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FRV *Scotia*

Cruise 1209S

Report

Dates: 3-28 September 2009

Project Codes: MF01TA 26 days

Half-landing: Ullapool 16 September

Part 1: Rockall Haddock Survey**,** 3 – 12 September

Personnel:

Marine Laboratory staff

F Burns (SIC)
F Neat
R Kynoch
J Drewery
M Gault
A Jaworski
D Bova
C Shand
A Weetman

Visitors

T. Cope (JNCC)

Objectives:

1. Routine daylight survey of the Rockall Plateau to assess the haddock stock within the 200 meter depth contour. Identify, quantify and record all other fish species encountered during the survey.

2. Opportunistic Habitat and Nephrops TV observation work on the plateau and flanks of Rockall bank to depths of 900 m using the drop frame.

3. Obtain temperature and salinity data from the surface and seabed at each trawling station using a Seabird 19+ CTD.

4. Identify, quantify and record all benthic invertebrate species caught.

5. Collect additional biological data on selected species for the DCF.

Narrative

Scotia sailed from Aberdeen at 1000 hours on Thursday 3 September stopping briefly at a trawling station northeast of Peterhead to test the performance of the fishing gear, Scanmar sensors and also the CTD. Scotia then proceeded northwards to the Pentland Firth before

heading west towards the Rockall Bank arriving at the first station ready to commence fishing operations at 1000hrs on Saturday 5 September. 5 stations were trawled successfully and without incident on the north side of the Bank. Moderate SW winds allowed good progress to made down the west side of the bank over the next couple of days with another 14 stations being completed before a deep area of low pressure arrived from the south and halted proceedings on Monday 7 September. Storm force winds were experienced throughout most of the morning with gusts of over 90 knots being recorded on more than one occasion. The wind moderated during the afternoon although the large swell meant that fishing was unable to resume until first light on the morning of the 9 September. The weather continued to improve with calm settled conditions being experienced for the remainder of the survey. This allowed the remainder of the fishing stations in the south as well as on the east side of the plateau to be completed successfully and the Rockall component of the survey concluded at midday on Saturday 12 September. In order to expand the bathymetric range of the survey three additional deeper stations were included in the survey on the south side of the Rockall Plateau. These stations were deeper than the 200m depth contour and yielded good catches of adult haddock.

Results

1. Trawling

The GOV was deployed on 42 occasions with 41 fishing stations being sampled successfully. (See figure 1 for map of haul stations) Beyond the normal wear and tear in the wings associated with this fishing gear there was very little gear damage to report. One foul haul resulted on account of one of the clips holding the exocet kite in place releasing. Net geometry was monitored throughout the survey using the scanmar system coupled with a bottom contact sensor. The NOAA single axis bottom contact sensor was attached to the centre of the trawl ground gear each haul.

The primary objective of this survey is to assess the state of the haddock stock on the Rockall Plateau: this is done by comparing the strength of the respective year classes in the current year with those of previous years. The provisional indices (See figure 2) using a length rather than age based delimiter indicate a small improvement in 0 –group recruitment for Haddock on Rockall for 2009, however given that 2007 and 2008 results delivered the lowest values since the survey began there is very little to be optimistic about with the 0 – group numbers still well below the 10 year average. There was also a paucity of one year old fish; however this was expected given the record low recruitment seen in 2008.

All fish species encountered during the survey were recorded and measured and a haul weight recorded for each species. In addition to the usual fish species encountered on the Rockall Plateau was a Dealfish at 114cm encountered during haul 352 on the southeast side of the Rockall Plateau. Ray's Sea Bream (*Brama brama*) was present in 5 hauls and a total of 9 specimens were encountered ranging from 50 – 55cm TL. A sunfish (*Mola mola*) was also observed from the vessel on the morning of the 7 September.

