

The distribution of Priority Marine Features and MPA search features within Lochs Linnhe, Eil, Leven and Etive: a broadscale validation survey (Part A)





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COMMISSIONED REPORT

Commissioned Report No. 501

**The distribution of Priority Marine Features
and MPA search features within Lochs
Linnhe, Eil, Leven and Etive: a broadscale
validation survey (Part A)**

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COMMISSIONED REPORT

Summary

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Background

Priority Marine Features (PMFs) are a collection of important habitats and species that have been identified by SNH and JNCC for nature conservation. With the implementation of the Marine (Scotland) Act 2010 and the UK Marine and Coastal Access Act 2009, Marine Protected Areas (MPAs) will be designated using information obtained from identified MPA search features. This study was designed to assess previously identified PMFs in the Loch Linnhe area, and to record instances of any new PMFs.

The survey area is located in north-west Scotland and extends from the northern entrance of the Firth of Lorn, west to the entrance of the Sound of Mull, fully through Lochs Etive, Linnhe & Leven, and up to Loch Eil by Corpach. Loch Creran is excluded from the survey area.

Main findings

- Four broad PMF/ MPA search feature habitats were observed throughout the survey area. The most widespread of these was burrowed mud, which included observations of the biotopes **SS.SMu.CFiMu.SpMmeg** and **SS.SMu.CFiMu.MegMax** as well as *Funiculina quadrangularis* and *Pachycerianthus multiplicatus*. Other observed PMFs/ MPA search features included kelp and seaweed communities on sublittoral sediment, northern seafan and deep sponge communities, inshore deep mud and northern feather aggregations on mixed substrata. In addition a small number of individual *Arctica islandica* were seen within infaunal grabs.
- Fine-grained muds with megafaunal burrows and seapens were observed throughout the central section of Loch Linnhe, from the Corran Narrows south to Appin and the northern tip of Lismore. Burrow densities were variable but appeared to be high at many stations. *Funiculina quadrangularis*, *Pennatula phosphorea* and *Virgularia mirabilis* were recorded throughout this area.
- Circalittoral fine muds with megafaunal burrows and seapens occurred throughout lower Loch Linnhe, with numerous records along both eastern and western sides of the island of Lismore, extending south as far as the stations off north-west Kerrera, and the Sound of Kerrera. *Funiculina quadrangularis* was present at the majority of fine mud/seapen stations, allowing assignment to the **SS.SMu.CFiMu.SpMmeg.Fun** biotope. The few stations without observations of *F. quadrangularis*, or lacking seapens entirely, were classed as **SS.SMu.CFiMu.SpMmeg** or **SS.SMu.CFiMu.MegMax**.
- Circalittoral fine muds were recorded from the head of Loch Leven west to the vicinity of Ballachulish and Eilean Munde. West of the Caolas nan Con narrows, megafaunal

burrows were abundant, with *Calocaris macandreae* and *Nephrops norvegicus* present. Rich seapen beds were also recorded here. *Pennatula phosphorea* was the most consistently abundant seapen, with *Funiculina quadrangularis* also present in smaller numbers at most stations. Station M81 had coarse gravel encrusted with serpulid tubes and barnacles (**SS.SCS.CCS.PomB**), while *Modiolus modiolus* occurred at low density nearby (**SS.SMx.CMx.CIlo.ModHo**).

- Circalittoral fine muds were found at a series of stations along the central axis of Loch Etive from close to the loch head (station M65) to just west of Airds Point, interrupted by a zone of coarser seabed at the Bonawe Sill. Megafaunal burrows were very sparse near the loch head, generally occurring at low to medium density at other mud stations. Surface features indicative of *Nephrops norvegicus*, *Calocaris macandreae*, *Jaxea nocturna* and *Maxmuelleria lankesteri* were all observed. Seapens were present at most of these stations but seldom in large numbers, and at no station were all three species recorded together.
- Three PMFs were not observed as previous records indicated. These were *Palinurus elephas*, *Mytilus edulis* beds and *Glossus humanus*. During this survey historical records of *P. elephas* and *M. edulis* were not targeted for validation and so it is not surprising that these PMFs were not observed during the survey.
- A small number (four in total) individual ocean quahogs, *Arctica islandica*, were recorded in three separate multigrabs, however, this is thought to under represent the actual population present within the 2011 survey area.

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1. INTRODUCTION

1.1 The survey area

The Linnhe system study area has been broken down into reasonably distinct geographical areas (the sea lochs) as well as slightly more arbitrary zones (the Firth and Lynn of Lorn) (Figure 1). The survey area is located in north-west Scotland and extends from the northern entrance of the Firth of Lorn, west to the entrance of the Sound of Mull, fully through Lochs Etive, Linnhe & Leven, and up to Loch Eil by Corpach. Loch Creran is excluded from the survey area.

Table 1. Summary physical characteristics of the study area sea lochs.

Loch	Length (km)	Max. depth (m)	No. of sills
Linnhe	17	155	3
Eil	12	69	2
Etive	30	139	6
Leven	13	62	5

The Linnhe system is a complex body of water, with hydrographically disparate component lochs. The Firth of Lorn, the exposed western approach to the Linnhe system, is deep (>200 m), tidally energetic and hydrographically well mixed. Aligned with the Great Glen Fault, the geology of the Firth is complex, with the bed comprising Moinian, Torridonian and Old Red Sandstone (Barber *et al.*, 1979). In the study area, Lochs Linnhe, Eil, Etive, and Leven are all classic fjordic sea lochs, with a series of sills separating deeper basins (Table 1). While turbulent mixing is generally frequent over shallow sills, deeper basins may be isolated areas of restricted exchange with more saline oceanic water. Loch Etive, for example, has the highest fresh/tidal ratio (120:1), narrowest length/width ratio (30:1), longest flushing time (14 days) of all Scottish sea lochs (Edwards & Sharples, 1986), and is known to undergo periodic deep water hypoxia.

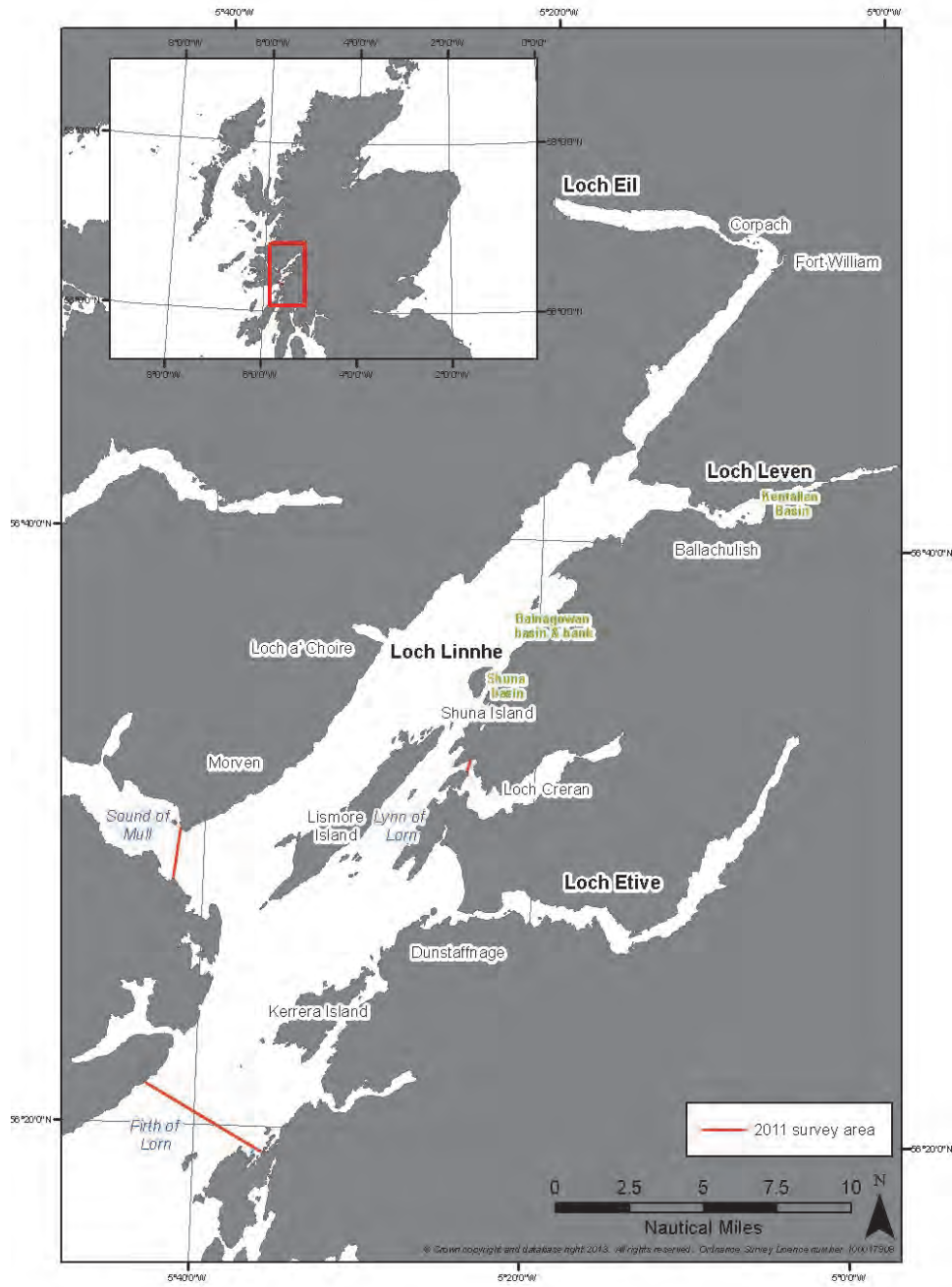


Figure 1. The 2011 Loch Linnhe survey area.

Whilst all of the Linnhe system is tidally swept, often pronounced at the shallow sills, the deeper and more sheltered basins, especially within the sea lochs, are typically accumulating environments and the sea bed covered in fine, silty sediment. The sea-floor of Loch Etive is, in the shallower areas, exposed granite bedrock, glacial erratics and rockfall debris. In the deeper areas, post-glacial, mainly riverine deposits overlay glacial deposits (McIntyre & Howe, 2010).

Although there are no published studies on the sedimentary and geological environments of Loch Leven, upper Loch Linnhe or Loch Eil, the deeper basins are frequently overlain with soft sediment; rockfall debris typically occurs along the steeper sides, and shallow sills are commonly tidally swept bedrock or cobble/gravel (T.D. Nickell, pers. obs.).

1.2 Previous surveys

There is extensive marine biological literature for the area going back to the early 1970s, largely as a consequence of the location of the Scottish Association for Marine Science (SAMS) at Dunstaffnage (see Table 22 and Table 25; Appendix 8). These studies include data sets on the effects of organic enrichment on the benthos in Loch Eil, water column productivity studies within the Loch Linnhe area, and long term data sets on flatfish predator/prey relationships in lower Loch Linnhe. However, the body of reports from which biotopes or PMFs can be derived is far more limited, and is summarised in Table 2. By far the most important surveys from the perspective of identifying PMFs are those carried out by the Marine Nature Conservation Review (MNCR) for Loch Linnhe, Loch Eil and Loch a' Choire (Connor, 1990), Loch Leven (Davies, 1991) and Loch Etive (Holt, 1991). These were diver surveys, and as such were limited in depth to the shallow sublittoral. These PMFs are displayed in Figure 2.

Recent SAMS geological surveys utilising multibeam and sidescan sonar are still being processed.

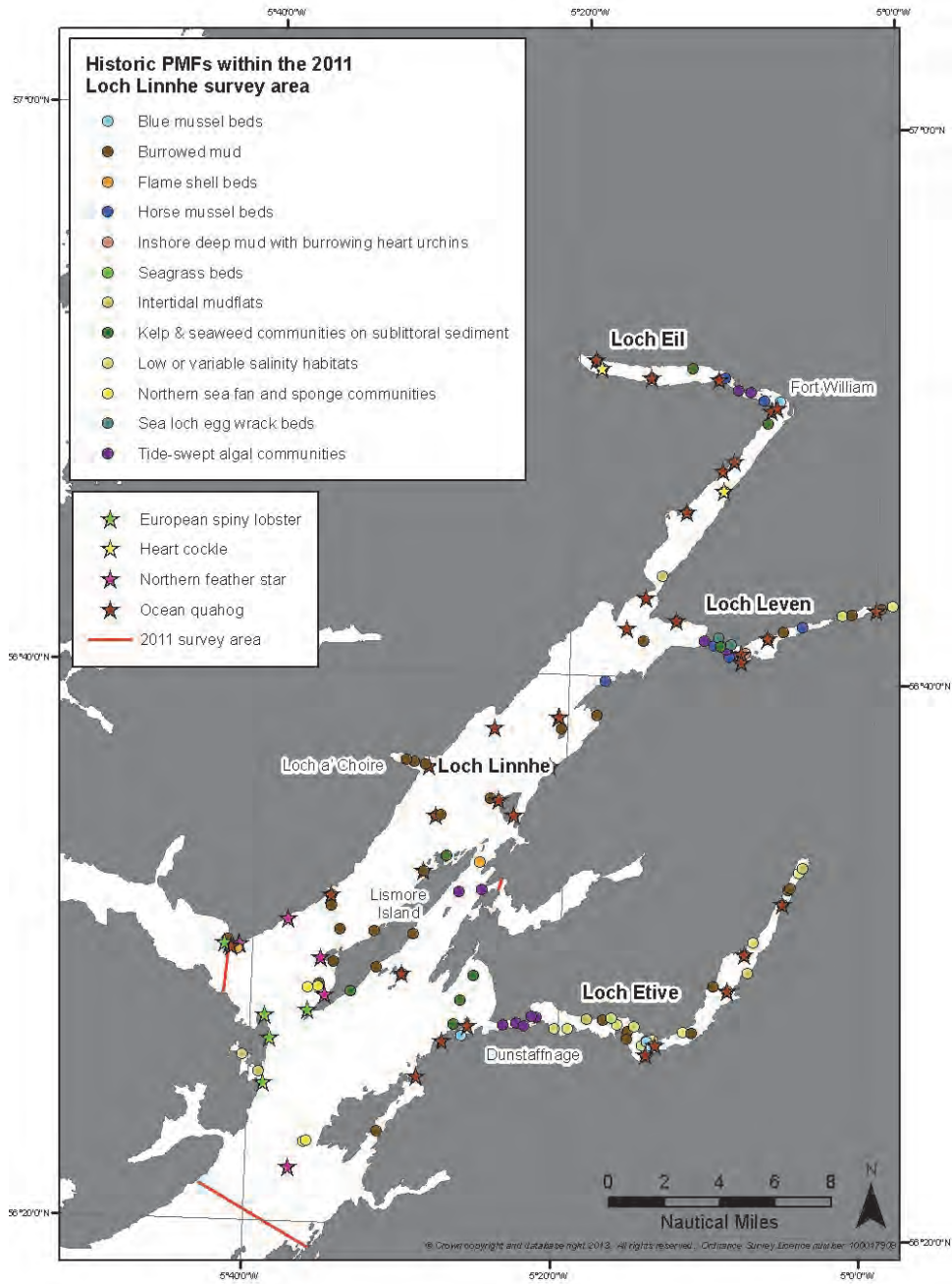


Figure 2. Historical PMF locations within the 2011 Loch Linnhe survey area.

Table 2. Historical marine biological surveys carried out within the 2011 survey area and other sources of records for PMF habitats and species. SMBA=Scottish Marine Biological Association; MBA=Marine Biological Association; MCS=Marine Conservation Society; (J)NCC=(Joint) Nature Conservancy Council; UMBSM=University Marine Biological Station Millport; FRS=Fisheries Research Services; SNH=Scottish Natural Heritage; HWU=Heriot-Watt University.

Year of survey	Organisation	Survey type	Reference/ source	MR survey code	PMF/MPA search feature
1972 - 1975	SMBA	Scottish <i>Palinurus elephas</i> survey	Ansell & Robb, 1977	MRMLN001000012A	European spiny lobster
1975 - 1976	SMBA	Study of two <i>Modiolus</i> beds in the Firth of Lorn and Loch Linnhe	Comely, 1978	not in MR nor PMF database	Horse mussel beds
1975 - 1977	SMBA/MBA	Littoral records of biota from six sites in Loch Linnhe and 3 sites in Loch Leven	Harvey <i>et al.</i> , 1980	JNCCMNCR10000265	Sea loch egg wrack beds
1978	Sheila Smith	Records of epibiota, especially molluscs, at five littoral sites in Loch Linnhe	Smith, 1978	JNCCMNCR10000084	Blue mussel beds
1983	MCS	Mull sublittoral survey includes epibiota records for one site in lower Loch Linnhe	Bishop, 1984	JNCCMNCR60000048	Ocean quahog
1983	Sheila Smith	Littoral records of epibiota at one site and infauna at one site in Loch Don	Smith & Gault, 1983	JNCCMNCR60000048	Blue mussel beds
1988	NCC	A collection of site details from different individual visits by NCC to the Firth of Lorn area.	unpublished; data in Marine Recorder	JNCCMNCR10000043	Blue mussel beds
1988 - 1989	NCC	MNCR phase 2 surveys at 58 sublittoral sites and 10 littoral sites throughout Loch Linnhe, Loch a' Choire and Loch Eil	Connor, 1990	JNCCMNCR10000006	Blue mussel beds
1990	UMBSM	MNCR phase 2 surveys at 32 sublittoral sites and 11 littoral sites in Loch Etive	Holt, 1991	JNCCMNCR10000032	Blue mussel beds
1990	NCC	MNCR phase 2 surveys at 27 sublittoral and 13 littoral sites in Loch Leven	Davies, 1991	JNCCMNCR10000005	Burrowing megafauna and <i>Maxmuelleria lankesteri</i> in circalittoral mud
1995	JNCC	MNCR Firth and Lynn of Lorn training survey. Three sites surveyed by standard MNCR sublittoral recording techniques	unpublished; data in Marine Recorder	JNCCMNCR10000624	Seapens and burrowing megafauna in circalittoral fine mud
1995	JNCC	Survey of the lagoon Leth-fhonn at the head of Loch Don	Covey <i>et al.</i> , 1998	JNCCMNCR10000450	<i>Ruppia maritima</i> in reduced salinity infralittoral muddy sand
1996	SMBA	Infaunal analysis of cores along transects from the littoral to sublittoral at four sites in Loch Etive and one site in Lochneil Bay. Littoral samples translated to biotopes in Marine Recorder	Gage, 1974	JNCCMNCR10000296	Ocean quahog
1996	FRS/SNH	Seabed video survey of Loch Linnhe with records of <i>Funiculina</i> and <i>Pachycerianthus</i>	unpublished	not in MR but in PMF database	Burrowed mud/Tall seapen Burrowed mud/Fireworks anemone
2006	HWU	Infaunal survey of <i>Limaria</i> bed off Port Appin	Trigg <i>et al.</i> , 2011	JNCCMNCR30000812	Flame shell beds
2006	HWU	Infaunal survey of <i>Limaria</i> bed off Port Appin	Trigg <i>et al.</i> , 2011	not in MR nor PMF database	Flame shell beds
2010	MCS	Seasearch surveys at three sublittoral locations around Lismore	MCS, 2010	not in MR nor PMF database	Flame shell beds, Northern sea fan and sponge communities, and Northern feather star

1.3 Priority Marine Features (PMFs) and MPA search features

The Marine (Scotland) Act 2010 and the UK Marine and Coastal Access Act 2009 will provide for the designation of Marine Protected Areas (MPAs) within Scottish waters. Areas or species already designated some level of protection under other legislations, such as the EC Habitats/Birds Directive, SPA, SACs, SSSIs, are not precluded from inclusion in wider MPAs, such as seaward extensions to encompass critical habitats, for nationally important populations of marine species or habitats.

To help target future marine conservation action, SNH and JNCC have generated a focused list of habitats and species of importance in Scottish waters - the Priority Marine Features (PMFs). MPA search features - species, habitats and areas considered of conservation value and for which spatial protection will help – will be utilised in the selection of future MPAs (Marine Scotland, 2011).

Previous marine biological surveys in the area have been reviewed and historical records of PMFs and MPA search features collated by Moore (2011). The Eil, Etive, Linnhe and Leven survey area has been identified as a region supporting a high diversity of MPA search features (Moore & James, 2011). Historical records suggest the presence of the MPA search features, detailed within Table 2 and Figure 2.

1.4 Geodiversity features

Published data on the geomorphology of the Linnhe system are limited, although there is currently a large unpublished dataset at SAMS. From the available multibeam and sidescan sonar surveys, the Linnhe sea-floor can be divided into the Kentallen Basin, the Shuna Basin, the Lismore Shallows, the Balnagowan Basin, the Balnagowan Bank and Loch a' Choire. McIntyre (2012) identified a number of moraines, ice scoured bedrock, pockmarks from gas escape, slope scars, gullies and fans, and depressions formed by currents along topographic highs (Figure 3). More specifically, there are two main moraine/diamict complexes in the Linnhe survey area: the Leven moraine in the Kentallen Basin (Figure 4); and the Shuna Diamict Complex in the Shuna Basin. At ca. 10 km², this diamict is the major geomorphological feature of the Shuna Basin and is over 55 m thick. It may represent the maximum extent of the Younger Dryas limit in Loch Linnhe.

The smoothed bedrock outcrops in the Loch Linnhe/Firth of Lorn area, in conjunction with the orientation of the Leven moraine, indicate the glacial movement to the south-west. The Firth shows evidence of a major glacial standstill between Mull and Kerrera, somewhere in the region of 16 ka BP (Figure 5) (McIntyre, 2012).

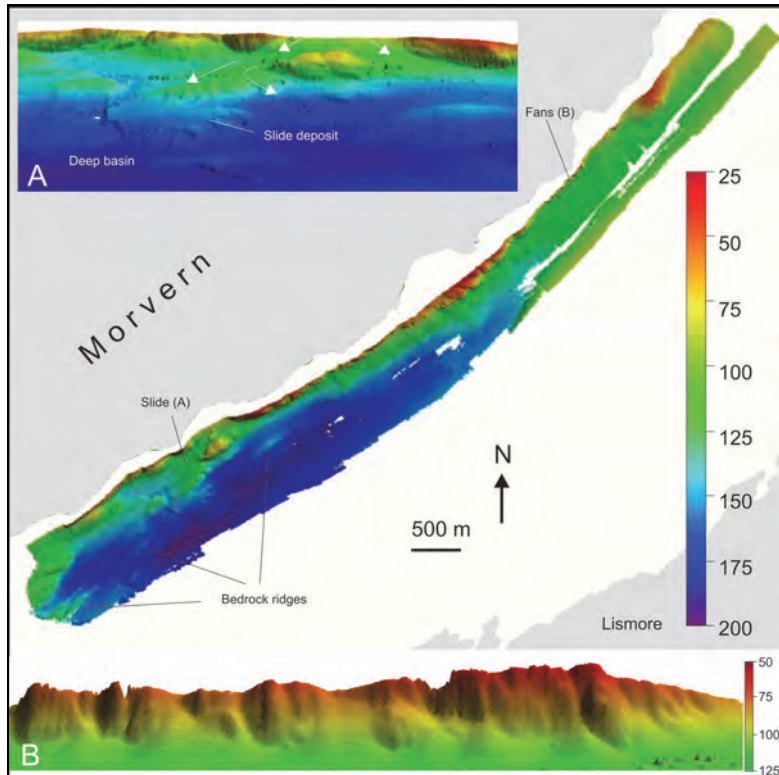


Figure 3. Sea bed geomorphology image from multibeam showing part of Lynn of Lorn and the geological features (steep cliffs, slide deposits and fans) – from McIntyre (2012). Scale bar shows depth in m.

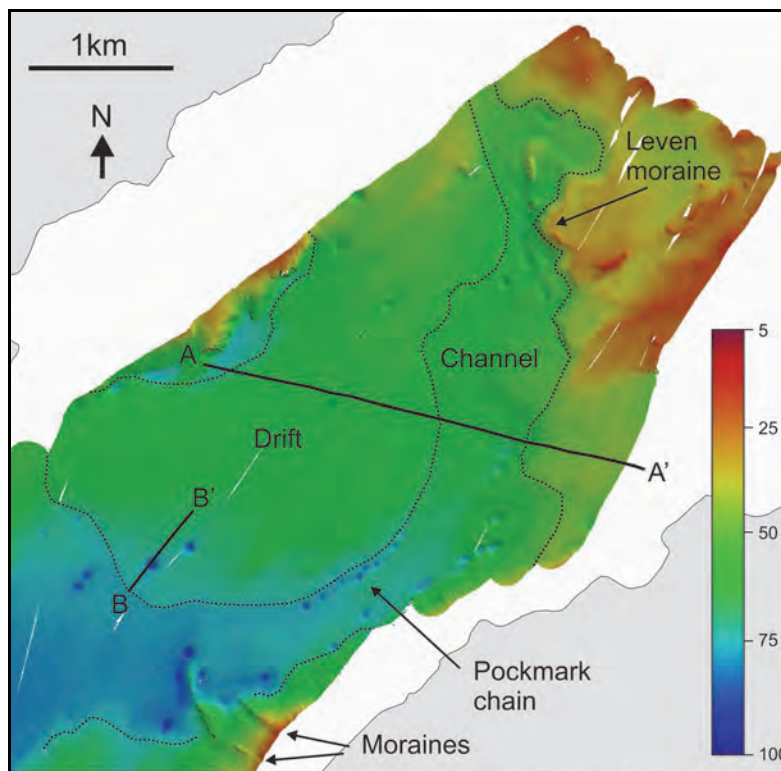


Figure 4. Sea bed geomorphology image from multibeam showing pockmarks, Leven moraine and part of Kentallen Basin – from McIntyre (2012). Scale bar shows depth in m.

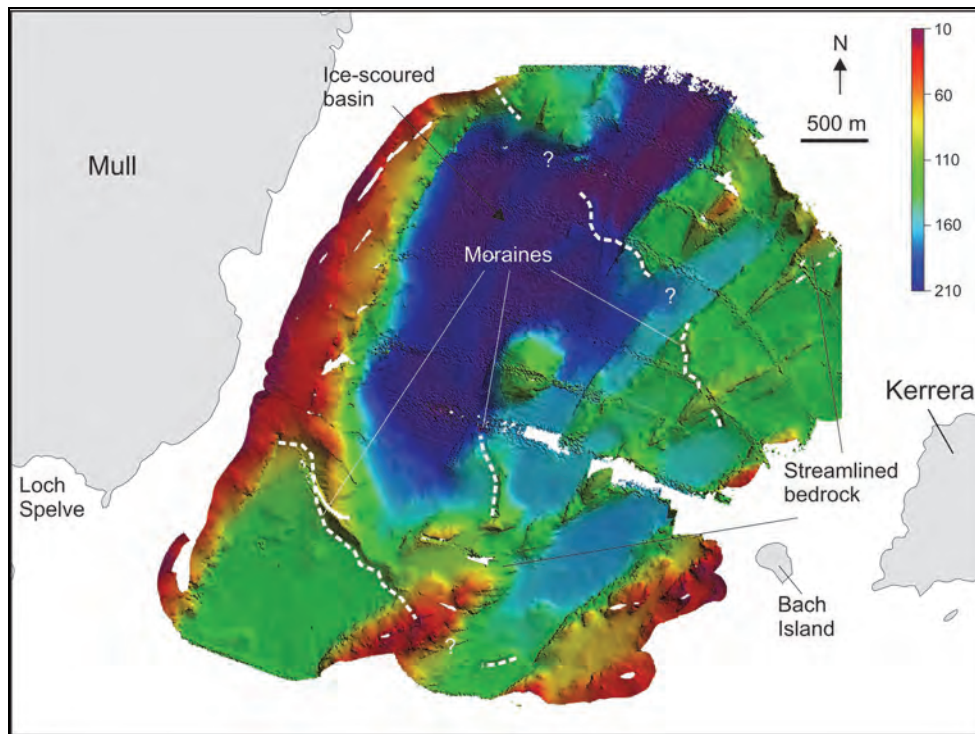


Figure 5. Sea bed geomorphology image from multibeam showing part of Firth of Lorn area and the geological features – from McIntyre (2012). Scale bar shows depth in m.

1.5 Related human activities

Aquaculture is one of the primary marine industries within the 2011 Linnhe survey area. Salmon farms are present in lower, middle and upper Lochs Linnhe, Leven and Eil, and rainbow trout farms are found in Loch Etive (The Scottish Government, 2011). Mussel farms are also common (14 within Loch Etive alone), and there are oysters cultivated in the middle of Loch Linnhe (Argyll & Bute Council, 2011; The Scottish Government, 2011). Whilst commercial fishing effort is not considered more than “light”, many of the muddy areas of the Linnhe system are subject to trawling and/or creeling for *Nephrops norvegicus* (Baxter *et al.*, 2011), whilst many of the rockier areas are creeled (Dipper *et al.*, 2008). The most recent fisheries data available show that 3,135 t were landed in Oban in 2010; all of this catch was classed as “shellfish”¹. Scallops (both dredged and dived) are locally important (ca. 37% of the total fisheries landings). Whilst there appears to be some *Nephrops* creeling in Loch Eil and Loch Etive (Argyll & Bute Council, 2011), fisheries data from Loch Leven are unknown.

Major population centres within the Loch Linnhe system are Oban (pop. 8,120) and Fort William (9,908; 2001 census);² the major industrial development is Scotland’s largest superquarry at Glensanda, with a capacity of over 9 million tonnes of aggregate per annum.³ All of this production is transported by sea.

¹ <http://www.scotland.gov.uk/Publications/2011/09/09155012/13>

² <http://www.scrol.gov.uk/scrol/browser/profile.jsp?profile=Population&mainArea=Oban&mainLevel=Locality>

³ <http://www.aggregate.com/documents/brochures/construction-solutions-overseas.pdf>

Other human activities in the Linnhe survey area are characterised by Argyll & Bute Council as “scuba diving, kayaking, sailing, charter boat operations and tourism”.⁴

1.6 Survey objectives

The purpose of this study was to design and carry out a broadscale validation survey of the multiple MPA search features historically recorded within the survey area and to record new instances of these and previously unrecorded PMFs. The study aimed to determine whether PMFs/MPA search features were still present at previously documented locations.

For a subset of search features a further objective involved more detailed analysis to determine the distribution, extent and condition of some of the MPA search features. These included; horse mussel beds on open coast circalittoral mixed sediment/with *Chlamys varia*, sponges, hydroids and bryozoans on slightly tide-swept very sheltered circalittoral mixed substrata; northern seafans on circalittoral rock/mixed turf of hydroids and large ascidians with *Swiftia pallida* and *Caryophyllia smithii* on weakly tide-swept circalittoral rock/deep sponge communities (circalittoral); seapens and burrowing megafauna in circalittoral fine mud; burrowing megafauna and *Maxmuelleria lankesteri* in circalittoral mud; the tall seapen, *Funiculina quadrangularis*; and the fireworks anemone, *Pachyceriatthis multiplicatus*.

2. METHODS

2.1 Site selection

Survey station selection was performed by Prof. Colin Moore, HWU, utilising previous survey data indicating the presence of PMFs and MPA search features (Figure 6). These station locations were then provided to SAMS by SNH. Selected MPA search features within Lochs Linnhe, Etive, Leven and Eil are covered in a separate report by Moore *et al.* (2012).

All techniques detailed were performed in all lochs apart from ROV (Loch Linnhe only) and multigrabs (Lochs Linnhe and Eil).

2.2 Video

A total of 181 drop down video stations were completed within the survey area (Figure 6). Drop-down video in Lochs Etive, Leven and parts of Loch Linnhe (14 sites) was carried out from RV *Seol Mara* (Figure 8), and from SV *Sir John Murray* (Figure 9) in Lochs Eil (14 sites) and Linnhe (79 sites) utilising a Seatronics frame mounted with twin SeaLED 1067 lux LED lights and a Kongsberg OE14-366 colour zoom camera, recording to standard HDD video recorder with DVD download (Figure 7). Video duration was usually 4-7 min in length, giving the video observer long enough to assess the site visually.

⁴ <http://www.argyll-bute.gov.uk/sites/default/files/planning-and-environment/Loch%20Etive%20ICZM%20Plan%20-%20Activities%20and%20Infrastructure.pdf>

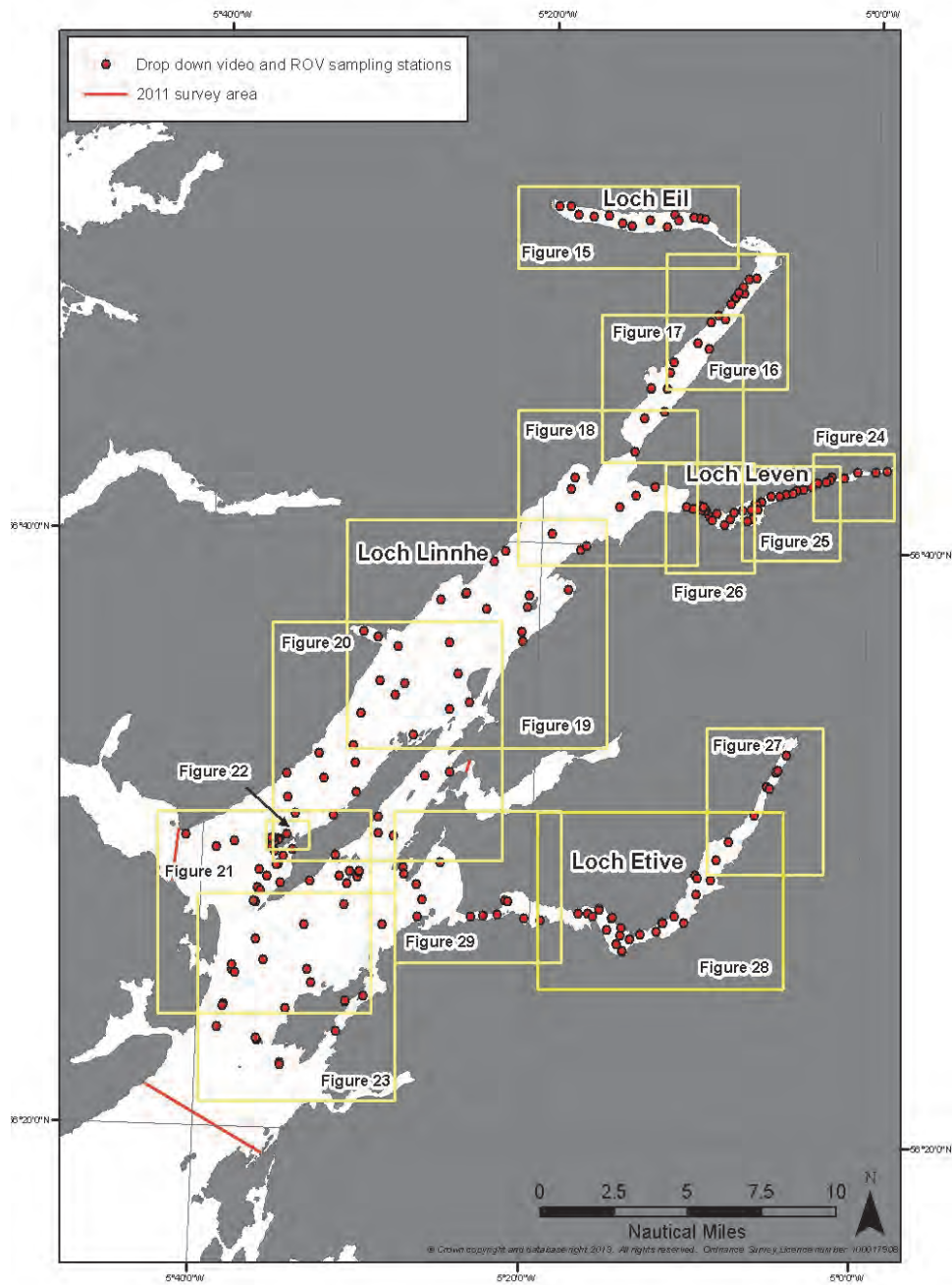


Figure 6. Map showing all video (DDV and ROV) stations sampled during the 2011 survey, with subdivisions for biotope maps.



Figure 7. Seatronics DTS6000 drop-down video system.

In this report all *Sir John Murray* video sites are given the prefix 'J' and *Seol Mara* sites the prefix 'M'. One surveyor (T.D. Nickell) was present for the entirety of each video deployment, and dictated notes onto survey record sheets (Appendix 1). No still photographs were taken.

Video sequences from DDV and ROV stations were viewed on a desktop computer screen, with the observer making notes by hand of seabed characteristics and visible fauna as the image scrolled (films were paused whenever necessary to ensure all important details were recorded). The elapsed time of any visible change in seabed type was recorded and later converted to positional data by reference to the ship track records.

Benthic organisms and biogenic seabed features (burrows, mounds) were identified to the lowest practicable level (usually genus or species) by reference to published or online pictorial identification guides where necessary. Individual counts were made of large epifauna occurring at relatively low density (e.g. seapens, *Pachycerianthus multiplicatus*, large decapod crustaceans) but this was not attempted for species found at higher local densities (e.g. *Leptometra celtica*, bed-forming brittlestars). The appearance of species such as *P. multiplicatus* was recorded for each individual so that these could be easily re-located on the video sequences if required. SACFOR abundance categories were assigned to all taxa identified based on the estimated field of view across each sequence (no absolute distance scale was present on the video sequences). Definite (seabed litter) or possible anthropogenic features (trawl marks) were noted whenever observed.

Seabed habitats and biota were assigned to biotopes using version 04.05 of the Marine Habitat Classification for Britain and Ireland. Biotopes were assigned to the lowest level possible (Levels 4 or 5) where diagnostic taxa were present (e.g. *Funiculina quadrangularis*). More generic, higher-level categories were assigned in cases where no diagnostic taxa were recorded. Where the observed features might fit more than one biotope, the possible alternatives were noted. The closest-matching biotope was noted in cases where observations generally resembled the v04.05 description, but with differences in key characteristics (e.g. crinoid-rich communities resembling **CR.LCR.BrAs.AntAsH**, but with *Leptometra celtica* rather than *Antedon bifida*).

Quality assurance on video data was performed by a third person on ca. 10% (20 videos) of the total record from DDV and ROV sites. Videos were selected at random, and analysed blind (without access to original notes).



Figure 8. RV Seol Mara.



Figure 9. SV Sir John Murray. Photo courtesy of SEPA.

Positions and times at the start, time at bottom (for station depths >30 m) and end of deployment were recorded from the ship's dGPS system (Table 9, Appendix 2). Vessel drift was the only source of motion, so that speed was dependent on tide and wind. These positional data, including target PMF and visual appraisal of biotope, were recorded manually. Additionally, the ship's track was logged from dGPS by computer every two seconds.

The video material from each deployment was processed in the laboratory, and notes taken where possible on substrate and biota, employing the SACFOR scale of abundance where visibility permitted. Biotopes were allocated based on the classification scheme of Connor *et al.* (2004). Stations were also categorized according to the PMFs/MPA search features present.

2.3 Chart datum

Water depths were related to chart datum by calculating the tidal rise or fall at the appropriate primary or secondary port using POLTIPS software (Proudman Oceanographic Laboratory) and then interpolating for time at sampling. Secondary ports Connel and Bonawe were used for Loch Etive; Craignure, Dunstaffnage and primary port Oban were appropriate in lower Loch Linnhe/the Firth of Lorn; Port Appin and Corpach were used for

the central and upper Loch Linnhe areas respectively, and Corran was used for Loch Leven. Tidal reference ports were always selected on the shortest distance criterion, calculated in ArcGIS v10.

2.4 ROV

The ROV survey, performed entirely from *SV Sir John Murray*, utilised an Outland 1000 ROV equipped with twin UWL500 LED lights rated at 1200 lux each, and UWC360/d tilting, fixed focus colour (550 line, 0.001 lux) camera. The Outland was provided with two 7.5 kg forward thrusters, tethered by 330 m neutrally buoyant umbilical (Figure 10). The ROV was operated by technician supplied by Buccaneer Ltd. Recording was performed straight to HDD.

ROV sites (23 in total) were selected by SNH, generally targeted at locations where the northern featherstar, *Swiftia pallida*, had been recorded, and/or where the proximity of steep underwater cliffs or pinnacles made deployment of the DDV problematic (Figure 11). On a few occasions the ROV was deployed near a station more than once to ensure that good coverage of the sea bed was achieved.



Figure 10. Outland 1000 ROV system. Photo courtesy Ian MacDonald, Buccaneer Ltd.

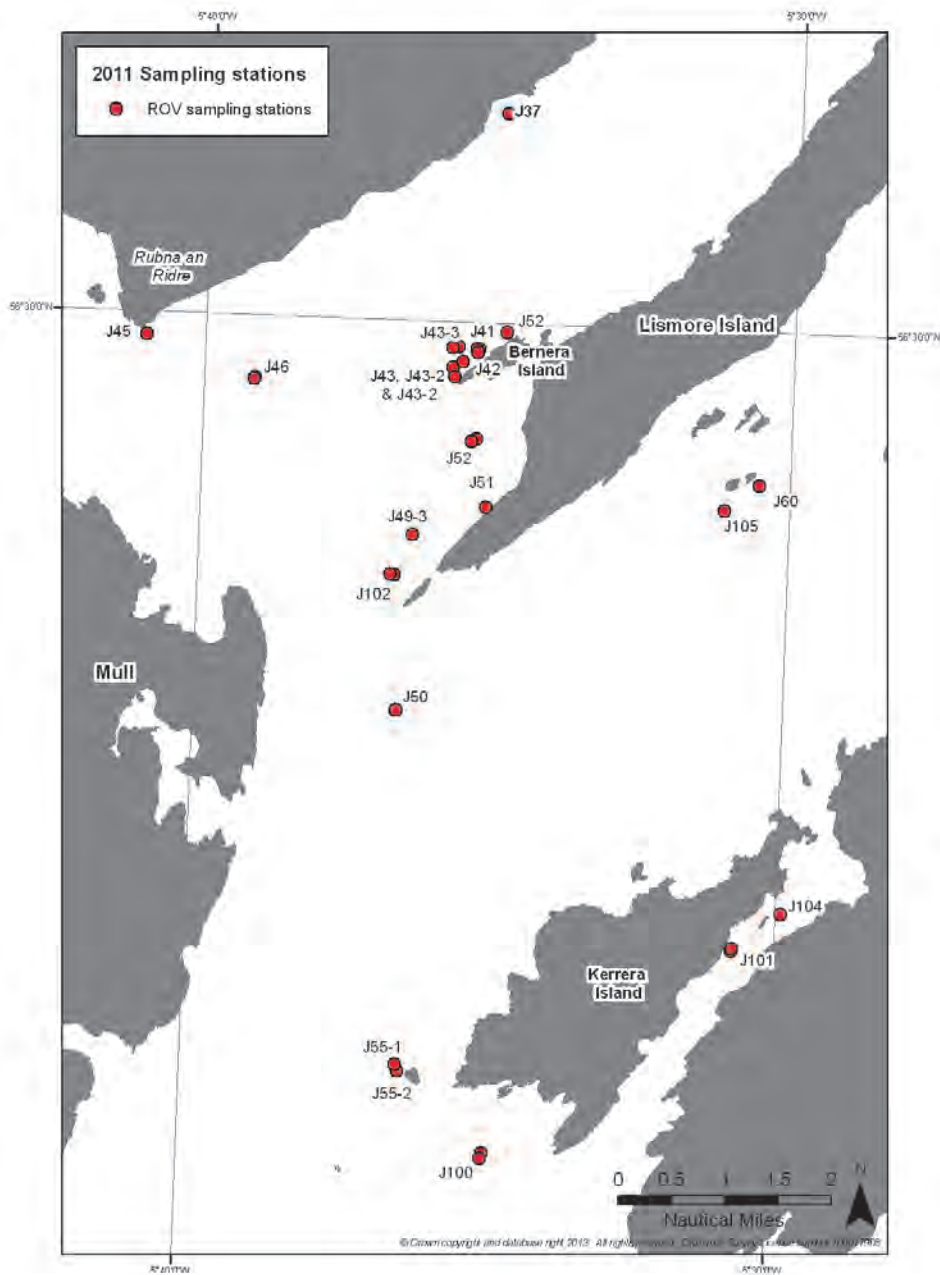


Figure 11. ROV station locations during the 2011 survey.

2.5 Infaunal grab survey

Quantitative grab samples for macrofauna and PSA were taken from RV *Seol Mara* and SV *Sir John Murray*. Multigrab samples were taken using the same samplers.

2.5.1 Benthic faunal sampling

Benthic faunal samples were taken via 0.1 m² van Veen grab (Figure 12a) (RV *Seol Mara*) or 0.1 m² Day grab (Figure 12b) (SV *Sir John Murray*), sieved on board over 1 mm mesh and the residue preserved in 10% buffered formosaline solution. Samples were later sorted into major taxa for further identification to lowest possible taxon using standard taxonomic keys and reference material. A total of 37 grabs were taken (Figure 13).



Figure 12. a) van Veen grab and

b) Day grab

Macrofaunal abundance data at each station were entered into PRIMER v5.0 (Clarke & Gorley, 2001) and the following diversity indices calculated: Margalef's D ; Shannon H' ; Pielou's J' ; Brillouin's H_B ; and Simpson's $1-\lambda$. Multidimensional scaling (MDS) was performed in PRIMER using fourth root transformed abundance data. Square root transformed infaunal and environmental data were imported into Canoco for Windows, version 4.53 to examine relationships between them using canonical correspondence analysis (CCA) (ter Braak, 1996); ordinations from CCA were displayed graphically using CanoDraw 4.0 (ter Braak & Šmilauer, 2002).

2.5.2 PSA

Each of the 37 macrofaunal grab samples was subsampled (50 mg) for surficial sediment through the top flap of the grab. These samples were kept cool until they could be frozen (-20°C nominal) immediately on return to the laboratory (RV *Seol Mara*) or in the on-board laboratory (SV *Sir John Murray*). Particle size analysis (PSA) was performed on bulk wet sediment (2 g samples). The analyses were obtained using a laser diffraction particle size analyser (Coulter Counter LS230, Beckman Coulter, Inc., Fullerton, CA, USA) (Pye and Blott, 2004). Sodium hexametaphosphate (20 ml) was added to each suspension to inhibit flocculation. Each sample was analysed three times, after 5 minutes of ultrasound treatment. Triplicate sample data were combined and means analysed using Gradistat v 8.0 (Blott, 2010).

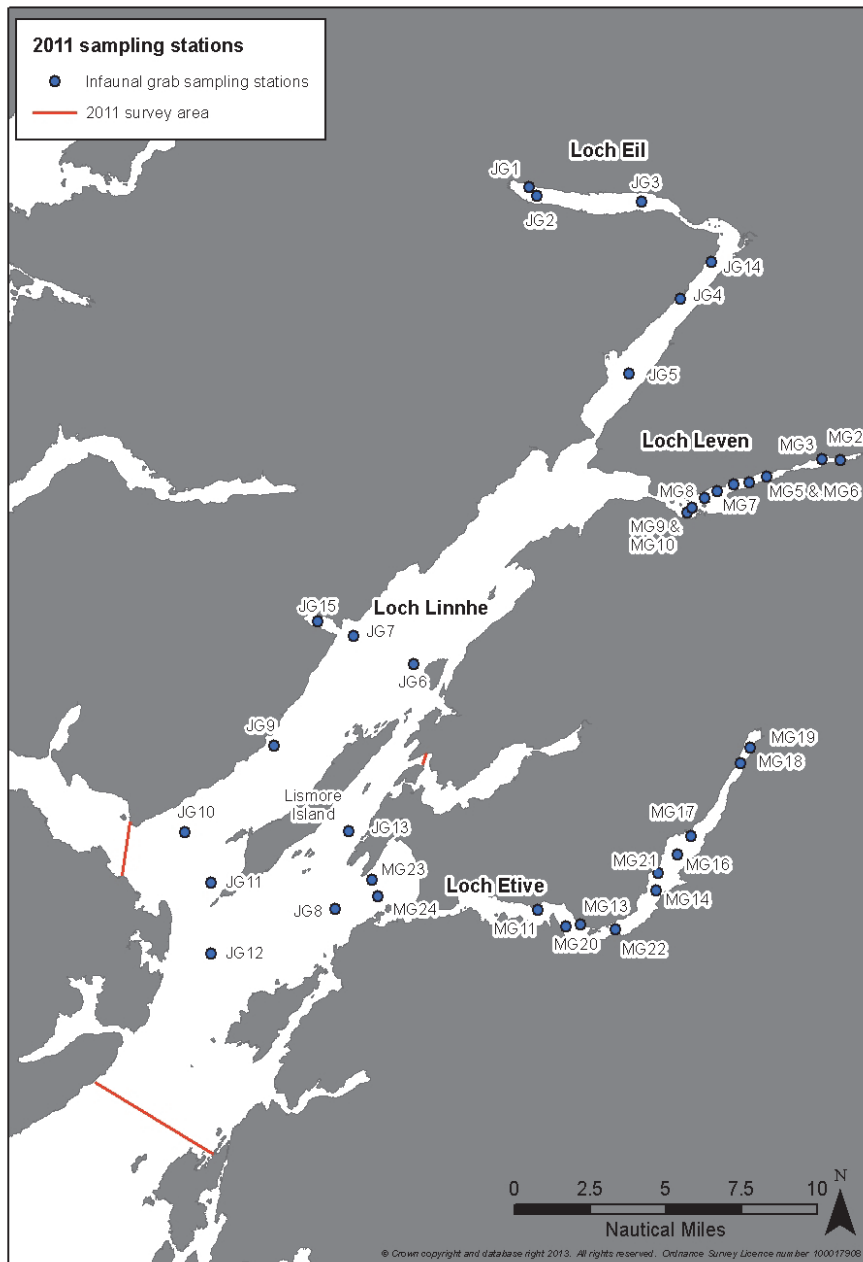


Figure 13. Quantitative grab sample station locations during the 2011 survey.

2.5.3 Multigrab survey

In order to determine the presence of *Arctica islandica* at six sites, *Glossus humanus* from two sites, and also the presence of *Modiolus modiolus* multigrab sampling stations were pre-selected. Five infaunal samples were obtained using the Day grab at each station on board the SV *Sir John Murray* (Figure 14). The grab contents were roughly sorted on deck through a coarse riddle, and target individuals were counted, measured and returned to the sea.

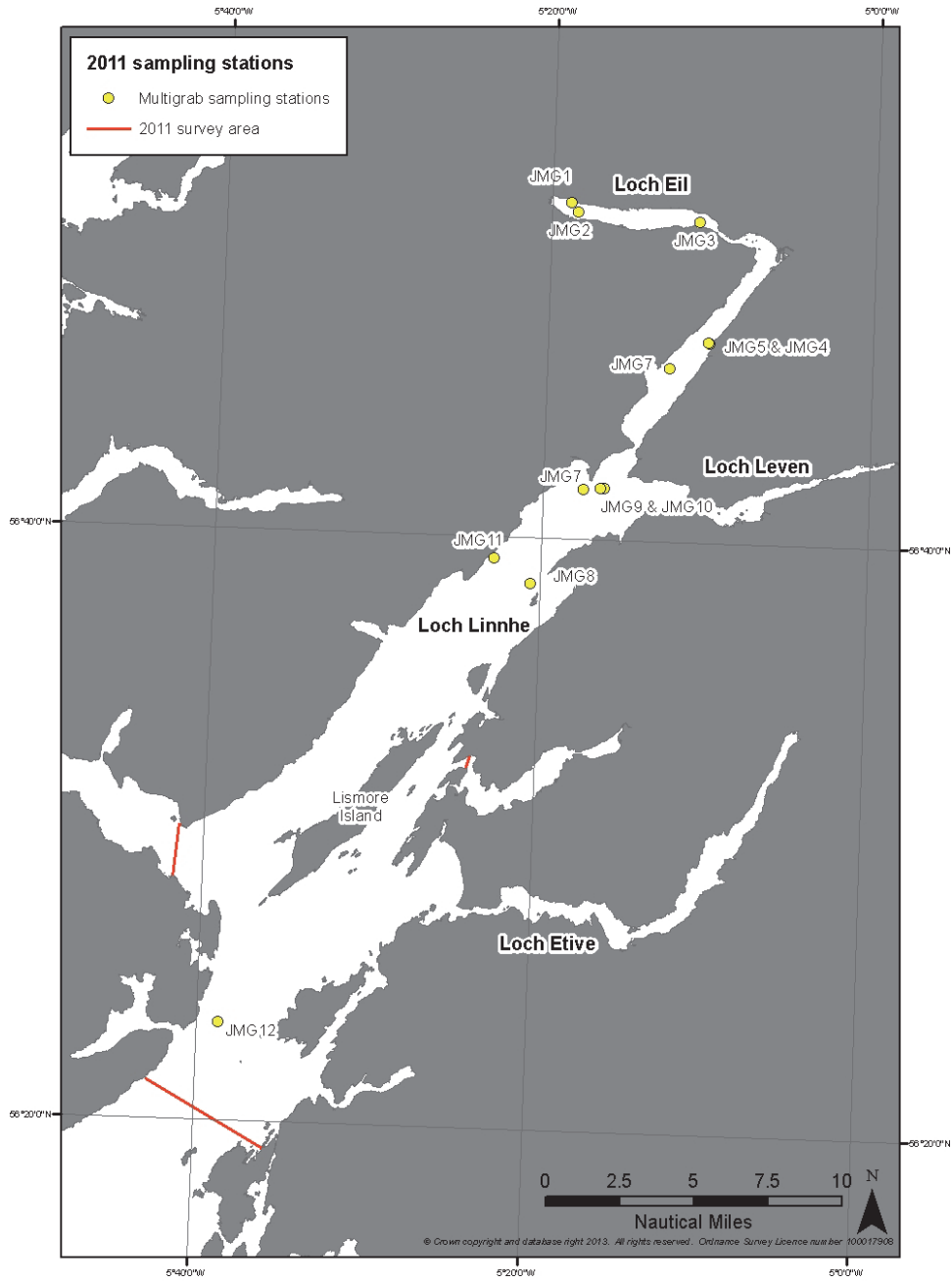


Figure 14. Location of multigrab stations during the 2011 survey.

3. RESULTS

3.1 Biotope composition and distribution within the 2011 survey area

Six biotopes were identified from infralittoral rock, 12 from circalittoral rock, and 20 from sublittoral sediment, giving a total of 38 different biotopes firmly or provisionally identified in the present survey (Table 3). Full descriptive data for each video deployment including position, depth, time and video file details are presented in Tables 9 and 10, Appendix 2. An illustrative photograph index of the biotopes recorded can be seen in Tables 22 and 23, Appendix 7.

Table 3. *Biotopes identified within the Loch Linnhe survey area in 2011 (all sampling methods). Biotopes follow Connor et al. (2004).*

Rock biotopes (IR = Infralittoral rock; CR = circalittoral rock)		Sublittoral Sediment Biotopes (SS)
High energy infralittoral rock (HIR)	High energy circalittoral rock (HCR)	Sublittoral coarse sediment (SCS)
Moderate energy infralittoral rock (MIR)	Moderate energy circalittoral rock (MCR)	Sublittoral sand (SSa)
Low energy infralittoral rock (LIR)	Low energy circalittoral rock (LCR)	Sublittoral mud (SMu)
Feature of infralittoral rock (FIR)	Feature of circalittoral rock (FCR)	Sublittoral mixed substrata (SMx)
Examples IR.MIR	= Habitat complex (level 3 in classification)	Sublittoral macrophytes on sediment (SMp)
IR.MIR.KR	= Habitat complex (level 4 in classification)	
IR.MIR.KR.Lhyp	= Biotope level (any longer = sub-biotype)	
Biotopes	Description	Count
IR.LIR.KLsac.Pk	<i>Laminaria saccharina</i> park on very sheltered lower infralittoral rock	1
IR.MIR.KR.Lhyp.Pk	<i>Laminaria hyperborea</i> and foliose red seaweeds on moderately exposed infralittoral rock	1
IR.MIR.KR.XFoR	Dense foliose red seaweeds on silty moderately exposed infralittoral rock	1
IR.MIR.KR.Lhyp.TX.Ft	<i>Laminaria hyperborea</i> forest and foliose red seaweeds on moderately exposed upper infralittoral rock	5
IR.MIR.KR.Lhyp.TX.Pk	<i>Laminaria hyperborea</i> park and foliose red seaweeds on tide-swept lower infralittoral mixed substrata	1
IR.MIR.KR.Lhyp	<i>Laminaria hyperborea</i> and foliose red seaweeds on moderately exposed infralittoral rock	1
CR.LCR.BrAs.AmenCio	Solitary ascidians, including <i>Ascidia mentula</i> and <i>Ciona intestinalis</i> , on wave-sheltered circalittoral rock	3
CR.LCR.BrAs.AmenCio.Ant	Solitary ascidians, including <i>Ascidia mentula</i> and <i>Ciona intestinalis</i> , with <i>Antedon</i> spp. on wave-sheltered circalittoral rock	1
CR.LCR.BrAs.NeoPro.FS	<i>Neocrania anomala</i> and <i>Protanthea simplex</i> on very wave-sheltered circalittoral rock	3
CR.LCR.BrAs.AntAsH	<i>Antedon</i> spp., solitary ascidians and fine hydroids on sheltered circalittoral rock	1
CR.MCR	Moderate energy circalittoral rock	1
CR.MCR.CfaVS.Hbow.Eud	<i>Halichondria bowerbanki</i> , <i>Eudendrium arbusculum</i> and <i>Eucreatea loricata</i> on reduced salinity tide-swept circalittoral mixed substrata	8

Table 3 continued

Biotores	Description	Count
CR.MCR.EcCr.FaAlCr.Flu	<i>Flustra foliacea</i> on slightly scoured silty circalittoral rock	1
CR.MCR.EcCr.AdigVt	<i>Alcyonium digitatum</i> and faunal crust communities on vertical circalittoral bedrock	1
CR.MCR.EcCr.CarSwi	<i>Caryophyllia smithii</i> and <i>Swiftia pallida</i> on circalittoral rock	1
CR.HCR.FaT.BalTub	<i>Balanus crenatus</i> and <i>Tubularia indivisa</i> on extremely tide-swept circalittoral rock	1
CR.HCR.FaT.CTub.Adig	<i>Alcyonium digitatum</i> with dense <i>Tubularia indivisa</i> and anemones on strongly tide-swept circalittoral rock	1
CR.HCR.Xfa.SwiLgAs	Mixed turf of hydroids and large ascidians with <i>Swiftia pallida</i> and <i>Caryophyllia smithii</i> on weakly tide-swept circalittoral rock	2
SS.SCS.CCS	Sublittoral coarse sediment (unstable cobbles and pebbles, gravels and coarse sands)	1
SS.SCS.CCS.PomB	<i>Pomatoceros triqueter</i> with barnacles and bryozoan crusts on unstable circalittoral cobbles and pebbles	1
SS.SMp.KSwSS	Kelp and seaweed communities on sublittoral sediment	1
SS.SMp.KSwSS.LsacCho	<i>Laminaria saccharina</i> and <i>Chorda filum</i> on sheltered upper infralittoral muddy sediment	1
SS.SMp.KSwSS.LsacR.Gv	<i>Laminaria saccharina</i> and robust red algae on infralittoral gravel and pebbles	1
SS.SMp.KSwSS.LsacR.Mu	<i>Laminaria saccharina</i> with red and brown seaweeds on lower infralittoral muddy mixed sediment	2
SS.SMp.KSwSS.LsacR.Sa	<i>Laminaria saccharina</i> and filamentous red algae on infralittoral sand	7
SS.SMu.CFiMu	Circalittoral fine mud	9
SS.SMu.CFiMu.BlyrAchi	<i>Brissopsis lyrifera</i> and <i>Amphiura chiajei</i> in circalittoral mud	6
SS.SMu.CFiMu.MegMax	Burrowing megafauna and <i>Maxmuelleria lankesteri</i> in circalittoral mud	7
SS.SMu.CFiMu.SpnMeg	Seapens and burrowing megafauna in undisturbed circalittoral fine mud	19
SS.SMu.CFiMu.SpnMeg.Fun	Seapens, including <i>Funiculina quadrangularis</i> , and burrowing megafauna in undisturbed circalittoral fine mud	28
SS.SMu.CSaMu	Circalittoral sandy mud	1
SS.SMu.CsaMu.VirOphPmax	<i>Virgularia mirabilis</i> and <i>Ophiura</i> spp. with <i>Pecten maximus</i> on circalittoral sandy or shelly mud	2
SS.SMx.CMx	Circalittoral mixed sediment	2
SS.SMx.CMx.ClloMx	<i>Cerianthus lloydii</i> and other burrowing anemones in circalittoral muddy mixed sediment	2
SS.SMx.CMx.FluHyd	<i>Flustra foliacea</i> and <i>Hydrallmania falcata</i> on tide-swept circalittoral mixed sediment	2
SS.SMx.CMx.OphMx	<i>Ophiothrix fragilis</i> and/or <i>Ophiocomina nigra</i> brittlestar beds on sublittoral mixed sediment	4
SS.SMx.IMx	Infralittoral mixed sediment	2
SS.SMx.CMx.ClloModHo	Sparse <i>Modiolus modiolus</i> , dense <i>Cerianthus lloydii</i> and burrowing holothurians on sheltered circalittoral stones and mixed sediment	3

Biotores firmly or provisionally identified from the drop-down video and ROV observations are listed according to survey sub-area in Table 11 (Appendix 3). Unsurprisingly, given the location of the survey in the upper reaches of Loch Linnhe and adjacent sea lochs, biotores associated with sublittoral sediments are the most numerous and widespread category. The majority of biotores recorded are characteristic of low to moderate hydrodynamic energy and low wave exposure. More energetic habitats and associated communities were generally confined to sealoch entrances or to shallow sills within the lochs, where topographic constrictions cause localised acceleration of tidal currents. Higher-energy biotores were also recorded at a few stations in the more wave-exposed reaches of southern Loch Linnhe.

The general nature and distribution of biotores in each major division of the survey area is summarised in the following sections (sections 3.1.1 - 3.1.6). Observations of PMFs and

MPA search features are presented in detail in section 3.3 and are highlighted in Figures 15 – 29 with red station numbers.

3.1.1 Summary of habitats and species observed in Loch Eil

A limited range of biotopes was observed in Loch Eil, from the loch head (station J1) to approximately 2 km west of the Annat Narrows (J8). The central axis of the loch was characterised by fine muds with sparse megafaunal burrows (Figure 15). The seapen *Pennatula phosphorea* was generally present, usually accompanied by smaller numbers of *Virgularia mirabilis*. Mobile epifauna were limited to a small number of common, widespread species such as *Pagurus bernhardus*, *Carcinus maenas* and *Asterias rubens*. Most of these observations fit comfortably within the biotope definition of **SS.SMu.CFiMu.SpnMeg**, with the exception of J3, which had very few burrows and low seapen densities, but large numbers of the brittlestar *Ophiura ophiura*, closer to the biotope **SS.SMu.CSaMu.VirOphPmax**. Coarser, shelly mixed sediments (**SS.SMx.CMx**) were recorded at two stations (J68 and J69, Figure 15) in the western approaches to the Annat Narrows, indicating stronger tidal currents than in the main loch basin. Video image quality was poor here but living *Modiolus modiolus* were recorded in small numbers at J69 (**SS.SMx.CMx.CIlModHo**) is probably the closest biotope match. The only hard-substratum habitat observed in Loch Eil was a heavily-silted boulder slope at J70 (Figure 15), with a sparse epifauna including *Munida rugosa*, *Echinus esculentus* and *Psammechinus miliaris*. The sealoch anemone *Protanthea simplex* was also present, although rare. This can be regarded as an impoverished example of **CR.LCR.BrAs.NeoPro.FS**, a biotope characteristic of sheltered rock walls and slopes in west coast sea-lochs.

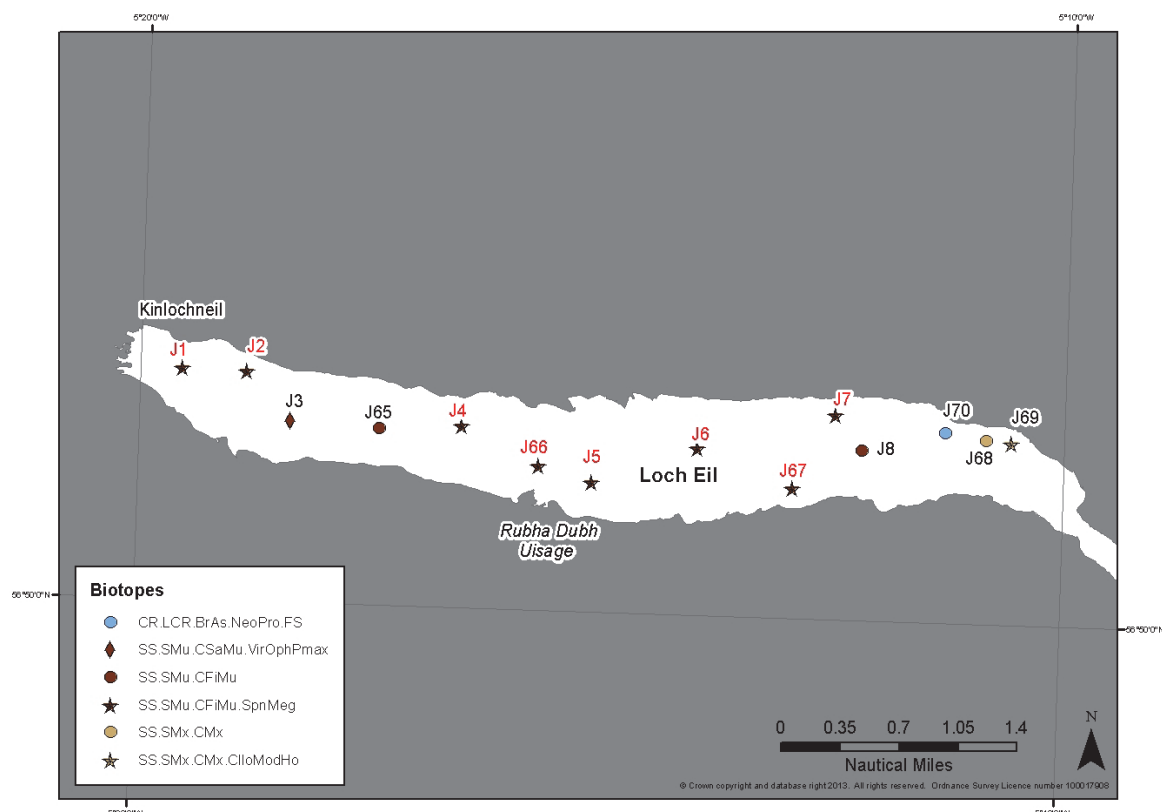


Figure 15 Distribution of biotopes within Loch Eil.

3.1.2 Summary of habitats and species observed in upper Loch Linnhe

Most of upper Loch Linnhe, from the vicinity of Fort William (J72, Figure 16) south to Inverscaddie Bay (J12, J13 and J82, Figure 17) was dominated by fine muddy sediments with megafaunal burrows and seapens. Burrow and seapen densities were generally higher than in Loch Eil. The tall seapen *Funiculina quadrangularis* was not observed in Loch Eil but was present at most stations in upper Loch Linnhe, resulting in these being assigned to the biotope **SS.SMu.CFiMu.SpnMeg.Fun**. Particularly rich seapen beds, including all three species, were recorded at stations extending down the western side of the loch, from J74 in the north to J12 in the south (Figure 16). The fireworks anemone *Pachygerianthus multiplicatus* was recorded at two stations but appeared to be uncommon. Station J13, close to the central axis of the loch (Figure 17), had megafaunal burrows but no visible seapens and may represent an example of **SS.SMu.CFiMu.MegMax**, although no direct evidence of *Maxmuelleria lankesteri* was visible. Mobile epifauna were usually few in number and limited to widespread species such as *Pagurus bernhardus*, *Asterias rubens* and *Ophiura ophiura*. At station J73, near Stronchreggan (Figure 16), burrowed mud with seapens adjoined heavily-silted bedrock covered in large numbers of *Protanthea simplex* and *Ophiothrix fragilis* (**CR.LCR.BrAs.NeoPro.FS**). It was not clear from the video footage whether this was an isolated large outcrop or the base of the western coastline of Loch Linnhe.

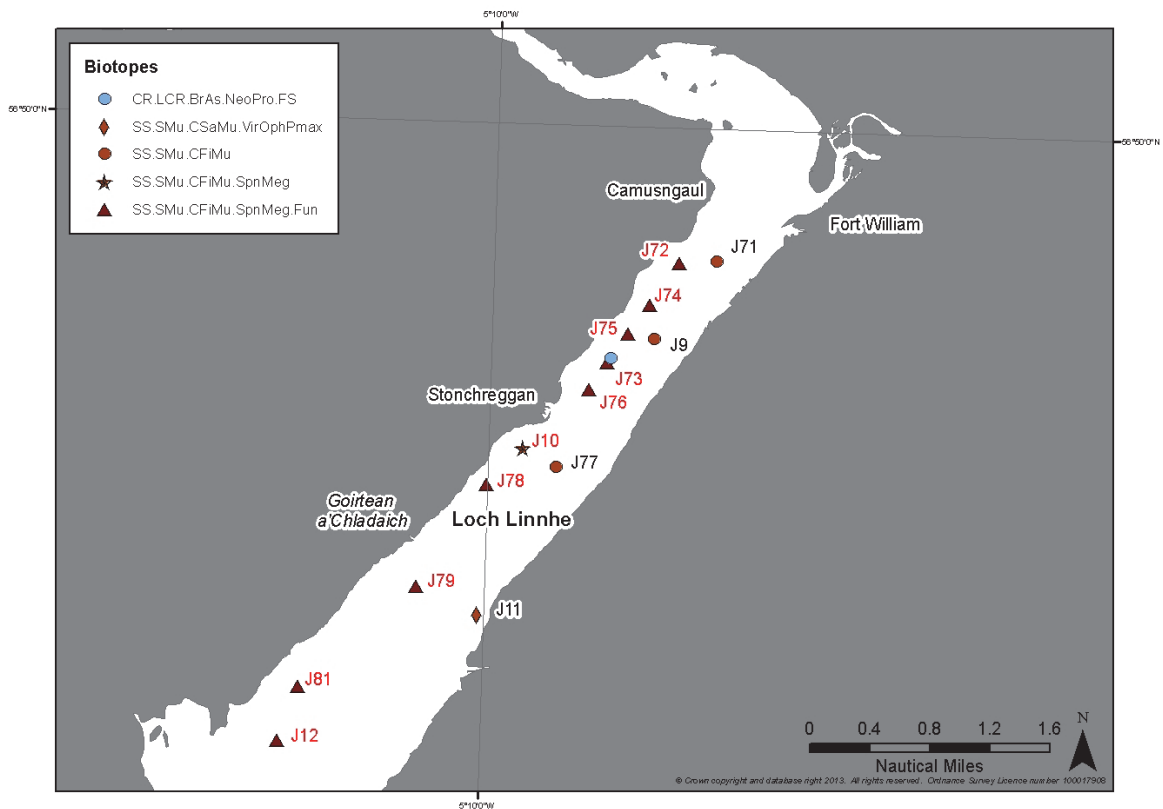


Figure 16. Distribution of biotopes observed within upper Loch Linnhe.

Two stations in the southern reaches of upper Loch Linnhe (J14 and J83, Figure 17) had coarser, mixed substrata of stony mud or shelly sand, indicating a transition to the higher-energy conditions of the strongly tidal Corran Narrows. Empty *Modiolus modiolus* shells were visible at station J14 but no confirmed living specimens were recorded. The most abundant epifauna here were brittlestars: at both stations comprising of a mixture of

Ophiocomina nigra and *Ophiothrix fragilis* (**SS.SMx.CMx.OphMx**). *Ophiopholis aculeata* was also present in small numbers at station J83. Brittlestar densities were relatively low at station J14, with no continuous bed being present, but higher at J83, reaching approximately 50% cover of the substratum. The biotope **CR.HCR.FaT.CTub.Adig**, associated with strong tidal streams was recorded in the Corran Narrows (station J15, Figure 17). Cobbles and small boulders supported a dense cover of *Alcyonium digitatum* colonies (S) at the start accompanied by *Urticina* sp. (C), encrusting serpulids (*Spirobranchus* sp.) and some *Metridium senile* (A).

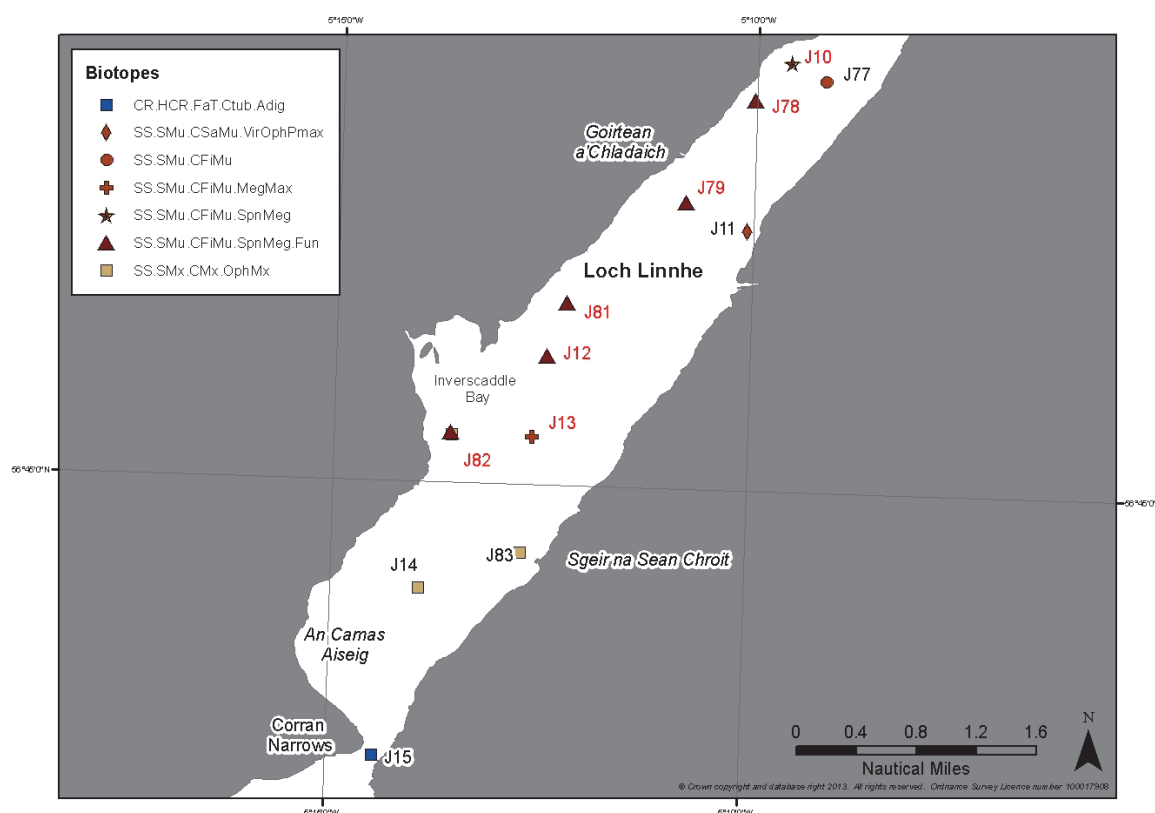


Figure 17. Distribution of biotopes observed within upper Loch Linnhe.

3.1.3 Summary of habitats and species observed in central Loch Linnhe

Fine-grained muds with megafaunal burrows and seapens were observed throughout the central section of Loch Linnhe, defined here as extending from the Corran Narrows south to Appin and the northern tip of Lismore (Figures 18 and 19). Burrow densities were variable but appeared to be high at many stations. *Funiculina quadrangularis*, *Pennatula phosphorea* and *Virgularia mirabilis* were recorded throughout this area, although all three species did not always occur together (Appendix 3). Seapen densities were generally much lower than at comparable stations in upper Loch Linnhe, with the exception of J22 (near Eilean Balnagowan) (Figure 19), where more than 100 *F. quadrangularis* were counted in a 6.5 minute camera drop, and J30 (inner Loch a' Choire) (Figure 19), which had a dense population of *V. mirabilis*. Fine mud stations in central Loch Linnhe are therefore a mixture of **SS.SMu.CFiMu.SpnMeg** and **SS.SMu.CFiMu.SpnMeg.Fun**, with a few stations lacking seapens possibly representing **SS.SMu.CFiMu.MegMax**, although no direct evidence of *Maxmuelleria lankesteri* was visible. Only one individual of *Pachycerianthus multiplicatus*

was observed in this group of stations, suggesting a low population density as recorded in upper Loch Linnhe.

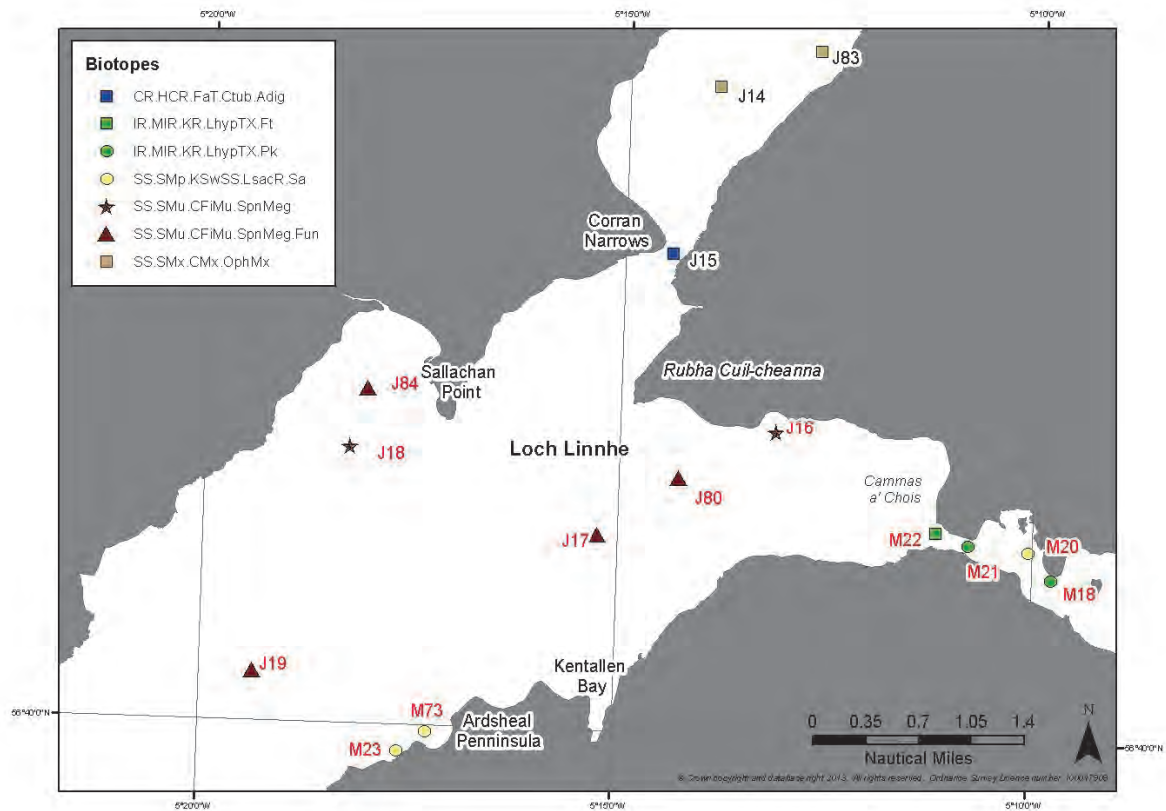


Figure 18. Distribution of biotopes observed within central Loch Linnhe.

Coarser, mixed sediments with variable quantities of stone and shell (**SS.SMx.CMx**) were recorded (J29 and J86-J89, Figure 19). Pebbles and cobbles usually supported encrusting coralline algae, serpulid tubes and a sparse hydroid turf. The most conspicuous mobile animal in this habitat was *Munida rugosa*, accompanied by small numbers of a few widespread species such as *Asterias rubens*, *Echinus esculentus* and *Pagurus bernhardus*. A patchy mixed bed of *Ophiothrix fragilis* and *Ophiocomina nigra* (**SS.SMx.CMx.OphMx**) was present at J87 (Sgeir nan Gillean, off the western coast of the loch near Rubha na h-Earba). Poor visibility and patchy sediments were observed at two stations on the Ardsheal Peninsula (M23 and M73, Figure 18) which supported beds of *Saccharina latissima* on inshore sediments (**SS.SMp.KSwSS.LsacR.Sa**).

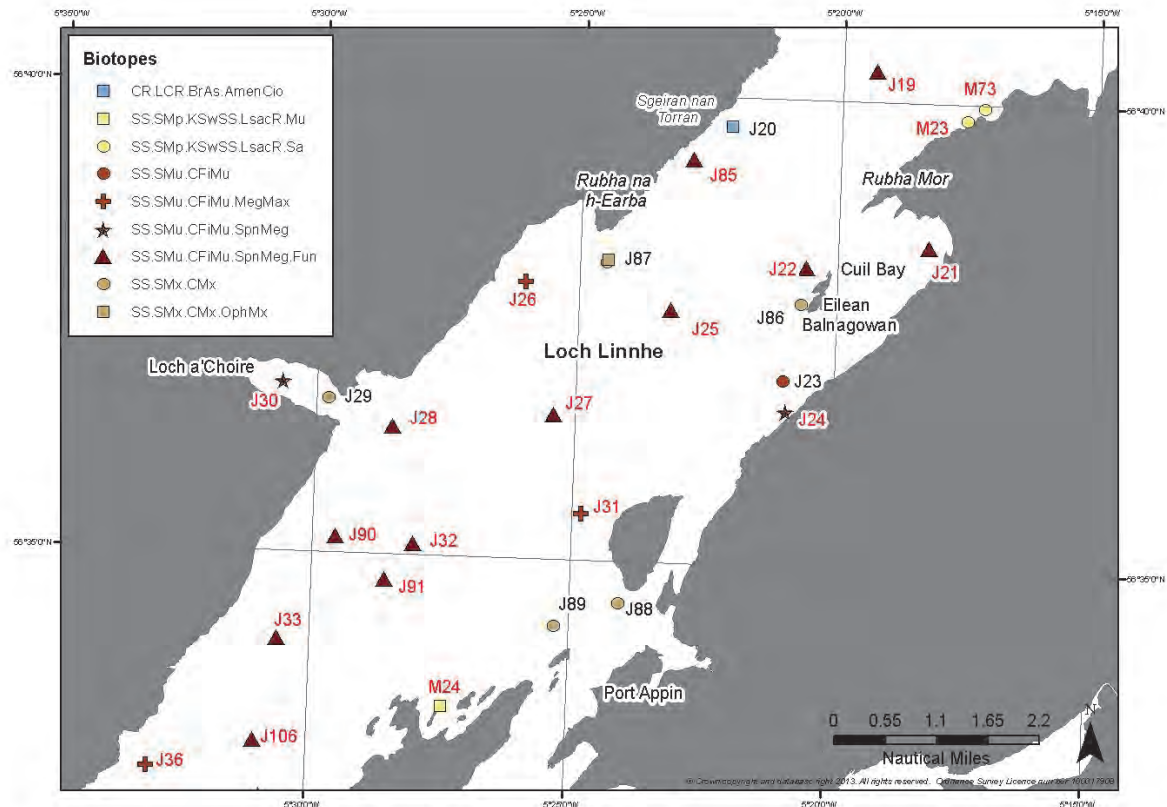


Figure 19. Distribution of biotopes observed in central Loch Linnhe.

The only station with a hard substratum was J20, near Sgeiran nan Torran along the western side of the loch opposite Rubha Mòr (Figure 19). Silted boulders and large cobbles supported encrusting coralline algae, small *Alcyonium digitatum* colonies and small ascidians. *Munida rugosa* was the most conspicuous mobile animal, present in large numbers among the rocks. In a sealoch setting, a heavily-silted rocky habitat with this sparse sessile epifauna is probably closest to the biotope **CR.LCR.BrAs.AmenCio**, although ascidians were not particularly prominent in this example.

3.1.4 Summary of habitats and species observed in lower Loch Linnhe

The large size and topographic complexity of lower Loch Linnhe was reflected in the number and variety of biotopes recorded (Figures 20 and 21). Circalittoral fine muds with megafaunal burrows and seapens occurred throughout the area, with numerous records along both eastern and western sides of Lismore, extending south as far as the stations off north-west Kerrera (J53, J56 and J95, Figure 21), and the Sound of Kerrera (J101, J103 and J104, Figure 23). High seapen densities were observed in particular off the western side of Lismore and at stations lying between south-east Lismore and the mainland at Dunstaffnage (Figure 29). *Funiculina quadrangularis* was present at the majority of fine mud/seapen stations (**SS.SMu.CFiMu.SpniMeg.Fun**). The few stations without observations of *F. quadrangularis*, or lacking seapens entirely, were classed as either **SS.SMu.CFiMu.SpniMeg** or **SS.SMu.CFiMu.MegMax**. One station in Camas Nathais (M70, Figure 29) appeared to have a sandier substratum with very few burrows. This was the only station in lower Loch Linnhe where high densities of *Virgularia mirabilis* were recorded, and is assigned to **SS.SMu.CsaMu.VirOphPmax**.

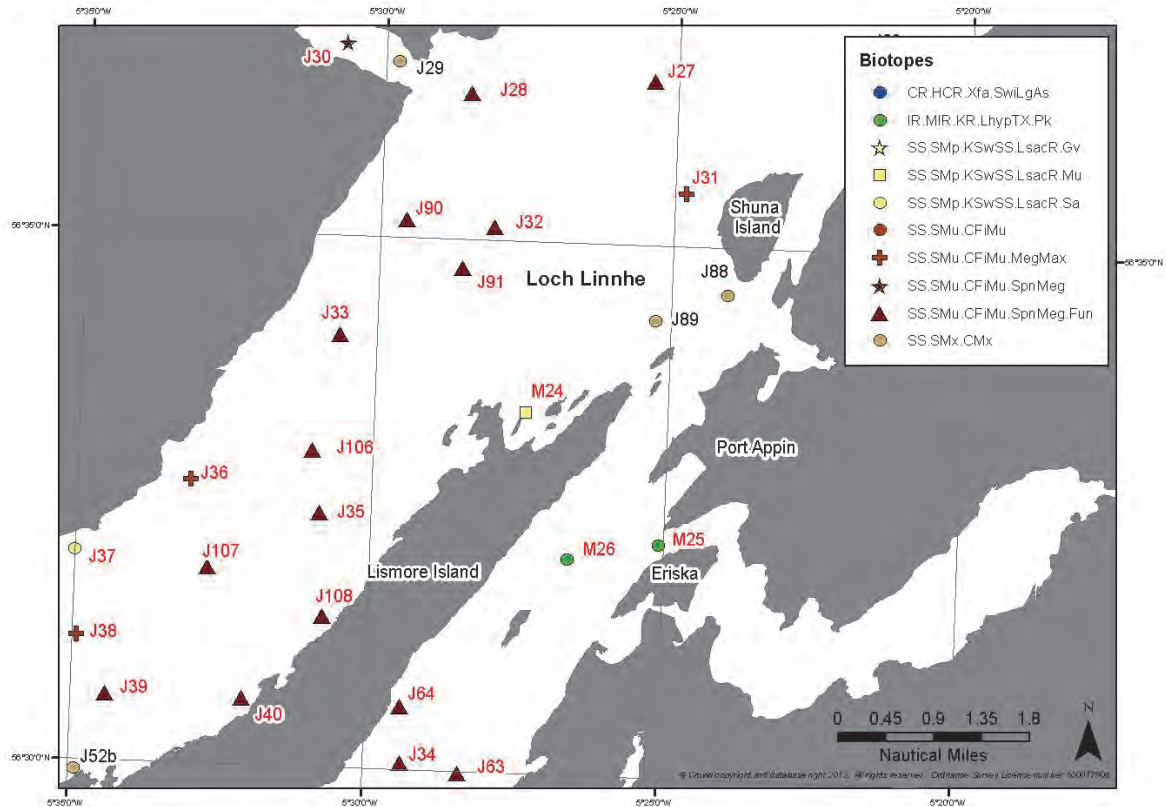


Figure 20. Distribution of biotopes observed in lower Loch Linnhe.

Mixed sediments, often stony muds with variable mixtures of cobble and shell, were noted at a number of stations clustered particularly around the southern end of Lismore (e.g. J50, J52, J61 and J105, Figure 21) and at the southern limit of the survey area between the islands of Mull and Kerrera (J54, J94 and J100, Figure 23). Where the biological community was non-diagnostic, a broad label of **SS.SMx.CMx** was assigned. *Munida rugosa* was almost always present in this habitat and was often the most common and conspicuous large epifaunal animal. The crinoid *Leptometra celtica* was recorded in large numbers at a number of muddy-sand or mixed sediment stations off southern Lismore, particularly J43, J99 and J61 (Figure 21). Brittlestar beds (*Ophiothrix fragilis* and/or *Ophiocomina nigra*, **SS.SMx.CMx.OphMx**) were present on mixed sediments off the southern tip of Lismore (J49 and J52, Figure 21) and outside the entrance to Loch Don, Mull (J54, J96 and J97, Figure 23).

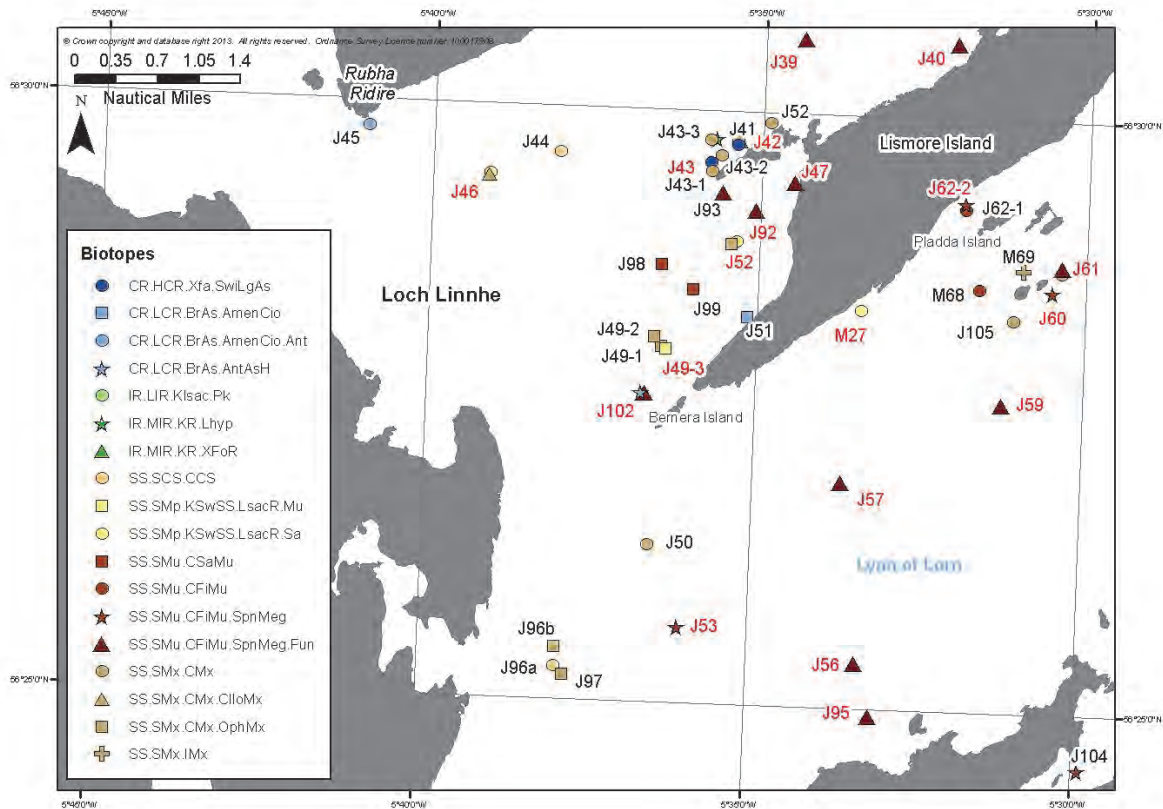


Figure 21. Distribution of biotopes observed in lower Loch Linnhe.

Macroalgal-dominated infralittoral biotopes were observed at several stations around the southern end of Lismore (J49, J52 and M27, Figure 21) and on the adjacent mainland coasts (J37, Figure 20; J46, Figure 21; M30, Figure 29). A park of *Saccharina latissima* on a sea bed of sand, mud or mixed sediments often with a patchy red algal understory (**SS.SMp.KSwSS.LsacR.Sa** or **LsacR.Mu**) was the most common macroalgal biotope observed. Kelp fronds were usually silted and heavily fouled with hydroids and bryozoans. Mobile epifauna were generally limited to a few widespread species such as *Asterias rubens*.

Silty bedrock or boulder slopes, usually with mud or mixed sediments at the base, were observed at seven stations in lower Loch Linnhe. Rock surfaces at stations J51 (south-west Lismore coast, Figure 21) and J101 (Sound of Kerrera, Figure 23) had patchy coralline crusts, diffuse hydroid turf and serpulid tubes. Large sessile epifauna were sparse and occurred mostly on the less heavily-silted vertical rock faces. Conspicuous sessile species included large ascidians (*Ascidia mentula* and *Diazona violacea*) and sabellids (*Sabella pavonina*). Station J51 had many *Munida rugosa* (F), while large echinoderms such as *Asterias rubens*, and *Echinus esculentus* were seen at both stations (**CR.LCR.BrAs.AmenCio**). The biotope at station J45 (Rubha an Rìdhe, mainland west of Lismore, Figure 21) was very similar in appearance and composition but also supported *Leptometra celtica* (in small numbers on the rocky slope, at higher density on the stony mud plain at its base). This biotope is closest to the variant **CR.LCR.BrAs.AmenCio.Ant**, although with the crinoid being *Leptometra celtica* rather than *Antedon bifida*. *Leptometra celtica* also occurred in great abundance on broad, sediment-draped bedrock 'steps' at J102, west of Bernera Island off Lismore (Figure 21). Conspicuous associated fauna included *Munida rugosa*, *Sabella pavonina*, *Caryophyllia smithii* and diffuse hydroid turf. The seapen *Funiculina quadrangularis* was also present on the flatter, sediment-covered

sections of the bedrock 'steps'. With abundance of crinoids, this biotope resembles **CR.LCR.BrAs.AntAsH**, although again with *Leptometra celtica* replacing *Antedon bifida*.

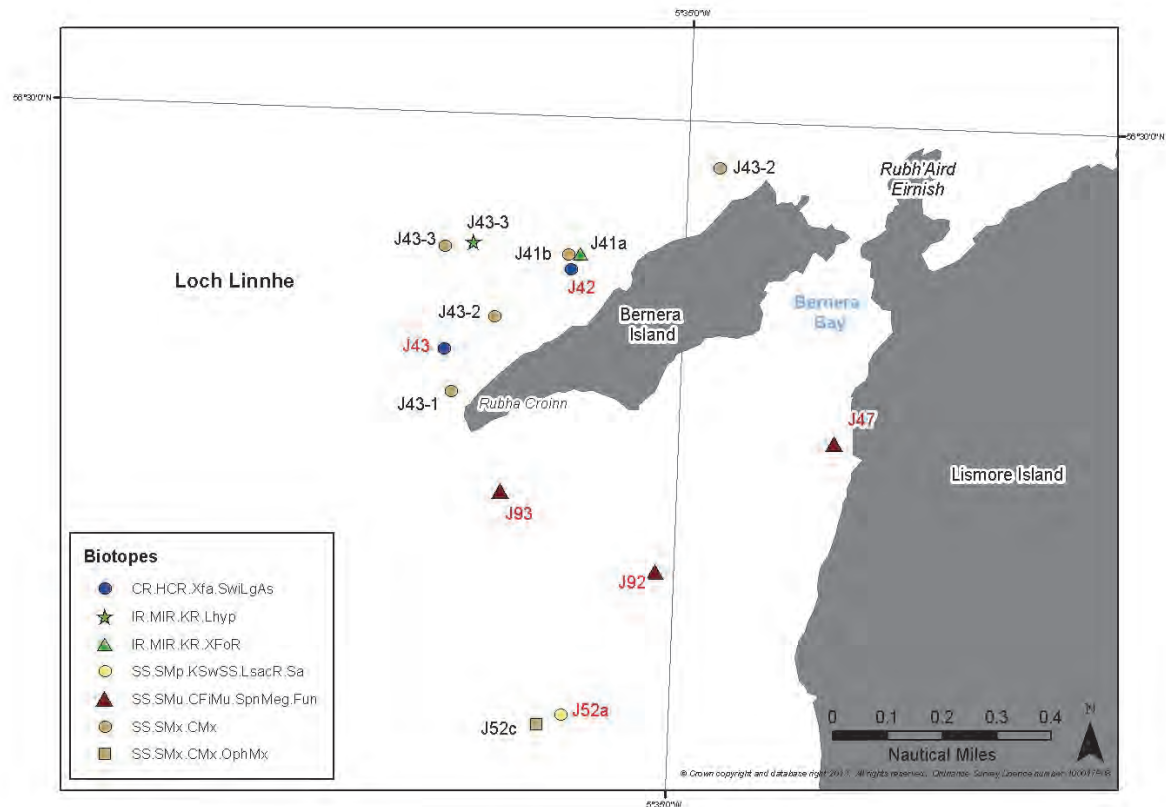


Figure 22. Distribution of biotopes observed in lower Loch Linnhe.

Stations J42 and J43, located close together on the south-west coast of Bernera Island (Figure 22), both showed silty bedrock and boulder slopes with hydroid/bryozoan turf, large ascidians, *Sabella pavonina* and *Caryophyllia smithii*. A few colonies of *Swiftia pallida* were observed at J42 (**CR.HCR.Xfa.SwiLgAs**). At station J43 *Leptometra celtica* was present in large numbers (A) on boulders at approximately 25 m depth. This station represents a variant of **CR.HCR.Xfa.SwiLgAs** with no *Swiftia pallida* seen. Two *Swiftia pallida* colonies were observed at J100 (Dubh Sgeir, south of Kerrera) (Figure 23). In common with the bedrock stations discussed previously, J100 had *Caryophyllia smithii*, *Sabella pavonina* and large ascidians growing among a diffuse hydroid turf, but the epifauna also included many small *Alcyonium digitatum* colonies (**CR.MCR.EcCr.CarSwi.LgAs**).

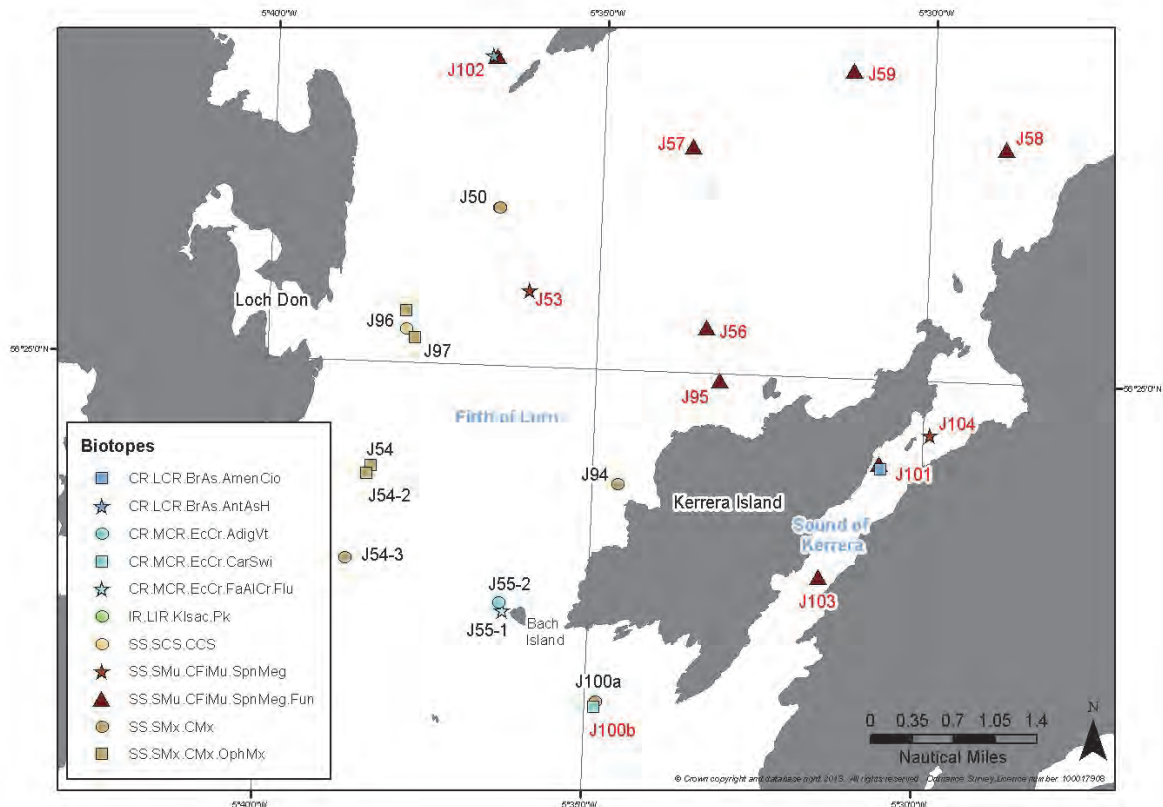


Figure 23. Distribution of biotopes observed in the Firth of Lorn.

Biotopes associated with high-energy, tideswept conditions were rare in the lower Loch Linnhe survey area. Station M25, near the entrance to Loch Creran, and M26, slightly to the south-west in the Lynn of Lorn (Figure 20), had substrata of cobbles, gravelly sand or fissured bedrock supporting a foliose red algal turf and open park of *Laminaria hyperborea*. Station M25 also showed a high density of *Alcyonium digitatum* and dense *Sagartia elegans* concentrated in bedrock fissures (IR.MIR.KR.Lhyp.TX.Pk). At stations J55-1 and J55-2, off Bach Island, south-west of Kerrera (Figure 23), stepped bedrock with boulders and cobbles at the base supported *Alcyonium digitatum* (higher density at J55-1), hydroid/bryozoan turf, *Flustra foliacea* and other sessile epifauna. These faunal characteristics are compatible with the circalittoral rock biotopes **CR.MCR.EcCr.FaAICr.Flu** and **CR.MCR.EcCr.Adig.Vt**.

One of the deepest (> 200 m) stations visited in this survey, J44, in the channel between the west coast of Lismore and the Morvern mainland (Figure 21), showed a substratum of coarse shell gravel, cobbles and small boulders. Visibility here was poor, but *Urticina* sp., *Munida rugosa* and *Asterias rubens* were present in small numbers however poor visibility made it impossible to determine their abundance. Observed fauna was not diagnostic of any biotope and this station was therefore assigned to the biotope complex **SS.SCS.CCS**.

3.1.5 Summary of habitats and species observed in Loch Leven

Circalittoral fine muds were recorded from the head of Loch Leven (station M1; Figure 24) west to the vicinity of Ballachulish and Eilean Munde (M86 and M87; Figure 26) in the outer loch. In the inner basin, east of the narrows at Caolas nan Con, megafaunal burrows were sparse or absent and seapens were not observed. Fine mud stations in this basin (M1-M4; Figure 24) may represent **SS.SMu.CFiMu.BlyrAchi**, although firm identification of this biotope is difficult from surface observations alone. West of the Caolas nan Con narrows,

megafaunal burrows tended to be much more abundant, with *Calocaris macandreae* and *Nephrops norvegicus* both certainly present. Rich seapen beds were also recorded here, extending west to station M86, north of Ballachulish. *Pennatula phosphorea* was the most consistently abundant seapen, with *Funiculina quadrangularis* also present in smaller numbers at most stations (**SS.SMu.CFiMu.SpnMeg.Fun**). *Virgularia mirabilis* was much less common, and recorded only at stations in the broader section of the loch basin west of Invercoe (Figure 25). Two individuals of *Pachycerianthus multiplicatus* were observed, confirming the presence of this species, at low density. Mobile epifauna consisted of the usual widespread scavengers such as *Pagurus bernhardus*, *Asterias rubens* and *Liocarcinus* sp.

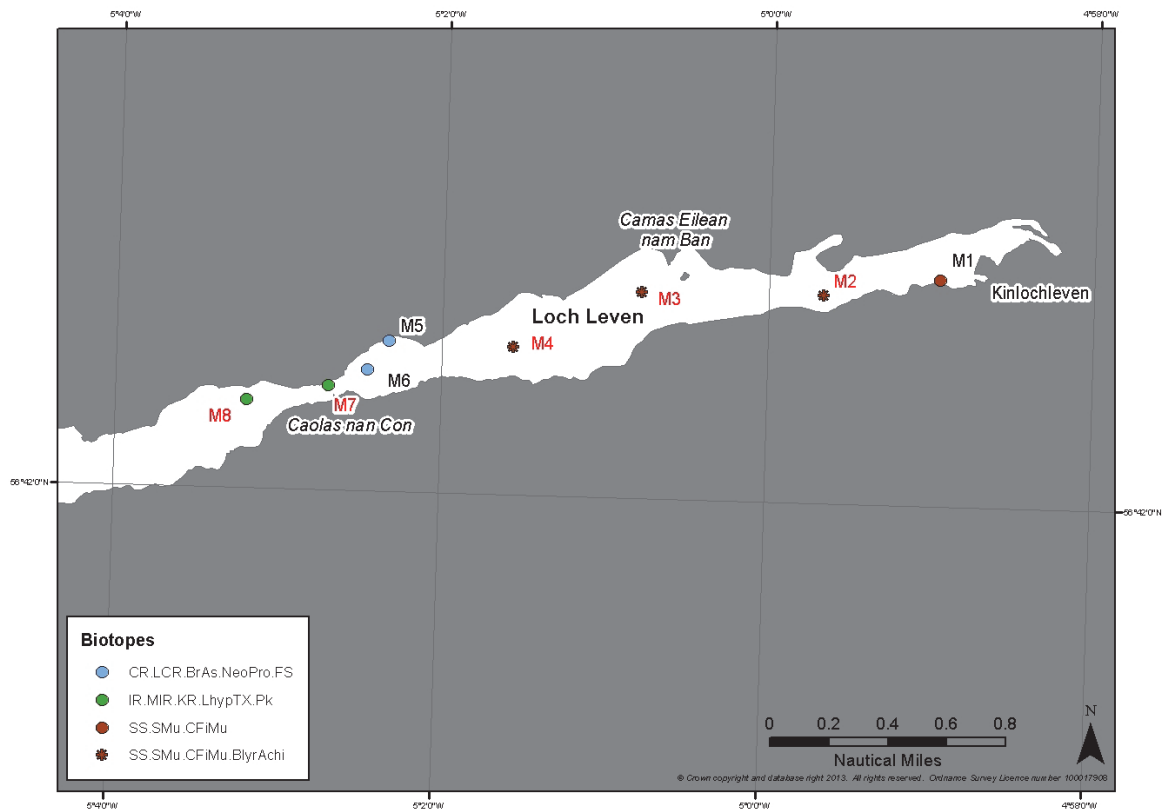


Figure 24. Distribution of biotopes observed in upper Loch Leven.

