

**TORRIDON 2000 SEASEARCH**

**Report of a SEASEARCH survey in Loch Torridon, Wester Ross,**

**August 18th-20th 2000**

**Sue Scott**

**October 2000**

**A report to the Minch Project**

**SURVEY TEAM**

**Survey organiser:** Angus McHattie

**Diving organiser:** Neil Cowie

**Survey team members:**

Lyndsey Bayer

Micha Bayer

Rosey Bayne

Sue Chambers

Ben Dipper

Iain Dixon

Calum Duncan

Frank Fortune

Anne Frankland

Chris Griffiths

Mary Harvey

Digger Jackson

Jeremy Milne

Sue Scott

Victoria Wiltshire



*Asteronyx loveni*, Loch Diabaig

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**TORRIDON 2000 SEASEARCH****Report of a SEASEARCH survey in Loch Torridon, Wester Ross,****August 18th-20th 2000****SYNOPSIS**

SEASEARCH is a programme of Phase 1 marine biological survey, developed by the Marine Conservation Society and the Joint Nature Conservation Committee, designed to give sports divers an opportunity to participate in marine biological surveys, and to contribute to the information from an area by recording habitats and species. The Minch Project aimed to address some of the growing concerns over the state of marine resources in the Minch, by promoting a more sustainable approach to their use. As part of a pilot project in Loch Torridon, the Minch Project supported a SEASEARCH survey to add to the information on underwater sites, habitats and species in the loch.

The survey was carried out by 16 divers, mainly from Lothian Divers Sub-Aqua Club, between August 18<sup>th</sup>-20<sup>th</sup> 2000. SEASEARCH recording forms were completed for 28 sites spread throughout the loch system. 33 biotopes were recognised, and their distribution mapped. Species lists and a catalogue of photographs have been compiled. Information on several particularly interesting or attractive dive sites visited on the survey has been incorporated into a draft dive guide for Loch Torridon.

The range of biotopes recorded is typical for sheltered fjordic sealoch systems, with a gradation from outer, more exposed sites with kelp-dominated rocky slopes ending in coarse sediments with maerl, through current-swept narrows with brittlestar beds, to sheltered inner areas with silted rock slopes characterised by encrusting algae and ascidians, and mixed muddy sediments. In the most sheltered and deepest parts, the seabed is of soft mud with seapen beds and prawns (*Nephrops norvegicus*), including well-developed giant seapen beds in Loch Diabaig. From evidence of numerous shells, burrows, tubes and trails, sediments in the loch system appeared particularly rich and varied, although infaunal samples were not taken for detailed examination. The lack of bottom trawling in the loch may well have helped to preserve the diversity of sediment communities and species.

Interesting species recorded on the survey include the deepwater brittlestar *Asteronyx loveni*, previously only seen in deep water below 75m, but found at 34m in Loch Diabaig. This big brittlestar lives perched on top of giant sea pens. The rarely recorded starfish *Luidea sarsi* was also found in Loch Diabaig, and Fries' goby (*Lesueurigobius friesii*), which lives in mud burrows, sometimes shared with prawns, was seen in Loch Diabaig and Loch Shildaig. Giant foraminiferans lived in the sediments at several sites.

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## **1. INTRODUCTION**

### **1.1. Background to survey**

Loch Torridon is a large fjordic sealoch system in Wester Ross, north west Scotland. As part of the Minch Project (see below), the loch and its environs have been the subject of a detailed study of the marine environment, its uses and importance to the local community (McHattie 1999). This SEASEARCH survey was carried out to add to the knowledge of the underwater sites, habitats and species of Loch Torridon, both to expand the existing information base and to identify particular locations of interest to divers, to assist the compilation of a dive guide for the loch (Scott, in prep). The survey was tied in with baseline work, including remote video (ROV) and acoustic surveys, done by others in the loch and supported by PESCA, LEADER, Ross and Cromarty Enterprise, Scottish Natural Heritage (SNH) and The Highland Council.



Ob Mheallaidh and Upper Loch Torridon. [Photo No: 00.209.23, S.Scott]

### **1.2. The Minch Project**

The Minch Project was set up and funded by SNH and Comhairle nan Eilean (now Comhairle nan Eilean Siar, the Western Isles Council) in recognition of the fact that the marine and coastal environments of the Minch and surrounding area support both an outstanding biological resource and a large percentage of the local population. Pressure on the resource is generally increasing and the Minch Project aimed to

address some of the growing concerns, by promoting a more sustainable approach to the use of environmental resources.

Phase one of the project was the production of a Minch Review, which was a 'stocktaking' exercise and allowed subsequent identification of areas where further work is required to improve the conservation of natural resources. Phase two involved a range of interested parties in individual projects. Loch Torridon was chosen as a project area because of the importance of its marine environment to local livelihoods, supporting a range of activities (McHattie 1999). Some of these, such as fishing for prawns (*Nephrops norvegicus*), have a long history of conflict over the methods used (creeling and trawling). The Minch Project aimed to gather information to inform the debate over these and other issues in the area.

### 1.3. SEASEARCH

SEASEARCH is a project for volunteer sports divers and others to record useful and accurate observations of underwater habitats and the life they support, thus contributing to the knowledge and understanding of the marine ecology of Britain. The underwater life and scenery of Britain is still little known, even by 'experts', so divers who see the marine life at first hand can contribute invaluable information. SEASEARCH aims to capture this information by recording it on structured forms, which are designed to fit a level of expertise to suit the diver. The aim is both to increase the knowledge and therefore the enjoyment of divers, and to contribute useful information to add to the pool of knowledge of an area. SEASEARCH is managed jointly by the Marine Conservation Society and the Joint Nature Conservation Committee. A starter pack is available giving more detail on SEASEARCH and how the surveys are planned and carried out (Scottish Natural Heritage 1995).

## 2. PREVIOUS DIVING SURVEYS

A survey by a team of sports divers and biologists was carried out in Loch Torridon in June 1985 (Smith 1985), which looked at 34 sublittoral and 9 littoral sites. The survey recorded a wide range of sublittoral habitats and species, as is to be expected of a loch system of this complexity, with sites ranging from semi-exposed to very sheltered from both wave action and tidal currents. Species recorded from sublittoral sites by divers were mainly prominent, easily



SEASEARCH divers on Shildaig slipway.  
[Photo No: 00.209.01. S.Scott]

recognisable animals. More detailed records of algae and molluscs from the shores, and from samples brought up by divers, reflected the particular specialities of the biologists on the survey.

In November 1998, the Minch Project commissioned the author to compile a set of photographs of Loch Torridon and environs, including 10 sublittoral sites. These aimed to cover a range of the typical habitats and species in the loch, and resulted in a collection of around 180 underwater photographs.

## **2. METHODS**

### **3.1. Survey facilities**

The SEASEARCH survey was carried out over the weekend of August 18<sup>th</sup>-20<sup>th</sup> 2000, with a team of divers mainly from Lothian Divers Sub-Aqua Club, based in Edinburgh. Around half the team had previous experience of SEASEARCH, and three were professional marine biologists. The club rigid inflatable boat (RIB) was used, together with a smaller RIB supplied by the Skye Diving Club. Accommodation was provided by SNH at its field station at Kinlochewe, as part of its support for the SEASEARCH survey.

### **3.2. Site selection**

Sites were selected from Admiralty chart no: 2210 to be additional to those surveyed by Smith (1985), providing a spread of sites around the loch. Additional information on potentially interesting sites came from remotely operated video (ROV) surveys in the loch undertaken by SNH. These included underwater pinnacles in the outer loch, dense seapen beds in Loch Diabaig, and extensive maerl beds in Upper Loch Torridon. Further interesting sites were identified by local scallop divers.

### **3.3. Survey methods**

Divers worked in pairs, or occasionally as a threesome, generally working from the deepest depth upwards according to safe diving practices and to allow maximum working time in shallow water. A number of the team, although competent divers, were relatively inexperienced, and were therefore paired with more experienced divers according to club guidelines. Some divers were working on dive times from calculated tables rather than dive computers, which limited their time and the depth to which they could practically work. Because the number of boats available could not take all divers at once, one of the boats took divers in shifts, limiting its range, as distances to the outer and upper lochs from the launch point at Shildaig are considerable. Fortunately, weather conditions during the survey were ideal.

Divers descended to the deepest depth of the dive, then began recording main habitat features and prominent species, using underwater writing boards. Ascending up the slope in a predetermined direction, usually directly towards the shore, they stopped to describe different habitats, noting the depth at which these changed. Species were recorded according to the diver's capabilities. The information was later transferred to SEASEARCH site and dive recording forms (Appendices VI & VII). Two levels of

forms were used on this survey, one basic, the other requiring more detailed information on more structured forms.

Few specimens were collected as logistics on this survey did not allow time for identification. However biologists on the survey were able to assist with identifying specimens in the field. Underwater photographs were taken by two survey members (Sue Scott & Iain Dixon).



Digger Jackson recording on seabed of maerl gravel with live maerl in furrows. [Photo No: 00.210.04. S.Scott]

### **3.4. Position fixing**

Positions were taken with GPS on the Lothian Divers' boat, and with hand-held GPS on the Skye boat (although the latter did not tally with charts, so chart positions have been used instead in the results). Positions were also marked on laminated Admiralty charts in the boat where there were sufficient above-water features for accurate location.

### **3.5. Data analysis**

After the survey, depths on the recording forms were corrected to Chart Datum using a Windows tidal programme with adjustments. Biotope codes according to the Marine Nature Conservation Review (MNCR) manual (Connor et al, 1997) were assigned to habitat descriptions where possible, although sometimes neither the data nor the habitat manual was adequate for this task (see discussion).



## 4. RESULTS

Recording forms were completed for 28 sites during the survey, less than the maximum planned because of difficult diving logistics. Site locations are marked on Figure 1 and listed in Appendix I.

33 biotopes (Connor, et al. 1997) were assigned (with difficulty, see below) to habitats at the sites surveyed. These are listed in Appendix II, and in Appendix III by site. The distribution in the loch of some major biotopes is shown on Figures 2 – 5. The species identified on the survey are listed in Appendix IV. A set of photographs from the survey has been mounted, labelled and catalogued (Appendix V).

## 5. DISCUSSION

### 5.1 Assignment of biotope codes



The assignment of biotope codes to habitats according to the descriptions in the MNCR manual (Connor et al 1997), proved difficult in some cases. This was partly because SEASEARCH data is not always adequate for this purpose, particularly when accurate species identifications are required (for the species of kelp, for instance, which are often very difficult to identify in sealoch conditions). However it was also because some easily recognisable, discrete biotopes encountered in the loch, often at more than one site, appear not to be described in the MNCR manual. This was the case, for instance, with the extensive pure stands of the large kelp *Saccorhiza polyschides* and the brown seaweed *Desmarestia* spp found at several sites, and kelp park dominated by featherstars. Many of the sediment biotopes could not be given a biotope code

Featherstars on kelp on Loch Diabaig sill.  
[Photo No: 00.252.07. S.Scott]

because the descriptions rely on identification of infauna. Thus the biotope codes should be taken as an indication only, and in some cases are a ‘best guess’.



## 5.2 Distribution of biotopes in Loch Torridon.

### 5.2.1. Rocky infralittoral biotopes.

Kelp-dominated biotopes were found throughout the loch system (Figure 2). In the clearer waters of the outer lochs, forests of cuvie kelp *Laminaria hyperborea* grew down to 10m, with sparser 'park' to 15m, while in more sheltered parts in the middle of the loch system sugar kelp *L. saccharina* was dominant, with forests to 8m and park to 14m. In Upper Loch Torridon *L. saccharina* was found to a maximum of 12m, but more commonly to 5-8m, on mixed substrata, reflecting both the decreased water clarity and the relative lack of bedrock in deeper water in the upper loch.



Kelps showed a distinct gradation from outer (more exposed) to inner (sheltered) loch sites (Figure 2). *Alaria esculenta* (dabberlocks) and *Laminaria digitata* (oarweed, tangle) were found together at one site only, characteristically the most exposed at Sgeir na Trian (Site 6). However this biotope is normally confined to a narrow band around low water, and may have been missed at other sites. *L. hyperborea* forest and park were found mainly in the outermost parts of the outer loch, around Sgeir na Trian (Sites 5, 6 & 7) and Sgeir a' Ghair (Site 8). *L. hyperborea* typically grows where there is good water movement, and the only place where *L. hyperborea* park was found in the inner lochs was in the narrows between Upper Loch Torridon and Loch Shildaig (Sites 3 & 4), where strong tidal currents flow. At Site 4 it was mixed with *L. digitata* in shallow water. At three sites on the south side of the outer loch and Loch Shildaig, a mixed forest of *Laminaria saccharina* and *L. hyperborea* was found. In the more sheltered waters of the inner lochs, *L. saccharina* was the dominant kelp on rock, sometimes with *Saccorhiza polyschides*, and occasionally with *L. hyperborea* in very shallow water (as at Site 17 in Loch Shildaig).

