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OCCURRENCES OF *LOPHELIA PERTUSA*

ON THE ATLANTIC MARGIN

by

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Introduction

While corals are most abundant and species-rich in shallow-water tropical seas, it has been known for many years that scleractinian corals are also found in temperate regions where there can be large structures of coral in deep continental shelf edge waters. These accumulations, variously referred to as patches, coral banks, bioherms and reefs, are composed of several coral species but the most abundant is *Lophelia pertusa* (L.) (Fig 1). This coral's growth form provides a habitat for a diverse associated fauna. *L. pertusa* does not contain symbiotic algae (zooxanthellae) and so unlike tropical coral species is not restricted to well-lit surface waters. Since individual polyps divide and grow to form colonies, but adult polyps are no longer joined by a tissue connection they are correctly termed pseudo-colonial azooxanthellate corals. There is growing concern over the environmental sensitivity of deep-water coral communities to both hydrocarbon exploration and deep-water trawling (Roberts, 1997; Rogers, 1999).

Lophelia pertusa was first discovered in the north-east Atlantic, offshore Norway (Gunnerus, 1768) with finds in the middle of the last century offshore the UK (Johnston, 1847; Wilson, 1979a). Although *L. pertusa* is also known to occur in the north-west Atlantic, Pacific and Indian oceans and the Mediterranean, most records are from the north-east Atlantic, including the Norwegian coast (e.g. Dons, 1944; Strømgren, 1971; Freiwald et al., 1997), around the Faroes (Frederiksen et al., 1992), to the west of Shetland (Wilson, 1979b) and on Rockall Bank (Wilson, 1979b; Zibrowius, 1980).

As with other scleractinians, *Lophelia pertusa* requires a hard settlement substrate (e.g. rock outcrop or a boulder). According to Wilson's description of patch development on Rockall Bank (Wilson, 1979c), once settled on a suitable hard substrate, coral colonies can expand themselves across areas of soft sediment by growing outwards and eventually breaking. These broken colonies accumulate on the surrounding sediment and may continue to grow or provide new areas of hard substrate for colonisation. Wilson (1979c) described this as developing through so-called 'thicket' and 'coppice' stages to form coral rings of about 10 to 13 metres in width. As the patch matures into the coppice stage, in the central, older region of the patch the colonies will be increasingly attacked by boring and will eventually collapse. This leaves a coral patch made of at least two major habitat types, outer living coral and inner dead coral skeleton. Thus the coral provides a complex habitat for other species and is well

known to support a diverse associated fauna (Le Danois, 1948; Dons, 1944; Jensen & Frederiksen, 1992; Mortensen et al., 1995).

Lophelia pertusa is associated with oceanic water, temperatures of between 4 and 12ºC (Dons, 1944) and thus on the Norwegian coast, coral banks are only found in fjords having a deep water connection to the open sea (Dons, 1944; Strømgren, 1971).

Along the north east Atlantic margin, our understanding of the distribution of *Lophelia pertusa* remains incomplete. Wilson (1979b) gathered the information available at that time from the scientific literature, trawl records, dredging and submersible observations. His study suggested that *L. pertusa* was sparsely distributed to the west of Shetland but was very much more abundant further south west on Rockall Bank. The small size of these colonies contrasts with that on the Norwegian coast where large coral banks are known in fjords having a deep water connection to the open sea (Dons, 1944) and where the largest *L. pertusa* bank, on the Sula Ridge, has been identified (Hovland et al., 1998). This collection of coral banks has in places grown to over 30 metres in height and extends for more than 13 kilometres in length (Freiwald et al., 1999).

Database

To assist a range of studies concerning *Lophelia pertusa* undertaken under the NERC / MTD MIME initiative (Managing Impacts in the Marine Environment) a database of reported occurrences within the UK offshore designated area has been tabulated (see Appendix). However this has been extended to adjacent areas to provide a more complete assessment of distribution in the Faroe – Shetland Channel and the Rockall Trough. The appendix contains details on all recordings of *L. pertusa* as noted in papers, cruise reports etc following literature searches, requests to relevant research groups and examination of other listings (eg Wilson, 1979a; Frederiksen et al., 1992; Rogers, 1999). These are grouped by the method of recovery as either “traverses” or “sites” and organized from west to east and north to south by degree rectangles. This listing is not considered complete for areas outwith the UK offshore designated area but thought to be virtually complete for the UK. It contains details of 150 “traverses” and 170 “sites”.

"Traverses" are reported recoveries collected while the vessel was moving and where start and end points are known. These may comprise trawls (net or dredge) or seabed- viewing equipment, ranging from manned submersible to photographic sledges. Therefore the seabed occurrence of *Lophelia pertusa* is somewhere between two end points. Such traverses may be very long, some in excess of 200 km, and the value of a reported *L. pertusa* occurrence is therefore somewhat limited. Those traverses over 50 km or where they cover a wide range of water depths have been excluded from the map.

"Sites" include samples recovered from a known location (subject to positioning accuracy) and may be from a wide variety of sampling devices, including, boxcores, gravity cores, piston cores. However where only a single location is reported for underway sampling (eg trawling then it too is reported as a site of *Lophelia pertusa* occurrence.

Location is given in degrees and decimal minutes. The accuracy of positioning will be suspect in older records. This is evident in the "round numbers" given for location e.g. 61° 00.00'N or 10° 10.00'W particularly for data gathered prior to about 1975. More modern records are likely to have used satellite-positioning systems. Additional information for each reported *Lophelia pertusa* occurrence is also included in the Appendix. This includes who originally collected the sample, the sampling methodology used, the water depth, original sample number and any references to any published reports.

Water depths are given as reported. Several sites have no water depth information. No attempt has been made to estimate a water depth for a site from other bathymetric information or to validate water depths given in reports.

No distinction has been made between samples where *Lophelia pertusa* has been recovered at seabed or buried. In the few instances where the latter occurs burial is usually shallow (<10 cms) but may extend to more than 3 m below seabed (Long, 1998a). The burial of coral may be a function of sedimentary processes (eg along slope contour currents) or seabed reworking as a result of fishing activity.

Accuracy of species identification

A wide range of names has been applied to *Lophelia pertusa* in the past (Rogers, 1999). Some early reports of *L. pertusa* have some remaining samples located in collections (eg Aberdeen University, National Museum of Scotland, Hancock Museum (Newcastle) and the Natural History Museum (London) (Wilson, 1979a). Modern re-examination has confirmed the true identification of *L. pertusa* (Wilson, 1979a). Therefore where several species had been presumed only a single form occurs.

However today there is a tendency to assume all deep water cold water corals are *Lophelia pertusa*. Other species of pseudo colonial azooxanthellate coral also occur in the NE Atlantic including *Madrepora oculata* and *Solenosmilia variabilis* (Zibrowius, 1980). This leads to instances such as when the *R/V Professor Logachev* cruise TTR7 sampled coral on the margins of the Rockall Trough (Kenyon et al., 1998) many of the sample descriptions referred to the presence of live coral or even *L. pertusa* (Mazzini et al., 1998). However, detailed biological examination suggests that several different types of coral were collected and only some of the reported occurrences are *L. pertusa* (Wilson and Vina Herbon, 1998). *Madrepora oculata* and *Desmophyllum cristagalli* were also recorded.

As part of its regional mapping programme the British Geological Survey has collected more than 3000 samples in water depths greater than 200 m. Many of the recorded samples were originally described as containing corals. These occurrences have been re-examined during this project where samples are still available and some have been shown to be single corals such as cup corals, *Caryophyllia smithii,* or even other taxa including bryozoa with only a few being samples of *Lophelia pertusa*.

Mounds

It has been suggested that *Lophelia pertusa* occurs as small reefs and these features may be considered a hazard to seabed activities. It has also been presumed that such a topographic expression could be used to map the distribution of the coral using acoustic surveying equipment such as sidescan sonar.

Large features up to 30 m high have been interpreted as coral reefs on Hatton Bank (Chesher, 1989) and Rockall Plateau (Akhmetzanov et al., 1998) and samples of *Lophelia pertusa* have subsequently been recovered from the vicinity. Likewise outwith the map area in the Porcupine Seabight (Henriet et al., 1998). These generally occur in water depths greater than 500 m . Detailed studies of the largest cold-water coral reef so far reported in the north-east Atlantic, the Sula Ridge, offshore mid-Norway in 270-310 m water depth, shows that it is at least 13km in length, 10-35m in height and some hundreds of metres across (Freiwald et al., 1999). To the southwest of the reef the corals occur as discrete mounds typically 30 m high, 150 m wide, 500 m long. These mounds extend over several 10's of kilometres (Hovland et al., 1998) and provide the basis of important ecosystems (Freiwald and Wilson, 1998). However no such features have been reported in areas of current hydrocarbon exploration north and west of the UK.

A range of mound-like structures has been reported in deepwater west of the UK. Site surveys conducted for exploration wells west of Shetland have frequently reported the presence of mounds on the seabed. They are usually 1-2 m high and 10-25 m in diameter (Fig 2). These have been interpreted as coral patches or carbonate mounds without sampling / visual evidence. An analysis of these features (Long, 1998b) in more than a dozen reports suggests that their occurrence is restricted to water depths in excess of 400 m and areas of soft / very soft sediments (Fig 3). Their frequency increases with depth with the greatest numbers in water depths greater than 700 m.

Slightly larger mounds, 200 m diameter, 3-4 m high, have been reported in the north-eastern part of the Rockall Trough (Bett, 1999). These have been shown to be associated with *Lophelia pertusa*. Although the mounds themselves do not comprise *L. pertusa* or coral debris (Holmes et al., 1988) they provide an elevated position on which the coral grows. The mounds appeared on video traverses to include clay rich material protruding through the surface of rippled sandy sediments (Holmes et al., 1988). There are also other biological associations that make these features of interest, eg the enhanced distribution of xenophyophores on the mound and within a "tail" down current from the mound (Bett, 1999).

Large mound like features, up to 1 km wide and 10's of metres high, have been noted at the northern end of the Faroe – Shetland Channel. These are thought to be mud diapirs (Long, 1998b; King et al., in prep) found at depths where the bottom water temperatures are too low for coral growth.

Map

The map of *Lophelia pertusa* occurrence to the north and west of the UK (Fig 4) uses the information given in the database (Appendix 1). The enclosed map is at a scale of 1:2,000,000. It is orientated such that north is at about 60° clockwise from the top of the paper sheet to maximise the scale within the paper available. The southern limit has been designed to include much of the Rockall Trough but to exclude the Porcupine Seabight where numerous large mounds, possibly of hydrocarbon origin, with abundant *L. pertusa* have been reported (eg Henriet et al., 1998). Although the latter area is an important part of the *L. pertusa* distribution in the NE Atlantic it is distinct from the UK offshore designated area.

The map distinguishes through colour the status of the recovered sample indicating if it was recovered / observed alive or dead, or unknown where no information on the status was reported. Sites of recovered / reported *Lophelia pertusa* are illustrated as a circle. However, if the means of collecting suggests that the survey vessel was moving at the time the sample of *L. pertusa* was collected eg a sledge or trawl, then a cross is plotted. Traverses are displayed as lines between the recorded end-points. Where traverses exceed 50 km in length or where they cover a wide range of water depths they have been excluded from the map. Where traverses are shorter than 2 km they have been displayed as a cross, centred on the mid-point between start and end positions. This is because if the traverse is represented by a line of less than 1mm in length it would appear insignificant compared with longer traverses yet the confidence in the accuracy of the location of *L. pertusa* (recovered / reported) is probably as good as at most site locations.

Interpretation of the map

The map and database show that *Lophelia pertusa* has been found widely distributed west of the UK. Water depths vary from 100 to 1500 m. The reported finding of *L. pertusa* in 2640 m in the Rockall Trough, south west of the Hebrides Terrace Seamount (Joubin, 1922a, b), has been ignored in the data displays (Fig 5d). The water depths where it has been reported depend on various factors and can be selective. There is not an even distribution of water depths across the area, for example the tops of banks are relatively flat giving large areas of a similar water depth. The surveys are not regional but selective for small areas with only a few extending over large areas. For example *L. pertusa* recovered as the result of fishing activity is restricted to areas and water depths of bottom trawling.

The map shows that *Lophelia pertusa* occurs throughout the area north and west of the UK. It has a preference for slope areas with only a few occurrences on the shelf, in particular the Hebridean and Shetland shelves compared with the Rockall plateau and Faroese shelf. Some of these reports from the Scottish shelf are over a hundred years old and have not been recently replicated eg in the Minches. Yet recent reports of *L. pertusa* growing on man-made structures (eg Brent Spar, Beryl) shows that there is an active dispersal of coral planula larvae within the upper parts of the water column and can grow to more than 20 cm within twenty years (Pearce, 1999; Shimmield, 1999).

