

VESSEL RRS JOHN MURRAY

CRUISE PERIOD 11-21 August 1980

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ITINERARY Sketch charts and station lists are attached.

Sunday 10 August Travel to Barry. Load and tested equipment.

Monday 11 August Lock out 0900 BST. Commence monitoring track 1100, proceed to St. 33, 32, 31, 17, 30, 29, 28, 40, 39, 38 for zooplankton hauls with continuous measurements of salinity, temperature, turbidity, chlorophyll fluorescence, nitrate, nitrite, phosphate, silicate, ammonia and incident radiation. ¹⁴C-micro heterotrophic incubations at St 12, 18, 22, 28, 33. DCMU fluorescence were also carried out.

Tuesday 12 August Plankton tows abandoned at St. 37, 25 because of heavy seas. Proceeded to St. 24, 23, 22, 21, 35, 18, 16, 14, 13, 12, along north Devon monitoring track.

Wednesday 13 August Arrive at Avonmouth 0435 BST (L.W) proceed downestuary to St. 11, 10, completed monitoring track, off Barry 10.15. Proceed to Scarweather Light; tested the pressure sensor on Net Monitor by vertical hydrocasts on davit winch. Proceeded to St. 25 and 37 for plankton tows, then Carmarthen Bay (2030). Equipment preparation for measurement of C/B grid state variables. Heave to overnight.

Thursday 14 August 0310 commence C/B grid at St. 29, proceed to 28, 27, ... clear danger zone area (St. 16) by 0800 BST then st. 15, 14... 1, followed by westerly approach stations 32, 33, 34, 35, 36. (See chart) completed 1430 (see methods) Experimental systems (coring N₂ glove box, EXPRO, MULEX etc...) prepared.

Friday 15 August Coring at St. 2 (0920-1020), St. 18 (1200-1220). Experiments on nitrogen preference index. Prelim. Vertical light profiling St. 16. Chemical analyses of DON, DOP and urea from C/B grid. Assembly of MULEX and EXPRO. Overnight in C/B.

Saturday 16 August Multiple coring St. 31 0340-0415. Zooplankton hand tows at St. 25 (size fraction, 4,3: Zoea, mysids, unidentified fish and jellyfish). Commence MULEX 'A' 0930. Large volume water sampling for $^{14}\text{C}/^{15}\text{N}$ EXPRO incubations and Std Primary Production at St. 25 and 29 (0805). Coring St 29 (0914) and St. 28 (1008) and St. 31 (1600) for benthic respiration and pore water chemistry. Chemical analyses of excretion products, pore waters and incubation waters completed 2330.

Sunday 17 August Large volume water sampling for $^{14}\text{C}/^{15}\text{N}$ EXPRO and standard primary production studies. St. 6 (0300) and St. 2 (0400). Multiple coring and zooplankton hand hauls at St. 2 (for size fraction 1,2 Othonia, Temora, Acartia). Commence MULEX 'B' 0830. Launching of Zodiac and shore party off Tenby to pick up C. George. Coring at St 25 (1115) and St. 31 (1400). Commence Knudson coring for benthos. Wire parted - Khudsen corer lost (1414). Naturalist Dredging for surface macrobenthos. C. George disembark at Tenby 1800. Completed experiment at 2300. Overnight anchor off Saundersfoot.

Monday 18 August 0430 Coring St. 16. Zooplankton hand netting for MULEX 'C' St. 1 (0637). St. 2 coring 1108. Production: Chlora transect. Proceed to Tenby Roads pick up C. George and Day Grab. St. 25 (1430) Vertical light profiling. St. 31 (1720) Day Grab sediment sampling then Craib coring. Return to Tenby Roads to disembark C. George. Overnight anchorage at Saundersfoot.

Tuesday 19 August St 31 (0511) Coring St. 16 (0906) launch free floating Dhan Buoy into flooding tide. Lagrangian radar and Decca Tracking of Dhan Buoy until 1630. Vertical light profiling at St. 16, 8, 6, 7, 17, 18, 19, 20, 22, 28, 31 with coring at St. 6. Zodiac transect in Barry Inlet not possible because of exposed westerly winds. Dhan Buoy retrieved near Helwick Light at 1630. Overnight anchorage at Saundersfoot.

Wednesday 20 August 0300 Start chemical transect across C/B grid St. 15 - Burry Holmes - Move to Rhossily Bay, Zodiac transect to Burry Port abandoned because sea state and mist. Proceed with peripheral shallow water track to St. 31. Coring St. 31 (0715). Vertical light profiling St. 25, 24, 14, 15, 11, 1. Steam back to Barry. Packing of scientific gear. Lock in Barry 2230.

Thursday 21 August Unload equipment and transfer into vehicles (1000-1200). Cruise debriefing. Travel to Plymouth arrive 1630.

