B.O.D.S.
(MRS EDWARDS)

I.O.S.

RRS DISCOVERY CRUISE 61

30 MARCH – 16 MAY 1974

PLANKTON INVESTIGATIONS AT 44°N 13°W

CRUISE REPORT NO. 10

1974

INSTITUTE OF
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Institute of Oceanographic Sciences,
Wormley,
Godalming,
Surrey.

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Scientific Personnel

R. Aldred	IOS	Left La Coruna
M.V. Angel	IOS	Principal Scientist
J. Banham	IOS	
F. Bilimoria	IOS	Joined in La Coruna
J. Bonfiglio	QMC	
P. Burkill	SUDO	" " "
E. Darlington	IOS	Left La Coruna
M. Fasham	IOS	
A. Gooday	IOS	
Miss H. Grigg	SMBA	Joined La Coruna
M. Harris	IOS	" " "
Miss E. Head	QMC	Left " "
P. Herring	IOS	
P. James	IOS	
N. Merrett	IOS	
Miss A. Moguilevsky	Argentina	
P. Parks	OSF	Joined La Coruna
C. Pattinson	LUDO	
G. Phillips	IOS	Joined La Coruna
P.R. Pugh	IOS	
H. Roe	IOS	
M. Sawkins	IOS	Left La Coruna
D. Shale	IOS	
J. Sherwood	IOS	" " "
Mrs R. Sherwood	IOS	" " "
R. Wild	IOS	

Abbreviations

RMT 1	1m² Rectangular Midwater Trawl (0.33mm mesh size).
RMT 8	8m² " " " (5mm mesh size). These nets were always used in combination.
RMT8/25HS	8m² Rectangular Midwater Trawl (25mm mesh size) high speed net.
NN	Neuston Net.
NN3	3 stage Neuston Net.
BN2.4/5	2.4m² Bottom net (5mm mesh size).
TSD	Temperature, salinity, depth probe.
WB7.4	7.4 litre water bottle.
CM	Current Meter.
PUMP	Pump sampler.
LMD	Photo-diode Light Meter
LMM	Photo-multiplier Light Meter
FL	Fluorometer
MS	Multi-sampler
BCAM	Bottom Camera.

Introduction

Cruise 61 aimed to investigate the rates of change in community structure and the growth and development rates of the mesopelagic fauna south of the Bay of Biscay. During previous cruises day and night series at approximately 10° intervals of latitude had given us a knowledge of the vertical distribution of plankton and micronekton in the top 2000m of the N.E. Atlantic. Each series consisted of single observations at each depth. The interpretation of the data needed a knowledge of the rates of temporal change in fauna, both diurnally and over longer periods of about a month. The cruise was timed to coincide with the time of the spring bloom when the greatest rates of change in community structure and in growth rates might be expected to occur. Much of the cruise was spent in the region of 44°N 13°W repeatedly sampling the 300-600m zone and 48 hours of repeated one hour tows at 100m, 250m, 450m and 600m to study the timing of migration through the 300-600m horizon.

Bottom sampling was carried out on Galicia Bank, and during a spell of bad weather, the ship steamed south and comparative samples were collected at 40°N 11°W. Experiments were carried out on the microstructure of the surface 100m of fluorescence, nutrients, temperature and salinity. Several very deep tows were made down to 4000m with the combination net. Samples were also collected for SMBA, and material was deep frozen for dry weight and biochemical determination.

Itinerary

Sailed from Barry	1000'A'/30 March
Arrived 44°N 13°W	0042Z/2 April
Left 44°N 13°W	0910Z/21 April
Arrived La Coruna	0754Z/22 April
Left La Coruna	1400'A'/24 April
Arrived 44°N 13°W	0900Z/25 April
Left 44°N 13°W	2330Z/1 May
Arrived 40°N 12°W	1700Z/3 May
Left 40°N 12°W	0530Z/5 May
Arrived Galicia Bank region	1800Z/5 May
Left " " "	1640Z/8May
Arrived 44°N 13°W	0730Z/9 May
Left 44°N 13°W	2245Z/12 May
Arrived Barry	1000Z/16 May

The ship sailed from Barry at 1000hrs on 30th March. The PES fish was streamed in Barry Roads and that evening clocks were retarded one hour to GMT. Throughout the cruise all ship's times were in GMT. At 0800 31st March echo-sounding began and neuston net tows were started, made every four hours until we reached the main cruise position at 44°N 13°W. The majority of the sampling was concentrated within a one degree square centred around this position.

The ship reached the position at 0042/2 April and combination netting began. Conditions were difficult with 20-25 knot winds and a heavy swell. Both the ship-side staff and the scientists were inexperienced or rusty in handling the gear which gave rise to some anxiety, also the monitors had a certain amount of teething troubles. By the end of the 4 April, the monitor faults had been ironed out, the first series of repeat hauls between 300-600m had been completed with an associated TSD to 1000m. On the night of 5/6 April when a mini series of one hour tows over 100m depth horizons to 1000m had been completed, conditions were calm enough to make the first pump experiment. The results of this initial experiment were so encouraging that it was planned to several more. On the morning of the 6 April the first of the 48 hour series of one hour tows began. This series was with the nets within ±10m of 100m, and was taken with the

objective of following the movement of animals through this narrow depth horizon during vertical migration. The series was completed on the morning of 8th April and the second series of repeated tows was begun. During 9 April measurements of the fishing angle of the combination net were made using an E.M. log mounted on the side wires. These were followed by some night-time deep tows and on the morning of the 10 April the second 48 hour series, this time at 250m, was started. The series was completed on the 12th. After some night-time deep tows the third 48 hour series at 600m was carried out. The third repeat series was completed on 15/16 April. On the night of the 16th after an inter-flow meter calibration and a deep TSD to 3000m, an attempt at a further pump experiment failed because of problems with the computer. So the rest of the night was occupied with trials of the high speed RMT 8. The fourth 48 hour series at 450m started on 17 April. The fourth repeat series was carried out on the 19/20 April and the final twenty-four hours was occupied with two very deep hauls and a further flow meter intercalibration. The ship left the position for La Coruna at 0900/21 and arrived at 0800/22.

In La Coruna Mr. Aldred, Mr. Darlington, Miss Head, Mr. Sawkins and Mr and Mrs Sherwood left the ship, and Mr. Bilimoria, Miss Grigg, Mr. Harris Mr. Parks and Mr. Phillips joined. The ship was officially visited by the U.K. chargé d'affaires in Madrid, Commander Baker and a party of Spanish scientists including the Directors of the Instituto de Investigaciones Pesqueras at Vigo, and the Laboratorio de la Costa Noroccidental at La Coruna. The ship left La Coruna at 1400/24 April.

On reaching the position again the programme restarted with a TSD, water bottle sampling and light profile measurements. The fifth series of repeat hauls was begun on the night of 25 April. This was followed by a deep tow the following night, and fluorescence, nutrient and light profiles on the morning of the 27th. Sampling for SMBA was carried out during the rest of the day, and the following night a 3500-3000m sample was collected. Throughout the day of 28th a series of four two-hour tows at 800m was made specifically for examining the daytime feeding of large decapods at that depth. The following night a ten hour tow at 4000-3500m was achieved. Further hauls for SMBA were collected on the 29/30th and the sixth series of repeat hauls was started on the 30th. The ship left for Galicia Bank on the night of 1 May. On arrival at Galicia Bank the weather had deteriorated and after lying hove to for twelve hours, it was decided to steam south to the Torre Seamount in the hope of clearing the bad conditions. At 0918/3May the ship hove to for minor storm damage repairs and a short wave measurement showed wave heights of up to 31 feet. The ship arrived at the Torre Seamount at 1650/3 May and began an echo-sounding survey to search for a flat bottom for bottom netting. Nothing suitable was found. By 0900/4 May conditions had ameliorated and twenty hours of combination netting and a light meter observation provided comparative material with the 44°N 13°W observations. There were marked differences, the water was clearer and the distributions of animals appeared to be about 100m deeper; the ctenophore Pleurobrachia was present in swarms. We left the area of the Torre Seamount at 0540/5 May and headed towards the Galicia Bank. As soon as we encountered a bottom suitable for bottom-netting we began sampling. Attempts were also made to use the bottom camera, but were mostly frustrated by mechanical failure. Bottom netting continued at various positions and depths over the bank until 1640/8 May interrupted only by an inter-calibration of the two light meter systems by moonlight and two pump experiments; one which was spoilt near its completion by the rising wind increasing the drag on the tube breaking it from its mounting on the TSD, the second was successful.

The ship headed back to 44°N 13°W and further towing trials with the high speed RMT 8 were carried out on the way. The position was reached at 0730/9 May but by then the weather had again deteriorated and the ship hove to. At 1130 conditions had moderated and a net was put out, but the haul was terminated early when yet again the conditions rapidly worsened. The ship remained hove to until 0630/10 May when a TSD dip to 1000m and a 7 litre water bottle cast was made. Conditions remained too bad for network until 2030/10 May when the 7th repeat series was started. The series was completed at 1427/11 May in rapidly deteriorating conditions and no further work was attempted until 2324/11 May when a TSD and multisampler were lowered to 1000m. Combination net sampling continued until 2251/12 May when the ship began steaming towards Barry.

During the morning of 13th May intercalibration of the two EM logs was carried out. At 1554/13 May the ship hove to for a short test on a vertical wire of a new command system. Steaming restarted at 1635/13 May and the ship arrived in the vicinity of a current meter mooring at 0824/14 May. A grid search was begun to search for the mooring. The search for the mooring was unsuccessful and steaming restarted at 0630/15 May. The ship docked at Barry at 1200/16 May. On the first leg 80 hours were spent steaming and 468 on station, on the second leg 125 hours were spent steaming 342 hours on station and 48 hove to.

Repeat series (M.V. Angel)

Seven series of repeat hauls with associated TSD dips to 1000m were taken over a period of seven weeks. One hundred metre horizons were fished for two hours between 300-600m both by day and by night. It was not always possible to take all the samples within a twenty-four hour period. Sampling was not done during the periods an hour either side of dawn and dusk. So as the nights shortened, any slight delay at night resulted in a failure to complete the sampling within 24 hours. The order of sampling and hence the time of sampling was kept as consistent as practically possible.

Gross changes in the samples did occur during the seven weeks sampling. There were wide fluctuations in the quantities of gelatinous organisms in the 400-300m hauls, Eucopia species were abundant in the 600-500m night hauls at the beginning of the cruise but were almost totally absent by the end, salps and hyperiid amphipods appeared in large numbers in the last series even in the deepest haul, whereas in earlier series they were sparse.

Displacement volumes showed in general larger catches by day than by night, and for the volume of the catch to decrease with increase in depth. Exceptions to these general trends were the first series when the night 600-500m samples in both nets were larger than the 500-400m samples and the second and third series when the night samples were larger than the day samples.

The ratio in the volumes between the two nets was 1:3 to 1:5 (RMT 1 : RMT 8) for the majority of samples from 600-400m. The ratio for the 300-400m haul was usually much higher especially in the hauls containing most gelatinous organisms. All RMT 8 samples with displacement volumes in excess of 4700 mls were 12-15 times greater than the RMT 1 samples. This could results from the general tendancy for gelatinous organisms to escape downwards. The displacement volumes of all the repeat series hauls are summarised in Table 1.

Series	Approx Day Numbers	DAY RMT 1	DAY RMT 8	DAY RMT 8 / RMT 1	NIGHTS RMT 1	NIGHTS RMT 8	NIGHTS RMT 8 / RMT 1
1	0	590	8000	13.6	410	2250	5.5
		260	1020	3.9	52	220	4.2
		48	205	4.3	100	525	5.3
2	4	165	1220	7.4	220	1400	6.4
		110	520	4.7	100	820	8.2
		120	580	4.8	110	560	5.1
3	11	200	880	4.4	320	4800	15.0
		200	700	3.5	160	840	5.3
		95(+40)	430	4.5(3.2)	165	550	3.3
4	15	300	980	3.3	340	1070	3.1
		290	710	2.4	180	750	4.2
		260	700	2.7	110	320	2.9
5	21	400	6000	15.0	310	5000	16.1
		340	750	2.2	220	660	3.0
		260	780	3.0	145	550	3.8
6	25	380	4550	11.9	310	1300	4.2
		220	980	4.5	135	600	4.4
		115	250	2.2	150	420	2.8
7	35	490	6500	13.3	390	4700	12.0
		300	1595	5.3	130	550	4.2
		185	700	3.8	90	650	7.2

Table 1. Displacement volumes in ccs of the total catches of the repeat series combination net samples. For each series, the approximate day number indicates the length of time which had elapsed since the first series. The order of the values is 400-300m, 500-400m, and 600-500m hauls. The average ratio (RMT 8 : RMT 1) for these three depths is 9.4, 4.3 and 4.0 respectively, the ratio tending to be higher at night than by day.

48 Hour Series (H. Roe)

To extend observations on the temporal patterns of vertical migrations four different depths were each sampled intensively/for a period of 48 hours with the RMT 1 + 8. A total of 97 hauls were taken, 25 at 100m, 23 at 250m, 26 at 450m and 23 at 600m. All the hauls were made in the same restricted geographic area and solarimeter and TSD records were made throughout the period.

Both the RMT 1 and the RMT 8 catches were volumed. The clearest trends were seen in the 100m hauls where both nets showed a nocturnal increase in volume on both nights. The RMT 8 catches had both a post sunset and a pre-sunrise peak on the first night with a marked decrease around midnight. On the second night the post sunset peak was absent, presumably because the dominant animal in these catches, Meganyctiphanes, migrated upwards at least two hours earlier on the second night. Solarimeter records showed that the light intensity was much lower on the second day than on the first. The volumes of the 250m, 400m and 600m catches showed no regular changes.

Only a superficial examination of the more conspicuous animals in the RMT 8 catches was possible on board. In general, the deeper living species arrived at a particular depth on their upward migrations later than shallower forms and conversely left earlier. Temporal and vertical segregation was maintained throughout the migratory cycles of at least some species, and in Systellaspis it seems that there may be similar differences between the adults and juveniles. It is clear that the migrations of many species start well before sunset and continue until several hours after dawn, and the migration timing of some species differed considerably on two consecutive nights.

The results seem to agree very well with those obtained from a 24 hour series taken on Cruise 45. The much greater coverage of the present sampling programme, both in time and space, will enable a much more detailed analysis of vertical migration patterns than has hitherto been possible.