West of the megafaunally-burrowed fine muds, slightly coarser sediments were encountered, reflecting the residual influence of tidal currents near the loch entrance (Figure 26). Station M16 (Figure 26) had a sandy mud substratum (**SS.SMu.CsaMu**) with shell flecks, lacking burrows and seapens. The visible fauna (not diagnostic of any biotope) consisted of large numbers of *Pagurus bernhardus* accompanied by a few other mobile scavengers. A similar habitat occurred further west at station M85 (Figure 26) where *Virgularia mirabilis* and *Ophiura ophiura* were present in small numbers (**SS.SMu.CsaMu.VirOphPmax**).

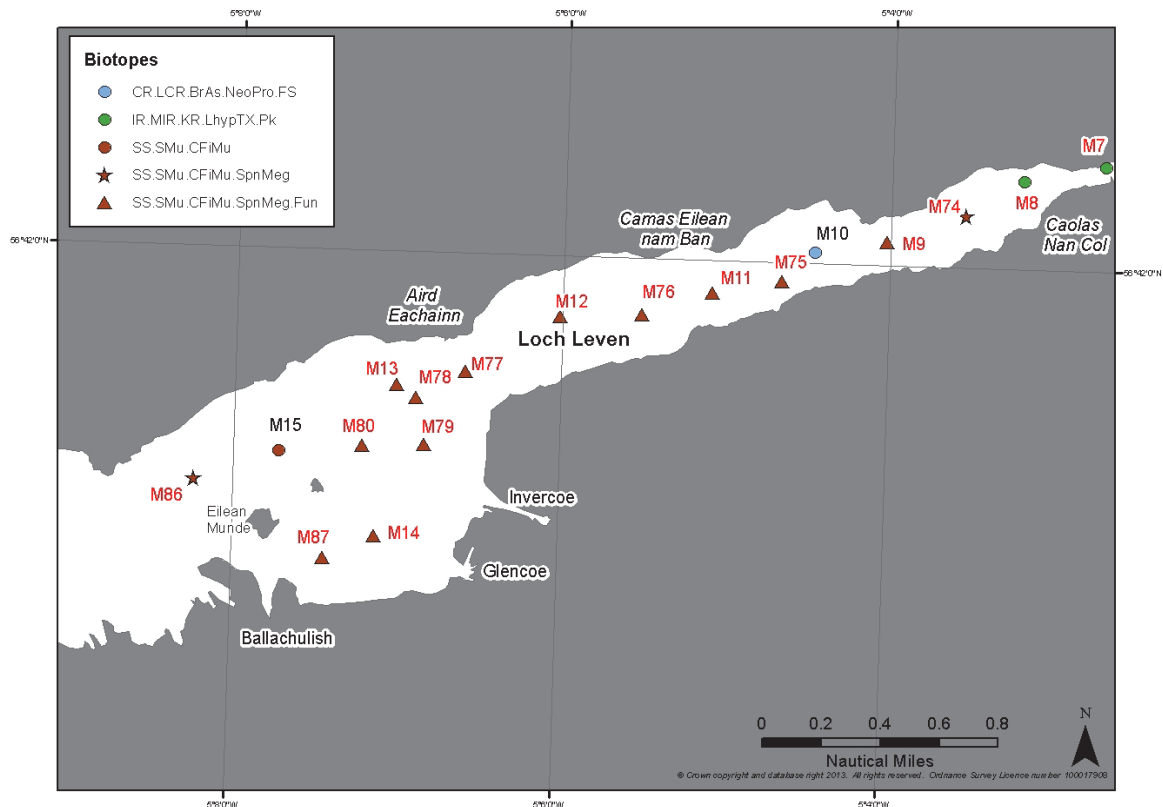


Figure 25 Distribution of biotopes observed in mid Loch Leven.

Biotopes indicating higher-energy conditions created by tidal flows were found at a series of stations extending into the loch from its entrance. Stations M21 and M22, in the shallows of Caolas Mhic Phadruig either side of the Ballachulish Bridge (Figure 26), had a sea bed of pebble gravel and cobbles heavily-encrusted with coralline algae, serpulid (*Spirobranchus* sp.) tubes and barnacles. Both stations supported beds of *Laminaria hyperborea* with an understory of foliose red algae. Observed kelp densities varied from an open park to a denser forest (IR.MIR.KR.LhypTX.Pk to LhypTX.Ft). Mobile epifauna were limited to *Asterias rubens*. This macroalgal community was also recorded further into the loch at M18 on a slightly finer substratum of shelly gravel. Stations M19 and M20 in the north shore (Figure 26) embayment just inside the loch entrance may lie outside the main path of tidal flow, as indicated by a finer substratum (gravelly sand) and a kelp community with *Saccharina latissima* rather than *Laminaria hyperborea*. Station M20 was assigned to **S.SMp.KSwSS.LsacR.Gv**. At M19 (Figure 26), the presence of some *Chorda filum* among the kelp supports a biotope identification of **SS.SMp.KSwSS.LsacCho**. Several stations close to the loch entrance were clearly exposed to strong tidal flow but were not dominated by macroalgae. Station M81 had coarse gravel encrusted with serpulid tubes and barnacles (**SS.SCS.CCS.PomB**), while *Modiolus modiolus* occurred at low density nearby at M82 (**SS.SMx.CMx.Cilo.ModHo**). Mixed sediments with coralline crusts on surface stones were recorded further into the loch at M83 and M84. Biota were not clearly diagnostic but the burrowing anemone *Cerianthus lloydii* was visible in close-up views of the sea bed, suggesting affinity to **SS.SMx.CMx.CiloMx**. A dense *Ophiothrix fragilis* bed (**SS.SMx.CMx.OphMx**) was recorded at M17, just north of the Ballachulish quarry.

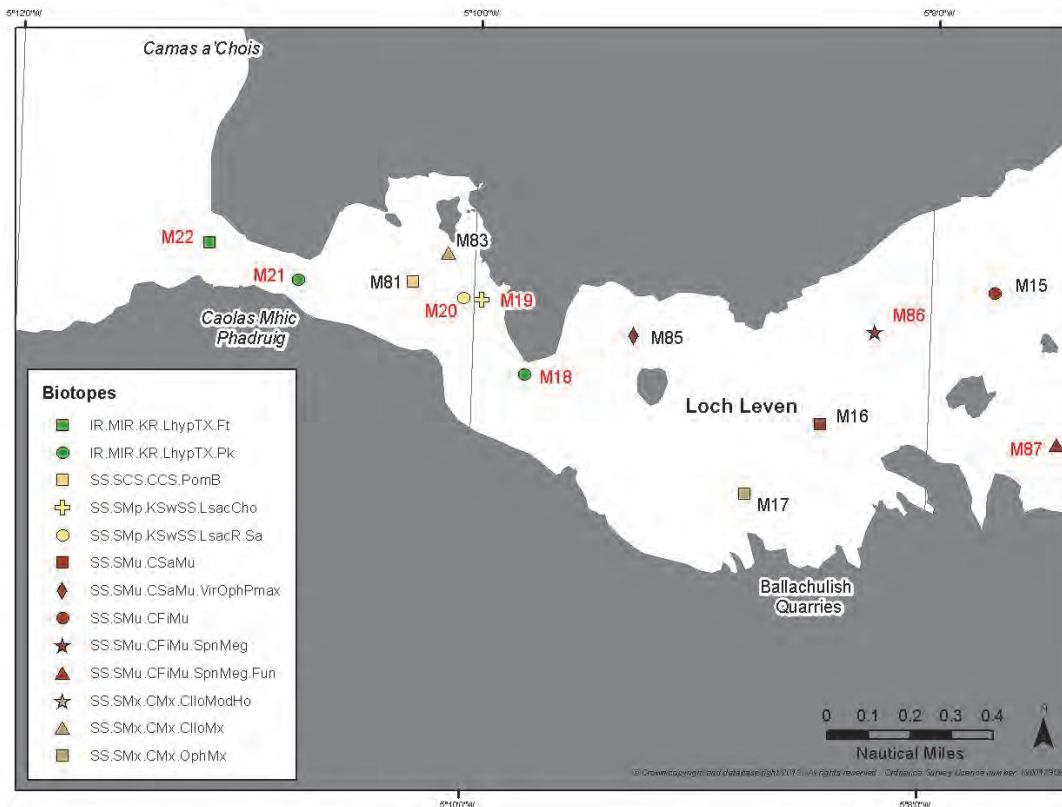


Figure 26. Distribution of biotopes observed in lower Loch Leven.

As would be expected, a biotope associated with strong tidal currents was also found at two stations in the Caolas nan Con narrows (M7 and M8, Figure 24). At both stations a *Laminaria hyperborea* park with red algal understorey occurred on shelly pebble gravel or gravelly sand with cobbles and small boulders (IR.MIR.KR.Lhyp.TX.Pk). *Asterias rubens* and *Psammechinus miliaris* were the most conspicuous mobile epifauna. Tidal influence was also apparent at M5 and M6 (Figure 24), in the inner basin of the loch just east of the narrows. Cobbles and boulders were encrusted with coralline algae, and serpulid tubes and supported large numbers of the anemone *Protanthea simplex*. Large numbers of this anemone in wave-sheltered sealoch basins are a characteristic feature of CR.LCR.BrAs.NeoPro.FS, although these Loch Leven stations appeared to be less silty and more tidally-exposed than is usual for the biotope. A more typical, lower-energy example was seen at M10 (Figure 25), approximately 2 km west of Caolas nan Con, where small numbers of *Protanthea simplex* (A) were found on stones and shells embedded in fine mud, apparently at the foot of a rocky slope.

3.1.6 Summary of habitats and species observed in Loch Etive

Circalittoral fine muds were found at a series of stations along the central axis of Loch Etive from close to the loch head (station M65, Figure 27) to just west of Airds Point (M38 and M39, Figure 28), interrupted by a zone of coarser sea bed at the Bonawe Sill. Megafaunal burrows were very sparse near the loch head, generally occurring at low to medium density at other mud stations. Surface features indicative of *Nephrops norvegicus*, *Calocaris macandreae*, *Jaxea nocturna* and *Maxmuelleria lankesteri* were all observed. Seapens were present at most of these stations but seldom in large numbers, and at no station were all three species recorded together. *Pennatula phosphorea* was seen only west of the Bonawe Sill, with *Funiculina quadrangularis* in the inner loch basin north-east of the sill. *Virgularia*

mirabilis was found in small numbers (with the exception of station M63, Figure 27) in both areas. *Pachycerianthus multiplicatus* was seen at five stations. The four individuals recorded at M60 (Figure 27) were the largest number seen at any individual station in this entire survey. Burrowed mud stations with seapens can mostly be assigned to **SS.SMu.CFiMu.Spnmeg**, except where *F. quadrangularis* was recorded (**SS.SMu.CFiMu.Spnmeg.Fun**). Examples of **SS.SMu.CFiMu.MegMax** and possibly **SS.SMu.CFiMu.BlyrAchi** were also observed, although as previously noted, confirmation of the latter biotope requires infaunal data. Mobile epifauna were usually sparse in these fine mud biotopes, with the exception of the brittlestar *Ophiura ophiura*, present in large numbers at several stations.

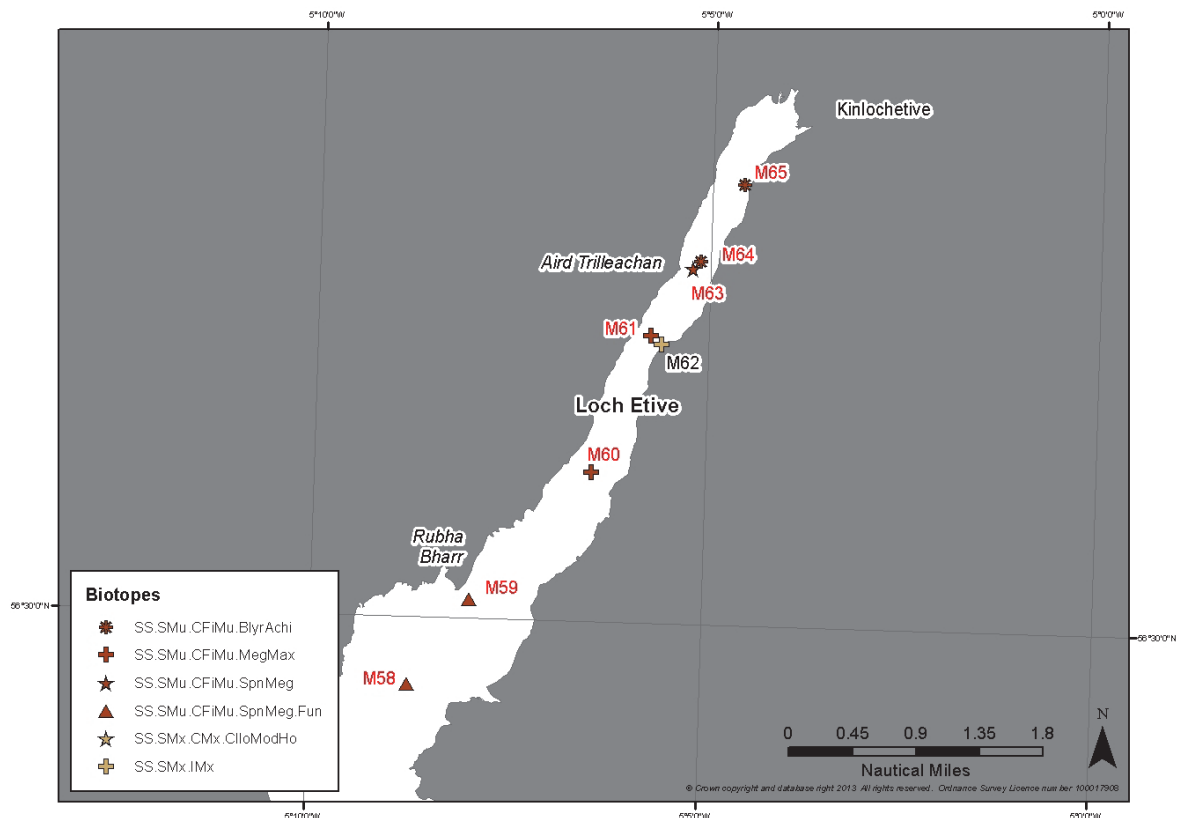


Figure 27. Distribution of biotopes observed in upper Loch Etive.

Between Airds Point and the Falls of Lora, fine muds were replaced by progressively coarser sediments, indicating the increasing strength of tidal currents in the approaches to the loch entrance. Moving from east to west, stations M37 and M36 (Figure 29) had a coarse sand seabed with shell fragments. A short algal turf with interspersed ascidians (*Ciona intestinalis*) at M37 (non-diagnostic biotope, probably in the **SS.SMp.KSwSS** group) was reduced to diffuse patches by M36, where the only organism visible was the burrowing anemone *Cerianthus lloydii* (possibly **SS.SMx.CMx.CiloMx**). Closer to the loch entrance, M34 and M35 (Figure 29) consisted of pebble gravel and cobbles. The bryozoan *Alcyonidium diaphanum* occurred in scattered clumps at M34 and at much higher density at M35, mixed with small colonies of the finger-like sponge *Halichondria bowerbanki*. These two sessile organisms are common components of a biotope widespread on shallow hard substrata in Loch Etive (**CR.MCR.CfaVS.Hbow.Eud**). A pebble gravel sea bed also occurred at stations M32 and M33 (Figure 29), in the narrow strait between Connel/Achaleven and Black Crofts, due east of the loch entrance. Stones encrusted with

pink coralline algae and serpulid (*Spirobranchus* sp.) tubes carried clumps of the large erect bryozoans *Flustra foliacea* and *Alcyonidium diaphanum* and bushy hydroids, probably *Sertularia* sp. This community, dominated by sessile suspension-feeders favouring strong tidal currents was assigned to the biotope **SS.SMx.CMx.FluHyd**.

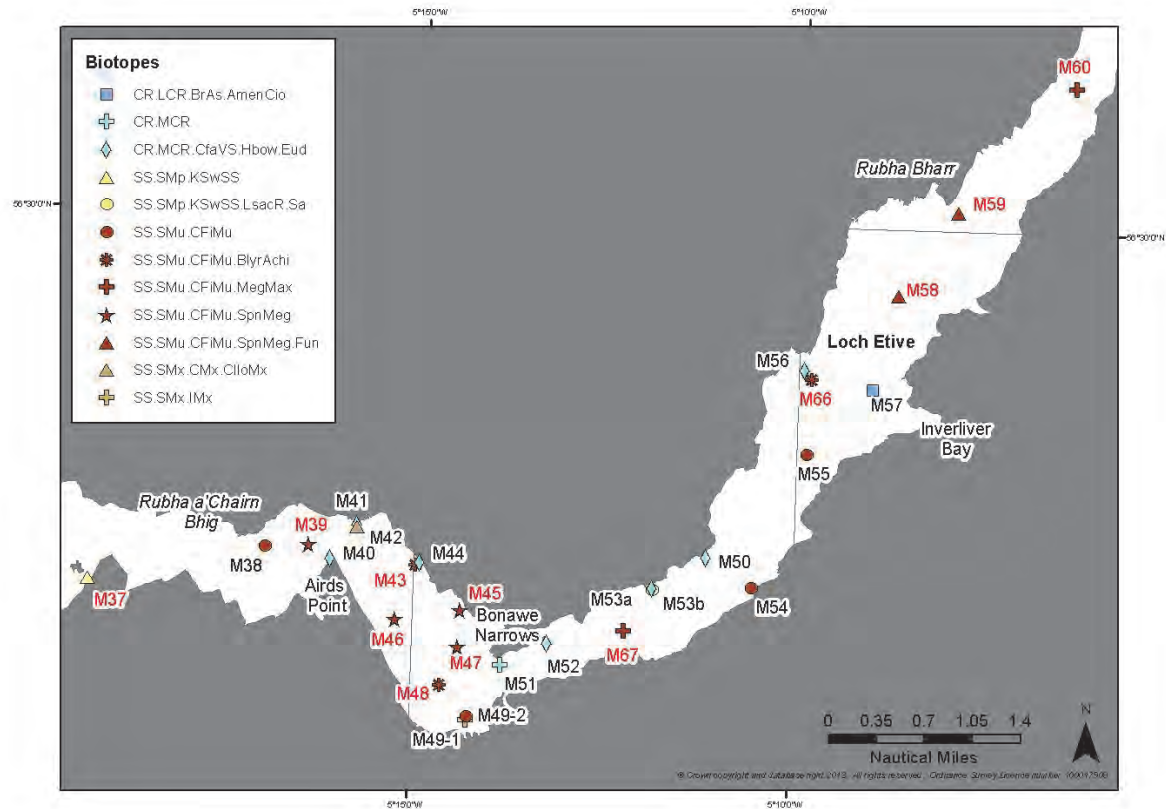


Figure 28. Distribution of biotopes observed in upper Loch Etive.

Shallow stations fringing the coastline west of Airds Point (M40, M41 and M44, Figure 28) showed a sea bed of coarse gravelly sand, sometimes adjoining a boulder slope. A sparse sessile fauna of *Alcyonidium diaphanum* and (at M44) *Halichondria bowerbanki* can be regarded as an impoverished variant of **CR.MCR.CfaVS.Hbow.Eud**. A similar community, probably assignable to the same biotope, was seen at stations along the northern coast of the inner loch (M50, M52, M53 and M56, Figure 28). A silty boulder slope off Inverliver Bay (station M57, Figure 28) had *Sabella pavonina* and ascidians, possibly *Ascidia mentula*. This sparse epifauna on low-energy, silted rock is probably closest to the widespread sealoch biotope **CR.LCR.BrAs.AmenCio**.

The narrow constriction of the sill at Bonawe Narrows also results in accelerated tidal currents. The camera tow here (station M51, Figure 28) gave very poor image quality but appeared to show a sea bed of boulders and cobbles on coarse gravelly sand. Stones carried an indeterminate biological turf, possibly of hydroids and red algae, but insufficient detail was visible to assign this to any biotope.

Station M31, located in the Falls of Lora at the loch entrance, showed vertical ridges of bedrock separated by cobble and boulder-filled gullies (Figure 29). Rock surfaces were almost completely covered in faunal turf, with the most conspicuous components a yellowish sponge, possibly *Halichondria panicea*, and the bryozoans *Flustra foliacea* and *Alcyonidium diaphanum*. This turf was replaced by a dense barnacle crust (probably *Balanus crenatus*)

on the more vertical rock faces. The crests of the bedrock ridges carried scattered *Laminaria hyperborea*. This sessile community dominated by a small number of species able to resist very strong tidal streams can be regarded as **CR.HCR.FaT.BaITub**. The characterising hydroid species *Tubularia indivisa* was not definitely identified at the level of image resolution available but is likely to form part of the indeterminate hydroid growth visible among the larger sponge and bryozoan colonies.

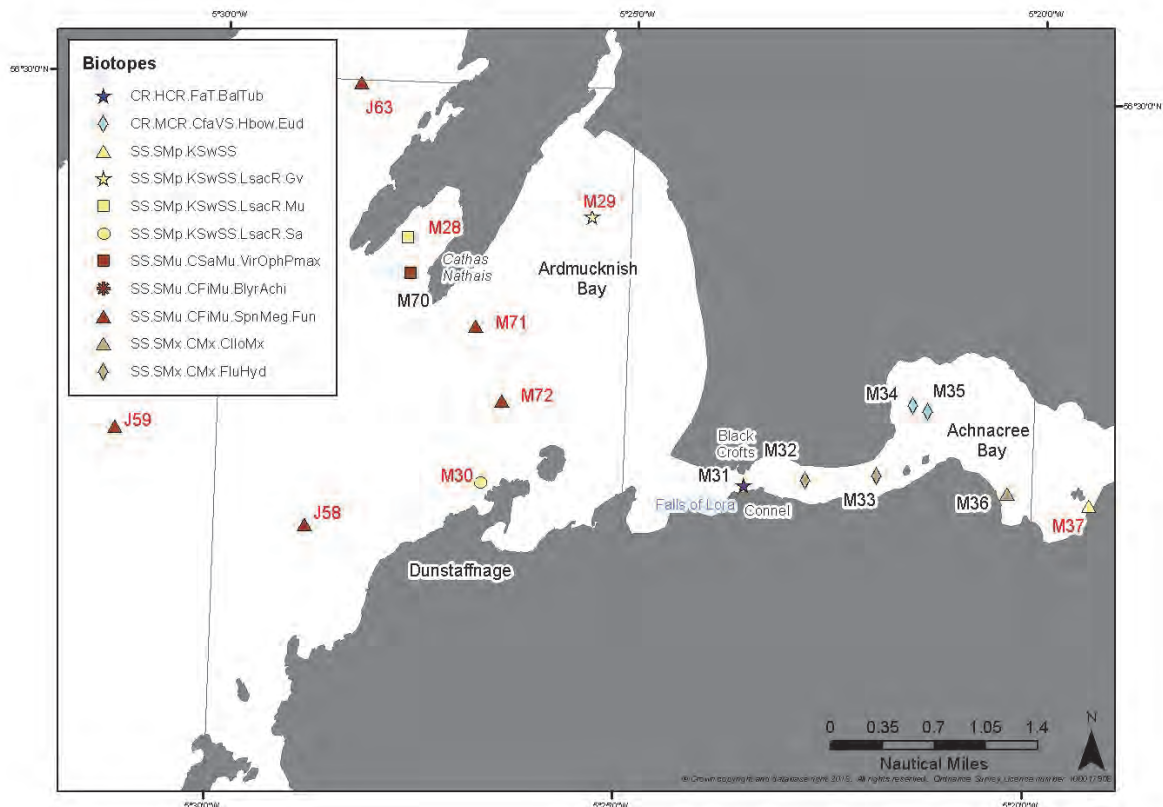


Figure 29. Distribution of biotopes observed in lower and outer Loch Etive.

3.2 Infaunal survey

Biotope assignment to the benthic infaunal samples collected can be seen in Table 4 with the raw data presented in Table 12, Appendix 4. A summary of the calculated diversity indices and biotopes are in Table 5.

3.2.1 Biotopes

Data from infaunal grabs were compared with the biotopes assigned to stations by video analysis in Table 4. Table 5 shows the calculated statistics for each of the infaunal samples. Three biotopes were recorded at only a single infaunal grab station each. The biotope **SS.SCS.CCS** was present at JG10 (video station J44), numerically dominated by the polychaete *Laonice cirrata*. There were 42 taxa recorded here, with 93 individuals and diversity as measured by Shannon H' of 3.395. Particle size (mean Φ) was 6.913.

Table 4. *Biotopes assigned from video analysis to infaunal grab stations.*

Grab Station	DDV Station	Assigned biotope/ biotope complex
JG10	J44	SS.SCS.CCS
JG3	J8	SS.SMu.CFiMu
MG11	M38	SS.SMu.CFiMu
MG14	M55	SS.SMu.CFiMu
MG8	M15	SS.SMu.CFiMu
MG1	M2	SS.SMu.CFiMu.BlyrAchi
MG2	M3	SS.SMu.CFiMu.BlyrAchi
MG18	M64	SS.SMu.CFiMu.BlyrAchi
MG19	M65	SS.SMu.CFiMu.BlyrAchi
MG21	M66	SS.SMu.CFiMu.BlyrAchi
JG5	J13	SS.SMu.CFiMu.MegMax
JG6	J31	SS.SMu.CFiMu.MegMax
JG9	J36	SS.SMu.CFiMu.MegMax
MG22	M67	SS.SMu.CFiMu.MegMax
JG4	J10	SS.SMu.CFiMu.SpnMeg
JG1	J2	SS.SMu.CFiMu.SpnMeg
JG15	J30	SS.SMu.CFiMu.SpnMeg
JG12	J53	SS.SMu.CFiMu.SpnMeg
MG13	M45	SS.SMu.CFiMu.SpnMeg
MG20	M46	SS.SMu.CFiMu.SpnMeg
JG7	J28	SS.SMu.CFiMu.SpnMeg.Fun
JG8	J34	SS.SMu.CFiMu.SpnMeg.Fun
JG13	J63	SS.SMu.CFiMu.SpnMeg.Fun
JG14	J72	SS.SMu.CFiMu.SpnMeg.Fun
MG5	M11	SS.SMu.CFiMu.SpnMeg.Fun
MG6	M12	SS.SMu.CFiMu.SpnMeg.Fun
MG7	M13	SS.SMu.CFiMu.SpnMeg.Fun
MG3	M4	SS.SMu.CFiMu.SpnMeg.Fun
MG16	M58	SS.SMu.CFiMu.SpnMeg.Fun
MG17	M59	SS.SMu.CFiMu.SpnMeg.Fun
MG23	M71	SS.SMu.CFiMu.SpnMeg.Fun
MG24	M72	SS.SMu.CFiMu.SpnMeg.Fun
MG4	M9	SS.SMu.CFiMu.SpnMeg.Fun
MG9	M16	SS.SMu.CSaMu
JG2	J3	SS.SMu.CsaMu.VirOphPmax
JG11	J49	SS.SMx.CMx.OphMx
MG10	M17	SS.SMx.CMx.OphMx

Table 5. Diversity indices calculated for all infaunal samples collected during the 2011 Linnhe survey, with corresponding biotope classification and PMF. All values are for 0.1 m² samples. BM = Burrowed mud, FQ = Funiculina quadrangularis, KS = Kelp and seaweed communities on sublittoral sediment, DM = Inshore deep mud, PM = Pachycerianthus multiplicatus. * = MPA search feature

Grab Station	Video Station	Taxa	Total Ind.	Diversity Index						PMF	Biotope
				Margalef's d	Pielou's J'	Brillouin	Fisher	Shannon H'(log _e)	Simpson's 1-λ'		
JG1	J2	7	28	1.801	0.724	1.156	2.996	1.408	0.696	BM*	SS.SMu.CFiMu.SpnMeg
JG2	J3	7	40	1.627	0.503	0.812	2.456	0.979	0.460		SS.SMu.CsaMu.VirOphPmax
JG3	J8	31	143	6.045	0.861	2.659	12.183	2.958	0.932		SS.SMu.CFiMu
JG4	J10	27	117	5.460	0.789	2.312	11.003	2.602	0.889	BM*	SS.SMu.CFiMu.SpnMeg
JG5	J13	22	59	5.150	0.906	2.360	12.720	2.801	0.940	BM*	SS.SMu.CFiMu.MegMax
JG6	J31	9	15	2.954	0.938	1.509	9.500	2.061	0.914	BM*	SS.SMu.CFiMu.MegMax
JG7	J28	13	25	3.728	0.905	1.797	10.915	2.320	0.907	BM*, FQ*	SS.SMu.CFiMu.SpnMeg.Fun
JG8	J34	11	20	3.338	0.926	1.684	10.032	2.221	0.916	BM*, FQ*	SS.SMu.CFiMu.SpnMeg.Fun
JG9	J36	19	40	4.880	0.878	2.083	14.167	2.585	0.915	BM*	SS.SMu.CFiMu.MegMax
JG10	J44	42	93	9.046	0.908	2.878	29.500	3.395	0.965		SS.SCS.CCS
JG11	J49	46	116	9.467	0.913	3.014	28.177	3.496	0.964	KS*	SS.SMx.CMx.OphMx
JG12	J53	18	62	4.119	0.747	1.830	8.514	2.158	0.803	BM*	SS.SMu.CFiMu.SpnMeg
JG13	J63	17	66	3.819	0.819	2.014	7.415	2.322	0.884	BM*, FQ*	SS.SMu.CFiMu.SpnMeg.Fun
JG14	J72	27	105	5.587	0.851	2.476	11.764	2.806	0.925	BM*, FQ*	SS.SMu.CFiMu.SpnMeg.Fun
JG15	J30	33	172	6.217	0.775	2.456	12.134	2.708	0.898	BM*	SS.SMu.CFiMu.SpnMeg
MG1	M2	20	41	5.116	0.913	2.207	15.416	2.734	0.939	DM*?	SS.SMu.CFiMu.BlyrAchi
MG2	M3	10	17	3.177	0.969	1.662	10.187	2.232	0.941	DM*?	SS.SMu.CFiMu.BlyrAchi
MG3	M4	30	130	5.958	0.872	2.653	12.225	2.965	0.938	BM* or DM*	SS.SMu.CFiMu.SpnMeg.Fun (without seapens) or SS.SMu.CFiMu.BlyrAchi
MG4	M9	38	163	7.264	0.852	2.783	15.580	3.098	0.933	BM*, FQ*	SS.SMu.CFiMu.SpnMeg.Fun
MG5	M11	35	121	7.090	0.886	2.779	16.513	3.151	0.952	BM*, FQ*	SS.SMu.CFiMu.SpnMeg.Fun
MG6	M12	31	93	6.619	0.924	2.750	16.283	3.174	0.960	BM*, FQ*	SS.SMu.CFiMu.SpnMeg.Fun
MG7	M13	37	112	7.630	0.893	2.814	19.295	3.225	0.956	BM*, FQ*	SS.SMu.CFiMu.SpnMeg.Fun SS.SMu.CFiMu later possibly
MG8	M15	49	191	9.139	0.863	3.020	21.318	3.360	0.951	BM*	SS.SMu.CFiMu.SpnMeg or SS.SMu.CFiMu.MegMax
MG9	M16	82	476	13.138	0.812	3.331	28.552	3.578	0.944		SS.SMu.CSaMu
MG10	M17	45	256	7.935	0.782	2.734	15.825	2.975	0.908		SS.SMx.CMx.OphMx
MG11	M38	21	118	4.192	0.847	2.331	7.431	2.580	0.909		SS.SMu.CFiMu

Table 5 continued

Grab Station	Video Station	Taxa	Total Ind.	Diversity Index						PMF	Biotope
				Margalef's d	Pielou's J'	Brillouin	Fisher	Shannon H'(log _e)	Simpson's 1-λ'		
MG13	M45	21	76	4.618	0.824	2.171	9.597	2.508	0.884	BM*	SS.SMu.CFiMu.SpMmeg
MG14	M55	6	11	2.085	0.860	1.093	5.403	1.540	0.800	PM*	SS.SMu.CFiMu
MG16	M58	12	25	3.417	0.895	1.738	9.064	2.224	0.900	FQ*, PM*	SS.SMu.CFiMu.SpMmeg.Fun (although lacking burrows)
MG17	M59	12	15	4.062	0.941	1.648	27.852	2.338	0.943	BM*, FQ*, PM*	SS.SMu.CFiMu.SpMmeg.Fun
MG18	M64	11	19	3.396	0.868	1.549	10.902	2.082	0.865	DM*?	SS.SMu.CFiMu.BlyrAchi
MG19	M65	18	65	4.072	0.771	1.906	8.238	2.229	0.830	DM*?	SS.SMu.CFiMu.BlyrAchi
MG20	M46	29	71	6.569	0.892	2.531	18.291	3.003	0.944	BM*	SS.SMu.CFiMu.SpMmeg
MG21	M66	23	62	5.331	0.906	2.398	13.236	2.840	0.941	DM*?	SS.SMu.CFiMu.BlyrAchi
MG22	M67	29	171	5.446	0.688	2.106	10.021	2.317	0.842	BM*, DM*?	SS.SMu.CFiMu.MegMax (although no evidence of <i>Maxmuelleria lankesteri</i>) or SS.SMu.CFiMu.BlyrAchi (although possibly more megafaunal burrows than typical for this biotope)
MG23	M71	15	21	4.598	0.960	1.924	23.473	2.599	0.962	BM*, FQ*	SS.SMu.CFiMu.SpMmeg.Fun
MG24	M72	20	43	5.052	0.887	2.158	14.539	2.657	0.927	BM*, FQ*	SS.SMu.CFiMu.SpMmeg.Fun

SS.SMu.CSaMu was assigned to MG9 (M16), where 82 taxa (numerically dominated by *Amphiura filiformis*), 476 individuals and an H' of 3.578 were recorded. Mean Φ was 4.210. The biotope **SS.SMu.CSaMu.VirOphPmax** was present only at JG2 (J3). There were seven taxa and 40 individuals recorded (numerically dominated by *Amphiura filiformis*), with an H' of 0.979 and mean Φ of 5.169.

The most common biotope assigned to video stations that had infaunal grabs taken was **SS.SMu.CFiMu.Spnmeg.Fun**, (13 stations). The mean number of taxa (S) at these stations was 22.9 (range 11-38 taxa), and the mean number of individuals (N) was 72.2 (range 15-163). Diversity as measured by Shannon H' averaged 2.700 (range 2.221-3.225), while mean Φ ranged from 4.288-7.430. The brittlestar *Amphiura chiajei* was numerically dominant at three of these **SS.SMu.CFiMu.Spnmeg.Fun** stations, and present at 11 stations assigned to the biotope (Table 4). See Table 12, Appendix 4 for further detail.

The next most common biotope assigned to infaunal stations by video analysis was **SS.SMu.CFiMu.Spnmeg** at six stations. The mean S per station was 22.5 (range 7-33), the mean N was 87.7 (range 28-172), mean H' was 2.398 (range 1.408-3.003) and mean Φ ranged from 4.608-6.272. The brittlestar *Amphiura chiajei* was numerically dominant at two of the stations in this assigned biotope (Table 4).

SS.SMu.CFiMu.BlyrAchi was the next most commonly assigned biotope at five stations. There was a mean S of 16.4 (range 10-23) at these stations, a mean N of 40.8 (range 17-65), a mean H' of 2.423 (range 2.082-2.840) and a range of mean Φ from 4.387-4.575. No one taxon was numerically dominant in all infaunal grabs taken from the five **SS.SMu.CFiMu.BlyrAchi** assigned stations (Table 5), nor was any top five numerically dominant taxon common to all stations.

The biotope **SS.SMu.CFiMu** was assigned to four infaunal grab stations, where the mean S per station was 26.8 (range 6-49), the mean N was 115.8 (range 11-191), mean H' = 2.609 (range 1.540-3.360) and range of mean Φ = 5.038-5.832. No top five numerically dominant taxon was common at all grab stations assigned the **SS.SMu.CFiMu** biotope, nor was any taxon numerically dominant at more than one station (Tables 15 – 20, Appendix 4).

SS.SMu.CFiMu.MegMax was also assigned by video to four infaunal stations. Mean S per station was 19.8 (range 9-29) at these stations, mean N = 71.3 (range 15-171), mean H' = 2.441 (range 2.061-2.801) and range of mean Φ = 4.998-6.028. No taxon was numerically dominant at more than one station in the four stations assigned to the **SS.SMu.CFiMu.MegMax**, nor was any one dominant taxon present at all infaunal grab stations in the biotope.

The biotope **SS.SMx.CMx.OphMx** was assigned to two infaunal stations, where mean S = 45.5 (range 45-46), mean N = 186.0 (range 116-256), mean H' = 3.236 (range 2.975-3.236) and range of mean Φ = 5.084-5.520. None of the numerically dominant taxa were common at the two infaunal grab stations assigned to the **SS.SMx.CMx.OphMx** biotope, and thus no taxon was dominant at either.

Examination of the infaunal data with multivariate techniques reveal an almost total lack of structuring based on assigned biotopes. Multidimensional scaling performed in PRIMER yielded the ordination shown in Figure 30.

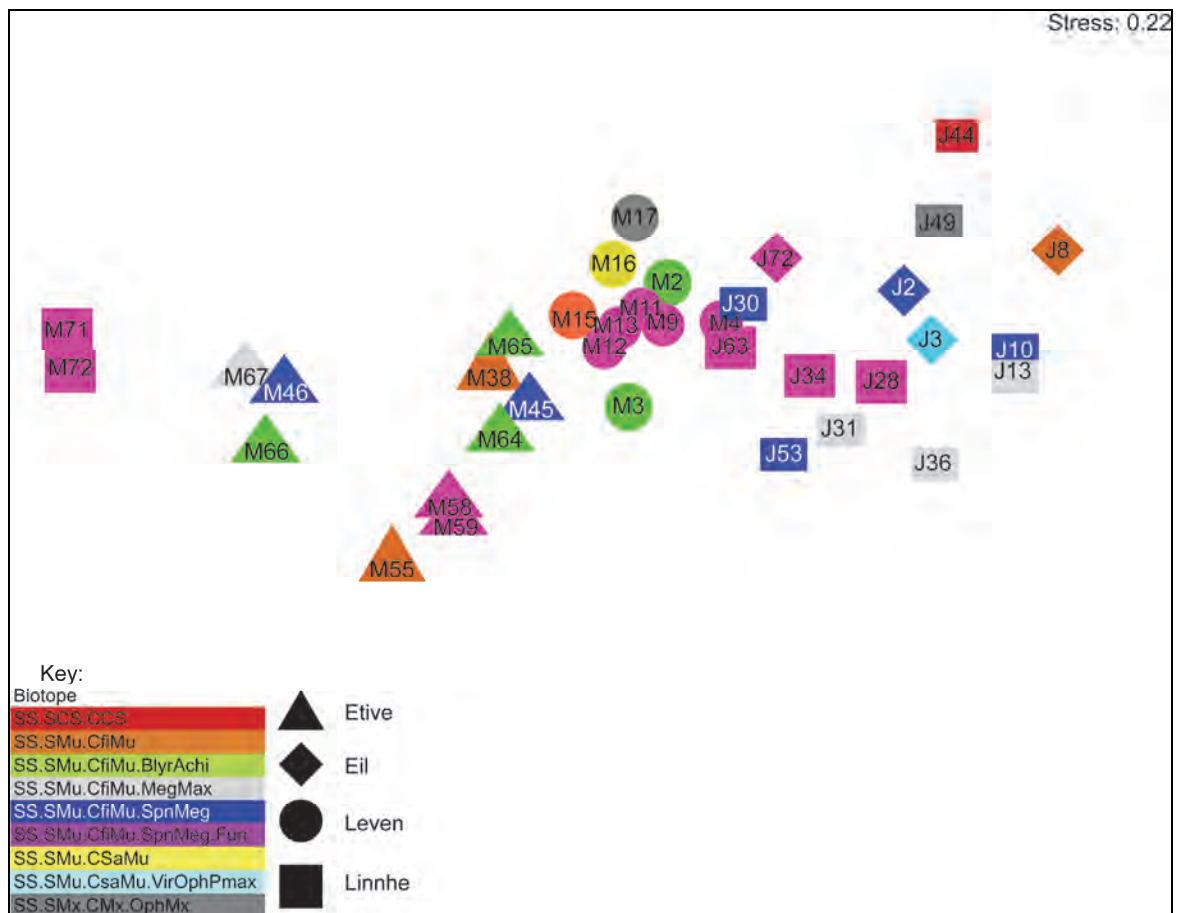


Figure 30. MDS plot of infaunal stations (station codes altered to DDV stations) and associated biotopes, fourth root transformed infaunal grab data.

While the stress value of 0.22 indicates that the ordination is not a particularly good representation in 2d of multidimensional space, it is very apparent that the environmental conditions represented by 'sea loch' are forcing the grouping of stations, while 'biotopes' are largely irrelevant. The only apparent exception to this would seem to be the Loch Linnhe stations M71 and M72 displayed at the far left of the ordination. Closer examination of these stations' positions reveal them to be just outside the mouth of Loch Etive, so their grouping with the other Loch Etive stations is not surprising. This finding is reiterated when the data are examined using canonical correspondence analysis (CCA) in CANOCO, when all the assigned environmental variables (sea loch, biotope, and particle size) are included (Figure 31).

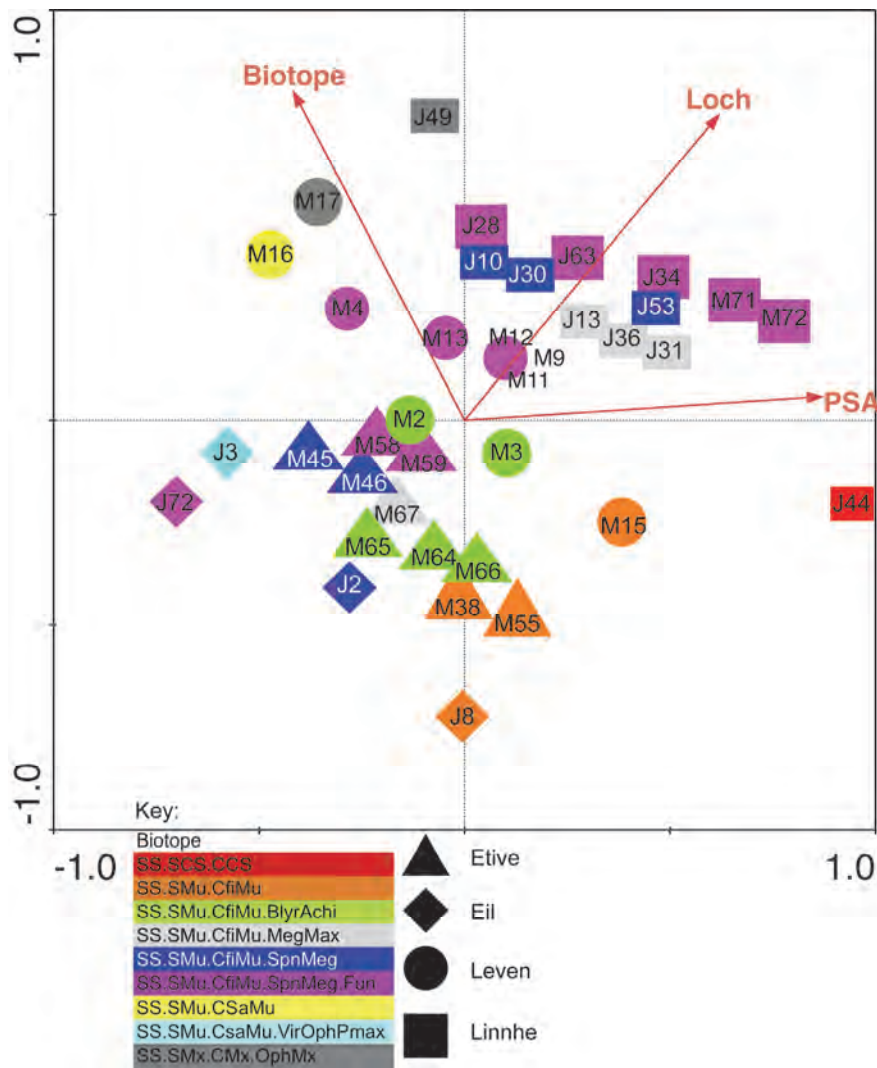


Figure 31. Biplot of CCA showing environmental variables and stations; square root transformed infaunal grab data. PSA refers to mean Φ .

The biplot in Figure 31 above clearly shows stations falling out in groups associated with sea loch location. The Loch Etive stations, distributed among four biotopes, separate out into a distinct cluster. The Loch Linnhe stations have three different biotopes all clustered together, while a fourth Linnhe station (J44) is separated but not associated with any other loch or biotope. The sea lochs were coded in the analysis with Loch Eil assigned 1, Loch Etive 2, Loch Leven 3 and Loch Linnhe 4, so the vector showing the orthogonal grouping of Loch Linnhe stations (coded 4) are farthest away from the origin. Environmental eigenvectors also indicate inverse associations, so the Loch Eil stations (coded 1) are displayed as furthest away from the Loch Linnhe stations. The biotope eigenvector appears to structure only four Loch Leven stations, of three different biotopes. Particle size, as represented by mean Φ , also does not appear to structure strongly the infaunal communities sampled presently.

3.2.2 Multigrab survey

The results of the multigrab survey are presented in Table 13 (Appendix 4). It should be noted that there were only four individuals collected during the survey all of which were identified as the ocean quahog, *Arctica islandica*. Thus, the presence of *A. islandica* was

confirmed only at stations JMG1, JMG2 and JMG5. Despite repeated attempts to collect *Modiolus modiolus* and *Glossus humanus* from historical sites, no living specimens were collected.

3.2.3 PSA

Sediment types for each infaunal grab sample station can be seen in Table 6 and Figure 32. Further detail can be seen in Appendix 4. Thirty-three of the 38 infaunal samples analysed were classified as coarse or very coarse silt with only five as either medium or fine silt.

Table 6. PSA folk classification of the 2011 infaunal samples.

Station	Sediment type	Sediment name	Sorting	Gravel %	Sand %	Mud %
JG2	Sandy mud	Very fine sandy coarse silt	Poorly sorted	0	24	76
JG3	Sandy mud	Very fine sandy coarse silt	Poorly sorted	0	20.5	79.5
JG4	Sandy mud	Very fine sandy very coarse silt	Poorly sorted	0	33.3	66.7
JG5	Sandy mud	Very fine sandy coarse silt	Very Poorly sorted	0	22.6	77.4
JG6	Sandy mud	Very fine sandy medium silt	Very Poorly sorted	0	20.4	79.6
JG7	Sandy mud	Very fine sandy fine silt	Very Poorly sorted	0	40	60
JG8	Sandy mud	Fine sandy fine silt	Very Poorly sorted	0	15	85
JG9	Sandy mud	Fine sandy medium silt	Very Poorly sorted	0	22.9	77.1
JG10	Mud	Fine silt	Poorly sorted	0	7.8	92.2
JG11	Sandy mud	Fine sandy medium silt	Very Poorly sorted	0	28.8	71.2
JG12	Sandy mud	Very fine sandy medium silt	Very Poorly sorted	0	14.6	85.4
JG13	Sandy mud	Fine sandy fine silt	Very poorly sorted	0	29.4	70.6
JG14	Sandy mud	Very fine sandy very coarse silt	Very poorly sorted	0	47.6	52.4
JG15	Sandy mud	Very fine sandy very coarse silt	Poorly sorted	0	23.2	76.8
MG1	Sandy mud	Very fine sandy very coarse silt	Very poorly sorted	0	41.1	58.9
MG2	Sandy mud	Very fine sandy very coarse silt	Poorly sorted	0	24.6	75.4
MG3	Sandy mud	Very fine sandy very coarse silt	Very poorly sorted	0	37.2	62.8
MG4	Sandy mud	Very fine sandy coarse silt	Poorly sorted	0	10.4	89.6
MG5	Sandy mud	Very fine sandy coarse silt	Poorly sorted	0	10.5	89.5
MG6	Sandy mud	Very fine sandy coarse silt	Poorly sorted	0	12.8	87.2

Table 6 continued

MG7	Sandy mud	Very fine sandy coarse silt	Poorly sorted	0	23.2	76.8
MG8	Sandy mud	Very fine sandy coarse silt	Poorly sorted	0	15.4	84.6
MG9	Muddy sand	Very coarse silty very fine sand	Poorly sorted	0	53.6	46.4
MG10	Sandy mud	Fine sandy medium silt	Very poorly sorted	0	33.6	66.4
MG11	Sandy mud	Very fine sandy coarse silt	Poorly sorted	0	32.7	67.3
MG13	Sandy mud	Very fine sandy very coarse silt	Poorly sorted	0	40.8	59.2
MG14	Sandy mud	Very fine sandy coarse silt	Poorly sorted	0	19.2	80.8
MG16	Sandy mud	Very fine sandy coarse silt	Poorly sorted	0	21.7	78.3
MG17	Sandy mud	Very fine sandy coarse silt	Poorly sorted	0	17.7	82.3
MG18	Sandy mud	Very fine sandy coarse silt	Poorly sorted	0	26.6	73.4
MG19	Sandy mud	Very fine sandy very coarse silt	Poorly sorted	0	39.2	60.8
MG20	Sandy mud	Very fine sandy coarse silt	Poorly sorted	0	33.2	66.8
MG21	Sandy mud	Fine sandy coarse silt	Very poorly sorted	0	24.6	75.4
MG22	Sandy mud	Fine sandy coarse silt	Very poorly sorted	0	38.2	61.8
MG23	Sandy mud	Fine sandy mud	Very poorly sorted	0	24.5	75.5
MG24	Mud	Fine silt	Very poorly sorted	0	7.1	92.9



Figure 32. PSA Folk Classification of infaunal samples throughout the 2011 Loch Linnhe survey area.

3.3 PMF/MPA search feature distribution

In addition to separating PMFs/MPA search features by geographical area, they have also been considered across the entire survey area (Figure 33), and their distributions are presented below.

3.3.1 Burrowed mud and associated PMFs

Circalittoral fine mud habitats with seapens and/or burrowing megafauna are well-known from the depositional basins of Scottish sea lochs and were recorded in all areas covered by

this survey. The data presented in Table 7, and the accompanying summaries below, show that there is considerable variation in the relative abundance of the key epifaunal species used to define the **SS.SMu.CFiMu.SpM** and **SS.SMu.CFiMu.SpM.Fun** biotopes. In this study, the **SpM.Fun** label was assigned wherever the characterising species *Funiculina quadrangularis* was recorded. Fine mud stations with *Pennatula phosphorea* and/or *Virgularia mirabilis*, but lacking *Funiculina quadrangularis*, were assigned to **SS.SMu.CFiMu.SpM**. Among the burrowing megafauna, the presence of *Nephtys norvegicus* was often confirmed by observation of individuals on the sediment surface or at the entrances to burrows, but identification of species which seldom or never emerge from their burrows (such as the various thalassinidean mud-shrimps) was dependent on sightings of surface features diagnostic of particular species (size, morphology and arrangement of burrow openings). Identification of such features from a moving video image at the available level of resolution is difficult, and as a result no attempt is made here to assess the details of species composition of the megafaunal burrowing community at different stations. Video sequences taken with the towed camera perpendicular to the sediment surface do not show vertical relief clearly, making it difficult to distinguish ejecta mounds such as those created by the echiuran worm *Maxmuelleria lankesteri*. It is therefore likely that this species, and its associated biotope **SS.SMu.CFiMu.MegMax**, have been under-recorded.

A small number of stations listed in Appendix 3 were characterised by fine circalittoral muds lacking both seapens and burrowing megafauna (or, if present, apparently very rare). These observations might represent the deep mud biotope **SS.SMu.CFiMu.BlyrAchi**, but this is impossible to confirm from video observations alone. The characterising species of this biotope are either entirely infaunal (*Brissopsis lyrifera*) or are inconspicuous at the sediment surface (the extended arms of *Amphiura* spp. were sometimes visible in close-up with the camera stationary, but were rarely distinguishable on the moving video footage). However, individual *B. lyrifera* were found in an infaunal sample at station JG6, and in one of the multigrabs at station JMG7

As an aid to comparison for each station Table 7 includes the duration of video observations at the sea floor. Owing to the lack of a distance scale on the video footage, differences in the field of view between stations, and the frequent occurrence of stretches of reduced or zero visibility, it is not possible to convert the animal abundance counts to a common quantitative standard (i.e. number of individuals per unit area). However, the time taken to record the listed number of seapens or *Pachycerianthus multiplicatus* allows at least a crude comparison of relative abundance between stations, as discussed in the following sections.

Table 7 summaries the observations made at fine mud stations with burrows and/ or seapens. Stations are grouped by survey area. Stations in Lochs Etive, Leven and Eil are listed in order starting from the head of each loch and progressing outwards towards the entrance. In Loch Linnhe, stations are listed in approximate north-south order. Stations in lower Loch Linnhe are partitioned into groups west (W) and east (E) of the island of Lismore. The approximate water depth (ship's bottom sounder reading) at the start of each station is indicated. The observed time column gives the duration of video footage of the sea bed at each station (i.e. excluding time spent on descent through the water column). Total abundance of surface features made by burrowing megafauna is expressed qualitatively as Low, Medium or High (or None, where no burrows were observed). Question marks after the burrow density ratings for a few stations indicate uncertainty due to poor visibility. The last four columns list the total number of individuals of the three seapen species, and the anemone *Pachycerianthus multiplicatus*, seen at each station. At station M70 in Lower Linnhe (E), specimens of *Virgularia mirabilis* were too numerous to count individually and the species is therefore listed as Superabundant.

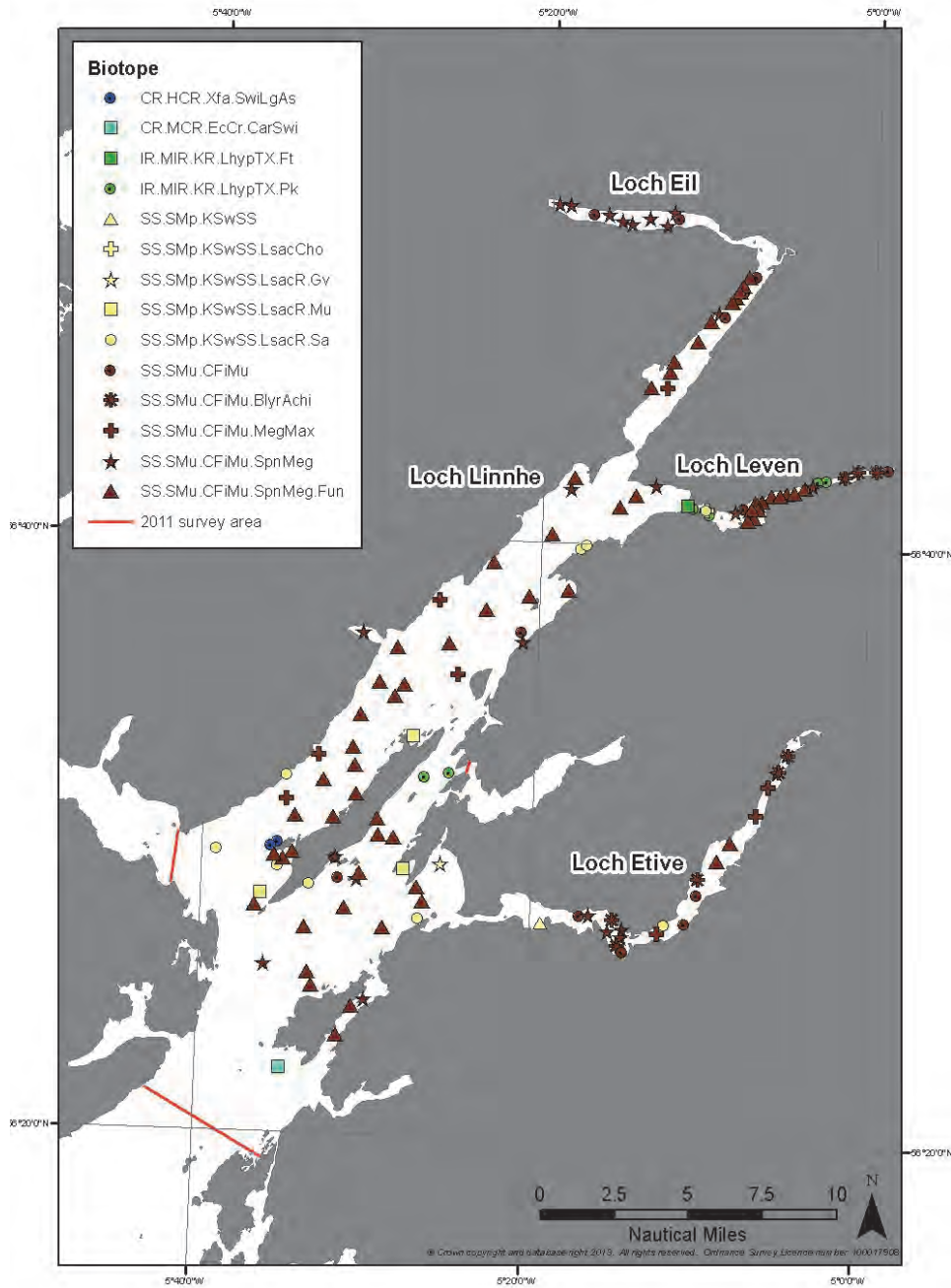


Figure 33. PMFs observed during the 2011 Loch Linnhe survey.

Table 7. Summary of observations made at stations characterised by fine mud substrata with megafaunal burrows and/or seapens (Burrowed Mud PMF).

Survey area	Station	Approx. depth (m)	Observed time (min: sec)	Burrow density	<i>Funiculina quadrangularis</i>	<i>Pennatula phosphorea</i>	<i>Virgularia mirabilis</i>	<i>Pachycerianthus multiplicatus</i>
Etive	M65	11	04:53	Low				
Etive	M64	35	10:25	Low			3	
Etive	M63	33	05:16	Medium			22	
Etive	M61	37	06:29	High			1	
Etive	M60	36	03:19	Low				4
Etive	M59	51	08:11	Low	6		4	1
Etive	M58	78	05:35	None	2			1
Etive	M66	43	04:42	Low			1	
Etive	M55	130	05:03	Low				1
Etive	M67	11	04:49	High				
Etive	M48	48	03:14	Low				
Etive	M47	35	03:08	Medium		27		1
Etive	M45	24	05:59	Medium?		2	1	
Etive	M46	32	03:55	Low		3		
Etive	M39	49	05:10	Low		4		
Leven	M1	6	02:58	None				
Leven	M2	22	04:50	Low				
Leven	M3	19	01:47	Low				
Leven	M4	49	06:57	Medium				
Leven	M74	24	04:58	Low		29		
Leven	M9	30	04:24	Low	3	98		
Leven	M75	34	03:53	Medium	2	15		
Leven	M11	45	05:05	Medium?	4	2		
Leven	M76	33	04:36	High	12	19		1
Leven	M12	40	04:00	High?	1	1		
Leven	M77	50	03:50	High	2	1		
Leven	M78	35	03:26	High	7	17	1	
Leven	M13	30	05:42	High	11	25	2	
Leven	M79	28	03:13	Low	2	5	2	

Table 7 continued

Survey area	Station	Approx. depth (m)	Observed time (min: sec)	Burrow density	<i>Funiculina quadrangularis</i>	<i>Pennatula phosphorea</i>	<i>Virgularia mirabilis</i>	<i>Pachycerianthus multiplicatus</i>
Leven	M14	20	04:30	Low	4	18	1	1
Leven	M87	26	05:32	Low	6	13	1	
Leven	M15	33	04:54	Low				
Leven	M86	31	04:59	Low		9	16	
Leven	M85	7	04:14	None			1	
Eil	J1	19	06:17	Low		1		
Eil	J2	21	06:56	Low		3	8	
Eil	J3	26	05:17	Low		2	2	
Eil	J4	31	04:53	Low		74		
Eil	J66	31	04:54	Low		21	1	
Eil	J5	27	05:55	Low		26	11	
Eil	J6	37	07:27	Low		34	3	
Eil	J67	18	08:56	Low		86	6	
Eil	J7	29	08:06	Low		38		
Eil	J8	67	06:36	Low				
Upper Linnhe	J71	69	05:19	None				1
Upper Linnhe	J72	28	04:25	Low	13	1		
Upper Linnhe	J74	30	06:49	Medium	16	31	46	
Upper Linnhe	J73	30	02:00	Low	1	10		
Upper Linnhe	J75	28	07:02	High	11	25	123	
Upper Linnhe	J76	62	07:43	High	66	18	2	
Upper Linnhe	J10	18	06:26	Low		13	98	
Upper Linnhe	J78	24	08:22	Low	10	6	30	
Upper Linnhe	J79	29	06:20	Medium	17	27	62	

Table 7 continued

Survey area	Station	Approx. depth (m)	Observed time (min: sec)	Burrow density	<i>Funiculina quadrangularis</i>	<i>Pennatula phosphorea</i>	<i>Virgularia mirabilis</i>	<i>Pachycerianthus multiplicatus</i>
Upper Linnhe	J11	18	06:04	Low		10	3	
Upper Linnhe	J81	18	08:13	Low	50	95	103	1
Upper Linnhe	J12	27	06:24	Low	103	47	34	
Upper Linnhe	J82	22	04:13	None	1	5	5	
Upper Linnhe	J13	146	06:26	High				
Central Linnhe	J84	24	05:52	Low	1	9	4	
Central Linnhe	J16	27	04:38	Low				
Central Linnhe	J80	23	06:45	Low	8	16		
Central Linnhe	J17	24	04:45	Medium	2		1	
Central Linnhe	J18	41	05:28	High			6	
Central Linnhe	J19	64	04:49	High	7			
Central Linnhe	J85	21	05:30	None	9		1	
Central Linnhe	J21	28	03:38	High	1	1	3	
Central Linnhe	J22	31	06:25	Low	110	1	2	
Central Linnhe	J24	27	04:51	Low		4		
Central Linnhe	J25	100	05:05	High	1			
Central Linnhe	J26	34	03:10	High				
Central Linnhe	J27	71	05:39	High	6			
Central Linnhe	J28	57	04:45	Medium	4			
Central Linnhe	J30	17	05:17	Low		1	82	
Central Linnhe	J31	48	05:10	Low				
Central Linnhe	J91	102	04:06	High	5			
Central Linnhe	J32	100	04:57	High	7			
Central Linnhe	J33	91	05:18	High	2	1		1
Lower Linnhe (W)	J106	72	06:27	High	39	3		2
Lower Linnhe (W)	J34	41	04:21	Low	39	6		
Lower Linnhe (W)	J35	60	06:06	Medium	70			
Lower Linnhe (W)	J36	116	02:20	High				
Lower Linnhe (W)	J107	66	06:09	Low	85	8		
Lower Linnhe (W)	J108	37	05:22	Low	44			
Lower Linnhe (W)	J38	159	01:56	High				
Lower Linnhe (W)	J39	93	06:51	High	22	4		

Table 7 continued

Survey area	Station	Approx. depth (m)	Observed time (min: sec)	Burrow density	<i>Funiculina quadrangularis</i>	<i>Pennatula phosphorea</i>	<i>Virgularia mirabilis</i>	<i>Pachycerianthus multiplicatus</i>
Lower Linnhe (W)	J40	26	05:51	Low	50	4		
Lower Linnhe (W)	J102	84	10:20	Low	34	4		1
Lower Linnhe (W)	J93	35	04:47	Low	57	1		
Lower Linnhe (W)	J92	71	03:22	High	5		7	
Lower Linnhe (W)	J47	22	04:34	Low	4	15	4	
Lower Linnhe (E)	J64	37	04:58	Low	1	5		
Lower Linnhe (E)	J63	51	04:27	High	1	8		
Lower Linnhe (E)	J61	31	05:15	Medium	4	93		
Lower Linnhe (E)	J62-2	38	06:00	Low		1		
Lower Linnhe (E)	J60	31	07:48	Low		1		
Lower Linnhe (E)	M70	19	03:44	Low			Superabundant	
Lower Linnhe (E)	M71	50	04:40	Medium	1	7	1	
Lower Linnhe (E)	M72	45	04:35	Low	1	36		
Lower Linnhe (E)	J59	36	03:58	Low	37	6		
Lower Linnhe (E)	J58	39	05:45	Low	62	10		
Lower Linnhe (E)	J57	33	07:15	Low	99	2		
Lower Linnhe (E)	J56	69	05:24	High	14			
Lower Linnhe (E)	J53	112	05:41	High		1		
Lower Linnhe (E)	J95	26	05:13	High	1			
Lower Linnhe (E)	J101	58	06:00	None	1	2		

Loch Etive

In Loch Etive fine mud biotopes were recorded from just west of Airds Point (stations M38, and M39, Figure 28) to the loch head at M65 (Figure 27), interrupted by an area of coarser, stony sea bed at the Bonawe Sill (M51, Figure 28). Burrow density was generally rated as Low or Medium, with a High score assigned at M61 in the upper reaches of the loch. The major burrowers included *Nephrops norvegicus* (observed at M63, Figure 27) and the mud-shrimp *Calocaris macandreae*, but as noted above other, less conspicuous species of thalassinidean mud-shrimp may also have been present. Large sediment mounds, probably those of *Maxmuelleria lankesteri*, were noted at M47 (Figure 28, just west of Bonawe) and at M60 and M61 in the upper loch. All three seapen species were recorded, but with distinctly different patterns of distribution. *Pennatula phosphorea* was recorded only at stations west of the Bonawe Sill (M39, M45, M46, and M47, Figure 28), with highest abundance at M47. *Funiculina quadrangularis* was observed in small numbers only at stations M58 and M59, approximately mid-way along the inner basin of the loch (Figure 28). *Virgularia mirabilis* was seen from M45, west of Bonawe, to M64 near the head of the loch. Numbers were very low except at station M63, where 22 specimens were counted. No seapens were observed at M65, the station closest to the loch head.

Loch Leven

Fine mud biotopes extended from the head of Loch Leven towards the loch entrance as far as station M86, north-west of Eilean Munde (Figure 26). As in Loch Etive, the station closest to the loch head (M1 in Loch Leven, Figure 24) was characterised by fine, flocculent mud with terrestrial leaf litter and few if any burrows. The other fine mud stations in the inner basin of Loch Leven (M2, M3 and M4, Figure 24) had a low density of megafaunal burrows, with *Calocaris macandreae* possibly the main species. No seapens were observed east of the Caolas nan Con narrows.

In the main basin of Loch Leven west of Caolas nan Con, (stations located between M74 and M86) (Figure 25 and Figure 26) well-developed examples of the **SS.SMu.CFiMu.SpnMeg.Fun** and **SS.SMu.CFiMu.SpnMeg** biotopes occurred. Burrow densities varied but were high at several of the stations in this area (Table 7). Burrowers included *Nephrops norvegicus* and *Calocaris macandreae*. All three seapen species were recorded, with *Pennatula phosphorea* being ubiquitous and the most consistently abundant species. *Funiculina quadrangularis* was recorded at 12 stations but was always less common than *P. phosphorea*. *Virgularia mirabilis* was present in small numbers west of Invercoe, where the loch basin broadens, with highest densities at station M86.

Loch Eil

Burrowed fine mud extended along the basin of Loch Eil from the loch head (station J1) to station J8, in the approach to the Annat Narrows (Figure 15). *Nephrops norvegicus* and *Calocaris macandreae* were both present but observed burrow densities were low at all stations. The seapen *Pennatula phosphorea* was sparsely present at the stations closest to the loch head (J1, J2 and J3) and at much higher densities at stations further to the east (J4, J5, J6, J7, J66 and J67). *Virgularia mirabilis* was also recorded at most of these stations but was usually much less common than *P. phosphorea* (Table 7). *Funiculina quadrangularis* was not observed in Loch Eil and observations are therefore assigned to **SS.SMu.CFiMu.SpnMeg**.

Upper Loch Linnhe

Some of the richest examples of the **SS.SMu.CFiMu.SpnMeg.Fun** biotope were recorded from stations extending down the west side of upper Loch Linnhe between Camusnagaul (station J72, Figure 18) and the mouth of Inverscaddle Bay (J12, Figure 16). Burrow densities were variable, with stations J75 and J76 appearing to have the highest numbers (Figure 16). Burrows of *Nephrops norvegicus* and *Calocaris macandreae* were both present throughout. All three seapen species were typically present, although their relative

abundance varied among stations. *Funiculina quadrangularis* was recorded in highest numbers at stations J12, J76 and J81 (Figure 16). Where this seapen was particularly abundant, it was noted that specimens of a range of heights were present, suggestive of a successfully reproducing population. *Pennatula phosphorea* and *Virgularia mirabilis* were also present across this series of stations, with particularly high densities observed at J81 (*P. phosphorea*) and J10, J75 and J81 (*V. mirabilis*).

Central Loch Linnhe

Burrowed fine muds with seapens were also recorded widely throughout the central sector of Loch Linnhe, from the Corran Narrows to the vicinity of Appin and the northern end of Lismore. High burrow densities were observed at several stations, with features of *Nephrops norvegicus* and *Calocaris macandreae* recognizable. *Munida rugosa* was seen in association with large burrow openings at several stations but it is unclear whether this species constructs its own burrows or opportunistically inhabits those made by *N. norvegicus*. Mounds probably created by *Maxmuelleria lankesteri* were observed at J26 (Figure 19), but as noted previously this species is likely to be under-recorded. All three seapen species were recorded across this series of stations, but their presence was more sporadic and densities generally lower than in upper Loch Linnhe (Table 7). Notable exceptions were dense populations of *Funiculina quadrangularis* observed at station J22, close to Eilean Balnagowan, and of *Virgularia mirabilis* at J30 off Kingairloch (Loch a' Choire) (Figure 19). Stations with seapens and burrowing megafauna in central Loch Linnhe are assigned to **SS.SMu.CFiMu.SpnMeg.Fun** or **SS.SMu.CFiMu.SpnMeg** depending on the presence or absence of *F. quadrangularis*.

Lower Loch Linnhe

Burrowed mud biotopes were recorded at most of the stations to the west of the island of Lismore. Burrows of *Nephrops norvegicus* and *Calocaris macandreae* were observed, with the highest densities at several stations (Table 7). *Munida rugosa* was again seen in association with burrows, and single individuals of the crab *Goneplax rhomboides* were noted at stations J35 and J39 (Figure 20). Sediment mounds, probably those of *Maxmuelleria lankesteri*, were present at J39. These observations indicate a diverse community of burrowing megafauna in the area. *Funiculina quadrangularis* was recorded at 11 stations west of Lismore, often at high density (Table 7). As in upper Loch Linnhe, a range of seapen heights was apparent. *Pennatula phosphorea* was recorded at most of the stations, but with one exception always at much lower density than *F. quadrangularis*. *Virgularia mirabilis* appeared to be uncommon in this area, with small numbers observed at only two stations.

Burrowed fine mud stations also extended through lower Loch Linnhe east of Lismore and down into the Lynn of Lorn between the islands of Kerrera and Mull. High burrow densities were noted at three stations in the Firth north-west of Kerrera (J53, J56 and J95, Figure 21). Burrowers included *Nephrops norvegicus*, *Calocaris macandreae* and probably *Maxmuelleria lankesteri* (mounds), with one specimen of *Goneplax rhomboides* seen at J56. All three seapen species were recorded from this area, but with wide variation in local abundance. *Funiculina quadrangularis* was observed at 11 stations. Numbers were generally low, but high densities were recorded within the Lyn of Lorn at stations J57, J56 and J59 (Table 7, Figure 21). *Pennatula phosphorea* was also widespread (12 stations) but locally abundant only at J61 (Pladda Island, Figure 21) and M72 (north of Dunstaffnage Point, Figure 29). In contrast, *Virgularia mirabilis* appeared to be virtually absent from this area with the exception of one station (M70, Camas Nathais) where the species was strikingly abundant. Densities here were estimated as exceeding 10 individuals m⁻² (colonies). Bottom sediments at M70 appeared to be sandier, with a higher content of shell fragments, than the fine muds typical of **SS.SMu.CFiMu.SpnMeg**, and very few megafaunal burrows were observed. The biotope at M70 is therefore provisionally assigned to **SS.SMu.CSaMu.VirOphPMax**.

3.3.1.1 Fireworks anemone (*Pachycerianthus multiplicatus*)

Pachycerianthus multiplicatus was observed at a total of 12 stations in Lochs Etive and Leven, in upper and central Loch Linnhe, and in lower Loch Linnhe west of Lismore. Abundances were very low, with only two stations recording more than a single individual (Table 7). The records extended across a broad depth range from approximately 18 - 130 m. In this survey the species was not observed in Loch Eil or in lower Loch Linnhe east of Lismore. With such a small number of records it is difficult to identify any clear patterns of association with habitat conditions or other species. Seven out of 12 records in Table 7 occurred at stations with high seapen densities (e.g. J74, Figure 16; J81, Figure 17 in upper Loch Linnhe), but the species was also seen at fine mud stations with few or no seapens (e.g. M59 and M60 in Loch Etive; Figure 27). Burrow density ranged from zero to high, with a low density at six out of 12 stations. All observed *P. multiplicatus* appeared to be large specimens, with no obvious juveniles.

3.3.2 Horse mussel (*Modiolus modiolus*) beds

No well-defined *Modiolus modiolus* beds were identified at any station in this survey. At station J69, close to the northern shore of Loch Eil, west of the Annat Narrows (Figure 15), live *Modiolus modiolus* were present on a substratum of coarse shelly sand with pebbles but densities were too low for this to be considered as a 'bed'. The sparse associated fauna was not diagnostic for any of the *Modiolus*-related biotopes in the Marine Habitat Classification, but the substratum type and low mussel density were closest to **SS.SMx.CMx.CIlloModHo**. Dead *Modiolus* shells were a visible component of the substratum at station J14, in upper Loch Linnhe just north of the Corran Narrows (Figure 17), but no live specimens were apparent. Station M82 in outer Loch Leven (Figure 26) showed live *Modiolus* at low density on a substratum of coarse shell gravel with pebbles and cobbles. Small *Alcyonium digitatum* colonies were frequent on the shells and stones, and several common mobile epifaunal species (e.g. *Carcinus maenas*, *Asterias rubens*, *Crossaster papposus*, *Echinus esculentus*) were also recorded.

3.3.3 Northern seafan (*Swiftia pallida*) communities

Swiftia pallida was recorded at only two stations in this survey, at both locations at very low density. At station J42 on the north-western side of Bernera Island, off Lismore (Figure 22), colonies were recorded in small numbers below 27 m depth on a stepped, silty bedrock slope. The associated fauna included a hydroid/bryozoan turf, the large ascidians *Ascidia mentula* and *Diazona violacea*, the massive sponge *Pachymatisma johnstonia*, the polychaete *Sabella pavonina* and unidentified encrusting sponges. Although *Swiftia pallida* was not abundant, the presence of large ascidians and a variety of sponges is consistent with an assignment to the **CR.HCR.Xfa.SwiLgAs** biotope. Station J43, slightly further to the south along the Bernera coast, showed a very similar benthic environment and epifaunal community but no *Swiftia pallida* were seen here.

Two *Swiftia pallida* colonies were noted at 51-52 m depth at station J100, near Dubh Sgeir south-west of the island of Kerrera (Figure 23). Habitat was a silty bedrock wall with patchy hydroid turf, *Alcyonium digitatum*, *Caryophyllia smithii*, *Sabella pavonina* and *Diazona violacea*. The Marine Habitat Classification lists the biotope **CR.MCR.EcCr.CarSwiLgAs** as having a similar community composition to **CR.HCR.Xfa.SwiLgAs** but a more impoverished appearance and generally lower sponge component. The biotope at J100 appears consistent with this description and is therefore assigned to **CR.MCR.EcCr.CarSwiLgAs**.

3.3.4 Northern feather star (*Leptometra celtica*) aggregations on mixed substrata

Leptometra celtica was observed at stations within a relatively small geographic area, centred on the southern end of Lismore (a few specimens were also seen at J103 in the Sound of Kerrera, Figure 23). Highest abundances were recorded to the west of Lismore. At most localities *L. celtica* was found on mixed sediment substrata, typically level or gently sloping stony mud or sandy mud. At station J43, off the southern tip of Bernera Island, west of Lismore (Figure 21), *L. celtica* was abundant on shelly mud in the depth range 25-60 m (ROV dives J43-1, J43-2, J43-3), but also extended up onto a silty boulder slope at slightly shallower depths (24-25 m). At J102, west of J43 (Figure 21), high densities of *L. celtica* were recorded at depths of 46-70 m on a stepped bedrock slope heavily draped with fine sediment. The crinoids were typically concentrated along the edges of the bedrock 'steps'. The fauna associated with *L. celtica* on mixed sediment typically included a diffuse hydroid turf on the surface stones, consistently large numbers of the decapod *Munida rugosa*, a small numbers of other large, widespread echinoderm species (*Echinus esculentus*, *Asterias rubens*). At J102, *Munida rugosa* was again present in large numbers, and the vertical faces of the bedrock 'steps' supported a sessile epifauna typical of silty hard substrata in the Loch Linnhe area (*Caryophyllia smithii*, *Sabella pavonina*, patchy hydroid turf). Interestingly, the seapen *Funiculina quadrangularis* also formed part of the community at J102, occurring on level or gently-sloping, sediment-covered rocky surfaces, and not the deep silty mud where it usually occurs.

No biotopes in the Marine Habitat Classification have *Leptometra celtica* as a defining species (or *Munida rugosa*, the next most conspicuous species at most of the *L. celtica* stations). The occurrences of this crinoid on mixed sediment are therefore assigned only to the biotope complex of **SS.SMx.CMx**. The community at J102 is possibly closest to **CR.LCR.BrAs.AntAsh**, with *Leptometra* substituted for *Antedon*, although the association with *Funiculina quadrangularis* is a novel feature.

3.3.5 Kelp and seaweed communities on sublittoral sediment

Beds of *Saccharina latissima* growing on sedimentary substrata were recorded at a total of 14 stations in Loch Etive (M53, Figure 28), Loch Leven (M19 and M20, Figure 26), the Ardsheal Peninsula in central Loch Linnhe (M23 and M73, Figure 18), the northern (M24, Figure 19) and southern ends of Lismore (M27, J49-3 and J52, Figure 21), the mainland west of Lismore (J37, Figure 20 and J46, Figure 21) and the Dunstaffnage-Ardmucknish area in the Lynn of Lorn (M28, M29 and M30; Figure 29). Sediment types covered a wide range from muddy sand to coarse gravelly sand, usually with a mixture of stones and shells which presumably provide hard surfaces for holdfast attachment. Stations with relatively uniform substrata could be assigned to one of the component biotopes of this PMF (**SS.SMp.KSwSS.LsacR.Sa** or **LsacR.Mu**). Biotope identity was less clear at stations with mixed or patchy sediments. Density of attached *Saccharina latissima* was recorded as low or patchy at most localities, constituting a kelp park, with three stations (M19, Figure 26; M24, Figure 20 and M53, Figure 28) rated as having a higher-density forest. However, it should be noted that where the camera or ROV track proceeded close to the seabed, among the kelp fronds, it was often difficult to assess the density of attached plants.

Saccharina latissima fronds were usually silted, with the older parts heavily fouled by hydroids and bryozoans. A patchy turf understorey of foliose and/or filamentous algae was usually present among the kelp plants. Turfs seemed to consist predominantly of red algae but individual species were not identified from the video clips. In some cases excessive brightness of the image obscured the colour of the understorey. Mobile epifauna were generally sparse and limited to a small number of widespread species such as *Asterias rubens*, *Echinus esculentus* and *Carcinus maenas*. The two-spot goby *Gobiusculus flavescens* was observed shoaling among the kelp at several stations.

3.4 Other species and habitats recorded

A number of biotopes were recorded in addition to the PMFs/MPA search features. All are well-known from sealoch environments along the Scottish west coast and would be expected to occur in the survey area. Mixed sediments, usually mud or sandy mud with variable stone and shell content, were widespread, particularly at stations in central and lower Loch Linnhe. In most cases the visible fauna and flora were not diagnostic of any biotope and records were assigned to the biotope complex **SS.SMx.CMx**. Surface stones often bore coralline crusts and a diffuse hydroid turf, while *Munida rugosa* was frequently the most common and conspicuous mobile animal. Large echinoderms such as *Asterias rubens* and *Echinus esculentus* were also often present. At several stations in upper, central and lower Loch Linnhe, and one station in Loch Leven, mixed sediments supported extensive beds of *Ophiothrix fragilis* and/or *Ophiocomina nigra* (**SS.SMx.CMx.OphMx**).

Silty bedrock and boulder slopes in sheltered conditions were recorded in Loch Leven and at stations throughout the extent of the Loch Eil-Linnhe system. Epifauna was often sparse, and sometimes virtually lacking, but the presence of large ascidians such as *Ascidia mentula* and *Diazona violacea*, and anthozoans such as *Protanthea simplex* and *Caryophyllia smithii* allowed assignment of stations to biotopes **CR.LCR.BrAs.NeoPro.FS** or **CR.LCR.BrAs.AmenCio**. Silted rock at most stations along the fringes of Loch Etive supported a different community characterised by *Alcyonidium diaphanum* and *Halichondria bowerbanki*, classed within **CR.MCR.CfaVS.Hbow.Eud**.

Coarse gravel or cobble substrata were confined to tideswept areas such as the Corran Narrows, outer Loch Leven and in the approaches to the Falls of Lora in Loch Etive. In the Corran Narrows, cobbles encrusted with serpulids and barnacles supported a dense bed of *Alcyonium digitatum* colonies (**CR.HCR.FaT.CTub.Adig**). A similar habitat in outer Loch Leven had serpulids and barnacles but lacked *Alcyonium* (**SS.SCS.CCS.PomB**). In outer Loch Etive *Flustra foliacea*, *Alcyonidium diaphanum* and bushy hydroids were found in dense clumps on cobbles and pebble gravel (**SS.SMx.CMx.FluHyd**).

Bedrock exposed to strong tidal streams was found off Bach Island, south-west of Kerrera, and in the Falls of Lora at the entrance to Loch Etive. Off Bach Island (J55-1 and J55-2; Figure 23), dominant species were *Alcyonium digitatum*, *Flustra foliacea*, serpulids and *Caryophyllia smithii*. Variations in the relative abundance of major epifauna may allow two biotopes to be distinguished here (possibly **CR.MCR.EcCr.FaAICr.Flu** and **CR.MCR.EcCr.AdigVt**). In the Falls of Lora, *Flustra foliacea*, *Alcyonidium diaphanum*, *Balanus crenatus* and *Halichondria panicea* were the most abundant and conspicuous visible epifauna (**CR.HCR.FaT.BalTub**).

No unusual species were recorded at any drop video or ROV station. All taxa identifiable from the video footage are known from previous records to occur in the survey area.

4. DISCUSSION

4.1 Comparative analysis of MPA search features

Several benthic species and habitats listed as MPA search features were not recorded at any drop video or ROV station discussed here (e.g. *Palinurus elephas*, *Glossus humanus*, *Arctica islandica*, subtidal *Mytilus edulis* beds), and these unrecorded features will not be discussed further here. Of the PMFs/MPA search features that were recorded, burrowed mud (and associated components) was sufficiently widespread and extensive to allow detailed comparison and assessment of the best examples observed in the survey area. A localised area of abundance for the northern feather star (*Leptometra celtica*) was also identified.

4.1.1 Burrowed mud and associated PMFs

The sheltered basins of Loch Linnhe and its peripheral sea lochs are characterised by extensive plains of fine, organic-rich mud, which typically support communities of seapens and burrowing megafauna. It is therefore not surprising that biotopes of the **SS.SMu.CFiMu** complex (**SS.SMu.CFiMu.SpnMeg**, **SS.SMu.CFiMu.SpnMeg.Fun**, **SS.SMu.CFiMu.MegMax** and possibly **SS.SMu.CFiMu.BlyrAchi**) were recorded at more than half of the stations in this survey (116 out of 204), and occurred in all lochs visited. Table 7, which summarises the observations made on circalittoral fine muds, shows that absolute and relative abundance of the three seapen species was highly variable among stations. In order to simplify these data, and facilitate comparative assessment of stations, Table 8 shows seapen numbers per station standardised to a common timescale (minute of observation). Data are presented separately for *Funiculina quadrangularis* (an MPA search feature in its own right). Counts for the two more widespread species (*Pennatula phosphorea* and *Virgularia mirabilis*) are combined. Strictly speaking, the data in Table 8 should be regarded as semi-quantitative, since they incorporate variation in camera field of view, stretches of reduced visibility and other complicating factors. However, with this caveat, they offer the best available means of comparing seapen densities at different stations and highlighting areas of notable abundance.

Table 8 and Figure 34 show that highest frequencies ($> 5 \text{ min}^{-1}$) of *Funiculina quadrangularis* were recorded at the following stations:

- Upper Loch Linnhe: J12, J76 and J81 (approx. 6 – 16 min^{-1})
- Central Loch Linnhe: J22 (approx. 17 min^{-1})
- Lower Loch Linnhe west of Lismore: J34, J35, J40, J93, J106, J107 and J108 (approx. 6 – 14 min^{-1})
- Lower Loch Linnhe east of Lismore: J57, J58 and J59 (approx. 9 – 14 min^{-1})

Maximum observed frequencies were very similar in all these areas, suggesting that they may reflect an upper limit of population density for *F. quadrangularis* in the Loch Linnhe system. Frequencies in Lochs Etive and Leven were consistently much lower, with most stations registering fewer than 1 individual min^{-1} .

Table 8. Frequency of observation of seapen species, standardised for duration of video observation. Stations are grouped by survey area. Stations in Lochs Etive, Leven and Eil are listed in order starting from the head of each loch and progressing outwards towards the entrance. In Loch Linnhe, stations are listed in approximate north-south order. Stations in lower Loch Linnhe are partitioned into groups west (W) and east (E) of the island of Lismore.

Survey area	Station	<i>Funiculina quadrangularis</i> min ⁻¹ observation	Total (<i>Virgularia</i> + <i>Pennatula</i>) min ⁻¹ observation
Etive	M64	0	0.29
Etive	M63	0	4.19
Etive	M61	0	0.15
Etive	M59	0.73	0.49
Etive	M58	0.36	0
Etive	M66	0	0.21
Etive	M47	0	8.74
Etive	M45	0	0.50
Etive	M46	0	0.77
Etive	M39	0	0.77
Leven	M74	0	5.86
Leven	M9	0.68	22.17
Leven	M75	0.51	3.85
Leven	M11	0.79	0.39
Leven	M76	2.62	4.15
Leven	M12	0.25	0.25
Leven	M77	0.52	0.26
Leven	M78	2.05	5.26
Leven	M13	1.94	4.74
Leven	M79	0.63	2.19
Leven	M80	3.25	3.64
Leven	M14	0.89	4.22
Leven	M87	1.09	2.52
Leven	M86	0	5.00
Leven	M85	0	0.24
Eil	J1	0	0.16
Eil	J2	0	1.59
Eil	J3	0	0.76
Eil	J4	0	15.10
Eil	J66	0	4.48
Eil	J5	0	6.25
Eil	J6	0	4.98
Eil	J67	0	10.31
Eil	J7	0	4.70
Upper Linnhe	J72	2.94	0.23
Upper Linnhe	J74	2.34	11.27
Upper Linnhe	J73	0.50	5.00
Upper Linnhe	J75	1.89	20.99
Upper Linnhe	J76	8.53	2.59
Upper Linnhe	J10	0	17.29
Upper Linnhe	J78	1.20	4.31
Upper Linnhe	J79	2.69	14.06
Upper Linnhe	J11	0	2.14
Upper Linnhe	J81	6.10	24.09
Upper Linnhe	J12	16.04	12.62
Upper Linnhe	J82	0.24	2.36
Upper Linnhe	J13	0	0

Table 8 continued.

Survey area	Station	<i>Funiculina quadrangularis</i> min ⁻¹ observation	Total (<i>Virgularia</i> + <i>Pennatula</i>) min ⁻¹ observation
Central Linnhe	J84	0.17	2.20
Central Linnhe	J80	1.19	2.37
Central Linnhe	J17	0.42	0.21
Central Linnhe	J18	0	1.10
Central Linnhe	J19	1.45	0
Central Linnhe	J85	1.64	0.18
Central Linnhe	J21	0.27	1.11
Central Linnhe	J22	17.13	0.47
Central Linnhe	J24	0	0.83
Central Linnhe	J25	0.20	0
Central Linnhe	J27	1.06	0
Central Linnhe	J28	0.84	0
Central Linnhe	J30	0	15.75
Central Linnhe	J91	1.23	0
Central Linnhe	J32	1.41	0
Central Linnhe	J33	0.38	0.19
Lower Linnhe (W)	J106	6.05	0.47
Lower Linnhe (W)	J34	9.01	1.38
Lower Linnhe (W)	J35	11.51	0
Lower Linnhe (W)	J107	13.78	1.30
Lower Linnhe (W)	J108	8.23	0
Lower Linnhe (W)	J39	3.22	0.59
Lower Linnhe (W)	J40	8.58	0.69
Lower Linnhe (W)	J102	3.29	0.39
Lower Linnhe (W)	J93	11.88	0.21
Lower Linnhe (W)	J92	1.50	2.09
Lower Linnhe (W)	J47	0.87	4.15
Lower Linnhe (E)	J64	0.20	1.01
Lower Linnhe (E)	J63	0.23	1.80
Lower Linnhe (E)	J61	0.76	17.71
Lower Linnhe (E)	J62-2	0	0.17
Lower Linnhe (E)	J60	0	0.13
Lower Linnhe (E)	M70	0	Superabundant
Lower Linnhe (E)	M71	0.22	1.71
Lower Linnhe (E)	M72	0.22	7.86
Lower Linnhe (E)	J59	9.37	1.52
Lower Linnhe (E)	J58	10.78	1.74
Lower Linnhe (E)	J57	13.66	0.28
Lower Linnhe (E)	J56	2.58	0
Lower Linnhe (E)	J53	0	0.18
Lower Linnhe (E)	J95	0.19	0
Lower Linnhe (E)	J101	0.17	0.33
Lower Linnhe (E)	J103	0.67	0
Lower Linnhe (E)	J104	0	0.19

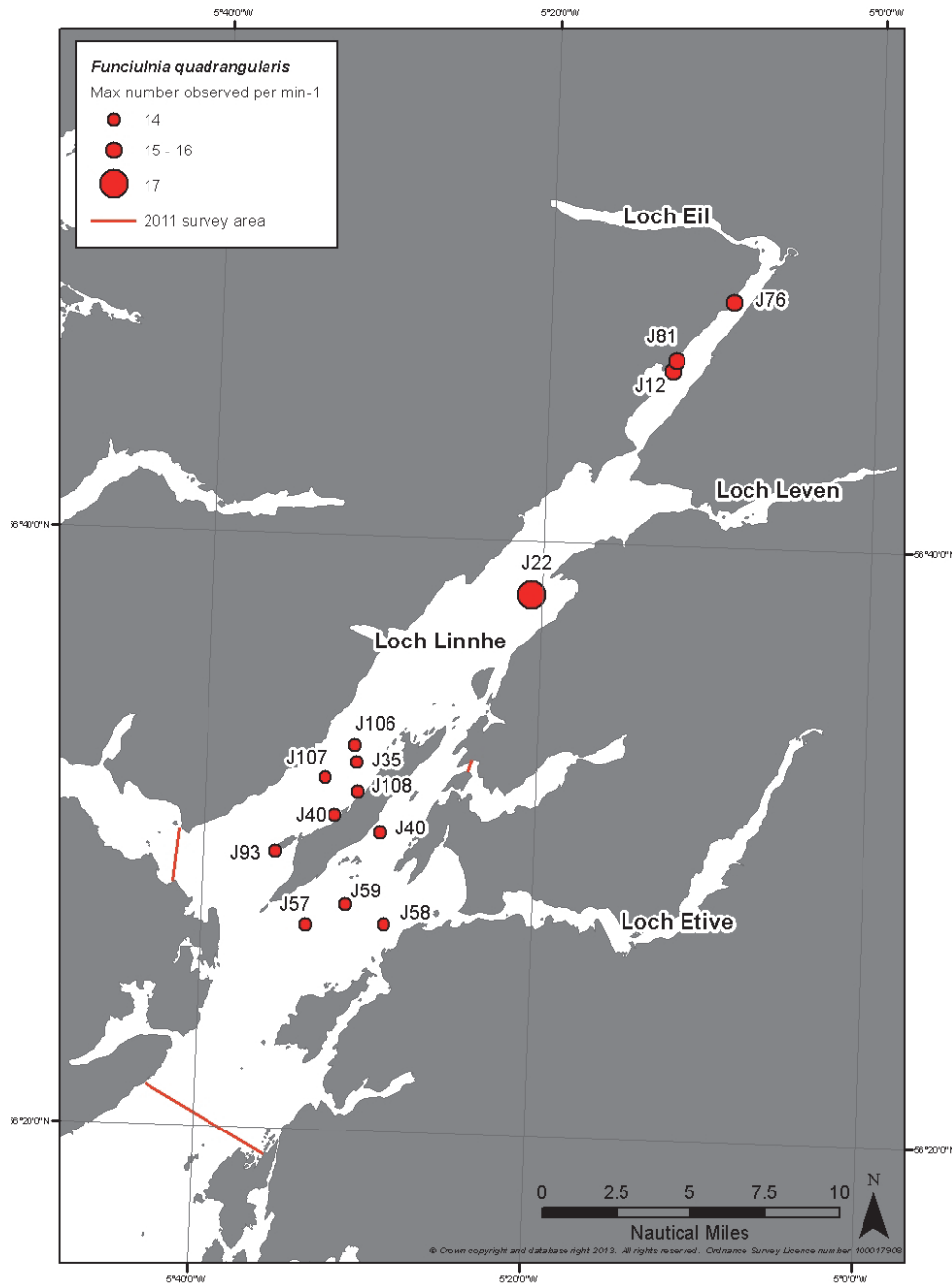


Figure 34. Observed frequency of the Tall seapen, *Funiculina quadrangularis*, during the 2011 survey.

The data from this survey represent a considerable advance in knowledge of the distribution and abundance of *F. quadrangularis* (and the biotope defined by it) in the Loch Linnhe system. Historical records are very few and widely scattered, with none previously noted from Lochs Etive or Leven.

With respect to the more widespread seapens *Pennatula phosphorea* and *Virgularia mirabilis*, high densities (regarded here as $> 5 \text{ min}^{-1}$) were recorded more widely within the survey area (Figure 35), and included stations in Lochs Etive, Leven and Eil, where *F. quadrangularis* was rare or absent:

- Loch Eil: J4, J5, J67 (approx. $6 - 15 \text{ min}^{-1}$, mostly *P. phosphorea*)
- Upper Loch Linnhe: J10, J12, J73, J74, J75, J79, J81 (approx. $5 - 24 \text{ min}^{-1}$, both species common)
- Central Loch Linnhe: J30 (approx. 16 min^{-1} , almost all *V. mirabilis*)
- Lower Loch Linnhe east of Lismore: J61, M72 (approx. $8 - 18 \text{ min}^{-1}$, mostly *P. phosphorea*) and M70 (superabundant *V. mirabilis*)
- Loch Leven: M9, M74, M78 (approx. $5 - 22 \text{ min}^{-1}$, almost all *P. phosphorea*) and M86 (5 min^{-1} , both species common)
- Loch Etive: M47 (approx. 9 min^{-1} , all *P. phosphorea*)

This survey shows that *Pachycerianthus multiplicatus* occurs throughout most of the Loch Linnhe system. Possible exceptions are Loch Eil and the area east of Lismore, although these apparent absences may be artefacts of very low population density. From the results discussed here it is not possible to identify any stations or areas as being of particular importance for the species

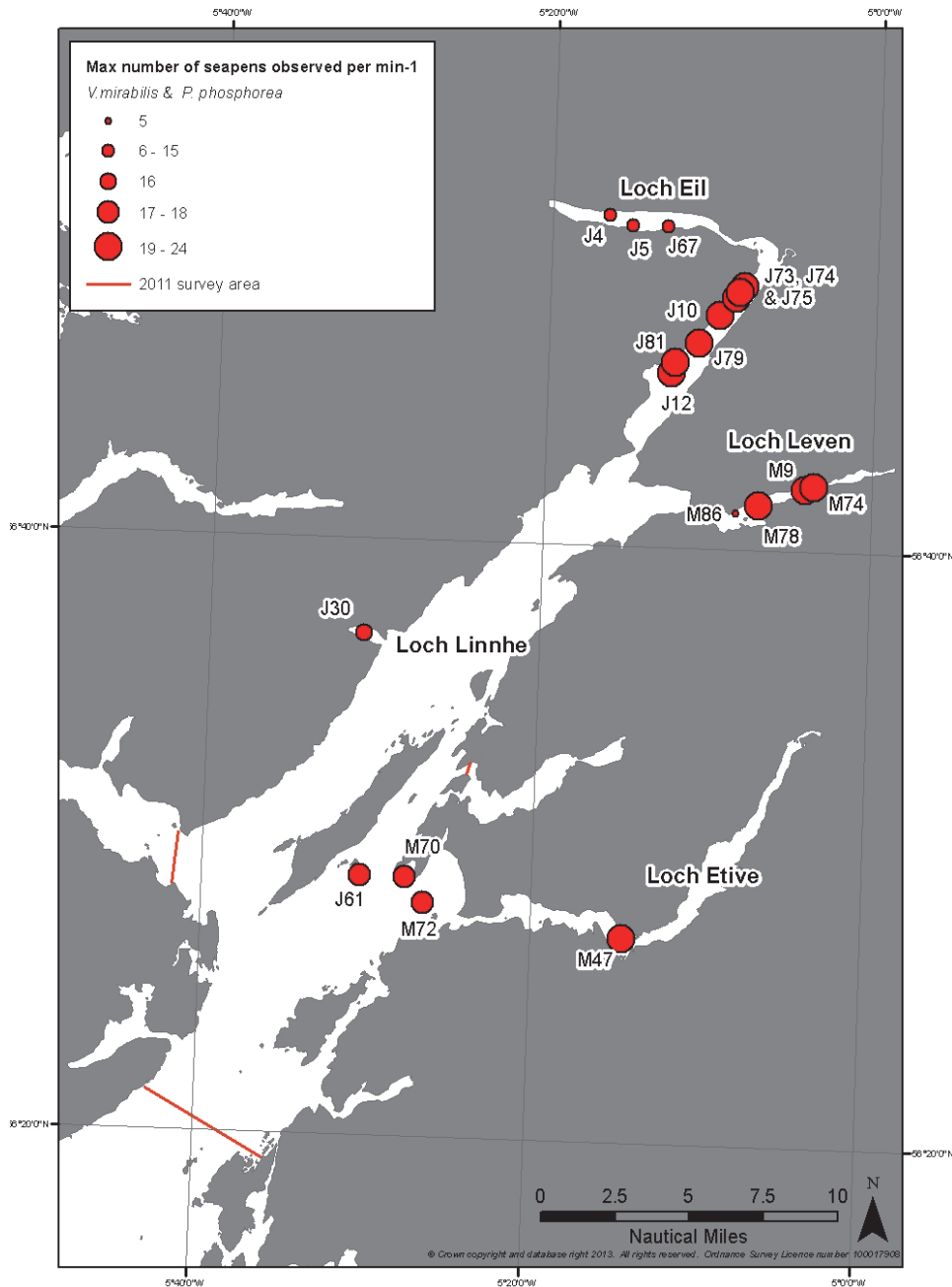


Figure 35. Max number of the seapens *Virgularia mirabilis* and *Pennatula phosphorea* observed during the 2011 survey.

From the semi-quantitative seapen frequency data summarised above, three broad areas encompassing stations with notably rich seapen communities can be identified:

Upper Loch Linnhe

Along the western side of upper Loch Linnhe a narrow strip extending from the vicinity of Trislaig (station J74) south to Inverscaddle Bay (J12) encompasses nine stations (from north to south J74, J73, J75, J76, J10, J78, J79, J81, J12), seven of which support all three seapen species, with two species recorded at the remaining stations (Figure 36). High densities of both *Funiculina quadrangularis* and *Pennatula phosphorea*/*Virgularia mirabilis* occur within this area. *Pachycerianthus multiplicatus* is also present, although apparently rare. Sediments are burrowed by megafauna throughout this area.

Lower Loch Linnhe, west of Lismore

Along the western side of Lismore, a quadrilateral with corners marked by stations J34, J106, J102 and J47 takes in 10 stations, all with *Funiculina quadrangularis*, mostly at high density (Figure 36). The other two seapen species occur here in small numbers, so that overall the seapen community is less rich than in the upper Loch Linnhe area identified above. *Pachycerianthus multiplicatus* is also present and several stations support high densities of megafaunal burrows. Station J102 includes the unusual occurrence of *F. quadrangularis* on sediment-draped bedrock in association with *Leptometra celtica*.

Lower Loch Linnhe, east of Lismore

To the south-east of Lismore, a polygon with angles marked by stations J61, M70, M72, J58 and J57 encloses seven fine mud stations (Figure 36). Three of these (J57, J58 and J59) support high densities of *Funiculina quadrangularis*, and three others (J61, M70 and M72) large numbers of either *Pennatula phosphorea* or *Virgularia mirabilis* (including, at M70, the densest *V. mirabilis* bed observed). Megafaunal burrow densities appeared to be generally low in this area, and *Pachycerianthus multiplicatus* was not recorded.

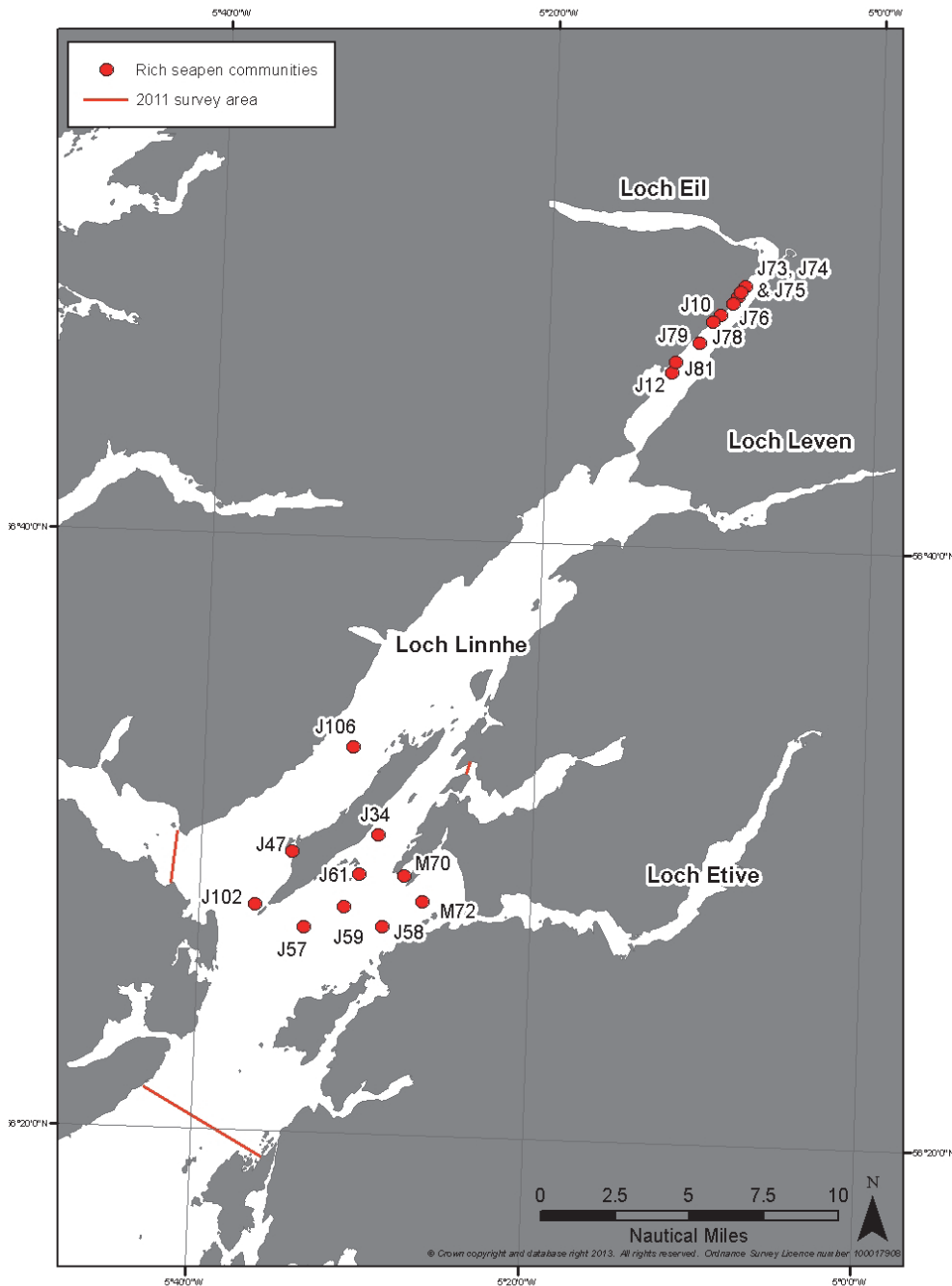


Figure 36. Rich seapen communities observed during the 2011 survey.

