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SYNOPSIS

The Marine Conservation Society is the lead organisation for the *Atrina fragilis* Biodiversity Action Plan (BAP). Otherwise known as the fan shell, this rare pinnate mollusc is also protected under the Wildlife and Countryside Act. Following a reliable account of a small population on a sandy step at approximately 30m below chart datum (bcd) on the north east side of Oberon Bank, it was chosen as the destination for the Scottish leg of a UK-wide fan shell search. Seasearch was used to collect baseline species and habitat data from Oberon Bank and the adjacent Sound of Arisaig marine Special Area of Conservation (mSAC).

Seasearch is an underwater habitat and species survey method originally developed by the Marine Conservation Society (MCS) and the Nature Conservancy Council (NCC) to enable recreational SCUBA divers to make simple but accurate seabed observations; help map the various kinds of habitats and marine life and contribute practically to marine conservation.

Seasearch Oberon Bank 2003 was organised by MCS on 15-18 August 2003 and, in recognition of the biological importance of the bank, was part-funded by the Scottish Natural Heritage Fort William office. Based at Glenuig Inn, diving was carried out from two Rigid-hulled Inflatable Boats (RIBs) involving six divers, including participants from Seasearch Observer courses in Arran and Inverness. Of 17 expedition dives, ten were on Oberon Bank itself and, when bad weather precluded diving offshore, seven within the Sound of Arisaig.

The Oberon Bank is a submerged seamount lying between the Isle of Eigg and the Arisaig Promontory. From the west the bank gradually rises to a series of rounded bedrock ridges crowned by *Laminaria hyperborea* park at ~16m – ~22m bcd. On one dive to the east of the bank, the nationally scarce brown seaweed *Carpometra costata* was recorded. To the east, the bank descends in a series of steep, rounded bedrock faces of varied filter-feeding animal turf cover, including hydroids (*Nemertesia*), bryozoa (*Securiflustra*) and crinoids (*Antedon* sp) and, deeper; cup sponges (*Axinella infundibuliformes*), the northern sea-fan *Swiftia pallida*, the erect bryozoan *Porella compressa* and Devonshire cup corals *Caryophyllia smithii*. At ~30m bcd on the east side the sandy steps described by the reliable source were located but, despite three dives in the vicinity, no *Atrina fragilis* were found.

Another seven dives on the mixed ground of coarse sand, pebbles, cobbles and small boulders that gradually descended to the south, west and north of the bank – arguably ideal fan shell habitat – located no *Atrina fragilis*. However, faunal diversity was high on these circalittoral mixed grounds, perhaps owing to the heterogeneity of the substrata. In particular, the mixed sediment plain to the west was characterised by scallops (*Pecten maximus* and *Aquepecten opercularis*), dragonets (*Callionymus lyra*), sandmasons (*Lanice conchilega*) and even an individual *Pennatula phosphorea*. Bedrock outcrops, large cobbles and small boulders embedded on the plain were covered in *Parazoanthus anguicomus* (deemed nationally scarce), *Epizoanthus couchii*, *Swiftia pallida*, the bryozoans *Porella compressa* and *Alcyonidium diaphanum*, and the football seasquirt *Diazona violacea*. Rock Cook, ballan and cuckoo wrasse and poor cod were common on many dives on Oberon Bank.

Dives carried out within the Sound of Arisaig mSAC in poor weather revealed a diversity of biotopes, from the mixed kelp covered boulders, and seapen and megafaunal rich muddy sediments of Rubh A' Chairn Mhoir; to the sheltered solitary ascidian dominated boulder slopes and crinoid dominated cliffs of Ardnish. The giant naked foraminiferan *Toxisarcon alba* was also recorded at Rubh A' Chairn Mhoir, only the fifth location in Scotland.

Although *Atrina fragilis* was not re-located on this expedition, the Seasearch surveys provided the first semi-quantitative infra and circalittoral species and habitat data for the Oberon Bank and additional records were collected for the Sound of Arisaig mSAC.

1 INTRODUCTION

1.1 The Fan Shell *Atrina fragilis*

The Marine Conservation Society is the lead organisation for the *Atrina fragilis* Biodiversity Action Plan (BAP). Otherwise known as the fan shell, this large, rare pinnate mollusc is protected under the Wildlife and Countryside Act and one of only 38 UK marine species or habitats with BAP status. It occurs naturally in all UK and Eire waters between the surface and down to at least 400m, growing in mud, sand and gravel. Up to 40 cm long, fan shells are commonly found with half to three quarters of their shell submerged in sediment (Fig 1).

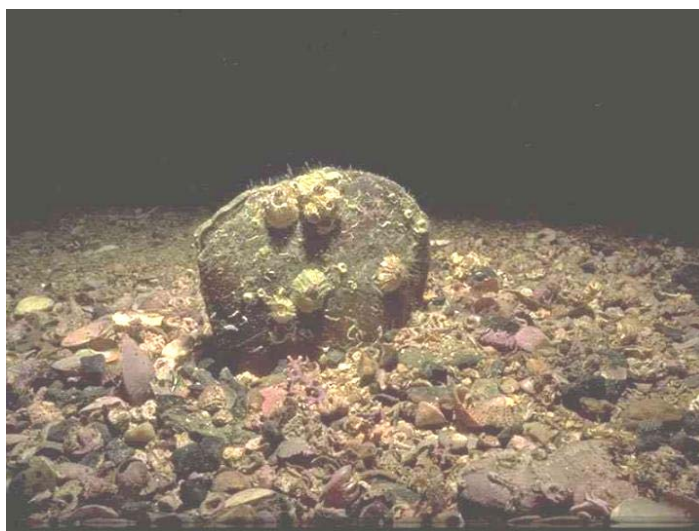


Figure 1 *Atrina fragilis*, at 10m depth in Loch Carron, Western Scotland (© Sue Scott)

The historical record contains considerable numbers of *A. fragilis* in the waters around the UK and Eire (Anon, 1999). Often they were caught in the dredges and trawls of expedition ships and in the nets of scallop and demersal fish trawlers, sometimes even in aggregations, showing evidence for considerable metapopulation centers. However, current inshore population numbers are described as 'scarce' (Anon 1999) with only 32 records in the UK and Eire.

Records of fan shells from the UK centre on Scotland, with approximately 20 coastal sightings, and Cornwall, with two. The Marine Life Information Network (www.marlin.ac.uk) notes records within deeper tidal waters of The Minch and the Sound of Skye, and another 'pocket' of abundance around Orkney. Offshore population numbers and 'hotspots' are presently unknown, although there are some historical records from scallop-trawl boat records of large populations off the west coast of Ireland, within the English Channel (ERCCIS; Solandt, 2003).

1.2 Background to survey

No known fan shell population 'hotspots' exist in UK waters. Due to the rarity of fan shells, if located, such 'hotspots' would immediately merit consideration for protected area status. During 2003, as part of their fulfilment of the Fan Shell BAP, MCS therefore organised Seasearch surveys to Plymouth Sound, Wales and, in Scotland, the Oberon Bank in search of fan shells.

Apart from two transplanted specimens in Loch Carron (Sue Scott, *pers. comm.*), and one recent recording (December 2003) in muddy habitat within the Plymouth mSAC (K. Hiscock, *pers. Comm.*), *in situ* fan shell sightings are few and far between. Following a reliable account of a population (more than one individual) on a sandy step at approximately 30m on

the north east side of Oberon Bank relayed to the author in 2003 by an experienced local diver, it was therefore chosen as the destination for the Scottish leg of the fan shell search.

1.3 The Oberon Bank

Lying between the Isle of Eigg and the Arisaig Promontory, the Oberon Bank is a submerged seamount that gradually rises from the west, to a pinnacle approximately 15m beneath chart datum (bcd) (Fig. 2). The apex of the ridge is approximately $\frac{3}{4}$ mile long and lies in a south-north direction (Ridley, 1985) with the north end descending steadily to around 55m bcd, and the south more steeply to 62m bcd. Most of the upper part of the bank is rocky reef, but some areas of sand occur in the more sheltered and deeper parts. The east side of the bank slopes steeply down to sand and gravel ledges at approximately 30m bcd, then drops precipitously to around 80m bcd. It was from these eastern ledges that the anecdotal observations of fan shells were made.

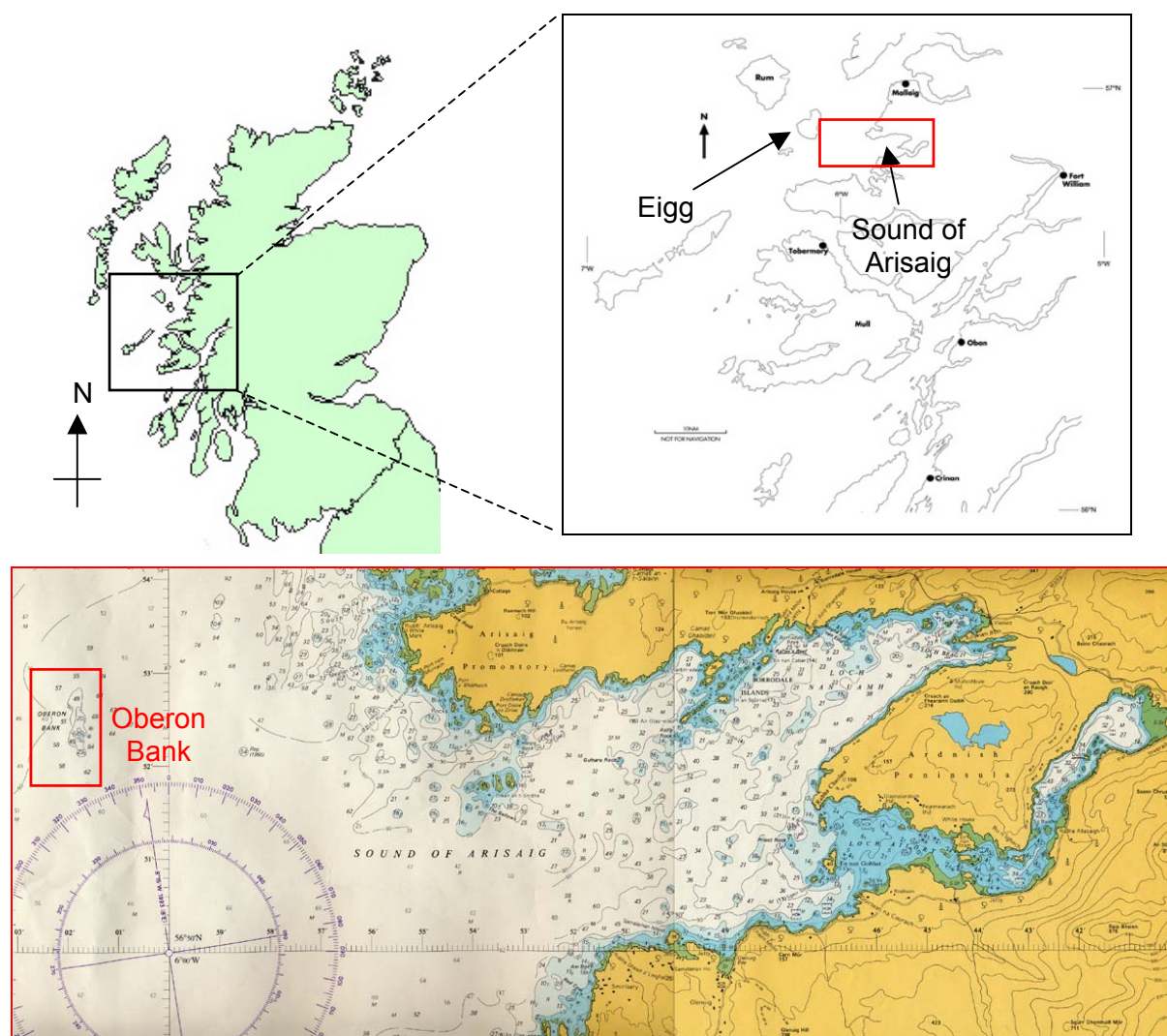


Figure 2 Location of Oberon Bank and Sound of Arisaig (approximately $56^{\circ}52.300\text{ N}$: $006^{\circ}01.800\text{ W}$) (Reproduced from Admiralty Chart No. 2207)

1.4 Previous work in the Arisaig area

1.4.1 Sound of Arisaig

The Sound of Arisaig is an area of national biological importance (Powell *et al.*, 1980), listed as a candidate marine Special Area of Conservation (SAC) under the European Habitats Directive. Without the shelter of larger Hebridean Islands such as Skye, previous Marine Nature Conservation Review (MNCR) work by the JNCC (Barne *et al.*, 1997) described the Sound as having a fauna associated with strong currents and high wave action. It was also noted that rich burrowing communities near to Loch Ailort were regarded as nationally important (Bishop and Holme, 1980) and although not the focus of the present survey, near to the Loch mouth, extensive maerl beds can be found (Howson, 1990). The MNCR report also found specimens of *Codium adhaerans* probably at the northern limit of its range in the northern part of Loch nan Uamh. Diverse habitats different from those at the mouth of Loch Ailort were found in this vicinity including sandy channels with zonation of fucoids and red algae, particularly *Palmaria palmata*, and the mat-forming algae *Audouinella floridula*.

1.4.2 The Oberon Bank

In contrast, little biological information exists for dives at the Oberon Bank, adding value to any Seasearch data collected. Oberon Bank is a challenging dive site, exposed to strong winds and currents and, even in the best of conditions, requires experienced divers.

Due to its relative inaccessibility, most reports from the Oberon Bank area are from experienced recreational divers. The 'Diver' guide to North-West Scotland describes the Oberon Bank as being one of the best dive sites in Scotland, particularly on the east side where a series of ledges eventually drops off to a precipitous wall between 30 and 84m (Ridley, 1985). A known sea-cave on this deep wall remains un-surveyed, lying as it does at the limits of air-diving. Oberon Bank therefore has two habitats listed for protection under the 1994 EU Habitats Directive; sea caves and submerged reefs.

1.5 Seasearch

Seasearch is an underwater habitat and species survey method for recreational SCUBA divers in the UK, extending to approximately five miles off the coast within depths of about 30 m. With over 16,000 km of coastline in Scotland alone (MLURI, 1993), vast tracts of UK inshore seabed remain unsurveyed, both by professional and volunteer divers. Through Seasearch, recreational divers can make simple but accurate observations and help map the various kinds of habitats and marine life, making a real contribution to marine conservation (see Fig 3). Collation of baseline habitat data from Seasearch volunteers can form the precursor to specialised professional surveys in newly identified areas of interest.