Currents (Capt. G. Howe)

During the course of the 48 hour series the ship remained within five miles radius of 44°05'N 12°45'W. The satellite fixes and the resultant current drifts were averaged over an approximate 24 hour period. The table below gives the results:-

Times	period	Current speed kts	direction in degrees	Number of observations
0552	6.IV - 0748 7.IV	0.09	347.5	19
0748	7.IV - 0658 8.IV	0.10	005.9	20
0658	8.IV - 0750 9.IV	0.12	017.7	20
0642	10.IV - 0720 11.IV	0.09	357.2	23
0720	11.IV - 0800 12.IV	0.13	319.3	21
0840	13.IV - 0724 14.IV	0.04	340.0	25
0724	14.IV - 1054 15.IV	0.06	339.3	24
0742	17.IV - 0822 18.IV	0.12	327.3	18
0822	18.IV - 0846 19.IV	0.17	335.8	23

Thus over a period of nearly two weeks the surface drift remained very small and swung from a northerly to a north-westerly direction. The smallness of the average drift was particularly fortunate since it allowed reciprocal courses to be trawled without noticeable variations in the fishing

performance of the nets.

Fluorescence profiling (P.R. Pugh and M.J.R. Fasham)

A Turner fluorometer was used to estimate the amounts of Chlorophyll a present in sea water. Horizontal profiles of the fluorescence at ca-4m depth were made by passing water from the ship's sea water supply through the fluorometer. Chart recordings of the fluorescence were initially made for the run down to and in the vicinity of 44°N 13°W. However, during the second leg of the Cruise the fluorometer was connected into the routine sampling system of the ship's computer and so data for fluorescence levels were recorded every two minutes, stored on disk, and profiles obtained later on the chart plotter. The fluorescence levels at 44°N 13°W were highest at the beginning of the Cruise, which presumably coincided with the Spring bloom. There was then a fairly steady decline during the remainder of the first leg, while the results for the second leg are more confused due to some faults with the fluorometer. There was a marked decrease in the fluorescence while the ship steamed south during the second leg.

Vertical profiles of fluorescence were obtained through the use of a submersible pump. The inlet probe for the system was attached to the TSD probe and varying lengths of 2" bore tubing, depending on the depth to which sampling was to be carried out, were attached between the probe and the pump. A small bleed was taken from the positive pressure side of the system on deck and was connected to the fluorometer. The flow was adjusted to about 500ml/min. The remainder of the pumped water was sometimes used for the collection of nutrient, microplankton and zooplankton samples.

To carry out the experiment as near as possible flat calm conditions were required. In all five vertical profiles of fluorescence were carried out, four to 100m and one to 75m depth. The major problem experienced was in lowering and raising the TSD + probe at a sufficiently slow speed to allow the minor fluctuations in fluorescence to show up. There was always a 1-2min delay during which the sea water travelled up the tubing, but the flow appeared to be turbulent as clear cut major changes in fluorescence were obtained. During the first three vertical profiles the probe was lowered continuously to maximum depth, but on the way up was stopped every 10m to allow the tubing to clear completely and thus obtain an actual fluorescence reading for that depth, as well as to obtain the nutrient, etc. samples. Although this method was not so convenient as and more time consuming than a continuous fluorescence/depth profile, it did enable us to determine the transit time of water in the tubing and to gauge more accurately the depths at which the major fluorescence changes were occurring. It was not unusual, however, to find that the down and up profiles were entirely different. Although these results for the vertical profiling of Chlorophyll a fluorescence are only preliminary they do indicate an interesting potential for this technique.

Studies of the spatial pattern of phytoplankton (M.J.R. Fasham and P.R. Pugh)

A number of workers have suggested that the spatial pattern of phytoplankton might be related to internal waves or to turbulence. The combination of the TSD, pump and fluorometer provided a means for testing these theories experimentally by placing the TSD at a fixed depth and then allowing the ship to drift. A current meter was hung below the TSD so that any time periodicities observed in the results could be converted to spatial ones. Very calm conditions were necessary for the experiments so that vertical changes in the temperature or fluorescence were not confused with horizontal changes. The experiments were also carried out a night so that any possible changes in the fluorescence caused by changes in the surface irradiance could be discounted. The data (temperature, salinity and fluorescence) were sampled by the computer every two seconds and stored on disk.

In the first experiments (Stations 8507*34 and *35) the TSD was put at 25m and 15m respectively, the thermocline being at about 25m. In both cases, if allowance was made for the delay in the fluorescence response due to the time taken for the water to flow through the tubing, an excellent correlation between temperature and fluorescence records was observed.

In the second set of experiments (Station 8513*5, *7 and *8) samples were taken at 100m, 20m and 40m, the thermocline being at about 20m. A correlation between changes in the temperature and fluorescence was observed at 20m but not at the other two depths. During this experiment water samples were taken from the pump outflow every 10 minutes for nutrient analysis. Zooplankton were also sampled at the same intervals by connecting a RMT 1 cod-end liner over the pump outflow and changing it every 10 minutes. The majority of the results have still to be analysed.

Plessey Light Meters (M.J.R. Fasham and P.R. Pugh)

Two photodiode light meters specially designed by Plessey were used for the first time. Owing to delivery problems the correct filters for the light meters were not available on time and so both meters were responding to infra-red radiation as well as to visible light. Both light meters were calibrated against a standard solarimeter. One meter was put in gimbals on the monkey island and the other was attached to the TSD for lowering into the water. Both meters gave a frequency output that was proportional to the logarithm of the irradiance and so the light attenuation could be calculated by subtracting the readings from the two meters. Both meters were connected to the IBM 1800 computer and programs were written to produce graphs of attenuation against depth on the Calcomp plotter.

Eight light profiles were made and reasonable attenuation curves were produced when the sky was either totally cloudy or totally clear. However in other cloud conditions the surface meter would respond rapidly to changing light conditions while the underwater meter would not, due to the scattering effect of the water column. This resulted in a noisy attenuation curve. Large differences in attenuation were noted between Station 8509 *17, where the irradiance was reduced by 4 decades in 80m, and Station 8511 *5 where the irradiance was only reduced by 2½ decades in the same distance. This difference was obviously related to the different fluorescence levels at these two stations.

In order to test the sensitivity of the instruments, a profile was carried out on a bright moonlit night (Station 8513 *6). It was found that one meter was more sensitive than the other and that the more sensitive one stopped responding effectively at about 35m depth. This represents a total range for the instruments of about 7½ decades. The meters were not as sensitive as the SMBA photo-multiplier system which was being tested at the same time.

The sytem is easy to use and reliable, and with a few modifications to the computer sampling system it could be used as a routine tool for biological investigations.

Underwater Light Measurements (H.S.J. Roe)

Through the generosity of Dr. J.H.S. Blaxter of the SMBA in loaning us his underwater light meter it was possible to obtain valuable experience in the use of such an instrument at sea. The photometer is similar to that described by Craig and Lawrie (1962) and is based upon a photomultiplier tube

(E.M.I. 9524B) and fitted with a blue-green filter (Chance Pilkington OB2A). The instrument was used four times to depths of 110m, twice in day light and twice at midnight with a full moon. On each occasion a very smooth curve of decreasing light intensity with depth was obtained. The night records were of especial interest since it appears that bioluminescence was recorded, between 40-100m on the first occasion and 90-100m on the second. The frequency and intensity of flashing apparently increased as the photometer was moved slowly vertically. The sensitivity of the photomultiplier was compared with that of the IOS photodiode system at two stations and proved to be superior.

Deep hauls (M.V. Angel)

A series of very deep hauls was carried out over 500m horizons down to a depth of 4000m. A deep oblique was carried out for the SMBA to 4650m. The limit the gear would reach was determined by the amount of the main warp which had been tensioned. Using the beam steering setting at 60° on the PES, there was no trouble in picking up the monitor signal. Also transmission from the ship to operate the release gear presented no difficulty; the present system should operate to depths of at least 5000m with slant ranges of 10km.

The catches, as expected were small, but of great interest. A very large cirroteuthid octopod was caught in the SMBA haul. Pelagic holothurians and large polychaetes embedded in a gelatinous matrix were caught at 4000-3500m. There was clear evidence of zonation with the catches being predominantly fish in the 2500-2000m haul and decapods (Hymenodora sp.) in the 3000-2500m haul. The 3000-2500m haul also contain some very lively Nebaliopsis and a large 25mm pre-adult female Gigantocypris. A large Conchoecia species also occurred in this haul, it is either new or is C. symmetrica, a southern ocean species.

When the combination net was finally stripped down, it was found that the top bar of the RMT 8 had imploded. 23 hauls had been completed successfully with the net after the SMBA deep tow many in bad conditions, without any suggestion that the bar had been weakened.

Nutrients and Trace Metal Sampling (C. Pattinson)

Several types of sampling profile were undertaken within the cruise square. With one exception, all samples were frozen and will be analysed at a later date. The profiles obtained were as follows:-

1) 4 trace-metal profiles, over a depth range 0-2000m, using 71 water bottles. The dissolved and particulate trace-metal fractions will be analysed for Cu, Pb, Cd, Ni, Zn, Co, Fe and Mn.

2) 8 nutrient profiles, over a depth range 0-1000m, using the TSD - multi-sampler system. The samples will be analysed for silicate, phosphate, nitrate and nitrite.

3) 2 profiles, at 10m intervals, over a depth range 0-100m using the TSD with submersible pump attached. The water at each depth was sampled for: dissolved and particulate trace-metals; particulate carbon; nitrogen and phosphorus; nutrients; total dissolved organics; chlorophylls a b c. The chlorophyll samples were determined immediately using the trichromatic method to prevent decomposition from becoming too critical.

Copepoda (H.S.J. Roe)

Very little specific identification of copepods was carried out on board. Both the numbers of individuals and numbers of species were relatively low and the overall population was apparently similar to that taken in 1970 at 40°N 20°W. The extensive migrants Undeuchaeta spp. and Chirundina were abundant in midwater by day and near surface at night but the most noticeable feature of

the copepod population was the virtual absence of Calanus. Large numbers of Calanus were caught only once, by the Oxfam at night, and consisted largely of juveniles. The most interesting copepods were taken in the nets fished below 2000m. These hauls contained large numbers of very rare and very large species including many Bradycalanus spp. and several further specimens of the large violet coloured Hemirhabdus sp. taken on two previous cruises. Specimens of several Euaugaptilus spp. were picked out for bioluminescence studies (by P.J.H.) and examples of E. magnus and Chirundina streetsii were deep frozen for dry weight analysis (by M.V.A.).

Euphausiacea (P.T. James)

Twelve species of euphausiids were recorded from the area round 44°N 13°W, but only four were common:- Meganyctiphanes norvegica, Nematobrachion boopis, Euphausia krohnii, and Nematoscelis megalops. By day N. boopis occurred at 500-300m M. norvegica at 300-200m, and Stylocheiron maximum at 500-400m, whereas at night their respective distribution were up to 100m, 200-0m, and 400-150m. The 3000-2500m haul contained large numbers of Bentheuphausia amblyops.

During the 48 hour series M. norvegica was well sampled at 100m. It migrated down over dawn and up again an hour before sunset on the first day and a little later on the second. N. boopis was in appreciable numbers in all the 250m hauls, but examination of their stomachs showed they feed only at night. Both E. krohnii and S. maximum migrated into the 250m layer at night, when they appear to feed. Few euphausiids occurred in either the 450m or the 600m series.

Night-time surface net samples contained an abundance of Meganyctiphanes larvae. At the beginning of the cruise these were at the calyptopis stage and by the fifth week had become young adolescents. The samples should allow their growth rates to be studied.

It was noted that the thelycum of M. norvegica housed a sperm mass which had been passed out of the male spermatophores; the empty spermatophore remained attached to the thelycum. In E. krohnii the ovary is blue coloured.

Fishes (N.R. Merrett)

Preliminary identification of the pelagic fishes caught revealed at least 73 species of 55 genera. In comparison with catches from lower latitudes this diversity is rather poor and was matched also by the low overall abundance of fishes. A noteable feature of the samples was that, with the exception of the alepocephalid Xenodermichthys, post-larvae and juveniles were very infrequent. Examination of the gonads of adults of some species, however, indicated that the onset of spawning was imminent. Myctophids and gonostomatids were the dominant groups in the catches and their vertical distributions tended to confirm our previous findings in the eastern North Atlantic. The genus Cyclothone was, as expected, most numerous among the non-migrant species. The predominantly mesopelagic C. brauerf was the most numerous species caught and data from the repeat hauls and the 48-hour series should among other things, provide confirmatory evidence on the stratified nature of its population structure.

The results of the 48-hour series confirmed in detail the cyclical pattern of migration in certain species found previously (Cruise No. 45). Valuable information on the sequence of vertical movement was obtained for the myctophids, Benthosema and Lampanyctus; the chauliodontid, C. danae; the

stoimiatid, S. boa; and Xenodermichthys. These comprehensive sets of samples should also give extensive data on the feeding patterns of migrant and non-migrant species alike.

Among the captures of special interest were specimens of rare bathypelagic alepocephaliform fishes, Leptochilichthys agassizii and Bathyprion danae and the chiasmodontid, Kali macrodon, from the deepest tows; the melanostomiatids Macrostomias, ?Leptostomias, Chirostomias and Flagellostomias; and the zoarcids Parabrotula and Leucobrotula.

Benthic species in the bottom net catches were dominated by macrourids; the halosaur, Halosauropsis; the synaphobranchid eel, Histiobranchus; and various species of demersal alepocephalid. Of special note was a 70cm specimen of Scymnodon ringens, as sharks of any size are rarely taken in this bottom net.

RMT 8 HS (N.R. Merrett)

An open high speed RMT 8 net was fished on 8 occasions. It was made of smaller mesh (2cm) than previously has been used on this net and for the first time was fished with a specially developed depth monitor (J type). The net was towed at 5 kts in the upper 200m at night, in the range of maximum influence of the Admiralty-style depressor used.

Although the tests were successful, it was difficult to assess the value of this net in an area of apparently low fish density. The intention was to obtain purely qualitative samples of larger-sized migrant species than are usually caught in the RMT 1 + 8. The catches were of small to moderate size but represented in them were some larger specimens of fish and decapods suggesting that this net may be viable in a more productive area.

Microplankton Studies (P.H. Burkill)

Microplankton populations were collected from several depth intervals over a vertical profile from 30 metres to 100 metres at Station 8511/5. Samples were obtained with a submersible pump and hose system, and were retained in a deck mounted plankton collecting unit which separated the material into three size fractions (> 200μ; 200-100μ; 100-50μ).

The numerical abundance of these populations and their vertical distribution pattern will be determined after examination in the laboratory. Samples examined on ship-board show that in the 200-100μ fraction, the Metazoa especially the harpacticoid and larval calanoid copepods are more numerous than the Protozoa. The tintinnid ciliate Eutintinnus ? elongatus was found to be abundant. In the size fraction 100-50μ, the smaller tintinnids such as Codonellopsis lusitanica dominated the microzooplankton. Various Ceratium species were found to be the predominant constituent of the phytoplankton greater than 50μ in size.

Microplankton samples were also collected by continuous filtration of sea-water taken from the ship's pure water supply via the fluorometer.

