

MINISTRY OF AGRICULTURE, FISHERIES AND FOOD
FISHERIES LABORATORY, LOWESTOFT, SUFFOLK, ENGLAND

1995 RESEARCH VESSEL PROGRAMME

REPORT: RV CORYSTES: CRUISE 6

STAFF:

H L REES (SIC)
D S LIMPENNY
P HUDSON
M PENDLE
S HULL
S BOYD
B JONES: part-time
D DOWNEY (PML): part-time

DURATION:

Left Lowestoft 10.30h, 31 May
Arrived Lowestoft 13.15h 18 June

LOCALITY:

North Sea/English Channel/Celtic Sea

AIMS:

1. To conduct further sampling at an experimentally dredged area off the Norfolk coast, using grab, side-scan sonar and underwater camera.
2. To sample the sediments and benthos off the Tyne for time-series studies using grab, core and beam trawl.
3. To obtain further samples of the benthos on the Dogger Bank for contaminant analyses, along with sediments for a PML project.
4. To sample horse-mussels from the Humber/Wash area for later analyses of contaminants in flesh.
5. To survey the sediments and benthos at Area 107 (a sand extraction area in the Wash) using grab, trawl and side-scan sonar.
6. To sample the benthos of gravels off the Humber and Lowestoft using the Hamon grab.
7. To collect samples of fish stomachs at gravel areas off Cromer and Lowestoft for analysis of feeding activity.

8. To conduct a survey at the Nab Tower dredgings disposal site, Isle of Wight, using side-scan sonar and grab.
9. To conduct a survey at a dredgings disposal site off Milford Haven using side-scan sonar and grab.
10. To conduct a survey of the sediments and benthos at the Barrow-in-Furness dredged material disposal site using grab and side-scan sonar.
11. To sample sediments at a dredgings disposal site in Swansea Bay for meiofauna and contaminant content.
12. To conduct a survey at the Hastings Shingle Bank aggregate extraction site using a Hamon grab.
13. To conduct a survey of the sediments and benthos at the Roughs Tower dredged material disposal site using grab, side-scan sonar and underwater camera.
14. To collect 2-metre beam trawl samples of the epifauna at selected NMP sites to complete coverage of the England and Wales coastline.
15. To collect sediment samples from an inflatable boat within selected industrialised estuaries for contaminant analysis.
16. To collect beam trawl samples at representative locations for the analysis of litter content.
17. To identify offshore locations in the North Sea, English Channel and Irish Sea suitable for the long-term monitoring of temporal trends in the benthos and sediments.
18. To sample the meiofauna at selected waste disposal and aggregate extraction sites.

NARRATIVE:

A simplified cruise track is given in Figure 1. *Corystes* sailed at 10.30 on 31 May, arriving off the Norfolk coast for Hamon grab sampling at an experimentally dredged site (aim 1), following collection of a 2-metre beam trawl sample of the epifauna (aim 14). On 1 June, two 4-metre beam trawl samples were obtained from gravel substrates in the vicinity, and the stomach contents of several fish species retained (aim 7). A side-scan sonar and underwater photographic survey of the experimentally dredged site was then conducted, followed by collection of horse-mussels off Cromer (aim 4). The following day, a side-scan sonar survey was conducted at a licensed sand dredging area in the Wash (area 107 : aim 5). *Corystes* then sailed overnight for NMP 345 (Silver Pit : aim 17).

On 3 June, sediment samples for macrofauna and trace contaminants were collected at NMP 345, using a Day grab. This was followed by successful initial deployment of a newly-purchased multicorer for meiofauna sampling (see Results, below). A 4-metre beam trawl sample was taken some 10 miles to the north, to supplement a catch of the larger epifauna for analyses of trace metal concentrations (aim 3). The multicorer was again deployed in muddy sediments on the southern edge of the Dogger Bank at 80 metre depth. Several Hamon grab samples were then taken to provide sediment for later experimental work by PML (aim 3); samples of the benthic infauna were also collected for later analysis of trace metal concentrations. Following sampling with a 2-metre beam trawl (aim 14), a series of Day grab samples of sediments were collected, in order to complete the grid of stations on the Dogger Bank, begun in 1994.

