MINISTRY OF AGRICULTURE, FISHERIES AND FOOD
FISHERIES LABORATORY, LOWESTOFT, SUFFOLK NR33 OHT, ENGLAND

1994 RESEARCH VESSEL PROGRAMME

REPORT: RV CIROLANA: CRUISE 5

STAFF:

J Nichols (SIC)
K Brander (from 25 April)
D Mills
L Woolner
A Winpenny
G Haynes
L Fernand (from 25 April)
J Read (25-27 April)
A Reeve (from 25 April)
P King
G Kennaway (NHM 19 April -3 May)
O Oosterhuis (NIOZ 19-25 April)
M Laan (NIOZ 19-25 April)
E Olsen (GMI 21-23 April and 3-4 May)
I Herdiman (GMI 3-4 May)

DURATION: 19 April-11 May

LOCATION: Irish Sea via northern North Sea and Malin Shelf.

AIMS:

1. Survey plankton populations and hydrographic structure from the Malin Shelf to the North Channel for evidence of transport of copepods into the Irish Sea.

2. Test new Scanfish and Optical Plankton Counter (OPC) undulator systems and compare with Dutch electronic particle counter.

3. Deploy moored current meters for studies of water movements and production in the northern Irish Sea.

4. Sample fish eggs and larvae in relation to physical domains in the northern Irish Sea for growth studies.

5. Continuous monitoring of surface chlorophyll and regular measurement of column primary production in relation to modelling studies.

6. Observation and recording of live phytoplankton and grazing using high magnification video.

7. Collect copepod samples from the northern North Sea, west of Scotland, Malin Shelf and Irish Sea for studies of genetic origins.

NARRATIVE:

Cirolana sailed from Lowestoft at 1500 BST on 19 April and steamed to the Dogger Bank to sample for Calanus on 20 April. Erik Olsen (GMI, Denmark - maker of the Scanfish) was picked up off Aberdeen on 21 April. The Dutch particle counter and Focal OPCs were deployed together while the Scanfish was being rigged and tested. 21 and 22 April were spent on performance trails with Scanfish and net sampling for Calanus. Olsen was put ashore in Stornaway on 23 April.

Scanfish survey legs and plankton sampling with the Longhurst Hardy Plankton Recorder (LHPR) were carried out west of Scotland on 24 April and the ship then steamed into the Irish Sea. Fernand, Oosterhuis and Laan disembarked at Port Erin and Brander, Read and Reeve joined the ship. Two moorings were laid on 26 April in poor weather. A third was recovered and relaid near Clogher Head on 27 April and J Read was put ashore at Douglas.

A series of E-W Scanfish survey lines was begun on 28 April from Belfast Lough working south and these continued until 1 May with several interruptions due to cable connector and software problems, culminating in failure to download control information to the Scanfish. The May Day holiday meant that contact with GMI was slow and the day was mainly spent sampling for phytoplankton and sediment in Dundalk Bay. A high speed tow net (HSTN) survey for fish larvae was carried out on 2 May and arrangements were made for GMI personnel to fly over from Denmark to check out the problem with the Scanfish. Olsen and Herdiman were picked up from Port Erin on 3 May and Kennaway left the ship. They repaired the Scanfish in a few minutes by replacing a defective microprocessor. The Scanfish was tested over night and they were put ashore again in Douglas on 4 May.

Work then continued with few breaks using Scanfish, LHPR, rosette and vertical ring net until 2030 on 8 May, when the ship sailed for Lowestoft.

RESULTS:

1. Three LHPR tows and Scanfish survey lines were worked from west of Stanton Bank in towards the North Channel. A series of eleven E-W Scanfish survey lines from the entrance to Belfast Lough south to 53 30'N gave a very detailed picture of the hydrographic structure and particle distribution for the north-western Irish Sea and zooplankton net samples were taken to identify the particle size peaks. A preliminary analysis of the hydrographic and plankton data shows no evidence of incursion of water or plankton through the North Channel.

