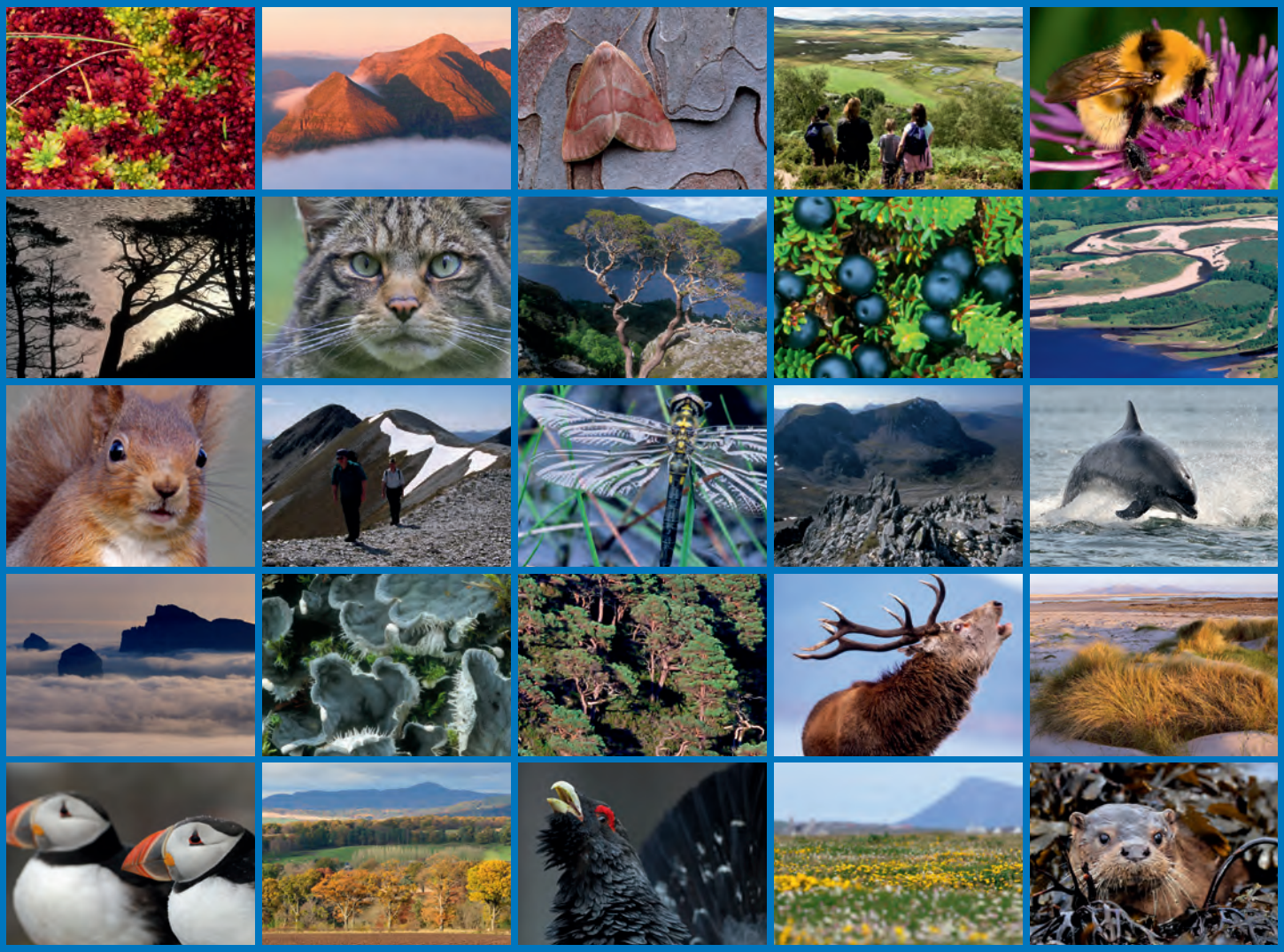
Scottish Natural Heritage
Commissioned Report No. 566

The distribution and condition of selected MPA search features within Lochs Alsh, Duich, Creran and Fyne



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COMMISSIONED REPORT

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The distribution and condition of selected MPA search features within Lochs Alsh, Duich, Creran and Fyne

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COMMISSIONED REPORT

Summary

The distribution and condition of selected MPA search features within Lochs Alsh, Duich, Creran and Fyne

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Background

Provisions to designate new Marine Protected Areas (MPAs) within Scottish waters have recently been introduced through the Marine (Scotland) Act 2010 and the UK Marine and Coastal Access Act 2009. To help target nature conservation action SNH and JNCC have generated a focused list of habitats and species of importance in Scottish waters - the Priority Marine Features (PMFs). A subset of the PMFs (MPA search features) will drive the identification of Nature Conservation MPAs.

SNH has identified a number of potential sea loch MPA locations, which include Loch Alsh, Loch Duich, Loch Creran and Loch Fyne, which form the subjects of the present investigation. The principal aim of the work was to validate historical records of specific MPA search features within search areas at these locations and to obtain an understanding of their distribution, extent and condition. The targeted features included flame shell, horse mussel and maerl beds and, within Loch Duich, burrowed and deep mud habitats.

Main findings

- Historical records of flame shell beds in Kyle Akin, Loch Alsh were confirmed with the finding of the largest known bed in Scottish waters covering 75 ha. The bed was of high quality with most of the seabed covered by dense nest material supporting a rich associated community.

- An extensive flame shell bed (50 ha) was recorded at Otter Spit, Loch Fyne, with around half the bed exhibiting nest coverage values >50%. There appears to have been a temporal decline in the status of the bed over the last 13 years, with disappearance of the habitat over part of its former range. Diversity of the associated community was fairly high but there was some evidence of a temporal decline, possibly related to a decline in maerl abundance in the area.

- The presence of two flame shell beds in Loch Creran was validated. The bed at Creagan was small (0.5 ha), fragmentary and of low quality but at Shian the bed was distributed over an area of 18 ha, largely as dense nest material supporting a rich associated community.

- The presence of a horse mussel bed at String Rock, Loch Alsh was validated (at least 6 ha in area) and was found to be linked by an area of sparse mussels to a second bed off Kyleakin, 500 m to the west (c.12 ha in extent). Both beds were

populated by dense flame shells. High diversity of the associated community was recorded at String Rock, whereas on the Kyleakin bed markedly lower diversity was observed in the presence of a blanket of brittlestars.

- The temporal decline in horse mussel density at String Rock recorded by previous surveys since 1999 was found to be continuing, with insignificant recruitment to the population over the last six years. The possibility that the decline is linked to an increase in density of the flame shell population is discussed.

- The only evidence found of a previously extensive maerl bed at Otter Spit, Loch Fyne, last recorded in 1999, was small amounts of dead maerl and very sparsely scattered live rhodoliths at a few stations.

- Loch Duich was found to contain an extensive and excellent example of the burrowed mud habitat, heavily worked by megafaunal crustaceans and supporting a dense population of *Funiculina quadrangularis* and widespread and locally numerous *Pachycerianthus multiplicatus*. Historical records of the biotopes, burrowed mud with *Maxmuelleria lankesteri* and inshore deep mud, could not be substantiated by the 2012 survey.

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1. INTRODUCTION

1.1 Background

Provisions to designate new marine protected areas (MPAs) within Scottish waters have recently been introduced through the Marine (Scotland) Act 2010 and the UK Marine and Coastal Access Act 2009. To help target nature conservation action as outlined in the marine nature conservation strategy (Marine Scotland, 2010), SNH and JNCC have generated a focused list of habitats and species of importance in Scottish waters - the Priority Marine Features (PMFs). It is a subset of these biological features (referred to as MPA search features) that will drive the identification of Nature Conservation MPAs (see Scottish Government, 2011 for list).

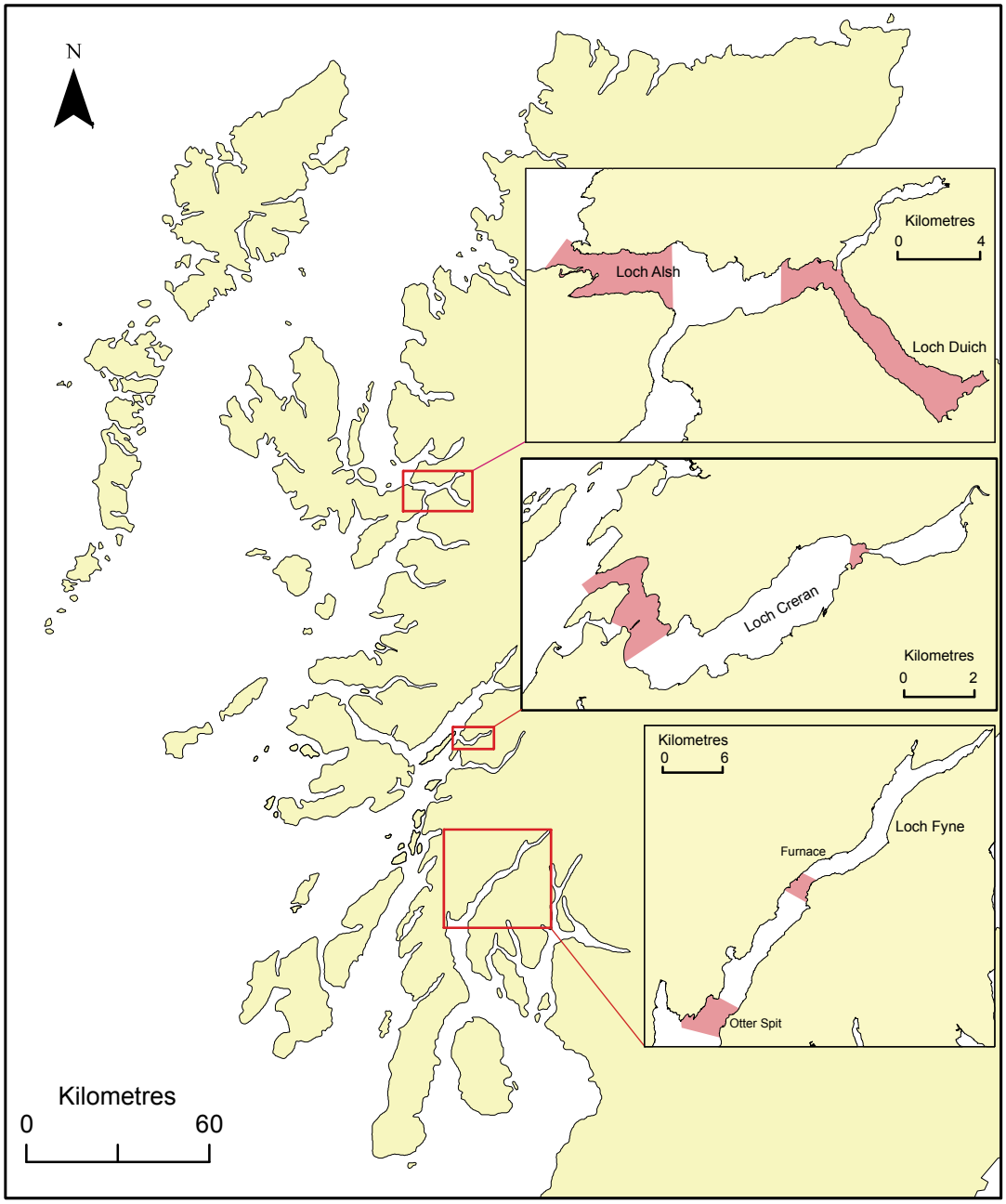

Figure 1. The study locations with survey areas depicted in pink. Reproduced by permission of Ordnance Survey on behalf of HMSO. © Crown copyright and database right [2013]. All rights reserved. Ordnance Survey Licence number 100017908.

Table 1: Target MPA search features at the survey locations

MPA search feature	Component biotopes/species (biotope/common name)	Component biotope/species (biotope code/species name)	PMF Code	Loch Alsh	Loch Duich	Loch Fyne	Loch Creran
Burrowed mud	Seapens and burrowing megafauna in circalittoral fine mud	SS.SMu.CFiMu.SpnMeg	BM		●		
	Burrowing megafauna and *Maxmuelleria lankesteri* in circalittoral mud	SS.SMu.CFiMu.MegMax	MX		●		
	Tall sea pen	*Funiculina quadrangularis*	FQ		●		
	Fireworks anemone	*Pachycerianthus multiplicatus*	PM		●		
Inshore deep mud with burrowing heart urchin	*Brissopsis lyrifera* and *Amphiura chiajei* in circalittoral mud	SS.SMu.CFiMu.BlyrAchi	DM		●		
Flame shell beds	*Limaria hians* beds in tide-swept sublittoral muddy mixed sediment	SS.SMx.IMx.Lim	FS	●		●	●
Horse mussel beds	*Modiolus modiolus* beds with *Chlamys varia*, sponges, hydroids and bryozoans on slightly tide-swept very sheltered circalittoral mixed substrata	SS.SBR.SMus.ModCvar	HM			●	
	Modiolus modiolus beds with fine hydroids and large solitary ascidians on very sheltered circalittoral mixed substrata	SS.SBR.SMus.ModHAs	HM	●			
	Modiolus modiolus beds with hydroids and red seaweeds on tide-swept circalittoral mixed substrata	SS.SBR.SMus.ModT	HM	●			
Maerl beds	Maerl beds	SS.SMp.Mrl	MB			●	

Scottish Natural Heritage (SNH) has identified a number of potential sea loch MPA search locations (SNH, 2012), amongst which are Loch Alsh, Loch Duich, Loch Creran and Loch Fyne, which form the subjects of the present investigation. The principal aim of the investigation was to validate historical records of specific MPA search features within search areas at these locations (Figure 1) and to obtain an understanding of their distribution, extent and condition. The target search features included *Limaria*, *Modiolus* and maerl beds and, within Loch Duich, burrowed and deep mud habitats (Table 1). Particular emphasis was placed on assessment of the current condition of the String Rock *Modiolus* bed in Loch Alsh, which was declared as unfavourable/declining following site condition monitoring work in this Special Area of Conservation in 2004 (Scottish Government, 2008).

1.2 Historical records of MPA search features

Table 10.1 (Appendix 10) summarises the sources of records for the target search features. Most of these records have been incorporated into the GeMS database v2.10 (Gillham *et al*., 2011) which was made available for this study, but as this does not provide important information for relocation, such as depth data, and for critical analysis of the records, collation of search feature records for the purposes of the current survey has been largely based on Marine Recorder. A recent snapshot of the database (July, 2012) was made available although this lacked some recent records, particularly Seasearch data, the 2010 Clyde PMF validation survey (Allen *et al.,* 2011), Scott's 1991 and 1996 Skye Bridge surveys (Scott, 1991, 1996) and several research publication sources.

Appendix 10 provides a compilation of the Marine Recorder search feature records, with Table 10.2 providing the necessary information for their relocation including depth, and Table 10.3 the biological descriptions. Some cited positions were found to be incorrect or at least dubious and so relevant field relocation data sheets from MNCR surveys have been scrutinised and corrected positions provided.

Table 10.4 includes additional search feature habitat records derived from the GeMS database, including those of Allen *et al.* (2011) and Scott (1991), while Table 10.5 is a compilation of records of *Pachycerianthus multiplicatus* from Loch Duich and Loch Alsh, derived in part from GeMS, but with depth data from the original reports or Marine Recorder, and additional records from the NBN database (NBN, 2012), which includes recent Seasearch surveys. Table 10.6 lists search feature habitat records not present in existing databases.

All MPA search feature records have been ascribed an identification code which is presented in the tables and employed as record labels in the figures.

1.2.1 Loch Alsh

Figure 2 shows the distribution of target MPA search feature records in Loch Alsh. An apparently large but patchy *Modiolus* bed has been recorded in the vicinity of String Rock in the Kyle Akin channel by various surveys, although records have been ascribed to a variety of *Modiolus* biotopes (Davies, 1989; SNH, 1995; Emu Ltd., 2006), possibly reflecting the range of conditions. Marine Bio-images (2007) carried out a dropdown video survey of the area in 2007 but were unable to map the bed due to the difficulty in observing live *Modiolus.*

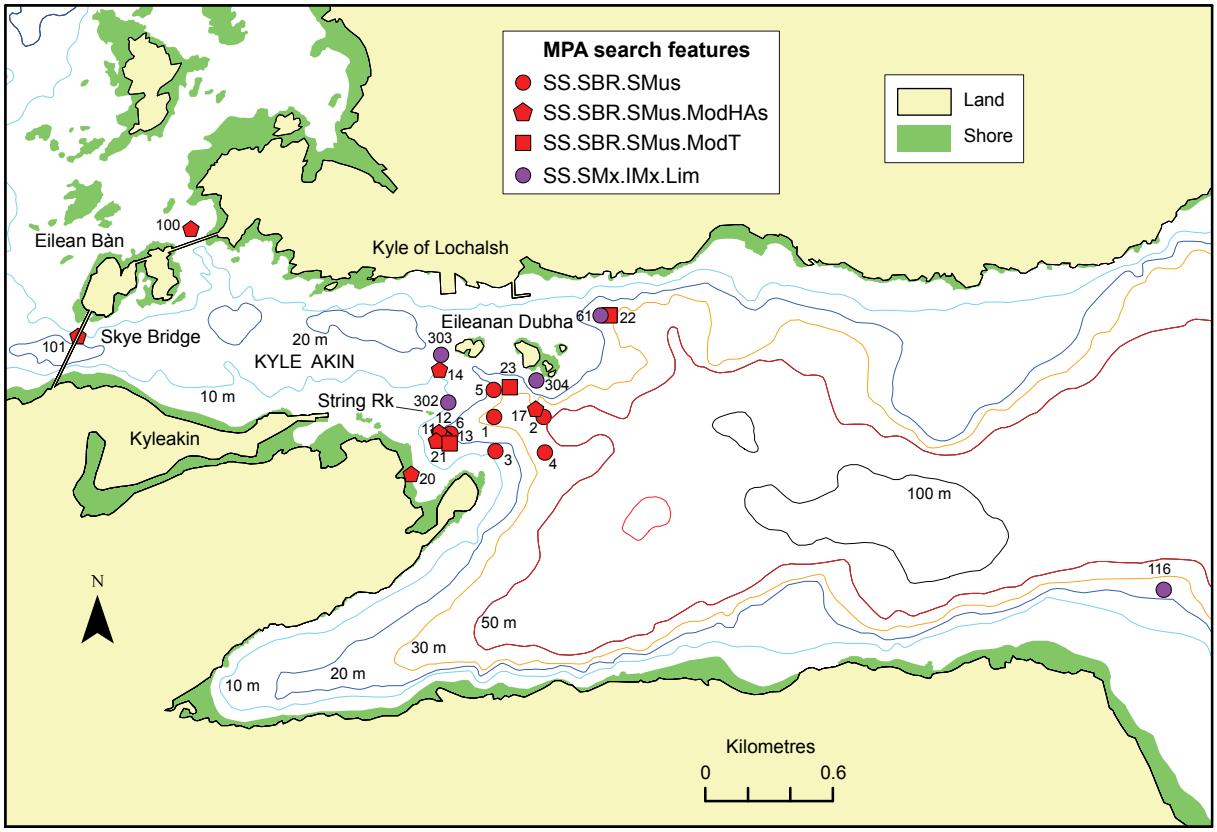

Figure 2. Distribution of target MPA search feature records in western Loch Alsh, with code numbers employed in Appendix 10. Reproduced by permission of Ordnance Survey on behalf of HMSO. © Crown copyright and database right [2013]. All rights reserved. Ordnance Survey Licence number 100017908.

The condition of the String Rock bed was examined by Mair *et al.* (2000) in 1999, who assessed percentage coverage of live *Modiolus* in part of the bed through the use of cross-strung quadrats, and examined the associated fauna by means of MNCR phase 2 survey, including the analysis of *Modiolus* clump samples. Emu Ltd. (2006) repeated this work in 2004 and the percentage cover results from the 1999 and 2004 surveys have been statistically analysed by Thomas and New (2006), who concluded that there had been a highly significant temporal decline in *Modiolus* cover. Marine Bio-images (2007) repeated percentage cover measurements in 2007 finding little change from 2004 densities.

During a 1991 survey of the Kyle Akin area prior to the construction of the Skye Bridge, Scott (1991) recorded *Modiolus* (subsequently ascribed to **SS.SBR.SMus.ModHAs** in Marine Recorder) at two sites. One site was in the secondary western entrance channel to Kyle Akin, north-east of Eilean Bàn. The Marine Recorder biotope ascription at this site appears dubious, with Scott (1991) noting 'at 8.5 m were dense beds of foliose algae on angular pebbles, and a few *Modiolus*'. The position of the other site is reportedly just outside Loch Alsh amongst reefs to the north of Eilean Bàn according to Scott (1991) and Marine Recorder. However, the name given to the site by Scott (1991) does not correspond with this location and subsequent investigation has revealed that the site is actually located under the main span of the Skye Bridge on the north side of the entrance channel (Scott, pers. comm.), where she recorded 'beds of *Modiolus* at 13 - 22 m, covered with hydroids, bryozoans and brittlestars in deeper water'.

A fairly dense *Modiolus* bed was recorded in 1988 north-east of Eileanan Dubha by Connor (1989), underlain by a population of *Limaria hians*, the site subsequently being referred to

the biotope mosaic, **SS.SBR.SMus.ModT** and **SS.SMx.IMx.Lim**, in Marine Recorder. During broadscale mapping of Loch Alsh in 1996 (Johnston *et al*., 2000), *Limaria* beds were predicted to occur at a number of sites, four of which are retained as records in the most recent version of GeMS (v2.10), although there is no evidence of the presence of *Limaria* at any of these sites (116-119 in Figures 2 and 3). Dense *Limaria* beds were recorded at two sites in the vicinity of String Rock during the 2007 *Modiolus* survey by Marine Bio-images (2007) and SNH observed terraced *Limaria* nests to the south of Eileanan Dubha in 2009. ERT (Scotland) Ltd. (2010) provides a description of the associated community of this bed.

1.2.2 Loch Duich

There are several records of burrowed mud in Loch Duich from surveys by Connor (1989), SNH (1997) and Emu Ltd. (2006) in 1988, 1997 and 2004 respectively and Johnston *et al*. (2000) mapped most of the seabed of the loch as 'deep soft mud with burrowing megafauna' (Figure 3). The dominant habitat recorded is **SS.SMu.CFiMu.SpnMeg.Fun**. One of the 1989 sites (28) is currently assigned to two biotopes in Marine Recorder (**SpnMeg** and **SS.SMu.CFiMu.BlyrAchi**). In fact the data on which the biotope determination is based is derived from a single grab sample and in Marine Recorder the habitat was first regarded as an uncertain record of **BlyrAchi** and then subsequently also as an uncertain example of **SpnMeg**. One grab sample was also taken at site 30 which Marine Recorder first lists as a certain record of **BlyrAchi** and subsequently as an uncertain record of **MegMax**, even though neither *Maxmuelleria* nor burrowing crustaceans were recorded. Site 29 has been referred to **BlyrAchi** in Marine Recorder, although the characterising species *Brissopsis lyrifera* was not recorded and it is surrounded by **SpnMeg.Fun** sites, with *Funiculina* skeletons recorded in the sample. There is a total of three records of **MegMax** in Loch Duich, site 30 (see above) and sites 31 and 32, which are segments of the same ROV run in 1995 at different depths. No *Maxmuelleria* were observed, the biotope ascription being based on the presence of mud extensively worked by callianassids (SNH, 1995).

There are scattered records of sparse *Pachycerianthus multiplicatus* throughout Loch Duich but high densities have been observed at several locations in Loch Beg in 1988 (Connor, 1989) and 2011 (MCS, 2011).

There are several records of **SS.SBR.SMus.ModHAs** in Loch Duich but these were not the focus of the current investigation.

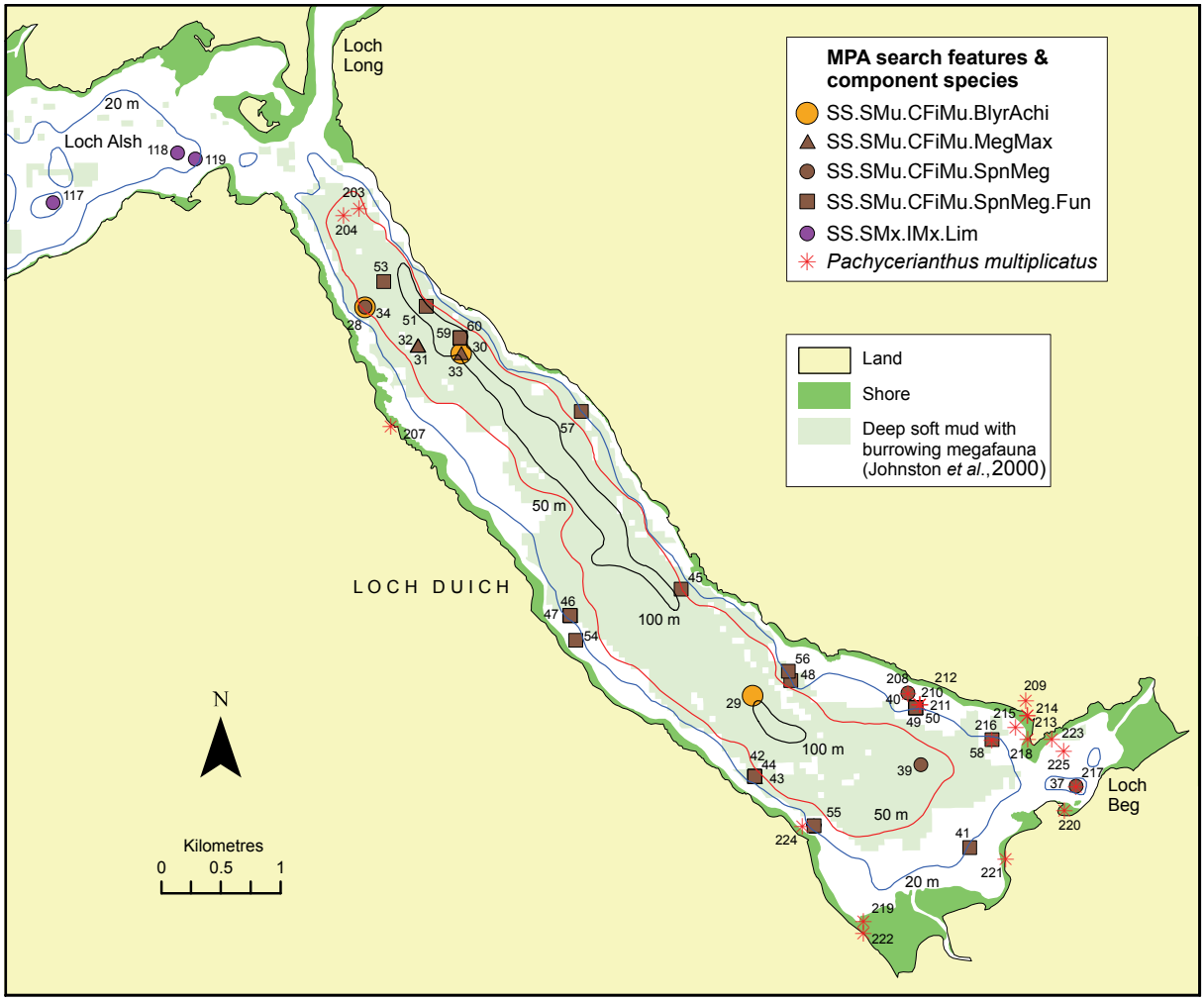

Figure 3. Distribution of target MPA search feature records in Loch Duich and eastern Loch Alsh, with code numbers employed in Appendix 10. Reproduced by permission of Ordnance Survey on behalf of HMSO. © Crown copyright and database right [2013]. All rights reserved. Ordnance Survey Licence number 100017908.

1.2.3 Loch Fyne

The first records of *Limaria hians* at Otter Spit were obtained during the 1988 survey by Davies (1989), who observed some of the gravel and pebbles to be incorporated in *Limaria* nest material at 9.5 - 21.5 m depth south-west of the spit (site 65) and frequent *Limaria* amongst a maerl bed at 8 - 10 m depth off Creag Gobhainn (site 63) (Figure 4). During a study over the years 1995 - 1999 Hall-Spencer and Moore (2000a) recorded a continuous byssus reef at 15 m depth located between the records of Davies extending over several hectares, 10 - 20 cm in thickness with a *Limaria* density >700 m^{-2} (site 305). Discrete nests were recorded around 100 m from the main bed. In 2006 *Limaria* nests were recorded during a Seasearch survey north of Creag Gobhainn at a depth of 7.3 - 11.3 m. In order to validate the presence of *Limaria* at Otter Narrows, Allen *et al.* (2011) carried out two dives at 6 - 10 m depth close to this Seasearch record. No *Limaria* was observed, but their search area was over 500 m north of the main bed as reported by Hall-Spencer and Moore (2000a).

Farther up Loch Fyne *Limaria* was recorded as being present amongst boulders of the breakwater at the Quarry Tea Rooms near Furnace during a 2009 Seasearch survey from the shore to 15.5 m depth, and in 2010 Seasearch recorded many empty *Limaria* shells here.

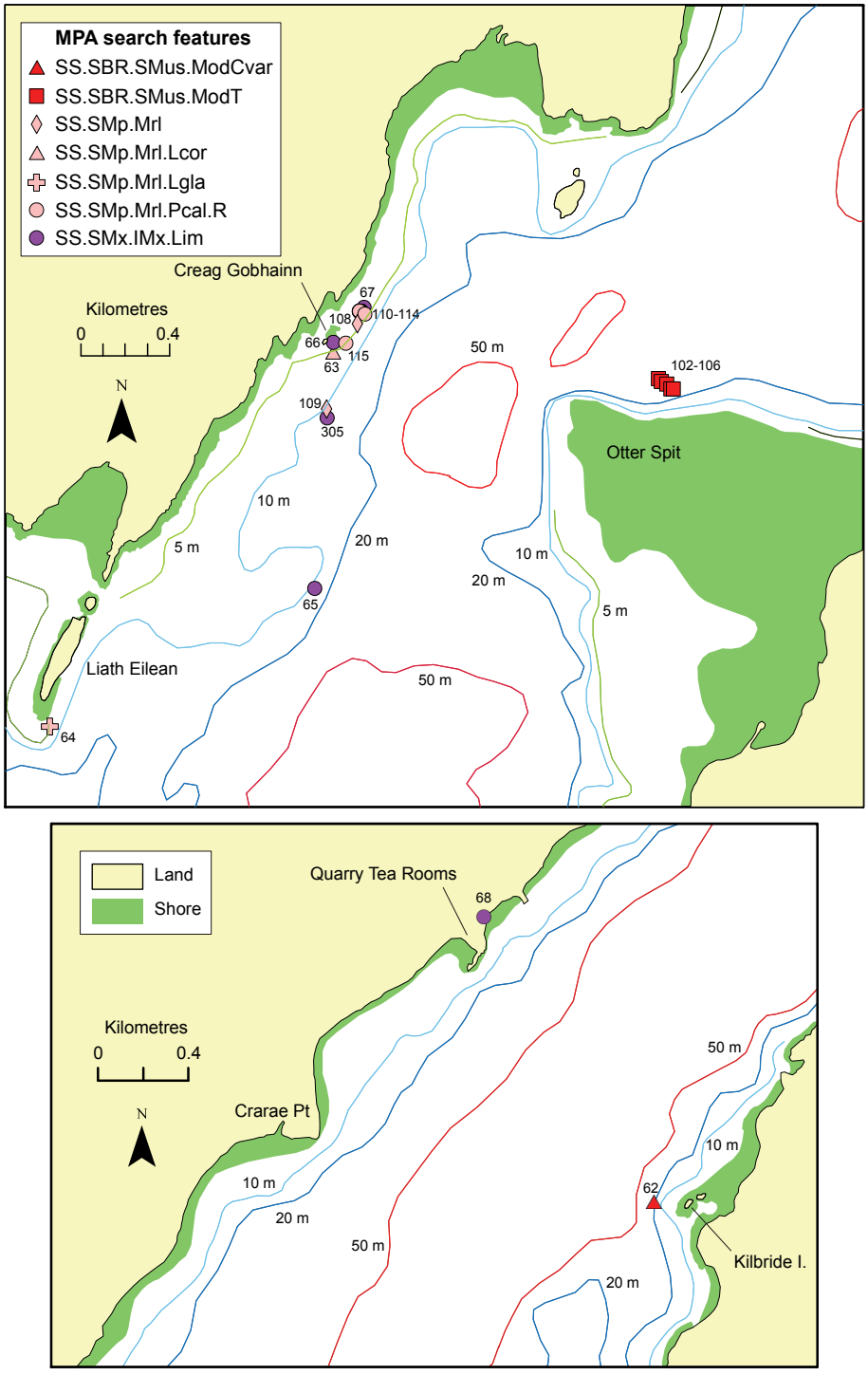

Figure 4. Distribution of target MPA search feature records in the Otter Spit (upper figure) and Furnace (lower figure) regions of Loch Fyne, with code numbers employed in Appendix 10. Reproduced by permission of Ordnance Survey on behalf of HMSO. © Crown copyright and database right [2013]. All rights reserved. Ordnance Survey Licence number 100017908.

In 1988 Davies (1989) recorded occasional maerl at 7.4 - 9.2 m depth south of Liath Eilean (site 64). This has been interpreted in Marine Recorder as **SS.SMp.Mrl.Lgla**, although in Davies (1989) there is no mention of a maerl bed and *Lithothamnion glaciale* is only mentioned in a list of encrusting species. Davies also recorded *Lithothamnion corallioides* (common) and *L. glaciale* (frequent) at the Creag Gobhainn *Limaria* site (see above). From

1994 - 1999 Hall-Spencer (1999) observed a muddy maerl band between depths of 6 - 14 m occupying 17.5 ha. around 300 m to the south of Creag Gobhainn. At one site at 10 m depth live maerl cover was 25%. This bed is contiguous and evidently overlaps with the *Limaria* bed described in Hall-Spencer and Moore (2000a). Allen *et al.* (2011) recorded maerl off Creag Cobhainn in 2010 during video runs in the same area as the record of Davies (1989).

During a 2010 drop-down video survey Allen *et al.* (2011) observed a tide-swept *Modiolus* bed (**SS.SBR.SMus.ModT**) in the Otter Narrows along a video run extending from 19 - 27 m depth. They also attempted to validate a *Modiolus* bed found by Davies (1989) west of Kilbride Island opposite the Quarry Tea Rooms (assigned to **SS.SBR.SMus.ModCvar** in Marine Recorder). They only observed dead *Modiolus* shells but the two search dives performed were incorrectly positioned (as revealed by Davies's original MNCR field data sheets) and at depths of 4 and 10 m, whereas the Davies (1989) record stipulates a depth of 19.5 - 27.5 m.

1.2.4 Loch Creran

Following the observation of scattered *Limaria hians* in the vicinity of South Shian near the mouth of Loch Creran, Heriot-Watt University carried out a search for a *Limaria* bed here in 2005 recording 100% *Limaria* nest cover to the east of Eriska Island (Moore, unpublished) (Figure 5). Since then, Heriot-Watt University have carried out a number of studies here, most notably that of Trigg *et al.* (2011). Shortly after the discovery of this bed, scattered *Limaria* nests were found at the western entrance to the Creagan Narrows in the upper part of Loch Creran (Burgess, 2007).

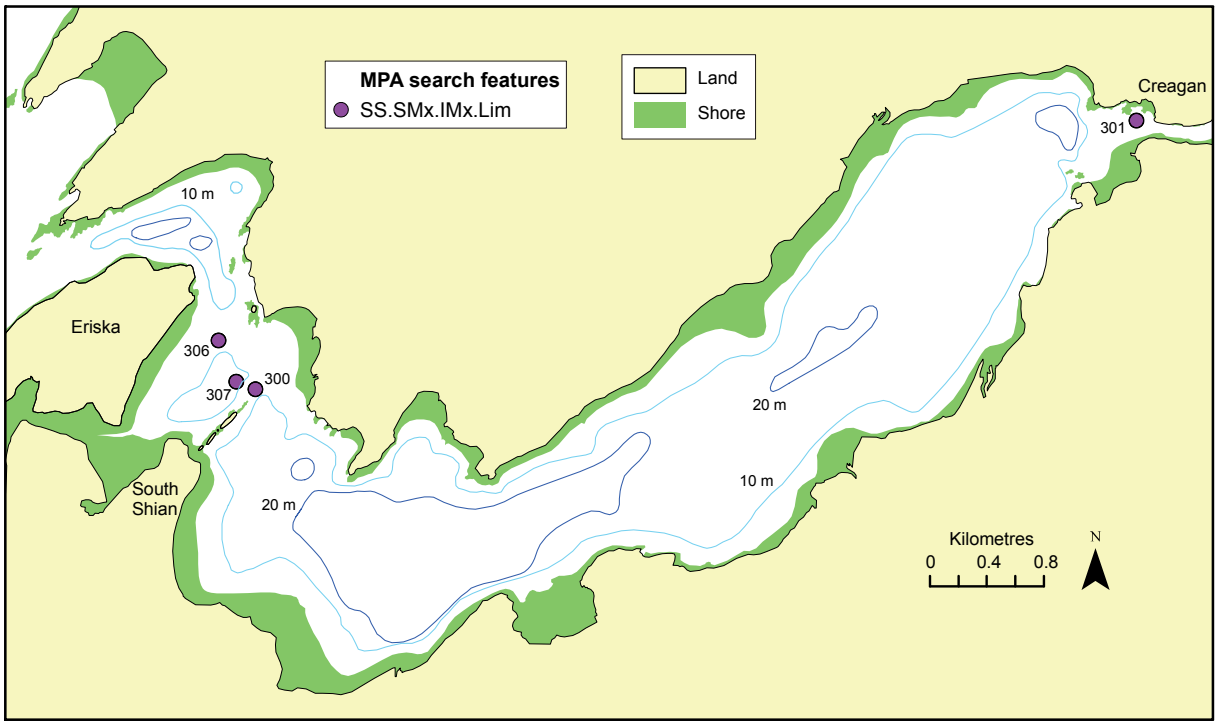

Figure 5. Distribution of target MPA search feature records in Loch Creran, with code numbers employed in Appendix 10. Reproduced by permission of Ordnance Survey on behalf of HMSO. © Crown copyright and database right [2013]. All rights reserved. Ordnance Survey Licence number 100017908.

2. METHODS

2.1 Loch Alsh and Loch Duich

The objective was to survey three *Modiolus* beds, a mixed *Modiolus/Limaria* bed and seven other possible *Limaria* beds.

2.1.1 String Rock Modiolus *bed*

Work initially concentrated on this bed as it was considered to be probably the largest, and reportedly in a declining condition (Emu Ltd., 2006; Thomas and New, 2006). Thus, additional site condition monitoring data were obtained here.

Divers employed 0.25 m^2 quadrats with cross strings at 10 cm intervals to assess percentage cover of live *Modiolus* at the 14 sites examined in 1999 (Mair *et al.*, 2000) and 2004 (Emu Ltd., 2006) (Figure 6), ten of which were also studied in 2007 (Marine Bio-images, 2007). Eleven sites were located at 20 m intervals along a 200 m ground line. The ground line was relaid but to enhance the accuracy of site relocation, station positions were adjusted using the recorded 1999 depths for each station, if necessary in combination with use of the calibrated ground line. The number of string intersection hits (maximum 16) was recorded using 10 haphazardly placed, replicate quadrats at each site, also recording the presence of dead *Modiolus*, depth, substrate and brittlestar percentage cover.

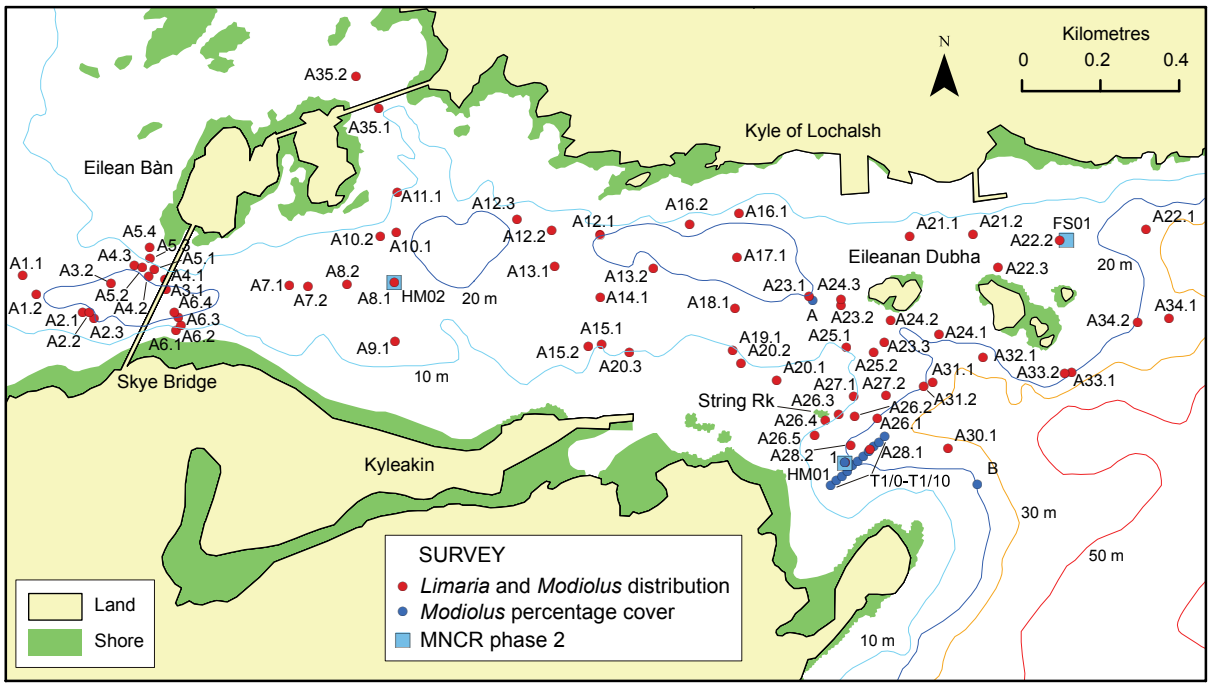

Figure 6. Distribution of diver survey stations in Loch Alsh. Reproduced by permission of Ordnance Survey on behalf of HMSO. © Crown copyright and database right [2013]. All rights reserved. Ordnance Survey Licence number 100017908.

To further examine possible recovery of the bed, *Modiolus* samples were taken for population structure analysis at station 1, where a similar study was carried out in 1999 (Mair *et al.*, 2000). Five replicate 0.25 m^2 quadrats were cleared of all shell and stone material and the material returned to the surface for measurement of length, breadth and height of *Modiolus* specimens using vernier callipers. The residue material was retained for future inspection and measurement of spat in the laboratory. As only 50 *Modiolus* were collected a further clearance of material was made to bring the total *Modiolus* measured to around 150. Measured specimens were returned live to the seabed at the collection site.

An MNCR phase 2 survey was carried out at station 1 (HM01, Figure 6), where Mair *et al*. (2000) also performed a phase 2 survey in 1999. Location data are provided in Appendix 5. The site was marked with a shot line for the duration of the survey and the dGPS position of the line recorded. A 25 m tape transect line was marked out on the seabed by running out a measuring tape from the base of the shot line. The bearing of the tape from the shot was noted and the depth at both ends of the tape recorded. A band 2 m either side of the tape was surveyed by two divers, who noted the presence, and where possible, estimated the abundance of conspicuous biota, collecting material which needed to be identified in the laboratory. To supplement the real-time visual records and collections, the transect band was videoed using a hand-held digital HD video camera (Canon Legria HF S30) and still photographs taken of the habitat and associated community using two Fuji Finepix S2 Pro digital still cameras with 14 mm wide-angle and 90 mm macro lenses.

Semiquantitative data on the epifauna and infauna of the *Modiolus* bed were acquired by collecting four replicate clumps of *Modiolus* from within the transect band. A diver carefully removed each clump, whose size just enabled it to be placed into a 5 litre bucket. The bucket was sealed with a lid before transport to the surface. In the laboratory the associated fauna and flora retained on a 0.5 mm mesh sieve was identified and, where appropriate, counted.

The diver species records and those derived from the study of the collected biota, video footage and still photographs were collated to produce a species list for the transect band with, where possible, SACFOR abundance estimates. Based on the physical and biological data collected, a biotope was subsequently allocated using Connor *et al.* (2004).

An indication of extent of this and other *Modiolus* beds (as well as *Limaria*) was carried out by recording various parameters at a number of stations along diver drift or swum transects (Figure 6). See section 2.1.2 for methodology.

2.1.2 Other Modiolus *and* Limaria *beds*

Initially, areas containing historical records of *Limaria* and *Modiolus* beds were examined by drift or swum diver transects, but it soon became apparent that *Limaria* was far more widely distributed than previously recorded and so the search area was extended to cover much of the seabed from west of the Skye Bridge to east of Eileanan Dubha. In total 75 stations were worked by divers along transects recording the following data for assessment of both *Limaria* and *Modiolus* distribution and condition (Figure 6, Appendix 4: Table 4.1):

- % cover by *Limaria* nest material
- thickness of *Limaria* nest
- presence of discrete nests
- *Limaria hians* seen/not seen
- substrate type
- depth
- % algal turf cover
- kelp species and SACFOR abundance
- brittlestar abundance (SACFOR)
- brief notes on community characteristics
- *Modiolus* SACFOR abundance

Station positions were fixed by the surface vessel, following diver signalling using the surface marker buoy.

MNCR phase 2 surveys were carried out with the collection of video and still imagery at two sites, a *Limaria* bed (FS01) and a mixed *Modiolus/Limaria* bed (HM02) (Figure 6, Appendix 5: Table 5.1). The survey methodology was similar to that used at the String Rock site, except that at FS01 four replicate cores (10.3 cm diameter to a depth of c.20 cm) were taken for infaunal analysis and one core for PSA, whereas at HM02 four replicate *Modiolus* clump samples were collected. Core material was screened with a 0.5 mm sieve.

2.1.3 Video and grab survey

Thirty-five sites were surveyed by dropdown video, which included 31 in Loch Duich and four to assess the presence of *Limaria* beds in Loch Alsh at sites predicted to support the habitat by the broadscale survey of Entec UK Ltd (Johnston *et al*., 2000). Site locations are shown in Figure 7 and locational details provided in Table 2.1 (Appendix 2).

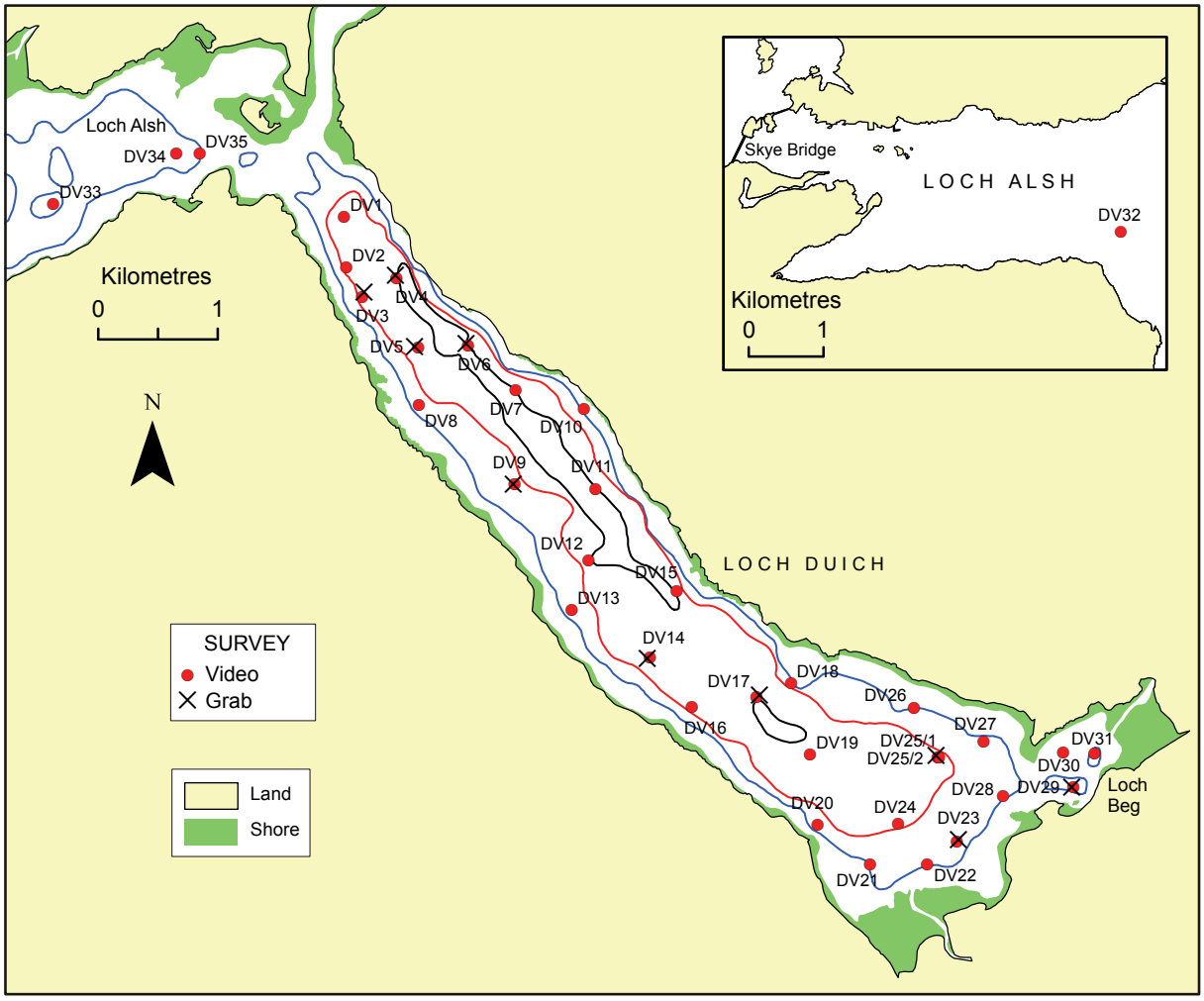

Figure 7. Distribution of video and grab survey sites in Loch Duich and Loch Alsh. Reproduced by permission of Ordnance Survey on behalf of HMSO. © Crown copyright and database right [2013]. All rights reserved. Ordnance Survey Licence number 100017908.

The video system used consisted of a Panasonic NV-GS150 3 chip digital video camera within a Seapro housing held within a frame and illuminated by twin 100 watt lamps. A 150m umbilical cable carried the video signal to a Sony Video Walkman for real-time observation and for recording on miniDV tape. At each station the camera was deployed from a drifting vessel for several minutes (generally 3 - 8), noting the times, depths and precise positions at the start and end of the drift using dGPS. These data, as well as brief notes on substrates

and biota, were entered onto a *pro forma* (Appendix 1). As many of the sites were for validation of historical records, the pro forma also contained target depths, so that the position of the video track could be adjusted where necessary to ensure that similar depths were sampled, taking into account the tidal rise above chart datum.

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

To assist in the process of biotope identification and condition assessment single 0.1 m^2 van Veen grab samples were taken at 10 stations (Figure 7) with a c.150 ml subsample taken for particle size analysis and the remaining material sieved on a 1 mm mesh and preserved in buffered 5% formalin. The macrobenthos was subsequently sorted, identified and enumerated by Fugro ERT (Edinburgh).

Sediment samples for grain size analysis were dry sieved using a nest of sieves from 4 to -4 phi at 0.5 phi intervals, following separation and measurement of the silt/clay fraction by puddling the sample of known weight, which had been soaked in sodium hexametaphosphate, through a 63 µm sieve. The sediment grain size parameters, median grain size and phi quartile deviation, were obtained by interpolation of the cumulative weight percentage curves.

2.2 Loch Fyne

The Otter Spit area was surveyed by diver drifts or swims along compass bearings, with the same data recorded as for Loch Alsh at 44 spot stations (Figure 8, Appendix 4: Table 4.1), but with the addition of % live and % dead maerl cover. The methodology was modified at two further locations. A validation dive for the presence of *Limaria* at The Tea Rooms in the Furnace area of Loch Fyne (Figure 8) involved recording at one spot station at the base of the breakwater, followed by the diver searching for *Limaria* whilst zigzagging between depths of 14 - 6 m. A validation dive for a *Modiolus* bed west of Kilbride Island (Figure 8) involved a search of the seabed slope between depths of 19.5 - 27.2 m.

An MNCR phase 2 survey was carried out in a representative area of the Otter Spit *Limaria* bed using the same methodology as for Loch Alsh, with collection of still and video imagery and four replicate core samples for infaunal analysis and one core for particle size analysis (Figure 8). Location data are provided in Appendix 5. The faunal cores were screened using a 0.5 mm mesh.

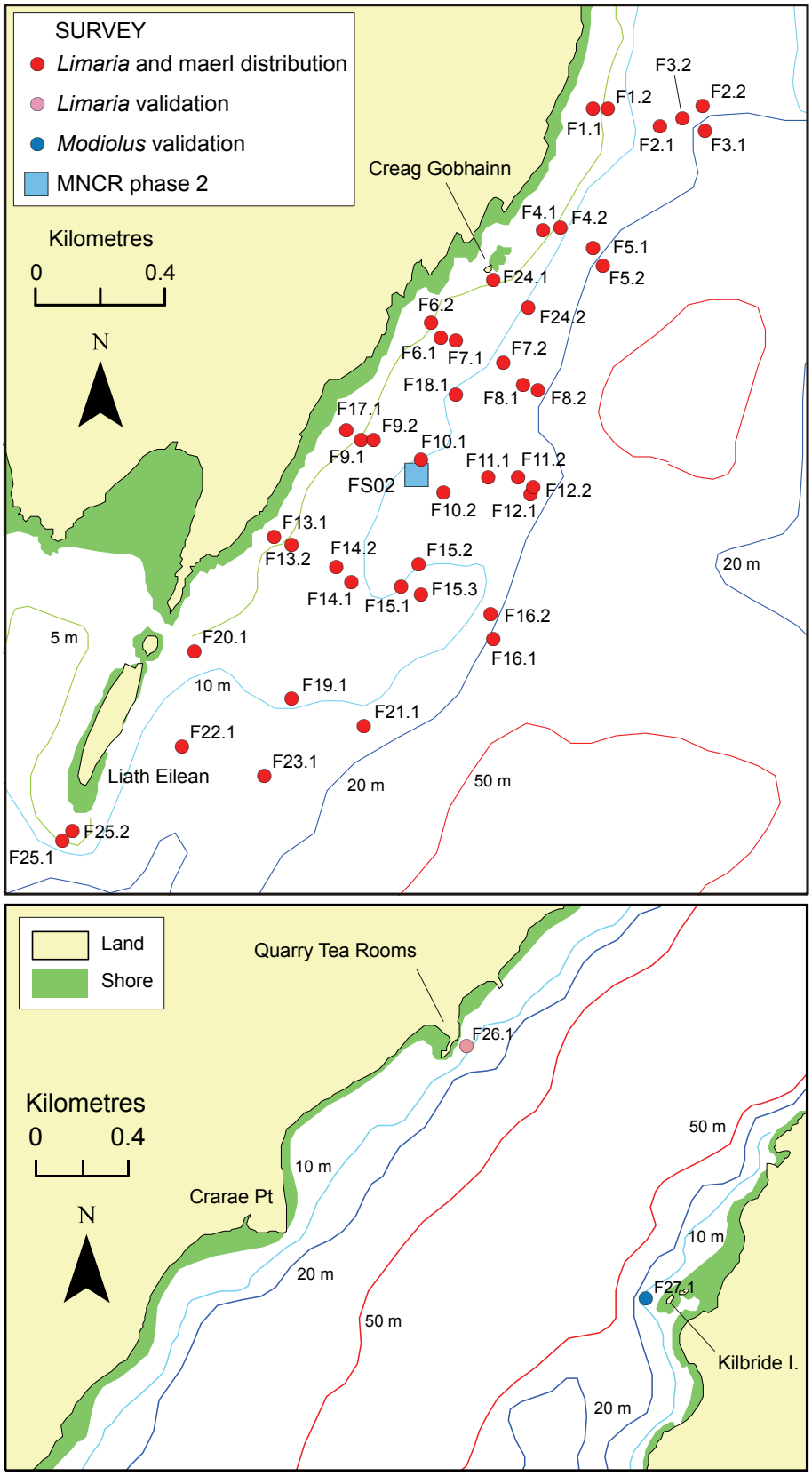

Figure 8. Distribution of diver survey stations in the Otter Spit (upper figure) and Furnace (lower figure) regions of Loch Fyne. Reproduced by permission of Ordnance Survey on behalf of HMSO. © Crown copyright and database right [2013]. All rights reserved. Ordnance Survey Licence number 100017908.

2.3 Loch Creran

Locations in Loch Creran were surveyed for *Limaria* using a similar methodology of diver swims or drifts along compass bearings to that used in Loch Fyne. However, in view of the smaller anticipated size of the Loch Creran *Limaria* beds and the strong current conditions, the method for position fixing of stations along transects was modified to facilitate a high density of recording stations. Rapid position fixing of stations was achieved by use of a towed surface GPS logger, attached to the SMB, with station positions obtained by the diver recording the time, which was synchronised with GPS time. An algorithm was developed to obtain site positions based on the GPS surface fix and the direction and distance of the GPS receiver layback, calculated from diver records of depth, SMB line length and SMB line direction. Other parameters recorded by diver included percentage cover and thickness of *Limaria* nest material and the observed presence of *Limaria* individuals. Records were made at a total of 152 stations at locations in the mouth of the loch, off South Shian and in the western entrance to Creagan Narrows (Figures 9, 10, Appendix 4: Table 4.1).

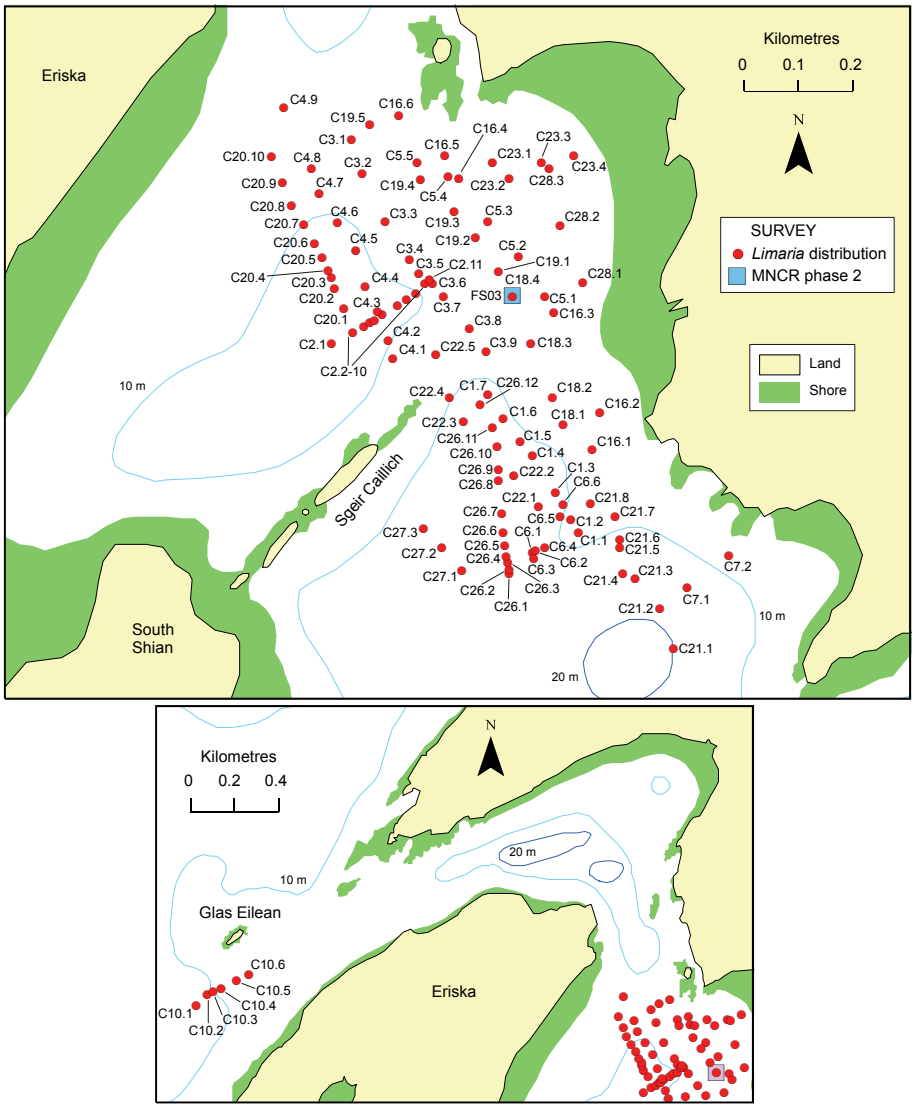

Figure 9. Distribution of diver survey stations in the South Shian (upper figure) and mouth (lower figure) regions of Loch Creran. Reproduced by permission of Ordnance Survey on behalf of HMSO. © Crown copyright and database right [2013]. All rights reserved. Ordnance Survey Licence number 100017908.

MNCR phase 2 surveys were carried out on the *Limaria* bed off South Shian (FS03) and Creagan (FS04), with associated imagery and core collection, and using the same methodology as for Loch Alsh (Figures 9 and 10, Appendix 5: Table 5.1).

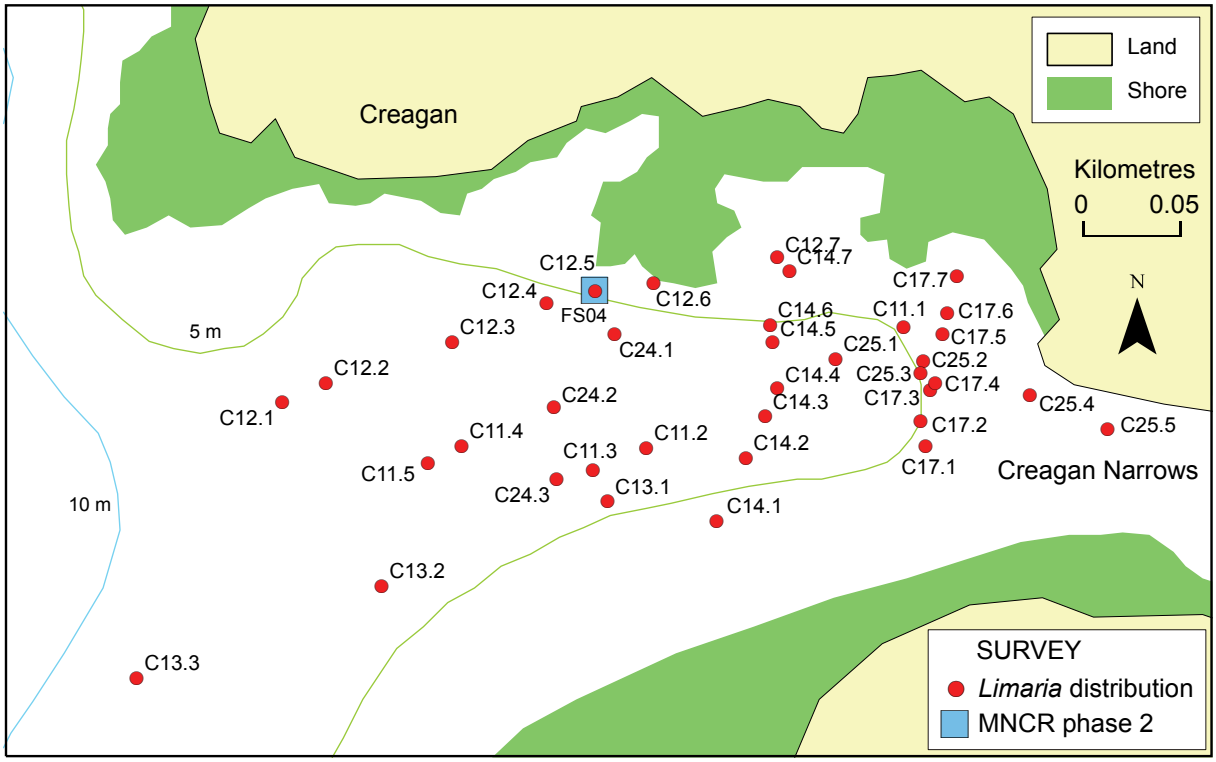

Figure 10. Distribution of diver survey stations off Creagan in Loch Creran. Reproduced by permission of Ordnance Survey on behalf of HMSO. © Crown copyright and database right [2013]. All rights reserved. Ordnance Survey Licence number 100017908.

3. RESULTS

3.1 Loch Duich

3.1.1 Video survey

3.1.1.1 Biotope distribution (Figure 11)

Most of Loch Duich is floored by burrowed mud, which was recorded at 26 of the 32 sites examined. The predominant biotope was **SS.SMu.CFiMu.SpnMeg.Fun** which was found in the central and outer loch below depths of 34 - 37 m, but extended to 19 m at the head of the loch. At most sites the mud was densely burrowed by megafaunal crustaceans, especially thalassinidean shrimps (probably mainly *Calocaris macandreae*), but also including *Nephrops norvegicus*, *Jaxea nocturna* and *Goneplax rhomboides*, as well as the burrowing goby, *Lesueurigobius friesii*. The sea pen fauna included *Virgularia mirabilis* and *Pennatula phosphorea* but was dominated by large numbers of *Funiculina quadrangularis*, common or abundant at most sites. In shallow waters (16 - 18 m) at the head of the loch *V. mirabilis* was the only sea pen recorded (**SS.SMu.CFiMu.SpnMeg**).

