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

1993 RESEARCH VESSEL PROGRAMME

REPORT: RV CORYSTES: CRUISE 5b

STAFF:

S M ROWLATT (SIC)
H L REES, 20-31 May
D S LIMPENNY
M A LAMBERT
W J MEADOWS
P M HUDSON
A LAWLER, 11-20 May
A KENNY, 11-20 May
P BAXTER (GeoAcoustics Ltd), 11-12 May
S BOYD (UCNW), 25-31 May

DURATION:

Left Lowestoft 1200 h 11 May
Arrived Lowestoft 1730 31 May
(all times are Greenwich Mean Time)

LOCALITY:

North Sea, Channel, SW Approaches and Irish Sea

AIMS:

1. To survey an experimentally dredged site off N.Norfolk, using grab, dredge, underwater camera, sidescan sonar and RoxAnn.

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

3. To survey the Barrow-in-Furness dredged material disposal site D using grab, dredge, sidescan sonar and RoxAnn.

4. To sample the sediment and benthos by grabbing and beam trawling at NMP sites throughout the survey area.

5. To collect sediments by grabbing and coring for physical, biological and chemical analysis at the Tyne sewage sludge disposal site and to sample epibenthos by beam trawling.

6. To collect sediment samples throughout the Tyne-Souter area for PCB analysis.

7. To collect sediment samples throughout the survey area for the development of various sediment normalisation techniques.

8. To investigate possible sites (eg the Celtic Deep and Burbo Bight) for the collection of sediment cores for the determination of background metal concentrations.

9. To collect *Modiolus* and other epifauna off the Humber for biological and chemical analysis.

10. To assess the quantity of litter, if any, present at the Tyne and Liverpool Bay sewage sludge disposal sites.

11. To survey the dredged material disposal sites at Dover and Roughs Tower using sidescan sonar.

12. To survey the Hastings Shingle Bank aggregate extraction area using sidescan sonar.

13. To survey a dredgings disposal site used for the deposition of material extracted from the experimental aggregate area (aim 1) using grab, dredge and sidescan sonar.

14. To collect a set of 25 sediment samples from Liverpool Bay for the development of the McLaren procedure to determine sediment transport directions.

15. To collect sediment samples from various sites in the JMG sediment baseline survey grid to act as a Quality Check.

ADDITIONAL AIMS:

16. To investigate the potential use of sidescan image enhancement equipment.

17. To measure the volume of the waste deposited at the Wearmouth colliery waste/dredged material disposal site.

NARRATIVE:

CORYSTES sailed from Lowestoft at 1200 h on 11 May. She steamed to the RoxAnn calibration box 10 miles east of Lowestoft where a series of Day grab samples and RoxAnn readings were taken for calibration purposes. CORYSTES then returned to Corton Roads, with sidescan data being collected *en route* and a new image enhancement system being evaluated. Poor weather conditions prevented the departure of Mr Baxter in the searider. The transfer was accomplished the following morning.

CORYSTES then steamed to the experimental aggregate extraction area north of Norfolk where a sidescan survey was carried out in deteriorating weather conditions. The survey was

terminated when the sea state began to have a significant deleterious effect on image quality. No other sampling was possible that day.

On 13 May the weather had moderated and it was possible to sample the treatment and reference areas using Hamon grab, RoxAnn and scallop dredge (aim 1). Hamon grab samples were also collected from the disposal site associated with the aggregate extraction area (aim 13). In the evening, video records were made of the treatment site and surrounding area.

On 14 May, weather conditions were too poor for the diving team to sample the aggregate treatment site so CORYSTES steamed to the Wash where the repositioned NSTF site 17 was sampled for benthos, epibenthos, metals and CB analysis (aim 4). Attempts to sample sediments at NMP38 (the original NSTF17) yielded only stones and the site was abandoned. The repositioned NSTF16 off the Humber was sampled instead of NMP37 (formerly NSTF16) as this had previously yielded only inadequate samples for benthos analysis. On completion of this station CORYSTES steamed to the Tyne area, a JMG baseline sample being collected off Whitby (aim 15).

On 15 May the inshore Tyne sediment temporal box was sampled during the day. Observations were made of the sludge slick deposited by the Northumbrian Water vessel. A bathymetric survey was carried out at the Wearmouth colliery waste/dredged material disposal site in the evening/night (additional aim).

