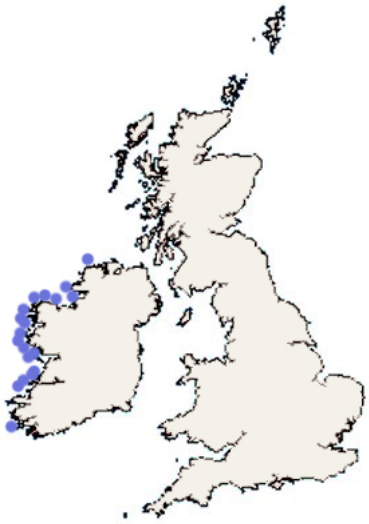

Figure 1: Recorded distribution of biotope complex CR.HCR.DpSp within the UK and Ireland (re-drawn from: http://www.jncc.gov.uk/marine/biotopes/biotope.aspx?biotope =JNCCMNCR00002122). (Further analysis of datasets is believed to be required and occurrences in western Scotland and the Isles of Scilly at least are likely.)

The biotope complex CR.HCR.DpSp includes one biotope CR.HCR.DPSP.PhaAxi (*Phakellia ventilabrum* and axinellid sponges on deep, wave- exposed circalittoral rock) which occurs on the upper faces of deep wave-exposed circalittoral rock and is subject

to negligible tidal streams (Connor et al. 2003). The sponge component of CR.HCR.DpSp is the most striking feature, with the sponges *Phakellia ventilabrum, Axinella infundibuliformis, Axinella dissimilis* and *Stelligera stuposa* dominating. Other sponge species frequently found on exposed rocky coasts are also present in low to moderate abundance. The cup coral *Caryophyllia smithii* and the anemone *Corynactis virdis* may be locally abundant in some areas, along with the holothurian *Holothuria forskali*. The soft corals *Alcyonium digitatum* and *Alcyonium glomeratum* are frequently observed. The bryozoans *Pentapora foliacea* and *Porella compressa* are also more frequently found in this deep-water biotope complex. Bryozoan crusts such as *Parasmittina trispinosa* are also occasionally recorded. Isolated clumps of large hydroids such as *Nemertesia antennina*, *Nemertesia ramosa* and *Sertularella gayi* may be seen on the tops of boulders and rocky outcrops. Large echinoderms such as *Echinus esculentus, Luidia ciliaris, Marthasterias glacialis, Strichastrella rosea, Henricia oculata* and *Aslia lefevrei* may also be present. The sea fan *Eunicella verrucosa* may be locally common, the top shell *Calliostoma zizyphinum* is often recorded as present (Connor et al. 2003).

Reported distribution

CR.HCR.DpSp is currently identified only from the west coast of Ireland on www.jncc.gov.uk/marine/biotopes. However, CR.HCR.DpSp appears very similar to MCR.ErSSwi (Erect sponges and *Swiftia pallida* on slightly tide-swept moderately exposed circalittoral rock, found on the west coast of Scotland) in the 1997 classification (Connor et al. 1997a). However, it has not been possible to match MCR.ErSSwi to a category in the 2003 classification. CR.HCR.DPSP.PhaAxi also appears similar to deep (<30 m) sponge dominated biotopes on open coast tide-sheltered areas on the east coast of St Mary's Isles of Scilly (K. Hiscock, own observations).

Overall, it is felt that there are probably several locations in Britain where at least very similar communities of species in the habitats characteristic of CR.HCR.DPSP.PhaAxi occur, i.e., the existing distribution map for CR.HCR.DpSp illustrated here is incomplete.

Biology and sensitivity key information

There is no MarLIN Biology and Sensitivity Key Information Review for biotope CR.HCR.DpSp (version 03.02 Connor et al. 2003) or MCR.PhaAxi (version 97.6 Connor et al. 1997) which is the predecessor to CR.HCR.DpSp.

Sensitivity of the biotope may be represented in part by research undertaken for the MarLIN review of MCR.ErEun (Erect sponges, Eunicella verrucosa and Pentapora fascialis on slightly tide-swept moderately exposed circalittoral rock) where sensitivity to substratum loss, physical abrasion and displacement is rated as 'Very High' (see www.marlin.ac.uk for definitions of Intolerance and Recoverability and Sensitivity). Little is known of the longevity and recruitment prospects for the sponges that characterise CR.HCR.DpSp but evidence from monitoring studies at Lundy (Hiscock, 1994) suggests that growth of *Axinella dissimilis* (as *Axinella polypoides*) and *Homaxinella subdola* is no more than about 2 mm a year (the sponges grow to a height of up to about 300 mm) and that all branching sponges included in photographic monitoring over a period of four years exhibited very little or no growth in that time. Furthermore, no recruitment of sponges was observed. The predominance of erect sponges in CR.HCR.DpSp is likely to mean that the biotope will not recover following loss.

Application of the criteria for special importance

Proportional importance

Currently identified only from the west and north-west coasts of Ireland, CR.HCR.DpSp is recorded in depths below 30m and typically up to 50m. With the biotope occuring at such depths and probably deeper, it is possible that the biotope is more widely spread than the dataset indicates as it is beyond the depth of most diving surveys (Connor et al. 2003). Recent video recording of deep (50-70 m) rock habitats in the Isles of Scilly, reveal several locations with examples most likely of CR.HCR.DpSp (analysis by Dr K. Hiscock of video tapes supplied by Dr D. Parry). The closest European descriptions of this biotope from the EUNIS Habitat Classification version 2.2 (Davies and Moss 2002) are codes: A3.A1 -Animal communities of deep circalittoral rock habitats exposed to weak or no currents, and code:A3.91 - Animal communities of deep circalittoral rock habitats exposed to moderately strong currents. Both descriptions fail to specify a similar decription of CR. HCR.DpSp beyond habitat level 2, and therefore the distribution of this biotope outside UK and Irish waters remains unknown.

Until analysis of datasets or collation of observations from other regions of the north-east Atlantic occurs, Britain and Ireland could be considered to hold a high proportion of this biotope globally. However, it is unlikely that the UK will have as extensive a representation of the biotope as indicated for western Ireland

Verdict: There is insufficient information available to assess whether Deep Sponge communities meet the criterion for proportional importance.

Rarity

It is possible that the biotope is more widespread than the dataset indicates as it is beyond the depth of most surveys (Connor et al. 2003). Examples of this biotope include species recognised under marine natural heritage importance lists (Table 1).

Within the UK seas, it is expected that the biotope will be scarce rather than rare but more data analysis is needed.

Verdict: Borderline case based on available information.

Application of the criteria for threatened/declined features

Decline

Evidence for any decline in extent of occurrence of CR.HCR.DpSp is very sparse. Hiscock (1994) observes that, at Lundy, several branching sponges in monitoring sites were 'missing' in 1986 following persistent easterly gales and subsequent studies revealed no recovery. Populations of erect sponges at Lundy are likely to have been

depleted by museum collecting in the early 1970's but no quantitative observations have been made. Bernard Picton (Ulster Museum, pers. comm.) has observed erect sponge communities on low rocks off Rathin Island (Northern Ireland) destroyed by scallop dredging although there are no return surveys to see if recovery is occurring. Loss of populations in recent years is most likely small but significant because of restricted occurrence.

Decline is unlikely to have been significant in terms of extent of occurrence.

Verdict: Unlikely to meet criterion.