2. The Scanfish and OPC were thoroughly tested and used during the cruise, with a total deployment time of 80 hours at 7 knots. Launching and recovering over the side turned out to be very easy at 3 knots and the system can probably be used in sea conditions which allow a steady speed of 6 knots or more to be maintained. There are some shortcomings with the software, documentation, data logging and depth performance, but the system was working reliably by the end of the cruise and producing very good quality data on temperature, salinity, fluorescence (from the GMI

instruments logged through Scanfish) and light attenuation and particle counts (from the OPC).

The sampling rate and detail which the system provides can be judged by comparing results Figure 2 with a transect in the north-western Irish Sea carried out using the Undulating Oceanographic Recorder (UOR) and rosette on 9 May 1992 (Figure 3). The 32 mile transect was sampled 5 times down to 80 m with the rosette in 6 hours; the UOR did 32 dives (64 oblique casts) between 10 and 35 m in 4 hours; Scanfish did 320 oblique cast between 3 and 65 m in 4.5 hours. Data are logged from the Scanfish at a rate of about 250K bytes h^{-1} (with a 1 second log interval) and from the OPC at about 400K bytes h^{-1}. The OPC was completely trouble-free throughout the cruise. Twelve comparative deployments of the OPC and two Dutch particle counters were carried out, with both mounted together on a towed body.

A full report on the performance of the Scanfish is being prepared, with details of the improvements required in the software and logging. The performance and reliability were improved by getting rid of the cable loop in front of the wing and connecting the towing able directly into the Scanfish underwater control unit. Further discussions will need to take place about the performance, but the makers have given us excellent and effective support in getting the equipment operational.

GMI CTD and fluorometer was compared directly with the Guildline and Aquatrakka on two occasions, by lowering them simultaneously from opposite sides of the ship. The values were very close, but from the shapes of the temperature and salinity profiles it appeared that the pressure (i.e. depth) values may differ by as much as 5 m at 100 m depth. A subsequent deployment of the OPC on the LHPR with a different Guildline showed good agreement, which suggests that the problem lies with the CTD on the rosette. Since this was the primary instrument used to record depth during all bottle sampling it needs to be checked.

3. Moorings were laid at three sites as part of the joint programme with AEP3, DANI and UCNW. The only problem which arose during the deployments was that a new NAS1 nitrate analyser did not work, so the one recovered from the mooring had to be rapidly serviced and redeployed. The eight day record from this instrument seems to be good.

4. In addition to the LHPR tows, 14 HSTN samples and numerous ring net samples were taken for fish larvae distribution and growth studies.

5. Surface chlorophyll fluorescence was monitored continuously and vertical profiles of chlorophyll fluorescence were obtained at each rosette station, but no primary production measurements were made due to malfunctioning of the endpoint detector system. Water samples for determination of chlorophyll concentration were collected from the rosette sampler at several depths at 30 stations during the cruise and further samples were collected from the continuous seawater supply.

One hundred and fifty-three samples were taken from both rosette and continuous flow system for nitrate, phosphate, ammonia and nitrite analysis on board. Samples were preserved for analysis of silicate. One hundred and forty-seven salinity samples were

taken from the rosette and 102 samples from the continuous flow system for calibration purposes.

6. A number of water samples were taken for direct observation of live phytoplankton, but the level of phytoplankton activity was low during the sampling period. Six settling velocity tube deployments were made and phytoplankton samples taken from them at regular intervals. Samples of near surface interstitial protozoa were taken from 3 sites using a Craib corer.

7. Five copepod samples from the northern North Sea and west of Scotland and a further 3 from the northern Irish Sea were preserved for genetic analysis by Dr A Bucklin at the University of Rhode Island and were given to Dr G Kleppel in Port Erin for delivery.