On 16 May, samples of sediment for CB analysis were collected between Blyth and Souter and epibenthos and litter samples collected at and to the south of the Tyne sewage sludge disposal site using beam trawls.

The following day benthos samples were collected at the sewage sludge disposal site. Poor weather prevented sampling at the offshore sediment temporal box, NMP24 and NSTF14A. It was possible to sample the repositioned NSTF15 site at the mouth of the Tees but weather conditions prevented work at the inshore NMP29. No attempt was made to sample the offshore NMP28 and NMP34.

On 18 May CORYSTES steamed to the experimental aggregate extraction area where a diver survey, further sidescan and scallop dredging were carried out. The following morning another diver survey was undertaken, but fog prevented an afternoon dive. *Modiolus* were sampled to the north of Norfolk and around the sewage sludge disposal area.

CORYSTES returned to Lowestoft on 20 May to change scientific staff and equipment, and to take on water. Messrs Kenny and Lawler left the ship and Dr Rees joined.

CORYSTES sailed in the evening and on 21/22 May undertook sidescan/bathymetry/RoxAnn surveys at the Dover dredged material disposal site and Hastings aggregate extraction area.

The rest of 22 May and all 23 May were spent steaming to the Barrow-in-Furness dredged material disposal site D.

On 24 May, the Barrow-in-Furness disposal site D was surveyed using sidescan, echosounder and RoxAnn. Sediment samples were collected along an E/W transect through and offshore

from the disposal site. Overnight, a RoxAnn survey was undertaken of the disposal area and the area offshore.

On 25 May a series of benthos samples were collected along the E/W transect, NMP78 was sampled, NMP77 was identifed as unsuitable and further RoxAnn work was carried out to the south of the disposal site. Ms Boyd joined the ship by searider from Fleetwood.

On 26 May NMP69 in the Burbo Bight was sampled, NMP70 was sampled for benthic infauna but had to be abandoned due to deteriorating weather conditions. Beam trawls were then collected at the Liverpool Bay sewage sludge disposal site (aim 10) and at NMP70. Poor weather conditions prevented grab sampling in the east of the Bay for McLaren analysis of sediments (aim 14). CORYSTES steamed to Cardigan Bay overnight.

On 27 May NMP64 and NMP65 were sampled. Attempts to collect dab in the vicinity of NMP65 yielded only two fish.

On 28 May further fishing for Dab was carried out in the Celtic Deep but yielded no fish. A core was collected in the Celtic Deep mud area (aim 8) and NMP59 was sampled. A scallop dredge was collected at the former Bristol Channel sewage disposal area for the assessment of litter. Fishing to the south of the Scarweather Sand yielded no dab. Attempts to sample at and in the vicinity of NMP60 were unsuccessful due to the presence of rock at the seabed.

On 29 May a beam trawl was worked north of Trevose and CORYSTES steamed to the Western Channel to sample NMP stations. NMP53 was successfully sampled, the ground at NMP49 was too hard and the weather too poor for grabbing. Because of the weather conditions, no attempt was made to sample NMP57.

Sampling at NMP49 was not possible on 29 May due to poor weather conditions. Further sidescan/RoxAnn/bathymetry survey work was carried out at Hastings Shingle Bank to improve the chart of areas affected by dredging (aim 12).

On 31 May a sidescan/bathymetry/RoxAnn survey was carried out at Roughs dredged material disposal site.

On completion of the survey CORYSTES sailed to Lowestoft and docked at 1730 h.

RESULTS:

Despite persistent poor weather conditions most aims were successfully achieved. The most significant omissions were the sediment grid in Liverpool Bay for McLaren analysis and the central North and Irish Sea NMP stations. The McLaren and Irish Sea NMP samples will be included in the Prince Madog programme for September.

1. Positional accuracy was enhanced by using Sextant in conjunction with Sercel. This was particularly noticable when sampling the experimental aggregate area off North Norfolk. A slight error in positioning for one scallop dredge (fig 1) which would not have been noticed without Sercel/Sextant resulted in a differing abundance of organisms compared to samples collected precisely from the treatment area (fig 2). The difference was due to a portion of the

sample having been collected from the uncompromised community outwith the impacted dredging area.

The ease of accurate position fixing was also improved over previous systems. In particular, the use of 'Bull rings' to define the acceptable positioning tolerance was of use to the helmsman, especially for NMP sampling (where small grids were used).

