John Gage

Scottish Marine Biological Association Cruise Report

Dunstaffnage Marine Research Laboratory, Oban

R.R.S. Challenger Cruise No. 14B/75 12-20 Nov.

a. Main Objectives

Investigations and sampling of deep sea demersal fish populations using a bottom trawl and of deep sea pelagic populations using a rectangular midwater trawl.

Studies of the deep sea and shelf benthos using an epibenthic sledge, a large box corer, a Craib corer, a multiple corer and a Shipek Series 700 deep sea camera.

b. Geographical area.

Shelf Station. 56° 01.5'N 07° 39.2'W (148 metres). Ten Craib core samples and one bottom water sample. One camera trial.

Fishing Station 1. Bottom trawl towed from 56°22.73'N 09°11.78'W (depth 700 m) to 56°34.55'N 09°11.52'W.

Fishing Station 2. Bottom trawl from 56° 19.14'N 09° 23.22'W (depth 1000 m) to 56° 35.37'N 09°20.95'W.

Hebridean Terrace station Box corer trial at 56° 36.40'N 09° 36.32'W.

Deep Station 1. 55° 03.5'N 12° 03.5'W, depth approx. 2,900 m. Multiple corer.

Deep Station 2. 54° 40'N 12° 16'W, depth approx. 2,900 m. Dhan buoy laid. Epibenthic sledge and large box corer. Camera trials.

Table 1.

Distribution of shiptime

Epibenthic sledge work	28.75 hrs
Rectangular Midwater Trawl	19.50 hrs
Coring	16.25 hrs
Trawling (Otter)	12.75 hrs
Box corer trials	3.75 hrs
Camera trials	3.75 hrs
Laying dhan buoy	1.75 hrs
Total scientific working time	86.50 hrs
Hove-to in bad weather	24.50 hrs
Total steaming time, on passage and between stations	79.00 hrs
Total cruise shiptime	190.00 hrs

BOOK ..

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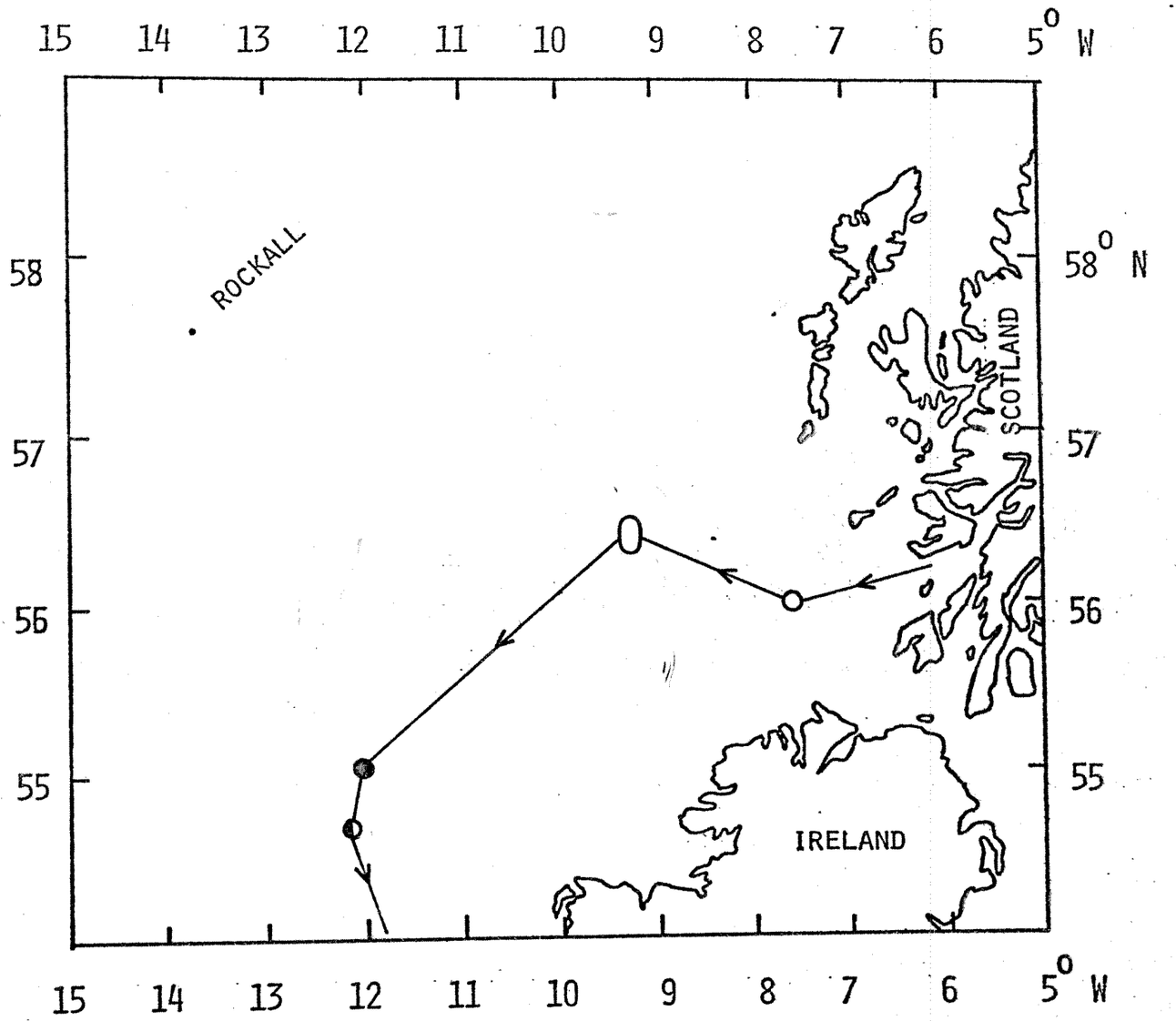
STATION POSITION LOG

