DEPARTMENT FOR ENVIRONMENT, FOOD AND RURAL AFFAIRS.

2004 RESEARCH VESSEL PROGRAMME

PROGRAMME: *RV CEFAS ENDEAVOUR*: CRUISE 6/04

STAFF:

Part 1 :
D Limpenny (SIC)
W Meadows
P Bersuder
S Birchenough
K Cooper
R Kilbride
S Bolam
P Whomersley
M Schratzberger
C Limpenny
J Eggleton
N Lyman
P Leonard ((Defra) Until 2nd June)

Part 2 :
K Cooper (SIC)
D Limpenny
W Meadows
P Whomersley
C Limpenny
E Rowe
A Meadows
R Kilbride
R Coggan
H Bates
M Curtis
M Childs

DURATION:

Part 1 : 29th May – 9th June
Part 2 : 9th June – 17th June

Changeover at Lowestoft on same tide.

LOCALITY:

North Sea/English Channel/Celtic Deep

AIMS:

1. To survey dredged material disposal sites at the Souter Point (Tyne), North Tyne (Tyne), Tees Bay, Inner and Outer Gabbard (outer Thames estuary), Roughs Tower (off Harwich), Nab Tower and Needles (Isle of Wight), Swanage Bay, Rame Head (off Plymouth), Falmouth and Swansea Bay for benthos and for trace metal and organic contaminants in sediments, using grabbing, coring and acoustic methods.

2. To apply a range of sampling methodologies at dredged material disposal and aggregate extraction sites, to assist in the development of environmental indicators for these activities.

3. To sample representative NMMP locations using grabbing, coring, acoustic and trawl methods for trace metal and organic contaminants, litter and the epi-, macro-, meio-, and micro fauna.

4. To sample surface waters at representative offshore and intermediate NMMP locations for salinity, nutrients and chlorophyll.

5. To sample the benthos and sediments for time-series studies using the Hamon grab, in the vicinity of aggregate extraction sites off the Isle of Wight and Lowestoft.

6. To conduct time-series studies at gravelly locations following cessation of aggregate dredging, using grabbing and acoustic techniques.

7. To sample horse-mussels from the Humber/Wash area for later analyses of contaminants in flesh.

8. To conduct habitat mapping surveys at a range of sites impacted by anthropogenic activities using grabbing, coring, trawling, photographic and acoustic techniques.

9. To carry out a short sidescan sonar survey at an aggregate extraction site in the outer Wash.

10. To augment an existing broadscale survey of an area of seabed between Dungeness and Hastings.

11. To sample the Tyne temporal transect at the historic sewage sludge disposal site.

12. To sample the Thames temporal transect at the historic sewage sludge disposal site

Additional Aims:

Buoys at TY070
Waverider in Bristol Channel

Narrative

Part A)

Endeavour left Lowestoft on the 18:00hrs tide on 29th May and the EM3000 multibeam system was initiated immediately, for QA checks. The vessel sailed directly for NMMP 345 (Off Humber/Wash) and commenced sampling on arrival at 06:00hrs on 30th May. The vessel then sailed to NMMP 245 to the west of the Dogger Bank and completed sampling here by 16:00. Overnight, and following a CTD dip for spee of sound measurement, a multibeam bathymetry and QTC survey was carried out at TY070, a dredged material disposal site off the Tyne. Unfortunately, due to problems with the DGPS input into the sidescan sonar system, it was not possible to collect the sidescan sonar dataset concurrently. On the morning of the 31st May a transect of Day grab stations was sampled for contaminants and macrofauna over the proposed capping site within the Souter Point disposal site. Two sites along the transect were also sampled for epifaunal and contaminant studies using a 2m beam trawl. During the evening, 3 guard buoys and two minilanders were successfully recovered from the Souter Point disposal site. Overnight, a sidescan sonar/multibeam/QTC survey was initiated at TY070, with the first 6 of a total of 12 lines being run. Five Jennings beam trawl samples were collected at TY070 on the morning of 1st June, followed by sediment, fauna and water sampling at NMMP 245 off the Tyne. During the afternoon and evening, a transect of Day grab stations for sediment contaminants and faunal analysis was worked across TY070 (FEPA). This was followed by sampling at two sites in the vicinity of TY070 using the NIOZ corer (AE0261). The sidescan sonar/multibeam/QTC survey of the TY070 disposal site was completed by 06:00hrs on 2nd June. (When did we do the TY070 infill bathy?)

Paul Leonard was put ashore at the Tyne on the morning of 2nd June following an extremely beneficial and hopefully enjoyable sojourn aboard the vessel. Work then commenced on the temporal transect at the historic sewage sludge disposal site off the Tyne. Three sites along this transect were sampled with a Day grab and multicorer for sediment contaminants, meio- and macrofauna and two of the sites were also sampled for epifauna and litter using a 2m beam trawl. A transect of four stations was sampled over the Souter Point disposal site using the Day grab. Throughout the remainder of the evening, two underwater video sledge tows were made at selected sites in the vicinity of the same disposal site. Overnight a multibeam bathymetry survey was carried out over the proposed capping site at Souter Point, which appended to the east of a survey carried out at the site on Corystes in May 2004.