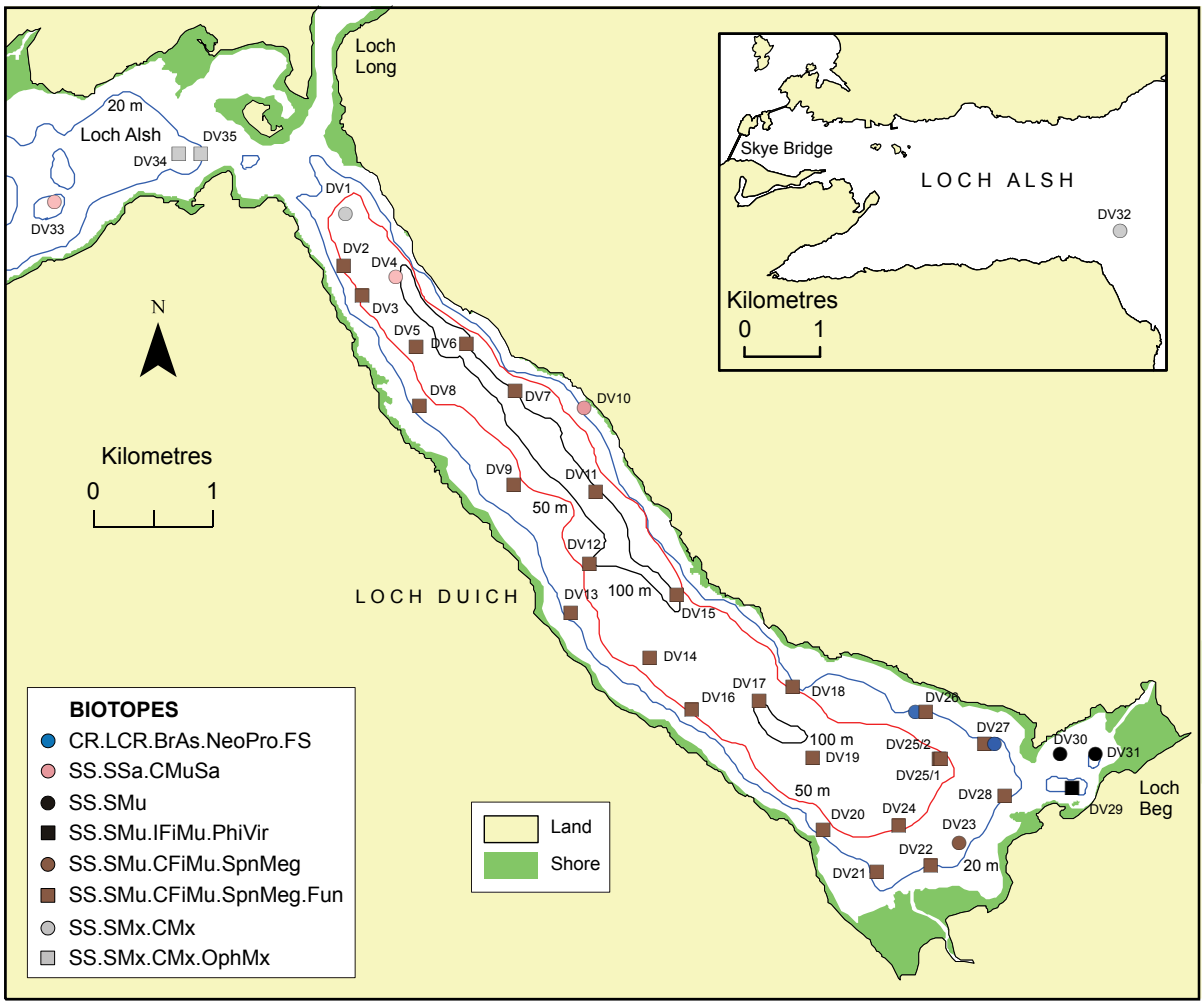

Figure 11. Distribution of biotopes in Loch Duich and approaches, with inset showing additional site in west Loch Alsh. Reproduced by permission of Ordnance Survey on behalf of HMSO. © Crown copyright and database right [2013]. All rights reserved. Ordnance Survey Licence number 100017908.

Burrowed mud habitats were not observed to extend into Loch Beg. Here, shallow mud (14 - 23 m) supported a population of spawning *Philine aperta* and *Virgularia mirabilis* (**SS.SMu.IFiMu.PhiVir**), which gave way at 27 - 29 m to large numbers of *Ophiura ophiura* accompanied by patches of *F. quadrangularis* (**SS.SMu**). At sites along the eastern side of Loch Duich above a depth of around 30 m the mud plain was replaced by a slope of muddy sand (**SS.SSa.CMuSa**) or muddy sediment accompanied by pebbles, cobbles and boulders supporting a sessile fauna dominated by *Protanthea simplex* and ascidians such as *Ciona intestinalis* and *Corella parallelogramma* (**CR.LCR.BrAs.NeoPro.FS**). Coarser substrates were also observed close to the mouth of Loch Duich in the form of muddy sand (**SS.SSa.CMuSa**) and mixed pebbly sediments (**SS.SMx.CMx**), supporting dense beds of *Ophiothrix fragilis* and *Ophiocomina nigra* (**SS.SMx.CMx.OphMx**) in strongly tide-swept conditions.

3.1.1.2 MPA search feature distribution (Figure 12)

As predicted from historical records (section 1.2.2), burrowed mud covers most of the sea bed of Loch Duich, largely in the form of **SS.SMu.CFiMu.SpnMeg.Fun**. The component species, *Funiculina quadrangularis*, was generally recorded in high abundance and was only absent from a single site at the head of the loch (**SS.SMu.CFiMu.SpnMeg**). It also spread into Loch Beg, although not accompanied by megafaunal burrows. Elsewhere, the mud was generally densely burrowed by megafaunal crustaceans but supported a low to moderate diversity infaunal community.

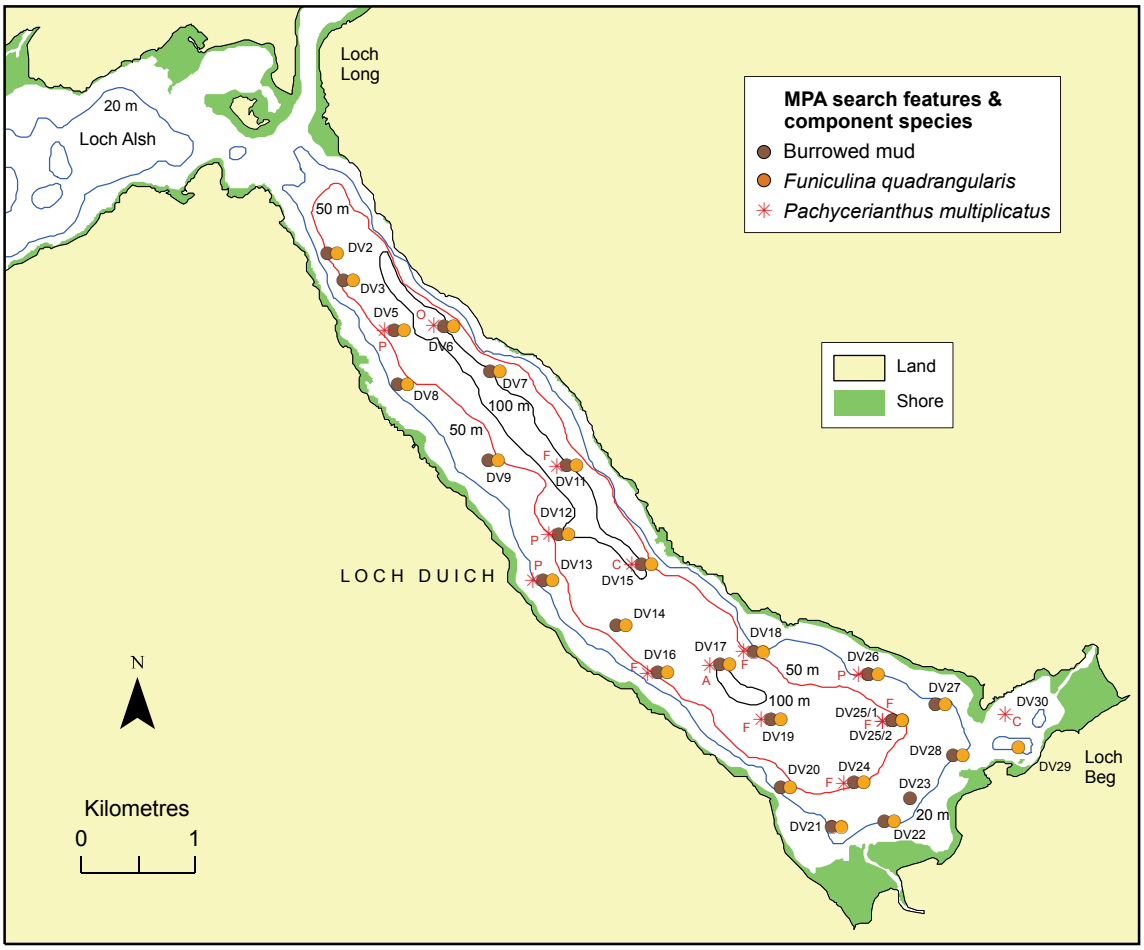

Figure 12. Distribution of MPA search features and component species in Loch Duich. Pachycerianthus multiplicatus *SACFOR abundance given in red. Reproduced by permission*

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The widespread distribution of *Pachycerianthus multiplicatus* indicated by historical records (section 1.2.2) was borne out by the 2012 survey, with occurrence at 15 sites throughout the loch system and high densities at locations in both Loch Duich (present - abundant) and Loch Beg (common) (Figure 12).

There was no evidence for the presence of **SS.SMu.CFiMu.BlyrAchi** in Loch Duich. At the only site currently ascribed to this biotope in Marine Recorder (based on data from the 1988 survey by Connor (1989)), video and infaunal samples from the 2012 survey (site DV17) revealed a typical **SS.SMu.CFiMu.SpnMeg.Fun** community, with the **BlyrAchi** characterising species sparse (*Amphiura chiajei*) or absent (*Brissopsis lyrifera*). Indeed, no *Brissopsis* tests or live material was observed throughout the 2012 survey. Video and infaunal samples in 2012 from the vicinity of the 1988 (Connor, 1989) and 1995 (SNH, 1995) records of **SS.SMu.CFiMu.MegMax** in Loch Duich (respectively sites DV6 and DV5), revealed burrowed mud supporting occasional *Funiculina quadrangularis* but no *Maxmuelleria lankesteri* (**SS.SMu.CFiMu.SpnMeg.Fun**). Neither *Maxmuelleria* mounds nor specimens were recorded anywhere in Loch Duich during the 2012 survey.

3.1.2 Infaunal survey

Granulometric data for the grab sites are provided in Appendix 3, with Table 3.2 showing summarised descriptors, Table 3.3 raw data and Figures 3.1 - 3.2 cumulative weight curves. Species abundance data are given in Table 3.4, with total abundance, diversity and biotope allocations in Table 3.5.

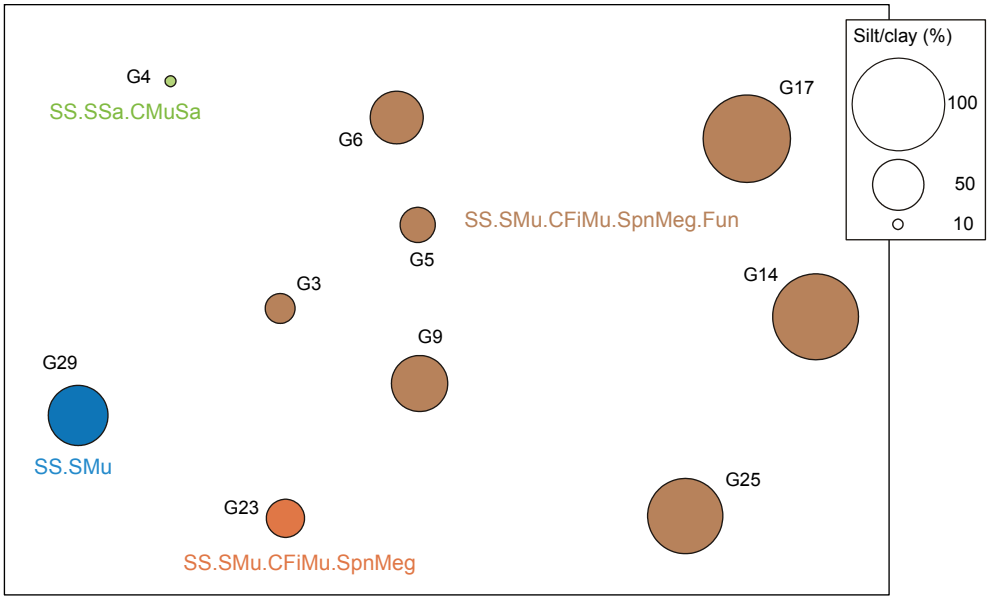

Figure 13. Multidimensional scaling analysis plot of logged species abundance data from all grab samples. Symbols scaled by silt/clay content and coloured by assigned biotope. Stress = 0.08.

The multidimensional scaling plot of the species abundance data (Figure 13) shows the sites supporting burrowed mud communities and *Funiculina quadrangularis* (**SS.SMu.CFiMu.SpnMeg.Fun**) separating into two groups, differing in silt/clay content and location. Sites G14, G17 and G25 are located in the upper loch (Figure 12) and exhibit high silt/clay contents (80 - 93%). Both diversity (10 - 15 taxa per grab) and abundance (19 - 34

ind./0.1m^2) are very low but not atypical for the inner regions of Scottish lochs (Moore *et al*., 2011). Sites G3, G5, G6 and G9 are located in the lower loch and have a lower silt/clay content (32 - 60%) and moderate levels of diversity (29 - 50 taxa per grab) and abundance (132 - 303 ind./0.1m^2). The difference in infaunal composition between these groupings is largely a reflection of the diversity pattern. G23 is a burrowed mud site located at the head of the loch but in terms of silt/clay content, species composition, diversity and abundance is closer to the lower loch burrowed mud sites. It was the shallowest site examined (17.1 m) and the infauna differs from all the other burrowed mud sites in the dominance of *Turritella communis* (**SS.SMu.CFiMu.SpnMeg**). Site G29 is also located at the head of the loch within the very sheltered embayment of Loch Beg. The infauna is strongly dominated by *Thyasira flexuosa* and *Mediomastus fragilis* and a number of species not recorded elsewhere, especially *Scalibregma inflatum* and *Melinna palmata*. This community suggests affinities with infralittoral and circalittoral sandy mud biotopes but the presence of a number of species, such as *Funiculina quadrangularis* and *Sagartiogeton laceratus*, characteristic of the adjacent biotopes, **SS.SMu.CFiMu.SpnMeg.Fun** and **SS.SMu.IFiMu.PhiVir**, is indicative of a transitional community (ascribed to **SS.SMu**). G4 is a deep (106 m), muddy sand (12% silt/clay) site near the mouth of the loch. The sediment supports a high diversity infaunal community (86 taxa per grab), differing from other sites by the inclusion of a number of species characteristic of coarser sediments, such as *Nucula nucleus* and *Timoclea ovata* (**SS.SSa.CMuSa**).

3.2 Loch Alsh

3.2.1 String Rock Modiolus *bed condition monitoring*

3.2.1.1 *Modiolus* density

The number of cross string intersections overlying living *Modiolus* shells in the ten replicate quadrats employed at 14 stations in 2012 is provided in Table 6.2 (Appendix 6). The derived mean value for percentage cover of 6.83% is compared with measures from previous surveys (respectively Mair *et al*., 2000; Emu Ltd., 2006, Marine Bio-images, 2007) in Table 2. Two values are provided for 2004 as the earlier statistical comparison of the 1999 and 2004 data by Thomas and New (2006) only utilised five replicates from each station, although more replicates were employed at three of the 2004 stations. Table 2 provides cover values for the same 14 stations surveyed in 1999, 2004 and 2012 and for a subset of 12 stations to permit comparisons with 2007, when two stations were not surveyed.

Table 2: Mean percentage cover of Modiolus modiolus *for the current and previous surveys of the Loch Alsh String Rock* Modiolus *bed. Values in brackets are derived from the initial five replicates. N/A = not applicable.*

No. stations	Survey year			
	1999	**2004**	**2007**	**2012**
14	29.02	15.60 (14.55)	N/A	6.83
12	29.48	15.70 (14.48)	10.51	6.93

The mean values are suggestive of a marked temporal reduction in cover from around 29% in 1999 to 7% in 2012.

In their comparison of the 1999 and 2004 data Thomas and New (2006) discussed and applied various approaches to the statistical analysis of temporal cover data and recommended the adoption of a one sample t-test for the comparison of two surveys. This involves determination of the mean cross-string hit count for each station and derivation of the temporal difference in mean counts for each station. The t-test compares these actual differences with a null hypothesis of zero difference. Although the cross-string counts, which

are constrained between 0 and 16, could not be assumed to approximate a normal distribution, due to the central limit theorem there should not be a problem in treating the differences between mean counts as having a normal distribution, and this was borne out by the statistical analyses of Thomas and New (2006). For the assessment of significant temporal differences in *Modiolus* percentage cover between all surveys the one sample t-test has been employed here, but to avoid inflation of type 1 errors through multiple comparisons, significance levels have been adjusted using Holm's sequential Bonferroni procedure (Holm, 1979).

T-tests between years utilising all 14 stations reveals a highly significant ($p<0.01$) temporal reduction in cover between 1999 and 2004 (as reported by Thomas and New (2006)) and from 2004 to 2012. Basing the comparisons on 12 stations permits the inclusion of the 2007 survey, the results being summarised in Table 3. In addition to the significant temporal changes revealed above, this analysis also shows a reduction in cover between 2007 and 2012, although there was no significant difference between levels in 2004 and 2007.

A comparison of the depths at the survey stations in 1999 and 2012 shows that there was very little temporal difference in depths for the 11 stations along the transect (T1/0 - T1/10), the maximum deviation at any one station being 0.2 m, but one of the other three stations worked was 1.7 m deeper in 2012. Repetition of the multiple comparison analysis with the exclusion of this station results in an identical outcome.

Table 3. Temporal comparisons of Modiolus modiolus *percentage cover data from four surveys of the Loch Alsh String Rock* Modiolus *bed, showing the significance level (p) of the difference in cover based on one sample t-tests with probability values adjusted by Holm's sequential Bonferroni procedure*

Year	1999	2004	2007
2004	<0.01		
2007	<0.05	>0.05	
2012	<0.01	<0.05	<0.05

3.2.1.2 *Modiolus* size frequency analysis

Dimensions of the 159 live shells collected at station HM01 are provided in Table 6.1 (Appendix 6) and the length frequency distribution is shown in Figure 14.

Although distinction between juvenile *Modiolus modiolus* and *Modiolula phaseolina* followed the published literature (Tebble, 1966; Oliver *et al*., 2010), a small element of doubt remains regarding the assignment of all small specimens. In 2012 shell lengths were predominantly from 58 - 116 mm representing an age range of 7 - 17 years, based on the von Bertalanffy growth model for this site (Mair *et al*., 2000). All the smallest specimens exhibited the characteristics of *M. phaseolina*, apart from two individuals which were possibly *M. modiolus*. It would appear that recruitment to the adult *Modiolus* population has been insignificant over the last six years. Mair *et al*. (2000) concluded that successful recruitment had not taken place for the preceding five years before their 1999 survey. However, clearly some successful recruitment has occurred between the 1999 and 2012 surveys, as there is no marked temporal shift in the size frequency distribution towards larger shells (Figure 14).

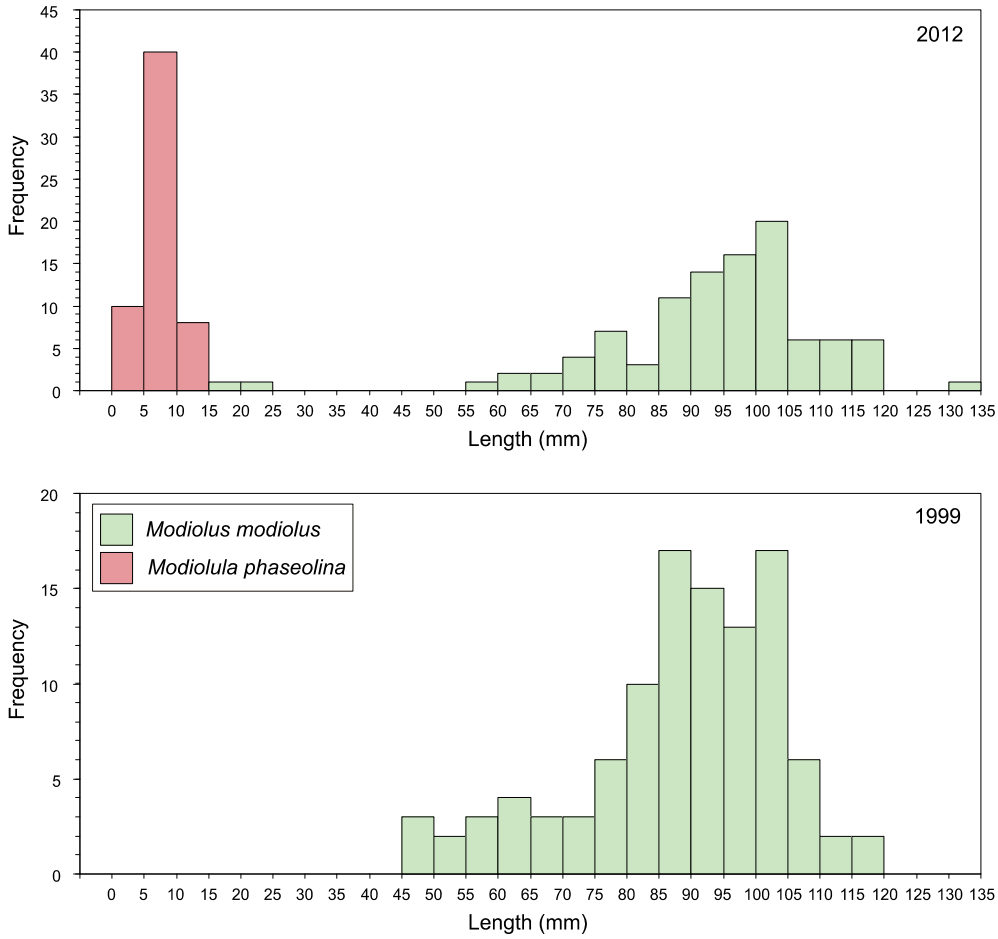

Figure 14. Length frequency distribution of Modiolus modiolus *from station HM01 in Loch Alsh for the current (2012) and previous (1999) surveys, with indication of material likely to be* Modiolula phaseolina*.*

3.2.2 Modiolus *distribution survey*

The detailed results of the diver survey are given in Appendix 4. They are collated and summarised here. *Modiolus modiolus* was found to be widely distributed in Kyle Akin but high densities (i.e. common - abundant) were restricted to beds at String Rock and north of Kyleakin, separated by an area of low abundance (Figure 15). Extent estimates based on polygon area measurements are 11.7 ha for Kyleakin and 6.2 ha for the String Rock bed, although deep water prevented the delineation of the eastern margin of this bed. Both beds are mixed *Modiolus/Limaria* habitats.

Despite extensive examination of the area beneath the Skye Bridge the historical record of a *Modiolus* bed here (Scott, 1991) could not be validated, nor were beds found at historical record sites to the north-east of Eilean Bàn (Scott, 1991) and north-east of Eileanan Dubha (Connor, 1989), although *Modiolus* occurred at low density at this latter site (Figures 2, 15).

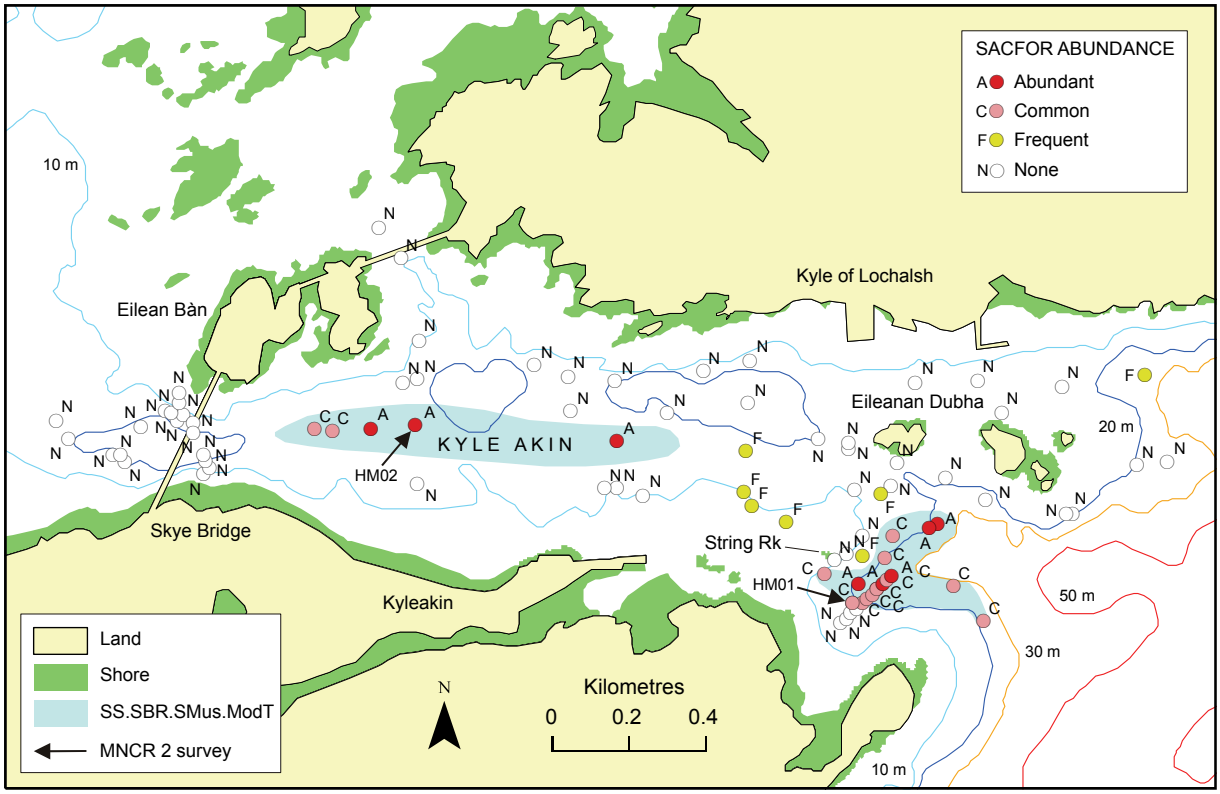

Figure 15. Distribution of Modiolus *beds in Loch Alsh (blue polygons). Circles denote Modiolus abundance measures (SACFOR scale). Reproduced by permission of Ordnance Survey on behalf of HMSO. © Crown copyright and database right [2013]. All rights reserved. Ordnance Survey Licence number 100017908.*

3.2.3 Modiolus *bed MNCR phase 2 surveys*

3.2.3.1 String Rock (HM01)

The transect was located 150 m south of String Rock near the south-western edge of the bed at a depth of 18.4 - 20.2 m (Figure 15). The substrate was composed of silty sand and shell gravel with much dead shell material and scattered pebbles, some of which was bound together by *Limaria* byssus forming a shelly turf covering around 50% of the sea bed. Live *Modiolus modiolus* was generally common but abundant in patches and *Limaria hians* abundant. Dense brittlestars were present, largely *Ophiothrix fragilis*, but they did not blanket the sea bed, and they were accompanied by large numbers of *Antedon bifida*. The algal flora included scattered plants of *Saccharina latissima* and *Chorda filum* and a fairly sparse patchy turf including occasional *Heterosiphonia japonica*. Full details of the biota present are provided in Table 5.2 (Appendix 5). The site is considered to represent a combination of the biotopes **SBR.SMus.ModT**, **SS.SMx.IMx.Lim** and **SS.SMx.OphMx**. The overall impression was of a fairly diverse community and this was supported by the total of 74 taxa recorded. A similar level of diversity (77 taxa) was recorded at this site in 1999 by Mair *et al*. (2000).

Analysis of the *Modiolus* clump samples revealed a rich associated biota with a total of 222 non-overlapping taxa recorded, with individual clumps supporting 125 - 146 taxa (Appendix 5, Table 5.3). This is similar to the diversity reported at this site in 2004 (118 - 142 taxa per clump; Emu Ltd., 2006) but greater than the 90 - 116 taxa per clump recorded in 1999 by Mair *et al*. (2000) ($p<0.05$, one-way analysis of variance with *a posteriori* Tukey test). Algae of interest in the current survey included *Heterosiphonia japonica* (present in all replicates) and *Aglaothamnion diaphanum*, only previously known from Cornwall within the UK. Four

species of boring sponge were recorded within *Modiolus* shells, including *Cliona caledoniae*, only recently described from the Mingulay *Lophelia* reefs (van Soest and Beglinger, 2009).

3.2.3.2 Kyleakin (HM02)

The transect was located at a depth of 14.4 - 16.0 m near the middle of the Kyle Akin channel in a strongly current-swept area (Figure 15). The substrate of *Modiolus* shell rubble with silty shell sand and gravel was bound by the byssal threads of abundant *Limaria hians*. Live *Modiolus* was common but was largely obscured from vision by a blanket of dense brittlestars including superabundant *Ophiothrix fragilis* and locally abundant *Ophiocomina nigra* and *Ophiopholis aculeata*. Tufts of *Rhizocaulus verticillatus* emerged above the blanket but the overall impression was of fairly low diversity. Only 47 epibiotic taxa were recorded, which included sparse *Heterosiphonia japonica*. As at site HM01, the habitat is considered to represent a combination of the biotopes **SBR.SMus.ModT**, **SS.SMx.IMx.Lim** and **SS.SMx.OphMx**.

The *Modiolus* clump samples appeared much more sparsely populated with epibiota than at site HM01 with laboratory analysis revealing a total of 163 taxa, with individual clump samples containing 93 - 100 taxa, significantly fewer than at site HM01 (two-sample t-test, p = 0.004). *Aglaothamnion diaphanum* and *Cliona caledoniae* were also present at this site.

3.2.4 Limaria *distribution survey*

The detailed results from the *Limaria* distribution study are provided in Appendix 4 and mapped in Figure 16.

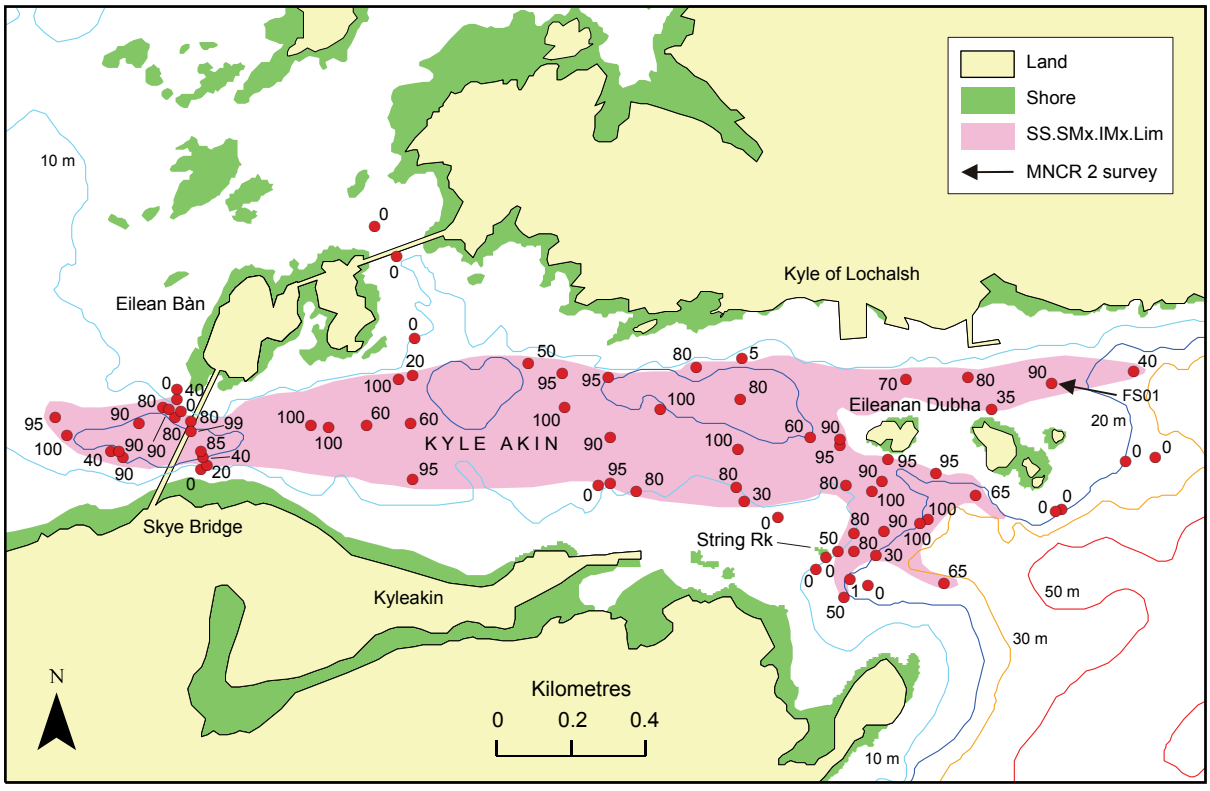

Figure 16. Distribution of the Limaria *bed in Loch Alsh. Red circles and accompanying labels denote* Limaria *nest cover measurements (%). Reproduced by permission of Ordnance Survey on behalf of HMSO. © Crown copyright and database right [2013]. All rights reserved. Ordnance Survey Licence number 100017908.*

Dense *Limaria* nest material covered most of the sea bed below the 10 m depth contour throughout Kyle Akin, extending from west of the Skye bridge to Eileanan Dubha. The western limit was not precisely defined, although farther significant extension of the bed is most unlikely given the rapid widening of the channel and concomitant current reduction west of the bridge. A minimum of 10% coverage of the sea bed by *Limaria* nest material has been adopted as a working definition of a *Limaria* bed and the *Limaria* biotope, **SS.SMx.IMx.Lim**. Based on this figure the Kyle Akin bed was found to cover an area of 75 ha. In fact at the great majority of sites byssus coverage was very high (mean = 77%), with around 70 ha displaying levels in excess of 50%. Nest thickness ranged from 2 to15 cm with a mean of 6 cm. The appearance of the bed varied regionally (Figure 17) with some areas exhibiting a spongy turf of byssus threads (e.g. site FS01), and other locations where byssus threads bound together dense dead and living *Modiolus* shell material and stones (e.g. site HM01). At most sites the bed supported dense populations of brittlestars (abundant or superabundant), principally *Ophiothrix fragilis* and *Ophiocomina nigra*.

Figure 17. Habitat photographs of the Limaria *bed at sites FS01 (left) and HM01 (right), Loch Alsh.*

The distribution of the *Limaria* bed as depicted in Figure 16 subsumes all locations of historical records of the biotope in Kyle Akin (see Figure 2). Elsewhere in Loch Alsh, the dropdown video survey (see Figure 11) found no evidence of *Limaria* presence at sites predicted to support beds by the 1996 broadscale survey of Johnston *et al*. (2000) (see Figures 2, 3).

3.2.5 Limaria *bed MNCR phase 2 surveys*

Surveys were carried out at three sites, two of which were combined *Modiolus/Limaria* beds and are considered in section 3.2.3.

3.2.5.1 North-east Eileanan Dubha (FS01)

The transect was located 150 m north-east of Eileanan Dubha near the eastern edge of the bed at a depth of 16.5 - 16.8 m (Figure 16). The substrate of clean, coarse, shell sand supported a spongy layer of *Limaria* byssus threads covering 80 - 90 % of the sea bed which housed abundant *Limaria hians* and provided a habitat for a rich associated community, 78 taxa being recorded. Scattered *Saccharina latissima* plants were accompanied by an abundant algal turf dominated by *Kallymenia reniformis*, *Bonnemaisonia asparagoides*, *B. hamifera*, *Heterosiphonia japonica* and *Plocamium cartilagineum*. Amongst the fauna, dominant sessile forms included *Nemertesia antennina*, *N. ramosa* and *Polycarpa pomaria*, while the motile element was represented by *Munida rugosa*, *Pagurus bernhardus*,

Buccinum undatum, *Crossaster papposus* and *Echinus esculentus*. *Cliona caledoniae* was also present in shell material at this site. Full details of the biota present are provided in Table 5.2 (Appendix 5). The site is clearly referable to the biotope, **SS.SMx.IMx.Lim**. Core samples included 106 taxa, with a mean of 56 taxa per core. The species abundance data are provided in Table 5.6 (Appendix 5), with comparative discussion in section 4.1.1.

3.3 Loch Fyne

3.3.1 Limaria *distribution survey*

The detailed results from the *Limaria* distribution study are provided in Appendix 4 and mapped in Figure 18. An extensive bed of *Limaria* was recorded at Otter Spit, 500 m to the south of Creag Gobhainn, extending from the 5 m contour to a maximum depth of 15.4 m and covering 50 ha.

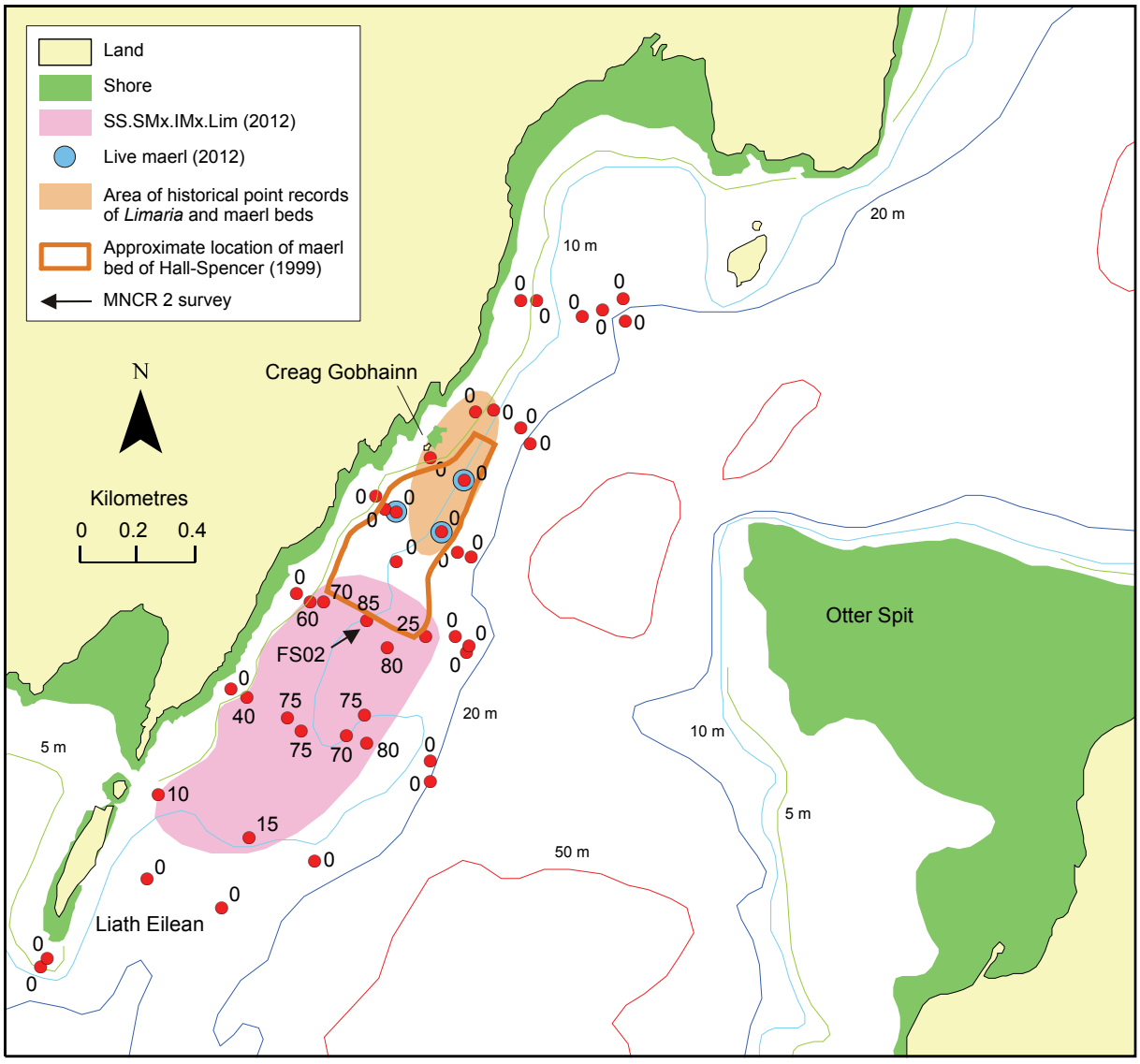

Figure 18. Distribution of the Limaria *bed and observations of live maerl presence at Otter Spit, Loch Fyne. Red circles and accompanying labels denote* Limaria *nest cover measurements (%). Also shown is a polygon delimiting the area of historical point records of* Limaria *and maerl beds off Creag Gobhainn and the approximate location of a maerl bed described by Hall-Spencer (1999). Reproduced by permission of Ordnance Survey on behalf*

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Around half this area (27 ha) is estimated to consist of dense *Limaria* nest material of spongy consistency (>50% cover). The underlying substrate was largely shelly gravel and coarse sand. Nest thickness ranged from 3 - 10 cm with a mean of 6 cm. At most sites the nest supported superabundant or abundant brittlestars, with varying dominance of *Ophiothrix fragilis* and *Ophiocomina nigra* (Figure 19). In places the *Limaria* turf provided anchorage for a park of *Laminaria hyperborea* or *Saccharina latissima*.

Figure 19. Habitat photograph of the Limaria *bed at site FS02, Loch Fyne, with dense* Ophiocomina nigra *and* Ascidiella aspersa.

The delineated offshore margin of the bed lies close to the 1988 record of the *Limaria* biotope by Davies (1989) (Figure 4, site 65) but the bed as a whole lies well to the south of most of the historical records, which are clustered around Creag Gobhainn (Figure 18 and Figure 4 for details). The closest of these records is that of Hall-Spencer and Moore (2000a), which lies 200 m to the north. This fairly recent record, whose position is GPS derived, is of a continuous byssus reef at 15 m depth extending over several hectares, 10 - 20 cm in thickness. No trace of this feature was observed at this location in 2012, and indeed nowhere were *Limaria* turfs of 10 - 20 cm thickness encountered. The bed appears to have declined over part of its former range.

One validation dive was carried out off the Quarry Tea Rooms in the upper part of Loch Fyne (Figure 4, site 68), where the presence of *Limaria hians* was recorded along the breakwater by Seasearch divers in 2009 (MCS, 2009). Despite a zigzag search of the breakwater over the recorded depth range, no *Limaria hians* were observed. The habitat appeared quite unsuitable for the development of a *Limaria* bed.

3.3.2 Limaria *bed MNCR phase 2 survey (FS02)*

The transect was located in the northern part of the Otter Spit bed at a depth of 11.0 - 11.9 m (Figure 18). The substrate of poorly sorted shell sand was coated in a 5 cm thick patchy turf (60% coverage) of *Limaria* nest material containing abundant *Limaria hians* and

supporting dense populations of *Ophiocomina nigra* and *Ascidiella aspersa* (Figure 19). Other numerous forms included in the total of 64 taxa recorded were *Nemertesia antennina*, *Cerianthus lloydii*, *Pagurus bernhardus*, *Hyas araneus* and *Aequipecten opercularis*, with *Cliona caledoniae* recorded in *Buccinum undatum* shell material. *Heterosiphonia japonica* was a dominant constituent of a patchy red algal turf. Full details of the biota present are provided in Table 5.2 (Appendix 5). The site can be considered to represent a combination of the biotopes **SS.SMx.IMx.Lim** and **SS.SMx.OphMx**. Core samples included 81 taxa, with a mean of 51 taxa per core. The species abundance data are provided in Table 5.6 (Appendix 5), with comparative discussion in section 4.1.1.

3.3.3 Maerl distribution survey

No evidence of a maerl bed at Otter Spit was found despite fairly high intensity surveying in areas of previous records. Note that divers not only recorded observations at station points but also searched for live maerl between adjacent pairs of stations; this resulted in observations along three transects passing through the area of most historical records off Creag Gobhainn (Figure 18). Hall-Spencer (1999) described a maerl band between depths of 6 - 14 m occupying 17.5 ha 300 m to the south of Creag Gobhainn; a polygon of this extent, centred at this location, is illustrated in Figure 18. Only scattered live rhodoliths with a maximum density of 1% cover were observed at three sites in the Creag Gobhainn area (Figure 18), compared to a density of 25% cover cited by Hall-Spencer (1999). Around 10% cover of dead maerl was recorded at two sites here. It seems likely that this bed has now been lost.

Only the encrusting form of *Lithothamnion glaciale* was recorded at a site to the south of Liath Eilean, where a previous 1988 record (Davies, 1989) has probably been erroneously ascribed to a maerl biotope in Marine Recorder.

3.3.4 Modiolus *bed validation survey*

Modiolus was not a focus of attention for this survey in the Otter Spit area, although the SACFOR abundance of *Modiolus* was recorded during the *Limaria*/maerl survey work. No live *Modiolus* was observed.

A validation dive was carried out off Kilbride Island (Figure 4), where Davies (1989) recorded *Modiolus modiolus* to be common along a mixed sediment slope from 19.5 - 27. 5 m in 1988 (**SS.SBR.SMus.ModCvar**). This depth range was searched but only scattered dead *Modiolus* shells were observed.

3.4 Loch Creran

3.4.1 Shian Limaria *distribution survey*

The detailed results from the *Limaria* distribution study are provided in Appendix 4 and mapped in Figure 20. A *Limaria* bed was recorded in an area of accelerated currents off the Sgeir Caillich promontory at South Shian on a generally mixed substrate of sand, gravel, shell material, pebbles and cobbles in varying proportions. The bed extended over an area of 18 ha, mostly as a dense, spongy *Limaria* turf (c. 14 ha >50% cover) and covered a depth range of 3.9 - 18.5 m. Nest thickness averaged 5.4 cm with a range of 2 - 15 cm. The *Limaria* turf supported a *Laminaria hyperborea* forest and park in places and occasional *Modiolus modiolus* (Figure 21). Unlike all the other locations studied in 2012, brittlestars appeared sparse throughout the Shian bed. The distribution of the bed is largely in accordance with the historical records at this location (Figure 5).

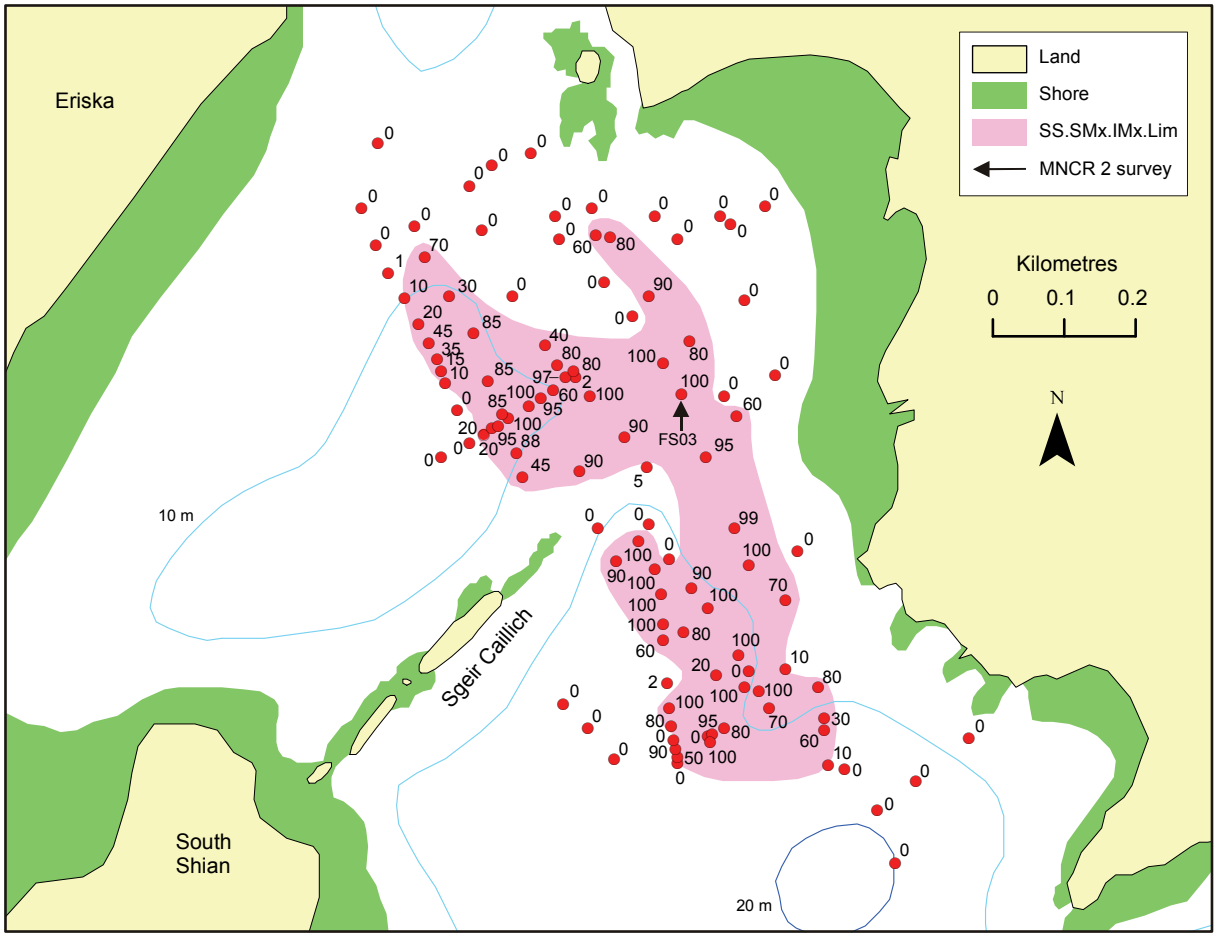

Figure 20. Distribution of the Limaria *bed at Shian, Loch Creran. Red circles and accompanying labels denote* Limaria *nest cover measurements (%). Reproduced by permission of Ordnance Survey on behalf of HMSO. © Crown copyright and database right [2013]. All rights reserved. Ordnance Survey Licence number 100017908.*

Figure 21. Habitat photographs of the Limaria *bed at Shian (site FS03), showing kelp park on left and red algal turf dominated by* Plocamium cartilagineum *(taller, dark red) and* Heterosiphonia japonica *(shorter, light red scrub).*

3.4.5 Creagan Limaria *bed MNCR phase 2 survey (FS04)*

To permit adequate survey time in this strongly tide-swept area, the transect was located in the westernmost patch of *Limaria* habitat (Figure 22) on a sea bed of silty gravelly sand with *Modiolus* shell rubble at a depth of 6.0 - 7.3 m. Much of the shell rubble (around 70% in area) was bound together by large *Limaria hians* (common) and *Modiolus modiolus* (abundant) and supported a blanket of *Ophiothrix fragilis*. Other dominant members of the faunal community included *Pagurus bernhardus*, *Carcinus maenas*, *Asterias rubens* and abundant *Psammechinus miliaris*. Apart from frequent *Laminaria hyperborea* and occasional *Saccharina latissima*, algae were poorly represented. Full details of the biota present are provided in Table 5.2 (Appendix 5). The overall impression was of a low diversity community, which was supported by the low total count of recorded taxa (36). The habitat is considered to represent a combination of the biotopes **SBR.SMus.ModT**, **SS.SMx.IMx.Lim** and **SS.SMx.OphMx**. Core samples included 74 taxa, with a mean of 40 taxa per core. The species abundance data are provided in Table 5.6 (Appendix 5), with comparative discussion in section 4.1.1.

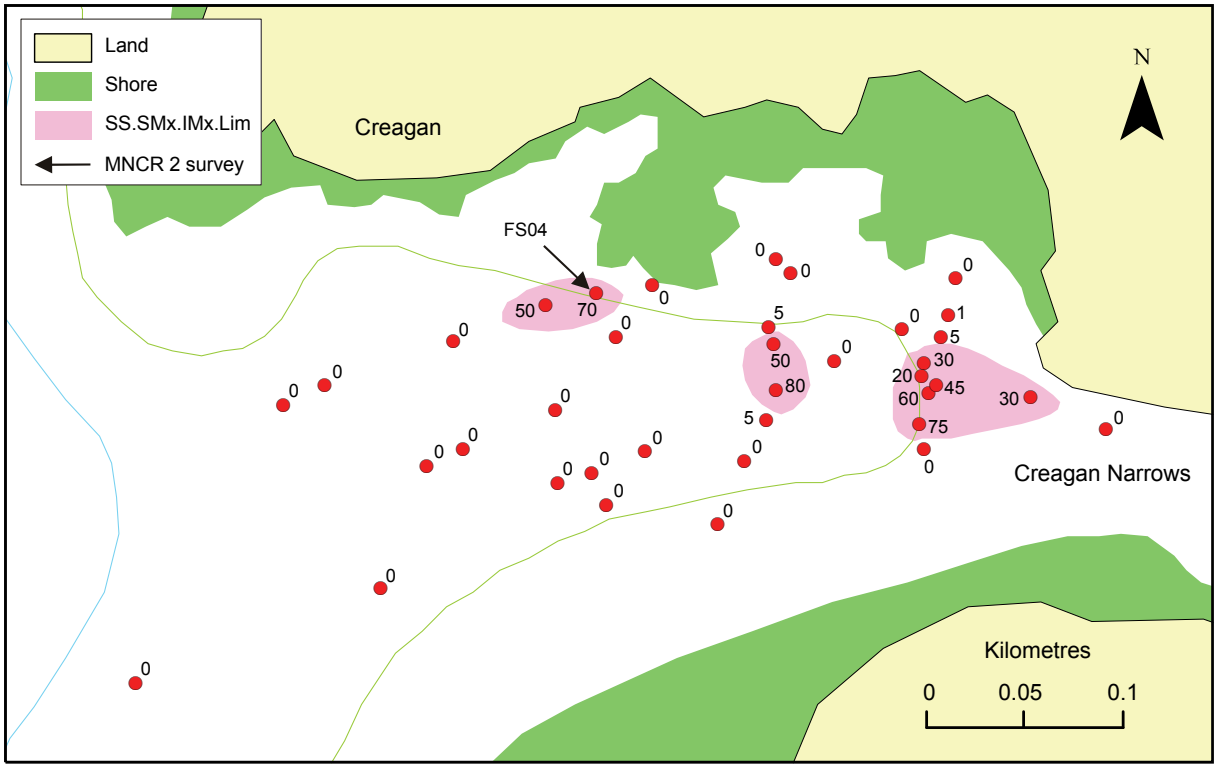

Figure 22. Distribution of the Limaria *bed at Shian, Loch Creran. Red circles and accompanying labels denote* Limaria *nest cover measurements (%).Reproduced by permission of Ordnance Survey on behalf of HMSO. © Crown copyright and database right [2013]. All rights reserved. Ordnance Survey Licence number 100017908.*

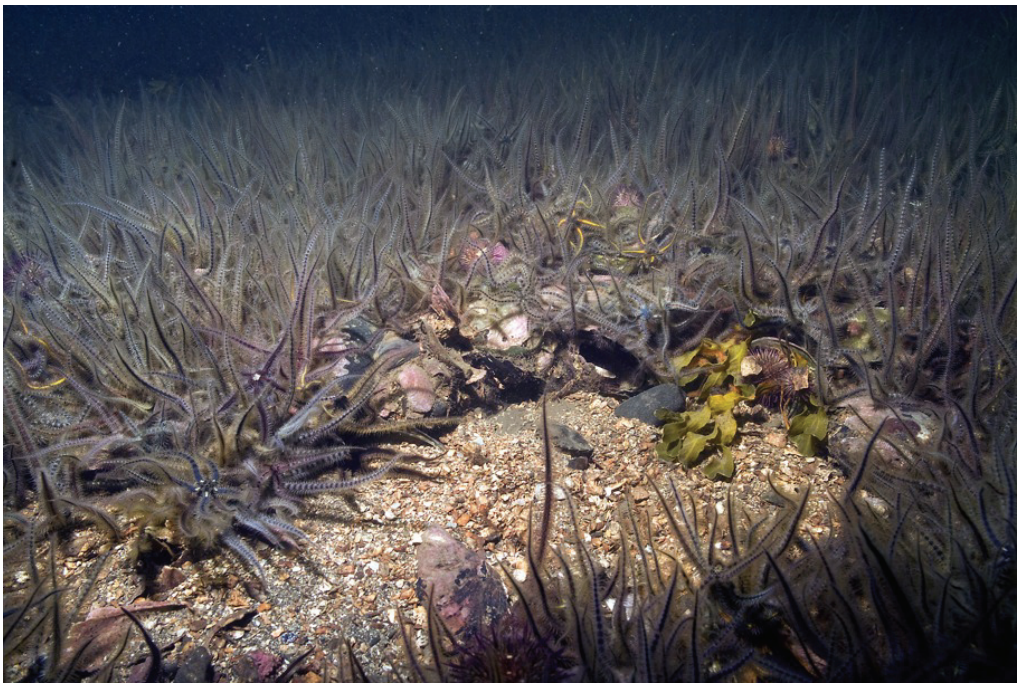

Figure 23. Habitat photograph of the Limaria *bed at Creagan (site FS04), with byssal bound shells supporting dense* Ophiothrix fragilis.

3.4.5 Creagan Limaria *bed MNCR phase 2 survey (FS04)*

To permit adequate survey time in this strongly tide-swept area, the transect was located in the westernmost patch of *Limaria* habitat (Figure 22) on a sea bed of silty gravelly sand with *Modiolus* shell rubble at a depth of 6.0 - 7.3 m. Much of the shell rubble (around 70% in area) was bound together by large *Limaria hians* (common) and *Modiolus modiolus* (abundant) and supported a blanket of *Ophiothrix fragilis*. Other dominant members of the faunal community included *Pagurus bernhardus*, *Carcinus maenas*, *Asterias rubens* and abundant *Psammechinus miliaris*. Apart from frequent *Laminaria hyperborea* and occasional *Saccharina latissima*, algae were poorly represented. Full details of the biota present are provided in Table 5.2 (Appendix 5). The overall impression was of a low diversity community, which was supported by the low total count of recorded taxa (36). The habitat is considered to represent a combination of the biotopes **SBR.SMus.ModT**, **SS.SMx.IMx.Lim** and **SS.SMx.OphMx**. Core samples included 74 taxa, with a mean of 40 taxa per core. The species abundance data are provided in Table 5.6 (Appendix 5), with comparative discussion in section 4.1.1.

4. DISCUSSION

4.1 *Limaria* beds

4.1.1 Comparison of Scottish beds

Extent and condition measures for the *Limaria* beds surveyed are compared in Table 4. Other Scottish beds are included, where data are available, in order to place these beds into a national context. Data from previous studies are also included, where these may aid in assessment of conservation importance.

Bed comparisons are fraught with difficulties introduced by methodological, temporal and worker variability and the degree of representativeness of the parameter measurement of the bed as a whole. The parameter in which most confidence can be placed is bed extent, although even here significant bare patches may be present within delineated margins. Loch Alsh clearly supports the largest known bed in Scotland and apparently the largest reported bed of *Limaria hians* in the world. In fact this site constitutes 50% of the total measured area of dense *Limaria* (>50% nest cover) for Scottish waters. Laudale Narrows and Otter Spit also support large beds, which are very similar in size. However, additional beds have been widely recorded from other parts of Loch Sunart, especially off Risga and Carna (Howson, 1996; Bates *et al*., 2004; Mercer *et al*., 2007). Existing data are too sparse to gauge extent, but these other Sunart beds are likely to be small in size. The Shian bed in Creran is significantly smaller than the Sunart and Fyne beds, although in terms of the extent of dense *Limaria* (>50% cover), it is only slightly smaller than Laudale, which is smaller than Otter Spit. The Loch Broom and Port Appin beds are small, whilst the Creagan bed in Loch Creran is by far the smallest bed surveyed. The extent of Loch Carron beds is unknown. Recent work (Moore *et al*., 2011) failed to confirm the continued presence of reported *Limaria* beds off the Carn Skerries in the Ullapool Approaches and in Little Loch Broom.

Table 4 collates available density data for *Limaria* individuals, some of which have been derived from the collection of small core samples. Because of the resultant low numbers of individuals per replicate, no statistical analysis of the data has been attempted. However, it is clear that Shian (Loch Creran) supports a very dense population. There is a historical record of high densities at Otter Spit (Hall-Spencer and Moore, 2000a), although how typical the cited figure of >700 m^{-2} might be is not stated. The 2012 Otter Spit estimate, based on core samples, will be imprecise, but supports the general visual impression that the bed probably currently supports moderate densities of *Limaria*, similar to Strome Slip (Loch Carron), Loch Alsh, Laudale and Port Appin. Relatively low densities have been recorded from Loch Broom, Conservation Bay (Loch Carron) and Creagan (Loch Creran) and this reflects the visual appearance of nest material at all these sites.

Caution should be exercised in analysing the MNCR phase 2 epibiota data, due to differences in methodology and personnel (though these were standardised for the 2012 surveys), and it is clear that there can be high variation in composition and diversity over the area of a bed. The highest diversities were recorded by the present study in Loch Alsh (74-78 taxa), although diversity was markedly reduced (47 taxa) in an area of dense brittlestar cover. Taxon richness ranged between 55 and 66 at most of the other sites (Port Appin, Otter Spit, Shian and Loch Broom). A high historical record of 70 taxa at Otter Spit (Davies, 1989) will be inflated by the wide depth range surveyed (9.5 - 21.5 m). The lowest diversity was recorded at Creagan, where it is likely to be influenced by both the high brittlestar cover and the reduced salinity resulting from the mixing of surface brackish and deeper saline layers in Creagan Narrows. Surprisingly low diversities were recorded during the recent SCM survey of Laudale Narrows (Mercer *et al*., 2007). Six MNCR phase 2 surveys were carried out in Laudale Narrows. Four of them involved coring and *Limaria* nest cover measurement as the main tasks of the dive and so relatively little effort may have been

expended on the phase 2 survey. At the other two Laudale sites brittlestars were superabundant which may have contributed to the low diversity measures.

Table 4: Extent and condition measures for Scottish Limaria *beds. †superabundant brittlestars present, ††lowest value corresponds with superabundant brittlestar presence, ‡derived from core samples.*

Location	Year	Month	*Limaria* density (m^{-2})	Bed extent (>10% nest cover) (ha)	Bed extent (>50% nest cover) (ha)	No. epibiotic taxa (MNCR survey)	No. faunal taxa in core Range	No faunal taxa in core Mean	Reference
Loch Broom	1991	May				61			Holt, 1991
Loch Broom	2010	Aug	97	7	c.7	57			Moore *et al.*, 2011
Strome Slip (Loch Carron)	2009	Mar	338‡				44-58	50	ERT, 2010
Conservation Bay (Loch Carron)	2009	Mar	84‡				47-55	50	ERT, 2010
Loch Alsh	2012	Aug	275‡	75	70	74-78 47†	44-65	56	This report
Loch Alsh	2009	Mar	295‡				57-62	60	ERT, 2010
Laudale Narrows (Loch Sunart)	2000	Jul	400	51	20				Bates *et al.*, 2004
Laudale Narrows (Loch Sunart)	2006	Jul	229‡			17-44††	32-64††	53 (35†)	Mercer *et al.*, 2007
Port Appin (Loch Linnhe)	1989	Jun				55			Connor, 1990
Port Appin (Loch Linnhe)	2006		348						Trigg & Moore, 2009
Port Appin (Loch Linnhe)	2006	Jun	514				54-75	66	Trigg, 2009
Port Appin (Loch Linnhe)	2007	Feb	343				49-74	63	Trigg, 2009
Port Appin (Loch Linnhe)	2011	Aug		3	c.3	63			Moore *et al.*, 2012
Shian (Loch Creran)	2006-7	Apr-Mar	476-779						Trigg, 2009
Shian (Loch Creran)	2006	Jun	930‡				60-89	75	Trigg, 2009
Shian (Loch Creran)	2007	Feb	955‡				58-68	63	Trigg, 2009
Shian (Loch Creran)	2012	Sep	612‡	18	14	66	53-73	63	This report
Creagan (Loch Creran)	2012	Sep	31‡	0.5	0.1	36†	37-43†	40†	This report
Otter Spit (Loch Fyne)	1988	Aug				70*			Davies, 1989
Otter Spit (Loch Fyne)	2000		>700						Hall-Spencer & Moore, 2000a
Otter Spit (Loch Fyne)	2012	Aug	367‡	50	27	64	44-59	51	This report

There are 15 additional MNCR phase 2 *Limaria* bed site records for Laudale (MESH webGIS, 2012), with a taxon count ranging between just 4 and 34. Re-examination of video recorded in Laudale Narrows in 2000 by Heriot-Watt University (Moore, unpublished) reveals areas densely covered in brittlestars and areas with comparatively bare-looking *Limaria* nest material giving the appearance of possibly having been previously colonised by a brittlestar blanket. It is unclear, however, how representative these observations might be of the area as a whole. Thus, whilst existing data could be interpreted as suggesting diversity of the associated epibiota of the Laudale bed may be comparatively low, no great confidence can be placed on this conclusion.

Table 4 also includes taxon richness measures from the analysis of core samples of virtually the same size (10 - 11 cm diameter) screened on a 0.5 mm sieve. Not all analyses have included the algal component and so this is excluded from the figures, as are taxa which might lead to duplication of species. Mean taxon richness generally ranges between 50 and 75, which represents high infaunal diversity, similar to that recorded for maerl biotopes. The lowest values (Creagan and Laudale Narrows) were recorded at sites exhibiting dense brittlestar populations. Analysis of the log transformed data using one-way analysis of variance and Tukey *a posteriori* testing confirmed the Creagan site to be of lower diversity than all other sites apart from Otter Spit and the Loch Carron sites ($p<0.05$), and the Shian June samples to be of higher diversity than Otter Spit, Loch Alsh (2012) and the Loch Carron sites ($p<0.05$). The Laudale samples were not included in the analysis due to the low number of replicates.

Hall-Spencer and Moore (2000a) have reviewed the evidence for a decline in *Limaria hians* populations in the Clyde Sea area over the last 40 years and implicated scallop dredging as a likely causative factor in their disappearance from a number of locations. In the same paper they record a dense bed of *Limaria* off Creag Gobhainn at Otter Spit in Loch Fyne, in the vicinity of other records (Davies, 1989; MCS, 2006), but observed damage to the bed taking place as a result of scallop dredging. In 2012 no evidence of the presence of *Limaria* could be found in this area, which lies to the north of the existing *Limaria* bed. It appears that in recent years the bed has declined over part of its former range, with southward migration of its northern boundary by several hundred metres. A similar regression has been recently recorded for a *Limaria* bed off Port Appin (Loch Linnhe), with creel fishing a possible contributory factor (Moore *et al*., 2012). There was no visual evidence of damage from any anthropogenic activities in the Otter Spit area during the 2012 survey.