Station No. 474/SLEDGE (2) Date 16.11.75 Decca 3B. Time from 0700

Time	Log	POSITION Lat. N	Long. W	Method of Determination	WIND Dir. from	Speed Kts.	Weath. and Vis.	WAVES Dir. from	Period secs.	Height ft.	Corrected Barometric Press. mbs.	TEMPERATURE Dry Bulb	Wet Bulb	CLOUD Type	Amt.	REMARKS AND GEAR USE
		° '	° '				6c ✓	R	G	P		Dm	11.8			
0700	216.4	54 44.5	12 20.5	Decca	360	25	9 7	15.2	47.4	69.9	1023.7	9.0	8.8			Home to
24	✓	L						✓	✓	✓						Sledge o/b.
0901		47.85	18.47					15.0	47.0	71.6						On bottom
1000								14.7	46.4	71.5						Comm hauling
1208	221.93	54 50.58	12 18.60	SAT NAV				B 14.3	C 45.3	E 74.3						Pinger aboard.
1216	227.10	54 50.79	12 18.61	—	000	22	6c 9 8	14.4	45.2	72.6	1025.3	8.5	7.7	CL	3.	Sledge aboard. Effecting
1509	225.16	54 54.16	12 17.55	—	345	20	6c 9 8	13.7	43.7	77.1						Sledge overside (3)
1516	225.33	54 54.35	12 17.93	—				13.7	43.9	77.2	1024.9.	8.4	6.5	Cm 3 CL 2	5 2	Weights attached. 100m
1630	226.9	56.18	18.32	✓				13.3	42.8	78.6						2850 m. out.
1654	227.17	56.31	18.99	✓				13.06	42.78	78.92						On Bottom
1746	228.6	58.25	20.20	✓				12.5	42.1	50.1						Comm recovering
2000	231.6	55 01.93	12 22.09	✓				11.7	40.6	53.0						Sledge 1/B.
2009		02.11	22.10	✓				12.05	40.6	53.4						Inboard
		~~56.66~~	~~21.26~~	✓				~~12.7~~	~~41.9~~	50.5						
2046		56 58.66	12 21.20	✓				12.7	41.9	50.5.						Co-ord o/b. 6.175° T. S
49		56 58.57	12 21.24	✓				12.8	42.1	50.4						Not shot. Spd. 2.0kts. Paying
2146		56.75	20.82	✓				13.3	42.7	78.8						2000m.
49		56.55	21.16	✓				13.4	42.3	78.6						Comm. hauling Spd. 1.5kts



○ SHELF STATION

O FISHING STATIONS

● DEEP STATION 1

◐ DEEP STATION 2

BOOK No

STATION POSITION LOG

Station No. 470 / Box Corer Date 13/11/75. Cruise 14/B Time from 20

Time	Log	POSITION			WIND		Weath. and Vis.	WAVES			Corrected Barometric Press. mbs.	TEMPERATURE		CLOUD		REMARKS AND GEAR USE
		Lat. N	Long. W	Method of Determination	Dir. from	Speed Kts.		Dir. from	Period secs.	Height ft.		Dry Bulb	Wet Bulb	Type	Amt.	
							0							Cc.		
2106		56° 35·98	09° 34·05	SAT. NAV.	205	18	96	210	3	3	1018·8	11·1	10·7	6	8	v/l on station. Hdd to wind
2115		35·98	34·05		Decca		Red	12·32.	Green		39·92	Purple	0J56·70			Corer 0/B.
2117		35·98	34·05													Stn @ 10 on to Mark wire.
2119		35·98	34·05													Paying out @ 25 m/min
2135		35·99	35·31	SNav Fix												SAT NAV. Fix.
2159		36·40	34·32	— " —												— " —
2205.		36·40	34·32													Corer on bottom. Comm. haul
2232		36·40	34·32													Wire on deck-head
2233		36·40	34·32													Corer inboard.
2236		36·40	34·32													Comp'd station

Rectangular midwater trawl (RMT) tows were made before and after Deep Station 2.

c. Personnel

P.R. Barnett, S.M.B.A

J.D. Gage S.M.B.A.

J. Gordon S.M.B.A.

Miss H. Grigg S.M.B.A.

J. Watson S.M.B.A.

J. Cleverly N.E.R.C. Headquarters, London.

R. Lightfoot. University of Newcastle.

Dr Shelagh Smith, Royal Scottish Museum, Edinburgh.

d. Sea and weather conditions

Very good for the first three days of the cruise with easterly winds, force 4 - 6, and little swell. Thereafter the weather deteriorated for two days with N to N.W. winds force 7 - 9 which prevented work for most of the 16th and part of 17th November, with a heavy swell. Work continued on the 17th and 18th with reduced westerly winds force 5 - 6 and a decreasing swell.

e. Conduct of the cruise, scientific equipment operation and handling.

