

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

1987 RESEARCH VESSEL PROGRAMME

REPORT: RV CIROLANA: Cruise 8

STAFF: J H Nichols
A B Thompson
J Dann
P M Hudson
S P Milligan
G M Haynes

D C Denoon)
D Allington)
D Limpenny) 22 September to 1 October
C A Hudson)
B R Riches)

L E Woolner)
G Bunn)
J W Read) 1 October to 12 October
A E Mitchell) Inst. of Marine Biochemistry

DURATION: Left Lowestoft 2040h 22 September
Arrived Lowestoft 1200h 12 October
(All times are Greenwich Mean Time)

LOCALITY: West Central North Sea

AIMS:

1. To participate in the ICES coordinated herring larvae survey in region IVE.
2. To study drift growth and mortality of herring larvae.
3. To examine the vertical distribution of herring larvae in relation to water masses and movement.
4. To sample herring larvae and their potential food organisms in a study of their diet and feeding status.
5. To identify herring larvae predators.
6. To collect sediment samples for sediment transport studies (AEP2).
7. To collect sediment and water samples for $^{234}\text{Th}/^{238}\text{U}$ disequilibria measurements, to study particle scavenging and resuspension.

NARRATIVE

RV CIROLANA sailed from Lowestoft at 2040h 22 September and steamed north to start the herring larvae survey at 1030h on the following day. The eastern edge of the area (fig 1) was covered first in order to sample where the Netherlands RV TRIDENS had been unable to survey. On the final day of the RV TRIDENS survey, 24 September, an unscheduled rendezvous was arranged in an area of high yolk sac larvae abundance, off the Yorkshire coast. Three

hours were spent doing comparative plankton sampler tows and CTD profiles before RV CIROLANA restarted the larvae survey at 1330h. The survey continued up the eastern edge to 56°N and then down the Northumberland coast to the Tyne area over the following two days. At 1715h 26 September the larvae survey was suspended and bottom sediment sampling began in an area off the River Tyne. By midnight on 27 September the first two priority sampling areas had been completed together with four geochemistry stations using the Reineck corer and CTD/Niskin rosette.

The larvae survey was restarted at 0135h 28 September off Tees Bay, proceeding down the coast and back through the centre of the area to complete the grid in Tees Bay at 0915h 29 September. A further series of bottom sediment samples was taken in the area whilst preparing the CSA Multi net sampler for trials. These trials were completed at 1900h and the remaining sediment samples completed by 0515h on the following day.

Sampling began in a patch of recently hatched herring larvae off Robin Hoods Bay at 0945h 30 September, with three Engel trawl hauls and a mini grid of fourteen stations. On completion of the mini grid at 0815h 1 October staff were exchanged off Scarborough by ships workboat. On return to the centre of the larvae patch a moored current meter rig was laid at 54°20'N 00°00.3'W at 1600h. The following three days were spent in the vicinity of this rig sampling with the LHPR, standard sampler, Methot Isaacs Kidd trawl and doing vertical profiles of chlorophyll 'a' fluorescence and irradiance. The moored rig was recovered at 0930h 4 October when an Argos satellite tracked drifting buoy was launched at the same position. The mini grid stations were repeated and completed by 2200h on the same day.

An overnight steam was made to an area between the Longstone and River Tyne where a patch of 9-10mm herring larvae was located. A moored current meter rig was laid in this patch at 55°15'N 01°10'W at 0930h 5 October. Problems with the LHPR allowed only fourteen hours work in this area before the final herring larvae grid was started at 0215h 6 October. The stations at the north western corner of the grid had been completed by 0330h on the following day. RV CIROLANA then returned to recover the moored rig and launch another Argos buoy by 0820h. The final grid was restarted in Tees Bay and continued northwards to complete the north eastern corner by 0630h 8 October. The following twelve hours were spent examining herring larvae vertical distribution in the thermally stratified water in that area, using a standard sampler. Deteriorating weather forced an early end to this study and after launching the final Argos buoy at 1950h at 55°45'N 00°30'W, passage was made to the south to restart the herring larvae survey. After being hove to for eleven hours, sampling began again at 1000h 9 October. The survey continued in moderate weather conditions until its completion at 0150h 11 October (figure 2).

RV CIROLANA docked at Lowestoft at 1200h 12 October.

RESULTS:

1. The ICES standard areas were sampled for the two periods to the end of September and for the first half of October (figures 1 and 2). Low larvae numbers at the eastern boundary during both surveys allowed optional stations to the east to be left unsampled.