Hall-Spencer and Moore (2000a) recorded a markedly higher count of species associated with the Otter Spit *Limaria* bed during 1998-9 than was observed in the core samples from 2012. In 1998-9 six discrete *Limaria* nests collected over a depth range of 10 - 15 m supported a fauna of 265 species, compared to 81 species in the four cores collected at 11 - 12 m in 2012. Although the total area of the *Limaria* nest material studied was greater in the earlier study, and the samples were collected more widely over the bed and over a greater time period, the 2012 cores sampled both *Limaria* nest material and the underlying sediment. Most of the difference between the years lay in the greater number of molluscs collected in 1989-9 compared to 2012 (respectively 74 and 18) and crustaceans (respectively 56 and 14). A possible reason for this difference lies in the loss of maerl from the area, which used to form a significant component of this habitat (Hall-Spencer and Moore (2000b) and indeed was present in the 1989-9 samples.

For the Loch Creran *Limaria* beds, historical data are too sparse to identify any temporal trends. In Loch Alsh such trends may be linked to those of *Modiolus* and so discussion of these is deferred to the following section. In 2012 *Limaria* beds were found to be absent from four sites in Loch Alsh predicted to support them by the 1996 broadscale survey (Johnston *et al*., 2000); however, there is no concrete, historical evidence for their presence.

4.1.2 Conservation importance

With regard to informing decisions on the inclusion of specific *Limaria* beds in MPAs, the following characteristics of the various Scottish examples are highlighted. However, in view of their rarity, fragility and the evidence of their threatened and, in places, declining nature, there is a strong case for incorporation of a high proportion of the few known beds in the MPA network, particularly as Scottish waters represent a stronghold for the habitat within northwest Europe.

The Kyle Akin area of Loch Alsh includes probably the largest population of *Limaria hians* and certainly the largest known bed in Scotland, where the highest epibiotic diversity has been recorded.

The Otter Spit bed in Loch Fyne represents the southernmost known significant example of the habitat in Scotland, has evidently suffered decline in recent years over part of its former range, and occurs in a region where *Limaria* has now disappeared from previous strongholds (Hall-Spencer and Moore, 2000a).

Although smaller than the above beds, the Loch Creran Shian site supports a bed of high quality with dense *Limaria* and a rich infaunal community. With the apparent decline of *Limaria* beds elsewhere in the Loch Linnhe system (Moore *et al*., 2012), the Shian bed now represents the major bed in the area and possibly the principal source of larval supply for Loch Linnhe. Moreover, a significant proportion of the Shian bed supports kelp, which can cause localised degradation of the habitat when uprooted. In addition to possible damage by mobile fishing methods, *Limaria* beds are also susceptible to the operation of static gear, such as creels. Uprooting of kelp during creel retrieval has been observed on the nearby Port Appin bed and may have contributed to its apparent decline (Moore *et al*., 2012).

Loch Sunart may support the second largest population of *Limaria* in Scotland taking into consideration the Laudale bed and other examples of the biotope distributed throughout the loch. Much of the Laudale bed also supports kelp, which is dense in places (Mercer *et al*., 2007; Moore, unpublished) and consequently enhances the susceptibility of the habitat to fishing practices.

The Loch Broom bed represents the most northerly known instance of the biotope in UK waters and the only confirmed record of the biotope north of Loch Carron. Although a small bed, it may be of regional importance in contributing to reseeding of other locations in the Ullapool area, where historical records of beds exist (i.e. Little Loch Broom, Carn Skerries), but which were not in evidence in 2010 (Moore *et al*., 2011).

The extent of the *Limaria* habitat in Loch Carron is unknown. Habitat records in the current-swept Strome Narrows area are very sparse and almost entirely restricted to the sides of the narrows, where the *Limaria* bed records are located (Dipper and Johnston, 2005; MESH webGIS, 2012). Indicative biotope mapping of the narrows area represents most of the sea bed as a tide-swept *Modiolus* bed (Dipper and Johnston, 2005) but this is apparently based on little evidence.

4.2 *Modiolus* beds

Provisions for the protection of the Loch Alsh *Modiolus* reefs are already in place as a consequence of their designated feature status within the Lochs Duich, Long and Alsh SAC (JNCC, 2013). Consequently, discussion will focus on temporal trends in condition, rather than on bed comparisons. Suffice it to say that the 2012 survey revealed a previously unknown bed off Kyleakin, and the extent of this and the String Rock bed lie in the middle of the range of bed sizes reported for Scottish waters (Hirst *et al*., 2012; Moore *et al*., 2012).

There are no previous estimates for the extent of the String Rock bed. An attempt to map the bed in 2007 using dropdown video (Marine Bio-images, 2007) was frustrated by the difficulty in discriminating live shells. The diving-based observations in 2012 were restricted by a 30 m depth limit and it is likely that the bed extends into deeper waters to the east of the mapped area (Figure 15). Indeed, there are a number of historical records of *Modiolus* biotopes here at depths of 30 - 45 m (Figure 2), based on ROV observations (SNH, 1995; Emu Ltd., 2006).

There are two additional firm historical records of *Modiolus* beds in Loch Alsh. In 1988 Connor (1989) recorded an area of abundant *Modiolus modiolus* overlying frequent *Limaria hians* to the north east of Eileanan Dubha along a slope over a depth range of 19 - 25 m (Figure 2). In 2012 a diver transect was carried out here from a depth of 16 - 26 m and the balance between the species appears to have changed, with observations of abundant *Limaria* (40 - 90% nest cover) and sparse *Modiolus* (frequent - absent). In 1991 Scott (1991) recorded the presence of beds of *Modiolus* at depths of 13 - 22 m in the western entrance channel to Loch Alsh (now lying under the northern half of the main Skye bridge span). Several dives here in 2012 covering a depth range of 10 - 21 m only recorded dead shells here, including those of *Modiolus*, but abundant *Limaria*, with nest coverage averaging 70%. This site lies only around 300 m from the observations of dense *Modiolus* on the Kyleakin bed, so the western extension of this bed has perhaps been curtailed over the last 20 years.

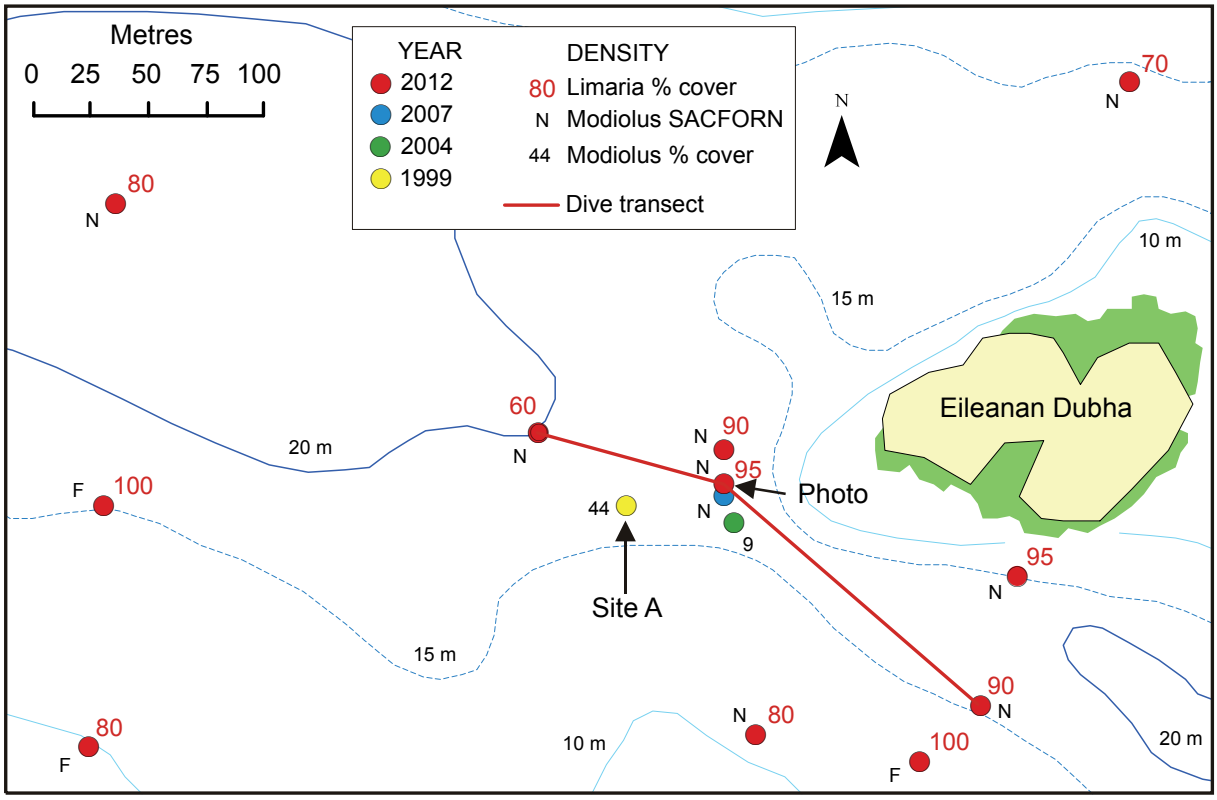

Figure 24. Detail of density measures of Limaria hians *and* Modiolus modiolus *west of Eileanan Dubha, Loch Alsh over the years 1999 - 2012. Also shown is the position of the photograph in Figure 25. Reproduced by permission of Ordnance Survey on behalf of HMSO. © Crown copyright and database right [2013]. All rights reserved. Ordnance Survey Licence number 100017908.*

In 1999 Mair *et al.* (2000) reported an abundant population of *Modiolus* (44% of sea bed covered by live shells) at site A, west of Eileanan Dubha on the String Rock bed (Figure 24). In 2004 Emu Ltd. (2006) recorded 9% cover at a site 47 m farther east but in 2007 this area

was found to support a dense *Limaria* bed, with no live *Modiolus*, only dead shells (Marine Bio-images, 2007). In 2012 a transect was swum passing within 20 m of the recorded 1999 position (with a visibility of c. 8 m) and within 15 m of the 2004 site. A dense, spongy *Limaria* turf was present throughout, covering 60 - 95% of the sea bed, with evidence of dense, dead *Modiolus* shells in places. The appearance of the current habitat is illustrated in the photograph in Figure 25, taken 17 m from the 2004 site and 44 m from the 1999 site. Evidence from the other sites examined in the vicinity in 2012 (Figure 24) shows the dense *Limaria* bed to be widespread and *Modiolus* to be absent within 100 m of the 1999 and 2004 sites.

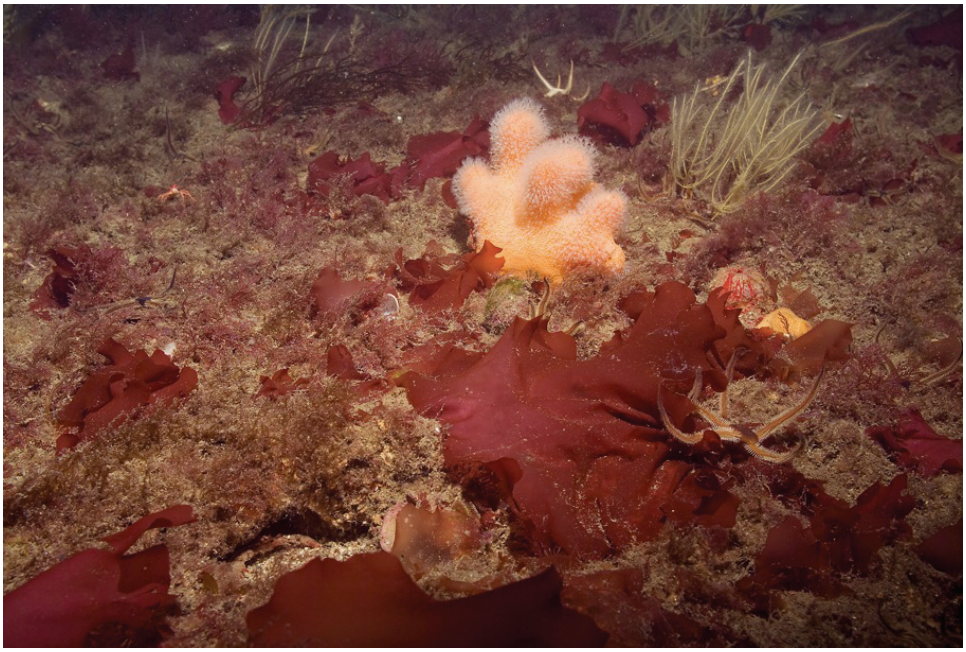

Figure 25. Photograph of dense Limaria *turf in vicinity of Site A in 2012 (see Figure 24).*

At site HM01 on the String Rock bed *Limaria hians* was recorded as rare during the MNCR phase 2 survey in 1999 and abundant in 2012. Four replicate *Modiolus* clump samples taken here included the following mean numbers of *Limaria hians*: 1.5 in 1999 (Mair *et al*., 2000), 4.3 in 2004 (Emu Ltd., 2006), '3 - 4 per clump' in 2007 (Marine Bio-images, 2007) and 6.3 in 2012. Despite the cryptic nature of *Limaria*, this is indicative of a temporal increase in density. Repeated surveys of *Modiolus* density on the String Rock bed between 1999 and 2012 indicate a consistent and significant temporal decline, with a mean cover of 29% in 1999 falling to 7% in 2012 (section 3.2.1.1).

In spite of the existence of potential complicating factors, such as positional inaccuracies, worker variability and spatial patchiness, there is a cogent pattern emerging of a decline in *Modiolus* density correlated with an increase in *Limaria* density in the Kyle Akin area. The apparent speed of *Limaria* bed development is surprising in view of the recorded very slow recovery of the habitat from experimental disturbance (Trigg and Moore, 2009). However, turf development will be dependent upon a number of factors, including the contribution from the recruiting population (Trigg and Moore, 2009), which may have been minimal in the apparently declining bed studied by Trigg and Moore (2009) in Loch Linnhe (Moore *et al*., 2012). Also, Trigg and Moore (2009) studied lateral turf development, whereas the apparent spread of *Limaria* habitat in Loch Alsh may merely result from enhanced conspicuity of an existing widespread population by upward growth of the byssal carpet resulting from population density increase.

Marine Bio-images (2007) have discussed possible causes of a decline in the String Rock *Modiolus* bed but failed to identify any likely reasons. Evidence from the current study and analysis of the previous survey data suggest the possibility that the decline in *Modiolus* may be functionally linked to *Limaria* population growth. Although the two species widely co-occur in Kyle Akin, areas of dense *Limaria* turf appear to largely exclude *Modiolus*, even from areas where *Modiolus* has previously flourished, such as north east of Eileanan Dubha (site FS01) and west of Eileanan Dubha (site A). Dense populations of *Limaria*, often supporting carpets of *Ophiothrix fragilis*, possibly represent a significant competitive challenge to *Modiolus*, all three species suspension feeding on phytoplankton. This impact will grow with increasing upward development of the fine byssal matrix of *Limaria*, which incorporates a system of galleries and inhalent and exhalent apertures channelling water currents to *Limaria* individuals, and probably away from other large, embedded, suspension feeders. *Modiolus* recruitment success and respiratory function may also be degraded.

4.3 Maerl beds

The unambiguous, historical records of beds of living maerl at Otter Spit are all located off the Creag Gobhainn islet, just north of the current location of the *Limaria* bed (Figure 18). Both Davies (1989) and Hall-Spencer and Moore (2000b) describe a mixed habitat of maerl and *Limaria* here. In 2012 no *Limaria* was found here (section 4.1) and maerl was represented only by the sporadic occurrence of dead maerl and very sparse living material, nowhere exceeding 1% cover. The last recorded observation of this bed was 1999 when its size was assessed at 17.5 ha, with a live maerl cover at one site of 25% (Hall-Spencer and Moore, 2000b). Records of the presence of a maerl bed here in 2010 (Allen *et al.,* 2011) are actually based on observations of dead maerl and patches of very sparse live maerl (apparently <1% cover), similar to the 2012 findings.

There are no obvious reasons for the disappearance of this large bed. According to Hall-Spencer and Moore (2000b), Clyde maerl beds have been extensively modified by scallop dredging, although they regarded the Creag Gobhainn site as unfished. However, Hall-Spencer and Moore (2000a) did observe some dredging activity off Creag Gobhainn in 1999 and Argyll and Bute Council (2009) map a scallop fishing ground just to the south of the historical bed. No evidence of dredge or trawl scarring of the sea bed was observed during the 2012 survey.

4.4 Burrowed and deep mud

Much of the sea bed of Loch Duich represents an extensive and excellent example of the burrowed mud habitat, heavily worked by megafaunal crustaceans and supporting a dense population of *Funiculina quadrangularis* and widespread and locally numerous *Pachycerianthus multiplicatus* (**SS.SMu.CFiMu.SpnMeg.Fun**). Dubious historical records of the burrowed mud biotope, **SS.SMu.CFiMu.MegMax**, and the inshore deep mud biotope, **SS.SMu.CFiMu.BlyrAchi**, could not be substantiated by the 2012 survey.

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ANNEX 1: DATA RECORDING FORMS

Annex 1.1: Drop-down video survey recording form

Loch Duich 2012 video survey *Surveyors:*

Site code	Target MPA search feature:		Target depth (m):
Vessel		**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)

Annex 1.2: Pro forma for diver surveying of Limaria, Modiolus and maerl habitats

Site			
Depth BSL (m)			
Limaria nest cover (%)			
Thickness *Limaria* nest (mean cm)			
Limaria seen? (Y/N)			
Isolated *Limaria* nests seen? (Y/N)			
Sediment type			
Brittlestar SACFOR			
Brittlestar species			
Modiolus SACFOR			
Algal turf cover (%)			
Laminaria hyperborea SACFOR			
Saccharina latissima SACFOR			
Comments/biota notes			
Surveyor			

Addendum for Loch Creran:

Length of SMB line (m)			
SMB buoy direction (°M)			
Time (hh:mm:ss)			

ANNEX 2: VIDEO SURVEY DATA

Table 2.1: Details of sites and video data collected for the drop-down survey of Loch Duich and Loch Alsh.

Site	Date	Latitude in	Long'de in	Latitude out	Long'de out	Depth in (m)	Depth out (m)	Tape ref no.	Video in (m:s)	Video out (m:s)
DV1	05/08/2012	57.26792	-5.51385	57.26832	-5.51373	88.1	82.1	D-DUICH-0812-1	06:39	13:18
DV2	05/08/2012	57.26412	-5.51330	57.26435	-5.51402	57.7	53.7	D-DUICH-0812-1	13:18	18:14
DV3	05/08/2012	57.26190	-5.51092	57.26222	-5.51127	49.3	50.5	D-DUICH-0812-1	18:14	23:19
DV4	05/08/2012	57.26343	-5.50627	57.26385	-5.50680	107.4	99.7	D-DUICH-0812-1	23:19	31:01
DV5	05/08/2012	57.25828	-5.50288	57.25832	-5.50380	77.3	77.9	D-DUICH-0812-1	31:01	37:27
DV6	05/08/2012	57.25863	-5.49603	57.25890	-5.49643	96.3	102.2	D-DUICH-0812-1	37:27	44:59
DV7	05/08/2012	57.25535	-5.48918	57.25527	-5.48927	83.7	84.6	D-DUICH-0812-1	44:59	52:38
DV8	05/08/2012	57.25403	-5.50250	57.25390	-5.50267	39.8	36.8	D-DUICH-0812-1	52:38	57:45
DV9	05/08/2012	57.24828	-5.48878	57.24813	-5.48908	46.8	42.4	D-DUICH-0812-2	00:00	07:31
DV10	05/08/2012	57.25413	-5.47957	57.25430	-5.47972	30.1	26.4	D-DUICH-0812-2	07:31	13:21
DV11	05/08/2012	57.24815	-5.47757	57.24783	-5.47753	96.0	98.2	D-DUICH-0812-2	13:21	19:06
DV12	05/08/2012	57.24277	-5.47817	57.24235	-5.47825	83.1	71.1	D-DUICH-0812-2	19:06	24:01
DV13	05/08/2012	57.23897	-5.48027	57.23872	-5.48032	34.4	33.7	D-DUICH-0812-2	24:01	29:39
DV14	05/08/2012	57.23565	-5.46915	57.23542	-5.46933	68.4	63.6	D-DUICH-0812-2	29:39	35:59
DV15	05/08/2012	57.24067	-5.46578	57.24015	-5.46588	104.4	96.5	D-DUICH-0812-2	35:59	42:25
DV16	05/08/2012	57.23200	-5.46312	57.23163	-5.46290	58.8	52.8	D-DUICH-0812-2	42:25	46:30
DV17	05/08/2012	57.23293	-5.45413	57.23242	-5.45355	94.9	99.4	D-DUICH-0812-2	46:30	52:47
DV18	05/08/2012	57.23405	-5.44947	57.23357	-5.44890	43.5	47.2	D-DUICH-0812-2	52:47	57:27
DV19	05/08/2012	57.22872	-5.44645	57.22825	-5.44580	79.0	75.1	D-DUICH-0812-3	00:00	04:30
DV20	05/08/2012	57.22352	-5.44505	57.22267	-5.44363	36.8	24.9	D-DUICH-0812-3	04:30	10:43
DV21	05/08/2012	57.22062	-5.43758	57.21967	-5.43573	25.6	23.5	D-DUICH-0812-3	10:43	16:34
DV22	05/08/2012	57.22085	-5.42967	57.22057	-5.42852	26.1	19.1	D-DUICH-0812-3	16:34	21:01
DV23	05/08/2012	57.22260	-5.42563	57.22240	-5.42505	17.9	16.2	D-DUICH-0812-3	21:01	25:06
DV24	06/08/2012	57.22373	-5.43390	57.22363	-5.43360	56.7	54.2	D-DUICH-0812-4	10:45	17:10
DV25/1	06/08/2012	57.22885	-5.42872	57.22867	-5.42825	50.9	51.2	D-DUICH-0812-4	17:10	23:55
DV25/2	06/08/2012	57.22887	-5.42858	57.22865	-5.42810	50.6	50.9	D-DUICH-0812-4	23:55	30:08
DV26.1	06/08/2012	57.23250	-5.43230	57.23207	-5.43197	17.1	31.5	D-DUICH-0812-4	30:08	37:28
DV26.2	06/08/2012	57.23250	-5.43230	57.23207	-5.43197	17.1	31.5	D-DUICH-0812-4	37:28	39:54
DV27.1	06/08/2012	57.23017	-5.42240	57.22998	-5.42217	23.9	25.1	D-DUICH-0812-4	39:54	41:09
DV27.2	06/08/2012	57.23017	-5.42240	57.22998	-5.42217	23.9	25.1	D-DUICH-0812-4	41:09	44:04
DV28	06/08/2012	57.22615	-5.41947	57.22610	-5.41917	31.8	25.2	D-DUICH-0812-4	44:04	48:44
DV29	06/08/2012	57.22697	-5.40978	57.22688	-5.41010	29.3	26.6	D-DUICH-0812-4	48:44	59:02
DV30	06/08/2012	57.22962	-5.41132	57.22935	-5.41217	14.5	14.1	D-DUICH-0812-5	00:00	06:52
DV31	06/08/2012	57.22955	-5.40692	57.22965	-5.40660	22.7	21.6	D-DUICH-0812-5	06:52	13:53
DV32	06/08/2012	57.26807	-5.65753	57.26817	-5.65757	23.5	24.1	D-DUICH-0812-4	00:00	05:35
DV33	06/08/2012	57.26810	-5.55433	57.26828	-5.55443	16.8	16.9	D-DUICH-0812-4	05:35	10:45
DV34	05/08/2012	57.27223	-5.53747	57.27230	-5.53723	27.4	26.4	D-DUICH-0812-1	00:00	03:23
DV35	05/08/2012	57.27227	-5.53425	57.27228	-5.53405	20.8	20.6	D-DUICH-0812-1	03:23	06:39

Table 2.2: Substrates, biota, biotopes and PMFs recorded during the drop-down video survey of Loch Duich and Loch Alsh. For PMF codes see Table 1.

Site	Substrate	Biota	Biotope	PMFs
DV1	Cobbles and pebbles on silty sediment	The area is a sink for much drift algae including *Saccharina latissima*. Stones support serpulid worms (F) and drift kelp fronds support *Obelia dichotoma* (P). The motile fauna includes *Ophiocomina nigra* (F), *Ophiura* sp. (locally C, possibly *O. ophiura*), *O. albida* (P), *Echinus esculentus* (C), *Crossaster papposus* (P), *Asterias rubens* (O), *Carcinus maenas* (P) and *Munida rugosa* (P). Dense *Sagitta* sp. in the water column.	SS.SMx.CMx	
DV2	Mud	Mud with small mounds and fairly sparse megafaunal burrows which include *Goneplax rhomboides* (P) and *Lesueurigobius friesii* (P). *Funiculina quadrangularis* (F), *Ophiura ophiura* (O), *Callionymus* sp. (P), Paguridae sp. (R), infaunal tubes (P). *Sagitta* sp. in the water column.	SS.SMu.CFiMu.SpnMeg.Fun	BM FQ
DV3	Mud	Mud burrowed by thalassinidean shrimps (C) and *Lesueurigobius friesii* (P) and exhibiting infaunal tubes and small mounds (possibly polychaetes). *Funiculina quadrangularis* (C), *Pennatula phosphorea* (R), *Ophiura ophiura* (F), *Echinus esculentus* (R). *Sagitta* sp. in water column.	SS.SMu.CFiMu.SpnMeg.Fun	BM FQ
DV4	Muddy sand with scattered pebbles	Infauna includes dense *Amphiura* spp. (A) and *Paracucumaria hyndmani* (C). Motile forms include *Ophiura ophiura* (O), *Pagurus bernhardus* (P), Paguridae spp. (P), Caridea sp. (R), *Munida rugosa* (R) and *Ophiocomina nigra* (R). Drift algae locally dense. *Meganyctiphanes norvegica*? in water column.	SS.SSa.CMuSa	
DV5	Mud with possible signs of creel scarring	Mud densely burrowed by thalassinidean shrimps (A) and by *Nephrops norvegicus* (F, 2 animals seen) and supporting *Amphiura* spp. (P). *Funiculina quadrangularis* (O), *Pennatula phosphorea* (R), *Pachycerianthus multiplicatus* (P), *Sabella pavonina* tubes? (R), Paguridae spp. (R), *Asterias rubens* (O), *Trisopterus luscus* (O), *Ophiura ophiura* (R). *Meganyctiphanes norvegica*? and *Sagitta* sp. in water column.	SS.SMu.CFiMu.SpnMeg.Fun	BM FQ PM
DV6	Mud	Mud burrowed by megafauna, probably largely thalassinidean shrimps (C). *Funiculina quadrangularis* (O), *Virgularia mirabilis* (R), *Pachycerianthus multiplicatus* (O), *Asterias rubens* (P). *Meganyctiphanes norvegica*? and *Sagitta* sp. in water column.	SS.SMu.CFiMu.SpnMeg.Fun	BM FQ PM

Table 2.2 continued.

Site	Substrate	Biota	Biotope	PMFs
DV7	Mud	Mud densely burrowed by thalassinidean shrimps (A) and with apparently sparse *Nephrops norvegicus* burrows (P). Juvenile *Funiculina quadrangularis?* (R), *Sabella pavonina* tubes? (R), *Ophiura ophiura?* (R), Pleuronectiformes sp. (P). *Meganyctiphanes norvegica*? and *Sagitta* sp. in water column.	SS.SMu.CFiMu.SpnMeg.Fun	BM FQ
DV8	Mud with possible signs of creel scarring	Mud with occasional megafaunal burrows. *Funiculina quadrangularis* (C, some flattened), *Pennatula phosphorea* (R), *Callionymus lyra* (P), *Munida rugosa* (P), *Amphiura* spp. (P). Drift kelp supporting *Protanthea simplex* (P).	SS.SMu.CFiMu.SpnMeg.Fun	BMF Q
DV9	Mud	Mud moderately densely burrowed by thalassinidean shrimps (C) and with *Nephrops norvegicus* burrows (P). *Funiculina quadrangularis* (C, locally A), *Virgularia mirabilis* (O), *Munida rugosa* (O), *Callionymus lyra* (P), Teleostei spp. (R).	SS.SMu.CFiMu.SpnMeg.Fun	BM FQ
DV10	Slope of muddy sand with scatter of shells, pebbles and gravel increasing in density up slope	Sparse life visible. *Chaetopterus variopedatus* (R) supporting *Corella parallelogramma*? (R), *Munida rugosa* (R), Paguridae spp. (R), *Protula tubularia* (R), *Turitella communis* shells (P), possible hydroid clumps (P), *Funiculina quadrangularis* skeletons	SS.SSa.CMuSa	
DV11	Mud	Mud densely burrowed by thalassinidean shrimps (A) and possibly by sparse *Nephrops norvegicus* (P) and supporting *Amphiura* spp. (A). *Funiculina quadrangularis* (C), *Pachycerianthus multiplicatus* (F), *Trisopterus luscus* (F), Lesueurigobius friesii? (P). *Meganyctiphanes norvegica*? in water column.	SS.SMu.CFiMu.SpnMeg.Fun	BM FQ PM
DV12	Mud	Mud densely burrowed by thalassinidean shrimps (A) and supporting *Amphiura* spp. (P). *Funiculina quadrangularis* (F), *Pachycerianthus multiplicatus* (P), *Trisopterus luscus?* (F), *Asterias rubens* (P). *Meganyctiphanes norvegica*? in water column.	SS.SMu.CFiMu.SpnMeg.Fun	BM FQ PM
DV13	Mud	Mud fairly densely burrowed by *Nephrops norvegicus* (C) and with thalassinidean shrimps burrows (F). *Funiculina quadrangularis* (C), *Virgularia mirabilis*? (F), *Pachycerianthus multiplicatus* (P), *Asterias rubens* (P). *Meganyctiphanes norvegica*? in water column.	SS.SMu.CFiMu.SpnMeg.Fun	BM FQ PM

Table 2.2 continued.

Site	Substrate	Biota	Biotope	PMFs
DV14	Mud	Mud densely burrowed by thalassinidean shrimps (A) and possibly with *Nephrops norvegicus* burrows (P). *Funiculina quadrangularis* (C), Caridea sp. (R), *Sabella* tube (R). *Sagitta* sp. in water column.	SS.SMu.CFiMu.SpnMeg.Fun	BM FQ
DV15	Mud	Mud densely burrowed by thalassinidean shrimps (A) and with *Nephrops norvegicus* burrows (P). Dense *Pachycerianthus multiplicatus* (C). *Funiculina quadrangularis* (F), Caridea sp. (R), *Ophiura ophiura* (R)	SS.SMu.CFiMu.SpnMeg.Fun	BM FQ PM
DV16	Mud	Mud densely burrowed by thalassinidean shrimps (A) and with *Nephrops norvegicus* burrows (P). *Funiculina quadrangularis* (C), *Pachycerianthus multiplicatus* (F), Caridea sp.? (R).	SS.SMu.CFiMu.SpnMeg.Fun	BM FQ PM
DV17	Mud	Mud densely burrowed by thalassinidean shrimps (A) . Dense *Pachycerianthus multiplicatus* (A). *Funiculina quadrangularis* (F), Caridea sp. (O), *Trisopterus luscus*? (P)	SS.SMu.CFiMu.SpnMeg.Fun	BMF QPM
DV18	Mud	Mud fairly densely burrowed by thalassinidean shrimps (C) and *Nephrops norvegicus* (C, 4 animals seen). *Funiculina quadrangularis* (C), *Pachycerianthus multiplicatus* (F).	SS.SMu.CFiMu.SpnMeg.Fun	BM FQ PM
DV19	Mud	Mud densely burrowed by thalassinidean shrimps (A). *Funiculina quadrangularis* (C), *Pachycerianthus multiplicatus* (F), Caridea sp. (O), *Trisopterus luscus* (P).	SS.SMu.CFiMu.SpnMeg.Fun	BM FQ PM
DV20	Mud	Mud moderately densely burrowed by thalassinidean shrimps (P) and *Nephrops norvegicus* (P, 1 animal seen). *Funiculina quadrangularis* (C), *Virgularia mirabilis*? (F), Pleuronectiformes sp. (P), Paguridae sp. (R), *Protanthea simplex* (O) on drift material, *Asterias rubens* (O), *Callionymus lyra* (R), *Lesueurigobius friesii*? (R).	SS.SMu.CFiMu.SpnMeg.Fun	BM FQ
DV21	Mud	Mud with small mounds and fairly sparse megafaunal burrows, including *Nephrops norvegicus* (P). *Funiculina quadrangularis* (C), *Virgularia mirabilis*? (F), *Pennatula phosphorea* (O), Paguridae sp. (R), *Asterias rubens* (O), *Lesueurigobius friesii* (O).	SS.SMu.CFiMu.SpnMeg.Fun	BM FQ
DV22	Mud	Mud with small mounds and megafaunal burrows including *Nephrops norvegicus* (C). *Funiculina quadrangularis* (C, locally A), *Virgularia mirabilis* (F, locally C), *Asterias rubens* (F), *Lesueurigobius friesii* (O), *Munida rugosa* (O).	SS.SMu.CFiMu.SpnMeg.Fun	BM FQ

Table 2.2 continued.

Site	Substrate	Biota	Biotope	PMFs
DV23	Mud	Mud with small mounds and megafaunal burrows including *Nephrops norvegicus* (C). *Virgularia mirabilis* (F), *Turritella communis* shells some of which contain small pagurids (P), *Sagartiogeton laceratus*? (P).	SS.SMu.CFiMu.SpnMeg	BM
DV24	Soft mud	Mud fairly densely burrowed by thalassinidean shrimps (C). *Funiculina quadrangularis* (C), *Pachycerianthus multiplicatus* (F), Paguridae sp. (P).	SS.SMu.CFiMu.SpnMeg.Fun	BM FQ PM
DV25/1	Soft mud	Mud fairly densely burrowed by thalassinidean shrimps (C). *Funiculina quadrangularis* (C), *Pachycerianthus multiplicatus* (F), *Lesueurigobius friesii* (P).	SS.SMu.CFiMu.SpnMeg.Fun	BM FQ PM
DV25/2	Soft mud	Mud fairly densely burrowed by thalassinidean shrimps (C) including *Calocaris macandreae* (P) and *Jaxea nocturna* (P). *Funiculina quadrangularis* (C), *Pachycerianthus multiplicatus* (F), *Pagurus prideaux* with *Adamsia carciniopados* (P), *Ascidiella scabra*? (P), Teleostei sp. (P), *Glyptocephalus cynoglossus*? (P).	SS.SMu.CFiMu.SpnMeg.Fun	BM FQ PM
DV26.1	Silted pebbles, cobbles and boulders on muddy sand grading into mud with progression down slope	Stones encrusted with serpulid worms (F) including *Protula tubularia* (P) and pink coralline algae (F) and supporting *Protanthea simplex* (F overall but A on larger stones) and an ascidian fauna including *Ciona intestinalis* (F) and *Corella prallelogramma* (P). *Ophiothrix fragilis* (P), *Echinus esculentus* (F), *Munida rugosa* (F), *Asterias rubens* (O), Teleostei sp. (R) and scattered *Funiculina quadrangularis* in a transitional area at the lower margin of the zone (locally F).	CR.LCR.BrAs.NeoPro.FS	FQ
DV26.2	Mud plain	Mud with small mounds and fairly sparse megafaunal burrows. *Funiculina quadrangularis* (A), *Virgularia mirabilis?* (P), *Lesueurigobius friesii* (F), *Pachycerianthus multiplicatus* (P), *Cerianthus lloydii*? (R).	SS.SMu.CFiMu.SpnMeg.Fun	BM FQ PM
DV27.1	Mud with sparsely scattered pebbles	Mud with small mounds and sparse megafaunal burrows. *Funiculina quadrangularis* (A), *Lesueurigobius friesii* (P), *Cerianthus lloydii* (R), *Ciona intestinalis* (R), *Corella parallelogramma* (R), *Protanthea simplex* (R), *Munida rugosa* (O), *Pagurus prideaux* with *Adamsia carciniopados* (R), hydroids (R), *Asterias rubens* (P).	SS.SMu.CFiMu.SpnMeg.Fun	BM FQ

Table 2.2 continued.

Site	Substrate	Biota	Biotope	PMFs
DV27.2	Slope of silted pebbles and cobbles on muddy sediment	Stones encrusted with serpulid worms (F) pink coralline algae (R) and orange bryozoans (R) and supporting *Protanthea simplex* (F), hydroids (O) and an ascidian fauna including *Ciona intestinalis* (F), *Corella parallelogramma* (F, locally C) and *Ascidia mentula* (P). *Munida rugosa* (F), *Asterias rubens* (P), Gobiidae sp. (P).	CR.LCR.BrAs.NeoPro.FS	
DV28	Mud with sparse cobbles	Mud with sparse burrows including *Nephrops norvegicus* (P) and supporting *Funiculina quadrangularis* (C), *Virgularia mirabilis* (F) and *Cerianthus lloydii* (R). Stones support sparse *Protanthea simplex* (O) and hydroids (R). *Lesueurigobius friesii* (P).	SS.SMu.CFiMu.SpnMeg.Fun	BM FQ
DV29	Shelly mud	Epibiota dominated by dense *Ophiura ophiura* (C), with *Cerianthus lloydii* (F), *Asterias rubens* (F) and scattered *Protanthea simplex* (R) and *Sagartiogeton laceratus* (R). There are areas of dense *Tubulanus* sp. (locally C) and *Funiculina quadrangularis* (locally C).	SS.SMu	FQ
DV30	Mud	*Amphiura* spp. (A), with *Ophiura ophiura* (C) and *Philine aperta* (F) and its egg masses present. *Pachycerianthus multiplicatus* (C), *Cerianthus lloydii* (O), *Myxicola infundibulum* (R), *Asterias rubens* (O), small teleosts (O), *Tubulanus* sp. (P), *Aequipecten opercularis* (P), Ascidiacea spp. (P), *Inachus* sp. (P) and Pleuronectiformes sp. (P).	SS.SMu.IFiMu.PhiVir	PM
DV31	Mud with shell fragments and much surface detritus	Sparse *Philine aperta* (O) and its egg masses, *Virgularia mirabilis* (R) and *Ophiura ophiura* (R). *Tubulanus* sp. (C), *Asterias rubens* (F), *Protanthea simplex* (R), small teleosts (R), Nudibranchia sp. (R), *Psammechinus miliaris*? (P), Ascidiacea sp. (P).	SS.SMu.IFiMu.PhiVir	
DV32	Mixed substrate of shelly muddy sand with pebbles and shells	Stones and shells support a sessile fauna of serpulid worms (F) including *Protula tubularia*? (P), hydroids (O), *Antedon* sp. (O), ascidians including *Ascidia virginea* (O), and *Suberites carnosus*? (O). Many *Turritella communis* shells, although appearing empty. *Cerianthus lloydii* (F), *Munida rugosa* (F), *Liocarcinus depurator* (R), shoal of small *Trisopterus minutus*.	SS.SMx.CMx	

Table 2.2 continued.

Site	Substrate	Biota	Biotope	PMFs
DV33	Shelly fine sand possibly with slight silt content	Area acts as a sink for drift algae, especially filamentous greens. *Amalosoma eddystonense* (F), *Ophiura ophiura* (O), *Virgularia mirabilis* (O), *Pagurus bernhardus* (R), Paguridae sp. (P), some in *Turritella* shells, *Cerianthus lloydii* (R), *Asterias rubens* (P), Gobiidae sp. (P), *Aequipecten opercularis* (P), *Inachus* sp. (R), *Lanice conchilega*? (R).	SS.SSa.CMuSa	
DV34	Dense pebbles on sand	Bed of *Ophiothrix fragilis* (S) with *Ophiocomina nigra* also present. *Munida rugosa* (F), Paguridae spp. (P), *Echinus esculentus* (P) and drift algae. Pebbles are encrusted with serpulid worms (C).	SS.SMx.CMx.OphMx	
DV35	Dense pebbles on shelly sand	Bed of *Ophiothrix fragilis* (S) and *Ophiocomina nigra* (A). Pebbles are encrusted with serpulid worms (C) and pink coralline algae (O) and support *Protanthea simplex* (F). *Urticina felina* (P), *Echinus esculentus* (P), *Crossaster papposus* (F).	SS.SMx.CMx.OphMx	

ANNEX 3: GRAB SURVEY DATA

Table 3.1: Sample details and in situ *characterisation of the sediment for the infaunal grab survey of Loch Duich.*

Site	Latitude	Longitude	Time	Date	Depth (m)	Sediment	Video site
G3	57.26227	-5.51062	17:27:04	06/08/2012	51.7	very slightly sandy mud	DV3
G4	57.26365	-5.50642	17:10:50	06/08/2012	105.8	pebbly sandy mud	DV4
G5	57.25833	-5.50332	17:06:35	06/08/2012	78.0	very soft mud	DV5
G6	57.25873	-5.49623	16:30:40	06/08/2012	97.2	very soft mud	DV6
G9	57.24825	-5.48895	16:13:00	06/08/2012	46.0	soft mud	DV9
G14	57.23557	-5.46948	15:53:40	06/08/2012	64.6	mud	DV14
G17	57.23305	-5.45372	15:33:24	06/08/2012	91.0	soft mud	DV17
G23	57.22275	-5.42533	13:14:06	06/08/2012	17.1	soft mud	DV23
G25	57.22898	-5.42890	14:27:18	06/08/2012	50.1	very soft mud	DV25
G29	57.22697	-5.40995	12:55:52	06/08/2012	29.4	soft mud	DV29

Table 3.2: Particle size characteristics of sediments sampled for the infaunal grab survey of Loch Duich. $MD_{\emptyset}$ = median grain diameter in phi units, Md_{μ} = median grain diameter in microns, $QD_{\emptyset}$ = phi quartile deviation, ND = not determined.

Site	$MD_{\emptyset}$	Md_{μ}	$QD_{\emptyset}$	% silt/clay	% sand	% gravel	% fine sand	% medium sand	% coarse sand
G3	3.5	88	ND	31.63	68.37	0.00	58.89	8.52	0.96
G4	-0.9	1866	2.40	11.71	47.52	40.77	9.85	24.14	13.53
G5	3.5	88	ND	37.55	62.45	0.00	51.45	7.36	3.64
G6	>4	<63	ND	55.98	38.88	5.14	24.96	6.42	7.50
G9	>4	<63	ND	59.62	38.15	2.23	30.44	4.18	3.53
G14	>4	<63	ND	91.12	8.88	0.00	4.74	1.59	2.54
G17	>4	<63	ND	92.93	7.07	0.00	1.40	3.13	2.54
G23	3.8	72	ND	40.49	59.51	0.00	54.34	4.26	0.91
G25	>4	<63	ND	79.74	20.26	0.00	4.94	9.03	6.29
G29	>4	<63	ND	63.65	36.35	0.00	22.35	6.29	7.71

Table 3.3: Percentage of total sediment sample collected by sieves at 0.5 phi interval mesh sizes for all Loch Duich sites sampled for infaunal analysis.

Sieve (phi)	Site									
	G3	G4	G5	G6	G9	G14	G17	G23	G25	G29
-3.5	0.0	12.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
-3.0	0.0	12.8	0.0	0.0	1.6	0.0	0.0	0.0	0.0	0.0
-2.5	0.0	9.4	0.0	0.0	0.6	0.0	0.0	0.0	0.0	0.0
-2.0	0.0	5.8	0.0	5.1	0.0	0.0	0.0	0.0	0.0	0.0
-1.5	0.0	5.4	0.0	3.1	0.0	0.1	0.0	0.0	0.2	0.0
-1.0	0.2	3.3	0.2	1.2	1.2	0.6	0.6	0.1	1.5	0.1
-0.5	0.3	2.9	1.7	1.9	1.4	1.0	0.8	0.3	2.0	3.9
0.0	0.4	1.9	1.6	1.3	0.9	0.9	1.1	0.5	2.6	3.7
0.5	0.8	2.8	1.6	1.4	1.1	0.7	1.2	0.5	2.9	2.6
1.0	1.2	4.3	1.4	1.2	0.9	0.4	0.9	0.6	2.4	1.4
1.5	2.6	7.7	1.7	1.5	1.0	0.3	0.6	1.2	2.2	1.1
2.0	4.0	9.4	2.7	2.3	1.1	0.2	0.4	1.9	1.5	1.2
2.5	4.9	5.3	4.2	3.6	1.5	0.2	0.2	3.0	1.0	2.1
3.0	13.7	2.4	15.8	6.7	6.5	0.6	0.4	11.0	1.2	5.3
3.5	21.4	1.2	17.8	7.9	9.4	1.0	0.3	19.2	1.1	5.9
4.0	19.0	0.9	13.6	6.8	13.0	2.9	0.5	21.2	1.6	9.1
>4	31.6	11.7	37.5	56.0	59.6	91.1	92.9	40.5	79.7	63.6

Figure 3.1: Cumulative weight of sediment retained on sieves at 0.5 phi intervals for Loch Duich grab sites G3 - G6.

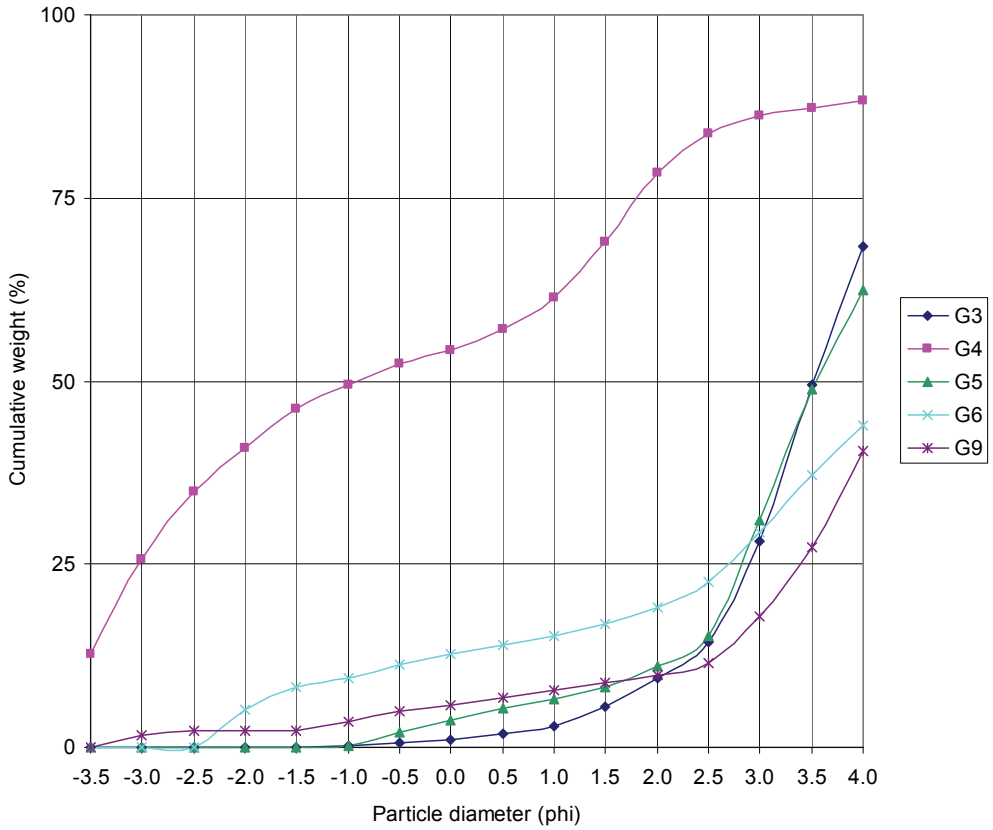

Figure 3.2: Cumulative weight of sediment retained on sieves at 0.5 phi intervals for Loch Duich grab sites G14 - G29.

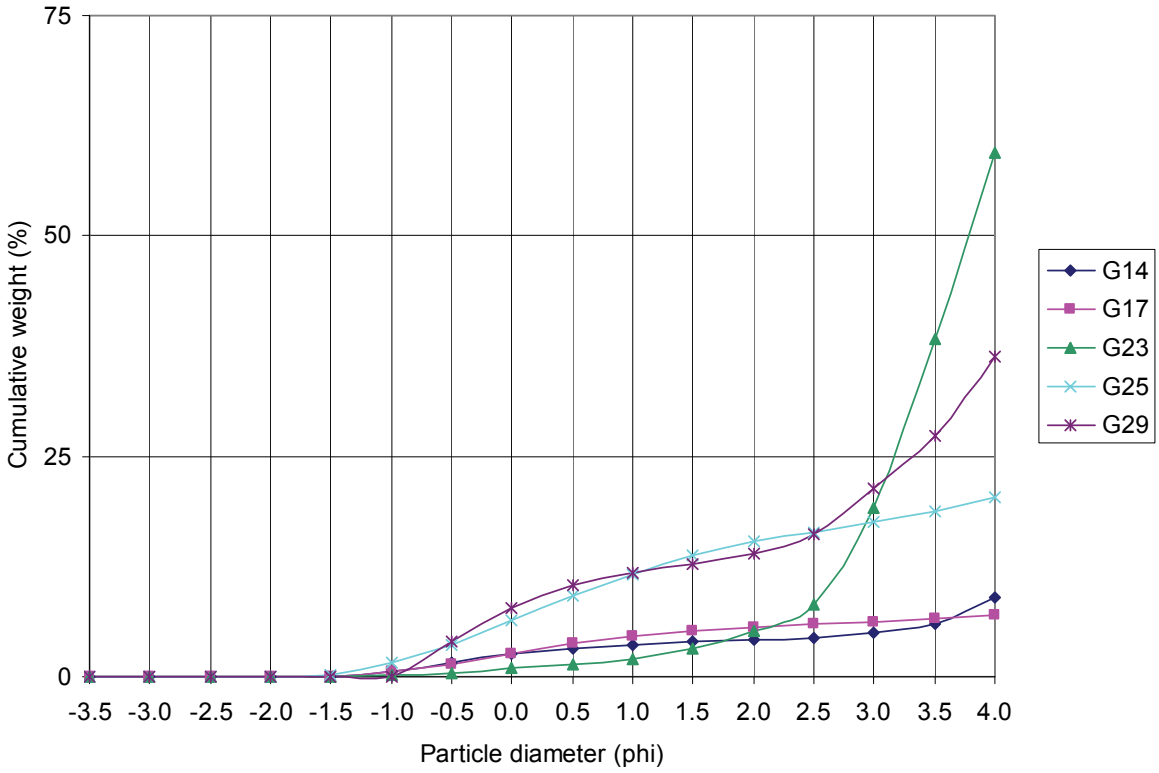

Table 3.4: Abundance of infauna (no./0.1m^2) in van Veen grab samples collected in Loch Duich. Nomenclature follows WoRMS (2013).

Taxa	Site									
	G3	G4	G5	G6	G9	G14	G17	G23	G25	G29
Virgularia mirabilis								1		
Cerianthus lloydii										2
Edwardsia claparedii					1					
Platyhelminthes spp.	5		1		1					
Tubulanus polymorphus	1	1	1	4	1		1	1		3
Cerebratulus spp.		2								
Priapulus caudatus										2
Thysanocardia procera								1		
Polynoidae spp. juv.		1		1						
Polynoidae spp. indet.		4								
Gattyana cirrhosa									1	
Harmothoe fragilis		2								
Malmgrenia andreapolis	1								1	
Malmgreniella arenicolae		1								
Pholoe assimilis				1						2
Pholoe baltica	4	7	2	5	1					27
Eteone longa agg.										1
Phyllodoce rosea		2								
Chaetoparia nilssoni		2								
Eulalia expusilla		1								
Eumida bahusiensis										4
Sige fusigera	1	1	1		1			1		
Glycera spp. juv.		2		4						
Glycera alba	2	1		2						2
Glycera lapidum	4	1								
Glycera unicornis	2	4	1	5						
Sphaerodorum gracilis		8	3	3						
Hesionidae sp. juv.				1						
Podarkeopsis capensis										1
Nereimyra punctata				1						
Oxydromus flexuosus	2	1		1	1			1		1
Ancistrosyllis groenlandica				1				3	2	7
Litocorsa stremma										5
Synelmis sp.		1								
Syllis parapari		2								
Odontosyllis fulgurans		2								
Exogone (Parexogone) hebes										1
Nephtys spp. juv.					1					
Nephtys hombergii								1		
Nephtys incisa	3		3		2	1		2	2	
Nothria sp.		1								
Lumbrineris sp.		1						1		1
Abyssoninoe hibernica	2	1	1		1					
Schistomeringos rudolphii		1								
Aricidea spp. indet.		3								
Cirrophorus branchiatus	1	1								

Table 3.4 continued

Taxa	Site									
	G3	G4	G5	G6	G9	G14	G17	G23	G25	G29
Paradoneis lyra		1						1		4
Laonice bahusiensis		2								
Dipolydora caulleryi		6						1		1
Prionospio fallax	6	1	8		4			3		1
Minuspio cirrifera	5	11		2	1		1	2		1
Prionospio multibranchiata	1	1	40	18		4	2		1	
Pseudopolydora cf paucibranchiata	12				6			18	3	10
Spio armata agg.										1
Paraspio decorata								1		
Spiophanes kroyeri	34	78	43	7	33	5	3	28	14	14
Magelona minuta								1		
Chaetozone setosa	3	2	4		8		1			
Chaetozone sp. D										1
Cirratulus caudatus	1							1		
Caulleriella killariensis	1									
Monticellina sp.	4	2	1		2					
Diplocirrus glaucus	12	2	72	42	9	4	2	18	1	1
Pherusa plumosa					1					
Macrochaeta polyonyx							1			
Capitella capitata agg.	17	1	1	10	1					
Mediomastus fragilis	6							2		71
Notomastus sp.		5								1
Maldanidae spp. juv.		1	4		6			3	1	
Clymenura sp.	2									
Euclymene sp. A		12								
Euclymene droebachiensis					1					
Euclymene lombricoides	2	1								
Heteroclymene robusta		7								
Praxillella sp.	15	9	10	16				3		1
Praxillella gracilis		1								
Nicomache (Loxochona) quadrispinata		12						4		
Rhodine loveni	1	1	2							
Ophelina cylindricaudata					1					
Scalibregma inflatum										58
Owenia fusiformis	1	10						1		1
Galathowenia oculata	14		1					10		1
Lagis koreni			1						1	
Melinna elisabethae		6								
Melinna palmata										7
Ampharete finmarchica	1									
Mugga wahrbergi				1		1				
Terebellides stroemii		3								1
Trichobranchus glacialis		3	2	2						
Amphitrite cirrata		2							1	
Lanice conchilega		6						2		1
Polycirrus sp.		9		1		1				24
Thelepus cincinnatus		3								

Table 3.4 continued

Taxa	Site									
	G3	G4	G5	G6	G9	G14	G17	G23	G25	G29
Paradialychone filicaudata		1								
Hydroides elegans		1								
Ampelisca aequicornis		3								
Medicorophium affine		1								
Eudorella truncatula	1									
Calocaris macandreae			1	1			1			
Pagurus prideaux								1		
Scutopus ventrolineatus									1	
Falcidens crossotus	1			1						
Leptochiton cancellatus		1								
Testudinalia testudinalis	1									
Onoba semicostata		1								
Turritella communis								15		
Buccinidae spp. juv.		1								
Cylichna cylindracea										1
Philine sp.				1						
Bivalvia spp. indet.									1	1
Nucula spp. juv.							1			
Nucula nitidosa	1			2	1					3
Nucula nucleus		10								
Nucula sulcata		1	27	8		1	1			
Yoldiella philippiana		2				1				
Pectinidae spp. juv.		1								
Lucinoma borealis				1						1
Myrtea spinifera	5	18	9	60	5		2			5
Mendicula ferruginosa		2								
Thyasira spp. juv.	6							3		9
Thyasira flexuosa	3	2		9	2			3		77
Kurtiella bidentata	2									
Astarte sulcata		1								
Acanthocardia	1									
Phaxas pellucidus	1	1								
Macoma balthica		1								
Abra spp. juv.	6	2	4		16					
Abra alba	1	9		6						10
Abra nitida	8	1	1		18			4		2
Timoclea ovata		5								
Mya sp. juv.		1								1
Corbula gibba	1	17	15	3	1	2		2	2	2
Hiatella arctica		2								
Lyonsia norwegica		1	1							
Thracia convexa								1		1
Tropidomya abbreviata			2	1	2		1			
Phoronis sp.	1									2
Ophiuroidea spp. juv.			2					2		
Amphiura chiajei	7	26	23	19	4	2	1		2	
Amphiura filiformis	11	8	6				1	2		1
Amphipholis squamata		1								

Table 3.4 continued

Taxa	Site									
	G3	G4	G5	G6	G9	G14	G17	G23	G25	G29
Ophiura ophiura										1
Leptopentacta elongata								2		
Paracucumaria hyndmani		3								
Pseudothyone raphanus		3								
Leptosynapta bergensis	1	1								
Labidoplax buskii	5	31	10							

Table 3.5: Community descriptors for all grab samples collected in Loch Duich. Diversity indices include the Shannon-Wiener function using log_e (H'_e) and log_2 (H'_2) and Peliou's evenness index (J').

Site	Abundance (no./0.1m^2)	No. taxa	H'_e	H'_2	J'	PMF	Biotope
G3	229	50	3.37	4.86	0.86	BM FQ	SS.SMu.CFiMu.SpnMeg.Fun
G4	411	86	3.61	5.21	0.81		SS.SSa.CMuSa
G5	303	33	2.60	3.76	0.74	BM FQ PM	SS.SMu.CFiMu.SpnMeg.Fun
G6	240	33	2.66	3.83	0.76	BM FQ PM	SS.SMu.CFiMu.SpnMeg.Fun
G9	132	29	2.65	3.83	0.79	BM FQ	SS.SMu.CFiMu.SpnMeg.Fun
G14	22	10	2.10	3.02	0.91	BM FQ	SS.SMu.CFiMu.SpnMeg.Fun
G17	19	14	2.55	3.68	0.97	BM FQ PM	SS.SMu.CFiMu.SpnMeg.Fun
G23	146	36	2.91	4.20	0.81	BM	SS.SMu.CFiMu.SpnMeg
G25	34	15	2.18	3.15	0.80	BM FQ PM	SS.SMu.CFiMu.SpnMeg.Fun
G29	376	48	2.71	3.91	0.70	FQ	SS.SMu

ANNEX 4: DIVER MPA SEARCH FEATURE DISTRIBUTION SURVEY DATA

Table 4.1: Positional and diver-collected data for all sites examined during flame shell, horse mussel and maerl bed distribution surveys.