The cruise was generally very successful. Craib core sampling of the hard sand bottom of the shelf station was carried out from 2200 hrs 12th November until 0100 hrs 13th November and was completed without any problems. The hydrographic winch worked very well and was operated with skill. At the same station the Shipek deep sea camera, on loan from I.O.S., Barry.

BOOK No

STATION POSITION LOG

Station No. 473 / Sledge (1) Date 15.11.75 Dana 3B. Cruise 14/B. Time from 163

Time	Log	POSITION			WIND		Weath. and Vis.	WAVES			Corrected Barometric Press. mbs.	TEMPERATURE		CLOUD		REMARKS AND GEAR USE
		Lat. N	Long. W	Method of Determination	Dir. from	Speed Kts.		Dir. from	Period secs.	Height ft.		Dry Bulb	Wet Bulb	Type	Amt.	
							0	R	G	P						
1630	179.6	54 40.50	12 19.22	✓	330	20	97	14.1	31.0	67.0	1006.0	Dh	NAV			Epibenthic Sledge O/B
1806	180.9	41.49	20.09	✓	340	25		16.0	30.8	67.9		130	+0.65			Sledge on bottom
30	181.1	41.56	19.91	✓				16.1	30.8	67.9		160	+2.72			
1900	181.5	41.67	17.85	✓	340	30		15.9	30.6	67.8		173	+2.6			A/c Cont To 340°- Wind
2000	182.1	42.06	16.69	✓				15.9	30.6	67.4		182	+2.81			Comm recovery Sledge
2042	182.5	40.02	16.07					15.2	30.4	67.7		-	-			
48		42.04	15.80													Pumps inboard
49		41.38	13.51	Fix.												On surface
54		41.39	13.52													SAT NAV. Fix.
2200		54 39.55	12 17.66													Sledge 1/B Steaming to N
2201		54 39.54	12 17.55	Fix												Dahn buoy search abandon
2328		40.25	17.52													Sledge O/B G. 330°T
0034	187.89	54 41.09	17.09		340	30		15.5	30.6	67.1				CL	8	Sledge on bottom
140		54 42.89	12 16.78		340	27	be	15.3	30.2	67.8				CL	4	Comm. heaving.
0309	190.68	44.74	18.75		330	35	97	14.8	47.7	68.6						SAT. NAV. FIX.
0344	190.79	44.35	18.86	Sat Nav	325	25		15.0	47.7	68.5				CL	4	Chain weights aboard
0316																Sledge aboard.
																A/c Have to Engine trouble.

for the cruise, was tested and found to work satisfactorily. This was particularly gratifying since the same camera on the two previous S.M.B.A. biological cruises in July and September had failed to work at all on the sea-bed. The modifications and improvements made by I.O.S., Barry to the cables and plugs appear to have solved the problem and photographs of the sea-bed were obtained at this station.

The fishing programme was carried out between 0812 and 2003 hrs 13th November and was completed without any difficulties. The hauls were very successful; indeed the first haul provided more fish than similar hauls on previous S.M.B.A. cruises this year. Furthermore, there were several species of fish which had not been recorded on the previous cruises. The success of the fishing was particularly pleasing since this now completes Dr Gordon's seasonal series of trawls at these stations.

The large box corer was tested immediately after the fishing in a depth of 1426 m. The sampler failed to operate because a safety release device had been inadevertently fitted with shear pins rated for a depth greater than 1610.m.

During the passage from the Hebridean Terrace to the first deep station a P.D.R. profile was recorded along a transect extending across the continental slope.

The multiple corer, fitted with the Shipek 700 camera, was used at the first deep station between 1318 hrs 14th November and 0200 hrs 15th November. Halfway through the first cast an updating of the satellite navigator revealed

that the ship was five miles off the correct position. The cast was completed successfully with four good cores but the ship's position was then corrected. This was important because the coring on this cruise was the fifth in a seasonal sampling series which has continued since May of this year. Five successful coring casts were then made at the correct position followed by one blank haul and a final haul with only two cores out of a possible four. The blank haul was due to the combination of an error in the ship's wire-out metering system (see f. Ship's performance) and a mistake in interpreting the pinger trace on the P.D.R. The meter reading indicated 2,900 m of wire-out (also the water depth) when the corer was still 700 m above the bottom. Evidently one should not rely entirely on the ship's wire metering system. The final corer cast returned four good cores to the surface but two of the Mills core catchers had failed to close at the bottom of two core tubes. When the multiple corer hit the stern violently during the recovery, the mud cores in these two tubes dropped into the sea and were lost. The core catchers on this corer are obviously of a very unreliable design and will be changed before the next Challenger cruise. Throughout the multiple coring, the Shipek Series 700 camera had been attached to the corer framework and it obtained good photographs of the core tubes entering the soft ooze bottom. The photographs have provided very useful information on the performance of this new design of corer as a result of which some modifications will be made.