Urchin-grazed *Laminaria hyperborea* kelp forest. [Photo No: 00.210.24. S.Scott]

*Saccorhiza polyschides* was found in extensive pure stands at two sites in the middle of the loch system, in disturbed habitats of boulder slopes, or bedrock with boulders

or sediments nearby. Another ‘disturbed’ boulder habitat at Eilean Mor (Site 1) had a dense cover of the brown seaweeds *Desmarestia* spp and red algae (Figure 3).

In many places, particularly in the inner lochs, pebbles, cobbles and boulders embedded in sediments also supported kelp forest or park. *L. saccharina* in the inner lochs often occurred with *Chorda filum* and other algae on such mixed substrata, and in the narrows between Shieldaig Island and Shieldaig village (Site 22), sea oak *Halidrys siliquosa* grew mixed with kelps and scour-resistant red algae in shallow water with enhanced currents.



Sugar kelp (*Laminaria saccharina*), featherstars and a dab on mixed substrata in Upper Loch Torridon narrows. [Photo No: 00.211.14. S.Scott]

In most places rock surfaces beneath the kelp were relatively sparsely colonised by both seaweeds and animals, with pink encrusting coralline or brown algae covering most surfaces. In some places this was apparently because of urchin grazing, but at other sites urchins were not particularly numerous, and smaller grazers such as limpets, chitons and gastropods may have been responsible. At a few sites with enhanced water movement, either from waves in the shallower parts of the outer loch or current-enhanced sites in the inner parts, featherstars (mainly *Antedon bifida*) were extremely abundant on the upper parts of kelp stipes and on kelp fronds.

### 5.2.2. Rocky circalittoral biotopes

Below the lower limit of kelp, a relatively small range of biotopes was encountered (Figure 4), as is to be expected in sheltered sealoch situations. Circalittoral rock was surveyed at relatively few places, partly because many rock sites ended in sediment at fairly shallow depths, but also because divers using tables to time their dives were generally restricted to working above 20m. Nearly all circalittoral rock habitats were sheltered, and typically, rock surfaces were covered with pink encrusting coralline algae, often heavily silted. Ascidians (sea squirts), particularly *Ascidia mentula*, *Ciona intestinalis* and *Asciella* spp, were the most conspicuous animals at most sites, often with hydroids and featherstars co-dominant where there were slight tidal currents. Featherstars were particularly abundant on top of the rock sill separating Loch Diabaig from the main loch (Site 11), where a noticeable current was felt. Circalittoral rock characterised by brachiopods and the anemone *Protanthea simplex*, a community

typical of deep rock in sheltered sealochs to the south (Loch Carron and Loch Duich) was found only at Site 26, in Upper Loch Torridon, on boulders in sediment rather than bedrock slopes.

Dense beds of brittlestars covered mixed substrata on the floor of the narrows to Upper Loch Torridon (Site 3), the only circalittoral site surveyed where strong currents flow.



Cushion star *Porania pulvillus*, ascidians *Ciona intestinalis* and featherstars *Antedon bifida* on Loch Diabaig sill. [Photo No: 00.252.08. S.Scott]

### 5.2.3. Sediment biotopes

A wide range of sediment types and mixtures with varied infauna and epifauna was found throughout the loch system (Figure 5). In the outer loch, wave action and currents have removed much of the surface silt from sediments, and rock slopes ended in coarse, clean sand or shell gravel with whole shells, often with maerl (*Phymatolithon calcareum*) in the wave troughs (Figure 3). Maerl was also found in the entrance to Ob Mheallaidh (Site 24) in Upper Loch Torridon, but extensive beds at the head of the upper loch, reported from ROV surveys by SNH, were not found (Sites 27 & 28).

Characteristically throughout the loch, sediments were a mixture of materials, with increasing amounts of silt or mud towards the more sheltered inner parts. At several sites in Upper Loch Torridon (Sites 15, 19, 21 & 27), and at Site 22 in Loch Shildaig, the seabed was predominantly fine sand. At Sites 21 & 22, where the sand was in very shallow water, burrowing urchins and lugworms were very numerous, and patches of eelgrass (*Zostera marina*) grew at Shildaig village (Site 22). At three sites in Upper Loch Torridon, loose-lying mats of algae, probably predominantly the filamentous red seaweed *Trailliella*, covered the sediment (Figure 3).





Fine sand with eelgrass *Zostera marina* and lugworm mounds by Shieldaig Village. [Photo No: 00.215.18. Sue Scott]

In deeper water at the most sheltered sites, a seabed of soft mud had typical sealoch communities of burrowing crustaceans, particularly the Norway lobster or prawn *Nephrops norvegicus*, and seapens. Behind the sill in Loch Diabaig, giant seapens *Funiculina quadrangularis* were particularly dense below 25m, together with the commensal brittlestar *Asteronyx loveni* (see below), and Fries' goby (*Lesueurigobius friesii*), rarely recorded from diving depths.

Although fishing for prawns (*Nephrops norvegicus*) is an important part of the local economy, and is fairly intensive in the loch, the fishing is mainly by creeling rather than bottom trawling, while scallops (*Pecten maximus*) are fished by diving rather than by dredging. The lack of fishing by mobile bottom gear has probably contributed greatly to preserve the diversity of sediment communities in the loch.



Fries' goby *Lesueurigobius friesii* in its mud burrow, off Shieldaig jetty. [Photo No: 00.263.01. S.Scott]

### 5.3. Interesting species

The number of species recorded by the SEASEARCH survey is relatively low, reflecting the type of survey which concentrated on habitats and mainly prominent, easily identifiable animals. There was also very little time for identification of collected specimens. The time of year is also significant, being too late for many ephemeral algae, especially those characteristic of mixed substrata. However a few particularly interesting species were found on the survey, especially in Loch Diabaig.



***Asteronyx loveni***: A particularly exciting find was the large white brittlestar *Asteronyx loveni*, at 34m in Loch Diabaig (Site 11). This brittlestar has been very rarely seen by divers because it normally lives deeper than 100m, in the fjordic sealochs, and in the very deep sea off the continental shelf. Although it is known from deep video surveys in a few sealochs, this is the first time this brittlestar has been seen in such shallow water, and photographed by divers. *Asteronyx* lives on the top of giant seapens, holding on with parts of its coiled arms, while the ends hang out in the water, presumably to catch falling food particles. A single specimen was seen on the survey, but was not refound on subsequent dives in Loch Diabaig on 14.10.00.

*Asteronyx loveni* on the giant seapen *Funiculina quadrangularis* in Loch Diabaig.  
[Photo No: 00.212.03. S.Scott]

***Luidea sarsi***: This starfish has a northern distribution, preferring colder water (and therefore lives deeper in the southern part of its range). It is not often seen, and is probably most active by night, living buried in the sand during the day. It is similar to the common seven-armed starfish *Luidea ciliaris*, but has only 5 arms. It was found in Loch Diabaig at Site 12.

***Lesueurigobius friesii***: Fries' goby (see above) lives in the same deep muddy habitats as prawns (*Nephrops*) and is reputed to share prawns' burrows sometimes. In situ it is not easy to identify, being similar to the much commoner sand goby, but photos from Loch Diabaig (Site 11), and on a subsequent dive off Sheildaig jetty (Site 23), clearly identify Fries' goby. Off Shieldaig slipway on 30.11.00, many more Fries' gobies



were seen and photographed out of their burrows at dusk than on the daytime dive on the SEASEARCH survey, suggesting that they may be more active at this time of day.

**Foraminiferans:** Giant naked foraminiferans were found in muddy sediments at Sites 1, 12 & 23. Noted from other sealochs by the MNCR, the identity of these strange organisms, which are small white fungus-like branched masses up to 5cm across with an outer organised network or 'pepperpot' of sand grains, remained a mystery until recently. Like many sealoch 'specialities', these fragile organisms are more typical of sediments in deep water, where there is little disturbance, but survive in relatively shallow water in the sheltered parts of sealochs. Biologists at the Dunstaffnage Marine Laboratory have been studying these organisms, have concluded that they are giant foraminiferans, and are to describe them in a forthcoming paper (Tom Wilding, pers. com.).

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## 7. ACKNOWLEDGEMENTS

The hard work of the survey organiser Angus McHattie and dive organiser Neil Cowie made the survey happen despite many initial setbacks. The dive team worked until all hours to fill in SEASEARCH forms, and we are grateful to them for cheerfully compiling much useful data. Thanks also to Skye Diving Club for the use of their boat, and to Scottish Natural Heritage for providing accommodation at Kinlochewe Field Station. The local knowledge of scallop diver Joel Keating was invaluable in choosing survey sites, and David Donnan of SNH also provided useful information on potential dive sites from ROV surveys in Loch Torridon.