2. Drop frame Camera Work

During trawling downtime the TV drop-frame was deployed successfully at various locations on the plateau with 20 deployments being successfully completed over five nights. 16 of the deployments contributed to mapping the distribution of Annex 1 reef habitat on the plateau and in particular the presence of *Lophelia pertusa*. Coral was observed on three occasions. (See figure 1 for drop-frame locations and accompanying coral and closed areas) This work was carried out as a collaborative project between JNCC and MSSML under the EC Habitats

Directive. In addition to this, 4 deployments were made to observe Nephrops burrows on the Southwest of Rockall Bank and burrows were recorded on two out of the four deployments.

3. Hydrography

The seabird 19+ CTD was deployed successfully at each trawl station to collect a vertical temperature and salinity profile at each trawling station. In addition the Thermosalinograph was run continuously throughout the survey. This automatically records sea surface temperature and salinity throughout the cruise. During the vertical dips reverser bottles were deployed at the surface and bottom at each station in order to obtain water samples for analysis for salinity as well as calibrating the thermosalinograph and CTD.

4. Benthic Organisms

All benthic organisms encountered during the trawl survey were recorded and quantified. Where possible identification was to species level, although in some cases this was only possible to the genus/family. All problem specimens were retained for further investigation back at the Marine Laboratory.

5. Biological Sampling

Additional biological data were collected from species listed in the 2009 report of the IBTS in support of EU Data Collection Framework. Information on length, total weight, gutted weight and sex was collected for 10 species. A summary of numbers collected by species is displayed below in Table 1. In addition to routine age analysis otoliths from cod, haddock and saithe were collected for population connectivity studies.

Table 1

Species	Nos. collected	Species	Nos. collected
Cod	1	Ray's Sea Bream	5
Haddock	940	Shagreen Ray	4
Saithe	18	Turbot	1
Megrim	292	Hake	1
Angler	65	Ling	70

Figure 1: 1209S – Rockall Trawl stations and drop frame locations.

