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

1995 RESEARCH VESSEL PROGRAMME

REPORT: RV CORYSTES: CRUISE 5b/95

STAFF:

Dr J Brown (SIC)
Mrs A Reeve
Mr W Meadows (4-10 May)
Ms M Angelico (UCNW)
Mr S Jones (10-23 May)
Mr L Fernand
Mr J Read
Mr K Medler
Mr J Lawrence

UCNW - University College of North Wales.

DURATION:

4 May - 23 May

LOCALITY:

Irish Sea and North Channel (see Fig. 1).

AIMS:

The work is directed at a better understanding of the dynamics of the North Channel which control the flushing characteristics of the Irish Sea. Net outflow from the Irish Sea is northward, but there are apparently long periods of inflow on the western side of the channel. It is not known to what extent outflowing water recirculates and extends southward along the Irish coast or what importance inflows of Atlantic water have on flushing characteristics of the region. Variability in the flow regime and factors governing it are poorly understood. The main sampling aims of the cruise were:

1. To deploy mooring arrays in the North Channel and western Irish Sea.
2. Deploy and retrieve free floating ARGOS buoys in the North Channel and western Irish Sea to determine the Lagrangian circulation.
3. Undertake associated physical and biological surveys of the region in support of 1) and 2).
4. Collect *Nephrops* larvae to augment data collected during Cirolana 4b/95, in order to progress our understanding of the role physical processes play in the retention or distribution of the stock associated with the Irish Sea mud patch.
5. Evaluate the performance of the new Valeport BFM308 current meter in a comparison with an Aanderaa.
6. Test new NAS-2 nitrate analysers in a deck tank.
7. Take water samples immediately above the munitions dumping sites in the North Channel for subsequent bio-assays at the Burnham Laboratory.

NARRATIVE (all times GMT):

The change over from Corystes 5a, made in Liverpool, required the entire two days allocated for loading and equipment set up. RV Corystes sailed 22:35 (4 May) for the western Irish Sea and deployment of two ARGOS drifting buoys (5 May). It was intended that this be followed by a SCANFISH leg eastward from Dublin to assess the physical structure of the water column. Disappointingly, when the instrument was deployed it failed to undulate. On recovery, the pressure sensor in the controlling CTD appeared to be defective, despite the manufacturers having given it a clean bill of health (at some expense) only weeks prior. Eventually, we were able to contact the manufacturers in Denmark, who confirmed our diagnosis. Unfortunately, it being the bank holiday weekend, we were forced to wait until Tuesday (9 May) for a spare sensor. Until then, time was occupied with ARGOS buoy deployments, fixed moorings in the North Channel, CTD's and Tin Tow trials.

On Tuesday afternoon (9 May) the replacement sensor and a number of parts for the Tin Tow were collected in Douglas. After repair, the SCANFISH was trialed for approximately three hours along a line extending south east from Douglas. It undulated successfully, but the altimeter that governs the height at which the instrument turns above the bed was also found to be defective. The manufacturers were immediately informed, promising to deliver a part by the following Monday (15 May) at the earliest. The instrument can be forced toward the surface by command from the controlling PC key board. In order that ship time not be wasted and following advice from the manufacturers, the decision was made to work the SCANFISH grid in this mode, turning the instrument nominally 15 m above the sea bed.

On Wednesday morning (10 May) Mr Meadows was exchanged for Mr Jones. This was followed by the start of the SCANFISH grid east of Dublin (Fig. 2). The grid was planned so that the inshore work and turns were made during daylight and those offshore at night. Progress was excellent until the evening of Friday 12 May when the instrument was recovered at the end of leg 72 (Fig. 2). This was done in order that work through the North Channel might proceed during daylight and enable an inspection of the instrument. As on all previous cruises, the cable counter failed, causing confusion as to the length of cable deployed. Precautionary markings had been placed at 50 m intervals, but had worn off during the 60 hours of towing. The deployed cable length was approximately 75 m greater than thought and the instrument touched the bottom as the ship slowed for recovery. Fortunately, damage was minor.

SCANFISH was redeployed at 0500 Saturday (13 May) to begin work through the North Channel. At approximately 1500 it was noticed that the conductivity cell on the FSI CTD had failed and the instrument was immediately recovered. The conductivity cell had been knocked from the instrument and some damage sustained to the body of SCANFISH. Inspection of the data records indicated that the instrument had struck the top of a 50 m pinnacle in 130 m of water. If the altimeter had been functioning this would undoubtedly have been avoided. A replacement altimeter duly arrived in Douglas on Tuesday 16 May!

Following this, an uncompleted section of the SCANFISH grid was occupied with a line of discrete CTD's, before proceeding to pick up an ARGOS buoy that was in danger of grounding near the Solway Firth (14 May). Overnight, augmenting MAFF's routine monitoring of coastal waters, CTD's profiles and water samples were taken over the three munitions dumping sites in the North Channel and at one control site. The following morning

(15 May) the samples were collected by Mr Thain at Girvan on the Clyde Sea for transport to Burnham and subsequent bio-assay work.

