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COMMISSIONED REPORT

Commissioned Report No. 319

Preliminary assessment of the conservation importance of benthic epifaunal species and habitats of the Pentland Firth and Orkney Islands in relation to the development of renewable energy schemes

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This report should be quoted as:

Moore, C.G. (2009). Preliminary assessment of the conservation importance of benthic epifaunal species and habitats of the Pentland Firth and Orkney Islands in relation to the development of renewable energy schemes. Scottish Natural Heritage Commissioned Report No. 319.

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COMMISSIONED REPORT

Summary

Preliminary assessment of the conservation importance of benthic epifaunal species and habitats of the Pentland Firth and Orkney Islands in relation to the development of renewable energy schemes.

Commissioned Report No. 319

Contractor: Scottish Natural Heritage

Year of publication: 2009

Background

In October 2008, Fisheries Research Services (Aberdeen) collected video and photographic stills imagery from 61 stations in the Pentland Firth and Orkney Islands. This formed part of a wider marine survey programme requested by Scottish Government, to inform potential marine renewables development in this region. This report provides a description of the seabed habitats, species assemblages and biotopes evident from the video and stills footage along with a preliminary assessment of their conservation importance and potential sensitivity to renewable energy schemes in the area.

Main findings

- Most sites examined in the Pentland Firth displayed low diversity circalittoral tideswept rocky communities, dominated by a sessile fauna of *Balanus crenatus* and *Urticina felina*, with an area of coarse, and apparently impoverished, sediment in the southwest of the Firth. Elsewhere, the habitats were predominantly sandy, sand-scoured rock or mixed substrates of sand and stones, which the visual evidence suggested supported low diversity communities. A total of 14 biotopes were recorded.
- The Pentland Firth probably represents the most extensive example of the UK BAP Priority Habitat “tidal rapids” in the United Kingdom. However, the communities observed during this survey were of low diversity, and composed of very common, widely distributed, scour-tolerant species, likely to be tolerant to modest reductions in current speed or sediment disturbance caused by the introduction of energy schemes. Similarly, the likely impact of schemes on other habitats recorded during the survey is considered to be unlikely to significantly affect the conservation of biotopes, considered to be of conservation importance, at Scottish or UK levels.
- Three species of recognised conservation importance were recorded but it is considered that conservation of these species is unlikely to be adversely impacted by renewable energy developments in the surveyed area.

- Regarding commercially important species, the sites surveyed in the Pentland Firth were found to support a large population of small *Cancer pagurus*, and so the implications of developments for a possibly important nursery ground for this species may need to be considered.

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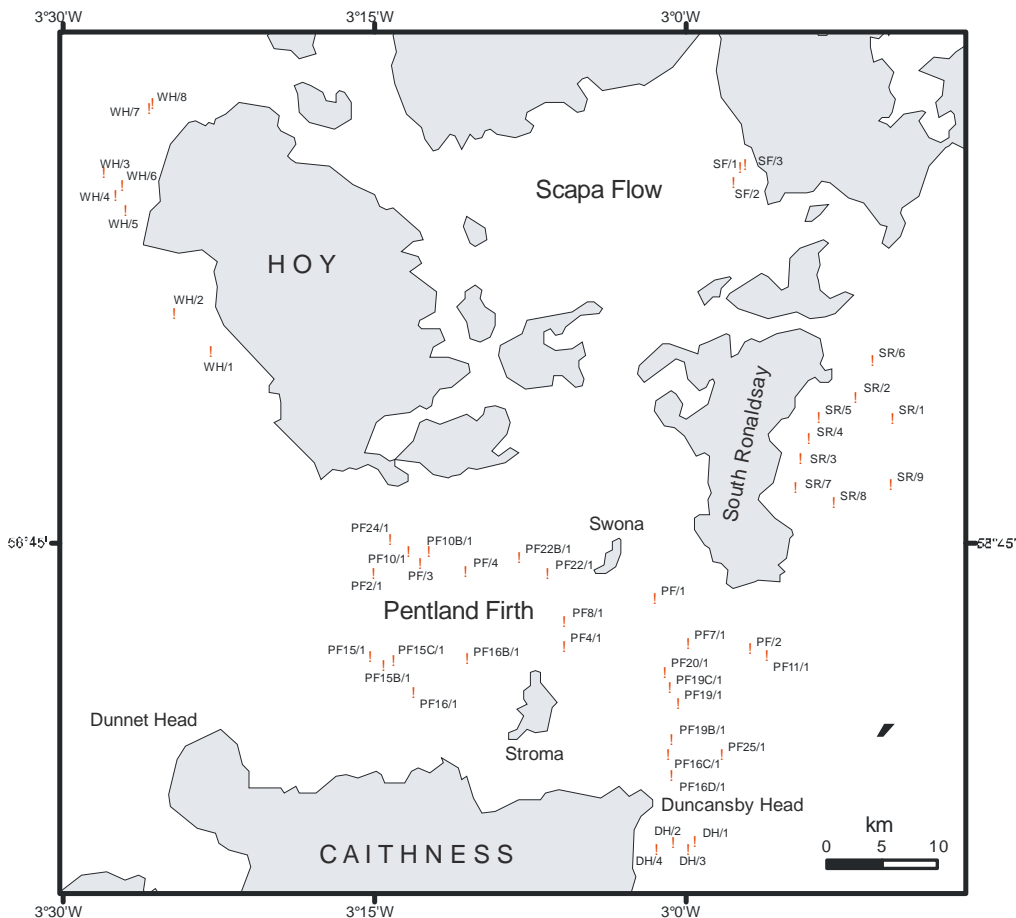
1. INTRODUCTION

In order to assess the likely environmental impact of the development of renewable energy schemes in the Pentland Firth and around the Orkney Islands, the Scottish Government commissioned Fisheries Research Services, Aberdeen (FRS) to map some areas of the seabed. FRS subsequently requested Scottish Natural Heritage to provide some early commentary on the conservation status of benthic species and habitats in the area. This report provides a preliminary description of the habitats observed by video during surveys carried out by FRS in 2008. It aims to inform SNH on the habitats and species of the area, with a view to assessing their conservation importance.

2. METHODS

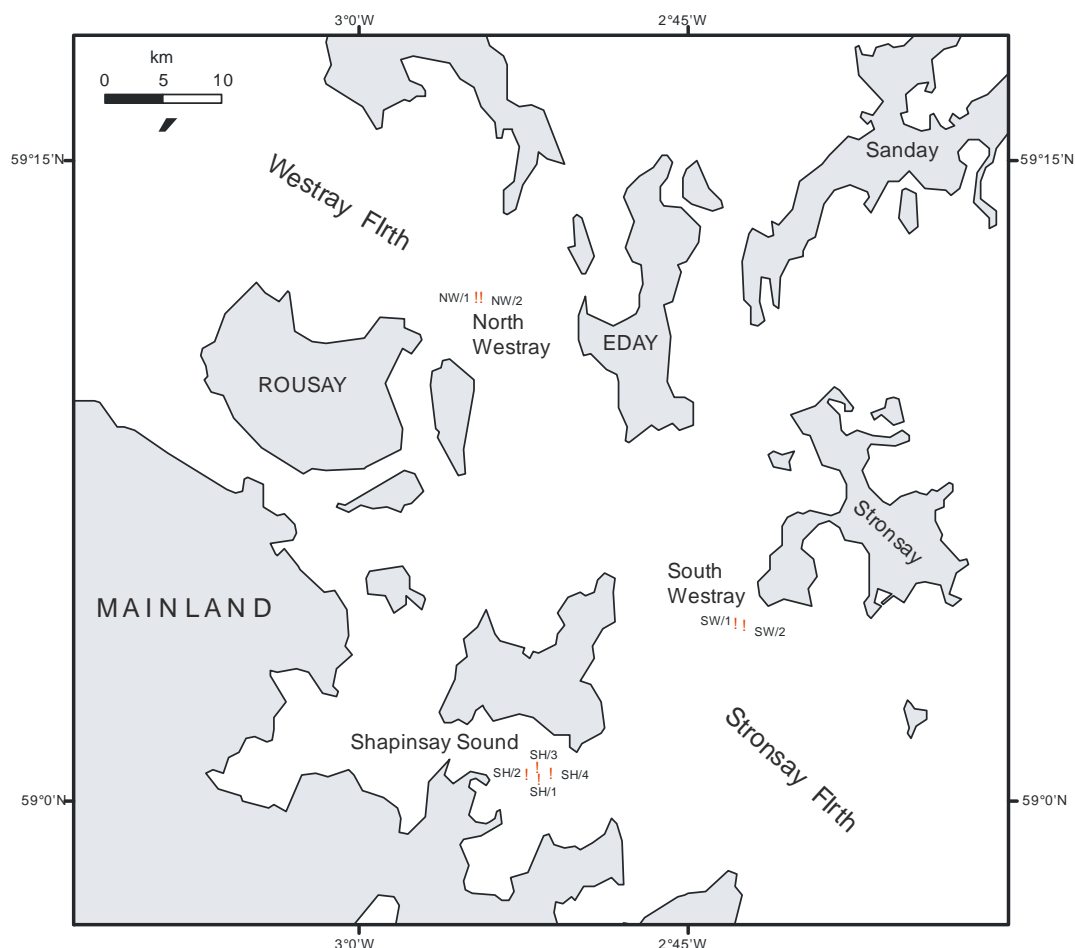
Observation of the seabed was carried out at 61 sites in the Pentland Firth and around the Orkney Islands during cruises by the *RV Scotia* from 12th October to 3rd November 2008. Site positions are shown in Figures 1 and 2 and further site details listed in Table A1. At each site a dropdown video system was deployed just above the seabed along runs varying from 1 to 37 minutes. The camera frame also carried a digital stills camera, which took vertically-orientated photographs of the seabed at

Figure 1 Video sites in southern part of surveyed area



intervals. The images were used to describe the nature of seabed, in terms of the physical structure and the species assemblages. Species present were, as far as possible, identified and quantified using the semi-quantitative MNCR SACFOR scale (Hiscock, 1996). Based on the physical and biological attributes, biotopes were allocated (Connor *et al.*, 2004).

