

**SURVEY OF THE PELAGIC FISH RESOURCES OFF
NORTH WEST AFRICA**

Cruise Report No 9/96

Part I SENEGAL - THE GAMBIA

1 - 9 November 1996

**Centre de Recherches Océanographiques de Dakar-Thiaroy
Dakar, Senegal**

**Institute of Marine Research
Bergen, Norway**

**Department of Fisheries
Banjul, The Gambia**

CRUISE REPORTS 'DR FRIDTJOF NANSEN'

**SURVEY OF THE PELAGIC FISH RESOURCES OFF
NORTH WEST AFRICA**

Cruise Report No 9/96

**Part I
SENEGAL - THE GAMBIA
1 - 9 November 1996**

by

R. Toresen

Institute of Marine Research
P.O.Box 1870 Nordnes
N-5024 Bergen, Norway

**Institute of Marine Research
Bergen, 1996**

TABLE OF CONTENTS

CHAPTER 1	INTRODUCTION.....	1
1.1	Objectives of the cruise.....	1
1.2	Participation.....	1
1.3	Narrative.....	2
1.4	Methods.....	2
CHAPTER 2	SURVEY RESULTS.....	6
2.1	Hydrography.....	6
2.2	The Casamance shelf.....	8
2.3	The Gambia shelf.....	11
2.4	The Gambia border - Cape Vert.....	11
2.5	Cape Vert - St. Louis.....	12
CHAPTER 3	OVERVIEW AND SUMMARY OF RESULTS.....	13
Annex I	Pooled length distributions by species and regions	
Annex II	Stock length distributions by numbers and weight	
Annex III	Records of fishing stations	
Annex IV	Description of instruments and fishing gear used	

CHAPTER 1 INTRODUCTION

1.1 OBJECTIVES OF THE CRUISE

The general objectives were to estimate the biomass and map the distribution of small pelagic fish stocks off NW Africa (Morocco, Mauritania, Senegal and The Gambia) by hydro-acoustic methods and describe the hydrographic conditions there over a period of 50 days, in November-December 1996. For Senegal and The Gambia the agreed objectives were:

- To map the distribution and estimate the biomass for the main small pelagic fish using hydroacoustic methods. The species of interest are: sardinella *Sardinella aurita*, *S. maderensis*, horse mackerel *Trachurus trecae*, false scad *Decapterus rhonchus*, and anchovy *Engraulis encrasicolus*.
- To identify acoustic targets by midwater and bottom trawl sampling and process the catches by recording weight and number by species. For the target species, length frequencies will be taken to correct the acoustic densities and to describe the size distribution of the target fish populations.
- To occupy standard hydrographical transects for temperature, salinity and oxygen at about 13°35' N and 14°50' N.

The time allocated for this part of the survey, off Senegal and The Gambia, was 9 days.

1.2 PARTICIPATION

Members of the scientific teams were:

Centre de Recherches Océanographiques de Dakar-Thiaroy, Senegal:
Ibrahima SOW and Mor SYLLA

Senegalese Navy:
Ahmadou SOW

Department of Fisheries, The Gambia:
M Asberr N. MENDY and Malick SAMBA

Centre National de Recherches Océanographiques et des Pêches, Mauritania:
Mohammed M'Barek Ould SOUEILEM (7-16/11) and Dah Ould ALIOUNE (7-16/11)

Institute of Marine Research , Norway:
Reidar TORESEN, Oddgeir ALVHEIM, Guillermo BURGOS, Terje HAUGLAND and Tore MØRK.

1.3 NARRATIVE

The course tracks with the fishing and hydrographical stations are shown in Figure 1.

The survey started off Casamance on November 2 with systematic parallel course tracks spaced about 10 NM apart. To cover the whole distribution area of pelagic fish, the shelf was covered from the 10 m isobath and offshore to beyond the 200 m isobath. Trawling was done regularly, either for confirming registrations or 'blindly' for checking if fish were mixed with the plankton in the upper layers of the water column. In the latter case, pelagic trawl with floats was often used. The bottom trawl with floats was used for sampling the pelagic fish in very shallow waters (depth less than 25m). The shelf was covered up to Cape Vert before a call was made on Dakar on November 7, to embark the participants from Mauritania.

The shelf from Cape Vert to St. Louis was surveyed on November 7 to 9.

The hydrographic profile off The Gambia was occupied on November 4 and that off Cape Vert on November 7.

1.4 METHODS

All catches were sampled for composition by weight and numbers of each species. The length frequency distributions of the target species were taken in almost all the stations where they were present. Total fish length was measured. The complete records of fishing stations are shown in Annex III.

The surface temperature and meteorological data were logged automatically and recorded with position and bottom depth every nautical mile sailed.

Hydrographic profiles were collected with a CTD sonde and temperature, salinity, and pressure (depth) were logged by the Seabird Software. From these data series, records were selected from standard depths and presented in figures.

The acoustic biomass estimates were based on the integration technique. The Bergen Integrator (BEI) was used for analysis and allocation of S_A values. This system does not underestimate dense schools close to the bottom as some times may have happened with the EK500 used in the 1992 surveys.

The following target strength (TS) function was applied to convert S_A -values (mean integrator value for a given species or group of species in a specified area) to number of fish:

$$TS = 20 \log L - 72 \text{ dB}$$

or in the form

$$C_F = 1.26 \cdot 10^6 \cdot L^{-2}$$

where L is total length and C_F is the fish conversion factor. The following formula was used to calculate the density of fish in numbers/ NM^2 in each length group:

$$\rho_i = S_A \cdot \frac{P_i}{\sum_{i=1}^n \frac{P_i}{C_{Fi}}}$$

where

ρ_i = density of fish in length group i

S_A = mean integrator value

p_i = proportion of fish in length group i

C_{Fi} = fish conversion factor for length group i

These densities are then converted to weights (biomass) by applying the condition factor for the species. Absolute biomasses are obtained by multiplying the densities by the size of the area of distribution, usually obtained with a digital planimeter.

The integrator outputs were split on fish groups using a combination of behaviour pattern as deduced from echo diagrams, the BEI analysis and catch composition. The following groups were used for Senegal: sardinellas, carangids and associated species which include chub mackerel, hairtails and barracudas. Catch compositions formed the basis for a further separation of biomass by species.

Annex IV gives a description of the instruments and the fishing gear used. All data on fishing stations and fish length sampling were made available to the participants on diskettes.

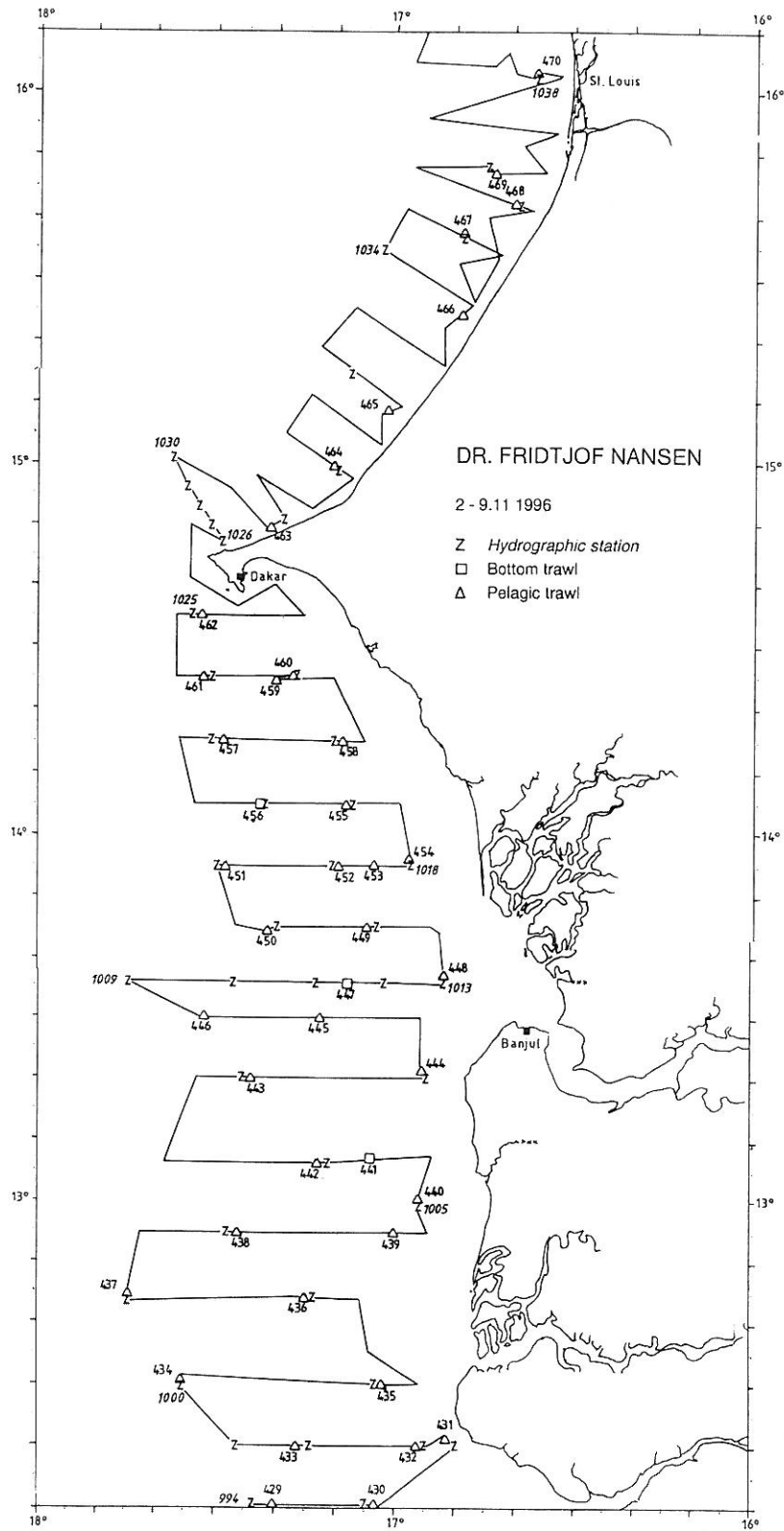
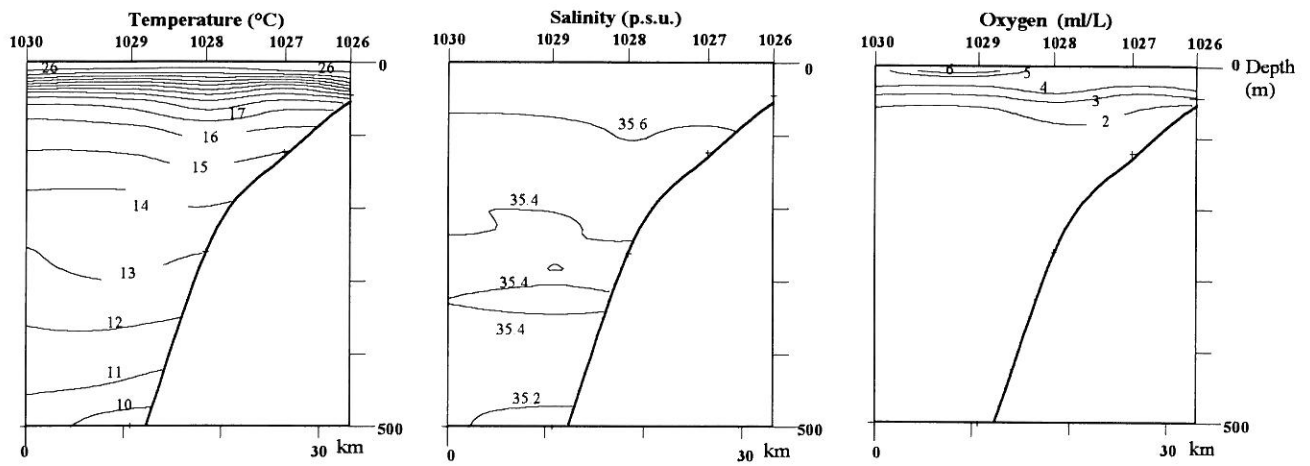


Figure 1 Course tracks with fishing and hydrographic stations; Casamance to St. Louis

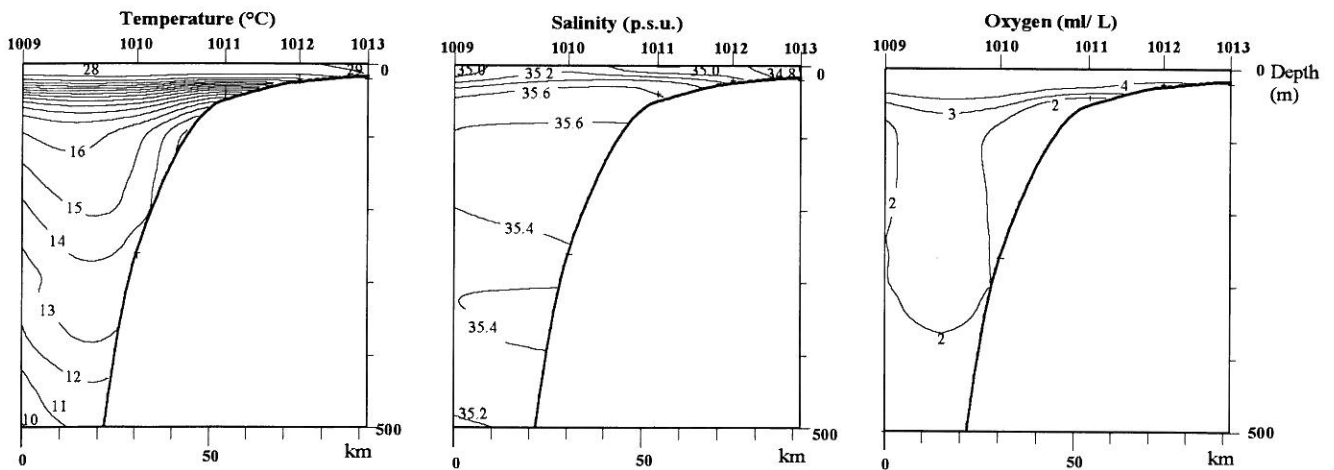
CHAPTER 2 SURVEY RESULTS

2.1 HYDROGRAPHY

Figure 2 shows the distribution of temperature, salinity and oxygen in the two profiles and Figure 3 the sea surface temperature at 5 m of depth.



CAPE VERT 4.11 1996



THE GAMBIA - WEST 7.11 1996

Figure 2 Hydrographic profiles with distribution of temperature, salinity and oxygen

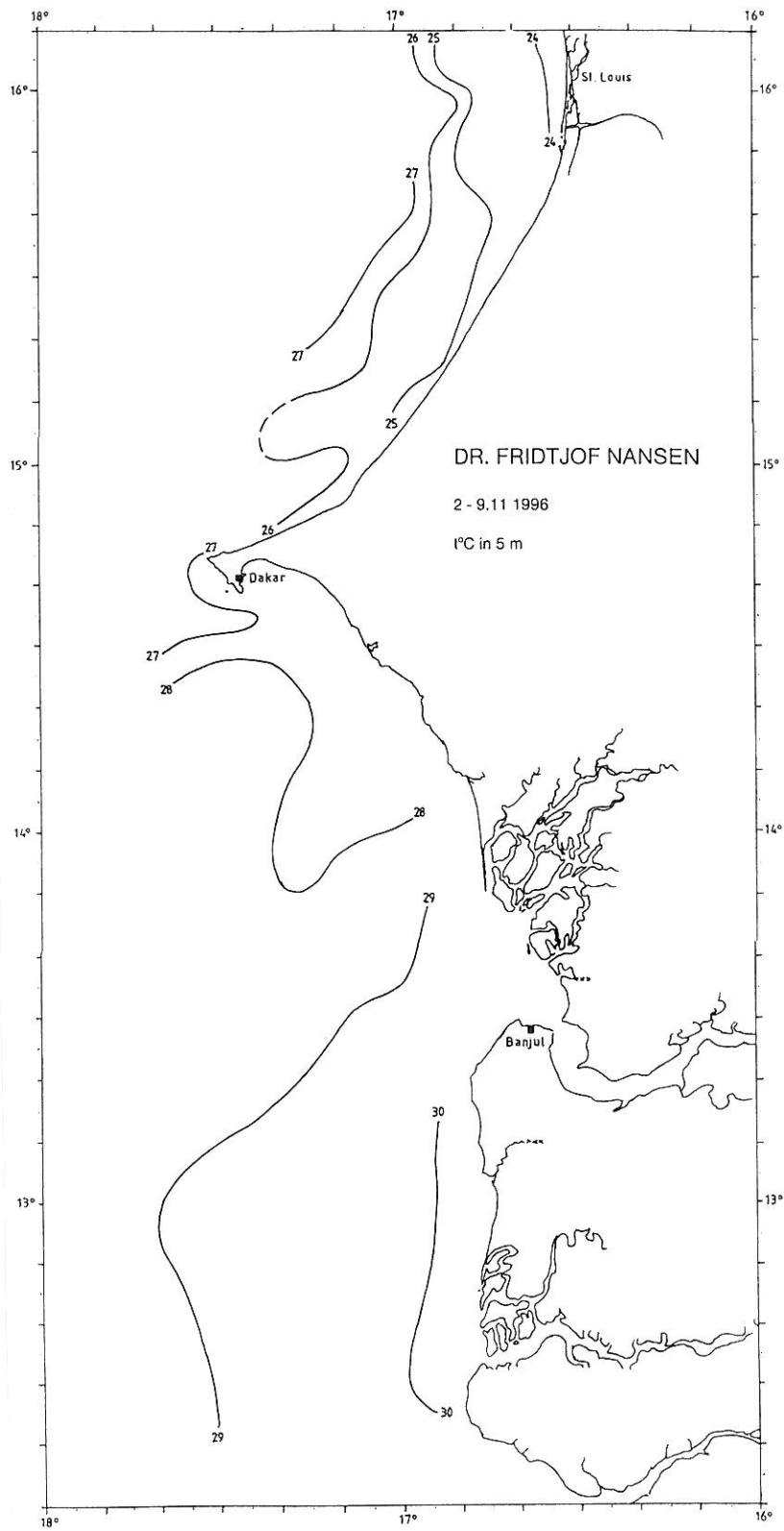


Figure 3 Sea surface temperature; Casamance to St. Louis

The distribution of surface temperature and the profile The Gambia-West shows that there was a stable surface layer with increasing temperature, from 28°C to 30°C towards the shore over the whole shelf south of 13°50' N. Over the shelf south of Dakar the surface temperature decreased towards the coast with 27°C over the inner 20NM distance from shore. North of Cape Vert this trend of decreasing temperature towards the shore was more pronounced, with a relatively sharp decline from 27°C over the outer and mid shelf to 24°C close to the shore. Near St. Louis the isolines of the cooler inshore water turned seawards indicating the approach of the front between the temperate northern waters and the tropical waters in the south. The overall temperature regime this year was about 1 degree higher than the one observed last year.

2.2 THE CASAMANCE SHELF

Figures 4 and 5 show the distribution of the main groups of pelagic fish by contoured acoustic densities for the whole shelf of Senegal and The Gambia.

Off the Casamance coast there was a school area of sardinella of medium and low density in shallow waters, mostly inside the 30 m depth line (Figure 4). The samples from this distribution were predominantly *Sardinella maderensis*. The modal size was 22 cm (total length). The size composition is shown in Annex I and the stock length compositions by numbers and weight in Annex II. The biomass was estimated at 133 000 tonnes (Table 1).

Other pelagic fish was found in various densities, and over a much wider area than the sardinellas, see Figure 5. The trawl samples indicated that these consisted of bumper, lookdown, barracudas and hairtails, with the bumper as the dominating species. The estimated biomass of this group of fish was 214 000 tonnes.

Table 1. Casamance. Biomass estimates of pelagic fish, 1 000 tonnes.

Flat sardinella	Round sardinella	Carangids etc.
115	18	214

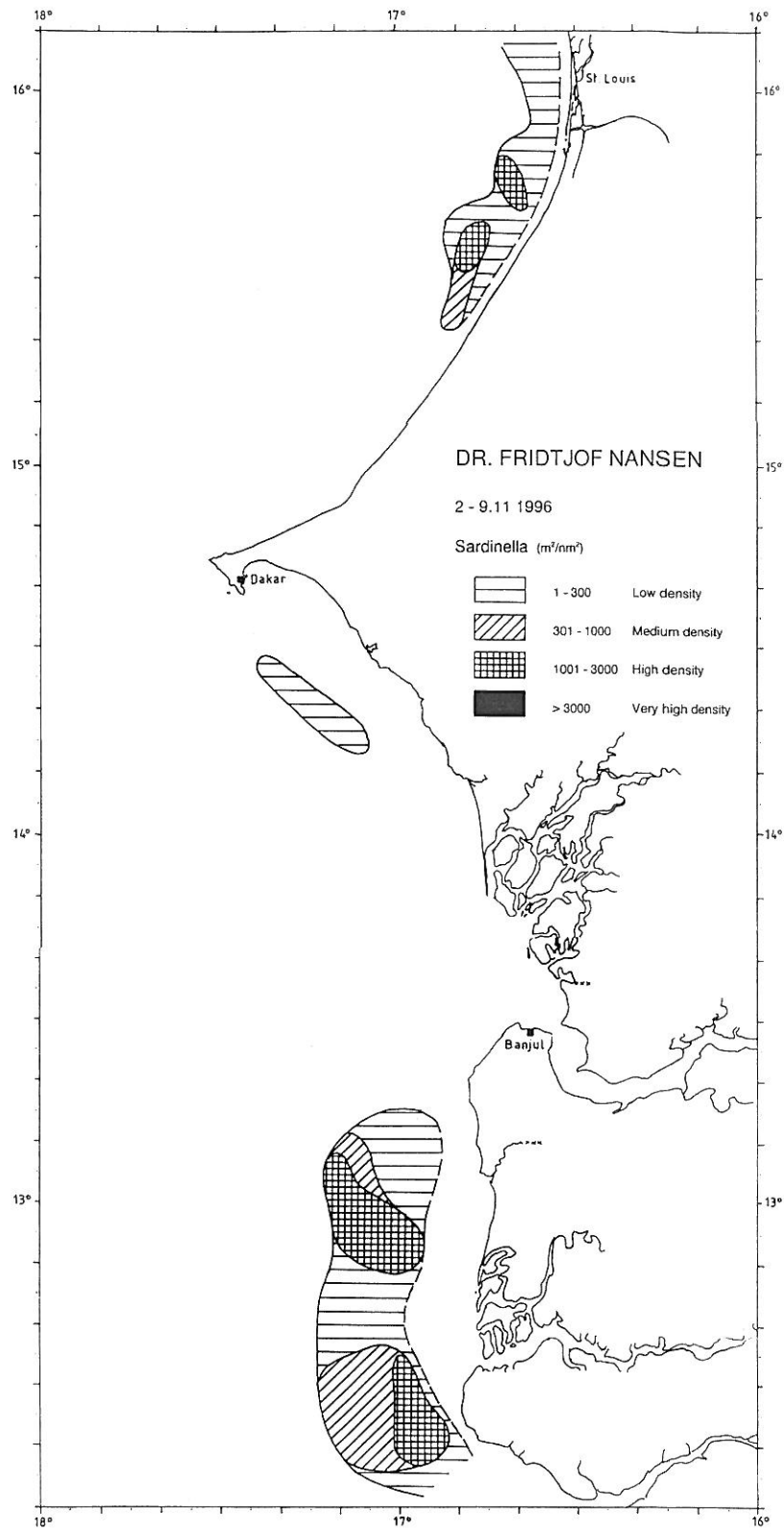


Figure 4 Distribution of sardinellas; Casamance to St. Louis

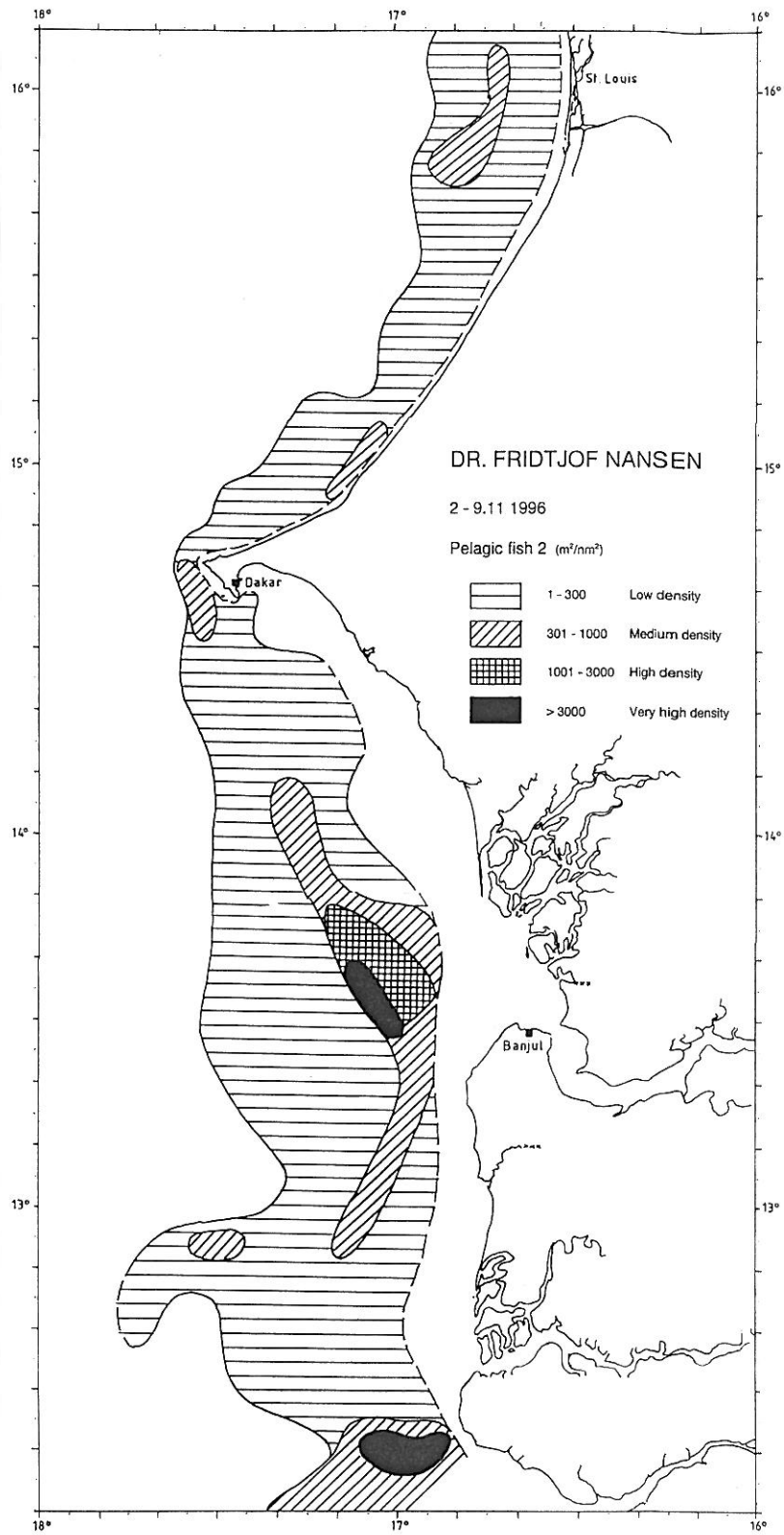


Figure 5 Distribution of carangids and associated species; Casamance to St. Louis.

2.3 THE GAMBIAN SHELF

The school area of sardinella found inshore off Casamance continued northwards off The Gambia only in the southernmost part (Figure 4). The samples showed again a dominance of flat sardinella (*Sardinella maderensis*) with a small proportion of round sardinella (*S. aurita*). The pooled length composition of the flat sardinella had a mode of 22 cm, see Annex I. The stock length compositions by numbers and weight are shown in Annex II.

Table 2 shows that the biomass estimates of the pelagic fish included 28 000 tonnes of sardinellas, of which, 6 000 tonnes were round sardinella mostly from the offshore parts of the school area.

Carangids and associated species were found mainly on the offshore side of the sardinella school area (Figure 5).

Catches of this group consisted mainly of bumper, false scad and lookdown with small amounts of barracudas and hairtails. The biomass was estimated at 94 000 tonnes.

Table 2. The Gambia. Biomass estimates of pelagic fish, 1 000 tonnes.

Flat sardinella	Round sardinella	Carangids etc.
22	6	94

2.4 THE GAMBIAN BORDER - CAPE VERT

One school area of sardinella was found on this shelf (Figure 4). This school area was found south of Dakar with the highest densities between 25 and 40 m depth. Table 3 shows the biomass estimates for the two sardinella species that summed up to 12 000 tonnes. Round sardinella was dominant in this area.

Pooled length compositions of samples showed that the adult part of the flat sardinella had a modal length of 24 cm and the round sardinella had it of 26 cm, see Annex I. Stock size compositions by numbers and weight are shown in Annex II.

Also here, the carangids and associated pelagic fish were distributed over most of the area with the highest concentrations outside the Saloum River, see Figure 5. Again bumper was caught in most of the trawl samples, and false scad appeared with some high catch rates. It is notable that hardly

any horse mackerel *Trachurus trecae* was caught south of Dakar. The biomass of the carangids and associated pelagic fish was estimated at about 163 000 tonnes (Table 3).

Table 3. The Gambia border to Cape Vert. Biomass estimates of pelagic fish, 1 000 tonnes.

Flat sardinella	Round sardinella	Carangids etc.
1	11	163

2.5 CAPE VERT - ST. LOUIS

On this part of the shelf sardinellas were found in an inshore distribution, some 30 NM north of Cayar (at about 15° 20'N) and in an area towards and outside St. Louis (Figure 4). Fairly dense schools of both flat and round sardinella were found, mainly along the isobath of 30m. The samples showed a 60% dominance of flat sardinella with modal length at 26 cm for both species, see Annex I. The biomass of the sardinellas was estimated at 58 000 tonnes (Table 4).

Carangids and associated pelagic fish were mainly found on the offshore side of the sardinella distribution all the way from Cape Vert to St. Louis (Figure 5). The catches consisted also here of bumper and hairtails with some barracudas and a little false scad and chub mackerel (*Scomber japonicus*). The biomass estimate was 55 000 tonnes.

Table 4. Cape Verte to St. Louis. Biomass estimates of pelagic fish, 1 000 tonnes.

Flat sardinella	Round sardinella	Carangids etc.
36	22	55

CHAPTER 3 OVERVIEW AND SUMMARY OF RESULTS

The survey was conducted successfully in the period November 2 to November 10 with a course track of about 1 400 NM and 41 fishing stations.

The limits of the school areas found are thought to have been well determined and the areas adequately sampled.

The hydrographical data showed a stable surface layer for the whole shelf in the south, but with declining surface temperatures towards the coast from about Dakar northwards.

Pelagic fish

Sardinellas were found in three school areas along the inshore shelf (Figure 4). The highest densities were found in the area off Casamance. Flat sardinella was the dominant species. A second, rather small sardinella area consisting mainly of round sardinella was located south of Dakar in slightly deeper waters. The third area with the two sardinella species present in almost equal amounts was found inshore between Cayar and St. Louis.

The distribution of carangids and associated species formed a band along the coast mostly on the offshore side of the sardinella areas, but still on the inner shelf, mainly inside the isobath of 50 m (Figure 5). South of Cape Vert the catches of this group consisted of bumper, false scad, barracudas and hairtails. Horse mackerel was hardly present. The catches north of Cape Vert were also dominated by bumper with the additional presence of hairtails, lookdown and false scad as the most important species.

An overview of the estimates of biomass of the main groups of pelagic fish based on the echo integration data is shown in Table 5. The total biomass of sardinellas was thus 230 000 tonnes and of carangids and associated species about 526 000 tonnes.

Table 5. Summary of biomass estimates of pelagic fish, Senegal and The Gambia. 1 000 tonnes.

	Flat sardinella	Round sardinella	Carangids etc.
St. Louis-Cape Vert	36	22	55
Cape Vert-Gambia	1	11	163
Gambia	22	6	94
Casamance	115	18	214
Total	174	57	526

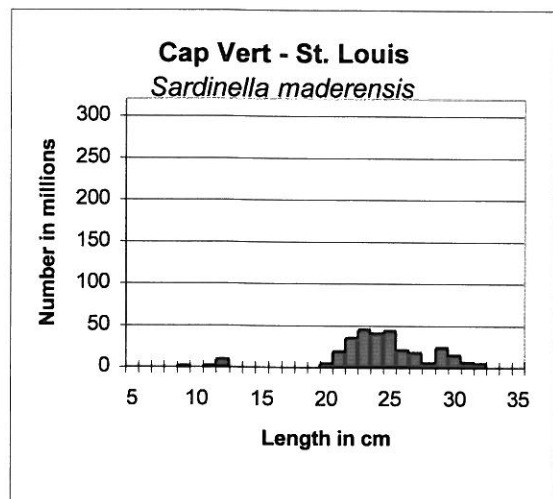
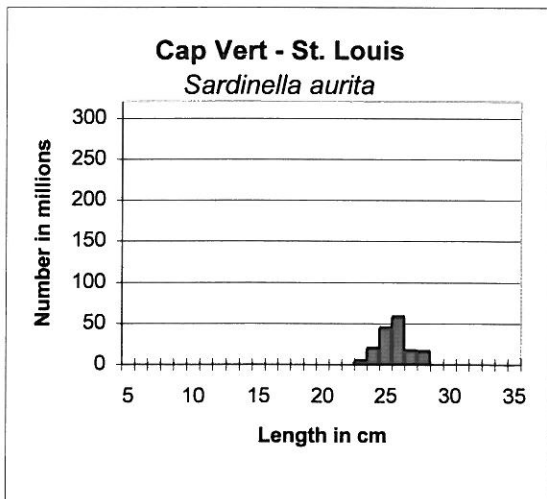
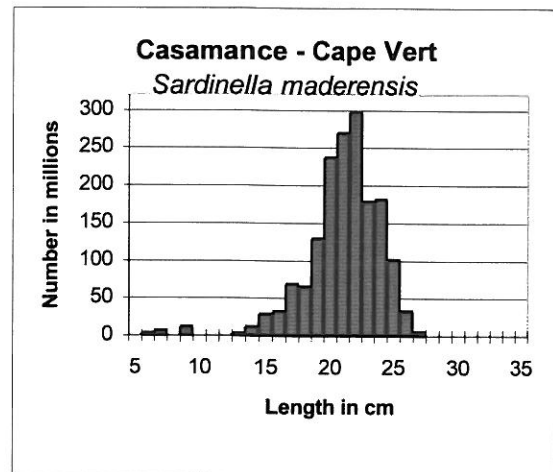
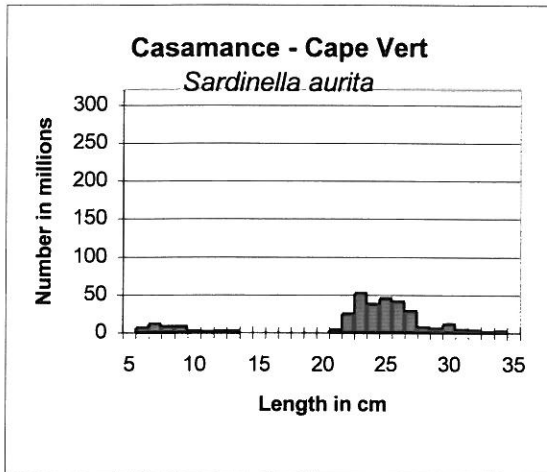
Table 6 lists biomass estimates of sardinellas and carangids and associated species from previous 'Dr. Fridtjof Nansen' surveys of this shelf region. Large-scale latitudinal movements of pelagic fish between West Sahara and Guinea Bissau are well known and November is still within the season of northern distribution. Compared with the Sept/81 and NovDec/86 surveys the estimate of 230 000 tonnes of sardinellas from the current survey is low. The carangid estimate of 526 000 tonnes is high compared to the previous autumn surveys.

Table 6. Biomass estimates from previous 'Dr Fridtjof Nansen' surveys of the Senegal-The Gambia shelf. 1 000 tonnes.

