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

1992 RESEARCH VESSEL PROGRAMME

REPORT : RV CIROLANA : Cruise 6

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DURATION: 21 May - 15 June
(all times GMT)

LOCALITY: Celtic Sea/Western Approaches

AIMS:

1. To participate in the international mackerel and horse mackerel egg survey of the western stocks, with responsibility for sampling coverage of the area from 48°N to 52°N (Figure 1).
2. To sample mackerel with the Danish Foto trawl and with handlines to determine levels of atresia in the female spawning stock.
3. To use the Danish Foto trawl to investigate the vertical distribution of spawning of mackerel.
4. To investigate the vertical distribution of mackerel egg production using the LHPR sampling system.
5. To measure the low molecular weight hydrocarbons from surface water over the whole egg survey area.

NARRATIVE:

RV CIROLANA sailed from Lowestoft at 1100h 21 May and made a good passage through the English Channel to a position 40nml west of the Isle d'Ouessant by 0800h 23 May. Here, a series of trial deployments of the Foto trawl was made to familiarise the crew and fishing officers with the operation of this gear. Serious problems were experienced with the headline transducer resulting in the loss of one transducer and cable damage on two other deployments. On the final trial, at 1800h, the 'pony' wires pulled off the net drum barrel before the bridles had been fixed to the doors. This resulted in the loss of the net, bridles and pony wires. The following 20 hours were spent searching for the gear with sonar and grapple. It was finally located and recovered at 1450h 24 May (separate report).
The plankton survey was started at 1840h 24 May at 48° 15'N; 5° 45'W and continued until 1030h on the following day. There was then a short break for bad weather, the survey resuming at 0630h 26 May. On 29 May at 1730h, the survey was temporarily suspended in order to sample with the Foto trawl. Sampling was carried out in the vicinity of King

Authur's Canyon (48° 53'N; 11°38'W) where early stage mackerel eggs had been noted in the plankton samples. A total of eleven deployments were made with the Foto trawl between 2045h 29 May and 1430h 31 May, using the Scanmar system instead of the headline transducer.

The plankton survey was resumed at 1727h 31 May, and continued until 1920h on the following day when a major electrical fault occurred in the engine room. This resulted in a loss of power and the remainder of the east-going leg of stations, at latitude 49° 45'N was completed at reduced speed. At the end of this leg, at 0630h 2 June, the vessel was stopped for repairs which were completed by 1130h on the same day. After some confusion over orders from Lowestoft, the vessel eventually steamed for Falmouth to land the faulty electrical component for urgent repair. This was transferred by boat off Falmouth, and the vessel then returned to the plankton survey, resuming at 1105h 3 June. The survey continued in poor weather, towing the sampler before the wind over the next 36 hours. The weather then improved and good progress was made through to 1200h 6 June. A further six deployments of the Foto trawl were then made SW of Ireland in the Hurd Bank area, where the Lough Foyle had reported good catches of spawning mackerel. The plankton survey was resumed at 0436h 7 June and continued, with only a short break for bad weather on 8 June, until its completion at 1615h 9 June, 5nml west of Great Skellig Rock.

An area off the shelf, south of the Dingle Bay Ground, was selected for further mid-water trawling. Trawling with the Foto trawl began at 2320h 9 june and continued until the final valid haul at 2315h 11 June. On the next deployment, and when preparing to haul, a major fault occurred with the main trawl winch resulting in its complete breakdown. The trawl was recovered intact using the net drum winch, after first stoppering and then cutting the trawl warps. The whole operation was carried out with commendable skill on the part of the fishing crew. Repair of the trawl winch was not possible and the planned two more days of fishing was abandoned.

Between 0900h and 2215h 12 June, six deployments of the LHPR sampling system were made in the same area. On completion course was set for Lowestoft, arriving there three days before the scheduled end of the cruise at 0900h 15 June.