Figure 2 Video sites in northern part of surveyed area



3. DESCRIPTION OF HABITATS

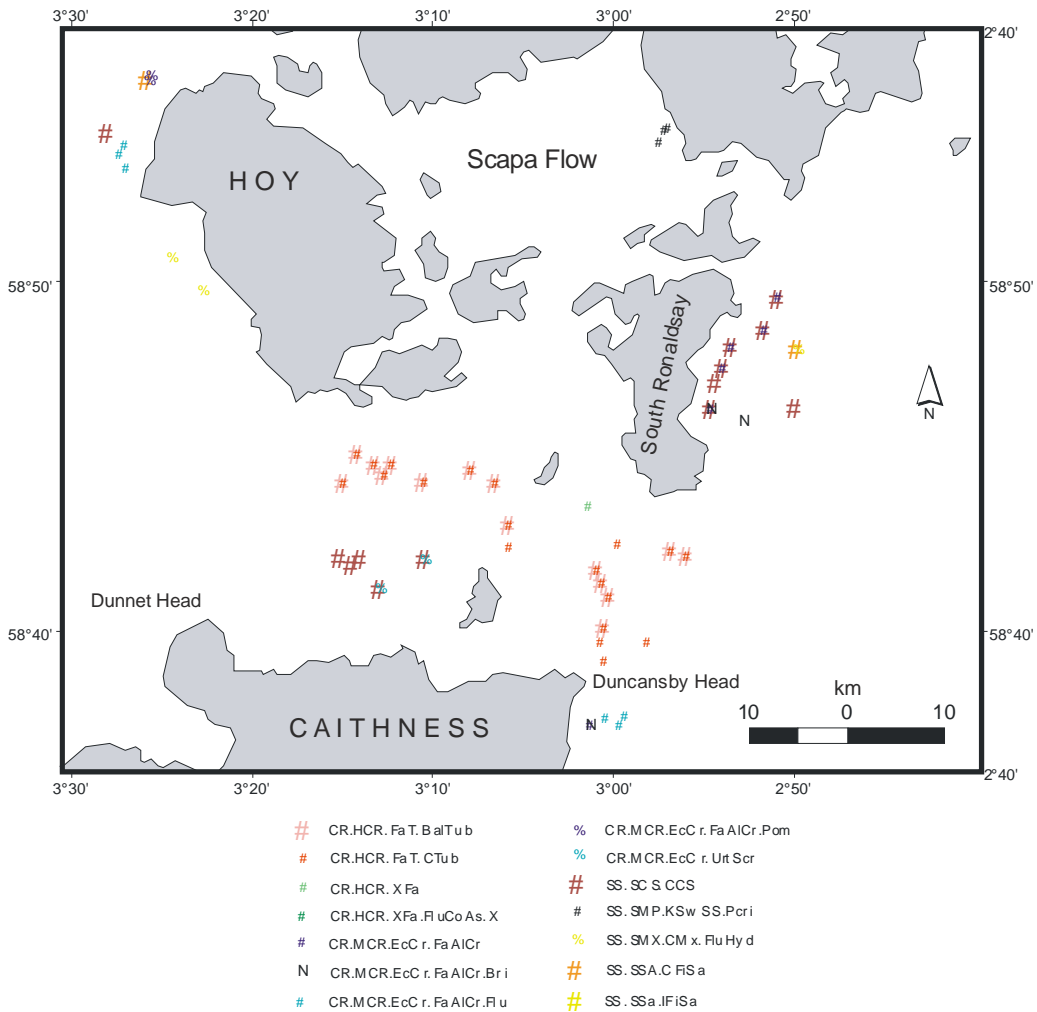
Habitat descriptions and biotopes are summarised in this section but presented in detail for each site in Table A2. Table A3 provides an inventory of the biotopes recorded, together with illustrative photographs and lists of their occurrence.

3.1 Pentland Firth (Figure 3)

The seabed of most of the area surveyed is rocky, consisting of boulders or a mix of bedrock and boulders. The boulders often lie on coarse shelly sand (or gravel) or coarse sediment is trapped between the boulders and often fills depressions and crevices in the bedrock. The bedrock takes several forms, including highly rugged areas with steeply-inclined and vertical faces, as well as horizontal, stepped platforms. Scour by coarse sediment and possibly by pebbles and cobbles is likely to be an important ecological factor over much of the area. The heterogeneity of the

seabed will serve to present a range of current speed conditions, with areas of elevated rock and the tops of larger boulders being subject to extreme tide-swept conditions, attaining 12 knots locally, whilst depressions, crevices, some vertical faces and boulder habitats will experience reduced, though still strong, currents. The communities throughout most of the area surveyed are of low diversity and strongly dominated by the current and scour-resistant species, *Balanus crenatus* and *Urticina felina*. Species distribution strongly reflects the variation in current conditions, which creates mosaics of assemblages, complicating the objective assignment of biotopes. Moreover, species assemblages generally do not neatly fit the biotope classification scheme. In the most current-swept areas, such as bedrock peaks, expanses of flat rock and tops of larger boulders, the fauna is reduced to a dense crust of barnacles, often very large (mostly *Balanus crenatus*, but possibly including *Chirona hammeri*). Small clumps of hydroids are also occasionally visible and *Urticina felina* may sometimes be sparsely scattered in local areas of shelter. Such areas have been allocated to the biotope, **CR.HCR.FaT.BalTub**, although the characterising *Tubularia indivisa* is apparently absent. At several sites large numbers of small *Cancer pagurus* were seen, apparently feeding on the barnacles.

Figure 3 Distribution of biotopes recorded in southern part of surveyed area



At one site (PF22/1), on extensive, densely barnacle-encrusted flat bedrock platforms, they were classed as abundant, being able to forage on the barnacles when currents permit and presumably retreating to the shelter at the base of the

steps, in adverse conditions. Where current strength is reduced, which comprises most of the surveyed area, diversity increases with the addition of scattered crustose and cushion sponges, such as *Pachymatisma johnstonia* and *Myxilla incrustans* and sometimes small, scattered, hydroid clumps (allocated to **CR.HCR.FaT.CTub**, despite the apparent paucity of *T. indivisa*). Barnacles are generally still common but *U. felina* often becomes spectacularly abundant. With decreasing current speed anemones first trace out crevices and fill hollows and other localised areas of shelter, eventually forming swards in gulleys and lows, often in the presence of gravel pockets. Such habitats could be attributed to the scoured *Urticina* biotope, **CR.MCR.EcCr.UrtScr**, but *U. felina* is so abundant over a much wider range of conditions that these pockets have been included within **CR.HCR.FaT.CTub**. In pockets of the greatest shelter, especially between boulders, *U. felina* is sometimes accompanied by clumps of bryozoans (especially *Flustra foliacea* and *Securiflustra securifrons*), *Alcyonium digitatum* and hydroids (including *Halecium halecinum* and possibly small amounts of *T. indivisa*). This community has been regarded as falling within the definition of **CR.HCR.FaT.CTub**, although it sometimes approaches **CR.HCR.XFa.FluCoAs**, albeit with a very poorly developed ascidian fauna. As the assemblages observed within the very strongly current-swept areas of the Pentland Firth actually represent stages along a continuum, an alternative approach to classification that might be justified by further work in the area, would be to merely assign all above records to the broader **CR.HCR.FaT**.

At site PF/1 situated at the northern edge of the main channel, and presumably in conditions of reduced current strength, an extensive faunal turf of bryozoans (mostly *Flustra foliacea* and *Securiflustra securifrons*) and hydroids (including *Nemertesia antennina* and *Halecium halecinum*) covers much of the substrate of bedrock and boulders (**CR.HCR.XFa**).

The other exception to the general pattern of extremely tideswept circalittoral rock communities in the surveyed area is found in the southwest of the Firth, west of Stroma. The seabed is predominantly medium or coarse sand, often formed into waves and sometimes with a surface scatter of pebbles, cobbles and small boulders (**SS.SCS.CCS**). The sand is likely to be highly mobile and the video evidence suggests it supports little life. Where larger boulders are present, this sand-scoured habitat supports large numbers of *Urticina felina*, as well as scattered patches of *Flustra foliacea* and hydroid clumps (including *Sertularia cupressina*?) (**CR.MCR.EcCr.UrtScr**).

3.2 Duncansby Head (Figure 3)

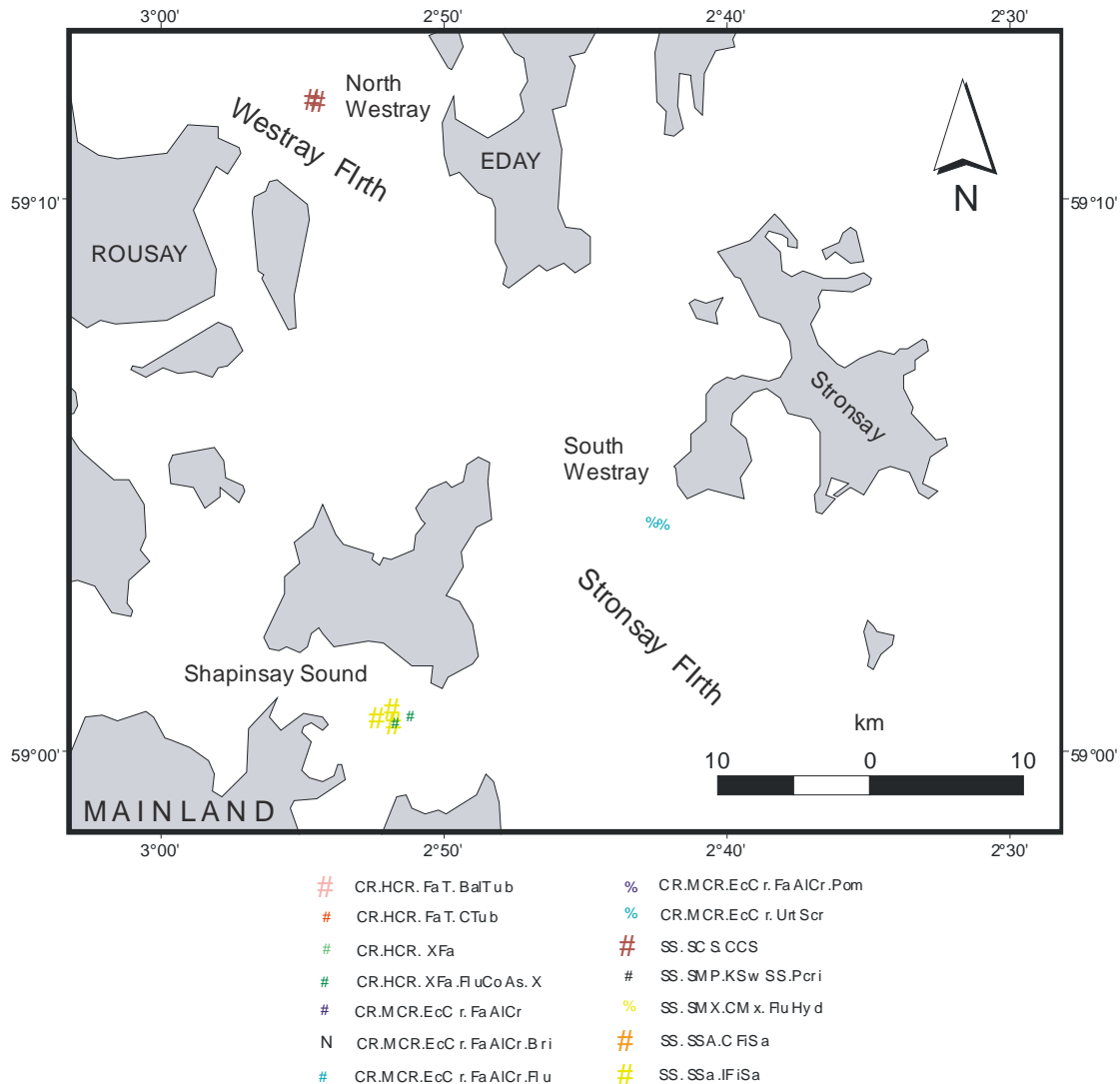
The four video runs to the south of Duncansby Head recorded mostly sand-scoured, low, flat bedrock with patches of sand, scattered with cobbles and boulders. The rock surface supported dense patches of *Flustra foliacea* but was otherwise fairly bare, apart from encrusting bryozoans, and scattered *Pomatoceros*, barnacles and occasional hydroid clumps (**CR.EcCr.FaAICr.Flu**). The shallowest site (DH4/1) appeared well-grazed; the rock supported a crust of pink coralline algae but lacked *Flustra* (**CR.EcCr.FaAICr**). Some areas at this site were overlain with dense *Ophiocomina nigra* (**CR.EcCr.FaAICr.Bri**).

3.3 North Westray (Figure 4)

Two video runs were located in the centre of the northwestern entrance to Westray

Firth. The channel floor was composed of a mixed substrate of dense cobbles and pebbles, with scattered small boulders on a gravel bed. The stones were densely encrusted with red bryozoans, barnacles and *Pomatoceros*, approaching the

Figure 4 Distribution of biotopes recorded in northern part of surveyed area



condition of **SS.SCS.CCS.PomB**; however, although the community was of fairly low diversity, it was richer than this biotope. The stones supported a low density cushion fauna of sponges and *Botryllus schlosseri*, small *Alcyonium digitatum* and anemones (*Urticina felina*, *Sagartia elegans*) were common between the stones (**SS.SCS.CCS**).

