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

1992 RESEARCH VESSEL PROGRAMME

REPORT: RV CORYSTES: CRUISE 6

STAFF:

H L Rees (SIC)
R G Lees
D S Limpenny
P M Hudson
C M G Vivian (14-26 May)
M A Lambert (14-26 May)
E G Shreeve (8-14 May)
J M Rees (8-14 May)
A R Lawler (8-14 May)
A J Kenny (8-14 May)

DURATION:

Left Lowestoft 13.30h 8 May
Arrived Lowestoft 14.30h 26 May
All times are Greenwich Mean Time

LOCALITY:

North Sea/English Channel

AIMS:

1. To conduct a survey of an experimentally-dredged site off Norfolk, using grab, dredge, underwater camera, side- and sector-scan sonar.

2. To photograph and sample the dredged area using divers.

3. To conduct a survey at a nearby site used for disposal of gravel dredgings, using grab, dredge and side-scan sonar.

4. To sample horse-mussels from the Humber/Wash area for biological and chemical analysis.

5. To sample the sediments and benthos at the Tyne sewage-sludge and dredged-material disposal sites, using grab, trawl and core.

6. To sample a grid of 23 stations off the north-east coast for the JMG sediment survey.

7. To sample the sediments and benthos at NSTF sites, using grab, core and trawl.

8. To conduct a survey of sediments at the Barrow Deep sewage-sludge disposal site.

9. To sample the sediments and benthos at the Hastings aggregate extraction site, using grab, dredge, underwater camera and side-scan sonar.

10. To sample the sediments and benthos of gravel deposits off the Isle of Wight, using an Anchor dredge and side-scan sonar.

NARRATIVE:

A simplified cruise track is shown in Figure 1. On 8 May, RV Corystes sailed to an area off the N Norfolk coast, for sector- and side-scan sonar surveys of a plot which had previously been experimentally dredged by the 'Sand Harrier', a commercial trailer-suction dredger, at the end of April (aim 1). In succeeding days, Hamon grab and scallop dredge samples were taken at this and two adjacent reference sites, and benthic organisms extracted for later laboratory analysis (aim 1). The underwater camera sledge was also deployed around slack water periods (aim 1). A Toroid buoy was laid at the centre of the dredged plot on 9 May, as a marker for diving work. A total of three dives were made as weather and tides dictated, involving sampling around dredge tracks by hand grab, along with video and still photography (aim 2). Five Anchor dredge samples were also taken for assessment of sampling efficiency relative to Hamon grabs, and a b/w video camera used to observe performance of the latter at the sea bed (additional aims).

Sampling of the benthos by Hamon grab and scallop dredge was also conducted at a nearby site licensed for the disposal of some 50,000 tonnes of gravel arising from the experimental dredging, along with a side-scan sonar survey. The underwater camera sledge was also deployed across the site (aim 3).

On 12 and early 13 May, samples of horse-mussels for later chemical and biological analyses were obtained by a Rock dredge at five sites in the Humber/Wash area (aim 4). A scallop dredge tow was also made through the Humber sewage-sludge disposal site for determination of litter content (additional aim). Grab samples for sediments and infauna at NSTF stations 16a and 17a, along with 2-metre beam trawl samples of the epifauna, were also taken (aim 7). Following further camera sledge deployment in the vicinity of the gravel extraction and disposal sites, and retrieval of the Toroid buoy, Corystes docked at Lowestoft at 06.30 on 14 May, for offloading of diving equipment and gravel samples. E Shreeve, J Rees, A Lawler and A Kenny left the ship, and C Vivian and M Lambert joined.

Corystes sailed at 08.30 on 14 May, collecting Day grab and beam trawl samples at NSTF stations 53, 43, 15 and at a supplementary coastal station near the Tees estuary (aim 7), *en route* for the Tyne sewage-sludge disposal site, in the vicinity of which samples were taken for sediments and benthos (aim 5). This was followed by beam trawl sampling for the epifauna and litter (aim 5). Day grab and beam trawl samples were taken at NSTF 14 and at a supplementary coastal station near the Tyne; a Kasten corer was also deployed at a muddy location in Marsden Bay, and at NSTF 14 (aim 7).

Two transects were sampled for sediments and benthos by Day grab through, respectively, the N Tyne dredgings/colliery waste disposal site, and the S Tyne colliery waste/dredgings disposal sites, in completion of aim 5 on 17 May.

