

R1/12

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FRV SCOTIA

Cruise 1196S

## REPORT

20 June - 8 July 1996

### Personnel

N Bailey	SSO (in charge)
C J Chapman	PSO
J A M Kinnear	HSO
C W Shand	HSO
P Copland	HSO (part-time 20-28 June)
D J Bova	SO
A R Weetman	ASO
I Garioch	CW (part-time 28 June - 8 July)
Eunice Pinn	CW
Joanna Murphy	PhD Student

### Objectives

- a) To obtain estimates of distribution and abundance of *Nephrops* in the Fladen Ground, Firth of Forth, Moray Firth, North Minch, Noup and Burra Haaf at Shetland using underwater television.
- b) To evaluate the use of the ROXANN seabed discrimination system for estimating burrow density.
- c) To collect samples of the sediment at each TV station.
- d) To use trawl caught samples of *Nephrops* to examine biological features at different sites throughout the survey areas and to collect samples for genetic analysis.
- e) To make use of the TV survey to estimate the densities of whelks and to use the trawl surveys to collect biological data on the various species encountered. Data on other shellfish species of potential commercial importance will also be collected if time permits.
- f) To sample *Nephrops* larvae at sites across the Fladen Ground using a Methot Net.

**Out-time days per project:** 19 days FAA1

## Narrative

*Scotia* departed from Aberdeen at 1100 on Thursday 20 June and steamed for the first of the Firth of Forth stations at 56°09.78'N 02°33.98'W. Television survey work commenced at 1800 and continued in an anticlockwise direction around the Firth covering 15 TV stations (and one trawl) before an increasing swell at the mouth of the Firth forced a stop at 1500 on 21 June. Two trawl hauls were made before TV operations were resumed at 0329 on 22 June. A further 14 stations were worked off the Berwickshire coast and in the outer Firth, before *Scotia* departed at 2030 for Shetland.

During passage the onboard Archimedes system broke down but a partial repair ensured that positional data could be accessed. *Scotia* arrived south west Shetland (59°54.00'N 01°30.00'W) at 1800 on 23 June where a ROXANN survey of the Burra Haaf area commenced. A series of east-west transects at one mile intervals was followed by shorter, "fillin" transects (to give approximately half mile spacing) in the areas with the softest sediment (see cruise track). The exercise was completed by 1100 on 24 June and TV surveying commenced in the areas of soft sediment. A total of 29 stations were worked without interruption, followed by two trawl hauls. *Scotia* steamed for the North Minch at 0100 on 26 June.

Upon arrival at 1900, trials using a magnetometer attachment for the sledge were conducted off the Eye Peninsula, Island of Lewis (58°35.0'N 6°10.0'W). Three runs were completed using a self contained TV video recorder to monitor the behaviour of the attachment. Routine TV observations commenced at 2300 at *Nephrops* stations in the north west part of the North Minch. Fourteen stations (including two with trawls) were completed before *Scotia* steamed for Stornoway. Docking for the half landing was at 0730 on 28 June; a scientific staff changeover took place and a replacement Archimedes was installed.

The survey resumed at 0830 on 29 June. Three TV stations were worked to the west of Skye before the sledge fouled some ropes causing damage to the outer covering of the TV cable. Following repair, a further three TV stations were covered before a major ship's power failure in Loch Snizort stopped operations at 0015 on 30 June. *Scotia* was forced to anchor and remained under repair until 1700 on 1 July. One more station was worked north of Rona before a second major breakdown necessitated a return to Stornoway for quayside repairs. *Scotia* departed again at 1800 on 3 July. During the next 24 hour period, 17 TV stations (including two trawl hauls) were completed on the eastern side of the North Minch.

*Scotia* then steamed for the Moray Firth arriving at 1330 on 5 July. A total of 31 TV stations (including three with trawl) were worked in the Moray Firth before *Scotia* steamed for Aberdeen where docking was at 2200 on Sunday 7 July.

## Data Collection

Owing to time lost, the Fladen and Noup grounds were not surveyed but adequate surveys were conducted in the remaining areas. With the exception of the survey at Shetland, BGS sediment data was used to locate stations on muddy superficial sediments within the statistical squares defining *Nephrops* stocks (as defined by the ICES WG). At Shetland ROXANN data were used to provide a preliminary definition of the area available for *Nephrops*.