Site	**A1.1**	**A1.2**	**A2.1**	**A2.2**	**A2.3**
Location	Loch Alsh	Loch Alsh	Loch Alsh	Loch Alsh	Loch Alsh
Latitude	57.27652	57.27610	57.27575	57.27561	57.27574
Longitude	-5.74867	-5.74808	-5.74610	-5.74559	-5.74582
Date	12/08/2012	12/08/2012	12/08/2012	12/08/2012	12/08/2012
Time	08:30	08:40	09:48	09:54	10:00
Surveyor	Rob Cook	Rob Cook	Natalie Hirst	Natalie Hirst	Natalie Hirst
Depth BSL (m)	18.6	20.0	20.9	22.2	22.4
Depth BCD (m)	16.3	17.7	18.7	20.0	20.2
Substrate	Gravel and shell gravel, with dead shell	Muddy gravel	Cleanish shell gravel and pebbles (30%)	Muddy sand and pebbles (30%)	Muddy sand and pebbles (30%)
Community	Brittlestars, mostly *Ophiothrix*, over *Limaria* turf. *Nemertesia* (O), *Luidia* (R), *Cancer pagurus* (F), *Pleuronectes platessa* (R)	Hydroids and red algae over *Limaria* turf. *Nemertesia* (C)	*Nemertesia ramosa* (C) and *Alcyonium digitatum* (R) on brittlestar bed on *Limaria* bed	Dense brittlestar bed on *Limaria* bed but without *Nemertesia* and *Alcyonium*	Boundary between dense brittlestar bed and less dense area with *Nemertesia* and *Alcyonium*
***Limaria* nest % cover**	95	100	40	90	90
Discrete nests?	N	N	N	N	N
Nest thickness (cm)	7	8	5	10	10
***Limaria* seen?**	Y	Y	Y	Y	Y
Algal turf cover (%)	0	80	1	0	0
***Laminaria hyperborea* SACFORN**	N	R (juv)	N	N	N
***Saccharina latissima* SACFORN**	N	N	N	N	N
***Modiolus* SACFORN**	N	N	N	N	N
Ophiuroid SACFORN	S	A	S	S	S
Ophiuroid species					
Biotope	Lim OphMx	Lim	Lim OphMx	Lim OphMx	Lim OphMx

Table 4.1 continued

Site	A3.1	A3.2	A4.1	A4.2	A4.3
Location	Loch Alsh	Loch Alsh	Loch Alsh	Loch Alsh	Loch Alsh
Latitude	57.27633	57.27643	57.27657	57.27663	57.27685
Longitude	-5.74262	-5.74493	-5.74267	-5.74337	-5.74397
Date	09/08/2012	09/08/2012	09/08/2012	09/08/2012	09/08/2012
Time	10:05	10:10	12:10	12:20	12:30
Surveyor	Rob Cook	Rob Cook	Natalie Hirst	Natalie Hirst	Natalie Hirst
Depth BSL (m)	24.6	24.6	20.8	21.2	20.2
Depth BCD (m)	21.1	21.0	16.9	17.3	16.3
Substrate	Shell, cobbles and coarse sand	Shell, cobbles and coarse sand	Coarse shell gravel and pebbles with empty dead shell	Coarse shell gravel and pebbles (20%) with empty dead shell (10%)	Coarse shell gravel and pebbles (20%) with empty dead shell (10%)
Community	*Limaria hians* nest material, covered in dense brittlestars, with common *Alcyonium digitatum* and common erect hydroids.	*Limaria hians* nest material, covered in dense brittlestars, with common *Alcyonium digitatum*, and common erect hydroids. Occasional patches of scour, leaving just bare substrate with no brittlestars or *Limaria*	Occasional *Alcyonium digitatum* with hydroid turf (C) including *Sertularia cupressina* and *Halecium* sp., on dense *Limaria* bed	Occasional *Alcyonium digitatum* with hydroid turf (C) including *Sertularia cupressina* and *Halecium* sp., on dense *Limaria* bed with common *Luidia ciliaris* and *Inachus* sp. and juvenille fish shoal	Occasional *Alcyonium digitatum* with hydroid turf (C) including *Sertularia cupressina* and *Halecium* sp., on dense *Limaria* bed with common *Luidia ciliaris*, and *Urtricina eques* and *Marthasterias*
***Limaria* nest % cover**	99	90	80	80	80
Discrete nests?	N	N	N	N	N
Nest thickness (cm)	10	10	6	6	8
***Limaria* seen?**	Y	Y	Y	Y	Y
Algal turf cover (%)	<1	<1	<1	<1	10
***Laminaria hyperborea* SACFORN**	N	N	N	N	N
***Saccharina latissima* SACFORN**	N	N	N	N	N
***Modiolus* SACFORN**	N	N	N	N	N
Ophiuroid SACFORN	S	S	S	S	F
Ophiuroid species					
Biotope	Lim OphMx	Lim OphMx	Lim OphMx	Lim OphMx	Lim

Table 4.1 continued

Site	**A5.1**	**A5.2**	**A5.3**	**A5.4**	**A6.1**
Location	Loch Alsh	Loch Alsh	Loch Alsh	Loch Alsh	Loch Alsh
Latitude	57.27678	57.27682	57.27705	57.27727	57.27542
Longitude	-5.74313	-5.74365	-5.74335	-5.74338	-5.74212
Date	11/08/2012	11/08/2012	11/08/2012	11/08/2012	12/08/2012
Time	08:30	08:38	08:46	08:55	09:10
Surveyor	Rob Cook	Rob Cook	Rob Cook	Rob Cook	Dan Harries
Depth BSL (m)	17.0	18.0	12.0	9.0	16.7
Depth BCD (m)	14.9	15.8	9.8	6.8	14.5
Substrate	Cobbles and dead shell	Cobbles 40%, pebbles and shell sand	Shell, shell sand, gravel	Dead shell 80% and 1% maerl	Steep ~45 deg slope of small boulders.
Community	Tide-swept large boulders, placed to support bridge structure meeting natural large cobbles and boulders. *Alcyonium digitatum* frequent on all large boulders. 50% red algae cover away from bridge foundation on top of old *Modiolus* shell	*Limaria* nest material, with good red algae cover. *Echinus* common	*Saccharina latissima* park. With partial *Limaria* nest material	*Saccharina latissima* park. *Echinus* common, maerl in shell gravel occasional	Sparse kelp park with foliose reds. Dense aggregations of *Onchidoris bilamellata*
***Limaria* nest % cover**	0	90	40	0	0
Discrete nests?	N	N	N	N	N
Nest thickness (cm)	0	5	3	0	0
***Limaria* seen?**	N	Y	Y	N	N
Algal turf cover (%)	50	80	30	20	70
***Laminaria hyperborea* SACFORN**	N	N	N	N	F
***Saccharina latissima* SACFORN**	C	R	A	A	F
***Modiolus* SACFORN**	N	N	N	N	N
Ophiuroid SACFORN	N	C	A	A	N
Ophiuroid species			*Ophiocomina*		
Biotope		Lim	Lim		

Table 4.1 continued

Site	**A6.2**	**A6.3**	**A6.4**	**A7.1**	**A7.2**
Location	Loch Alsh	Loch Alsh	Loch Alsh	Loch Alsh	Loch Alsh
Latitude	57.27553	57.27572	57.27582	57.27655	57.27653
Longitude	-5.74192	-5.74205	-5.74222	-5.73743	-5.73662
Date	12/08/2012	12/08/2012	12/08/2012	10/08/2012	10/08/2012
Time	09:15	09:21	09:24	16:53	17:08
Surveyor	Dan Harries	Dan Harries	Dan Harries	Rob Cook	Rob Cook
Depth BSL (m)	21.1	24.0	25.6	18.1	18.4
Depth BCD (m)	18.9	21.8	23.4	15.2	15.6
Substrate	Cobbles & pebbles (~70%) on coarse shell sand	Cobbles & pebbles (~20%) on coarse shell sand	Cobbles & pebbles (~20%) on coarse shell sand	Dead shell	Dead shell
Community	*Alcyonium* (40%) on tide-swept cobbles with *Limaria* on sediment between rocks	*Limaria* bed with overlying dense *Ophiothrix*. Sparse *Alcyonium* (5%)	*Limaria* bed with sparse *Ophicomina*, *Alcyonium* (5-10%) and hydroids	Mixed *Modiolus* and *Limaria* turf 10 cm deep. Overlaid with 100% brittlestar coverage	Mixed *Modiolus* and *Limaria* turf 10 cm deep. Overlaid with 100% brittlestar coverage
***Limaria* nest % cover**	20	40	85	100	100
Discrete nests?	N	N	N	N	N
Nest thickness (cm)	3	4	8	10	10
***Limaria* seen?**	Y	Y	Y	Y	Y
Algal turf cover (%)	5	0	0	5	5
***Laminaria hyperborea* SACFORN**	N	N	N	R	R
***Saccharina latissima* SACFORN**	N	N	N	N	N
***Modiolus* SACFORN**	N	N	N	C	C
Ophiuroid SACFORN	C	S	A	S	S
Ophiuroid species		*Ophiothrix*	*Ophiocomina*		
Biotope	Lim	Lim OphMx	Lim	Lim ModT OphMx	Lim ModT OphMx

Table 4.1 continued

Site	**A8.1**	**A8.2**	**A9.1**	**A10.1**	**A10.2**
Location	Loch Alsh	Loch Alsh	Loch Alsh	Loch Alsh	Loch Alsh
Latitude	57.27672	57.27662	57.27537	57.27785	57.27775
Longitude	-5.73300	-5.73498	-5.73287	-5.73300	-5.73365
Date	11/08/2012	11/08/2012	11/08/2012	11/08/2012	11/08/2012
Time	09:50	09:54	11:10	09:15	09:21
Surveyor	Natalie Hirst	Natalie Hirst	Colin Moore	Dan Harries	Dan Harries
Depth BSL (m)	17.0	18.0	17.0	18.0	19.0
Depth BCD (m)	14.5	15.5	14.0	15.7	16.7
Substrate	Shelly mud with pebbles and empty *Modiolus* shell	Shelly mud with pebbles and empty *Modiolus* shell	Silty shelly gravel with pebbles and shells	Boulders ~60%. Remainder is poorly sorted slightly silty coarse sand.	Poorly sorted slightly silty coarse sand.
Community	Dense brittlestars on *Modiolus* and *Limaria* bed with rare hydroid clumps and red foliose algae with rare *Alcyonium digitatum*	Dense brittlestars on *Modiolus* and *Limaria* bed with rare hydroid clumps and red foliose algae with rare *Alcyonium digitatum*	Tide-swept *Laminaria hyperborea* forest on mixed substrata. *Plocamium* 25%	Sparse kelp park with foliose reds. Near continuous cover of *Limaria* nest on sediment between boulders and cobble	*Limaria* bed with sparse kelp and brittlestars. *Nemertesia ramosa* (C, locally F)
***Limaria* nest % cover**	60	60	95	20	100
Discrete nests?	N	N	N	N	N
Nest thickness (cm)	15	15	6	3	5
***Limaria* seen?**	Y	Y	Y	Y	Y
Algal turf cover (%)	<1	<1	50	80	1
***Laminaria hyperborea* SACFORN**	N	N	A	C	N
***Saccharina latissima* SACFORN**	N	N	N	F	F
***Modiolus* SACFORN**	A	A	N	N	N
Ophiuroid SACFORN	A	A	N	C	A
Ophiuroid species	*Ophiothrix*	*Ophiothrix*		*Ophiocomina*	*Ophiocomina*
Biotope	Lim ModT	Lim ModT	Lim	Lim	Lim

Table 4.1 continued

Site	**A11.1**	**A12.1**	**A12.2**	**A12.3**	**A13.1**
Location	Loch Alsh	Loch Alsh	Loch Alsh	Loch Alsh	Loch Alsh
Latitude	57.27877	57.27798	57.27805	57.27827	57.27723
Longitude	-5.73302	-5.72440	-5.72646	-5.72793	-5.72627
Date	11/08/2012	12/08/2012	12/08/2012	12/08/2012	10/08/2012
Time	10:30	10:46	10:51	10:59	16:05
Surveyor	Graham Saunders	Graham Saunders	Graham Saunders	Graham Saunders	Graham Saunders
Depth BSL (m)	14.0	22.7	19.7	16.7	27.9
Depth BCD (m)	11.3	20.3	17.3	14.3	24.7
Substrate	Coarse shell sand	Shell gravel	Coarse sand and shell gravel	Coarse shell sand and boulders	Muddy shelly sand
Community	*Laminaria hyperborea* park with foliose red algal turf and common *Antedon*	*Nemertesia* and other hydroids, *Echinus* frequent, foliose and filamentous red algae	*Nemertesia*, *Saccharina latissima*, foliose red algae. *Marthasteras* frequent	*Laminaria hyperborea* forest, *Antedon* common, *Echinus* frequent, foliose and filamentous red algae	Brittlestar bed overlaying a *Limaria* bed
***Limaria* nest % cover**	0	95	95	50	100
Discrete nests?	N	N	N	N	N
Nest thickness (cm)	0	4	4	3	4
***Limaria* seen?**	N	Y	Y	Y	Y
Algal turf cover (%)	20	1	20	50	0
***Laminaria hyperborea* SACFORN**	C	N	N	A	N
***Saccharina latissima* SACFORN**	F	O (juv)	F	F	N
***Modiolus* SACFORN**	N	N	N	N	N
Ophiuroid SACFORN	N	N	N	N	S
Ophiuroid species					
Biotope		Lim	Lim	Lim	Lim OphMx

Table 4.1 continued

Site	**A13.2**	**A14.1**	**A15.1**	**A15.2**	**A16.1**
Location	Loch Alsh	Loch Alsh	Loch Alsh	Loch Alsh	Loch Alsh
Latitude	57.27727	57.27655	57.27548	57.27543	57.27860
Longitude	-5.72209	-5.72427	-5.72413	-5.72470	-5.71858
Date	10/08/2012	11/08/2012	11/08/2012	11/08/2012	12/08/2012
Time	16:14	12:15	11:50	12:00	12:45
Surveyor	Graham Saunders	Natalie Hirst	Rob Cook	Rob Cook	Rob Cook
Depth BSL (m)	23.2	18.0	16.0	13.0	16.8
Depth BCD (m)	20.1	14.7	12.8	9.8	13.8
Substrate	Muddy sand	Shell gravel in mud with empty *Modiolus* shell	Shell sand	Bedrock 90%, shell sand 10%	Sandy gravel 80%, plus cobbles
Community	Brittlestar bed overlaying a *Limaria* bed	Mixed *Modiolus* and *Limaria* bed. Rare *Alcyonium digitatum* with hydroids including *Rhizocaulus verticillatus*	*Laminaria hyperborea* park with nearly 100% *Limaria* coverage and dense red algal cover. *Desmarestia* common, *Nemertesia* common	*Laminaria hyperborea* forest on rocky reef. In patches between rocky reef discrete *Limaria* nests present	*Laminaria hyperborea* park with dense feather stars, with red algae occasional. *Limaria* in discrete nest patches
***Limaria* nest % cover**	100	90	95	0	5
Discrete nests?	N	N	N	Y	Y
Nest thickness (cm)	4	12	5	0	5
***Limaria* seen?**	Y	Y	Y	Y	y
Algal turf cover (%)	0	5	80	40	30
***Laminaria hyperborea* SACFORN**	N	N	C	A	C
***Saccharina latissima* SACFORN**	N	N	N	N	N
***Modiolus* SACFORN**	N	A	N	N	N
Ophiuroid SACFORN	S	A	N	N	N
Ophiuroid species		*Ophiothrix*			
Biotope	Lim OphMx	Lim ModT	Lim		

Table 4.1 continued

Site	**A16.2**	**A17.1**	**A18.1**	**A19.1**	**A20.1**
Location	Loch Alsh	Loch Alsh	Loch Alsh	Loch Alsh	Loch Alsh
Latitude	57.27830	57.27760	57.27642	57.27548	57.27483
Longitude	-5.72063	-5.71858	-5.71858	-5.71862	-5.71671
Date	12/08/2012	13/08/2012	13/08/2012	13/08/2012	12/08/2012
Time	12:51	11:48	09:47	09:16	11:40
Surveyor	Rob Cook	Dan Harries	Dan Harries	Natalie Hirst	Colin Moore
Depth BSL (m)	20.8	26.6	17.1	11.0	10.5
Depth BCD (m)	17.8	24.4	14.9	8.7	7.9
Substrate	50% bedrock and large boulders, 50% shelly sand	Slightly silty coarse sand & shell gravel	Shell rubble and poorly sorted muddy shell sand.	Muddy shell gravel and empty shell and pebbles	Shelly sand with pebbles and *Modiolus* shells
Community	Large boulders and bedrock with *Limaria* turf in between. Red alage and hydriods on the turf. *Nemertesia* and *Antedon* common	*Limaria* bed with dense *Ophiothrix* and scattered *Nemertesia ramosa* (F)	Well developed *Limaria* bed with sparse *Modiolus* and dense overlying mat of *Ophiothrix*	*Laminaria hyperborea* park with cover of brittlestars on dense *Limaria*	Mixed *Laminaria hyperborea* and *Saccharina latissima* forest with *Alaria* (C). *Ophiocomina* (S)
***Limaria* nest % cover**	80	80	100	80	0
Discrete nests?	N	N	N	N	N
Nest thickness (cm)	5	7	10	4	0
***Limaria* seen?**	y	Y	Y	Y	N
Algal turf cover (%)	20	0	1	35	5
***Laminaria hyperborea* SACFORN**	O (juv)	N	O	C	C
***Saccharina latissima* SACFORN**	N	N	N	N	C
***Modiolus* SACFORN**	N	N	F	F	F
Ophiuroid SACFORN	A	S	S	S	S
Ophiuroid species		*Ophiothrix*	*Ophiothrix*		*Ophiocomina*
Biotope	Lim	Lim OphMx	Lim OphMx	Lim OphMx	OphMx

Table 4.1 continued

Site	**A20.2**	**A20.3**	**A21.1**	**A21.2**	**A22.1**
Location	Loch Alsh	Loch Alsh	Loch Alsh	Loch Alsh	Loch Alsh
Latitude	57.27517	57.27532	57.27823	57.27833	57.27862
Longitude	-5.71823	-5.72297	-5.71133	-5.70867	-5.70138
Date	12/08/2012	12/08/2012	10/08/2012	10/08/2012	09/08/2012
Time	11:56	12:11	15:15	15:25	10:58
Surveyor	Colin Moore	Colin Moore	Rob Cook	Rob Cook	Dan Harries
Depth BSL (m)	12.1	13.7	19.4	19.4	30.0
Depth BCD (m)	9.4	10.9	15.9	16.0	26.2
Substrate	Shelly sand with pebbles and *Modiolus* shells	Shelly gravel with shells	Shell sand with occasional 1m square boulders	Shell sand	Muddy sand
Community	*Laminaria hyperborea* forest	*Laminaria hyperborea* forest with 60% cover of *Plocamium* on *Limaria* nest	*Limaria* turf, with red algae and *Nemertesia.* Large boulders scattered around with *Saccharina latissima* occasional. Very similar to MNCR site FS01. Also occasional debris, cables, tyres etc	*Limaria* turf, with red algae and *Nemertesia.* Large boulders scattered with occasional *Saccharina latissima*. Very similar to MNCR site FS01	Patchy bed of *Limaria* with *Ophiothrix* and sparse *Modiolus*
***Limaria* nest % cover**	30	80	70	80	40
Discrete nests?	N	N	N	N	N
Nest thickness (cm)	5	6	5	5	4
***Limaria* seen?**	Y	Y	Y	Y	Y
Algal turf cover (%)	10	25	50	50	0
***Laminaria hyperborea* SACFORN**	A	A	N	N	N
***Saccharina latissima* SACFORN**	N	N	O	O	N
***Modiolus* SACFORN**	F	N	N	N	F
Ophiuroid SACFORN	S	N	O	O	S
Ophiuroid species					*Ophiothrix*
Biotope	Lim OphMx	Lim	Lim	Lim	Lim OphMx

Table 4.1 continued

Site	**A22.2**	**A22.3**	**A23.1**	**A23.2**	**A23.3**
Location	Loch Alsh	Loch Alsh	Loch Alsh	Loch Alsh	Loch Alsh
Latitude	57.27828	57.27760	57.27677	57.27660	57.27578
Longitude	-5.70500	-5.70755	-5.71548	-5.71413	-5.71223
Date	09/08/2012	09/08/2012	09/08/2012	09/08/2012	09/08/2012
Time	11:15	11:25	13:20	13:35	13:45
Surveyor	Dan Harries	Dan Harries	Colin Moore	Colin Moore	Colin Moore
Depth BSL (m)	20.0	15.0	23.4	23.4	19.5
Depth BCD (m)	16.1	11.1	19.6	19.7	15.8
Substrate	Coarse shell sand	Coarse shell sand with scattered boulders and cobbles	Muddy shelly sand	Sand	Muddy sand
Community	Well developed *Limaria* bed with sparse algae. *Nemertesia ramosa* (F), *Alcyonium, Desmarestia & Callophyllis*	*Laminaria hyperborea* park with dense foliose red algae.	Dense *Ophiothrix*	*Nemertesia antennina*, *Alcyonium*, *Ophiocomina*, red algal turf	Dense *Ophiothrix*
***Limaria* nest % cover**	90	35	60	95	90
Discrete nests?	N	N	N	N	N
Nest thickness (cm)	7	5	5	7	5
***Limaria* seen?**	Y	Y	Y	Y	Y
Algal turf cover (%)	7.5	80	0	30	0
***Laminaria hyperborea* SACFORN**	N	C	N	N	N
***Saccharina latissima* SACFORN**	C (juv)	N	N	C	N
***Modiolus* SACFORN**	N	N	N	N	N
Ophiuroid SACFORN	N	N	S	A	S
Ophiuroid species				*Ophiocomina*	
Biotope	Lim	Lim	Lim OphMx	Lim	Lim OphMx

Table 4.1 continued

Site	**A24.1**	**A24.2**	**A24.3**	**A25.1**	**A25.2**
Location	Loch Alsh	Loch Alsh	Loch Alsh	Loch Alsh	Loch Alsh
Latitude	57.27602	57.27629	57.27673	57.27563	57.27555
Longitude	-5.70992	-5.71199	-5.71414	-5.71383	-5.71265
Date	10/08/2012	10/08/2012	10/08/2012	13/08/2012	13/08/2012
Time	10:32	10:47	10:56	08:37	08:47
Surveyor	Colin Moore	Colin Moore	Colin Moore	Rob Cook	Rob Cook
Depth BSL (m)	22.4	22.9	19.6	13.7	15.8
Depth BCD (m)	19.2	19.6	16.2	11.1	13.3
Substrate	Muddy shelly sand with rock outcrops	Shelly sand	Shelly sand	Bedrock 50%, 50% shell sand.	Muddy shelly sand
Community	*Nemertesia ramosa* (C), *N. antennina* (C), red algae, *Alcyonium* 1-9/10x10 m	Hydroid turf 25% including *Nemertesia antennina* (C), *N. ramosa* (C), *Alcyonium* (F)	*Nemertesia antennina* (C), *N. ramosa* (C), dense algal turf, kelp park	Bedrock slope ending in shell sand; sand covered in *Limaria* nest materail. Red algae and *Laminaria hyperborea* park	*Limaria* turf with >30 per m^2. Lots of dead *Modiolus* shell, with occasional live one. *Liamaria* had built nest in and around the *Modiolus* reef structure. Turf covered in brittlestars.
***Limaria* nest % cover**	95	95	90	80	100
Discrete nests?	N	N	N	N	N
Nest thickness (cm)	8	8	8	5	10
***Limaria* seen?**	Y	Y	Y	Y	Y
Algal turf cover (%)	7.5	5	30	30	0
***Laminaria hyperborea* SACFORN**	N	N	O	C	O
***Saccharina latissima* SACFORN**	F	N	F	N	N
***Modiolus* SACFORN**	N	N	N	N	F
Ophiuroid SACFORN	N	N	C	A	S
Ophiuroid species			*Ophiocomina*		
Biotope	Lim	Lim	Lim	Lim	Lim OphMx

Table 4.1 continued

Site	**A26.1**	**A26.2**	**A26.3**	**A26.4**	**A26.5**
Location	Loch Alsh	Loch Alsh	Loch Alsh	Loch Alsh	Loch Alsh
Latitude	57.27404	57.27408	57.27410	57.27394	57.27361
Longitude	-5.71239	-5.71335	-5.71403	-5.71459	-5.71499
Date	10/08/2012	10/08/2012	10/08/2012	10/08/2012	10/08/2012
Time	08:36	08:45	08:54	09:00	09:07
Surveyor	Dan Harries	Dan Harries	Dan Harries	Dan Harries	Dan Harries
Depth BSL (m)	24.8	20.0	17.0	16.5	16.2
Depth BCD (m)	22.5	17.7	14.6	14.0	13.7
Substrate	Muddy sand	Silty shell sand	Coarse shell sand	Coarse shell sand with pebbles	Coarse shell sand with pebbles
Community	*Modiolus* bed with inter-mixed *Limaria* and a dense mat of *Ophiothrix*	*Limaria* bed with foliose reds & brown algae. *Nemertesia ramosa* (C, locally F) and sparse *Ophiocomina*	*Limaria* bed with dense foliose reds. Park of mixed kelp. *Nemertesia ramosa* (F).	Sparse foliose reds and kelp (dominated by *Desmarestia*). Clumps of *Antedon* and *Nemertesia ramosa* (O, locally F)	*Modiolus* bed with foliose reds and *Antedon*
***Limaria* nest % cover**	30	80	50	0	0
Discrete nests?	N	N	N	N	N
Nest thickness (cm)	4	7	7	0	0
***Limaria* seen?**	Y	Y	Y	N	N
Algal turf cover (%)	0	15	80	70	50
***Laminaria hyperborea* SACFORN**	N	N	C	C	C
***Saccharina latissima* SACFORN**	N	N	C	C	C
***Modiolus* SACFORN**	C	F	N	N	C
Ophiuroid SACFORN	S	C	N	N	N
Ophiuroid species	*Ophiothrix*	*Ophiocomina*			
Biotope	Lim ModT OphMx	Lim	Lim		ModT

Table 4.1 continued

Site	**A27.1**	**A27.2**	**A28.1**	**A28.2**	**A29.1**
Location	Loch Alsh	Loch Alsh	Loch Alsh	Loch Alsh	Loch Alsh
Latitude	57.27453	57.27458	57.27332	57.27341	57.27300
Longitude	-5.71342	-5.71205	-5.71264	-5.71347	-5.71367
Date	08/08/2012	08/08/2012	10/08/2012	10/08/2012	07/08/2012
Time	16:20	16:35	09:44	09:48	17:45
Surveyor	Dan Harries	Dan Harries	Natalie Hirst	Natalie Hirst	Colin Moore
Depth BSL (m)	11.6	16.2	25.6	24.7	21.2
Depth BCD (m)	9.6	14.3	22.7	21.8	20.0
Substrate	Coarse, slightly silty shell sand	Muddy sand	Coarse gravelly sand on top with softer muddy sand below	Coarse gravelly sand on top with softer muddy sand below	Shelly sand
Community	Sparse forest of mixed kelp with dense cover of *Limaria* nests and abundant *Ophiocomina*	Dense mat of *Ophiothrix* overlying almost continuous turf of *Limaria* nest with clumps of *Modiolus*	Brittlestars on *Modiolus* bed with *Crossaster*, *Luidia cilaris* and *Pecten maximus*	Brittlestars on *Modiolus* bed with *Crossaster*, *Luidia cilaris* and *Pecten maximus* as well as *Inachus* and *Echinus esculentus*	Mixed *Ophiothrix*, *Modiolus* and *Limaria* bed
***Limaria* nest % cover**	80	90	0	1	50
Discrete nests?	N	N	N	N	N
Nest thickness (cm)	5	8	0	2	5
***Limaria* seen?**	Y	Y	Y	Y	Y
Algal turf cover (%)	10	1	0	0	5
***Laminaria hyperborea* SACFORN**	C	O	N	N	N
***Saccharina latissima* SACFORN**	F	N	N	N	F
***Modiolus* SACFORN**	N	C	A	A	C
Ophiuroid SACFORN	A	S	A	A	S
Ophiuroid species	*Ophiocomina*	*Ophiothrix*			*Ophiothrix*
Biotope	Lim	Lim ModT OphMx	ModT	ModT	Lim ModT OphMx

Table 4.1 continued

Site	**A30.1**	**A31.1**	**A31.2**	**A32.1**	**A33.1**
Location	Loch Alsh	Loch Alsh	Loch Alsh	Loch Alsh	Loch Alsh
Latitude	57.27343	57.27492	57.27483	57.27553	57.27528
Longitude	-5.70937	-5.71012	-5.71050	-5.70805	-5.70427
Date	12/08/2012	12/08/2012	12/08/2012	09/08/2012	12/08/2012
Time	16:43	15:53	16:06	15:08	15:15
Surveyor	Colin Moore	Graham Saunders	Graham Saunders	Graham Saunders	Natalie Hirst
Depth BSL (m)	30.0	27.2	22.2	25.4	25.0
Depth BCD (m)	26.3	23.5	18.5	22.2	21.4
Substrate	Shelly muddy sand with many dead *Modiolus* shells	Muddy sand	Muddy sand	Coarse shell sand	Shell gravel and pebbles (60%)
Community	*Ophiothrix* bed on *Limaria* bed	Brittlestars overlaying a *Modiolus* bed. *Echinus* frequent, *Nemertesia* frequent	Brittlestars overlaying a *Modiolus* bed. *Echinus* (F), *Nemertesia* (F), foliose and filamentous red algae	Hydroid-dominated terraced *Limaria* bed with abundant *Antedon* and common *Nemertesia antennina* and *N. ramosa*. *Echinus* and *Munida rugosa* (F)	Ascidians and abundant *Aequipecten opercularis* (20 per m^2), with common feather stars and encrusting algae and *Spirobranchus*
***Limaria* nest % cover**	65	100	100	65	0
Discrete nests?	N	N	N	N	N
Nest thickness (cm)	5	2	2	5	0
***Limaria* seen?**	Y	Y	Y	Y	N
Algal turf cover (%)	0	0	2	<1	0
***Laminaria hyperborea* SACFORN**	N	N	P (drift?)	N	N
***Saccharina latissima* SACFORN**	N	O (drift?)	P (drift?)	O (drift?)	N
***Modiolus* SACFORN**	C	A	A	N	N
Ophiuroid SACFORN	S	A	A	N	N
Ophiuroid species	*Ophiothrix*				
Biotope	Lim ModT OphMx	Lim ModT	Lim ModT	Lim	

Table 4.1 continued

Site	**A33.2**	**A34.1**	**A34.2**	**A35.1**	**A35.2**
Location	Loch Alsh	Loch Alsh	Loch Alsh	Loch Alsh	Loch Alsh
Latitude	57.27525	57.27660	57.27647	57.28068	57.28138
Longitude	-5.70457	-5.70025	-5.70157	-5.73397	-5.73497
Date	12/08/2012	12/08/2012	12/08/2012	09/08/2012	09/08/2012
Time	15:23	14:35	14:42	18:45	19:00
Surveyor	Natalie Hirst	Dan Harries	Dan Harries	Rob Cook	Rob Cook
Depth BSL (m)	26.5	27.2	26.4	11.5	9.7
Depth BCD (m)	22.8	23.7	22.9	9.7	7.8
Substrate	Shell gravel and pebbles (70%) bedrock (5%)	Patch (~5 m x 5 m) of pebbles on muddy sand surrounded by bedrock	Muddy sand with surface shell gravel & pebbles	Bedrock, cobbles, boulders, coarse sand (10%)	Coarse sand and maerl
Community	Ascidians and abundant *Aequipecten opercularis* (20 per m^2), with abundant feather stars and juvenille fish, and encrusting algae and *Spirobranchus*	Ascidian dominated community (C) - including *Ciona*, *Diazona*, *Ascidia virginea*, *Polycarpa*	Aequipecten (C), Virgularia (F) and ascidians (F) (including *Ascidia virginea* and *Corella*	Gullies with *Laminaria hyperborea*	Coarse sandy patch with occasional maerl. Sandy patch around 10m square, surrounded by *Laminaria hyperborea* forest on bedrock and boulders
***Limaria* nest % cover**	0	0	0	0	0
Discrete nests?	N	N	N	N	N
Nest thickness (cm)	0	0	0	0	0
***Limaria* seen?**	Y	N	N	N	N
Algal turf cover (%)	0	0	0	20	0
***Laminaria hyperborea* SACFORN**	N	N	N	F	P
***Saccharina latissima* SACFORN**	N	N	N	N	N
***Modiolus* SACFORN**	N	N	N	N	N
Ophiuroid SACFORN	N	N	N	N	N
Ophiuroid species					
Biotope					

Table 4.1 continued

Site	**F1.1**	**F1.2**	**F2.1**	**F2.2**	**F3.1**
Location	Loch Fyne	Loch Fyne	Loch Fyne	Loch Fyne	Loch Fyne
Area	Otter Spit	Otter Spit	Otter Spit	Otter Spit	Otter Spit
Latitude	56.01735	56.01732	56.01693	56.01750	56.01682
Longitude	-5.36448	-5.36363	-5.36103	-5.35890	-5.35873
Date	23/08/2012	23/08/2012	23/08/2012	23/08/2012	23/08/2012
Time	10:17	10:26	11:01	11:15	11:37
Surveyor	Rob Cook	Rob Cook	Laura Clark	Laura Clark	Flora Kent
Depth BSL (m)	6.4	9.4	15.5	20.2	21.9
Depth BCD (m)	6.0	9.0	14.9	19.5	21.0
Substrate	Sand	Sand, 20% dead shell, 10% mud	Muddy sand with empty shell	Muddy sand with with empty shell	Sand and pebbles
Community	Sand plain	*Ascidiella* (O), old dead *Ensis* shells and drift weed	*Echinus*, *Porania* and ascidians. Empty shell	*Chaetopterus* tubes, *Echinus*, scattered ascidians	
***Limaria* nest % cover**	0	0	0	0	0
Discrete nests?	N	N	N	N	N
Nest thickness (cm)	0	0	0	0	0
***Limaria* seen?**	N	N	N	N	N
Algal turf cover (%)	10	0	0	0	5
***Laminaria hyperborea* SACFORN**	N	N	N	N	N
***Saccharina latissima* SACFORN**	O	N	N	N	N
***Modiolus* SACFORN**	N	N	N	N	N
Ophiuroid SACFORN	N	N	N	N	N
Ophiuroid species					
Biotope					
Live maerl % cover	0	0	0	0	0
Dead maerl % cover	0	0	0	0	0

Table 4.1 continued

Site	**F3.2**	**F4.1**	**F4.2**	**F5.1**	**F5.2**
Location	Loch Fyne	Loch Fyne	Loch Fyne	Loch Fyne	Loch Fyne
Area	Otter Spit	Otter Spit	Otter Spit	Otter Spit	Otter Spit
Latitude	56.01712	56.01390	56.01395	56.01340	56.01293
Longitude	-5.35996	-5.36675	-5.36582	-5.36420	-5.36370
Date	23/08/2012	23/08/2012	23/08/2012	23/08/2012	23/08/2012
Time	12:00	09:13	09:28	09:44	09:57
Surveyor	Flora Kent	Flora Kent	Flora Kent	Natalie Hirst	Natalie Hirst
Depth BSL (m)	17.9	6.9	10.9	15.5	20.5
Depth BCD (m)	16.7	6.1	10.3	15.0	20.1
Substrate	Sand and stones and shell gravel	Sand and gravel	Sand shell pebbles	Sandy mud and shell gravel	Mixed muddy sand
Community		Gravel and red algal turf	Ascidians on dead shell and gravel	Flat barren seabed, *Virgularia mirabilis* present	Flat barren seabed
***Limaria* nest % cover**	0	0	0	0	0
Discrete nests?	N	N	N	N	N
Nest thickness (cm)	0	0	0	0	0
***Limaria* seen?**	N	N	N	N	N
Algal turf cover (%)	0	80	50	0	0
***Laminaria hyperborea* SACFORN**	N	N	N	N	N
***Saccharina latissima* SACFORN**	N	O	R	N	N
***Modiolus* SACFORN**	N	N	N	N	N
Ophiuroid SACFORN	N	N	N	F	R
Ophiuroid species					
Biotope					
Live maerl % cover	0	0	0	0	0
Dead maerl % cover	0	0	0	0	0

Table 4.1 continued

Site	**F6.1**	**F6.2**	**F7.1**	**F7.2**	**F8.1**
Location	Loch Fyne	Loch Fyne	Loch Fyne	Loch Fyne	Loch Fyne
Area	Otter Spit	Otter Spit	Otter Spit	Otter Spit	Otter Spit
Latitude	56.01078	56.01120	56.01070	56.01013	56.00953
Longitude	-5.37158	-5.37212	-5.37090	-5.36843	-5.36745
Date	23/08/2012	23/08/2012	23/08/2012	23/08/2012	23/08/2012
Time	09:11	09:25	09:48	10:20	10:42
Surveyor	Lisa Kamphausen	Lisa Kamphausen	Alastair Lyndon	Alastair Lyndon	Colin Moore
Depth BSL (m)	6.7	8.7	11.2	12.1	15.5
Depth BCD (m)	5.9	8.1	10.7	11.7	15.0
Substrate	Muddy sand	Muddy sand	Fine muddy sand with broken/ dead shell and dead maerl	Muddy coarse sand, shell, stoney	Shelly medium sand
Community	Algal turf on muddy sand	Sandy mud with algal turf	*Asterias*, red alage, *Liocarcinus depurator*, *Aequipecten*, *Ascidia virginea*	Brittlestar bed, *Ophiothrix*, *Metridium*, *Ascidia virginea*, *Cerianthus*, *Nemertesia*, *Marthesterias*	*Ophiocomina* bed, *Ascidiella* (A), *Chaetopterus* (A)
***Limaria* nest % cover**	0	0	0	0	0
Discrete nests?	N	N	N	N	N
Nest thickness (cm)	0	0	0	0	0
***Limaria* seen?**	N	N	N	N	N
Algal turf cover (%)	50	25	20	0	0
***Laminaria hyperborea* SACFORN**	N	N	N	N	N
***Saccharina latissima* SACFORN**	A	C	F	N	N
***Modiolus* SACFORN**	N	N	N	N	N
Ophiuroid SACFORN	N	N	N	S	S
Ophiuroid species				*Ophiothrix*	*Ophiocomina*
Biotope				OphMx	OphMx
Live maerl % cover	0	0	<1	<1	0
Dead maerl % cover	0	0	10	<5	0

Table 4.1 continued

Site	**F8.2**	**F9.1**	**F9.2**	**F10.1**	**F10.2**
Location	Loch Fyne	Loch Fyne	Loch Fyne	Loch Fyne	Loch Fyne
Area	Otter Spit	Otter Spit	Otter Spit	Otter Spit	Otter Spit
Latitude	56.00943	56.00787	56.00787	56.00732	56.00650
Longitude	-5.36673	-5.37542	-5.37478	-5.37237	-5.37122
Date	23/08/2012	23/08/2012	23/08/2012	23/08/2012	23/08/2012
Time	10:52	16:22	16:36	15:52	16:22
Surveyor	Colin Moore	Natalie Hirst	Natalie Hirst	Alastair Lyndon	Alastair Lyndon
Depth BSL (m)	20.5	9.4	11.5	14.0	16.2
Depth BCD (m)	20.0	5.9	8.0	10.7	12.7
Substrate	Medium sand with pebbles and cobbles	Sandy gravel and shell	Sandy gravel and shell	Coarse sand with some mud	Clean coarse sand
Community	*Ophiocomina* bed, *Ascidiella* (A), *Chaetopterus* (C)	*Laminaria hyperborea* park and brittlestar bed on *Limaria* bed	*Laminaria hyperborea* park and brittlestar bed on *Limaria* bed	*Limaria* bed with brittlestars, *Ophiocomina*. 3 *Limaria* in 10 x 10 cm seen	*Ophiocomina*, *Limaria, Nemertesia* and *Marthasterias*. 7 *Limaria* in 10 x 10 cm
***Limaria* nest % cover**	0	60	70	85	80
Discrete nests?	N	N	N	N	N
Nest thickness (cm)	0	6	6	10	10
***Limaria* seen?**	N	Y	Y	Y	Y
Algal turf cover (%)	0	40	40	25	5
***Laminaria hyperborea* SACFORN**	N	O	O	N	N
***Saccharina latissima* SACFORN**	N	N	N	N	N
***Modiolus* SACFORN**	N	N	N	N	N
Ophiuroid SACFORN	S	S	S	S	S
Ophiuroid species	*Ophiocomina*			*Ophiocomina*	*Ophiocomina*
Biotope	OphMx	Lim OphMx	Lim OphMx	Lim OphMx	Lim OphMx
Live maerl % cover	0	0	0	0	0
Dead maerl % cover	0	0	0	<1	0

Table 4.1 continued

Site	**F11.1**	**F11.2**	**F12.1**	**F12.2**	**F13.1**
Location	Loch Fyne	Loch Fyne	Loch Fyne	Loch Fyne	Loch Fyne
Area	Otter Spit	Otter Spit	Otter Spit	Otter Spit	Otter Spit
Latitude	56.00693	56.00695	56.00645	56.00670	56.00507
Longitude	-5.36905	-5.36752	-5.36682	-5.36675	-5.37963
Date	23/08/2012	23/08/2012	23/08/2012	23/08/2012	23/08/2012
Time	11:59	12:15	11:22	11:30	12:27
Surveyor	Alastair Lyndon	Alastair Lyndon	Lisa Kamphausen	Lisa Kamphausen	Natalie Hirst
Depth BSL (m)	16.6	17.3	21.0	18.7	7.1
Depth BCD (m)	15.4	15.9	20.3	17.9	5.6
Substrate	Muddy sand and cobbles	Muddy sand and gravel	Rock wall	Rock wall	Mixed sand gravel and pebbles (5%)
Community	*Ophiophrix*, *Ophiocomina*, *Aequipecten opercularis*, *Chaetopterus*. 3 *Limaria* in 10 x 10 cm seen	Brittlestar bed, *Ophiothrix*, *Ophiocomina*	Brittlestars, sea urchins and some ascidians on bedrock	Brittlestars, sea urchins and some ascidians on bedrock	Coarse sand and sparse kelp community with razor clams and sand gobies
***Limaria* nest % cover**	25	0	0	0	0
Discrete nests?	Y	N	N	N	N
Nest thickness (cm)	5	0	0	0	0
***Limaria* seen?**	Y	N	N	N	N
Algal turf cover (%)	0	0	0	0	10
***Laminaria hyperborea* SACFORN**	N	N	N	N	R
***Saccharina latissima* SACFORN**	N	N	N	N	N
***Modiolus* SACFORN**	N	N	N	N	N
Ophiuroid SACFORN	S	S	S	S	N
Ophiuroid species	*Ophiothrix, Ophiocomina*	*Ophiothrix, Ophiocomina*			
Biotope	Lim OphMx	OphMx	FaAlCr.Bri	FaAlCr.Bri	
Live maerl % cover	0	0	0	0	0
Dead maerl % cover	0	0	0	0	0

Table 4.1 continued

Site	**F13.2**	**F14.1**	**F14.2**	**F15.1**	**F15.2**
Location	Loch Fyne	Loch Fyne	Loch Fyne	Loch Fyne	Loch Fyne
Area	Otter Spit	Otter Spit	Otter Spit	Otter Spit	Otter Spit
Latitude	56.00482	56.00385	56.00427	56.00377	56.00443
Longitude	-5.37875	-5.37573	-5.37650	-5.37320	-5.37233
Date	23/08/2012	23/08/2012	23/08/2012	23/08/2012	23/08/2012
Time	12:35	15:13	15:23	15:38	16:01
Surveyor	Natalie Hirst	Laura Clark	Laura Clark	Flora Kent	Flora Kent
Depth BSL (m)	9.4	13.0	12.5	14.0	13.0
Depth BCD (m)	7.8	10.0	9.4	10.8	9.6
Substrate	Mixed sand gravel	Coarse sand	Coarse sand	Fine shelly gravel and sand	Fine shelly gravel and sand
Community	Brittlestars, ascidians and featherstars among red algae	Dense *Limaria* patches as far as visibility allowed (7m). Brittlestars	Dense *Limaria* patches as far as visibility allowed (7m). Brittlestars	Dense *Limaria* patches	Dense *Limaria* patches
***Limaria* nest % cover**	40	75	75	70	75
Discrete nests?	N	N	N	N	N
Nest thickness (cm)	5	5	7	6	7
***Limaria* seen?**	Y	Y	Y	Y	Y
Algal turf cover (%)	60	0	0	20	20
***Laminaria hyperborea* SACFORN**	N	N	N	N	N
***Saccharina latissima* SACFORN**	C	N	N	N	N
***Modiolus* SACFORN**	N	N	N	N	N
Ophiuroid SACFORN	N	S	S	A	A
Ophiuroid species					
Biotope	Lim	Lim OphMx	Lim OphMx	Lim	Lim
Live maerl % cover	0	0	0	0	0
Dead maerl % cover	0	0	0	0	0

Table 4.1 continued

Site	**F15.3**	**F16.1**	**F16.2**	**F17.1**	**F18.1**
Location	Loch Fyne	Loch Fyne	Loch Fyne	Loch Fyne	Loch Fyne
Area	Otter Spit	Otter Spit	Otter Spit	Otter Spit	Otter Spit
Latitude	56.00360	56.00242	56.00310	56.00812	56.00918
Longitude	-5.37212	-5.36852	-5.36862	-5.37620	-5.37078
Date	23/08/2012	23/08/2012	23/08/2012	24/08/2012	24/08/2012
Time	16:52	15:12	15:30	09:33	09:35
Surveyor	Rob Cook	Lisa Kamphausen	Lisa Kamphausen	Laura Clark	Flora Kent
Depth BSL (m)	11.0	23.0	15.0	7.5	11.2
Depth BCD (m)	7.4	20.0	11.9	6.3	10.1
Substrate	Shelly sand	Pebbles and cobbles on coarse sand	Cobbles on coarse sand with some boulders	Coarse sand with broken shell	Sand, dead shell and pebbles
Community	*Limaria* turf fairly extensive. Ascidians (F), *Alcyonium digitatum* (O), brittlestars (A-S). Occasional large 3m^2 boulder around the site	Dense feather stars, few ascidians and brittlestars	Brittlestar bed	Red tufty algae (R), encrusting pink algae on small pebbles	Brittlestar bed on sand and pebbles
***Limaria* nest % cover**	80	0	0	0	0
Discrete nests?	N	N	N	N	N
Nest thickness (cm)	4	0	0	0	0
***Limaria* seen?**	Y	N	N	N	N
Algal turf cover (%)	0	0	0	15	5
***Laminaria hyperborea* SACFORN**	N	N	N	N	N
***Saccharina latissima* SACFORN**	N	N	N	R	N
***Modiolus* SACFORN**	N	N	N	N	N
Ophiuroid SACFORN	A	C	S	N	C
Ophiuroid species	*Ophiothrix, Ophiocomina*				
Biotope	Lim		OphMx		
Live maerl % cover	0	0	0	0	0
Dead maerl % cover	0	0	0	0	0

Table 4.1 continued

Site	**F19.1**	**F20.1**	**F21.1**	**F22.1**	**F23.1**
Location	Loch Fyne	Loch Fyne	Loch Fyne	Loch Fyne	Loch Fyne
Area	Otter Spit	Otter Spit	Otter Spit	Otter Spit	Otter Spit
Latitude	56.00055	56.00175	55.99987	55.99913	55.99832
Longitude	-5.37842	-5.38340	-5.37475	-5.38392	-5.37975
Date	24/08/2012	24/08/2012	24/08/2012	24/08/2012	24/08/2012
Time	12:07	13:03	12:31	13:04	13:29
Surveyor	Laura Clark	Rob Cook	Natalie Hirst	Flora Kent	Laura Clark
Depth BSL (m)	9.5	16.8	16.9	14.5	17.7
Depth BCD (m)	8.7	15.5	15.9	13.2	16.1
Substrate	Sandy gravel with pebbles	Sand with 10% mud, 20% dead shell	Muddy sand and shell gravel with empty shell	Sand and dead shell	Coarse sand with pebbles
Community	Dense brittlestars, *Ophiothrix* with a few *Ophiocomina*, *Aequipecten opercularis* (R), ascidians	Sandy seabed with patches of dead *Ensis* shell, mostly bound together with *Limaria*, ascidians common on the dead shell, with *Saccharina latissima* (O)	Barren muddy mixed sediment with *Chaetopterus* tubes, *Cerianthus lloydii*, and *Nemertesia antennina*	Sparse *Ascidia virginea* and *Asterias* on sand and dead shell	*Ophiothrix*, *Echinus*, ascidians, 1 x *Virgularia*, *Aequipecten opercularis*
***Limaria* nest % cover**	15	10	0	0	0
Discrete nests?	Y	Y	N	N	N
Nest thickness (cm)	3	3	0	0	0
***Limaria* seen?**	Y	Y	N	N	N
Algal turf cover (%)	0	5	0	5	0
***Laminaria hyperborea* SACFORN**	N	N	N	N	N
***Saccharina latissima* SACFORN**	N	O	N	N	N
***Modiolus* SACFORN**	N	N	N	N	N
Ophiuroid SACFORN	S	N	N	N	O
Ophiuroid species	*Ophiothrix, Ophiocomina*				*Ophiothrix*
Biotope	Lim OphMx	Lim			
Live maerl % cover	0	0	0	0	0
Dead maerl % cover	0	0	0	0	0

Table 4.1 continued

Site	**F24.1**	**F24.2**	**F25.1**	**F25.2**	**F26.1**	**F27.1**
Location	Loch Fyne	Loch Fyne	Loch Fyne	Loch Fyne	Loch Fyne	Loch Fyne
Area	Otter Spit	Otter Spit	Otter Spit	Otter Spit	Quarry Tea Rooms	Kilbride Island
Latitude	56.01242	56.01173	55.99633	55.99662	56.13158	56.12210
Longitude	-5.36912	-5.36727	-5.38962	-5.38918	-5.22463	-5.21168
Date	24/08/2012	24/08/2012	23/08/2012	23/08/2012	23/08/2012	23/08/2012
Time	13:34	13:50	16:50	17:06	14:06	14:07
Surveyor	Dan Harries	Dan Harries	Colin Moore	Colin Moore	Rob Cook	Colin Moore
Depth BSL (m)	4.5	12.0	13.8	10.9	15.8	25.9
Depth BCD (m)	2.9	10.2	10.2	7.3	14.1	24.4
Substrate	Bedrock ledge with 45 deg rock slope below	Medium shell sand with gravel & pebbles	Slightly silty medium sand	Slightly silty medium sand with many cobbles and pebbles	Muddy sand with cobbles and pebbles	Slope of pebbles and cobbles on muddy sand with *Modiolus* shells
Community	Sparse *Saccharina latissima* forest with dense *Ascidiella* on foliose reds	Coarse mixed sediments with *Ascidiella* (C) and *Cerianthus* (C)	Scattered *Saccharina latissima* (LsacR.Sa)	*Saccharina latissima* park on mixed substrate. Pink encrusting corallines (O), including *Lithothamnion glaciale* (R)	Pebbles and cobbles with *Alcyonium digitatum* (O) and hydroids (C). Muddy sand fairly barren	Stones support sparse hydroid turf (F) including *Nemertesia ramosa* (O) and *Balanus balanus* (O)
***Limaria* nest % cover**	0	0	0	0	0	0
Discrete nests?	N	N	N	N	N	N
Nest thickness (cm)	0	0	0	0	0	0
***Limaria* seen?**	N	N	N	N	N	N
Algal turf cover (%)	30	1	5	40	0	0
***Laminaria hyperborea* SACFORN**	N	N	N	N	N	N
***Saccharina latissima* SACFORN**	A	N	C	C	N	N
***Modiolus* SACFORN**	N	N	N	N	N	N
Ophiuroid SACFORN	N	N	N	N	N	N
Biotope						
Live maerl % cover	0	~1	0	0	0	0
Dead maerl % cover	0	5-10	0	0	0	0

Table 4.1 continued

Site	**C1.1**	**C1.2**	**C1.3**	**C1.4**	**C1.5**	**C1.6**	**C1.7**
Location	Loch Creran	Loch Creran	Loch Creran	Loch Creran	Loch Creran	Loch Creran	Loch Creran
Area	South Shian	South Shian	South Shian	South Shian	South Shian	South Shian	South Shian
Latitude	56.52632	56.52651	56.52696	56.52754	56.52777	56.52813	56.52854
Longitude	-5.38961	-5.38985	-5.39036	-5.39106	-5.39146	-5.39198	-5.39247
Date	20/09/2012	20/09/2012	20/09/2012	20/09/2012	20/09/2012	20/09/2012	20/09/2012
Time	10:38	10:42	10:50	10:59	11:06	11:12	11:17
Surveyor	Graham Saunders	Graham Saunders	Graham Saunders	Graham Saunders	Graham Saunders	Graham Saunders	Graham Saunders
Depth BSL (m)	14.9	11.0	14.5	16.5	16.7	17.1	16.8
Depth BCD (m)	11.3	7.4	10.9	13.0	13.2	13.7	13.4
Substrate	Gravel, pebble, cobble	Muddy shell gravel	Muddy shell gravel	Muddy sand, pebble	Coarse sand, shell gravel	Shell gravel, pebbles, cobbles, boulders	Shell gravel pebbles, cobbles
Community		Kelp park					
***Limaria* nest % cover**	70	100	100	100	90	0	0
Nest thickness (cm)	4	3	4	4	4	0	0
***Limaria* seen?**	Y	Y	Y	Y	Y	N	N
Biotope	Lim	Lim	Lim	Lim	Lim		

Table 4.1 continued

Site	**C2.1**	**C2.2**	**C2.3**	**C2.4**	**C2.5**	**C2.6**	**C2.7**
Location	Loch Creran	Loch Creran	Loch Creran	Loch Creran	Loch Creran	Loch Creran	Loch Creran
Area	South Shian	South Shian	South Shian	South Shian	South Shian	South Shian	South Shian
Latitude	56.52929	56.52947	56.52958	56.52966	56.52970	56.52979	56.52996
Longitude	-5.39719	-5.39657	-5.39625	-5.39608	-5.39593	-5.39573	-5.39527
Date	20/09/2012	20/09/2012	20/09/2012	20/09/2012	20/09/2012	20/09/2012	20/09/2012
Time	09:28	09:35	09:41	09:47	09:50	09:54	09:59
Surveyor	Colin Trigg	Colin Trigg	Colin Trigg	Colin Trigg	Colin Trigg	Colin Trigg	Colin Trigg
Depth BSL (m)	18.0	16.9	16.1	15.6	15.3	14.3	12.9
Depth BCD (m)	14.1	13.0	12.2	11.7	11.5	10.5	9.1
Substrate	Shell/ pebbles on coarse sand	Pebbles 40%, coarse sand gravel	Coarse sand gravel, shell/ pebbles	Coarse sand gravel, shell/ pebbles	Coarse sand gravel, shell/pebbles with fine sediment	Coarse sand gravel, shell/pebbles with fine sediment	Coarse sand gravel, shell/pebbles with fine sediment
Community					*Modiolus* (O)	*Modiolus* (O)	*Modiolus* (O)
***Limaria* nest % cover**	0	0	20	20	95	100	100
Nest thickness (cm)	0	0	6	4	5	5	6
***Limaria* seen?**	N	N	Y	Y	Y	Y	Y
Biotope			Lim	Lim	Lim	Lim	Lim

Table 4.1 continued

Site	**C2.8**	**C2.9**	**C2.10**	**C2.11**	**C3.1**	**C3.2**	**C3.3**
Location	Loch Creran	Loch Creran	Loch Creran	Loch Creran	Loch Creran	Loch Creran	Loch Creran
Area	South Shian	South Shian	South Shian	South Shian	South Shian	South Shian	South Shian
Latitude	56.53007	56.53017	56.53033	56.53040	56.53267	56.53211	56.53133
Longitude	-5.39502	-5.39475	-5.39448	-5.39431	-5.39680	-5.39645	-5.39574
Date	20/09/2012	20/09/2012	20/09/2012	20/09/2012	20/09/2012	20/09/2012	20/09/2012
Time	10:01	10:05	10:09	10:11	08:48	08:51	08:54
Surveyor	Colin Trigg	Colin Trigg	Colin Trigg	Colin Trigg	Rob Cook	Rob Cook	Rob Cook
Depth BSL (m)	11.9	11.3	10.7	10.2	11.5	10.0	10.2
Depth BCD (m)	8.1	7.5	6.9	6.4	7.7	6.2	6.3
Substrate	Coarse sand gravel, shell/pebbles with fine sediment	Cobbles and pebbles on sandy gravel	Cobbles and pebbles on sandy gravel	Cobbles and pebbles on sandy gravel	Cobbles + Pebbles	Cobbles + Pebbles	Cobbles + Pebbles
Community	Kelp and occasional *Modiolus*	Kelp park	Kelp park	Kelp park	*Laminaria hyperborea* (O), Feather stars (C)	*Laminaria hyperborea* (A)	*Laminaria hyperborea* (C)
***Limaria* nest % cover**	95	60	97	80	0	0	0
Nest thickness (cm)	6	4	5	5	0	0	0
***Limaria* seen?**	Y	Y	Y	Y	N	N	N
Biotope	Lim	Lim	Lim	Lim			

Table 4.1 continued

Site	**C3.4**	**C3.5**	**C3.6**	**C3.7**	**C3.8**	**C3.9**	**C4.1**
Location	Loch Creran	Loch Creran	Loch Creran	Loch Creran	Loch Creran	Loch Creran	Loch Creran
Area	South Shian	South Shian	South Shian	South Shian	South Shian	South Shian	South Shian
Latitude	56.53072	56.53049	56.53034	56.53012	56.52961	56.52925	56.52907
Longitude	-5.39496	-5.39466	-5.39425	-5.39389	-5.39311	-5.39256	-5.39534
Date	20/09/2012	20/09/2012	20/09/2012	20/09/2012	20/09/2012	20/09/2012	20/09/2012
Time	08:57	09:00	09:02	09:04	09:08	09:11	13:11
Surveyor	Rob Cook	Rob Cook	Rob Cook	Rob Cook	Rob Cook	Rob Cook	Colin Trigg
Depth BSL (m)	10.3	9.9	10.2	10.1	10.9	11.8	12.3
Depth BCD (m)	6.4	6.0	6.3	6.2	7.0	7.9	10.1
Substrate	Cobbles + Pebbles	Pebbles coarse shell sand with dead *Modiolus* shell	Coarse shell sand with dead *Modiolus* shell	Coarse shell sand with dead *Modiolus* shell	Coarse shell sand	Cobbles + Pebbles	Sandy gravel
Community	*Laminaria hyperborea* (C)	*Laminaria hyperborea* (A)	*Laminaria hyperborea* (A)	*Laminaria hyperborea* (A)	*Laminaria hyperborea* (C)	*Laminaria hyperborea* (C)	
***Limaria* nest % cover**	40	80	2	100	90	5	45
Nest thickness (cm)	5	5	0	5	5	0	8
***Limaria* seen?**	Y	Y	Y	Y	Y	Y	Y
Biotope	Lim	Lim		Lim	Lim		Lim

Table 4.1 continued

Site	**C4.2**	**C4.3**	**C4.4**	**C4.5**	**C4.6**	**C4.7**	**C4.8**
Location	Loch Creran	Loch Creran	Loch Creran	Loch Creran	Loch Creran	Loch Creran	Loch Creran
Area	South Shian	South Shian	South Shian	South Shian	South Shian	South Shian	South Shian
Latitude	56.52937	56.52985	56.53025	56.53084	56.53129	56.53176	56.53215
Longitude	-5.39552	-5.39585	-5.39623	-5.39655	-5.39713	-5.39774	-5.39797
Date	20/09/2012	20/09/2012	20/09/2012	20/09/2012	20/09/2012	20/09/2012	20/09/2012
Time	13:16	13:21	13:26	13:31	13:37	13:43	13:46
Surveyor	Colin Trigg	Colin Trigg	Colin Trigg	Colin Trigg	Colin Trigg	Colin Trigg	Colin Trigg
Depth BSL (m)	12.6	12.6	12.6	11.3	11.6	11.8	11.4
Depth BCD (m)	10.4	10.5	10.6	9.3	9.7	10.0	9.6
Substrate	Sandy gravel	Sandy gravel	Sandy gravel	Sandy gravel with pebbles and cobbles	Sandy gravel with pebbles and cobbles	Sandy gravel with pebbles and cobbles	Gravel and cobbles
Community				Kelp park	Kelp park	Kelp park	
***Limaria* nest % cover**	88	85	85	85	30	70	0
Nest thickness (cm)	8	7	6	4	3	3	0
***Limaria* seen?**	Y	Y	Y	Y	Y	Y	N
Biotope	Lim	Lim	Lim	Lim	Lim	Lim	

Table 4.1 continued

Site	**C4.9**	**C5.1**	**C5.2**	**C5.3**	**C5.4**	**C5.5**	**C6.1**
Location	Loch Creran	Loch Creran	Loch Creran	Loch Creran	Loch Creran	Loch Creran	Loch Creran
Area	South Shian	South Shian	South Shian	South Shian	South Shian	South Shian	South Shian
Latitude	56.53315	56.53018	56.53084	56.53139	56.53212	56.53233	56.52594
Longitude	-5.39885	-5.39089	-5.39170	-5.39266	-5.39390	-5.39482	-5.39096
Date	20/09/2012	20/09/2012	20/09/2012	20/09/2012	20/09/2012	20/09/2012	21/09/2012
Time	13:51	11:35	11:42	11:47	11:54	11:57	10:00
Surveyor	Colin Trigg	Flora Kent	Flora Kent	Flora Kent	Flora Kent	Flora Kent	Rob Cook
Depth BSL (m)	11.1	8.3	11.6	15.4	15.2	9.0	15.3
Depth BCD (m)	9.4	5.0	8.4	12.2	12.1	5.9	11.6
Substrate	Gravel and cobbles with small boulders	Cobbles	Shelly mud	Shelly mud and cobbles	Shelly mud and cobbles	Boulders	Gravel and pebbles
Community							
***Limaria* nest % cover**	0	0	80	90	60	0	0
Nest thickness (cm)	0	0	3	4	3	0	0
***Limaria* seen?**	N	N	Y	Y	Y	N	N
Biotope			Lim	Lim	Lim		

Table 4.1 continued

Site	**C6.2**	**C6.3**	**C6.4**	**C6.5**	**C6.6**	**C7.1**	**C7.2**
Location	Loch Creran	Loch Creran	Loch Creran	Loch Creran	Loch Creran	Loch Creran	Loch Creran
Area	South Shian	South Shian	South Shian	South Shian	South Shian	South Shian	South Shian
Latitude	56.52597	56.52585	56.52603	56.52656	56.52676	56.52546	56.52602
Longitude	-5.39088	-5.39095	-5.39061	-5.39021	-5.39010	-5.38629	-5.38510
Date	21/09/2012	21/09/2012	21/09/2012	21/09/2012	21/09/2012	21/09/2012	21/09/2012
Time	10:03	10:07	10:12	10:16	10:17	15:12	15:20
Surveyor	Rob Cook	Rob Cook	Rob Cook	Rob Cook	Rob Cook	Graham Saunders	Graham Saunders
Depth BSL (m)	15.3	15.4	13.5	11.1	9.1	19.5	4.5
Depth BCD (m)	11.6	11.7	9.8	7.4	5.4	18.0	3.1
Substrate	Sand, cobbles, boulders	Sand, cobbles, pebbles	Dead shell, cobbles, gravel	Boulders, gravel, cobbles	Bedrock	Sandy mud with pebbles and cobbles	Sandy mud with pebbles and cobbles
Community							
***Limaria* nest % cover**	95	100	80	100	0	0	0
Nest thickness (cm)	5	5	5	5	0	0	0
***Limaria* seen?**	Y	Y	Y	Y	Y	N	N
Biotope	Lim	Lim	Lim	Lim			

Table 4.1 continued

Site	**C10.1**	**C10.2**	**C10.3**	**C10.4**	**C10.5**	**C10.6**	**C11.1**
Location	Loch Creran	Loch Creran	Loch Creran	Loch Creran	Loch Creran	Loch Creran	Loch Creran
Area	Mouth	Mouth	Mouth	Mouth	Mouth	Mouth	Creagan
Latitude	56.53216	56.53265	56.53278	56.53293	56.53325	56.53353	56.54816
Longitude	-5.43040	-5.42962	-5.42922	-5.42858	-5.42749	-5.42656	-5.29335
Date	23/09/2012	23/09/2012	23/09/2012	23/09/2012	23/09/2012	23/09/2012	20/09/2012
Time	11:32	11:39	11:42	11:47	11:55	12:01	15:59
Surveyor	Dan Harries	Dan Harries	Dan Harries	Dan Harries	Dan Harries	Dan Harries	Flora Kent
Depth BSL (m)	20.8	14.3	11.7	8.7	8.7	8.7	7.1
Depth BCD (m)	17.7	11.2	8.6	5.6	5.5	5.5	6.7
Substrate	Pebbles (~50%) on coarse sand and gravel	Pebbles (~50%) on coarse sand and gravel	Coarse shell gravel and sand	Pebbles (~70%) on coarse sand and gravel	Pebbles (~70%) on coarse sand and gravel	Pebbles (~70%) on coarse sand and gravel	Fine sand and shell
Community							*Modiolus* bed
***Limaria* nest % cover**	0	0	0	0	0	0	0
Nest thickness (cm)	0	0	0	0	0	0	0
***Limaria* seen?**	N	N	N	N	N	N	N
Biotope							ModT

Table 4.1 continued

Site	**C11.2**	**C11.3**	**C11.4**	**C11.5**	**C12.1**	**C12.2**	**C12.3**
Location	Loch Creran	Loch Creran	Loch Creran	Loch Creran	Loch Creran	Loch Creran	Loch Creran
Area	Creagan	Creagan	Creagan	Creagan	Creagan	Creagan	Creagan
Latitude	56.54757	56.54746	56.54755	56.54747	56.54772	56.54782	56.54803
Longitude	-5.29544	-5.29588	-5.29696	-5.29725	-5.29846	-5.29811	-5.29707
Date	20/09/2012	20/09/2012	20/09/2012	20/09/2012	20/09/2012	20/09/2012	20/09/2012
Time	16:09	16:14	16:28	16:32	18:06	18:11	18:18
Surveyor	Flora Kent	Flora Kent	Flora Kent	Flora Kent	Graham Saunders	Graham Saunders	Graham Saunders
Depth BSL (m)	10.4	10.2	8.5	8.4	8.9	8.4	8.3
Depth BCD (m)	10.0	9.8	8.1	8.0	7.9	7.4	7.1
Substrate	Fine sand and shell	Cobbles and fine sand	Fine sand and shell	Cobbles and fine sand	Muddy sand, pebbles cobbles and shell	Muddy sand, pebbles cobbles and shell	Medium/coarse sand, pebble, cobble, shell
Community	*Modiolus* bed		*Modiolus* bed				
***Limaria* nest % cover**	0	0	0	0	0	0	0
Nest thickness (cm)	0	0	0	0	0	0	0
***Limaria* seen?**	N	N	N	N	N	N	N
Biotope	ModT		ModT				

Table 4.1 continued

Site	C12.4	C12.5	C12.6	C12.7	C13.1	C13.2	C13.3
Location	Loch Creran	Loch Creran	Loch Creran	Loch Creran	Loch Creran	Loch Creran	Loch Creran
Area	Creagan	Creagan	Creagan	Creagan	Creagan	Creagan	Creagan
Latitude	56.54822	56.54828	56.54832	56.54846	56.54732	56.54690	56.54644
Longitude	-5.29631	-5.29590	-5.29543	-5.29441	-5.29575	-5.29760	-5.29960
Date	20/09/2012	20/09/2012	20/09/2012	20/09/2012	20/09/2012	20/09/2012	20/09/2012
Time	18:29	18:35	18:39	18:45	15:21	15:32	15:42
Surveyor	Graham Saunders	Graham Saunders	Graham Saunders	Graham Saunders	Graham Saunders	Graham Saunders	Graham Saunders
Depth BSL (m)	9.3	8.1	7.8	5.9	10.5	9.8	13.1
Depth BCD (m)	8.0	6.7	6.3	4.4	9.9	9.2	12.6
Substrate	Shell gravel and whole shells	Muddy shelly sand. Large no. of whole *Modiolus* shells	Shelly sand	Muddy fine sand, pebbles, cobbles	Muddy sand, pebbles, cobbles	Fine muddy sand	Sandy mud
Community						Brittlestar bed between this station and previous	*Virgularia, Pachycerianthus*
***Limaria* nest % cover**	50	70	0	0	0	0	0
Nest thickness (cm)	4	4	0	0	0	0	0
***Limaria* seen?**	Y	Y	N	N	N	N	N
Biotope	Lim	Lim					

Table 4.1 continued

Site	**C14.1**	**C14.2**	**C14.3**	**C14.4**	**C14.5**	**C14.6**	**C14.7**
Location	Loch Creran	Loch Creran	Loch Creran	Loch Creran	Loch Creran	Loch Creran	Loch Creran
Area	Creagan	Creagan	Creagan	Creagan	Creagan	Creagan	Creagan
Latitude	56.54725	56.54754	56.54773	56.54786	56.54807	56.54815	56.54840
Longitude	-5.29483	-5.29462	-5.29446	-5.29437	-5.29442	-5.29446	-5.29430
Date	20/09/2012	20/09/2012	20/09/2012	20/09/2012	20/09/2012	20/09/2012	20/09/2012
Time	16:51	16:54	16:57	16:59	17:02	17:05	17:09
Surveyor	Rob Cook	Rob Cook	Rob Cook	Rob Cook	Rob Cook	Rob Cook	Rob Cook
Depth BSL (m)	9.9	10.4	11.6	10.9	8.7	8.1	5.1
Depth BCD (m)	9.5	10.0	11.2	10.5	8.3	7.7	4.7
Substrate	Sand and dead shell	Pebbles and muddy sand	*Modiolus* shell live and dead	*Modiolus* shell and coarse sand	Pebbles and cobbles	Sand and pebbles	Sand and dead shell
Community			*Modiolus* present				
***Limaria* nest % cover**	0	0	5	80	50	5	0
Nest thickness (cm)	0	0	0	4	2	0	0
***Limaria* seen?**	N	N	Y	Y	Y	Y	N
Biotope				Lim	Lim		

Table 4.1 continued

Site	**C16.1**	**C16.2**	**C16.3**	**C16.4**	**C16.5**	**C16.6**	**C17.1**
Location	Loch Creran	Loch Creran	Loch Creran	Loch Creran	Loch Creran	Loch Creran	Loch Creran
Area	South Shian	South Shian	South Shian	South Shian	South Shian	South Shian	Creagan
Latitude	56.52767	56.52829	56.52992	56.53210	56.53245	56.53310	56.54762
Longitude	-5.38932	-5.38911	-5.39061	-5.39355	-5.39400	-5.39543	-5.29314
Date	20/09/2012	20/09/2012	20/09/2012	20/09/2012	20/09/2012	20/09/2012	20/09/2012
Time	12:26	12:31	12:39	12:47	12:50	12:53	17:20
Surveyor	Rob Cook	Rob Cook	Rob Cook	Rob Cook	Rob Cook	Rob Cook	Colin Trigg
Depth BSL (m)	8.7	7.1	8.9	15.2	8.6	7.5	3.6
Depth BCD (m)	5.9	4.4	6.3	12.6	6.1	5.1	3.1
Substrate	Coarse sand	Coarse sand	Coarse sand	Pebbles and cobbles	Boulders	Bedrock and boulders	Cobbles and pebbles with small boulders
Community				*Modiolus* (F, possibly C)			Kelp forest
***Limaria* nest % cover**	70	0	60	80	0	0	0
Nest thickness (cm)	4	0	3	5	0	0	0
***Limaria* seen?**	Y	N	Y	Y	N	N	N
Biotope	Lim		Lim	Lim			

Table 4.1 continued

Site	**C17.2**	**C17.3**	**C17.4**	**C17.5**	**C17.6**	**C17.7**	**C18.1**
Location	Loch Creran	Loch Creran	Loch Creran	Loch Creran	Loch Creran	Loch Creran	Loch Creran
Area	Creagan	Creagan	Creagan	Creagan	Creagan	Creagan	South Shian
Latitude	56.54773	56.54788	56.54791	56.54813	56.54823	56.54840	56.52808
Longitude	-5.29318	-5.29311	-5.29306	-5.29302	-5.29298	-5.29292	-5.39018
Date	20/09/2012	20/09/2012	20/09/2012	20/09/2012	20/09/2012	20/09/2012	21/09/2012
Time	17:27	17:30	17:32	17:37	17:41	17:44	10:33
Surveyor	Colin Trigg	Colin Trigg	Colin Trigg	Colin Trigg	Colin Trigg	Colin Trigg	Colin Trigg
Depth BSL (m)	4.9	5.3	6.8	6.5	5.6	4.2	12.2
Depth BCD (m)	4.4	4.7	6.2	5.9	4.9	3.5	8.6
Substrate	*Modiolus* shells and pebbles, gravel 10%	Shells and gravel	Mixed *Modiolus* with shell/gravle/pebbles	*Modiolus* shells, cobble and gravel on muddy sand	Muddy sand with shells and pebbles	Fine muddy Sand	Gravel and muddy sand
Community	Kelp forest		Brittlestar bed	Brittlestar bed			Kelp forest
***Limaria* nest % cover**	75	60	45	5	1	0	100
Nest thickness (cm)	3	5	3	2	2	0	9
***Limaria* seen?**	Y	Y	Y	Y	Y	N	Y
Biotope	Lim	Lim	Lim OphMx	OphMx			Lim