Seasearch contributes to a growing baseline of knowledge fed into the national marine biodiversity database 'Marine Recorder'. It is possible to identify which seabed types are most widespread, where there are unusual or important underwater features, and which species of marine wildlife are threatened, or most abundant. Records from frequently visited sites will also help to identify where changes may be occurring – this data can complement information gathered from the statutory monitoring of marine Special Areas of Conservation. Seasearch information is vital in providing an additional framework for management decisions and conservation activities to protect and enhance our marine environment. Seasearch also provides a means to record UK Biodiversity Action Plan species, and therefore provides information necessary for the UK to carry out its commitment to conserving biodiversity, made at the Earth Summit on Biodiversity in Rio in 1992.

A National Seasearch Steering Group (NSSG) was established in 1999 to develop the potential of the project. The NSSG members include statutory conservation bodies (Scottish Natural Heritage, English Nature, Countryside Council for Wales and Joint Nature Conservation Committee), the Environment Agency, Non-Governmental Organisations (Marine Conservation Society and The Wildlife Trusts), the Marine Biological Association (MarLIN), diver training organisations (BSAC, SSAC, PADI and SAA), the Nautical Archaeology Society and independent marine life experts. The Marine Conservation Society with the support of Scottish Natural Heritage is responsible for coordinating Seasearch activities in Scotland. The appointment of a National Seasearch Co-ordinator for England and Wales in January 2003 has helped with Seasearch promotion south of the border, whilst Calum Duncan, MCS Marine Conservation Officer for Scotland continues to run Seasearch Observer and Surveyor courses and dives north of the border.



Figure 3 Seasearch diver surveying rock wall near Faraid Head, Cape Wrath (© Sue Scott).

2 METHODS

2.1 Aims and objectives

Principally the aim of the survey was to re-locate and corroborate anecdotal sightings of *Atrina fragilis* on the eastern ledges of Oberon Bank. Since no MNCR records exist for Oberon Bank, collection of habitat and species data using the Seasearch surveyor methodology was also a key objective.

2.2 Survey facilities

The Oberon Bank Seasearch survey was organised by Dr. Jean-Luc Solandt and Calum Duncan of the Marine Conservation Society and Chris Wood of Seasearch as an 'MCS dives' voluntary trip. The challenging nature of the dive site meant experienced surveyors were needed to collect accurate and effective data, as well as being able to look out for fanshells. Expedition divers stayed at Glenuig Inn, whose proprietor supplied compressed air for re-filling cylinders, and diving was conducted from Rigid-hulled Inflatable Boats (RIBs) coxed by John Payne and George Brown.

2.3 Site selection and position fixing

Sites were selected to cover as much of the Oberon Bank as was practical given safety constraints. In practice, the area of bank suitable for Seasearch surveying by open-circuit air-diving, 15.7m bcd at its shallowest, was a small proportion of the $\frac{3}{4}$ mile length of the bank itself, perhaps only some 150m N-S by 100m E-W (see Figure 5). Initially, dives were focused towards the eastern drop off at ~30m bcd from where reliable anecdotal accounts of a small fan shell population had been returned (see 1.2 and 4.1). Once the eastern margin had been explored, the remainder of the dives were carried out to the south, west and north in waters between 33.5 m and 16m bcd deep.

During periods of heavier weather, when sea conditions prevented safe access to the bank, Seasearch sites were selected from sheltered areas in the Sound of Arisaig.

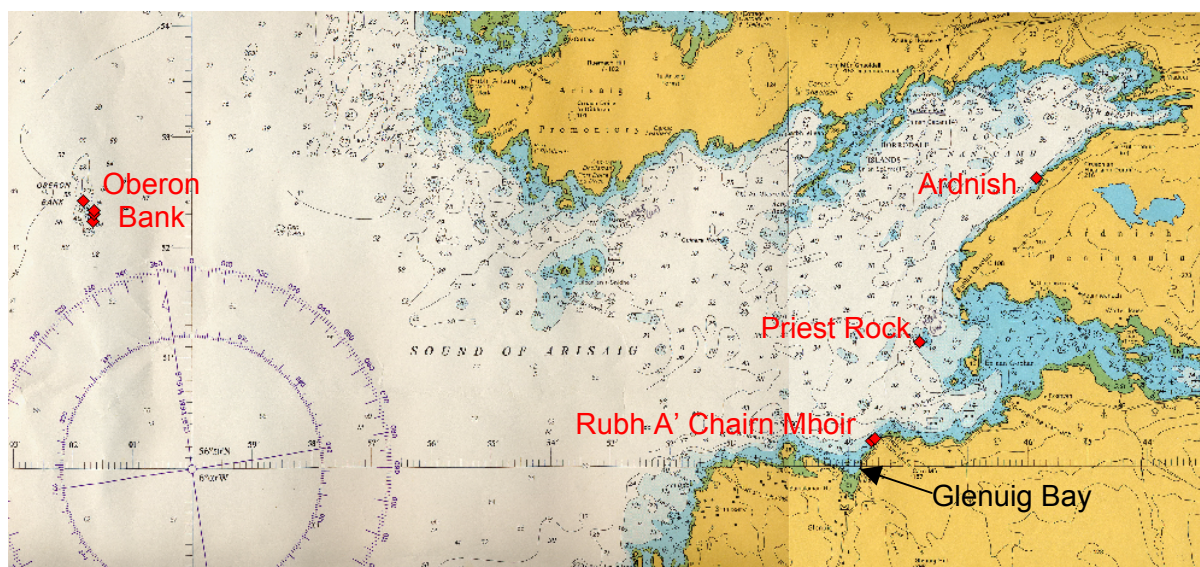


Figure 4 Location of dives carried out on Oberon Bank (10 dives: see Figure 5) and Sound of Arisaig (7 dives) 15-18 August 2003. (Reproduced from Admiralty Chart No. 2207)

2.4 Survey techniques

Divers worked in pairs with the divers descending to the deepest depth of the dive where they then began recording the main habitat features and prominent species, using underwater writing boards. Ascending up the slope in a predetermined direction, usually directly towards the shore (or in the case of Oberon Bank, towards the shallowest part of the bank where a shot-line was deployed). Divers stopped to record different habitats and the most conspicuous species, noting the depth at which changes occurred. Species were recorded according to the diver's capabilities and the information later transferred to Seasearch forms, Observer for the less experienced, and Surveyor for the more experienced. The Observer Form is the basic Seasearch survey form, requiring details of the site location, a sketch of the underwater terrain and some basic information about the types of seabed and plant or animal cover present. It also allows divers to record as many species as they are able. The Surveyor form requires the diver to divide the site into habitats and record a description, some basic information, and a species list for each habitat. More details of these methods are included in the Seasearch Observer and Surveyor Course participant packs (these can be ordered via the Seasearch website <http://www.seasearch.co.uk/>).

Not all forms are presented in the results section of this report, as many forms have similar information from a number of dives on the Oberon Bank – examples of these entered forms can be found in APPENDIX 1. In addition, Seasearch Observer forms were not highlighted in detail below, but the species information from these dives was included in the species list at the end of the report (APPENDIX 2). The day trip format enabled 6 divers to be involved, including participants from Seasearch Observer courses in Arran and Inverness.

2.5 Data analysis

A list of sites surveyed with their location was compiled and species recorded were entered into a Microsoft Excel spreadsheet. Depths on the recording forms were corrected to Chart Datum using the Belfield Tideplotter programme. Where possible, biotope codes were assigned to habitat descriptions according to the original Marine Nature Conservation Review (MNCR) manual (Connor *et al*, 1997). It should be noted that the MNCR biotope manual is currently being revised in accordance with the latest multivariate analysis techniques on the MNCR dataset (www.jncc.gov.uk/marine/biotopes).

All species and habitat data were collated in Microsoft Excel and then compiled into the following spreadsheets:

- Site information including location, biotope, substratum type and site features;
- Species list.

The above lists were imported into the MapInfo® Geographical Information System (GIS), enabling the sites to be mapped.

3 RESULTS

The Seasearch forms were divided into two areas: Oberon Bank (10 forms: **3.1**) and Sound of Arisaig (7 forms: **3.2**). Of the total 17 Seasearch forms, three were Observer (only one of which was from Oberon Bank) and 14 the more detailed Surveyor form.

3.1 Oberon Bank Dives

The ten dives on Oberon Bank were grouped according to the position of the shotline from which they commenced. Due to the depths being worked at, the survey method required returning on a reciprocal bearing to the shotline for subsequent ascent, therefore no positions were fixed for the deepest end of each dive. Positions of shotlines from which dives commenced, along with approximate bearing of Seasearch dives, is shown in Figure 5. Shotline position is matched to bearing and dive in Table 1. All Seasearch dive details, including positions, divers, biotopes, substratum type and site features are listed in APPENDIX 2.

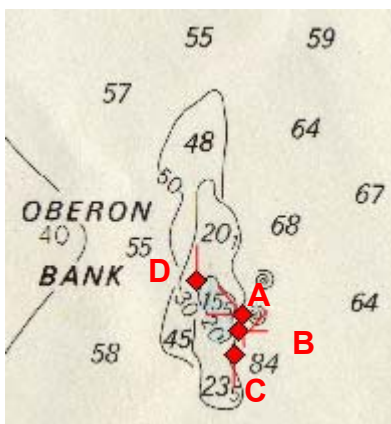


Figure 5 Oberon Bank shot positions and diver bearings.

Table 1 Allocation of dive number to shot position

Shot	Bearing	Dive Number(s)	Area of Bank
A	W	10, 11	West (3.1.2)
	NW	12	
B	E/NE	4, 6, 8	East (3.1.1)
	S	5, 9	South (3.1.3)
C	S	7	
D	N	15	North (3.1.4)

From the bearing taken on the different dives, comparison of Seasearch sketches and observation of Figure 5, it is possible to consider 4 areas of Oberon Bank: East (**3.1.1**), West (**3.1.2**), South (**3.1.3**) and North (**3.1.4**). Where more than one dive is listed in **3.1.1** to **3.1.4**, the habitat descriptions and species lists are a composite.

3.1.1 East Oberon Bank

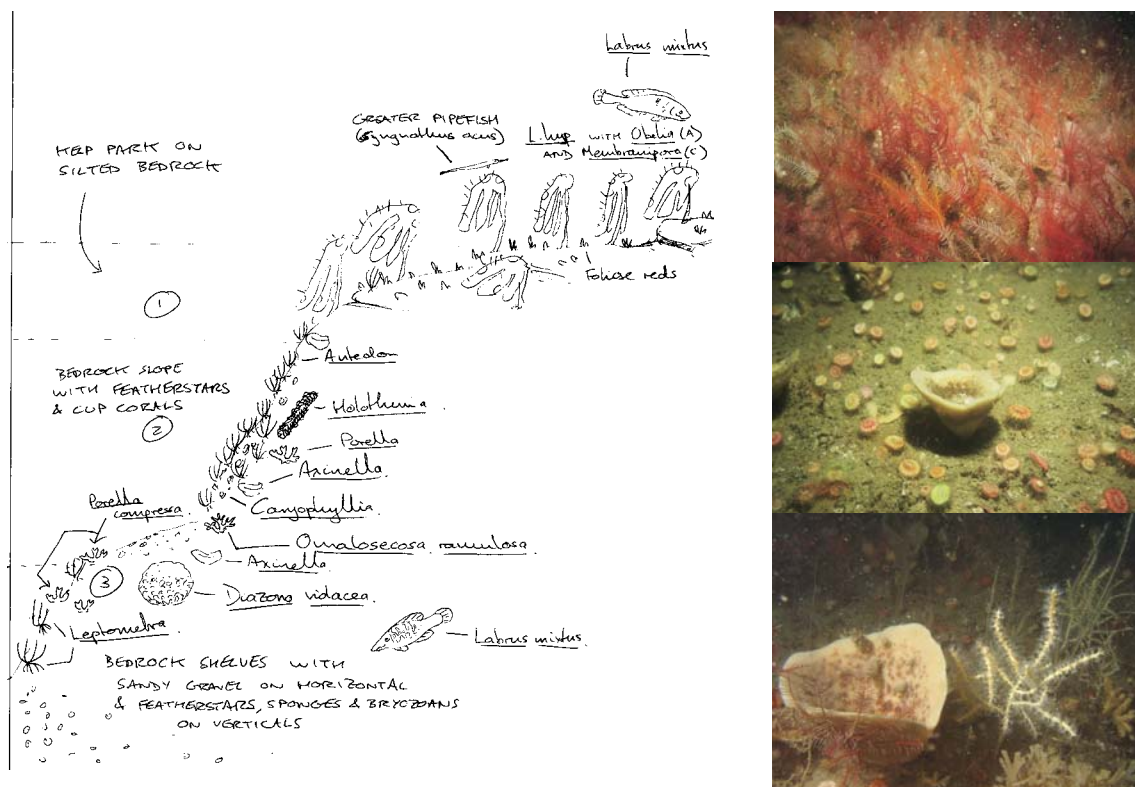


Figure 6 Habitats and species on the east side of Oberon Bank (dives 4, 6 and 8) (sketch: Calum Duncan). Photos (T-B): featherstars (Chris Wood); *Axinella infundibuliformes* and *Caryophyllia smithii* (CW); *Axinella* and *Swiftia pallida* (Howard Wood).

Habitat 1 (16-21m bcd)	Habitat 2 (21-32.3m bcd)	Habitat 3 (32.3m+ bcd)
Domed, silted fairly smooth bedrock with occasional large and small boulders; <i>Laminaria hyperborea</i> park (dense in some places) with quite small plants and foliose reds and featherstars beneath.	Steep bedrock faces, generally smooth and domed with occasional vertical sections and small ledges, some with small boulders. Animal turf dominated by featherstars (<i>Antedon bifida</i>) and <i>Caryophyllia smithii</i> with some bryozoans (<i>Porella compressa</i>) and <i>Securiflustra securifrons</i> and occasional <i>Holothuria</i> sea-cucumbers.	Steep bedrock faces with series of shell gravel covered ledges. Bedrock faces with common <i>Leptometra celtica</i> and northern sea fan (<i>Swiftia pallida</i>) and occasional cup sponges (<i>Axinella infundibuliformes</i>), erect bryozoans (<i>Porella compressa</i>) and football seasquirts (<i>Diazona violacea</i>). This habitat extended into a drop-off that was not investigated.
Other species on dive (recorded as abundant, common or frequent)		
<i>Laminaria hyperborea</i>	<i>Axinella infundibuliformes</i>	<i>Caryophyllia smithii</i>
<i>Dictyota dichotoma</i>	<i>Caryophyllia smithii</i>	<i>Swiftia pallida</i>
<i>Heterosiphonia plumosa</i>	<i>Swiftia pallida</i>	<i>Leptometra celtica</i>
<i>Phycodrys rubens</i>	<i>Securiflustra securifrons</i>	
<i>Necora puber</i>	<i>Antedon bifida</i>	
<i>Obelia geniculata</i>	<i>Leptometra celtica</i>	
<i>Membranipora membranacea</i>		
<i>Ctenolabrus rupestris</i>		
<i>Pollachius virens</i>		

It should be noted that although the sandy ledges in habitat 3 correspond exactly to the description of where fan shells were originally sighted before these surveys (see 1.2), none were seen during dives 4, 6 and 8 during this expedition.