The preference for slope locations has been noted previously. Frederiksen et al., (1992) suggested that the distribution of *Lophelia pertusa* around the Faroe Islands could be related to areas of the continental edge that reached a critical slope to allow internal tidal waves to be generated (Huthnance, 1989). Such waves are believed to increase the vertical nutrient flux through a thermocline to bands of colder water where the increased nutrient availability promotes phytoplankton production (Sandstrom and Elliot, 1984). This could then increase the vertical detritus flux and so the food available for benthic suspension-feeders. As water depth increases, the link between increased phytoplankton production and detritus fall will become less important, so to explain the link between critical slopes and *L. pertusa* colonies in deeper water, Frederiksen et al. (1992) suggest that the critical slope also promotes increased bottom mixing and resuspension. These processes could add to the supply of food particles further down the slope from the region where they were resuspended.

There appears to be a greater abundance of *Lophelia pertusa* on the slopes around Rockall and Porcupine banks compared with the West Shetland and west of Hebrides margins. A potentially significant difference between these areas (even in areas of seabed temperatures >4°C, see following section) is that terrigenous input in the latter areas was considerably greater during recent glacial periods. This could obscure rock outcrops with loose sediments and thereby limit the amount of seabed available as potential anchorage for colonies of *L. pertusa* to become established. The entire Atlantic margin was subjected to dropstones from icebergs that could provide settlement points for *L. pertusa*. However, these too would have had a greater likelihood of burial west of the Hebrides and Shetland by terrigenous input to the slope areas from ice-sheets that extended to and locally beyond the shelf break at the Barra Fan, Sula Sgeir Fan and west of Shetland

Constraints on the distribution of *Lophelia pertusa*

The dataset and map can be used to identify locational constraints on the distribution of *Lophelia pertusa*. The map area has been subdivided in four geographical areas:

Southern Rockall Trough – all sites south of 56° N

Northern Rockall Trough – all sites between 60° N and 56° N

Banks south and west of the Faroes – all sites north of 60° N and west of 7° W

Faroe – Shetland Channel – all sites north of 60° N and east of 7° W

The titles are for ease of use and the areas include data outside the topographic feature eg the Northern Rockall Trough area includes sites on Hatton Bank and the Rockall Plateau. The data have been plotted against water depth in 25 m intervals (Figs 5a-d). Reports of *L. pertusa* from the North Sea have been excluded, as the oceanographic regime there is significantly different from that west of the UK. Also excluded from the plots are those reports listed in the Appendix that do not indicate the water depth where the sample was recovered and no attempt has been made to estimate water depth from published bathymetry maps. The plots (Figs 5a-d) indicate an even distribution of live and dead corals suggesting there has been little downslope transport.

Examining the variability in coral distribution with water depth indicates that in all areas, except the Faroe – Shetland Channel, the distribution of *Lophelia pertusa* extends to more

than 1 km depth (Fig 6). Although deep water occurs in the Faroe – Shetland Channel (it extends to more than 1500 m), *L. pertusa* has not been recovered from such depths (Fig 5a) despite the large amount of seabed sampling in the area. This apparent anomaly fits with the difference in bottom water temperatures (typically –1°C) west of Shetland compared with the Rockall Trough (typically 4°C) for 1000 m water depth. This is caused by the presence of cold Norwegian bottom waters moving south westwards through the Faroe – Shetland Channel from the Norwegian Sea and then entering the North Atlantic via the Faroe Bank Channel where it mixes with warmer waters. This temperature control on the distribution fits with other studies of *L. pertusa* that suggest it can not thrive in water temperatures below 4°C (eg Dons, 1944; Friewald et al., 1998). The distribution of *L. pertusa* in the Faeroe – Shetland Channel is completely at variance with the distribution of the seabed mounds. Therefore in the Faroe – Shetland channel it is unlikely that these features are associated with coral growth.

Conclusions

1. *Lophelia pertusa* occurs offshore the British Isles.
2. It is locally abundant, particularly in areas away from terrigenous inputs, where rock outcrops or other suitable substrates are available to produce an initial anchorage for colonisation.
3. There is little difference in the bathyal distribution of live and dead recovered samples of *Lophelia pertusa* suggesting minimal downslope transport.
4. The bathyal distribution of *Lophelia pertusa* in the Faeroe – Shetland Channel is significantly different from other areas west of the UK. There is a strong temperature control. In water depths beyond 500 m where bottom water temperatures are less than 4°C and are often below 0°C *Lophelia pertusa* can not thrive.
5. Environmental studies of the seabed in the centre of the Faroe – Shetland Channel, where bottom water temperatures are less than 4°C, can be planned without the need to search for the occurrence of *Lophelia pertusa*.

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Figures

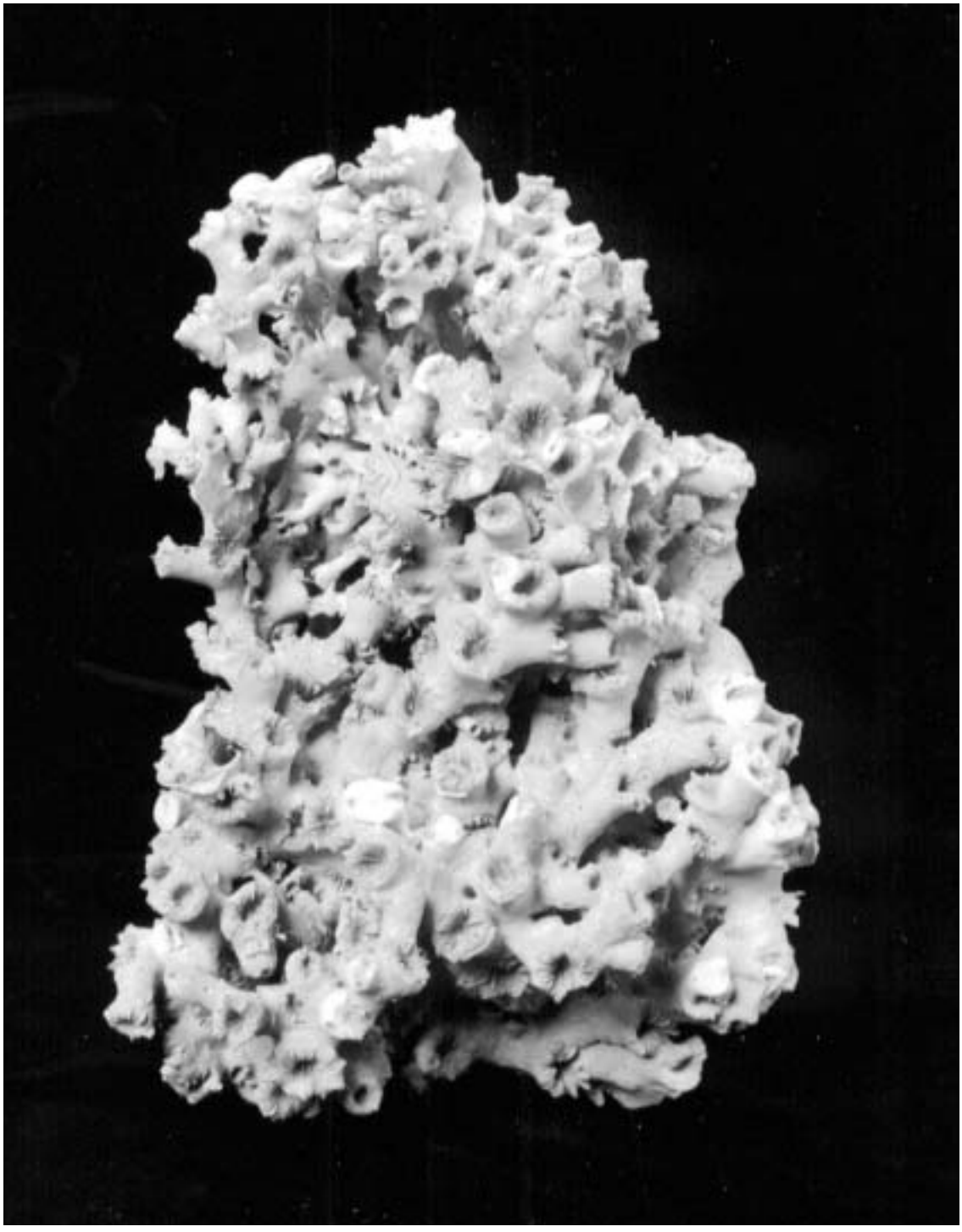

Figure 1 Lophelia pertusa
Photograph of a colony of *Lophelia pertusa* collected from the Wyville-Thomson Ridge (specimen 25cm tall)

BGS Line 79/14/34

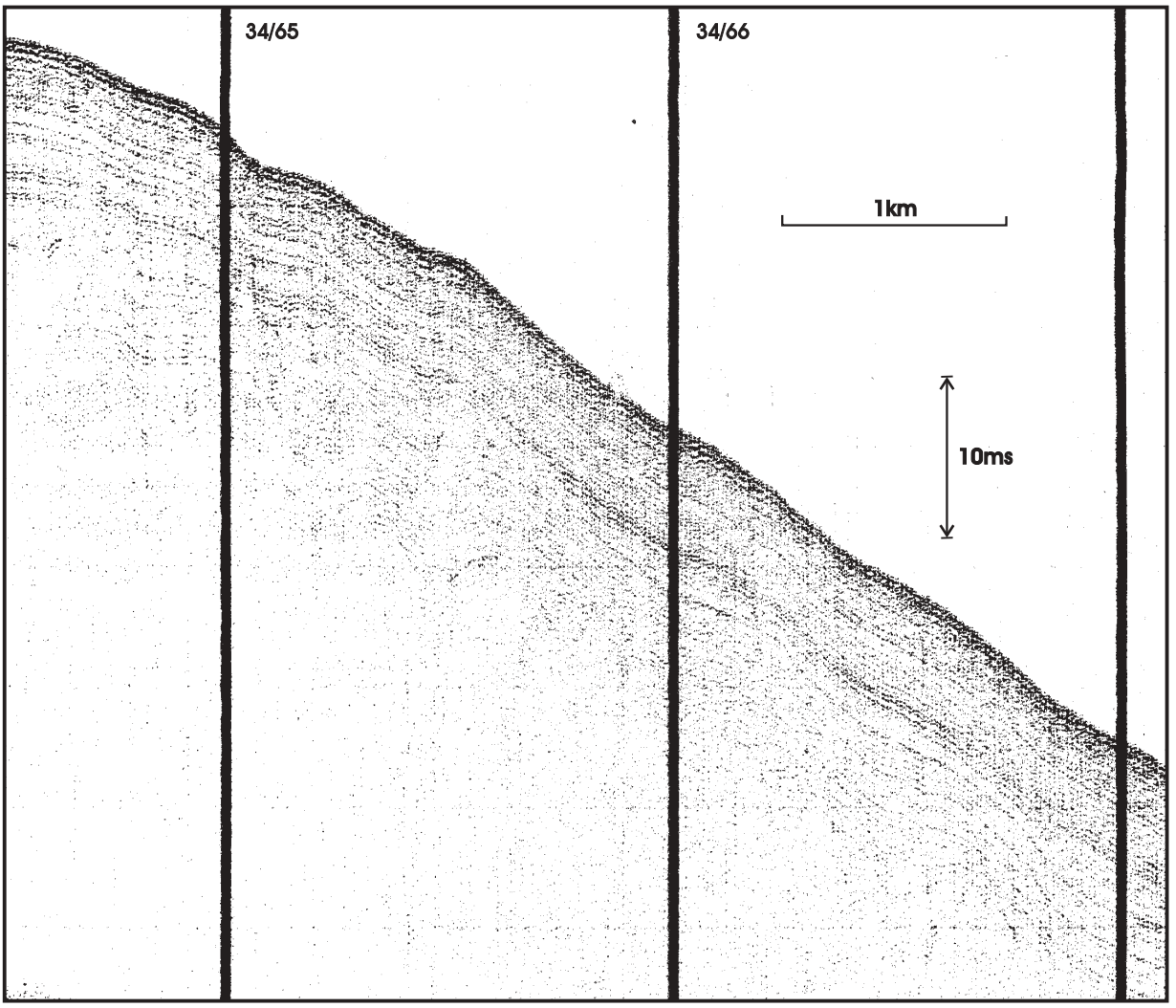

Fig 2 Seismic profile across a seabed mound in 700m water depth west of Shetland.