3.4 Scapa Flow (Figure 3)

Three sites were surveyed to the west of St. Marys on the eastern side of Scapa Flow. The seabed of flat muddy sand was covered with a patchy mat of loose-lying red algae, consisting principally of *Phyllophora crispera*, with occasional balls of *Trilliella* (**SS.SMP.KSwSS.Pcri**). The infauna included sparse *Lanice conchilega*, *Cerianthus lloydii* and terebellid worms, whilst the epifauna included occasional *Liocarcinus depurator*, *Aequipecten opercularis* and *Asterias rubens*.

3.5 Shapinsay (Figure 4)

The four sites in Shapinsay Sound contained areas of rippled fine or medium sand and mixed substrate areas, with pebbles, cobbles and boulders on a bed of sand. The sandy areas supported a sparse epibiota of portunid crabs, *Asterias rubens* and scattered fragments of live maerl (**SS.SSa.IFiSa**). In the mixed areas the stones were encrusted with barnacles, *Pomatoceros*, bryozoans, as well as yellow and red sponges and there was a patchy turf of *Flustra foliacea* and *Securiflustra securifrons*. The biota has been regarded as a rather poor example of **CR.HCR.XFa.FluCoAs.X**.

3.6 South Ronaldsay (Figure 3)

Nine sites were surveyed along the eastern coast of the island, with seven of them strung out along the 30 m contour. These latter sites were similar, revealing a seabed of medium or coarse sand with patches of generally low, sand-scoured rock outcrops and scattered cobbles and boulders on sand. The sandy areas displayed a sparse epibiota including *Asterias rubens*, *Crossaster papposus* and *Cancer pagurus* (**SS.SCS.CCS**), while the rock was generally of bare appearance with algal and bryozoan crusts, sparse *Alcyonium digitatum* and numerous *Echinus esculentus* (**CR.EcCr.FaAICr**). At the most southern of these sites (SR/7) dense patches of brittlestars (mainly *Ophiocomina nigra*, but also *Ophriothrix fragilis*) coated the rock and extended onto the sediment (**CR.EcCr.FaAICr.Bri**). A brittlestar bed was also found about 2 km to the east of this site in an area of bedrock and boulders on sand (SR/8) and so this bed may be very extensive. 3 km to the east of this latter site in deeper water (SR/9) the seabed consisted of a plain of medium or coarse sand with scattered stones, supporting a sparse biota (**SS.SCS.CCS**). The remaining site was located farther north, on the 50 m contour (SR/1), where the seabed was a mosaic of areas of rippled fine sand and pockets of sand-scoured bedrock, cobbles and boulders. The open sand displayed little sign of life (**SS.SSA.CFiSa**), while the rock supported tufts of *Nemertesia antennina* and other hydroids, and sparse *Flustra foliacea* (**SS.SMX.CMx.FluHyd**).

3.7 South Westray (Figure 4)

Two sites were located at depths of around 30 m in the Stronsay Firth. The substrate consisted of scoured flat, low, bedrock outcrops and scattered cobbles, pebbles and boulders on coarse sediment. No photographs were available for this area and the video footage was unclear but the impression was of coralline encrusted rock with numerous *Urticina felina*, sparse *Alcyonium digitatum*, and possibly occasional patches of *Flustra foliacea* (**CR.MCR.EcCr.UrtScr**).

3.8 West of Hoy (Figure 3)

The eight sites to the west of the Island of Hoy were deployed in three clusters. The southern grouping (WH/1, WH/2) displayed mixed substrates of scattered boulders, cobbles and pebbles on medium sand. *Flustra foliacea* was the dominant cover on the stones, but other scour-resistant bryozoans and hydroids were present, occasional *Alcyonium digitatum* and crusts of *Pomatoceros* and bryozoans (**SS.SMX.CMx.FluHyd**). The central cluster of sites (WH/3-6) largely covered a seabed of cobbles and small boulders on sand. The stones supported *Pomatoceros*

and bryozoan crusts, as well as a patchy turf of bryozoans, dominated by *Flustra foliacea* (**CR.EcCr.FaAICr.Flu**). *Porania pulvillus* was fairly numerous at this site and *Caryophyllia smithii*, rarely recorded elsewhere during the survey, was present. At the most offshore site (WH/3) scattered pebbles and shells on coarse gravelly sand were encrusted with *Pomatoceros*; otherwise little life was discernible apart from sparse *Asterias rubens* (**SS.SCS.CCS**). The northernmost sites (WH/7, WH/8) in Hoy Mouth covered a region of small boulders, cobbles and pebbles on sand, with patches of fine or medium, rippled sand. The stones were subject to sand scour and probably a degree of instability and presented a barren appearance, apart from crusts of *Pomatoceros*, bryozoans and coralline algae, and sparse, small *Alcyonium digitatum*. The biotope approaches **SS.SCS.CCS.PomB** but has been assigned to **CR.MCR.EcCr.FaAICr.Pom** based on the abundance of boulders.

4. DISCUSSION

Only three species recorded during the survey have been formally identified as being of conservation importance (Table 1). *Nucella lapillus* was only found at three sites in the Pentland Firth. The identification was tentative and the species appeared to be present in low abundance. The species is principally found on rocky shores and is common around most of the United Kingdom.

Table 1 Species recorded during the survey of recognised conservation importance. SoCC = Species of Conservation Concern (UK Biodiversity Steering Group, 1995), IUCN = IUCN Red List of Threatened Species (lower risk category) (IUCN, 2008), OSPAR = OSPAR List of Threatened and/or Declining Species and Habitats (OSPAR, 2008).

	SoCC	IUCN	OSPAR
<i>Nucella lapillus</i>	•		•
<i>Modiolus modiolus</i>	•		
<i>Echinus esculentus</i>	•	•	

Modiolus modiolus was recorded at a single site, south of Duncansby Head, apparently at low density, with no evidence of the presence of a *Modiolus* bed or *Modiolus* biotope. Except along the eastern coast of Scotland, the species is widely distributed around the coastline of the UK, at many sites in high abundance.

Echinus esculentus is also common around most of the UK, including Scotland. It was widely recorded during the present survey, often in high numbers. It is known to be common in a wide range of ecological conditions and is considered to display low or very low sensitivity to modification of such physical factors as current speed and sediment suspension (Tyler-Walters, 2008). Renewable energy schemes in the area are most unlikely to adversely impact the conservation of any of the three species discussed above.

Possibly of greatest importance, particularly at a local level, is any likely impact of developments on *Cancer pagurus*, although this species is generally tolerant to most likely physical impacts (Neal and Wilson, 2008). Small individuals of the species were extremely common at several sites in the Pentland Firth, apparently feeding on the dense barnacle crusts, often of large specimens, that developed in the current-swept conditions. This area could be an important Scottish nursery ground, where anthropogenic activities influencing the barnacle population could have consequential

impacts on the crab population.

Table 2 lists the 14 biotopes recorded during the survey and shows measures of their perceived conservation importance. No habitats are on the OSPAR List of Threatened and/or Declining Species and Habitats. Five fall within UK BAP Priority Habitats, though all of these are examples from within the broadly defined priority habitats of “tidal rapids” and “subtidal sands and gravels”. In the Scottish Biodiversity List the same five habitats appear, but in addition **CR.HCR.XFa.FluCoAs.X** and **SS.SMX.CMx.FluHyd** are specifically listed.

Although tidal rapids are generally associated with abundant and diverse communities, including supporting uncommon species, extremely high current speeds can lead to very low diversity assemblages (Hiscock, 1985). In the Pentland Firth this is generally the case. Moreover the species that are present are of widespread occurrence and very common locally and nationally. That said, such strongly tide-swept biotopes are uncommon and the Pentland Firth probably represents the most extensive example of the type in the UK. However, the biota are highly scour-resistant and capable of flourishing in current speeds slower than those currently experienced at this site, so the impact of renewable energy projects may not be adverse and could act to enhance diversity.

The sublittoral sand biotopes (**SS.SCS.CCS**, **SS.SSa.CFiSa**, **SS.SSa.IFiSa**) are of widespread occurrence throughout Scotland and the UK and at least surface observation of the sediment suggests impoverished faunas, especially in the highly mobile sediments of the southwestern region of the Pentland Firth. **CR.HCR.XFa.FluCoAs.X** was only found at two stations in Shapinsay Sound and was considered to be a low diversity example of the biotope. **SS.SMX.CMx.FluHyd** was recorded at one site off South Ronaldsay, where it was a poor fit to the biotope, and at the two southernmost stations off Hoy. It is a scour-resistant, low-diversity community, widely recorded around Scotland. It is considered that the development of renewable energy schemes is unlikely to make a significant impact on the conservation of these biotopes.

Lastly, it should be noted that the video footage described herein was collected in tandem with a wider acoustic survey of the seabed of the Pentland Firth and Orkney. Before inferences can be made regarding the wider distribution of the species and biotopes identified, it is important that these acoustic data are worked up to ensure that there are no acoustically different habitats for which drop-video data has not been collected. Furthermore, this survey took place on a broad scale with video taken to represent a wide area; any maps produced will be predictive therefore future developments may still require site specific survey work to be conducted to validate these predictions and inform any future EIA.

Table 2 Biotopes recorded during the survey, with measures of recognised conservation importance. UK = UK Biodiversity Action Plan Priority Habitat (UKBAP, 2007); Scottish = Scottish Biodiversity List Habitat (BiodiversityScotland, 2008).

Biotope	UK	Scottish
CR.HCR.FaT.BalTub	•	•
CR.HCR.FaT.CTub	•	•

CR.HCR.XFa		
CR.HCR.XFa.FluCoAs.X		•
CR.MCR.EcCr.UrtScr		
CR.MCR.EcCrFaAlCr		
CR.MCR.EcCrFaAlCr.Bri		
CR.MCR.EcCr.FaAlCr.Pom		
CR.MCR.EcCr.FaAlCr.Flu		
SS.SCS.CCS	•	•
SS.SSa.CFiSa	•	•
SS.SSa.IFiSa	•	•
SS.SMP.KSwSS.Pcri		
SS.SMX.CMx.FluHyd		•

5. REFERENCES

- BiodiversityScotland. 2008.** The Scottish Biodiversity List. <<http://www.biodiversityscotland.gov.uk/pageType2.php?id=35&type=2&navID=92>> Accessed on 16/12/08.
- Connor, D.W., Allen, J.H., Golding, N., Howell, K.L., Lieberknecht, L.M., Northen, K.O. & Reker, J.B. 2004.** *The National Marine Habitat Classification for Britain and Ireland. Version 04.05.* Peterborough: Joint Nature Conservation Committee. ISBN: 1 861 07561 8 (internet version).
- Hiscock, K. 1985.** Aspects of the ecology of rocky sublittoral areas. In: P.G. Moore and R. Seed (eds), *The Ecology of Rocky Coasts.* London: Hodder & Stoughton: p290-328.
- Hiscock, K. (ed). 1996.** *Marine Nature Conservation Review: Rationale and Methods.* Peterborough: Joint Nature Conservation Committee.
- IUCN. 2008.** 2008 IUCN Red List of Threatened Species. <www.iucnredlist.org>. Accessed on 16/12/08.
- Neal, K.J. and Wilson, E. 2008.** *Cancer pagurus.* Edible crab. *Marine Life Information Network: Biology and Sensitivity Key Information Sub-programme.* Plymouth: Marine Biological Association of the United Kingdom. <<http://www.marlin.ac.uk/species/Cancerpagurus.htm>> Accessed on 16/12/08.
- OSPAR. 2008.** List of Threatened and/or Declining Species and Habitats. Reference Number: 2008-6. <http://www.ospar.org/documents/DBASE/DECRECS/Agreements/08-06e_OSPAR%20List%20species%20and%20habitats.doc> Accessed on 16/12/08.
- Tyler-Walters, H. 2008.** *Echinus esculentus.* Edible sea urchin. *Marine Life Information Network: Biology and Sensitivity Key Information Sub-programme.* Plymouth: Marine Biological Association of the United Kingdom. <<http://www.marlin.ac.uk/species/Echinusesculentus.htm>> Accessed on 16/12/08.
- UK Biodiversity Steering Group. 1995.** *The UK Steering Group Report - Volume II: Action Plans. Annex F Lists of key species, key habitats and broad habitats.* London: HMSO. <<http://www.ukbap.org.uk/librarysearchresults.aspx?ID=619>> Accessed on 16/12/08.
- UKBAP. 2007.** UK List of Priority Species and Habitats. <<http://www.ukbap.org.uk/NewPriorityList.aspx>> Accessed on 16/12/08.