3.1.2 West Oberon Bank



Figure 7 West Oberon Bank characterised by a rock and boulder reef descending from 16.3m bcd to a coarse mixed sediment plane at 29.3m bcd (dives 10-12). Sketch (Calum Duncan) Photos (T-B): *Parazoanthus anguicomus* (Howard Wood); *Cliona celata* with *Securiflustra securifrons* (HW); dragonet (*Callionymus lyra*) (George Brown).

Habitat 1 (16.3-22.3m bcd)	Habitat 2 (19.2-28.5m bcd)	Habitat 3 (25.2-29.3m+)
Bedrock ridges in strata running approximately North-South on top of Oberon Bank with <i>Laminaria hyperborea</i> and red algae. There were many fish, predominantly poor cod (<i>Trisopterus minutus</i>) and cuckoo wrasse (<i>Labrus mixtus</i>). Below the algal zone, animal turf on the bedrock was dominated by barnacles, <i>Nemertesia antennina</i> , <i>Caryophyllia smithii</i> and some <i>Leptometra celtica</i> .	Small to large boulders with feather stars (including <i>Leptometra celtica</i>) and <i>Nemertesia</i> spp.	Small boulders, cobbles and pebbles in mixed sediment of sand, shell and muddy gravels on fairly level seabed. Diversity of faunal assemblage was considerable on the seabed. Cobbles were encrusted with barnacles, hydroids, bryozoans (<i>Alcyonidium</i>) and sponges (<i>Ciocalypa penicillus</i> and <i>Axinella infundibuliformes</i>). The sedentary annelids <i>Lanice conchilega</i> and <i>Myxicola</i> ; king and queen scallops and the dragonet (<i>Callionymus lyra</i>) were seen on the sediment patches.
Other species on dive (recorded as abundant, common or frequent).		
<i>Laminaria hyperborea</i>	<i>Nemertesia antennina</i>	<i>Nemertesia antennina</i>
<i>Heterosiphonia plumosa</i>	<i>Kirchenpaueria</i> sp	<i>Caryophyllia smithii</i>
<i>Phycodrys rubens</i>	<i>Epizoanthus couchii</i>	<i>Parazoanthus anguicomus</i>
<i>Cliona celata</i>	<i>Caryophyllia smithii</i>	<i>Epizoanthus couchii</i>
<i>Nemertesia antennina</i>	<i>Chaetopterus variopedatus</i>	<i>Pomatoceros triqueter</i>
<i>Obelia dichotoma</i>	Barnacles indet.	<i>Lanice conchilega</i>
<i>Epizoanthus couchii</i>	Bryozoa indet.	Barnacles
<i>Caryophyllia smithii</i>	<i>Securiflustra securifrons</i>	<i>Alcyonidium gelatinosum</i>
Barnacles	<i>Leptometra celtica</i>	<i>Aquepecten opercularis</i>
<i>Gibbula cineraria</i>	<i>Antedon bifida</i>	<i>Pecten maximus</i>
<i>Membranipora membranacea</i>	<i>Antedon petasus</i>	<i>Luideia sarsi</i>
<i>Leptometra celtica</i>		<i>Antedon petasus</i>
<i>Antedon bifida</i>		<i>Leptometra celtica</i>
<i>Trisopterus minutus</i>		<i>Trisopterus minutus</i>

3.1.3 South Oberon Bank

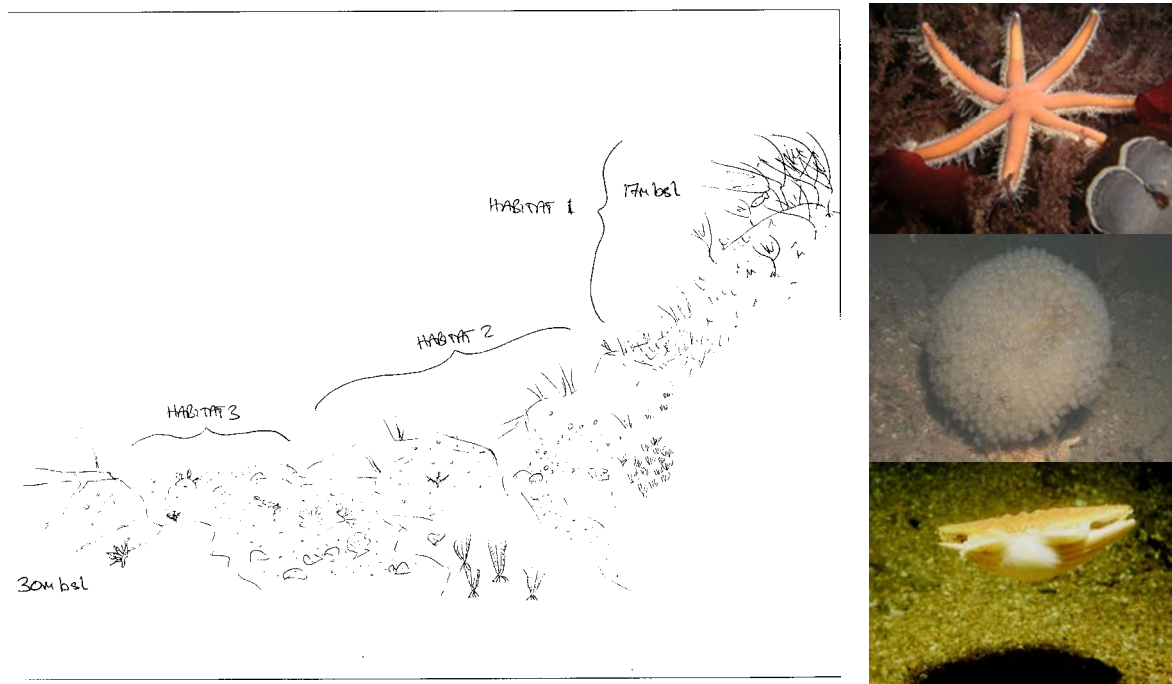


Figure 8 South Oberon Bank (dives 5, 7, 9) (sketch: Sue Scott). Photos (T-B): *Luidea ciliaris* (George Brown); *Diazona violacea* (GB); *Pecten maximus* (Chris Wood).

Habitat 1 (15.7-20.6m bcd)	Habitat 2 (20.6-28.5m bcd)	Habitat 3 (28.5m bcd)
Bedrock reef with horizontal and vertical faces and <i>Caryophyllia smithii</i> and barnacles on verticals. <i>Laminaria hyperborea</i> park to ~17.5m bcd with abundant red algae (including <i>Heterosiphonia plumosa</i> and <i>Delesseria sanguinea</i>) from ~20.5m bcd.	Mostly upward-facing bedrock with lots of typical life – barnacles, <i>Caryophyllia smithii</i> , <i>Nemertesia</i> , sponges, <i>Swiftia pallida</i> , <i>Diazona violacea</i> , <i>Securiflustra securifrons</i> , many <i>Leptometra</i> , some dense areas of <i>Antedon</i> and one colony of <i>Alcyonidium glomeratum</i> .	Boulders, cobbles and pebbles in coarse muddy shell gravel with hydroids and sponges. Former covered in barnacles and <i>Parazoanthus anguicomus</i> , with <i>Epizoanthus couchii</i> , <i>Swiftia</i> , <i>Leptometra</i> and <i>Caryophyllia</i> . <i>Lanice conchilega</i> in shell gravel.
Other species on dive (recorded as abundant, common or frequent)		
<i>Laminaria hyperborea</i>	<i>Nemertesia antennina</i>	Hydroids indet.
<i>Heterosiphonia plumosa</i>	<i>Caryophyllia smithii</i>	<i>Nemertesia antennina</i>
Encrusting pink algae	Barnacles indet.	<i>Abietinaria abietina</i>
<i>Calliblepharis ciliata</i>	<i>Securiflustra securifrons</i>	<i>Caryophyllia smithii</i>
<i>Obelia geniculata</i>	<i>Antedon bifida</i>	<i>Parazoanthus anguicomus</i>
<i>Caryophyllia smithii</i>		<i>Swiftia pallida</i>
Barnacles indet.		Barnacles indet.
<i>Membranipera membranacea</i>		<i>Pecten maximus</i>
<i>Porania pulvillus</i>		<i>Porella compressa</i>
<i>Luidia ciliaris</i>		<i>Alcyonidium diaphanum</i>
<i>Echinus esculentus</i>		Bryozoan crusts indet.
<i>Labrus mixtus</i>		<i>Luidea ciliaris</i>
<i>Ctenolabrus rupestris</i>		<i>Marthasterias glacialis</i>
<i>Gadus morhua</i>		<i>Botryllus schlosseri</i>
		<i>Asciidiella aspersa</i>
		<i>Molgula</i> sp.
		<i>Diazona violacea</i>
		<i>Labrus mixtus</i>
		<i>Ctenolabrus rupestris</i>
		<i>Gadus morhua</i>

3.1.4 North Oberon Bank

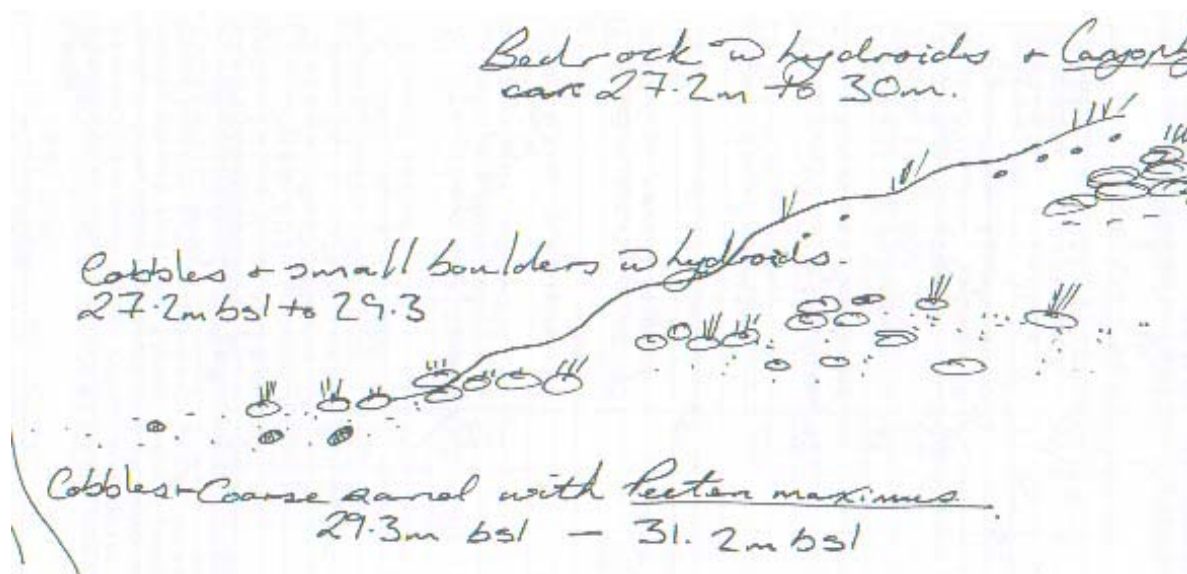


Figure 9 North Oberon Bank with boulder/rocky reef descending to coarse sediment at 27.6m bcd (sketch: Frank Fortune). Photos (L to R): *Porania pulvillus* (CW) *Leptometra celtica* (GB); *Lanice conchilega* (CW)

Habitat 1 (27.2-30m bcd)	Habitat 2 (25.7-27.7m bcd)	Habitat 3 (27.6-29.6m bcd)
100% Bedrock with <i>Caryophyllia smithii</i> . Bedrock lies at approximately 30° to the horizontal.	Cobbles and small boulders and some gravel with associated hydroids, <i>Caryophyllia smithii</i> and sponges.	Coarse sand on flat substrate with cobbles and <i>Pecten maximus</i> .
Other species on dive (recorded as abundant, common or frequent)		
<i>Suberites carnosus</i>	<i>Abietinaria abietina</i>	<i>Chaetopterus</i> sp.
<i>Caryophyllia smithii</i>	<i>Kirchenpaueria pinnata</i>	<i>Lanice conchilega</i>
Encrusting bryozoa	<i>Parazoanthus anguicomus</i>	<i>Pecten maximus</i>
<i>Securiflustra securifrons</i>	<i>Caryophyllia smithii</i>	<i>Antedon bifida</i>
<i>Alcyonidium diaphanum</i>	<i>Munida rugosa</i>	<i>Antedon petasus</i>
<i>Porania pulvillus</i>	Bryozoa	<i>Echinus esculentus</i>
<i>Echinus esculentus</i>	<i>Securiflustra foliosus</i>	
<i>Antedon bifida</i>	<i>Porania pulvillus</i>	
<i>Leptometra celtica</i>	<i>Antedon bifida</i>	
	<i>Antedon petasus</i>	
	<i>Echinus esculentus</i>	

3.2 Sound of Arisaig Dives

3.2.1 Rubh A' Chairn Mhoir

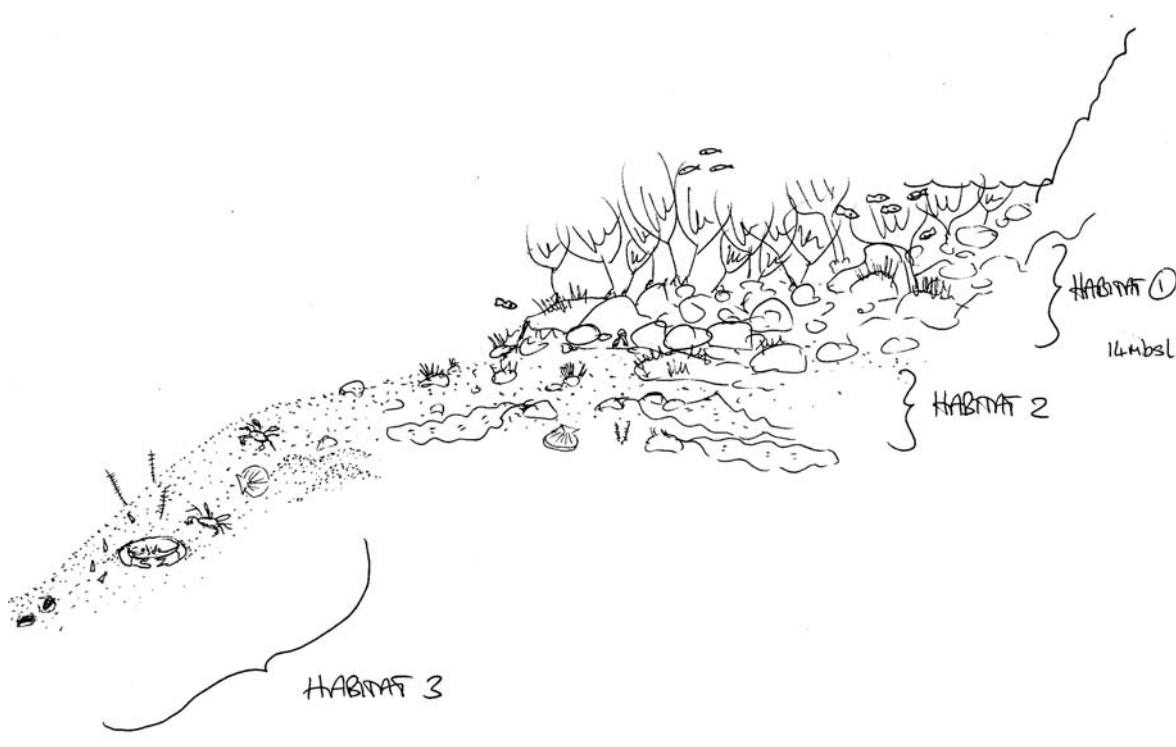


Figure 9 Rubh A' Chairn Mhoir within the Sound of Arisaig (dives 1-3) (sketch: Sue Scott).