Table 4.1 continued

Site	**C18.2**	**C18.3**	**C18.4**	**C19.1**	**C19.2**	**C19.3**	**C19.4**
Location	Loch Creran	Loch Creran	Loch Creran	Loch Creran	Loch Creran	Loch Creran	Loch Creran
Area	South Shian	South Shian	South Shian	South Shian	South Shian	South Shian	South Shian
Latitude	56.52852	56.52940	56.53018	56.53056	56.53111	56.53154	56.53204
Longitude	-5.39056	-5.39123	-5.39183	-5.39230	-5.39301	-5.39367	-5.39471
Date	21/09/2012	21/09/2012	21/09/2012	21/09/2012	21/09/2012	21/09/2012	21/09/2012
Time	10:39	10:45	10:53	11:21	11:29	11:34	11:39
Surveyor	Colin Trigg	Colin Trigg	Colin Trigg	Graham Saunders	Graham Saunders	Graham Saunders	Graham Saunders
Depth BSL (m)	10.4	9.9	11.4	12.2	13.9	14.9	13.7
Depth BCD (m)	6.8	6.3	7.9	8.8	10.5	11.5	10.4
Substrate	Gravel and muddy sand	Gravel and muddy sand	Gravel and muddy sand	Muddy sand	Coarse shelly sand, cobble, pebble	Shell gravel, cobble, pebble	Pebble and cobble on muddy shell gravel
Community	Kelp forest	Kelp forest	Kelp park				
***Limaria* nest % cover**	99	95	100	100	0	0	0
Nest thickness (cm)	9	10	10	8	0	0	0
***Limaria* seen?**	Y	Y	Y	Y	N	N	N
Biotope	Lim	Lim	Lim	Lim			

Table 4.1 continued

Site	**C19.5**	**C20.1**	**C20.2**	**C20.3**	**C20.4**	**C20.5**	**C20.6**
Location	Loch Creran	Loch Creran	Loch Creran	Loch Creran	Loch Creran	Loch Creran	Loch Creran
Area	South Shian	South Shian	South Shian	South Shian	South Shian	South Shian	South Shian
Latitude	56.53292	56.52988	56.53019	56.53036	56.53049	56.53070	56.53093
Longitude	-5.39627	-5.39688	-5.39718	-5.39728	-5.39737	-5.39758	-5.39783
Date	21/09/2012	21/09/2012	21/09/2012	21/09/2012	21/09/2012	21/09/2012	21/09/2012
Time	11:47	13:50	14:01	14:07	14:08	14:11	14:13
Surveyor	Graham Saunders	Colin Trigg	Colin Trigg	Colin Trigg	Colin Trigg	Colin Trigg	Colin Trigg
Depth BSL (m)	11.7	15.3	15.4	15.2	15.2	15.2	15.1
Depth BCD (m)	8.4	12.9	13.1	13.0	13.0	13.0	13.0
Substrate	Pebble, cobble, shell, boulders	Pebbles and gravel with coarse sand	Pebbles/cobbles on gravel with muddy sand	Pebbles/cobbles on gravel with muddy sand	Pebbles/cobbles on gravel with muddy sand	Pebbles/cobbles on gravel with muddy sand	Pebbles/cobbles on gravel with muddy sand
Community			*Modiolus* present	*Modiolus* present	*Modiolus* present	*Modiolus* present	*Modiolus* present
***Limaria* nest % cover**	0	0	10	15	35	45	20
Nest thickness (cm)	0	0	4	4	5	5	5
***Limaria* seen?**	N	N	Y	Y	Y	Y	Y
Biotope			Lim	Lim	Lim	Lim	Lim

Table 4.1 continued

Site	**C20.7**	**C20.8**	**C20.9**	**C20.10**	**C21.1**	**C21.2**	**C21.3**
Location	Loch Creran	Loch Creran	Loch Creran	Loch Creran	Loch Creran	Loch Creran	Loch Creran
Area	South Shian	South Shian	South Shian	South Shian	South Shian	South Shian	South Shian
Latitude	56.53125	56.53155	56.53190	56.53234	56.52445	56.52510	56.52559
Longitude	-5.39817	-5.39852	-5.39885	-5.39918	-5.38667	-5.38711	-5.38789
Date	21/09/2012	21/09/2012	21/09/2012	21/09/2012	21/09/2012	21/09/2012	21/09/2012
Time	14:16	14:20	14:24	14:31	13:01	13:08	13:13
Surveyor	Colin Trigg	Colin Trigg	Colin Trigg	Colin Trigg	Rob Cook	Rob Cook	Rob Cook
Depth BSL (m)	14.8	14.0	13.7	12.8	24.0	24.0	22.0
Depth BCD (m)	12.7	12.0	11.7	10.9	21.1	21.2	19.3
Substrate	Pebbles/cobbles on gravel with muddy sand	Gravel with cobbles and shells, *Modiolus*	Gravel with cobbles and shells, *Modiolus*	Gravel with cobbles and shells, *Modiolus*	Pebbles and cobbles	Pebbles and cobbles	Pebbles and cobbles
Community	*Modiolus* present						
***Limaria* nest % cover**	10	1	0	0	0	0	0
Nest thickness (cm)	4	3	0	0	0	0	0
***Limaria* seen?**	Y	Y	N	N	N	N	N
Biotope	Lim						

Table 4.1 continued

Site	**C21.4**	**C21.5**	**C21.6**	**C21.7**	**C21.8**	**C22.1**	**C22.2**
Location	Loch Creran	Loch Creran	Loch Creran	Loch Creran	Loch Creran	Loch Creran	Loch Creran
Area	South Shian	South Shian	South Shian	South Shian	South Shian	South Shian	South Shian
Latitude	56.52564	56.52607	56.52621	56.52658	56.52681	56.52671	56.52722
Longitude	-5.38827	-5.38836	-5.38836	-5.38855	-5.38929	-5.39086	-5.39163
Date	21/09/2012	21/09/2012	21/09/2012	21/09/2012	21/09/2012	21/09/2012	21/09/2012
Time	13:16	13:21	13:24	13:27	13:31	12:09	12:16
Surveyor	Rob Cook	Rob Cook	Rob Cook	Rob Cook	Rob Cook	Flora Kent	Flora Kent
Depth BSL (m)	21.2	17.6	15.4	11.2	6.5	15.9	15.8
Depth BCD (m)	18.5	14.9	12.8	8.6	3.9	12.7	12.6
Substrate	Pebbles and cobbles	Pebbles, cobbles and dead shell	Pebbles, cobbles and dead shell	Boulders,cobbles and sand	Bedrock and boulders	Cobbles, pebbles, sand	Shell cobbles pebbles
Community							
***Limaria* nest % cover**	10	60	30	80	10	20	80
Nest thickness (cm)	4	6	5	4	2	2	4
***Limaria* seen?**	Y	Y	Y	Y	Y	Y	Y
Biotope	Lim	Lim	Lim	Lim	Lim	Lim	Lim

Table 4.1 continued

Site	**C22.3**	**C22.4**	**C22.5**	**C23.1**	**C23.2**	**C23.3**	**C23.4**
Location	Loch Creran	Loch Creran	Loch Creran	Loch Creran	Loch Creran	Loch Creran	Loch Creran
Area	South Shian	South Shian	South Shian	South Shian	South Shian	South Shian	South Shian
Latitude	56.52807	56.52847	56.52916	56.53236	56.53211	56.53240	56.53255
Longitude	-5.39319	-5.39363	-5.39407	-5.39259	-5.39204	-5.39110	-5.39013
Date	21/09/2012	21/09/2012	21/09/2012	21/09/2012	21/09/2012	21/09/2012	21/09/2012
Time	12:26	12:30	12:35	09:15	09:23	09:33	09:40
Surveyor	Flora Kent	Flora Kent	Flora Kent	Flora Kent	Flora Kent	Flora Kent	Flora Kent
Depth BSL (m)	14.7	11.0	12.6	16.0	13.0	11.0	7.0
Depth BCD (m)	11.6	7.9	9.6	12.5	9.4	7.4	3.4
Substrate	Shell cobbles pebbles	Shell cobbles pebbles	Shell cobbles pebbles	Cobbles, *Modiolus*, mud	Muddy sand, drift weed	Muddy sand	Muddy Sand
Community							
***Limaria* nest % cover**	90	0	90	0	0	0	0
Nest thickness (cm)	4	0	4	0	0	0	0
***Limaria* seen?**	Y	N	Y	N	N	N	N
Biotope	Lim		Lim				

Table 4.1 continued

Site	**C24.1**	**C24.2**	**C24.3**	**C25.1**	**C25.2**	**C25.3**	**C25.4**
Location	Loch Creran	Loch Creran	Loch Creran	Loch Creran	Loch Creran	Loch Creran	Loch Creran
Area	Creagan	Creagan	Creagan	Creagan	Creagan	Creagan	Creagan
Latitude	56.54808	56.54774	56.54741	56.54801	56.54801	56.54795	56.54787
Longitude	-5.29573	-5.29621	-5.29617	-5.29390	-5.29317	-5.29319	-5.29228
Date	21/09/2012	21/09/2012	21/09/2012	21/09/2012	21/09/2012	21/09/2012	21/09/2012
Time	16:51	16:56	17:06	17:20	17:26	17:27	17:31
Surveyor	Flora Kent	Flora Kent	Flora Kent	Rob Cook	Rob Cook	Rob Cook	Rob Cook
Depth BSL (m)	7.9	9.7	8.7	8.8	8.5	6.9	5.0
Depth BCD (m)	7.2	9.0	8.1	8.2	7.9	6.3	4.4
Substrate	Boulders in *Modiolus* bed	Mud and shell	Mud, pebbles	Pebbles, muddy sand, *Modiolus*	Pebbles, muddy sand, *Modiolus*	Coarse sand, pebbles and dead shell and *Modiolus*	Coarse sand, pebbles and dead shell and *Modiolus*
Community	*Modiolus* bed	*Modiolus* and brittlestars					
***Limaria* nest % cover**	0	0	0	0	30	20	30
Nest thickness (cm)	0	0	0	0	3	4	4
***Limaria* seen?**	N	N	N	N	Y	Y	Y
Biotope	ModT				Lim	Lim	Lim

Table 4.1 continued

Site	**C25.5**	**C26.1**	**C26.2**	**C26.3**	**C26.4**	**C26.5**	**C26.6**
Location	Loch Creran	Loch Creran	Loch Creran	Loch Creran	Loch Creran	Loch Creran	Loch Creran
Area	Creagan	South Shian	South Shian	South Shian	South Shian	South Shian	South Shian
Latitude	56.54773	56.52559	56.52567	56.52577	56.52587	56.52605	56.52628
Longitude	-5.29164	-5.39167	-5.39165	-5.39170	-5.39176	-5.39181	-5.39187
Date	21/09/2012	23/09/2012	23/09/2012	23/09/2012	23/09/2012	23/09/2012	23/09/2012
Time	17:34	12:40	12:44	12:47	12:50	12:53	12:57
Surveyor	Rob Cook	Rob Cook	Rob Cook	Rob Cook	Rob Cook	Rob Cook	Rob Cook
Depth BSL (m)	4.4	16.4	15.6	15.5	15.2	14.8	14.8
Depth BCD (m)	3.8	13.2	12.4	12.3	12.0	11.6	11.6
Substrate	Boulders and cobbles	Dead shell, pebbles, cobbles, gravel	Sand and gravel with coarse sand	Coarse sand and shell	Pebbles and gravel with coarse sand	Coarse sand	Coarse sand
Community							
***Limaria* nest % cover**	0	0	50	90	0	80	100
Nest thickness (cm)	0	0	5	5	0	4	10
***Limaria* seen?**	N	N	Y	Y	N	Y	Y
Biotope			Lim	Lim		Lim	Lim

Table 4.1 continued

Site	**C26.7**	**C26.8**	**C26.9**	**C26.10**	**C26.11**	**C26.12**	**C27.1**
Location	Loch Creran	Loch Creran	Loch Creran	Loch Creran	Loch Creran	Loch Creran	Loch Creran
Area	South Shian	South Shian	South Shian	South Shian	South Shian	South Shian	South Shian
Latitude	56.52657	56.52712	56.52730	56.52769	56.52798	56.52835	56.52561
Longitude	-5.39194	-5.39207	-5.39207	-5.39216	-5.39229	-5.39268	-5.39308
Date	23/09/2012	23/09/2012	23/09/2012	23/09/2012	23/09/2012	23/09/2012	23/09/2012
Time	13:01	13:06	13:09	13:13	13:17	13:22	13:49
Surveyor	Rob Cook	Rob Cook	Rob Cook	Rob Cook	Rob Cook	Rob Cook	Flora Kent
Depth BSL (m)	14.7	15.0	16.0	17.0	17.7	14.6	17.9
Depth BCD (m)	11.6	11.9	12.9	13.9	14.6	11.5	14.8
Substrate	Gravel and pebbles	Gravel and dead shell	Coarse sand	Pebbles and coarse sand	Big shell bank	Pebbles and dead shell	Pebbles, sand, shell
Community					*Limaria* terraces with *Limaria* varying from 0% to 100% cover		
***Limaria* nest % cover**	2	60	100	100	100	100	0
Nest thickness (cm)	0	8	7	6	15	12	0
***Limaria* seen?**	Y	Y	Y	Y	Y	Y	N
Biotope		Lim	Lim	Lim	Lim	Lim	

Table 4.1 continued

Site	**C27.2**	**C27.3**	**C28.1**	**C28.2**	**C28.3**
Location	Loch Creran	Loch Creran	Loch Creran	Loch Creran	Loch Creran
Area	South Shian	South Shian	South Shian	South Shian	South Shian
Latitude	56.52598	56.52628	56.53045	56.53136	56.53230
Longitude	-5.39371	-5.39426	-5.38977	-5.39050	-5.39088
Date	23/09/2012	23/09/2012	23/09/2012	23/09/2012	23/09/2012
Time	13:55	14:01	14:37	14:43	14:52
Surveyor	Flora Kent	Flora Kent	Dan Harries	Dan Harries	Dan Harries
Depth BSL (m)	21.6	24.8	3.5	7.1	11.4
Depth BCD (m)	18.5	21.7	0.5	4.2	8.5
Substrate	Pebbles, sand, shell	Pebbles, sand, shell	Muddy sand	Muddy sand and gravel	Fine sand
Community					
***Limaria* nest % cover**	0	0	0	0	0
Nest thickness (cm)	0	0	0	0	0
***Limaria* seen?**	N	N	N	N	N
Biotope					

ANNEX 5: MNCR PHASE 2 SURVEY DATA

Table 5.1: Site details for MNCR phase 2 dive surveys. Surveyors at all sites: Dan Harries, Colin Moore.

Location	Date	Site	Biotope	Latitude	Longitude	Transect bearing (°T)	Depth at start (m)	Depth at end (m)
Loch Alsh	08/08/2012	HM01	SBR.SMus.ModTSS.SMx.IMx.LimSS.SMx.OphMx	57.27300	-5.71367	265	20.2	18.4
Loch Alsh	11/08/2012	HM02	SBR.SMus.ModTSS.SMx.IMx.LimSS.SMx.OphMx	57.27672	-5.73300	25	14.4	16.0
Loch Alsh	10/08/2012	FS01	SS.SMx.IMx.Lim	57.27838	-5.70447	355	16.5	16.8
Loch Fyne	24/08/2012	FS02	SS.SMx.IMx.LimSS.SMx.OphMx	56.00682	-5.37273	196	11.0	11.9
Loch Creran	22/09/2012	FS03	SS.SMx.IMx.Lim	56.53018	-5.39183	146	7.8	7.5
Loch Creran	22/09/2012	FS04	SBR.SMus.ModTSS.SMx.lMx.LimSS.SMx.OphMx	56.54829	-5.29590	226	6.0	7.3

Table 5.2: SACFOR abundance records for species recorded during MNCR phase 2 surveys. Localised abundance in brackets. Nomenclature follows WoRMS (2013).

Taxa	Site					
	HM01	**HM02**	**FS01**	**FS02**	**FS03**	**FS04**
Leucosolenia sp.				P		
Sycon ciliatum		P	P	P		
Cliona caledoniae			P	P		
Cliona celata	P		P			
Pione vastifica						P
Suberites carnosus				R		
Suberites ficus				R		
Suberites sp.			R			
Suberites sp.?	P					
Haliclona (Rhizoniera) viscosa			P			
Amphilectus fucorum			P			R
Amphilectus sp.?					R	
Porifera sp. indet.						R
Eudendrium rameum		P		P		
Hydractinia echinata						R
Obelia geniculata			P		P	
Rhizocaulus verticillatus		C		P		
Halecium halecinum			R	O		
Halopteris catharina				P		
Kirchenpaueria pinnata			R	R		
Nemertesia antennina	R		F	F	R	
Nemertesia ramosa	O		F			
Diphasia rosacea?		R				
Hydrallmania falcata					R	R
Sertularella polyzonias	R			P		
Sertularia argentea		R				
Alcyonium digitatum		R	R	O		R
Anemonia viridis		P			R	
Anemonia viridis?			P			
Bolocera tuediae		R				
Urticina eques	P				F	
Urticina felina			P		P	
Sagartia elegans					O	
Sagartia sp.				R		
Cerianthus lloydii				F		
Caryophyllia (Caryophyllia) smithii	P					
Lineus sp.			P		P	
Tubulanus sp.					P	
Chaetopterus variopedatus				P		
Flabelligera affinis?					P	
Eupolymnia nebulosa				O	F	P
Lanice conchilega			P			
Hydroides norvegicus			P			
Hydroides sp.				P		

Table 5.2 continued

Taxa	Site					
	HM01	**HM02**	**FS01**	**FS02**	**FS03**	**FS04**
Protula tubularia	P					
Spirobranchus lamarcki					R	
Spirobranchus spp.						R
Spirobranchus triqueter	F(A)		P	P		
Spirorbinae spp.	P				P	
Sabella pavonina	O		O	O	O	
Balanus balanus	F			R		R
Balanus crenatus			P		R	
Verruca stroemia				P		
Pandalus sp.	P	P				P
Cancer pagurus	F	P		P	P	
Galathea sp.		P			P	
Munida rugosa	C	O	F		P	
Pagurus bernhardus	F		F	F		F
Pagurus sp.				P		
Paguridae sp.	R					
Inachus sp.	F		O		P	
Macropodia sp.					P	
Hyas araneus				F		
Hyas sp.		O	P		P	
Atelecyclus rotundatus	P		P			
Liocarcinus corrugatus?			P			
Liocarcinus depurator	P		P	P		
Necora puber	P			P	O	O
Carcinus maenas	P				P	F
Brachiopoda sp.?				P		
Leptochiton asellus?						P
Lacuna sp.?					A	
Lacuna vincta					P	
Natica eggs			P			
Trivia monacha			P	P		
Buccinum undatum	F	O(F)	F	P	P	O
Nassarius incrassatus			P			
Nudibranchia sp. A				P		
Doridiacea sp.		P	P			
Nudibranchia eggs			P			
Calliostoma zizyphinum	O		P			
Testudinalia testudinalis		P				
Tectura virginea						O
Gibbula cineraria	P	P			P	O
Gibbula umbilicalis	P					
Limaria hians	A	A	A	A	A	C
Modiolus modiolus	C(A)	C				A
Anomiidae sp.					P	
Monia patelliformis	O					P
Aequipecten opercularis	P	P	O	F		
Mimachlamys varia nivea						P

Table 5.2 continued

Taxa	Site					
	HM01	**HM02**	**FS01**	**FS02**	**FS03**	**FS04**
Pecten maximus	O		O		O	
Bugula avicularia	R					
Bugula sp.			P			
Scrupocellaria scruposa		R		P		
Electra pilosa	R	R		R	R	
Membranipora membranacea					P	
Asterias rubens	F	F	P		P	F
Marthasterias glacialis	F			P		
Astropecten irregularis			P			
Luidia ciliaris	F			P		
Henricia sp.	P	P	O	P	P	
Crossaster papposus	P	P	F		F	P
Solaster endeca	P					
Antedon bifida	C(S)				F	P
Echinus esculentus	C	F	F			
Psammechinus miliaris						A
Thyone sp.?					P	
Ophiocomina nigra	P	C(A)	P	A	R	
Ophiopholis aculeata	P	F(A)				
Ophiothrix fragilis	A	S		P		S
Clavelina lepadiformis					P	
Didemnum sp.					R	
Diplosoma listerianum				R	P	
Lissoclinum sp.	P	P	R			
Didemnidae sp.				R		
Polyclinidae sp.			R			
Ascidia mentula			P			
Ascidia virginea			P	O		
Ascidiella aspersa				A	F	
Ascidiella scabra?				P		
Ciona intestinalis		O	P	O		O
Corella parallelogramma	R			O	P	
Pyura microcosmus					P	
Botrylloides leachii			R		P	
Botryllus schlosseri		P	R		R	
Dendrodoa grossularia				P		
Polycarpa pomaria	O	P	F			
Scyliorhinus canicula				P		
Scyliorhinus canicula egg case				R		
Scyliorhinus egg case					P	
Gadus morhua	P		P			
Trisopterus minutus	P		P			
Parablennius gattorugine?	P					
Callionymus reticulatus			P			
Callionymus sp.						P
Pomatoschistus minutus					P	
Pomatoschistus pictus			P	P		
Gobiidae indet.	P					

Table 5.2 continued

Taxa	Site					
	HM01	**HM02**	**FS01**	**FS02**	**FS03**	**FS04**
Pholis gunnellus	P	O	P	P	P	P
Chirolophis ascanii		P	P	P		P
Zeugopterus punctatus	P					
Myoxocephalus scorpius	P		P	P		
Myoxocephalus scorpius?		P				
Taurulus bubalis				P		
Rhodochorton purpureum					R	
Bonnemaisonia asparagoides			C			
Bonnemaisonia hamifera	R	R	F	R	R	
Corallinaceae pink crust	R	R	R		R	O
Lithothamnion glaciale						O
Rhodophyllis divaricata		R	R	O		
Callophyllis laciniata					R	
Kallymenia reniformis	F		F			
Plocamium cartilagineum	R	R	F		A	
Aglaothamnion priceanum?					R	
Seirospora interrupta	R					
Pterothamnion plumula			R			
Heterosiphonia japonica	O	R	F	F	A	
Heterosiphonia plumosa	R					
Apoglossum ruscifolium			R			
Cryptopleura ramosa		R			R	
Erythroglossum laciniatum	R		O			
Membranoptera alata					P	
Phycodrys rubens	O	R		R	P	R
Delesseria sanguinea				R		
Polyneura bonnemaisonii	O	R				
Brongniartella byssoides	R	R	O	R	R	
Odonthalia dentata					R	
Polysiphonia sp.			R			
Compsothamnion thuyoides	R		R	O		
Halurus flosculosus			R			
Pleonosporium borreri				P		
Phaeophyceae crust						R
Rhodophyta crust					R	
Filamentous red algae			A	C		
Foliose red algae			C	O		
Red algal turf					A	
Desmarestia aculeata	R		R		R	
Desmarestia ligulata	R	R	R			
Dictyota dichotoma	R		R			
Ectocarpus sp.			R			
Ectocarpaceae sp.		R				
Pilayella littoralis	R					
Chorda filum	F		O			
Laminaria hyperborea					C	F
Saccharina latissima	F		C			O
Ulva compressa	O					

Table 5.2 continued

Taxa	Site					
	HM01	**HM02**	**FS01**	**FS02**	**FS03**	**FS04**
Ulva lactuca					R	
Ulva rigida?	R					
Algal turf	F		A			

Table 5.3: Abundance of taxa recorded in four replicate clumps of Modiolus modiolus *collected from two MNCR phase 2 sites in Loch Alsh. + denotes presence.*

Taxa	Site	HM01				HM02			
	Replicate	1	2	3	4	1	2	3	4
Foraminifera spp.		+	+	+	+	+	+	+	+
Leucosolenia variabilis?		+	+	+	+	+	+	+	+
Sycon ciliatum		+					+	+	+
Cliona caledoniae		+	+	+				+	+
Cliona celata		+			+				
Cliona lobata		+							
Pione vastifica			+	+	+	+	+	+	+
Suberites sp.									+
Haliclona sp.		+	+	+	+				
Microcionidae sp.?		+							
Amphilectus fucorum			+			+	+	+	
Hymedesmia (Stylopus) coriacea?			+	+	+				
Hymedesmia sp.							+		
Mycale (Carmia) macilenta							+	+	
Porifera sp.							+		
Corynidae sp.		+	+		+				
Eudendriidae sp.				+	+				
Clytia hemisphaerica		+	+		+	+	+	+	+
Obelia sp. juv.								+	
Obelia sp.?					+				
Rhizocaulus verticillatus							+	+	
Halecium sp.					+				+
Sertularella polyzonias			+	+	+				
Sertularia sp.		+		+	+				
Hydrozoa spp. indet.				+	+		+		
Anthozoa spp. juv.		1	5		8			1	2
Platyhelminthes spp.		1	1	1	2				1
Nemertea spp.				1	1			2	1
Cerebratulus spp.		5	3	1	2	2			
Nematoda spp.		96	31	7	45	24	42	32	12
Pedicellina cernua		+	+	+	+				
Sipuncula spp. juv.		6	14	2	13	9	10	6	5
Sipuncula sp.				1					
Sipuncula sp.?		1							
Golfingia (Golfingia) elongata		8	8	4	3	1	2		2
Golfingia (Golfingia) vulgaris vulgaris		44	10	14	1	2	6	3	1
Echiura sp.			1						
Maxmuelleria lankesteri							2		
Polynoidae spp. juv.		15	24	7	12	7	9	21	15
Polynoidae spp. indet.		10	9	13	9	12	8	6	3
Acanthicolepis asperrima		1				1			
Enipo elisabethae					1				
Harmothoe extenuata						1			
Harmothoe fragilis						1			
Harmothoe imbricata				1					

Table 5.3 continued

Taxa	Site	HM01				HM02			
	Replicate	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**
Lepidonotus squamatus		3	4	7	9	1	2	1	3
Pholoe inornata		42	61	36	36	47	47	30	17
Pholoe baltica		10	8	4	5	1	2	2	1
Pterocirrus sp.?									1
Sthenelais boa		2				1		1	1
Eteone longa agg.		1	1						
Eulalia viridis			1	1	1				
Eumida sanguinea		19	42	12	18	6	16	9	5
Nereiphylla lutea				1					
Nereiphylla rubiginosa		1	2	1					
Glycera lapidum		1	2	2	1	1		3	
Sphaerodorum gracilis		2	3		3	2	1		1
Sphaerosyllis hystrix		1							
Podarkeopsis capensis		1	1						
Hesiospina similis							2		
Psamathe fusca		20	27	21	20	34	15	15	15
Nereimyra punctata		32	118	84	42	78	94	96	42
Syllidia armata									2
Syllis parapari							1		
Syllis columbretensis		1	2	8	2				
Syllis armillaris		3		3	1	6	7	2	3
Syllis hyalina								1	
Syllis hyalina?					1				
Syllis variegata			2		1				
Syllis type A		3	3		1		1		
Trypanosyllis (Trypanosyllis) coeliaca		1	8	2	1		1		3
Eusyllis lamelligera		1					1		
Exogone (Exogone) naidina								1	
Prosphaerosyllis sp.						9		5	
Sphaerosyllis bulbosa		2	2	2					
Sphaerosyllis hystrix		14	9		2	33	11	14	4
Sphaerosyllis taylori		5	1		7		4	3	
Autolytinae sp.		2	7	2	6			2	
Eunereis longissima		1			1	2	3		
Nematonereis unicornis		4	1		3				
Lumbrineridae sp. juv.									1
Lumbrineris sp.		5	8	1	1		1		2
Dorvillea rubrovittata				2					
Ophryotrocha sp.		1				4			
Protodorvillea kefersteini					1				
Paradoneis lyra		2	2			1			
Aonides oxycephala		34	35	13	28	30	28	21	16
Scolelepis fuliginosa		2	10		4	8	5		3
Dipolydora coeca agg.			1		2	1			
Dipolydora caulleryi		3	6		2		6		
Dipolydora socialis			1				2	1	1
Aurospio banyulensis		18	30	7	8	7	9	9	18

Table 5.3 continued

Taxa	Site	HM01				HM02			
	Replicate	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**
Minuspio cirrifera		2	7		2	3			2
Prionospio cirrifera									1
Spio sp.				2	1				
Spio armata agg.							2		
Caulleriella alata				1	1				
Cirratulus cirratus			1	2	3				
Cirriformia tentaculata		1		2					
Tharyx marioni			1						
Flabelligera affinis		18	15	18	16	21	14	20	10
Pherusa plumosa		2			1			1	1
Capitella capitata agg.						1			
Mediomastus fragilis		5	5	1	1	4	7	13	9
Notomastus latericeus		2							
Notomastus sp.		4	4	8	8	1		1	3
Praxillella sp.					1				
Polyophthalmus pictus		1	5	2	1				
Asclerocheilus intermedius						14	24	16	8
Scalibregma inflatum			1		2			1	
Scalibregma celticum		1	3	1			1	2	4
Sabellides octocirrata				1	1				
Terebellides stroemii			2	2	1	2	1		1
Trichobranchus glacialis		5	5	3	2	21	11	8	8
Terebellidae sp.1			1	1	1				
Terebellidae sp.2		1							
Amphitritinae spp. juv.				4					
Lanassa venusta		5	1	1					
Eupolymnia nebulosa				2					
Phisidia aurea			1		1		1		
Pista sp.			4						1
Polycirrus sp.		32	55	40	24	29	17	8	14
Branchiomma bombyx				2					
Paradialychone filicaudata		1		1					
Jasmineira elegans		202	164	196	116	55	93	22	46
Serpulidae spp. indet.		1		8	9				
Serpulidae sp.									1
Serpula vermicularis			2						
Hydroides elegans		6	6	13	11	4	4	3	1
Spirobranchus triqueter		30	40	38	36	9	6	15	3
Spirobranchus spp. juv.		1		8	4		2	4	
Protula tubularia?					1				
Janua pagenstecheri			2	2	9		3	3	2
Jugaria granulata		1		1	5				
Paradexiospira (Spirorbides) vitrea				1					
Spirorbis (Spirorbis) tridentatus					2				
Polychaeta indet.				1					
Tubificoides amplivasatus						18	7	15	12
Callipallene brevirostris							1		
Balanus balanus		21	5	15	13		5		

Table 5.3 continued

Taxa	Site	HM01				HM02			
	Replicate	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**
Balanus spp. spat				3	2			1	
Verruca stroemia					3	2		4	3
Ostracoda sp.		32	38	1	11	15	14	25	2
Mysida spp. indet.			1			1	1		
Perioculodes longimanus			1						
Amphilochus manudens								1	
Metopa bruzelii?				2					
Urothoe elegans		3				2	3	18	2
Harpinia crenulata		1		1		3	5	5	4
Metaphoxus fultoni		4	4	3	4	8	8	8	11
Lysianassa ceratina				1					
Ampelisca diadema		7	8	7					
Othomaera othonis		1	11			1			
Gammaropsis maculata		5	4			2			2
Aoridae spp. indet. female		2	3		10				
Lembos websteri				1					
Corophiidae spp. indet.							5	1	3
Crassicorophium bonellii				2	2		1		1
Caprella septentrionalis			1						
Pseudoprotella phasma									1
Anthura gracilis		1	1	1	2			2	
Janira maculosa						23	4	35	17
Munna sp.						7	3	6	1
Leptognathia breviremis		2	9			3	1	1	3
Pseudoparatanais batei		3	2				1		
Tanaopsis graciloides		2				2	1	1	1
Vaunthompsonia cristata					2	1			
Eudorella truncatula			1						
Cumella (Cumella) pygmaea						1			
Nannastacus unguiculatus								1	
Caridea spp. indet.			1	2	2	2	1	2	4
Eualus pusiolus					2				1
Paguridae spp. juv.			1	1					
Galathea nexa		2	2	5	4			1	
Pisidia longicornis			1						
Majidae spp. juv.		3	1	3			1		
Hyas coarctatus				1		1			
Eurynome spinosa		2							
Leptochiton asellus		8	10	16	3	2			
Leptochiton cancellatus			3		4	2			1
Callochiton septemvalvis		1							
Emarginula fissura			3		2			1	1
Testudinalia testudinalis		3	9		2			1	2
Gibbula tumida			1					3	
Calliostoma zizyphinum			1	1	1				
Alvania beanii			1						
Onoba semicostata		2	4				2		1
Velutina velutina		1							

Table 5.3 continued

Taxa	Site	HM01				HM02			
	Replicate	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**
Buccinidae spp. juv.		1	1						
Buccinum undatum						1		1	
Bivalvia spp. juv.			2						
Nucula nucleus		10	16	3	7	6	13	4	11
Nucula sulcata							1		
Mytilidae spp. juv.							6	3	3
Mytilus edulis							1		
Musculus subpictus		1	1	2				1	
Modiolus modiolus/Modiolula phaseolina juv.		14	7	14	14	9	10	16	8
Modiolus modiolus		4	2	2	4	2	3	2	5
Limaria hians		6	7	9	3	9	5	5	7
Pectinidae spp. juv.		1							
Mimachlamys varia		1							
Talochlamys pusio		1							
Anomiidae spp. juv.		10	10	5	12	1	2	6	2
Monia patelliformis		1	1	2		2	4	4	1
Kurtiella bidentata			6	1	1		1	1	
Cardiidae spp. juv.			2			2			
Parvicardium pinnulatum		1	3	4	1				
Abra alba			2		1				
Tapes sp. juv.		2	4	9	5				
Timoclea ovata		2	4	12	1				
Mya truncata			2	1	2		2		
Corbula gibba		1							
Hiatella arctica		8	17	10	11	6	9		2
Thracia spp. juv.		7	6	8	6	6	5		3
Thracia distorta		4	7	2	5	7	8		7
Aetea sica		+	+		+				+
Beania mirabilis		+	+	+	+				
Bugula avicularia				+					
Amphiblestrum flemingii		+				+		+	+
Callopora dumerilii		+	+	+	+		+		+
Scrupocellaria scruposa				+					
Electra pilosa			+						
Fenestrulina malusii		+	+	+	+		+	+	+
Microporella ciliata		+	+	+	+	+		+	
Escharella immersa								+	
Scruparia ambigua			+	+					
Alcyonidium mamillatum			+	+	+				
Nolella dilatata		+		+	+				
Bowerbankia gracilis		+	+	+	+			+	+
Cyclostomatida sp.		+	+			+		+	+
Diplosolen obelia		+	+	+	+	+		+	1
Disporella hispida		+	+	+	+			+	+
Lichenopora verrucaria		+	+		+			+	
Eurystrotos compacta		+							
Plagioecia patina?			+				+		

Table 5.3 continued

Taxa	Site	HM01				HM02			
	Replicate	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**
Tubulipora sp.								+	+
Tubulipora sp.?					+				
Antedon bifida			3	1	1				
Ophiuroidea spp. juv.		15	2	1		4	3		1
Ophiothrix fragilis		6	13	1	5	24	4	16	11
Ophiocomina nigra		9	13	1	6	12	3	8	4
Ophiopholis aculeata		6	16	6	5	21	9	42	28
Amphipholis squamata		5	15		5	1	2	3	2
Psammechinus miliaris						1			
Labidoplax media					1				
Didemnidae sp.		+	+		+	+	+	+	+
Ascidia mentula		2							1
Ascidia conchilega				1					
Ascidia sp. juv.			4	1	1		1		
Ascidiella aspersa		1							
Ascidiacea sp.				1	6				
Ascidiacea spp. juv.		7	3	8	3	1	1		4
Ciona intestinalis		1							
Polycarpa pomaria juv.								1	
Polycarpa sp.		1		1					
Pyura tessellata		2				1			1
Cyanobacteria sp.							+		
Derbesia marina		+							
Ostreobium quekettii		+	+	+	+	+	+	+	+
Okellya curvata		+	+	+		+	+	+	+
Erythrotrichia carnea		+						+	
Bonnemaisonia asparagoides		+							
Bonnemaisonia hamifera		+	+	+	+				
Aglaothamnion bipinnatum									+
Aglaothamnion diaphanum					+			+	
Aglaothamnion sp.						+			
Pterothamnion plumula		+		+	+				
Heterosiphonia japonica		+	+	+	+				
Apoglossum ruscifolium								+	
Cryptopleura ramosa						+			
Erythroglossum laciniatum				+					
Haraldiophyllum bonnemaisonii?					+				
Membranoptera alata									+
Phycodrys rubens		+	+	+	+	+			+
Brongniartella byssoides		+		+					
Polysiphonia sp. juv.		+	+						
Compsothamnion thuyoides			+	+	+				
Plumaria plumosa		+							
Colaconema sp.		+		+		+	+		+
Corallinaceae pink crust		+	+	+	+	+	+	+	+
Corallinaceae pink crust (white edge)								+	
Corallinaceae dark pink crust							+		+

Table 5.3 continued

Taxa	Site	HM01				HM02			
	Replicate	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**
Lithothamnion glaciale?		+	+			+			
Halarachnion ligulatum						+			
Cruoria sp.?		+							
Rhodophyllis divaricata		+	+	+	+				
Kallymenia reniformis juv.?							+	+	
Phyllophora sp. juv.?		+	+					+	
Peyssonnelia dubyi			+	+	+			+	+
Plocamium cartilagineum				+	+				
Rhodophyta sp. encrusting				+					
Ulva compressa		+	+	+	+				
Dictyota dichotoma				+					
Pilayella littoralis			+	+					
Pseudolithoderma extensum?		+	+	+	+	+	+		

Table 5.4: Particle size characteristics of sediment sampled from MNCR phase 2 Limaria *transects. $MD_{ø}$ = median grain diameter in phi units, Md_{μ} = median grain diameter in microns, $QD_{ø}$ = phi quartile deviation.*

Site	$MD_{ø}$	Md_{μ}	$QD_{ø}$	% silt/clay	% sand	% gravel	% fine sand	% medium sand	% coarse sand
FS01	0.8	574	1.45	18.11	74.88	7.01	13.44	36.41	25.03
FS02	1.4	379	1.20	13.28	85.63	1.09	23.88	42.87	18.87
FS03	1.0	500	1.30	15.58	73.14	11.28	10.78	41.84	20.53
FS04	1.1	467	2.30	24.54	59.61	15.85	9.93	32.51	17.18

Table 5.5: Percentage of total sediment sample collected by sieves at 0.5 phi interval mesh sizes for MNCR phase 2 Limaria *transect sites.*

Sieve (phi)	Site			
	FS01	FS02	FS03	FS04
-3.5	1.0	0.0	3.1	3.7
-3.0	1.7	0.0	2.5	5.3
-2.5	3.0	0.0	2.1	4.9
-2.0	1.3	1.1	3.6	2.0
-1.5	2.1	1.7	4.0	3.9
-1.0	3.3	2.8	4.3	3.6
-0.5	8.5	6.6	5.7	4.9
0.0	11.2	7.8	6.5	4.8
0.5	12.3	8.4	8.7	6.4
1.0	8.7	9.9	10.3	7.9
1.5	8.3	13.1	12.8	9.9
2.0	7.0	11.4	10.0	8.4
2.5	5.7	9.1	5.4	4.7
3.0	4.3	6.4	2.9	3.0
3.5	2.1	4.8	1.4	1.3
4.0	1.3	3.5	1.1	1.0
>4	18.1	13.3	15.6	24.5

Figure 5.1: Cumulative weight of sediment retained on sieves at 0.5 phi intervals for MNCR phase 2 Limaria *transect sites.*

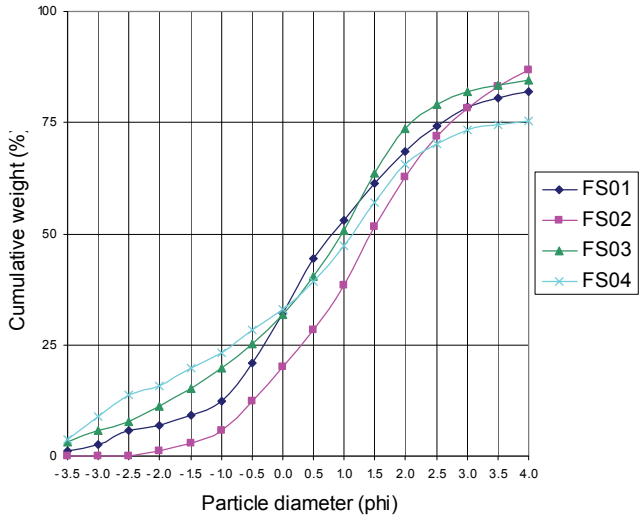

Table 5.6: Abundance of taxa recorded in four replicate core samples (area 83 cm^2) from MNCR phase 2 Limaria *transects. P denotes presence*

Taxon	Site	FS01				FS02				FS03				FS04			
	Replicate	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**
Porifera spp.							P										
Platyhelminthes spp.						1							2				
Nemertea spp.		2				2		1									
Cerebratulus spp.		2								2	1						
Nematoda spp.		47	37	22	14	165	140	44	108	146	21	7	27	1	25	36	5
Sipuncula spp. juv.		33	36	13	14	30	15	15	16				2		8		
Golfingia (Golfingia) elongata		4	4	2	4		1								3		
Golfingia (Golfingia) vulgaris vulgaris		4		1	3	4	1			41	15	24	30				
Polynoidae spp. juv.		2		1	1	3			1	10	6	13	3	6	4	11	15
Polynoidae spp. indet.		2		1	2	3	2			1			1	2	1	2	6
Harmothoe extenuata														2	1	1	
Harmothoe fragilis			2														
Harmothoe clavigera		1			1							2	1				
Harmothoe cf bellani			1														
Lepidonotus squamatus		2	1	1	3	1	1			1	2	1		1	3	1	6
Pholoe inornata		41	13	38	20	3	1		2	16	6	12	7	6	7	3	7
Pholoe baltica			2	1		2	4	2	5	4	3	5	3	2	3	3	3
Eteone longa agg.						1			1			2	3				2
Pseudomystides limbata				1													
Eulalia viridis					1												
Eulalia bilineata			1														
Eumida bahusiensis					1												
Eumida sanguinea		7	6	8	4		5	1	3	2		12	6	8	2	2	
Eumida arctica												1					
Glycera alba														1			
Glycera lapidum			1	3	2		1	1		4	6	6	4	1	2		
Sphaerodorum gracilis		1					1	3	1		1	1	1	1	2	1	1
Psamathe fusca		13	7	7	7	9	4	5	5	4	3	6	7	5	5	5	5
Nereimyra punctata		13	9	9	6	53	62	6	51	15	6	22	10	12	8	22	53
Syllidia armata					1												
Syllis parapari					1												
Trypanosyllis (Trypanosyllis) coeliaca				1													
Syllis armillaris		2			1	1				2		1					
Syllis type A		1															1
Odontosyllis fulgurans											1						
Syllides japonicus		1		2							1						
Exogone (Parexogone) hebes			2	1													
Exogone (Exogone) verugera									1	3							
Prosphaerosyllis sp.			1	6		13	2	4	8	12	4						
Typosyllis mauretanica?										1							
Sphaerosyllis bulbosa			1							2							
Erinaceusyllis erinaceus										1							

Table 5.6 continued

Taxon	Site	FS01				FS02				FS03				FS04			
	Replicate	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**
Sphaerosyllis hystrix		4	1	3		2			5	10			1				1
Sphaerosyllis taylori		1		2		35	18	6	30	15	3	10	2		1	7	7
Sphaerosyllis pirifera?			1			11	1	3	6							7	1
Autolytinae sp.		2		1					1	1						1	
Eunereis longissima		2			3	2	1	1	1	5	2	3	3		1		1
Nephtys spp. juv.											1						
Nephtys kersivalensis														1			
Nematonereis unicornis		2		1				1		1	1	1	1		1		
Lumbrineris sp.		1	3	1			5	5	3	1			2				
Protodorvillea kefersteini				1									1				
Schistomeringos rudolphii																1	
Cirrophorus branchiatus		1	1														
Paradoneis lyra							2	2		1	2	2					1
Aonides oxycephala		1	3	3	7	15	13	8	6	36	37	45	37	3	2	19	11
Scolelepis fuliginosa											4						
Dipolydora coeca agg.					1						1						
Dipolydora caulleryi		1	1	1		1		1		1		2	1			1	1
Dipolydora socialis												1					
Aurospio banyulensis		11	5	9	4						1						
Minuspio cirrifera		4										2			1		
Spio sp.		1	1														
Spio armata agg.					1												
Microspio mecznikowianus			1	1													
Caulleriella alata										3							
Cirratulus cirratus			1							13		8	1		1		
Aphelochaeta sp. A						1											
Flabelligera affinis		10	3	4	9	7	6	4		8	15	18	7		2	1	2
Pherusa plumosa					1	8	2	1				2		3	3	2	1
Capitella capitata agg.										13	10	8	4				
Mediomastus fragilis		1	2	2	3	5	2	8	1	36	12	42	17	7	3	15	22
Notomastus sp.		2	5	4	1					1							1
Arenicolidae sp. juv.				1													
Maldanidae spp. juv.				4													
Polyophthalmus pictus		10	2	2	1												
Asclerocheilus intermedius		2	4							17	1	2	2				
Polyphysia crassa									1	2							
Scalibregma inflatum							1										
Scalibregma celticum										2	2						
Melinna elisabethae											1						
Terebellides stroemii							1			1				1			2
Trichobranchus glacialis		6	1		1	5	2	2	3	4	10	3	1		4	2	
Amphitritinae spp. juv.													1				
Lanassa venusta			1														
Eupolymnia nebulosa					1						1			1		1	
Nicolea zostericola											1	2	1				
Phisidia aurea				1							1						
Pista sp.				1				1									

Table 5.6 continued

Taxon	Site	FS01				FS02				FS03				FS04			
	Replicate	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**
Polycirrus sp.		15	17	9	10		3		3	15	9	21	9	5	3	3	3
Thelepus cincinnatus		1															
Sabellidae sp. indet.		1															
Branchiomma bombyx						1											
Paradialychone filicaudata						1		2				1					
Parasabella torulis								1									
Euchone rubrocincta						1											
Euchone southerni													1				
Jasmineira caudata		1									1						
Jasmineira elegans		109	29	46	61					1			1				1
Serpulidae spp. indet.						2									1	1	
Spirobranchus triqueter						1	1		1						2		3
Tubificoides amplivasatus			1	1													
Enchytraeidae sp.				7						10	1	8	1				
Callipallene brevirostris		1								2		1					
Verruca stroemia						4	2			1							
Balanus sp.						1				3							
Ostracoda sp.		6	8	6		46	13	21	17	29	12	45	16	35	38	35	21
Mysida spp. indet.																	2
Deflexilodes subnudus						1											
Urothoe elegans		2	2	1						1	4	2					
Harpinia crenulata		1				1				1				1		1	3
Metaphoxus fultoni		4	5	6	1	5	4	1	2	6	3	8	5	1		2	
Lysianassidae sp. juv.													1				
Socarnes filicornis				1			1				1	10					
Liljeborgia kinahani															1		
Dexamine spinosa										3	6						1
Ampelisca diadema		2		4													
Othomaera othonis														1			
Gammaropsis maculata		1			3												
Ischyroceridae spp. juv.										2							
Aoridae spp. indet. female		1				24	3	1			1			1	1		
Autonoe longipes						2											
Corophiidae spp. indet.			1	1	1		4			1		1					1
Crassicorophium bonellii										1	3						3
Caprella septentrionalis											1						
Pariambus typicus												1					
Phtisica marina										1	1	2	1				
Gnathia vorax												1					
Janira maculosa				1	1												
Munna sp.		1	2	1	2	1		1	8	8		9					
Leptognathia breviremis		1	4	4		5	3	4	1	6		1	2				
Pseudoparatanais batei										1			1				
Tanaopsis graciloides				1										1		1	
Typhlotanais sp.													1				
Vaunthompsonia cristata		1										2			2		
Cumella (Cumella) pygmaea									1					1			

Table 5.6 continued

Taxon	Site	FS01				FS02				FS03				FS04			
	Replicate	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**
Nannastacus unguiculatus			2	1					2	3		7					
Diastylis sp. indet.		1															
Caridea spp. indet.											1	1	1				
Paguridae spp. juv.													1				
Galathea intermedia													1				
Galathea nexa		1		1													
Pisidia longicornis							1					4					3
Polyplacophora sp. juv.		1															
Leptochiton asellus			1										1				
Leptochiton cancellatus				3	1					1	1						1
Gastropoda spp. indet.										1		10		1			1
Testudinalia testudinalis														1	1	2	1
Gibbula tumida				1										1			
Alvania beanii				1		6			25	1						1	4
Alvania punctura						21			10								
Onoba semicostata			11	5	1	72	46	4	32	2			2	33	61	52	24
Odostomia sp.													1				
Turbonilla sp.																1	
Vitreolina philippi						2			1								
Retusa truncatula						1	1	1									
Nucula spp. juv.			1			3	2		4								
Nucula nucleus			1	3		25	15	8	17	5	4	3			1	1	
Nucula sulcata													2				
Mytilidae spp. juv.				1		5		2	4					4	2	3	1
Musculus subpictus		5	1							4	3	3	1			1	
Modiolus modiolus/Modiolula phaseolina juv.		6	11	9	9	9	4	5	6	24	9	22	8				
Modiolus modiolus							1	1						1	1		
Limaria hians		3	2		4	4	5	2	1	6	6	5	3		1		
Limatula gwyni				1													
Pectinidae spp. juv.				1						3	3	13					
Anomiidae spp. juv.				2							1	8				2	3
Monia patelliformis					1	1			1								
Lucinoma borealis																1	
Kurtiella bidentata			2	1		3	2	2	1	6		9	4	32	15	23	12
Cardiidae spp. juv.			1	1						1							
Acanthocardia		2															
Parvicardium pinnulatum			2	5		4	1	1	4	2	3	6					
Gari tellinella				1													
Abra spp. juv.								5	1	3	1	2	2	1			
Abra alba						1	3		1		3	5		1			1
Tapes sp. juv.		2	10	10		13	15	3	9	2		1					
Timoclea ovata			2			1							1				
Mya sp. juv.						14	8	6	5								
Mya truncata										5	2	2			1		
Hiatella arctica		4		1	1	37	19	5	16	7	1	11	2	1	2	1	
Thracia spp. juv.		7	13	10	4	2	2	1	3	1	1	3				2	
Thracia villosiuscula						1	1		2	1							

Table 5.6 continued

Taxon	Site	FS01				FS02				FS03				FS04			
	Replicate	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**
Thracia distorta		5	3	4	1		1	1									
Asteroidea sp. juv.									1								
Asterias rubens														1			
Ophiuroidea spp. juv.		4	3	2		4	4	4	9	10	9	24	8	6	11	7	5
Ophiothrix fragilis														27	13	30	15
Ophiocomina nigra						5	6	2	1							1	
Amphipholis squamata		6	8	3	2	4	7	1	1	1	1	1	2	2	1		2
Echinoidea spp. juv.						1				2	1	1			2		
Psammechinus miliaris														2		2	1
Enteropneusta sp.					2												
Ascidiacea spp. juv.			1		2	2	3			3	3	1	1				1
Ascidiacea sp. indet.						1											
Ciona intestinalis							2									1	
Ascidiidae sp.									2								
Ascidiella sp. juv.										1							
Dendrodoa grossularia						2											

Table 5.7: Community descriptors for all core samples (area 82 cm^2) from MNCR phase 2 Limaria *transects. Diversity indices include the Shannon-Wiener function using log$_e$* (H'$_e$) and log$_2$ (H'$_2$) and Peliou's evenness index (J')

Site	Replicate	Abundance (no./0.1m^2)	No. taxa	H'$_e$	H$_2$	J'
FS01	1	435	65	3.11	4.49	0.75
FS01	2	304	60	3.41	4.92	0.83
FS01	3	316	72	3.55	5.13	0.83
FS01	4	226	48	3.04	4.39	0.79
FS02	1	723	68	3.15	4.55	0.75
FS02	2	478	58	2.90	4.19	0.72
FS02	3	210	48	3.24	4.68	0.84
FS02	4	451	54	3.04	4.39	0.76
FS03	1	625	80	3.40	4.90	0.78
FS03	2	278	63	3.58	5.16	0.86
FS03	3	521	68	3.62	5.23	0.86
FS03	4	269	59	3.36	4.85	0.82
FS04	1	224	42	2.88	4.15	0.77
FS04	2	253	44	2.89	4.17	0.76
FS04	3	318	45	2.94	4.24	0.77
FS04	4	268	47	3.11	4.49	0.81

ANNEX 6: *MODIOLUS MODIOLUS* SIZE AND DENSITY DATA

Table 6.1: Modiolus modiolus *shell measurements from site HM01, Loch Alsh on 8/08/2012. Shells obtained from the clearance of five 0.25 m^2 quadrats. Measurements with no allocated quadrat number were obtained from an additional clearance of material outside the quadrats. Shaded measurements are believed to be of* Modiolula phaseolina. Shells <25 mm length were only measured to the nearest millimetre

Quadrat	Length (mm)	Height (mm)	Width (mm)
1	109.72	55.10	45.70
1	90.65	47.43	41.30
1	104.88	51.00	41.56
1	102.38	49.07	44.37
1	95.24	44.42	38.37
1	61.60	34.40	26.72
2	102.71	73.17	43.76
2	110.51	52.33	45.61
2	109.44	50.78	41.42
2	97.30	48.49	39.87
2	82.80	42.59	34.00
3	103.39	54.06	44.89
3	106.66	50.46	45.28
3	96.74	47.05	38.76
3	90.62	45.47	37.70
3	78.47	40.62	32.83
3	76.48	42.05	32.50
3	73.70	37.49	26.99
4	99.62	52.04	36.45
4	101.48	51.59	41.59
4	115.56	56.37	45.28
4	91.24	47.81	36.90
4	85.61	46.78	35.87
4	101.27	54.16	43.12
4	91.10	46.25	37.87
4	116.28	51.21	48.46
4	98.22	48.82	37.41
4	102.75	49.16	43.52
4	87.97	34.67	35.24
4	86.61	45.70	39.72
4	99.47	47.97	39.93
4	91.51	46.83	42.89
4	79.43	38.26	31.08
4	71.72	37.11	25.74
4	57.79	30.84	24.54
4	66.07	31.61	25.53
4	72.07	37.32	31.30
4	61.56	31.56	24.79
5	115.08	59.36	44.59
	103.46	50.50	45.75
	100.75	48.59	40.21
	134.11	64.14	59.81
	115.07	56.50	49.72
	102.81	51.37	45.13
	100.96	53.34	42.77
	106.83	52.12	41.40
	105.77	52.09	45.69
	96.14	50.26	45.67
	99.31	50.04	42.41
	99.71	48.49	41.64
	104.34	50.47	44.47
	111.81	55.78	44.01
	95.66	45.24	35.87
	94.01	47.04	39.73
	103.29	49.61	43.13
	115.73	55.91	44.72
	100.99	48.32	44.29
	110.22	48.50	45.60
	104.51	53.89	45.59
	90.77	45.94	38.99
	65.96	31.41	26.41
	91.45	49.44	40.54
	102.01	51.78	43.51
	91.78	46.95	37.40
	88.88	45.53	37.54
	85.62	42.18	39.05
	80.03	42.89	33.14
	95.36	46.62	41.64
	79.60	41.50	37.21
	76.59	36.83	30.09
	105.08	52.39	46.51
	91.36	43.41	37.92
	89.88	47.07	45.35
	96.85	48.71	34.01
	96.93	48.13	43.14
	98.14	48.78	39.57
	116.04	60.04	43.80
	102.93	49.80	46.22
2	9	6	4
2	6	4	3
2	8	5	4
2	9	5	4
2	9	5	4
2	11	7	6
3	6	4	3
3	9	5	4
3	5	3	2
3	24	13	9
3	7	4	3
3	10	5	5
3	7	4	3
3	4	3	2
3	7	4	3
3	6	4	3
3	7	5	3
3	4	3	2
3	9	6	4
3	5	3	2
3	4	3	2
3	7	4	3
3	6	4	3
3	10	6	4
3	15	8	9
4	8	5	5
4	10	6	5
4	9	6	4
4	9	6	4
4	10	5	4
4	8	4	3
4	6	3	3
5	3	2	2
5	5	3	2
5	6	4	3
5	7	4	3
5	7	4	3
5	5	3	2
5	6	4	3

Table 6.1 continued

Quadrat	Length (mm)	Height (mm)	Width (mm)
5	113.33	52.05	42.24
5	97.24	49.64	35.06
5	93.04	47.54	48.57
5	103.89	50.69	45.57
5	87.71	46.90	38.49
5	76.70	40.80	32.87
5	96.06	49.22	41.52
5	89.08	48.08	40.20
5	82.93	42.86	40.57
5	79.15	43.42	33.74
5	73.95	37.85	31.85
	89.24	44.80	40.20
	112.13	52.88	46.17
	101.71	52.15	42.41

Quadrat	Length (mm)	Height (mm)	Width (mm)
	86.46	48.72	46.65
	92.64	47.84	37.98
	114.08	57.40	49.95
	104.46	51.21	37.91
	90.39	45.43	37.72
	93.22	47.94	40.31
	86.90	43.01	37.43
1	3	2	1
1	5	3	2
1	5	3	2
1	6	4	2
1	4	3	2
1	7	4	3
1	12	6	5

Quadrat	Length (mm)	Height (mm)	Width (mm)
5	7	5	3
5	7	4	3
5	5	3	2
5	4	3	2
5	3	2	2
	6	4	2
	5	3	2
	6	4	3
	7	4	3
	4	2	2
	6	4	3
	12	8	7
	2	2	1
	10	6	5

Table 6.2: Modiolus modiolus *frequency counts in 10 0.25 m^2 cross-strung quadrats haphazardly placed to the left (L1-L5) or right (R1-R5) of the ground tape at the String Rock Modiolus bed, Loch Alsh. Frequency value is number of cross-string hits out of 16. Also shows distance of the station along the tape and descriptors of the habitat, as well as the equivalent site names used in the 1999 study by Mair* et al. *(2000). N/A = not applicable*

Site (2012)	Site (1999)	Date	Latitude	Longitude	Distance (m)	Dead shell	Sediment
T1/0	T1/0	07/08/2012	57.27250	-5.71417	0	No	shelly sand
T1/1	T1/1	07/08/2012	57.27265	-5.71390	23	No	shelly sand
T1/2	T1/2	07/08/2012	57.27276	-5.71369	41	No	shelly sand
T1/3	T1/3	07/08/2012	57.27290	-5.71343	63	No	coarse sand
T1/4	T1/4	07/08/2012	57.27304	-5.71317	85	Yes	shelly sand
T1/5	T1/5	07/08/2012	57.27316	-5.71295	104	Yes	poorly sorted shell sand with silt & gravel
T1/6	T1/6	07/08/2012	57.27332	-5.71264	130	Yes	poorly sorted shell sand with silt & gravel
T1/7	T1/7	07/08/2012	57.27341	-5.71248	144	Yes	poorly sorted muddy sand with gravel
T1/8	T1/8	07/08/2012	57.27347	-5.71237	153	Yes	poorly sorted muddy sand with gravel
T1/9	T1/9	07/08/2012	57.27351	-5.71229	160	Yes	poorly sorted muddy sand with gravel
T1/10	T1/10	07/08/2012	57.27359	-5.71215	172	Yes	poorly sorted muddy sand with gravel
HM01	1	07/08/2012	57.27300	-5.71367	N/A	Yes	shelly sand
A23.1	A	09/08/2012	57.27677	-5.71548	N/A	Yes	muddy shelly sand
B	B	07/08/2012	57.27262	-5.70805	N/A	Yes	muddy sand

Site	Biota	Quadrat										
		R1	R2	R3	R4	R5	L1	L2	L3	L4	L5	Surveyors
T1/0	algal turf, *Saccharina latissima*	0	0	0	0	0	0	0	0	0	0	CM
T1/1	algal turf, *Saccharina latissima*	0	0	0	0	0	0	0	0	0	0	CM
T1/2	algal turf, *Saccharina latissima*, hydroids, *Antedon*	0	0	0	0	0	0	0	0	0	0	CM
T1/3	hydroids and *Antedon*	0	0	0	0	0	0	0	0	0	0	CM
T1/4	dense *Ophiothrix* 50% cover	1	1	0	0	0	2	0	0	1	0	CM
T1/5	*Ophiothrix* ~70%. *Echinus*	2	1	5	4	1	1	1	2	2	1	DH, RC
T1/6	*Ophiothrix* ~90%. *Echinus*	2	0	3	3	1	1	1	1	2	3	DH, RC
T1/7	*Ophiothrix* ~90%. *Luidia*	2	2	1	2	1	3	1	1	5	2	DH, RC
T1/8	*Ophiothrix* ~90%. *Munida*	3	7	2	3	4	3	2	2	1	2	DH, RC
T1/9	*Ophiothrix* ~90%. *Munida*	1	0	2	2	2	2	2	5	1	2	DH, RC
T1/10	*Ophiothrix* ~90%. *Luidia*	2	1	2	4	3	1	2	3	2	3	DH, RC
HM01	*Ophiothrix* superabundant, *Limaria* nest cover 50%	2	1	1	2	2	1	1	1	1	2	CM
A23.1	*Ophiothrix* superabunadant	0	0	0	0	0	0	0	0	0	0	CM
B	*Ophiothrix* abundant	1	0	0	0	1	0	0	1	2	1	CM

ANNEX 7: MPA SEARCH FEATURE AND NON-PMF BIOTOPE INVENTORIES

Table 7.1: MPA search features recorded during the current survey with illustrative photograph or video frame grab. Italicised sites indicate provenance of image. No PMFs were recorded that were not search features.

Search feature and stes	Photograph
BURROWED MUD **SS.SMu.CFiMu.SpnMeg** (Seapens and burrowing megafauna in circalittoral fine mud) *DV23*	
BURROWED MUD **SS.SMu.CFiMu.SpnMeg.Fun** (Seapens, including *Funiculina quadragularis*, and burrowing megafauna in undisturbed circalittoral fine mud) DV2, DV3, DV5, DV6, DV7, DV8, DV9, DV11, DV12, DV13, *DV14*, DV15, DV16, DV17, DV18, DV19, DV20, DV21, DV22, DV24, DV25/1, DV25/2, DV26.2, DV27.1, DV28	
FUNICULINA QUADRANGULARIS (Component species of burrowed mud) DV2, DV3, DV5, DV6, DV7, DV8, DV9, DV11, DV12, DV13, DV14, DV15, DV16, DV17, DV18, DV19, DV20, DV21, DV22, DV24, DV25/1, DV25/2, DV26.1, DV26.2, DV27.1, *DV28*, DV29	

Table 7.1 continued

Search feature and stes	Photograph
PACHYCERIANTHUS MULTIPLICATUS (Component species of burrowed mud) DV5, DV6, DV11, DV12, DV13, *DV15*, DV16, DV17, DV18, DV19, DV24, DV25/1, DV25/2, DV26.2, DV30	
FLAME SHELL BEDS **SS.SMx.IMx.Lim** (*Limaria hians* beds in tide-swept sublittoral muddy mixed sediment) A1.1, A1.2, A2.1, A2.2, A2.3, A3.1, A3.2, A4.1, A4.2, A4.3, A5.2, A5.3, A6.2, A6.3, A6.4, A7.1, A7.2, A8.1, A8.2, A9.1, A10.1, A10.2, A12.1, A12.2, A12.3, A13.1, A13.2, A14.1, A15.1, A16.2, A17.1, A18.1, A19.1, A20.2, A20.3, A21.1, A21.2, A22.1, A22.2, A22.3, A23.1, *A23.2* (upper photo), A23.3, A24.1, A24.2, A24.3, A25.1, A25.2, A26.1, A26.2, A26.3, A27.1, A27.2, A29.1, A30.1, A31.1, A31.2, A32.1, C1.1, C1.2, C1.3, C1.4, C1.5, C2.3, C2.4, C2.5, C2.6, C2.7, C2.8, C2.9, C2.10 ,C2.11, C3.4, C3.5, C3.7, C3.8, C4.1, C4.2, C4.3, C4.4, C4.5, C4.6, C4.7, C5.2, C5.3, C5.4, C6.2, C6.3, C6.4, C6.5, C12.4, C12.5, C14.4, C14.5, C16.1, C16.3, C16.4, C17.2, C17.3, C17.4, C18.1, C18.2, C18.3, C18.4, C19.1, C20.2, C20.3, C20.4, C20.5, C20.6, C20.7, C21.4, C21.5, C21.6, C21.7, C21.8, C22.1, C22.2, C22.3, C22.5, C25.2, C25.3, C25.4, C26.2, C26.3, C26.5, C26.6, C26.8, C26.9, C26.10, C26.11, C26.12, F9.1, F9.2, F10.1, F10.2, F11.1, F13.2, F14.1, F14.2, F15.1, F15.2, F15.3, F19.1, F20.1, *FS01* (lower photo), FS02, FS03, FS04, HM01, HM02	 

Table 7.1 continued

Search feature and stes	Photograph
HORSE MUSSEL BEDS **SS.SBR.SMus.ModT** (*Modiolus modiolus* beds with hydroids and red seaweeds on tide-swept circalittoral mixed substrata) A7.1, A7.2, A8.1, A8.2, A14.1, A26.1, A26.5, A27.2, A28.1, A28.2, A29.1, A30.1, A31.1, A31.2, B, C11.1, C11.2, C11.4, C24.1, FS04, *HM01*, HM02, T1/4, T1/5, T1/6, T1/7, T1/8, T1/9, T1/10	

Table 7.2 Non-PMF biotopes recorded during the current survey with illustrative photograph or video frame grab. Italicised sites indicate provenance of image.