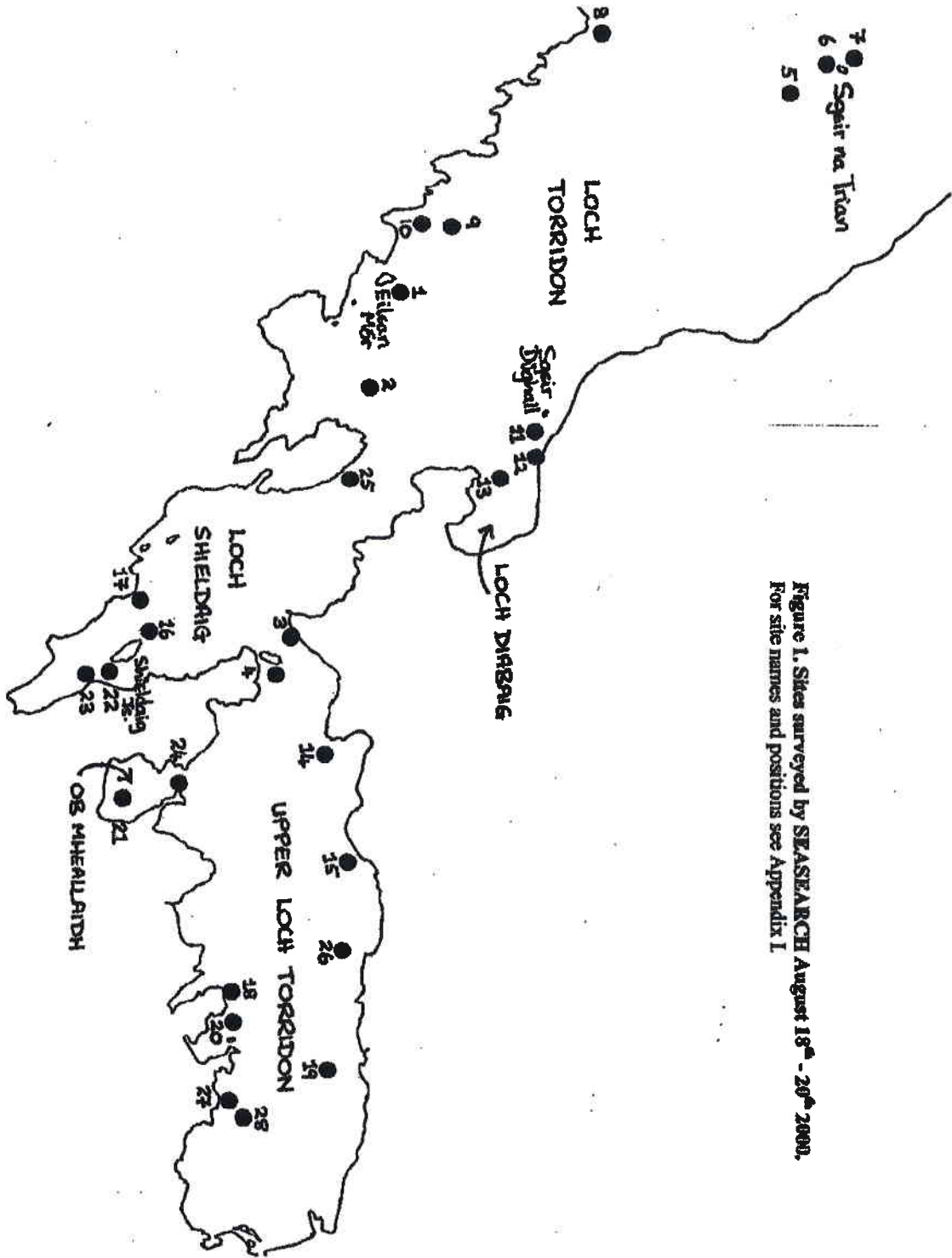
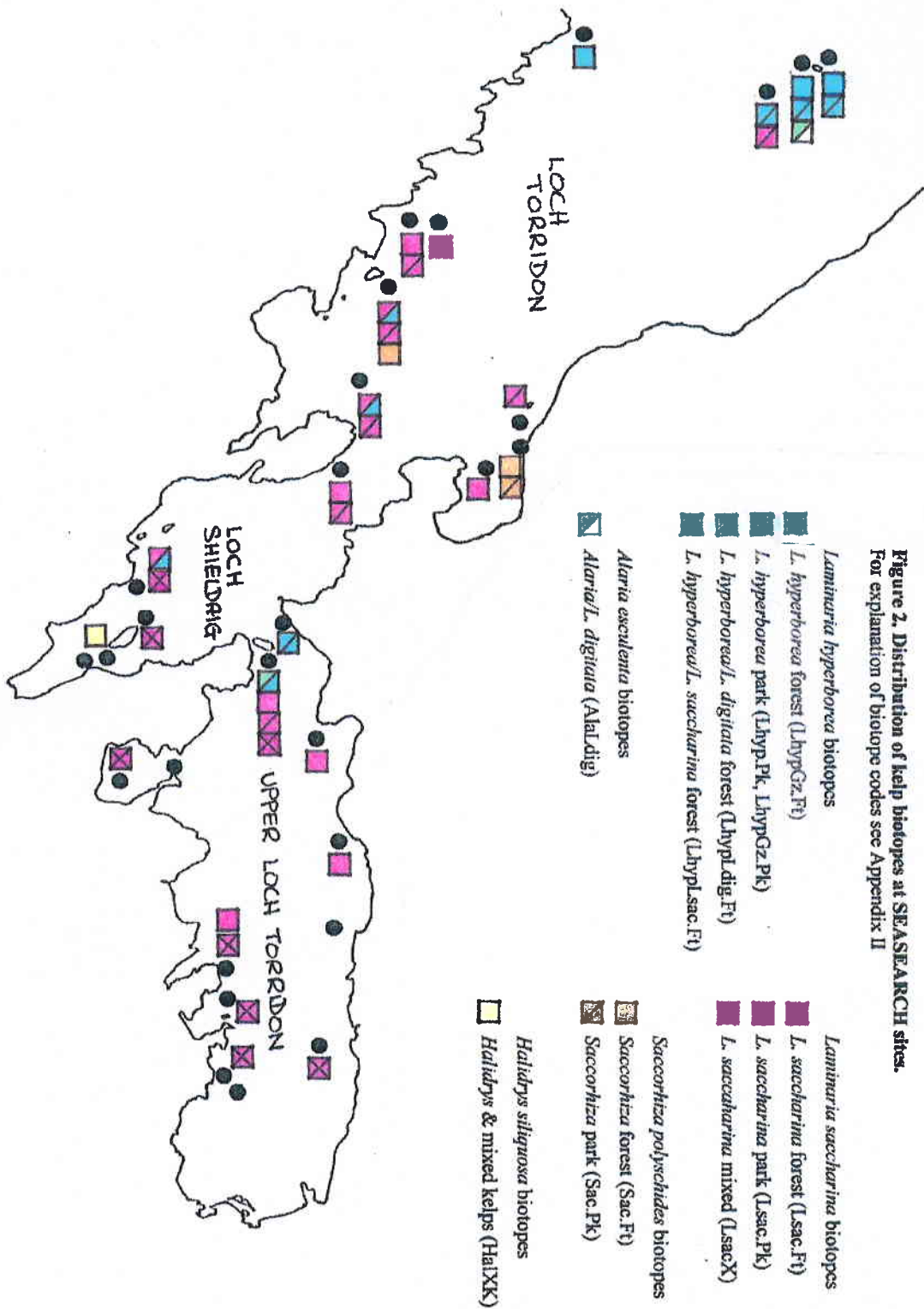


Figure 1. Sites surveyed by SEASEARCH August 18<sup>th</sup> - 20<sup>th</sup> 2000.  
For site names and positions see Appendix 1



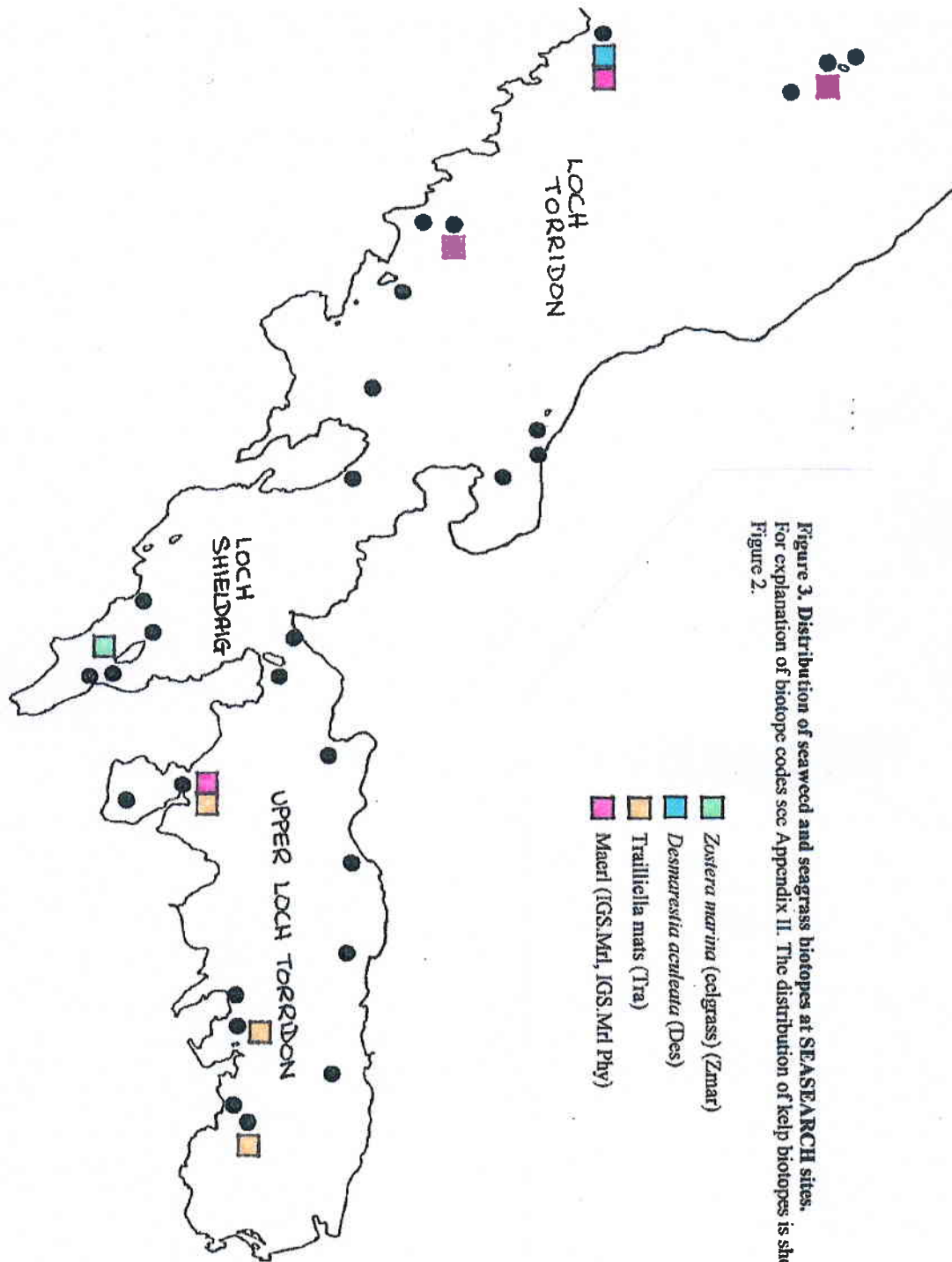


Figure 3. Distribution of seaweed and seagrass biotopes at SEASEARCH sites. For explanation of biotope codes see Appendix II. The distribution of kelp biotopes is shown on Figure 2.

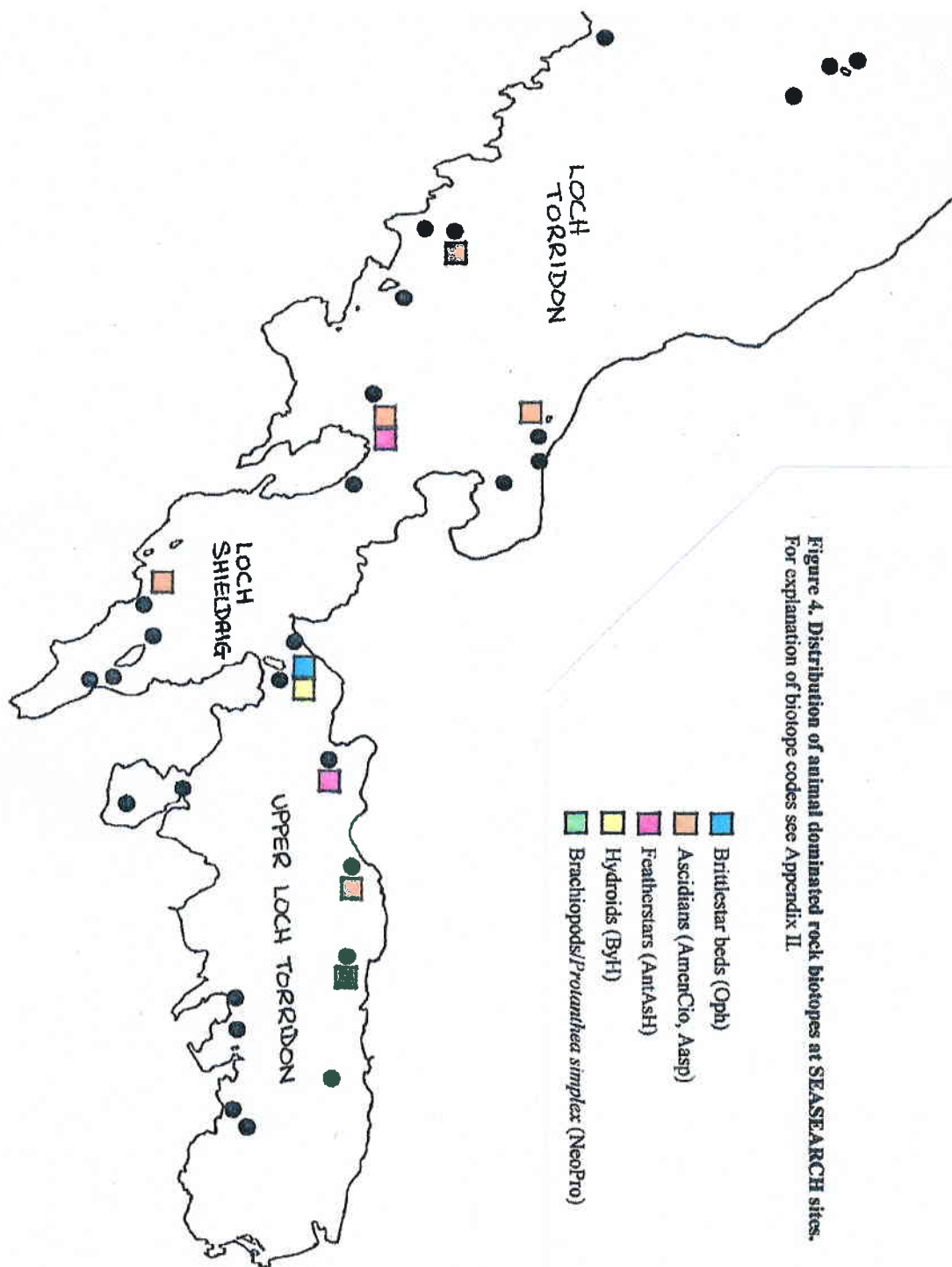


Figure 4. Distribution of animal dominated rock biotopes at SEASEARCH sites. For explanation of biotope codes see Appendix II.