In the absence of SCANFISH, the opportunity was taken to extend the planned Tin Tow grid (Fig. 3) in the southern North Channel and western Irish Sea, with the aim of detailing the distribution of *Nephrops* larvae in relation to the circulation. *Nephrops* also have the advantage that they act as an indicator of potential contaminate pathways in the region during their approximately 50 day planktonic phase.

The Tin Tow grid was interrupted for a man over board exercise (17 May). Subsequently, the opportunity was taken to re-seed the western Irish Sea gyre with 4 more ARGOS buoys before resuming the Tin Tow grid late evening. On completion of the grid (19 May), an attempt was made to recover an ARGOS buoy aground off Dublin. The buoy was located, but it was just submerged and on a rising tide. Surprisingly, even when well submerged a signal could detected from the buoy with the hand held VHF tracking gear. The next suitable low water was the following morning. In the meantime a number of Tin Tows were carried out and a further ARGOS buoy deployed.

The grounded ARGOS buoy was winched aboard at low water (1000) Saturday 20 May after the Senior and Junior Fishing Mates attached a line from the Searider. A final CTD for oxygen calibration purposes was undertaken in the centre of the western Irish Sea, before departing for Lowestoft.

RESULTS (Preliminary):

1. Moorings were successfully deployed in the northern Irish Sea and North Channel (see Fig. 1 for positions). I, J, K and L were of the standard 'U'-shaped construction, but those at the munitions dumping sites (N and P) were 20 m length single point moorings attached by acoustic release to an anchor clump. The former were deployed to assist with validation of the high resolution North Channel model in a region were there is a dearth of data. The latter were designed to monitor near bed velocities in the vicinity of the munitions sites following public concern over munitions being washed up along the Manx, Antrim and Mull of Kintyre coasts.

2. The free floating ARGOS buoys deployed in the western Irish Sea took a little time to describe the organised anti-clockwise circulation pattern typical of summer time stratification (see Fig. 4 for representative plots). This may be attributable to a stronger than usual salinity component and the deployments occurring during the transitional phase between winter mixed and summer stratified conditions. The buoys deployed at the southern end of the north channel followed the pattern observed during June 1994 (Corystes 7/94). The western buoy moved strongly south into the Irish Sea whilst the eastern moved weakly north eventually exiting the North Channel. The buoys were left for recovery by the RV Prince Madog at the end of May.

3. The comprehensive SCANFISH survey of the Irish Sea (see Fig. 2) showed stratification to be well developed (e.g. Fig. 5), but with a considerable salinity (fresh water) component. When combined with the ship mounted ADCP data we will have a remarkably detailed description of the physical structure of the region and associated

flows. Even after a year of use, it is still hard to believe the tremendous improvement in the description of the physics brought about by the combination of SCANFISH and ADCP. The fluorometer revealed a detailed description of the chlorophyll distribution and the high levels associated with the pycnocline in the stratified region.

The discrete CTD surveys, which included nutrients, suspended load and chlorophyll samples, also revealed considerable stratification at the southern end of the North Channel and the mouth of the Clyde Sea during neap tides. During a sparser survey approximately a week later (spring tides) this was much reduced.

4. Following curtailment of the SCANFISH survey an extended Tin Tow grid (Fig. 3) was sampled. Stage I and II *Nephrops* larvae were plentiful in the central western Irish Sea, with particularly high levels of plankton immediately east of Dundalk Bay. Until analysis ashore, it is too early to assess the loss through the north, south and east boundaries of system.

5. A Valeport BFM308 current meter was deployed adjacent to an Aanderaa RCM7 at mooring I (Fig. 1) for intercomparison purposes. The instruments will be recovered by RV Prince Madog in mid June.

7. One NAS 2 nitrate analyser was run continuously for almost 7 days in a deck tank whilst sea water was constantly renewed by hose. Nutrient samples were taken hourly from the tank, producing 37 samples for calibration/comparative purposes. Unlike the NAS 1 samplers, the instrument appeared to perform well throughout. Analysis will be completed in the Laboratory.

8. As part of MAFF's routine monitoring of coastal waters three near bottom (closer than 5 m) water samples at each of the three disposal sites (Mu) in the North Channel (Fig. 1). A further three samples were taken at a control site (Mu (c)) approximately 20 miles distant from the nearest dumping position (Fig. 1). The samples were delivered ashore the next morning for immediate bio-assay tests at the Burnham Laboratory.

Excepting the curtailment of the SCANFISH grid, the principal aims of the cruise were met. The three days of SCANFISH data collected was of excellent quality, but the supply of the instrument with defective sensors was disappointing, the defective altimeter contributing largely to the damage.