4.1.2 Horse mussel (*Modiolus modiolus*) beds

Live *Modiolus modiolus* were noted at stations in Lochs Eil (J69) and Leven (M82), with additional sightings of dead shells at other localities, but no occurrences at sufficient density to qualify as ‘beds’ were recorded. The Eil and Leven observations confirm the current presence of horse mussels at localities close to historical records of the species. However, the available evidence does not suggest that these sites host particularly notable or significant examples of *Modiolus* biotopes.

4.1.3 Northern seafan (*Swiftia pallida*) communities

The sparse observations of *Swiftia pallida* confirm the presence of the species off Bernera Island (station J42), where historical records exist (Bishop, 1984), and near Dubh Sgeir (J100) at the southern limit of this survey, previously recorded by Seasearch in 2006. No sightings were made at other bedrock stations in lower Loch Linnhe where *Swiftia pallida* might have been expected to occur. From the low densities recorded, stations J42 and J100 cannot at present be classed as important sites for the species.

4.1.4 Northern feather star (*Leptometra celtica*) aggregations on mixed substrata

Historical data, from Seasearch surveys in 2010, show a concentration of *Leptometra celtica* records around Bernera Island and south-west Lismore, and at Rubha an Ridire, on the mainland west of Lismore. This distribution pattern is supported by the results of the present study, which show dense populations of northern feather stars at stations corresponding to the older records. Largest numbers were recorded at stations J43, J45, J99 and J102. High densities at station J61, in the channel between south-east Lismore and the mainland at Camas Nathais, suggest a regional focus of abundance centred on southern Lismore and extending to both sides of the island.

4.1.5 Kelp and seaweed communities on sublittoral sediment

Kelp (*Saccharina latissima*) beds on sand, mud or mixed sediments appear to be widespread, with observations in all areas surveyed apart from Loch Eil and upper Loch Linnhe (historical records exist for these areas). The small number and wide scatter of records may reflect the fact that most drop video stations in this survey were below the typical depth limits of kelp. A greater focus on shallow, near-shore sites would probably have produced additional records. *Saccharina latissima* fronds were typically silted, with a dense cover of hydroids and bryozoans. Kelp parks usually occurred with an indeterminate algal understory and a sparse mobile epifauna consisting of a small number of widespread species such as *Asterias rubens* and *Carcinus maenas*. At the level of detail visible on the drop video footage none of the kelp communities showed any unusual or interesting features and there is no obvious reason to assign particular importance to individual stations.

4.2 Related human activities

In the UK commercial fishing activity, especially bottom trawling and dredging, has increased over time such that some areas of the sea bed are trawled several times every year. This activity disrupts not only the benthic communities but the biogeochemical properties and integrity of seabed sediments (cf. Jennings & Kaiser, 1998, Watling & Norse, 1998).

There are no current statutory protective measures for seapens, although seapens and burrowing megafaunal habitats are considered by OSPAR as a Priority Habitat and classed as “sensitive” (Curd 2010). The greatest single pressure on seapens is from bottom trawling (Hughes 1998). This is especially true for the *Nephrops* fishery, as this species coexists with seapens over much of its distribution; it is generally accepted, however, that creel fishing causes far less damage than trawling (Kinneir *et al.*, 1996; Hughes, 1998). Smothering, organic enrichment (e.g. from aquaculture) and physical disturbance (e.g. from anchoring) are also problematic for seapens and burrowing megafauna (Hughes, 1998). Many of the deeper burrowing megafauna are assumed to be relatively unaffected by demersal trawling (Atkinson, 1989; Greathead *et al.*, 2007), however, Howson & Davies (1991) found burrow density decreased in trawled areas of Loch Fyne compared to those where trawling was prevented. Muddy substrate stations where possible evidence of trawling was visible were J58 and J102.

Trawling and dredging is also problematic for tidally swept communities such as maerl, *Limaria* beds, and *Modiolus modiolus* communities, although none of these communities were identified in the present survey (the presence of isolated individual *M. modiolus* notwithstanding). For a complete synopsis of pressures on these and other important Scottish marine communities, see Bell *et al.* (2010).

There are a number of non-native introduced species in the Linnhe area: *Caprella mutica* (Ashton *et al.*, 2006); *Sargassum muticum* (Harries *et al.*, 2007); *Didemnum vexillum*, *Corella eumyota*, *Heterosiphonia japonica* and *Codium fragile* (Beveridge *et al.*, 2011) have all been recorded locally. It is unknown, however, what effects, if any, these invasives have had or will have on the biotopes recorded in the present survey.

4.3 Geological features

The Linnhe system has previously been identified by SNH as important in terms of the sedimentary and bedform features present which yield information about Scotland's postglacial depositional record (Brooks *et al.*, 2011) (Figure 37). Among these features are moraines, diamicts and pockmarks.

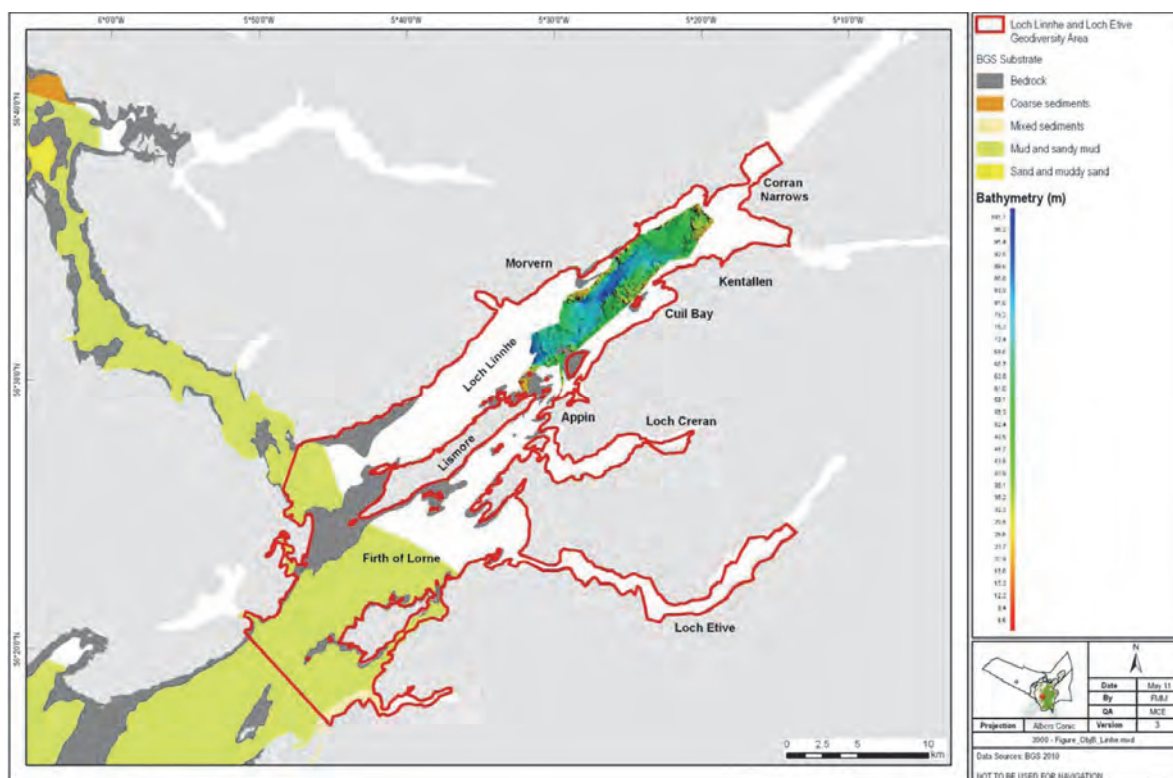


Figure 37. Multibeam image of Linnhe system seabed (unpublished SAMS data). Sediment data from BGS.

The location of some video stations in the present survey corresponded to some of these geological features, although this was serendipitous, as no *a priori* selection of stations was made on this basis. These stations and their corresponding geological features, sediment type, biota, and biotopes are present in Table 21, Appendix 6. It is difficult to see what correlation could be assumed from the presence of some biotopes and/or biota on these geological features, since they are themselves overlain by thick deposits of recently sedimented material; the present infaunal community is undoubtedly structured by, *inter alia*,

the food availability of this recent sediment, and not the presence of a relict deposit metres below. A more understandable correlation would possibly be between glacially scoured rock and encrusting epifauna, although again no station selection was made to test this assumption.

4.4 Recommendations

4.4.1 Further work

The multigrab survey was designed to assess whether certain historical populations of infaunal bivalves were still extant. This method was probably suitable for *Glossus humanus* and *Arctica islandica*, although sub-optimal for sampling infaunal *Modiolus modiolus* beds. Both the Day and van Veen grab systems available were inefficient, as they were unable to penetrate the compacted stony sediment typical of the conditions where this species can live. Some type of dredge survey, e.g. *via* anchor or naturalist dredge, should be performed at historical *M. modiolus* sites to obtain a better sample therefore the absence of *Modiolus modiolus* at the pre-planned multigrab sample stations should not be taken as evidence of absence. Further infaunal sampling work should be completed throughout the loch system to determine the presence of both *Arctica islandica* and *Glossus humanus* as the number and distribution of those sites selected for sampling in this survey may not be representative of the population of these two species in their entirety.

If recommendations on geodiversity features and their association(s) with certain communities/biotopes are needed, work is required to select these features prior to any future survey with this aim in mind.

If more information is required on the PMF of kelp and seaweed on sediment, it is also recommended that, as it is a shallow biotope, further survey work is performed by divers as DDV and ROV images have generally proven to be of insufficient clarity.

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APPENDIX 1. DATA RECORDING FORMS

Drop-down video survey recording form

	Target PMF:		Target depth (m):
Site code		Date	
Time in			
GPS waypoint in		Latitude & longitude in	
Depth BSL in			
Time out			
GPS waypoint out		Latitude & longitude out	
Depth BSL out			
Substrate notes			
Biological notes & abundance estimates			
Video footage (tape no)			

APPENDIX 2. DROP-DOWN VIDEO SURVEY DATA

Table 9. Positions, depths and video data for all video (DDV AND ROV) deployments on 2011 survey. Bottom sounder depths are corrected + 1.5 m; chart datum (CD) calculated as in Section 2. Video bottom time only entered for deeper stations.

STATION		GENERAL	VIDEO TIME					POSITION IN		POSITION OUT		BOTTOM SOUNDER DEPTH (m)		CORRECTED DEPTH (m)		CD (m)	
DATE	NO.	LOCATION	FILE NAME	IN	BOTTOM	OUT	LENGTH	LAT	LOE	LAT	LOE	IN	OUT	IN	OUT	IN	OUT
03/08/2011	M30	Lower Loch Linnhe	DDV_03082011	08:38	08:38	08:52	00:14	56.455300	-5.444967	56.454683	-5.446400	10.4	11.7	6.8	8.2	3.6	3.5
03/08/2011	M32	Loch Etive	DDV_03082011	09:38	09:38	09:42	00:04	56.456650	-5.379817	56.456567	-5.378900	14.1	11.6	11.2	8.8	2.9	2.8
03/08/2011	M33	Loch Etive	DDV_03082011	09:50	09:50	09:53	00:03	56.457267	-5.365367	56.457467	-5.364567	12.4	12.2	9.6	9.5	2.8	2.7
03/08/2011	M31	Loch Etive	DDV_03082011	10:05	10:05	10:13	00:08	56.455750	-5.392617	56.455800	-5.391267	16.7	9.1	14.1	6.5	2.6	2.6
03/08/2011	M34	Loch Etive	DDV_03082011	10:32	10:32	10:36	00:04	56.465383	-5.358133	56.465633	-5.357867	13.8	16.5	11.4	14.1	2.4	2.4
03/08/2011	M35	Loch Etive	DDV_03082011	10:41	10:41	10:44	00:03	56.464867	-5.354550	56.464900	-5.355067	15.8	14.0	13.5	11.7	2.3	2.3
03/08/2011	M36	Loch Etive	DDV_03082011	10:55	10:55	10:59	00:04	56.455867	-5.338150	56.455867	-5.338050	15.9	17.6	13.7	15.4	2.2	2.2
03/08/2011	M37	Loch Etive	DDV_03082011	11:07	11:07	11:12	00:05	56.454917	-5.321233	56.454717	-5.321533	12.0	11.8	9.9	9.7	2.1	2.1
03/08/2011	M38	Loch Etive	DDV_03082011	11:40	11:43	11:55	00:15	56.459450	-5.282467	56.459233	-5.283033	41.5	40.5	40.0	39.1	1.5	1.4
03/08/2011	M39	Loch Etive	DDV_03082011	12:46	12:49	12:54	00:08	56.459750	-5.272700	56.459750	-5.273750	50.5	41.5	49.3	40.3	1.2	1.2
03/08/2011	M40	Loch Etive	DDV_03082011	13:06	13:06	13:12	00:06	56.458200	-5.268300	56.458167	-5.268233	9.7	9.0	8.6	7.9	1.1	1.1
03/08/2011	M41	Loch Etive	DDV_03082011	13:18	13:19	13:23	00:05	56.462333	-5.262133	56.462383	-5.262883	8.7	7.5	7.6	6.5	1.1	1.0
03/08/2011	M42	Loch Etive	DDV_03082011	13:29	13:29	13:37	00:08	56.462183	-5.261667	56.462050	-5.263383	20.9	31.2	19.9	30.2	1.0	1.0
03/08/2011	M43	Loch Etive	DDV_03082011	14:03	14:04	14:07	00:04	56.457717	-5.249900	56.457500	-5.249267	31.5	28.5	30.6	27.7	0.9	0.8
03/08/2011	M44	Loch Etive	DDV_03082011	14:14	14:14	14:19	00:05	56.458183	-5.248833	56.457750	-5.248533	9.5	12.6	8.7	11.8	0.8	0.8
03/08/2011	M46	Loch Etive	DDV_03082011	14:31	14:33	14:37	00:06	56.450650	-5.253700	56.451300	-5.253583	33.5	38.5	32.8	37.8	0.7	0.7
03/08/2011	M45	Loch Etive	DDV_03082011	15:10	15:11	15:17	00:07	56.452333	-5.239200	56.452433	-5.239583	25.5	25.6	24.9	25.1	0.6	0.5
04/08/2011	M65	Loch Etive	DDV_04082011	09:16		09:22	00:06	56.552433	-5.076433	56.551666	-5.076467	12.6	12.5	11.2	11.1	1.4	1.4
04/08/2011	M64	Loch Etive	DDV_04082011	09:41	09:43	09:48	00:07	56.543483	-5.085183	56.542250	-5.085600	36.5	38.5	35.0	36.9	1.5	1.6
04/08/2011	M63	Loch Etive	DDV_04082011	09:56	09:57	10:02	00:06	56.542600	-5.086817	56.541466	-5.087350	35.5	34.3	33.9	32.7	1.6	1.6
04/08/2011	M61	Loch Etive	DDV_04082011	10:27	10:29	10:35	00:08	56.534300	-5.094983	56.533666	-5.096333	38.5	38.5	36.7	36.7	1.8	1.8
04/08/2011	M62	Loch Etive	DDV_04082011	10:41		10:46	00:05	56.533216	-5.092933	56.532750	-5.093533	15.0	12.5	13.2	10.7	1.8	1.8
04/08/2011	M60	Loch Etive	DDV_04082011	10:57	10:59	11:03	00:06	56.517716	-5.107283	56.517716	-5.107733	37.7	39.0	35.9	37.3	1.8	1.7
04/08/2011	M59	Loch Etive	DDV_04082011	11:19		11:30	00:11	56.502566	-5.132567	56.502100	-5.132883	52.2	58.5	50.5	56.9	1.7	1.6
04/08/2011	M58	Loch Etive	DDV_04082011	11:47	11:51	11:57	00:10	56.492116	-5.145150	56.492050	-5.145633	79.5	73.5	77.9	72.0	1.6	1.5
04/08/2011	M56	Loch Etive	DDV_04082011	13:12		13:19	00:07	56.482733	-5.165367	56.482616	-5.165683	11.9	15.5	10.7	14.3	1.2	1.2
04/08/2011	M66	Loch Etive	DDV_04082011	13:25	13:27	13:32	00:07	56.481633	-5.163800	56.481550	-5.163950	44.5	50.5	43.3	49.4	1.2	1.1
04/08/2011	M57	Loch Etive	DDV_04082011	13:51	13:53	14:03	00:12	56.480600	-5.150383	56.480566	-5.150500	10.1	12.2	9.1	11.2	1.0	1.0
04/08/2011	M55	Loch Etive	DDV_04082011	14:11	14:20	14:25	00:14	56.472350	-5.164883	56.472550	-5.163933	131.5	131.5	130.5	130.6	1.0	0.9
04/08/2011	M54	Loch Etive	DDV_04082011	15:14	15:15	15:18	00:04	56.456116	-5.176000	56.456216	-5.175550	29.5	24.1	28.8	23.4	0.7	0.7
04/08/2011	M50	Loch Etive	DDV_04082011	15:26		15:30	00:04	56.459583	-5.186317	56.459783	-5.185600	13.5	13.5	12.8	12.9	0.7	0.6
04/08/2011	M53	Loch Etive	DDV_04082011	15:38		15:43	00:05	56.455366	-5.197750	56.455700	-5.197467	5.3	11.5	4.7	10.9	0.6	0.6
05/08/2011	M47	Loch Etive	DDV_05082011	08:22	08:23	08:27	00:05	56.448033	-5.240117	56.447750	-5.239450	36.5	36.5	35.6	35.6	0.9	0.9
05/08/2011	M48	Loch Etive	DDV_05082011	08:34		08:39	00:05	56.443150	-5.243833	56.443150	-5.243333	49.5	50.5	48.5	49.5	1.0	1.0
05/08/2011	M49	Loch Etive	DDV_05082011	08:49		08:51	00:02	56.439000	-5.237517	56.439100	-5.237433	3.5	4.2	2.5	3.2	1.0	1.0
05/08/2011	M49	Loch Etive	DDV_05082011	08:57		09:00	00:03	56.439433	-5.237783	56.439483	-5.237183	19.5	20.5	18.5	19.5	1.0	1.0

Table 9 continued

STATION		GENERAL	VIDEO TIME					POSITION IN		POSITION OUT		BOTTOM SOUNDER DEPTH (m)		CORRECTED DEPTH (m)		CD (m)	
DATE	NO.	LOCATION	FILE NAME	IN	BOTTOM	OUT	LENGTH	LAT	LON	LAT	LON	IN	OUT	IN	OUT	IN	OUT
05/08/2011	M51	Loch Etive	DDV_05082011	09:07		09:12	00:05	56.445700	-5.231783	56.445967	-5.228983	15.2	14.5	14.1	13.4	1.1	1.1
05/08/2011	M52	Loch Etive	DDV_05082011	09:21		09:26	00:05	56.448617	-5.220283	56.448633	-5.219950	10.0	11.6	8.8	10.4	1.2	1.2
05/08/2011	M67	Loch Etive	DDV_05082011	09:40	09:43	09:49	00:09	56.450117	-5.204117	56.450817	-5.202683	13.1	12.9	11.9	11.6	1.2	1.3
05/08/2011	M27	Loch Linnhe	DDV_05082011	12:04		12:09	00:05	56.472667	-5.556867	56.472650	-5.556817	15.5	15.9	13.1	13.6	2.4	2.3
05/08/2011	M68	Loch Linnhe	DDV_05082011	12:49	12:51	12:58	00:09	56.476100	-5.527267	56.476133	-5.527017	39.7	39.6	37.5	37.5	2.2	2.1
05/08/2011	M69	Loch Linnhe	DDV_05082011	13:07		13:12	00:05	56.479000	-5.516133	56.478733	-5.516183	21.3	23.1	19.3	21.1	2.0	2.0
05/08/2011	M28	Loch Linnhe	DDV_05082011	13:34		13:39	00:05	56.482400	-5.462483	56.482433	-5.462067	9.4	10.5	7.6	8.7	1.8	1.8
05/08/2011	M70	Loch Linnhe	DDV_05082011	13:46		13:50	00:04	56.478333	-5.461867	56.478417	-5.460900	20.0	20.1	18.3	18.4	1.7	1.7
05/08/2011	M29	Loch Linnhe	DDV_05082011	14:08		14:12	00:04	56.485317	-5.425183	56.485800	-5.424183	7.8	8.3	6.2	6.7	1.6	1.6
05/08/2011	M71	Loch Linnhe	DDV_05082011	14:26	14:29	14:33	00:07	56.472733	-5.448400	56.472667	-5.447083	51.5		50.0		1.5	1.4
05/08/2011	M72	Loch Linnhe	DDV_05082011	14:57		15:04	00:07	56.463967	-5.441667	56.464817	-5.441883	46.5	43.5	45.3	42.3	1.2	1.2
06/08/2011	M26	Upper Loch Linnhe	DDV_06082011	09:18		09:24	00:06	56.533883	-5.443683	56.533983	-5.443617	13.5	11.5	10.3	8.2	3.2	3.3
06/08/2011	M25	Upper Loch Linnhe	DDV_06082011	09:34		09:39	00:05	56.536250	-5.418917	56.537000	-5.417017	14.6	14.5	11.3	11.1	3.3	3.4
06/08/2011	M24	Upper Loch Linnhe	DDV_06082011	10:14		10:19	00:05	56.556783	-5.456700	56.556533	-5.456700	8.8	8.5	5.4	5.1	3.4	3.4
06/08/2011	M73	Upper Loch Linnhe	DDV_06082011	11:58		12:03	00:05	56.665983	-5.287617	56.666017	-5.286917	9.5	8.0	6.5	5.1	3.0	2.9
06/08/2011	M23	Upper Loch Linnhe	DDV_06082011	11:38		11:51	00:13	56.663917	-5.292750	56.663633	-5.293000	12.0	8.8	8.9	5.8	3.1	3.0
06/08/2011	M19	Loch Leven	DDV_06082011	13:00		13:03	00:03	56.687717	-5.166267	56.687717	-5.165767	6.6	4.4	4.0	1.9	2.6	2.5
06/08/2011	M18	Loch Leven	DDV_06082011	13:10		13:16	00:06	56.684683	-5.162433	56.684867	-5.163017	10.2	8.2	7.7	5.7	2.5	2.5
06/08/2011	M20	Loch Leven	DDV_06082011	12:47	12:48	12:55	00:08	56.687817	-5.167567	56.687650	-5.167150	12.5	10.5	9.8	7.9	2.7	2.6
06/08/2011	M17	Loch Leven	DDV_06082011	13:47	13:50	13:56	00:09	56.680467	-5.146700	56.680083	-5.146183	60.5	59.5	58.3	57.3	2.2	2.2
06/08/2011	M16	Loch Leven	DDV_06082011	14:03	14:04	14:09	00:06	56.683167	-5.141283	56.683133	-5.140850	46.5	46.5	44.4	44.4	2.1	2.1
06/08/2011	M15	Loch Leven	DDV_06082011	14:39	14:41	14:47	00:08	56.688667	-5.129233	56.688483	-5.128100	34.5	41.5	32.6	39.7	1.9	1.8
07/08/2011	M1	Loch Leven	DDV_07082011	09:00	09:01	09:10	00:10	56.712733	-4.982200	56.712800	-4.982700	7.5	7.5	4.9	4.8	2.6	2.7
07/08/2011	M2	Loch Leven	DDV_07082011	09:11		09:16	00:05	56.711750	-4.994400	56.711750	-4.994317	23.6	24.5	20.9	21.8	2.7	2.7
07/08/2011	M3	Loch Leven	DDV_07082011	09:25	09:26	09:29	00:04	56.711617	-5.012883	56.711667	-5.013067	20.5	20.5	17.7	17.7	2.8	2.8
07/08/2011	M4	Loch Leven	DDV_07082011	09:36	09:39	09:46	00:10	56.708233	-5.026283	56.708500	-5.025683	50.5	49.5	47.7	46.6	2.8	2.9
07/08/2011	M5	Loch Leven	DDV_07082011	10:52		10:58	00:06	56.708567	-5.038550	56.708367	-5.038850	9.1	9.4	5.8	6.1	3.3	3.3
07/08/2011	M6	Loch Leven	DDV_07082011	11:05		11:12	00:07	56.706700	-5.041183	56.706933	-5.040583	10.5	13.4	7.1	10.0	3.4	3.4
07/08/2011	M7	Loch Leven	DDV_07082011	11:16		11:22	00:06	56.705933	-5.044583	56.705800	-5.044983	7.5	7.7	4.1	4.3	3.4	3.5
07/08/2011	M8	Loch Leven	DDV_07082011	11:26		11:31	00:05	56.704900	-5.053283	56.704983	-5.052983	7.5	7.5	4.1	4.1	3.4	3.4
07/08/2011	M9	Loch Leven	DDV_07082011	11:43	11:45	11:49	00:06	56.701233	-5.067567	56.701433	-5.066517	31.5	31.2	28.2	27.9	3.3	3.3
07/08/2011	M10	Loch Leven	DDV_07082011	11:57		12:02	00:05	56.700550	-5.067883	56.700700	-5.080733	16.5	22.5	13.2	19.3	3.3	3.2
07/08/2011	M11	Loch Leven	DDV_07082011	12:49	12:51	12:56	00:07	56.698050	-5.085183	56.698317	-5.084183	46.5	40.5	43.5	37.6	3.0	2.9
07/08/2011	M12	Loch Leven	DDV_07082011	14:25		14:30	00:05	56.696517	-5.100700	56.696667	-5.099667	41.5	38.5	39.1	36.1	2.4	2.4
07/08/2011	M13	Loch Leven	DDV_07082011	14:41	14:42	14:48	00:07	56.692567	-5.117167	56.692417	-5.116350	31.9	33.5	29.6	31.2	2.3	2.3
08/08/2011	M14	Loch Leven	DDV_08082011	08:44		08:49	00:05	56.684050	-5.119133	56.683833	-5.118117	21.6	23.4	19.5	21.2	2.1	2.2
08/08/2011	M74	Loch Leven	DDV_08082011	10:09	10:10	10:15	00:06	56.702617	-5.059800	56.703250	-5.058200	26.0	23.6	23.5	21.1	2.5	2.5
08/08/2011	M75	Loch Leven	DDV_08082011	10:25	10:26	10:30	00:05	56.698767	-5.078400	56.699133	-5.076900	35.5	33.0	32.9	30.4	2.6	2.6
08/08/2011	M77	Loch Leven	DDV_08082011	10:56	10:57	11:02	00:06	56.693150	-5.110467	56.693567	-5.109033	51.5	53.5	48.8	50.8	2.7	2.7
08/08/2011	M76	Loch Leven	DDV_08082011	10:39	10:40	10:45	00:06	56.696717	-5.093000	56.696983	-5.090667	34.5	33.5	31.9	30.8	2.6	2.7
08/08/2011	M79	Loch Leven	DDV_08082011	11:19	11:21	11:24	00:05	56.689033	-5.114250	56.689250	-5.113400	29.5	29.5	26.7	26.7	2.8	2.8

Table 9 continued

DATE	STATION NO.	GENERAL LOCATION	FILE NAME	IN	VIDEO TIME			POSITION IN		POSITION OUT		BOTTOM SOUNDER DEPTH (m)		CORRECTED DEPTH (m)		CD (m)	
					BOTTOM	OUT	LENGTH	LAT	LO	LAT	LO	IN	OUT	IN	OUT	IN	OUT
08/08/2011	M80	Loch Leven	DDV_08082011	11:31	11:32	11:37	00:06	56.688983	-5.121017	56.689050	-5.119233	49.5	38.5	46.6	35.6	2.9	2.9
08/08/2011	M81	Loch Leven	DDV_08082011	12:37	12:38	12:43	00:06	56.688583	-5.171567	56.688117	-5.170517	37.5	37.5	34.3	34.3	3.2	3.2
08/08/2011	M82	Loch Leven	DDV_08082011	12:54		13:01	00:07	56.690133	-5.171817	56.690300	-5.172117	22.5	11.7	19.3	8.4	3.2	3.3
08/08/2011	M83	Loch Leven	DDV_08082011	13:08		13:18	00:10	56.689450	-5.168683	56.689650	-5.168450	11.2	10.8	7.9	7.5	3.3	3.3
08/08/2011	M22	Loch Leven	DDV_08082011	13:25		13:31	00:06	56.689833	-5.186300	56.689517	-5.185717	9.5	9.6	6.1	6.3	3.4	3.3
08/08/2011	M21	Loch Leven	DDV_08082011	13:38		13:45	00:07	56.688467	-5.179717	56.688100	-5.179217	10.5	10.4	7.2	7.1	3.3	3.3
08/08/2011	M84	Loch Leven	DDV_08082011	14:07		14:18	00:11	56.682950	-5.160567	56.682050	-5.158650	14.0	15.0	10.9	11.9	3.1	3.1
08/08/2011	M85	Loch Leven	DDV_08082011	14:30		14:34	00:04	56.686567	-5.155250	56.686350	-5.154483	8.5	13.0	5.5	10.0	3.0	3.0
09/08/2011	M86	Loch Leven	DDV_09082011	08:36		08:42	00:06	56.687167	-5.137050	56.686650	-5.137517	32.5	33.2	30.8	31.5	1.7	1.7
09/08/2011	M87	Loch Leven	DDV_09082011	08:50		08:56	00:06	56.682633	-5.124167	56.682600	-5.123467	27.0	22.7	25.2	20.9	1.8	1.8
15/08/2011	J1	Loch Eil	DDV_15082011	11:00		11:08	00:08	56.855995	-5.326535	56.836274	-5.324916	21.0	20.8	19.31	19.18	1.7	1.6
15/08/2011	J2	Loch Eil	DDV_15082011	11:15	11:16	11:23	00:08	56.855972	-5.314784	56.855927	-5.313217	22.8	22.8	21.23	21.30	1.6	1.5
15/08/2011	J3	Loch Eil	DDV_15082011	11:28	11:29	11:34	00:06	56.851421	-5.306882	56.851101	-5.305014	27.5	27.5	26.04	26.09	1.5	1.4
15/08/2011	J4	Loch Eil	DDV_15082011	13:17		13:23	00:06	56.851532	-5.276581	56.851055	-5.273504	32.0	32.5	31.44	31.99	0.6	0.5
15/08/2011	J5	Loch Eil	DDV_15082011	13:41		13:46	00:05	56.846268	-5.252666	56.846081	-5.250291	28.0	27.8	27.34	27.09	0.7	0.7
15/08/2011	J6	Loch Eil	DDV_15082011	13:54	13:56	14:03	00:09	56.849907	-5.233780	56.849777	-5.231306	38.5	40.0	37.71	39.12	0.8	0.9
15/08/2011	J7	Loch Eil	DDV_15082011	14:27	14:29	14:37	00:10	56.853245	-5.209116	56.853722	-5.206712	30.5	19.5	29.37	18.27	1.1	1.2
15/08/2011	J8	Loch Eil	DDV_15082011	14:41	14:43	14:49	00:08	56.849918	-5.204380	56.850269	-5.201816	68.5	69.0	67.23	67.64	1.3	1.4
15/08/2011	J65	Loch Eil	DDV_15082011	13:04		13:10	00:06	56.850929	-5.291462	56.850521	-5.288349	39.5	33.9	38.84	33.29	0.7	0.6
15/08/2011	J66	Loch Eil	DDV_15082011	13:29	13:30	13:35	00:06	56.847622	-5.262542	56.847649	-5.259822	32.5	33.0	31.97	32.41	0.5	0.6
15/08/2011	J67	Loch Eil	DDV_15082011	14:10		14:20	00:10	56.845871	-5.216841	56.846428	-5.213700	19.5	27.5	18.55	26.44	1.0	1.1
15/08/2011	J68	Loch Eil	DDV_15082011	15:51		15:57	00:06	56.851425	-5.179513	56.851505	-5.181824	29.5	42.5	27.50	40.44	2.0	2.1
15/08/2011	J69	Loch Eil	DDV_15082011	16:03		16:08	00:05	56.850754	-5.175248	56.851696	-5.177129	20.0	11.5	17.88	9.33	2.1	2.2
15/08/2011	J70	Loch Eil	DDV_15082011	15:34		15:44	00:10	56.851784	-5.187223	56.852432	-5.188943	49.0	45.5	47.18	43.58	1.8	1.9
16/08/2011	J71	Loch Linnhe	DDV_16082011	07:33	07:34	07:41	00:08	56.818542	-5.121743	56.818935	-5.121825	70.5	68.5	66.9	64.9	3.6	3.6
16/08/2011	J72	Loch Linnhe	DDV_16082011	07:48		07:54	00:06	56.818149	-5.129942	56.818725	-5.128803	29.5	26.5	26.0	23.0	3.5	3.5
16/08/2011	J75	Loch Linnhe	DDV_16082011	08:40		08:48	00:08	56.810036	-5.140060	56.810913	-5.138494	29.5	33.5	26.4	30.5	3.1	3.0
16/08/2011	J74	Loch Linnhe	DDV_16082011	08:09		08:17	00:08	56.813141	-5.136054	56.814266	-5.134042	31.0	35.5	27.6	32.2	3.4	3.3
16/08/2011	J9	Loch Linnhe	DDV_16082011	08:24	08:26	08:29	00:05	56.809421	-5.133984	56.810425	-5.133718	90.5		87.3		3.2	3.2
16/08/2011	J73	Loch Linnhe	DDV_16082011	08:55	08:56	09:02	00:07	56.806946	-5.143519	56.807838	-5.142117	31.0	39.0	28.0	36.1	3.0	2.9
16/08/2011	J76	Loch Linnhe	DDV_16082011	09:12	09:13	09:20	00:08	56.803650	-5.147559	56.804611	-5.145951	63.5	57.5	60.6	54.7	2.9	2.8
16/08/2011	J10	Loch Linnhe	DDV_16082011	09:31	09:32	09:39	00:08	56.797577	-5.159747	56.797413	-5.159714	20.0	19.5	17.3	16.9	2.7	2.6
16/08/2011	J77	Loch Linnhe	DDV_16082011	09:47	09:50	09:53	00:06	56.795330	-5.152962	56.795639	-5.152796	119.5	119.5	116.9	117.0	2.6	2.5
16/08/2011	J78	Loch Linnhe	DDV_16082011	10:15	10:16	10:24	00:09	56.793304	-5.166553	56.793304	-5.167182	25.5	25.5	23.2	23.2	2.3	2.3
16/08/2011	J79	Loch Linnhe	DDV_16082011	10:38		10:45	00:07	56.781792	-5.180669	56.781689	-5.180090	30.5	31.5	28.3	29.4	2.2	2.1
16/08/2011	J11	Loch Linnhe	DDV_16082011	10:54		11:01	00:07	56.779102	-5.167677	56.778549	-5.168144	20.0	18.5	18.0	16.5	2.0	2.0
16/08/2011	J14	Loch Linnhe	DDV_16082011	12:56	12:58	13:08	00:12	56.738422	-5.231749	56.738132	-5.232041	114.5	110.5	113.5	109.6	1.0	0.9
16/08/2011	J15	Loch Linnhe	DDV_16082011	13:19		13:25	00:06	56.720112	-5.239771	56.719124	-5.240871	20.5	24.5	19.7	23.8	0.8	0.7
16/08/2011	J16	Loch Linnhe	DDV_16082011	13:53	13:54	13:59	00:06	56.700130	-5.218656	56.700539	-5.218479	28.5	25.5	27.4	24.4	1.1	1.1
16/08/2011	J80	Loch Linnhe	DDV_16082011	14:09	14:10	14:16	00:07	56.695110	-5.237037	56.694668	-5.238791	24.5	23.5	23.3	22.2	1.2	1.3
16/08/2011	J17	Loch Linnhe	DDV_16082011	14:24	14:25	14:29	00:05	56.688553	-5.254071	56.68819	-5.253838	25.5	25.5	24.1	24.1	1.4	1.4

Table 9 continued

DATE	STATION NO.	GENERAL LOCATION	FILE NAME	IN	VIDEO TIME			POSITION IN		POSITION OUT		BOTTOM SOUNDER DEPTH (m)		CORRECTED DEPTH (m)		CD (m)	
					BOTTOM	OUT	LENGTH	LAT	LO N	LAT	LO N	IN	OUT	IN	OUT	IN	OUT
16/08/2011	J13	Loch Linnhe	DDV_16082011	15:03	15:07	15:13	00:10	56.755592	-5.209123	56.75497	-5.210972	147.5	151.5	145.7	149.6	1.8	1.9
17/08/2011	J81	Loch Linnhe	DDV_17082011	08:21		08:30	00:09	56.769947	-5.204403	56.770641	-5.202831	19.5	20.5	18.5	19.5	1.0	1.0
17/08/2011	J82	Loch Linnhe	DDV_17082011	08:42		08:49	00:07	56.755127	-5.225961	56.755798	-5.226376	23.5	23.5	22.0	22.0	1.5	1.5
17/08/2011	J83	Loch Linnhe	DDV_17082011	08:58		09:04	00:06	56.742283	-5.212141	56.742641	-5.211377	38.5	40.5	36.3	38.2	2.2	2.3
17/08/2011	J84	Loch Linnhe	DDV_17082011	10:01		10:18	00:17	56.703690	-5.300407	56.703827	-5.301259	25.5	26.5	23.5	24.4	2.0	2.1
17/08/2011	J18	Loch Linnhe	DDV_17082011	10:23		10:30	00:07	56.697437	-5.304243	56.697304	-5.303934	42.5	42.5	38.8	38.9	3.7	3.6
17/08/2011	J19	Loch Linnhe	DDV_17082011	10:59	11:01	11:06	00:07	56.672184	-5.321731	56.672127	-5.322753	65.5	65.5	62.0	62.0	3.5	3.5
17/08/2011	J20	Loch Linnhe	DDV_17082011	11:20		11:28	00:08	56.661259	-5.368878	56.661789	-5.368520	25.5	25.5	22.1	22.2	3.4	3.3
17/08/2011	J85	Loch Linnhe	DDV_17082011	11:35		11:41	00:06	56.655285	-5.380840	56.655739	-5.380602	22.5	21.5	20.6	19.5	1.9	2.0
17/08/2011	J21	Loch Linnhe	DDV_17082011	12:42	12:43	12:47	00:05	56.640983	-5.304280	56.641083	-5.303460	29.0	28.5	26.1	25.8	2.9	2.7
17/08/2011	J22	Loch Linnhe	DDV_17082011	13:16		13:24	00:08	56.636242	-5.343495	56.637520	-5.342859	32.5	41.5	30.4	39.5	2.1	2.0
17/08/2011	J86	Loch Linnhe	DDV_17082011	13:31		13:39	00:08	56.629776	-5.345424	56.630649	-5.344419	19.5	15.5	17.7	13.7	1.8	1.8
17/08/2011	J87	Loch Linnhe	DDV_17082011	14:04	14:05	14:13	00:09	56.636459	-5.408096	56.637375	-5.406920	17.5	16.5	15.1	14.1	2.4	2.4
17/08/2011	J26	Loch Linnhe	DDV_17082011	14:22		14:27	00:05	56.632503	-5.433630	56.633129	-5.433895	35.5	34.5	34.4	33.3	1.1	1.2
17/08/2011	J29	Loch Linnhe	DDV_17082011	15:13	15:14	15:18	00:05	56.611038	-5.496360	56.610828	-5.495850	30.5	30.5	28.1	28.2	2.4	2.3
17/08/2011	J30	Loch Linnhe	DDV_17082011	14:53		14:59	00:06	56.613659	-5.511369	56.613613	-5.510528	18.5	18.5	16.3	16.4	2.2	2.1
17/08/2011	J28	Loch Linnhe	DDV_17082011	15:27	15:29	15:33	00:06	56.606140	-5.475503	56.606422	-5.474573	58.5	46.5	55.8	43.9	2.7	2.6
17/08/2011	J27	Loch Linnhe	DDV_17082011	15:52	15:54	15:59	00:07	56.609135	-5.424046	56.609241	-5.422261	72.5	73.5	71.1	72.1	1.4	1.4
17/08/2011	J31	Loch Linnhe	DDV_17082011	16:09	16:10	16:15	00:06	56.591763	-5.413780	56.591835	-5.413002	49.5	54.5	48.0	53.1	1.5	1.4
18/08/2011	J88	Loch Linnhe	DDV_18082011	07:48	07:49	07:57	00:09	56.575462	-5.400823	56.576588	-5.400575	24.5	21.4	20.6	17.6	3.9	3.8
18/08/2011	J89	Loch Linnhe	DDV_18082011	08:05		08:12	00:07	56.571648	-5.420596	56.571677	-5.421579	28.5	27.5	24.8	23.8	3.7	3.7
18/08/2011	J24	Loch Linnhe	DDV_18082011	08:38	08:39	08:44	00:06	56.611136	-5.348875	56.611168	-5.348554	28.5	28.5	25.0	25.1	3.5	3.4
18/08/2011	J23	Loch Linnhe	DDV_18082011	08:47		08:52	00:05	56.611992	-5.349954	56.621087	-5.349953	43.5	44.5	40.1	41.1	3.4	3.4
18/08/2011	J25	Loch Linnhe	DDV_18082011	09:05	09:08	09:13	00:08	56.628826	-5.386492	56.628288	-5.386717	101.5	99.5	98.2	96.3	3.3	3.2
18/08/2011	J90	Loch Linnhe	DDV_18082011	09:44	09:46	09:52	00:08	56.586098	-5.492200	56.586452	-5.492332	87.5	85.5	84.5	82.5	3.0	3.0
18/08/2011	J32	Loch Linnhe	DDV_18082011	10:05	10:08	10:13	00:08	56.580753	-5.467044	56.590143	-5.467653	101.5	101.5	98.6	98.7	2.9	2.8
18/08/2011	J91	Loch Linnhe	DDV_18082011	10:20	10:23	10:27	00:07	56.579052	-5.475732	56.578659	-5.476405	103.5	103.5	100.7	100.8	2.8	2.7
18/08/2011	J33	Loch Linnhe	DDV_18082011	10:39	10:42	10:47	00:08	56.568081	-5.509894	56.567680	-5.510191	92.5	92.5	89.9	89.9	2.6	2.6
18/08/2011	J34	Loch Linnhe	DDV_18082011	11:03	11:04	11:09	00:06	56.456192	-5.493861	56.545849	-5.483853	42.5	45.5	40.1	43.1	2.4	2.4
18/08/2011	J35	Loch Linnhe	DDV_18082011	11:23		11:31	00:08	56.540199	-5.513520	56.539387	-5.514750	61.5	60.5	59.2	58.3	2.3	2.2
18/08/2011	J36	Loch Linnhe	DDV_18082011	11:41		11:48	00:07	56.544590	-5.550606	56.544199	-5.551563	117.5	117.5	115.3	115.4	2.2	2.1
18/08/2011	J40	Loch Linnhe	DDV_18082011	12:50		12:57	00:07	56.510185	-5.534591	56.510490	-5.534164	27.5	25.5	25.8	23.9	1.7	1.6
18/08/2011	J39	Loch Linnhe	DDV_18082011	13:08	13:11	13:18	00:10	56.510475	-5.572641	56.510277	-5.573808	94.5	96.5	92.9	95.0	1.6	1.5
18/08/2011	J38	Loch Linnhe	DDV_18082011	13:26	13:30	13:33	00:07	56.519550	-5.582177	56.519489	-5.581916	160.5	159.5	159.1	158.1	1.4	1.4
18/08/2011	J93	Loch Linnhe	DDV_18082011	13:59		14:05	00:06	56.488914	-5.593423	56.488025	-5.592448	36.5	67.5	35.3	66.3	1.2	1.2
18/08/2011	J47	Loch Linnhe	DDV_18082011	14:12		14:18	00:06	56.490452	-5.577923	56.490147	-5.571253	23.5	21.9	22.4	20.8	1.1	1.1
18/08/2011	J92	Loch Linnhe	DDV_18082011	14:23		14:28	00:05	56.486404	-5.584706	56.485950	-5.583767	72.5	34.5	71.4	33.5	1.1	1.0
18/08/2011	J56	Loch Linnhe	DDV_18082011	15:38		15:46	00:08	56.423183	-5.555898	56.423035	-5.555317	70.0	57.5	68.3	55.8	1.7	1.7
18/08/2011	J57	Loch Linnhe	DDV_18082011	15:59		16:07	00:08	56.448334	-5.560916	56.448456	-5.560307	34.5	34.5	32.7	32.6	1.8	1.9
18/08/2011	J59	Loch Linnhe	DDV_18082011	16:18		16:23	00:05	56.459976	-5.521222	56.459923	-5.519760	37.5	36.5	35.5	34.5	2.0	2.0
18/08/2011	J58	Loch Linnhe	DDV_18082011	16:34		16:40	00:06	56.449600	-5.481943	56.449600	-5.480461	40.5	39.5	38.3	37.3	2.2	2.2

Table 9 continued

DATE	STATION NO.	GENERAL LOCATION	FILE NAME	IN	VIDEO TIME		LENGTH	POSITION IN		POSITION OUT		BOTTOM SOUNDER DEPTH (m)		CORRECTED DEPTH (m)		CD (m)	
					BOTTOM	OUT		LAT	LOIN	LAT	LOIN	IN	OUT	IN	OUT	IN	OUT
19/08/2011	J44	Loch Linnhe	DDV_19082011	08:16		08:33	00:17	56.494842	-5.636015	56.492142	-5.633098	208.5	201.5	40.1	41.1	3.5	3.6
19/08/2011	J43-2	Loch Linnhe	ROV_19082011	09:16		09:28	00:12	56.493828	-5.592642	56.493770	-5.594608			40.1	41.1	3.2	3.1
19/08/2011	J43-3	Loch Linnhe	ROV_19082011	09:38		09:51	00:13	56.492998	-5.593100	56.492664	-5.596296			40.1	41.1	1.3	1.4
19/08/2011	J37	Loch Linnhe	ROV_19082011	10:37		10:41	00:04	56.532860	-5.583025	56.532650	-5.583626	5.5	13.2	40.1	41.1	2.8	2.8
19/08/2011	J94	Loch Linnhe	DDV_19082011	12:13		12:21	00:08	56.400509	-5.575510	56.400867	-5.577976	29.5	39.5	40.1	41.1	2.2	2.2
19/08/2011	J95	Loch Linnhe	DDV_19082011	12:32		12:37	00:05	56.415539	-5.551380	56.416027	-5.551945	27.5	29.5	40.1	41.1	2.1	2.1
19/08/2011	J52	Loch Linnhe	ROV_19082011	13:10		13:23	00:13	56.464882	-5.596910	56.464264	-5.599361	13.5	8.2	40.1	41.1	1.9	1.8
19/08/2011	J51	Loch Linnhe	ROV_19082011	13:37		13:50	00:13	56.471062	-5.585993	56.471378	-5.585573	16.5	31.5	40.1	41.1	1.7	1.7
19/08/2011	J42	Loch Linnhe	ROV_19082011	14:39		14:54	00:15	56.494976	-5.589090	56.495651	-5.589884	19.5	31.5	40.1	41.1	1.4	1.3
19/08/2011	J41	Loch Linnhe	ROV_19082011	14:11		14:28	00:17	56.498524	-5.581040	56.498463	-5.582328	9.5	31.5	40.1	41.1	1.5	1.4
19/08/2011	J43	Loch Linnhe	ROV_19082011	15:07		15:23	00:16	56.492746	-5.594726	56.492794	-5.597966	21.5	31.5	40.1	41.1	3.4	3.3
20/08/2011	J96	Loch Linnhe	DDV_20082011	07:47		07:59	00:12	56.420400	-5.631633	56.425671	-5.631796	34.5	31.5	31.5	28.5	3.0	3.0
20/08/2011	J97	Loch Linnhe	DDV_20082011	08:13	08:15	08:20	00:07	56.418972	-5.629771	56.421497	-5.629090	48.5	52.5	45.4	49.3	3.1	3.2
20/08/2011	J64	Loch Linnhe	DDV_20082011	09:09	09:11	09:17	00:08	56.508911	-5.489956	56.511063	-5.489330	38.5	31.5	35.1	28.1	3.4	3.4
20/08/2011	J63	Loch Linnhe	DDV_20082011	09:27		09:34	00:07	56.498951	-5.472977	56.500515	-5.472411	52.5	52.5	49.2	49.2	3.3	3.3
20/08/2011	J61	Loch Linnhe	DDV_20082011	09:53		10:00	00:07	56.478256	-5.506357	56.479790	-5.506166	32.5	41.5	29.3	38.4	3.2	3.1
20/08/2011	J62	Loch Linnhe	DDV_20082011	10:18	10:19	10:23	00:05	56.486862	-5.531053	56.487564	-5.531354	38.5		35.4		3.1	3.0
20/08/2011	J98	Loch Linnhe	DDV_20082011	11:28	11:29	11:41	00:13	56.477508	-5.608097	56.478828	-5.607427	48.5	63.5	45.8	60.9	2.7	2.6
20/08/2011	J99	Loch Linnhe	DDV_20082011	12:39		12:48	00:09	56.474876	-5.599902	56.474815	-5.599436	44.5	44.5	42.1	42.2	2.4	2.3
20/08/2011	J55	Loch Linnhe	ROV_20082011	14:01		14:06	00:05	56.38248	-5.604790	56.382492	-5.604778	24.5	27.0	22.5	25.0	2.0	2.0
20/08/2011	J55	Loch Linnhe	ROV_20082011	14:35		15:05	00:30	56.383449	-5.604605	56.383490	-5.606681	36.5	44.6	34.5	42.6	2.0	2.0
20/08/2011	J62	Loch Linnhe	DDV_20082011	15:55		16:02	00:07	56.48732	-5.531751	56.488739	-5.530639	39.5	27.5	36.4	24.5	3.1	3.0
20/08/2011	J60	Loch Linnhe	ROV_20082011	16:23		16:31	00:08	56.47559	-5.509464	56.476429	-5.507837	32.5	32.1	30.5	30.1	2.0	2.0
21/08/2011	J46	Loch Linnhe	ROV_21082011	08:42		09:04	00:22	56.496971	-5.688685	56.496441	-5.689047	12.5	30.8	9.9	28.2	2.6	2.6
21/08/2011	J45	Loch Linnhe	ROV_21082011	09:15		09:26	00:11	56.496468	-5.682512	56.496136	-5.683972		37.5		34.4	3.2	3.1
21/08/2011	J50	Loch Linnhe	ROV_21082011	09:57		10:16	00:19	56.475769	-5.578443	56.475811	-5.578164	33.7	26.0	30.8	23.2	2.9	2.8
21/08/2011	J54	Loch Linnhe	DDV_21082011	11:07	11:17	11:26	00:19	56.401962	-5.639890	56.402191	-5.638648	207.5	207.5	205.2	205.3	2.3	2.2
21/08/2011	J53	Loch Linnhe	DDV_21082011	12:22		12:32	00:10	56.427811	-5.601534	56.427029	-5.600079	113.5	89.5	111.1	87.1	2.4	2.4
21/08/2011	J100	Loch Linnhe	ROV_21082011	13:14		13:32	00:18	56.36747	-5.624785	56.365932	-5.625312	64.5	45.5	61.4	42.3	3.1	3.2
21/08/2011	J101	Loch Linnhe	ROV_21082011	14:04		14:25	00:21	56.371948	-5.536441	56.372768	-5.536269	59.5	26.5	56.6	23.4	2.9	3.1
22/08/2011	J49-1	Loch Linnhe	ROV_22082011	07:55		08:08	00:13	56.466953	-5.607751	56.466465	-5.606571	22.5	38.5	20.1	36.0	2.4	2.5
22/08/2011	J49-2	Loch Linnhe	ROV_22082011	08:07		08:10	00:03	56.468319	-5.609765	56.467701	-5.608652	19.5	20.5	17.0	18.0	2.5	2.5
22/08/2011	J49-3	Loch Linnhe	ROV_22082011	08:20		08:31	00:11	56.467293	-5.607283	56.465561	-5.604894	20.5	22.5	18.0	19.9	2.5	2.6
22/08/2011	J102	Loch Linnhe	ROV_22082011	09:17		09:54	00:37	56.495937	-5.589690	56.496162	-5.591942	85.5	47.1	82.8	44.2	2.7	2.9
22/08/2011	J54	Loch Linnhe	DDV_22082011	10:49	10:58	11:15	00:26	56.40041	-5.641264	56.401623	-5.639495	204.5	207.5	201.6	204.7	2.9	2.8
22/08/2011	J54	Loch Linnhe	DDV_22082011	11:34	11:41	11:51	00:17	56.388763	-5.645555	56.389385	-5.644634	178.5	190.5	175.6	187.7	2.9	2.8
22/08/2011	J103	Loch Linnhe	DDV_22082011	14:06	14:08	14:16	00:10	56.388737	-5.524766	56.388782	-5.525210	45.5	43.5	43.1	41.1	2.4	2.4
22/08/2011	J104	Loch Linnhe	ROV_22082011	14:33		14:41	00:08	56.408977	-5.498354	56.409286	-5.498238	37.5	36.5	35.1	34.1	2.4	2.4
22/08/2011	J105	Loch Linnhe	ROV_22082011	15:12		15:30	00:18	56.472286	-5.519406	56.471531	-5.517006	20.5	16.5	18.1	14.1	2.4	2.4
23/08/2011	J106	Loch Linnhe	DDV_23082011	08:36	08:39	08:45	00:09	56.550308	-5.515822	56.548790	-5.517875	73.5	73.5	71.0	71.0	2.5	2.5
23/08/2011	J108	Loch Linnhe	DDV_23082011	09:00		09:07	00:07	56.523792	-5.512406	56.523464	-5.512308	38.5	38.5	35.9	35.9	2.6	2.6

Table 9 continued

DATE	STATION NO.	GENERAL LOCATION	FILE NAME	IN	VIDEO TIME			POSITION IN		POSITION OUT		BOTTOM SOUNDER DEPTH (m)		CORRECTED DEPTH (m)		CD (m)	
					BOTTOM	OUT	LENGTH	LAT	LON	LAT	LON	IN	OUT	IN	OUT	IN	OUT
23/08/2011	J107	Loch Linnhe	DDV_23082011	09:15	09:17	09:24	00:09	56.531345	-5.544475	56.530067	-5.546624	67.5	67.5	64.9	64.9	2.6	2.6

APPENDIX 3. SUBSTRATES, BIOTA, BIOTOPES AND PMFS/MPA SEARCH FEATURES RECORDED DURING THE 2011 VIDEO SURVEY

Table 10. Details of sites and video data collected for the 2011 drop-down video and ROV survey. (SACFOR and P for present).

Site	Substratum	Biota	Biotopes	PMFs
J1	Fine mud	Very sparse megafaunal burrows. Identity uncertain, mostly small non-diagnostic holes. One <i>Pennatula phosphorea</i> (P), also <i>Pagurus bernhardus</i> (O), <i>Asterias rubens</i> (O), <i>Carcinus maenas</i> (P), <i>Buccinum undatum</i> (P)	SS.SMu.CFiMu.SpnMeg	BM
J2	Fine mud	Very sparse megafaunal burrows. Identity uncertain, mostly small non-diagnostic holes. <i>Virgularia mirabilis</i> and <i>Pennatula phosphorea</i> at low density (O). Also <i>Pagurus bernhardus</i> (P).	SS.SMu.CFiMu.SpnMeg	BM
J3	Fine mud	Very few burrow openings. <i>Virgularia mirabilis</i> and <i>Pennatula phosphorea</i> at low density (O). Many <i>Ophiura ophiura</i> (F). Small numbers of <i>Asterias rubens</i> (O), <i>Carcinus maenas</i> (P), <i>Pagurus bernhardus</i> (P), <i>Buccinum undatum</i> (P).	SS.SMu.CsaMu.VirOphPmax	
J4	Fine mud	Sparse megafaunal burrows, mainly <i>Nephrops norvegicus</i> (observed on surface), possibly also <i>Calocaris macandreae</i> . <i>Pennatula phosphorea</i> at high density (C), also <i>Pagurus bernhardus</i> (O)	SS.SMu.CFiMu.SpnMeg	BM
J5	Fine mud	Megafaunal burrows very sparse, but <i>Calocaris macandreae</i> and <i>Nephrops norvegicus</i> probably present. Many <i>Pennatula phosphorea</i> (F) with small numbers of <i>Virgularia mirabilis</i> (O).	SS.SMu.CFiMu.SpnMeg	BM

Table 10 continued

Site	Substratum	Biota	Biotopes	PMFs
J6	Fine mud	Sparse megafaunal burrows, mainly <i>Nephrops norvegicus</i> (observed on surface). Many <i>Pennatula phosphorea</i> (F) with small numbers of <i>Virgularia mirabilis</i> (O). Also <i>Asterias rubens</i> (O), <i>Pagurus bernhardus</i> (O)	SS.SMu.CFiMu.SpnMeg	BM
J7	Fine mud, becoming more shelly later in tow. Some leaf litter	Sparse megafaunal burrows, mainly <i>Nephrops norvegicus</i> (observed on surface). Many <i>Pennatula phosphorea</i> (F). Also <i>Munida rugosa</i> (P), <i>Carcinus maenas</i> (P), <i>Asterias rubens</i> (P)	SS.SMu.CFiMu SpnMeg	BM
J8	Fine mud with macroalgal debris	Camera moving fast at high elevation, details hard to observe. Frequent dark blobs which may be burrow openings and/or <i>Cerianthus lloydii</i> (a few definite <i>C. lloydii</i> observed). Many <i>Pagurus bernhardus</i> (F), also <i>Asterias rubens</i> (O), <i>Ophiura ophiura</i> (P), <i>Carcinus maenas</i> (O), <i>Liocarcinus</i> sp. (P)	SS.SMu.CFiMu, details not distinguishable	
J9	Fine mud	Visibility near zero for entire drop. No observations possible.	SS.SMu.CFiMu, details not distinguishable	
J10	Fine mud	Megafaunal burrows sparse, almost absent later in tow. Main type possibly <i>Calocaris macandreae</i> . <i>Virgularia mirabilis</i> at high density (C), with small numbers of <i>Pennatula phosphorea</i> (O). Mobile epifauna scarce, <i>Pagurus bernhardus</i> (O), <i>Asterias rubens</i> (P).	SS.SMu.CFiMu.SpnMeg	BM
J11	Mud or sandy mud with shell flecks. Some surface patches of shell and algal debris.	No megafaunal burrows. Small numbers of <i>Pennatula phosphorea</i> (O) and <i>Virgularia mirabilis</i> (O). Isolated <i>Protanthea simplex</i> (P) and a few small <i>Alcyonium digitatum</i> colonies on shell fragments (O). Also <i>Liocarcinus</i> sp. (P), <i>Aequipecten opercularis</i> (P)	Possibly SS.SMu.CsaMu.VirOphPmax	

Table 10 continued

Site	Substratum	Biota	Biotopes	PMFs
J12	Fine mud	Sparse megafaunal burrows, including <i>Nephrops norvegicus</i> (observed on surface) and <i>Calocaris macandreae</i> . Very rich seapen bed, with high densities of all three species: <i>Funiculina quadrangularis</i> (C), <i>Pennatula phosphorea</i> (F), <i>Virgularia mirabilis</i> (F). Mobile epifauna scarce, <i>Pagurus bernhardus</i> (O) and unidentified small fish (P).	SS.SMu.CFiMu.SpnMeg.Fun	BM FQ
J13	Fine mud, lots of drift algae	Visibility poor for much of tow. Appears to have high density of megafaunal burrows, including <i>Calocaris macandreae</i> and <i>Nephrops norvegicus</i> (<i>Nephrops</i> observed on surface). No seapens or mobile epifauna observed.	Possibly SS.SMu.CFiMu.MegMax	BM
J14	Stony mud with dead shells. Some leaf litter	Many of the empty shells are <i>Modiolus modiolus</i> , but no living specimens observed. <i>Ophiothrix fragilis</i> present throughout most of tow as scattered individuals or small clusters (C), but not forming a continuous bed. <i>Ophiocomina nigra</i> present in small numbers (F), also <i>Echinus esculentus</i> (F), <i>Psammechinus miliaris</i> (F), <i>Asterias rubens</i> (P), <i>Solaster endeca</i> (P), <i>Munida rugosa</i> (O), possible <i>Sagartiogeton laceratus</i> (P), terebellid mound (P)	Sparse example of SS.SMx.CMx.OphMx	

Table 10 continued

Site	Substratum	Biota	Biotopes	PMFs
J15	Cobble bed with some small boulders	Very dense (~90%) cover of <i>Alcyonium digitatum</i> at start (S), with numerous <i>Urticina</i> sp. (C). Cobbles also heavily encrusted with small serpulid tubes (<i>Spirobranchus</i> sp.) and barnacles. <i>A. digitatum</i> cover more variable in mid-tow, in patches replaced by dense <i>Metridium senile</i> (A). Towards end of tow, <i>A. digitatum</i> thins out to ~10% cover on serpulid/barnacle-encrusted cobbles with scattered <i>Urticina</i> sp. No mobile epifauna seen.	CR.HCR.FaT.CTub.Adig	
J16	Fine mud, some algal debris and leaf litter	Very sparse megafaunal burrows, including <i>Nephrops norvegicus</i> and <i>Munida rugosa</i> (both seen in burrow openings). No seapens observed. <i>Liocarcinus</i> sp. (O), <i>Pagurus bernhardus</i> (P)	Possibly SS.SMu.CFiMu.SpnMeg (lacking seapens) or SS.SMu.CFiMu.BlyrAchi	BM or DM
J17	Fine mud	Megafaunal burrows initially common, but becoming sparse by end of tow. <i>Nephrops norvegicus</i> observed on surface. Some mounds, possibly <i>Maxmuelleria lankesteri</i> . <i>Funiculina quadrangularis</i> (O) and <i>Virgularia mirabilis</i> (O) in small numbers. Unidentified small goby (P)	SS.SMu.CFiMu.SpnMeg.Fun	BM FQ
J18	Fine mud	High density of megafaunal burrows, mainly <i>Nephrops norvegicus</i> . <i>Nephrops</i> observed on surface and one seen trapped in a creel. <i>Virgularia mirabilis</i> in small numbers (O). Possible <i>Callionymus lyra</i> (P).	SS.SMu.CFiMu.SpnMeg	BM
J19	Fine mud	High density of megafaunal burrows, mainly <i>Calocaris macandreae</i> , with some <i>Nephrops norvegicus</i> . <i>Funiculina quadrangularis</i> in small numbers (O). No mobile epifauna seen.	SS.SMu.CFiMu.SpnMeg.Fun	BM FQ

Table 10 continued

Site	Substratum	Biota	Biotopes	PMFs
J20	Silty boulder slope. Sandy mud or muddy sand with cobbles and shell fragments at base	Silty boulders and larger cobbles heavily encrusted with pink coralline algae (A). Sparse <i>Alcyonium digitatum</i> (O) on boulders, colonies usually small and contracted. Also occasional small ascidians (unidentified). Large numbers of <i>Munida rugosa</i> among boulders (F?), also <i>Echinus esculentus</i> (O)	Possibly closest to CR.LCR.BrAs.AmenCio (although ascidians not prominent here)	
J21	Fine mud	Visibility very poor throughout tow, but appears to have high density of megafaunal burrows, including <i>Nephrops norvegicus</i> . <i>Virgularia mirabilis</i> and <i>Pennatula phosphorea</i> in small numbers (O), with one possible <i>Funiculina quadrangularis</i> (P), also <i>Pagurus bernhardus</i> (P).	SS.SMu.CFiMu.SpnMeg or SS.SMu.CFiMu.SpnMeg.Fun	BM FQ?
J22	Stony mud with shell debris at start, grading into fine mud with fewer stones later in tow	Megafaunal burrows absent at start, but present at low density in finer sediment later on. <i>Calocaris macandreae</i> possibly present. <i>Funiculina quadrangularis</i> at high density (C) perhaps thinning out towards end of tow. <i>Pennatula phosphorea</i> and <i>Virgularia mirabilis</i> also present in small numbers (O). <i>Munida rugosa</i> frequently seen on surface (F), also <i>Asterias rubens</i> (P), <i>Pagurus bernhardus</i> (P).	SS.SMu.CFiMu.SpnMeg.Fun	BM FQ
J23	Fine mud	Visibility near zero for entire drop. Some megafaunal burrows faintly visible.	SS.SMu.CFiMu, details not distinguishable	
J24	Fine mud with high content of <i>Turritella</i> shells	Sparse megafaunal burrows, possibly made by <i>Munida rugosa</i> (observed in burrow openings). Small numbers of <i>Pennatula phosphorea</i> (O), also <i>Liocarcinus</i> sp. (O), unidentified small goby (P).	SS.SMu.CFiMu.SpnMeg	BM

Table 10 continued

Site	Substratum	Biota	Biotopes	PMFs
J25	Fine mud	High density of megafaunal burrows, mainly <i>Calocaris macandreae</i> , with some <i>Nephrops norvegicus</i> . One <i>Funiculina quadrangularis</i> (P). No mobile epifauna seen.	SS.SMu.CFiMu.SpnMeg.Fun	BM FQ
J26	Fine mud	Very poor visibility but appears to have a high density of megafaunal burrows, including mounds possibly made by <i>Maxmuelleria lankesteri</i> . No seapens observed. <i>Pagurus bernhardus</i> (P).	Possibly SS.SMu.CFiMu.MegMax	BM
J27	Fine mud	High density of megafaunal burrows, main species probably <i>Calocaris macandreae</i> and <i>Nephrops norvegicus</i> . Small numbers of <i>Funiculina quadrangularis</i> (O). No mobile epifauna seen.	SS.SMu.CFiMu.SpnMeg.Fun	BM FQ
J28	Fine mud	Megafaunal burrows present, but less dense than J27. <i>Calocaris macandreae</i> burrows observed. Small numbers of <i>Funiculina quadrangularis</i> (O), also <i>Munida rugosa</i> (P).	SS.SMu.CFiMu.SpnMeg.Fun	BM FQ
J29	Starts on sandy mud with <i>Turritella</i> shells, becomes stonier as tow progresses. Some stones look like fragments of brick. Ends on a silty boulder field	<i>Munida rugosa</i> observed (F) throughout, particularly in stonier areas. Pink coralline crusts on silty boulders at end. Also <i>Pagurus bernhardus</i> (O), <i>Asterias rubens</i> (O)	SS.SMx.CMx	
J30	Fine mud	Megafaunal burrows very sparse. <i>Nephrops norvegicus</i> observed on surface. <i>Amphiura</i> sp. arms visible in close-up. Many <i>Virgularia mirabilis</i> (C), with one <i>Pennatula phosphorea</i> (P). <i>Pagurus bernhardus</i> (O)	SS.SMu.CFiMu.SpnMeg	BM

Table 10 continued

Site	Substratum	Biota	Biotopes	PMFs
J31	Fine mud	Sparse megafaunal burrows, including <i>Calocaris macandreae</i> and possibly <i>Nephrops norvegicus</i> . Large goby, possibly <i>Lesueurigobius friesii</i> , seen at burrow entrance, also <i>Munida rugosa</i> (P) and unidentified small flatfish (P). No seapens observed.	Possibly SS.SMu.CFiMu.MegMax	BM
J32	Fine mud	High density of megafaunal burrows, mainly <i>Calocaris macandreae</i> . <i>Funiculina quadrangularis</i> in small numbers (O). <i>Callionymus lyra</i> (P), <i>Pandalus</i> sp. (O)	SS.SMu.CFiMu.SpnMeg.Fun	BM FQ
J33	Fine mud	High density of megafaunal burrows, mainly <i>Calocaris macandreae</i> . <i>Nephrops norvegicus</i> observed in burrow. <i>Funiculina quadrangularis</i> (O) and <i>Pennatula phosphorea</i> (P) in small numbers. One <i>Pachycerianthus multiplicatus</i> (P), also <i>Pandalus</i> sp. (O), <i>Scylliorhinus canicula</i> (P)	SS.SMu.CFiMu.SpnMeg.Fun	BM FQ PM
J34	Fine mud	Sparse megafaunal burrows, mainly <i>Nephrops norvegicus</i> . Many <i>Funiculina quadrangularis</i> (F) and smaller numbers of <i>Pennatula phosphorea</i> (O). No mobile epifauna seen.	SS.SMu.CFiMu.SpnMeg.Fun	BM FQ
J35	Fine mud	Megafaunal burrows initially sparse, becoming more common later. Mainly <i>Nephrops norvegicus</i> , with some <i>Calocaris macandreae</i> . One possible <i>Goneplax rhomboides</i> . Many <i>Funiculina quadrangularis</i> (F). No mobile epifauna seen.	SS.SMu.CFiMu.SpnMeg.Fun	BM FQ
J36	Fine mud or sandy mud with high density of shell flecks	High density of megafaunal burrows, mainly <i>Calocaris macandreae</i> . No seapens or mobile epifauna observed.	Possibly SS.SMu.CFiMu.MegMax	BM

Table 10 continued

Site	Substratum	Biota	Biotopes	PMFs
J37	Sand with shell fragments	<i>Saccharina latissima</i> park (~50% cover) with patchy red algal turf understorey. Older kelp fronds heavily fouled with hydroids and bryozoans. Kelp lost towards end of tow. <i>Asterias rubens</i> (O)	SS.SMp.KSwSS.LsacR.Sa	KS
J38	Fine mud or sandy mud with high density of shell flecks	Visibility very poor throughout tow. Appears to have a high density of megafaunal burrows, but no details visible. No epifauna observed.	Possibly SS.SMu.CFiMu.MegMax	BM
J39	Fine mud	High density of megafaunal burrows, including <i>Calocaris macandreae</i> and <i>Nephrops norvegicus</i> (several <i>Nephrops</i> observed on surface). One possible <i>Goneplax rhomboides</i> . Some mounds, possibly <i>Maxmuelleria lankesteri</i> . <i>Funiculina quadrangularis</i> (F) with smaller numbers of <i>Pennatula phosphorea</i> (O) <i>Pandalus</i> sp. (P).	SS.SMu.CFiMu.SpnMeg.Fun	BM FQ
J40	Fine mud with scattered <i>Turritella</i> shells	Sparse megafaunal burrows, some probably <i>Nephrops norvegicus</i> . <i>Funiculina quadrangularis</i> at high density (F), with smaller numbers of <i>Pennatula phosphorea</i> (O). No mobile epifauna seen.	SS.SMu.CFiMu.SpnMeg.Fun	BM FQ

Table 10 continued

Site	Substratum	Biota	Biotopes	PMFs
J41	Stony mud or sandy mud from deepest point (31.6 m). Surface cobbles becoming more frequent from ~18 m, leading onto boulders and bedrock from ~10 m to shallowest point (5.6 m)	<p><u>Approx. depth 32 - 14 m</u> No visible burrows, lots of drift algae. Many <i>Munida rugosa</i> (C), also <i>Liocarcinus</i> sp. (P), <i>Cerianthus lloydii</i> (P). Surface stones at shallower depths with hydroid clumps, including <i>Nemertesia ramosa</i>.</p> <p><u>Approx. depth 14 - 6 m</u> Patchy foliose red algal turf (species unidentified) from ~14 m, increasing in density, reaching ~100% cover by ~10 m and remaining so to shallowest point reached. Pink coralline crusts visible on underlying rock and on vertical rock faces. All very silty. A few small patches of <i>Pachymatisma johnstonia</i> (O) and <i>Ascidia mentula</i> (F) among the algal turf. Attached <i>Saccharina latissima</i> at 9.4 m. Still many <i>Munida rugosa</i> (C), also <i>Necora puber</i> (P), <i>Liocarcinus</i> sp. (P)</p>	<p>SS.SMx.CMx</p> <p>Probably closest to IR.MIR.KR.XFoR</p>	
J42	Stepped silty bedrock slope with coarse shelly mud at base. Boulders on horizontal ledges	Silty hydroid/bryozoan turf with patchy ascidians (<i>Ascidia mentula</i> , <i>Diazona violacea</i>). Ascidians densest on vertical or overhanging rock faces, with <i>Sabella pavonina</i> , <i>Pachymatisma johnstonia</i> and unidentified yellowish and blue sponges. <i>Swiftia pallida</i> (F) on deepest parts of slope (~27 m). One <i>Funiculina quadrangularis</i> on mud at base of slope. Many <i>Munida rugosa</i> (C), also <i>Liocarcinus</i> sp. (P), <i>Cancer pagurus</i> (P). Many small gadoids (<i>Trisopterus</i> sp.)	CR.HCR.Xfa.SwiLgAs	NS SP FQ

Table 10 continued

Site	Substratum	Biota	Biotopes	PMFs
J43	Silty bedrock and boulder slope	Rock surfaces covered with hydroid/bryozoan turf appearing similar to that seen at J42. Hydroids include <i>Nemertesia ramosa</i> . Patchy, locally dense <i>Ascidia mentula</i> , with <i>Sabella pavonina</i> , <i>Caryophyllia smithii</i> , and unidentified yellowish sponge on vertical or overhanging rock faces. <i>Alcyonium digitatum</i> colonies on boulders (F). No <i>Swiftia pallida</i> seen. <i>Leptometra celtica</i> (A) on boulders at shallowest depth (~25 m). Other mobile fauna <i>Munida rugosa</i> (C), <i>Cancer pagurus</i> (P), small gadoid shoal (<i>Trisopterus</i> sp.)	Closest to CR.HCR.Xfa.SwiLgAs (although <i>Swiftia pallida</i> not observed)	NS LC
J43-1	Flat or gently sloping shelly mud with pebbles and cobbles	<i>Leptometra celtica</i> in large numbers (A), all in uniform orientation to current. Density increases as tow proceeds. Also <i>Munida rugosa</i> (F), <i>Cerianthus lloydii</i> (F), <i>Liocarcinus</i> sp. (P)	SS.SMx.CMx	LC
J43-2	Flat or gently sloping shelly mud with pebbles and cobbles	<i>Leptometra celtica</i> in large numbers (A), possibly ~ 5 m ⁻² . Also <i>Munida rugosa</i> (F), <i>Cerianthus lloydii</i> (F), <i>Crossaster papposus</i> (P), <i>Scyliorhinus canicula</i> (P), unidentified elongate fish, possibly a rockling (P)	SS.SMx.CMx	LC

Table 10 continued

Site	Substratum	Biota	Biotopes	PMFs
J43-3	Starts on shallow (~8 – 12 m) rock wall, leading on to gently sloping coarse mixed sediment to ~23 m. Also covers silty boulder slope from ~23 – 29 m	ROV progress jerky and erratic, with frequent stretches of poor visibility. Difficult to identify biotopes and assess abundance of biota. Shallow rock with scattered silty <i>Laminaria hyperborea</i> overlying red algal turf (species unidentified). Deeper sediment with <i>Munida rugosa</i> and hydroid clumps on surface stones. <i>Leptometra celtica</i> present on stony mud/boulder slope at end of run (>24 m), appearing to become more abundant as depth increases. Also <i>Munida rugosa</i> , <i>Cerianthus lloydii</i> .	Possibly IR.MIR.KR.Lhyp leading on to SS.CMx.CMx	LC
J44	Coarse shell gravel with embedded cobbles and occasional boulders	Visibility very poor for most of tow. Very little biota visible. Stones appear unfouled apart from rare small serpulid tubes. Sporadic <i>Urticina</i> sp. (F), also <i>Asterias rubens</i> (P), <i>Munida rugosa</i> (P)	SS.SCS.CCS	
J45	Silty bedrock and boulders, mostly sloping with some stretches of vertical wall. Muddy gravel and shell fragments as base (~28 m)	Silty rock surfaces with pink coralline crusts and an orange sheet bryozoan (unidentified). Small <i>Alcyonium digitatum</i> colonies present on bedrock/boulder slope, and on stones on flat seabed below. Colony density sparse on silty slopes (F), higher on more vertical rock faces (C). Diffuse hydroid turf and <i>Caryophyllia smithii</i> visible in close-ups of silty rock, also small numbers of <i>Ascidia mentula</i> (F). Many <i>Munida rugosa</i> among boulders (C), also <i>Echinus esculentus</i> (O). <i>Leptometra celtica</i> in small numbers on rocky slope, but at higher density (C) on stony mud plain (~35m)	Close to CR.LCR.BrAs.AmenCio.Ant but with <i>Leptometra</i> rather than <i>Antedon</i>	LC

Table 10 continued

Site	Substratum	Biota	Biotores	PMFs
J46	Gently sloping sediment, initially sand or muddy sand at 9-10 m, becoming coarser and more shelly from ~20 m, ending on shelly gravel at ~29 m. <i>Arctica islandica</i> shells visible from ~24 m depth, but no obvious living specimens	Sparse silty kelp (<i>Saccharina latissima</i> and/or <i>Laminaria hyperborea</i>) and diffuse red algal turf (species unidentified) from ~9-15 m, with <i>Asterias rubens</i> (F). <i>Cerianthus lloydii</i> visible from ~18 m, below limit of macroalgae, frequent (F) to lower limit of run. A few <i>Virgularia mirabilis</i> (F) at 18-19 m. Also <i>Munida rugosa</i> (F), <i>Liocarcinus</i> sp. (P), <i>Pagurus bernhardus</i> (F), <i>Asterias rubens</i> (P), <i>Crossaster papposus</i> (P), <i>Echinus esulentus</i> (P), <i>Callionymus lyra</i> (P)	SS.SMp.KSwSS.LsacR.Sa SS.SMx.CMx.CIlOmx	KS
J47	Fine mud with scattered <i>Turritella</i> shells	Sparse megafaunal burrows, mainly <i>Nephrops norvegicus</i> or <i>Munida rugosa</i> (<i>Munida</i> observed in burrow entrance). <i>Funiculina quadrangularis</i> , <i>Pennatula phosphorea</i> and <i>Virgularia mirabilis</i> all present at low density (O). Also <i>Asterias rubens</i> (O)	SS.SMu.CFiMu.SpnMeg.Fun	BM FQ
J48	Station not accessible			
J49-1	Muddy sand with shell flecks	Dense <i>Ophiothrix fragilis</i> (S) bed, mostly continuous with only scattered patches of bare sediment. Also <i>Asterias rubens</i> (F), <i>Munida rugosa</i> (O), <i>Liocarcinus</i> sp. (P)	SS.SMx.CMx.OphMx	
J49-2	Muddy sand with shell flecks and surface pebbles	Surface stones with purple coralline crusts and small numbers of serpulid tubes (<i>Spirobranchus</i> sp.). <i>Echinus esculentus</i> (F), <i>Asterias rubens</i> (P). Late in tow, passes onto dense <i>Ophiothrix fragilis</i> (S) bed with smaller numbers of <i>Ophiocomina nigra</i> (C).	SS.SMx.CMx followed by SS.SMx.CMx.OphMx	

Table 10 continued

Site	Substratum	Biota	Biotopes	PMFs
J49-3	Stony mud or muddy sand	Initially (~22 m depth) only pink coralline crusts on surface stones. Patchy red algal turf (species unidentified) appears at ~21 m, increasing to ~50% cover. <i>Saccharina latissima</i> park from ~14 m, fronds ragged and silty, heavily fouled with hydroids and bryozoans. Very little mobile epifauna visible: <i>Echinus esculentus</i> (P), <i>Asterias rubens</i> (P), <i>Liocarcinus</i> sp. (P)	SS.SMp.KSwSS.LsacR.Mu	KS
J50	Silty boulder slope from ~13-18 m, grading onto stony mud slope as depth increases down to ~33 m	<i>Saccharina latissima</i> park on boulders at ~13 m, pink coralline crusts on exposed rock surfaces. Kelp fronds silty and heavily fouled with hydroids. Patchy foliose red algal turf (species unidentified) and coralline crusts on rocks below kelp, down to ~19 m, still very silty. <i>Munida rugosa</i> (F), <i>Echinus esculentus</i> (F). Mud slope below macroalgal zone with sparse hydroid clumps on surface stones, <i>Munida rugosa</i> at high density (C), also <i>Liocarcinus</i> sp. (P), <i>Asterias rubens</i> (F), <i>Echinus esculentus</i> (F). Scattered <i>Leptometra celtica</i> (F) between ~22-33 m	IR.LIR.KLsac.Pk	LC

Table 10 continued

Site	Substratum	Biota	Biotopes	PMFs
J51	Silty boulder slope with stony mud and shell fragments at base	Boulders very silty, but showing pink coralline crusts, serpulid tubes and patchy hydroid turf. Foliose red algae (unidentified) present at shallowest depths viewed (~17 m). Very few large sessile animals, scattered <i>Ascidia mentula</i> (F) and two <i>Diazona violacea</i> colonies (O). <i>Munida rugosa</i> most common (F) mobile animal, in large numbers among rocks. Also <i>Antedon bifida</i> (O), <i>Echinus esculentus</i> (O), <i>Asterias rubens</i> (O), <i>Cancer pagurus</i> (P), <i>Pecten maximus</i> (P)	CR.LCR.BrAs.AmenCio	
J52	Sand or muddy sand with pebbles and cobbles at shallower depths, grading onto stony mud as depth increases	<p><u>Approx. depth 6-13 m:</u> Bed of <i>Saccharina latissima</i> with foliose red algal understory. Kelp fronds ragged and silty with heavy hydroid/bryozoan fouling. <i>Echinus esculentus</i> (O), <i>Sabella pavonina</i> (P), <i>Pollachius pollachius</i> and/or <i>P. virens</i> swimming over kelp bed.</p> <p><u>Approx. depth 13-17 m:</u> Kelp absent. Pink coralline crusts on stones, <i>Echinus esculentus</i> (F), <i>Asterias rubens</i> (O)</p> <p><u>Approx. depth 17-21 m:</u> Dense <i>Ophiothrix fragilis</i> bed (S) with <i>Echinus esculentus</i> (O). A few boulders with diffuse hydroid turf.</p>	<p>SS.SMp.KSwSS.LsacR.Sa</p> <p>SS.SMx.CMx</p> <p>SS.SMx.CMx.OphMx</p>	KS
J53	Fine mud with high content of shell flecks	High density of megafaunal burrows, mainly <i>Calocaris macandreae</i> , with <i>Nephrops norvegicus</i> (several <i>Nephrops</i> observed on surface). One <i>Pennatula phosphorea</i> (P), no mobile epifauna seen.	SS.SMu.CFiMu.SpnMeg	BM

Table 10 continued

Site	Substratum	Biota	Biotopes	PMFs
J54	Stony mud or sandy mud with shell fragments	<i>Ophiocomina nigra</i> (C) present throughout as individuals or small clusters, but not forming a continuous bed. Small numbers of <i>Ophiothrix fragilis</i> (F), <i>Ophiura ophiura</i> (O), <i>Inachus</i> sp. (O), <i>Pagurus bernhardus</i> (F), <i>Hyas araneus</i> (O), <i>Liocarcinus</i> sp. (P), <i>Cancer pagurus</i> (P), <i>Asterias rubens</i> (P)	SS.SMx.CMx.OphMx	
J54-2	Muddy sand with pebbles and shell flecks. Some drift algae	<i>Ophiocomina nigra</i> present throughout tow, initially as occasional scattered individuals, with density gradually increasing. Abundant (A) by end of tow, but still not forming a continuous bed. <i>Pagurus bernhardus</i> next most common animal (C). Also <i>Ophiura ophiura</i> (O), <i>Ophiothrix fragilis</i> (O), <i>Ophiopholis aculeata</i> (P), <i>Asterias rubens</i> (F), <i>Crossaster papposus</i> (P), <i>Buccinum undatum</i> (O), <i>Hyas araneus</i> (P), <i>Inachus</i> sp. (P), <i>Liocarcinus</i> sp. (P), <i>Gadus morhua</i> (P), <i>Platichthys flesus</i> (P), <i>Scyliorhinus canicula</i> (O)	SS.SMx.CMx with a gradual transition to SS.SMx.CMx.OphMx	
J54-3	Stony coarse sand with high density of embedded shell (mostly <i>Modiolus</i>).	Rather barren, with little visible life. No obvious living <i>Modiolus</i> . <i>Munida rugosa</i> (O), <i>Inachus</i> sp. (P), <i>Macropodia</i> sp. (P), <i>Solaster endeca</i> (P), <i>Cerianthus lloydii</i> (O), <i>Urticina</i> sp. (P)	SS.SMx.CMx	
J55-1	Bedrock slope with cobble bed at base	Rock surfaces with dense <i>Alcyonium digitatum</i> (~50% cover), with turf of hydroids and foliose erect bryozoans (including <i>Flustra foliacea</i>) between colonies. Stones at base of wall encrusted with pink corallines and serpulid tubes. <i>Echinus esculentus</i> (P)	Closest to CR.MCR.EcCr.FaAlCr.Flu	

Table 10 continued

Site	Substratum	Biota	Biotopes	PMFs
J55-2	Stepped bedrock wall with boulders and cobbles at base (~36 m), leading onto coarse shelly sand (~46 m)	Vertical faces of rock 'steps' with scattered <i>Alcyonium digitatum</i> colonies (seem to be less dense than J55-1, ~20% cover) set among dense hydroid/bryozoan turf, including thick clumps of <i>Flustra foliacea</i> . Occasional <i>Diazona violacea</i> colonies. More horizontal rock surfaces silty with serpulid tubes, orange sheet bryozoans and <i>Caryophyllia smithii</i> . Also <i>Labrus mixtus</i> (P). Boulders and cobbles at base of rock wall with diffuse hydroid turf, patchy <i>Flustra foliacea</i> , orange sheet bryozoan, <i>Caryophyllia smithii</i> . Also <i>Echinus esculentus</i> (P), <i>Crossaster papposus</i> (P), <i>Callionymus lyra</i> (P).	Possibly a variant of CR.MCR.EcCr.AdigVt	
J56	Fine mud	High density of megafaunal burrows, mainly <i>Calocaris macandreae</i> , also possibly <i>Nephrops norvegicus</i> and <i>Maxmuelleria lankesteri</i> (mounds). <i>Goneplax rhomboides</i> also present, observed on surface (P). <i>Funiculina quadrangularis</i> (O) only seapen observed.	SS.SMu.CFiMu.SpnMeg.Fun	BM FQ
J57	Fine mud	Megafaunal burrows present throughout but patchy, rare or absent for long stretches. <i>Calocaris macandreae</i> and possibly <i>Maxmuelleria lankesteri</i> (mounds) present. High density of <i>Funiculina quadrangularis</i> (C) with small numbers of <i>Pennatula phosphorea</i> (O). No mobile epifauna seen.	SS.SMu.CFiMu.SpnMeg.Fun	BM FQ

Table 10 continued

Site	Substratum	Biota	Biotopes	PMFs
J58	Fine mud. Some possible trawl marks.	Sparse megafaunal burrows, including <i>Calocaris macandreae</i> and probably <i>Nephrops norvegicus</i> . High density of <i>Funiculina quadrangularis</i> (F) with smaller numbers of <i>Pennatula phosphorea</i> (O). One <i>Liocarcinus</i> sp. (P).	SS.SMu.CFiMu.SpnMeg.Fun	BM FQ
J59	Fine mud	Megafaunal burrows present but visibility very poor for most of drop. <i>Nephrops novegicus</i> probably present. Many <i>Funiculina quadrangularis</i> (F) and smaller numbers of <i>Pennatula phosphorea</i> (O).	SS.SMu.CFiMu.SpnMeg.Fun	BM FQ
J60	Fine mud with <i>Turritella</i> and other shell fragments. Large masses of drift algae	No megafaunal burrows at start, a few appearing late in run. <i>Nephrops norvegicus</i> seen in burrow opening. One <i>Pennatula phosphorea</i> (P). Many <i>Munida rugosa</i> , especially around loose weed (F). <i>Liocarcinus</i> sp. (P).	SS.SMu.CFiMu.SpnMeg (although both seapens and burrowing megafauna are poorly-represented)	BM
J61	Starts on stony mud or muddy sand with scattered cobbles and small boulders. Gradually becomes less stony, but with occasional cobbles to end	Initial mixed substratum section with many <i>Leptometra celtica</i> (C) perched on stones. Diffuse hydroid turf on stones, also <i>Munida rugosa</i> (O), <i>Echinus esculentus</i> (O). Later finer mud bottom has some megafaunal burrows, probably becoming more common towards end. High density of <i>Pennatula phosphorea</i> (C) and small numbers of <i>Funiculina quadrangularis</i> (O). <i>Munida rugosa</i> and <i>Echinus esculentus</i> still present (O). Isolated cobbles with <i>Metridium senile</i> (O)	SS.SMx.CMx SS.SMu.CFiMu.SpnMeg.Fun	LC BM FQ
J62-1	Fine mud with large masses of drift algae	Visibility very poor, almost zero for long stretches. Some burrow openings briefly visible. <i>Munida rugosa</i> (P).	SS.SMu.CFiMu, details not distinguishable	BM

Table 10 continued

Site	Substratum	Biota	Biotopes	PMFs
J62-2	Fine mud with fragments of drift algae	Sparse megafaunal burrows, including some mounds, possibly <i>Maxmuelleria lankesteri</i> . One <i>Pennatula phosphorea</i> (P), also <i>Munida rugosa</i> (O), <i>Necora puber</i> (P), <i>Carcinus maenas</i> (P), <i>Echinus esculentus</i> (O), <i>Asterias rubens</i> (P)	SS.SMu.CFiMu.SpnMeg or SS.SMu.CFiMu.MegMax	BM
J63	Fine mud	Visibility poor, but appears to have a high density of megafaunal burrows, including <i>Calocaris macandreae</i> . <i>Pennatula phosphorea</i> at low density (O), also one <i>Funiculina quadrangularis</i> (P). No mobile epifauna seen.	SS.SMu.CFiMu.SpnMeg.Fun	BM FQ
J64	Fine mud	Visibility poor, megafaunal burrows appear sparse. <i>Nephrops norvegicus</i> and <i>Maxmuelleria lankesteri</i> possibly present. Small numbers of <i>Pennatula phosphorea</i> (O) and one <i>Funiculina quadrangularis</i> (P).	SS.SMu.CFiMu.SpnMeg.Fun	BM FQ
J65	Fine mud?	Clearly sediment, but visibility near zero for entire drop. <i>Asterias rubens</i> (P)	SS.SMu.CFiMu, details not distinguishable	
J66	Fine mud	Sparse megafaunal burrows, including <i>Calocaris macandreae</i> and <i>Nephrops norvegicus</i> . Many <i>Pennatula phosphorea</i> (F), also <i>Virgularia mirabilis</i> (P) and <i>Pagurus bernhardus</i> (P).	SS.SMu.CFiMu.SpnMeg	BM
J67	Fine mud	Sparse megafaunal burrows, mainly <i>Nephrops norvegicus</i> and/or <i>Munida rugosa</i> . <i>Pennatula phosphorea</i> at high density (C), with smaller numbers of <i>Virgularia mirabilis</i> (O). Mobile epifauna: <i>Pagurus bernhardus</i> (O), <i>Asterias rubens</i> (F), <i>Carcinus maenas</i> (P), <i>Munida rugosa</i> (P), <i>Callionymus lyra</i> (P).	SS.SMu.CFiMu.SpnMeg	BM

Table 10 continued

Site	Substratum	Biota	Biotopes	PMFs
J68	Coarse shelly sand with pebbles. One car tyre.	Camera moving fast, so difficult to see details (e.g. any living <i>Modiolus</i>). <i>Echinus esculentus</i> (O) and <i>Psammechinus miliaris</i> (F) on kelp debris, also <i>Pagurus bernhardus</i> (P)	SS.SMx.CMx	HM?
J69	Coarse shelly sand with pebbles. <i>Modiolus</i> and <i>Ensis</i> shells clearly visible. Macroalgal fragments	Probably some living <i>Modiolus modiolus</i> , but as scattered individuals, not a bed (F?). Also <i>Echinus esculentus</i> (O) and <i>Psammechinus miliaris</i> (F) on kelp debris.	Possibly SS.SMx.CMx.CIloModHo (although no <i>Cerianthus lloydii</i> or holothurians seen)	HM
J70	Boulder slope with gravel and cobbles at base, all heavily-silted. Large masses of drift algae trapped among boulders	Rock surfaces silt-covered and largely devoid of encrusting biota apart from sparse serpulid tubes. <i>Echinus esculentus</i> (C) and <i>Psammechinus milaris</i> (F) among rocks and on kelp debris. <i>Munida rugosa</i> visible among boulders, probably numerous but abundance hard to assess. <i>Cerianthus lloydii</i> (P) in silty gravel at base of slope, also <i>Protanthea simplex</i> (P), <i>Pagurus bernhardus</i> (P)	Probably a very impoverished variant of CR.LCR.BrAs.NeoPro.FS	
J71	Fine mud with leaf and twig litter, some drift algae	No megafaunal burrows or seapens observed. Loose stringy green algae (<i>Enteromorpha</i> ?) common on surface, also <i>Pagurus bernhardus</i> (O), <i>Asterias rubens</i> (O), <i>Ophiura ophiura</i> (P)	SS.SMu.CFiMu	
J72	Fine mud	Visibility very poor, but some megafaunal burrows and <i>Funiculina quadrangularis</i> observed (O). Also <i>Pennatula phosphorea</i> (P) and <i>Pagurus bernhardus</i> (O).	SS.SMu.CFiMu.SpnMeg.Fun	BM FQ

Table 10 continued

Site	Substratum	Biota	Biotopes	PMFs
J73	Fine mud, close to a silty bedrock wall or outcrop	Mud bottom in view only for short period, seems to have some megafaunal burrows, also <i>Pennatula phosphorea</i> (O), <i>Funiculina quadrangularis</i> (P), <i>Munida rugosa</i> (P) Heavily-silted bedrock with dense <i>Protanthea simplex</i> (A) and <i>Ophiothrix fragilis</i> (A), also <i>Echinus esculentus</i> . Visibility very poor here, intermittently lost	SS.SMu.CFiMu.SpnMeg.Fun CR.LCR.BrAs.NeoPro.FS	BM FQ
J74	Fine mud	Visibility poor, but seems to have moderate density of megafaunal burrows, mainly <i>Calocaris macandreae</i> . All three seapens present, with <i>Virgularia mirabilis</i> most abundant (F), followed by <i>Pennatula phosphorea</i> (F) and <i>Funiculina quadrangularis</i> (F). One <i>Pachycerianthus multiplicatus</i> observed (P). Also <i>Cerianthus lloydii</i> (O), <i>Ophiura ophiura</i> (P), <i>Pagurus bernhardus</i> (O) unidentified elongate fish (P).	SS.SMu.CFiMu.SpnMeg.Fun	BM FQ PM
J75	Fine mud	High density of megafaunal burrows, mainly <i>Calocaris macandreae</i> , with some <i>Nephrops norvegicus</i> . One <i>Nephrops</i> observed on surface. High seapen density throughout, especially <i>Virgularia mirabilis</i> (C) with smaller numbers of <i>Pennatula phosphorea</i> (F) and <i>Funiculina quadrangularis</i> (F). <i>Scyliorhinus canicula</i> (P) and unidentified small gadoids observed, but no mobile invertebrate epifauna.	SS.SMu.CFiMu.SpnMeg.Fun	BM FQ

Table 10 continued

Site	Substratum	Biota	Biotopes	PMFs
J76	Fine mud	High density of megafaunal burrows, mainly <i>Calocaris macandreae</i> . <i>Nephrops norvegicus</i> also present (observed on surface). Many <i>Funiculina quadrangularis</i> (F), with smaller numbers of <i>Pennatula phosphorea</i> (F) and a few <i>Virgularia mirabilis</i> (O). Isolated rock or piece of debris with attached <i>Protanthea simplex</i> , also <i>Pagurus bernhardus</i> . (P).	SS.SMu.CFiMu.SpnMeg.Fun	BM FQ
J77	Fine mud?	Visibility near zero for entire drop. No observations possible.	SS.SMu.CFiMu, details not distinguishable	
J78	Fine mud	Sparse megafaunal burrows, probably <i>Calocaris macandreae</i> and <i>Nephrops norvegicus</i> . <i>Virgularia mirabilis</i> (F), with smaller numbers of <i>Funiculina quadrangularis</i> (O) and <i>Pennatula phosphorea</i> (O). <i>Amphiura</i> sp. arms visible in close-ups of surface. Also <i>Pagurus bernhardus</i> (O), <i>Cerianthus lloydii</i> (P) and scattered clumps of ascidians (possibly <i>Asciella scabra</i>)	SS.SMu.CFiMu.SpnMeg.Fun	BM FQ
J79	Fine mud	Burrowed by <i>Calocaris macandreae</i> and <i>Nephrops norvegicus</i> , possibly at higher density than J78. <i>Virgularia mirabilis</i> at high density (C), with smaller numbers of <i>Funiculina quadrangularis</i> (F) and <i>Pennatula phosphorea</i> (F). Also <i>Pagurus bernhardus</i> (O), <i>Scylliorhinus canicula</i> (P) and scattered clumps of ascidians (possibly <i>Asciella scabra</i>)	SS.SMu.CFiMu.SpnMeg.Fun	BM FQ

Table 10 continued

Site	Substratum	Biota	Biotopes	PMFs
J80	Fine mud, with patchy <i>Turritella</i> shell fragments and drift algae	Sparse megafaunal burrows, possibly <i>Nephrops norvegicus</i> . Some <i>Pennatula phosphorea</i> (O) and smaller numbers of <i>Funiculina quadrangularis</i> (O). Also <i>Munida rugosa</i> (P) and <i>Liocarcinus</i> sp. (P).	SS.SMu.CFiMu.SpnMeg.Fun	BM FQ
J81	Fine mud	Sparse megafaunal burrows, seem to be mainly <i>Calocaris macandreae</i> with some <i>Nephrops norvegicus</i> . <i>Amphiura</i> sp. arms visible in close-up. <i>Pennatula phosphorea</i> (C) and <i>Virgularia mirabilis</i> (C) at high density throughout. <i>Funiculina quadrangularis</i> at lower density but still numerous (F). One <i>Pachycerianthus multiplicatus</i> (P). Also <i>Asterias rubens</i> (F), <i>Pagurus bernhardus</i> (O), <i>Liocarcinus</i> sp. (P), <i>Cerianthus lloydii</i> (P).	SS.SMu.CFiMu.SpnMeg.Fun	BM FQ PM
J82	Stony mud at start, stones gradually becoming less common and eventually lost. Finishes on fine mud with shell flecks	Stony mixed substratum at start with many <i>Ophiocomina nigra</i> (A), in dense patches rather than a continuous bed. Also <i>Cerianthus lloydii</i> (P), <i>Echinus esculentus</i> (P) and large ascidians, possibly <i>Ascidia mentula</i> (O). Finer mud seems to lack megafaunal burrows. <i>Pennatula phsophorea</i> (O), <i>Funiculina quadrangularis</i> (P) and <i>Virgularia mirabilis</i> (O) all present at low density. Also <i>Ophiura ophiura</i> (O), <i>Pagurus bernhardus</i> (O), <i>Inachus</i> sp. (P)	SS.SMx.CMx.OphMx SS.SMu.CFiMu.SpnMeg.Fun	BM FQ

Table 10 continued

Site	Substratum	Biota	Biotopes	PMFs
J83	Starts on coarse shelly sand with pebbles and cobbles, towards end passes over silty bedrock	Patchy brittlestar bed at start (~50% cover), with <i>Ophiothrix fragilis</i> and <i>Ophiocomina nigra</i> at roughly equal density (A), with small numbers of <i>Ophiopholis aculeata</i> (C). Brittlestars thin out later in tow, but <i>Ophiopholis aculeata</i> still present in bedrock hollows and fissures. Also <i>Echinus esculentus</i> (O), small serpulid tubes on bedrock	SS.SMx.CMx.OphMx	
J84	Fine mud	Sparse megafaunal burrows, probably <i>Nephrops norvegicus</i> and <i>Calocaris macandreae</i> . <i>Pennatula phosphorea</i> most abundant seapen (O), with smaller numbers of <i>Virgularia mirabilis</i> (O) and one <i>Funiculina quadrangularis</i> (P). Mobile epifauna <i>Asterias rubens</i> (O), <i>Carcinus maenas</i> (O), <i>Liocarcinus</i> sp. (P).	SS.SMu.CFiMu.SpnMeg.Fun	BM FQ
J85	Mud or sandy mud with <i>Turritella</i> shell fragments, drift algae and occasional surface cobbles	No visible burrows. <i>Funiculina quadrangularis</i> at low density (O). Also <i>Virgularia mirabilis</i> (P), <i>Cerianthus lloydii</i> (P), <i>Echinus esculentus</i> (P), <i>Munida rugosa</i> (O) and <i>Liocarcinus</i> sp. (O). Cobbles with pink coralline crusts.	SS.SMu.CFiMu.SpnMeg.Fun	BM FQ
J86	Patchy mixed sediment, ranging from silty cobbles on sandy mud to gravelly sand with shell flecks	Surface stones with pink coralline crusts and sparse hydroid turf. <i>Munida rugosa</i> (F) and <i>Asterias rubens</i> (F) most common mobile epifauna, also <i>Liocarcinus</i> sp. (P), <i>Inachus</i> sp. (P), <i>Echinus esculentus</i> (F)	SS.SMx.CMx	

Table 10 continued

Site	Substratum	Biota	Biotopes	PMFs
J87	Starts on muddy sand with abundant shell flecks, surface pebbles and cobbles. Moves onto flat sandy mud or muddy sand with worm casts and scattered stones	<p>Surface stones with pink coralline crusts, small serpulid tubes and diffuse hydroid turf. Mobile fauna visible <i>Munida rugosa</i> (P), <i>Liocarcinus</i> sp. (P), <i>Aequipecten opercularis</i> (P).</p> <p>Sediment plain with few stones has greenish surface floc, possibly benthic diatoms. <i>Ophiocomina nigra</i> seen as single individuals from start of this habitat, becoming more frequent as tow proceeds (F to C). Clusters of <i>Ophiothrix fragilis</i> appear (A), becoming larger and more frequent, but not forming a continuous bed. Smaller numbers of <i>Ophiocomina nigra</i> still present, also small <i>Ophiura</i> sp. (P), <i>Cancer pagurus</i> (P). Worm casts probably <i>Arenicola marina</i>. One conical ejecta mound with expelled sediment, possibly <i>Callianassa subterranea</i>.</p>	<p>SS.SMx.CMx</p> <p>SS.SMx.CMx.OphMx</p>	
J88	Coarse shelly sand with gravel and pebbles. Lots of macroalgal debris	<p>Pink coralline crusts, serpulid tubes and diffuse hydroid turf on stones. Some patchy attached foliose red algae (unidentified). Small <i>Munida rugosa</i> under stones (F), <i>Chaetopterus variopedatus</i> tube endings occasionally visible. Also <i>Echinus esculentus</i> (O). Some dead <i>Arctica islandica</i> shells but no obvious living specimens.</p>	SS.SMx.CMx	
J89	Stony mud or sandy mud with shell flecks. Lots of macroalgal debris. Occasional small boulders	<p><i>Munida rugosa</i> observed throughout (F), often under stones. Also <i>Echinus esculentus</i> (O), <i>Asterias rubens</i> (P). Pink coralline crusts on silted boulders.</p>	SS.SMx.CMx	

Table 10 continued

Site	Substratum	Biota	Biotopes	PMFs
J90	Fine mud	High density of megafaunal burrows, mainly <i>Calocaris macandreae</i> . <i>Funiculina quadrangularis</i> at low density (O). No mobile epifauna seen.	SS.SMu.CFiMu.SpnMeg.Fun	BM FQ
J91	Fine mud	High density of megafaunal burrows, mainly <i>Calocaris macandreae</i> and <i>Nephrops norvegicus</i> . Sparse <i>Funiculina quadrangularis</i> (O). No mobile epifauna seen.	SS.SMu.CFiMu.SpnMeg.Fun	BM FQ
J92	Fine mud	High density of megafaunal burrows, mainly <i>Calocaris macandreae</i> and <i>Nephrops norvegicus</i> . <i>Funiculina quadrangularis</i> and <i>Virgularia mirabilis</i> at low density (O), also <i>Munida rugosa</i> (P), <i>Cerianthus lloydii</i> (P) and unidentified small goby (<i>Potamoschistus</i> sp.) (P).	SS.SMu.CFiMu.SpnMeg.Fun	BM FQ
J93	Fine mud	Sparse megafaunal burrows, including small mounds (possibly <i>Callianassa subterranea</i>). Some drift algae. Many <i>Funiculina quadrangularis</i> (F), one <i>Pennatula phosphorea</i> (P). Many <i>Munida rugosa</i> (F) on surface, one <i>Callionymus lyra</i> (P).	SS.SMu.CFiMu.SpnMeg.Fun	BM FQ
J94	Muddy sand with pebbles and abundant shell flecks. Some larger cobbles, frequency increasing through tow. Fragments of drift algae	Pink coralline crusts and diffuse hydroid turf on stones. <i>Munida rugosa</i> most common mobile animal, seen among and under stones (F). Also <i>Asterias rubens</i> (O), <i>Solaster endeca</i> (P), <i>Pecten maximus</i> (P), <i>Necora puber</i> (P)	SS.SMx.CMx	