Biotope and stes	Photograph
CR.LCR.BrAs.NeoPro.FS (*Neocrania anomala* and *Protanthea simplex* on very wave-sheltered circalittoral rock) *DV26.1*, DV27.2	
SS.SSa.CMuSa (Circalittoral muddy sand) DV4, *DV10*, DV33	
SS.SMu **(**Sublittoral cohesive mud and sandy mud communities) *DV29*	

Table 7.2 continued

Biotope and stes	Photograph
SS.SMu.IFiMu.PhiVir (*Philine aperta* and *Virgularia mirabilis* in soft stable infralittoral mud) *DV30*, DV31	
SS.SMx.CMx (Circalittoral mixed sediment) DV1, *DV32*	
SS.SMx.CMx.OphMx (*Ophiothrix fragilis* and/or *Ophiocomina nigra* brittlestar beds on sublittoral mixed sediment) A1.1, A2.1, A2.2, A2.3, A3.1, A3.2, A4.1, A4.2, A6.3, A7.1, A7.2, A13.1, A13.2, A17.1, A18.1, A19.1, A20.1, A20.2, A22.1, A23.1, A23.3, A25.2, A26.1, A27.2, A29.1, A30.1, B, C17.4, C17.5, DV34, DV35, F7.2, F8.1, F8.2, F9.1, F9.2, F10.1, F10.2, F11.1, F11.2, F12.1, F12.2, F14.1, F14.2, F16.2, F19.1, FS02, FS04, HM01, *HM02*, T1/4, T1/5, T1/6, T1/7, T1/8, T1/9, T1/10	

ANNEX 8: IMAGE LOGS

Table 8.1: Digital still photographic log showing details of photographs taken during the 2012 survey and lodged with Scottish Natural Heritage. Files are jpegs with the extensions 'jpg'. All filenames are preceded by the trunk SNH_LIM_2012_'. Photographers (Phot) are Graham Saunders (GS) and Rob Cook (RC).

File name	Date	Site Code	Locat-ion	Position	Habitat	Description	Phot
DSCF2678_CU	08/08/2012	HM01	Loch Alsh	57.27300 -5.71367	*Ophiothrix* on mixed *Modiolus/Limaria* bed	*Ophiothrix fragilis* bed	GS
DSCF2679_CU	08/08/2012	HM01	Loch Alsh	57.27300 -5.71367	*Ophiothrix* on mixed *Modiolus/Limaria* bed	*Ophiothrix fragilis*, *Opiocomina nigra* and *Antedon bifida*	GS
DSCF2681_CU	08/08/2012	HM01	Loch Alsh	57.27300 -5.71367	*Ophiothrix* on mixed *Modiolus/Limaria* bed	*Ophiothrix fragilis*, *Opiocomina nigra* and *Antedon bifida*	GS
DSCF2682_CU	08/08/2012	HM01	Loch Alsh	57.27300 -5.71367	*Ophiothrix* on mixed *Modiolus/Limaria* bed	*Modiolus modiolus* and *Aequipecten opercularis*	GS
DSCF2683_CU	08/08/2012	HM01	Loch Alsh	57.27300 -5.71367	*Ophiothrix* on mixed *Modiolus/Limaria* bed	*Modiolus modiolus* and *Aequipecten opercularis*	GS
DSCF2684_CU	08/08/2012	HM01	Loch Alsh	57.27300 -5.71367	*Ophiothrix* on mixed *Modiolus/Limaria* bed	*Ophiothrix fragilis* bed	GS
DSCF2685_CU	08/08/2012	HM01	Loch Alsh	57.27300 -5.71367	*Ophiothrix* on mixed *Modiolus/Limaria* bed	*Munida rugosa*, *Ophiothrix fragilis*	GS
DSCF2687_CU	08/08/2012	HM01	Loch Alsh	57.27300 -5.71367	*Ophiothrix* on mixed *Modiolus/Limaria* bed	*Luidia ciliaris* on drift A*scophyllum*. *Ophiothrix fragilis, Antedon bifida*	GS
DSCF2688_CU	08/08/2012	HM01	Loch Alsh	57.27300 -5.71367	*Ophiothrix* on mixed *Modiolus/Limaria* bed	*Cancer pagurus*	GS
DSCF2689_CU	08/08/2012	HM01	Loch Alsh	57.27300 -5.71367	*Ophiothrix* on mixed *Modiolus/Limaria* bed	*Buccinum undatum*, *Antedon bifida*, *Ophiothrix fragilis*	GS

Table 8.1 continued

File name	Date	Site Code	Locat-ion	Position	Habitat	Description	Phot
DSCF2690_CU	08/08/2012	HM01	Loch Alsh	57.27300 -5.71367	*Ophiothrix* on mixed *Modiolus/Limaria* bed	*Pecten maximus*, *Munida rugosa*, foliose red algae	GS
DSCF2691_CU	08/08/2012	HM01	Loch Alsh	57.27300 -5.71367	*Ophiothrix* on mixed *Modiolus/Limaria* bed	*Pecten maximus*, foliose red algae	GS
DSCF2692_CU	08/08/2012	HM01	Loch Alsh	57.27300 -5.71367	*Ophiothrix* on mixed *Modiolus/Limaria* bed	*Ophiothrix fragilis*	GS
DSCF2693_CU	08/08/2012	HM01	Loch Alsh	57.27300 -5.71367	*Ophiothrix* on mixed *Modiolus/Limaria* bed	*Ophiothrix fragilis* close-up	GS
DSCF2694_CU	08/08/2012	HM01	Loch Alsh	57.27300 -5.71367	*Ophiothrix* on mixed *Modiolus/Limaria* bed	*Polycarpa pomaria*	GS
DSCF2695_CU	08/08/2012	HM01	Loch Alsh	57.27300 -5.71367	*Ophiothrix* on mixed *Modiolus/Limaria* bed	*Crossaster papposus*, *Ophiothrix fragilis*	GS
DSCF2696_CU	08/08/2012	HM01	Loch Alsh	57.27300 -5.71367	*Ophiothrix* on mixed *Modiolus/Limaria* bed	*Trisopterus minutus* juvenile, *Ophiothrix fragilis*	GS
DSCF2120_WA	08/08/2012	HM01	Loch Alsh	57.27300 -5.71367	*Ophiothrix* on mixed *Modiolus/Limaria* bed	*Echinus esculentus, Ophiothrix fragilis* and *Antedon bifida* on *Modiolus* bed. Juvenile *Trisopterus minutus* shoal.	GS
DSCF2121_WA	08/08/2012	HM01	Loch Alsh	57.27300 -5.71367	*Ophiothrix* on mixed *Modiolus/Limaria* bed	*Echinus esculentus, Ophiothrix fragilis* and *Antedon bifida* on *Modiolus* bed. Juvenile *Trisopterus minutus* shoal.	GS
DSCF2122_WA	08/08/2012	HM01	Loch Alsh	57.27300 -5.71367	*Ophiothrix* on mixed *Modiolus/Limaria* bed	*Ophiothrix fragilis, Antedon bifida* and *Chorda filum* on *Modiolus* bed. Juvenile *Trisopterus minutus* shoal.	GS
DSCF2123_WA	08/08/2012	HM01	Loch Alsh	57.27300 -5.71367	*Ophiothrix* on mixed *Modiolus/Limaria* bed	*Ophiothrix fragilis, Antedon bifida*and *Munida rugosa* on *Modiolus* bed *(Modiolus* visible)	GS
DSCF2124_WA	08/08/2012	HM01	Loch Alsh	57.27300 -5.71367	*Ophiothrix* on mixed *Modiolus/Limaria* bed	*Ophiothrix fragilis, Antedon bifida* and *Echinus esculentus* on *Modiolus* bed. Juvenile *Trisopterus minutus* shoal	GS

Table 8.1 continued

File name	Date	Site Code	Location	Position	Habitat	Description	Phot
DSCF2125_WA	08/08/2012	HM01	Loch Alsh	57.27300 -5.71367	*Ophiothrix* on mixed *Modiolus/Limaria* bed	*Ophiothrix fragilis, Antedon bifida* and *Echinus esculentus* on *Modiolus* bed	GS
DSCF2126_WA	08/08/2012	HM01	Loch Alsh	57.27300 -5.71367	*Ophiothrix* on mixed *Modiolus/Limaria* bed	*Ophiothrix fragilis, Antedon bifida* and *Echinus esculentus* on *Modiolus* bed. Juvenile *Trisopterus minutus* shoal	GS
DSCF2127_WA	08/08/2012	HM01	Loch Alsh	57.27300 -5.71367	*Ophiothrix* on mixed *Modiolus/Limaria* bed	*Luidia ciliaris, Ophiothrix fragilis Ophiocomina nigra, Antedon bifida* and *Echinus esculentus* on *Modiolus* bed	GS
DSCF2128_WA	08/08/2012	HM01	Loch Alsh	57.27300 -5.71367	*Ophiothrix* on mixed *Modiolus/Limaria* bed	*Luidia ciliaris, Ophiothrix fragilis Ophiocomina nigra, Antedon bifida* and *Echinus esculentus* on *Modiolus* bed.	GS
DSCF2129_WA	08/08/2012	HM01	Loch Alsh	57.27300 -5.71367	*Ophiothrix* on mixed *Modiolus/Limaria* bed	*Luidia ciliaris, Ophiothrix fragilis Ophiocomina nigra, Antedon bifida* and *Echinus esculentus* on *Modiolus* bed.	GS
DSCF2130_WA	08/08/2012	HM01	Loch Alsh	57.27300 -5.71367	*Ophiothrix* on mixed *Modiolus/Limaria* bed	*Buccinum undatum*, *Ophiothrix fragilis*, *Antedon bifida*, *Ulva* sp., *Phycodrys rubens* and Ectocarpaceae sp. on *Modiolus* bed.	GS
DSCF2131_WA	08/08/2012	HM01	Loch Alsh	57.27300 -5.71367	*Ophiothrix* on mixed *Modiolus/Limaria* bed	*Ophiothrix fragilis*, *Nemertesia ramosa*, *Polycarpa pomaria* and *Ulva compressa*	GS
DSCF2132_WA	08/08/2012	HM01	Loch Alsh	57.27300 -5.71367	*Ophiothrix* on mixed *Modiolus/Limaria* bed	*Ophiothrix fragilis*, *Ophiocomina nigra*, *Echinus esculentus*, *Ophiopholis aculeata*, *Ulva compressa* and foliose red algae, including *Phycodrys rubens*	GS
DSCF2133_WA	08/08/2012	HM01	Loch Alsh	57.27300 -5.71367	*Ophiothrix* on mixed *Modiolus/Limaria* bed	*Asterias rubens, Ophiothrix fragilis, Echinus esculentus, Polycarpa pomaria*, *Ulva compressa*	GS
DSCF2134_WA	08/08/2012	HM01	Loch Alsh	57.27300 -5.71367	*Ophiothrix* on mixed *Modiolus/Limaria* bed	*Ophiothrix fragilis, Marthasterias glacialis, Echinus esculentus*, *Modiolus modiolus*, *Heterosiphonia japonica*	GS
DSCF2135_WA	08/08/2012	HM01	Loch Alsh	57.27300 -5.71367	*Ophiothrix* on mixed *Modiolus/Limaria* bed	*Ophiothrix fragilis, Marthasterias glacialis, Echinus esculentus*	GS
DSCF2136_WA	08/08/2012	HM01	Loch Alsh	57.27300 -5.71367	*Ophiothrix* on mixed *Modiolus/Limaria* bed	*Ophiothrix fragilis, Marthasterias glacialis*, foliose red algae including *Phycodrys rubens*, *Heterosiphonia japonica*	GS

Table 8.1 continued

File name	Date	Site Code	Location	Position	Habitat	Description	Phot
DSCF2137_WA	08/08/2012	HM01	Loch Alsh	57.27300 -5.71367	*Ophiothrix* on mixed *Modiolus/Limaria* bed	*Ophiothrix fragilis, Marthasterias glacialis*, foliose red algae including *Phycodrys rubens*, *Heterosiphonia japonica*	GS
DSCF2138_WA	08/08/2012	HM01	Loch Alsh	57.27300 -5.71367	*Ophiothrix* on mixed *Modiolus/Limaria* bed	*Ophiothrix fragilis, Pecten maximus, Ophiopholis aculeata*, *Ulva compressa*, *Antedon bifida*	GS
DSCF2139_WA	08/08/2012	HM01	Loch Alsh	57.27300 -5.71367	*Ophiothrix* on mixed *Modiolus/Limaria* bed	*Ophiothrix fragilis*, *Pecten maximus*, *Ophiocomina nigra*, *Ophiopholis aculeata*	GS
DSCF2140_WA	08/08/2012	HM01	Loch Alsh	57.27300 -5.71367	*Ophiothrix* on mixed *Modiolus/Limaria* bed	*Antedon bifida*, *Ophiothrix fragilis*, *Ophiopholis aculeata*	GS
DSCF2141_WA	08/08/2012	HM01	Loch Alsh	57.27300 -5.71367	*Ophiothrix* on mixed *Modiolus/Limaria* bed	*Antedon bifida*, *Ophiothrix fragilis*, *Ophiopholis aculeata*	GS
DSCF2142_WA	08/08/2012	HM01	Loch Alsh	57.27300 -5.71367	*Ophiothrix* on mixed *Modiolus/Limaria* bed	Juvenile *Trisopterus minutus*, *Ophiothrix fragilis*, *Antedon bifida*, *Buccinum undatum*	GS
DSCF2144_WA	08/08/2012	HM01	Loch Alsh	57.27300 -5.71367	*Ophiothrix* on mixed *Modiolus/Limaria* bed	*Juvenile Trisopterus minutus*, *Ophiothrix fragilis*, *Antedon bifida*, *Buccinum undatum*	GS
DSCF2145_WA	08/08/2012	HM01	Loch Alsh	57.27300 -5.71367	*Ophiothrix* on mixed *Modiolus/Limaria* bed	*Ophiothrix fragilis*, *Ophiopholis aculeata*, juvenile *Trisopterus minutus*	GS
DSCF2699	10/08/2012	FS01	Loch Alsh	57.27838 -5.70447	*Limaria* bed	*Munida rugosa* with *Limaria hians*	GS
DSCF2701	10/08/2012	FS01	Loch Alsh	57.27838 -5.70447	*Limaria* bed	*Munida rugosa* with *Limaria hians*	GS
DSCF2702	10/08/2012	FS01	Loch Alsh	57.27838 -5.70447	*Limaria* bed	*Urticina eques*	GS
DSCF2703	10/08/2012	FS01	Loch Alsh	57.27838 -5.70447	*Limaria* bed	*Munida rugosa*, *Kallymenia reniformis*	GS
DSCF2704	10/08/2012	FS01	Loch Alsh	57.27838 -5.70447	*Limaria* bed	*Munida rugosa*, *Kallymenia reniformis*	GS
DSCF2706	10/08/2012	FS01	Loch Alsh	57.27838 -5.70447	*Limaria* bed	*Munida rugosa*, *Kallymenia reniformis*	GS
DSCF2707	10/08/2012	FS01	Loch Alsh	57.27838 -5.70447	*Limaria* bed	*Inachus* sp. *Plocamium cartilagineum*, *Rhodophyllis divaricata*?	GS
DSCF2708	10/08/2012	FS01	Loch Alsh	57.27838 -5.70447	*Limaria* bed	*Buccinum undatum*	GS
DSCF2709	10/08/2012	FS01	Loch Alsh	57.27838 -5.70447	*Limaria* bed	*Crossaster papposus*	GS

Table 8.1 continued

File name	Date	Site Code	Location	Position	Habitat	Description	Phot
DSCF2710	10/08/2012	FS01	Loch Alsh	57.27838 -5.70447	*Limaria* bed	*Munida rugosa*, *Kallymenia reniformis*	GS
DSCF2711	10/08/2012	FS01	Loch Alsh	57.27838 -5.70447	*Limaria* bed	*Munida rugosa, Cliona celata*	GS
DSCF2712	10/08/2012	FS01	Loch Alsh	57.27838 -5.70447	*Limaria* bed	*Munida rugosa, Cliona celata*	GS
DSCF2713	10/08/2012	FS01	Loch Alsh	57.27838 -5.70447	*Limaria* bed	*Calliostoma zizyphinum*	GS
DSCF2714	10/08/2012	FS01	Loch Alsh	57.27838 -5.70447	*Limaria* bed	Polyclinidae sp., *Kirchenpaueria pinnata*, filamentous red algae	GS
DSCF2716	10/08/2012	FS01	Loch Alsh	57.27838 -5.70447	*Limaria* bed	*Ascidia virginea*	GS
DSCF2717	10/08/2012	FS01	Loch Alsh	57.27838 -5.70447	*Limaria* bed	*Limaria hians* close-up	GS
DSCF2719	10/08/2012	FS01	Loch Alsh	57.27838 -5.70447	*Limaria* bed	*Limaria hians* close-up	GS
DSCF2720	10/08/2012	FS01	Loch Alsh	57.27838 -5.70447	*Limaria* bed	*Limaria hians* close-up	GS
DSCF2721	10/08/2012	FS01	Loch Alsh	57.27838 -5.70447	*Limaria* bed	*Limaria hians* close-up	GS
DSCF2722	10/08/2012	FS01	Loch Alsh	57.27838 -5.70447	*Limaria* bed	*Limaria hians* close-up	GS
DSCF2726	10/08/2012	FS01	Loch Alsh	57.27838 -5.70447	*Limaria* bed	*Limaria hians* close-up	GS
DSCF2727	10/08/2012	FS01	Loch Alsh	57.27838 -5.70447	*Limaria* bed	Well-camouflaged *Inachus* sp.	GS
DSCF2728	10/08/2012	FS01	Loch Alsh	57.27838 -5.70447	*Limaria* bed	*Henricia* sp., filamentous red algae	GS
DSCF2731	10/08/2012	FS01	Loch Alsh	57.27838 -5.70447	*Limaria* bed	Juvenile *Munida rugosa*. filamentous red algae	GS
DSCF2732	10/08/2012	FS01	Loch Alsh	57.27838 -5.70447	*Limaria* bed	*Ascidia* sp.	GS
DSCF2733	10/08/2012	FS01	Loch Alsh	57.27838 -5.70447	*Limaria* bed	*Munida rugosa*, *Cliona celata*	GS
DSCF2734	10/08/2012	FS01	Loch Alsh	57.27838 -5.70447	*Limaria* bed	*Polycarpa pomaria*, *Kallymenia reniformis*	GS
DSCF2735	10/08/2012	FS01	Loch Alsh	57.27838 -5.70447	*Limaria* bed	*Aequipecten opercularis* close-up	GS
DSCF2736	10/08/2012	FS01	Loch Alsh	57.27838 -5.70447	*Limaria* bed	*Aequipecten opercularis* close-up	GS
DSCF2737	10/08/2012	FS01	Loch Alsh	57.27838 -5.70447	*Limaria* bed	*Polycarpa pomaria*, *Kallymenia reniformis*	GS
DSCF2739	10/08/2012	FS01	Loch Alsh	57.27838 -5.70447	*Limaria* bed	*Nemertesia ramosa*, *Munida rugosa*	GS
DSCF2740	10/08/2012	FS01	Loch Alsh	57.27838 -5.70447	*Limaria* bed	*Henricia* sp., *Kallymenia reniformis*	GS
DSCF2741	10/08/2012	FS01	Loch Alsh	57.27838 -5.70447	*Limaria* bed	*Alcyonium digitatum*, filamentous red algae	GS
DSCF2742	10/08/2012	FS01	Loch Alsh	57.27838 -5.70447	*Limaria* bed	*Aequipecten opercularis* close-up, filamentous and foliose red algae	GS

Table 8.1 continued

File name	Date	Site Code	Location	Position	Habitat	Description	Phot
DSCF2743	10/08/2012	FS01	Loch Alsh	57.27838 -5.70447	*Limaria* bed	Nudibranch egg ribbon, filamentous red algae and *Plocamium cartilagineum*	GS
DSCF2744	10/08/2012	FS01	Loch Alsh	57.27838 -5.70447	*Limaria* bed	*Polyclinidae sp*?	GS
DSCF2146	10/08/2012	FS01	Loch Alsh	57.27838 -5.70447	*Limaria* bed	View along transect tape. Juvenile *Trisopterus minutus*, *Kallymenia reniformis*, *Urticina felina*, *Nemertesia antennina*, *Calliostoma zizyphinum*	GS
DSCF2147	10/08/2012	FS01	Loch Alsh	57.27838 -5.70447	*Limaria* bed	Edge of *Limaria* nest. *Urticina felina*, *Kallymenia reniformis*, filamentous red algae, *Desmarestia ligulata*, *Saccharina latissima*	GS
DSCF2148	10/08/2012	FS01	Loch Alsh	57.27838 -5.70447	*Limaria* bed	Edge of *Limaria* nest. *Kallymenia reniformis*, filamentous red algae, *Desmarestia ligulata*, juvenile *Trisopterus minutus*, *Nemertesia ramosa*, *Munida rugosa*	GS
DSCF2149	10/08/2012	FS01	Loch Alsh	57.27838 -5.70447	*Limaria* bed	*Nemertesia antennina*, *Munida rugosa, Kallymenia reniformis*, filamentous red algae	GS
DSCF2150	10/08/2012	FS01	Loch Alsh	57.27838 -5.70447	*Limaria* bed	Surface of *Limaria* nest. *Munida rugosa*, *Saccharina latissima*, *Kallymenia reniformis*, filamentous red algae	GS
DSCF2151	10/08/2012	FS01	Loch Alsh	57.27838 -5.70447	*Limaria* bed	Surface of *Limaria* nest. *Munida rugosa*, *Saccharina latissima*, *Kallymenia reniformis*, filamentous red algae, *Nemertesia ramosa*	GS
DSCF2152	10/08/2012	FS01	Loch Alsh	57.27838 -5.70447	*Limaria* bed	Transect tape across edge of *Limaria* nest. *Crossaster papposus*, *Nemertesia antennina*, *Munida rugosa*, *Saccharina latissima*, *Dictyota dichotoma*, *Kallymenia reniformis*, filamentous red algae	GS
DSCF2154	10/08/2012	FS01	Loch Alsh	57.27838 -5.70447	*Limaria* bed	Diver taking core	GS
DSCF2159	10/08/2012	FS01	Loch Alsh	57.27838 -5.70447	*Limaria* bed	Diver taking core	GS
DSCF2160	10/08/2012	FS01	Loch Alsh	57.27838 -5.70447	*Limaria* bed	*Limaria* nest with sediment pockets. *Nemertesia antennina*, *Saccharina latissima*, *Kallymenia reniformis*, filamentous red algae, *Desmarestia aculeata*	GS

Table 8.1 continued

File name	Date	Site Code	Location	Position	Habitat	Description	Phot
DSCF2161	10/08/2012	FS01	Loch Alsh	57.27838 -5.70447	*Limaria* bed	*Limaria* nest with sediment pockets. *Nemertesia antennina*, *Saccharina latissima*, *Kallymenia reniformis*, filamentous red algae including *Bonnemaisonia asparagoides*	GS
DSCF2162	10/08/2012	FS01	Loch Alsh	57.27838 -5.70447	*Limaria* bed	Edge of *Limaria* nest. *Munida rugosa, Kallymenia reniformis*, filamentous red algae	GS
DSCF2163	10/08/2012	FS01	Loch Alsh	57.27838 -5.70447	*Limaria* bed	Edge of *Limaria* nest. *Munida rugosa, Kallymenia reniformis*, filamentous red algae	GS
DSCF2164	10/08/2012	FS01	Loch Alsh	57.27838 -5.70447	*Limaria* bed	*Limaria* nest. *Nemertesia ramosa*, juvenile *Trisopterus minutus*, *Munida rugosa*, *Kallymenia reniformis*, filamentous red algae	GS
DSCF2167	10/08/2012	FS01	Loch Alsh	57.27838 -5.70447	*Limaria* bed	*Limaria* nest. *Munida rugosa* with *Limaria hians* in claw. *Kallymenia reniformis, Plocamium cartilagineum* and filamentous red algae	GS
DSCF2169	10/08/2012	FS01	Loch Alsh	57.27838 -5.70447	*Limaria* bed	*Limaria* nest. *Munida rugosa* with *Limaria hians* in claw. *Plocamium cartilagineum* and filamentous red algae	GS
DSCF2171	10/08/2012	FS01	Loch Alsh	57.27838 -5.70447	*Limaria* bed	*Limaria* nest. *Munida rugosa* with *Limaria hians* in claw. *Plocamium cartilagineum, Desmarestia ligulata* and filamentous red algae	GS
DSCF2173	10/08/2012	FS01	Loch Alsh	57.27838 -5.70447	*Limaria* bed	Edge of *Limaria* nest. *Kallymenia reniformis*, filamentous red algae, juvenile *Trisopterus minutus*, *Saccharina latissima*	GS
DSCF2174	10/08/2012	FS01	Loch Alsh	57.27838 -5.70447	*Limaria* bed	Edge of *Limaria* nest. *Munida rugosa*, *Kallymenia reniformis*, *Plocamium cartilagineum*, filamentous red algae, *Nemertesia antennina*, *Saccharina latissima*, *Desmarestia ligulata*	GS
DSC_4950	10/08/2012	FS01	Loch Alsh	57.27838 -5.70447	*Limaria* bed	*Callionymus reticulatus* close-up	RC
DSC_4955	10/08/2012	FS01	Loch Alsh	57.27838 -5.70447	*Limaria* bed	*Pomatoschistus pictus* close-up	RC
DSCF2759	11/08/2012	HMO2	Loch Alsh	57.27672 -5.73300	*Ophiothrix* on mixed *Modiolus/Limaria* bed	*Rhizocaulus verticillatus* on brittlestar bed	GS

Table 8.1 continued

File name	Date	Site Code	Locat-ion	Position	Habitat	Description	Phot
DSCF2760	11/08/2012	HMO2	Loch Alsh	57.27672 -5.73300	*Ophiothrix* on mixed *Modiolus/Limaria* bed	*Ophiothrix fragilis* and *Ophiopholis aculeata* on brittlestar bed	GS
DSCF2761	11/08/2012	HMO2	Loch Alsh	57.27672 -5.73300	*Ophiothrix* on mixed *Modiolus/Limaria* bed	*Ophiothrix fragilis* and *Ophiopholis aculeata* on brittlestar bed	GS
DSCF2762	11/08/2012	HMO2	Loch Alsh	57.27672 -5.73300	*Ophiothrix* on mixed *Modiolus/Limaria* bed	*Ophiothrix fragilis* and *Ophiopholis aculeata* on brittlestar bed	GS
DSCF2763	11/08/2012	HMO2	Loch Alsh	57.27672 -5.73300	*Ophiothrix* on mixed *Modiolus/Limaria* bed	*Ophiocomina nigra, Ophiothrix fragilis* and *Ophiopholis aculeata* on brittlestar bed	GS
DSCF2764	11/08/2012	HMO2	Loch Alsh	57.27672 -5.73300	*Ophiothrix* on mixed *Modiolus/Limaria* bed	*Ophiocomina nigra*, *Ophiophlis aculeata* and *Pholis gunnellus*	GS
DSCF2765	11/08/2012	HMO2	Loch Alsh	57.27672 -5.73300	*Ophiothrix* on mixed *Modiolus/Limaria* bed	*Ophiocomina nigra*, *Ophiothrix fragilis* and *Ophiopholis aculeata* on *brittlestar bed*	GS
DSCF2766	11/08/2012	HMO2	Loch Alsh	57.27672 -5.73300	*Ophiothrix* on mixed *Modiolus/Limaria* bed	*Ophiocomina nigra*, *Ophiothrix fragilis* and *Ophiopholis aculeata on* brittlestar bed	GS
DSCF2767	11/08/2012	HMO2	Loch Alsh	57.27672 -5.73300	*Ophiothrix* on mixed *Modiolus/Limaria* bed	*Ophiothrix fragilis* and *Ophiopholis aculeata* on brittlestar bed	GS
DSCF2768	11/08/2012	HMO2	Loch Alsh	57.27672 -5.73300	*Ophiothrix* on mixed *Modiolus/Limaria* bed	*Ophiothrix fragilis*, *Buccinum undatum* and *Ophiopholis aculeata* on brittlestar bed	GS
DSCF2769	11/08/2012	HMO2	Loch Alsh	57.27672 -5.73300	*Ophiothrix* on mixed *Modiolus/Limaria* bed	*Bolacera tuediae* on brittlestar bed	GS
DSCF2771	11/08/2012	HMO2	Loch Alsh	57.27672 -5.73300	*Ophiothrix* on mixed *Modiolus/Limaria* bed	*Bolacera tuediae* on brittlestar bed	GS
DSCF2177	13/08/2012	A23.2	Loch Alsh	57.27660 -5.71413	*Limaria* bed	Surface of *Limaria* nest. *Nemertesia antennina*, *Alcyonium digitatum*, *Ophiocomina nigra*, *Saccharina latissima*, *Kallymenia reniformis* and filamentous red algae	GS

Table 8.1 continued

File name	Date	Site Code	Location	Position	Habitat	Description	Phot
DSCF2178	13/08/2012	A23.2	Loch Alsh	57.27660 -5.71413	*Limaria* bed	Surface of *Limaria* nest. *Nemertesia antennina*, *Alcyonium digitatum*, *Ophiocomina nigra*, *Saccharina latissima*, *Kallymenia reniformis* and filamentous red algae	GS
DSCF2179	13/08/2012	A23.2	Loch Alsh	57.27660 -5.71413	*Limaria* bed	Surface of *Limaria* nest. *Nemertesia antennina*, *Alcyonium digitatum*, *Ophiocomina nigra*, *Saccharina latissima*, *Kallymenia reniformis* and filamentous red algae	GS
DSCF2180	13/08/2012	A23.2	Loch Alsh	57.27660 -5.71413	*Limaria* bed	Surface of *Limaria* nest. *Nemertesia antennina*, *Alcyonium digitatum*, *Ophiocomina nigra*, *Saccharina latissima*, *Kallymenia reniformis* and filamentous red algae	GS
DSCF2181	13/08/2012	A23.2	Loch Alsh	57.27660 -5.71413	*Limaria* bed	Surface of *Limaria* nest. *Nemertesia antennina*, *Alcyonium digitatum*, *Ophiocomina nigra*, *Saccharina latissima*, *Kallymenia reniformis* and filamentous red algae	GS
DSCF2185	13/08/2012	A23.2	Loch Alsh	57.27660 -5.71413	*Limaria* bed	Surface of *Limaria* nest. *Nemertesia antennina*, *Alcyonium digitatum*, *Ophiocomina nigra*, *Kallymenia reniformis* and filamentous red algae	GS
DSCF2186	13/08/2012	A23.2	Loch Alsh	57.27660 -5.71413	*Limaria* bed	Surface of *Limaria* nest. *Nemertesia antennina*, *Alcyonium digitatum*, *Ophiocomina nigra*, *Kallymenia reniformis* and filamentous red algae	GS
DSCF2187	13/08/2012	A23.2	Loch Alsh	57.27660 -5.71413	*Limaria* bed	Surface of *Limaria* nest. *Nemertesia antennina, Alcyonium digitatum, Ophiocomina nigra*, *Kallymenia reniformis,* filamentous red algae, *Urticina felina*	GS
DSCF2188	13/08/2012	A23.2	Loch Alsh	57.27660 -5.71413	*Limaria* bed	Surface of *Limaria* nest. *Nemertesia antennina, Alcyonium digitatum, Ophiocomina nigra*, *Kallymenia reniformis,* filamentous red algae, *Urticina felina*	GS

Table 8.1 continued

File name	Date	Site Code	Locat-ion	Position	Habitat	Description	Phot
DSCF2189	13/08/2012	A23.2	Loch Alsh	57.27660 -5.71413	*Limaria* bed	Surface of *Limaria* nest. *Nemertesia antennina, Alcyonium digitatum, Ophiocomina nigra*, *Kallymenia reniformis,* filamentous red algae, *Urticina felina*	GS
DSCF2191	13/08/2012	A23.2	Loch Alsh	57.27660 -5.71413	*Limaria* bed	Surface of *Limaria* nest. *Nemertesia antennina, Nemertesia ramosa, Ophiocomina nigra, Porania pulvillus,* foliose and filamentous red algae, *Limaria* visible	GS
DSCF2192	13/08/2012	A23.2	Loch Alsh	57.27660 -5.71413	*Limaria* bed	Surface of *Limaria* nest.*Porania pulvillus, Ophiocomina nigra*, foliose and filamentous red algae including *Plocamium cartilagineum*	GS
DSCF2193	13/08/2012	A23.2	Loch Alsh	57.27660 -5.71413	*Limaria* bed	Surface of *Limaria* nest. *Nemertesia antennina, Nemertesia ramosa, Ophiocomina nigra, Alcyonium digitatum, Kallymenia reniformis* and filamentous red algae	GS
DSCF2194	13/08/2012	A23.2	Loch Alsh	57.27660 -5.71413	*Limaria* bed	Surface of *Limaria* nest. *Nemertesia antennina, Nemertesia ramosa, Ophiocomina nigra, Alcyonium digitatum, Kallymenia reniformis* and filamentous red algae	GS
DSCF2195	13/08/2012	A23.2	Loch Alsh	57.27660 -5.71413	*Limaria* bed	Surface of *Limaria* nest. *Nemertesia antennina, Ophiocomina nigra, Urticina felina*, *Desmarestia ligulata*, *Kallymenia reniformis* and filamentous red algae	GS
DSCF2196	13/08/2012	A23.2	Loch Alsh	57.27660 -5.71413	*Limaria* bed	Surface of *Limaria* nest. *Nemertesia ramosa,Ophiocomina nigra, Kallymenia reniformis* and filamentous red algae	GS
DSCF2198	13/08/2012	A23.2	Loch Alsh	57.27660 -5.71413	*Limaria* bed	Surface of *Limaria* nest. *Nemertesia antennina, Nemertesia ramosa, Ophiocomina nigra, Alcyonium digitatum, Urticina felina*, *Kallymenia reniformis* and filamentous red algae	GS

Table 8.1 continued

File name	Date	Site Code	Locat-ion	Position	Habitat	Description	Phot
DSCF2199	13/08/2012	A23.2	Loch Alsh	57.27660 -5.71413	*Limaria* bed	Surface of *Limaria* nest. *Nemertesia antennina, Nemertesia ramosa, Ophiocomina nigra, Alcyonium digitatum, Urticina felina*, *Kallymenia reniformis* and filamentous red algae	GS
DSCF2200	13/08/2012	A23.2	Loch Alsh	57.27660 -5.71413	*Limaria* bed	Surface of *Limaria* nest. *Nemertesia antennina, Nemertesia ramosa, Ophiocomina nigra, Alcyonium digitatum, Kallymenia reniformis* and filamentous red algae	GS
DSCF2202	13/08/2012	A23.2	Loch Alsh	57.27660 -5.71413	*Limaria* bed	Surface of *Limaria* nest. *Nemertesia antennina, Nemertesia ramosa, Ophiocomina nigra, Alcyonium digitatum, Kallymenia reniformis* and filamentous red algae	GS
DSCF2772	13/08/2012	A23.2	Loch Alsh	57.27660 -5.71413	*Limaria* bed	*Ophiocomina nigra*, *Hinia* sp.?, *Plocamium cartilagineum*, filamentous red algae	GS
DSCF2774	13/08/2012	A23.2	Loch Alsh	57.27660 -5.71413	*Limaria* bed	*Limaria hians* emerging from nest	GS
DSCF2776	13/08/2012	A23.2	Loch Alsh	57.27660 -5.71413	*Limaria* bed	*Archidoris pseudoargus*	GS
DSCF2777	13/08/2012	A23.2	Loch Alsh	57.27660 -5.71413	*Limaria* bed	*Archidoris pseudoargus*	GS
DSCF2780	13/08/2012	A23.2	Loch Alsh	57.27660 -5.71413	*Limaria* bed	*Limaria hians* emerging from nest	GS
DSCF2781	13/08/2012	A23.2	Loch Alsh	57.27660 -5.71413	*Limaria* bed	*Limaria hians* emerging from nest	GS
DSCF2782	13/08/2012	A23.2	Loch Alsh	57.27660 -5.71413	*Limaria* bed	*Inachus* sp.	GS
DSCF2783	13/08/2012	A23.2	Loch Alsh	57.27660 -5.71413	*Limaria* bed	*Inachus* sp.	GS
DSCF2784	13/08/2012	A23.2	Loch Alsh	57.27660 -5.71413	*Limaria* bed	*Ophiocomina nigra*	GS
DSCF2785	13/08/2012	A23.2	Loch Alsh	57.27660 -5.71413	*Limaria* bed	*Munida rugosa*	GS
DSCF2786	13/08/2012	A23.2	Loch Alsh	57.27660 -5.71413	*Limaria* bed	*Munida rugosa*	GS
DSCF2788	13/08/2012	A23.2	Loch Alsh	57.27660 -5.71413	*Limaria* bed	Urticina felina	GS
DSCF2789	13/08/2012	A23.2	Loch Alsh	57.27660 -5.71413	*Limaria* bed	*Ophiocomina nigra*	GS
DSCF2791	13/08/2012	A23.2	Loch Alsh	57.27660 -5.71413	*Limaria* bed	*Ophiocomina nigra*	GS
DSCF2792	13/08/2012	A23.2	Loch Alsh	57.27660 -5.71413	*Limaria* bed	*Ophiocomina nigra, Polycarpa pomaria*	GS
DSCF2794	13/08/2012	A23.2	Loch Alsh	57.27660 -5.71413	*Limaria* bed	*Limaria hians* (3), Ophiocomina nigra	GS

Table 8.1 continued

File name	Date	Site Code	Location	Position	Habitat	Description	Phot
DSCF2795	13/08/2012	A23.2	Loch Alsh	57.27660 -5.71413	*Limaria* bed	*Limaria hians* (3)	GS
DSCF2797	13/08/2012	A23.2	Loch Alsh	57.27660 -5.71413	*Limaria* bed	*Limaria hians* (3)	GS
DSCF2799	13/08/2012	A23.2	Loch Alsh	57.27660 -5.71413	*Limaria* bed	*Limaria hians* (3)	GS
DSCF2800	13/08/2012	A23.2	Loch Alsh	57.27660 -5.71413	*Limaria* bed	*Limaria hians* (3)	GS
DSCF2803	13/08/2012	A23.2	Loch Alsh	57.27660 -5.71413	*Limaria* bed	*Limaria hians* (3)	GS
DSCF2807	13/08/2012	A23.2	Loch Alsh	57.27660 -5.71413	*Limaria* bed	*Limaria hians* (3)	GS
DSCF2810	13/08/2012	A23.2	Loch Alsh	57.27660 -5.71413	*Limaria* bed	*Limaria hians* (2)	GS
DSCF2811	13/08/2012	A23.2	Loch Alsh	57.27660 -5.71413	*Limaria* bed	*Ascidia mentula*?	GS
DSCF2813	13/08/2012	A23.2	Loch Alsh	57.27660 -5.71413	*Limaria* bed	Juvenile *Munida rugosa*	GS
DSCF2815	13/08/2012	A23.2	Loch Alsh	57.27660 -5.71413	*Limaria* bed	*Ascidia mentula*?	GS
DSCF2817	13/08/2012	A23.2	Loch Alsh	57.27660 -5.71413	*Limaria* bed	*Ophiocomina nigra*	GS
DSCF2818	13/08/2012	A23.2	Loch Alsh	57.27660 -5.71413	*Limaria* bed	*Pholis gunnellus*	GS
DSCF2819	13/08/2012	A23.2	Loch Alsh	57.27660 -5.71413	*Limaria* bed	*Pholis gunnellus,* filamentous red algae	GS
DSCF2820	13/08/2012	A23.2	Loch Alsh	57.27660 -5.71413	*Limaria* bed	*Porania pulvillus, Pagurus* sp.	GS
DSCF2822	13/08/2012	A23.2	Loch Alsh	57.27660 -5.71413	*Limaria* bed	*Ascidia mentula*?	GS
DSCF2823	13/08/2012	A23.2	Loch Alsh	57.27660 -5.71413	*Limaria* bed	*Inachus* sp.?	GS
DSCF2827	13/08/2012	A23.2	Loch Alsh	57.27660 -5.71413	*Limaria* bed	*Haliclona urceolus*	GS
DSCF2830	13/08/2012	A23.2	Loch Alsh	57.27660 -5.71413	*Limaria* bed	*Limaria hians* emerging from nest	GS
DSCF2831	13/08/2012	A23.2	Loch Alsh	57.27660 -5.71413	*Limaria* bed	*Limaria hians* emerging from nest	GS
DSCF2838	13/08/2012	A23.2	Loch Alsh	57.27660 -5.71413	*Limaria* bed	*Limaria hians* emerging from nest	GS
DSCF2839	13/08/2012	A23.2	Loch Alsh	57.27660 -5.71413	*Limaria* bed	*Limaria hians* emerging from nest	GS
DSCF2840	13/08/2012	A23.2	Loch Alsh	57.27660 -5.71413	*Limaria* bed	*Limaria hians* emerging from nest	GS
DSCF2842	13/08/2012	A23.2	Loch Alsh	57.27660 -5.71413	*Limaria* bed	*Galathea* sp.	GS
DSCF2843	13/08/2012	A23.2	Loch Alsh	57.27660 -5.71413	*Limaria* bed	*Galathea* sp.	GS
DSCF2845	13/08/2012	A23.2	Loch Alsh	57.27660 -5.71413	*Limaria* bed	*Galathea* sp.	GS
DSCF2846	13/08/2012	A23.2	Loch Alsh	57.27660 -5.71413	*Limaria* bed	*Haliclona urceolus*	GS

Table 8.1 continued

File name	Date	Site Code	Location	Position	Habitat	Description	Phot
DSCF2848	13/08/2012	A23.2	Loch Alsh	57.27660 -5.71413	*Limaria* bed	*Munida rugosa*, *Alcyonium digitatum*	GS
DSCF2849	13/08/2012	A23.2	Loch Alsh	57.27660 -5.71413	*Limaria* bed	*Munida rugosa*, *Alcyonium digitatum*	GS
DSCF2852	13/08/2012	A23.2	Loch Alsh	57.27660 -5.71413	*Limaria* bed	*Ophiocomina nigra* and emerging *Limaria hians*	GS
DSCF2854	13/08/2012	A23.2	Loch Alsh	57.27660 -5.71413	*Limaria* bed	*Ophiocomina nigra* and emerging *Limaria hians*	GS
DSCF2857	13/08/2012	A23.2	Loch Alsh	57.27660 -5.71413	*Limaria* bed	*Polycarpa pomaria*	GS
DSCF2858	13/08/2012	A23.2	Loch Alsh	57.27660 -5.71413	*Limaria* bed	*Ophiocomina nigra*	GS
DSCF2860	13/08/2012	A23.2	Loch Alsh	57.27660 -5.71413	*Limaria* bed	*Pholis gunnellus, Ophiocomina nigra*	GS
DSCF2861	13/08/2012	A23.2	Loch Alsh	57.27660 -5.71413	*Limaria* bed	*Pholis gunnellus, Ophiocomina nigra*	GS
DSC_4971	13/08/2012	A23.2	Loch Alsh	57.27660 -5.71413	*Limaria* bed	*Munida rugosa* close-up	RC
DSC_4972	13/08/2012	A23.2	Loch Alsh	57.27660 -5.71413	*Limaria* bed	*Munida rugosa* close-up	RC
DSC_4973	13/08/2012	A23.2	Loch Alsh	57.27660 -5.71413	*Limaria* bed	*Munida rugosa* close-up	RC
DSC_4977	13/08/2012	A23.2	Loch Alsh	57.27660 -5.71413	*Limaria* bed	*Pandalus montagui* close-up	RC
DSC_4978	13/08/2012	A23.2	Loch Alsh	57.27660 -5.71413	*Limaria* bed	*Pandalus montagui* close-up	RC
DSC_4985	13/08/2012	A23.2	Loch Alsh	57.27660 -5.71413	*Limaria* bed	*Limaria hians* close-up	RC
DSC_4986	13/08/2012	A23.2	Loch Alsh	57.27660 -5.71413	*Limaria* bed	*Limaria hians* close-up	RC
DSC_4987	13/08/2012	A23.2	Loch Alsh	57.27660 -5.71413	*Limaria* bed	*Limaria hians* close-up	RC
DSC_4988	13/08/2012	A23.2	Loch Alsh	57.27660 -5.71413	*Limaria* bed	*Limaria hians* close-up	RC
DSC_4989	13/08/2012	A23.2	Loch Alsh	57.27660 -5.71413	*Limaria* bed	*Limaria hians* close-up	RC
DSC_4990	13/08/2012	A23.2	Loch Alsh	57.27660 -5.71413	*Limaria* bed	*Ophiocomina nigra* close-up	RC
DSC_4994	13/08/2012	A23.2	Loch Alsh	57.27660 -5.71413	*Limaria* bed	*Elysia viridis* close-up	RC
DSC_5004	13/08/2012	A23.2	Loch Alsh	57.27660 -5.71413	*Limaria* bed	*Munida rugosa* close-up	RC
DSC_5005	13/08/2012	A23.2	Loch Alsh	57.27660 -5.71413	*Limaria* bed	*Munida rugosa* close-up	RC
DSC_5009	13/08/2012	A23.2	Loch Alsh	57.27660 -5.71413	*Limaria* bed	*Trivia monacha* close-up	RC
DSC_5030	13/08/2012	A23.2	Loch Alsh	57.27660 -5.71413	*Limaria* bed	Juvenile *Gadus morhua*	RC
DSC_5031	13/08/2012	A23.2	Loch Alsh	57.27660 -5.71413	*Limaria* bed	*Coryphella* sp. close-up	RC
DSC_5032	13/08/2012	A23.2	Loch Alsh	57.27660 -5.71413	*Limaria* bed	*Coryphella* sp. close-up	RC

Table 8.1 continued

File name	Date	Site Code	Location	Position	Habitat	Description	Phot
DSC_5033	13/08/2012	A23.2	Loch Alsh	57.27660 -5.71413	*Limaria* bed	*Coryphella* sp. close-up	RC
DSC_5046a	24/08/2012	FS02	Loch Fyne	56.00682 -5.37273	*Ophiocomina* on *Limaria* bed	*Limaria* bed with *Ophiocomina nigra*, *Ascidiella aspersa* and *Alcyonium digitatum*	RC
DSC_5048a	24/08/2012	FS02	Loch Fyne	56.00682 -5.37273	*Ophiocomina* on *Limaria* bed	*Limaria* bed with *Ophiocomina nigra*, *Ascidiella aspersa* and *Ciona intestinalis*	RC
DSC_5049a	24/08/2012	FS02	Loch Fyne	56.00682 -5.37273	*Ophiocomina* on *Limaria* bed	*Limaria* bed with *Ophiocomina nigra*, *Ascidiella aspersa* and *Ciona intestinalis*	RC
DSC_5050a	24/08/2012	FS02	Loch Fyne	56.00682 -5.37273	*Ophiocomina* on *Limaria* bed	*Limaria* bed with *Ophiocomina nigra*, *Ascidiella aspersa* and *Ciona intestinalis*	RC
DSC_5051a	24/08/2012	FS02	Loch Fyne	56.00682 -5.37273	*Ophiocomina* on *Limaria* bed	*Limaria* bed with *Ophiocomina nigra*, *Ascidiella aspersa* and *Ciona intestinalis*	RC
DSC_5053a	24/08/2012	FS02	Loch Fyne	56.00682 -5.37273	*Ophiocomina* on *Limaria* bed	*Limaria* bed with *Ophiocomina nigra* and *Ascidiella aspersa*	RC
DSC_5057a	24/08/2012	FS02	Loch Fyne	56.00682 -5.37273	*Ophiocomina* on *Limaria* bed	*Limaria* bed with *Ophiocomina nigra, Ascidiella aspersa*, *Marthasterias glacialis* and surveying diver (Colin Moore)	RC
DSC_5058a	24/08/2012	FS02	Loch Fyne	56.00682 -5.37273	*Ophiocomina* on *Limaria* bed	*Limaria* bed with *Ophiocomina nigra*, *Ascidiella aspersa, Ciona intestinalis* and *Alcyonium digitatum*	RC
DSC_5059a	24/08/2012	FS02	Loch Fyne	56.00682 -5.37273	*Ophiocomina* on *Limaria* bed	*Limaria* bed with *Ophiocomina nigra*, *Ascidiella aspersa, Ciona intestinalis* and *Alcyonium digitatum*	RC
DSC_5060a	24/08/2012	FS02	Loch Fyne	56.00682 -5.37273	*Ophiocomina* on *Limaria* bed	*Limaria* bed with *Ophiocomina nigra*, *Ascidiella aspersa, Ciona intestinalis* and *Alcyonium digitatum*	RC
DSC_5061a	24/08/2012	FS02	Loch Fyne	56.00682 -5.37273	*Ophiocomina* on *Limaria* bed	Isolated boulder on *Limaria* bed with *Ophiocomina nigra*, *Ascidiella aspersa, Ciona intestinalis* and *Pagurus bernhardus*	RC
DSC_5062a	24/08/2012	FS02	Loch Fyne	56.00682 -5.37273	*Ophiocomina* on *Limaria* bed	Diver (Colin Moore) surveying *Limaria* bed with *Ophiocomina nigra*, *Ascidiella aspersa* and *Cancer pagurus*	RC
DSC_5063a	24/08/2012	FS02	Loch Fyne	56.00682 -5.37273	*Ophiocomina* on *Limaria* bed	Diver (Colin Moore) surveying *Limaria* bed with *Ophiocomina nigra*, *Ascidiella aspersa* and *Cancer pagurus*	RC

Table 8.1 continued

File name	Date	Site Code	Location	Position	Habitat	Description	Phot
DSC_5067a	24/08/2012	FS02	Loch Fyne	56.00682 -5.37273	*Ophiocomina* on *Limaria* bed	Diver (Dan Harries) surveying *Limaria* bed with *Ophiocomina nigra*, *Ascidiella aspersa* and *Ascidia virginea*	RC
DSC_5069a	24/08/2012	FS02	Loch Fyne	56.00682 -5.37273	*Ophiocomina* on *Limaria* bed	Diver (Natalie Hirst) surveying patchy *Limaria* bed with *Ophiocomina nigra* and *Ascidiella aspersa*	RC
DSC_5071a	24/08/2012	FS02	Loch Fyne	56.00682 -5.37273	*Ophiocomina* on *Limaria* bed	Diver (Natalie Hirst) surveying patchy *Limaria* bed with *Ophiocomina nigra* and *Ascidiella aspersa*	RC
DSC_5072a	24/08/2012	FS02	Loch Fyne	56.00682 -5.37273	*Ophiocomina* on *Limaria* bed	*Limaria* bed with *Ophiocomina nigra* and *Ascidiella aspersa*	RC
DSC_5073a	24/08/2012	FS02	Loch Fyne	56.00682 -5.37273	*Ophiocomina* on *Limaria* bed	*Limaria* bed with *Ophiocomina nigra* and *Ascidiella aspersa*	RC
DSC_5074a	24/08/2012	FS02	Loch Fyne	56.00682 -5.37273	*Ophiocomina* on *Limaria* bed	*Limaria* bed with *Ophiocomina nigra* and *Ascidiella aspersa*	RC
DSC_5075a	24/08/2012	FS02	Loch Fyne	56.00682 -5.37273	*Ophiocomina* on *Limaria* bed	*Limaria* bed with *Ophiocomina nigra* and *Ascidiella aspersa*	RC
DSC_5076a	24/08/2012	FS02	Loch Fyne	56.00682 -5.37273	*Ophiocomina* on *Limaria* bed	*Limaria* bed with *Ophiocomina nigra* and *Ascidiella aspersa*	RC
DSC_5079a	24/08/2012	FS02	Loch Fyne	56.00682 -5.37273	*Ophiocomina* on *Limaria* bed	*Limaria* bed with *Ophiocomina nigra* and *Ascidiella aspersa*	RC
DSC_5080a	24/08/2012	FS02	Loch Fyne	56.00682 -5.37273	*Ophiocomina* on *Limaria* bed	*Limaria* bed with *Ophiocomina nigra*, *Aequipecten opercularis*, *Alcyonium digitatum* and *Ascidiella aspersa*	RC
DSC_5081a	24/08/2012	FS02	Loch Fyne	56.00682 -5.37273	*Ophiocomina* on *Limaria* bed	*Limaria* bed with *Ophiocomina nigra* and *Ascidiella aspersa*	RC
DSC_5082a	24/08/2012	FS02	Loch Fyne	56.00682 -5.37273	*Ophiocomina* on *Limaria* bed	*Limaria* bed with *Ophiocomina nigra*, *Alcyonium digitatum*, *Marthasterias glacialis* and *Ascidiella aspersa*	RC
DSC_5083a	24/08/2012	FS02	Loch Fyne	56.00682 -5.37273	*Ophiocomina* on *Limaria* bed	*Limaria* bed with *Ophiocomina nigra*, *Alcyonium digitatum*, *Diplosoma listerianum* and *Ascidiella aspersa*	RC
DSC_5084a	24/08/2012	FS02	Loch Fyne	56.00682 -5.37273	*Ophiocomina* on *Limaria* bed	*Limaria* bed with *Ophiocomina nigra*, *Alcyonium digitatum* and *Ascidiella aspersa*	RC
DSC_5086a	24/08/2012	FS02	Loch Fyne	56.00682 -5.37273	*Ophiocomina* on *Limaria* bed	*Limaria* bed with *Ophiocomina nigra* and *Ascidiella aspersa*	RC

Table 8.1 continued

File name	Date	Site Code	Locat-ion	Position	Habitat	Description	Phot
DSC_5089a	24/08/2012	FS02	Loch Fyne	56.00682 -5.37273	*Ophiocomina* on *Limaria* bed	*Limaria* bed with *Ophiocomina nigra, Pagurus bernhardus* and *Ascidiella aspersa*	RC
DSC_5092a	24/08/2012	FS02	Loch Fyne	56.00682 -5.37273	*Ophiocomina* on *Limaria* bed	*Limaria* bed patches with *Ophiocomina nigra*, *Ascidiella aspersa* and *Luidia ciliaris*	RC
DSC_5093a	24/08/2012	FS02	Loch Fyne	56.00682 -5.37273	*Ophiocomina* on *Limaria* bed	*Limaria* bed with *Ophiocomina nigra, Ascidiella aspersa*, *Diplosoma listerianum*, *Aequipecten opercularis* and exposed *Limaria hians*	RC
DSC_5097a	24/08/2012	FS02	Loch Fyne	56.00682 -5.37273	*Ophiocomina* on *Limaria* bed	*Limaria* bed with *Ophiocomina nigra, Ascidiella aspersa*, *Diplosoma listerianum*, *Aequipecten opercularis* and exposed *Limaria hians*	RC
DSC_5102a	24/08/2012	FS02	Loch Fyne	56.00682 -5.37273	*Ophiocomina* on *Limaria* bed	*Limaria* bed with *Ophiocomina nigra, Ascidiella aspersa*, *Diplosoma listerianum*, *Aequipecten opercularis* and exposed *Limaria hians*	RC
DSC_5106a	24/08/2012	FS02	Loch Fyne	56.00682 -5.37273	*Ophiocomina* on *Limaria* bed	*Limaria* bed patches with *Ophiocomina nigra*, *Ascidiella aspersa* and *Luidia ciliaris*	RC
DSC_5111a	24/08/2012	FS02	Loch Fyne	56.00682 -5.37273	*Ophiocomina* on *Limaria* bed	*Limaria* bed with *Ophiocomina nigra, Ascidiella aspersa*, *Marthasterias glacialis* and *Scyliorhinus canicula*	RC
DSC_5122a	24/08/2012	FS02	Loch Fyne	56.00682 -5.37273	*Ophiocomina* on *Limaria* bed	*Limaria* bed with *Ophiocomina nigra, Ascidiella aspersa and Marthasterias glacialis*	RC
DSC_5124a	24/08/2012	FS02	Loch Fyne	56.00682 -5.37273	*Ophiocomina* on *Limaria* bed	*Limaria* bed with *Ophiocomina nigra, Ascidiella aspersa*, *Ciona intestinalis*, *Necora puber* and *Marthasterias glacialis*	RC
DSCF2865	22/09/2012	FS03	Loch Creran	56.53018 -5.39183	*Limaria* bed	Ascidiacea sp., filamentous red algae	GS
DSCF2866	22/09/2012	FS03	Loch Creran	56.53018 -5.39183	*Limaria* bed	Ascidiacea sp., filamentous red algae	GS
DSCF2867	22/09/2012	FS03	Loch Creran	56.53018 -5.39183	*Limaria* bed	*Ascidiella aspersa*, *Plocamium cartilagineum*, juvenile *Antedon bifida.* small gastropod on algae	GS
DSCF2869	22/09/2012	FS03	Loch Creran	56.53018 -5.39183	*Limaria* bed	*Necora puber, Laminaria* frond, *Membranipora membranacea,* filamentous red algae	GS
DSCF2870	22/09/2012	FS03	Loch Creran	56.53018 -5.39183	*Limaria* bed	*Urticina* sp., filamentous red algae	GS
DSCF2871	22/09/2012	FS03	Loch Creran	56.53018 -5.39183	*Limaria* bed	*Urticina* sp. filamentous red algae	GS
DSCF2872	22/09/2012	FS03	Loch Creran	56.53018 -5.39183	*Limaria* bed	*Sagartia elegans, Plocamium cartilagineum*	GS

Table 8.1 continued

File name	Date	Site Code	Location	Position	Habitat	Description	Phot
DSCF2875	22/09/2012	FS03	Loch Creran	56.53018 -5.39183	*Limaria* bed	*Sagartia elegans, Plocamium cartilagineum*	GS
DSCF2876	22/09/2012	FS03	Loch Creran	56.53018 -5.39183	*Limaria* bed	*Crossaster papposus*	GS
DSCF2878	22/09/2012	FS03	Loch Creran	56.53018 -5.39183	*Limaria* bed	*Urticina* sp.	GS
DSCF2880	22/09/2012	FS03	Loch Creran	56.53018 -5.39183	*Limaria* bed	*Ascidiella aspersa, Plocamium cartilagineum* and filamentous red algae	GS
DSCF2882	22/09/2012	FS03	Loch Creran	56.53018 -5.39183	*Limaria* bed	*Urticina* sp., *Plocamium cartilagineum* and filamentous red algae	GS
DSCF2883	22/09/2012	FS03	Loch Creran	56.53018 -5.39183	*Limaria* bed	*Urticina* sp., *Plocamium cartilagineum* and filamentous red algae	GS
DSCF2884	22/09/2012	FS03	Loch Creran	56.53018 -5.39183	*Limaria* bed	*Echinus esculentus*	GS
DSCF2886	22/09/2012	FS03	Loch Creran	56.53018 -5.39183	*Limaria* bed	*Necora puber* feeding on *Limaria*	GS
DSCF2887	22/09/2012	FS03	Loch Creran	56.53018 -5.39183	*Limaria* bed	*Necora puber* feeding on *Limaria*	GS
DSCF2889	22/09/2012	FS03	Loch Creran	56.53018 -5.39183	*Limaria* bed	*Necora puber* feeding on *Limaria*	GS
DSCF2892	22/09/2012	FS03	Loch Creran	56.53018 -5.39183	*Limaria* bed	*Urticina fellina*	GS
DSCF2895	22/09/2012	FS03	Loch Creran	56.53018 -5.39183	*Limaria* bed	*Urticina fellina*	GS
DSCF2897	22/09/2012	FS03	Loch Creran	56.53018 -5.39183	*Limaria* bed	*Urticina fellina*	GS
DSCF2899	22/09/2012	FS03	Loch Creran	56.53018 -5.39183	*Limaria* bed	*Sagartia elegans*, *Plocamium cartilagineum*	GS
DSCF2901	22/09/2012	FS03	Loch Creran	56.53018 -5.39183	*Limaria* bed	*Urticina sp., Plocamium cartilagineum*	GS
DSCF2902	22/09/2012	FS03	Loch Creran	56.53018 -5.39183	*Limaria* bed	*Urticina sp., Plocamium cartilagineum*	GS
DSCF2903	22/09/2012	FS03	Loch Creran	56.53018 -5.39183	*Limaria* bed	*Urticina sp., Plocamium cartilagineum*	GS
DSCF2905	22/09/2012	FS03	Loch Creran	56.53018 -5.39183	*Limaria* bed	*Macropodia* sp., *Plocamium cartilagineum*	GS
DSCF2907	22/09/2012	FS03	Loch Creran	56.53018 -5.39183	*Limaria* bed	*Macropodia* sp., *Plocamium cartilagineum*	GS
DSCF2908	22/09/2012	FS03	Loch Creran	56.53018 -5.39183	*Limaria* bed	*Antedon bifida*	GS
DSCF2909	22/09/2012	FS03	Loch Creran	56.53018 -5.39183	*Limaria* bed	*Inachus* sp., *Antedon bifida*	GS
DSCF2911	22/09/2012	FS03	Loch Creran	56.53018 -5.39183	*Limaria* bed	Juvenile *Antedon* on *Plocamium cartilagineum*	GS
DSCF2913	22/09/2012	FS03	Loch Creran	56.53018 -5.39183	*Limaria* bed	Juvenile *Antedon* on *Plocamium cartilagineum*	GS
DSCF2914	22/09/2012	FS03	Loch Creran	56.53018 -5.39183	*Limaria* bed	*Ascidiella aspersa* and *Plocamium cartilagineum*	GS

Table 8.1 continued

File name	Date	Site Code	Location	Position	Habitat	Description	Phot
DSCF2916	22/09/2012	FS03	Loch Creran	56.53018 -5.39183	*Limaria* bed	*Ascidiella aspersa*, filamentous red algae, juvenile *Antedon*, small gastropods	GS
DSCF2917	22/09/2012	FS03	Loch Creran	56.53018 -5.39183	*Limaria* bed	*Plocamium cartilagineum* with small gastropoda	GS
DSCF2918	22/09/2012	FS03	Loch Creran	56.53018 -5.39183	*Limaria* bed	*Pomatoschistus pictus, Plocamium cartilagineum*	GS
DSCF2919	22/09/2012	FS03	Loch Creran	56.53018 -5.39183	*Limaria* bed	*Pomatoschistus pictus, Plocamium cartilagineum*	GS
DSCF2920	22/09/2012	FS03	Loch Creran	56.53018 -5.39183	*Limaria* bed	*Pomatoschistus pictus, Plocamium cartilagineum*	GS
DSCF2922	22/09/2012	FS03	Loch Creran	56.53018 -5.39183	*Limaria* bed	*Sagartia elegans*, *Heterosiphonia japonica* and *Plocamium cartilagineum*	GS
DSCF2924	22/09/2012	FS03	Loch Creran	56.53018 -5.39183	*Limaria* bed	*Sagartia elegans*	GS
DSCF2925	22/09/2012	FS03	Loch Creran	56.53018 -5.39183	*Limaria* bed	*Sagartia elegans*	GS
DSCF2926	22/09/2012	FS03	Loch Creran	56.53018 -5.39183	*Limaria* bed	*Sagartia elegans*, *Plocamium cartilagineum*	GS
DSCF2927	22/09/2012	FS03	Loch Creran	56.53018 -5.39183	*Limaria* bed	*Pagurus bernhardus* and *Plocamium cartilagineum*	GS
DSCF2928	22/09/2012	FS03	Loch Creran	56.53018 -5.39183	*Limaria* bed	*Pagurus bernhardus* and *Plocamium cartilagineum*	GS
DSCF2933	22/09/2012	FS03	Loch Creran	56.53018 -5.39183	*Limaria* bed	*Flabelligera affinis*? on *Plocamium cartilagineum*	GS
DSCF2934	22/09/2012	FS03	Loch Creran	56.53018 -5.39183	*Limaria* bed	*Flabelligera affinis*? on *Plocamium cartilagineum*	GS
DSCF2935	22/09/2012	FS03	Loch Creran	56.53018 -5.39183	*Limaria* bed	*Flabelligera affinis*? on *Plocamium cartilagineum*	GS
DSCF2936	22/09/2012	FS03	Loch Creran	56.53018 -5.39183	*Limaria* bed	*Flabelligera affinis*? on *Plocamium cartilagineum*	GS
DSCF2938	22/09/2012	FS03	Loch Creran	56.53018 -5.39183	*Limaria* bed	*Flabelligera affinis*? on *Plocamium cartilagineum*	GS
DSCF2940	22/09/2012	FS03	Loch Creran	56.53018 -5.39183	*Limaria* bed	*Flabelligera affinis*? on *Plocamium cartilagineum*	GS
DSCF2941	22/09/2012	FS03	Loch Creran	56.53018 -5.39183	*Limaria* bed	*Flabelligera affinis*? on *Plocamium cartilagineum*	GS
DSCF2942	22/09/2012	FS03	Loch Creran	56.53018 -5.39183	*Limaria* bed	*Flabelligera affinis*? on *Plocamium cartilagineum*	GS
DSCF2943	22/09/2012	FS03	Loch Creran	56.53018 -5.39183	*Limaria* bed	*Flabelligera affinis*? on *Plocamium cartilagineum*	GS
DSCF2944	22/09/2012	FS03	Loch Creran	56.53018 -5.39183	*Limaria* bed	*Limaria hians*	GS
DSCF2947	22/09/2012	FS03	Loch Creran	56.53018 -5.39183	*Limaria* bed	*Limaria hians*	GS
DSCF2949	22/09/2012	FS03	Loch Creran	56.53018 -5.39183	*Limaria* bed	*Limaria hians*	GS
DSCF2950	22/09/2012	FS03	Loch Creran	56.53018 -5.39183	*Limaria* bed	*Ascidiacea* sp., *Plocamium cartilagineum* and filamentous red algae	GS