Finally, the enthusiasm and expertise of the ships officers and crew contributed in no small part to the success of the work.

Juan Brown
(Scientist-in-Charge)
21 May 1995

SEEN IN DRAFT:

B. Chapman (Master)
W. May (Senior Fishing Mate)

INITIALLED: JEP

DISTRIBUTION:

BASIC LIST+
Dr J Brown x 10
Mr S Milligan
Dr D Bennett
Dr J Campbell
Mr S Flatman
Mr J Thain

CORYSTES 5B/95

⊙ = CURRENT METER STATIONS

\+ = CTD STATIONS

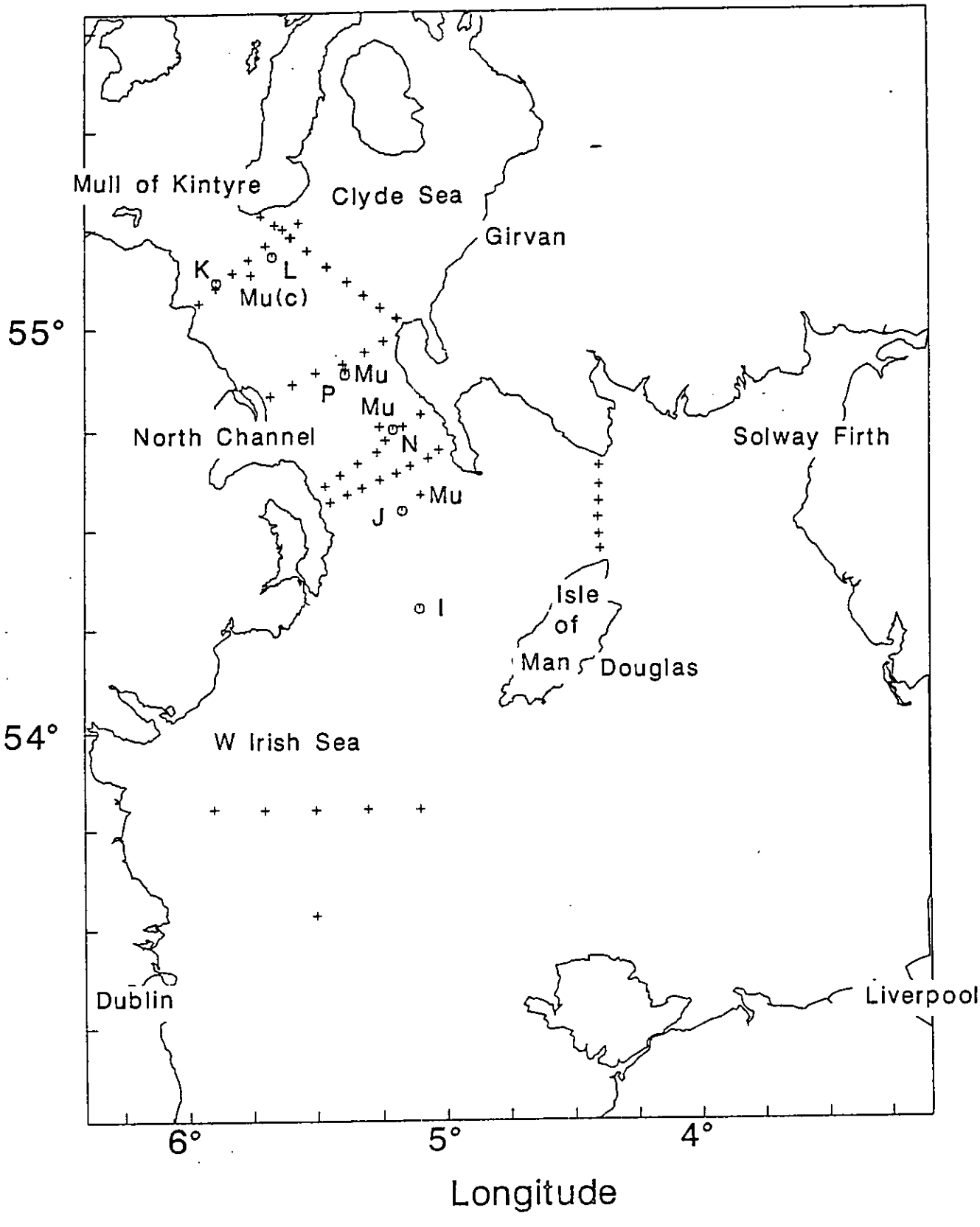


Fig. 2

CORYSTES 5B/95

SCANFISH TOWS

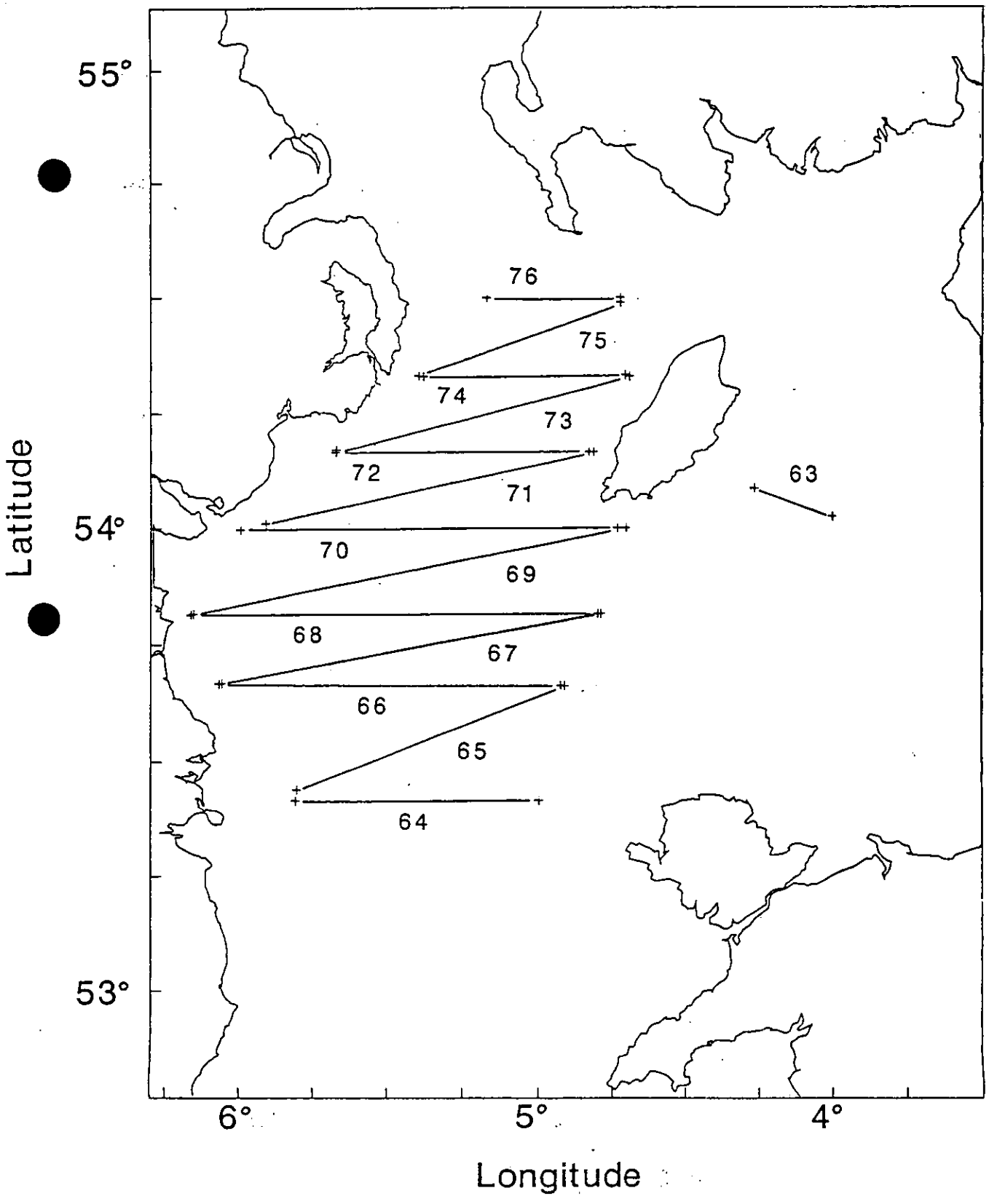
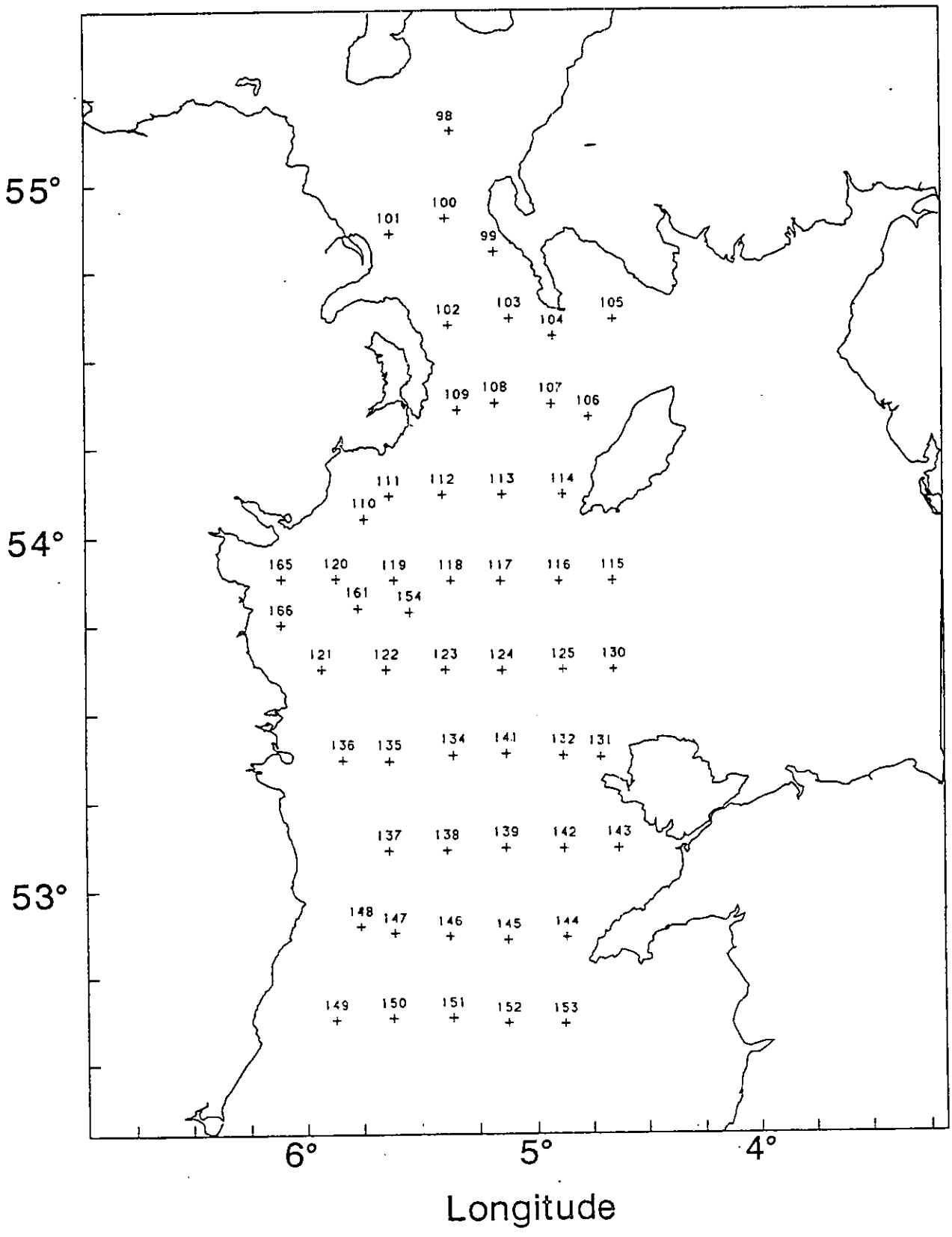