RESULTS:

1. A total of 132 deployments were made with the 53cm plankton sampler fitted with a 15cm diameter nose cone and a 270 micron aperture net. Sampling was completed within the specified time period and covered the whole area allocated to us from 48°N to 52°N (Figure 1). Two stations were sampled in many rectangles where the results of previous surveys indicated a likelihood of high production of mackerel or horse mackerel eggs. Five extra stations were sampled west of the standard area between latitude 51°N and 52°N. These were added after Lough Foyle reported spawning mackerel at the western edge of the area and high egg numbers along latitude 51° 45'N.

Rough sample counts showed very little production of mackerel eggs on the shelf, with most of the observed production occurring over depths >500m (Figure 1). The highest production appeared to be north of 50°N although preliminary stage I mackerel egg numbers there, seem to be lower than at a similar time in 1989. No inferences should be drawn from these observations until the whole picture, from the series of surveys, is complete.

Net clogging was not a problem on this survey, with noticeable quantities of phytoplankton occurring on only a few stations. The new EG&G software modified for the plankton sampler, worked extremely well. The display is impressive and useful, and the system proved easy for everyone to use after a short training session. A full report on this first long operational deployment will be made to RSS. Some suggestions will be made for further enhancement together with a repeat of our request for position logging during a tow.

Salinity and temperature profiles were taken on each plankton sampler deployment, using the sampler Guildline CTD. Surface salinity samples were also taken at each station, for CTD validation. Temperature, salinity and chlorophyll 'a' fluorescence were also monitored continuously throughout the survey using the vessels non-toxic pumped seawater supply. These data together with measurements of deck level irradiance were logged throughout the survey at 5 minute intervals. One 250ml sample of seawater filtered on to a GF/F filter was taken in each sampling rectangle. These were deep frozen and returned to the laboratory for chlorophyll analysis.

Radio contact was maintained on a fairly regular basis with the Lough Foyle working north of us. However, all attempts to contact RV's Tridens, Thalassa and Corneda de Savedtra and the MV Kings Cross, failed.

2. It was decided, prior to the cruise, that sampling to determine levels of atresia in female mackerel during this survey period would be carried out from the charter vessel Kings Cross.

3. The design of the after deck on CIROLANA makes the shooting of the Foto trawl a difficult operation. The net drum is positioned well forward and during shooting the gear is restricted by the narrow ramp. Thus there is no opportunity for it to spread until the doors are attached. Prior to this the numerous headline floats fall among the larger meshes forming bights in the rigging which are pulled apart with great force when the doors take effect. This resulted in a number of aborted or invalid hauls (particularly at night) during the early part of the cruise. For the first few hauls the cable linked headline transducer was used and further problems, including the loss of a transducer, occurred which were eventually tracked down to a faulty winch brake. During early hauls it was not possible to retain the trawl close enough to the surface and at a sufficient distance astern of the ship. It was therefore decided to reduce the length of the buff ropes from 24ft to 4ft and also to reduce the wing-end weights from 95 to 60kg (the specification recommended by the manufacturer). This adjustment allowed us to tow the trawl on the surface some 400m astern at a speed of 5 knots. When the trawl was fishing satisfactorily the cable linked transducer was replaced by the Scanmar system. The wing-end transducers were attached to the bridles about 2m from the wing-ends and reasonably consistent measurements were obtained for spread (33m) height (18-20m) and headline depth, except at the surface where depth measurements were not possible. Following results from the previous cruise (CORYSTES 6/91) a section (30ft) of smaller mesh in the 'trumpet' of the net was removed; this greatly enhanced the flow through of water and eliminated the problem of fish being retained in the meshes and appearing in subsequent catches. In addition, the elevated position of the net drum enabled us to shake fish down into the cod end. These two factors greatly enhanced our sampling technique.

A total of 6 rod and line and 30 valid Foto trawl stations were worked during the cruise and at each station, when numbers permitted, 30 mature ovaries were preserved for histological analysis. It is not possible to determine maturity stages accurately from a visual inspection of the ovary and a description of the vertical distribution of spawning mackerel must await

histological analysis. The weight of catches by day and by night and at three depths (surface, 50m and 100m) are shown in the attached table. Although the number of hauls are relatively few, preliminary results suggest that catches were greater at all depths at night, and both day and night catches increased towards the surface.