Survey:	Sardinellas	Carangids etc.
AprMay-81	210	570
Sept -81	360	*
FebMar-82	40	90
NovDec-86	330	170
FebMar-92	1 530	690
NovDec-95	760	220

* Not available

Annex I Pooled length distributions by species and regions



Annex II Stock length distribution by numbers and weight

Sardinella aurita

Length cm	N(Millions)						Biomass (1000 tonnes)					
	St. Louis- Cap Vert	Cap Vert- Saloum R	Saloum R- Gambia	Gambia	Casa- mance	TOTAL	St. Louis- Cap Vert	Cap Vert- Saloum R	Saloum R Gambia	Gambia	Casa- mance	TOTAL
5												
6		6.2				6.2		0.0				0.0
7		11.3				11.3		0.0				0.0
8		7.4				7.4		0.0				0.0
9		7.8				7.8		0.1				0.1
10		1.5				1.5		0.0				0.0
11		0.8				0.8		0.0				0.0
12		1.5				1.5		0.0				0.0
13		1.9				1.9		0.0				0.0
14		0.4				0.4		0.0				0.0
15												
16												
17												
18												
19												
20												
21				0.9	2.8	3.6				0.1	0.2	0.3
22		4.3		4.9	15.1	24.3		0.4		0.4	1.3	2.1
23	4.0	9.7		10.3	31.7	55.6	0.4	1.0		1.0	3.1	5.5
24	19.8	17.1		4.9	15.1	56.9	2.2	1.9		0.6	1.7	6.4
25	44.3	19.0		6.3	19.3	88.9	5.6	2.4		0.8	2.4	11.2
26	57.8	4.3		8.9	27.5	98.5	8.2	0.6		1.3	3.9	13.9
27	16.6	4.3		5.8	17.9	44.6	2.6	0.7		0.9	2.8	7.1
28	15.8	3.1		0.9	2.8	22.6	2.8	0.5		0.2	0.5	4.0
29		3.5		0.4	1.4	5.3		0.7		0.1	0.3	1.0
30		5.8		1.3	4.1	11.3		1.3		0.3	0.9	2.4
31		3.5				3.5		0.8				0.8
32		2.3				2.3		0.6				0.6
33		0.8				0.8		0.2				0.2
34				0.4	1.4	1.8				0.1	0.4	0.6
35												
TOTAL	158.3	116.5	0.0	45.2	139.0	459.0	21.8	11.3	0.0	5.7	17.6	56.3

Annex II Cont.

Sardinella maderensis

Length cm	N (Millions)					Biomass (1000 tonnes)						
	St. Louis- Cap Vert	Cap Vert- Saloum R	Saloum R- Gambia	Gambia	Casa- mance	TOTAL	St. Louis- Cap Vert	Cap Vert- Saloum R	Saloum R Gambia	Gambia	Casa- mance	TOTAL
5												
6					2.9	2.9						0.0
7					5.7	5.7						0.0
8												
9	0.7			3.2	7.6	11.4	0.0				0.1	0.1
10												
11	0.7					0.7	0.0					0.0
12	8.5					8.5	0.1					0.1
13					2.9	2.9					0.1	0.1
14					11.4	11.4					0.3	0.3
15				3.2	24.6	27.8				0.1	0.7	0.8
16					31.3	31.3					1.1	1.1
17					68.2	68.2					2.9	2.9
18				4.0	60.6	64.6				0.2	3.0	3.2
19				9.6	119.3	128.9				0.6	7.0	7.6
20	3.5			27.1	209.2	239.9	0.2			1.8	14.2	16.3
21	18.3			49.5	219.6	287.4	1.4			3.9	17.2	22.6
22	34.5			52.7	244.3	331.5	3.1			4.7	22.0	29.8
23	44.4	1.2		26.3	150.5	222.4	4.6	0.1		2.7	15.4	22.8
24	39.5	1.9		34.3	143.9	219.5	4.6	0.2		4.0	16.7	25.5
25	43.0	1.9		20.8	77.7	143.3	5.6	0.2		2.7	10.2	18.8
26	19.7			7.2	25.5	52.5	2.9			1.1	3.8	7.7
27	16.9			1.6	3.8	22.3	2.8			0.3	0.6	3.7
28	4.9					4.9	0.9					0.9
29	23.2					23.2	4.7					4.7
30	13.4					13.4	3.0					3.0
31	5.6					5.6	1.4					1.4
32	3.5					3.5	1.0					1.0
33												
34												
35												
TOTAL	280.4	4.9	0.0	239.4	1409.0	1933.7	36.3	0.6	0.0	22.1	115.3	174.3

Annex II Cont.

Round sardinella (*Sardinella aurita*)

SENEGAL - THE GAMBIA - MAURITANIA - MOROCCO

Length cm	Number in millions				Biomass in tonnes			
	Senegal	Mauritania	Morocco	TOTAL	Senegal	Mauritania	Morocco	TOTAL
5	0	0	0	0	0	0	0	0
6	6	0	0	6	13	0	0	13
7	11	0	0	11	36	0	0	36
8	7	0	0	7	34	0	0	34
9	8	0	0	8	51	0	0	51
10	2	0	0	2	14	0	0	14
11	1	0	0	1	9	0	0	9
12	2	0	0	2	23	0	0	23
13	2	0	0	2	36	0	0	36
14	0	0	0	0	9	0	0	9
15	0	0	0	0	0	0	0	0
16	0	0	0	0	0	0	0	0
17	0	0	0	0	0	0	0	0
18	0	0	0	0	0	0	0	0
19	0	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0	0
21	4	5	0	9	276	448	0	724
22	24	0	0	24	2107	0	0	2107
23	56	0	0	56	5485	0	0	5485
24	57	10	0	67	6364	1304	0	7669
25	89	42	1	131	11202	6295	82	17579
26	99	175	0	273	13938	29608	0	43546
27	45	279	0	324	7051	53033	0	60084
28	23	336	0	359	3975	71128	0	75102
29	5	204	8	217	1038	47873	1947	50857
30	11	44	6	61	2436	11271	1578	15284
31	3	45	45	93	830	12635	13204	26669
32	2	38	80	120	608	11606	25929	38142
33	1	112	230	344	223	38075	81418	119716
34	2	318	549	869	569	117539	212026	330135
35	0	238	812	1050	0	95792	341604	437396
36	0	95	509	604	0	41647	232446	274093
37	0	15	205	220	0	7131	101557	108688
38	0	0	27	27	0	0	14316	14316
39	0	0	7	7	0	0	4155	4155
40	0	0	0	0	0	0	0	0
Total	461	1955	2479	4895	56326	545385	1030262	1631973

Annex II Cont.

Flat sardinella (*Sardinella maderensis*)

SENEGAL - THE GAMBIA - MAURITANIA - MOROCCO

Length cm	Number in millions				Biomass in tonnes			
	Senegal	Mauritania	Morocco	TOTAL	Senegal	Mauritania	Morocco	TOTAL
5	0	0	0	0	0	0	0	0
6	3	0	0	3	0	0	0	0
7	6	0	0	6	0	0	0	0
8	0	0	0	0	0	0	0	0
9	11	0	0	11	56	0	0	56
10	0	0	0	0	0	0	0	0
11	1	0	0	1	8	0	0	8
12	8	5	0	13	131	82	0	213
13	3	0	0	3	56	0	0	56
14	11	5	0	16	273	128	0	401
15	28	5	0	33	818	156	0	974
16	31	0	0	31	1110	0	0	1110
17	68	0	0	68	2888	0	0	2888
18	65	0	0	65	3232	0	0	3232
19	129	0	0	129	7552	0	0	7552
20	240	0	0	240	16328	0	0	16328
21	287	0	0	287	22568	0	0	22568
22	331	107	0	439	29827	10826	0	40653
23	222	300	0	523	22803	34213	0	57016
24	219	315	0	534	25499	40620	0	66119
25	143	409	0	552	18765	59524	0	78289
26	52	239	0	291	7712	38605	0	46316
27	22	171	0	193	3667	30458	0	34124
28	5	172	33	210	903	33974	7405	42282
29	23	295	10	328	4714	64787	2516	72018
30	13	477	188	678	2998	115661	51743	170402
31	6	753	193	951	1392	201020	58571	260982
32	4	490	382	876	958	143714	127078	271751
33	0	217	451	668	0	69722	164469	234191
34	0	30	131	161	0	10663	52059	62722
35	0	8	61	69	0	2904	26378	29282
36	0	8	7	15	0	3157	3189	6346
37	0	0	0	0	0	0	0	0
38	0	0	0	0	0	0	0	0
39	0	0	0	0	0	0	0	0
40	0	0	0	0	0	0	0	0
Total	1934	4003	1456	7393	174257	860216	493408	1527880

Annex III Records of fishing stations

PROJECT STATION: 429
 DATE: 2/11/96 GEAR TYPE: PT No:2 POSITION:Lat N 1209
 start stop duration Long W 1721
 TIME :23:30:00 24:00:00 30 (min) Purpose code: 1
 LOG :8922.50 8924.50 2.00 Area code : 1
 FDEPTH: 10 10 GearCond.code:
 BDEPTH: 160 113 Validity code:
 Towing dir: 90° Wire out: 150 m Speed: 36 kn*10
 Sorted: 14 Kg Total catch: 14.37 CATCH/HOUR: 28.74

SPECIES	CATCH/HOUR weight numbers	% OF TOT. C	SAMP
Euthynnus alletteratus	26.40 28	91.86	846
Echeneis naucrates	1.42 4	4.94	
MYCTOPHIDAE	0.84 912	2.92	
APOGONIDAE	0.08 26	0.28	
Sphyræna sp.	0.00 2		
BOTHIDAE	0.00 8		
ACANTHURIDAE	0.00 8		
Todaropsis eblanae	0.00 8		
MELANOSTOMIATIDAE	0.00 2		
Trachurus trecae	0.00 4		
Total	28.74	100.00	

PROJECT STATION: 430
 DATE: 3/11/96 GEAR TYPE: PT No:7 POSITION:Lat N 1210
 start stop duration Long W 1704
 TIME :02:06:00 02:36:00 30 (min) Purpose code: 1
 LOG :8939.60 8941.30 1.70 Area code : 1
 FDEPTH: 0 0 GearCond.code:
 BDEPTH: 19 17 Validity code:
 Towing dir: 60° Wire out: 180 m Speed: 34 kn*10
 Sorted: 108 Kg Total catch: 107.62 CATCH/HOUR: 215.24

SPECIES	CATCH/HOUR weight numbers	% OF TOT. C	SAMP
Chloroscombrus chrysurus	112.32 1826	52.18	849
Sphyræna guachancho	46.50 104	21.60	848
Ilisha africana	19.70 1110	9.15	850
Elops senegalensis	12.30 34	5.71	847
Brachydeuterus auritus	10.66 212	4.95	
Hemicarax bicolor	7.72 58	3.59	
Scomberomorus tritor	3.44 6	1.60	
Caranx senegalensis	1.10 2	0.51	
Trichiurus lepturus	0.66 2	0.31	
Selene dorsalis	0.54 2	0.25	
Sardinella maderensis	0.16 2	0.07	
Drepane africana	0.10 2	0.05	
Galeoides decadactylus	0.04 2	0.02	
Pteroscion pelli	0.00 2		
Total	215.24	99.99	

PROJECT STATION: 431
 DATE: 3/11/96 GEAR TYPE: PT No:7 POSITION:Lat N 1219
 start stop duration Long W 1651
 TIME :04:45:00 05:15:00 30 (min) Purpose code: 1
 LOG :8958.30 8959.90 1.60 Area code : 1
 FDEPTH: 0 0 GearCond.code:
 BDEPTH: 13 14 Validity code:
 Towing dir: 270° Wire out: 180 m Speed: 32 kn*10
 Sorted: 68 Kg Total catch: 305.50 CATCH/HOUR: 611.00

SPECIES	CATCH/HOUR weight numbers	% OF TOT. C	SAMP
Chloroscombrus chrysurus	347.20 1768	56.82	854
Sardinella maderensis	100.80 1328	16.50	853
Ilisha africana	64.48 7480	10.55	
Scomberomorus tritor	59.00 56	9.66	851
Brachydeuterus auritus	14.40 272	2.36	
Sphyræna guachancho	9.60 28	1.57	852
Trichiurus lepturus	6.72 96	1.10	
Galeoides decadactylus	3.52 32	0.58	
Penaeus notialis	2.40 448	0.39	
Portunus validus	1.60 64	0.26	
Selene dorsalis	1.28 64	0.21	
Total	611.00	100.00	

PROJECT STATION: 432
 DATE: 3/11/96 GEAR TYPE: PT No:7 POSITION:Lat N 1220
 start stop duration Long W 1657
 TIME :06:30:00 06:45:00 15 (min) Purpose code: 1
 LOG :8968.70 8969.40 0.70 Area code : 1
 FDEPTH: 5 5 GearCond.code:
 BDEPTH: 19 18 Validity code:
 Towing dir: 90° Wire out: 160 m Speed: 28 kn*10
 Sorted: 155 Kg Total catch: 3031.75 CATCH/HOUR: 12127.00

SPECIES	CATCH/HOUR weight numbers	% OF TOT. C	SAMP
Chloroscombrus chrysurus	9300.00 514820	76.69	858
Sardinella maderensis	2420.00 45980	19.96	857
Scomberomorus tritor	200.40 136	1.65	855
Sphyræna guachancho	96.00 216	0.79	856
Arius heudeloti	90.60 40	0.75	
Brachydeuterus auritus	20.00 800	0.16	
Total	12127.00	100.00	

PROJECT STATION: 433
 DATE: 3/11/96 GEAR TYPE: PT No:2 POSITION:Lat N 1220
 start stop duration Long W 1717
 TIME :09:14:00 09:44:00 30 (min) Purpose code: 1
 LOG :8988.80 8990.60 1.80 Area code : 1
 FDEPTH: 0 0 GearCond.code:
 BDEPTH: 42 46 Validity code:
 Towing dir: 270° Wire out: 160 m Speed: 36 kn*10
 Sorted: Kg Total catch: 0.11 CATCH/HOUR: 0.22

SPECIES	CATCH/HOUR weight numbers	% OF TOT. C	SAMP
Echeneis naucrates	0.22 2	100.00	
Total	0.22	100.00	

PROJECT STATION: 434
 DATE: 3/11/96 GEAR TYPE: PT No:2 POSITION:Lat N 1230
 start stop duration Long W 1735
 TIME :13:23:00 13:53:00 30 (min) Purpose code: 1
 LOG :9016.60 9018.60 2.00 Area code : 1
 FDEPTH: 0 0 GearCond.code:
 BDEPTH: 445 380 Validity code:
 Towing dir: 180° Wire out: 160 m Speed: 40 kn*10
 Sorted: 3 Kg Total catch: 3.35 CATCH/HOUR: 6.70

SPECIES	CATCH/HOUR weight numbers	% OF TOT. C	SAMP
Echeneis naucrates	5.90 14	88.06	
Trachinotus ovatus	0.80 2	11.94	
Total	6.70	100.00	

PROJECT STATION: 435
 DATE: 3/11/96 GEAR TYPE: PT No:7 POSITION:Lat N 1230
 start stop duration Long W 1703
 TIME :17:32:00 18:02:00 30 (min) Purpose code: 1
 LOG :9051.20 9052.80 1.60 Area code : 1
 FDEPTH: 0 0 GearCond.code:
 BDEPTH: 14 14 Validity code:
 Towing dir: 90° Wire out: 180 m Speed: 32 kn*10
 Sorted: 41 Kg Total catch: 100.13 CATCH/HOUR: 200.26

SPECIES	CATCH/HOUR weight numbers	% OF TOT. C	SAMP
Sardinella maderensis	151.20 1930	75.50	862
Chloroscombrus chrysurus	23.76 894	11.86	863
Scomberomorus tritor	12.90 8	6.44	860
Sphyræna guachancho	8.90 18	4.44	859
Rhizopronodon acutus	1.38 2	0.69	
Caranx senegalensis	1.10 4	0.55	
Brachydeuterus auritus	0.60 6	0.30	
Sardinella aurita	0.42 6	0.21	861
Total	200.26	99.99	

PROJECT STATION: 436
 DATE: 3/11/96 GEAR TYPE: PT No:7 POSITION:Lat N 1243
 start stop duration Long W 1714
 TIME :22:04:00 22:34:00 30 (min) Purpose code: 1
 LOG :9084.40 9085.60 1.20 Area code : 1
 FDEPTH: 5 5 GearCond.code:
 BDEPTH: 24 27 Validity code:
 Towing dir: 270° Wire out: 160 m Speed: 24 kn*10
 Sorted: 23 Kg Total catch: 22.76 CATCH/HOUR: 45.52

SPECIES	CATCH/HOUR weight numbers	% OF TOT. C	SAMP
Scomberomorus tritor	14.10 8	30.98	
Brachydeuterus auritus	10.70 122	23.51	
Ilisha africana	7.36 184	16.17	865
Sardinella maderensis	4.58 88	10.06	864
Brachydeuterus auritus	3.00 1500	6.59	
Sphyræna guachancho	2.20 2	4.83	
Sepia officinalis hierredda	1.40 2	3.08	
Selene dorsalis	1.24 8	2.72	
Chloroscombrus chrysurus	0.88 18	1.93	
Decapterus rhonchus	0.06 26	0.13	
Total	45.52	100.00	

PROJECT STATION: 437
 DATE: 4/11/96 GEAR TYPE: PT No:2 POSITION:Lat N 1244
 start stop duration Long W 1744
 TIME :01:53:00 02:23:00 30 (min) Purpose code: 1
 LOG :9115.50 9117.40 1.90 Area code : 1
 FDEPTH: 5 5 GearCond.code:
 BDEPTH: 1003 1367 Validity code:
 Towing dir: 10° Wire out: 160 m Speed: 38 kn*10
 Sorted: 37 Kg Total catch: 280.32 CATCH/HOUR: 560.64

SPECIES	CATCH/HOUR weight numbers	% OF TOT. C	SAMP
Trichiurus lepturus	547.20 6032	97.60	
Auxis thazard	9.40 12	1.68	866
Todarodes sagittatus	3.60 30	0.64	
Brama brama	0.24 2	0.04	
Cubiceps sp.	0.20 6	0.04	
Total	560.64	100.00	

PROJECT STATION: 438
 DATE: 4/11/96 GEAR TYPE: PT No:2 POSITION:Lat N 1255 Long W 1727
 start stop duration
 TIME :05:21:00 05:51:00 30 (min) Purpose code: 1
 LOG :9142.30 9144.10 1.80 Area code : 1
 FDEPTH: 5 5 GearCond.code:
 BDEPTH: 49 47 Validity code:
 Towing dir: 90° Wire out: 160 m Speed: 36 kn*10
 Sorted: 15 Kg Total catch: 15.49 CATCH/HOUR: 30.98

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Trachinotus ovatus	16.10	42	51.97	867
Trichiurus lepturus	8.90	90	28.73	
Saurida brasiliensis	1.56	936	5.04	
Sphyræna guachancho	1.14	2	3.68	
Pseneis sp.	0.94	10	3.03	
Lagocephalus laevigatus	0.86	4	2.78	
Echeneis naucrates	0.70	4	2.26	
Scomber japonicus	0.60	6	1.94	868
Todaropsis eblanae	0.18	4	0.58	
Total	30.98		100.01	

PROJECT STATION: 443
 DATE: 4/11/96 GEAR TYPE: PT No:2 POSITION:Lat N 1320 Long W 1725
 start stop duration
 TIME :21:50:00 22:20:00 30 (min) Purpose code: 1
 LOG :9269.20 9270.70 1.50 Area code : 1
 FDEPTH: 5 5 GearCond.code:
 BDEPTH: 79 72 Validity code:
 Towing dir: 90° Wire out: 160 m Speed: 30 kn*10
 Sorted: 36 Kg Total catch: 35.71 CATCH/HOUR: 71.42

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Trachurus trecae	51.60	2966	72.25	879
Scomber japonicus	8.56	232	11.99	880
Brachydeuterus auritus	2.88	24	4.03	
Elops lacerta	2.42	2	3.39	
Caranx crysos	2.26	2	3.16	
Sardinella aurita	2.14	62	3.00	881
Aricomma bondi	0.62	14	0.87	
Echeneis naucrates	0.58	2	0.81	
Saurida brasiliensis	0.36	108	0.50	
Total	71.42		100.00	

PROJECT STATION: 439
 DATE: 4/11/96 GEAR TYPE: PT No:7 POSITION:Lat N 1256 Long W 1659
 start stop duration
 TIME :08:41:00 09:11:00 30 (min) Purpose code: 1
 LOG :9171.90 9173.40 1.50 Area code : 1
 FDEPTH: 5 5 GearCond.code:
 BDEPTH: 18 19 Validity code:
 Towing dir: 270° Wire out: 160 m Speed: 30 kn*10
 Sorted: 93 Kg Total catch: 707.77 CATCH/HOUR: 1415.54

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Sardinella aurita	798.00	6252	56.37	870
Sardinella maderensis	376.00	4452	26.56	871
Chloroscombrus chrysurus	111.00	4532	7.84	872
Brachydeuterus auritus	80.80	1320	5.71	
Scomberomorus tritor	36.10	30	2.55	869
Arius heudeloti	3.80	2	0.27	
Caranx crysos	3.58	2	0.25	
Sphyræna guachancho	3.40	8	0.24	
Rhizoprionodon acutus	1.90	2	0.13	
Echeneis naucrates	0.62	2	0.04	
Trachinotus ovatus	0.34	2	0.02	
Total	1415.54		99.98	

PROJECT STATION: 444
 DATE: 5/11/96 GEAR TYPE: PT No:7 POSITION:Lat N 1321 Long W 1656
 start stop duration
 TIME :01:35:00 02:05:00 30 (min) Purpose code: 1
 LOG :9298.00 9299.70 1.70 Area code : 1
 FDEPTH: 5 5 GearCond.code:
 BDEPTH: 16 16 Validity code:
 Towing dir: 360° Wire out: 180 m Speed: 34 kn*10
 Sorted: 36 Kg Total catch: 249.83 CATCH/HOUR: 499.66

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Chloroscombrus chrysurus	294.84	9044	59.01	
Brachydeuterus auritus	94.22	7378	18.86	
Ilisha africana	35.70	10094	7.14	
Trichiurus lepturus	21.14	42	4.23	
Sardinella maderensis	15.40	140	4.08	883
Brachydeuterus auritus	14.28	238	2.86	
Sardinella maderensis	11.06	4494	2.21	882
Sardinella aurita	5.46	3066	1.09	884
Decapterus rhonchus	2.94	14	0.59	
Penaeus sp.	2.80	266	0.56	
Engraulis encrasicolus	0.84	1050	0.17	
Selene dorsalis	0.70	14	0.14	
Galeoides decadactylus	0.28	56	0.06	
Total	499.66		100.00	

PROJECT STATION: 440
 DATE: 4/11/96 GEAR TYPE: PT No:7 POSITION:Lat N 1300 Long W 1656
 start stop duration
 TIME :11:38:00 12:08:00 30 (min) Purpose code: 1
 LOG :9188.60 9190.20 1.60 Area code : 1
 FDEPTH: 0 5 GearCond.code:
 BDEPTH: 14 15 Validity code:
 Towing dir: 20° Wire out: 160 m Speed: 32 kn*10
 Sorted: 11 Kg Total catch: 11.05 CATCH/HOUR: 22.10

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Sardinella maderensis	11.22	106	50.77	873
Scomberomorus tritor	10.58	8	47.87	874
Sardinella aurita	0.30	2	1.36	
Total	22.10		100.00	

PROJECT STATION: 445
 DATE: 5/11/96 GEAR TYPE: PT No:2 POSITION:Lat N 1330 Long W 1712
 start stop duration
 TIME :04:49:00 05:19:00 30 (min) Purpose code: 1
 LOG :9324.00 9325.60 1.60 Area code : 1
 FDEPTH: 5 5 GearCond.code:
 BDEPTH: 44 49 Validity code:
 Towing dir: 270° Wire out: 160 m Speed: 32 kn*10
 Sorted: 4 Kg Total catch: 4.23 CATCH/HOUR: 8.46

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Decapterus rhonchus	2.24	18	26.48	
Euthynnus alletteratus	1.70	4	20.09	
Scomber japonicus	1.66	10	19.62	
Sardinella aurita	1.22	12	14.42	
Trachurus trecae	0.96	60	11.35	
Echeneis naucrates	0.62	8	7.33	
Alloteuthis africana	0.04	24	0.47	
Saurida brasiliensis	0.02	6	0.24	
Carangidae juveniles	0.00	4		
Priacanthus arenatus	0.00	2		
Total	8.46		100.00	

PROJECT STATION: 441
 DATE: 4/11/96 GEAR TYPE: BT No:1 POSITION:Lat N 1308 Long W 1703
 start stop duration
 TIME :14:24:00 14:44:00 20 (min) Purpose code: 1
 LOG :9209.00 9210.10 1.10 Area code : 1
 FDEPTH: 21 20 GearCond.code:
 BDEPTH: 21 20 Validity code:
 Towing dir: 90° Wire out: 120 m Speed: 33 kn*10
 Sorted: 89 Kg Total catch: 805.39 CATCH/HOUR: 2416.17

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Brachydeuterus auritus	1594.35	23760	65.99	876
Chloroscombrus chrysurus	604.80	18549	25.03	877
Galeoides decadactylus	69.60	756	2.88	
Sardinella maderensis	55.08	648	2.28	875
Sphyræna guachancho	25.92	81	1.07	
Pomadasys jubelini	17.01	0	0.70	
Arius heudeloti	12.69	81	0.53	
Euclinostomus melanopterus	11.34	135	0.47	
Selene dorsalis	10.80	162	0.45	
Trichiurus lepturus	9.72	27	0.40	
Ilisha africana	4.32	108	0.18	
Pseudupeneus prayensis	0.54	27	0.02	
Total	2416.17		100.00	

PROJECT STATION: 446
 DATE: 5/11/96 GEAR TYPE: PT No:2 POSITION:Lat N 1330 Long W 1731
 start stop duration
 TIME :07:22:00 07:52:00 30 (min) Purpose code: 1
 LOG :9341.30 9342.70 1.40 Area code : 1
 FDEPTH: 5 5 GearCond.code:
 BDEPTH: 613 713 Validity code:
 Towing dir: 295° Wire out: 160 m Speed: 28 kn*10
 Sorted: 4 Kg Total catch: 3.86 CATCH/HOUR: 7.72

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Decapterus rhonchus	6.22	52	80.57	885
Euthynnus alletteratus	0.98	2	12.69	
Trachinotus ovatus	0.52	2	6.74	
Total	7.72		100.00	

PROJECT STATION: 442
 DATE: 4/11/96 GEAR TYPE: PT No:2 POSITION:Lat N 1307 Long W 1712
 start stop duration
 TIME :16:10:00 16:40:00 30 (min) Purpose code: 1
 LOG :9219.90 9221.50 1.60 Area code : 1
 FDEPTH: 5 5 GearCond.code:
 BDEPTH: 37 38 Validity code:
 Towing dir: 270° Wire out: 180 m Speed: 30 kn*10
 Sorted: 16 Kg Total catch: 15.91 CATCH/HOUR: 31.82

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Alectis alexandrinus	28.70	90	90.19	878
Trachinotus ovatus	2.70	8	8.49	
Echeneis naucrates	0.42	4	1.32	
Total	31.82		100.00	

PROJECT STATION: 447
 DATE: 5/11/96 GEAR TYPE: BT No:1 POSITION:Lat N 1335 Long W 1707
 start stop duration
 TIME :14:32:00 15:13:00 41 (min) Purpose code: 1
 LOG :9397.40 9399.10 1.70 Area code : 1
 FDEPTH: 35 38 GearCond.code:
 BDEPTH: 35 38 Validity code:
 Towing dir: 270° Wire out: 160 m Speed: 30 kn*10
 Sorted: 66 Kg Total catch: 229.63 CATCH/HOUR: 336.04

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Decapterus rhonchus	177.22	1345	52.74	887
Pagellus bellottii	92.20	635	27.44	888
Chloroscombrus chrysurus	38.20	338	11.37	886
Fistularia petimba	5.28	26	1.57	
Sarda sarda	4.36	6	1.30	
Sparus caeruleostictus *	3.75	10	1.12	
Dactylopterus volitans	3.75	16	1.12	
Pomadasys peroteti	3.38	10	1.01	
Sepia officinalis hierredda	2.41	6	0.72	
Acanthurus monroviae	2.00	6	0.60	
Pseudupeneus prayensis	1.74	16	0.52	
Trachinotus ovatus	0.98	6	0.29	
Selene dorsalis	0.41	6	0.12	
Brachydeuterus auritus	0.37	6	0.11	
Total	336.05		100.03	

PROJECT STATION: 448
 DATE: 5/11/96 GEAR TYPE: PT No:7 POSITION:Lat N 1336 Long W 1652
 start stop duration
 TIME :17:29:00 17:59:00 30 (min) Purpose code: 1
 LOG :9417.50 9419.20 1.70 Area code : 1
 FDEPTH: 5 5 GearCond.code:
 BDEPTH: 15 15 Validity code:
 Towing dir: 360° Wire out: 160 m Speed: 34 kn*10
 Sorted: 50 Kg Total catch: 50.13 CATCH/HOUR: 100.26

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Scomberomorus tritor	96.40	96	96.15	889
Brachydeuterus auritus	2.90	2176	2.89	
Sardinella maderensis	0.42	148	0.42	890
Callinectes marginatus	0.40	6	0.40	
Galeoides decadactylus	0.12	14	0.12	
Penaeus notialis	0.02	2	0.02	
Total	100.26		100.00	

PROJECT STATION: 453
 DATE: 6/11/96 GEAR TYPE: PT No:7 POSITION:Lat N 1354 Long W 1703
 start stop duration
 TIME :05:51:00 06:21:00 30 (min) Purpose code: 1
 LOG :9499.90 9501.50 1.60 Area code : 1
 FDEPTH: 5 5 GearCond.code:
 BDEPTH: 24 29 Validity code:
 Towing dir: 270° Wire out: 150 m Speed: 32 kn*10
 Sorted: 1 Kg Total catch: 0.70 CATCH/HOUR: 1.40

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Euthynnus alletteratus	0.60	2	42.86	
Pomadasys incisus	0.38	2	27.14	
Sardinella aurita	0.16	38	11.43	898
Echeneis naucrates	0.10	2	7.14	
Decapterus rhonchus	0.10	2	7.14	
Callinectes marginatus	0.06	2	4.29	
Total	1.40		100.00	

PROJECT STATION: 449
 DATE: 5/11/96 GEAR TYPE: PT No:2 POSITION:Lat N 1345 Long W 1704
 start stop duration
 TIME :20:17:00 20:47:00 30 (min) Purpose code: 1
 LOG :9437.80 9439.80 2.00 Area code : 1
 FDEPTH: 0 0 GearCond.code:
 BDEPTH: 29 33 Validity code:
 Towing dir: 270° Wire out: 160 m Speed: 40 kn*10
 Sorted: 39 Kg Total catch: 314.99 CATCH/HOUR: 629.98

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Chloroscombrus chrysurus	548.00	6784	86.99	894
Sardinella aurita	40.00	12526	6.35	891
Sardinella maderensis	14.74	174	2.34	893
Brachydeuterus auritus	14.40	180	2.29	
Trachinotus ovatus	8.00	40	1.27	
Decapterus rhonchus	2.40	20	0.38	
Sarda sarda	1.78	2	0.28	
Sardinella aurita	0.66	10	0.10	892
Total	629.98		100.00	

PROJECT STATION: 454
 DATE: 6/11/96 GEAR TYPE: PT No:7 POSITION:Lat N 1356 Long W 1658
 start stop duration
 TIME :07:38:00 08:08:00 30 (min) Purpose code: 1
 LOG :9510.40 9511.90 1.50 Area code : 1
 FDEPTH: 0 0 GearCond.code:
 BDEPTH: 14 14 Validity code:
 Towing dir: 356° Wire out: 150 m Speed: 30 kn*10
 Sorted: Kg Total catch: CATCH/HOUR:

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
N O C A T C H	0.00			
Total				

PROJECT STATION: 450
 DATE: 5/11/96 GEAR TYPE: PT No:2 POSITION:Lat N 1345 Long W 1721
 start stop duration
 TIME :22:37:00 23:07:00 30 (min) Purpose code: 1
 LOG :9453.60 9455.20 1.60 Area code : 1
 FDEPTH: 5 5 GearCond.code:
 BDEPTH: 81 88 Validity code:
 Towing dir: 270° Wire out: 160 m Speed: 32 kn*10
 Sorted: 29 Kg Total catch: 29.04 CATCH/HOUR: 58.08

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Scomber japonicus	56.20	1754	96.76	895
Trachinotus ovatus	0.86	4	1.48	
Priacanthus arenatus	0.54	2	0.93	
Trachurus trecae	0.40	24	0.69	
Ariomma bondi	0.04	2	0.07	
Echeneis naucrates	0.02	2	0.03	
Decapterus rhonchus	0.02	2	0.03	
Total	58.08		99.99	

PROJECT STATION: 455
 DATE: 6/11/96 GEAR TYPE: PT No:2 POSITION:Lat N 1405 Long W 1708
 start stop duration
 TIME :10:24:00 10:54:00 30 (min) Purpose code: 1
 LOG :9529.10 9530.90 1.80 Area code : 1
 FDEPTH: 0 0 GearCond.code:
 BDEPTH: 30 33 Validity code:
 Towing dir: 270° Wire out: 150 m Speed: 36 kn*10
 Sorted: Kg Total catch: CATCH/HOUR:

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
N O C A T C H	0.00			
Total				

PROJECT STATION: 451
 DATE: 6/11/96 GEAR TYPE: PT No:2 POSITION:Lat N 1355 Long W 1730
 start stop duration
 TIME :01:24:00 01:54:00 30 (min) Purpose code: 1
 LOG :9472.10 9473.80 1.70 Area code : 1
 FDEPTH: 5 5 GearCond.code:
 BDEPTH: 510 191 Validity code:
 Towing dir: 90° Wire out: 160 m Speed: 35 kn*10
 Sorted: 39 Kg Total catch: 39.30 CATCH/HOUR: 78.60

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Trichiurus lepturus	43.90	498	55.85	
MYCTOPHIDAE	18.50	11016	23.54	
Euthynnus alletteratus	15.10	4	19.21	
Scomber japonicus	0.90	30	1.15	896
Promethichthys prometheus	0.10	8	0.13	
Trachurus trecae	0.10	6	0.13	
Total	78.60		100.01	

PROJECT STATION: 452
 DATE: 6/11/96 GEAR TYPE: PT No:2 POSITION:Lat N 1355 Long W 1711
 start stop duration
 TIME :04:16:00 04:46:00 30 (min) Purpose code: 1
 LOG :9491.10 9492.70 1.60 Area code : 1
 FDEPTH: 5 5 GearCond.code:
 BDEPTH: 37 36 Validity code:
 Towing dir: 90° Wire out: 160 m Speed: 35 kn*10
 Sorted: 7 Kg Total catch: 7.21 CATCH/HOUR: 14.42

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Decapterus rhonchus	6.68	40	46.32	897
Pomadasys incisus	2.84	18	19.69	
Chloroscombrus chrysurus	2.42	18	16.78	
MYCTOPHIDAE	0.86	516	5.96	
Sphyræna viridensis	0.46	2	3.19	
Todaropsis eblanæ	0.42	106	2.91	
Sardinella maderensis	0.40	2	2.77	
Echeneis naucrates	0.16	2	1.11	
Trichiurus lepturus	0.12	2	0.83	
Sardinella aurita	0.06	10	0.42	
Total	14.42		99.98	

PROJECT STATION: 456
 DATE: 6/11/96 GEAR TYPE: BT No:1 POSITION:Lat N 1404 Long W 1723
 start stop duration
 TIME :13:18:00 14:17:00 59 (min) Purpose code: 1
 LOG :9549.50 9552.70 3.20 Area code : 1
 FDEPTH: 81 83 GearCond.code:
 BDEPTH: 81 83 Validity code:
 Towing dir: 180° Wire out: 320 m Speed: 32 kn*10
 Sorted: 56 Kg Total catch: 336.24 CATCH/HOUR: 341.94