Threat of significant decline

The biotope occurs mainly in rocky areas that are unlikely to be subject to mobile fishing gear. Other factors that may adversely affect the biotope include collecting for natural history studies and it would be expected that knowledge of longevity and likely nil recovery of species would discourage collecting. There is a threat of collection of sponges for biomedical purposes. Sponges, including the nationally scarce *Axinella damicornis*, have medical potential. At present, there is no known significant impact of this activity, and it is not known whether it is likely to pose a significant threat in the future.

Verdict: Possibly meets criterion

Overall Verdict:

It is unknown whether deep sponge communities meet the criterion for proportional importance, they are borderline for rarity, and there is a possibility that there may be a threat of significant decline criteria. However, the overall verdict has to be that there is insufficient evidence to justify this biotope qualifying as nationally important, and more research is required.

Other available information

Table 1: Summary of species found within MNCR Biotope CR. HCR.DpSp and recognised under Marine Natural Heritage Importance Designations.

Species	Marine Natural Heritage Designation
Alcyonium glomeratum	Biodiversity – Long list (Plowman 1995)
Axinella damicornis	Nationally Scarce Marine Species
Echinus esculentus	IUCN (1994) - Lower risk least concern

Eunicella verrucosa	Biodiversity - long list (Plowman 1995), IUCN (pre-1994) - rare, UK B.A.P. Priority Species List, WCA 1981 Schedule 5 Section 9.1 (Injuring/Killing)(Taking), WCA 1981 Schedule 5 Section 9.2, WCA 1981 Schedule 5 Section 9.5a, WCA 1981 Schedule 5 Section 9.5b.
Tritonia nilsodhneri	Nationally Scarce Marine Species

References

Connor, D W Allen, J H Golding, N Lieberknecht, L M Northen, K O and Reker, J B (2003) *The National Marine Habitat Classification for Britain and Ireland Version 03.02.[on-line*]. Joint Nature Conservation Commitee.12/12/03. Available from http://www.jncc.gov.uk/marine/biotopes/default.htm

Connor, D W Dalkin, M J Hill, T O Holt, R H F and Sanderson, W G (1997) *Marine biotope classification for Britain and Ireland. Volume 2. Sublittoral biotopes.*

Davies, C E & Moss, D (2002) EUNIS Habitat Classification. *Final Report to the European Topic Centre on Nature Protection and Biodiversity.* European Environment Agency

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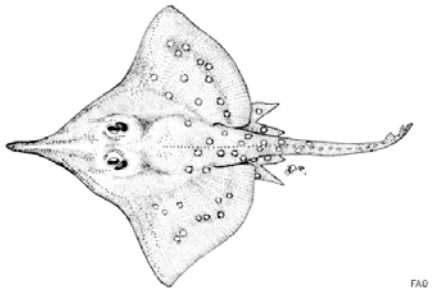
Dossier for: *Dipturus oxyrinchus* (Linnaeus, 1758) (Long-nosed skate)

Basic information



Dipturus oxyrhynchus (image width ca. 1 m).

Sourced from www.fishbase.org and reproduced with permission from the Food and Agriculture Organisation of the United Nations.

Recorded and expected distribution of *Dipturus oxyrhynchus* in the north-east Atlantic. Based on Wheeler 1969 and Whitehead et al. 1984. The areas shaded are within the depth contours where D*. oxyrhnchus* is found.

Dipturus oxyrinchus grows to around 250cm for females (Whitehead et al. 1984) and 150cm for males (Froese and Pauly 2003). This species has a long pointed snout and its disc has a smooth upper surface, which becomes prickly in larger specimens (Whitehead et al. 1984). The long-nosed skate is found on sand and sand-rock bottoms at 90m to 900m depth where it feeds on benthic species. *Dipturus oxyrinchus* produces eggs that are oblong shaped capsules with stiff pointed horns at the corners deposited in sandy or muddy seabed (Froese and Pauly 2003). *Dipturus oxyrinchus* is also known as *Raja oxyrinchus*.

Reported distribution

"Atlantic coasts northwards from the Canaries, Madeira and northern Morocco to the Faroes, the Shetlands and central Norway, also northern part of North Sea and to Skaggerak; Mediterranean (mainly at around 500m)" (Whithead et al. 1984). Recent records from UK waters (CEFAS and FRS – see Acknowledgements) confirm presence in depths greater than 100m to south-west, west and in the northern North Sea.

Biology and sensitivity key information

There is no MarLIN Biology and Sensitivity Key Information Review for *Dipturus oxyrinchus*. Ray species are typically slow growing and take several years to reach maturity. The eggs of *Dipturus oxyrinchus* are large and most likely produced in small quantities. The species is fished and numbers appear to have declined (Wheeler 1969

notes that "the long-nose skate is relatively common in appropriate depths, and makes a considerable contribution to the fisheries statistics for rays and skates". However, CEFAS trawl surveys since 1990 have caught and recorded only four individuals). The 'Resilience' ranking on www.fishbase.org is "Low, minimum population doubling time 4.5 - 14 years". The species appears to be intolerant of the effects of fisheries so that it is of 'High' sensitivity to 'Extraction of this species' and, because of the small number of eggs produced, is likely to have a 'Low' recovery potential making the species 'High' sensitivity (see www.marlin.ac.uk for definitions of Intolerance and Recoverability and Sensitivity).

Application of the criteria for special importance

Proportional importance

Dipturus oxyrinchus is distributed in the Eastern Atlantic from central Norway to Senegal including the Faeroes and within the Mediterranean. (Whitehead et al. 1984, Froese and Pauly 2003). Assuming that *Dipturus oxyrinchus* occurs at depths of 100-1000 m, the extent of the UK population is a significant but not high proportion of the global extent: possibly 20%. Records of occurrence are very sparse. The trawl database at Fisheries Research Services Aberdeen provides 52 records between 1925 and 2003, mostly at Rockall and off the Scottish west coast at depths of 100 to 300m (Dr Douglas Beard, pers. comm.). Ellis et al. (in press) note that *Dipturus oxyrinchus* were recorded occasionally in the northern North Sea and Celtic Sea in depths of 111 to 159 m. However, there have been only four records from CEFAS surveys since 1990, three from the Celtic Sea and one from the northern North Sea (Dr James Ellis, pers. comm.). Published information on distribution has also been obtained from Whitehead et al. (1984) and Froese and Pauly (2003).

Given that the UK area where *Dipturus oxyrinchus* occurs is a significant but not high part of the total distribution and that the abundance of this species is most likely higher to the south of the British Isles, the UK population is not of regional importance.

Verdict: Does not meet criterion

Rarity

Dipturus oxyrinchus is not currently registered under any conservation designations. A proposal has been submitted for the addition of *Dipturus oxyrinchus* to the Wildlife Conservation Act 1981 Schedule 5 in the Fourth Quinquennial Review [pers. comm. (letter) from Shark Trust to John Clorley (Defra) dated 14th December 2002].

Although total population size, historical (natural) abundance and range is poorly known, the species clearly has a low abundance in UK waters including within UK Fisheries limits and is rarely encountered.

Verdict: Meets criterion

Application of the criteria for threatened/declined features

Decline

Formally considered moderately common and regularly landed by longliners and trawlers in Northern Europe (Whitehead et al. 1984). Wheeler 1969 notes that "the long-nose skate is relatively common in appropriate depths, and makes a considerable contribution to the fisheries statistics for rays and skates". However, CEFAS trawl surveys since 1990 have caught and recorded only four individuals. Numbers maybe depleted due to unregulated fisheries [pers. comm. (letter) from Shark Trust to John Clorley (DEFRA) dated 14th December 2002] although no sources for current/past population size exist. Published records of skate capture are not usually made on a species specific basis, i.e. Defra record 'skates and rays' as a single group, and as Sea Fisheries Committees have no legal obligation to collect fisheries data, no quantitative information exists at species level (Hood and Ballerstedt 2002).

