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CENTRE FOR ENVIRONMENTAL, FISHERIES AND AQUACULTURE SCIENCE
LOWESTOFT LABORATORY, LOWESTOFT, SUFFOLK, NR33 OHT
1999 RESEARCH VESSEL PROGRAM: RV CORYSTES: CRUISE 2

Report.

STAFF:

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DURATION: Left Lowestoft 19:00h 1 March
Arrived Lowestoft 02:30 h 25 March
All times are GMT

LOCALITY: Irish Sea

AIMS

1. To incubate cod eggs and determine stage duration in relation to temperature.
2. To collect fish egg samples to test a DNA method of ageing fish eggs.
3. To sample western Irish Sea plaice for histological assessment of atresia and maturity.
4. To study apoptosis in captive plaice and sole.
5. To examine egg mortality rates of plaice in the eastern Irish Sea (or of cod in the western Irish Sea) spawning areas.
6. To determine diel periodicity of cod spawning in the wild (if the patch study, objective 5, is carried out in the western Irish Sea).
7. To collect depth stratified fish larval samples for the University of Stirling.
8. To test the Longhurst-Hardy plankton recorder (LHPR) with the new 'Guildline' CTDs.

In addition two further aims were added in repsonse to requests from Bill Hutchinson (University of Hull) and Dr Ciro-Rico (University of East Anglia).

9. To collect fin-clip samples from cod from the western Irish Sea for a genetics population study (Bill Hutchinson).
10. To collect gonad samples of cod and haddock for developmentn of DNA probes for identifying fish eggs of these species (Dr Rico).

NARRATIVE:

Scientific staff were all aboard by 08:00 h but sailing was delayed until 19:00 h because of inclement weather. Several scientific staff stayed on board and the opportunity was taken to secure all equipment in preparation for sailing. RV Corystes sailed at 19:00 h with strong winds forecast for the Channel passage. The worsening sea state forced the ship to take shelter in Weymouth Bay on 3 March and to shelter off St Michael's Mount on 4-5 March. RV Corystes weighed anchor at 22:00 h on 5 March arriving in the western Irish Sea around 01:00 h on 6 March. Fishing with the Granton trawl for mature cod (Task 1) began at first

light but few cod were caught. Fishing continued until 17:30 h on 8 March when it was noticed that the port warp had suffered extensive damage limiting the depth of fishing to < 40 m. Few cod were caught and those which were mature were all male. The opportunity was taken to collect fin clips from immature cod and gonads from a few haddock caught (Tasks 9 and 10). Many plaice were caught and Task 3 was completed using these fish. From 07:00 h on 10 March fishing was transferred to the Eastern Irish Sea using the 4 m beam trawl. The live holding tanks were stocked with plaice and sole for Task 4. Since Task 1 could not be undertaken with cod, plaice eggs were artificially fertilised and the eggs set up in the temperature incubation block at 11:30 h on 10 March. Fishing ceased at 00:20 h on 11 March and RV Corystes entered Liverpool Docks for mid-cruise break at 16:30 h.

Following departure from Liverpool, a grid of 14 plankton stations was worked off Great Orme Head with the aim of identifying a patch of plaice eggs for Task 5. Having identified a suitable region, 3 Argos tracked buoys were released around 18:30 h on 13 March. Over the following three days, a grid of 6 stations was worked twice daily around the buoys. However, egg counts performed on board suggested that the buoys might be drifting in a different direction to the egg patch. At 06:00 h on 17 March a grid of 12 plankton stations covering a larger area was set up and this was worked 4 times over the next 4 days (Fig 1). Two further Argos buoys were released at the centre of this grid on 17 March around 24:00 h. On each station plaice eggs were sorted, staged and frozen for later age determination by DNA quantitation. By 09:00 h on 21 March the weather had again deteriorated and plankton sampling had to be suspended. By the following morning the sea state had moderated and recovery of Argos buoys was begun at first light. Two buoys were recovered by 13:30 h but there was insufficient time to recover the third buoy still in the region, the remaining bouys having run ashore on the Lancashire coast. RV Corystes then began passage for Lowestoft. Task 8 was completed at a station in the English Channel during passage to Lowestoft. Only Task 7 was not attempted on this cruise due to the time lost because of bad weather during passage to the Irish Sea.

RESULTS

Aim 1. Despite 3 days intensive fishing, mature cod were not caught so a plaice incubation study was performed instead. Eggs were incubated at 15 temperatures. Development up to hatching was recorded at 6 hourly intervals.

Aim 2. Plaice eggs from the incubation experiment above were individually frozen at –80°C for subsequent DNA analyses in the laboratory.

Aim 3. 250 plaice (from 15 to 40 cm in length) were sampled from the western Irish Sea. Otoliths and ovaries were removed and fixed for subsequent laboratory analysis.

Aim 4. 72 female plaice and 72 female sole were placed in live rearing tanks aboard RV Corystes. Ten fish were sampled every two days and samples of blood, otoliths and ovaries taken. Blood samples will be subsequently examined for steroid hormones and the ovarian samples for levels of induced atresia.