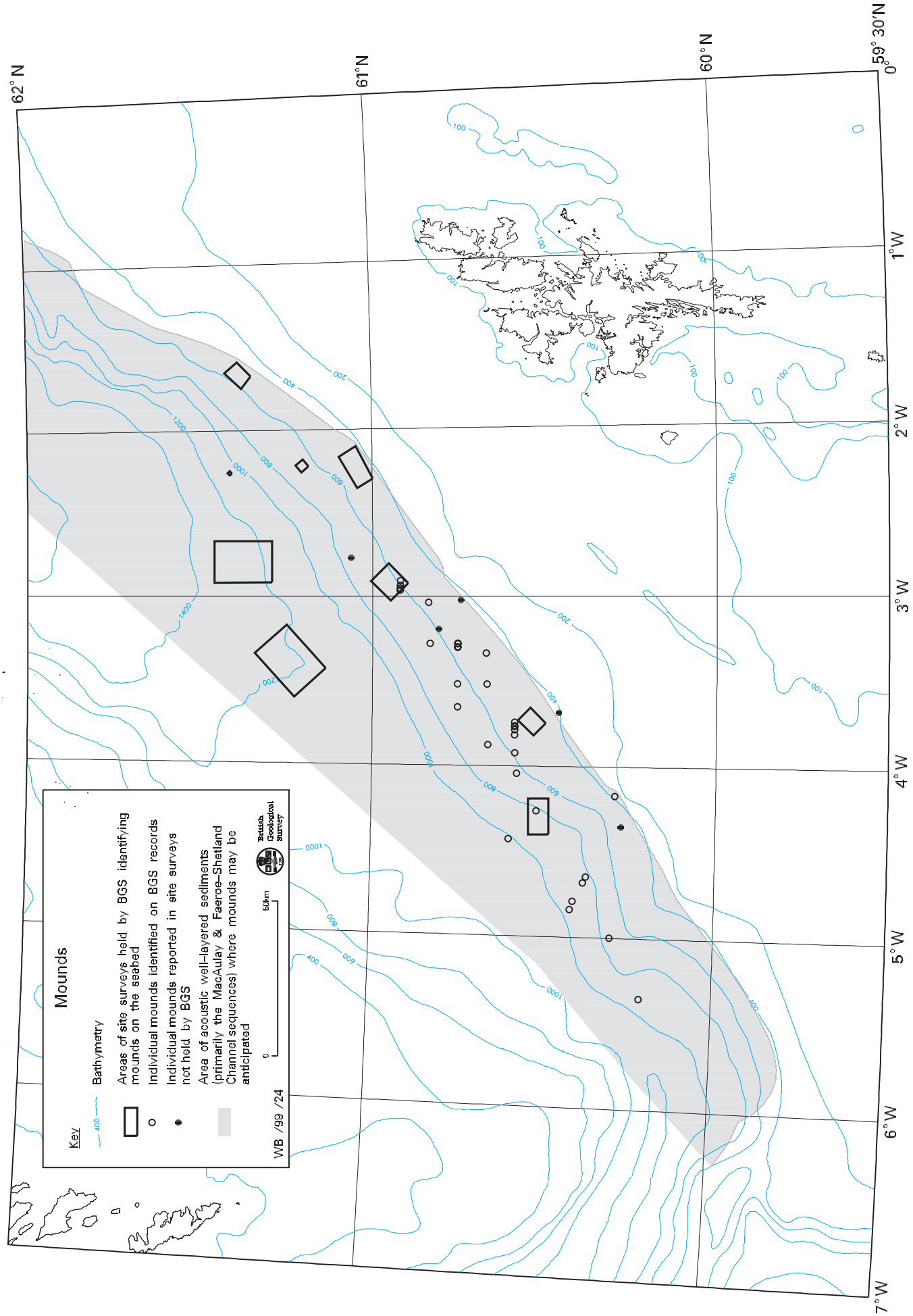

Fig 3 Map showing area of mounds West of Shetland (modified from Long 1998b)

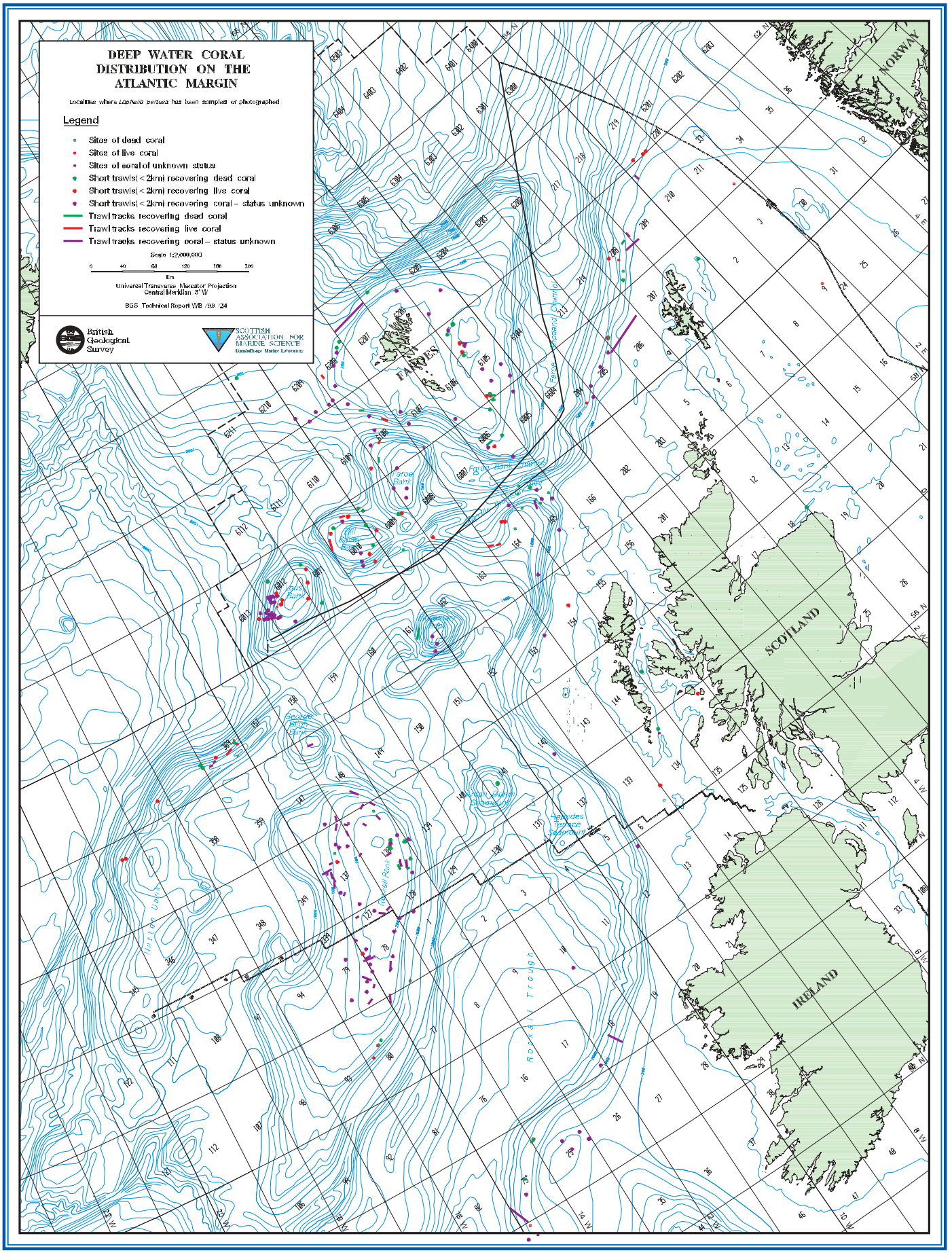

Fig 4 A4 copy of the enclosed map

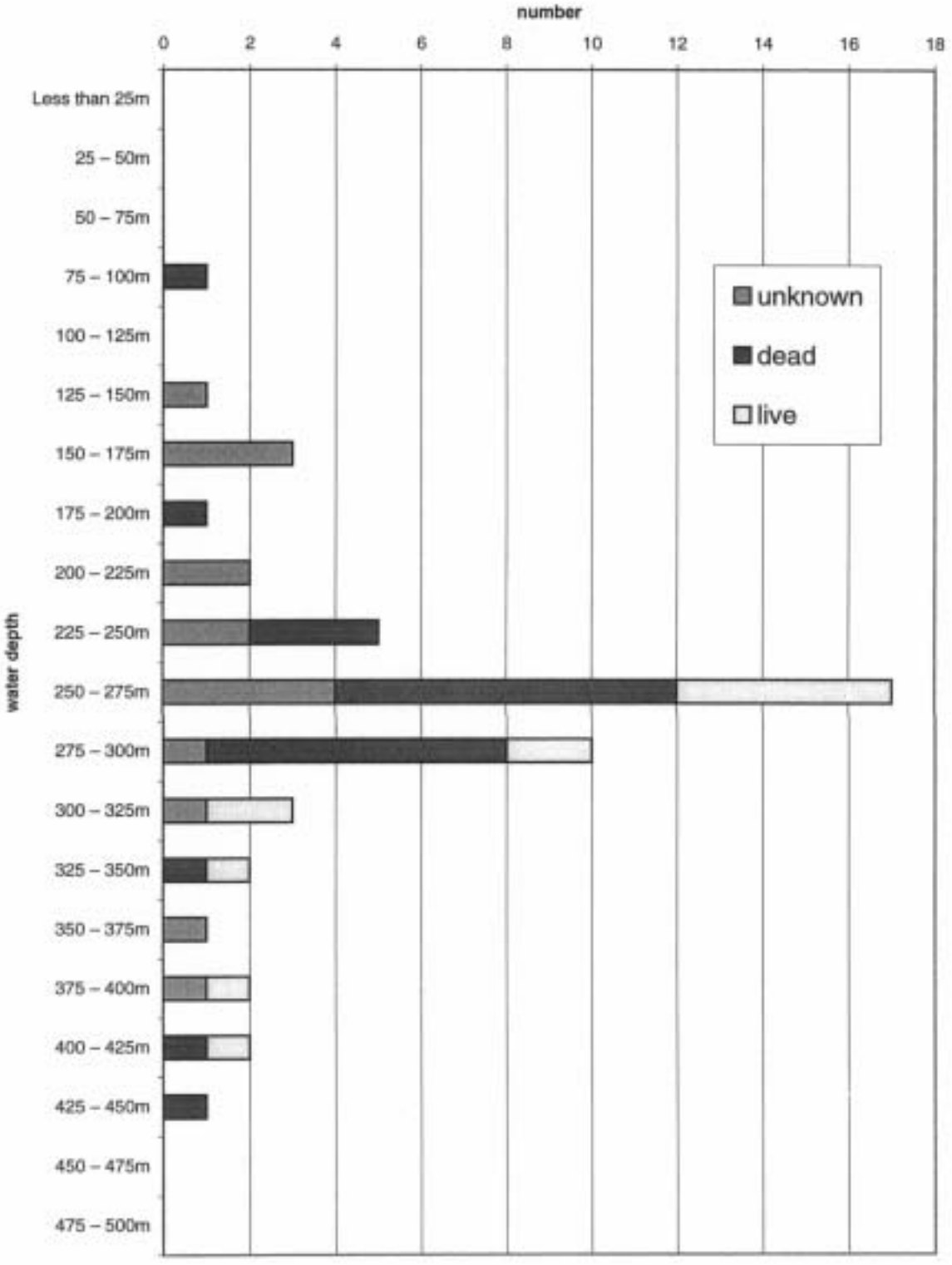

Fig 5a Numbers of total recoveries of *Lophelia pertusa* in the Faroe – Shetland Channel (north of 60°N east of 7°W) for each 25m bathyal interval separated into live, dead and unknown groupings