K Brander
25 May 1994

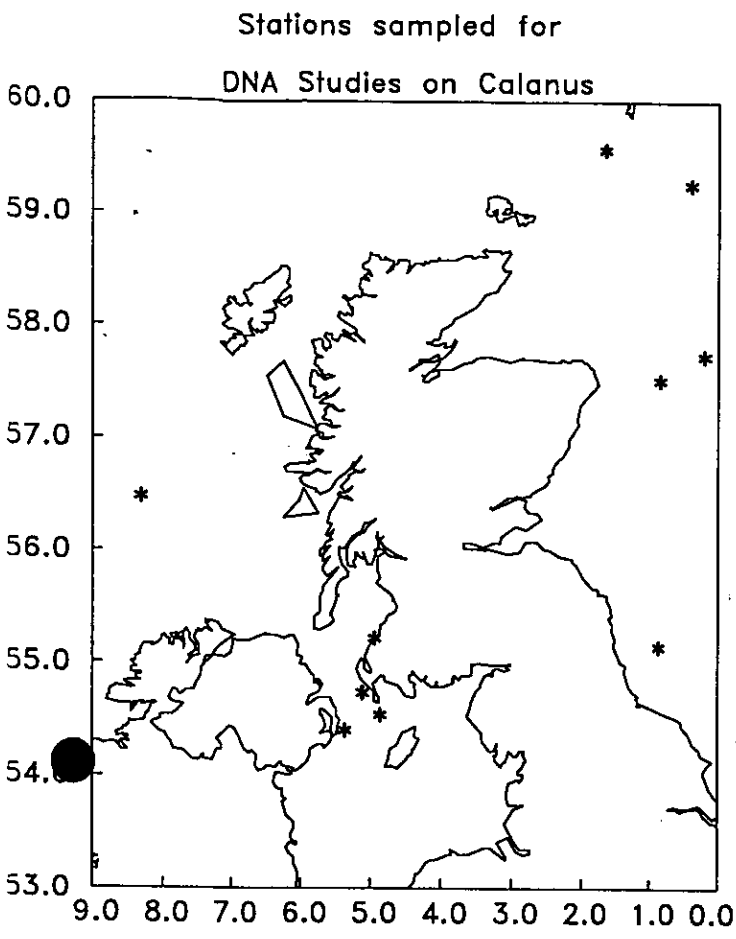
SEEN IN DRAFT: BC, JH

INITIALLED: JWH

DISTRIBUTION:

Basic list +
J Nichols
K Brander
D Mills
L Woolner
A Winpenny
G Haynes
L Fernand
J Read
A Reeve
P King
G Kennaway
O Oosterhuis
M Laan
E Olsen
I Herdiman

Fig 1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DNA Studies on Calanus
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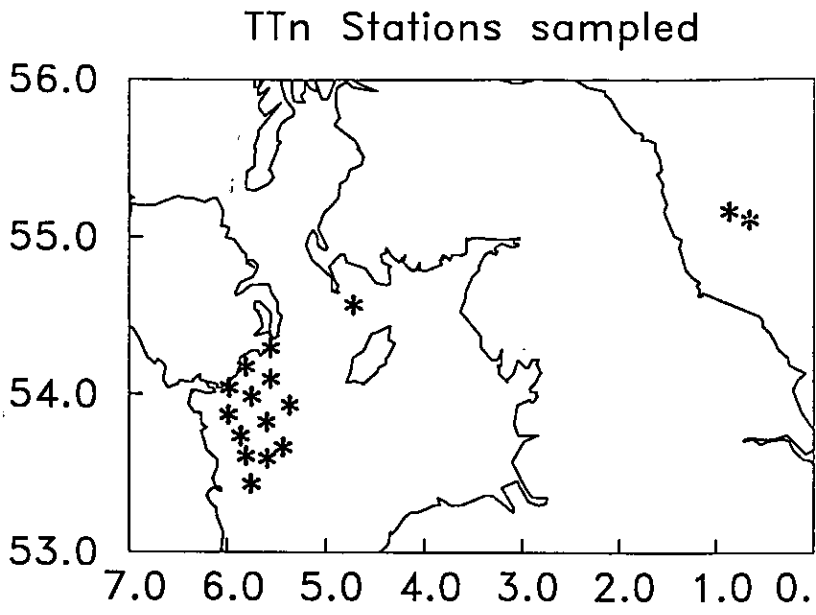
59.0
58.0
57.0
56.0
55.0
54.
53.0
9.0 8.0 7.0 6.0 5.0 4.0 3.0 2.0 1.0 0.0