Fig. 3

CORYSTES 5B/95

TTN STATIONS



Representative ARGOS buoy tracks

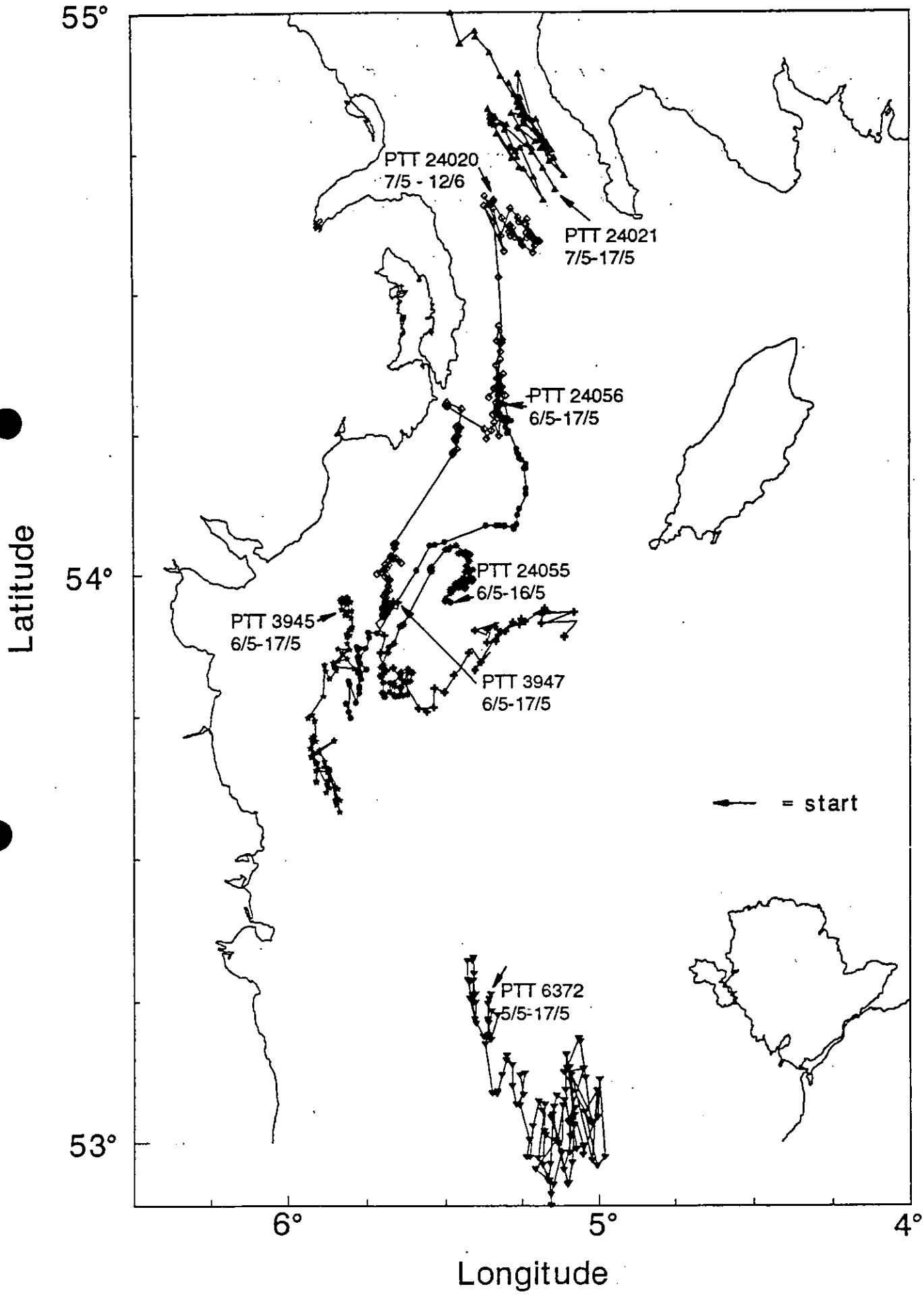
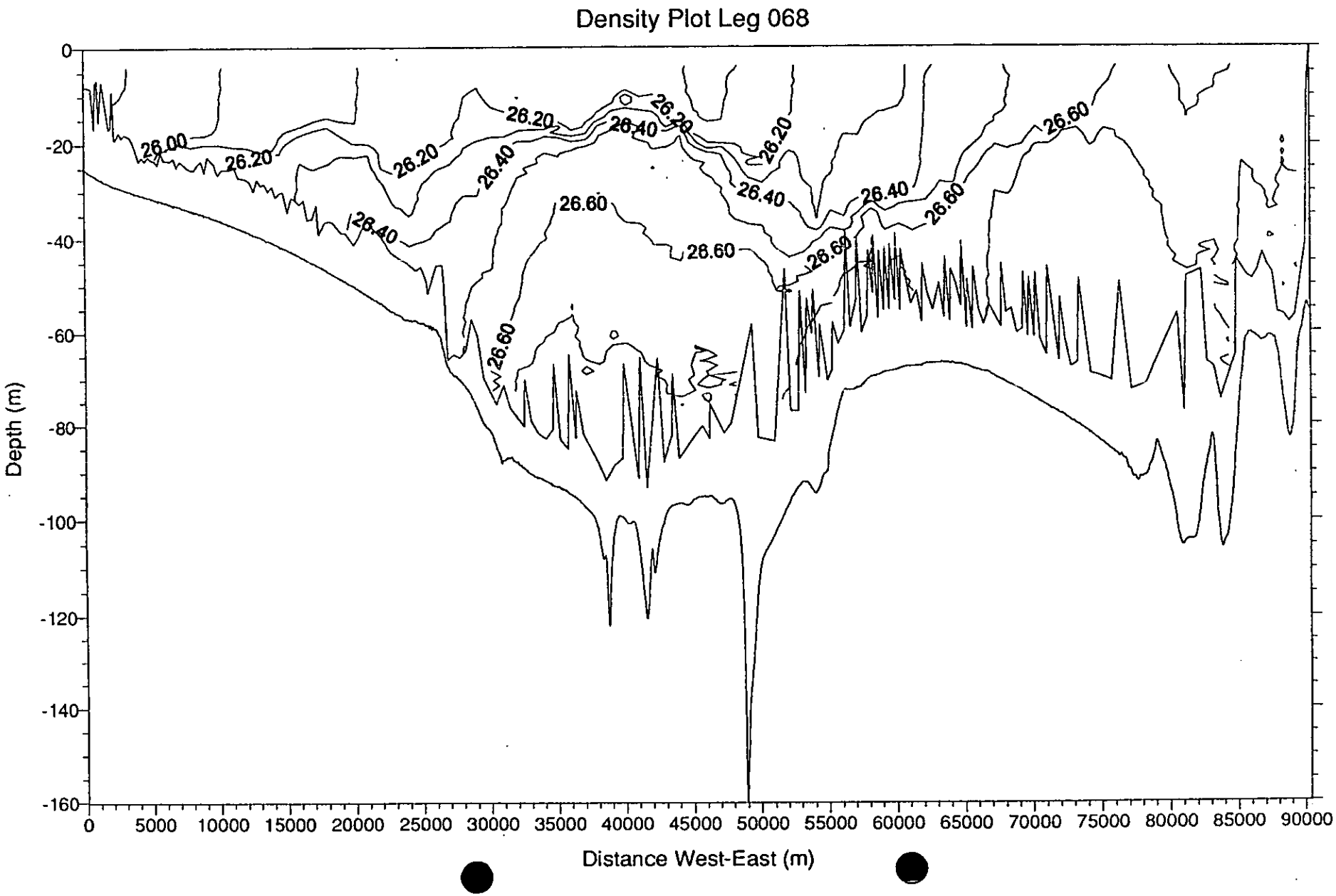


