

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

1995 RESEARCH VESSEL PROGRAMME

REPORT: RV CORYSTES: CRUISE 7

STAFF: JD Metcalfe (SIC)
BH Holford
BF Riches
AA Buckley
MO Eagle
PJ Bromley - (28 June-8 July)
AWK Emery - (26-28 June)
WJ Meadows - (26-28 June)
PJ Robinson (Systems Engineering) - (26-28 June)

DURATION: 26 June - 8 July

LOCALITY: Southern North Sea

AIMS:

1. To test and calibrate the recently upgraded sector scanning sonar system.
2. To estimate swimming speed and orientation of acoustically tagged plaice on their summer feeding grounds by simultaneous use of the sector scanning sonar and the ADCP.
3. To test methods of releasing acoustically tagged cod from cages at sea, and to estimate the swimming speed and orientation of the fish by simultaneous use of the sector scanning sonar and the ADCP.
4. To collect blood samples from live plaice through a 24 h period for analysis of melatonin levels in relation to diel activity cycles.
5. To use free floating sonar buoys to record sea noise in relation to the tidal cycle.
6. To track plaice equipped with attitude sensing acoustic transponding telemetry tags.

NARRATIVE: (All time are Greenwich Mean Time)

CORYSTES sailed at 2010 h on 26 June and proceeded to a position about 12 miles east of Lowestoft at 52° 25'N, 02° 04'E and commenced scanner trials. Shortly after deployment of the sector scanner a fault developed with the transmitter control unit and the rest of the evening was spent attempting to repair the fault. The problem was finally rectified during the morning of the following day. During the afternoon, various electrical engineering and processing problems with the new sector scanner display system and ancillary equipment were attended to, and the 34 kHz gear marking tag was tested successfully out to a range of 2100 m using the SM 600 sonar. On the morning of 28 June, CORYSTES returned to Lowestoft, docking at 0915 h, to

pick up live fish and change over staff. CORYSTES set sail again at 1005 h and proceeded to a position east of Smiths Knoll at approximately 52° 41'N, 02° 33'E. Fishing for plaice (Aim 4) commenced at 1430 h and continued until 1300 h on 29 June. CORYSTES then proceeded to the Dogger Bight to a position approximately 54° 20'N, 02° 00'E to carry out fish tracking.

After initial tests with a tag on a buff and line, tracking commenced at 0845 h on 30 June. An adult female plaice (E69 7088, 42 cm) fitted with an acoustic transponding tag was released at 54° 21.052'N, 02° 04.730'E. The fish was tracked for 50 h until 1100 h on 2 July. By this time the fish had moved due north a net distance of only 730 m, making no substantial excursions into mid-water, and was therefore abandoned. CORYSTES moved a little to the west and, at 1340 h, a cod (E69 7048, 77 cm), fitted with an acoustic tag, was successfully deployed on the sea bed in a cage in order that it might have time (~24 h) to adjust its buoyancy prior to tracking. The rest of the day was spent carrying out initial trials with the sonar buoy (Aim 5) and attempting to identify the source of a problem with the sector scanner azimuth stabilisation control.

On the morning of 3 July recordings of sea noise were made with the sonar buoy while repairs to the sector scanner continued. The fault was eventually tracked down to the gyro redistribution unit and, although the fault could not be rectified directly, a temporary re-routing of the signal was achieved. During the afternoon of 3 July, the cod cage was relocated, and the fish successfully released at 1205 h. This fish was tracked for 3½ h until 1530 h when tracking had to be abandoned due to a failure of the scanner's hydraulic azimuth drive. The rest of the day was spend engaged in sector scanner repairs.

The following day (4 July) further recordings of sea noise were made with the sonar buoy while the electronic engineers continued with their attempts to repair the sector scanner azimuth drive. At 1750 h a second cod (E69 7090, 52 cm), fitted with an acoustic tag, was successfully deployed on the sea bed in a cage in anticipation of successfully completing the scanner repairs on the following day. However, continued attempts to repair the sector scanner through 5 and 6 July were unsuccessful. Further fish tracking was abandoned and the cod cage, together with the tagged cod, were recovered. Further fishing for plaice commenced at 1100 h on 6 July and continued until 0130 h on 7 July. CORYSTES returned to Lowestoft via the Race Bank where a minipod and two guard buoys were successfully recovered for AEP 3. CORYSTES finally docked at 0415 h on 8 July.

RESULTS:

1. *Sector Scanning sonar.* The new Systems Engineering sector scanning sonar display performed extremely well, proving to be a marked improvement over the previous LSI system. The full colour system clearly displayed tags out to ranges of 400 m and the procedures for data logging were a considerable improvement. A number of minor modifications are however required to the display and data logging software.

2. *Fish tracking.* Due to substantial mechanical problems with the sector scanner azimuth drive, only two fish were tracked during the cruise. A plaice was followed for 50 h and a cod was followed for 3½ h. The plaice made only two very brief excursions into mid water, covering a net distance of 730 m before being abandoned. The cod remained in mid water for its entire track and travelled almost 2 km to the south-west at 90° to the tidal axis (Fig. 1).

Throughout tracking, an updated version of "Sextant" navigation and survey software was used to good effect. This version, displayed on a screen in the scanner console, used data from the sector scanner to automatically display and update position of the fish relative to the ship. This version of "Sextant" made tracking much easier than had previously been the case, despite being the only visual aid to tracking available to crew on the bridge.

Attempts to deploy acoustically tagged cod on the sea bed in cages with subsequent release for tracking after a period of adaptation were carried out successfully

3. *ADCP measurement of tidal stream vectors.* Measurements of the speed and direction of the tidal streams were made with the ADCP during the tracks of these fish. Acoustic interference on the sonar was apparent at all times and this occasionally made tracking difficult. Although the improvements made to "Sextant" reduced the tracking problems associated with interference from the ADCP, synchronisation between the ADCP and the sector scanner would markedly improve the situation. Since the plaice did not come into mid-water for any prolonged periods, no meaningful estimates of swimming speed or orientation can be made for this fish. Suitable data for calculating swimming speed or orientation were however gathered during the cod track.

4. *Collection of plaice blood samples.* A total of 172 plaice were caught in 20 half-hour tows carried out both during the day and during the night. Blood samples and eye tissue were taken for 51 of these fish for subsequent analysis of blood melatonin levels and migration of eye pigments respectively in relation to the diel cycle of light and dark.

5. *Records of sea noise.* A free-floating sonar buoy was deployed successfully out to ranges of between $\frac{1}{2}$ and 1 nm on three separate occasions during the cruise. Ambient sea noise was recorded over a total of about 12 h via a radio link for analysis of possible auditory cues that fish might use to synchronise patterns of vertical movement to the tidal cycle.

JD Metcalfe
7 July 1995

SEEN IN DRAFT: M J Willcock, Master
R F Graham, Senior Fishing Mate

INITIALED: J W H

DISTRIBUTION:
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FIGURE CAPTIONS:

Figure 1. The ground track of cod 1 (77 cm, Petersen tag No. E69 7048) which moved 1951 m at 90° to the tidal axis in $3 \frac{1}{2}$ h.