Table 10 continued

Site	Substratum	Biota	Biotores	PMFs
J95	Fine mud with rare patches of <i>Turritella</i> shells	High density of megafaunal burrows, including <i>Calocaris macandreae</i> , <i>Nephrops norvegicus</i> and possibly <i>Maxmuelleria lankesteri</i> (mounds). One <i>Funiculina quadrangularis</i> (P), also <i>Asterias rubens</i> (F) and <i>Liocarcinus</i> sp. (P).	SS.SMu.CFiMu.SpnMeg.Fun	BM FQ PM
J96	Very coarse shelly sand, later with some cobbles	Camera moving very fast for most of the tow, giving poor image quality. Initial shell sand seems to be devoid of visible biota,. From about half-way through tow, cobbles carry dense clusters of <i>Ophiothrix fragilis</i> (A), with scattered small <i>Alcyonium digitatum</i> colonies (O) and possibly some foliose red algae. Also <i>Echinus esculentus</i> (O), <i>Asterias rubens</i> (P)	SS.SCS.CCS followed by SS.SMx.CMx.OphMx	
J97	Coarse shelly sand with cobbles to start, some small boulders later on, finishing on coarse shell gravel without stones	Camera apparently towed against strong current, visibility generally poor. Shelly sand/cobbles with patchy bed of <i>Ophiothrix fragilis</i> (A) with smaller numbers of <i>Ophiocomina nigra</i> (C). Also <i>Echinus esculentus</i> (F), <i>Munida rugosa</i> (O), <i>Asterias rubens</i> (O), <i>Scyliorhinus canicula</i> (P). Boulders with <i>Ophiothrix fragilis</i> , diffuse hydroid turf and small <i>Alcyonium digitatum</i> colonies. Brittlestars may thin out over course of tow, absent from shell gravel at end.	SS.SMx.CMx.OphMx	
J98	Muddy sand or sandy mud with shell fragments	Low density of megafaunal burrows, probably made by <i>Munida rugosa</i> , observed in burrow openings and in large numbers (F) on surface. Also many <i>Asterias rubens</i> (F), <i>Astropecten irregularis</i> (P), <i>Pagurus bernhardus</i> (P), possible <i>Sagartiogeton undatus</i> (P),	SS.SMu.CSaMu	

Table 10 continued

Site	Substratum	Biota	Biotopes	PMFs
J99	Muddy sand or sandy mud with shell fragments	<i>Leptometra celtica</i> in large numbers (A), possibly ~10 m ⁻² , in uniform orientation to current. Many <i>Munida rugosa</i> (C) and <i>Cerianthus lloydii</i> (C). Also two <i>Pennatula phosphorea</i> (O), <i>Pagurus bernhardus</i> (O), unidentified small flatfish (P)	SS.SMu.CSaMu	LC
J100	Silty bedrock slope/wall with boulders at base, leading onto muddy gravel with abundant shell	Away from bedrock, muddy gravel with <i>Munida rugosa</i> (F), <i>Asterias rubens</i> (F), <i>Pecten maximus</i> (P), <i>Caryophyllia smithii</i> on larger stones. Silty bedrock and boulders with diffuse hydroid turf, many small <i>Alcyonium digitatum</i> colonies (F), <i>Caryophyllia smithii</i> (C), orange encrusting bryozoan (O), <i>Sabella pavonina</i> (C), <i>Diazona violacea</i> (P). Sessile epifauna sparse, most common on vertical or overhanging faces. Two <i>Swiftia pallida</i> colonies seen. Mobile epifauna <i>Echinus esculentus</i> (F), <i>Asterias rubens</i> (O), <i>Labrus mixtus</i> (P)	SS.SMx.CMx CR.MCR.EcCr.CarSwi	SP

Table 10 continued

Site	Substratum	Biota	Biotopes	PMFs
J101	Starts on mud with shell fragments and drift algae at ~58 m, becoming gradually stonier and ascending to base of steep bedrock wall edged by tumbled boulders at ~26 m	<p>Shelly mud with no obvious burrows. Sparse seapens: two <i>Pennatula phosphorea</i>, one <i>Funiculina quadrangularis</i>. <i>Munida rugosa</i> most common mobile animal (F), also <i>Cancer pagurus</i> (P), <i>Liocarcinus</i> sp. (O), <i>Necora puber</i> (P), <i>Echinus esculentus</i> (O), <i>Solaster endeca</i> (P).</p> <p>Boulders and bedrock with patchy epifaunal crust of pink corallines, <i>Balanus crenatus</i>, serpulid tubes, unidentified encrusting sponges and/or bryozoans. Larger sessile fauna sparse and seen mostly on vertical rock faces: small <i>Alcyonium digitatum</i> (O), <i>Diazona violacea</i> (O), <i>Ascidia mentula</i> (C), <i>Sabella pavonina</i> (F). Also <i>Echinus esculentus</i> (F), <i>Asterias rubens</i> (F), <i>Pollachius</i> sp., <i>Trisopterus</i> sp., <i>Labrus mixtus</i>.</p>	<p>SS.SMu.CFiMu.SpnMeg.Fun (although few if any burrows)</p> <p>Possibly CR.LCR.BrAs.AmenCio</p>	FQ

Table 10 continued

Site	Substratum	Biota	Biotopes	PMFs
J102	<p>Fine mud at start (84 m), becoming more shelly by ~70 m. Mud surface looks disturbed at ~70-75 m, possible trawl damage.</p> <p>From ~70-46 m, seems to be a series of broad bedrock steps heavily draped in fine sediment. Exposed rock only visible on short steep sections between flatter ledges</p>	<p>Sparse megafaunal burrows, including <i>Nephrops norvegicus</i> (several individuals observed). <i>Munida rugosa</i> also observed in burrows, and many on surface (F). <i>Funiculina quadrangularis</i> seen (F) throughout this zone, with small numbers of <i>Pennatula phosphorea</i> (O), one <i>Pachycerianthus multiplicatus</i> (P). Frequent small cod (<i>Gadus morhua</i>), also <i>Pagurus bernhardus</i> (P)</p> <p>Large numbers of <i>Leptometra celtica</i> throughout this zone (C, locally A), especially dense along edges of bedrock steps. Seem to thin out towards end of run (< 50 m). Many <i>Munida rugosa</i> (C) among the crinoids. <i>Funiculina quadrangularis</i> at low density (O) on the flatter, sediment-draped ledges. Steeper, silty rock faces with encrusting sponges (unidentified), patchy hydroid turf, <i>Sabella pavonina</i>, <i>Caryophyllia smithii</i>. Also <i>Liocarcinus</i> sp. (P), <i>Cancer pagurus</i> (P), <i>Pagurus bernhardus</i> (P), <i>Scyliorhinus canicula</i> (P)</p>	<p>SS.SMu.CFiMu.SpnMeg.Fun</p> <p>Probably closest to CR.LCR.BrAs.AntAsH, although with <i>Leptometra</i> rather than <i>Antedon</i>. However, ascidians not prominent here, and close association with <i>Funiculina quadrangularis</i> does not seem to have been recorded before</p>	<p>BM FQ PM</p> <p>FQ LC</p>
J103	<p>Fine mud. One isolated small boulder</p>	<p>Sparse megafaunal burrows, probably including <i>Nephrops norvegicus</i> and/or <i>Munida rugosa</i>. Several <i>M. rugosa</i> visible on surface (F). Small numbers of <i>Funiculina quadrangularis</i> (F). A few <i>Leptometra celtica</i> perched on a boulder and one on a creel</p>	<p>SS.SMu.CFiMu.SpnMeg.Fun</p>	<p>BM FQ LC</p>

Table 10 continued

Site	Substratum	Biota	Biotopes	PMFs
J104	Fine mud. Large patches of silty kelp debris and abundant smaller weed fragments. Several bottles, cans and other items of man-made litter	Megafaunal burrows very sparse. One <i>Munida rugosa</i> seen at a burrow entrance, and several more on surface (F). One <i>Pennatula phosphorea</i> (P). Also <i>Pagurus bernhardus</i> (P), <i>Liocarcinus</i> sp. (P), <i>Echinus esculentus</i> (C, but only on kelp patches), unidentified small gadoid (P)	SS.SMu.CFiMu.SpnMeg or SS.SMu.CFiMu.BlyrAchi	BM or DM
J105	Mixed sediment with pebbles, cobbles and shell on sandy mud. Occasional small boulders, one large boulder at end.	Surface stones with pink coralline crusts and diffuse hydroid turf. <i>Munida rugosa</i> most common mobile animal (F), also <i>Echinus esculentus</i> (O), <i>Solaster endeca</i> (P), <i>Astropecten irregularis</i> (P), <i>Asterias rubens</i> (P), unidentified flatfish (P). <i>Buccinum undatum</i> egg mass on one cobble. <i>Leptometra celtica</i> at low density (F) in mid-part of run, around 21-22 m depth, also one <i>Antedon bifida</i> perched on a creel. Foliose red algal turf in latter part of run, reaching ~50% cover (15-19 m). Large boulder at end with cluster of <i>Metridium senile</i> .	SS.SMx.CMx	LC
J106	Fine mud	High density of megafaunal burrows, probably <i>Calocaris macandreae</i> . Many <i>Funiculina quadrangularis</i> (F), small numbers of <i>Pennatula phosphorea</i> (O), and two <i>Pachycerianthus mutiplicatus</i> (O). No mobile epifauna seen.	SS.SMu.CFiMu.SpnMeg.Fun	BM FQ PM
J108	Fine mud	Sparse megafaunal burrows, probably <i>Nephrops norvegicus</i> . <i>Amphiura</i> sp. arms visible in close-ups. Many <i>Funiculina quadrangularis</i> (F), but no mobile epifauna seen.	SS.SMu.CFiMu.SpnMeg.Fun	BM FQ

Table 10 continued

Site	Substratum	Biota	Biotopes	PMFs
M1	Fine mud, flocculent surface with leaf/twig litter, occasional small patches of <i>Beggiatoa</i>	No megafaunal burrows observed. <i>Psammechinus miliaris</i> (O), <i>Pagurus bernhardus</i> (O)	SS.SMu.CFiMu	
M2	Fine mud	Sparse megafaunal burrows, possibly <i>Calocaris macandreae</i> . <i>Amphiura</i> sp. arms visible in close-up. No seapens observed, <i>Ophiura ophiura</i> (P), <i>Pagurus bernhardus</i> (P), a few ascidians, possibly <i>Ascidrella scabra</i> on surface debris	Possibly SS.SMu.CFiMu.BlyrAchi	DM?
M3	Fine mud with some shell flecks	Sparse megafaunal burrows, possibly <i>Calocaris macandreae</i> . No seapens or mobile epifauna observed. Occasional ascidians, possibly <i>Ascidrella scabra</i> on surface debris	Possibly SS.SMu.CFiMu.BlyrAchi	DM?
M4	Fine mud	Megafaunal burrows, possibly <i>Calocaris macandreae</i> , at higher density than M2, M3. No seapens observed, occasional small gadoids. Near end of tow, isolated boulder with <i>Protanthea simplex</i> and unidentified yellow sponge, followed by drift algae and patches of <i>Beggiatoa</i>	Possibly SS.SMu.CFiMu.SpnMeg.Fun (without seapens) or SS.SMu.CFiMu.BlyrAchi	BM or DM
M5	Slope of large cobbles and small boulders, leading onto stony mud with abundant dead shells	Stones with pink coralline crusts and <i>Protanthea simplex</i> at high density (A). Also visible: serpulid tubes on stones, <i>Echinus esculentus</i> (P)	CR.LCR.BrAs.NeoPro.FS	

Table 10 continued

Site	Substratum	Biota	Biotopes	PMFs
M6	Coarse shelly sand with embedded cobbles and occasional small boulders	Stones with pink coralline crusts, serpulid tubes and <i>Protanthea simplex</i> at high density (A). Some small <i>Alcyonium digitatum</i> colonies (O). <i>Cerianthus lloydii</i> in sediment between stones (F). Also many <i>Psammechinus miliaris</i> (F), <i>Echinus esculentus</i> (O), <i>Crossaster papposus</i> (O), <i>Asterias rubens</i> (P), <i>Metridium senile</i> (O)	CR.LCR.BrAs.NeoPro.FS	
M7	Pebble gravel with cobbles	Pink coralline crusts on stones (A), initially scattered <i>Laminaria hyperborea</i> , becoming denser during tow to form a park. Very little epifauna on fronds, but some foliose red algae on stipes. Large numbers of small <i>Asterias rubens</i> (A), also <i>Psammechinus miliaris</i> (F), small <i>Gadus morhua</i> (P)	Possibly IR.MIR.KR.LhypTX.Pk	
M8	Coarse gravelly sand with pebbles and high shell content.	<i>Laminaria hyperborea</i> park with foliose red algal understory (species unidentified). Kelp fronds clean, unfouled. <i>Protanthea simplex</i> (F) on larger stones, also <i>Psammechinus miliaris</i> (F), <i>Asterias rubens</i> (O)	Possibly IR.MIR.KR.Lhyp.TX.Pk	
M9	Fine mud	Sparse megafaunal burrows, mainly <i>Nephrops norvegicus</i> . <i>Pennatula phosphorea</i> at high density (C), with small numbers of <i>Funiculina quadrangularis</i> (O). Also <i>Pagurus bernhardus</i> (P), <i>Aequipecten opercularis</i> (P).	SS.SMu.CFiMu.SpnMeg.Fun	BM FQ
M10	Heavily silted stones and empty shells embedded in fine mud. Looks like foot of a slope of slate fragments	Visibility poor, lots of suspended floc in water column. Very little biota. Small numbers of <i>Protanthea simplex</i> (F), <i>Liocarcinus</i> sp. (P)	An impoverished variant of CR.LCR.BrAs.NeoPro.FS	

Table 10 continued

Site	Substratum	Biota	Biotopes	PMFs
M11	Fine mud	Visibility poor, but megafaunal burrows present, including probable <i>Calocaris macandreae</i> . <i>Pennatula phosphorea</i> (O) and <i>Funiculina quadrangularis</i> (O) at low density. Also <i>Cerianthus lloydii</i> (P), <i>Scyliorhinus canicula</i> (P).	SS.SMu.CFiMu.SpnMeg.Fun	BM FQ
M12	Fine mud	Visibility poor, but megafaunal burrows present. <i>Pennatula phosphorea</i> (P) and <i>Funiculina quadrangularis</i> (P) at low density. Also <i>Pagurus bernhardus</i> (P), <i>Asterias rubens</i> (P), unidentified small goby (P).	SS.SMu.CFiMu.SpnMeg.Fun	BM FQ
M13	Fine mud	High density of megafaunal burrows, including <i>Calocaris macandreae</i> and <i>Nephrops norvegicus</i> (<i>Nephrops</i> observed on surface). <i>Pennatula phosphorea</i> (F) and <i>Funiculina quadrangularis</i> (F) at moderate density, with small numbers of <i>Virgularia mirabilis</i> (O). Also <i>Asterias rubens</i> (P) cluster of ascidians (unidentified) on mud surface.	SS.SMu.CFiMu.SpnMeg.Fun	BM FQ
M14	Fine mud	Sparse megafaunal burrows, mainly <i>Nephrops norvegicus</i> (observed on surface). <i>Pennatula phosphorea</i> at moderate density (F), with smaller numbers of <i>Funiculina quadrangularis</i> (F) and <i>Virgularia mirabilis</i> (P). Also <i>Liocarcinus</i> sp. (O), <i>Carcinus maenas</i> (P), and scattered ascidians (O) on mud surface.	SS.SMu.CFiMu.SpnMeg.Fun	BM FQ

Table 10 continued

Site	Substratum	Biota	Biotopes	PMFs
M15	Fine mud, initially with some small stones and shell fragments. These lost towards end	Megafaunal burrows absent in stonier mud, but appear at high density towards end. Seem to be mainly <i>Calocaris macandreae</i> . <i>Psolus phantapus</i> in small numbers in stonier mud (O), also <i>Pagurus bernhardus</i> (P), <i>Callionymus lyra</i> (P). Isolated cobble with attached <i>Protanthea simplex</i> . No seapens observed.	SS.SMu.CFiMu later possibly SS.SMu.CFiMu.SpnMeg or SS.SMu.CFiMu.MegMax	BM
M16	Sandy mud with shell flecks and algal debris	Starts on dense mat of silt-covered drift algae. Algal debris thins out later, but with intermittent dense patches. No megafaunal burrows visible. Large numbers of <i>Pagurus bernhardus</i> (F), also <i>Munida rugosa</i> (P), <i>Echinus esculentus</i> (P), <i>Psammechinus miliaris</i> (P), <i>Asterias rubens</i> (O), <i>Ophiura ophiura</i> (O), <i>Ophiothrix fragilis</i> (O), <i>Aequipecten opercularis</i> (P), <i>Psolus phantapus</i> (P)	SS.SMu.CSaMu	
M17	Coarse sand with mix of gravel and pebbles	Bed of <i>Ophiothrix fragilis</i> (S) with smaller numbers of <i>Ophiocomina nigra</i> (A). Bed patchy but very dense over much of the site. Also <i>Pagurus bernhardus</i> (O), <i>Aequipecten opercularis</i> (P)	SS.SMx.CMx.OphMx	
M18	Coarse shelly gravel, grading into cobble field	<i>Laminaria hyperborea</i> park with red algal understorey (species unidentified) to start, understorey changes to <i>Fucus serratus</i> later on. Older parts of kelp fronds with dense hydroid fouling. Stones heavily encrusted with pink coralline algae and <i>Spirobranchus</i> sp. tubes. <i>Asterias rubens</i> (P)	Possibly IR.MIR.KR.LhypTX.Pk	

Table 10 continued

Site	Substratum	Biota	Biotopes	PMFs
M19	Coarse gravelly sand	Dense <i>Saccharina latissima</i> forest, fronds ragged, silty and heavily fouled with <i>Electra pilosa</i> . Some <i>Chorda filum</i> mixed in, and patchy foliose algal understory. No mobile epifauna seen.	SS.SMp.KSwSS.LsacCho	KS
M20	Fine gravelly sand to start, grading into pebble gravel later on. Lots of macroalgal debris	Sparse small <i>Saccharina latissima</i> plants with patchy filamentous red algal turf. Pebbles in coarser area encrusted with pink corallines and <i>Spirobranchus</i> sp. tubes. Also <i>Asterias rubens</i> (O), <i>Crossaster papposus</i> (P), <i>Echinus esculentus</i> (P), <i>Carcinus maenas</i> (P). <i>Cerianthus lloydii</i> (P) in finer sediment at start.	SS.SMp.KSwSS.LsacR.Sa or SS.SMp.KSwSS.LsacR.Gv	KS
M21	Pebble gravel and cobbles	Stones heavily encrusted with pink coralline algae (A), serpulid tubes, probably <i>Spirobranchus</i> sp. (A), and possibly <i>Balanus</i> sp. Open <i>Laminaria hyperborea</i> park with foliose red algal understory. Red algae with dense cover of encrusting bryozoans (<i>Electra pilosa</i>). Many <i>Asterias rubens</i> on cobble bed (C).	Possibly IR.MIR.KR.LhypTX.Pk	
M22	Pebble gravel and cobbles	Stones heavily encrusted with pink coralline algae (A) and serpulid tubes, probably <i>Spirobranchus</i> sp. (A). Dense <i>Laminaria hyperborea</i> with understory of foliose red algae (unidentified). Older parts of kelp fronds with <i>Membranipora membranacea</i> , younger areas unfouled. <i>Asterias rubens</i> (P) only mobile animal seen.	Possibly IR.MIR.KR.LhypTX.Ft	

Table 10 continued

Site	Substratum	Biota	Biotopes	PMFs
M23	Gravelly sand with shell fragments, some patches of pebble gravel. Single small boulder seen near end	Patchy <i>Saccharina latissima</i> , fronds ragged and heavily fouled by hydroids and bryozoans. Patchy short red algal turf, pebbles with pink coralline crusts and <i>Spirobranchus</i> sp. tubes. Also <i>Carcinus maenas</i> (P), <i>Munida rugosa</i> (P), <i>Pagurus bernhardus</i> (P), <i>Echinus esculentus</i> (O)	SS.SMp.KSwSS.LsacR.Sa or SS.SMp.KSwSS.LsacR.Gv	KS
M24	Sand or muddy sand with shell fragments	Dense <i>Saccharina latissima</i> , mostly ragged, silty fronds heavily fouled with hydroids, <i>Spirobranchus</i> sp. and bryozoans. Also lots of drift furoid and kelp debris. May be a short algal turf understorey, but view blocked by kelp fronds most of the time. <i>Carcinus maenas</i> (P), <i>Gobiusculus flavescens</i> (P)	SS.SMp.KSwSS.LsacR.Mu or SS.SMp.KSwSS.LsacR.Sa	KS
M25	Cobble bed, with fissured bedrock at end of tow	Cobbles heavily encrusted with <i>Spirobranchus</i> sp. tubes, supporting turf of foliose red algae (species unidentified) and <i>Alcyonium digitatum</i> . Initially ~60% algal cover, ~10% <i>Alcyonium</i> , later shifting to ± equal coverage. <i>Laminaria hyperborea</i> park towards end of tow, with red algae on stipes and hydroids/bryozoans on fronds. At end, bedrock with dense <i>Sagartia elegans</i> (A) concentrated in fissures	IR.MIR.KR.Lhyp.TX.Pk or IR.MIR.KR.Lhyp.TX.Ft	TS
M26	Coarse gravelly sand, possibly with areas of boulders or bedrock, but obscured by high macroalgal cover	Dense turf (~80% cover) of foliose red algae (unidentified), then <i>Laminaria hyperborea</i> park with red algal understorey and stipe cover. Kelp fronds not heavily fouled, some <i>Membranipora membranacea</i> . Shoal of <i>Gobiusculus flavescens</i> .	Possibly IR.MIR.KR.Lhyp.Pk	

Table 10 continued

Site	Substratum	Biota	Biotopes	PMFs
M27	Coarse gravelly sand with shell fragments and scattered cobbles. Lots of drift algae	Sparse <i>Saccharina latissima</i> , fronds ragged and silty. Diffuse short algal turf on stones. 'Washed-out' image doesn't show natural colours. Coralline crusts and serpulid tubes on larger cobbles. <i>Cancer pagurus</i> (P)	SS.SMp.KSwSS.LsacR.Sa	KS
M28	Muddy sand with mix of gravel, pebbles and shell fragments	Diffuse patchy algal turf, looks like filamentous brown algae. Drift kelp, possibly some attached <i>Saccharina latissima</i> . <i>Asterias rubens</i> (P)	Possibly SS.SMp.KSwSS.LsacR.Mu	KS
M29	Cobbles and small boulders on sand	<i>Saccharina latissima</i> park, fronds silty and fouled by <i>Electra pilosa</i> and <i>Membranipora membranacea</i> . Kelp thins out later in tow, showing algal turf (colour uncertain) on stones. Cobbles with coralline crusts. <i>Asterias rubens</i> (P)	SS.SMp.KSwSS.LsacR.Gv or SS.SMp.KSwSS.LsacR.Sa	
M30	Coarse gravelly sand with shell fragments	<i>Saccharina latissima</i> park, patchy but quite dense in places. Fronds silty, ragged and heavily fouled with hydroids. Diffuse algal turf (~70% cover) among and between the kelp patches. 'Washed-out' image makes it hard to determine colour. <i>Asterias rubens</i> (F), <i>Echinus esculentus</i> (P)	SS.SMp.KSwSS.LsacR.Sa or SS.SMp.KSwSS.LsacR.Gv	KS
M31	Bedrock in irregular vertical ridges separated by cobble and boulder-filled gullies	Rock surfaces with ~100% cover of faunal turf, consisting of a yellowish sponge, possibly <i>Halichondria panicea</i> (S) mixed with <i>Flustra foliacea</i> (A) and <i>Alcyonidium diaphanum</i> (A). Vertical faces with sparse turf but dense barnacle (<i>Balanus crenatus?</i>) cover (S). Very few mobile epifauna, only <i>Carcinus maenas</i> (F) seen. Sparse <i>Laminaria hyperborea</i> park on ridge tops.	Probably closest to CR.HCR.FaT.BalTub	

Table 10 continued

Site	Substratum	Biota	Biotopes	PMFs
M32	Starts on pebble gravel, then onto shelly sand with cobbles as depth increases	Sparse <i>Laminaria hyperborea</i> park on gravel. Cobbles on shell sand are encrusted with pink coralline algae and serpulid tubes (<i>Spirobranchus</i> sp.) and carry clumps of <i>Flustra foliacea</i> and <i>Alcyonidium diaphanum</i> , with bushy hydroids (possibly <i>Sertularia</i> sp.) and/or bryozoans. One <i>Urticina</i> sp. (P). No mobile epifauna seen.	Probably SS.SMx.CMx.FluHyd	
M33	Pebble gravel	Stones with pink coralline crusts. Initially patchy turf of <i>Flustra foliacea</i> , increasing in density as tow progresses. Finishes with ~70% <i>Flustra</i> cover (A). Some <i>Alcyonidium diaphanum</i> and unidentified bushy hydroids and/or bryozoans. No mobile epifauna seen.	Probably SS.SMx.CMx.FluHyd	
M34	Pebble gravel at start, becoming more shelly. Finishes on gravelly sand	Very little visible biota. Scattered clumps of <i>Alcyonidium diaphanum</i> near start, then lost. <i>Crossaster papposus</i> (O)	Probably an impoverished variant of CR.MCR.CfaVS.Hbow.Eud	
M35	Gravel and cobbles	Larger stones heavily encrusted with pink coralline crusts (A) and serpulid (<i>Spirobranchus</i> sp.) tubes (S). <i>Alcyonidium diaphanum</i> colonies at high density (~60% cover) mixed with a small amount of <i>Halichondria bowerbanki</i> (hard to distinguish in prevailing light conditions). Also <i>Crossaster papposus</i> (O)	CR.MCR.CfaVS.Hbow.Eud	
M36	Coarse sand with shell fragments	Camera moves only a short distance from starting position. Patches of diffuse filamentous algae (unidentified). Several <i>Cerianthus lloydii</i> seen, difficult to distinguish against sandy background, so possibly under recorded	Possibly SS.SMx.CMx.CIloMx	

Table 10 continued

Site	Substratum	Biota	Biotopes	PMFs
M37	Coarse gravelly sand with shell fragments. A few larger cobbles	Short algal turf, ~50% cover (S), species unidentified. Scattered <i>Ciona intestinalis</i> among turf (F), also <i>Crossaster papposus</i> (P), <i>Asterias rubens</i> (P), <i>Pagurus bernhardus</i> (P). Serpulid tubes on larger cobbles	SS.SMp.KSwSS	
M38	Fine mud	<i>Amphiura</i> sp. arms visible in close-up, but visibility near zero for almost entire drop. No details visible.	SS.SMu.CFiMu, details not distinguishable	
M39	Fine mud	Camera static for most of drop, so very little spatial coverage. Burrows of <i>Calocaris macandreae</i> visible. Also <i>Pennatula phosphorea</i> (F?), <i>Ophiura ophiura</i> (O?), <i>Pagurus bernhardus</i> (P).	SS.SMu.CFiMu.SpnMeg	BM
M40	Coarse gravelly sand with mussel shells and cobbles	Stones with coralline algal crusts and serpulid tubes. Clumps of <i>Alcyonidium diaphanum</i> and scattered ascidians (unidentified) on cobbles. Shoal of <i>Gobiusculus flavescens</i> .	Possibly an impoverished variant of CR.MCR.CfaVS.Hbow.Eud	
M41	Starts on coarse gravelly sand with shell fragments, becoming finer and less stony. Ends at base of a boulder slope with large masses of drift algae	Stones on gravelly sand carry small serpulid tubes and clumps of <i>Alcyonidium diaphanum</i> (C). Also <i>Asterias rubens</i> (P). Boulders with dense cover of serpulid tubes (A), also <i>Hyas araneus</i> (P), <i>Henricia sanguinolenta</i> (P)	Possibly an impoverished variant of CR.MCR.CfaVS.Hbow.Eud	
M42	Starts on mud or sandy mud with gravel, lots of macroalgal debris and leaf/twig litter. Ends on silty cobbles with masses of black floc and leaf litter	Visibility poor, with very little visible biota. Possible <i>Cerianthus lloydii</i> (P). Cobbles towards end with <i>Spirobranchus</i> sp. tubes	Possibly SS.SMx.CMx.CIoMx	

Table 10 continued

Site	Substratum	Biota	Biotopes	PMFs
M43	Fine mud	Visibility very poor or zero for most of drop. Some burrow openings visible, also <i>Ophiura ophiura</i> (O), unidentified small goby (P).	Possibly SS.SMu.CFiMu.BlyrAchi	DM?
M44	Mud or sandy mud with surface gravel and shell fragments. Gravel sparse later in tow	Very little visible biota. Scattered <i>Ciona intestinalis</i> (F) and a few strands of yellowish sponge (probably <i>Halichondria bowerbanki</i>) on stones. Also <i>Asterias rubens</i> (P), <i>Crossaster papposus</i> (P)	Probably an impoverished variant of CR.MCR.CfaVS.Hbow.Eud	
M45	Fine mud	Visibility very poor or zero for most of drop, but megafaunal burrows faintly visible. <i>Pennatula phosphorea</i> (O) and <i>Virgularia mirabilis</i> (O) at low density, also <i>Cerianthus lloydii</i> (P).	SS.SMu.CFiMu.SpnMeg	BM
M46	Fine mud	Sparse megafaunal burrows, possibly including <i>Nephrops norvegicus</i> . <i>Amphiura</i> sp. arms visible in close-up. <i>Pennatula phosphorea</i> at low density (O). Many <i>Ophiura ophiura</i> (F) also <i>Cerianthus lloydii</i> (O).	SS.SMu.CFiMu.SpnMeg	BM
M47	Fine mud	Megafaunal burrows at moderate density, including <i>Calocaris macandreae</i> and large mounds, possibly <i>Maxmuelleria lankesteri</i> . Many <i>Pennatula phosphorea</i> (F), especially later in tow. Also <i>Ophiura ophiura</i> , <i>Pagurus bernhardus</i> (P). One large contracted anemone, possibly <i>Pachycerianthus multiplicatus</i> (P).	SS.SMu.CFiMu.SpnMeg	BM PM?
M48	Fine mud, some leaf litter	Megafaunal burrows extremely sparse, only a few holes seen towards end of tow. <i>Amphiura</i> sp. arms visible in close-up. <i>Ophiura ophiura</i> (O), <i>Cerianthus lloydii</i> (O), no seapens observed.	Possibly SS.SMu.CFiMu.BlyrAchi	DM

Table 10 continued

Site	Substratum	Biota	Biotopes	PMFs
M49 Dive 1	Mixed sediment, mud or muddy sand with small stones and shell fragments	Scattered cobbles with sparse algal turf. <i>Asterias rubens</i> (P), <i>Carcinus maenas</i> (P)	SS.SMx.IMx	
M49 Dive 2	Fine mud with abundant leaf litter, some empty shells	Flocculent surface almost covered in leaf litter. No living biota observed.	SS.SMu.CFiMu	
M50	Starts on gently sloping muddy sand or sandy mud with shell flecks and scattered cobbles. Gradient steepens rapidly near end, leading onto silty boulder slope	Sandy bed with dense patches of algal turf (species unidentified), presumably attached to surface stones. Strands of yellowish sponge, probably <i>Halichondria bowerbanki</i> , among algal turf, also <i>Crossaster papposus</i> (P). Algal/sponge patches thin out and disappear before steep slope reached. No biota visible on silty boulders.	Possibly an impoverished variant of CR.MCR.CfaVS.Hbow.Eud	
M51	Boulders and cobbles on coarse gravelly sand.	Camera moving fast and bouncing across the seabed, giving very poor image quality. Stones appear to be covered with biological turf, probably hydroids, possibly with red algae. Several <i>Crossaster papposus</i> briefly seen, but no details of biotope visible	Possibly CR.MCR	
M52	Silty bedrock slope with coarse shelly sand at base. Some bedrock outcrops or boulders	Patchy filamentous algal turf (unidentified) on rock surfaces, with frequent clumps of <i>Alcyonidium diaphanum</i> (A). Some small ascidians (unidentified) among algal turf, also <i>Crossaster papposus</i> (F), <i>Urticina</i> sp. (P)	Possibly an impoverished variant of CR.MCR.CfaVS.Hbow.Eud	

Table 10 continued

Site	Substratum	Biota	Biotopes	PMFs
M53	Starts on coarse shelly sand, grading onto muddy sand. Finishes on silty boulders	Dense <i>Saccharina latissima</i> (~90% cover) on shelly sand. Fronds with <i>Spirorbis</i> sp. tubes, small <i>Asterias rubens</i> (F) on bed. Kelp thins out and disappears before boulder zone. Boulders with patchy <i>Halichondria bowerbanki</i> strands, grey ascidians (unidentified), with indeterminate dark faunal turf	SS.SMp.KSwSS.LsacR.Sa or SS.SMp.KSwSS.LsacR.Mu followed by CR.MCR.CfaVS.Hbow.Eud	KS
M54	Solid cover of dead mussel shells to start, then onto fine mud with gradually decreasing shell content	Rope with attached <i>Sabella pavonina</i> in view at start. Scattered (O) <i>Ascidia mentula</i> on mussel shell bed, small <i>Ophiura</i> sp. (possibly <i>O. albida</i>) on shelly mud (F).	SS.SMu.CFiMu, looks as though covered in mussel farm debris	
M55	Fine mud, flocculent surface with occasional <i>Beggiatoa</i> patches	Megafaunal burrows absent until very late in tow, when a few holes visible. Mounds and tentacles of terebellid polychaetes (probably <i>Eupolymnia nebulosa</i>) present throughout at low density, as are tube endings of <i>Chaetopterus variopedatus</i> . Small <i>Ophiura</i> sp. (possibly <i>O. albida</i>) visible (F?), but often half-buried so abundance hard to estimate. Scattered <i>Ciona intestinalis</i> (O) on surface. One <i>Pachycerianthus multiplicatus</i> (P), also <i>Munida rugosa</i> (P)	SS.SMu.CFiMu	PM
M56	Starts on coarse shelly sand with surface cobbles. Becomes rockier, with small boulders appearing. Ends on silty boulder field	Strands of <i>Halichondria bowerbanki</i> , small grey ascidians (<i>Ciona intestinalis</i> and possibly <i>Ascidiella scabra</i>) and serpulid tubes on rocks. Also indeterminate patchy brown biological turf. Ascidians denser (A) on larger rocks at end. <i>Carcinus maenas</i> (P)	CR.MCR.CfaVS.Hbow.Eud	

Table 10 continued

Site	Substratum	Biota	Biotopes	PMFs
M57	Silty boulders, perhaps a slope, with shelly sand or muddy sand at base	Visibility often poor. Boulders with sparse <i>Sabella pavonina</i> tubes and grey ascidians, possibly <i>Ascidia mentula</i> . Off bouldery area, strands of <i>Halichondria bowerbanki</i> on small stones. Very few mobile epifauna, small <i>Ophiura</i> sp. (P) and occasional small gobies (unidentified)	Probably closest to CR.LCR.BrAs.AmenCio	
M58	Fine mud	No megafaunal burrows seen. One <i>Chaetopterus variopedatus</i> tube ending. Many <i>Ciona intestinalis</i> scattered on mud surface (C), also <i>Ophiura ophiura</i> (O). <i>Funiculina quadrangularis</i> at low density (O), one <i>Pachycerianthus multiplicatus</i> (P).	Closest to SS.SMu.CFiMu.SpnMeg.Fun (although lacking burrows)	FQ PM
M59	Fine mud	Sparse megafaunal burrows, possibly <i>Nephrops norvegicus</i> . <i>Ciona intestinalis</i> scattered as individuals or small clusters on mud surface (F). <i>Funiculina quadrangularis</i> (O) and <i>Virgularia mirabilis</i> at low density (O). One <i>Pachycerianthus multiplicatus</i> (P).	SS.SMu.CFiMu.SpnMeg.Fun	BM FQ PM
M60	Fine mud	Sparse megafaunal burrows, including <i>Calocaris macandreae</i> and some large mounds, possibly <i>Maxmuelleria lankesteri</i> . No seapens seen, but several <i>Pachycerianthus multiplicatus</i> (O). Also <i>Ophiura ophiura</i> (O), <i>Ciona intestinalis</i> (O).	SS.SMu.CFiMu.MegMax	BM PM

Table 10 continued

Site	Substratum	Biota	Biotopes	PMFs
M61	Fine mud, occasional small patches of <i>Beggiatoa</i>	Megafaunal mounds, probably <i>Maxmuelleria lankesteri</i> , numerous at start, more patchy later but present throughout. Some possible <i>Nephrops norvegicus</i> burrows and <i>Chaetopterus variopedatus</i> tube endings. <i>Ciona intestinalis</i> scattered as individuals or small clusters on surface (O). Also <i>Virgularia mirabilis</i> (P), <i>Ophiura ophiura</i> , <i>Cerianthus lloydii</i> (P), <i>Sabella pavonina</i> (P).	SS.SMu.CFiMu.MegMax	BM
M62	Muddy sand with pebbles and shell fragments, occasional larger cobbles. Masses of fucoid debris at end.	Very little biota visible. Sparse patches of filamentous algae on stones and some strands of finger-like branching sponge, possibly <i>Halichondria bowerbanki</i> . Occasional small gobies (unidentified).	SS.SMx.IMx	
M63	Fine mud	Megafaunal burrows sparse initially, but more common later on. Some small mounds. <i>Nephrops norvegicus</i> observed in burrow opening. Many <i>Virgularia mirabilis</i> (F) and <i>Ophiura ophiura</i> (F), also <i>Cerianthus lloydii</i> (P), scattered <i>Ciona intestinalis</i> (O) on surface	SS.SMu.CFiMu.SpnMeg	BM
M64	Fine mud, occasional patches of dark, reduced subsurface sediment	Megafaunal burrows extremely sparse. One possible <i>Jaxea nocturna</i> surface opening. <i>Virgularia mirabilis</i> present in small numbers (O). Many <i>Ophiura ophiura</i> (C), also unidentified small gobies (O).	Possibly SS.SMu.CFiMu.BlyrAchi	DM?
M65	Fine mud, occasional small patches of <i>Beggiatoa</i>	Megafaunal burrows extremely sparse, rare small mounds. No seapens seen. Very sparse mobile epifauna: <i>Carcinus maenas</i> (O), <i>Liocarcinus</i> sp.(O), <i>Pagurus bernhardus</i> (P).	Possibly SS.SMu.CFiMu.BlyrAchi	DM?

Table 10 continued

Site	Substratum	Biota	Biotopes	PMFs
M66	Fine mud	Megafaunal burrows extremely sparse, some possible <i>Calocaris macandreae</i> holes. A few <i>Ciona intestinalis</i> scattered on mud surface (O), also <i>Ophiura ophiura</i> (O), <i>Virgularia mirabilis</i> (P), <i>Chaetopterus variopedatus</i> (P).	Possibly SS.SMu.CFiMu.BlyrAchi	DM?
M67	Fine mud	High density of megafaunal burrows, possibly including <i>Calocaris macandreae</i> , <i>Jaxea nocturna</i> and <i>Nephrops norvegicus</i> . Many fine projecting tube endings, probably <i>Spiochaetopterus typicus</i> . No seapens seen. <i>Ophiura ophiura</i> at high density (C), also <i>Psolus phantapus</i> (O).	Possibly SS.SMu.CFiMu.MegMax (although no evidence of <i>Maxmuelleria lankesteri</i>) or SS.SMu.CFiMu.BlyrAchi (although possibly more megafaunal burrows than typical for this biotope)	BM DM?
M68	Fine mud	Extensive mats of silty, decaying kelp debris. Towards end, moves off algal mat onto burrowed mud. No seapens or mobile epifauna seen, apart from <i>Echinus esculentus</i> (O) on algal mat.	SS.SMu.CFiMu, details not distinguishable	BM
M69	Stony mud with fragments of drift algae	Very little visible biota. Surface stones with pink coralline crusts, barnacles and <i>Spirobranchus</i> sp. tubes. Occasional small conical mounds between the stones. <i>Echinus esculentus</i> (O), <i>Asterias rubens</i> (P)	SS.SMx.IMx	
M70	Mud or sandy mud with shell flecks and patches of <i>Turritella</i> .	Very sparse megafaunal burrows, possibly <i>Nephrops norvegicus</i> or other large decapod. <i>Virgularia mirabilis</i> at very high density (S) throughout. Also <i>Asterias rubens</i> (C), <i>Liocarcinus</i> sp. (P).	SS.SMu.CsaMu.VirOphPmax	

Table 10 continued

Site	Substratum	Biota	Biotopes	PMFs
M71	Fine mud	Megafaunal burrows initially at high density, becoming less frequent later. <i>Calocaris macandreae</i> possibly main burrow type. <i>Funiculina quadrangularis</i> (O), <i>Pennatula phosphorea</i> (O) and <i>Virgularia mirabilis</i> (O) all present in small numbers. No mobile epifauna seen.	SS.SMu.CFiMu.SpnMeg.Fun	BM FQ
M72	Fine mud	Sparse megafaunal burrows, including <i>Calocaris macandreae</i> and <i>Nephrops norvegicus</i> . Many <i>Pennatula phosphorea</i> (F), one <i>Funiculina quadrangularis</i> (P). Also <i>Liocarcinus</i> sp. (P)	SS.SMu.CFiMu.SpnMeg.Fun	BM FQ
M73	Starts on coarse gravelly sand, becoming finer and less stony as tow progresses	<i>Saccharina latissima</i> park over patchy algal turf (~10% cover) at start. 'Washed-out' image makes algal colour hard to determine. Kelp and algal turf both thin out and eventually disappear. Diffuse greenish floc on sand surface at end (possibly benthic diatoms). <i>Pagurus bernhardus</i> (P), small gobies (unidentified)	SS.SMp.KSwSS.LsacR.Sa	KS
M74	Fine mud	Very sparse megafaunal burrows, including <i>Calocaris macandreae</i> and possibly <i>Nephrops norvegicus</i> . Many <i>Pennatula phosphorea</i> (F), also <i>Asterias rubens</i> (O), <i>Pagurus bernhardus</i> (O)	SS.SMu.CFiMu.SpnMeg	BM
M75	Fine mud	Megafaunal burrows at moderate density, probably including <i>Calocaris macandreae</i> and <i>Nephrops norvegicus</i> . Many <i>Pennatula phosphorea</i> (F) and small numbers of <i>Funiculina quadrangularis</i> (O). Also <i>Pagurus bernhardus</i> (O)	SS.SMu.CFiMu.SpnMeg.Fun	BM FQ

Table 10 continued

Site	Substratum	Biota	Biotopes	PMFs
M76	Fine mud	High density of megafaunal burrows, including <i>Calocaris macandreae</i> and <i>Nephrops norvegicus</i> . <i>Funiculina quadrangularis</i> and <i>Pennatula phosphorea</i> at similar density (F). One <i>Pachycerianthus multiplicatus</i> (P), also <i>Asterias rubens</i> (O), <i>Liocarcinus</i> sp.(O), <i>Pagurus bernhardus</i> (P). Scattered small clusters of ascidians on mud surface (O).	SS.SMu.CFiMu.SpnMeg.Fun	BM FQ PM
M77	Fine mud	Visibility very poor, but seems to have high density of megafaunal burrows. <i>Funiculina quadrangularis</i> and <i>Pennatula phosphorea</i> in small numbers (O), also <i>Pagurus bernhardus</i> (P).	SS.SMu.CFiMu.SpnMeg.Fun	BM FQ
M78	Fine mud	High density of megafaunal burrows, including <i>Nephrops norvegicus</i> (observed on surface). Many <i>Pennatula phosphorea</i> (F) with smaller numbers of <i>Funiculina quadrangularis</i> (O) and one <i>Virgularia mirabilis</i> (P). Also <i>Asterias rubens</i> (P).	SS.SMu.CFiMu.SpnMeg.Fun	BM FQ
M79	Fine mud	Sparse megafaunal burrows, including <i>Nephrops norvegicus</i> . <i>Pennatula phosphorea</i> , <i>Funiculina quadrangularis</i> and <i>Virgularia mirabilis</i> all present in small numbers (O). Also <i>Pagurus bernhardus</i> (P) and scattered ascidians (O) on surface. Possible <i>Callionymus lyra</i> (P).	SS.SMu.CFiMu.SpnMeg.Fun	BM FQ

Table 10 continued

Site	Substratum	Biota	Biotopes	PMFs
M80	Fine mud	High density of megafaunal burrows, including <i>Nephrops norvegicus</i> . Many <i>Pennatula phosphorea</i> (F) and <i>Funiculina quadrangularis</i> (F), one <i>Virgularia mirabilis</i> (P). Also <i>Pagurus bernhardus</i> (P)	SS.SMu.CFiMu.SpnMeg.Fun	BM FQ
M81	Coarse pebble gravel with cobbles	Stones heavily encrusted with serpulid tubes (<i>Spirobranchus</i> sp.) (S), and barnacles (<i>Balanus</i> sp.) (S). <i>Cerianthus lloydii</i> occasionally visible but inconspicuous among stones, abundance hard to assess. Also <i>Urticina</i> sp. (O), <i>Liocarcinus</i> sp. (P), <i>Carcinus maenas</i> (P)	SS.SCS.CCS.PomB	
M82	Coarse shell gravel with some larger pebbles and cobbles. Ends at edge of a silty bedrock slope.	<i>Modiolus modiolus</i> present, density appears relatively low (C?) but not always easy to distinguish living and dead shells. <i>Spirobranchus</i> sp. (A) tubes and small <i>Alcyonium digitatum</i> (F) colonies on stones. Also <i>Carcinus maenas</i> (P), <i>Liocarcinus</i> sp. (P), <i>Asterias rubens</i> (F), <i>Crossaster papposus</i> (P), <i>Echinus esculentus</i> (O), <i>Protanthea simplex</i> (P)	Possibly SS.SMx.CMx.CIlo.ModHo (although no <i>Cerianthus</i> or holothurians observed) or SS.SBR.SMus.ModHAs (no large ascidians observed)	HM
M83	Coarse shelly sand with gravel and pebbles	Patchy diffuse red algal turf, 40-50% cover (species unidentified). Sparse attached <i>Laminaria hyperborea</i> towards end. Fronds look unfouled. <i>Cerianthus lloydii</i> in large numbers (C?) throughout, usually several visible when camera stops. Pink coralline crusts on pebbles. <i>Echinus esculentus</i> (O)	SS.SMx.CMx.CIloMx or SS.SMx.CMx.CIloMx.Nem (substratum more similar to this, although hydroids not prominent in biota)	

Table 10 continued

Site	Substratum	Biota	Biotopes	PMFs
M84	Pebble gravel, probably overlying coarse shelly sand	Camera moving very fast for much of the tow, detail visible mainly during intermittent stops. Stones heavily encrusted with pink corallines and <i>Spirobranchus</i> sp. tubes. Several <i>Cerianthus lloydii</i> usually visible when camera stops, indicating high density (C?). Small <i>Alcyonium digitatum</i> colonies on stones (C), also <i>Echinus esculentus</i> (O), <i>Asterias rubens</i> (O), <i>Crossaster papposus</i> (O), <i>Carcinus maenas</i> (P)	Seems closest to SS.SMx.CMx.Cilo.ModHo (although <i>Modiolus</i> not observed)	
M85	Sandy mud or muddy sand, with some algal debris and scattered shells	No megafaunal burrows observed. Thin coating of floc or benthic diatoms crossed by epifaunal trails. <i>Asterias rubens</i> (F), also <i>Ophiura</i> sp. (P), <i>Carcinus maenas</i> (P), one <i>Virgularia mirabilis</i> (P)	SS.SMu.CsaMu.VirOphPmax	
M86	Mud or sandy mud with shells flecks and patches of <i>Turritella</i>	Sparse <i>Nephrops norvegicus</i> burrows (animals observed in burrow entrance). <i>Pennatula phosphorea</i> and <i>Virgularia mirabilis</i> at medium density (O). Also <i>Buccinum undatum</i> (O), <i>Asterias rubens</i> (P), <i>Cerianthus lloydii</i> (P) and <i>Pagurus bernhardus</i> (O)	SS.SMu.CFiMu.SpnMeg	BM
M87	Fine mud	Sparse megafaunal burrows, including <i>Nephrops norvegicus</i> . <i>Funiculina quadrangularis</i> and <i>Pennatula phosphorea</i> at moderate density (O), with one <i>Virgularia mirabilis</i> (P). Also one <i>Pachycerianthus multiplicatus</i> (P), <i>Asterias rubens</i> (P), <i>Pagurus bernhardus</i> (O)	SS.SMu.CFiMu.SpnMeg.Fun	BM FQ PM

Table 11. *Biotope recorded from towed camera and ROV observations, listed by survey area. X indicates a well-defined example of the stated biotope, fully consistent with the description in the JNCC Marine Habitat Classification (v. 04.05). (X) indicates a possible occurrence or provisional identification based on closest apparent similarity to a biotope in the JNCC classification. Lower Linnhe (W) and (E) refer to stations west or east of the island of Lismore.*

Biotope	Eil	Upper Linnhe	Central Linnhe	Leven	Etive	Lower Linnhe (W)	Lower Linnhe (E)
Infralittoral rock							
IR.LIR.KLsac.Pk						X	
IR.MIR.KR.XfoR						(X)	
IR.MIR.KR.Lhyp						(X)	
IR.MIR.KR.LhypTX.Pk				(X)			(X)
IR.MIR.KR.LhypTX.Ft				(X)			(X)
Circalittoral rock							
CR.LCR.BrAs.AmenCio			(X)		(X)	X	(X)
CR.LCR.BrAs.AmenCio.Ant						(X)	
CR.LCR.BrAs.AntAsH						(X)	
CR.LCR.BrAs.NeoPro.FS	X	X		X			
CR.MCR					X		
CR.MCR.CfaVS.Hbow.Eud					X		
CR.MCR.EcCr.CarSwi							X
CR.MCR.EcCr.AdigVt							(X)
CR.MCR.EcCr.FaAICr.Flu							(X)
CR.HCR.FaT.BalTub					X		
CR.HCR.FaT.CTub.Adig		X					
CR.HCR.Xfa.SwiLgAs						X	
Sublittoral sediment							
SS.SMu.CFiMu	X	X		X			
SS.SMu.CFiMu.SpnMeg	X	X	X	X	X		X
SS.SMu.CFiMu.SpnMeg.Fun		X	X	X	X	X	X
SS.SMu.CFiMu.SpnMegMax		(X)	(X)	(X)	X	(X)	(X)

Table 11 continued

Biotope	Eil	Upper Linnhe	Central Linnhe	Leven	Etive	Lower Linnhe (W)	Lower Linnhe (E)
SS.SMu.CFiMu.BlyrAchi			(X)	(X)	(X)		(X)
SS.SMu.CsaMu				X		X	
SS.SMu.CsaMu.VirOphPmax	X	(X)		X			X
SS.SMx.IMx					X		X
SS.SMx.CMx	X		X			X	X
SS.SMx.CMx.FluHyd					X		
SS.SMx.CMx.CIloModHo	(X)			(X)			
SS.SMx.CMx.CIloMx				(X)	(X)	X	
SS.SMx.CMx.CIloMx.Nem				(X)			
SS.SMx.CMx.OphMx		X	X	X		X	X
SS.SMp.KSwSS					X		
SS.SMp.KSwSS.LsacCho				X			
SS.SMp.KSwSS.LsacR.Mu			X		X	X	(X)
SS.SMp.KSwSS.LsacR.Sa			(X)	(X)	X	X	X
SS.SMp.KSwSS.LsacR.Gv			(X)	(X)			(X)
SS.SCS.CCS						X	X
SS.SCS.CCS.PomB				X			
SS.SBR.SMus.ModHAs				(X)			

APPENDIX 4. INFAUNAL SURVEY DATA

Table 12. Grab stations sampled in Loch Linnhe survey.

Date	General Location	Station Number	Lat	Lon	Depth	Biotope	Notes
03/08/2011	Lower Loch Etive	MG11	56.459450	-5.282467	40	SS.SMu.CFiMu	fine mud
03/08/2011	Lower Loch Etive	MG20	56.450650	-5.253700	32	SS.SMu.CFiMu.Spnmeg	heavily burrowed soft mud
03/08/2011	Lower Loch Etive	MG13	56.452333	-5.239200	24	SS.SMu.CFiMu.Spnmeg	soft mud with burrows
04/08/2011	Upper Loch Etive	MG19	56.552067	-5.076250	11	SS.SMu.CFiMu.BlyrAchi	soft mud anoxic sediment, mounds
04/08/2011	Upper Loch Etive	MG18	56.543483	-5.085183	35	SS.SMu.CFiMu.BlyrAchi	fine soft mud small burrows
04/08/2011	Upper Loch Etive	MG17	56.502567	-5.132567	50.7	SS.SMu.CFiMu.Spnmeg.Fun	burrowed soft mud mounds
04/08/2011	Upper Loch Etive	MG16	56.492117	-5.145150	78	SS.SMu.CFiMu.Spnmeg.Fun	burrowed soft mud mounds
04/08/2011	Upper Loch Etive	MG21	56.481633	-5.163800	43	SS.SMu.CFiMu.BlyrAchi	soft mud small occasional burrows
04/08/2011	Upper Loch Etive	MG14	56.472350	-5.164883	130	SS.SMu.CFiMu	silty mud
05/08/2011	Upper Loch Etive	MG22	56.450183	-5.204183	116	SS.SMu.CFiMu.MegMax	soft mud with burrows
05/08/2011	Lower Loch Linnhe	MG23	56.472717	-5.448533	50	SS.SMu.CFiMu.Spnmeg.Fun	soft silty mud
05/08/2011	Lower Loch Linnhe	MG24	56.463583	-5.441567	45	SS.SMu.CFiMu.Spnmeg.Fun	soft mud with burrows
06/08/2011	Loch Leven	MG10	56.680467	-5.146700	59	SS.SMu.CMx.OphMx	coarse sand pebbles gravel
06/08/2011	Loch Leven	MG9	56.683167	-5.141283	45	SS.SMu.CSaMu	sandy mud drift kelp
07/08/2011	Loch Leven	MG1	56.711750	-4.994400	22.1	SS.SMu.CFiMu.BlyrAchi	soft mud
07/08/2011	Loch Leven	MG2	56.711750	-4.994400	23.6	SS.SMu.CFiMu.BlyrAchi	fine soft mud
07/08/2011	Loch Leven	MG3	56.711617	-5.012883	20.5	SS.SMu.CFiMu.Spnmeg.Fun	fine silty mud
07/08/2011	Loch Leven	MG4	56.701233	-5.067567	31.5	SS.SMu.CFiMu.Spnmeg.Fun	burrowed mud
07/08/2011	Loch Leven	MG5	56.698050	-5.085183	45	SS.SMu.CFiMu.Spnmeg.Fun	soft mud Nephrops burrows
07/08/2011	Loch Leven	MG6	56.696517	-5.100700	40	SS.SMu.CFiMu.Spnmeg.Fun	heavily burrowed mud
08/08/2011	Loch Leven	MG7	56.692567	-5.117167	30.4	SS.SMu.CFiMu.Spnmeg.Fun	heavily burrowed mud
08/08/2011	Loch Leven	MG8	56.688667	-5.129233	33.0	SS.SMu.CFiMu	soft mud heavily burrowed
15/08/2011	Loch Eil	JG1	56.855972	-5.314784	21.3	SS.SMu.CFiMu.Spnmeg	burrowed mud
15/08/2011	Loch Eil	JG2	56.851421	-5.306882	26	SS.SMu.CsaMu.VirOphPmax	burrowed mud
16/08/2011	Loch Eil	JG3	56.849918	-5.201816	67	SS.SMu.CFiMu	soft mud with burrows
16/08/2011	Loch Eil	JG4	56.797577	-5.159747	18	SS.SMu.CFiMu.Spnmeg	fine burrowed mud
16/08/2011	Loch Eil	JG14	56.818149	-5.129942	28	SS.SMu.CFiMu.Spnmeg.Fun	silty mud

Table 12 continued

Date	General Location	Station Number	Lat	Lon	Depth	Biotope	Notes
16/08/2011	Loch Linnhe	JG5	56.755592	-5.209123	147	SS.SMu.CFiMu.MegMax	soft silty burrowed mud
17/08/2011	Loch Linnhe	JG15	56.613659	-5.511369	17	SS.SMu.CFiMu.SpnMeg	burrowed mud
17/08/2011	Loch Linnhe	JG7	56.606140	-5.475503	57	SS.SMu.CFiMu.SpnMeg.Fun	very soft burrowed mud
18/08/2011	Loch Linnhe	JG8	56.456192	-5.483861	41	SS.SMu.CFiMu.SpnMeg.Fun	fine mud
18/08/2011	Loch Linnhe	JG9	56.544590	-5.550606	116	SS.SMu.CFiMu.MegMax	soft mud heavily burrowed
18/08/2011	Loch Linnhe	JG12	56.429234	-5.605309	122	SS.SMu.CFiMu.SpnMeg	fine soft mud
19/08/2011	Loch Linnhe	JG10	56.494842	-5.636015	207	SS.SCS.CCS	gravel stone hard sand
20/08/2011	Loch Linnhe	JG13	56.498951	-5.472977	51	SS.SMu.CFiMu.SpnMeg.Fun	soft mud
21/08/2011	Loch Linnhe	JG11	56.468143	-5.607947	15	SS.SMx.CMx.OphMx	gravel shell sand

Table 13. Specimens collected during multigrab survey.

Site	Target spp.	Date	Lat	Lon	Depth (m)	Substrate Notes	Sp. collected	Ind. No.	Shell Length (mm)	Shell Depth (mm)
JMG1	<i>Arctica islandica</i> / <i>Glossus humanus</i>	15/08/2011	56.856422	-5.313261	14.5	Muddy. Lots of <i>A. islandica</i> shells	<i>A. islandica</i>	1	75	69
								2	69	64
JMG2	<i>A. islandica</i> / <i>G. humanus</i>		56.851421	-5.306882	26		<i>A. islandica</i>	1	23	21
JMG3	<i>A. islandica</i> / <i>G. humanus</i>		56.847752	-5.181448	19	Mud & <i>Mytilus</i> shells				
JMG4	<i>A. islandica</i> / <i>G. humanus</i>	16/08/2011	56.778549	-5.168144	18.5	Only dead <i>A. islandica</i> shells found				
JMG5	<i>A. islandica</i> / <i>G. humanus</i>		56.779713	-5.16868	22	Mud/shell. Dead <i>A. islandica</i> shells found. Could not get to historic depth (7-13 m) due to steep incline & bedrock	<i>A. islandica</i>	1	78	71
JMG6	<i>A. islandica</i> / <i>G. humanus</i>		56.764889	-5.207248	27.5	Dead <i>A. islandica</i> shells. Soft mud				
JMG7	<i>A. islandica</i> / <i>G. humanus</i>	17/08/2011	56.696258	-5.270743	42	Coarse muddy sand. <i>A. islandica</i> shell. Single <i>Brissopsis</i> found				
JMG8	<i>A. islandica</i> / <i>G. humanus</i>		56.641487	-5.341372	28	No <i>A. islandica</i> found. Slightly W of point to reach required depth				
JMG9	<i>A. islandica</i> / <i>G. humanus</i>		56.695343	-5.275431	25.5	Coarse muddy sand with small stones Single <i>A. islandica</i> shell.				
JMG10	<i>A. islandica</i> / <i>G. humanus</i>		56.695151	-5.292092	27	Fine soft mud. No shells				
JMG11	<i>A. islandica</i> / <i>G. humanus</i>		56.655285	-5.38084	21	Sandy mud with <i>A. islandica</i> shell debris.				
JMG12	<i>Modiolus modiolus</i>	22/08/2011	56.388794	-5.64517	177					

Table 14. Full list of infaunal taxa collected at grab stations during 2011 Linnhe survey.

Taxa	Grab Station											
	JG1	JG2	JG3	JG4	JG5	JG6	JG7	JG8	JG9	JG10	JG11	JG12
<i>Abra alba</i>	0	0	0	0	1	0	0	2	0	0	5	26
<i>Abra nitida</i>	0	0	0	0	0	0	2	0	0	0	3	1
<i>Abra prismatica</i>	1	0	0	0	0	0	0	0	0	0	0	0
<i>Abyssoninoe hibernica</i>	0	0	0	1	0	2	1	0	0	0	0	0
<i>Acanthocardia echinata</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>Acidostoma obesum</i>	0	0	1	0	0	0	0	0	0	0	0	0
<i>Testudinalia testudinalis</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>Alvania punctura</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>Ampelisca gibba</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>Ampelisca tenuicornis</i>	0	0	0	0	0	0	0	0	0	0	1	0
<i>Ampelisca typica</i>	0	0	0	0	0	0	0	0	0	0	1	0
<i>Ampharete finmarchica</i>	0	0	2	0	8	0	0	0	0	0	0	0
<i>Ampharete grubei</i>	0	0	0	0	0	0	0	0	0	0	1	0
<i>Amphicteis gunneri</i>	0	0	0	0	0	0	0	0	0	0	1	0
<i>Amphipholis squamata</i>	0	0	0	0	0	0	0	0	0	0	1	0
<i>Amphitrite edwardsii</i>	0	0	0	0	0	0	0	0	0	3	4	0
<i>Amphiura chiajei</i>	0	1	0	30	2	2	7	5	2	0	0	0
<i>Amphiura filiformis</i>	1	29	15	19	0	0	2	3	2	5	2	2
<i>Aonides oxycephala</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>Aonides paucibranchiata</i>	0	0	0	0	0	0	0	0	0	7	0	0
<i>Apherusa bispinosa</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>Aphrodita aculeata</i>	0	0	0	0	0	0	0	0	0	0	2	0
<i>Apistobranchnus tullbergi</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>Aricidea sp</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>Myrianida sp</i>	0	0	0	0	0	0	0	0	0	1	0	0
<i>Axinulus croulinensis</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>Brissopsis lyrifera</i>	0	0	0	0	0	1	0	0	0	0	0	0
<i>Calocaris macandreae</i>	0	0	0	0	1	0	0	0	3	0	0	0
<i>Capitella capitata</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>Cauleriella killariensis</i>	0	0	0	1	0	0	0	0	0	0	0	0
<i>Cauleriella zetlandica</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>Cerebratulus sp</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>Cerianthus lloydii</i>	0	0	3	0	5	0	0	0	0	5	3	0
<i>Chaetoderma nitidulum</i>	0	0	0	0	1	2	0	1	1	0	0	1
<i>Chaetopterus variopedatus</i>	0	0	0	0	0	0	0	0	1	0	0	0
<i>Chaetozone gibber</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>Chaetozone setosa</i>	0	0	0	0	8	0	1	0	2	0	0	2
<i>Chaetozone sp</i>	0	0	0	0	0	0	0	0	0	0	3	0
<i>Cheirocratus intermedius</i>	0	0	0	0	0	0	0	0	0	1	1	0
<i>Chirimia biceps</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>Cirratulus caudatus</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>Cirriformia tentaculata</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>Clymenella cincta</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>Commensodorum commensalis</i>	0	0	0	0	0	0	0	0	0	1	0	0
<i>Copepoda</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>Corbula gibba</i>	0	0	4	2	0	0	1	0	1	0	1	0
<i>Cossura longocirrata</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>Cuspidaria cuspidata</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>Cylichna cylindracea</i>	0	0	0	1	2	1	1	0	0	0	0	0
<i>Decapoda larva</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>Diplocirrus glaucus</i>	0	0	2	1	6	0	0	0	1	0	0	1
<i>Echinocardium cordatum</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>Echinus esculentus</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>Edwardsia sp</i>	0	0	0	1	0	0	0	0	0	1	1	0
<i>Emarginula fissura</i>	0	0	0	0	0	0	0	0	0	0	2	0
<i>Ennucula tenuis</i>	0	0	2	0	0	0	0	0	0	0	1	0
<i>Eriopisa elongata</i>	0	0	0	0	0	0	0	0	1	0	0	0

Table 14 continued

Taxa	Grab Station										
	JG1	JG2	JG3	JG4	JG5	JG6	JG7	JG8	JG9	JG10	JG11
<i>Eteone longa</i>	0	0	0	0	0	0	0	0	0	0	0
<i>Eualus cranchii</i>	0	0	0	0	0	0	0	0	0	0	0
<i>Euchone southerni</i>	0	0	0	0	0	0	0	0	0	1	0
<i>Euclymene droebachiensis</i>	0	0	0	0	0	0	0	0	0	0	0
<i>Euclymene lumbricoides</i>	0	0	0	0	0	0	0	0	0	0	0
<i>Euclymene oerstedii</i>	0	0	0	0	0	0	0	0	0	0	0
<i>Euclymeninae sp</i>	0	0	0	0	0	0	0	0	0	0	0
<i>Eulima bilineata</i>	0	0	0	0	0	0	0	0	0	1	0
<i>Eumida bahusiensis</i>	0	0	0	0	0	0	0	0	0	1	0
<i>Eunereis longissima</i>	0	0	0	0	0	0	0	0	0	0	0
<i>Eupolymnia nesidensis</i>	0	0	0	0	0	0	0	0	0	0	0
<i>Eusyllis blomstrandii</i>	0	0	0	0	0	0	0	0	0	0	0
<i>Falcidens crossotus</i>	0	0	0	0	0	1	0	0	1	1	0
<i>Galathea intermedia</i>	0	0	0	0	0	0	0	0	0	0	0
<i>Galathowenia oculata</i>	0	0	25	7	1	0	0	0	1	0	3
<i>Gammaropsis nitida</i>	0	0	0	0	0	0	0	0	0	1	0
<i>Gammarus sp</i>	0	0	0	0	0	0	0	0	0	0	0
<i>Gattyana cirrhosa</i>	0	0	0	0	0	0	0	0	0	0	2
<i>Glossus humanus</i>	0	0	0	1	0	0	0	0	0	0	0
<i>Glycera alba</i>	0	0	1	0	1	0	0	0	0	0	0
<i>Glycera unicornis</i>	0	0	0	0	0	0	2	0	3	4	1
<i>Golfingia sp</i>	0	0	0	1	0	0	0	1	0	1	3
<i>Goniada maculata</i>	0	0	5	1	0	0	0	0	0	0	0
<i>Harmothoe fragilis</i>	0	0	0	0	0	0	0	0	1	0	3
<i>Harpinia pectinata</i>	0	0	0	0	0	0	0	0	0	0	0
<i>Hiatella arctica</i>	0	0	0	0	0	0	0	0	0	0	1
<i>Hyalia vitrea</i>	3	0	0	0	4	0	0	0	0	0	0
<i>Hyas coarctatus</i>	0	0	0	0	0	0	0	0	0	0	0
<i>Idotea neglecta</i>	0	0	0	0	0	0	0	0	0	0	0
<i>Iphinoe serrata</i>	0	0	0	0	0	0	0	0	0	0	0
<i>Jasmineira caudata</i>	0	0	1	0	0	0	0	0	0	0	0
<i>Kurtiella bidentata</i>	0	0	10	1	0	0	0	2	0	3	3
<i>Labidoplax buskii</i>	0	0	2	0	0	0	0	0	0	0	0
<i>Labidoplax media</i>	0	0	0	0	0	0	0	0	0	0	1
<i>Lacuna vincta</i>	0	0	0	0	0	0	0	0	0	0	0
<i>Lagis koreni</i>	0	0	0	2	1	0	2	0	0	0	0
<i>Lanice conchilega</i>	0	0	0	0	0	0	0	0	0	1	0
<i>Laonice cirrata</i>	0	0	0	0	0	0	0	0	0	9	0
<i>Leitoscoloplos mammosus</i>	0	0	0	0	0	0	0	0	0	0	0
<i>Leptochiton asellus</i>	0	0	0	0	0	0	0	0	0	5	6
<i>Leptomysis sp</i>	0	0	0	0	0	0	0	0	0	0	0
<i>Leptosynapta inhaerens</i>	0	0	1	0	0	0	0	0	0	0	0
<i>Leucothoe lilljeborgi</i>	0	0	0	0	0	0	0	0	0	0	0
<i>Levinsenia gracilis</i>	0	0	0	6	3	0	0	0	1	0	0
<i>Lucinoma borealis</i>	0	0	4	0	0	0	0	0	0	0	0
<i>Lumbrineris gracilis</i>	0	0	0	0	0	0	0	0	0	2	0
<i>Lysilla loveni</i>	0	0	0	0	0	0	0	0	0	0	1
<i>Magelona alleni</i>	0	0	0	5	0	0	0	0	0	0	0
<i>Magelona minuta</i>	0	0	0	0	0	0	0	0	0	0	0
<i>Malmgreniella marphysae</i>	0	0	0	0	0	0	0	0	0	3	0
<i>Mediomastus fragilis</i>	0	0	0	0	0	0	0	0	0	0	0
<i>Melinna sp</i>	0	0	0	0	0	0	0	0	0	0	2
<i>Melinna palmata</i>	0	0	10	0	0	0	0	0	0	0	16
<i>Modiolus modiolus</i>	0	0	0	0	0	0	0	0	0	1	0
<i>Monticellina dorsobranchialis</i>	0	0	0	0	0	0	0	1	9	0	0
<i>Munida rugosa</i>	0	0	0	0	0	0	0	0	0	0	1
<i>Myrtea spinifera</i>	0	0	6	0	2	0	0	0	0	0	0

Table 14 continued

Taxa	Grab Station											
	JG1	JG2	JG3	JG4	JG5	JG6	JG7	JG8	JG9	JG10	JG11	JG12
<i>Mysida sp. juv</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>Nebalia bipes</i>	0	0	0	0	0	0	0	0	0	1	0	0
<i>Nematoda</i>	0	0	0	0	0	0	0	0	0	7	0	0
<i>Nemertea</i>	0	0	1	0	0	0	0	0	0	1	0	0
<i>Nephrops norvegicus</i>	0	0	0	0	0	0	0	1	0	0	0	0
<i>Nephtys hombergi</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>Nephtys hystricis</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>Nephtys incisa</i>	7	1	0	9	0	4	3	2	0	0	0	1
<i>Nephtys kersivalensis</i>	0	0	2	0	0	0	0	0	0	0	2	0
<i>Nereimyra punctata</i>	0	0	0	0	0	0	0	0	0	1	0	0
<i>Nicomache lumbricalis</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>Notomastus latericeus</i>	0	1	4	0	1	0	1	0	0	1	5	0
<i>Nucula nitidosa</i>	0	0	5	0	0	0	0	0	0	0	1	0
<i>Nuculana minuta</i>	0	0	0	0	0	0	0	0	0	1	0	0
<i>Ophelina acuminata</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>Ophiactis balli</i>	0	0	0	0	0	0	0	0	0	1	0	0
<i>Ophiocomina nigra</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>Ophiodromus flexuosus</i>	0	1	1	0	1	0	1	1	0	0	0	0
<i>Ophiothrix fragilis</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>Ophiura albida</i>	0	0	0	0	0	0	0	0	0	0	3	0
<i>Orchomenella nana</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>Ostracoda</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>Othomaera othonis</i>	0	0	0	0	0	0	0	0	0	1	0	0
<i>Owenia fusiformis</i>	0	0	0	0	0	0	0	0	0	2	4	0
<i>Pagurus bernhardus</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>Pagurus pubescens</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>Palliolium striatum</i>	0	0	0	0	0	0	0	0	0	0	2	0
<i>Palliolium tigerinum</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>Panthalis oerstedii</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>Paracucumaria hyndmani</i>	0	0	0	0	0	0	0	0	0	1	0	0
<i>Paradoneis sp</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>Paranaitis kosteriensis</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>Parvicardium scabrum</i>	0	0	0	0	0	0	0	0	0	0	1	0
<i>Phaxas pellucidus</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>Philine aperta</i>	1	0	0	0	0	0	0	0	0	0	0	0
<i>Philine scabra</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>Pholoe baltica</i>	0	0	1	1	0	0	0	0	0	0	0	0
<i>Phoronis sp</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>Phtisica marina</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>Phyllodoce mucosa</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>Phyllodoce rosea</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>Pilargis verrucosa</i>	0	1	7	1	4	1	0	0	0	0	0	1
<i>Pista cristata</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>Polycirrus sp</i>	1	0	4	1	0	0	0	1	0	2	0	0
<i>Polydora sp</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>Polyopthalmus pictus</i>	0	0	0	1	1	0	0	0	7	0	0	0
<i>Polyphysia crassa</i>	0	0	0	0	0	0	0	0	1	0	0	0
<i>Praxillella affinis</i>	0	0	0	3	3	0	0	0	0	0	5	0
<i>Praxillella gracilis</i>	0	0	0	0	0	0	1	0	1	0	0	0
<i>Priapulus caudatus</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>Prionospio cirrifera</i>	0	0	0	0	0	0	0	0	0	7	0	1
<i>Prionospio fallax</i>	0	0	1	0	0	0	0	0	0	0	0	0
<i>Prionospio multibranchiata</i>	0	0	0	0	0	0	0	0	0	0	0	7
<i>Processa nouveli holthuisi</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>Protodorvillea kefersteini</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>Pseudomystides limbata</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>Pseudopolydora paucibranchiata</i>	0	0	0	0	0	0	0	0	0	0	0	0

Table 14 continued

Taxa	Grab Station											
	JG1	JG2	JG3	JG4	JG5	JG6	JG7	JG8	JG9	JG10	JG11	JG12
<i>Psolus phantapus</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>Pygospio elegans</i>	0	0	0	0	0	0	0	0	0	0	1	0
<i>Rhodine loveni</i>	0	0	0	2	0	0	0	0	0	0	0	0
<i>Venerupis decussata</i>	0	0	0	0	0	0	0	0	0	0	2	0
<i>Sabella pavonina</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>Scalibregma inflatum</i>	0	0	0	0	0	0	0	0	0	1	1	6
<i>Scaphander lignarius</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>Scolelepis sp</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>Sige fusigera</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>Similipecten similis</i>	0	0	0	0	0	0	0	0	0	1	0	0
<i>Sosane sulcata</i>	0	0	3	0	0	0	0	0	0	0	0	0
<i>Sphaerodorum gracilis</i>	0	0	0	0	0	0	0	0	0	2	0	0
<i>Spiochaetopterus typicus</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>Spiophanes bombyx</i>	0	0	0	0	0	0	0	0	0	1	0	0
<i>Spiophanes kroyeri</i>	0	0	0	10	2	0	0	0	1	0	2	2
<i>Streblosoma bairdi</i>	0	0	0	0	0	0	0	0	0	0	0	0
Tanaidacea	0	0	0	0	0	0	0	0	0	0	0	0
<i>Tectura virginea</i>	0	0	0	0	0	0	0	0	0	0	1	0
<i>Tellimya ferruginosa</i>	0	0	0	0	0	1	0	0	0	0	0	0
<i>Terebellides stroemii</i>	0	0	0	2	0	0	0	0	0	0	0	0
<i>Thelepus cincinnatus</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>Thracia pubescens</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>Thyasira flexuosa</i>	14	6	15	6	0	0	0	0	0	0	8	0
<i>Thyone roscovita</i>	0	0	0	0	0	0	0	0	0	1	0	0
<i>Thysanocardia procera</i>	0	0	0	1	0	0	0	0	0	0	0	0
<i>Trichobranchus roseus</i>	0	0	0	0	0	0	0	0	0	0	1	0
<i>Trypanosyllis zebra</i>	0	0	0	0	0	0	0	0	0	1	0	0
<i>Tubulanus polymorphus</i>	0	0	2	0	1	0	0	0	0	0	0	0
<i>Turbellaria</i>	0	0	2	0	0	0	0	0	0	1	0	1
<i>Turritella communis</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>Upogebia stellata</i>	0	0	0	0	0	0	0	0	0	0	1	0
<i>Velutina velutina</i>	0	0	0	0	0	0	0	0	0	1	0	0
<i>Venus casina</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>Virgularia mirabilis</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>Westwoodilla caecula</i>	0	0	1	0	0	0	0	0	0	0	0	0

Table 14 continued

Taxa	Grab Station										
	JG13	JG14	JG15	MG1	MG2	MG3	MG4	MG5	MG6	MG7	MG8
<i>Abra alba</i>	0	0	1	0	0	0	1	0	1	1	5
<i>Abra nitida</i>	0	0	6	0	0	0	0	0	0	0	0
<i>Abra prismatica</i>	0	0	2	0	0	0	0	0	0	0	0
<i>Abyssoninoe hibernica</i>	0	1	1	0	0	0	7	11	4	6	3
<i>Acanthocardia echinata</i>	0	0	0	0	0	0	0	0	0	0	0
<i>Acidostoma obesum</i>	0	0	0	0	0	0	0	0	0	0	0
<i>Testudinalia testudinalis</i>	0	0	0	0	0	0	0	0	0	0	0
<i>Alvania punctura</i>	0	0	0	0	0	0	1	0	0	0	0
<i>Ampelisca gibba</i>	0	0	0	0	0	0	0	0	0	0	0
<i>Ampelisca tenuicornis</i>	3	0	0	1	0	0	0	0	0	1	0
<i>Ampelisca typica</i>	0	0	0	0	0	0	0	0	0	0	0
<i>Ampharete finmarchica</i>	0	0	0	0	0	2	0	0	0	0	0
<i>Ampharete grubei</i>	0	0	0	2	0	1	0	0	0	0	0
<i>Amphicteis gunneri</i>	0	0	0	0	0	0	0	0	0	0	0
<i>Amphipholis squamata</i>	0	0	0	0	0	0	0	1	0	0	0
<i>Amphitrite edwardsii</i>	0	2	0	1	0	0	0	2	0	0	0
<i>Amphiura chiajei</i>	8	2	13	7	2	20	12	10	7	9	16
<i>Amphiura filliformis</i>	15	9	33	0	2	1	3	1	1	9	16
<i>Aonides oxycephala</i>	0	0	0	0	0	0	0	0	0	0	0
<i>Aonides paucibranchiata</i>	0	0	0	0	0	0	0	0	0	0	0
<i>Apherusa bispinosa</i>	0	0	0	0	0	0	0	0	0	0	0
<i>Aphrodita aculeata</i>	0	0	1	0	0	0	0	0	0	0	0
<i>Apistobranchus tullbergi</i>	0	0	0	0	0	0	0	0	0	0	0
<i>Aricidea sp</i>	0	0	0	0	0	0	1	0	0	0	1
<i>Myrianida sp</i>	0	0	0	0	0	0	0	0	0	0	0
<i>Axinulus croulinensis</i>	0	0	0	0	0	0	0	0	0	0	0
<i>Brissopsis lyrifera</i>	0	0	0	0	0	0	0	0	0	0	0
<i>Calocaris macandreae</i>	0	0	0	0	0	1	0	0	1	0	0
<i>Capitella capitata</i>	0	0	0	0	0	0	0	0	0	0	0
<i>Caulleriella killariensis</i>	0	0	0	1	0	0	0	0	0	2	0
<i>Caulleriella zetlandica</i>	0	0	0	0	0	0	0	0	0	0	0
<i>Cerebratulus sp</i>	0	0	2	0	0	0	0	0	0	0	0
<i>Cerianthus lloydii</i>	0	0	0	0	0	0	0	0	0	0	1
<i>Chaetoderma nitidulum</i>	9	0	0	0	0	0	0	0	4	0	1
<i>Chaetopterus variopedatus</i>	0	0	0	0	0	0	0	0	0	0	0
<i>Chaetozone gibber</i>	0	0	0	0	0	0	0	0	0	0	0
<i>Chaetozone setosa</i>	0	2	9	0	0	6	1	0	2	4	8
<i>Chaetozone sp</i>	0	0	0	0	0	0	0	0	1	1	0
<i>Cheirocratus intermedius</i>	0	0	0	0	0	0	0	0	0	0	0
<i>Chirimia biceps</i>	0	0	0	0	0	0	0	0	0	0	0
<i>Cirratulus caudatus</i>	0	0	0	0	0	0	0	0	0	0	0
<i>Cirriformia tentaculata</i>	0	0	0	0	0	0	0	0	0	0	0
<i>Clymenella cincta</i>	0	2	0	0	0	0	0	0	0	0	0
<i>Commensodorum commensalis</i>	0	0	0	0	0	0	0	0	0	0	0
<i>Copepoda</i>	0	0	0	0	0	1	0	0	0	1	0
<i>Corbula gibba</i>	1	0	1	0	0	0	2	2	6	1	2
<i>Cossura longocirrata</i>	0	0	0	0	0	0	0	0	0	1	0
<i>Cuspidaria cuspidata</i>	0	0	0	0	0	0	0	0	0	0	0
<i>Cylichna cylindracea</i>	0	0	3	0	0	0	3	8	8	6	2
<i>Decapoda larva</i>	0	0	0	0	0	0	0	1	0	0	0
<i>Diplocirrus glaucus</i>	0	2	0	2	2	0	1	0	1	0	5
<i>Echinocardium cordatum</i>	0	1	0	0	0	0	0	0	0	0	0
<i>Echinus esculentus</i>	0	0	0	0	0	0	0	0	0	0	0
<i>Edwardsia sp</i>	0	0	3	0	0	0	0	0	0	0	0
<i>Emarginula fissura</i>	0	0	0	0	0	0	0	0	0	0	0
<i>Ennucula tenuis</i>	0	0	0	0	0	0	0	0	0	0	0
<i>Eriopisa elongata</i>	0	0	0	0	0	0	0	0	0	0	0

Table 14 continued

Taxa	Grab Station										
	JG13	JG14	JG15	MG1	MG2	MG3	MG4	MG5	MG6	MG7	MG8
<i>Euclymene droebachiensis</i>	1	0	0	0	0	0	0	0	0	0	0
<i>Euclymene lumbricoides</i>	0	1	0	0	0	0	0	0	0	1	2
<i>Euclymene oerstedii</i>	0	0	0	0	0	0	0	0	0	0	0
<i>Euclymeninae sp</i>	0	0	0	0	0	0	0	0	0	0	0
<i>Eulima bilineata</i>	0	0	0	0	0	0	0	0	0	0	0
<i>Eumida bahusiensis</i>	0	0	0	0	0	0	0	0	0	0	0
<i>Eunereis longissima</i>	0	0	0	0	0	0	0	0	0	0	0
<i>Eupolymnia nesidensis</i>	0	0	0	1	0	0	0	0	0	0	0
<i>Eusyllis blomstrandii</i>	0	0	0	0	0	0	0	0	0	0	0
<i>Falcidens crossotus</i>	0	0	0	0	0	0	0	0	0	0	0
<i>Galathea intermedia</i>	0	0	0	0	0	0	0	0	0	0	0
<i>Galathowenia oculata</i>	0	9	1	1	0	4	0	0	0	0	1
<i>Gammaropsis nitida</i>	0	0	0	0	0	1	0	0	0	0	0
<i>Gammarus sp</i>	0	0	0	0	0	0	0	0	0	0	0
<i>Gattyana cirrhosa</i>	0	0	0	0	0	0	0	0	0	0	0
<i>Glycera alba</i>	0	0	0	0	0	0	1	1	2	3	2
<i>Glycera unicornis</i>	0	2	0	0	0	2	0	1	0	1	4
<i>Goniada maculata</i>	0	1	0	0	0	1	0	0	0	0	0
<i>Harmothoe fragilis</i>	0	0	0	0	0	0	2	0	0	1	1
<i>Hiatella arctica</i>	0	0	0	0	0	0	0	1	0	0	0
<i>Hyala vitrea</i>	0	0	0	2	0	2	33	4	7	0	0
<i>Iphinoe serrata</i>	0	0	0	1	0	0	0	0	0	0	1
<i>Kurtiella bidentata</i>	10	1	24	0	0	0	13	0	2	0	2
<i>Labidoplax buskii</i>	0	17	0	0	0	0	0	0	0	0	0
<i>Laqis koreni</i>	1	0	0	0	0	0	1	1	0	0	1
<i>Lanice conchilega</i>	0	0	0	0	0	0	0	0	0	0	0
<i>Laonice cirrata</i>	0	0	0	0	0	0	0	0	0	0	0
<i>Leitoscoloplos mammosus</i>	0	0	0	0	0	0	0	0	0	0	1
<i>Leptochiton asellus</i>	0	0	0	0	0	0	0	0	0	0	0
<i>Leptomysis sp</i>	0	0	0	0	0	1	0	0	0	0	0
<i>Leucothoe lilljeborgi</i>	0	0	0	0	0	0	2	0	0	0	0
<i>Levinsenia gracilis</i>	0	0	0	0	0	9	0	0	0	1	1
<i>Lucinoma borealis</i>	0	7	0	0	0	1	0	0	0	0	0
<i>Lumbrineris gracilis</i>	0	0	0	0	0	0	0	0	0	0	0
<i>Lysilla loveni</i>	0	3	3	0	0	0	7	13	6	12	4
<i>Magelona alleni</i>	0	0	0	0	0	0	0	0	0	0	1
<i>Magelona minuta</i>	0	0	1	0	0	0	1	1	0	2	1
<i>Malmgreniella marphysae</i>	0	1	0	0	0	0	0	0	0	0	1
<i>Mediomastus fragilis</i>	0	0	1	0	0	0	2	0	0	0	1
<i>Melinna palmata</i>	0	1	32	1	0	0	0	0	0	0	0
<i>Myrtea spinifera</i>	0	0	0	1	0	10	2	1	3	0	6

Table 14 continued

Taxa	Grab Station										
	JG13	JG14	JG15	MG1	MG2	MG3	MG4	MG5	MG6	MG7	MG8
<i>Mysida sp. juv</i>	0	0	0	0	0	0	0	0	0	2	0
<i>Nebalia bipes</i>	0	0	0	0	0	0	0	0	0	0	0
<i>Nematoda</i>	0	0	0	0	0	0	0	0	0	0	1
<i>Nemertea sp</i>	0	0	1	0	0	6	8	11	2	2	15
<i>Nephrops norvegicus</i>	0	0	0	0	0	0	0	0	0	0	0
<i>Nephtys hombergi</i>	0	2	0	0	0	0	0	0	0	0	0
<i>Nephtys hystricis</i>	0	0	0	0	0	0	0	0	0	0	0
<i>Nephtys incisa</i>	1	0	9	3	3	1	1	1	1	1	5
<i>Nephtys kersivalensis</i>	0	0	0	0	0	1	0	0	0	0	0
<i>Nereimyra punctata</i>	0	0	0	1	0	0	0	0	0	0	0
<i>Nicomache lumbricalis</i>	0	0	0	0	0	0	0	0	0	0	0
<i>Notomastus latericeus</i>	1	11	1	0	0	1	6	3	5	8	3
<i>Nucula nitidosa</i>	0	0	0	2	0	0	4	1	1	4	4
<i>Nuculana minuta</i>	0	0	0	0	0	0	0	0	0	0	0
<i>Ophelina acuminata</i>	0	0	0	0	0	0	0	1	0	0	0
<i>Ophiactis balli</i>	0	0	0	0	0	0	0	0	0	0	0
<i>Ophiocomina nigra</i>	0	0	0	0	0	0	0	0	0	0	0
<i>Ophiodromus flexuosus</i>	1	0	0	4	0	0	3	6	1	3	3
<i>Ophiothrix fragilis</i>	0	0	0	0	0	0	0	0	0	0	0
<i>Ophiura albida</i>	0	0	0	0	0	0	0	0	0	0	0
<i>Orchomenella nana</i>	0	0	0	0	0	0	0	0	0	0	0
<i>Ostracoda</i>	0	0	0	0	0	0	0	0	0	0	1
<i>Othomaera othonis</i>	0	0	0	0	0	0	0	0	0	0	0
<i>Owenia fusiformis</i>	0	0	2	0	0	0	0	0	0	0	0
<i>Pagurus bernhardus</i>	0	0	0	0	0	0	0	0	0	0	0
<i>Pagurus pubescens</i>	0	0	0	0	0	0	1	0	0	0	0
<i>Palliolum striatum</i>	0	0	0	0	0	0	0	0	0	0	0
<i>Palliolum tigrinum</i>	0	0	0	0	0	0	0	0	0	0	0
<i>Panthalis oerstedii</i>	0	0	0	1	0	0	0	0	0	0	0
<i>Paracucumaria hyndmani</i>	0	0	0	0	0	0	0	0	0	0	0
<i>Paradoneis sp</i>	0	0	0	0	0	2	0	1	0	2	7
<i>Paranaitis kosteriensis</i>	0	0	0	0	0	0	0	0	0	0	0
<i>Parvicardium scabrum</i>	0	0	0	0	0	0	0	0	0	0	0
<i>Phaxas pellucidus</i>	0	0	0	0	0	0	0	0	0	0	0
<i>Philine aperta</i>	0	0	0	0	0	0	0	0	0	0	0
<i>Philine scabra</i>	0	0	0	0	0	0	0	0	0	0	0
<i>Pholoe baltica</i>	0	0	3	1	0	3	1	3	1	0	4
<i>Phoronis sp</i>	1	0	1	0	0	0	0	0	0	0	1
<i>Phtisica marina</i>	1	0	0	0	0	0	0	0	0	0	0
<i>Phyllodoce mucosa</i>	0	0	0	0	0	0	0	0	0	0	0
<i>Phyllodoce rosea</i>	0	0	0	0	0	0	1	0	0	1	1
<i>Pilargis verrucosa</i>	1	0	2	2	1	6	11	3	7	0	1
<i>Pista cristata</i>	0	0	0	0	0	9	0	0	0	0	8
<i>Polycirrus sp</i>	8	2	0	0	0	0	3	5	0	1	1
<i>Polydora sp</i>	0	0	0	0	0	0	0	0	0	0	0
<i>Polyophthalmus pictus</i>	0	0	0	0	0	0	2	1	0	1	0
<i>Polyphysia crassa</i>	0	0	0	0	0	0	0	0	0	0	0
<i>Praxillella affinis</i>	0	7	3	0	0	6	2	2	2	6	4
<i>Praxillella gracilis</i>	0	0	0	0	0	0	0	0	0	0	0
<i>Priapulus caudatus</i>	0	1	0	0	0	0	0	0	0	0	0
<i>Prionospio cirrifera</i>	0	0	0	0	0	3	0	0	0	0	2
<i>Prionospio fallax</i>	0	0	0	0	1	8	8	4	0	3	27
<i>Prionospio multibranchiata</i>	0	0	0	0	0	0	0	0	0	0	0
<i>Processa nouveli holthuisi</i>	0	0	0	0	0	0	0	1	0	0	0
<i>Protodorvillea kefersteini</i>	0	0	0	0	0	0	0	0	0	0	0
<i>Pseudomystides limbata</i>	1	0	0	0	0	0	0	0	0	0	0
<i>Pseudopolydora paucibranchiata</i>	0	0	0	0	0	0	0	0	0	0	0

Table 14 continued

Taxa	Grab Station										
	JG13	JG14	JG15	MG1	MG2	MG3	MG4	MG5	MG6	MG7	MG8
<i>Psolus phantapus</i>	0	0	0	0	0	0	0	0	0	0	0
<i>Pygospio elegans</i>	0	0	0	0	0	0	0	0	0	0	0
<i>Rhodine loveni</i>	0	0	1	0	2	4	0	3	4	1	0
<i>Venerupis decussata</i>	0	0	0	0	0	0	0	0	0	0	0
<i>Sabella pavonina</i>	0	0	0	0	0	0	0	2	0	0	0
<i>Scalibregma inflatum</i>	0	0	3	0	0	0	3	5	4	0	1
<i>Scaphander lignarius</i>	0	2	0	0	0	0	0	0	0	0	0
<i>Scolelepis sp</i>	0	0	0	0	0	0	0	1	0	1	0
<i>Sige fusigera</i>	0	0	1	0	0	0	0	0	0	1	0
<i>Similipecten similis</i>	0	0	0	0	0	0	0	0	0	0	0
<i>Sosane sulcata</i>	0	0	0	0	0	0	0	0	0	0	0
<i>Sphaerodorum gracilis</i>	0	0	0	0	0	0	0	0	0	0	0
<i>Spiochaetopterus typicus</i>	0	0	0	0	0	0	0	0	0	0	0
<i>Spiophanes bombyx</i>	0	0	0	0	0	0	0	0	0	0	0
<i>Spiophanes kroyeri</i>	3	0	1	0	1	2	6	8	4	9	6
<i>Streblosoma bairdi</i>	0	0	0	0	0	0	0	0	0	0	0
Tanaidacea	0	0	0	0	0	0	0	0	0	0	0
<i>Tectura virginea</i>	0	0	0	0	0	0	0	0	0	0	0
<i>Tellimya ferruginosa</i>	0	1	0	0	0	0	0	0	0	0	0
<i>Terebellides stroemii</i>	0	0	1	0	0	0	1	0	1	0	1
<i>Thelepus cincinnatus</i>	0	0	0	0	0	0	0	0	0	1	0
<i>Thracia pubescens</i>	0	0	1	0	0	0	0	0	0	0	0
<i>Thyasira flexuosa</i>	0	14	5	6	2	15	3	0	1	0	3
<i>Thyone roscovita</i>	0	0	0	0	0	0	0	0	0	0	0
<i>Thysanocardia procera</i>	0	0	0	0	0	0	3	0	0	0	0
<i>Trichobranchus roseus</i>	0	0	0	0	0	0	0	0	0	0	0
<i>Trypanosyllis zebra</i>	0	0	0	0	0	0	0	0	0	0	0
<i>Tubulanus polymorphus</i>	0	1	0	0	1	0	0	0	1	0	2
<i>Turbellaria</i>	0	0	0	0	0	0	0	0	0	0	0
<i>Turritella communis</i>	0	0	0	0	0	0	0	0	0	0	0
<i>Upogebia stellata</i>	0	0	0	0	0	0	0	0	0	0	0
<i>Velutina velutina</i>	0	0	0	0	0	0	0	0	0	0	0
<i>Venus casina</i>	0	0	0	0	0	0	0	0	0	0	0
<i>Virgularia mirabilis</i>	0	0	0	0	0	0	0	0	0	0	0
<i>Westwoodilla caecula</i>	0	0	0	0	0	0	0	0	2	2	0

Table 14 continued

Taxa	Grab Station								
	MG9	MG10	MG11	MG13	MG14	MG16	MG17	MG18	MG19
<i>Abra alba</i>	8	0	0	0	0	0	0	0	0
<i>Abra nitida</i>	0	0	0	0	0	0	0	0	0
<i>Abra prismatica</i>	0	0	0	0	0	0	0	0	0
<i>Abyssoninoe hibernica</i>	0	9	1	0	0	0	0	0	0
<i>Acanthocardia echinata</i>	2	0	0	0	0	0	0	0	0
<i>Acidostoma obesum</i>	1	2	0	0	0	0	0	0	0
<i>Testudinalia testudinalis</i>	2	0	0	0	0	0	0	0	0
<i>Alvania punctura</i>	0	0	0	0	0	0	0	0	0
<i>Ampelisca gibba</i>	0	0	0	0	0	0	0	0	0
<i>Ampelisca tenuicornis</i>	3	1	0	0	0	0	0	0	0
<i>Ampelisca typica</i>	0	0	0	0	0	0	0	0	0
<i>Ampharete finmarchica</i>	5	0	3	1	0	1	0	1	0
<i>Ampharete grubei</i>	0	13	1	0	0	0	0	0	0
<i>Amphicteis gunneri</i>	0	0	0	0	0	0	0	0	0
<i>Amphipholis squamata</i>	0	0	0	0	0	0	0	1	0
<i>Amphitrite edwardsii</i>	1	0	0	0	0	1	1	1	3
<i>Amphiura chiajei</i>	15	3	22	22	0	2	0	0	0
<i>Amphiura filiformis</i>	84	0	0	0	5	1	1	0	0
<i>Aonides oxycephala</i>	0	20	0	0	0	0	0	0	0
<i>Aonides paucibranchiata</i>	0	3	0	0	0	0	0	0	0
<i>Apherusa bispinosa</i>	4	1	0	0	0	0	0	0	0
<i>Aphrodita aculeata</i>	1	0	0	0	0	0	0	0	0
<i>Apistobanchus tullbergi</i>	0	2	0	0	0	0	0	0	0
<i>Aricidea sp</i>	0	0	0	0	0	0	0	0	2
<i>Myrianida sp</i>	0	0	0	0	0	0	0	0	0
<i>Axinulus croulinensis</i>	0	0	0	0	0	3	4	0	0
<i>Brissopsis lyrifera</i>	0	0	0	0	0	0	0	0	0
<i>Calocaris macandreae</i>	0	0	0	0	0	0	0	0	0
<i>Capitella capitata</i>	0	0	0	1	0	0	0	0	1
<i>Caulleriella killariensis</i>	7	7	3	3	0	0	1	0	0
<i>Caulleriella zetlandica</i>	0	0	0	0	0	0	0	0	0
<i>Cerebratulus sp</i>	0	0	0	0	0	0	0	0	0
<i>Cerianthus lloydii</i>	2	1	0	0	0	0	0	0	0
<i>Chaetoderma nitidulum</i>	0	0	0	0	0	0	0	0	0
<i>Chaetopterus variopedatus</i>	0	0	0	0	0	0	0	0	0
<i>Chaetozone gibber</i>	0	0	0	0	0	0	0	0	0
<i>Chaetozone setosa</i>	11	5	3	4	0	0	0	0	0
<i>Chaetozone sp</i>	0	63	0	0	0	0	0	0	0
<i>Cheirocratus intermedius</i>	0	0	0	0	0	0	0	0	0
<i>Chirimia biceps</i>	0	0	0	0	0	0	0	0	0
<i>Cirratulus caudatus</i>	0	0	0	5	0	0	0	0	0
<i>Cirriformia tentaculata</i>	0	1	2	1	0	0	0	0	0
<i>Clymenella cincta</i>	0	0	0	0	0	0	0	0	0
<i>Commensodorum commensalis</i>	0	0	0	0	0	0	0	0	0
<i>Copepoda</i>	0	1	0	0	0	0	0	0	7
<i>Corbula gibba</i>	8	1	15	1	0	0	1	0	0
<i>Cossura longocirrata</i>	0	0	0	1	0	0	0	0	0
<i>Cuspidaria cuspidata</i>	0	0	0	0	0	0	0	0	0
<i>Cylichna cylindracea</i>	10	0	0	0	0	0	0	0	0
<i>Decapoda larva</i>	2	0	0	0	0	0	0	0	0
<i>Diplocirrus glaucus</i>	4	0	5	2	0	0	0	1	0
<i>Echinocardium cordatum</i>	0	0	0	0	0	0	0	0	0
<i>Echinus esculentus</i>	1	0	0	0	0	0	0	0	0
<i>Edwardsia sp</i>	1	0	0	0	0	0	0	0	0
<i>Emarginula fissura</i>	1	0	0	0	0	0	0	0	0
<i>Ennucula tenuis</i>	0	0	0	0	1	0	0	0	0
<i>Eriopisa elongata</i>	0	0	0	0	0	0	0	0	0

Table 14 continued

Taxa	Grab Station								
	MG9	MG10	MG11	MG13	MG14	MG16	MG17	MG18	MG19
<i>Eteone longa</i>	0	0	0	0	0	0	0	0	0
<i>Eualus cranchii</i>	2	0	0	0	0	0	0	0	0
<i>Euchone southerni</i>	0	0	0	0	0	0	0	0	0
<i>Euclymene droebachiensis</i>	0	0	0	0	0	0	0	0	0
<i>Euclymene lumbricoides</i>	5	0	0	0	0	0	0	0	0
<i>Euclymene oerstedii</i>	3	0	0	0	0	0	0	0	0
<i>Euclymeninae sp</i>	0	3	0	0	0	0	0	0	0
<i>Eulima bilineata</i>	0	0	0	0	0	0	0	0	0
<i>Eumida bahusiensis</i>	0	0	0	0	0	0	0	0	1
<i>Eunereis longissima</i>	0	0	0	0	0	0	0	1	1
<i>Eupolymnia nesidensis</i>	0	0	0	0	0	0	0	0	0
<i>Eusyllis blomstrandii</i>	1	1	0	0	0	0	0	0	0
<i>Falcidens crossotus</i>	0	0	0	0	0	5	0	0	0
<i>Galathea intermedia</i>	1	0	0	0	0	0	0	0	0
<i>Galathowenia oculata</i>	6	0	0	0	0	0	0	0	0
<i>Gammaropsis nitida</i>	0	0	0	0	0	0	0	0	0
<i>Gammarus sp</i>	2	0	0	0	0	0	0	0	0
<i>Gattyana cirrhosa</i>	0	0	0	0	0	0	0	0	0
<i>Glossus humanus</i>	0	0	0	0	0	0	0	0	0
<i>Glycera alba</i>	0	0	0	0	0	0	0	0	2
<i>Glycera unicornis</i>	2	5	0	0	1	0	0	0	2
<i>Golfingia sp</i>	4	0	0	0	0	0	0	0	0
<i>Goniada maculata</i>	0	0	0	0	0	0	0	0	0
<i>Harmothoe fragilis</i>	2	1	0	1	0	0	0	0	0
<i>Harpinia pectinata</i>	2	0	0	0	0	0	0	0	0
<i>Hiatella arctica</i>	0	1	0	0	0	0	0	0	0
<i>Hyala vitrea</i>	0	0	2	0	0	0	0	0	1
<i>Hyas coarctatus</i>	1	0	0	0	0	0	0	0	0
<i>Idotea neglecta</i>	10	3	0	0	0	0	0	0	0
<i>Iphinoe serrata</i>	0	0	0	0	0	0	0	0	0
<i>Jasmineira caudata</i>	0	7	0	0	0	0	0	0	0
<i>Kurtiella bidentata</i>	55	0	0	0	0	0	0	0	0
<i>Labidoplax buskii</i>	0	0	0	0	0	0	0	0	0
<i>Labidoplax media</i>	0	0	0	0	0	0	0	0	0
<i>Lacuna vincta</i>	3	0	0	0	0	0	0	0	0
<i>Lagis koreni</i>	1	0	0	0	0	0	0	0	0
<i>Lanice conchilega</i>	0	0	0	0	0	0	0	0	0
<i>Laonice cirrata</i>	1	0	0	0	0	0	0	0	0
<i>Leitoscoloplos mammosus</i>	0	0	0	0	0	0	0	0	24
<i>Leptochiton asellus</i>	0	5	0	0	0	0	0	0	0
<i>Leptomysis sp</i>	0	0	0	0	0	0	0	0	0
<i>Leptosynapta inhaerens</i>	0	0	0	0	0	0	0	0	0
<i>Leucothoe lilljeborgi</i>	0	0	0	0	0	0	0	0	0
<i>Levinsenia gracilis</i>	0	0	14	5	0	0	1	0	0
<i>Lucinoma borealis</i>	7	0	0	0	0	0	0	1	0
<i>Lumbrineris gracilis</i>	0	2	0	0	0	0	0	0	0
<i>Lysilla loveni</i>	1	0	0	0	0	0	0	0	0
<i>Magelona alleni</i>	2	0	0	0	0	0	0	0	0
<i>Magelona minuta</i>	1	0	0	0	0	0	0	0	0
<i>Malmgreniella marphysae</i>	0	0	0	0	0	0	1	0	0
<i>Mediomastus fragilis</i>	0	16	0	0	0	0	0	0	0
<i>Melinna sp</i>	0	0	0	0	0	0	0	0	0
<i>Melinna palmata</i>	21	0	0	0	0	0	0	0	0
<i>Modiolus modiolus</i>	0	0	0	0	0	0	0	0	0
<i>Monticellina dorsobranchialis</i>	0	0	0	0	0	0	0	0	0
<i>Munida rugosa</i>	0	0	0	0	0	0	0	0	0
<i>Myrtea spinifera</i>	6	0	0	0	0	0	0	0	0

Table 14 continued

Taxa	Grab Station								
	MG9	MG10	MG11	MG13	MG14	MG16	MG17	MG18	MG19
<i>Mysida sp.juv</i>	0	0	0	0	0	0	0	0	0
<i>Nebalia bipes</i>	0	1	0	0	0	0	0	0	0
<i>Nematoda</i>	0	0	0	0	0	0	0	0	0
<i>Nemertea</i>	1	1	0	0	0	0	0	2	0
<i>Nephrops norvegicus</i>	0	0	0	0	0	0	0	0	0
<i>Nephtys hombergi</i>	0	0	0	0	0	0	0	0	0
<i>Nephtys hystrix</i>	0	0	0	0	0	6	0	0	2
<i>Nephtys incisa</i>	0	0	10	7	0	0	0	0	0
<i>Nephtys kersivalensis</i>	1	0	0	0	0	0	0	0	0
<i>Nereimyra punctata</i>	1	0	0	0	0	0	0	0	0
<i>Nicomache lumbricalis</i>	0	3	0	0	0	0	0	0	0
<i>Notomastus latericeus</i>	9	0	0	0	0	0	0	0	0
<i>Nucula nitidosa</i>	6	0	0	1	2	1	1	0	0
<i>Nuculana minuta</i>	0	0	0	0	0	0	0	0	0
<i>Ophelina acuminata</i>	1	0	0	0	0	0	0	0	0
<i>Ophiactis balli</i>	0	0	0	0	0	0	0	0	0
<i>Ophiocomina nigra</i>	0	8	0	0	0	0	0	0	0
<i>Ophiodromus flexuosus</i>	3	0	0	0	0	0	0	0	0
<i>Ophiothrix fragilis</i>	14	14	0	0	0	0	0	0	0
<i>Ophiura albida</i>	4	5	0	0	0	0	0	0	10
<i>Orchomenella nana</i>	1	0	0	0	0	0	0	0	0
<i>Ostracoda</i>	0	0	0	0	0	0	0	0	0
<i>Othomaera othonis</i>	0	0	0	0	0	0	0	0	0
<i>Owenia fusiformis</i>	13	4	0	0	0	0	0	0	0
<i>Pagurus bernhardus</i>	0	1	0	0	0	0	0	0	0
<i>Pagurus pubescens</i>	0	0	0	0	0	0	0	0	0
<i>Palliolum striatum</i>	1	0	0	0	0	0	0	0	0
<i>Palliolum tigrinum</i>	0	1	0	0	0	0	0	0	0
<i>Panthalis oerstedii</i>	0	0	0	0	0	0	0	0	0
<i>Paracucumaria hyndmani</i>	0	0	0	0	0	0	0	0	0
<i>Paradoneis sp</i>	2	4	0	0	0	0	0	2	0
<i>Paranaitis kosteriensis</i>	1	1	0	0	0	0	0	0	0
<i>Parvicardium scabrum</i>	0	0	0	0	0	0	0	0	0
<i>Phaxas pellucidus</i>	6	0	0	0	0	0	0	0	0
<i>Philine aperta</i>	0	0	0	1	0	0	0	0	0
<i>Philine scabra</i>	0	0	0	0	0	0	0	0	0
<i>Pholoe baltica</i>	16	1	0	0	0	0	0	0	2
<i>Phoronis sp</i>	1	0	0	0	0	0	0	0	0
<i>Phtisica marina</i>	0	0	0	0	0	0	0	0	0
<i>Phyllodoce mucosa</i>	0	0	0	0	0	0	0	0	1
<i>Phyllodoce rosea</i>	0	0	0	0	0	0	0	0	0
<i>Pilargis verrucosa</i>	0	0	1	0	0	0	0	0	0
<i>Pista cristata</i>	5	0	0	0	0	0	0	0	0
<i>Polycirrus sp</i>	2	1	0	0	0	0	0	1	0
<i>Polydora sp</i>	1	0	0	0	0	0	0	0	0
<i>Polyopthalmus pictus</i>	0	0	0	0	0	0	0	0	0
<i>Polyphysia crassa</i>	0	0	0	1	0	1	0	0	1
<i>Praxillella affinis</i>	7	0	10	5	0	0	0	0	0
<i>Praxillella gracilis</i>	0	0	0	0	0	0	1	0	0
<i>Priapulus caudatus</i>	1	0	0	0	0	0	0	0	0
<i>Prionospio cirrifera</i>	6	2	0	0	0	0	0	0	0
<i>Prionospio fallax</i>	13	0	2	0	0	0	0	0	0
<i>Prionospio multibranchiata</i>	0	0	0	0	0	0	0	0	0
<i>Processa nouveli holthuisi</i>	0	0	0	0	0	0	0	0	0
<i>Protodorvillea kefersteini</i>	0	1	0	0	0	0	0	0	0
<i>Pseudomystides limbata</i>	0	0	0	1	0	0	0	0	0
<i>Pseudopolydora paucibranchiata</i>	0	0	0	0	0	0	0	0	0