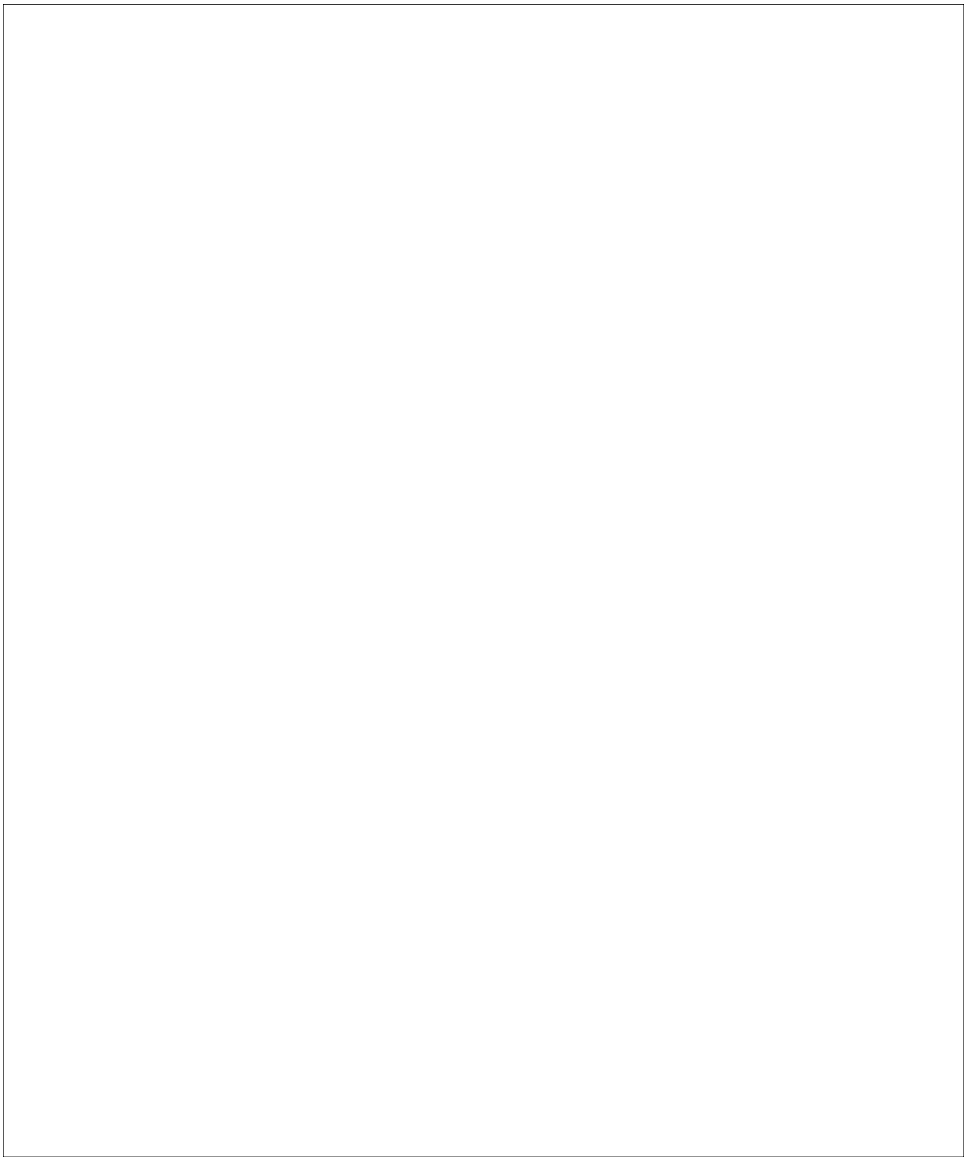
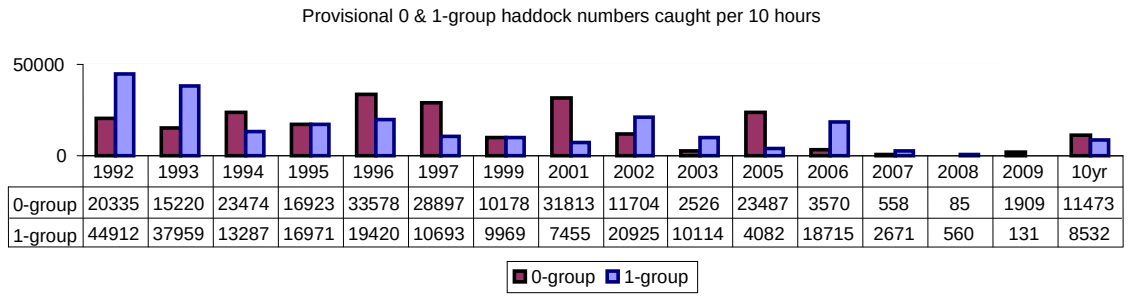


Figure 2:



	1992	1993	1994	1995	1996	1997	1999	2001	2002	2003	2005	2006	2007	2008	2009	10yr
0-group	20335	15220	23474	16923	33578	28897	10178	31813	11704	2526	23487	3570	558	85	1909	11473
1-group	44912	37959	13287	16971	19420	10693	9969	7455	20925	10114	4082	18715	2671	560	131	8532

Part 2 Deepwater survey: 13 – 28 September

Marine Laboratory staff

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H Dobby
J Drewery
N Campbell
E Dalgarno

Visitors

T Blasdale	(JNCC)
D Moore	(University of Bangor)
W Reid	(University of Newcastle)
A Santos	(University of Cork)
J Balle	(SMRU)