Herring larvae abundances on the first survey were high in the expected hatching areas off the Longstone and Whitby with yolk sac larvae abundances up to 5000m⁻² during the comparative tows with RV TRIDENS. Small larvae

were also found at the north eastern corner of the survey area in the vicinity of the old North-east Bank spawning. On the second survey abundances of small larvae had generally declined but there was further evidence of the re-occupation of the old spawning grounds on the western edge of the Dogger south of 54°30'N. Small numbers of recently hatched larvae were also found in the vicinity of the Outer Dowsing light vessel confirming reports from RV TRIDENS that spawning fish were present in that area during the second half of September.

2. The start of the 'patch study' off the Yorkshire coast coincided with a large overnight hatching of herring larvae. Extensive sampling over the following four days and the subsequent coverage during the final survey should provide some data on growth and mortality.

Data are not yet available from the moored current meter rigs but early indications from the drift of the Argos buoy placed in the Yorkshire coast larvae patch, are that the product from this hatching is now moving rapidly eastwards (figure 3). This is in contrast to the south-easterly movement normally observed. This eastward movement is tentatively confirmed by a preliminary examination of the samples on the final survey.

The Argos buoys launched in the Yorkshire coast, Longstone and North-east Bank areas, are intended to follow the drift of larvae over the autumn and early winter period. The drogue depth on each was determined from the vertical distribution studies which indicated that most of the larvae were in the top 30 metres. These data should provide a useful input to the Autumn circulation experiment (ACE) in the North Sea.

3. The CSA multi-net was not available for the vertical distribution studies. During trials with this system on the first half of the cruise, the load on the cable became unacceptably high at 2.25 tonnes when towing at 5 knots. The fully sprung net bars were still failing to positively open and close the nets and the indication system remained ambiguous. Finally the net bar loading winch cracked and was damaged beyond immediate repair rendering the whole system unserviceable. It seems likely that the excessive load on the cable winch during these trials was a contributory factor to the damage caused to the inner drum flange. This caused the drum to move axially when under load. The problem did not arise until the penultimate day of the cruise when only six survey stations remained.

The LHPR system on loan from IMER withstood the high sampling frequency demanded of it for the first three days. Subsequently the weakness of the rechargeable battery pack was a serious limitation and it eventually became unserviceable (separate report FLR 4840A).

Sampling was carried out with the LHPR in the Yorkshire coast patch (11 deployments) from 1 October to 4 October, and in the Longstone/Tyne area (5 deployments) from 5 October to 6 October. Good discrimination of herring larvae distribution vertically at approximately 5 metres resolution was achieved in both areas. Concurrent measurement of water movement from the moored current meter rigs was successful for the Yorkshire coast deployment only. The rig in the Longstone/Tyne area had been damaged and the top meter and sub-surface buoy were missing. Both were subsequently landed by a trawler at Blyth, and handed over to the local District Inspector of Fisheries.

4. Fine mesh samples to assess the abundance of herring larvae food items were taken on the mini grids in the Yorkshire coast area. Additionally, fine net samples were taken on four of the LHFR deployments in this area providing discrete depth samples which can be compared directly with larvae vertical distribution diurnally.

Thirteen samples of herring larvae from different parts of the survey area were taken for subsequent lipid analysis by the Institute of Marine Biochemistry. Concurrent samples of filtered sea water were also collected for an examination of lipids in phytoplankton.

Samples of herring larvae were also collected for feeding status studies. These will include histological examination, length/weight measurements and studies of the RNA/DNA ratios in various size groups of larvae.

5. Fish traces in the areas of high herring larvae abundance were very light and Engel trawl hauls yielded only large numbers of the scyphomedusa Cyanea and a few small whiting. Examination of Cyanea on board failed to provide evidence of their food items. However numerous samples were preserved for a closer examination in the laboratory. An attempt was made to assess the abundance of Cyanea, which was widespread over the survey area, using the Methot Isaacs Kidd trawl (MIKT).

All fish caught in the Engel trawl and MIKT were kept for subsequent stomach content analysis. It seems unlikely that these studies will shed any further light on herring larvae predation.

6. A total of 141 stations were sampled with the Shipeck grab or the Day grab in a small area from north of the R. Tyne to south of the R. Wear and within 7 nml of the coast. Successful bottom sediment samples were taken at most stations. These will be returned to the Burnham laboratory for use in sediment transport studies related to the industrial and sludge dump sites north of the R. Tyne.
7. Water samples from the surface to near the sea bed were taken at four stations from south of the R. Wear out to 10nml from the coast. At the same stations the Reineck corer was used to take a sediment sample. At the inshore station the sea bed was too hard for the corer and no sample was obtained. Some water sample preparation and Xray analysis of cores was done on board, but most of the geochemical analysis, principally for $^{238}\text{U}/^{243}\text{Th}$ disequilibria measurements will be done at the laboratory.