On 4 June, further samples of the larger epifauna were obtained from 4-metre beam trawls on the northern part of the Dogger Bank. Hamon grab samples of sediment were collected for PML (aim 3), along with Day grab samples for the macrofauna; the multicorer was unsuccessful on the shelly sand. After sailing to the north-western edge of the Dogger Bank, further sediment samples were collected for PML, for macrofauna, and for meiofauna using the multicorer. *Corystes* then sailed west to the Tyne, collecting a 2-metre beam trawl *en route* (aim 14). On 5 June, samples of the macrofauna and meiofauna were successfully collected off the Tyne (aim 2), followed by Day grab samples along a transect through the Souter Point dredgings disposal site; sub-samples of sediment were taken for later determination of particle size, trace metal concentrations and meiofauna distributions (aim 18). After collection of three 2-metre beam trawl samples at the Tyne sewage-sludge disposal site (aims 2 and 16), *Corystes* anchored overnight near to the Tyne mouth.

On the morning of 6 June, sediment samples were collected by sea-rider along the Tyne estuary (aim 15); the hand-grab was lost on the last station, and arrangements were made via Lowestoft (Jon Rees) for a replacement to be available the following day for work in the Tees estuary. During the afternoon, D Downey transferred to shore along with sediment samples collected from the Dogger Bank. Bryn Jones joined the ship, which then sailed to Tees Bay for initial Day grab sampling along a transect through a dredgings disposal site (aim 18). *Corystes* then anchored overnight off the Tees mouth in readiness for estuary sampling by small boat the following day. However, strengthening winds prevented this objective from being met, and the offshore transect was completed by further Day grab sampling; sampling using the multicorer was prevented by the worsening weather. *Corystes* then sailed via a 2-metre beam trawl site near Flamborough Head (aim 14) to a site off the Humber estuary for sampling of horse-mussels using a Rock dredge (aim 4).

Day grab sampling for 'ground-truthing' of the earlier side-scan sonar survey at area 107 (aim 5) was completed early on 8 June, and three 4-metre beam trawl tows were then made off Lowestoft for collection of fish stomachs (aim 7). Following collection of spares via small boat at Lowestoft for repair of the ship's crane, *Corystes* sailed to the Roughs Tower dredgings disposal site for collection of sediment samples by Shipek grab for later analyses of trace metal concentrations (aim 13). Following completion on 9 June, a side-scan sonar survey of the area was conducted. On the last leg, the bolt securing the fish to the tow arm parted, and the fish was retrieved on the emergency cable, and later fixed. After collection of Hamon grab samples for the benthic macrofauna, *Corystes* sailed for the Isle of Wight (Nab Tower dredgings disposal site : aim 8).

On 10 and 11 June, a side-scan sonar survey in the vicinity of the Nab Tower was successfully completed, along with collection of sediments by Shipek grab. Corystes then sailed for Milford Haven, via a 2-metre beam trawl station off Poole Bay (aim 14), arriving on the evening of 12 June. Side-scan sonar and Shipek grab surveys were conducted in the vicinity of the Milford Haven dredgings disposal site, and at a site further offshore which had previously been identified as a possible alternative location for the receipt of a predicted increase in the quantities to be disposed of. Consideration of an alternative site has arisen from concerns about the possibility of transport of fine material from the presently used site to the nearby Skomer marine nature reserve.

On 14 June, a transect through the Swansea Bay dredgings disposal site was worked by Day grab and multicorer (aim 11). The ship then sailed for the Celtic Deep, for Day grab and multicore sampling (aim 17). On completion, Corystes sailed for an NMP site in the central Channel where Day grab samples of sediments were collected for later biological and chemical analyses (aim 17). On completion on the evening of 15 June, the ship sailed for Hastings via two 2-metre beam trawl sites in the English Channel (aim 14). At the Hastings Shingle Bank, 8 Hamon grab samples were collected for biological analysis (aim 12) and a side-scan sonar survey of the southern edge of aggregate dredging site 'Y' was carried out in order to check for the persistence of 'out-of-area' dredging tracks (extra aim). Corystes then sailed to the Thames estuary on the evening of 16 June, in strengthening southwesterly winds.

On 17 June, a side-scan sonar survey at the Roughs Tower dredgings disposal site was completed. (A leg had earlier been missed due to loss of a securing bolt on the towed fish). Extra Shipek grab samples were then collected at locations previously sampled by Hamon grab, and an additional Hamon grab station was worked in the disposal site, completing this part of aim 13. Conditions were too turbid for deployment of the underwater camera sledge, and so Corystes sailed north to anchor at a muddy site off Southwold, in order to compare the quality of Day grab and multicore samples of sediment in conditions of relative shelter (extra aim). This work was completed on the evening of 17 June, and Corystes docked at Lowestoft at 13.15 on 18 June.