Enrichment media made up by adding peptone to seawater that had passed through the collecting unit produced "mass cultures" of hymenostomatid (?Uronema sp.) and hypotrich ciliates (?Euplotes sp.). It is hoped that these will be maintained in order to carry out quantitative feeding experiments in the laboratory.

Ostracods (A. Gooday and A. Moguilevsky)

Sinking rates

The sinking rates of over 250 live halocyprid ostracods were measured to study:- a) the passive sinking rate and its variability for individual

animals and within a population. b) The effects of anaesthetics on the passive sinking rate. c) The control of buoyancy and the attainment of near neutral buoyancy observed on Cruise 52. Animals were picked out live from RMT 8 samples and the experiments were conducted in the constant temperature laboratory at 8 - 11°C using near surface seawater of salinity about 35.7‰ (35.61 - 35.78). Three species were concentrated on Conchoecia rhynchena, C. haddoni and C. ametra, and a few specimens of C. imbricata C. lophura, C. loricata, C. hyalophyllum and C. inermis were used.

Passive sinking rates varied quite widely with a population mainly because of variations in the orientation of the animals. Several specimens of C. haddoni were observed 25-50 times and gave reasonably consistent results.

Anaesthetics used were 1% Urethane in sea-water and 7% magnesium chloride. Magnesium chloride was slow to act and tends to reduce sinking rates, recovery was also slow. Urethane was quick acting (in less than two minutes), resulted in no significant change in the sinking rate, and recovery was rapid.

All species examined showed an ability to reduce their sinking rates. A typical orientation was adopted by the animals, head down with the body axis 0-45° to the vertical. There was a complete gradation between passive sinking near neutral buoyancy, rates being reduced by between a half and over an order of magnitude. Several specimens of C. rhynchena and C. imbricata were observed to become neutrally buoyant. Some species (e.g. C. imbricata) controlled their sinking more readily in the laboratory than others (e.g. C. haddoni).

Gigantocypris (A. Moguilevsky and A. Gooday)

Gigantocypris mulleri was particularly abundant in the hauls between 700-1500m. Over 450 specimens were picked out of the RMT 8 samples and measured. Brooding females occurred only in hauls taken at 1500-1250m. The youngest instars occurred abundantly in the 1250-1000m hauls, and pre-adult females with developing ovaries near the top of the range. In contrast to this ontogenic migration, there was no evidence of diurnal migration.

The gut contents of 55 specimens were examined, of which only six were empty or the contents were totally unidentifiable. 60% contained chaetognaths. Copepods (at least 10 spp.) were frequent, but some were undigested shallow species suggesting feeding occurs in the net. Eucopid mysids were also frequent. Other remains included halocyprid ostracods, gastric filaments of medusae, fish fin rays, and radiolarians. A red gelatinous material present in several stomachs fluoresced in UV light after treatment with methonolic sulphuric acid, and was likely to be porphyrin containing tissue from medusae such as Atolla.

G. dracontavalis was caught in quite large numbers from 2500-3500m. A single pre-adult female of G. ?agassizi was caught in the 2500-3000m haul.

Halocyprids (M.V. Angel)

The planktonic ostracod fauna showed a close relationship to the fauna found at 52°N 20°W. The abundance of C. haddoni sensu strictu at 44°N 13°W was the major difference between the fauna at 40°N 20°W where it was absent. The comparative hauls taken at the Torre Seamount (40°N 12°W) should confirm this difference. The deep tows taken from below 2000m contained several

rarely caught species such as C. tyloda. The 3000-2500m haul contained specimens of C. ?symmetrica previously only known from the Southern Ocean, and possibly confirming a faunistic link between the Antarctic and Atlantic bottom water.

The bottom net tows from below 2000m yielded several specimens of the new Azygocypridina species previously caught at 53°N 20°W.

Siphonophores (P.R. Pugh)

Although vast numbers of siphonophores were caught during the cruise, the actual number of species present was very low. The most important species were Chuniphyes multidentata and Rosacea ?plicata both of which occurred mainly in the 200 to 400m depth range. The 48 hour series at 250m showed that neither of these species appeared to undergo any extensive vertical migration but since both species have such a wide depth range a closer analysis of the actual numbers may reveal some small diurnal migrations. The deeper three 48 hour series (250, 450 and 600m) in fact showed that only species of the genus Vogtia underwent any major diurnal vertical migrations. Halistemma rubrum and Physophora hydrostatica also appeared erratically in these hauls but were much rarer species. Lensia conoidea, Agalma elegans and Vogtia spinosa were present in the 100m 48 hour series, with the first species migrating through the range in the pre-sunset haul and back again at sunrise. It did not, however, appear to migrate in any numbers as deep as 250m.

The series of repeat hauls between 300 and 600m did not appear to show any significant changes in the siphonophore population during the duration of the cruise. The 400-300m band was dominated by the siphonophores, Chuniphyes multidentata and Rosacea ?plicata. The presence of C. multidentata at these relatively shallow depths is of interest as further south it normally exists below 800m, and in the very deep hauls is replaced by C. moserae. This latter species was not noted in any of the deeper hauls and, in fact, siphonophores appeared to be totally absent from the very deep hauls which were made. In the 1000-2000m band several specimens of the large siphonophore, Halistemma sp. nov. were noted, as well as some very interesting specimens of a Lensia species which were orange in colour. This appears to be a new observation as usually the species in this genus are totally colourless.

Bioluminescence (P.J. Herring)

Observations on bioluminescence in fishes have concentrated on the hatchet fish Argyropelecus olfersi and the argentinoid Opisthoproctus. The ready availability of the hatchet fish has allowed determination of both the spectral and angular distribution of the light. Measurements of the angular distribution of the light of whole fishes and specific photophore groups, before and after removal of some of the reflecting systems in the photophores, appear to confirm their function as angular distributors. The bacterial light organ of Opisthoproctus has been examined in detail and a number of cultures obtained for comparison with other luminous bacteria. The operation of the light organ has been observed in a live specimen and simulated with a fibre optic system. Among the Crustacea the comparative chemistry of the luminescence of some decapods has been investigated as well as the flash parameters of several species of copepod. The angular distribution of light from certain decapods and euphausiids has also been determined, and considerable fresh material from both groups has been deep-frozen for subsequent chemical analysis.

Bottom net tows, aimed primarily at the collection of deep-living echinoderms, yielded relatively few species but nevertheless provided additional information on the bioluminescence of some species of ophiuroid and holothurian. Three

additional species of luminous holothurian were taken in the deepest mid-water trawls.

Two species of polynoid worm have been taken in considerable numbers and the flash response characteristics both of whole animals and isolated scales have been analysed in detail.

Material from several groups of animals has been fixed for histological and ultrastructural investigation, and use has been made of an image intensifier system to film the bioluminescence of some of the brighter species.

Pigments and Lipid (P.J. Herring)

Eggs of Acanthephyra pelagica and Systellaspis debilis at various stages of development have been collected and deep-frozen for study of the carotenoid pigment and lipid metabolism of the embryos. Eggs from four specimens of A. pelagica have been maintained alive for parallel study of individual broods . Specimens of the decapod Ephyrina have been frozen for extraction and identification of novel specific carotenoid pigments.

Pigment studies (J. Bonfiglio and E. Head)

Material was collected to study the porphyrins present in deep sea medusae and the pigments in the photophores of certain fishes. In the medusae Atolla, Periphylla and Nausithoe the coloration varies from deep red to chocolate brown. The pigment is often localised within the animals, and in Atolla and Periphylla its distribution varies with development. Specimens were identified, volumed and stored deep frozen.

The fish species studied included Chauliodus sloani, C. dana, Stomias boa ferox, Argyropelecus hemigymnus, A. olfersi, and Valencienellus tripunctulata. The pigment of the ventral and jaw photophores of Chauliodus and Stomias is purplish in colour and red fluorescent. Argyropelecus olfersi proved to be a particulary good species to work with, being large and easy to handle. The abdominal, supraabdominal, branchiostegal and occasionally isthmus groups of photophores were removed. The pigment in this species is lilac-coloured and is not fluorescent. The excised photophores were deep frozen in phials under nitrogen. Some preliminary observations were carried out on the effects of various reagents on the photophore pigments.

SMBA tows (H. Grigg)

Oblique combination net hauls were made subdividing from 5m to 1500m. The hauls will be used to obtain comparative data on Pareuchaeta norvegica, to supplement a study currently being carried out in Loch Etive on the West Coast of Scotland. A further deep tow 1500-4650m was taken for taxonomic purposes.

Dry Weights (M.V. Angel)

Representative material of most micronektonic species and several planktonic species occurring in the repeated hauls were deep frozen for dry weight determination.

Neuston (D.M. Shale)

Standard NN hauls at 5 knots were taken at 4-hourly intervals from leaving the continental shelf, to arriving on station. The first two contained large numbers of Anomalocera patersoni, but subsequent hauls were typically small.

Nine samples in all were taken along this line.

Samples taken on station using the NN3 at 2 knots revealed distinct faunal separation in the three 10cm layers. Catches were almost totally dominated by the juveniles of two species: Parathemisto gaudichaudii and Meganyctiphanes norvegica; A. patersoni occurred occasionally. Day hauls were very small.

Gear (D.M. Shale)

1. RMT Nets

RMT 1+8

Over 200 hauls were made with the combination nets, 155 on the first leg. Twenty-six consecutive hauls of one hour's duration at 100m were taken in a 48-hour period. In the same time hauls at 250m numbered 23, at 600m, 23 and at 450m, 26. This pressure inevitably took its toll of the gear, but the success rate of sampling was exceedingly high, and very few samples were lost. On the second leg the combination nets were not used as much, although seven hauls were made below 1000m; of these, 3 hauls between 2500 and 4000m totalled 25 hours of fishing time, the deepest haul, an oblique from 1500-4650m was fished open for eight hours and a total time of eleven hours. It later became apparent that the top bar of the RMT 8 had imploded at one end beneath the lug, yet it was successfully fished for another 22 hauls, without any apparent effect.

A series of minor faults became evident and necessitated changing various components after continuous use. These were, the frequent changing of release gear strops, bridles and side wires and RMT 8 top bar inserts. These have now been modified by slotting the inserts and using a push-fit collar on the upper side of the eye bolt. The weight bar was changed twice due to excessive bending and nets were changed for repairs to chafing and holing, as well as for brass eyelet replacement. The major fault which resulted in severe damage to two of the RMT 8's was that the top norse links become locked through the eyebolt in the 8 top bar and caused the net to hang up and not close - on hauling at 1m/s. the nets were ripped. The fault was rectified by the replacement of polypropylene discs on the top of the RMT 8 side wires, and the lengthening of the RMT 8 opening bridles, to prevent bunching of the norse links.

Ancillaries

The release gear system as usual functioned well, although weak pawl springs were believed partly responsible for strops pulling out when launching the net in moderately rough conditions. No hauls were lost because of this and the fault was rectified by the insertion of back-up plates to increase spring tension. Welds between the release gear body and eye bolt were fractured; eye bolts were replaced by stainless steel ones, on gear 2 and 4.

The flowmeter system unfortunately suffered quite badly - impeller blades, impeller and finally the whole flow unit on 'Jane' was lost. The towed flowmeter was calibrated against 'Jason', but that was also damaged. Finally Plessey impeller no 2 was lost, impeller no 6 replaced it and after cross calibration against 'Jason' was used successfully for the rest of the cruise. It would appear that the T-type flowmeter is possibly less susceptible to damage.

2. Bottom net

Eight trawls were made with the BN2.4; successfully at both shallow (755m) and deep stations (2632m). The chafing netting on the underside of the net was badly torn on the coralline sediment on the second haul and changed (8511#2).

On retrieval after this haul the net caught on the steel plates on the stern and badly bent both top bars. These were replaced together with a new net, which was also torn on the next haul (due to shrinkage). Hauls at station 8513#1-3 were all successful - on the last, all weak links broke and the net overturned. The main cause of damage was the nature of the sediment, which in all hauls was a pteropod ooze, with coral.

Bottom Camera (D.M. Shale)

The proposed programmes of a bottom net station followed by a bottom camera had to be abandoned since the system was totally unreliable. Station 8511#2 was abhorted before reaching the bottom, because the camera was triggering continuously, due to a faulty bottom switch. At station 8512#2, 17 consecutive frames were successfully exposed, but negatives were thin, probably since the flash was incorrectly angled. On hauling, the camera continued to wind on; a faulty microswitch was found to be the cause. This was rectified but failed again at station 8513#4 and use of the camera thereafter was abandoned.

Angle Measurements (M.V. Angel)

Measurements were made of the angle of fishing of the combination net using an EM log mounted on the side wires. A 100m conducting cable was used to feed the signal from the net to a pen recorder on deck. This limited the amount of warp that could be paid out to 50m. At such a shallow depth i.e. about 30m the net was probably still within the influence of the ship's screw which may account for the yaw observed in the horizontal component, but which was absent from the vertical component.

The first test was carried out on the outer side wires of the RMT 1. The net was opened underwater and towed at 1½, 2 and 2½ knots, and closed again. The second test on the side wire of the RMT 8 could only be carried out with the net open. Ship's speeds of 1½ - 3 knots were used. The third test was similar to the second with the EM head rotated through 90°, the results were similar. The effects of hauling and paying out were examined in all three tests. The opportunity was taken to calibrate the net flow meters against the EM log.

Table 2 summarises the results. The angles given are the angles to the horizontal.

Ships Speed	RMT 1 Closed	Open	Hauling	Paying out	RMT 8 Open	Hauling	Paying out
1½		51-62°			45°		
2	63°	60°	66°	47°	45°	57°	50°
2½		63°			45°		
3		-			45°		

Table 2.

Angles to the horizontal of the side wires of the RMT1+8 at various ship's speeds.

Gear Notes (M.V. Angel)

RMT1+8 was paid out at 0.5 m/s^{-1} and opened at the lower fishing depth. When fishing 2 hour tows over 100m horizons, the net was kept within the lower 25m band for the first half hour, and then in successively shallower

25m bands. Flow was measured by timing the intervals between successive blips with a stop watch. Towed flow meters were especially inaccurate when the net was rising, so measurements could only be taken once the net had stabilised. Thus on one hour tows it was not possible to adjust the net's speed, and the ship's speed was kept constant at 2 knots. On this cruise there was little evidence of troublesome current shears.

Obliques were fished downwards. The net was opened at the surface with the ship's speed at 2½ knots. Paying out was at $0.3m/s^{-1}$ and the ship's speed regulated to keep the flow blip interval equivalent to 2 knots. The net was closed at the lowest depth, the ship's speed dropped to 2 knots and the net hauled at the usual $1\ m/s^{-1}$.

