

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

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1971 RESEARCH VESSEL PROGRAMME

REPORT: RV CLIONE: CRUISE 8A

(PROVISIONAL: Not to be quoted without prior reference to the author)

STAFF

Part 1: R R Dickson  
P G Griffiths  
B K Clarke  
B H Holford  
M R Vince  
K M Brander

Part 2: R R Dickson  
B K Clarke  
B H Holford  
M R Vince  
R L Keable  
I N McCave (University of East Anglia)

DURATION

Left Lowestoft 0900 hours, 6 July

Arrived Lowestoft 1524 hours, 16 July

All times are British Standard Time

LOCALITY

The shingle banks off Hastings

AIMS

1. To resurvey the area of known dredging activity south of Hastings using the ARL Scanner;
2. To monitor the dredging of an experimental pit by MV CAMBROOK in an adjoining area using ARL Scanner;
3. To study the infill-rate of the experimental pit;
4. To monitor the surface to bottom water movements in the area of the experimental pit over a period of up to seven days using DRCM, the McCave current meter array and the Lowestoft bottom current meter.

NARRATIVE

Leaving Lowestoft at 0900 hours, 6 July, CLIONE proceeded to Dover for installation of the scanner dome before continuing to the survey area off Hastings. Beginning at 0923 hours, 7 July, six north-south survey legs, each 1½ n. mi long, were worked at 200 yard spacing over the area of proved dredger activity; the scanner was locked due west and filming and video were continuous. The complex of dredged pits was again encountered as on CLIONE cruises 15B/70 and 2A/71 and, as on these earlier cruises, it was possible to make a positive identification of a particularly distinctive area of dredged seabed comprising a clover-leaf shaped hole with a trailer dredger trench running from it towards the north. At 1420 hours, 7 July CLIONE anchored by the clover-leaf hole and an inspection was carried out by divers, the path of the divers around the pit being monitored on the ARL scanner. Photographs and

sediment samples were taken.

At 0725 hours, 8 July, CLIONE proceeded to the position assigned for the dredging of the experimental pit. The dredger MV CAMBROOK arrived on time at 0940 hours, and the dredging of the pit was observed by ARL scanner until completion at 1130 hours. A dahn was then anchored within the pit with an acoustic target at its base, four acoustic targets were accurately located outside the lip of the pit to serve as base-points for the future measurement of the pit and a spiked base plate was located in the centre of the pit to allow future measurement of infill rate. Two of the peripheral acoustic targets were anchored using 200 lb chain weights; the other pair had 100 lb chain anchors secured to the seabed with 3-foot steel spikes.

The location of seabed equipment together with the initial measuring of the pit occupied CLIONE until am on 9 July. The fishing vessel OUR LADY then brought out two replacement scientists and anchored to stand by the dahn while CLIONE proceeded to Boulogne to de-dome. En route for Boulogne, CLIONE anchored beside the trailer-dredger track in the vicinity of the clover-leaf hole and measurements were made by divers. Photographs and sediment samples were also taken. CLIONE then continued to Boulogne docking at 2025 hours, 9 July. At 2135 hours, with dome removed and plate fitted, CLIONE left Boulogne and proceeded to the Hastings survey area, arriving 0210 hours, 10 July. At 0300 hours OUR LADY reported dragging her anchor and floats from acoustic targets were seen on the surface. Following the departure of OUR LADY for Hastings with the two replaced scientists, divers confirmed that the standby boat had caused considerable damage to the underwater equipment. One acoustic target had been carried into the pit with the target itself (floats) removed another had been carried out of the area altogether and was not subsequently recorded, a third showed signs of having been dragged some distance around the perimeter of the pit; the dahn together with the acoustic target attached to its anchor had been dragged across the floor of the pit and the target itself removed, while the loss of the bottom weight on the dahn pole had caused the dahn to fall over. The damage had been repaired, with acoustic targets rigged and re-sited, by the morning of 12 July, so that measurement and profiling of the pit could once again be carried out between fixed base-points.

From the afternoon of 10 July, with CLIONE anchored close beside the pit, measurements of water movements and suspended sediment began. Measurements of velocity shear close to the seabed were made using an array of 5 S-rotors (at heights of 28, 48, 72, 102 and 152 cm from the bottom) suspended in a heavy tetrapod frame, and linked to counters aboard CLIONE. Ten minute counts of the revolutions of each rotor were made simultaneously at each whole hour and half-hour from the start of measurements at 1500 hours, 10 July until 0200 hours, 14 July with short breaks in the record due to the lifting and re-lowering of the array at each change of tide. This period included the spring tidal maximum.