The species has declined in abundance in historical times although there is insufficient information to give a quantitative measure of that decline.

Verdict: Probably meets criterion

Threat of significant decline

Long-nosed skate will continue to be caught in fisheries around the UK. As a species with a long-life, slow growth and low reproductive capacity, recovery to whatever natural levels may have been seems unlikely. It has not been possible to assess whether any further decline may occur or whether current population size is in a 'steady state' in relation to current fishing pressures.

Verdict: Probably meets criterion

Overall Verdict

Meets criterion for Rarity and probably meets criteria for Decline and Threat of significant decline: should be on the list of nationally important features.

Acknowledgements

Preparing this dossier has been assisted by advice and information received from Dr Douglas Beare (Fisheries Research Services, Aberdeen), Drs Richard Millner and James Ellis (Centre for Environment Fisheries and Aquaculture Science, Lowestoft), Ali Hood at the Shark Trust,

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Dossier for: Mixed kelp with foliose red seaweeds, sponges and ascidians on sheltered, tide-swept infralittoral rock (IR.HIR.Ksed.XKT)

Basic information

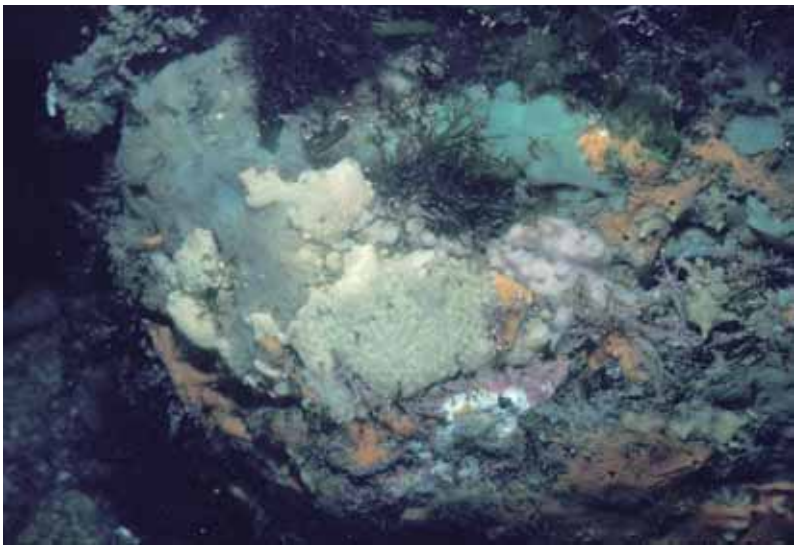

Plate 1. Part of IR.HIR.Ksed.XKT biotope in Linnhe Mhurich rapids, Loch Sween. (Image: © Keith Hiscock)

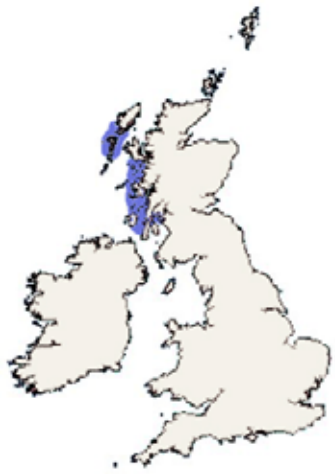

Figure 1. Reported and expected distribution of IR.HIR.Ksed.XKT (based on distribution of SIR.Lsac.T (Hiscock 2001) and descriptions from Connor et al. 2003).

Stable, tide-swept rock characterised by dense kelp *Laminaria hyperborea* and/or *Laminaria saccharina* forest on scoured, coralline-encrusted rock. This biotope occurs in the sheltered narrows and sills of Scottish sealochs, where there is an increase in tidal

flow. Although *L. hyperborea* (typically Common) generally occurs in greater abundance than *L. saccharina* (Frequent), either kelp may dominate, sometimes to the exclusion of the other. (This biotope should not be confused with sheltered, but silted LhypLsac). Large stands of the brown seaweed *Halidrys siliquosa* may also occur amongst the kelp along with *Dictyota dichotoma* on bedrock and boulders. In contrast to the scoured rock surface the kelp stipes themselves often support prolific growths of foliose red seaweeds such as *Phycodrys rubens*, *Membranoptera alata*, *Delesseria sanguinea* and *Plocamium cartilagineum*. Other foliose seaweeds may be present among the kelp holdfasts include *Chondrus crispus* and *Dilsea carnosa*. The scoured rock surface is characterised by encrusting coralline algae, barnacles *Balanus crenatus* and the tube-building polychaete *Pomatoceros triqueter*. The sponge *Halichondria panicea*, anthozoans *Urticina felina, Anemonia viridis* and *Sagartia elegans* can also occur on the scoured rock. Sponges, particularly *Halichondria panicea* and colonial and solitary ascidians *Botryllus schlosseri* and *Ascidiella aspersa* encrust the stipes, whilst hydroid growth of *Obelia geniculata* and seamats *Membranoptera membranacea* can cover the fronds, optimising the increased tidal flow. Mobile species such as the gastropod *Gibbula cineraria* can often be found on and around the kelp. The echinoderms *Asterias rubens, Ophiothrix fragilis* and *Echinus esculentus* can be found underneath the kelp canopy on the rock along with the crab *Carcinus maenas*. Where some protection is afforded from the scour anthozoans may occur on the rock such as *Alcyonium digitatum* or *Metridium senile* (Connor et al. 2003).

Reported distribution

IR.HIR.Ksed.XKT is reported as occurring specifically in the sheltered narrows and sills of Scottish sealochs. (SIR.Lsac.T in the 1997 classification was also recorded from the Menai Strait and at sites in west Wales and south Cornwall and Devon.)

Biology and sensitivity key information

The biotope (as SIR.Lsac.T) has a high intolerance to several factors that will destroy the habitat. Recoverability potential, if the same habitat remains after disturbance, is considered moderate and therefore sensitivity moderate (Hiscock 2001). However, it is notable that the human activities that are likely to damage IR.HIR.Ksed.XKT are often irreversible or very difficult to reverse and sensitivity would be very high to activities such as causeway building.

Application of the criteria for special importance

Proportional importance

There are no European descriptions of this biotope from the EUNIS Habitat Classification version 2.2 (Davies and Moss 2002) and therefore the distribution of this biotope beyond UK waters remains unknown. However, the biotope is likely to occur in the narrows between islands or at the entrance to fjordic or fjardic features in Scandinavia.

Verdict: Data deficient.

Rarity

This biotope is, in part, similar to previous biotope SIR.Lsac.T (version 97.06) (Connor et al. 1997) which is included in an interest feature of the Habitats Directive Annex 1 Habitat 'Coastal lagoons'. Further it forms part of the UK Biodiversity Action Plans for 'Tidal Rapids' 'Saline lagoons' and 'Inshore subtidal rock'.

Current description of this biotope suggests it is primarily only found in Scottish sealochs. Whilst SIR.Lsac.T is only recorded in two sealoch areas (Loch Roag, Lochs Leurbost and Erisort) (Beaver & Dipper 2002) this biotope is known to occur in other sealoch locations with a 'classic' example being Linne Mhurich rapids in Loch Sween, Argyll. So, although the biotope would be considered rare from available data that has been analysed, it is more likely a 'scarce' biotope. The restricted (small areas) in which it occurs does, though, make those locations important for the conservation of the biotope.