Bottom nets were paid out at $0.5m/s^{-1}$ with the ship at 2 knots. Paying out speed was reduced to $0.3m/s^{-1}$ on reaching the bottom, and the ship's speed reduced to 1½ knots, if the wire out to depth ratio exceeded 1.5. A futher 100m of warp were paid out after the net reached the bottom, and further 50m lengths each time the net began to lift off. At the end of the tow hauling started at $0.3m/s^{-1}$ until the net lifted off the bottom when the hauling rate was increased to $0.7m/s^{-1}$.

Pump sampling appears to be limited to calm conditions with wind speeds $<$ 12 knots. Higher wind speeds results in the drag of the tubing pulling the pump clear of the water unless tension is maintained on the exhaust tube, and also increases the strain on the tube attachment to the TSD. Sampling was carried out with the ship lying to with the wind on the starboard (TSD winch and pump) side, so the tube was carried clear of the ship. The main prop was stopped and the starboard EM log raised in very calm conditions. The tube was not made off onto the TSD cable but allowed to float free.

Treatment of catches (M.V. Angel)

RMT 8 material is in high demand live for physiological observations, but the RMT 1 catches are seldom examined live. In an attempt to improve the preservations of the RMT 1 material which deteriorates rapidly, the net liner holding the catch was dropped into a bucket of 5% formalin immediately on arrival on deck. The effectiveness of this immediate preservation will have to be judged later.

The displacement volumes were measured for all the standard tow samples, except those taken below 1000m; damage to fragile bathypelagic specimens could render them useless for taxonomic identification and so invalidate any meaning to the displacement volume of the total catch. The best solution for RMT 1 samples would be to fish two nets in combination and use on sample for taxonomy etc. and the other for biomass determination. It was hoped to experiment with two RMT 1 nets fished side by side above the RMT 8 towards the end of the cruise. However, the deterioration of weather conditions prevented this.

STN.	DATE 1974	POSITION LAT N	POSITION LONG W	GEAR	DEPTH (M)	FISHING TIME GMT	REMARKS	LOCAL TIME GMT
8499	31/ 3	48 51.7	7 13.0	NN	0- 0	0810-0822	NET DID NOT STREAM OUT PROPERLY	
# 0		48 50.9	7 13.9			DAY		
8500	31/ 3	48 22.7	7 46.4	NN	0- 0	1159-1211	NET NOT FAR ENOUGH AWAY FROM SHIP	
# 0		48 21.9	7 47.3			DAY		
8501	31/ 3	47 50.8	8 20.8	NN	0- 0	1557-1609		
# 0		47 49.9	8 21.8			DAY		
8502	31/ 3	47 18.1	8 56.0	NN	0- 0	2002-2014		
# 0		47 17.2	8 56.9			NIGHT		
8503	1/ 4	46 49.6	9 31.2	NN	0- 0	0000-0012		
# 0		46 48.8	9 32.4			NIGHT		
8504	1/ 4	46 22.6	10 8.3	NN	0- 0	0359-0411		
# 0		46 21.7	10 9.1			NIGHT		
8505	1/ 4	45 28.9	11 12.6	NN	0- 0	1159-1211		
# 0		45 27.8	11 12.0			DAY		
8506	1/ 4	44 33.1	12 25.3	NN	0- 0	2000-2012		
# 0		44 32.2	12 26.4			NIGHT		
8507	2/ 4	44 17.6	12 56.0	NN	0- 0	0001-0013		
# 1		44 17.4	12 57.3			NIGHT		
8507	2/ 4	44 14.9	12 57.2	RMT 1	900-1000	0123-0323	RMT8 LINER DETACHED- NO CATCH	
# 2		44 10.2	12 56.1	RMT 8		NIGHT	FLOW DIST. 7.38 KM.	
8507	2/ 4	44 5.8	12 42.1	NN	0- 0	0801-0813		
# 3		44 5.3	12 40.5			DAY		
8507	2/ 4	44 5.3	12 40.5	NN	0- 0	0813-0825		
# 4		44 4.9	12 39.1			DAY		

STN.	DATE 1974	POSITION LAT N	POSITION LONG W	GEAR	DEPTH (M)	FISHING TIME GMT	REMARKS	LOCAL TIME GMT
8507	2/ 4	44 3.8	12 40.5	RMT 1	0- 0	0917-1030	HAUL ABORTIVE- CATCH DISCARDED	
# 5		44 3.5	12 45.8	RMT 8		DAY		
8507	2/ 4	44 3.6	12 44.7	RMT 1	0- 100	1338-1438	DEPTH LIMITS OF HAUL ARE DOUBTFUL	
# 6		44 4.0	12 48.9	RMT 8		DAY		
8507	2/ 4	44 7.2	12 55.1	RMT 1	100- 200	1745-1849		
# 7		44 6.3	12 58.2	RMT 8		DAY		
8507	2/ 4	44 6.6	12 58.9	TSD	0-1000	1939-2050	SAL. SAMPLES AT 1000,750,500,250,10M ,	
# 8		44 6.8	12 59.1	MS				
8507	2/ 4	44 6.1	13 1.7	RMT 1	505- 600	2153-2356	REPEAT 1	
# 9		44 4.1	13 7.6	RMT 8		NIGHT	FLOW DIST. 7.79 KM.	
8507	3/ 4	44 3.0	13 12.1	RMT 1	400- 500	0121-0321	REPEAT 1- MONITOR FAULT,NO FLOW	
# 10		44 1.4	13 19.1	RMT 8		NIGHT		
8507	3/ 4	44 0.9	13 21.7	RMT 1	0-1000	0402-0532		
# 11		43 59.7	13 26.9	RMT 8		NIGHT	FLOW DIST. 4.85 KM.	
8507	3/ 4	44 2.3	13 24.3	RMT 1	505- 600	0758-0959	REPEAT 1	
# 12		44 6.7	13 21.1	RMT 8		DAY	FLOW DIST. 8.26 KM.	
8507	3/ 4	44 14.7	13 15.0	RMT 1	400- 500	1350-1550	REPEAT 1	
# 13		44 18.9	13 10.9	RMT 8		DAY	FLOW DIST. 8.23 KM.	
8507	3/ 4	44 22.2	13 7.4	RMT 1	300- 400	1728-1928		
# 14		44 25.8	13 3.5	RMT 8		DUSK	FLOW DIST. 7.80 KM.	
8507	3/ 4	44 27.9	13 1.7	RMT 1	305- 400	2039-2239	REPEAT 1	
# 15		44 31.5	12 57.9	RMT 8		NIGHT	FLOW DIST. 7.96 KM.	
8507	4/ 4	44 29.2	12 59.2	RMT 1	905-1000	0020-0120	VERTICAL MINISERIES	
# 16		44 27.0	13 0.7	RMT 8		NIGHT	FLOW DIST. 3.94 KM.	

STN.	DATE 1974	POSITION LAT N	POSITION LONG W	GEAR	DEPTH (M)	FISHING TIME GMT	REMARKS	LOCAL TIME GMT
8507	4/ 4	44 24.5	13 3.3	RMT 1	200- 300	0231-0331	VERTICAL MINISERIES	
# 17		44 22.0	13 5.4	RMT 8		NIGHT	FLOW DIST. 4.41 KM.	
8507	4/ 4	44 20.5	13 6.6	RMT 1	100- 200	0407-0507	VERTICAL MINISERIES	
# 18		44 18.5	13 8.6	RMT 8		NIGHT	FLOW DIST. 4.11 KM.	
8507	4/ 4	44 11.6	13 15.0	RMT 1	905-1000	0755-0855	VERTICAL MINISERIES	
# 19		44 10.2	13 16.5	RMT 8		DAY	FLOW DIST. 3.85 KM.	
8507	4/ 4	44 7.7	13 18.6	RMT 1	305- 400	1021-1221	REPEAT 1	
# 20		44 4.0	13 22.1	RMT 8		DAY	FLOW DIST. 7.78 KM.	
8507	4/ 4	43 57.7	13 19.4	RMT 1	410- 495	1820-1909	TEST HAUL FOR MONITOR	
# 21		43 58.7	13 17.5	RMT 8		DAY	FLOW DIST. 2.92 KM.	
8507	4/ 4	43 59.4	13 16.2	TSD	0- 500	2007-2054	RED MONITOR RANGE 1 CALIBRATION	
# 22		43 59.4	13 15.7					
8507	4/ 4	43 59.4	13 15.6	TSD	0- 500	2108-2146	BLUE MONITOR RANGE 1 CALIBRATION	
# 23		43 59.4	13 15.4					
8507	4/ 4	43 59.4	13 13.4	RMT 1	8- 100	2238-2338	VERTICAL MINISERIES	
# 24		43 58.6	13 10.5	RMT 8		NIGHT	FLOW DIST. 3.48 KM.	
8507	5/ 4	43 57.2	13 6.4	RMT 1	800- 900	0052-0152	VERTICAL MINISERIES	
# 25		43 56.4	13 3.3	RMT 8		NIGHT	FLOW DIST. 3.58 KM.	
8507	5/ 4	43 54.4	12 57.7	RMT 1	705- 800	0329-0429	VERTICAL MINISERIES	
# 26		43 53.5	12 54.8	RMT 8		NIGHT	FLOW DIST. 3.71 KM.	
8507	5/ 4	43 52.0	12 48.8	RMT 1	800- 900	0727-0827	VERTICAL MINISERIES	
# 27		43 51.2	12 46.0	RMT 8		DAY	FLOW DIST. 3.46 KM.	
8507	5/ 4	43 49.2	12 39.4	RMT 1	700- 800	1014-1118	VERTICAL MINISERIES	
# 28		43 48.1	12 35.8	RMT 8		DAY	FLOW DIST. 4.47 KM.	

STN.	DATE 1974	POSITION LAT N	POSITION LONG W	GEAR	DEPTH (M)	FISHING TIME GMT	REMARKS	LOCAL TIME GMT
8507 # 29	5/ 4	43 46.9 43 46.1	12 31.9 12 29.8	RMT 1 RMT 8	550- 700	1227-1305 DAY	HAUL ABORTED-NET TOWED TOO FAST	
8507 # 30	5/ 4	43 46.1 43 47.1	12 29.5 12 32.2	RMT 1 RMT 8	600- 700	1414-1514 DAY	VERTICAL MINISERIES FLOW DIST. 4.02 KM.	
8507 # 31	5/ 4	43 47.9 43 48.9	12 34.2 12 36.7	RMT 1 RMT 8	3- 100	1555-1655 DAY	VERTICAL MINISERIES FLOW DIST. 3.58 KM.	
8507 # 32	5/ 4	43 49.6 43 50.9	12 38.5 12 41.3	RMT 1 RMT 8	205- 300	1725-1825 DAY	VERTICAL MINISERIES FLOW DIST. 3.76 KM.	
8507 # 33	5/ 4	43 51.6 43 51.7	12 44.5 12 47.7	RMT 1 RMT 8	605- 700	2018-2118 NIGHT	VERTICAL MINISERIES FLOW DIST. 3.12 KM.	
8507 # 34	5/ 4	43 52.1 43 55.4	12 49.1 12 44.3	TSD PUMP FL CM	25- 25	2242-0320 NIGHT	CHLOROPHYLL A/TURBULENCE EXPT.	
8507 # 35	6/ 4	43 56.1 43 57.0	12 42.7 12 41.6	TSD PUMP FL CM	15- 15	0415-0615 NIGHT	CHLOROPHYLL A/TURBULENCE EXPT.	
8507 # 36	6/ 4	44 1.5 44 0.9	12 45.3 12 47.4	RMT 1 RMT 8	100- 200	0805-0905 DAY	VERTICAL MINISERIES FLOW DIST. 3.66 KM.	
8507 # 37	6/ 4	44 2.0 44 3.4	12 45.5 12 43.7	RMT 1 RMT 8	95- 110	1001-1101 DAY	100M. 48 HR. SERIES NO.1 FLOW DIST. 3.12 KM.	
8507 # 38	6/ 4	44 1.8 44 4.3	12 45.9 12 42.4	RMT 1 RMT 8	90- 110	1204-1304 DAY	100M. 48 HR. SERIES NO.2 FLOW DIST. 3.48 KM.	
8507 # 39	6/ 4	44 2.5 44 3.7	12 43.8 12 41.3	RMT 1 RMT 8	95- 110	1404-1504 DAY	100M. 48 HR. SERIES NO.3 FLOW DIST. 3.75 KM.	

STN.	DATE 1974	POSITION LAT N	POSITION LONG W	GEAR	DEPTH (M)	FISHING TIME GMT	REMARKS	LOCAL TIME GMT
8507	6/ 4	44 1.6	12 47.0	RMT 1	95- 109	1629-1729	100M. 48 HR. SERIES NO.4	
# 40		44 3.1	12 44.6	RMT 8		DAY	FLOW DIST. 3.75 KM.	
8507	6/ 4	44 2.9	12 44.8	RMT 1	96- 112	1801-1901	100M. 48 HR. SERIES NO.5	
# 41		44 1.6	12 46.9	RMT 8		DUSK	FLOW DIST. 3.30 KM.	
8507	6/ 4	44 1.1	12 47.7	RMT 1	95- 111	1922-2023	100M. 48 HR. SERIES NO.6	
# 42		43 59.8	12 50.4	RMT 8		DUSK	FLOW DIST. 3.75 KM.	
8507	6/ 4	44 0.0	12 50.6	RMT 1	95- 112	2052-2152	100M. 48 HR. SERIES NO.7	
# 43		44 1.6	12 48.7	RMT 8		NIGHT	FLOW DIST. 2.94 KM.	
8507	6/ 4	44 2.5	12 47.7	RMT 1	95- 105	2219-2320	100M. 48 HR. SERIES NO.8	
# 44		44 4.4	12 45.6	RMT 8		NIGHT	FLOW DIST. 3.25 KM.	
8507	7/ 4	44 2.3	12 45.2	RMT 1	92- 110	0017-0117	100M. 48 HR. SERIES NO.9	
# 45		44 4.2	12 42.5	RMT 8		NIGHT	FLOW DIST. 3.85 KM.	
8507	7/ 4	44 2.7	12 46.0	RMT 1	93- 105	0224-0324	100M. 48 HR. SERIES NO.10	
# 46		44 4.5	12 43.8	RMT 8		NIGHT	FLOW DIST. 3.58 KM.	
8507	7/ 4	44 4.9	12 43.3	RMT 1	96- 105	0406-0506	100M. 48 HR. SERIES NO.11	
# 47		44 3.3	12 46.0	RMT 8		NIGHT	FLOW DIST. 3.48 KM.	
8507	7/ 4	44 4.3	12 44.8	RMT 1	93- 110	0551-0654	100M. 48 HR. SERIES NO.12	
# 48		44 6.3	12 42.3	RMT 8		DAWN	FLOW DIST. 3.84 KM.	
8507	7/ 4	44 7.0	12 42.0	RMT 1	95- 110	0718-0819	100M. 48 HR. SERIES NO.13	
# 49		44 8.7	12 43.7	RMT 8		DAY	FLOW DIST. 3.75 KM.	
8507	7/ 4	44 1.6	12 43.4	RMT 1	93- 110	1028-1128	100M. 48 HR. SERIES NO.14	
# 50		44 3.4	12 45.0	RMT 8		DAY	FLOW DIST. 3.48 KM.	
8507	7/ 4	44 1.7	12 44.7	RMT 1	90- 107	1223-1324	100M. 48 HR. SERIES NO.15	
# 51		44 3.7	12 46.3	RMT 8		DAY	FLOW DIST. 3.75 KM.	