The upper velocity profile was monitored by hourly DRCM dips from 1550 hours, 10 July, until 0050 hours, 16 July, with observations at 5 metre intervals on each dip. In addition the "Delft bottle" sediment trap was lowered for a 45 minute period in each hour from 1600 hours, 10 July, until 2345 hours, 15 July. The intake nozzle was fixed at 20 cm above the seabed, and sediment samples were taken from the bottle after each dip. The bottle remained in-board during each swing of the tide.

During this period, repeat measurements and profiling of the pit were carried out by divers; photographs and sediment samples were taken in characteristic locations and some clinometer measurements were made. From the surrounding seabed, the entire surface layer of gravel was removed within a square meter

quadrat, and reconstituted on deck to permit precise estimation of surface roughness and characteristic size of particles. The distance between all acoustic targets was measured by divers to assist in the mapping of the pit. The Lowestoft bottom current meter, mounted on a pallett, was placed on the floor of the pit with the base of the rotor 27.2 cm above the general floor level. By streaming a hydrophone from CLIONE, the acoustic signal plus background noise was monitored on each alternate tide with background noise alone recorded on each intervening tide when the hydrophone streamed away from the pit. This attempt to measure currents within the pit was abandoned after 24 hours when it became clear that multipath signals were artificially increasing the acoustic signal received.

At 0120 hours, 16 July, the survey was terminated and CLIONE proceeded to Lowestoft, docking at 1524 hours.

Dome distance this cruise - 111.6 n.mi  
Total dome distance - 525.9 n.mi

## RESULTS

1. Clover-leaf hole, trailer track complex: the lack of other trailer-dredger tracks in the area and the unusual shape of the pit leave no doubt as to identification, so that these features have persisted since at least December 1970. Diver inspection on 7 July, showed the pit to be at least 15 feet deep at its deepest with a floor of fine silt at this deepest point. The interior of the pit maintained a sparse population of non-sessile benthic organisms, in sharp contrast to the abundant sessile and non-sessile benthos characteristic of the surrounding seabed. Diver inspection of the trailer track on 9 July showed the trench to be 6 feet across by  $\frac{1}{2}$  foot to 1 foot deep with a floor of fines. Again the fauna was sparser than on the surrounding seabed, but less markedly so than in the case of the clover-leaf hole.
2. Experimental pit: Diver inspection of the pit on the day of dredging showed the lithology to consist of 5-6 feet of shingle overlying shingle/sand and mud/silt. The edge of the pit was sharply defined at this stage with almost vertical walls of shingle and showed chisel-sharp vertical grooves due to the dredging-pipe. Thick beds of mud/silt were exposed lower in the walls. The base of the pit was obscured by a dense turbid cloud of this fine material in the process of settling-out, evidently deriving from the disturbance of these beds of mud/silt during dredging. Subsequently, diver observations showed that infill of the pit was restricted to some rounding of the edge of the pit and some avalanching of shingle down the initially-shear walls. Avalanching did not carry the shingle far beyond the base of the walls so that over the floor of the pit, the only noticable event was the gradual settling-out and partial compaction of mud and fine silt to an eventual depth of 15 cm over the base-plate.
3. Experimental pit: Measurements show the pit to be some 30 m diameter by 4 metres deep (at deepest) which is the same order of size as other illegally-dredged pits in the vicinity.
4. At the maximum seabed shear velocity observed (peak tide at spring maximum), the shear stress was capable of moving sediment of up to 4 mm diameter.
5. Analysis of Delft-bottle samples has not yet been carried out but visual inspection of samples shows little evidence of sand transport at the (20 cm) level of observation.

6. On the seabed surrounding the pit, incrustation by marine life occurred on the upper surfaces of large shingle and cobbles. The lower surface tended to be smooth suggesting that little, if any, rolling of the shingle takes place.
7. One wreck was observed by ARL scanner and divers for the Hydrographer, proving to be the dispersed wreck of a trawler. (Observations made pm 7 July).
8. Line-caught samples of 10 mackerel, 10 horse mackerel and 7 pout whiting were frozen for Dr Portmann, Burnham. (DDT analysis).

#### ACKNOWLEDGEMENTS

This work would not have been possible without the assistance of Civil and Marine Ltd in providing a dredger, and of Cdr Moorey, District Inspector, Hastings, and I N McCave, University of East Anglia. Their help is gratefully acknowledged.

R R Dickson  
27 July 1971

SEEN IN DRAFT MRS

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