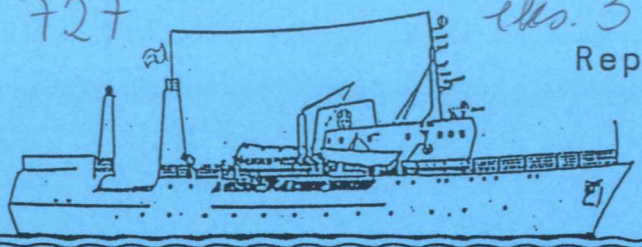

Reports on Surveys with the
R/V DR. Fridtjof Nansen

REPORT on the

R/V DR. FRIDTJOF NANSEN FISH RESOURCE SURVEYS OFF WEST AFRICA: MOROCCO TO SIERRA LEONE. AUGUST - DECEMBER 1986.

PART I
FINAL REPORT

NORAD - FAO/UNDP GL082/001

IMR, Bergen

REPORT ON THE R/V DR FRIDTJOF NANSEN FISH RESOURCE SURVEYS OFF WEST AFRICA: MOROCCO TO SIERRA LEONE, AUGUST - DECEMBER 1986.

Note.

This report has been prepared by T.Strømme and G.Sætersdal, Institute of Marine Research, Bergen with the assistence of O. Alvheim and H. Ullebust. Chapter 2 with the account of the intercalibration experiments is based on a report prepared by J. J. Levenez, P. Oliver and I. Svellingen.

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PREFACE

Within the framework of the NORAD/FAO/UNDP Project GLO/82/001 arrangements were made for the R/V DR FRIDTJOF NANSEN to work off NW Africa during August - September and November-December 1986. The Committee for the Eastern Central Atlantic Fisheries, CECAF had also received an offer for the services at about this time of surveys with the Spanish research vessel CORNIDE DE SAAVEDRA. The CECAF Programme decided to make use of the presence of these two vessels to organize a cooperative acoustic survey jointly with national institutions in the region. A similar cooperative survey had been successfully conducted in 1981.

The detailed plans for the cooperative survey were worked out at a special planning meeting organized by CECAF at Tenerife 7 - 9 April 1986. The main part of the planned work was successfully completed. This report presents the main findings of the intercalibration experiments undertaken between the research vessels and of the survey work with the DR FRIDTJOF NANSEN. Brief preliminary Cruise Reports which outlined the work done and the main findings were issued upon completion of each cruise and distributed by CECAF. A data file listing the catch records, biological data and some tabulations is also made available for further processing both in a printed version and in computer storage form.

CHAPTER 1. INTRODUCTION

1.1 Objectives

The CECAF Cooperative Survey had two principal aims: a) To obtain the best possible description of the composition, distribution and abundance of small pelagic fish along the coastal shelf from Morocco to Benin; and b) To contribute to methodological advancement of acoustic survey techniques in the area through intercalibration exercises and other special experiments. The plans included participation of research vessels from Morocco, Mauritania and Senegal in addition to the two non-

region vessels. The Moroccan vessel unfortunately had to be withdrawn from the programme for technical reasons.

1.2 Plan and conduct of the surveys.

The plan agreed for the August - September cruise of the DR FRIDTJOF NANSEN was as follows:

August 8 - 25: Survey Sherbro Isl. - Cape Roxo with possible overlap Senegambia and trawl coverage off the Gambia.

August 26 - September 13: Intercalibration programme and acoustic development work Senegambia - Mauritania in a joint operation with LOUIS SAUGER, N'DIAGO and CORNIDE DE SAAVEDRA.

September 15 - 28: Intercalibration programme and acoustic development work Morocco.

The plan for the six weeks cruise November - mid December for the DR FRIDTJOF NANSEN aimed at an complete as possible coverage of all the main stocks in the area and joint work with the Moroccan vessel, and with LOUIS SAUGER and N'DIAGO.

The course tracks with fishing stations for Surveys I and II are shown in Annex 1 and 2 respectively. Table 1 shows the details of the survey efforts spent on the various parts of the coast.

From the CECAF countries the following participated in Survey I:

Sierra Leone: P.A.T.Showers, I.E.Bangura
Guinea: S.Kouyate, Cheik Ahmed Bangura
Guinea-Bissau: A.P.J.Da Silva
The Gambia: J.Ndene, Anna Lloyd Evans
Senegal: B.Samb

Morocco: Mostafa Idrissi Chbani, Mbarek Zouiri

In Survey II participation was as follows:
Mauritania: Ibrahim S.Ba, Aliou Dia Mamaoudou
Morocco: Mostafa Idrissi Chbani

The staff from IMR were:

Survey I: T.Strømme, G.Sætersdal, A.Abella,O.Alvheim, K.Strømsnes, T. Haugland, E.Molvær,

Survey II: I.Svellingen, A.Abella, O.Alvheim, Ø.Torgersen, T.Mørk.

Table 1. Details of investigational efforts in the two surveys.

Survey	Country	Dates	Days	Distance sailed nm	Number of fishing stations
I	S.Leone	Aug. 19-21	3	300	17
I	Guinea	" 21-25	5	800	32
I	G.Bissau	" 25-27	3	590	19
		Sep. 7- 9	3	700	22
I	Senegal	Aug.28-Sp.5	9	1470	27
I	Gambia	Sep. 10-12	3	180	24
I	Maurit.	Sep. 14-17	3	670	10
I	Morocco	Sp.23-Oct.4	12	2000	44
II	Morocco	Nov. 6-13	8	1000	23
II	G.Bissau	Nov. 23-26	4	700	16
II	Gambia	Nov. 27-29	3	300	23
II	Senegal	Dec. 2- 7	6	750	18
II	Maurit.	Dec. 7-12	6	1000	19

1.3 Methods of investigation.

The main survey effort was spent in investigating the pelagic schooling fish using acoustic integration technique combined with fishing with bottom - and mid water trawls for identification and sampling. Fish near the surface and very close to the bottom are not properly observed with this system. Horizontal ranging sonar was used to observe surface schooling fish, but such observations are not easily quantifiable in terms of measure of biomass. To include bottom dwelling fish a programme of prelocated trawls stations was worked off Sierra Leone, Guinea, Guinea Bissau and the Gambia to provide data for swept area assessments.

The reliability of acoustic techniques in providing estimates of biomass is under continuous review by the scientific community. The intercalibration experiments described in Chapter 2 form a contribution to this process. Opportunities were also taken during the surveys of doing repeated survey coverages of assumed identical biomasses of fish over a time interval of a few days to test the consistency of the resulting estimates. The results which are described in a special report (see Strømme and Sætersdal, 1987) showed that the consistency of the results is high. This does not, however, preclude the possibility of systematic bias in the results deriving for instance from such factors as surface schooling of fish and vessel avoidance. A general problem is also the incomplete information on the target strength of the species surveyed. For the pelagic fish biomass estimates are based on an assumption of a target strength similar to that of the European herring. Another limitation is found in the incomplete coverage of inshore waters by the survey, since the parts of the shelf shallower than about 10 fathoms could not be navigated by the vessel.

The overall effects of these various limitations are thought to lead to an underestimation of the biomass.

The identification of the targets recorded by the acoustic integration system represents an important problem. The basis for this step is the composition of the catches in hauls with bottom - and mid water trawls together with an evaluation of the characteristics of the echo traces. Because the catchability of fish is highly species- and size dependent the catch data must be used with considerable reservations and in areas where many species occur in mixture, identification can only be made by relatively broad groups. Some species occur however in distributional patches or in larger continuous aggregations and this facilitates the identification. The integrator values were allocated to the following groups:

Clupeids and anchovies;
Carangids, scombrids, barracudas etc.;
Triggerfish;
Demersal fish in mid water.

The swept area trawl survey method used to assess the bottom

dwelling demersal fish carries with it a special problem of estimation viz. which value to assign to the catchability quotient, q. We have used 1 which implies that all fish in the path of the gear are caught and contained in the catch. It seems however likely that part of the fish escape through the meshes and over or under the trawl and that this may exceed the herding effect of the sweep wires. The assumption q = 1 thus probably results in underestimates of biomass.

All catches were sampled for species so that a total composition by weight could be estimated. The most common species were sampled for size.

A record of the acoustic instruments and their calibration is presented in Appendix 1 together with a description of the fishing gears.

CHAPTER 2 RESULTS OF THE INTERCALIBRATION EXPERIMENTS.

2.1 Introduction

For cooperative surveys it is imperative to have detailed and accurate information on the acoustic instruments and systems used by the participating vessels and to harmonize their use. Only then can one expect to achieve results which are comparable between vessels, fit for a joint total analysis and which can be related to set standards. To this end, all cooperative surveys should include a special programme of instrument calibration and comparisons at different levels. This chapter describes the intercalibration programme for the CECAF 1986 Cooperative Surveys. The participating vessels in these surveys were:

From Spain: CORNIDE DE SAAVEDRA ;60m; Simrad EK400 38/120kHz, QD
From Senegal: LOUIS SAUGER ;36m; Biosonics 101, 120kHz
From Mauritania: N'DIAGO 35m; Simrad EK400 38kHz, Agenor
From Norway: DR FRIDTJOF NANSEN ;50m; Simrad EK400 38/120kHz, QD, QM

A planned participation from Morocco had to be cancelled

due to technical problems with the vessel.

The following elements of calibrations and system comparisons can be identified:

1) Measurements of the electrical properties of the instrument components.
2) Measurements of the on-axis sensitivity of the echo sounding- and integrating system.
3) Time-varied gain function of the receiver.
4) Equivalent beam angle of the transducer.

For a final biomass estimate by groups of species comes in addition:

5) Difference in echo integrator output caused by difference in sound frequency used (if any).
6) Estimate of the part of the total integrator output caused by fish as apart from plankton and spurious echoes.
7) Estimates of the species-and size composition of the fish for conversion of integrator output to fish biomass by species or groups of species.

Points 1 through 3 can be dealt with by each vessel as a preparatory exercise to the cooperative survey. For comparability on-axis calibration should be undertaken by means of a standard target sphere.

By an intership calibration, i.e. having two or more ships sail over a common target, the same aggregations of fish or an even bottom and afterwards compare their acoustic observations, one can test the systems up to and including point 5.

The total systems can be compared by an inter-system calibration in which two or more vessels undertake a full simultaneous survey of the fish aggregations in a defined area under as far as possible identical conditions of fish behaviour and environment (mini-surveys). In this exercise the vessels should adopt agreed normal working procedures. If only one vessel has been absolutely calibrated inter-ship or inter-system calibration allows the others to be calibrated against it.

In order to obtain a good result of inter-ship calibration, it is necessary to find an area with layered or dispersed fish aggregations preferably of varying density and varying depth where simultaneous runs can be made in an appropriate formation of the vessels.

The success of an inter-ship calibration depends especially on the properties of the fish aggregations worked on. Favourable conditions of fish layers may be difficult to find. The sea bottom may be used as an alternative common target. One must then choose a fairly even bottom where variation in back scattering is not too irregular.

For the full system-intercalibration or simultaneous mini-surveys, two or more ships undertake a full survey of a defined area containing suitable aggregations of fish. Identical or similar survey-tracks should be followed and also the time coverage should be the same, particularly as regards day/night period of work. Fishing for identification and size sampling should form part of the exercise. System-calibration will cover the elements up to 7 listed above, but will in addition include some random survey variability since the ships will not work continuously close up as in inter-ship calibration. It will, however, include comparisons of important routines of both survey execution and data processing and will enable attempts to harmonize these.

2.2 Intership calibration using the sea bottom as common target

The four vessels were available for joint intercalibration exercises during some days at the end of August-beginning of September 1986. Detailed plans were agreed at a meeting in Dakar, 28 August. Since suitable fish aggregations had not been identified within easy reach, it was decided to base the intership calibrations on bottom back scattering. An area on the shelf north of Dakar was chosen and here successive runs were made with each of the four vessels over a distance of about 15 nm. The instrument settings used and the results are set out in Annex 1. These were discussed at various meetings of the participants and the findings are as follows:

Comparison DR FRIDTJOF NANSEN/CORNIDE DE SAAVEDRA

The expected difference from performance and settings would be 9.8 dB, but the data show a difference of about 11.6 dB. Possible causes were thought to be: a) Saturation in the DR FRIDTJOF NANSEN data; b) Different beam characteristics; c) Inaccurate calibration data. a) was tested by an experiment using full and 1/10 power in bottom integration on the shelf off Panama where the vessel operated in February. No saturation was detected. c) was tested by a new calibration experiment for the CORNIDE DE SAAVEDRA in which the level of SL + VR was found to be 131.4 dB, 1.6 dB higher than previously reported. The main difference between the results from the two systems is thus explained by the differences in performance and settings.

The experiments disclosed a difference in the readings of the nautical logs of the vessels, that of the CORNIDE DE SAAVEDRA giving some 10 per cent too high estimates of the distance. This would not affect the fish abundance estimates, but in order to obtain the best possible correlation in the intercalibration experiment, the two sets of values were plotted over an identical range and new pairs of observations selected. Figure 2.1 shows the regression of these observations. The correlation is good with r=0.93.

DR FRIDTJOF NANSEN-N'DIAGO

The difference found corresponded well with the estimates based on performance and settings. Figure 2.2 shows the regression with r=0.96.

LOUIS SAUGER

Although the results from this vessel demonstrated the same general trend as those from the other vessels, a more detailed comparison does not show a good correspondence. This is probably explained by different properties of bottom back scattering with a frequency of 120 KHz as compared with that of 38 KHz used by the other vessels. Further processings of these

data were therefore not attempted.

2.3 Intercalibration on fish layers

During the night 2nd-3rd August, a ship to ship intercalibration was made between DR FRIDTJOF NANSEN and LOUIS SAUGER south of Dakar in an area with fish layers and schools of varying density. Also plankton of varying density was present and recorded especially by the 38 KHz system. Three different runs were made of 12, 15 and 11 nm respectively and with interchange of lead vessel. Because of low fish- and high plankton values, the first two, four and five observations of each run were rejected. The remaining sets of observations are shown in Table 2.1. With rejection of three unlikely sets of data, the regression obtained is $M_{FN} = 1.9M_{LS} + 66$, $r = 0.96$, see Figure 2.3. Thus the estimates of abundance from DR FRIDTJOF NANSEN must be expected to be about twice those of LOUIS SAUGER.

Table 2.1. Records of observations from DR FRIDTJOF NANSEN and LOUIS SAUGER during ship to ship calibration 2nd-3rd August 1986. Units: m^2/nm^2

1st RUN		2nd RUN		3rd RUN	
LS	FN	LS	FN	LS	FN
48	70	147	440	279	670
79	70	263	920	695	1650
124	70	450	1380	2482	4550
71	70	274	180	2347	9850*
336	400	226	150	1282	3880
2639	4720	70	480		
102	290	131	260		
87	70	239	580		
290	70*	415	520		
		784	220*		

$M_{FN} = 1.9\ M_{LS} + 66$ $\quad r=0.96$

*Not used in regression.

2.4 System comparisons - mini surveys

Simultaneous comparative mini-surveys of defined shelf areas were made both north and south of Dakar. Figure 2.4 shows a

fish distribution chart of the area with indications of the species present (data from DR FRIDTJOF NANSEN). The distribution charts of all the vessels show the same main features.

Previous survey results from NW African waters have revealed that night-observations of fish biomass tend to be higher than observations made during the day. Although in general simultaneous, some difference in the day/night coverage of areas of fish occurrence may have taken place between the vessels and this could give rise to some variability.

Mini-Survey No.1: 28 August-1 September

The shelf north of Dakar between 15°00'and 15°35' was covered to 200 m depth by all four vessels in a nearly simultaneous operation. Data from the N'DIAGO have not yet been presented.

CORNIDE DE SAAVEDRA-DR FRIDTJOF NANSEN

The data processed independently gave the following indices of abundance (unit:m reflecting surface/square nm).

CORNIDE DE SAAVEDRA	132 390 m^2/nm^2
DR FRIDTJOF NANSEN	82 500 m^2/nm^2

Since this difference could not be caused by instrumentation, an exchange of acoustic data and echo diagrams was made. It appeared that heavy plankton recordings in the area had complicated the interpretation. The 120 KHz sounder is used by both vessels to help distinguish fish and plankton, but this instrument was temporarily out of use in the CORNIDE DE SAAVEDRA.

A "blind" processing of the DR FRIDTJOF NANSEN data and echo-diagrams by the Spanish team resulted in an abundance index of 71 710m^2/nm^2, a value somewhat lower than that obtained originally by DR FRIDTJOF NANSEN.

LOUIS SAUGER-DR FRIDTJOF NANSEN

The transformed observations resulted in the following indices:

LOUIS SAUGER	46 931 m^2/nm^2
DR FRIDTJOF NANSEN	82 500 m^2/nm^2

This relationship DR FRIDTJOF NANSEN = 1.75 x LOUIS SAUGER is not far from that obtained during the ship to ship intercalibration and this confirms the likelyhood of a difference in the performance of the systems not so far identified.

Mini-Survey No.2: 2-3 September

This took place south of Dakar between N 13°32.5' and 14°02.5' from 10 m of depth to W 17°20'. Night time survey was 30 per cent for both vessels. The distance steamed was 178 and 190 nm for LOUIS SAUGER and DR FRIDTJOF NANSEN respectively. The estimates of total fish abundance were:

LOUIS SAUGER	178 000 m^2/nm^2
DR FRIDTJOF NANSEN	689 000 m^2/nm^2

With a ratio of 3.87, this difference is considerably higher than that found during the intership test. It goes, however, in the same direction of higher estimates with the DR FRIDTJOF NANSEN.

2.5 Concluding remarks

The experience from this program of intercalibration and system comparisons, and the results obtained seem to allow the following conclusions to be drawn:

The sea bottom can serve as a suitable common target for intership testing of instruments, at least when a common frequency is used. The application of this method to instruments of

different frequencies must be the subject of further studies.

An intership calibration between two of the vessels involving three runs on schools and layers of small pelagic fish was successful in revealing an otherwise unidentified and unexplained difference of nearly 100 per cent which could be caused by a difference in the performance of the two vessels systems and/or a difference in data processing.

Comparison of the simultaneous results of the two vessels using the same instrument systems, CORNIDE DE SAAVEDRA and DR FRIDTJOF NANSEN first of all revealed the importance which must be attached to the process of distinguishing between back scattering from fish and from plankton and other non-fish sources. In tropical waters, plankton often represents a major source of "interference" when using frequencies of the order of 38 kHz. The use of an additional sounder of a higher frequency for identification of fish is therefore an advantage. Dual frequencies were only available to one of the vessels, and an analysis by the Spanish team of the data from DR FRIDTJOF NANSEN gave results largely similar to the original estimate.

The mini-survey comparison between LOUIS SAUGER and DR FRIDTJOF NANSEN for which a difference in output of about 100 per cent had been revealed, showed consistently higher abundance estimates for DR FRIDTJOF NANSEN, the ratios being 1.75 and 3.87. The latter is nearly the double of that established by inter-calibration, but obtained in an area with high density schools and resulting high variability of the estimates.

A final conclusion would be that the results clearly demonstrate the importance of giving programmes of intercalibration and other systems comparisons high priority in cooperative survey work.

CHAPTER 3. RESULTS OF THE SURVEYS; FINDINGS REGARDING THE COMPOSITION, DISTRIBUTION AND ABUNDANCE OF THE RESOURCES.

3.1 Introduction.

Based on their behaviour fish species are generally classified as demersal or pelagic. Although many demersal fish often occur in mid water and pelagic fish near the bottom, this is still a useful classification. In addition, the triggerfish which is mostly found by itself in mid water can easily be recognized in echo diagrams and sampled with fishing gear, and has been separately assessed in this report. The larger species of pelagic fish, tunas and billfishes are for methodical reasons not included in the survey.

The general features of the fish communities on the shelf off NW Africa are well known from the fisheries and from previous surveys. In the relatively cool waters in the north off Morocco the sardine, Sardina pilchardus dominates the pelagic community and is usually found together with mackerel, Scomber japonicus and horse mackerel, Trachurus trachurus. From Mauritania southwards the two sardinella species, round sardinella, Sardinella aurita and flat sardinella, Sardinella maderensis represent the clupeids while the carangids include the horse mackerel Trachurus trecae, the scads, Decapterus rhonchus and D. punctatus and the bumper, Chloroscombrus chrysurus among the most common. The triggerfish, Balistes capriscus occurs in the whole area, but appears in abundance from Guinea Bissau southwards.

The main species among the demersal fish from the Gambia to Sierra Leone include representatives of the grunts (Pomadasyidae), seabreams (Sparidae), croakers (Sciaenidae), catfishes (Ariidae), threadfins (Polynemidae) and others, and of cuttlefish (Sepia).

3.2 Sierra Leone, Guinea and Guinea Bissau.

This area was covered between 17 August and 10 September and Guinea Bissau a second time from 23 to 26 November 1986.

Small pelagic fish.

Figure 3.1 shows the distribution of fish as observed with the acoustic integration system for the August - September survey. The registrations are mainly made of small pelagic fish and the dominant feature is the aggregations over the middle- and outer parts of the shelf which for the greater part consisted of triggerfish, Balistes. The highest densities were recorded near the shelf edge in the border area between Guinea and Guinea Bissau, but generally the triggerfish was found in relatively loose formations in mid water and near the bottom. This species dominates, however, in the bottom trawl catches as shown in Datafile Table 6.1, appearing in abt. 70 per cent of all hauls and with 6 catches of abt. 4 tonnes or more per hour, one ranging above 20 tonnes per hour. The size composition of samples of trigger fish from August - September and November is shown in Annex VI. Medium sized fish dominate, but with sizes ranging beyond 30 cm.

Outside Freetown an area with aggregations of sardinellas was located. Samples contained both round- and flat sardinella, but the behaviour with almost exclusively surface schooling fish which extended onto the shallow St.Ann's shoals during the time of our survey did not permit a proper acoustic coverage of the fish. Counts on horizontal ranging sonar showed 10 schools per nautical mile. A purse seine fleet operated in the area.

Along the inner shallow part of the Guinea shelf several patches of pelagic fish were located. These consisted mostly of bumper (Chloroscombrus) with some scad (Decapterus), pompano (Alectis) and jacks (Caranx). The catches also contained smaller amounts of flat and round sardinellas, barracudas (Sphyraena) and Spanish mackerel (Scomberomorus). In the shallow waters, (20 - 30 m) catch rates of bumper ranged up to abt. 3 tonnes per hour in bottom trawl.

The false scad (Decapterus rhonchus) dominated among the small pelagics on the shelf outside the Bijagos Islands in Guinea Bissau with smaller quantities of barracudas, lookdown (Selene dorsalis), chub mackerel and others. The scad was caught by bottom trawl at intermediate depths, 20 - 60 m with catch rates ranging up to 4.5 tonnes per hour.

In the very shallow waters north of the Bissagos Islands,

African ilisha was the most common pelagic form, but also some hairtails (Trichiurus lepturus) occured here. Catches were however small for both species.

Size compositions of pooled samples of bumper, scads, jacks, barracudas and Spanish mackerel are given in Annex IV to show the prevailing sizes of these fish in the catches.

The acoustic estimate of the total biomass of small pelagic fish in the area from Freetown to Cape Roxo is shown in Table 3.1.

Table 3.1 Estimated biomass of pelagic fish based on acoustic survey data, 1 000 tonnes.Freetown to Cape Roxo, August - September 1986

Clupeids, carangids scombrids etc.	Trigger fish	Total
200	220	420

The 200 000 tonnes estimate for clupeids, carangids etc. is likely to be an underestimate, probably to a significant degree for the shallow water species such as ilisha, anchovy and bumper because of the large extent of inshore waters along this coast with depth less than the operational limit of the vessel. But also the sardinellas are underestimated since it was not possible to obtain an adequate acoustic coverage of the school area of this fish which was located off Freetown.

The total biomass of the trigger fish estimated at abt. 220 000 tonnes represents an acoustic assessment from day- and night surveying and may also be an underestimate since part of the fish is found near the bottom at least during daytime as evidenced by the often high catch rates in demersal trawl.

The abundance estimates will be further discussed under Chapter 4 below.

The fish distribution on the Guinea Bissau shelf in the November survey is shown in Figure 3.1. The trigger fish dominated the pelagic community outside the Bijagos Islands. Further north the samples consisted of various carangids, anchovy and Spanish mackerels. Catch rates apart from those for trigger fish were low. Estimates of biomass give 45 000 tonnes for trigger

fish and 65 000 tonnes for other small pelagics.

Demersal fish.

The demersal fish has generally a very scattered distribution and a species' distribution and abundance will not be properly mapped by the acoustic system. The only demersal species which formed aggregations recorded by the acoustic system, was the silverside grunt (Brachydeuterus auritus), located within 30 nm South of Cape Roxo, see Figure 3.1 .

During the first survey random trawl stations were set out to assess the demersal biomass by the swept area method. 73 trawl stations were worked out, of which 38 were in the 5-30m bottom depth stratum, 21 between 30 and 60m, 11 from 60 to 100m and 3 stations from 100 to 200m. The results from the analysis are shown in Table 3.2.

The overall mean density for the shelf is estimated to abt 11 tonnes/nm². By depth strata the mean densities are: 5-30m: ≈9 tonnes/nm² ; 30-60m : ≈15 tonnes/nm² ; 60-100m : ≈9 tonnes/nm² and 100-200m : 15 tonnes/nm². The last estimate has a low precision as based on three hauls only.

The dominating species is the flying gurnard (Dactylopterus volitans) making up abt 20% of the biomass of demersal fish. It has its principal distribution between 30 and 60m bottom depth. In regional abundance the species is followed by seabreams (Pagellus bellottii, Sparus caeruleostictus) 13%, cuttlefish (Sepia) 5% and silverside grunt (Brachydeuterus auritus) 4% .

Mean densities and predominant depth ranges for some commercially interesting species groups are as follows:

	Mean density tonnes/nm²	Main depth m
Flying gurnards	2.2	30-60
Seabreams	1.7	30-100
Cuttlefish	0.6	5-100
Groupers	0.2	60-100
Emperors	0.2	5-30
Shrimps	0.3	5-30
Silverside grunt	0.5	5-30
Other fish	5.8	

Estimates of abundance are obtained by multiplying the

Table 3.2 Swept-area analysis from the trawl survey between Freetown and Cape Roxo, August 1986.

PELAGIC SPECIES HAVE NOT BEEN INCLUDED IN THE ANALYSIS.

SPECIES NAME	CATCH DISTRIBUTION BY KG/NM GROUPS						% incidence	Mean dens. t/nm²	Mean densities by bottom depth strata t/nm²			
	<10	10-30	30-100	100-300	300-1000	>1000			5- 30m	30- 60m	60-100m	100-200
Dactylopterus volitans	14	2	2	3	2		32	2.23	0.75	6.25	0.27	
Pagellus bellottii	29	7	5	1			58	0.85	0.13	1.70	1.93	0.07
Sparus caeruleostictus	25	9	1	1			48	0.61	0.57	1.04	0.11	
Sepia sp	48	6	4				79	0.58	0.42	0.89	0.68	0.13
Brachydeuterus auritus	11	2	2	1			22	0.49	0.88	0.12		
Selene dorsalis	7	2	1	1			15	0.46	0.83	0.09		
Galeoides decadactylus	7	2	3				16	0.33	0.64			
Lagocephalus laevigatus	12	6		1			26	0.31	0.15	0.74	0.14	
Antigonia capros	1		1	1			4	0.28				6.80
Priacanthus arenatus	25	3	2				41	0.27	0.01	0.77	0.23	0.24
Sphyraena guachancho	17	4	1				30	0.24	0.36	0.16		
Epinephelus aeneus	7	1		1			12	0.21		0.06	1.25	
Mustelus mustelus	12	3					21	0.16	0.01	0.41	0.14	0.36
Lethrinus atlanticus	4	2	1				10	0.16	0.29	0.03		
Fistularia petimba	24	1					34	0.14	0.09	0.14	0.32	0.03
Pseudotolithus elongatus	2	3					7	0.13	0.24			
PASIPHAEIDAE			1				1	0.12	0.23			
Scomberomorus tritor	21	1					30	0.12	0.19	0.06	0.02	
Pseudupeneus prayensis	27	1					38	0.12	0.14	0.12	0.08	
Ariomma bondi	1	1	1				4	0.12				2.91
Alectis alexandrinus	9	3					16	0.11	0.10	0.19	0.03	
Trichiurus lepturus	6	4					14	0.10	0.19			0.03
Trachinus draco	4		1				7	0.10		0.02	0.64	
S H R I M P S			1				1	0.10	0.18			
Pseudotolithus senegalensis	2		1				4	0.10	0.19			
Hemicaranx bicolor	6		1				10	0.10	0.01	0.32		
Caranx senegallus	11	2					18	0.10	0.18	0.02		
Chelidonichthys lastoviza	12	2					19	0.09		0.12	0.37	
Trachinocephalus myops	29	1					41	0.09	0.12	0.09	0.02	
Dentex congoensis	1	1	1				3	0.09			0.54	0.29
Dentex angolensis	2	2	1				7	0.09			0.46	0.43
Pomadasys peroteti	4	3					10	0.08	0.16			
Shrimps small	3	2					7	0.07	0.14			
Pomadasys rogeri	1		1				3	0.07		0.25		
Sphoeroides cutaneus	2	3					7	0.06			0.28	0.38
Dentex barnardi	1		1				3	0.06		0.22		
Pteroscion peli	6	1					10	0.06	0.12			
Psettodes belcheri	14	1					21	0.06	0.12	0.01		
Chlorophthalmus atlanticus			1				1	0.06				1.49
Saurida brasiliensis	5	1					8	0.05		0.03	0.21	0.25
Pseudotolithus typus	6	1					10	0.05	0.10			
Raja miraletus	13	1					19	0.05		0.12	0.09	0.06
Scyacium micrurum	27						37	0.05	0.03	0.06	0.07	
Arius latiscutatus			1				1	0.05	0.10			
PENAEIDAE		1					1	0.02	0.04			
Parapenaeopsis atlantica	3						4	0.01	0.01	0.01		
Palaemon sp.	1						1					
Penaeus kerathurus	6						8		0.01			
Penaeus notialis	5						7		0.01			
Penaeus sp	1						1					
Parapenaeus longirostris	1						1					0.05
Plesionica sp.	1						1					
Other fish								1.09	1.15	0.61	1.57	1.75
Sum all species								10.89	8.89	14.65	9.45	15.27
Sum seabreams								1.71	0.70	2.96	3.11	0.79
Sum snappers								0.01		0.02		
Sum groupers								0.22		0.06	1.34	
Sum emperors								0.16	0.29	0.03		
Sum shrimps								0.25	0.48	0.01		0.05
Number of stations included in analysis, total and by depth strata								73	38	21	11	3

densities by the area of the shelf. The areas by depth zones have been calculated from seamaps by planimeter and are as follows:

0-30m	30-60m	60-200m
≈16350nm²	≈10000nm²	≈4700nm²

Biomass estimates by depth zones for the above species groups thus become, in tonnes:

	0-30m	30-60m	60-200m	0-200m
Flying gurnards	12250	62500	1000	75750
Seabreams	11500	29600	12300	53400
Groupers		600	4950	5550
Emperors	4700	300		5000
Cuttlefish	6850	8900	2650	18400
Shrimps	7850	100		7950
Silverside grunt	14400	1200		15600
Other fish	87850	43300	29400	160550
Total	145400	146500	50300	342200

The survey net covered roughly 70% of the shelf in the region, leaving 30% of the shelf unsurveyed due to navigational problems in the shallow waters. The estimates above are made under the assumption that the hauls made in the 5-30 m bottom depth zone are representative also for the unsurveyed waters. The total biomass is estimated to roughly 342 thousand tonnes. The acoustic estimate of the demersal fish in the region is roughly 55 thousand tonnes in the surveyed part. This is a considerable underestimate compared to the one based on swept area, even if a doubling of the figure is made to compensate for the unsurveyed areas. As mentioned above, the acoustic method is not precise on bottom dwelling species in dispersed distribution patterns.

3.3 Senegal, The Gambia, Mauritania.

The shelf off Senegambia was covered by an acoustic survey between 29 August and 5 September, and a swept area trawl survey was made off The Gambia between 10 and 12 September. The trawl survey was repeated off The Gambia 27 - 29 November and most of the Senegambia shelf was covered by an acoustic survey 2 - 7 December and the Mauritanian shelf on 8 - 12 December. The course tracks are shown in Annex I.

3.3.1 Small pelagic fish.

Senegambia

Figure 3.2 shows the fish distribution off Senegambia in August - September. Some silverside grunts which occur in mid water especially during the night, are included, but by far the main part consists of small pelagic fish mostly clupeids and carangids. The behavior of the fish was reasonably favourable for acoustic surveying with limited surface schooling of sardinellas.

Several areas of high densities of pelagic fish were located during this survey. The offshore aggregation in the south off Kasamanze consisted of bumper and false scad with some flat sardinella, barracudas, Spanish mackerel and lookdown. To the north of Kasamanze up to the Gambia river, the inshore concentrations seemed to consist mainly of flat sardinella and bumper, also mixed with some jacks, scads and barracudas. The bumper was the dominant form together with both sardinella species in the area of high concentration off Point Sangomar. Among the accompanying species lookdown, scads and pompano were the most common.

Inshore, north of Cayar, the two sardinella species occurred in dense schools with bumper, sharks and barracudas while the offshore aggregations, further north, was identified as horse mackerel, round sardinella and chub mackerel.

The acoustic survey was supplemented with fishing with both bottom - and mid water trawl for purposes of identification and sampling. High catch rates were obtained for bumper in the shallow inshore parts south of Cape Verde, particularly in the midwater trawl where rates ranged up to about 6 tonnes per hour. In the south, the false scad had an occasional good catch rate, 1.4 tonne per hour, sharks up to 400 kgs per hour, barracudas and pompano up to 115 and lookdown up to 300 kgs per hour.

North of Cape Verde some good catch rates, 0.6 and 3 tonnes per hour of horse mackerel (T. trecae) were obtained at abt. 100 m depth. Catch rates for sharks ranged beyond 300 kgs per hour and barracudas appeared in nearly all catches with rates up to 90 kgs per hour.

Samples of the pooled size compositions of the main species are shown in Annex VI.

The estimates of the standing biomass of the small pelagic fish resulting from the observations from the acoustic integra-

tion system are shown in Table 3.2. As mentioned under 1.3 above an attempt is made to distinguish between two groups in these assessments, the clupeids, in this case mainly the sardinellas, and a group consisting of other pelagic fish, the carangids-horse mackrel, jacks, scads etc together with mackerels, barracudas and hairtails. This separation is mostly based on trawl sampling and is only roughly approximate. The estimates for total pelagic fish is thus more reliable than those for each group.

The shelf area between 14°05' and Dakar was not covered. A total estimate of pelagic fish between Cape Roxo and St. Louis will be about 450 000 tonnes, with by far the major part south of Cape Verde. About 2/3 of this or abt. 300 000 tonnes is assessed to be sardinellas, and abt. 150 000 tonnes carangids etc.

Table 3.2 Estimated biomass of pelagic fish based on acoustic survey data.(in thousand tonnes) Senegambia -September survey.

	Clupeids	Carangids, Scombrids,etc	Total
N.of C. Verde	15	35	50
S.of C. Verde	260	110	370
Total	275	145	420

Figure 3.3 shows the fish distribution during the December survey as observed by the acoustic integration system. There is a similar picture of aggregations of small pelagic fish over the inshore and middle parts of the shelf as was found in September. The two sardinella species occurred over most of the area, but concentrated especially north of the Gambia River and off St.Louis. The horse mackerel T. trecae was the most abundant species among the carangids, both south and north of Cape Verde.

Some of the trial fishing hauls gave good catch rates, especially of horse mackerel: up to abt. 3 tonnes/hr in bottom trawl and reaching nearly 5 tonnes/hr in mid water hauls.

The size compositions(ANNEX VI) show that south of Cape Verde the samples contained mostly juvenile and immature fish of the two sardinellas, while adult fish occurred off St.Louis. The

horse mackerel samples showed consistently medium sized fish.

The biomass estimates for the parts of the Senegambian shelf covered are shown in Table 3.3.

Table 3.3 Estimated biomass of pelagic fish based on acoustic survey data. 1 000 tonnes. Senegambia - November survey.

	Clupeids	Carangids, Scombrids,etc	Total
North of C.Verde	100	110	210
South of C.Verde	180	60	240
Total	280	170	450

Including an approximately assessed addition for the Senegal shelf south of the Gambia which was not covered, the total biomass of small pelagic fish on the Senegambia shelf is estimated at 500 000 tonnes, with 2/3 sardinellas and 1/3 horse mackerels, jack mackerels, scombrids etc. This is very similar to the totals found in September, but a higher proportion of the fish was located north of Cape Verde in the November survey.

Mauritania

Figure 3.4 shows the distribution of the small pelagic fish over the Mauritanian shelf in early December as observed with the acoustic integration system. A number of smaller areas of high fish densities were located from St. Louis up to Cape Timeris. These consisted mostly of dense mid water schools of large sized horse mackerel, but also hairtails formed a significant part of the catches in this area. Both of the Trachurus species were caught with a majority of T. trecae in the catches, but their true relative abundance is uncertain since there are great difficulties in obtaining representative catches of these fish with the gear and fishing system used by the DR FRIDTJOF NANSEN.

An unusually dense school area was found off Nouadhibou. A few catches gave a mixture of sardinellas and sardine (Sardina pilchardus), but it is likely that the latter species formed the main part of this registration.

The estimates of the standing biomass of the small pelagic fish on the Mauritanian shelf during the survey are shown in Table 3.4.

Table 3.4 Estimated biomass of pelagic fish based on acoustic survey data. 1 000 tonnes. Mauritania, November survey.

Sardine and sardinellas	Carangids (mostly horse mackerel)	Total
980	540	1 520

About 750 000 tonnes of the sardines and sardinellas were located off Nouadhibou, while the major part of the horse mackerel was found south of Cape Timeris.

The catch rates in the 19 trawl hauls made were generally low except in the dense school area in the north where a pelagic haul of abt. 10 tonnes/hr of sardinella and sardine was obtained.

The size compositions of the main species are shown in ANNEX IV. Large size adult fish predominate, but for horse mackerel some juvenile fish were also sampled.

3.3.2 Demersal fish off the Gambia.

During both surveys random trawl stations were set out in the waters off Gambia in order to obtain a trawl survey estimate. 24 and 23 stations were worked out on the first and the second survey respectively. The positions of the trawlstations are shown in Annex I. The results from the swept-area analysis are shown in Tables 3.4 and 3.5. The average density for the whole shelf is estimated to 21 and 18 tonnes/nm² for the respective surveys. The dominating species is the silverside grunt during both coverages, followed by the red pandora (Pagellus bellottii). A striking feature is the vertical migration of the fish between the surveys, clearly demonstrated by the grunt which during the first survey had its main distribution in waters shallower than 30m, and which in the November survey had moved to the 30-60m zone, with only fractions in the shallow waters (30 t/nm² compared to

Table 3.4 Swept-area analysis from the trawl survey off Gambia September 1986.

SPECIES NAME	CATCH DISTRIBUTION BY KG/NM GROUPS						% incidence	Mean dens. t/nm²	Mean densities by bottom depth strata t/nm²			
	<10	10-30	30-100	100-300	300-1000	>1000			5- 30m	30- 60m	60-100m	100-200
Brachydeuterus auritus	5	4	2	1		1	50	9.63	16.51	0.01		
Pagellus bellottii	8	2	4		1		63	2.99	0.77	2.62	11.34	
Galeoides decadactylus	2	5	1	1			33	1.34	2.29			
Chelidonichthys lastoviza	2		3				21	0.61		0.04	3.60	
Priacanthus arenatus	7	3	1				46	0.45	0.17	1.32	0.17	
Pomadasys peroteti	3	1	2				25	0.45	0.78			
Pseudupeneus prayensis	5	4					38	0.37	0.34	0.70		
Scomberomorus tritor	8	1	1				42	0.33	0.57			
Sphyraena guachancho	6		1				29	0.28	0.47			
Sparus caeruleostictus	4	2					25	0.23	0.37	0.06		
Dactylopterus volitans	8	1					38	0.23	0.04	0.67	0.22	
Pomatomus saltatrix	1		1				8	0.22	0.37			
Arius sp	4	3					29	0.21	0.36			
Rinoptera sp.			1				4	0.20	0.35			
Eucinostomus melanopterus	4	2					25	0.19	0.33			
Hemicaranx bicolor	3		1				17	0.19	0.33			
Sepia sp	14						58	0.17	0.12	0.18	0.33	
Pomadasys incisus	9						38	0.17	0.18	0.25		
TRIGLIDAE	1		1				8	0.15		0.05	0.85	
Pteroscion peli	3	1					17	0.12	0.20			
Miscellaneous fishes	5						21	0.09	0.14		0.05	
Lutjanus goreensis	1	1					8	0.09	0.12	0.06		
Elops senegalensis	2	1					13	0.09	0.16			
Trichiurus lepturus	9						38	0.08	0.12	0.03		
Octopus sp.	6						25	0.08		0.26	0.07	
SOLEIDAE	5	1					25	0.08	0.02	0.01	0.43	
Dasyatis margarita	2	1					13	0.08	0.14			
Pegusa lascaris		1					4	0.07			0.40	
Scorpaena sp	2	1					13	0.07		0.01	0.40	
Pseudotolithus typus	3						13	0.07	0.11			
Alectis alexandrinus	3						13	0.07	0.12			
Arnoglossus sp.	5						21	0.07			0.44	
Sphyraena sp		1					4	0.06	0.10			
Diplodus vulgaris		1					4	0.06	0.10			
Carcharinus sp	1	1					8	0.06	0.10			
Rhinobatus rhinobatus	2	1					13	0.06	0.10			
Scyacium micrurum	11						46	0.06	0.03	0.15	0.02	
Pseudotolithus brachygnathus	2						8	0.05	0.08			
Pseudotolithus senegalensis	4						17	0.05	0.09			
Raja miraletus	4						17	0.05		0.08	0.17	
Gymnura micrura	2						8	0.05	0.08			
Plectorhynchus mediterraneus	4						17	0.05	0.05	0.10		
Grammoplites gruveli	7						29	0.05		0.02	0.25	
Selene dorsalis	7						29	0.05	0.02	0.16		
PALAEMONIDAE	2						8	0.04	0.07			
Penaeus notialis	7						29	0.04	0.07			
Penaeus kerathurus	2						8	0.01	0.02			
Other fish								0.90	0.87	0.78	1.38	
Sum all species								21.11	27.26	7.56	20.12	
Sum seabreams								3.37	1.26	2.79	11.65	
Sum snappers								0.10	0.13	0.06		
Sum groupers								0.03	0.03	0.05	0.03	
Sum emperors												
Sum shrimps								0.09	0.16			
Number of stations included in analysis, total and by depth strata								24	14	6	4	

Table 3.5 Swept-area analysis from the trawl survey off Gambia November 1986.

SPECIES NAME	CATCH DISTRIBUTION BY KG/NM GROUPS						% incidence	Mean dens. t/nm²	Mean densities by bottom depth strata t/nm²			
	<10	10-30	30-100	100-300	300-1000	>1000			5- 30m	30- 60m	60-100m	100-200
Brachydeuterus auritus	8			1		1	43	10.67	0.19	30.40		
Pagellus bellottii	3	1	4	3			48	3.67	0.01	8.38	5.73	
Mustelus mustelus	1			1			9	1.00		2.84	0.09	
Arioma bondi	1		1				9	0.30			2.31	
Scomberomorus tritor	9	1					43	0.23	0.44			
Selene dorsalis	8	1					39	0.18	0.06	0.44		
Priacanthus arenatus	6	1					30	0.15		0.34	0.23	
Scomber japonicus	2	1					13	0.14		0.39		
Stromateus fiatola	2	1					13	0.10	0.20			
Sphyraena afra	1	1					9	0.07	0.13			
Rhinoptera bonasus	1	1					9	0.07	0.13			
Sparus caeruleostictus	4	1					22	0.06		0.18		
Torpedo torpedo	3	1					17	0.06		0.03	0.41	
Galeoides decadactylus	5						22	0.06	0.11			
Acanthurus monroviae	1	1					9	0.05		0.14		
Penaeus kerathurus	1											
Penaeus notialis	3						13					
Penaeus sp	1						4					
Other fish								0.74	0.59	0.92	0.86	
Sum all species								17.55	1.86	44.06	9.63	
Sum seabreams								3.81	0.01	8.68	5.98	
Sum snappers								0.02		0.05		
Sum groupers								0.04		0.11		
Sum emperors												
Sum shrimps												
Number of stations included in analysis, total and by depth strata								23	12	8	3	

0.2 t/nm²). The pattern is valid also for the whole fish community as can be seen from the average densities in the bottom depth strata during the two surveys (in tonnes/nm²):

	5-30m	30-60m	60-100m
First survey	27.3	7.6	20.1
Second survey	1.9	44.1	9.6

It is likely that the phenomenon is linked to some change in the environment, likely the oceanographic conditions. But as no oeanographic data were collected during the surveys, we can not make a direct comparison.

The results in Tables 3.4-3.5 have been concentrated into Table 3.6 where the findings concerning most abundant species or commercially important species groups have been summarized.

Table 3.6 Mean densities of most abundant species or commercially important species groups by bottom depth

Depth zone Period	5-30m Sep.	 Nov.	30-60m Sep.	 Nov.	60-100m Sep.	 Nov.
Silverside grunt	16.5	0.2	30.4			
Seabreams	1.3		2.8	8.7	11.7	6.0
Snappers	0.1		0.1	0.1		
Groupers			0.1	0.1		
Emperors						
Octopus			0.26		0.07	
Cuttlefish (Sepia)	0.12		0.18		0.33	
Shrimps	0.16					
Total fish	27.2	1.9	7.6	44.0	20.1	9.6

The area of the shelf off Gambia has been measured by planimeter on seacharts and is, by depth zones: 0-30m: 755nm²; 30-60m: 485nm²; 60-100m: 210nm².

