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FRV *Scotia*

Cruise 1099S

## REPORT

7-25 June 1999

**Loading:** Aberdeen

**Unloading:** Aberdeen

**Half landing:** Stornoway 16 June (provisional)

### Personnel

Nick Bailey (In charge)

Jim Kinnear

Ian Tuck

Charlie Shand

Dave Bova

Adrian Weetman

### 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 make exploratory observations in deeper water west of the Hebrides.
- c) To collect samples of the sediment at each TV station.
- d) To make use of the TV survey to estimate the densities of whelks and other shellfish species of potential commercial importance.
- e) To carry out *Nephrops* trawling in each stratum throughout the survey areas for size composition analysis and examination of biological features.
- f) To collect samples of *Nephrops* for genetic and chemical analysis, and hagfish for biological studies.

**Out- turn days per project: M01T: 19days**

### Narrative

*Scotia* departed from Aberdeen at 1000 hours on 7 June and steamed for the first of the Fladen Ground stations at 57°49.38'N 00°09.72'E. TV work commenced at about 1730 hours in good weather conditions and proceeded through stations located in the southeast corner of the ground. Seven stations were completed before the vessel began a southwesterly course

through the central, soft mud area of the Fladen Ground. TV observations were made at a further 21 stations before deteriorating weather and increased wave height on the morning of 9 June forced a halt. With no improvement by 1500 hours, *Scotia* steamed for the Firth of Clyde arriving at the first station ( $55^{\circ}18.00'N$   $05^{\circ}15.00'W$ ) at 0330 hours on 11 June. Working in a clockwise direction around Arran, TV observations were made at 42 stations and good catches were made in three trawl tows of 30 minutes duration. There were no serious interruptions and work in the Clyde was completed by 2400 hours on 12 June. *Scotia* then steamed for the South Minch arriving off Iona at 0830 hours on 13 June. A total of 17 TV stations were worked before freshening winds restricted the use of TV in exposed areas; work was able to continue by temporarily moving operations inshore. A further 23 TV stations and three trawl tows were completed without interruption before the vessel moved to the southern end of the North Minch area ( $57^{\circ}32.94'N$   $06^{\circ}44.76'W$ ) at 2100 hours on 15 June. Despite strong southwesterly winds, TV observations were made at 24 stations to the north and northeast of Skye and there was one further trawl tow before the half landing. *Scotia* arrived in Stornoway at 0900 hours on 17 June.

*Scotia* resumed the TV survey at 0900 hours on 18 June commencing work in the north western corner of the North Minch ( $58^{\circ}18.18'N$   $05^{\circ}59.8'W$ ). Successful observations were made at the remaining 15 stations and a further two trawl hauls completed by 0730 hours on 19 June. At this point in the cruise it was hoped to conduct trials to the west of the Hebrides, however, sustained unfavourable winds and a significant swell prevented this from taking place and *Scotia* steamed instead for the Noup Ground arriving at the first station ( $59^{\circ}12.37'N$   $03^{\circ}46.46'W$ ) at 1530 hours. Improving wind and sea state enabled 10 TV stations to be completed by 0130 hours on 20 June. The vessel then made passage to the northern end of the Fladen Ground ( $59^{\circ}50.57'N$   $00^{\circ}34.77'W$ ) arriving at 1330 hours. The remaining 34 Fladen Ground stations, four trawls and eight investigative TV tows in the deepwater trench of the Moray Firth (approximately  $57^{\circ}45.00'N$   $02^{\circ}00.00'W$ ) were completed without interruption by 24 June and *Scotia* steamed for Aberdeen, docking at 1800 hours.

### Data Collection

Surveys were completed as planned in the main areas and time was available for making observations at the Noup and also in the deep trench at the eastern end of the Moray Firth a site not previously studied. Owing to unsuitable weather conditions to the west of the Hebrides, plans to survey the deeper water in this area were abandoned.

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 201 television sledge runs of 10 minutes duration were made of which 191 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 an odometer to measure distance travelled. 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 at each station using a Day Grab. Analysis of these in the laboratory, using a laser particle size analyser, will take place shortly.

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 from on-board counts of videotape are given by station in Table 1. In common with previous surveys, highest densities on the west coast (in excess of  $0.9 \text{ m}^{-2}$ ) 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  $0.3 \text{ m}^{-2}$  although poorer visibility to some extent hampered the preliminary observations at these stations. Elsewhere on the west coast density was generally lower, particularly in the South Minch where the maximum was  $0.785 \text{ m}^{-2}$  and where only 35% of stations had densities exceeding  $0.3 \text{ m}^{-2}$ . In the Fladen Ground, preliminary examination of the results suggest that density has been maintained at a reasonable level and, given the large area, confirms that the overall stock size continues to be much larger than other Scottish *Nephrops* stocks. Highest densities were obtained at more southerly stations while north of  $58^{\circ}40.00'N$ , densities were lower. More detailed laboratory counts and analysis of the data taking into account survey stratification will provide indices of abundance for the next meeting of the ICES *Nephrops* Working Group.