Narrative

Calm conditions at Rockall on 12 September allowed the switch-over to the deepwater doors to take place at sea. Passage was made to the shelf edge (ICES square 45EO) where the BT184 was rigged in readiness for the bagging trials which took place over the next 3 days (see Fig 3). During the night-time the TV drop-frame was deployed for *Nephrops* observation work on the shelf slope (Fig 3). On the evening of 15 September passage was made to Ullapool for the half landing on 16 September. All the GOV fishing gear including the doors were uplifted at the half landing and returned to the Marine Laboratory. Following the half-landing and personnel change over in Ullapool, *Scotia* sailed at 08.35 hrs on 17 September making passage south down the Minch to arrive on station on the shelf slope the following morning to recommence the deepwater trawl survey. A series of 1 hour hauls with the new 16" rock-hopper grounder gear were undertaken at 500, 750, 1000, 1500 and 1800 m depths daily from 06.00 hrs to 19.00 hrs as far south as Donegal before returning North (trawl paths are shown in Fig 3). The night-time was used to make opportunistic acoustic recording of cetacean activity in the area. Severe weather on the night of 21 September meant that shelter was sought in the lee of St. Kilda. Force 9-10 winds the following day prevented any survey work until 18.00 hrs when passage was made back to the shelf slope and the survey resumed the following morning. Passage was made to Rosemary bank on the night of 23 September and 3 trawl stations were completed there the following day. Scotia then returned to the shelf slope where the remaining time series stations were completed. *Scotia* began passage to Aberdeen on the evening of 26 September, docking and unloading in Aberdeen the morning of 28 September.

Objectives

1. To undertake bagging trials and TV observation to assess selectivity and sampling bias/catchability of the net with 2 different ground-gears (21" v 16"rock-hoppers).

2. To map the composition, distribution and abundance of continental slope species including anglerfish (*Lophius spp.)* on the deepwater slope west of the Hebrides and Rosemary Bank.

3. Identify, quantify and record all benthic invertebrate species caught.

4. Collect temperature at depth during all deepwater hauls using a data storage sensor attached to the trawl headline.

5. Collect biological samples (genetics and otoliths) for key species for population and contaminant studies as requested.

Results

All objectives were satisfactorily fulfilled and are summarised as follows;

1. Deepwater bagging trials to compare 21" rockhopper ground-gear with 16" rockhoppers. The effect of changing ground gear on the BT184 was quantified by attaching 3 separate ground gear bags (port, centre and starboard) to the footrope of the BT 184. At 1000 m depth 4 hauls (30 mins) with the old 21" groundgear were made followed by 4 hauls (30 mins duration) with the new 16" groundgear. Damage to the side bags was caused by boulders in 6 out of the 8 tows, but the central bag remained intact on all hauls. Data from the central bag and the main cod-end of the net were therefore used as to estimate the difference in catch using the 2 different groundgears. On average the weight of fish captured by the central ground bag was 29 % of that in the main code-end; with the new ground-gear this was reduced to on average 20 %. The results indicate an improved catchability, provide a quantitative basis for comparing data from this year with previous years and justify reducing tow duration from 2 hours to 1 hour. Infrared TV cameras were deployed below the headline on the wings of the net in an attempt to observe fish behaviour during the capture process. The LED lighting system however proved to be inadequate for the fishing depth and observations were only possible to within 1 meter of the cameras.

2. To map the composition, distribution and abundance of continental slope species including anglerfish (*Lophius spp.)* on the deepwater slope west of the Hebrides and Rosemary Bank. A total of 30 deepwater hauls (1 h. duration) were made on the shelf slope (Fig 3) at 500 m (n = 8), 750 m (n = 1), 1000 m (n = 9), 1500 m (n = 7) and at depths between 1700-1800 m (n = 4). In addition to the shelf slope time series hauls, three hauls were made on Rosemary bank (Fig 3). On only 2 occasions were problems encountered and the gear hauled early to avoid potential damage. No significant gear damage was incurred. Scanmar data was collected on gear performance including door depth (all hauls), wing spread and headline height (hauls 1500 m and less). The door spread sensors malfunctioned and no data were available for this parameter. Bottom contact was monitored using a NOAA sensor and used to fine tune block-up and knock-out times. From each haul all species were sorted, weighed and a length frequency distribution obtained. Catches were high with up-to 3 tonnes being caught per hour confirming the improved catchability of the net with the new ground gear. Catch composition varied according to depth, with deeper hauls being dominated by roundnose grenadier (*Coryphenoidies rupestris)* and Baird's smoothhead (*Alepocepahlus bairdii)*. In addition to the common species, several unusual species on the survey were captured including *Deania profundorum*, *Neocytis helgae*, *Aleposaurus brevirostrus* and *Chirostomias pliopterus*. Specimens of a potentially undescribed species of Chimaerid were collected for taxonomic validation and submission as specimens to the Museum of Scotland.