Verdict: Does not meet criterion

Application of the criteria for threatened/declined features

Decline

Building causeways across narrow tidal channels is a popular way of linking islands or 'short-circuiting' other links in the Outer Hebrides. Such causeways are usually solid barriers stopping water flow. It is possible that some examples of the IR.HIR.Ksed.XKT biotope may have been lost.

Verdict: Probably meets criterion

Threat of significant decline

The sorts of narrow shallow sounds where IR.HIR.Ksed.XKT occurs are attractive for bridging. Further examples of IR.HIR.Ksed.XKT may be lost if solid causeways are constructed.

Verdict: Meets criterion

Overall Verdict

Data deficient for Proportional importance, unlikely to meet criterion for Rarity, probably meets 'Decline' and meets 'Threat of significant decline' criteria: should be on list of nationally important features.

References

Connor, D W Allen, J H Golding, N Lieberknecht, L M Northen, K O and Reker, J B (2003) *The National Marine Habitat Classification for Britain and Ireland Version 03.02*.[on-line]. Joint Nature Conservation Commitee.12/12/03. Available from http://www.jncc.gov.uk/marine/biotopes/default.htm

Connor, D W Dalkin, M J Hill, T O Holt, R H F and Sanderson, W G (1997) *Marine biotope classification for Britain and Ireland. Volume 2. Sublittoral biotopes*. Peterborough, Joint Nature Conservation Committee

Davies, C E & Moss, D (2002) EUNIS Habitat Classification. *Final Report to the European Topic Centre on Nature Protection and Biodiversity*. European Environment Agency

Hiscock, K (2001) Laminaria saccharina, *foliose red seaweeds, sponges and ascidians on tide-swept infralittoral rock.*[on-line]. Marine Life Information Network: Biology and Sensitivity Key Information Sub-programme.18/12/2003. Available from http://www.marlin.ac.uk

Dossier for: Intertidal mussel beds (Mixed sediment shores with mussels) (LS.LMX.LMus)

Basic information

Plate 1: Photograph of LS.LMX.Lmus as SLR.MytX (*Mytilus edulis* beds on eulittoral mixed substrata) (Image from: www.jncc.gov.uk/mermaid).

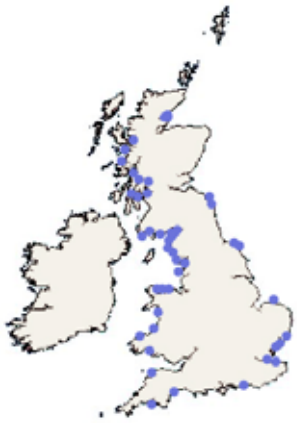

Figure 1: Recorded and expected distribution of biotope complex LS.LMX.Lmus in the UK and Ireland

Mixed sediment shores characterised by beds of adult mussels *Mytilus edulis* occur principally on mid and lower eulittoral mixed substrata (mainly cobbles and pebbles on muddy sediments) in a wide range of exposure conditions. In high densities the mussels bind the substratum and provide a habitat for many infaunal and epifaunal species. This biotope is also found in lower shore tide-swept areas, such as in the tidal narrows of Scottish sealochs. A fauna of dense juvenile mussels may be found in sheltered firths, attached to algae on shores of pebbles, gravel, sand, mud and shell debris with a strandline of fucoid algae. There are two biotopes in this biotope complex, LS.LMX.LMUS.MytFab (*Mytilus edulis* and *Fabricia sabella* in littoral mixed sediment) and LS.LMX.LMUS.Myt (*Mytilus edulis* on littoral sediments). Samples of the former are mainly infaunal, and of the latter mainly epifaunal (Connor et al. 2003). There are three sub-biotopes in LS.LMX.LMUS.Myt:

LS.LMX.LMUS.Myt.Mu Mytilus edulis beds on littoral mud.

LS.LMX.LMUS.Myt.Sa Mytilus edulis beds on littoral sand.

LS.LMX.LMUS.Myt.Mx Mytilus edulis beds on littoral mixed substrata.

Reported distribution

The biotope complex is widely distributed.

Biology and sensitivity key information

There is no MarLIN Biology and Sensitivity Key Information Review for biotope complex LS.LMX.LMus (version 03.02 Connor et al. 2003) or SLR.Mx.Myt (version 97.6 Connor et al. 1997) which is the predecessor to LS.LMX.LMus. Biotope MLR.MytFves has been researched and used to represent the sensitivity of LS.LMX.LMus (see: www.marlin.ac.uk/biotopes/bio_basicinfo_MLR.MytFves.htm). The biotope IMX.MytV (Mytilus edulis beds on variable salinity infralittoral mixed sediment) has also been researched (Tyler-Walters, 2001) is also similar and has been used here to assess sensitivity.

LS.LMX.LMus is likely to show 'high' intolerance to physical disturbance (wave exposure, displacement, and smothering) and chemical factors (hydrocarbon compounds). Recovery is recorded as 'moderate' as a single good recruitment event may recolonize the substratum within a year. However, recovery may take up to 5 years, and is some circumstances significantly longer. For instance, Edwards (1997) notes that the commercial development of natural beds is hampered by sporadic and unpredictable recruitment. Overall sensitivity is recorded as 'moderate'

.

Application of the criteria for special importance

Proportional importance

The closest European description of LS.LMX.LMus from the EUNIS Habitat Classification version 2.2 (Davies and Moss 2002) is code A2.411/B-LMX.MytFab - *Mytilus edulis* and *Fabricia sabella* in poorly-sorted muddy sand or muddy gravel shores. This is biotope LS.LMX.LMUS.MytFab and is described from only two European sites (Dornoch Firth and Moray Firth). The other biotopes described in this complex are widely distributed across the UK, but no satisfactory description of them exist at present in the EUNIS classification.

It is likely that much more extensive mussel beds that may constitute the biotope complex occur elsewhere in Europe as evidenced by the harvesting of mussels from such beds where British mussel production is relatively small comprising only 5% of total European Community production (Edwards, 1997).

Verdict: Does not meet criterion

Rarity

This biotope complex is widely distributed across the UK although the biotope MytFab has a far more limited distribution being only recorded at 2 sites, which would suggest that this biotope would realise the 'rare' criterion.

No characterising species of this biotope complex are listed in any marine conservation designations, however the biotope is included in the Habitat Directive Annex I habitat 'Mudflats and sandflats not covered by sea water at low tide'.

Verdict: Does not meet criterion

Application of the criteria for threatened/declined features

Decline

LS.LMX.LMus biotopes may vary greatly in extent and abundance with time. They are subject to catastrophic events such as displacement by storms or consumption by starfish *Asterias rubens*. They may also be fished in an unsustainable way. Studies of variability in extent of mussel beds in the UK that may help in assessing 'Decline' have not been found. However, studies on the North Sea coast of continental Europe suggest that distribution of beds over periods of up to 50 years remained rather constant with abundances of the mussels varying considerably due to irregular mass spat fall, ice drift, storm surges and parasitism (reviewed in Holt et al. 1998). Overall, mussel beds are not believed to be in long-term decline.

Verdict: Does not met criterion

Threat of significant decline

Mussel beds are not believed to be significantly threatened by pollution but may be reduced in extent and possibly in an unsustainable way by fisheries. However, recruitment and likely recovery is rapid and overall, beds of mussels are not, in the UK, believed to be threatened by decline.

Verdict: Does not meet criterion

Overall Verdict:

LS.LMX.LMus does not meet any of the criteria: should not be on the list of nationally important features.

References.