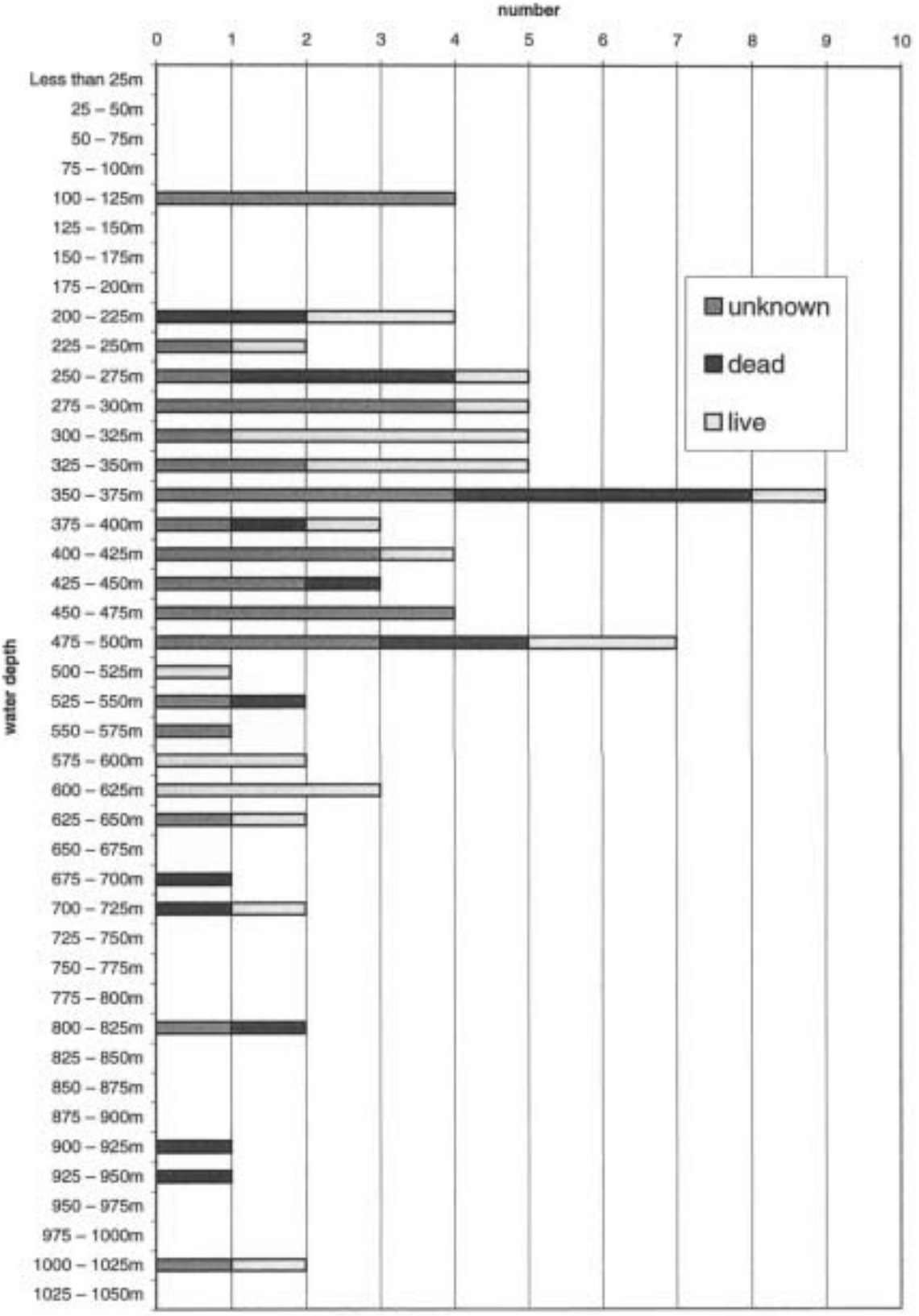

Fig 5b Numbers of total recoveries of *Lophelia pertusa* south and west of the Faroes (north of 60°N west of 7°W) for each 25m bathyal interval separated into live, dead and unknown groupings

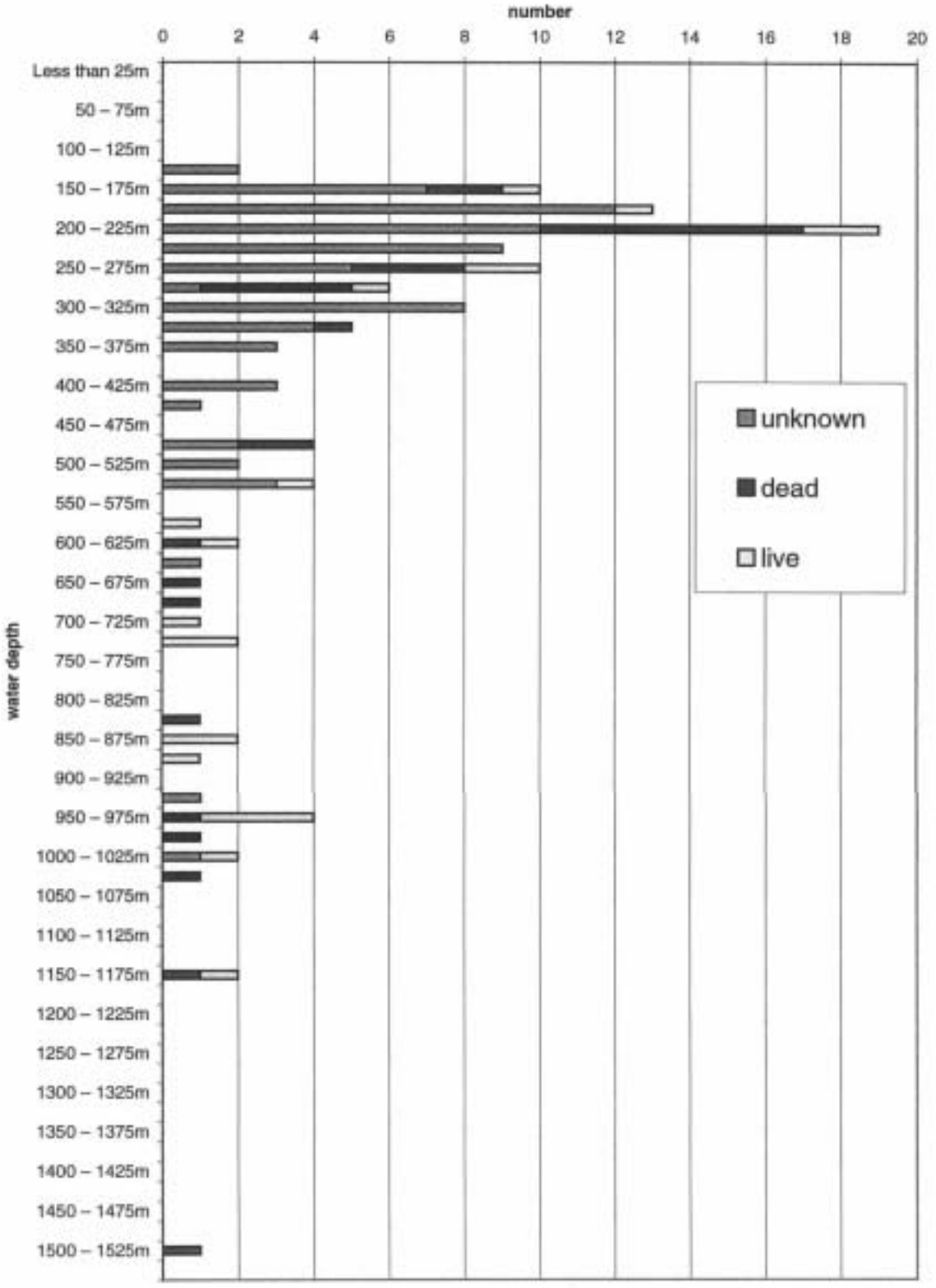

Fig 5c Numbers of total recoveries of *Lophelia pertusa* in the northern part of the Rockall trough (between 56°N and 60°N) for each 25m bathyal interval separated into live, dead and unknown groupings

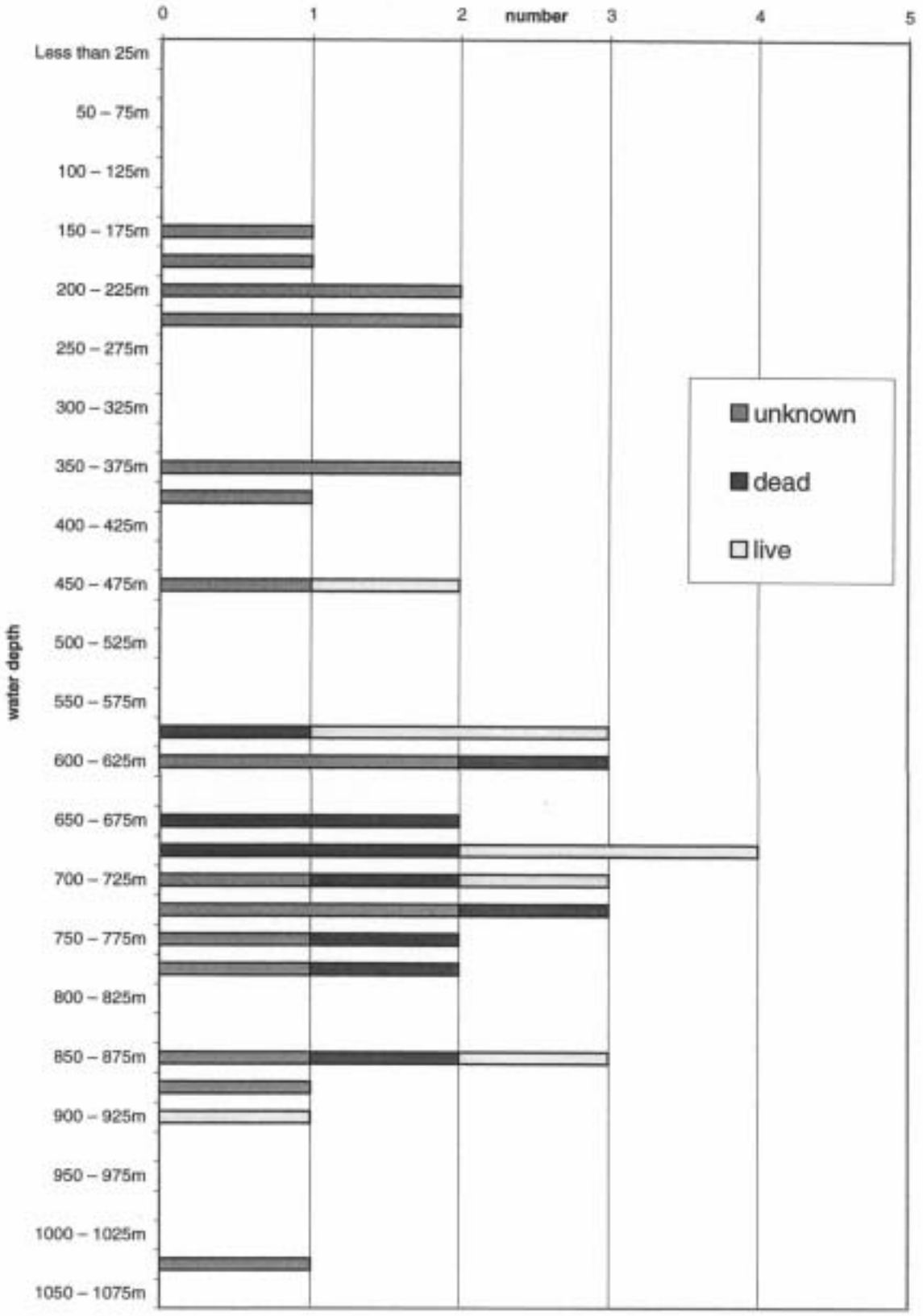

Fig 5d Numbers of total recoveries of *Lophelia pertusa* in the southern part of the Rockall trough (south of 56°N) for each 25m bathyal interval separated into live, dead and unknown groupings