BOOK No

STATION POSITION LOG

Station No. 477/Box Corer Trials Date 18.11.75 Decca 3B Time from

Time	Log	POSITION Lat. N	Long. W	Method of Determination	WIND Dir. from	Speed Kts.	Weath. and Vis.	WAVES Dir. from	Period secs.	Height ft.	Corrected Barometric Press. mbs.	TEMPERATURE Dry Bulb	Wet Bulb	CLOUD Type	Amt.	REMARKS AND GEAR USE
							bc	R	G	P		Sea	12.0	CH3	4/8	
0548	247.2	54° 45.0	12° 09.0	Decca	300	18	98	14.9	47.2	69.0 ~~77.0~~	1020.0	11.7	11.2	CU4	2/8	Box Corer O/B.
52																Ranging on
53								14.9	47.1	68.9						Lowering away.
0636								15.0	47.2	68.8						On bottom
37								✓	✓	✓						Comm. recovery
44								14.9	47.3	68.7						Stop Hoving — Lower
0700		54 46.29	12 17.94	Sat/Nav				15.0	47.3	68.9						On bottom — Comm. recovery
57								15.1	47.4	69.0						Ranging up
0806	248.2							15.3	47.3	69.1						Comm. O/B Comm. S/T
0810 ~ 0840		Dahn buoy search — abandoned — no sign														
								Red. B	Grn. D	Pink. E						
		478/RMT														
1000	264.1							17.6	36.8	54.6						V/L on station RMT mag
04								✓	✓	✓						Cod-end shot.
06								17.6	36.8	54.3						Net shot. Spd. 2.0 kts.
1101	266.0							18.1	37.6	52.3						Stopped paying out
07	266.3							15.1	37.6	52.1						Hauling in 1.5 kts.

Two successful tows with the rectangular midwater trawl (RMT) were made between 0230 hrs and 1300 hrs, 15th November, as part of the continuing series of seasonal samplings of the bathypelagic communities.

The dhan buoy was then laid at Deep Station 2 between 1335 and 1516 hrs to mark the station as a prelude to the epibenthic sledge and box corer work. Two epibenthic sledge hauls were then made until 0315 hrs 16th November when engine trouble and an increasingly strong wind and heavy swell prevented further work. The first epibenthic sample contained very few organisms whilst the second haul was empty. It then became apparent that the door closing mechanism on the sledge had been closing during the descent to the bottom instead of immediately prior to heaving off the bottom. With the vessel hove-to because of bad weather, the opportunity was taken of testing the wire safety shear pins of the firing mechanism at various depths using the hydrographic winch. The wire used previously had been thought capable of withstanding shear by waterpressure alone on the piston assembly of the gate release mechanism to depths greater than the sampling depth. The wire was supposed to shear only when a timer activated cartridge fired. The tests showed that the wire sheared at about 2,200 m depth although the depth being sampled was 2,900 m. Heavier gauge wire and brass pins were then tested to bottom depth without overpressure shear and when the swell had moderated sufficiently two further sledge hauls were made between 0700 hrs, and 2009 hrs, 17th November. In the first haul the new shear pins appeared to have worked correctly and the door

to have closed at the correct time, although the catch which locks the door shut had failed to operate. Unfortunately, the sledge was recovered damaged with a large hole in the collecting bag due to chafing on the damaged part of the sledge. Hurried repairs were carried out and an alternative, improvised locking catch was fitted to the sledge to prevent the closed door from opening and shutting whilst surging during recovery. The fourth and final sledge haul proved to be the most successful. A washed though rich sample of bottom faura was obtained despite the fact that the door closing release cartridge had failed to operate owing to battery failure. The sledge had been recovered with the door still locked in the open position. Unfortunately the bad weather during the epibenthic sledge work carried away the dhan buoy. Despite careful radar watch there was not further sign of the buoy.

Two further successful RMT 7 tows were then made between 2046 hrs 17th November and 0230 hrs 18th November and were followed by trials with the Shipek camera in which a series of photographs of the seabed were made at this station. The camera appeared to work very satisfactorily and the first photographs show evidence of a bottom current at this part of the Rockall Trough.

A second box corer trial was then carried out between 0548 and 0806 hrs, 18th November, and although the release mechanisms had all worked correctly and the corer had closed, it was recovered completely empty. One of the difficulties had been further trouble with the main wire metering when, as with the

multiple corer previously, the corer had been lowered to within 700 m of the bottom and the winch stopped on the mistaken impression that the gear was on the bottom. There was no characteristic reduction of tension meter load, as occurs when the corer lands on the bottom. The corer was then lowered again, this time to the bottom following the pinger trace on the P.D.R. It is thought that the closing mechanism almost certainly released whilst the corer was suspended 700 m above the bottom.

The ship then commenced steaming for Barry, although soon afterwards the opportunity was taken of a final RMT tow at reduced speed between 1000 hrs and 1217 hrs.

Table 1 shows the distribution of shiptime on various aspects of the cruise.

Out of a total shiptime of 190 hours 45.5% was spent sampling, 13% was lost through bad weather and 41.5% was spent steaming. Considering the distances involved and the time of year, the 86.5 hours spent on scientific work was considered to be very good and contributed greatly to the success of the cruise.

f. Ship performance.

There is no doubt that Challenger is now a much more reliable vessel than previously. Firstly, it is a relief to be able to rely on sailing dates and times in complete contrast to earlier cruises. Secondly, the ship itself appears to be much more reliable.