Absolute biomass estimates are obtained by multiplying the density figures with the areas concerned and are given in Table 3.7.

Table 3.7 Biomass estimates of most abundant species or commercially important species groups by bottom depth str ta. (thousand tonnes).

Depth zone Period	5-30m Sep.	 Nov	30-60m Sep.	 Nov.	60-100m Sep.	 Nov.
Silverside grunt	12.5	0.1	14.7			
Seabreams	1.0		1.4	4.2	2.4 *	1.3
Snappers	0.1		0.03	0.02	0	
Groupers	0.02		0.02	0.05	0.01*	
Emperors	0		0		0	
Octopus			0.13		0.01*	
Cuttlefish (Sepia)	0.1		0.1		0.07*	
Shrimps	0.12					
Total fish	20.6	1.4	3.7	21.4	4.2*	2.0

* Unprecise, few hauls

The total estimate from the September survey is 28 500 tonnes of which 12 500 is silverside grunt and only 2 100 is of the high market value groups mentioned in the table. The total from the November survey is 24 800 tonnes with 14 800 silverside grunt and 5 570 of the "valuable" fish. Most of the fish is probably stationary, making only vertical migrations. This

conclusion is based on the fact that the total shelf estimates by groups are quite close for the two surveys:

	Thousand tonnes	
	Sep.	Nov.
Silverside grunt	12.5	14.8
Seabreams	4.8	5.5
Snappers	0.13	0.02
Groupers	0.06	0.05

It seems that the octopus and the cuttlefish had migrated out of the area during the second survey. For the shrimp however our estimate is not reliable. Most of the shrimp was located in a narrow depth zone along the coast and the survey were not designed for assessment of the shrimp stock. For this a much more intensive sampling in this zone would be required.

The density figures given Tables 3.5 and 3.5 can easely be converted to expected catch rates if one knows the width of the trawl gear and the trawling speed. Expected mean catch rates can be calculated from the formula:

$$C = \frac{D \times W \times S}{1852}$$

where C the expected catch rate in kg/hour, D is the estimated density in kg/nm², W is the length between the wings of the trawl and S is the trawling speed in knots. For example the estimated density of seabreams during the first survey is 3.37 tonnes/nm². The width of the gear is 18.5 m and the average trawling speed is 3 knots. This gives an expected average catch rate for the whole shelf of 101 kg/hour for the gear used by Dr. Fridtjof Nansen.

3.4 Morocco

3.4.1 Pelagic fish Agadir to Cape Juby.

The shelf between Agadir and Cape Juby was covered between 22 September and 5 October, and again between 6 and 12 November. During the first survey experiments with repeated coverages were carried out on the main concentrations of the sardine Sardina pilchardus in order to test the consistency of the acoustic estimates and the day/night variations of the acoustic registrations.

The investigational effort was concentrated on the small pelagic

species, and no random bottom trawl stations were set out.

The pelagic community is dominated by the sardine with mackerel (Scomber japonicus) and horse mackerel (Trachurrus trachurus) as secondary species. Other pelagic species play only a very minor role in the area concerned. Figure 3.5 through 3.13 show the fish distribution by species and coverages.

The sardine is mainly concentrated in the nearshore waters and south of latitude 29° 30' during both surveys. Comparisons with maps of the surface temperature, Figures 3.14 and 3.15, show that areas with highest density of sardine corresponds closely with the zones of upwelling, indicated by pockets or belts of cold water close to the shore. On the basis of the observed fish distribution during the two surveys, no major fish migration seems to have occurred between them. The sardine stock is composed of two size groups with modal lengths around 14 and 18 cm. The modal lengths during the first survey are from 0.5 to 1 cm less than during the second, and the oldest age group clearly dominated the samples, both by weight and number.

The mackerel co-occurs with the sardine mainly in the nearshore waters, but generally at lesser density and abundance. The distribution is limited to south of 29°10' N during the first survey, while during the second it was sampled north to Agadir. Comparison between the distribution maps and the surface temperature maps suggests that the mackerel prefers water temperatures less than 20°C while the sardine extend its distribution to the 21°C limit. The mackerel in the area investigated seems to consists of one age group with mean length around 17.5 cm.

The horse mackerel tends to have a more offshore distribution than the two previous mentioned species. The species is found in a quite even but very scattered distribution on the main part of the invetigated shelf area. The species was mostly located close to the seabed and was never observed at densitites of interest for commercial fishing. The investigated part of the stock consist of two age groups with modal lenghts around 14 and 19cm, and with the oldest age group as the dominant in the samples.

All trawling in the area were for sampling purposes. The catches grouped by the three dominant species and other fish are

STA.NO.	Sardine	Mackerel	Horse mack	Other
153			5.00	1.60
154	28.00	4.60	0.20	7.00
155				
156				
157	175.00	47.60		
158				
159	63.00	471.00	69.00	349.20
160	3816.00			2.16
161				
162	254.80	298.20	98.00	399.70
163	8946.00	375.80	30.00	248.20
164	127.00	190.00	1.00	3.40
165	2.00	22.00		
166	17420.00	580.60		
167	0.10	0.60		
168	12.00	7.80	3.60	192.00
169	764.40	84.00	22.40	81.20
170	5.20	5.20	221.00	638.40
171	3109.60	114.40		
172	233.80	1150.00	102.60	105.20
173	16860.00			
174	1984.00	6.20		
175	1352.00	182.00	31.20	83.20
176	248.40	36.00	0.45	4.50
177	78.00	14.70		0.90
178	868.00	2.80		23.10
179	232.00	16.80		
180	67.50	39.00		
181	8727.30	272.70		
182		18.80	259.20	166.20
183	117.20	2.80	10.80	0.40
184	47.00	1.80	1.20	0.20
185	12000.00			
186	320.00	3.00		
187	4032.00	6.00	3.60	
188	239.40	674.60	91.20	135.00
189	405.00	513.00	18.90	669.60
190	1620.00	66.00	42.00	168.00
191	88.00	17.60		
192	5387.00	590.60		22.40
MEAN	2240.74	145.41	25.28	82.54

Total number of stations : 40

Table 3.8 Catches of sardine,mackerel,horse mackerel and other fish during the September survey in Morocco.

STA.NO.	Sardine	Mackerel	Horse mack	Other
197				
198		0.10		
199		60.00		0.20
200	69.00	13.00		11.10
201	601.66	7.61		2.58
202	25.20	176.40	82.80	83.40
203	5606.26			3.74
204	207.20	72.80		
205	176.25	14.14		
206	0.40			5.20
207				426.00
208	85.00	1597.00	1486.60	1831.60
209	15.00	1.20	0.90	85.80
210	485.10	4.90		
211		385.65	12.85	15.41
212	500.00	76.00	28.00	22.00
213	3.00	7.80	22.80	145.50
214	13.60		20.40	147.60
215	5.40	516.60		
216	3410.00	80.00		10.00
217	4864.20	135.80		
218	496.00	192.00	70.40	171.20
MEAN	752.88	151.86	78.40	134.61

Total number of stations : 22

Table 3.9 Catches of sardine,mackerel,horse mackerel and other fish during the November survey in Morocco.

presented in Table 3.8 and 3.9 for the first and second survey respectively. The various groups' shares of the total catch are as follows (in %):

	Sardine	Mackerel	Horse Mackerel	Other
First survey	90	6	1	3
Second survey	67	14	7	12

The higher share of the sardine during the first survey compared to the second is partly due to a more intensive sampling on this species during the repeated coverages then carried out.

Although catch rates based on a programme for sampling purposes do not reflect expected catch rates in a commercial fishery, the figures can be used as indicative of the relative importance and catchability of the species. Table 3.10 shows the catch distribution of sardine, mackerel and horse mackerel.

Table 3.10 Catch distribution by size classes of catches of the three dominant pelagic species in Morocco. (number of hauls in Kg/hour or tonnes/hour groups)

Species	Survey	<30kg	30-100	100-300	300-1000	1-3t	>3t
Sardine	I	6	5	8	4	3	9
	II	6	2	2	4	0	3
Mackerel	I	19	5	5	6	1	0
	II	9	4	3	2	1	0
Horse	I	12	6	3	0	0	0
mackerel	II	5	2	0	0	1	0

The table shows that especially the sardine, but also the mackerel can be found in aggregations of interest for commercial fishing. The horse mackerel does not seem to be an interesting target for fishing, at least during the two periods investigated, as only one haul exceeded 300 kg/hour.

The acoustically-based biomass estimates provisionally given in the preliminary cruise reports, have been corrected and slightly reduced and are shown in Table 3.11.

The estimates of total biomass from the two surveys come out remarkably close with 1185 and 1165 thousand tonnes. And the estimates on the species level are in close argeement as well. This indicates that no greater migration from/to the investigated

area had taken place between the two surveys. The total estimate is composed of 83% sardine, 7% mackerel and 10% horse mackerel during the first survey, while the corresponding figures from the second survey are 80, 6 and 13% respectively.

Table 3.11 Estimated biomass of pelagic fish between Agadir and Cape Juby, based on acoustic survey data. (1000 tonnes):

	Sardines	Mackerel	Horse mackerel	Total
First survey				
A: main coverage	660	85	115	860
B: detailed coverages averaged	905	70	15	990
A and B combined	985	85	115	1185
Second survey	935	75	155	1165

3.4.2 Results from repeated coverages.

During the first survey in Morocco considerable amounts of sardine was located in the shallow waters, and the main survey net did not survey these aggregations properly. To compensate for this a detailed coverage was run twice to assess the biomass in the shallow waters. In addition, a selected course track was run repeatedly under day and night light conditions, to see how the acoustic registrations varied under the influence of light. The two detailed coverages gave a biomass of 820 and 990 thousand tonnes, average 905 thousand tonnes. The two sets of day/night comparisons gave a ratio of 1.38 and 1.42 between average densities observed during night and during day. The night readings thus give at average about 40% higher density figures than during daylight. This difference has not been compensated for in the estimations on biomass and gives a bias towards underestimation in the abundance estimates given above. Comparisons between successive sets of day runs give a ratio of 1.12 and the night runs give a ratio of 1.09. For further details see **Strømme and Sætersdal 1987.**

To conclude, both the repeated surveys on the major aggregations of the sardine, and the comparisons under similar light conditions show that acoustic surveys can give high consistency in the estimates on this species.

3.4.3 Fish distribution and abundance Cape Juby - Cape Bojador.

The shelf between Cape Juby and Cape Bojador was surveyed during the second survey only, between 13 and 15 November. The cruise track with stations are shown in Annex I. Nine trawl stations were worked out to identify the acoustic registrations.

As in the region Agadir - Cape Juby the area is dominated by the sardine, with mackerel and horse mackerel only of minor importance. The distribution of these species are shown in Figures 3.16 to 3.18. In the trawl hauls carried out the sardine makes up 93% of the total catch, mackerel 5%, horse mackerel 1%, and other fish 1%. The sardine has, as further north, a rather coastal distribution, and they can in both regions be considered as belonging to the same stock.

The total biomass in this area was estimated to 1140 thousand tonnes, with 1080 thousand tonnes sardine (94%), 40 thousand tonnes mackerel (4%) and 20 thousand tonnes horse-mackerel (2%).

4. OVERVIEW OF DISTRIBUTIONS AND ABUNDANCE OF STOCKS OF SMALL PELAGIC FISH.

4.1 The sardinella stocks.

As discussed under section 1.3 above, problems of sampling and identification limit the degree to which the total observed biomass can be allocated to fish types or species. The sardinellas form the most important part of the group identified as clupeids and anchovies from Mauritania southwards. Figure 4.1 shows the distribution of this group during the two survey

coverages, in August - September and in November - December. The African ilisha was found in limited amounts in inshore waters off the Bijagos Islands and the Gambia. The dense aggregation shown off Nouadhibou in Survey II consisted mainly of sardine (Sardina pilchardus). Because of incomplete coverages the total distribution of the sardinellas can not be described, but it seems that only limited amounts occurred south of Cape Roxo although it must be noted that the aggregations off Freetown was no doubt substantially underestimated in the survey. From the distribution charts there does not seem to be any clear distributional difference between the two species, either by depths nor latitude, both species were found over the whole area. Table 4.1 shows the catch rates and the incidence of occurrence of the round and flat sardinellas. Because of the clear size related catchability of these fish in trawl gears, too much confidence should not be placed in the interpretation of these data, but the results show that they occur in about the same proportion, in precence in number of total catches. The catch rates for flat sardinella are somewhat higher than those for the round, but this may be a consequence of some difference in depth distribution between the two species which may cause a higher catchability of flat sardinella in trawl hauls in shallow water.

Table 4.1 Mean catch rates and incidence of occurrence in bottom - and mid water trawl of the two sardinella species.

	Flat sardinella		Round sardinella	
	Mean catch kg/hr	% Incid.	Mean catch kg/hr	% Incid.
Aug.-Sept.	65	27	31	20
Nov.-Dec.	448	25	121	26

Table 4.2 shows the biomass estimates for the sardinellas by surveys and areas including probable assessments for the smaller uncovered parts of the Senegambian shelf. A rounded likely total estimate for the sardinella biomass is 650 000 tonnes.

The distribution of the sardinellas by these surveys, with the main parts located on the Mauritanian - Senegambian shelf, is

very similar to that found in previous surveys of the area e.g. the surveys by DR FRIDTJOF NANSEN between May 1981 and March 1982. The estimates of biomass are, however, now approximately 30% higher than those from 1981/82.

Table 4.2 Biomass estimates of sardinellas by areas and surveys. 1 000 tonnes.

	Aug.-Sept.	Nov.-Dec.
Mauritania	n.s.	300
Senegambia	300	330
C.Roxo - Sherbro Isl.	30	n.s.

4.2 Horse - and jack mackerels, scombrids etc.

Figure 4.2 shows the distribution of this group as a whole. The various species differed, however, considerably with regard to their main areas of location by latitude and by depth. The horse mackerel Trachurus trachurus ranges south to Mauritania where in December it was found overlapping in distribution with T. trecae. This species appeared in concentrations from Cape Timeris to the Gambia, often, and particularly for the larger fish, over the offshore parts of the shelf. The false scad, Decapterus rhonchus again overlapped with this horse mackerel species, but was found in highest concentrations from the Gambia southwards past the Bijagos Islands. The bumper, Chloroscombrus chrysurus was found in high concentrations in many locations from Freetown northwards past Cape Verde especially in the August-September survey and some times mixed with the lookdown, Selene dorsalis. Of the other species in this group, Spanish mackerel Scomberomorus tritor occurred frequently, but in limited amounts inshore from Freetown to Cape Verde. The hairtail Trichiurus lepturus was found in some abundance off Mauritania in December.

The estimated biomass for this group by areas and surveys is shown in Table 4.3.

An attempt can be made to roughly allocate these biomass

estimates to species or species groups based on the catch compositions and the geographical distributions observed. The December survey represents a point in time when the seasonal southward shift is well under way and it seems likely that the stock of the horse mackerel T. trecae will then have its main distribution within the Mauritania - Senegambia area. The August - September survey from St.Louis to Sherbro Isl. will probably provide the best coverage of the false scad and the inshore carangids. Table 4.4 shows the results of such a rough allocation.

Table 4.3 .Estimated biomass by areas and surveys of horse mackerels, scads, jacks etc 1 000 tonnes.

	Aug.-Sept	Nov.-Dec
Mauritania	-	540
Senegambia	150	170
C. Roxo to Sherbro Isl.	170	-

Table 4.4 Rough allocation of biomass estimates of the carangids etc. on species or species groups. 1 000 tonnes.

Aug.- Sept.	Decapterus rhoncus	Chloroscombrus and others
Senegambia	60	90
Sherbro-C.Roxo	110	60
Total	170	150

Nov. - Dec.	Trachurus trecae	Trichiurus and others
Mauritania	380	160
Senegambia	100	70
Total	480	230

Likely assessments of stock biomass for these fish are thus: close to 500 000 tonnes for horse mackerel; about 170 000 tonnes for scad and 200 000 - 250 000 tonnes for bumper, hairtails,look-down and other jacks, Spanish mackerel, and barracudas, a total of 900 000 tonnes for these types of fish.

The DR FRIDTJOF NANSEN survey in May/June 1981 and Feb/-March 1982 which covered the same area, gave total biomass estimates of 1 130 000 tonnes and 975 000 tonnes respectively for this group, thus about the same level as observed in 1986. The allocation on species was, however, somewhat different with 670 000 and 610 000 tonnes of horse mackerel, and 330 000 and 150 000 tonnes of scad. The methodological problems of allocating the total biomass estimates on species or subspecies groups are as we have already discussed, considerable, and it seems reasonable to conclude that there is no major difference in the estimates of stock biomass between the two survey programmes.

4.3 The stock of trigger fish.

The distribution of the trigger fish from Freetown to Cape Roxo in August - September and off Guinea Bissau in November is shown in Figure 4.3. The species also occurs further north, but during these surveys it was only found in small aggregations here. The distributional area off Guinea and Guinea-Bissau corresponds to that of the western of the two stocks in the CECAF area, the eastern stock being found off Ghana - Ivory Coast. The distributional characteristics for the western stock demonstrated by the present surveys are very similar to those found in previous investigations. The size distribution with predominance of medium sized fish is also similar to that found in the 1981-82 surveys with the DR FRIDTJOF NANSEN.

Assuming that the August - September survey covered the main western stock its estimated biomass is thus some 220 000 tonnes. This should be compared with similar estimates for the same stock of 1 050 000 tonnes in June 1981 and 1 350 000 in February 1982. There is no evidence of large short term fluctuations in trigger fish stocks, but long term changes have been demonstrated over spans of several years. The greatly reduced biomass estimate from

1986 as compared to 1981/82 must probably be interpreted as the effect of a corresponding stock decline over this period. The available estimates of the biomass of this western stock can be summarized as follows: (FAO /CECAF, 1981 and Strømme, 1983), (1 000 tonnes):

USSR survey 1975	80
CAPRICORNE Nov.1978	440
CAPRICORNE Mar.1979	440
CORN.DE SAAVEDRA 1980	760
DR FRIDTJOF NANSEN, MAY-JUNE 1981	1 050
" " , FEB. 1982	1 350
" " , AUG.-SEPT.1986	220

These surveys are not all direcly comparable as different survey methods have been applied, but even allowing for a considerable possible biases we are left with a picture of a stock increase in the late 1970's and early 1980's followed by a sharp decline in recent years. Especially the decline is well documented since the survey method in this period is more or less identical.

Commercial fishing for triggerfish started on a large scale in 1980. Catches from the Eastern Central Atlantic are reported as follows: (FAO, Yearbook of Fishery Statistics vol. 52,56,-60)), 1 000 tonnes:

1978	10	1982	92
1979	14	1983	72
1980	70	1984	28
1981	102	1985	26

It is not unconceivable that this fishery may have affected the stocks, and this should be evaluated if access is obtained to more detailed data of the fishery and the biology of the trigger fish.

A decline seems to have taken place also in the Ghana-Ivory Coast stock of trigger fish. In the DR FRIDTJOF NANSEN survey of June 1981 it was estimated at 500 000 tonnes while from an August 1986 survey with the R/V CORNIDE DE SAAVEDRA it is concluded that the biomass of this stock was approximately 140 000 tonnes. (Oliver and Miquel, 1987). This indicates a

proportional decline similar to that in the western stock.

4.4 Morroccan sardine

The sardine is the clearly dominating species in Morocco, at least south of Agadir. During the two surveys between Agadir and Cape Juby the distribution were found to be almost identical, with the main part of the species in the southern half of this area. During the second survey, which also covered the region between Cape Juby and Cape Bojador, there were observed considerable amounts in this area as well, also in the shallower waters, within 20 nm from the coast.

The biomass was assessed to about 0.95 million tonnes between Agadir and Cape Juby, and additional 1.1 million tonnes south to Cape Bojador. The stock of sardine in Morocco was composed of two size cohorts of around 14 and 18 cm modal length, and with the largest as the clearly dominant.

The sardine was also observed in Mauritania, during the second survey. The species formed dense registrations in a small area just off Nouadhibou, which also was the southern limit of the species distribution. The sardine in this area was assessed to 540 thousand tonnes. The sardine was composed of one size group only, with a modal length around 24 cm and thus abt. 6 cm longer than the dominating lenght cohort in the Agadir- Cape Juby area.

The area between Agadir and Cape Juby was surveyed by "Dr. Fridtjof Nansen" also in March 1981. From this survey the total pelagic biomass in the area was estimated to 750 thousand tonnes with abt 350 thousand as sardine and another 350 thousand tonnes as mackerel and horse mackerel grouped together. Compared to the previous survey the 1986 surveys shows that the stock of sardine has increased since the 1982 level. The increase seems to have been partially compensated by a decline in the abundance of the stocks of mackerel and horse mackerel, at least in the area investigated. Some uncertainties are linked to this comparison as the 1982 survey was in spring while the 1986 surveys were in fall/winter period. Some of the differences might thus be ascribed fluctuations due to seasonal migration.

5. BRIEF SUMMARY OF FINDINGS

The contribution made by the DR FRIDTJOF NANSEN programme between August and December 1986 to the CECAF COOPERATIVE SURVEY 1986 consisted in: (i) development work with reference to acoustic methods, (ii) participation in variuos acoustic inter-calibration experiments conducted jointly with the other survey vessels, and (iii) acoustic cum trawling surveys covering various parts of the shelf between Agadir in Morocco and Freetown in Sierra Leone. The field work was undertaken in two periods, August 19 to October 4, and November 6 to December 12.

The acoustic development work consisted mainly in repeated survey coverages of assumed identical biomasses of fish over a time interval of a few days in order to test the consistency of the resulting abundance estimates. The experiments included sardinellas and scads off Senegal, and sardine off Morocco. The main finding was that the consistency of the results is high. The data also support previous findings in demonstrating that surveys during night will give higher estimates than those from daytime. This bias seems to be related to a diurnal change in schooling behaviour. The experiments and their results are described in a paper submitted to the Acoustic Symposium in Seattle, June 1987.

The programme of intercalibrations and other comparisons of the acoustic systems included all of the four vessels which participated in the survey. It consisted of intership calibrations using the sea bottom as a common target, intership calibrations on fish layers, and simultaneous mini-surveys of defined areas, the last for the purpose of comparing the entire systems. The results demonstrated the importance of such inter-calibration programmes by revealing differences in both the performance of the instruments and in the working procedures which would affect the abundance estimates to a significant degree.

The acoustic surveys provide data from major parts of the distributional area of the main stocks of small pelagic fish between Agadir and Cape Bojador in Morocco and from Cape Blanc in Mauritania to Freetown in Sierra Leone. Estimates of the total standing biomass of these fish are presented by areas for each survey coverage. Frequent trawl sampling provides a basis for

allocating these total biomass figures on main species or species groups. When account is taken of survey coverage and the distribution of the various stocks the following findings can be presented:

For the sardine (Sardina pilchardus), both the September and the November surveys gave estimates of biomass between Agadir and Cape Juby of 1 million tonnes. A coverage between Cape Juby and Cape Bojador in November demonstrated the presence also in this area of approximately 1 million tonnes of this fish. The species was furthermore located in a small area off Cape Blanc in Morocco in December in a dense aggregation estimated at about 540 000 tonnes. Comparisons with previous survey findings indicate the stock(s) of sardine must be in a state of recovery.

The two sardinella species, Sardinella aurita and S. maderensis can not be properly separated in the assessments,but they appeared with about the same incidence in the catches. Their joint total biomass is estimated at about 650 000 tonnes, the main part located on the Senegambia and Mauritania shelf. A school area of sardinella found off Freetown in August could ,however not be properly assessed. The distribution of the sardinellas is very similar to that found in previous surveys, but biomass estimates are about 30 per cent higher than those from surveys in 1981/82.

Also the distribution of the horse- and jack mackerels and scombrids, hairtails and barracudas was as previously described with the horse mackerel Trachurus trecae having the highest abundance in Mauritania and southwards in Senegambia, overlapping with the false scad Decapterus rhonchus which was found in highest concentrations from the Gambia southwards past the Bijagos Islands. The hairtail Trichiurus lepturus was an important part of this group in Mauritania, but further south the bumper Chloroscombrus chrysurus dominated especially in inshore waters together with the lookdown Selene dorsalis, the Spanish mackerel Scomeromorus tritor and other species. A somewhat rough allocation of the total biomass estimates of these fish on species or species groups gives stock biomasses as follows: close to 500 000 tonnes for horse mackerel; about 180 000 tonnes for scad and 200 000 - 250 000 tonnes for bumper, hairtails, spanish mackerel and barracudas, a total of about 900 000 tonnes for

these types of fish. This is about the same level as found in a 1981/82 survey, where however the allocation on species was somewhat different.

The trigger fish Balistes capriscus was as previously found mainly off Guinea and Guinea Bissau. The biomass of this western stock was estimated at 220 000 tonnes, a considerable decline from a level exceeding 1 million tonnes in surveys in 1981/82. This species is known to undergo long term changes in stock size, but there is also the possibility that an industrial fishery which started in 1980 and reached abt. 100 000 tonnes per year in 1981/82 can have affected the state of the stock. An evaluation of this could be made with access to more detailed data.

The demersal stocks in the region Freetown - Cape Roxo and off Gambia have been separately assessed by trawl surveys. The demersal fish Freetown - Cape Roxo were estimated to 340 thousand tonnes of which 90 thousand tonnes were classified as commercially valuable and the remaining 250 thousand tonnes as low market value fish, such as flying gurnards and silverside grunts. Off Gambia the demersal fish was estimated to abt 30 thousand and 25 thousand tonnes from the two coverages. High market value fish was assessed to 2100 and 5600 tonnes from the two surveys. The silverside grunt is the dominating species in the fish community, making up abt. 44 and 60% of the total biomass during the repective surveys in Gambia.

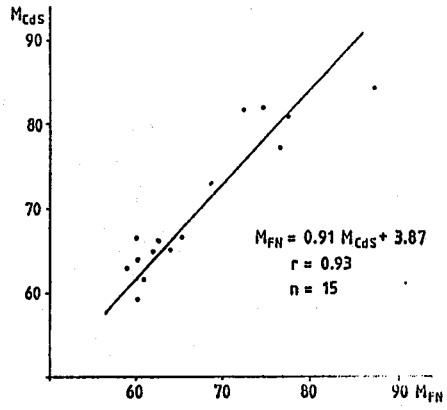


Fig. 2.1. Integrator values: DR.FRIDTJOF NANSEN versus CORNIDE DE SAAVEDRA. Units: 0.001 m^2/nm^2.

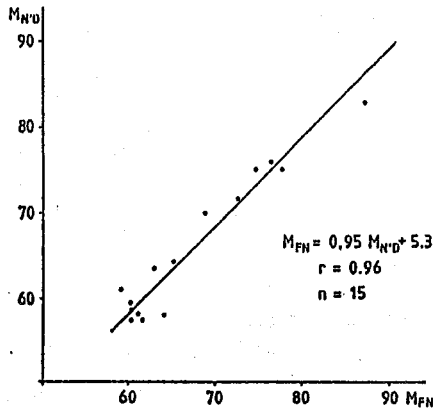


Fig. 2.2. Integrator values: DR.FRIDTJOF NANSEN versus N'DIAGO. Units: 0.001 m^2/nm^2.

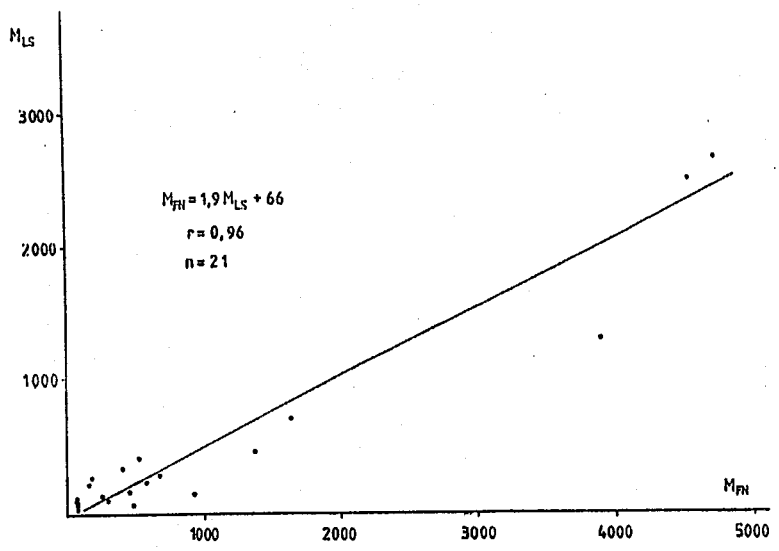


Fig. 2.3. Integrator values DR.FRIDTJOF NANSEN versus LOUIS SAUGER values during ship to ship calibration on fish. Units: m^2/nm^2.

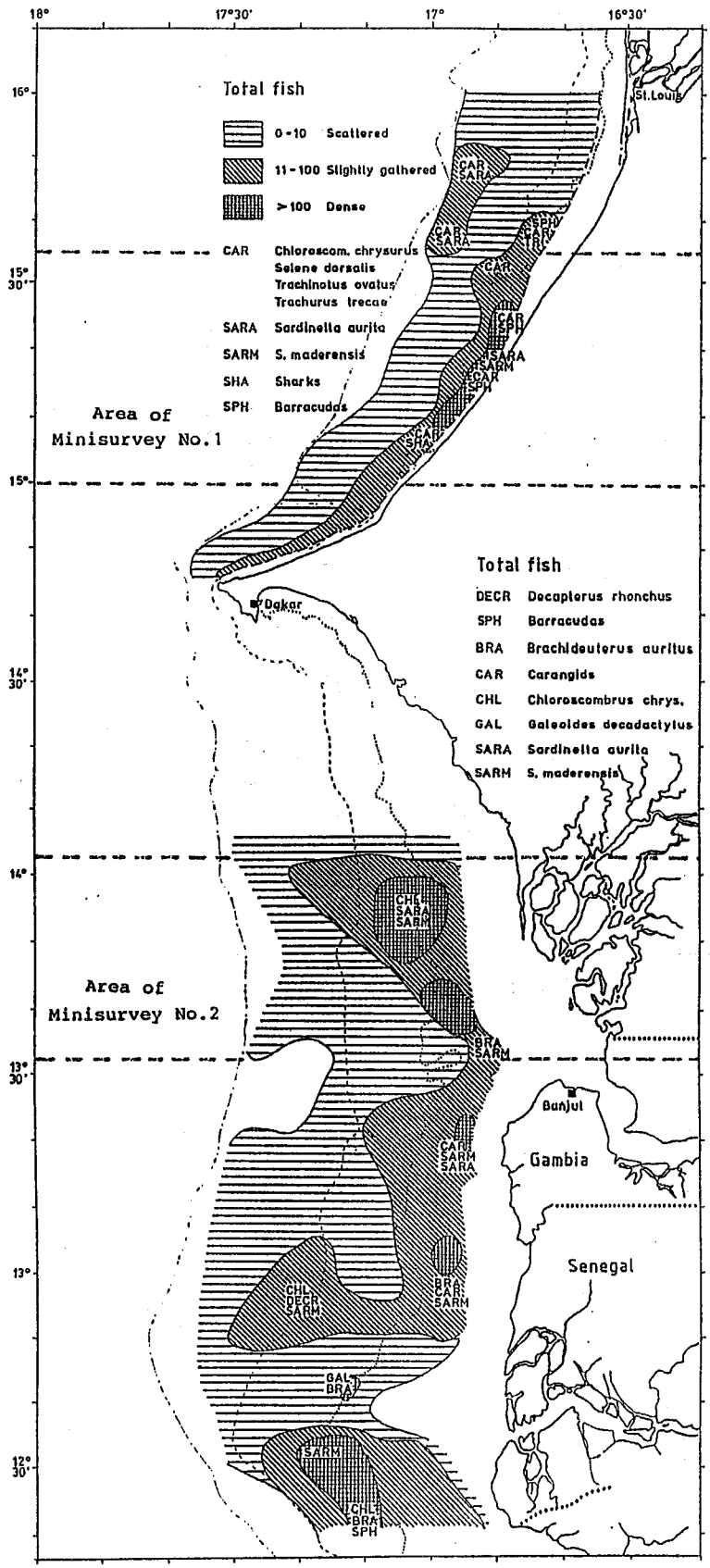


Fig. 2.4. Fish distribution chart with indications of species present. Broken lines indicate areas of minisurvey no. 1 and no. 2.

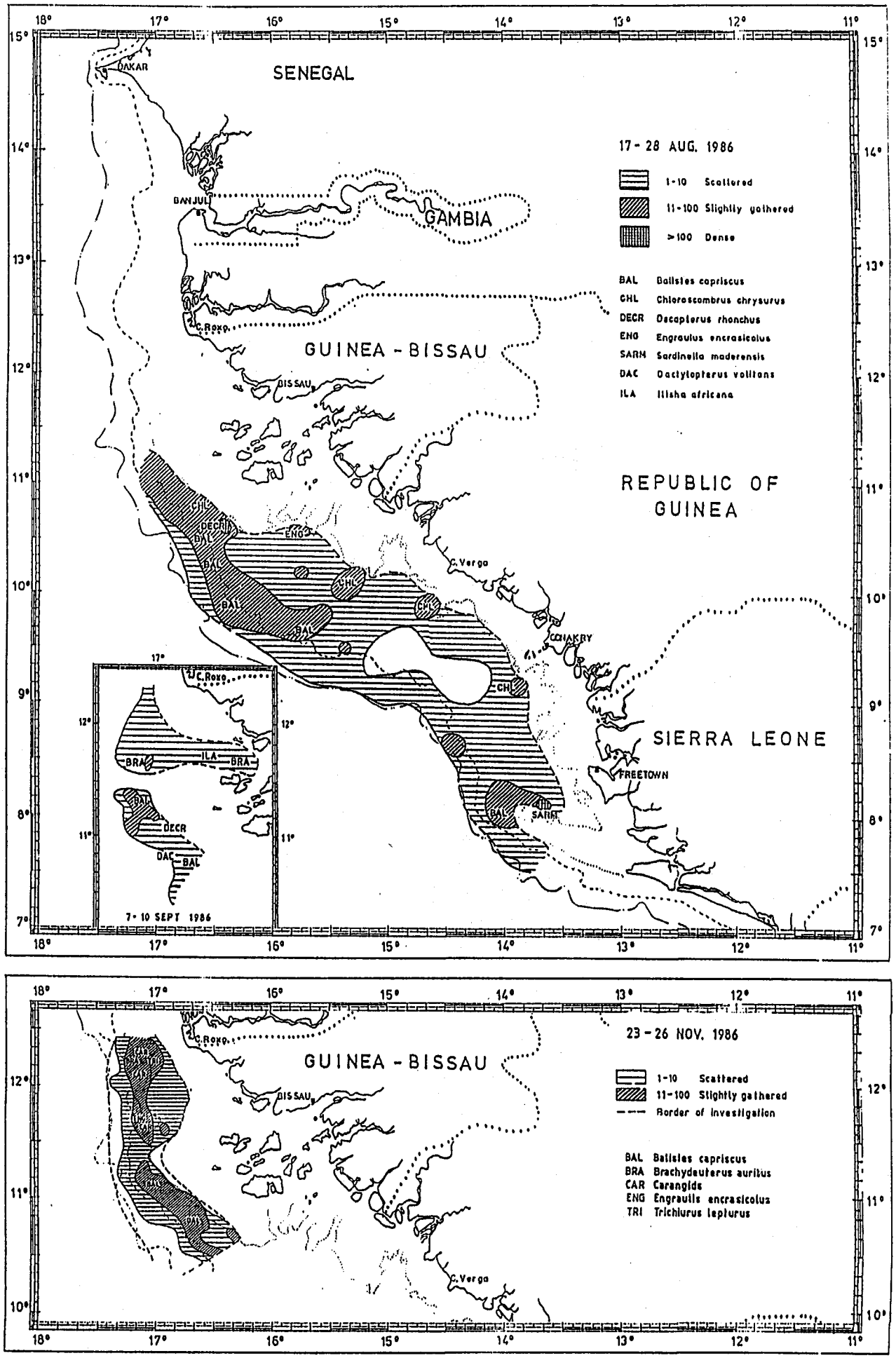


FIGURE 3.1. Fish distribution between Freetown and Cape Roxo in August-September and off Guinea Bissau in November.

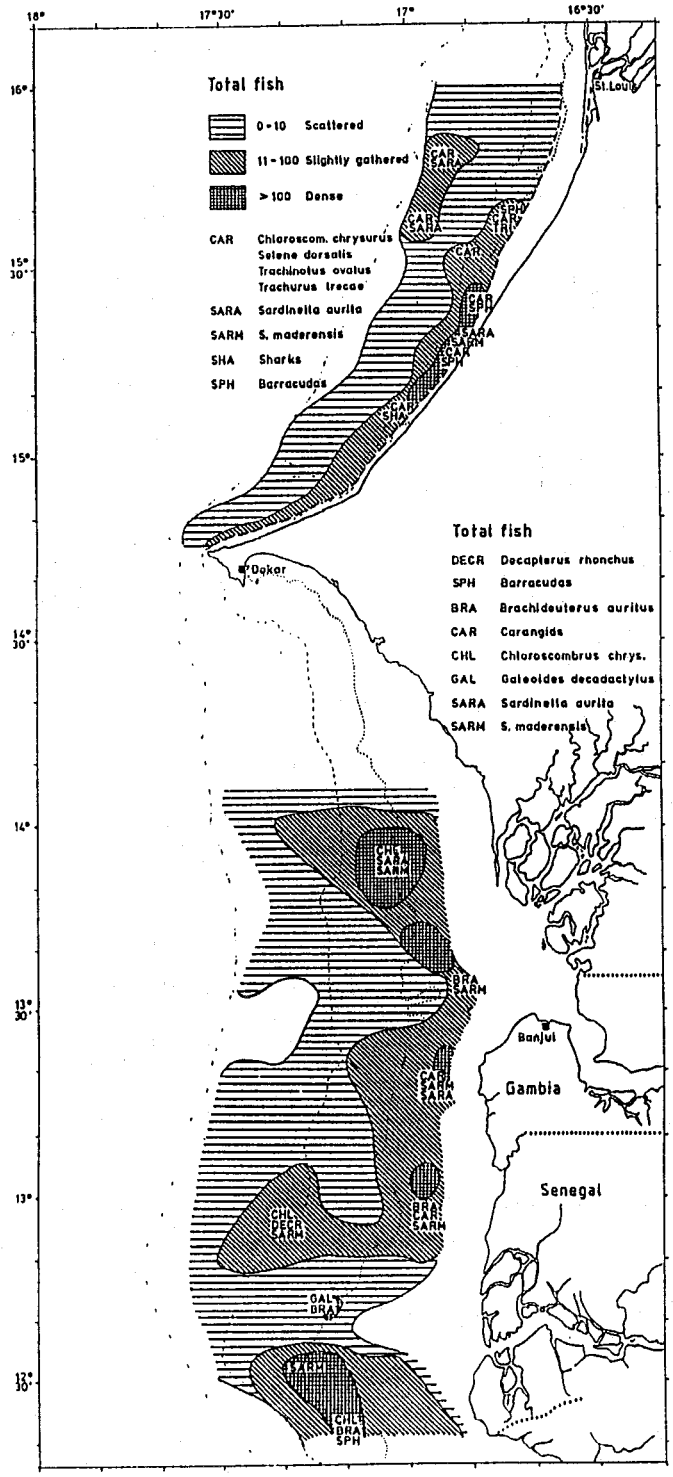


FIGURE 3.2 Fish distribution off Senegambia in August-September.

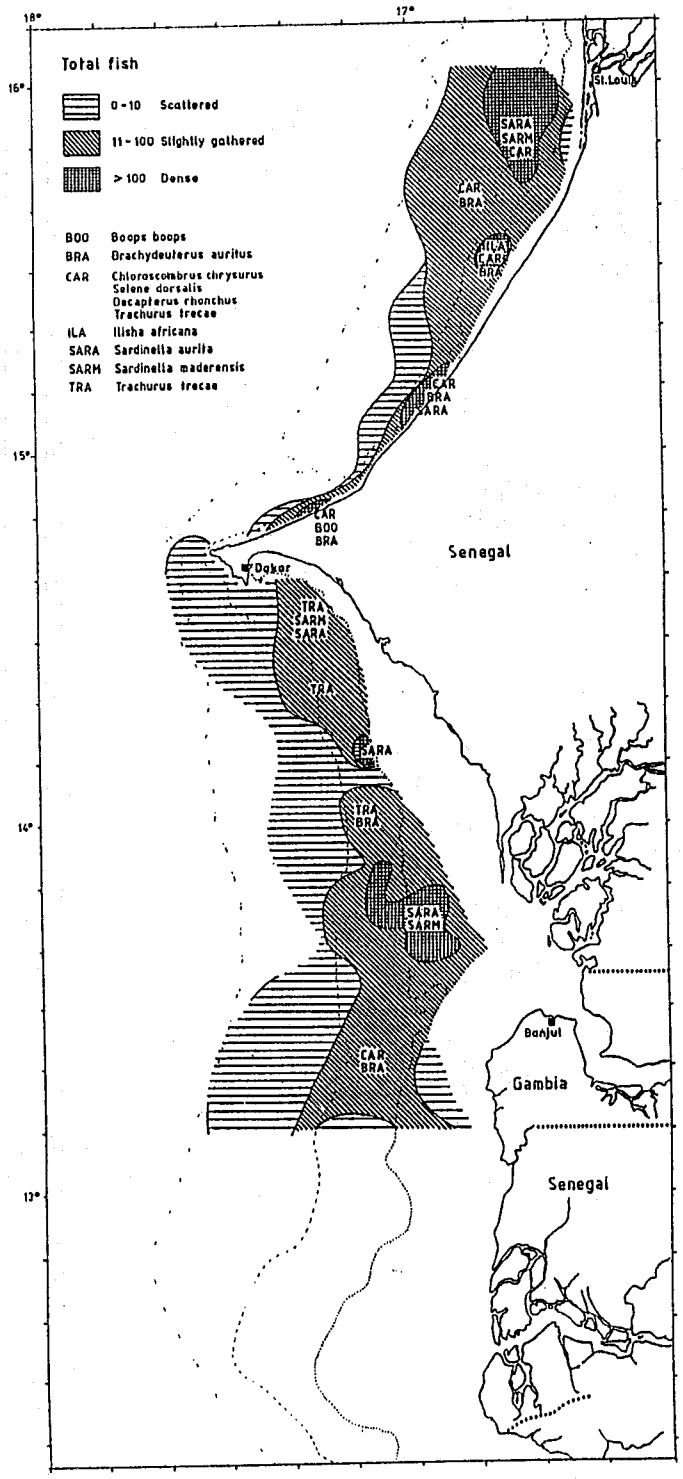


FIGURE 3.3 Fish distribution off Senegambia in December.

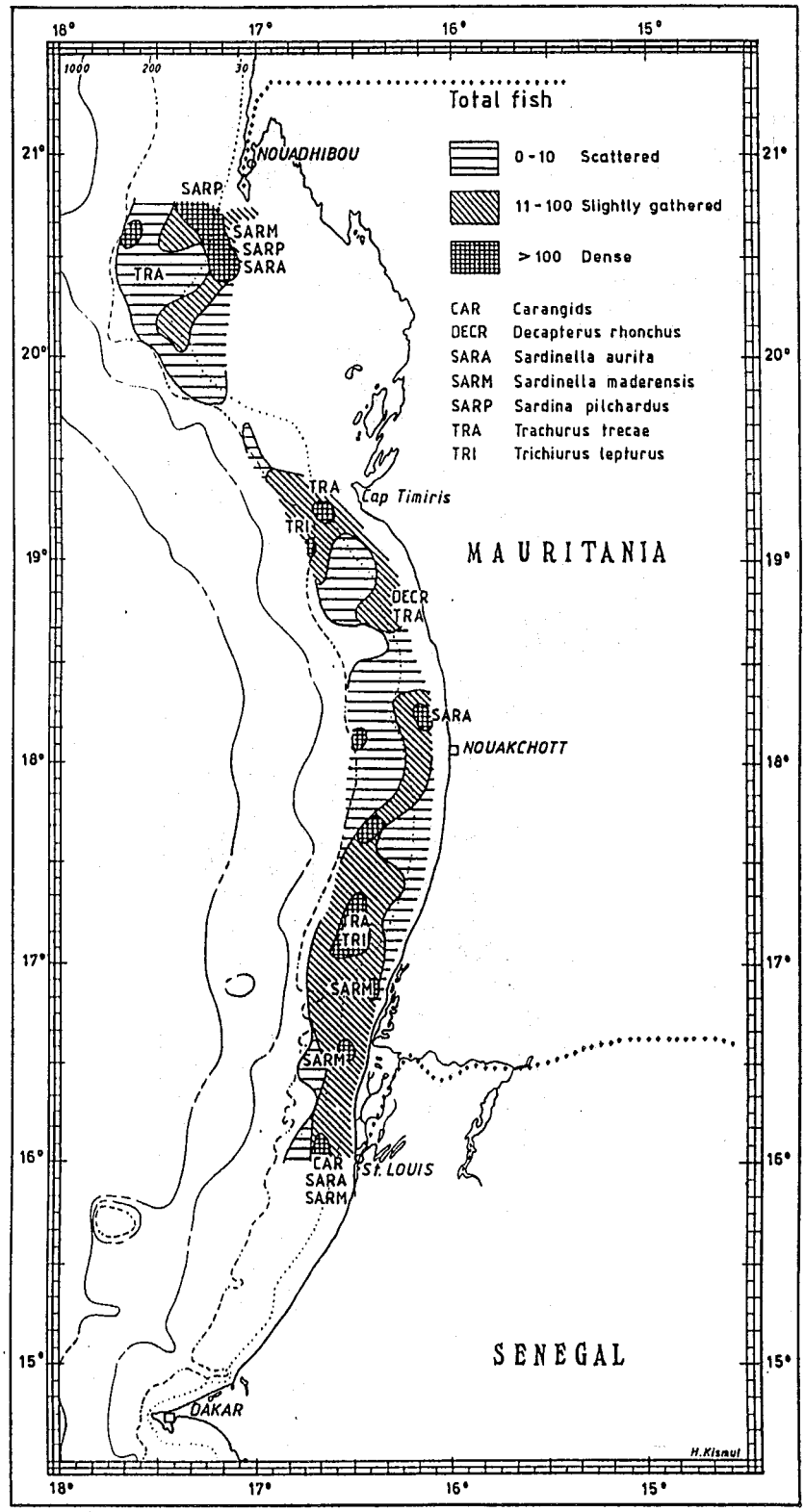


FIGURE 3.4 Fish distribution off Mauritania in December.