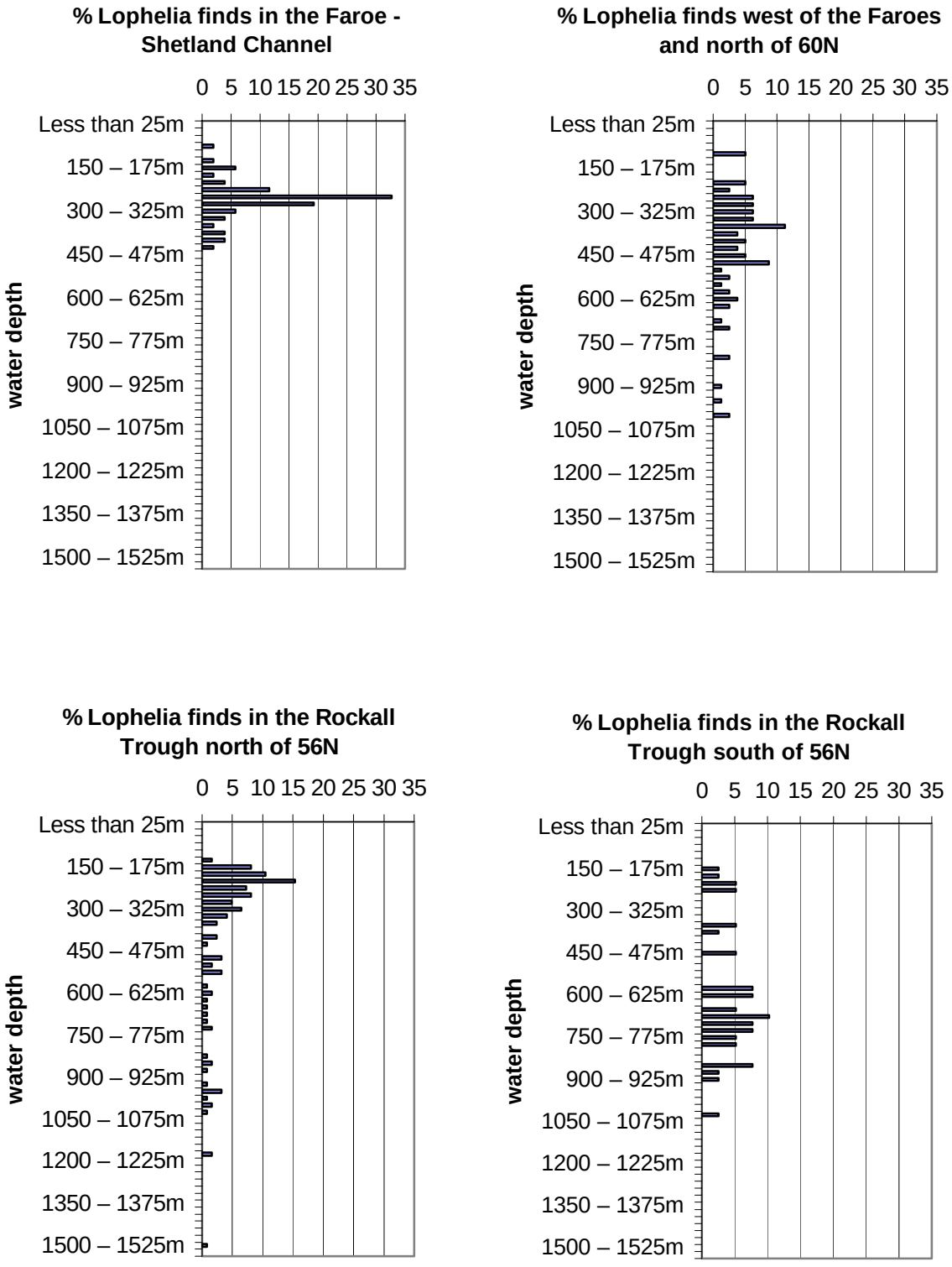

Fig 6 Comparison of the percentage of total recoveries of *Lophelia pertusa* for each area with depth

Appendix 1

Table of *Lophelia pertusa* occurrence

Listing of traverses where *Lophelia pertusa* has been recovered or recorded

start of trawl						end of trawl						trawl length (kms)	status of coral	collected by whom	equipment used	water depth (m)	sample number	reference
Latitude			Longitude			Latitude			Longitude									
62	00.00	N	9	00.00	W	62	30.00	N	8	20.00	W	65.66	unknown	S. Poulsen	Trawl	360		Frederiksen et al., 1992
62	18.50	N	8	52.20	W	62	21.80	N	8	52.70	W	6.15	Live	T 89	Bottom trawl	370	535	Frederiksen et al., 1992
62	30.70	N	8	10.80	W	62	30.70	N	8	11.00	W	0.17	Dead	MH 88	Triangular dredge	358	345	Frederiksen et al., 1992
62	45.00	N	7	00.00	W	62	40.00	N	8	00.00	W	52.03	unknown	S. Poulsen	Bottom trawl	500		Frederiksen et al., 1992
62	01.00	N	0	41.10	E	62	00.60	N	0	41.30	E	0.76	Live	IOS		300		Wilson, 1984
62	02.13	N	0	18.97	E	62	02.06	N	0	18.99	E	0.13	Live	SOC	WASP	382	54501#1	Bett, 1999
61	10.10	N	8	56.40	W	61	13.60	N	8	52.20	W	7.52	Dead	MH 89	Triangular dredge	250	528	Frederiksen et al., 1992
61	22.00	N	8	37.50	W	61	21.00	N	8	42.00	W	4.42	Live	MLA	Bottom trawl	274-384		Wilson, 1979
61	29.80	N	8	11.90	W	61	34.00	N	8	17.60	W	9.30	Live	MH 89	Bottom trawl	364-446	531	Frederiksen et al., 1992
61	45.00	N	8	31.00	W	61	47.10	N	8	36.80	W	6.43	Dead	T 89	Bottom trawl	396	532	Frederiksen et al., 1992
61	00.70	N	7	52.20	W	61	02.00	N	7	52.00	W	2.42	Live	MLA	Trawl	395		Wilson, 1979
61	26.70	N	7	43.40	W	61	26.40	N	7	45.90	W	2.29	Dead	T89	Bottom trawl	260	529	Frederiksen et al., 1992
61	01.80	N	5	51.60	W	61	00.30	N	5	48.20	W	4.14	Dead	MH 89	Bottom trawl	290-300	488	Frederiksen et al., 1992
61	02.30	N	5	54.00	W	61	02.90	N	5	53.90	W	1.12	Dead	MH87	Shell dredge	280	47	Frederiksen et al., 1992
61	02.30	N	5	54.30	W	61	02.30	N	5	53.30	W	0.90	Live	MH 89	Bottom trawl	282	487	Frederiksen et al., 1992
61	03.60	N	5	52.30	W	61	03.50	N	5	53.00	W	0.66	Dead	MH 87	Shell dredge	287-400	46	Frederiksen et al., 1992
61	03.70	N	5	58.80	W	61	03.40	N	5	58.20	W	0.78	Live	MH 89	Bottom trawl	272	486	Frederiksen et al., 1992
61	15.00	N	5	05.00	W	60	40.00	N	6	20.00	W	93.86	unknown	J. Havgard	Trawl	263		Frederiksen et al., 1992
61	36.80	N	5	47.90	W	61	36.90	N	5	48.40	W	0.48	Dead	MH 88	Triangular dredge	243	156	Frederiksen et al., 1992
61	37.60	N	5	47.80	W	61	37.60	N	5	48.10	W	0.27	Live	T 89	Triangular dredge	251	550	Frederiksen et al., 1992
61	43.40	N	5	43.40	W	61	43.30	N	5	43.00	W	0.40	Live	MH 88	Triangular dredge	260	279	Frederiksen et al., 1992
61	44.00	N	5	45.00	W	61	40.00	N	5	35.00	W	11.53	unknown	K. Joensen	Trawl	280-240		Frederiksen et al., 1992
61	53.27	N	5	50.28	W	61	53.06	N	5	49.37	W	0.89	Dead	DGU	Rock dredge	265-259	6, 87090133	Chesher, 1987; Frederiksen et al., 1992
61	56.20	N	5	34.30	W	61	56.70	N	5	34.10	W	0.94	Dead	MH 90	Triangular dredge	250	779	Frederiksen et al., 1992
61	56.30	N	5	34.40	W	61	56.20	N	5	34.20	W	0.26	Dead	MH 90	Triangular dredge	254	778	Frederiksen et al., 1992
61	56.60	N	5	34.20	W	61	56.90	N	5	33.60	W	0.77	Dead	HM 88	Triangular dredge	252	163	Frederiksen et al., 1992

start of trawl						end of trawl						trawl length (kms)	status of coral	collected by whom	equipment used	water depth (m)	sample number	reference
Latitude			Longitude			Latitude			Longitude									
61	05.93	N	1	45.70	W	61	06.02	N	1	46.99	W	1.17	Dead	HM 97	Triangular dredge	242		Roberts et al., in prep (Håkon Mosby cruise 13, 1997)
61	24.90	N	1	14.80	W	61	25.80	N	1	07.50	W	6.71	Dead	IOS	dredge	190		Wilson 1979
61	20.00	N	0	51.00	W	61	20.00	N	1	16.00	W	22.30	unknown	TC	Trawl	219		Wilson 1979
61	25.00	N	0	59.00	W	61	29.00	N	0	59.00	W	7.43	unknown	FLL	Trawl	247-265		Wilson 1979
61	50.00	N	0	06.00	E	61	54.00	N	0	06.00	E	7.43	unknown	FLL	Trawl	238-282		Wilson 1979
60	25.46	N	13	15.32	W	60	24.88	N	13	14.31	W	1.43	Live	DGU	Rock dredge	730-679	61, 87090188	Chesher, 1987; Frederiksen et al., 1992
60	19.42	N	12	02.51	W	60	19.68	N	12	02.80	W	0.55	Live	DGU	Rock dredge	500-450	119, 87100060	Chesher, 1987; Frederiksen et al., 1992
60	26.07	N	12	44.01	W	60	25.37	N	12	46.28	W	2.46	Live	DGU	Rock dredge	300	65, 87090192	Frederiksen et al., 1992
60	27.70	N	12	34.60	W	60	24.80	N	12	37.90	W	6.20	Live	MH 89	Bottom trawl	336-272	521	Frederiksen et al., 1992
60	44.10	N	12	37.20	W	60	43.70	N	12	37.50	W	0.79	Dead	MH 89	Shell dredge	702-684	524	Frederiksen et al., 1992
60	28.60	N	11	51.00	W	60	27.60	N	11	51.90	W	2.04	Dead	MH 89	Bottom trawl	530	526	Frederiksen et al., 1992
60	28.91	N	11	51.32	W	60	29.10	N	11	51.87	W	0.62	Live	DGU	Rock dredge	650-500	118, 87100059	Chesher, 1987; Frederiksen et al., 1992
60	37.40	N	11	44.00	W	60	37.10	N	11	43.80	W	0.59	Live	MH 89	Shell dredge	496	514	Frederiksen et al., 1992
60	41.80	N	11	46.50	W	60	41.90	N	11	47.20	W	0.67	Dead	MH 89	Shell dredge	700	515	Frederiksen et al., 1992
60	22.30	N	10	18.40	W	60	22.40	N	10	18.70	W	0.33	Live	MH 88	Triangular dredge	508	310	Frederiksen et al., 1992
60	25.90	N	10	07.90	W	60	26.00	N	10	08.00	W	0.21	Dead	MH 89	Triangular dredge	354	308	Frederiksen et al., 1992
60	37.80	N	10	58.90	W	60	45.80	N	10	53.70	W	15.62	Live	L 79	Bottom trawl	397-275	76	Frederiksen et al., 1992
60	51.70	N	10	15.80	W	60	51.50	N	10	14.30	W	1.41	Live	MH 88	Triangular dredge	631-610	316	Frederiksen et al., 1992
60	51.80	N	10	14.00	W	60	51.60	N	10	14.00	W	0.37	Live	MH 88	Triangular dredge	650-560	314	Frederiksen et al., 1992
60	53.40	N	10	18.20	W	60	54.30	N	10	25.90	W	7.18	Live	MH 89	Bottom trawl	649-621	527	Frederiksen et al., 1992
60	33.00	N	9	52.49	W	60	33.02	N	9	52.58	W	0.09	Live	DGU	Rock dredge	322-300	122, 87100063	Chesher, 1987; Frederiksen et al., 1992
60	33.70	N	9	15.20	W	60	33.70	N	9	14.30	W	0.82	Dead	MH 88	Triangular dredge	210	322	Frederiksen et al., 1992
60	33.80	N	9	15.20	W	60	33.80	N	9	15.00	W	0.18	Dead	MH 88	Triangular dredge	220	323	Frederiksen et al., 1992
60	35.00	N	9	10.00	W	60	25.00	N	10	10.00	W	58.08	Live	J.Olsen	Bottom trawl	338		Frederiksen et al., 1992
60	40.00	N	9	50.00	W	60	55.00	N	11	00.00	W	69.49	Live	S.Poulsen	Bottom trawl	580		Frederiksen et al., 1992
60	49.40	N	9	53.30	W	60	49.20	N	9	52.30	W	0.98	Dead	MH 89	Triangular dredge	800	493	Frederiksen et al., 1992
60	52.60	N	9	56.80	W	60	52.20	N	9	56.40	W	0.83	Dead	MH 89	Shell dredge	900	492	Frederiksen et al., 1992
60	07.30	N	8	54.00	W	60	07.50	N	8	53.90	W	0.38	Live	MH 88	Triangular dredge	700-500	303	Frederiksen et al., 1992