Connor, D W Allen, J H Golding, N Lieberknecht, L M Northen, K O and Reker, J B (2003) *The National Marine Habitat Classification for Britain and Ireland Version 03.02.* Peterborough, Joint Nature Conservation Committee ISBN 1 86107 546 4 (internet version)

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Dossier for: Deep water mud basins (Marine Landscape)

Basic information

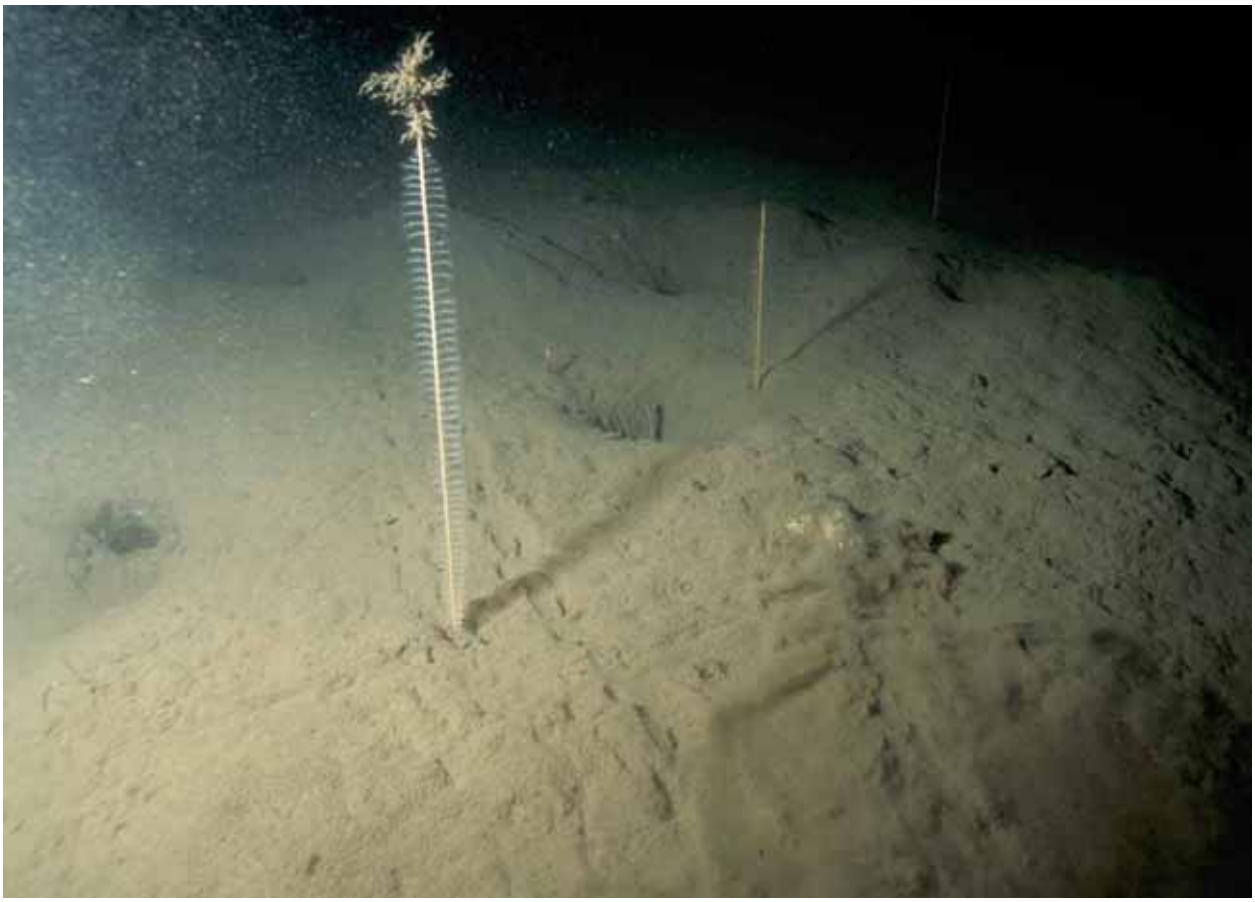

Plate 1. A deep mud basin with the sea pen Virgularia mirabilis and burrows of Nephrops norvegicus. Loch Duich. (Image: © Keith Hiscock)

Figure 1. Expected distribution of deep water mud basins around Britain and Ireland (map not available).

Deep water mud basins are described as circalittoral mud's located in water in excess of 50m depth, and occurring within depressions of the seabed which are subject to very weak currents (Golding et al. 2003). In this review, those mud basins are taken to include deeper parts of sea lochs although it is recognised that assumption creates a marine landscape within a marine landscape.

Table 1: Summary of biotopes found within Deep water mud basins and recognised as constituting the UK Biodiversity Action Plan Habitat. The comparative biotopes for The National Marine Habitat Classification for Britain and Ireland - Version 03.02 (Connor et al. 2003) (received from Dr. K. Howell pers. comm.)

1997 Marine Biotope Classification (Version 97.06) (Connor et al. 1997).	Comparative biotope for The National Marine Habitat Classification for Britain and Ireland – Version 03.02 (Connor et al. 2003)	Marine Natural Heritage Designation
COS.Sty Styela gelatinosa and other solitary ascidians on very sheltered deep circalittoral muddy sediment. (Partly fulfils SMU.Omu).	SMU.Omu Circalittoral offshore cohesive sandy mud and mud communities.	U.K. Biodiversity Action Plan – Mud Habitats in deep water. Nationally Rare Marine Biotope.
COS.ForThy Foraminiferans and Thyasira sp. In deep circalittoral soft mud. (Partly fulfils SMU.Omu).	SMU.Omu Circalittoral offshore cohesive sandy mud and mud communities.	U.K. Biodiversity Action Plan – Mud Habitats in deep water.
COS.AmpPar Ampharete falcata turf with Parvicardium ovale on cohesive muddy very fine sand near margins of deep stratified seas. (Partly fulfils SMU.Omu).	SMU.Omu Circalittoral offshore cohesive sandy mud and mud communities.	U.K. Biodiversity Action Plan – Mud Habitats in deep water.
CMS.AbrNucCor Abra alba, Nucula nitida and Corbula gibba in circalittoral muddy sand or slightly mixed sediment.		U.K. Biodiversity Action Plan – Mud Habitats in deep water.
CMU.BriAchi Brissopsis lyrifera and Amphiura chiajei in circalittoral mud.(Partly fulfils SMU.CfiMu).	SMU.CfiMu Circalittoral (deep) marine mud communities.	U.K. Biodiversity Action Plan – Mud Habitats in deep water.
CMU.SpMeg Seapens and burrowing megafauna in ciraclittoral soft mud. (Partly fulfils SMU.CfiMu).	SMU.CfiMu Circalittoral (deep) marine mud communities.	U.K. Biodiversity Action Plan – Mud Habitats in deep water.

CMU.SpMeg.Fun Seapens, including Funiculina quadrangularis, and burrowing megafauna in undisturbed circalittoral soft mud. (Partly fulfils SMU.CfiMu).	SMU.CfiMu Circalittoral (deep) marine mud communities.	U.K. Biodiversity Action Plan – Mud Habitats in deep water.
No Previous code.	SMU.CsaMu Circalittoral cohesive sandy mud and muddy sand.	U.K. Biodiversity Action Plan – Mud Habitats in deep water.

Table 2: Summary of species found within Deep Water Mud Basin Biotopes and recognised under Marine Natural Heritage Importance Designations.