Habitat 1 (1-12m bcd)	Habitat 2 (11.6-13.6m bcd)	Habitat 3 (13.6-25.2m bcdm)
Mixed species kelp forest on boulders (mobile and scoured) with bedrock outcrops. Boulders with encrusting coralline, red and brown algae, barnacles and <i>Pomatoceros</i> sp. Squat lobsters were seen in holes in the boulders. The bedrock had a barish appearance but there were few urchins seen. Foliose algae increased with depth.	Sand and shell gravel with embedded boulders and cobbles. Animals included <i>Pecten maximus</i> and numerous swimming crabs. Algae included <i>Ahnfeltia plicata</i> and <i>Scinaia</i> .	Steep slope of sand with shell gravel material and increasing amounts of mud with depth. Many swimming crabs, <i>Turritella</i> sp. and scattered <i>Virgularia</i> sp. Soft mud at 25.2m bcd extensively burrowed by <i>Goneplax rhomboides</i> .
Other species recorded as abundant, common or frequent on dive		
<i>Laminaria hyperborea</i>	<i>Callophyllis laciniata</i>	<i>Lanice conchilega</i>
<i>Laminaria saccharhina</i>	<i>Pomacoteros triqueter</i>	<i>Pagurus bernhardus</i>
<i>Saccorhiza polyschides</i>	<i>Liocarcinus depurator</i>	<i>Liocarcinus depurator</i>
<i>Heterosiphonia plumosa</i>		<i>Turritella communis</i>
Mixed foliose red algae		<i>Pecten Maximus</i>
<i>Obelia dichotoma</i>		<i>Pomatoschistus minutus</i>
<i>Pomatoceros triqueter</i>		
Barnacles indet.		
<i>Galathea strigosa</i>		
<i>Liocarcinus depurator</i>		
<i>Gibbula cineraria</i>		
<i>Helcion pellucidum</i>		
<i>Membranipora membrinacea</i>		
<i>Pollachius virens</i>		
<i>Crenilabrus melops</i>		
<i>Centrolabrus exoletus</i>		

3.2.2 Ardnish Cliff, South Loch nan Uamh

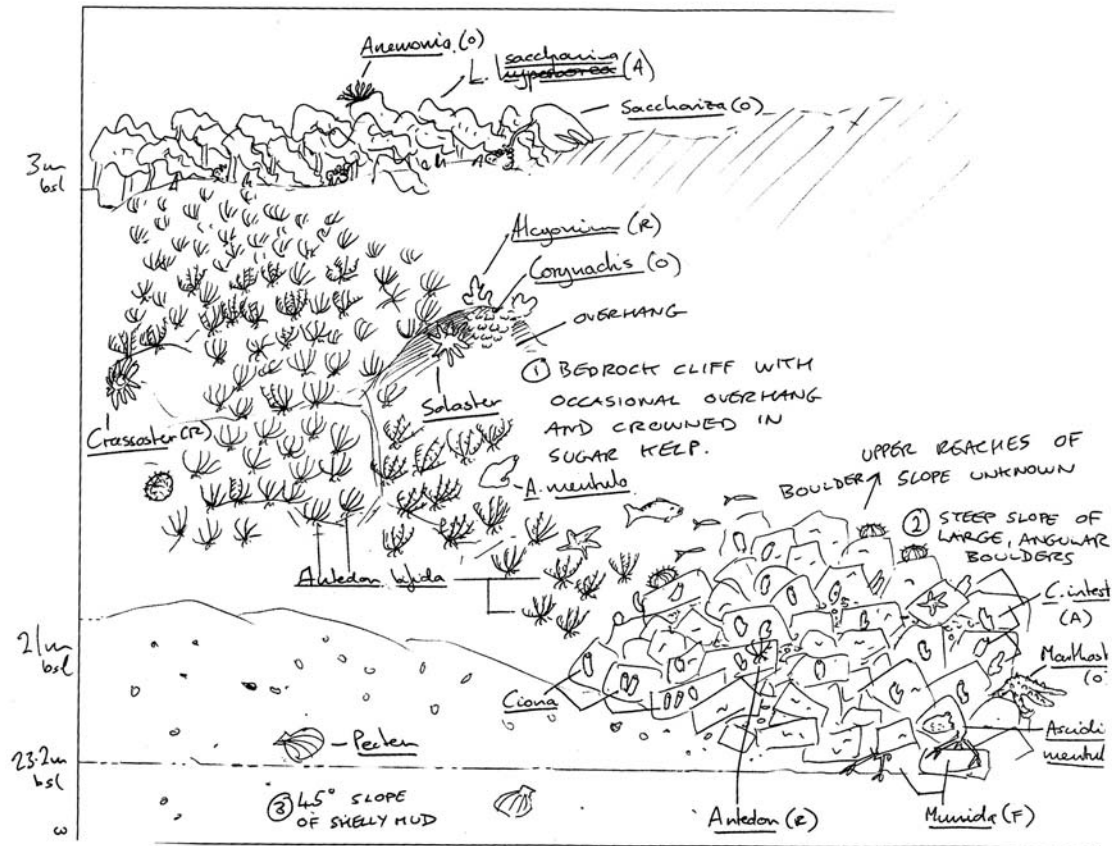


Figure 10 Ardnish Cliff and boulder slope from 19.6m bcd to surface, Sound of Arisaig (dives 13-14) (Sketch: Calum Duncan).

Habitat 1 (1.8-19.6m bcd)	Habitat 2 (?-22.1m bcd)	Habitat 3 20.8m+ bcd)
Bedrock cliff with occasional overhangs and abundant <i>Antedon</i> sp, occasional <i>Sagartia elegans</i> and <i>Urticina felina</i> . Occasional <i>Corynactis viridis</i> on underhangs. Mixed kelp forest on top of cliff at end of survey at 1.8m bcd.	Steep slope of large very angular boulders with <i>Caryophyllia smithii</i> , encrusting pink algae, <i>Pomatoceros triqueter</i> , <i>Munida rugosa</i> and numerous <i>Ciona intestinalis</i> , fish and echinoderms. Since the dive was at an angle up the cliff, it was not known how shallow the boulder slope extended.	Shell gravel and mud with occasional burrowing anemones (<i>Cerianthus lloydii</i>) and <i>Pecten maximus</i> .
Other species on dive (recorded as abundant, common or frequent)		
<i>Laminaria saccharina</i>	Encrusting coralline algae	<i>Pecten maximus</i>
Encrusting coralline algae	Mixed foliose red algae	
Mixed foliose red algae	Barnacles	
<i>Obelia geniculata</i>	<i>Munida rugosa</i>	
<i>Caryophyllia smithii</i>	<i>Echinus esculentus</i>	
Barnacles indet.	<i>Ciona intestinalis</i>	
<i>Antedon bifida</i>	<i>Trisopterus minutus</i>	
	<i>Ctenolabrus rupestris</i>	
	<i>Labrus mixtus</i>	

3.2.3 South Priest Rock

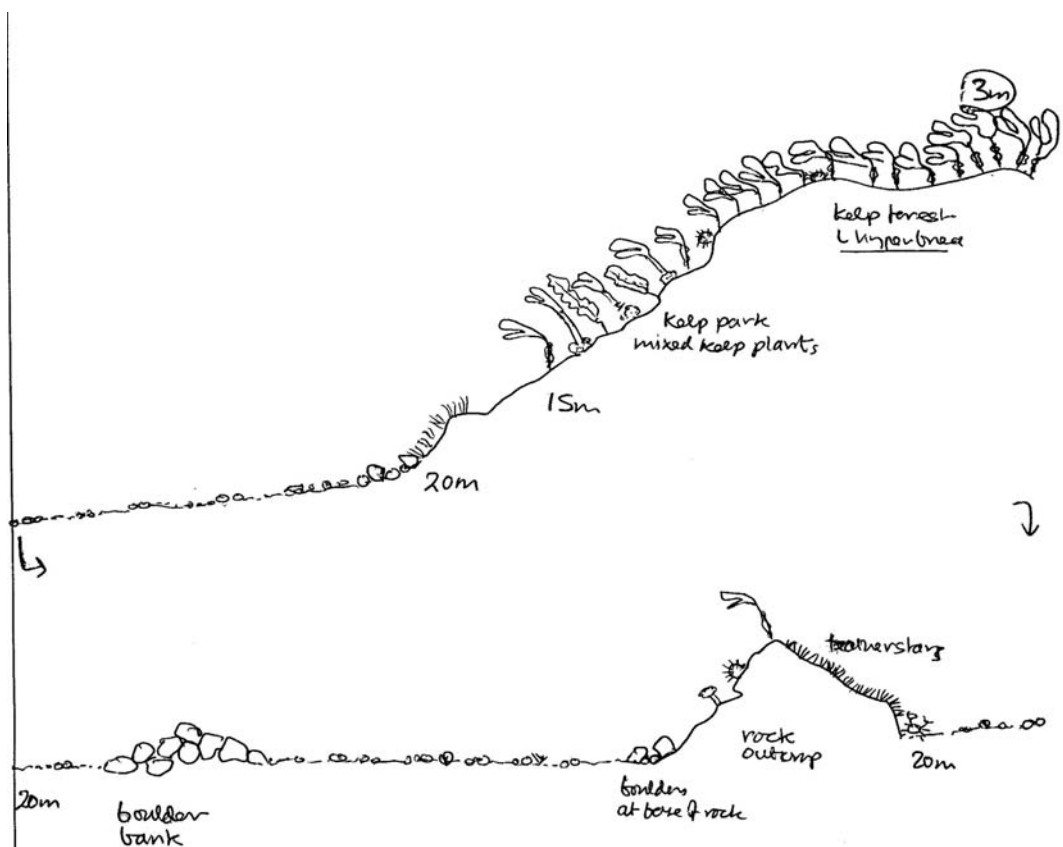


Figure 11 Cross section of Priest Rock, Mouth of Loch Ailort (dives 16-17) (sketch: Chris Wood)

Habitat 1 (0-11.5m bcd)	Habitat 2 (11.4-16.4m bcd)	Habitat 3 (16.4m bcd)
Bedrock with <i>Laminaria hyperborea</i> forest in shallow part of dive, mixed kelp park deeper down, hydroids and bryozoans on the kelp and bedrock encrusted by coralline algae.	Bedrock outcrops, some with kelp above, others not reaching shallower than 11.4m bcd. Relatively smooth and rounded surfaces, many covered with featherstars. Small boulders at base of rock and some boulder beds.	Flat seabed of cobbles, pebbles, gravel and shell pieces with hydroids and scallops.
Other species recorded as abundant, common or frequent on dive		
<i>Laminaria hyperborea</i>	<i>Caryophyllia smithii</i>	<i>Lanice conchilega</i>
<i>Laminaria saccharina</i>	Barnacles indet.	<i>Pomatoceros triqueter</i>
<i>Saccorhiza polyschides</i>	<i>Munida rugosa</i>	Barnacles indet.
Encrusting coralline algae	<i>Antedon bifida</i>	<i>Antedon bifida</i>
Mixed foliose red algae		<i>Luidia ciliaris</i>
<i>Obelia</i>		<i>Asterias rubens</i>
<i>Kirchenpaueria pinnata</i>		<i>Ophiura albida</i>
<i>Caryophyllia smithii</i>		
Barnacles indet.		
<i>Gibbula</i> sp.		
<i>Helcion pellucidum</i>		
<i>Mytilus edulis</i>		
<i>Membranipora membranacea</i>		
<i>Electra pilosa</i>		
<i>Asterias rubens</i>		
<i>Echinus esculentus</i>		
<i>Electra pilosa</i>		
Small gadoids		

4 DISCUSSION

Of 17 dives conducted during the expedition, 10 were on Oberon Bank itself and, when bad weather precluded diving offshore, seven in the shelter of the Sound of Arisaig. Most of the survey team were experienced Seasearch divers completing 14 Surveyor forms between them, with nine from Oberon Bank. The Surveyor form divides the sites into different habitats, allowing more detailed species lists and habitat descriptions.

Since kelp species were identified to species level on all Seasearch Surveyor forms, tertiary infralittoral biotope codes (e.g. EIR.Lhyp.pk) could be assigned according to Connor (1997): see APPENDIX 3. Tertiary, secondary and primary codes were assigned for circalittoral biotopes where possible (e.g. MCR.ErSSwi). Details from the Seasearch Observer forms were not in themselves sufficient for biotope ascription.

