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

1988 RESEARCH VESSEL PROGRAMME

REPORT : RV CORYSTES : CRUISE 1/88

STAFF: G P Arnold
J D Metcalfe
B H Holford
Miss L S Emerson
E G Shreeve
B F Riches (to 3 May only)
J W Read (28 April only)
N D Pearson (5 May only)
A Emery (5 May only)

DURATION:
Left Lowestoft 0830h 28 April 1988
Arrived Lowestoft 2245h 6 May 1988
(All times are Greenwich Mean Time)

LOCALITY:
Suffolk coast

AIMS:

1. To evaluate the new control and data logging system of the sector scanning sonar under operational conditions.
2. To test the prototype transponding acoustic tilt tag being developed for IMR, Bergen.
3. To test for possible behavioural reactions of fish to the discrete tones generated by the propulsion motors with the smoothing chokes out of circuit.

NARRATIVE

On leaving Lowestoft CORYSTES steamed a triangular course and laid two current meter rigs along the axis of the tidal stream, one off Orfordness and the other east of Lowestoft. She returned to Lowestoft to put John Read ashore by small boat later the same day. Sector scanning trials commenced the next morning and continued for four days. During this period a series of physical measurements was undertaken, the prototype tilt tag was deployed and a fish cage was laid containing an acoustically-tagged plaice. Several problems were encountered with the hydraulic package and the marker dahn disappeared from the fish cage, rendering the cage inoperative. CORYSTES returned to Lowestoft on 3 May and again on 4 May to put ashore first a member of the scientific staff and then a member of the crew, both of whom had suffered a family bereavement. The tilt tag was returned to the laboratory on 3 May for modification. Between 2 and 6 May four more acoustically-tagged plaice were released and tracked. The first two were lost soon after release in an area of sand ridges, when the tag was at a range of about 220m. The third track was aborted after 4.5h following failure of the hydraulic slip rings and a major loss of hydraulic fluid from the stabilisation package. Nick Pearson and Alan Emery were picked up by small boat on the morning of 5 May to carry out tests with the miniscanner and the modified tilt tag, while the main scanner was under repair. They were put ashore at 1450h the same day after successfully completing their work and CORYSTES was back on station to resume tracking at 1830h. The fourth plaice was tracked until 0600h 6 May, when the scientific work was terminated.

CORYSTES then recovered the southern current meter rig but unfortunately fouled her propeller when attempting to retrieve the northern rig. She was forced to steam home using only her bowthruster. Once in Corton Roads a team of MAFF divers cleared the propeller and CORYSTES eventually docked at 2245h.

RESULTS:

Aim 1

(i) Scanner and tags The digital scan converter system displays the sonar image on a standard television monitor, which has the advantage of a flicker-free display, daylight viewing and simple data logging. As presently set up the new system provides good images of wrecks and sand waves, but it is not as easy to follow acoustic tags at longer ranges as it was with the previous analogue display. The tag appears as a smaller target on intermediate (380m) range than it did on long (400m) range on the old system and the signal is also broken up vertically by the pattern of interlacing that has been adopted for the lines on the television screen. The tag signal appears thinner on the expanded display and on short range the signal on both displays is resolved into two separate components formed by the main and side lobes of the sonar beam. The tilt angle of the sonar transducer and the power output of the transmitter both seem to be more critical.

During the physical trials some difficulty was experienced in locating certain tags and this problem appears to have arisen from the presence of air bubbles in the oil used to fill the tag case. The first two fish were lost at a range of 220m, under conditions when we would not previously have expected to have lost the tag signal for more than a short period. The signal disappeared in the noise bands produced by the tide running over sand waves and was not relocated despite a search lasting several hours. The third and fourth fish proved much easier to follow once the RCG level had been substantially reduced and there was only one transmitter module in operation. Manual gain was also tried but found to be less effective than RCG. Plaice 3 and 4 both moved over the ground with the tide after dark (Fig. 1) and neither fish came more than a few metres off the bottom (Fig. 2). The duration of the tracks was probably too short for a definitive pattern of behaviour to have been established.

(ii) Scanner controls and data logging The new controls are well laid out and generally easy to use, although one or two minor alterations to a number of systems would be helpful. The microcomputer data logging system is excellent. It allows the position of the fish to be rapidly fixed in relation to the ship and programs were written during the course of the cruise to calculate the latitude and longitude of the fish and plot both the horizontal and vertical tracks as work proceeds.

(iii) Hydraulic stabilisation package Problems were encountered with both the mode ram, which operated only intermittently for a period, and the hydraulic slip rings which became displaced vertically in their housing. The displacement resulted in a major oil leak and a total failure of hydraulic control, although fortunately only after the package had been retrieved. It was discovered that the shipyard had reversed the azimuth gearbox vent pipe and the hydraulic drain line and this mistake may possibly have contributed to the other problems. The gearbox was being lubricated by hydraulic fluid in place of oil, and the azimuth header tank was filling up under pressure and overflowing.