STN.	DATE 1974	POSITION LAT N	LONG W	GEAR	DEPTH (M)	FISHING TIME GMT	REMARKS	LOCAL TIME GMT
8507	7/ 4	44 1.3	12 45.6	TSD	0-1000	1450-1613	NUTRIENT SAMPLES	
# 52		44 2.1	12 45.3	MS				
8507	7/ 4	44 2.6	12 45.7	RMT 1	90- 105	1632-1732	100M. 48 HR. SERIES NO.16	
# 53		44 4.9	12 48.0	RMT 8		DAY	FLOW DIST. 4.02 KM.	
8507	7/ 4	44 5.1	12 48.2	RMT 1	90- 110	1756-1856	100M. 48 HR. SERIES NO.17	
# 54		44 3.5	12 47.1	RMT 8		DAY	FLOW DIST. 4.20 KM.	
8507	7/ 4	44 3.0	12 46.8	RMT 1	90- 110	1915-2015	100M. 48 HR. SERIES NO.18	
# 55		44 1.4	12 45.7	RMT 8		DUSK	FLOW DIST. 3.39 KM.	
8507	7/ 4	44 1.5	12 45.7	RMT 1	94- 107	2045-2145	100M. 48 HR. SERIES NO.19	
# 56		44 2.4	12 45.8	RMT 8		NIGHT	FLOW DIST. 3.48 KM.	
8507	7/ 4	44 0.2	12 44.0	RMT 1	90- 110	2301-0001	100M. 48 HR. SERIES NO.20	
# 57		44 2.7	12 47.7	RMT 8		NIGHT	FLOW DIST. 3.85 KM.	
8507	8/ 4	44 1.6	12 45.6	RMT 1	95- 110	0128-0228	100M. 48 HR. SERIES NO.21	
# 58		44 2.8	12 48.9	RMT 8		NIGHT	FLOW DIST. 4.02 KM.	
8507	8/ 4	44 1.7	12 46.0	RMT 1	95- 105	0356-0456	100M. 48 HR. SERIES NO.22	
# 59		44 3.1	12 48.6	RMT 8		NIGHT	FLOW DIST. 3.94 KM.	
8507	8/ 4	44 2.5	12 47.5	RMT 1	94- 107	0552-0652	100M. 48 HR. SERIES NO.23	
# 60		44 4.0	12 50.2	RMT 8		DAWN	FLOW DIST. 3.75 KM.	
8507	8/ 4	44 4.7	12 51.3	RMT 1	95- 110	0718-0818	100M. 48 HR. SERIES NO.24	
# 61		44 6.5	12 54.0	RMT 8		DAY	FLOW DIST. 3.94 KM.	
8507	8/ 4	44 6.3	12 54.3	RMT 1	95- 110	0848-0948	100M. 48 HR. SERIES NO.25	
# 62		44 4.5	12 54.0	RMT 8		DAY	FLOW DIST. 3.12 KM.	
8507	8/ 4	44 0.5	12 52.2	RMT 1	300- 400	1210-1410	REPEAT 2	
# 63		43 57.0	12 50.0	RMT 8		DAY	FLOW DIST. 6.46 KM.	

STN.	DATE 1974	POSITION LAT N	POSITION LONG W	GEAR	DEPTH (M)	FISHING TIME GMT	REMARKS	LOCAL TIME GMT
8507	8/ 4	43 55.4	12 48.9	RMT 1	405- 500	1502-1702	REPEAT 2	
# 64		43 51.3	12 46.5	RMT 8		DAY	FLOW DIST. 6.68 KM.	
8507	8/ 4	43 50.6	12 49.6	RMT 1	605- 700	1816-1901	TEST FOR RED MONITOR	
# 65		43 51.1	12 53.6	RMT 8		DAY	FLOW DIST. 2.66 KM.	
8507	8/ 4	43 52.8	12 56.2	RMT 1	510- 600	2036-2236	REPEAT 2	
# 66		43 55.6	13 1.5	RMT 8		NIGHT	FLOW DIST. 7.42 KM.	
8507	8/ 4	43 56.9	13 4.2	RMT 1	405- 500	2333-0133	REPEAT 2	
# 67		43 58.7	13 9.5	RMT 8		NIGHT	FLOW DIST. 7.48 KM.	
8507	9/ 4	43 58.2	13 9.0	RMT 1	305- 400	0231-0431	REPEAT 2	
# 68		43 55.4	13 3.6	RMT 8		NIGHT	FLOW DIST. 7.14 KM.	
8507	9/ 4	43 57.7	12 54.1	TSD	0-1500	0556-0745	NUTRIENT SAMPLES-RED MONITOR CALIBR.	
# 69		43 57.8	12 54.3	MS				
8507	9/ 4	43 58.2	12 52.5	RMT 1	500- 600	0825-1025	REPEAT 2	
# 70		43 59.6	12 47.2	RMT 8		DAY	FLOW DIST. 6.78 KM.	
8507	9/ 4	44 0.5	12 44.6	RMT 1	0- 40	1126-1612	NET ANGLE MEASUREMENTS	
# 71		44 3.4	12 32.0	RMT 8		DAY		
8507	9/ 4	44 4.1	12 28.0	RMT 1	1250-1500	1748-2148		
# 72		44 5.2	12 15.7	RMT 8			FLOW DIST. 13.80 KM.	
8507	10/ 4	44 1.9	12 10.9	RMT 1	1550-2000	0103-0603		
# 73		43 55.7	12 26.8	RMT 8		NIGHT	FLOW DIST. 18.64 KM.	
8507	10/ 4	43 59.6	12 43.0	RMT 1	243- 260	0910-1010	250M.48HR.SERIES NO.26-NO RMT8 CATCH	
# 74		43 58.1	12 45.3	RMT 8		DAY	FLOW DIST. 3.41 KM.	
8507	10/ 4	44 3.4	12 43.1	RMT 1	240- 260	1200-1300	250M. 48 HR. SERIES NO.27	
# 75		44 1.5	12 45.0	RMT 8		DAY	FLOW DIST. 3.51 KM.	

STN.	DATE 1974	POSITION LAT N	LONG W	GEAR	DEPTH (M)	FISHING TIME GMT	REMARKS	LOCAL TIME GMT
8507	10/ 4	44 3.4	12 48.5	RMT 1	250- 260	1448-1548	250M.48HR.# NO.28-RMT8 DID NOT CLOSE	
# 76		44 2.0	12 50.7	RMT 8		DAY	FLOW DIST. 3.62 KM.	
8507	10/ 4	44 4.3	12 46.3	RMT 1	240- 260	1710-1810	250M. 48 HR. SERIES NO.29	
# 77		44 2.7	12 47.7	RMT 8		DAY	FLOW DIST. 3.30 KM.	
8507	10/ 4	44 3.0	12 47.4	RMT 1	240- 260	1935-2035	250M. 48 HR. SERIES NO.30	
# 78		44 3.7	12 44.8	RMT 8		DUSK	FLOW DIST. 3.06 KM.	
8507	10/ 4	44 3.2	12 44.9	RMT 1	244- 255	2117-2217	250M. 48 HR. SERIES NO.31	
# 79		44 1.2	12 46.4	RMT 8		NIGHT	FLOW DIST. 3.68 KM.	
8507	10/ 4	44 0.3	12 46.9	RMT 1	232- 262	2309-0009	250M. 48 HR. SERIES NO.32	
# 80		44 1.4	12 42.8	RMT 8		NIGHT	FLOW DIST. 3.62 KM.	
8507	11/ 4	44 3.8	12 45.4	RMT 1	238- 255	0150-0250	250M. 48 HR. SERIES NO.33	
# 81		44 1.7	12 46.2	RMT 8		NIGHT	FLOW DIST. 3.73 KM.	
8507	11/ 4	44 1.3	12 45.4	RMT 1	240- 260	0331-0431	250M. 48 HR. SERIES NO.34	
# 82		44 1.7	12 42.5	RMT 8		NIGHT	FLOW DIST. 2.97 KM.	
8507	11/ 4	44 3.4	12 42.5	RMT 1	242- 262	0543-0643	250M. 48 HR. SERIES NO.35	
# 83		44 2.0	12 44.8	RMT 8		DAWN	FLOW DIST. 3.70 KM.	
8507	11/ 4	44 1.0	12 46.2	RMT 1	240- 255	0724-0824	250M. 48 HR. SERIES NO.36	
# 84		43 59.4	12 48.7	RMT 8		DAY	FLOW DIST. 4.20 KM.	
8507	11/ 4	43 59.5	12 48.6	RMT 1	240- 260	0908-1008	250M. 48 HR. SERIES NO.37	
# 85		44 0.2	12 46.0	RMT 8		DAY	FLOW DIST. 3.37 KM.	
8507	11/ 4	44 3.9	12 46.4	RMT 1	240- 260	1128-1228	250M. 48 HR. SERIES NO.38	
# 86		44 3.4	12 49.5	RMT 8		DAY	FLOW DIST. 3.51 KM.	
8507	11/ 4	44 3.3	12 48.8	RMT 1	249- 260	1314-1415	250M. 48 HR. SERIES NO.39	
# 87		44 2.8	12 45.7	RMT 8		DAY	FLOW DIST. 3.19 KM.	

STN.	DATE 1974	POSITION LAT N	LONG W	GEAR	DEPTH (M)	FISHING TIME GMT	REMARKS	LOCAL TIME GMT
8507	11/ 4	44 2.6	12 45.8	RMT 1	240- 260	1449-1549	250M. 48 HR. SERIES NO.40	
# 88		44 2.1	12 48.0	RMT 8		DAY	FLOW DIST. 3.20 KM.	
8507	11/ 4	44 4.9	12 47.3	RMT 1	245- 260	1706-1806	250M. 48 HR. SERIES NO.41	
# 89		44 4.5	12 50.6	RMT 8		DAY	FLOW DIST. 3.51 KM.	
8507	11/ 4	44 4.4	12 50.5	RMT 1	240- 265	1909-2016	250M.48HR.#NO.42-NET CLOSE DIFFICULT	
# 90		44 3.7	12 47.3	RMT 8		DUSK	FLOW DIST. 3.63 KM.	
8507	11/ 4	44 2.4	12 40.0	RMT 1	240- 260	2245-2345	250M. 48 HR. SERIES NO.43	
# 91		44 2.3	12 44.2	RMT 8		NIGHT	FLOW DIST. 4.14 KM.	
8507	12/ 4	44 3.8	12 44.7	RMT 1	240- 260	0058-0158	250M. 48 HR. SERIES NO.44	
# 92		44 3.3	12 41.3	RMT 8		NIGHT	FLOW DIST. 3.56 KM.	
8507	12/ 4	44 3.2	12 41.4	RMT 1	240- 260	0238-0340	250M. 48 HR. SERIES NO.45	
# 93		44 2.8	12 44.2	RMT 8		NIGHT	FLOW DIST. 3.91 KM.	
8507	12/ 4	44 2.4	12 46.6	RMT 1	240- 265	0419-0519	250M. 48 HR. SERIES NO.46	
# 94		44 1.7	12 50.8	RMT 8		NIGHT	FLOW DIST. 3.73 KM.	
8507	12/ 4	44 1.5	12 50.3	RMT 1	245- 260	0555-0655	250M. 48 HR. SERIES NO.47	
# 95		44 1.1	12 47.0	RMT 8		DAWN	FLOW DIST. 3.51 KM.	
8507	12/ 4	44 5.8	12 45.4	RMT 1	235- 260	0903-1003	250M. 48 HR. SERIES NO.48	
# 96		44 8.0	12 44.1	RMT 8		DAY	FLOW DIST. 3.62 KM.	
8507	12/ 4	44 8.7	12 44.0	TSD	0-1000	1029-1208	NUTRIENT SAMPLES	
# 97		44 9.1	12 44.8	MS				
8508	12/ 4	44 10.2	12 42.7	RMT 1	1005-1250	1413-1814		
# 1		44 17.2	12 37.7	RMT 8		DAY	FLOW DIST. 11.77 KM.	
8508	12/ 4	44 20.5	12 36.1	RMT 1	640-1250	2008-0047	NET WOULDN'T CLOSE 'TIL HAUL TO 640M	
# 2		44 30.7	12 30.1	RMT 8		NIGHT	FLOW DIST. 18.50 KM.	

STN.	DATE 1974	POSITION LAT N	POSITION LONG W	GEAR	DEPTH (M)	FISHING TIME GMT	REMARKS	LOCAL TIME GMT
8508	13/ 4	44 29.0	12 29.9	RMT 1	1000-1250	0239-0639		
# 3		44 21.0	12 31.5	RMT 8		NIGHT	FLOW DIST. 12.24 KM.	
8508	13/ 4	44 3.5	12 43.3	RMT 1	590- 610	0950-1050	600M. 48 HR. SERIES NO.49	
# 4		44 2.4	12 40.8	RMT 8		DAY	FLOW DIST. 2.97 KM.	
8508	13/ 4	44 2.6	12 41.2	RMT 1	590- 610	1211-1311	600M. 48 HR. SERIES NO.50	
# 5		44 3.5	12 43.9	RMT 8		DAY	FLOW DIST. 2.99 KM.	
8508	13/ 4	44 3.5	12 43.8	RMT 1	590- 610	1422-1522	600M. 48 HR. SERIES NO.51	
# 6		44 2.4	12 40.7	RMT 8		DAY	FLOW DIST. 2.72 KM.	
8508	13/ 4	44 2.4	12 40.9	RMT 1	590- 610	1628-1730	600M. 48 HR. SERIES NO.52	
# 7		44 3.1	12 43.9	RMT 8		DAY	FLOW DIST. 3.34 KM.	