start of trawl						end of trawl						trawl length (kms)	status of coral	collected by whom	equipment used	water depth (m)	sample number	reference
Latitude			Longitude			Latitude			Longitude									
60	33.30	N	6	32.10	W	60	32.80	N	6	32.20	W	0.93	Live	MH 87	Shell dredge	252	90	Jensen & Frederiksen, 1992; Frederiksen et al., 1992
60	36.10	N	6	14.50	W	60	35.70	N	6	14.50	W	0.74	Dead	MH88	Triangular dredge	285	287	Frederiksen et al., 1992
60	37.23	N	6	29.48	W	60	36.88	N	6	40.61	W	10.18	Dead	DGU	Rock dredge	252-255	91, 87100029	Chesher, 1987; Frederiksen et al., 1992
60	55.10	N	6	06.40	W	60	54.90	N	6	06.20	W	0.41	Dead	MH 88	Triangular dredge	237	147	Frederiksen et al., 1992
60	59.20	N	5	54.10	W	60	58.80	N	5	53.90	W	0.76	Dead	MH 87	Shell dredge	290	49	Frederiksen et al., 1992
60	33.70	N	3	05.00	W	60	42.00	N	2	05.00	W	56.84	unknown	TC	Trawl	228		Wilson 1979
60	42.83	N	2	54.45	W	60	42.80	N	2	54.14	W	0.29	Dead	HM 97	Triangular dredge	288		Roberts et al., in prep (Håkon Mosby cruise 1997)
60	43.19	N	2	55.79	W	60	42.71	N	2	54.44	W	1.52	Live	HM 97	Triangular dredge	279-277		Roberts et al., in prep (Håkon Mosby cruise 1997)
60	43.02	N	2	54.51	W	60	42.60	N	2	53.94	W	2.14	dead	HM	Agassiz trawl	296-268		Murray Roberts
59	11.50	N	17	14.40	W	59	11.10	N	17	14.20	W	0.77	Live	DGU	Rock dredge	560-529	36, 87090163	Chesher, 1987; Frederiksen et al., 1992
59	16.30	N	16	00.60	W	59	16.80	N	16	00.80	W	0.95	Dead	DGU	Rock dredge	497	32, 87090159	Chesher, 1987; Frederiksen et al., 1992
59	19.00	N	16	02.00	W	59	18.70	N	16	02.00	W	0.56	Dead	DGU	Rock dredge	622-605	33, 87090160	Chesher, 1987; Frederiksen et al., 1992
59	11.74	N	15	12.44	W	59	12.79	N	15	12.88	W	2.01	Dead	DGU	Rock dredge	1040-870	55, 87090182	Chesher, 1987; Frederiksen et al., 1992
59	15.00	N	15	52.00	W	59	15.00	N	15	47.00	W	4.78	unknown	FLL	Trawl	494-512		Wilson 1979
59	16.00	N	15	46.00	W	59	17.00	N	15	41.00	W	5.13	unknown	FLL	Trawl	549-530		Wilson 1979
59	16.40	N	15	25.30	W	59	18.50	N	15	15.00	W	10.59	Live	KT 98	trawl	500-650	40	Roberts et al., in prep (Koralnes Trawler)
59	18.48	N	15	39.54	W	59	18.40	N	15	38.67	W	0.84	Live	DGU	Rock dredge	730	51, 87090178	Chesher, 1987; Frederiksen et al., 1992
59	19.75	N	15	07.60	W	59	19.16	N	15	03.87	W	3.73	Live	DGU	Rock dredge	747-673	54, 87090181	Chesher, 1987; Frederiksen et al., 1992
59	21.57	N	15	08.04	W	59	20.94	N	15	07.72	W	1.21	Dead	DGU	Rock dredge	880-778	52, 87090179	Chesher, 1987; Frederiksen et al., 1992
59	23.24	N	15	07.94	W	59	22.52	N	15	05.94	W	2.33	Live	DGU	Rock dredge	1065-977	53, 87090180	Chesher, 1987; Frederiksen et al., 1992
59	00.00	N	14	00.00	W	59	30.00	N	18	00.00	W	236.39	unknown	CC		457-604		Wilson 1979
59	02.13	N	10	16.76	W	59	02.82	N	10	18.14	W	1.84	unknown	DGU	Rock dredge	1048-978	114, 87100055	Chesher, 1987; Frederiksen et al., 1992
59	16.00	N	10	29.00	W	59	22.00	N	10	18.00	W	15.30	Dead			671-704		Wilson, 1979

start of trawl						end of trawl						trawl length (kms)	status of coral	collected by whom	equipment used	water depth (m)	sample number	reference
Latitude			Longitude			Latitude			Longitude									
59	38.00	N	7	50.00	W	59	37.00	N	7	44.00	W	5.94	Live	MLA	Scraper trawl	870	S98-467	Scotia S98-467
59	39.00	N	7	53.00	W	59	41.00	N	8	00.00	W	7.56	Live	MLA	Scraper trawl	856	S98-466	Scotia S98-466
59	47.65	N	7	22.14	W	59	47.67	N	7	22.17	W	0.05	Live	SOC	WASP	962	54565#1	Bett, 1999
59	47.82	N	7	22.27	W	59	47.83	N	7	22.28	W	0.02	Live	SOC	WASP	962	54565#1	Bett, 1999
59	49.12	N	7	26.56	W	59	48.71	N	7	25.56	W	1.21	Live	SOC	WASP	884-908	54630#1	Bett, 1999
59	41.20	N	6	37.00	W	59	47.70	N	6	33.00	W	12.64	unknown	FLL	Trawl	476-417		Wilson, 1979
58	46.68	N	18	25.93	W	58	46.11	N	18	24.94	W	1.44	Live	DGU	Rock dredge	646-591	42, 87090169	Chesher, 1987; Frederiksen et al., 1992
58	46.93	N	18	31.12	W	58	46.58	N	18	30.13	W	1.17	Live	DGU	Rock dredge	771-710	43, 87090170	Chesher, 1987; Frederiksen et al., 1992
58	00.00	N	14	04.00	W	58	04.00	N	14	02.00	W	7.72	unknown	FLL	Trawl	256-265		Wilson, 1979
58	00.00	N	13	15.00	W	57	56.00	N	13	11.00	W	8.44	unknown	MLA	Trawl	229		Wilson 1979
58	10.00	N	13	25.00	W	58	13.50	N	13	30.00	W	8.17	unknown	MLA	Trawl	190-230		Wilson 1979
58	11.00	N	13	26.00	W	58	08.00	N	13	22.00	W	6.84	unknown	MLA	Trawl	366		Wilson 1979
58	53.50	N	13	39.00	W	58	54.00	N	13	47.00	W	7.78	unknown	FLL	Trawl	512-466		Wilson 1979
57	03.75	N	14	32.00	W	57	04.20	N	14	31.50	W	0.98	unknown	IOS	submersible	152		Wilson, 1979
57	16.00	N	14	40.00	W	57	14.00	N	14	44.00	W	5.51	unknown	FLL	Trawl	348-320		Wilson, 1979
57	26.00	N	14	45.00	W	57	21.50	N	14	49.00	W	9.32	unknown	MLA	Trawl	348		Wilson, 1979
57	28.00	N	14	45.00	W	57	31.00	N	14	44.00	W	5.69	unknown	MLA	Trawl	348		Wilson, 1979
57	29.00	N	14	44.00	W	57	25.00	N	14	44.00	W	7.47	unknown	MLA	Trawl	300		Wilson, 1979
57	32.50	N	14	43.00	W	57	30.50	N	14	44.00	W	3.87	unknown	MLA	Trawl	265		Wilson, 1979
57	33.50	N	14	47.00	W	57	31.75	N	14	49.00	W	3.83	unknown	MLA	Trawl	412		Wilson, 1979
57	34.00	N	14	40.00	W	57	34.00	N	14	54.00	W	14.04	unknown	FLL	Trawl	330-410		Wilson, 1979
57	36.00	N	14	30.92	W	57	36.50	N	14	28.20	W	2.88	Dead	IOS	Rock dredge	290		Wilson, 1979
57	36.60	N	14	29.10	W	57	35.70	N	14	29.20	W	1.68	live	IOS	submersible	256		Wilson, 1979
57	37.50	N	14	35.00	W	57	37.50	N	14	40.00	W	5.01	unknown	MLA	Trawl	329-348		Wilson, 1979
57	47.50	N	14	00.00	W	57	51.50	N	14	00.00	W	7.46	unknown	FLL	Trawl	132		Wilson, 1979
57	55.00	N	14	11.00	W	57	59.00	N	14	05.00	W	9.54	unknown	FLL	Trawl	219-247		Wilson, 1979
57	08.00	N	13	14.50	W	57	07.80	N	13	19.00	W	4.58	Dead	IOS	Rock dredge	269-234		Wilson, 1979
57	12.90	N	13	07.20	W	57	12.50	N	13	09.00	W	1.97	Dead	IOS	Rock dredge	245-265		Wilson, 1979
57	13.67	N	13	13.01	W	57	08.57	N	13	17.83	W	10.69	Live	MLA	Trawl	277-291		Shelton, 1980, Wilson, 1979
57	13.99	N	13	25.48	W	57	09.85	N	13	25.99	W	7.74	Dead	MLA	Trawl	217-220		Shelton, 1980, Wilson, 1979

start of trawl						end of trawl						trawl length (kms)	status of coral	collected by whom	equipment used	water depth (m)	sample number	reference
Latitude			Longitude			Latitude			Longitude									
57	15.46	N	13	21.40	W	57	11.22	N	13	23.01	W	8.07	Live	MLA	Trawl	200		Shelton, 1980, Wilson, 1979
57	16.00	N	13	19.00	W	57	14.00	N	13	22.00	W	4.81	unknown	MLA	Trawl	220		Wilson, 1979
57	23.00	N	13	25.00	W	57	23.00	N	13	32.00	W	7.05	unknown	FLL	Trawl	210-187		Wilson, 1979
57	28.45	N	13	19.71	W	57	28.50	N	13	19.84	W	0.16	Unknown	MLA	Video	213-212		Shelton, 1980, Wilson, 1979
57	33.00	N	13	57.00	W	57	32.00	N	14	02.00	W	5.35	unknown	FLL	Trawl	137		Wilson, 1979
57	46.00	N	13	15.00	W	57	50.00	N	13	17.00	W	7.72	unknown	FLL	Trawl	182		Wilson, 1979
57	47.50	N	13	34.00	W	57	50.00	N	13	37.00	W	5.54	unknown	FLL	Trawl	150		Wilson, 1979
57	54.00	N	13	54.00	W	57	56.00	N	13	58.00	W	5.45	unknown	MLA	Trawl	201		Wilson, 1979
57	59.00	N	13	30.00	W	58	01.00	N	13	23.00	W	7.87	unknown	FLL	Trawl	183-205		Wilson, 1979
57	23.00	N	12	56.00	W	57	26.00	N	12	57.00	W	5.68	unknown	MLA	Trawl	318		Wilson, 1979
57	26.00	N	12	58.00	W	57	24.00	N	12	59.00	W	3.86	unknown	MLA	Trawl	457-366		Wilson, 1979
56	02.00	N	15	24.00	W	56	04.00	N	15	16.00	W	9.16	unknown	FLL	Trawl	274-271		Wilson, 1979
56	10.00	N	15	09.00	W	56	12.00	N	15	05.00	W	5.60	unknown	FLL	Trawl	247		Wilson, 1979
56	16.11	N	15	11.05	W	56	15.64	N	15	12.02	W	1.34	unknown	DGR	Rock dredge	154-192		Wilson, 1979
56	20.50	N	15	14.00	W	56	15.00	N	15	06.00	W	13.21	unknown	MLA	Trawl	205		Wilson, 1979
56	29.00	N	15	03.00	W	56	28.00	N	14	50.00	W	13.56	unknown	MLA	Trawl	229		Wilson, 1979
56	30.00	N	15	00.00	W	56	30.00	N	14	52.00	W	8.26	unknown	MLA	Trawl	185		Wilson, 1979
56	45.00	N	15	00.00	W	56	43.00	N	14	56.50	W	5.18	unknown	IOS	submersible	223		Wilson, 1979
56	01.00	N	14	55.00	W	55	55.00	N	15	00.00	W	12.37	unknown	MLA	Trawl	375		Wilson, 1979
56	15.50	N	14	37.00	W	56	14.00	N	14	42.00	W	5.90	unknown	MLA	Trawl	278		Wilson, 1979
56	20.00	N	14	34.00	W	56	15.00	N	14	40.00	W	11.22	unknown	MLA	Trawl	256		Wilson, 1979
56	29.00	N	14	48.00	W	56	28.00	N	14	49.00	W	2.13	unknown	MLA	Trawl	192		Wilson, 1979
56	34.00	N	14	58.90	W	56	33.50	N	14	59.60	W	1.18	unknown	IOS	submersible	200		Wilson, 1979
56	35.30	N	14	52.30	W	56	35.30	N	14	53.30	W	1.03	unknown	IOS	submersible	183		Wilson, 1979
56	49.50	N	14	10.00	W	56	52.00	N	14	17.00	W	8.54	unknown	MLA	Trawl	183		Wilson, 1979
56	52.00	N	14	00.00	W	56	51.00	N	14	07.00	W	7.39	unknown	MLA	Trawl	183		Wilson, 1979
56	57.00	N	14	45.00	W	56	57.00	N	14	40.00	W	5.10	unknown	MLA	Trawl	183		Wilson, 1979
56	49.55	N	7	24.60	W	56	48.55	N	7	21.50	W	3.66	unknown	IGS	submersible	170	56-8/31 (SH218)	Wilson, 1979
54	10.00	N	11	30.00	W	54	20.00	N	11	40.00	W	21.57	unknown			400-1000		Le Danois, 1948
53	00.00	N	14	50.00	W	53	15.00	N	15	00.00	W	30.20	unknown			500-1000		Le Danois, 1948