J H Nichols
12 October 1987

SEEN IN DRAFT: M J Willcock (Master)
E W Pearson (Senior Fishing Mate)

INITIALED: DJG

DISTRIBUTION:

Basic list + staff on cruise
V Christensen (Denmark)
G Van de Kamp (Netherlands)

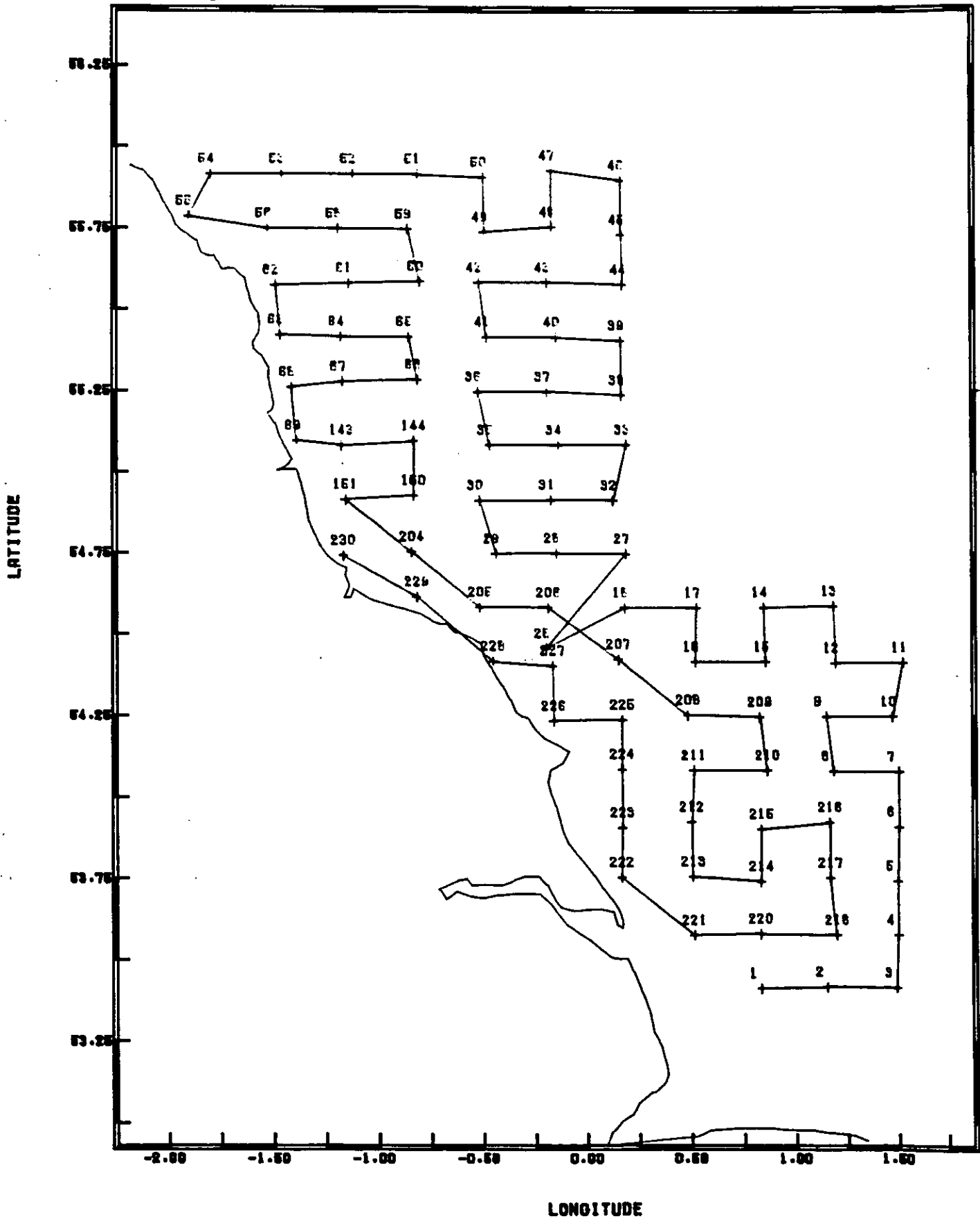
CRUISE TRACK FOR CIROLANA 8/87 FIRST PLANKTON GRID