Fig. 3.5 Distribution of sardine during main coverage, Sept. 1986.

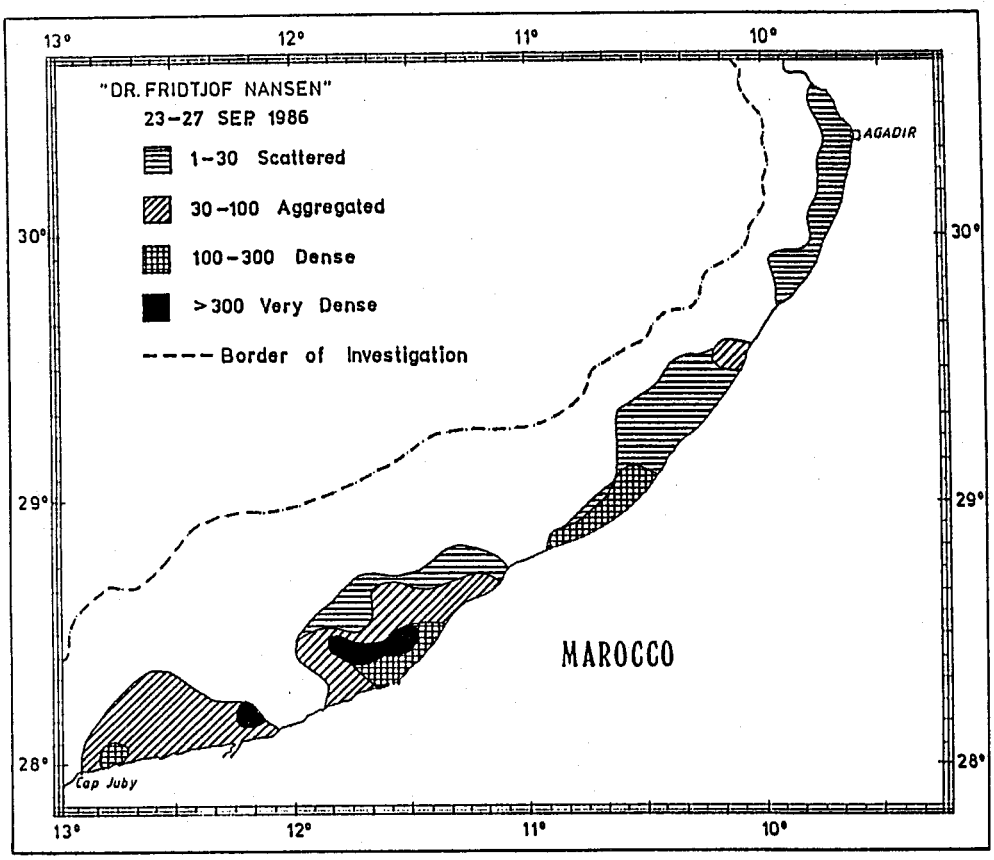


Fig. 3.6 Distribution of sardine the first detailed coverage, Sept. 1986.

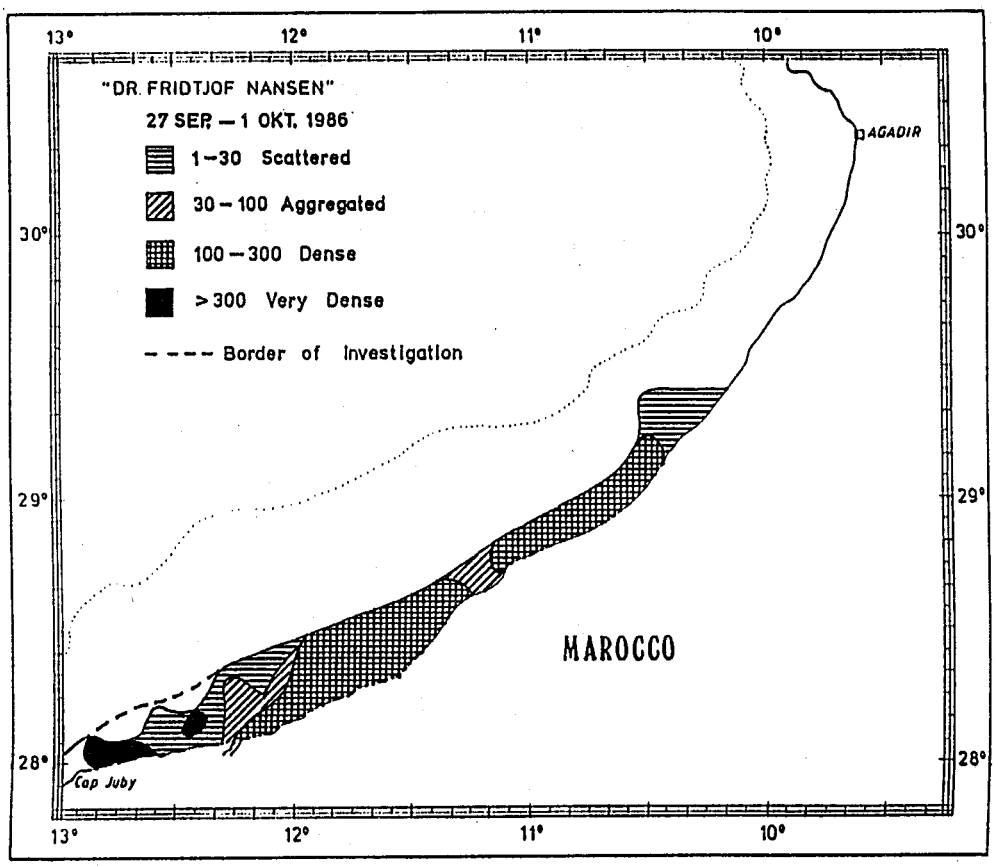


Fig. 3.7 Distribution of sardine during the second detailed coverage, Sept. 1986.

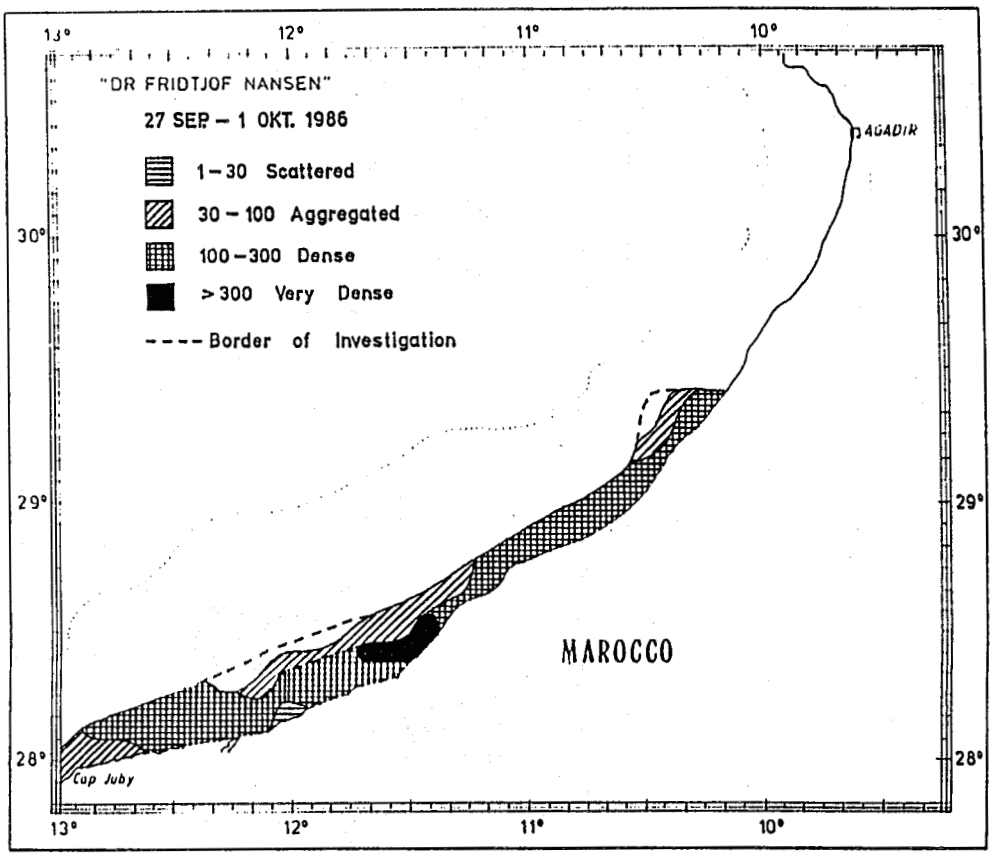


Fig. 3.8 Distribution of mackerel, main coverage, Sept. 1986.

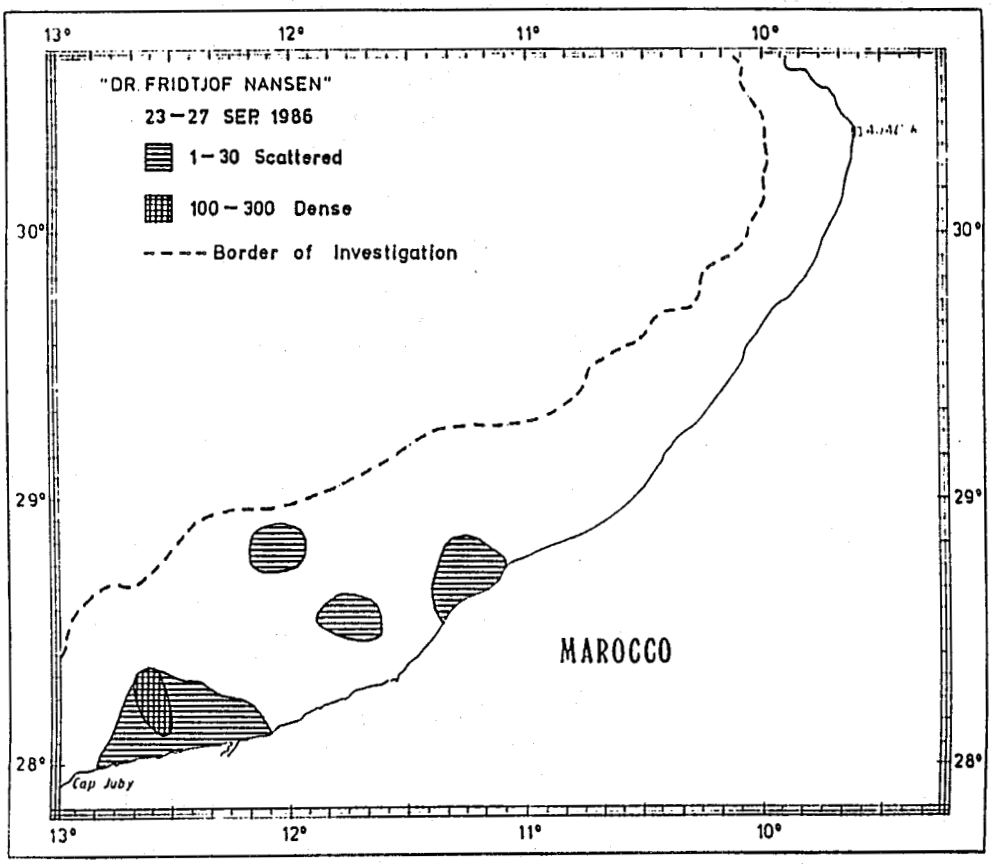


Fig. 3.9 Distribution of mackerel, detailed coverages, Sept. 1986.

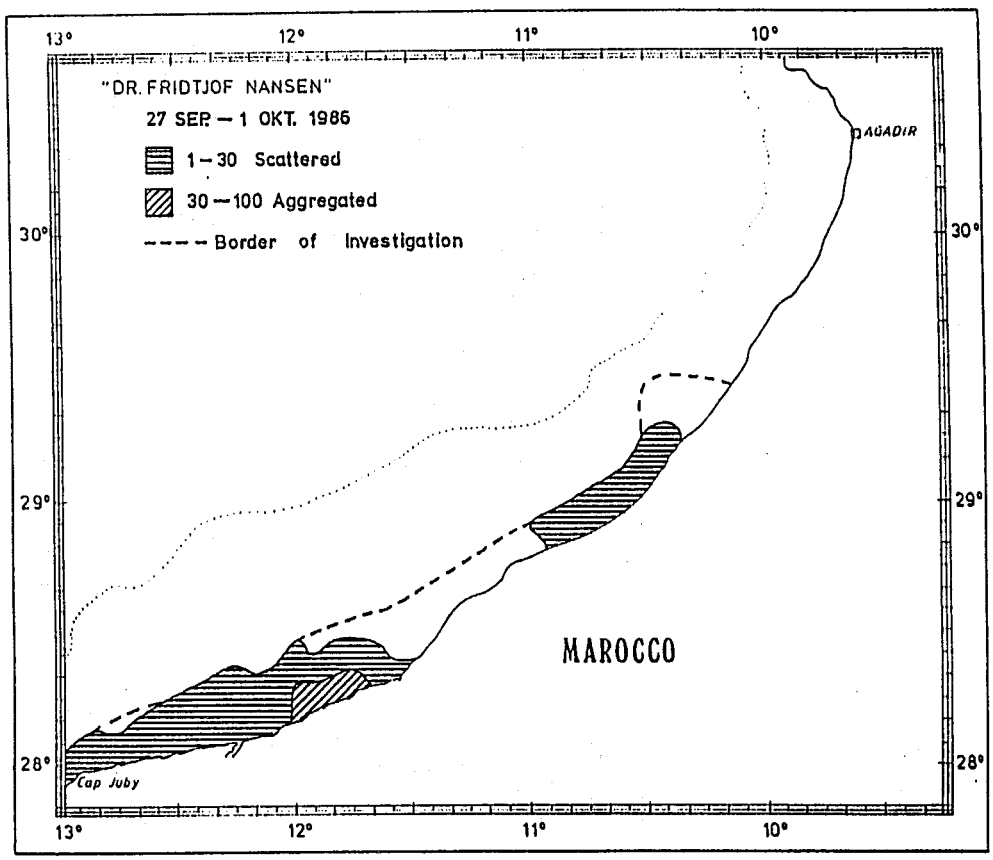


Fig. 3.10 Distribution of horse mackrel, main coverage, Sept. 1986.

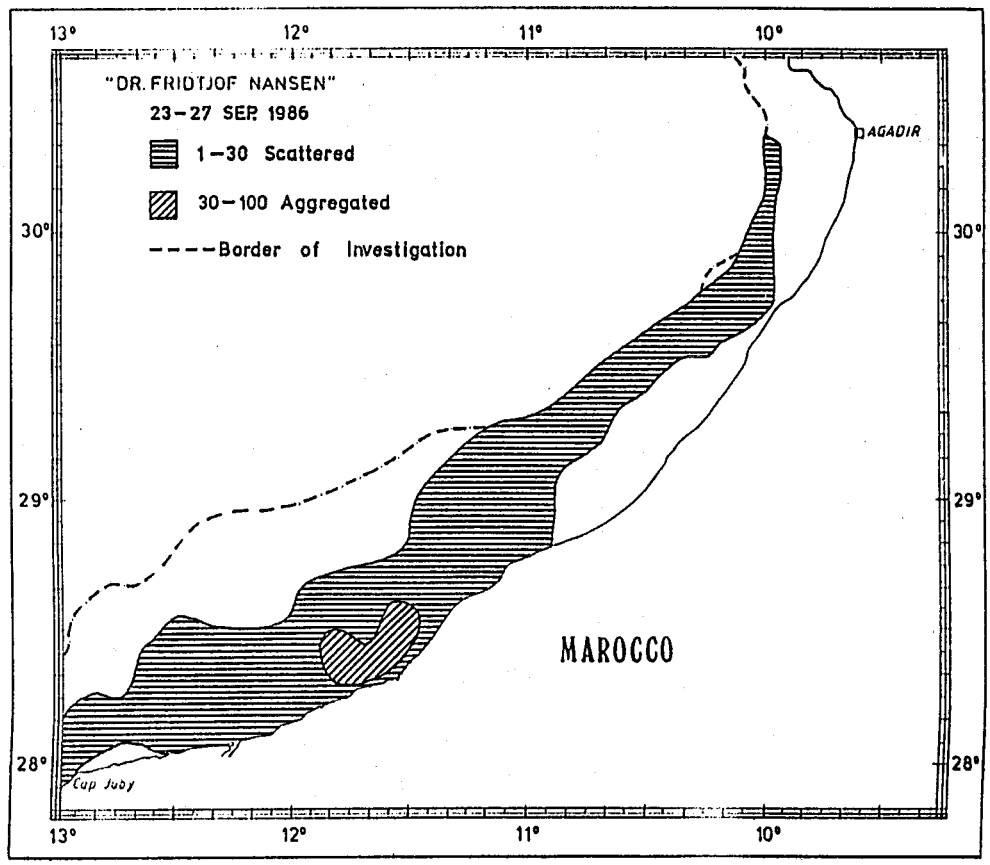


Fig. 3.11 Distribution of sardine, Nov. 1986.

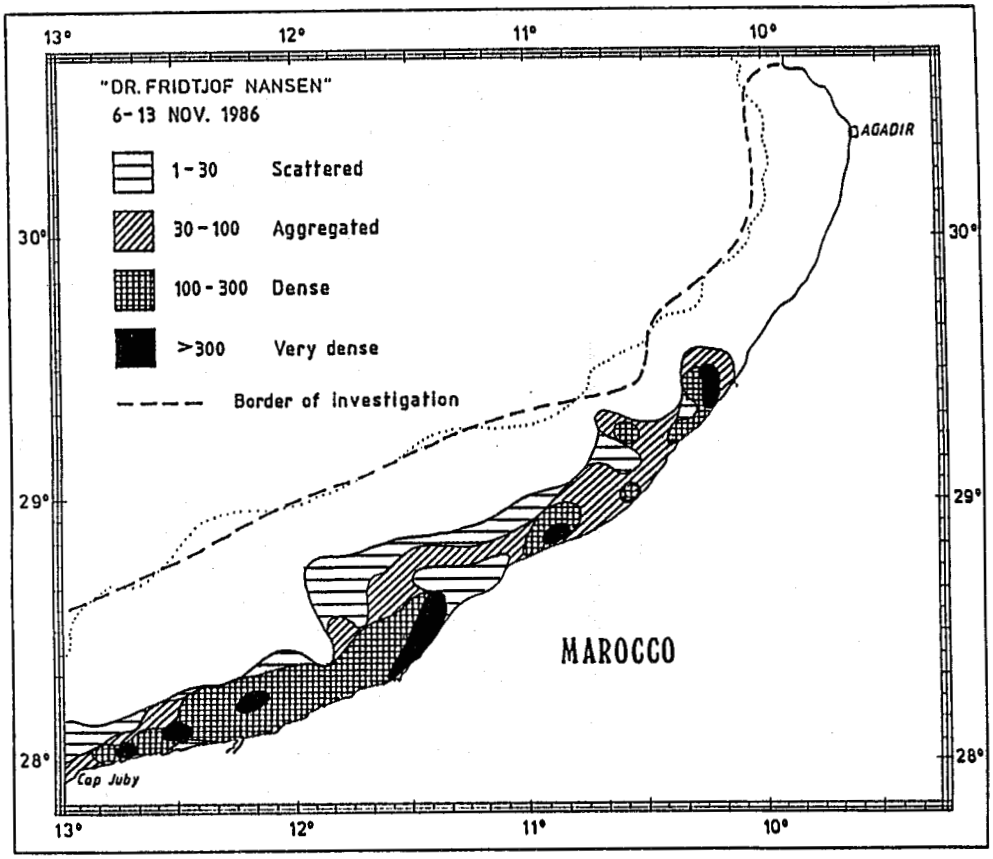


Fig. 3.12 Distribution of mackerel, Nov. 1986.

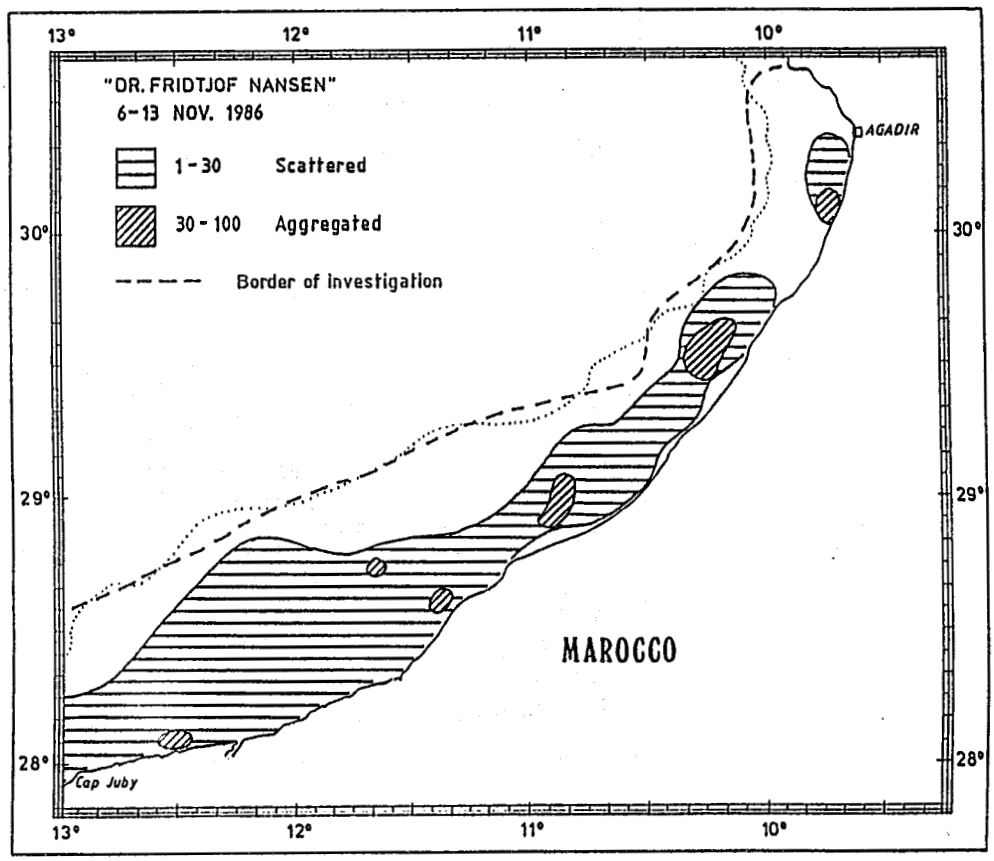


Fig. 3.13 Distribution of horse mackerel, Nov. 1986.

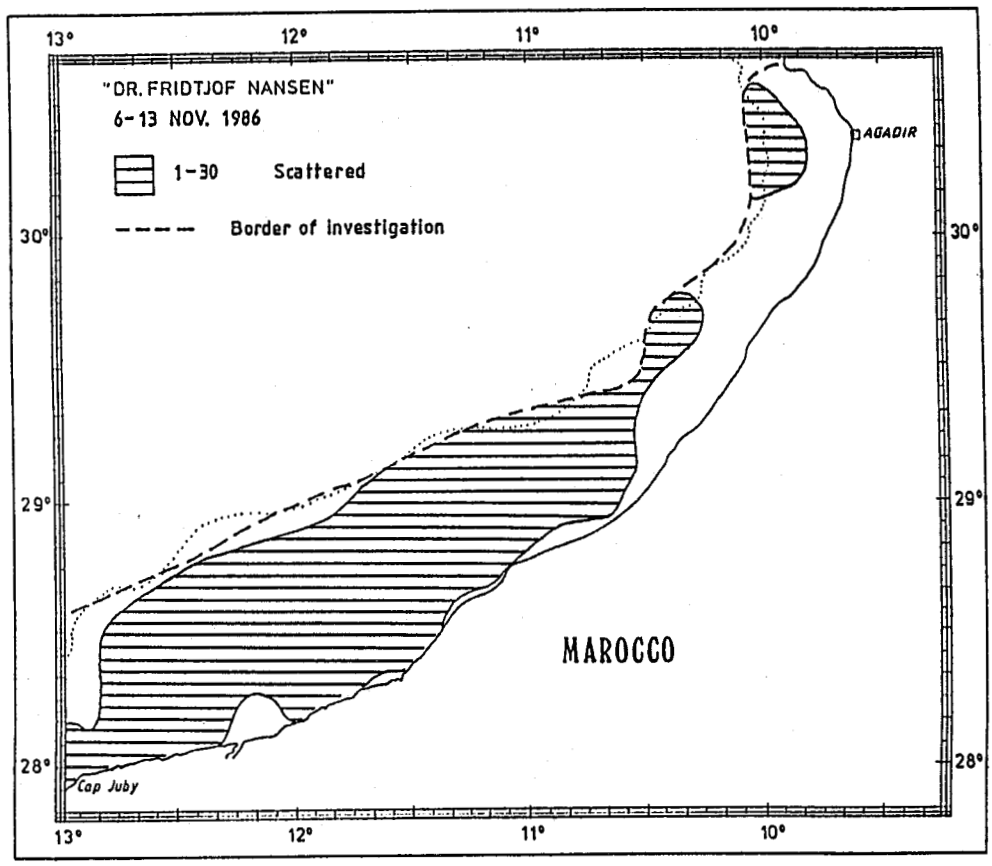


Fig. 3.14 Surface temperature Agadir - Cape Juby, Sept. 1986.

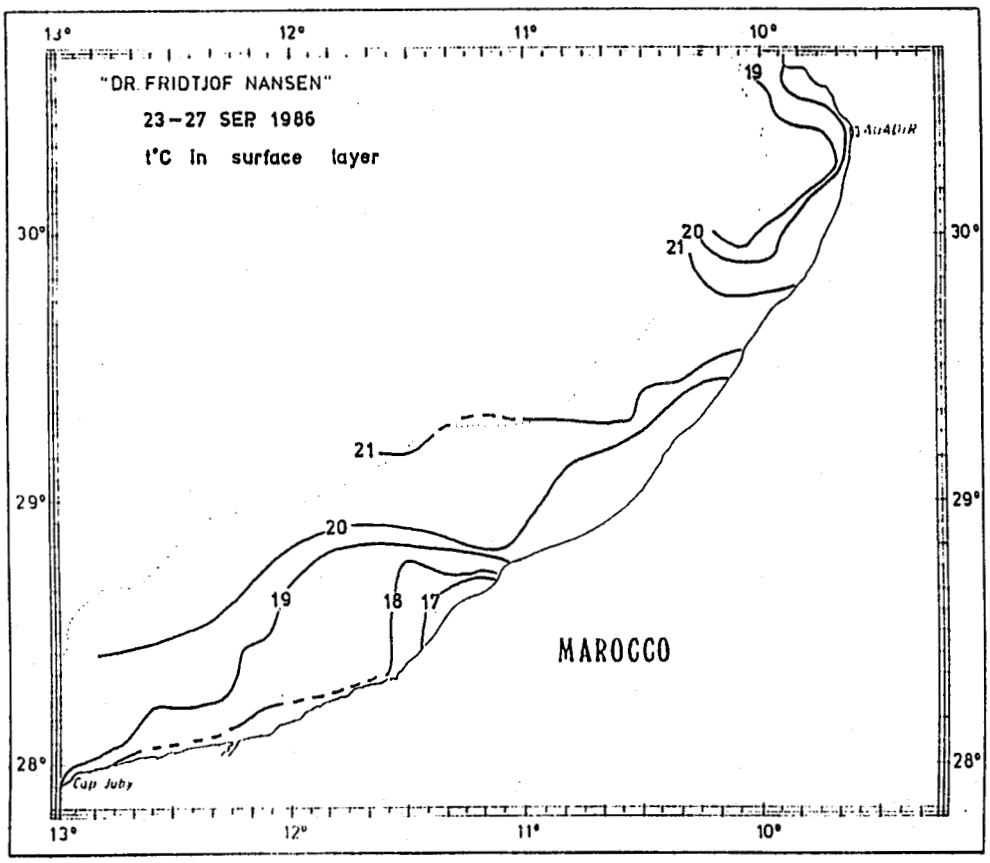


fig. 3.15 Surface temperatue Agadir - Cape Juby, Nov. 1986.

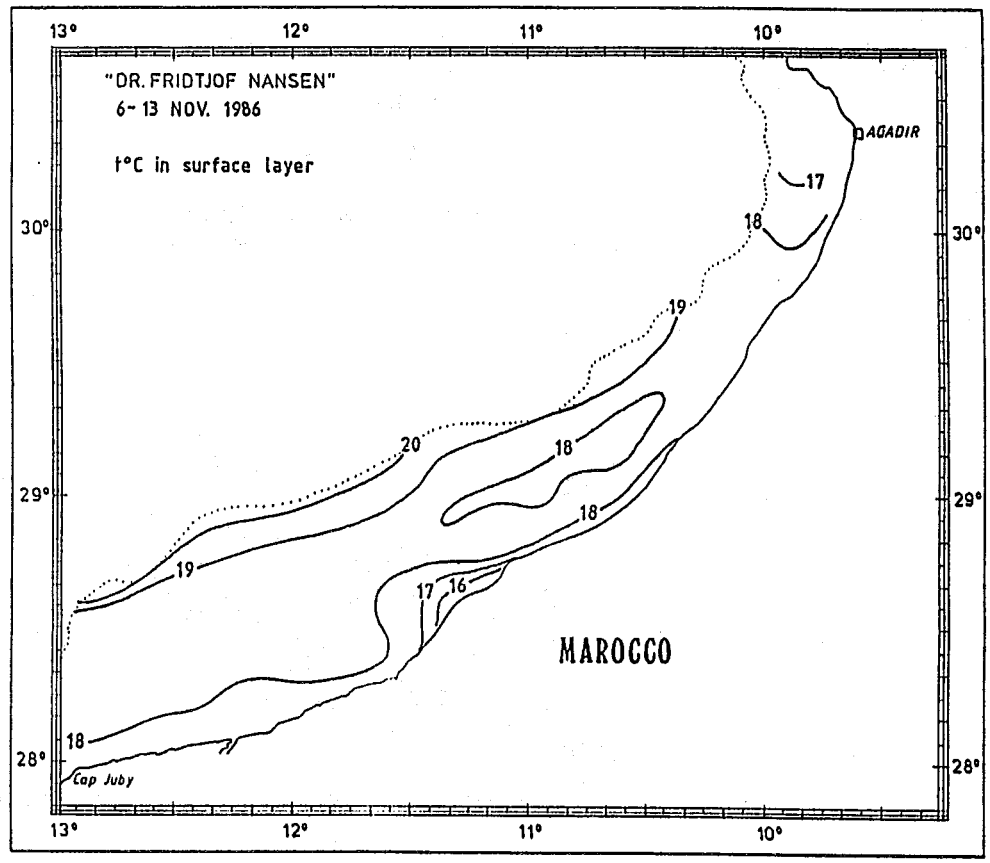
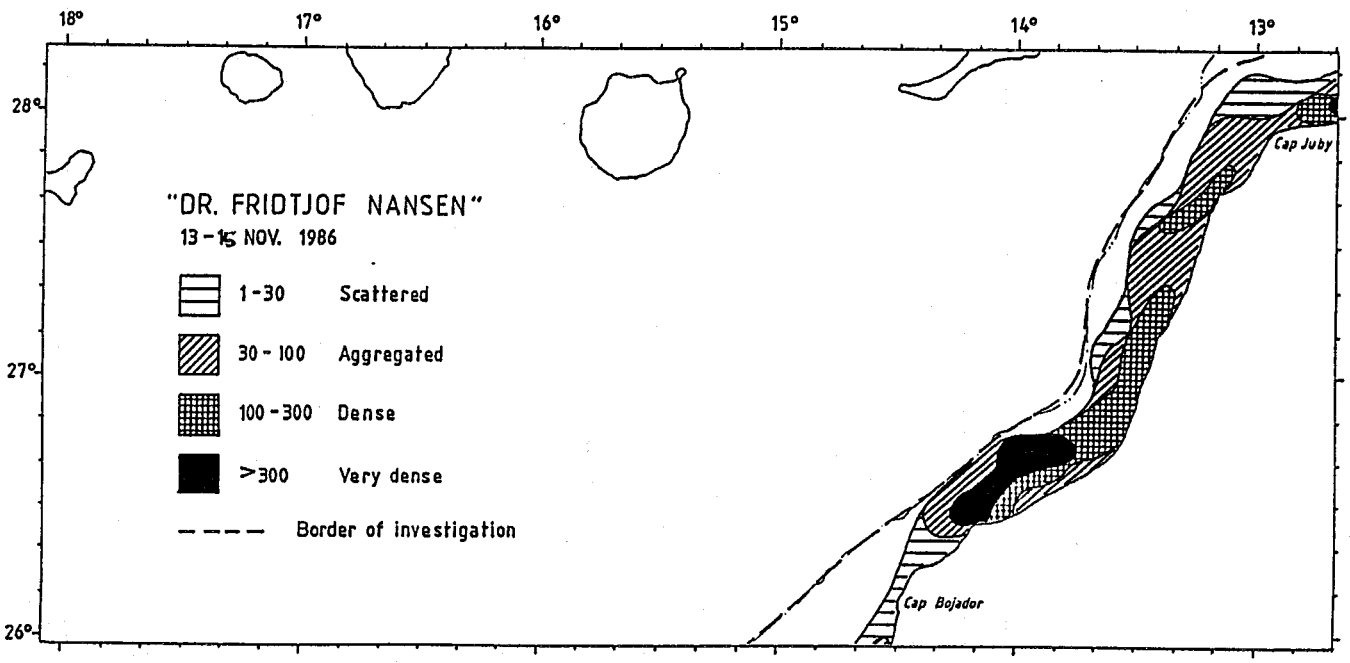


Fig. 3.16 Distribution of sardine. Cape Juby - Cape Bojador, Nov. 1986.



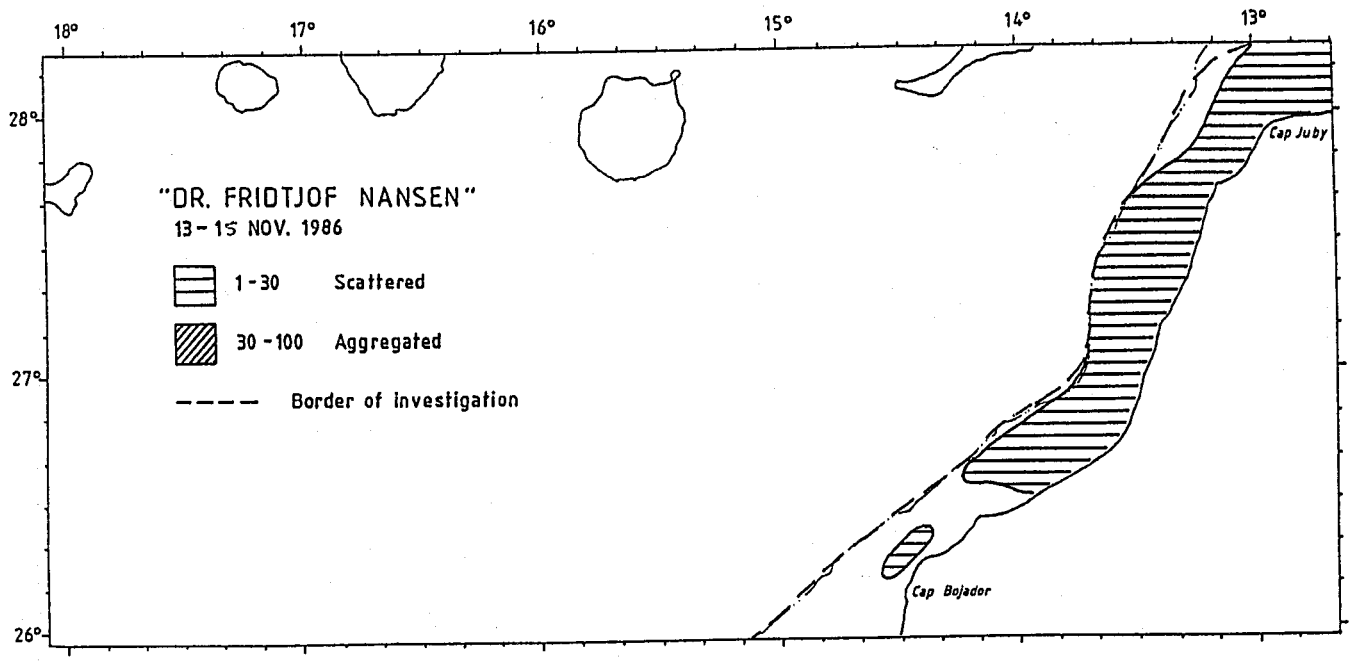


Fig. 3.17 Distributon of mackerel, Cape juby - Cape Bojador, Nov. 1986.

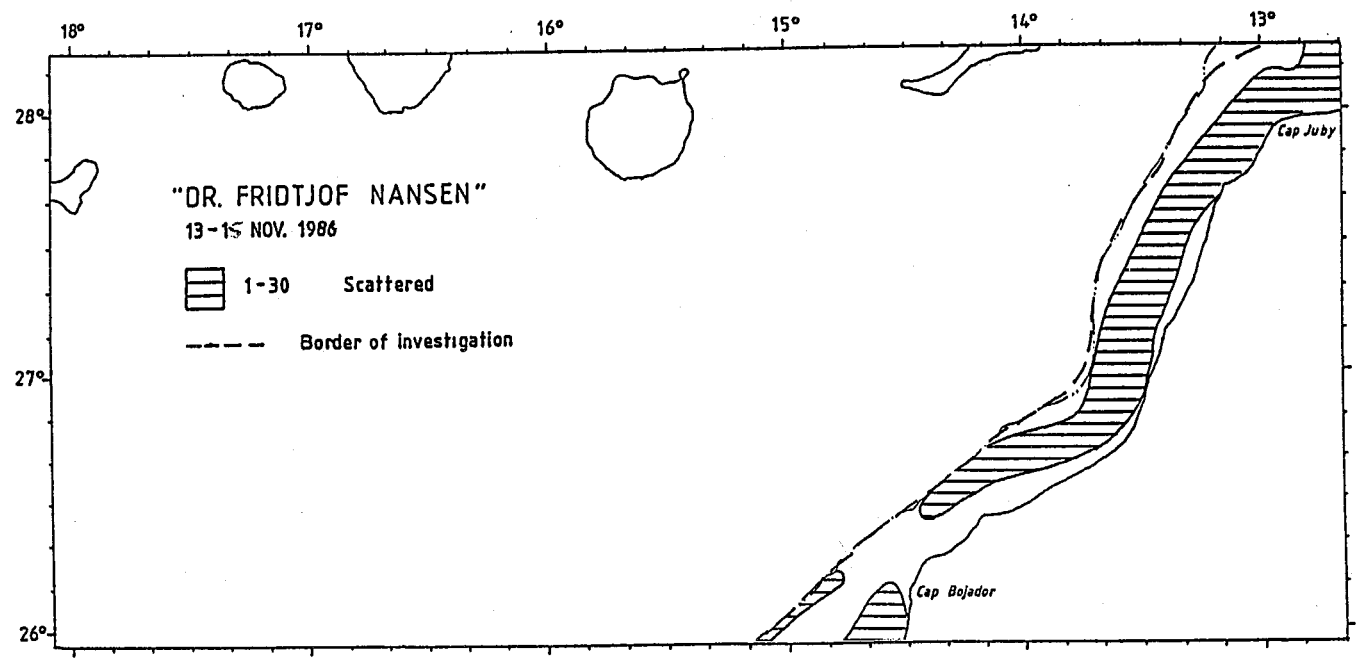


Fig. 3.18 Distribution of horse mackerel, Cape Juby - Cape Bojador, Nov. 1986.

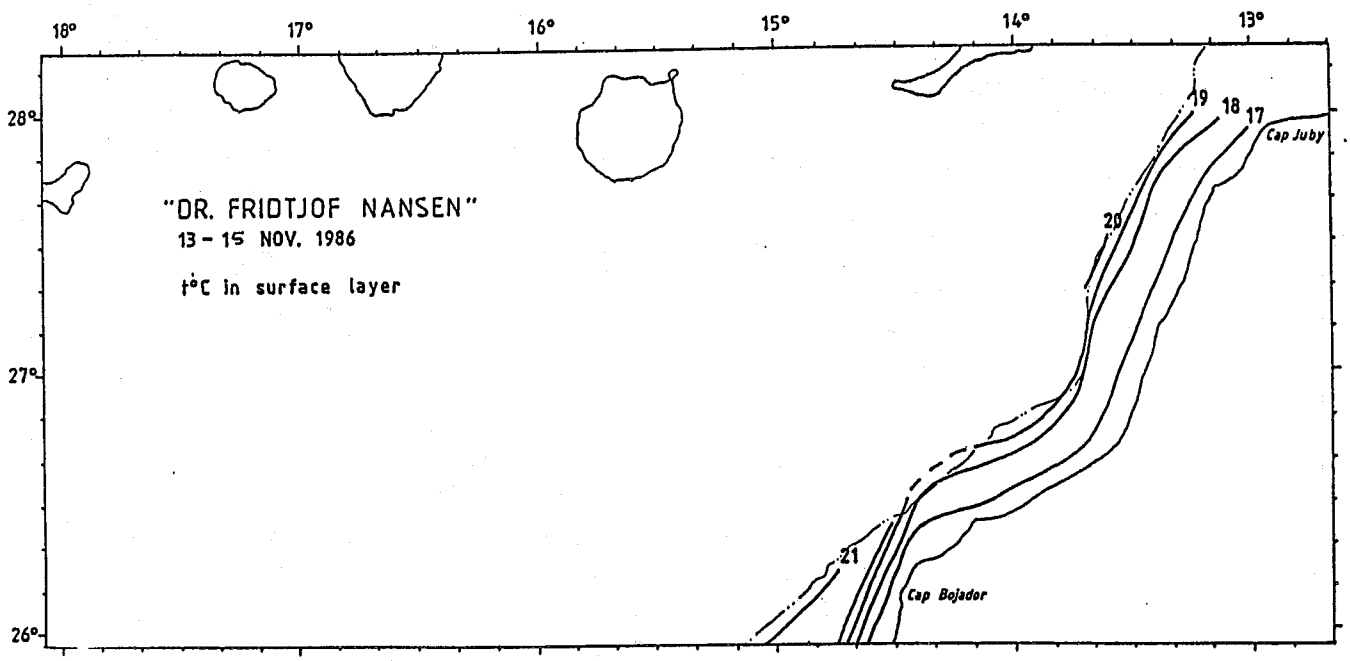


Fig. 3.19 Surface temperature Cape Juby - Cape Bojador, Nov. 1986.

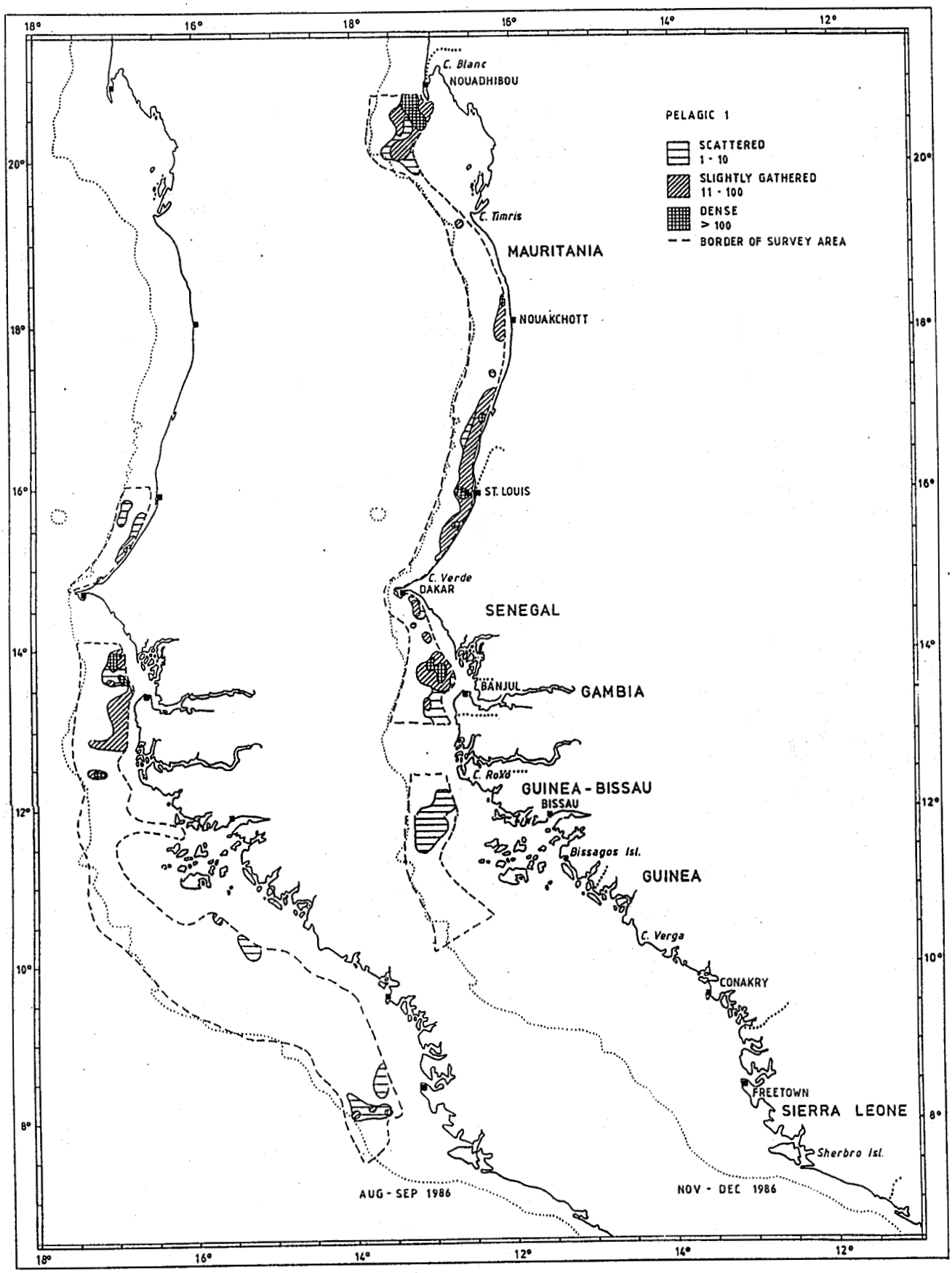


FIGURE 4.1 Distribution of sardinellas, sardine and other clupeid fish in August-September and in November-December.