Table 8.1 continued

File name	Date	Site Code	Locat-ion	Position	Habitat	Description	Phot
DSCF2951	22/09/2012	FS03	Loch Creran	56.53018 -5.39183	*Limaria* bed	*Amphilectus* sp.?, juvenile *Antedon, Palaemon* sp. filamentous red algae	GS
DSCF2952	22/09/2012	FS03	Loch Creran	56.53018 -5.39183	*Limaria* bed	*Amphilectus* sp.?, juvenile *Antedon, Palaemon* sp. filamentous red algae	GS
DSCF2953	22/09/2012	FS03	Loch Creran	56.53018 -5.39183	*Limaria* bed	*Amphilectus* sp.?, juvenile *Antedon, Palaemon* sp. filamentous red algae	GS
DSCF2954	22/09/2012	FS03	Loch Creran	56.53018 -5.39183	*Limaria* bed	*Pisidia longicornis*	GS
DSCF2955	22/09/2012	FS03	Loch Creran	56.53018 -5.39183	*Limaria* bed	*Pisidia longicornis*	GS
DSCF2956	22/09/2012	FS03	Loch Creran	56.53018 -5.39183	*Limaria* bed	*Pisidia longicornis, Plocamium cartilagineum* and filamentous red algae	GS
DSCF2957	22/09/2012	FS03	Loch Creran	56.53018 -5.39183	*Limaria* bed	*Pisidia longicornis, Plocamium cartilagineum* and filamentous red algae	GS
DSCF2958	22/09/2012	FS03	Loch Creran	56.53018 -5.39183	*Limaria* bed	*Pisidia longicornis, Plocamium cartilagineum* and filamentous red algae	GS
DSCF2962	22/09/2012	FS03	Loch Creran	56.53018 -5.39183	*Limaria* bed	*Aequipecten opercularis,* filamentous red algae	GS
DSCF2964	22/09/2012	FS03	Loch Creran	56.53018 -5.39183	*Limaria* bed	*Pomatoschistus pictus,* filamentous red algae	GS
DSCF2965	22/09/2012	FS03	Loch Creran	56.53018 -5.39183	*Limaria* bed	*Juvenile Antedon*, *Plocamium cartilagineum* with small gastropods	GS
DSCF2966	22/09/2012	FS03	Loch Creran	56.53018 -5.39183	*Limaria* bed	*Botryllus schlosseri*, *Electra pilosa* on *Phycodrys rubens*	GS
DSCF2969	22/09/2012	FS03	Loch Creran	56.53018 -5.39183	*Limaria* bed	*Botryllus schlosseri* on red algae	GS
DSCF2970	22/09/2012	FS03	Loch Creran	56.53018 -5.39183	*Limaria* bed	*Macropodia* sp. on *Heterosiphonia japonica*	GS
DSCF2971	22/09/2012	FS03	Loch Creran	56.53018 -5.39183	*Limaria* bed	*Macropodia* sp. on *Heterosiphonia japonica*	GS
DSCF2972	22/09/2012	FS03	Loch Creran	56.53018 -5.39183	*Limaria* bed	*Macropodia* sp. on *Heterosiphonia japonica*	GS
DSCF2977	22/09/2012	FS03	Loch Creran	56.53018 -5.39183	*Limaria* bed	*Crossaster papposus*, *Balanus crenatus*	GS
DSCF2981	22/09/2012	FS03	Loch Creran	56.53018 -5.39183	*Limaria* bed	*Amphilectus sp.?, Plocamium cartilagineum* and filamentous red algae	GS
DSCF2983	22/09/2012	FS03	Loch Creran	56.53018 -5.39183	*Limaria* bed	*Amphilectus sp.?, Plocamium cartilagineum* and filamentous red algae	GS
DSCF2984	22/09/2012	FS03	Loch Creran	56.53018 -5.39183	*Limaria* bed	*Amphilectus sp.?, Plocamium cartilagineum* and filamentous red algae	GS
DSCF2985	22/09/2012	FS03	Loch Creran	56.53018 -5.39183	*Limaria* bed	*Buccinum undatum, Pagurus* sp. filamentous red algae	GS

Table 8.1 continued

File name	Date	Site Code	Location	Position	Habitat	Description	Phot
DSCF2986	22/09/2012	FS03	Loch Creran	56.53018 -5.39183	*Limaria* bed	*Botryllus schlosseri,* foliose red algae	GS
DSCF2987	22/09/2012	FS03	Loch Creran	56.53018 -5.39183	*Limaria* bed	*Nemertesia antennina* with caprellid amphipods	GS
DSCF2988	22/09/2012	FS03	Loch Creran	56.53018 -5.39183	*Limaria* bed	*Sagartia elegans*	GS
DSCF2990	22/09/2012	FS03	Loch Creran	56.53018 -5.39183	*Limaria* bed	*Sagartia elegans*	GS
DSCF2203	22/09/2012	FS03	Loch Creran	56.53018 -5.39183	*Limaria* bed	Transect tape and red algal turf on *Limaria* bed	GS
DSCF2204	22/09/2012	FS03	Loch Creran	56.53018 -5.39183	*Limaria* bed	*Limaria* bed with red algal turf dominated by *Plocamium cartilagineum* (larger darker fronds) and *Heterosiphonia japonica* (shorter lighter turf)	GS
DSCF2205	22/09/2012	FS03	Loch Creran	56.53018 -5.39183	*Limaria* bed	*Limaria* bed with red algal turf, *Laminaria hyperborea* and transect tape	GS
DSCF2207	22/09/2012	FS03	Loch Creran	56.53018 -5.39183	*Limaria* bed	*Limaria* bed with red algal turf, *Laminaria hyperborea, Necora puber* and transect tape	GS
DSCF2208	22/09/2012	FS03	Loch Creran	56.53018 -5.39183	*Limaria* bed	*Limaria* bed with red algal turf, *Laminaria hyperborea* and *Necora puber*	GS
DSCF2211	22/09/2012	FS03	Loch Creran	56.53018 -5.39183	*Limaria* bed	*Limaria* bed with red algae turf dominated by *Plocamium cartilagineum* (foreground) and *Heterosiphonia japonica* (background) with *Antedon bifida*	GS
DSCF2212	22/09/2012	FS03	Loch Creran	56.53018 -5.39183	*Limaria* bed	*Limaria* bed with *Antedon bifida*, red algal turf and drift *Fucus*	GS
DSCF2215	22/09/2012	FS03	Loch Creran	56.53018 -5.39183	*Limaria* bed	*Limaria* bed with red algae turf dominated by *Plocamium cartilagineum* (larger darker fronds) and *Heterosiphonia japonica* (shorter lighter turf), *Necora puber* and *Laminaria hyperborea*	GS
DSCF2216	22/09/2012	FS03	Loch Creran	56.53018 -5.39183	*Limaria* bed	*Limaria* bed with *Plocamium cartilagineum* in foreground, *Necora puber* eating *Limaria hians*, and *Laminaria hyperborea*	GS
DSCF2218	22/09/2012	FS03	Loch Creran	56.53018 -5.39183	*Limaria* bed	*Limaria* bed with red algae turf of *Plocamium cartilagineum* and *Heterosiphonia japonica* with *Ascidiella aspersa*	GS
DSCF2219	22/09/2012	FS03	Loch Creran	56.53018 -5.39183	*Limaria* bed	*Limaria* bed with red algal turf, *Laminaria hyperborea* and *Antedon bifida*	GS

Table 8.1 continued

File name	Date	Site Code	Location	Position	Habitat	Description	Phot
DSCF2220	22/09/2012	FS03	Loch Creran	56.53018 -5.39183	*Limaria* bed	*Limaria* bed with red algae turf dominated by *Plocamium cartilagineum* (larger darker fronds) and *Heterosiphonia japonica* (shorter lighter turf)	GS
DSCF2221	22/09/2012	FS03	Loch Creran	56.53018 -5.39183	*Limaria* bed	*Limaria* bed with *Pecten maximus* and red algae turf dominated by *Plocamium cartilagineum* (larger darker fronds) and *Heterosiphonia japonica* (shorter lighter turf)	GS
DSCF2223	22/09/2012	FS03	Loch Creran	56.53018 -5.39183	*Limaria* bed	*Limaria* bed with *Pecten maximus* and red algae turf dominated by *Plocamium cartilagineum* (larger darker fronds) and *Heterosiphonia japonica* (shorter lighter turf)	GS
DSCF2226	22/09/2012	FS03	Loch Creran	56.53018 -5.39183	*Limaria* bed	*Limaria* bed with *Pecten maximus* and red algae turf dominated by *Plocamium cartilagineum* (larger darker fronds) and *Heterosiphonia japonica* (shorter lighter turf)	GS
DSCF2227	22/09/2012	FS03	Loch Creran	56.53018 -5.39183	*Limaria* bed	*Limaria* bed with *Antedon bifida and* red algal turf	GS
DSCF2233	22/09/2012	FS03	Loch Creran	56.53018 -5.39183	*Limaria* bed	*Limaria* bed with *Crossaster papposus and* red algal turf	GS
DSCF2234	22/09/2012	FS03	Loch Creran	56.53018 -5.39183	*Limaria* bed	*Limaria* bed with *Crossaster papposus and* red algal turf	GS
DSCF2237	22/09/2012	FS03	Loch Creran	56.53018 -5.39183	*Limaria* bed	*Limaria* bed with *Crossaster papposus and* red algal turf	GS
DSCF2238	22/09/2012	FS03	Loch Creran	56.53018 -5.39183	*Limaria* bed	*Limaria* bed with *Crossaster papposus and* red algal turf	GS
DSCF2241	22/09/2012	FS03	Loch Creran	56.53018 -5.39183	*Limaria* bed	*Limaria* bed with red algal turf, *Urticina* sp. and drift *Fucus*	GS
DSCF2242	22/09/2012	FS03	Loch Creran	56.53018 -5.39183	*Limaria* bed	*Limaria* bed with red algal turf, *Urticina* sp. and drift *Fucus*	GS
DSCF2243	22/09/2012	FS03	Loch Creran	56.53018 -5.39183	*Limaria* bed	*Limaria* bed with red algae turf dominated by *Plocamium cartilagineum* (larger darker fronds) and *Heterosiphonia japonica* (shorter lighter turf)	GS
DSCF2244	22/09/2012	FS03	Loch Creran	56.53018 -5.39183	*Limaria* bed	*Laminaria hyperborea* stipe with ascidians and foliose red algae	GS
DSCF2991	22/09/2012	FS04	Loch Creran	56.54829 -5.29590	*Ophiothrix* on mixed *Modiolus/Limaria* bed	*Callionymus lyra, Psammechinus miliaris*	GS
DSCF2992	22/09/2012	FS04	Loch Creran	56.54829 -5.29590	*Ophiothrix* on mixed *Modiolus/Limaria* bed	*Callionymus lyra, Psammechinus miliaris*	GS

Table 8.1 continued

File name	Date	Site Code	Locat-ion	Position	Habitat	Description	Phot
DSCF2993	22/09/2012	FS04	Loch Creran	56.54829 -5.29590	*Ophiothrix* on mixed *Modiolus/Limaria* bed	*Callionymus lyra, Psammechinus miliaris*	GS
DSCF2995	22/09/2012	FS04	Loch Creran	56.54829 -5.29590	*Ophiothrix* on mixed *Modiolus/Limaria* bed	*Callionymus lyra, Psammechinus miliaris*	GS
DSCF2997	22/09/2012	FS04	Loch Creran	56.54829 -5.29590	*Ophiothrix* on mixed *Modiolus/Limaria* bed	*Carcinus maenas, Ophiothrix fragilis*	GS
DSCF3000	22/09/2012	FS04	Loch Creran	56.54829 -5.29590	*Ophiothrix* on mixed *Modiolus/Limaria* bed	*Ophiothrix fragilis*	GS
DSCF3001	22/09/2012	FS04	Loch Creran	56.54829 -5.29590	*Ophiothrix* on mixed *Modiolus/Limaria* bed	*Ophiothrix fragilis, Modiolus modiolus, Psammechinus miliaris*	GS
DSCF3002	22/09/2012	FS04	Loch Creran	56.54829 -5.29590	*Ophiothrix* on mixed *Modiolus/Limaria* bed	*Ophiothrix fragilis, Alcyonium digitatum*	GS
DSCF3003	22/09/2012	FS04	Loch Creran	56.54829 -5.29590	*Ophiothrix* on mixed *Modiolus/Limaria* bed	*Ophiocomina nigra, Ophiothrix fragilis, Psammechinus miliaris*	GS
DSCF3004	22/09/2012	FS04	Loch Creran	56.54829 -5.29590	*Ophiothrix* on mixed *Modiolus/Limaria* bed	*Modiolus modiolus, Ophiothrix fragilis, Pisidia longicornis*	GS
DSCF3008	22/09/2012	FS04	Loch Creran	56.54829 -5.29590	*Ophiothrix* on mixed *Modiolus/Limaria* bed	*Psammechinus miliaris, Ophiothrix fragilis*	GS
DSCF3009	22/09/2012	FS04	Loch Creran	56.54829 -5.29590	*Ophiothrix* on mixed *Modiolus/Limaria* bed	*Psammechinus miliaris, Ophiothrix fragilis*	GS
DSCF3010	22/09/2012	FS04	Loch Creran	56.54829 -5.29590	*Ophiothrix* on mixed *Modiolus/Limaria* bed	*Ophiocomina nigra, Ophiothrix fragilis, Psammechinus miliaris,* crustose coralline red algae	GS
DSCF3011	22/09/2012	FS04	Loch Creran	56.54829 -5.29590	*Ophiothrix* on mixed *Modiolus/Limaria* bed	*Psammechinus miliaris*	GS

Table 8.1 continued

File name	Date	Site Code	Location	Position	Habitat	Description	Phot
DSCF3014	22/09/2012	FS04	Loch Creran	56.54829 -5.29590	*Ophiothrix* on mixed *Modiolus/Limaria* bed	*Modiolus modiolus, Ophiothrix fragilis, Spirobranchus* sp., crustose oralline red algae	GS
DSCF3015	22/09/2012	FS04	Loch Creran	56.54829 -5.29590	*Ophiothrix* on mixed *Modiolus/Limaria* bed	*Limaria hians, Ophiothrix fragilis, Modiolus modiolus*	GS
DSCF3017	22/09/2012	FS04	Loch Creran	56.54829 -5.29590	*Ophiothrix* on mixed *Modiolus/Limaria* bed	*Limaria hians, Ophiothrix fragilis, Modiolus modiolus*	GS
DSCF3018	22/09/2012	FS04	Loch Creran	56.54829 -5.29590	*Ophiothrix* on mixed *Modiolus/Limaria* bed	*Limaria hians, Ophiothrix fragilis, Modiolus modiolus*	GS
DSCF3019	22/09/2012	FS04	Loch Creran	56.54829 -5.29590	*Ophiothrix* on mixed *Modiolus/Limaria* bed	*Limaria hians, Ophiothrix fragilis*	GS
DSCF3020	22/09/2012	FS04	Loch Creran	56.54829 -5.29590	*Ophiothrix* on mixed *Modiolus/Limaria* bed	*Limaria hians, Ophiothrix fragilis*	GS
DSCF3022	22/09/2012	FS04	Loch Creran	56.54829 -5.29590	*Ophiothrix* on mixed *Modiolus/Limaria* bed	*Ophiocomina nigra, Ophiothrix fragilis, Spirobranchus* sp., *Modiolus modiolus*	GS
DSCF3025	22/09/2012	FS04	Loch Creran	56.54829 -5.29590	*Ophiothrix* on mixed *Modiolus/Limaria* bed	*Inachus sp. Ophiothrix fragilis*	GS
DSCF3026	22/09/2012	FS04	Loch Creran	56.54829 -5.29590	*Ophiothrix* on mixed *Modiolus/Limaria* bed	*Inachus sp. Ophiothrix fragilis*	GS
DSCF3027	22/09/2012	FS04	Loch Creran	56.54829 -5.29590	*Ophiothrix* on mixed *Modiolus/Limaria* bed	*Inachus sp. Ophiothrix fragilis*	GS
DSCF3028	22/09/2012	FS04	Loch Creran	56.54829 -5.29590	*Ophiothrix* on mixed *Modiolus/Limaria* bed	*Inachus sp. Ophiothrix fragilis*	GS
DSCF3037	22/09/2012	FS04	Loch Creran	56.54829 -5.29590	*Ophiothrix* on mixed *Modiolus/Limaria* bed	*Inachus sp. Ophiothrix fragilis*	GS

Table 8.1 continued

File name	Date	Site Code	Location	Position	Habitat	Description	Phot
DSCF3039	22/09/2012	FS04	Loch Creran	56.54829 -5.29590	*Ophiothrix* on mixed *Modiolus/Limaria* bed	*Pagurus* sp., *Ophiothrix fragilis*	GS
DSCF3040	22/09/2012	FS04	Loch Creran	56.54829 -5.29590	*Ophiothrix* on mixed *Modiolus/Limaria* bed	*Amphilectus fucorum*, *Ophiothrix fragilis*	GS
DSCF3041	22/09/2012	FS04	Loch Creran	56.54829 -5.29590	*Ophiothrix* on mixed *Modiolus/Limaria* bed	*Amphilectus fucorum*, *Ophiothrix fragilis*	GS
DSCF3043	22/09/2012	FS04	Loch Creran	56.54829 -5.29590	*Ophiothrix* on mixed *Modiolus/Limaria* bed	*Ophiothrix fragilis*	GS
DSCF3046	22/09/2012	FS04	Loch Creran	56.54829 -5.29590	*Ophiothrix* on mixed *Modiolus/Limaria* bed	*Ophiothrix fragilis*	GS
DSCF3048	22/09/2012	FS04	Loch Creran	56.54829 -5.29590	*Ophiothrix* on mixed *Modiolus/Limaria* bed	*Ophiothrix fragilis, Alcyonium digitatum*	GS
DSCF3049	22/09/2012	FS04	Loch Creran	56.54829 -5.29590	*Ophiothrix* on mixed *Modiolus/Limaria* bed	*Ophiothrix fragilis, Lithothamnion glaciale*	GS
DSCF3051	22/09/2012	FS04	Loch Creran	56.54829 -5.29590	*Ophiothrix* on mixed *Modiolus/Limaria* bed	*Chlamys* sp, *Spirobranchus* sp. on kelp frond	GS
DSCF3052	22/09/2012	FS04	Loch Creran	56.54829 -5.29590	*Ophiothrix* on mixed *Modiolus/Limaria* bed	*Chlamys* sp, *Spirobranchus* sp. on kelp frond	GS
DSCF3061	22/09/2012	FS04	Loch Creran	56.54829 -5.29590	*Ophiothrix* on mixed *Modiolus/Limaria* bed	*Ophiothrix fragilis*	GS
DSCF3062	22/09/2012	FS04	Loch Creran	56.54829 -5.29590	*Ophiothrix* on mixed *Modiolus/Limaria* bed	*Ophiothrix fragilis*	GS
DSCF2246	22/09/2012	FS04	Loch Creran	56.54829 -5.29590	*Ophiothrix* on mixed *Modiolus/Limaria* bed	Transect tape, *Ophiothrix fragilis* bed, *Psammechinus miliaris, Asterias rubens*	GS

Table 8.1 continued

File name	Date	Site Code	Location	Position	Habitat	Description	Phot
DSCF2247	22/09/2012	FS04	Loch Creran	56.54829 -5.29590	*Ophiothrix* on mixed *Modiolus/Limaria* bed	Transect tape, *Ophiothrix fragilis* bed, *Psammechinus miliaris, Ophiocomina nigra, Buccinum undatum, Lithothamnion glaciale*	GS
DSCF2249	22/09/2012	FS04	Loch Creran	56.54829 -5.29590	*Ophiothrix* on mixed *Modiolus/Limaria* bed	*Ophiothrix fragilis* bed	GS
DSCF2250	22/09/2012	FS04	Loch Creran	56.54829 -5.29590	*Ophiothrix* on mixed *Modiolus/Limaria* bed	*Ophiothrix fragilis* bed, *Carcinus maenas,* crustose coralline red algae (transect tape in view)	GS
DSCF2251	22/09/2012	FS04	Loch Creran	56.54829 -5.29590	*Ophiothrix* on mixed *Modiolus/Limaria* bed	*Ophiothrix fragilis* bed, *Carcinus maenas, Ophiocomina nigra,* crustose coralline red algae, *Modiolus modiolus*	GS
DSCF2253	22/09/2012	FS04	Loch Creran	56.54829 -5.29590	*Ophiothrix* on mixed *Modiolus/Limaria* bed	*Ophiothrix fragilis* bed, *Necora puber*, *Carcinus maenas, Ophiocomina nigra, Modiolus modiolus*, crustose coralline red algae	GS
DSCF2254	22/09/2012	FS04	Loch Creran	56.54829 -5.29590	*Ophiothrix* on mixed *Modiolus/Limaria* bed	*Ophiothrix fragilis* bed, *Necora puber*, *Carcinus maenas, Ophiocomina nigra, Modiolus modiolus*, crustose coralline red algae	GS
DSCF2256	22/09/2012	FS04	Loch Creran	56.54829 -5.29590	*Ophiothrix* on mixed *Modiolus/Limaria* bed	O*phiothrix fragilis* bed, *Psammechinus miliaris*	GS
DSCF2257	22/09/2012	FS04	Loch Creran	56.54829 -5.29590	*Ophiothrix* on mixed *Modiolus/Limaria* bed	O*phiothrix fragilis* bed, *Psammechinus miliaris,* drift *Fucus*	GS
DSCF2259	22/09/2012	FS04	Loch Creran	56.54829 -5.29590	*Ophiothrix* on mixed *Modiolus/Limaria* bed	O*phiothrix fragilis* bed, *Psammechinus miliaris, Ophiocomina nigra,* drift *Fucus*	GS
DSCF2261	22/09/2012	FS04	Loch Creran	56.54829 -5.29590	*Ophiothrix* on mixed *Modiolus/Limaria* bed	O*phiothrix fragilis* bed, *Buccinum undatum*, *Psammechinus miliaris, Ophiocomina nigra, Pagurus* sp.,	GS
DSCF2263	22/09/2012	FS04	Loch Creran	56.54829 -5.29590	*Ophiothrix* on mixed *Modiolus/Limaria* bed	O*phiothrix fragilis* bed, *Buccinum undatum*, *Psammechinus miliaris, Ophiocomina nigra, Pagurus* sp.,	GS
DSCF2264	22/09/2012	FS04	Loch Creran	56.54829 -5.29590	*Ophiothrix* on mixed *Modiolus/Limaria* bed	O*phiothrix fragilis* bed, *Psammechinus miliaris, Ophiocomina nigra, Modiolus modiolus*	GS

Table 8.1 continued

File name	Date	Site Code	Location	Position	Habitat	Description	Phot
DSCF2267	22/09/2012	FS04	Loch Creran	56.54829 -5.29590	*Ophiothrix* on mixed *Modiolus/Limaria* bed	O*phiothrix fragilis* bed, *Psammechinus miliaris, Ophiocomina nigra, Asterias rubens*	GS
DSCF2268	22/09/2012	FS04	Loch Creran	56.54829 -5.29590	*Ophiothrix* on mixed *Modiolus/Limaria* bed	O*phiothrix fragilis* bed, *Pagurus bernhardus*, *Psammechinus miliaris*	GS
DSCF2271	22/09/2012	FS04	Loch Creran	56.54829 -5.29590	*Ophiothrix* on mixed *Modiolus/Limaria* bed	O*phiothrix fragilis* bed, *Psammechinus miliaris, Laminaria hyperborea, Modiolus modiolus*	GS
DSCF2272	22/09/2012	FS04	Loch Creran	56.54829 -5.29590	*Ophiothrix* on mixed *Modiolus/Limaria* bed	O*phiothrix fragilis* bed, *Modiolus modiolus, Psammechinus miliaris, Laminaria hyperborea,* drift *Desmarestia aculeata*	GS
DSCF2274	22/09/2012	FS04	Loch Creran	56.54829 -5.29590	*Ophiothrix* on mixed *Modiolus/Limaria* bed	Diver (Dan Harries) undertaking survey	GS

Table 8.2: Details of video recorded during the drop-down and MNCR phase 2 surveys. Drop-down footage was stored on miniDV, diver video on computer file. Positional data for each run is provided in Appendix 2. Surveyors are CM (Colin Moore), RC (Rob Cook), NH (Natalie Hirst), FK (Flora Kent).

Method	Location	Media ID	Surveyor	Site	Target	Start (mm:ss)	End (mm:ss)
Dropdown	Loch Alsh	D-DUICH-0812-1	CM, RC, NH	DV34	*Limaria* bed	00:00	03:23
Dropdown	Loch Alsh	D-DUICH-0812-1	CM, RC, NH	DV35	*Limaria* bed	03:23	06:39
Dropdown	Lochs Duich	D-DUICH-0812-1	CM, RC, NH	DV1	Burrowed mud	06:39	13:18
Dropdown	Lochs Duich	D-DUICH-0812-1	CM, RC, NH	DV2	Burrowed mud	13:18	18:14
Dropdown	Lochs Duich	D-DUICH-0812-1	CM, RC, NH	DV3	Burrowed mud	18:14	23:19
Dropdown	Lochs Duich	D-DUICH-0812-1	CM, RC, NH	DV4	Burrowed mud	23:19	31:01
Dropdown	Lochs Duich	D-DUICH-0812-1	CM, RC, NH	DV5	Burrowed mud	31:01	37:27
Dropdown	Lochs Duich	D-DUICH-0812-1	CM, RC, NH	DV6	Burrowed mud	37:27	44:59
Dropdown	Lochs Duich	D-DUICH-0812-1	CM, RC, NH	DV7	Burrowed mud	44:59	52:38
Dropdown	Lochs Duich	D-DUICH-0812-1	CM, RC, NH	DV8	Burrowed mud	52:38	57:45
Dropdown	Lochs Duich	D-DUICH-0812-2	CM, RC, NH	DV9	Burrowed mud	00:00	07:31
Dropdown	Lochs Duich	D-DUICH-0812-2	CM, RC, NH	DV10	Burrowed mud	07:31	13:21
Dropdown	Lochs Duich	D-DUICH-0812-2	CM, RC, NH	DV11	Burrowed mud	13:21	19:06
Dropdown	Lochs Duich	D-DUICH-0812-2	CM, RC, NH	DV12	Burrowed mud	19:06	24:01
Dropdown	Lochs Duich	D-DUICH-0812-2	CM, RC, NH	DV13	Burrowed mud	24:01	29:39
Dropdown	Lochs Duich	D-DUICH-0812-2	CM, RC, NH	DV14	Burrowed mud	29:39	35:59
Dropdown	Lochs Duich	D-DUICH-0812-2	CM, RC, NH	DV15	Burrowed mud	35:59	42:25
Dropdown	Lochs Duich	D-DUICH-0812-2	CM, RC, NH	DV16	Burrowed mud	42:25	46:30
Dropdown	Lochs Duich	D-DUICH-0812-2	CM, RC, NH	DV17	Burrowed mud	46:30	52:47
Dropdown	Lochs Duich	D-DUICH-0812-2	CM, RC, NH	DV18	Burrowed mud	52:47	57:27
Dropdown	Lochs Duich	D-DUICH-0812-3	CM, RC, NH	DV19	Burrowed mud	00:00	04:30
Dropdown	Lochs Duich	D-DUICH-0812-3	CM, RC, NH	DV20	Burrowed mud	04:30	10:43
Dropdown	Lochs Duich	D-DUICH-0812-3	CM, RC, NH	DV21	Burrowed mud	10:43	16:34
Dropdown	Lochs Duich	D-DUICH-0812-3	CM, RC, NH	DV22	Burrowed mud	16:34	21:01
Dropdown	Lochs Duich	D-DUICH-0812-3	CM, RC, NH	DV23	Burrowed mud	21:01	25:06
Dropdown	Loch Alsh	D-DUICH-0812-4	CM, RC, NH	DV32	*Limaria* bed	00:00	05:35
Dropdown	Loch Alsh	D-DUICH-0812-4	CM, RC, NH	DV33	*Limaria* bed	05:35	10:45
Dropdown	Lochs Duich	D-DUICH-0812-4	CM, RC, NH	DV24	Burrowed mud	10:45	17:10
Dropdown	Lochs Duich	D-DUICH-0812-4	CM, RC, NH	DV25	Burrowed mud	17:10	23:55
Dropdown	Lochs Duich	D-DUICH-0812-4	CM, RC, NH	DV25/2	Burrowed mud	23:55	30:08
Dropdown	Lochs Duich	D-DUICH-0812-4	CM, RC, NH	DV26	Burrowed mud	30:08	39:54
Dropdown	Lochs Duich	D-DUICH-0812-4	CM, RC, NH	DV27	Burrowed mud	39:54	44:04
Dropdown	Lochs Duich	D-DUICH-0812-4	CM, RC, NH	DV28	Burrowed mud	44:04	48:44
Dropdown	Lochs Duich	D-DUICH-0812-4	CM, RC, NH	DV29	Burrowed mud	48:44	59:02
Dropdown	Lochs Duich	D-DUICH-0812-5	CM, RC, NH	DV30	Burrowed mud	00:00	06:52
Dropdown	Lochs Duich	D-DUICH-0812-5	CM, RC, NH	DV31	Burrowed mud	06:52	13:53
Diver	Loch Alsh	20120808112548.mts	NH	HM01	*Modiolus* & *Limaria*	00:00	08:38
Diver	Loch Alsh	20120811155152.mts	NH	HM02	*Modiolus* & *Limaria*	00:00	03:09
Diver	Loch Alsh	20120810124237.mts	NH	FS01	*Limaria*	00:00	08:58
Diver	Loch Alsh	20120813103808.mts	NH	A23.2	*Limaria*	00:00	11:01
Diver	Loch Fyne	20120824104951.mts	NH	FS02	*Limaria*	00:00	23:48
Diver	Loch Creran	20120922114043.mts	FK	FS03	*Limaria*	00:00	18:14
Diver	Loch Creran	20120922165851.mts	FK	FS04	*Limaria*	00:00	09:31

ANNEX 9: LOG OF SPECIMENS COLLECTED

Table 9.1: All taxon names follow the nomenclature of WoRMS (2013). MCS code = Marine Conservation Society taxonomic code. Identifiers are Fugro ERT (ERT) and Colin Moore (CM). Location of material includes National Museums of Scotland (NMS), Fugro ERT (ERT) and Heriot-Watt University (HWU). Numbers following the full stop refer to the sample replicate number.

MCS code	Taxon	Sample	Location	ID
C270	*Leucosolenia variabilis*?	HM01.2	NMS	CM
C350	*Sycon ciliatum*	HM02	NMS	CM
	Cliona caledoniae	HM01.1	NMS	CM
C2210	*Suberites ficus*	FS02	NMS	CM
C7100	*Hymedesmia (Stylopus) coriacea*?	HM01.2	NMS	CM
D1550	Corynidae sp.	HM01.1	NMS	CM
D2280	Eudendriidae sp.	HM01.3	NMS	CM
D2370	*Eudendrium rameum*	FS02	NMS	CM
D2370	*Eudendrium rameum*	HM02	NMS	CM
D5260	*Halecium halecinum*	FS01	NMS	CM
D5780	*Halopteris catharina*	FS02	NMS	CM
D5850	*Kirchenpaueria pinnata*	FS02	NMS	CM
D6430	*Diphasia rosacea?*	HM02	NMS	CM
D6530	*Hydrallmania falcata*	FS03	NMS	CM
D6690	*Sertularella polyzonias*	FS02	NMS	CM
D6760	*Sertularia argentea*	HM02	NMS	CM
D7280	*Obelia* sp. juv.	HM02.3	NMS	CM
D6750	*Sertularia* sp.	HM01.1	NMS	CM
D7430	*Rhizocaulus verticillatus*	HM02	NMS	CM
D10060	Anthozoa spp. juv.	HM02.3	NMS	ERT
D10560	*Virgularia mirabilis*	G23	NMS	ERT
D10750	*Cerianthus lloydii*	G29	NMS	ERT
D13410	*Edwardsia claparedii*	G9	NMS	ERT
F1	Platyhelminthes spp.	G9	NMS	ERT
G1	Nemertea spp.	HM02.4	NMS	ERT
G460	*Tubulanus polymorphus*	G6	NMS	ERT
G620	*Cerebratulus* spp.	HM01.4	NMS	ERT
HD1	Nematoda spp.	FS01.2	NMS	ERT
J80	*Priapulus caudatus*	G29	NMS	ERT
K540	Pedicellina cernua	HM01.1	NMS	CM
N1	*Sipuncula* spp. juv.	HM02.1	NMS	ERT
N1	*Sipuncula* sp.?	HM01.1	NMS	CM
N90	*Golfingia (Golfingia) elongata*	FS01.2	NMS	ERT
N90	Golfingia (Golfingia) elongata	HM02.1	NMS	CM
N109	*Golfingia (Golfingia) vulgaris vulgaris*	FS03.1	NMS	ERT
N109	Golfingia (Golfingia) vulgaris vulgaris	HM02.3	NMS	CM
N190	*Thysanocardia procera*	G23	NMS	ERT
O001	Echiura sp.	HM01.2	NMS	CM
O260	*Maxmuelleria lankesteri*	HM02.2	NMS	ERT
P10	Polychaeta indet.	HM01.3	NMS	CM
P420	Polynoidae spp. juv.	G6	NMS	ERT

Table 9.1 continued

MCS code	Taxon	Sample	Location	ID
P420	Polynoidae spp. indet.	HM02.4	NMS	ERT
P440	*Acanthicolepis asperrima*	HM02.1	NMS	ERT
P810	*Enipo elisabethae*	HM01.4	NMS	ERT
P930	*Gattyana cirrhosa*	G25	NMS	ERT
P1020	*Harmothoe extenuata*	FS04.3	NMS	ERT
P1030	*Harmothoe fragilis*	G4	NMS	ERT
P1060	*Harmothoe imbricata*	HM01.3	NMS	ERT
P970	*Harmothoe clavigera*	FS01.4	NMS	ERT
P970	*Harmothoe cf bellani*	FS01.2	NMS	ERT
P1160	*Malmgrenia andreapolis*	G2	NMS	ERT
	Malmgreniella arenicolae	G4	NMS	ERT
P1330	*Lepidonotus squamatus*	HM01.1	NMS	ERT
P1330	*Lepidonotus squamatus*	HM01.2	NMS	CM
P1690	*Pholoe inornata*	HM02.1	NMS	ERT
P1690	*Pholoe inornata*	HM01.1	NMS	CM
	Pholoe assimilis	G6	NMS	ERT
P1720	*Pholoe baltica*	G3	NMS	ERT
P1870	*Sthenelais boa*	HM02.1	NMS	ERT
P2050	*Eteone longa* agg.	G29	NMS	ERT
P2300	*Pseudomystides limbata*	FS01.3	NMS	ERT
P2580	*Phyllodoce rosea*	G4	NMS	ERT
P2640	*Chaetoparia nilssoni*	G4	NMS	ERT
P2690	*Eulalia viridis*	HM01.3	NMS	ERT
P2700	*Eulalia bilineata*	FS01.2	NMS	ERT
P2710	*Eulalia expusilla*	G4	NMS	ERT
P2770	*Eulalia viridis*	HM01.2	NMS	ERT
P2830	*Eumida bahusiensis*	G29	NMS	ERT
P2850	*Eumida sanguinea*	FS01.1	NMS	ERT
P2850	*Eumida sanguinea*	HM01.1	NMS	CM
P2820	*Eumida arctica*	FS03.3	NMS	ERT
P2900	*Nereiphylla lutea*	HM01.3	NMS	ERT
P2960	*Nereiphylla rubiginosa*	HM01.1	NMS	ERT
P3300	*Pterocirrus* sp.?	HM02.4	NMS	CM
P3380	*Sige fusigera*	G3	NMS	ERT
P4710	*Glycera* spp. juv.	G6	NMS	ERT
P4720	*Glycera alba*	G6	NMS	ERT
P4760	*Glycera lapidum*	G4	NMS	ERT
P4790	*Glycera unicornis*	G6	NMS	ERT
P5270	*Sphaerodorum gracilis*	G4	NMS	ERT
P5270	*Sphaerodorum gracilis*	HM01.1	NMS	CM
P5320	Hesionidae sp. juv.	G6	NMS	ERT
P5410	*Podarkeopsis capensis*	G29	NMS	ERT
P5470	*Hesiospina similis*	HM02.2	NMS	ERT
	Psamathe fusca	FS01.1	NMS	ERT
P5630	*Nereimyra punctata*	G6	NMS	ERT
P5630	*Nereimyra punctata*	HM01.3	NMS	CM
P5680	*Oxydromus flexuosus*	G3	NMS	ERT
P5830	*Syllidia armata*	HM02.4	NMS	ERT
P6120	*Ancistrosyllis groenlandica*	G6	NMS	ERT

Table 9.1 continued

MCS code	Taxon	Sample	Location	ID
P6170	*Litocorsa stremma*	G29	NMS	ERT
	Synelmis sp.	G4	NMS	ERT
	Syllis parapari	G4	NMS	ERT
	Syllis columbretensis	HM01.4	NMS	ERT
P6610	*Trypanosyllis (Trypanosyllis) coeliaca*	HM02.4	NMS	ERT
P6670	*Syllis armillaris*	HM02.1	NMS	ERT
P6670	*Syllis armillaris*	HM02.1	NMS	CM
P6540	*Syllis* type A	HM01.4	NMS	ERT
P6700	*Syllis hyalina*	HM02.3	NMS	CM
P6700	*Syllis hyalina*?	HM01.4	NMS	CM
P6730	*Syllis variegata*	HM01.2	NMS	CM
P6730	*Syllis variegata*	HM01.4	NMS	CM
P6880	*Eusyllis lamelligera*	HM02.2	NMS	ERT
P6990	*Odontosyllis fulgurans*	FS03.2	NMS	ERT
	Syllides japonicus	FS03.3	ERT	ERT
P7440	*Exogone (Parexogone) hebes*	G29	NMS	ERT
P7450	*Exogone (Exogone) naidina*	HM02.3	NMS	ERT
P7460	*Exogone (Exogone) verugera*	FS02.4	NMS	ERT
	Prosphaerosyllis sp.	HM02.1	NMS	ERT
	Typosyllis mauretanica?	FS03.1	NMS	ERT
P7510	*Sphaerosyllis bulbosa*	FS01.2	NMS	ERT
P7520	*Erinaceusyllis erinaceus*	FS03.1	NMS	ERT
P7530	*Sphaerosyllis hystrix*	FS01.1	NMS	ERT
P7530	*Sphaerosyllis hystrix*	HM01.1	NMS	CM
P7555	*Sphaerosyllis taylori*	FS03.1	NMS	ERT
P7550	*Sphaerosyllis pirifera*?	FS01.2	NMS	ERT
P7600	Autolytinae sp.	FS03.1	NMS	ERT
P8340	*Eunereis longissima*	HM02.1	NMS	ERT
P8670	Nephtys spp. juv.	G9	NMS	ERT
P8710	*Nephtys hombergii*	G23	NMS	ERT
P8720	*Nephtys kersivalensis*	FS04.4	NMS	ERT
P8740	*Nephtys incisa*	G3	NMS	ERT
P9450	*Nothria* sp.	G4	NMS	ERT
P9910	*Nematonereis unicornis*	FS01.1	NMS	ERT
P9910	*Nematonereis unicornis*	HM01.4	NMS	CM
P9950	Lumbrineridae sp. juv.	HM02.4	NMS	ERT
P10010	*Lumbrineris* sp.	G4	NMS	ERT
	Abyssoninoe hibernica	G3	NMS	ERT
P10620	*Dorvillea rubrovittata*	HM01.3	NMS	ERT
P10660	*Ophryotrocha* sp.	HM02.1	NMS	ERT
P11040	*Protodorvillea kefersteini*	FS03.4	NMS	ERT
P11150	*Schistomeringos rudolphii*	G4	NMS	ERT
P11560	Aricidea spp. indet.	G4	NMS	ERT
P11730	*Cirrophorus branchiatus*	G3	NMS	ERT
P11850	*Paradoneis lyra*	G4	NMS	ERT
P12270	*Aonides oxycephala*	HM02.4	NMS	ERT
P12270	*Aonides oxycephala*	HM01.1	NMS	CM
P12500	*Laonice bahusiensis*	G4	NMS	ERT
P12590	*Scolelepis fuliginosa*	FS03.2	NMS	ERT

Table 9.1 continued

MCS code	Taxon	Sample	Location	ID
P12690	*Prionospio cirrifera*	HM02.4	NMS	CM
P12760	*Dipolydora coeca* agg.	HM02.1	NMS	ERT
P12770	*Dipolydora caulleryi*	G4	NMS	ERT
P12860	*Dipolydora socialis*	HM02.4	NMS	ERT
P13020	*Prionospio fallax*	G4	NMS	ERT
P13030	*Aurospio banyulensis*	FS03.2	NMS	ERT
P12690	*Minuspio cirrifera*	G4	NMS	ERT
P12700	*Prionospio multibranchiata*	G3	NMS	ERT
P13110	*Pseudopolydora cf paucibranchiata*	G3	NMS	ERT
P13330	*Spio* sp.	FS01.1	NMS	ERT
P13340	*Spio armata* agg.	G29	NMS	ERT
P13350	*Paraspio decorata*	G23	NMS	ERT
P13380	*Microspio mecznikowianus*	FS01.2	NMS	ERT
P13440	*Spiophanes kroyeri*	G4	NMS	ERT
P13640	*Magelona minuta*	G23	NMS	ERT
	Tharyx marioni	HM01.2	NMS	CM
P13940	*Caulleriella alata*	FS03.1	NMS	ERT
P14030	*Chaetozone setosa*	G17	NMS	ERT
P14020	*Chaetozone* sp. D	G29	NMS	ERT
P14080	*Cirratulus cirratus*	FS03.1	NMS	ERT
	Cirratulus caudatus	G3	NMS	ERT
P14140	*Cirriformia tentaculata*	HM01.1	NMS	ERT
P14280	*Aphelochaeta* sp. A	FS02.1	NMS	ERT
P13970	*Caulleriella killariensis*	G3	NMS	ERT
P14300	*Monticellina* sp.	G3	NMS	ERT
P14790	*Diplocirrus glaucus*	G4	NMS	ERT
P14840	*Flabelligera affinis*	FS01.1	NMS	ERT
P14840	*Flabelligera affinis*	HM01.2	NMS	CM
P14910	*Pherusa plumosa*	G9	NMS	ERT
P15050	*Macrochaeta polyonyx*	G17	NMS	ERT
P15310	*Capitella capitata* agg.	HM02.1	NMS	ERT
P15580	*Mediomastus fragilis*	G23	NMS	ERT
P15580	*Mediomastus fragilis*	HM01.3	NMS	CM
P15620	*Notomastus* sp.	G4	NMS	ERT
P15630	*Notomastus latericeus*	HM01.1	NMS	CM
P15730	Arenicolidae sp. juv.	FS01.3	NMS	ERT
P15910	Maldanidae spp. juv.	G9	NMS	ERT
P16230	*Clymenura* sp.	G3	NMS	ERT
P16290	*Euclymene* sp. A	G4	NMS	ERT
P16300	*Euclymene droebachiensis*	G6	NMS	ERT
P16320	*Euclymene lombricoides*	G3	NMS	ERT
P16380	*Heteroclymene robusta*	G4	NMS	ERT
P16470	*Praxillella* sp.	G6	NMS	ERT
P16490	*Praxillella gracilis*	G4	NMS	ERT
P16650	*Nicomache (Loxochona) quadrispinata*	G4	NMS	ERT
P16810	*Rhodine loveni*	G3	NMS	ERT
P17200	*Ophelina cylindricaudata*	G9	NMS	ERT
P17270	*Polyophthalmus pictus*	FS01.1	NMS	ERT
P17330	*Asclerocheilus intermedius*	HM02.1	NMS	ERT

Table 9.1 continued

MCS code	Taxon	Sample	Location	ID
P17380	*Polyphysia crassa*	FS02.4	NMS	ERT
P17430	*Scalibregma inflatum*	G29	NMS	ERT
P17425	*Scalibregma celticum*	FS03.1	NMS	ERT
P18360	*Owenia fusiformis*	G23	NMS	ERT
P18280	*Galathowenia oculata*	G3	NMS	ERT
P18540	*Lagis koreni*	G25	NMS	ERT
P18840	*Melinna elisabethae*	FS03.2	NMS	ERT
P18860	*Melinna palmata*	G29	NMS	ERT
P19100	*Ampharete finmarchica*	G3	NMS	ERT
P19520	*Mugga wahrbergi*	G6	NMS	ERT
P19580	*Sabellides octocirrata*	HM01.4	NMS	ERT
P19900	*Terebellides stroemii*	G3	NMS	ERT
P19950	*Trichobranchus glacialis*	G4	NMS	ERT
P19950	*Trichobranchus glacialis*	HM01.4	NMS	CM
P20000	Terebellidae sp.1	HM01.2	NMS	CM
P20000	Terebellidae sp.2	HM01.1	NMS	CM
P20010	Amphitritinae spp. juv.	HM01.3	NMS	ERT
P20030	*Amphitrite cirrata*	G25	NMS	ERT
P20310	*Lanice conchilega*	G4	NMS	ERT
P20260	*Lanassa venusta*	HM01.1	NMS	ERT
P20190	*Eupolymnia nebulosa*	FS03.2	NMS	ERT
P20610	*Nicolea zostericola*	FS03.2	NMS	ERT
P20710	*Phisidia aurea*	HM01.2	NMS	ERT
P20750	*Pista* sp.	HM01.2	NMS	ERT
P21170	*Polycirrus* sp.	G4	NMS	ERT
P21440	*Thelepus cincinnatus*	G4	NMS	ERT
P21500	Sabellidae sp. indet.	FS01.1	NMS	ERT
P21620	*Branchiomma bombyx*	FS02.1	NMS	ERT
P21710	*Paradialychone filicaudata*	G4	NMS	ERT
P21810	*Parasabella torulis*	FS02.3	NMS	ERT
P21870	*Euchone rubrocincta*	FS02.1	NMS	ERT
P21880	*Euchone southerni*	FS03.4	NMS	ERT
P22040	*Jasmineira caudata*	FS01.1	NMS	ERT
P22050	*Jasmineira elegans*	FS01.1	NMS	ERT
P22050	*Jasmineira elegans*	HM01.1	NMS	CM
P22720	Serpulidae spp. indet.	HM01.4	NMS	ERT
P22720	Serpulidae sp.	HM02.4	NMS	ERT
P22860	*Hydroides elegans*	G4	NMS	ERT
P22880	*Hydroides norvegicus*	HM01.1	NMS	CM
P23040	*Spirobranchus triqueter*	HM02.1	NMS	ERT
P23040	*Spirobranchus triqueter*	HM01.1	NMS	CM
P23660	*Janua pagenstecheri*	HM01.3	NMS	CM
P23800	*Paradexiospira (Spirorbides) vitrea*	HM01.3	NMS	CM
P24070	*Spirorbis (Spirorbis) tridentatus*	HM01.4	NMS	CM
P24860	*Tubificoides amplivasatus*	HM02.1	NMS	ERT
P25760	Enchytraeidae sp.	FS03.1	NMS	ERT
Q450	*Callipallene brevirostris*	FS01.1	NMS	ERT
R640	*Verruca stroemia*	FS03.1	NMS	ERT
R1060	*Balanus* sp.	FS03.1	NMS	ERT

Table 9.1 continued

MCS code	Taxon	Sample	Location	ID
R35180	Ostracoda sp.	FS01.1	NMS	ERT
S370	Mysida spp. indet.	FS04.4	NMS	ERT
S2220	*Deflexilodes subnudus*	FS02.1	NMS	ERT
S2280	*Perioculodes longimanus*	HM01.2	NMS	ERT
S2790	*Amphilochus manudens*	HM02.3	NMS	ERT
S3360	*Metopa bruzelii*?	HM01.3	NMS	ERT
S4290	*Urothoe elegans*	FS01.1	NMS	ERT
S4390	*Harpinia crenulata*	FS01.1	NMS	ERT
S4470	*Metaphoxus fultoni*	FS01.1	NMS	ERT
S4640	Lysianassidae sp. juv.	FS03.4	NMS	ERT
S5090	*Lysianassa ceratina*	HM01.3	NMS	ERT
S5571	*Socarnes filicornis*	FS01.3	NMS	ERT
S6590	*Liljeborgia kinahani*	FS04.2	NMS	ERT
S6900	*Dexamine spinosa*	FS04.4	NMS	ERT
S7080	*Ampelisca aequicornis*	G4	NMS	ERT
S7110	*Ampelisca diadema*	FS01.1	NMS	ERT
S8530	*Othomaera othonis*	FS04.1	NMS	ERT
S8980	*Gammaropsis maculata*	FS01.1	NMS	ERT
S9350	Ischyroceridae spp. juv.	FS03.1	NMS	ERT
S9720	Aoridae spp. indet. female	FS01.1	NMS	ERT
S9820	*Lembos websteri*	HM01.3	NMS	ERT
S9810	*Autonoe longipes*	FS02.1	NMS	ERT
S10160	Corophiidae spp. indet.	FS01.2	NMS	ERT
S10220	*Crassicorophium bonellii*	FS04.4	NMS	ERT
S10200	*Medicorophium affine*	G4	NMS	ERT
S10780	*Caprella septentrionalis*	FS03.2	NMS	ERT
S10840	*Pariambus typicus*	FS03.3	NMS	ERT
S10960	*Phtisica marina*	FS03.1	NMS	ERT
S11010	*Pseudoprotella phasma*	HM02.4	NMS	ERT
S13230	*Gnathia vorax*	FS03.3	NMS	ERT
S13350	*Anthura gracilis*	HM02.3	NMS	ERT
S14840	*Janira maculosa*	FS01.3	NMS	ERT
S15050	*Munna* sp.	FS01.2	NMS	ERT
S19070	*Leptognathia breviremis*	FS01.1	NMS	ERT
S19210	*Pseudoparatanais batei*	FS03.1	NMS	ERT
S19310	*Tanaopsis graciloides*	FS04.1	NMS	ERT
S19350	*Typhlotanais* sp.	FS03.4	NMS	ERT
S19940	*Vaunthompsonia cristata*	FS01.1	NMS	ERT
S20220	*Eudorella truncatula*	G3	NMS	ERT
S20480	*Cumella (Cumella) pygmaea*	FS04.1	NMS	ERT
S20550	*Nannastacus unguiculatus*	FS01.2	NMS	ERT
S20950	*Diastylis* sp. indet.	FS01.1	NMS	ERT
S21690	Caridea spp. indet.	HM02.1	NMS	ERT
S22630	*Eualus pusiolus*	HM02.4	NMS	ERT
S23780	*Calocaris macandreae*	G6	NMS	ERT
S24440	Paguridae spp. juv.	FS03.4	NMS	ERT
S24700	*Pagurus prideaux*	G23	NMS	ERT
S24860	*Galathea intermedia*	FS03.4	NMS	ERT
S24880	*Galathea nexa*	FS01.1	NMS	ERT

Table 9.1 continued

MCS code	Taxon	Sample	Location	ID
S25020	*Pisidia longicornis*	FS03.3	NMS	ERT
S25500	Majidae spp. juv.	HM02.2	NMS	ERT
S25600	*Hyas coarctatus*	HM02.1	NMS	ERT
S25930	*Eurynome spinosa*	HM01.1	NMS	ERT
W50	*Scutopus ventrolineatus*	G25	NMS	ERT
W140	*Falcidens crossotus*	G3	NMS	ERT
W500	Polyplacophora sp. juv.	FS01.1	NMS	ERT
W550	*Leptochiton asellus*	HM01.4	NMS	ERT
W560	*Leptochiton cancellatus*	G4	NMS	ERT
W830	*Callochiton septemvalvis*	HM01.1	NMS	ERT
W920	*Gastropoda spp. indet.*	FS03.1	NMS	ERT
W1110	*Emarginula fissura*	HM01.4	NMS	ERT
W1250	*Testudinalia testudinalis*	G3	NMS	ERT
W1910	*Gibbula tumida*	HM01.2	NMS	ERT
W2000	*Calliostoma zizyphinum*	HM01.2	NMS	ERT
W3070	*Alvania beanii*	FS03.1	NMS	ERT
W3130	*Alvania punctura*	FS02.1	NMS	ERT
W3400	*Onoba semicostata*	G4	NMS	ERT
W4420	*Turritella communis*	G23	NMS	ERT
W5370	*Odostomia* sp.	FS03.4	NMS	ERT
W5930	*Turbonilla sp.*	FS04.3	NMS	ERT
W6890	*Vitreolina philippi*	FS02.4	NMS	ERT
W7540	*Velutina velutina*	HM01.1	NMS	ERT
W8370	Buccinidae spp. juv.	G4	NMS	ERT
W8440	*Buccinum undatum*	HM02.1	NMS	ERT
W9690	*Cylichna cylindracea*	G29	NMS	ERT
W9770	*Philine sp.*	G6	NMS	ERT
W10170	*Retusa truncatula*	FS02.2	NMS	ERT
W13790	Doridacea sp.	HM02	NMS	CM
W16120	Bivalvia spp. juv.	HM01.2	NMS	ERT
W16120	*Bivalvia spp. indet.*	G25	NMS	ERT
W16160	*Nucula spp. juv.*	G17	NMS	ERT
W16180	*Nucula nitidosa*	G3	NMS	ERT
W16190	*Nucula nucleus*	G4	NMS	ERT
W16200	*Nucula sulcata*	G17	NMS	ERT
W16372	*Yoldiella philippiana*	G4	NMS	ERT
W16480	Mytilidae spp. juv.	HM02.2	NMS	ERT
W16500	*Mytilus edulis*	HM02.2	NMS	ERT
W16690	*Musculus subpictus*	HM01.4	NMS	ERT
W16720	*Modiolus* sp. juv.	HM01.4	NMS	ERT
W16750	*Modiolus modiolus*	HM01.1	NMS	ERT
W16830	*Modiolula phaseolina* spat?	HM01.1	NMS	CM
W16831	*Modiolula phaseolina* spat?	HM01.2	NMS	CM
W17390	*Limaria hians*	HM01.4	NMS	ERT
W17500	*Limatula gwyni*	FS01.3	NMS	ERT
W17740	Pectinidae spp. juv.	G4	NMS	ERT
W17960	*Talochlamys pusio*	HM01.1	NMS	CM
ZM430	*Mimachlamys varia*	HM01.1	NMS	ERT
W18130	Anomiidae spp. juv.	HM01.4	NMS	ERT

Table 9.1 continued

MCS code	Taxon	Sample	Location	ID
W18200	*Monia patelliformis*	HM02.2	NMS	ERT
W18420	*Lucinoma borealis*	G6	NMS	ERT
W18380	*Myrtea spinifera*	G3	NMS	ERT
W18620	*Mendicula ferruginosa*	G4	NMS	ERT
W18500	*Thyasira* spp. juv.	G3	NMS	ERT
W18520	*Thyasira flexuosa*	G3	NMS	ERT
W19050	*Kurtiella bidentata*	G3	NMS	ERT
W19450	*Astarte sulcata*	G4	NMS	ERT
W19650	Cardiidae spp. juv.	HM01.2	NMS	ERT
W19660	*Acanthocardia*	G3	NMS	ERT
W19770	*Parvicardium pinnulatum*	HM01.3	NMS	ERT
W20320	*Phaxas pellucidus*	G3	NMS	ERT
W20670	*Macoma balthica*	G4	NMS	ERT
W20900	*Gari tellinella*	FS01.3	NMS	ERT
W21010	*Abra* spp. juv.	G3	NMS	ERT
W21020	*Abra alba*	G3	NMS	ERT
W21040	*Abra nitida*	G3	NMS	ERT
W21690	*Tapes* sp. juv.	HM01.4	NMS	ERT
W22010	*Timoclea ovata*	G4	NMS	ERT
W22250	*Mya* sp. juv.	G4	NMS	ERT
W22270	*Mya truncata*	HM01.2	NMS	ERT
W22390	*Corbula gibba*	G3	NMS	ERT
W22510	*Hiatella arctica*	G4	NMS	ERT
W22510	*Hiatella arctica*	HM01.3	NMS	CM
W23430	*Lyonsia norwegica*	G4	NMS	ERT
W23480	*Thracia sp.?*	HM01.1	NMS	CM
W23480	*Thracia* spp. juv.	HM01.4	NMS	ERT
W23500	*Thracia convexa*	G23	NMS	ERT
W23530	*Thracia villosiuscula*	FS03.1	NMS	ERT
W23550	*Thracia distorta*	HM01.1	NMS	ERT
W23800	*Tropidomya abbreviata*	G5	NMS	ERT
Y1400	*Alcyonidium mamillatum*	HM01.2	NMS	CM
Y1620	*Nolella dilatata*	HM01.1	NMS	CM
Y2510	*Bowerbankia gracilis*	HM01.1	NMS	CM
Y2510	*Bowerbankia gracilis*	HM01.3	NMS	CM
Y6440	*Aetea sica*	HM01.1	NMS	CM
Y8410	*Scrupocellaria scruposa*	FS02	NMS	CM
Y8640	*Beania mirabilis*	HM01.1	NMS	CM
Y8700	*Bugula avicularia*	HM01	NMS	CM
Y8700	*Bugula avicularia*	HM01.3	NMS	CM
Y7610	*Amphiblestrum flemingii*	HM01.1	NMS	CM
Y6510	*Scruparia ambigua*	HM01.2	NMS	CM
Y6510	*Scruparia ambigua*	HM01.3	NMS	CM
ZA30	*Phoronis* sp.	G29	NMS	ERT
ZB110	*Antedon bifida*	HM01.2	NMS	ERT
ZB310	Asteroidea sp. juv.	FS02.4	NMS	ERT
ZB1900	*Asterias rubens*	FS04.1	NMS	ERT
ZB2040	Ophiuroidea spp. juv.	G23	NMS	ERT
ZB2350	*Ophiothrix fragilis*	FS04.1	NMS	ERT

Table 9.1 continued

MCS code	Taxon	Sample	Location	ID
ZB2350	*Ophiothrix fragilis*	HM01	NMS	CM
ZB2420	*Ophiocomina nigra*	FS02.2	NMS	ERT
ZB2780	*Ophiopholis aculeata*	HM01.1	NMS	ERT
ZB2860	*Amphiura chiajei*	G17	NMS	ERT
ZB2880	*Amphiura filiformis*	G17	NMS	ERT
ZB3000	*Amphipholis squamata*	G4	NMS	ERT
ZB3000	*Amphipholis squamata*	HM01.2	NMS	CM
ZB3150	*Ophiura ophiura*	G29	NMS	ERT
ZB3380	Echinoidea spp. juv.	FS02.1	NMS	ERT
ZB3550	*Psammechinus miliaris*	FS04.1	NMS	ERT
ZB4640	*Leptopentacta elongata*	G23	NMS	ERT
ZB4690	*Paracucumaria hyndmani*	G4	NMS	ERT
ZB4970	*Pseudothyone raphanus*	G4	NMS	ERT
ZB5240	*Leptosynapta bergensis*	G3	NMS	ERT
ZB5320	*Labidoplax buskii*	G3	NMS	ERT
ZB5340	*Labidoplax media*	HM01.4	NMS	ERT
ZC10	Enteropneusta sp.	FS04.4	NMS	ERT
ZD10	Ascidiacea spp. juv.	FS03.1	NMS	ERT
ZD10	Ascidiacea sp. juv.	HM01.2	NMS	CM
ZD10	Ascidiacea sp. indet.	FS02.1	NMS	ERT
ZD1170	*Ciona intestinalis*	HM01.1	NMS	ERT
ZD1390	Ascidiidae sp.	FS02.4	NMS	ERT
ZD1400	*Ascidiella* sp. juv.	FS03.1	NMS	ERT
ZD1490	*Ascidia conchilega*	HM01.3	NMS	ERT
ZD1840	*Polycarpa* sp.	HM01.3	NMS	ERT
ZD1940	*Dendrodoa grossularia*	FS03.1	NMS	ERT
ZD2420	*Pyura tessellata*	HM01.1	NMS	ERT
ZD2420	*Pyura tessellata*	HM02.1	NMS	CM
ZM2080	*Bonnemaisonia asparagoides*	HM01.1	HWU	CM
ZM3280	*Kallymenia reniformis*	FS01	HWU	CM
ZM5830	*Phyllophora* sp. juv.?	HM01.1	HWU	CM
ZM5830	*Phyllophora* sp. juv.?	HM02.3	HWU	CM
ZM6310	*Plocamium cartilagineum*	FS01	HWU	CM
ZM6930	*Rhodophyllis divaricata*	FS01	HWU	CM
ZM7760	*Aglaothamnion* sp.	HM02.1	HWU	CM
ZM7901	*Aglaothamnion diaphanum*	HM01.4	HWU	CM
ZM7901	*Aglaothamnion diaphanum*	HM02.3	HWU	CM
ZM7975	*Aglaothamnion priceannum*?	FS03	HWU	CM
ZM8340	*Compsothamnion thuyoides*	FS01	HWU	CM
ZM8460	*Halurus flosculosus*	FS01	HWU	CM
ZM8770	*Pleonosporium borreri*	FS02	HWU	CM
ZM8830	*Plumaria plumosa*	HM01.1	NMS	CM
ZM8880	*Pterothamnion plumula*	HM01.1	HWU	CM
ZM8880	*Pterothamnion plumula*	FS01	HWU	CM
ZM9080	*Seirospora interrupta*	HM01	HWU	CM
ZM9400	*Apoglossum ruscifolium*	FS01	HWU	CM
ZM9950	*Haraldiophyllum bonnemaisonii*?	HM01.4	HWU	CM
ZM10170	*Polyneura bonnemaisonii*	HM01	HWU	CM
ZM10170	*Polyneura bonnemaisonii*	HM02	HWU	CM

Table 9.1 continued

MCS code	Taxon	Sample	Location	ID
ZM10180	*Erythroglossum laciniatum*	FS01	HWU	CM
ZM10390	*Heterosiphonia plumosa*	HM01	HWU	CM
	Heterosiphonia japonica	FS01	HWU	CM
	Heterosiphonia japonica	FS01	HWU	CM
	Heterosiphonia japonica	FS02	HWU	CM
ZM10500	*Brongniartella byssoides*	FS01	HWU	CM
ZR30	Ectocarpaceae sp.	HM02	HWU	CM
ZR1070	*Pilayella littoralis*	HM01	HWU	CM
ZR4570	*Dictyota dichotoma*	FS01	HWU	CM
ZR4990	*Desmarestia ligulata*	FS01	HWU	CM
ZS2150	*Ulva compressa*	HM01	HWU	CM
ZS2480	*Ulva rigida*?	HM01	HWU	CM

ANNEX 10: HISTORICAL MPA SEARCH FEATURE RECORDS FOR THE SURVEY AREAS

Table 10.1: Sources of historical records of target search features. The Marine Recorder survey code is given where applicable. MCS = Marine Conservation Society, NCC = Nature Conservancy Council, SNH = Scottish Natural Heritage, UMBSM = University Marine Biological Station Millport, HWU = Heriot-Watt University.

Location	Year of survey	Organisation	Survey type	Reference	Marine Recorder survey code
Loch Alsh and Duich	1976-1990	MCS	MCS Observation Scheme records for 1976 - 1990 for Loch Duich and Loch Alsh	Unpublished	MRMLN01200000002
Loch Alsh and Duich	1988	NCC	MNCR phase 2 surveys in Loch Alsh and Loch Duich	Connor, 1989	JNCCMNCR10000003
Loch Alsh and Duich	1991	Sue Scott	Epibiota recording at two sublittoral sites in Loch Alsh	Scott, 1991	JNCCMNCR10000290
Loch Alsh and Duich	1995	SNH	Loch Alsh and Duich ROV survey	SNH, 1995	JNCCMNCR30000650
Loch Alsh and Duich	1996	Sue Scott	Epibiota recording at Loch Alsh *Modiolus* bed site	Scott, 1996	
Loch Alsh and Duich	1996	Entec UK Ltd.	Remote video, infaunal sampling and acoustic mapping of Loch Alsh and Duich	Johnston *et al*., 2000	JNCCMNCR30000761
Loch Alsh and Duich	1997	SNH	Loch Alsh and Duich ROV survey	SNH, 1997	JNCCMNCR30000731
Loch Alsh and Duich	2004	Emu Ltd.	Site condition monitoring of features in Loch Alsh and Loch Duich	Emu Ltd., 2006	MRSNH01200000007
Loch Alsh and Duich	2004	MCS	Seasearch Loch Alsh and Duich survey	Unpublished	MRMCS0070000000F
Loch Alsh and Duich	2005	MCS	Seasearch Loch Duich survey	Unpublished	MRMCS0020000002D
Loch Alsh and Duich	2007	Marine Bio-images	Mapping and monitoring of Loch Alsh *Modiolus* bed and recording of *Limaria* beds	Marine Bio-images, 2007	

Table 10.1 continued

Location	Year of survey	Organisation	Survey type	Reference	Marine Recorder survey code
Loch Alsh and Duich	2007	MCS	Seasearch Loch Duich survey	Unpublished	MRMCS00200000064
Loch Alsh and Duich	2008	MCS	Seasearch Loch Duich survey	Unpublished	MRMCS00700000074
Loch Alsh and Duich	2009	MCS	Seasearch Loch Duich survey	Unpublished	MRMCS0070000008C
Loch Alsh and Duich	2009	SNH	*Limaria* nest community samples from one bed in Loch Alsh	ERT (Scotland) Ltd. (2010)	
Loch Alsh and Duich	2011	MCS	Seasearch *Pachycerianthus* survey of Loch Duich	Unpublished	
Loch Fyne	1988	UMBSM	MNCR phase 2 surveys in Otter Narrows and W Kilbride Island, Loch Fyne	Davies, 1989	JNCCMNCR10000022
Loch Fyne	1994-1999	UMBSM	Experimental study of Loch Fyne maerl bed	Hall-Spencer, 1999	
Loch Fyne	1999	UMBSM	Study of Loch Fyne *Limaria* bed	Hall-Spencer & Moore, 2000a	
Loch Fyne	2006	MCS	Seasearch Loch Fyne survey	Unpublished	MRMCS00200000034
Loch Fyne	2009	MCS	Seasearch Loch Fyne survey	Unpublished	MRMCS00700000086
Loch Fyne	2010	Seastar Survey Ltd.	Validation of PMF records in Loch Fyne	Allen *et al.*, 2011	MRSNH01600000008
Loch Creran	2005	HWU	Search for *Limaria* bed	Moore, unpublished	
Loch Creran	2006	HWU	*Limaria hians* population structure at two sites in Loch Creran	Burgess, 2007	
Loch Creran	2006	HWU	Community analysis of *Limaria* bed off South Shian, Loch Creran	Trigg *et al.*, 2011	

Table 10.2: Records of target MPA search features from a July 2012 snapshot of Marine Recorder, with location and depth data. Figures in brackets are corrected positions (following reference to original field data sheet sketches). The code is the record identifier used in the figures and text of this report.