SHOWING :

CRUISE TRACK

STATION NUMBER

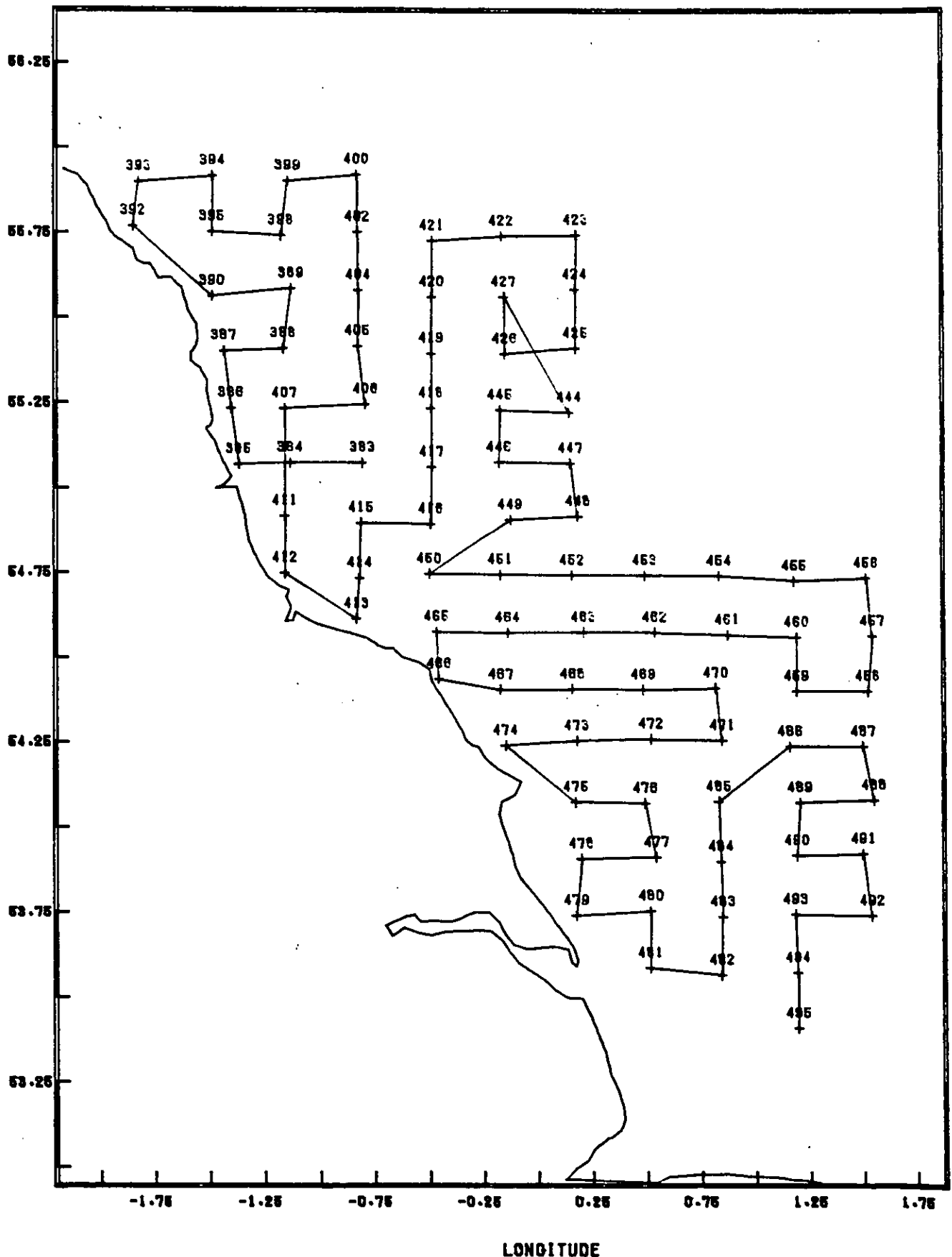
COASTLINE



CRUISE TRACK FOR CIROLANA 8/87 SECOND PLANKTON GRID

SHOWING :
CRUISE TRACK
STATION POSITION
STATION NUMBER
COASTLINE

LATITUDE



ARGOUS BOUY 6681 RELEASED 4/10/87 CIROLANA 8/87

SHOWING :
CRUISE TRACK
STATION POSITION
STATION NUMBER
DATA VALUES REPRESENTING : HOUR OF FIX (GMT)
COASTLINE