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Pagellus bellottii	243.15	2514	71.11	899
Dentex canariensis	12.57	24	3.68	
Chromis cadenati	12.20	110	3.57	
Dentex congongensis	11.53	85	3.37	
Parapristipoma octolineatum	6.89	18	2.01	
Dentex gibbosus	6.53	18	1.91	
Umbrina canariensis	5.98	12	1.75	
Priacanthus arenatus	5.25	18	1.54	
Raja miraletus	4.94	6	1.44	
Sparus pagrus africanus *	4.88	24	1.43	
Sepia officinalis hierredda	4.52	12	1.32	
Chaetodon hoefleri	3.48	24	1.02	
Fistularia petimba	3.17	6	0.93	
Zeus faber	2.99	12	0.87	
Chelidonicichthys gabonensis	2.32	24	0.68	
Pseudupeneus prayensis	2.20	12	0.64	
Adioryx hastatus	1.89	12	0.55	
Dicologlossa cuneata	1.89	24	0.55	
Spondyliosa cantharus	1.40	6	0.41	
Bembrops heterurus	0.92	24	0.27	
Sardinella aurita	0.85	6	0.25	
ArgoGLOSSUS imperialis	0.73	92	0.21	
Citharus linguatula	0.61	18	0.18	
Boops boops	0.61	6	0.18	
Chelidonicichthys cuculus	0.24	12	0.07	
Anthias anthias	0.18	18	0.05	
Total	341.92		99.99	

PROJECT STATION: 457
 DATE: 6/11/96 GEAR TYPE: PT No:2 POSITION:Lat N 1415 Long W 1730
 start stop duration
 TIME :17:40:00 18:10:00 30 (min) Purpose code: 1
 LOG :9580.70 9582.40 1.70 Area code : 1
 FDEPTH: 5 5 GearCond.code:
 BDEPTH: 114 105 Validity code:
 Towing dir: 90° Wire out: 180 m Speed: 34 kn*10
 Sorted: Kg Total catch: CATCH/HOUR:

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
N O C A T C H	0.00			
Total				

PROJECT STATION: 458
 DATE: 6/11/96 GEAR TYPE: PT No:2 POSITION:Lat N 1415 Long W 1710
 start stop duration
 TIME :20:23:00 20:40:00 17 (min) Purpose code: 1
 LOG :9600.00 9601.20 1.20 Area code : 1
 FDEPTH: 0 0 GearCond.code:
 BDEPTH: 31 27 Validity code:
 Towing dir: 90° Wire out: 150 m Speed: 40 kn*10
 Sorted: 5 Kg Total catch: 5.01 CATCH/HOUR: 17.68

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Sardinella aurita	13.71	2107	77.66	900
Decapterus punctatus	1.48	49	8.37	901
Echeneis naucratus	1.20	7	6.79	
Sphyraena sphyraena	1.06	4	6.00	
Alloteuthis africana	0.21	71	1.19	
Total	17.68		100.01	

PROJECT STATION: 459
 DATE: 6/11/96 GEAR TYPE: PT No:1 POSITION:Lat N 1424 Long W 1720
 start stop duration
 TIME :23:31:00 23:51:00 20 (min) Purpose code: 1
 LOG :9625.60 9627.00 1.40 Area code : 1
 FDEPTH: 20 20 GearCond.code:
 BDEPTH: 52 57 Validity code:
 Towing dir: 270° Wire out: 90 m Speed: 40 kn*10
 Sorted: 79 Kg Total catch: 78.67 CATCH/HOUR: 236.01

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Brachydeuterus auritus	122.10	1269	51.74	903
Decapterus rhonchus	56.10	459	23.77	904
Sardinella aurita	54.45	426	23.07	902
Decapterus punctatus	3.18	93	1.35	905
Scomber japonicus	0.18	3	0.08	
Total	236.01		100.01	

PROJECT STATION: 460
 DATE: 7/11/96 GEAR TYPE: PT No:1 POSITION:Lat N 1425 Long W 1717
 start stop duration
 TIME :01:05:00 01:12:00 7 (min) Purpose code: 1
 LOG :9631.50 9631.80 0.30 Area code : 1
 FDEPTH: 15 15 GearCond.code:
 BDEPTH: 44 43 Validity code:
 Towing dir: 67° Wire out: 90 m Speed: 38 kn*10
 Sorted: 65 Kg Total catch: 327.00 CATCH/HOUR: 2802.86

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Chloroscombrus chrysurus	1560.00	17786	55.66	909
Sardinella aurita	951.43	4929	33.94	906
Sardinella maderensis	183.86	1457	6.56	907
Decapterus rhonchus	55.71	514	1.99	908
Sphyraena viridensis	27.86	86	0.99	
Sarda sarda	24.00	43	0.86	
Total	2802.86		100.00	

PROJECT STATION: 461
 DATE: 7/11/96 GEAR TYPE: PT No:2 POSITION:Lat N 1425 Long W 1732
 start stop duration
 TIME :03:42:00 04:12:00 30 (min) Purpose code: 1
 LOG :9649.80 9651.70 1.90 Area code : 1
 FDEPTH: 10 10 GearCond.code:
 BDEPTH: 123 184 Validity code:
 Towing dir: 270° Wire out: 160 m Speed: 38 kn*10
 Sorted: 3 Kg Total catch: 2.53 CATCH/HOUR: 5.06

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Auxis thazard	2.98	12	58.89	
Aluterus punctata	0.94	2	18.58	
Synagrops microlepis	0.68	80	13.44	
OMMASTREPHIDAE	0.22	128	4.35	
Selene dorsalis	0.08	80	1.58	
Ariomma sp.	0.08	2	1.58	
MYCTOPHIDAE	0.04	16	0.79	
Balistes sp.	0.02	66	0.40	
Saurida brasiliensis	0.02	2	0.40	
Total	5.06		100.01	

PROJECT STATION: 462
 DATE: 7/11/96 GEAR TYPE: PT No:2 POSITION:Lat N 1435 Long W 1733
 start stop duration
 TIME :06:55:00 07:25:00 30 (min) Purpose code: 1
 LOG :9671.40 9673.50 1.10 Area code : 1
 FDEPTH: 10 10 GearCond.code:
 BDEPTH: 85 82 Validity code:
 Towing dir: 90° Wire out: 160 m Speed: 22 kn*10
 Sorted: Kg Total catch: CATCH/HOUR:

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
N O C A T C H	0.00			
Total				

PROJECT STATION: 463
 DATE: 7/11/96 GEAR TYPE: PT No:2 POSITION:Lat N 1449 Long W 1722
 start stop duration
 TIME :22:10:00 22:40:00 30 (min) Purpose code: 1
 LOG :9771.50 9773.20 1.70 Area code : 1
 FDEPTH: 5 5 GearCond.code:
 BDEPTH: 67 64 Validity code:
 Towing dir: 45° Wire out: 160 m Speed: 34 kn*10
 Sorted: 72 Kg Total catch: 72.37 CATCH/HOUR: 144.74

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Trachurus trecae	91.80	7272	63.42	911
Saurida brasiliensis	22.06	4870	15.24	
Rhizoprionodon acutus	9.80	6	6.77	
Brachydeuterus auritus	9.80	62	6.77	
Scomber japonicus	3.38	32	2.34	913
Echeneis naucratus	1.82	10	1.26	
Trachinotus ovatus	1.54	16	1.06	
Sardinella aurita	1.52	16	1.05	910
Auxis thazard	1.50	6	1.04	912
Sphyraena guachancho	0.54	2	0.37	
Ariomma bondi	0.44	8	0.30	
Octopus vulgaris	0.34	2	0.23	
Sphyraena sphyraena	0.20	2	0.14	
Total	144.74		99.99	

PROJECT STATION: 464
 DATE: 8/11/96 GEAR TYPE: PT No:2 POSITION:Lat N 1500 Long W 1710
 start stop duration
 TIME :02:40:00 03:10:00 30 (min) Purpose code: 1
 LOG :9806.50 9808.00 1.50 Area code : 1
 FDEPTH: 5 5 GearCond.code:
 BDEPTH: 97 100 Validity code:
 Towing dir: 97° Wire out: 18 m Speed: 3 kn*10
 Sorted: 77 Kg Total catch: 76.78 CATCH/HOUR: 153.56

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Trichiurus lepturus	151.00	1604	98.33	
Ariomma bondi	0.70	10	0.46	
Brachydeuterus auritus	0.64	4	0.42	
Trachurus trecae	0.56	20	0.36	
Saurida brasiliensis	0.24	60	0.16	
Scomber japonicus	0.22	2	0.14	
Auxis thazard	0.20	2	0.13	
Total	153.56		100.00	

PROJECT STATION: 465
 DATE: 8/11/96 GEAR TYPE: PT No:1 POSITION:Lat N 1508 Long W 1701
 start stop duration
 TIME :07:25:00 07:55:00 30 (min) Purpose code: 1
 LOG :9847.30 9848.90 1.60 Area code : 1
 FDEPTH: 20 20 GearCond.code:
 BDEPTH: 54 68 Validity code:
 Towing dir: 253° Wire out: 90 m Speed: 32 kn*10
 Sorted: 2 Kg Total catch: 1.90 CATCH/HOUR: 3.80

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Echeneis naucratus	3.18	30	83.68	
Trachinotus ovatus	0.62	2	16.32	
Total	3.80		100.00	

PROJECT STATION: 466
 DATE: 8/11/96 GEAR TYPE: PT No:7 POSITION:Lat N 1525 Long W 1649
 start stop duration
 TIME :14:13:00 14:43:00 30 (min) Purpose code: 1
 LOG :9910.90 9912.50 1.60 Area code : 1
 FDEPTH: 10 10 GearCond.code:
 BDEPTH: 22 24 Validity code:
 Towing dir: 228° Wire out: 180 m Speed: 32 kn*10
 Sorted: 70 Kg Total catch: 173.24 CATCH/HOUR: 346.48

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Sardinella aurita	320.26	2080	92.43	915
Sardinella maderensis	23.26	200	6.71	914
Stromateus fiatola	1.60	2	0.46	
Trachinotus ovatus	1.16	6	0.33	
Echeneis naucratus	0.20	6	0.06	
Total	346.48		99.99	

PROJECT STATION: 467
 DATE: 8/11/96 GEAR TYPE: PT No:1 POSITION:Lat N 1537 Long W 1649
 start stop duration
 TIME :19:25:00 19:55:00 30 (min) Purpose code: 1
 LOG :9955.30 9956.90 1.90 Area code : 1
 FDEPTH: 20 20 GearCond.code:
 BDEPTH: 48 60 Validity code:
 Towing dir: 293° Wire out: 100 m Speed: 32 kn*10
 Sorted: 94 Kg Total catch: 732.63 CATCH/HOUR: 1465.26

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Brachydeuterus auritus	1233.60		84.19	
Chloroscombrus chrysurus	80.00	608	5.46	919
Trichiurus lepturus	40.00	752	2.73	
Trachurus trecae	34.72	1040	2.37	918
Sardinella maderensis	20.80	144	1.42	917
Decapterus rhonchus	15.84	128	1.08	920
Sardinella aurita	14.08	80	0.96	916
Selene dorsalis	11.68	112	0.80	
Ilisha africana	5.76	48	0.39	
Sphyraena sphyraena	3.68	16	0.25	
Sarda sarda	2.70	4	0.18	
Rhizoprionodon acutus	2.40	2	0.16	
Total	1465.26		99.99	

PROJECT STATION: 468
 DATE: 9/11/96 GEAR TYPE: PT No:7 POSITION:Lat N 1542 Long W 1641
 start stop duration
 TIME :01:32:00 02:02:00 30 (min) Purpose code: 1
 LOG : 9.50 11.20 1.70 Area code : 1
 FDEPTH: 10 10 GearCond.code:
 BDEPTH: 25 20 Validity code:
 Towing dir: 100° Wire out: 180 m Speed: 32 kn*10
 Sorted: 66 Kg Total catch: 232.56 CATCH/HOUR: 465.12

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Sardinella maderensis	339.08	2248	72.90	921
Chloroscombrus chrysurus	32.56	302	7.00	923
Brachydeuterus auritus	32.20	244	6.92	922
Galeoides decadactylus	10.92	28	2.35	
Pteroscion peli	9.80	182	2.11	
Ilisha africana	8.54	484	1.84	924
Pomadasy s incisus	8.34	28	1.79	
Arius heudeloti	7.42	8	1.60	
Sphyræna viridensis	4.20	14	0.90	
Pomadasy s jubelini	3.16	8	0.68	
Sardinella aurita	3.08	22	0.66	
Trichiurus lepturus	2.60	196	0.56	
Parapenaeopsis atlantica	1.96	924	0.42	
Selene dorsalis	0.98	22	0.21	
Ethmalosa fimbriata	0.28	14	0.06	
Total	465.12		100.00	

PROJECT STATION: 472
 DATE: 10/11/96 GEAR TYPE: PT No:7 POSITION:Lat N 1621 Long W 1635
 start stop duration
 TIME :15:17:00 15:47:00 30 (min) Purpose code: 1
 LOG : 194.40 195.80 1.40 Area code : 1
 FDEPTH: 10 10 GearCond.code:
 BDEPTH: 22 27 Validity code:
 Towing dir: 273° Wire out: 200 m Speed: 28 kn*10
 Sorted: 11 Kg Total catch: 10.60 CATCH/HOUR: 21.20

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Pomadasy s peroteti	11.10	54	52.36	
Decapterus rhonchus	2.92	10	13.77	
Sardinella maderensis	2.78	26	13.11	
Sphyræna guachancho	2.10	8	9.91	
Alectis alexandrinus	1.38	2	6.51	
Chloroscombrus chrysurus	0.50	6	2.36	
Sardinella aurita	0.24	2	1.13	
Echeneis naucrates	0.12	2	0.57	
Ilisha africana	0.06	10	0.28	
Total	21.20		100.00	

PROJECT STATION: 469
 DATE: 9/11/96 GEAR TYPE: PT No:2 POSITION:Lat N 1547 Long W 1645
 start stop duration
 TIME :06:15:00 06:47:00 32 (min) Purpose code: 1
 LOG : 45.20 47.00 1.80 Area code : 1
 FDEPTH: 5 5 GearCond.code:
 BDEPTH: 47 39 Validity code:
 Towing dir: 90° Wire out: 160 m Speed: 35 kn*10
 Sorted: 143 Kg Total catch: 1555.41 CATCH/HOUR: 2916.39

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Chloroscombrus chrysurus	2245.50	15999	77.00	925
Brachydeuterus auritus	335.25	3593	11.50	
Selene dorsalis	150.30	2638	5.15	926
Stromateus fiatola	47.48	68	1.63	
Rhizopriodon acutus	28.80	23	0.99	
Trachinotus ovatus	27.45	113	0.94	
Acanthocybium solandri	26.72	2	0.92	
Alectis alexandrinus	18.90	68	0.65	
Trichiurus lepturus	15.30	405	0.52	
Sarda sarda	10.80	23	0.37	
Sardinella aurita	3.60	23	0.12	
Sardinella maderensis	3.15	23	0.11	
Echeneis naucrates	1.80	23	0.06	
Trachurus trecae	1.35	68	0.05	
Total	2916.40		100.01	

PROJECT STATION: 470
 DATE: 9/11/96 GEAR TYPE: PT No:2 POSITION:Lat N 1602 Long W 1635
 start stop duration
 TIME :14:02:00 14:32:00 30 (min) Purpose code: 1
 LOG : 115.10 116.70 1.60 Area code : 1
 FDEPTH: 5 5 GearCond.code:
 BDEPTH: 28 35 Validity code:
 Towing dir: 276° Wire out: 160 m Speed: 32 kn*10
 Sorted: 89 Kg Total catch: 89.34 CATCH/HOUR: 178.68

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Brachydeuterus auritus	49.30	458	27.59	928
Sardinella maderensis	45.20	282	25.30	927
Chloroscombrus chrysurus	32.60	218	18.24	929
Trachinotus ovatus	13.20	60	7.39	930
Pomadasy s rogeri	11.60	42	6.49	
Stromateus fiatola	6.24	10	3.49	
Galeoides decadactylus	4.96	14	2.78	
Selene dorsalis	4.96	42	2.78	
Sphyræna guachancho	4.70	12	2.63	
Scomberomorus tritor	1.42	2	0.79	
Chaetodon hoefleri	1.00	6	0.56	
Trichiurus lepturus	0.80	2	0.45	
Ilisha africana	0.74	8	0.41	
Pomadasy s jubelini	0.70	2	0.39	
Sardinella aurita	0.66	4	0.37	
Decapterus rhonchus	0.60	2	0.34	
Total	178.68		100.00	

PROJECT STATION: 471
 DATE: 10/11/96 GEAR TYPE: PT No:1 POSITION:Lat N 1612 Long W 1641
 start stop duration
 TIME :12:32:00 12:49:00 17 (min) Purpose code: 1
 LOG : 172.00 172.80 0.80 Area code : 1
 FDEPTH: 45 55 GearCond.code:
 BDEPTH: 67 74 Validity code:
 Towing dir: 280° Wire out: 200 m Speed: 35 kn*10
 Sorted: 120 Kg Total catch: 1563.64 CATCH/HOUR: 5518.73

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Brachydeuterus auritus	5028.71	39092	91.12	931
Decapterus rhonchus	227.58	734	4.12	932
Trichiurus lepturus	134.44	918	2.44	
Selene dorsalis	90.39	688	1.64	
Trachurus trecae	15.60	92	0.28	
Boops boops	14.22	92	0.26	
Chloroscombrus chrysurus	7.80	46	0.14	
Total	5518.74		100.00	

Annex IV Instruments and fishing gear used

The Simrad EK-500/38kHz scientific sounder was used during the survey for fish abundance estimation. The Bergen Echo Integrator system (BEI) was used to scrutinize the acoustic records from the 38kHz echo sounder, and to allocate integrator values to fish species.

The details of the settings of the 38kHz echo sounder where as follows:

Tranceiver-1 menu (38 kHz lowering keel)

Transducer depth	0.00 m
Absorbtion coeff.	10 dB/km
Pulse length	medium (1ms)
Bandwidth	wide
Max power	2000 Watt
2-way beam angle	-21.0 dB
SV transducer gain	28.1 dB
TS transducer gain	28.0 dB
Angle sensitivity	21.9
3 dB beamwidth	6.8 dg
Alongship offset	0.00 "
Athwardship offset	0.04 "

Display menu

Echogram	1 (38 kHz)
Bottom range	12 m
Bottom range start	10 m
Sv colour min	-67 dB

Printer- menu

Echogram	1 (38 kHz)
Range	100, 250 and 500 m
Range start	0
Bottom range	12 m
Bottom range start	10 m
Sv colour min	-67 dB
TVG	20 log R

Bottom detection menu Minimum level -50 dB

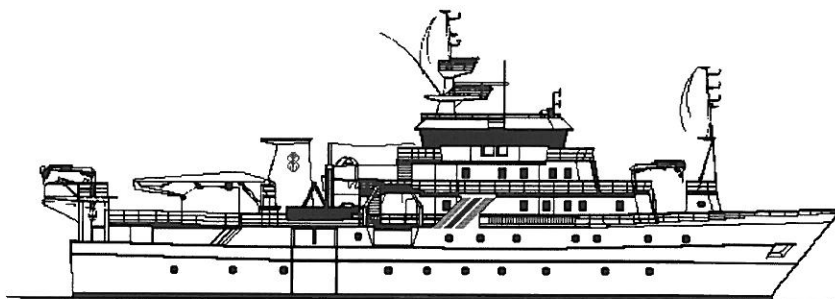
Fishing gear

The vessel has two different sized "Åkrahamn" pelagic trawls and one "Gisund super bottom trawl". Both the bottom trawl and the smallest pelagic trawl were used during the survey.

The bottom trawl has a headline of 31 m, footrope 47 m and 20 mm meshsize in the codend with an innernet of 10 mm meshsize. The estimated opening is 6 m (observed 5.7) and distance between wings during towing about 18 m. The sweeps are 40 m long. The trawl is equipped with a 12" rubber bobbins gear. The doors are of 'Thyborøn' combi type, 7.81 m², 1670 kg, their distance while trawling is about 46 m in average.

The SCANMAR system was used on all trawl hauls. This equipment consists of sensors, a hydrophone, a receiver, a display unit and a battery charger. Communication between sensors and ship is based on acoustic transmission. The doors are fitted with sensors to provide information on their distance and a height sensor is fitted to the bottom trawl to measure the trawl opening and to provide information on clearance and bottom contact..

The pelagic trawl is equipped with a trawl-eye that provides information on the trawl opening and the distance from the footrope to the bottom.



**SURVEY OF THE PELAGIC FISH RESOURCES
OFF NORTH WEST AFRICA**

Cruise Report No 9/96

Part II MAURITANIA

9 - 18 November 1996

CRUISE REPORT "DR FRIDTJOF NANSEN"

**SURVEY OF THE PELAGIC FISH RESOURCES
NORTH WEST AFRICA**

Cruise Report No 9/96

**Part II
MAURITANIA
9 - 18 November 1996**

by

R. Toresen

Institute of Marine Research
P.O.Box 1870 Nordnes
N-5024 Bergen, Norway

**Institute of Marine Research
Bergen, 1996**

TABLE OF CONTENTS

CHAPTER 1	INTRODUCTION.....	1
1.1	Objectives of the cruise.....	1
1.2	Participation.....	1
1.3	Narrative.....	2
1.4	Methods.....	2
CHAPTER 2	SURVEY RESULTS.....	6
2.1	Hydrography.....	6
2.2	Pelagic fish on the shelf from St. Louis to Cape Timiris.....	6
2.3	Pelagic fish on the shelf from Cape Timiris to Cape Blanc.....	12
CHAPTER 3	OVERVIEW AND SUMMARY OF RESULTS.....	13
ANNEX I	Pooled length distributions by main species	
ANNEX II	Biomass and number by length	
ANNEX III	Records of fishing stations	
ANNEX IV	Instruments and fishing gear used	

CHAPTER 1 INTRODUCTION

1.1 OBJECTIVES OF THE CRUISE

The defined general objectives were to estimate and map the distribution and biomass of small pelagic fish stocks off NW Africa (Morocco, Mauritania, Senegal and The Gambia) by hydro-acoustic methods and describe the hydrographic conditions there over a period of 50 days, in November-December 1996.

For Mauritania the agreed objectives were:

- To map the distribution and estimate the biomass of the main small pelagic fish using hydroacoustic methods. The species of interest are: sardine *Sardina pilchardus*, sardinella *Sardinella aurita*, *S. maderensis*, horse mackerel *Trachurus trecae*, false scad *Decapterus rhonchus*, and anchovy *Engraulis encrasicolus*.
- To identify acoustic targets by midwater and bottom trawl sampling and process the catches by recording weight and number by species. For the target species, length frequencies will be taken to correct the acoustic densities and to describe the size distribution of the target fish populations.
- To occupy standard hydrographical transects for temperature, salinity and oxygen at about 17°20' N, off Cape Timiris and off Cape Blanc.

The time allocated for this part of the survey was 7 days.

1.2 PARTICIPATION

Members of the scientific teams were:

Centre National de Recherches Océanographiques et des Pêches, Mauritania:
Mohammed M'Barek Ould SOUEILEM (7-16/11) and Dah Ould ALIOUNE (7-16/11)

Centre de Recherches Océanographiques de Dakar-Thiaroy, Senegal:
Ibrahima SOW and Mor SYLLA

Senegalese Navy:

Ahmadou SOW

Department of Fisheries, The Gambia:

M Asberr N. MENDY and Malick SAMBA

Institute of Marine Research , Norway:

Reidar TORESEN, Oddgeir ALVHEIM, Guillermo BURGOS, Terje HAUGLAND and Tore MØRK.

1.3 NARRATIVE

After embarking the Mauritanian scientific team in Dakar on 7 November and surveying the Senegal shelf from Cayar to St Louis, the survey of the Mauritanian shelf started at the border with Senegal on November 9. Figure 1 shows the survey tracks with the fishing and hydrographic stations. Systematic triangular transects were run from about 17°30'N and northwards, with about 15 NM distance between the end points. *Sardinella* was found in abundance over the inner shelf in a nearly continuous belt south of Cape Timiris, and it was considered that the concentrations had been well covered and sampled. A higher acoustic sampling effort was applied over the broad shelf between Cape Timiris and Cape Blanc. From Cape Timiris northwards, where horse mackerel was expected to be found on the outer shelf, the survey tracks were extended in several places outside the shelf edge to see whether horse mackerel occurred over the slope.

The hydrographic profile at 17°20' N was occupied on November 12, off Cape Timiris on the 14th and off Cape Blanc on the 18th.

The survey finished in Nouadhibou on November 18.

1.4 METHODS

All catches were sampled for composition by weight and numbers of each species. The length frequency distributions of the target species were almost always taken. Total fish length was measured. The complete records of fishing stations are shown in Annex III.

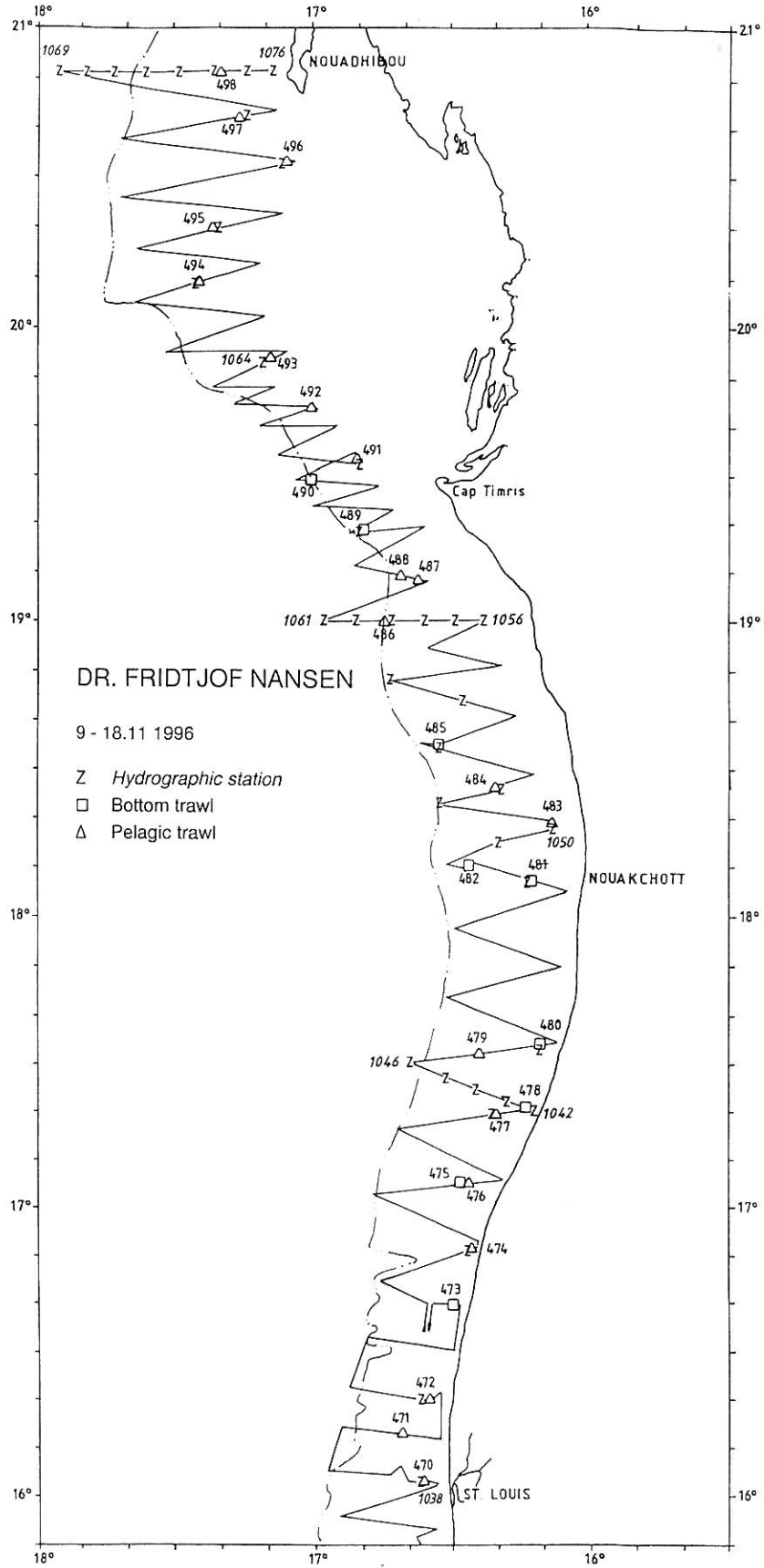


Figure 1 Course track with fishing and hydrographic stations, St. Louis to Cape Blanc.

The surface temperature and meteorological data were logged automatically and recorded with position and bottom depth every nautical mile sailed.

Hydrographical profiles were collected with a CTD sonde recording conductivity, temperature, density and oxygen content. Records of temperature, oxygen and pressure (depth) were logged and salinity calculated by the Seabird Software system. From these data series, records were selected from standard depths and presented in figures.

The acoustic biomass estimates were based on the integration technique. The Bergen Integrator (BEI) was used for analysis and allocation of S_A values. This system does not underestimate dense schools close to the bottom as may have happened with the EK500 used in the 1992 surveys.

The following target strength (TS) function was applied to convert S_A -values (mean integrator value for a given species or group of species in a specified area) to number of fish:

$$TS = 20 \log L - 72 \text{ dB}$$

or in the form
$$C_F = 1.26 \cdot 10^6 \cdot L^{-2}$$

where L is total length and C_F is the fish conversion factor. The following formula was used to calculate the density of fish in numbers/NM² in each length group:

$$\rho_i = S_A \cdot \frac{P_i}{\sum_{i=1}^n \frac{P_i}{C_{Fi}}}$$

where

ρ_i = density of fish in length group i

S_A = mean integrator value

P_i = proportion of fish in length group i

C_{Fi} = fish conversion factor for length group i

These densities are then converted to weights (biomass) by applying the condition factor for the species. Absolute biomasses are obtained by multiplying the densities by the size of the distribution area, usually obtained with a digital planimeter.

The integrator outputs were split on fish groups using a combination of behaviour pattern as deduced from echo diagrams, the BEI analysis and catch composition. Two groups were used for Mauritania: the sardinellas as one group and carangids and associated species as the other. The latter included chub mackerel, hairtails and barracudas. Catch compositions formed the basis for a further separation of biomass by species.

For the estimation of the biomass of carangids and associated species an overall average length of 23 cm and a condition factor of 0.88 were applied.

Annex IV gives a description of the instruments and the fishing gear used.

All data of fishing stations and length sampling were made available to the participants on diskettes.

CHAPTER 2 SURVEY RESULTS

2.1 HYDROGRAPHY

Figure 2 shows the distribution of temperature, salinity and oxygen in the three profiles and Figure 3, the sea surface temperature at 5 m of depth.

The distribution of surface temperature showed that over the shelf, from St. Louis to north of Nouakchott, there was a decrease offshore from 26°C to 21°C. Then there was an increase again to 24-25°C off Cape Timiris. Near the coast, however, there was in general lower temperatures than offshore. In the south, the inshore temperature was measured at about 24°C decreasing northwards to 20-21°C off Cape Timiris. In an area north of Nouakchott, water of about 20°C covered most of the shelf.

Between Cape Timiris and Cape Blanc, the surface temperature was low inshore, 19-20°C, increasing offshore to 22-23°C. Along the Cape Blanc hydrographic section, the surface temperature ranged from 17°C inshore to 21°C offshore.

The two southernmost hydrographic profiles showed a sharp thermocline, but upward sloping isotherms above 50 m depth inshore. The profile off Cape Blanc appeared affected by the front with a partly disrupted thermocline and higher surface temperatures inshore.

2.2 PELAGIC FISH ON THE SHELF FROM ST. LOUIS TO CAPE TIMIRIS

Figures 4 and 5 shows the distribution of the main groups of pelagic fish by contoured acoustic densities for the whole shelf of Mauritania.

Sardinellas were found over the inner shelf in a nearly continuous belt along the entire coast from St. Louis to some 30 NM south of Cape Timiris, see Figure 4. Particularly dense school areas were located between about 16°40'N and 17°45'N and between 18°05'N to 18°50'N where pockets of cooler water occurred, see Figure 3. Also the aggregation of sardinella at about 18°30'N coincided with a cool water pocket.

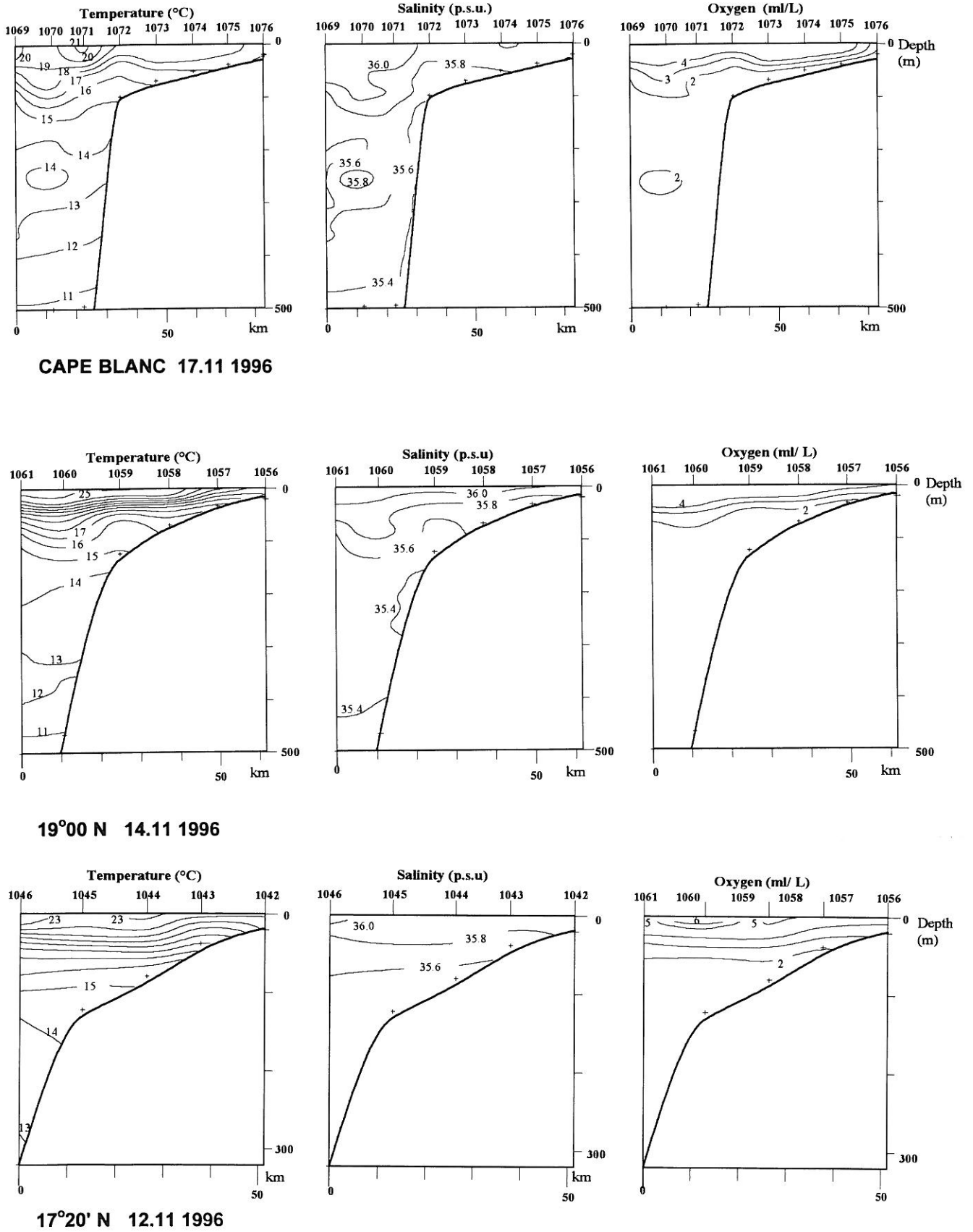


Figure 2. Hydrographic profiles with distribution of temperature, salinity and oxygen.