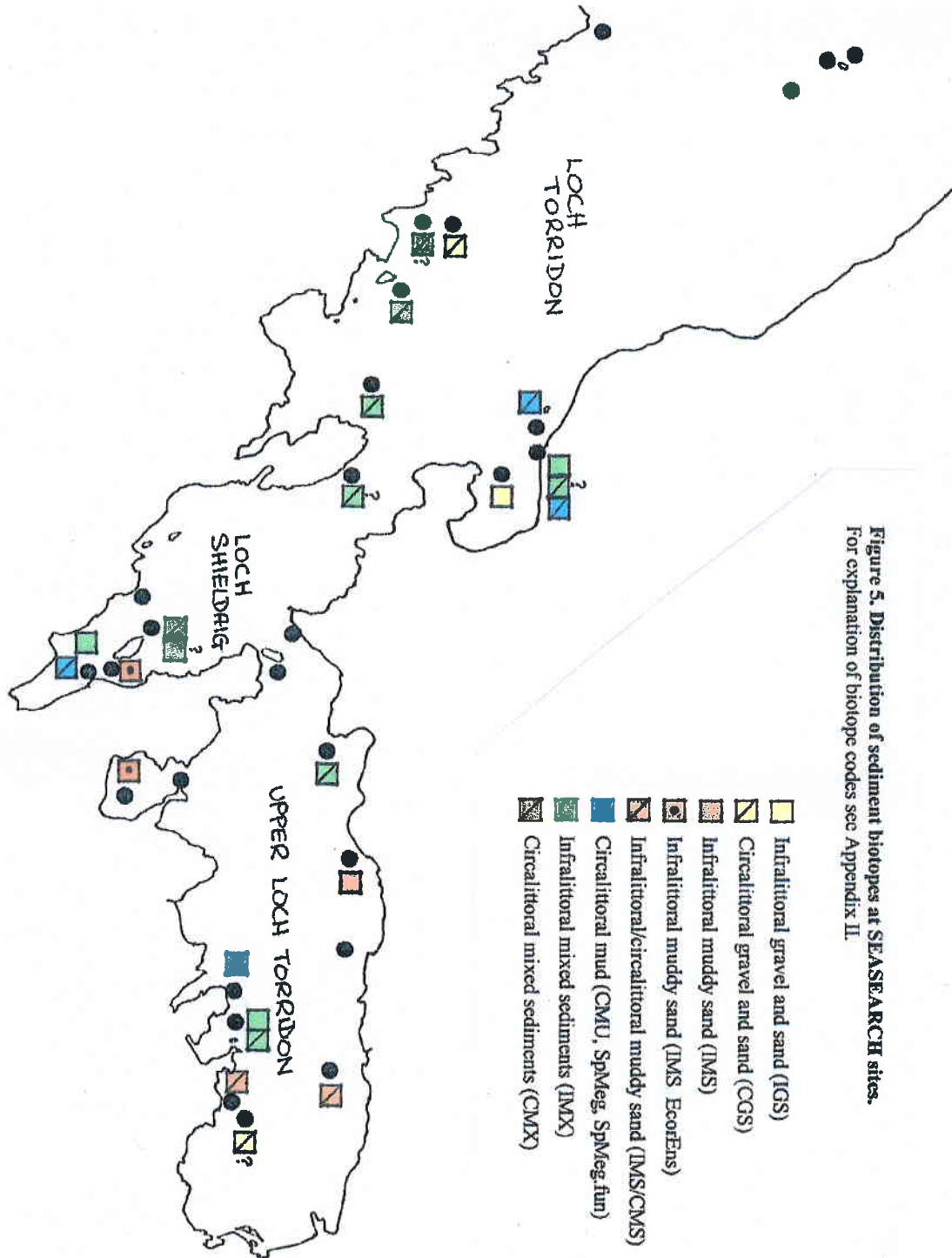


Figure 5. Distribution of sediment biotopes at SEASEARCH sites. For explanation of biotope codes see Appendix II

## APPENDIX I

## List of sites surveyed

Most site positions are taken from Admiralty chart no: 2210. Positions marked with an asterisk (\*) were taken by GPS on the Lothian club boat; those marked with a double asterisk (\*\*) were taken by GPS on the Skye boat.

Site No	Site name	Position Lat/Long (source – chart, GPS)	Date	Divers	Dive time (mins)	Depths (m) BCD
1	Eilean Mor	57°33.6'0N, 05°44.80'W	18.08.00	RB/JM/SS	58	+0.8-25
2	Dubh Sgeir	57°33.50'N, 05°43.30'W	18.08.00	NC/DJ		
3	N side of Upper Loch Narrows	57°32.80'N, 05°39.80'W	18.08.00	JM/NC	55	+1.5-24
4	E Eilean a' Chaoil	57°32.65'N, 05°39.20'W	18.08.00	SS/RB/DJ	42	+1.5-12
5	Pinnacle S of Sgeir na Trian	57°36.65'N, 05°48.00'W	19.08.00	NC/BD	38	2-16
6	S of Sgeir na Trian	57°37.00'N, 05°47.84'W	19.08.00	ID/CG	54	+4.6-15
7	W of N end Sgeir na Trian	57°37.10'N, 05°48.00'W	19.08.00	JM/AF	42	+1.2-14
8	W of Sgeir a' Ghair	*57°35.243'N, 05°58.640'W	19.08.00	SS/DJ	65	2-16
9	Ridge N of Sgeir Dhubh	57°34.10'N, 05°45.80'W *57°33.981'N, 05°46.052'W	19.08.00	RB/CD	33	8-22
10	SE of Sgeir Dhubh	*57°33.874'N, 05°45.997'W	19.08.00	MH/VW	36	0-21
11	E of Sgeir Dughall, Loch Diabaig	*57°34.70'N, 05°42.770'W	19.08.00	SS/NC	35	12-34
12	N Loch Diabaig	57°34.70'N, 05°42.10'W *57°34.707'N, 05°42.397'W	19.08.00	RB/DJ/CD	46	1-17
13	N of Rubha na h-Airde	57°34.35'N, 05°42.20'W	19.08.00	MH/VW	34	0-14
14	Rubh a' Ghiubhais	57°33.0'N, 05°38.1'W	19.08.00	MB/LB	49	+1.8-16
15	S of Inveralligin	57°33.2'N, 05°36.3'W	19.08.00	FF/SC	43	+2.8-13
16	NW of Shildaig Is	57°31.6'N, 05°39.7'W	19.08.00	MB/LB	32	+0.5-20
17	E of Rhuroin	57°31.6'N, 05°40.4'W	19.08.00	FF/SC	20	+0.6-16
18	E entrance to Ob Gorm Beag	57°32.20'N, 05°34.53'W	19.08.00	JM/BD	40	1-19
19	S of Torridon House	57°32.98'N, 05°33.45'W	19.08.00	ID/CG	30	1-18
20	Ob Gorm Mor Entrance	57°32.22'N, 05°34.05'W	20.08.00	MH/CD	36	2-14
21	Ob Mheallaidh	57°31.45'N, 05°37.40'W	20.08.00	NC/VW	74	+4.9-1
22	Shildaig Village	57°31.40'N, 05°39.36'W	20.08.00	SS/BD	66	+1.3-2
23	W of Shildaig Jetty	57°31.20'N, 05°39.10'W	20.08.00	SS/ID/DJ	37	1-19
24	Ob Mheallaidh Entrance	57°31.88'N, 05°37.60'W	20.08.00	RB/SC	39	+1.1-1
25	S Loch Shildaig Entrance	57°33.25'N, 05°42.2'W	20.08.00	MH/CD	30	0-12
26	S of Rechullin	**57°33.100'N, 05°35.300'W	20.08.00	ID/JM	42	20-30
27	E of Sron an Dubh-Aird	**57°32.16'N, 05°32.93'W	20.08.00	FF/	50	0-21
28	Near Head of Upper Loch Torridon	**57°32.305'N, 05°32.835'W 57°32.63'N, 05°32.20'W	20.08.00	MB/LB	42	5-20

## APPENDIX II

## Biotores recorded by the survey

Biotope codes follow those in Connor et al (1997), except where marked with an asterisk (\*). Depths are in metres below Chart Datum.

Biotope code		Biotope title	Sites & depth	Substratum & features	Depth range
EIR	AlaLdig	<i>Alaria esculenta</i> and <i>Laminaria digitata</i> on exposed sublittoral fringe bedrock	6(+1.5)	Sloping bedrock	+1.5
MIR.KR	Lhyp.Pk	<i>Laminaria hyperborea</i> park and foliose red seaweeds on moderately exposed lower infralittoral rock	3(0-14), 5(2-11), 6(10-15), 7(10-14)	On bedrock at the most exposed sites surveyed, and one current-swept site in the narrows	0-15
MIR.GzK	LhypGz.Ft	Grazed <i>Laminaria hyperborea</i> forest with coralline crusts on upper infralittoral rock	6(0-10), 7(0-10), 8(3-10)	Sloping and broken bedrock	0-10
MIR.GzK	LhypGz.Pk	Grazed <i>Laminaria hyperborea</i> park with coralline crusts on upper infralittoral rock	5(2-11)	Bedrock on top of pinnacle	2-11
MIR.SedK	*Sac.Ft	<i>Saccorhiza polyschides</i> forest and other opportunistic kelps on disturbed upper infralittoral rock	1(0-4), 12(1-2)	Bedrock and large boulders	0-2
MIR.SedK	*Sac.Pk	<i>Saccorhiza polyschides</i> park and other opportunistic kelps on disturbed upper infralittoral rock	12(2-6)	Steep slope of large boulders	2-6
MIR.SedK	HalXK	<i>Halidrys siliquosa</i> and mixed kelps on tide-swept infralittoral rock with coarse sediment	22(0.7)	Stones in sand, some current	0.7
MIR.SedK	*Des	Dense <i>Desmarestia</i> spp on disturbed bedrock and boulders	8(10-15)	Boulder slope, moderately exposed	10-15
SIR.K	*LhypLdig.Ft	Mixed <i>Laminaria hyperborea</i> and <i>L. digitata</i> forest on sheltered upper infralittoral rock	4(0-4)	Upward-facing bedrock and boulders	0-4
SIR.K	LhypLsac.Ft	Mixed <i>Laminaria hyperborea</i> and <i>L. saccharina</i> forest on sheltered lower infralittoral rock	1(4-11), 2(0-7), 17(+0.6)	Bedrock and boulders	+0.6-11
SIR.K	Lsac.Ft	<i>L. saccharina</i> forest on very sheltered upper infralittoral rock	4(4-6), 10(0-5), 13(3-8), 14(+1-1), 15(0-3), 18(0-1), 25(0-1)	Bedrock, boulders and cobbles	+1-8

Biotope code		Biotope title	Sites & depth	Substratum & features	Depth range
SIR.K	Lsac.Pk	<i>L. saccharina</i> park on very sheltered lower infralittoral rock	1(11-14), 2(6-12), 5(14-15), 9(10-14), 10(5-13), 11(12-14), 14(1-10), 25(1-10)	Bedrock and boulders, often with coarse sediments	1-15
MCR.ByH		Bryozoan/hydroid turfs, sand influenced	3(14-24)	Slope of embedded boulders	14-24
MCR.Bri	Oph	<i>Ophiothrix fragilis</i> and/or <i>Ophiocomina nigra</i> beds on slightly tideswept circalittoral rock or mixed substrata	3(14-24)	Pebbles, cobbles, shell sand and scattered boulders	14-24
SCR.BrAs	AntAsH	<i>Antedon</i> spp, solitary ascidians and fine hydroids on sheltered circalittoral rock	2(16-21), 14(10-12)	Boulders in mixed sediments, sloping bedrock	10-21
SCR.BrAs	AmenCio	Solitary ascidians, including <i>Ascidia mentula</i> and <i>Ciona intestinalis</i> , on very sheltered circalittoral rock	2(12-17), ?9(14-20), 11(15-28)	Boulder slopes with shell gravel patches; smooth steep bedrock.	12-28
SCR.BrAs	Aasp	<i>Ascidiella aspersa</i> on sheltered circalittoral rocks on muddy sediment	?15(6-11), 17(8-16)	Silted bedrock and boulders; boulders on muddy shell gravel	6-16
SCR.BrAs	NeoPro	<i>Neocrania anomola</i> and <i>Protanthea simplex</i> on very sheltered circalittoral rock	26(21-29)	Pebbles, cobbles and small boulders in muddy sediments	21-29
IGS		Infralittoral gravel and sand	13(11-14)	Shelly gravel & a few pebbles	11-14
IGS.Mrl		Maerl beds	9(8-11), 24(+1-1)	Coarse sediments with maerl	+1-11
IGS.Mrl	Phy	<i>Phymatolithon calcareum</i> beds in infralittoral clean gravel or coarse sand	6(14-15), 8(15-16),	Coarse sediments with maerl	14-16
CGS		Circalittoral gravel and sand	9(20-22), ?28(10-20)	Slope of sand, shell and maerl gravel	10-22
IMS		Infralittoral muddy sand	15(11-13)	Shell gravel slope with scattered boulders	11-13
IMS/CMS		Infralittoral/circalittoral muddy sand	19(5-18), 27(5-21)	Slopes of muddy sand	5-21
IMS.Sgr	Zmar	<i>Zostera marina</i> / <i>angustifolia</i> beds in lower shore or infralittoral clean or muddy sand	22(0.7-1)	Level fine sand with eelgrass	0.7-1
IMS.FaMS	EcorEns	<i>Echinocardium cordatum</i> and <i>Ensis</i> sp in lower shore or shallow sublittoral muddy fine sand	?21(+1.5 ob), 22(1-2)	Fine sand with burrowing urchins, lugworms and other fauna	?-2