TTn Stations sampled
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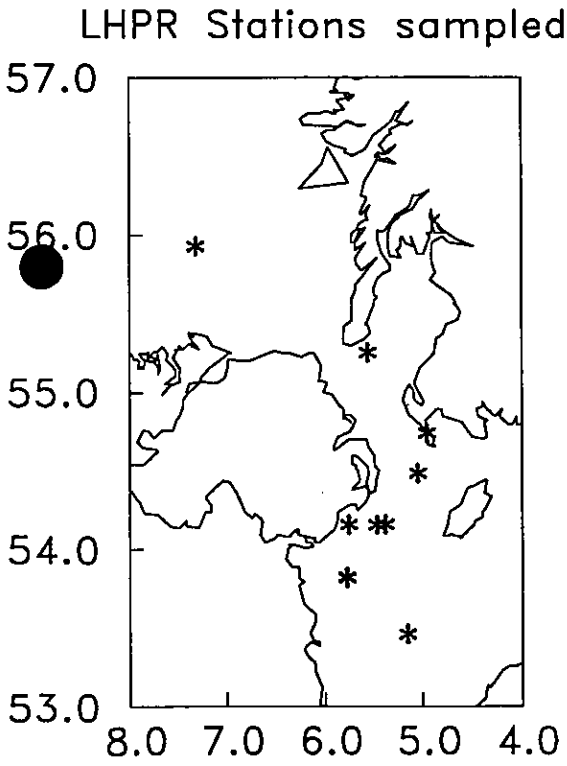
55.0
54.0
53.0
7.0 6.0 5.0 4.0 3.0 2.0 1.0 0.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55.0
54.0
53.0
8.0 7.0 6.0 5.0 4.0