Following sampling at NSTF 42 (aim 7), grab sampling for sediments on a grid of JMG stations in the central North Sea commenced on 18 May (aim 6). During execution, a Kasten corer was deployed at 'Devil's Hole' (c. 240m), along with two beam trawl samples at selected JMG stations (additional aim).

Following completion of the JMG grid on 20 May, Corystes sailed south for sampling at NSTF stations 47, 50, 18 and 25. A Kasten corer was deployed at a muddy location south of the Dogger Bank, and at NSTF 50.

On 21 and 22 May, Day grab and beam trawl samples were taken at stations along the Barrow, Middle, Black and Knock Deeps (Thames estuary), for sediments, infauna, epifauna and litter (aim 8). A beam trawl sample was also taken at NSTF station 19 in completion of aim 7.

On 23/24 May, samples of sediment and fauna were taken at the Hastings Shingle Bank by Hamon grab and scallop dredge, along with tows of the underwater camera sledge at dredged and reference sites, and a side-scan sonar survey (aim 9). This was followed by Anchor dredge sampling, and a side-scan sonar survey at and around commercially dredged areas east of the Isle of Wight (aim 10). On completion, Corystes sailed for Lowestoft on the evening of 25 May, docking at 14.30h on 26 May.

RESULTS:

All aims (including four additions) were successfully achieved. Full results will only become available on completion of laboratory analyses of samples.

A total of 13 NSTF/NMP stations were sampled for sediments (trace metals/PCB's) and benthic infauna. Additionally, 16 beam trawl samples of the epifauna were collected at these and adjacent stations; preliminary results from shipboard processing of this material are shown in Figure 2. (Trawls from NSTF and disposal sites were also examined for litter content). Sampling by Kasten corer was successful at NSTF 14, but not at other locations.

The experimentally dredged plot (dimensions : 300 x 500m) and the associated disposal site off N Norfolk were successfully relocated, due to the enhanced navigational facility provided by the Deccalink and Sercel Differential GPS receivers, and the expertise of the operators. (In this type of 'fine-scale' survey work, it is important to ensure that the same Geodetic Spheroid is used for satellite navigation, on succeeding visits). Side- and sector-scanning surveys allowed clear definition of the scale and intensity of physical impacts. Good water clarity also allowed detailed inspection of tracks by underwater television and divers. For example, accumulations of sand were evident in furrows created by the drag-head; surviving animals were observed on the crests between dredge tracks, within furrows as a result of erosion from crests, and in undredged patches.

At the site used for disposal of dredgings from the experimental plot, local accumulations of gravel and shell debris could be clearly attributed to the discharge operation; moreover, a number of the colonising organisms had evidently survived dredging, transport and disposal, giving rise to enhanced abundances compared with nearby sediments (Figure 3).

A total of 51 Hamon grabs, 9 scallop dredges, 5 Anchor dredges and10 diver-operated grabs, along with video, still and sonar records, were obtained during the execution of aims 1-3. Additionally, video images of the performance of the weighted Hamon grab at the sea bed provided no evidence of lateral movement during closure, thus confirming its efficient operation on loose aggregate in this area.

Samples of horse-mussels were obtained at each of five stations in the Humber/Wash area, for a programme of annual monitoring of trace metal burdens and biological condition (aim 4; large specimens were also obtained from a beam trawl at NSTF 42, for reference purposes). Sub-samples of the associated fauna from Rock dredges were retained for later laboratory analyses. There was no evidence of accumulations of litter from these or a scallop dredge sample taken at and adjacent to the Humber sewage-sludge disposal site.

Fifty-four Day grab samples were collected from two areas off the Tyne (one covering the sewage-sludge disposal site) for a programme evaluating temporal trends in trace metal concentrations of sediments. An additional 23 stations were worked for the benthic fauna and sediments in the vicinity of the Tyne sewage-sludge and dredged material/colliery waste disposal areas (aim 5). As in previous years, beam trawl samples along a transect south from the sewage-sludge disposal site revealed an accumulation of sewage-derived artefacts in the immediate vicinity. A relationship between these and the occurrence of scavenging hermit crabs is suggestive of mild organic enrichment (Figure 4).

Twenty-three stations in the central North Sea were worked for collection of samples as part of the JMG survey of trace contaminants in sediments (aim 6).