Biotope code		Biotope title	Sites & depth	Substratum & features	Depth range
CMU		Circolittoral mud	23(9-15)	Slope of muddy sediment with diatoms	9-15
CMU	SpMeg	Seapens and burrowing megafauna in circolittoral soft mud	18(9-19), 23(15-19)	Gentle slopes of soft mud with seapens and burrows	9-19
CMU	SpMeg.Fun	Seapens, including <i>Funiculina quadrangularis</i> , and burrowing megafauna in undisturbed circolittoral soft mud	11(28-33), 12(25-30)	Soft mud slopes and plains. <i>Asteronyx loveni</i> at site 11	25-33
IMX		Infralittoral mixed sediments	12(6-15), ?16(7-10), 20(4-8), 23(1-9),	Mixed sediments, shells and boulders	1-15
IMX.KSwMx	LsacX	<i>Laminaria saccharina</i> , <i>Chorda filum</i> and filamentous red seaweeds on sheltered infralittoral sediment	4(6-12), 16(0-7), 17(0-8), 18(1-9), 19(4-5), 20(2-4), 21(0.4,ob), 27(0-5)	Muddy sand, shell gravel, shells, pebbles & boulders	0-12
IMX.KSwMx	Tra	Mats of <i>Trailliella</i> on infralittoral muddy gravel	20(9-19), 24(1), 28(5-10)	Muddy anoxic sediments	1-19
CMX		Circolittoral mixed sediments	1(14-25), 2(16-21), 5(15-16), ?10(13-21), ?12(15-25), 14(12-16), 16(10-20), 20(10-14), ?25(10-12)	Coarse muddy sediments, scattered shells, pebbles, cobbles and boulders	10-25



## APPENDIX III

## Biotopes recorded at each site

Biotope codes follow those in Connor et al (1997) except where marked with an asterisk. Depths are in metres below Chart Datum

Site No	Biotope	Depth	Substratum & features	
1	MIR.SedK	*Sac.Ft	0-4	Bedrock & boulders
1	SIR.K	LhypLsac.Ft	4-11	Gentle boulder slope, gravel patches
1	SIR.K	Lsac.Pk	11-14	Steep boulder slope
1	CMX		14-25	Coarse sediments, scattered pebbles, cobbles & shells
2	SIR.K	LhypLsac.Ft	0-6	Bedrock with large steps
2	SIR.K	Lsac.Pk	6-12	Vertical bedrock with ledges, ascidians & featherstars
2	SCR.BrAs	AmenCio	12-17	Boulder slope with shell gravel patches
2	SCR.BrAs	AntAsH	16-21	Boulders in mixed sediments
2	CMX		16-21	Slope of mixed sediments, scattered boulders
3	MIR.KR	Lhyp.Pk	0-14	Rock wall
3	MCR.ByH		14-24	Slope of embedded boulders
3	MCR.Bri	Oph	14-24	Pebbles, cobbles & shell sand with brittlestars, scattered boulders
4	SIR.K	*LhypLdig.Ft	0-4	Upward-facing bedrock & boulders
4	SIR.K	Lsac.Ft	4-6	Smooth sloping bedrock & boulders
4	IMX.KSwMx	LsacX	6-12	Muddy shell gravel with shells, pebbles and seaweeds
5	MIR.KR or MIR.GzK	Lhyp.Pk LhypGz.Pk	2-11	Bedrock on top of pinnacle, with steps, gullies and ridges.
5	SIR.K	Lsac.Pk	14-15	Bedrock slope, patches of shell gravel
5	CMX		15-16	Coarse sediments with scattered boulders & pebbles
6	ELR.MB	MytB	+2.9	Intertidal bedrock
6	EIR.KFaR	AlaLdig	+1.5	Sloping bedrock in sublittoral fringe
6	MIR.GzK	LhypGz.Ft	0-10	Sloping bedrock
6	MIR.KR	Lhyp.Pk	10-15	Sloping & terraced bedrock with small boulders
6	IGS.Mrl	Phy	14-15	Maerl & shell gravel
7	MIR.GzK	LhypGz.Ft	0-10	Sloping bedrock
7	MIR.KR	Lhyp.Pk	10-14	Gentle boulder slope
8	MIR.GzK	LhypGz.Ft	3-10	Broken bedrock with vertical faces & deep gullies
8	?MIR.SedK	*Des	10-15	Boulder slope with red algae and <i>Desmarestia</i>
8	IGS.Mrl	Phy	15-16	Coarse sediments & maerl
9	IGS.Mrl	?Phy	8-11	Shell gravel & maerl, scattered boulders
9	SIR.K	Lsac.Pk	10-14	Boulders on bedrock with coarse sediment patches
9	?SCR.BrAs	Amen	14-20	Shell gravel, maerl & boulders on bedrock
9	CGS		20-22	Slope of sand, shell & maerl gravel
10	SIR.K	Lsac.Ft	0-5	Large boulders
10	SIR.K	Lsac.Pk	5-13	Slope of boulders on gravel
10	?CMX		13-21	Boulders in shell sand & gravel
11	SIR.K	Lsac.Pk	12-14	Top of bedrock sill with kelp & featherstars
11	SCR.BrAs	AmenCio	15-28	Smooth, steep glaciated bedrock slope with ascidians
11	CMU	SpMeg.Fun	28-33	Soft mud slope with <i>Funiculina</i> bed and <i>Asteronyx loveni</i>
12	MIR.SedK	*Sac.Ft	1-2	Upper surfaces of large boulders
12	MIR.SedK	*Sac.Pk	2-6	Steep slope of large boulders
12	IMX		6-15	Steep slope of muddy sand, shells & boulders
12	?CMX		15-25	Slope of muddy sand with some shell gravel
12	CMU	SpMeg.Fun	25-30	Soft mud slope with <i>Funiculina</i> bed

Site No	Biotope		Depth	Substratum & features
13	SIR.K	Lsac.Ft	3-8	Bedrock & boulders
13	SIR	?	8-12	'Bare' rock
13	SIR	?	8-12	Vertical rock
13	IGS		11-14	Shelly gravel with a few pebbles
14	SIR.K	Lsac.Ft	+1-1	Bedrock with shell gravel patches
14	SIR.K	Lsac.Pk	1-6	Bedrock with shell gravel patches
14	SIR.K	Lsac.Pk	6-10	Large boulders on shell gravel slope
14	SCR.BrAs	AntAsH	10-12	Bedrock slabs at 30 degree angle
14	CMX		12-16	Shell gravel slope with scattered boulders
15	SIR.K	Lsac.Ft	0-3	Cobbles & small boulders
15	?SCR.BrAs	Aasp	6-11	Silted bedrock & boulders
15	IMS		11-13	Coarse muddy sand & gravel with burrows & tubes
16	IMX.KSwMx	Lsac.X	0-7	Shell gravel with a few small boulders
16	?		7-10	Shell gravel with 50% boulders
16	CMX		10-20	Steep slope of shell gravel with scattered boulders
17	SIR.K	LhypLsac.Ft	+0.6	Slope of small boulders
17	IMX.KSwMx	LsacX	0-8	Boulders with some shell sand & gravel
17	SCR.BrAs	Aasp	8-16	Steep slope of boulders on muddy shell gravel
18	SIR.K	Lsac.Ft	0-1	Slope of small angular boulders
18	IMX.KSwMx	LsacX	1-9	Sediment slope with scattered boulders
18	CMU	SpMeg	9-19	Gentle slope of soft mud with burrows
19	IMX.KSwMx	LsacX	4-5	Gentle slope of muddy sand with pebbles
19	IMS/CMS		5-18	Steep slope of fine muddy sand
20	IMX.KSwMx	LsacX	2-4	Shelly gravel with medium boulders
20	IMX		4-8	Muddy sediment with cobbles and burrows
20	IMX.KSwMx	Tra	9-10	Muddy anoxic sediment with Trailliella mat
20	CMX		10-14	Silty sediment with small boulders and pebbles
21	?IMS.FaMS	EcorEns	+1.5 (ob)	Fine sand with lugworm mounds and urchin burrows in shallow silled ob
21	IMX.KSwMx	LsacX	0.4 (ob)	Mixed substrata in shallow silled ob
22	IMS.Sgr	Zmar	0.7-1	Fine sand with eelgrass
22	?MIR.Sed.K	HalXK	0.7	Level seabed with stones in sand and scour-resistant algae
22	IMS.FaMS	EcorEns	1-2	Fine sand with diatom film, burrows and tubes
23	IMX		1-9	Steep slope of coarse sand and cinders with diatoms
23	CMU		9-15	Slope of muddy sediment with diatoms
23	CMU	SpMeg	15-19	Gentle slope of soft mud, seapens and <i>Nephrops</i>
24	IGS.Mrl	?Phy	+1-1	Coarse sediments with dead and live maerl
24	?IMX.KSwMx	Tra	1	Shell sand with algal mat and kelp
25	SIR.K	Lsac.Ft	0-1	Boulders and bedrock
25	SIR.K	Lsac.Pk	1-10	Steep slope of angular boulders
25	?CMX		10-12	Steep slope of boulders in shelly silt
26	?SCR.BrAs	NeoPro	21-29	Silt, cobbles, pebbles and small boulders
27	IMX.KSwMx	LsacX	0-5	Scattered boulder and bedrock on muddy sand
27	IMS/CMS		5-21	Slope of muddy sand with broken shells
28	?IMS.KSwMx	Tra	5-10	Slope of muddy gravel with algal mat
28	?CMS		10-20	Slope of muddy gravel with some maerl

## APPENDIX IV

## Species recorded by the survey

Nomenclature follows that in Howson & Picton (1997); sites are located on Figure 1.  
(e) = eggs only

SPECIES	
<b>RHODOPHYCOTA</b>	
<i>Sciniaia</i> sp	4,6,8,
<i>Bonnemaisonia asparagoides</i>	6,8
<i>Trailliella</i>	1,4,8,11,17,20,22,24,?28
<i>Callophyllis laciniata</i>	1
<i>Kallymenia reniformis</i>	8
Encrusting corallines	1,2,3,4,5,6,7,8,9,10,11,12,14,15,16,17,21,24,25,26,27
Maerl	3,6,8,9,24,27,28
<i>Gracilaria verrucosa</i>	19
<i>Phyllophora crispa</i>	4
<i>Phyllophora pseudoceranooides</i>	4
<i>Chondrus crispus</i>	2
<i>Plocamium cartilagineum</i>	1,4,6
<i>Furcellaria lumbricalis</i>	22
<i>Ceramium</i> sp	4,22
<i>Halurus flosculosus</i>	4
<i>Ptilota gunneri</i>	8
<i>Cryptopleura ramosa</i>	8
<i>Delesseria sanguinea</i>	6,8,16
<i>Hypoglossum hypoglossoides</i>	22
<i>Membranoptera alata</i>	8
<i>Phycodrys rubens</i>	3
<b>CHROMOPHYCOTA</b>	
<i>Leathesia difformis</i>	22
<i>Stilophora rhizodes</i>	?22
<i>Mesogloia vermiculata</i>	1,22
<i>Cutleria multifida</i> ( <i>Aglaozonia</i> )	1,8
<i>Dictyota dichotoma</i>	1,2,4,5,6,11,15,22
<i>Desmarestia aculeata</i>	1,6,7
<i>Desmarestia viridis</i>	8
<i>Arthrocladia villosa</i>	8
<i>Asperococcus turneri</i>	4,15,22,24,27,28
<i>Asperococcus</i> sp	1,17
<i>Chorda filum</i>	4,12,15,16,17,18,19,20,21,22,23,24
<i>Laminaria digitata</i>	4,6,24
<i>Laminaria hyperborea</i>	1,2,3,4,5,6,7,8,14,16,17,21,22
<i>Laminaria saccharina</i>	1,2,4,5,7,8,9,10,11,13,14,15,16,17,18,19,20,21,22,23,24,25,27,28
<i>Saccorhiza polyschides</i>	1,6,10,12