Friday 22 August Unloaded scientific gear at IMER.

OBJECTIVES

- a) To continue the series of five "MULEX" cruises designed to quantify nutrient cycling processes in Carmarthen Bay, including:
- 1) Nutrient excretion rates of the zooplankton assemblage
 - 2) Nutrient demand rates by the phytoplankton assemblage
 - 3) Nutrient regeneration rates by the benthos
 - 4) Nutrient upflux from sediments
 - 5) Nitrification/denitrification processes by bacteria
 - 6) Nutrient advection and diffusion from the surrounding regions of Carmarthen Bay
- b) To continue the monitoring of the Bristol Channel and Severn Estuary.

OUTLINE OF PROCEDURES AND METHODS

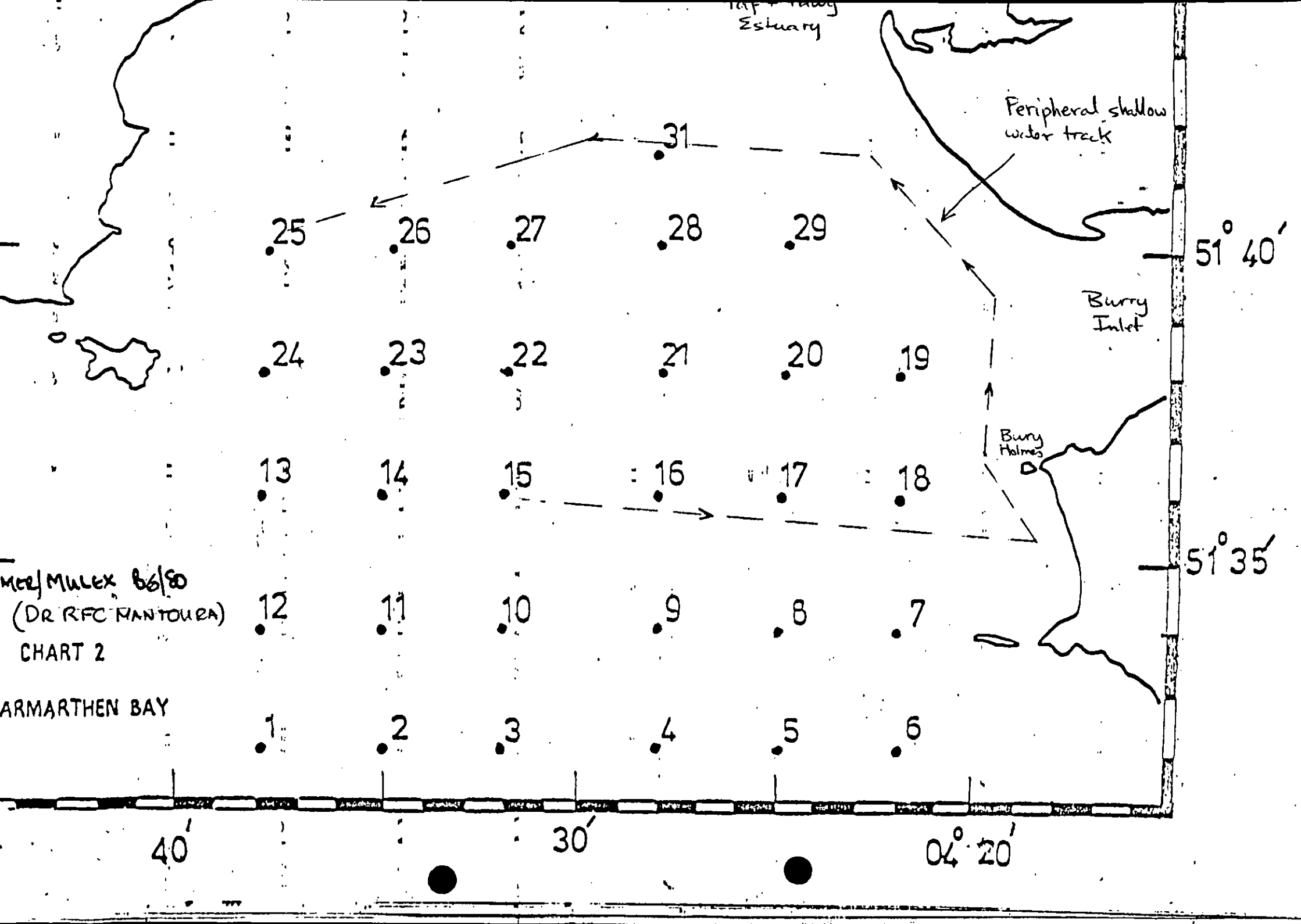
- a) The following state variables were measured along the 29 station grid in Carmarthen Bay and 6 stations on the approach leg (Chart 2). Temperature, turbidity, salinity, fluorescence, microseston, POC, PON, Chlorophyll-a, phaeopigments, nitrate, nitrite, silicate, phosphate, ammonia, primary amines, urea, DOC, DON, DOP. Double-oblique hauls with the 30" Lowestoft sampler equipped with 100 um and 280 um nets were carried out at alternate stations, and counts of nitrifying and ammonifying bacteria every third station. Incident photosynthetically-active radiation (PAR) was measured continuously; seventeen vertical profiles of PAR and particulates were carried out.
- b) Shipboard experimental rate measurements of plankton, benthos sediments and water samples from CB included:
- i) Multiple excretion experiments (MULEX) carried out on four size classes of zooplankton to measure respiration and excretion rates of NH_3 , R.NH_2 , PO_4 , SiO_2 , DOC, DON and DOP.
 - ii) Primary production and nutrient demand and nitrogen preference rates were measured by standard and experimental production (EXPRO) techniques using $^{14}\text{C-CO}_3$, $^{15}\text{N-NH}_3$ and $^{15}\text{N-NO}_3$.
 - iii) Bacterial nutrient remineralisation rates were determined using ^{15}N isotope dilution techniques.
 - iv) Benthic nutrient regeneration rates were determined using onboard isothermal incubation of cores and measurement of release rates of NH_3 , NO_3 and O_2 .
 - v) Estimates of nutrient advection and diffusion in CB regions will be carried out from measurements made at stations within and surrounding CB (Chart 3).