The following morning, a series of HamCam ($0.1m^2$ Hamon grab with video camera fitted) samples were collected at the North Tyne disposal site for macrofaunal analysis and ground-truthing of the sidescan sonar survey conducted earlier in the cruise. Winch problems called a temporary halt to this survey and 3 remaining camera tows were carried out at TY070 whilst the grabbing winch was repaired. On completion of

the camera tows, the remaining three HamCam samples were collected and work finished soon after midnight. The next morning (4th June) three NOIZ core sites (2 at Souter point and 1 at TY070) were sampled and sub-cores were sliced at varying depths and preserved for macrofaunal analysis. *Endeavour* then sailed to Tees Bay where the Tees Inner dredged material disposal site was sampled with a Day grab for contaminants and the Tees Outer site was sampled for both contaminants and infauna. Samples were also collected for plastic micropellets at a number of these sites. The Simrad EM3000 multibeam system was run during the Tees grabbing survey to provide some limited topographical data on the condition of the site. This survey was completed by 01:00hrs on 5th June and *Endeavour* steamed overnight to aggregate extraction Area 408, 60 miles off the Humber.

During the morning, HamCam samples were collected at a reference site to the west of Area 408 and at high and low treatment boxes within a relinquished part of the licensed area. A sidescan sonar/multibeam/QTC survey was then completed over a relinquished zone of the site (Zone 2) and over the western reference site. Further multibeam lines were completed over the two treatment boxes to compensate for the reduced horizontal coverage of this system when compared to sidescan sonar and thereby provide near 100% topographic coverage of these areas of particular interest. A single UWTV sledge tow was made over the low treatment box but relatively poor visibility did not encourage the further use of the technique. HamCams and a single sidescan sonar line were completed at a second reference site to the south of the area. Soon after midnight on 6th June, *Endeavour* sailed for a temporal *Modiolus* (Horse mussel) sampling site off the Humber where a scallop dredge was deployed on arrival at 06:00hrs and 42 mussels were successfully tracked down, captured and dispatched to the freezer following depuration. Sampling for sediment contaminants and water was conducted at NMMP 376 and NMMP 386 (Wash), ahead of further *Modiolus* hunting exploits at a temporal site off North Norfolk. Here, the creatures remained elusive and secretive and their capricious temperament reminded us why there are generally known as “Black Gold”. However, undeterred we were able to capture 16 individuals and they joined their northern relatives in the freezer.

During the evening of 6th June and into the early hours of the 7th June, sampling was carried out at a number of temporal sites over coarse substrates off Norfolk and Suffolk. *Endeavour* then sailed to the Roughs Tower disposal site off Harwich where sampling using Hamon and Shipek grabs commenced over a reduced transect across the site for macrofauna and contaminants. At high water, two multibeam lines were run over the area to check the integrity of the clay bund surrounding the site. The remaining Hamon and Shipek grab samples were then collected along the transect. On completion of the work at Roughs Tower, the Gabbard NMMP site was sampled with a Day grab and 2 m beam trawl for sediment contaminants, water, macro-, meio- and microfauna and also litter. Rebecca Kilbride acted as Scientist-in-Charge for the day and performed exceptionally well under complex surveying conditions (24hr operations, multi-disciplinary work, multi-contract aims and shallow and busy waterways). Rebecca already SIC’s charter vessels and it is hoped that in the near future she will expand both hers, and EQ/EM’s, leadership capability on-board CEFAS research vessels.

During the day on 8th June, the proposed dredged material disposal site at Gabbard East and the current disposal site at Inner Gabbard were sampled using Hamon and

Shipek grabs. During the evening, 4 sidescan sonar/multibeam/QTC lines were run at the Inner Gabbard site with the aim of identifying the presence of dredged material at the seabed and also to describe the acoustic characteristics of *Sabellaria* reef found in grab samples. Two camera tows were carried out over Inner Gabbard site G7, a location where *Sabellaria* reef had been found earlier in the day. Unfortunately, underwater visibility was not good enough to discern the presence of reef structures. On completion of this work, Endeavour sailed overnight to sample the two remaining Cross Sands EARS sites the following morning. Endeavour docked at Lowestoft at ??hrs on 9th June to change scientific crew, unload the buoys collected at TY070 and also to collect a Waverider buoy for deployment at a site in the Bristol Channel later in the cruise.

The Simrad EM 3000 multibeam was left running for protracted periods of time during the cruise. This enabled us to assess the quantity of data that might be collected if the system were to be left running routinely during all research cruises in the future as has been suggested. This will help to identify and answer any subsequent data storage and data utility issues that might arise from the collection of this data.