STN.	DATE 1974	POSITION LAT N	LONG W	GEAR	DEPTH (M)	FISHING TIME GMT	REMARKS	LOCAL TIME GMT
8508	13/ 4	44 3.2	12 44.8	RMT 1	580- 610	1914-2014	600M. 48 HR. SERIES NO. 53	
# 8		44 1.5	12 42.6	RMT 8		DUSK	FLOW DIST. 2.63 KM.	
8508	13/ 4	44 3.5	12 43.9	RMT 1	525- 610	2134-2234	600M. 48 HR. SERIES NO. 54	
# 9		44 5.9	12 47.7	RMT 8		NIGHT		
8508	13/ 4	44 6.6	12 46.9	RMT 1	590- 610	2347-0047	600M. 48 HR. SERIES NO. 55	
# 10		44 5.8	12 44.4	RMT 8		NIGHT	FLOW DIST. 3.20 KM.	
8508	14/ 4	44 4.8	12 40.8	RMT 1	586- 610	0149-0250	600M. 48 HR. SERIES NO. 56	
# 11		44 3.4	12 37.2	RMT 8		NIGHT	FLOW DIST. 3.41 KM.	
8508	14/ 4	44 3.2	12 39.1	RMT 1	590- 620	0349-0449	600M. 48 HR. SERIES NO. 57	
# 12		44 3.6	12 42.0	RMT 8		NIGHT	FLOW DIST. 3.01 KM.	
8508	14/ 4	44 4.3	12 44.7	RMT 1	590- 610	0551-0651	600M. 48 HR. SERIES NO. 58	
# 13		44 4.8	12 47.9	RMT 8		DAWN	FLOW DIST. 3.34 KM.	
8508	14/ 4	44 4.4	12 47.9	RMT 1	590- 610	0756-0856	600M. 48 HR. SERIES NO. 59	
# 14		44 3.4	12 45.3	RMT 8		DAY	FLOW DIST. 2.83 KM.	
8508	14/ 4	44 3.0	12 45.7	RMT 1	590- 610	1007-1107	600M. 48 HR. SERIES NO. 60	
# 15		44 3.7	12 48.6	RMT 8		DAY	FLOW DIST. 2.92 KM.	
8508	14/ 4	44 3.7	12 48.5	RMT 1	590- 610	1209-1309	600M. 48 HR. SERIES NO. 61	
# 16		44 2.7	12 46.4	RMT 8		DAY	FLOW DIST. 2.10 KM.	
8508	14/ 4	44 2.7	12 46.9	RMT 1	590- 612	1416-1503	600M.48HR.# NO.62-CLOSED PREMATURELY	
# 17		44 3.4	12 49.0	RMT 8		DAY	FLOW DIST. 2.21 KM.	
8508	14/ 4	44 3.3	12 48.1	RMT 1	590- 612	1603-1703	600M. 48 HR. SERIES NO. 63	
# 18		44 2.5	12 45.5	RMT 8		DAY	FLOW DIST. 2.97 KM.	
8508	14/ 4	44 1.7	12 46.0	RMT 1	590- 610	1819-1919	600M. 48 HR. SERIES NO. 64	
# 19		44 1.4	12 48.8	RMT 8		DAY	FLOW DIST. 2.92 KM.	

STN.	DATE 1974	POSITION LAT N	LONG W	GEAR	DEPTH (M)	FISHING TIME GMT	REMARKS	LOCAL TIME GMT
8508	14/ 4	44 1.1	12 48.7	RMT 1	590- 610	2027-2127	600M. 48 HR. SERIES NO. 65	
# 20		44 0.5	12 46.0	RMT 8		NIGHT	FLOW DIST. 2.83 KM.	
8508	14/ 4	43 59.8	12 42.6	RMT 1	590- 615	2227-2327	600M. 48 HR. SERIES NO. 66	
# 21		43 59.2	12 39.5	RMT 8		NIGHT	FLOW DIST. 2.74 KM.	
8508	15/ 4	44 0.7	12 40.3	RMT 1	590- 615	0032-0132	600M. 48 HR. SERIES NO. 67	
# 22		44 2.0	12 42.4	RMT 8		NIGHT	FLOW DIST. 2.88 KM.	
8508	15/ 4	44 3.5	12 44.6	RMT 1	590- 610	0232-0332	600M. 48 HR. SERIES NO. 68	
# 23		44 5.1	12 46.5	RMT 8		NIGHT	FLOW DIST. 3.15 KM.	
8508	15/ 4	44 4.9	12 46.5	RMT 1	590- 612	0427-0527	600M. 48 HR. SERIES NO. 69	
# 24		44 3.6	12 44.8	RMT 8		NIGHT	FLOW DIST. 2.51 KM.	
8508	15/ 4	44 2.1	12 42.9	RMT 1	590- 612	0625-0725	600M. 48 HR. SERIES NO. 70	
# 25		44 0.5	12 41.2	RMT 8		DAWN	FLOW DIST. 3.20 KM.	
8508	15/ 4	44 0.1	12 42.0	RMT 1	585- 610	0835-0935	600M. 48 HR. SERIES NO. 71	
# 26		44 1.6	12 44.3	RMT 8		DAY	FLOW DIST. 3.25 KM.	
8508	15/ 4	44 3.6	12 47.1	RMT 1	500- 600	1041-1243	REPEAT 3	
# 27		44 7.4	12 52.3	RMT 8		DAY	FLOW DIST. 8.00 KM.	
8508	15/ 4	44 8.9	12 54.1	RMT 1	400- 500	1336-1536	REPEAT 3	
# 28		44 12.6	12 58.1	RMT 8		DAY	FLOW DIST. 6.96 KM.	
8508	15/ 4	44 14.4	12 59.0	RMT 1	305- 400	1625-1825	REPEAT 3	
# 29		44 19.0	13 2.2	RMT 8		DAY	FLOW DIST. 7.74 KM.	
8508	15/ 4	44 19.9	13 2.3	TSD	0-1000	1851-1958	NUTRIENT SAMPLES	
# 30		44 20.1	13 2.2	MS				
8508	15/ 4	44 18.3	13 2.9	RMT 1	505- 600	2047-2247	REPEAT 3	
# 31		44 13.4	13 4.2	RMT 8		NIGHT	FLOW DIST. 7.50 KM.	

STN.	DATE 1974	POSITION LAT N	POSITION LONG W	GEAR	DEPTH (M)	FISHING TIME GMT	REMARKS	LOCAL TIME GMT
8508	15/ 4	44 10.6	13 5.1	RMT 1	405- 500	2347-0147	REPEAT 3	
# 32		44 6.4	13 7.1	RMT 8		NIGHT	FLOW DIST. 7.32 KM.	
8508	16/ 4	44 4.8	13 7.6	RMT 1	302- 400	0235-0435	REPEAT 3	
# 33		44 0.4	13 9.2	RMT 8		NIGHT	FLOW DIST. 7.14 KM.	
8508	16/ 4	43 59.4	13 9.5	WB 7.4	0-2000	0515-0646	TRACE METAL SAMPLES	
# 34		43 59.6	13 9.5					
8508	16/ 4	43 59.8	13 9.6	TSD	0-3000	0708-1014	BLUE MONITOR RANGE 3 CALIBRATION	
# 35		43 59.9	13 9.7	MS				
8508	16/ 4	44 0.3	13 7.0	RMT 1	435- 465	1102-1202	NO FLOW	
# 36		44 0.8	13 3.1	RMT 8		DAY		
8508	16/ 4	44 1.5	12 57.0	TSD	0- 80	1409-1448	LIGHT METER TEST	
# 37		44 1.6	12 56.9	LMD		DAY		
8508	16/ 4	44 1.7	12 52.9	RMT 1	530- 820	1614-1915	FLOWMETER CALIBR.-CATCH DISCARDED	
# 38		44 1.1	12 44.4	RMT 8		DAY		
8508	16/ 4	44 0.6	12 43.9	TSD	0- 75	2120-2348	VERTICAL PROFILE OF FLUORESCENCE	
# 39		44 0.0	12 45.5	PUMP		NIGHT		
				FL				
				CM				
8508	17/ 4	43 59.7	12 46.0	RMT 8/25HS	0- 175	0027-0151	TOWED AT 2-5 KNOTS	
# 40		44 5.5	12 49.1			NIGHT		
8508	17/ 4	44 6.1	12 49.5	RMT 8/25HS	0- 175	0203-0357	TOWED AT 2-6 KNOTS-TOP BAR BROKEN	
# 41		44 16.2	12 54.1			NIGHT		
8508	17/ 4	44 16.6	12 54.3	RMT 8/25HS	0- 135	0421-0618	TOWED AT 2-5 KNOTS	
# 42		44 7.2	12 51.1			NIGHT		
8508	17/ 4	44 3.6	12 47.4	RMT 1	440- 460	0717-0818	450M. 48 HR. SERIES NO. 72	
# 43		44 3.5	12 44.6	RMT 8		DAY	FLOW DIST. 2.75 KM.	

STN.	DATE 1974	POSITION LAT N	POSITION LONG W	GEAR	DEPTH (M)	FISHING TIME GMT	REMARKS	LOCAL TIME GMT
8508	17/ 4	44 2.8	12 42.6	RMT 1	440- 465	0909-1010	450M. 48 HR. SERIES NO. 73	
# 44		44 1.7	12 40.7	RMT 8		DAY	FLOW DIST. 2.65 KM.	
8508	17/ 4	44 1.6	12 41.1	RMT 1	440- 460	1102-1202	450M. 48 HR. SERIES NO. 74	
# 45		44 2.6	12 44.0	RMT 8		DAY	FLOW DIST. 2.78 KM.	
8508	17/ 4	44 4.0	12 46.9	RMT 1	440- 460	1306-1406	450M. 48 HR. SERIES NO. 75	
# 46		44 5.0	12 48.9	RMT 8		DAY	FLOW DIST. 2.74 KM.	
8508	17/ 4	44 4.6	12 48.3	RMT 1	440- 465	1502-1602	450M. 48 HR. SERIES NO. 76	
# 47		44 2.7	12 46.8	RMT 8		DAY	FLOW DIST. 2.65 KM.	
8508	17/ 4	44 1.0	12 45.4	RMT 1	440- 460	1655-1755	450M. 48 HR. SERIES NO. 77	
# 48		43 59.0	12 44.2	RMT 8		DAY	FLOW DIST. 3.01 KM.	
8508	17/ 4	43 59.1	12 45.2	RMT 1	440- 460	1851-1951	450M. 48 HR. SERIES NO. 78	
# 49		44 0.4	12 48.0	RMT 8		DUSK	FLOW DIST. 3.30 KM.	
8508	17/ 4	44 1.6	12 50.6	RMT 1	440- 460	2045-2145	450M. 48 HR. SERIES NO. 79	
# 50		44 2.7	12 53.6	RMT 8		NIGHT	FLOW DIST. 2.94 KM.	
8508	17/ 4	44 2.7	12 53.9	RMT 1	440- 465	2241-2341	450M. 48 HR. SERIES NO. 80	
# 51		44 1.8	12 50.9	RMT 8		NIGHT	FLOW DIST. 2.92 KM.	
8508	18/ 4	44 1.3	12 48.7	RMT 1	440- 460	0030-0130	450M. 48 HR. SERIES NO. 81	
# 52		44 0.7	12 46.0	RMT 8		NIGHT	FLOW DIST. 3.01 KM.	
8508	18/ 4	44 1.7	12 46.8	RMT 1	440- 470	0224-0324	450M. 48 HR. SERIES NO. 82	
# 53		44 3.7	12 49.5	RMT 8		NIGHT	FLOW DIST. 3.25 KM.	
8508	18/ 4	44 6.1	12 51.0	RMT 1	440- 460	0430-0530	450M. 48 HR. SERIES NO. 83	
# 54		44 8.3	12 52.7	RMT 8		NIGHT	FLOW DIST. 3.01 KM.	
8508	18/ 4	44 8.0	12 51.5	RMT 1	440- 460	0628-0728	450M. 48 HR. SERIES NO. 84	
# 55		44 6.4	12 49.5	RMT 8		DAWN	FLOW DIST. 3.01 KM.	

STN.	DATE 1974	POSITION LAT N	LONG W	GEAR	DEPTH (M)	FISHING TIME GMT	REMARKS	LOCAL TIME GMT
8508	18/ 4	44 5.0	12 47.7	RMT 1	435- 465	0823-0923	450M. 48 HR. SERIES NO. 85	
# 56		44 3.6	12 46.1	RMT 8		DAY	FLOW DIST. 2.97 KM.	
8508	18/ 4	44 2.2	12 43.9	RMT 1	425- 460	1017-1117	450M. 48 HR. SERIES NO. 86	
# 57		44 0.8	12 42.1	RMT 8		DAY	FLOW DIST. 2.97 KM.	
8508	18/ 4	44 2.4	12 41.5	RMT 1	440- 470	1219-1319	450M. 48 HR. SERIES NO. 87	
# 58		44 4.5	12 43.2	RMT 8		DAY		
8508	18/ 4	44 6.7	12 43.7	RMT 1	440- 460	1415-1515	450M. 48 HR. SERIES NO. 88	
# 59		44 8.8	12 44.5	RMT 8		DAY		
8508	18/ 4	44 8.8	12 45.4	RMT 1	440- 460	1610-1710	450M. 48 HR. SERIES NO. 89	
# 60		44 7.0	12 45.8	RMT 8		DAY		
8508	18/ 4	44 5.1	12 46.0	RMT 1	440- 460	1808-1908	450M. 48 HR. SERIES NO. 90	
# 61		44 3.1	12 46.7	RMT 8		DAY		
8508	18/ 4	44 3.4	12 47.9	RMT 1	440- 460	2007-2107	450M. 48 HR. SERIES NO. 91	
# 62		44 5.0	12 49.5	RMT 8		DUSK		
8508	18/ 4	44 6.5	12 50.3	RMT 1	440- 460	2158-2258	450M. 48 HR. SERIES NO. 92	
# 63		44 8.6	12 51.4	RMT 8		NIGHT		
8508	18/ 4	44 8.8	12 51.2	RMT 1	440- 460	2346-0046	450M. 48 HR. SERIES NO. 93	
# 64		44 7.2	12 49.9	RMT 8		NIGHT		
8508	19/ 4	44 6.2	12 48.8	RMT 1	440- 460	0133-0233	450M. 48 HR. SERIES NO. 94	
# 65		44 4.8	12 47.3	RMT 8		NIGHT		
8508	19/ 4	44 3.7	12 45.9	RMT 1	440- 465	0323-0423	450M. 48 HR. SERIES NO. 95	
# 66		44 2.3	12 44.6	RMT 8		NIGHT		
8508	19/ 4	44 3.0	12 43.9	RMT 1	440- 460	0530-0630	450M. 48 HR. SERIES NO. 96	
# 67		44 5.0	12 44.9	RMT 8		DAWN		

STN.	DATE 1974	POSITION LAT N	LONG W	GEAR	DEPTH (M)	FISHING TIME GMT	REMARKS	LOCAL TIME GMT
8508	19/ 4	44 6.7	12 45.6	RMT 1	440- 460	0718-0819	450M. 48 HR. SERIES NO. 97	
# 68		44 8.8	12 46.6	RMT 8		DAY		
8508	19/ 4	44 10.9	12 47.2	RMT 1	505- 600	0919-1119	REPEAT 4	
# 69		44 14.8	12 48.5	RMT 8		DAY	FLOW DIST. 3.42 KM.	
8508	19/ 4	44 17.0	12 49.1	RMT 1	400- 500	1218-1418	REPEAT 4	
# 70		44 20.6	12 50.2	RMT 8		DAY	FLOW DIST. 3.30 KM.	
8508	19/ 4	44 22.2	12 50.4	RMT 1	300- 395	1510-1710	REPEAT 4	
# 71		44 25.5	12 51.7	RMT 8		DAY	FLOW DIST. 3.05 KM.	
8508	19/ 4	44 26.0	12 51.9	TSD	0-1000	1800-1921	NUTRIENT SAMPLES	
# 72		44 25.9	12 52.1	MS				
8508	19/ 4	44 27.3	12 52.3	RMT 1	505- 600	2110-2310	REPEAT 4	
# 73		44 30.8	12 54.6	RMT 8		NIGHT	FLOW DIST. 3.05 KM.	
8508	20/ 4	44 30.3	12 55.4	RMT 1	400- 500	0012-0212	REPEAT 4	
# 74		44 26.1	12 55.6	RMT 8		NIGHT	FLOW DIST. 3.42 KM.	
8508	20/ 4	44 24.3	12 55.8	RMT 1	305- 400	0255-0455	REPEAT 4	
# 75		44 20.2	12 56.7	RMT 8		NIGHT	FLOW DIST. 3.55 KM.	
8508	20/ 4	44 16.6	12 57.5	RMT 1	2000-2500	0641-1141		
# 76		44 8.5	12 57.4	RMT 8		DAY	FLOW DIST. 12.80 KM.	
8508	20/ 4	44 2.8	12 57.3	RMT 1	610- 975	1443-1758	FLOWMETER INTERCALIBRATION	
# 77		44 9.1	12 57.2	RMT 8		DAY		
8508	20/ 4	44 16.0	12 56.9	RMT 1	2500-3100	2118-0718		
# 78		44 29.4	12 41.7	RMT 8		NIGHT	FLOW DIST. 32.19 KM.	