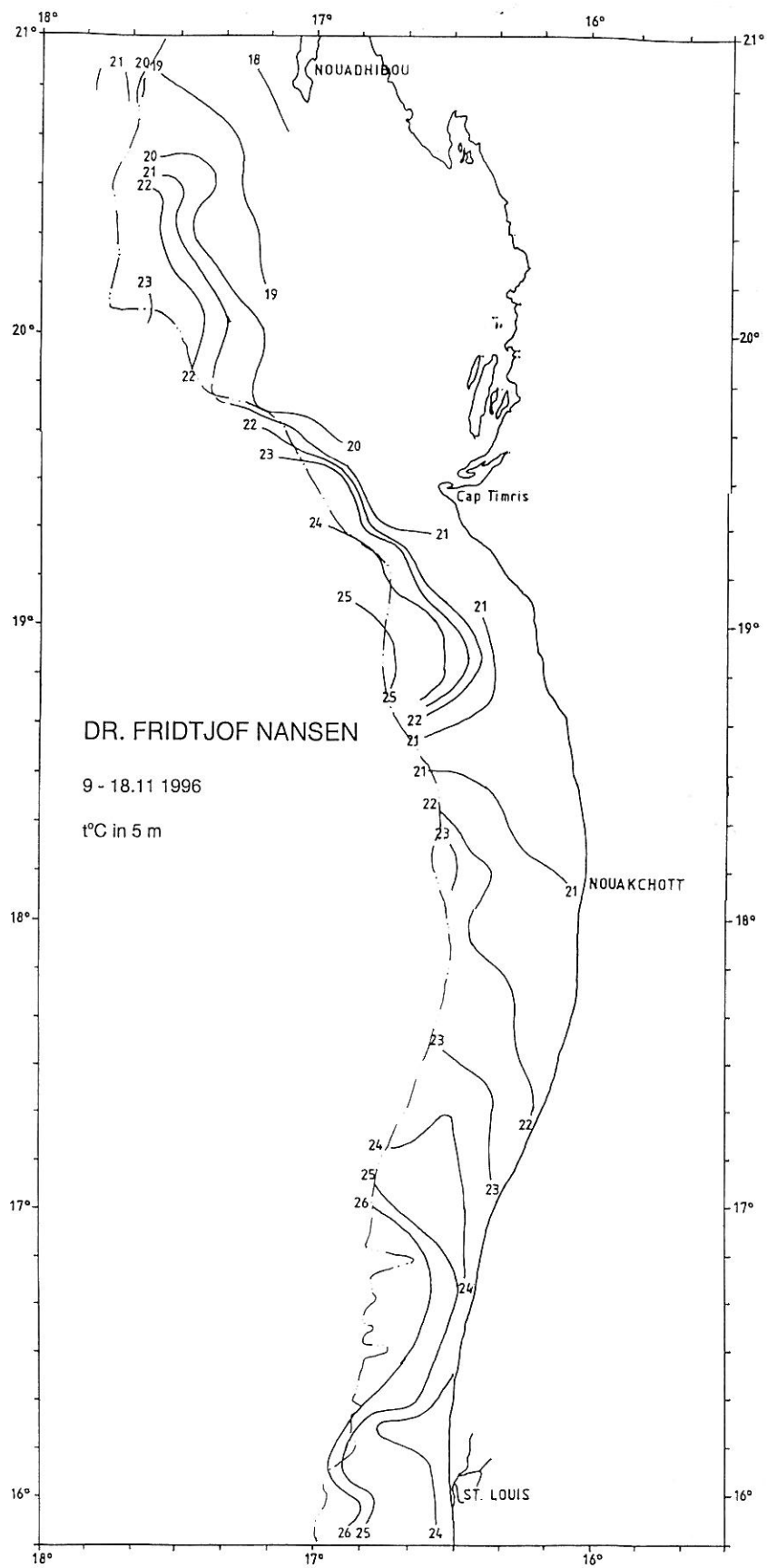


Figure 3 Sea surface temperature, St. Louis to Cape Blanc.

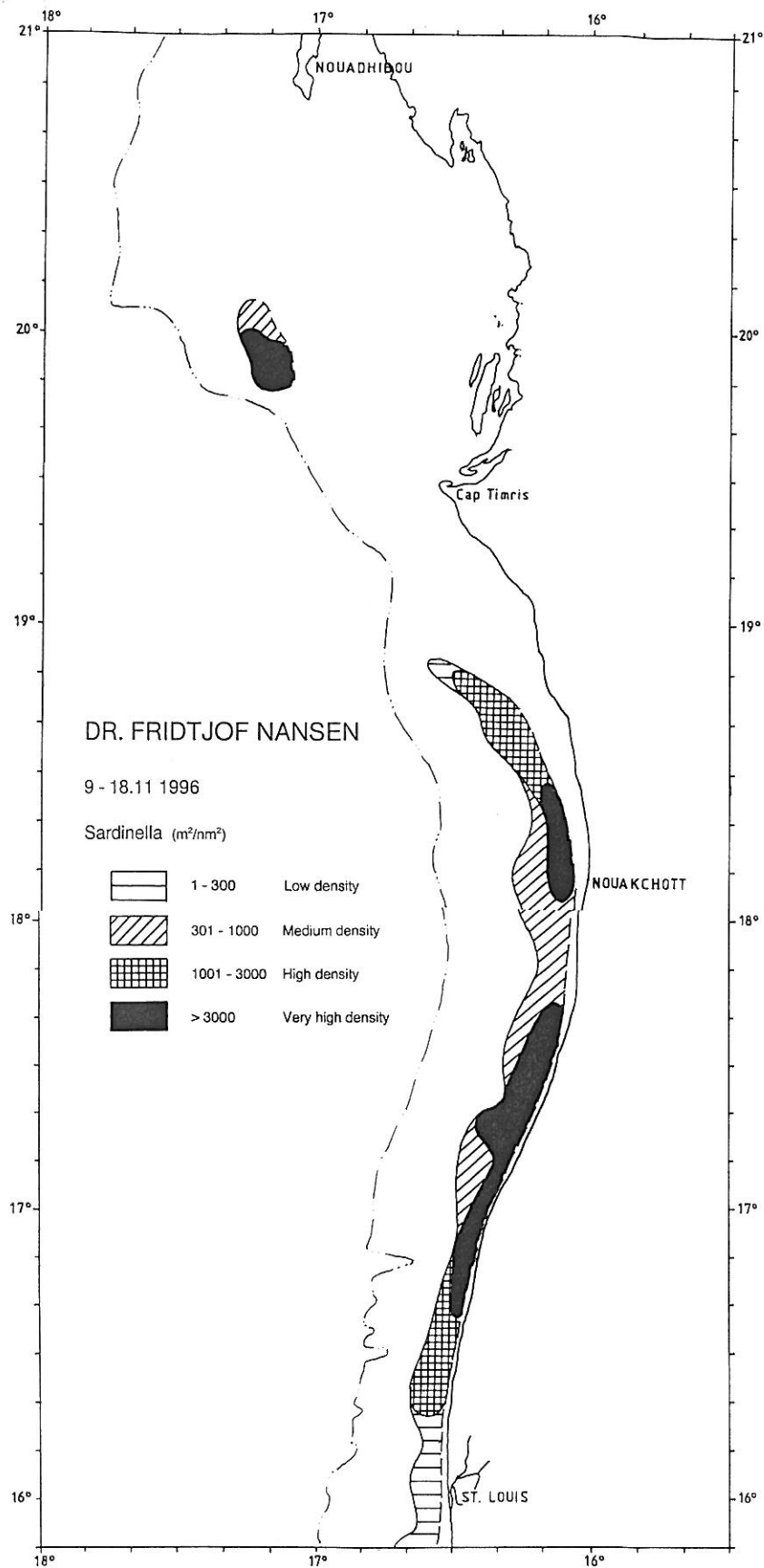


Figure 4 Distribution of sardinellas, St. Louis to Cape Blanc

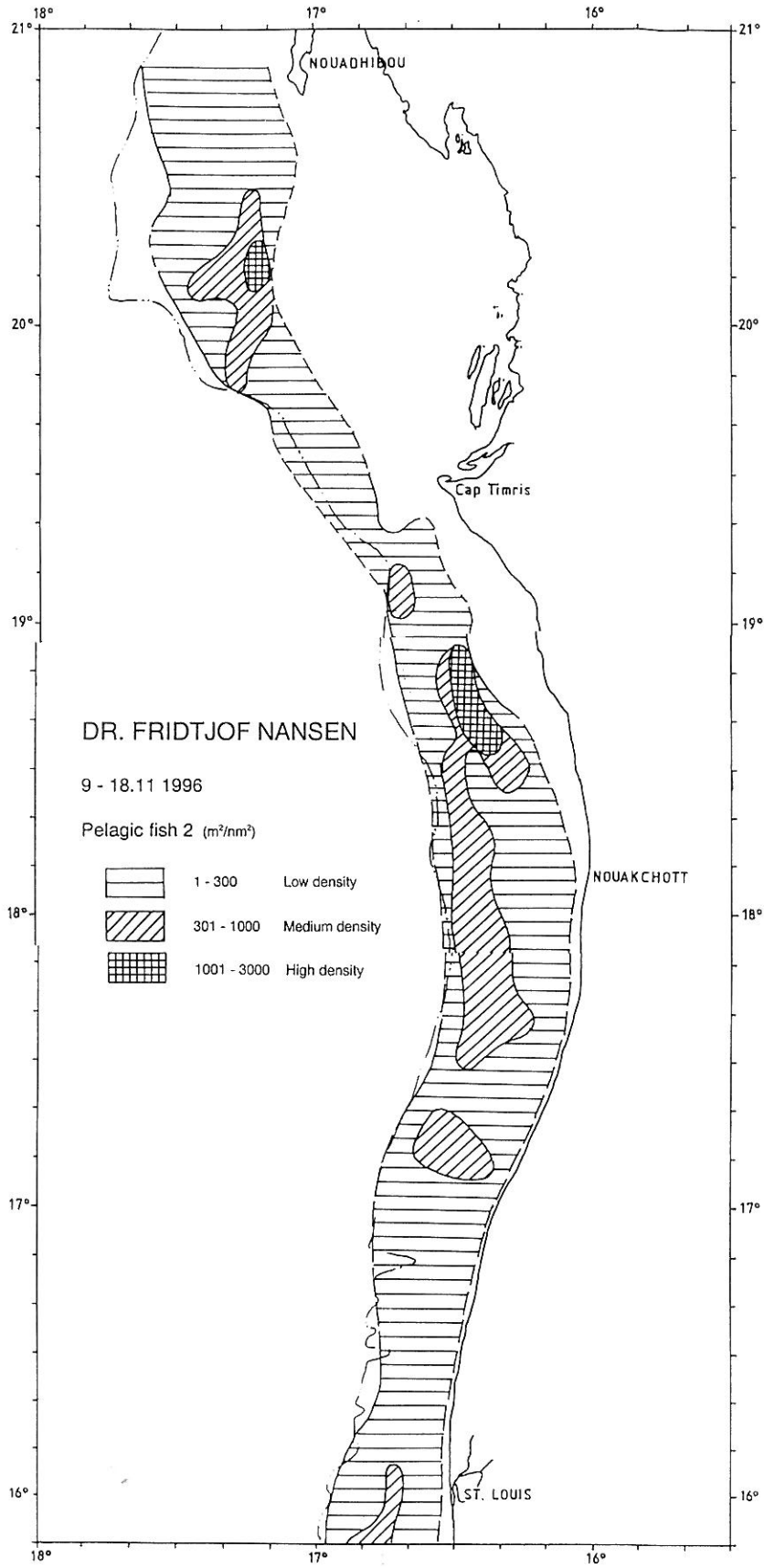


Figure 5 Distribution of carangids and associated species, St. Louis to Cape Blanc.

The body length samples in both sardinella species showed consistent large sizes in a bi-modal distribution with modes at 28 and 34 cm for round sardinella, and 25 and 31 cm for flat sardinella, see Annex I. The stock length compositions by numbers and weight are shown in Annex II.

Table 1 gives the biomass estimates of sardinellas in the area sampled, based on their size composition. The total estimate was 1.4 million tonnes of which 61% was flat- and 39% round sardinella.

Attempts were made to identify horse mackerel in the acoustic analysis, but this proved difficult since this species did not appear in any abundance in separate aggregations in the survey area. Most often it occurred in low densities mixed with other carangids and associated species, and the horse mackerels were therefore included in this group.

Figure 5 shows that the distribution of the mixed species group took the form of a continuous belt of various densities. The total biomass was estimated at 283 000 tonnes of which 83% were found in the region between 17°00'N and 19°00'N. The species composition of this group consisted mainly of horse mackerels, scad, hairtails and bumper, with small amounts of chub mackerel, *Scomber japonicus* and barracudas. By weighting the relative proportions in the samples by the density in the sampling area the composition of the most important ones were as follows:

Horse mackerel	22%
Scad	46%
Hairtails	22%
Bumper	10%

The horse mackerels were *Trachurus trecae*. *T. trachurus* were not observed in any samples during this survey.

Table 1. St. Louis to Cape Timiris. Biomass estimates of pelagic fish, 1 000 tonnes.

Flat sardinella	Round sardinella	Carangids etc.
860	545	283

2.3 PELAGIC FISH ON THE SHELF FROM CAPE TIMIRIS TO CAPE BLANC

Some 30 NM north of Cape Timiris (at about 20°00'N) a school area of rather high densities of juvenile sardinellas was recorded. Both flat and round sardinella were present, but flat sardinella dominated with modal length of 7 cm.

The aggregations of juvenile sardinella and carangids were not included in the biomass estimates of the respective groups. This is because their main distributional areas were thought to lie in shallow inshore waters which could not be covered by the survey. The patches which were surveyed would only represent incidental unknown parts of the total abundance of the juvenile stocks.

Only a few specimens of adult sardinella were caught in the trawl catches in this area, and no registrations were found in the echograms, thus, no estimate of sardinellas was made here.

Limited patches of anchovy and sardine, *Sardina pilchardus*, were recorded and identified in a few locations, mostly in shallow water inshore and often mixed with juvenile sardinellas and carangids.

The carangids and associated species were found as a continuous belt of low density shoals all the way to Cape Blanc. An area of higher density was delineated in the same area as the juvenile sardinellas were found, some 30 NM north of Cape Timiris, see Figure 4. No records of horse mackerel were made in the slope or over deep water on any of the survey tracks.

The catches of this group consisted of horse mackerels and scad with some hairtails, mackerel and Spanish mackerel *Scomberomorus tritor*. The biomass of the group was estimated at 117 000 tonnes.

CHAPTER 3 OVERVIEW AND SUMMARY OF RESULTS

The survey was conducted successfully in the period November 9 to 18 with a course track of 1 600 NM and 29 fishing stations (Figure 1). The limits of the school areas of adult fish found are thought to have been well determined and the main areas adequately sampled.

The hydrographical data showed lower surface temperatures inshore between St Louis and Cape Timiris with upward slanting isotherms shorewards from about 50 m depth. A distinct front was found west of Cape Blanc (Figures 2 and 3).

Sardinellas were found in high density between St Louis and Cape Timiris, while juveniles were found in the area between Cape Timiris and Cape Blanc (Figure 4). Carangids and associated species occurred in low densities all along the shelf, with patches of high density areas (Figure 5). No separate aggregations of horse mackerels of significant densities were located.

The total biomass of sardinellas was estimated at 1 405 000 tonnes with 61% flat and 39% round sardinella. The carangids and associated species had an estimated biomass of 190 000 tonnes (Table 2).

Table 2 Summary of biomass estimates of pelagic fish, Mauritania. 1 000 tonnes.

	Flat sardinella	Round sardinella	Carangids etc.
St.Louis-Cape Timiris	860	545	283
Cape Timiris-Cape Blanc	0	0	117
Total	860	545	400

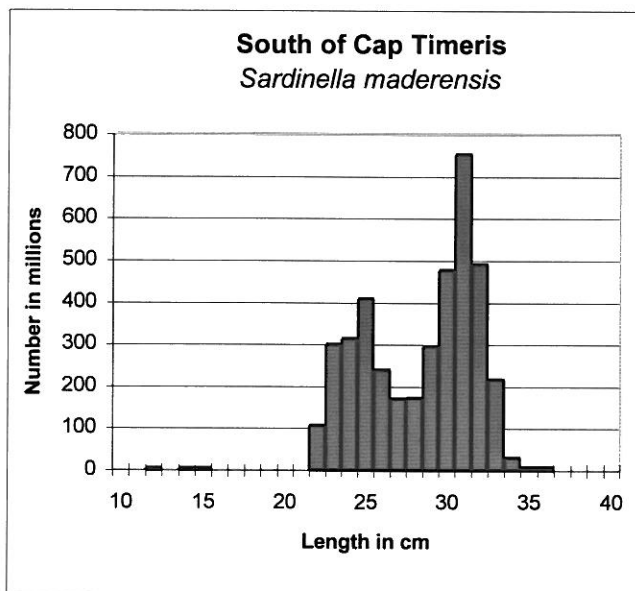
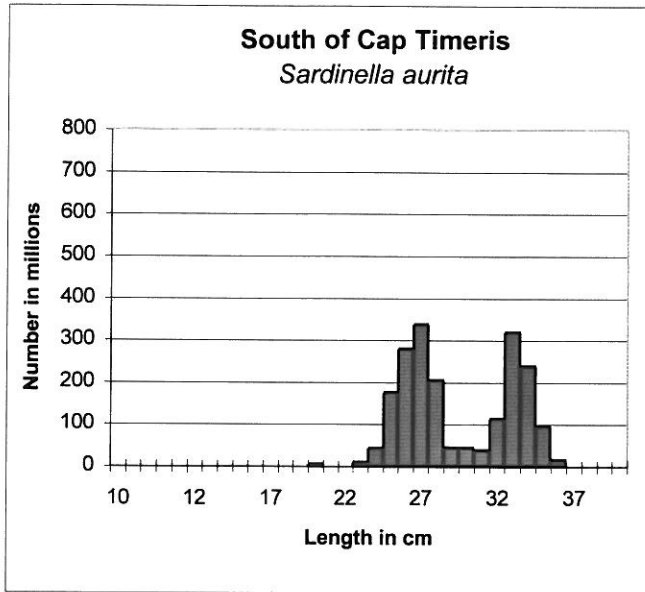
Table 3 lists biomass estimates of sardinellas and carangids and associated species from previous 'Dr Fridtjof Nansen' surveys of this shelf region. Compared with the surveys from the same season: Sept/81 and Nov-Dec/86, the estimate of 1 405 000 tonnes of sardinellas from the current survey is high but lower than the one from last year. The carangid estimate of 400 000 tonnes is somewhat lower than that from Nov-Dec/86, but significantly higher than the estimate from last year of 190 000 tonnes. Over the whole period, there has been a tendency for the biomass of carangid stocks to be high when that of the sardinellas was low and vice versa. However, this year estimates are contradictory to this.

Table 3 Biomass estimates from previous 'Dr Fridtjof Nansen' surveys of the Mauritanian shelf. 1 000 tonnes.

Survey:	Sardinellas	Carangids etc.
AprMay-81	20	370
Sept -81	75	*
FebMar-82	50	470
NovDec-86	300	540
FebMar-92	1970	190
NovDec-95	1780	190

* Not available

Annex I Pooled length distributions by species and regions



Annex II Biomass and number by length

Sardinella aurita

Length cm	C. Blanc-C. Timeris		South of Cap Timeris		Total	
	Tonnes	Millions	Tonnes	Millions	Tonnes	Millions
5	0	0	0	0	0	0
6	0	0	0	0	0	0
7	0	0	0	0	0	0
8	0	0	0	0	0	0
9	0	0	0	0	0	0
10	0	0	0	0	0	0
11	0	0	0	0	0	0
12	0	0	0	0	0	0
13	0	0	0	0	0	0
14	0	0	0	0	0	0
15	0	0	0	0	0	0
16	0	0	0	0	0	0
17	0	0	0	0	0	0
18	0	0	0	0	0	0
19	0	0	0	0	0	0
20	0	0	0	0	0	0
21	0	0	448	5.0	448	5
22	0	0	0		0	0
23	0	0	0		0	0
24	0	0	1304	9.8	1304	10
25	0	0	6295	41.9	6295	42
26	0	0	29608	174.7	29608	175
27	0	0	53033	279.2	53033	279
28	0	0	71128	336.0	71128	336
29	0	0	47873	203.9	47873	204
30	0	0	11271	43.6	11271	44
31	0	0	12635	44.8	12635	45
32	0	0	11606	37.6	11606	38
33	0	0	38075	112.5	38075	112
34	0	0	117539	318.0	117539	318
35	0	0	95792	237.9	95792	238
36	0	0	41647	95.2	41647	95
37	0	0	7131	15.0	7131	15
Total	0	0	545385	1955.1	545385	1955

Annex II cont.

Sardinella maderensis

Length cm	C. Blanc-C. Timeris		South of Cap Timeris		Total	
	Tonnes	Millions	Tonnes	Millions	Tonnes	Millions
5	0	0	0	0	0	0
6	0	0	0	0	0	0
7	0	0	0	0	0	0
8	0	0	0	0	0	0
9	0	0	0	0	0	0
10	0	0	0	0	0	0
11	0	0	0	0	0	0
12	0	0	82	5	82	5
13	0	0	0	0	0	0
14	0	0	128	5	128	5
15	0	0	156	5	156	5
16	0	0	0	0	0	0
17	0	0	0	0	0	0
18	0	0	0	0	0	0
19	0	0	0	0	0	0
20	0	0	0	0	0	0
21	0	0	0	0	0	0
22	0	0	10826	107	10826	107
23	0	0	34213	300	34213	300
24	0	0	40620	315	40620	315
25	0	0	59524	409	59524	409
26	0	0	38605	239	38605	239
27	0	0	30458	171	30458	171
28	0	0	33974	172	33974	172
29	0	0	64787	295	64787	295
30	0	0	115661	477	115661	477
31	0	0	201020	753	201020	753
32	0	0	143714	490	143714	490
33	0	0	69722	217	69722	217
34	0	0	10663	30	10663	30
35	0	0	2904	8	2904	8
36	0	0	3157	8	3157	8
37	0	0	0	0	0	0
Total	0	0	860216	4003	860216	4003

Annex III Records of fishing stations

PROJECT STATION: 470
 DATE: 9/11/96 GEAR TYPE: PT No:2 POSITION: Lat N 1602 Long W 1635
 start stop duration
 TIME :14:02:00 14:32:00 30 (min) Purpose code: 1
 LOG : 115.10 116.70 1.60 Area code : 1
 FDEPTH: 5 5 GearCond code:
 BDEPTH: 28 35 Validity code:
 Towing dir: 276° Wire out: 160 m Speed: 32 kn*10
 Sorted: 89 Kg Total catch: 89.34 CATCH/HOUR: 178.68

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Brachydeuterus auritus	49.30	458	27.59	928
Sardinella maderensis	45.20	282	25.30	927
Chloroscombrus chrysurus	32.60	218	18.24	929
Trachinotus ovatus	13.20	60	7.39	930
Pomadasy s rogeri	11.60	42	6.49	
Stromateus fiatola	6.24	10	3.49	
Galeoides decadactylus	4.96	14	2.78	
Selene dorsalis	4.96	42	2.78	
Sphyræna guachancho	4.70	12	2.63	
Scomberomorus tritor	1.42	2	0.79	
Chaetodon hoefleri	1.00	6	0.56	
Trichiurus lepturus	0.80	2	0.45	
Ilisha africana	0.74	8	0.41	
Pomadasy s jubelini	0.70	2	0.39	
Sardinella aurita	0.66	4	0.37	
Decapterus rhonchus	0.60	2	0.34	
Total	178.68		100.00	

PROJECT STATION: 471
 DATE: 10/11/96 GEAR TYPE: PT No:1 POSITION: Lat N 1612 Long W 1641
 start stop duration
 TIME :12:32:00 12:49:00 17 (min) Purpose code: 1
 LOG : 172.00 172.80 0.80 Area code : 1
 FDEPTH: 45 55 GearCond code:
 BDEPTH: 67 74 Validity code:
 Towing dir: 280° Wire out: 200 m Speed: 35 kn*10
 Sorted: 120 Kg Total catch: 1563.64 CATCH/HOUR: 5518.73

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Brachydeuterus auritus	5028.71	39092	91.12	931
Decapterus rhonchus	227.58	734	4.12	932
Trichiurus lepturus	134.44	918	2.44	
Selene dorsalis	90.39	688	1.64	
Trachurus trecae	15.60	92	0.28	
Boops boops	14.22	92	0.26	
Chloroscombrus chrysurus	7.80	46	0.14	
Total	5518.74		100.00	

PROJECT STATION: 472
 DATE: 10/11/96 GEAR TYPE: PT No:7 POSITION: Lat N 1621 Long W 1635
 start stop duration
 TIME :15:17:00 15:47:00 30 (min) Purpose code: 1
 LOG : 194.40 195.80 1.40 Area code : 1
 FDEPTH: 10 10 GearCond code:
 BDEPTH: 22 27 Validity code:
 Towing dir: 273° Wire out: 200 m Speed: 28 kn*10
 Sorted: 11 Kg Total catch: 10.60 CATCH/HOUR: 21.20

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Pomadasy s peroteti	11.10	54	52.36	
Decapterus rhonchus	2.92	10	13.77	
Sardinella maderensis	2.78	26	13.11	
Sphyræna guachancho	2.10	8	9.91	
Alectis alexandrinus	1.38	2	6.51	
Chloroscombrus chrysurus	0.50	6	2.36	
Sardinella aurita	0.24	2	1.13	
Echeneis naucrates	0.12	2	0.57	
Ilisha africana	0.06	10	0.28	
Total	21.20		100.00	

PROJECT STATION: 473
 DATE: 10/11/96 GEAR TYPE: PT No:7 POSITION: Lat N 1640 Long W 1630
 start stop duration
 TIME :21:59:00 22:18:00 19 (min) Purpose code: 1
 LOG : 254.70 255.80 1.10 Area code : 2
 FDEPTH: 10 10 GearCond code:
 BDEPTH: 20 16 Validity code:
 Towing dir: 90° Wire out: 100 m Speed: 31 kn*10
 Sorted: 36 Kg Total catch: 1440.80 CATCH/HOUR: 4549.90

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Sardinella aurita	3896.84	20381	85.65	933
Sardinella maderensis	330.95	2526	7.27	934
Decapterus rhonchus	149.05	1768	3.28	935
Chloroscombrus chrysurus	109.89	1263	2.42	
Galeoides decadactylus	31.58	1011	0.69	
Selene dorsalis	12.63	253	0.28	
Pagellus bellottii	10.11	126	0.22	
Pomadasy s incisus	8.84	126	0.19	
Total	4549.89		100.00	

PROJECT STATION: 474
 DATE: 12/11/96 GEAR TYPE: PT No:7 POSITION: Lat N 1652 Long W 1625
 start stop duration
 TIME :04:45:00 05:05:00 20 (min) Purpose code: 1
 LOG : 604.30 605.40 1.10 Area code : 2
 FDEPTH: 10 10 GearCond code:
 BDEPTH: 19 19 Validity code:
 Towing dir: 251° Wire out: 150 m Speed: 33 kn*10
 Sorted: 110 Kg Total catch: 243.67 CATCH/HOUR: 731.01

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Sardinella maderensis	254.25	1728	34.78	937
Rhizoprionodon acutus	108.45	48	14.84	
Brachydeuterus auritus	97.20	1107	13.30	938
Selene dorsalis	72.27		9.89	
Sardinella aurita	64.35	288	8.80	936
Mylibatis aquila	21.45	6	2.93	
Decapterus rhonchus	16.56	126	2.27	
Galeoides decadactylus	14.22	441	1.95	
Chloroscombrus chrysurus	13.95	180	1.91	
Sphyræna guachancho	10.62	27	1.45	
Pomadasy s incisus	10.26	45	1.40	
Alectis alexandrinus	9.63	9	1.32	
Stromateus fiatola	9.00	9	1.21	
Leptocharias smithii	7.02	9	0.96	
Argyrosomus regius	5.31	9	0.73	
Dasyatis marmorata	4.77	9	0.65	
Arius heudeloti	3.69	27	0.50	
Pagellus bellottii	3.60	18	0.49	
Sepia officinalis hierredda	1.71	18	0.23	
Penaeus notialis	1.26	153	0.17	
Pomadasy s peroteti	1.26	153	0.17	
Trachurus trecae	0.18	9	0.02	
Total	731.01		99.99	

PROJECT STATION: 475
 DATE: 12/11/96 GEAR TYPE: PT No:1 POSITION: Lat N 1705 Long W 1627
 start stop duration
 TIME :10:45:00 11:15:00 30 (min) Purpose code: 1
 LOG : 658.40 660.20 1.80 Area code : 2
 FDEPTH: 20 20 GearCond code:
 BDEPTH: 57 68 Validity code:
 Towing dir: 264° Wire out: 100 m Speed: 36 kn*10
 Sorted: 2 Kg Total catch: 2.00 CATCH/HOUR: 4.00

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Echeneis naucrates	4.00	8	100.00	
Total	4.00		100.00	

PROJECT STATION: 476
 DATE: 12/11/96 GEAR TYPE: BT No:1 POSITION: Lat N 1704 Long W 1626
 start stop duration
 TIME :12:02:00 12:32:00 30 (min) Purpose code: 1
 LOG : 665.50 667.10 1.60 Area code : 2
 FDEPTH: 50 51 GearCond code:
 BDEPTH: 50 51 Validity code:
 Towing dir: 86° Wire out: 220 m Speed: 32 kn*10
 Sorted: 150 Kg Total catch: 149.66 CATCH/HOUR: 299.32

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Decapterus rhonchus	109.10	306	36.45	939
Pagellus bellottii	58.40	408	19.51	941
Pseudupeneus prayensis	23.20	154	7.75	942
Trachurus trecae	23.00	302	7.68	940
Zeus faber	14.30	16	4.78	
Loligo vulgaris	12.82	72	4.28	
Raja miraletus	12.60	24	4.21	
Torpedo torpedo	8.00	20	2.67	
Sepia officinalis hierredda	7.50	14	2.51	
Pomadasy s incisus	5.16	22	1.72	
Octopus vulgaris	4.90	4	1.64	
Dicolloglossa cuneata	3.90	30	1.30	
Sardinella maderensis	3.58	12	1.20	
Citharus linguatula	2.88	90	0.96	
Rhinobatos rhinobatos	2.08	2	0.69	
Uranoscopus scaber	1.80	2	0.60	
Trichiurus lepturus	1.10	2	0.37	
Lagocephalus laevisgatus	0.96	28	0.32	
Dentex gibbosus	0.70	8	0.23	
Fistularia petimba	0.66	2	0.22	
Penaeus notialis	0.54	14	0.18	
Alloteuthis sp.	0.48	210	0.16	
Boops boops	0.46	42	0.15	
Bembrops heterurus	0.42	12	0.14	
OPHICHTHIDAE	0.30	2	0.10	
Arnoglossus imperialis	0.20	18	0.07	
Squilla mantis	0.12	2	0.04	
Halobatrachus didactylus	0.08	2	0.03	
Chelidonicichthys lucerna	0.08	2	0.03	
Total	299.32		99.99	

PROJECT STATION: 477
 DATE: 12/11/96 GEAR TYPE: PT No:1 POSITION: Lat N 1719 Long W 1619
 start stop duration
 TIME : 18:21:00 18:37:00 16 (min) Purpose code: 1
 LOG : 725.80 726.80 1.00 Area code : 2
 FDEPTH: 20 20 GearCond.code:
 BDEPTH: 48 54 Validity code:
 Towing dir: 270° Wire out: 110 m Speed: 40 kn*10

Sorted: 58 Kg Total catch: 87.00 CATCH/HOUR: 326.25

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Sardinella maderensis	312.75	1211	95.86	944
Sardinella aurita	13.50	41	4.14	943
Total	326.25		100.00	

PROJECT STATION: 478
 DATE: 12/11/96 GEAR TYPE: BT No:1 POSITION: Lat N 1720 Long W 1612
 start stop duration
 TIME : 20:31:00 20:41:00 10 (min) Purpose code: 1
 LOG : 737.60 738.00 0.40 Area code : 2
 FDEPTH: 19 17 GearCond.code:
 BDEPTH: 19 17 Validity code:
 Towing dir: 292° Wire out: 110 m Speed: 25 kn*10

Sorted: 67 Kg Total catch: 222.32 CATCH/HOUR: 1333.92

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Rhinoptera marginata	639.00	180	47.90	
Caleoides decadactylus	130.80		9.81	
Sardinella maderensis	114.60	468	8.59	945
Brachydeuterus auritus	76.20		5.71	
Pagellus bellottii	57.48	444	4.31	
Diplodus puntazzo	46.80	36	3.51	
Pomadasy incisus	46.20	396	3.46	
Pomadasy rogeri	36.24	108	2.72	
Arius parkii	36.00	444	2.70	
Sparus pagrus pagrus *	15.72	24	1.18	
Sparus caeruleostictus *	15.48	72	1.16	
Plectorhinchus mediterraneus	15.00	36	1.12	
Pseudupeneus prayensis	12.60	132	0.94	
Bodianus speciosus	12.00	12	0.90	
Dentex canariensis	10.80	132	0.81	
Chilomycterus reticulatus	9.00	6	0.67	
Decapterus rhonchus	8.04	36	0.60	
Epinephelus goreensis	7.92	24	0.59	
Trichiurus lepturus	7.20	36	0.54	
Diplodus vulgaris	6.96	12	0.52	
Dasyatis marmorata	6.60	6	0.49	
Raja miraletus	6.00	6	0.45	
Halobatrachus didactylus	5.52	24	0.41	
Trachurus trecae	5.28	36	0.40	
Torpedo marmorata	3.00	12	0.22	
Chaetodon hoeffleri	1.44	12	0.11	
Fistularia petimba	0.96	12	0.07	
Penaeus notialis	0.60	390	0.04	
Boops boops	0.36	36	0.03	
Trachinocephalus myops	0.12	12	0.01	
Penaeus kerathurus	0.00	12		
Total	1333.92		99.97	

PROJECT STATION: 479
 DATE: 13/11/96 GEAR TYPE: PT No:4 POSITION: Lat N 1732 Long W 1624
 start stop duration
 TIME : 02:00:00 02:30:00 30 (min) Purpose code: 1
 LOG : 780.40 781.80 1.40 Area code : 2
 FDEPTH: 5 5 GearCond.code:
 BDEPTH: 92 83 Validity code:
 Towing dir: 81° Wire out: 162 m Speed: 28 kn*10

Sorted: 37 Kg Total catch: 36.97 CATCH/HOUR: 73.94

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Trichiurus lepturus	72.50	330	98.05	
Trachurus trecae	1.38	94	1.87	946
Saurida brasiliensis	0.06	26	0.08	
Total	73.94		100.00	

PROJECT STATION: 480
 DATE: 13/11/96 GEAR TYPE: PT No:7 POSITION: Lat N 1734 Long W 1610
 start stop duration
 TIME : 04:06:00 04:25:00 19 (min) Purpose code: 1
 LOG : 794.80 795.80 1.00 Area code : 2
 FDEPTH: 10 10 GearCond.code:
 BDEPTH: 22 29 Validity code:
 Towing dir: 261° Wire out: 120 m Speed: 30 kn*10

Sorted: 103 Kg Total catch: 305.23 CATCH/HOUR: 963.88

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Sardinella aurita	489.79	1980	50.81	948
Sardinella maderensis	388.42	2236	40.10	947
Trachurus trecae	27.57	379	2.86	949
Decapterus rhonchus	9.19	38	0.95	
Dasyatis marmorata	8.91	9	0.92	
Brachydeuterus auritus	6.92	57	0.72	
Pomadasy incisus	5.68	28	0.59	
Trichiurus lepturus	5.49	9	0.57	
Spondyliosoma cantharus	5.21	9	0.54	
Sarda sarda	4.58	3	0.48	
Lagocephalus laevigatus	3.03	3	0.31	
Arius heudeloti	2.94	19	0.31	
Leptocharias smithii	2.27	9	0.24	
Pagellus bellottii	1.99	19	0.21	
Pseudupeneus prayensis	1.71	9	0.18	
Penaeus notialis	0.19	28	0.02	
Total	963.89		100.01	