<b>SPECIES</b>	
<i>Alaria esculenta</i>	6
<i>Fucus serratus</i>	19,21,27
<i>Fucus</i> sp (sporelings)	6
<i>Himantalia elongata</i>	6,14
<i>Halidrys siliquosa</i>	22
Filamentous brown	?28
Encrusting brown	2,3,4,5,21
<b>CHLOROPHYCOTA</b>	
<i>Enteromorpha</i> sp	6,12,13,20,22
<i>Ulva</i> sp	1,10,12,13,17,20,21,22,24,25
<i>Cladophora</i> sp	1,4
Filamentous green	21
<b>CHRYSOPHYCOTA</b>	
Diatom film	19,22,23
<b>ANGIOSPERMAE</b>	
<i>Zostera marina</i>	22
<b>BACTERIA</b>	
Bacteria indet	15
<b>FORAMINIFERA</b>	
Giant naked foraminifera	1,12,23
<b>PORIFERA</b>	
<b>Suberites carnosus</b>	23
<i>Halichondria panicea</i>	8,21
Orange sponge on scallop	27
Porifera indet	21,25
<b>CNIDARIA</b>	
<i>Hydractinia echinata</i>	1,15,22,23,27
<i>Halecium</i> sp	26
<i>Nemertesia antennina</i>	8,14
<i>Nemertesia ramosa</i>	3
<i>Hydrallmania falcata</i>	11
<i>Laomedea flexuosa</i>	14
<i>Obelia geniculata</i>	1,3,4,7,15,17,24
<i>Obelia</i> sp	11,17
<i>Rhizocaulus verticillatus</i>	3,4,16
Hydroidea indet	1,2,3,9,10,11,17,18,24,25
<i>Alcyonium digitatum</i>	3,5,8,12
<i>Funiculina quadrangularis</i>	11
<i>Virgularia mirabilis</i>	11,18
<i>Pennatula phosphorea</i>	11,23
<i>Cerianthus lloydii</i>	1,15,18,19,22,23,24,27
<i>Protanthea simplex</i>	2,26
<i>Anemonia viridis</i>	6,7,21
<i>Urticina felina</i>	3,8
<i>Metridium senile</i>	3,14,23
<i>Adamsia carciniopados</i>	1,2,3,5,8,11
<i>Corynactis viridis</i>	7

<b>SPECIES</b>	
<i>Caryophyllia smithii</i>	3,8,26
<b>NEMERTEA</b>	
<i>Lineus longissimus</i>	8
<b>ECHIURA</b>	
?Echiuran indet	22
<b>ANNELIDA</b>	
<i>Chaetopterus variopedatus</i>	1,3,5,6,9,15,27
<i>Arenicola marina</i>	19,21,22,23
Terebellidae indet	15,19,22,27
<i>Amphitrite</i> sp	5,20
<i>Eupolmnia nebulosa</i>	28
<i>Lanice conchilega</i>	1,6,8,19,26,27
<i>Myxicola</i> sp	19,23
<i>Sabella pavonina</i>	21
<i>Pomatoceros triqueter</i>	1,2,4,5,6,10,11,12,13,14,15,19,20,21,24,25,26
<i>Serpulida vermicularis</i>	27
Serpulidae indet	26
Spirorbidae indet	2
Polychaete tubes indet	22
<b>CHELICERATA</b>	
Pycnogonida indet	2
<b>CRUSTACEA</b>	
<i>Balanus balanus</i>	6
<i>Balanus crenatus</i>	6,19
Cirripedia indet	1,4,5,6,12,25
Mysidae indet	8
Caridea indet	8,19,26
<i>Nephrops norvegicus</i>	11,18,23
<i>Pagurus bernhardus</i>	6,12,19
<i>Pagurus prideaux</i>	1,2,3,5,8,11
Paguridae indet	1,2,3,4,8,9,13,15,18,20,21,22,23,24,26,27,28
<i>Galathea strigosa</i>	2,8,10
<i>Munida rugosa</i>	1,2,3,5,8,9,10,11,12,14,15,16,18,20,23,25,26,27
<i>Inachus dorsettensis</i>	1,4
<i>Macropodia rostrata</i>	1,22
<i>Macropodia</i> sp	4
Spider crab indet	1,9,18
<i>Atelecyclus rotundatus</i>	6
<i>Cancer pagurus</i>	3,6,10,12,14,16,21,22,24
<i>Liocarcinus depurator</i>	4,6,14,15,17,18,19,21,22,25,27
<i>Liocarcinus</i> sp	28
<i>Necora puber</i>	1,2,4,5,6,10,12,13,20,21,22,24
<i>Carcinus maenas</i>	1,11,18,19,20,21,22,24,27
<b>MOLLUSCA</b>	
Polyplacophora indet	12,15,27
<i>Patella vulgata</i>	6
<i>Helcion pellucidum</i>	24

<b>SPECIES</b>	
<i>Gibbula magus</i>	1,20
<i>Gibbula cineraria</i>	1,4,7,9,17
<i>Gibbula</i> sp	25
<i>Calliostoma ziziphinum</i>	1,2,4,7,9,13,24
<i>Turritella communis</i>	20,23
<i>Nucella lapillus</i>	2
<i>Lunatia alderi</i>	8
<i>Buccinum undatum</i>	22,23,27
<i>Pleurobranchus membranaceus</i>	2(e),11
<i>Dendronotus frondosus</i>	3
<i>Limacia clavigera</i>	11
<i>Flabellina pedata</i>	8
<i>Mytilus edulis</i>	6,13,23
<i>Modiolus modiolus</i>	21,27
<i>Chlamys varia</i>	15
<i>Aequipecten opercularis</i>	3,19,26,27,28
<i>Pecten maximus</i>	1,3,4,5,8,10,13,14,16,18,20,21,26,27,28
Anomiidae indet	24
<i>Ensis</i> sp	1,6,14,19
<i>Eledone cirrhosa</i>	8,12
<b>BRACHIOPODA</b>	
<i>Neocrania anomala</i>	15,26
<b>BRYOZOA</b>	
<i>Celleporella hyalina</i>	14,16
<i>Membranipora membranacea</i>	4,6,8,14,15,16,17,22,25
<i>Electra pilosa</i>	11,14,16
Encrusting on kelp	2,7,24
<i>Scrupocellaria reptans</i>	16
Encrusting indet	1,2,3,4,5,15,17
<b>ECHINODERMATA</b>	
<i>Antedon bifida</i>	2,3,4,5,6,9,10,11,13,14,15,25
<i>Antedon petasus</i>	11
<i>Astropecten irregularis</i>	6,8,27
<i>Luidea ciliaris</i>	1,2,3,5,6,7,8,25
<i>Luidea sarsi</i>	12
<i>Porania pulvillus</i>	1,2,3,5,6,7,9,10,11,12,13,14,16,17,18,25
<i>Solaster endeca</i>	9,13
<i>Crossaster papposus</i>	2,3,6,14,27,28
<i>Henricea</i> sp	7,8,26
<i>Asterias rubens</i>	1,2,3,4,5,7,8,9,10,12,14,15, 16,17,18,19,20,21,22,23,24,26,27,28
<i>Marthasterias glacialis</i>	1,2,6,8,9,10,12,14,24
<i>Ophiothrix fragilis</i>	27
<i>Ophiocomina nigra</i>	6
<i>Ophiura albida</i>	1,15,23,27
<i>Ophiura ophiura</i>	5
<i>Asteronyx loveni</i>	11

<b>SPECIES</b>	
Brittlestars indet	3,12,26,28
<i>Psammechinus miliaris</i>	27,28
<i>Echinus esculentus</i>	1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,23,24,26,27,28
<i>Echinocardium cordatum</i>	21,22
<b>TUNICATA</b>	
<i>Clavelina lepadiformis</i>	2,4,5,8,10,13,21,24
<i>Diplosoma</i> sp	21,22
Didemnidae indet	16
<i>Ciona intestinalis</i>	1,2,3,5,6,7,11,14,16,26
<i>Diazona violacea</i>	2
<i>Corella parallelogramma</i>	2,10,15
<i>Asciidiella aspersa</i>	1,7,10,11,12,15,16,17,18,22
<i>Asciidiella scabra</i>	8,22,24,25
<i>Asciidiella</i> sp	2,9
<i>Ascidia mentula</i>	1,2,7,8,9,10,11,12,15,17,18
<i>Botryllus schlosseri</i>	2,10,16
<i>Botrylloides leachii</i>	16
<b>PISCES</b>	
<i>Scyliorhinus canicula</i>	1,3,4,5,21,28
<i>Raja batis</i>	9
<i>Raja clavata</i>	28
Ray indet	27
Clingfish indet	8
<i>Gadus morhua</i>	3,12
<i>Molva molva</i>	5
<i>Pollachius virens</i>	1,3,7,8,10,17,25
<i>Trisopterus luscus</i>	2
<i>Trisopterus minutus</i>	8,10,13,20,23
Gadidae indet	4
<i>Spinachia spinachia</i>	23
<i>Nerophis lumbriciformis</i>	22,?27
<i>Eutrigla gurnardus</i>	27
<i>Myoxocephalus scorpius</i>	17
<i>Taurulus bubalis</i>	2,14,21,22,27
<i>Centrolabrus exoletus</i>	4,5
<i>Crenilabrus melops</i>	2,8
<i>Ctenolabrus rupestris</i>	2,7,8
<i>Labrus bergylta</i>	1,2,25
<i>Labrus mixtus</i>	2,5,7,8,16
<i>Pholis gunnellus</i>	1,9,15,19,20,21,22,24,27
<i>Ammodytes</i> sp	8
<i>Callyonymus lyra</i>	1,8,13,18
<i>Gobiusculus flavescens</i>	4,21
<i>Lesueurigobius friesii</i>	11, 23
<i>Pomatoschistus pictus</i>	4,21,22,24
<i>Pomatoschistus</i> sp	6,8,13,17,19,20,21,22,23,27



<b>SPECIES</b>	
<i>Thorogobius ephippiatus</i>	1,2,5,6,8,10,12,16,17,25
<i>Phrynorhombus norvegicus</i>	3
<i>Microstomus kitt</i>	5
<i>Pleuronectes platessa</i>	4,21,22
Pleuronectidae indet	27

## APPENDIX V

## Catalogue of photographs taken on SEASEARCH survey

All photographs taken by Sue Scott. Photos marked 'SS' were taken on dives outwith the SEASEARCH survey and have been donated from personal collections.

## SCENIC AND PEOPLE

- 00.209.01. Divers on Shieldaig slipway and in Lothian Divers club boat.
- 00.209.02. Skye Club boat with divers in front of Shieldaig Island.
- 00.209.06. Skye Club boat with divers in front of Shieldaig Island.
- 00.209.14. Sunset over Loch Shieldaig.
- 00.209.20. Sunset over Ob Mheallaidh, Upper Loch Torridon.
- 00.209.23. Ob Mheallaidh and Upper Loch Torridon.
- 00.211.19. Skye Club boat off Shieldaig slipway.
- 00.243.05. Survey divers on Lothian Club boat 'Safina'.
- 00.243.09. Finding sites using echo sounder trace.
- 00.243.11. Divers kitting up.

## UNDERWATER

**West of Sgeir a'Ghair (Site 8)**

- 00.210.04. Digger Jackson recording on maerl gravel and maerl *Phymatolithon calcareum*.
- 00.210.11. Male cuckoo wrasse *Labrus mixtus* amongst urchin-grazed kelp and boulders.
- 00.210.12. Male cuckoo wrasse *Labrus mixtus* amongst urchin-grazed kelp and boulders.
- 00.210.15. Gravel and boulders with dense algae.
- 00.210.16. Male (R) and female (L) cuckoo wrasse *Labrus mixtus* amongst urchin-grazed boulders.
- 00.210.18. Digger Jackson surveying, with male cuckoo wrasse *Labrus mixtus* amongst urchin-grazed boulders.
- 00.210.19. Digger Jackson surveying in *Laminaria hyperborea* kelp forest.
- 00.210.21. Digger Jackson surveying in *Laminaria hyperborea* kelp forest.
- 00.210.22. Dense *Laminaria hyperborea* kelp forest with hydroids and bryozoans on fronds.
- 00.210.23. Urchin-grazed *Laminaria hyperborea* kelp forest.
- 00.210.27. Dense *Laminaria hyperborea* kelp forest.
- 00.210.28. Dense *Laminaria hyperborea* kelp forest.