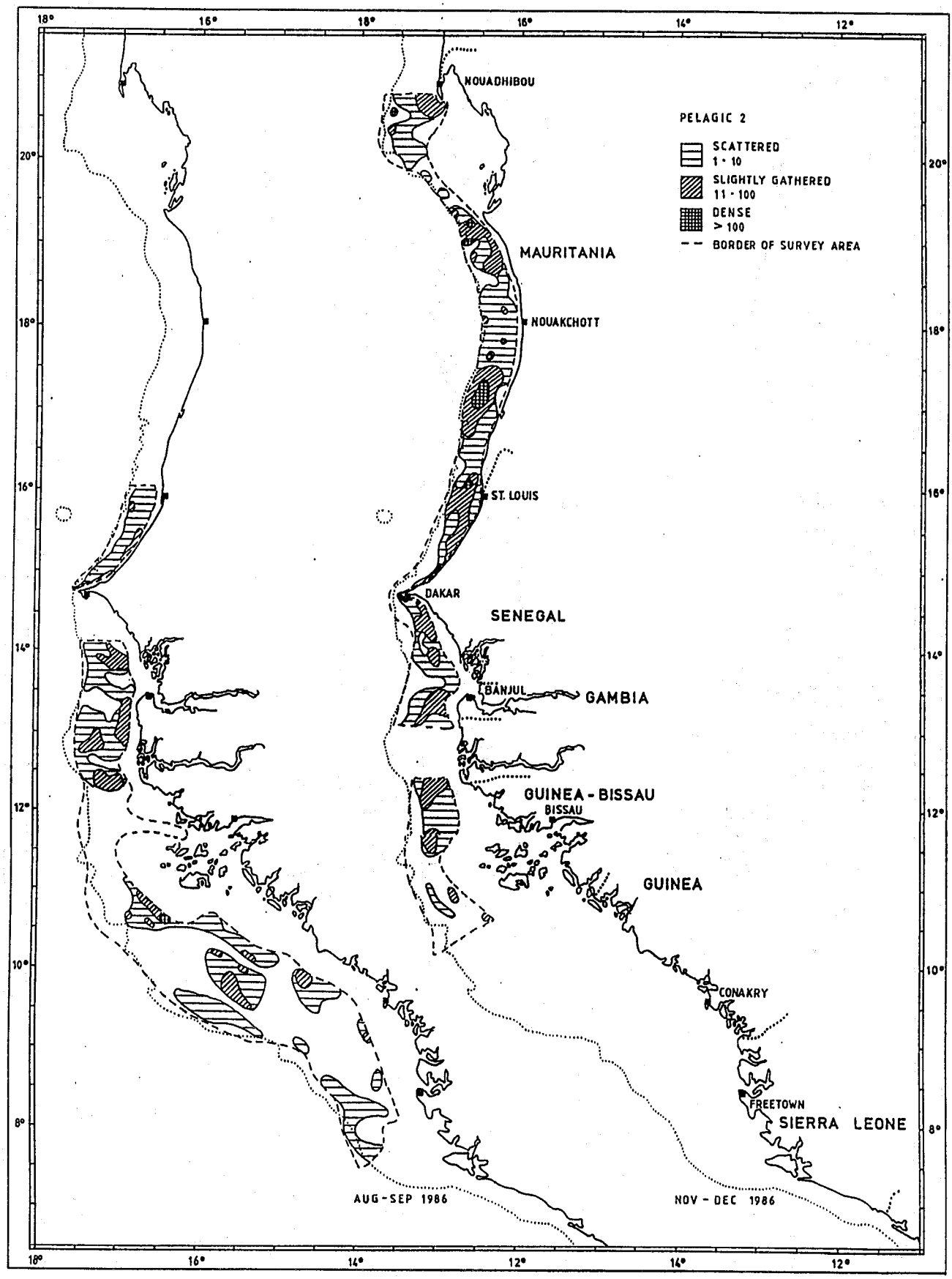


FIGURE 4.2 Distribution of horse- and jack mackerels, scombrids etc. in August-September and in November-December.

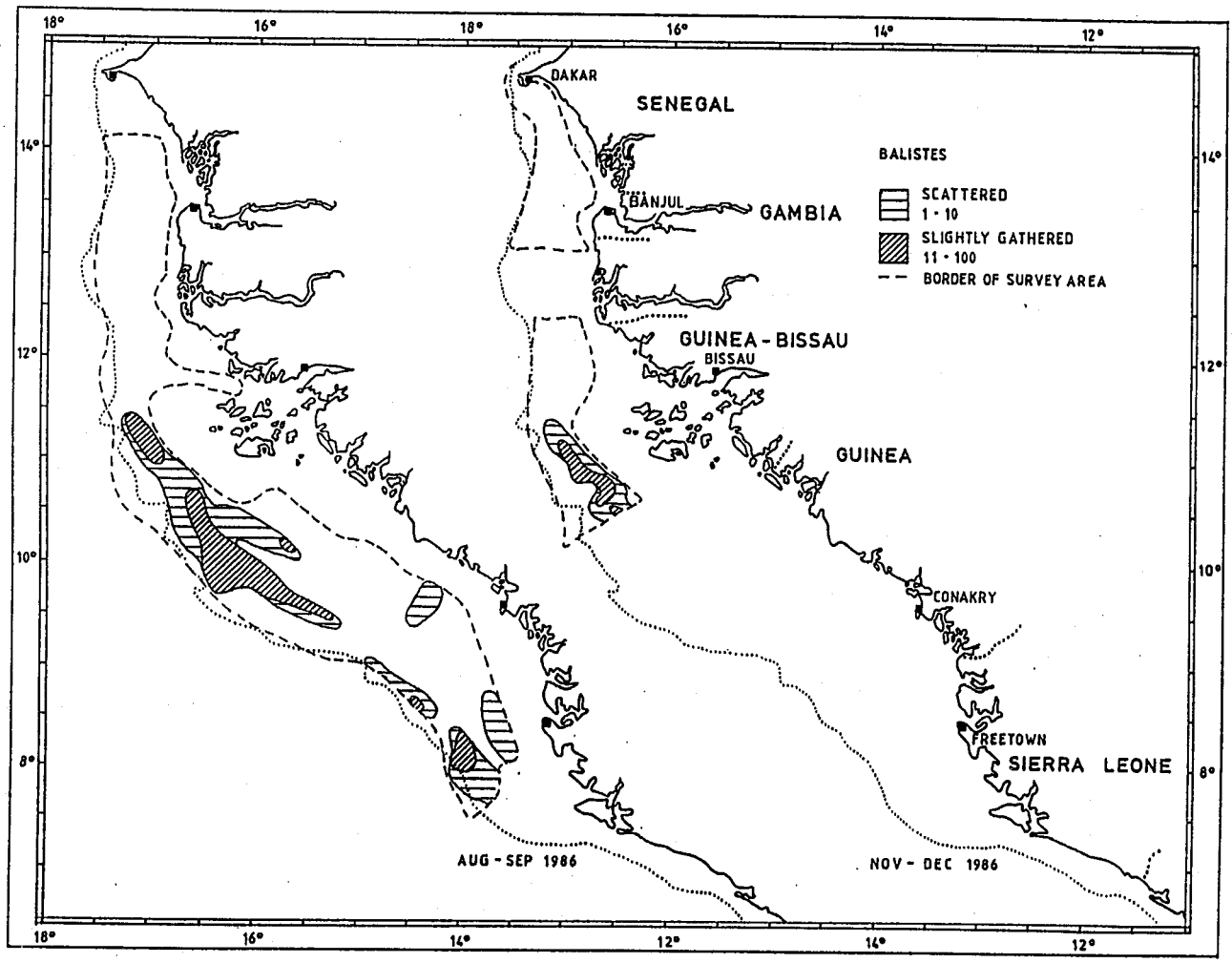
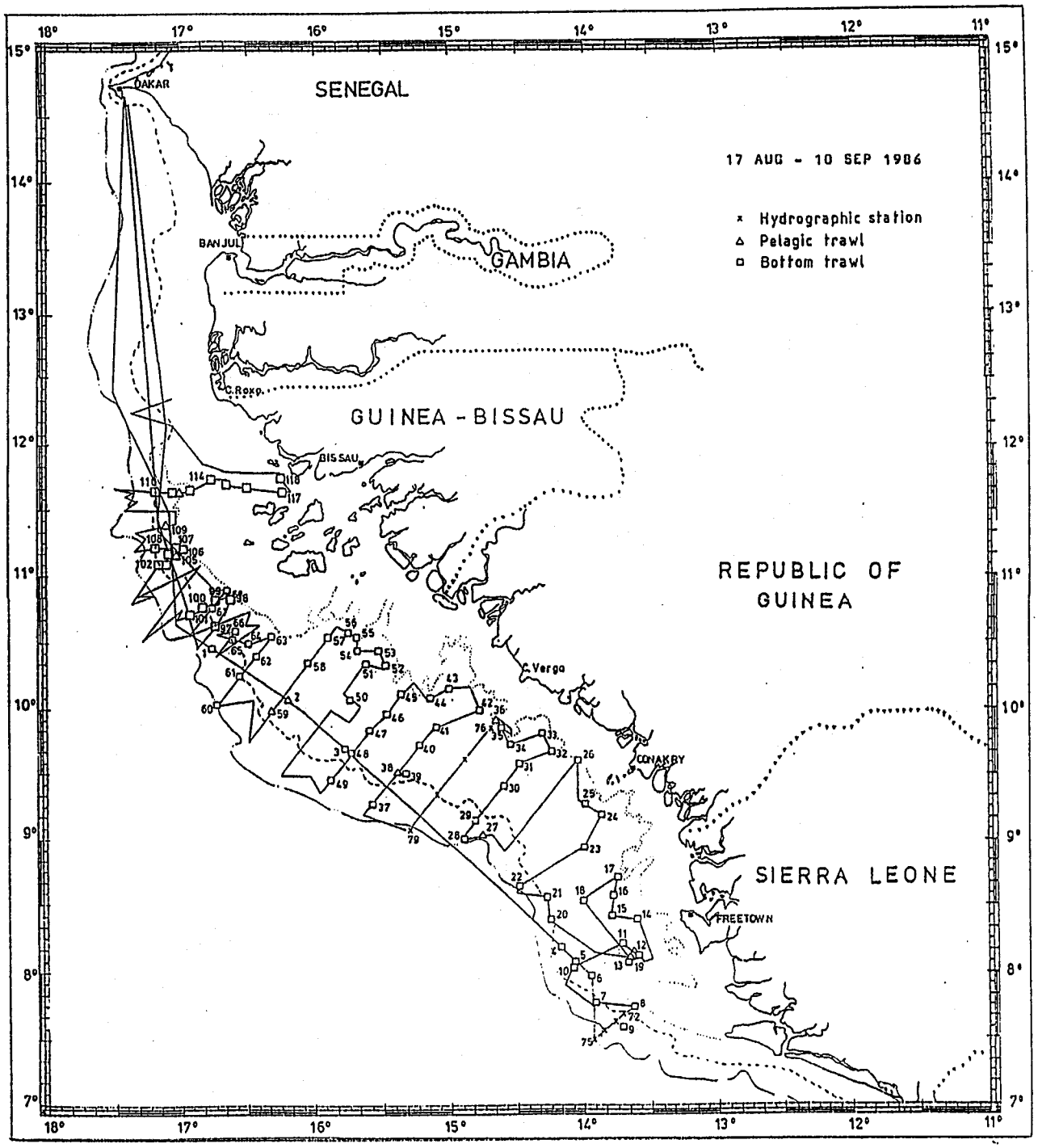
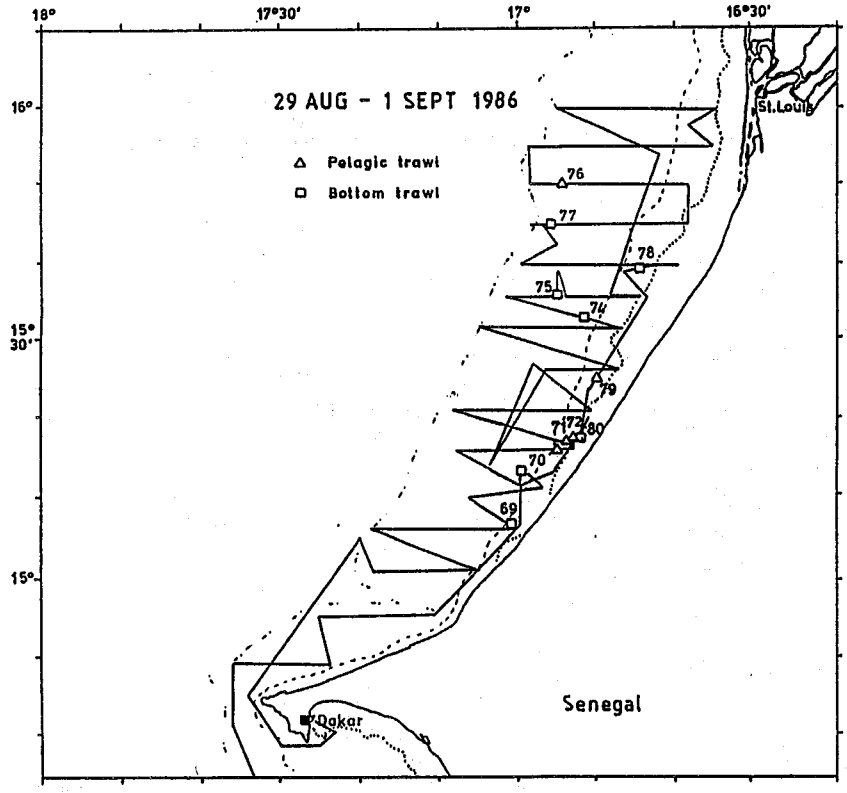
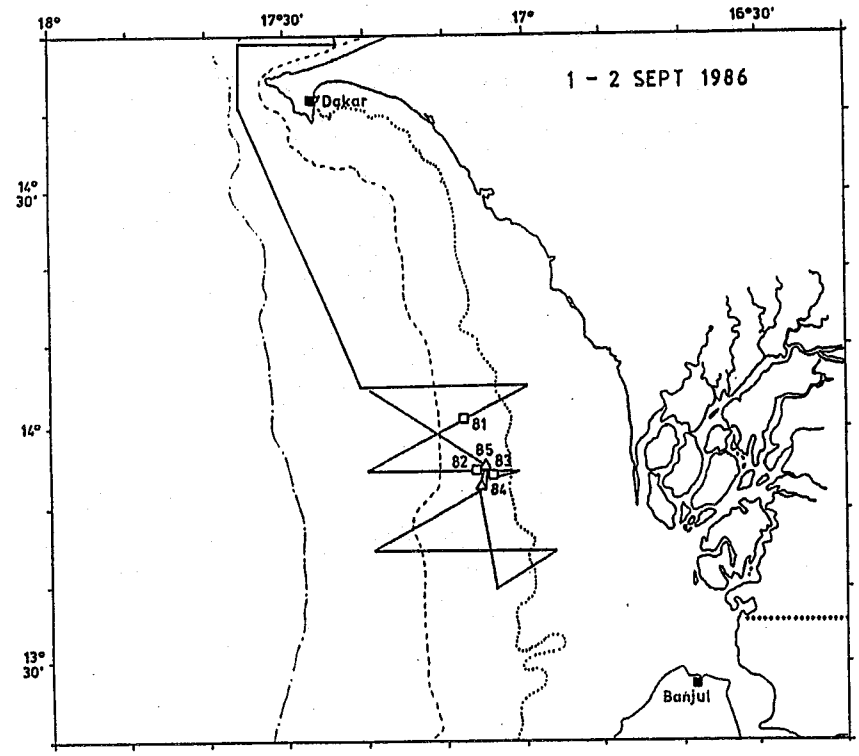


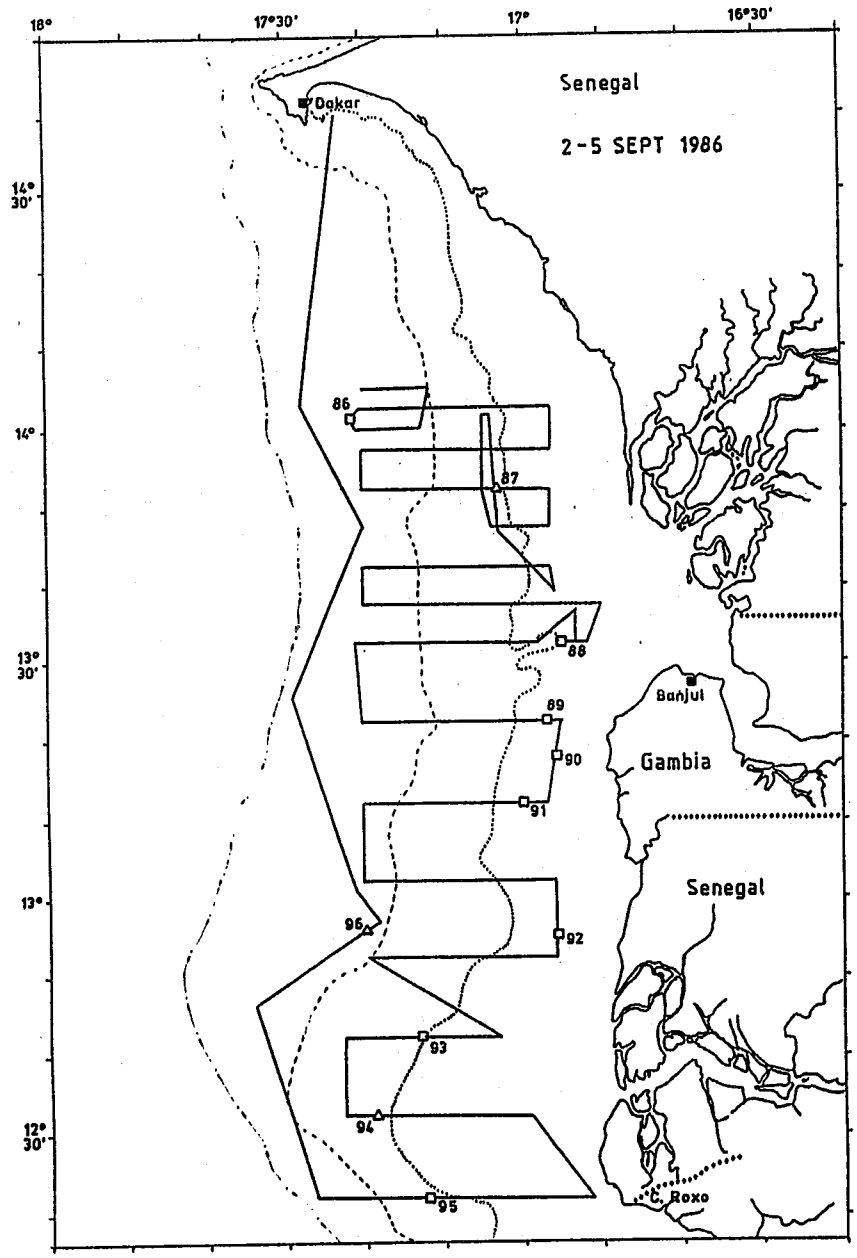
FIGURE 4.3 Distribution of trigger fish in August-September and off Guinea Bissau in December.

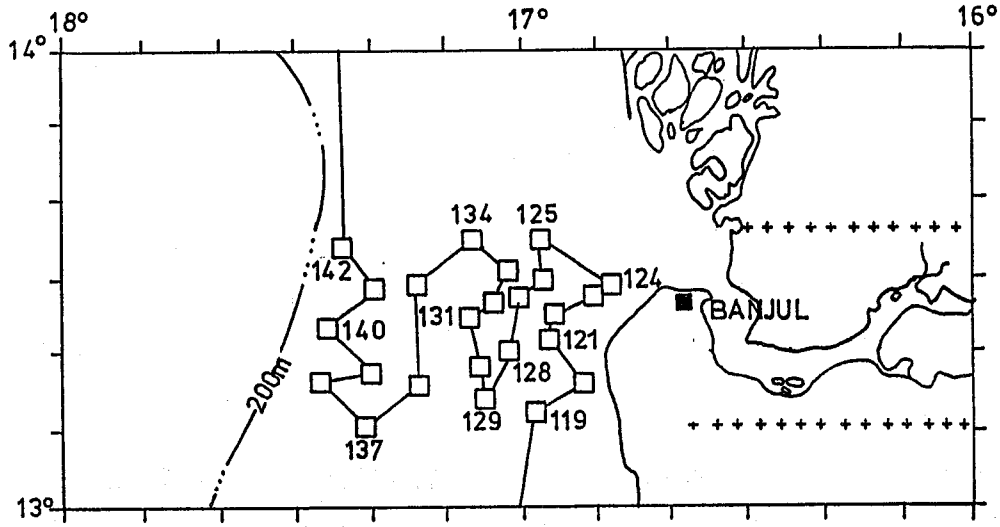
ANNEX I Course tracks and posistion of fishing stations.

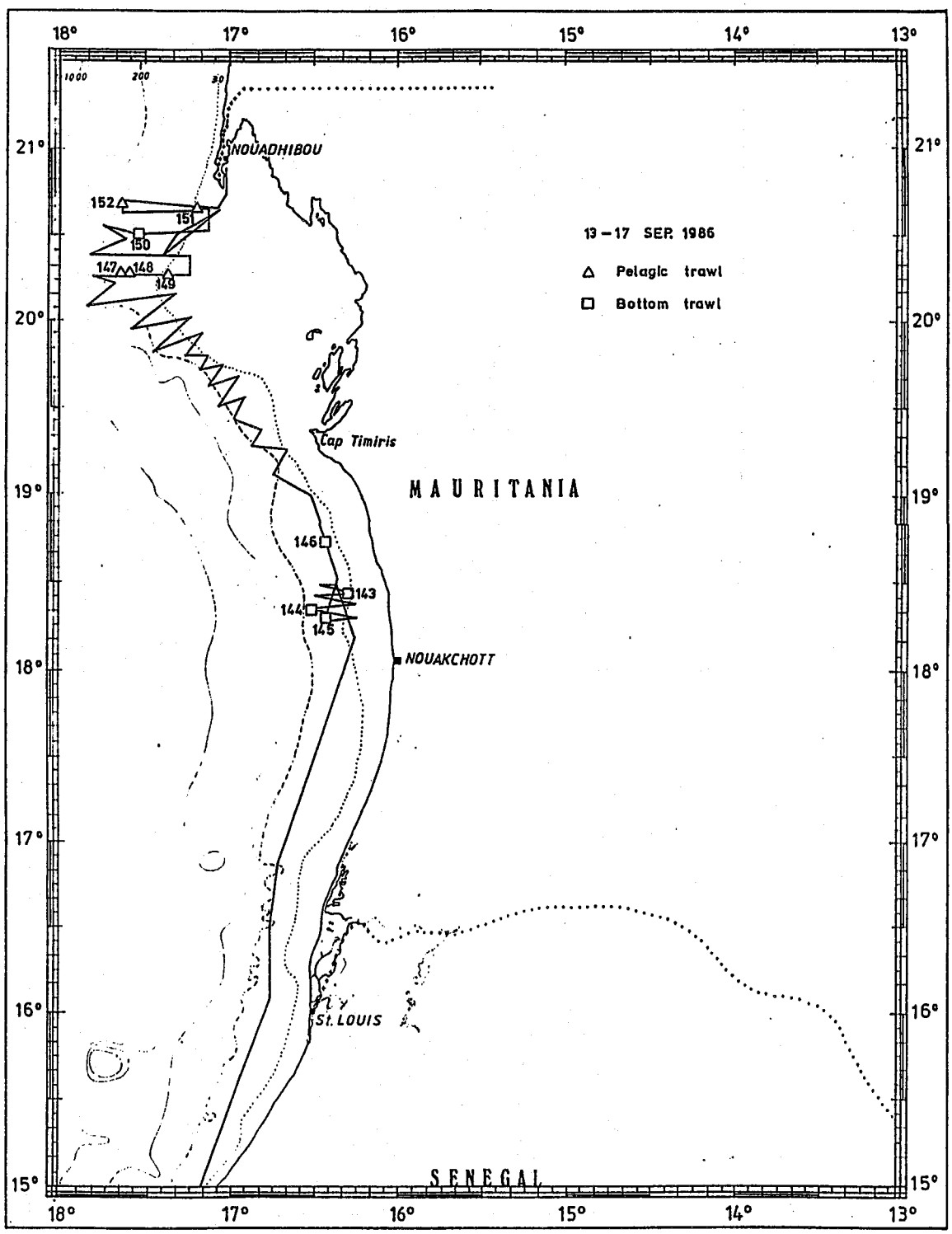


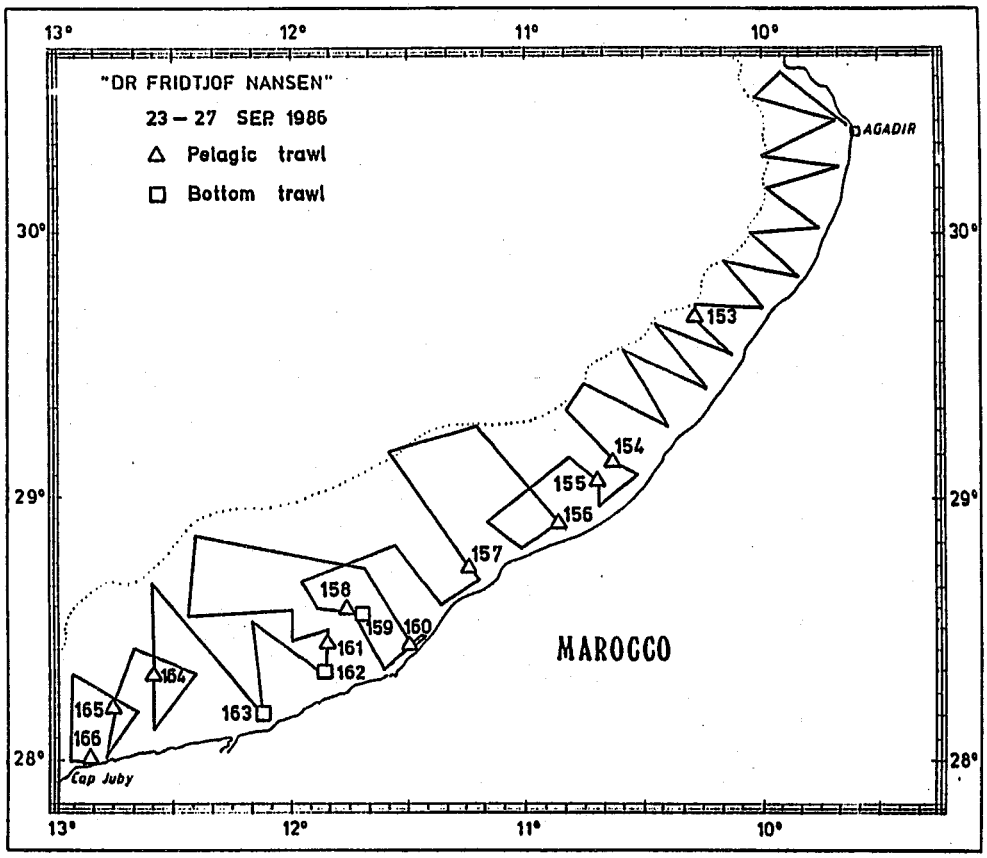

18°
17°30'
17°
16°30'
16°
15°
30'
15°
29 AUG - 1 SEPT 1986
Pelagic trawl
Bottom trawl
St.Louis
76
77
78
75
74
79
71
72
80
70
69
Senegal
Dakar

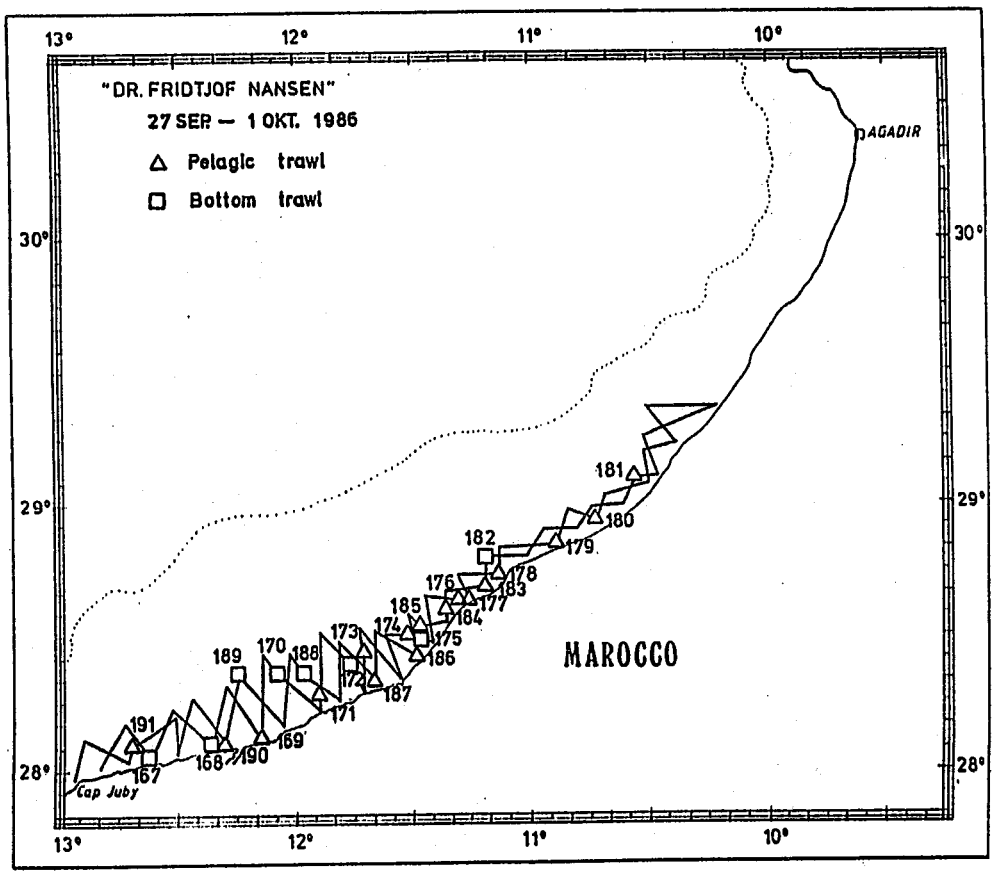

18°
17°30'
17°
16°30'
1 - 2 SEPT 1986
Dakar
14°
30'
14°
81
85
82
83
84
13°
30'
Banjul


18°
17°30'
17°
16°30'
14° 30'
14°
13° 30'
13°
12° 30'
Senegal
2-5 SEPT 1986
Dakar
86
87
88
89
90
91
92
93
94
95
96
Banjul
Gambia
Senegal
C. Roxo


18°
17°
16°
14°
13°
134
125
142
124
131
140
121
128
129
119
137
200m
BANJUL


18°
17°
16°
15°
14°
13°
21°
20°
19°
18°
17°
16°
15°
1000
200
30
NOUADHIBOU
152
151
150
147
148
149
13 – 17 SEP. 1986
Pelagic trawl
Bottom trawl
Cap Timiris
MAURITANIA
146
143
144
145
NOUAKCHOTT
St. LOUIS
SENEGAL


"DR FRIDTJOF NANSEN"
23 – 27 SEP. 1986
Pelagic trawl
Bottom trawl
AGADIR
MAROCCO
Cap Juby
13°
12°
11°
10°
30°
29°
28°
153
154
155
156
157
158
159
160
161
162
163
164
165
166


"DR. FRIDTJOF NANSEN"
27 SEP – 1 OKT. 1986
Pelagic trawl
Bottom trawl
AGADIR
MAROCCO
Cap Juby
13°
12°
11°
10°
30°
29°
28°
167
168
169
170
171
172
173
174
175
176
177
178
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182
183
184
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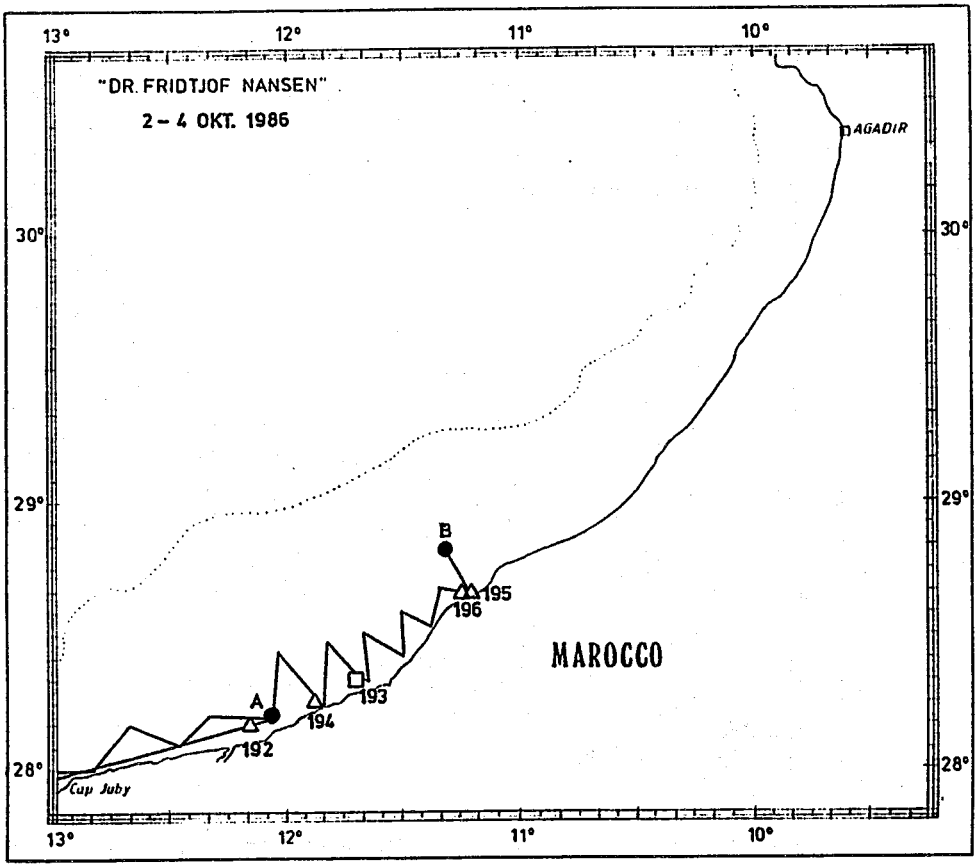
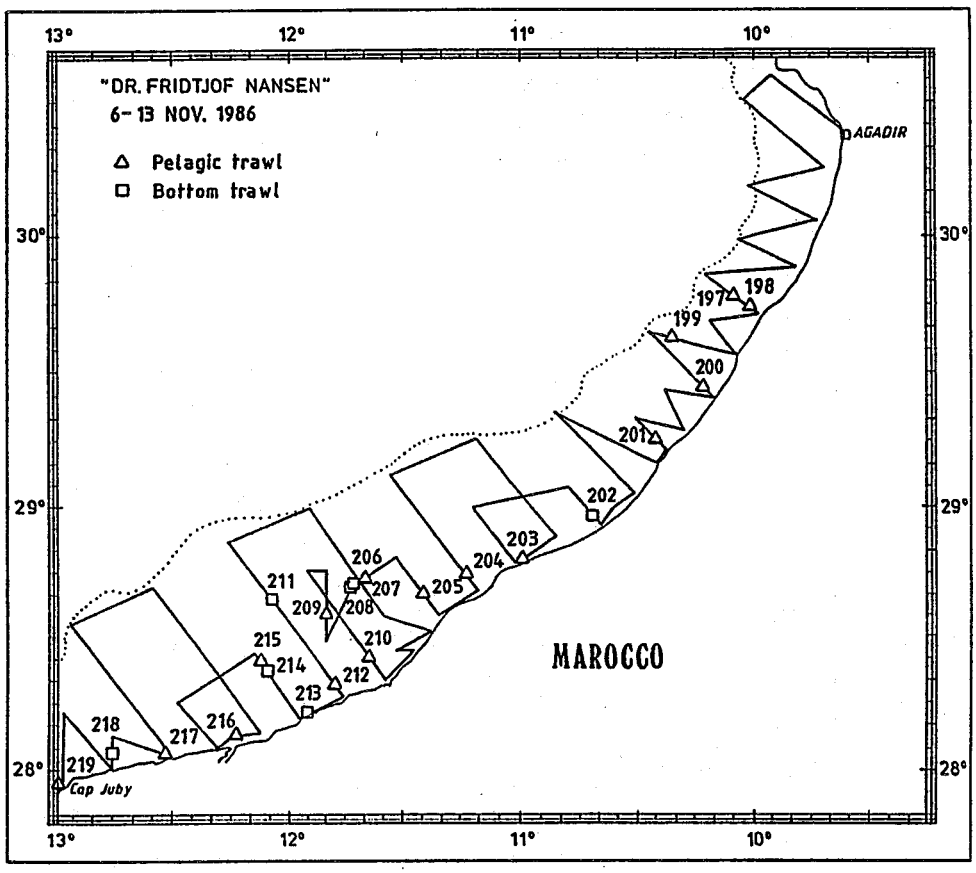
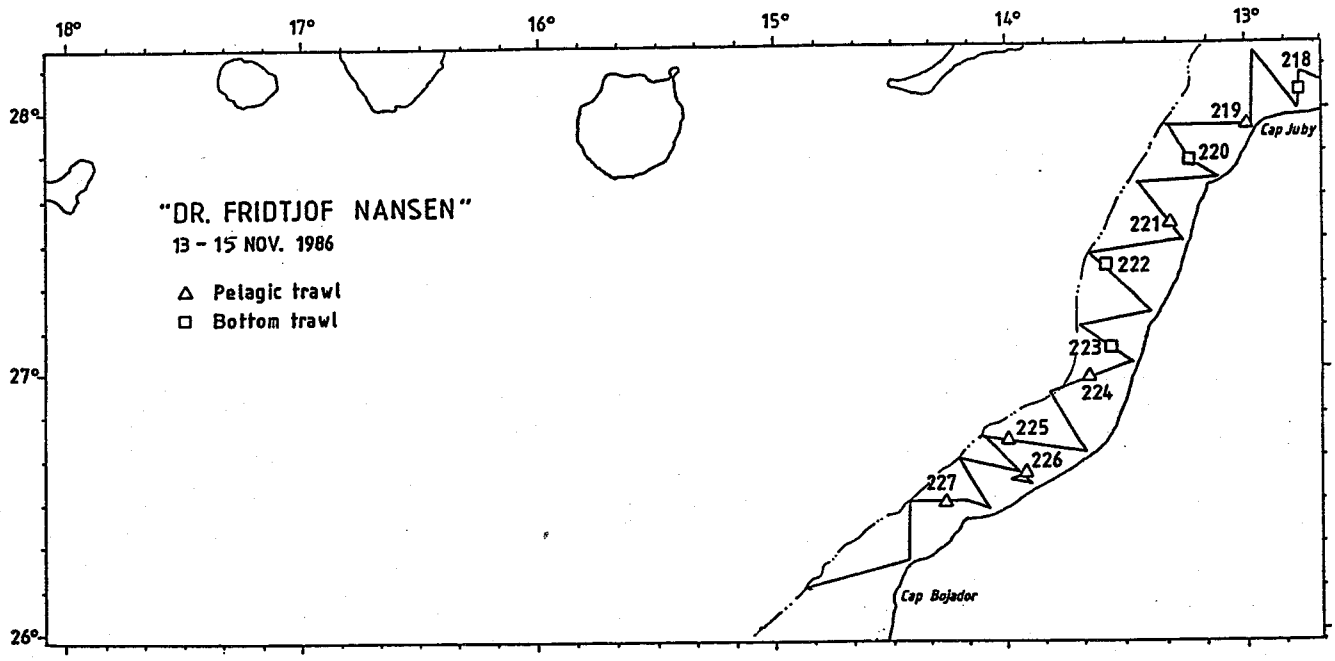
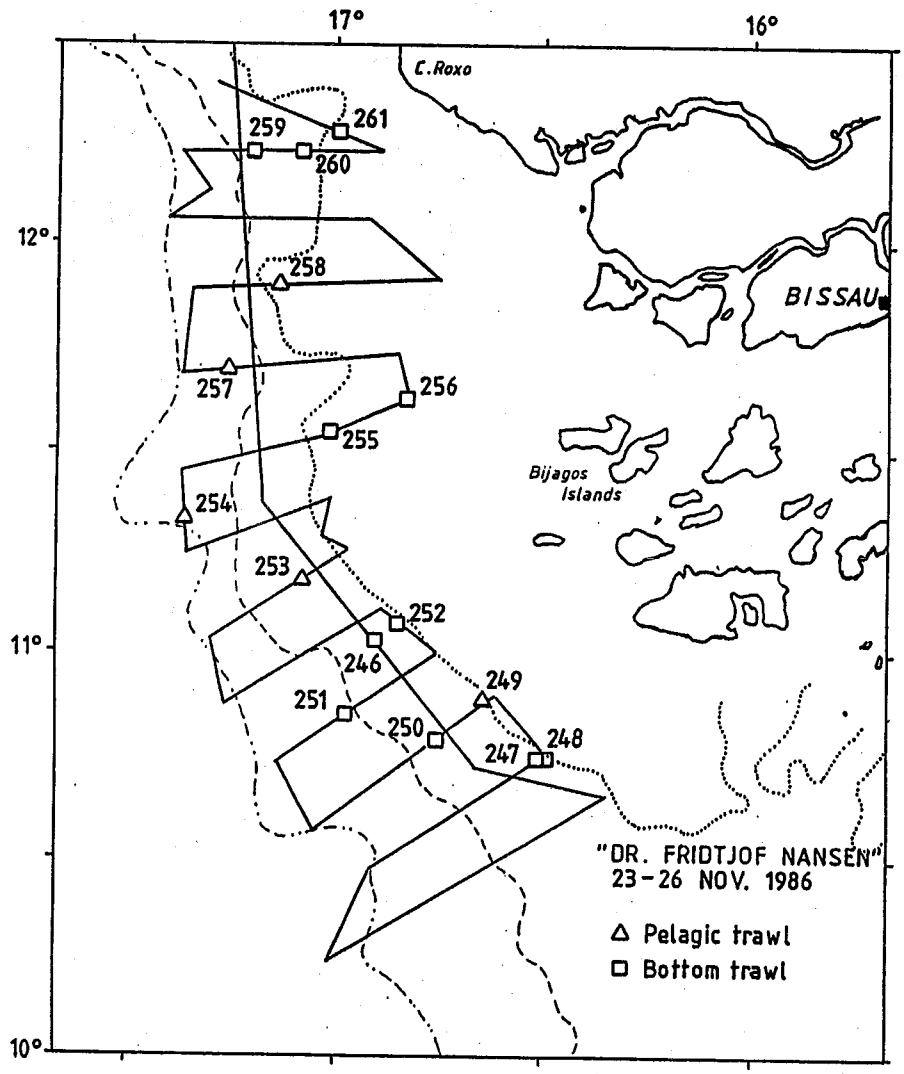
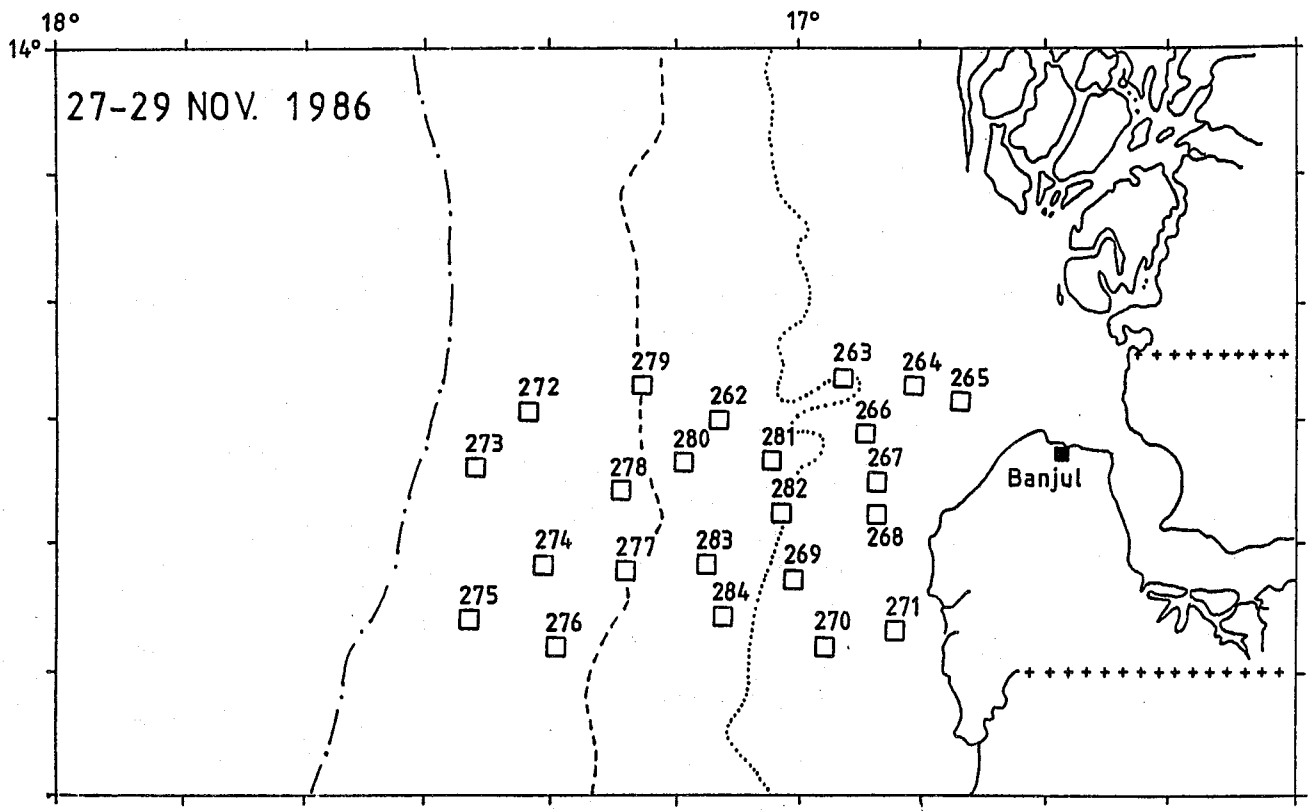
186
187
188
189
190
191