Table 14 continued

Taxa	Grab Station								
	MG9	MG10	MG11	MG13	MG14	MG16	MG17	MG18	MG19
<i>Psolus phantapus</i>	1	0	0	0	0	0	0	0	0
<i>Pygospio elegans</i>	0	0	0	0	0	0	0	0	0
<i>Rhodine loveni</i>	0	0	0	0	1	0	0	0	0
<i>Venerupis decussata</i>	0	0	0	0	0	0	0	0	0
<i>Sabella pavonina</i>	1	0	0	0	0	0	0	0	0
<i>Scalibregma inflatum</i>	13	28	0	0	0	0	0	0	1
<i>Scaphander lignarius</i>	0	0	0	0	0	0	0	0	0
<i>Scolelepis sp</i>	0	0	0	0	0	0	0	0	0
<i>Sige fusigera</i>	1	0	0	0	0	0	0	0	0
<i>Similipecten similis</i>	0	0	0	0	0	0	0	0	0
<i>Sosane sulcata</i>	0	0	0	0	0	0	0	0	0
<i>Sphaerodoru gracilis</i>	0	0	0	0	0	0	0	0	0
<i>Spiochaetopterus typicus</i>	0	0	0	0	1	1	1	1	0
<i>Spiophanes bombyx</i>	0	0	0	0	0	0	0	0	0
<i>Spiophanes kroyeri</i>	5	0	1	0	0	1	0	7	3
<i>Streblosoma bairdi</i>	1	0	12	2	0	0	0	0	0
<i>Tanaidacea</i>	1	0	0	0	0	0	0	0	0
<i>Tectura virginea</i>	0	0	0	0	0	0	0	0	0
<i>Tellimya ferruginosa</i>	0	0	0	0	0	0	0	0	0
<i>Terebellides stroemii</i>	2	0	7	2	0	0	1	0	1
<i>Thelepus cincinnatus</i>	0	0	0	0	0	0	0	0	0
<i>Thracia pubescens</i>	1	0	0	0	0	0	0	0	0
<i>Thyasira flexuosa</i>	16	1	2	0	0	0	0	0	0
<i>Thyone roscovita</i>	0	0	0	0	0	0	0	0	0
<i>Thysanocardia procera</i>	0	0	0	0	0	0	0	0	0
<i>Trichobranchus roseus</i>	1	0	0	0	0	2	1	0	0
<i>Trypanosyllis zebra</i>	0	0	0	0	0	0	0	0	0
<i>Tubulanus polymorphus</i>	3	1	1	0	0	0	0	0	0
<i>Turbellaria</i>	0	0	0	0	0	0	0	0	0
<i>Turritella communis</i>	1	0	0	0	0	0	0	0	0
<i>Upogebia stellata</i>	0	0	0	0	0	0	0	0	0
<i>Velutina velutina</i>	0	0	0	0	0	0	0	0	0
<i>Venus casina</i>	0	1	0	0	0	0	0	0	0
<i>Virgularia mirabilis</i>	0	0	1	9	0	0	0	0	0
<i>Westwoodilla caecula</i>	1	0	0	0	0	0	0	0	0

Table 14 continued

Taxa	Grab Station				
	MG20	MG21	MG22	MG23	MG24
<i>Abra alba</i>	0	0	0	0	1
<i>Abra nitida</i>	0	0	0	0	0
<i>Abra prismatica</i>	0	0	0	0	0
<i>Abyssoninoe hibernica</i>	2	0	0	1	3
<i>Acanthocardia echinata</i>	0	0	0	0	0
<i>Acidostoma obesum</i>	0	0	0	0	0
<i>Testudinalia testudinalis</i>	0	0	0	0	0
<i>Alvania punctura</i>	0	0	0	0	0
<i>Ampelisca gibba</i>	1	0	0	0	0
<i>Ampelisca tenuicornis</i>	0	0	0	0	0
<i>Ampelisca typica</i>	0	0	0	0	0
<i>Ampharete finmarchica</i>	0	0	2	0	0
<i>Ampharete grubei</i>	0	0	1	0	0
<i>Amphicteis gunneri</i>	0	0	0	0	0
<i>Amphipholis squamata</i>	0	0	0	0	0
<i>Amphitrite edwardsii</i>	0	0	0	1	0
<i>Amphiura chiajei</i>	5	5	15	1	6
<i>Amphiura filiformis</i>	0	0	47	0	1
<i>Aonides oxycephala</i>	0	0	0	0	0
<i>Aonides paucibranchiata</i>	0	0	0	0	0
<i>Apherusa bispinosa</i>	0	0	0	0	0
<i>Aphrodita aculeata</i>	0	0	0	0	0
<i>Apistobanchus tullbergi</i>	0	0	0	0	0
<i>Aricidea sp</i>	0	0	0	0	0
<i>Myrianida sp</i>	0	0	0	0	0
<i>Axinulus croulinensis</i>	0	8	9	0	0
<i>Brissopsis lyrifera</i>	0	0	0	0	0
<i>Calocaris macandreae</i>	0	0	0	0	0
<i>Capitella capitata</i>	0	0	0	0	0
<i>Caulleriella killariensis</i>	2	0	0	0	0
<i>Caulleriella zetlandica</i>	0	1	0	0	0
<i>Cerebratulus sp</i>	0	0	0	0	0
<i>Cerianthus lloydii</i>	0	0	0	0	0
<i>Chaetoderma nitidulum</i>	0	1	1	3	0
<i>Chaetopterus variopedatus</i>	0	0	0	0	0
<i>Chaetozone gibber</i>	0	6	0	1	0
<i>Chaetozone setosa</i>	1	0	0	0	0
<i>Chaetozone sp</i>	0	0	0	0	0
<i>Cheirocratus intermedius</i>	0	0	0	0	0
<i>Chirimia biceps</i>	0	1	0	0	0
<i>Cirratulus caudatus</i>	0	0	0	0	0
<i>Cirriformia tentaculata</i>	0	0	0	1	0
<i>Clymenella cincta</i>	0	0	0	0	0
<i>Commensodorum commensalis</i>	0	0	0	0	0
<i>Copepoda</i>	0	0	19	0	0
<i>Corbula gibba</i>	10	1	1	1	0
<i>Cossura longocirrata</i>	0	0	0	0	0
<i>Cuspidaria cuspidata</i>	1	0	0	0	0
<i>Cylichna cylindracea</i>	0	0	0	0	3
<i>Decapoda larva</i>	0	0	1	0	0
<i>Diplocirrus glaucus</i>	4	1	1	0	1
<i>Echinocardium cordatum</i>	0	0	0	0	0
<i>Echinus esculentus</i>	0	0	0	0	0
<i>Edwardsia sp</i>	0	1	0	0	0
<i>Emarginula fissura</i>	0	0	0	0	0
<i>Ennucula tenuis</i>	0	0	0	0	0
<i>Eriopisa elongata</i>	0	0	0	0	0

Table 14 continued

Taxa	Grab Station				
	MG20	MG21	MG22	MG23	MG24
<i>Eteone longa</i>	1	0	0	0	0
<i>Eualus cranchii</i>	0	0	0	0	0
<i>Euchone southerni</i>	0	0	0	0	0
<i>Euclymene droebachiensis</i>	0	0	0	0	0
<i>Euclymene lumbricoides</i>	0	0	0	0	0
<i>Euclymene oerstedii</i>	0	0	0	0	0
<i>Euclymeninae sp</i>	0	0	0	0	0
<i>Eulima bilineata</i>	0	0	0	0	0
<i>Eumida bahusiensis</i>	0	0	0	0	0
<i>Eunereis longissima</i>	0	0	0	0	0
<i>Eupolymnia nesidensis</i>	0	0	0	0	0
<i>Eusyllis blomstrandii</i>	0	0	0	0	0
<i>Falcidens crossotus</i>	0	2	1	0	0
<i>Galathea intermedia</i>	0	0	0	0	0
<i>Galathowenia oculata</i>	1	2	0	0	0
<i>Gammaropsis nitida</i>	0	0	0	0	0
<i>Gammarus sp</i>	0	0	0	0	0
<i>Gattyana cirrhosa</i>	0	0	0	0	0
<i>Glossus humanus</i>	0	0	0	0	0
<i>Glycera alba</i>	0	0	0	0	0
<i>Glycera unicornis</i>	0	0	1	0	0
<i>Golfingia sp</i>	0	2	0	0	0
<i>Goniada maculata</i>	1	1	0	0	0
<i>Harmothoe fragilis</i>	0	0	0	0	0
<i>Harpinia pectinata</i>	0	0	1	0	0
<i>Hiatella arctica</i>	0	0	0	0	0
<i>Hyala vitrea</i>	0	0	0	0	0
<i>Hyas coarctatus</i>	0	0	0	0	0
<i>Idotea neglecta</i>	0	0	0	0	0
<i>Iphinoe serrata</i>	0	0	0	0	0
<i>Jasmineira caudata</i>	0	0	0	0	0
<i>Kurtiella bidentata</i>	0	0	0	2	0
<i>Labidoplax buskii</i>	0	0	0	0	0
<i>Labidoplax media</i>	1	0	1	0	0
<i>Lacuna vincta</i>	0	0	0	0	0
<i>Lagis koreni</i>	0	0	0	0	0
<i>Lanice conchilega</i>	0	0	0	0	0
<i>Laonice cirrata</i>	0	0	0	0	0
<i>Leptomysis sp</i>	0	0	0	0	0
<i>Leptosynapta inhaerens</i>	0	0	0	0	0
<i>Leucothoe lilljeborgi</i>	0	0	0	0	0
<i>Levinsenia gracilis</i>	6	0	0	0	0
<i>Lucinoma borealis</i>	0	0	0	0	0
<i>Lumbrineris gracilis</i>	0	0	0	0	0
<i>Lysilla loveni</i>	1	0	1	3	6
<i>Magelona alleni</i>	0	0	0	0	0
<i>Magelona minuta</i>	0	0	0	0	0
<i>Malmgreniella marphysae</i>	0	0	0	0	0
<i>Mediomastus fragilis</i>	0	0	0	0	0
<i>Melinna sp</i>	0	0	0	0	0
<i>Melinna palmata</i>	0	0	1	0	0
<i>Modiolus modiolus</i>	0	0	0	0	0
<i>Monticellina dorsobranchialis</i>	4	9	42	0	0
<i>Munida rugosa</i>	0	0	0	0	0
<i>Myrtea spinifera</i>	0	0	8	0	0

Table 14 continued

Taxa	Grab Station				
	MG20	MG21	MG22	MG23	MG24
<i>Mysida sp. juv</i>	0	0	0	0	0
<i>Nebalia bipes</i>	0	0	0	0	0
<i>Nematoda</i>	0	0	0	0	0
<i>Nemertea</i>	0	0	0	0	0
<i>Nephrops norvegicus</i>	0	0	0	0	1
<i>Nephtys hombergi</i>	0	0	0	0	0
<i>Nephtys hystricis</i>	0	1	0	0	0
<i>Nephtys incisa</i>	3	0	0	2	8
<i>Nephtys kersivalensis</i>	0	0	0	0	0
<i>Nereimyra punctata</i>	0	0	0	0	0
<i>Nicomache lumbricalis</i>	0	0	0	0	0
<i>Notomastus latericeus</i>	0	0	0	1	2
<i>Nucula nitidosa</i>	3	4	3	0	1
<i>Nuculana minuta</i>	0	0	0	0	0
<i>Ophelina acuminata</i>	0	0	0	0	0
<i>Ophiactis balli</i>	0	0	0	0	0
<i>Ophiocomina nigra</i>	0	0	0	0	0
<i>Ophiodromus flexuosus</i>	0	0	0	1	0
<i>Ophiothrix fragilis</i>	0	0	0	0	0
<i>Ophiura albida</i>	0	0	0	0	0
<i>Orchomenella nana</i>	0	0	0	0	0
<i>Ostracoda</i>	0	0	0	0	0
<i>Othomaera othonis</i>	0	0	0	0	0
<i>Owenia fusiformis</i>	0	0	0	0	0
<i>Pagurus bernhardus</i>	0	0	0	0	0
<i>Pagurus pubescens</i>	0	0	0	0	0
<i>Palliolum striatum</i>	0	0	0	0	0
<i>Palliolum tigerinum</i>	0	0	0	0	0
<i>Panthalis oerstedii</i>	0	0	0	0	0
<i>Paracucumaria hyndmani</i>	0	0	0	0	0
<i>Paradoneis sp</i>	0	0	3	0	0
<i>Paranaitis kosteriensis</i>	0	0	0	0	1
<i>Parvicardium scabrum</i>	0	0	0	0	0
<i>Phaxas pellucidus</i>	0	0	0	0	0
<i>Philine aperta</i>	0	0	0	0	0
<i>Philine scabra</i>	1	0	0	0	0
<i>Pholoe baltica</i>	2	0	1	0	0
<i>Phoronis sp</i>	0	0	0	0	0
<i>Phtisica marina</i>	0	0	0	0	0
<i>Phyllodoce mucosa</i>	0	0	0	0	0
<i>Phyllodoce rosea</i>	0	0	0	0	0
<i>Pilargis verrucosa</i>	1	1	2	1	1
<i>Pista cristata</i>	1	0	1	0	1
<i>Polycirrus sp</i>	0	0	1	1	1
<i>Polydora sp</i>	0	0	0	0	0
<i>Polyopthalmus pictus</i>	0	0	0	0	0
<i>Polyphysia crassa</i>	2	0	0	0	0
<i>Praxillella affinis</i>	10	2	2	1	0
<i>Praxillella gracilis</i>	0	0	1	0	0
<i>Priapulus caudatus</i>	0	0	0	0	0
<i>Prionospio cirrifera</i>	0	0	0	0	0
<i>Prionospio fallax</i>	1	0	0	0	1
<i>Prionospio multibranchiata</i>	0	0	0	0	0
<i>Processa nouveli holthuisi</i>	0	0	0	0	0
<i>Protodorvillea kefersteini</i>	0	0	0	0	0
<i>Pseudomystides limbata</i>	0	0	0	0	0
<i>Pseudopolydora paucibranchiata</i>	1	0	1	0	0

Table 14 continued

Taxa	Grab Station				
	MG20	MG21	MG22	MG23	MG24
<i>Psolus phantapus</i>	0	0	0	0	0
<i>Pygospio elegans</i>	0	0	0	0	0
<i>Rhodine loveni</i>	0	0	0	0	1
<i>Venerupis decussata</i>	0	0	0	0	0
<i>Sabella pavonina</i>	0	0	0	0	0
<i>Scalibregma inflatum</i>	0	0	0	0	2
<i>Scaphander lignarius</i>	0	0	0	0	0
<i>Scoelepis sp</i>	0	0	0	0	0
<i>Sige fusigera</i>	0	1	1	0	0
<i>Similipecten similis</i>	0	0	0	0	0
<i>Sosane sulcata</i>	0	0	0	0	0
<i>Sphaerodorum gracilis</i>	0	0	0	0	0
<i>Spiochaetopterus typicus</i>	1	3	0	0	0
<i>Spiophanes bombyx</i>	0	0	0	0	0
<i>Spiophanes kroyeri</i>	1	4	0	0	1
<i>Streblosoma bairdi</i>	2	0	0	0	0
Tanaidacea	0	0	0	0	0
<i>Tectura virginea</i>	0	0	0	0	0
<i>Tellimya ferruginosa</i>	0	0	0	0	0
<i>Terebellides stroemii</i>	0	3	2	0	0
<i>Thelepus cincinnatus</i>	0	0	0	0	0
<i>Thracia pubescens</i>	0	0	0	0	0
<i>Thyasira flexuosa</i>	0	0	0	0	0
<i>Thyone roscovita</i>	0	0	0	0	0
<i>Thysanocardia procera</i>	0	0	0	0	0
<i>Trichobranchus roseus</i>	0	2	0	0	0
<i>Trypanosyllis zebra</i>	0	0	0	0	0
<i>Tubulanus polymorphus</i>	1	0	0	0	0
<i>Turbellaria</i>	0	0	0	0	0
<i>Turritella communis</i>	0	0	0	0	0
<i>Upogebia stellata</i>	0	0	0	0	1
<i>Velutina velutina</i>	0	0	0	0	0
<i>Venus casina</i>	0	0	0	0	0
<i>Virgularia mirabilis</i>	0	0	0	0	0
<i>Westwoodilla caecula</i>	0	0	0	0	0

Table 15. Top 5 numerically dominant taxa and number of individuals at SS.SMu.CFiMu.SpnMeg.Fun assigned infaunal grab stations.

Station J28	Ind	Station J34	Ind	Station J63	Ind
<i>Amphiura chiajei</i>	7	<i>Amphiura chiajei</i>	5	<i>Amphiura filiformis</i>	15
<i>Nephtys incisa</i>	3	<i>Amphiura filiformis</i>	3	<i>Kurtiella bidentata</i>	10
<i>Lagis koreni</i>	2	<i>Nephtys incisa</i>	2	<i>Chaetoderma nitidulum</i>	9
<i>Amphiura filiformis</i>	2	<i>Abra alba</i>	2	<i>Polycirrus sp.</i>	8
<i>Abra nitida</i>	2	<i>Kurtiella bidentata</i>	2	<i>Amphiura chiajei</i>	8
<i>Glycera unicornis</i>	2	<i>Ophiodromus flexuosus</i>	1	<i>Spiophanes kroyeri</i>	3
<i>Abyssoninoe hibernica</i>	1	<i>Chaetoderma nitidulum</i>	1	<i>Ampelisca tenuicornis</i>	3
<i>Cylichna cylindracea</i>	1	<i>Polycirrus sp.</i>	1		
<i>Chaetozone setosa</i>	1	<i>Golfingia sp.</i>	1		
<i>Notomastus latericeus</i>	1	<i>Monticellina dorsobranchialis</i>	1		
<i>Ophiodromus flexuosus</i>	1	<i>Nephrops norvegicus</i>	1		
<i>Corbula gibba</i>	1				
<i>Praxillella gracilis</i>	1				

Station J72	Ind	Station M4	Ind	M9	Ind
<i>Labidoplax buskii</i>	17	<i>Amphiura chiajei</i>	20	<i>Hyala vitrea</i>	33
<i>Thyasira flexuosa</i>	14	<i>Thyasira flexuosa</i>	15	<i>Kurtiella bidentata</i>	13
<i>Notomastus latericeus</i>	11	<i>Myrtea spinifera</i>	10	<i>Amphiura chiajei</i>	12
<i>Amphiura filiformis</i>	9	<i>Levinsenia gracilis</i>	9	<i>Pilargis verrucosa</i>	11
<i>Galathowenia oculata</i>	9	<i>Pista cristata</i>	9	<i>Prionospio fallax</i>	8
<i>Praxillella affinis</i>	7	<i>Prionospio fallax</i>	8	<i>Nemertea</i>	8
<i>Lucinoma borealis</i>	7				

Station M11	Ind	Station M12	Ind	M13	Ind
<i>Lysilla loveni</i>	13	<i>Cylichna cylindracea</i>	8	<i>Lysilla loveni</i>	12
<i>Nemertea</i>	11	<i>Amphiura chiajei</i>	7	<i>Amphiura chiajei</i>	9
<i>Abyssoninoe hibernica</i>	11	<i>Hyala vitrea</i>	7	<i>Spiophanes kroyeri</i>	9
<i>Amphiura chiajei</i>	10	<i>Pilargis verrucosa</i>	7	<i>Amphiura filiformis</i>	9
<i>Spiophanes kroyeri</i>	8	<i>Lysilla loveni</i>	6	<i>Notomastus latericeus</i>	8
<i>Cylichna cylindracea</i>	8	<i>Corbula gibba</i>	6		

Station M58	Ind	Station M59	Ind	Station M71	Ind
<i>Nephtys hystricis</i>	6	<i>Axinulus croulinensis</i>	4	<i>Chaetoderma nitidulum</i>	3
<i>Falcidens crossotus</i>	5	<i>Trichobranchus roseus</i>	1	<i>Lysilla loveni</i>	3
<i>Axinulus croulinensis</i>	3	<i>Amphiura filiformis</i>	1	<i>Nephtys incisa</i>	2
<i>Amphiura chiajei</i>	2	<i>Nucula nitidosa</i>	1	<i>Kurtiella bidentata</i>	2
<i>Trichobranchus roseus</i>	2	<i>Spiochaetopterus typicus</i>	1	<i>Amphiura chiajei</i>	1
		<i>Amphitrite edwardsii</i>	1	<i>Praxillella affinis</i>	1
		<i>Levinsenia gracilis</i>	1	<i>Pilargis verrucosa</i>	1
		<i>Caulleriella killariensis</i>	1	<i>Corbula gibba</i>	1
		<i>Terebellides stroemii</i>	1	<i>Polycirrus sp.</i>	1
		<i>Corbula gibba</i>	1	<i>Chaetozone gibber</i>	1
		<i>Malmgreniella marphysae</i>	1	<i>Abyssoninoe hibernica</i>	1
		<i>Praxillella gracilis</i>	1	<i>Amphitrite edwardsii</i>	1
				<i>Cirriformia tentaculata</i>	1
				<i>Ophiodromus flexuosus</i>	1

Station M72	Ind
<i>Nephtys incisa</i>	8
<i>Lysilla loveni</i>	6
<i>Amphiura chiajei</i>	6
<i>Abyssoninoe hibernica</i>	3
<i>Cylichna cylindracea</i>	3

Table 16. Top 5 numerically dominant taxa and number of individuals at S.SMu.CFiMu.SpnMeg assigned infaunal grab stations.

Station J2	Ind	Station J10	Ind	Station J53	Ind
<i>Thyasira flexuosa</i>	14	<i>Amphiura chiajei</i>	30	<i>Abra alba</i>	26
<i>Nephtys incisa</i>	7	<i>Amphiura filiformis</i>	19	<i>Prionospio multibranchiata</i>	7
<i>Hyala vitrea</i>	3	<i>Spiophanes kroyeri</i>	10	<i>Scalibregma inflatum</i>	6
<i>Abra prismatica</i>	1	<i>Nephtys incisa</i>	9	<i>Glycera unicornis</i>	4
<i>Amphiura filiformis</i>	1	<i>Galathowenia oculata</i>	7	<i>Monticellina dorsobranchialis</i>	3
<i>Philine aperta</i>	1				
<i>Polycirrus sp.</i>	1				

Station J30	Ind	Station M45	Ind	Station M46	Ind
<i>Amphiura filiformis</i>	33	<i>Amphiura chiajei</i>	22	<i>Corbula gibba</i>	10
<i>Melinna palmata</i>	32	<i>Virgularia mirabilis</i>	9	<i>Praxillella affinis</i>	10
<i>Kurtiella bidentata</i>	24	<i>Nephtys incisa</i>	7	<i>Levinsenia gracilis</i>	6
<i>Amphiura chiajei</i>	13	<i>Levinsenia gracilis</i>	5	<i>Amphiura chiajei</i>	5
<i>Chaetozone setosa</i>	9	<i>Praxillella affinis</i>	5	<i>Diplocirrus glaucus</i>	4
<i>Nephtys incisa</i>	9	<i>Cirratulus caudatus</i>	5	<i>Monticellina dorsobranchialis</i>	4

Table 17. Top 5 numerically dominant taxa and number of individuals at SS.SMu.CFiMu.BlyrAchi assigned infaunal grab stations.

Station M2	Ind	Station M3	Ind	Station M64	Ind
<i>Amphiura chiajei</i>	7	<i>Nephtys incisa</i>	3	<i>Spiophanes kroyeri</i>	7
<i>Thyasira flexuosa</i>	6	<i>Amphiura chiajei</i>	2	<i>Paradoneis sp.</i>	2
<i>Ophiodromus flexuosus</i>	4	<i>Thyasira flexuosa</i>	2	<i>Nemertea</i>	2
<i>Nephtys incisa</i>	3	<i>Diplocirrus glaucus</i>	2	<i>Spiochaetopterus typicus</i>	1
<i>Pilargis verrucosa</i>	2	<i>Amphiura filiformis</i>	2	<i>Amphitrite edwardsii</i>	1
<i>Diplocirrus glaucus</i>	2	<i>Rhodine loveni</i>	2	<i>Ampharete finmarchica</i>	1
<i>Nucula nitidosa</i>	2	<i>Pilargis verrucosa</i>	1	<i>Diplocirrus glaucus</i>	1
<i>Ampharete grubei</i>	2	<i>Spiophanes kroyeri</i>	1	<i>Polycirrus sp.</i>	1
<i>Hyala vitrea</i>	2	<i>Tubulanus polymorphus</i>	1	<i>Lucinoma borealis</i>	1
		<i>Prionospio fallax</i>	1	<i>Amphipholis squamata</i>	1
				<i>Eunereis longissima</i>	1

Station M65	Ind	Station M66	Ind
<i>Leitoscoloplos mammosus</i>	24	<i>Monticellina dorsobranchialis</i>	9
<i>Ophiura albida</i>	10	<i>Axinulus croulinensis</i>	8
<i>Copepoda</i>	7	<i>Chaetozone gibber</i>	6
<i>Spiophanes kroyeri</i>	3	<i>Amphiura chiajei</i>	5
<i>Amphitrite edwardsii</i>	3	<i>Nucula nitidosa</i>	4
		<i>Spiophanes kroyeri</i>	4

Table 18. Top 5 numerically dominant taxa and number of individuals at SS.SMu.CFiMu assigned infaunal grab stations.

Station J8	Ind	Station M15	Ind	Station M38	Ind
<i>Galathowenia oculata</i>	25	<i>Prionospio fallax</i>	27	<i>Amphiura chiajei</i>	22
<i>Amphiura filiformis</i>	15	<i>Amphiura chiajei</i>	16	<i>Corbula gibba</i>	15
<i>Thyasira flexuosa</i>	15	<i>Amphiura filiformis</i>	16	<i>Levinsenia gracilis</i>	14
<i>Kurtiella bidentata</i>	10	<i>Nemertea</i>	15	<i>Streblosoma bairdi</i>	12
<i>Melinna palmata</i>	10	<i>Chaetozone setosa</i>	8	<i>Praxillella affinis</i>	10
<i>Pilargis verrucosa</i>	7	<i>Pista cristata</i>	8	<i>Nephtys incisa</i>	10
<i>Myrtea spinifera</i>	6				

Station M55	Ind
<i>Amphiura filiformis</i>	5
<i>Nucula nitidosa</i>	2
<i>Glycera unicornis</i>	1
<i>Rhodine loveni</i>	1
<i>Ennucula tenuis</i>	1
<i>Spiochaetopterus typicus</i>	1

Table 19. Top 5 numerically dominant taxa and number of individuals at SS.SMu.CFiMu.MegMax assigned infaunal grab stations.

Station J13	Ind	Station J31	Ind	Station J36	Ind
<i>Ampharete finmarchica</i>	8	<i>Nephtys incisa</i>	4	<i>Monticellina dorsobranchialis</i>	9
<i>Chaetozone setosa</i>	8	<i>Amphiura chiajei</i>	2	<i>Polyophthalmus pictus</i>	7
<i>Diplocirrus glaucus</i>	6	<i>Chaetoderma nitidulum</i>	2	<i>Glycera unicornis</i>	3
<i>Cerianthus lloydii</i>	5	<i>Abyssoninoe hibernica</i>	2	<i>Calocaris macandreae</i>	3
<i>Pilargis verrucosa</i>	4	<i>Pilargis verrucosa</i>	1	<i>Amphiura chiajei</i>	2
<i>Hyala vitrea</i>	4	<i>Cylichna cylindracea</i>	1	<i>Amphiura filiformis</i>	2
<i>Levinsenia gracilis</i>	3	<i>Brissopsis lyrifera</i>	1	<i>Chaetozone setosa</i>	2
<i>Praxillella affinis</i>	3	<i>Falcidens crossotus</i>	1	<i>Chaetoderma nitidulum</i>	1
		<i>Tellimyia ferruginosa</i>	1	<i>Corbula gibba</i>	1
				<i>Praxillella gracilis</i>	1
				<i>Falcidens crossotus</i>	1
				<i>Diplocirrus glaucus</i>	1
				<i>Levinsenia gracilis</i>	1
				<i>Spiophanes kroyeri</i>	1
				<i>Galathowenia oculata</i>	1
				<i>Chaetopterus variopedatus</i>	1
				<i>Eriopisa elongata</i>	1
				<i>Harmothoe fragilis</i>	1
				<i>Polyphysia crassa</i>	1

Station M67	Ind
<i>Amphiura filiformis</i>	47
<i>Monticellina dorsobranchialis</i>	42
<i>Copepoda</i>	19
<i>Amphiura chiajei</i>	15
<i>Axinulus croulinensis</i>	9

Table 20. Top 5 numerically dominant taxa and number of individuals at SS.SMx.CMx.OphMx assigned infaunal grab stations.

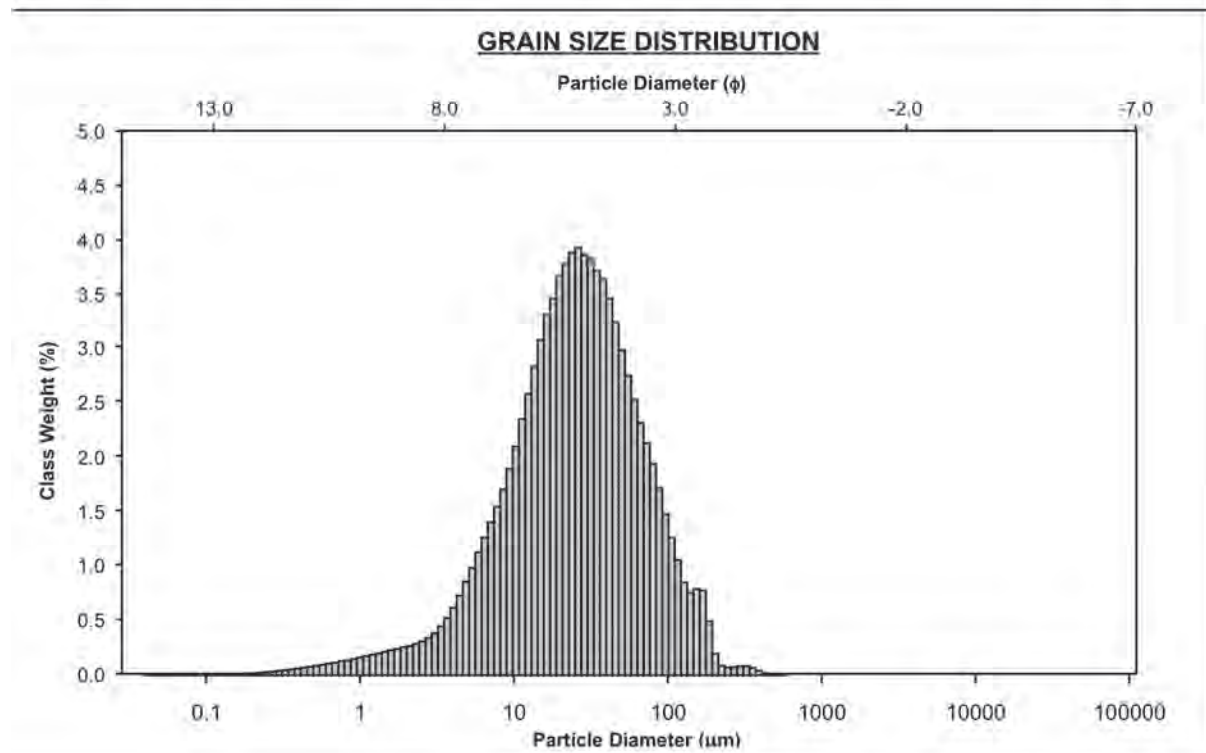
Station J49	Ind	Station M17	Ind
<i>Melinna palmata</i>	16	<i>Chaetozone sp.</i>	63
<i>Thyasira flexuosa</i>	8	<i>Scalibregma inflatum</i>	28
<i>Leptochiton asellus</i>	6	<i>Aonides oxycephala</i>	20
<i>Notomastus latericeus</i>	5	<i>Mediomastus fragilis</i>	16
<i>Abra alba</i>	5	<i>Ophiothrix fragilis</i>	14
<i>Praxillella affinis</i>	5		
<i>Amphitrite edwardsii</i>	4		
<i>Owenia fusiformis</i>	4		

APPENDIX 5. PSA DATA

Particle size analysis data from each infaunal grab station

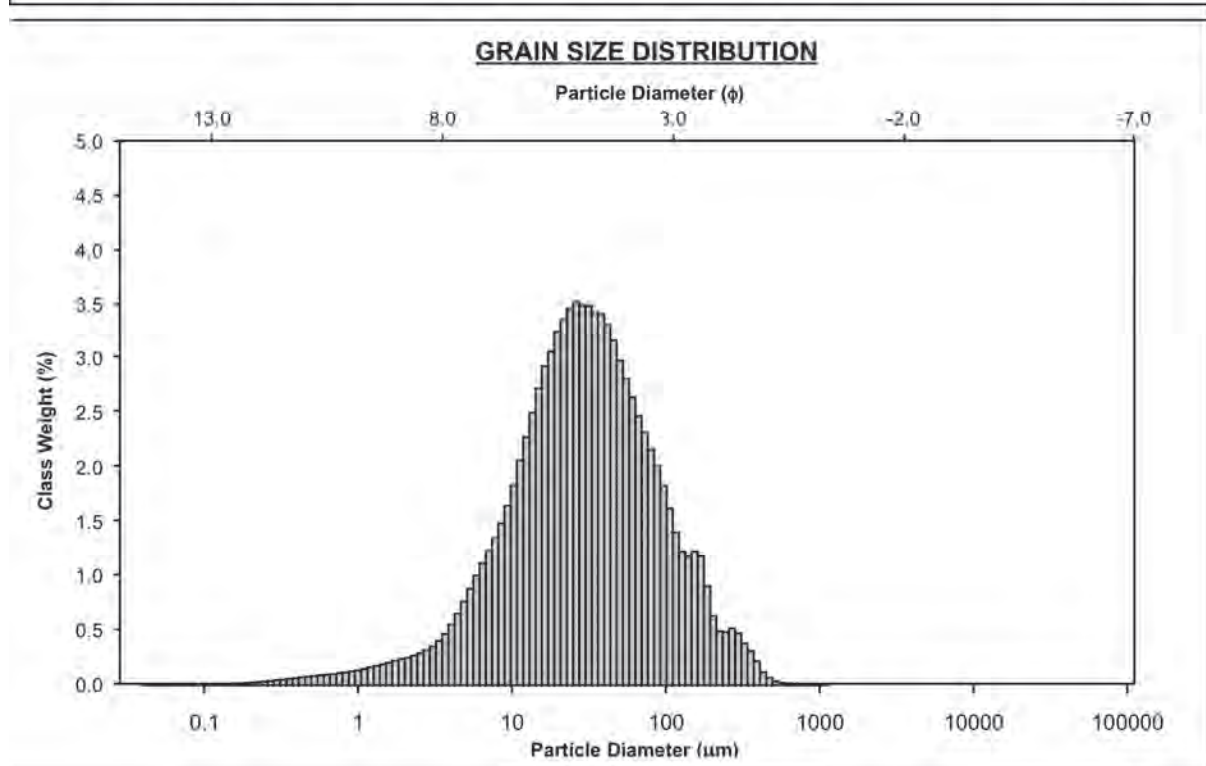
Grab station JG1

SAMPLE STATISTICS						
SAMPLE IDENTITY: SAMS Etive MPA16-8-11_JG1			ANALYST & DATE:			
SAMPLE TYPE: Bimodal, Poorly Sorted			TEXTURAL GROUP: Sandy Mud			
SEDIMENT NAME: Very Fine Sandy Coarse Silt						
	μm	ϕ	GRAIN SIZE DISTRIBUTION			
MODE 1:	26.17	5.258	GRAVEL: 0.0%	COARSE SAND: 0.0%		
MODE 2:	154.0	2.701	SAND: 16.9%	MEDIUM SAND: 0.4%		
MODE 3:			MUD: 83.1%	FINE SAND: 3.8%		
D ₁₀ :	6.146	3.575		V FINE SAND: 12.7%		
MEDIAN or D ₅₀ :	25.38	5.300	V COARSE GRAVEL: 0.0%	V COARSE SILT: 24.4%		
D ₉₀ :	83.94	7.346	COARSE GRAVEL: 0.0%	COARSE SILT: 27.8%		
(D ₉₀ / D ₁₀):	13.66	2.055	MEDIUM GRAVEL: 0.0%	MEDIUM SILT: 17.3%		
(D ₉₀ - D ₁₀):	77.79	3.772	FINE GRAVEL: 0.0%	FINE SILT: 7.8%		
(D ₇₅ / D ₂₅):	3.673	1.427	V FINE GRAVEL: 0.0%	V FINE SILT: 2.7%		
(D ₇₅ - D ₂₅):	34.69	1.877	V COARSE SAND: 0.0%	CLAY: 3.0%		
	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic μm	Geometric μm	Logarithmic ϕ	Geometric μm	Logarithmic ϕ	Description
MEAN (\bar{x}):	37.85	23.22	5.429	24.47	5.353	Coarse Silt
SORTING (σ):	40.20	2.984	1.577	2.797	1.484	Poorly Sorted
SKEWNESS (Sk):	2.923	-0.799	0.799	-0.097	0.097	Symmetrical
KURTOSIS (K):	16.88	4.603	4.603	1.110	1.110	Leptokurtic



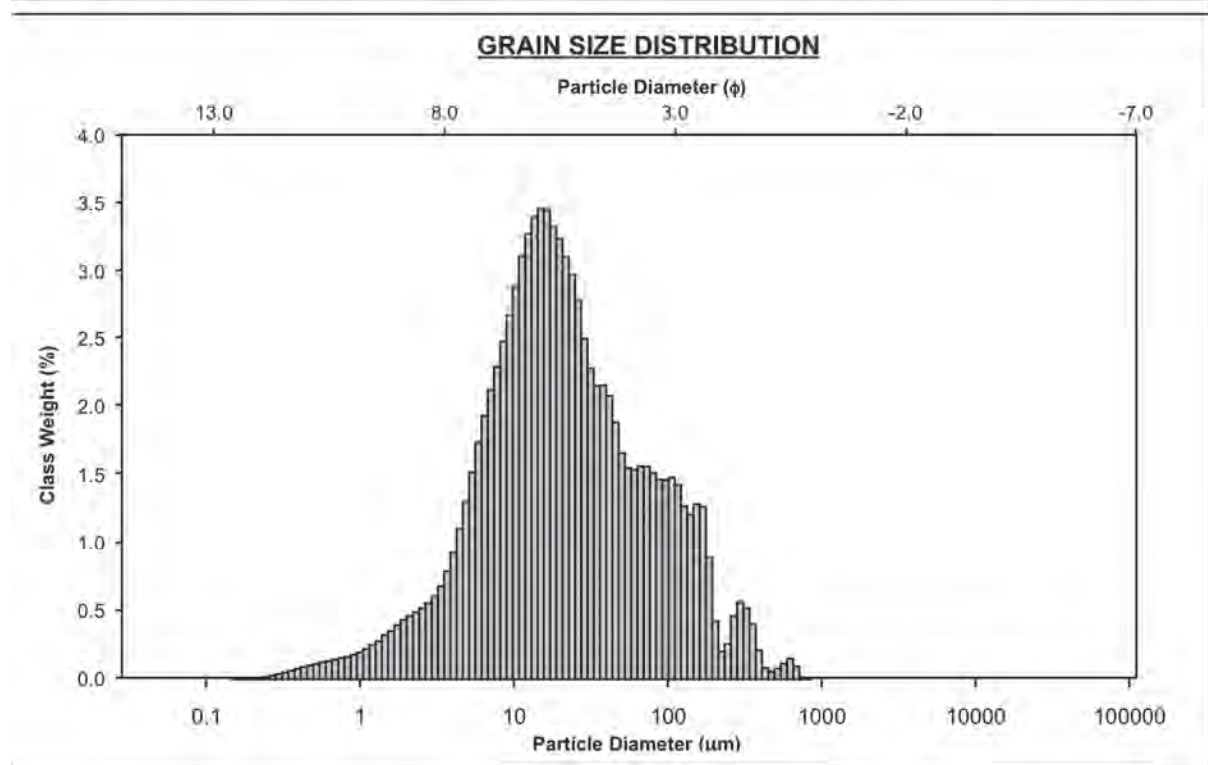
Grab station JG2

SAMPLE STATISTICS						
SAMPLE IDENTITY: SAMS Etive MPA16-8-11_JG2			ANALYST & DATE:			
SAMPLE TYPE: Bimodal, Poorly Sorted			TEXTURAL GROUP: Sandy Mud			
SEDIMENT NAME: Very Fine Sandy Coarse Silt						
	μm	ϕ	GRAIN SIZE DISTRIBUTION			
MODE 1:	26.17	5.258	GRAVEL: 0.0%	COARSE SAND: 0.1%		
MODE 2:	154.0	2.701	SAND: 24.0%	MEDIUM SAND: 2.3%		
MODE 3:			MUD: 76.0%	FINE SAND: 6.9%		
D ₁₀ :	6.589	3.069		V FINE SAND: 14.7%		
MEDIAN or D ₅₀ :	29.36	5.090	V COARSE GRAVEL: 0.0%	V COARSE SILT: 23.6%		
D ₉₀ :	119.2	7.246	COARSE GRAVEL: 0.0%	COARSE SILT: 24.8%		
(D ₉₀ / D ₁₀):	18.09	2.361	MEDIUM GRAVEL: 0.0%	MEDIUM SILT: 15.2%		
(D ₉₀ - D ₁₀):	112.6	4.177	FINE GRAVEL: 0.0%	FINE SILT: 7.0%		
(D ₇₅ / D ₂₅):	4.218	1.513	V FINE GRAVEL: 0.0%	V FINE SILT: 2.5%		
(D ₇₅ - D ₂₅):	46.11	2.077	V COARSE SAND: 0.0%	CLAY: 2.8%		
	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic μm	Geometric μm	Logarithmic ϕ	Geometric μm	Logarithmic ϕ	Description
MEAN (\bar{x}):	51.04	27.79	5.169	29.14	5.101	Coarse Silt
SORTING (σ):	64.74	3.304	1.724	3.095	1.630	Poorly Sorted
SKEWNESS (Sk):	3.391	-0.617	0.617	-0.044	0.044	Symmetrical
KURTOSIS (K):	21.00	4.302	4.302	1.100	1.100	Mesokurtic



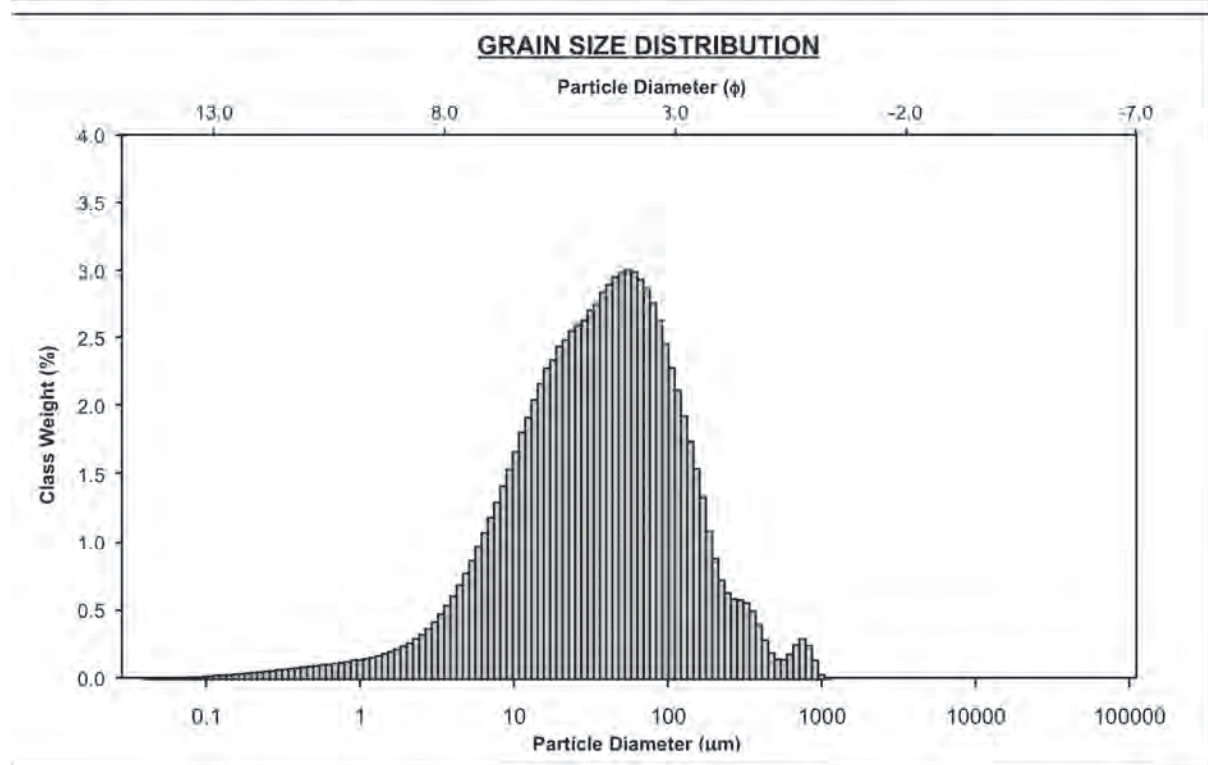
Grab station JG3

SAMPLE STATISTICS						
SAMPLE IDENTITY: SAMS Etive MPA16-8-11_JG3			ANALYST & DATE:			
SAMPLE TYPE: Polymodal, Poorly Sorted			TEXTURAL GROUP: Sandy Mud			
SEDIMENT NAME: Very Fine Sandy Coarse Silt						
	μm	ϕ	GRAIN SIZE DISTRIBUTION			
MODE 1:	14.96	6.065	GRAVEL: 0.0%	COARSE SAND: 0.4%		
MODE 2:	38.01	4.719	SAND: 20.5%	MEDIUM SAND: 2.4%		
MODE 3:	66.52	3.912	MUD: 79.5%	FINE SAND: 6.4%		
D ₁₀ :	4.578	3.069		V FINE SAND: 11.2%		
MEDIAN or D ₅₀ :	19.10	5.710	V COARSE GRAVEL: 0.0%	V COARSE SILT: 14.3%		
D ₉₀ :	119.2	7.771	COARSE GRAVEL: 0.0%	COARSE SILT: 22.6%		
(D ₉₀ / D ₁₀):	26.04	2.532	MEDIUM GRAVEL: 0.0%	MEDIUM SILT: 22.5%		
(D ₉₀ - D ₁₀):	114.6	4.703	FINE GRAVEL: 0.0%	FINE SILT: 11.9%		
(D ₇₅ / D ₂₅):	5.142	1.540	V FINE GRAVEL: 0.0%	V FINE SILT: 4.4%		
(D ₇₅ - D ₂₅):	38.72	2.362	V COARSE SAND: 0.0%	CLAY: 3.9%		
	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic μm	Geometric μm	Logarithmic ϕ	Geometric μm	Logarithmic ϕ	Description
MEAN (\bar{x}):	45.82	20.68	5.596	21.67	5.528	Coarse Silt
SORTING (σ):	72.89	3.623	1.857	3.583	1.841	Poorly Sorted
SKEWNESS (Sk):	3.911	-0.081	0.081	0.091	-0.091	Symmetrical
KURTOSIS (K):	24.09	3.182	3.182	1.064	1.064	Mesokurtic



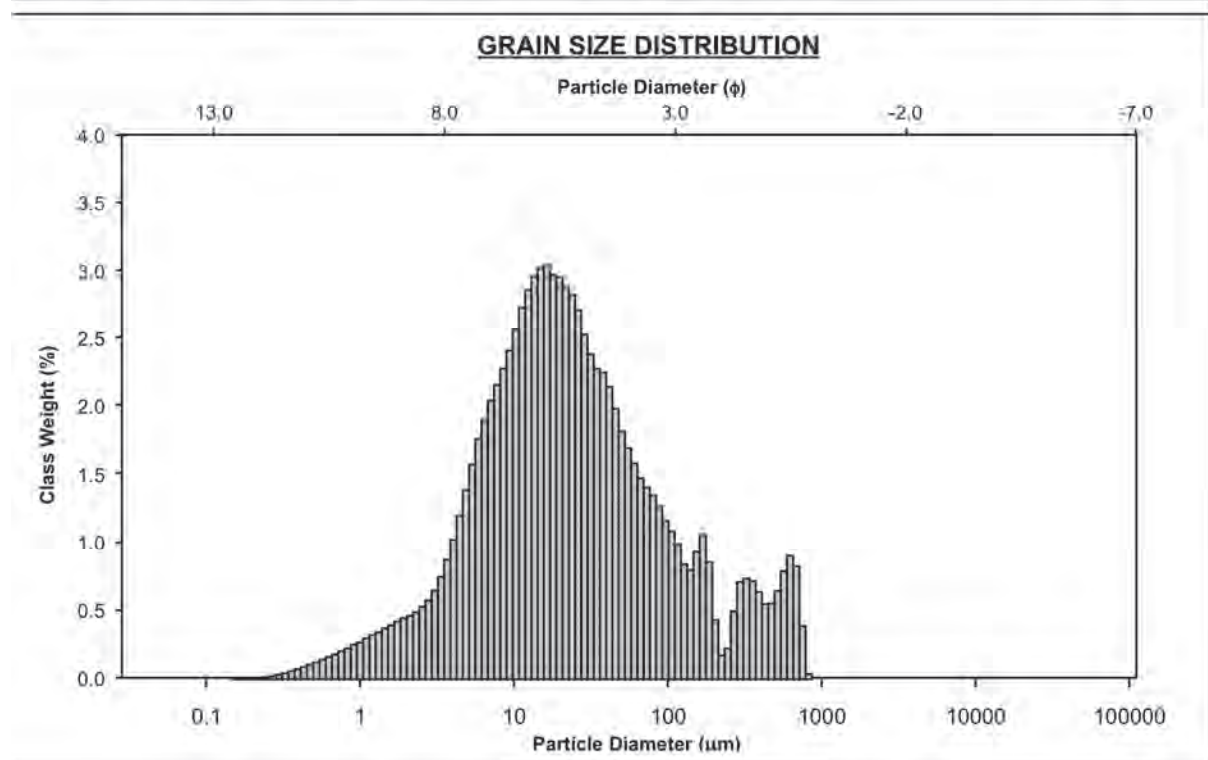
Grab station JG4

SAMPLE STATISTICS						
SAMPLE IDENTITY: SAMS Etive MPA16-8-11_JG4			ANALYST & DATE:			
SAMPLE TYPE: Unimodal, Poorly Sorted			TEXTURAL GROUP: Sandy Mud			
SEDIMENT NAME: Very Fine Sandy Very Coarse Silt						
	μm	ϕ	GRAIN SIZE DISTRIBUTION			
MODE 1:	55.20	4.181	GRAVEL: 0.0%	COARSE SAND: 1.4%		
MODE 2:			SAND: 33.3%	MEDIUM SAND: 3.3%		
MODE 3:			MUD: 66.7%	FINE SAND: 9.3%		
D ₁₀ :	6.167	2.694		V FINE SAND: 19.3%		
MEDIAN or D ₅₀ :	37.05	4.755	V COARSE GRAVEL: 0.0%	V COARSE SILT: 21.8%		
D ₉₀ :	154.5	7.341	COARSE GRAVEL: 0.0%	COARSE SILT: 18.7%		
(D ₉₀ / D ₁₀):	25.06	2.725	MEDIUM GRAVEL: 0.0%	MEDIUM SILT: 13.2%		
(D ₉₀ - D ₁₀):	148.4	4.647	FINE GRAVEL: 0.0%	FINE SILT: 6.9%		
(D ₇₅ / D ₂₅):	5.502	1.680	V FINE GRAVEL: 0.0%	V FINE SILT: 2.9%		
(D ₇₅ - D ₂₅):	66.73	2.460	V COARSE SAND: 0.0%	CLAY: 3.2%		
	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic μm	Geometric μm	Logarithmic ϕ	Geometric μm	Logarithmic ϕ	Description
MEAN (\bar{x}):	70.32	32.72	4.934	34.26	4.867	Very Coarse Silt
SORTING (σ):	107.1	3.895	1.962	3.589	1.843	Poorly Sorted
SKEWNESS (Sk):	4.163	-0.652	0.652	-0.113	0.113	Fine Skewed
KURTOSIS (K):	25.48	4.230	4.230	1.039	1.039	Mesokurtic



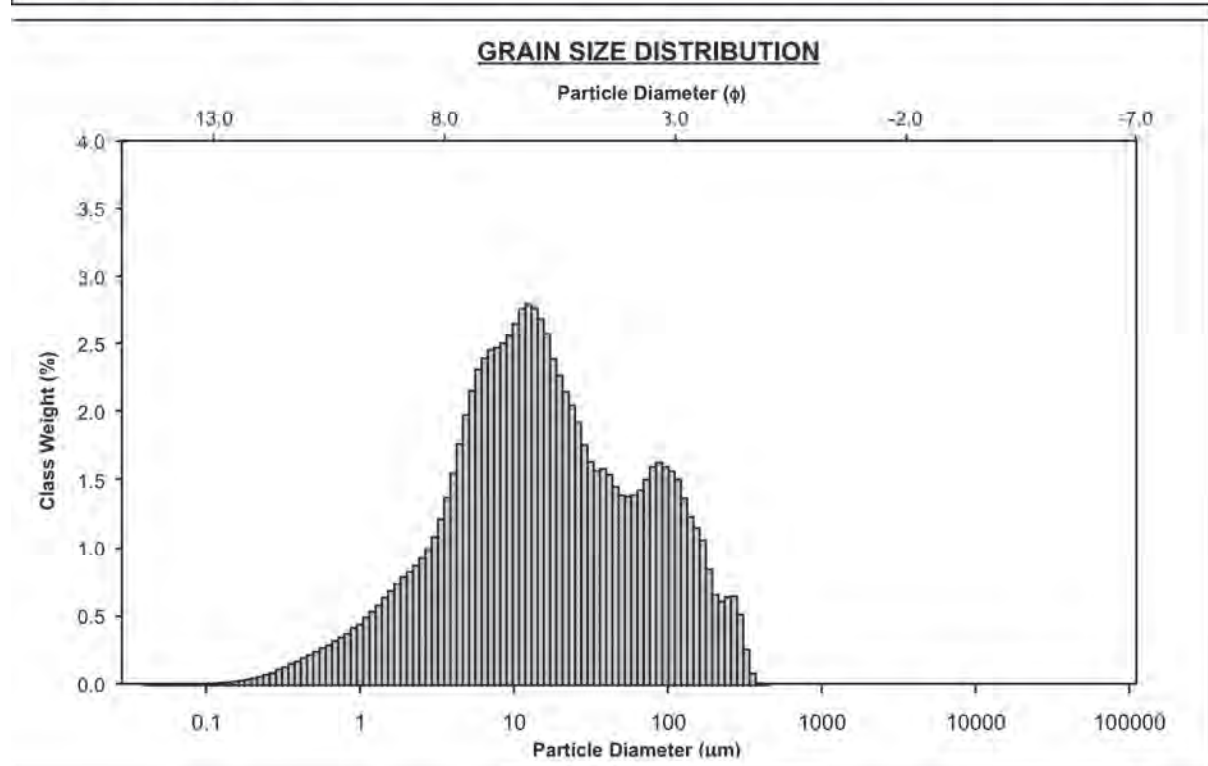
Grab station JG5

SAMPLE STATISTICS						
SAMPLE IDENTITY: SAMS Etive MPA16-8-11_JG5			ANALYST & DATE:			
SAMPLE TYPE: Polymodal, Very Poorly Sorted			TEXTURAL GROUP: Sandy Mud			
SEDIMENT NAME: Very Fine Sandy Coarse Silt						
	μm	ϕ	GRAIN SIZE DISTRIBUTION			
MODE 1:	16.41	5.931	GRAVEL: 0.0%	COARSE SAND: 3.5%		
MODE 2:	169.0	2.566	SAND: 22.6%	MEDIUM SAND: 4.6%		
MODE 3:	624.0	0.682	MUD: 77.4%	FINE SAND: 5.1%		
D ₁₀ :	4.203	2.524		V FINE SAND: 9.3%		
MEDIAN or D ₅₀ :	20.50	5.608	V COARSE GRAVEL: 0.0%	V COARSE SILT: 15.1%		
D ₉₀ :	173.9	7.894	COARSE GRAVEL: 0.0%	COARSE SILT: 21.2%		
(D ₉₀ / D ₁₀):	41.37	3.128	MEDIUM GRAVEL: 0.0%	MEDIUM SILT: 19.9%		
(D ₉₀ - D ₁₀):	169.7	5.371	FINE GRAVEL: 0.0%	FINE SILT: 12.1%		
(D ₇₅ / D ₂₅):	5.983	1.615	V FINE GRAVEL: 0.0%	V FINE SILT: 4.6%		
(D ₇₅ - D ₂₅):	45.34	2.581	V COARSE SAND: 0.0%	CLAY: 4.5%		
	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic μm	Geometric μm	Logarithmic ϕ	Geometric μm	Logarithmic ϕ	Description
MEAN (\bar{x}):	70.03	23.04	5.439	23.07	5.438	Coarse Silt
SORTING (σ):	134.4	4.360	2.124	4.404	2.139	Very Poorly Sorted
SKEWNESS (Sk):	3.166	0.172	-0.172	0.131	-0.131	Coarse Skewed
KURTOSIS (K):	12.95	3.084	3.084	1.195	1.195	Leptokurtic



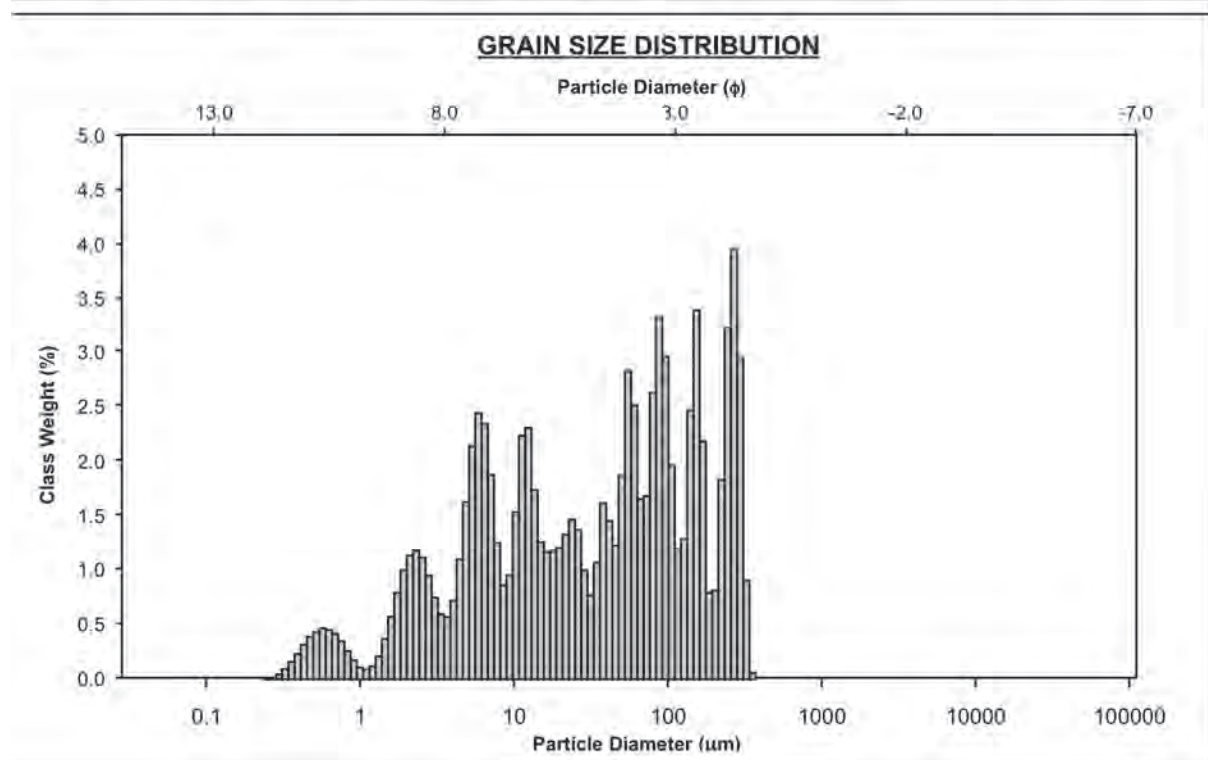
Grab station JG6

SAMPLE STATISTICS						
SAMPLE IDENTITY: SAMS Etive MPA16-8-11_JG6			ANALYST & DATE:			
SAMPLE TYPE: Polymodal, Very Poorly Sorted			TEXTURAL GROUP: Sandy Mud			
SEDIMENT NAME: Very Fine Sandy Medium Silt						
	μm	ϕ	GRAIN SIZE DISTRIBUTION			
MODE 1:	12.41	6.334	GRAVEL: 0.0%	COARSE SAND: 0.0%		
MODE 2:	88.00	3.508	SAND: 20.4%	MEDIUM SAND: 1.7%		
MODE 3:	38.01	4.719	MUD: 79.6%	FINE SAND: 7.1%		
D ₁₀ :	2.300	3.106		V FINE SAND: 11.6%		
MEDIAN or D ₅₀ :	14.41	6.117	V COARSE GRAVEL: 0.0%	V COARSE SILT: 11.2%		
D ₉₀ :	116.1	8.764	COARSE GRAVEL: 0.0%	COARSE SILT: 16.0%		
(D ₉₀ / D ₁₀):	50.50	2.822	MEDIUM GRAVEL: 0.0%	MEDIUM SILT: 20.0%		
(D ₉₀ - D ₁₀):	113.8	5.658	FINE GRAVEL: 0.0%	FINE SILT: 16.0%		
(D ₇₅ / D ₂₅):	7.826	1.669	V FINE GRAVEL: 0.0%	V FINE SILT: 7.8%		
(D ₇₅ - D ₂₅):	40.31	2.968	V COARSE SAND: 0.0%	CLAY: 8.5%		
	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic μm	Geometric μm	Logarithmic ϕ	Geometric μm	Logarithmic ϕ	Description
MEAN (\bar{x}):	39.64	15.32	6.028	16.52	5.919	Coarse Silt
SORTING (σ):	58.08	4.412	2.142	4.548	2.185	Very Poorly Sorted
SKEWNESS (Sk):	2.427	-0.179	0.179	0.064	-0.064	Symmetrical
KURTOSIS (K):	9.312	2.740	2.740	0.983	0.983	Mesokurtic



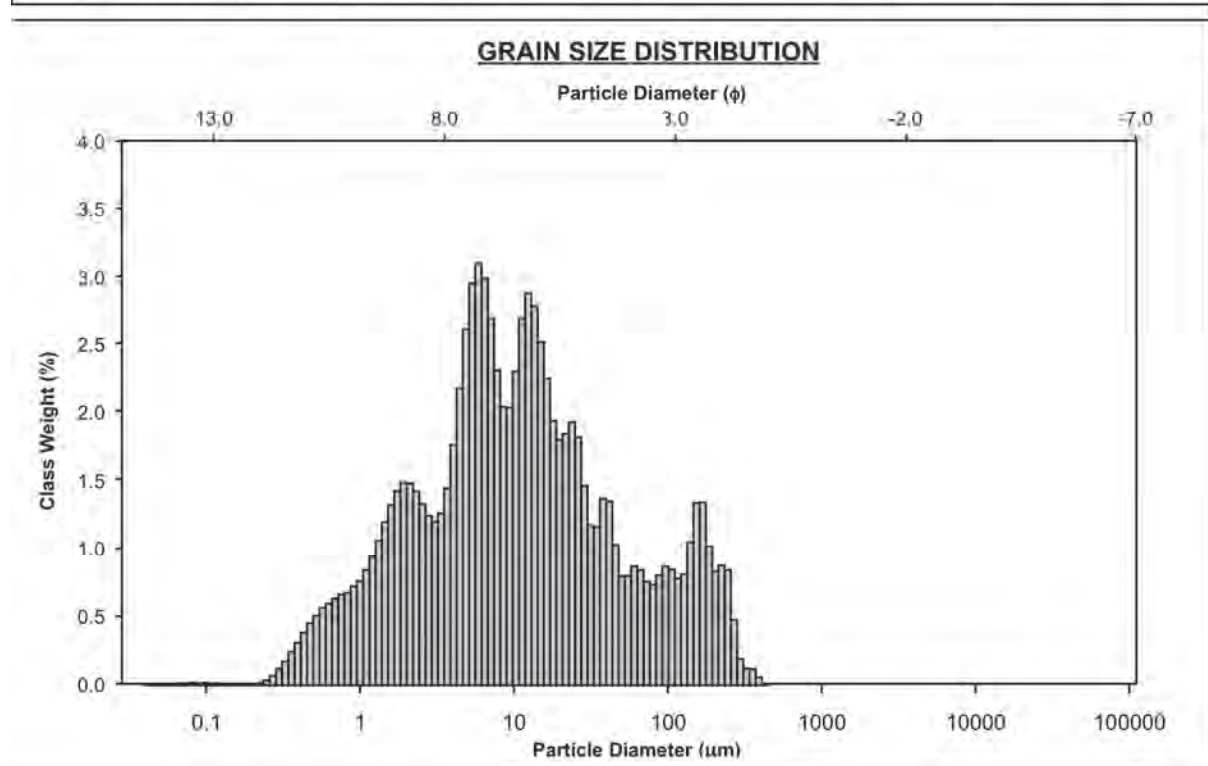
Grab station JG7

SAMPLE STATISTICS						
SAMPLE IDENTITY: SAMS Etive MPA16-8-11_JG7			ANALYST & DATE:			
SAMPLE TYPE: Polymodal, Very Poorly Sorted			TEXTURAL GROUP: Sandy Mud			
SEDIMENT NAME: Very Fine Sandy Fine Silt						
	μm	ϕ	GRAIN SIZE DISTRIBUTION			
MODE 1:	5.885	7.410	GRAVEL: 0.0%	COARSE SAND: 0.0%		
MODE 2:	12.41	6.334	SAND: 40.0%	MEDIUM SAND: 8.9%		
MODE 3:	38.01	4.719	MUD: 60.0%	FINE SAND: 14.8%		
D ₁₀ :	2.535	2.046		V FINE SAND: 16.3%		
MEDIAN or D ₅₀ :	38.95	4.682	V COARSE GRAVEL: 0.0%	V COARSE SILT: 12.8%		
D ₉₀ :	242.2	8.624	COARSE GRAVEL: 0.0%	COARSE SILT: 9.1%		
(D ₉₀ / D ₁₀):	95.53	4.215	MEDIUM GRAVEL: 0.0%	MEDIUM SILT: 11.5%		
(D ₉₀ - D ₁₀):	239.6	6.578	FINE GRAVEL: 0.0%	FINE SILT: 13.0%		
(D ₇₅ / D ₂₅):	15.93	2.272	V FINE GRAVEL: 0.0%	V FINE SILT: 6.7%		
(D ₇₅ - D ₂₅):	106.3	3.993	V COARSE SAND: 0.0%	CLAY: 6.8%		
	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic μm	Geometric μm	Logarithmic ϕ	Geometric μm	Logarithmic ϕ	Description
MEAN (\bar{x}):	76.76	28.11	5.153	31.59	4.985	Very Coarse Silt
SORTING (σ):	89.10	5.462	2.449	5.294	2.404	Very Poorly Sorted
SKEWNESS (Sk):	1.245	-0.464	0.464	-0.210	0.210	Fine Skewed
KURTOSIS (K):	3.392	2.301	2.301	0.763	0.763	Platykurtic



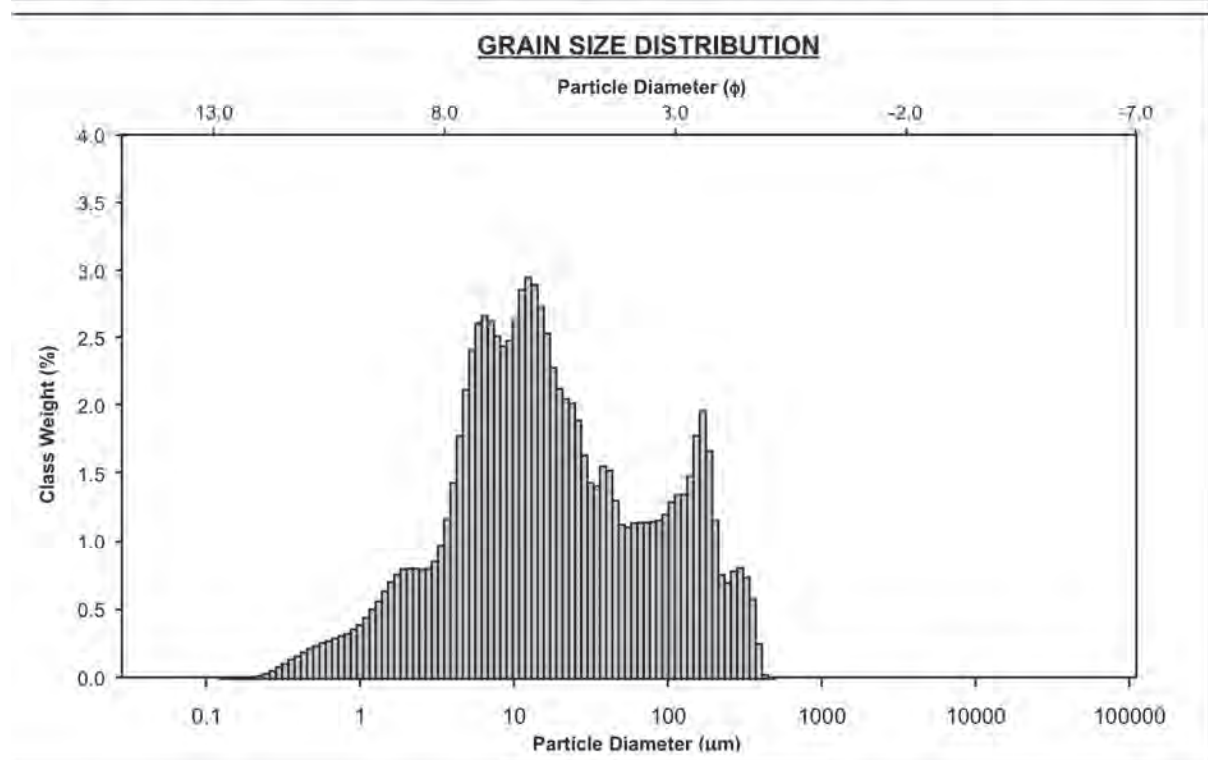
Grab station JG8

SAMPLE STATISTICS						
SAMPLE IDENTITY: SAMS Etive MPA16-8-11_JG8			ANALYST & DATE:			
SAMPLE TYPE: Polymodal, Very Poorly Sorted			TEXTURAL GROUP: Sandy Mud			
SEDIMENT NAME: Fine Sandy Fine Silt						
	μm	ϕ	GRAIN SIZE DISTRIBUTION			
MODE 1:	5.885	7.410	GRAVEL: 0.0%	COARSE SAND: 0.0%		
MODE 2:	12.41	6.334	SAND: 15.0%	MEDIUM SAND: 1.2%		
MODE 3:	23.84	5.392	MUD: 85.0%	FINE SAND: 7.7%		
D ₁₀ :	1.378	3.175		V FINE SAND: 6.1%		
MEDIAN or D ₅₀ :	9.826	6.669	V COARSE GRAVEL: 0.0%	V COARSE SILT: 8.0%		
D ₉₀ :	110.7	9.503	COARSE GRAVEL: 0.0%	COARSE SILT: 13.7%		
(D ₉₀ / D ₁₀):	80.38	2.993	MEDIUM GRAVEL: 0.0%	MEDIUM SILT: 18.4%		
(D ₉₀ - D ₁₀):	109.4	6.329	FINE GRAVEL: 0.0%	FINE SILT: 19.6%		
(D ₇₅ / D ₂₅):	7.119	1.546	V FINE GRAVEL: 0.0%	V FINE SILT: 10.2%		
(D ₇₅ - D ₂₅):	23.57	2.832	V COARSE SAND: 0.0%	CLAY: 15.1%		
	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic μm	Geometric μm	Logarithmic ϕ	Geometric μm	Logarithmic ϕ	Description
MEAN (\bar{x}):	32.99	10.43	6.584	10.46	6.579	Medium Silt
SORTING (σ):	57.19	4.784	2.258	5.162	2.368	Very Poorly Sorted
SKEWNESS (Sk):	2.679	0.102	-0.102	0.060	-0.060	Symmetrical
KURTOSIS (K):	10.33	2.582	2.582	1.124	1.124	Leptokurtic



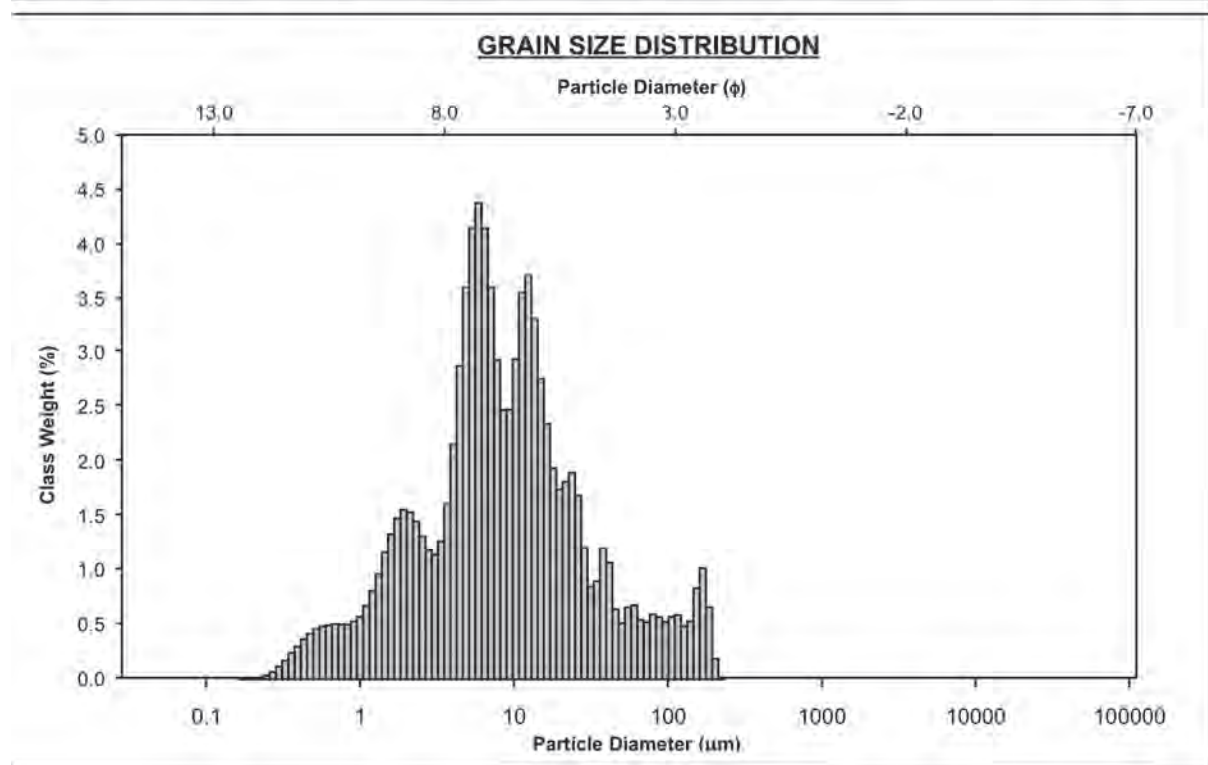
Grab station
JG9

SAMPLE STATISTICS						
SAMPLE IDENTITY: SAMS Etive MPA16-8-11_JG9			ANALYST & DATE: ,			
SAMPLE TYPE: Polymodal, Very Poorly Sorted			TEXTURAL GROUP: Sandy Mud			
SEDIMENT NAME: Fine Sandy Medium Silt						
	μm	ϕ	GRAIN SIZE DISTRIBUTION			
MODE 1:	12.41	6.334	GRAVEL: 0.0%	COARSE SAND: 0.0%		
MODE 2:	6.460	7.276	SAND: 22.9%	MEDIUM SAND: 3.4%		
MODE 3:	169.0	2.566	MUD: 77.1%	FINE SAND: 10.4%		
D ₁₀ :	2.530	2.668		V FINE SAND: 9.1%		
MEDIAN or D ₅₀ :	14.71	6.087	V COARSE GRAVEL: 0.0%	V COARSE SILT: 9.9%		
D ₉₀ :	157.3	8.626	COARSE GRAVEL: 0.0%	COARSE SILT: 15.3%		
(D ₉₀ / D ₁₀):	62.18	3.233	MEDIUM GRAVEL: 0.0%	MEDIUM SILT: 20.3%		
(D ₉₀ - D ₁₀):	154.8	5.958	FINE GRAVEL: 0.0%	FINE SILT: 17.0%		
(D ₇₅ / D ₂₅):	8.473	1.726	V FINE GRAVEL: 0.0%	V FINE SILT: 6.7%		
(D ₇₅ - D ₂₅):	46.44	3.083	V COARSE SAND: 0.0%	CLAY: 7.8%		
	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic μm	Geometric μm	Logarithmic ϕ	Geometric μm	Logarithmic ϕ	Description
MEAN (\bar{x}):	48.30	17.11	5.869	18.95	5.721	Coarse Silt
SORTING (σ):	73.24	4.592	2.199	4.788	2.259	Very Poorly Sorted
SKEWNESS (Sk):	2.252	-0.011	0.011	0.145	-0.145	Coarse Skewed
KURTOSIS (K):	7.954	2.531	2.531	0.964	0.964	Mesokurtic



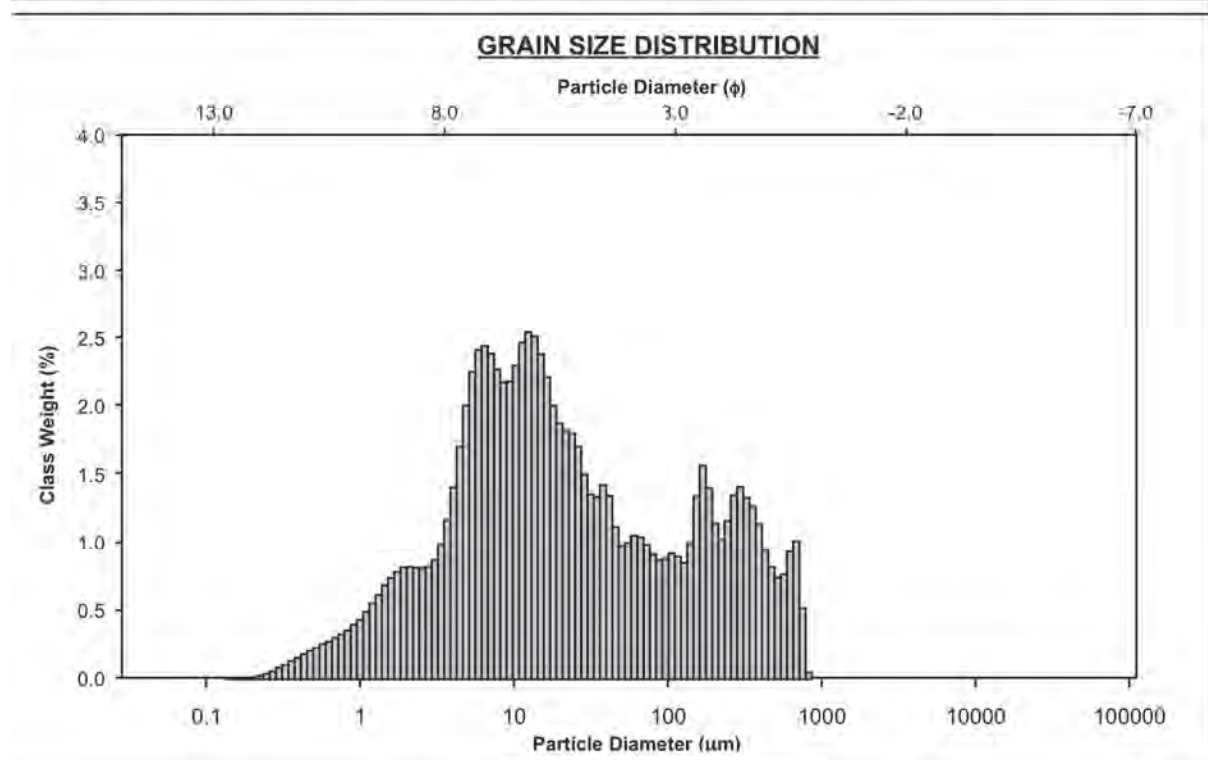
Grab station JG10

SAMPLE STATISTICS						
SAMPLE IDENTITY: SAMS Etive MPA16-8-11_JG10			ANALYST & DATE: ,			
SAMPLE TYPE: Polymodal, Poorly Sorted			TEXTURAL GROUP: Mud			
SEDIMENT NAME: Fine Silt						
	μm	ϕ	GRAIN SIZE DISTRIBUTION			
MODE 1:	5.885	7.410	GRAVEL: 0.0%	COARSE SAND: 0.0%		
MODE 2:	12.41	6.334	SAND: 7.8%	MEDIUM SAND: 0.0%		
MODE 3:	23.84	5.392	MUD: 92.2%	FINE SAND: 3.6%		
D ₁₀ :	1.576	4.471		V FINE SAND: 4.2%		
MEDIAN or D ₅₀ :	7.751	7.011	V COARSE GRAVEL: 0.0%	V COARSE SILT: 6.1%		
D ₉₀ :	45.09	9.309	COARSE GRAVEL: 0.0%	COARSE SILT: 13.1%		
(D ₉₀ / D ₁₀):	28.61	2.082	MEDIUM GRAVEL: 0.0%	MEDIUM SILT: 22.7%		
(D ₉₀ - D ₁₀):	43.52	4.839	FINE GRAVEL: 0.0%	FINE SILT: 26.5%		
(D ₇₅ / D ₂₅):	4.109	1.347	V FINE GRAVEL: 0.0%	V FINE SILT: 10.3%		
(D ₇₅ - D ₂₅):	12.82	2.039	V COARSE SAND: 0.0%	CLAY: 13.4%		
	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic μm	Geometric μm	Logarithmic ϕ	Geometric μm	Logarithmic ϕ	Description
MEAN (\bar{x}):	19.74	8.299	6.913	7.788	7.005	Fine Silt
SORTING (σ):	34.08	3.657	1.871	3.763	1.912	Poorly Sorted
SKEWNESS (Sk):	3.239	0.117	-0.117	0.047	-0.047	Symmetrical
KURTOSIS (K):	13.65	3.102	3.102	1.362	1.362	Leptokurtic



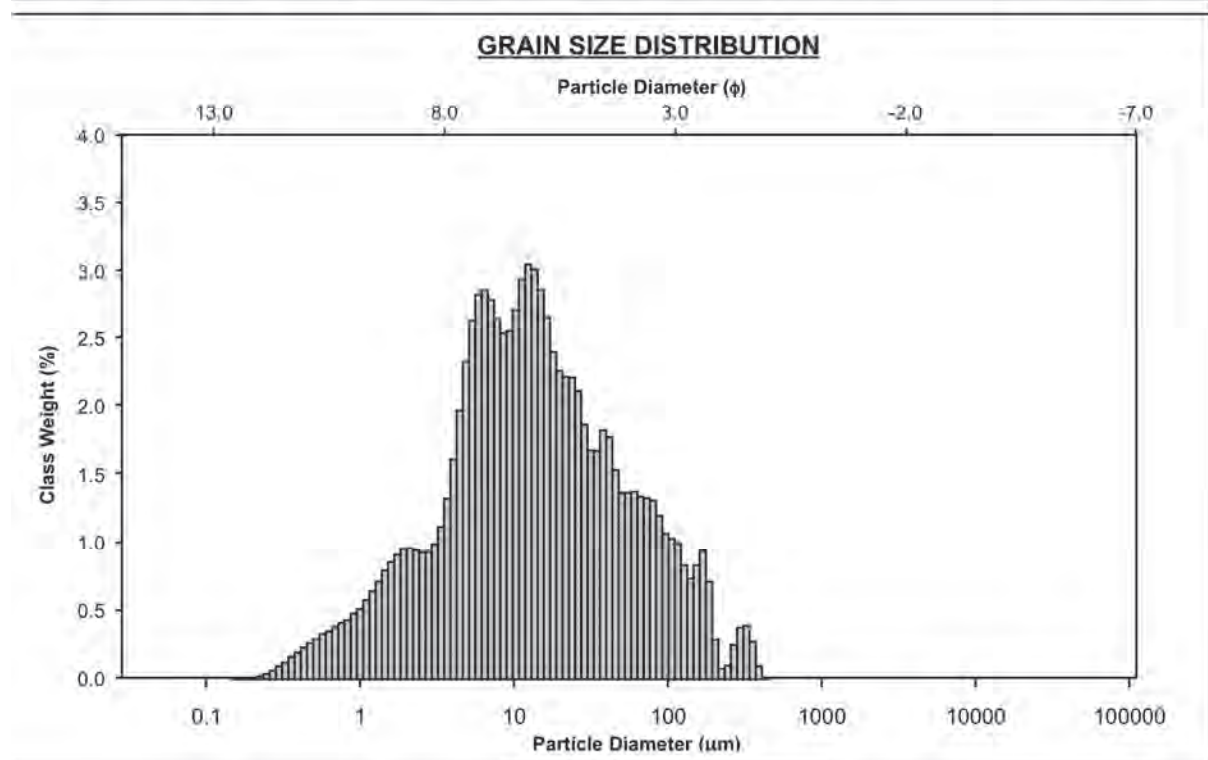
Grab station JG11

SAMPLE STATISTICS						
SAMPLE IDENTITY: SAMS Etive MPA16-8-11_JG11			ANALYST & DATE:			
SAMPLE TYPE: Polymodal, Very Poorly Sorted			TEXTURAL GROUP: Sandy Mud			
SEDIMENT NAME: Fine Sandy Medium Silt						
	μm	ϕ	GRAIN SIZE DISTRIBUTION			
MODE 1:	12.41	6.334	GRAVEL: 0.0%	COARSE SAND: 4.0%		
MODE 2:	6.460	7.276	SAND: 28.8%	MEDIUM SAND: 8.8%		
MODE 3:	38.01	4.719	MUD: 71.2%	FINE SAND: 9.0%		
D ₁₀ :	2.408	1.725		V FINE SAND: 7.0%		
MEDIAN or D ₅₀ :	16.60	5.913	V COARSE GRAVEL: 0.0%	V COARSE SILT: 9.0%		
D ₉₀ :	302.5	8.698	COARSE GRAVEL: 0.0%	COARSE SILT: 13.7%		
(D ₉₀ / D ₁₀):	125.6	5.042	MEDIUM GRAVEL: 0.0%	MEDIUM SILT: 17.7%		
(D ₉₀ - D ₁₀):	300.1	6.973	FINE GRAVEL: 0.0%	FINE SILT: 15.9%		
(D ₇₅ / D ₂₅):	14.40	2.107	V FINE GRAVEL: 0.0%	V FINE SILT: 6.8%		
(D ₇₅ - D ₂₅):	83.59	3.848	V COARSE SAND: 0.0%	CLAY: 8.1%		
	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic μm	Geometric μm	Logarithmic ϕ	Geometric μm	Logarithmic ϕ	Description
MEAN (\bar{x}):	88.59	21.79	5.520	23.71	5.399	Coarse Silt
SORTING (σ):	152.6	5.935	2.569	6.286	2.652	Very Poorly Sorted
SKEWNESS (Sk):	2.366	0.139	-0.139	0.205	-0.205	Coarse Skewed
KURTOSIS (K):	8.301	2.302	2.302	0.895	0.895	Platykurtic



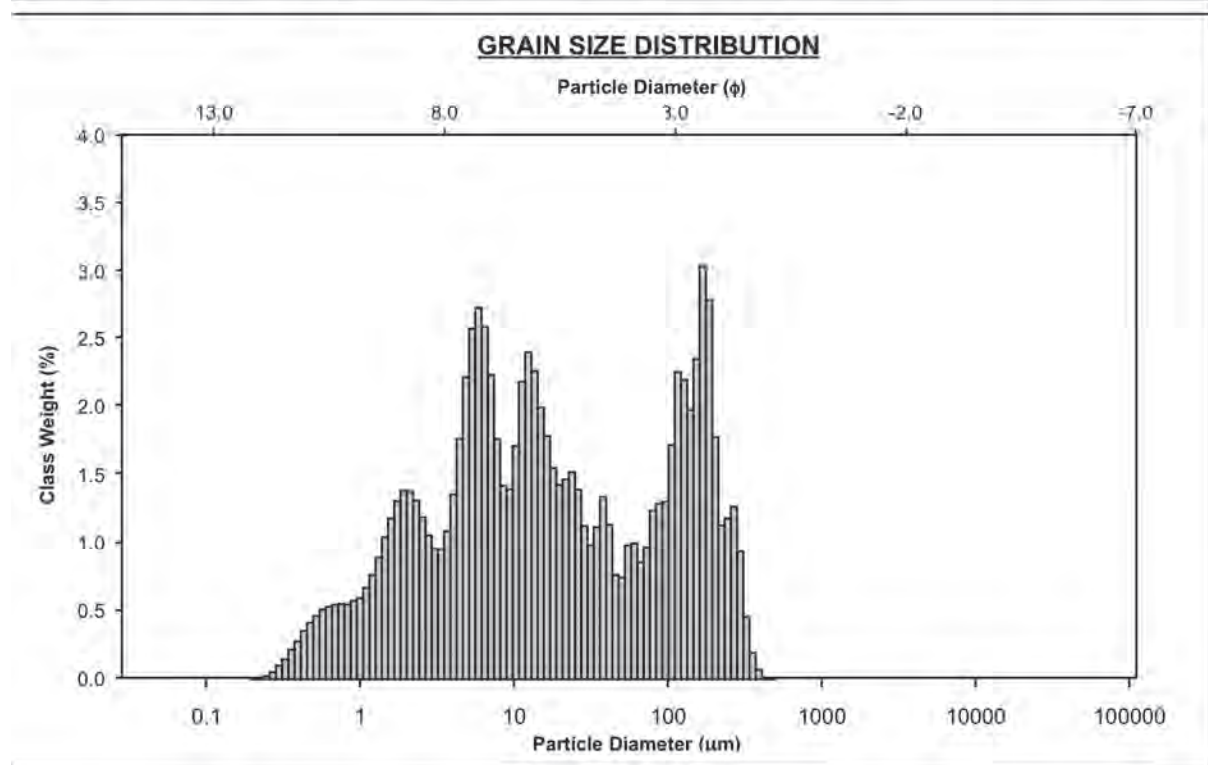
Grab station JG12

SAMPLE STATISTICS						
SAMPLE IDENTITY: SAMS Etive MPA16-8-11_JG12			ANALYST & DATE:			
SAMPLE TYPE: Polymodal, Very Poorly Sorted			TEXTURAL GROUP: Sandy Mud			
SEDIMENT NAME: Very Fine Sandy Medium Silt						
	μm	ϕ	GRAIN SIZE DISTRIBUTION			
MODE 1:	12.41	6.334	GRAVEL: 0.0%	COARSE SAND: 0.0%		
MODE 2:	6.460	7.276	SAND: 14.6%	MEDIUM SAND: 1.4%		
MODE 3:	38.01	4.719	MUD: 85.4%	FINE SAND: 4.3%		
D ₁₀ :	2.015	3.538		V FINE SAND: 8.8%		
MEDIAN or D ₅₀ :	12.57	6.314	V COARSE GRAVEL: 0.0%	V COARSE SILT: 11.8%		
D ₉₀ :	86.08	8.955	COARSE GRAVEL: 0.0%	COARSE SILT: 16.6%		
(D ₉₀ / D ₁₀):	42.72	2.531	MEDIUM GRAVEL: 0.0%	MEDIUM SILT: 21.0%		
(D ₉₀ - D ₁₀):	84.06	5.417	FINE GRAVEL: 0.0%	FINE SILT: 18.5%		
(D ₇₅ / D ₂₅):	6.207	1.539	V FINE GRAVEL: 0.0%	V FINE SILT: 7.8%		
(D ₇₅ - D ₂₅):	28.30	2.634	V COARSE SAND: 0.0%	CLAY: 9.7%		
	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic μm	Geometric μm	Logarithmic ϕ	Geometric μm	Logarithmic ϕ	Description
MEAN (\bar{x}):	32.07	12.94	6.272	13.62	6.198	Medium Silt
SORTING (σ):	51.81	4.062	2.022	4.131	2.046	Very Poorly Sorted
SKEWNESS (Sk):	3.374	-0.082	0.082	0.042	-0.042	Symmetrical
KURTOSIS (K):	17.01	2.795	2.795	1.074	1.074	Mesokurtic



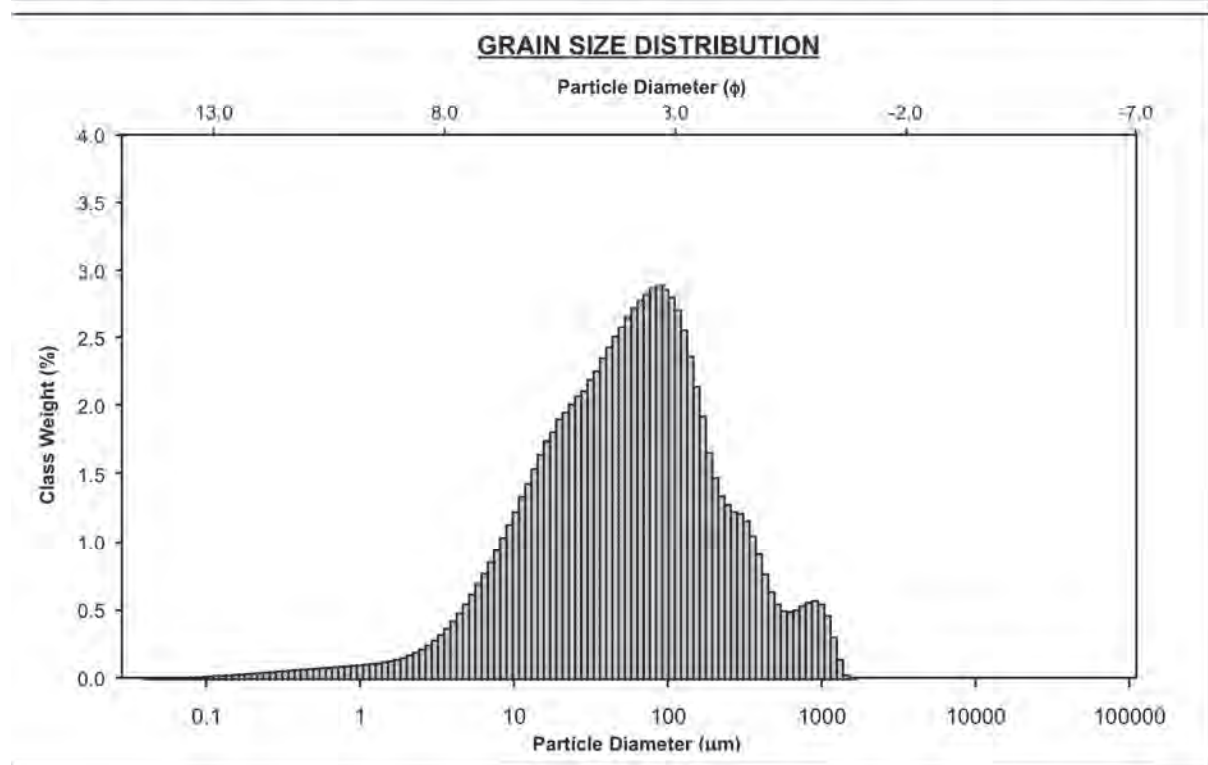
Grab station JG13

SAMPLE STATISTICS						
SAMPLE IDENTITY: SAMS Etive MPA16-8-11_JG13			ANALYST & DATE:			
SAMPLE TYPE: Polymodal, Very Poorly Sorted			TEXTURAL GROUP: Sandy Mud			
SEDIMENT NAME: Fine Sandy Fine Silt						
	μm	ϕ	GRAIN SIZE DISTRIBUTION			
MODE 1:	5.885	7.410	GRAVEL: 0.0%	COARSE SAND: 0.0%		
MODE 2:	12.41	6.334	SAND: 29.4%	MEDIUM SAND: 3.3%		
MODE 3:	23.84	5.392	MUD: 70.6%	FINE SAND: 15.6%		
D ₁₀ :	1.597	2.503		V FINE SAND: 10.5%		
MEDIAN or D ₅₀ :	14.16	6.142	V COARSE GRAVEL: 0.0%	V COARSE SILT: 7.6%		
D ₉₀ :	176.4	9.291	COARSE GRAVEL: 0.0%	COARSE SILT: 10.8%		
(D ₉₀ / D ₁₀):	110.5	3.712	MEDIUM GRAVEL: 0.0%	MEDIUM SILT: 14.3%		
(D ₉₀ - D ₁₀):	174.8	6.788	FINE GRAVEL: 0.0%	FINE SILT: 16.4%		
(D ₇₅ / D ₂₅):	19.19	2.235	V FINE GRAVEL: 0.0%	V FINE SILT: 8.6%		
(D ₇₅ - D ₂₅):	86.63	4.262	V COARSE SAND: 0.0%	CLAY: 12.8%		
	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic μm	Geometric μm	Logarithmic ϕ	Geometric μm	Logarithmic ϕ	Description
MEAN (\bar{x}):	55.62	16.48	5.923	16.97	5.881	Coarse Silt
SORTING (σ):	76.59	5.808	2.538	6.365	2.670	Very Poorly Sorted
SKEWNESS (Sk):	1.589	-0.080	0.080	0.065	-0.065	Symmetrical
KURTOSIS (K):	4.766	2.008	2.008	0.762	0.762	Platykurtic



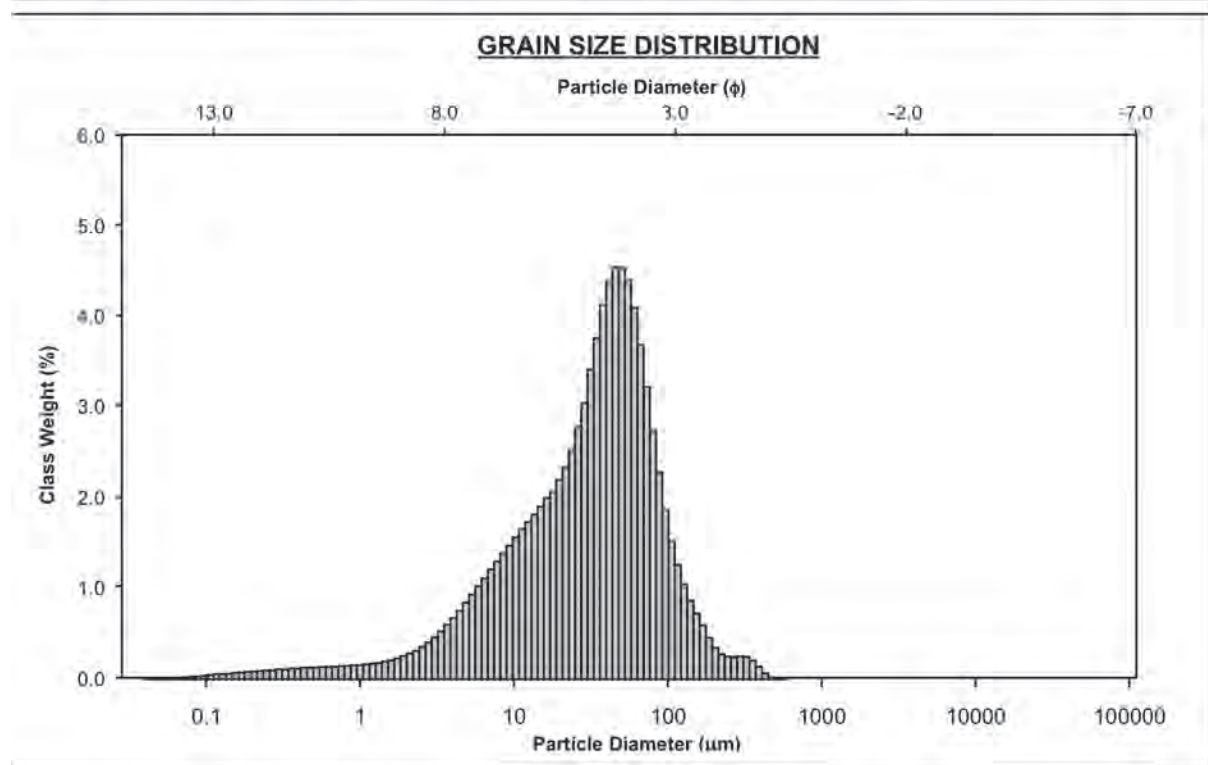
Grab station JG14

SAMPLE STATISTICS						
SAMPLE IDENTITY: SAMS Etive MPA16-8-11_JG14			ANALYST & DATE:			
SAMPLE TYPE: Bimodal, Very Poorly Sorted			TEXTURAL GROUP: Sandy Mud			
SEDIMENT NAME: Very Fine Sandy Very Coarse Silt						
	μm	ϕ	GRAIN SIZE DISTRIBUTION			
MODE 1:	88.00	3.508	GRAVEL: 0.0%	COARSE SAND: 4.0%		
MODE 2:	906.1	0.144	SAND: 47.6%	MEDIUM SAND: 7.5%		
MODE 3:			MUD: 52.4%	FINE SAND: 13.8%		
D ₁₀ :	8.361	1.710		V FINE SAND: 21.1%		
MEDIAN or D ₅₀ :	57.58	4.118	V COARSE GRAVEL: 0.0%	V COARSE SILT: 18.6%		
D ₉₀ :	305.7	6.902	COARSE GRAVEL: 0.0%	COARSE SILT: 14.7%		
(D ₉₀ / D ₁₀):	36.56	4.037	MEDIUM GRAVEL: 0.0%	MEDIUM SILT: 9.9%		
(D ₉₀ - D ₁₀):	297.3	5.192	FINE GRAVEL: 0.0%	FINE SILT: 4.9%		
(D ₇₅ / D ₂₅):	6.276	1.907	V FINE GRAVEL: 0.0%	V FINE SILT: 1.9%		
(D ₇₅ - D ₂₅):	110.9	2.650	V COARSE SAND: 1.2%	CLAY: 2.4%		
	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic μm	Geometric μm	Logarithmic ϕ	Geometric μm	Logarithmic ϕ	Description
MEAN (\bar{x}):	124.7	51.19	4.288	53.12	4.235	Very Coarse Silt
SORTING (σ):	194.6	4.345	2.119	4.063	2.022	Very Poorly Sorted
SKEWNESS (Sk):	3.220	-0.569	0.569	-0.083	0.083	Symmetrical
KURTOSIS (K):	14.76	4.036	4.036	1.060	1.060	Mesokurtic