STN.	DATE 1974	POSITION LAT N	POSITION LONG W	GEAR	DEPTH (M)	FISHING TIME GMT	REMARKS	LOCAL TIME GMT
8509	25/ 4	44 5.2	12 44.1	TSD	0-1000	0902-1037	NUTRIENT SAMPLES	
# 1		44 5.1	12 44.6	MS				
8509	25/ 4	44 5.1	12 44.6	WB 7.4	0-2000	1057-1220	TRACE METAL SAMPLES	
# 2		44 4.9	12 44.8					
8509	25/ 4	44 5.0	12 45.2	TSD	0- 79	1250-1332	LIGHT METER TEST	
# 3		44 5.0	12 45.5	LMD				
8509	25/ 4	44 8.0	12 48.0	RMT 1	735-1170	1510-1909	FLOWMETER CALIBRATION-RMT1 TO SMBA	
# 4		44 15.8	12 54.9	RMT 8		DAY		
8509	25/ 4	44 16.8	12 54.8	RMT 1	500- 600	2051-2252	REPEAT 5	
# 5		44 13.5	12 50.7	RMT 8		NIGHT	FLOW DIST. 6.86 KM.	
8509	26/ 4	44 11.7	12 48.6	RMT 1	408- 500	0000-0200	REPEAT 5	
# 6		44 8.4	12 44.2	RMT 8		NIGHT	FLOW DIST. 6.86 KM.	
8509	26/ 4	44 7.6	12 42.9	RMT 1	0- 90	0234-0302	ABORTED-WOULDN'T CLOSE-CATCH TO SMBA	
# 7		44 7.0	12 41.7	RMT 8		NIGHT		
8509	26/ 4	44 5.3	12 39.5	RMT 1	0-1000	0408-0520	OBLIQUE TOW	
# 8		44 3.2	12 37.3	RMT 8			FLOW DIST. 3.54 KM.	
8509	26/ 4	44 2.6	12 38.9	RMT 1	0- 600	0652-0956	NET FAILED TO CLOSE-CATCH TO SMBA	
# 9		44 4.8	12 48.7	RMT 8		DAY		
8509	26/ 4	44 5.0	12 51.0	RMT 1	505- 600	1048-1248	REPEAT 5	
# 10		44 6.3	12 58.0	RMT 8		DAY	FLOW DIST. 7.72 KM.	
8509	26/ 4	44 6.7	13 0.4	RMT 1	400- 510	1346-1546	REPEAT 5	
# 11		44 7.8	13 6.0	RMT 8		DAY	FLOW DIST. 7.08 KM.	
8509	26/ 4	44 8.5	13 9.6	RMT 1	305- 400	1651-1851	REPEAT 5	
# 12		44 9.7	13 14.9	RMT 8		DAY	FLOW DIST. 7.32 KM.	

STN.	DATE 1974	POSITION LAT N	POSITION LONG W	GEAR	DEPTH (M)	FISHING TIME GMT	REMARKS	LOCAL TIME GMT
8509	26/ 4	44 10.2	13 16.7	RMT 1	135- 165	1929-2025	MATERIALS HAUL	
# 13		44 10.4	13 18.9	RMT 8		DUSK	FLOW DIST. 2.87 KM.	
8509	26/ 4	44 10.5	13 17.9	RMT 1	300- 400	2108-2310	REPEAT 5	
# 14		44 10.4	13 11.5	RMT 8		NIGHT	FLOW DIST. 7.06 KM.	
8509	27/ 4	44 10.9	13 3.7	RMT 1	2000-2500	0126-0626		
# 15		44 13.8	12 49.0	RMT 8		NIGHT	FLOW DIST. 17.34 KM.	
8509	27/ 4	44 14.3	12 45.3	TSD	0- 100	0836-1054	NUTRIENT SAMPLES EVERY 10M.-1' PROD.	
# 16		44 13.6	12 46.2	MS PUMP FL		DAY		
8509	27/ 4	44 13.5	12 46.3	TSD	0- 79	1130-1158	LIGHT METER TEST	
# 17		44 13.3	12 46.4	LMD		DAY		
8509	27/ 4	44 14.5	12 46.9	RMT 1	475-1000	1337-1601	SMBA TOW	
# 18		44 19.9	12 48.4	RMT 8		DAY	FLOW DIST. 7.87 KM.	
8509	27/ 4	44 24.4	12 49.2	RMT 1	1000-1500	1759-2024	SMBA TOW	
# 19		44 29.6	12 49.3	RMT 8			FLOW DIST. 7.49 KM.	
8509	28/ 4	44 27.1	12 44.2	RMT 1	3000-3500	0012-0531		
# 20		44 18.4	12 34.0	RMT 8		NIGHT	FLOW DIST. 17.54 KM.	
8509	28/ 4	44 26.4	12 43.2	NN3	0- 0	0045-0115		
# 21		44 25.7	12 42.0			NIGHT		
8509	28/ 4	44 22.9	12 38.4	NN3	0- 0	0300-0330		
# 22		44 22.0	12 37.4			NIGHT		
8509	28/ 4	44 15.3	12 34.0	RMT 1	780- 820	0822-1022		
# 23		44 16.3	12 40.5	RMT 8		DAY	FLOW DIST. 7.40 KM.	
8509	28/ 4	44 16.5	12 40.3	RMT 1	775- 820	1138-1338		
# 24		44 16.9	12 35.0	RMT 8		DAY	FLOW DIST. 6.28 KM.	

STN.	DATE 1974	POSITION LAT N	LONG W	GEAR	DEPTH (M)	FISHING TIME GMT	REMARKS	LOCAL TIME GMT
8509	28/ 4	44 16.5	12 37.2	RMT 1	780- 820	1522-1722		
# 25		44 16.5	12 43.3	RMT 8		DAY	FLOW DIST. 7.10 KM.	
8509	28/ 4	44 16.4	12 42.7	RMT 1	780- 825	1852-2052		
# 26		44 15.7	12 36.4	RMT 8		DUSK	FLOW DIST. 6.36 KM.	
8509	29/ 4	44 14.4	12 42.7	RMT 1	3500-4000	0013-1030		
# 27		44 12.3	13 10.2	RMT 8			FLOW DIST. 29.31 KM.	
8509	29/ 4	44 6.5	13 14.7	RMT 1	210- 500	1509-1718	SMBA TOW	
# 28		44 2.3	13 12.5	RMT 8		DAY	FLOW DIST. 7.22 KM.	
8509	29/ 4	44 0.4	13 11.3	RMT 1	212- 300	1816-1931	MATERIALS HAUL	
# 29		43 58.0	13 9.5	RMT 8			FLOW DIST. 4.28 KM.	
8509	29/ 4	43 55.6	13 5.6	RMT 1	515-1000	2101-2303	SMBA TOW	
# 30		43 53.3	13 0.5	RMT 8		NIGHT	FLOW DIST. 6.26 KM.	
8509	30/ 4	43 51.5	12 59.6	RMT 1	207- 500	0001-0215	SMBA TOW	
# 31		43 46.6	13 0.7	RMT 8		NIGHT	FLOW DIST. 7.17 KM.	
8509	30/ 4	43 45.4	13 1.3	RMT 1	5- 200	0244-0411	SMBA TOW	
# 32		43 42.2	13 2.0	RMT 8		NIGHT	FLOW DIST. 5.09 KM.	
8509	30/ 4	43 41.5	13 2.3	RMT 1	50-1000	0430-0550		
# 33		43 38.6	13 4.2	RMT 8		DAWN	FLOW DIST. 3.96 KM.	
8509	30/ 4	43 38.4	13 4.2	RMT 1	510- 600	0705-0905	REPEAT 6	
# 34		43 41.5	12 59.4	RMT 8		DAY	FLOW DIST. 6.86 KM.	
8509	30/ 4	43 43.1	12 56.6	RMT 1	400- 500	1008-1208	REPEAT 6	
# 35		43 45.1	12 51.3	RMT 8		DAY	FLOW DIST. 7.20 KM.	
8509	30/ 4	43 45.2	12 50.4	TSD	0- 145	1259-1339	LIGHT METER TEST	
# 36		43 45.0	12 50.5	LMD		DAY		

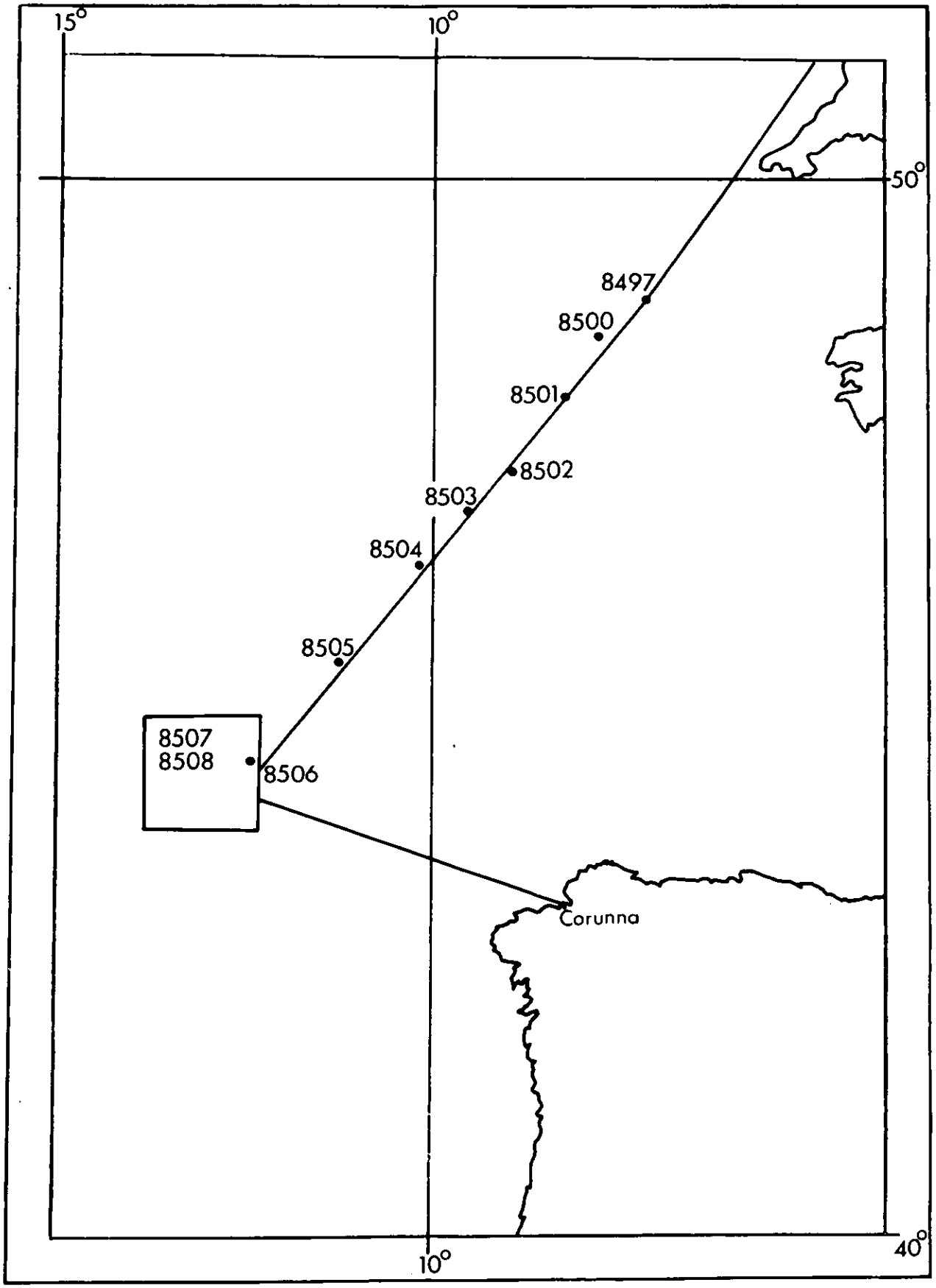
STN.	DATE 1974	POSITION LAT N	POSITION LONG W	GEAR	DEPTH (M)	FISHING TIME GMT	REMARKS	LOCAL TIME GMT
8509	30/ 4	43 45.8	12 49.6	RMT 1	305- 400	1420-1620	REPEAT 6	
# 37		43 48.1	12 45.0	RMT 8		DAY	FLOW DIST. 6.98 KM.	
8509	30/ 4	43 48.3	12 44.2	TSD	0-1000	1649-1816	NUTRIENT SAMPLES	
# 38		43 48.2	12 44.0	MS				
8509	30/ 4	43 48.1	12 44.0	WB 7.4	0-2000	1835-2012	TRACE METAL SAMPLES	
# 39		43 47.8	12 43.6					
8509	30/ 4	43 46.3	12 44.9	RMT 1	500- 600	2101-2301	REPEAT 6	
# 40		43 42.8	12 48.2	RMT 8		NIGHT	FLOW DIST. 7.08 KM.	
8509	1/ 5	43 40.9	12 50.5	RMT 1	400- 500	0002-0202	REPEAT 6	
# 41		43 37.5	12 54.6	RMT 8		NIGHT	FLOW DIST. 7.16 KM.	
8509	1/ 5	43 36.3	12 56.2	RMT 1	300- 400	0246-0446	REPEAT 6 -RMT8 ABORTIVE	
# 42		43 32.9	13 0.6	RMT 8		NIGHT	FLOW DIST. 6.76 KM.	
8509	1/ 5	43 33.8	12 58.4	RMT 1	1500-4650	0637-1500	SMBA TOW	
# 43		43 45.9	12 40.4	RMT 8		DAY	FLOW DIST. 27.75 KM.	
8509	1/ 5	43 48.2	12 37.0	RMT 1	5- 200	1727-1857	SMBA TOW	
# 44		43 47.2	12 32.9	RMT 8		DAY	FLOW DIST. 4.96 KM.	
8509	1/ 5	43 46.9	12 31.7	LMM	0- 90	1924-2000	LIGHT METER TEST	
# 45		43 46.9	12 31.0			DUSK		
8509	1/ 5	43 48.2	12 31.5	RMT 1	305- 400	2101-2301	REPEAT 6	
# 46		43 52.5	12 34.0	RMT 8		NIGHT	FLOW DIST. 7.76 KM.	
8510	4/ 5	39 46.0	12 40.3	RMT 1	500- 600	0943-1143		
# 1		39 48.3	12 36.4	RMT 8		DAY	FLOW DIST. 7.40 KM.	
8510	4/ 5	39 48.7	12 35.6	LMD	0- 150	1223-1300	LIGHT METER TEST	
# 2		39 48.5	12 35.8			DAY		