Fig 5a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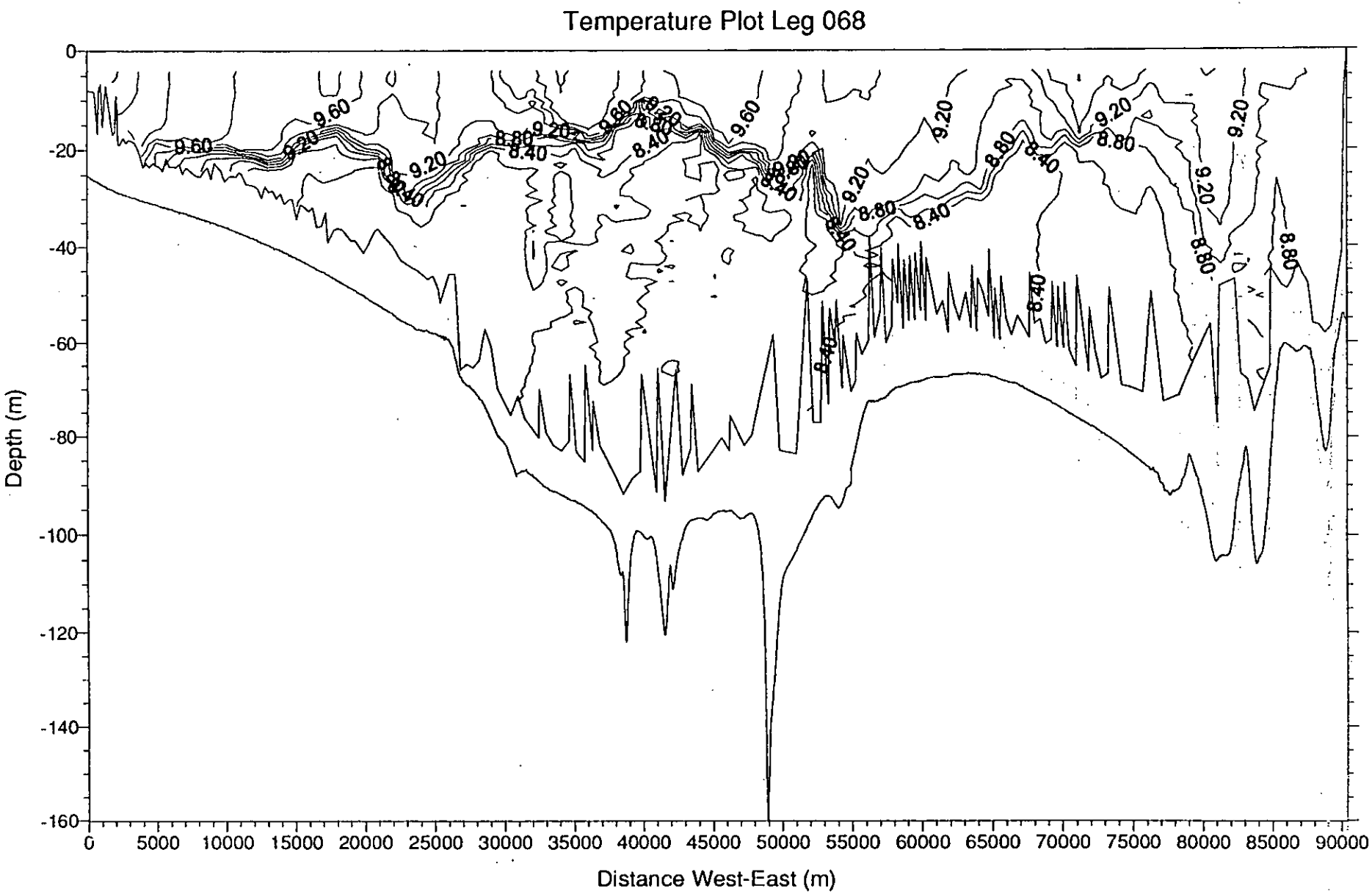
Depth (m)
0
-20
-40
-60
-80
-100
-120
-140
-160
26.00
26.20
26.40
26.60
0
5000
10000
15000
20000
25000
30000
35000
40000
45000
50000
55000
60000
65000
70000
75000
80000
85000
90000
Distance West-East (m)