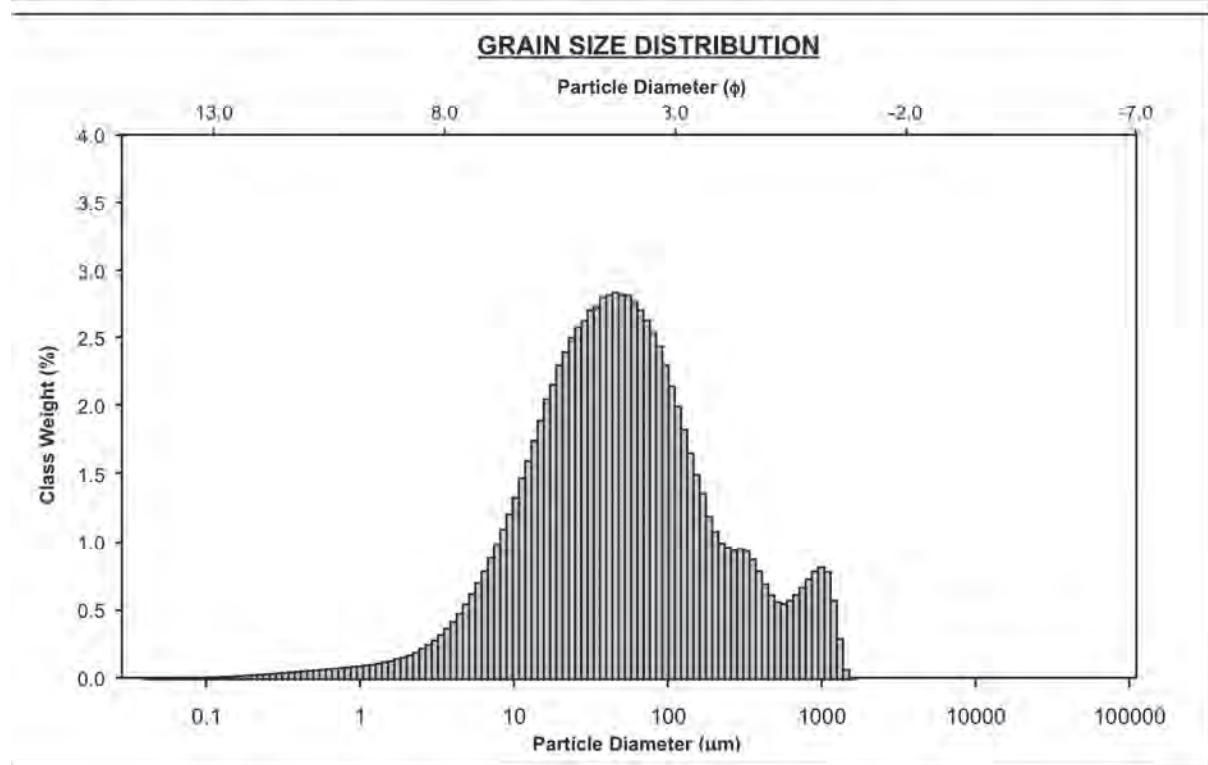
Grab station JG15

SAMPLE STATISTICS						
SAMPLE IDENTITY: SAMS Etive MPA16-8-11_JG15			ANALYST & DATE: .			
SAMPLE TYPE: Unimodal, Poorly Sorted			TEXTURAL GROUP: Sandy Mud			
SEDIMENT NAME: Very Fine Sandy Very Coarse Silt						
	μm	ϕ	GRAIN SIZE DISTRIBUTION			
MODE 1:	45.80	4.450	GRAVEL: 0.0%	COARSE SAND: 0.0%		
MODE 2:			SAND: 23.2%	MEDIUM SAND: 1.3%		
MODE 3:			MUD: 76.8%	FINE SAND: 4.2%		
D ₁₀ :	5.355	3.407		V FINE SAND: 17.7%		
MEDIAN or D ₅₀ :	35.25	4.826	V COARSE GRAVEL: 0.0%	V COARSE SILT: 31.5%		
D ₉₀ :	94.30	7.545	COARSE GRAVEL: 0.0%	COARSE SILT: 18.6%		
(D ₉₀ / D ₁₀):	17.61	2.215	MEDIUM GRAVEL: 0.0%	MEDIUM SILT: 12.2%		
(D ₉₀ - D ₁₀):	88.95	4.138	FINE GRAVEL: 0.0%	FINE SILT: 7.2%		
(D ₇₅ / D ₂₅):	4.177	1.508	V FINE GRAVEL: 0.0%	V FINE SILT: 3.1%		
(D ₇₅ - D ₂₅):	45.61	2.062	V COARSE SAND: 0.0%	CLAY: 4.2%		
	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic μm	Geometric μm	Logarithmic ϕ	Geometric μm	Logarithmic ϕ	Description
MEAN (\bar{x}):	46.49	26.51	5.237	28.42	5.137	Coarse Silt
SORTING (σ):	49.81	3.581	1.840	3.130	1.646	Poorly Sorted
SKEWNESS (Sk):	3.108	-1.283	1.283	-0.318	0.318	Very Fine Skewed
KURTOSIS (K):	17.50	5.614	5.614	1.133	1.133	Leptokurtic



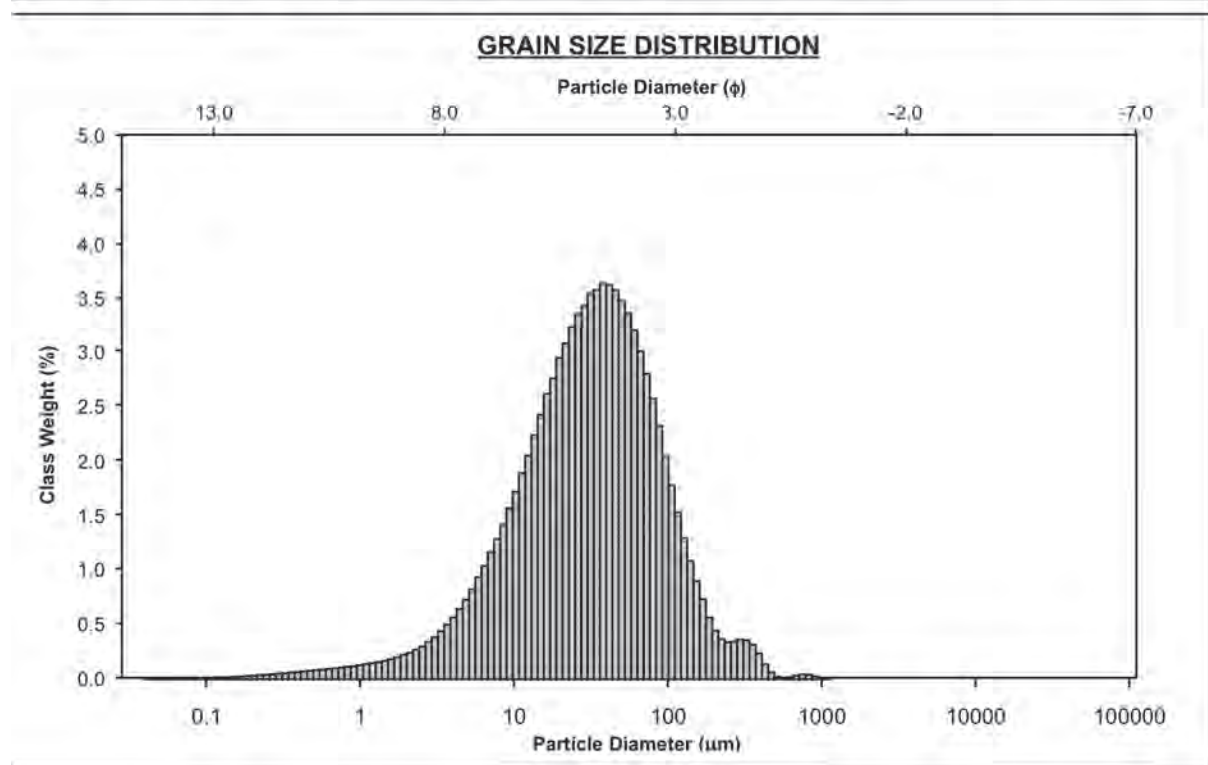
Grab station MG1

SAMPLE STATISTICS						
SAMPLE IDENTITY: SAMS Etive MPA 7-8-11_MG1			ANALYST & DATE:			
SAMPLE TYPE: Trimodal, Very Poorly Sorted			TEXTURAL GROUP: Sandy Mud			
SEDIMENT NAME: Very Fine Sandy Very Coarse Silt						
	μm	ϕ	GRAIN SIZE DISTRIBUTION			
MODE 1:	45.80	4.450	GRAVEL: 0.0%	COARSE SAND: 4.9%		
MODE 2:	295.9	1.759	SAND: 41.1%	MEDIUM SAND: 6.2%		
MODE 3:	994.6	0.009	MUD: 58.9%	FINE SAND: 9.9%		
D ₁₀ :	8.484	1.536		V FINE SAND: 17.9%		
MEDIAN or D ₅₀ :	46.64	4.422	V COARSE GRAVEL: 0.0%	V COARSE SILT: 21.0%		
D ₉₀ :	344.9	6.881	COARSE GRAVEL: 0.0%	COARSE SILT: 18.0%		
(D ₉₀ / D ₁₀):	40.65	4.480	MEDIUM GRAVEL: 0.0%	MEDIUM SILT: 10.9%		
(D ₉₀ - D ₁₀):	336.4	5.345	FINE GRAVEL: 0.0%	FINE SILT: 5.0%		
(D ₇₅ / D ₂₅):	5.900	1.820	V FINE GRAVEL: 0.0%	V FINE SILT: 1.9%		
(D ₇₅ - D ₂₅):	95.26	2.561	V COARSE SAND: 2.1%	CLAY: 2.1%		
	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic μm	Geometric μm	Logarithmic ϕ	Geometric μm	Logarithmic ϕ	Description
MEAN (\bar{x}):	131.0	47.78	4.387	48.82	4.356	Very Coarse Silt
SORTING (σ):	229.1	4.364	2.126	4.217	2.076	Very Poorly Sorted
SKEWNESS (Sk):	3.055	-0.207	0.207	0.066	-0.066	Symmetrical
KURTOSIS (K):	12.51	3.705	3.705	1.153	1.153	Leptokurtic



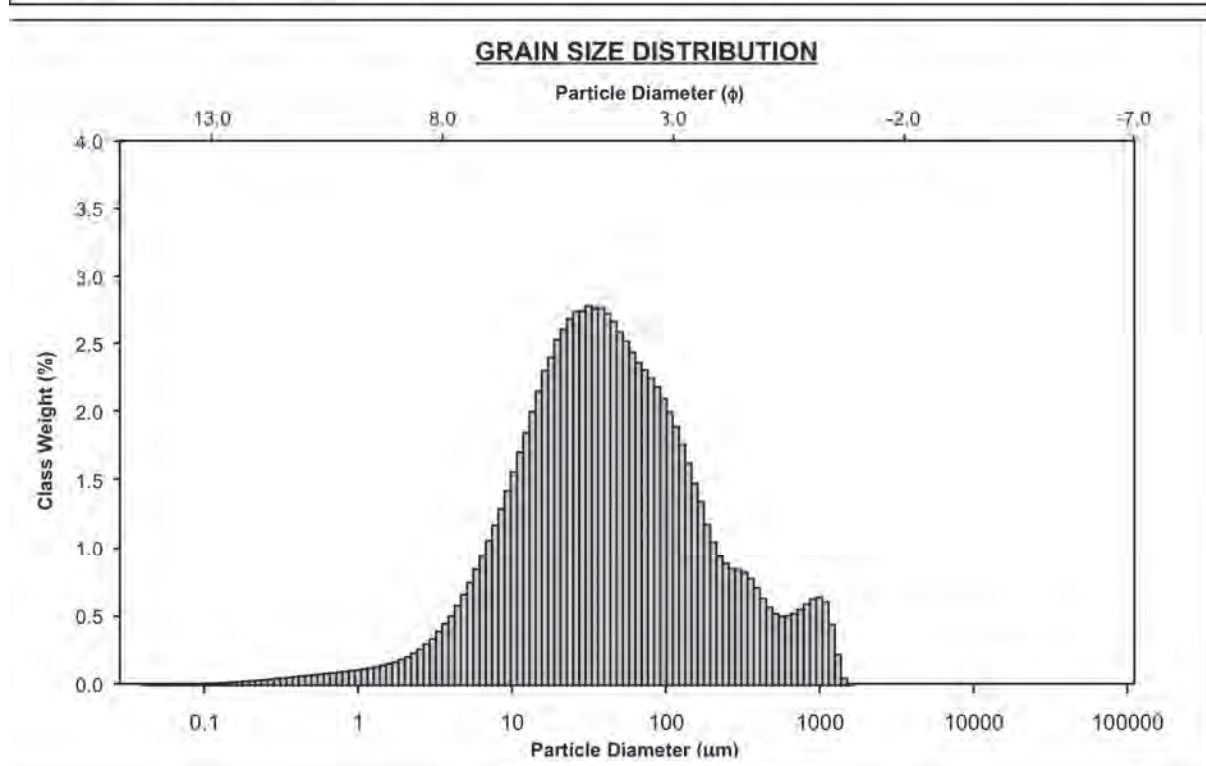
Grab station MG2

SAMPLE STATISTICS						
SAMPLE IDENTITY: SAMS Etive MPA 7-8-11_MG2			ANALYST & DATE:			
SAMPLE TYPE: Unimodal, Poorly Sorted			TEXTURAL GROUP: Sandy Mud			
SEDIMENT NAME: Very Fine Sandy Very Coarse Silt						
	μm	ϕ	GRAIN SIZE DISTRIBUTION			
MODE 1:	38.01	4.719	GRAVEL: 0.0%	COARSE SAND: 0.2%		
MODE 2:			SAND: 24.6%	MEDIUM SAND: 1.9%		
MODE 3:			MUD: 75.4%	FINE SAND: 5.3%		
D ₁₀ :	6.692	3.218		V FINE SAND: 17.1%		
MEDIAN or D ₅₀ :	31.96	4.968	V COARSE GRAVEL: 0.0%	V COARSE SILT: 26.3%		
D ₉₀ :	107.5	7.223	COARSE GRAVEL: 0.0%	COARSE SILT: 23.2%		
(D ₉₀ / D ₁₀):	16.06	2.245	MEDIUM GRAVEL: 0.0%	MEDIUM SILT: 14.0%		
(D ₉₀ - D ₁₀):	100.8	4.006	FINE GRAVEL: 0.0%	FINE SILT: 6.6%		
(D ₇₅ / D ₂₅):	4.103	1.507	V FINE GRAVEL: 0.0%	V FINE SILT: 2.6%		
(D ₇₅ - D ₂₅):	46.68	2.037	V COARSE SAND: 0.0%	CLAY: 2.8%		
	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic μm	Geometric μm	Logarithmic ϕ	Geometric μm	Logarithmic ϕ	Description
MEAN (\bar{x}):	50.75	28.46	5.135	29.81	5.068	Coarse Silt
SORTING (σ):	65.86	3.265	1.707	2.988	1.579	Poorly Sorted
SKEWNESS (Sk):	4.665	-0.792	0.792	-0.130	0.130	Fine Skewed
KURTOSIS (K):	39.40	4.785	4.785	1.087	1.087	Mesokurtic



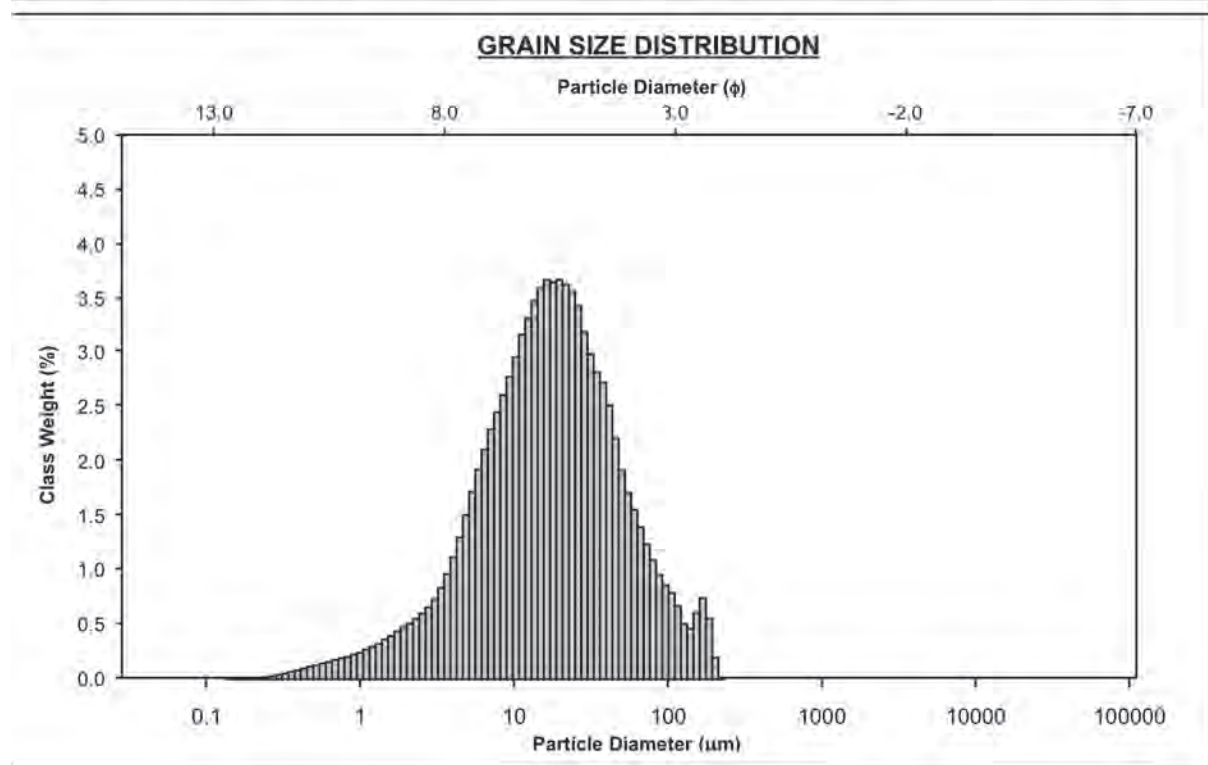
Grab station MG3

SAMPLE STATISTICS						
SAMPLE IDENTITY: SAMS Etive MPA 7-8-11_MG3			ANALYST & DATE:			
SAMPLE TYPE: Trimodal, Very Poorly Sorted			TEXTURAL GROUP: Sandy Mud			
SEDIMENT NAME: Very Fine Sandy Very Coarse Silt						
	μm	ϕ	GRAIN SIZE DISTRIBUTION			
MODE 1:	31.54	4.988	GRAVEL: 0.0%	COARSE SAND: 4.2%		
MODE 2:	38.01	4.719	SAND: 37.2%	MEDIUM SAND: 5.6%		
MODE 3:	994.6	0.009	MUD: 62.8%	FINE SAND: 9.6%		
D ₁₀ :	7.341	1.779		V FINE SAND: 16.1%		
MEDIAN or D ₅₀ :	39.65	4.656	V COARSE GRAVEL: 0.0%	V COARSE SILT: 20.0%		
D ₉₀ :	291.3	7.090	COARSE GRAVEL: 0.0%	COARSE SILT: 19.4%		
(D ₉₀ / D ₁₀):	39.69	3.985	MEDIUM GRAVEL: 0.0%	MEDIUM SILT: 12.6%		
(D ₉₀ - D ₁₀):	284.0	5.311	FINE GRAVEL: 0.0%	FINE SILT: 6.0%		
(D ₇₅ / D ₂₅):	6.204	1.804	V FINE GRAVEL: 0.0%	V FINE SILT: 2.3%		
(D ₇₅ - D ₂₅):	86.70	2.633	V COARSE SAND: 1.6%	CLAY: 2.4%		
	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic μm	Geometric μm	Logarithmic ϕ	Geometric μm	Logarithmic ϕ	Description
MEAN (\bar{x}):	115.4	41.35	4.596	41.84	4.579	Very Coarse Silt
SORTING (σ):	209.6	4.376	2.130	4.190	2.067	Very Poorly Sorted
SKEWNESS (Sk):	3.344	-0.169	0.169	0.070	-0.070	Symmetrical
KURTOSIS (K):	14.90	3.619	3.619	1.112	1.112	Leptokurtic



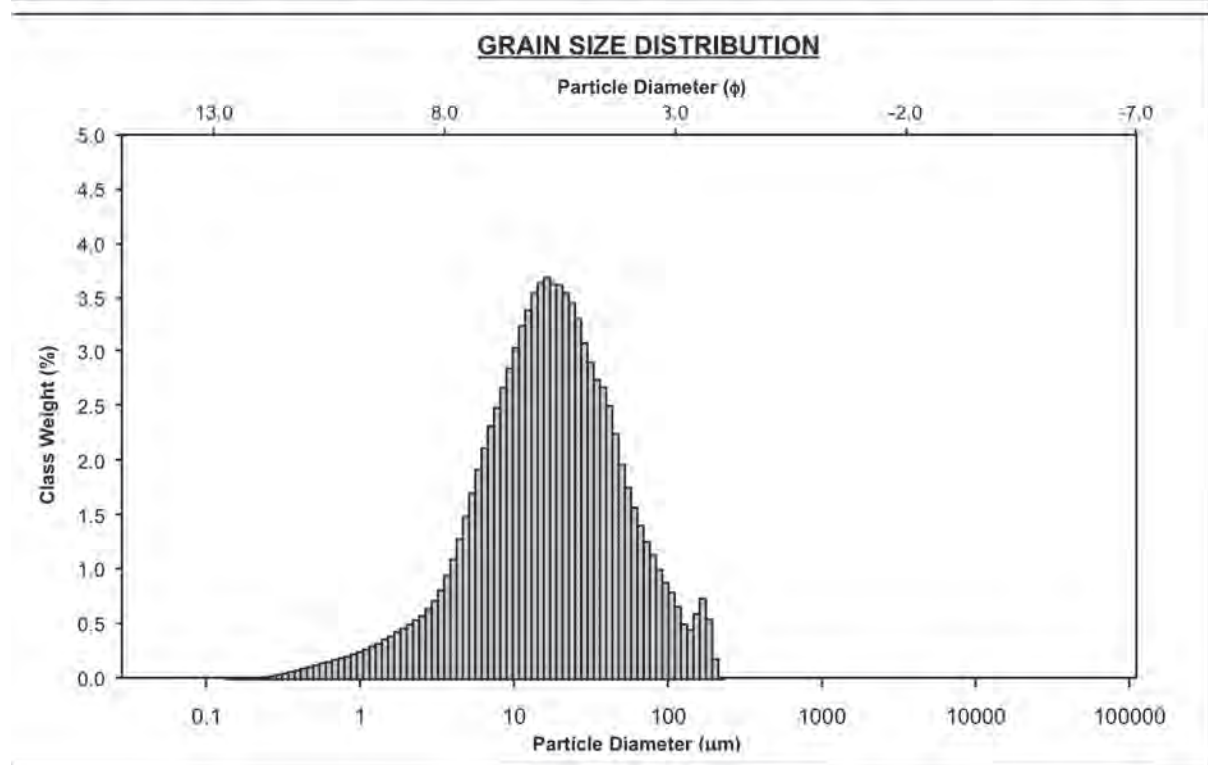
Grab station MG4

SAMPLE STATISTICS						
SAMPLE IDENTITY: SAMS Etive MPA 7-8-11_MG4			ANALYST & DATE:			
SAMPLE TYPE: Trimodal, Poorly Sorted			TEXTURAL GROUP: Sandy Mud			
SEDIMENT NAME: Very Fine Sandy Coarse Silt						
	μm	ϕ	GRAIN SIZE DISTRIBUTION			
MODE 1:	19.78	5.661	GRAVEL: 0.0%	COARSE SAND: 0.0%		
MODE 2:	16.41	5.931	SAND: 10.4%	MEDIUM SAND: 0.0%		
MODE 3:	169.0	2.566	MUD: 89.6%	FINE SAND: 3.0%		
D ₁₀ :	4.026	3.960		V FINE SAND: 7.5%		
MEDIAN or D ₅₀ :	17.25	5.858	V COARSE GRAVEL: 0.0%	V COARSE SILT: 17.1%		
D ₉₀ :	64.25	7.956	COARSE GRAVEL: 0.0%	COARSE SILT: 26.3%		
(D ₉₀ / D ₁₀):	15.96	2.009	MEDIUM GRAVEL: 0.0%	MEDIUM SILT: 23.1%		
(D ₉₀ - D ₁₀):	60.23	3.996	FINE GRAVEL: 0.0%	FINE SILT: 13.3%		
(D ₇₅ / D ₂₅):	4.023	1.411	V FINE GRAVEL: 0.0%	V FINE SILT: 5.2%		
(D ₇₅ - D ₂₅):	25.46	2.008	V COARSE SAND: 0.0%	CLAY: 4.5%		
	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic μm	Geometric μm	Logarithmic ϕ	Geometric μm	Logarithmic ϕ	Description
MEAN (\bar{x}):	28.17	16.23	5.945	16.76	5.899	Coarse Silt
SORTING (σ):	32.87	3.070	1.618	2.996	1.583	Poorly Sorted
SKEWNESS (Sk):	2.603	-0.445	0.445	-0.067	0.067	Symmetrical
KURTOSIS (K):	10.82	3.536	3.536	1.120	1.120	Leptokurtic



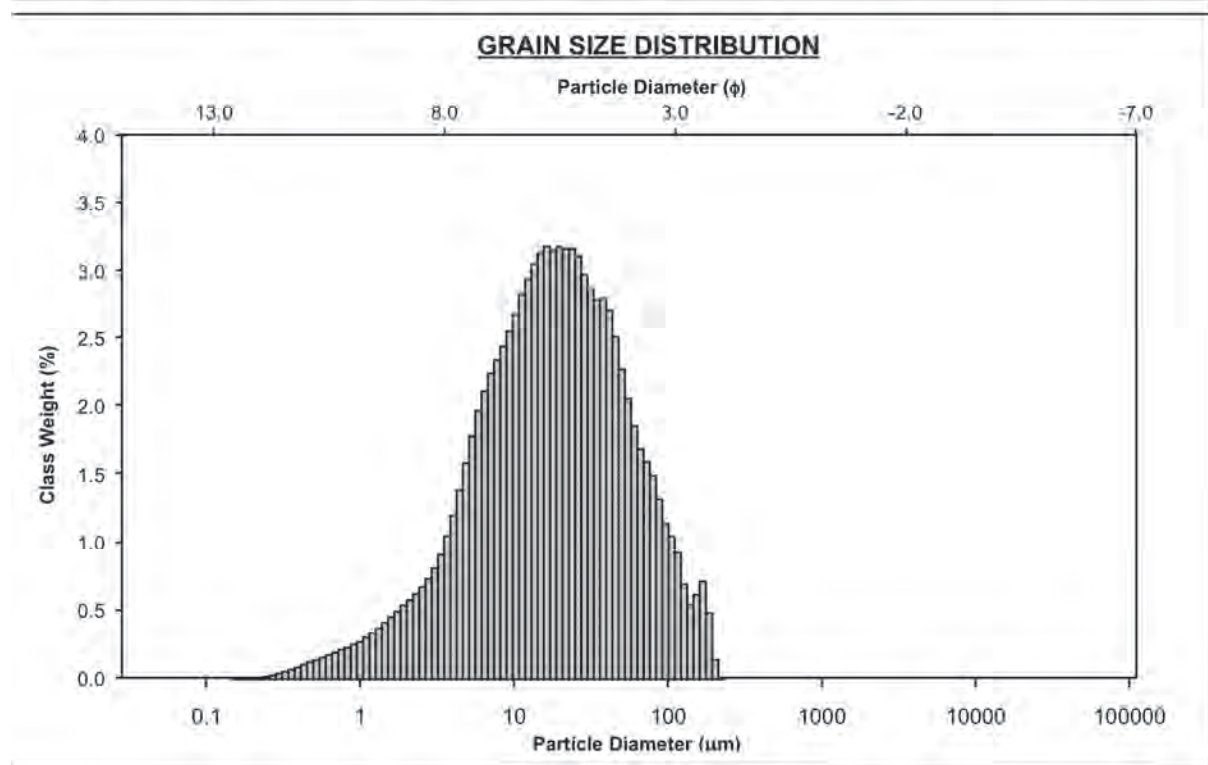
Grab station MG5

SAMPLE STATISTICS						
SAMPLE IDENTITY: SAMS Etive MPA 7-8-11_MG5			ANALYST & DATE:			
SAMPLE TYPE: Bimodal, Poorly Sorted			TEXTURAL GROUP: Sandy Mud			
SEDIMENT NAME: Very Fine Sandy Coarse Silt						
	μm	ϕ	GRAIN SIZE DISTRIBUTION			
MODE 1:	16.41	5.931	GRAVEL: 0.0%	COARSE SAND: 0.0%		
MODE 2:	169.0	2.566	SAND: 10.5%	MEDIUM SAND: 0.0%		
MODE 3:			MUD: 89.5%	FINE SAND: 2.9%		
D ₁₀ :	4.064	3.953		V FINE SAND: 7.6%		
MEDIAN or D ₅₀ :	17.05	5.874	V COARSE GRAVEL: 0.0%	V COARSE SILT: 17.1%		
D ₉₀ :	64.59	7.943	COARSE GRAVEL: 0.0%	COARSE SILT: 25.9%		
(D ₉₀ / D ₁₀):	15.89	2.010	MEDIUM GRAVEL: 0.0%	MEDIUM SILT: 23.7%		
(D ₉₀ - D ₁₀):	60.53	3.990	FINE GRAVEL: 0.0%	FINE SILT: 13.3%		
(D ₇₅ / D ₂₅):	4.032	1.412	V FINE GRAVEL: 0.0%	V FINE SILT: 5.1%		
(D ₇₅ - D ₂₅):	25.59	2.012	V COARSE SAND: 0.0%	CLAY: 4.5%		
	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic μm	Geometric μm	Logarithmic ϕ	Geometric μm	Logarithmic ϕ	Description
MEAN (\bar{x}):	28.14	16.21	5.947	16.79	5.896	Coarse Silt
SORTING (σ):	32.75	3.068	1.617	2.993	1.581	Poorly Sorted
SKEWNESS (Sk):	2.583	-0.443	0.443	-0.055	0.055	Symmetrical
KURTOSIS (K):	10.73	3.542	3.542	1.116	1.116	Leptokurtic



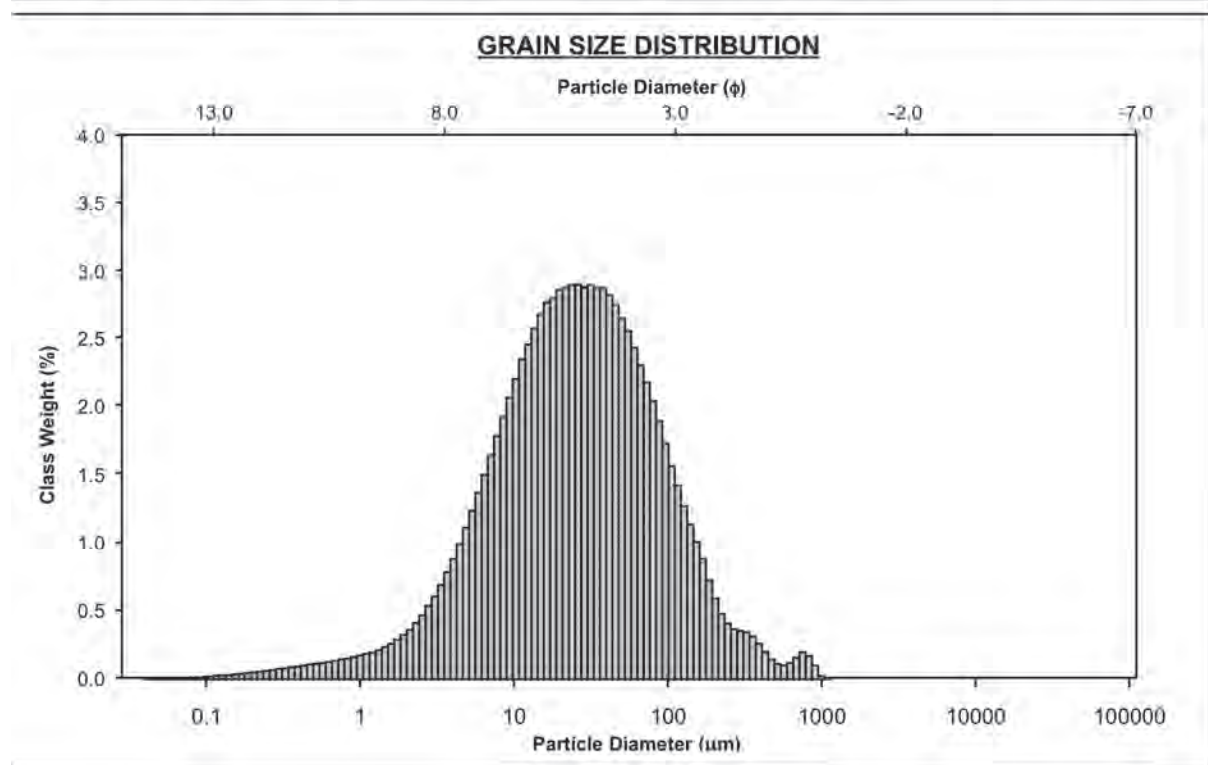
Grab station MG6

SAMPLE STATISTICS						
SAMPLE IDENTITY: SAMS Etive MPA 7-8-11_MG6			ANALYST & DATE:			
SAMPLE TYPE: Polymodal, Poorly Sorted			TEXTURAL GROUP: Sandy Mud			
SEDIMENT NAME: Very Fine Sandy Coarse Silt						
	μm	ϕ	GRAIN SIZE DISTRIBUTION			
MODE 1:	16.41	5.931	GRAVEL: 0.0%	COARSE SAND: 0.0%		
MODE 2:	19.78	5.661	SAND: 12.8%	MEDIUM SAND: 0.0%		
MODE 3:	38.01	4.719	MUD: 87.2%	FINE SAND: 3.0%		
D ₁₀ :	3.658	3.774		V FINE SAND: 9.8%		
MEDIAN or D ₅₀ :	17.98	5.797	V COARSE GRAVEL: 0.0%	V COARSE SILT: 18.6%		
D ₉₀ :	73.10	8.095	COARSE GRAVEL: 0.0%	COARSE SILT: 23.4%		
(D ₉₀ / D ₁₀):	19.99	2.145	MEDIUM GRAVEL: 0.0%	MEDIUM SILT: 20.8%		
(D ₉₀ - D ₁₀):	69.45	4.321	FINE GRAVEL: 0.0%	FINE SILT: 13.6%		
(D ₇₅ / D ₂₅):	4.810	1.483	V FINE GRAVEL: 0.0%	V FINE SILT: 5.8%		
(D ₇₅ - D ₂₅):	30.56	2.266	V COARSE SAND: 0.0%	CLAY: 5.0%		
	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic μm	Geometric μm	Logarithmic ϕ	Geometric μm	Logarithmic ϕ	Description
MEAN (\bar{x}):	30.10	16.69	5.905	17.38	5.846	Coarse Silt
SORTING (σ):	34.04	3.265	1.707	3.238	1.695	Poorly Sorted
SKEWNESS (Sk):	2.221	-0.461	0.461	-0.082	0.082	Symmetrical
KURTOSIS (K):	8.564	3.198	3.198	1.035	1.035	Mesokurtic



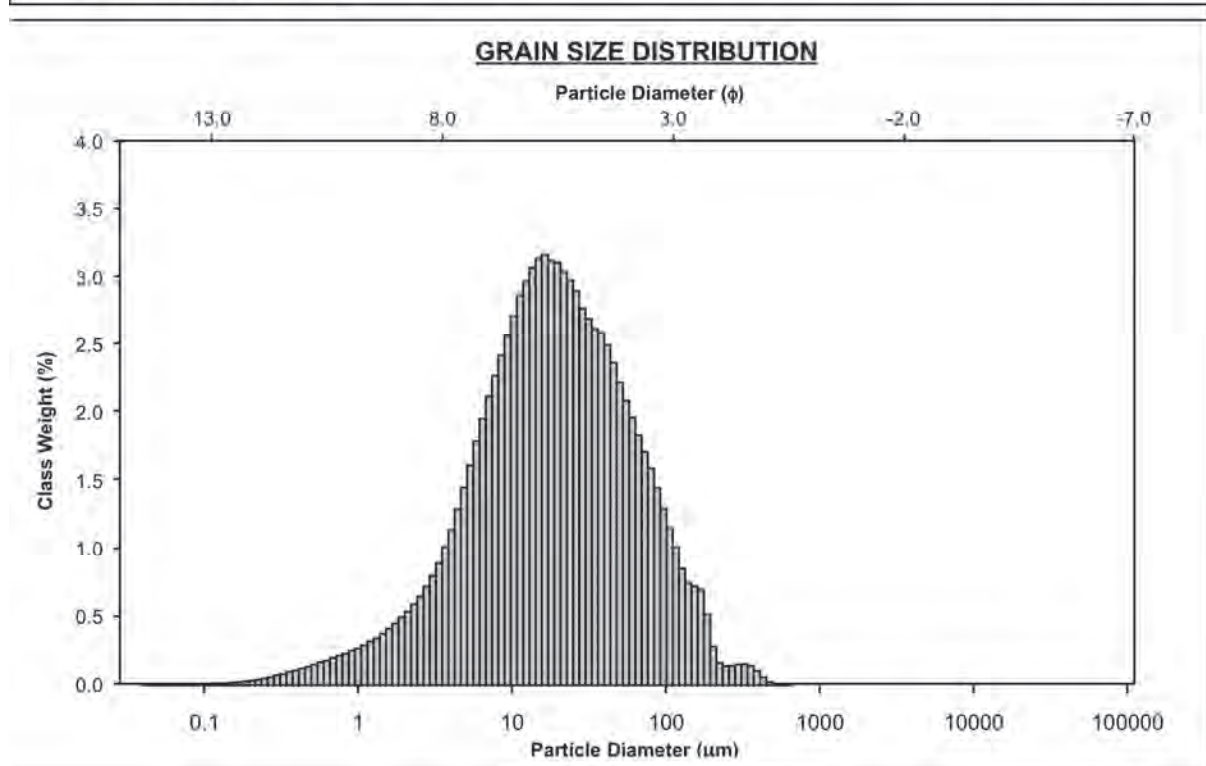
Grab station MG7

SAMPLE STATISTICS						
SAMPLE IDENTITY: SAMS Etive MPA 7-8-11_MG7			ANALYST & DATE:			
SAMPLE TYPE: Bimodal, Poorly Sorted			TEXTURAL GROUP: Sandy Mud			
SEDIMENT NAME: Very Fine Sandy Coarse Silt						
	μm	ϕ	GRAIN SIZE DISTRIBUTION			
MODE 1:	26.17	5.258	GRAVEL: 0.0%	COARSE SAND: 1.0%		
MODE 2:	31.54	4.988	SAND: 23.2%	MEDIUM SAND: 2.1%		
MODE 3:			MUD: 76.8%	FINE SAND: 6.1%		
D ₁₀ :	4.756	3.078		V FINE SAND: 14.0%		
MEDIAN or D ₅₀ :	25.56	5.290	V COARSE GRAVEL: 0.0%	V COARSE SILT: 20.5%		
D ₉₀ :	118.5	7.716	COARSE GRAVEL: 0.0%	COARSE SILT: 21.4%		
(D ₉₀ / D ₁₀):	24.91	2.507	MEDIUM GRAVEL: 0.0%	MEDIUM SILT: 17.2%		
(D ₉₀ - D ₁₀):	113.7	4.639	FINE GRAVEL: 0.0%	FINE SILT: 9.7%		
(D ₇₅ / D ₂₅):	5.363	1.591	V FINE GRAVEL: 0.0%	V FINE SILT: 4.1%		
(D ₇₅ - D ₂₅):	47.52	2.423	V COARSE SAND: 0.0%	CLAY: 3.8%		
	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic μm	Geometric μm	Logarithmic ϕ	Geometric μm	Logarithmic ϕ	Description
MEAN (\bar{x}):	53.53	24.06	5.377	24.94	5.326	Coarse Silt
SORTING (σ):	91.76	3.815	1.932	3.544	1.825	Poorly Sorted
SKEWNESS (Sk):	5.040	-0.454	0.454	-0.055	0.055	Symmetrical
KURTOSIS (K):	36.38	3.972	3.972	1.041	1.041	Mesokurtic



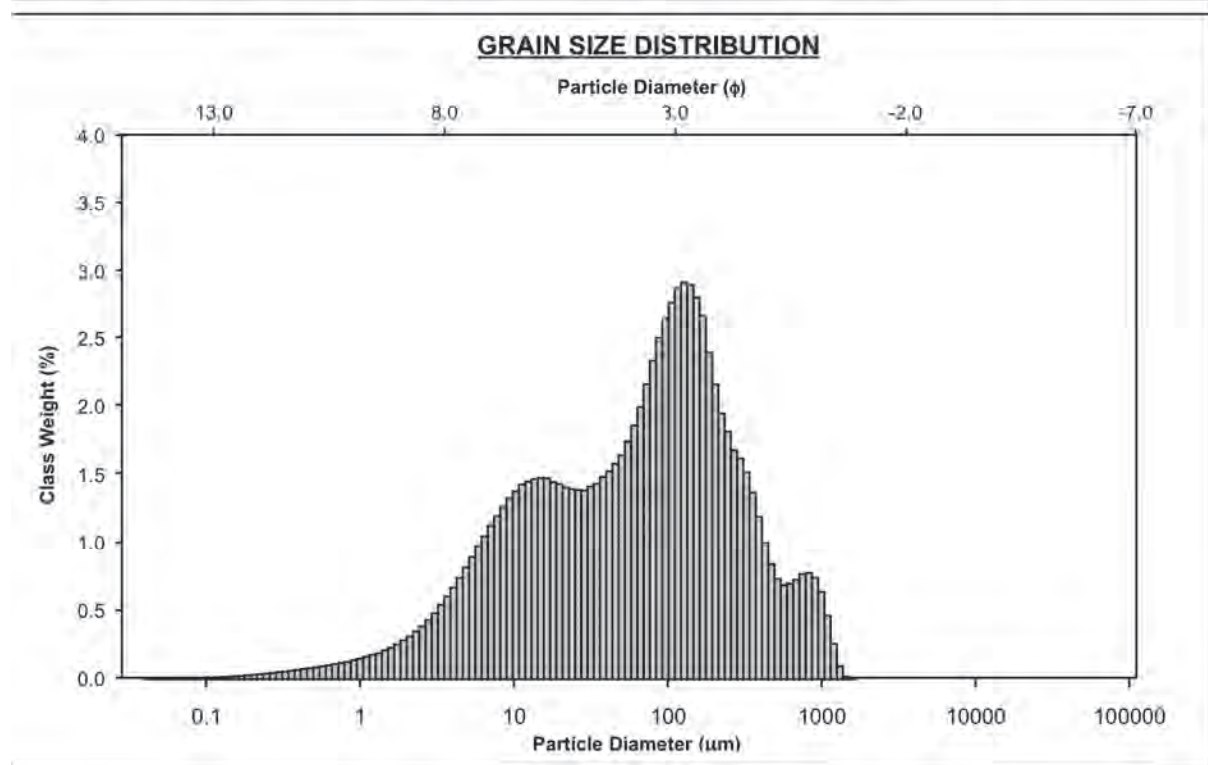
Grab station MG8

SAMPLE STATISTICS						
SAMPLE IDENTITY: SAMS Etive MPA 7-8-11_MG8			ANALYST & DATE:			
SAMPLE TYPE: Unimodal, Poorly Sorted			TEXTURAL GROUP: Sandy Mud			
SEDIMENT NAME: Very Fine Sandy Coarse Silt						
	μm	ϕ	GRAIN SIZE DISTRIBUTION			
MODE 1:	16.41	5.931	GRAVEL: 0.0%	COARSE SAND: 0.0%		
MODE 2:			SAND: 15.4%	MEDIUM SAND: 0.8%		
MODE 3:			MUD: 84.6%	FINE SAND: 3.9%		
D ₁₀ :	3.639	3.581		V FINE SAND: 10.7%		
MEDIAN or D ₅₀ :	18.47	5.759	V COARSE GRAVEL: 0.0%	V COARSE SILT: 17.8%		
D ₉₀ :	83.58	8.102	COARSE GRAVEL: 0.0%	COARSE SILT: 22.5%		
(D ₉₀ / D ₁₀):	22.97	2.263	MEDIUM GRAVEL: 0.0%	MEDIUM SILT: 20.9%		
(D ₉₀ - D ₁₀):	79.94	4.522	FINE GRAVEL: 0.0%	FINE SILT: 12.6%		
(D ₇₅ / D ₂₅):	5.026	1.509	V FINE GRAVEL: 0.0%	V FINE SILT: 5.6%		
(D ₇₅ - D ₂₅):	33.53	2.329	V COARSE SAND: 0.0%	CLAY: 5.2%		
	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic μm	Geometric μm	Logarithmic ϕ	Geometric μm	Logarithmic ϕ	Description
MEAN (\bar{x}):	34.65	17.55	5.832	18.40	5.764	Coarse Silt
SORTING (σ):	46.57	3.526	1.818	3.425	1.776	Poorly Sorted
SKEWNESS (Sk):	3.518	-0.463	0.463	-0.051	0.051	Symmetrical
KURTOSIS (K):	21.07	3.530	3.530	1.059	1.059	Mesokurtic



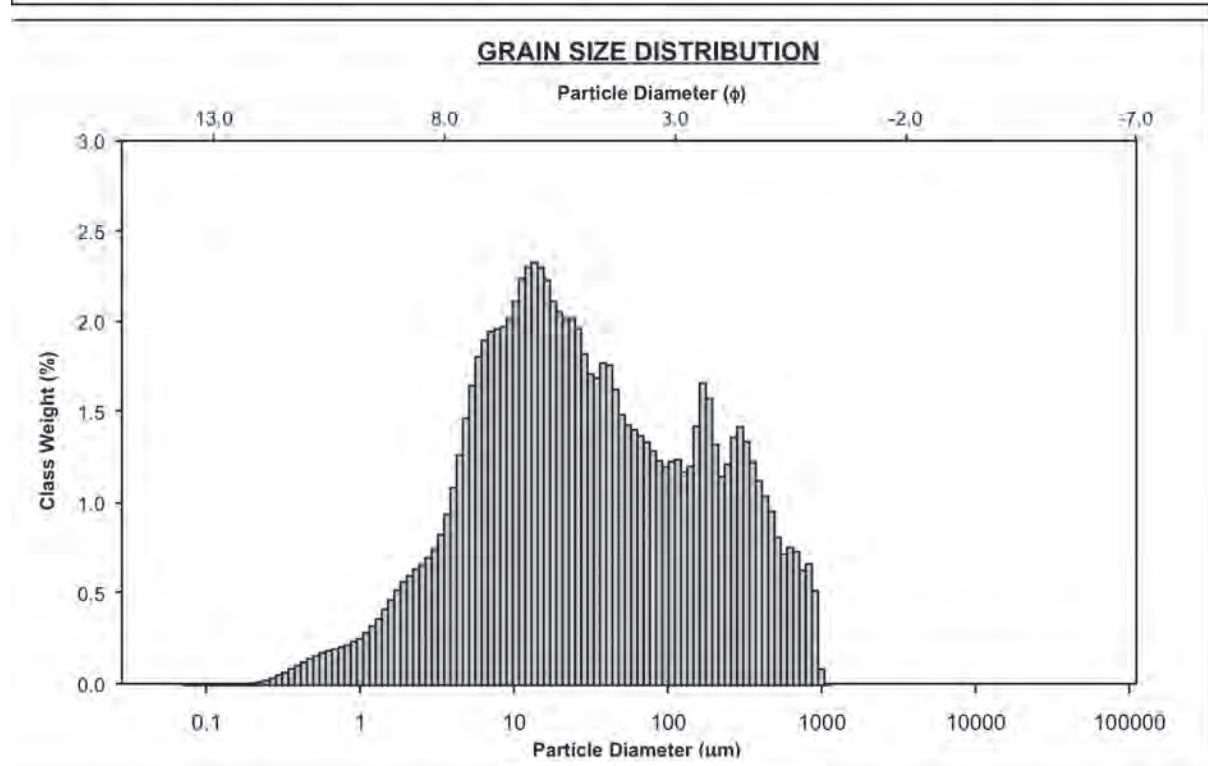
Grab station MG9

SAMPLE STATISTICS						
SAMPLE IDENTITY: SAMS Etive MPA 7-8-11_MG9			ANALYST & DATE: .			
SAMPLE TYPE: Trimodal, Very Poorly Sorted			TEXTURAL GROUP: Muddy Sand			
SEDIMENT NAME: Very Coarse Silty Very Fine Sand						
	μm	ϕ	GRAIN SIZE DISTRIBUTION			
MODE 1:	127.8	2.970	GRAVEL: 0.0%	COARSE SAND: 5.5%		
MODE 2:	14.96	6.065	SAND: 53.6%	MEDIUM SAND: 10.0%		
MODE 3:	825.4	0.278	MUD: 46.4%	FINE SAND: 18.5%		
D ₁₀ :	5.864	1.445		V FINE SAND: 18.6%		
MEDIAN or D ₅₀ :	73.52	3.766	V COARSE GRAVEL: 0.0%	V COARSE SILT: 11.9%		
D ₉₀ :	367.3	7.414	COARSE GRAVEL: 0.0%	COARSE SILT: 10.7%		
(D ₉₀ / D ₁₀):	62.63	5.130	MEDIUM GRAVEL: 0.0%	MEDIUM SILT: 10.4%		
(D ₉₀ - D ₁₀):	361.4	5.969	FINE GRAVEL: 0.0%	FINE SILT: 6.9%		
(D ₇₅ / D ₂₅):	10.30	2.332	V FINE GRAVEL: 0.0%	V FINE SILT: 3.3%		
(D ₇₅ - D ₂₅):	156.6	3.365	V COARSE SAND: 1.1%	CLAY: 3.1%		
	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic μm	Geometric μm	Logarithmic ϕ	Geometric μm	Logarithmic ϕ	Description
MEAN (\bar{x}):	145.6	54.03	4.210	56.33	4.150	Very Coarse Silt
SORTING (σ):	207.3	5.151	2.365	5.097	2.350	Very Poorly Sorted
SKEWNESS (Sk):	2.636	-0.564	0.564	-0.220	0.220	Fine Skewed
KURTOSIS (K):	10.74	3.055	3.055	0.931	0.931	Mesokurtic



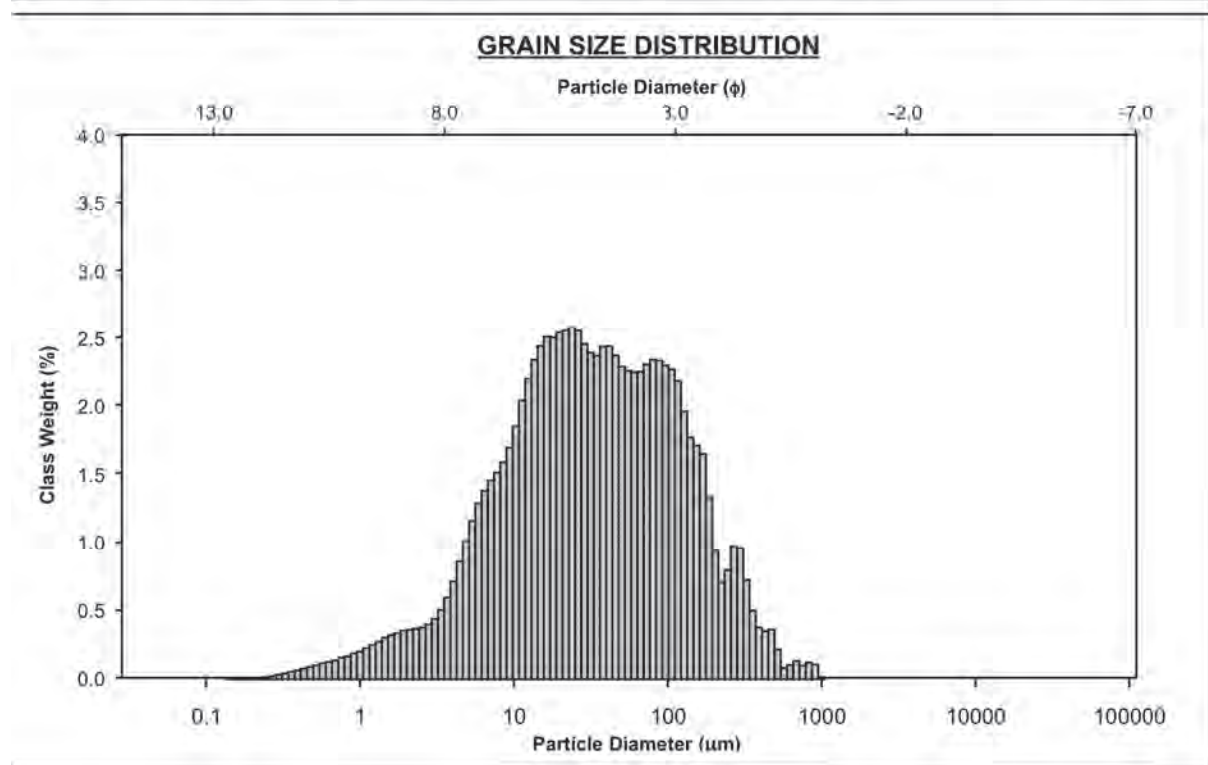
Grab station MG10

SAMPLE STATISTICS						
SAMPLE IDENTITY: SAMS Etive MPA 7-8-11_MG10			ANALYST & DATE: _____			
SAMPLE TYPE: Polymodal, Very Poorly Sorted			TEXTURAL GROUP: Sandy Mud			
SEDIMENT NAME: Fine Sandy Medium Silt						
	μm	ϕ	GRAIN SIZE DISTRIBUTION			
MODE 1:	13.63	6.199	GRAVEL: 0.0%	COARSE SAND: 4.8%		
MODE 2:	38.01	4.719	SAND: 33.6%	MEDIUM SAND: 9.0%		
MODE 3:	169.0	2.566	MUD: 66.4%	FINE SAND: 10.2%		
D ₁₀ :	3.665	1.618		V FINE SAND: 9.5%		
MEDIAN or D ₅₀ :	25.22	5.309	V COARSE GRAVEL: 0.0%	V COARSE SILT: 12.1%		
D ₉₀ :	325.8	8.092	COARSE GRAVEL: 0.0%	COARSE SILT: 15.1%		
(D ₉₀ / D ₁₀):	88.91	5.002	MEDIUM GRAVEL: 0.0%	MEDIUM SILT: 16.3%		
(D ₉₀ - D ₁₀):	322.2	6.474	FINE GRAVEL: 0.0%	FINE SILT: 12.2%		
(D ₇₅ / D ₂₅):	13.49	2.210	V FINE GRAVEL: 0.0%	V FINE SILT: 5.5%		
(D ₇₅ - D ₂₅):	107.8	3.753	V COARSE SAND: 0.0%	CLAY: 5.2%		
	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic μm	Geometric μm	Logarithmic ϕ	Geometric μm	Logarithmic ϕ	Description
MEAN (\bar{x}):	103.8	29.47	5.084	31.05	5.009	Coarse Silt
SORTING (σ):	171.8	5.538	2.469	5.766	2.528	Very Poorly Sorted
SKEWNESS (Sk):	2.507	-0.005	0.005	0.120	-0.120	Coarse Skewed
KURTOSIS (K):	9.447	2.393	2.393	0.876	0.876	Platykurtic



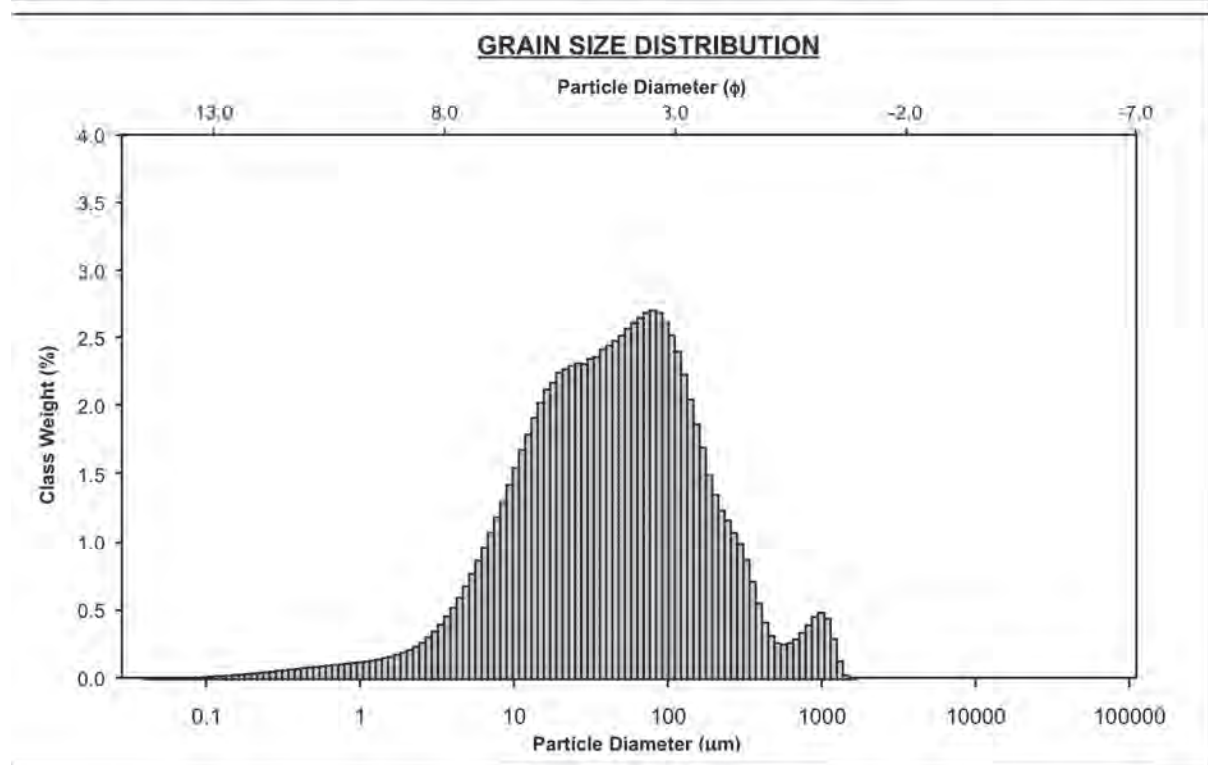
Grab station MG11

SAMPLE STATISTICS						
SAMPLE IDENTITY: SAMS Etive MPA 7-8-11_MG11			ANALYST & DATE:			
SAMPLE TYPE: Polymodal, Poorly Sorted			TEXTURAL GROUP: Sandy Mud			
SEDIMENT NAME: Very Fine Sandy Coarse Silt						
	μm	ϕ	GRAIN SIZE DISTRIBUTION			
MODE 1:	23.84	5.392	GRAVEL: 0.0%	COARSE SAND: 0.9%		
MODE 2:	16.41	5.931	SAND: 32.7%	MEDIUM SAND: 4.6%		
MODE 3:	41.72	4.585	MUD: 67.3%	FINE SAND: 10.2%		
D ₁₀ :	5.332	2.577		V FINE SAND: 17.1%		
MEDIAN or D ₅₀ :	31.75	4.977	V COARSE GRAVEL: 0.0%	V COARSE SILT: 17.7%		
D ₉₀ :	167.6	7.551	COARSE GRAVEL: 0.0%	COARSE SILT: 19.0%		
(D ₉₀ / D ₁₀):	31.44	2.930	MEDIUM GRAVEL: 0.0%	MEDIUM SILT: 15.0%		
(D ₉₀ - D ₁₀):	162.3	4.974	FINE GRAVEL: 0.0%	FINE SILT: 8.7%		
(D ₇₅ / D ₂₅):	6.798	1.778	V FINE GRAVEL: 0.0%	V FINE SILT: 3.3%		
(D ₇₅ - D ₂₅):	72.70	2.765	V COARSE SAND: 0.0%	CLAY: 3.6%		
	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic μm	Geometric μm	Logarithmic ϕ	Geometric μm	Logarithmic ϕ	Description
MEAN (\bar{x}):	68.47	30.44	5.038	31.47	4.990	Very Coarse Silt
SORTING (σ):	99.29	3.986	1.995	3.955	1.984	Poorly Sorted
SKEWNESS (Sk):	3.558	-0.356	0.356	-0.042	0.042	Symmetrical
KURTOSIS (K):	21.21	3.056	3.056	0.975	0.975	Mesokurtic



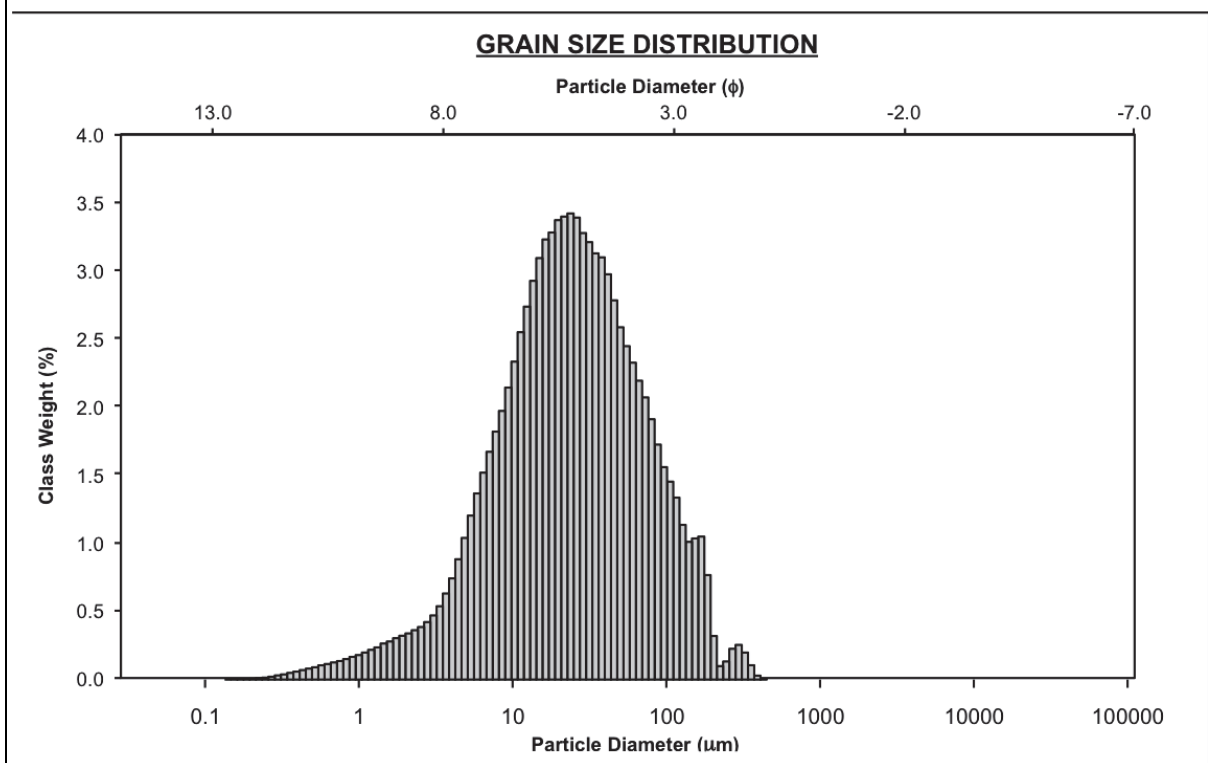
Grab station MG13

SAMPLE STATISTICS						
SAMPLE IDENTITY: SAMS Etive MPA 7-8-11_MG13			ANALYST & DATE:			
SAMPLE TYPE: Trimodal, Poorly Sorted			TEXTURAL GROUP: Sandy Mud			
SEDIMENT NAME: Very Fine Sandy Very Coarse Silt						
	μm	ϕ	GRAIN SIZE DISTRIBUTION			
MODE 1:	80.17	3.642	GRAVEL: 0.0%	COARSE SAND: 2.5%		
MODE 2:	26.17	5.258	SAND: 40.8%	MEDIUM SAND: 5.4%		
MODE 3:	994.6	0.009	MUD: 59.2%	FINE SAND: 12.3%		
D ₁₀ :	7.002	2.110		V FINE SAND: 19.5%		
MEDIAN or D ₅₀ :	44.83	4.479	V COARSE GRAVEL: 0.0%	V COARSE SILT: 18.6%		
D ₉₀ :	231.6	7.158	COARSE GRAVEL: 0.0%	COARSE SILT: 16.9%		
(D ₉₀ / D ₁₀):	33.08	3.392	MEDIUM GRAVEL: 0.0%	MEDIUM SILT: 12.3%		
(D ₉₀ - D ₁₀):	224.6	5.048	FINE GRAVEL: 0.0%	FINE SILT: 6.1%		
(D ₇₅ / D ₂₅):	6.546	1.846	V FINE GRAVEL: 0.0%	V FINE SILT: 2.4%		
(D ₇₅ - D ₂₅):	91.82	2.711	V COARSE SAND: 1.1%	CLAY: 2.8%		
	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic μm	Geometric μm	Logarithmic ϕ	Geometric μm	Logarithmic ϕ	Description
MEAN (\bar{x}):	102.7	41.00	4.608	42.32	4.562	Very Coarse Silt
SORTING (σ):	177.1	4.296	2.103	3.944	1.980	Poorly Sorted
SKEWNESS (Sk):	3.907	-0.459	0.459	-0.071	0.071	Symmetrical
KURTOSIS (K):	20.62	3.869	3.869	1.003	1.003	Mesokurtic



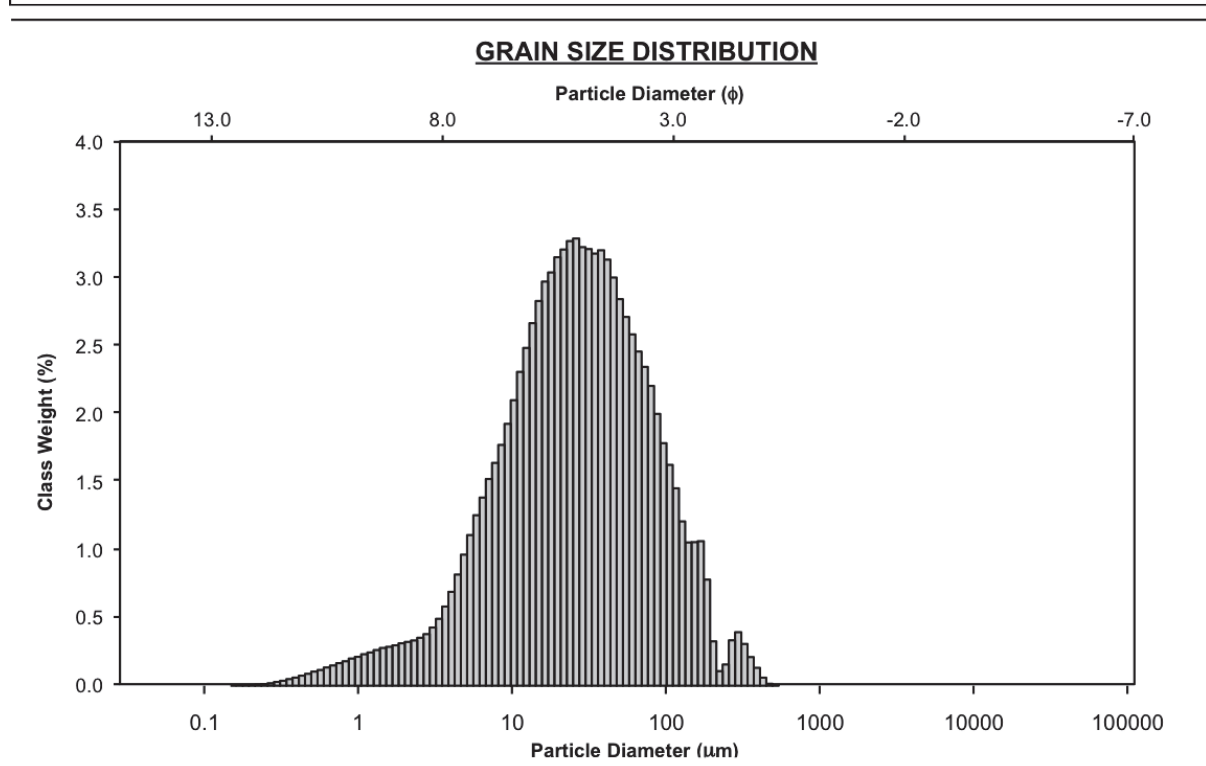
Grab station MG14

SAMPLE STATISTICS						
SAMPLE IDENTITY: SAMS Etive MPA 7-8-11_MG14			ANALYST & DATE: ,			
SAMPLE TYPE: Bimodal, Poorly Sorted			TEXTURAL GROUP: Sandy Mud			
SEDIMENT NAME: Very Fine Sandy Coarse Silt						
	μm	ϕ	GRAIN SIZE DISTRIBUTION			
MODE 1:	23.84	5.392	GRAVEL: 0.0%		COARSE SAND: 0.0%	
MODE 2:	169.0	2.566	SAND: 19.2%		MEDIUM SAND: 0.9%	
MODE 3:			MUD: 80.8%		FINE SAND: 5.3%	
D ₁₀ :	5.440	3.370			V FINE SAND: 13.1%	
MEDIAN or D ₅₀ :	23.86	5.390	V COARSE GRAVEL: 0.0%		V COARSE SILT: 21.1%	
D ₉₀ :	96.69	7.522	COARSE GRAVEL: 0.0%		COARSE SILT: 25.0%	
(D ₉₀ / D ₁₀):	17.77	2.232	MEDIUM GRAVEL: 0.0%		MEDIUM SILT: 18.7%	
(D ₉₀ - D ₁₀):	91.25	4.152	FINE GRAVEL: 0.0%		FINE SILT: 9.4%	
(D ₇₅ / D ₂₅):	4.382	1.494	V FINE GRAVEL: 0.0%		V FINE SILT: 3.4%	
(D ₇₅ - D ₂₅):	38.67	2.131	V COARSE SAND: 0.0%		CLAY: 3.2%	
	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic	Geometric	Logarithmic	Geometric	Logarithmic	Description
	μm	μm	ϕ	μm	ϕ	
MEAN (\bar{x}):	40.27	22.70	5.461	23.70	5.399	Coarse Silt
SORTING (σ):	46.93	3.179	1.669	3.102	1.633	Poorly Sorted
SKEWNESS (Sk):	2.703	-0.489	0.489	-0.046	0.046	Symmetrical
KURTOSIS (K):	12.99	3.561	3.561	1.059	1.059	Mesokurtic



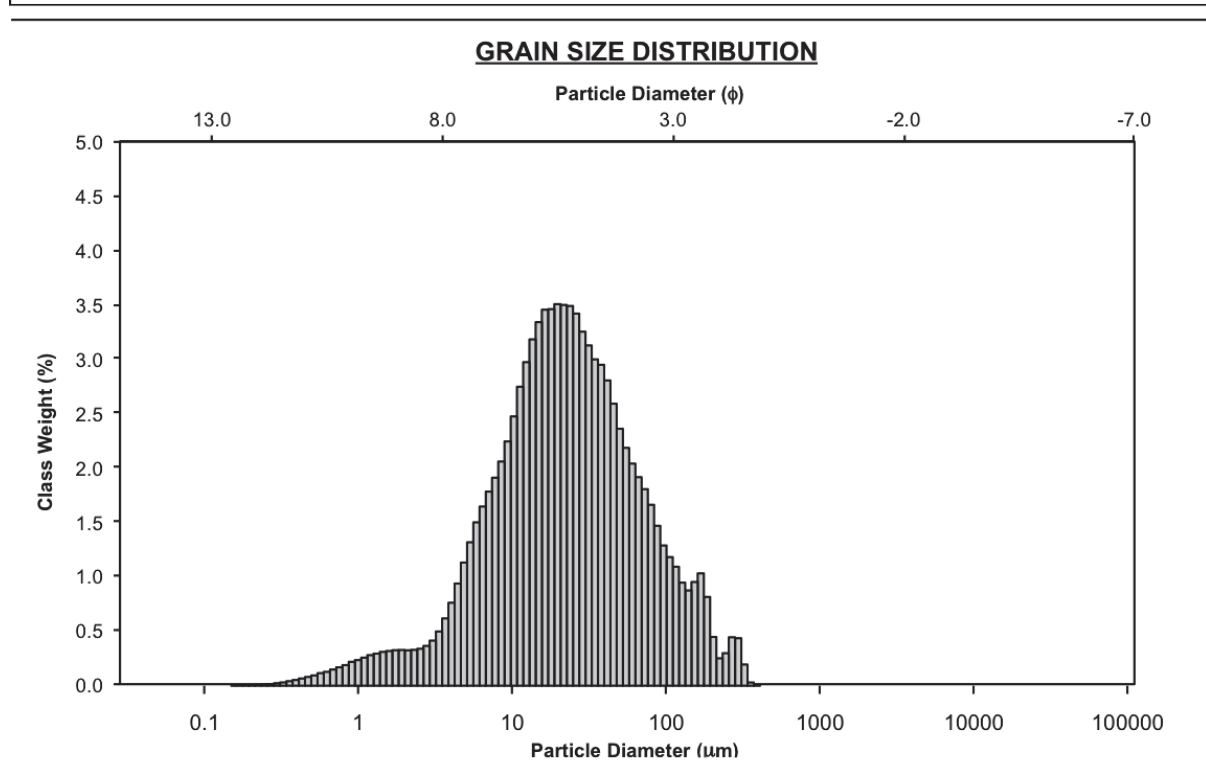
Grab station MG16

SAMPLE STATISTICS						
SAMPLE IDENTITY: SAMS Etive MPA 7-8-11_MG16			ANALYST & DATE: ,			
SAMPLE TYPE: Trimodal, Poorly Sorted			TEXTURAL GROUP: Sandy Mud			
SEDIMENT NAME: Very Fine Sandy Coarse Silt						
	μm	ϕ	GRAIN SIZE DISTRIBUTION			
MODE 1:	26.17	5.258	GRAVEL: 0.0%	COARSE SAND: 0.0%		
MODE 2:	38.01	4.719	SAND: 21.7%	MEDIUM SAND: 1.5%		
MODE 3:	169.0	2.566	MUD: 78.3%	FINE SAND: 5.4%		
D ₁₀ :	5.552	3.275		V FINE SAND: 14.8%		
MEDIAN or D ₅₀ :	26.37	5.245	V COARSE GRAVEL: 0.0%	V COARSE SILT: 22.4%		
D ₉₀ :	103.3	7.493	COARSE GRAVEL: 0.0%	COARSE SILT: 23.8%		
(D ₉₀ / D ₁₀):	18.61	2.288	MEDIUM GRAVEL: 0.0%	MEDIUM SILT: 16.9%		
(D ₉₀ - D ₁₀):	97.77	4.218	FINE GRAVEL: 0.0%	FINE SILT: 8.6%		
(D ₇₅ / D ₂₅):	4.559	1.525	V FINE GRAVEL: 0.0%	V FINE SILT: 3.1%		
(D ₇₅ - D ₂₅):	43.43	2.189	V COARSE SAND: 0.0%	CLAY: 3.5%		
	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic μm	Geometric μm	Logarithmic ϕ	Geometric μm	Logarithmic ϕ	Description
MEAN (\bar{x}):	44.32	24.44	5.355	25.58	5.289	Coarse Silt
SORTING (σ):	53.10	3.288	1.717	3.180	1.669	Poorly Sorted
SKEWNESS (Sk):	2.942	-0.548	0.548	-0.082	0.082	Symmetrical
KURTOSIS (K):	14.86	3.607	3.607	1.058	1.058	Mesokurtic



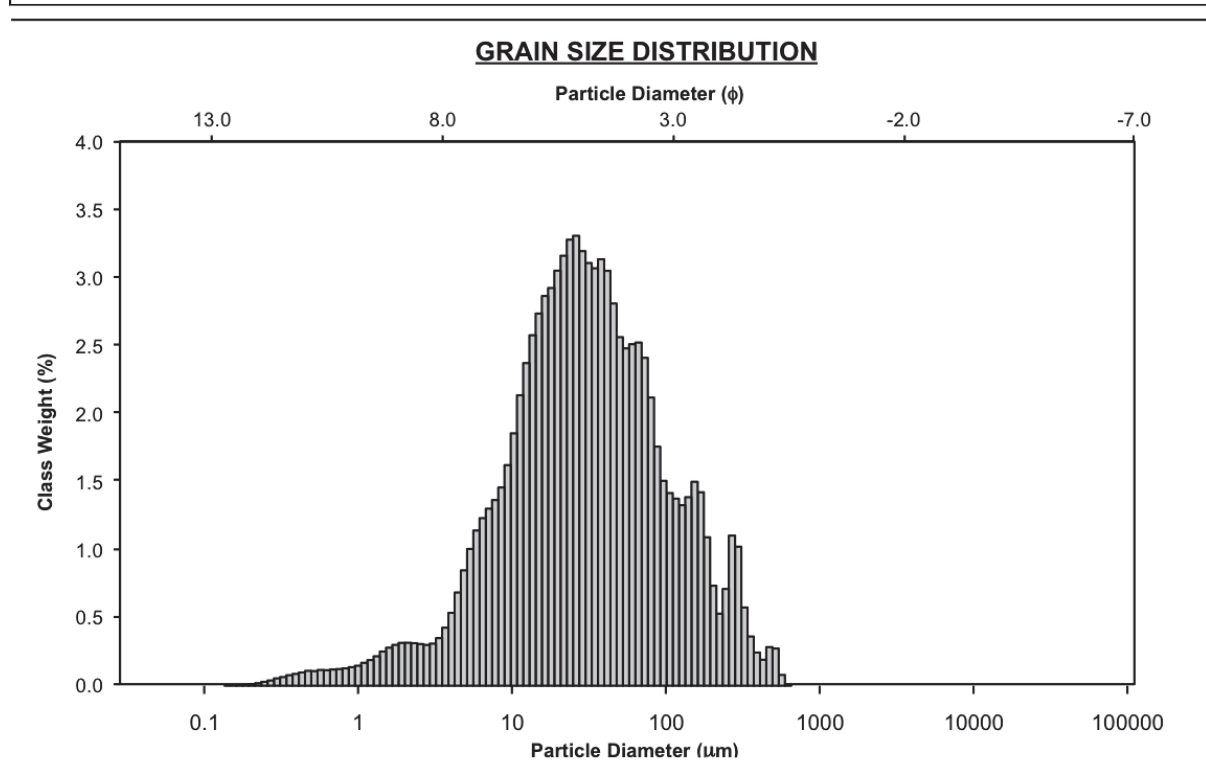
Grab station MG17

SAMPLE STATISTICS						
SAMPLE IDENTITY: SAMS Etive MPA 7-8-11_MG17			ANALYST & DATE: ,			
SAMPLE TYPE: Bimodal, Poorly Sorted			TEXTURAL GROUP: Sandy Mud			
SEDIMENT NAME: Very Fine Sandy Coarse Silt						
	μm	ϕ	GRAIN SIZE DISTRIBUTION			
MODE 1:	19.78	5.661	GRAVEL: 0.0%		COARSE SAND: 0.0%	
MODE 2:	169.0	2.566	SAND: 17.7%		MEDIUM SAND: 1.2%	
MODE 3:			MUD: 82.3%		FINE SAND: 5.3%	
D ₁₀ :	5.265	3.399			V FINE SAND: 11.1%	
MEDIAN or D ₅₀ :	22.07	5.502	V COARSE GRAVEL: 0.0%		V COARSE SILT: 19.7%	
D ₉₀ :	94.79	7.569	COARSE GRAVEL: 0.0%		COARSE SILT: 25.7%	
(D ₉₀ / D ₁₀):	18.00	2.227	MEDIUM GRAVEL: 0.0%		MEDIUM SILT: 20.0%	
(D ₉₀ - D ₁₀):	89.52	4.170	FINE GRAVEL: 0.0%		FINE SILT: 10.2%	
(D ₇₅ / D ₂₅):	4.244	1.470	V FINE GRAVEL: 0.0%		V FINE SILT: 3.1%	
(D ₇₅ - D ₂₅):	35.35	2.085	V COARSE SAND: 0.0%		CLAY: 3.7%	
	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic μm	Geometric μm	Logarithmic ϕ	Geometric μm	Logarithmic ϕ	Description
MEAN (\bar{x}):	39.50	21.52	5.538	22.33	5.485	Coarse Silt
SORTING (σ):	49.22	3.223	1.688	3.159	1.659	Poorly Sorted
SKEWNESS (Sk):	2.746	-0.391	0.391	-0.014	0.014	Symmetrical
KURTOSIS (K):	12.05	3.518	3.518	1.121	1.121	Leptokurtic



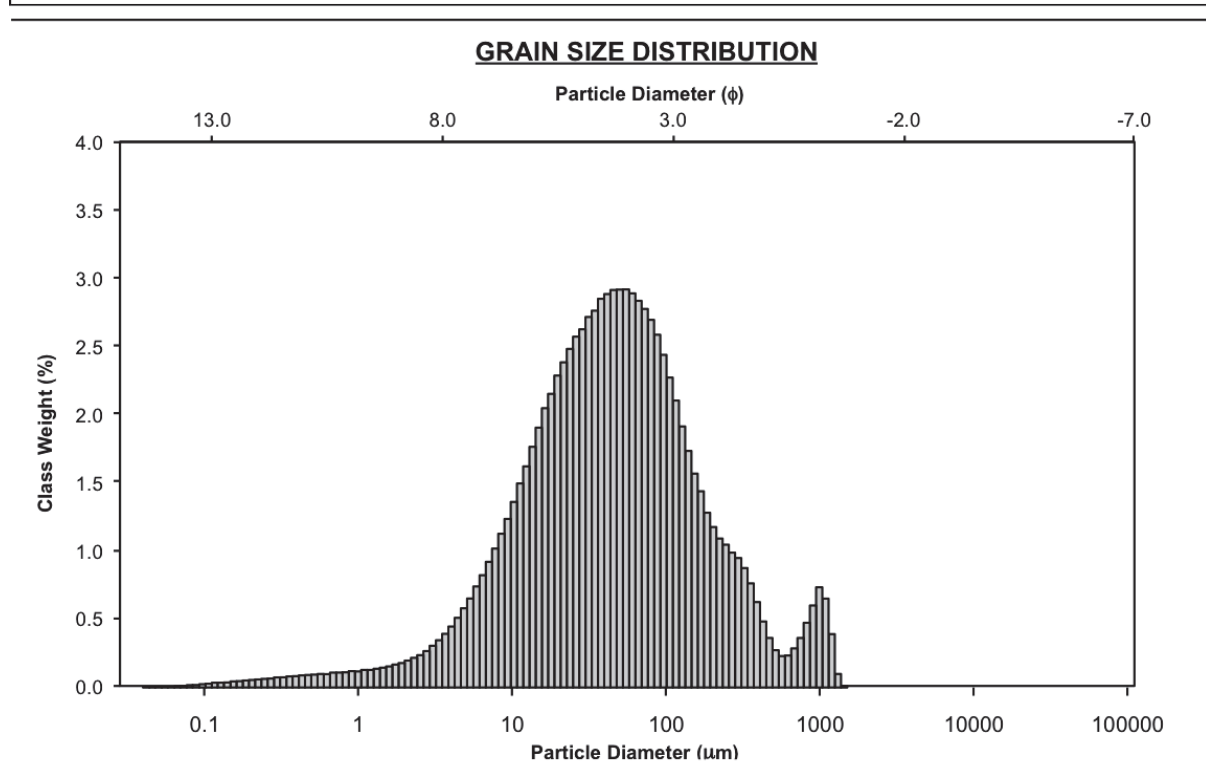
Grab station MG18

SAMPLE STATISTICS						
SAMPLE IDENTITY: SAMS Etive MPA 7-8-11_MG18			ANALYST & DATE: ,			
SAMPLE TYPE: Polymodal, Poorly Sorted			TEXTURAL GROUP: Sandy Mud			
SEDIMENT NAME: Very Fine Sandy Coarse Silt						
	μm	ϕ	GRAIN SIZE DISTRIBUTION			
MODE 1:	26.17	5.258	GRAVEL: 0.0%	COARSE SAND: 0.3%		
MODE 2:	38.01	4.719	SAND: 26.6%	MEDIUM SAND: 4.1%		
MODE 3:	66.52	3.912	MUD: 73.4%	FINE SAND: 8.2%		
D ₁₀ :	6.181	2.747		V FINE SAND: 14.0%		
MEDIAN or D ₅₀ :	29.37	5.089	V COARSE GRAVEL: 0.0%	V COARSE SILT: 21.3%		
D ₉₀ :	149.0	7.338	COARSE GRAVEL: 0.0%	COARSE SILT: 23.4%		
(D ₉₀ / D ₁₀):	24.10	2.671	MEDIUM GRAVEL: 0.0%	MEDIUM SILT: 15.5%		
(D ₉₀ - D ₁₀):	142.8	4.591	FINE GRAVEL: 0.0%	FINE SILT: 7.5%		
(D ₇₅ / D ₂₅):	4.827	1.580	V FINE GRAVEL: 0.0%	V FINE SILT: 2.5%		
(D ₇₅ - D ₂₅):	52.58	2.271	V COARSE SAND: 0.0%	CLAY: 3.2%		
	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic μm	Geometric μm	Logarithmic ϕ	Geometric μm	Logarithmic ϕ	Description
MEAN (\bar{x}):	58.00	28.73	5.121	30.07	5.055	Coarse Silt
SORTING (σ):	77.98	3.568	1.835	3.449	1.786	Poorly Sorted
SKEWNESS (Sk):	2.847	-0.435	0.435	-0.001	0.001	Symmetrical
KURTOSIS (K):	12.81	3.657	3.657	1.106	1.106	Mesokurtic



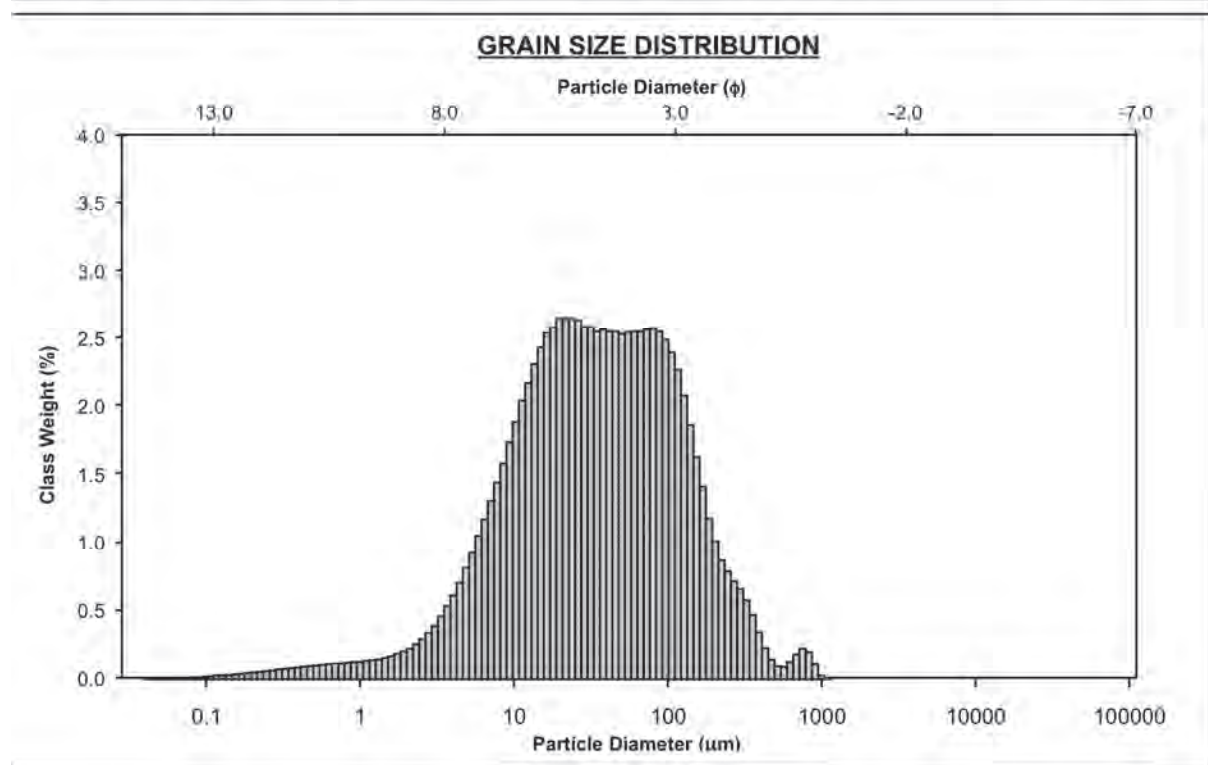
Grab station MG19

SAMPLE STATISTICS						
SAMPLE IDENTITY: SAMS Etive MPA 7-8-11_MG19			ANALYST & DATE: ,			
SAMPLE TYPE: Bimodal, Poorly Sorted			TEXTURAL GROUP: Sandy Mud			
SEDIMENT NAME: Very Fine Sandy Very Coarse Silt						
	μm	ϕ	GRAIN SIZE DISTRIBUTION			
MODE 1:	55.20	4.181	GRAVEL: 0.0%	COARSE SAND: 2.9%		
MODE 2:	994.6	0.009	SAND: 39.2%	MEDIUM SAND: 5.5%		
MODE 3:			MUD: 60.8%	FINE SAND: 10.5%		
D ₁₀ :	7.591	2.023		V FINE SAND: 18.9%		
MEDIAN or D ₅₀ :	44.41	4.493	V COARSE GRAVEL: 0.0%	V COARSE SILT: 21.5%		
D ₉₀ :	246.0	7.042	COARSE GRAVEL: 0.0%	COARSE SILT: 17.9%		
(D ₉₀ / D ₁₀):	32.41	3.480	MEDIUM GRAVEL: 0.0%	MEDIUM SILT: 11.0%		
(D ₉₀ - D ₁₀):	238.4	5.018	FINE GRAVEL: 0.0%	FINE SILT: 5.2%		
(D ₇₅ / D ₂₅):	5.578	1.754	V FINE GRAVEL: 0.0%	V FINE SILT: 2.1%		
(D ₇₅ - D ₂₅):	83.99	2.480	V COARSE SAND: 1.5%	CLAY: 3.0%		
	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic μm	Geometric μm	Logarithmic ϕ	Geometric μm	Logarithmic ϕ	Description
MEAN (\bar{x}):	108.0	41.96	4.575	43.53	4.522	Very Coarse Silt
SORTING (σ):	192.6	4.326	2.113	3.908	1.966	Poorly Sorted
SKEWNESS (Sk):	3.675	-0.498	0.498	-0.030	0.030	Symmetrical
KURTOSIS (K):	17.58	4.328	4.328	1.125	1.125	Leptokurtic



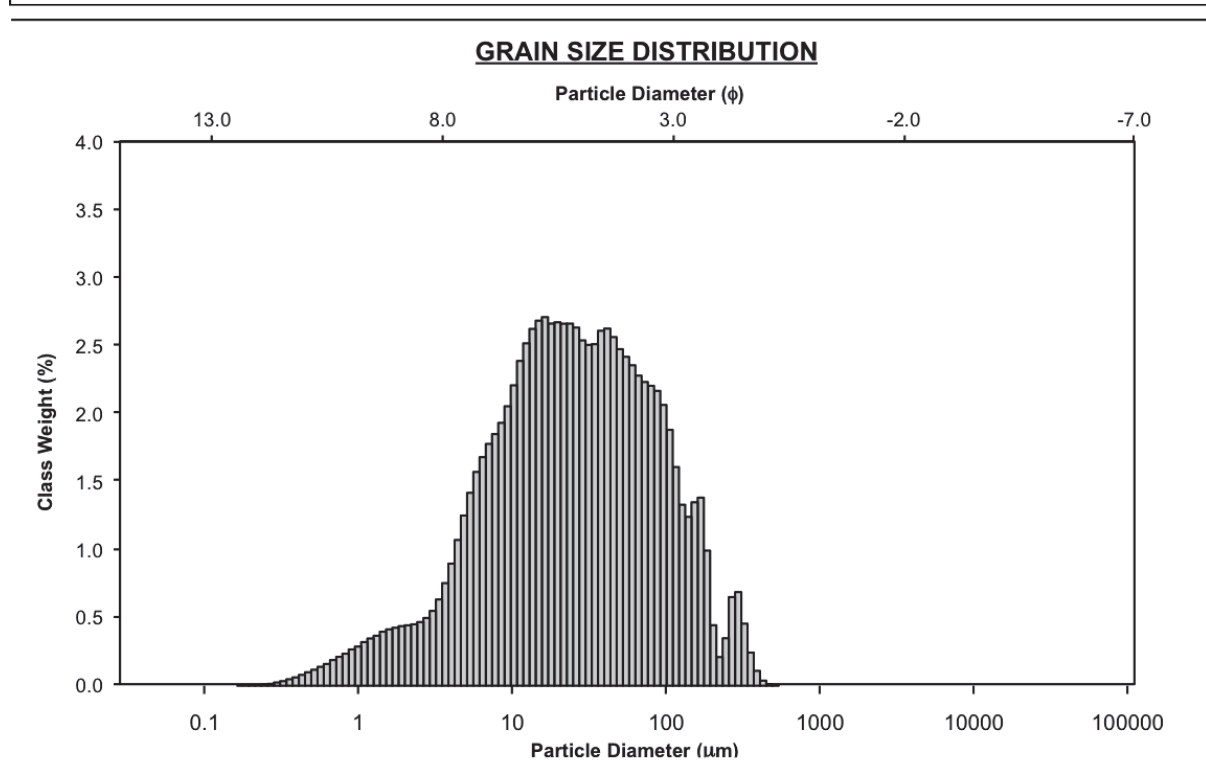
Grab station MG20

SAMPLE STATISTICS						
SAMPLE IDENTITY: SAMS Etive MPA 7-8-11_MG20			ANALYST & DATE: _____			
SAMPLE TYPE: Polymodal, Poorly Sorted			TEXTURAL GROUP: Sandy Mud			
SEDIMENT NAME: Very Fine Sandy Coarse Silt						
	μm	ϕ	GRAIN SIZE DISTRIBUTION			
MODE 1:	21.72	5.527	GRAVEL: 0.0%	COARSE SAND: 1.0%		
MODE 2:	31.54	4.988	SAND: 33.2%	MEDIUM SAND: 3.4%		
MODE 3:	80.17	3.642	MUD: 66.8%	FINE SAND: 10.1%		
D ₁₀ :	6.250	2.669		V FINE SAND: 18.6%		
MEDIAN or D ₅₀ :	34.01	4.878	V COARSE GRAVEL: 0.0%	V COARSE SILT: 19.2%		
D ₉₀ :	157.2	7.322	COARSE GRAVEL: 0.0%	COARSE SILT: 19.6%		
(D ₉₀ / D ₁₀):	25.15	2.743	MEDIUM GRAVEL: 0.0%	MEDIUM SILT: 14.9%		
(D ₉₀ - D ₁₀):	151.0	4.653	FINE GRAVEL: 0.0%	FINE SILT: 7.4%		
(D ₇₅ / D ₂₅):	6.036	1.725	V FINE GRAVEL: 0.0%	V FINE SILT: 2.7%		
(D ₇₅ - D ₂₅):	70.01	2.593	V COARSE SAND: 0.0%	CLAY: 3.1%		
	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic μm	Geometric μm	Logarithmic ϕ	Geometric μm	Logarithmic ϕ	Description
MEAN (\bar{x}):	68.04	31.75	4.977	33.34	4.907	Very Coarse Silt
SORTING (σ):	100.1	3.887	1.959	3.584	1.842	Poorly Sorted
SKEWNESS (Sk):	4.103	-0.608	0.608	-0.054	0.054	Symmetrical
KURTOSIS (K):	26.52	4.096	4.096	0.963	0.963	Mesokurtic



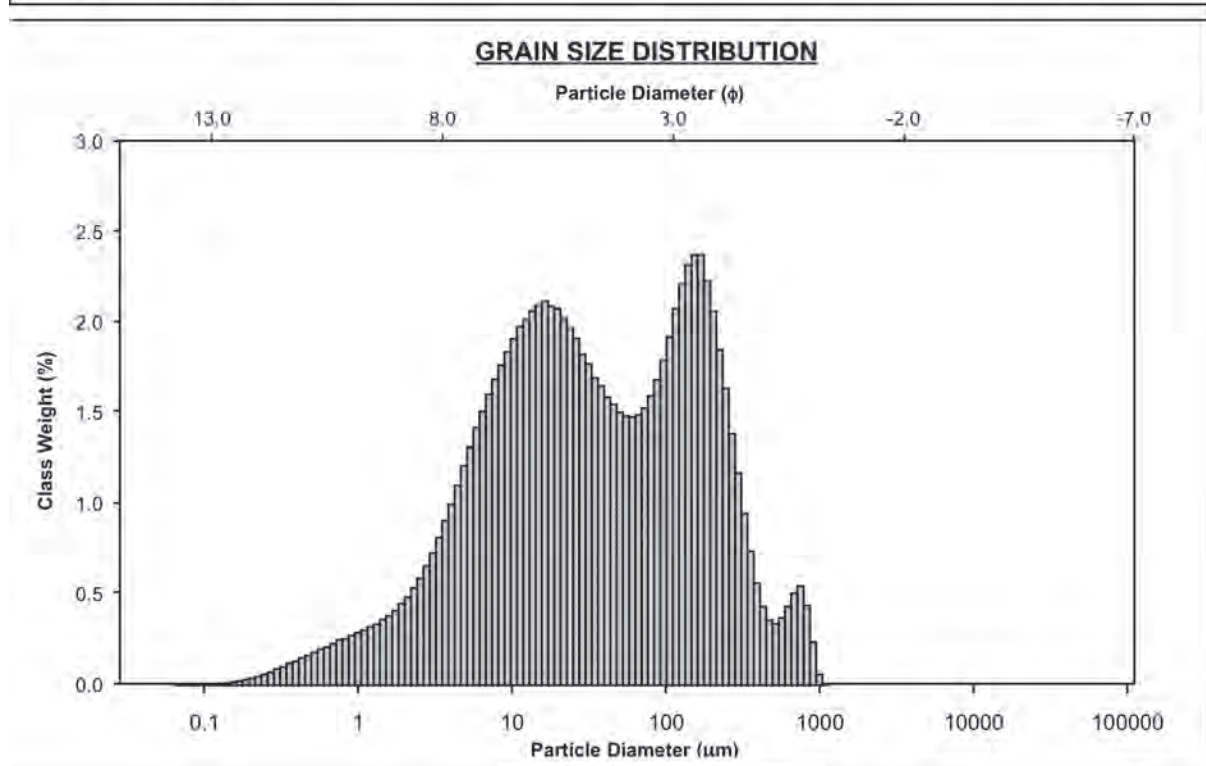
Grab station MG21

SAMPLE STATISTICS						
SAMPLE IDENTITY: SAMS Etive MPA 7-8-11_MG21			ANALYST & DATE: ,			
SAMPLE TYPE: Polymodal, Poorly Sorted			TEXTURAL GROUP: Sandy Mud			
SEDIMENT NAME: Very Fine Sandy Coarse Silt						
	μm	ϕ	GRAIN SIZE DISTRIBUTION			
MODE 1:	16.41	5.931	GRAVEL: 0.0%	COARSE SAND: 0.0%		
MODE 2:	19.78	5.661	SAND: 24.6%	MEDIUM SAND: 2.3%		
MODE 3:	23.84	5.392	MUD: 75.4%	FINE SAND: 6.9%		
D ₁₀ :	4.430	3.071		V FINE SAND: 15.3%		
MEDIAN or D ₅₀ :	24.68	5.340	V COARSE GRAVEL: 0.0%	V COARSE SILT: 18.9%		
D ₉₀ :	119.0	7.818	COARSE GRAVEL: 0.0%	COARSE SILT: 19.8%		
(D ₉₀ / D ₁₀):	26.87	2.546	MEDIUM GRAVEL: 0.0%	MEDIUM SILT: 17.4%		
(D ₉₀ - D ₁₀):	114.6	4.748	FINE GRAVEL: 0.0%	FINE SILT: 10.7%		
(D ₇₅ / D ₂₅):	6.065	1.646	V FINE GRAVEL: 0.0%	V FINE SILT: 4.1%		
(D ₇₅ - D ₂₅):	51.30	2.600	V COARSE SAND: 0.0%	CLAY: 4.6%		
	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic μm	Geometric μm	Logarithmic ϕ	Geometric μm	Logarithmic ϕ	Description
MEAN (\bar{x}):	47.69	23.29	5.424	24.33	5.361	Coarse Silt
SORTING (σ):	60.17	3.712	1.892	3.724	1.897	Poorly Sorted
SKEWNESS (Sk):	2.524	-0.403	0.403	-0.069	0.069	Symmetrical
KURTOSIS (K):	10.75	2.994	2.994	0.994	0.994	Mesokurtic



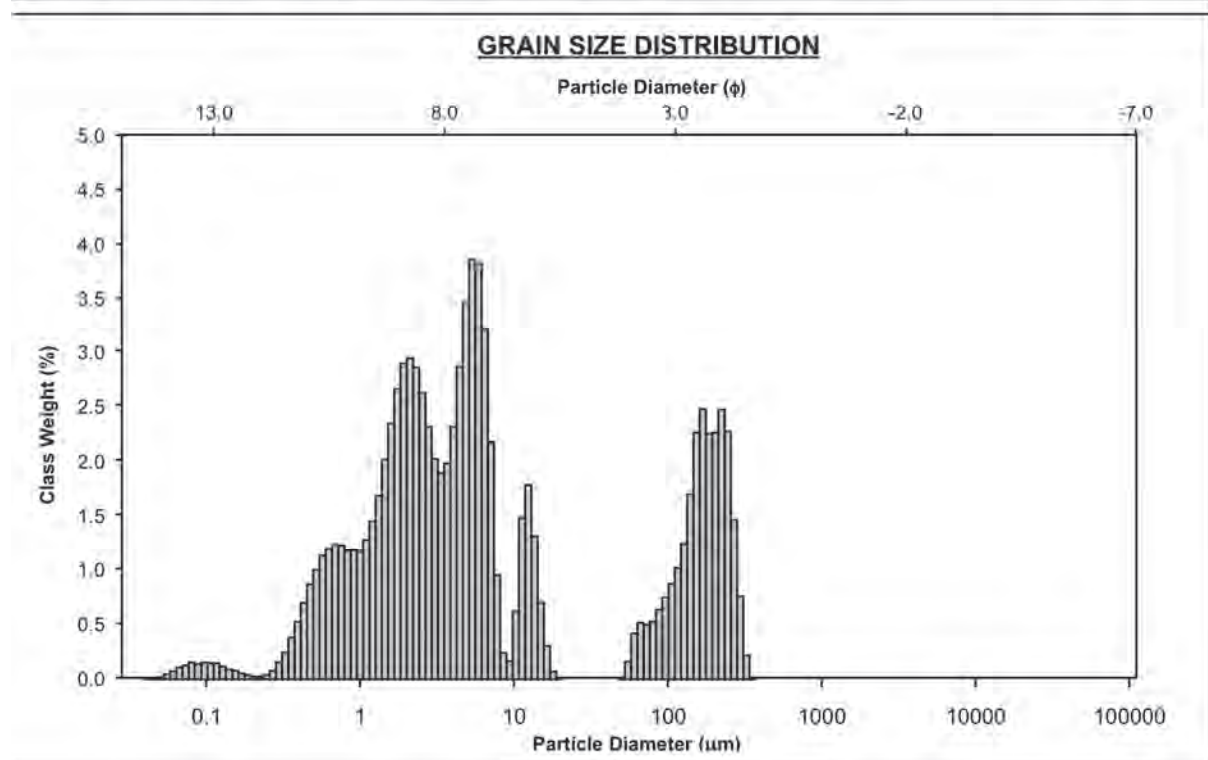
Grab station MG22

SAMPLE STATISTICS						
SAMPLE IDENTITY: SAMS Etive MPA 7-8-11_MG22			ANALYST & DATE:			
SAMPLE TYPE: Trimodal, Very Poorly Sorted			TEXTURAL GROUP: Sandy Mud			
SEDIMENT NAME: Fine Sandy Coarse Silt						
	μm	ϕ	GRAIN SIZE DISTRIBUTION			
MODE 1:	169.0	2.566	GRAVEL: 0.0%	COARSE SAND: 2.9%		
MODE 2:	16.41	5.931	SAND: 38.2%	MEDIUM SAND: 6.2%		
MODE 3:	751.9	0.413	MUD: 61.8%	FINE SAND: 16.1%		
D ₁₀ :	3.738	2.075		V FINE SAND: 13.0%		
MEDIAN or D ₅₀ :	31.39	4.994	V COARSE GRAVEL: 0.0%	V COARSE SILT: 11.8%		
D ₉₀ :	237.4	8.063	COARSE GRAVEL: 0.0%	COARSE SILT: 14.9%		
(D ₉₀ / D ₁₀):	63.50	3.887	MEDIUM GRAVEL: 0.0%	MEDIUM SILT: 14.5%		
(D ₉₀ - D ₁₀):	233.6	5.989	FINE GRAVEL: 0.0%	FINE SILT: 10.0%		
(D ₇₅ / D ₂₅):	12.77	2.230	V FINE GRAVEL: 0.0%	V FINE SILT: 5.0%		
(D ₇₅ - D ₂₅):	116.2	3.675	V COARSE SAND: 0.0%	CLAY: 5.4%		
	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic μm	Geometric μm	Logarithmic ϕ	Geometric μm	Logarithmic ϕ	Description
MEAN (\bar{x}):	92.42	31.28	4.998	32.37	4.949	Very Coarse Silt
SORTING (σ):	141.3	5.263	2.396	5.194	2.377	Very Poorly Sorted
SKEWNESS (Sk):	2.953	-0.320	0.320	-0.032	0.032	Symmetrical
KURTOSIS (K):	13.62	2.631	2.631	0.846	0.846	Platykurtic



Grab station MG23

SAMPLE STATISTICS						
SAMPLE IDENTITY: SAMS Etive MPA 7-8-11_MG23			ANALYST & DATE:			
SAMPLE TYPE: Polymodal, Very Poorly Sorted			TEXTURAL GROUP: Sandy Mud			
SEDIMENT NAME: Fine Sandy Mud						
	μm	ϕ	GRAIN SIZE DISTRIBUTION			
MODE 1:	5.361	7.545	GRAVEL: 0.0%	COARSE SAND: 0.0%		
MODE 2:	2.109	8.891	SAND: 24.5%	MEDIUM SAND: 3.1%		
MODE 3:	12.41	6.334	MUD: 75.5%	FINE SAND: 16.1%		
D ₁₀ :	0.765	2.391		V FINE SAND: 5.3%		
MEDIAN or D ₅₀ :	4.576	7.772	V COARSE GRAVEL: 0.0%	V COARSE SILT: 0.5%		
D ₉₀ :	190.6	10.35	COARSE GRAVEL: 0.0%	COARSE SILT: 0.4%		
(D ₉₀ / D ₁₀):	249.1	4.329	MEDIUM GRAVEL: 0.0%	MEDIUM SILT: 6.8%		
(D ₉₀ - D ₁₀):	189.9	7.960	FINE GRAVEL: 0.0%	FINE SILT: 22.2%		
(D ₇₅ / D ₂₅):	29.83	2.160	V FINE GRAVEL: 0.0%	V FINE SILT: 18.0%		
(D ₇₅ - D ₂₅):	51.79	4.899	V COARSE SAND: 0.0%	CLAY: 27.6%		
	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic μm	Geometric μm	Logarithmic ϕ	Geometric μm	Logarithmic ϕ	Description
MEAN (\bar{x}):	46.65	7.152	7.127	9.386	6.735	Medium Silt
SORTING (σ):	80.36	7.536	2.914	8.443	3.078	Very Poorly Sorted
SKEWNESS (Sk):	1.625	0.501	-0.501	0.366	-0.366	Very Coarse Skewed
KURTOSIS (K):	4.235	2.247	2.247	0.737	0.737	Platykurtic



Grab station MG24

SAMPLE STATISTICS

SAMPLE IDENTITY: SAMS Etive MPA 7-8-11_MG24

ANALYST & DATE:



APPENDIX 6. GEODIVERSITY FEATURES AND ASSOCIATED STATIONS

Table 21. Video stations from 2011 survey and associated fauna, biotopes and identified geodiversity features.