APPENDICES

Table A1 Details of video sequences recorded during the survey. Two sets of DVD disk numbers are given, each set referring to a different cruise. Where there is more than one entry for a site, this reflects splitting of the video run amongst different habitat types.

Cruise	Site	TV Run	Code	Time Start	Time Finish	Duration (h:m:s)	Date	Disk No.
1208S	Pentland Firth	1	PF/1	9:44:00	9:54:00	0:10:00	12-Oct-08	1
1208S	Pentland Firth	2	PF/2	10:42:38	10:44:20	0:01:42	12-Oct-08	1
1208S	Pentland Firth	2	PF/2	10:44:20	10:44:44	0:00:24	12-Oct-08	1
1208S	Pentland Firth	3	PF/3	21:28:00	21:33:00	0:05:00	12-Oct-08	2
1208S	Pentland Firth	4	PF/4	22:10:00	22:12:00	0:02:00	12-Oct-08	2
1208S	Pentland Firth	5	PF/5	23:10:45	23:32:45	0:22:00	15-Oct-08	5
1308S	Pentland Firth Site 2	1	PF2/1	0:39:00	0:51:00	0:12:00	31-Oct-08	4
1308S	Pentland Firth Site 4	1	PF4/1	12:10:35	12:16:00	0:05:25	30-Oct-08	3
1308S	Pentland Firth Site 5	1	PF5/1	8:34:15	8:37:30	0:03:15	02-Nov-08	11
1308S	Pentland Firth Site 7	1	PF7/1	2:46:15	2:47:40	0:01:25	03-Nov-08	14
1308S	Pentland Firth Site 8	1	PF8/1	12:47:07	13:02:00	0:14:53	31-Oct-08	4
1308S	Pentland Firth Site 9	1	PF9/1	6:13:52	6:40:00	0:26:08	30-Oct-08	1
1308S	Pentland Firth Site 10	1	PF10/1	0:12:03	0:17:20	0:05:17	31-Oct-08	3
1308S	Pentland Firth Site 10B	1	PF10B/1	19:38:46	19:59:00	0:20:14	31-Oct-08	5
1308S	Pentland Firth Site 11	1	PF11/1	10:48:45	10:50:58	0:02:13	30-Oct-08	3
1308S	Pentland Firth 15	1	PF15/1	13:06:05	13:16:05	0:10:00	01-Nov-08	8
1308S	Pentland Firth 15B	1	PF15B/1	13:32:53	13:37:02	0:04:09	01-Nov-08	8
1308S	Pentland Firth 15B	1	PF15B/1	13:37:02	13:39:50	0:02:48	01-Nov-08	8
1308S	Pentland Firth 15C	1	PF15C/1	13:56:52	14:03:40	0:06:48	01-Nov-08	9
1308S	Pentland Firth Site 16	1	PF16/1	13:29:10	13:35:33	0:06:23	02-Nov-08	12
1308S	Pentland Firth Site 16	1	PF16/1	13:35:33	14:04:14	0:28:41	02-Nov-08	12
1308S	Pentland Firth Site 16B	1	PF16B/1	14:28:25	14:51:47	0:23:22	02-Nov-08	13
1308S	Pentland Firth Site 16C	1	PF16C/1	20:02:57	20:18:38	0:15:41	02-Nov-08	13
1308S	Pentland Firth Site 16D	1	PF16D/1	20:35:15	20:40:40	0:05:25	02-Nov-08	14
1308S	Pentland Firth Site 19	1	PF19/1	20:10:50	20:14:13	0:03:23	01-Nov-08	10
1308S	Pentland Firth Site 19B	1	PF19B/1	1:36:00	1:43:55	0:07:55	02-Nov-08	11
1308S	Pentland Firth Site 19C	1	PF19C/1	2:05:00	2:22:40	0:17:40	02-Nov-08	11
1308S	Pentland Firth Site 20	1	PF20/1	1:57:48	2:22:45	0:24:57	03-Nov-08	14
1308S	Pentland Firth Site 22	1	PF22/1	0:49:33	1:09:35	0:20:02	01-Nov-08	7
1308S	Pentland Firth 22B	1	PF22B/1	7:42:34	7:57:30	0:14:56	01-Nov-08	7
1308S	Pentland Firth Site 24	1	PF24/1	18:57:06	19:14:52	0:17:46	31-Oct-08	5
1308S	Pentland Firth Site 25	1	PF25/1	19:21:29	19:36:38	0:15:09	02-Nov-08	13
1308S	Duncansby Head	1	DH/1	11:28:37	11:35:45	0:07:08	31-Oct-08	4
1308S	Duncansby Head	2	DH/2	18:40:41	18:50:40	0:09:59	01-Nov-08	9
1308S	Duncansby Head	3	DH/3	19:10:00	19:25:00	0:15:00	01-Nov-08	9

Table A1 continued.

Cruise	Site	TV Run	Code	Time Start	Time Finish	Duration (h:m:s)	Date	Disk No.
1308S	Duncansby Head	4	DH/4	7:25:59	7:48:02	0:22:03	03-Nov-08	14
1208S	North Westray	1	NW/1	10:42:36	10:50:05	0:07:29	14-Oct-08	5
1208S	North Westray	2	NW/2	11:02:51	11:08:42	0:05:51	14-Oct-08	5
1208S	Scapa Flow	1	SF/1	10:25:00	10:44:00	0:19:00	13-Oct-08	3
1208S	Scapa Flow	2	SF/2	11:36:33	11:44:50	0:08:17	13-Oct-08	3
1208S	Scapa Flow	3	SF/3	12:01:08	12:18:25	0:17:17	13-Oct-08	3
1208S	Shapinsay	1	SH/1	3:07:28	3:17:30	0:10:02	14-Oct-08	4
1208S	Shapinsay	2	SH/2	3:38:00	3:48:00	0:10:00	14-Oct-08	4
1208S	Shapinsay	3	SH/3	4:05:32	4:11:30	0:05:58	14-Oct-08	4
1208S	Shapinsay	3	SH/3	4:11:30	4:16:08	0:04:38	14-Oct-08	4
1208S	Shapinsay	4	SH/4	4:34:14	4:46:10	0:11:56	14-Oct-08	4
1308S	East of South Ronaldsay	1	SR/1	7:58:38	8:16:40	0:18:02	30-Oct-08	1
1308S	East of South Ronaldsay	2	SR/2	8:41:32	9:03:32	0:22:00	30-Oct-08	2
1308S	East of South Ronaldsay	3	SR/3	9:34:58	9:55:15	0:20:17	30-Oct-08	2
1308S	East of South Ronaldsay	4	SR/4	21:23:17	21:43:45	0:20:28	31-Oct-08	6
1308S	East of South Ronaldsay	5	SR/5	21:56:23	21:59:23	0:03:00	31-Oct-08	6
1308S	East of South Ronaldsay	5	SR/5	21:59:23	22:11:20	0:11:57	31-Oct-08	6
1308S	East of South Ronaldsay	6	SR/6	22:34:16	22:44:15	0:09:59	31-Oct-08	6
1308S	East of South Ronaldsay	7	SR/7	21:24:52	21:45:00	0:20:08	01-Nov-08	10
1308S	East of South Ronaldsay	8	SR/8	22:29:01	22:44:04	0:15:03	01-Nov-08	10
1308S	East of South Ronaldsay	9	SR/9	23:11:27	23:31:27	0:20:00	01-Nov-08	10
1208S	South Westray	1	SW/1	16:25:46	16:36:15	0:10:29	14-Oct-08	5
1208S	South Westray	2	SW/2	16:51:00	17:02:12	0:11:12	14-Oct-08	5
1308S	West of Hoy	1	WH/1	18:28:50	18:34:00	0:05:10	30-Oct-08	3
1308S	West of Hoy	2	WH/2	19:00:30	19:10:50	0:10:20	30-Oct-08	3
1308S	West of Hoy	3	WH/3	16:40:30	16:51:52	0:11:22	31-Oct-08	4
1308S	West of Hoy	4	WH/4	17:13:00	17:29:00	0:16:00	31-Oct-08	5
1308S	West of Hoy	5	WH/5	10:05:42	10:25:30	0:19:48	01-Nov-08	7
1308S	West of Hoy	6	WH/6	10:50:04	11:10:05	0:20:01	01-Nov-08	8
1308S	West of Hoy	7	WH/7	11:10:32	11:15:15	0:04:43	02-Nov-08	12
1308S	West of Hoy	8	WH/8	11:26:44	11:36:45	0:10:01	02-Nov-08	12

Table A2 Physical and biological descriptions of the survey sites.

Code	Substrate	Biota	Biotope	Comment
PF/1	Linearly-fissured bedrock and areas of boulders on coarse sediment.	Rock surface encrusted with <i>Balanus crenatus</i> (C), <i>Pomatoceros</i> (C) and red encrusting bryozoans and/or thin red sponges (O) and fairly dense cover of <i>Alcyonium digitatum</i> (C). Rock also supports a faunal turf (c.50% of surface), comprised largely of bryozoans, but also including hydroids. Turf dominated by <i>Flustra foliacea</i> (F) and <i>Securiflustra securifrons</i> (F) and includes <i>Nemertesia antennina</i> (P) and <i>Halecium halecinum</i> (P). <i>Urticina felina</i> (F), <i>Diplosoma listerianum?</i> (R), <i>Necora puber</i> (P), <i>Cancer pagurus</i> (P), cream encrusting sponge (R), <i>Henricia sanguinolenta</i> (F), <i>Echinus esculentus</i> (O), <i>Pholis gunnellus</i> (P).	CR.HCR.XFa	Substrate approaches that of XFa.FluCoAs.X but biota not a good fit. Community apparently fairly similar to that found in the most sheltered pockets over much of the main very strongly current-swept channel of the Firth.
PF/2	Initially cobbles and small boulders on coarse shelly sand, then larger boulders and bedrock.	Smaller rocks fairly bare, larger boulders with patchy crust of <i>Balanus crenatus</i> (F overall); dense <i>Urticina felina</i> (C, locally A), particularly adjacent to sediment. Patchy turf of bryozoans (mostly) and hydroids, declining towards end of run. Bryozoans include <i>Flustra foliacea</i> (C) and <i>Securiflustra securifrons</i> (O), while hydroids include <i>Halecium halecinum</i> (O). Scattered clumps of <i>Alcyonium digitatum</i> (O). <i>Asterias rubens</i> and <i>Echinus esculentus</i> present at low density; <i>Caridea</i> sp. (C), <i>Cancer pagurus</i> (P).	CR.HCR.FaT.CTub	Although the fit to the biotope may appear weak, the community is basically the same as that found in small sheltered pockets over much of the main very strongly current-swept channel of the Firth.
PF/2	Steep bedrock slope.	Apparently dense crust of barnacles (S) and little else.	CR.HCR.FaT.BalTub	

Table A2 continued.