Fifty samples of sediment for analyses of trace metal concentrations, and 20 samples for the benthic fauna, were collected by grab along transects in the outer Thames estuary (aim 8). A further 3 beam trawl samples were collected for assessment of the benthic fauna and litter content; contamination by the latter was noticeably less than at the Tyne site. However, floatables were noted in a discrete patch towards the southern end of the Barrow Deep.

Samples of the benthos from 18 Hamon grabs and 3 scallop dredges were obtained at and adjacent to an aggregate extraction site off Hastings, along with underwater images from the camera sledge, under conditions of exceptional water clarity (aim 9). The effects of recent highly-intensive dredging on the sediments and benthos were clearly evident from this work, eg very few animals were present in scallop dredge samples, compared with adjacent undredged sediments (Figure 5). A side-scan sonar survey of the area appeared to indicate that some dredging activity had occurred just to the south of the licensed zone.

Four Anchor dredge samples from an area east of the Isle of Wight were obtained, as part of a regional assessment of the benthos of gravel deposits (aim 10). A side-scan sonar survey of aggregate extraction areas 213 and 340 provided no indication of recent dredging outside

licensed areas. Even though aggregate extraction was suspended in area 213 in September 1990, dredged tracks were still evident there, indicating slow physical recovery of the sea bed.

H L Rees
(Scientist-in-Charge)
14 July 1992

SEEN IN DRAFT J R French (Master)

P McKay (Fishing Skipper)

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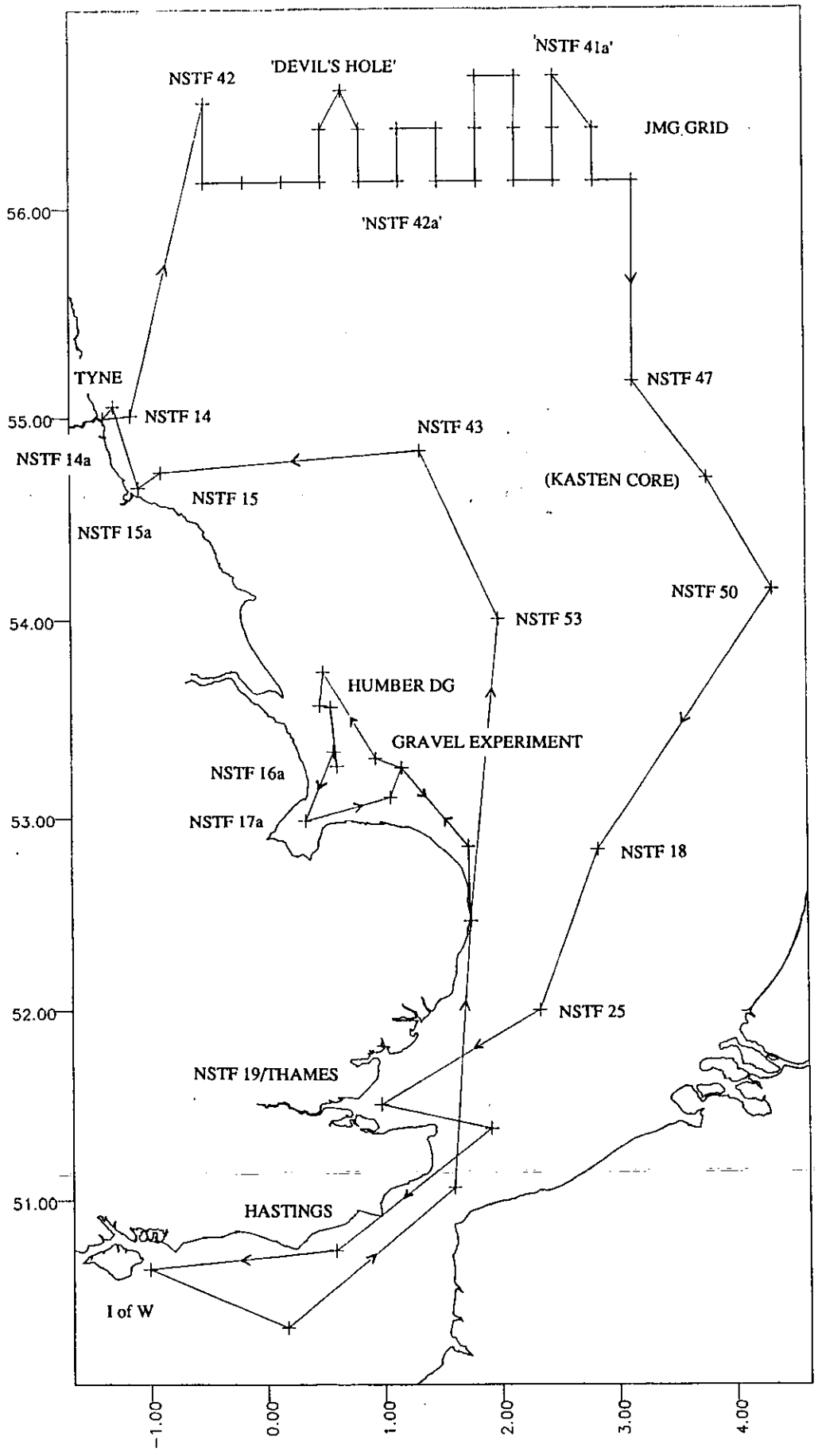