Station no.	Lat	Lon	Substratum	Biota	Biotopes	Geodiversity features
J18	56.697437	-5.304243	Fine mud	High density of megafaunal burrows, mainly <i>Nephrops norvegicus</i> . <i>Nephrops</i> observed on surface and one seen trapped in a creel. <i>Virgularia mirabilis</i> in small numbers (O). Possible <i>Callionymus lyra</i> (P).	SS.SMu.CFiMu.SpnMeg	Off the survey data but possibly outwash fan from Corran
J19	56.672184	-5.321731	Fine mud	High density of megafaunal burrows, mainly <i>Calocaris macandreae</i> , with some <i>Nephrops norvegicus</i> . <i>Funiculina quadrangularis</i> in small numbers (O). No mobile epifauna seen.	SS.SMu.CFiMu.SpnMeg.Fun	On the drift of sediment from Corran - fine-grained muds?
J20	56.661259	-5.368878	Silty boulder slope. Sandy mud or muddy sand with cobbles and shell fragments at base	Silty boulders and larger cobbles heavily encrusted with pink coralline algae (A). Sparse <i>Alcyonium digitatum</i> (O) on boulders, colonies usually small and contracted. Also occasional small ascidians (unidentified). Large numbers of <i>Munida rugosa</i> among boulders (F?), also <i>Echinus esculentus</i> (O)	Possibly closest to CR.LCR.BrAs.AmenCio (although ascidians not prominent here)	Deep central trough of Linnhe, close to pockmarks
J22	56.636242	-5.343495	Stony mud with shell debris at start, grading into fine mud with fewer stones later in tow	Megafaunal burrows absent at start, but present at low density in finer sediment later on. <i>Calocaris macandreae</i> possibly present. <i>Funiculina quadrangularis</i> at high density (C) perhaps thinning out towards end of tow. <i>Pennatula phosphorea</i> and <i>Virgularia mirabilis</i> also present in small numbers (O). <i>Munida rugosa</i> frequently seen on surface (F), also <i>Asterias rubens</i> (P), <i>Pagurus bernhardus</i> (P).	SS.SMu.CFiMu.SpnMeg.Fun	On the moraines offshore Cuil Bay, possibly between moraine ridge

Table 21 continued

Station no.	Lat	Lon	Substratum	Biota	Biotopes	Geodiversity features
J25	56.628826	-5.386492	Fine mud	High density of megafaunal burrows, mainly <i>Calocaris macandreae</i> , with some <i>Nephrops norvegicus</i> . One <i>Funiculina quadrangularis</i> (P). No mobile epifauna seen.	SS.SMu.CFiMu.SpMg.Fun	Central Linnhe trough, pockmarks and possibly slides
J27	56.609135	-5.424046	Fine mud	High density of megafaunal burrows, main species probably <i>Calocaris macandreae</i> and <i>Nephrops norvegicus</i> . Small numbers of <i>Funiculina quadrangularis</i> (O). No mobile epifauna seen.	SS.SMu.CFiMu.SpMg.Fun	Close to large submarine moraine and pockmarks
J29	56.611038	-5.496360	Starts on sandy mud with <i>Turritella</i> shells, becomes stonier as tow progresses. Some stones look like fragments of brick. Ends on a silty boulder field	<i>Munida rugosa</i> observed (F) throughout, particularly in stonier areas. Pink coralline crusts on silty boulders at end. Also <i>Pagurus bernhardus</i> (O), <i>Asterias rubens</i> (O)	SS.SMx.CMx	Possibly on the slope into deeper water
J31	56.591763	-5.413780	Fine mud	Sparse megafaunal burrows, including <i>Calocaris macandreae</i> and possibly <i>Nephrops norvegicus</i> . Large goby, possibly <i>Lesueurigobius friesii</i> , seen at burrow entrance, also <i>Munida rugosa</i> (P) and unidentified small flatfish (P). No seapens observed.	Possibly SS.SMu.CFiMu.MegMax	W Shuna on moraine ridge complex
J33	56.568081	-5.509894	Fine mud	High density of megafaunal burrows, mainly <i>Calocaris macandreae</i> . <i>Nephrops norvegicus</i> observed in burrow. <i>Funiculina quadrangularis</i> (O) and <i>Pennatula phosphorea</i> (P) in small numbers. One <i>Pachycerianthus multiplicatus</i> (P), also <i>Pandalus sp.</i> (O), <i>Scyliorhinus canicula</i> (P)	SS.SMu.CFiMu.SpMg.Fun	Pock mark field off northern Lismore

Table 21 continued

Station no.	Lat	Lon	Substratum	Biota	Biotopes	Geodiversity features
J84	56.703690	-5.300407	Fine mud	Sparse megafaunal burrows, probably <i>Nephrops norvegicus</i> and <i>Calocaris macandreae</i> . <i>Pennatula phosphorea</i> most abundant seapen (O), with smaller numbers of <i>Virgularia mirabilis</i> (O) and one <i>Funiculina quadrangularis</i> (P). Mobile epifauna <i>Asterias rubens</i> (O), <i>Carcinus maenas</i> (O), <i>Liocarcinus sp.</i> (P).	SS.SMu.CFiMu.SpnMeg.Fun	Off the survey data but possibly outwash fan from Corran
J85	56.655285	-5.380840	Mud or sandy mud with <i>Turritella</i> shell fragments, drift algae and occasional surface cobbles	No visible burrows. <i>Funiculina quadrangularis</i> at low density (O). Also <i>Virgularia mirabilis</i> (P), <i>Cerianthus lloydii</i> (P), <i>Echinus esculentus</i> (P), <i>Munida rugosa</i> (O) and <i>Liocarcinus sp.</i> (O). Cobbles with pink coralline crusts.	SS.SMu.CFiMu.SpnMeg.Fun	Deep central trough of Linnhe, close to pockmarks
J86	56.629776	-5.345424	Patchy mixed sediment, ranging from silty cobbles on sandy mud to gravelly sand with shell flecks	Surface stones with pink coralline crusts and sparse hydroid turf. <i>Munida rugosa</i> (F) and <i>Asterias rubens</i> (F) most common mobile epifauna, also <i>Liocarcinus sp.</i> (P), <i>Inachus sp.</i> (P), <i>Echinus esculentus</i> (F)	SS.SMx.CMx	Offshore from Balnagowan Island? No data - but possibly on moraine ridge

Table 21 continued

Station no.	Lat	Lon	Substratum	Biota	Biotores	Geodiversity features
J87	56.636459	-5.408096	Starts on muddy sand with abundant shell flecks, surface pebbles and cobbles. Moves onto flat sandy mud or muddy sand with worm casts and scattered stones	Surface stones with pink coralline crusts, small serpulid tubes and diffuse hydroid turf. Mobile fauna visible <i>Munida rugosa</i> (P), <i>Liocarcinus</i> sp. (P), <i>Aequipecten opercularis</i> (P); Sediment plain with few stones has greenish surface floc, possibly benthic diatoms. <i>Ophiocomina nigra</i> seen as single individuals from start of this habitat, becoming more frequent as tow proceeds (F to C). Clusters of <i>Ophiothrix fragilis</i> appear (A), becoming larger and more frequent, but not forming a continuous bed. Smaller numbers of <i>Ophiocomina nigra</i> still present, also small <i>Ophiura</i> sp. (P), <i>Cancer pagurus</i> (P). Worm casts probably <i>Arenicola marina</i> . One conical ejecta mound with expelled sediment, possibly <i>Callianassa subterranea</i>	SS.SMx.CMx; SS.SMx.CMx.OphMx	Offshore from Morvern, flat shelf
J88	56.575462	-5.400823	Coarse shelly sand with gravel and pebbles. Lots of macroalgal debris	Pink coralline crusts, serpulid tubes and diffuse hydroid turf on stones. Some patchy attached foliose red algae (unidentified). Small <i>Munida rugosa</i> under stones (F), <i>Chaetopterus variopedatus</i> tube endings occasionally visible. Also <i>Echinus esculentus</i> (O). Some dead <i>Arctica islandica</i> shells but no obvious living specimens.	SS.SMx.CMx	Between Shuna and n. Lismore - little data, possibly on moraine ridge
J89	56.571648	-5.420596	Stony mud or sandy mud with shell flecks. Lots of macroalgal debris. Occasional small boulders	<i>Munida rugosa</i> observed throughout (F), often under stones. Also <i>Echinus esculentus</i> (O), <i>Asterias rubens</i> (P). Pink coralline crusts on silted boulders.	SS.SMx.CMx	Skerries off n. Lismore possibly in area of pockmarks

APPENDIX 7. MPA SEARCH FEATURE AND NON-PMF BIOTOPE INVENTORIES

Table 22. MPA search features and their components recorded during the current survey with illustrative photograph or video frame grab. Station numbers in boldface indicate provenance of image.


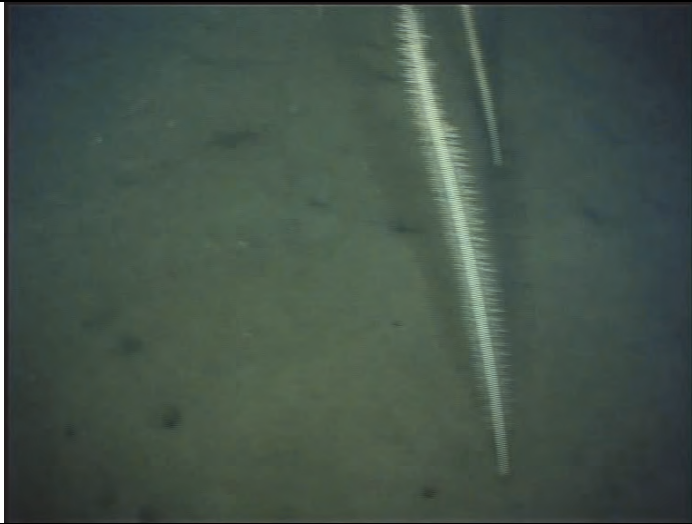
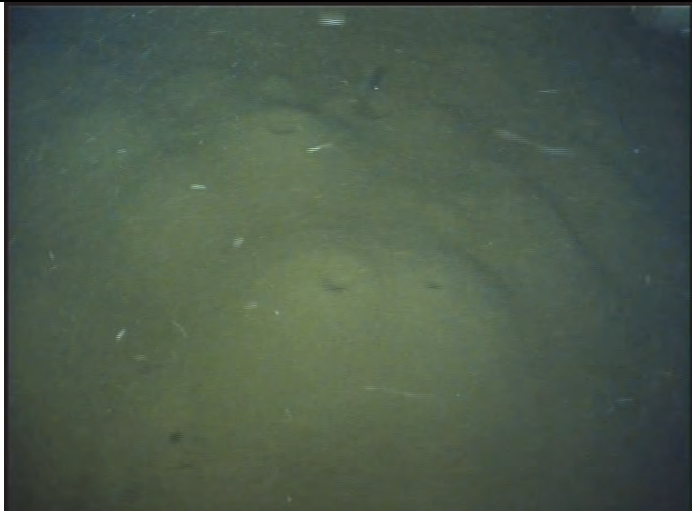
MPA search features and sites	Photograph
<p>BURROWED MUD Seapens and burrowing megafauna in circalittoral fine mud SS.SMu.CFiMu.SpMmeg</p> <p>J1, J2, J4, J5, J6, J7, J10, J16, J18, J21, J24, J30, J53, J60, J62, J66, J67, J104, M15, M39, M45, M46, M47, M63, M74, M86</p>	
<p>BURROWED MUD Seapens, including <i>Funiculina quadrangularis</i>, and burrowing megafauna in circalittoral fine mud SS.SMu.CFiMu.SpMmeg.Fun</p> <p>J12, J17, J19, J21, J22, J25, J27, J28, J32, J33, J34, J35, J39, J40, J47, J56, J57, J58, J59, J61, J63, J64, J72, J73, J74, J75, J76, J78, J79, J80, J81, J82, J84, J85, J90, J91, J92, J93, J95, J101, J102, J103, J106, J107, J108, M4, M9, M11, M12, M13, M14, M58, M59, M71, M72, M75, M76, M77, M78, M79, M80, M87</p>	
<p>BURROWED MUD Burrowing megafauna and <i>Maxmuelleria lankesteri</i> in circalittoral mud SS.SMu.CFiMu.MegMax</p> <p>J13, J26, J31, J36, J38, J62-2, M15, M60, M61, M67</p>	

Table 22 continued


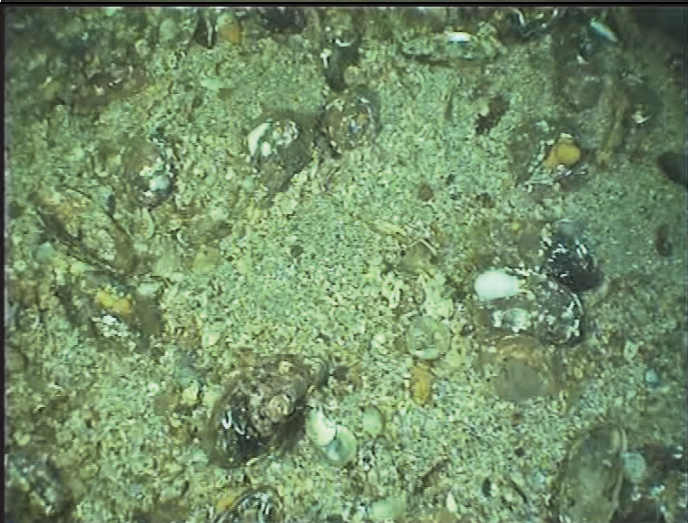
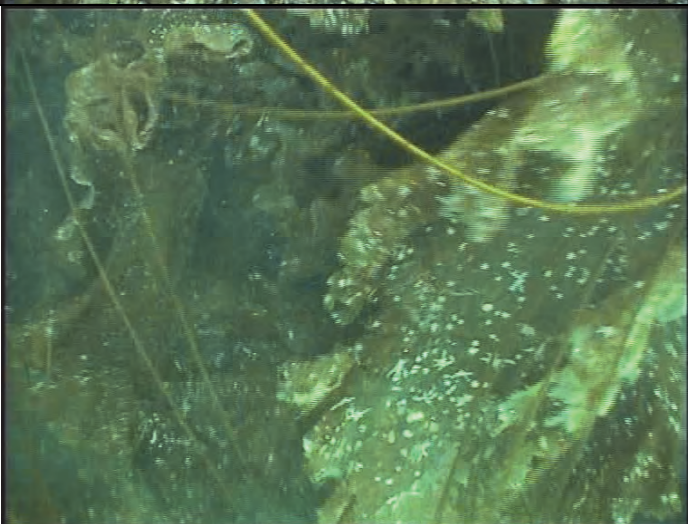
MPA search features and sites	Photograph
<p>BURROWED MUD <i>Pachycerianthus multiplicatus</i></p> <p>J33, J74, J81, J102, J106, M47, M55, M58, M59, M60, M76, M87</p>	
<p>HORSE MUSSEL BEDS <i>Modiolus modiolus</i> beds with fine hydroids and large solitary ascidians on very sheltered circalittoral mixed substrata SS.SBR.Smus.ModHAs</p> <p>M82</p>	
<p>KELP AND SEAWEED COMMUNITIES ON SUBLITTORAL SEDIMENT <i>Saccharina latissima</i> and <i>Chorda filum</i> on sheltered upper infralittoral muddy sediment SS.SMp.KSwSS.LsacCho</p> <p>M19</p>	

Table 22 continued


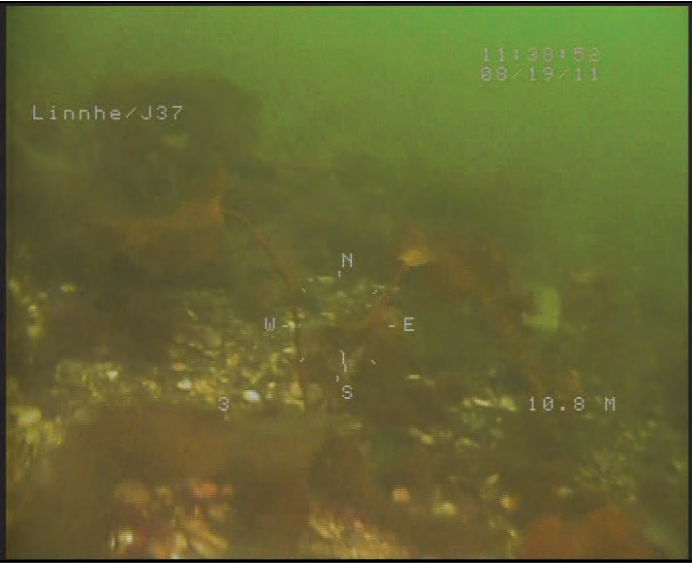

MPA search features and sites	Photograph
<p>KELP AND SEAWEED COMMUNITIES ON SUBLITTORAL SEDIMENT <i>Saccharina latissima</i> with red and brown seaweeds on lower infralittoral muddy mixed sediment SS.SMp.KSwSS.LsacR.Mu</p> <p>J49-3 M24, M28,</p>	
<p>KELP AND SEAWEED COMMUNITIES ON SUBLITTORAL SEDIMENT <i>Saccharina latissima</i> and filamentous red algae on infralittoral sand SS.SMp.KSwSS.LsacR.Sa</p> <p>J37, J46, J52, M20, M23, M27, M30, M53</p>	
<p>NORTHERN SEA FAN AND SPONGE COMMUNITIES Mixed turf of hydroids and large ascidians with <i>Swiftia pallida</i> and <i>Caryophyllia smithii</i> on weakly tide-swept circalittoral rock CR.HCR. Xfa.SwiLgAs</p> <p>J42, J43</p>	

Table 22 continued




MPA search features and sites	Photograph
<p>NORTHERN SEA FAN AND SPONGE COMMUNITIES <i>Swiftia pallida</i> J42, J100</p>	
<p>TIDE-SWEPT ALGAL COMMUNITIES <i>Laminaria hyperborea</i> forest and foliose red seaweeds on tide-swept upper infralittoral mixed substrata IR.MIR.KR. LhypTX.Ft M22</p>	
<p>NORTHERN FEATHER STAR <i>Leptometra celtica</i> J43, J45, J50, J61, J99, J102, J103, J105</p>	

Table 23. Non-MPA search features/PMF biotopes recorded during the current survey with illustrative video frame grab. Station numbers in boldface indicate provenance of image.


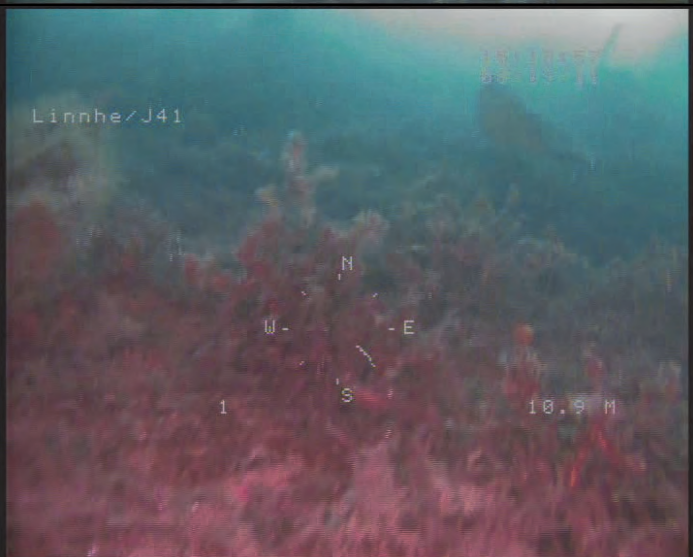

Biotope and sites	Photograph
<p>IR.LIR.K.Lsac.Pk</p> <p><i>Saccharina latissima</i> park on very sheltered lower infralittoral rock</p> <p>J50</p>	
<p>IR.MIR.KR.XfoR</p> <p>Dense foliose red seaweeds on silty moderately exposed infralittoral rock</p> <p>J41</p>	
<p>IR.MIR.KR.Lhyp</p> <p><i>Laminaria hyperborea</i> and foliose red seaweeds on moderately exposed infralittoral rock</p> <p>J43-3</p>	

Table 23 continued



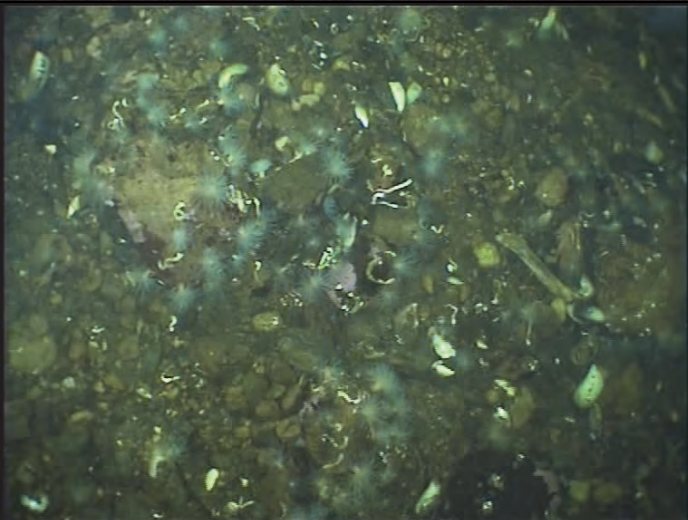
Biotope and sites	Photograph
<p>IR.MIR.KR.LhypTX.Pk</p> <p><i>Laminaria hyperborea</i> park and foliose red seaweeds on tide-swept lower infralittoral mixed substrata</p> <p>M7, M18, M21</p>	
<p>CR.LCR.BrAs.AmenCio</p> <p>Solitary ascidians, including <i>Ascidia mentula</i> and <i>Ciona intestinalis</i>, on wave-sheltered circalittoral rock</p> <p>J20, J51, J101, M57</p>	
<p>CR.LCR.BrAs.NeoPro.FS</p> <p><i>Neocrania anomala</i> and <i>Protanthea simplex</i> on very wave-sheltered circalittoral rock</p> <p>J70, J73, M5, M6, M10</p>	

Table 23 continued

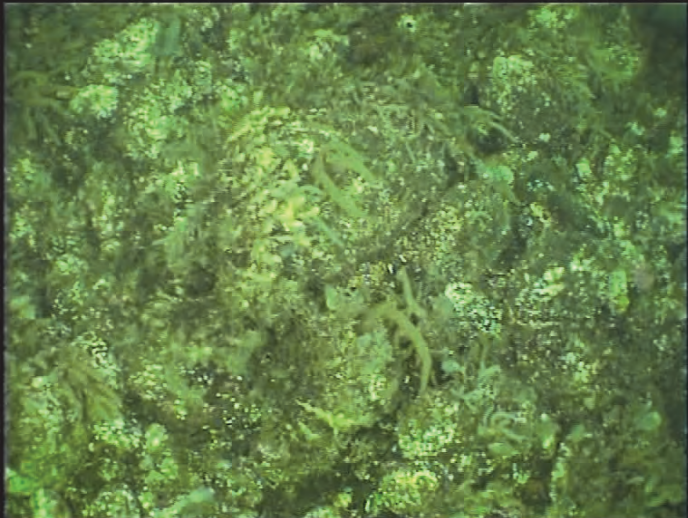


Biotope and sites	Photograph
<p>CR.MCR.CfaVS.HbowEud</p> <p><i>Halichondria bowerbanki</i>, <i>Eudendrium arbusculum</i> and <i>Eucratea loricata</i> on reduced salinity tide-swept circalittoral mixed substrata</p> <p>M34, M35, M40, M41, M44, M50, M52, M53, M56</p>	
<p>CR.MCR.EcCr.CarSwi</p> <p><i>Caryophyllia smithii</i> and <i>Swiftia pallida</i> on circalittoral rock</p> <p>J100</p>	
<p>CR.MCR.EcCr.AdigVT</p> <p><i>Alcyonium digitatum</i> and faunal crust communities on vertical circalittoral bedrock</p> <p>J55-2</p>	

Table 23 continued


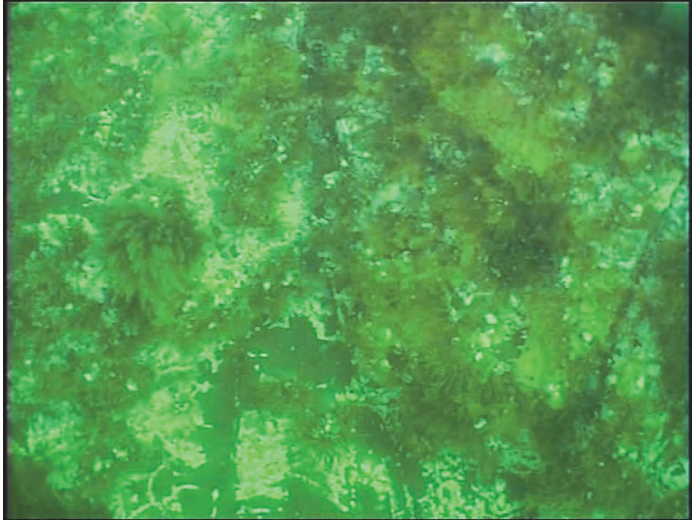
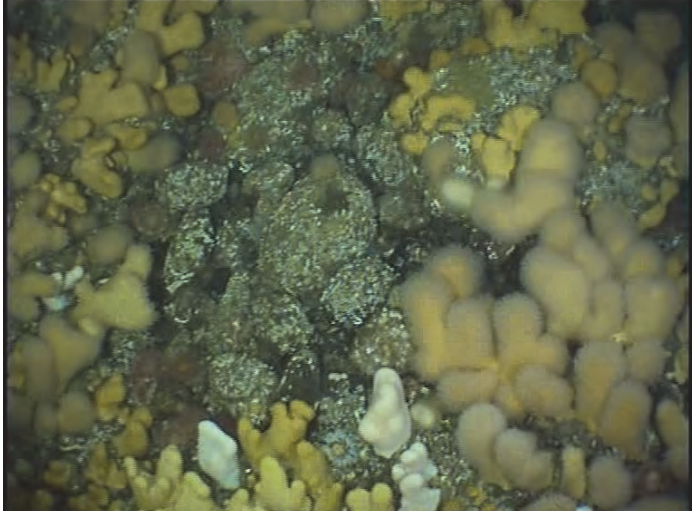
Biotope and sites	Photograph
<p>CR.MCR.EcCr.FaAICr.Flu</p> <p><i>Flustra foliacea</i> on slightly scoured silty circalittoral rock</p> <p>J55-1</p>	
<p>CR.HCR.FaT.BalTub</p> <p><i>Balanus crenatus</i> and <i>Tubularia indivisa</i> on extremely tide-swept circalittoral rock</p> <p>M31</p>	
<p>CR.HCR.FaT.Ctub.Adig</p> <p><i>Alcyonium digitatum</i> with dense <i>Tubularia indivisa</i> and anemones on strongly tide-swept circalittoral rock</p> <p>J15</p>	

Table 23 continued


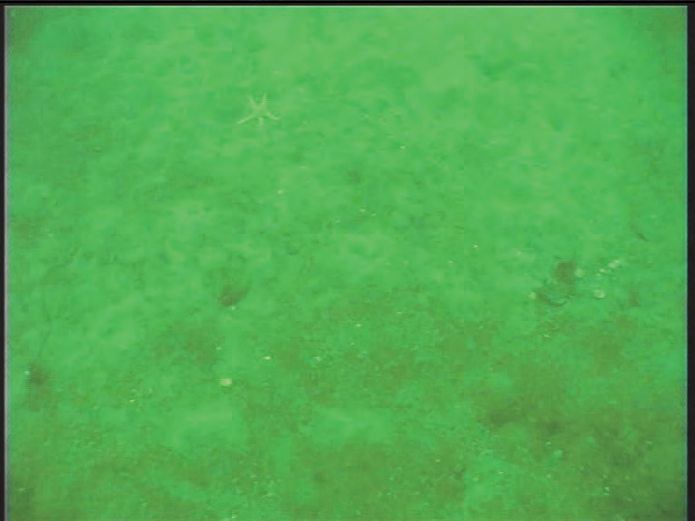
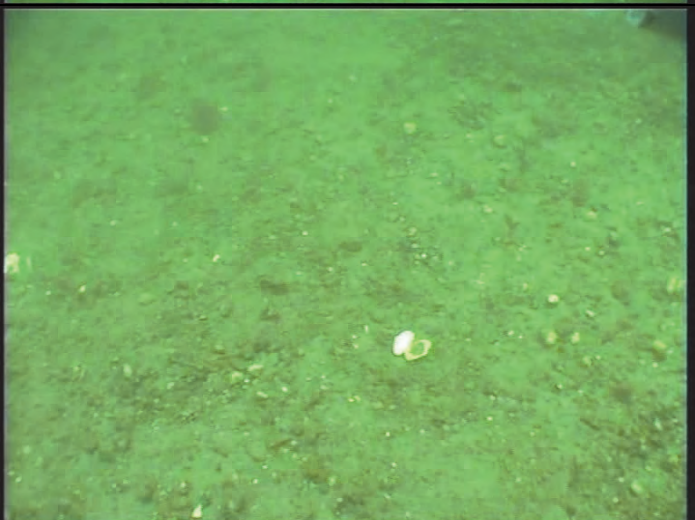
Biotope and sites	Photograph
<p>SS.SMu.CSaMu</p> <p>Circalittoral sandy mud</p> <p>J98, J99, M16</p>	
<p>SS.SMu.CSaMu.VirOPhPmax</p> <p><i>Virgularia mirabilis</i> and <i>Ophiura</i> spp. with <i>Pecten maximus</i>, hydroids and ascidians on circalittoral sandy or shelly mud with stones</p> <p>J3, J11, M70, M85</p>	
<p>SS.SMx.IMx</p> <p>Infralittoral mixed sediment</p> <p>M49-1, M62, M69</p>	

Table 23 continued



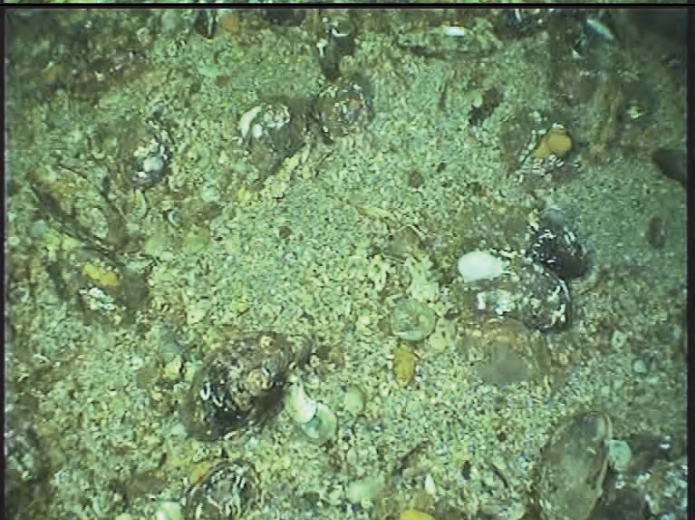
Biotope and sites	Photograph
<p>SS.SMx.CMx</p> <p>Circalittoral mixed sediment</p> <p>J29, J41, J43-1, J43-2, J43-3, J49-2, J50, J52, J54-2, J54-3, J61, J68, J86, J87, J88, J89, J94, J100, J105</p>	
<p>SS.SMx.CMx.FluHyd</p> <p><i>Flustra foliacea</i> and <i>Hydrallmania falcata</i> on tide-swept circalittoral mixed sediment</p> <p>M32, M33</p>	
<p>SS.SMx.CMx.CiloModHo</p> <p>Sparse <i>Modiolus modiolus</i>, dense <i>Cerianthus lloydii</i> and burrowing holothurians on sheltered circalittoral stones and mixed sediment</p> <p>J69, M82, M84</p>	

Table 23 continued





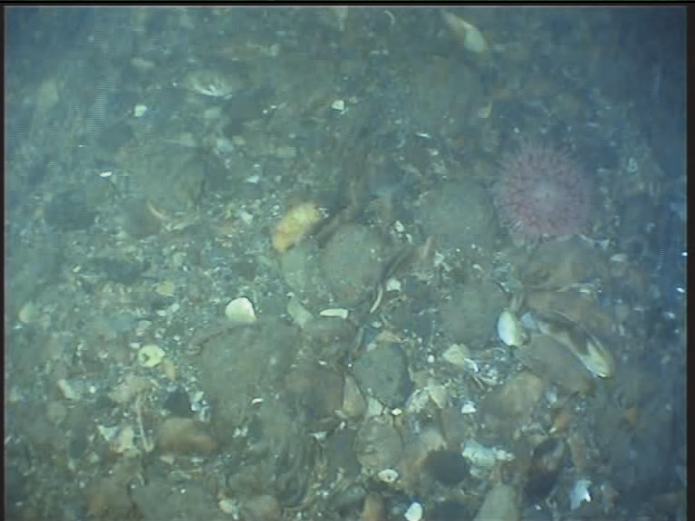
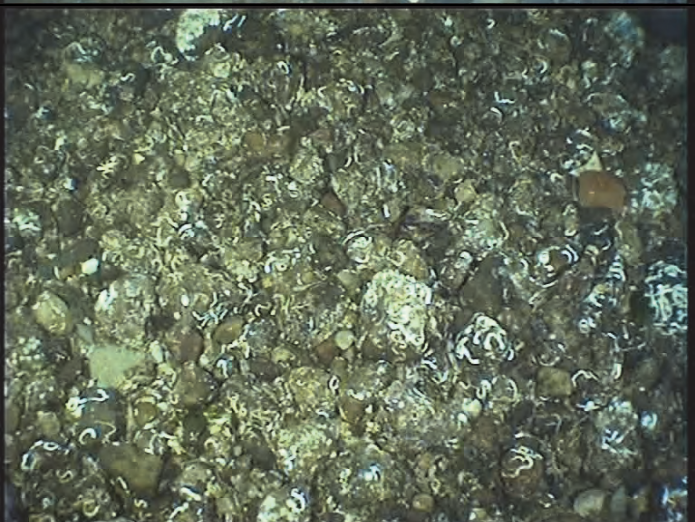
Biotope and sites	Photograph
<p>SS.SMx.CMx.CIloMx</p> <p><i>Cerianthus lloydii</i> and other burrowing anemones in circalittoral muddy mixed sediment</p> <p>J46, M36, M42</p>	
<p>SS.SMx.CMx.CIloMx.Nem</p> <p><i>Cerianthus lloydii</i> with <i>Nemertesia</i> spp. and other hydroids in circalittoral muddy mixed sediment</p> <p>M83</p>	
<p>SS.SMx.CMx.OphMx</p> <p><i>Ophiothrix fragilis</i> and/or <i>Ophiocomina nigra</i> brittlestar beds on circalittoral mixed sediment</p> <p>J14, J49-1, J49-2, J52, J54, J54-2, J82, J83, J87, J96, J97, M17</p>	

Table 23 continued

Biotope and sites	Photograph
<p>SS.SMp.KSwSS.LsacR.GV</p> <p><i>Saccharina latissima</i> and robust red algae on infralittoral gravel and pebbles</p> <p>M29</p>	
<p>SS.SCS.CCS</p> <p>Cirralittoral coarse sediment</p> <p>J44, J96</p>	
<p>SS.SCS.CCS.PomB</p> <p><i>Spirobranchus triqueter</i> with barnacles and bryozoan crusts on unstable cirralittoral cobbles and pebbles</p> <p>M81</p>	

APPENDIX 8. HISTORICAL PMF/MPA SEARCH FEATURE HABITAT RECORDS FOR THE SURVEY AREA

Table 24. Historical PMFs recorded for the survey area.

Habitat (biotope)	Search feature	Species (including component species)	Search feature
LS.LBR.LMus.Myt	●	<i>Funiculina quadrangularis</i>	●
LS.LBR.LMus.Myt.Mx	●	<i>Pachycerianthus multiplicatus</i>	●
IR.LIR.IFaVS.MytRS	●	<i>Swiftia pallida</i>	●
SS.SMu.CFiMu.SpnMeg	●	<i>Arctica islandica</i>	●
SS.SMu.CFiMu.SpnMeg.Fun	●	<i>Glossus humanus</i>	●
SS.SMu.CFiMu.MegMax	●	<i>Leptometra celtica</i>	●
SS.SMx.IMx.Lim	●	<i>Palinurus elephas</i>	●
SS.SBR.SMus.ModCvar	●	<i>Anguilla anguilla</i>	
SS.SBR.SMus.ModHAs	●	<i>Cetorhinus maximus</i>	●
SS.SBR.SMus.ModT	●	<i>Dipturus batis</i>	●
Modiolus bed	●	<i>Pollachius virens juv?</i>	
SS.SMu.CFiMu.BlyrAchi	●	<i>Gadus morhua</i>	
LS.LMu		<i>Molva molva</i>	
LS.LMu.MEst.HedMac		<i>Pomatoschistus minutus</i>	
LS.LMu.MEst.HedMacScr		<i>Salmo trutta</i>	
LS.LMu.UEst.Hed		<i>Cepphus grylle</i>	●
SS.SMp.KSwSS.LsacCho	●	<i>Halichoerus grypus</i>	
SS.SMp.KSwSS.LsacMxVS	●	<i>Phoca vitulina</i>	
SS.SMp.KSwSS.LsacR.Mu	●	<i>Lutra lutra</i>	
SS.SMp.KSwSS.LsacR.Sa	●		
IR.LIR.IFaVS	●		
IR.LIR.KVS.LsacPhyVS	●		
IR.LIR.Lag			
IR.LIR.Lag.FcerEnt			
IR.LIR.Lag.FChoG			
SS.SMu.SMuLS			
CR.HCR.XFa.SwiLgAs	●		
LS.LMp.LSgr.Znol	●		
SS.SMp.SSgr.Rup	●		
LR.LLR.FVS.Ascmac	●		
LR.HLR.FT.AscT	●		
IR.MIR.KT.LdigT	●		
IR.MIR.KT.XKT	●		
IR.MIR.KT.XKTX	●		
IR.MIR.KR.LhypTX.Ft	●		

Table 25. Records of PMF habitats from Marine Recorder, with location and depth data. SL=sea level, CD=chart datum, low=lower boundary, hi=upper boundary.

Code	SAMPLE_REF	EventName	Date	Surveyors	Lat	Long	SL_low	SL_hi	CD_low	CD_hi
1	006.015.003	Lochy Flats, Fort William (Upper Loch Linnhe)	21/06/1989	Jon Davies, Christine Howson	56.83481	-5.11127				
2	006.053.002	N of Dunbeg, Dunstaffnage Bay (Lower Loch Linnhe)	01/05/1988	Sue Hiscock	56.44868	-5.43655				
3	085.007.001	Loch Don (Loch Don, Mull)	09/06/1983	Shelagh Smith	56.43319	-5.67272				
4	032.022.001	Airds Bay (Loch Etive)	17/09/1990	Jon Moore, Colin Munro	56.44658	-5.24110	-2.8	-1.3		
5	032.023.002	S of Eilean Duirinnis. (Loch Etive)	16/09/1990	Bernard Picton, Roger Covey	56.44587	-5.23016	-12.0	-9.0	-11.1	-8.1
6	032.025.001	Eilean nan Meann (Loch Etive)	17/09/1990	Jon Moore, Colin Munro	56.44853	-5.23526	-2.7	-1.5		
7	006.060.003	E of Pladda Island, Lismore (Lower Loch Linnhe)	18/06/1989	Bernard Picton, Jon Davies	56.47748	-5.50644	-24.0	-19.0	-23.0	-18.0
8	006.060.004	E of Pladda Island, Lismore (Lower Loch Linnhe)	18/06/1989	Bernard Picton, Jon Davies	56.47748	-5.50644	-37.0	-24.0	-36.0	-23.0
9	006.062.002	ESE Port Kilcheran, Lismore (Lower Loch Linnhe)	18/06/1989	Christine Howson, Ken Cameron	56.48837	-5.53115			-28.0	-14.0
10	005.001.003	Off Onich Pier (Loch Leven)	23/04/1990	Keith Hiscock, Dave Mills	56.70176	-5.21776	-27.0	-22.0	-24.5	-19.5
11	005.021.003	S of Callert House (Loch Leven)	22/04/1990	David Connor, Dan Laffoley	56.69263	-5.11733	-28.0	-25.0	-26.7	-23.7
12	005.034.001	S of mouth of Allt Nathrach Bay (Loch Leven)	24/04/1990	Dan Laffoley, Dave Mills, Clare Eno, Philip Dixon-Smith, Robert Hillier	56.71236	-4.99458	-23.0	-23.0	-22.0	-22.0
13	006.002.001	NW of South Garvan (Loch Eil)	22/06/1989	Teresa Bennett, David Connor	56.85152	-5.30707	-35.0	-28.0	-32.0	-25.0
14	006.003.001	N of Duisky (Loch Eil)	22/06/1989	Charlotte Johnston, Ken Cameron, David Connor	56.84646	-5.25285	-27.9	-25.0	-24.9	-22.0
15	006.005.004	N shore, W of Outward Bound centre (Loch Eil)	21/06/1989	Christine Howson, Jon Davies	56.85319	-5.20861			-26.0	-15.0
16	006.018.003	N of Callas na Dallaig (Upper Loch Linnhe)	22/06/1989	Christine Howson, Bernard Picton	56.77985	-5.16960			-25.0	-13.0
17	006.019.002	Victorious Rock (Upper Loch Linnhe)	21/06/1989	Dale Rostron, Bernard Picton, Ken Cameron	56.76651	-5.20956	-30.0	-24.0	-27.0	-21.0
18	006.035.001	S of Kingairloch, Loch a' Choire (Lower Loch Linnhe)	14/06/1989	Sue Hiscock	56.61315	-5.50611	-17.0	-16.0	-16.0	-15.0
19	032.013.001	SE of Ardchattan Point. (Loch Etive)	16/09/1990	Christine Howson, Colin Munro	56.46074	-5.28371	-28.0	-24.0	-27.0	-23.0
20	032.013.002	SE of Ardchattan Point. (Loch Etive)	16/09/1990	Christine Howson, Colin Munro	56.46074	-5.28371	-31.0	-28.0	-30.0	-27.0
21	032.013.003	SE of Ardchattan Point. (Loch Etive)	16/09/1990	Christine Howson, Colin Munro	56.46074	-5.28371	-36.0	-31.0	-35.0	-30.0
22	032.017.003	SE of Kennacraig (Loch Etive)	17/09/1990	Roger Covey, Pete Taylor	56.45786	-5.24953	-30.0	-20.0		
23	032.018.003	SSE of Airds Point. (Loch Etive)	21/09/1990	Bernard Picton, Christine Howson	56.44985	-5.25696	-29.0	-25.0	-27.0	-23.0

Table 25 continued

Code	SAMPLE_REF	EventName	Date	Surveyors	Lat	Long	SL_low	SL_hi	CD_low	CD_hi
24	032.019.004	Bonawe School (Loch Etive)	17/09/1990	Pete Taylor, Roger Covey	56.45454	-5.25622	-24.0	-20.0		
25	032.020.001	W of Eilean Duirinnis (Loch Etive)	21/09/1990	Jon Moore, Rohan Holt, Roger Covey	56.44904	-5.23611	-38.0	-38.0		
26	032.029.002	Off Gleann Rudha Alltan. (Loch Etive)	18/09/1990	Roger Covey, Colin Munro	56.45488	-5.18790	-26.0	-20.0	-25.2	-19.2
27	032.035.003	Rubha Bharr (Loch Etive)	20/09/1990	Rohan Holt, Colin Munro	56.50258	-5.13258	-27.0	-15.0		
28	032.038.005	N Ru-inbhir ghuithasan (Loch Etive)	20/09/1990	Bernard Picton, Christine Howson	56.53324	-5.09282	-30.0	-23.0		
29	032.038.006	N Ru-inbhir ghuithasan (Loch Etive)	20/09/1990	Bernard Picton, Christine Howson	56.53324	-5.09282	-33.0	-30.0		
30	032.039.002	Ru aird Trileadhan. (Loch Etive)	20/09/1990	David Connor, Jon Moore	56.54237	-5.08706	-27.0	-14.0	-26.0	-13.0
31	032.040.001	NE of Ru aird Trileadhan (Loch Etive)	21/09/1990	Rohan Holt, Roger Covey, Jon Moore	56.54331	-5.08551	-30.0	-30.0		
32	624.003.002	S side of Pladda Island	14/05/1995	David Connor	56.47555	-5.51094	-24.0	-23.0	-22.0	-21.0
33	624.003.005	S side of Pladda Island	14/05/1995	Tim Hill	56.47555	-5.51094	-30.0	-27.0	-28.0	-25.0
34	624.003.006	S side of Pladda Island	14/05/1995	Kate Northen	56.47555	-5.51094	-28.0	-28.0	-26.0	-26.0
35	624.003.007	S side of Pladda Island	14/05/1995	Rohan Holt	56.47555	-5.51094	-28.3	-25.0	-26.3	-23.0
36	006.063.001	S of Achnacroish, Lismore (Lower Loch Linnhe)	18/06/1989	David Connor, Charlotte Johnston	56.50908	-5.49194	-38.0	-37.0	-36.0	-35.0
37	006.017.001	W of Achadh an Todhair Hill (Upper Loch Linnhe)	22/06/1989	Dale Rostron, Charlotte Johnston, Ken Cameron	56.79818	-5.15951			-18.5	-13.5
38	006.023.001	Cuil-Cheanna Spit (Lower Loch Linnhe)	20/06/1989	Bernard Picton, Jon Davies	56.68898	-5.25277	-25.0	-25.0	-21.0	-21.0
39	006.027.001	NE Cuil Bay (Lower Loch Linnhe)	20/06/1989	Teresa Bennett, Christine Howson	56.64321	-5.30120	-28.0	-28.0	-26.0	-26.0
40	006.034.002	SW of Camasnacroise, Loch a' Choire (Lower Loch Linnhe)	14/06/1988	David Connor, Roger Covey	56.61239	-5.49773	-27.0	-26.0	-26.0	-25.0
41	006.036.002	W of Beinn Sguilich (Lower Loch Linnhe)	20/06/1989	Charlotte Johnston, Dale Rostron	56.61149	-5.35032	-28.0	-20.0	-26.0	-18.0
42	006.044.003	E of Dubh Sgeir, Lismore (Lower Loch Linnhe)	28/06/1989	David Connor, Charlotte Johnston	56.54699	-5.48323			-43.0	-30.0
43	006.045.001	Port an Dreadhain, Lismore (Lower Loch Linnhe)	28/06/1989	Christine Howson, Bernard Picton	56.50985	-5.53445	-27.0	-25.0	-25.0	-22.0
44	006.049.001	Bernera Bay, Lismore (Lower Loch Linnhe)	28/06/1989	David Connor, Charlotte Johnston	56.49072	-5.57785	-28.0	-24.0	-25.0	-21.0
45	005.023.001	S Callert Cottage (Loch Leven)	23/04/1990	Jon Davies, Teresa Bennett, Dan Laffoley, Steve Bolt	56.69654	-5.10115	-35.0	-35.0	-34.0	-34.0
46	005.030.001	N of mouth of Allt Gleann a Chaolais (Loch Leven)	24/04/1990	Dan Laffoley, Dave Mills, Clare Eno, Philip Dixon-Smith, Robert Hillier	56.70818	-5.02628	-44.0	-44.0	-42.0	-42.0
47	032.030.002	SE of Eilean Uisneachan (Loch Etive)	18/09/1990	Bernard Picton	56.48288	-5.16507			-26.0	-25.0
48	006.037.004	Creag an Fhithich, Shuna Island (Lower Loch Linnhe)	20/06/1989	Teresa Bennett, Ken Cameron, Christine Howson	56.59066	-5.40464	-13.2	-9.0	-10.2	-6.0

Table 25 continued

Code	SAMPLE_REF	EventName	Date	Surveyors	Lat	Long	SL_low	SL_hi	CD_low	CD_hi
49	006.048.002	Rubha an Ridire, Lynn of Morven (Lower Loch Linnhe)	28/06/1989	Dale Rostron, Mark Davies	56.49650	-5.68277	-20.5	-17.0	-18.0	-15.0
51	006.067.001	Narrows N of Appin Rocks, Lynn of Lorn (Lower Loch Linnhe)	18/06/1989	Christine Howson, Mark Davies, Ken Cameron	56.55334	-5.42325			-16.0	-14.0
52	005.025.001	W of Camas na h-Eirghe (Loch Leven)	22/04/1990	David Connor, Dan Laffoley	56.69984	-5.08035	-13.0	-7.0	-9.5	-3.5
53	006.024.002	WSW of Ardsheal House (Lower Loch Linnhe)	23/06/1989	David Connor, Christine Howson, Ken Cameron	56.66402	-5.29290	-16.0	-6.0	-13.0	-3.0
54	005.005.001	E Ballchulish Narrows (Loch Leven)	26/04/1990	Dave Mills, Jon Davies	56.68756	-5.17571	-18.0	-15.0	-17.0	-14.0
55	005.012.001	NE of Rubha Poll an t-Sailisdeire (Loch Leven)	22/04/1990	Keith Hiscock, Steve Bolt	56.68080	-5.15881	-14.5	-12.0	-11.0	-8.5
56	005.012.003	NE of Rubha Poll an t-Sailisdeire (Loch Leven)	22/04/1990	Keith Hiscock, Steve Bolt	56.68164	-5.15757	-26.0	-22.0	-22.5	-18.5
57	006.008.002	NW of Annat Narrows (Loch Eil)	22/06/1989	Teresa Bennett, David Connor	56.84813	-5.17286	-11.2	-7.4	-10.0	-7.0
58	006.011.001	NW of Rubha Dearg (Upper Loch Linnhe)	21/06/1989	Dale Rostron, Bernard Picton, Ken Cameron	56.83480	-5.12947	-8.0	-8.0	-7.0	-7.0
59	006.011.003	NW of Rubha Dearg (Upper Loch Linnhe)	21/06/1989	Dale Rostron, Bernard Picton, Ken Cameron	56.83480	-5.12947			-15.0	-15.0
60	005.015.001	W of Rubha na Glas-lice (Loch Leven)	23/04/1990	Jon Davies, Charlotte Johnston, Dave Mills, Clare Eno	56.68322	-5.14121	-65.0	-65.0	-64.0	-64.0
61	006.001.003	Kinlocheil (Loch Eil)	22/06/1989	Jon Davies, Mark Davies	56.85646	-5.31367	-18.0	-13.0	-14.5	-9.5
62	006.038.003	Pinnacle W of Shuna Island (Lower Loch Linnhe)	23/06/1989	Bernard Picton	56.59154	-5.41368	-49.0	-48.0	-47.0	-46.0
63	032.016.003	SW of Kennacraig. (Loch Etive)	16/09/1990	Bernard Picton, Roger Covey	56.46223	-5.27491	-36.0	-25.0	-35.2	-24.2
64	084.011.001	Manse Hole, Loch Linnhe (Loch Linnhe)	28/07/1978	Shelagh Smith	56.72820	-5.23457				
65	085.008.001	Eilean nan Caorach (Loch Don, Mull)	09/06/1983	Shelagh Smith	56.42321	-5.65440				
66	296.005.003	Head of Loch Etive (Loch Etive)	04/03/1969	Scottish Marine Biological Association	56.55533	-5.07184			0.3	0.3
67	296.001.002	W of Ardchattan Priory (Loch Etive)	04/03/1969	Scottish Marine Biological Association	56.46135	-5.30130			1.3	1.3
68	296.001.003	W of Ardchattan Priory (Loch Etive)	04/03/1969	Scottish Marine Biological Association	56.46135	-5.30130			0.3	0.3
69	296.004.002	Ardmaddy Bay (Loch Etive)	04/03/1969	Scottish Marine Biological Association	56.49190	-5.12845			1.3	1.3
70	296.004.003	Ardmaddy Bay (Loch Etive)	04/03/1969	Scottish Marine Biological Association	56.49190	-5.12845			0.3	0.3
71	296.005.002	Head of Loch Etive (Loch Etive)	04/03/1969	Scottish Marine Biological Association	56.55533	-5.07184			1.3	1.3
72	085.007.001	Loch Don (Loch Don, Mull)	09/06/1983	Shelagh Smith	56.43319	-5.67272				
73	296.003.001	E of Airds Bay (Loch Etive)	04/03/1969	Scottish Marine Biological Association	56.44059	-5.23620			2.3	2.3
74	296.005.001	Head of Loch Etive (Loch Etive)	04/03/1969	Scottish Marine Biological Association	56.55533	-5.07184			2.3	2.3

Table 25 continued

Code	SAMPLE_REF	EventName	Date	Surveyors	Lat	Long	SL_low	SL_hi	CD_low	CD_hi
75	006.001.001	Kinlochail (Loch Eil)	22/06/1989	Jon Davies, Mark Davies	56.85646	-5.31367	-8.0	-3.0	-4.5	0.5
76	005.009.002	SW of Rubha Charnuis (Loch Leven)	26/04/1990	Teresa Bennett, David Connor	56.68683	-5.16912	-11.0	-6.0	-10.0	-5.0
77	006.005.001	N shore, W of Outward Bound centre (Loch Eil)	21/06/1989	Christine Howson, Jon Davies	56.85319	-5.20861			-3.0	-1.0
78	006.007.001	Dorathy Stone (Loch Eil)	22/06/1989	Mark Davies, Jon Davies	56.84648	-5.17950	-13.0	-2.0	-11.0	0.0
79	006.018.001	N of Callas na Dallaig (Upper Loch Linnhe)	22/06/1989	Christine Howson, Bernard Picton	56.77985	-5.16960			-7.0	-5.0
80	006.061.001	Sgeir Sgoraig, Lismore (Lower Loch Linnhe)	18/06/1989	Dale Rostron, Teresa Bennett	56.47322	-5.55784	-14.0	-12.5	-13.0	-11.0
81	006.056.004	SE of St Margaret's Tower, Ardmucknish Bay (Lower Loch Linnhe)	17/06/1989	Charlotte Johnston, Mark Davies	56.48523	-5.42524	-14.0	-11.0	-11.0	-8.0
82	006.058.001	W Camas Nathais, Lynn of Lorn (Lower Loch Linnhe)	17/06/1989	David Connor, Teresa Bennett	56.48317	-5.46613	-11.9	-9.9	-9.0	-7.0
83	624.002.003	Dunstaffnage (Lynn of Lorn)	14/05/1995	Paul Brazier	56.45563	-5.44530	-13.0	-6.0	-12.0	-5.0
84	624.002.004	Dunstaffnage (Lynn of Lorn)	14/05/1995	Frank Fortune	56.45563	-5.44530	-13.0	-5.0	-12.0	-4.0
85	624.002.005	Dunstaffnage (Lynn of Lorn)	14/05/1995	David Connor	56.45563	-5.44530	-15.0	-9.0	-14.0	-8.0
86	624.002.007	Dunstaffnage (Lynn of Lorn)	14/05/1995	Rohan Holt	56.45563	-5.44530	-15.0	-10.0	-14.0	-9.0
87	624.002.008	Dunstaffnage (Lynn of Lorn)	14/05/1995	Tim Hill	56.45563	-5.44530	-13.0	-9.0	-12.0	-8.0
88	006.016.001	Rubha Mòr, Trislaig (Upper Loch Linnhe)	21/06/1989	Christine Howson, Jon Davies	56.82153	-5.12460	-7.0	-4.0	-5.0	-2.0
89	006.036.001	W of Beinn Sgluich (Lower Loch Linnhe)	20/06/1989	Charlotte Johnston, Dale Rostron	56.61149	-5.35032	-20.0	-10.1	-18.0	-8.0
90	006.042.008	Rocks W of Port Ramsay, Lismore (Lower Loch Linnhe)	23/06/1989	David Connor, Ken Cameron, Christine Howson	56.55616	-5.45913	-7.0	-6.0	-6.0	-5.0
91	006.046.001	Camas Eigneig, Lynn of Morvern (Lower Loch Linnhe)	28/06/1989	Teresa Bennett, Jon Davies	56.53067	-5.58276	-9.0	-7.0	-7.0	-5.0
92	006.056.002	SE of St Margaret's Tower, Ardmucknish Bay (Lower Loch Linnhe)	17/06/1989	Charlotte Johnston, Mark Davies	56.48523	-5.42524	-8.0	-8.0	-5.0	-5.0
93	005.036.002	Kinlochleven (Loch Leven)	25/04/1990	Teresa Bennett, Jon Davies	56.71401	-4.98197	-5.0	-2.0	-3.0	0.0
94	005.028.001	E of Caolas nan Con (Loch Leven)	25/04/1990	David Connor, Keith Hiscock	56.70738	-5.03700	-10.0	-2.0	-8.0	0.0
95	032.006.001	W of Eilean Traighe (Loch Etive)	21/09/1990	David Connor, Colin Munro	56.45484	-5.33613	-7.0	-3.0		
96	032.006.002	W of Eilean Traighe (Loch Etive)	21/09/1990	David Connor, Colin Munro	56.45484	-5.33613	-13.0	-7.0		
97	032.010.001	Channel SE of Abbot's Isle. (Loch Etive)	21/09/1990	Christine Howson, Bernard Picton	56.45488	-5.32119			-9.0	-2.0
98	032.015.001	NW of Airds Point (Loch Etive)	21/09/1990	David Connor, Colin Munro	56.45855	-5.26777	-7.0	-4.0		
99	032.015.002	NW of Airds Point (Loch Etive)	21/09/1990	David Connor, Colin Munro	56.45855	-5.26777	-14.0	-7.0		
100	032.016.001	SW of Kennacraig. (Loch Etive)	16/09/1990	Bernard Picton, Roger Covey	56.46223	-5.27491	-6.0	-3.0	-5.2	-2.2
101	032.017.001	SE of Kennacraig (Loch Etive)	17/09/1990	Roger Covey, Pete Taylor	56.45786	-5.24953	-8.0	-3.0		
102	032.019.001	Bonawe School (Loch Etive)	17/09/1990	Pete Taylor, Roger Covey	56.45454	-5.25622	-8.0	-3.0		
103	032.022.002	Airds Bay (Loch Etive)	17/09/1990	Jon Moore, Colin Munro	56.44658	-5.24110	-9.7	-2.8		

Table 25 continued

Code	SAMPLE_REF	EventName	Date	Surveyors	Lat	Long	SL_low	SL_hi	CD_low	CD_hi
104	032.025.002	Eilean nan Meann (Loch Etive)	17/09/1990	Jon Moore, Colin Munro	56.44853	-5.23526	-6.7	-2.7		
106	032.027.002	W of Sgeirlag Choan. (Loch Etive)	18/09/1990	Christine Howson, Jon Moore	56.45510	-5.19685	-6.0	-3.0	-5.5	-2.5
107	032.027.003	W of Sgeirlag Choan. (Loch Etive)	18/09/1990	Christine Howson, Jon Moore	56.45510	-5.19685	-12.0	-6.0	-11.5	-5.5
108	032.028.003	Mackinley's Cliff (Loch Etive)	23/05/1988	Christine Howson, Jon Moore	56.44984	-5.22949	-3.0	-2.0	-1.5	-0.5
109	032.028.004	Mackinley's Cliff (Loch Etive)	23/05/1988	Christine Howson, Jon Moore	56.44984	-5.22952			-4.5	-1.5
110	032.028.005	Mackinley's Cliff (Loch Etive)	23/05/1988	Christine Howson, Jon Moore	56.44984	-5.22952			-10.5	-4.5
111	032.031.001	Rocks W of Ardnellan Point (Loch Etive)	18/09/1990	David Connor, Peter Tilbrook	56.48056	-5.15026	-6.0	-3.5	-6.0	-3.0
112	032.031.002	Rocks W of Ardnellan Point (Loch Etive)	18/09/1990	David Connor, Peter Tilbrook	56.48056	-5.15026	-14.0	-6.0	-14.0	-6.0
113	032.038.003	N Ru-inbhir ghuithasan (Loch Etive)	20/09/1990	Bernard Picton, Christine Howson	56.53324	-5.09282	-14.0	-10.0		
114	032.038.001	N Ru-inbhir ghuithasan (Loch Etive)	20/09/1990	Bernard Picton, Christine Howson	56.53324	-5.09282	-5.0	-2.0		
115	450.017.002	Leth-Fhonn, Loch Don (Mull)	13/08/1995	Roger Covey, Frank Fortune	56.42495	-5.69886	-1.0	0.0		
116	032.035.001	Rubha Bharr (Loch Etive)	20/09/1990	Rohan Holt, Colin Munro	56.50258	-5.13258	-8.0	-2.5		
117	032.037.001	E of Sgeir na Beolarach (Loch Etive)	20/09/1990	Jon Moore, David Connor	56.51000	-5.12344			-9.0	-6.0
118	032.042.001	N of Aird Trilleachan (Loch Etive)	20/09/1990	Roger Covey, Pete Taylor	56.55252	-5.07649	-17.0	-10.0	-16.5	-9.5
119	006.050.004	W B...gh Clach an Dobhrain, Lismore (Lower Loch Linnhe)	28/06/1989	Teresa Bennett, Jon Davies, Ken Cameron	56.47484	-5.57611	-39.0	-20.0	-36.0	-17.0
120	043.003.001	Bach Island, W of Kerrera (Firth of Lorn)	27/05/1988	Sue Hiscock	56.38189	-5.60392	-27.5	-16.0		
121	048.11/3.001	Liath Sgeir (Lower Loch Linnhe)	17/06/1983	Gill Bishop, Barry Brooke, Janet Chapman	56.47457	-5.60443	-20.0			
122	624.001.005	North Bach Island (Firth of Lorn)	13/05/1995	David Connor	56.38288	-5.60078	-27.0	-19.0	-24.5	-16.5
123	624.001.008	North Bach Island (Firth of Lorn)	13/05/1995	Rohan Holt	56.38288	-5.60078	-32.4	-19.0	-29.9	-16.5
124	085.007.001	Loch Don (Loch Don, Mull)	09/06/1983	Shelagh Smith	56.43319	-5.67272				
125	450.017.001	Leth-Fhonn, Loch Don (Mull)	13/08/1995	Roger Covey, Frank Fortune	56.42495	-5.69886	0.0	0.2		
126	005.007.001	Allshellach (Loch Leven)	24/04/1990	Keith Hiscock, John Baxter	56.69217	-5.17120			0.7	3.5
127	005.011.006	Carness (Loch Leven)	24/04/1990	David Connor, Jon Davies, Charlotte Johnston, Steve Bolt	56.68804	-5.15697	0.5	0.7	1.5	1.7
128	006.009.004	W end of Annat Narrows (Loch Eil)	22/06/1989	Mark Davies, Jon Davies	56.84140	-5.16285	1.5	2.5	2.5	3.5
129	032.003.003	Below Black Crofts (Loch Etive)	19/09/1990	Pete Taylor, Jon Moore	56.45750	-5.37727				
130	032.003.004	Below Black Crofts (Loch Etive)	19/09/1990	Pete Taylor, Jon Moore	56.45750	-5.37727				
131	032.004.003	Dunfuinary (Loch Etive)	19/09/1990	Pete Taylor, Jon Moore	56.45593	-5.36902				
132	032.004.006	Dunfuinary (Loch Etive)	19/09/1990	Jon Moore	56.45593	-5.36902				
133	005.027.001	Narrows, Caolas nan Con (Loch Leven)	26/04/1990	Dan Laffoley, Steve Bolt	56.70567	-5.04454	-3.8	-3.8	-2.8	-2.8

Table 25 continued

Code	SAMPLE_REF	EventName	Date	Surveyors	Lat	Long	SL_low	SL_hi	CD_low	CD_hi
134	006.009.006	W end of Annat Narrows (Loch Eil)	22/06/1989	Mark Davies, Jon Davies	56.84140	-5.16285		0.0		1.0
135	005.004.001	Ballachulish Narrows (Loch Leven)	26/04/1990	David Connor, Teresa Bennett	56.68981	-5.18619	-6.0	-4.0	-5.0	-3.0
136	006.068.001	Entrance to loch (Loch Creran)	18/06/1989	Teresa Bennett, Dale Rostron	56.53650	-5.41947	-11.5	-9.6	-9.0	-7.0
137	032.002.001	Falls of Lora (Loch Etive)	16/09/1990	Jon Moore, David Connor	56.45620	-5.39193	-8.0	-6.0		
138	032.005.002	NE end of Kilmaronag Narrows to Achnaba. (Loch Etive)	16/09/1990	Bernard Picton, David Connor	56.46154	-5.36107	-6.0	-3.0	-5.0	-2.0
139	005.009.001	SW of Rubha Charnuis (Loch Leven)	26/04/1990	Teresa Bennett, David Connor	56.68683	-5.16912	-6.0	-4.0	-5.0	-3.0
140	005.010.004	Rubha Charnuis (Loch Leven)	24/04/1990	Charlotte Johnston, David Connor, Jon Davies, Steve Bolt	56.68521	-5.16196			0.9	1.2
141	006.008.001	NW of Annat Narrows (Loch Eil)	22/06/1989	Teresa Bennett, David Connor	56.84813	-5.17286	-7.4	-7.0	-6.5	-6.0
142	006.010.001	Annat Narrows (Loch Eil)	21/06/1989	Mark Davies, Teresa Bennett	56.84065	-5.15784	-7.0	-5.0	-6.0	-4.0
143	032.005.001	NE end of Kilmaronag Narrows to Achnaba. (Loch Etive)	16/09/1990	Pete Taylor, Rohan Holt	56.46158	-5.35620	-12.0	-9.0		
144	006.066.001	W Branra Rock, Lynn of Lismore (Lower Loch Linnhe)	18/06/1989	Bernard Picton, Jon Davies	56.53483	-5.44447	-13.0	0.0	-9.4	3.6

Table 26. Records of PMF habitats from Marine Recorder, with habitat and biological data.

Code	SAMPLE_REF	Habitat	Biotope	Description
1	006.015.003	Lower shore sand & pebbles with <i>Mytilus edulis</i> and <i>Fucus serratus</i> .	LS.LBR.LMus.Myt	Lower shore slightly muddy sand with patchy bed of <i>Mytilus edulis</i> . <i>Fucus serratus</i> abundant. Barnacles (<i>Semibalanus balanoides</i> and <i>Balanus crenatus</i>) on mussels and stones. Few littorids and little or no infauna found. Shore very wet.
2	006.053.002	Muddy sand, shell gravel and <i>Mytilus</i>	LS.LBR.LMus.Myt	Clumps of <i>Mytilus</i> overlying poorly sorted muddy fine sand and shell gravel with black layer <1 cm. Sub-surface very coarse sand and fine gravel.
3	085.007.001	Flat-lying soft mud with some gravel and boulder areas.	LS.LBR.LMus.Myt	Flat-lying soft mud with some gravel and boulder areas. There appeared to be a patch of <i>Zostera sp.</i> near low water (not investigated due to the softness of the mud). The mud contained numerous <i>A. marina</i> and sparse <i>C. edule</i> , <i>M. balthica</i> and <i>S. plana</i> . There were <i>N. diversicolor</i> amongst the boulders where there was more gravel. The boulders supported <i>A. nodosum</i> and <i>M. edulis</i> . The upper shore had <i>Hydrobia ulvae</i> and the Sacoglossan mollusc <i>Limapontia depressa</i> amongst <i>Vaucheria sp.</i> , and the stones at high water sheltered numerous <i>Ligia oceanica</i> rather than gammarids. NOTE: Substratum % data are converted from the original substratum 1-3 scoring system.
4	032.022.001	Pebbles and gravel with <i>Mytilus</i> and <i>Fucus serratus</i> in sublittoral fringe.	LS.LBR.LMus.Myt.Mx	<i>Mytilus</i> bed with abundant <i>Fucus serratus</i> on pebbles and shells. Clumps of <i>Polysiphonia sp.</i> with large numbers of small <i>Musculus</i> or <i>Mytilus</i> (?) spat inside the clumps. Abundant small <i>Asterias</i> .
5	032.023.002	Bed of live and empty <i>Mytilus</i> shells at 8-11m bcd	IR.LIR.IFaVS.MytRS	Bed of live and empty <i>Mytilus edulis</i> , little else colonizing, behind bedrock ridge, so sheltered from main current.
6	032.025.001	<i>Mytilus</i> bed in sublittoral fringe.	IR.LIR.IFaVS.MytRS	Dense <i>Mytilus</i> bed starting at 2.7m bsl, with <i>Fucus serratus</i> occasional at 2.7m, becoming abundant at 1.5m bsl. Clumps of <i>Polysiphonia sp.</i> with large numbers of <i>Musculus</i> /juvenile <i>Mytilus</i> spat inside the clumps.
7	006.060.003	Shelly mud with <i>Virgularia</i> at 18-23m	SS.SMu.CFiMu.SpMmeg	Soft shelly mud with <i>Virgularia</i> and <i>Cerianthus</i> . Occasional <i>Pennatula</i> and <i>Lanice</i> , <i>Liocarcinus depurator</i> was frequent.
8	006.060.004	<i>Amphiura</i> , <i>Pennatula</i> ; mud with stones	SS.SMu.CFiMu.SpMmeg	Very soft silty mud covered by dead shells, some shell gravel and small pebbles. <i>Amphiura filiformis</i> and <i>Pennatula phosphorea</i> dominant species on/within the sediment. The 'hard' substrata had many hydroids: <i>Halecium</i> , <i>Nemertesia</i> and <i>Tubularia</i> .
9	006.062.002	Clayey mud with pebbles, <i>Amphiura</i> & <i>Virgularia</i> at 14-28m	SS.SMu.CFiMu.SpMmeg	Gradual slope of clayey mud with some pebbles on surface and embedded throughout the mud. <i>Amphiura spp.</i> abundant. <i>Virgularia mirabilis</i> extremely abundant in narrow band (14-19m) and occasional or frequent elsewhere. One <i>Anseropoda placenta</i> and one <i>Pennatula phosphorea</i> .
10	005.001.003	Soft sandy mud plain, dominated by <i>Turritella</i> at 19-24m	SS.SMu.CFiMu.SpMmeg	Flat plain of soft sandy mud. <i>Turritella</i> were present in some abundance. Other species present were typical of muddy places everywhere, including <i>Virgularia mirabilis</i> , <i>Aporrhais pespelecani</i> and <i>Amphiura spp.</i> Lots of burrows which looked like <i>Nephrops</i> burrows, but only <i>Munida</i> found in them. Also, vertical finger-sized burrows c 6/m ² .
11	005.021.003	Soft mud with seapens and megafaunal burrows.	SS.SMu.CFiMu.SpMmeg	Plain of soft mud with frequent <i>Pennatula</i> , fewer <i>Virgularia</i> and burrows of <i>Nephrops</i> and <i>Calloccaris</i> - No <i>Amphiura</i> seen. <i>Turritella</i> common on surface.
12	005.034.001	Mud plain at 22m	SS.SMu.CFiMu.SpMmeg	Flat mud with leaf litter on indicated depth of 22m. Anchor dredge sample: bivalves and polychaetes common.
13	006.002.001	Mud	SS.SMu.CFiMu.SpMmeg	Soft smooth mud with large <i>Cerianthus lloydii</i> , <i>Nephrops norvegicus</i> , <i>Virgularia mirabilis</i> , <i>Pennatula phosphorea</i> and <i>Glossus</i> .

Table 26 continued

Code	SAMPLE_REF	Habitat	Biotope	Description
14	006.003.001	Very soft mud <i>Virgularia</i> bed.	SS.SMu.CFiMu.SpMmeg	Very gently sloping muddy seabed with lots of <i>Ophiura</i> on the surface. <i>Virgularia</i> and <i>Pennatula</i> were dotted about. The mud was reasonably firm and dark grey beneath the surface brown layer. Two <i>Pachycerianthus</i> . Nephrops burrows, and burrows about 2cm. diameter, straight down vertically for about 15-20cm.
15	006.005.004	Soft mud with <i>Nephrops norvegicus</i> and <i>Ophiura affinis</i> .	SS.SMu.CFiMu.SpMmeg	Soft mud with Nephrops burrows and <i>Ophiura affinis</i> and <i>O. ophiura</i> common. Numerous <i>Cerianthus</i> and many <i>Pagurus bernhardus</i> on the surface.
16	006.018.003	Soft burrowed mud with sea pens and amphiuroids at 13 to 25m.	SS.SMu.CFiMu.SpMmeg	Soft mud extensively burrowed with large <i>Nephrops norvegicus</i> burrows and many other unidentified ones. Tall <i>Virgularia mirabilis</i> and <i>Pennatula phosphorea</i> abundant. <i>Amphiurids</i> abundant - <i>chiajei</i> and <i>filiformis</i> . <i>Edwardsia claparedii</i> frequent particularly around burrow entrances. Several <i>Trachythyone elongata</i> .
17	006.019.002	Mud at 21-27m	SS.SMu.CFiMu.SpMmeg	<i>Amphiura chiajei/filiformis</i> has been given a nominal abundance value of Present for this record as in Arev it had no abundance value. Quite firm mud with <i>Pennatula</i> and <i>Virgularia</i> . <i>Munida rugosa</i> occupied most of the burrows; other spp. were present (<i>Lesueurigobius</i>) and there were occasional worm casts. <i>Amphiura</i> arms and <i>Arctica islandica</i> were very dense.
18	006.035.001	Fine mud plain with <i>Amphiura sp.</i> at 15-16m	SS.SMu.CFiMu.SpMmeg	Holothuriodea has been removed from the species list for this record as more specific related taxa were also present, these are now marked as characterising. <i>Amphiura chiajei/filiformis</i> has been given a nominal abundance value of Present for this record. Gently sloping mud plain with <i>Virgularia</i> , <i>Pennatula</i> , <i>Cerianthus</i> and <i>Pachycerianthus</i> (R). Abundant <i>Amphiura sp.</i> <i>Nephrops</i> burrows frequent. <i>Trachythyone elongata</i> frequent.
19	032.013.001	Soft mud, shell debris and bedrock outcrops with <i>Halichondria bowerbanki</i> at 23-27m	SS.SMu.CFiMu.SpMmeg	Mud slope with considerable amounts of shell debris and small bedrock outcrops. <i>Halichondria bowerbanki</i> , <i>Corella parallelogramma</i> , <i>Suberites carnosus</i> and <i>Ascidia aspersa</i> attached to shells and pebbles. <i>Sabella pavonina</i> and barnacles on bedrock with <i>Bougainvillia ramosa</i> . <i>Pagurus bernhardus</i> on sediment with rare <i>Virgularia mirabilis</i> and <i>Cerianthus lloydii</i> . 23 to 27m.
20	032.013.002	Soft mud with <i>Virgularia mirabilis</i> and <i>Amphiura spp.</i>	SS.SMu.CFiMu.SpMmeg	Mud slope with very dense bed of <i>Virgularia mirabilis</i> and <i>Amphiura spp.</i> but little else. This habitat graded into the ones above and below, with no clear boundary. 27 to 30m.
21	032.013.003	Soft burrowed mud with <i>Nephrops norvegicus</i> .	SS.SMu.CFiMu.SpMmeg	Plain of soft mud, heavily burrowed and excavated with many mounds, and all appearing very undisturbed. Many <i>Nephrops norvegicus</i> about on the surface and in burrows. Other burrows not identified - some possibly <i>Callianassa subterranea</i> . 30 to 35m.
22	032.017.003	Gently sloping mud plain at 20-30m bsl	SS.SMu.CFiMu.SpMmeg	Soft mud plain with <i>Virgularia</i> and <i>Nephrops</i> in burrows.
23	032.018.003	Mud with <i>Amphiura filiformis</i> .	SS.SMu.CFiMu.SpMmeg	Mud with burrows and abundant <i>Amphiura filiformis</i> . Occasional <i>Virgularia mirabilis</i> .
24	032.019.004	Soft mud plain at 20-24m bsl	SS.SMu.CFiMu.SpMmeg	Gently sloping soft mud plain with sparse bed of <i>Virgularia mirabilis</i> .
25	032.020.001	Circalittoral soft mud at 38 m bsl	SS.SMu.CFiMu.SpMmeg	About 5 litres of mud sampled and sieved through 1mm sieve. Species identified from sample include <i>Virgularia mirabilis</i> , <i>Pennatula phosphorea</i> , <i>Nucula sulcata</i> , <i>Lucinoma borealis</i> , <i>Corbula gibba</i> , <i>Lagis koreni</i> , <i>Nephtys hombergii</i> and <i>Glycera sp.</i> Large quantities of decaying terrestrial vegetable matter in the mud.
26	032.029.002	Gently sloping circalittoral mud.	SS.SMu.CFiMu.SpMmeg	Gently sloping mud plain in the circalittoral with <i>Virgularia mirabilis</i> , <i>Pennatula phosphorea</i> , <i>Pachycerianthus multiplicatus</i> , <i>Ascidia virginea</i> and tubes of <i>Chaetopterus variopedatus</i> . One boulder in the mud had a number of <i>Caryophyllia smithii</i> attached.
27	032.035.003	Soft mud with burrows and sea pens at 15-27m bsl	SS.SMu.CFiMu.SpMmeg	Soft mud slope with burrows of <i>Nephrops norvegicus</i> , possible thalassinid shrimp burrows and <i>Virgularia mirabilis</i> . Empty <i>Arctica</i> shells with ascidians and hydroids. One <i>Pachycerianthus multiplicatus</i> found. Depth range from 15 to 27m BSL. Water much clearer at depth; less fresh.

Table 26 continued

Code	SAMPLE_REF	Habitat	Biotope	Description
28	032.038.005	Mud slope with burrows and <i>Virgularia mirabilis</i> at 23-30m bsl	SS.SMu.CFiMu.SpnMeg	Steep slope with some burrows and frequent <i>Virgularia mirabilis</i> . Many <i>Chaetopterus</i> tubes projecting from the sediment as well as other small polychaete tubes. Some <i>Pseudamussium septemradiata</i> . <i>Corella parallelogramma</i> on polychaete tubes. One <i>Pachycerianthus multiplicatus</i> seen.
29	032.038.006	Soft burrowed with <i>Nephrops norvegicus</i> at 30-33m bsl	SS.SMu.CFiMu.SpnMeg	Plain of soft, very burrowed mud with mounds as well as burrows. Some <i>Nephrops norvegicus</i> , others not identified. Mud very well worked with lots of small polychaete tubes.
30	032.039.002	Soft mud plain.	SS.SMu.CFiMu.SpnMeg	Gently sloping soft mud with considerable terrestrial debris (branches and leaves) and drift <i>Fucus</i> on surface. Few mounds of <i>Arenicola</i> and single <i>Nephrops</i> burrows seen with a <i>Gobius niger</i> in it. Many <i>Chaetopterus</i> tubes and <i>Ophiura albida</i> , with a few solitary ascidians attached to surface debris. Pale <i>Suberites carnosus</i> frequent.
31	032.040.001	Circalittoral soft mud at 30m bsl (dredge)	SS.SMu.CFiMu.SpnMeg	Very soft mud with terrestrial vegetable matter. Species recorded from sample include <i>Lucinoma borealis</i> , <i>Corbula gibba</i> , <i>Cerianthus lloydii</i> (one, very large), and <i>Nucula sulcata</i> . About 15 litres of mud taken by dredge and sieved through 1mm sieve.
32	624.003.002	Shelly mud with <i>Nephrops</i> and sea pens at 23 m.	SS.SMu.CFiMu.SpnMeg	Steep slope of shelly mud with fairly dense <i>Pennatula</i> , tall <i>Virgularia</i> and scattered <i>Nephrops</i> . A few scattered pebbles with <i>Kirkenpaueria</i> .
33	624.003.005	Circalittoral mud with <i>Pennatula phosphorea</i> , <i>Cerianthus lloydii</i> and <i>Nephrops norvegicus</i> .	SS.SMu.CFiMu.SpnMeg	Circalittoral soft mud with <i>Pennatula phosphorea</i> , <i>Cerianthus lloydii</i> and <i>Nephrops norvegicus</i> burrows. Occasional pebbles and gravel provided a refuge for small <i>Munida rugosa</i> . <i>Virgularia mirabilis</i> also present.
34	624.003.006	Fine mud with seapens and burrowing megafauna	SS.SMu.CFiMu.SpnMeg	Fine soft mud at 28 m with the seapens <i>Virgularia mirabilis</i> and <i>Pennatula phosphorea</i> and the anemone <i>Cerianthus lloydii</i> . Occasional <i>Anseropoda placenta</i> and small <i>Munida rugosa</i> with <i>Turritella</i> .
35	624.003.007	Soft sandy mud with some hard substrata with sea pens and <i>Nephrops norvegicus</i> .	SS.SMu.CFiMu.SpnMeg	Sandy mud slope with <i>Nephrops</i> burrows (and possibly <i>Calocaris</i> burrows), <i>Pennatula phosphorea</i> and <i>Virgularia mirabilis</i> . <i>Amphiura chiajei</i> common (more in deeper water) and <i>Cerianthus lloydii</i> and <i>Turritella communis</i> common.
36	006.063.001	Soft mud with <i>Virgularia</i> and megafaunal burrowers.	SS.SMu.CFiMu.SpnMeg.Fun	Plains of very soft mud with many large megafaunal burrows. <i>Virgularia</i> fairly dense and lots of tiny <i>Pennatula</i> . Couple of <i>Funiculina</i> also present. <i>Nephrops</i> present with many burrows. Single ?snake blenny seen.
37	006.017.001	Soft mud <i>Virgularia</i> bed with <i>Funiculina</i> at 14-19m.	SS.SMu.CFiMu.SpnMeg.Fun	Soft mud from 14-19m bcd with lots of burrows (<i>Nephrops</i> and 2cm diameter straight down for 20cm then horizontal for 20cm). <i>Virgularia</i> , <i>Funiculina</i> , <i>Amphiura</i> , <i>Arctica</i> , <i>Ophiura albida</i> , large <i>Pachycerianthus</i> , <i>Turritella</i> , <i>Pennatula</i> (large), <i>Trachythyone</i> . Very rich in species, with quite high densities, over a large area.
38	006.023.001	<i>Funiculina</i> / <i>Virgularia</i> bed on soft mud.	SS.SMu.CFiMu.SpnMeg.Fun	Very soft mud dominated by anthozoans <i>Funiculina</i> and <i>Virgularia</i> . Some <i>Pennatula</i> and <i>Sagartiogeton</i> . There were many <i>Nephrops</i> burrows but only a few animals observed. On the surface there were abundant <i>Turritella</i> with occasional <i>Aporrhais</i> . Within the sediment there was <i>Brissopsis</i> and <i>Amphiura</i> .
39	006.027.001	Soft mud with <i>Virgularia mirabilis</i> , <i>Nephrops norvegicus</i>	SS.SMu.CFiMu.SpnMeg.Fun	Soft mud with many burrows, particularly <i>Nephrops norvegicus</i> . Others not identified. Many very tall <i>Virgularia mirabilis</i> and some <i>Funiculina quadrangularis</i> . <i>Amphiura</i> spp. (not collected) abundant, and <i>Brissopsis lyrifera</i> present.

Table 26 continued

Code	SAMPLE_REF	Habitat	Biotope	Description
40	006.034.002	Deep fine muddy sand at 25m	SS.SMu.CFiMu.SpnMeg.Fun	Plain of muddy fine sand adjoining area of small boulders at 25m bcd, with <i>Funiculina</i> and <i>Pennatula</i> , and changing to area of fairly dense <i>Thyone</i> and <i>Psolus</i> . <i>Beggiatoa</i> present in patches and with <i>Amphiura filiformis</i> and small burrowing anemone (? <i>Edwardsia</i>) in sediment. Frequent large vertical holes amongst <i>Funiculina</i> (no indication of what), with numerous polychaete tubes in the sediment. Fairly rich in species.
41	006.036.002	Silty mud slope at 18-26m	SS.SMu.CFiMu.SpnMeg.Fun	Soft mud with some holes/burrows and mounds. Not much surface fauna visible. Did see a few <i>Funiculina quadrangularis</i> .
42	006.044.003	Steeply sloping shelly mud at 30-43m	SS.SMu.CFiMu.SpnMeg.Fun	Steeply sloping soft shelly mud from 30 - 43m (rock above 30m) with <i>Funiculina</i> , <i>Virgularia</i> and <i>Pennatula</i> . Occasional tall <i>Tubularia</i> on sediment and boulders.
43	006.045.001	Mud plain with burrows and <i>Funiculina quadrangularis</i>	SS.SMu.CFiMu.SpnMeg.Fun	<i>Amphiura chiajei/filiformis</i> has been given a nominal abundance value of Present for this record as in Arev it had no abundance value. Mud plain with many burrows, including <i>Nephrops norvegicus</i> . <i>Funiculina</i> common, <i>Amphiura spp.</i> abundant. Area with considerable dead kelp and other organis debris - many <i>Asterias rubens</i> . Small clumps of <i>Tubularia indivisa</i> .
44	006.049.001	Soft mud plain with burrows.	SS.SMu.CFiMu.SpnMeg.Fun	Soft mud plain from 25 - 21m bcd with lots of burrows, (some <i>Nephrops</i> , some unidentified). Sagartiogeton abundant, <i>Pennatula</i> and <i>Funiculina</i> common, and <i>Virgularia</i> occasional. <i>Turritella</i> frequent, <i>Nephrops</i> occasional.
45	005.023.001	Soft mud with polychaetes at 34m; dredge sample.	SS.SMu.CFiMu.MegMax	Polychaeta has been removed from the species list for this record as more specific related taxa were also present, these are now marked as characterising. An anchor dredge sample: soft mud with polychaetes and <i>Amphiura chiajei</i> and <i>Virgularia mirabilis</i> .
46	005.030.001	Mud plain at 42m; dredge sample	SS.SMu.CFiMu.MegMax	Flat mud with leaf litter, at an indicated depth of 42 m bcd. Large burrowing prawns and polychaetes present. Anchor dredge sample: bivalves and Terebellids common.
47	032.030.002	Mud plain with burrows and mounds.	SS.SMu.CFiMu.MegMax	Mud plain with burrows - possibly <i>Callianassa</i> and inhabited by <i>Gobius niger</i> , and mounds probably <i>Maxmuelleria</i> (Echiuran). Occasional large <i>Virgularia</i> .
48	006.037.004	Muddy broken shell gravel over bedrock with <i>Limaria hians</i>	SS.SMx.IMx.Lim	Area of muddy shell gravel supporting bed of <i>Limaria hians</i> .
49	006.048.002	Bed of <i>Limaria hians</i> with consolidated gravel surface at 15-18m	SS.SMx.IMx.Lim	<i>Nemertesia</i> has been removed from the species list for this record as more specific related taxa were also present, these are now marked as characterising. Small area of almost horizontal substratum covered by <i>Nemertesia spp</i> with <i>Limaria hians</i> beneath. Did not spend much time here.
50	006.067.002	Bed of <i>Limaria hians</i> with areas of red algae and others of <i>Ophiothrix fragilis</i> .	SS.SMx.IMx.Lim	Dense bed of <i>Limaria hians</i> with areas of abundant red algae, particularly <i>Plocamium cartilagineum</i> , other areas with no epiphytes and others with abundant <i>Ophiothrix fragilis</i> .
51	006.067.001	Abundant <i>Modiolus modiolus</i> with dense hydroid cover.	SS.SBR.SMus.ModCvar	Tideswept channel with dense bed of <i>Modiolus modiolus</i> , 100% cover apart from occasional cobbles and boulders. <i>Modiolus</i> covered with dense hydroids, particularly <i>Rhizocaulus verticillatus</i> , <i>Halecium halecinum</i> and <i>Halecium muricatum</i> . Several very large <i>Asterias rubens</i> .
52	005.025.001	Sparse <i>Modiolus</i> on pebbles with boulders.	SS.SBR.SMus.ModHAs	Scattered <i>Modiolus</i> on a pebbly surface with a few small boulders. Fauna poor with <i>Pomatoceros</i> and <i>Pagurus bernhardus</i> the most common animals. A few pieces of kelp and <i>Phycodrys</i> .
53	006.024.002	Slope of cobbles on muddy sand from 3 to 13m.	SS.SBR.SMus.ModHAs	Steep slope of cobbles on muddy sand with some <i>Modiolus modiolus</i> scattered amongst them. Occasional large plants of <i>Laminaria saccharina</i> . <i>Phycodys rubens</i> and other foliose algae frequent. A large angler fish eyed us up.

Table 26 continued

Code	SAMPLE_REF	Habitat	Biotope	Description
54	005.005.001	<i>Modiolus</i> bed in tide-swept narrows.	SS.SBR.SMus.ModT	Hydrozoa has been removed from the species list for this record as more specific related taxa were also present, these are now marked as characterising. Dense <i>Modiolus modiolus</i> bed at 14-17 m bcd. <i>Modiolus</i> shells covered with dense hydroid growth and Pomatoceros tubes. Very clean habitat but diversity limited.
55	005.012.001	Lower infralittoral pebbles and <i>Modiolus</i> bed at 8 to 11 m bcd.	SS.SBR.SMus.ModT	A gradually sloping plain of cobbles and patchy but dense <i>Modiolus modiolus</i> colonised by <i>Phycodrys rubens</i> and with a few fairly small variety of species on and amongst the <i>Modiolus</i> including <i>Psammechinus miliaris</i> and <i>Buccinum undatum</i> .
56	005.012.003	Lower circalittoral pebbles, cobbles and <i>Modiolus</i> bed at 18.5 to 22.5 m bcd.	SS.SBR.SMus.ModT	<i>Alcyonium digitatum</i> has been given a nominal abundance value of Present for this record as in Arev it had no abundance value. A gradually sloping plain of cobbles and patchy but dense <i>Modiolus modiolus</i> with a small variety of species including <i>Alcyonium digitatum</i> .
57	006.008.002	<i>Modiolus</i> and foliose red algae.	SS.SBR.SMus.ModT	Habitat similar to habitat 3. Mixture of pebbles and small cobbles with patches of muddy shell gravel (patches larger than habitat 3). Characterised by <i>Modiolus</i> and foliose red algae particularly <i>Delesseria</i> .
58	006.011.001	Shallow tideswept <i>Modiolus</i> bed.	SS.SBR.SMus.ModT	A site in the rapids with substratum of cobbles/ <i>Modiolus modiolus</i> , covered by a low diversity but high abundance of red algae.
59	006.011.003	Tide-swept <i>Modiolus</i> bed.	SS.SBR.SMus.ModT	<i>Modiolus modiolus</i> on bedrock. Red algae and <i>Tubularia indivisa</i> all over it.
60	005.015.001	Coarse muddy sand at 64m	SS.SMu.CFiMu.BlyrAchi	<i>Ophiuroidea</i> , <i>Polychaeta</i> has been removed from the species list for this record as more specific related taxa were also present, these are now marked as characterising. An anchor dredge sample: coarse muddy sand with bivalves, polychaetes (<i>Owenia fusiformis</i>), brittlestars (<i>Amphiuira chiajei</i>), <i>Ophiopholis</i> and <i>Ophiothrix</i> .
61	006.001.003	Soft mud with <i>Arctica</i> and <i>Amphiura</i> at 9-14m	SS.SMu.CFiMu.BlyrAchi	A gradual, very soft, mud slope. Community dominated by <i>Arctica</i> and <i>Amphiura</i> . <i>Asterias</i> and <i>Pagurus bernhardus</i> with <i>Hydractinia</i> were common. Occasional <i>Buccinum</i> and <i>Aporrhais</i> .
62	006.038.003	Mud plain with <i>Funiculina</i> and <i>Amphiura</i> at 46m	SS.SMu.CFiMu.BlyrAchi	Mud plain with <i>Funiculina</i> and <i>Amphiura</i> at 46m
63	032.016.003	Lower circalittoral mud slope.	SS.SMu.CFiMu.BlyrAchi	<i>Amphiura</i> has been removed from the species list for this record as more specific related taxa were also present, these are now marked as characterising. Steep mud slope with occasional large <i>Virgularia mirabilis</i> and abundant <i>Amphiura</i> .
64	084.011.001	A discreet mud-filled hole on a sheltered pebble shore.	LS.LMu	A discreet mud-filled hole on a sheltered pebble shore. See also site description.
65	085.008.001	Irregular rock ridges with some boulders and gravel.	LS.LMu	Irregular, fairly steep-sided, rocky ridges with some boulders and gravel. The area around this site was heavily blanketed by fucoids – rotting weed permanent feature? Beneath the fucoids on the lower shore and into the <i>Laminaria</i> zone was a RHODOPHYACEAE community. Mollusca and Arthropoda were particularly numerous. Near high water at Camas Low there were patches of mud with <i>Hydrobia ulvae</i> , <i>Limapontia depressa</i> and <i>Vaucheria</i> sp. NOTE: Substratum % data are converted from the original substratum 1-3 scoring system.
66	296.005.003	296.005.003	LS.LMu	
67	296.001.002	296.001.002	LS.LMu.Mest.HedMac	
68	296.001.003	296.001.003	LS.LMu.Mest.HedMac	
69	296.004.002	296.004.002	LS.LMu.Mest.HedMac	
70	296.004.003	296.004.003	LS.LMu.Mest.HedMac	
71	296.005.002	296.005.002	LS.LMu.Mest.HedMac	

Table 26 continued

Code	SAMPLE_REF	Habitat	Biotope	Description
72	085.007.001	Flat-lying soft mud with some gravel and boulder areas.	LS.LMu.Mest.HedMacScr	Flat-lying soft mud with some gravel and boulder areas. The mud contained numerous <i>A. marina</i> and sparse <i>C. edule</i> , <i>M. balthica</i> and <i>S. plana</i> . There were <i>N. diversicolor</i> amongst the boulders where there was more gravel. The boulders supported <i>A. nodosum</i> and <i>M. edulis</i> . The upper shore had <i>Hydrobia ulvae</i> and the <i>Sacoglossan</i> mollusc <i>Limapontia depressa</i> amongst <i>Vaucheria sp.</i> , and the stones at high water sheltered numerous <i>Ligia oceanica</i> rather than gammarids. NOTE: Substratum % data are converted from the original substratum 1-3 scoring system.
73	296.003.001	296.003.001	LS.LMu.Uest.Hed	
74	296.005.001	296.005.001	LS.LMu.Uest.Hed	
75	006.001.001	Mud with occasional stones with <i>L. saccharina</i> at 0-5m	SS.SMp.KSwSS.LsacCho	Shallow mud with subsurface clay with occasional stones. <i>L. saccharina</i> attached to stones. Fronds had <i>Membranipora</i> , <i>Dendrodoa</i> and <i>Balanus crenatus</i> . Abundant <i>Chorda filum</i> . <i>Terebellidae</i> indet. common in mud, <i>Arctica islandica</i> frequent.
76	005.009.002	Kelp park on pebbles in lower infralittoral.	SS.SMp.KSwSS.LsacMxVS	A mosaic of substratum types with patches of small pebbles, patches of larger pebbles and small areas of sand/shell gravel. <i>Mya</i> was found throughout the area, while kelp plants were only occasionally observed forming the kelp park. Tiny weeds were attached to pebbles and the siphons of <i>Mya</i> . A variety of species were recorded but none in great abundance.
77	006.005.001	Cobbles and pebbles on muddy sand in upper infralittoral.	SS.SMp.KSwSS.LsacMxVS	Upper infralittoral area of cobbles on muddy sand with abundant cover of <i>Laminaria saccharina</i> . Some <i>Chorda filum</i> . Many foliose algae on cobbles with <i>Polyides rotundus</i> and <i>Phyllophora pseudoceranoides</i> .
78	006.007.001	Muddy sand slope with brown algae.	SS.SMp.KSwSS.LsacMxVS	A gentle mud slope with abundant <i>Chorda filum</i> and frequent <i>L. saccharina</i> . <i>Arenicola marina</i> within the sediment. Chumps of <i>Polysiphonia</i> abundant.
79	006.018.001	Muddy sand and cobble with <i>Chorda filum</i>	SS.SMp.KSwSS.LsacMxVS	Muddy sand and cobble with dense cover of <i>Chorda filum</i> , <i>Laminaria saccharina</i> and <i>Ectocarpaceae</i> . Red algae frequent on stones, particularly <i>Polysiphonia spp.</i>
80	006.061.001	Boulders and pebbles on muddy gravel.	SS.SMp.KSwSS.LsacR.Mu	Filamentous red algae, Foliose red algae has been given a nominal abundance value of Present for this record as in Arev it had no abundance value. Gentle slope of scattered boulders on muddy gravel with pebble patches. Siphons (presumed to be <i>Mya</i> – several dead shells etc on surface) occurred in groups around the edges of boulders.
81	006.056.004	Upper circalittoral muddy sand with cobbles/pebbles/shells	SS.SMp.KSwSS.LsacR.Mu	Slope of muddy sand with cobbles, pebbles and dead shells in upper circalittoral -8 to -11m. <i>Phycodrys</i> and <i>Polysiphonia urceolata</i> frequent, with tall, branching <i>Obelia sp.</i> on cobbles, <i>Gibbula magus</i> frequent on sediment.
82	006.058.001	Plain of tiny pebbles on muddy gravel with algal cover.	SS.SMp.KSwSS.LsacR.Mu	Plain of tiny pebbles and gravel on a muddy gravel bed. Rare small cobbles or boulders. 80 – 90% cover of algae with <i>L. saccharina</i> (F) and <i>L. hyperborea</i> (O) and masses of foliose reds and browns. Small bare patches of sediment (1 – 2 m squared) with <i>Amphitrite sp.</i> in deeper water and <i>Mya</i> and <i>Ensis arcuatus</i> and <i>Lanice</i> in shallower water. <i>Epifauna</i> rather sparse, but algae rich.
83	624.002.003	Lower infralittoral stable gravel to 13 m BSL with cape <i>Laminaria saccharina</i> .	SS.SMp.KSwSS.LsacR.Mu	Gravel and pebbles with occasional larger cobbles with cape form <i>Laminaria saccharina</i> , <i>Phycodrys</i> and <i>Traliella</i> . <i>Mya arenaria</i> and <i>Cerianthus lloydii</i> in the sediment.
84	624.002.004	Mud and pebbles with <i>Laminaria saccharina</i> and <i>Laminaria Hyperborean</i> .	SS.SMp.KSwSS.LsacR.Mu	Mud with pebbles and attached kelp with <i>terrebellids</i> and burrowing anemones in mud with <i>Lanice conchilega</i> .

Table 26 continued

Code	SAMPLE_REF	Habitat	Biotope	Description
85	624.002.005	<i>Laminaria saccharina</i> park on pebbly sediment.	SS.SMp.KSwSS.LsacR.Mu	Scattered <i>Laminaria saccharina</i> attached to pebbles on a muddy gravel slope. Small <i>Delessaria</i> and a few other algae attached to pebbles but many of hydroids present in deeper water absent. <i>Ensis</i> common in sediment along with terebellids.
86	624.002.007	Muddy pebble slope with <i>Laminaria saccharina</i>	SS.SMp.KSwSS.LsacR.Mu	<i>Laminaria saccharina</i> park on muddy pebbles with sparse hydroids and filamentous and foliose red algae.
87	624.002.008	Lower infralittoral <i>Laminaria saccharina</i> park with <i>Ensis sp.</i>	SS.SMp.KSwSS.LsacR.Mu	Lower infralittoral muddy cobbles, pebbles and gravel with <i>Laminaria saccharina</i> park and <i>Ensis sp.</i> siphons. Among the kelp was <i>Desmarestia</i> , <i>Porphyra miniata</i> and <i>Polysiphonia sp.</i> Small <i>Munida rugosa</i> were also found among the pebbles.
88	006.016.001	Current swept pebbles and cobbles on sand with <i>L.saccharina</i>	SS.SMp.KSwSS.LsacR.Sa	Pebbles and cobbles on sand subject to surface tidal streams and lower salinity. Abundant <i>L.saccharina</i> and <i>Chorda filum</i> common. Numerous small tufts of red algae, particularly <i>Pterothamnion plumula</i> and <i>Polysiphonia urceolata</i> .
89	006.036.001	Sandy slope with shells and stones at 8-18m	SS.SMp.KSwSS.LsacR.Sa	Substratum fairly uniform – No species were particularly abundant except <i>Arctica</i> . Various hydroids were attached to shells and small stones. There was a distinct zone of filamentous red/green algae between 8 and 14 m bcd, growing on shells, small stones and pebbles.
90	006.042.008	Muddy sand with occasional boulders at 5 – 6m.	SS.SMp.KSwSS.LsacR.Sa	<i>Arenicola marina</i> has been given a nominal abundance value of Present for this record as in Arev it had no abundance value. Plain of sheltered muddy sand with occasional boulders. Scattered foliose algae, all very bleached. Enormous plants of <i>Nitophyllum punctatum</i> , all green! Algae on boulders very silty. Sediment and epifauna very poor.
91	006.046.001	Sand/gravel and shells.	SS.SMp.KSwSS.LsacR.Sa	Predominantly coarse sand or fine gravel or a mixture of the two! Piles of empty shells occurred in the lower part of the zone. The deepest <i>Laminaria saccharina</i> occurred at 6.8m bcd. <i>Ensis</i> and <i>Dosinia</i> characterised the sediment while <i>Ophiocomina nigra</i> was found over the debris of empty shells mixed with filamentous weeds.
92	006.056.002	Fine sand (infralittoral) with shell fragments and pebbles.	SS.SMp.KSwSS.LsacR.Sa	Level plain of fine sand with shell fragments, cobbles and pebbles in upper infralittoral at -5m. <i>Laminaria saccharina</i> confined to larger cobbles, majority of habitat was fine sand with <i>Mya runcate</i> and <i>Echinocardium cordatum</i> both frequent. Smaller algal species included frequent <i>Pterothamnion plumula</i> and <i>Desmarestia viridis</i> .
93	005.036.002	Pebble bank with <i>Modiolus modiolus</i> .	IR.LIR.IfavS	A pebble bank with <i>Modiolus modiolus</i> subject to freshwater influence. Few other fauna/flora, - impoverished habitat.
94	005.028.001	Sparse <i>Laminaria saccharina</i> park on boulders, cobbles and stoney gravel.	IR.LIR.KVS.LsacPhyVS	Scattered small boulders and cobbles on a plain of pebble and stone gravel. Isolated plants of <i>Laminaria saccharina</i> and other tatty pieces of algae on the larger stones. Otherwise virtually devoid of life. <i>Modiolus</i> and <i>Balanus crenatus</i> shells appeared to have died recently (probably killed by freshwater). <i>Laminaria saccharina</i> to 5 m bcd and <i>Phycodrys</i> to 8 m bcd.
95	032.006.001	<i>Laminaria saccharina</i> park on boulders and cobbles.	IR.LIR.KVS.LsacPhyVS	Foliose red algae has been given a nominal abundance value of Present for this record as in Arev it had no abundance value. Gentle slope of small boulders and cobbles on muddy seabed. Sparse park of <i>L.saccharina</i> with <i>Electra</i> , <i>Bowerbankia</i> and spirorbids on fronds. Understorey of quite dense very silty algae, including <i>Phyllophora spp.</i> , <i>Odonthalia</i> , filamentous green algae and <i>Chorda filum</i> (lying horizontal).
96	032.006.002	Boulders and cobbles on muddy sand.	IR.LIR.KVS.LsacPhyVS	Gentle slope of boulder and cobble on muddy sand. Sediment with a few <i>Arenicola</i> , terebellids and thick muddy tubes (indet). Boulders with barnacles, <i>Eucratea</i> , ascidians and many covered by thin sheet of ochre sponge. <i>Halichondria bowerbanki</i> present but less common than other sites.