Table

The weight (kg) of mackerel caught by Foto trawl at the surface, 50m and 100m depth by day and by night

DEPTH	NIGHT			DAY		
	No hauls	Total weight	Mean weight per haul	No hauls	Total weight	Mean weight per haul
Surface	5	1548	310	5	340	68
50m	5	122	24	5	97	20
100m	5	28	7	5	31	6

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4. A total of seven deployments of the LHPR were made down to 100m depth. Of these six were valid, with ten discrete samples in 10 metre depth bands on each one. Three of these were analysed fresh for stage IA mackerel eggs. Numbers of 'cell stages' present in the samples were encouragingly high. The analysis showed that over the deep water, south of the Dingle Bay Ground, most of these early stages occurred above 50m depth.

Some problems were experienced with the LHPR system. At one stage the motor switched to a double wind on mode although this was not apparent until the sample was examined.

5. Light non-methane hydrocarbons were measured simultaneously in the surface ocean and air. Seawater samples (500ml) were taken from the non toxic seawater supply. Analysis of these samples agreed well with samples taken in Niskin bottles adapted GoFlo and NI0 bottles . Air samples were collected into the wind at the bow of the ship through a 2m stainless steel tube and pumped into a stainless steel canister to 30Psi using on electric metal bellows pump. Two litres of air was used for the analyses.

Water samples were concentrated by a purge and trap method and analysed by gas chromatography. Air samples were similarly cryogenically concentrated at -185°C (a temperature achieved in the headspace above boiling liquid nitrogen) before analysis by gas chromatography.

Several problems were encountered on the cruise which prevented a full-time sampling programme . Initially the stripping chambers were broken, then problems were found with the calibration (which remain unresolved) and finally the liquid nitrogen ran out after 3 weeks. Three hundred litres of liquid nitrogen were brought on board and less than 6l used per day. Therefore loss rates from the dewar must have been very high.

Due to calibration problems, exact concentrations of 'species' have not yet been established, although most values are in the ppt range.

6. Miscellaneous observation

i) Numerous garfish (*Belone bellone*) were taken in the midwater trawl mainly when fishing close to the surface. This included a catch of 10.9kg of small, <50cm fish caught south of the Outer Dingle Bay ground on 11 June.

ii) Myctophids and various stomiatids of the deep scattering layer were taken in the mid water trawl at night. Mackerel, taken in the same hauls were generally feeding on the myctophids. Samples of the myctophids and some mackerel stomachs were preserved for Dr Angell (I.O.S).

iii) A single sunfish (*Mola mola*), numerous snake pipefish (*Entelerus aequareus*) including egg carrying males, two *Tetragonurus cuivieri* and one ribbon fish (*Regalecus glesne*) (to be confirmed), were taken in the trawl in the King Aurthur's Canyon area.

iv) A sample of 50 herring was taken in the Hurd Bank area and returned to the laboratory deep frozen, to be examined for Ichthyophonus disease. '0' group hake were also taken in mid water in this area.

v) A total of 5 blackfish (*Centrolophus niger*) was taken whilst fishing in the area south of the Outer Dingle Bay ground. One deal fish (*Trachipterus arcticus*), one sea lamprey (*Petromyzon marinus*) and one tope (*Galeorhinus galeus*) were also caught in this area.

vi) Whilst towing the plankton sampler on 7 June, SW of Ireland, a shark sucker (*Remora remora*) was noticed, attached just below the water line to the stern ramp of the vessel.

vii) An age length key sample of 193 mackerel was taken from ICES area VIIJ and returned deep frozen to the laboratory for analysis.

J H Nichols
S.I.C
19 June 1992

SEEN IN DRAFT : B Chapman (Captain)
J Harper SFM

INITIALLED : J W H

26/6/92

DISTRIBUTION:
Basic list+
Staff on cruise
Dr M Walsh SOAFD
Dr G Eltink (RIVO)
Dr J Massé (IFREMER)
Dr J Molloy (Dublin)
Mr P Walker
Mr D Bucke

CIROLANA CRUISE 6/1992 (21 May - 15 June)