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

1991 RESEARCH VESSEL PROGRAMME

REPORT: RV CORYSTES: CRUISE 6b

STAFF:

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J H Nichols
B F Riches
P R Witthames
Mrs G Haynes
Mrs A J Sutcliffe
M Beach )
B Kay ) 8 June only
M B Mumford )

DURATION:

8-28 June 1991
All times are GMT

LOCALITY:

English Channel, south western approaches, west of Ireland.

AIMS:

1. To test the Danish FOTO midwater trawl and use it to investigate the diurnal vertical distribution of spawning mackerel.

2. To investigate the diurnal and vertical distribution of egg production using the LHPR.

3. To estimate the duration of the alpha stage of atresia in ovaries from captive mackerel.

4. To collect samples of 1, 2 and 3 year old mackerel from areas VIIE and VIIJ to study changes in the ovary related to the onset of spawning.

5. To collect ovaries from spawning mackerel in order to estimate annual changes in the batch fecundity.

NARRATIVE:

Staff for the second part of the cruise joined CORYSTES at Falmouth on 7 June and the ship sailed the following morning at 0800 h. During the day, trials were conducted with the Foto trawl some 10 n miles south of Falmouth; three trawl stations were worked, two in midwater and one on the surface with the two large buffs attached to the wingends. Ten baskets of mackerel were caught altogether and a sample of ovaries from 1, 2 and 3 year old fish preserved (aim 4). A wingend scanmar trandsucer was torn off and lost during the last haul. Capt Kay, Mr Beach and Mr Mumford were put ashore at 1720 h 8 June by small boat at Falmouth and arrangements were made to acquire a replacement transducer from Lowestoft. This was collected at 1000 h the following morning.

Fishing continued periodically over the next two days in Falmouth Bay (aim 4) as weather allowed and adjustments were made to the positioning of the

Scanmar transducers on the trawl. When the weather had abated sufficiently CORYSTES steamed overnight (10-11 June) westwards to the Great Sole Bank (N19 in Figure). Some 300 live mackerel were caught during the evening of 11 June by rod and line and placed in the two large circular deck tanks. These fish were used to study the duration of atretic eggs in the ovary (aim 3) and were sampled on alternate days for a period of 15 days. No work was possible on 12 June because of gale force winds and many of the captive fish were lost and had to be replaced by feathering the following day. Several plankton hauls were then made in the general area of the bank (rectangles N20, N21) with reference to the 1989 survey data (CIROLANA 5/89) and the site with the maximum number of young eggs selected for further study. Plankton hauls using the 53 cm HSTN were made at this position every 2 h for a period of 24 h (13-14 June) to estimate the diurnal production of stage 1A eggs (aim 2). Following a further spell of bad weather trawling began on 15 June (aim 1). Three depths were chosen, on the surface, at the thermocline and close to the bottom. At each of the three depths four 1 h hauls (0100 h, 0600 h, 1200 h and 1800 h) were made interspersed at 0300 h, 0900 h, 1500 h and 2100 h with depth stratified plankton samples collected with the LHPR making a total of 12 FOTO trawl stations and 12 LHPR stations. Ovaries were sampled from 1, 2 and 3 year old mackerel (aim 4 VIIJ) and a number of ovaries containing hydrated oocytes were preserved in order to estimate the batch fecundity (aim 5).

In the early morning of 18 June CORYSTES left the Great Sole Bank and steamed northwards towards the Porcupine Bank. A number of plankton stations identified from the CIROLANA 5/89 report as favourable were worked en route (see chart). No significant spawning was found to be taking place on the Porcupine Bank at this time and a mackerel sample collected by feathering confirmed this. It was decided therefore to return southwards to square T22 where the highest egg counts had been observed earlier, but again sampling en route in the hope of finding a more prolific spawning ground. This hope proved illusory and CORYSTES arrived on station in square T22 at 1230 h on 20 June. However at this point heavy swells made work increasingly difficult and a feathering station was used to confirm the presence of spawning mackerel. As conditions were unsuitable for trawling a second series of plankton hauls using the 53 cm HSTN (aim 2) and covering a 24 h period was carried out over the following four days during breaks in the weather. It became possible to resume trawling at 0600 h on 23 June and two 24 h cycles of trawl hauls and plankton samples using the LHPR were worked as previously on the Great Sole Bank. The first cycle of trawl and plankton stations was made on the surface and the second in the region of the thermocline. The programme of work was concluded during the morning of 25 June with a LHPR station sampling down to 201 m. CORYSTES left the Outer Dingle Bay Ground at 1000 h on 25 June and docked at Lowestoft at 0900 h on 28 June.

