

**DEPARTMENT FOR ENVIRONMENT, FOOD AND RURAL AFFAIRS
CEFAS, LOWESTOFT LABORATORY, SUFFOLK, ENGLAND**

REPORT: RV CEFAS ENDEAVOUR: CRUISE 0804

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DURATION: Thursday 15th July to Monday 19th July

LOCALITY: North Sea

AIMS

1. To perform side by side comparative sampling with RV Corystes. Work will involve comparing the performance of biological sampling gears in shallow water (~20m; Grid 1, transects 1-J & 1-L), mid water (20-40m; Grid 1, transect 1-G & 1-H) and deep water (40m+; Grid 2, transect 2-J & 2-H)². The gears used will be scientific echosounders (EK60 & SH80), standard Granton trawl and sandeel dredge.
2. To undertake trials of a video dredge³ (video camera mounted on an arm in front of dredge hood).

NARRATIVE (All times are Universal Time)

RV ENDEAVOUR sailed at 0645 h on Thursday 15th July and proceeded to the coast off Bridlington to meet CORYSTES for transfer of staff in the early evening. After staff had transferred by searider, ENDEAVOUR proceeded to the south-western end of the Dogger Bank to test an experimental sandeel dredge (Aim 2) in shallow water during the night. Three successful trials of the video dredge were undertaken before 0200 h on 16th July before ENDEAVOUR proceeded to (54° 17.77', 0° 59.78') to meet with CORYSTES and begin comparative trials of acoustic, fishing and dredge gears (Aim 1), using the protocol detailed at Appendix A. All gears were deployed successfully at each station. Results with the scientific echosounders were broadly comparable: very few sandeel schools were observed during the three day trial. ENDEAVOUR caught consistently more pelagic species and consistently less plaice with the Granton trawl. There was no real difference in the performance of the gear with respect to other species. Dredge catches of sandeels were broadly comparable on both vessels. More detailed analysis on length frequency of fish species will be required however. The smooth running of the comparative trials permitted eight 'video dredges' to be performed (only four or five were expected) at night during the normal course of operation. Several other video dredges were performed to configure and optimise the performance of the camera equipment and to increase understanding of the behaviour of the dredge under different fishing conditions. An additional acoustic survey was conducted during the morning of the 19th July at (54°29.86', 1°32.74) to assess the abundance of sandeel schools along the 30m contour of the sand banks. With all aims of the cruise completed, ENDEAVOUR set a course for Lowestoft at 0700 h, and docked at 2200 h.

¹ Chris Firmin was transferred from Endeavour to Corystes at 1800 h on 15th July to ensure adequate staffing for fish stomach sampling work on Corystes.

² These were changed from the original cruise plan due to bad weather during Cor_0904 and the subsequent requirement to modify station order due to missed sampling opportunities.

³ Additional aim.

RESULTS

1.1. To perform side-by-side comparative sampling with RV Corystes using fisheries acoustics.

Fisheries acoustic data were recorded to compare and calibrate the acoustic estimates on distribution and abundance of sandeels with those of CORYSTES. The survey was carried out from 0400 h to (roughly) 930 h each day between 16th and 18th July using the Simrad EK60 dual frequency (38 kHz and 120 kHz), split beam echosounder with echo integration. A total of 14 sandeel schools were observed. Additional acoustic surveying for sandeels was carried out during early daylight hours of the 19th July northwest of the survey grid, from 54° 30.00N, 1° 32.34E via 54° 29.75N, 1° 27.09E along the 30m depth contour line to 54° 38.67N, 1° 07.92E.

1.2. To perform side by side comparative sampling with RV Corystes using Granton Trawl.

ENDEAVOUR trawled a standard Granton net (standard rig, 15 fathom bridles, one tickler chain, towed at 3.8 to 4 kts) at 18 stations. In total, 20640 (1155 kg) fish were caught compared to the 14708 (790 kg) caught at the same stations by CORYSTES. The principal causes of the difference were: consistently larger catches of sprat and mackerel, consistently lower catches of plaice and one large haul of haddock. Catches of other species were very similar (Table 1).

Species	End	Cor	Difference
<i>Limanda limanda</i>	652.24	528.88	123.36
<i>Scomber scombrus</i>	140.487	15.72	124.767
<i>Eutrigla gurnardus</i>	101.048	79.68	21.368
<i>Melanogrammus aeglefinus</i>	89.842	25.316	64.526
<i>Echiichthys vipera</i>	69.283	55.052	14.231
<i>Sprattus sprattus</i>	67.049	8.91	58.139
<i>Pleuronectes platessa</i>	10.807	34.88	24.073
<i>Merlangius merlangus</i>	7.9339	18.514	10.5801
<i>Microstomus kitt</i>	6.775	9.322	2.547
<i>Buglossidium luteum</i>	2.196	4.662	2.466
<i>Trachurus trachurus</i>	1.72	0	1.72
<i>Callionymidae</i>	1.687	1.022	0.665
<i>Lanceolatus hyperoplus</i>	1.46	0.706	0.754
<i>Mullus surmuletus</i>	1.046	2.83	1.784
<i>Hippoglossoides platessoides</i>	0.944	0.235	0.709
<i>Arnoglossus laterna</i>	0.606	2.913	2.307
<i>Gadus morhua</i>	0.267	0.56	0.293
<i>Gymnammodytes semisquamatus</i>	0.237	0	0.237
<i>Raja naevus</i>	0.145	0	0.145
<i>Ammodytes marinus</i>	0.096	0.254	0.158
<i>Raja radiata</i>	0.066	0	0.066
<i>Agonus cataphractus</i>	0.023	0	0.023
<i>Syngnathidae (indet.)</i>	0.001	0.001	0
<i>Squalus acanthias</i>	0	0.19	0.19
<i>Trisopterus minutus</i>	0	0.54	0.54
Total	1155.96	790.187	455.6481

Table 1. Comparison of total fish catch (kg) with the standard Granton trawl.