Code	Substrate	Biota	Biotope	Comment
PF/3	Small and large angular boulders and uneven bedrock, with pockets of coarse shelly sand.	Upper surfaces of more current-swept higher boulders with crusts of barnacles (C) and orange bryozoans (O). More sheltered rock encrusted with red bryozoans (O), Pomatoceros (A), Balanus spp. (P), cream sponges (O) and possibly colonial tunicates (R). Amongst the erect forms, there is dense <i>Urticina felina</i> (A), while <i>Flustra foliacea</i> forms patches (F), with other bryozoans, including <i>Securiflustra foliacea</i> (R), at lower density; <i>Alcyonium digitatum</i> (O). Motile fauna includes <i>Echinus esculentus</i> (C) and <i>Necora puber</i> (P).	CR.HCR.FaT.BalTub CR.HCR.FaT.CTub	
PF/4	Mostly cobbles and small boulders with shelly gravel in interstices; some large boulders also present.	Upper surfaces of more current-swept higher boulders with crusts of <i>Balanus</i> spp. (C) and orange bryozoans (O). Smaller boulders and sides of boulders with higher diversity fauna dominated by <i>Urticina felina</i> (A) and encrusting fauna of <i>Balanus</i> spp. (C), <i>Pomatoceros</i> (P) and red Bryozoa (F), with patches of erect bryozoans, including <i>Flustra foliacea</i> (R) and <i>Securiflustra securifrons?</i> (R) and hydroids (O); <i>Alcyonium digitatum</i> (R). Motile fauna includes <i>Echinus esculentus</i> (C), <i>Asterias rubens</i> (P) and <i>Crossaster papposus</i> (P).	CR.HCR.FaT.BalTub CR.HCR.FaT.CTub	
PF/5	Mostly highly uneven, fissured angular bedrock interrupted by gullies of boulders and cobbles on coarse shell sand; pockets of sediment in lows, such as crevices.	Rock strongly dominated by <i>Balanus crenatus</i> (A) and <i>Urticina felina</i> (A). Subsidiary fauna comprises cushion sponges (red (O) and cream (R) forms) and scattered tufts of hydroids (R) and bryozoans (R). Motile fauna includes <i>Calliostoma zizyphinum</i> (O), <i>Nucella lapillus?</i> (O), small <i>Cancer pagurus</i> (C), <i>Asterias rubens</i> (O), <i>Henricia sanguinolenta</i> (P), <i>Leptasterias muelleri</i> (P), <i>Echinus esculentus</i> (R).	CR.HCR.FaT.CTub	

Table A2 continued.

Code	Substrate	Biota	Biotope	Comment
PF2/1	Partly flat, stepped, creviced bedrock, but also very mixed areas with very large, large and small boulders, sometimes with cobbles and pebbles.	Fully exposed rock fairly barren, with scattered <i>Balanus crenatus</i> (C) and orange bryozoan crusts (O). Over an extensive area, however, the biota is dominated by <i>Urticina felina</i> (A), especially in crevices, hollows and adjacent to sediment; also present is <i>Myxilla incrustans</i> (R) and <i>Pachymatisma johnstonia</i> (R). In the most sheltered pockets, a turf of bryozoans (<i>Flustra foliacea</i> , <i>Securiflustra securifrons</i>) and hydroids (including <i>Halecium halecinum</i> ?) develops, accompanied by colonial tunicates, including <i>Botryllus schlosseri</i> . Also present is <i>Echinus esculentus</i> (O), <i>Asterias rubens</i> (P), <i>Alcyonium digitatum</i> (R), purple bryozoan? crust (R), <i>Cancer pagurus</i> (P), yellow encrusting sponge (R).	CR.HCR.FaT.BalTub CR.HCR.FaT.CTub	
PF4/1	Linearly-fissured bedrock and areas of boulders on coarse sediment.	Rock dominated by crusts of <i>Balanus crenatus</i> (C) and red bryozoans (F) and dense <i>Urticina felina</i> (A), with scattered patches of yellow encrusting sponges (O) and tufts of hydroids? (O) and <i>Flustra foliacea</i> (R). Juvenile asteroids (C), <i>Pomatoceros</i> (P).	CR.HCR.FaT.CTub	
PF5/1	Mix of small, large and very large boulders, with coarse sediment in interstices.	Exposed, upper surfaces of larger boulders with barnacle crust. With increasing shelter, such as between boulders or on boulder sides, barnacles decrease but diversity increases, with following taxa in evidence: <i>Urticina felina</i> (P), <i>Alcyonium digitatum</i> (P), hydroid clumps (F), <i>Pomatoceros</i> (C), <i>Echinus esculentus</i> (C), orange bryozoan crust (O), yellow cushion sponge (R).	CR.HCR.FaT.BalTub CR.HCR.FaT.CTub	Only 1 photo.
PF7/1	Mostly ridges of bedrock with boulders and coarse sediment in between.	Crust of <i>Balanus crenatus</i> (F) with abundant <i>Urticina felina</i> ; Patches of <i>Flustra foliacea</i> (P) and <i>Alcyonium digitatum</i> (P) in lower, more current-sheltered areas.	CR.HCR.FaT.CTub	Poor video and photo coverage.

Table A2 continued.

Code	Substrate	Biota	Biotope	Comment
PF8/1	Areas of flat, stepped, fissured bedrock, in places broken up into small, large and very large boulders, with pockets of gravel in interstices.	Most current-exposed rock with crust of <i>Balanus crenatus</i> (C), accompanied by dense <i>Urticina felina</i> (A) in slightly more sheltered conditions over much of the area. <i>Cancer pagurus</i> (C), <i>Henricia sanguinolenta</i> (P), <i>Asterias rubens</i> (C), <i>Flustra foliacea</i> (R), <i>Nucella lapillus?</i> (P), patchy sparse hydroid turf, <i>Pachymatisma johnstonia</i> (R), yellow encrusting sponge (O), yellow erect sponge (R). No <i>Echinus</i> seen.	CR.HCR.FaT.BalTub CR.HCR.FaT.CTub	
PF9/1	Uneven, fissured bedrock, and small and large boulders with pockets of coarse sediment.	Rock strongly dominated by <i>Balanus crenatus</i> (A), almost as a monoculture in the most exposed areas but accompanied by <i>Urticina felina</i> (A) elsewhere. Subsidiary fauna comprises occasional cushion sponges (including cream forms (P)), <i>Alcyonium digitatum</i> (R) and possibly <i>Flustra foliacea</i> (P). Motile fauna includes <i>Cancer pagurus</i> (P), <i>Asterias rubens</i> (P).	CR.HCR.FaT.BalTub CR.HCR.FaT.CTub	images unclear – no photos and video blurred.

Table A2 continued.

Code	Substrate	Biota	Biotope	Comment
PF10/1	Very uneven seabed consisting of areas of large and very large boulders, small boulders and cobbles, and extensive areas of rugged bedrock, often vertically ridged. Pockets of shell gravel accumulate in the lows.	Rugosity of habitat creates a range of current strengths, reflected in the distribution of the biota. The most exposed areas of bedrock, such as ridge tops, support little else than barnacles: <i>Balanus crenatus</i> (C) and possibly <i>Chirona hameri</i> (P), with occasional patches of orange and red bryozoan crusts. Increasing shelter leads to increasing densities of <i>Urticina felina</i> , which in hollows, crevices and lows are often abundant (locally S) and scattered small tufts of hydroids; <i>Corynactis viridis</i> (P). In the most sheltered lows, patches of bryozoans (mostly <i>Flustra foliacea</i> (C) and <i>Securiflustra securifrons?</i> (O)), <i>Alcyonium digitatum</i> (F) and a patchy, thin, hydroid turf dominate. This has been interpreted as a mosaic of two biotopes. Also present: <i>Echinus esculentus</i> (F), <i>Crossaster papposus</i> (P), <i>Henricia sanguinolenta</i> (P), small <i>Cancer pagurus</i> (F), <i>Necora puber</i> (P), <i>Caridea</i> sp. (P), <i>Myxilla incrustans</i> (R), <i>Pachymatisma johnstonia?</i> (R), yellow encrusting sponge (R), serpulid worms (P).	CR.HCR.FaT.BalTub CR.HCR.FaT.CTub	
PF10B/1	Areas of inclined laminated bedrock and boulder fields with coarse sand in interstices.	Most exposed smooth rock surfaces fairly bare apart from scatter of barnacles and patches of orange encrusting bryozoans (R). Crevices contain <i>Urticina felina</i> , which becomes abundant in greater shelter, accompanied by <i>Echinus esculentus</i> (C), <i>Crossaster papposus</i> (F), <i>Asterias rubens</i> (P), <i>Henricia sanguinolenta</i> (P), <i>Cancer pagurus</i> (F), <i>Homarus gammarus</i> (P), <i>Alcyonium digitatum</i> (P), <i>Nucella lapillus?</i> (P), <i>Calliostoma zizyphinum</i> (P), <i>Pomatoceros</i> (C), <i>Thuiaria thuja</i> (P) and clumps of other hydroids. Some of the most sheltered areas between boulders support a dense bryozoan turf.	CR.HCR.FaT.BalTub CR.HCR.FaT.CTub	

Table A2 continued.

Code	Substrate	Biota	Biotope	Comment
PF11/1	Irregular, fissured bedrock and boulders on coarse shelly sand.	Much of rock surface dominated by crust of <i>Balanus crenatus</i> (C) but patchy turf of hydroids (F) and <i>Alcyonium digitatum</i> (F) particularly in slightly more current-sheltered areas. Poorly-developed motile fauna, apart from <i>Echinus esculentus</i> (C).	CR.HCR.FaT.BalTub CR.HCR.FaT.CTub	
PF15/1	Waves of medium or coarse sand with surface scatter of small shell fragments.	No signs of life seen.	SS.SCS.CCS	
PF15B/1	Scatter of small boulders, cobbles and pebbles (c. 50% cover) on medium-coarse sand.	Rock surface virtually barren. Some very sparse barnacles but possibly dead. Sparse hydroid tufts (R), including <i>Tubularia indivisa</i> . <i>Cancer pagurus</i> (P), <i>Asterias rubens</i> ? (P).	SS.SCS.CCS	Basically a sand biotope, with little contribution to supporting life by the stones.
PF15B/1	Waves of medium or coarse sand.	<i>Lanice conchilega</i> ? (R).	SS.SCS.CCS	
PF15C/1	Rippled medium sand.	No signs of life seen.	SS.SCS.CCS	
PF16/1	Waves of medium sand.	No signs of life seen.	SS.SCS.CCS	No photos.
PF16/1	Mostly small boulders (occasional large), cobbles and pebbles (c.50% cover) on medium sand.	Abundant <i>Urticina felina</i> and scattered clumps of <i>Flustra foliacea</i> (F), other erect bryozoans (O), <i>Alcyonium digitatum</i> (R) and yellow cushion sponge (R). <i>Echinus esculentus</i> (O), asteroids (P), <i>Cancer pagurus</i> (P).	CR.MCR.EcCr.UrtScr	No photos.
PF16B/1	Mosaic of areas of predominantly medium sand and areas of scattered cobbles and small boulders (with occasional large ones) on medium sand.	No signs of life seen in sandy patches. In mixed areas the rock is largely bare, except for <i>Urticina felina</i> (C), sparse <i>Pomatoceros</i> (P) and <i>Balanus</i> spp. and sparse <i>Flustra foliacea</i> (R) and hydroid clumps, including <i>Sertularia cupressina</i> ? (R) and <i>Tubularia indivisa</i> ? (R). <i>Cancer pagurus</i> (R).	SS.SCS.CCS CR.MCR.EcCr.UrtScr	

Table A2 continued.