PROJECT STATION: 481
 DATE: 13/11/96 GEAR TYPE: BT No:1 POSITION: Lat N 1806 Long W 1612
 start stop duration
 TIME : 15:31:00 15:47:00 16 (min) Purpose code: 1
 LOG : 906.60 907.30 0.70 Area code : 2
 FDEPTH: 25 25 GearCond.code:
 BDEPTH: 25 25 Validity code:
 Towing dir: 284° Wire out: 160 m Speed: 30 kn*10

Sorted: 13 Kg Total catch: 13.23 CATCH/HOUR: 49.61

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Decapterus rhonchus	12.75	53	25.70	950
Halobatrachus didactylus	12.08	270	24.35	
Arius heudeloti	7.65	8	15.42	
Loligo vulgaris	2.85	15	5.74	
Campogramma graycos	2.63	4	5.30	
Pistularia tabacaria	2.55	15	5.14	
Sardinella aurita	2.29	4	4.62	
Pagellus bellottii	1.43	15	2.88	
Pseudupeneus prayensis	1.05	8	2.12	
Trachinus draco	0.94	8	1.89	
Sepia officinalis hierredda	0.53	4	1.07	
Fistularia petimba	0.45	4	0.91	
Alloteuthis africana	0.15	41	0.30	
Total	49.64		100.06	

PROJECT STATION: 482
 DATE: 13/11/96 GEAR TYPE: BT No:1 POSITION: Lat N 1811 Long W 1626
 start stop duration
 TIME : 17:55:00 18:25:00 30 (min) Purpose code: 1
 LOG : 925.60 927.10 1.50 Area code : 2
 FDEPTH: 92 95 GearCond.code:
 BDEPTH: 92 95 Validity code:
 Towing dir: 170° Wire out: 340 m Speed: 30 kn*10

Sorted: 33 Kg Total catch: 256.62 CATCH/HOUR: 513.24

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Trachurus trecae	370.40	1564	72.17	951
Dentex macrophthalmus	64.00	1168	12.47	
Microchirus boscanion	31.52	4236	6.14	
Zeus faber	12.00	128	2.34	
Trichiurus lepturus	6.08	32	1.18	
Dentex maroccanus	5.44	96	1.06	
Scorpaena stephanica	5.28	176	1.03	
Pagellus bellottii	4.64	16	0.90	
Merluccius senegalensis	4.48	16	0.87	
Brotula barbata	4.00	64	0.78	
Arnoglossus imperialis	1.28	128	0.25	
Citharus linguatula	1.28	48	0.25	
Sphoeroides spengleri	1.08	2	0.21	
Liocarcinus sp	0.64	32	0.12	
Blennius normani	0.64	16	0.12	
Halobatrachus didactylus	0.32	16	0.06	
Saurida brasiliensis	0.16	32	0.03	
Total	513.24		99.98	

PROJECT STATION: 483
 DATE: 13/11/96 GEAR TYPE: PT No:7 POSITION: Lat N 1818 Long W 1608
 start stop duration
 TIME : 22:01:00 22:31:00 30 (min) Purpose code: 1
 LOG : 957.10 958.90 1.80 Area code : 2
 FDEPTH: 5 5 GearCond.code:
 BDEPTH: 13 16 Validity code:
 Towing dir: 350° Wire out: 150 m Speed: 36 kn*10

Sorted: 59 Kg Total catch: 1475.35 CATCH/HOUR: 2950.70

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Sardinella aurita	1100.00	2700	37.28	952
Decapterus rhonchus	685.00	6050	23.21	954
Sardinella maderensis	532.50	2150	18.05	953
Pomadasy incisus	214.00	1450	7.25	
Chloroscombus chrysurus	100.00	600	3.39	
Pomadasy incisus	90.00	200	3.05	
Brachydeuterus auritus	75.00	450	2.54	
Pagellus bellottii	44.00	400	1.49	
Arius parkii	29.00	200	0.98	
Plectorhinchus mediterraneus	29.00	100	0.98	
Leptocharias smithii	26.00	50	0.88	
Diplodus vulgaris	17.00	100	0.58	
Dentex canariensis	6.00	100	0.20	
Gymnura altavela	2.20	2	0.07	
Penaeus notialis	1.00	250	0.03	
Total	2950.70		99.98	

PROJECT STATION: 484
 DATE: 14/11/96 GEAR TYPE: PT No:4 POSITION: Lat N 1826 Long W 1620
 start stop duration
 TIME : 02:27:00 02:57:00 30 (min) Purpose code: 1
 LOG : 993.90 995.60 1.70 Area code : 2
 FDEPTH: 10 10 GearCond.code:
 BDEPTH: 42 38 Validity code:
 Towing dir: 42° Wire out: 160 m Speed: 32 kn*10

Sorted: 95 Kg Total catch: 94.61 CATCH/HOUR: 189.22

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Sardinella maderensis	50.80	150	26.85	955
Trachurus trecae	43.80	1834	23.15	957
Mugil sp.	39.70	32	20.98	
Trichiurus lepturus	35.40	88	18.71	
Sardinella aurita	10.90	28	5.76	956
Pomadasy rogeri	2.54	2	1.34	
Decapterus rhonchus	2.08	6	1.10	
Pomadasy incisus	1.40	6	0.74	
Selene dorsalis	1.06	2	0.56	
Scomber japonicus	1.04	10	0.55	
Sepia officinalis hierredda	0.38	2	0.20	
Sphoeroides spengleri	0.12	2	0.06	
Total	189.22		100.00	

PROJECT STATION: 485
 DATE:14/11/96 GEAR TYPE: BT No:1 POSITION:Lat N 1834
 start stop duration Long W 1633
 TIME :07:30:00 08:01:00 31 (min) Purpose code: 1
 LOG :1036.90 1038.60 1.70 Area code : 2
 FDEPTH: 139 150 GearCond code:
 BDEPTH: 139 150 Validity code:
 Towing dir: 180° Wire out: 420 m Speed: 33 kn*10
 Sorted: 9 Kg Total catch: 8.50 CATCH/HOUR: 16.45

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Trichiurus lepturus	16.45	33	100.00	
Total	16.45		100.00	

PROJECT STATION: 486
 DATE:14/11/96 GEAR TYPE: PT No:2 POSITION:Lat N 1900
 start stop duration Long W 1644
 TIME :21:55:00 22:25:00 30 (min) Purpose code: 1
 LOG :1165.90 1167.40 1.50 Area code : 2
 FDEPTH: 5 5 GearCond code:
 BDEPTH: 144 157 Validity code:
 Towing dir: 270° Wire out: 150 m Speed: 30 kn*10
 Sorted: 58 Kg Total catch: 58.04 CATCH/HOUR: 116.08

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Trichiurus lepturus	100.00	500	86.15	
Auxis thazard	14.40	26	12.41	958
Cypselurus pinnatibarbatus	1.28	2	1.10	
Scomber japonicus	0.40	4	0.34	
Total	116.08		100.00	

PROJECT STATION: 487
 DATE:15/11/96 GEAR TYPE: PT No:2 POSITION:Lat N 1908
 start stop duration Long W 1637
 TIME :03:08:00 03:38:00 30 (min) Purpose code: 1
 LOG :1206.10 1207.60 1.50 Area code : 2
 FDEPTH: 5 5 GearCond code:
 BDEPTH: 72 81 Validity code:
 Towing dir: 280° Wire out: 160 m Speed: 30 kn*10
 Sorted: 36 Kg Total catch: 35.96 CATCH/HOUR: 71.92

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Trichiurus lepturus	44.30	102	61.60	
Trachurus trecae	19.80	652	27.53	959
Sarda sarda	4.94	4	6.87	
Auxis thazard	2.42	4	3.36	
Scomber japonicus	0.20	2	0.28	
Saurida brasiliensis	0.14	54	0.19	
Sepiella ornata	0.06	4	0.08	
Penaeus notialis	0.06	6	0.08	
Total	71.92		99.99	

PROJECT STATION: 488
 DATE:15/11/96 GEAR TYPE: PT No:1 POSITION:Lat N 1910
 start stop duration Long W 1641
 TIME :04:35:00 04:45:00 10 (min) Purpose code: 1
 LOG :1213.40 1213.80 0.40 Area code : 2
 FDEPTH: 70 100 GearCond code:
 BDEPTH: 341 163 Validity code:
 Towing dir: 100° Wire out: 220 m Speed: 30 kn*10
 Sorted: 32 Kg Total catch: 32.30 CATCH/HOUR: 193.80

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Trichiurus lepturus	83.82	1860	43.25	
MYCTOPHIDAE	53.04	30648	27.37	
Trachurus trecae	27.60	66	14.24	960
Synagrops microlepis	12.12	1254	6.25	
Krill	11.16	12894	5.76	
Scomber japonicus	5.28	6	2.72	
Hoplostethus cadenati	0.78	96	0.40	
GOBIIDAE	0.00	6		
Total	193.80		99.99	

PROJECT STATION: 489
 DATE:15/11/96 GEAR TYPE: BT No:1 POSITION:Lat N 1917
 start stop duration Long W 1649
 TIME :09:48:00 10:18:00 30 (min) Purpose code: 1
 LOG :1258.60 1260.10 1.50 Area code : 2
 FDEPTH: 105 104 GearCond code:
 BDEPTH: 105 104 Validity code:
 Towing dir: 360° Wire out: 360 m Speed: 30 kn*10
 Sorted: 60 Kg Total catch: 1791.30 CATCH/HOUR: 3582.60

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Dentex macrophthalmus	2493.00	18266	69.59	963
Dentex angolensis	265.20	840	7.40	961
Dentex maroccanus	181.80	1260	5.07	962
Pagellus acarne	168.00	720	4.69	
Umbriina canariensis	159.60	660	4.45	
Scorpaena stephanica	91.80	300	2.56	
Zeus faber	58.20	60	1.62	
Trachurus trecae	58.20	300	1.62	
Scorpaena normani	55.80	60	1.56	
Merluccius senegalensis	33.60	120	0.94	
Boops boops	14.40	60	0.40	
Scomber japonicus	1.80	60	0.05	
Sphoeroides spengleri	1.20	60	0.03	
Total	3582.60		99.98	

PROJECT STATION: 490
 DATE:15/11/96 GEAR TYPE: BT No:1 POSITION:Lat N 1330
 start stop duration Long W 1701
 TIME :16:52:00 17:19:00 27 (min) Purpose code: 1
 LOG :1325.00 1326.30 1.30 Area code : 2
 FDEPTH: 175 164 GearCond code:
 BDEPTH: 175 164 Validity code:
 Towing dir: 160° Wire out: 600 m Speed: 30 kn*10
 Sorted: 29 Kg Total catch: 571.00 CATCH/HOUR: 1268.89

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Merluccius senegalensis	568.89	6211	44.83	
Helicolenus dactylopterus	231.11	7211	18.21	
Chlorophthalmus atlanticus	151.11	14004	11.91	
Scorpaena sp.	131.56	2178	10.37	
CHRISTYLIDAE	46.22	11709	3.64	
Dentex macrophthalmus	21.33	89	1.68	
Capros aper	18.67	2800	1.47	
Synagrops microlepis	16.44	1333	1.30	
Llocairenus sp	15.56	2044	1.23	
Plesionika heterocarpus	13.33	6533	1.05	
Synchiropus phaeton	12.44	711	0.98	
Lepidotrigla cadmani	12.44	178	0.98	
Malacocephalus occidentalis	10.67	533	0.84	
Monolene microstoma	8.00	311	0.63	
MYCTOPHIDAE	5.33	1333	0.42	
Sepia elegans	2.67	267	0.21	
Zeus faber	2.67	44	0.21	
Antigonia capros	0.44	44	0.03	
Total	1268.88		99.99	

PROJECT STATION: 491
 DATE:15/11/96 GEAR TYPE: PT No:7 POSITION:Lat N 1934
 start stop duration Long W 1651
 TIME :19:49:00 20:05:00 16 (min) Purpose code: 1
 LOG :1346.50 1347.30 0.80 Area code : 2
 FDEPTH: 10 10 GearCond code:
 BDEPTH: 24 25 Validity code:
 Towing dir: 140° Wire out: 150 m Speed: 31 kn*10
 Sorted: 25 Kg Total catch: 200.07 CATCH/HOUR: 750.26

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Trachurus trecae	311.25	19943	41.49	964
Pomadasy incisus	213.75	1050	28.49	965
Brachydeuterus auritus	120.75	2888	16.09	
Diplodus sargus *	41.25	75	5.50	
Decapterus rhonchus	19.13	38	2.55	
Scomberomorus tritor	15.94	8	2.12	
Penaeus notialis	12.38	675	1.65	
Pagellus bellottii	9.75	38	1.30	
Diplodus cervinus cervinus	4.95	4	0.66	
Penaeus kerathurus	1.13	38	0.15	
Total	750.28		100.00	

PROJECT STATION: 492
 DATE:16/11/96 GEAR TYPE: PT No:7 POSITION:Lat N 1945
 start stop duration Long W 1700
 TIME :03:03:00 03:33:00 30 (min) Purpose code: 1
 LOG :1411.40 1413.20 1.80 Area code : 2
 FDEPTH: 10 10 GearCond code:
 BDEPTH: 43 25 Validity code:
 Towing dir: 120° Wire out: 160 m Speed: 34 kn*10
 Sorted: 25 Kg Total catch: 99.68 CATCH/HOUR: 199.36

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Trichiurus lepturus	78.40	3496	39.33	
Brachydeuterus auritus	47.20	6016	23.68	967
Pomadasy incisus	28.80	96	14.45	
Trachurus trecae	19.68	960	9.87	966
Pomadasy proteti	18.80	24	9.43	
Penaeus notialis	2.48	120	1.24	
Pagellus bellottii	2.40	8	1.20	
Sepiella ornata	0.80	152	0.40	
Synchiropus phaeton	0.40	16	0.20	
Sepia officinalis hierredda	0.24	8	0.12	
OPHICHTHIDAE	0.16	8	0.08	
Total	199.36		100.00	

PROJECT STATION: 493
 DATE:16/11/96 GEAR TYPE: PT No:7 POSITION:Lat N 1954
 start stop duration Long W 1708
 TIME :09:18:00 09:48:00 30 (min) Purpose code: 1
 LOG :1467.50 1468.80 1.30 Area code : 2
 FDEPTH: 10 10 GearCond code:
 BDEPTH: 23 25 Validity code:
 Towing dir: 245° Wire out: 150 m Speed: 26 kn*10
 Sorted: 63 Kg Total catch: 106.64 CATCH/HOUR: 213.28

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Trichiurus lepturus	100.00	212	46.89	
Scomberomorus tritor	82.00	84	38.45	968
Sardinella maderensis	14.80	3720	6.94	970
Decapterus rhonchus	6.40	2920	3.00	971
Pomadasy rogeri	4.00	4	1.88	
Sardinella aurita	2.00	880	0.94	969
Rhizoprionodon acutus	0.82	2	0.38	
Diplodus sargus *	0.80	2	0.38	
Stromateus fiatola	0.74	2	0.35	
Sphyræna sphyraena	0.62	2	0.29	
Pomadasy incisus	0.48	2	0.23	
Zeus faber	0.38	2	0.18	
Fistularia petimba	0.24	4	0.11	
Total	213.28		100.02	

PROJECT STATION: 494
 DATE:16/11/96 GEAR TYPE: PT No:2 POSITION:Lat N 2008
 start stop duration Long W 1723
 TIME :20:10:00 20:40:00 30 (min) Purpose code: 1
 LOG :1507.40 1509.10 1.70 Area code : 2
 FDEPTH: 5 5 GearCond code:
 BDEPTH: 31 36 Validity code:
 Towing dir: 260° Wire out: 150 m Speed: 34 kn*10

Sorted: 112 Kg Total catch: 1000.80 CATCH/HOUR: 2001.60

SPECIES	CATCH/HOUR		% OF TOT	C	SAMP
	weight	numbers			
Scomberomorus tritor	1540.80	992	76.98		972
Engraulis encrasicolus	336.00	42640	16.79		973
Decapterus rhonchus	60.00	180	3.00		
Stromateus fiatola	30.00	30	1.50		
Pomadasy incisis	21.00	30	1.05		
Campogramma glaycos	12.00	30	0.60		
Trachurus trecae	1.80	90	0.09		
Total	2001.60		100.01		

PROJECT STATION: 495
 DATE:17/11/96 GEAR TYPE: PT No:2 POSITION:Lat N 2021
 start stop duration Long W 1722
 TIME :03:37:00 04:07:00 30 (min) Purpose code: 1
 LOG :1634.20 1635.90 1.70 Area code : 2
 FDEPTH: 5 5 GearCond code:
 BDEPTH: 35 31 Validity code:
 Towing dir: 175° Wire out: 150 m Speed: 32 kn*10

Sorted: 102 Kg Total catch: 109.31 CATCH/HOUR: 218.62

SPECIES	CATCH/HOUR		% OF TOT	C	SAMP
	weight	numbers			
Stromateus fiatola	75.00	74	34.31		
Scomberomorus tritor	41.40	22	18.94		
Trachurus trecae	39.48	1242	18.06		976
Trachinotus ovatus	18.60	32	8.51		
Sardinella maderensis	9.68	182	4.43		974
Campogramma glaycos	8.40	8	3.84		
Decapterus rhonchus	6.50	16	2.97		
Sardina pilchardus	6.24	268	2.85		975
Arius heudeloti	4.12	2	1.88		
Pomadasy rogeri	2.88	2	1.32		
Trichiurus lepturus	2.70	4	1.24		
Scomber japonicus	1.26	18	0.58		
Loligo vulgaris	1.18	46	0.54		
Pagellus bellottii	0.78	36	0.36		
Boops boops	0.40	4	0.18		
Trachurus trachurus	0.00				
Decapterus punctatus	0.00				
Total	218.62		100.01		

PROJECT STATION: 496
 DATE:17/11/96 GEAR TYPE: BT No:1 POSITION:Lat N 2033
 start stop duration Long W 1705
 TIME :12:59:00 13:14:00 15 (min) Purpose code: 1
 LOG :1722.70 1723.60 0.80 Area code : 2
 FDEPTH: 25 27 GearCond code:
 BDEPTH: 25 27 Validity code:
 Towing dir: 258° Wire out: 160 m Speed: 32 kn*10

Sorted: 162 Kg Total catch: 208.93 CATCH/HOUR: 835.72

SPECIES	CATCH/HOUR		% OF TOT	C	SAMP
	weight	numbers			
Scomberomorus tritor	563.40	448	67.41		
Diplodus bellottii	162.40	2240	19.43		
Decapterus rhonchus	33.60	1808	4.02		978
Trachurus trecae	27.68	864	3.31		
Engraulis encrasicolus	16.48	8752	1.97		977
Sardinella aurita	11.04	208	1.32		979
Campogramma glaycos	9.40	12	1.12		
Orcynopsis unicolor	6.56	4	0.78		
Pomadasy incisis	3.84	16	0.46		
Sphyaena sphyraena	1.32	4	0.16		
Trichiurus lepturus	0.00	4			
Total	835.72		99.98		

PROJECT STATION: 497
 DATE:17/11/96 GEAR TYPE: PT No:2 POSITION:Lat N 2042
 start stop duration Long W 1716
 TIME :19:41:00 20:12:00 31 (min) Purpose code: 1
 LOG :1786.50 1788.10 1.60 Area code : 2
 FDEPTH: 5 5 GearCond code:
 BDEPTH: 41 41 Validity code:
 Towing dir: 80° Wire out: 160 m Speed: 31 kn*10

Sorted: 27 Kg Total catch: 26.62 CATCH/HOUR: 51.52

SPECIES	CATCH/HOUR		% OF TOT	C	SAMP
	weight	numbers			
Trichiurus lepturus	25.55	29	49.59		
Euthynnus alletteratus	20.32	6	39.44		
Loligo vulgaris	5.42	10	10.52		
Scomber japonicus	0.23	2	0.45		
Total	51.52		100.00		

PROJECT STATION: 498
 DATE:18/11/96 GEAR TYPE: PT No:2 POSITION:Lat N 2051
 start stop duration Long W 1721
 TIME :06:43:00 07:13:00 30 (min) Purpose code: 1
 LOG :1878.60 1880.80 1.80 Area code : 2
 FDEPTH: 5 5 GearCond code:
 BDEPTH: 59 47 Validity code:
 Towing dir: 90° Wire out: 160 m Speed: 36 kn*10

Sorted: 4 Kg Total catch: 4.00 CATCH/HOUR: 8.00

SPECIES	CATCH/HOUR		% OF TOT	C	SAMP
	weight	numbers			
Sarda sarda	5.20	6	65.00		
Trichiurus lepturus	2.00	2	25.00		
Loligo vulgaris	0.80	2	10.00		
Total	8.00		100.00		

Annex IV Instruments and fishing gear used

The Simrad EK-500/38kHz scientific sounder was used during the survey for fish abundance estimation. The Bergen Echo Integrator system (BEI) was used to scrutinize the acoustic records from the 38kHz echo sounder, and to allocate integrator values to fish species.

The details of the settings of the 38kHz echo sounder where as follows:

Tranceiver-1 menu (38 kHz lowering keel)

Transducer depth	0.00 m
Absorbtion coeff.	10 dB/km
Pulse length	medium (1ms)
Bandwidth	wide
Max power	2000 Watt
2-way beam angle	-21.0 dB
SV transducer gain	28.1 dB
TS transducer gain	28.0 dB
Angle sensitivity	21.9
3 dB beamwidth	6.8 dg
Alongship offset	0.00 "
Athwardship offset	0.04 "

Display menu

Echogram	1 (38 kHz)
Bottom range	12 m
Bottom range start	10 m
Sv colour min	-67 dB

Printer- menu

Echogram	1 (38 kHz)
Range	100, 250 and 500 m
Range start	0
Bottom range	12 m
Bottom range start	10 m
Sv colour min	-67 dB
TVG	20 log R

Bottom detection menu Minimum level -50 dB

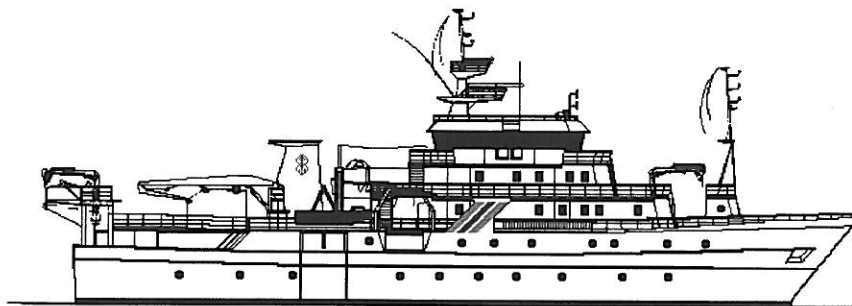
Fishing gear

The vessel has two different sized "Åkrahamn" pelagic trawls and one "Gisund super bottom trawl". Both the bottom trawl and the smallest pelagic trawl were used during the survey.

The bottom trawl has a headline of 31 m, footrope 47 m and 20 mm meshsize in the codend with an innernet of 10 mm meshsize. The estimated opening is 6 m (observed 5.7) and distance between wings during towing about 18 m. The sweeps are 40 m long. The trawl is equipped with a 12" rubber bobbins gear. The doors are of 'Thyborøn' combi type, 7.81 m², 1670 kg, their distance while trawling is about 46 m in average.

The SCANMAR system was used on all trawl hauls. This equipment consists of sensors, a hydrophone, a receiver, a display unit and a battery charger. Communication between sensors and ship is based on acoustic transmission. The doors are fitted with sensors to provide information on their distance and a height sensor is fitted to the bottom trawl to measure the trawl opening and to provide information on clearance and bottom contact..

The pelagic trawl is equipped with a trawl-eye that provides information on the trawl opening and the distance from the footrope to the bottom.



**SURVEY OF THE PELAGIC FISH RESOURCES
OFF NORTH WEST AFRICA**

Cruise Report No 9/96

Part III MOROCCO

20 November- 20 December 1996

CRUISE REPORTS 'DR. FRIDTJOF NANSEN'

**SURVEY OF THE PELAGIC FISH RESOURCES
OFF NORTH WEST AFRICA**

Cruise Report No 9/96

**Part III MOROCCO
20 November - 20 December 1996**

by

T. Strømme

and

R. Toresen

Institute of Marine Research
P.O. box 1870 Nordnes
N-5024 Bergen, Norway

**Institute of Marine Research
Bergen, 1996**

TABLE OF CONTENTS

CHAPTER 1	INTRODUCTION	1
1.1	Survey Objectives	1
1.2	Participation	1
1.3	Narrative	2
1.4	Methods	5
CHAPTER 2	SURVEY RESULTS	9
2.1	Hydrography and weather conditions	9
2.2	Pelagic fish on the shelf from Cape Blanc to Cape Juby	14
2.3	Pelagic fish on the shelf from Cape Juby to Cape Cantin	23
CHAPTER 3	CONCLUDING REMARKS	28
ANNEX I	Biomass and number by fish length class	
ANNEX II	Records of fishing stations	
ANNEX III	Instruments and fishing gear used	

SIMRAD, Norway: Erik FRØNES, Tore Werner HANSEN

Christian Michelsen Research (CMR), Norway: Per Erik NORDBØ

1.3 NARRATIVE

The survey started on November 20, three days after schedule due to delayed arrival of the Moroccan scientific team. The survey started from Cape Blanc northwards and the region up to Cape Bojador was surveyed during the first 10 days by parallel transects 15 nm apart. Close to shore, a denser coverage was carried out by triangular transects. Figure 1 (a-b) shows the survey tracks and the fishing and hydrographic stations. Between Cape Dra and Cape Juby the survey track on the outer shelf was opened to 20 nm due to poor fish recordings. On November 29 the vessel called on Las Palmas for crew exchange, refuelling and mounting of an updated sonar system. The sonar was tested while steaming to Agadir where a call was made on December 7. The acoustic survey was continued from Cape Cantin working southwards. Two short calls were made at Agadir anchorage to disembark the sonar specialists on December 11 and 13. For the area north of Agadir the transect distance was about 10 nm while between Agadir and Cape Juby the shallow areas were surveyed during daytime with triangular transects about 8 nm apart, while the outer shelf was surveyed at night time with about 20 nm transect distance.

The vessel arrived at Las Palmas on December 20. Moroccan scientists disembarked on December 23 and the Norwegian scientific team disembarked on the 21st and the 22nd.

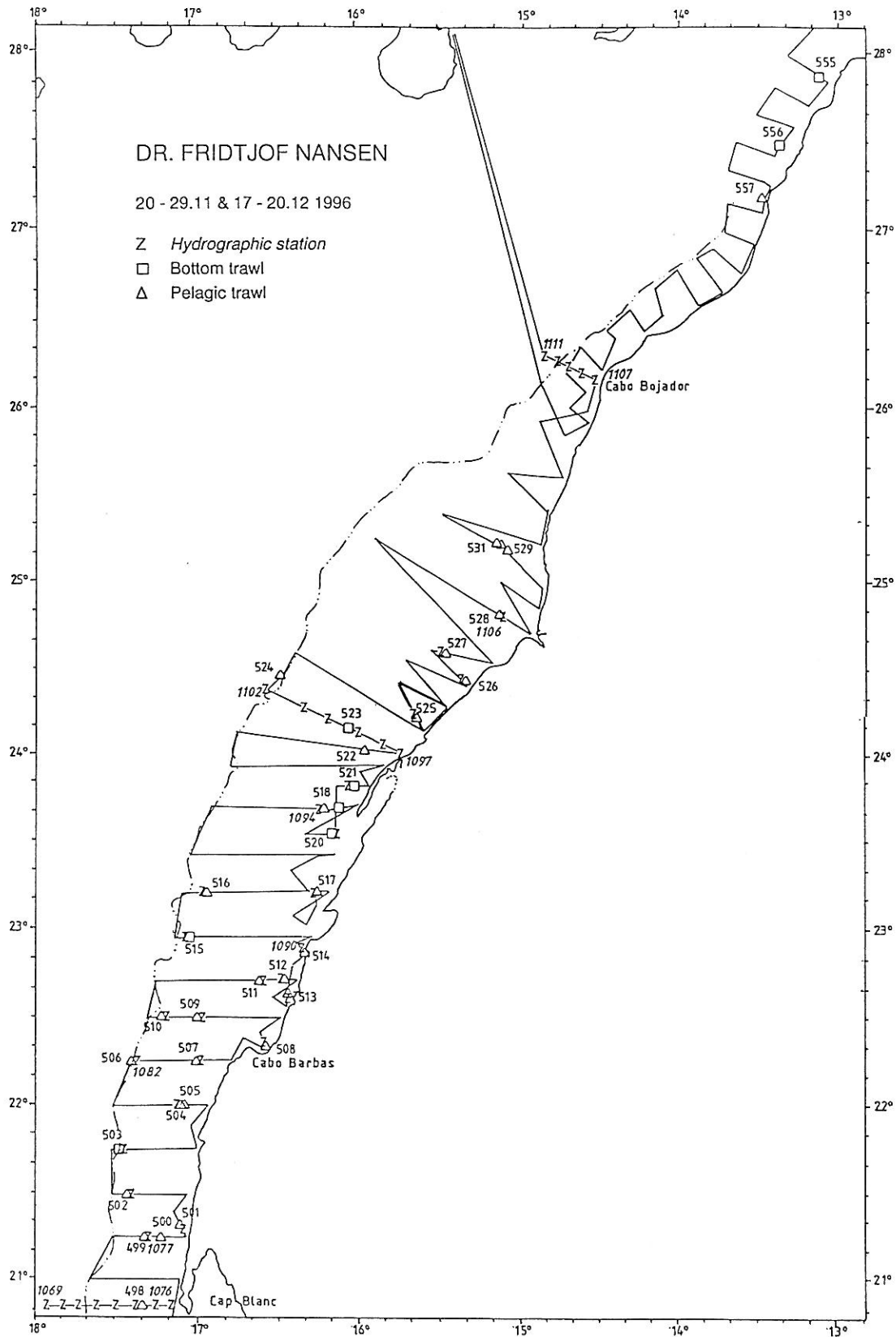


Figure 1a Course track with fishing and hydrographic stations, Cape Blanc to Cape Jubi.

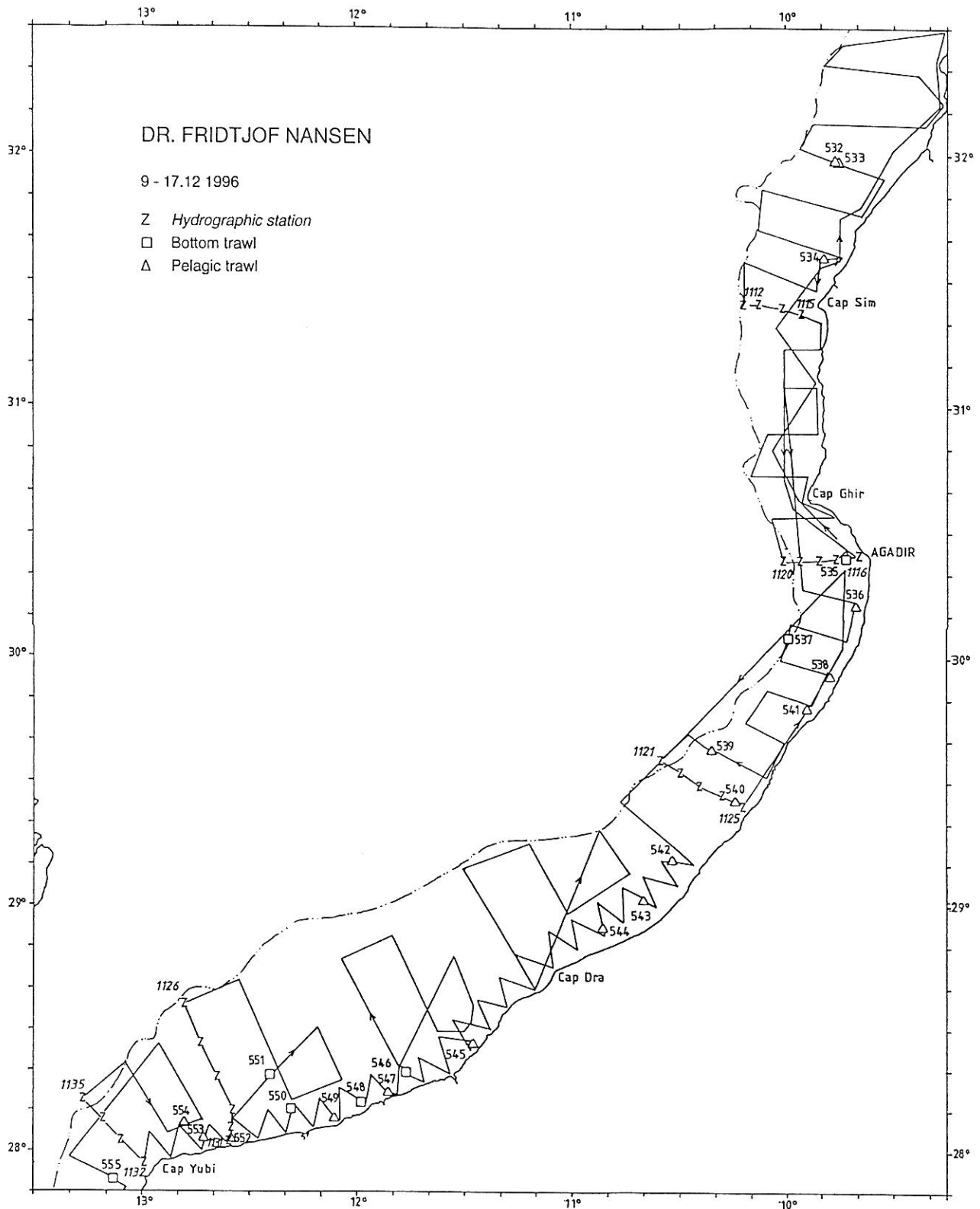


Figure 1b Course track with fishing and hydrographic stations, Cape Yubi to Cape Cantin.

1.4 METHODS

All catches were sampled for weight and numbers of each species. Length measurements (total body length) were taken for target species. The complete records of all fishing stations are shown in Annex II.

The surface temperature and meteorological data were logged automatically and recorded with position and bottom depth every nautical mile sailed.

Hydrographic profiles were collected with a CTD sonde. Temperature, salinity, oxygen and pressure (depth) were logged by the Seabird Software. From these data series, records were selected at standard depths and presented in figures.

The acoustic biomass estimates were based on the integration technique. The Bergen Integrator (BEI) was used for analysis and allocation of S_A values by species based on the composition in the trawl catches and on the characteristics of the acoustic traces. The BEI system allows a better discrimination between bottom signals and dense schools close to the bottom than the previous EK500 system used during the 1992 surveys. In addition the amplifiers in the EK500 do not saturate on dense schools, as it could have been a problem with previous technology. These sources of bias are thus much reduced with the present system.

The integrator values are plotted out in a working map and aggregations of fish are contoured, the mean integrator value of each aggregation is calculated and the areas are digitized and measured by computer software.

The following target strength (TS) function was applied to convert S_A -values (mean integrator value for a given species or group of species in a specified area) to number of fish:

$$TS = 20 \log L - 72$$

This is the same equation as used in previous surveys.

The biomass density in numbers/nm² of a length group i is calculated from the formula:

$$\rho_i = \frac{1}{4\pi} * \bar{s}_a \frac{n_i}{\sum_{i=\min}^{\max} n_i k_i} \quad \text{where} \quad k_i = 10^{2 \log l_i - 7.2}$$

For TS = 20log L - 72 the formula can be further simplified into:

$$\rho_i = 1261217 * \bar{s}_a \frac{n_i}{\sum_{i=\min}^{\max} n_i l_i^2}$$

where \bar{s}_a = mean integrator value of a species within an aggregation area, in m²/nm²

n_i = frequency count of length group i in a pooled representative sample from the distribution area.

l_i = mid length of fish in length group i .

The constant 1261217 incorporates the TS equation with its constant -72. For other TS relationships the equation constant is:

TS constant	Equation constant
-74	1998895
-73	1587779
-72	1261217
-71	1001821
-70	795774
-69	632106
-68	502099

The densities are then converted from numbers to weight by applying a condition factor for the species, obtained from the samples. Abundance, in number and weight, is obtained by multiplying the densities by the area of the aggregations. These calculations can easily be carried out in a spreadsheet where inputs are the length distribution, the mean integrator value and the area (in nm^2).