start of trawl						end of trawl						trawl length (kms)	status of coral	collected by whom	equipment used	water depth (m)	sample number	reference
Latitude			Longitude			Latitude			Longitude									
53	27.36	N	14	26.12	W	53	28.28	N	14	24.79	W	2.27	unknown	CH11/81	dredge	895-900	C40	Scoffin and Bowes 1988
53	26.98	N	13	02.10	W	53	27.00	N	13	03.20	W	1.22	unknown	CH11/81	dredge	240-230	C35	Scoffin and Bowes 1988
53	27.04	N	13	01.76	W	53	27.26	N	13	01.87	W	0.43	unknown	CH11/81	TV	240	C35-C36	Scoffin and Bowes 1988
53	27.19	N	13	24.24	W	53	27.07	N	13	25.90	W	1.86	unknown	CH11/81	dredge	170	C36	Scoffin and Bowes 1988
53	34.58	N	13	08.10	W	53	34.52	N	13	06.86	W	1.38	unknown	CH11/81	dredge	220-225	C44	Scoffin and Bowes 1988
53	35.35	N	13	29.84	W	53	35.65	N	13	29.61	W	0.62	unknown	CH11/81	TV	220-225	C43	Scoffin and Bowes 1988
53	46.60	N	13	56.61	W	53	46.49	N	13	56.98	W	0.46	live	TTR7	dredge	457	TTR7-AT-41D	Wilson &Vina Herbon, 1998
52	49.92	N	15	00.19	W	52	49.56	N	14	58.83	W	1.68	unknown	CH11/81	dredge	1035	C17	Scoffin and Bowes 1988
52	00.02	N	14	14.13	W	52	00.98	N	14	12.61	W	2.51	unknown	CH11/81	dredge	350	C8	Scoffin and Bowes 1988
52	49.63	N	14	48.83	W	52	48.70	N	14	46.37	W	3.28	unknown	CH11/81	dredge	690-535	C18	Scoffin and Bowes 1988
51	40.42	N	14	59.95	W	51	40.34	N	14	58.63	W	1.54	live	CH11/81	dredge	875-845	C5	Scoffin and Bowes 1988
51	46.75	N	14	44.30	W	51	46.85	N	14	43.88	W	0.52	unknown	CH11/81	dredge	475-470	C6	Scoffin and Bowes 1988
51	52.35	N	14	32.60	W	51	52.95	N	14	31.17	W	2.00	unknown	CH11/81	dredge	370	C7	Scoffin and Bowes 1988

Listing of sites where *Lophelia pert*usa has been recovered or recorded

Latitude			Longitude			status of coral	collected by whom	equipment used	water depth (m)	sample number	reference
62	07.00	N	10	00.00	W	unknown	P. Mikklesen	Bottom trawl	-		Frederiksen et al., 1992
62	52.00	N	10	39.00	W	dead	L79	Bottom trawl	490	15	Frederiksen et al. 1992
62	00.00	N	9	45.00	W	unknown	P. Mikklesen	Bottom trawl	-		Frederiksen et al., 1992
62	02.00	N	9	08.00	W	unknown	J. Havgard	Bottom trawl	376-470		Frederiksen et al., 1992
62	03.00	N	9	00.00	W	unknown	P. Mikklesen	Bottom trawl	-		Frederiksen et al., 1992
62	03.00	N	9	30.00	W	unknown	P. Mikklesen	Bottom trawl	-		Frederiksen et al., 1992
62	59.00	N	9	23.00	W	dead	L79	Bottom trawl	483	94	Frederiksen et al. 1992
62	10.00	N	8	45.00	W	unknown	P. Mikklesen	Bottom trawl	-		Frederiksen et al., 1992
62	22.00	N	8	30.00	W	unknown	P. Mikklesen	Bottom trawl	-		Frederiksen et al., 1992
62	28.00	N	8	15.00	W	unknown	P. Mikklesen	Bottom trawl	-		Frederiksen et al., 1992
62	33.00	N	8	03.00	W	dead	L79	Bottom trawl	251	30	Frederiksen et al. 1992
62	38.00	N	6	10.00	W	unknown	CC		154		Wilson, 1979
62	49.00	N	6	46.00	W	dead	L79	Bottom trawl	439	33	Frederiksen et al. 1992
62	12.00	N	5	53.00	W	unknown	CC		159		Wilson, 1979
62	20.00	N	5	18.00	W	unknown	CC		166		Wilson, 1979
62	00.60	N	0	35.40	E	live	MV Oil Challenger	Trawl	300		John Hartley (pers comm)
61	10.00	N	9	10.00	W	live	J. Olsen	Trawl	235		Frederiksen et al., 1992
61	00.00	N	8	40.00	W	unknown	CC		101		Wilson, 1979
61	23.00	N	8	52.00	W	unknown	IPM		250		Wilson, 1979
61	30.00	N	8	35.00	W	unknown	P.Mikkelsen	Trawl			Frederiksen et al., 1992
61	40.00	N	8	30.00	W	unknown	P. Mikklesen	Bottom trawl	-		Frederiksen et al., 1992
61	55.00	N	8	45.00	W	unknown	P. Mikklesen	Bottom trawl	-		Frederiksen et al., 1992
61	20.00	N	7	50.00	W	unknown	P. Mikklesen	Bottom trawl	-		Frederiksen et al., 1992
61	30.00	N	7	50.00	W	unknown	S.Poulsen	Bottom trawl	250-300		Frederiksen et al., 1992
61	04.00	N	6	53.00	W	unknown	CC		146		Wilson, 1979
61	05.00	N	5	15.00	W	unknown	P. Mikklesen	Bottom trawl	-		Frederiksen et al., 1992
61	10.00	N	5	40.00	W	unknown	MS06		280	64	Jungerson, 1916; Frederiksen et al., 1992
61	15.00	N	5	15.00	W	unknown	P. Mikklesen	Bottom trawl	-		Frederiksen et al., 1992
61	20.00	N	5	40.00	W	unknown		Bottom trawl	300		Frederiksen et al., 1992

Latitude			Longitude			status of coral	collected by whom	equipment used	water depth (m)	sample number	reference
61	35.00	N	5	49.00	W	dead	L79	Bottom trawl	256	51	Frederiksen et al. 1992
61	40.00	N	5	40.00	W	unknown	P. Mikklesen	Bottom trawl	-		Frederiksen et al., 1992
61	43.20	N	5	42.80	W	dead	V90	Triangular dredge	260	620	Frederiksen et al. 1992
61	43.40	N	5	43.40	W	live	MH	Triangular dredge	260	279	Jensen & Frederiksen, 1992
61	55.00	N	5	45.00	W	unknown	P. Mikklesen	Bottom trawl	-		Frederiksen et al., 1992
61	10.43	N	1	38.12	W	dead	SOC	Box corer	248	53796#3	Bett 1997, Bett (pers comm)
61	18.23	N	1	32.09	W	live	SOC	Day grab	331	53797#5	Bett 1997, Bett (pers comm)
61	23.39	N	1	41.68	W	live	SOC	WASP			Bett 1997, Bett (pers comm)
61	03.25	N	1	40.07	E	live	Shell	Brent Spar	140		Ali Onder (pers comm)
60	22.00	N	13	04.00	W	unknown	MAF	Trawl	412		Wilson, 1979; Pawsey & Davis, 1924
60	23.00	N	13	05.00	W	unknown	CC		465		Wilson, 1979
60	23.00	N	13	09.00	W	unknown	MAF	Trawl	530		Wilson, 1979; Pawsey & Davis, 1924
60	24.00	N	13	00.00	W	unknown	MAF	Trawl	357		Wilson, 1979; Pawsey & Davis, 1924
60	26.00	N	13	02.00	W	unknown	MAF	Trawl	484		Wilson, 1979; Pawsey & Davis, 1924
60	28.00	N	13	09.00	W	unknown	DHI		464		Wilson, 1979
60	11.00	N	12	34.00	W	unknown	IPM		550		Wilson, 1979
60	19.00	N	12	48.00	W	unknown	MAF	Trawl	247		Wilson, 1979; Pawsey & Davis, 1924
60	19.00	N	12	52.00	W	unknown	MAF	Trawl	284		Wilson, 1979; Pawsey & Davis, 1924
60	21.00	N	12	59.00	W	unknown	MAF	Bottom trawl	326		Wilson, 1979; Pawsey & Davis, 1924
60	21.00	N	12	56.00	W	unknown	MAF	Trawl	278		Wilson, 1979; Pawsey & Davis, 1924
60	22.00	N	12	54.00	W	unknown	MAF	Trawl	284		Wilson, 1979; Pawsey & Davis, 1924
60	22.00	N	12	58.00	W	unknown	MAF	Trawl	302		Wilson, 1979; Pawsey & Davis, 1924
60	24.00	N	12	56.00	W	unknown	MAF	Trawl	357		Wilson, 1979; Pawsey & Davis, 1924
60	26.00	N	12	39.00	W	live	FLL	Trawl	247-197		Frederiksen et al., 1992
60	27.00	N	12	58.00	W	unknown	MAF	Trawl	446		Wilson, 1979; Pawsey & Davis, 1924
60	28.00	N	12	34.00	W	live	FLL	Trawl	234-302		Frederiksen et al., 1992
60	29.50	N	12	45.00	W	unknown	MAF	Trawl	412		Wilson, 1979; Pawsey & Davis, 1924
60	30.50	N	12	49.00	W	unknown	MAF	Trawl	457		Wilson, 1979; Pawsey & Davis, 1924
60	32.00	N	12	37.00	W	unknown	MAF	Trawl	375		Wilson, 1979; Pawsey & Davis, 1924
60	32.50	N	12	48.00	W	unknown	MAF	Trawl	452		Wilson, 1979; Pawsey & Davis, 1924
60	33.00	N	12	42.00	W	unknown	MAF	Trawl	448		Wilson, 1979; Pawsey & Davis, 1924

Latitude			Longitude			status of coral	collected by whom	equipment used	water depth (m)	sample number	reference
60	34.00	N	12	45.00	W	unknown	CC		487		Wilson, 1979
60	34.00	N	12	36.00	W	live	FLL	Trawl	301-338		Frederiksen et al., 1992
60	34.50	N	12	49.00	W	unknown	MAF	Trawl	485		Wilson, 1979; Pawsey & Davis, 1924
60	44.00	N	12	38.00	W	unknown	IPM		640		Wilson, 1979
60	12.00	N	11	50.00	W	dead	L79	Bottom trawl	432	73	Frederiksen et al. 1992
60	16.00	N	10	18.00	W	live	WH 74		1004-1020	897-174	Zibrowius, 1980
60	18.00	N	10	35.00	W	unknown	IPM		1000		Wilson, 1979
60	21.00	N	10	33.00	W	unknown	IPM		800		Wilson, 1979
60	26.00	N	10	28.00	W	unknown	IPM		360		Wilson, 1979
60	40.30	N	10	00.90	W	dead	V90	Triangular dredge	400-320	588	Frederiksen et al. 1992
60	48.50	N	10	48.00	W	live	J. Olsen	Bottom trawl	278		Frederiksen et al., 1992
60	50.60	N	10	40.70	W	dead	V90	Triangular dredge	350	594	Frederiksen et al. 1992
60	51.00	N	10	25.00	W	unknown	IPM		340		Wilson, 1979
60	12.00	N	9	37.00	W	dead	SMBA	Smith McIntyre Grab	950	95	SMBA cruise 10/76
60	33.00	N	9	10.00	W	live	J. Olsen	Trawl	216		Frederiksen et al., 1992
60	50.00	N	9	00.00	W	unknown	CC		102		Wilson, 1979
60	40.00	N	8	53.00	W	unknown	CC		123		Wilson, 1979
60	45.00	N	8	45.00	W	unknown	CC		110		Wilson, 1979
60	01.38	N	6	38.29	W	dead	BGS	vibrocore	400	60-07/12	
60	20.00	N	6	20.00	W	unknown	P. Mikklesen	Bottom trawl	-		Frederiksen et al., 1992
60	35.00	N	6	40.00	W	unknown	P. Mikklesen	Bottom trawl	-		Frederiksen et al., 1992
60	55.00	N	5	25.00	W	unknown	P. Mikklesen	Bottom trawl	-		Frederiksen et al., 1992
60	17.67	N	4	15.01	W	live	BP	ROV	400	Tape BP/96/KS/0044	Hurtside wreck
60	18.00	N	4	03.00	W	unknown	KC		174-256		Wilson, 1979
60	25.00	N	3	56.00	W	unknown	KC		384		Wilson, 1979
60	31.00	N	3	29.00	W	unknown	DHI, AHO		368		Wilson, 1979
60	35.00	N	3	08.00	W	unknown	KC		220		Wilson, 1979
60	42.60	N	2	55.50	W	unknown					L.Bullough pers comm
60	42.82	N	2	54.48	W	dead	HM 13/97	Triangular dredge	270		Roberts et al., in prep (Håkon Mosby cruise, 1997)
60	42.81	N	2	54.51	W	dead	HM 13/97	Van Veen grab	278		Roberts et al., in prep (Håkon Mosby cruise, 1997)
60	42.75	N	0	08.31	W	dead	BGS	cone dredge	92	60-01/23	BGS core descriptions