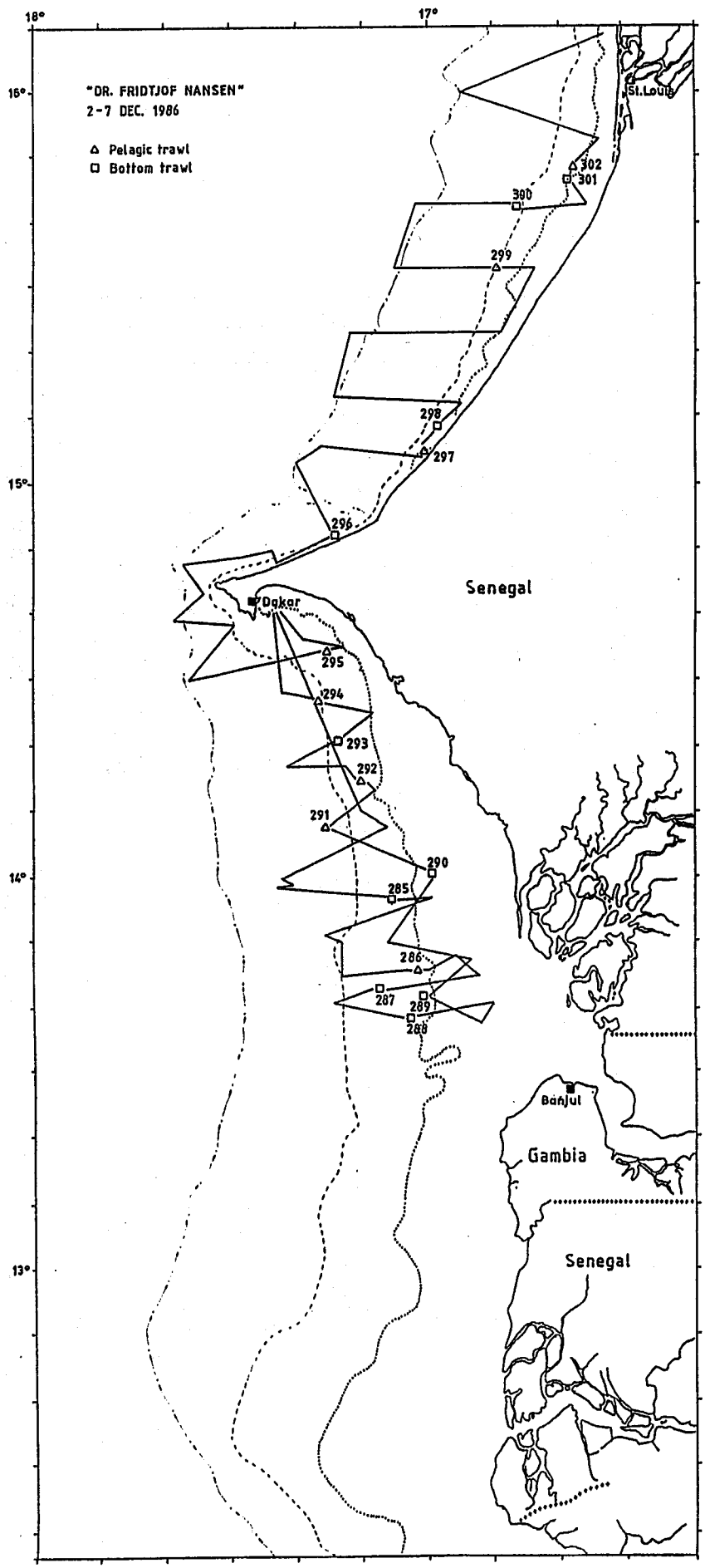

"DR. FRIDTJOF NANSEN"
2 – 4 OKT. 1986
AGADIR
MAROCCO
Cap Juby
A
B
192
193
194
195
196
13°
12°
11°
10°
30°
29°
28°

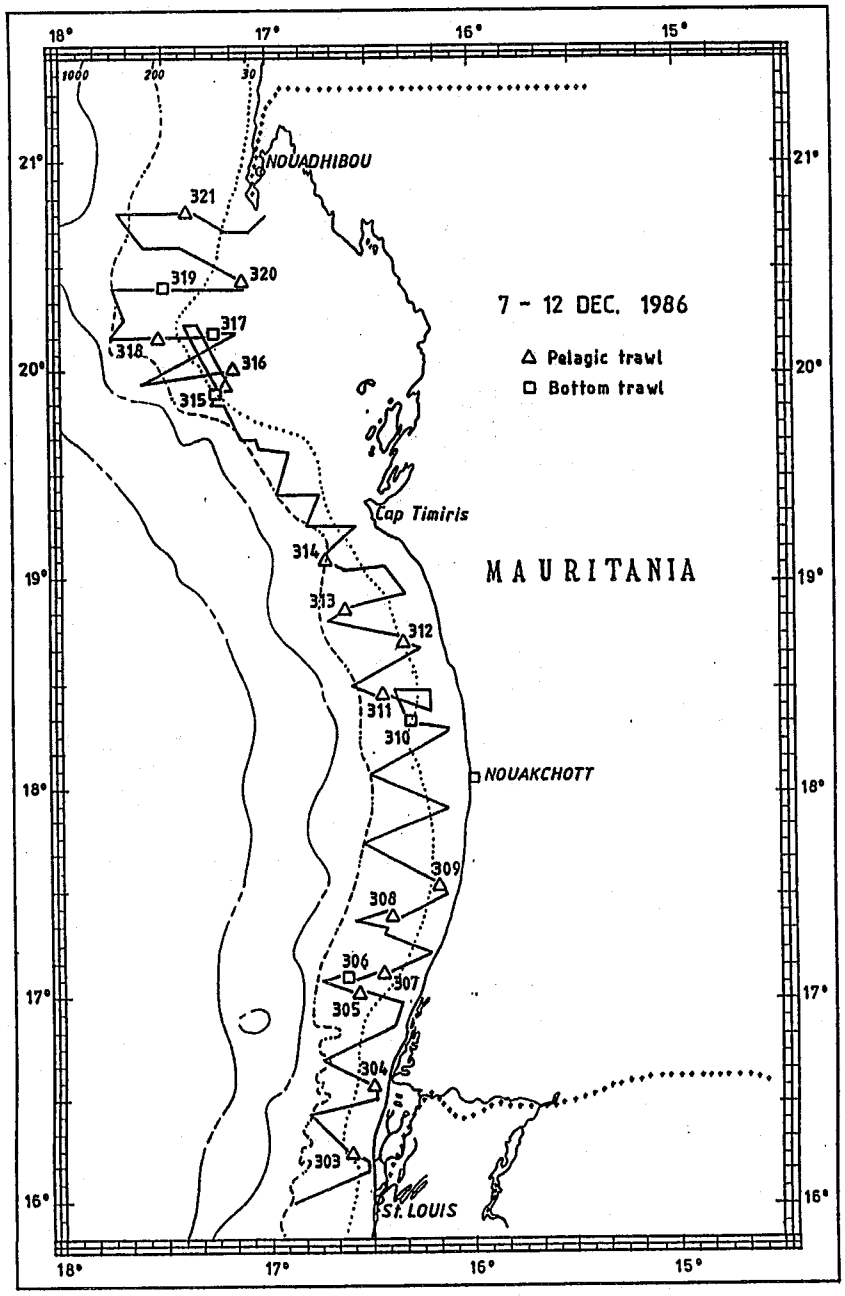

"DR. FRIDTJOF NANSEN"
6 – 13 NOV. 1986
Pelagic trawl
Bottom trawl
AGADIR
MAROCCO
Cap Juby
192
193
194
195
196
197
198
199
200
201
202
203
204
205
206
207
208
209
210
211
212
213
214
215
216
217
218
219
13°
12°
11°
10°
30°
29°
28°


18°
17°
16°
15°
14°
13°
28°
27°
26°
"DR. FRIDTJOF NANSEN"
13 - 15 NOV. 1986
Pelagic trawl
Bottom trawl
218
219
220
221
222
223
224
225
226
227
Cap Juby
Cap Bojador


17°
16°
12°
11°
10°
C.Roxo
BISSAU
Bijagos Islands
259
261
260
258
257
256
255
254
253
252
246
249
251
250
247
248
"DR. FRIDTJOF NANSEN"
23 - 26 NOV. 1986
Pelagic trawl
Bottom trawl


18°
17°
14°
27-29 NOV. 1986
263
264
265
279
272
262
266
273
280
281
267
278
282
Banjul
274
277
283
269
268
275
284
270
271
276


"DR. FRIDTJOF NANSEN"
2-7 DEC. 1986
Δ Pelagic trawl
□ Bottom trawl
18°
17°
16°
15°
14°
13°
St.Louis
302
301
300
299
298
297
296
Senegal
Dakar
295
294
293
292
291
290
285
286
287
289
288
Banjul
Gambia
Senegal


18°
17°
16°
15°
1000
200
30
21°
20°
19°
18°
17°
16°
NOUADHIBOU
321
320
319
317
318
316
315
7 - 12 DEC. 1986
Pelagic trawl
Bottom trawl
Cap Timiris
314
313
312
311
310
MAURITANIA
NOUAKCHOTT
309
308
306
307
305
304
303
St. LOUIS

ANNEX II. Description of instruments and fishing gear.

ACOUSTIC INSTRUMENTS

Two SIMRAD scientific echo sounders, 38 and 120 kHz, were used during the survey for estimation of fish density. In addition an Es 400 split beam sounder was used.

INSTRUMENT SETTINGS

	EK 400/38	EK 400/120	ES 400
Range	0-100 or 0-250	0-100	0-25 to 0-250
Trans.	High (5000 W NOM)	High (1250 W NOM)	EK/ES adapter
Bandwith	3.3 kHz	3.3 kHz	3.5 kHz
Pulslength	1 ms	1 ms	1ms
TVG	20 log R	20 log R	40 log R
Attenuator	20 dB	0	Fixed
Rec. gain	7	5	
Transducer	8^{o}x8^{o} ceramic or split beam	Ceramic	Split beam 10^{o}

Presentation mode: Compensated

EK 400/38 was coupled to the digital integrator QD and to one analog integrator QM.

QD settings: Gain 30dB, Threshold 10 to 26 mv.
QM settings: Gain 20 dB x 10. Threshold 10.

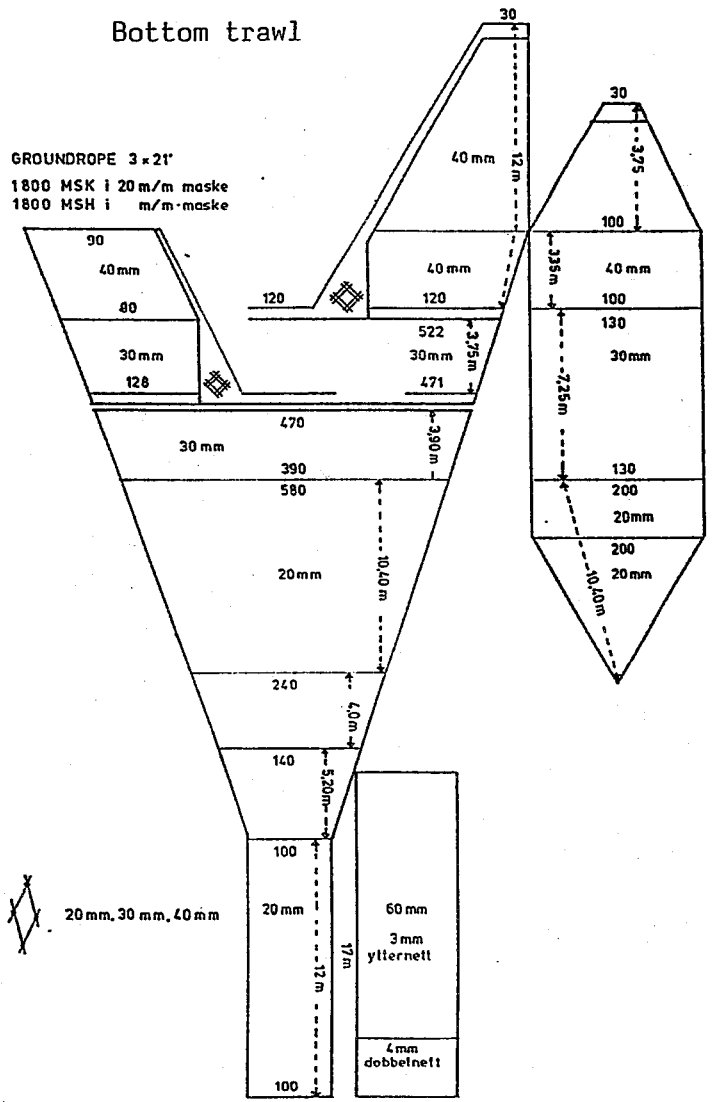
EK 400/120 was coupled to the other QM Integrator. Gain 10dB x 10. Threshold 0.

ES 400 was connected to an Epson printer for hardcopy of the size distribution diagram (histogram).

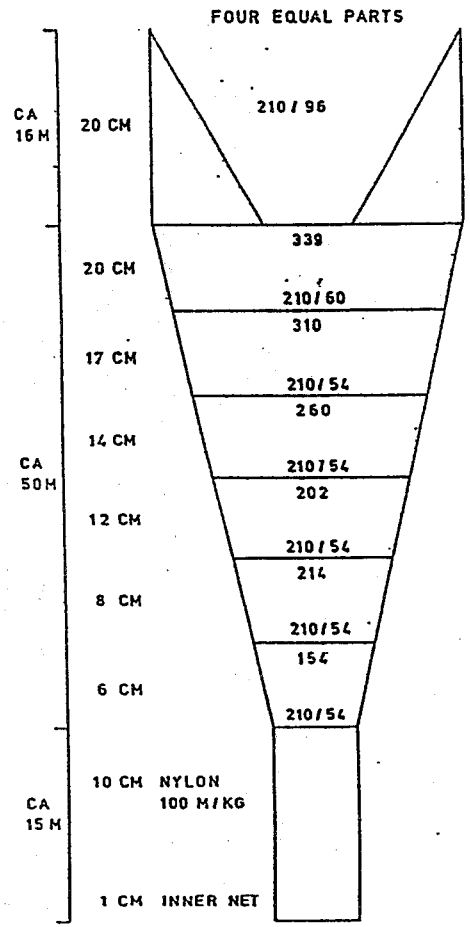
Calibration on standard copper sphere.

		Grand Canary 5.10 1986	Las Palmas 4.11 1986
EK 400/38 + split beam transduser : SL + VR	=	135.9	135.8

Bottom trawl



1360 MESH PELAGIC TRAWL



ANNEX III Tables intercalibration experiments.

DR FRIDTJOF NANSEN31/8/86

CECAF COOPERATIVE SURVEY 1986

Record of observations during ship-to-ship intercalibration off northern Senegal wth integration of bottom back scattering.

1. Instrument settings:

CORNIDE DE SAAVEDRA: EK 400, 38KHz, attenuation 30 dB, QD gain -30dB, SL+VR=129,8 dB.

NDIAGO: EK 400,38 KHz, att. 30 dB, QD gain - 49 dB, SL+VR= 130 dB.

DR FRIDTJOF NANSEN:EK 400,38 KHz, att. 3o dB,QD gain - 14.1 dB,SL+VR= 136,6.

LOUIS SAUGER: Biosonics , 120 KHz, transmitter -13dB, receiver - 18 dB, pulse length 0,6 ms, treshold 120 mv, band width 2 KHz, 0 dB,0.224, SL+VR=81.3 dB

2. First trial, C d S and F N. Abt 15° 20, 17° 00, 90m depth channel 85-95 m., 30/8 ,0130 hrs.
Recorded in order from last mile completed:
C d S : 1145,1107,1520,1337,1244,1051,931,1064,1092, 1056,1073,1054,989,889,792.
Dr F N: 67,71,89,90,75,63,58,62,69,64,58,57,52 .

3 Four vessel trial: Abt 15°40,16° 45, 4o m depth, channel 30-50 m, 30/8 1500 hrs.
Recorded in order from last mile completed:
L.S.(x1/100) 10.027,10.014,9.495,9.121,9.234,9.213,8.551, 8.774,8.793,8.138,7.819,7.971,8.043.
C d S:793,772,840,725,762,793,675,635,637,603,631,590, 578,659,617,644,571.
NDIAGO: 52380,55040,60440,54600,54720,49140,46830,46210, 42270,42730,41750,42190,43162,41786.
Dr FN:50.0,51.5,60.2,52.7,53.6,47.5,45.2,43.3,40.8, 41.7, 42.2, 42.7, 44.2, 41.6, 41.6 .

DR FRIDTJOF NANSEN 3/9/86 .

CECAF COOPERATIVE SURVEY 1986

Record of observations from DR FRIDTJOF NANSEN during ship to ship calibration with LOUIS SAUGER on fish layers 2nd - 3rd August 1986.

Instruments :EK 400 38 kHz, QD integrator; auxiliary instruments EK 400 120 kHz, QM integrators, ES 400 38 (split beam sounder) with color printer.
Integration over whole depth column with write-out each nautical mile.Units: 1/10x m2 /nm2.
Total values allocated on fish/plankton in accordance with information from ES 400 120kHz -QM system with threshhold and TS observations from ES 400.

1st run L S Dr FN			2nd run Dr FN L S			3rd run L S Dr, FN		
log	fish	plkt	log	fish	plkt	log	fish	plkt
618	25	222	631	25	129	646	31	35
619	6	241	632	6	143	647	0	57
620	6	230	633	6	129	648	0	67
621	6	226	634	13	94	649	63	58
622	6	222	635	38	50	650	69	21
623	6	143	636	92	31	651	49	0
624	31	80	637	101	11	652	97	0
625	302	69	638	16	18	653	314	0
626	2601	34	639	13	28	654	843	0
627	25	48	640	35	31	655	314	0
628	6	73	641	28	31	656	238	0
629	6	106	642	50	34			
			643	50	72			
			644	19	94			
			645	44	68			

ANNEX IV Abbreviated list of fishing stations.

DATE	TIME START	STN No.	GEAR TYPE	DEPTH (M) BOTTON	DEPTH (M) GEAR	POSITION LATIT.	POSITION LONGIT.	CATCH (KG) TOTAL	CATCH (KG) PR HR	DOMINANT SPECIES	WEIGTH (KG) PR HR	WEIGTH (KG) %
18.08	1120	1	BT	136	136	N10 28'	W016 46'	430,5	861,0	Antigonia capros	519,60	60,3
										Trachurus trecae	57,60	6,6
										Saurida brasiliensis	45,60	5,2
										Ariomma bondi	36,00	4,1
18.08	1635	2	PT	42	20	N10 03'	W016 10'	,0	,0	NO CATCH	,00	,0
18.08	2027	3	BT	41	41	N09 42'	W015 48'	3000,0	6000,0	Balistes capriscus	4934,80	82,2
										Decapterus rhonchus	400,60	6,6
										Lagocephalus laevigatus	288,40	4,8
										Pomatomus saltatrix	80,20	1,3
19.08	0628	4	BT	25	25	N08 12'	W014 10'	99,6	199,2	Trachinocephalus myops	89,00	44,6
										Lagocephalus laevigatus	41,80	20,9
										Dactylopterus volitans	25,20	12,6
										Balistes capriscus	7,00	3,5
19.08	0958	5	BT	22	22	N08 05'	W014 03'	423,3	846,6	Balistes capriscus	688,60	81,3
										Lagocephalus laevigatus	47,60	5,6
										Trachinocephalus myops	46,00	5,4
										Dactylopterus volitans	17,00	2,0
19.08	1144	6	BT	23	23	N07 59'	W013 57'	74,8	149,6	Balistes capriscus	92,00	61,4
										Trachinocephalus myops	20,60	13,7
										Sparus caeruleostictus	7,40	4,9
										Diodon hystrix	5,40	3,6
19.08	1330	7	BT	70	70	N07 47'	W013 56'	192,6	385,2	Saurida brasiliensis	73,80	19,1
										Pagellus bellottii	59,40	15,4
										Dentex angolensis	48,00	12,4
										Sepia officinalis hierredda	42,00	10,9
19.08	1550	8	BT	17	17	N07 46'	W013 38'	149,6	299,2	Balistes capriscus	159,60	53,3
										Caranx senegallus	77,20	25,8
										Dactylopterus volitans	24,00	8,0
										Lagocephalus laevigatus	16,40	5,4
19.08	1818	9	BT	77	77	N07 37'	W013 47'	107,9	215,8	Dentex angolensis	115,20	53,3
										Squatina oculata	16,00	7,4
										Lepidotrigla carolae	15,60	7,2
										Sepia sp	12,00	5,5
20.08	0220	10	BT	20	20	N08 03'	W014 05'	3000,0	4500,0	Balistes capriscus	3911,40	86,9
										Chloroscombrus chrysurus	197,25	4,3
										Decapterus rhonchus	92,85	2,0
										Lagocephalus laevigatus	92,85	2,0
20.08	0652	11	BT	33	33	N08 13'	W013 43'	199,8	399,6	Balistes capriscus	222,60	55,7
										Sparus caeruleostictus	53,20	13,3
										Sardinella aurita	38,60	9,6
										Decapterus rhonchus	23,20	5,8

DATE	TIME START	STN No.	GEAR TYPE	DEPTH (M) BOTTOM	DEPTH (M) GEAR	POSITION LATIT.	POSITION LONGIT.	CATCH (KG) TOTAL	CATCH (KG) PR HR	DOMINANT SPECIES	WEIGTH (KG) PR HR	WEIGTH (KG) %
20.08	0900	12	BT	24	24	N08 10'	W013 37'	269,4	538,8	Balistes capriscus	307,80	57,1
										Sepia sp	63,00	11,6
										Sphyraena guachancho	63,00	11,6
										Sparus caeruleostictus	50,40	9,3
20.08	1035	13	BT	15	15	N08 05'	W013 41'	166,9	333,8	Sepia sp	101,60	30,4
										Balistes capriscus	61,60	18,4
										Selene dorsalis	59,00	17,6
										Scomberomorus tritor	22,00	6,5
20.08	1507	14	BT	23	23	N08 23'	W013 38'	132,7	265,4	Balistes capriscus	132,00	49,7
										Sparus caeruleostictus	55,00	20,7
										Pagellus bellottii	18,40	6,9
										SEPIIDAE	13,00	4,8
20.08	1652	15	BT	27	27	N08 25'	W013 48'	55,7	111,4	Sparus caeruleostictus	34,40	30,8
										Balistes capriscus	11,60	10,4
										Aluterus punctatus	11,00	9,8
										Fistularia petimba	8,00	7,1
20.08	1815	16	BT	31	31	N08 34'	W013 47'	24,9	99,6	Decapterus rhonchus	33,20	33,3
										Sparus caeruleostictus	27,20	27,3
										Balistes capriscus	6,40	6,4
										Pagellus bellottii	6,00	6,0
20.08	1915	17	BT	21	21	N08 42'	W013 45'	597,9	1195,8	Balistes capriscus	805,20	67,3
										Sphyraena guachancho	88,00	7,3
										Psettodes belcheri	55,00	4,5
										Sphyraena sphyraena	40,00	3,3
20.08	2212	18	BT	31	31	N08 32'	W014 00'	62,8	125,6	Sparus caeruleostictus	18,60	14,8
										Trachinocephalus myops	16,00	12,7
										Lagocephalus laevigatus	15,80	12,5
										Sepia sp	12,00	9,5
21.08	0202	19	PT	19	1	N08 07'	W013 40'	67,5	135,0	Brachydeuterus auritus	125,40	92,8
										Sardinella maderensis	6,00	4,4
										Sphyraena sphyraena	1,60	1,1
21.08	0645	20	BT	42	42	N08 23'	W014 14'	310,2	620,4	Dactylopterus volitans	264,00	42,5
										Priacanthus arenatus	82,80	13,3
										Pagellus bellottii	78,00	12,5
										Balistes capriscus	72,00	11,6
21.08	0832	21	BT	43	43	N08 33'	W014 16'	228,1	456,2	Pagellus bellottii	159,60	34,9
										Dactylopterus volitans	128,80	28,2
										Mustelus mustelus	53,60	11,7
										Sepia sp	50,40	11,0

DATE	TIME START	STN No.	GEAR TYPE	DEPTH (M) BOTTOM	DEPTH (M) GEAR	POSITION LATIT. LONGIT.	CATCH (KG) TOTAL	CATCH (KG) PR HR	DOMINANT SPECIES	WEIGTH (KG) PR HR	WEIGTH (KG) %
21.08	1110	22	BT	74	74	N08 38' W014 28'	247,5	495,0	Pagellus bellottii	167,20	33,7
									Dentex congoensis	120,80	24,4
									Lagocephalus laevigatus	43,20	8,7
									Epinephelus aeneus	36,40	7,3
21.08	1540	23	BT	28	28	N08 57' W014 00'	336,2	672,4	Sparus caeruleostictus	310,20	46,1
									Balistes capriscus	69,60	10,3
									Pseudupeneus prayensis	61,00	9,0
									Lethrinus atlanticus	47,60	7,0
21.08	1745	24	BT	22	22	N09 11' W013 52'	1800,0	3600,0	Chloroscombrus chrysurus	3324,40	92,3
									Sepia sp	74,60	2,0
21.08	1944	25	BT	22	22	N09 17' W014 00'	239,6	479,2	Lethrinus atlanticus	160,00	33,3
									Galeoides decadactylus	94,40	19,6
									Brachydeuterus auritus	80,00	16,6
									Sparus caeruleostictus	46,40	9,6
21.08	2145	26	BT	17	17	N09 36' W014 03'	69,0	138,0	Ephippion guttifer	15,40	11,1
									Sepia sp	15,40	11,1
									Brachydeuterus auritus	12,20	8,8
									Lagocephalus laevigatus	10,00	7,2
22.08	0410	27	PT	68	40	N09 02' W014 45'	2,5	5,0	Scomberomorus tritor	3,40	68,0
									Echeneis naucrates	1,60	32,0
22.08	0656	28	BT	88	88	N09 00' W014 53'	,0	,0	NO CATCH	,00	,0
22.08	0805	29	BT	54	54	N09 09' W014 49'	92,3	553,8	Sparus caeruleostictus	316,80	57,2
									Dentex barnardi	111,00	20,0
									Mustelus mustelus	39,00	7,0
									Sphoeroides spengleri	19,80	3,5
22.08	1035	30	BT	53	53	N09 25' W014 36'	31,6	126,4	Lagocephalus laevigatus	36,80	29,1
									Sepia sp	24,00	18,9
									Balistes capriscus	18,80	14,8
									Pagellus bellottii	17,20	13,6
22.08	1212	31	BT	27	27	N09 34' W014 29'	29,4	58,8	Balistes capriscus	52,20	88,7
									Scomberomorus tritor	3,20	5,4
									Echeneis naucrates	1,00	1,7
									Caranx crysos	1,00	1,7
22.08	1426	32	BT	18	18	N09 40' W014 13'	42,5	85,0	Balistes capriscus	25,60	30,1
									Decapterus rhonchus	18,00	21,1
									Rachycentron canadum	8,20	9,6
									Sepia sp	12,00	14,1

DATE	TIME START	STN No.	GEAR TYPE	DEPTH (M) BOTTOM	DEPTH (M) GEAR	POSITION LATIT.	POSITION LONGIT.	CATCH (KG) TOTAL	CATCH (KG) PR HR	DOMINANT SPECIES	WEIGTH (KG) PR HR	WEIGTH (KG) %
22.08	1552	33	BT	16	16	N09 48'	W014 18'	25,9	51,8	Sphyraena guachancho	9,40	18,1
										Sepia sp	9,40	18,1
										Ephippion guttifer	7,00	13,5
										Caranx crysos	5,60	10,8
22.08	1751	34	BT	25	25	N09 43'	W014 33'	179,3	358,6	Chloroscombrus chrysurus	194,20	54,1
										Rachycentrom canadum	56,00	15,6
										Sparus caeruleostictus	21,00	5,8
										Balistes capriscus	16,60	4,6
22.08	1925	35	BT	21	21	N09 51'	W014 38'	185,8	371,6	Brachydeuterus auritus	180,00	48,4
										Sphyraena sphyraena	49,00	13,1
										Sepia sp	50,40	13,5
										Chloroscombrus chrysurus	39,00	10,4
22.08	2230	36	PT	21	21	N09 54'	W014 40'	,1	,2	Chloroscombrus chrysurus	,00	,0
23.08	0900	37	BT	135	135	N09 15'	W015 39'	189,1	378,2	Antigonia capros	252,80	66,8
										Ariomma bondi	30,40	8,0
										Sphoeroides spengleri	27,20	7,1
										Saurida brasiliensis	13,60	3,5
23.08	1147	38	PT	41	20	N09 31'	W015 23'	35,3	50,1	Balistes capriscus	49,70	99,2
23.08	1355	39	BT	43	43	N09 30'	W015 23'	330,9	661,8	Lagocephalus laevigatus	457,20	69,1
										Balistes capriscus	72,60	10,9
										Sparus caeruleostictus	27,00	4,0
										Sepia officinalis hierredda	22,80	3,4
23.08	1615	40	BT	31	31	N09 43'	W015 14'	62,6	170,2	Sparus caeruleostictus	39,44	23,1
										Alectis alexandrinus	36,17	21,2
										MONACANTHIDAE	24,20	14,2
										Balistes capriscus	10,33	6,0
23.08	1753	41	BT	27	27	N09 52'	W015 06'	67,1	134,2	Balistes capriscus	74,40	55,4
										Alectis alexandrinus	40,60	30,2
										Carcharinus sp	5,60	4,1
										Scomberomorus tritor	4,60	3,4
23.08	2015	42	BT	21	21	N10 00'	W014 47'	11,0	22,0	Sepia sp	5,60	25,4
										Echeneis naucrates	4,40	20,0
										Palaemon sp.	2,40	10,9
										Balistes capriscus	1,80	8,1
24.08	0850	43	BT	23	23	N10 10'	W015 01'	2,7	5,4	Sepia sp	5,00	92,5
										Calappa rubroguttata	,20	3,7
										Xyrichthys sp.	,10	1,8

DATE	TIME START	STN No.	GEAR TYPE	DEPTH (M) BOTTOM	DEPTH (M) GEAR	POSITION LATIT. LONGIT.	CATCH (KG) TOTAL	CATCH (KG) PR HR	DOMINANT SPECIES	WEIGTH (KG) PR HR	WEIGTH (KG) %
24.08	1020	44	BT	16	16	N10 06' W015 09'	15,8	31,6	Scomberomorus tritor	16,80	53,1
									Sepia sp	8,00	25,3
									Echeneis naucrates	3,00	9,4
									Balistes capriscus	1,00	3,1
24.08	1250	45	BT	21	21	N10 08' W015 22'	1069,1	2138,2	Chloroscombrus chrysurus	1075,20	50,2
									Galeoides decadactylus	266,60	12,4
									Pseudotolithus senegalensis	232,80	10,8
									Brachydeuterus auritus	208,00	9,7
24.08	1436	46	BT	28	28	N09 58' W015 26'	291,1	436,6	Chloroscombrus chrysurus	316,50	72,4
									Balistes capriscus	44,25	10,1
									Octopus sp.	31,50	7,2
									Caranx crysos	18,75	4,2
24.08	1625	47	BT	38	38	N09 51' W015 34'	115,7	173,5	Alectis alexandrinus	97,50	56,1
									Balistes capriscus	58,35	33,6
									Sepia sp	10,05	5,7
									Octopus sp.	3,00	1,7
24.08	1835	48	BT	40	40	N09 40' W015 43'	2500,0	5000,0	Balistes capriscus	4144,20	82,8
									Pagellus bellottii	215,60	4,3
									Decapterus rhonchus	181,80	3,6
									Pomadasys rogeri	155,00	3,1
24.08	2026	49	BT	70	70	N09 28' W015 52'	181,8	363,6	Trachinus draco	223,20	61,3
									Trachinus pellegrini	36,00	9,9
									Lepidotrigla carolae	25,20	6,9
									Sepia sp	20,40	5,6
25.08	0635	50	BT	24	24	N10 05' W015 43'	95,2	190,4	Balistes capriscus	135,20	71,0
									Sepia sp	28,00	14,7
									Scomberomorus tritor	14,80	7,7
									Zanobatus shoenleinii	6,00	3,1
25.08	0907	51	BT	32	32	N10 21' W015 37'	176,8	353,6	Hemicaranx bicolor	204,00	57,6
									Balistes capriscus	45,60	12,8
									Scomberomorus tritor	24,00	6,7
									Sepia sp	21,00	5,9
25.08	1109	52	BT	23	23	N10 19' W015 28'	115,2	230,4	Rhinobatus cemiculus	60,00	26,0
									Eucinostomus melanopterus	35,80	15,5
									Sphyraena guachancho	28,80	12,5
									Caranx senegallus	21,00	9,1
25.08	1250	53	BT	30	30	N10 28' W015 31'	92,6	185,2	Galeoides decadactylus	70,40	38,0
									Scomberomorus tritor	30,00	16,1
									Caranx senegallus	29,80	16,0
									Alectis alexandrinus	11,20	6,0

DATE	TIME START	STN No.	GEAR TYPE	DEPTH (M) BOTTOM	DEPTH (M) GEAR	POSITION LATIT.	POSITION LONGIT.	CATCH (KG) TOTAL	CATCH (KG) PR HR	DOMINANT SPECIES	WEIGTH (KG) PR HR	WEIGTH (KG) %
25.08	1430	54	BT	20	20	N10 28'	W015 40'	20,6	41,2	Scomberomorus tritor	20,00	48,5
										Sepia sp	8,00	19,4
										Caranx senegallus	2,20	5,3
										Dasyatis margarita	2,00	4,8
25.08	1545	55	BT	20	20	N10 33'	W015 40'	68,4	136,8	Lethrinus atlanticus	53,60	39,1
										Sparus caeruleostictus	22,80	16,6
										Sepia sp	18,20	13,3
										Pomadasys incisus	14,60	10,6
25.08	1707	56	BT	21	21	N10 35'	W015 44'	94,8	284,4	Drepane africana	55,20	19,4
										Lethrinus atlanticus	25,20	8,8
										Scomberomorus tritor	24,30	8,5
										Psettodes belcheri	19,50	6,8
25.08	1846	57	BT	25	25	N10 33'	W015 53'	165,4	330,8	Galeoides decadactylus	194,60	58,8
										Scomberomorus tritor	30,00	9,0
										Sepia sp	15,60	4,7
										Eucinostomus melanopterus	14,60	4,4
25.08	2043	58	BT	29	29	N10 21'	W016 02'	96,2	192,4	Balistes capriscus	161,60	83,9
										Epinephelus aeneus	6,20	3,2
										Torpedo torpedo	5,20	2,7
										Lutjanus goreensis	4,00	2,0
26.08	0030	59	PT	44	20	N10 00'	W016 19'	62,4	124,8	Balistes capriscus	124,80	100,0
26.08	0801	60	BT	200	200	N10 03'	W016 43'	246,8	493,6	Ariomma bondi	231,00	46,7
										Chlorophthalmus atlanticus	134,40	27,2
										Dentex angolensis	32,20	6,5
										Squatina oculata	32,00	6,4
26.08	1012	61	BT	73	73	N10 14'	W016 32'	209,0	418,0	Pagellus bellottii	268,80	64,3
										Sphoeroides cutaneus	42,00	10,0
										Priacanthus arenatus	31,60	7,5
										Raja miraletus	20,40	4,8
26.08	1210	62	BT	41	41	N10 24'	W016 25'	895,3	1790,6	Balistes capriscus	1679,60	93,8
										Sepia sp	41,60	2,3
26.08	1427	63	BT	28	28	N10 33'	W016 18'	584,6	876,9	Balistes capriscus	620,40	70,7
										Selene dorsalis	103,20	11,7
										Trichiurus lepturus	70,80	8,0
										Pseudupeneus prayensis	18,00	2,0
26.08	1605	64	BT	44	44	N10 30'	W016 29'	200,8	401,6	Balistes capriscus	208,00	51,7
										Mustelus mustelus	70,00	17,4
										Pagellus bellottii	34,40	8,5
										Pseudupeneus prayensis	25,60	6,3

DATE	TIME START	STN No.	GEAR TYPE	DEPTH (M) BOTTOM	DEPTH (M) GEAR	POSITION LATIT.	POSITION LONGIT.	CATCH (KG) TOTAL	CATCH (KG) PR HR	DOMINANT SPECIES	WEIGTH (KG) PR HR	WEIGTH (KG) %
26.08	1735	65	BT	53	53	N10 32'	W016 37'	4500,0	9000,0	Decapterus rhonchus	4647,40	51,6
										Dactylopterus volitans	3646,60	40,5
										Balistes capriscus	422,40	4,6
										Pagellus bellottii	111,20	1,2
26.08	1945	66	BT	49	49	N10 34'	W016 35'	581,9	1163,8	Pagellus bellottii	440,00	37,8
										Balistes capriscus	286,00	24,5
										Decapterus rhonchus	88,00	7,5
										Dactylopterus volitans	72,60	6,2
27.08	0625	67	BT	59	59	N10 46'	W016 46'	413,6	827,2	Epinephelus aeneus	366,60	44,3
										Sepia sp	113,40	13,7
										Chelidonichthys lastoviza	82,80	10,0
										Pagellus bellottii	44,20	5,3
27.08	0818	68	BT	25	25	N10 54'	W016 39'	2000,0	4000,0	Chloroscombrus chrysurus	1290,80	32,2
										Balistes capriscus	1030,60	25,7
										Selene dorsalis	721,40	18,0
										Brachydeuterus auritus	525,20	13,1
29.08	1002	69	BT	50	50	N15 07'	W017 02'	803,6	1607,2	Brachydeuterus auritus	822,80	51,1
										Carcharinus sp	301,20	18,7
										Galeoides decadactylus	129,80	8,0
										Selene dorsalis	110,00	6,8
29.08	1243	70	BT	55	55	N15 12'	W017 00'	95,6	191,2	Brachydeuterus auritus	48,80	25,5
										Pagellus bellottii	37,00	19,3
										Mustelus mustelus	24,60	12,8
										Trichiurus lepturus	22,40	11,7
29.08	1556	71	PT	38	30	N15 16'	W016 56'	186,5	373,0	Carcharinus sp	336,00	90,0
										Alectis alexandrinus	21,60	5,7
										Sphyrna lewini	8,00	2,1
29.08	1745	72	PT	25	10	N15 17'	W016 53'	4,9	14,7	Trachinotus ovatus	3,60	24,4
										Brachydeuterus auritus	3,60	24,4
										Pomadasys peroteti	2,70	18,3
										Chloroscombrus chrysurus	2,10	14,2
29.08	1845	73	PT	24	10	N15 16'	W016 54'	9,3	27,9	Sphyraena guachancho	8,40	30,1
										Pomadasys peroteti	6,60	23,6
										Sardinella maderensis	5,40	19,3
										Chloroscombrus chrysurus	3,60	12,9
30.08	0800	74	BT	60	60	N15 34'	W016 52'	322,8	645,6	Brachydeuterus auritus	235,40	36,4
										Trachurus trecae	133,20	20,6
										Pagellus bellottii	84,80	13,1
										Alectis alexandrinus	76,00	11,7

DATE	TIME START	STN No.	GEAR TYPE	DEPTH (M) BOTTOM	DEPTH (M) GEAR	POSITION LATIT.	POSITION LONGIT.	CATCH (KG) TOTAL	CATCH (KG) PR HR	DOMINANT SPECIES	WEIGTH (KG) PR HR	WEIGTH (KG) %
30.08	1056	75	BT	79	79	N15 39'	W016 55'	427,7	855,4	Trachurus trecae	616,00	72,0
										Sardinella aurita	74,20	8,6
										Dentex maroccanus	61,60	7,2
										Dentex angolensis	35,00	4,0
31.08	0230	76	PT	90	40	N15 50'	W016 55'	,0	,0	NO CATCH	,00	,0
31.08	0740	77	BT	100	100	N15 45'	W016 57'	1750,0	3500,0	Trachurus trecae	3147,00	89,9
										Sardinella aurita	117,60	3,3
										Dentex angolensis	81,80	2,3
										Dentex maroccanus	56,20	1,6
31.08	1300	78	BT	32	32	N15 39'	W016 45'	226,3	452,6	Brachydeuterus auritus	167,20	36,9
										Sphyraena guachancho	64,00	14,1
										Carcharinus sp	58,40	12,9
										Selene dorsalis	56,80	12,5
31.08	1528	79	PT	20	5	N15 25'	W016 50'	114,1	114,1	Sphyraena guachancho	33,40	29,2
										Trachinotus ovatus	21,80	19,1
										Pomadasys peroteti	20,[illegible]	[illegible],1
										Chloroscombrus chrysurus	11,40	
31.08	1731	80	BT	24	24	N15 17'	W016 53'	644,6	644,6	Sardinella aurita	165,90	25,7
										Chloroscombrus chrysurus	119,70	18,5
										Sphyraena guachancho	90,30	14,0
										Pomadasys peroteti	81,20	12,5
01.09	0837	81	BT	31	31	N14 02'	W017 08'	234,8	469,6	Chloroscombrus chrysurus	164,80	35,0
										Pseudupeneus prayensis	96,60	20,5
										Octopus sp.	59,80	12,7
										Priacanthus arenatus	37,80	8,0
01.09	1208	82	BT	29	29	N13 55'	W017 07'	292,2	584,4	Selene dorsalis	314,40	53,7
										Octopus vulgaris	68,00	11,6
										Alectis alexandrinus	58,00	9,9
										Chloroscombrus chrysurus	50,60	8,6
01.09	1420	83	BT	28	28	N13 54'	W017 05'	162,5	325,0	Chloroscombrus chrysurus	286,80	88,2
										Octopus vulgaris	21,00	6,4
										Decapterus rhonchus	6,00	1,8
										Selene dorsalis	4,20	1,2
01.09	2055	84	PT	29	15	N13 53'	W017 06'	5000,0	6000,0	Chloroscombrus chrysurus	5865,00	97,7
										Sardinella maderensis	77,16	1,2
01.09	2355	85	PT	28	5	N13 55'	W017 06'	3500,0	7000,0	Chloroscombrus chrysurus	5973,40	85,3
										Sardinella maderensis	497,80	7,1
										Sardinella aurita	217,80	3,1
										Decapterus rhonchus	124,40	1,7