The above equation shows that the conversion from S_A -value into number of fish is dependant on the size composition of the fish. In general there are many problems associated with getting representative length distributions when the various size classes are geographically segregated. When no segregation occurs the various length distributions are pooled together with equal importance. Otherwise, when the size distribution varies with the sampling site, a weighting factor is applied that takes into account the density at the location. In most cases, the mean acoustic density at the location of the sample is the most representative index of this fish density.

A systematic approach to a) produce pooled length distributions of a target species for use in the above equation and b) calculate the biomass estimates for a region, are obtained through the following procedure:

- Each trawl station gets an integrator value as a density index for the sampling site.
- Representative length distributions are selected from all the collected samples of a fish aggregation.
- The mean back scattering strength of each of these length frequency distributions is calculated.
- The selected length distributions are then pooled using the ratio between the allocated S_A value and the mean back scattering strength as the weighting factor. (If the size distribution is geographically uniform the three steps mentioned above can be skipped and the samples are pooled together with equal importance.)
- The pooled length distribution is used together with the mean S_A value to calculate the biomass in numbers by length groups, for each area in the map, using the above formula. Numbers are converted to weight using the condition factor.
- Biomass is calculated as the product of the density and the area of the aggregation, and finally the area-related biomass values in a region are summed together.

The necessary calculations are done in NAN-SIS software after the scientist has completed the two first steps in the above list manually.

The two sardinellas were treated as one species during the scrutinizing process and the mean S_A values were later separated by species (*S. aurita* and *S. maderensis*) according to the catch rates and the length distributions of the two species. The same procedure was applied to the horse mackerel data.

Annex III gives a description of the instruments and the fishing gear used.

CHAPTER 2 SURVEY RESULTS

2.1 HYDROGRAPHY AND WEATHER CONDITIONS

Figure 2 shows the distribution of temperature, salinity and oxygen in the eight sections and Figure 3 (a-b) the sea surface temperature at 5 m depth. The distribution of surface temperature showed well developed coastal upwelling in the survey area. Upwelling cells are located off Cape Sim, North of Cape Dra and between Cape Juby and Cape Barbas. The same pattern is reflected in the transects. There are no signs of oxygen depletion in the water over the shelf.

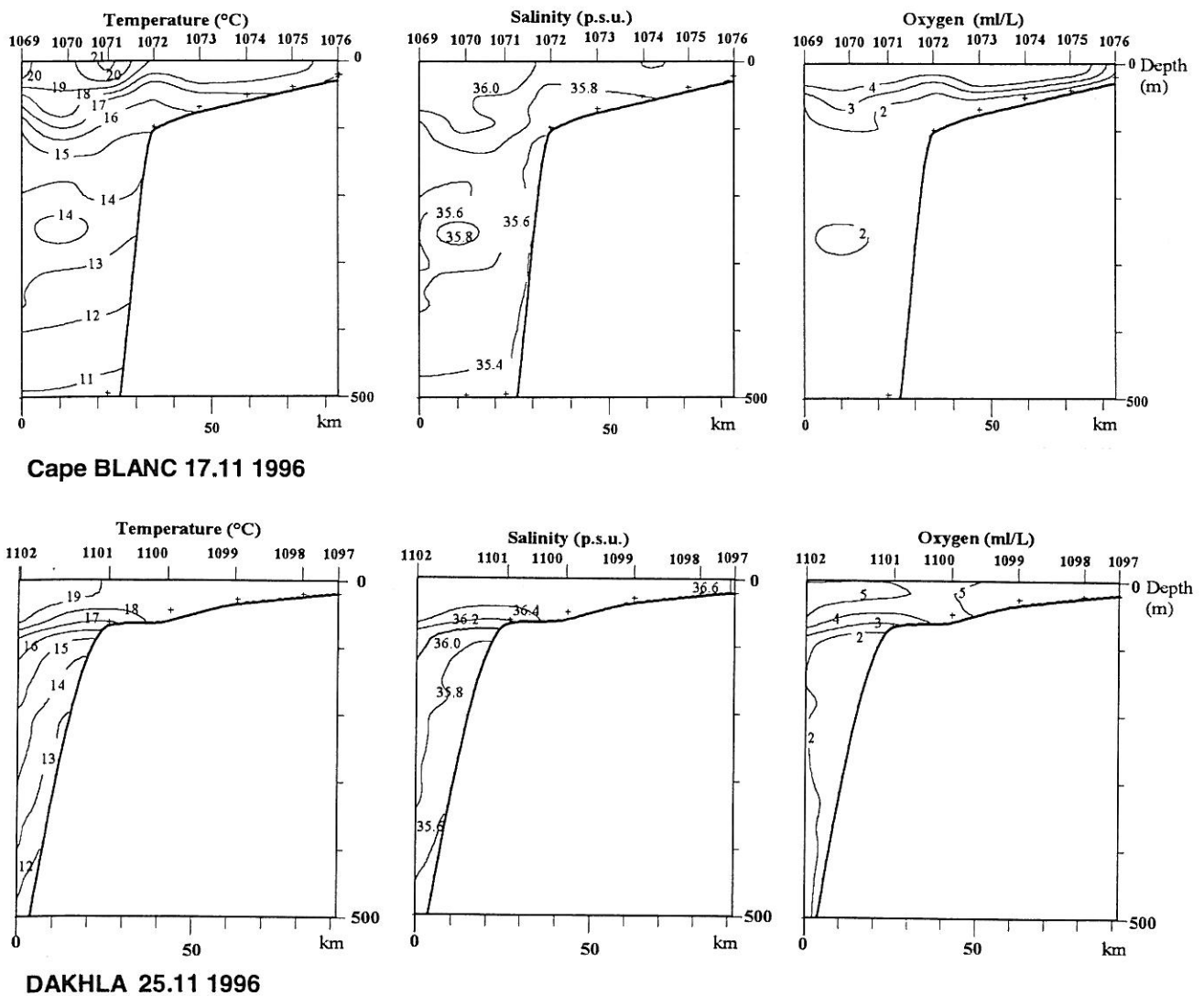
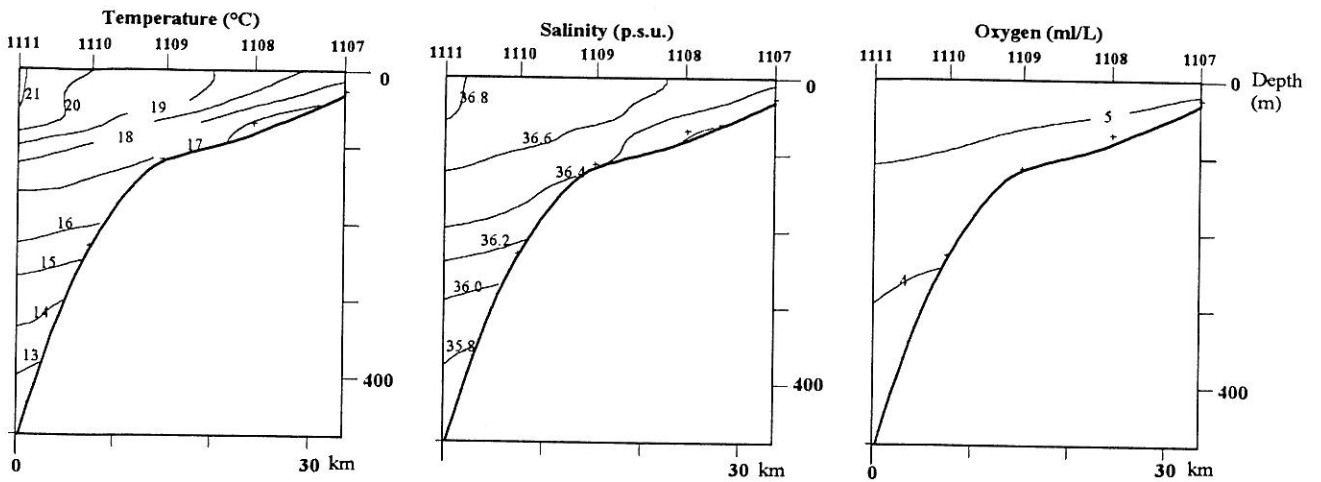
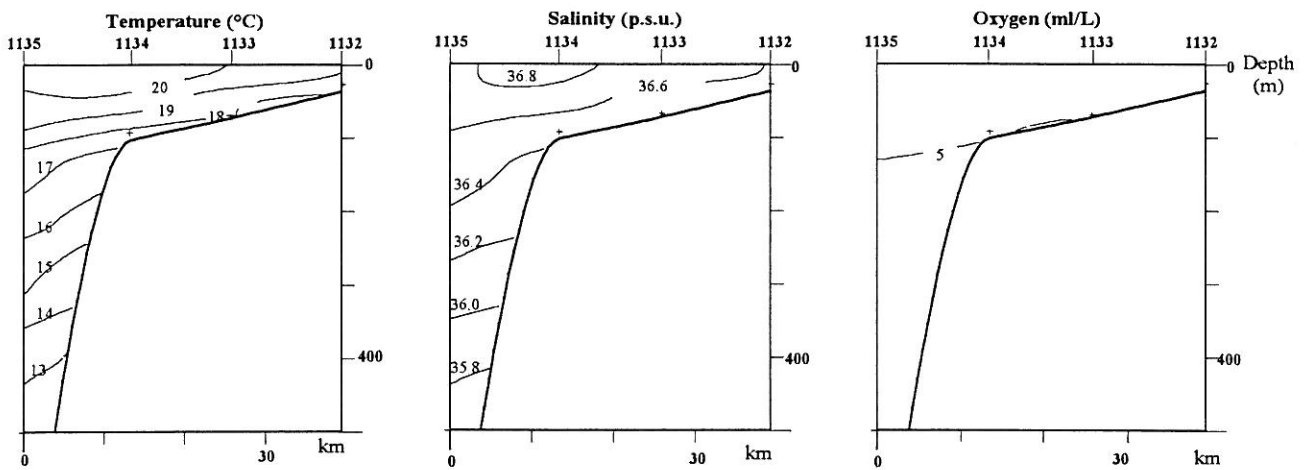


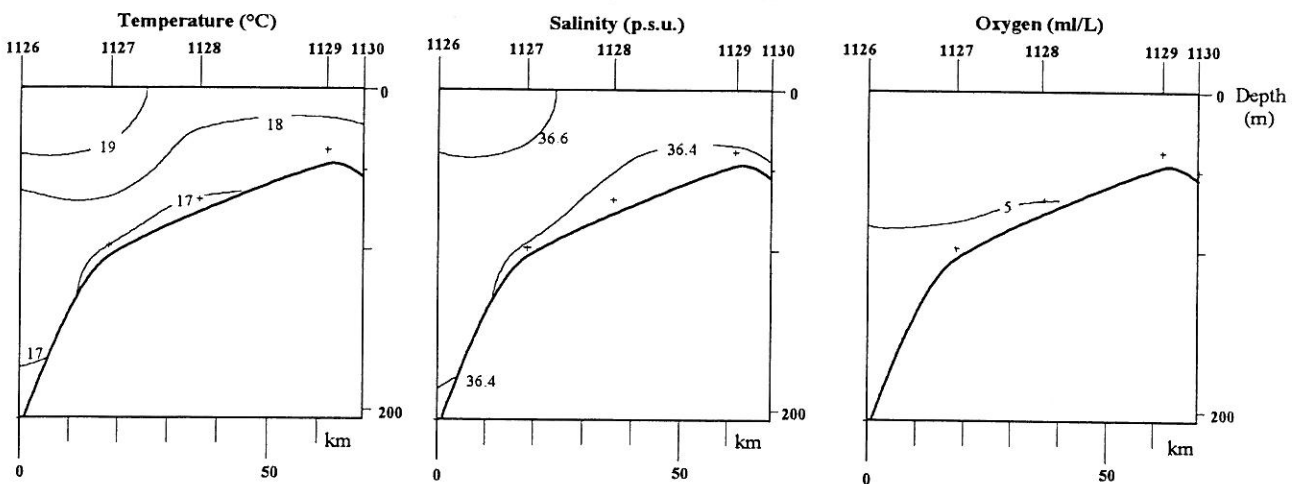
Figure 2 Hydrographic profiles with distribution of temperature, salinity and oxygen.



Cape BOJADOR 27.11 1996

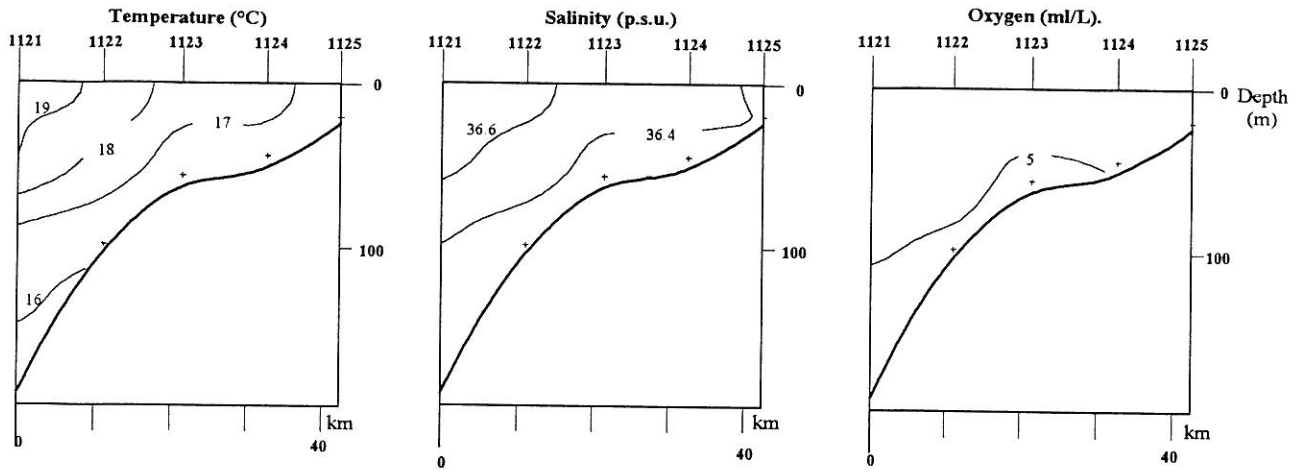


Cape JUBY 17.12 1996

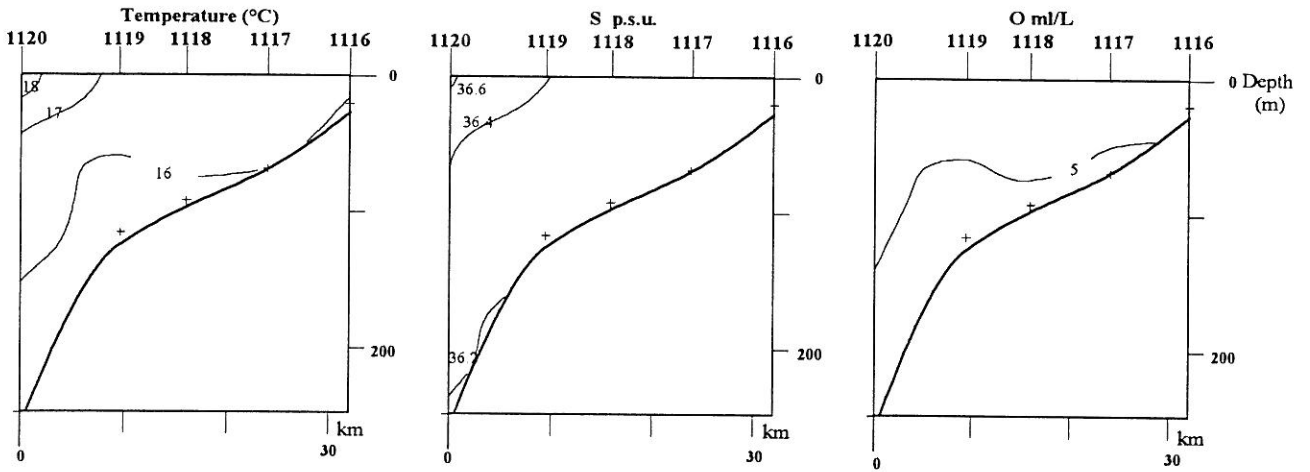


12° 30 W 17.12 1996

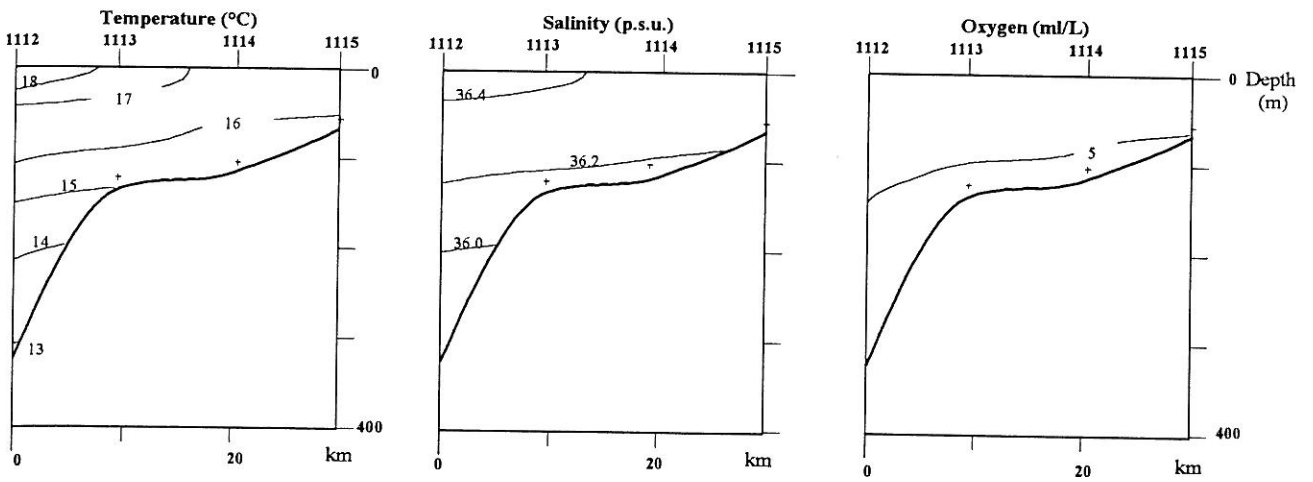
Figure 2 cont. Hydrographic profiles with distribution of temperature, salinity and oxygen.



SIDI IFNI 13.12 1996



AGADIR 11.12 1996



CAPE SIM 11.12 1996

Figure 2 cont. Hydrographic profiles with distribution of temperature, salinity and oxygen

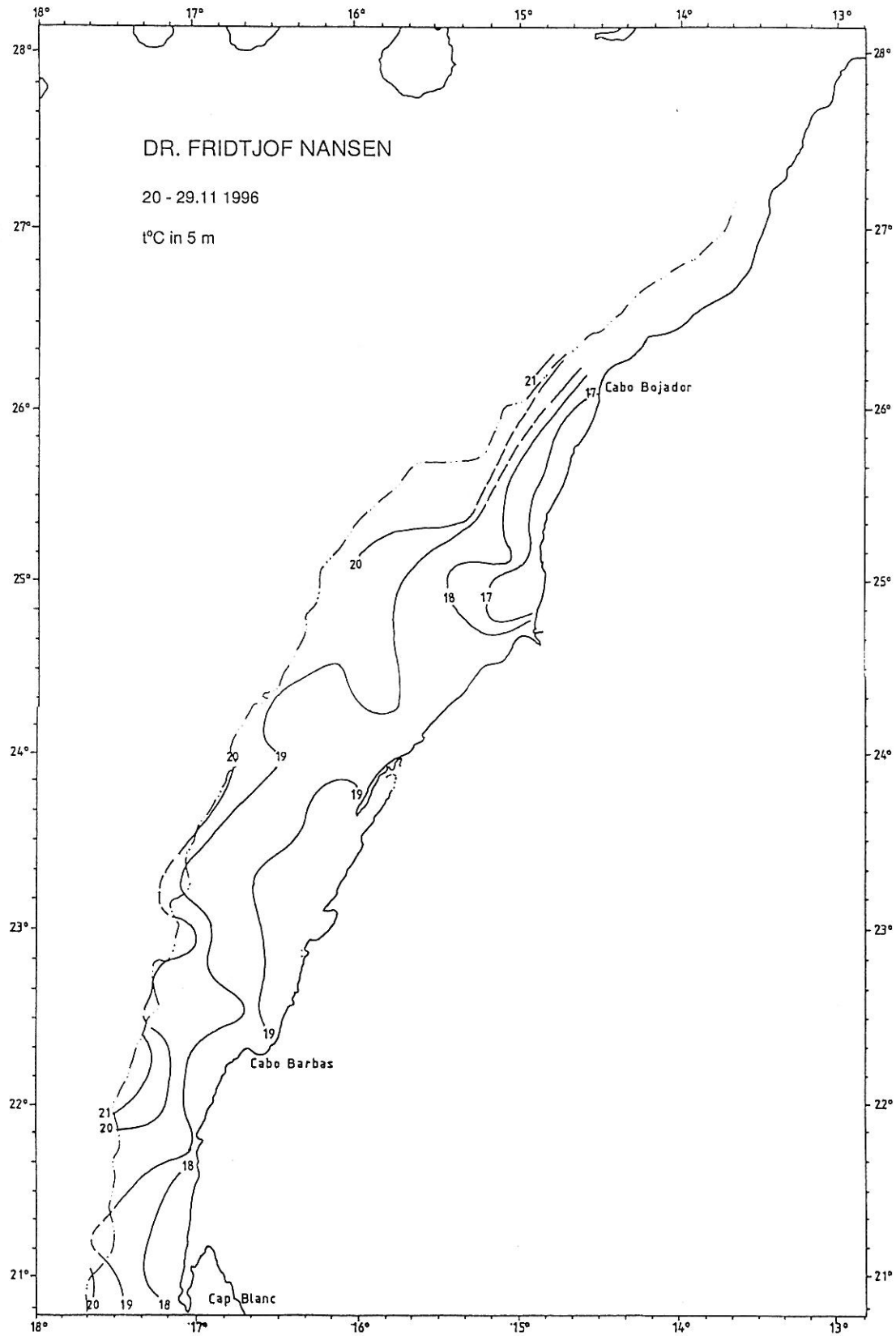


Figure 3a Sea surface temperature, Cape Blanc to Cape Bojador

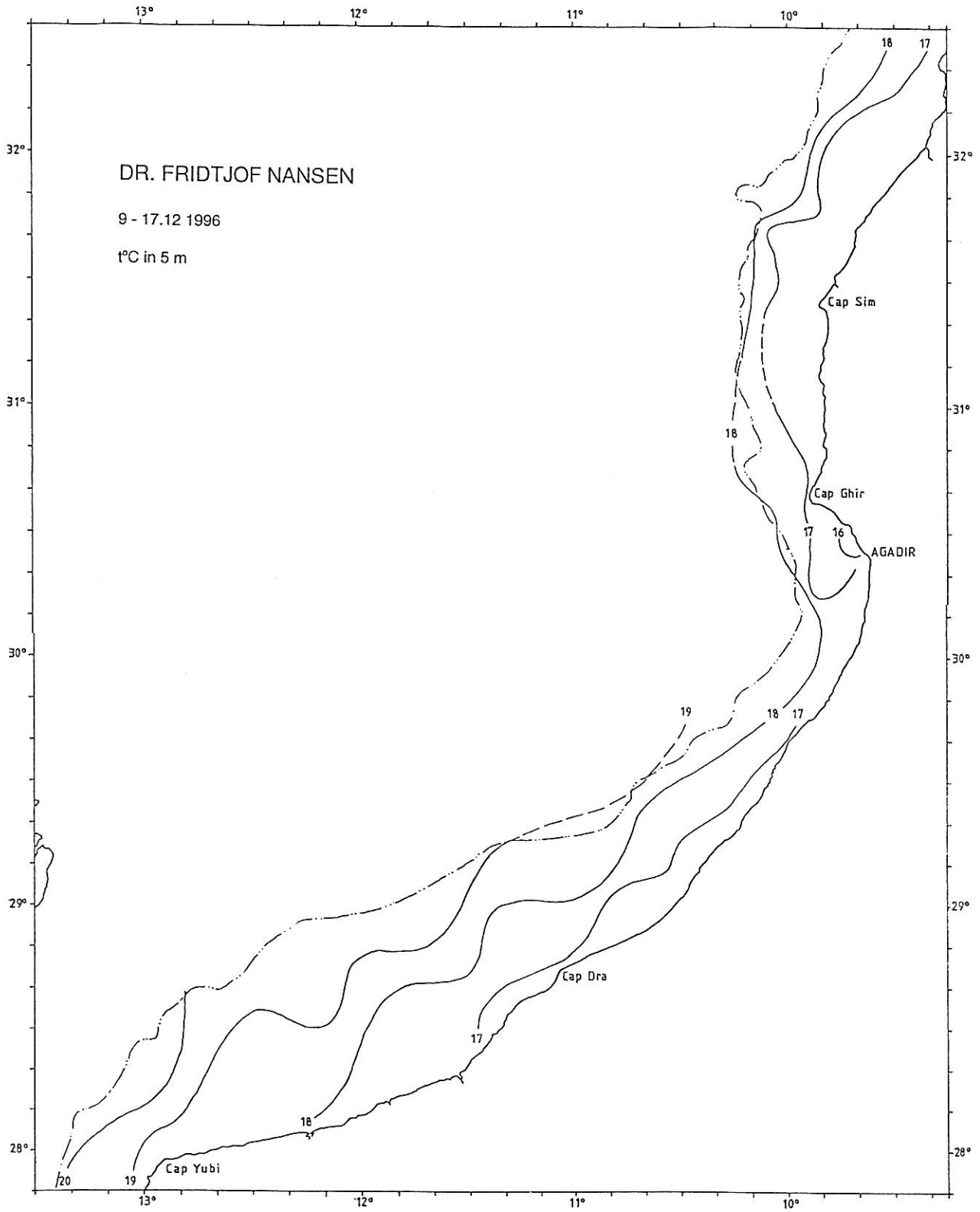


Figure 3b Sea surface temperature, Cape Jubi to Cape Cantin

The wind conditions along the survey track are shown in Figure 4 (a-b). For the first part of the survey, between Cape Blanc and Cape Juby, the winds were generally more than 20 knots and from the north-east, driving the upwelling. In the northern area the wind conditions were more variable with strong northerly winds between Cape Cantin and Cape Ghir in the period 8-12 December, and with calmer and shifting winds during the last week of the survey, between Cape Ghir and Cape Juby. The weather conditions did not restrict the survey work.

2.2 PELAGIC FISH ON THE SHELF FROM CAPE BLANC TO CAPE JUBY

Figures 5 to 8 show the distribution of the four main species groups of pelagic fish by contoured acoustic densities.

Sardine (Fig. 5) was found more or less continuously along the coast from Cape Barbas to 25°00'N. As during previous surveys, the highest densities were found close to the shore, often close to the bottom. This kind of behaviour was observed both at day and night. Dense schools near the bottom represent a problem as they may be difficult to discriminate from the bottom by the echointegrator. This loss is to a large extent compensated for when postprocessing the records by the BEI system but the sardine could still be somewhat underestimated due to this methodological limitation.

The length distribution ranged from 6 to 28 cm with modal lengths at 15 and 22.5 cm.

Sardinellas (Fig. 6) were found in dense schools between 21 and 23°N and, occasionally, in low densities further north. It was located further offshore than the sardine and was found in dense schools at 20-30 m below the surface. The sardinellas represent the continuation of the population in Mauritania and Senegal, which in later years has increased several times from its level in the 80ies. Both flat and round sardinella show unimodal length distributions with modal length at 32 and 35 cm respectively. The total catch proportion of the two sardinellas was 14% for flat- and 86% for round sardinella.

Anchovy were recorded in very shallow waters (15-20 m) North of Cape Barbas (Fig 7). Another school area was found some 20 nm north of Cape Blanc, also very close to the shore. The modal length from the samples was 10 cm.

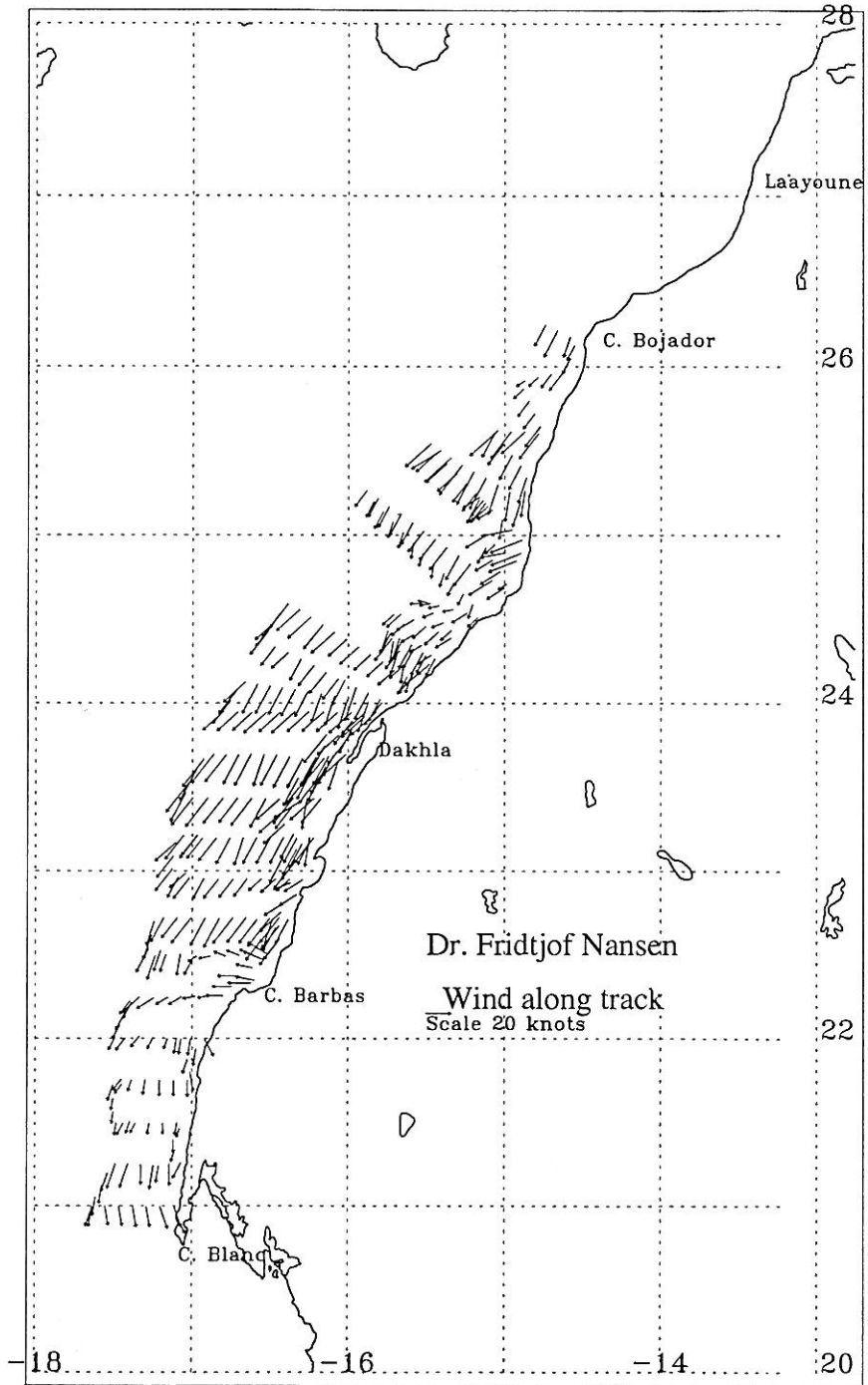


Figure 4a Wind conditions along the survey track 20-29 November, Cape Blanc to Cape Bojador.

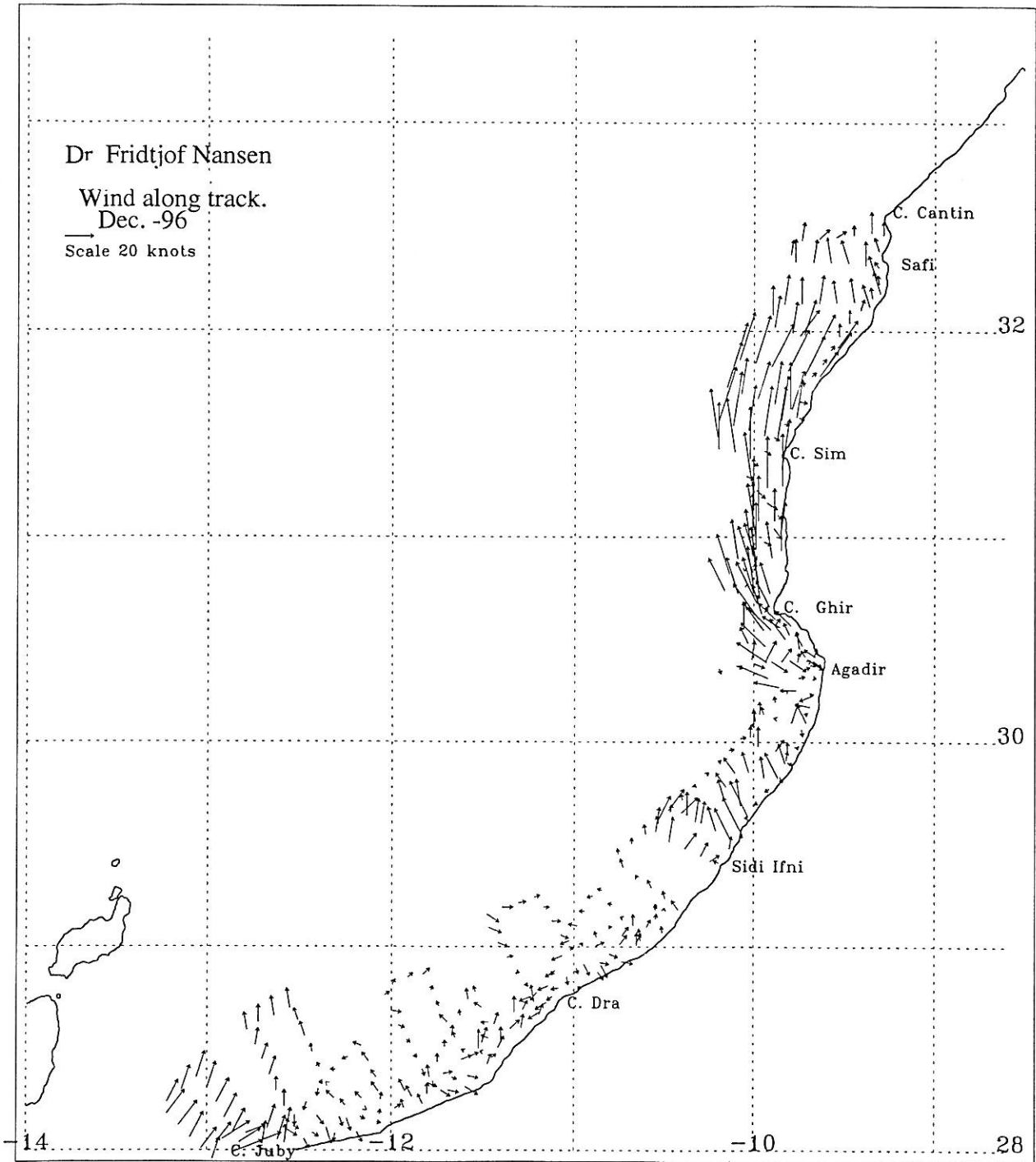


Figure 4b Wind conditions along the survey track 8-20 December, Cape Jubi to Cape Cantin.