Table 26 continued

Code	SAMPLE_REF	Habitat	Biotope	Description
97	032.010.001	Boulder and cobble slope with ascidians and algae.	IR.LIR.KVS.LsacPhyVS	Steep slope with bedrock near the surface, then boulders and cobbles. Some scattered <i>Laminaria saccharina</i> to 5m, but generally dense cover of red algae and ascidians, <i>Corella parallelogramma</i> and <i>Asciidiella scabra</i> .
98	032.015.001	<i>Laminaria saccharina</i> on boulder and cobble.	IR.LIR.KVS.LsacPhyVS	Filamentous red algae, Foliose red algae has been given a nominal abundance value of Present for this record as in Arev it had no abundance value. Sparse park of <i>L.saccharina</i> on mixture of boulders and cobbles. Silty weeds, mainly <i>Phyllophora spp.</i> , <i>Odonthalia</i> with a few <i>Asciidiella scabra</i> and <i>Asterias. Electra, Bowerbankia</i> and spirorbids on kelp stipes.
99	032.015.002	Boulder and cobble on stoney gravel.	IR.LIR.KVS.LsacPhyVS	Small boulders and cobbles on pebble/gravel slope. Silty <i>Phyllophora sp.</i> , <i>Eucreatea, H.bowerbanki</i> and solitary ascidians on rocks covered by <i>Dendrodoa</i> and <i>Balanus crenatus</i> .
100	032.016.001	Infralittoral boulders on muddy gravel.	IR.LIR.KVS.LsacPhyVS	Boulders on muddy gravel with <i>Laminaria saccharina</i> .
101	032.017.001	Infralittoral boulders with <i>Laminaria saccharina</i> .	IR.LIR.KVS.LsacPhyVS	Infralittoral boulders with mixed cobbles, gravel, fine sand and mud, characterised by <i>Laminaria saccharina</i> and foliose algae undergrowth.
102	032.019.001	Infralittoral boulders dominated by <i>Laminaria saccharina</i> .	IR.LIR.KVS.LsacPhyVS	Infralittoral boulder with mixed cobbles, gravel and fine sand, characterised by <i>Laminaria saccharina</i> .
103	032.022.002	Infralittoral coarse sand and gravel with <i>Laminaria saccharina</i> on shells.	IR.LIR.KVS.LsacPhyVS	<i>Laminaria saccharina</i> dense in places. Sparse understorey of foliose red algae – <i>Phyllophora pseudoceranoides</i> , <i>Phycodrys rubens</i> and some <i>Polysiphonia sp.</i> . Occasional large boulders and cobbles with more algae. <i>Electra</i> on <i>L.saccharina</i> fronds. Many large bloated <i>Asterias. Corella</i> and <i>A.scabra</i> on scraggy algae. Patches of <i>Ectocarpaceae indet. mats</i> .
104	032.025.002	Infralittoral bedrock and pebbly gravel with <i>L. saccharina</i>	IR.LIR.KVS.LsacPhyVS	Dense cover of <i>Laminaria saccharina</i> over much of the area with dense understorey of <i>Phyllophora pseudoceranoides</i> both with <i>Electra pilosa</i> . Also lots of <i>Polysiphonia sp.</i> and <i>Asterias juveniles</i> . Kelp stipes often with dense <i>Dynamena</i> just above holdfast.
105	032.027.001	Bedrock in sublittoral fringe with filamentous green algae.	IR.LIR.KVS.LsacPhyVS	Bedrock in sublittoral fringe with a thick blanket cover of filamentous green algae and some <i>Laminaria saccharina</i> plants. Algae covered with spat from <i>Mytilus edulis</i> – larger <i>M.edulis</i> in clearings and underneath. Many <i>Asterias rubens</i> on the green blanket. Patches of blue-green algae and <i>Beggiatoa</i> .
106	032.027.002	Bedrock and boulders with <i>Laminaria saccharina</i> .	IR.LIR.KVS.LsacPhyVS	Silty bedrock and boulders with scattered plants of <i>Laminaria saccharina. Phyllophora spp.</i> on upward facing rock, supporting ascidians – similar to habitat 3. Coralline crusts abundant under the silt.
107	032.027.003	Silty bedrock outcrops and boulders with red algae.	IR.LIR.KVS.LsacPhyVS	<i>Asciidiella aspersa</i> has been given a nominal abundance value of Present for this record as in Arev it had no abundance value. Muddy gravel plain with scattered outcrops of bedrock and boulders and then a bedrock and boulder slope. All very silty but upward facing surfaces supporting fairly dense cover of red algae, mostly <i>Phyllophora spp.</i> , which were covered with ascidians – <i>Corella parallelogramma</i> and <i>Asciidiella aspersa</i> – <i>Gobius niger</i> under boulders. Coralline crusts abundant under the silt. Vertical surfaces of boulders with common dead barnacles.
108	032.028.003	Bedrock with mat of filamentous green algae.	IR.LIR.KVS.LsacPhyVS	Steep and upward facing bedrock covered with thick blanket of filamentous green algae. Many <i>Asterias rubens</i> and mussel spat on and amongst the algae – larger <i>Mytilis edulis</i> underneath and in clearings.
109	032.028.004	Infralittoral silty bedrock with <i>Laminaria saccharina</i> .	IR.LIR.KVS.LsacPhyVS	Steep bedrock with ledges, cobbles and silt on ledges. Scattered scruffy <i>Laminaria saccharina</i> plants with understorey primarily <i>Phyllophora spp.</i> , as in habitat 3. Large numbers of <i>Asterias</i> adults and juveniles, <i>Obelia sp.</i> frequent on kelp fronds.

Table 26 continued

Code	SAMPLE_REF	Habitat	Biotope	Description
110	032.028.005	Lower infralittoral bedrock cliff dominated by ascidians.	IR.LIR.KVS.LsacPhyVS	Very steep and vertical granite bedrock with shell, silty ledges and rare overhangs. Dominated by ascidians. Large <i>Balanus</i> shells present – but all dead.
112	032.031.002	Bedrock and boulder with <i>Phyllophora pseudoceranoides</i> .	IR.LIR.KVS.LsacPhyVS	Mixture of smooth bedrock and boulders, some large, with small areas of silty mud. Upper surfaces with silty <i>Phyllophora pseudoceranoides</i> covered by <i>Corella</i> and <i>A.scabra</i> . Some vertical faces dominated by large <i>Balanus crenatus</i> (?). <i>Dendrodoa</i> common on upper faces, but less common than deeper. Single <i>Arctica</i> found in otherwise barren mud.
113	032.038.003	Silty boulders with <i>Phyllophora pseudoceranoides</i> .	IR.LIR.KVS.LsacPhyVS	Steep slope of heavily silted boulders with <i>Phyllophora pseudoceranoides</i> on upward-facing surfaces but virtually nothing else.
114	032.038.001	Bare granite boulders.	IR.LIR.Lag	Bare granite boulders with nothing growing on them or living amongst them! Water entirely fresh and drinkable.
115	450.017.002	Muddy mixed substrata with <i>Fucus ceranoides</i> and <i>Enteromorpha sp.</i>	IR.LIR.Lag.FcerEnt	Boulders with mixed substrata with mud. <i>F. ceranoides</i> , <i>Cladophora sp</i> and <i>Enteromorpha sp.</i> were common. Associated with the boulders along with <i>Littorina</i> . Occasional <i>Arenicola marina</i> casts were seen in patches of mud. Sea Trout <i>Salmo trutta fario</i> were seen.
116	032.035.001	Infralittoral coarse sand with small boulders/cobbles at 2-8m bsl	IR.LIR.Lag.FchoG	Narrow band of coarse sandy sediment in shallow water with <i>Fucus serratus</i> on small boulders and cobbles. <i>Corella parallelogramma</i> common over fucoid fronds. <i>Asterias</i> common slightly deeper in a narrow band. Freshwater influence near surface very obvious – current flowing out of loch on surface, very cold and poor visibility to 6m BSL. Very low diversity.
117	032.037.001	Steep sloping angular pebbles and boulders affected by freshwater.	IR.LIR.Lag.FchoG	Dead algae in piles and some attached, including kelp stipes, live (?) <i>Fucus serratus</i> and <i>Fucus vesiculosus</i> . Clearly affected by freshwater. Rare <i>Carcinus</i> and <i>Asterias</i> .
118	032.042.001	Sheltered brackish mud at 9-16m	SS.Smu.SmuLS	Sheltered sublittoral mud in brackish conditions, gently sloping. Surface of mud extensively mounded by unidentified polychaete with 'dirty' leathery tube. Other species included <i>Chaetopterus variopedatus</i> , <i>Ophiura albida</i> and <i>Asterias rubens</i> .
119	006.050.004	Bedrock, boulders and sediment.	CR.HCR.Xfa.SwiLgAs	<i>Ascidia</i> , <i>Hydrozoa</i> , <i>Porifera</i> has been removed from the species list for this record as more specific related taxa were also present, these are now marked as characterising. Steep and vertical mixed slope of bedrock and boulders covered in sediment – sediment forming patches between boulders. A fairly thick layer of sediment covered the rock.
120	043.003.001	Vertical bedrock, ledges with some shell gravel.	CR.HCR.Xfa.SwiLgAs	Vertical bedrock from 16 – 27.5 m with some ledges with shell gravel. Rich fauna of ascidians, hydroids and bryozoan turf. Becoming less abundant upwards, with foilose red algae (<i>Delesseria</i> and <i>Plocamium</i>) down to 18.5 m. The lowest kelp plants were at 16 m.
121	048.11/3.001	Vertical cliff with overhangs.	CR.HCR.Xfa.SwiLgAs	<i>Porifera</i> has been removed from the species list for this record as more specific related taxa were also present, these are now marked as characterising. Vertical cliff in strong current. Overhangs present. Dominated by high densities of sponges especially <i>Axinella spp.</i> <i>Pachymastisma johnstonia</i> seen in quantity only at this site of survey. High densities of hydroids, erect Bryozoa and Anthozoa. <i>Alcyonium digitatum</i> present but, unlike similar site in Loch na Keal, <i>Alcyonium glomeratum</i> absent. <i>Caryophyllia smithii</i> , <i>Metridium senile</i> , <i>Urticina line</i> all found. The tunicates <i>Ciona intestinalis</i> and <i>Clavelina lepadiformis</i> cover large areas. <i>Antedon bifida</i> another dominant species. Many nudibranchs.

Table 26 continued

Code	SAMPLE_REF	Habitat	Biotope	Description
122	624.001.005	Circalittoral cliff face with <i>Securiflustra</i> , <i>Antedon</i> and sponges.	CR.HCR.Xfa.SwiLgAs	Circalittoral cliff face with mixed cover of <i>Securiflustra securifrons</i> and dense <i>Antedon bifida</i> , but with good variety of other species, especially sponges, <i>Syonicum pulmonaria</i> colonies particularly large (up to 10 cm across). Recording on a 2 m strip up a transect line – insufficient time to survey thoroughly.
123	624.001.008	Lower circalittoral bedrock with wall and steps with sponges, hydroids and ascidians.	CR.HCR.Xfa.SwiLgAs	Lower circalittoral bedrock face with steps with some surface silt. Faunal turf comprising sponges including <i>Axinella infundibuliformis</i> , <i>Polymastia boletiformis</i> and <i>Suberites carnosus</i> , ascidians, hydroids, <i>Caryophyllia smithii</i> , <i>Neocrania anomala</i> and <i>Securiflustra securifrons</i> .
124	085.007.001	Flat-lying soft mud with some gravel and boulder areas.	LS.LMp.LSgr.Znol	Flat-lying soft mud with some gravel and boulder areas. There appeared to be a patch of <i>Palmate</i> sp. near low water (not investigated due to the softness of the mud). The mud contained numerous <i>A. marina</i> and sparse <i>C. edule</i> , <i>M. balthica</i> and <i>S. plana</i> . There were <i>N. diversicolor</i> amongst the boulders where there was more gravel. The boulders supported <i>A. nodosum</i> and <i>M. edulis</i> . The upper shore had <i>Hydrobia ulvae</i> and the <i>Sacoglossan</i> mollusc <i>Limapontia depressa</i> amongst <i>Vaucheria</i> sp., and the stones at high water sheltered numerous <i>Ligia oceanica</i> rather than gammarids. NOTE: Substratum % data are converted from the original substratum 1-3 scoring system.
125	450.017.001	Muddy fine sand flats with <i>Corophium volutator</i>	SS.SMp.SSgr.Rup	Muddy fine sand flats with <i>Corophium volutator</i> visible on the surface. 6* cores were sieved.
126	005.007.001	Extremely sheltered eulittoral pebbles and muddy fine sand at 3.5 to 0.7 m acd	LR.LLR.FVS.Ascmac	Pebbles with a few cobbles on muddy fine sand with much terrestrial debris covered by <i>Fucus spiralis</i> , <i>Ascophyllum nodosum</i> and <i>Ascophyllum nodosum</i> ecad <i>mackaii</i> , with <i>Littorina littorea</i> , <i>Littorina obtusata</i> , <i>Hydrobia ulvae</i> and amphipods. Patches of sediment clear of algae have <i>Arenicola</i> casts and <i>Branchiomma</i> tubes at lowest shore.
127	005.011.006	<i>Ascophyllum nodosum</i> ecad <i>mackii</i> bed on stoney mud.	LR.LLR.FVS.Ascmac	Dense cover of <i>Ascophyllum nodosum</i> ecad <i>mackaii</i> on stoney sandy mud. Many gammarids and littorinids beneath the algae.
128	006.009.004	<i>Ascophyllum</i> zone on steep bedrock	LR.HLR.FT.AscT	Steep bedrock shore dominated by <i>Ascophyllum nodosum</i> . Frequent <i>Cladophora rupestris</i> and scarce fauna with <i>Balanus balanoides</i> (f) and <i>Mytilus</i> (o).
129	032.003.003	Mid-eulittoral, <i>Ascophyllum</i> dominated shore.	LR.HLR.FT.AscT	Cobbles and boulders with super-abundant <i>Ascophyllum</i> .
130	032.003.004	Underboulder on lower mid-shore and mid-shore.	LR.HLR.FT.AscT	Mid-eulittoral boulder, dominated by <i>Ascophyllum nodosum</i> on upper surfaces. Undersurfaces dominated by spirorbids and clumps of <i>Mytilus edulis</i> with a variety of other mobile and encrusting species, including <i>Littorina saxatilis</i> and <i>Flustrellidra hispida</i> . Dogwhelks and dogwhelk eggs frequent. (Sub-habitat of 032.003.003)
131	032.004.003	<i>Ascophyllum</i> dominated eulittoral boulders.	LR.HLR.FT.AscT	Sloping eulittoral boulders with some stone and shell. Dominated by superabundant <i>Ascophyllum nodosum</i> and abundant <i>Verrucaria mucosa</i> on boulders.
132	032.004.006	Mid eulittoral very steep bedrock dominated by <i>Ascophyllum</i> .	LR.HLR.FT.AscT	Mid eulittoral very steep bedrock. Tide exposed. Dominated by <i>Ascophyllum nodosum</i> with abundant <i>Cladophora</i> sp. and frequent <i>Audouinella</i> sp. covering rock. Common <i>B. balanoides</i> . <i>Fucus serratus</i> frequent near the bottom of habitat and covered in <i>Flustrellidra hispida</i> and <i>Dynamena pumila</i> . <i>Patella</i> sp. occasional. <i>Fucus vesiculosus</i> occasional at the top of habitat.
133	005.027.001	Upper infralittoral tide-swept compacted cobbles with <i>Laminaria digitata</i> .	IR.MIR.KT.LdigT	Upper infralittoral previously dredged narrows with frequent rafted? <i>Laminaria digitata</i> and other small red seaweeds. Evidence of very strong currents.

Table 26 continued

Code	SAMPLE_REF	Habitat	Biotope	Description
134	006.009.006	Sublittoral fringe	IR.MIR.KT.LdigT	This habitat was the sublittoral fringe at the base of a very steep bedrock shore. Shore subject to strong tidal streams (up to 5 knots). Zone dominated by algae – <i>L. digitata</i> ©, <i>Cladophora rupestris</i> (F), <i>Polysiphonia urceolata</i> (F), <i>Palmaria palamata</i> (F). Sparse fauna with <i>Alcyonidium diaphanum</i> (O) and <i>Dynamena pumila</i> (O).
136	006.068.001	Lower infralittoral tide-swept boulders and cobbles.	IR.MIR.KT.XKT	Mixture of large and small boulders, cobbles, pebbles and gravel in tide-swept area. Abundant algal and animal life with <i>Laminaria hyperborea</i> , <i>Delesseria sanguinea</i> , <i>Alcyonium digitatum</i> . Kelp stipes with abundant <i>Sertularia argentea</i> . On patches of pebbles - there were encrusting bryozoans and saddle oysters. <i>Balanus crenatus</i> was common in patches.
137	032.002.001	infralittoral bedrock exposed to very strong tidal streams, dominated by <i>Laminaria hyperborea aro</i>	IR.MIR.KT.XKT	Upward facing surfaces of rugged bedrock with <i>Laminaria hyperborea</i> park (small specimens). Stipes clean or covered by <i>Diphasia rosacea</i> . About 70% cover of encrusting coralline algae. Rest covered by barnacles. Foliose algae abundant. Narrow band below kelp park with kelp sporlings. <i>Sertularia argentea</i> common.
138	032.005.002	Tideswept boulders with <i>Laminaria hyperborea</i> .	IR.MIR.KT.XKT	Foliose red algae has been given a nominal abundance value of Present for this record as in Arev it had no abundance value. Shallow slope of tideswept boulders with forest of short small <i>L.hyperborea</i> . Understorey of foliose red algae and <i>Laminaria sporlings</i> (mostly <i>L.hyperborea</i>). Rocks covered by <i>Balanus crenatus</i> , with many <i>Nucella</i> .
139	005.009.001	Upper infralittoral kelp forest.	IR.MIR.KT.XKTX	Kelp forest of <i>Laminaria saccharina</i> on predominantly pebbles plus small cobbles and empty shells on surface. Various foliose and filamentous red weeds which mainly consisted of young <i>Phycodrys rubens</i> . <i>Mya truncata</i> were scattered between the pebbles and <i>Pagurus bernhardus</i> scampered over them.
140	005.010.004	Sublittoral fringe cobbles, pebbles and coarse sand.	IR.MIR.KT.XKTX	Mixed stones and coarse sand subject to moderate tidal streams. The kelps <i>Laminaria digitata</i> and <i>Laminaria saccharina</i> were frequent. Clumps of <i>Halichondria panicea</i> were present on holdfasts and between stones. Occasional red algae below kelp plants. <i>Mya truncata</i> present in sand.
141	006.008.001	Pebbles and cobbles dominated by <i>Balanus crenatus</i> .	IR.MIR.KT.XKTX	Mixture of pebbles and cobbles covered in <i>Balanus crenatus</i> .
142	006.010.001	Current swept infralittoral boulders and cobbles.	IR.MIR.KT.XKTX	Fairly level bottom of boulders and cobbles, at -6 to -4m, exposed to strong tidal currents. <i>Laminaria hyperborea</i> with very clean fronds abundant, mainly on boulders, which were dragged in the current by the algae. <i>Mytilus</i> and <i>Balanus crenatus</i> , all of which were small, were both very abundant, covering many boulders and cobbles completely. Relatively few other animal species were noted, even beneath stones - no chitons or decapods could be found, possibly due to the (?) low salinity and/or mobile substratum. <i>Sertularia argentea</i> was common.
143	032.005.001	Extensive plain of cobble and pebbles; tide swept; 9-12m bsl	IR.MIR.KT.XKTX	Hydrozoa has been removed from the species list for this record as more specific related taxa were also present, these are now marked as characterising. Pebble dominated plain with some cobbles. Tide swept area of hydroids and foliose red algae. Scattered macrofauna included Echinodermata and Decapoda.
144	006.066.001	Upper infralittoral bedrock with gullies.	IR.MIR.KR.LhypTX.Ft	Steep bedrock slope with gullies and fissure sediment on rock. Zone dominated by <i>Laminaria hyperborea</i> with dense understorey of red algae.

Table 27. Records of PMF species from Marine Recorder, with abundance, location and depth data. CD=chart datum, low=lower boundary, hi=upper boundary. Note that some records will include species where density and habitat do not match the PMF criteria.

SAMPLE_REF	EventName	Species	SACFORN	CD_low	CD_hi	Lat	Long	Date
006.049.001	Benera Bay, Lismore (Lower Loch Linnhe)	<i>Funiculina quadrangularis</i>	O	-25.0	-21.0	56.49072	-5.57785	28/06/1989
006.063.001	S of Achnacroish, Lismore (Lower Loch Linnhe)	<i>Funiculina quadrangularis</i>	R	-36.0	-35.0	56.50908	-5.49194	18/06/1989
006.045.001	Port an Dreadhain, Lismore (Lower Loch Linnhe)	<i>Funiculina quadrangularis</i>	C	-25.0	-22.0	56.50985	-5.53445	28/06/1989
006.036.002	W of Beinn Sgluich (Lower Loch Linnhe)	<i>Funiculina quadrangularis</i>	O	-26.0	-18.0	56.61149	-5.35032	20/06/1989
006.017.001	W of Achadh an Todhair Hill (Upper Loch Linnhe)	<i>Funiculina quadrangularis</i>	F	-18.5	-13.5	56.79818	-5.15951	22/06/1989
006.027.001	NE Cuil Bay (Lower Loch Linnhe)	<i>Funiculina quadrangularis</i>	F	-26.0	-26.0	56.64321	-5.30120	20/06/1989
006.034.002	SW of Camasnacroise, Loch a' Choire (Lower Loch Linnhe)	<i>Funiculina quadrangularis</i>	O	-26.0	-25.0	56.61239	-5.49773	14/06/1988
006.023.001	Cuil-Cheanna Spit (Lower Loch Linnhe)	<i>Funiculina quadrangularis</i>	F	-21.0	-21.0	56.68898	-5.25277	20/06/1989
006.044.003	E of Dubh Sgeir, Lismore (Lower Loch Linnhe)	<i>Funiculina quadrangularis</i>	F	-43.0	-30.0	56.54699	-5.48323	28/06/1989
006.038.003	Pinnacle W of Shuna Island (Lower Loch Linnhe)	<i>Funiculina quadrangularis</i>	F	-47.0	-46.0	56.59154	-5.41368	23/06/1989
032.035.003	Rubha Bharr (Loch Etive)	<i>Pachycerianthus multiplicatus</i>	R			56.50258	-5.13258	20/09/1990
032.029.002	Off Gleann Rudha Alltan. (Loch Etive)	<i>Pachycerianthus multiplicatus</i>	O	-25.2	-19.2	56.45488	-5.18790	18/09/1990
032.038.005	N Ru-inbhir ghuithasan (Loch Etive)	<i>Pachycerianthus multiplicatus</i>	R			56.53324	-5.09282	20/09/1990
006.035.001	S of Kingairloch, Loch a' Choire (Lower Loch Linnhe)	<i>Pachycerianthus multiplicatus</i>	R	-16.0	-15.0	56.61315	-5.50611	14/06/1989
006.045.001	Port an Dreadhain, Lismore (Lower Loch Linnhe)	<i>Pachycerianthus multiplicatus</i>	R	-25.0	-22.0	56.50985	-5.53445	28/06/1989
006.017.001	W of Achadh an Todhair Hill (Upper Loch Linnhe)	<i>Pachycerianthus multiplicatus</i>	F	-18.5	-13.5	56.79818	-5.15951	22/06/1989
006.003.001	N of Duisky (Loch Eil)	<i>Pachycerianthus multiplicatus</i>	O	-24.9	-22.0	56.84646	-5.25285	22/06/1989
006.050.004	W B...gh Clach an Dobhrain, Lismore (Lower Loch Linnhe)	<i>Swiftia pallida</i>	F	-36.0	-17.0	56.47484	-5.57611	28/06/1989
006.050.005	W B...gh Clach an Dobhrain, Lismore (Lower Loch Linnhe)	<i>Swiftia pallida</i>	R	-41.5	-36.0	56.47484	-5.57611	28/06/1989
006.050.004	W B...gh Clach an Dobhrain, Lismore (Lower Loch Linnhe)	<i>Leptometra celtica</i>	O	-36.0	-17.0	56.47484	-5.57611	28/06/1989
006.044.002	E of Dubh Sgeir, Lismore (Lower Loch Linnhe)	<i>Leptometra celtica</i>	R	-30.0	-17.0	56.54699	-5.48323	28/06/1989
006.048.004	Rubha an Ridire, Lynn of Morven (Lower Loch Linnhe)	<i>Leptometra celtica</i>	R	-38.0	-29.0	56.49650	-5.68277	28/06/1989
006.030.003	Skerry N of Sgeirean nan Torran (Lower Loch Linnhe)	<i>Leptometra celtica</i>	R	-31.0	-17.0	56.66148	-5.36948	23/06/1989
006.047.003	SW of Camas Gorm, Lynn of Morvern (Lower Loch Linnhe)	<i>Leptometra celtica</i>	O	-48.0	-22.0	56.51516	-5.62780	28/06/1989
006.050.005	W B...gh Clach an Dobhrain, Lismore (Lower Loch Linnhe)	<i>Leptometra celtica</i>	C	-41.5	-36.0	56.47484	-5.57611	28/06/1989
MRMCS00700000036.02	Thesis - Stern of the wreck	<i>Leptometra celtica</i>	R		-30.6	56.49876	-5.69137	21/08/2004
MRMCS0070000003E3.01	Breda wreck	<i>Leptometra celtica</i>	R	-20.5	-12.3	56.47583	-5.41833	01/11/2008
MRMCS00700000043C.02	East of Rubha an Ridire	<i>Leptometra celtica</i>	F	-17.6	-13.6	56.49929	-5.68017	07/06/2008
MRMCS00700000043C.03	East of Rubha an Ridire	<i>Leptometra celtica</i>	C	-20.2	-17.6	56.49929	-5.68017	07/06/2008
MRMCS00700000043D.03	Rubha an Ridire	<i>Leptometra celtica</i>	F	-16.2	-14.2	56.49947	-5.68016	07/06/2008
MRMCS007000000441.01	Eilean Narrows, Rubha an Ridire	<i>Leptometra celtica</i>	O	-15.9	-13.8	56.50167	-5.67647	07/06/2008
MRMCS007000000443.01	Eilean Narrows, rubha an Ridire	<i>Leptometra celtica</i>	R	-15.1	-15.0	56.50167	-5.69313	07/06/2008
MRMCS007000000447.03	Rhuba an Ridire	<i>Leptometra celtica</i>	R	-24.7	-20.0	56.49714	-5.68834	08/06/2008
MRMCS007000000449.02	Rhuba an Ridire bPoint	<i>Leptometra celtica</i>	P	-21.7	-15.2	56.49714	-5.68834	08/06/2008
MRMCS007000000449.03	Rhuba an Ridire bPoint	<i>Leptometra celtica</i>	P	-23.7	-21.7	56.49714	-5.68834	08/06/2008
006.002.001	NW of South Garvan (Loch Eil)	<i>Glossus humanus</i>	R	-32.0	-25.0	56.85152	-5.30707	22/06/1989
006.018.003	N of Callas na Dallaig (Upper Loch Linnhe)	<i>Glossus humanus</i>	R	-25.0	-13.0	56.77985	-5.16960	22/06/1989

Table 27 continued

SAMPLE_REF	EventName	Species	SACFORN	CD_low	CD_hi	Lat	Long	Date
032.035.002	Rubha Bharr (Loch Etive)	<i>Arctica islandica</i>	F			56.50258	-5.13258	20/09/1990
032.031.002	Rocks W of Ardnellan Point (Loch Etive)	<i>Arctica islandica</i>	R	-14.0	-6.0	56.48056	-5.15026	18/09/1990
032.038.004	N Ru-inbhir ghuithasan (Loch Etive)	<i>Arctica islandica</i>	F			56.53324	-5.09282	20/09/1990
032.024.001	Central Bonawe Narrows (Loch Etive)	<i>Arctica islandica</i>	P	-18.5	-11.5	56.44652	-5.22616	16/09/1990
032.035.003	Rubha Bharr (Loch Etive)	<i>Arctica islandica</i>	O			56.50258	-5.13258	20/09/1990
624.003.002	S side of Pladda Island	<i>Arctica islandica</i>	R	-22.0	-21.0	56.47561	-5.51126	14/05/1995
624.003.006	S side of Pladda Island	<i>Arctica islandica</i>	R	-26.0	-26.0	56.47561	-5.51126	14/05/1995
624.003.003	S side of Pladda Island	<i>Arctica islandica</i>	R	-25.0	-21.0	56.47561	-5.51126	14/05/1995
624.003.001	S side of Pladda Island	<i>Arctica islandica</i>	R	-25.2	-15.1	56.47561	-5.51126	14/05/1995
624.003.007	S side of Pladda Island	<i>Arctica islandica</i>	R	-26.3	-23.0	56.47561	-5.51126	14/05/1995
084.010.001	Clovulin Flat, Loch Linnhe (Loch Linnhe)	<i>Arctica islandica</i>	P			56.71482	-5.25124	28/07/1978
296.003.007	E of Airds Bay (Loch Etive)	<i>Arctica islandica</i>		-7.6	-7.6	56.44059	-5.23620	04/03/1969
296.003.008	E of Airds Bay (Loch Etive)	<i>Arctica islandica</i>		-12.6	-12.6	56.44059	-5.23620	04/03/1969
006.032.003	Caimas na Croise (Lower Loch Linnhe)	<i>Arctica islandica</i>	O	-15.0	-5.0	56.60982	-5.48113	14/06/1989
006.018.002	N of Callas na Dallaig (Upper Loch Linnhe)	<i>Arctica islandica</i>	A	-13.0	-7.0	56.77985	-5.16960	22/06/1989
006.002.001	NW of South Garvan (Loch Eil)	<i>Arctica islandica</i>	R	-32.0	-25.0	56.85152	-5.30707	22/06/1989
005.001.002	Off Onich Pier (Loch Leven)	<i>Arctica islandica</i>	F	-11.5	-6.0	56.70176	-5.21776	23/04/1990
005.032.006	S shore opposite Allt Nathrach Bay (Loch Leven)	<i>Arctica islandica</i>	R	-20.0	-16.0	56.71081	-4.99953	24/04/1990
005.013.002	Rock to E of Eilean Choinneich (Loch Leven)	<i>Arctica islandica</i>	O	-16.0	-14.0	56.68292	-5.14592	22/04/1990
006.046.002	Camas Eigneig, Lynn of Morvern (Lower Loch Linnhe)	<i>Arctica islandica</i>	R	-21.0	-7.0	56.53067	-5.58276	28/06/1989
006.039.001	W of Knap Point, Sound of Shuna (Lower Loch Linnhe)	<i>Arctica islandica</i>	F	-13.0	-6.0	56.58155	-5.38785	20/06/1989
006.029.003	W Eilean Balnagowan (Lower Loch Linnhe)	<i>Arctica islandica</i>	A	-30.0	-14.0	56.64151	-5.34119	20/06/1989
005.021.002	S of Callert House (Loch Leven)	<i>Arctica islandica</i>	F	-23.7	-16.7	56.69263	-5.11733	22/04/1990
006.019.002	Victorious Rock (Upper Loch Linnhe)	<i>Arctica islandica</i>	A	-27.0	-21.0	56.76651	-5.20956	21/06/1989
006.014.001	E of McLean Rock, Fort William (Upper Loch Linnhe)	<i>Arctica islandica</i>	O	-18.0	-16.0	56.83063	-5.11486	21/06/1989
006.007.002	Dorathy Stone (Loch Eil)	<i>Arctica islandica</i>	A	-23.0	-11.0	56.84648	-5.17950	22/06/1989
006.031.001	S of Sgeir nan Gillean (Lower Loch Linnhe)	<i>Arctica islandica</i>	R	-16.0	-15.0	56.63398	-5.41114	23/06/1989
006.013.001	S of New Rock, Fort William (Upper Loch Linnhe)	<i>Arctica islandica</i>	C	-16.0	-11.0	56.82899	-5.12112	21/06/1989
006.036.001	W of Beinn Sgluich (Lower Loch Linnhe)	<i>Arctica islandica</i>	C	-18.0	-8.0	56.61149	-5.35032	20/06/1989
006.036.002	W of Beinn Sgluich (Lower Loch Linnhe)	<i>Arctica islandica</i>	O	-26.0	-18.0	56.61149	-5.35032	20/06/1989
006.028.004	E side Eilean Balnagowan (Lower Loch Linnhe)	<i>Arctica islandica</i>	R	-20.0	-14.0	56.64156	-5.34282	20/06/1989
006.001.003	Kinlocheil (Loch Eil)	<i>Arctica islandica</i>	A	-14.5	-9.5	56.85646	-5.31367	22/06/1989
006.017.001	W of Achadh an Todhair Hill (Upper Loch Linnhe)	<i>Arctica islandica</i>	C	-18.5	-13.5	56.79818	-5.15951	22/06/1989
006.028.002	E side Eilean Balnagowan (Lower Loch Linnhe)	<i>Arctica islandica</i>	R	-9.0	-6.0	56.64156	-5.34282	20/06/1989
005.021.003	S of Callert House (Loch Leven)	<i>Arctica islandica</i>	R	-26.7	-23.7	56.69263	-5.11733	22/04/1990
006.022.001	SE of Sallachan Point (Lower Loch Linnhe)	<i>Arctica islandica</i>	A	-24.0	-21.0	56.69569	-5.27116	23/06/1989
006.003.001	N of Duisky (Loch Eil)	<i>Arctica islandica</i>	F	-24.9	-22.0	56.84646	-5.25285	22/06/1989

Table 27 continued

SAMPLE_REF	EventName	Species	SACFORN	CD_low	CD_hi	Lat	Long	Date
006.018.003	N of Callas na Dallaig (Upper Loch Linnhe)	<i>Arctica islandica</i>	R	-25.0	-13.0	56.77985	-5.16960	22/06/1989
006.001.001	Kinlocheil (Loch Eil)	<i>Arctica islandica</i>	F	-4.5	0.5	56.85646	-5.31367	22/06/1989
005.001.003	Off Onich Pier (Loch Leven)	<i>Arctica islandica</i>	R	-24.5	-19.5	56.70176	-5.21776	23/04/1990
005.001.001	Off Onich Pier (Loch Leven)	<i>Arctica islandica</i>	O	-2.5	-1.9	56.70176	-5.21776	23/04/1990
MRMCS00700000395.01	The slates, Ballahulish, 2	<i>Arctica islandica</i>	C	-13.2	2.3	56.67775	-5.14503	27/07/2008
MRMCS007000003B3.01	Western shore, S of fish farm, upper Loch Linnhe	<i>Arctica islandica</i>	P	-14.3	2.7	56.79194	-5.17144	28/04/2008
MRMCS0070000044A.03	Rhuba an Ridire	<i>Arctica islandica</i>	F	-19.3	-14.3	56.49714	-5.68834	08/06/2008
032.041.002	Ru Doire Sgriodan (Loch Etive)	<i>Anguilla anguilla</i>	F			56.54983	-5.07627	20/09/1990
005.026.006	Camas na h-Eirghe (Loch Leven)	<i>Anguilla anguilla</i>	R	0.7	2.0	56.70278	-5.07078	25/04/1990
450.017.002	Leth-Fhonn, Loch Don (Mull)	<i>Salmo trutta</i>	R			56.42495	-5.69886	13/08/1995
032.018.001	SSE of Airds Point. (Loch Etive)	<i>Gadus morhua</i>	R	-14.0	-9.0	56.44985	-5.25696	21/09/1990
032.010.001	Channel SE of Abbot's Isle. (Loch Etive)	<i>Gadus morhua</i>	R	-9.0	-2.0	56.45488	-5.32119	21/09/1990
005.032.005	S shore opposite Allt Nathrach Bay (Loch Leven)	<i>Gadus morhua</i>	R	-16.0	-8.0	56.71081	-4.99953	24/04/1990
MRMCS007000003A1.01	Maiden Isle, south	<i>Molva molva</i>	R	-14.8	-1.8	56.42916	-5.49158	07/09/2008
032.035.002	Rubha Bharr (Loch Etive)	<i>Pomatoschistus minutus</i>	O			56.50258	-5.13258	20/09/1990
032.035.001	Rubha Bharr (Loch Etive)	<i>Pomatoschistus minutus</i>	R			56.50258	-5.13258	20/09/1990
032.008.001	NW of Abbot's Isle. (Loch Etive)	<i>Pomatoschistus minutus</i>	R			56.45817	-5.32944	17/09/1990
006.061.001	Sgeir Sgoraig, Lismore (Lower Loch Linnhe)	<i>Pomatoschistus minutus</i>	R	-13.0	-11.0	56.47322	-5.55784	18/06/1989
005.001.002	Off Onich Pier (Loch Leven)	<i>Pomatoschistus minutus</i>	R	-11.5	-6.0	56.70176	-5.21776	23/04/1990
006.039.001	W of Knap Point, Sound of Shuna (Lower Loch Linnhe)	<i>Pomatoschistus minutus</i>	R	-13.0	-6.0	56.58155	-5.38785	20/06/1989
006.059.002	SW Rubha Fion-aird, Lynn of Lorn (Lower Loch Linnhe)	<i>Pomatoschistus minutus</i>	R	-13.0	-12.0	56.47900	-5.47780	17/06/1989
006.067.001	Narrows N of Appin Rocks, Lynn of Lorn (Lower Loch Linnhe)	<i>Pomatoschistus minutus</i>	O	-16.0	-14.0	56.55334	-5.42325	18/06/1989
006.058.001	W Camas Nathais, Lynn of Lorn (Lower Loch Linnhe)	<i>Pomatoschistus minutus</i>	O	-9.0	-7.0	56.48317	-5.46613	17/06/1989
005.009.002	SW of Rubha Charnuis (Loch Leven)	<i>Pomatoschistus minutus</i>	R	-10.0	-5.0	56.68683	-5.16912	26/04/1990
006.036.001	W of Beinn Sgluich (Lower Loch Linnhe)	<i>Pomatoschistus minutus</i>	F	-18.0	-8.0	56.61149	-5.35032	20/06/1989
006.018.003	N of Callas na Dallaig (Upper Loch Linnhe)	<i>Pomatoschistus minutus</i>	O	-25.0	-13.0	56.77985	-5.16960	22/06/1989
MRMCS00700000448.02	Rhuba an Ridire bPoint	<i>Pomatoschistus minutus</i>	O	-9.9	-5.5	56.49667	-5.68333	08/06/2008
MRMCS00900000022.01	Rubha nam Moine Bay, Loch Linnhe	<i>Pomatoschistus minutus</i>	R	-6.9	3.1	56.66884	-5.27373	26/08/2004

Table 28. Records of PMF species from Marine Recorder, with habitat and community data. Note that some records will include species where density and habitat do not match the PMF criteria.

SAMPLE_REF	Species	Habitat	Description
006.049.001	<i>Funiculina quadrangularis</i>	Soft mud plain with burrows.	Soft mud plain from 25 - 21m bcd with lots of burrows, (some <i>Nephrops</i> , some unidentified). <i>Sagartiogeton</i> abundant, <i>Pennatula</i> and <i>Funiculina</i> common, and <i>Virgularia</i> occasional. <i>Turritella</i> frequent, <i>Nephrops</i> occasional.
006.063.001	<i>Funiculina quadrangularis</i>	Soft mud with <i>Virgularis</i> and megafaunal burrowers.	Plains of very soft mud with many large megafaunal burrows. <i>Virgularia</i> fairly dense and lots of tiny <i>Pennatula</i> . Couple of <i>Funiculina</i> also present. <i>Nephrops</i> present with many burrows. Single snake blenny seen.
006.045.001	<i>Funiculina quadrangularis</i>	Mud plain with burrows and <i>Funiculina quadrangularis</i>	<i>Amphiura chiajei/filiformis</i> has been given a nominal abundance value of Present for this record as in Arev it had no abundance value. Mud plain with many burrows, including <i>Nephrops norvegicus</i> . <i>Funiculina</i> common, <i>Amphiura</i> spp. abundant. Area with considerable dead kelp and other organis debris - many <i>Asterias rubens</i> . Small clumps of <i>Tubularia indivisa</i> .
006.036.002	<i>Funiculina quadrangularis</i>	Silty mud slope at 18-26m	Soft mud with some holes/burrows and mounds. Not much surface fauna visible. Did see a few <i>Funiculina quadrangularis</i> .
006.017.001	<i>Funiculina quadrangularis</i>	Soft mud <i>Virgularia</i> bed with <i>Funiculina</i> at 14-19m.	Soft mud from 14-19m bcd with lots of burrows (<i>Nephrops</i> and 2cm diameter straight down for 20cm then horizontal for 20cm). <i>Virgularia</i> , <i>Funiculina</i> , <i>Amphiura</i> , <i>Arctica</i> , <i>Ophiura albida</i> , large <i>Pachycerianthus</i> , <i>Turritella</i> , <i>Pennatula</i> (large), <i>Trachythyone</i> . Very rich in species, with quite high densities, over a large area.
006.027.001	<i>Funiculina quadrangularis</i>	"Soft mud with <i>Virgularia mirabilis</i> , <i>Nephrops norvegicus</i> "	Soft mud with many burrows, particularly <i>Nephrops norvegicus</i> . Others not identified. Many very tall <i>Virgularia mirabilis</i> and some <i>Funiculina quadrangularis</i> . <i>Amphiura</i> spp. (not collected) abundant, and <i>Brissopsis lyrifera</i> present.
006.034.002	<i>Funiculina quadrangularis</i>	Deep fine muddy sand at 25m	Plain of muddy fine sand adjoining area of small boulders at 25m bcd, with <i>Funiculina</i> and <i>Pennatula</i> , and changing to area of fairly dense <i>Thyone</i> and <i>Psolus</i> . <i>Beggiatoa</i> present in patches and with <i>Amphiura filiformis</i> and small burrowing anemone (<i>Edwardsia</i>) in sediment. Frequent large vertical holes amongst <i>Funiculina</i> (no indication of what), with numerous polychaete tubes in the sediment. Fairly rich in species.
006.023.001	<i>Funiculina quadrangularis</i>	<i>Funiculina/Virgularia</i> bed on soft mud.	Very soft mud dominated by anthozoans <i>Funiculina</i> and <i>Virgularia</i> . Some <i>Pennatula</i> and <i>Sagartiogeton</i> . There were many <i>Nephrops</i> burrows but only a few animals observed. On the surface there were abundant <i>Turritella</i> with occasional <i>Aporrhais</i> . Within the sediment there was <i>Brissopsis</i> and <i>Amphiura</i> .
006.044.003	<i>Funiculina quadrangularis</i>	Steeply sloping shelly mud at 30-43m	Steeply sloping soft shelly mud from 30 - 43m (rock above 30m) with <i>Funiculina</i> , <i>Virgularia</i> and <i>Pennatula</i> . Occasional tall <i>Tubularia</i> on sediment and boulders.
006.038.003	<i>Funiculina quadrangularis</i>	Mud plain with <i>Funiculina</i> and <i>Amphiura</i> at 46m	Mud plain with <i>Funiculina</i> and <i>Amphiura</i> at 46m
032.035.003	<i>Pachycerianthus multiplicatus</i>	Soft mud with burrows and sea pens at 15-27m bsl	Soft mud slope with burrows of <i>Nephrops norvegicus</i> , possible thalassinid shrimp burrows and <i>Virgularia mirabilis</i> . Empty <i>Arctica</i> shells with ascidians and hydroids. One <i>Pachycerianthus multiplicatus</i> found. Depth range from 15 to 27m BSL. Water much clearer at depth; less fresh.

Table 28 continued

SAMPLE_REF	Species	Habitat	Description
032.029.002	<i>Pachycerianthus multiplicatus</i>	Gently sloping circalittoral mud.	Gently sloping mud plain in the circalittoral with <i>Virgularia mirabilis</i> , <i>Pennatula phosphorea</i> , <i>Pachycerianthus multiplicatus</i> , <i>Ascidia virginea</i> and tubes of <i>Chaetopterus variopedatus</i> . One boulder in the mud had a number of <i>Caryophyllia smithii</i> attached.
032.038.005	<i>Pachycerianthus multiplicatus</i>	Mud slope with burrows and <i>Virgularia mirabilis</i> at 23-30m bsl	Steep slope with some burrows and frequent <i>Virgularia mirabilis</i> . Many <i>Chaetopterus</i> tubes projecting from the sediment as well as other small polychaete tubes. Some <i>Pseudamussium septemradiata</i> . <i>Corella parallelogramma</i> on polychaete tubes. One <i>Pachycerianthus multiplicatus</i> seen.
006.035.001	<i>Pachycerianthus multiplicatus</i>	Fine mud plain with <i>Ampiura</i> sp. at 15-16m	Holothurioidea has been removed from the species list for this record as more specific related taxa were also present, these are now marked as characterising. <i>Amphiura chiajei/filiformis</i> has been given a nominal abundance value of Present for this record. Gently sloping mud plain with <i>Virgularia</i> , <i>Pennatula</i> , <i>Cerianthus</i> and <i>Pachycerianthus</i> (R). Abundant <i>Amphiura</i> sp. <i>Nephrops</i> burrows frequent. <i>Trachythyone elongata</i> frequent.
006.045.001	<i>Pachycerianthus multiplicatus</i>	Mud plain with burrows and <i>Funiculina quadrangularis</i>	<i>Amphiura chiajei/filiformis</i> has been given a nominal abundance value of Present for this record as in Arev it had no abundance value. Mud plain with many burrows, including <i>Nephrops norvegicus</i> . <i>Funiculina</i> common, <i>Amphiura</i> spp. abundant. Area with considerable dead kelp and other organis debris - many <i>Asterias rubens</i> . Small clumps of <i>Tubularia indivisa</i> .
006.017.001	<i>Pachycerianthus multiplicatus</i>	Soft mud <i>Virgularia</i> bed with <i>Funiculina</i> at 14-19m.	Soft mud from 14-19m bcd with lots of burrows (<i>Nephrops</i> and 2cm diameter straight down for 20cm then horizontal for 20cm). <i>Virgularia</i> , <i>Funiculina</i> , <i>Amphiura</i> , <i>Arctica</i> , <i>Ophiura albida</i> , large <i>Pachycerianthus</i> , <i>Turritella</i> , <i>Pennatula</i> (large), <i>Trachythyone</i> . Very rich in species, with quite high densities, over a large area.
006.003.001	<i>Pachycerianthus multiplicatus</i>	Very soft mud <i>Virgularia</i> bed.	Very gently sloping muddy seabed with lots of <i>Ophiura</i> on the surface. <i>Virgularia</i> and <i>Pennatula</i> were dotted about. The mud was reasonably firm and dark grey beneath the surface brown layer. Two <i>Pachycerianthus</i> . <i>Nephrops</i> burrows, and burrows about 2cm. diameter, straight down vertically for about 15-20cm.
006.050.004	<i>Swiftia pallida</i>	"Bedrock, boulders and sediment." "	<i>Ascidia</i> , <i>Hydrozoa</i> , <i>Porifera</i> has been removed from the species list for this record as more specific related taxa were also present, these are now marked as characterising. Steep and vertical mixed slope of bedrock and boulders covered in sediment - sediment forming patches between boulders. A fairly thick layer of sediment covered the rock.
006.050.005	<i>Swiftia pallida</i>	"Mud, shells and boulders at 36-41m" "	<i>Cerianthus lloydii</i> has been given a nominal abundance value of Present for this record as in Arev it had no abundance value. Large pieces of broken shell mixed with sticky mud with scattered cobbles and boulders to which various species, mainly <i>Leptometra celtica</i> , were attached. <i>Amphiura</i> and <i>Cerianthus</i> were common within the sediment.
006.050.004	<i>Leptometra celtica</i>	"Bedrock, boulders and sediment." "	<i>Ascidia</i> , <i>Hydrozoa</i> , <i>Porifera</i> has been removed from the species list for this record as more specific related taxa were also present, these are now marked as characterising. Steep and vertical mixed slope of bedrock and boulders covered in sediment - sediment forming patches between boulders. A fairly thick layer of sediment covered the rock.
006.044.002	<i>Leptometra celtica</i>	Silty steep bedrock with boulders.	Steeply sloping bedrock outcropping from muddy sediment plains, with areas of boulder mostly embedded in sediment. Small outcrop of bedrock at 50m with frequent <i>Mycale lingua</i> . Rocks extremely silty. Most of rock very pitted limestone with <i>Ciona</i> and <i>Ophiopholis</i> in holes. Boulders a mixture of limestone and igneous rocks. <i>Caryophyllia</i> common in deeper water, with abundant <i>Neocrania</i> at most depths. <i>Terebratulina</i> frequent and present in low numbers in shallow water.
006.048.004	<i>Leptometra celtica</i>	<i>Ophiothrix</i> dominated steep bedrock.	Deep bedrock and boulders, dominated by brittlestars - there were small patches of settled sediment but only <i>Ophiura albida</i> was characteristic.

Table 28 continued

SAMPLE_REF	Species	Habitat	Description
006.030.003	<i>Leptometra celtica</i>	Shell gravel & coarse sand on mud dominated by hotothurians.	A steep slope of shell gravel and coarse sand on mud. The community was dominated by the holothurians <i>Thyone</i> and <i>Thyonidium</i> and the ophiurid <i>Amphiura</i> . Occasional <i>Astropecten</i> , <i>Liocarcinus depurator</i> . <i>Cerianthus</i> was common.
006.047.003	<i>Leptometra celtica</i>	Lower circalittoral bedrock and boulders.	Boulders with coarse sediment between on steep slope to -30m. Below 30m (28m BCD) terraced cliff face covered with <i>Ophiothrix</i> and <i>Tubularia</i> and low abundance of other species.
006.050.005	<i>Leptometra celtica</i>	"Mud, shells and boulders at 36-41m"	<i>Cerianthus lloydii</i> has been given a nominal abundance value of Present for this record as in Arev it had no abundance value. Large pieces of broken shell mixed with sticky mud with scattered cobbles and boulders to which various species, mainly <i>Leptometra celtica</i> , were attached. <i>Amphiura</i> and <i>Cerianthus</i> were common within the sediment.
MRMCS00700000036.02	<i>Leptometra celtica</i>	flat mixed ground seabed	Surrounding seabed at the stern, consisting of mixed cobbles, pebbles and gravel with featherstars, occasional hydroids and <i>Epizoanthus couchii</i> . Also some iron wreckage and debris.
MRMCS0070000003E3.01	<i>Leptometra celtica</i>	wreck	Survey on wreckage only. Wreck relatively complete standing more or less upright (on a muddy seabed around about 25m bsl). wreckage rising to about 15m bsl (12.3m bcd) and surveyed to 23.2m bsl (20.52m bcd).seasquirts on wreck and sides, most DMF on deck.noteworthy – lots of seasquirts- none
MRMCS00700000043C.02	<i>Leptometra celtica</i>	gravel	Coarse gravel with occasional cobbles and pebbles. Empty shells present. Sediment on gravel. seaweeds and crinoids on 227longat.brittlestars in areas with sediment.became more coarse and more cobbles and pebbles towards west.
MRMCS00700000043C.03	<i>Leptometra celtica</i>	bedrock reef	Bedrock reef. Stable. Smooth rock with some fissures. TAT and brittle stars becoming more numerous to the south.
MRMCS00700000043D.03	<i>Leptometra celtica</i>	shell sand slope	Gently sloping coarse shell sand with occasional small boulders, cobbles, pebbles and gravel.seaweeds.present,
MRMCS007000000441.01	<i>Leptometra celtica</i>	mixed	Mixed seabed of cobbles, pebbles and gravel dominated by clumps of mixed red seaweeds and patches of SAT & TAT dominated by hydroids, attached to larger stones.with silty sand and gravel mix beneath the surface.burrowing anemones and peacock worm tubes in the gravel.of cobbles, pebbles and gravel varied, some areas had higher proportion of gravel.of mobile species present.
MRMCS007000000443.01	<i>Leptometra celtica</i>	mixed level seabed	Relatively level seabed of mixed pebbles, cobbles, shell gravel, sand and mud with red algae, hydroids and abundant squat lobseters.
MRMCS007000000447.03	<i>Leptometra celtica</i>	muddy coarse sand and shell gravel	Muddy coarse sand and shell gravel with many empty shells on surface and some gravel and pebbles. Colonies and individuals including <i>Nemertesia elongata</i> and <i>N. antennina</i> and <i>Tubularia indivisa</i> attached to shells and pebbles. Flame shells present as individuals in sausages of gravel and shells around mat matrix not surveyed in detail.
MRMCS007000000449.02	<i>Leptometra celtica</i>	coarse shell sand and gravel	Gently sloping bed of coarse shell sand and gravel extensively burrowed by <i>Cerianthus lloydii</i> with occasional <i>Sagartia elegans</i> . The odd cobble and small boulder with plumose anemones.
MRMCS007000000449.03	<i>Leptometra celtica</i>	bedrock	Smooth rounded silted bedrock surveyed
006.002.001	<i>Glossus humanus</i>	Mud	Soft smooth mud with large <i>Cerianthus lloydii</i> , <i>Nephrops norvegicus</i> , <i>Virgularia mirabilis</i> , <i>Pennatula phosphorea</i> and <i>Glossus</i> .
006.018.003	<i>Glossus humanus</i>	Soft burrowed mud with sea pens and amphiuroids at 13 to 25m.	Soft mud extensively burrowed with large <i>Nephrops norvegicus</i> burrows and many other unidentified ones. Tall <i>Virgularia mirabilis</i> and <i>Pennatula phosphorea</i> abundant. Amphiuroids abundant – <i>chiajei</i> and <i>filiformis</i> . <i>Edwardsia claparedii</i> frequent particularly around burrow entrances. Several <i>Trachythyone elongata</i> .

Table 28 continued

SAMPLE_REF	Species	Habitat	Description
032.035.002	<i>Arctica islandica</i>	Sandy mud slope with <i>Arctica islandica</i> at 8-15m	Sandy mud slope from 8 to 15m BSL with many <i>Arctica</i> shells and live <i>Arctica islandica</i> . Shells used as a substrate by ascidians and hydroids.
032.038.004	<i>Arctica islandica</i>	Boulders embedded in mud with <i>Lafoea</i> at 14-23m bsl	Boulders embedded in mud with hydroids, mainly <i>Lafoea dumosa</i> and <i>Dendrodoa</i> . <i>Hyas araneus</i> frequent.
032.024.001	<i>Arctica islandica</i>	"Tide scoured sand, shell debris and cobbles with little life. "	Channel bed of tide-swept coarse sand, cobbles and shell debris, all very barren. Part of area was 100% <i>Modiolus modiolus</i> and <i>Mytilus edulis</i> valves, all very clean and with virtually no epifauna. Only one live <i>M.modiolus</i> found. Other areas of sculpted clean sand with nothing on it. Some life on the cobbles, but this was sporadic – occasional tufts of hydroids and bryozoans.
032.035.003	<i>Arctica islandica</i>	Soft mud with burrows and sea pens at 15-27m bsl	Soft mud slope with burrows of <i>Nephrops norvegicus</i> , possible thalassinid shrimp burrows and <i>Virgularia mirabilis</i> . Empty <i>Arctica</i> shells with ascidians and hydroids. One <i>Pachycerianthus multiplicatus</i> found. Depth range from 15 to 27m BSL. Water much clearer at depth; less fresh.
624.003.002	<i>Arctica islandica</i>	Shelly mud with <i>Nephrops</i> and sea pens at 23 m.	Steep slope of shelly mud with fairly dense <i>Pennatula</i> , tall <i>Virgularia</i> and scattered <i>Nephrops</i> . A few scattered pebbles with <i>Kirkenpaueria</i> .
624.003.006	<i>Arctica islandica</i>	Fine mud with seapens and burrowing megafauna	Fine soft mud at 28 m with the seapens <i>Virgularia mirabilis</i> and <i>Pennatula phosphorea</i> and the anemone <i>Cerianthus lloydii</i> . Occasional Anseropoda placenta and small <i>Munida rugosa</i> with <i>Turitella</i> .
624.003.003	<i>Arctica islandica</i>	Slope of muddy shell gravel with sea pens and <i>Cerianthus lloydii</i> .	Slope of predominantly mud and some shell gravel between 27 m and 24 m BSL. Epifauna comprised sea pens <i>Virgularia mirabilis</i> and <i>Pennatula phosphorea</i> . Infauna visible were <i>Cerianthus lloydii</i> and <i>Chaetopterus variopedatus</i> . <i>Arctica islandica</i> was found burrowing in the sediment.
624.003.001	<i>Arctica islandica</i>	Muddy slope with <i>Cerianthus lloydii</i> and seapens.	Muddy slope with occasional small cobbles and pebbles. Common <i>Pennatula phosphorea</i> and patchy but frequent <i>Virgularia mirabilis</i> . <i>Cerianthus lloydii</i> common. Small amounts of epifauna including hydroids, particularly <i>Nemertesia ramosa</i> .
624.003.007	<i>Arctica islandica</i>	Soft sandy mud with some hard substrata with sea pens and <i>Nephrops norvegicus</i> .	Sandy mud slope with <i>Nephrops</i> burrows (and possibly <i>Calocaris</i> burrows), <i>Pennatula phosphorea</i> and <i>Virgularia mirabilis</i> . <i>Amphiura chiajei</i> common (more in deeper water) and <i>Cerianthus lloydii</i> and <i>Turitella communis</i> common.
084.010.001	<i>Arctica islandica</i>	Eulittoral gravel flat with fucoids.	Eulittoral gravel flat with fucoids. See also site description.
296.003.007	<i>Arctica islandica</i>	296.003.007	
296.003.008	<i>Arctica islandica</i>	296.003.008	
006.032.003	<i>Arctica islandica</i>	Mixed sediment slope with kelp park.	<i>Holothurioidea</i> , <i>Modiolus</i> , <i>Pelecypoda</i> has been removed from the species list for this record as more specific related taxa were also present, these are now marked as characterising. <i>Modiolus</i> has been given a nominal abundance value of Present for this record. Mixed sediment slope, muddy coarse sand, shell and stone gravel with whole shells, pebbles and boulders. Rich infauna with burrowing bivalves and holothurians and scattered <i>Modiolus</i> . <i>Ophiura albida</i> common on sediment. Scattered <i>Laminaria saccharina</i> park on boulders.
006.018.002	<i>Arctica islandica</i>	Firm muddy sand with abundant <i>Arctica</i> & <i>Psolus</i> common	Firm muddy sand with pebbles at surface and <i>Arctica islandica</i> 20 per m squared. <i>Psolus phantapus</i> common and occasional <i>Thyonidium conspicuos</i> . <i>Amphiura</i> only in lower part of habitat.
006.002.001	<i>Arctica islandica</i>	Mud	Soft smooth mud with large <i>Cerianthus lloydii</i> , <i>Nephrops norvegicus</i> , <i>Virgularia mirabilis</i> , <i>Pennatula phosphorea</i> and <i>Glossus</i> .

Table 28 continued

SAMPLE_REF	Species	Habitat	Description
005.001.002	<i>Arctica islandica</i>	Sandy mud at 6 to 11.5 m bcd.	Slope of sandy mud with shells and a few bottles (providing hard substratum for barnacles). Scattered fauna including <i>Arctica islandica</i> , <i>Mya arenaria</i> , and casts of <i>Arenicola marina</i> .
005.032.006	<i>Arctica islandica</i>	Sandy mud plain at 16-20 m bcd with <i>Cerianthus lloydii</i> .	Fairly typical sandy mud plain habitat dominated by <i>Cerianthus lloydii</i> at about 3 per sq. m and <i>Virgularia mirabilis</i> at about 4 per 10 sq. m.
005.013.002	<i>Arctica islandica</i>	Muddy sand with small stones and empty shells.	Muddy sand with shell fragments. <i>Turritella communis</i> apparent on surface with burrowing bivalves beneath.
006.046.002	<i>Arctica islandica</i>	"Sandy mud, pebbles and boulders."	Sandy mud with a subsurface layer of pebbles, and pebbles scattered on the surface along with a few boulders and patches of gravel. Ophiothrix dominated the habitat in the lower part of the zone while <i>Ophiocomina nigra</i> was more abundant above 14m bcd.
006.039.001	<i>Arctica islandica</i>	Plain of fine sand with scattered shells.	<i>Amphiura</i> has been removed from the species list for this record as more specific related taxa were also present, these are now marked as characterising. Extensive plain of very fine sand. Widely scattered whole shells on surface. Single small low lying bedrock reef present. <i>Pterothamnion plumula</i> very common in little tufts. <i>Arctica islandica</i> and <i>Trachythone</i> and <i>Amphiura</i> reasonably frequent. <i>Turritella</i> common with <i>Gibbula magus</i> frequent in shallower water. Bedrock well grazed with <i>Gibbula magus</i> and <i>Psammechinus</i> , and dominated by <i>Pseudolithoderma</i> and coralline crusts.
006.029.003	<i>Arctica islandica</i>	"Coarse sand/gravel and pebbles with <i>Arctica</i> and olothurians, muddy sand beneath surface."	A moderate slope of coarse sand/gravel and mud covered with small cobbles and pebbles, fewer in lower part. Communities dominated by <i>Arctica</i> and holothurians <i>Thyone</i> and <i>Thyonidium</i> . Some <i>Amphiura</i> and <i>Virgularia</i> at bottom of zone.
005.021.002	<i>Arctica islandica</i>	Fine muddy sand with <i>Arctica</i> at 17-24m	Gentle slope of fine sandy mud with frequent <i>Arctica</i> and <i>Turritella</i> common on surface. No <i>Amphiura</i> found in sediment. Two small boulders embedded in sediment with <i>Neocrania</i> , <i>Pomatoceros</i> and <i>Ophiothrix</i> .
006.019.002	<i>Arctica islandica</i>	Mud at 21-27m	<i>Amphiura chiajei/filiformis</i> has been given a nominal abundance value of Present for this record as in Arev it had no abundance value. Quite firm mud with <i>Pennatula</i> and <i>Virgularia</i> . <i>Munida rugosa</i> occupied most of the burrows; other spp. were present (<i>Lesueurigobius</i>) and there were occasional worm casts. <i>Amphiura arms</i> and <i>Arctica islandica</i> were very dense.
006.014.001	<i>Arctica islandica</i>	Pebbles over sandy mud.	Muddy sand with a surface layer of pebbles. <i>Cerianthus lloydii</i> dominated the area, <i>Psolus phantapus</i> and <i>Ophiura albida</i> and <i>Thyone fusus</i> were frequent.
006.007.002	<i>Arctica islandica</i>	Shelly mud with <i>Arctica</i> and terebellids at 11-23m	Shelly mud above and below bedrock outcrop – upper area of mud from -11 to -16m, lower section from -21 to -23m. <i>Arctica</i> very abundant in both patches, terebellids common, <i>Molliolus</i> occasional in habitat as a whole, but more frequent in upper area. <i>Cerianthus</i> common throughout. Small patch of mud with few dead shells in lower area, with five or six <i>Nephrops</i> burrows, not all of which appeared currently occupied.
006.031.001	<i>Arctica islandica</i>	Sandy mud over pebbles at 15-16m	<i>Amphiura</i> has been removed from the species list for this record as more specific related taxa were also present, these are now marked as characterising. Sandy mud overlying pebbles with scattered pebbles, cobbles and small boulders on the surface. Many burrows and a few mounds. Habitat dominated by <i>Ophiothrix fragilis</i> .
006.013.001	<i>Arctica islandica</i>	Plain of firm fine sandy mud at 11-16m	Extensive plain of fairly firm fine sandy mud. <i>Cerianthus</i> abundant and <i>Arctica</i> more abundant in patches common (2-3 per 10m squared). Lots of Ectocarpoid algae laying on surface in patches, and many accumulations of dead and drifting algae. Fauna not rich. <i>Virgularia</i> tiny (½ – 1' tall), <i>Cerianthus</i> all small and <i>Arctica</i> smaller than in outer Loch Linnhe.

Table 28 continued

SAMPLE_REF	Species	Habitat	Description
006.036.001	<i>Arctica islandica</i>	Sandy slope with shells and stones at 8-18m	Substratum fairly uniform – No species were particularly abundant except <i>Arctica</i> . Various hydroids were attached to shells and small stones. There was a distinct zone of filamentous red/green algae between 8 and 14 m bcd, growing on shells, small stones and pebbles.
006.036.002	<i>Arctica islandica</i>	Silty mud slope at 18-26m	Soft mud with some holes/burrows and mounds. Not much surface fauna visible. Did see a few <i>Funiculina quadrangularis</i> .
006.028.004	<i>Arctica islandica</i>	Small cobbles on fine sandy mud with holothurians.	Plain of fine sandy mud with many very small cobbles on surface. Cobbles heavily grazed and nearly devoid of any life. <i>Echinus</i> and <i>Asterias</i> both common. Sediment much richer with wide range of holothurians, <i>Arctica</i> and <i>Amphiura</i> .
006.001.003	<i>Arctica islandica</i>	Soft mud with <i>Arctica</i> and <i>Amphiura</i> at 9-14m	A gradual, very soft, mud slope. Community dominated by <i>Arctica</i> and <i>Amphiura</i> . <i>Asterias</i> and <i>Pagurus bernhardus</i> with <i>Hydractinia</i> were common. Occasional <i>Buccinum</i> and <i>Aporrhais</i> .
006.017.001	<i>Arctica islandica</i>	Soft mud <i>Virgularia</i> bed with <i>Funiculina</i> at 14-19m.	Soft mud from 14-19m bcd with lots of burrows (<i>Nephrops</i> and 2cm diameter straight down for 20cm then horizontal for 20cm). <i>Virgularia</i> , <i>Funiculina</i> , <i>Amphiura</i> , <i>Arctica</i> , <i>Ophiura albida</i> , large <i>Pachycerianthus</i> , <i>Turritella</i> , <i>Pennatula</i> (large), <i>Trachythyone</i> . Very rich in species, with quite high densities, over a large area.
006.028.002	<i>Arctica islandica</i>	Lower infralittoral cobbles and pebbles on sand at 6-9m	Gradually sloping sand with large numbers of cobbles and pebbles in lower infralittoral, -6 to -9m. Habitat visually dominated by brown algae, particularly <i>Desmarestia viridis</i> , but also tufts of colonial diatoms and <i>Eudesme</i> agg. Few red algae except <i>Phycodrys</i> . <i>Echinus</i> were abundant, and <i>Asterias</i> common.
005.021.003	<i>Arctica islandica</i>	Soft mud with seapens and megafaunal burrows.	Plain of soft mud with frequent <i>Pennatula</i> , fewer <i>Virgularia</i> and burrows of <i>Nephrops</i> and <i>Callocaris</i> – No <i>Amphiura</i> seen. <i>Turritella</i> common on surface.
006.022.001	<i>Arctica islandica</i>	Medium fine sand with <i>Arctica islandica</i> at 21-24m	Medium fine sand with <i>Arctica islandica</i> at 21-24m.
006.003.001	<i>Arctica islandica</i>	Very soft mud <i>Virgularia</i> bed.	Very gently sloping muddy seabed with lots of <i>Ophiura</i> on the surface. <i>Virgularia</i> and <i>Pennatula</i> were dotted about. The mud was reasonably firm and dark grey beneath the surface brown layer. Two <i>Pachycerianthus</i> . <i>Nephrops</i> burrows, and burrows about 2cm. diameter, straight down vertically for about 15-20cm.
006.018.003	<i>Arctica islandica</i>	Soft burrowed mud with sea pens and amphiuroids at 13 to 25m.	Soft mud extensively burrowed with large <i>Nephrops norvegicus</i> burrows and many other unidentified ones. Tall <i>Virgularia mirabilis</i> and <i>Pennatula phosphorea</i> abundant. <i>Amphiurids</i> abundant – <i>chiajei</i> and <i>filiformis</i> . <i>Edwardsia claparedii</i> frequent particularly around burrow entrances. Several <i>Trachythyone elongata</i> .
006.037.008	<i>Arctica islandica</i>	Muddy sand and shell gravel with occasional pebbles at 18-23m	<i>Amphiura</i> , Hydrozoa has been removed from the species list for this record as more specific related taxa were also present, these are now marked as characterising. 30 degrees slope of muddy sand and broken shells (gravel) with occasional pebbles on the surface. Many <i>Turritella</i> shells on surface.
006.001.001	<i>Arctica islandica</i>	Mud with occasional stones with <i>L. saccharina</i> at 0-5m	Shallow mud with subsurface clay with occasional stones. <i>L. saccharina</i> attached to stones. Fronds had <i>Membranipora</i> , <i>Dendrodia</i> and <i>Balanus crenatus</i> . Abundant <i>Chorda filum</i> . <i>Terebellidae</i> indet. Common in mud, <i>Arctica islandica</i> frequent.
005.001.003	<i>Arctica islandica</i>	"Soft sandy mud plain, dominated by <i>Turritella</i> at 19-24m "	Flat plain of soft sandy mud. <i>Turritella</i> were present in some abundance. Other species present were typical of muddy places everywhere, including <i>Virgularia mirabilis</i> , <i>Aporrhais pespelecani</i> and <i>Amphiura</i> spp. Lots of burrows which looked like <i>Nephrops</i> burrows, but only <i>Munida</i> found in them. Also, vertical finger-sized burrows c 6/m ² .

Table 28 continued

SAMPLE_REF	Species	Habitat	Description
005.001.001	<i>Arctica islandica</i>	Rippled fine sand at 2-2.5 m bcd	<i>Eteone flava</i> has been given a nominal abundance value of Present for this record as in Arev it had no abundance value. Plain of rippled fine sand at 2-2.5 m bcd with large numbers of (recently?) dead <i>Arctica</i> and <i>Ensis</i> shells protruding from the sediment. Very sparse epibiota.
MRMCS00700000395.01	<i>Arctica islandica</i>	sand gravel with slate	The profile between the promontories was a steep slope with mermaids tresses and sea beech from the surface to about 10m bsl, then slate fragments on the steep slope down to about 15m bsl. Fairly level fine sand with mud and shell fragments continued until a steep slope covered in slate fragments to the surface on the east promontory. Seabed: predominantly sand/gravel, and other. (slate) noteworthy – sparse life on slate. Flame shells. 2 separate pairs of black gobies seen mating.- two spits of land created from slate waste. Slate quarry nearby. This area used for loading seagoing vessels. Also, bottles and china fragments.
MRMCS007000003B3.01	<i>Arctica islandica</i>	boulders and sediment	Survey between 0-17m bsl (to 14.3m bcd) on seabed of boulders, and also sand/gravel. Survey from shore starting on very tall kelp with no much life between them to about 5m bsl. at (or to?) 8m bsl (5.3m bcd) then sand and gravel with lots of life to 17m bsl (14.3m bcd). Noteworthy – nothing reported. litter – not much.
MRMCS0070000044A.03	<i>Arctica islandica</i>	coarse muddy sediments	Coarse muddy sediments with scattered pebbles and many dead shells. Abundant <i>Cerianthus</i> and a wide variety of other animals. <i>Arctica</i> seen just at the surface (algae growing on exposed bit) and obviously a rich bivalve fauna buried below. Several <i>Virgularia</i> . 1 clump of <i>securiflustra</i> , several species of nudibranch among the animals of interest. Pebbles with hydroids, barnacles, <i>Pomatoceros</i> .
032.041.002	<i>Anguilla anguilla</i>	Boulder shore dominated by <i>Fucus ceranoides</i> .	Abundant <i>Fucus ceranoides</i> with occasional <i>F. vesiculosus</i> on lower shore. Frequent gammarid amphipods under boulders, and numerous young eels.
005.026.006	<i>Anguilla anguilla</i>	Lower eulittoral fucoids on boulders on stoney shore.	Scattered boulders on a stoney beach of cobbles and pebbles. Fucoids attached to larger stones (<i>Fucus serratus</i> 20% cover, <i>Fucus vesiculosus</i> 30% and <i>Ascophyllum</i> 15%), with <i>Mastocarpus</i> common on some boulders. Large <i>Mytilus</i> common in patches and an impoverished fauna and flora.
450.017.002	<i>Salmo trutta</i>	Muddy mixed substrata with <i>Fucus ceranoides</i> and <i>Enteromorpha</i> sp.	Boulders with mixed substrata with mud. <i>F. ceranoides</i> , <i>Cladophora</i> sp. and <i>Enteromorpha</i> sp. were common. Associated with the boulders along with <i>Littorina</i> . Occasional <i>Arenicola marina</i> casts were seen in patches of mud. Sea Trout <i>Salmo trutta</i> fario were seen.
032.018.001	<i>Gadus morhua</i>	Pebbles with occasional boulders.	Pebbles with sea-squirts <i>Corella parallelogramma</i> and <i>Asciidiella scabra</i> . Occasional boulder with growth of <i>Eucretea loricata</i> .
032.010.001	<i>Gadus morhua</i>	Boulder and cobble slope with ascidians and algae.	Steep slope with bedrock near the surface, then boulders and cobbles. Some scattered <i>Laminaria saccharina</i> to 5m, but generally dense cover of red algae and ascidians, <i>Corella parallelogramma</i> and <i>Asciidiella scabra</i> .
005.032.005	<i>Gadus morhua</i>	Mud and boulder slope with shells from 8-16 m bcd	Steep sediment slope with small boulders from 8-16 m bcd. Boulders covered with encrusting organisms, mainly <i>Pododesmus patelliformis</i> , <i>Neocrania anomala</i> , and <i>Dendrodoa grossularia</i> . <i>Modiolus modiolus</i> was present on the sediment.
MRMCS007000003A1.01	<i>Molva molva</i>	boulders by rock and sand slope	Survey between about 4-17m bsl (about 2-15m bcd) on seabed of predominantly boulders with rocky reef and sand/gravel. Cliff with cracks and sand covered with boulders on gentler slopes. Kelp at about 4m bsl and base of south/west facing cliff at about 17m bsl. noteworthy – flocculated algae/plankton in water column- none
032.035.002	<i>Pomatoschistus minutus</i>	Sandy mud slope with <i>Arctica islandica</i> at 8-15m	Sandy mud slope from 8 to 15m BSL with many <i>Arctica</i> shells and live <i>Arctica islandica</i> . Shells used as a substrate by ascidians and hydroids.

Table 28 continued

SAMPLE_REF	Species	Habitat	Description
032.035.001	<i>Pomatoschistus minutus</i>	Infralittoral coarse sand with small boulders/cobbles at 2-8m bsl	Narrow band of coarse sandy sediment in shallow water with <i>Fucus serratus</i> on small boulders and cobbles. <i>Corella parallelogramma</i> common over furoid fronds. <i>Asterias</i> common slightly deeper in a narrow band. Freshwater influence near surface very obvious – current flowing out of loch on surface, very cold and poor visibility to 6m BSL. Very low diversity.
032.008.001	<i>Pomatoschistus minutus</i>	Muddy sand and shell debris with <i>Lanice conchilega</i> at 27m bsl	Plain of muddy sand with some shell gravel and dead shells (mostly <i>Arctica islandica</i>). Slight tidal current across the site. <i>Lanice conchilega</i> frequent and some hydroids and <i>Cliona celata</i> attached to shell debris. Many small tubes in the sand but no sign of <i>Amphiura</i> spp.
006.061.001	<i>Pomatoschistus minutus</i>	Boulders and pebbles on muddy gravel.	Filamentous red algae, Foliose red algae has been given a nominal abundance value of Present for this record as in Arev it had no abundance value. Gentle slope of scattered boulders on muddy gravel with pebble patches. Siphons (presumed to be <i>Mya elongata</i> – several dead shells etc on surface) occurred in groups around the edges of boulders.
005.001.002	<i>Pomatoschistus minutus</i>	Sandy mud at 6 to 11.5 m bcd.	Slope of sandy mud with shells and a few bottles (providing hard substratum for barnacles). Scattered fauna including <i>Arctica islandica</i> , <i>Mya elongata</i> , and casts of <i>Arenicola marina</i> .
006.039.001	<i>Pomatoschistus minutus</i>	Plain of fine sand with scattered shells.	<i>Amphiura</i> has been removed from the species list for this record as more specific related taxa were also present, these are now marked as characterising. Extensive plain of very fine sand. Widely scattered whole shells on surface. Single small low lying bedrock reef present. <i>Pterothamnion plumula</i> very common in little tufts. <i>Arctica islandica</i> and <i>Trachythone</i> and <i>Amphiura</i> reasonably frequent. <i>Turritella</i> common with <i>Gibbula magus</i> frequent in shallower water. Bedrock well grazed with <i>Gibbula magus</i> and <i>Psammechinus</i> , and dominated by <i>Pseudolithoderma</i> and coralline crusts.
006.059.002	<i>Pomatoschistus minutus</i>	Muddy shell gravel at 12-13m with <i>Ophiocomina nigra</i> and <i>Ophiothrix fragilis</i> .	Shell gravel on poorly sorted sand and mud with occasional cobbles and boulders. Brittlestar bed with large <i>Alcyonium digitatum</i> on boulders. Red algae and hydroids on hard substrata.
006.067.001	<i>Pomatoschistus minutus</i>	Abundant <i>Modiolus modiolus</i> with dense hydroid cover.	Tideswept channel with dense bed of <i>Modiolus modiolus</i> , 100% cover apart from occasional cobbles and boulders. <i>Modiolus</i> covered with dense hydroids, particularly <i>Rhizocaulus verticillatus</i> , <i>Halecium halecinum</i> and <i>Halecium muricatum</i> . Several very large <i>Asterias rubens</i> .
006.058.001	<i>Pomatoschistus minutus</i>	Plain of tiny pebbles on muddy gravel with algal cover.	Plain of tiny pebbles and gravel on a muddy gravel bed. Rare small cobbles or boulders. 80 – 90% cover of algae with <i>L. saccharina</i> (F) and <i>L. hyperborea</i> (O) and masses of foliose reds and browns. Small bare patches of sediment (1 – 2 m squared) with <i>Amphitrite</i> sp. in deeper water and <i>Mya elongata</i> and <i>Ensis arcuatus</i> and <i>Lanice</i> in shallower water. Epifauna rather sparse, but algae rich.
005.009.002	<i>Pomatoschistus minutus</i>	Kelp park on pebbles in lower infralittoral.	A mosaic of substratum types with patches of small pebbles, patches of larger pebbles and small areas of sand/shell gravel. <i>Mya elongata</i> was found throughout the area, while kelp plants were only occasionally observed forming the kelp park. Tiny weeds were attached to pebbles and the siphons of <i>Mya</i> . A variety of species were recorded but none in great abundance.
006.036.001	<i>Pomatoschistus minutus</i>	Sandy slope with shells and stones at 8-18m	Substratum fairly uniform – No species were particularly abundant except <i>Arctica</i> . Various hydroids were attached to shells and small stones. There was a distinct zone of filamentous red/green algae between 8 and 14 m bcd, growing on shells, small stones and pebbles.
006.018.003	<i>Pomatoschistus minutus</i>	Soft burrowed mud with sea pens and amphiuroids at 13 to 25m.	Soft mud extensively burrowed with large <i>Nephrops norvegicus</i> burrows and many other unidentified ones. Tall <i>Virgularia mirabilis</i> and <i>Pennatula phosphorea</i> abundant. Amphiuroids abundant – <i>chiajei</i> and <i>filiformis</i> . <i>Edwardsia claparedii</i> frequent particularly around burrow entrances. Several <i>Trachythone elongata</i> .
MRMCS00700000448.02	<i>Pomatoschistus minutus</i>	gravel	Gravel with <i>Cerianthus</i>

Table 28 continued

SAMPLE_REF	Species	Habitat	Description
MRMCS00900000022.01	<i>Pomatoschistus minutus</i>	Mixed ground, cobbles / pebbles, sand and gravel. Mixed seaweeds, sediment with life.	Gradual slope over mixed ground with boulders and sand / gravel. Slope begins in shallow water and continues past 10m bsl (6.88m bcd), a distance of approximately 175m. At the beginning of the slope the seabed is cobbles and sand / shell with patches of <i>Chorda filum</i> for a distance of 50m and to a depth of 2m bsl (1.12m acd). There are then boulders with wracks and pink encrusting algae for 20m, to a depth of 3m bsl (0.12m acd). The seabed for the next 50m along the slope, to a depth of 6m bsl (2.88m bcd), is pebbles with a dense covering of <i>Laminaria saccharina</i> . The final seabed type is sand / pebbles with occasional boulders with <i>Laminaria saccharina</i> attached.as "a typical gentle sea loch slope".

Table 29. Records of species from the PMF database (v8), not included in Marine Recorder.

Species	Date	SACFORN	SpCount	NumPerSqm	Latitude	Longitude	SurveyKey	Sample_ref	Surv_Name	Event_Name	Determiner
<i>Funiculina quadrangularis</i>	01/08/1980	P			56.63473	-5.33928	MRMLN01200000002	MRMLN0120000023E.01	Marine Conservation Society Observation Scheme Records 1976 - 1990	Eillean Balnagowan	George Brown
<i>Funiculina quadrangularis</i>	18/09/1996	O	1	0.007	56.61100	-5.48600	SNHFEATURES0000055	Not applicable	Sea pen and fireworks anemone records from FRS surveys	SM96306	FRS, FRV Clupea
<i>Funiculina quadrangularis</i>	18/09/1996	P			56.52400	-5.58200	MPALAYERS000277	Unknown	Fisheries Research Services marine Laboratory Seapen distribution	SM96304	FRS surveyors
<i>Funiculina quadrangularis</i>	18/09/1996	P			56.51000	-5.57200	MPALAYERS000277	Unknown	Fisheries Research Services marine Laboratory Seapen distribution	SM96300	FRS surveyors
<i>Pachycerianthus multiplicatus</i>	18/09/1996	F	5	0.038	56.58100	-5.46700	SNHFEATURES0000055	Not applicable	Sea pen and fireworks anemone records from FRS surveys	SM96307	FRS, FRV Clupea
<i>Pachycerianthus multiplicatus</i>	18/09/1996	F	5	0.039	56.54000	-5.51300	SNHFEATURES0000055	Not applicable	Sea pen and fireworks anemone records from FRS surveys	SM96305	FRS, FRV Clupea
<i>Palinurus elephas</i>	01/01/1972	P			56.41653	-5.64938	MRMLN0010000012A	MRMLN00100000C8D.01	1972-1975 Scotland spiny lobster <i>Palinurus elephas</i> surveys	Off Loch Don	A.D Ansell
<i>Palinurus elephas</i>	01/01/1972	P			56.44366	-5.64386	MRMLN0010000012A	MRMLN00100000C8E.01	1972-1975 Scotland spiny lobster <i>Palinurus elephas</i> surveys	Duart Castle	A.D Ansell
<i>Palinurus elephas</i>	01/01/1972	P			56.45697	-5.65001	MRMLN0010000012A	MRMLN00100000C8F.01	1972-1975 Scotland spiny lobster <i>Palinurus elephas</i> surveys	Duart Point	A.D Ansell
<i>Palinurus elephas</i>	01/01/1972	P			56.46103	-5.60331	MRMLN0010000012A	MRMLN00100000C90.01	1972-1975 Scotland spiny lobster <i>Palinurus elephas</i> surveys	Rubha Fiart	A.D Ansell
<i>Palinurus elephas</i>	01/01/1972	P			56.49965	-5.69638	MRMLN0010000012A	MRMLN00100000C91.01	1972-1975 Scotland spiny lobster <i>Palinurus elephas</i> surveys	Inninmore Bay	A.D Ansell
<i>Pomatoschistus minutus</i>	09/05/2009	R			56.44701	-5.22950	MRMCS0070000009C	MRMCS0070000054E.01	2009 Seasearch Loch Etive	Bonawe North Ferry Slip	Trevor Davies

Table 30. Records of PMFs neither in Marine Recorder nor the PMF database.

Survey	Site ID	Date	PMF	Site	Lat	Long	Recorder	Comments
Seasearch	SC10/044	22-Aug-10	<i>Swiftia pallida</i>	North of Tom na Faire 3, SW Lismore, Loch Linnhe, Argyll	56.47145	-5.58383	Barbara Bellerby	Silty. <i>Swiftia pallida</i>
Seasearch	SC10/045	22-Aug-10	<i>Leptometra celtica</i>	North of Tom Na Faire 5, SW Lismore, Loch Linnhe, west Scotland	56.47280	-5.58167	Fraser Kirkpatrick and Kim Pratt	Curled octopus. <i>Leptometra</i>
Seasearch	SC10/047	22-Aug-10	<i>Swiftia pallida</i>	W Bernara 4, W Lismore, Loch Linnhe, west Scotland	56.49438	-5.58767	Fraser Kirkpatrick and Kim Pratt	<i>Swiftia pallida</i>
Seasearch	SC10/048	22-Aug-10	<i>Swiftia pallida</i>	W Bernara 5, W Lismore, Loch Linnhe, W Scotland	56.49525	-5.58700	Joanne Beaton	At bout 15m to 30m there were a lot of small fish about 15cm long swimming in quite large shoals. <i>Swiftia</i> also recorded
Seasearch	SC10/049	22-Aug-10	<i>Leptometra celtica</i>	W Bernara 3, W Lismore, Loch Linnhe, west Scotland	56.49375	-5.58867	Ruth Sharratt	Kelp covered in <i>Dendronotus frondosus</i> . <i>Leptometra</i> present
Seasearch	SC10/053	23-Aug-10	<i>Limaria bed</i>	East Eilean nan Caorach 1, Appin narrows, north Lismore, Loch Linnhe, west Scotland	56.56402	-5.41317	Calum Duncan, Roy Restell	Flame shell bed
Seasearch	SC10/064	22-Aug-10	<i>Leptometra celtica</i>	North of Tom na Faire 1, SW Lismore, Loch Linnhe, west Scotland	56.47058	-5.58550	Ruth Sharratt	Celtic featherstars
Seasearch	SC10/065	22-Aug-10	<i>Leptometra celtica</i>	North of Tom na Faire 2, SW Lismore, Loch Linnhe, west Scotland	56.47107	-5.59100	Mary Restell	<i>Leptometra celtica</i>
Seasearch	SC10/066	22-Aug-10	<i>Swiftia pallida</i>	North of Tom na Faire 4, SW Lismore, Loch Linnhe, west Scotland	56.47215	-5.58250	Michael Bramham	Profuse sponges and northern sea fans.
Seasearch	SC10/067	22-Aug-10	<i>Leptometra celtica</i>	North of Tom na Faire 6, SW Lismore, Loch Linnhe, west Scotland	56.47355	-5.58033	Calum Duncan	<i>Leptometra celtica</i> , <i>Funiculina quadrangularis</i> (a single specimen on wall!) and <i>Swiftia pallida</i>
Seasearch	SC10/067	22-Aug-10	<i>Swiftia pallida</i>	North of Tom na Faire 6, SW Lismore, Loch Linnhe, west Scotland	56.47355	-5.58033	Calum Duncan	<i>Leptometra celtica</i> , <i>Funiculina quadrangularis</i> (a single specimen on wall!) and <i>Swiftia pallida</i>
Seasearch	SC10/067	22-Aug-10	<i>Funiculina quadrangularis</i>	North of Tom na Faire 6, SW Lismore, Loch Linnhe, west Scotland	56.47355	-5.58033	Calum Duncan	<i>Leptometra celtica</i> , <i>Funiculina quadrangularis</i> (a single specimen on wall!) and <i>Swiftia pallida</i>
Seasearch	SC10/068	22-Aug-10	<i>Leptometra celtica</i>	W Bernara 1, SW Lismore, Loch Linnhe, west Scotland	56.49282	-5.59100	Mary Restell	<i>Leptometra celtica</i>
Seasearch	SC10/069	22-Aug-10	<i>Swiftia pallida</i>	W Bernara 6, SW Lismore, Loch Linnhe, west Scotland	56.49578	-5.58567	Calum Duncan	<i>Swiftia pallida</i> and rich sponge/hyroid communities
Trigg et al., 2011	PA1	17-Jun-06	<i>Limaria bed</i>	Port Appin	56.56323	-5.41365	Colin Trigg	Seabed with 100% cover of <i>Limaria</i> nest material. Depth 9.1 m.
Trigg & Moore, 2009	PA2	14-Sep-06	<i>Limaria bed</i>	Port Appin	56.56408	-5.41362	Colin Trigg	Seabed with almost 100% cover of <i>Limaria</i> nest material. Depth 8.0 m

Table 30 continued

Survey	Site_ID	Date	PMF	Site	Lat	Long	Recorder	Comments
Edwards & Moore	LI	28-Feb-04 - 23-Jan-05	<i>Funiculina</i> <i>quadrangularis</i>	Port na Moralachd, NW Lismore	56.54933	-5.47585	Dan Edwards	Common at 18.9-24.3 m depth

APPENDIX 9. OVERVIEW OF GIS PRODUCT

The project was compiled using ArcGIS Map 10.0 and OSGB36 projection. Coordinates were recorded in WGS84 and converted, on the fly, for display purposes only to British National Grid using the WGS84 to OSGB36 Petroleum transformation. ESRI Shape files remain in the original WGS84 geographic projection.

The files are stored on DVD in the following structure:

Table 31. Project, shape and symbology files.

File	Content
SNH 9-3.MXD	ArcGIS Map file (saved as v9.3 from v10)
Biotopes.dbf Biotopes.lyr Biotopes.prj Biotopes.sbn Biotopes.sbx Biotopes.shp Biotopes.shp.xml Biotopes.shx	Biotopes: ESRI Shape file - point (including lyr file) (ESRI shape files are composed of shp, sbx, shx, sbn, dbf, prj and lyr files)
SHip_tracks.dbf SHip_tracks.lyr SHip_tracks.prj SHip_tracks.sbn SHip_tracks.sbx SHip_tracks.shp SHip_tracks.shx	Ships tracks: ESRI Shape file - point (including lyr file)
Grabs.dbf Grabs.lyr Grabs.prj Grabs.sbn Grabs.sbx Grabs.shp Grabs.shx	Grabs: ESRI Shape file - point (including lyr file)
Multigrab.dbf Multigrab.lyr Multigrab.prj Multigrab.sbn Multigrab.sbx Multigrab.shp Multigrab.shx	Multigrab: ESRI Shape file - point (including lyr file)
ROVs.dbf ROVs.lyr ROVs.prj ROVs.sbn ROVs.sbx ROVs.shp ROVs.shx	ROVs: ESRI Shape file - point (including lyr file)
OS_Outline.dbf OS_Outline.prj OS_Outline.sbn OS_Outline.sbx OS_Outline.shp OS_Outline.shx	Coast: OS coast outline

APPENDIX 10. SURVEY LOG

Outline of daily activities during the field survey of the survey area (3rd August - 26^{1st} August 2011) – Extract from Broadscale Validation Survey of Priority Marine Features and MPA search features in Loch Linnhe, Loch Eil, Loch Leven and Loch Etive, Cruise Report

Vessels:	Sir John Murray, SJM (SEPA) Seol Mara (SAMS) Serpula (HWU) Aphrodite (SNH)
Scientific personnel:	Colin Trigg (SNH) Suzanne Henderson (SNH) Morven McGrath (SNH) James Dargie (SNH) Colin Moore (HWU) Dan Harries (HWU) Graham Saunders (HWU) Rob Cook (HWU) Thom Nickell (SAMS) Tom Wilding (SAMS)
SJM personnel:	Skipper: Hugh Anderson (SEPA) Brian (SEPA) Grant (SEPA) Davie (SEPA)
Seol Mara personnel	Skipper: Chris Ireland (SAMS) Gary (SAMS)
Serpula personnel	Skipper: Colin Moore (HWU)
Equipment on board:	Konsberg OE14-366 colour zoom camera Konsberg Simrad OE14-208 digital stills camera Day grab (SJM) Van Veen grab (Seol Mara) Outland 1000 ROV Scuba gear (Serpula and Aphrodite)

Diary

(Benthic Survey 05)

3/8/2011

Departed Dunstaffnage at ~08:30, following the BBC Scotland radio interview. There was a small delay in starting work due to technical issues with DVD recorder. Weather conditions were good – flat calm. The first site was M30, very close to Dunstaffnage. Then to catch tides we had to enter Etive. A total of 17 DDV stations and 3 grab stations completed. One of the grab stations MG12 was not done as position given for sampling was too far inshore in very shallow water. Some delay in uploading all data but everything seemed in order. Moored in Airds Bay (Loch Etive) ~ 17:20.

4/8/2011

Calm, cloudy with light ppt. Started at upper end of Loch Etive and worked down the loch. Departed Airds Bay just after 08:30 and headed north for about 1 hour to bring boat on site for first station (M65). Total of 15 DDV and 6 grab stations ranging from ~4m to 130m. Last site was M53. Returned to pontoon at Airds Bay just after 17:00. No grab was done at M56 as many boulders were seen here. An additional site was added south west of M56 and called M66. At M66 an additional grab was also added (MG21). At the deepest site (M55) the grab (MG14) misfired and had to be repeated. A number of PMFs were observed today including SpnMeg, MegMax, SpnMegFun, and Fun. *Pachycerianthus* and *Funiculina* were both recorded as frequent at 2 separate sites (M60 and M59 respectively).

5/8/2011

Calm, cloudy. Started at 08:30 beginning with station M47. As the position of M49 was not the predicted depth two video dives were done here - M49a and M49b. Total of 15 DDV and 3 grabs completed. As ahead of schedule 6 additional DDV stations were added, and 3 additional grabs (M67-M72, MG22-MG24). Once all sites were completed in Etive sites in lower Loch Linnhe were investigated. A number of search fetaures were confirmed including Spn.Meg, SpnMeg.Fun, BlyAchi (possibly), LSacR.Sa and LSacRMu. *Pachycerianthus* and *Funiculina*. At a couple of sites the presence of a PMF could not be confirmed. Returned to Dunstaffnage for 17:00.

6/8/2011

Calm, cloudy, wind slight. Boarded boat just after 08:45 as skipper getting provisions. First station was M26. At M24 on north end of Lismore precautions were taken to reduce disturbance to seals. An additional site was done at M73 to look for possible ModHAs biotope - this was the last site in Linnhe. Missed out first few sites in Leven due to strong tides. Last station was M15 giving a total of 11 DDVs and 2 grabs. Large distances travelled today precluded further work. Moored at 16:15 as journey back by car to dunstaffnage required. Search features confirmed included Spn.Meg, KT.XKTX, LSacR.Sa, LhypTxPk and LsacMxVS. Neither BlyAchi nor ModHAs biotopes were found, although at the site M23 it was difficult to see any *Modiolus*. Returned to Dunstaffnage for 17:40.

7/8/2011

Calm, cloudy, slight ppt. Crew arrived at Marine Harvest pontoon at 08:45. First station was M1 at the upper end. Worked down the loch from this point. Stations ranged in depth from 6m to 48m. The FW input at the head end of the loch was such that the camera image was poor quality (noticeable haloclines). At ~14:00 the camera stopped working-this was resolved within 45 minutes. Total of 13 DDVs and 6 grabs (M1-M13 and MG1-MG6). Moored at Marine Harvest pontoon at 16:15. Search features confirmed included SpnMeg; SpnMeg.Fun; LdigT. Could not confirm presence of ModHAs or ModT. At historic ModT site only 3 individual *Modiolus* observed.

8/8/2011

Slight north westerly wind. Crew arrived at Marine Harvest pontoon for 08:45. First station was M14. A number of additional stations were done today (M74-M85). Search features confirmed included SpnMeg; SpnMeg.Fun; IR.MIR.XKT. *Modiolus* were looked for but their presence could not be confirmed. The clapper board of M82 showed M81 - this was noted and corrected in data collection. Crew needed to be at mooring for 16:00. Disembarked at 16:15.

9/8/2011

Slight wind. Left Marine Harvest pontoon at 09:00. As all assigned stations were complete, 2 additional stations (M86 and M87) were DDVd, these were SpnMeg and SpnMeg.Fun respectively. A single *Pachycerianthus* was seen at M87. Demobilised.

(Benthic Survey 06)

15/8/2011

Mobilised in the morning at Corpach marina. Steamed to upper end of Loch Eil. Drop down video of first station (J1) commenced at 11:00 (GMT). A total of 14 DDV, 3 grabs and 3 Multigrab stations were completed. Of the DDVs 6 additional sites were looked at (J65-J70). Depths ranged from 14m - 67m. At site J65 the quality of video was very poor due to wind on beam of boat. The only search feature confirmed today was SpnMeg, which was seen at many of the sites. Possible *Mytilus* beds were seen at the last 2 sites J68 and J69. No BlyrAchi was observed (though SJM did not go to depth advised), and no *Pachycerianthus* or *Funiculina* seen. At the multigrab sites (JMG1-JMG3) *Arctica* was recorded at JMG1 and 2 (1 and 2 individuals respectively). No *Glossus* was found. Returned to Corpach for 17:00 (GMT).

16/8/2011

Calm sea, light ppt. Departed Corpach at 07:00. Started at top end of upper Loch Linnhe (adjacent to Fort William). Ten additional sites were done (J71-J80). Planned sites completed were (J9-J17). Depths ranged from ~18m to 150m. Three multigrab sites were done JMG4-JMG6. Three infauna grabs were done JG4, JG5 and additional grab JG14. Within the middle of the Loch video footage was poor due to strong currents even at depth - this resulted in 2 videos being aborted (J9 and J77). Search features confirmed were burrowed mud components SpnMeg, SpnMeg.Fun, *Funiculina*, *Pachycerianthus*. A single *Arctica* was found within all Multigrabs (though dead *Arctica* shells were found). A single *Arctica* was also found in grab JG4 and a *Brissopsis* in grab JG14. *Funiculina* was recorded in abundance at several sites. Returned to Corpach at 17:00

17/8/2011

Calm sea, sunny spells. Departed at 07:30. On first site for 08:20. Did a total of 7 additional DDV sites (J81-J87), 1 additional grab site (JG15) and 3 additional multigrab sites (JMG9, 10 and 11). Including all planned sites a total of 18 DDVs, 3 grabs and 4 multigrabs were completed. A wire in the winch cable snapped which prevented any DDV deeper than 100m- this has now been fixed. Search features confirmed were burrowed mud components SpnMeg, SpnMeg.Fun, *Pachycerianthus*. BlyrAchi biotope could not be confirmed however, *Amphiura* arms were observed at several sites and grabs taken for infaunal analysis. No live *Arctica* or *Glossus* were found in any of the multigrabs although *Arctica* shells were viewed on video and collected in grabs. *Funiculina* was recorded in abundance at one site (J22). Moored at Dunstaffnage at ~17:30.

18/8/2011

Staff changeover in the morning - CT left to join the HWU team and JD arrived. The first sites were J88 and J89 at the South end of Shuna Island. These additional sites were added because of a possible flame shell bed record, however no flame shells were observed. Footage then collected at stations predominantly in the middle and western half of central and lower Loch Linnhe. SpnMeg.Fun was recorded at a number of sites (with *Funiculina* recorded as frequent, common or abundant at J33 J34, J35, J39, J40, J47, J57, J58, J59, J92). *Pachycerianthus* was observed at J33, although not at J32 or J35 (as per historic records). Skipper noted that quite a few prawn trawlers work in the area of central-lower Linnhe west of Lismore. At some sites *Funiculina* was dead or damaged and trawl tracks were noted from another site (where *Funiculina* was abundant). In total 22 drop down video stations were sampled and 3 infaunal grabs taken. One of the video stations, J53, was moved slightly north of the original site to avoid cable crossing. It then had to be abandoned when the umbilical became tangled in the drop camera frame (plan to revisit). The infaunal grab JG12 was still collected at this site. Colin (Buccanneer) arrived in the evening in prep for ROV work 19th-22nd.

19/8/2011

Left Dunstaffnage at 08:00. In total we collected footage from 6 ROV stations and 3 DDV stations (including 2 additional sites) and completed one infaunal grab. The first station was J44/ JG10 at 207 metres where we collected drop camera footage and an infaunal grab sample - shelly gravel sediment, not SpnMeg. We then moved to the ROV station J43, in order to catch the high water slack period. Colin (Buccanneers) had trouble manoeuvring the ROV, however, with the amount of tide and did 3 dives to try and collect footage. We then moved to a more sheltered shallow site (J37) - KSwSS.LSacR recorded. Tide/wind limited collection of further ROV or deep DDV footage while tide was running. Therefore collected DDV at 2 additional sites along west side of Kererra until low water slack. Successful ROV dives at J41, 42, 43 (repeated), 51 and 52. *Swiftia* recorded at J42 near base of wall @ 27-30 metres. *Leptometra celtica* recorded at J43.

20/8/2011

Left Dunstaffnage at 08:00. In total nine DDV sites (including 3 additional sites J96- J99) were sampled, one ROV site (J55) and one infaunal grab (JG13) was taken. Sampling was limited by the southwesterly winds. Original plan to head to outer sites for the high water slack was therefore aborted and instead we collected footage from additional sites (J96 and J97) located over and adjacent to a sandy cobble bank in Firth of Lorn. *Funiculina* was observed at stations J63 and J61. *Leptometra* also observed at J61. Footage collected at J62 was very poor due to swell and J60 was not attempted as the wind was blowing SJM onto Islands. Sampled a further two additional stations (J98 and J99) inside Liath Sgier reef. *Leptometra* aggregations observed at J99. Towards low water slack attempted to collect ROV footage at J48. However, this had to be abandoned when the ROV became entangled in a creel line (several creels currently down outside and inside the reef which will make sampling difficult). Rib mobilised to remove ROV from creel line. Skipper considered that the only other planned ROV site possible in conditions was J55, where we collected footage over two video dives. *Caryophyllia*, *Alcyonium digitatum*, poss Axinellid and other sponges, ascidians and hydroids on bedrock down to approx 47m, but no *Swiftia pallida* observed. Revisited J62 and collected ROV footage at J60 on return to Dunstaffnage.

21/8/2011

Left Dunstaffnage at 08:30 BST. In total 7 sites were sampled. Two DDV sites (J54 * J53), five ROV sites (J46, J45, J50, J100 & J101), J100 & 101 were additional sites to plan. One infaunal grab was (JG11) was taken at site J49. ROV sampling at sites J49 & J48 proved impossible due to creel buoys and tethers, and prevailing wind/ tidal conditions; it is unlikely that these sites will be possible with ROV while creels are in position. Further DDV sampling on Lismore/ Morvern coast was not possible due to tidal conditions, feeling that Lismore sites had been well covered and time constraints later in the day. Possible multi-grab at DDV site J54 was not carried out as target *modiolus* bed was not located on DDV. Site J46 had good habitat for *Limaria hians* at 20-30m bsl (with 3.2m height of tide, but no *L. hians* were observed on camera. *Leptometra celtica* was observed at site J50. Infaunal grab for Maerl at JG11 (J49) found no Maerl. Additional site J100 SW of Kerrera found *Swiftia pallida* on a site rich with biota.

22/8/2011

Left Dunstaffnage at 08:00. 6 sites were sampled during the day. Multiple DDV runs/ROV dives were undertaken at some of the sites and overall 6 DDV runs, 3 ROV dives and a multigrab (JG12) was completed. DDV/ ROV footage (J49/ samples 1, 2 & 3) did not detect maerl at station J49. An additional site (J102) was completed below the wall on the SW corner of Lismore running between 84-45 metres. A ridge of stepped bedrock with thick silt layer had cup corals, sponges (inc poss axinellid), poss *Swiftia*, aggregations of *Leptometra celtica* and occasional *Funiculina* and rare *Pachycerianthus*. A further two DDV runs were completed at J54 (samples 2-3). Dense mussel shells were observed at J54/3, which was completed approx 0.5 - 1 mile south of the original coordinates. No live mussels or mussel species could be discerned. A multigrab was done (JG12). No live mussels were collected, but mussel shells and shell fragments have been retained for identification. 2 additional DDV sites were completed in the Sound of Kerrera for burrowed mud. *Funiculina* was recorded as rare at JG103, and *Pennatula* recorded as rare at JG104. An additional ROV site was completed at the Creag Islands (J105) where *Leptometra* was recorded.

23/8/2011

Steamed from Dunstaffnage at 08:00 BST. Sea state 1, clear visibility with overcast skies. Targetted three additional stations for SpnMeg (J106, J107 & J108). All three stations had mud in the most heavily burrowed, with *Funiculina*, *Pennatula*, *Pachycerianthus* and *Nephrops* being observed. Steamed for Dunstaffnage at 10:15 BST, arriving 11:45 BST. Survey demobilisation took place prior to disembarkation from vessel.

(Diving survey 07)

19/8/2011

Departed Appin at 07:30. Wind slight increasing to force 6 in late afternoon. *Limaria* bed spot dives off west coast of Shuna island in morning, drop down video at Appin narrows. Spot dives for MNCR at slack tide in afternoon. Moored at ~18:00.

20/8/2011

Departed Appin at 08:00. Strong southerly in morning decreasing in afternoon. MNCR survey on *Limaria* bed during morning. Spot dives on potential *Limaria* and *Modiolus* beds in afternoon. Moored ~18:00. Got fuel for *Aphrodite*.

21/8/2011

Departed Appin at 08:00. Calm sea, light pptn. Clearing slightly in afternoon. MNCR phase 2 survey carried out on *Swiftia* and sponge community off Berrera. *Swiftia* found at ~22m alongside axinellid and massive sponges. Concurrent work from *Aphrodite* carried out off Southern Morvern - 2 spot dives for *Limaria* (negative). In afternoon *Aphrodite* out further 7 spot dives within Appin narrows, positive result for station L7. Additional extent of *Modiolus* bed also confirmed in southern end of narrows. *Serpula* and *Aphrodite* sailed to Balluchulish. Moored both vessels ~18:00.

22/8/2011

Boarded *Aphrodite* ~08:45. Calm sea, light ppt. In the morning drop-down video was done to assess extent and presence of *modiolus*, along with drop dives on several sites. Tom Wilding perforated ear drum during dive. In afternoon MNCR phase 2 was carried out on the *Modiolus* bed (either ModHAs or tide swept Mod) in Leven. *Serpula* and *Aphrodite* were then taken to Fort William. Moored in Fort William at ~21:30.

23/8/2011

Tidal anomaly resulted in late start of 10:00 at Fort William yacht club. Wind was slight but increased over course of day. *Serpula* carried out drop down video sites all day, whilst team of divers on *Aphrodite* carried out a number of spot dives (S11-S16, S5D and S7D) *Modiolus* beds were recorded at several of the sites around Annat Narrows. A bed of *Arctica* was also observed on west side of Annat Narrows. Moored boats ~18:15.

24/8/2011

Arrived at moorings at 08:30. Carried out MNCR phase 2 of *Modiolus* bed in east Annat Narrows during morning. In afternoon carried out a series of spot dives to delimit mod bed in Loch Eil and also investigate possible presence of *Arctica*. Sailed for Appin in late afternoon. Wind picked up from south with heavy rain. Moored vessels at ~18:30.

25/8/2011

Arrived at moorings at 08:00. Carried out MNCR phase 2 survey of *Modiolus* bed in Appin narrows in morning. In afternoon a series of drift dives were done to assess the extent of the *Modiolus* bed and the *Limaria* bed at Appin. Moored boat at 16:30.

26/8/2011

Demobilisation.

PROBLEMS ENCOUNTERED

During the course of the survey several issues resulted in changes to the survey plan. Probably the most significant were the observed discrepancies between geographical coordinates as a result of the inaccuracy of historical geographical systems at the time of previous surveys. This meant that a number of sites had to be relocated once it became apparent that the area was different from that previously recorded (e.g. obvious depth or sediment differences).

A number of sites were subject to strong currents which, even with current charts and navigation aids, could not be predicted with accuracy. The combination of these currents and at times strong winds, prevented the vessels from being directly on station and occasionally meant the vessel could not even get close to the site. At a few locations this was further compounded by the presence of creel lines. In addition to the vessels being affected by the above mentioned issues, the ROV had difficulty working on several occasions in medium to strong currents.

Although minor problems occurred, such as a wire snapping on the warp of the SV *Sir John Murray* and the Seatronics camera not focusing on one of the days, these were easily rectified and only caused small losses in survey time.

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