(iv) Depth resolution A standard acoustic tag was deployed on a near-bed current meter frame to determine the height above the bottom at which it is no longer possible to resolve the tag signal from the bottom echo. Excellent signals were obtained with this rig. With a tag at a height of 2.5m the

angular separation of the two signals was greater than 1° out to a range of 100m. Beyond that range the tag signal was separated from the bottom by a tilt angle of less than 1° and would have been classified as JOB (just off bottom) with the old scanner system. At a height of 1m the tag signal was not separated from the bottom echo at any range and would therefore be classified as OB (on the bottom) with both old and new systems.

A series of depth measurements was made with a tag suspended at a number of known depths below the surface to check on the accuracy of the vertical fish tracks. Some of the results were equivocal, despite the calm conditions, but in general the error (+ve and -ve) increased progressively with range and inversely with depth. Maximum errors were 40-50% at ranges of 200-240m.

(v) Ship manoeuvrability The ship proved to be extremely manoeuvrable at the low speeds required for fish tracking using the main propeller. It was also possible to use the bow thruster without interference with the sonar except at high thruster power. The bridge track plotter was invaluable for locating lost targets and provided a useful check for the fish tracks plotted from the data logged on the scanner console.

Aim 2

On its initial deployment it was found that the tilt tag was subject to failure at temperatures below 8°C, and signals were seen only briefly on the sector scanner when the tag was first lowered over the side of the ship. After the tag had been modified in the laboratory excellent signals were obtained using the miniscanner deployed down the instrument tube and the tilt tag mounted on the current meter frame on the seabed. The main scanner was unavailable during this period, while repairs were carried out to the hydraulic package. The prototype telemetry tag decoder also gave promising results.

Aim 3

Experiments with the chokes were not attempted because of lack of time.

G P Arnold
9 May 1988

SEEN IN DRAFT: Master: JRF

INITIALLED: DJG

DISTRIBUTION:

Basic list+
G P Arnold
J D Metcalfe
B H Holford
Miss L S Emerson
E G Shreeve
B F Riches
J W Read
N D Pearson
A Emery