DATE	TIME START	STN No.	GEAR TYPE	DEPTH (M) BOTTOM	DEPTH (M) GEAR	POSITION LATIT.	POSITION LONGIT.	CATCH (KG) TOTAL	CATCH (KG) PR HR	DOMINANT SPECIES	WEIGTH (KG) PR HR	WEIGTH (KG) %
02.09	1025	86	BT	66	66	N14 02'	W017 22'	817,6	1635,2	Pagellus bellottii	952,20	58,2
										Dentex barnardi	133,00	8,1
										Priacanthus arenatus	106,20	6,4
										Spondyliosoma cantharus	102,60	6,2
02.09	1825	87	PT	24	15	N13 53'	W017 04'	427,9	855,8	Chloroscombrus chrysurus	798,40	93,2
										Scomberomorus tritor	18,00	2,1
										Sphyraena guachancho	17,60	2,0
										Sphyrna lewini	8,60	1,0
03.09	0836	88	BT	17	17	N13 32'	W016 55'	1616,5	3233,0	Brachydeuterus auritus	1123,80	34,7
										Brachydeuterus auritus	836,40	25,8
										Carcharinus sp	407,40	12,6
										Galeoides decadactylus	375,20	11,6
03.09	1515	89	BT	14	14	N13 22'	W017 00'	14,7	39,9	Sepia sp	15,77	39,5
										Sardinella maderensis	8,16	20,4
										Sardinella aurita	5,44	13,6
										Scomberomorus tritor	3,80	9,5
03.09	1636	90	BT	11	11	N13 18'	W016 56'	2000,0	5440,0	Galeoides decadactylus	2011,71	36,9
										Brachydeuterus auritus	1760,11	32,3
										Chloroscombrus chrysurus	1226,44	22,5
										Eucinostomus melanopterus	122,67	2,2
03.09	1826	91	BT	14	14	N13 12'	W017 00'	105,2	210,4	Decapterus rhonchus	67,60	32,1
										Brachydeuterus auritus	39,60	18,8
										Caranx senegallus	25,20	11,9
										Sardinella maderensis	22,40	10,6
04.09	0050	92	BT	9	9	N12 55'	W016 56'	11,2	134,4	Brachydeuterus auritus	39,60	29,4
										Galeoides decadactylus	36,00	26,7
										Chloroscombrus chrysurus	18,00	13,3
										Brachydeuterus auritus	14,40	10,7
04.09	0621	93	BT	19	19	N12 42'	W017 13'	1500,0	3000,0	Galeoides decadactylus	1247,40	41,5
										Brachydeuterus auritus	1023,60	34,1
										Eucinostomus melanopterus	318,00	10,6
										Carcharinus sp	159,00	5,3
04.09	0940	94	PT	21	10	N12 32'	W017 18'	22,1	44,2	Sardinella maderensis	33,60	76,0
										Scomberomorus tritor	4,40	9,9
										Sphyraena guachancho	4,20	9,5
										Alectis alexandrinus	1,20	2,7
04.09	1526	95	BT	21	21	N12 22'	W017 12'	1500,0	3000,0	Brachydeuterus auritus	1752,80	58,4
										Chloroscombrus chrysurus	368,20	12,2
										Galeoides decadactylus	362,60	12,0
										Sphyraena guachancho	115,40	3,8
04.09	2140	96	PT	35	20	N12 55'	W017 19'	2000,0	4000,0	Chloroscombrus chrysurus	1975,40	49,3
										Decapterus rhonchus	1385,40	34,6
										Sardinella maderensis	429,00	10,7
										Selene dorsalis	129,60	3,2

DATE	TIME START	STN No.	GEAR TYPE	DEPTH (M) BOTTOM	DEPTH (M) GEAR	POSITION LATIT.	POSITION LONGIT.	CATCH (KG) TOTAL	CATCH (KG) PR HR	DOMINANT SPECIES	WEIGTH (KG) PR HR	WEIGTH (KG) %
07.09	0938	97	BT	68	68	N10 37'	W016 43'	155,5	311,0	Pagellus bellottii	86,80	27,9
										Scomber japonicus	60,80	19,5
										Sphoeroides cutaneus	46,00	14,7
										Decapterus rhonchus	26,00	8,3
07.09	1200	98	BT	33	33	N10 49'	W016 37'	1421,0	5001,9	Balistes capriscus	3970,56	79,3
										Dactylopterus volitans	760,32	15,2
										Chloroscombrus chrysurus	133,76	2,6
										Priacanthus arenatus	63,36	1,2
07.09	1353	99	BT	50	50	N10 49'	W016 44'	1000,6	2001,2	Dactylopterus volitans	773,40	38,6
										Decapterus rhonchus	626,60	31,3
										Sepia sp	186,60	9,3
										Pagellus bellottii	138,60	6,9
07.09	1523	100	BT	83	83	N10 45'	W016 49'	50,9	101,8	Dentex congoensis	46,00	45,1
										Mustelus mustelus	20,00	19,6
										Sepia sp	8,00	7,8
										Fistularia petimba	7,00	6,8
07.09	1647	101	BT	125	125	N10 42'	W016 53'	303,7	607,4	Antigonia capros	402,20	66,2
										Sphoeroides cutaneus	38,40	6,3
										Mustelus mustelus	33,00	5,4
										Dentex congoensis	29,80	4,9
08.09	0803	102	BT	82	82	N11 05'	W017 08'	4,0	8,0	Fistularia petimba	8,00	100,0
08.09	0857	103	BT	73	73	N11 04'	W017 06'	17,7	81,5	Sepia sp	29,96	36,7
										Sparus caeruleostictus	15,67	19,2
										Fistularia petimba	13,36	16,3
										Pagellus bellottii	3,68	4,5
08.09	1035	104	BT	37	37	N11 10'	W017 04'	463,0	926,0	Dactylopterus volitans	852,00	92,0
										Balistes capriscus	46,00	4,9
										Sepia sp	14,00	1,5
08.09	1140	105	PT	35	12	N11 08'	W017 03'	,0	,0	NO CATCH	,00	,0
08.09	1306	106	BT	25	25	N11 12'	W017 00'	12000,0	24000,0	Balistes capriscus	21643,40	90,1
										Decapterus rhonchus	1705,40	7,1
										Dactylopterus volitans	589,20	2,4
08.09	1510	107	BT	38	38	N11 12'	W017 03'	485,1	970,2	Dactylopterus volitans	588,00	60,6
										Balistes capriscus	224,00	23,0
										Priacanthus arenatus	81,20	8,3
										Decapterus rhonchus	32,20	3,3

DATE	TIME START	STN No.	GEAR TYPE	DEPTH (M) BOTTOM	DEPTH (M) GEAR	POSITION LATIT.	POSITION LONGIT.	CATCH (KG) TOTAL	CATCH (KG) PR HR	DOMINANT SPECIES	WEIGTH (KG) PR HR	WEIGTH (KG) %
08.09	1650	108	BT	59	59	N11 12'	W017 10'	19,4	38,8	Fistularia petimba	19,00	48,9
										Scomber japonicus	5,80	14,9
										Dactylopterus volitans	3,80	9,7
										Octopus vulgaris	3,00	7,7
08.09	2133	109	PT	37	20	N11 22'	W017 07'	5000,0	10000,0	Balistes capriscus	9863,00	98,6
										Dactylopterus volitans	102,80	1,0
09.09	0635	110	BT	53	53	N11 37'	W017 11'	75,6	151,2	Brachydeuterus auritus	96,60	63,8
										Saurida brasiliensis	16,20	10,7
										GOBIIDAE	16,20	10,7
										Parapenaeopsis atlantica	6,00	3,9
09.09	0816	111	BT	29	29	N11 38'	W017 03'	230,7	461,4	SHRPS00 ??? 281,60 61,0		
										PENAEIDAE	43,20	9,3
										Trichiurus lepturus	35,20	7,6
										Cynoponticus ferox	27,80	6,0
09.09	0918	112	PT	21	1	N11 38'	W017 03'	367,8	735,6	Elops senegalensis	357,60	48,6
										Stromateus fiatola	80,00	10,8
										Trachinotus teraia	65,60	8,9
										Hemicaranx bicolor	60,00	8,1
09.09	1105	113	BT	15	15	N11 39'	W016 54'	324,0	648,0	Galeoides decadactylus	98,40	15,1
										Pteroscion peli	97,20	15,0
										Pseudotolithus typus	82,80	12,7
										Trichiurus lepturus	60,00	9,2
09.09	1230	114	BT	12	12	N11 44'	W016 45'	190,5	381,0	Pseudotolithus elongatus	105,00	27,5
										Shrimps small	85,40	22,4
										Pomadasys peroteti	49,00	12,8
										Pseudotolithus typus	30,20	7,9
09.09	1355	115	BT	12	12	N11 42'	W016 38'	195,7	391,4	S H R I M P S	238,00	60,8
										Trichiurus lepturus	35,00	8,9
										Brachydeuterus auritus	35,00	8,9
										Pentanemus quinquarius	34,00	8,6
09.09	1520	116	BT	12	12	N11 41'	W016 29'	116,4	232,8	Ilisha africana	64,80	27,8
										Brachydeuterus auritus	34,40	14,7
										Trichiurus lepturus	33,60	14,4
										Pseudotolithus elongatus	31,20	13,4
										Shrimps small	28,00	12,0
09.09	1732	117	BT	20	20	N11 39'	W016 13'	45,3	90,6	Pseudotolithus elongatus	47,80	52,7
										Shrimps small	13,80	15,2
										Arius sp	9,20	10,1
										Galeoides decadactylus	3,40	3,7
09.09	1935	118	BT	18	18	N11 44'	W016 15'	92,9	185,8	Pseudotolithus elongatus	116,80	62,8
										Brachydeuterus auritus	16,60	8,9
										Shrimps small	12,60	6,7
										Pentanemus quinquarius	8,00	4,3

DATE	TIME START	STN No.	GEAR TYPE	DEPTH (M) BOTTOM	DEPTH (M) GEAR	POSITION LATIT.	POSITION LONGIT.	CATCH (KG) TOTAL	CATCH (KG) PR HR	DOMINANT SPECIES	WEIGTH (KG) PR HR	WEIGTH (KG) %
10.09	1003	119	BT	13	13	N13 12'	W016 58'	58,9	117,8	Sardinella maderensis	59,80	50,7
										Scomberomorus tritor	41,00	34,8
										Sardinella aurita	14,00	11,8
										Chloroscombrus chrysurus	2,00	1,6
10.09	1134	120	BT	8	8	N13 15'	W016 52'	917,1	1834,2	Chloroscombrus chrysurus	802,60	43,7
										Rinoptera sp.	174,20	9,4
										Galeoides decadactylus	147,40	8,0
										Ilisha africana	112,00	6,1
10.09	1240	121	BT	13	13	N13 21'	W01? 56'	5750,0	11500,0	Brachydeuterus auritus	6924,60	60,2
										Chloroscombrus chrysurus	2296,40	19,9
										Galeoides decadactylus	806,40	7,0
										Sardinella maderensis	508,40	4,4
10.09	1345	122	BT	10	10	N13 24'	W016 55'	343,3	686,6	Sardinella maderensis	159,60	23,2
										Scomberomorus tritor	100,20	14,5
										Chloroscombrus chrysurus	96,80	14,0
										Ilisha africana	90,20	13,1
10.09	1446	123	BT	7	7	N13 27'	W016 50'	189,7	379,4	Chloroscombrus chrysurus	70,00	18,4
										Ilisha africana	50,40	13,2
										Pteroscion peli	40,00	10,5
										Galeoides decadactylus	30,80	8,1
10.09	1549	124	BT	8	8	N13 33'	W016 51'	257,1	514,2	Hemicaranx bicolor	107,20	20,8
										Pomadasys peroteti	104,40	20,3
										Chloroscombrus chrysurus	58,60	11,3
										Galeoides decadactylus	35,20	6,8
10.09	1705	125	BT	15	15	N13 34'	W016 57'	115,1	230,2	Brachydeuterus auritus	121,60	52,8
										Rhinobatus rhinobatus	33,60	14,5
										Dasyatis margarita	14,60	6,3
										Sepia sp	14,00	6,0
10.09	1810	126	BT	12	12	N13 29'	W016 55'	421,9	843,8	Brachydeuterus auritus	702,00	83,1
										Carcharinus sp	45,60	5,4
										Ilisha africana	39,00	4,6
										Chloroscombrus chrysurus	20,80	2,4
10.09	1918	127	BT	18	18	N13 26'	W017 00'	87,0	174,0	Brachydeuterus auritus	108,00	62,0
										Scomberomorus tritor	24,00	13,7
										Trichiurus lepturus	13,00	7,4
										Sphyraena guachancho	6,40	3,6
10.09	2034	128	BT	18	18	N13 19'	W017 01'	279,5	559,0	Sardinella aurita	103,40	18,4
										Eucinostomus melanopterus	72,60	12,9
										Sparus caeruleostictus	55,00	9,8
										Brachydeuterus auritus	52,80	9,4

DATE	TIME START	STN No.	GEAR TYPE	DEPTH (M) BOTTOM	DEPTH (M) GEAR	POSITION LATIT.	POSITION LONGIT.	CATCH (KG) TOTAL	CATCH (KG) PR HR	DOMINANT SPECIES	WEIGTH (KG) PR HR	WEIGTH (KG) %
10.09	2140	129	BT	22	22	N13 13'	W017 05'	123,3	246,6	Pseudupeneus prayensis	85,00	34,4
										Miscellaneous fishes	30,00	12,1
										Pagellus bellottii	29,00	11,7
										Sparus caeruleostictus	23,00	9,3
11.09	0637	130	BT	26	26	N13 17'	W017 06'	330,5	661,0	Pagellus bellottii	294,60	44,5
										Sparus caeruleostictus	84,00	12,7
										Priacanthus arenatus	61,60	9,3
										Lutjanus goreensis	52,00	7,8
11.09	0815	131	BT	33	33	N13 23'	W017 07'	62,4	124,8	Dactylopterus volitans	93,00	74,5
										Octopus sp.	8,40	6,7
										Lagocephalus laevigatus	6,00	4,8
										Scyacium micrurum	4,00	3,2
11.09	0921	132	BT	27	27	N13 25'	W017 04'	4,0	8,0	Scomberomorus tritor	5,40	67,5
										Selene dorsalis	1,20	15,0
										Dactylopterus volitans	1,20	15,0
										Echeneis naucrates	,20	2,5
11.09	1126	133	BT	18	18	N13 30'	W017 02'	80,0	160,0	Brachydeuterus auritus	84,00	52,5
										Alectis alexandrinus	19,40	12,1
										Scomberomorus tritor	18,00	11,2
										Decapterus rhonchus	10,20	6,3
11.09	1250	134	BT	33	33	N13 33'	W017 07'	45,8	91,6	Octopus sp.	28,00	30,5
										Selene dorsalis	27,20	29,6
										Priacanthus arenatus	10,80	11,7
										Dactylopterus volitans	4,60	5,0
11.09	1410	135	BT	46	46	N13 28'	W017 14'	205,1	410,2	Pagellus bellottii	232,00	56,5
										Priacanthus arenatus	96,00	23,4
										Pomadasys incisus	25,60	6,2
										Sphyraena sphyraena	16,00	3,9
11.09	1619	136	BT	37	37	N13 15'	W017 13'	40,7	81,4	Priacanthus arenatus	40,00	49,1
										Sepia sp	7,00	8,5
										Pagellus bellottii	6,60	8,1
										Sparus caeruleostictus	6,20	7,6
11.09	1814	137	BT	50	50	N13 10'	W017 20'	163,6	327,2	Pagellus bellottii	110,40	33,7
										Priacanthus arenatus	77,60	23,7
										Pseudupeneus prayensis	36,00	11,0
										Dactylopterus volitans	24,80	7,5
11.09	1949	138	BT	76	76	N13 16'	W017 27'	155,8	311,6	TRIGLIDAE	116,00	37,2
										Pagellus bellottii	52,00	16,6
										SOLEIDAE	48,00	15,4
										Arnoglossus sp.	17,00	5,4

DATE	TIME START	STN No.	GEAR TYPE	DEPTH (M) BOTTOM	DEPTH (M) GEAR	POSITION LATIT.	POSITION LONGIT.	CATCH (KG) TOTAL	CATCH (KG) PR HR	DOMINANT SPECIES	WEIGTH (KG) PR HR	WEIGTH (KG) %
11.09	2125	139	BT	50	50	N13 17'	W017 19'	121,8	365,4	Pagellus bellottii	123,60	33,8
										Pseudupeneus prayensis	90,75	24,8
										Plectorhynchus mediterraneus	20,70	5,6
										Raja miraletus	16,50	4,5
11.09	2245	140	BT	76	76	N13 23'	W017 25'	138,6	277,2	Chelidonichthys lastoviza	99,60	35,9
										Pegusa lascaris	48,00	17,3
										Pagellus bellottii	19,20	6,9
										Sepia sp	15,60	5,6
12.09	0005	141	BT	62	62	N13 28'	W017 19'	155,7	311,4	Chelidonichthys lastoviza	142,80	45,8
										Pagellus bellottii	38,40	12,3
										Arnoglossus sp.	22,80	7,3
										Trachurus trecae	18,00	5,7
12.09	0115	142	BT	77	77	N13 33'	W017 23'	320,1	1920,6	Pagellus bellottii	1511,40	78,6
										Chelidonichthys lastoviza	237,60	12,3
										Scorpaena sp	56,40	2,9
										Umbrina canariensis	23,40	1,2
14.09	0145	143	BT	21	21	N18 26'	W016 17'	98,4	196,8	Brachydeuterus auritus	123,00	62,5
										Sardinella aurita	23,40	11,8
										Eucinostomus melanopterus	16,80	8,5
										Decapterus rhonchus	8,40	4,2
14.09	0655	144	BT	95	95	N18 20'	W016 27'	176,7	353,4	Trachurus trecae	208,60	59,0
										SOLEIDAE	44,80	12,6
										Dentex canariensis	21,00	5,9
										Citharus linguatula	15,40	4,3
14.09	1055	145	BT	71	71	N18 18'	W016 24'	1432,5	2865,0	Trachurus trecae	2550,00	89,0
										Pagellus bellottii	75,00	2,6
										Scomber japonicus	70,00	2,4
										Sepia sp	40,00	1,3
14.09	1440	146	BT	58	58	N18 43'	W016 25'	1232,6	2465,2	Pagellus bellottii	2208,00	89,5
										Raja miraletus	66,60	2,7
										Sphyraena sphyraena	34,60	1,4
										Octopus vulgaris	32,00	1,2
15.09	2210	147	PT	195	160	N20 16'	W017 37'	,0	,0	NO CATCH	,00	,0
15.09	2340	148	PT	200	160	N20 18'	W017 36'	96,8	387,2	Trichiurus lepturus	216,00	55,7
										Trachurus trachurus	160,00	41,3
										Brama brama	5,60	1,4
16.09	0210	149	PT	30	20	N20 17'	W017 22'	6,2	12,4	Sardinella maderensis	7,60	61,2
										Decapterus rhonchus	3,00	24,1
										Trachurus trachurus	1,00	8,0
										Pagellus bellottii	,80	6,4

DATE	TIME START	STN No.	GEAR TYPE	DEPTH (M) BOTTOM	DEPTH (M) GEAR	POSITION LATIT. LONGIT.	CATCH (KG) TOTAL	CATCH (KG) PR HR	DOMINANT SPECIES	WEIGTH (KG) PR HR	WEIGTH (KG) %
16.09	1830	150	BT	57	57	N20 30' W017 32'	343,2	686,4	Trachurus trecae	575,00	83,7
									Octopus vulgaris	104,00	15,1
16.09	2320	151	PT	34	20	N20 39' W017 11'	7,2	14,4	Sardinella maderensis	3,40	23,6
									Trachurus trecae	3,00	20,8
									Decapterus rhonchus	3,00	20,8
									Arius sp	2,20	15,2
									Sardinella aurita	1,60	11,1
17.09	0350	152	PT	97	60	N20 41' W017 38'	8,3	24,9	Trichiurus lepturus	13,50	54,2
									Trachurus trecae	8,40	33,7
									MYCTOPHIDAE	3,00	12,0
24.09	1340	153	PT	105	100	N29 41' W010 17'	3,3	6,6	Trachurus trachurus	5,00	75,7
									Anthias anthias	1,60	24,2
25.09	0425	154	PT	50	1	N29 08' W010 37'	19,3	38,6	Sardina pilchardus	28,00	72,5
									Sphyrna zygaena	5,00	12,9
									Scomber japonicus	4,60	11,9
									Prionace glaucus	1,20	3,1
25.09	0805	155	PT	60	15	N29 04' W010 42'	,0	,0	NO CATCH	,00	,0
25.09	1420	156	PT	53	15	N28 54' W010 52'	,0	,0	NO CATCH	,00	,0
25.09	2345	157	PT	64	1	N28 45' W011 14'	111,3	222,6	Sardina pilchardus	175,00	78,6
									Scomber japonicus	47,60	21,3
26.09	0845	158	PT	57	20	N28 34' W011 44'	,0	,0	NO CATCH	,00	,0
26.09	0945	159	BT	55	55	N28 34' W011 45'	476,1	952,2	Scomber japonicus	471,00	49,4
									Trachinus sp	216,00	22,6
									Trachurus trachurus	69,00	7,2
									Sardina pilchardus	63,00	6,6
26.09	1430	160	PT	35	1	N28 26' W011 29'	1590,8	3817,9	Sardina pilchardus	3816,00	99,9
27.09	0635	161	PT	49	1	N28 28' W011 51'	,0	,0	NO CATCH	,00	,0
27.09	0830	162	BT	40	40	N28 19' W011 52'	525,3	1050,6	Scomber japonicus	298,20	28,3
									Sardina pilchardus	254,80	24,2
									Conger conger	168,00	15,9
									Trachurus trachurus	98,00	9,3
27.09	1340	163	BT	34	34	N28 10' W012 08'	4800,0	9600,0	Sardina pilchardus	8946,00	93,1
									Scomber japonicus	375,80	3,9
									Diplodus vulgaris	135,40	1,4
									Merluccius senegalensis	105,20	1,0

DATE	TIME START	STN No.	GEAR TYPE	DEPTH (M) BOTTOM	DEPTH (M) GEAR	POSITION LATIT.	POSITION LONGIT.	CATCH (KG) TOTAL	CATCH (KG) PR HR	DOMINANT SPECIES	WEIGTH (KG) PR HR	WEIGTH (KG) %
27.09	2155	164	PT	54	1	N28 18'	W012 35'	160,7	321,4	Scomber japonicus	190,00	59,1
										Sardina pilchardus	127,00	39,5
28.09	0450	165	PT	60	10	N28 12'	W012 45'	12,0	24,0	Scomber japonicus	22,00	91,6
										Sardina pilchardus	2,00	8,3
28.09	1255	166	PT	38	10	N28 01'	W012 50'	9000,0	18000,0	Sardina pilchardus	17420,00	96,7
										Scomber japonicus	580,60	3,2
28.09	1610	167	BT	34	34	N28 02'	W012 37'	,3	,6	Scomber japonicus	,60	100,0
										Sardina pilchardus	,10	16,6
28.09	1940	168	BT	29	29	N28 05'	W012 21'	107,7	215,4	Solea sp.	61,80	28,6
										Merluccius senegalensis	55,20	25,6
										Trisopterus minutus	13,20	6,1
										Torpedo marmorata	13,20	6,1
28.09	2300	169	PT	25	15	N28 07'	W012 09'	476,0	952,0	Sardina pilchardus	764,40	80,2
										Scomber japonicus	84,00	8,8
										Pagellus acarne	64,40	6,7
										Trachurus trachurus	22,40	2,3
29.09	0150	170	BT	47	47	N28 22'	W012 05'	434,4	868,8	Trachurus trachurus	221,00	25,4
										Pagellus acarne	210,80	24,2
										Plectorhynchus mediterraneus	87,80	10,1
										Pagellus erythrinus	76,60	8,8
29.09	0445	171	PT	34	10	N28 16'	W011 54'	806,0	3224,0	Sardina pilchardus	3109,60	96,4
										Scomber japonicus	114,40	3,5
29.09	0805	172	BT	43	43	N28 23'	W011 47'	795,8	1591,6	Scomber japonicus	1150,00	72,2
										Sardina pilchardus	232,60	14,6
										Trachurus trachurus	102,60	6,4
										Trachinus sp	67,60	4,2
29.09	1055	173	PT	48	30	N28 26'	W011 44'	1405,0	16860,0	Sardina pilchardus	16860,00	100,0
29.09	1500	174	PT	53	30	N28 31'	W011 32'	995,1	1990,2	Sardina pilchardus	1984,00	99,6
29.09	1615	175	BT	41	41	N28 29'	W011 28'	412,1	1648,4	Sardina pilchardus	1352,00	82,0
										Scomber japonicus	182,00	11,0
										Solea sp.	36,40	2,2
										Merluccius senegalensis	31,20	1,8
29.09	1925	176	PT	31	15	N28 38'	W011 17'	96,4	289,2	Sardina pilchardus	248,40	85,8
										Scomber japonicus	36,00	12,4
										Octopus vulgaris	3,60	1,2

DATE	TIME START	STN No.	GEAR TYPE	DEPTH (M) BOTTOM	DEPTH (M) GEAR	POSITION LATIT.	POSITION LONGIT.	CATCH (KG) TOTAL	CATCH (KG) PR HR	DOMINANT SPECIES	WEIGTH (KG) PR HR	WEIGTH (KG) %
29.09	2025	177	PT	31	1	N28 38'	W011 17'	31,2	93,6	Sardina pilchardus	78,00	83,3
										Scomber japonicus	12,60	13,4
										Scomber scombrus	2,10	2,2
29.09	2250	178	PT	25	1	N28 44'	W011 07'	446,9	893,8	Sardina pilchardus	868,00	97,1
										Diplodus bellottii	23,10	2,5
30.09	0130	179	PT	35	1	N28 51'	W011 54'	124,4	248,8	Sardina pilchardus	232,00	93,2
										Scomber japonicus	16,80	6,7
30.09	0345	180	PT	35	1	N28 57'	W010 43'	53,2	106,4	Sardina pilchardus	67,50	63,4
										Scomber japonicus	39,00	36,6
30.09	1330	181	PT	39	10	N29 05'	W010 34'	3000,0	9000,0	Sardina pilchardus	8727,30	96,9
										Scomber japonicus	272,70	3,0
30.09	1845	182	BT	68	68	N28 47'	W011 11'	222,1	444,2	Trachurus trachurus	259,20	58,3
										Trisopterus minutus	53,60	12,0
										Dentex macrophthalmus	23,20	5,2
										Pagellus acarne	20,00	4,5
30.09	2025	183	PT	37	1	N28 42'	W011 10'	65,6	131,2	Sardina pilchardus	117,20	89,3
										Trachurus trachurus	10,80	8,2
										Scomber japonicus	2,80	2,1
30.09	2310	184	PT	49	1	N28 37'	W011 22'	25,1	50,2	Sardina pilchardus	47,00	93,6
										Scomber japonicus	1,80	3,5
										Trachurus trachurus	1,20	2,3
01.10	0125	185	PT	55	40	N28 32'	W011 29'	2000,0	12000,0	Sardina pilchardus	12000,00	100,0
01.10	0340	186	PT	30	1	N28 25'	W011 29'	161,5	323,0	Sardina pilchardus	320,00	99,0
01.10	0650	187	PT	37	20	N28 20'	W011 40'	1010,4	4041,6	Sardina pilchardus	4032,00	99,7
01.10	1130	188	BT	46	46	N28 21'	W011 58'	570,1	1140,2	Scomber japonicus	659,40	57,8
										Sardina pilchardus	239,40	20,9
										Trachurus trachurus	91,20	7,9
										Trachinus sp	60,80	5,3
01.10	1650	189	BT	51	51	N28 21'	W012 15'	535,5	1606,5	Scomber japonicus	513,00	31,9
										Sardina pilchardus	405,00	25,2
										Pagellus erythrinus	199,80	12,4
										Sparus auriga	164,70	10,2
01.10	1930	190	PT	16	1	N28 04'	W012 18'	790,0	1896,0	Sardina pilchardus	1620,00	85,4
										Diplodus bellottii	90,00	4,7
										Diplodus vulgaris	54,00	2,8
										Scomber japonicus	48,00	2,5

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02.10	0040	191	PT	49	10	N28 05'	W012 42'	52,8	105,6	Sardina pilchardus	88,00	83,3
										Scomber japonicus	17,60	16,6
02.10	0835	192	BT	31	31	N28 09'	W012 09'	3000,0	6000,0	Sardina pilchardus	5387,00	89,7
										Scomber japonicus	590,60	9,8
02.10	2340	193	BT	37	37	N28 19'	W011 47'	145,0	435,0	Sardina pilchardus	126,00	28,9
										Cynoglossus sp	79,50	18,2
										Pagellus acarne	78,00	17,9
										Trachurus trachurus	48,00	11,0
03.10	0250	194	PT	36	10	N28 16'	W011 53'	659,5	1978,5	Sardina pilchardus	1953,00	98,7
										Scomber scombrus	25,50	1,2
03.10	1835	195	PT	33	1	N28 41'	W011 12'	66,4	132,8	Sardina pilchardus	112,60	84,7
										Scomber japonicus	17,20	12,9
										Scomber scombrus	1,60	1,2
										Trachurus trachurus	1,40	1,0
03.10	2135	196	PT	32	1	N28 40'	W011 13'	57,8	76,8	Sardina pilchardus	59,45	77,4
										Sardina pilchardus	12,23	15,9
										RAJIDAE	4,12	5,3
										Scomber japonicus	1,06	1,3
07.11	0950	197	PT	105	27	N29 47'	W010 06'	,0	,0	NO CATCH	,00	,0
07.11	1137	198	PT	45	15	N29 44'	W010 02'	,1	.1	Scomber japonicus	,10	100,0
07.11	1744	199	PT	104	80	N29 38'	W010 21'	30,1	60,2	Scomber japonicus	60,00	99,6
07.11	2100	200	PT	45	23	N29 27'	W010 14'	46,6	93,2	Sardina pilchardus	69,00	74,0
										Scomber japonicus	13,00	13,9
										Oicentrarchus labrax	9,00	9,6
										Pagellus acarne	1,20	1,2
08.11	0225	201	PT	39	13	N29 15'	W010 26'	225,0	612,0	Sardina pilchardus	601,66	98,3
										Scomber japonicus	7,61	1,2
08.11	1037	202	BT	37	37	N28 57'	W010 42'	103,9	367,8	Scomber japonicus	162,00	44,0
										Trachurus trachurus	82,80	22,5
										Lepidotrigla carolae	32,40	8,8
										Sardina pilchardus	25,20	6,8
08.11	1605	203	PT	25	10	N28 48'	W011 00'	3000,0	5610,0	Sardina pilchardus	5606,26	99,9
09.11	0125	204	PT	65	10	N28 44'	W011 14'	140,0	280,0	Sardina pilchardus	207,20	74,0
										Scomber japonicus	72,80	26,0

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09.11	0446	205	PT	64	14	N28 40'	W011 24'	70,0	190,4	Sardina pilchardus	176,25	92,5
										Scomber japonicus	14,14	7,4
09.11	0736	206	PT	75	10	N28 44'	W011 39'	2,8	5,6	Trachinus draco	5,20	92,8
										Sardina pilchardus	,40	7,1
09.11	0910	207	BT	66	66	N28 42'	W011 43'	14,2	426,0	Dentex macrophthalmus	360,00	84,5
										Pagellus erythrinus	21,00	4,9
										Dentex gibbosus	12,00	2,8
										Loligo vulgaris	9,00	2,1
09.11	0940	208	BT	67	67	N28 42'	W011 42'	2500,0	5000,0	Scomber japonicus	1597,00	31,9
										Trachurus trachurus	1486,60	29,7
										Pagellus acarne	900,40	18,0
										Dentex macrophthalmus	450,20	9,0
11.11	2001	209	PT	59	40	N28 35'	W011 51'	51,5	103,0	Diplodus vulgaris	50,00	48,5
										Pagellus bellottii	22,00	21,3
										Sardina pilchardus	15,00	14,5
										Dasyatis sp.	5,60	5,4
12.11	0025	210	PT	44	10	N28 25'	W011 10'	245,0	490,0	Sardina pilchardus	485,10	99,0
										Scomber japonicus	4,90	1,0
12.11	1205	211	BT	100	100	N28 38'	W012 05'	48,3	413,9	Scomber japonicus	385,65	93,1
										Trachurus trachurus	12,85	3,1
										Pagellus acarne	11,99	2,8
12.11	1505	212	PT	38	20	N29 19'	W011 48'	313,0	626,0	Sardina pilchardus	500,00	79,8
										Scomber japonicus	76,00	12,1
										Trachurus trachurus	28,00	4,4
										Pagellus acarne	20,00	3,1
12.11	1721	213	BT	19	19	N28 12'	W011 55'	89,6	179,2	Diplodus bellottii	120,00	66,9
										Trachurus trachurus	22,80	12,7
										Merluccius merluccius	15,00	8,3
										Scomber scombrus	6,60	3,6
12.11	1952	214	BT	48	48	N28 22'	W012 06'	90,8	181,6	Pagellus acarne	33,90	18,6
										Dentex macrophthalmus	27,00	14,8
										Trachurus trachurus	20,40	11,2
										Sepia sp	19,20	10,5
12.11	2120	215	PT	50	1	N28 24'	W012 08'	261,0	522,0	Scomber japonicus	516,60	98,9
										Sardina pilchardus	5,40	1,0
13.11	0213	216	PT	36	10	N28 08'	W012 14'	1750,0	3500,0	Sardina pilchardus	3410,00	97,4
										Scomber japonicus	80,00	2,2

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13.11	1223	217	PT	34	10	N28 04'	W012 32'	2500,0	5000,0	Sardina pilchardus	4864,20	97,2
										Scomber japonicus	135,80	2,7
13.11	1545	218	BT	46	46	N28 04'	W012 44'	464,8	929,6	Sardina pilchardus	496,00	53,3
										Scomber japonicus	192,00	20,6
										Pagellus acarne	73,60	7,9
										Trachurus trachurus	70,40	7,5
13.11	2010	219	PT	23	2	N27 57'	W013 01'	33,7	67,4	Sardina pilchardus	34,20	50,7
										Sphyraena sphyraena	13,00	19,2
										Scomber japonicus	13,00	19,2
										Pomadasys incisus	2,40	.3,5
14.11	0018	220	BT	47	47	N27 48'	W013 14'	286,0	572,0	Scomber japonicus	264,00	46,1
										Trachurus trachurus	136,00	23,7
										Pagellus acarne	90,00	15,7
										Merluccius senegalensis	18,00	3,1
13.11	0430	221	PT	34	10	N27 33'	W013 21'	140,0	466,2	Sardina pilchardus	452,88	97,1
										Scomber japonicus	13,32	2,8
14.11	0809	222	BT	93	93	N27 24'	W013 35'	542,2	1084,4	Scomber japonicus	948,60	87,4
										Scomber scombrus	38,20	3,5
										Trachurus trachurus	34,00	3,1
										Pagellus acarne	27,20	2,5
14.11	1240	223	BT	67	67	N27 06'	W013 34'	1117,8	2235,6	Sardina pilchardus	1872,00	83,7
										Trachurus trachurus	234,00	10,4
										Scomber japonicus	90,00	4,0
14.11	1515	224	PT	86	52	N26 58'	W013 40'	350,0	700,0	Sardina pilchardus	700,00	100,0
14.11	2025	225	PT	83	17	N26 44'	W014 00'	465,0	1860,0	Sardina pilchardus	1842,00	99,0
15.11	0015	226	PT	38	10	N26 36'	W013 55'	20,9	69,5	Sardina pilchardus	62,60	90,0
										Scomber japonicus	4,82	6,9
										Salpa salpa	1,66	2,3
15.11	0444	227	PT	53	25	N26 30'	W014 16'	1750,0	21000,0	Sardina pilchardus	21000,00	100,0

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23.11	1624	246	BT	33	33	N11 02'	W016 54'	4000,0	8000,0	Balistes capriscus	8000,00	100,0
24.11	0649	247	BT	32	32	N10 45'	W016 32'	65,0	130,0	Balistes capriscus	69,00	53,0
										Caranx senegallus	51,60	39,6
										Caranx crysos	1,80	1,3
										Scomberomorus tritor	1,60	1,2
24.11	0830	248	BT	22	22	N10 45'	W016 28'	4,1	8,2	Balistes capriscus	4,40	53,6
										Scomberomorus tritor	3,40	41,4
										Echeneis naucrates	,40	4,8
24.11	1035	249	PT	20	1	N10 54'	W016 39'	,5	1,0	Echeneis naucrates	1,00	100,0
24.11	1232	250	BT	54	54	N10 47'	W016 45'	419,0	838,0	Balistes capriscus	722,00	86,1
										Epinephelus aeneus	60,80	7,2
										Priacanthus arenatus	24,00	2,8
										Fistularia petimba	16,00	1,9
24.11	1758	251	BT	90	90	N10 51'	W016 58'	77,6	98,5	Ariomma bondi	37,71	38,2
										Fistularia petimba	18,54	18,8
										Priacanthus arenatus	10,16	10,3
										Mustelus mustelus	9,27	9,4
24.11	2145	252	BT	20	20	N11 05'	W016 52'	12,6	25,2	Balistes capriscus	18,40	73,0
										Decapterus rhonchus	3,00	11,9
										Fistularia petimba	2,00	7,9
										Priacanthus arenatus	1,40	5,5
25.11	0347	253	PT	39	20	N11 10'	W017 04'	457,8	915,6	Balistes capriscus	903,00	98,6
										Dactylopterus volitans	12,60	1,3
25.11	0943	254	PT	377	75	N11 20'	W017 22'	,0	,0	NO CATCH	,00	,0
25.11	1325	255	BT	31	31	N11 33'	W017 04'	69,4	138,8	Alectis alexandrinus	87,20	62,8
										Scomberomorus tritor	26,00	18,7
										Caranx crysos	6,40	4,6
										Pomadasys peroteti	6,20	4,4
										Brachydeuterus auritus	36,00	25,9
25.11	1547	256	BT	12	12	N11 38'	W016 49'	101,9	141,6	Galeoides decadactylus	51,43	36,3
										Chloroscombrus chrysurus	36,69	25,9
										Pseudotolithus senegalensis	9,17	6,4
										Scomberomorus tritor	7,92	5,5
25.11	2010	257	PT	93	12	N11 42'	W017 16'	13,2	26,4	Engraulis encrasicolus	21,60	81,8
										Trachurus trecae	3,40	12,8
										Trichiurus lepturus	,60	2,2
										Saurida brasiliensis	,40	1,5

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26.11	0105	258	PT	34	15	N11 54'	W017 09'	63,2	126,4	Selene dorsalis	39,20	31,0
										Sphyraena sp	31,00	24,5
										Sphyraena guachancho	24,60	19,4
										Ilisha africana	13,00	10,2
26.11	1030	259	BT	38	38	N12 16'	W017 12'	286,9	573,8	Selene dorsalis	238,00	41,4
										Brachydeuterus auritus	130,00	22,6
										Brachydeuterus auritus	130,00	22,6
										Sphyraena guachancho	25,00	4,3
26.11	1232	260	BT	23	23	N12 15'	W017 05'	182,0	364,0	CARCHARHINIDAE	123,60	33,9
										Chloroscombrus chrysurus	42,60	11,7
										Pseudotolithus senegalensis	36,60	10,0
										Stromateus fiatola	24,00	6,5
26.11	1524	261	BT	17	17	N12 18'	W016 59'	120,0	240,0	Chloroscombrus chrysurus	,00	,0
27.11	0715	262	BT	30	30	N13 30'	W017 06'	7000,0	14000,0	Brachydeuterus auritus	7231,20	51,6
										Trachurus trecae	5911,80	42,2
										Pagellus bellottii	736,80	5,2
27.11	0903	263	BT	14	14	N13 34'	W016 58'	14,9	29,8	Scomberomorus tritor	29,80	100,0
27.11	1011	264	BT	8	8	N13 34'	W016 51'	177,2	354,4	Chloroscombrus chrysurus	187,20	52,8
										Ilisha africana	140,40	39,6
										Trichiurus lepturus	8,40	2,3
										Brachydeuterus auritus	6,00	1,6
27.11	1113	265	BT	5	5	N13 32'	W016 47'	40,9	81,8	Rhinoptera bonasus	50,00	61,1
										Caranx senegallus	17,60	21,5
										Scomberomorus tritor	9,00	11,0
										Alectis alexandrinus	4,00	4,8
27.11	1230	266	BT	13	13	N13 29'	W016 56'	189,5	379,0	Ilisha africana	192,60	50,8
										Pomadasys peroteti	21,60	5,6
										Brachydeuterus auritus	21,00	5,5
										Chloroscombrus chrysurus	21,00	5,5
27.11	1345	267	BT	8	8	N13 24'	W016 54'	173,7	347,4	Scomberomorus tritor	84,40	24,2
										Chloroscombrus chrysurus	72,80	20,9
										Ilisha africana	48,80	14,0
										Stromateus fiatola	46,00	13,2
27.11	1520	268	BT	8	8	N13 21'	W016 54'	23,7	47,4	Scomberomorus tritor	14,60	30,8
										Chloroscombrus chrysurus	11,20	23,6
										Chloroscombrus chrysurus	3,40	7,1
										Stromateus fiatola	3,40	7,1

DATE	TIME START	STN No.	GEAR TYPE	DEPTH (M) BOTTOM	DEPTH (M) GEAR	POSITION LATIT.	POSITION LONGIT.	CATCH (KG) TOTAL	CATCH (KG) PR HR	DOMINANT SPECIES	WEIGTH (KG) PR HR	WEIGTH (KG) %
27.11	1655	269	BT	16	16	N13 18'	W017 01'	3,2	6,4	Scomberomorus tritor	4,00	62,5
										Pomatomus saltatrix	2,20	34,3
										Echeneis naucrates	,10	1,5
27.11	1752	270	BT	14	14	N13 13'	W016 59'	403,7	1211,1	Chloroscombrus chrysurus	977,10	80,6
										Sardinella maderensis	105,30	8,6
										Sphyraena afra	52,80	4,3
										Brachydeuterus auritus	29,40	2,4
27.11	1908	271	BT	8	8	N13 14'	W016 52'	238,2	476,4	Chloroscombrus chrysurus	448,00	94,0
										Sardinella maderensis	19,20	4,0
28.11	0716	272	BT	76	76	N13 30'	W017 21'	3,7	7,4	Fistularia petimba	2,60	35,1
										Pegusa lascaris	2,00	27,0
										Zeus faber	1,00	13,5
										Dentex angolensis	1,00	13,5
28.11	0845	273	BT	87	87	N13 25'	W017 26'	189,3	378,6	Ariomma bondi	240,40	63,4
										Torpedo torpedo	43,00	11,3
										Trachurus trecae	39,00	10,3
										Dentex angolensis	18,80	4,9
28.11	1030	274	BT	56	56	N13 19'	W017 21'	277,0	831,0	Mustelus mustelus	681,30	81,9
										Sparus caeruleostictus	33,30	4,0
										Acanthurus monroviae	32,40	3,8
										Dentex barnardi	15,60	1,8
28.11	1221	275	BT	76	76	N13 15'	W017 27'	344,4	688,8	Pagellus bellottii	516,00	74,9
										Trachurus trecae	96,00	13,9
										Ariomma bondi	18,00	2,6
										Priacanthus arenatus	18,00	2,6
28.11	1346	276	BT	48	48	N13 11'	W017 20'	292,0	584,0	Pagellus bellottii	320,00	54,7
										Trachurus trecae	245,00	41,9
										Priacanthus arenatus	8,00	1,3
28.11	1505	277	BT	39	39	N13 17'	W017 14'	2000,1	4000,2	Trachurus trecae	3436,80	85,9
										Sardinella aurita	221,40	5,5
										Pagellus bellottii	95,80	2,3
										Decapterus rhonchus	82,60	2,0
28.11	1620	278	BT	47	47	N13 24'	W017 15'	141,3	282,6	Pagellus bellottii	139,00	49,1
										Trachurus trecae	44,00	15,5
										Priacanthus arenatus	30,00	10,6
										Pomadasys incisus	21,00	7,4
28.11	1748	279	BT	41	41	N13 34'	W017 12'	363,5	727,0	Trachurus trecae	318,00	43,7
										Pagellus bellottii	318,00	43,7
										Sardinella aurita	123,60	17,0
										Decapterus rhonchus	42,00	5,7

DATE	TIME START	STN No.	GEAR TYPE	DEPTH (M) BOTTOM	DEPTH (M) GEAR	POSITION LATIT.	POSITION LONGIT.	CATCH (KG) TOTAL	CATCH (KG) PR HR	DOMINANT SPECIES	WEIGTH (KG) PR HR	WEIGTH (KG) %
29.11	0724	280	BT	36	36	N13 26'	W017 09'	2000,0	4000,0	Trachurus trecae	3031,20	75,7
										Brachydeuterus auritus	493,00	12,3
										Sardinella aurita	364,60	9,1
										Pagellus bellottii	69,40	1,7
29.11	0854	281	BT	21	21	N13 28'	W017 02'	20,6	41,2	Brachydeuterus auritus	17,00	41,2
										Decapterus rhonchus	9,20	22,3
										Galeoides decadactylus	5,00	12,1
										Trichiurus lepturus	3,20	7,7
29.11	0958	282	BT	18	18	N13 22'	W017 01'	,6	1,2	Caranx senegallus	1,20	100,0
29.11	1107	283	BT	34	34	N13 19'	W017 08'	404,4	808,8	Pagellus bellottii	478,40	59,1
										Selene dorsalis	91,00	11,2
										Trachurus trecae	87,20	10,7
										Chloroscombrus chrysurus	65,00	8,0
29.11	1215	284	BT	26	23	N13 14'	W017 06'	10,6	21,2	Caranx senegallus	7,00	33,0
										Scomberomorus tritor	5,60	26,4
										Pagellus bellottii	2,00	9,4
										Raja miraletus	1,40	6,6
02.12	2213	285	BT	28	28	N13 57'	W017 06'	1800,0	3600,0	Trachurus trecae	2856,40	79,3
										Pagellus bellottii	321,20	8,9
										Brachydeuterus auritus	219,80	6,1
										Sepia officinalis hierredda	50,80	1,4
03.12	0401	286	FT	21	10	N13 46'	W017 03'	912,6	1825,2	Sardinella maderensis	1128,40	61,8
										Sardinella aurita	306,80	16,8
										Sardinella maderensis	265,20	14,5
										Brachydeuterus auritus	57,20	3,1
03.12	0721	287	BT	31	31	N13 44'	W017 08'	176,4	352,8	Pagellus bellottii	327,00	92,6
										Trachurus trecae	7,80	2,2
										Dactylopterus volitans	6,60	1,8
										Stromateus fiatola	6,00	1,7
03.12	0953	288	BT	21	21	N13 39'	W017 04'	128,4	256,8	Sphyraena afra	167,60	65,2
										Balistes capriscus	25,40	9,8
										Sparus caeruleostictus	13,20	5,1
										Epinephelus aeneus	13,00	5,0
03.12	1326	289	BT	21	21	N13 43'	W017 02'	1005,0	1467,3	Sardinella aurita	800,81	54,5
										Trachurus trecae	368,50	25,1
										Sardinella maderensis	188,63	12,8
										Brachydeuterus auritus	92,12	6,2
03.12	1735	290	BT	11	11	N14 00'	W016 59'	2,1	4,2	Decapterus rhonchus	2,80	66,6
										Pagellus bellottii	,60	14,2
										Halobatrachus didactylus	,40	9,5
										Sparus caeruleostictus	,20	4,7