FIGURE 1. Simplified cruise track : Corystes 6/92

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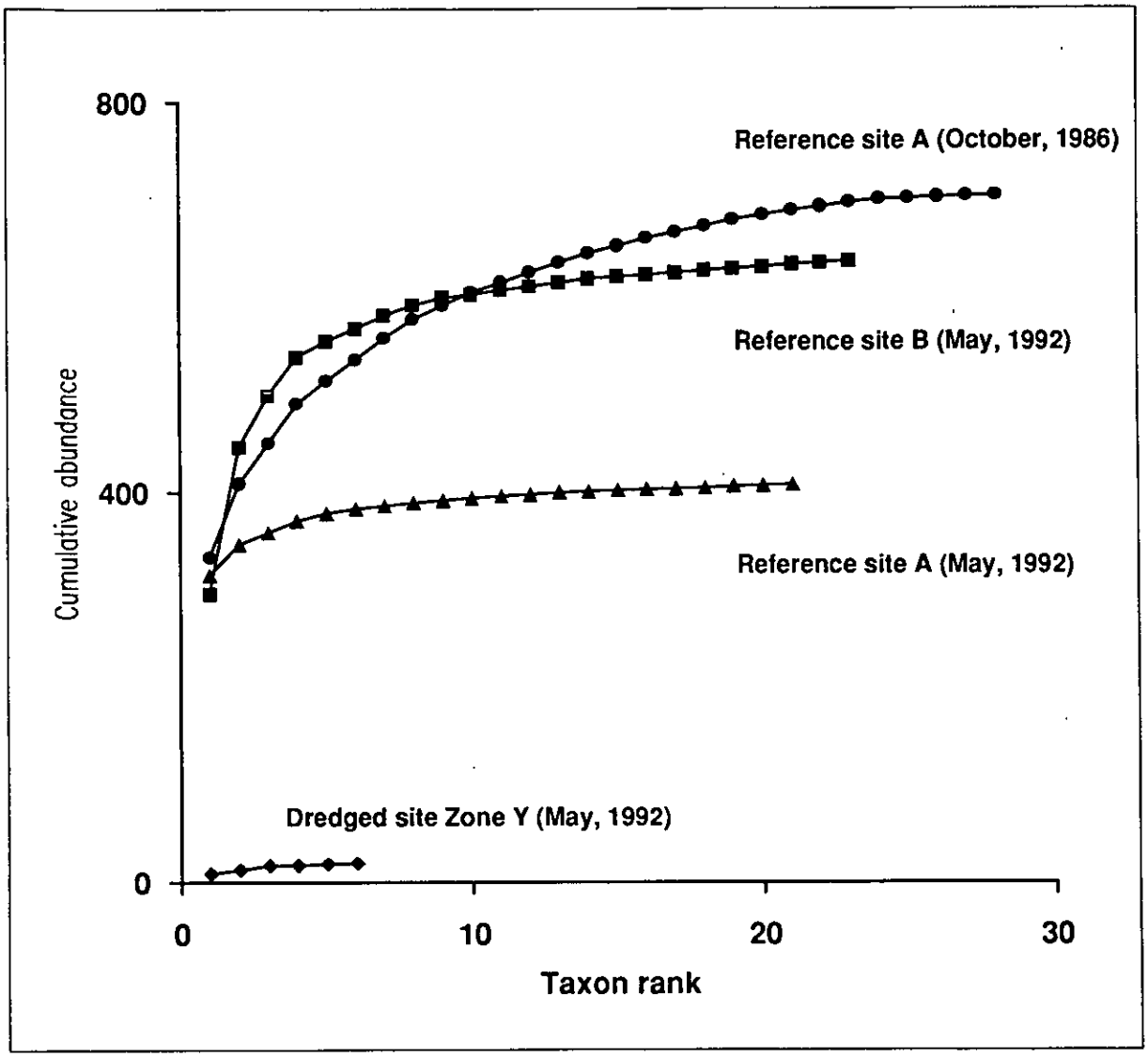

FIGURE 5. Cumulative abundance curves for the benthos from scallop dredges at Hastings Shingle Bank.