Table 2 shows summary results from trawl hauls taken during the survey. Catch rates were extremely variable, an observation which is not unusual when sampling *Nephrops* by trawling. Mean sizes were generally on the large size and with the exception of the Clyde samples, exceeded 30 mm carapace length in both males and females. Males were mostly larger than females - another commonly observed feature of *Nephrops* populations which reflects differences in growth rate between the sexes.

N Bailey  
30 May 2000

# Cruise Track FRV Scotia 1099s: 7th - 25th June 1999

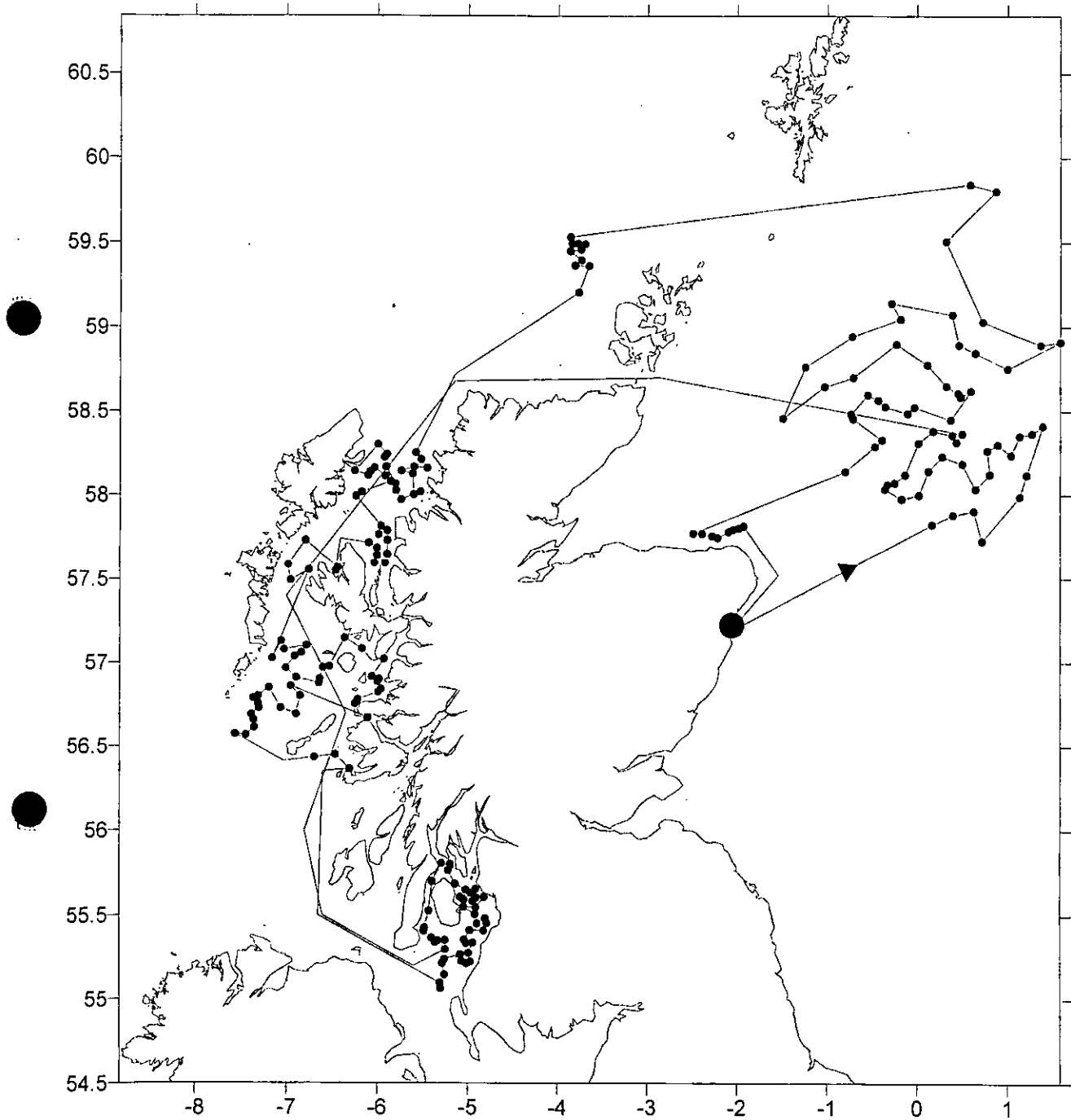


Table 1 Preliminary estimates of Nephrops burrow density (number m<sup>-2</sup>) at stations located throughout each of the Nephrops grounds surveyed during the 1999 Scotia survey. Densities are based on counts made on-board and assuming a TV track width of 1m