Code	Substrate	Biota	Biotope	Comment
PF16C/1	Highly irregular rocky seabed, with large outcrops of angular rock, broken in places into large and very large boulders; some areas of cobble and smaller boulders, with pockets of shell gravel in lows and crevices.	Low diversity rock surface community, strongly dominated by crust of <i>Balanus crenatus</i> (A) and abundant <i>Urticina felina</i> (locally S). Minor crust biota includes red bryozoans (O) and yellow sponges (R). In areas exhibiting reduced currents, patches of <i>Alcyonium digitatum</i> (R), <i>Flustra foliacea</i> (R), <i>Securiflustra securifrons</i> (R) and hydroids (R) occur. Motile fauna includes small <i>Cancer pagurus</i> (C), <i>Echinus esculentus</i> (C), <i>Asterias rubens</i> (F), <i>Henricia sanguinolenta</i> (P). Cobbles in the lows appear barren, suggestive of mobility and possibly scouring of adjacent rock by cobbles, as well as by gravel.	CR.HCR.FaT.CTub	Could also be interpreted as including patches of CR.MCR.EcCr. FaAlCr.Flu.
PF16D/1	Highly irregular rocky seabed, with large outcrops of angular rock, with small and large boulders, particularly in lows; pockets of shell gravel in crevices.	Rock widely dominated by <i>Urticina felina</i> (A, locally S), with a crust of red bryozoans and fairly sparse, living, <i>Balanus crenatus</i> (O); yellow cushion sponge (R). <i>Dendrodoa grossularia</i> is often present (R/O) but in some areas it forms extensive sheets (locally S), often in association with <i>Pachymatisma johnstonia</i> (locally O but generally R). Patches of small erect bryozoans (R) and hydroids (R) occur, particularly in crevices. Motile forms include <i>Echinus esculentus</i> (C), <i>Asterias rubens</i> (O), <i>Crossaster papposus</i> (R), <i>Necora puber</i> (R).	CR.HCR.FaT.CTub	
PF19/1	Uneven bedrock and boulders.	Rock surface of mostly barren appearance, with a scatter of barnacle and patches of orange bryozoan and yellow sponge crusts. <i>Urticina felina</i> , confined to crevices in greater exposure, becomes abundant in more sheltered areas, often with <i>Alcyonium digitatum</i> , as well as yellow and cream cushion sponges, <i>Pachymatisma johnstoni</i> (R) and <i>Pomatoceros</i> (C). <i>Echinus esculentus</i> (O), <i>Cancer pagurus</i> (O).	CR.HCR.FaT.BalTub CR.HCR.FaT.CTub	

Table A2 continued.

Code	Substrate	Biota	Biotope	Comment
PF19B/1	Areas of angular bedrock, large boulders and fields of predominantly small boulders with coarse sediment in interstices.	Most exposed rock surfaces with crust of <i>Balanus crenatus</i> (C) and patches of orange bryozoans (O) and occasional <i>Urticina felina</i> in localised shelter, such as crevices. With a reduction in current speed, such as in areas of boulders, barnacles decrease in abundance, but <i>Urticina</i> becomes abundant. Also present are <i>Alcyonium digitatum</i> (P), <i>Myxilla incrustans</i> ? (O); <i>Echinus esculentus</i> (C), <i>Asterias rubens</i> ? (P).	CR.HCR.FaT.BalTub CR.HCR.FaT.CTub	No photos.
PF19C/1	Uneven bedrock and boulders with small pockets of pebbly gravel.	Most exposed rock surfaces with crust of <i>Balanus crenatus</i> (C, locally A) and patches of orange bryozoans (O) and occasional <i>Urticina felina</i> in localised shelter, such as crevices. <i>Cancer pagurus</i> are numerous (C) on the barnacles. With a reduction in current speed, barnacles decrease in abundance, but <i>Urticina</i> becomes abundant (especially in the vicinity of gravel patches, and may be joined by <i>Alcyonium digitatum</i> (O, but locally C) and yellow sponges, possibly <i>Myxilla incrustans</i> (O); <i>Echinus esculentus</i> (O), <i>Pomatoceros</i> (P).	CR.HCR.FaT.BalTub CR.HCR.FaT.CTub	

Table A2 continued.

Code	Substrate	Biota	Biotope	Comment
PF20/1	Mostly a jumble of small, large and very large boulders, with cobbles, and areas of uneven bedrock; shell gravel in crevices.	In areas of strongest current the rock is encusted with <i>Balanus crenatus</i> (C). With slightly less exposure, <i>Urticina felina</i> appears in crevices and patches of yellow sponge and red bryozoan crusts are found and scattered cushion sponges, including <i>Pachymatisma johnstonia</i> (R) and <i>Myxilla incrustans?</i> (R). A patchy, hydroid scrub is sometimes visible and <i>Pomatoceros</i> is common, at least locally; <i>Echinus esculentus</i> (C), <i>Cancer pagurus</i> (F). In the lows and most current-sheltered areas <i>Urticina felina</i> is abundant, erect bryozoans and hydroids are occasional, <i>Alcyonium digitatum</i> frequent and there are patches of red and cream encrusting sponges; <i>Henricia sanguinolenta</i> (P), This area has been interpreted as a mosaic of CR.HCR.FaT.BalTub in the most exposed areas and CR.HCR.FaT.CTub elsewhere.	CR.HCR.FaT.BalTub CR.HCR.FaT.CTub	
PF22/1	A singular habitat, consisting of extensive, very flat, stepped, horizontal rock platforms, with steps of around 1m or less.	Most of the platform is coated with a dense crust of barnacles (A) and little else apart from scattered <i>Urticina felina</i> in crevices. However, the motile fauna consists of a very dense population of young <i>Cancer pagurus</i> (A) and dense <i>Asterias rubens</i> (C), both presumably feeding on the barnacles. At the base of the steps there are dense bands of <i>Urticina felina</i> (A), with <i>Alcyonium digitatum</i> concentrated on the short vertical walls, together with patches of <i>Pachymatisma johnstonia</i> (R). <i>Echinus esculentus</i> is absent, presumably due to the strong currents on the open platform rock, from which <i>Cancer</i> can retreat.	CR.HCR.FaT.BalTub CR.HCR.FaT.CTub	Photos no good.

Table A2 continued.

Code	Substrate	Biota	Biotope	Comment
PF22B/1	Areas of flat, fissured bedrock and fields of small and large boulders with pockets of gravel.	Most exposed upper rock surfaces fairly barren apart from <i>Balanus crenatus</i> (C) and orange bryozoan crusts (O), but most of rock with scattered <i>B. crenatus</i> (O), orange bryozoan crusts (O), yellow sponge crusts (R) and patches of <i>Pachymatisma johnstonia</i> (R) and hydroids. <i>Cancer pagurus</i> (C) and <i>Asterias rubens</i> (F). Most sheltered areas with <i>Alcyonium digitatum</i> patches, sometimes accompanied by dense bryozoan turf; <i>Urticina felina</i> (C), <i>Calliostoma zizyphinum</i> (P), <i>Echinus esculentus</i> (F).	CR.HCR.FaT.BalTub CR.HCR.FaT.CTub	
PF24/1	Initially cobbles and small boulders on coarse sand or gravel, then areas of uneven bedrock and boulders, with patches of coarse sand/gravel.	Much of the rock surface is dominated by <i>Urticina felina</i> (A) with some dense patches of <i>Pachymatisma johnstonia</i> (overall R), <i>Alcyonium digitatum</i> (locally C, but overall R) and of <i>Myxilla incrustans</i> ? (R). The most current-exposed areas, such as crests appear to support little else than barnacles (C). Some areas of rock in the vicinity of coarse sand are covered by a bryozoan turf of <i>Flustra foliacea</i> (P) and <i>Securiflustra securifrons</i> ? (P), frequent <i>Alcyonium digitatum</i> and dense <i>Urticina felina</i> (A). <i>Echinus esculentus</i> (F), <i>Cancer pagurus</i> (P).	CR.HCR.FaT.BalTub CR.HCR.FaT.CTub	Photos no good.
PF25/1	Irregular, fissured bedrock, with lows and gulleys of cobbles and small boulders.	Fairly sparse crust of <i>Balanus crenatus</i> (F), <i>Pomatoceros</i> (F), red bryozoans (R) and yellow sponges (R); some large patches of <i>Myxilla incrustans</i> (R) and <i>Pachymatisma johnstonia</i> (R) and apparently a light turf of hydroids in more current-sheltered areas. Dominant species appears to be <i>Urticina felina</i> (C?), although poor image quality makes overall density assessment difficult. <i>Echinus esculentus</i> (O), <i>Necora puber</i> (P), <i>Cancer pagurus</i> (P).	CR.HCR.FaT.CTub	Poor quality video. Biotope assignment dubious.

Table A2 continued.

Code	Substrate	Biota	Biotope	Comment
DH/1	Flat, stepped bedrock, with sand patches, at least some of which are only thin coatings over the rock. Sand-scoured habitat.	Biota strongly dominated by <i>Flustra foliacea</i> , which covers around half the rock surface (S). Outwith <i>Flustra</i> patches rock is fairly bare, with a sparse scatter of <i>Pomatoceros</i> and <i>Balanus</i> spp., orange bryozoan patches (R) and clumps of hydroids (O), including <i>Sertularia cupressina?</i> (O) <i>Echinus esculentus</i> (C), <i>Crossaster papposus</i> (P), <i>Asterias rubens</i> (P), <i>Modiolus modiolus</i> (P) <i>Caridea</i> sp. (P).	CR.MCR.EcCr.FaAICr.Flu	
DH/2	Initially stepped bedrock with sand patches, then boulders and cobbles on sand.	Rock largely bare apart from sparse <i>Pomatoceros</i> (F), orange bryozoan crust (O) and patches of <i>Flustra foliacea</i> (C) and a patchy short turf of hydroids? (P). <i>Urticina felina</i> is present in sand-filled crevices in the rock (P), but increases in abundance at rock/sand boundary (C), possibly indicating a second biotope. <i>Echinus esculentus</i> (F), <i>Crossaster papposus</i> (P), yellow cushion sponge (R).	CR.MCR.EcCr.FaAICr.Flu	
DH/3	Initially largely flat bedrock with superficial? Sand patches, then mixed substrate of small boulders, cobbles with trapped sand, shell gravel and <i>Modiolus</i> shells, interrupted by second area of flat bedrock.	Bedrock with dense cover of <i>Flustra foliacea</i> (A), which declines in boulder areas. Otherwise rock surface fairly bare, except for red bryozoan crust (O), tufts of <i>Sertularia cupressina?</i> (O) and sparse barnacles and <i>Pomatoceros</i> . <i>Urticina felina</i> (F), <i>Echinus esculentus</i> (C), <i>Asterias rubens</i> (P), <i>Crossaster papposus</i> (P), <i>Caridea</i> sp. (P), <i>Cancer pagurus</i> (P), <i>Calliostoma zizyphinum</i> (P).	CR.MCR.EcCr.FaAICr.Flu	

Table A2 continued.