STN.	DATE 1974	POSITION LAT N	POSITION LONG W	GEAR	DEPTH (M)	FISHING TIME GMT	REMARKS	LOCAL TIME GMT
8510	4/ 5	39 49.2	12 34.5	RMT 1	405- 500	1355-1555		
# 3		39 51.6	12 30.9	RMT 8		DAY	FLOW DIST. 6.86 KM.	
8510	4/ 5	39 53.0	12 29.1	RMT 1	310- 410	1650-1850		
# 4		39 56.1	12 25.4	RMT 8		DAY	FLOW DIST. 7.30 KM.	
8510	4/ 5	39 57.0	12 24.8	RMT 1	0-1000	1911-2032	OBLIQUE TOW	
# 5		39 59.6	12 22.0	RMT 8		DUSK	FLOW DIST. 4.05 KM.	
8510	4/ 5	40 1.7	12 18.0	RMT 1	605- 700	2210-0010		
# 6		40 4.3	12 13.2	RMT 8		NIGHT	FLOW DIST. 7.28 KM.	
8510	5/ 5	40 5.8	12 9.3	RMT 1	700- 800	0144-0344		
# 7		40 7.4	12 4.6	RMT 8		NIGHT	FLOW DIST. 6.68 KM.	
8510	5/ 5	40 8.1	12 3.6	RMT 1	100- 200	0426-0526		
# 8		40 8.9	12 2.2	RMT 8		DAWN	FLOW DIST. 3.08 KM.	
8511	5/ 5	41 54.9	11 15.7	BN 2.4/5	2384-2399	1948-2037		
# 1		41 54.3	11 14.8					
8511	6/ 5	41 49.6	11 6.0	BN 2.4/5	2574-2584	0246-0316		
# 2		41 49.1	11 5.4					
8511	6/ 5	41 48.4	11 4.8	NN3	0- 0	0358-0428		
# 3		41 47.8	11 4.4			NIGHT		
8511	6/ 5	41 48.0	11 4.7	TSD	0-1000	0736-0831		
# 4		41 48.0	11 4.9					
8511	6/ 5	41 47.7	11 5.8	TSD	0- 100	0937-1229	FLUORESCENCE PROFILE-NUTRIENTS	
# 5		41 45.7	11 8.2	LMD PUMP FL		DAY		
8512	6/ 5	42 18.5	11 26.6	BN 2.4/5	1872-1884	1900-1930		
# 1		42 17.5	11 26.0					

STN.	DATE 1974	POSITION LAT N	POSITION LONG W	GEAR	DEPTH (M)	FISHING TIME GMT	REMARKS	LOCAL TIME GMT
8512	6/ 5	42 13.7	11 26.0	BCAM	1935-1950	2251-0001	19 FRAMES EXPOSED	
# 2		42 13.5	11 26.3					
8512	7/ 5	42 13.5	11 26.8	TSD	0- 100	0052-0123	LIGHT METER TESTS	
# 3		42 13.5	11 27.0	LMD		NIGHT		
				LMM				
8512	7/ 5	42 15.2	11 35.2	BN 2.4/5	2281-2465	0405-0450		
# 4		42 15.4	11 36.9					
8513	7/ 5	42 39.7	11 43.0	BN 2.4/5	755- 759	1054-1124		
# 1		42 39.1	11 42.5					
8513	7/ 5	42 40.9	11 43.7	BN 2.4/5	761- 765	1414-1444		
# 2		42 41.8	11 44.8					
8513	7/ 5	42 48.8	11 49.7	BN 2.4/5	955- 955	1833-1911	WEAK LINK BROKEN MID WAY THROUGH TOW	
# 3		42 48.5	11 50.6					
8513	7/ 5	42 47.7	11 52.8	BCAM	0- 0	2039-2138	CAMERA FAILED	
# 4		42 47.3	11 53.0					
8513	7/ 5	42 47.1	11 53.7	TSD	0- 100	2209-0021	FLUORESCENCE PROFILE-1 HR. AT 100M.	
# 5		42 46.1	11 56.0	PUMP		NIGHT		
				FL				
8513	8/ 5	42 46.1	11 56.3	TSD	0- 100	0045-0134	FLUORESCENCE PROFILE & LIGHT METERS	
# 6		42 46.1	11 56.8	LMD		NIGHT		
				LMM				
				PUMP				
8513	8/ 5	42 46.0	11 57.4	TSD	20- 20	0217-0455	CHLOROPHYLL A/TURBULENCE EXPERIMENT	
# 7		42 47.0	11 57.9	PUMP		NIGHT		
				FL				
				CM				

STN.	DATE 1974	POSITION LAT N	POSITION LONG W	GEAR	DEPTH (M)	FISHING TIME GMT	REMARKS	LOCAL TIME GMT
8513	8/ 5	42 47.1	11 58.0	TSD	45- 45	0457-0711	CHLOROPHYLL A/TURBULENCE EXPERIMENT	
# 8		42 48.6	11 58.7	PUMP		DAWN		
				FL				
				CM				
8514	8/ 5	43 7.7	11 10.1	BN 2.4/5	2622-2632	1400-1500		
# 1		43 7.9	11 11.6					
8515	8/ 5	43 24.7	11 42.2	RMT 8/25HS	0- 173	1953-2220	FISHING DEPTH CA.170M.	
# 1		43 32.8	11 54.2			NIGHT		
8515	8/ 5	43 33.2	11 54.6	RMT 8/25HS	0- 134	2236-0109	FISHING DEPTH CA.130M.	
# 2		43 42.4	12 5.6			NIGHT		
8515	9/ 5	43 43.0	12 5.7	RMT 8/25HS	0- 110	0132-0340	FISHING DEPTH CA. 90M.	
# 3		43 50.3	12 13.7			NIGHT		
8516	9/ 5	43 59.0	12 49.4	RMT 1	1400-1500	1256-1417	TERMINATED EARLY DUE TO BAD WEATHER	
# 1		43 56.9	12 45.6	RMT 8		DAY	FLOW DIST. 5.60 KM.	
8516	10/ 5	43 42.9	13 12.7	TSD	0-1000	0638-0731		
# 2		43 43.4	13 13.2					
8516	10/ 5	43 43.7	13 13.1	WB 7.4	0-2000	0747-0950	TRACE METAL SAMPLES	
# 3		43 41.2	13 12.3					
8516	10/ 5	43 42.4	13 22.7	RMT 1	500- 600	2108-2308	REPEAT 7	
# 4		43 45.8	13 18.9	RMT 8		NIGHT	FLOW DIST. 7.10 KM.	
8516	11/ 5	43 47.3	13 17.8	RMT 1	400- 500	0002-0202	REPEAT 7	
# 5		43 50.8	13 14.9	RMT 8		NIGHT	FLOW DIST. 6.86 KM.	
8516	11/ 5	43 51.6	13 15.0	RMT 1	300- 400	0239-0439	REPEAT 7	
# 6		43 55.4	13 12.6	RMT 8		NIGHT	FLOW DIST. 6.69 KM.	
8516	11/ 5	43 56.0	13 8.6	RMT 1	500- 600	0625-0825	REPEAT 7	
# 7		44 0.0	13 10.4	RMT 8		DAY	FLOW DIST. 6.94 KM.	

STN.	DATE 1974	POSITION LAT N	POSITION LONG W	GEAR	DEPTH (M)	FISHING TIME GMT	REMARKS	LOCAL TIME GMT
8516	11/ 5	44 1.8	13 12.0	RMT 1	400- 500	0923-1123	REPEAT 7	
# 8		44 5.4	13 15.5	RMT 8		DAY	FLOW DIST. 7.64 KM.	
8516	11/ 5	44 7.0	13 16.3	RMT 1	300- 400	1212-1412	REPEAT 7	
# 9		44 12.1	13 18.1	RMT 8		DAY	FLOW DIST. 8.89 KM.	
8516	11/ 5	44 9.3	13 16.7	TSD	0-1000	2324-0037	NUTRIENT SAMPLES	
# 10		44 9.1	13 16.1	MS				
8516	12/ 5	44 8.3	13 14.2	RMT 1	200- 300	0150-0350		
# 11		44 8.2	13 9.0	RMT 8		NIGHT	FLOW DIST. 6.60 KM.	
8516	12/ 5	44 3.8	13 12.3	RMT 1	600- 700	0946-1146		
# 12		44 8.1	13 10.5	RMT 8		DAY	FLOW DIST. 6.72 KM.	
8516	12/ 5	44 8.9	13 10.3	RMT 1	0-1000	1220-1354	OBLIQUE TOW	
# 13		44 4.6	13 7.2	RMT 8		DAY	FLOW DIST. 5.36 KM.	
8516	12/ 5	44 2.0	13 4.5	RMT 1	700- 800	1537-1737		
# 14		43 58.8	13 0.6	RMT 8		DAY	FLOW DIST. 6.50 KM.	
8516	12/ 5	43 59.6	13 0.3	RMT 1	805- 900	1902-2102		
# 15		44 3.7	13 2.8	RMT 8		DUSK	FLOW DIST. 6.94 KM.	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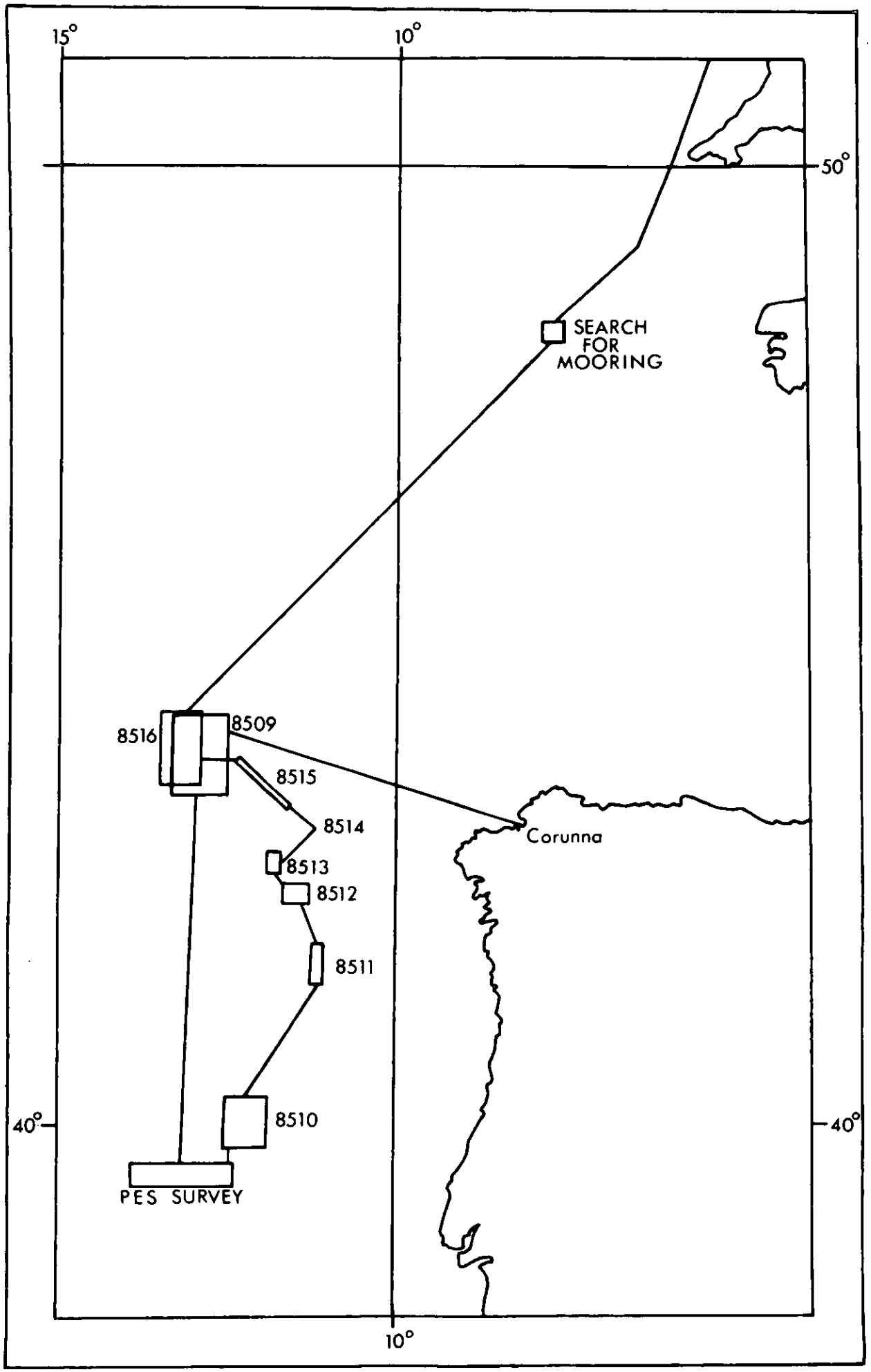
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