2. At the experimental site diver observation revealed that the roughness caused by dredging had been eliminated, probably by winter storms. Textural differences in sediment type reflecting the original dredge tracks remained. These were also observed on the sidescan record.

3. Significant advances were made in the DFR capability for bathymetric survey (fig 3), due primarily to the installation of Sextant. The aquisition of a telemetring tide guage should be investigated as the next step in this area.

4. The combination of EG&G sidescan, bathymetric survey and RoxAnn provided a powerful tool for assessing solid waste disposal and aggregate extraction sites. Post-processing of the data should give an indication of the rate and direction of waste disposal at the Barrow-in-Furness disposal site.

5. Few dab were found at the central Irish Sea NMP stations.

6. Two inspections of dredged material disposal operations (at Wearmouth and Dover) were carried out and revealed no infringement of licence conditions.

7. Image enhancement equipment was used with the sidescanning sonar and showed promise, although further post-processing of the images is necessary. This will be carried out in the Geoacoustics laboratory at Yarmouth.

8. Minimal litter was observed in the sludge slick at the Tyne sewage disposal site, but significant quantities were collected by beam trawling at the site. This is in agreement with previous experience and indicates that despite the introduction of screening in 1990 material persists at the seabed.

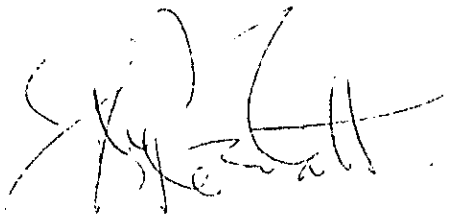
9. Significant dredging was observed outwith the licenced area at the Hastings aggregate extraction site, especially to the south of the area Z (fig 4).

10. Preliminary analysis of data show no evidence of significant accumulation of waste at the Dover dredged material disposal site.

11. Ten 2-metre beam trawl samples of the epibenthos were successfully taken along the western coasts of England and Wales and offshore. These complement a wider trawl survey at NMP and NSTF stations in the North Sea and English Channel, which was initiated in May 1992. Some 130 taxa were identified at sea from the western stations, contributing to over 300 taxa from the one-year survey period. These include some 60 crustaceans, 45 molluscs, 20 echinoderms and 35 fish. A plot of western stations ranked by numbers of taxa is shown in Figure 5a. Higher numbers are associated with coarser deposits; these notably include a station at the Liverpool Bay sewage-sludge disposal site.

The combined data from surveys in May and December, 1992, along with the present results, are shown in Figure 5b. Again, highest diversity is generally associated with the coarser offshore deposits which are a particular feature of the English Channel and western UK, but also of the northern North Sea. The generally more uniform sandy or muddy substrates, especially in parts of the central and southern North Sea, support lower numbers of taxa. A full picture of spatial variability in both the variety and abundances of taxa must await the outcome of further laboratory and data analyses.

12. It was possible to carry out initial post-processing of the geophysical records at sea and modify the later parts of the cruise accordingly. An example of this approach was that taken with the Hastings data where additional sampling was carried out when it became apparent that dredge track marks were present to the south of the licensed area.



S.M.Rowlatt
31.5.93

SEEN IN DRAFT:

B.A.Chapman, Master
J.Harper, SFM

INITIALLED: JP; P.G.-S

CIRCULATION:

Basic list +

H L REES
D S LIMPENNY
M A LAMBERT
W J MEADOWS
P M HUDSON
A LAWLER
A KENNY
S BOYD (UCNW)