3. Identify, quantify and record all benthic invertebrate species caught. The invertebrate by-catch was sorted, identified and recorded. There was an occurrence of *Madrepora oculata* on Rosemary bank. Additionally of note were specimens of black corals occurring in the 1700-1800m depth range: *Stauropathes arctica* on the slope NW of St Kilda and *Parantipathes hirondelle* and a further species of *Stauropathes* new to the survey on the slope west of Donegal. This and any other

rare or unidentified specimens were frozen or preserved for further study and future reference.

4. **Collect temperature at depth during all hauls using a data storage sensor attached to the trawl headline.** A software problem meant that temperature at depth logger was not successfully deployed during the hauls prior to the half-landing. This problem was resolved after the half-landing and the logger was deployed and downloaded successfully thereafter. Average bottom temperatures at each trawling depth are given in Table 2.

Table 2: Average bottom temperature for each depth strata of the survey

Area	trawl depth (m)	mean temperature (°C)
Slope	500	10.04
Slope	800	8.77
Slope	1000	6.46
Slope	1500	4.29
Slope	1700	3.53
Rosemary	500	9.20
Rosemary	850	7.81

5. **Collect biological, genetics and otoliths samples for key species for population studies as requested**.

   a. Deepwater elasmobranch species were sampled as requested for the University of Hawaii (*C. squamosus, C. coelolepis, E. spinax, C. fabricii, C. crepidator* and *Apristurus* sp.) and University of Bangor (*G. melastomus, G. murinus, C. crepidator* and *Apristurus* sp.)

   b. A total of 500 fish and 17 invertebrate samples were collected from the 1000m and 1500m contours on the continental slope and between 850m and 950m on the Rosemary Seamount for stable isotope analysis by Newcastle University.

   c. 32 genetic samples from Portuguese sharks (*C. coelolepis)* were collected for IPIMAR, Portugal.

   d. A selection of otoliths from various deepwater species were collected as requested for NOC (Southampton).

   e. Black scabbard (*Aphanopus carbo*) were sampled by the University of Cork for biological investigations as part of a PhD project.

6. **Collect additional biological data in connection with the EU Data Directive 1639/2001.** Biological data was collected for angler fish (*Lophius piscatorius*). In addition weight-length data was collected for various species to supplement the Marine Laboratory's deepwater database.

7. **Collect tissue, liver and otolith samples for contaminant analyses.** Samples were collected from 50 roundnose grenadier (*C. rupestris*), 45 black scabbard

(*A.carbo*), 5 black dogfish (*C.fabricii*) and 10 miscellaneous prey species. Mud samples were also collected from the trawl doors. All will be analysed for contaminants including CB's, PBDE's, lipids and heavy metals.

8. **Opportunistic recording of cetacean activity.** The hydrophone was deployed successfully on 6 nights giving a total of 55 hours of data and covering a distance of approximately 350 nm. Several different cetacean species were identified including Sperm whales (*Physeter macrocephalus*), Long-finned pilot whales (*Globicephala melas*) and Short-beaked common dolphins (*Delphinus delphis*).

Additional objectives

In addition to the times series stations, a tow at 750 m was completed and a new tow at 1700 m was successfully sourced in ICES square 41EO.