Species	Marine Natural Heritage Designation	97.06 Biotope
Pachycerianthus multiplicatus	Biodiversity – Long list (Plowman 1995) Nationally scarce species	CMU.SpMeg CMU.SpMeg.Fun
Funiculina quadrangularis	Species statement in UK Biodiversity Action Plans Nationally scarce species	CMU.SpMeg.Fun
Styela gelatinosa	UK B.A.P. Priority Species List Nationally rare species	COS.Sty

Biology and Key Sensitivity Information Review

There is at present no MarLIN Biology and Sensitivity Key Information Review for Landscapes within the MarLIN Web pages, however MarLIN Biology and Sensitivity Key Information Reviews do exist for key biotopes which occur within deep water mud basins. In the work undertaken by the MBA for JNCC in the Irish Sea Pilot, the following biotopes (likely dominant biotope in terms of extent are shown in bold) were especially linked to Deep water mud basins:

CMU.BriAchi - Brissopsis lyrifera and Amphiura chiajei in circalittoral mud

COS.AmpPar - Ampharete falcata turf with Parvicardium ovale on cohesive muddy very fine sand near margins of deep stratified seas

COS.ForThy - Foraminiferans and Thyasira sp. in deep circalittoral soft mud

CMU.SpMeg - Seapens and burrowing megafauna in circalittoral soft mud

CMS.AbrNucCor - Abra alba, Nucula nitida and Corbula gibba in circalittoral muddy sand or slightly mixed sediment

The information outlined in Tyler-Walters et al. (2003) suggests that the benthic communities of deep mud basins in the Irish Sea are of intermediate tolerance to physical disturbance at the benchmark level but that most species would probably recover within ca 5 years, suggesting a sensitivity of low. Recovery will be slower where long-lived, slow growing species are recorded. Such species may include the fireworks anemone Pachycerianthus multiplicatus which is present in Scottish sea loch deep mud basins.

Application of the criteria for special importance

Proportional importance

Maps showing the distribution of deep water mud basins have not been located. It seems likely that there are extensive and well-developed deep water mud basins in Scandinavian fjords, in the Kattegat (Petersen 1918) and the Grand Vasière off Gascony, France at least in the north-east Atlantic. Deep water mud basins also occur in the Mediterranean. It is notable that a case is being made (see http://www.ngo.grida.no/wwfneap/Publication/briefings/GrandeVasiere.pdf) for the Grand Vasière to be "a showcase example for the OSPAR System of marine protected areas". Deep water mud basins within UK territorial seas or the UK EEZ are unlikely to constitute a major proportion of the north-east Atlantic resource for this marine landscape.

Verdict: Unlikely to meet criterion

Rarity

Tables 1 and 2 identify designations that apply to biotopes and species that are part of deep mud basins. Only COS.Sty Styela gelatinosa and other solitary ascidians on very sheltered deep circalittoral muddy sediment (Connor 1997) is a rare biotope together with its characterising species. It may be that the nationally rare fan mussel Atrina fragilis also occurs in deep soft mud.

Verdict: Does not meet criterion

Application of the criteria for threatened/declined features

Decline

Whilst the physical habitat is unlikely to decline, the biotopes that characterise the habitat are likely to have been substantially changed by fishing activities especially for the Norway lobster Nephrops norvegicus. Le Coc'h and Hiley (in press) found that in the Grand Vasière, only 82 of the 144 (in 1966) and 150 (in 2000) species sampled by

dredge were common to both surveys and only 28% of stations were similar in community composition. Ball et al. (2000) also describe significant change to benthic communities in areas dredged for Nephrops. In a personal communication to K. Hiscock following the presentation of the paper by Le Coc'h and Hiley at the 2003 European Marine Biology Symposium, Christian Hiley indicated that epifauna species in particular had been adversely affected by demersal fishing and that the fan mussel Atrina fragilis may have been made locally extinct in the area. There is therefore a suspected significant decline in fragile (epifaunal) species including some rare or scarce species in Deep mud basins and the habitat is likely to have lost several of its natural components. The extent of change due to human activities is likely to be substantial (see Le Coc'h and Hiley, in press).

Verdict: Meets criterion

Threat of significant decline

Expansion of trawling activities especially in restricted areas such as the deep mud basins of the Scottish sea lochs is likely to cause further decline in the abundance of erect epifaunal species.

Verdict: Meets criterion.

Overall Verdict:

Biotopes characteristic of deep mud basins are likely to be quantitatively and qualitatively changed with the loss if some sensitive species as a result of human activities. Therefore the marine landscape Mud basins in deep water meets criteria of 'Decline' and 'Threat of significant decline': should be on list of nationally important features.

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Dossier for: Sea lochs (Marine Landscape)

Research undertaken by: Dr Keith Hiscock and Hugh Jones, Marine Life Information Network, Marine Biological Association, Plymouth PL1 2PB.

Basic information

Plate 1. Fjardic landscape. Neavag Bay, Benbecula, Outer Hebrides. (Image: © Keith Hiscock)

Plate 2. Fjordic sea loch. Loch Leven, western Highlands. (Image: © Keith Hiscock)

Figure 1: Distribution of fjordic and fjardic sealochs within the UK and Ireland.(Adapted from Hiscock 1998).

Sea lochs are separated into two distinctive types: fjordic and fjardic.

Fjordic sea lochs occur in the more mountainous areas of the Scottish west coast and islands and were formed by the scouring action of glaciers and ice sheets. The result was an over-deepened basin (with some examples recording a charted depth of 200 m) or a series of basins connected to each other and to the open sea by narrow and shallow 'sills' at depths of less than 30 m, with many less than 20 m. (Anon. 1999). Fjordic lochs are deep with steep rocky sides). Strong gradients of wave exposure from outer sections to extremely sheltered inner basins occur. Freshwater influence is limited in most lochs, but water exchange between the sea and the loch may also be very limited, with a very long turnover time for the entire water body that it contains. Deep basins may have temporary or permanent thermoclines and/or haloclines and may become seasonally deoxygenated (Fowler 2003).

Fjardic sea lochs are much shallower than fjordic lochs often with a maze of islands and shallow basins connected by rapids, which are usually less than five metres deep and often intertidal. Fjardic sea lochs are found mainly in the Western Isles (Anon 1999).

The variability of sea lochs in size, shape, number of basins and length and depth of sills, produces a wide range of marine communities particularly related to substratum type and degree of exposure to tidal currents.

Biology and Key Sensitivity Information Review

There is at present no MarLIN Biology and Sensitivity Key Information Review for Landscapes within the MarLIN Web pages, however MarLIN Biology and Sensitivity Key Information Reviews do exist for key biotopes which occur within sealochs (see Appendix 1).

Some biotopes are likely to have a high intolerance to physical disturbance and a slow recoverability. For instance, CMX.ModHo and SCR.ModHAs are likely to have a high intolerance of abrasion and physical disturbance, a low recoverability and therefore are high sensitivity (see Tyler-Walters, 2001). For the highly characteristic sea loch biotope SCR.NeoPro, many factors show high intolerance and moderate recoverability potential leading to a sensitivity of moderate (see Jackson, 2000). The deep mud biotopes present within sea lochs such as CMU.SpMeg (see Hill, 2002) are assessed as having intermediate intolerance to abrasion and physical disturbance and high recoverability so that sensitivity is low. However, if likely slow growing and long-lived species such as the fireworks anemone Pachycerianthus multiplicatus are affected, recovery is likely to be slow and therefore sensitivity high. With such a range of sensitivity assessments for different biotope components of sea loch landscapes sensitivity to human activities should be identified as high but intermediate or low in places.