4.1 Oberon Bank

4.1.1 Rocky infralittoral biotopes

The shallowest part of Oberon Bank, rising to a minimum of 15.7m bcd (see APPENDIX 2), comprised a series of rounded bedrock ridges crowned by *Laminaria hyperborea* park with foliose red and brown seaweeds (EIR.LhypR.pk), thickening to forest density (EIR.LhypR.ft) in some places (dives 4, 7 and 10). Although the common urchin *Echinus esculentus* was recorded on 8 of 10 Oberon Bank dives, it was 'Rare' at 3 and only 'Occasional' at another 3. Grazing was therefore minimal and surfaces beneath the kelp correspondingly rich in foliose and filamentous red algae (including *Delesseria sanguinea*, *Phycodrys rubens* and *Heterosiphonia plumosa*), brown algae (*Dictyota dichotoma*), encrusting coralline algae, hydroids, bryozoa and featherstars. Beneath the kelp park zone, *Dictyota dichotoma* densities were not great enough to merit classification as the EIR.FoR.Dic biotope.

4.1.2 Rocky circalittoral biotopes

Through and beneath the infralittoral zone, Oberon Bank descended to the north, west and south in a series of bedrock ledges, interspersed with boulders and cobbles. Mixed animal turf (MCR.XFa) comprised, hydroids (including *Nemertesia* and *Kirchenpaueria* species), bryozoa (such as *Securiflustra securifrons* and *Alcyonidium* species) and featherstars (*Antedon bifida*, *Antedon petasus* and *Leptometra celtica*), increased in density as foliose algae diminished.

Bedrock ledges descended to a mixed ground of coarse shell sand, pebbles, cobbles and small boulders. Barnacles, the colonial white anemone *Parazoanthus anguicomus* and, particularly on the verticals, Devonshire cup corals (*Caryophyllia smithii*) all increased in abundance with depth, particularly to the south and west. Here they were associated with deeper circalittoral boulders, cobbles and pebbles among mixed sediments. The colonial anemone *Epizoanthus couchii* was 'Frequent' on boulders, cobbles and pebbles to the west of the bank, with *Swiftia pallida* and the bryozoans *Porella compressa* and *Alcyonidium diaphanum* 'Frequent' or 'Common' to the south. With increasing depth the football seasquirt *Diazona violacea* was also found, albeit 'Occasional' or 'Rare', on rock and boulders surfaces to the north, west and south. It is also worth noting that poor cod (*Trisopterus minutus*) were recorded as 'Common' or 'Abundant' at deeper habitats on dives to the south and west of Oberon Bank.



Epizoanthus couchii to the west of Oberon Bank (photo: George Brown)

Oberon Bank descended to the east in a series of steep, smooth rounded bedrock faces of varied filter-feeding animal turf cover (MCR.XFa): some patches were characterised by the branched bryozoans *Porella compressa* and *Omalosecosa ramulosa*; others by featherstars with the mobile sea-cucumber *Holothuria forskali*, whilst the Devonshire Cup Coral (*Caryophyllia smithii*) was ubiquitous throughout, increasing in abundance with depth. Similarly, the northern sea fan *Swiftia pallida*, the erect cupped sponge *Axinella infundibuliformes* (and perhaps *Phakellia ventilabrum*: see 4.3), the crinoid *Leptometra celtica* and the 'Occasional' *Diazona violacea* increased in abundance with depth. Although patchy, the prevalence of erect sponges, *C. smithii* and *S. pallida* characterised the deeper bedrock faces as a more exposed, more tideswept example of the MCR.ErSSwi biotope.



MCR.ErSSwi:
erect sponges
and *Swiftia*
pallida on
slightly silted
bedrock (photo:
Howard Wood)

Although ledges of coarse circalittoral sand and small boulders were found at ~30m bcd in accordance with the description in 1.2, during the course of the present expedition no fan shells were found here (see 3.1.1 and 4.1.4).

4.1.3 Circalittoral sediment biotopes

Suitable secondary circalittoral biotopes could neither be assigned to the sedimentary habitats to the north, south and west, nor the coarse sands on the ledges to the east, instead the generic CMX (Circalittoral Mixed Sediments) for the former and CGS (Circalittoral Gravels and Sands) for the latter were used.

A mixed ground of coarse sand, pebbles, cobbles and small boulders gradually descended to the south, west and north of the central shallow rocky ridge of the Oberon Bank. As discussed in 4.1.2, a mixed faunal turf of hydroids, featherstars, colonial anemones and colonial seasquirts was associated with the cobbles, whilst the coarse sand was characterised by scallops (*Pecten maximus* and, to the west, *Aquepecten opercularis*), dragonets (*Callionymus lyra*), the terebellid sandmason worm *Lanice conchilega* and, occasionally to the west, the parchment worm *Chaetopterus variopedatus* and the burrowing



Lone
Pennatula
phosphorea
on west
Oberon
Bank (photo:
George
Brown)

sabellid *Myxicola*. In general, species richness was high on the circalittoral mixed grounds to the south and west, perhaps owing to the patchiness of these deeper mixed substrata. In particular, the diversity of faunal assemblage in the mixed sediments to the west, where there was even a sighting of a lone *Pennatula phosphorea*, was deemed 'considerable' (see 3.1.2).

4.1.4 Fan Shells

Unfortunately, despite finding the sandy ledges on the east face of Oberon Bank above the drop-off (see 3.1.1 and 4.1.2), from where a reliable anecdotal account of a small fan shell population was returned (see 1.2), neither live nor dead fan shells were recorded here during the expedition. Following *in situ* observation of the ledges, it was thought that other regions

of Oberon Bank might be more suitable fan shell habitat. However, despite the gentle mixed circalittoral sediment habitats found to the north and west that might be considered suitable fan shell substrate, none were found.

Nonetheless, given that 18.3m bcd was the average shallowest depth recorded on the Oberon Bank during the Seasearch expedition and 28.2m bcd the average depth of the sedimentary habitat likely to harbour fan shells, no-decompression time, effectively fan shell searching time, was limited to 8-10 minutes per dive. Consequently, the logistical difficulties of searching for a small population of maybe only 2 or 3 fan shells at considerable depth using open-circuit SCUBA gear are apparent.

4.2 Sound of Arisaig

4.2.1 Infralittoral rocky biotopes

The mixed *Laminaria hyperborea* and *Laminaria saccharina* forests (SIR.LhypLsac.ft) and parks (SIR.LhypLsac.pk) typical of Scottish sea lochs were found at all sites in the Sound of Arisaig, occurring on bedrock at Ardnish Cliff and Priest Rock and a gentle slope of large boulders at Rubh A' Chairn Mhoir. Sheltered conditions at the top of Ardnish Cliff also supported an area of *Laminaria saccharina* forest (SIR.Lsac.Ft) with the solitary anemone *Anemonia viridis* on some blades. The opportunistic kelp *Sacchoriza polyschides* was also found at all Sound of Arisaig sites. Foliose red algae were particularly abundant in the kelp understorey and deeper down at Rubh A' Chairn Mhoir, due to the lack of urchin grazing. Common urchins (*E. esculentus*) were more common at Priest Rock where foliose algal abundance was lower.

4.2.2 Circalittoral rocky biotopes

At Ardnish Cliff, the circalittoral bedrock face was dominated by the featherstar *Antedon bifida*, with rarer *A. petasus* and some solitary ascidians (SCR.Ant.AsH). Where rockslides had occurred, the animal fauna on the boulders were dominated by the solitary ascidians *Ascidia mentula*, *Ciona intestinalis* and *Corella parallelograma* (SCR.AmenCio). Circalittoral bedrock outcrops in the vicinity of Priest Rock were also abundant in featherstars although there were no solitary ascidians at this more exposed heavily-grazed site.



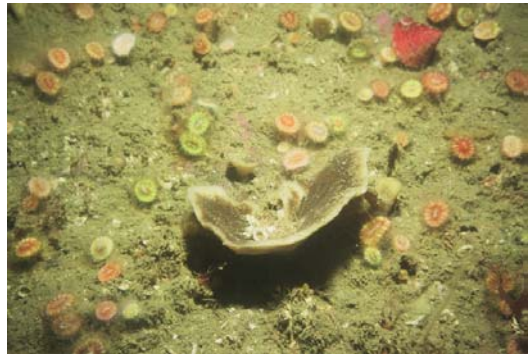
The anemone *Protanthea simplex* at Ardnish (photo: George Brown)

4.2.3 Circalittoral sediments

At the base of Ardnish cliff *Cerianthus lloydii* anemones were recorded in muddy shell gravel (IMX.An, although strictly not in the infralittoral). Below Priest Rock a poorly sorted mixture of cobbles, pebbles, gravels and sands could not be assigned a secondary biotope (CGS). In contrast, at Rubh A' Chairn Mhoir the circalittoral sediments were much more diverse, descending from a mixed ground of sand, shell gravel, cobbles and boulders with *Pecten maximus*, 'Frequent' swimming crabs, hermit crabs, sand gobies and even a gurnard species. Abundance of the sea pen *Virgularia mirabilis*, associated with some *Ophiura albida* (CMS.VirOph), increased with depth, as did the number of *Cancer pagarus* hollows and, in the true circalittoral muds, the burrows of the mud-runner crab *Goneplax rhomboides* (CMU.SpMeg).

4.3 Interesting and rare species

Phakellia ventilabrum: this nationally scarce erect cup-like sponge (Sanderson, 1996) was recorded on Dives 7 and 15 to the south and north of Oberon Bank. However, it is difficult to distinguish *Phakellia ventilabrum* from *Axinella infundibuliformes* in the field and so the sighting of the former should be viewed with caution. Indeed, both species may have been present on the east of Oberon Bank although only the latter was recorded here (photo: Chris Wood).



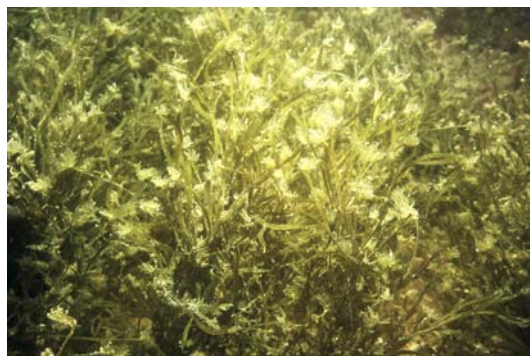
Haliclona viscosa: this unusual sponge was photographed at ~28m depth on Dive 4 to the east of Oberon Bank (photo: Chris Wood).



Parazoanthus anguicomus: although listed as nationally scarce (Sanderson, 1996), this white colonial anemone was routinely recorded on dives 7, 9, 10-12 and 15 to the north, south and west of Oberon Bank, suggesting that the species is widespread. Since much of the MNCR database and subsequent biotope classification is based on records from more sheltered areas, particularly sea lochs in Scotland, the listing of *P. anguicomus* as 'scarce', as for any other species associated with more exposed offshore sites, may simply be an artefact of geographical survey coverage (photo: Howard Wood)



Carpomitra costata: this brown algae is listed as nationally scarce (Sanderson, 1996) and was recorded again only on Dive 4 (photo: Chris Wood).



Toxisarcon alba: this giant naked foraminiferan has only recently been recognised and described (Wilding, 2002). In the only form observed in the field, it resembles a small white fungus-like branched mass up to 5cm across surrounded with an outer organised network of sand grains. More typical of undisturbed sediments in deep waters, these fragile organisms can also survive in the relatively shallow water of sheltered sea lochs, although to date they have only been found in Lochs Linnhe, Duich and Torridon and the Crowlin Islands (Wilding, 2002). The record from Dive 3 at Rubh A' Charin Mhoir in the Sound of Arisaig is thus only the fifth from the Scottish west coast.

5 CONCLUSIONS

Although *Atrina fragilis* was not re-located on this expedition, these Seasearch surveys provide the first species and habitat data for the Oberon Bank. In addition, further marine data, including the first recorded sighting of the giant naked foraminiferan *Toxissarcon alba* for the area, were collected for the Sound of Arisaig marine Special Area of Conservation. In future, the task of gathering *Atrina fragilis* sightings *in situ* from the west and north of Scotland would benefit greatly from the education and engagement of the local recreational diving and, particularly, commercial scallop-diving communities. MCS (with support from SNH) has produced a fanshell information and recording leaflet that will be distributed to Scottish dive clubs and marine users in 2004 in order to stimulate more recordings of these rare molluscs (see APPENDIX 5).

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7 ACKNOWLEDGEMENTS

The preparatory work of the survey organiser Calum Duncan with Chris Wood ensured that the Seasearch survey ran smoothly. We would like to thank John Payne and George Brown for the use of their boats – particularly the former for providing the use of his RIB at such short notice. Many thanks to all the other divers for contributing to a successful expedition at a challenging dive site, Liz Rennie for filling in the species list (APPENDIX 2) and Christine Howson for the report template. Scottish Natural Heritage supported this work.

APPENDIX 1

SEASEARCH SURVEY FORMS

- **(example of) Observer form**
- **(example of) Surveyor form**



 www.seasearch.org.uk

Seasearch Observation Form

This form asks for two types of information from your dive - what the seabed was like and what marine life you saw. Please read the guidance notes before completing the form. By completing this form you will be adding to our knowledge of the near-shore marine environment - helping it to remain fit for life!

Please complete the following sections in a black pen and BLOCK CAPITALS

Name DON MACNEISH

Address SHIPLEED
LANLASH
AREBAN Postcode KA27 8WB

Tel: Home 01770 600538 Mobile -

Email -

Buddy's Name HOWARD WOOD

Please send this form to:
 Seasearch
 Marine Conservation Society
 9 Gloucester Road
 Ross-on-Wye
 Herefordshire
 HR9 5BU

Record No. Validated by date
 Verified by date

For Seasearch use only Validated by date
 Record No. Verified by date

Please tick here if you do NOT want to be sent newsletters or details of other marine surveys.

Thank you for completing this form
 All that's left for you to do is to either hand it to the Dive Organiser or fold it into thirds along the dotted lines, tuck one part into the other, add a stamp and send it off. Your name and address will be included on the Seasearch database and those of partner organisations. You will also receive Seasearch newsletters and information about other marine surveys and projects.

Please tick here if you do NOT want to be sent newsletters or details of other marine surveys.