EQUIPMENT PERFORMANCE AND OVERALL CRUISE SUCCESS

All IMER equipment performed well at sea with the exceptions of (a) Lowestoft Net Monitor depth sensor (b) 0-100 ppp Partech Optical head damaged during vertical profiling. (c) one of the Orion O_2 electrodes malfunctioned. Manpower shortage at RVS meant that the provision of equipment requested from RVS was left to 1 hour before the start of the cruise at which time, it was too late to replace or repair these items found to be damaged at RVS.

Day grab and N₂ cylinder rack was not provided. Attempts to transect the very shallow Burry Inlet using a ship-launched Zodiac were twice foiled by adverse weather. A coordinated land based deployment of small crafts and scientists will be considered in the future cruises. However, low water peripheral transects through low salinity plumes from Burry Inlet and the Taf-Tavy Estuaries provided useful nutrients inputs data for C/B. EXPRO ventilation and illumination system worked well. Coring success rate was high and overall objectives of the programme were realised, despite persistent swells giving rise to uncomfortable working conditions.

Prepared by: R. F. C. Mantoura
Approved by: *B. L. Bayne*
Date: 28 August 1980



CRUISE : 86.180
(See R.F.C. MANTOURA)

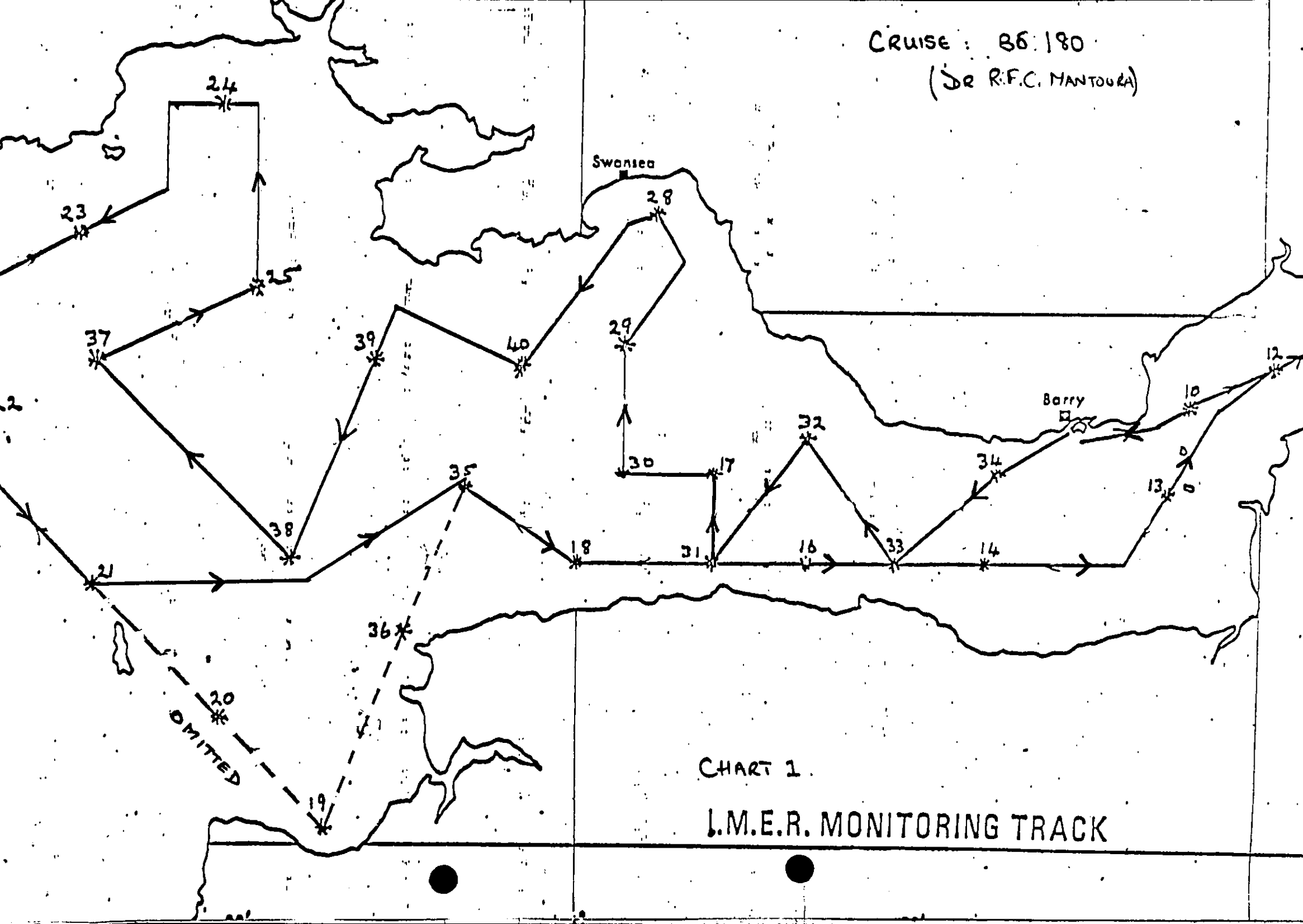


CHART 1.

L.M.E.R. MONITORING TRACK

APPROXIMATE MID-TOW POSITIONS
OF PLANKTON HAULS

(modified as of B2/80, 14 March 1980)