The deck crew is now much improved and we particularly appreciated the help and organisation of the new bo'sun, Mr Carew. Despite the automatic pilot being out of action and

the fact that for most of the time one deckhand was tied up with steering, there was never any hold-up in the scientific programme. Indeed, the help we received on deck was far better than on previous cruises.

Yet again, the fishing and RMT programmes owe much of their success to the fishing skipper Mr Dunning.

Throughout the vertical wire work we were very impressed by the ship's station keeping. The satellite navigator is proving to be very valuable for this type of work.

The new control room is clearly very much better and far more convenient although some improvements will be suggested later, and there are a number of other criticisms which will be dealt with in the next section.

The catering continues to be excellent in every way.

We were very impressed and grateful for the help we received from the ship's officers, the engine room staff, bo'sun and deckhands. The Chief Engineer, Mr Johnson, anticipated problems with the wire metering equipment, and recommended marking the main wire. This proved to be invaluable advice.

Finally, it is a pleasure to record with gratitude the valuable and ready help, co-operation and advice we received from Captain Maw. We found this outstanding and without it the cruise would not have been so successful.

g. Criticisms and recommendations.

1. The wire-out metering equipment is very unreliable, particularly at payout speeds in excess of about 25 m/min. Despite the notorious unreliability of this type of equipment

we strongly recommend that something more reliable be installed on Challenger.

2. The main wire on Challenger should be marked at appropriate intervals to allow for and to check the metering equipment. It should be possible to do this using the methods of the trawling industry.

3. There is a strong case for improved control of the wire payout speed. The present 'notch' system is too inflexible and does not allow maintenance of constant wire speeds because of the increasing or decreasing radii of the winch drums according to the number of wire layers.

4. We very strongly recommend that the wire metering system generally be improved. Slave displays should be provided next to the P.D.R. Furthermore, experience during several Challenger cruises has clearly shown a need for the facility for recording wire-out, speed of payout/hauling in and tension on a chart recorded. This facility is particularly important for the tension gauges. It would greatly assist in the handling of gear on the bottom, particularly during vertical wire work.

5. The lighting is very poor for people following the P.D.R. trace. There are irritating reflections from the Perspex scale when trying to follow the latest information received by the P.D.R. from the bottom or from pingers. Perhaps a strategically positioned spotlight would help?

6. The signal received by the P.D.R. fish is now weaker than that picked up by the hull transducer. The cable from

the P.D.R. is still badly chafed at one point, as was first reported following Cruise 7B/75 in May. This means that the fish cannot be towed for prolonged periods and has to be launched as required. The fish is mainly required during bad weather to improve on the hull transducer but is much more difficult to launch in rough conditions. Thus, provision of a satisfactory cable would allow the fish to be towed throughout a cruise and to be more independent of weather conditions.

7. We did not know that the P.D.R. had been changed from the metric to fathoms version. I accept full responsibility for not having checked this prior to the cruise but would strongly recommend that in future, instructions to Senior Scientists should clearly state that this type of equipment needs to be specified prior to the cruise. I was under the mistaken impression that the P.D.R.'s on Challenger had been standardized as the metric type and that this type was aboard as a standard piece of ship's equipment. Apparently this is not the case. It is provided by I.O.S., Barry and not by R.V.B. The distinctions between the two are not always obvious to outsiders and some clear guidance would be a great help in future and could prevent the occasional abortive cruise. It was only by good fortune and the foresight of one member of the scientific party that we happened to have one fathom pinger on board which was used throughout the cruise. Without it, much of the vertical wire and epibenthic sledge work would have been very difficult or even impossible.

8. It is essential that something is done to improve the clearance between the 'A' frame centre block and the stern rail. Since the previous cruise in September the multiple corer had been reduced in height by ten inches in an attempt to make the launching easier. Ten inches was the maximum reduction in corer height without altering the performance. Although, on this cruise, corer launching was considerably easier, the sampler still has to be heaved up close to the centre block, which does not allow any error in winch handling. It is almost inevitable that this could be the cause of the main wire parting on some future occasion. In a previous report (Cruise No. 7B/75) I referred to this problem and asked whether or not it would be possible to raise the sheave of the centre block in some way to gain more height. Perhaps this aspect could now be investigated to provide a satisfactory answer? Perhaps the best answer would be to redesign the stern rail so that it can be removed at sea for vertical main wire work? Not only would this improve the handling of the multiple corer, it would also make the task of launching and recovering the heavy box corer much easier.

9. Larger blocks and extended block brackets are required on the inner sides of the 'A' frame. This would allow otter trawling to be carried out without having to shackle and unshackle the boards during the lowering and hauling of the nets. At present this part of the job is time consuming and rather hazardous, with two large boards swinging on the sides of the gantry.