RESULTS:

All survey aims were successfully achieved, with the exception of aim 6 (weather conditions at the time were unsuitable for Hamon grab deployment), aim 10 and parts of aims 15 and 17 (insufficient time for Irish Sea work). These aims will be addressed during future AEP2 cruises. In most cases, results will only become available on completion of laboratory analysis of collected samples.

Side-scan sonar images at a gravel area off Norfolk which was experimentally dredged in April 1992 (aim 1) continued to reveal the existence of dredge tracks, although these are now much weathered. Underwater video images confirmed that an undulating sea-bed relief which was evident immediately post-dredging has largely disappeared, through erosion of crests and infilling of troughs largely by sandy sediments. (The RoxAnn sediment discrimination system was run concurrently with this and all other side-scan sonar surveys conducted during the cruise).

Adequate quantities of sediment with a significant mud component were collected in the vicinity of the Dogger Bank for a PML project, although the locations necessarily fringed the

Bank itself, which is predominantly sandy in nature. Quantities of epifaunal species were successfully collected in order to supplement samples obtained in 1994 for contaminant analysis (DoE project).

Side-scan sonar images at area 107, a sand extraction area in the Wash, delineated a zone of intensive dredging activity in the NE part, arising from a recent increase in demand for material for sea-defence work on the Lincolnshire coast. The survey area was extended to the NW part of area 107 in anticipation of intensified dredging here for the same purpose.

Sampling at the Nab Tower dredgings disposal site will provide 'baseline' data against which the effects of anticipated future increases in disposal activity can be assessed.

A further 8 samples of the epifauna (including a number of hitherto unrecorded species) were collected by 2-metre beam trawl as a supplement to an extensive survey of this component of the benthos around the UK coastline and offshore.

Day grab samples collected at the Souter Point disposal ground off the Tyne revealed that mine-waste (especially coal and shale) was still much in evidence, but was frequently covered with recently deposited dredged material from the Tyne (mine-waste disposal has now ceased at this site). Qualitative assessment of litter content in trawls at the Tyne sewage-sludge disposal site revealed a similar range of smaller sewage-derived artefacts to that previously observed. On-board analysis of the epifauna provided no evidence of gross effects arising from continuing disposal activity.

Side-scan sonar images at the Milford Haven dredgings disposal site demonstrated the hard nature of substrates (including extensive rock outcrops) extending to the north in the direction of Skomer. Grab samples provided no visible evidence of dredgings except at the disposal site. Images at a location further offshore which has been identified for possible future disposal activity revealed a largely sandy sea bed. Surprisingly, one Shipek grab obtained for the purpose of 'ground-truthing' the area contained anoxic mud which was suggestive of dredged material. However, further sampling in the vicinity failed to identify additional deposits; the origin of the material should be clarified following laboratory analysis.

Marks suggestive of substantial commercial beam trawling activity were evident from the side-scan sonar record at Hastings Shingle Bank. Preliminary assessment of the southern edge of the dredged area provided no evidence of extensive 'out-of-area' dredging; however, the results require more detailed evaluation back at the laboratory.

Surveys at the Roughs Tower dredgings disposal site highlighted the complexity of the sea bed environment, with very variable sediment types, some of which were clearly modified as a result of dredged material inputs. The Hamon grab proved successful in the biological sampling of these sediments.

As part of a research project on the utility of meiofauna studies (S Boyd), samples were collected by various means from several locations subject to waste inputs, as well as at offshore muddy stations earmarked for long-term monitoring of trends in biological and chemical variables. This work included initial field trials of a Bowers and Connelly mini-corer modified to MAFF specifications. The device can take up to four core samples simultaneously; the quality of samples obtained was generally good, and the device was effective over a range

of depths from 15 to 100 metres. However, the performance of the core-closing mechanisms proved to be inconsistent, at times leading to an unacceptably high failure rate. Sufficient sea-going experience has been gained to ensure that such problems can be resolved through further discussions with the manufacturers.

H L Rees
18 June 1995

SEEN IN DRAFT: B A Chapman (Master)
W May (Senior Fishing Mate)

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Figure 1.

Corystes 6/95 : simplified cruise track