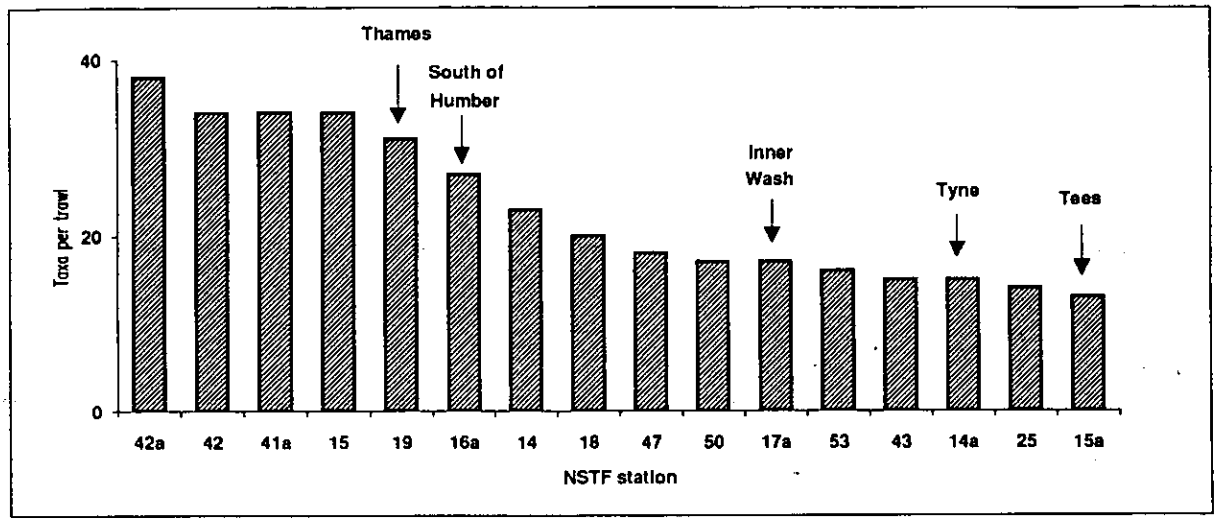

FIGURE 2. 2-metre beam trawl tows at NSTF and adjacent sites; those in proximity to major estuaries are specified.