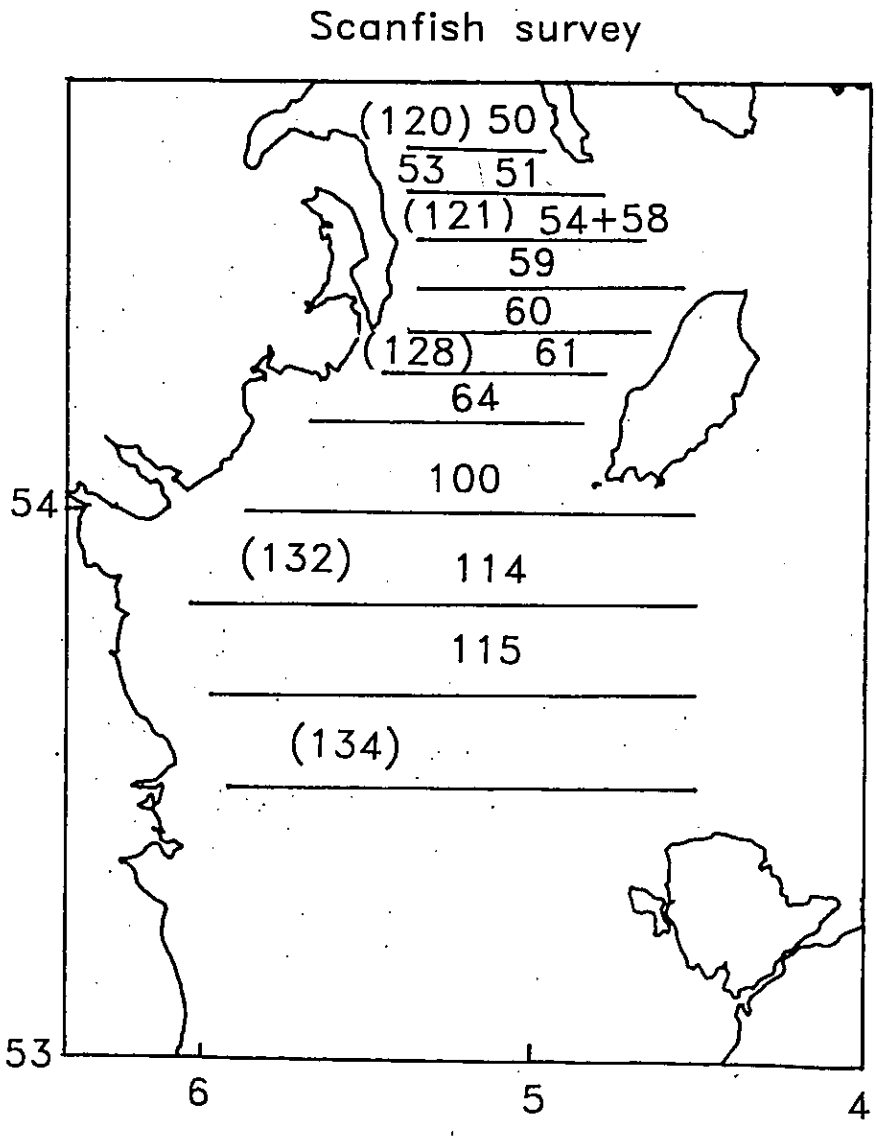
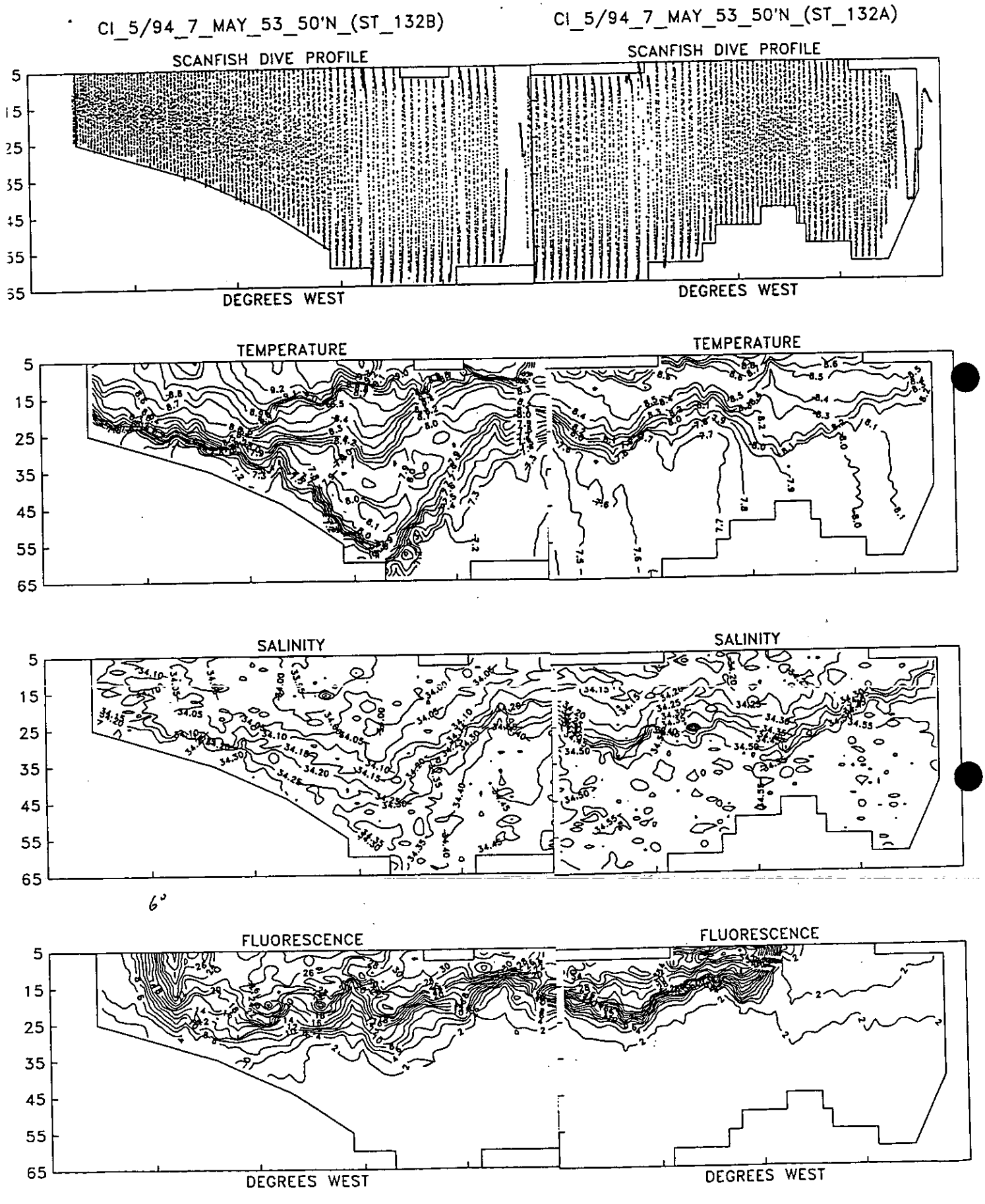