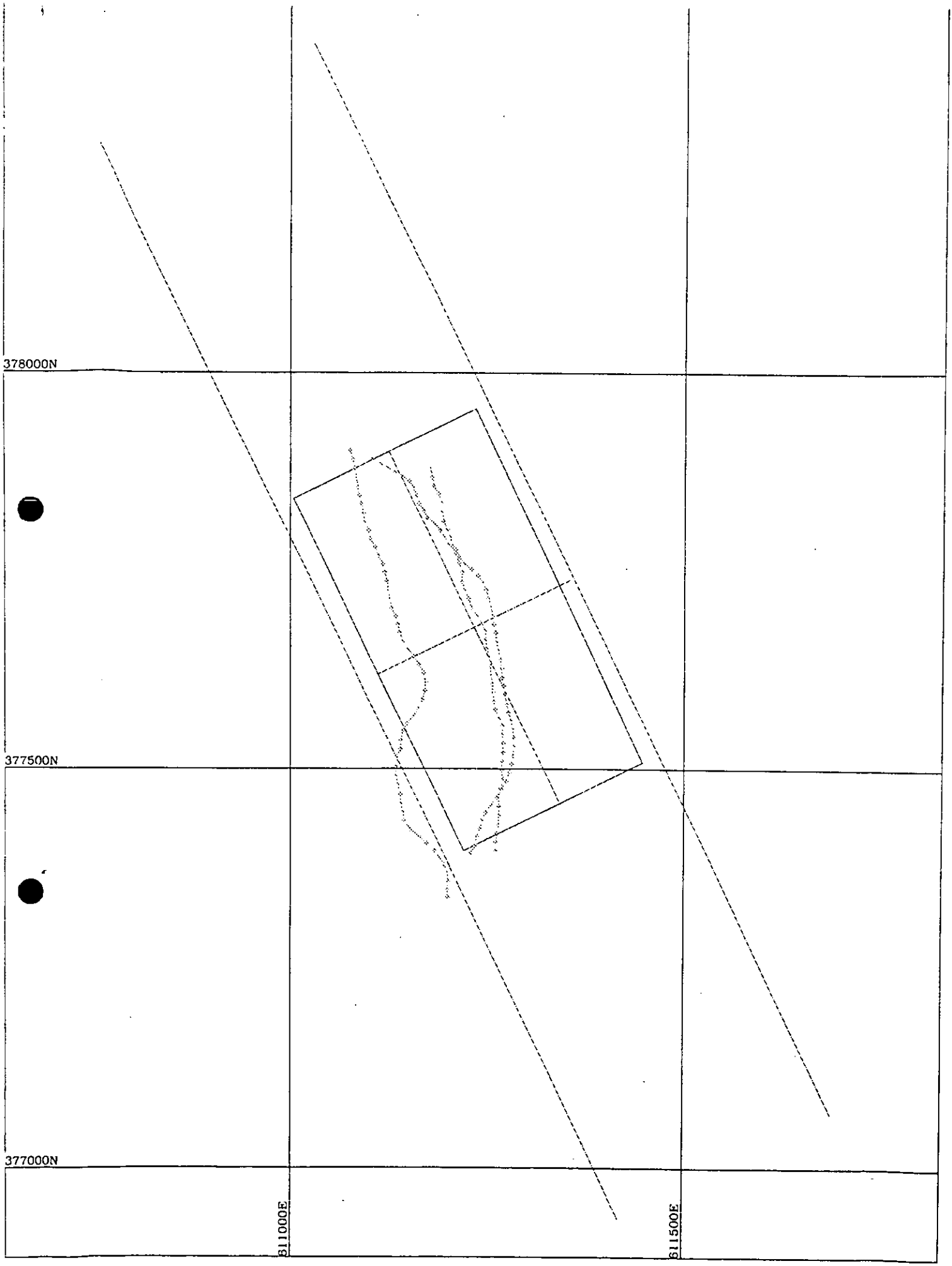


Figure 1. Scallop dredge tracks at the N.Norfolk experimental aggregate extraction site.