Site Name RUSH A CHWEN KWOR Date of Dive 15/8/03

~~GENERAL BAY~~ Start of dive 12:10 (hour)

General Location CUTR LOCK ALBERT Dive duration 45 (min)

(inc county) OUND OF ARLSALG UNW visibility - m

Sea Temperature - °C

Position of centre of site or OS Grid Reference

50° 10' 23" N 5° 18' 52" W or E


Position derived from (circle) GPS Admiralty Chart OS Map Other

Drift diver? yes no

Night dive? yes no

Did you take any photographs? yes no or video footage? yes no

SOI-3/03 HOWARD

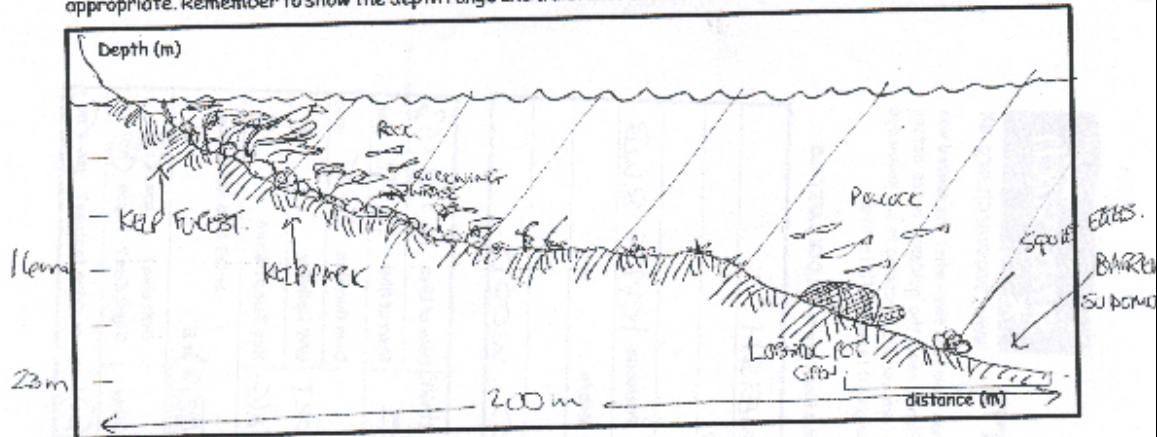


 www.seasearch.org.uk

Seasearch is a joint project co-ordinated by the Marine Conservation Society and supported by: The Heritage Lottery Fund, The Wildlife Trusts, English Nature, Cadw/Cymdeithas Cymru/Wales, Scottish Natural Heritage, John Nature Conservation Committee, Environment Agency, Marine Biological Association (MURLIN), British Sub-Aqua Club, Professional Association of Diving Instructors and Project Aware, Scottish Sub-Aqua Club, Sub-Aqua Association and the Nautical Archaeology Society.

Description of the seabed

Please draw an approximate profile of the seabed (i.e. a side-on view), labeling features and dominant forms as appropriate. Remember to show the depth range and a distance scale.



Types of seabed present: (please tick all that you saw and circle the dominant one)

- Rocky Reef
- Boulders
- Cobbles and Pebbles
- Mixed Ground
- Sand and Gravel
- Mud
- Wreckage
- Other

Did you notice anything unusual or noteworthy about the seabed or the marine life?

Was there any litter or were there any man-made objects apparent?

[Empty box for notes]

ABANDONED LOBSTER POT
END OPENED

What marine life did you see on your dive?

Seabed cover types (tick all those present)

- Kelp forest
- Kelp park
- Mixed seaweeds
- Encrusting pink algae
- Barren sediment (no life or structures apparent)
- Animal turf on rocks - Short
- Animal turf on rocks - Tall
- Animal Beds (e.g. mussels, brittlestars, scallops - state which) MUSSELS / SCALLOPS
- Sediment with life apparent (tubes, burrows etc)

Species you saw

Show abundance of each species as Rare, Occasional, Common, or if you're unsure, Present.

Species	R, O, C or P
KEEL	C
URCHINS (COMMON)	P
VIRGULARIA MARIBILLIS	C
EDIBLE CRAB	P
SWIMMING CRAB	P
KEEL SQUID	C
TOP SHELL (GREY)	C
SPINY STAR	P
HORNED CRAB IN DARK SHELL	P
SCALLOPS	P
RARE FISH	P
QUEEN F-SCALLOPS	P
SQUAT LOBSTERS (LONG-CLAW)	P
SEA STAR	P
* SEA SQUIDS *	P *
SPINY CRAB	P
* MUSSELS / K LIMPIDS *	P *
KEEL WORM	P
DORVILLE	P
SAND MASON	#
* CUTLEFISH OR SPINY EGGS	O *



SEASEARCH SURVEY FORM



- If anything is unclear please refer to the **Guidance Notes**
- Each pair of divers should complete a form between them.
- Please complete all parts of the form. Where there is a * only fill in the information if you know it.

Validated by	Date	Verified by	Date
--------------	------	-------------	------

Your details

Name	SUB-SCOTT	Tel No:	01520 722588	hm/wk
Address	STROKE HOUSE	Email:	csstrone@aol.com	
	NORTH STROKE, LOLHCAPRON	Buddy's Name	GEORGE BROWN	
	ROSS-SHIRE IRISH	Name of group or survey	SEASEARCH	
Postcode	IV54 8YS		OBERON & ARISAIG '03	

Dive details

Site name				N. OF GLENNIG		Date of dive:		15 dd / 08 mm / 03 yy	
General location				ARISAIG		Start of dive:		12 : 23 (24hr)	
						Dive duration:		66 (mins)	
						U/W visibility:		8-10 m	
						Sea temperature:		14 °C	
Position	Latitude	Longitude	W or E	Drift dive?	yes / no				
Centre of site	56° 50.257	5° 48.521	W	Night dive?	yes / no				
For drift dives				Did you take any of the following?					
From	°	'		photographs	20MM	yes / no	yes / no	yes / no	yes / no
To	°	'		video footage		yes / no	yes / no	yes / no	yes / no
Or OS Grid Reference				specimens		yes / no	yes / no	yes / no	yes / no
Position derived from: (circle)				seaweeds for pressing		yes / no	yes / no	yes / no	yes / no
GPS Admiralty chart OS map other				WSGB4	OSGB36				

Seabed summary

Tick which types of seabed were present	For the area surveyed, what was
rocky reef <input checked="" type="checkbox"/> boulders <input checked="" type="checkbox"/> cobbles/pebbles <input checked="" type="checkbox"/> mixed ground <input checked="" type="checkbox"/>	the deepest depth? (m) 27.5 bsl bod
sand/gravel <input checked="" type="checkbox"/> mud <input checked="" type="checkbox"/> wreckage <input type="checkbox"/> other	the shallowest depth? (m) 5 bsl bod
Circle the dominant one	Tidal correction to chart datum m*

Summarise: a. the main features of the seabed, b. any unusual features or species, c. any human activities or impacts at the site.

a. From rocky shore the seabed was a gentle slope of boulders + bedrock outcrops, leading onto sand + shell gravel with cobbles + boulders at 12-14m bel. further out a steeper slope of sand with increasing amounts of mud to 27.5m
 b. Cephalopod eggs in sand; stalked jellyfish.
 c. None seen or done; least collecting creeds offshore.

Habitat descriptions

Complete a box below for each **habitat** you found on your dive. Each written description should tally with the information entered in the columns below and with your diagrams on the next page. If you found more than 3 habitats, continue your descriptions on another Form. Tick boxes where shown, or give percentages (make sure they add up to 100%), or assign a score from 1-5 as appropriate. If you are uncertain about anything, leave the box blank.

1. DESCRIPTION
 Kelp forest (mixed species) on boulders (rotated + scoured) + bedrock outcrops. Boulders with mainly encrusting coralline, red + brown algae, barnacles + Porolithothamnion, with squat lobsters in holes. Brownish appearance, but very few visible sea. More foliose red algae with increasing depth. 0-11m bsl.

2. DESCRIPTION
 Sand + shell gravel surface with cobbles + boulders embedded. Range of typical animals including Pecten + various swimming crabs, + algal including Alveolata + Sargassum. 14-16m bsl.

3. DESCRIPTION
 Steepish slope of sand with shell gravel, + increasing amount of mud. Many swimming crabs, Tantulla, + scattered Virgulina. Many small burrows, + couple of Gorgopax burrows. 16-27.5m bsl.

1	2	3	
			m DEPTH LIMITS
3	14	186	Upper (from sea level) (i.e. minimum)
14	186	28	Lower (from sea level) (i.e. maximum)
			Upper (from chart datum) *
			Lower (from chart datum) ^

%			SUBSTRATUM
10			Bedrock type?
			Boulders - very large > 1.0 m
20	5		- large 0.5 - 1.0 m
40	5		- small 0.25 - 0.5 m
30	15		Cobbles (fist - head size)
	15	5	Pebbles (50p - fist size)
			Gravel - stone
	20	10	- shell fragments
	20	5	Sand - coarse
	10	20	- medium
	10	5	- fine
	✓	10	Mud
			Shells (empty - or as large pieces)
			Shells (living - eg mussels, limpets)
			Artificial - metal
			- concrete
			- wood
			Other (state)
100	100	100	Total

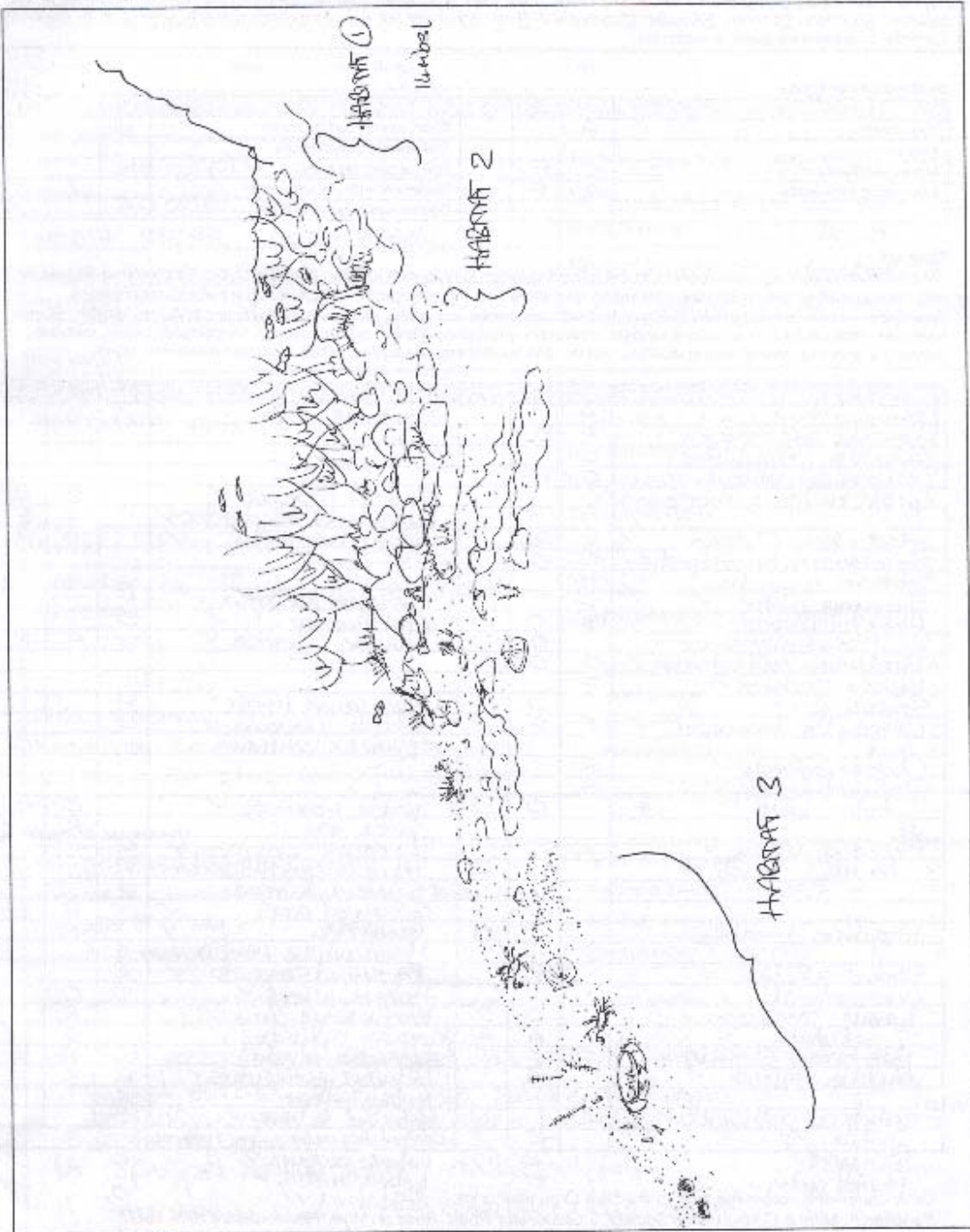
1	2	3	
			1-5 FEATURES - ROCK (all categories)
2			Relief of habitat (even - rugged)
2			Texture (smooth - pitted)
3	2		Stability (stable - mobile)
3	4		Scour (none - scoured)
2	2		Silt (none - silted)
			Fissures > 10 mm (none - many)
			Crevices < 10 mm (none - many)
1	3		Boulder/cobble/pebble shape (rounded - angular)
✓			Sediment on rock? (tick if present)

✓			FEATURES - SEDIMENT (1)
			Mounds / casts
		✓	Burrows / holes
	✓	✓	Waves (>10 cm high)
			Ripples (< 10 cm high)
			Subsurface coarse layer?
			Subsurface anoxic (black) layer?

1-5			FEATURES - SEDIMENT (2)
2	2		Firmness (firm - soft)
2	2		Stability (stable - mobile)
5	5		Sorting (well - poor)

Sketches and plans

Draw a **profile or plan** of the sea bed you encountered on your dive in the space below. Mark (& number) the different habitats, corresponding to the written descriptions on p.2. Indicate conspicuous and/or characteristic species. Make sure you include **depth(s)** (vertical axis) and a **distance** scale (horizontal axis) for a profile and scale and north point for a plan. Indicate your direction of travel (compass bearing) and/or the direction of any current.



Marine Life

Score the abundance of each group of animals and plants in each habitat alongside the name. In the blank spaces list the seaweeds & animals which you were able to identify positively from the different habitats. Use latin names if possible, but if you don't know them, common or descriptive names are acceptable. If you are not 100% sure about any, add a question mark. Do not enter names as guesses - it's better to exclude them than to include incorrect identifications. Give abundances in the columns: Abundant, Common, Frequent, Occasional & Rare. If you did not note abundances, simply enter a P for Present. Continue on a separate sheet, if necessary.

Seabed cover types

	1	2	3		1	2	3
Kelp forest	A			Short animal turf on rocks			
Kelp park				Tall animal turf on rocks			
Mixed seaweeds	C	F		Animal bed: (specify)			
Encrusting pink algae	C	F		Sediment with life apparent		✓	✓
				Barren sediment			

Species

Please arrange your species records in the following order to help with logging the result later. Ensure that all species you have identified are on this list - including any shown on the plan/profile or noted in the habitat descriptions. Seaweeds - brown, red and green, sponges, hydroids, anemones and corals, soft corals, seafans and seapens, jellyfish, worms, barnacles, shrimps & prawns, crabs & lobsters, molluscs - gastropods & bivalves, nudibranchs, cephalopods (squid, cuttlefish, octopus), bryozoans, starfish and brittlestars, urchins, sea cucumbers, sea squirts, fishes, birds and mammals, others.