Scanfish survey
(120) 50
53 51
(121) 54+58
59
60
(128) 61
64
100
(132) 114
115
(134)
54
53
6
5
4

Fig 2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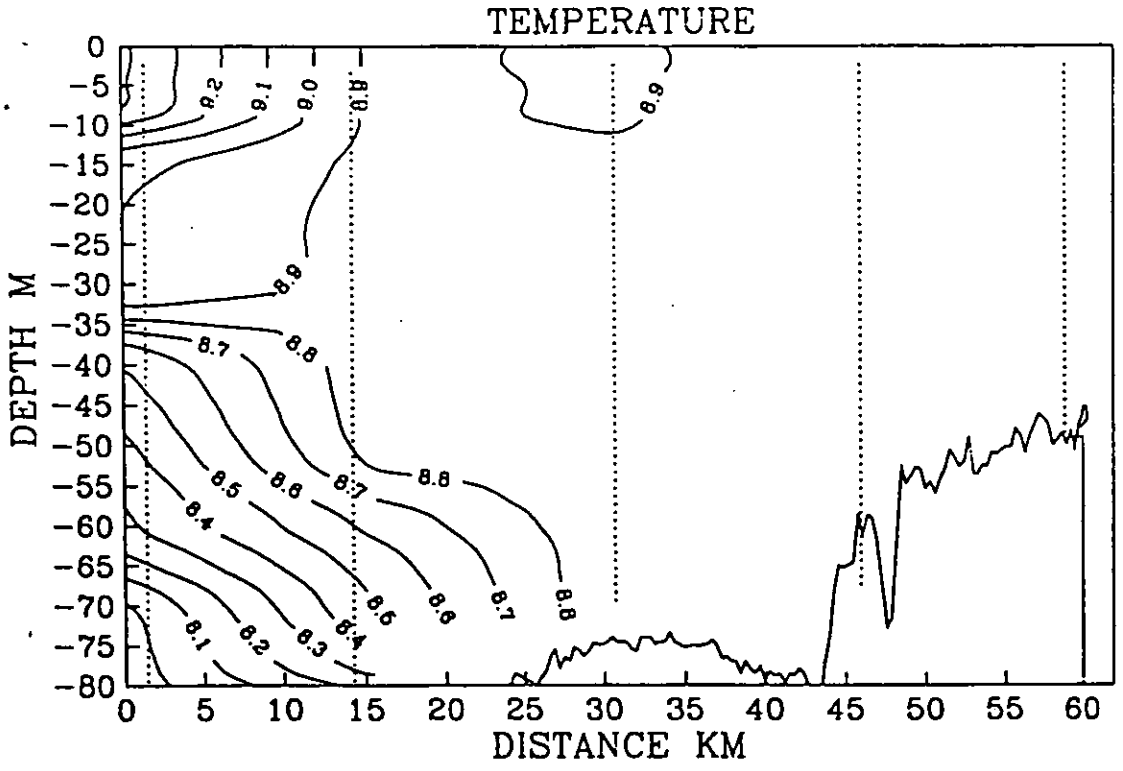
CI_5/94_7_MAY_53_50'N_(ST_132A)
SCANFISH DIVE PROFILE
SCANFISH DIVE PROFILE
DEGREES WEST
DEGREES WEST
TEMPERATURE
TEMPERATURE
SALINITY
SALINITY
FLUORESCENCE
FLUORESCENCE
DEGREES WEST
DEGREES WEST
5
15
25
35
45
55
65

6°

CI 5/92 ROSETTE

9 MAY 1992

Fig 3



UOR 9 MAY 1992