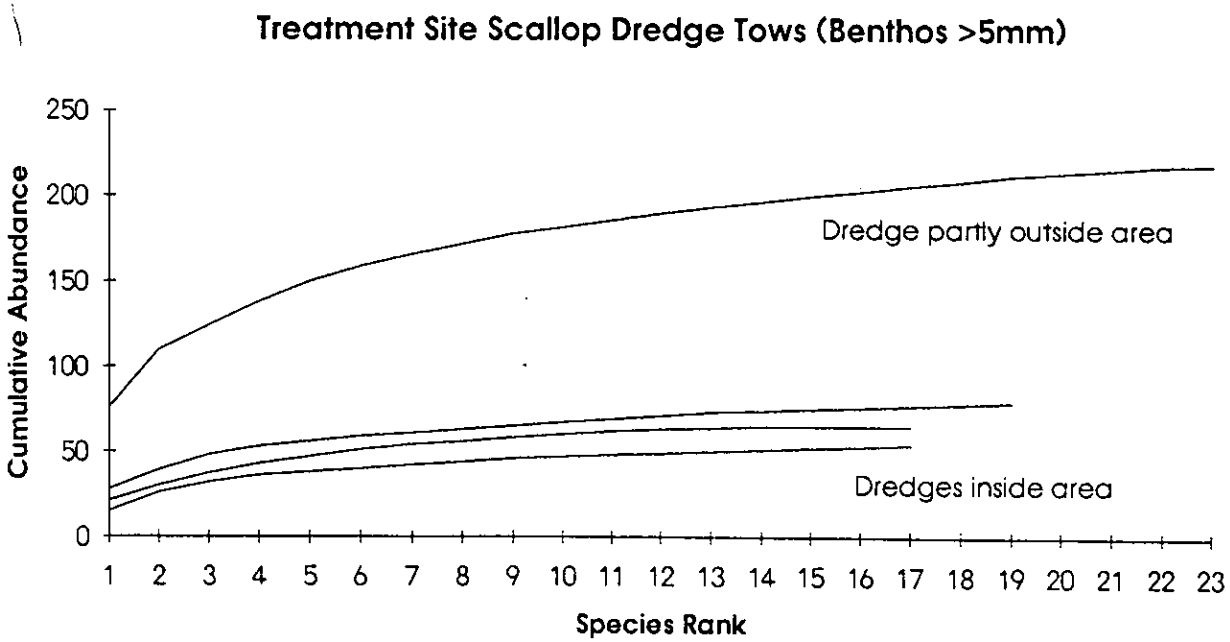


Figure 2. Cumulative abundance diagrams from scallop dredge samples collected at the N.Norfolk experimental aggregate extraction site.