Latitude			Longitude			status of coral	collected by whom	equipment used	water depth (m)	sample number	reference
59	06.00	N	10	10.00	W	unknown	MRD	Dredge	630		Wilson, 1979
59	12.00	N	10	10.00	W	unknown	MRD	Dredge	500		Wilson, 1979
59	05.00	N	7	28.00	W	unknown	I, CC		219		Wilson, 1979
59	39.58	N	7	16.51	W	dead	BGS	vibrocore	1035	59-08/49	BGS core descriptions
59	55.00	N	7	05.00	W	unknown	MRD	Dredge	930		Wilson, 1979
59	21.00	N	6	30.00	W	unknown	CC		170		Wilson, 1979
59	41.00	N	6	12.00	W	unknown	KC		216		Wilson, 1979
59	43.40	N	6	28.90	W	dead	BGS	vibrocorer	282	59-07/293	Long, 1998; BGS core descriptions
59	45.00	N	6	24.00	W	unknown	KC		229		Wilson, 1979
59	45.70	N	6	11.20	W	dead	BGS	vibrocorer	341	59-07/284	BGS core descriptions
59	47.00	N	6	30.85	W	dead	BGS	shipek grab	274	59-07/271	BGS core descriptions
59	47.96	N	6	53.09	W	dead	SOC	Megacorer	996	54567#4	Bett, 1999
59	52.00	N	6	22.00	W	unknown	WH 74		420-675		Zibrowius, 1976 in Wilson, 1979
59	56.00	N	6	27.00	W	dead	HMS Porcupine in 1869		664		Zibrowius, 1980
59	57.48	N	6	45.17	W	dead	BGS	vibrocore	493	59-07/342	BGS core descriptions
59	32.78	N	1	32.23	E	live	SAMS	Beryl A	117		Murray Roberts (pers comm)
58	02.50	N	14	19.00	W	unknown	IPM	Trawl	300		Wilson, 1979
58	29.00	N	8	08.00	W	unknown	CC		183		Wilson, 1979
58	36.00	N	7	20.00	W	live	HMS Lightning in 1868		969		Carpenter, 1869; Zibrowius, 1980
57	17.00	N	14	45.00	W	unknown	IPM	Trawl	300		Wilson, 1979
57	36.65	N	14	29.69	W	live	IOS	submersible	256		Wilson, 1979b
57	42.00	N	14	08.00	W	unknown	IPM	Trawl	170		Wilson, 1979
57	42.10	N	14	26.80	W	dead	IOS	grab	275		Wilson, 1979
57	44.00	N	14	18.00	W	unknown			240		Dollfus, 1924
57	47.00	N	14	20.00	W	unknown	CC		232		Wilson, 1979
57	04.00	N	13	15.00	W	unknown	MLA	Trawl (circular)	403		Wilson, 1979
57	24.60	N	13	03.20	W	dead	MLA	Rock dredge	288		Wilson, 1979, Shelton, 1980
57	25.70	N	13	22.37	W	dead	MLA	Dredge	206		Shelton, 1980
57	27.20	N	13	22.91	W	dead	MLA	Dredge	200		Shelton, 1980
57	30.34	N	13	17.40	W	dead	MLA	Dredge	220		Shelton, 1980

Latitude			Longitude			status of coral	collected by whom	equipment used	water depth (m)	sample number	reference
57	30.42	N	13	17.40	W	dead	MLA	Rock dredge	220		Wilson, 1979
57	31.00	N	13	07.00	W	unknown	IPM	Trawl	250		Wilson, 1979
57	53.18	N	13	16.25	W	dead	IOS	grab	200		Wilson, 1979
57	54.90	N	13	52.30	W	unknown	IOS	submersible	158		Wilson, 1979
57	24.00	N	10	45.00	W	dead	EJJ	dredge	1500		Wilson, 1979
57	19.00	N	9	25.00	W	unknown	CC		497		Wilson, 1979
57	30.00	N	6	55.00	W	dead		Trawl	145-190		Gosse 1860, Wilson, 1979c
57	47.00	N	2	00.00	W	dead	DAK	trawl	150		Wilson, 1979
56	10.00	N	15	18.00	W	unknown	IPM	Trawl	225		Wilson, 1979
56	10.00	N	15	39.00	W	unknown	IPM	Trawl	300		Wilson, 1979
56	20.00	N	15	00.00	W	unknown	IPM	Trawl	220		Wilson, 1979
56	36.00	N	15	21.00	W	unknown	IPM	Trawl	350		Wilson, 1979
56	01.63	N	14	25.46	W	live	BGS	gravity core	1191	78/28/002	Hitchen & Cavill, 1998
56	01.63	N	14	25.44	W	dead	BGS	gravity core	1190	78/28/003	Hitchen & Cavill, 1998
56	22.00	N	14	29.00	W	unknown	IPM	Trawl	300		Wilson, 1979
56	25.00	N	14	58.00	W	unknown	IPM	Trawl	215		Wilson, 1979
56	33.60	N	14	59.40	W	live	IOS	submersible	183		Wilson, 1979b
56	33.80	N	14	59.10	W	live	IOS	submersible	200		Wilson, 1979b
56	36.00	N	14	12.00	W	unknown	MLA	Trawl (circular)	238		Wilson, 1979
56	55.00	N	14	20.00	W	unknown	CC		182		Wilson, 1979
56	41.00	N	13	39.00	W	unknown			300		Porcupine, 1869 in Zibrowius, 1980
56	42.00	N	13	58.00	W	unknown	IPM	Trawl	300		Wilson, 1979
56	20.00	N	8	00.00	W	live					SMBA Stanton Bank sample
56	52.00	N	7	21.00	W	dead	IOS	dredge	201		Wilson, 1979
56	55.00	N	6	15.00	W	live		Trawl	150		Fleming 1846, Wilson, 1979c
55	28.34	N	15	49.73	W	dead	TTR7	gravity core	870	TTR7-AT-68G	Wilson &Vina Herbon, 1998
55	28.78	N	15	50.07	W	live	TTR7	gravity core	684	TTR7-AT-67G	Wilson &Vina Herbon, 1998
55	34.64	N	15	38.67	W	live	TTR7	gravity core	598	TTR7-AT-56C	Wilson &Vina Herbon, 1998
55	34.65	N	15	38.67	W	live	TTR7	Kastencorer	590	TTR7-AT-60K	Wilson &Vina Herbon, 1998
55	35.00	N	15	37.23	W	dead	TTR7	gravity core	698	TTR7-AT-58G	Wilson &Vina Herbon, 1998
55	36.61	N	15	32.25	W	dead	TTR7	gravity core	657	TTR7-AT-63G	Wilson &Vina Herbon, 1998

Latitude			Longitude			status of coral	collected by whom	equipment used	water depth (m)	sample number	reference
55	36.75	N	15	31.88	W	dead	TTR7	Kastencorer	594	TTR7-AT-61K	Wilson &Vina Herbon, 1998
55	36.79	N	15	31.91	W	dead	TTR7	gravity core	604	TTR7-AT-62G	Wilson &Vina Herbon, 1998
55	11.00	N	11	31.00	W	unknown			2640		Joubin 1922a, b
55	55.00	N	9	05.00	W	unknown	CC		181		Wilson, 1979
54	05.00	N	12	06.00	W	unknown	SMBA	Trawl	785	17	Gage 1977
53	17.00	N	14	36.00	W	unknown	CH11/81	dredge	600	C30	Scoffin and Bowes, 1988
53	26.07	N	14	27.75	W	dead	BGS	gravity core	762	75/18/001	Hitchen & Cavill, 1998
53	45.39	N	14	00.22	W	dead	TTR7	gravity core	743	TTR7-AT-49G	Wilson &Vina Herbon, 1998
53	45.99	N	13	57.64	W	dead	TTR7	boxcore	783	TTR7-AT-43B	Wilson &Vina Herbon, 1998
53	46.48	N	13	56.71	W	live	TTR7	1 tonne gravity corer	685	TTR7-AT-51G	Wilson &Vina Herbon, 1998
53	46.54	N	13	56.83	W	dead	TTR7	Kastencore	689	TTR7-AT-44K	Wilson &Vina Herbon, 1998
53	46.55	N	13	56.83	W	dead	TTR7	boxcore	668	TTR7-AT-42B	Wilson &Vina Herbon, 1998
52	13.93	N	14	54.93	W	unknown	BGS	gravity core	746	74/21/002	Hitchen & Cavill, 1998
52	13.98	N	14	54.92	W	unknown	BGS	gravity core	738	74/21/001	Hitchen & Cavill, 1998
52	57.40	N	14	49.87	W	live	BGS	gravity core	712	74/1/001	Hitchen & Cavill, 1998
50	42.10	N	11	07.10	W	dead	IFREMER	manned submersible	724	Dive 36	Tudhope and Scoffin 1995
50	44.00	N	11	13.20	W	live	IFREMER	manned submersible	910-925	Dive 31, 40, 41	Tudhope and Scoffin 1995
49	26.00	N	11	36.30	W	unknown	SMBA	epibenthic sledge (1.75km tow)	845-870	50824#3	Gordon 1980

Collector codes

AHO	Admiralty / Hydrographic Office chart
BGS	British Geological Survey
CC	Close's chart
CH	RRS Challenger (cruise number)
DAK	Mr D A Kerr
DGR	Mr D G Roberts
DGU	Danish Geological Survey (now known as GEUS)
DHI	Deutsches Hydrographisches Institut chart
EJJ	Dr. E.J.W.Jones
FLL	Fisheries Laboratory Lowerstoft
HM	Håkon Mosby (year of collection)
IFREMER	French Institute of Research and Exploitation of the Sea
IGS	Institute of Geological Sciences (now known as BGS)
IOS	Institute of Oceanographic Sciences (now known as SOC)
IPM	Institut Scientifique et Technique des Pêches Maritimes chart
JH	Skipper J Havgard
JO	Skipper J Olsen
KC	Kingfisher chart
KJ	Skipper K Joensen
KT	Koralnes Trawler (year of collection)
L	Logos (year of collection)
MLA	Marine Laboratory Aberdeen
MAF	Ministry of Agriculture and Fisheries
MH	Magnus Heinason (year of collection)
MRD	Dr M R Dobson
MS	Michael Sars (year of collection)
PM	Skipper P Mikklesen
SAMS	Scottish Association for Marine Science
SMBA	Scottish Marine Biological Association (now known as SAMS)
SOC	Southampton Oceanography Centre
SP	Skipper S Poulsen
T	Tjaldrid (year of collection)
TC	Skipper T Christy
TTR7	TTR-7 cruise of R/V Professor Logachev
V	Valdivia (year of collection)
WH	Walther Hervig (year of collection)

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DEEP WATER CORAL DISTRIBUTION ON THE ATLANTIC MARGIN

Localities where *Lophelia pertusa* has been sampled or photographed

Legend

- Sites of dead coral
- Sites of live coral
- Sites of coral of unknown status
- Short trawls(<2km) recovering dead coral
- Short trawls(<2km) recovering live coral
- Short trawls(<2km) recovering coral – status unknown
- Trawl tracks recovering dead coral
- Trawl tracks recovering live coral
- Trawl tracks recovering coral – status unknown

Scale 1:2,000,000

0 40 80 120 160 200

Km

Universal Transverse Mercator Projection
Central Meridian 3°W

BGS Technical Report WB /99 /24

British Geological Survey

SCOTTISH ASSOCIATION FOR MARINE SCIENCE
Dunstaffnage Marine Laboratory

NORWAY

FAROES

SCOTLAND

IRELAND

Faroe Shetland Channel

Faroe Bank

Faroe Bank Channel

Wyville Thomson Ridge

Bill Bailey Bank

Lousy Bank

Rosemary Bank

George Bligh Bank

Anton Dohrn Seamount

Hebrides Terrace Seamount

Hatton Bank

Rockall Bank

Rockall Trough

U.K. / IRELAND