	1	2	3		1	2	3
Laminaria hydropus ✓	A			Panardis infect ✓	C	C	
Laminaria setchelliana ✓	F	O					
Sargassum polyceroides ✓	C						
Desmarestia munda ✓	O	R					
Cutleria multifida (Halosargassum) ✓	C			Caecum pinnatus ✓		R	R
Heterosiphonia filitosa ✓	F	O		Littoridinella uliginosa ✓		F	F
Enteromorpha linza ✓	O	O		Pagurus maclaughlinae ✓		O	R
Phaeosiphonia nigrescens ✓	O						
Phaeosiphonia nigrescens ✓	F			Gelidium striatum ✓	F		
Agardhiella subulata ✓	O	O		Gelidium sp. ✓	O		
Agardhiella subulata ✓	O	O		Murchiesonia rigida ✓		R	R
Agardhiella subulata ✓	O	O					
Agardhiella subulata ✓	F						
Agardhiella subulata ✓	F	O		Bryopsis plumosa ✓	F		
Agardhiella subulata ✓	F	F		Gibberula aurea ✓	C		
Agardhiella subulata ✓				Turritella caelestis ✓			C
Agardhiella subulata ✓	R						
Agardhiella subulata ✓	A						
Agardhiella subulata ✓	*	O	O	Peckea marginata ✓		O	O
Agardhiella subulata ✓	R			Squilla sp.		R	
Agardhiella subulata ✓				Littoridinella clavata ✓	R		
Agardhiella subulata ✓			R	Bryopsis plumosa ✓	R		
Agardhiella subulata ✓				Agardhiella subulata ✓	R		
Agardhiella subulata ✓			O	Gelidium sp. ✓		R	
Agardhiella subulata ✓				Agardhiella subulata ✓		R	
Agardhiella subulata ✓				Heterosiphonia linza ✓	C		
Agardhiella subulata ✓		R		Pausanias setchelliana ✓	R		
Agardhiella subulata ✓		O	O	Heterosiphonia linza ✓	O	O	
Agardhiella subulata ✓		R	R	Parthenoceras glacialis ✓		O	R
Agardhiella subulata ✓	F	F		Parthenoceras glacialis ✓		O	R
Agardhiella subulata ✓	R	R		Galathea alba ✓		R	R
Agardhiella subulata ✓				Asterias pinnatus ✓	R	R	
Agardhiella subulata ✓	R			* Astia laevigata	R		
Agardhiella subulata ✓		R		Bryopsis plumosa ✓	R		
Agardhiella subulata ✓		O		Continue on a separate sheet if you need to			
Agardhiella subulata ✓				Lobus baculata ✓	O	R	
Agardhiella subulata ✓				Lobus multus ✓			
Agardhiella subulata ✓				Gelidium sp. ✓	O		
Agardhiella subulata ✓							
Agardhiella subulata ✓				Rock Cook ✓	C		
Agardhiella subulata ✓				Carinata ✓	C		

Once completed, return the form to the Dive Organiser or to:
 Seasearch, Marine Conservation Society, 9 Gloucester Road, Ross on Wye, Herefordshire HR9 5BU.
 Your name and address will be included on the Seasearch database and those of partner organisations. You will also receive Seasearch newsletters and information on other marine surveys and projects. Please tick here if you do NOT want to be sent newsletters or information on other marine surveys and projects 4

APPENDIX 2
LIST OF SITES SURVEYED

Dive No.	Date	Site Name (Bearing)	Name of divers	Depth (m bcd)		Latitude	Longitude	Biotope	Substratum type	Site features
				Min	Max					
1	15/08/03	Rubh A Chairn Mhoir	Don McNeish, Howard Wood	0	19.8	56°50.234	5°48.582	LhypLsac.Ft; VirOph; SpMeg	Boulders, mixed ground, mud	Boulder slope, mixed plain
2	15/08/03	Rhubh A Chairn Mhoir	George Brown, Sue Scott	1	25.2	56°50.257	5°48.521	LhypLsac.Ft; VirOph; SpMeg	Boulders, mixed ground, mud	Boulder slope, mixed plain
3	15/08/03	Rhubh A Chairn Mhoir	Calum Duncan, Chris Wood	0	25.2	56°50.257	5°48.521	LhypLsac.Ft; VirOph; SpMeg	Boulders, mixed ground, mud	Boulder slope, mixed plain
4	16/08/03	Oberon Bank B (E)	Sue Scott, Chris Wood	16	29	56°52.298	6°01.633	LhypR.ft; LhypR.Pk; XFa; ErSSwi; CGS	Bedrock, coarse sand	Steep rounded bedrock, sand shelves
5	16/08/03	Oberon Bank B (S)	George Brown, Calum Duncan	18.8	21.4	56°52.298	6°01.633	LhypR.Pk; XFa; CMX	Bedrock, boulders, mixed ground	Bedrock steps, mixed ground
6	16/08/03	Oberon Bank B (E)	Don MacNeish, Howard Wood	18.1	33.5	56°52.298	6°01.633	LhypR.pk; XFa; ErSSwi; CGS	Bedrock, coarse sand	Steep rounded bedrock, sand shelves
7	16/08/03	Oberon Bank C	Sue Scott, Chris Wood	15.7	28.5	56°52.237	6°01.635	LhypR.ft; LhypR.pk; XFa; ErSSwi; CMX	Bedrock, mixed ground	Rounded bedrock, mixed plain
8	16/08/03	Oberon Bank B (NE)	George Brown, Calum Duncan	17.8	32.8	56°52.298	6°01.633	LhypR.pk; XFa; ErSSwi; CGS	Bedrock, coarse sand	Steep rounded bedrock, sand shelves
9	16/08/03	Oberon Bank B (S)	Frank Fortune, Don MacNeish Howard Wood	17.4	26.2	56°52.298	6°01.633	LhypR.pk; XFa; ErSSwi; CMX	Bedrock, mixed ground	Bedrock, spp-rich mixed plain
10	17/08/03	Oberon Bank A (W)	Don MacNeish, Sue Scott	16.3	25.2	56°52.336	6°01.622	LhypR.ft; LhypR.pk; XFa; CMX	Bedrock, mixed ground	Bedrock ridges, species-rich mixed ground
11	17/08/03	Oberon Bank A (W)	George Brown, Calum Duncan Howard Wood	20.8	29.3	56°52.336	6°01.622	LhypR.pk; XFa; CMX	Bedrock, boulders, mixed ground	Bedrock ridges, species-rich mixed ground
12	17/08/03	Oberon Bank A (NW)	Frank Fortune; Chris Wood	16.3	26.2	56°52.336	6°01.622	LhypR.ft; LhypR.pk; XFa; CMX	Bedrock, boulders, mixed ground	Bedrock steps, mixed plain
13	17/08/03	Ardnish	Don MacNeish, Howard Wood	0	21.6	56°52.595	5°45.838	Lsac.ft; LhypLsac.Ft; AntAsH; AmenCio; IMX.An	Bedrock, boulders, sandy gravel	Cliff
14	17/08/03	Ardnish	George Brown, Calum Duncan	1.8	22.1	56°52.595	5°45.838	Lsac.ft; LhypLsac.Ft; AntAsH; AmenCio; IMX.An	Bedrock, boulders, sandy gravel	Cliff
15	17/08/03	Oberon Bank D (N)	Frank Fortune, Sue Scott Chris Wood	26	29.6	56°52.417	6°01.807	ErSSwi; XFa; CMX	Bedrock, boulders, mixed ground	Bedrock steps, mixed plain
16	18/08/03	Priest Rock	Frank Fortune, Sue Scott	2.5	19.4	56°51.123	5°47.788	LhypLsac.Ft; LhypLsac.Pk; CGS	Bedrock, boulders, mixed ground	Bedrock outcrops; mixed plain
17	18/08/03	Priest Rock	Calum Duncan, Chris Wood	0	16.4	56°51.123	5°47.788	LhypLsac.Ft; LhypLsac.Pk; CGS	Bedrock, boulders, mixed ground	Bedrock outcrops; mixed plain

APPENDIX 3

LIST OF BIOTOPES RECORDED

Higher Code	Biotope Code	Biotope Name	Dive Numbers	Site Name
EXPOSED INFRALITTORAL ROCK (EIR)	LhypR.Ft	<i>Laminaria hyperborea</i> forest with dense foliose red seaweeds on exposed upper infralittoral rock	4, 7, 10, 12	Patches on Oberon Bank S, E, W
	LhypR.Pk	<i>Laminaria hyperborea</i> park with dense foliose red seaweeds on exposed lower infralittoral rock	4-12	Oberon Bank S, E, W
SHELTERED INFRALITTORAL ROCK (SIR)	LhypLsac.Ft	Mixed <i>Laminaria hyperborea</i> and <i>Laminaria saccharina</i> forest on sheltered upper infralittoral rock	1-3	Rubh A' Chairn Mhoir
			13-14	Ardnish Cliff
			16-17	Priest Rock
	LhypLsac.Pk	Mixed <i>Laminaria hyperborea</i> and <i>Laminaria saccharina</i> forest on sheltered upper infralittoral rock	16-17	Priest Rock
	Lsac.Ft	<i>Laminaria saccharina</i> forest on very sheltered upper infralittoral rock	13-14	
MODERATELY EXPOSED CIRCALITTORAL ROCK (MCR)	XFa	Mixed faunal turfs (moderately exposed rock)	4-12, 15	Oberon Bank N, S, E, W
	ErSSwi	Erect sponges and <i>Swiftia pallida</i> on slightly tide-swept moderately exposed circalittoral rock	4, 6-9, 15	Oberon Bank N, S, E
SHELTERED CIRCALITTORAL ROCK (SCR)	AntAsH	<i>Antedon</i> spp., solitary ascidians and fine hydroids on sheltered circalittoral rock	13-14	Ardnish Cliff
	AmenCio	Solitary ascidians, including <i>Ascidia mentula</i> and <i>Ciona intestinalis</i> , on very sheltered circalittoral rock		
CIRCALITTORAL GRAVELS AND SANDS (CGS)			4, 6, 8	Oberon Bank E (ledges at 30m bcd)
			16-17	Priest Rock
CIRCALITTORAL MUDS (CMU)	VirOph	<i>Virgularia mirabilis</i> and <i>Ophiura</i> spp. On circalittoral sandy or shelly mud	1-3	Rubh A' Chairn Mhoir
	SpMeg	Seapens and burrowing megafauna in circalittoral soft mud	1-3	Rubh A' Chairn Mhoir
INFRALITTORAL MIXED SEDIMENTS (IMX)	An	Burrowing anemones in sublittoral muddy gravel	13-14	Ardnish Cliff
CIRCALITTORAL MIXED SEDIMENTS (CMX)			5, 7, 9-12, 15	Oberon Bank N, S, W

APPENDIX 4

SPECIES LIST

Species are arranged according to Howson & Picton (1997).

KEY: * nationally scarce species (occur in 9-55 OS 10x10km squares)
(after Sanderson, 1996)

MCS Code letter	MCS Code No	Species	Common name	Dives
Foraminifera		<i>Toxisarcon alba</i>		3
Porifera				
C	416	<i>Suberites carnosus</i>		2, 3, 15
C	480	<i>Cliona celata</i>		4, 5, 9, 10, 15
C	545	<i>Axinella infundibuliformis</i>		4, 5, 6, 7, 8, 9, 10, 11, 14
C	577	<i>Phakellia ventilabrum*</i>		7, 15
C	626	<i>Ciocalypta penicillus</i>		10, 12, 14
C	638	<i>Halichondria bowerbanki</i>		7
C	651	<i>Halichondria panicea</i>	Bread-crumbs sponge	9
C	758	<i>Esperiopsis fucorum</i>		9, 15
C	924	<i>Hymedesmia</i>		5
C	1315	<i>Raspailia?</i>		4, 7
C	1420	<i>Haliclona</i>		7
C	1430	<i>Haliclona simulans</i>		17
C	1431	<i>Haliclona viscosa</i>		4
Cnidaria				
D	11	<i>Haliclystus auricula</i>		2
D	44	<i>Cyanea capillata</i>	Lions mane	6
D	45	<i>Cyanea lamarckii</i>		5, 11
D	48	<i>Aurelia aurita</i>		11
D	58	HYDROZOA indet.		2, 3, 9
D	409	<i>Abietinaria abietina</i>		9, 10, 15
D	454	<i>Kirchenpaueria pinnata</i>		9, 12, 15, 16
D	463	<i>Nemertesia antennina</i>		3, 4, 5, 6, 7, 9, 10, 11, 12, 15, 16, 17
D	466	<i>Nemertesia ramosa</i>		12, 16
D	517	<i>Obelia geniculata</i>		3, 4, 8, 14
D	517	<i>Obelia sp.</i>		12, 16, 17
D	519	<i>Obelia dichotoma</i>		2, 7, 10
D	520	<i>Obelia geniculata</i>		5
D	597	<i>Alcyonium digitatum</i>	Dead men's fingers	3, 6, 11, 13, 14, 15, 16, 17
D	598	<i>Alcyonium glomeratum</i>	Red fingers	6,7
D	608	<i>Swiftia pallida</i>		4, 6, 7, 8, 9, 10, 12, 15
D	618	<i>Virgularia mirabilis</i>		1, 2, 3, 10
D	622	<i>Pennatula phosphorea</i>		11
D	632	<i>Cerianthus lloydii</i>		2, 3
D	649	<i>Epizoanthus couchii</i>		7, 10, 11, 12
D	655	<i>Parazoanthus anguicomus*</i>		7, 9, 10, 11, 12, 15
D	668	<i>Protanthes simplex</i>		14
D	679	<i>Anemonia viridis</i>		2, 3, 14
D	683	<i>Urticina eques</i>		14
D	684	<i>Urticina felina</i>	Dahlia anemone	13, 17