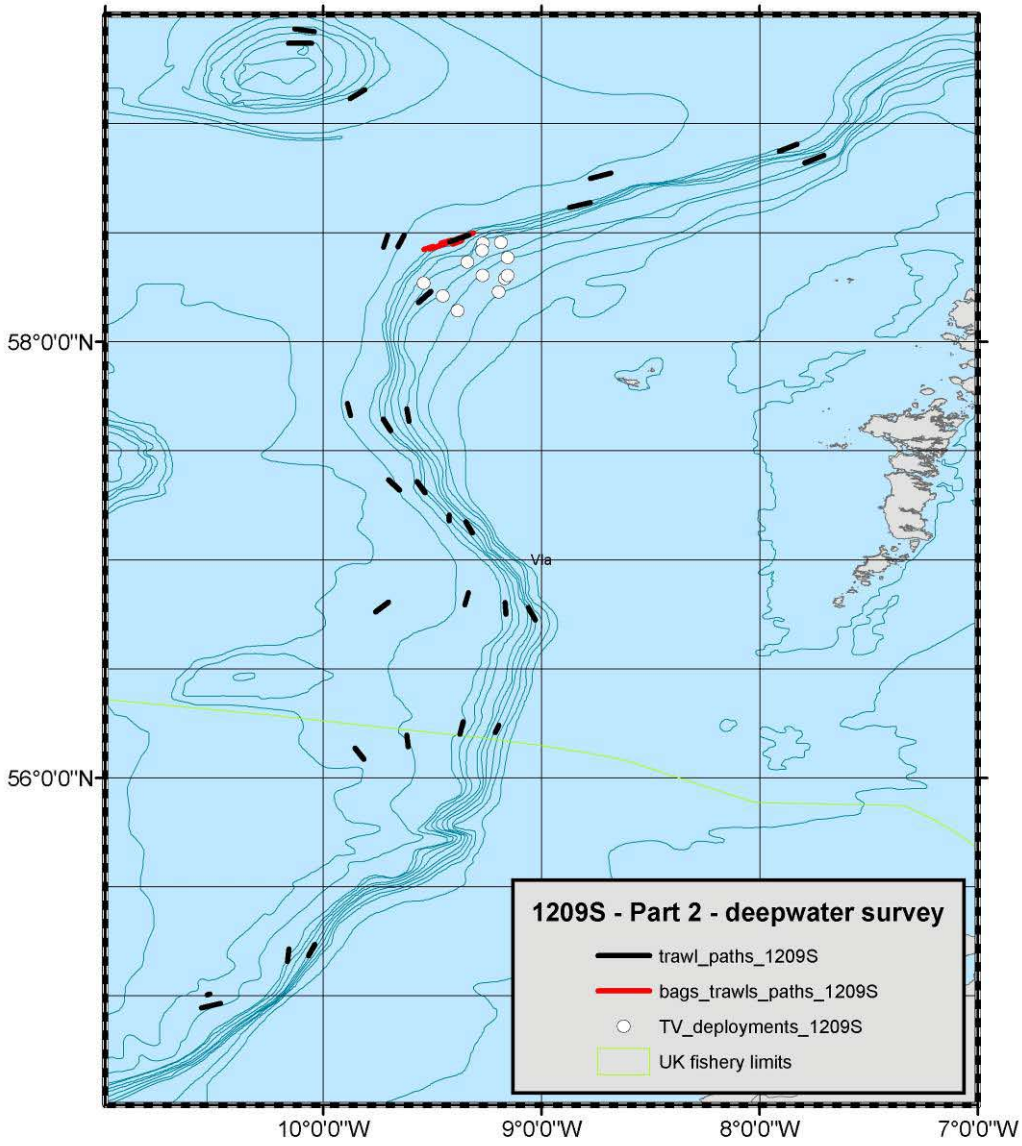

Figure 3: Map showing trawl paths on the shelf slope and Rosemary bank (black = time series, red = bagging trials) and TV deployments on Part 2 of 1209S.

F Burns and F C Neat
14 October 2009

(Seen in draft by Captain R Jowett).