During the cruise, the hull mounted acoustic doppler current profiler (ADCP) was running almost continuously to collect spatially extensive data on water current speed and direction. The system was also used to provide site-specific data at sites of interest, such as dredged material disposal and aggregate extraction sites.

Suspended load samples were collected and processed each day to give widely spread information on this variable around the English coastline. This information will be used to …….

Digilog

Following the changeover of staff at Lowestoft, *R.V. Cefas Endeavour* sailed to NMMP 466 (Aim 3 & 4) in the Thames estuary. Work at this site was carried out on arrival in the early hours of Thursday morning. The ship then sailed, overnight, to NMMP 484 (Aim 3 & 4) off Dungeness in the eastern English Channel. Again, work was carried out here on arrival on Thursday morning. *R.V. Cefas Endeavour* then undertook the first of 2 multibeam survey lines running between Dungeness and Hastings (Aim 10). At Hastings, the opportunity was taken, whilst no dredgers were present, to collect a number of Hamon grab samples within the Hastings Shingle Bank extraction licence (Aim 2). Further multibeam data was collected from the second multibeam survey line running back to Dungeness. The ship then returned to the Hastings Shingle Bank, whilst collecting data from an additional line running between the two original Dungeness-Hastings multibeam lines. This surey was completed late on Thursday night. Further acoustic data was then collected from Hastings Shingle Bank, (sidescan, multibeam and QTC) in vicinity of historic aggregate extraction areas X and Y, to aid in understanding of physical recovery of seabed following cessation of dredging (Aim 6).

On Friday morning work commenced on a number of surveys at Shoreham (acoustic, grab, trawl and camera) aimed at developing marine habitat mapping techniques in areas of anthropogenic disturbance, in this case an aggregate extraction area in the

Owers licence (Aim 8). Whilst in this area a hydraulic hose on the stern ramp failed, disabling the ship's hydraulic systems. Unfortunately, no spares were available to allow ship's staff to fix the problem. However, a spare was sourced and was later picked up at Brighton marina following the transfer of an engineer from SES who had joined in Lowestoft. This incident highlights the necessity of carrying spares to enable problems to be fixed at sea.

Overnight, multibeam surveys were carried out across the Shoreham site. The following morning (Sat) the remaining beam trawl samples were collected. The ship then sailed to an area east of the Isle of Wight where a grid of stations were sampled using Hamon and Shipek grabs, for later analysis of fauna and contaminants respectively. Some of these stations form part of a time series investigation into natural variability in gravel communities (Aim 6) and others contribute to on-going assessment of conditions in the vicinity of the Nab tower disposal site (Aim 1). Following completion of this work, in the early hours of Sunday morning, the ship steamed to a site off the Needles on the western tip of the Isle of Wight. Here a number of grab samples were collected for later contaminant analysis (Aim 1). The next destination was a disposal site at Swanage Bay where both acoustic and grab samples were collected. Unfortunately the presence of fixed fishing gear prevented the collection of sidescan data. However, it was possible to survey the lines using multibeam and in order to achieve the same coverage extra survey lines were added (Aim 1). Work at this site was completed in the early hours of Monday morning and *R.V. Cefas Endeavour* then proceeded to NMMP 536 in Lyme Bay where a variety of samples were collected for later analysis of both PSA and various chemical determinants (Aims 3 & 4). In the afternoon the ship sailed to a disposal site off Rame Head to the West of Plymouth Sound. A number of grab samples were collected here for later analysis of benthos and contaminants (Aim 1). Overnight, a number of multibeam lines were run opportunistically across the site. The following morning a survey was undertaken at Falmouth disposal site (Aim 1). The ship then sailed to NMMP 605 (Celtic Deep) in the Bristol Channel where a range of samples were collected (Aims 3 & 4). Following completion of this work the ship then sailed east to a site (LUNDYWN001) where a wave rider buoy was deployed (Additional Aim). In the afternoon the ship proceeded to Milford Haven where samples were collected for contaminant analysis (Aim 1). Two samples, also for contaminant analysis, were also collected from Swansea Bay on Wednesday evening (Aim 1). The ship then anchored overnight prior to docking in Swansea the following morning.

In addition to the work detailed above a number of detailed Standard operating Procedures were compiled, by a student participating in the cruise, detailing various activities onboard R.V. Cefas Endeavour. These included the deployment of the blade, use of QTC, Multibeam and Sidescan sonar, and operation of the thermosalinigraph. These documents will be an invaluable resource and should help ensure both the quality and safe use of equipment.

INITIALLED:

DISTRIBUTION:

Basic list +

All scientific cruise personnel
M Waldock
S Malcolm
L Murray
D Morris
J Hunt
R Jolliffe
R Law
C Kelly
H Rees
C Vivian
J Thain
J Rees
D Sivyer
J Jones

DEFECTS

Scientific DGPS
Tower
Extension cables for the winches
Tower screen viewable from the DP position
Freezer corridor wet
UHF radios
Winch cameras
Scientific DGPS
Winch block on the blade
Clock in cabin B1