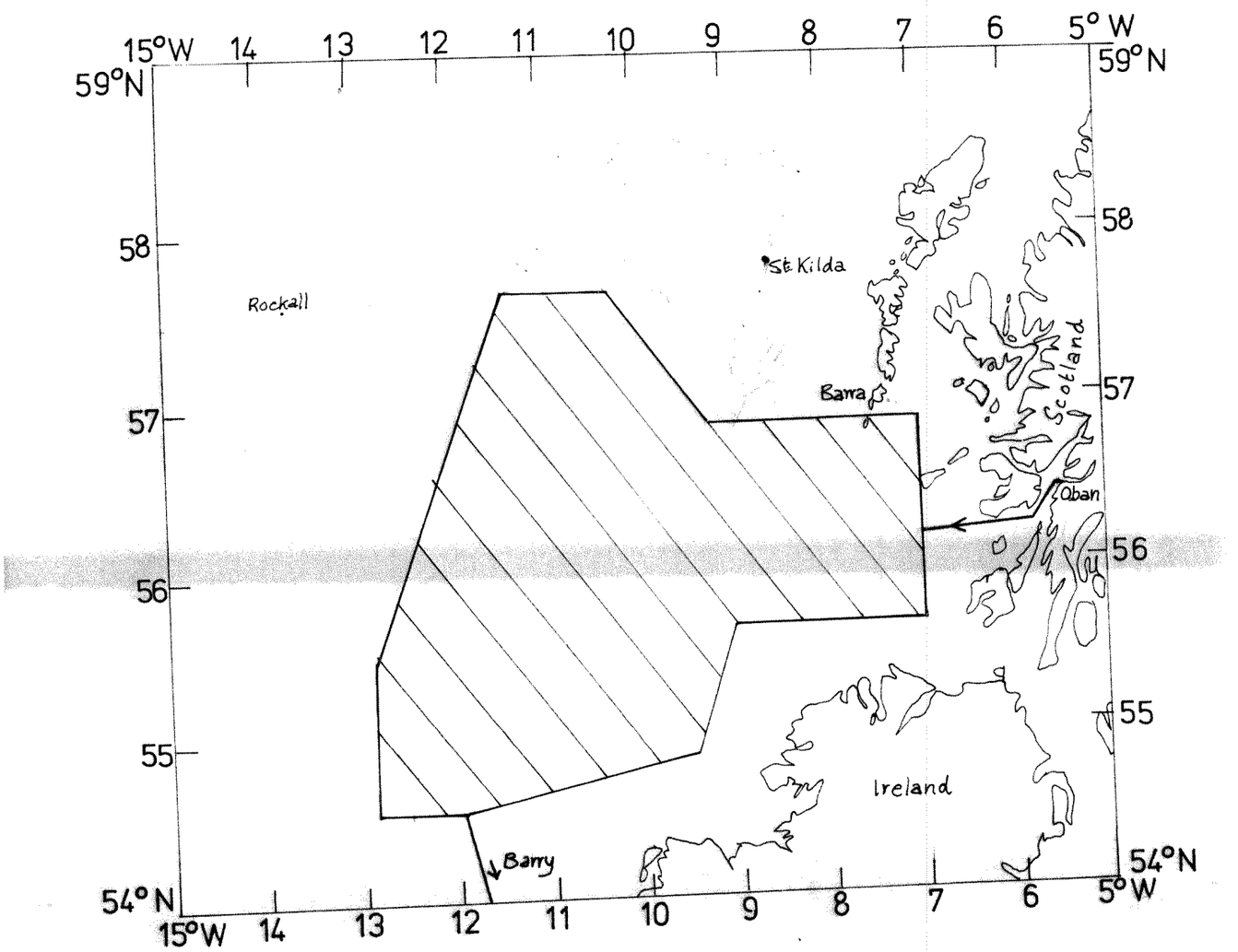
10. The scientific workshop continues to be a problem with the disappearance of tools, although it is difficult to know how to solve this question.

11. There were continual complaints from the scientific party about fumes on the afterdeck, when the ship was lying head to wind. This has always been a complaint on Challenger cruises.

Finally, we would like to acknowledge gratefully all the help we have received from R.V.B. and from I.O.S. Barry during the planning stages of the cruise and for all the willing help and advice following our return to Barry.

Peter Barnett.

Peter Barnett.
27th November 1975.



Proposed working area Challenger cruise 14B/75

November 12-20

CHALLENGER CRUISE 14B/75 (Nov 12-20th 1975)

EPIBENTHIC SLEDGE AND SPADE CORER WORK (in order of priority)

1) Two good epibenthic sledge hauls from approx. 54°40'N 12°16'W, depth ca. 2900m.

Exact starting position will depend on ship's heading when towing (ie on wind and sea conditions at the time) so as to best follow track of a haul made on Challenger's cruise 14/73. The 'net over' and 'net on-board' positions of this (1973) haul were 54°42.3'N 12°15.3'W to 54°35.8'N 12°19.0'W.

Time required for each haul:- 5 hrs (allowing wire pay-out of ∿ 30m/min, a one-hour bottom tow and heave-in at ∿ 20m/min). Time for at least one extra haul should be allowed to allow for a blank haul. Total time required would then be 16 hrs, allowing a 0.5-hr turnaround between hauls.

Manpower required (exclusive of that needed to put gear over side and get it back inboard) will be at least two persons in the control room, one of them constantly monitoring strain gauge and the other manning the PDR. It would be helpful if stints of strain gauge monitoring are alternated with someone else. For sample washing two persons, one of them experienced in the technique, are required. A large sample may require several hours to wash and it would then be helpful for another pair of washers to take over halfway.

2) Spade Corer Work:- up to six satisfactory spade corer hauls from 54°39.8'N 12°15.9'W. Because of modification made to the gear the first haul will be somewhat experimental, and modification work may be necessary (as well as usual small repairs) before the next haul. But assuming all goes well, the separate drops and recoveries should not take longer than 1.5 hrs each. Total time required would then be 11.5 hrs, allowing approx. 0.5 hr for removing full box and replacing it with empty one, and the other deck manipulations, between hauls. As for the epibenthic sledge work, help with the washing would be appreciated.