Application of the criteria for special importance

Proportional importance

Whilst fjordic and fjardic habitats are more extensive on the western coasts of Scandinavia than in Scotland within the north-east Atlantic area, the Scandinavian fjords are subject to less water exchange and have weaker tidal flows over sills (see Connor 1991). Scottish fjordic and fjardic habitats therefore appear to be characterized by

distinctive biotopes several of which do not occur or are poorly represented in Scandinavian fjordic or fjardic physiographic features

Verdict: Meets criterion for Regionally Important

Rarity

The sealoch landscape supports UK Biodiversity Action Plan habitats: 'Tidal Rapids', 'Mud Habitats in Deep Water', 'Maerl Beds', and 'Modiolus modiolus beds' (Anon 1999). Appendix 2 indicates biotopes found in sea lochs and, where available, information on national status. There is insufficient information from other relevant locations in Europe and Scandinavia to assess regional rarity. Biotopes that occur in sealoch habitats that are rated as rare or uncommon (for instance some maerl beds, Serpula vermicularis reefs, Limaria hians beds) and do not contribute to the assessment of rarity of the sea loch landscape unit.

With in excess of 60 sealochs present in Britain, the landscape is not considered rare.

Verdict: Does not meet criterion

Application of the criteria for threatened/declined features

Decline

The landscape feature is not in decline. However, biological features (species, biotopes) within sea lochs have been adversely affected, most likely by human activities. For instance, reefs of Serpula vermicularis have been lost from Linne Mhuirich in Loch Sween leaving only Loch Creran as a location for them – possibly due to run-off following forest clear-felling; trawling within sea lochs is almost certainly damaging sea pens and sea anemones only found within the lochs whilst the results of scallop dredging (possibly together with nutrification and other factors) has resulted in loss of horse mussel communities in Strangford Lough (Magorrian et al. 1995). Scallop dredging may also be damaging maerl beds and removing populations of the rare fan mussel Atrina fragilis from within sea lochs. Fish farms are generally considered to have localised effects only but some of the basins in which they are established are small with weak tidal flow so that even a small 'footprint' is significant. All-in-all, it does seem that the quality of biological features within the sea loch marine landscape is being affected locally at least and, in some sea lochs subject to use of mobile fishing gear, extensively. There are, however, few quantitative studies to identify degree of impact from human activities.

Verdict: Probably meets criterion

Threat of significant decline

There is little evidence to suggest that significant action is being taken to identify the human activities causing damage, to quantify damage or to take measures, including precautionary measures, to prevent or reduce decline in the quality of sea loch features caused by human activities. Main 'culprits' of damage to marine natural heritage features are likely to be inappropriately sited aquaculture and the use of mobile bottom fishing gear especially.

Verdict: Probably meets criterion

Overall Verdict:

Meets criterion for Regionally Important and probably meets criterion for Decline and Threat of significant decline: should be on the list of nationally important features.

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Appendix 1: Biotopes exclusively or especially found in sea lochs. Biotope codes and nomenclature are from MNCR Version 97.06 (Connor et al. 1997a,b).

Code	Name	Represented in MarLIN Biology and Sensitivity reviews by:
SLR.Fserr.Vs	Fucus serratus and large Mytilus edulis on variable salinity lower eulittoral rock.	MLR.BF
SLR.Fx.AscX.mac	Ascophyllum nodosum ecad mackaii beds on extremely sheltered mid eulittoral mixed substrata.	SLR.Fx.AscX.mac
SLR.FserX.T	Fucus serratus with sponges, ascidians and red seaweeds on tide-swept lower eulittoral mixed substrata.	SLR.FX.FvesX
SIR.Lsac.Pk	Laminaria saccharina park on very sheltered lower infralittoral rock.	SIR.Lsac.Pk
SIR.LsacRs.Psa	Laminaria saccharina and Psammechinus miliaris on slightly reduced salinity grazed infralittoral rock.	SIR.LsacRs
SIR.LhypLsac.Ft	Mixed kelps Laminaria hyperborea and Laminaria saccharina forest on sheltered upper infralittoral rock.	SIR.LsacRs
SIR.Lhyplsac.Pk	Mixed kelps Laminaria hyperborea and Laminaria saccharina park on sheltered lower infralittoral rock.	SIR.LsacRs
SIR.EchBriCC	Echinus, brittlestars and coralline crusts on grazed infralittoral rock.	MIR.LhypGz

SCR.AntAsH	Antedon spp., solitary ascidians and fine hydroids on sheltered circalittoral rock.	SCR.AntAsh
SCR.AmenCio	Solitary ascidians, including Ascidia mentula and Ciona intestinalis, on very sheltered circalittoral rock.	SCR.SubSoAs
SCR.AmenCio.Met	Large Metridium senile and solitary ascidians on grazed very sheltered circalittoral rock.	SCR.SubSoAs
SCR.NeoPro	Neocrania anomala and Protanthea simplex on very sheltered circalittoral rock.	SCR.NeoPro
SCR.ModHAs	Modiolus modiolus beds with fine hydroids and large solitary ascidians on very sheltered circalittoral mixed substrata.	MCR.ModT
CR.Ant	Antedon bifida and a bryozoan/hydroid turf on steep or vertical circalittoral rock.	CR.FaV.Bug
IGS.Phy	Phymatolithon calcareum maerl beds in infralittoral clean gravel or coarse sand	IGS.Mrl.Phy.HEc
IGS.Lgla	Lithothamnion glaciale maerl beds in tide-swept variable salinity infralittoral gravel.	IGS.Lgla
CMS.VirOph	Virgularia mirabilis and Ophiura spp. on circalittoral sandy or shelly mud.	CMS.VirOph
CMS.VirOphHAs	Virgularia mirabilis and Ophiura spp. with hydroids and ascidians	CMS.VirOph
CMS.Ser	Serpula vermicularis reefs on very sheltered circalittoral muddy sand	CMS.Ser
IMU.AreSyn	Arenicola marina and synaptid holothurians in extremely shallow soft mud.	IMU.AreSyn
IMU.PhiVir	Philine aperta and Virgularia mirabilis in soft stable infralittoral mud	IMU.PhiVir
IMU.Ocn	Ocnus planci aggregations on sheltered sublittoral muddy sediment	IMU.Ocn

CMU.SpMeg	Seapens and burrowing megafauna in circalittoral soft mud	CMU.SpMeg
CMU.SpMeg.Fun	Seapens, including Funiculina quadrangularis, and burrowing megafauna in undisturbed circalittoral soft mud.	CMU.SpMeg
CMU.Beg	Beggiatoa spp. on anoxic sublittoral mud	CMU.Beg
IMX.Lim	Limaria hians beds in tide-swept sublittoral muddy mixed sediment	IMX.Lim
CMX.ModHo	Sparse Modiolus modiolus, dense Cerianthus lloydii and burrowing holothurians on sheltered circalittoral stones and mixed sediment	(None)
COS.Sty	Styela gelatinosa and other solitary ascidians on sheltered deep circalittoral muddy sediment	COS.Sty
MCR.ErSSwi	Erect sponges and Swiftia pallida on slightly tide-swept moderately exposed circalittoral rock	MCR.ErSEun
MCR.Oph.Oacu	Ophiopholis aculeata beds on slightly tide-swept circalittoral rock or mixed substrata.	MCR.Oph
IMX.Tra	Mats of Trailliella on infralittoral muddy gravel.	IMX.LsacX

Appendix 2: Summary of biotopes found within Sealochs including matches between the MNCR Biotope classification (97.06) (Connor et al. 97a,b) and The National Marine Habitat Classification for Britain and Ireland - Version 03.02 (Connor et al. 2003) where possible. Biotopes that are included in Marine Natural Heritage Importance designations and, where information is available, national status are indicated.