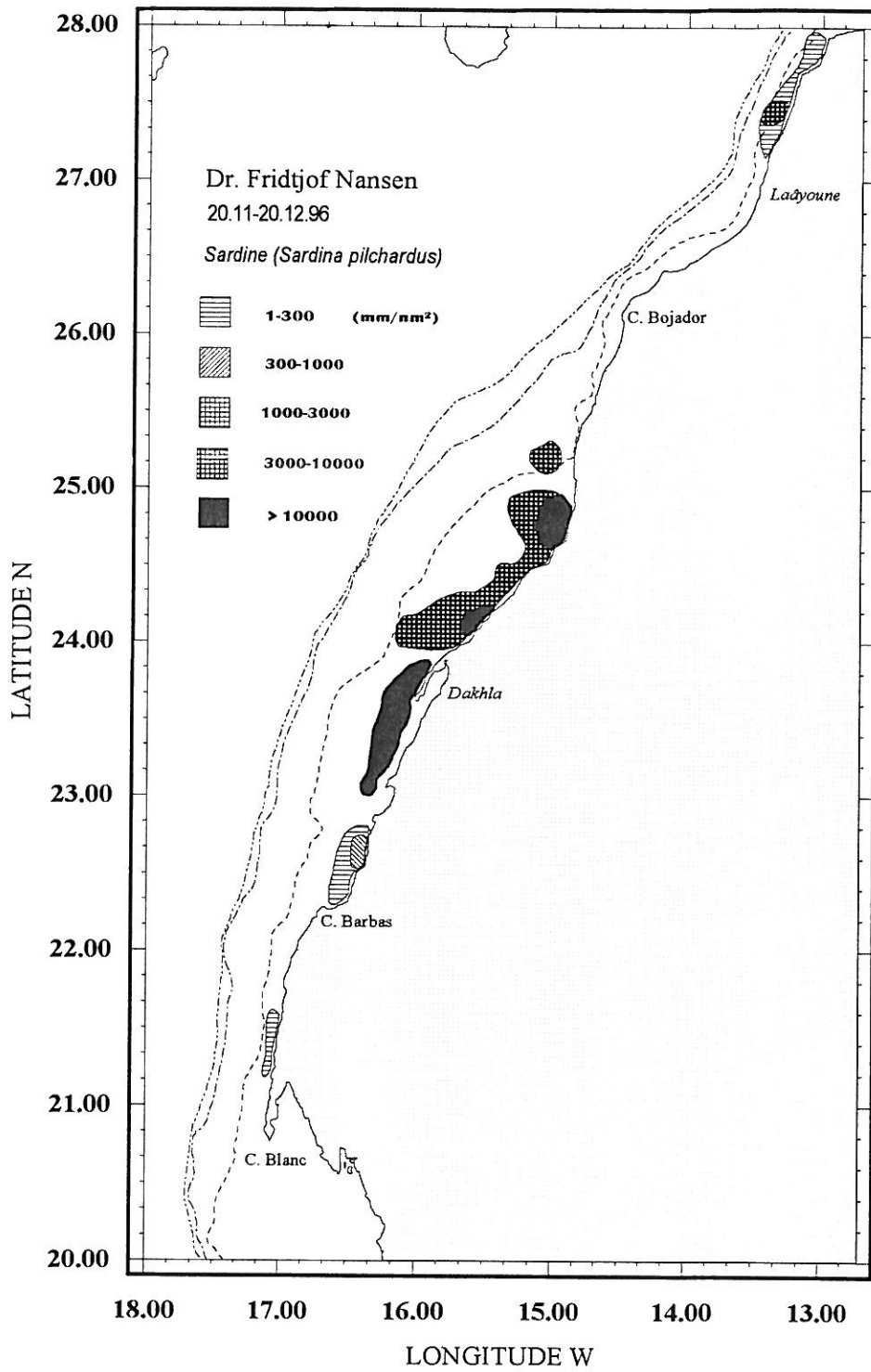


Figure 5 Distribution of sardine, Cape Blanc to Cape Juby

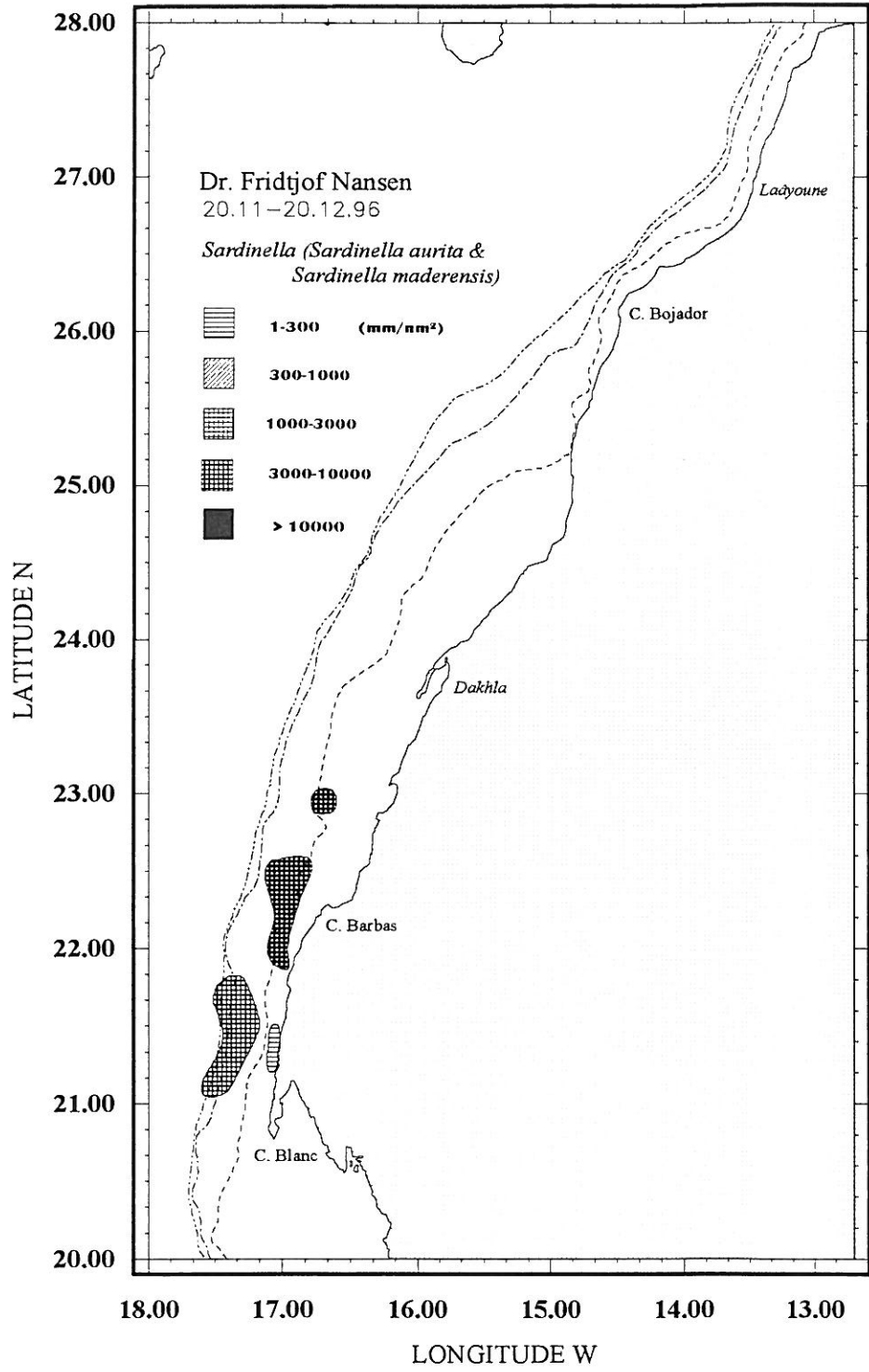


Figure 6 Distribution of sardinella, Cape Blanc to Cape Juby

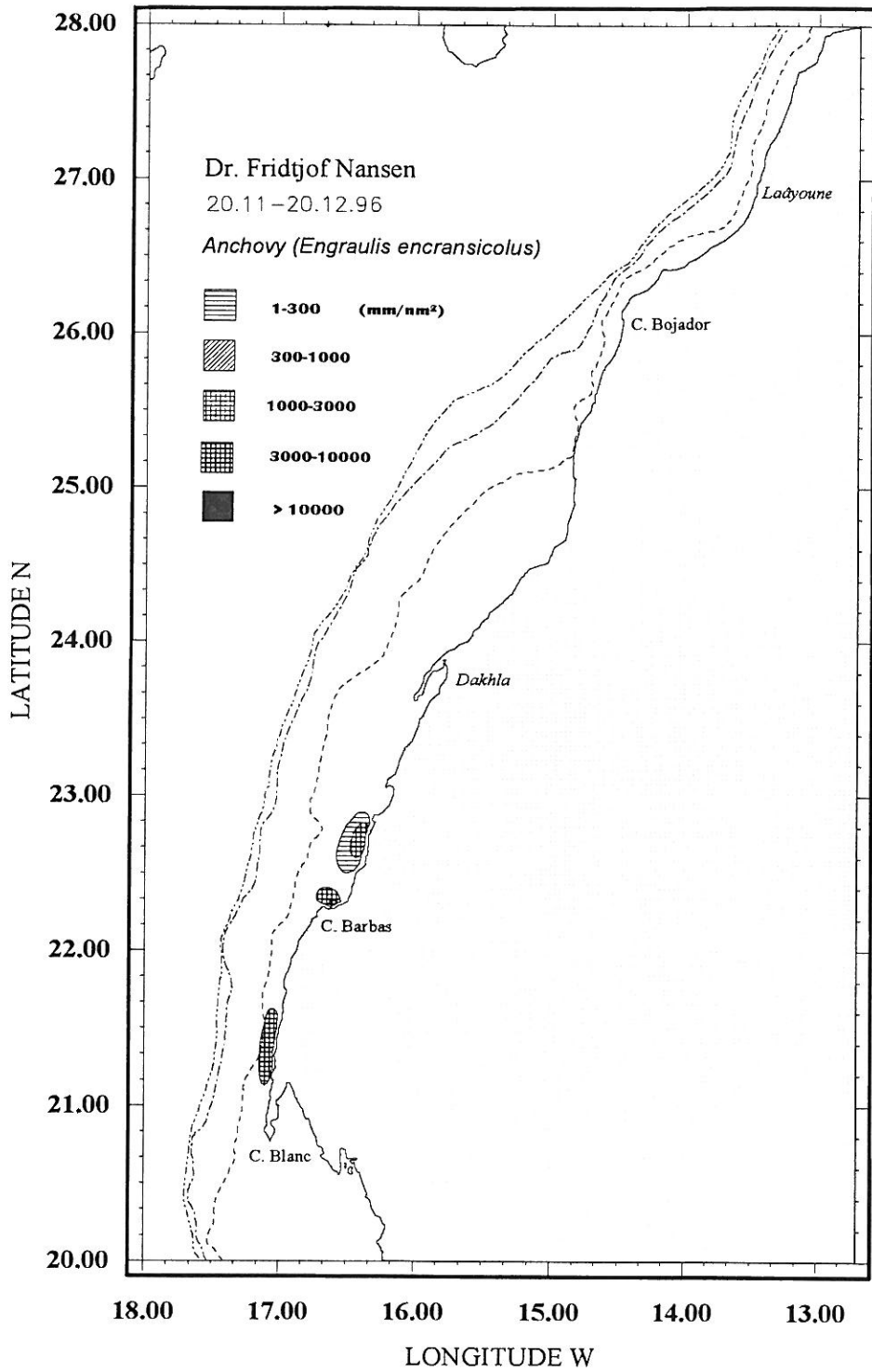


Figure 7 Distribution of anchovy, Cape Blanc to Cape Juby

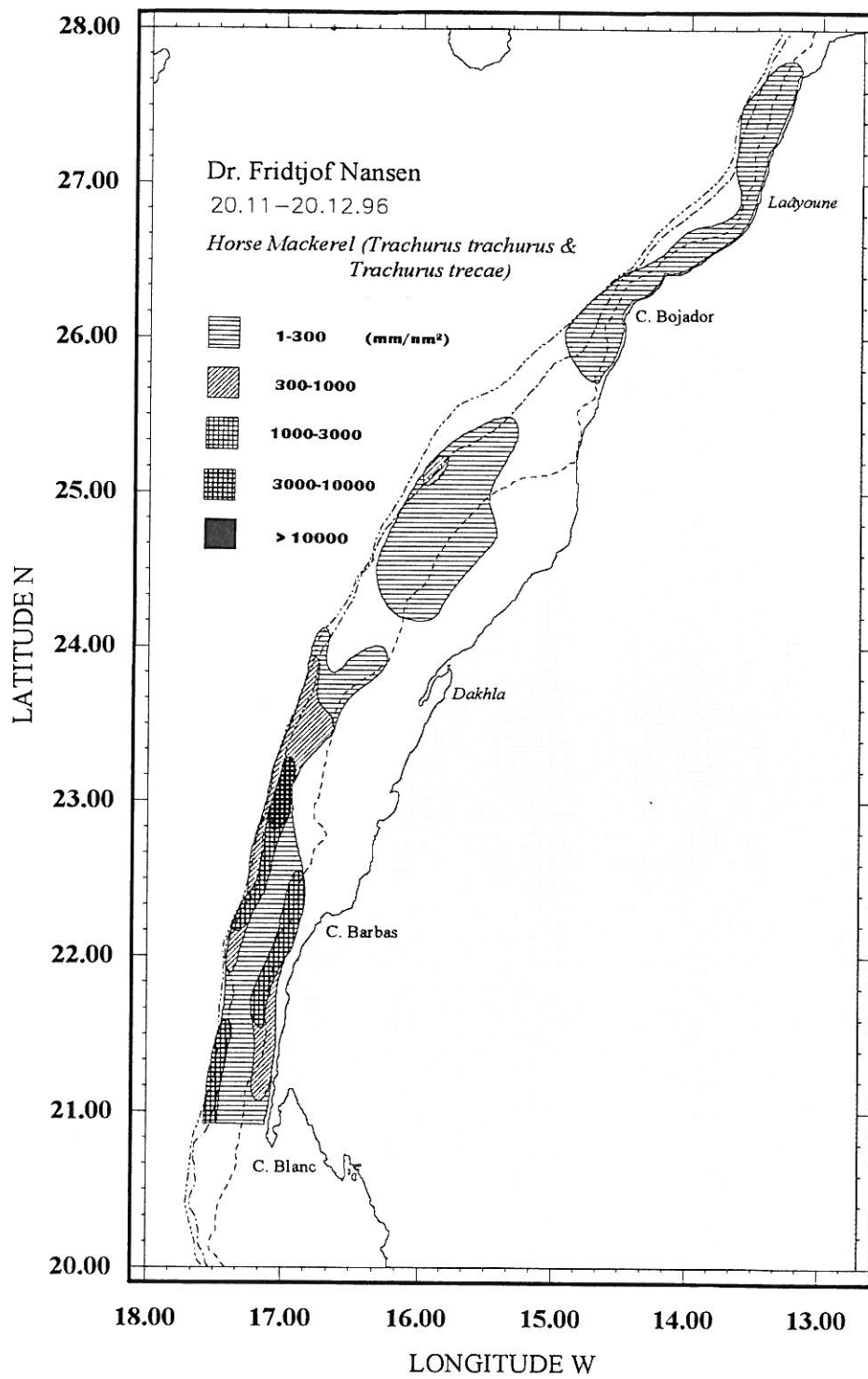


Figure 8 Distribution of horse mackerels, Cape Blanc to Cape Juby

Horse mackerels (*Trachurus trachurus* and *T. trecae*) (Fig. 8) were found in dense aggregations between Cape Blanc and 23° N and more scattered further north. The northermost identification of the Cunene horse mackerel was at 23° 30' N while further north only the Atlantic horse mackerel appeared in some few catches. The horse mackerel classification north of Dahkla was mainly based on the characteristics of the echotraces. The two species appeared with the same mean catch rates in the samples but if corrected for the acoustic density, the Cunene horse mackerel made up 65% in the samples. The length distribution showed a dominance of young individuals with a modal length of 15 cm, for both species.

BIOMASS ESTIMATES

Detailed biomass estimates in number and weight by length groups are shown in Annex I.

The sardine was estimated to 5.4 million tonnes. Of this, 4.3 million tonnes or 80% were in extremely dense concentrations with mean integrator readings higher than 10 000 per nm sailed. In these extreme high density areas the mean density was 4700 tonnes/nm² or 1.35 Kg/m². The length distribution is shown in Figure 9.

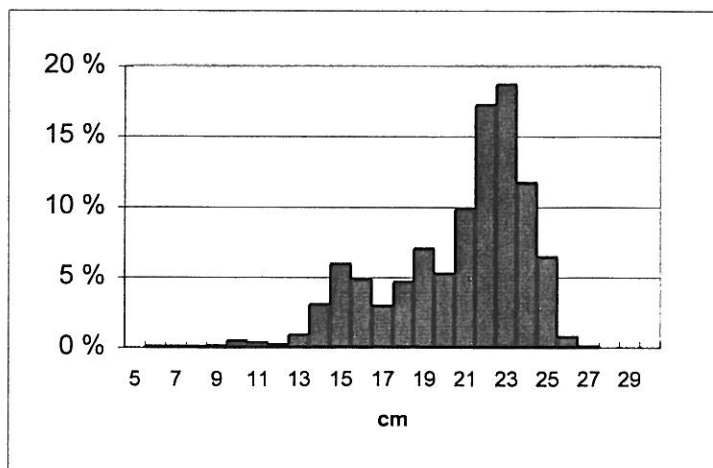


Figure 9 Length frequency distributions of sardine, Cape Blanc to Cape Jubi

Table 1 shows the estimates of sardinella and horse mackerel. The total estimate of sardinella was 1.5 mill. tonnes. It should be noted that a low precision is associated with this number as the sardinella was hit in extremely dense schools at rather few occasions. For example one aggregation, estimated to 880 thousand tonnes, was based on six integrator readings only. Unfortunately the delay in the start of the survey did not allow any time to repeat the coverage of these high aggregations with the required sampling density. One million tonnes were estimated in aggregations higher than 3000 integrator units. The mean density in these aggregations was 1750 tonnes per nm². Based on the acoustic data, weighted with the catch rates, roughly 70% of the group was round sardinella and 30% flat sardinella.

The total estimate of horse mackerel was 1 million tonnes of which 40% was Atlantic horse mackerel and 60% Cunene horse mackerel. The latter was found only south of 23° N. Of the total biomass of horse mackerel, 850 thousand tonnes (85%) were found south of the main sardine population, indicating a good separation of the species, in terms of biomass.

Table 1 Cape Blanc to Cape Juby. Biomass estimates of pelagic fish, 1000 tonnes.				
Sardines	Round sardinella	Flat sardinella	Atlantic horsem.	Cunene horsem.
5400	1050	450	400	600

2.3 PELAGIC FISH ON THE SHELF FROM CAPE JUBY TO CAPE CANTIN

Sardine was found in most of the shallow areas in the region (Fig. 11), but in varying densities. Relative high densities were located off Safi and between Cape Juby and north to $29^{\circ}15' N$. In general, the pattern was much like the distribution observed the previous year. The estimated length frequency distribution (Fig.10) shows that most of the sardine is small sized, below 20 cm. The sardine consisted of one cohort with a mode around 15 cm.

Anchovy (Fig. 12) was found all along the coast close to the shore and in unexpected high abundance compared to last year when it was barely noticed. The highest concentrations were found between Agadir and Cape Dra. The population consisted of one cohort with a mode around 12 cm.

Horse mackerel was found only in scattered occurrences (Fig. 13). Chub mackerel was located in scattered patches along the coast, usually outside the sardine distributions. Chub mackerel was hit as bycatch in some catches but never in quantities. Neither did this species form aggregations detected by the acoustic system.

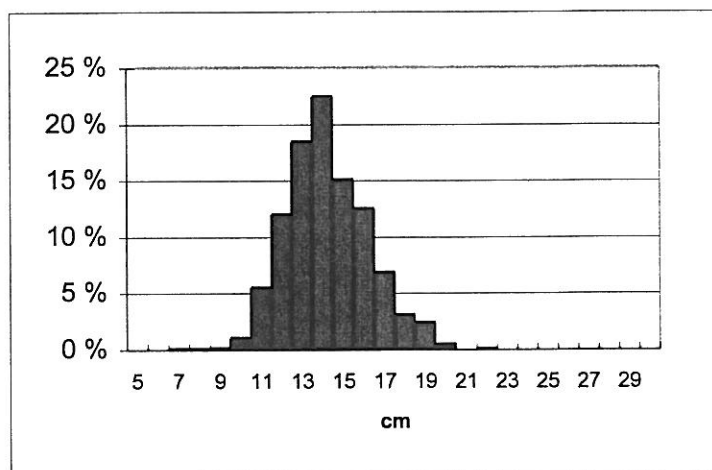


Figure 10 Length frequency distribution of sardine, Cape Juby to Cape Cantin

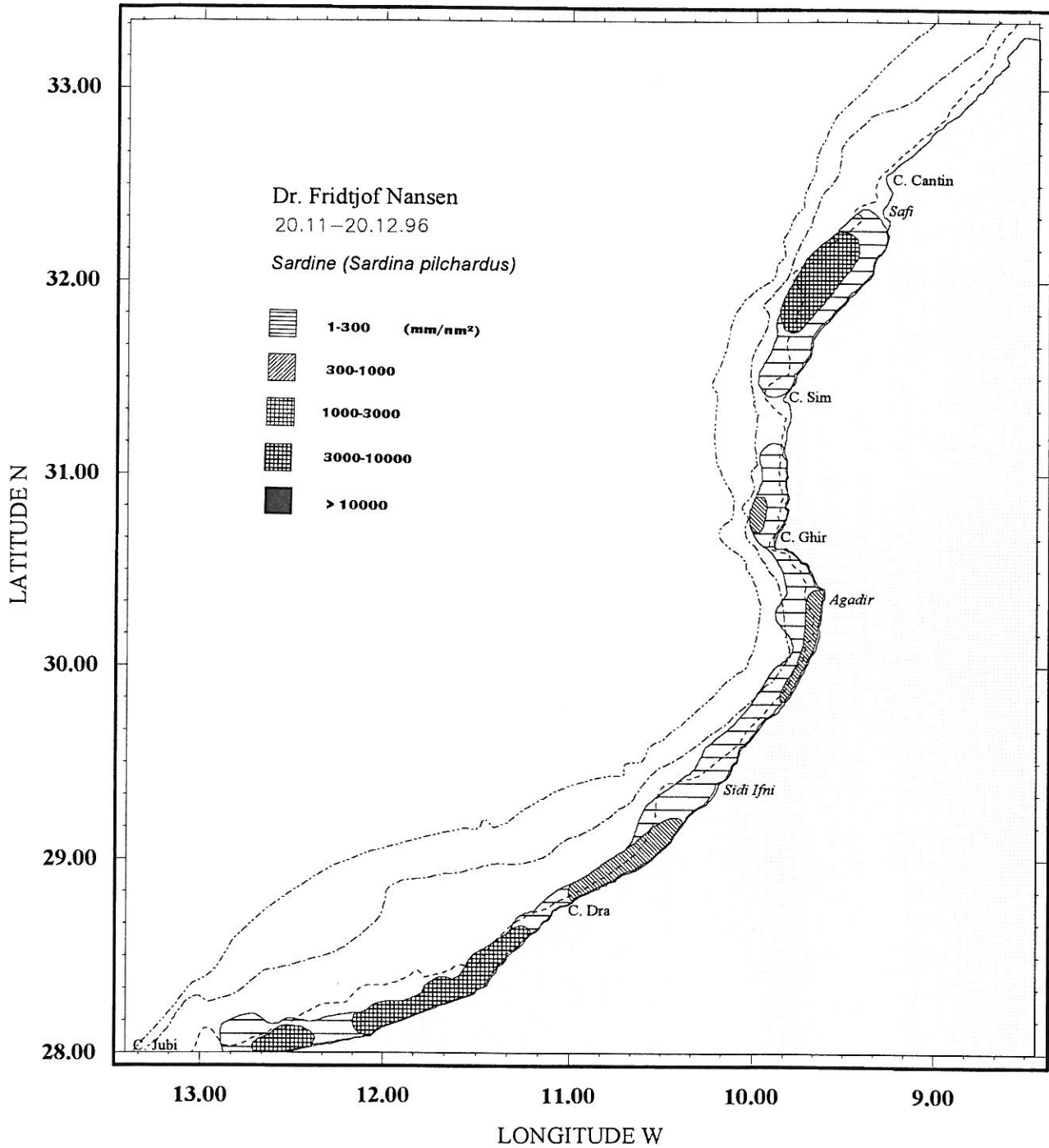


Figure 11 Distribution of sardine, Cape Juby to Cape Cantin

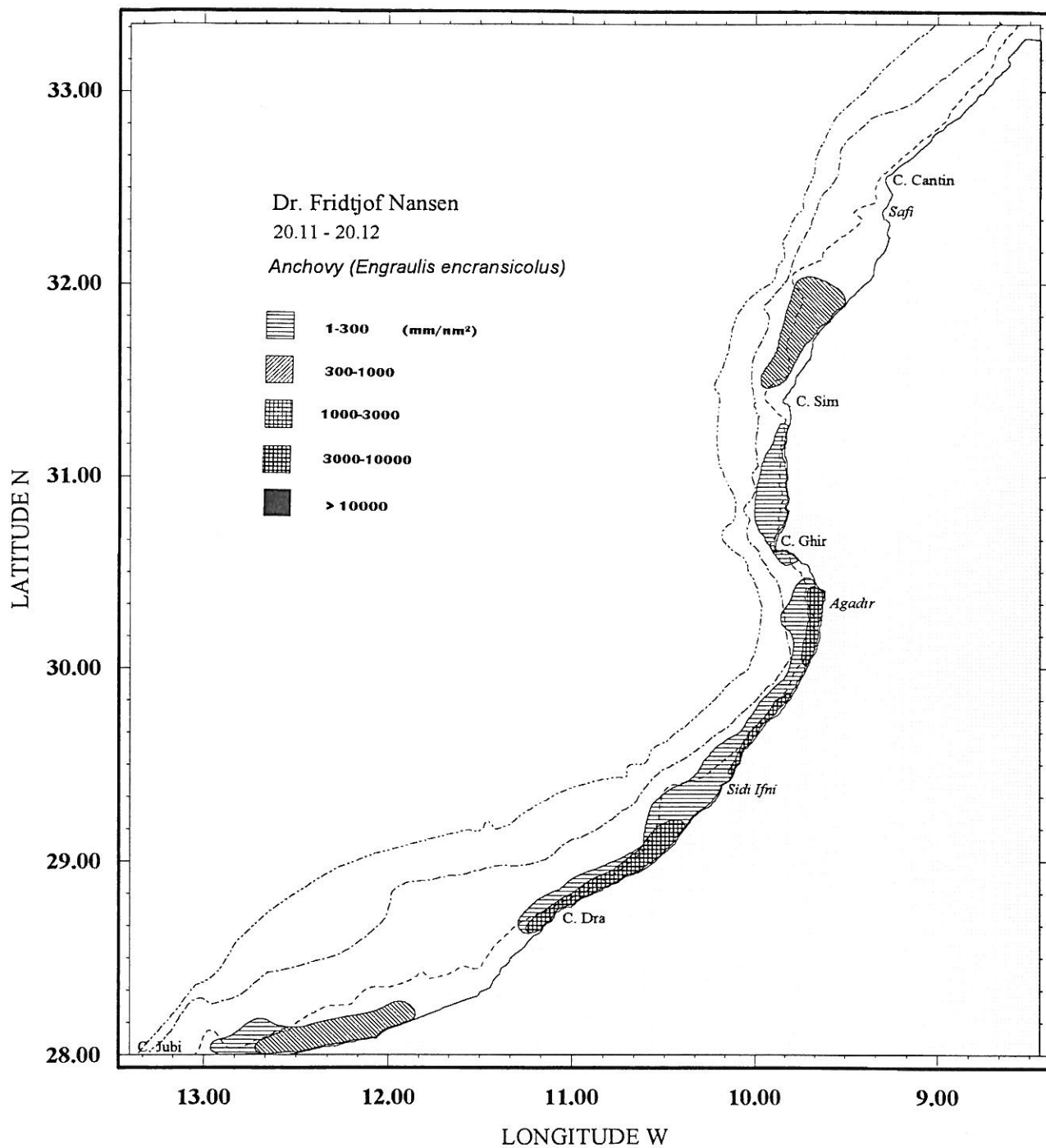


Figure 12 Distribution of anchovy, Cape Juby to Cape Cantin

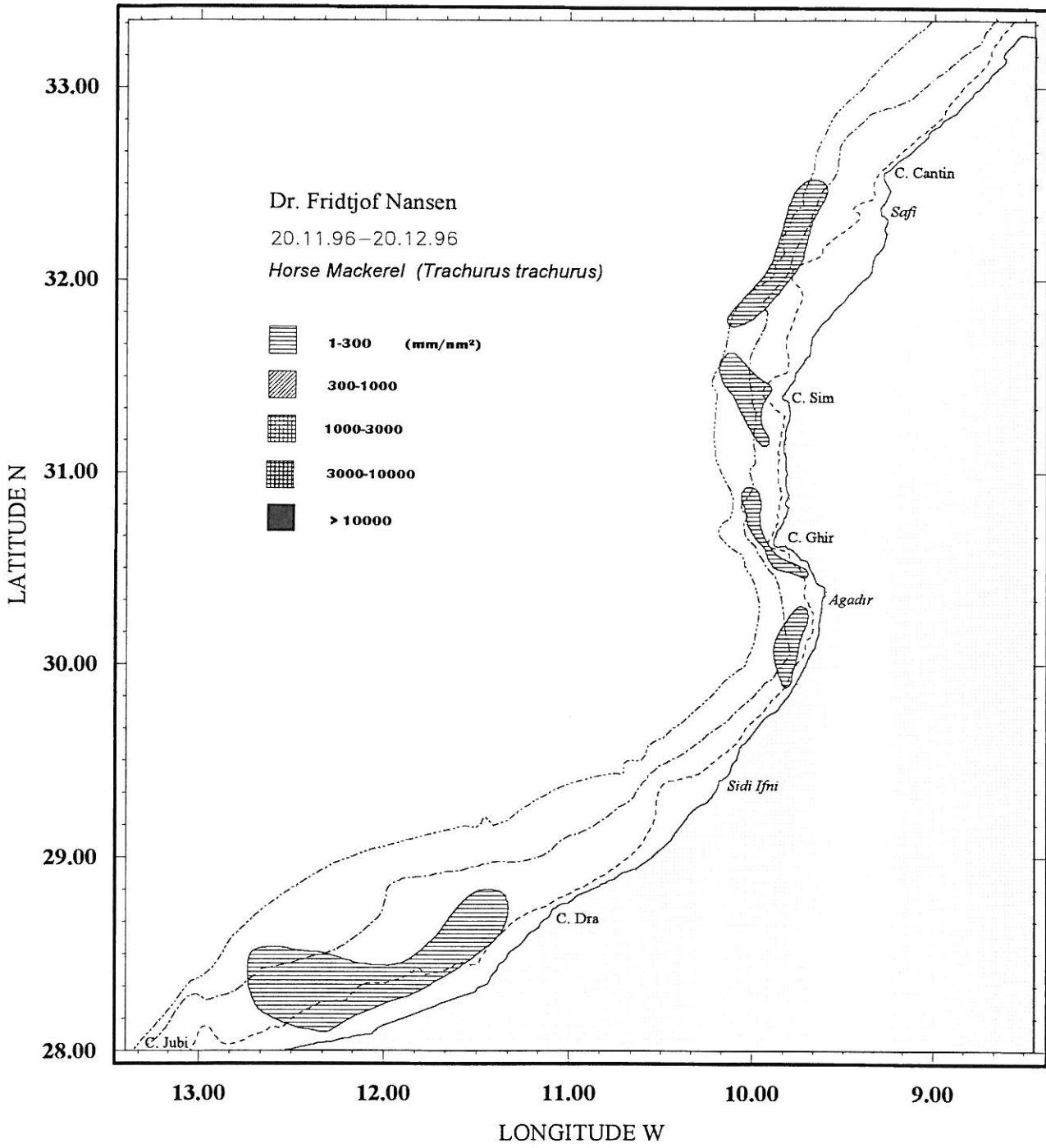


Figure 13 Distribution of horse mackerel, Cape Juby to Cape Cantin

BIOMASS ESTIMATES

The sardine was estimated to 260 thousand tonnes, a not too significant decrease from the 315 thousand tonnes estimated the previous year. About 170 thousand tonnes or 55% was found in relative high densities with mean integrator values just beyond 1000 units/nm² (see map legend). The mean density in these high aggregations was 185 tonnes/nm² and made up 30% of the distribution area of the species. These densities were still of a lower order of magnitude compared to the concentrations found off Dakhla (4700 tonnes/nm²).

Anchovy was estimated to 110 thousand tonnes. Of this 90 thousand tonnes were located in high density aggregations higher than 1000 integrator units, or more than 125 tonnes per nm². The mean density in these aggregations was 250 tonnes/nm²

The estimate for horse mackerel in the region was 50 thousand tonnes. This is a very rough figure as much of the classification was based on recognition of the acoustic traces on the echograms. The species was generally scattered, with no high aggregations found that could be a target for aimed commercial fishing.

No estimate was done on the chub mackerel, and as for the horse mackerel, no aggregations of commercial interest were located.

CHAPTER 3 CONCLUDING REMARKS

The survey was conducted successfully in the period November 20 to December 20 with a course track of 4 800 nm and 59 fishing stations. The limits of the school areas of the sardine, anchovy and horse mackerel are thought to have been well determined and the main areas adequately sampled, while for some high concentrations of sardinella the sampling grid was too open. Time constraints on the survey did not allow these concentrations to be sampled once more. The weather conditions were favourable and did not put any constraints on the survey.

The hydrographic data show well developed upwelling along the entire coastline, and the whole shelf holds water well enriched with oxygen. Except for the upwelling, no fronts or oceanographic barriers were observed on the shelf.

Figure 14 gives a general overview on the major aggregations of pelagic fish with rounded biomass figures.

Sardine was found in extreme high densities in shallow waters between Cape Barbas and 25°N. It is believed that this distributional behaviour is highly seasonal, as the stock during the year would probably have to utilise the plankton production of a wider area of the shelf to sustain such high biomasses.

Except for one small aggregation, the area between 25°N and Cape Juby was generally free from sardines, while it was found in moderately high densities in the Tan Tan area. The species was found in shallow waters along the coast from Cape Juby to Cape Cantin, but generally at low densities between Cape Dra and Cape Sim.

Round and flat sardinellas were found up to 24°N, but the main concentrations were found between Cape Blanc and 23°N. The registrations of sardinella confirmed the picture of last year of a northward movement of a substantial quantity of the species.

Horse mackerel was found in high abundance between Cape Blanc and Cape Barbas, as a continuation of the distribution recorded in Mauritania. Further north, horse mackerel was generally scattered.

