SW

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

1978 RESEARCH VESSEL PROGRAMME

REPORT: RV CLIONE: CRUISE 4
(PROVISIONAL: Not to be quoted without prior reference to the author)

STAFF

R Mitson	
P Griffiths	
L Cox	
C Hood	15-23 March
T Lee	" " "
P Stevens	Loughborough University 15-17 March
B Robinson	17-23 March
M Walker	23-28 "
N Pearson	25-28 "
T Storeton West	25-28 "

DURATION

Left Lowestoft 1300 h on 15 March
Arrived Lowestoft 0930 h 28 March
(All times are Greenwich Mean Times).

LOCALITY

Southern North Sea

AIMS

1. Transducer measurements.

2. Tests of fishborne sensors.

3. Measurements on multichannel fish tag.

NARRATIVE

CLIONE left Lowestoft at 1300 h 15 March and anchored in the Roads to carry out preliminary tests of scanning sonar equipment. Calibration of the transducer and performance checks on the receiver were completed by the morning of 17 March. At midday Dr Stevens left and Mr Robinson joined CLIONE via a small boat from Gorleston. The ship then left the area by the Hewett channel carrying out a fish, seabed and wreck survey whilst moving southwards, eventually anchoring off Margate on 18 March. Strong SW winds and a rough sea did not allow work in the Zodiac but various trials of equipment and resolution measurements using targets paid out by line, were possible.

On 20 March a heartbeat monitoring acoustic tag was fitted to a plaice which was put into a cage. It was lowered to the seabed to allow remote counting of heartbeats on the scanning sonar whilst range and bearing of its position were also recorded. The cage was seen to be moving across the seabed and with a rapidly increasing westerly wind the cage was recovered and the ship started to dredge at 2340 h. On the morning of 21 March the gale was too strong to allow any work so shelter was sought off Ramsgate or Deal.

A small cabin cruiser was found adrift on the way and its position reported to the coastguard but no further action was taken. No refuge was found from the rough conditions so an anchorage in Dover harbour was requested. The winds were so strong that the anchor could not hold and a berth was taken alongside. This was in a fairly sheltered position and allowed the placing of a fish cage at a suitable range and depth for heartbeat monitoring.

CLIONE left Dover at 0930 h in a severe SW gale and headed for Margate Roads. When conditions moderated the scanner was used for a fish survey but little was found and it was decided to move north to meet TELLINA off Corton on the morning of 23 March. Messrs Hood, Robinson and Lee left the ship; Dr Greer Walker joined. The ship stayed at anchor until the captive fish had been examined, then moved to the Southwold area.

During 24 March a fish cage being tested for stability was lost. It was located on the seabed by the scanner but a few minutes later the ship's steering gear jammed. The ship's engines managed to free it for use in hand control and work continued with a second cage with a tagged fish inside. During the early hours of 25 March the cage started to move over the seabed so recovery was started at 0150 h and completed at 0215 h. Messrs Pearson and Storeton West were picked up off Gorleston in the afternoon after which CLIONE returned to a position off Southwold. The ship anchored for examination of the cardiac response of some captive fish; winds of 48 knots and snow showers were recorded. Tests of the combined compass and heartrate tag were made on 26 March when it was fitted inside a cage on a vane. A fish was later prepared with a heartbeat tag and placed inside the cage which was lowered to the seabed. It was intended to anchor the ship nearby and observe its heartrate but the ship's anchor stuck and had to be laid out of sonar range when eventually freed. Cage and fish were recovered at 0830 h on 27 March but the electrode had caught in the netting and was detached from the fish.

The heartbeat tag was still working well so was attached to another fish which was released at 1012 h and followed until 1720 h when it was abandoned for other work. A compass tag fitted to a vane inside a cage was lowered to the seabed and monitored after some difficulty when the buoy line was caught up on a ship's sacrificial anode. Signals were lost at 0300 h and the scanner package hauled at 0346 h. Buoy and cage were recovered at 0650 h and CLIONE set course for Lowestoft, releasing 8 tagged fish on the way and docking at 0930 h 28 March.

RESULTS

Aim 1

1.1 The beam patterns of the new transducer were plotted for horizontal and vertical planes on transmission and conform to within 1dB of those predicted by theory.

1.2 Transmitting source level at short ranges agreed with tank tests. Long range measurements were not possible due to poor weather conditions.

1.3 Sensitivity of receiving elements and their beam patterns were as predicted.

1.4 In vertical scanning mode the seabed signal was visible out to a maximum of 320 m in a depth of 20 m.

1.5 During the period of measurement, sea temperatures ranged from 5.2°C off Lowestoft to 6.2°C near Dover. Salinity was 33.4‰.

2. An acoustic tag, designed to monitor the heartbeat of free swimming fish in the sea, was fitted to a 51 cm plaice. This fish was released at 1012 h 27 March at 52°18'N 1°42.8'E and tracked until 1730 h when it was abandoned in favour of other work. The tidal direction was 207° for the first two hours when the fish moved eastwards along the seabed. At 1230 h the tide turned to the north (026°) and the fish moved into mid water. It covered a total distance of 6 nautical miles in a northerly direction using selective tidal stream transport. Long heart rate sequences were recorded at 1330, 1430 and 1530 h during which periods the average rate was 30 beats/minute whilst the fish was on the seabed (sea temperature 5°C). There was no significant increase when the fish moved into midwater, suggesting that the fish was gliding rather than swimming at an increased speed. These observations are in agreement with the energy saving locomotory mechanism, selective tidal stream transport, recently proposed for fish migrations.

3. Two acoustic tags which incorporated a compass, in addition to heart rate circuitry were tested. The first of these tags was fitted to a vane which was free to rotate in the horizontal plane, the whole assembly being placed inside a fish cage. This was lowered to the seabed and the ship stationed at about 100 m range to interrogate the compass during a tidal cycle. Very little change was observed, evidently due to the fact that the bearings in which the vane was set swelled as they took up water. The compass tag was still working on recovery.

   In order to provide a positive check of the compass tag, sector scanner combination, the tag was attached to a retractable carriage and lowered through the instrument tube. Its operation could then be checked accurately and it was found to meet the specification of $\pm$ 22.5° with a first response time. A further experiment with the tag fixed to the vane and placed inside the fish cage, failed, possibly due to weed having attached itself between the netting and the vane. Because the remaining fish were in poor condition and time was short the compass tags were not fitted to fish for tracking.

MISCELLANEOUS

1. The hydraulic stabiliser ran for 150 h during the cruise and apart from a slight oil leak from the forward pitch ram, performed well.

2. Trials of the MK II receiver showed up some serious limitations.

3. One module in each of the solid state transmitters failed.

4. A miniature repeater display from the scanner was fitted to the ship's bridge and performed well.

5. The new high resolution photographic display gave good results.

6. Some recordings of individual fish and shoals were made on the digitising equipment on loan from the Admiralty Marine Technology Establishment.

INITIALLED: AJL

R B Mitson
10 April 1978

SEEN IN DRAFT: G S Captain
GFR Fishing Skipper

DISTRIBUTION:

Basic list +

R Mitson
P Griffiths
L Cox
C Hood
T Lee
P Stevens (Loughborough University)
B Robinson
M Walker
N Pearson
T Storeton West