1997 Marine Biotope Classification (Version 97.06) (Connor et al. 1997).	Comparative biotope for The National Marine Habitat Classification for Britain and Ireland - Version 03.02 (Connor et al. 2003)	Marine Natural Heritage Designation
SLR.Fserr.Vs Fucus serratus and large Mytilus edulis on variable salinity lower eulittoral rock.	LR.LLR.FVS.FserVS	
SLR.Fx.AscX.mac Ascophyllum nodosum ecad mackaii beds on extremely sheltered mid eulittoral mixed substrata.	LR.LLR.FVS.Ascmac	EC Habitats Directive: Reefs, Bays and Lagoons. UK BAP- Ascophyllum nodosum ecad mackaii beds National Status: Scarce
SLR.FserX.T Fucus serratus with sponges, ascidians and red seaweeds on tide-swept lower eulittoral mixed substrata.	LR.LLR.F.Fserr.X	
SIR.Lsac.Pk Laminaria saccharina park on very sheltered lower infralittoral rock.	IR.LIR.K.Lsac.Pk Laminaria saccharina park on very sheltered lower infralittoral rock.	
SIR.LsacRs.Psa Laminaria saccharina and Psammechinus miliaris on slightly reduced salinity grazed infralittoral rock.	IR.LIR.K.Lsac.Gz Laminaria saccharina and Psammechinus miliaris on variable salinity grazed infralittoral rock.	

SIR.LhypLsac.Ft Mixed kelps Laminaria hyperborea and Laminaria saccharina forest on sheltered upper infralittoral rock.	IR.LIR.K.LhypLsac.Ft Mixed Laminaria hyperborea and Laminaria saccharina forest on sheltered upper infralittoral rock.	
SIR.LhypLsac.Pk Mixed kelps Laminaria hyperborea and Laminaria saccharina park on sheltered lower infralittoral rock	IR.LIR.K.LhypLsac.Pk Mixed Laminaria hyperborea and Laminaria saccharina park on sheltered lower infralittoral rock	
SIR.EchBriCC Echinus, brittlestars and coralline crusts on grazed infralittoral rock.	?	
SCR.AntAsH Antedon spp., solitary ascidians and fine hydroids on sheltered circalittoral rock.	CR.LCR.BRAS.AntAsH Antedon spp., solitary ascidians and fine hydroids on sheltered circalittoral rock	EC Habitats Directive: Reefs, Bays National Status : Uncommon
SCR.AmenCio Solitary ascidians, including Ascidia mentula and Ciona intestinalis, on very sheltered circalittoral rock.	CR.LCR.BRAS.AmenCio Solitary ascidians, including Ascidia mentula and Ciona intestinalis, on wave-sheltered circalittoral rock	
SCR.AmenCio.Met Large Metridium senile and solitary ascidians on grazed very sheltered circalittoral rock.	?	
SCR.NeoPro Neocrania anomala and Protanthea simplex on very sheltered circalittoral rock.	CR.LCR.BRAS.NeoPro.FS Neocrania anomala and Protanthea simplex on very wave-sheltered circalittoral rock	EC Habitats Directive: Reefs, Bays National Status : Uncommon
SCR.ModHAs Modiolus modiolus beds with fine hydroids and large solitary ascidians on very sheltered circalittoral mixed substrata.	?	

CR.Ant Antedon bifida and a bryozoan/hydroid turf on steep or vertical circalittoral rock.	CR.FCR.FAV.Ant ?	
IGS.Phy Phymatolithon calcareum maerl beds in infralittoral clean gravel or coarse sand	Sublittoral Sediment Classification not currently available from Connor et al. 2003.	
IGS.Lgla Lithothamnion glaciale maerl beds in tide-swept variable salinity infralittoral gravel.	Sublittoral Sediment Classification not currently available from Connor et al. 2003.	EC Habitats Directive: Bays, Sandbanks, Lagoons. UK BAP: Maerl Beds National Status: Scarce
CMS.VirOph Virgularia mirabilis and Ophiura spp. on circalittoral sandy or shelly mud.	Sublittoral Sediment Classification not currently available from Connor et al. 2003.	EC Habitats Directive: Bays. UK BAP: Mud Habitats in Deep Water. National Status: Common
CMS.VirOphHAs Virgularia mirabilis and Ophiura spp. with hydroids and ascidians	Sublittoral Sediment Classification not currently available from Connor et al. 2003.	EC Habitats Directive: Bays. UK BAP: Mud Habitats in Deep Water. National Status: Common
CMS.Ser Serpula vermicularis reefs on very sheltered circalittoral muddy sand	Sublittoral Sediment Classification not currently available from Connor et al. 2003.	EC Habitat Directive: Reefs, Bays UK BAP: Serpula vermicularis reefs National Status: Rare
IMU.AreSyn Arenicola marina and synaptid holothurians in extremely shallow soft mud.	Sublittoral Sediment Classification not currently available from Connor et al. 2003.	EC Habitat Directive: Bays, Lagoons UK BAP: Saline Lagoons

IMU.PhiVir Philine aperta and Virgularia mirabilis in soft stable infralittoral mud	Sublittoral Sediment Classification not currently available from Connor et al. 2003.	EC Habitat Directive: Bays, Lagoons UK BAP: Mud habitats in deep water National Status: Uncommon
IMU.Ocn Ocnus planci aggregations on sheltered sublittoral muddy sediment	Sublittoral Sediment Classification not currently available from Connor et al. 2003.	
CMU.SpMeg Seapens and burrowing megafauna in circalittoral soft mud	Sublittoral Sediment Classification not currently available from Connor et al. 2003.	EC Habitat Directive: Bays UK BAP: Mud habitats in deep water
CMU.SpMeg.Fun Seapens, including Funiculina quadrangularis, and burrowing megafauna in undisturbed circalittoral soft mud.	Sublittoral Sediment Classification not currently available from Connor et al. 2003.	EC Habitat Directive: Bays UK BAP: Mud habitats in deep water
CMU.Beg Beggiatoa spp. on anoxic sublittoral mud	Sublittoral Sediment Classification not currently available from Connor et al. 2003.	EC Habitat Directive: Bays, Lagoons UK BAP: Mud habitats in deep water
IMX.Lim Limaria hians beds in tide-swept sublittoral muddy mixed sediment	Sublittoral Sediment Classification not currently available from Connor et al. 2003.	EC Habitat Directive: Bays National Status: Scarce
CMX.ModHo Sparse Modiolus modiolus, dense Cerianthus lloydii and burrowing holothurians on sheltered circalittoral stones and mixed sediment	Sublittoral Sediment Classification not currently available from Connor et al. 2003.	

COS.Sty Styela gelatinosa and other solitary ascidians on sheltered deep circalittoral muddy sediment	Sublittoral Sediment Classification not currently available from Connor et al. 2003.	U.K. BAP: Mud habitats in deep water. National Status: Rare
MCR.ErSSwi Erect sponges and Swiftia pallida on slightly tide-swept moderately exposed circalittoral rock	In part: CR.MCR.ECCR.CarSwi.Aglo Caryophyllia smithii, Swiftia pallida and Alcyonium glomeratum on wave-sheltered circalittoral rock. And CR.MCR.ECCR.CarSwi.LgAs Caryophyllia smithii, Swiftia pallida and large solitary ascidians on exposed or moderately exposed circalittoral rock.	
MCR.Oph.Oacu Ophiopholis aculeata beds on slightly tide-swept circalittoral rock or mixed substrata.	?	
IMX.Tra Mats of Trailliella on infralittoral muddy gravel.	Infralittoral Sediment Classification not currently available from Connor et al. 2003.	