3) Contingency sampling

a) It would be helpful if time were allowed for a spade corer drop either on the shelf at the crab corer station, or else at ca. 1000m on the Hebrides Terrace after the fishing. An early trial of the spade corer would then allow time for any modifications to be made whilst on passage to the deep station(s) rather than possibly wasting ship time when occupying the deep stations.

b) I would also be interested in obtaining deep water box cores from other positions (depths) on the Hebrides Terrace, and on the Porcupine Bight (between latitude 52 - 53°N, longitude 12 - 13°W).

John D. Gage

John Gage

Reference P12/14B/75

R.V.B. SAILING INSTRUCTIONS

R.R.S."CHALLENGER" : CRUISE 14B/75 : 12-20 NOVEMBER, 1975

To The Master

1. Ship's Programme

(a) R.R.S."CHALLENGER" is to sail from Dunstaffnage on Wednesday 12 November with members of the Scottish Marine Biological Association and the Royal Scottish Museum, Edinburgh, for a biological cruise in the North East Atlantic, as required by the Senior Scientist (See attached plan). The Secretary to Council (Mr.R.J.H.Beverton, CBE, FRS) will also embark for this cruise.

The outline programme is given below:-

(b) Wednesday 12 November p.m. - Sail Dunstaffnage.
Thursday 20 November 1800 - Arrive Barry

2. Scientific Equipment

(a) The requirement is to continue seasonability studies into the deep water benthos and meiobenthos, demersal fish and midwater plankton populations. Methods of sampling will include trawling and dredging. A Dan buoy will be laid from 14-18 November in position 55° 03.5'N 12° 03.5'W in a depth of 2900 m.

(b) SMBA equipment will be loaded in Dunstaffnage during the afternoon of Wednesday 12 November, and unloaded in Barry.

3. Scientific Party

(a) From the Scottish Marine Biological Association, Dunstaffnage:

Dr.P.BARNETT Senior Scientist
Dr.J.GORDON
Dr.J.GAGE
J.WATSON
MISS H.GRIGG.

From the Royal Scottish Museum, Edinburgh :-

Dr.SHELAGH SMITH

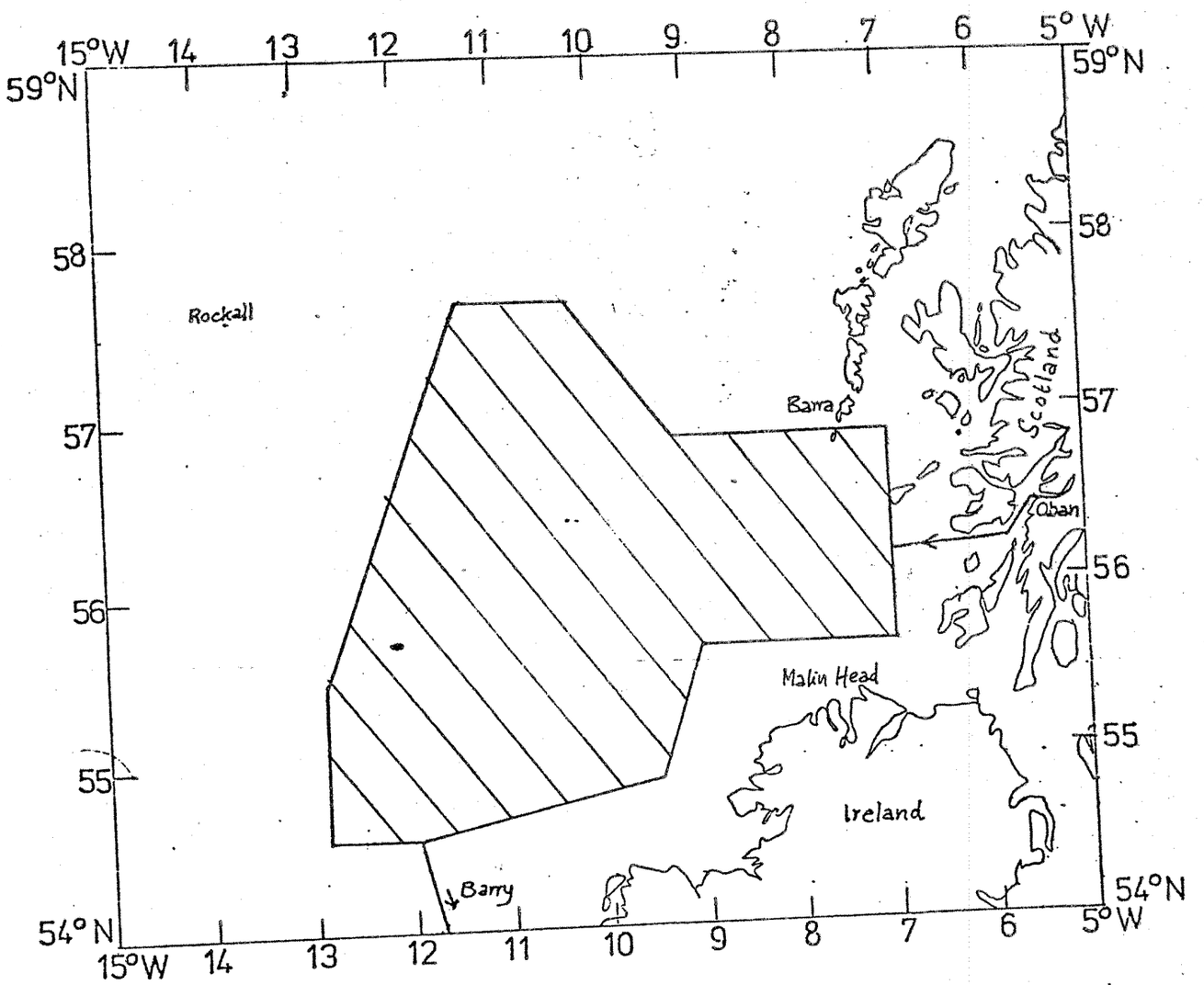
From the Headquarters, Natural Environment Research Council, London :

