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FRV *Scotia*

Cruise 0900S

REPORT

12 June - 1 July 2000

Start port: Aberdeen
End port: Aberdeen
Half landing: Stornoway

Personnel

Nick Bailey	(In charge)
Jim Kinnear	
Charlie Shand	
Ian Tuck	
Dave Bova	
Hector Lizarraga	Student Visitor
Beth Mouat	Student Visitor
Barry Ward	Student Visitor
Jeff Weisbeck	Visitor (part time)

Objectives

a) To obtain estimates of distribution and abundance of *Nephrops* in the Fladen Ground North Minch, South Minch and Firth of Clyde using underwater television. If time permits the survey will include stations at the Noup.

b) To collect samples of the sediment at each TV station.

c) To make use of the TV survey to estimate the densities of whelks and other shellfish species of potential commercial importance.

d) To carry out Nephrops trawling in each stratum throughout the survey areas for size composition analysis and examination of biological features.

e) To collect samples of *Nephrops* for comparison of reproductive condition in different areas.

Out-time days per project: M01T 13 days, C687 7 days

Narrative

Scientific staff joined the ship at 0830 hours on 12 June but *Scotia's* departure from Aberdeen was delayed until 2000 hours owing to trawl readout problems. The first of the Fladen Ground stations at 57°36.16'N 00°0.289'E was reached at 0200 hours on 13 June but weather conditions were very severe and TV work did not commence until 2000 hours. Improving weather conditions permitted surveying at stations located in the southeast corner of the ground and 30 were completed by 2100 hours on 15 June. A 30 minute trawl was then followed by further

uninterrupted TV work at another 20 stations, completing the stage 1 Fladen work by 1530 hours on Saturday 17 June.

Scotia then steamed for the Firth of Clyde arriving at the first station to the south-west of Ailsa Craig 55°13.03'N 05°13.6'W at 2015 hours on 18 June. Working in a clockwise direction around Arran, TV observations were made at 30 stations until the evening of 19 June when three trawl samples (each of 30 minutes duration) were taken to the east and south of Arran. A further 13 TV stations were surveyed before *Scotia* sailed at 1440 hours on 20 June for the half landing at Stornoway. Docking was at 0930 hours on 21 June.

Scotia resumed the TV survey at 0900 hours on 22 June and completed one of the westerly North Minch stations before a break in the video line occurred and damage to the camera cable sheathing was discovered. Following a cable changeover, the survey recommenced and a further six stations were covered before operations shifted to the South Minch on 23 June. Steady progress was made through 41 stations until midday on 25 June. During this period, South Minch trawl tows were made on the evenings of 23 and 24 June and on the morning of 25 June. At the penultimate South Minch Station, a second break in a video link occurred forcing another cable change and a further hours delay. Surveying at the last South Minch station resumed at about 2000 hours on 25 June and the *Scotia* steamed for Loch Dunvegan and picked up the next North Minch stations. Work in the North Minch continued uninterrupted until 1530 hours on 27 June by which time 33 TV stations and three trawl tows had been completed.

Scotia steamed back to the north end of the Fladen Ground for the first of a series of second stage samples in the adaptive survey design. Wave conditions on arrival at 1200 hours (28 June) were too poor for TV work and so two stations were abandoned and *Scotia* shifted position southwards where conditions moderated and work could begin at 1640 hours. A total of 18 extra stations and three trawl hauls were made by 1210 hours on 30 June. Dismantling of TV equipment took place during the steam back to Aberdeen where docking was at 2100 hours.

Data Collection

Surveys were completed as planned in the main areas but owing to weather and gear breakdown, time was not available for making observations at the Noup.

BGS sediment data was used to provisionally locate stations on muddy superficial sediments within the statistical squares defining *Nephrops* stocks (as defined by the ICES WG). A total of 175 stations were visited and weather conditions permitted television sledge runs of 10 minutes duration at 173 of these. Successful observations were made at 167 stations which were located on suitable sediment, gave a clear picture and yielded estimates of *Nephrops* burrow density. All seabed operations performed well and there were only minor technical problems. Calculation of the area surveyed in each run was facilitated by using a rangefinder to monitor the height of the camera off the bottom and a new odometer to measure distance travelled; logging of these data was successful. Preliminary counts of burrow numbers were made during TV camera observations and the material was recorded on video for more detailed analysis at the laboratory.

Sediment samples for size particle analysis were taken using a Day Grab at most stations except for the Clyde where time constraints prevented this. Analysis of these in the laboratory, using a laser particle size analyser, will take place later.

A Scotnet 50 mm Prawn Trawl (headline 176'), was used to make trawl hauls of 30 minutes duration as follows: Fladen Ground (4), North Minch (3), South Minch (3), Firth of Clyde (3).

Data on *Nephrops*, catch rate, size composition, sex ratio and ovary condition of *Nephrops* were collected from each haul.

Summary of TV Survey Results

For each area, estimates of *Nephrops* burrow density were obtained from counts of videotape made in the laboratory by two observers. These data have been worked up in readiness for the 2001 Nephrops WG meeting and summaries for each area are provided in Table 2. In common with previous surveys, highest densities on the west coast (in excess of 0.9 m^{-2}) were obtained in the southern parts of the Firth of Clyde south of Ailsa Craig. Densities at more northerly stations in the Clyde were typically between 0.1 and 0.5 m^{-2} and the poorer visibility experienced in some years was not so evident in 2000. Elsewhere on the west coast density was generally lower, particularly in the South Minch where the maximum was 0.9 m^{-2} and where only about 50% of stations had densities exceeding 0.3 m^{-2}. In the Fladen Ground, preliminary examination of the results suggest that density, although not particularly high (78% at 0.3 m^{-2} or below), has been maintained at a reasonable level. Given the large area, the results again confirm that overall stock size continues to be much larger than other Scottish *Nephrops* stocks. Highest densities were obtained at more southerly stations while north of 58°40.00'N, densities were lower.

N Bailey
3 April 2001

Seen in draft: pp P Ramsay

TABLE 1

Analysis of Underwater Television results obtained during *Scotia* Cruise 0900S. For each area, summary statistics are provided for each stratum surveyed. Note that stratification was based on sediment grade (% silt content) for the Fladen ground, on the Folk classification of sediments for the South Minch and Clyde and by arbitrary >rectangles = for the North Minch.

Stratum	Area (km^2)	Number of stations	Mean burrow density (No m^{-2})	Observed variance	Total number (millions)	Stratum variance	Proportion of total variance
Fladen Ground							
>80	3248	14	0.278	0.009	902	6865	0.063
55<80	4967	20	0.299	0.006	1482	7585	0.069
40<55	4304	15	0.207	0.008	893	9816	0.089
<40	15634	19	0.104	0.007	1621	85792	0.779
Total	28153	68			4898	110058	1
Firth of Clyde							
M	717	13	0.560	0.054	401	2127	0.166
sM	699	15	0.741	0.206	518	6698	0.523
mS	665	12	0.594	0.108	395	3982	0.311
Total	2080	40			1314	12807	1
South Minch							
M	303	6	0.257	0.009	78	139	0.005
sM	2741	17	0.328	0.029	898	13009	0.471
mS	2028	16	0.432	0.056	876	14469	0.524
Total	5072	39			1852	27617	1
North Minch							
U	656	12	0.358	0.016	234	569	0.352
V	425	12	0.518	0.047	220	713	0.441
W	563	9	0.354	0.006	200	211	0.131
X	131	6	0.542	0.043	71	124	0.076
Total	1775	39			725	1617	1