Code	Substrate	Biota	Biotope	Comment
DH/4	Mostly flat bedrock outcrops with linear fissures, but areas of coarse sand and boulders.	Well-grazed rock with pink coralline crust (C) and a scatter of barnacles (O) and patches of encrusting yellow sponges (O) and <i>Alcyonium digitatum</i> (O). <i>Urticina felina</i> (P), <i>Echinus esculentus</i> (C), <i>Asterias rubens</i> (F), <i>Crossaster papposus</i> (P), <i>Porania pulvillus</i> (P). Some areas overlain with dense <i>Ophiocomina nigra</i> (A), forming a second biotope.	CR.MCR.EcCr.FaAICr CR.MCR.EcCr.FaAICr.Bri	No useable photos.
NW/1	Mixed substrate of dense cobbles and pebbles, with occasional small boulders, on stone and shell gravel.	Cobbles and pebbles densely encrusted with red bryozoans (C), <i>Balanus</i> spp. (C) and <i>Pomatoceros</i> (C), accompanied by a significant cushion fauna of sponges (O) and <i>Botryllus schlosseri</i> (O); sponges include <i>Leuconia nivea</i> ? (R), as well as yellow (O) and red (R) forms. Anemones are common between the stones, with <i>Urticina felina</i> (C) and <i>Sagartia elegans</i> (O). Small <i>Alcyonium digitatum</i> (O). Motile fauna includes <i>Cancer pagurus</i> (R), <i>Echinus esculentus</i> (F), <i>Asterias rubens</i> (O), <i>Henricia sanguinolenta</i> (P).	SS.SCS.CCS	approaches SS.SCS.CCS.P omB but significantly richer, probably due to greater stability of the substrate.
NW/2	Mixed substrate of dense cobbles and pebbles, with occasional small boulders, on stone and shell gravel.	Cobbles and pebbles densely encrusted with red bryozoans (C), <i>Balanus</i> spp. (C) and <i>Pomatoceros</i> (C), accompanied by a significant cushion fauna of sponges (O) and <i>Botryllus schlosseri</i> (R); sponges include yellow (O) and red (R) forms. Anemones are common between the stones, with <i>Urticina felina</i> (C) and <i>Sagartia elegans</i> (F). Small <i>Alcyonium digitatum</i> (R). Motile fauna includes <i>Caridea</i> sp. (P), <i>Pagurus</i> sp. (P), <i>Echinus esculentus</i> (O), <i>Asterias rubens</i> (O).	SS.SCS.CCS	approaches SS.SCS.CCS.P omB but significantly richer, probably due to greater stability of the substrate.

Table A2 continued.

Code	Substrate	Biota	Biotope	Comment
SF/1	Flat muddy sand.	Sediment covered with patchy mat of loose-lying algae, composed principally of <i>Phyllophora crispa</i> (C), with balls of <i>Trailliella</i> (O). Infauna includes sparse <i>Lanice conchilega</i> (O) and <i>Cerianthus lloydii</i> (O). Epifauna includes <i>Liocarcinus depurator</i> (O), <i>Asterias rubens</i> (O) and <i>Aequipecten opercularis</i> (O). <i>Turritella communis</i> shells (F) on sediment surface.	SS.SMP.KSwSS.Pcri	
SF/2	Flat muddy sand.	Sediment covered with patchy mat of algae (C). Epifauna includes portunid crabs (O) and <i>Asterias rubens</i> (O).	SS.SMP.KSwSS.Pcri	No photos and video footage blurred.
SF/3	Flat muddy sand with scattered shells and pebbles.	Sediment covered with patchy mat of loose-lying <i>Phyllophora crispa</i> (A). Epifauna includes <i>Liocarcinus depurator</i> (O), <i>Asterias rubens</i> (O), <i>Aphrodita aculeata</i> (O) and <i>Gobiidae</i> (R). Infauna includes <i>Terebellidae</i> (O).	SS.SMP.KSwSS.Pcri	
SH/1	Rippled fine or medium sand with scattered <i>Ensis</i> shells.	Sparse scatter of live and dead maerl (R), drift algae and drift <i>Flustra foliacea</i> . Sparse epifauna includes <i>Liocarcinus</i> sp. (O) and <i>Asterias rubens</i> (R).	SS.Ssa.lfiSa	
SH/2	Fine or medium sand, initially flat with scattered pebbles and shells and occasional small boulders, becoming rippled, pure, fine-medium sand.	Sparse epibiota, including portunid crabs (O), <i>Asterias rubens</i> (R), <i>Crossaster papposus</i> (R), <i>Echinus esculentus</i> (R), <i>Gobiidae</i> (R) and very scattered fragments of live and dead maerl (R) and drift algae and <i>Flustra foliacea</i> .	SS.Ssa.lfiSa	

Table A2 continued.

Code	Substrate	Biota	Biotope	Comment
SH/3	Cobbles, boulders and pebbles on sand.	Stones encrusted with <i>Balanus</i> spp. (A), <i>Pomatoceros</i> (P), red bryozoans (O) and pink calcareous algae (R). Erect forms are dominated by patches of <i>Flustra foliacea</i> (F); other bryozoans are present, including <i>Securiflustra securifrons</i> (R), as well as hydroids (O), filamentous red algae (R) and <i>Desmarestia aculeata</i> (R but possibly drift). Small <i>Urticina felina</i> are common and small <i>Alcyonium digitatum</i> rare. Motile species include <i>Gadus morhua</i> (R), <i>Necora puber</i> (F), <i>Cancer pagurus</i> (R), <i>Liocarcinus depurator</i> (R), <i>Echinus esculentus</i> (O), <i>Crossaster papposus</i> (R) and <i>Henricia sanguinolenta</i> (O).	CR.HCR.XFa.FluCoAs.X	assignment uncertain
SH/3	Rippled fine or medium sand with scattered boulders.	Sparse scatter of dead maerl fragments; portunid crabs (O). Boulders densely encrusted with pink algae (A).	SS.SSa.IFiSa	
SH/4	Mixed substrate of cobbles, pebbles, shells and gravelly sand, with scattered boulders.	Most conspicuous feature is the scattered turf of <i>Flustra foliacea</i> (F), although scattered clumps of hydroids (O) and filamentous red algae (R) also present. Encrusting yellow sponges (O) and <i>Esperiopsis fucorum</i> (R) coat some of the stones, with others encrusted in <i>Balanus</i> spp. (C), <i>Pomatoceros</i> (P) and <i>Dendrodoa grossularia?</i> (P). The sessile fauna also includes small colonies of <i>Alcyonium digitatum</i> and small individuals of <i>Urticina felina</i> (A), whilst the motile fauna includes <i>Pagurus bernhardus</i> (R), portunid crabs (R), <i>Asterias rubens</i> (O), <i>Echinus esculentus</i> (O).	CR.HCR.XFa.FluCoAs.X	assignment uncertain

Table A2 continued.

Code	Substrate	Biota	Biotope	Comment
SR/1	Mosaic of areas of rippled fine sand, with scattered pockets of sand-scoured rock, in the form of bedrock outcrops, boulders and cobbles.	Open sand with little surface signs of life. Rock encrusted with Pomatoceros (C) and red bryozoans (R) and supporting sparse Alcyonium digitatum (R), tufts of Nemertesia antennina (C) and other hydroids (R), and sparse Flustra foliacea (R) and Axinella dissimilis? (R). Motile fauna includes Galathea sp. (F), Pagurus bernhardus (P), Echinus esculentus (C), Crossaster papposus (P), Ophiuroid sp. (R).	SS.SSA.CFiSa SS.SMX.CMx.FluHyd	poor fit to CMx.FluHyd.
SR/2	Small boulders and cobbles on coarse shelly sand, with angular, linear bedrock outcrops; some extensive patches of shelly sand.	Rock of bare appearance, with extensive crust of pink coralline algae (C), orange bryozoans (O) and Pomatoceros (P). Sessile erect species confined largely to Alcyonium digitatum (O), Urticina felina (R) and tufts of hydroids or bryozoans (R). Motile fauna includes Galathea sp. (P), Crossaster papposus (R), Asterias rubens (F), Echinus esculentus (C), Shelly sand patches with little surface life.	CR.MCR.EcCr.FaAlCr SS.SCS.CCS	no photos
SR/3	Waves of pebbly shelly gravel	Sparse echinoderm epibiota of Asterias rubens (O) and Crossaster papposus (R).	SS.SCS.CCS	
SR/4	Outcrops of low, sand-scoured bedrock with linear striations and small boulders and cobbles on coarse pebbly sand; pockets of sand also lie within hollows of bedrock.	Rock of generally bare appearance, with a crust biota of coralline pink algae (C) and orange bryozoans (O), with frequent Alcyonium digitatum and occasional Urticina felina. Motile fauna includes Echinus esculentus (C), Asterias rubens (F), Crossaster papposus (O), Cancer pagurus (P). Some hydroid patches on sand, including Nemertesia antennina (P).	CR.MCR.EcCr.FaAlCr SS.SCS.CCS	No photos. Rock biotope verges towards FaAlCr.Alc but Alcyonium no more than frequent.

Table A2 continued.

Code	Substrate	Biota	Biotope	Comment
SR/5	Outcrops of low, sand-scoured bedrock with linear striations between sand patches, and small boulders and cobbles on sand. Much of sand with surface scatter of pebbles or possibly tufts of hydroids – images unclear.	Rock of generally bare appearance, with a crust biota of coralline pink algae (C) and orange bryozoans (O), with occasional <i>Alcyonium digitatum</i> . Motile fauna includes <i>Echinus esculentus</i> (C), <i>Asterias rubens</i> (O), <i>Cancer pagurus</i> (P).	CR.MCR.EcCr.FaAICr SS.SCS.CCS	No photos.
SR/5	Pebbly coarse or medium sand.	Apparently sparse epibiota though images unclear. <i>Asterias</i> (O), <i>Cancer pagurus</i> (P)	SS.SCS.CCS	
SR/6	Mosaic of medium or coarse sand patches and outcrops of flat, scoured, striated bedrock, boulders and cobbles	Rock of very barren appearance with crusts of pink coralline algae (C) and orange bryozoans (F), Sessile biota mostly consist of sparse <i>Alcyonium digitatum</i> (O) and <i>Urticina felina</i> (O). Motile fauna consists of <i>Echinus esculentus</i> (C), <i>Asterias rubens</i> (F), <i>Crossaster papposus</i> (R), <i>Munida rugosa</i> (P) and unidentified crabs.	CR.MCR.EcCr.FaAICr SS.SCS.CCS	No photos.
SR/7	Mostly small boulders and cobbles on coarse sediment, with vertically-laminated bedrock outcrops and areas of coarse sediment of pebbles, gravel and sand.	Rock of generally bare appearance, with a crust biota of coralline pink algae (C) and orange bryozoans (O), with occasional <i>Alcyonium digitatum</i> and <i>Urticina felina</i> . Motile fauna includes <i>Echinus esculentus</i> (C), <i>Asterias rubens</i> (O), <i>Henricia sanguinolenta</i> (P), <i>Crossaster papposus</i> (F), <i>Cancer pagurus</i> (O). This biota is augmented by dense patches of brittlestars, mostly <i>Ophiocomina nigra</i> , but also <i>Ophiothrix fragilis</i> (A). The brittlestar beds extend onto some sediment patches, although most of the sediment has little epibiota in evidence.	CR.MCR.EcCr.FaAICr, CR.MCR.EcCr.FaAICr.Bri SS.SCS.CCS	This site is considered to display a mosaic of three biotopes.

Table A2 continued.

