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

1972 RESEARCH VESSEL PROGRAMME

REPORT: RV CORELLA: CRUISE 9

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

STAFF

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DURATION

Left Lowestoft 1550 h 6 June

Arrived Lowestoft 0740 h 26 June

All times are Greenwich Mean Time

LOCALITY

Lyme Bay and South Coast

AIMS

1. To observe, photograph and measure the disturbance of the seabed due to the passage of a 10 m beam trawl fitted with various numbers and weights of tickler chains on gravel, sand and mud.

2. To measure the tidal flow close to the seabed wherever the trawl observations are made.

3. To obtain samples of the bottom sediments before and after the passage of the trawl.

NARRATIVE

Prior to this cruise a method of measuring the extent to which tickler chains penetrate the sea bed had been devised and tried out in a tidal pool on Pakefield Beach. This method involved driving into the sea bed a steel arrowhead to which was attached a 300 mm length of twine on to which thirteen steel spacer beads each $\frac{1}{2}$ in. (12 mm) long were loosely threaded. A special implanter drove the arrowhead 200 mm vertically into the soil so that the top spacer was flush with the soil surface and 100 mm of twine protruded to mark its position. Thus any penetration of the soil up to $6\frac{1}{2}$ in. (165 mm) could be estimated by the number of spacers pulled off the string.

At sea the plan was that divers would implant 40-50 such 'arrowhead markers' in a line between two anchored buoys about 50 yds apart. A beam trawl with a given number and size of tickler chains would then be towed at a known speed between the buoys. Divers would retrieve the arrowheads together with any spacers remaining so that they might be counted. Some 400 such arrowhead markers were made up before sailing.

CORELLA sailed from Lowestoft at 1550 h 6 June and later set course for the Newhaven-Brighton area. On arrival on the morning of 7 June a SW wind force 6 was blowing and a heavy swell running thus making diving impossible. The vessel continued westwards to the relatively sheltered waters of Start Bay arriving 0200 h 8 June.

Diving conditions there, as almost everywhere else visited on this cruise, were poor. Almost every day strong winds, rain and low cloud reduced the light intensity and detritus in the water reduced visibility still further.

On 8 June after trying out various implanting techniques the Dutch beam trawl used in the 1971 experiments with 4 tickler chains of $\frac{5}{8}$ in. diameter and a rubber disc groundrope was towed over a row of 40 arrowhead markers but no spacers were knocked off.

On 9 and 10 June a further three tows were made on an exceptionally soft muddy bottom off Teignmouth with the same gear and with much the same result. After a further tow in Start Bay it became clear that on normal trawling grounds only the top spacer was likely to be removed by this gear, ie no more than $\frac{1}{2}$ in. penetration.

Therefore heavier trawl heads with wider shoes and extra lugs to take up to 10 tickler chains were fitted and 5 heavy ticklers ($\frac{3}{4}$-$\frac{7}{8}$ in. diameter) were attached. The divers went down to inspect and photograph this rig after it had been shot without a net and winched back some way towards the anchored ship.

On 13 June when strong winds once again made diving impossible the vessel called at Brixham for a few hours where a number of new devices christened 'combs' were made up by a local engineer. A 'comb' consisted of a steel bar 500 mm in length, 25 mm wide and 10 mm thick with 9 holes drilled 50 mm apart to take matches. When hammered into the sea bed using improvised implanting tools one end of the bar lay about 25 mm and the other end about 100 mm below the surface of the soil. The top match then protruded about 10 mm above the soil while the 9th and lowest match lay about 50 mm below soil level. By towing the gear 'uphill' over 8 such 'combs' set in a line between two marker buoys it was hoped to assess, by counting how many matches were broken off, the maximum penetration of that gear over the range 0-50 mm with reasonable accuracy.

On 14 and 15 June, 8 of these 'combs' were tried out on firm muddy sand off Chesil Beach and on 16 June in the soft mud off Teignmouth. The results were encouraging.

CORELLA called at Brixham at 1615 h 17 June and left again after some small repairs were completed at 1011 h 19 June. Still more ticklers were added and three further tows over the 'combs' were made in Start Bay on 20 June.

On 21 June while sheltering off Brixham the Marconi underwater TV camera was rigged and tried out but the best definition obtainable by natural light was quite inadequate for our purposes.

On 22 June two further hauls were made on soft silt in Torbay and on 23 June the morning was spent trying to find suitable grounds differing in composition from those previously visited. Dives off Dawlish, Exmouth, Budleigh Salterton and Sidmouth, showed that visibility there was often as low as 18 inches at 6 fms, and so we were forced to return to Start Bay where underwater filming of the methods used was carried out in shallow water.

On 24 June two tows were made in Start Bay at low speed with divers riding on the beam.

Finally after an overnight steam to the Brighton area quite reasonable diving conditions were encountered and a single haul was made on clean firm sand over 'combs' and photographs taken.

After an uneventful overnight passage the vessel docked at Lowestoft at 0740 h 26 June.

RESULTS

Five tows over 'arrowhead markers' were made with the original gear and 12 tows over the 'combs' with the new net at different speeds and with various numbers of tickler chains.

Over 800 ft of underwater cine film was exposed and 10 spools of photographs were taken underwater on 4 other tows as well as 7 spools of film covering the gear used and the catches made. Until this material has been examined many answers cannot be given but some general conclusions clearly emerge.

1. All the divers' observations, as well as the missing spacers and broken matches showed that on most grounds where sand or muddy sand occurred the disturbance of the soil could be measured only in millimetres rather than inches. Even in the softest mud, where a diver could bury his hand to the wrist without effort the maximum measured penetration was no more than 20-30 mm.

2. Where stones occurred near or on the soil-surface, as off Chesil Beach, about 1 cwt of stones and boulders were caught per 5-minute tow.

3. Where a layer of soft silt overlay firmer soil, the silt was usually dispersed by the tickler but the tubesof tube worms in the silt were not necessarily broken off.

4. Heart urchins were taken in large quantities on some grounds and spiny cockles on others despite quite moderate penetration of the chains.

5. All the fish caught were examined for bruising. Where large quantities of heart urchins, spiny cockles etc were caught the fish were quite badly bruised but on other grounds where the benthos was either less abundant or softer, no serious bruising was detected even among the undersized fish retained by a shrimp mesh blinder.

6. Soil samples were obtained by the divers both before and after the passage of the gear on each ground visited to try to establish whether the finer particles had been removed from the trawl track by the passage of the gear.

7. Current strengths near the bottom and in midwater were measured at several places in Lyme Bay.

8. Since the majority of the tows were of short duration and the catches of marketable fish very small no estimate of the effect of tickler chains on the catch was possible.

9. The quantity of benthos and boulders taken appeared to be very roughly related to the number or weight of tickler chains used and the type of groundrope.

A more detailed report containing full details of the rigs tested and the depth of penetration each achieved on various types of bottom sediments will be prepared at a later date.

J P Bridger
28 June 1972

Distribution (see overleaf)

SEEN IN DRAFT: M R Sutcliffe (Master)

C N Snowling (Fishing Skipper)

INITIALLED: AJL

DISTRIBUTION

Basic List

J P Bridger
B C Mumford
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