Aim 5. A plaice egg patch track study was conducted over 7 days in the eastern Irish Sea. Five Argos buoys were deployed in the patch and tracked for up to 10 days. In total 92 plankton stations were worked and over 3000 plaice eggs sorted, staged and individually frozen for subsequent ageing. Initial results suggested that the Argos buoys drifted away from the egg patch with the result that the survey grid design was changed after 3 days to cover a wider area. The preliminary results of total plaice egg numbers m^{-2} based upon ship-board sampling are shown in Figure 1. The experiment was envisaged as essentially a pilot study to ascertain whether the techniques employed could be used to assess the shape of the egg mortality curve in fish eggs. Initial results suggest

that the use of Argos buoys is useful to determine diffusion rates in an area but it is difficult to reliably track an egg patch using drogue drifters. Water movements at different depths may differ considerably and this could move eggs (near the surface) and drogues (at 10 m depth) in different directions. In addition, it would be desirable to use more modern drifters which give positional updates more frequently than once every 12 hours. The final results of the study will depend on whether a more precise method of ageing the eggs can be developed (Task 2) but it seems likely that it is feasible to obtain better results using present techniques by deploying more than one research vessel to cover the patch. This would achieve the increased spatial and temporal coverage required.

Aim 6. This was not carried out for cod as the patch study was undertaken in the eastern Irish Sea. Initial analysis of the plaice eggs staged on board showed a strong diurnal pattern in egg production. In addition, it was observed that the peak of production (over the limited period observed) coincided with the new moon. Lunar synchronicity in plaice spawning has been postulated and if true has important consequences for egg sampling programs on this species.

Aim 7. Not undertaken due to lack of time

Aim 8. Successfully completed in the English Channel

Aim 9. Length measurement, otoliths and fin-clips were collected from 100 immature cod sampled in the western Irish Sea. Fin clips were preserved in ethanol for subsequent DNA analysis.

Aim 10. Gonad samples from two male cod and haddock were frozen at -80°C for use in gene probe development for egg identification.

C J Fox
24 March 1999

DRAFT SEEN: Captn Chapman
Captn Kay

INITIALLED: GPA

DISTRIBUTION:
Basic list +
Staff on cruise

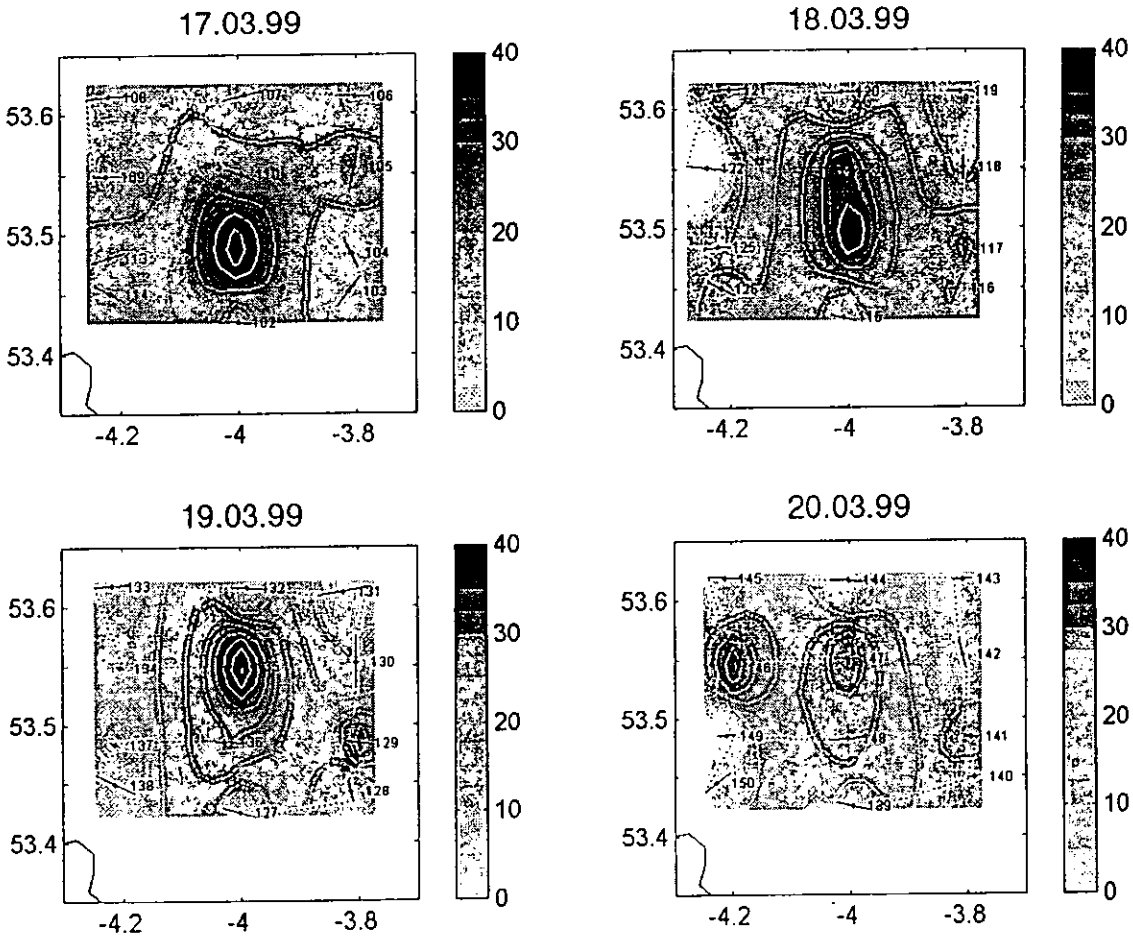

Figure 1
Estimated total number of plaice eggs m^{-2}