A total of 127 television sledge runs of 10 minutes duration were made of which 121 were on suitable sediment and gave a clear picture; all seabed operations performed well. Calculation of the area surveyed in each run was facilitated by using a rangefinder to monitor height of camera off the bottom and an odometer to measure distance travelled. Some difficulties were, however, experienced with the electronic counting of the odometer signal so that automatic logging of this was not possible. Preliminary counts of burrow numbers were made during TV camera observations and the material was recorded on video for more detailed analysis which has been completed at the laboratory.

Sediment samples for size particle analysis were taken at each station using a Day Grab. Analyses of these in the laboratory, using a laser particle size analyser, is in progress. Once completed, these will be combined with UTV and ROXANN data to examine the extent to which ROXANN is capable of distinguishing variation in signal due to biotic effects from variation in signal due to physical ones.

A Scoonet 50 mm Prawn Trawl (headline 176'), was used to make trawl hauls of 30 minutes as follows: Firth of Forth (3), Shetland (2), North Minch (4), Moray Firth (3). Data on *Nephrops* sex ratio, size composition and ovary condition of *Nephrops* were collected from each haul. Information on mean weights will be used to calculate stock biomass.

There was no plankton sampling owing to time constraints.

### **Summary of TV Survey Data Analysis**

In those areas where BGS sediment data was utilized, the targeting of stations on soft sediments was generally successful. Estimates of mean *Nephrops* burrow density from laboratory counts of video tape are given, by stratum for each area, in Table 1. Mean densities were raised to overall areas of the "mud" sediments to provide abundance estimates.

As in previous surveys, some of the highest station densities recorded were in the Firth of Forth and mean stratum densities were also higher than in other areas (exceeding  $0.5 \text{ m}^{-2}$ ). In the Moray Firth, densities were less variable and mean densities fairly similar between strata and generally on the low side. This compares with a much more variable picture in the well sampled North Minch area. Here there were marked differences in density between strata. In contrast to other areas, the North Minch comprises a number of loosely connected patches of *Nephrops* ground where the composition of the sediment is rather varied.

At the very small Burra Haaf ground, Shetland, more emphasis was placed on the classic role of ROXANN as tool for identifying different seabed characteristics. Following a detailed transect survey of the area using ROXANN, locations with low E1 and E2 values were examined by UTV. Of the 29 such sites visited, 10 revealed evidence of *Nephrops* burrowing but densities were always low and mean density ( $0.09 \text{ m}^{-2}$ ) was lower than in any other stratum examined anywhere during the survey.

N Bailey  
29 May 1997

Table 1 Results by stratum for the 1996 TV surveys in A. North Minch B. Firth of Forth and C. Moray Firth. For each stratum, the number of stations, mean density, variance and raised estimate of abundance is given.

A

Stratum	Area (km <sup>2</sup> )	Sample size	Mean Density burrows m <sup>-2</sup>	Observed variance	Abundance (millions)	Stratum variance	Prop. of Total variance
u	655.6	12	0.183	0.0049	120.1933	174.747	0.1837
v	425	10	0.319	0.0099	135.575	178.397	0.1876
w	563	10	0.214	0.0147	120.482	465.733	0.4897
x	131	6	0.477	0.0462	62.44333	132.216	0.1390
Total	1774.6	38			438.6937	951.0929	1

B

Stratum	Area (km <sup>2</sup> )	Sample size	Mean Density burrows m <sup>-2</sup>	Observed variance	Abundance (millions)	Stratum variance	Prop. of Total variance
x	423	13	0.535	0.0688	226.4677	946.630	0.3511
w	291	9	0.384	0.1130	111.8733	1063.243	0.3944
y	201	5	0.522	0.0849	104.922	686.171	0.2545
Total	915	27			443.263	2696.043	1

C

Stratum	Area (km <sup>2</sup> )	Sample size	Mean Density burrows m <sup>-2</sup>	Observed variance	Abundance (millions)	Stratum variance	Prop. of Total variance
p	690	10	0.323	0.0212	222.87	1009.385	0.3371
q	655	7	0.227	0.0157	148.7786	963.701	0.3219
r	728	9	0.211	0.0173	153.6889	1020.874	0.3410
s	122	1	0.310		37.82		
Total	2195	27			563.1575	2993.959	1

# Cruise Track FRV Scotia 1196s: 20th June - 8th July 1996