Code	Sample reference	Survey key	Event name (site name)	Date	Latitude	Longitude	Lower depth (m)	Upper depth (m)
1	MRSNH01200000058.04	MRSNH01200000007	DLA04ROV10 ROV spot survey	17/06/2004	57.27402	-5.70980	-29.7	-29.7
2	MRSNH01200000058.05	MRSNH01200000007	DLA04ROV10 ROV spot survey	17/06/2004	57.27410	-5.70593	-45.3	-45.3
3	MRSNH01200000058.06	MRSNH01200000007	DLA04ROV10 ROV spot survey	17/06/2004	57.27258	-5.70958	-15.0	-15.0
4	MRSNH01200000058.07	MRSNH01200000007	DLA04ROV10 ROV spot survey	17/06/2004	57.27260	-5.70574	-39.0	-39.0
5	MRSNH01200000058.01	MRSNH01200000007	DLA04ROV10 ROV spot survey	17/06/2004	57.27515	-5.70990	-21.6	-21.6
6	MRSNH01200000047.01	MRSNH01200000007	Kyle Akin Modiolus bed transect	25/06/2004	57.27312	-5.71330	-27.1	-19.7
7	MRSNH0120000004B.01	MRSNH01200000007	Centre of Loch System DLA04SP4	28/06/2004	57.27195	-5.51840	-25.8	-25.8
8	MRSNH0120000004B.02	MRSNH01200000007	Centre of Loch System DLA04SP4	28/06/2004	57.27195	-5.51840	-25.1	-25.1
9	003.014.005	JNCCMNCR10000003	E of Letterfearn (Loch Duich)	29/08/1988	57.25584	-5.50647	-12.0	-10.0
10	003.014.006	JNCCMNCR10000003	E of Letterfearn (Loch Duich)	29/08/1988	57.25584	-5.50647	-25.0	-14.0
11	MRSNH0120000004E.01	MRSNH01200000007	Kyle Akin Modiolus bed DLA04HWU1	25/06/2004	57.27312	-5.71363	-19.6	-19.6
12	MRSNH0120000004E.03	MRSNH01200000007	Kyle Akin Modiolus bed DLA04HWU1	25/06/2004	57.27312	-5.71363	-19.6	-19.6
13	MRSNH0120000004E.02	MRSNH01200000007	Kyle Akin Modiolus bed DLA04HWU1	25/06/2004	57.27312	-5.71363	-18.6	-18.6
14	003.052.002	JNCCMNCR10000003	N of String Rock (Loch Alsh)	24/08/1988	57.27593 (57.27549)	-5.71420 (-5.71490)	-10.0	-7.0
15	003.011.001	JNCCMNCR10000003	NE of church, Ard-an-Eoin (Loch Duich)	30/08/1988	57.23680	-5.47980	-11.0	-1.5
16	003.007.002	JNCCMNCR10000003	NE of Ratagan (Loch Duich)	26/08/1988	57.22337	-5.44538	-29.0	-2.0
17	650.010.001	JNCCMNCR30000650	S of Eilenan Dubha (Loch Alsh)	01/09/1995	57.27445	-5.70658	-40.5	-40.5
18	MRSNH01200000044.09	MRSNH01200000007	Vicinity of MNCR site 3/16 transect	22/06/2004	57.26917	-5.52184	-20.6	-18.7
19	MRSNH01200000044.10	MRSNH01200000007	Vicinity of MNCR site 3/16 transect	22/06/2004	57.26917	-5.52184	-21.0	-18.6
20	650.008.001	JNCCMNCR30000650	W of Rubha Ard (Loch Alsh)	30/08/1995	57.27147	-5.71607	-10.6	-10.6
21	MRSNH01200000047.01	MRSNH01200000007	Kyle Akin Modiolus bed transect	25/06/2004	57.27312	-5.71330	-27.1	-19.7
22	003.051.001	JNCCMNCR10000003	NE of Eileanan Dubha (Loch Alsh)	24/08/1988	57.27901	-5.70123	-25.0	-19.0
23	650.009.001	JNCCMNCR30000650	SW of Eileanan Dubha (Loch Alsh)	01/09/1995	57.27529	-5.70865	-28.0	-28.0
24	003.043.002	JNCCMNCR10000003	NW of Racoon Rock (Loch Alsh)	23/08/1988	57.26968	-5.58910	-18.1	-16.1
25	003.043.001	JNCCMNCR10000003	NW of Racoon Rock (Loch Alsh)	23/08/1988	57.26968	-5.58910	-16.1	-14.1
26	003.042.003	JNCCMNCR10000003	N of Glas Eilean (Loch Alsh)	23/08/1988	57.27171	-5.58100	-11.0	-9.0
27	003.052.001	JNCCMNCR10000003	N of String Rock (Loch Alsh)	24/08/1988	57.27593 (57.27549)	-5.71420 (-5.71490)	-7.0	-7.0
28	003.022.001	JNCCMNCR10000003	E of Druidaig Lodge (Loch Duich)	31/08/1988	57.26112 (57.26192)	-5.51029 (-5.51110)	-49.0	-49.0
29	003.020.001	JNCCMNCR10000003	SW of Inverinate (Loch Duich)	31/08/1988	57.23300	-5.45457	-96.0	-96.0

Table 10.2 continued

Code	Sample reference	Survey key	Event name (site name)	Date	Latitude	Longitude	Lower depth (m)	Upper depth (m)
30	003.021.001	JNCCMNCR10000003	SW of Wester Keppoch (Loch Duich)	31/08/1988	57.25791 (57.25872)	-5.49672 (-5.49612)	-94.0	-94.0
31	650.006.001	JNCCMNCR30000650	NE of Letter Fearn (1) (Loch Duich)	29/08/1995	57.25837	-5.50273	-78.5	-78.5
32	650.005.001	JNCCMNCR30000650	NE of Letterfearn (2) (Loch Duich)	29/08/1995	57.25837	-5.50273	-64.0	-64.0
30	003.021.001	JNCCMNCR10000003	SW of Wester Keppoch (Loch Duich)	31/08/1988	57.25791 (57.25872)	-5.49672 (-5.49612)	-94.0	-94.0
34	003.022.001	JNCCMNCR10000003	E of Druidaig Lodge (Loch Duich)	31/08/1988	57.26112 (57.26192)	-5.51029 (-5.51110)	-49.0	-49.0
35	051.010.001	JNCCMNCR60000051	Inner Loch na Beiste (Loch Alsh)	15/08/1980	57.26200	-5.72938	-15.0	-1.0
36	650.018.001	JNCCMNCR30000650	N of Sr•n an Tairbh (Loch Alsh)	30/08/1995	57.26980	-5.67524	-107.0	-107.0
37	003.005.004	JNCCMNCR10000003	NE of Eilean Nan Gall, Loch Beg (Loch Duich)	26/06/1988	57.22705	-5.40926	-29.0	-22.0
38	650.015.001	JNCCMNCR30000650	S of Scalpaidh (Loch Alsh)	01/09/1995	57.27421	-5.69012	-99.0	-99.0
39	003.019.001	JNCCMNCR10000003	S of Torchuillin (Loch Duich)	31/08/1988	57.22826	-5.43092	-46.0	-46.0
40	003.009.002	JNCCMNCR10000003	SW of church, Torchuillin (Loch Duich)	26/08/1988	57.23359	-5.43308	-17.0	-17.0
41	003.006.003	JNCCMNCR10000003	Bay of Invershiel (Loch Duich)	30/06/1988	57.22216	-5.42373	-18.0	-14.0
42	MRSNH0120000005F.02	MRSNH01200000007	DLA04ROV15 ROV transect	18/06/2004	57.22692	-5.45387	-32.7	-31.7
43	MRSNH0120000005F.04	MRSNH01200000007	DLA04ROV15 ROV transect	18/06/2004	57.22692	-5.45387	-25.8	-24.3
44	MRSNH0120000005F.06	MRSNH01200000007	DLA04ROV15 ROV transect	18/06/2004	57.22692	-5.45387	-22.3	-6.0
45	MRSNH01200000061.01	MRSNH01200000007	DLA04ROV17 ROV transect	18/06/2004	57.24080	-5.46505	-102.9	-94.9
46	MRSNH01200000050.01	MRSNH01200000007	DLA04ROV2 ROV transect	16/06/2004	57.23853	-5.48032	-33.4	-29.5
47	MRSNH01200000050.03	MRSNH01200000007	DLA04ROV2 ROV transect	16/06/2004	57.23853	-5.48032	-27.5	-15.5
48	MRSNH01200000051.01	MRSNH01200000007	DLA04ROV3 ROV transect	16/06/2004	57.23422	-5.44935	-39.9	-37.9
49	MRSNH01200000052.01	MRSNH01200000007	DLA04ROV4 ROV transect	16/06/2004	57.23252	-5.43192	-18.1	-15.0
50	MRSNH01200000052.02	MRSNH01200000007	DLA04ROV4 ROV transect	16/06/2004	57.23252	-5.43192	-15.0	-11.8
51	MRSNH01200000054.01	MRSNH01200000007	DLA04ROV6 ROV transect	16/06/2004	57.26133	-5.50182	-118.9	-113.8
52	MRSNH01200000057.01	MRSNH01200000007	DLA04ROV9 ROV transect	17/06/2004	57.27195	-5.59543	-43.3	-30.3
53	650.004.001	JNCCMNCR30000650	E of Druidaig Lodge (Loch Duich)	31/08/1995	57.26308	-5.50783	-84.0	-79.0
54	003.011.004	JNCCMNCR10000003	NE of church, Ard-an-Eoin (Loch Duich)	30/08/1988	57.23680	-5.47980	-32.0	-23.0
55	003.007.003	JNCCMNCR10000003	NE of Ratagan (Loch Duich)	26/08/1988	57.22337	-5.44538	-33.0	-29.0
56	003.010.003	JNCCMNCR10000003	S of Gertrude Rock (Loch Duich)	26/08/1988	57.23493	-5.44978	-22.0	-20.0
57	003.012.003	JNCCMNCR10000003	SW of Sgurr Aoide (Loch Duich)	26/08/1988	57.25388	-5.47975	-30.0	-18.0
58	003.008.001	JNCCMNCR10000003	SW of Tigh-Geal (Loch Duich)	26/08/1988	57.23032	-5.42117	-24.0	-24.0
59	731.001.001	JNCCMNCR30000731	W of Carr Brae (Loch Duich)	29/01/1997	57.25907	-5.49699	-62.5	-56.5
60	731.001.002	JNCCMNCR30000731	W of Carr Brae (Loch Duich)	29/01/1997	57.25907	-5.49699	-76.5	-62.5
61	003.051.001	JNCCMNCR10000003	NE of Eileanan Dubha (Loch Alsh)	24/08/1988	57.27901 (57.27857)	-5.70123 (-5.70245)	-25.0	-19.0

Table 10.2 continued

Code	Sample reference	Survey key	Event name (site name)	Date	Latitude	Longitude	Lower depth (m)	Upper depth (m)
62	022.011.003	JNCCMNCR10000022	W Kilbride Island (Loch Fyne)	15/08/1988	56.12122 (56.12211)	-5.21092 (-5.21233)	-27.5	-19.5
63	022.033.001	JNCCMNCR10000022	Creag Gobhainn (Loch Fyne)	11/09/1988	56.01272 (56.01267)	-5.36880 (-5.36728)	-10.0	-8.0
64	022.034.005	JNCCMNCR10000022	S of Liath Eilean (Loch Fyne)	11/09/1988	55.99690 (55.99633)	-5.38828 (-5.38961)	-9.2	-7.4
65	022.020.001	JNCCMNCR10000022	Mid loch, SW of Otter Spit (Loch Fyne)	16/08/1988	56.00281	-5.36955	-21.5	-9.5
66	022.033.001	JNCCMNCR10000022	Creag Gobhainn (Loch Fyne)	11/09/1988	56.01272 (56.01267)	-5.36880 (-5.36728)	-10.0	-8.0
67	MRMCS002000002D1.02	MRMCS00200000034	Creag Gobhiainn Shell Reef	12/06/2006	56.01416	-5.36667	-11.3	-7.3
68	MRMCS00700000539.01	MRMCS00700000086	Quarry Tea rooms	18/01/2009	56.13317	-5.22534	-15.5	2.5

Table 10.3: Records of target MPA search features from a July 2012 snapshot of Marine Recorder, with habitat and biological data. Each entry relates to the corresponding physical data given for that code in Table 10.2.

Code	Biotope	Description
1	SS.SBR.SMus	Dense, mixed brittlestar bed dominated by *Ophiothrix* and subdominated by *Ophiocomina nigra* covering silty gravel with clumps of live *Modiolus* and large amounts of dead *Modiolus* shells.
2	SS.SBR.SMus	Dense, mixed brittlestar bed dominated by *Ophiothrix* and subdominated by *Ophiopholis aculeata* covering coarse shelly, clean sand with cobbles and clumps of *Modiolus*. Bare patches of sand <10%. Dead *Modiolus* shells present.
3	SS.SBR.SMus	Dense, mixed brittlestar bed dominated by *Ophiocomina nigra* and sub-dominated by *Ophiothrix* covering clean, coarse sand with cobbles, pebbles, shell debris and some gravel. Few boulders half buried in the sand. *Modiolus* clumps present as well as dead *Modious* shells.
4	SS.SBR.SMus	Dense, mixed brittlestar bed co-dominated by *Ophiothrix* and *Ophiopholis aculeata*, and sub-dominated by *Ophiocomina nigra*. This is covering coarse sand and gravel with shell debris and cobbles. *Modiolus* clumps present as well as dead *Modiolus* shells.
5	SS.SBR.SMus	*Modiolus* clumps, cobbles, pebbles, shell debris and coarse sand with some gravel and silt. Seabed obscured by a dense carpet of *Ophiothrix*.
6	SS.SBR.SMus	Muddy shell gravel with patchy clumps of *Modiolus* and dense *Ophiothrix*.
7	SS.SBR.SMus.ModHAs	Coarse sandy gravel with shell debris and small pebbles. Area surrounded by medium to large boulders (30-40%). Sparse *Modiolus* clumps also present. Current swept site.
8	SS.SBR.SMus.ModHAs	12 replicate quadrat frequency counts of dominant taxa. Count given is for the number of quadrat squares (25 in total) containing the taxon.Cobbles and pebbles with occasional patches of coarse sand.
9	SS.SBR.SMus.ModHAs	Boulders on muddy coarse sand at 10-12m bcd. Boulders dominated by encrusting *Pseudolithoderma extensum* with encrusting Corallinaceae grazed by *Psammechinus miliaris*, chitons and *Tectura*. *Echinus esculentus*. *Aequipecten* frequent on sediment and a few Pecten maximus seen. Includes outlines of bedrock communities and deeper slope communties.
10	SS.SBR.SMus.ModHAs	Slope of sandy mud with pebbles and cobbles, from 14 to 25m bcd, with scattered *Modiolus modiolus* with *Serpula vermicularis* in clumps on them. Also prominent was *Aequipecten opercularis* and *Ophiothrix fragilis*. (Species labelled as 'P' were present in samples of *Modiolus*).
11	SS.SBR.SMus.ModHAs	Level seabed of muddy shell gravel with occasional pebbles, cobbles and abundant clumps of *Modiolus*. Dominated by brittlestars.
12	SS.SBR.SMus.ModHAs	4 *Modiolus* clumps collected by diver for enumeration of associated community retained on 0.5 mm sieve. Clumps of a size that they just fit within a 5 litre bucket.

Table 10.3 continued

Code	Biotope	Description
13	SS.SBR.SMus.ModHAs	12 replicate quadrat frequency counts of dominant taxa. Count given is for the number of quadrat squares (25 in total) containing the taxon.Muddy shell gravel with occasional pebbels and cobbles and clumps of *Modiolus*.
14	SS.SBR.SMus.ModHAs	*Modiolus* bed with *Laminaria hyperborea*, *Ophiocomina nigra*, *Ophiothrix fragilis*, *Ophiopholis acculeata*, baby *Echinus esculentus*, *Pagurus bernhardus*, *Gibbula cineraria*, *Pomatoceros triqueter* on empty shells and *Modiolus*, *Buccinium undatum*.
15	SS.SBR.SMus.ModHAs	Pebbles and cobbles on sandy mud at 1.5 to 11m bcd. Dominated by *Pseudolithoderma extensum* and encrusting red algae with occasional encrusting Corallinacea. *Laminaria saccharina* and *Phycodrys rubens* occurred at -1.5 bcd.
16	SS.SBR.SMus.ModHAs	Very steep slope of sediment with very numerous pebbles and small cobbles from 2.1 to 29m bcd. *Protanthea* was the dominant species, with *Ophiothrix fragilis*, *Aequipecten opercularis* and *Pododesmus patelliformis* important. Lowest *L. saccharina* at 10.8m.
17	SS.SBR.SMus.ModHAs	Occasional boulders with cobbles and *Modiolus modiolus* in between. Large numbers of brittlestars around mussels and cobbles, with the hard substrata supporting hydriods.
18	SS.SBR.SMus.ModHAs	*Modiolus* bed covered with dense brittlestars on a plain of pebbles and coarse sand.
19	SS.SBR.SMus.ModHAs	12 replicate quadrat frequency counts of characterising taxa. Count given is for the number of quadrat squares (25 in total) containing the taxon.*Modiolus* bed on a plain of pebbles and coarse sand.
20	SS.SBR.SMus.ModHAs	*Modiolus modiolus* beds, cobbles, pebbles and some sand, encrusted by algae and with brittlestars between cobbles. Loose- lying filimentous algae on the substrata's surface.
21	SS.SBR.SMus.ModT	Muddy shell gravel with patchy clumps of *Modiolus* and dense *Ophiothrix*.
22	SS.SBR.SMus.ModT	Very gently sloping plain of pebble and gravel overlying coarse firm sediment - all more or less covered by fairly dense bed of *Modiolus* with *Ophiothrix* common. *Limaria hians* common under *Modiolus* and pebble clumps. *Aequipecten* abundant. Other common mobile species included *Pagurus pubescens* and *Clelandella clelandii*. Hydroids and ascidians quite common. Area generally quite rich.
23	SS.SBR.SMus.ModT	*Modiolus modiolus* bed with shell, sand and gravel between and supporting brittlestars and hydroids.
24	SS.SMp.Mrl.Pcal.Nmix	Tide-swept plain of pebbles, small cobbles and gravel. Rich hydroid fauna. *Cerianthus lloydii*, *Aequipecten opercularis*, *Ciona intestalis*, *Cancer pagarus* and *Crossaster papossus* (particularly juvenile) were conspicuous.
25	SS.SMp.Mrl.Pcal.Nmix	Gentle slope of maerl gravel and live maerl, with occasional pebbles and patches of gravel.
26	SS.SMp.Mrl.Pcal.R	Chromophycota indet.(crusts) has been given a nominal abundance value of Present for this record as in Arev it had no abundance value. Mixed substratum of maerl, maerl gravel, gravel, shell gravel and pebbles, with occasional cobbles and many dead whole shells.

Table 10.3 continued

Code	Biotope	Description
27	SS.SMp.Mrl.Pcal.R	Chromophycota indet.(crusts), *Trailliella intricata* has been given a nominal abundance value of Present for this record as in Arev it had no abundance value. Gravel, shell gravel, live maerl and pebbles with some whole shells at 7m bcd. Trailliella and other foliose algae (small) frequent, and encrusting algae on pebbles. Fairly interesting for algae, few animals. Maerl - flat form.
28	SS.SMu.CFiMu.BlyrAchi	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. Biological dredge (approx 25 litres) of soft gloupy mud, with fine sand and some organic debris - oxic. *Amphiura* rare, worm tubes frequent, *Funiculina* skeletons present.
29	SS.SMu.CFiMu.BlyrAchi	*Amphiura*, Pelecypoda has been removed from the species list for this record as more specific related taxa were also present, these are now marked as characterising. Biological dredge (approx 10 litres) of very soft gloupy mud - dark grey and fine, oxic. *Amphiura* (A), bivalves (O), some old *Funiculina* skeletons.
30	SS.SMu.CFiMu.BlyrAchi	Biological dredge of soft gloupy mud, slightly sandy and with a few shell fragments (volume approx. 12 litres). *Amphiura* (C), bivalves (F), polychaetes (F), 1 heart urchin, 1 *Echinus*, 1 *Antalis*, several flatworms and ? leeches, 2 spp. of shrimp. Moderately oxic and quite rich.
31	SS.SMu.CFiMu.MegMax	Extensively burrowed mud by callianassid shrimps and the brittlestar *Amphiura filiformis*. Occasional *Virgularia mirabilis* were recorded.
32	SS.SMu.CFiMu.MegMax	Extensively worked, soft mud, with callionassid shrimps and *Virgularia mirabilis*. Occasional *Asterias rubens* were noted on the mud.
33	SS.SMu.CFiMu.MegMax	Biological dredge of soft gloupy mud, slightly sandy and with a few shell fragments (volume approx. 12 litres). *Amphiura* (C), bivalves (F), polychaetes (F), 1 heart urchin, 1 *Echinus*, 1 *Antalis*, several flatworms and ? leeches, 2 spp. of shrimp. Moderately oxic and quite rich.
34	SS.SMu.CFiMu.SpnMeg	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. Biological dredge (approx 25 litres) of soft gloupy mud, with fine sand and some organic debris - oxic. *Amphiura* rare, worm tubes frequent, *Funiculina* skeletons present.
35	SS.SMu.CFiMu.SpnMeg	Boulder slope to about 6 m followed by a soft mud plain. Predominant species: forest of *L. saccharina* on the boulders. Mud partially covered by the red alga *A. floridula*?. *Echinus* frequent on boulders, few on mud. Small *Pennatula phosphorea* in patches in mud. *Arenicola marina*, *Nephrops norvegicus* (holes) and *Turritella communis* common. NOTE: Substratum % data are converted from the original substratum 1-3 scoring system.
36	SS.SMu.CFiMu.SpnMeg	Mud at 107m bcd, burrowed by *Nephrops* with *Munida* and *Aequipecten* on the surface. Occasional drift algae was observed.
37	SS.SMu.CFiMu.SpnMeg	Shallow sloping plain of very soft mud with no visible mounds or burrows. Surface covered with ? spines sticking vertically about 0.5cm from surface. *Pachycerianthus* very common at 1-2/msq. Few *Virgularia* and *Cerianthus* also present. *Ophiodromus* common on surface.

Table 10.3 continued

Code	Biotope	Description
38	SS.SMu.CFiMu.SpnMeg	Sandy mud with *Munida rugosa* and *Aequipecten opercularis* and occasional *Nephrops norvegicus*.
39	SS.SMu.CFiMu.SpnMeg	Pelecypoda, 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. Dredge sample of very soft gloupy mud - dark grey and fine. About 6 litres sampled. Few small bivalve shells, *Amphiura* sp. (C), large polychaetes in tubes (F), small bivalves (F), one prawn. Grab sample taken at same site contained *Amphiura* (A), but no worm tubes or bivalves. Mud oxic.
40	SS.SMu.CFiMu.SpnMeg	Mud plain at 17m bcd with moderate working by megafaunal burrows including *Virgularia* (C), *Nephrops* (C), *Callianassa* (F), *Pachycerianthus* (O), *Amphiura chiajei* (C). Probably higher diversity in deeper water but many components conspicuously absent.
41	SS.SMu.CFiMu.SpnMeg.Fun	*Virgularia* bed on soft mud with dense *Turritella*. *Amphuira* frequent in mud with many polychaete tubes and occasional *Nephrops* burrows. Slope very gradual from 14-18m bcd. Single *Funiculina* at 18m.
42	SS.SMu.CFiMu.SpnMeg.Fun	Heavily silted, muddy slope of compact cobbles with some shell debris. Dominated by *Munida* and *Funiculina*.
43	SS.SMu.CFiMu.SpnMeg.Fun	Thin veneer of relatively barren mud on a slope of compact cobbles with some shell debris.
44	SS.SMu.CFiMu.SpnMeg.Fun	Mud slope with relatively compact cobbles and some shell debris, including *Turritella* shells. With decreasing depth the substrate grades into a mix of cobbles, pebbles and sand dominated by *Cerianthus*.
45	SS.SMu.CFiMu.SpnMeg.Fun	Soft, fine mud with *Nephrops* burrows overlying harder substrate (possibly bedrock) indicated by the presence of vertically situated *Sabella* tubes in the mud. Mud dominated by *Funiculina* and *Sabella*.
46	SS.SMu.CFiMu.SpnMeg.Fun	Soft, fine mud with Nephrops burrows, mounds and dead *Funiculina* rods. Community dominated by *Funiculina*.
47	SS.SMu.CFiMu.SpnMeg.Fun	Soft, fine mud with *Nephrops* burrows, some shell debris and occasional boulders. Mud dominated by *Funiculina* while boulder fauna is dominated by sparse coralline crusts, hydroids and ascidians.
48	SS.SMu.CFiMu.SpnMeg.Fun	Soft, fine mud with some shell debris, occasional boulders, cobbles and *Nephrops* burrows.
49	SS.SMu.CFiMu.SpnMeg.Fun	Fine mud with numerous boulders, cobbles and pebbles. Boulders and cobbles are dominated by *Protanthea*, *Serpula* and *Ophiothrix* and the sediment is dominated by *Funiculina*.
50	SS.SMu.CFiMu.SpnMeg.Fun	Fine mud with sparse cobbles, small boulders and *Nephrops* burrows. Dominated by seapens and *Asterias*.
51	SS.SMu.CFiMu.SpnMeg.Fun	Soft, fine mud with heavily silted sugar kelp debris. Mud with many *Nephrops* burrows and dominated by *Ophiura* and *Funiculina*.
52	SS.SMu.CFiMu.SpnMeg.Fun	Relatively barren, fine mud with *Nephrops* burrows. Dominated by *Munida* and seapens (in particular *Funiculina*
53	SS.SMu.CFiMu.SpnMeg.Fun	Mud and some cobbles and boulders. The mud supported the brittlestar *Ophiura* ophiura with *Aequipecten* and occasionally *Funicularia quadrangularis*.

Table 10.3 continued

Code	Biotope	Description
54	SS.SMu.CFiMu.SpnMeg.Fun	Gradual slope of sandy mud with some shell debris and *Ascidia mentula* providing hard substrata. Forest of *Funiculina* present deeper than 23m bcd. Sediment worked with holes and mounds and (C) *Turritella* but generally sparse fauna on mud.
55	SS.SMu.CFiMu.SpnMeg.Fun	Soft mud slope with *Funiculina* and burrows.
56	SS.SMu.CFiMu.SpnMeg.Fun	Flat mud sediment plain with *Nephrops norvegicus* burrows and patches of large *Funinculina quadrangularis*. Otherwise fauna relatively limited.
57	SS.SMu.CFiMu.SpnMeg.Fun	Steeply sloping muddy fine sand bottom from 18-30m bcd. Large numbers of *Arctica* and other bivalves present on the surface. Few burrows - only *Munida*. *Funiculina* and *Virgularia* bed (1-5m/2 and 1-10m/2 respectively), *Aequipecten*, *Munida* and *Nemertesia ramosa*.
58	SS.SMu.CFiMu.SpnMeg.Fun	Mud sediment plain at 24m bcd with large populations of megafaunal burrows; *Funiculina* (C), *Virgularia* (C), *Pennatula* (O), *Pachycerianthus* (O), *Nephrops* (F), *Callianassa* (F), *Amphiura chiajei* (C), *Lesueurigobius* (O), Lacking volcanos? (?*Maxmulleria*), *Calocaris*, *Goneplax*, *Gobius niger*, *Lumpenus* apparently.
59	SS.SMu.CFiMu.SpnMeg.Fun	Mixed mud and boulders, bedrock and cobbles. Soft substratum supported the seapen *Funiculina quadrangularis* with *Munida rugosa* and keelworms on/among the hard substrata. Surveyed 56.5-62.5m bcd.
60	SS.SMu.CFiMu.SpnMeg.Fun	Soft mud with the seapen *Funiculina quadrangularis*. The mud was much burrowed. The Norwegian lobster *Nephrops norvegicus* was observed using the burrows. Surveyed from 62.5-76.5m bcd.
61	SS.SMx.IMx.Lim	Very gently sloping plain of pebble and gravel overlying coarse firm sediment - all more or less covered by fairly dense bed of *Modiolus* with *Ophiothrix* common. *Limaria hians* common under *Modiolus* and pebble clumps. *Aequipecten* abundant. Other common mobile species included *Pagurus pubescens* and *Clelandella clelandii*. Hydroids and ascidians quite common. Area generally quite rich.
62	SS.SBR.SMus.ModCvar	Gradual muddy shelly gravel slope with pebbles and occasional large boulders, -19.5 to -27.5 m. Many hydroids, encrusting bryozoans, *Pomatoceros*, *Munida* and *Ascidia mentula* common, *Ophiothrix* abundant.
63	SS.SMp.Mrl.Lcor	Muddy fine sand covered with maerl (dead and alive) and frequent pebbles and empty shells, -8 to -10 m. *Ophiocomina* dominant, along with *Lithothamnion glaciale* and *L. corallioides*. *Limaria hians* frequent, binding stones with byssus threads.
64	SS.SMp.Mrl.Lgla	Boulders, cobbles, pebbles and whole shells on coarse sand plain (habitat 4). Quite rich in encrusting species, particularly Corallinaceae indet, encrusting dark red algae, and *Lithothamnion glaciale*. *Tectura testinalis* and *Tonicella marmorea* frequent. Hydroids included *Halecium halecinum* and *Bouganvillea ramosa*. *Ascidiella aspera* and *Pomatoceros* on some stones.

Table 10.3 continued

Code	Biotope	Description
65	SS.SMx.IMx.Lim	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. Tide-swept pebbles and gravel with some sandy patchse and small boulders, -9.5 to -21.5 m. Habitat dominated by *Ophiothrix*, *Alcyonium digitatum* and hydroids common. Some of the gravel/pebbles had been incorporated into *Limaria hians* nests, which also had small foliose algae attached. Small scallops of several species common.
66	SS.SMx.IMx.Lim	Muddy fine sand covered with maerl (dead and alive) and frequent pebbles and empty shells, -8 to -10 m. *Ophiocomina* dominant, along with *Lithothamnion glaciale* and *L. corallioides*. *Limaria hians* frequent, binding stones with byssus threads.
67	SS.SMx.IMx.Lim	Mixed ground of small stone, pebbles, cobbles, whole and broken shells on top of mud and bits of dead maerl. Stable seabed with with flame shell nests.
68	SS.SMx.IMx.Lim	Large boulder breakwater from survace to 18m bsl. numerous crevices and overhangs sheltering a wide range of marine life including flame shells, squat lobsters, brittle stars, seasquirts.

Table 10.4: Records of target MPA search features from the GeMS database v2.10 (Gillham et al.*, 2011) not included in the 2012 Marine Recorder snapshot. The code is the record identifier used in the figures and text of this report. MR = Marine Recorder.*

Code	Biotope	Date	Survey name	Event name	Latitude	Longitude	MR Survey Key	MR Sample Reference
100	SS.SBR.SMus.ModHAs	04/07/1991	1991 Scott Skye bridge survey	Between Plock of Kyle and Eilean Bàn (secondary channel) (Loch Alsh)	57.28146	-5.73401	JNCCMNCR10000290	290.0S1.001
101	SS.SBR.SMus.ModHAs	04/07/1991	1991 Scott Skye bridge survey	Channel between Eilean Bàn and Doctors Rock (Loch Alsh)	57.28189	-5.74163	JNCCMNCR10000290	290.0S2.001
102	SS.SBR.SMus.ModT	17/08/2010	2010 Survey to establish the distribution of Priority Marine Features (PMF) in the Clyde Sea Area	LF44#1 stills	56.01170	-5.34530	MRSNH01600000008	MRSNH016000001B2.01
103	SS.SBR.SMus.ModT	17/08/2010	2010 Survey to establish the distribution of Priority Marine Features (PMF) in the Clyde Sea Area	LF44#1 stills	56.01160	-5.34510	MRSNH01600000008	MRSNH016000001B2.03
104	SS.SBR.SMus.ModT	17/08/2010	2010 Survey to establish the distribution of Priority Marine Features (PMF) in the Clyde Sea Area	LF44#1 stills	56.01150	-5.34471	MRSNH01600000008	MRSNH016000001B2.05

Table 10.4 continued

Code	Biotope	Date	Survey name	Event name	Latitude	Longitude	MR Survey Key	MR Sample Reference
105	SS.SBR.SMus.ModT	17/08/2010	2010 Survey to establish the distribution of Priority Marine Features (PMF) in the Clyde Sea Area	LF44#1 stills	56.01130	-5.34440	MRSNH01600000008	MRSNH016000001B2.07
106	SS.SBR.SMus.ModT	17/08/2010	2010 Survey to establish the distribution of Priority Marine Features (PMF) in the Clyde Sea Area	LF44#1 stills	56.01130	-5.34421	MRSNH01600000008	MRSNH016000001B2.08
107	SS.SMp.Mrl	04/07/1991	1991 Scott Skye bridge survey	Between Plock of Kyle and Eilean Bàn (secondary channel) (Loch Alsh)	57.28146	-5.73401	JNCCMNCR10000290	290.0S1.001
108	SS.SMp.Mrl	17/08/2010	2010 Survey to establish the distribution of Priority Marine Features (PMF) in the Clyde Sea Area	LF16#2 stills (a)	56.01400	-5.36689	MRSNH01600000008	MRSNH01600000191.07
109	SS.SMp.Mrl	01/01/1996	1996 Conservation issues relating to maerl beds as habitats for mollucs JHS 1998	CIMaerl01	56.01002	-5.36913	MPALAYERS000219	Unknown
110	SS.SMp.Mrl.Pcal.R	17/08/2010	2010 Survey to establish the distribution of Priority Marine Features (PMF) in the Clyde Sea Area	LF16#2 stills (a)	56.01400	-5.36689	MRSNH01600000008	MRSNH01600000191.08

Table 10.4 continued

Code	Biotope	Date	Survey name	Event name	Latitude	Longitude	MR Survey Key	MR Sample Reference
111	SS.SMp.Mrl.Pcal.R	17/08/2010	2010 Survey to establish the distribution of Priority Marine Features (PMF) in the Clyde Sea Area	LF16#2 stills (a)	56.01400	-5.36701	MRSNH01600000008	MRSNH01600000191.04
112	SS.SMp.Mrl.Pcal.R	17/08/2010	2010 Survey to establish the distribution of Priority Marine Features (PMF) in the Clyde Sea Area	LF16#2 stills (a)	56.01400	-5.36701	MRSNH01600000008	MRSNH01600000191.05
113	SS.SMp.Mrl.Pcal.R	17/08/2010	2010 Survey to establish the distribution of Priority Marine Features (PMF) in the Clyde Sea Area	LF16#2 stills (a)	56.01400	-5.36701	MRSNH01600000008	MRSNH01600000191.06
114	SS.SMp.Mrl.Pcal.R	17/08/2010	2010 Survey to establish the distribution of Priority Marine Features (PMF) in the Clyde Sea Area	LF16#2 stills (a)	56.01390	-5.36660	MRSNH01600000008	MRSNH01600000191.09
115	SS.SMp.Mrl.Pcal.R	17/08/2010	2010 Survey to establish the distribution of Priority Marine Features (PMF) in the Clyde Sea Area	LF16#3 stills	56.01270	-5.36790	MRSNH01600000008	MRSNH01600000193.06
116	SS.SMx.IMx.Lim	01/01/1996	Broadscale survey and mapping of seabed and shore habitats and biota, Lochs Duich, Alsh and Long.	Broadscale survey and mapping of seabed and shore habitats and biota, Lochs Duich, Alsh and Long.	57.26783	-5.65702	GB000272	Not applicable

Table 10.4 continued

Code	Biotope	Date	Survey name	Event name	Latitude	Longitude	MR Survey Key	MR Sample Reference
117	SS.SMx.IMx.Lim	01/01/1996	Broadscale survey and mapping of seabed and shore habitats and biota, Lochs Duich, Alsh and Long.	Broadscale survey and mapping of seabed and shore habitats and biota, Lochs Duich, Alsh and Long.	57.26808	-5.55415	GB000272	Not applicable
118	SS.SMx.IMx.Lim	01/01/1996	Broadscale survey and mapping of seabed and shore habitats and biota, Lochs Duich, Alsh and Long.	Broadscale survey and mapping of seabed and shore habitats and biota, Lochs Duich, Alsh and Long.	57.27216	-5.53713	GB000272	Not applicable
119	SS.SMx.IMx.Lim	01/01/1996	Broadscale survey and mapping of seabed and shore habitats and biota, Lochs Duich, Alsh and Long.	Broadscale survey and mapping of seabed and shore habitats and biota, Lochs Duich, Alsh and Long.	57.27178	-5.53460	GB000272	Not applicable

Table 10.5: Historical records of Pachycerianthus multiplicatus *from Loch Duich. The code is the record identifier used in the figures and text of this report. MR = Marine Recorder.*

Code	Date	SACFOR	Survey name	Event name	Latitude	Longitude	MR Survey key	MR Sample reference	Lower depth (m)	Upper depth (m)
203	29/01/1997	O	1997 SNH Kyle Rhea, Loch Alsh and Loch Duich ROV survey	Mouth of Loch Duich (Loch Duich)	57.26855	-5.51166	JNCCMNCR30000731	731.003.001	-58.0	-58.0
204	29/08/1995	O	1995 SNH Lochs Alsh and Duich ROV survey	SE of Totaig (Loch Duich)	57.26795	-5.51376	JNCCMNCR30000650	650.003.001	-84.0	-84.0
207	13/03/2005	R	2005 Seasearch Loch Duich various	Loch Duich, "Hopscotch" near Letterfearn.	57.25225	-5.50613	MRMCS0020000002D	MRMCS002000001B4.01	*-30.0*	*0.0*
208	26/08/1988	O	1988 MNCR Lochs Duich, Long and Alsh survey	SW of church, Torchuillin (Loch Duich)	57.23359	-5.43308	JNCCMNCR10000003	003.009.002	-17.0	-17.0
209	29/01/2009	O	2009 Seasearch Loch Duich	School Bay	57.23333	-5.41667	MRMCS0070000008C	MRMCS007000004BD.01	-21.0	3.0
210	02/10/1980	P	Marine Conservation Society Observation Scheme Records 1976 - 1990	Church Site, Lochduich Bay, Kyle of Lochalsh	57.23274	-5.43134	MRMLN01200000002	MRMLN0120000023A.01	-9.0	-25.0
211	11/08/1980	P	Marine Conservation Society Observation Scheme Records 1976 - 1990	Loch Duich, Kyle of Lochalsh	57.23274	-5.43134	MRMLN01200000002	MRMLN0120000023C.01	-15.0	-20+

Table 10.5 continued

Code	Date	SACFOR	Survey name	Event name	Latitude	Longitude	MR Survey key	MR Sample reference	Lower depth (m)	Upper depth (m)
212	28/11/1981	P	Marine Conservation Society Observation Scheme Records 1976 - 1990	Church Site, Loch Duich, nr Kyle	57.23274	-5.43134	MRMLN01200000002	MRMLN0120000029F.01	-15.0	-30.0
213	21/08/2008	O	2008 Seasearch Loch Duich	School Bay	57.23225	-5.41638	MRMCS00700000074	MRMCS007000003A5.01	-19.6	-1.6
214	17/05/2009	C	2009 Seasearch Loch Duich	School Bay	57.23225	-5.41638	MRMCS0070000008C	MRMCS007000004BE.01	-21.0	-3.0
215	26/07/2007	R	2007 Seasearch Loch Duich	School Bay	57.23131	-5.41795	MRMCS00200000064	MRMCS002000002E5.01	-18.8	2.2
216	26/08/1988	O	1988 MNCR Lochs Duich, Long and Alsh survey	SW of Tigh-Geal (Loch Duich)	57.23032	-5.42117	JNCCMNCR10000003	003.008.001	-24.0	-24.0
217	26/06/1988	A	1988 MNCR Lochs Duich, Long and Alsh survey	NE of Eilean Nan Gall, Loch Beg (Loch Duich)	57.22705	-5.40926	JNCCMNCR10000003	003.005.004	-29.0	-22.0
218	12/03/2011	R	2011 Seasearch Loch Duich	School Bay	57.23046	-5.41621			-21.0	-9.0
219	12/03/2011	R	2011 Seasearch Loch Duich	Next to fish trap, Ratagan Bay	57.21638	-5.43810			-22.0	3.0
220	15/05/2011	C	2011 Seasearch Loch Duich	South Shore, Loch Beg	57.22521	-5.41075			-28.7	-3.7
221	15/05/2011	O	2011 Seasearch Loch Duich	North of Hotel	57.22140	-5.41869			-13.0	2.0
222	12/03/2011	O	2011 Seasearch Loch Duich	Ratagan Bay Passing Place	57.21548	-5.43802			-15.5	-0.5
223	20/03/2011	C	2011 Seasearch Loch Duich	Loch Beg-Upper Loch Duich	57.23055	-5.41290			-12.7	-0.2
224	20/03/2011	P	2011 Seasearch Loch Duich	West side of Youth Hostel	57.22332	-5.44704			-34.5	-4.5
225	13/03/2011	C	2011 Seasearch Loch Duich	West Shore Loch Beg	57.22970	-5.41117			-14.0	-1.0

Table 10.6: MPA search feature records neither in the July 2012 Marine Recorder snapshot nor in the GeMS database v2.10 (Gillham et al.*, 2011). The code is the record identifier used in the figures and text of this report.*

Code	Biotope	Description	Location	Reference	Latitude	Longitude	Depth	Date
300	SS.SMx.IMx.Lim	100% *Limaria* nest cover	South Shian, Loch Creran	Trigg *et al*., 2011	56.52908	-5.39383	10.0	17/06/2006
301	SS.SMx.IMx.Lim	scattered nests of *Limaria*	Creagan Narrows, Loch Creran	Burgess, 2007	56.54792	-5.29435		13/11/2006
302	SS.SMx.IMx.Lim	extensive dense *Limaria* bed	WP11, Loch Alsh	Marine Bio-images, 2007	57.27454	-5.71342	11.7	04/06/2007
303	SS.SMx.IMx.Lim	dense *Limaria* bed	StA, Loch Alsh	Marine Bio-images, 2007	57.27655	-5.71413	20.6	02/06/2007
304	SS.SMx.IMx.Lim	abundant *Limaria*	SE of Eileanan Dubh, Loch Alsh	ERT, 2010	57.27562	-5.70660	22.4	03/2009
305	SS.SMx.IMx.Lim	continuous byssus *Limaria* reef (>700/m^2)	Creag Gobhainn, Loch Fyne	Hall-Spencer & Moore, 2000a	56.01002	-5.36913	15.0	1999
306	SS.SMx.IMx.Lim	100% *Limaria* nest cover; position approx.	South Shian, Loch Creran	Moore, unpublished	56.53208	-5.39823		06/03/2005
307	SS.SMx.IMx.Lim	60% *Limaria* nest cover; position approx.	South Shian, Loch Creran	Moore, unpublished	56.52951	-5.39606	10.0	11/07/2012

ANNEX 11: OVERVIEW OF GIS PRODUCT

The project was compiled using ArcGIS Map 9.3 and UTM projection. Coordinates were recorded in WGS84 and retained as WGS84 for all shape files.

Table 11.1 Project, shape and symbology files

File	Content
Limaria_2012.mxd	ArcGIS 9.3 map file
Additional_PMF_records.shp	PMF records for biotopes not included in Marine Recorder or GeMS v2.10 databases
Additional_PMF_records.lyr	Symbology file for corresponding shape file
coast25.shp	MHWS Scottish coastline (for context, supplied by SNH)
Dive_data.shp	Records from diver observations at sites during surveys of *Limaria*, *Modiolus* and putative maerl beds
Feature_polygons.shp	Mapped polygons of *Limaria* and *Modiolus* beds in Lochs Alsh, Fyne and Creran
Feature_polygons.lyr	Symbology file for corresponding shape file
GeMS_habitat_records.shp	Historical records of PMF habitats for the survey areas derived from GeMS v2.10 but excluding Marine Recorder records
GeMS_habitat_records.lyr	Symbology file for corresponding shape file
Grab_data.shp	Details of Loch Duich grab stations including biotopes and PMFs recorded
Grab_data.lyr	Symbology file for corresponding shape file
MNCR_data.shp	Details of MNCR phase 2 surveys worked
Modiolus_SCM_sites.shp	Site condition monitoring sites in Loch Alsh, with *Modiolus* SACFORN data
Modiolus_SACFORN.lyr	Symbology file for corresponding shape file
MR_habitat_records.shp	Historical records of PMF habitats for the survey areas derived from Marine Recorder
MR_habitat_records.lyr	Symbology file for corresponding shape file
Pachycerianthus_records.shp	Historical records of *Pachycerianthus multiplicatus* from Loch Duich
Photolog.shp	Digital still image log containing MEDIN standard data
Video_data.shp	Full results of the analysis of the video runs including location and temporal data, depths, habitat physical and biological descriptions, biotopes and priority marine features (PMFs)
Biotope1.lyr	Symbology file for video_data.shp showing first biotope
Biotope2.lyr	Symbology file for video_data.shp showing second biotope. Note that symbol positions have been offset by a few pixels to facilitate their visibility
PMF1.lyr	Symbology file for video_data.shp showing first PMF
PMF2.lyr	Symbology file for video_data.shp showing second PMF. Note that symbol positions for PMFs 2-3 have been offset by a few pixels to facilitate their visibility
PMF3.lyr	Symbology file for video_data.shp showing third PMF
Video_tracks.shp	Line joining start and end positions of video runs or video runs

Table 11.2: List of affiliated index, projection and metadata files. Note that the file, Limaria_2012_xslttransformation.xml *serves as the metadata file for the survey as a whole.*

Additional_PMF_records.dbf	MNCR_data.sbx
Additional_PMF_records.prj	MNCR_data.shp.xml
Additional_PMF_records.sbn	MNCR_data.shx
Additional_PMF_records.sbx	MNCR_data_xslttransformation.xml
Additional_PMF_records.shp.xml	Modiolus_SCM_sites.dbf
Additional_PMF_records.shx	Modiolus_SCM_sites.prj
Additional_PMF_records_xslttransformation.xml	Modiolus_SCM_sites.sbn
Coast25.DBF	Modiolus_SCM_sites.sbx
Coast25.prj	Modiolus_SCM_sites.shp.xml
Coast25.sbn	Modiolus_SCM_sites.shx
Coast25.sbx	Modiolus_SCM_sites_xslttransformation.xml
Coast25.shp.xml	MR_habitat_records.dbf
Coast25.shx	MR_habitat_records.prj
Dive_data.dbf	MR_habitat_records.sbn
Dive_data.prj	MR_habitat_records.sbx
Dive_data.sbn	MR_habitat_records.shp.xml
Dive_data.sbx	MR_habitat_records.shx
Dive_data.shp.xml	MR_habitat_records_xslttransformation.xml
Dive_data.shx	Pachycerianthus_records.dbf
Dive_data_xslttransformation.xml	Pachycerianthus_records.prj
Feature_polygons.dbf	Pachycerianthus_records.sbn
Feature_polygons.prj	Pachycerianthus_records.sbx
Feature_polygons.sbn	Pachycerianthus_records.shp.xml
Feature_polygons.sbx	Pachycerianthus_records.shx
Feature_polygons.shp.xml	Pachycerianthus_records_xslttransformation.xml
Feature_polygons.shx	Photolog.dbf
Feature_polygons_xslttransformation.xml	Photolog.prj
GeMS_habitat_records.dbf	Photolog.sbn
GeMS_habitat_records.prj	Photolog.sbx
GeMS_habitat_records.sbn	Photolog.shp.xml
GeMS_habitat_records.sbx	Photolog.shx
GeMS_habitat_records.shp.xml	Photolog_xslttransformation.xml
GeMS_habitat_records.shx	Video_data.dbf
GeMS_habitat_records_xslttransformation.xml	Video_data.prj
Grab_data.dbf	Video_data.sbn
Grab_data.prj	Video_data.sbx
Grab_data.sbn	Video_data.shp.xml
Grab_data.sbx	Video_data.shx
Grab_data.shp.xml	Video_data_xslttransformation.xml
Grab_data.shx	Video_tracks.dbf
Grab_data_xslttransformation.xml	Video_tracks.prj
Limaria_2012.mxd.xml	Video_tracks.sbn
Limaria_2012_xslttransformation.xml	Video_tracks.sbx
MNCR_data.dbf	Video_tracks.shp.xml
MNCR_data.prj	Video_tracks.shx
MNCR_data.sbn	Video_tracks_xslttransformation.xml

Table 11.3: Fields for shape files with data attributes. Field type shows the code for data type (S=string, N=numeric, D=date), field length and number of decimal places.

File name and field	Content	Type
Additional_PMF_records.shp		
CODE	site code used in body of current report	N4
PMF	PMF	S12
ABUNDANCE	textual description of abundance	S28
LOCATION	location	S24
REFERENCE	source of record	S21
LATITUDE	WGS84 latitude	N8.5
LONGITUDE	WGS84 longitude	N9.5
DEPTH	depth (m)	N7.1
DATE_	date	S11
Dive_data.shp		
SITE	site code	S7
LOCATION	sea loch	S11
AREA	specific area	S16
LAT	WGS84 latitude	N8.5
LONG	WGS84 longitude	N8.5
DATE_	date	D8
TIME	time	S5
SURVEYOR	surveyor	S16
DEPTH_BSL	depth below sea level (m)	N11.1
DEPTH_CD	depth below chart datum (m)	N9.1
SUBSTRATE	substrate description	S68
COMMUNITY	biota notes	S220
NEST_COVER	estimate of *Limaria* nest cover (%)	N13
DISCRETE	discrete nests observed?	S10
THICK	*Limaria* nest thickness (cm)	N6
LIVE_SEEN	Live Limaria seen?	S11
PERC_ALGAE	% cover by algal turf	S13
L_HYP	*Laminaria hyperborea* SACFORN density	S8
S_LAT	*Saccharina latissima* SACFORN density	S8
MOD_SACFOR	*Modiolus modiolus* SACFORN density	S14
BRIT_SACFO	Brittlestar SACFORN density	S12
BRIT_SPEC	*Brittlestar species*	S22
LIVE_MAERL	% cover live maerl	S12
DEAD_MAERL	% cover dead maerl	S13
BIOTOPE1	first biotope observed	S19
BIOTOPE2	second biotope observed	S19
BIOTOPE3	third biotope observed	S19
PMF1	first PMF observed	S6
PMF2	second PMF observed	S6
Feature_polygons.shp		
Id	bed code number	N6
Feature	bed type	S15
Location	location	S15
Area	extent (m^2)	N10

Table 11.3 continued

File name and field	Content	Type
GeMS_habitat_records.shp		
CODE	site code used in body of current report	N6
BIOTOPE	biotope	S20
DATE_	date	D8
SURVEYNAME	survey name	S71
EVENTNAME	event name	S70
LATITUDE	WGS84 latitude	N10
LONGITUDE	WGS84 longitude	N9.5
SURVEYKEY	survey key	S19
SAMPLEREF	sample reference	S21
Grab_data.shp		
SITE	site code	S9
LATITUDE	WGS84 latitude	N9.5
LONGITUDE	WGS84 longitude	N9.5
TIME	time	S9
DATE_	date	D8
DEPTH_CD	depth below chart datum (m)	N10.1
BIOTOPE	biotope	S26
PMF	PMF	S10
MNCR_data.shp		
LOCATION	location	S13
DATE_	date	D8
SITE	site code	S8
FEATURE	habitat(s) surveyed	S19
LATITUDE	WGS84 latitude at transect start	N8.5
LONGITUDE	WGS84 longitude at transect end	N9.5
BEARING_T	transect bearing from start (degrees true)	N10
DEP_START	depth below chart datum (m) at transect start	N15.1
DEP_END	depth below chart datum (m) at transect end	N15.1
BIOTOPE1	first biotope observed	S17
BIOTOPE2	second biotope observed	S17
BIOTOPE3	third biotope observed	S15
PMF1	first PMF observed	S9
PMF2	second PMF observed	S9
Modiolus_SCM_sites.shp		
SITE	site code	S9
LATITUDE	WGS84 latitude	N9.5
LONGITUDE	WGS84 longitude	N9.5
SACFOR	*Modiolus modiolus* SACFORN density	S9
MR_habitat_records.shp		
CODE	site code used in body of current report	N5
SAMPLE_REF	sample reference	S22
SURVEYKEY	survey key	S19
EVENT_KEY	event key	S19
EVENTNAME	event name	S40
EVENTREF	event reference	S8
EVENTDATE	event date	D8
DERIVDFROM	source of position	S11

Table 11.3 continued

File name and field	Content	Type
COORDSYST	original coordinate system used	S18
SAMPLE_KEY	sample key	S19
USRSAMPREF	user sample reference	S11
SURVEYORS	surveying personnel	S87
LAT	OSGB36 latitude	N8.5
LONG	OSGB36 longitude	N8.5
LATWGS84	WGS84 latitude	N10.5
LONGWGS84	WGS84 longitude	N11.5
HABITAT	habitat type	S77
DESCRIP1	habitat and community description (part)	S254
DESCRIP2	habitat and community description (continued)	S254
BIOTOPE	biotope ascription	S25
BIOTOPEOLD	previous biotope ascription	S25
DETERMDATE	determination date	D8
ASSESSEDBY	assessor	S13
LWHEIGHTSL	height of lower margin above sea level (m)	S10
UPHEIGHTSL	height of upper margin above sea level (m)	S10
LWHEIGHTCD	height of lower margin above chart datum (m)	N11.1
UPHEIGHTCD	height of upper margin above chart datum (m)	N11.1
Pachycerianthus_records.shp		
CODE	site code used in body of current report	N5
DATE_	date	D8
SACFORN	SACFORN abundance	S10
DETERMINER	recorder	S15
SURVEY_NAM	survey name	S61
EVENT_NAME	survey event	S48
LATITUDE	WGS84 latitude	N8.5
LONGITUDE	WGS84 longitude	N9.5
SURVEYKEY	survey key	S19
SAMPLEREF	sample reference	S22
SAMPLEKEY	sample key	S20
LWHEIGHTCD	height of lower margin above chart datum (m)	N11.1
UPHEIGHTCD	height of upper margin above chart datum (m)	N11.1
Photolog.shp		
FILE_NAME	file name	S29
DATE_	date	D8
SITE_CODE	site code	S9
LOCATION	location	S10
LATITUDE	WGS84 latitude	N8.5
LONGITUDE	WGS84 longitude	N9.5
LENS	camera lens used	S15
HABITAT	habitat	S37
DESCRIP	description of subject of photo	S158
PHOTOG	photographer	S15
DEPTH	depth (m below chart datum)	N5
WIDTH	photo width (pixels)	N5
HEIGHT	photo height (pixels)	N6
X_RES	x resolution (dpi)	N6
Y_RES	y resolution (dpi)	N5

Table 11.3 continued

File name and field	Content	Type
RES_UNITS	resolution units	S9
Video_data.shp		
LOCATION	location	S10
ID	site code	S7
DATE_	date	D8
START_LAT	WGS84 latitude at start	N8.5
START_LONG	WGS84 longitude at start	N10.5
END_LAT	WGS84 latitude at end	N8.5
END_LONG	WGS84 longitude at end	N9.5
MID_LAT	WGS84 latitude at midpoint	N8.5
MID_LONG	WGS84 longitude at midpoint	N9.5
BSL_START	depth below sea level (m) at start of run	N10.1
BSL_END	depth below sea level (m) at end of run	N10.1
CD_START	depth below chart datum (m) at start of run	N8.1
CD_END	depth below chart datum (m) at end of run	N8.1
TAPE_REF	miniDV tape reference code	S14
TIME_START	time at start of run	S10
TIME_END	time at end of run	S9
COUNT_STRT	tape counter at start of video clip	S11
COUNT_END	tape counter at end of video clip	S12
SUBSTRATE	substrate description	S95
BIOTA1	biota description (part)	S254
BIOTA2	biota description (continued)	S254
BIOTOPE1	first biotope	S25
BIOTOPE2	second biotope	S25
PMF1	first PMF	S6
PMF2	second PMF	S6
PMF3	third PMF	S6
COMMENTS	comments, such as certainty of biotope ascription	S116
Video_tracks.shp		
ID_1	site code	S7
START_LAT	WGS84 latitude at start	N8.5
START_LONG	WGS84 longitude at start	N10.5
END_LAT	WGS84 latitude at end	N8.5
END_LONG	WGS84 longitude at end	N9.5

ANNEX 12: SURVEY LOG

Initials	Personnel
CM	Colin Moore
DH	Dan Harries
CT	Colin Trigg
AL	Alastair Lyndon
GS	Graham Saunders
RC	Rob Cook
NH	Natalie Hirst
FK	Flora Kent
LC	Laura Clark
LK	Lisa Kamphausen
JD	Jane Dodd
SE	Simon Exley

Date	Time	Personnel	Details
04/08/2012	1000-1400	CM, RC, NH	Mobilisation to Kyle of Lochalsh
	1400-1700		Load boat with dropdown and grab equipment and set up dropdown video system.
	1700-1730		Travel to accommodation at Plockton
05/08/2012	0700-0800	CM, RC, NH	Depart accommodation for Kyle pontoon and prepare equipment.
	0800-1900		Sail for Loch Duich, carrying out 25 dropdown video sites. No mooring space at Kyle on return, so moored Kyle Akin pontoon.
	1900-1930		Return to accommodation.
06/08/2012	0700-0800	CM, RC, NH	Depart accommodation for Kyle Akin pontoon.
	0800-1915	CM, RC, NH	Sail for Loch Duich, carrying out 11 dropdown video and 10 grab sites. Return to Kyle Akin.
	1915-2030	CM, RC, NH	Return to accommodation.
	1600	DH, GS	Pack van, buy lunch & breakfast supplies and depart at ~1700 for Plockton
	2100	DH, GS	Arrive at accommodation Plockton. Unload.
07/08/2012	0700-1030	CM, RC, NH, DH, GS	Depart accom. Visit harbour master at Kyle. Drive to Kyle Akin. Load boat. Depart for String Rock. Deploy 200 m transect ground line from boat. Await slack water.
	1030-1230		Dives on transect for *Modiolus* abundance estimates (RC, DH & CM).
	1230-1330		Work up dive for NH & GS
	1330-1530		Tie up at Kyle to await slack water.

Date	Time	Personnel	Details
	1530-1830		Return to String Rock transect and complete transect abundance counts. Further abundance counts at spot locations (station 1 and station B). Recover transect and return to Kyle Akin.
	1830-2030		Meal, visit supermarket and return to accommodation.
	evening		Data recording and preparation.
08/08/2012	0700-1000	CM, RC, NH, DH, GS	Depart accomm. Drive to Kyle Akin. Load boat. Prepare equipment, Depart for String Rock. Await slack water.
	1000-1300		Dives at station 1 (HM01) for MNCR survey, photography, video, *Modiolus* clump collection and size frequency clearance.
	1300-1530		Tie up at Kyle Akin to await slack water. Take dive cyliders to Kyle for filling.
	1530-1830		Dives at station 1 to complete MNCR survey and size frequency clearance. Spot dive for assessing *Limaria* bed.
	1830-2100		Return to Kyle Akin, unload, meal, sieve clump samples, visit supermarket and return to accommodation.
	evening		Preserve samples, data recording, camera download and preparation.
09/08/2012	0830-1000	CM, RC, NH, DH, GS	Depart accomm. Collect diving cylinders. Drive to Kyle Akin. Load boat. Prepare equipment, Depart for dive site below bridge. Await slack water.
	1000-1600		Dives to verify and assess quality of historical *Limaria* & *Modiolus* sites.
	1600-1830		Tie up at Kyle Akin to await slack water. Take dive cylinders to Kyle for filling. Measuring *Modiolus* for size frequency data.
	1830-1930		Dive to verify and assess quality of historical *Modiolus* site.
	1930-2030		Return to Kyle Akin, unload, visit supermarket and return to accommodation.
	evening		Meal, preserve samples, data recording, camera download and preparation.
10/08/2012	0700-0830	CM, RC, NH, DH, GS	Depart accom. Collect diving cylinders. Drive to Kyle Akin. Load boat. Prepare equipment, Depart for dive site below bridge. Tidal stream too strong relocate to site near String Rock.
	0830-1130		Dives to verify and assess quality of historical *Limaria* & *Modiolus* sites.
	1130-1430		Dives to survey *Limaria* bed FS01.
	1430-1730		Dives to verify and assess extent of *Limaria* bed.
	1730-1930		Return to Kyle Akin, no berth available, unload, DH & RC move vans to Kyle, others relocate *RV Serpula* to berth at Kyle, sieve *Limaria* samples, take dive cylinders to fire station for filling, visit supermarket and return to accommodation.
	evening		Meal, preserve samples, data recording, camera download and preparation.

Date	Time	Personnel	Details
11/08/2012	0700-0830	CM, RC, NH, DH, GS	Depart accomm. Collect diving cylinders. Drive to Kyle. Load boat. Prepare equipment, Depart for dive site below bridge.
	0830-1230		Dives to assess extent & distribution of *Limaria* & *Modiolus* reefs.
	1230-1400		Tie up near Kyle Akin to await slack water.
	1400-1630		Dives to survey mixed *Limaria* & *Modiolus* bed HM02.
	1630-1830		Return to Kyle, unload, sieve *Modiolus* clump samples, take dive cylinders to fire station for filling, visit supermarket and return to accommodation.
	evening		Meal, preserve samples, data recording, camera download and preparation.
12/08/2012	0700-0815	CM, RC, NH, DH, GS	Depart accomm. Collect diving cylinders. Drive to Kyle. Load boat. Prepare equipment, Depart for dive site below bridge.
	0815-1300		Dives to assess extent & distribution of *Limaria* & *Modiolus* reefs.
	1300-1400		Tie up at Kyle to await slack water.
	1400-1800		Dives to assess extent & distribution of *Modiolus* reefs.
	1800-2000		Return to Kyle, unload, transfer *Serpula* to berth at Kyle Akin, take dive cylinders to fire station for filling & settle bill, visit supermarket and drive to Plockton for meal.
	evening		Meal, data recording and preparation.
13/08/2012	0700-0830	CM, RC, NH, DH, GS	Depart accomm Drive to Kyle Akin. Load boat. Prepare equipment, Depart for dive site near String Rock.
	0830-1000		Dives to assess extent & distribution of *Limaria* & *Modiolus* reefs.
	1000-1130		Dives for stills and video footage of *Limaria* bed
	1130-1215		Dive to assess extent & distribution of *Limaria* & *Modiolus* reefs.
	1215-1430		Return to Kyle Akin and unload equipment.
	1430-1630		Move boat to Railway Pier, Kyle. Settle mooring bill with harbourmaster. Return to accommodation.
	evening		Meal, data recording and camera cleaning
14/08/2012	0600-	CM, RC, NH, DH, GS	Demobilisation
22/08/2012	1200	CM, RC, AL, NH, LC, LK, FK	Mobilisation from Oban, Edinburgh and Inverness.
	1600-1800		Launch SNH RIB at Ardrishaig and book in at accommodation.

Date	Time	Personnel	Details
23/08/2012	0700-0830	CM, RC, AL, NH, LC, LK, SE, FK	Depart accommodation and load SNH RIB (*Aphrodite*) and charter RIB (*Fyne Pioneer*).
	0830-1245		Sail to Otter Spit carrying out spot dives for *Limaria* and maerl distribution around LW slack.
	1245-1500		Sail to upper Fyne carrying out validation dives for *Modiolus* at Kilbride Island and *Limaria* at the Quarry Tea Rooms.
	1500-1745		Continue spot dives at Otter Spit and validation dive for maerl off Liath Eilean, returning to Ardrishaig.
	1745-1840		Unload and moor vessels.
	evening		Return to accommodation, meal, data entry and preparation of gear for MNCR phase 2 surveying.
	evening	DH	Mobilisation.
24/08/2012	0800-0900	CM, RC, AL, NH, LC, LK, DH, SE, FK	Depart accommodation and load vessels.
	0900-1000		Sail for Otter Spit and carry out spot dives for *Limaria* and maerl distribution.
	1000-1200		MNCR phase 2 survey at site FS02 (*Limaria* bed), Otter Spit.
	1200-1500		Continue spot dives for *Limaria* and maerl distribution and return to Ardrishaig.
	1500-1700		Unload vessels and recover *Aphrodite* at Ardrishaig slip.
	1700-1830		Return to accommodation, data collation and input to computer.
	evening		Demobilisation
19/09/2012	0830-1800	GS, RC, CT, FK, CM	Mobilisation to Creran. Load *RV Serpula*.
	evening	GS, RC, CT, FK, CM	Depart Creran for meal, then equipment preparation.
20/09/2012	0630-0700	GS, RC, CT, FK, CM	Depart accommodation for Loch Creran pontoon and load boat
	0700-1910		Dive transects for *Limaria* distribution study at Shian and Creagan, returning to pontoon at 1910
	1910-2100	FK	Cylinders to Puffin Divers, Oban for air fills.
	evening	CM, GS, RC, CT	Meal, then data collation with data entry of survey data into computer and entry into ARCGIS to plan further survey sites for following day.
21/09/2012	0730-0830	CM, GS, RC, CT, FK, JD	Depart accommodation for Creran, meeting JD at 0800. Load boat

Date	Time	Personnel	Details
	0830-1800		Continue dive transects for *Limaria* distribution study at Shian and Creagan, returning to pontoon at 1800. CT departs for Southampton.
	evening	CM, GS, RC, FK	Cylinders to Puffin Divers, Oban for air, meal, then data entry and distribution plotting in ARCGIS.
	evening	DH	Mobilisation from Edinburgh to Creran.
22/09/2012	0830-1000	CM, DH, GS, RC, FK	Depart accommodation for Loch Creran pontoon and load boat
	1000-1915		MNCR phase 2 surveys at Shian (FS03) and Creagan (FS04).
	evening		Meal and return to accommodation. Sample preservation, camera cleaning and downloading, data entry.
23/09/2012	0830-0920	CM, DH, GS, RC, FK	Depart accommodation for Loch Creran pontoon and load boat
	0920-1530		Dive transects for *Limaria* distribution study at Shian and Loch Creran mouth, returning to pontoon at 1530.
	1530-1700		Unload equipment and pack vehicles.
	evening		Demobilisation.

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