DATE	TIME START	STN No.	GEAR TYPE	DEPTH (M) BOTTOM	DEPTH (M) GEAR	POSITION LATIT.	POSITION LONGIT.	CATCH (KG) TOTAL	CATCH (KG) PR HR	DOMINANT SPECIES	WEIGTH (KG) PR HR	WEIGTH (KG) %
03.12	2110	291	PT	44	1	N14 07'	W017 16'	,3	,6	Trachurus trecae	,60	100,0
03.12	2321	292	PT	26	11	N14 15'	W017 10'	88,7	443,5	Trachurus trecae	352,50	79,4
										Pagellus bellottii	52,50	11,8
										Brachydeuterus auritus	24,00	5,4
										Sardinella aurita	7,50	1,6
04.12	0220	293	BT	33	33	N14 21'	W017 14'	922,4	1844,8	Trachurus trecae	1136,00	61,5
										Pagellus bellottii	457,60	24,8
										Pseudupeneus prayensis	54,40	2,9
										Chelidonichthys lastoviza	44,80	2,4
04.12	0518	294	PT	45	20	N14 27'	W017 18'	600,0	1200,0	Trachurus trecae	1196,00	99,6
05.12	2350	295	PT	27	1	N14 35'	W017 15'	104,9	209,8	Sardinella maderensis	151,20	72,0
										Lichia amia	40,00	19,0
										Trachurus trecae	8,40	4,0
										Sardinella aurita	5,40	2,5
06.12	1215	296	BT	50	50	N14 53'	W017 13'	1800,0	5400,0	Trachurus trecae	2163,60	40,0
										Boops boops	1713,00	31,7
										Brachydeuterus auritus	576,90	10,6
										Pagellus bellottii	351,60	6,5
06.12	1723	297	PT	18	1	N13 06'	W017 00'	4000,4	8000,8	Trachurus trecae	4599,80	57,4
										Decapterus rhonchus	2896,20	36,1
										Selene dorsalis	283,80	3,5
										Trachurus trachurus	142,00	1,7
06.12	1905	298	BT	24	24	N15 09'	W016 58'	541,5	1624,5	Brachydeuterus auritus	1536,00	94,5
										Decapterus rhonchus	21,00	1,2
										Arius parkii	18,00	1,1
07.12	0316	299	PT	39	10	N15 33'	W016 49'	308,3	616,6	Chloroscombrus chrysurus	195,00	31,6
										Selene dorsalis	151,00	24,4
										Ilisha africana	63,00	10,2
										Carcharinus sp	60,00	9,7
07.12	0814	300	BT	48	48	N15 43'	W016 47'	190,3	380,6	Brachydeuterus auritus	282,00	74,0
										Brachydeuterus auritus	48,00	12,6
										Mustelus mustelus	17,60	4,6
										Trichiurus lepturus	10,80	2,8
07.12	1035	301	BT	27	27	N15 47'	W016 39'	532,0	1064,0	Rhinoptera bonasus	554,00	52,0
										Pteroscion peli	174,00	16,3
										Brachydeuterus auritus	100,00	9,3
										Trichiurus lepturus	56,00	5,2

DATE	TIME START	STN No.	GEAR TYPE	DEPTH (M) BOTTOM	DEPTH (M) GEAR	POSITION LATIT.	POSITION LONGIT.	CATCH (KG) TOTAL	CATCH (KG) PR HR	DOMINANT SPECIES	WEIGTH (KG) PR HR	WEIGTH (KG) %
07.12	1207	302	PT	23	8	N15 49'	W016 38'	108,0	184,6	Sardinella aurita	77,46	41,9
										Sardinella maderensis	47,70	25,8
										Decapterus rhonchus	29,58	16,0
										Stromateus fiatola	7,86	4,2
07.12	1935	303	PT	48	20	N16 14'	W016 38'	106,4	212,8	Decapterus rhonchus	80,00	37,5
										Brachydeuterus auritus	64,00	30,0
										Trachurus trecae	29,20	13,7
										Trichiurus lepturus	26,40	12,4
08.12	0034	304	PT	21	1	N16 35'	W016 31'	56,7	113,4	Sardinella maderensis	34,00	29,9
										Brachydeuterus auritus	33,40	29,4
										Selene dorsalis	8,60	7,5
										Campogramma glaycos	8,40	7,4
08.12	0725	305	PT	94	40	N17 02'	W016 37'	3,3	5,9	Sepia sp	5,97	101,1
08.12	1023	306	BT	105	105	N17 06'	W016 38'	108,3	144,0	Trachurus trecae	53,46	37,1
										Dentex angolensis	36,70	25,4
										Trichiurus lepturus	30,32	21,0
										Raja miraletus	4,52	3,1
08.12	1300	307	PT	100	35	N17 08'	W016 27'	258,0	358,6	Trichiurus lepturus	354,45	98,8
08.12	1941	308	PT	91	50	N17 24'	W016 26'	118,2	236,4	Trachurus trecae	217,60	92,0
										Scomber japonicus	8,00	3,3
										Mustelus mustelus	5,60	2,3
										Torpedo torpedo	5,60	2,3
08.12	2230	309	PT	31	15	N17 31'	W016 12'	62,0	124,0	Pagellus bellottii	38,60	31,1
										Pomadasys incisus	36,00	29,0
										Decapterus rhonchus	20,40	16,4
										Stromateus fiatola	7,40	5,9
09.12	0935	310	BT	37	37	N18 21'	W016 19'	55,3	110,6	Pagellus bellottii	29,60	26,7
										Decapterus rhonchus	24,00	21,6
										Scomber japonicus	16,00	14,4
										Alloteuthis africana	8,60	7,7
09.12	1442	311	PT	72	5	N18 27'	W016 27'	,0	,0	NO CATCH	,00	,0
09.12	1930	312	PT	16	1	N18 42'	W016 20'	679,5	1359,0	Decapterus rhonchus	942,60	69,3
										Trachurus trecae	375,00	27,5
										Boops boops	16,20	1,1
10.12	0013	313	PT	117	100	N18 53'	W016 40'	7,0	14,0	Trachurus trachurus	13,40	95,7
										Decapterus rhonchus	,40	2,8

DATE	TIME START	STN No.	GEAR TYPE	DEPTH (M) BOTTOM	DEPTH (M) GEAR	POSITION LATIT.	POSITION LONGIT.	CATCH (KG) TOTAL	CATCH (KG) PR HR	DOMINANT SPECIES	WEIGTH (KG) PR HR	WEIGTH (KG) %
10.12	0600	314	PT	177	40	N19 06'	W016 44'	35,5	47,2	Trichiurus lepturus	47,08	99,7
10.12	1848	315	BT	31	31	N19 54'	W017 14'	153,8	307,6	Pagellus bellottii	167,00	54,2
										Engraulis encrasicolus	41,60	13,5
										Zeus faber	32,00	10,4
										Pagellus bellottii	22,00	7,1
11.12	0237	316	PT	23	10	N19 58'	W017 12'	50,6	101,2	Stromateus fiatola	17,80	17,5
										Engraulis encrasicolus	16,20	16,0
										SEPIOLIDAE	13,60	13,4
										Trachurus trecae	12,80	12,6
11.12	0915	317	BT	17	17	N20 11'	W017 16'	13,6	27,2	Campogramma glaycos	10,00	36,7
										Octopus vulgaris	8,40	30,8
										Stromateus fiatola	2,80	10,2
										Uranoscopus sp	1,20	4,4
11.12	1130	318	PT	47	16	N20 10'	W017 31'	,0	,0	NO CATCH	,00	,0
11.12	1643	319	BT	53	53	N20 24'	W017 30'	72,9	145,8	Trachurus trecae	51,40	35,2
										LOLIGINIDAE	34,20	23,4
										Trachurus trachurus	32,60	22,3
										C R A B S	11,40	7,8
11.12	2042	320	PT	20	10	N20 26'	W017 08'	5000,0	10000,0	Sardinella maderensis	6539,20	65,3
										Sardina pilchardus	3057,40	30,5
										Sardinella aurita	403,40	4,0
12.12	0414	321	PT	53	20	N20 46'	W017 23'	57,2	114,4	Sardina pilchardus	110,00	96,1
										Trachurus trecae	2,20	1,9

ANNEX V List of species caught.

LIST OF CODES FROM REGION NORTH-WEST AFRICA
Monday February 2 1988 09:06:43 AM

SCIENTIFIC NAME	ENGLISH NAME
ACANTHURIDAE	
Acanthurus monroviae	Monrovia doctorfish
ACROPOMATIDAE	
Synagrops sp.	
Synagrops microlepis	
ALBULIDAE	Bonefishes
Albula vulpes	Bonefish
Pterothrissus belloci	Longfin bonefish
ANGUILLIFORMES	EELS
ANTHIIDAE	
Anthias anthias	
Callanthias ruber	
APOGONIDAE	CARDINALFISHES
Apogonichthyoides uninotatus	
Epigonus telescopus	
ARIIDAE	SEA CATFISHES
Arius sp	
Arius heudeloti	Smoothmouth sea catfish
Arius latiscutatus	Roughhead sea catfish
Arius parkii	
ARGENTINIDAE	
Argentina sphyraena	
ARIOMMIDAE	ARIOMMIDS
Ariomma sp	
Ariomma bondi	Silver rag driftfish
Ariomma melanum	
AULOPODIDAE	
Aulopus cadenati	
BALISTIDAE	TRIGGERFISHES
Balistes sp.	
Balistes capriscus	Grey triggerfish
Balistes punctatus	Bluespotted triggerfish
BATRACHOIDIDAE	TOADFISHES
Batrachoides liberiensis	Hairy toadfish
Halobatrachus didactylus	Lusitanian toadfish
BELONIDAE	NEEDLEFISHES
Ablennes hians	Flat needlefish
Belone houttuyni	
BLENNIIDAE	
Blennius sp.	

SCIENTIFIC NAME	ENGLISH NAME
Blennius normani	
BOTHIDAE	LEFTEYE FLOUNDERS
Arnoglossus sp.	
Arnoglossus blanchei	
Arnoglossus imperialis	Imperial scaldfish
Bothus sp	
Bothus podas africanus	Wide-eyed flounder
Chascanopsetta lugubris	
Monolene microstoma	
Scyacium micrurum	
BRAMIDAE	POMFRETS
Brama brama	Atlantic pomfret
BRANCHIOSTEGIDAE	TILEFISHES
Branchiostegus semifasciatus	Zebra tilefish
BREGMACEROTIDAE	CODLETS
Bregmaceros sp	
CALLIONYMIDAE	
Callionymus sp.	
CAPROIDAE	BOARFISHES
Antigonia capros	
Capros aper	Boarfish
CARANGIDAE	JACKS AND POMPANOS
Alectis alexandrinus	Alexandria pompano
Caranx sp	Horse mackerel
Caranx crysos	Blue runner
Caranx senegallus	Senegal jack
Caranx hippos	
Chloroscombrus chrysurus	Atlantic bumper
Campogramma glaycos	Vadigo
Decapterus sp	Scad
Decapterus punctatus	Round scad
Decapterus rhonchus	False scad
Decapterus tabl	Redtail scad
Decapterus macarellus	Mackerel scad
Elagatis bipinnulata	
Hemicaranx bicolor	Two colour jack
Lichia amia	Leerfish
Selar crumenophthalmus	Bigeye scad
Seriola rivoliana	Greater amberjack
Seriola carpenteri	Guinean amberjack
Seriola fasciata	Lesser amberjack
Seriola dumerili	
Selene dorsalis	African lookdown
Trachinotus sp	Pampano
Trachinotus maxillosus	Galloon pompano
Trachinotus goreensis	Longfin pompano
Trachinotus ovatus	Pompano
Trachinotus teraia	

SCIENTIFIC NAME	ENGLISH NAME
Trachurus trachurus	Atlantic horse mackrel
Trachurus trecae	Cunene horse mackrel
Uraspis secunda	Cottonmouth jack
CENTRACHANTIDAE	PICARELS
Spicara sp	Picarel
Spicara alta	Bigeye picarel
CEPOLIDAE	
Cepola sp.	Bandfish
CHAETODONTIDAE	BUTTERFLYFISHES
Chaetodon sp	
Chaetodon hoefleri	
Chaetodon marcellae	
CHILODIPTERIDAE	CHILODIPTERIDAE
Hypoclydonia bella	
CHLOROPHTHALMIDAE	GREENEYES
Chlorophthalmus atlanticus	
Chlorophthalmus fraser	
CITHARIDAE	FLOUNDERS
Citharus linguatula	Spotted Flounder
CLUPEIDAE	HERRINGS
Alosa fallax	
Ethmalosa fimbriata	Bonga shad
Ilisha africana	West African ilisha
Sardina pilchardus	European pilchard
Sardinella aurita	Round sardinella
Sardinella maderensis	Madeiran sardinella
CONGRIDAE	CONGER EELS
Conger conger	
Ophisurus serpens	
Paraconger notialis	
Rhechias sp	
C R A B S	C R A B S
CALAPPIDAE	
Calappa rubroguttata	
PORTUNIDAE	
Neptunus validens	
Portunus validus	
Cronius ruber	
Callinectes sp.	
CRUSTACEANS	CRUSTACEANS
Krill	Krill
SQUILLIDAE	
Squilla mantis	Squilla mantis
Squilla aculeata	

SCIENTIFIC NAME	ENGLISH NAME
CYNOGLOSSIDAE	TONGUEFISHES AND TONGUESOLES
Cynoglossus sp	Tonguesoles
Cynoglossus canariensis	Canary tonguesole
Cynoglossus monodi	Guinean tonguesole
DACTYLOPTERIDAE	FLYING GURNARDS
Dactylopterus volitans	Flying gurnard
DIODONTIDAE	
Chilomycterus spinosus	
Diodon sp	
Diodon hystrix	
DREPANIDAE	SICKLEFISHES
Drepane africana	African sicklefish
ECHINODERMATA	
ECHENEIDIDAE	REMORAS
Echeneis naucrates	Sharksucker
Remora sp	
ELOPIDAE	TENPOUNDERS
Elops sp.	
Elops senegalensis	
Elops lacerta	West African ladyfish
EMMELICHTHYIDAE	RUBYFISHES
Erythrocles monodi	Atlantic rubyfish
ENGRAULIDIDAE	ANCHOVIES
Engraulis encrasicolus	European anchovy
EPHIPPIDAE	SPADEFISHES
Chaetodipterus goreensis	African spadefish
Chaetodipterus lippei	
FISTULARIIDAE	CORNETFISHES
Fistularia petimba	Red cornetfish
Fistularia tabacaria	
FISH LARVAE	FISH LARVAE
POSTLARVAL FISH	POSTLARVAL FISH
GADIDAE	
Trisopterus minutus	
Trisopterus luscus	Pouting
GEMPYLIDAE	SNAKE MACKRELS
Gempylus serpens	
Nesiarchus nasutus	
Neolatus tripes	
Promethichthys prometheus	Promethean escolar
GERREIDAE	MOJARRAS
Eucinostomus melanopterus	Flagfin mojarra

SCIENTIFIC NAME	ENGLISH NAME
GOBIIDAE	GOBIES
Bathygadus paganellus	
GONOSTOMATIDAE	BRISTLEMOUTHS
Vinciguerria sp	Bristlemouth
HEMIRAMPHIDAE	
Hemiramphus far	
HOLOCENTRIDAE	SOLDIERFISHES
Adioryx hastatus	Red squirrelfish
Holocentrus ascensionis	
JELLYFISH	JELLYFISH
LABRIDAE	WRASSES
Bodianus speciosus	Blackbar hogfish
Coris julis	
Xyrichthys sp.	
Xyrichtys novacula	Pearly razorfish
LOBOTIDAE	
LETHRINIDAE	EMPERORS
Lethrinus atlanticus	Atlantic emperor
L O B S T E R S	L O B S T E R S
PALINURIDAE	SPINY LOBSTERS
Palinurus sp	Spiny lobster
Panulirus sp	
LOPHIIDAE	
Lophius sp.	
LUTJANIDAE	SNAPPERS
Apsilus fuscus	African forktail snapper
Lutjanus sp	Red snapper
Lutjanus goreensis	Goreean snapper
Lutjanus agennes	African red snapper
Lutjanus fulgens	
Lutjanus gibbus	
MACRORHAMPHOSIDAE	SNIPEFISHES
Macrorhamphosus scolopax	Longspine snipefish
MACROURIDAE	
Hymenocephalus italicus	
Malacocephalus laevis	
MERLUCCIIDAE	HAKES
Merluccius sp	
Merluccius merluccius	European hake
Merluccius senegalensis	Senegalese hake
Merluccius polli	Benguela hake
MISCELLANEOUS	MISCELLANEOUS

SCIENTIFIC NAME	ENGLISH NAME
Miscellaneous fishes	
MOLLUSCS	
MOLIDAE	
Mola mola	Mola
MONACANTHIDAE	FILEFISHES
Alutera sp	
Alutera punctata	
Stephanolepis hispidus	
MORIDAE	
Physiculus sp	
MORONIDAE	
Dicentrarchus labrax	
Dicentrarchus punctatus	Spotted seabass
MUGILIDAE	MULLETS
Liza ramada	Thinlip mullet
Mugil sp	
Mugil capito	
MULLIDAE	GOATFISHES
Mullus surmuletus	
Pseudupeneus prayensis	West African goatfish
MURAENIDAE	MORAYS
Lycodontis sp	Moray
MURAENSOCIDAE	PIKE CONGERS
Cynoponticus ferox	Guinean pike conger
MYCTOPHIDAE	LANTERNFISHES
Ceratoscopelus sp	
NEMICHTHYIDAE	SNIPE EELS
NO CATCH	NO CATCH
NOMEIDAE	MAN OF WAR FISHES
Cubiceps sp	Cubiceps
Cubiceps gracilis	
Cubiceps niger	
Psenes sp	
Psenes maculatus	
OPHIDIIDAE	CUSK EELS
Brotula barbata	Bearded brotula
OPHICHTHIDAE	
Myrichthys pardalis	Leopard eel
PARALEPIDIDAE	BARRACUDINAS
Lestidium sp	

SCIENTIFIC NAME	ENGLISH NAME
PERISTEDIIDAE	ARMOURED SEAROBINS
Peristedion cataphractum	
PLATYCEPHALIDAE	SPINY FLATHEADS
Grammoplites gruveli	African spiny flathead
POLYNEMIDAE	THREADFINS
Galeoides decadactylus	Lesser African threadfin
Pentanemus quinquarius	Royal threadfin
POMACENTRIDAE	DAMSELFISHES
Chromis sp	
Chromis cadenati	Striped chromis
Chromis lineatus	
POMADASYIDAE	GRUNTS
Brachydeuterus auritus	Bigeye grunt
Parapristipoma sp	Grunt
Parapristipoma octolineatum	African striped grunt
Plectorhynchus mediterraneus	Rubberlip grunt
Pomadasys sp	Grunts
Pomadasys jubelini	Sompat grunt
Pomadasys incisus	Bastard grunt
Pomadasys peroteti	Parrot grunt
Pomadasys rogeri	Pigsnout grunt
POMATOMIDAE	BLUEFISHES
Pomatomus saltatrix	Bluefish
PRIACANTHIDAE	BIGEYES
Priacanthus arenatus	Atlantic bigeye
PSETTODIDAE	SPINY TURBOTS
Psettodes sp	
Psettodes belcheri	Spottail spiny turbot
Psettodes bennettii	
RACHYCENTRIDAE	
Rachycentron canadum	
R A Y S	R A Y S
DASYATIDAE	STINGRAYS
Dasyatis sp.	
Dasyatis margarita	
GYMNURIDAE	
Gymnura microura	
Gymnura altavela	
MYLIOBATIDAE	
Myliobatis aquila	
PLATYRHINIDAE	
Zanobatus shoenleinii	
RAJIDAE	SKATES
Raja sp.	
Raja miraletus	

SCIENTIFIC NAME	ENGLISH NAME
Raja straleni	
RHINOBATIDAE	
Rhinobatos sp.	
Rhinobatos rhinobatos	
Rhinobatos cemiculus	
RHINOPTERIDAE	
Rhinoptera sp	
Rhinoptera bonasus	
Rhinoptera marginata	
TORPEDINIDAE	ELECTRIC RAYS
Torpedo torpedo	
Torpedo marmorata	
NORTH-WEST AFRICA	
SALPS	SALPS
SCARIDAE	PARROTFISHES
Sparisoma rubripinne	Redfin parrotfish
SCIAENIDAE	CROAKERS
Argyrosomus sp	
Argyrosomus regius	Meagre
Argyrosomus hololepidotus	
Atractoscion aequidens	African weakfish
Miracorvina angolensis	Angola croaker
Pseudotolithus sp	
Pseudotolithus elongatus	Bobo croaker
Pseudotolithus senegalensis	Cassava croaker
Pseudotolithus typus	Longneck croaker
Pseudotolithus epipercus	Guinea croaker
Pseudotolithus brachygnathus	
Pteroscion sp	
Pteroscion peli	Boe drum
Umbrina canariensis	Canary drum
SCOMBRIDAE	MACKRELS AND TUNAS
Auxis thazard	Frigate tuna
Auxis rochei	
Euthynnus alletteratus	Little tunny
Sarda sarda	Belted bonito
Scomber japonicus	Chub mackrel
Scomber scombrus	
Scomberomorus tritor	West African Spanish mackerel
SCOPHTHALMIDAE	
Psetta maxima	
SCORPAENIDAE	SCORPIONFISHES
Helicolenus dactylopterus	
Neomerinthe folgori	Scorpion fish
Pontinus kuhlii	
Scorpaena sp	
Scorpaena maderensis	
Scorpaena angolensis	
Scorpaena normani	

SCIENTIFIC NAME	ENGLISH NAME
Scorpaena stephanica	
Setarches insularis	
SERRANIDAE	GROUPERS
Cephalopholis taeniops	Bluespotted seabass
Epinephelus sp	
Epinephelus aeneus	White grouper
Epinephelus guaza	Dusky grouper
Epinephelus fasciatus	Dungat grouper
Epinephelus alexandrinus	Golden grouper
Epinephelus caninus	
Mycteroperca rubra	Comb grouper
Serranus sp	
Serranus scriba	Painted comber
Serranus accraensis	
Serrannus cabrilla	
S H A R K S	S H A R K S
CARCHARHINIDAE	REQUIEM SHARKS
Carcharhinus sp	
Prionace glauca	
Rhizoprionodon acutus	Milk shark
HEMIGALEIDAE	
Paragaleus pectoralis	
LEPTOCHARIIDAE	BARBELED HOUNDSHARKS
Leptocharias smithii	Barbeled houndshark
SCYLIORHINIDAE	
Scyliorhinus canicula	
SPHYRNIDAE	HAMMERHEAD SHARKS
Sphyrna sp	Hammerhead shark
Sphyrna couardi	
Sphyrna lewini	Scalloped hammerhead
Sphyrna zygaena	Smooth hammerhead
SQUALIDAE	DOGFISH SHARKS
Squalus blainvillei	Longnose spurdog
SQUATINIDAE	ANGEL SHARKS
Squatina oculata	Smoothback angelshark
TRIAKIDAE	HOUNDSHARKS
Mustelus mustelus	Smoothhound
S H R I M P S	S H R I M P S
Shrimps small	
PANDALIDAE	
Plesionika sp.	
PENAEIDAE	PENAEID SHRIMPS
Parapenaeopsis atlantica	Guinea shrinp
Parapenaeus longirostris	
Penaeus sp	
Penaeus notialis	Pink shrimp
Penaeus kerathurus	Caramote prawn
PALAEMONIDAE	
Palaemon sp.	
PASIPHAEIDAE	GLASS SHRIMPS

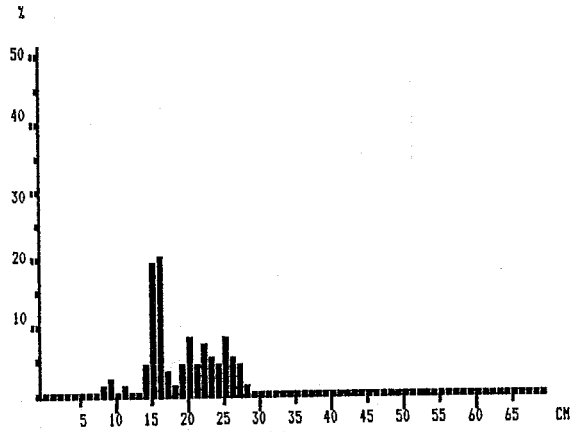
SCIENTIFIC NAME	ENGLISH NAME
SOLEIDAE	SOLES
Dicolocoglossa cuneata	Wedge sole
Dicolocoglossa hexophthalma	
Microchirus frechkopi	
Microchirus boscanion	
Pegusa lascaris	
Solea sp.	
Solea senegalensis	Senegalese sole
Vanstraelenia chirophthalmus	
SPARIDAE	SEABREAMS
Boops boops	Bogue
Dentex sp	Dentex
Dentex angolensis	Angola dentex
Dentex canariensis	Canary dentex
Dentex macrophthalmus	Large eye dentex
Dentex congoensis	Congo dentex
Dentex gibbosus	Pink dentex
Dentex barnardi	Barnard dentex
Dentex maroccanus	Marocco dentex
Diplodus sp	Seabream
Diplodus bellottii	Senegal seabream
Diplodus vulgaris	Common two banded seabream
Diplodus fasciatus	Banded seabream
Diplodus prayensis	Twobanded seabream
Diplodus sargus	White seabream
Diplodus cervinus	
Lithognathus mormyrus	Striped seabream
Pagellus sp.	
Pagellus acarne	Axillary seabream
Pagellus bellottii	Red panadora
Pagellus erythrinus	Common pandora
Sparus caeruleostictus	Bluespotted seabream
Sparus pagrus africanus	Southern common seabream
Sparus auriga	Redbanded seabream
Sparus pagrus pagrus	
Sparus auratus	
Sarpa salpa	
Spondyliosoma cantharus	Blackk seabream
Viridentex acromegalus	Bulldog dentex
SPHYRAENIDAE	BARRACUDAS
Sphyraena sp	
Sphyraena guachancho	
Sphyraena sphyraena	
Sphyraena afra	
Sphyraena viridensis	
C E P H A L O P O D A	SQUIDS
LOLIGINIDAE	INSHORE SQUIDS
Alloteuthys sp.	
Alloteuthis africana	
Loligo sp	
Loligo vulgaris	European squid
OCTOPODIDAE	OCTOPUSES

SCIENTIFIC NAME	ENGLISH NAME
Octopus sp.	Octopus
Octopus vulgaris	Common octopus
OMMASTREPHIDAE	FLYING SQUIDS
Illex sp	
Illex coindetii	Shortfin squid
Todarodes sp	
Todarodes sagittatus	
SEPIIDAE	CUTTLEFISHES
Sepia sp	Cuttlefish
Sepia officinalis hierredda	Common cuttlefish
SEPIOLIDAE	BOB-TAILED SQUIDS
STROMATEIDAE	
Stromateus fiatola	Butterfish
SYNODONTIDAE	LIZARDFISHES
Saurida brasiliensis	Brazilian lizardfish
Synodus sp	Lizardfish
Synodus saurus	Atlantic lizardfish
Synodus synodus	Diamond lizardfish
Trachinocephalus myops	Bluntnose lizardfish
TETRAODONTIDAE	PUFFERS
Ephippion guttifer	Pricky puffer
Lagocephalus sp	
Lagocephalus laevigatus	Sooth puffer
Liosaccus cutaneus	
Sphoeroides spengleri	
Sphoeroides cutaneus	
TRACHINIDAE	WEEVERFISHES
Trachinus sp	Weever
Trachinus armatus	Greater weever
Trachinus draco	Greater weever
Trachinus lineolatus	
Trachinus pellegrini	
TRIGLIDAE	GURNARDS
Chelidonichthys sp	Gurnard
Chelidonichthys gabonensis	Gabon gurnard
Chelidonichthys lastoviza	Streaked gurnard
Chelidonichthys lucerna	Tub gurnard
Chelidonichthys obscurus	Longfin gurnard
Lepidotrigla sp	Gurnard
Lepidotrigla carolae	Carols gurnard
Lepidotrigla cadmani	Scalebreast gurnard
Lepidotrigla dieuzeidei	Spiny gurnard
Trigla lyra	
TRACHICHTHYIDAE	
Hoplostethus cadenati	
TRICHIURIDAE	HAIRTAILFISHES
Aphanophus sp	Scabbardfish
Lepidopus caudatus	

SCIENTIFIC NAME	ENGLISH NAME
Trichiurus lepturus	Largehead hairtail
URANOSCOPIDAE	STARGAZERS
Uranoscopus sp	
Uranoscopus polli	Whitespotted stargazer
Uranoscopus cadenati	West African stargazer
Uranoscopus albesca	
XIPHIIDAE	SWORDFISHES
Xiphias gladius	Swordfish
ZEIDAE	DORIES
Zeus faber	John dory
Zenopsis conchifer	Silvery John dory

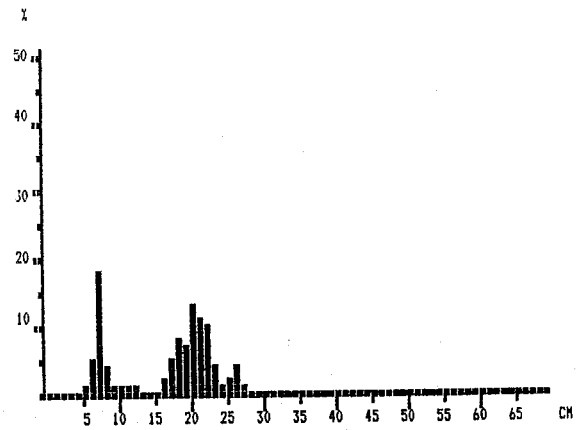
species printed: 511

ANNEX VI Histograms of pooled length frequency distributions by species, areas and surveys.



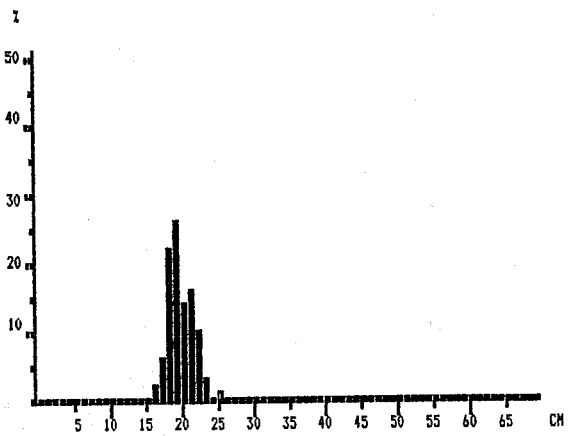
Sardinella aurita
SENEGAL CRUISE NO.1

Pooled sample (simple adding)
MEAN LENGTH = 19.02cm N= 356
NUMBER OF SUBSAMPLES : 14
SAMPLES FOUND BETWEEN ST. NO. 70 AND 94.
SAMPLES SEARCHED BETWEEN ST. NO. 69 AND 96 .



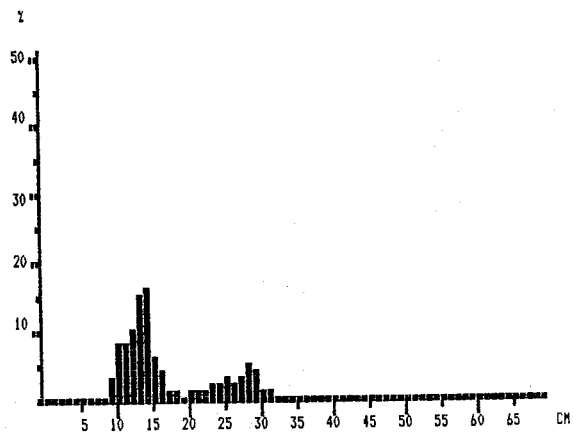
Sardinella maderensis
SENEGAL CRUISE NO.1

Pooled sample (simple adding)
MEAN LENGTH = 16.43cm N= 679
NUMBER OF SUBSAMPLES : 18
SAMPLES FOUND BETWEEN ST. NO. 72 AND 96.
SAMPLES SEARCHED BETWEEN ST. NO. 69 AND 96 .



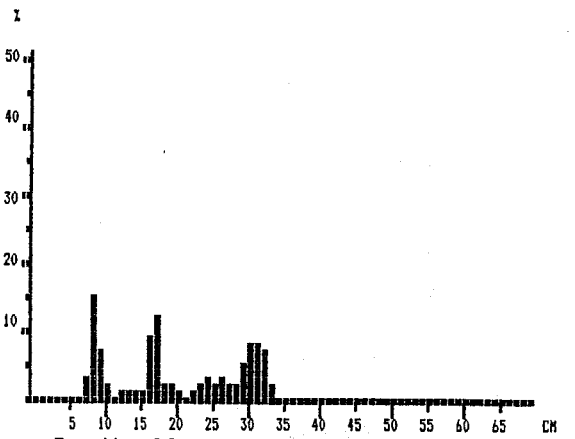
Sardinella aurita
GAMBIA CRUISE NO.1

Pooled sample (simple adding)
MEAN LENGTH = 19.54cm N= 104
NUMBER OF SUBSAMPLES : 2
SAMPLES FOUND BETWEEN ST. NO. 119 AND 128.
SAMPLES SEARCHED BETWEEN ST. NO. 119 AND 142 .



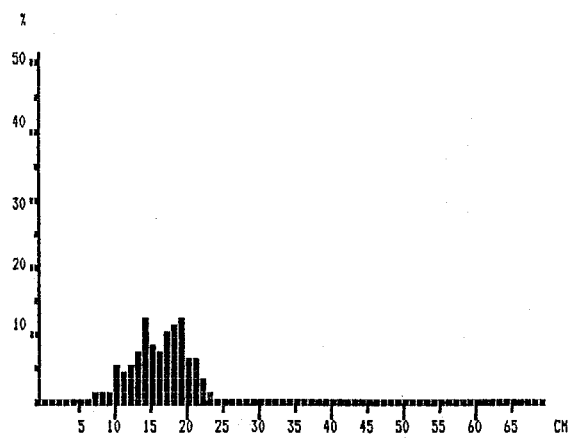
Sardinella maderensis
SENEGAL CRUISE NO.2

Pooled sample (simple adding)
MEAN LENGTH = 16.50cm N= 503
NUMBER OF SUBSAMPLES : 5
SAMPLES FOUND BETWEEN ST. NO. 286 AND 302.
SAMPLES SEARCHED BETWEEN ST. NO. 285 AND 302 .



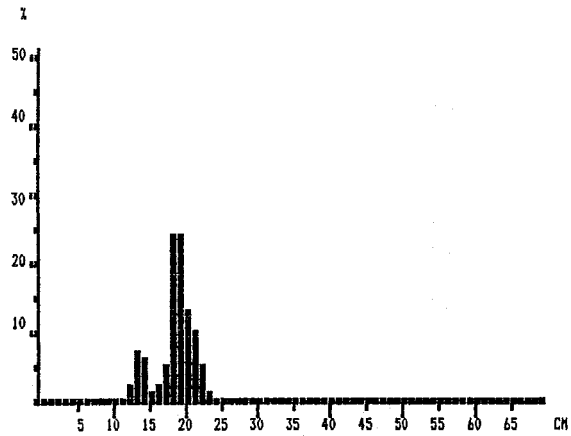
Sardinella aurita
SENEGAL CRUISE NO.2

Pooled sample (simple adding)
MEAN LENGTH = 19.76cm N= 331
NUMBER OF SUBSAMPLES : 5
SAMPLES FOUND BETWEEN ST. NO. 286 AND 302.
SAMPLES SEARCHED BETWEEN ST. NO. 285 AND 302 .



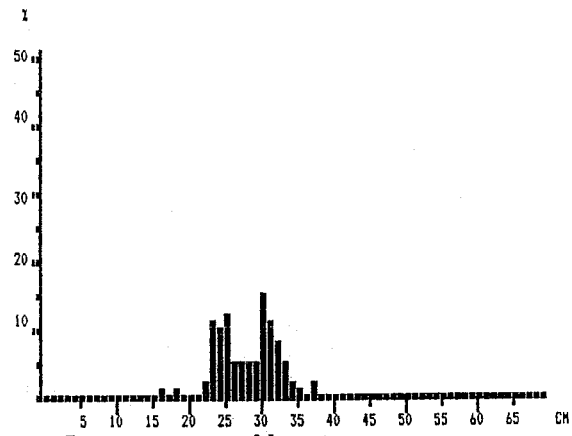
Ilisha africana
OFF BISSAGOS ISLANDS

Pooled sample (simple adding)
MEAN LENGTH = 15.96cm N= 310
NUMBER OF SUBSAMPLES : 6
SAMPLES FOUND BETWEEN ST. NO. 111 AND 116.
SAMPLES SEARCHED BETWEEN ST. NO. 97 AND 118 .



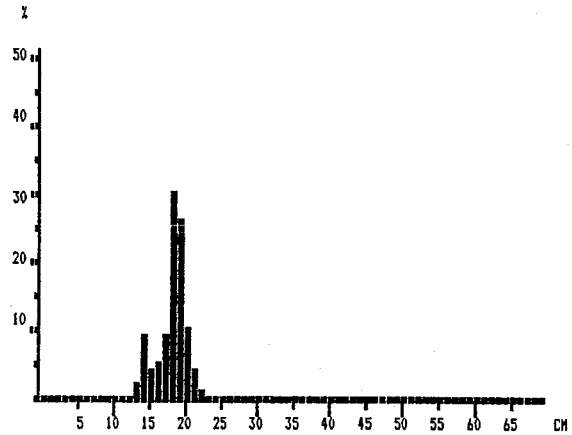
Sardina pilchardus
AGADIR - C.JUBY CRUISE NO.1

Pooled sample (simple adding)
MEAN LENGTH = 18.17cm N= 3542
NUMBER OF SUBSAMPLES : 37
SAMPLES FOUND BETWEEN ST. NO. 154 AND 196.
SAMPLES SEARCHED BETWEEN ST. NO. 153 AND 196 .



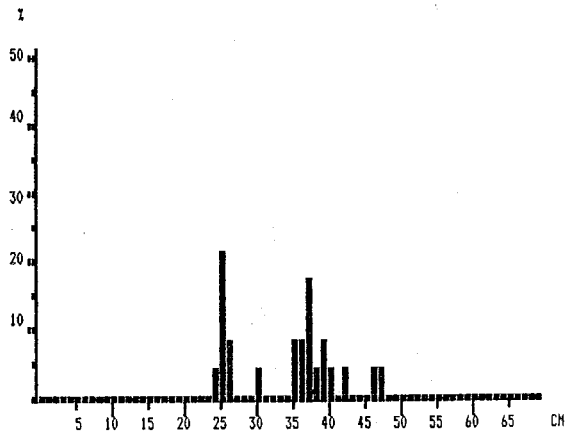
Caranx senegallus
GUINEA CRUISE NO.1

Pooled sample (simple adding)
MEAN LENGTH = 27.76cm N= 131
NUMBER OF SUBSAMPLES : 10
SAMPLES FOUND BETWEEN ST. NO. 8 AND 55.
SAMPLES SEARCHED BETWEEN ST. NO. 1 AND 68 .



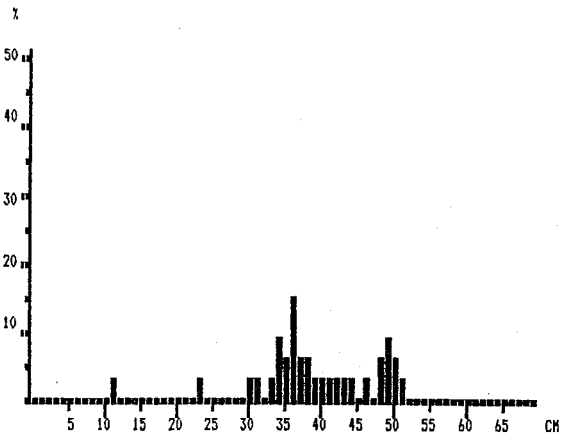
Sardina pilchardus
AGADIR - C.JUBY CRUISE NO.2

Pooled sample (simple adding)
MEAN LENGTH = 17.82cm N= 1277
NUMBER OF SUBSAMPLES : 15
SAMPLES FOUND BETWEEN ST. NO. 200 AND 218.
SAMPLES SEARCHED BETWEEN ST. NO. 197 AND 218 .



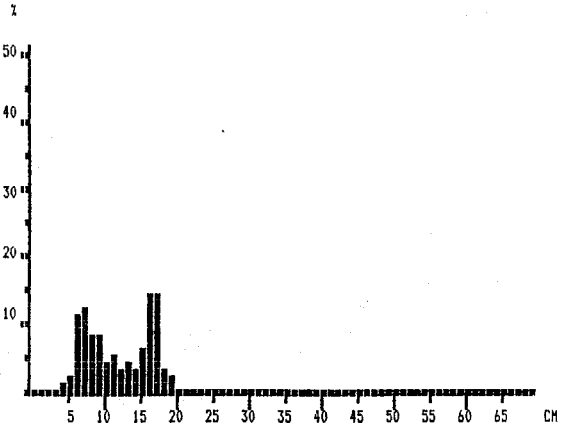
Caranx crysos
GUINEA CRUISE NO.1

Pooled sample (simple adding)
MEAN LENGTH = 33.83cm N= 24
NUMBER OF SUBSAMPLES : 7
SAMPLES FOUND BETWEEN ST. NO. 4 AND 56.
SAMPLES SEARCHED BETWEEN ST. NO. 1 AND 68 .



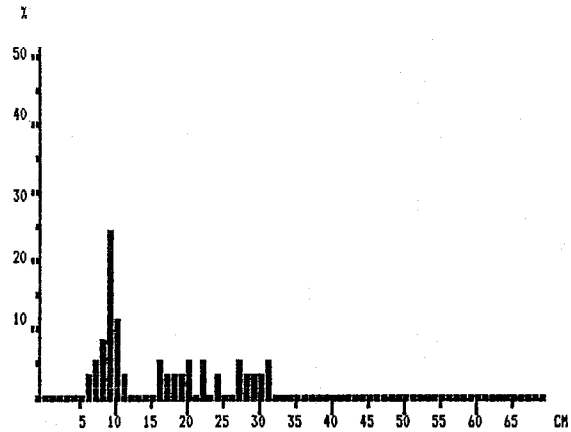
Alectis alexandrinus
SENEGAL CRUISE NO.1

Pooled sample (simple adding)
MEAN LENGTH = 38.79cm N= 34
NUMBER OF SUBSAMPLES : 10
SAMPLES FOUND BETWEEN ST. NO. 70 AND 94.



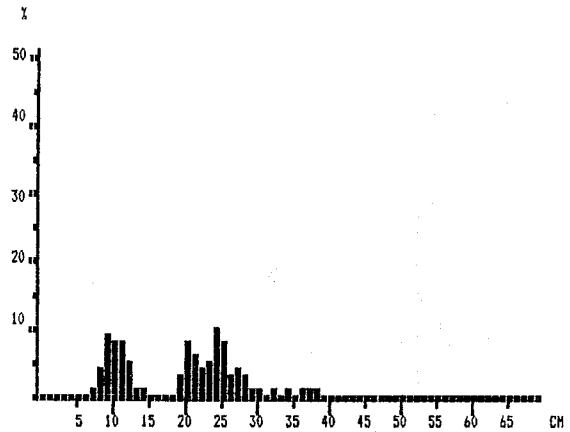
Decapterus punctatus
GUINEA CRUISE NO.1

Pooled sample (simple adding)
MEAN LENGTH = 11.58cm N= 131
NUMBER OF SUBSAMPLES : 8
SAMPLES FOUND BETWEEN ST. NO. 7 AND 57.
SAMPLES SEARCHED BETWEEN ST. NO. 1 AND 68 .



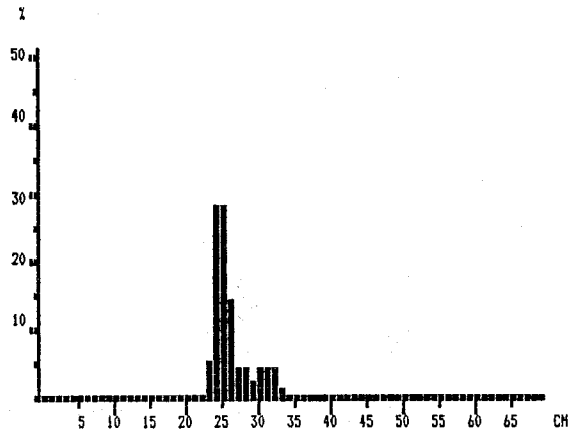
Decapterus rhonchus
MAURITANIA CRUISE NO.1

Pooled sample (simple adding)
MEAN LENGTH = 15.49cm N= 37
NUMBER OF SUBSAMPLES : 2
SAMPLES FOUND BETWEEN ST. NO. 143 AND 149.
SAMPLES SEARCHED BETWEEN ST. NO. 143 AND 152 .