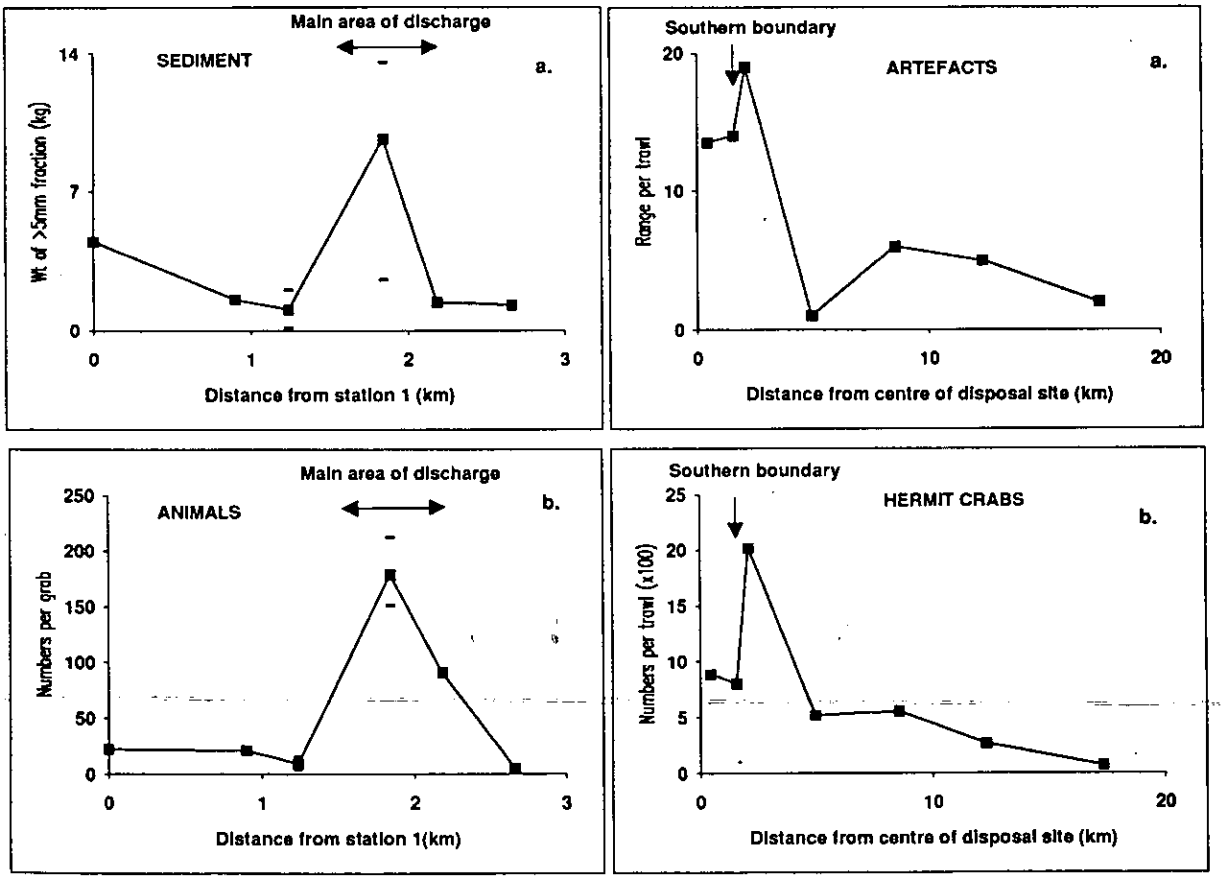

FIGURE 3a,b. Trends in coarse sediment weight and numbers of benthic organisms at a gravel disposal site off Norfolk.

FIGURE 4a,b. Trends in numbers of artefacts and hermit crabs in 2-m beam trawl samples along a transect south from the Tyne sewage-sludge disposal site.

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

1992 DIVING PROGRAMME

REPORT: RV CORYSTES: CRUISE 6

STAFF: J M Rees (8-14)
D S Limpenny (Dive Project Leader)
A R Lawler (8-14)
A J Kenny (8-14) (Scientific Project Leader)

DURATION: Depart Lowestoft 1330h 8 May
Arrived Lowestoft 0700h 14 May

LOCATION: 17 miles North of Cromer

AIMS:

1. To take 35mm stills photographs for the analysis of benthos from dredged and non-dredged areas following the extraction of c.50,000 tonnes of marine aggregate.

2. To record dredged and non-dredged areas using a video camera.

3. To sample benthos within dredged and non-dredged areas using a diver operated sampling device.

4. To sample sediments within dredged and non-dredged areas.

NARRATIVE:

On the 9 May a toroid buoy was deployed in the experimental dredging site from which all dives were undertaken. On 10 May a dive was organised to complete aim 2 and to locate areas for aims 3 & 4. A search line was deployed to locate a dredge track. On 11 May a dive was undertaken to provide samples for the analysis of benthos from a dredge track located on the previous dive. A total of 4 samples were taken using a newly constructed diver operated grab. A second dive on the 11 May was undertaken to sample areas adjacent to dredge tracks for the analysis of benthos and to take sediment samples from dredged and non-dredged areas for particle size analysis. A total of 3 samples were taken for benthos and 6 samples for particle size analysis. A third dive was undertaken to take stills photographs across the dredge site.

RESULTS:

The area of seabed surrounding the toroid buoy was heavily dredged and the seabed had been lowered in places by nearly 1.5 metres. The tracks were easily identified by the presence of sand which had accumulated along the bottom of the track furrows. Very little benthos was observed within dredge tracks. All diving aims were completed successfully.

About 15 minutes of video records were taken along with 36 x 35mm stills photographs.

The diver operated grab performed efficiently, although a number of modifications should be made to make it easier to operate, one of which should be to reduce the overall weight of the grab and secondly, improvements should be made to make the removal of the sample containers easier.

A Kenny
8 June 1992

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