St. No.	Lat. N.	Long. W.
P 10	51°24.0'	03°06.0'
P 11	51°30.0'	02°47.0'
P 12	51°26.7'	02°59.0'
P 13	51°20.0'	03°08.0'
P 14	51°16.0'	03°24.0'
P 16	51°16.0'	03°40.0'
P 17	51°21.0'	03°48.0'
P 18	51°16.0'	04°00'
P 19	51°01.0'	04°22.0'
P 20	51°07.0'	04°31.0'
P 21	51°14.5'	04°42.5'
P 22	51°24.0'	04°52.0'
P 23	51°34.0'	04°42.0'
P 24	51°41.0'	04°31.0'
P 25	51°31.0'	04°28.0'
P 28	51°35.0'	03°53.0'
P 29	51°28.0'	03°56.0'
P 30	51°21.0'	03°56.0'
P 31	51°16.0'	03°48.0'
P 32	51°23.0'	03°40.0'
P 33	51°16.0'	03°32.0'
P 34	51°21.0'	03°23.5'
P 35	51°20.0'	04°10.0'
P 36	51°17.0'	04°15.0'
P 37	51°27.0'	04°41.0'
P 38	51°16.0'	04°25.0'
P 39	51°28.0'	04°17.0'
P 40	51°27.0'	04°06.0'

Lat.N.

Long.W

1	51° 32' 0"	04° 38' 0"
2	51° 32' 0"	04° 34' 8"
3	51° 32' 0"	04° 32' 6"
4	51° 32' 0"	04° 28' 4"
5	51° 32' 0"	04° 25' 2"
6	51° 32' 0"	04° 22' 0"
7	51° 34' 0"	04° 22' 0"
8	51° 34' 0"	04° 25' 2"
9	51° 34' 0"	04° 28' 4"
10	51° 34' 0"	04° 32' 6"
11	51° 34' 0"	04° 35' 8"
12	51° 34' 0"	04° 38' 0"
13	51° 36' 0"	04° 38' 0"
14	51° 36' 0"	04° 34' 8"
15	51° 36' 0"	04° 32' 6"
16	51° 36' 0"	04° 28' 4"
17	51° 36' 0"	04° 25' 2"
18	51° 36' 0"	04° 22' 0"
19	51° 38' 0"	04° 22' 0"
20	51° 38' 0"	04° 25' 2"
21	51° 38' 0"	04° 28' 4"
22	51° 38' 0"	04° 32' 6"
23	51° 38' 0"	04° 34' 8"
24	51° 38' 0"	04° 38' 0"
25	51° 40' 0"	04° 38' 0"
26	51° 40' 0"	04° 34' 8"
27	51° 40' 0"	04° 32' 6"
28	51° 40' 0"	04° 28' 4"
29	51° 40' 0"	04° 25' 2"