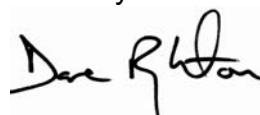
1.3. To perform side-by-side comparative sampling with RV Corystes using sandeel dredge.

ENDEAVOUR dredged a modified scallop dredge (1.2 m width) at 18 stations. In total, 945 sandeels were caught by ENDEAVOUR compared to 928 by CORYSTES. While the totals were similar, catches per station were less consistent and only 50% of the variance in sandeel catches was explained by the catch at the same station by the CORYSTES.

2. To undertake trials of a video-camera equipped sandeel dredge.

Experimental trials of a video-camera equipped sandeel dredge ('video dredge') were carried out during the night and early morning of the 15th and 16th of July. Images of the dredge running along the seabed were obtained but were partially obscured due to excessive glare from the halogen lamp. Efforts were made to diffuse the light cone, but were largely unsuccessful. In consequence, the position of the lamp was changed: instead of being aligned to one side of the camera, it was positioned above the camera, facing down. The video dredge was shot again during the late afternoon on the 17th July. Ambient light was sufficient to capture high quality images of the dredge descending, landing on the seabed, then being towed across different sediment types. An immediate impression was that the dredge fished differently over different sediments. Over sandy sediments, only the bottom of the dredge teeth entered the sediment and it tended to bounce a little; but over gravelly sediments, the dredge teeth dug in fully and pulled the chain belly down onto the seabed. The dredge was used successfully on two normal dredge tows during the night although the quality of images was poor, again due to glare from the halogen lamp. The video dredge was shot again in shallow water in the early evening of the 18th July. As the sediment was mainly sand, it was decided to relocate the camera to a lower position closer to the hood of the dredge. This was extremely successful: high quality video of the dredge hood and teeth were collected, and it was possible to see sandeels leaving the sediment as the dredge approached. A brief test was made with the camera facing forward to the tow bar to assess the effect of the tow bar and wheels on fauna ahead of the dredge hood. Again, high quality images were obtained, but footage was inconclusive. In consequence, it was decided to return the camera to the backward facing position in order to record the six dredge tows during the night of the 18th July. Great success was achieved with the video dredge and lamp glare was virtually absent with the camera in the new position. Sandeels and other fauna were observed leaving the sediment and entering the dredge on a number of occasions during the evening, but low catches of sandeels proved frustrating. However, catch composition on hauling of the dredge was similar to that predicted in advance on the basis of observations with the camera. More detailed viewing with image analysis software will be required for a full analysis.

D. Righton
19th July 2004



Seen in Draft: A. Reading, A. Lincoln

Distribution list:

Basic list +

D. Righton (SIC), J. van der Kooij, C. Firmin, P. Welsby, C. Mills, K Turner-Welsby, E. Bell, Eastern Region and Northeastern Region Sea Fisheries District, Sea Fisheries Inspectorate.

APPENDIX A- Protocols for cruise End_0804

The survey area.

The survey took place on the west side of the Dogger Bank, on and around the shoals of the North West Riff. Eighteen stations were selected for comparative work: 6 within a relatively unfished area, 12 in a (usually) heavily fished area. For more details, see report for Cor_0904.

The survey strategy and fish sampling.

Acoustic surveying for fish shoals was carried out using a split beam, dual frequency (38 & 120 kHz) scientific echosounder (EK60, Simrad) between 0500 h (just after dawn) and 0900h at speeds of between 5 and 7 kts depending on weather. Sandeel schools were identified based on their vertical position, location with regards to bottom structure, shape and by comparing the 120 kHz and 38 kHz echograms. Due to absence of a swimbladder, sandeels show up stronger on the 120 kHz. This is in contrast to many other locally abundant species like clupeids and gadoids.

Following each acoustic survey, the trawl was carried out at each station between about 0900 h and 1700 h using a standard Granton trawl with a 6 mm mesh liner. Twenty minute trawls were carried out at each of the day's six stations. Catches were sorted by species and either counted directly (small catches), or numbers were calculated by raising the total weight of the catch by the number in a weighed sub-sample.

Subsequently, the dredge survey for sandeels in the sea bed was carried out using a 1.2 m sandeel dredge from 2100 h to about 0300 h each night. 10-minute tows were carried out at each dredge station. Sandeel catches ranged from 0 to 89 fish per tow. All fish were counted and measured. Sandeels were counted as whole fish or heads, heads were subsequently discarded and only whole fish measured or weighed. Other species were either counted directly (small catches), or numbers were calculated by raising the total weight of the catch by the number in a weighed sub-sample. A note was also made of the typical benthic fauna associated with the catch in the dredge.

Survey navigation guidelines

At the first station of each 'shift' (acoustics, granton or dredge), the watchmen of each vessel will make arrangement as to relative vessel position based on local conditions (tide, wind etc.). The default procedure will be that RV Corystes will lead for the first three stations and after 3 stations the vessels will switch lead. The vessels will operate at approximately 0.5 nm apart with one vessel shadowing the other at a 45 offset. The bearing of trawl and dredge tows, in addition to details such as warp to depth ratios etc., will be discussed between watches in the run up to gear deployment. Communication will be via radio (Frequency 77).