**Eilean Mor (Site 1)**

- 00.211.01. Jeremy Milne surveying mixed sediments.
- 00.211.02. Jeremy Milne surveying mixed sediments.
- 00.211.03. Brown crab *Cancer pagurus* on coarse sediments.
- 00.211.04. Mixed seabed of urchin-grazed boulders and gravel.
- 00.211.05. Rosemary Bayne over urchin-grazed sugar kelp (*Laminaria saccharina*) forest.

- 00.211.06. Rosemary Bayne over sugar kelp (*Laminaria saccharina*) forest.  
 00.211.07. *Desmarestia aculeata* on scoured boulders.  
 00.211.08. Surveying in forest of furbelows (*Saccorhiza polyschides*).  
 00.211.11. Forest of furbelows (*Saccorhiza polyschides*).

#### East Eilean a'Chaoil (Site 4)

- 00.211.12. Mixed seabed of coarse sediment and cobbles, with bivalve shells, kelp, featherstars, urchins and starfish.  
 00.211.14. Mixed seabed of coarse sediment and cobbles, with bivalve shells, kelp, featherstars, a dab (*Limanda limanda*) and shoal of poor cod (*Trisopterus minutus*).  
 00.211.15. Mixed seabed of coarse sediment with bivalve shells, kelp, and a variety of smaller algae.  
 00.211.16. Dense sugar kelp (*Laminaria saccharina*).  
 00.211.17. Dense sugar kelp (*Laminaria saccharina*).

#### East of Sgeir Dughall, Loch Diabaig (Site 11)

- 00.212.03. Deepwater brittlestar *Asteronyx loveni* on giant seapen *Funiculina quadrangularis*. (COPY)  
 00.212.08. Eggs of opisthobranch seaslug *Pleurobranchus membranaceus*.  
 00.212.09. Opisthobranch seaslug *Pleurobranchus membranaceus*.  
 00.212.12. Giant seapen *Funiculina quadrangularis*, close up showing polyps.  
 00.212.18. Seapen *Pennatula phosphorea*.  
 00.212.19. Featherstar *Antedon bifida* on ascidian.  
 00.212.21. Red cushion star *Porania pulvillus*.  
 00.212.23. Featherstars, spirorbid worms and sea mats on kelp frond.  
 00.212.24. Dense featherstars on kelp frond.  
 00.212.25. Dense featherstars and red algae (*Trailliella*) on rock.  
 00.212.26. Spirorbid worms and sea mats on kelp frond.  
 00.212.28. Hermit crab with cloak anemone *Adamsia carciniopados* emitting defensive acontia. Red filamentous algae (*Trailliella*) covering rock.  
 00.212.31. Nudibranch seaslug *Limacia clavigera* and spirorbid worms on kelp frond.  
 00.252.02. (SS). Fries' goby *Lesueurigobius friesii* and mud burrow.  
 00.252.09. (SS). Featherstars *Antedon bifida*, topshell *Calliostoma ziziphinum* and sea mats on kelp stipe.  
 00.252.22. (SS). Featherstar *Antedon bifida* on kelp frond.

#### North Loch Diabaig (Site 12)

- 00.253.01. (SS). Starfish *Luidea sarsi*.

#### West of Shildaig Jetty (Site 23)

- 00.213.07. Prawn, Norway lobster *Nephrops norvegicus*.  
 00.213.09. Prawn, Norway lobster *Nephrops norvegicus* and burrow.  
 00.213.11. Giant naked foraminiferan, view from top of 'pepperpot'.  
 00.213.21. Swimming crab *Liocarcinus depurator*.  
 00.213.27. Giant naked foraminiferan, view from side with part of 'pepperpot' removed  
 00.213.31. Hermit crab *Pagurus berngardus* with hydroid *Hydractinia echinata* covering shell.

**Shieldaig village (Site 22)**

- 00.215.04. Eelgrass *Zostera marina* in fine sand.
- 00.215.05. Ben Dipper surveying eelgrass *Zostera marina* in fine sand.
- 00.215.07. Ben Dipper surveying seabed of fine sand with *Chorda filum*, sugar kelp and other algae.
- 00.215.10. Ben Dipper surveying seabed of fine sand with *Chorda filum*.
- 00.215.11. Ben Dipper on seabed of fine sand, with spider crab *Macropodia rostrata*.
- 00.215.16. Ben Dipper surveying eelgrass *Zostera marina* in fine sand.
- 00.215.18. Fine sand with eelgrass *Zostera marina* and large lugworm mounds.
- 00.215.21. Fine sand with eelgrass *Zostera marina*, algae and lugworms.
- 00.215.25. Fine sand with burrows of heart urchin *Echinocardium cordatum*, swimming crab *Liocarcinus depurator* and tentacles of terebellid worms.
- 00.215.28. Green crab *Carcinus maenas* digging in fine sand.
- 00.215.32. Sea oak *Halidrys siliquosa* and mixed kelps on cobbles in fine sand.

## APPENDIX VI

### Examples of completed SEASEARCH forms

Two levels of SEASEARCH form were trialled during the Torridon survey. The basic form (first 4 sheets) comprises a site sheet and dive sheet, and can be completed by any diver. The second form (next 4 sheets) was designed to obtain more structured information on substrata and species, for use by divers with more experience of marine biological survey work.

# SEASEARCH

## SITE RECORDING FORM

Survey name: Loch Torridon Date of survey: 20.8.50

Site name: South of Reckullin Site number: 26

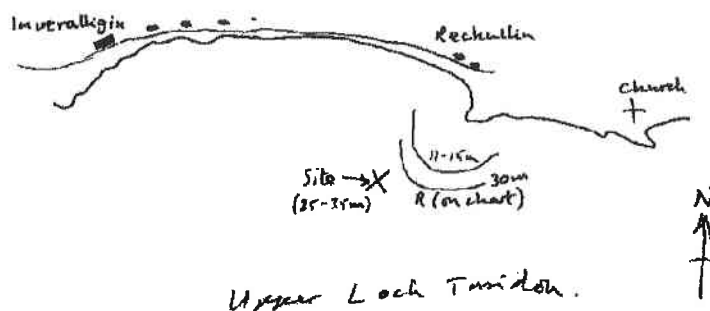
Site location: use one of the following: OS grid reference; latitude/longitude; Decca:

In. 57° 33.100' N 5° 35.300' W Out: 57° 33.100' N 5° 35.4' W

Name and address of person completing this form: IAN DIXON, ATLEFIELD, MAIN ST., ORTILISTON

E. LOTHIAN; JEREMY MILNE, HAMILTON HALL, COTTE BRIDGE, MID LOTHIAN

Map of area: Please insert a photocopy of a map or chart, or sketch map. Mark any rapids, areas of fast currents, offshore rocks and islands. Indicate transit marks where applicable. Please mark the dive locations on the map.



Reasons for site selection (see Guidance Notes):

Looking for steep slopes + rock, as indicated on chart of upper Loch Torridon at this point.

If any specimens were collected, who has them?

If any photographs were taken, who has them? IAN DIXON; Frames 2-31 inc. on F50; Fuji 50;

Please fill in this section to the best of your knowledge:

**A. Physical nature of the site.**

Is the site one of the following:- Open coast; enclosed coast; lagoon; straits or narrows; shallow rapids; (other?) ... SEA LOCH

Is the site:- Extremely exposed; very exposed; moderately exposed; sheltered; very sheltered; extremely sheltered? ... VERY SHELTERED.

Is the current:- very strong (6kn); strong (3-6kn); moderately strong (1-3kn); weak (less than 1kn); very weak; unknown? ... WEAK?

Additional comments on the nature of the site: .....

**B. Human usage and impact at the site.**

Fishing (e.g., trawling, potting, angling): .....

Fish farming (e.g., salmon, shellfish): .....

Extraction (e.g., of sand, gravel, oil): .....

Waste disposal (e.g., sewage, industrial discharge): .....

Litter: .....

Coastal defence (e.g., groynes, sea wall, breakwater): .....

Port or marina: .....

Moorings: ..... Launch site: .....

Watersports: ..... Popular dive site: .....

Educational/scientific use: .....

Your comments on the human usage of the area: ... Small hamlet / village on shore nearby.

Site protection at site or on nearby shore (e.g., Site of Special Scientific Interest, owned by the National Trust): .....

**C. Access.**

Is access easy, difficult or very difficult? ... DIFFICULT (DART)

**D. What is your assessment of the site, based on your experience?**

1. Underwater scenery (e.g., typical, unusual, spectacular): ... TYPICAL SIGHT SEALOCH HABITAT.

2. Range of habitats (little variety, wide variety): ... VERY LITTLE

3. Richness of marine life (sparse or dense in terms of numbers; poor or rich in terms of the variety of species): ... SPARSE TO MODERATE  
POOR VARIETY.



Marine Nature Conservation Review

SCASERCH is run by the Marine Conservation Society on behalf of the Joint Nature Conservation Committee

# SEASearch

## DIVE RECORDING FORM

Survey name: L.O. CH. TARRIDON Date of dive: 20/0/06

Site name: ..... Site number: 26 Dive number: .....

Name and address of recorder: IAN DIXON; JEREMY MILNE

Site location: use one of the following:- OS grid reference; latitude/longitude; Decca:

Start: 57° 32' 100' N 5° 35' 300' W

Time of dive (24hr clock please): Start: 11.55 Finish: 12.37 Duration: 4.2

Depth range below sea level: From: 2.5 To: 3.4

Depth range below chart datum (if known): From: 20.7 To: 21.3

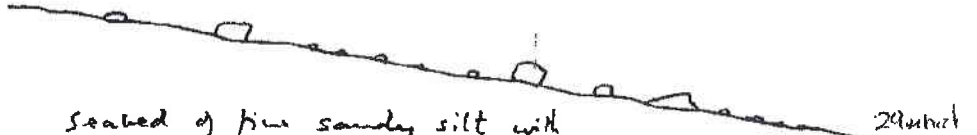
Underwater visibility: 5 m

**Sketch:**

Please sketch your dive plan (map) and profile. Draw any habitats, communities or peculiar features marking depths. Indicate positions corresponding to your written habitat descriptions (see reverse side of form).

on sediment: *Munida* <sup>(c)</sup> *ragosa*, *Asterias* <sup>(off)</sup>, *Harrisia* <sup>(R)</sup>, *Pagurus* <sup>(a)</sup>  
*Vermetaria* <sup>(c)</sup> in *Arctica* shell, *Echinus* <sup>(a)</sup>, *Pecten* <sup>(F)</sup>, *Aequipecten* <sup>(a)</sup>  
*Lanice conchiliga* <sup>(R)</sup> & *little stars* <sup>(a)</sup>  
 on stones: *Pink encrusting calc. alg.* <sup>(F/c)</sup>, *Pomatourus biguttatus* <sup>(F)</sup>, *Serpula* <sup>(a)</sup> sp.  
*Branchiopod* <sup>(F)</sup> (sp. indet), *Circa intestinalis*, *Malacostraca* <sup>(a)</sup> sp.  
*Protanthes* <sup>(a)</sup>, *Caryophyllia smithii* <sup>(R)</sup>, *Poromus* <sup>(a)</sup> indet.

21 m bed  
25 m  
BSL



Sealed off fine sandy silt with pebbles, cobbles and small boulders. Lots of burrows under stones (*Munida*) <sup>holes</sup> in sediment; generally quite lumpy (!). Some ? gastropod tracks. Some empty shells around, inc. scallops, *gemmae* & *Arctica*.



**Dive Description:**

Describe the following four points for each habitat you wish to describe. Try to use terms in the Guidance Notes. Please start with the shallowest (where applicable); number your habitats and indicate their positions on the sketch map and profile.

- 1. **Sea floor type (substratum).** 2. **Depth (range) of each habitat.** 3. **Communities** (describe conspicuous species and those which are most numerous; what is the general appearance of the community?). 4. **Any special features** that might influence the community (e.g., silt, urchin grazing).

1 habitat / biotope: -

Fine sandy silt with pebbles, cobbles and small boulders,  
 on gentle slope from 25 - 34 m BSL. Quite silty overall.  
 Stones = ~20% of habitat.