RESULTS

Aim 1 - The FOTO trawl was deployed successfully on 20 occasions without serious difficulty and catch rates varied between a few baskets and 1½ tons of mackerel per hour trawling. Following the loss of one of the wingend Scanmar transducers during trials they were repositioned a metre closer to the doors and after further adjustments to the position of the headline transducer consistent records were obtained of the spread (38 m) of the net, depth of the headline below the surface and above the bottom. However, it was not possible to obtain an echo from the footrope to estimate the gape of the net (18-19 m). The 50 kHz cable connected transducer gave reliable information on both the gape of the net and the height of the headline above the bottom. Some preliminary observations were made concerning changes in the configuration of the trawl during shooting and hauling.

The optimum trawling speed was found to be 4 knots at a warp length of 310 m - increased warp lengths caused the gear when on the surface to sink. It was not possible to fish with the chokes in and under optimum conditions 550 Kw and 130 revs were used.

The trawl is constructed with a long narrow close meshed 'trumpet' prior to the cod end and a proportion of fish were trapped in meshes in this region before reaching the codend. These fish could be recognised and estimated in the codend on subsequent hauls by their lacklustre appearance, lack of muscle tone and pale gills. It was therefore found necessary to clean the net at intervals by streaming it astern of the ship with the codend open.

At each trawling station the total weight by species and the length frequency distribution of mackerel were recorded. In order to determine the female maturity stages a procedure was adopted whereby all fish were sampled until 30 mature females were recorded and these were preserved for histological analysis. The highest catches were made on the surface at night (up to 1320 kg) and the lowest close to the bottom both by day and by night. In general, sex ratios were in favour of the males particularly in the feathering samples, where ratios reached 4 or 5 to 1. Spawning male and female fish were more numerous in surface hauls.

Aim 2 - The diurnal production of early stage 1A eggs was investigated at the Great Sole Bank and the Outer Dingle Bay Ground using the 53 cm HSTN. A total of 28 samples was taken at 2 h intervals during the two 24 h series.

The modified LHPR system was deployed 18 times in manual mode and operated successfully on each occasion; it was used in conjunction with the FOTO trawl to estimate the vertical distribution of early stage 1A eggs.

It was impossible to count mackerel eggs or identify the development of the early blastula in samples from either the 53 cm HSTN or the LHPR because of the weather conditions. Samples were therefore fixed in 2% formaldehyde solution and will be analysed on return to the laboratory.

Aim 3 - Mackerel were caught on rod and line close to the Great Sole Bank and kept alive in two circular deck tanks without food. The resulting stress induces atresia.

They were sampled at regular intervals over a 15 day period and the ovaries preserved to estimate the duration of the alpha atretic stage. Preliminary estimates in 1990 (CORYSTES 6b/90) suggested that it was about 9 days. These results will be used to provide a correction to the total egg production method which is used to estimate the spawning biomass of mackerel.

Aim 4 - Ovaries from mackerel (24-33 cm) were collected from trawl hauls in areas VIIE (80 specimens) and VIIJ (90 specimens) and preserved in formalin. The relevant age groups (1, 2 and 3 years old) were identified by reading their otoliths on board.

Aim 5 - Ovaries containing hydrated oocytes were collected from 65 mackerel (area VIIJ) and preserved in formalin. These will be used by Univ. Aberdeen to estimate the batch fecundity, a parameter used in the daily egg production method for estimating the biomass of mackerel.

MISCELLANEOUS

1. Small amounts of Phaeocystis an algae normally associated with coastal waters were found at many of the stations along the shelf edge.