MCS Code letter	MCS Code No	Species	Common name	Dives
D	710	<i>Metridium senile</i>	Plumose anemone	17
D	713	<i>Sagartia elegans</i>		14, 16
D	719	<i>Actinothoe sphysodenta</i>		13
D	743	<i>Adamsia carciniopados</i>		14
D	775	<i>Corynactis viridis</i>		14
D	783	<i>Caryophyllia smithii</i>	Devonshire cup coral	4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17
Platyhelminthes				
F	107	<i>Prostheceraeus vittatus</i>	Candy-striped flatworm	13
Annelida				
P	814	<i>Chaetopterus variopedatus</i>		2, 5, 11, 12, 15, 16, 17
P	1179	Terebellidae sp.	Strawberry worm	2
P	1195	<i>Lanice conchilega</i>	Sand mason	1, 2, 3, 7, 9, 10, 11, 12, 15, 16, 17
P	1298	<i>Myxicola</i> sp.		10
P	1339	<i>Pomatoceros</i> sp.	Keelworm	1, 2, 17
P	1341	<i>Pomatoceros triqueter</i>		3, 10, 14, 16
Crustacea				
R	74	<i>Balanidae</i> indet	Barnacle	2, 3, 5, 7, 10, 11, 14, 17
R	77	<i>Balanus crenatus</i>		12, 15, 16
S	1315	<i>Palaemon</i> sp	Large prawn	3
S	1400	<i>Homarus gammarus</i>	Common lobster	13
S	1457	<i>Pagurus bernhardus</i>	Hermit crab	1, 2, 3, 17
S	1462	<i>Pagurus prideaux</i>		14
S	1470	<i>Galathea</i> sp	Squat lobster	2, 13
S	1476	<i>Galathea strigosa</i>	Squat lobster	2
S	1478	<i>Munida rugosa</i>	Long-clawed squat lobster	1, 2, 3, 4, 5, 6, 7, 14, 15, 16, 17
S	1518	<i>Hyas araneus</i>	Spider crab	1
S	1529	<i>Macropodia</i>		17
S	1566	<i>Cancer pagurus</i>	Edible crab	1, 2, 3, 10, 13, 14, 17
S	1580	<i>Liocarcinus depurator</i>	Harbour crab	2, 3, 16
S	1589	<i>Necora puber</i>	Velvet swimming crab	1, 3, 4, 6, 12, 13, 14, 15, 17
S	1606	<i>Goneplax rhomboides</i>	Mud-runner crab	3
Mollusca				
W	163	<i>Gibbula cineraria</i>	Grey top shell	1, 2, 3, 4, 10, 17
W	182	<i>Calliostoma zizyphinum</i>	Painted top shell	3, 4, 10, 15, 17
W	234	<i>Helcion pellucidum</i>	Blue-rayed limpet	2, 3, 17
W	270	<i>Turritella communis</i>		2
W	461	<i>Trivia monacha</i>	Cowrie	10,16
W	708	<i>Buccinum undatum</i>	Common Whelk	3
W	1145	<i>Aplysia</i>		4
W	1341	<i>Crimra papillata</i>		4
W	1243	NUDIBRANCHIA indet.		2
W	1350	<i>Polycera quadrilineata</i>		2,10
W	1354	<i>Limacia clavigera</i>		2
W	1695	<i>Mytilus edulis</i>	Common Mussel	1, 13, 16
W	1771	<i>Pecten maximus</i>	King scallop	2, 3, 7, 9, 10, 11, 12, 13, 14, 15, 16, 17
W	1773	<i>Aequipecten opercularis</i>	Queen scallop	1, 11, 12, 16
W	1786	<i>Chlamys tigrina</i> (?)		16
W	1920	<i>Astartacea</i>		2

MCS Code letter	MCS Code No	Species	Common name	Dives
W	1998	<i>Ensis</i> sp.	Razor shell	1, 2
W	2298	Cephalopoda		2, 10
W	2298	Cephalopoda	Squid eggs	3
Bryozoa				
Y	1	BRYOZOA indet.	Orange encrusting	7, 9, 12, 15, 16
Y	76	<i>Alcyonidium diaphanum</i>		9, 15
Y	77	<i>Alcyonidium gelatinosum</i>		4, 5, 10, 11
Y	169	<i>Membranipora</i>		7
Y	170	<i>Membranipora membranacea</i>	Hornwrack	2, 3, 4, 5, 8, 9, 10, 12, 14, 16, 17
Y	178	<i>Electra pilosa</i>		17
Y	194	<i>Securiflustra securifrons</i>		4, 8, 12, 15
Y	193	<i>Securiflustra</i>		7
Y	260	<i>Bugula</i>		11, 12
Y	382	<i>Porella</i>		7
Y	384	<i>Porella compressa</i>		4, 8, 9, 12, 15
Y	507	<i>Omalosecosa</i> indet.		5, 7
Y	508	<i>Omalosecosa ramulosa</i>		8, 15
Echinodermata				
ZB	10	<i>Antedon bifida</i>		4, 5, 6, 7, 8, 10, 11, 12, 14, 15, 17
ZB	11	<i>Antedon petasus</i>		10, 12, 14, 15
ZB	15	<i>Leptometra celtica</i>		4, 7, 8, 10, 11, 12, 15
ZB	23	<i>Luidia ciliaris</i>		3, 4, 5, 8, 9, 10, 11, 14, 15, 16, 17
ZB	24	<i>Luidea sarsi</i>		12
ZB	54	<i>Poronia pulvillus</i>		4, 5, 7, 9, 10, 11, 12, 15
ZB	72	<i>Solaster endeca</i>	Sun star	1, 6, 13, 14
ZB	75	<i>Crossaster papposus</i>	Purple sunstar	14
ZB	83	<i>Henricia</i> sp.	Bloody henry	3, 8
ZB	86	<i>Henricia sanguinolenta</i>		5, 17
ZB	100	<i>Asterias rubens</i>	Common starfish	2, 3, 4, 5, 10, 11, 14, 15, 16, 17
ZB	104	<i>Marthasterias glacialis</i>	Spiny starfish	1, 2, 3, 6, 9, 10, 14, 17
ZB	168	<i>Ophiura albida</i>	Brittle star	2, 16
ZB	149	<i>Amphiura</i> sp	Brittle star	3
ZB	198	<i>Echinus esculentus</i>	Common sea urchin	1, 2, 3, 4, 5, 7, 8, 9, 10, 12, 14, 15, 16, 17
ZB	264	<i>Thyone roscovita</i>		5, 15
ZB	269	<i>Pawsonia</i>		4
ZB	270	<i>Pawsonia saxicola</i>		2
ZB	244	<i>Holothuria forskali</i>		8
ZB	278	<i>Aslia lefevrei</i>		2, 3, 17
Tunicata				
ZD	1	TUNICATA indet.	Sea squirts	1, 13
ZD	71	<i>Ciona intestinalis</i>		14
ZD	74	<i>Diazona violacea</i>		4, 7, 8, 9, 10, 11, 15
ZD	81	<i>Corella parallelogramma</i>		3, 14
ZD	84	<i>Ascidia aspersa</i>		9, 15
ZD	89	<i>Ascidia mentula</i>		14
ZD	126	<i>Botryllus schlosseri</i>		2, 9
ZD	138	<i>Pyura</i>		10
ZD	146	<i>Molgula</i>		9
Pisces				

MCS Code letter	MCS Code No	Species	Common name	Dives
ZF	28	<i>Scyliorhinus canicula</i>	Dog fish	3
ZG	94	<i>Lophius piscatorius</i>	Angler Fish	3
ZG	104	GADIFORMES indet. (juveniles)		17
ZG	116	<i>Gadus morhua</i>	Cod	5, 6
ZG	123	<i>Merlangius merlangus</i>	Whiting	2
ZG	129	<i>Molva molva</i>	Ling	14
ZG	135	<i>Pollachius pollachius</i>	Pollack	2
ZG	136	<i>Pollachius virens</i>	Saithe	3, 4
ZG	143	<i>Trisopterus luscus</i>	Bib	3
ZG	144	<i>Trisopterus minutus</i>	Poor cod	7, 10, 11, 12, 14
ZG	237	<i>Entelurus aequoreus</i>		3, 15
ZG	245	<i>Synganthus acus</i>		3, 8, 16
ZG	260	Triglidae	'Gurnard'	3
ZG	283	<i>Taurulus bubalis</i>	Sea scorpion	4, 6, 15
ZG	390	<i>Centrolabrus exoletus</i>	Rock cook	2, 3, 17
ZG	395	<i>Crenilabrus melops</i>	Corkwing	2, 3, 17
ZG	397	<i>Ctenolabrus rupestris</i>	Goldsinny wrasse	2, 4, 5, 6, 7, 10, 12, 13, 14, 15, 17
ZG	399	<i>Labrus bergylla</i>	Ballan wrasse	2, 3, 4, 12, 13, 17
ZG	400	<i>Labrus mixtus</i>	Cuckoo wrasse	2, 4, 5, 6, 7, 8, 10, 11, 13, 14, 15, 17
ZG	452	<i>Callionymus lyra</i>	Dragonet	1, 2, 10, 11, 12, 13
ZG	470	<i>Gobiusculus flavescens</i>	Two spotted goby	13
ZG	479	<i>Pomatoschistus minutus</i>	Sand Goby	3
ZG	481	<i>Pomatoschistus pictus</i>	Painted goby	2
ZG	558	<i>Zeugopterus punctatus</i>	Norwegian topknot	6
Rhodophycota				
ZM	1	RHODOPHYCOTA indet.		3, 5, 14
ZM	1	Enc. Dark red algae		6
ZM	127	<i>Scinaia</i>		2,3
ZM	146	<i>Bonnemaisonia asparagoides</i>		2,16
ZM	170	<i>Palmaria palmata</i>	Dulse	2
ZM	186	<i>Ahnfeltia plicata</i>		2
ZM	194	Encrusting <i>Corallinaceae</i> spp	Enc. coralline algae	5, 9,16
ZM	319	<i>Calliblepharis ciliata</i>		9
ZM	324	<i>Rhodophyllis divaricata</i>		16
ZM	370	<i>Callophyllis laciniata</i>		2, 7, 16
ZM	372	<i>Kallymenia reniformis</i>		4,7,10
ZM	443	<i>Plocamium cartilagineum</i>		2, 3
ZM	554	<i>Pterothamnion plumula</i>		16
ZM	581	<i>Heterosiphonia plumosa</i>		2, 4, 7, 9, 10, 12, 16
ZM	592	<i>Cryptopleura ramosa</i>		16
ZM	594	<i>Delesseria sanguinea</i>	Sea beech	2, 4, 6, 10, 15, 16
ZM	615	<i>Phycodrys</i>		16
ZM	616	<i>Phycodrys rubens</i>		2, 4, 10, 12
ZM	628	<i>Brongniartella byssoides</i>		16
ZM	667	<i>Polysiphonia nigrescens</i>		2
Chromophycota				
ZR	271	<i>Cutleria multifida</i>		2
ZR	313	<i>Dictyota dichotoma</i>		3, 4, 7, 8, 10, 16
ZR	325	<i>Carpomitra costata*</i>		4

MCS Code letter	MCS Code No	Species	Common name	Dives
ZR	334	<i>Desmarestia aculeata</i>		2
ZR	351	<i>Laminaria hyperborea</i>	Cuvie	2, 3, 4, 5, 7, 8, 9, 10, 11, 12, 16, 17
ZR	354	<i>Laminaria saccharina</i>	Sugar kelp	1, 2, 3, 14, 17
ZR	359	<i>Saccorhiza polyschides</i>		2, 3, 14, 17
Chlorophycota				
ZS	1	CHLOROPHYCOTA indet.		14

APPENDIX 5

MCS FAN SHELL LEAFLET

What you can do to help conserve the Fanshell

On your dives, look out for fanshells, if you see one, fill in a fanshell recording form (below) and send it to us -

UK Fanshell recording form
(also available from www.mcsuk.org)




*The photo above is of the Fanshell (*Atrina fragilis*), a shell that occurs in UK and Eire waters between 10 and 400m deep. It is approximately between 10 and 30cm long, and usually half to two thirds of the (lower part) shell will appear 'clean'. The rest may have other animals and plants attached (the upper area).*

Have you seen this shell on your dive? If so, fill in the following and send the information to us at the MCS (put your contact details on the back of the form):

1. Where were you (Lat-Long preferred)?
2. What was the depth?
3. How many shells were there?
4. Was the shell(s) broken or intact?
5. How big were the shells?

Email to: info@mcsuk.org; Fax to: 01989 567 815

Action to Conserve Scottish Marine Life

Scottish Natural Heritage and the Marine Conservation Society (MCS) are responsible for leading conservation for a number of different Biodiversity Action Plans. The BAP was written by the UK Government in 1994 to conserve marine and terrestrial habitats and species. See the BAP website www.ukbap.org for further information on fanshells and other species.



MCS is the lead partner for the Fanshell Species Action Plan

SNH is the lead partner for the Maerl Species Action Plan

Marine Conservation Society,
9 Gloucester Rd
Ross on Wye HR9 5BU
Telephone: 01989 566 017
www.mcsuk.org
Email: info@mcsuk.org





Scottish Natural Heritage,
2 Anderson Place
Edinburgh EH6 5NP
Telephone: 0131 447 4784
www.snh.gov.uk

Have you seen one of these?



The Fanshell: A Scottish Marine Treasure



What is a Fanshell?

Fanshells are bivalve (2-shelled) molluscs, related to land-based snails. They feed on tiny marine organisms in the plankton, using a cleverly adapted gill to collect food particles.

Fanshells reproduce by broadcast spawning (eggs and sperm are released into the water and are externally fertilised). Reproduction is more successful if large numbers of Fanshells are located close to each other.

Fanshells are firmly 'dug into' the sediment in which they remain for their entire lives after settling from the plankton.

Fanshells occur in the same habitat as scallops, which makes them vulnerable to damage from trawler fishing boats.



Sadly, the most likely place you are likely to see a Fanshell is within a museum collection, such as this specimen at the Natural History Museum, London



This specimen was collected by scallop trawlers and transplanted into Loch Carron.



Region	1985 (Woodward)	2003 (MarLIN)
England	0	3
Scotland	18	24
Wales	0	3
N. Ireland	0	3
Eire	0	6

This graph demonstrates the lack of firm knowledge of Fanshell numbers and distribution. We need more information!

Why Conserve the Fanshell in Scotland?



UK Fanshell distribution. Note the dominance of observations from Scottish waters. (source: MarLIN www.marlin.ac.uk)

Fanshells are most commonly found in Scottish waters - they need conserving because:

- They are part of Scotland's unique marine natural heritage
- It is spectacular – up to 40cm long
- It is a UK protected species (Wildlife and Countryside Act, 1981)
- It has been threatened by divers collecting shells as 'trophies'
- Little is known about its interaction with the environment and role in the ecosystem
- We only have vague records of existing populations (mainly from Scotland)