Main biota: *Murchiea rugosa* living under stones, plus  
 small *pagurus venustus* in *Turritella* shells. Rocks/stones  
 covered in pink enc. coral, algal crust, plus brachiopods  
 and occasional *Ciona* + *Protanthes*.



**Marine Nature Conservation Review**

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Leave blank	
Field site no.	25
Database input	
Survey no.	
Site no.	
Habitat nos.	
Input by	
Date	

## SEASearch RECORDING FORM

-----INSTRUCTIONS FOR COMPLETING THIS FORM-----

1. Please complete all sections of this form (\* means complete if information known).
2. If any parts of the form are unclear, refer to the accompanying 'Guidance Notes'.
3. Every diving buddy pair should complete one form per dive.
4. Where asked, please give as much detail about the sea bed and the conspicuous marine life as you are able to.

MARINE  
CONSERVATION  
SOCIETY

Survey name: TORRIDON 2000

Name & address of person completing this form:

Name CALUM DUNCAN

Address 3 COATES PLACE  
EDINBURGH  
EH2 3DX

Tel. no. (0131) 226 6360 (Hm/Wk)

Name of buddy MARLY HARVEY

Name of group (boat/club) LOTHIAN DIVERS

### SITE INFORMATION

Site name (if known) \*  
S LOCH SHIELDAIG ENTRANCE

Date (dd : mm : yy) 20 : 08 : 00

Time (24 hr : min) start 14 : 20 end 14 : 50

Duration of dive (hr : min) 00 : 30

Underwater visibility 12 m Enter single figure only

Depth of sea bed (m) (below sea level)

Upper	Lower
<u>3m</u>	<u>15m</u>

Tidal correction (to chart datum) \* 2.7 3.0

Corrected depth (m)\* (below chart datum)

Upper	Lower
<u>0.3</u>	<u>12</u>

Position	LATITUDE (N)		LONGITUDE (W) OR (E)	
	deg.	minutes	deg.	minutes
Centre of site	<u>57°</u>	<u>33.25</u>	<u>5°</u>	<u>42.2</u>
For drift dives From	°	.	°	.
To	°	.	°	.
Position derived from (circle):				
GPS	<u>Admiralty chart</u>	OS map	Other	

Physical details (check Guidance Notes) \*

Salinity	
Wave exposure	
Tidal streams	

Uses & impacts at the site (tick as appropriate) \*

Fishing - potting	Sand/gravel extraction
- trawling	Marina/port
- netting	Water sports
Angling	Known dive site
Sewage discharge	Other(s) (please state)
Waste dumping	
Litter & debris	

Site description: include general location of site (e.g. 4.5 km SE of Brighton); outline general sea bed type(s); & highlight any unusual or important features.

ROCK WALL AND STEEP BOULDER SLOPE AT SOUTH SHORE OF ENTRANCE TO LOCH SHIELDAIG. SUGAR KELP GROWING FROM 15m - 3m. DEEPER THAN 15m SHELLY SILT SLOPING AT ~20°. PARTICULARLY LARGE L. saccharinum GROWING FROM VERTICAL BEDROCK AT 8m DEPTH (BLADES > 2m)

Have you taken any of the following? (circle) photographs (habitat and/or species) specimens for preservation seaweeds for pressing

**DIVE INFORMATION 1**

Complete a box below for each biotope (= habitat + marine life) you encountered on your dive. Each written description should tally with the information entered in the columns on the opposite page and with your diagram on the back page. If you encountered more than 3 biotopes, please continue your descriptions on another Recording Form. Use terms given in the Promptsheet. For each biotope, please make sure you mention the following:

SEA BED TYPE    DEPTH RANGE    DOMINANT COVER ORGANISMS    CHARACTERISTIC SPECIES    SPECIAL INFLUENCES (e.g. SILT)

HABITAT NAME (leave blank)

1. DESCRIPTION    10-12m bed  
 45° SLOPE OF 0.5-1m ANGULAR BOULDERS (90% COVER) WITH PATCHES OF SHELLY SILT (10% COVER). BOULDERS ENCRUSTED WITH CORALLINE REDS. OCCASIONAL L. saccharina SPECIMEN. PEACH-COLOURED SPONGE (A. fuconum?)

HABITAT NAME (leave blank)

2. DESCRIPTION    10-12m bed  
 AS 1. ABOVE BUT COLONISED BY SUGAR KELP. BLADES COLONISED BY HYDROIDS AND SMALL ASCIDIANS AND, GETTING SMALLER, SEAMAT. 13m-14m BELOW SEA LEVEL. OCCASIONAL Luidia ciliaris. Porania CUSHION STARS AND M. nigra AMONG THE BOULDERS. LATTER ENCRUSTED IN CORALLINE REDS (CRUSTOSE), KEELWORMS AND BARNACLES. KELP BLADES WERE DRIZZLED WITH A FINE LAYER OF SILT. SHOAL OF SAITHE PASSED BY.

HABITAT NAME (leave blank)

3. DESCRIPTION    About 10-12m bed  
 AS 1. SUGAR KELP (100% COVER) ON 0.5-1m AND 1m BOULDERS AND ATOP VERTICAL CHUNKS OF BEDROCK, AGAIN ENCRUSTED WITH CRUSTOSE CORALLINES. SEA-MAT VERY COMMON ON KELP BLADES.

**HABITAT & SPECIES INFORMATION**

Each column below refers to a numbered biotope (relating to your descriptions on page 2). Tick boxes as indicated, or give percentages (please make sure these add up to 100%), or assign a score from 1-5 as appropriate. If you are uncertain about anything, leave the box blank.

1	2	3	
m			<b>DEPTH LIMITS</b>
13m	4m		Upper (from sea level) (i.e. minimum)
15m	13m	4m	Lower (from sea level) (i.e. maximum)
			Upper (from chart datum) *
			Lower (from chart datum) *

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

1-5			<b>FEATURES - SEDIMENT</b>
			Mounds / casts
			Burrows / holes
			Waves (>10 cm high)
			Ripples (< 10 cm high)
			Subsurface coarse layer?
			Subsurface anoxic (black) layer?

For each biotope, estimate the % cover<sup>3</sup> provided by:

1	2	3	
			green algae
			brown algae (incl kelp)
			red algae
			encrusting pink algae
			hydroid-bryozoan turf

1	2	3	
%			<b>SUBSTRATUM</b>
			Bedrock type?
			Boulders - very large > 1.0 m
			- large 0.5 - 1.0 m
			- small 0.25 - 0.5 m
			Cobbles (fist - head size)
			Pebbles (50p - fist size)
			Gravel - stone
			- shell fragments
			Sand - coarse <sup>2</sup>
			- medium <sup>2</sup>
			- fine <sup>2</sup>
			Mud
			Shells (empty - or as large pieces)
			Shells (living - e.g. mussels, s limpets)
			Artificial - metal
			- concrete
			- wood
			Other (state)
100	100	100	Total

1-5			<b>FEATURES - SEDIMENT</b>
			Firmness (firm - soft)
			Stability (stable - mobile)
			Sorting (well - poor)

Notes  
<sup>1</sup> Categories of 'bedrock' include: granite, slate, sandstone, shale, limestone, chalk, mudstone, clay, peat & 'not known'.  
<sup>2</sup> If the sand is silty or muddy, ensure that a small value is also entered under 'Mud'.  
<sup>3</sup> As this includes all surfaces, totals may exceed 100%.

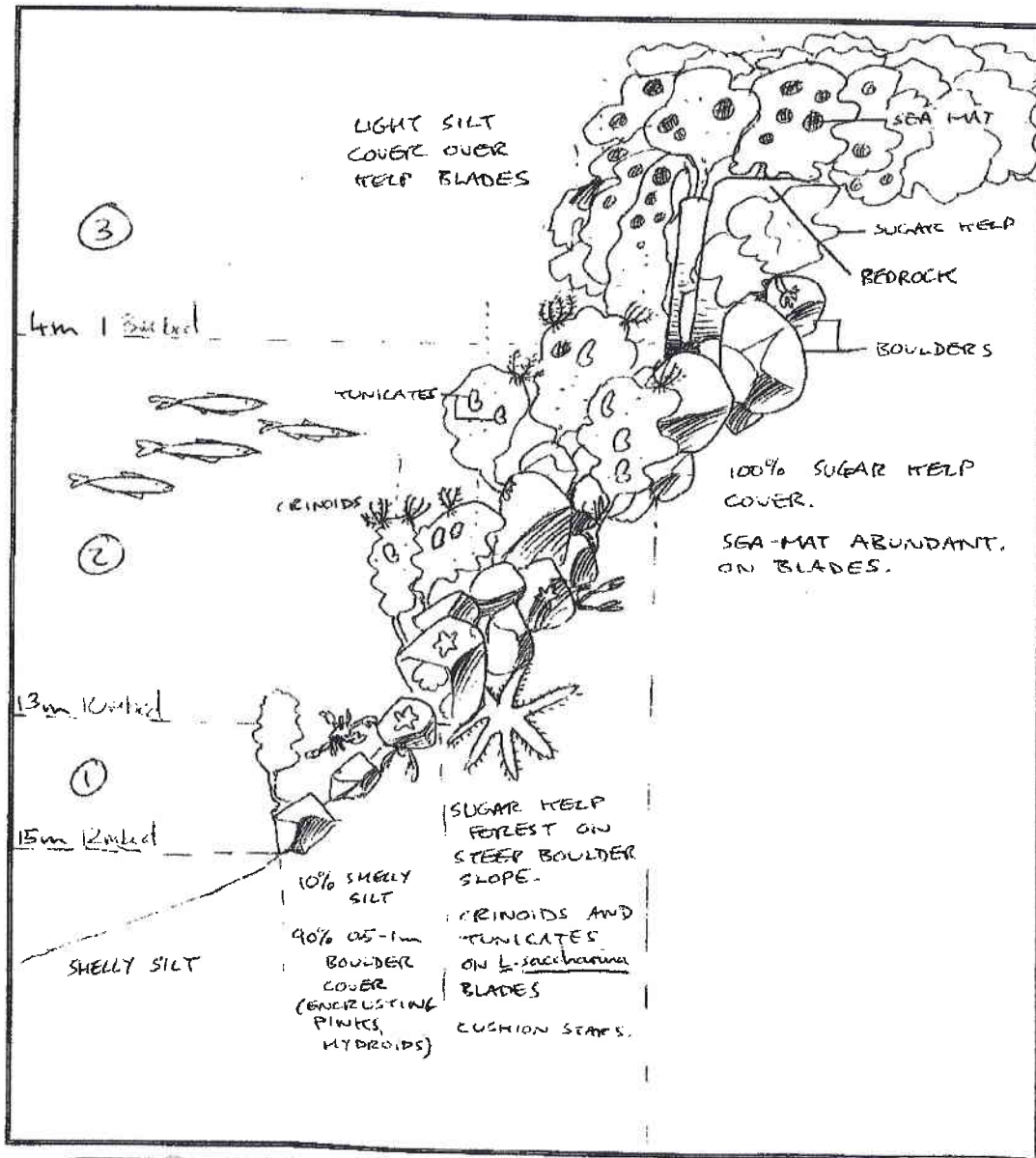
List the seaweeds & animals which you were able to identify positively from the different biotopes. Use latin names if possible, but if you don't know them, common or descriptive names are acceptable. If you are not 100% sure about any, add a question mark. Do not enter names as guesses - it's better 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 next page, or separate sheet, if necessary.

SPECIES	1	2	3	SPECIES	1	2	3
<i>L. saccharina</i>	R	C	A	<i>Amphilectus furcorum</i> (?)	O		
CRUSTOSE CORALLINE ROCS	O	C	C	<i>Gibbula</i> sp.		O	O
<i>Ulva lactuca</i>		O	O	<i>Antedon bifida</i> (?)		F	
BALLAN WRASSE	O						
SAITHE		F					
<i>Thorogobius ephippiaefus</i>	O						
SWIMMING CRAB (sp?)	O	O					
<i>Munida rigida</i>	O	O					
<i>Porania</i> sp.	O	O					
<i>Leidia ciliaris</i>	O	O					
HYDROIDS		F	F				
SEA MAT ( <i>M. membranacea</i> )		F	C				
SMALL TUNICATES ON KELP BLADES		C	F				



DIVE INFORMATION 2

Draw a profile 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). Indicate your direction of travel (compass bearing) and/or the direction of any current. You may also find it useful to draw a plan of the sea bed.



SEASEARCH is run by the Marine Conservation Society on behalf of the Joint Nature Conservation Committee. It is supported by English Nature, Scottish Natural Heritage and the Countryside Council for Wales.

Once completed, this form should be returned to: