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

1994 RESEARCH VESSEL PROGRAMME

REPORT: RV CORYSTES: CRUISE 14/94

STAFF: J D Metcalfe (SIC)
B H Holford
B F Riches
A A Buckley
M O Eagle
A K W Emery - (24 - 28 November)
S J Parker (vis)

DURATION: 24 November-7 December (staff changeover on 28 November)

LOCALITY: Southern North Sea

AIMS:

1. To test and calibrate the sector scanning sonar transducer following refurbishment.

2. a. To test the telemetry tag decoder, b. To test 34 kHz transponder.

3. To estimate (for the Data Storage Tag programme) the survival of plaice caught by 4m beam trawl.

4. To estimate (for the Data Storage Tag programme) the effects of tagging at sea with dummy DSTs on survival of plaice caught by 4m beam trawl.

5. To measure pressure on the sea bed with data storage tags to provide test data from known positions for the hydrographic models used in the Data Storage Tag programme.

6. To estimate swimming speed and orientation of plaice on their pre-spawning migration by simultaneous use of the sector scanning sonar and the ADCP.

NARRATIVE: (all times are Greenwich Mean Time)

CORYSTES sailed at 1345 h on 24 November and proceeded to Smiths Knoll to a position approximately 52° 40'N, 02° 18'E where trawling for plaice (Aim 3) commenced at 1700 h. Fishing, and fish tagging, (Aim 4) continued until 0025 h on 25 November, but catches were poor and fishing was discontinued until first light in the hope that catches would improve during the daytime. Fishing recommenced at 0705 h, but catches were still low and so CORYSTES moved to a new position further east, at 52° 46'N, 02° 32'E. Fishing recommenced at 1025 h and terminated at 1155 h to allow scanner trials to proceed (Aims 1 & 2). Scanner trials for the day were terminated at 1655 h and fishing for plaice recommenced at 1750 h. Fishing continued throughout

the night of 25 November and until 0720 h in the morning of 26 November; scanner trials were resumed at 0905 h. This pattern of scanner trials during the day, and fishing for plaice at night, continued until 0410 h on the morning of 28 November, by which time sufficient plaice (152) of appropriate size and condition had been caught and tagged. On the morning of 28 November trials with the 34 kHz transponder using the SM600 sonar were carried out until mid-day. CORYSTES then returned briefly to Lowestoft to put the fish, and one member of the scientific staff, ashore.

CORYSTES sailed again from Lowestoft at 1630 on 28 November and proceeded to the Outer Gabbard at 52° 03.95'N, 01° 59.9'E to deploy a data storage tag on static gear (Aim 5). CORYSTES then returned north to Smiths Knoll to commence fish tracking (Aim 6). After brief tag trials, a 48 cm maturing female plaice (Petersen tag no. E67 0995) equipped with a long life acoustic tag was released at 0040 on the 29 November at 52° 45.89'N, 02° 34.02' E. This fish was tracked continuously until 0410 h on 3 December when a fault developed in the sector scanner transmission cable. Tracking was temporarily suspended while the package was recovered and the cable repaired. Subsequently, the fish was quickly found and tracking recommenced at 0755 h and continued until 1600 h on the same day, when tracking was abandoned due to a combination of worsening weather and electronic problems with the sector scanner generated by the vertical mode switch on the scanner console. CORYSTES remained on station dodging overnight and, on the following morning (4 December), the plaice was relocated briefly in the same position in which it had been left the previous night. However severe weather halted any further tracking and the fish was finally abandoned at 0955 after a total of 129 h tracking. CORYSTES subsequently steamed inshore to a position off Southwold to shelter from winter gales while carrying out modifications to the sector scanner controls.

On the morning of 5 December, CORYSTES returned to the vicinity of the Outer Gabbard to retrieve the static gear and data storage tag (Aim 5). A search for the marker dan continued for about 5 h, but it was not located, and the search was eventually abandoned at 1245 h. CORYSTES subsequently returned to a position off Southwold to shelter from the worsening weather. Work on modifications to the sector scanner controls continued throughout this time. The scanner was finally returned to a working condition at about 1800 h, but southerly gales prevented any fish tracking that day.

By the morning of 6 December the wind had moderated and trials of the telemetry tag decoder were undertaken with the intention of releasing a plaice equipped with a pressure tag. Despite assistance by phone from laboratory electronics engineers, however, telemetry signals could not be decoded successfully and plans to release a fish equipped with a pressure tag were abandoned. Subsequently, and following brief range tests of the 34 kHz transponder, a second maturing female plaice (48 cm, Petersen tag no. E69 7009) equipped with a long life acoustic tag was released at 52° 20.00'N, 01° 46.07' E at 1800 h. This fish was lost after 3 h at 2110 h. A search for the fish was continued until 0245 h on 7 December, when it was abandoned due to bad weather.

Due to continuing bad weather and the forecast of further south-easterly gales, the cruise was terminated on 7 December and CORYSTES docked at 1200 h.

RESULTS:

1. *Sector scanning sonar trials.*

This was the first occasion in which the sector scanner had been used for fish tracking since the transducer had been refurbished. The scanner's receiving transducers were rephased and the beam pattern was retuned to give best achievable beam pattern. Nonetheless a substantial 'ghost' running vertically down the centre of the scanner display was evident throughout most of the cruise. During the course of the cruise, the cause of an intermittent fault which had been noted on previous cruises and resulted in occasional "lock ups" of the tilt and azimuth display unit was traced to a power surge from the transducer mode switch and successfully corrected. On a number of occasions during the cruise the sector scanner display developed a cyclical change in image intensity. The cause of this problem was not established.

2a. *Telemetry tag decoder.*

The decoder was initially tested with a pressure tag tied at a depth of 20 m to a buff and floated away from the ship. Subsequently the tag was attached to a lobster pot and placed on the sea bed at a depth of 43 m. In buff tests the scanner displayed the tag out to 320 m while the range of the reference pulse was usually decoded successfully out to a range of 250 m. However there was discrepancy of 6-10 m between the range of the reference pulse as indicated by the sector scanner and as indicated by the tag decoder. This discrepancy appears to be due to an inherent offset in the sector scanner software. The telemetry pulse was regularly decoded to within 0.5 m of the set depth out to a range of 200 m. Buff tests were performed using 4 & 5 transmitter modules to give a realistic performance test of background noise. This improvement of tag decoder performance in comparison with its previous test (CORYSTES 6/94) was achieved by fine tuning of the decoder hardware and modifications in the software carried out at sea.

However on a second occasion, later in the cruise, no telemetry signals could be decoded at any range and plans to track plaice equipped with a pressure sensing acoustic tag were abandoned.

2b. *Trials with the 34 kHz transponder.*

The prototype 34 kHz transponder (intended for marking valuable gear at sea) was tested using the SM600 sonar on two occasions. On the first, transponder performance using a new transducer configuration embedded in acoustically transparent rubber was compared with the conventional configuration of the transducer in castor oil. With the new rubber embedded transducer, the transponder performed very well, being detectable out to a range of 3000 m. This performance was not appreciably different from that achieved with the transducer in castor oil.

On the second test, the transponder was fitted with a battery pack consisting of "C" cells, rather than the larger "D" cells. However with the smaller battery pack the transponder was detectable out to only 1120 m.

3 & 4. *Estimate (for the Data Storage Tag programme) the survival of plaice caught by 4m beam trawl and tagged at sea.*

A total of 310 plaice was caught in 112, fifteen minute, tows with the 4 m beam trawl. One hundred and fifty two of these fish >26 cm, and which appeared to be relatively undamaged, were kept for survival analysis. Fifty of these fish > 36 cm were tagged with dummy data storage tags, a further 50 were tagged with conventional Petersen tags, and 52 remained untagged. These fish were put ashore on 28 November for return to the Laboratory, at which time none had died.

5. *The measurement of pressure on the sea bed with data storage tags (for the Data Storage Tag programme).*

One data storage tag (No. 10074303) was deployed on static gear (a lobster pot) on 28 November at 52° 03.95'N, 01° 59.9'E where the tidal range would be sufficient for accurately identifying the times of high water, the tidal range and the bottom depth. However the static gear could not be relocated on returning to the position 7 days later, despite an extensive search.

6. *Fish tracking and ADCP measurement of tidal stream vectors.*

Two maturing adult female plaice were followed for periods of 129 and 3 hours. Both fish were equipped with long-life acoustic transponders. The tags worked extremely well giving clear signals out to over 300 m, although the strong central 'ghost' on the sonar screen made tracking more difficult.

Plaice 1 made only one prolonged (~3 h) excursion into mid-water throughout the entire 129 h track (Fig 1). The fish initially moved across the sea bed, first about 4.6 km due east and then about 4.6 km north-north-east, before coming into mid-water and moving about 6.6 km south-south-east (Fig 2). The total net distance covered was about 8.2 km. Plaice 2 was only tracked for 3 h before being lost.

Measurements of the speed and direction of the tidal streams were made with the ADCP for long periods during the track of plaice 1. Acoustic interference on the sonar was apparent at all times but only occasionally made tracking difficult.

JD Metcalfe
9 December 1994

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

INITIALED: JWH

DISTRIBUTION:

Basic list +
J D Metcalfe
G P Arnold
B H Holford
B F Riches
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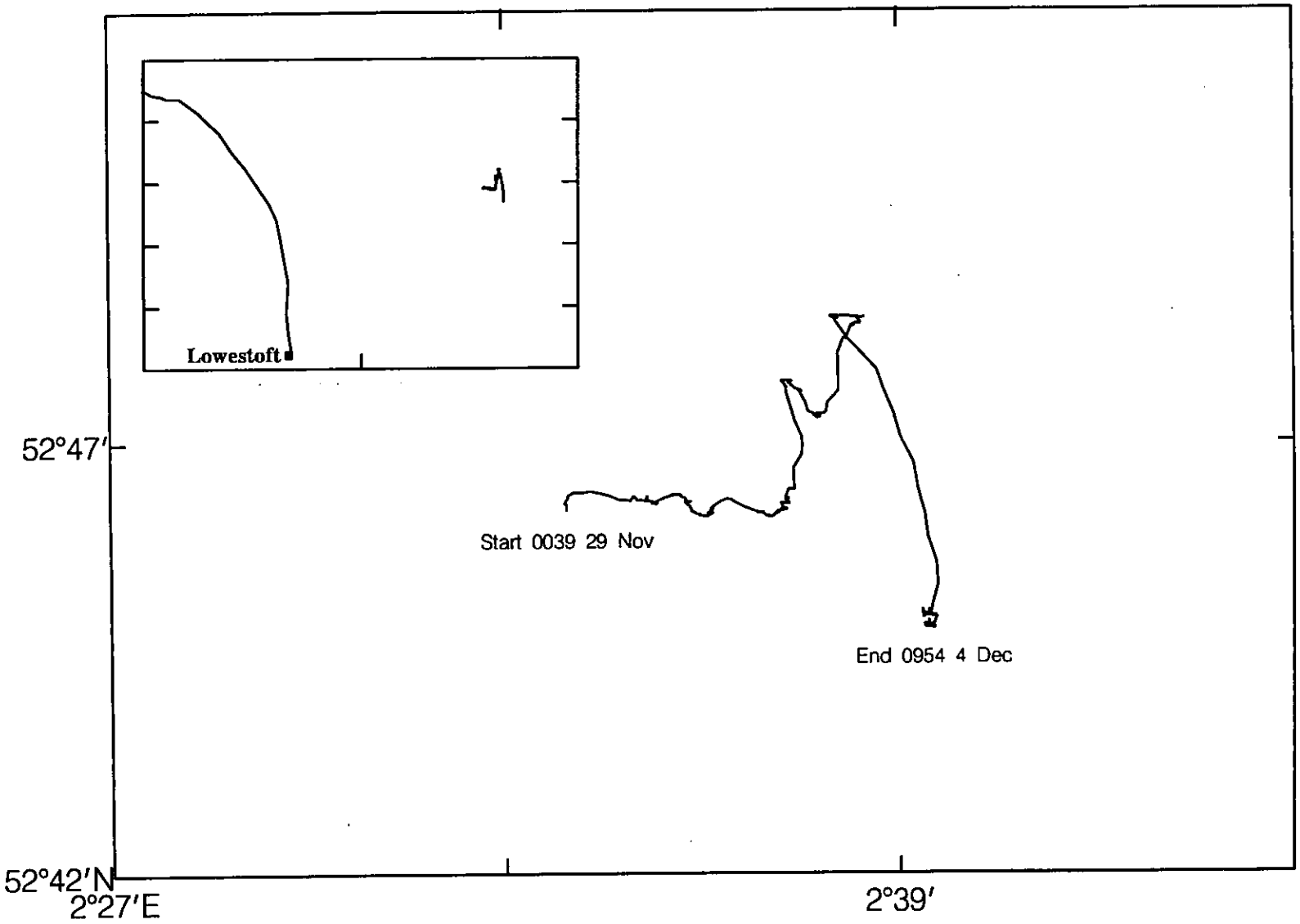
FIGURE CAPTION:

Figure 1. The ground track of plaice 1 (48 cm, Petersen tag No. 67 0995) which moved a net distance of 8.2 km in 129 h (Inset shows the location of the track relative to the East Anglian coast).

Fig. 1


Lowestoft
52°47′
Start 0039 29 Nov
End 0954 4 Dec
52°42′N
2°27′E
2°39′

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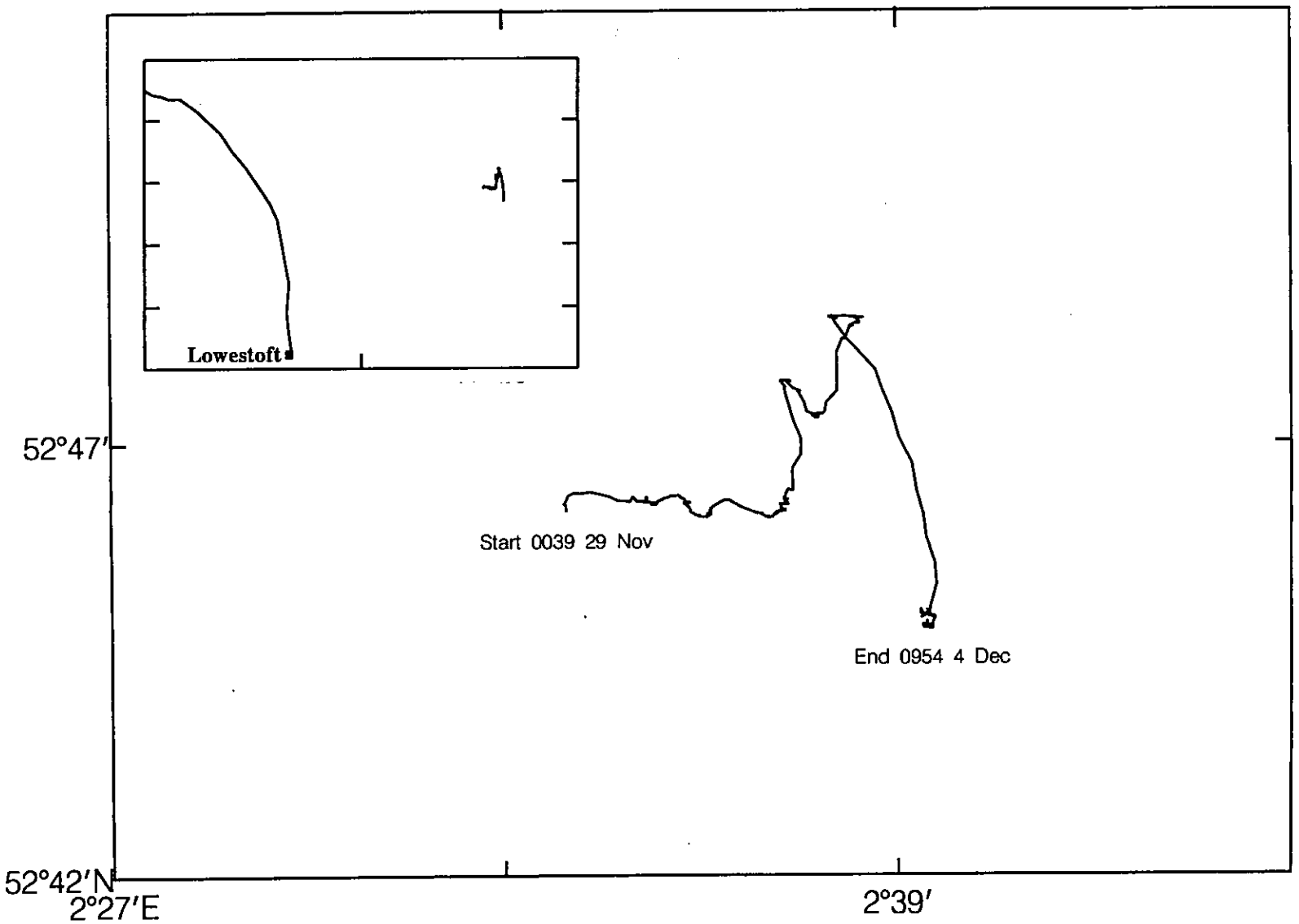
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