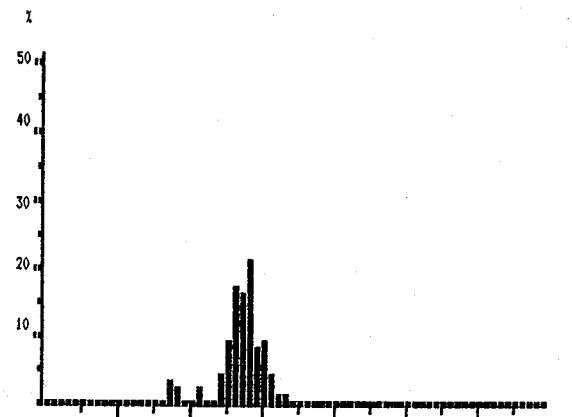
Decapterus rhonchus
SENEGAL CRUISE NO.1

Pooled sample (simple adding)
MEAN LENGTH = 19.28cm N= 357
NUMBER OF SUBSAMPLES : 14
SAMPLES FOUND BETWEEN ST. NO. 70 AND 96.
SAMPLES SEARCHED BETWEEN ST. NO. 69 AND 96 .



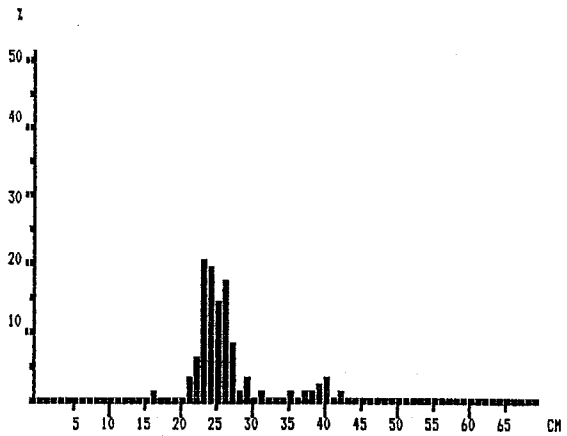
Decapterus rhonchus
MAURITANIA CRUISE NO.2

Pooled sample (simple adding)
MEAN LENGTH = 26.02cm N= 342
NUMBER OF SUBSAMPLES : 5
SAMPLES FOUND BETWEEN ST. NO. 303 AND 312.
SAMPLES SEARCHED BETWEEN ST. NO. 303 AND 321 .



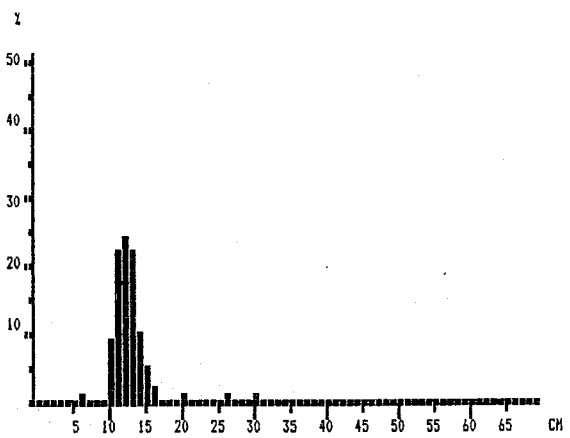
Decapterus rhonchus
SENEGAL CRUISE NO.2

Pooled sample (simple adding)
MEAN LENGTH = 26.72cm N= 203
NUMBER OF SUBSAMPLES : 3
SAMPLES FOUND BETWEEN ST. NO. 290 AND 302.
SAMPLES SEARCHED BETWEEN ST. NO. 285 AND 302 .



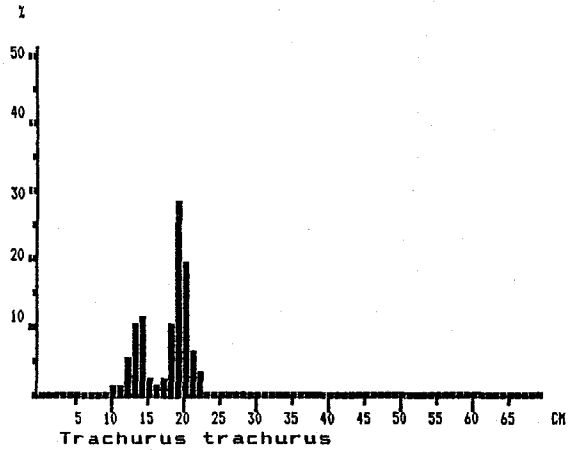
Decapterus rhonchus
OFF BISSAGOS ISLANDS

Pooled sample (simple adding)
MEAN LENGTH = 25.58cm N= 118
NUMBER OF SUBSAMPLES : 6
SAMPLES FOUND BETWEEN ST. NO. 97 AND 108.
SAMPLES SEARCHED BETWEEN ST. NO. 97 AND 118 .



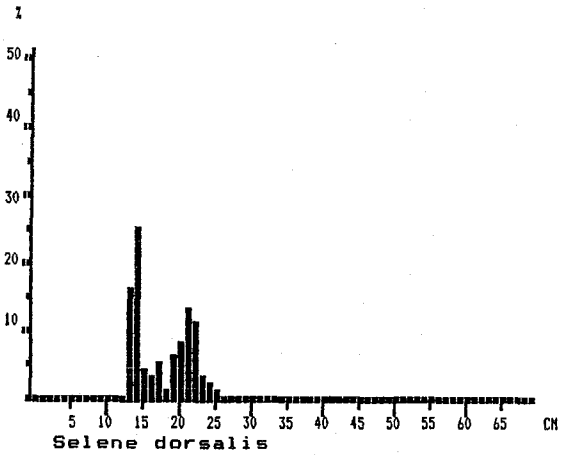
Decapterus rhonchus
GAMBIA CRUISE NO.1

Pooled sample (simple adding)
MEAN LENGTH = 12.80cm N= 248
NUMBER OF SUBSAMPLES : 6
SAMPLES FOUND BETWEEN ST. NO. 125 AND 136.
SAMPLES SEARCHED BETWEEN ST. NO. 119 AND 142 .



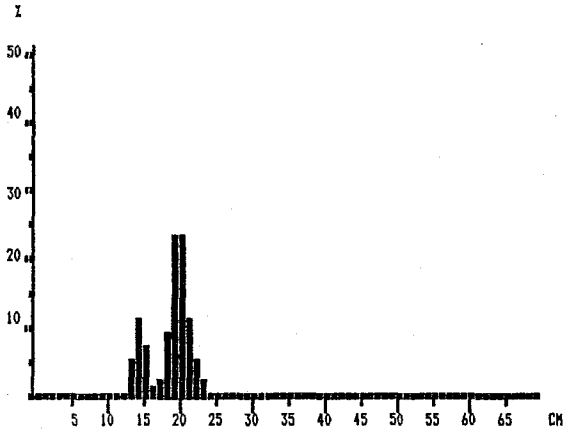
Trachurus trachurus
AGADIR - C.JUBY CRUISE NO.1

Pooled sample (simple adding)
MEAN LENGTH = 17.52cm N= 725
NUMBER OF SUBSAMPLES : 12
SAMPLES FOUND BETWEEN ST. NO. 153 AND 195.
SAMPLES SEARCHED BETWEEN ST. NO. 153 AND 196 .



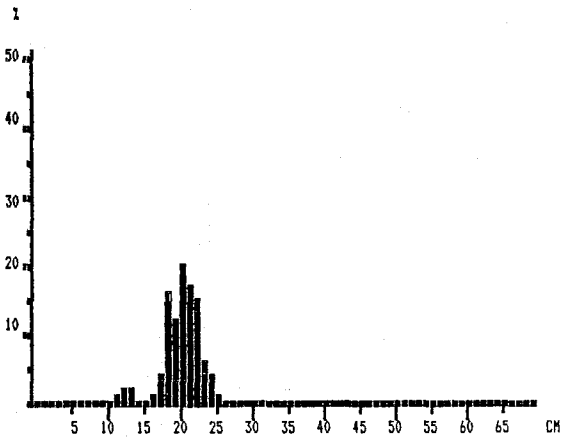
Selene dorsalis
GUINEA CRUISE NO.1

Pooled sample (simple adding)
MEAN LENGTH = 17.39cm N= 236
NUMBER OF SUBSAMPLES : 5
SAMPLES FOUND BETWEEN ST. NO. 11 AND 68.
SAMPLES SEARCHED BETWEEN ST. NO. 1 AND 68 .



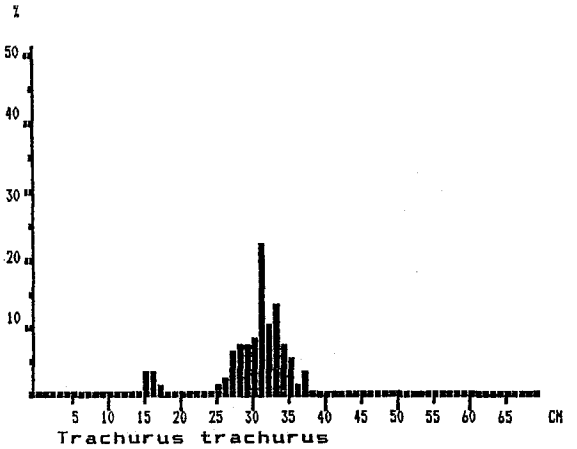
Trachurus trachurus
AGADIR - C.JUBY CRUISE NO.2

Pooled sample (simple adding)
MEAN LENGTH = 18.41cm N= 525
NUMBER OF SUBSAMPLES : 7
SAMPLES FOUND BETWEEN ST. NO. 202 AND 218.
SAMPLES SEARCHED BETWEEN ST. NO. 197 AND 218 .



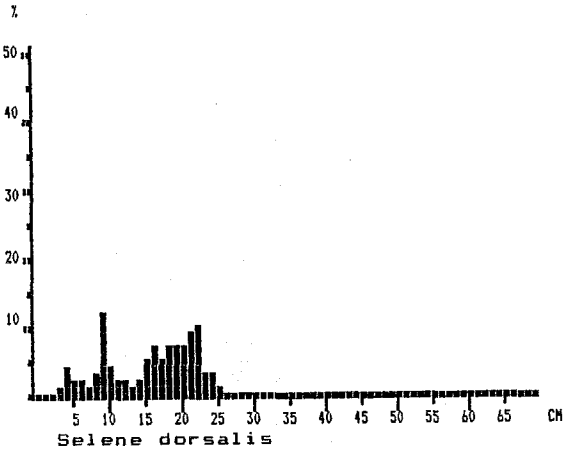
Selene dorsalis
GAMBIA CRUISE NO.1

Pooled sample (simple adding)
MEAN LENGTH = 19.92cm N= 111
NUMBER OF SUBSAMPLES : 6
SAMPLES FOUND BETWEEN ST. NO. 122 AND 134.
SAMPLES SEARCHED BETWEEN ST. NO. 119 AND 142 .



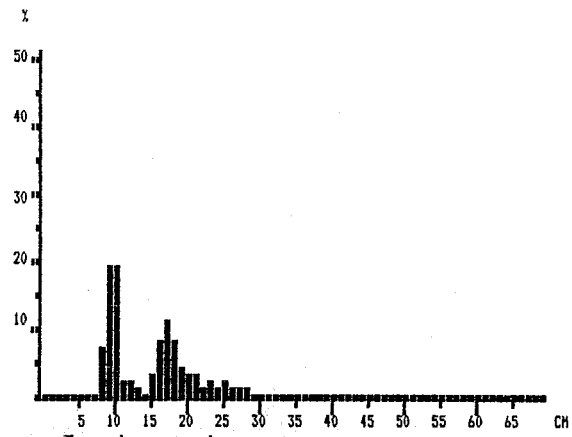
Trachurus trachurus
MAURITANIA CRUISE NO.2

Pooled sample (simple adding)
MEAN LENGTH = 29.94cm N= 87
NUMBER OF SUBSAMPLES : 2
SAMPLES FOUND BETWEEN ST. NO. 313 AND 319.
SAMPLES SEARCHED BETWEEN ST. NO. 303 AND 321 .



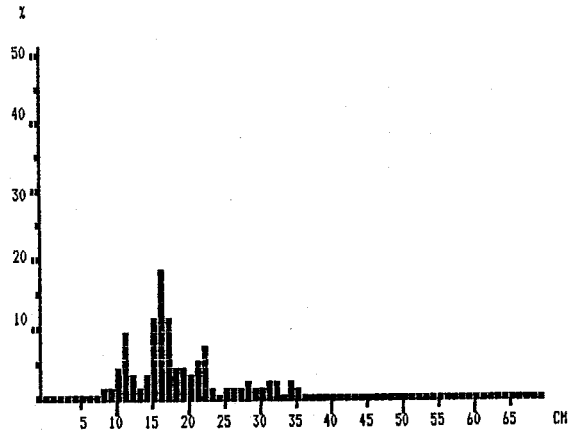
Selene dorsalis
SENEGAL CRUISE NO.1

Pooled sample (simple adding)
MEAN LENGTH = 15.58cm N= 429
NUMBER OF SUBSAMPLES : 18
SAMPLES FOUND BETWEEN ST. NO. 69 AND 96.
SAMPLES SEARCHED BETWEEN ST. NO. 69 AND 96 .



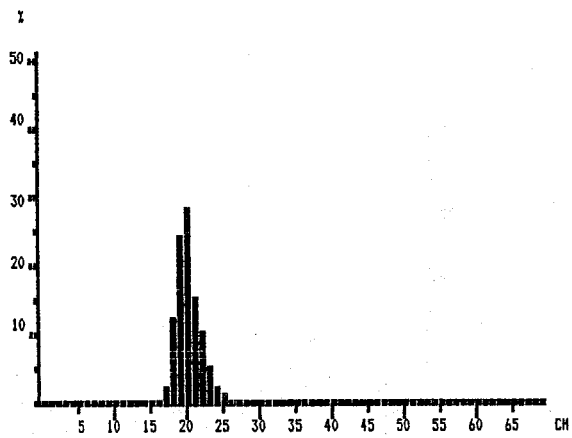
Trachurus trecae
SENEGAL CRUISE NO.1

Pooled sample (simple adding)
MEAN LENGTH = 14.23cm N= 465
NUMBER OF SUBSAMPLES : 4
SAMPLES FOUND BETWEEN ST. NO. 74 AND 78.
SAMPLES SEARCHED BETWEEN ST. NO. 69 AND 96 .



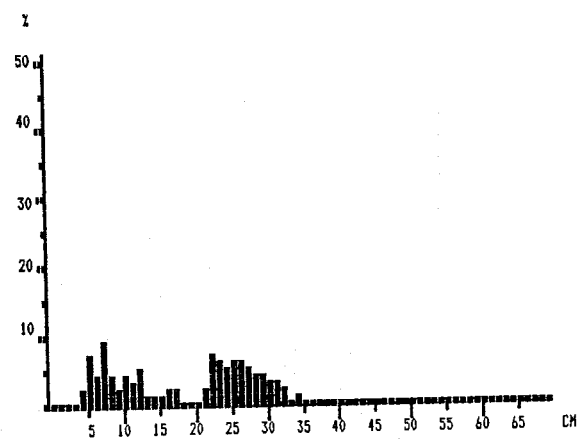
Trachurus trecae
MAURITANIA CRUISE NO.1

Pooled sample (simple adding)
MEAN LENGTH = 18.18cm N= 521
NUMBER OF SUBSAMPLES : 6
SAMPLES FOUND BETWEEN ST. NO. 144 AND 151.
SAMPLES SEARCHED BETWEEN ST. NO. 143 AND 152 .



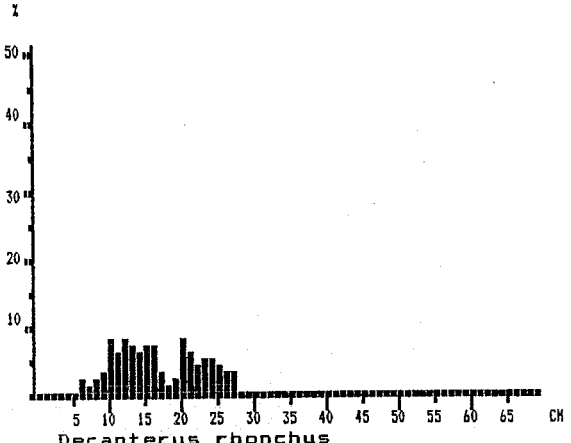
Trachurus trecae
SENEGAL CRUISE NO.2

Pooled sample (simple adding)
MEAN LENGTH = 20.12cm N= 846
NUMBER OF SUBSAMPLES : 10
SAMPLES FOUND BETWEEN ST. NO. 285 AND 299.
SAMPLES SEARCHED BETWEEN ST. NO. 285 AND 302 .



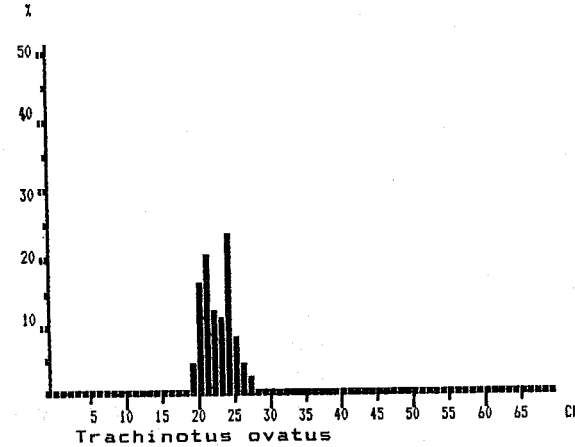
Trachurus trecae
MAURITANIA CRUISE NO.2

Pooled sample (simple adding)
MEAN LENGTH = 18.31cm N= 1026
NUMBER OF SUBSAMPLES : 11
SAMPLES FOUND BETWEEN ST. NO. 303 AND 319.
SAMPLES SEARCHED BETWEEN ST. NO. 303 AND 321 .



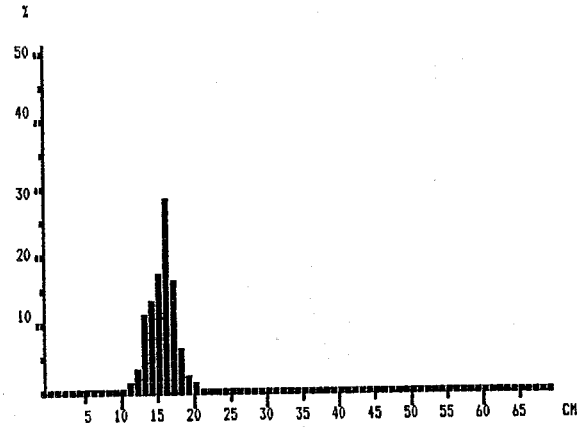
Decapterus rhonchus
GUINEA CRUISE NO.1

Pooled sample (simple adding)
MEAN LENGTH = 16.40cm N= 779
NUMBER OF SUBSAMPLES : 20
SAMPLES FOUND BETWEEN ST. NO. 3 AND 68.
SAMPLES SEARCHED BETWEEN ST. NO. 1 AND 68 .



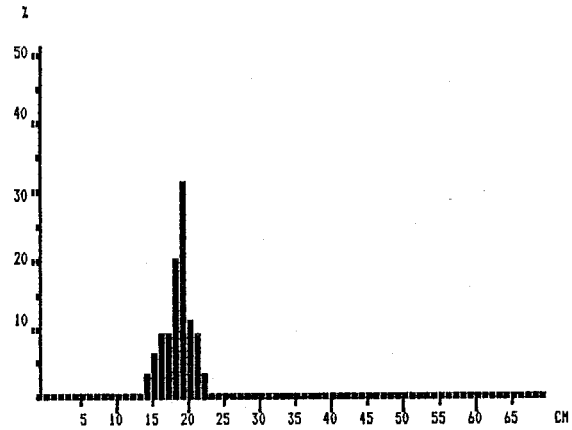
Trachinotus ovatus
SENEGAL CRUISE NO.1

Pooled sample (simple adding)
MEAN LENGTH = 22.41cm N= 93
NUMBER OF SUBSAMPLES : 4
SAMPLES FOUND BETWEEN ST. NO. 72 AND 80.
SAMPLES SEARCHED BETWEEN ST. NO. 69 AND 96 .



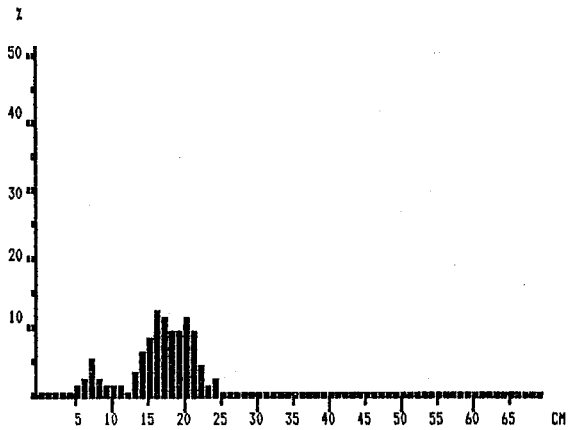
Chloroscombrus chrysurus
GUINEA CRUISE NO.1

Pooled sample (simple adding)
MEAN LENGTH = 15.93cm N= 816
NUMBER OF SUBSAMPLES : 11
SAMPLES FOUND BETWEEN ST. NO. 10 AND 68.
SAMPLES SEARCHED BETWEEN ST. NO. 1 AND 68 .



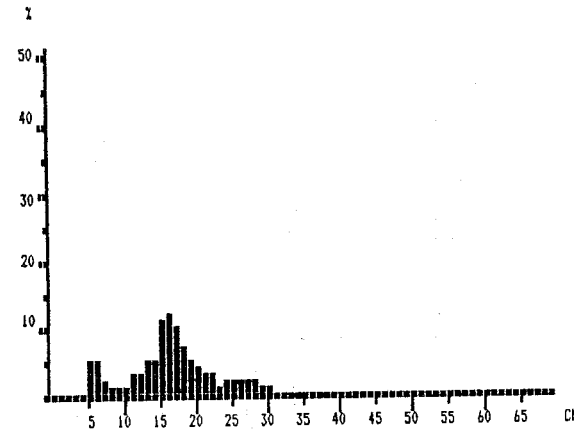
Chloroscombrus chrysurus
OFF BISSAGOS ISLANDS

Pooled sample (simple adding)
MEAN LENGTH = 18.37cm N= 35
NUMBER OF SUBSAMPLES : 4
SAMPLES FOUND BETWEEN ST. NO. 98 AND 117.
SAMPLES SEARCHED BETWEEN ST. NO. 97 AND 118 .



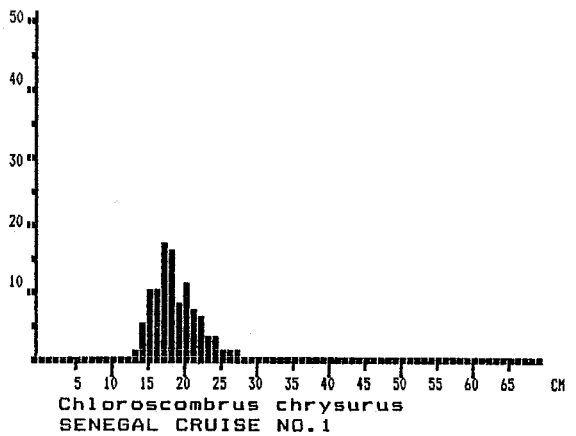
Chloroscombrus chrysurus
GAMBIA CRUISE NO.1

Pooled sample (simple adding)
MEAN LENGTH = 16.34cm N= 268
NUMBER OF SUBSAMPLES : 6
SAMPLES FOUND BETWEEN ST. NO. 119 AND 133.
SAMPLES SEARCHED BETWEEN ST. NO. 119 AND 142 .



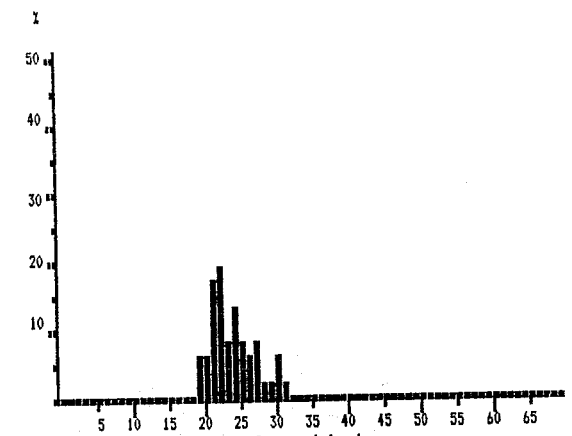
Sparus caeruleostictus
GUINEA CRUISE NO.1

Pooled sample (simple adding)
MEAN LENGTH = 16.46cm N= 810
NUMBER OF SUBSAMPLES : 26
SAMPLES FOUND BETWEEN ST. NO. 6 AND 57.
SAMPLES SEARCHED BETWEEN ST. NO. 1 AND 68 .



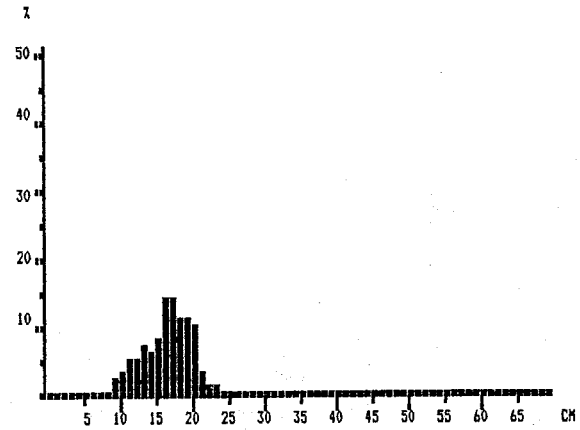
Chloroscombrus chrysurus
SENEGAL CRUISE NO.1

Pooled sample (simple adding)
MEAN LENGTH = 18.38cm N= 1336
NUMBER OF SUBSAMPLES : 20
SAMPLES FOUND BETWEEN ST. NO. 71 AND 96.
SAMPLES SEARCHED BETWEEN ST. NO. 69 AND 96 .



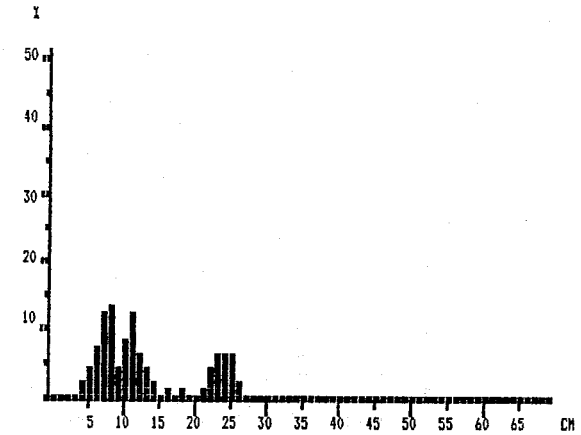
Sparus caeruleostictus
GAMBIA CRUISE NO.1

Pooled sample (simple adding)
MEAN LENGTH = 23.58cm N= 53
NUMBER OF SUBSAMPLES : 4
SAMPLES FOUND BETWEEN ST. NO. 128 AND 136.
SAMPLES SEARCHED BETWEEN ST. NO. 119 AND 142 .



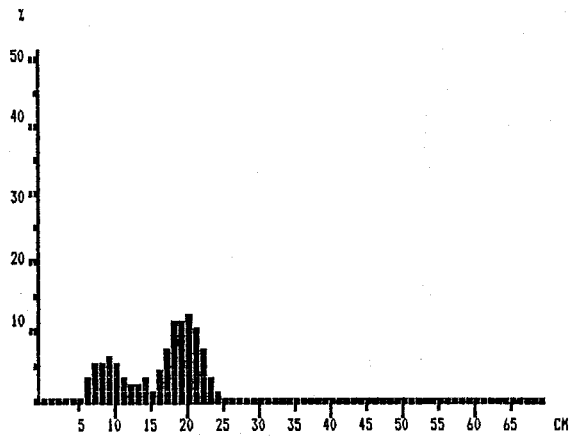
Pagellus bellottii
GUINEA CRUISE NO.1

Pooled sample (simple adding)
MEAN LENGTH = 16.18cm N= 1191
NUMBER OF SUBSAMPLES : 21
SAMPLES FOUND BETWEEN ST. NO. 7 AND 67.
SAMPLES SEARCHED BETWEEN ST. NO. 1 AND 68 .



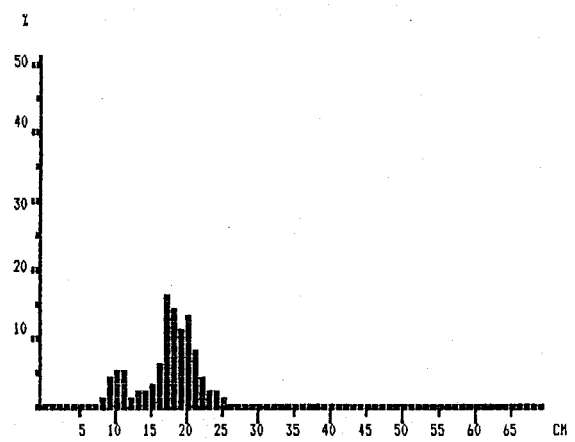
Pagellus bellottii
MAURITANIA CRUISE NO.2

Pooled sample (simple adding)
MEAN LENGTH = 12.75cm N= 370
NUMBER OF SUBSAMPLES : 5
SAMPLES FOUND BETWEEN ST. NO. 309 AND 317.
SAMPLES SEARCHED BETWEEN ST. NO. 303 AND 321 .



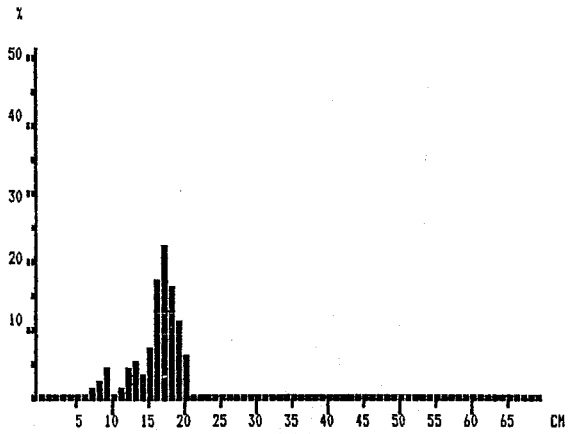
Pagellus bellottii
GAMBIA CRUISE NO.1

Pooled sample (simple adding)
MEAN LENGTH = 16.13cm N= 583
NUMBER OF SUBSAMPLES : 10
SAMPLES FOUND BETWEEN ST. NO. 129 AND 142.
SAMPLES SEARCHED BETWEEN ST. NO. 119 AND 142 .



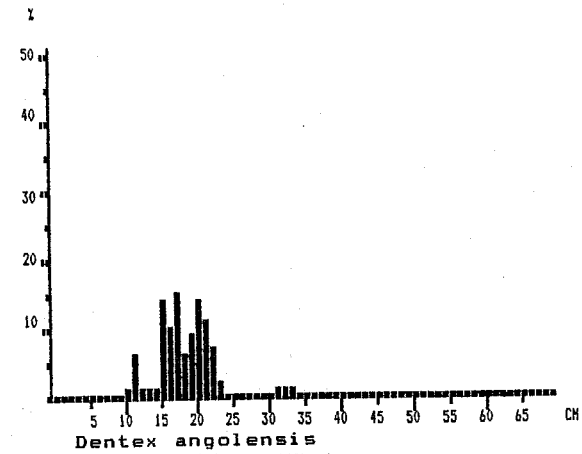
Pagellus bellottii
SENEGAL CRUISE NO.2

Pooled sample (simple adding)
MEAN LENGTH = 17.33cm N= 367
NUMBER OF SUBSAMPLES : 5
SAMPLES FOUND BETWEEN ST. NO. 285 AND 296.
SAMPLES SEARCHED BETWEEN ST. NO. 285 AND 302 .



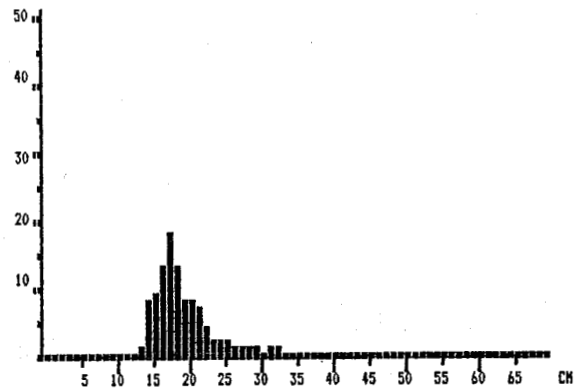
Pagellus bellottii
OFF BISSAGOS ISLANDS

Pooled sample (simple adding)
MEAN LENGTH = 16.06cm N= 249
NUMBER OF SUBSAMPLES : 7
SAMPLES FOUND BETWEEN ST. NO. 97 AND 110.
SAMPLES SEARCHED BETWEEN ST. NO. 97 AND 118 .



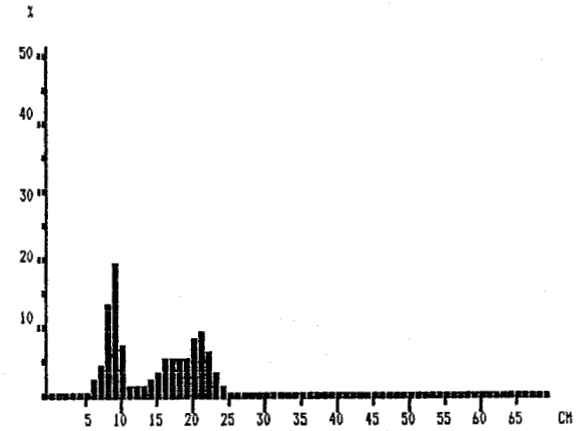
Dentex angolensis
GUINEA CRUISE NO.1

Pooled sample (simple adding)
MEAN LENGTH = 18.05cm N= 156
NUMBER OF SUBSAMPLES : 3
SAMPLES FOUND BETWEEN ST. NO. 7 AND 60.
SAMPLES SEARCHED BETWEEN ST. NO. 1 AND 68 .



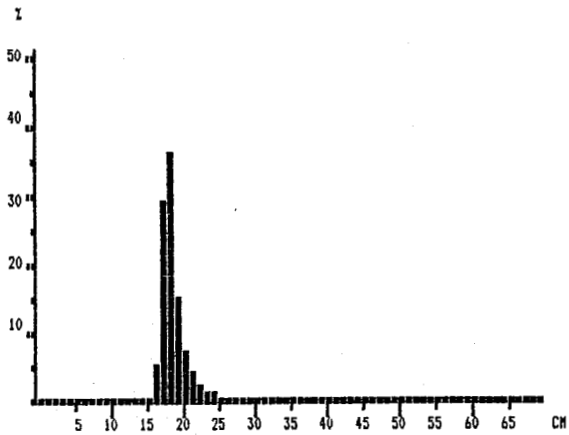
Balistes capriscus
GUINEA CRUISE NO.1

Pooled sample (simple adding)
MEAN LENGTH = 18.53cm N= 2550
NUMBER OF SUBSAMPLES : 49
SAMPLES FOUND BETWEEN ST. NO. 3 AND 68.
SAMPLES SEARCHED BETWEEN ST. NO. 1 AND 68 .



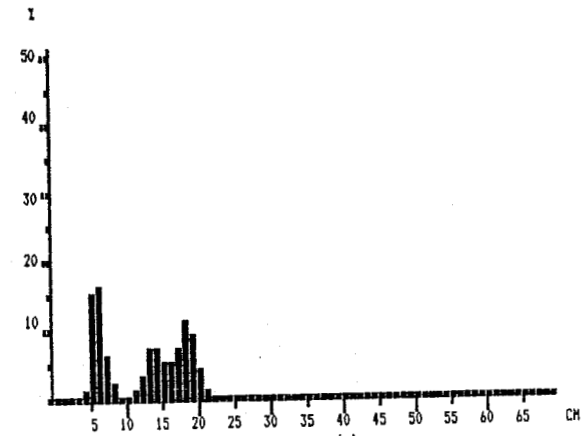
Brachydeuterus auritus
SENEGAL CRUISE NO.2

Pooled sample (simple adding)
MEAN LENGTH = 14.21cm N= 697
NUMBER OF SUBSAMPLES : 10
SAMPLES FOUND BETWEEN ST. NO. 285 AND 301.
SAMPLES SEARCHED BETWEEN ST. NO. 285 AND 302 .



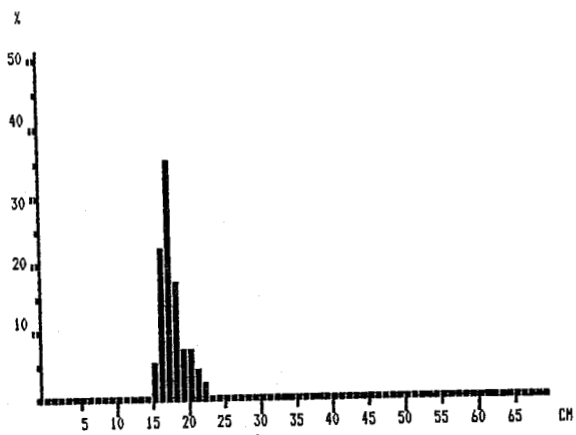
Balistes capriscus
GAMBIA CRUISE NO.2

Pooled sample (simple adding)
MEAN LENGTH = 18.19cm N= 463
NUMBER OF SUBSAMPLES : 6
SAMPLES FOUND BETWEEN ST. NO. 246 AND 253.
SAMPLES SEARCHED BETWEEN ST. NO. 246 AND 261 .



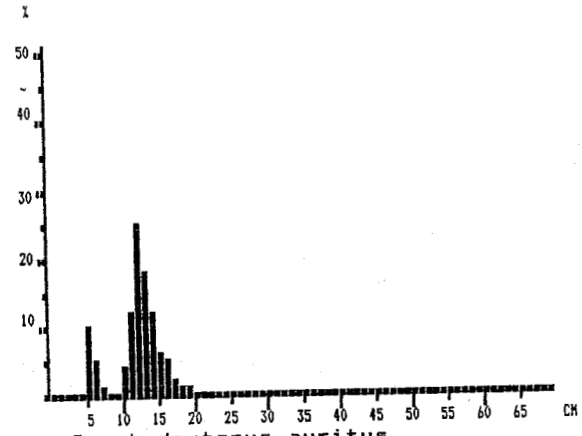
Brachydeuterus auritus
GAMBIA CRUISE NO.1

Pooled sample (simple adding)
MEAN LENGTH = 12.06cm N= 571
NUMBER OF SUBSAMPLES : 6
SAMPLES FOUND BETWEEN ST. NO. 121 AND 133.
SAMPLES SEARCHED BETWEEN ST. NO. 119 AND 142 .



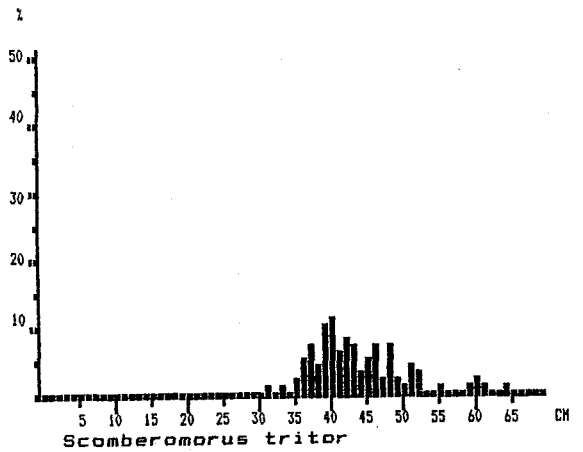
Balistes capriscus
OFF BISSAGOS ISLANDS

Pooled sample (simple adding)
MEAN LENGTH = 17.57cm N= 505
NUMBER OF SUBSAMPLES : 5
SAMPLES FOUND BETWEEN ST. NO. 98 AND 109.
SAMPLES SEARCHED BETWEEN ST. NO. 97 AND 118 .



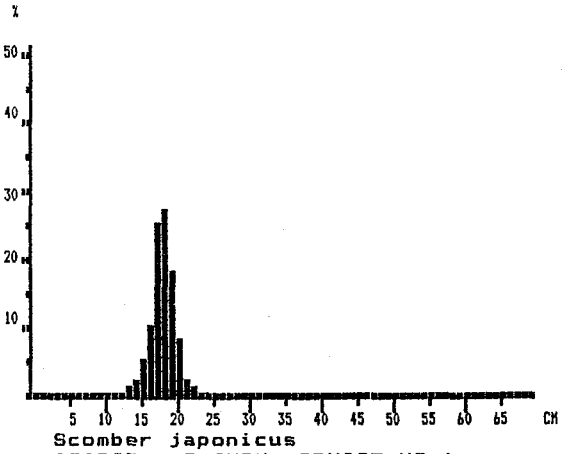
Brachydeuterus auritus
OFF BISSAGOS ISLANDS

Pooled sample (simple adding)
MEAN LENGTH = 11.71cm N= 530
NUMBER OF SUBSAMPLES : 8
SAMPLES FOUND BETWEEN ST. NO. 110 AND 118.
SAMPLES SEARCHED BETWEEN ST. NO. 97 AND 118 .



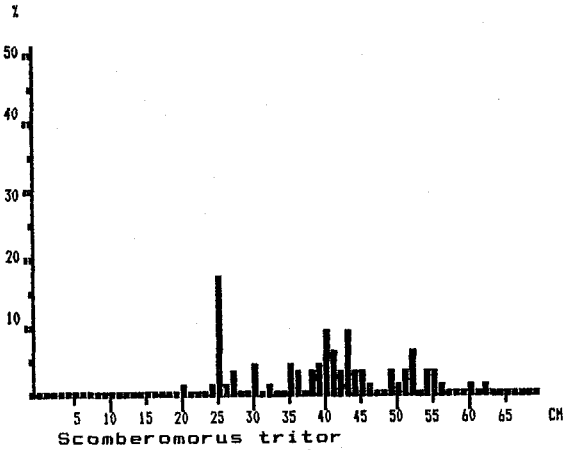
Scomberomorus tritor
GUINEA CRUISE NO.1

Pooled sample (simple adding)
MEAN LENGTH = 43.26cm N= 107
NUMBER OF SUBSAMPLES : 18
SAMPLES FOUND BETWEEN ST. NO. 11 AND 68.
SAMPLES SEARCHED BETWEEN ST. NO. 1 AND 68 .



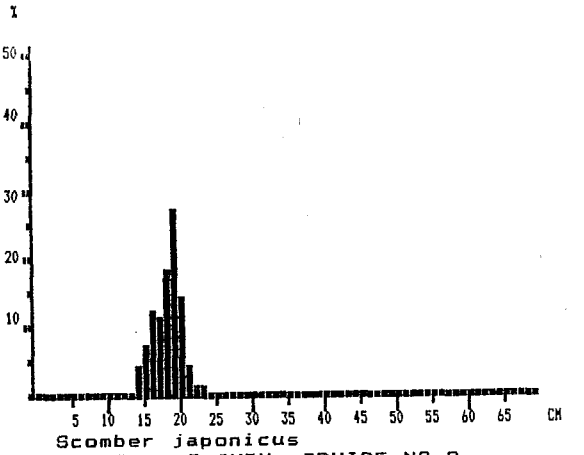
Scomber japonicus
AGADIR - C.JUBY CRUISE NO.1

Pooled sample (simple adding)
MEAN LENGTH = 17.73cm N= 1580
NUMBER OF SUBSAMPLES : 27
SAMPLES FOUND BETWEEN ST. NO. 154 AND 196.
SAMPLES SEARCHED BETWEEN ST. NO. 153 AND 196 .



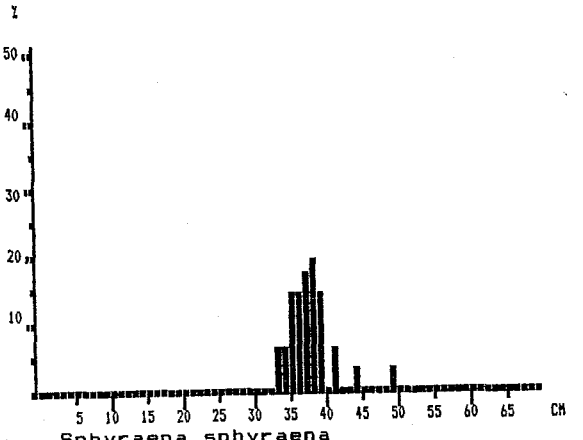
Scomberomorus tritor
GAMBIA CRUISE NO.1

Pooled sample (simple adding)
MEAN LENGTH = 39.14cm N= 70
NUMBER OF SUBSAMPLES : 7
SAMPLES FOUND BETWEEN ST. NO. 119 AND 133.
SAMPLES SEARCHED BETWEEN ST. NO. 119 AND 142 .



Scomber japonicus
AGADIR - C.JUBY CRUISE NO.2

Pooled sample (simple adding)
MEAN LENGTH = 18.10cm N= 779
NUMBER OF SUBSAMPLES : 13
SAMPLES FOUND BETWEEN ST. NO. 199 AND 218.
SAMPLES SEARCHED BETWEEN ST. NO. 197 AND 218 .



Sphyraena sphyraena
SENEGAL CRUISE NO.1

Pooled sample (simple adding)
MEAN LENGTH = 37.42cm N= 36
NUMBER OF SUBSAMPLES : 2
SAMPLES FOUND BETWEEN ST. NO. 70 AND 75.
SAMPLES SEARCHED BETWEEN ST. NO. 69 AND 96 .