Code	Substrate	Biota	Biotope	Comment
SR/8	Field of small boulders on sand with bedrock outcrops.	Very dense blanket of <i>Ophiothrix fragilis</i> (S) over much of rock surface and sediment; <i>Ophiocomina nigra</i> (C). In patches devoid of brittlestars the rock surface appears to be largely bare, apart from scattered individuals of <i>Urticina felina</i> (F) and clumps of <i>Alcyonium digitatum</i> (O). Motile species include <i>Necora puber</i> (P), <i>Echinus esculentus</i> (F), <i>Asterias rubens</i> (O), <i>Luidia ciliaris</i> (R).	CR.MCR.EcCr.FaAlCr.Bri	No photos.
SR/9	Plain of coarse or medium sand with surface scatter of shells and algal detritus; occasional small boulders and cobbles..	<i>Cancer pagurus</i> (R), <i>Galathea</i> sp. (O), <i>Pagurus bernhardus</i> (O), <i>Luidia ciliaris</i> (R), <i>Echinus esculentus</i> (O), <i>Urticina felina</i> (R). <i>Alcyonium digitatum</i> (R) on scattered stones. Possibly some sparse hydroids and bryozoans.	SS.SCS.CCS	No photos.
SW/1	Scoured flat, low outcropping bedrock and scattered cobbles, pebbles and boulders on coarse sediment.	Cobbles, boulders and bedrock covered in pink coralline algae (S), with <i>Urticina felina</i> (C), <i>Alcyonium digitatum</i> (R) and possibly patches of <i>Flustra foliacea</i> (O). Motile fauna includes <i>Echinus esculentus</i> (C), large <i>Asterias rubens</i> (C), <i>Crossaster papposus</i> (R) <i>Cancer pagurus</i> (P), <i>Pagurus bernhardus</i> (P).	CR.MCR.EcCr.UrtScr	images unclear – no photos and video blurred. Biotope also close to CR.MCR.EcCr.FaAlCr.Flu.
SW/2	Scoured flat, low outcropping bedrock and scattered cobbles, pebbles and boulders on coarse sediment.	Cobbles, boulders and bedrock covered in pink coralline algae (S), with <i>Urticina felina</i> (C, locally A), <i>Alcyonium digitatum</i> (R) and possibly patches of <i>Flustra foliacea</i> (O). Motile fauna includes <i>Echinus esculentus</i> (C), large <i>Asterias rubens</i> (C), <i>Crossaster papposus</i> (R).	CR.MCR.EcCr.UrtScr	images unclear – no photos and video blurred. Biotope also close to CR.MCR.EcCr.FaAlCr.Flu.

Table A2 continued.

Code	Substrate	Biota	Biotope	Comment
WH/1	Mixed substrate of scattered small boulders, cobbles and pebbles on sand.	Dominant cover on stones is <i>Flustra foliacea</i> (C), but crust fauna of <i>Pomatoceros</i> (C) and orange bryozoans (O) also present. Erect fauna includes <i>Alcyonium digitatum</i> (O) and <i>Urticina felina</i> (F). Motile fauna includes <i>Echinus esculentus</i> (C), <i>Asterias rubens</i> (P), <i>Crossaster papposus</i> (P), <i>Cancer pagurus</i> (P) and <i>Munida rugosa</i> (F).	SS.SMX.CMx.FluHyd	Just 2 photos – and of little use.
WH/2	Mixed substrate of scattered small boulders, cobbles and pebbles on medium sand.	Dominant cover on stones is <i>Flustra foliacea</i> (C) but other scour-tolerant erect bryozoans (R) and hydroids (O) also present, some emerging from the sand. Crusts on stones include <i>Pomatoceros</i> (F), orange bryozoans (O) and <i>Balanus</i> spp. (P). <i>Alcyonium digitatum</i> (O), <i>Urticina felina</i> (F). Motile fauna includes <i>Echinus esculentus</i> (F), <i>Asterias rubens</i> (P), <i>Cancer pagurus</i> (P), <i>Munida rugosa</i> (F) and <i>Agonus cataphractus</i> (P).	SS.SMX.CMx.FluHyd	
WH/3	Coarse gravelly sand with some pebbles and shells.	<i>Pomatoceros</i> on pebbles and shells (C), otherwise little life visible; <i>Asterias rubens</i> (R). Possibly some dead maerl fragments present.	SS.SCS.CCS	
WH/4	Mostly dense small boulders and cobbles with some small sand patches between stones.	Rock surface mostly of bare appearance with a crust of <i>Pomatoceros</i> (C) and red bryozoans. Patches of <i>Flustra foliacea</i> (F) and other bryozoans (O), including <i>Securiflustra securifrons</i> ? (P) are also present, as well as hydroid patches (O), particularly on the sides of boulders. Motile fauna includes <i>Munida rugosa</i> (P), <i>Porania pulvillus</i> (O), <i>Echinus esculentus</i> (C).	CR.MCR.EcCr.FaAICr.Flu	

Table A2 continued.

Code	Substrate	Biota	Biotope	Comment
WH/5	Mixed substrate, though rock-dominated for most of run, with small boulders, cobbles and pebbles on gravelly sand.	Most of rock surface fairly bare, with crusts of orange bryozoans (O), Pomatoceros (C) and other serpulid worms (P). However, there is also a patchy turf of erect bryozoans, mostly <i>Flustra foliacea</i> (C) and <i>Securiflustra securifrons</i> ? (O) and clumps of hydroids (O), including <i>Tubularia indivisa</i> ? (P). Other sessile species include <i>Alcyonium digitatum</i> (O), <i>Caryophyllia smithii</i> (R) and <i>Alcyonidium diaphanum</i> (R). Motile forms include <i>Crossaster papposus</i> (O), <i>Echinus esculentus</i> (F), <i>Porania pulvillus</i> (R).	CR.MCR.EcCr.FaAlCr.Flu	
WH/6	Mixed substrate, though rock-dominated for most of run, with small boulders, cobbles, pebbles and sand.	Most of rock surface bare, with crusts of orange bryozoans (O) and <i>Pomatoceros</i> (C). Patches of erect bryozoans, mostly <i>Flustra foliacea</i> (C) and possibly <i>Securiflustra securifrons</i> (O) and sparse clumps of hydroids (O). Motile forms include <i>Asterias rubens</i> (F), <i>Luidia ciliaris</i> (O), <i>Crossaster papposus</i> (R), <i>Echinus esculentus</i> (F), <i>Porania pulvillus</i> (F).	CR.MCR.EcCr.FaAlCr.Flu	
WH/7	Small boulders, cobbles and pebbles on sand, with patches of fine or medium rippled sand.	Habitat subject to scour and a degree of instability. Rocks of very barren appearance with sparse crusts of <i>Pomatoceros</i> (C), orange bryozoans (O) and pink coralline algae (R), and very sparse, small <i>Alcyonium digitatum</i> (R). Motile fauna sparse apart from <i>Echinus esculentus</i> (C), with <i>Asterias rubens</i> (P) and <i>Caridea</i> sp. (P).	CR.MCR.EcCr.FaAlCr.Pom SS.SSA.CFiSa	Rock biotope approaches SS.SCS.CCS.P omB, but too many boulders.
WH/8	Small boulders, cobbles and pebbles on sand.	Habitat subject to scour and a degree of instability. Rocks of very barren appearance with sparse crusts of <i>Pomatoceros</i> (C), orange bryozoans (O) and pink coralline algae (R). Motile fauna fairly sparse apart from <i>Echinus esculentus</i> (C), with <i>Munida rugosa</i> (P) and <i>Crossaster papposus</i> (P).	CR.MCR.EcCr.FaAlCr.Pom	Biotope approaches SS.SCS.CCS.P omB, but too many boulders.

Table A3. *Biotope inventory. Biotopes recorded during the survey, together with all site records and illustrative photograph (italicised site code indicates provenance).*



Biotope	Sites	Photograph
<p>CR.HCR.FaT. BalTub</p> <p><i>Balanus crenatus</i> and <i>Tubularia indivisa</i> on extremely tide- swept circalittoral rock</p>	<p>PF/2, PF/3, PF/4, PF2/1, PF5/1, PF8/1, PF9/1, PF10/1, <i>PF10B/1</i>, PF11/1, PF19/1, PF19B/1, PF19C/1, PF20/1, PF22/1, PF22B/1, PF24/1</p>	
<p>CR.HCR.FaT. CTub</p> <p><i>Tubularia indivisa</i> on tide-swept circalittoral rock</p>	<p>PF/2, PF/3, PF/4, PF/5, PF2/1, <i>PF4/1</i>, PF5/1, PF7/1, PF8/1, PF9/1, PF10/1, PF10B/1, PF11/1, PF16C/1, <i>PF16D/1</i>, PF19/1, PF19B/1, PF19C/1, PF20/1, PF22/1, PF22B/1, PF24/1, PF25/1</p>	

Table A3 continued.



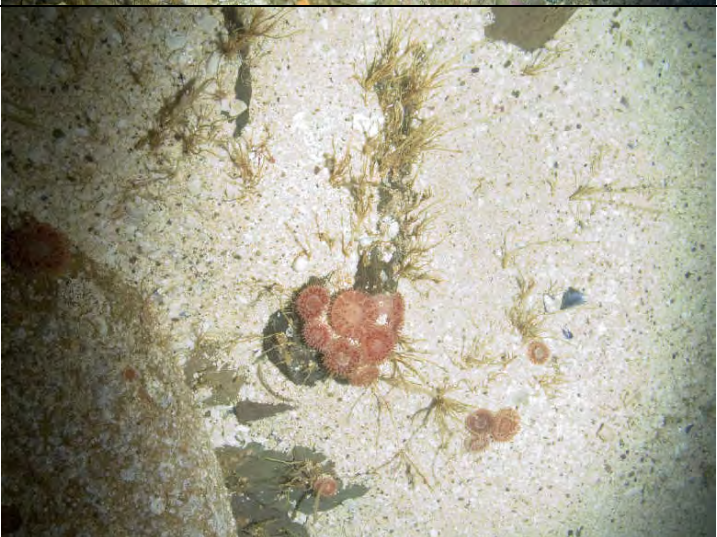
Biotope	Sites	Photograph
<p>CR.HCR.XFa</p> <p>Mixed faunal turf communities</p>	<p>PF/1</p>	
<p>CR.HCR.XFa. FluCoAs.X</p> <p><i>Flustra foliacea</i> and colonial ascidians on tide-swept exposed circalittoral mixed substrata</p>	<p>SH/3, SH/4</p>	
<p>CR.MCR.EcCr. UrtScr</p> <p><i>Urticina felina</i> and sand-tolerant fauna on sand-scoured or covered circalittoral rock</p>	<p>PF16/1, PF16B/1, SW/1, SW/2</p>	

Table A3 continued.




Biotope	Sites	Photograph
<p>CR.MCR.EcCr. FaAlCr</p> <p>Faunal and algal crusts on exposed to moderately wave-exposed circalittoral rock</p>	<p>DH/4, SR/2, SR/4, SR/5, SR/6, SR/7</p>	
<p>CR.MCR.EcCr. FaAlCr.Flu</p> <p><i>Flustra foliacea</i> on slightly scoured silty circalittoral rock</p>	<p>DH/1,DH/2, DH/3, WH/4, WH/5, WH/6</p>	
<p>CR.MCR.EcCr. FaAlCr.Bri</p> <p>Brittlestar bed on faunal and algal encrusted, exposed to moderately wave-exposed circalittoral rock</p>	<p>DH/4, SR/7, SR/8</p>	

Table A3 continued.






Biotope	Sites	Photograph
<p>CR.MCR.EcCr. FaAlCr.Pom</p> <p>Faunal and algal crusts with <i>Pomatoceros triqueter</i> and sparse <i>Alcyonium digitatum</i> on exposed to moderately wave-exposed circalittoral rock</p>	<p>WH/7, WH/8</p>	
<p>SS.SCS.CCS</p> <p>Circalittoral coarse sediment</p>	<p>PF15/1, PF15B/1, PF15C/1, PF16/1, PF16B/1, NW/1, NW/2, SR/2, SR/3, SR/4, SR/5, SR/5, SR/6, SR/7, SR/9, WH/3</p>	
<p>SS.SSa.IFiSa</p> <p>Infralittoral fine sand</p>	<p>SH/1, SH/2, SH/3</p>	

Table A3 continued.

Biotope	Sites	Photograph
<p>SS.SSA.CFiSa</p> <p>Circalittoral fine sand</p>	<p>SR/1, WH/7</p>	
<p>SS.SMX.CMx. FluHyd</p> <p><i>Flustra foliacea</i> and <i>Hydrallmania falcata</i> on tide-swept circalittoral mixed sediment</p>	<p>SR/1, WH/1, WH/2</p>	
<p>SS.SMP.KSwSS. Pcri</p> <p>Loose-lying mats of <i>Phyllophora crispera</i> on infralittoral muddy sediment</p>	<p>SF/1, SF/2, SF/3</p>	