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FRV *SCOTIA*

Cruise 0893S

REPORT

16 June - 5 July 1993

Personnel

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D J Bova	SO
A R Weetman	ASO
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Objectives

1. To obtain estimates of distribution and abundance of *Nephrops* on the Fladen Ground and in the Firth of Forth using underwater television and trawling.
2. To use the trawl caught samples to examine biological features of *Nephrops* at different sites throughout the survey area.

Narrative

Scotia sailed from Aberdeen at 1015 on Friday 16 June and proceeded to 57°53'N 00°11'E at the southern end of the Fladen Ground survey area arriving 1730 where television surveys were commenced. Working northwards, 16 TV stations were covered (including three at which trawling took place) before cable damage halted operations for five hours on 18 June. Following replacement, TV and trawling operations recommenced for two days during which 20 TV and six trawl hauls were made. Bad weather prevented TV work for a period of about 24 hours, during which time three trawl hauls were made at more northerly stations. A further 33 TV stations (eight with trawl hauls also) were worked in the next three days before steaming to Invergordon for the half landing on 25 June (congestion caused by a backlog of shipping activity prevented use of Kirkwall, the programmed port).

Scotia steamed for the Moray Firth grounds on 26 June, completing four TV stations before increasing wind strength curtailed activity until the evening. Work resumed with a trawl station and continued uninterrupted for the next two days with 27 TV stations and another trawl haul being completed. Following a return to the southwest corner of the Fladen Ground to complete six outstanding TV stations, a further trawl haul was made on the northeast corner of the Moray Firth ground before *Scotia* commenced steaming to the Firth of Forth on the evening of 29 June. Five days work were successfully carried out on the Firth of Forth and Arbroath *Nephrops* grounds where a total of 46 TV stations and three trawl hauls were completed. *Scotia* steamed for Aberdeen docking at approximately 0630 on 5 July.

The sequence of stations is illustrated in the attached cruise track.

Data Collection

In each of the three main areas surveyed, activity was restricted to areas of sea bed composed of muddy sediment within the statistical squares making up the different grounds (as described by the ICES *Nephrops* WG).

Television sledge runs of 10 minutes duration were made at each station and camera observations were generally facilitated by good water clarity in all areas. An odometer was attached to the sledge in order to better estimate the distance travelled - this appeared to perform well although there were some problems with onboard instrumentation.

Using a Scotnet 50 mm prawn trawl (headline 176'), 26 trawl hauls of 30 minutes duration were made at various stations throughout the survey areas.

Morphometric measurements were made on samples of *Nephrops* from three hauls in order to provide additional information on size at first maturity. Sediment samples for size particle analysis were taken at each station using a Day grab.

Preliminary Results

Fladen Ground

The overall survey area was divided into 11 strata within each of which between two and 13 randomly positioned stations were worked. A total of 74 stations were visited in all. *Nephrops* burrows were observed at all stations but counts suggested that density was very variable. Emergent *Nephrops* were also observed, although counts were generally low. Preliminary estimates of mean burrow density in each strata (Table 1) were raised to the areas of the ground and summed to give total population size. At 6,073 millions, this was slightly higher than in 1992. Information from the 20 trawl hauls covering this area will be used to provide estimates of the weight composition of the *Nephrops* and lead to stock biomass estimates.

Moray Firth

In this area, four strata were used each sampled by between two and 10 stations (a total of 31 in all). Preliminary estimates of mean density are given in Table 2 indicating that burrow density is of a similar order of magnitude to that on the Fladen Ground. Raised estimates of abundance suggest a stock size of 418 million *Nephrops*. The three trawl hauls available will be used to provide catch composition data for use in biomass estimation.

Firth of Forth

A total of 37 stations in four strata were visited in the Firth of Forth. Compared with the other areas, burrow densities were generally much higher and emergent *Nephrops* more frequent. Table 3 shows preliminary estimates of mean burrow density in each strata with a highest value of over 1 per m². Raised estimates of abundance suggest a stock size of about 670 millions which is not too dissimilar to the 1993 VPA estimate of 730 millions. Compared with the Moray Firth, this relatively smaller ground appears to support a larger stock. Some TV runs were also made on the Arbroath ground - these remain to be analysed. Sediment distribution was more patchy here and densities were generally lower.

N Bailey
13 December 1993

Seen in draft: P Ramsay
for C Brazier

TABLE 1

Fladen TV survey 1993 - summary of preliminary results

Stratum	A	B	C	D	E	F	G	H	I	J	Total
No stations	9	8	8	8	13	5	6	4	11	2	74
Mean burrow density (m ⁻²)	0.19	0.164	0.174	0.312	0.352	0.116	0.399	0.078	0.214	0.089	
Area (km ²)	2665.9	3074.7	4007	3064	3207.6	2461.6	2558.9	2002	2864.2	2245.7	28151.6
Abundance (millions)	506.2	504.3	697.4	957.1	1130.6	285.5	1021.5	156.2	613.5	201	6073.2

TABLE 2

Moray Firth TV survey 1993 - preliminary summary of results

Stratum	P	Q	R	S	Total
No stations	10	9	10	2	31
Mean burrow density (m ⁻²)	0.256	0.226	0.124	0.025	
Area (km ²)	690.2	654.7	727.6	122.4	2195
Abundance (millions)	176.6	148.1	90.3	3	418

TABLE 3

Firth of Forth TV survey 1993 - summary of preliminary results

Stratum	W	X	Y	Z	Total
No stations	12	12	11	2	37
Mean burrow density (m ⁻²)	0.479	1.103	0.809	0.503	
Area (km ²)	290.8	190.5	332.6	101.4	915.3
Abundance (millions)	139.2	210.2	269.1	51	669.5