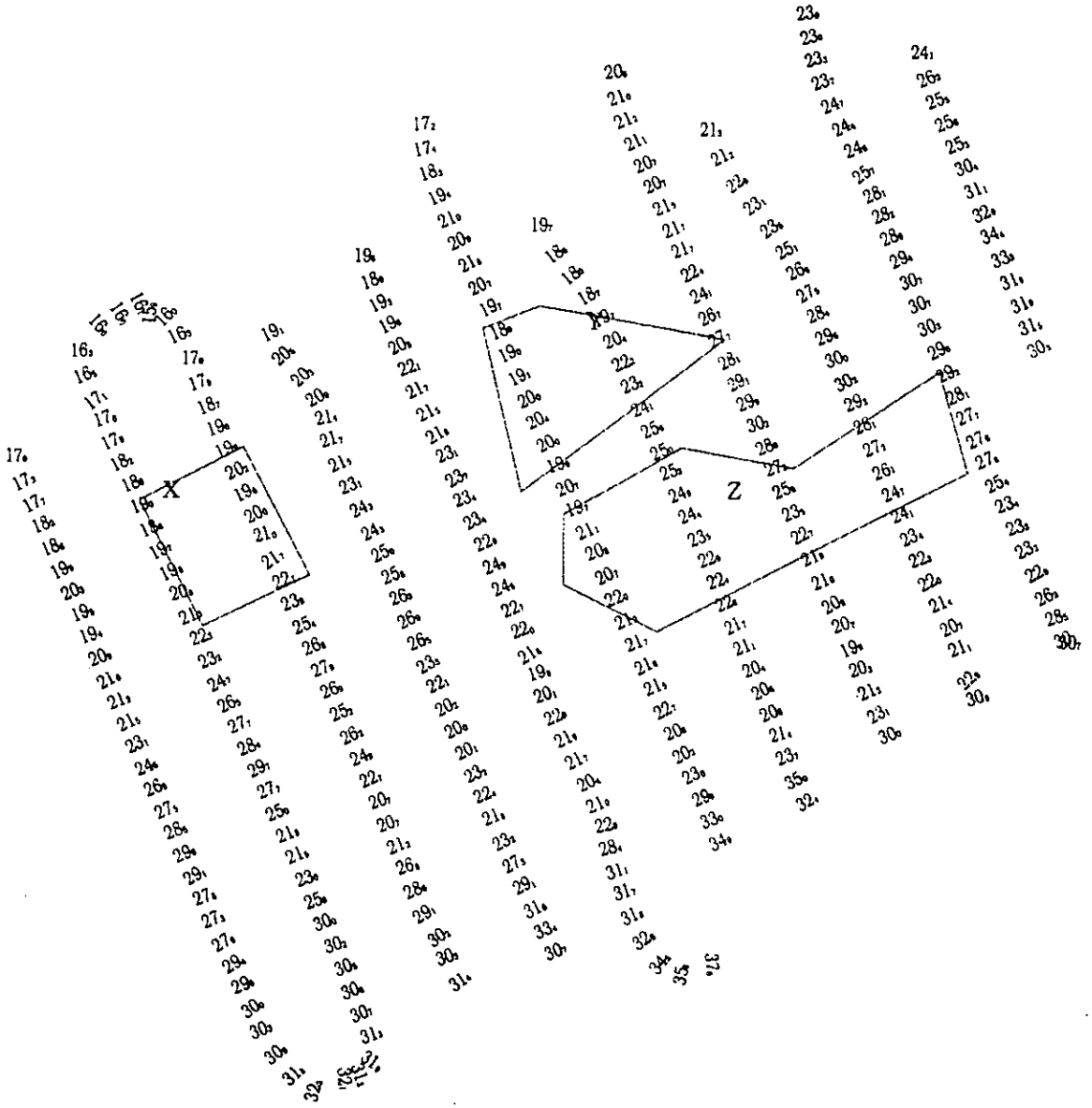


Figure 3. Preliminary bathymetric survey of the Hastings Shingle Bank aggregate extraction site.