**Fladen Ground**

Station	lat	long	density	Station	lat	long	density	Station	lat	long	density
1	57.823	0.162	0.169	22	58.072	-0.250	0.315	43	58.458	-1.494	0.289
2	57.880	0.390	0.535	23	58.119	-0.136	0.301	44	58.646	-1.030	0.198
3	57.904	0.622	0.850	24	58.310	0.011	0.288	45	58.700	-0.713	0.405
4	57.726	0.716	0.194	25	58.382	0.173	0.135	46	58.899	-0.232	0.278
5	57.991	1.132	0.381	26	58.358	0.385	0.235	47	58.777	0.109	0.324
6	58.119	1.207	0.185	27	58.314	0.432	0.163	48	58.651	0.318	poor viz
7	58.412	1.387	0.047	28	58.366	0.496	0.412	49	58.608	0.447	0.243
8	58.366	1.267	0.114	29	59.843	0.580	0.113	50	58.586	0.474	0.446
9	58.351	1.129	0.103	30	59.803	0.863	0.006	51	58.621	0.592	0.354
10	58.236	1.035	0.492	31	59.507	0.313	0.034	52	58.449	0.368	0.516
11	58.301	0.886	0.361	32	59.033	0.721	0.006	53	58.525	-0.034	0.310
12	58.264	0.771	0.465	33	58.895	1.361	0.098	54	58.466	-0.108	0.464
13	58.123	0.799	0.485	34	58.914	1.584	0.209	55	58.527	-0.355	0.146
14	58.035	0.643	0.582	35	58.753	0.995	0.000	56	58.567	-0.433	0.262
15	58.186	0.494	0.488	36	58.848	0.639	0.299	57	58.598	-0.552	0.409
16	58.229	0.273	0.637	37	58.895	0.458	0.225	58	58.483	-0.738	0.354
17	58.142	0.122	0.556	38	59.075	0.386	0.011	59	58.454	-0.714	0.389
18	57.998	0.017	0.465	39	59.142	-0.287	0.250	60	58.329	-0.390	0.411
19	57.975	-0.174	0.696	40	59.049	-0.185	0.779	61	58.268	-0.470	0.276
20	58.035	-0.359	0.435	41	58.944	-0.724	0.219	62	58.138	-0.802	0.028
21	58.062	-0.330	0.187	42	58.763	-1.244	0.288				

**North Minch**

Station	lat	long	density	Station	lat	long	density	Station	lat	long	density
500	57.555	-6.754	0.500	513	57.730	-5.891	0.388	526	58.226	-5.923	0.453
501	57.493	-6.954	0.439	514	57.766	-5.986	0.245	527	58.167	-5.906	0.352
502	57.586	-6.983	0.060	515	57.816	-5.960	0.297	528	58.067	-5.804	0.398
503	57.730	-6.792	0.810	516	57.992	-6.238	0.315	529	58.027	-5.798	0.579
504	57.570	-6.440	0.671	517	58.018	-6.176	0.617	530	57.972	-5.741	0.464
505	57.549	-6.460	0.620	518	58.079	-5.855	0.474	531	58.019	-5.530	hard
506	57.716	-6.096	poor viz	519	58.114	-5.916	0.177	532	58.002	-5.602	0.673
507	57.687	-6.008	0.235	520	58.163	-6.036	0.140	533	58.126	-5.613	0.353
508	57.596	-6.035	0.214	521	58.139	-6.085	0.187	534	58.144	-5.741	0.602
509	57.643	-6.007	0.242	522	58.117	-6.107	poor viz	535	58.168	-5.599	0.444
510	57.596	-5.917	0.371	523	58.144	-6.253	0.285	536	58.160	-5.456	0.909
511	57.648	-5.892	0.171	524	58.303	-5.997	0.648	537	58.211	-5.521	0.241
512	57.789	-5.895	0.421	525	58.241	-5.899	0.453	538	58.252	-5.581	0.347

**South Minch**

Station	lat	long	density	Station	lat	long	density	Station	lat	long	density
300	56.364	-6.306	0.156	314	56.692	-6.894	0.008	328	56.977	-6.530	0.615
301	56.449	-6.464	0.319	315	56.801	-6.850	0.059	329	56.969	-6.598	0.642
302	56.433	-6.694	0.785	316	56.861	-6.955	0.030	330	56.901	-6.634	0.290
303	56.574	-7.551	0.209	317	56.670	-6.105	0.530	331	56.877	-6.644	0.065
304	56.567	-7.443	0.481	318	56.754	-6.248	hard	332	56.910	-6.893	0.025
305	56.612	-7.354	0.351	319	56.779	-6.216	hard	333	56.968	-7.009	0.119
306	56.659	-7.360	0.279	320	56.823	-5.994	0.617	334	57.039	-6.907	0.185
307	56.690	-7.383	0.207	321	56.841	-5.963	0.547	335	57.060	-6.834	0.183
308	56.730	-7.302	0.203	322	56.886	-6.000	0.673	336	57.104	-6.780	0.145
309	56.756	-7.310	0.299	323	56.903	-5.982	0.512	337	57.079	-7.025	0.038
310	56.788	-7.359	hard	324	56.916	-6.062	0.764	338	57.131	-7.058	0.206
311	56.800	-7.311	0.302	325	57.021	-5.926	0.323	339	57.026	-7.158	0.141
312	56.850	-7.190	0.289	326	57.084	-6.170	0.585				
313	56.729	-7.064	0.191	327	57.150	-6.360	0.152				