SCALE: 1km. S= .15

OK

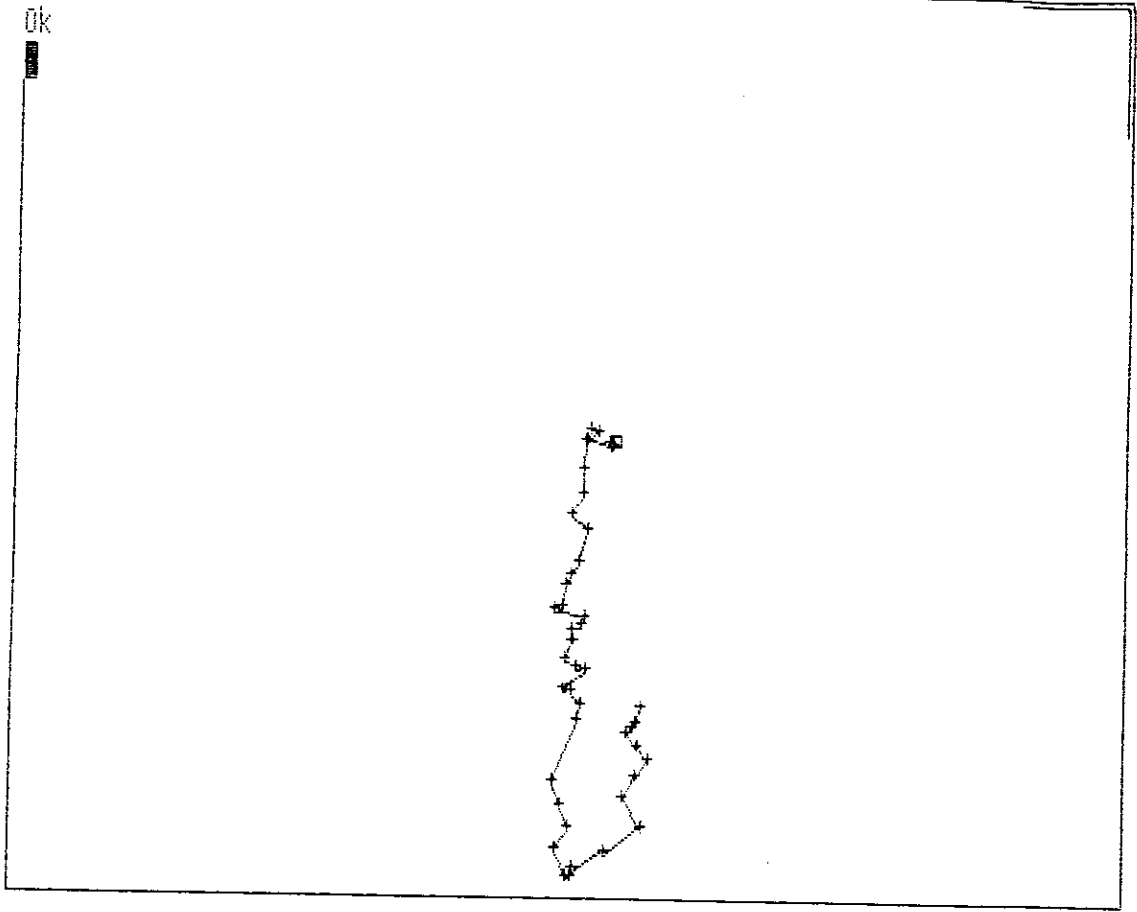


FIG. 1 Ground track of plaice 4, 5-6 May 1988.

TIME SCALE: 22.68475 MIN

Ok

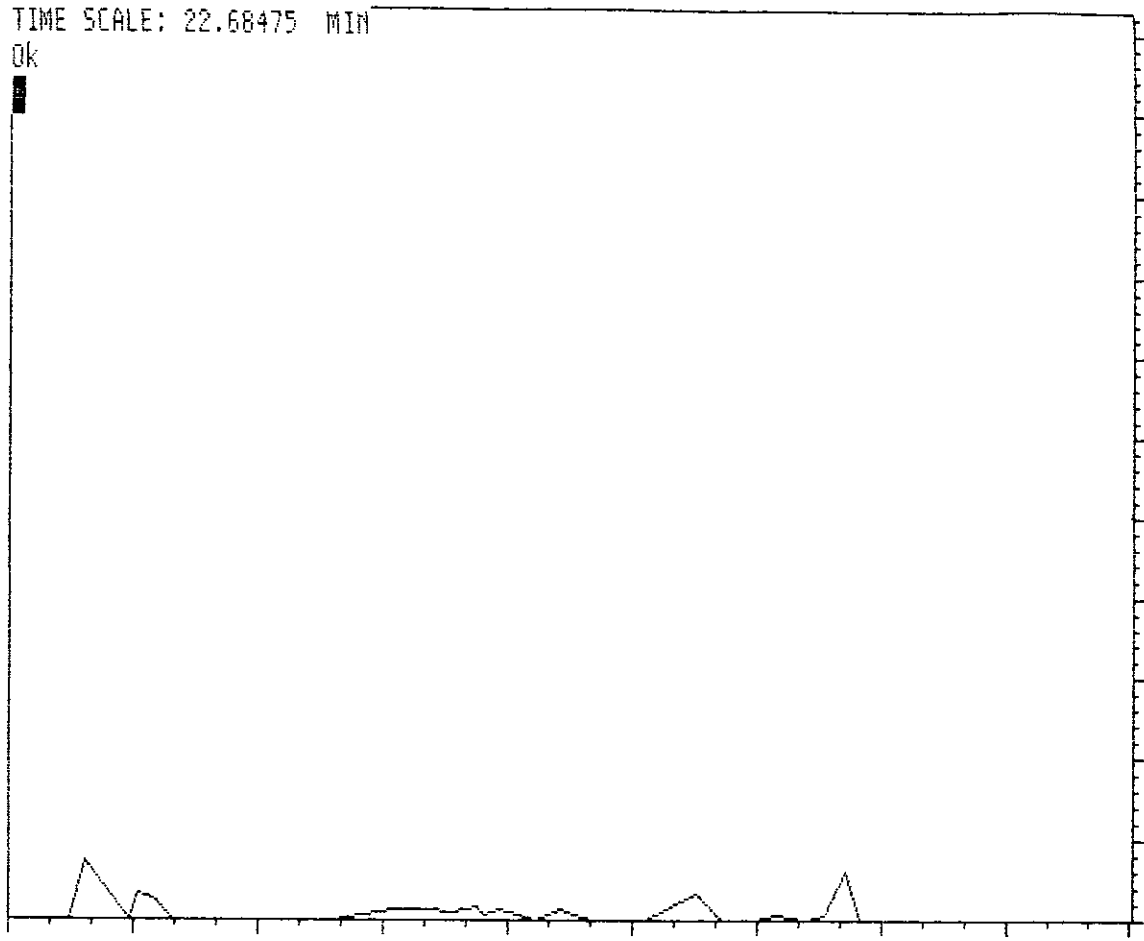


FIG 2. Vertical plot of plaice 4, 5-6 May.