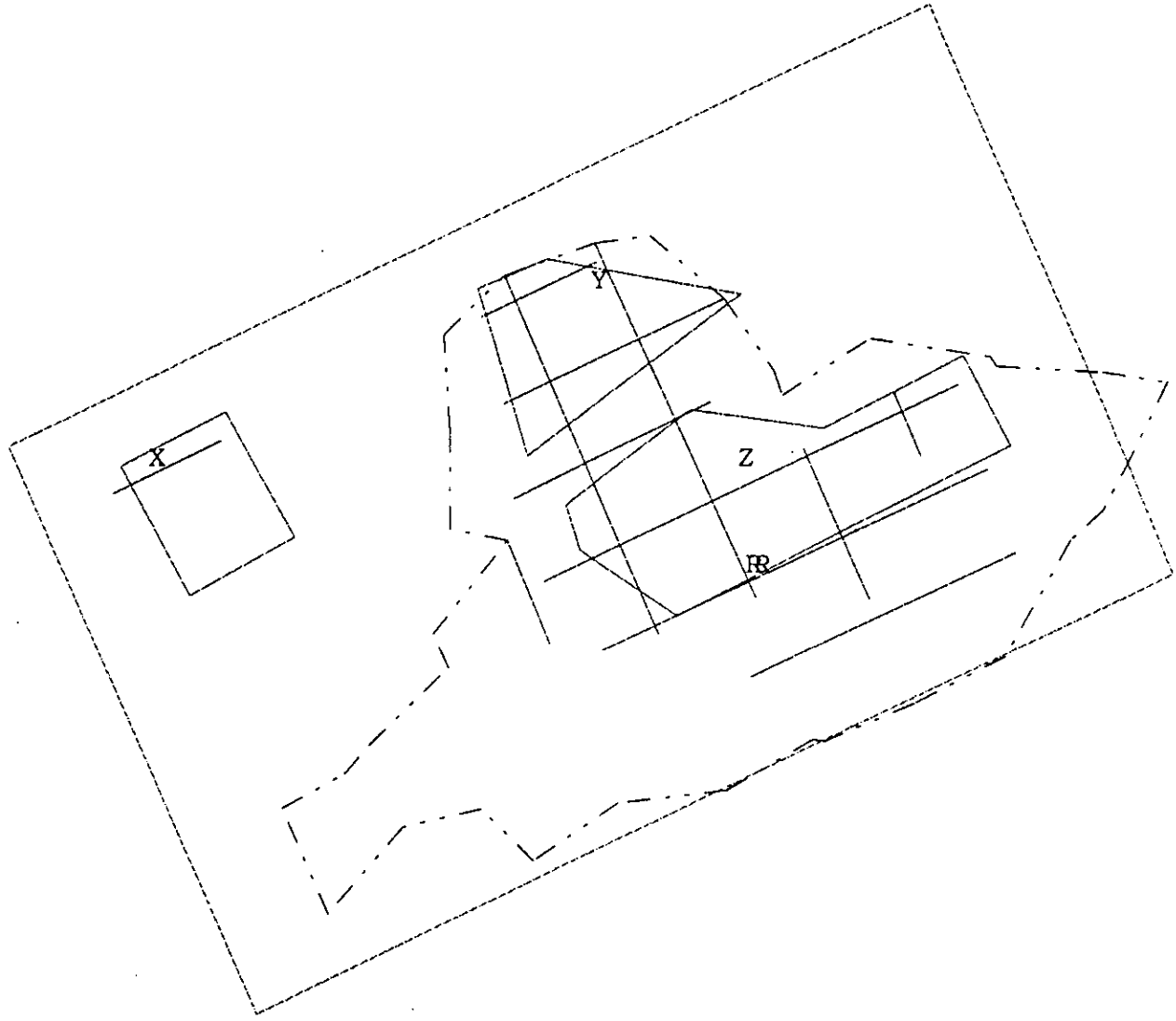


Figure 4. Portions of sidescan survey where dredge tracks were observed during the initial study of the Hastings Shingle Bank aggregate extraction site (COR 5b/93).

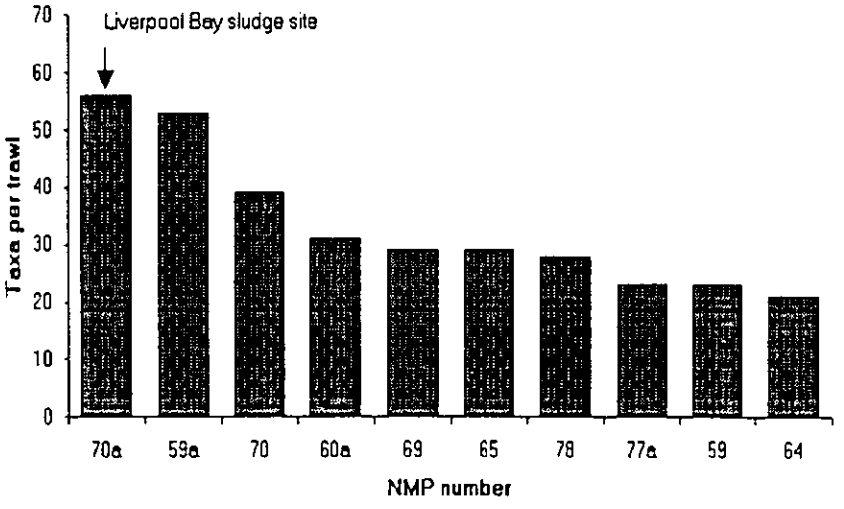


Figure 5a. Epifauna in 2-metre beam trawl tows at NMP sites sampled on Corystes 5b/93.

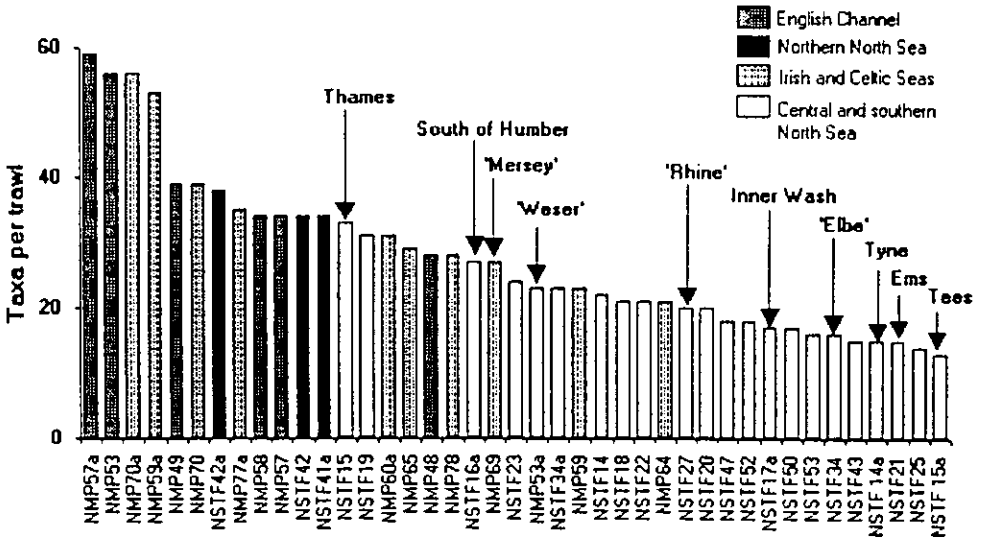


Figure 5b. Combined results for the epifauna from 2-metre beam trawl tows taken on Corystes 6/92, Corystes 14/92 and Corystes 5b/93.

CORYSTES 5b/93