**Firth of Clyde**

Station	lat	long	density	Station	lat	long	density	Station	lat	long	density
400	55.298	-5.249	0.485	414	55.657	-4.910	0.187	428	55.411	-4.975	0.503
401	55.352	-5.252	0.527	415	55.632	-4.963	0.258	429	55.354	-5.037	0.627
402	55.350	-5.334	1.002	416	55.609	-5.079	0.146	430	55.336	-5.013	0.439
403	55.342	-5.359	1.113	417	55.593	-5.041	0.237	431	55.339	-4.942	0.632
404	55.368	-5.400	0.598	418	55.584	-4.940	0.401	432	55.277	-4.991	0.917
405	55.407	-5.486	0.208	419	55.606	-4.904	0.239	433	55.225	-4.973	hard
406	55.428	-5.477	0.064	420	55.609	-4.814	0.281	434	55.214	-5.014	0.987
407	55.527	-5.429	poor viz	421	55.546	-4.912	poor viz	435	55.228	-5.066	0.721
408	55.700	-5.393	0.783	422	55.550	-5.043	0.296	436	55.269	-5.078	1.031
409	55.606	-5.290	0.297	423	55.506	-4.921	0.520	437	55.240	-5.258	1.012
410	55.801	-5.195	0.225	424	55.452	-4.896	0.222	438	55.216	-5.280	0.810
411	55.766	-5.217	0.278	425	55.483	-4.800	0.251	439	55.147	-5.257	2.294
412	55.686	-5.139	0.218	426	55.453	-4.787	0.300	440	55.065	-5.303	0.078
413	55.651	-5.021	0.021	427	55.410	-4.820	0.143	441	55.097	-5.305	0.482

**Noup**

Station	lat	long	density
600	59.206	-3.774	0.005
601	59.363	-3.656	0.777
602	59.367	-3.815	0.035
603	59.396	-3.745	0.618
604	59.451	-3.867	0.498
605	59.459	-3.750	0.542
606	59.492	-3.703	0.534
607	59.494	-3.781	0.615
608	59.495	-3.848	0.571
609	59.534	-3.865	0.454

**Moray Firth (deep trench)**

Station	lat	long	density
A	57.771	-2.487	0.293
B	57.769	-2.387	0.466
C	57.756	-2.278	0.568
D	57.746	-2.217	0.545
E	57.781	-2.092	0.000
F	57.794	-2.046	0.000
G	57.803	-1.979	0.000
H	57.816	-1.926	0.000

Table 2 Overall catch rates ( $\text{kg hr}^{-1}$ ) and mean sizes (mm) of male and female Nephrops obtained in 30 minute trawl hauls taken at various locations (positions given in decimal degrees, -ve indicates west) throughout the areas surveyed during the 1999 underwater television survey

Area	Haul No	Position shot		Position hauled		Catch rate $\text{Kg hr}^{-1}$	Mean carapace length (mm)	
		Latitude	Longitude	Latitude	Longitude		males	females
Fladen Ground	272	58.52	-0.07	58.52	0.03	0.5	44.3	-
	273	58.56	-0.10	58.53	-0.08	0	-	-
	274	58.52	-0.61	58.49	-0.61	86.9	34.9	32.1
	275	58.44	-0.75	58.46	-0.79	46.0	33.0	33.2
North Minch	268	57.78	-5.99	57.78	-5.98	27.0	33.8	31.1
	269	58.01	-5.77	58.05	-5.76	23.0	33.4	31.2
	271	58.07	-5.71	58.10	-5.70	6.3	37.6	34.2
South Minch	265	57.10	-7.02	57.13	-7.02	6.8	36.5	30.9
	266	57.13	-6.96	57.10	-6.95	7.9	31.3	30.7
	267	56.86	-6.65	56.89	-6.64	34.4	36.4	34.5
Firth of Clyde	262	55.34	-4.94	55.32	-4.97	340.0	27.0	26.6
	263	55.25	-5.28	55.23	-5.24	92.4	28.9	27.3
	264	55.24	-5.18	55.27	-5.16	307.2	26.1	25.5