R.J.H.BEVERTON
J.CLEVERLY

(b) Scientific personnel will embark in Dunstaffnage on Wednesday 12 November, and disembark in Barry.

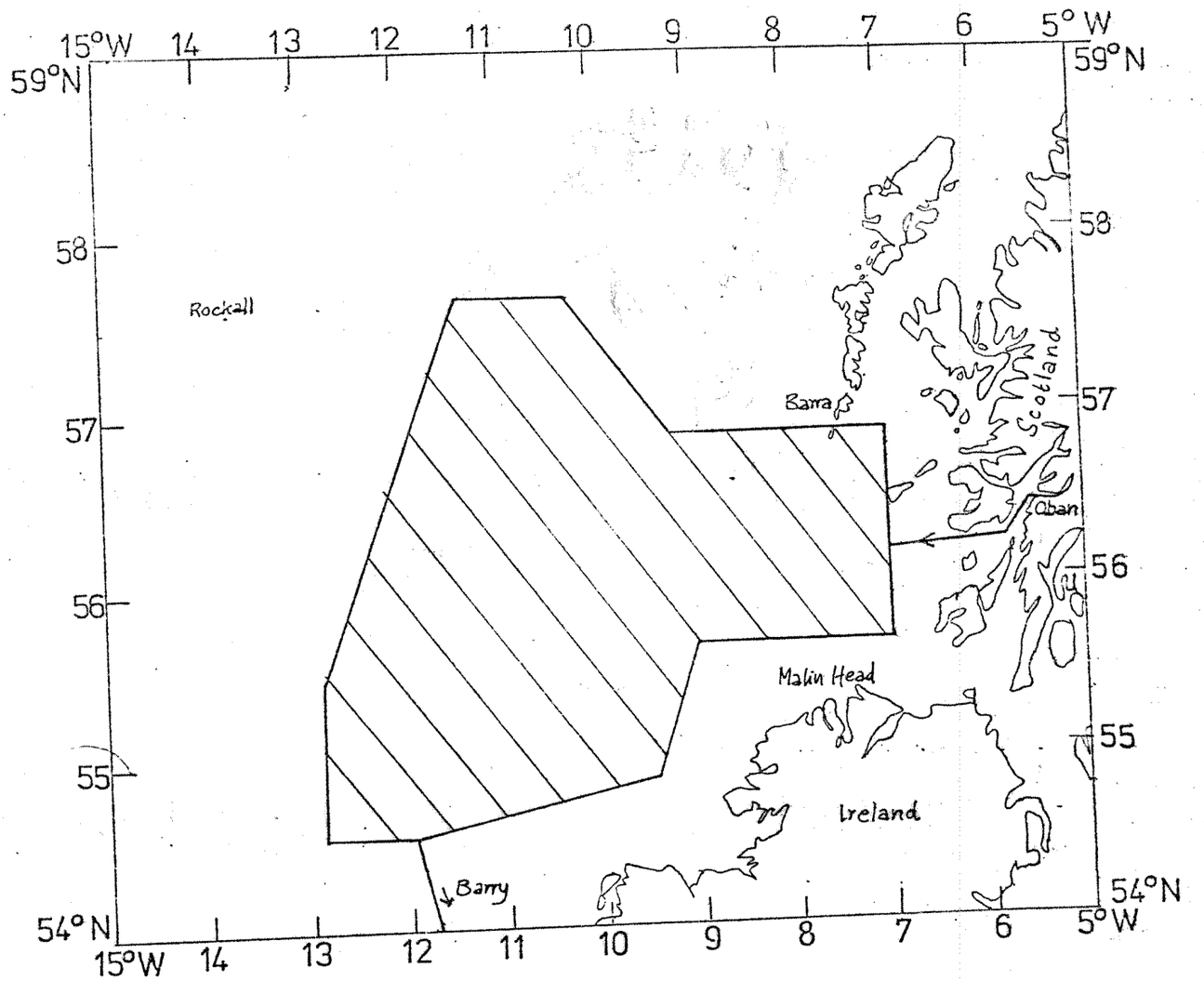
(D.M.H.Stobie)
DIRECTOR

3rd November, 1975



Proposed working area Challenger cruise 14B/75

November 12-20



Proposed working area Challenger cruise 14B/75

November 12-20