2. An electric ray (Torpedo nobiliana) was caught in midwater (trawl depth 45 m seabed 145 m).

3. Mackerel caught at night were feeding heavily on Myctophids.

4. A mackerel sample was collected from 107J (T22) for stock assessment purposes.

M Greer Walker
1 July 1991

INITIALLED: J G S

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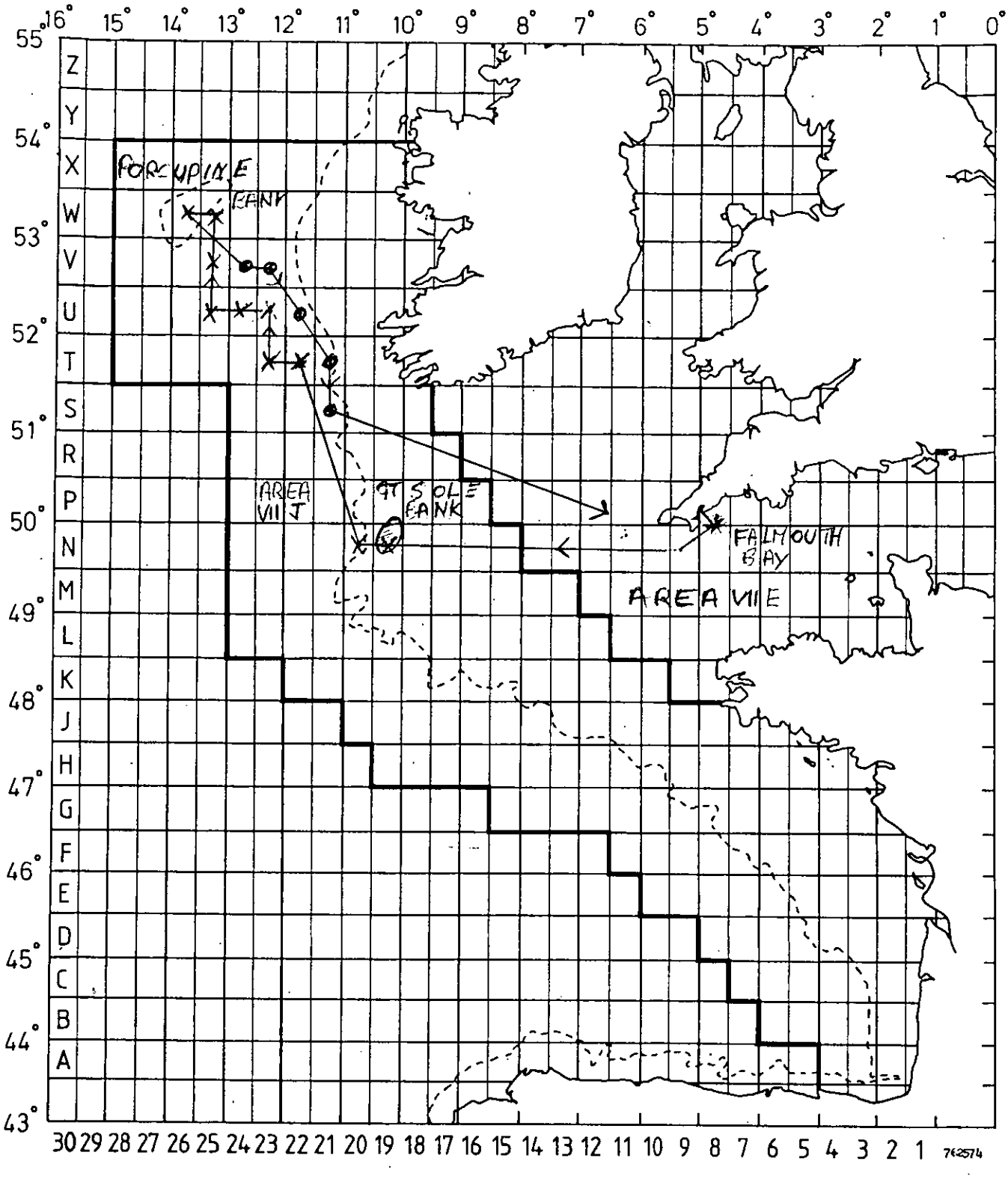
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