Fig 5b


Temperature Plot Leg 068
Depth (m)
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-60
-80
-100
-120
-140
-160
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9.20
8.80
8.40
0
5000
10000
15000
20000
25000
30000
35000
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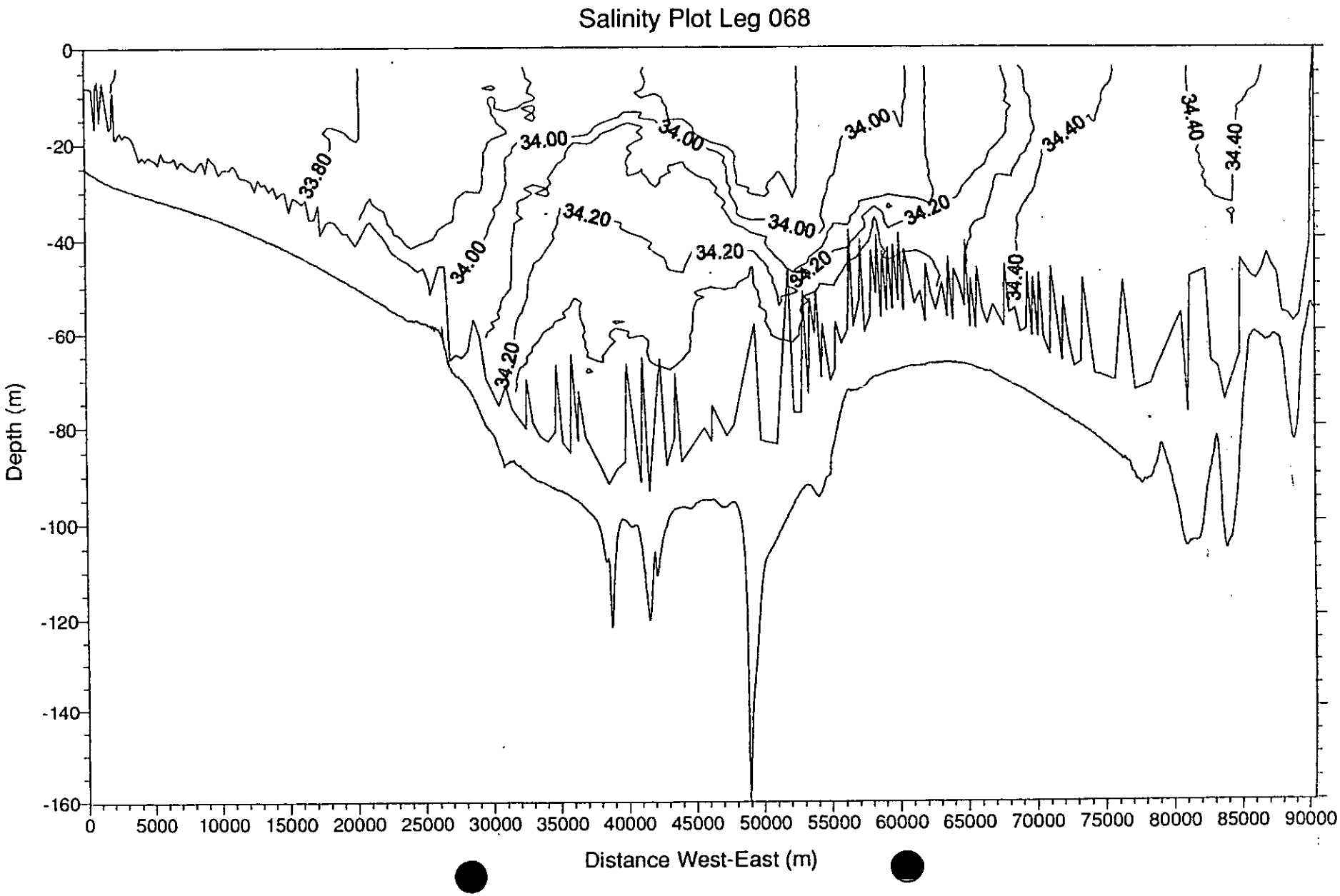
75000
80000
85000
90000
Distance West-East (m)

Fig 5c


Salinity Plot Leg 068
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-60
-80
-100
-120
-140
-160
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34.00
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0
5000
10000
15000
20000
25000
30000
35000
40000
45000
50000
55000
60000
65000
70000
75000
80000
85000
90000
Distance West-East (m)