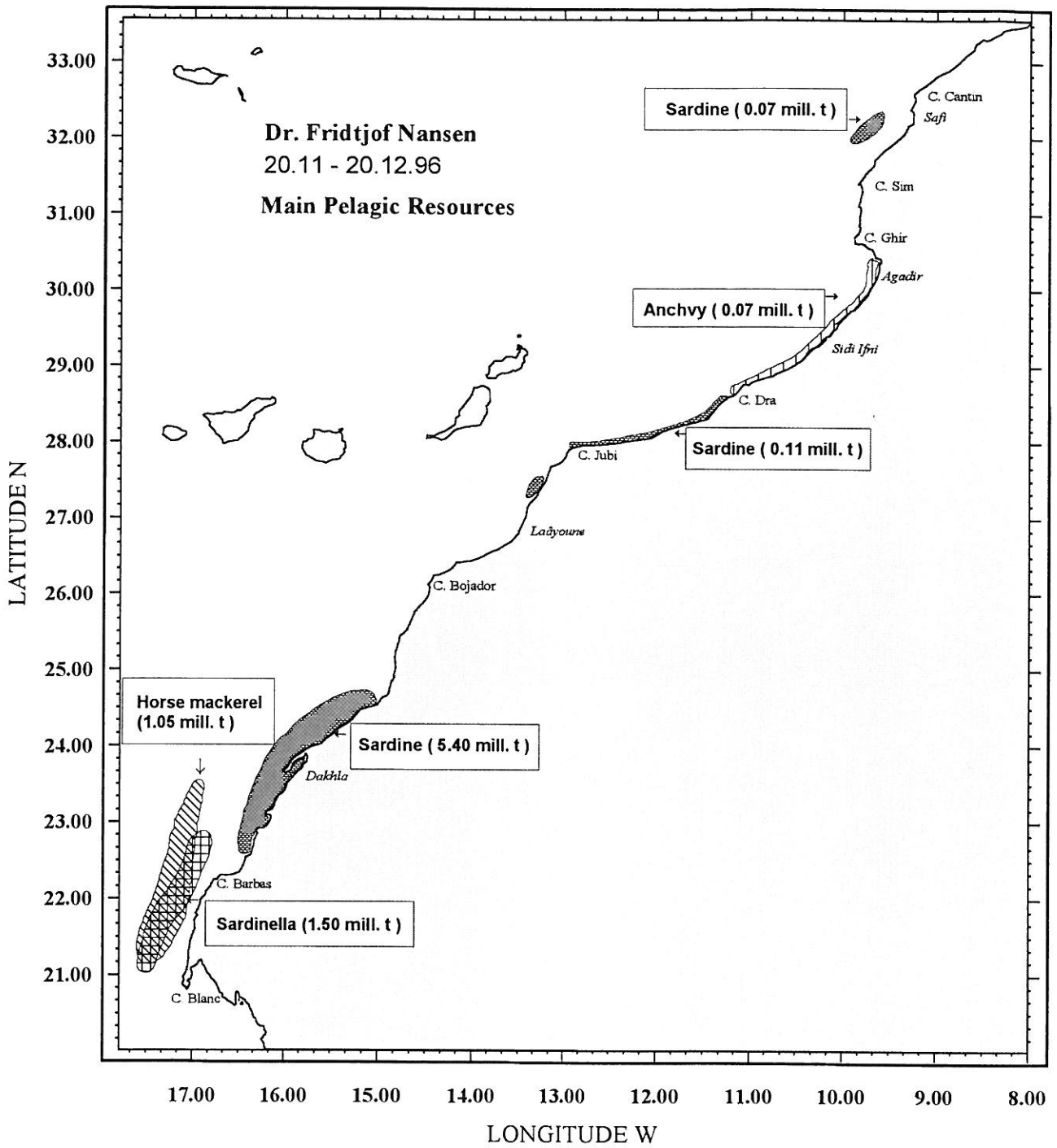


Figure 14 Map of the major pelagic fish concentrations with estimated abundance (thousand tonnes), Cape Blanc to Cape Cantin.

Anchovies were found in notable quantities between Agadir and Cape Juby. This is in contrast to the survey at the same time last year when the species was almost absent from the catches.

The biomass estimates are summarized in Table 2.

	C. Blanc-C. Juby	C. Juby- C. Cantin	Total
Sardines	5400	260	5660
Sardinellas	1500	0	1500
Anchovies	0	110	110
Horse mackerel	1000	50	1050
Chub mackerel	-	-	-

Figure 15 shows the biomass estimates of sardine compared with results from previous “Dr. Fridtjof Nansen” surveys. The sardine in the south shows a remarkable growth from 3.4 million to 5.3 million tonnes in one year, and the stock is now back to its high level of the mid 80ies. The central stock between Cape Juby and Safi has declined further from 310 thousand tonnes to the present 260 thousand tonnes and is now at about one fourth of the level in 1986.

Sardinella was first estimated in 1992, but only to 10 thousand tonnes, increasing to 0.95 million tonnes in 1995, and to 1.50 million tonnes in 1996. Although this last estimate on sardinella has a low precision, an increase of the order of 60% respect to the previous estimate, indicates an increasing stock in the area. In the preceding surveys in Senegal and Mauritania a recent decline of 750 thousand tonnes since 1995 was observed. It is likely that the increase of the stock in Morocco and the decline in Senegal can be explained by seasonal migration. Of the combined regional stock of the two sardinella species, merged together, about 50% was north of Cape Blanc during this survey.

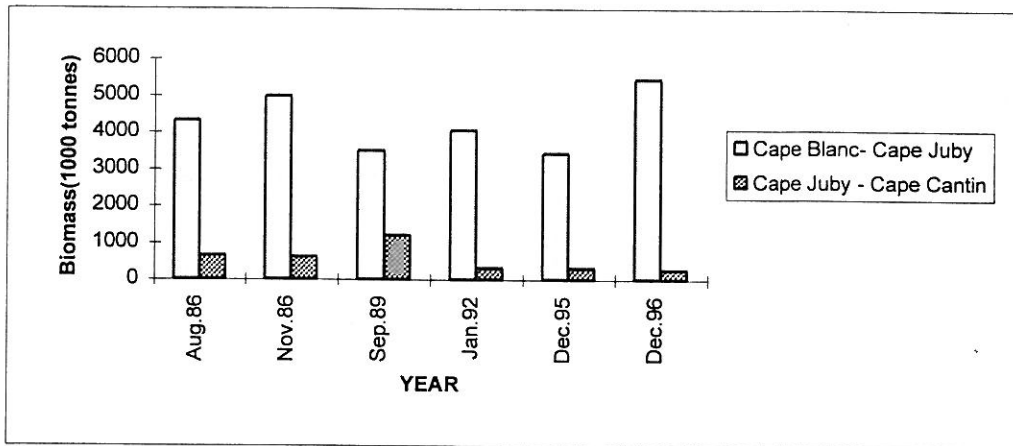


Figure 15 Sardine biomass estimates Cape Blanc-Cape Juby and Cape Juby- Cape Cantin, Dr Fridjof Nansen 1986-96

Horse mackerel estimates have increased from 120 thousand tonnes in 1992, to 340 thousand tonnes in 1995 reaching at present 1.05 million tonnes. Most of the horse mackerel was located close to Cape Blanc and much of the variation could be explained by seasonal migration between Mauritania and Morocco. Of the regionally shared stock of horse mackerel, more than 50 % was recorded north of Cape Blanc.

Annex I Biomass and number by fish length class

Sardine (*Sardina pilchardus*)

MOROCCO

Length cm	Cape Juby - Cape Cantin		Cape Blanc - Cape Juby		Total	
	tonnes	N millions	tonnes	N millions	tonnes	N millions
5	0	0	0	0	0	0
6	0	0	47	22	47	22
7	16	5	98	30	114	34
8	23	5	106	22	130	27
9	72	10	347	52	419	62
10	880	95	2764	306	3645	401
11	6327	520	2403	203	8730	723
12	17811	1140	1914	126	19725	1266
13	34526	1754	11208	584	45734	2338
14	52056	2134	48859	2055	100915	4189
15	42740	1435	117039	4029	159779	5464
16	42742	1189	114376	3264	157118	4454
17	27841	649	83644	2001	111485	2650
18	14929	295	155443	3147	170372	3442
19	13366	225	275341	4761	288707	4986
20	3080	45	237634	3536	240713	3581
21	0	0	517394	6674	517394	6674
22	433	5	1040450	11711	1040883	11715
23	0	0	1284359	12688	1284359	12688
24	0	0	909060	7925	909060	7925
25	0	0	562373	4348	562373	4348
26	0	0	71042	489	71042	489
27	0	0	6256	39	6256	39
28	0	0	0	0	0	0
29	0	0	0	0	0	0
30	0	0	0	0	0	0
Total	256842	9506	5442156	68012	5698998	77518

Annex I Cont.

Atlantic horse mackerel (*Trachurus trachurus*)

MOROCCO

Length cm	Cape Juby - Cape Cantin		Cape Blanc - Cape Juby		Total	
	tonnes	N millions	tonnes	N millions	tonnes	N millions
5	0	0	0	0	0	0
6	0	0	0	0	0	0
7	0	0	0	0	0	0
8	0	0	246	47	246	47
9	0	0	0	0	0	0
10	0	0	1094	111	1094	111
11	0	0	16918	1306	16918	1306
12	0	0	39511	2380	39511	2380
13	0	0	20807	991	20807	991
14	0	0	40026	1507	40026	1507
15	984	25	74541	2186	75525	2211
16	3110	66	83928	2080	87038	2146
17	6581	117	54108	1089	60689	1206
18	4477	67	38510	707	42987	774
19	3866	50	8164	130	12030	179
20	1907	21	1599	22	3506	43
21	1277	12	1845	22	3122	34
22	2115	18	0	0	2115	18
23	3057	22	0	0	3057	22
24	1157	7	0	0	1157	7
25	592	3	0	0	592	3
26	111	1	0	0	111	1
27	124	1	0	0	124	1
28	0	0	558	3	558	3
29	307	1	619	3	926	4
30	170	1	2053	9	2223	10
31	0	0	5278	20	5278	20
32	0	0	6624	23	6624	23
33	0	0	907	3	907	3
34	0	0	0	0	0	0
35	0	0	0	0	0	0
36	0	0	0	0	0	0
37	0	0	0	0	0	0
38	0	0	0	0	0	0
39	0	0	0	0	0	0
40	0	0	0	0	0	0
41	0	0	0	0	0	0
42	459	1	0	0	459	1
43	0	0	0	0	0	0
44	0	0	0	0	0	0
45	0	0	0	0	0	0
46	602	1	0	0	602	1
47	1282	1	0	0	1282	1
48	2275	2	0	0	2275	2
49	3871	3	0	0	3871	3
50	4880	4	0	0	4880	4
51	3542	2	0	0	3542	2
52	2885	2	0	0	2885	2
53	916	1	0	0	916	1
54	0	0	0	0	0	0
55	0	0	0	0	0	0
Total	50547	429	397336	12639	447883	13067

Annex I Cont.

Cunene horse mackerel (*Trachurus trecae*)

MOROCCO

Length cm	Cape Juby - Cape Cantin		Cape Blanc - Cape Juby		Total	
	tonnes	N millions	tonnes	N millions	tonnes	N millions
5	0	0	0	0	0	0
6	0	0	0	0	0	0
7	0	0	0	0	0	0
8	0	0	0	0	0	0
9	0	0	0	0	0	0
10	0	0	0	0	0	0
11	0	0	0	0	0	0
12	0	0	0	0	0	0
13	0	0	16255	826	16255	826
14	0	0	59835	2453	59835	2453
15	0	0	108854	3654	108854	3654
16	0	0	82927	2308	82927	2308
17	0	0	50165	1170	50165	1170
18	0	0	19317	381	19317	381
19	0	0	13552	228	13552	228
20	0	0	20112	292	20112	292
21	0	0	29642	373	29642	373
22	0	0	27370	300	27370	300
23	0	0	22249	214	22249	214
24	0	0	11856	101	11856	101
25	0	0	2529	19	2529	19
26	0	0	2838	19	2838	19
27	0	0	0	0	0	0
28	0	0	0	0	0	0
29	0	0	3915	19	3915	19
30	0	0	4327	19	4327	19
31	0	0	0	0	0	0
32	0	0	0	0	0	0
33	0	0	0	0	0	0
34	0	0	6262	19	6262	19
35	0	0	15401	43	15401	43
36	0	0	22465	58	22465	58
37	0	0	34474	82	34474	82
38	0	0	26364	58	26364	58
39	0	0	9399	19	9399	19
40	0	0	0	0	0	0
Total	0	0	590107	12655	590107	12655

Annex I Cont.

Round sardinella (*Sardinella aurita*)

SENEGAL - THE GAMBIA - MAURITANIA - MOROCCO

Length cm	Number in millions				Biomass in tonnes			
	Senegal	Mauritania	Morocco	TOTAL	Senegal	Mauritania	Morocco	TOTAL
5	0	0	0	0	0	0	0	0
6	6	0	0	6	13	0	0	13
7	11	0	0	11	36	0	0	36
8	7	0	0	7	34	0	0	34
9	8	0	0	8	51	0	0	51
10	2	0	0	2	14	0	0	14
11	1	0	0	1	9	0	0	9
12	2	0	0	2	23	0	0	23
13	2	0	0	2	36	0	0	36
14	0	0	0	0	9	0	0	9
15	0	0	0	0	0	0	0	0
16	0	0	0	0	0	0	0	0
17	0	0	0	0	0	0	0	0
18	0	0	0	0	0	0	0	0
19	0	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0	0
21	4	5	0	9	276	448	0	724
22	24	0	0	24	2107	0	0	2107
23	56	0	0	56	5485	0	0	5485
24	57	10	0	67	6364	1304	0	7669
25	89	42	1	131	11202	6295	82	17579
26	99	175	0	273	13938	29608	0	43546
27	45	279	0	324	7051	53033	0	60084
28	23	336	0	359	3975	71128	0	75102
29	5	204	8	217	1038	47873	1947	50857
30	11	44	6	61	2436	11271	1578	15284
31	3	45	45	93	830	12635	13204	26669
32	2	38	80	120	608	11606	25929	38142
33	1	112	230	344	223	38075	81418	119716
34	2	318	549	869	569	117539	212026	330135
35	0	238	812	1050	0	95792	341604	437396
36	0	95	509	604	0	41647	232446	274093
37	0	15	205	220	0	7131	101557	108688
38	0	0	27	27	0	0	14316	14316
39	0	0	7	7	0	0	4155	4155
40	0	0	0	0	0	0	0	0
Total	461	1955	2479	4895	56326	545385	1030262	1631973

Annex I Cont.

Flat sardinella (*Sardinella maderensis*)

SENEGAL - THE GAMBIA - MAURITANIA - MOROCCO

Length cm	Number in millions				Biomass in tonnes			
	Senegal	Mauritania	Morocco	TOTAL	Senegal	Mauritania	Morocco	TOTAL
5	0	0	0	0	0	0	0	0
6	3	0	0	3	0	0	0	0
7	6	0	0	6	0	0	0	0
8	0	0	0	0	0	0	0	0
9	11	0	0	11	56	0	0	56
10	0	0	0	0	0	0	0	0
11	1	0	0	1	8	0	0	8
12	8	5	0	13	131	82	0	213
13	3	0	0	3	56	0	0	56
14	11	5	0	16	273	128	0	401
15	28	5	0	33	818	156	0	974
16	31	0	0	31	1110	0	0	1110
17	68	0	0	68	2888	0	0	2888
18	65	0	0	65	3232	0	0	3232
19	129	0	0	129	7552	0	0	7552
20	240	0	0	240	16328	0	0	16328
21	287	0	0	287	22568	0	0	22568
22	331	107	0	439	29827	10826	0	40653
23	222	300	0	523	22803	34213	0	57016
24	219	315	0	534	25499	40620	0	66119
25	143	409	0	552	18765	59524	0	78289
26	52	239	0	291	7712	38605	0	46316
27	22	171	0	193	3667	30458	0	34124
28	5	172	33	210	903	33974	7405	42282
29	23	295	10	328	4714	64787	2516	72018
30	13	477	188	678	2998	115661	51743	170402
31	6	753	193	951	1392	201020	58571	260982
32	4	490	382	876	958	143714	127078	271751
33	0	217	451	668	0	69722	164469	234191
34	0	30	131	161	0	10663	52059	62722
35	0	8	61	69	0	2904	26378	29282
36	0	8	7	15	0	3157	3189	6346
37	0	0	0	0	0	0	0	0
38	0	0	0	0	0	0	0	0
39	0	0	0	0	0	0	0	0
40	0	0	0	0	0	0	0	0
Total	1934	4003	1456	7393	174257	860216	493408	1527880

Annex II Records of fishing stations

PROJECT STATION: 498
 DATE: 18/11/96 GEAR TYPE: PT No:9 POSITION: Lat N 2051 Long W 1721
 start stop duration
 TIME : 06:43:00 07:13:00 30 (min) Purpose code: 1
 LOG : 1878.60 1880.80 1.80 Area code : 2
 FDEPTH: 5 5 GearCond.code:
 BDEPTH: 59 47 Validity code:
 Towing dir: 90° Wire out: 160 m Speed: 36 kn*10
 Sorted: 4 Kg Total catch: 4.00 CATCH/HOUR: 8.00

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP. NO.
	weight	numbers		
Sarda sarda	5.20	6	65.00	
Trichiurus lepturus	2.00	2	25.00	
Loligo vulgaris	0.80	2	10.00	
Total	8.00		100.00	

PROJECT STATION: 502
 DATE: 21/11/96 GEAR TYPE: PT No:8 POSITION: Lat N 2130 Long W 1725
 start stop duration
 TIME : 08:09:00 08:39:00 30 (min) Purpose code: 1
 LOG : 2120.80 2122.50 1.70 Area code : 3
 FDEPTH: 20 20 GearCond.code:
 BDEPTH: 103 97 Validity code:
 Towing dir: 90° Wire out: 110 m Speed: 34 kn*10
 Sorted: 54 Kg Total catch: 54.20 CATCH/HOUR: 108.40

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP. NO.
	weight	numbers		
Sardinella aurita	105.40	220	97.23	990
Scomber japonicus	3.00	4	2.77	
Total	108.40		100.00	

PROJECT STATION: 499
 DATE: 21/11/96 GEAR TYPE: PT No:9 POSITION: Lat N 2115 Long W 1720
 start stop duration
 TIME : 00:02:00 00:32:00 30 (min) Purpose code: 1
 LOG : 2059.90 2061.60 1.70 Area code : 3
 FDEPTH: 5 5 GearCond.code:
 BDEPTH: 65 64 Validity code:
 Towing dir: 90° Wire out: 160 m Speed: 34 kn*10
 Sorted: 44 Kg Total catch: 44.32 CATCH/HOUR: 88.64

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP. NO.
	weight	numbers		
Trachurus trecae	42.80	1536	48.29	982
Sardinella maderensis	15.00	46	16.92	980
Loligo vulgaris	9.36	94	10.56	
Trichiurus lepturus	7.30	8	8.24	
Sarda sarda	5.80	6	6.54	
Sardinella aurita	5.40	20	6.09	
Sardina pilchardus	2.34	94	2.64	981
Scomber japonicus	0.64	4	0.72	
Total	88.64		100.00	

PROJECT STATION: 503
 DATE: 21/11/96 GEAR TYPE: BT No:1 POSITION: Lat N 2144 Long W 1727
 start stop duration
 TIME : 12:24:00 12:54:00 30 (min) Purpose code: 1
 LOG : 2155.20 2156.60 1.40 Area code : 3
 FDEPTH: 156 138 GearCond.code:
 BDEPTH: 156 138 Validity code:
 Towing dir: 35° Wire out: 520 m Speed: 30 kn*10
 Sorted: 66 Kg Total catch: 165.45 CATCH/HOUR: 330.90

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP. NO.
	weight	numbers		
Trachurus trachurus	111.60	4104	33.73	993
Zeus faber	41.40	30	12.51	
Synagrops microlepis	25.80	1278	7.80	
Scomber japonicus	23.40	426	7.07	992
Capros aper	20.60	2490	6.23	
CHRISTYLIDAE	18.00	6390	5.44	
Chlorophthalmus atlanticus	15.30	1310	4.62	
Zenopsis conchifer	14.10	24	4.26	
Octopus vulgaris	13.20	6	3.99	
Sardina pilchardus	7.80	72	2.36	991
Plesionika edwardsii	6.30	2710	1.90	
Sepia sp.	5.20	580	1.57	
Merluccius senegalensis	4.68	18	1.41	
Trachurus trecae	3.84	12	1.16	
Helicolenus dactylopterus	3.78	258	1.14	
Scorpaena elongata	3.30	30	1.00	
Illex coindetii	3.26	8	0.99	
Microchirus boscanion	3.20	370	0.97	
Dentex macropthalmus	2.04	12	0.62	
Sarda sarda	1.74	2	0.53	
Liocarcinus corrugatus	1.00	150	0.30	
Torpedo marmorata	0.56	6	0.17	
Antigonia capros	0.50	40	0.15	
Macrorhamphosus scolopax	0.30	30	0.09	
Total	330.90		100.01	

PROJECT STATION: 500
 DATE: 21/11/96 GEAR TYPE: PT No:8 POSITION: Lat N 2115 Long W 1712
 start stop duration
 TIME : 01:50:00 02:10:00 20 (min) Purpose code: 1
 LOG : 2069.10 2070.10 1.00 Area code : 3
 FDEPTH: 25 25 GearCond.code:
 BDEPTH: 49 50 Validity code:
 Towing dir: 270° Wire out: 140 m Speed: 30 kn*10
 Sorted: 68 Kg Total catch: 67.59 CATCH/HOUR: 202.77

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP. NO.
	weight	numbers		
Trachurus trecae	163.95	2565	80.86	984
Sardina pilchardus	21.90	192	10.80	983
Loligo vulgaris	8.82	15	4.35	
Trichiurus lepturus	2.34	3	1.15	
Scomber japonicus	1.71	15	0.84	
Uranoscopus scaber	1.68	3	0.83	
Sardinella aurita	1.35	3	0.67	
Sardinella maderensis	0.72	3	0.36	
Belone svetovidovi	0.30	3	0.15	
Total	202.77		100.01	

PROJECT STATION: 504
 DATE: 21/11/96 GEAR TYPE: PT No:9 POSITION: Lat N 2200 Long W 1706
 start stop duration
 TIME : 18:57:00 19:27:00 30 (min) Purpose code: 1
 LOG : 2212.30 2213.70 1.40 Area code : 3
 FDEPTH: 20 20 GearCond.code:
 BDEPTH: 58 53 Validity code:
 Towing dir: 90° Wire out: 150 m Speed: 28 kn*10
 Sorted: 134 Kg Total catch: 134.00 CATCH/HOUR: 268.00

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP. NO.
	weight	numbers		
Sardinella aurita	166.70	358	62.20	994
Trachurus trecae	35.70	426	13.32	997
Decapterus rhonchus	23.40	48	8.73	996
Sardinella maderensis	14.30	40	5.34	995
Sarda sarda	11.20	6	4.18	
Pagellus bellottii	8.00	40	2.99	
Scomber japonicus	3.70	14	1.38	
Loligo vulgaris	1.80	48	0.67	
Pomadourus incisus	1.80	6	0.67	
Campogramma glaycos	1.40	2	0.52	
Total	268.00		100.00	

PROJECT STATION: 501
 DATE: 21/11/96 GEAR TYPE: PT No:9 POSITION: Lat N 2118 Long W 1706
 start stop duration
 TIME : 03:54:00 04:24:00 30 (min) Purpose code: 1
 LOG : 2083.00 2084.50 1.50 Area code : 3
 FDEPTH: 5 5 GearCond.code:
 BDEPTH: 40 43 Validity code:
 Towing dir: 332° Wire out: 160 m Speed: 30 kn*10
 Sorted: 95 Kg Total catch: 385.65 CATCH/HOUR: 771.30

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP. NO.
	weight	numbers		
Engraulis encrasicolus	436.50	98212	56.59	985
Trachurus trecae	99.50	2140	12.90	988
Sardina pilchardus	68.50	1860	8.88	986
Sardinella aurita	65.00	180	8.43	987
Sarda sarda	27.40	10	3.55	
Scomber japonicus	21.90	360	2.84	989
Gymnura micrura	17.00	4	2.20	
Decapterus rhonchus	14.70	40	1.91	
Loligo vulgaris	11.10	330	1.44	
Trichiurus lepturus	8.60	10	1.12	
Uranoscopus scaber	1.10	10	0.14	
Total	771.30		100.00	

PROJECT STATION: 505
 DATE: 21/11/96 GEAR TYPE: PT No:9 POSITION: Lat N 2200 Long W 1705
 start stop duration
 TIME : 20:05:00 20:34:00 29 (min) Purpose code: 1
 LOG : 2215.60 2216.90 1.30 Area code : 3
 FDEPTH: 5 5 GearCond.code:
 BDEPTH: 53 58 Validity code:
 Towing dir: 270° Wire out: 150 m Speed: 26 kn*10
 Sorted: 81 Kg Total catch: 1244.15 CATCH/HOUR: 2574.10

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP. NO.
	weight	numbers		
Sardinella aurita	1624.14	3517	63.10	998
Sardinella maderensis	821.45	2406	31.99	999
Mugil capurrii	55.86	41	2.17	
Sarda sarda	39.62	12	1.54	
Auxis thazard	28.97	41	1.13	
Loligo vulgaris	2.07	6	0.08	
Total	2574.11		100.01	

PROJECT STATION: 506
 DATE: 22/11/96 GEAR TYPE: PT No:8 POSITION: Lat N 2214 Long W 1723
 start stop duration
 TIME :01:16:00 01:33:00 17 (min) Purpose code: 1
 LOG :2257.60 2258.50 0.90 Area code : 3
 FDEPTH: 60 60 GearCond.code:
 BDEPTH: 386 370 Validity code:
 Towing dir: 202° Wire out: 220 m Speed: 30 kn*10
 Sorted: 43 Kg Total catch: 42.77 CATCH/HOUR: 150.95

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP.NO.
	weight	numbers		
MYCTOPHIDAE	110.12	63625	72.95	
Brama brama	30.71	88	20.34	
Krill	6.21	8951	4.11	
Aphanopus sp.	2.29	11	1.52	
PANDALIDAE	1.45	1812	0.96	
Loligo vulgaris	0.18	4	0.12	
Total	150.96		100.00	

PROJECT STATION: 511
 DATE: 22/11/96 GEAR TYPE: PT No:9 POSITION: Lat N 2243 Long W 1638
 start stop duration
 TIME :22:58:00 23:28:00 30 (min) Purpose code: 1
 LOG :2430.90 2432.40 1.50 Area code : 3
 FDEPTH: 5 5 GearCond.code:
 BDEPTH: 47 49 Validity code:
 Towing dir: 90° Wire out: 160 m Speed: 30 kn*10
 Sorted: 4 Kg Total catch: 4.25 CATCH/HOUR: 8.50

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP.NO.
	weight	numbers		
Loligo vulgaris	4.30	10	50.59	
Campogramma glaycos	2.82	4	33.18	
Scomber japonicus	0.78	8	9.18	
Loligo vulgaris	0.58	88	6.82	
Microchirus boscanion	0.02	2	0.24	
Total	8.50		100.01	

PROJECT STATION: 507
 DATE: 22/11/96 GEAR TYPE: PT No:8 POSITION: Lat N 2215 Long W 1701
 start stop duration
 TIME :04:33:00 05:03:00 30 (min) Purpose code: 1
 LOG :2283.00 2284.70 1.70 Area code : 3
 FDEPTH: 25 25 GearCond.code:
 BDEPTH: 57 54 Validity code:
 Towing dir: 90° Wire out: 120 m Speed: 32 kn*10
 Sorted: 28 Kg Total catch: 28.74 CATCH/HOUR: 57.48

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP.NO.
	weight	numbers		
Pagellus bellottii	23.40	114	40.71	1002
Trachurus trecae	12.30	188	21.40	1000
Diplodus vulgaris	5.00	10	8.70	
Trichiurus lepturus	4.90	4	8.52	
Pomadasys incisus	2.86	14	4.98	
Diplodus puntazzo	2.00	2	3.48	
Scomber japonicus	1.66	24	2.89	1001
Loligo vulgaris	1.22	2	2.12	
Spondyliosoma cantharus	1.02	4	1.77	
MYCTOPHIDAE	0.78	632	1.36	
Sepia sp.	0.72	8	1.25	
Ophiurus serpens	0.66	2	1.15	
Boops boops	0.38	4	0.66	
Allotheutis subulata	0.22	144	0.38	
GOBIDAE juvenile	0.22	430	0.38	
Pagellus bellottii	0.14	258	0.24	
Total	57.48		99.99	

PROJECT STATION: 512
 DATE: 23/11/96 GEAR TYPE: PT No:4 POSITION: Lat N 2243 Long W 1627
 start stop duration
 TIME :01:10:00 01:40:00 30 (min) Purpose code: 1
 LOG :2443.67 2445.39 1.72 Area code : 3
 FDEPTH: 5 5 GearCond.code:
 BDEPTH: 33 33 Validity code:
 Towing dir: 270° Wire out: 150 m Speed: 32 kn*10
 Sorted: 118 Kg Total catch: 379.65 CATCH/HOUR: 759.30

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP.NO.
	weight	numbers		
Sardina pilchardus	501.68	23376	66.07	1008
Loligo vulgaris	69.00	190	9.09	
Engraulis encrasicolus	59.82	11664	7.88	1009
Campogramma glaycos	54.68	80	7.20	
Sarda sarda	40.60	24	5.35	
Loligo vulgaris	14.82	954	1.95	
Trachurus trecae	8.80	242	1.16	1010
Scomber japonicus	3.52	66	0.46	1011
Trichiurus lepturus	3.22	8	0.42	
Decapterus rhonchus	3.16	8	0.42	
Total	759.30		100.00	

PROJECT STATION: 513
 DATE: 23/11/96 GEAR TYPE: PT No:7 POSITION: Lat N 2237 Long W 1626
 start stop duration
 TIME :05:26:00 05:56:00 30 (min) Purpose code: 1
 LOG :2476.50 2478.10 1.60 Area code : 3
 FDEPTH: 5 5 GearCond.code:
 BDEPTH: 28 27 Validity code:
 Towing dir: 5° Wire out: 150 m Speed: 32 kn*10
 Sorted: 31 Kg Total catch: 146.44 CATCH/HOUR: 292.88

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP.NO.
	weight	numbers		
Sardina pilchardus	172.80	7014	59.00	1013
Engraulis encrasicolus	62.20	9460	21.24	1012
Decapterus rhonchus	25.40	150	8.67	1014
Trichiurus lepturus	20.30	40	6.93	
Diplodus bellottii	6.90	60	2.36	
Sarda sarda	2.30	2	0.79	
Campogramma glaycos	1.76	2	0.60	
Sphyræna sphyraena	1.02	2	0.35	
Trachurus trecae	0.20	10	0.07	
Total	292.88		100.01	

PROJECT STATION: 508
 DATE: 22/11/96 GEAR TYPE: PT No:7 POSITION: Lat N 2219 Long W 1635
 start stop duration
 TIME :08:43:00 09:13:00 30 (min) Purpose code: 1
 LOG :2313.20 2314.70 1.50 Area code : 3
 FDEPTH: 10 10 GearCond.code:
 BDEPTH: 19 24 Validity code:
 Towing dir: 244° Wire out: 150 m Speed: 30 kn*10
 Sorted: 33 Kg Total catch: 1303.20 CATCH/HOUR: 2606.40

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP.NO.
	weight	numbers		
Engraulis encrasicolus	2344.00	320660	89.93	1003
Decapterus rhonchus	136.80	1120	5.25	1005
Sardina pilchardus	92.80	4326	3.56	1004
Campogramma glaycos	24.00	80	0.92	
Sardinella aurita	8.80	80	0.34	
Total	2606.40		100.00	

PROJECT STATION: 514
 DATE: 23/11/96 GEAR TYPE: PT No:7 POSITION: Lat N 2252 Long W 1620
 start stop duration
 TIME :08:11:00 08:41:00 30 (min) Purpose code: 1
 LOG :2495.10 2496.40 1.30 Area code : 3
 FDEPTH: 10 10 GearCond.code:
 BDEPTH: 20 23 Validity code:
 Towing dir: 335° Wire out: 150 m Speed: 26 kn*10
 Sorted: 64 Kg Total catch: 597.87 CATCH/HOUR: 1195.74

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP.NO.
	weight	numbers		
Campogramma glaycos	700.00	2508	58.54	1015
Trichiurus lepturus	228.00	400	19.07	
Stromateus fiatola	158.00	360	13.21	1017
Diplodus bellottii	44.00	500	3.68	
Decapterus rhonchus	34.00	260	2.84	1016
Pomadasys incisus	16.60	60	1.39	
Orcynopsis unicolor	6.22	2	0.52	
Sardinella aurita	5.40	20	0.45	
Sarpa salpa	1.90	2	0.16	
Argyrosomus regius	1.62	2	0.14	
Total	1195.74		100.00	

PROJECT STATION: 510
 DATE: 22/11/96 GEAR TYPE: PT No:8 POSITION: Lat N 2231 Long W 1712
 start stop duration
 TIME :16:57:00 17:27:00 30 (min) Purpose code: 1
 LOG :2376.00 2377.50 1.50 Area code : 3
 FDEPTH: 85 85 GearCond.code:
 BDEPTH: 106 101 Validity code:
 Towing dir: 180° Wire out: 340 m Speed: 34 kn*10
 Sorted: Kg Total catch: CATCH/HOUR:

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP.NO.
	weight	numbers		
N O C A T C H	0.00			
Total				

PROJECT STATION: 515
 DATE: 23/11/96 GEAR TYPE: BT No:1 POSITION: Lat N 2259 Long W 1702
 start stop duration
 TIME :14:50:00 15:20:00 30 (min) Purpose code: 1
 LOG :2550.50 2552.00 1.50 Area code : 3
 FDEPTH: 101 101 GearCond.code:
 BDEPTH: 101 101 Validity code:
 Towing dir: 180° Wire out: 360 m Speed: 30 kn*10
 Sorted: 68 Kg Total catch: 272.08 CATCH/HOUR: 544.16

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP. NO.
	weight	numbers		
Trachurus trachurus	139.20	3864	25.58	1018
Dentex macrophthalmus	128.00	2136	23.52	
Allotheutis subulata	50.24	19088	9.23	
Scomber japonicus	49.60	1904	9.11	1019
Dentex maroccanus	43.20	408	7.94	
Lepidopus caudatus	28.16	416	5.17	
Loligo vulgaris	21.76	96	4.00	
Pagellus acarne	18.00	80	3.31	
Dentex angolensis	10.88	24	2.00	
Merluccius senegalensis	10.48	8	1.93	
Sparus aurata	8.72	8	1.60	
Scylliorhinus canicula	6.80	8	1.25	
Raja miraletus	5.36	8	0.99	
Zeus faber	4.08	8	0.75	
Capros aper	4.08	128	0.75	
Serranus cabrilla	3.92	16	0.72	
Citharus linguatula	2.48	104	0.46	
Camogramma glaycos	2.48	8	0.46	
Sardina pilchardus	2.16	88	0.40	
Lepidotrigla dieuzeidei	1.92	88	0.35	
Chelidonichthys obscurus	1.44	8	0.26	
Boops boops	0.88	8	0.16	
Decapterus rhonchus	0.32	8	0.06	
Total	544.16		100.00	

PROJECT STATION: 516
 DATE: 23/11/96 GEAR TYPE: PT No:9 POSITION: Lat N 2313 Long W 1656
 start stop duration
 TIME :18:53:00 19:23:00 30 (min) Purpose code: 1
 LOG :2583.30 2584.80 1.50 Area code : 3
 FDEPTH: 50 50 GearCond.code:
 BDEPTH: 78 83 Validity code:
 Towing dir: 270° Wire out: 250 m Speed: 30 kn*10
 Sorted: 32 Kg Total catch: 32.06 CATCH/HOUR: 64.12

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP. NO.
	weight	numbers		
Trachurus trachurus	33.20	2158	51.78	1020
Scomber japonicus	14.90	592	23.24	1021
Trachurus trachurus	12.00	42	18.71	1022
Scomber japonicus	3.60	10	5.61	1023
Sardina pilchardus	0.32	12	0.50	
Allotheutis subulata	0.10	32	0.16	
Total	64.12		100.00	

PROJECT STATION: 517
 DATE: 24/11/96 GEAR TYPE: BT No:1 POSITION: Lat N 2312 Long W 1615
 start stop duration
 TIME :00:16:00 00:29:00 13 (min) Purpose code: 1
 LOG :2630.47 2631.00 0.53 Area code : 3
 FDEPTH: 23 28 GearCond.code:
 BDEPTH: 23 28 Validity code:
 Towing dir: 270° Wire out: 140 m Speed: 30 kn*10
 Sorted: 65 Kg Total catch: 382.01 CATCH/HOUR: 1763.12

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP. NO.
	weight	numbers		
Sardina pilchardus	1672.62	15868	94.87	1024
Diplodus bellottii	21.88	332	1.24	
Decapterus rhonchus	17.72	138	1.01	
Trichiurus lepturus	15.78	28	0.90	
Sepia officinalis hierredda	9.97	28	0.57	
Sarda sarda	9.92	5	0.56	
Pomadourus inciaus	9.69	55	0.55	
Engraulis encrasicolus	3.88	637	0.22	1025
Chelidonichthys obscurus	1.66	28	0.09	
Total	1763.12		100.01	

PROJECT STATION: 518
 DATE: 24/11/96 GEAR TYPE: PT No:7 POSITION: Lat N 2341 Long W 1612
 start stop duration
 TIME :20:11:00 20:41:00 30 (min) Purpose code: 1
 LOG :2811.90 2813.50 1.60 Area code : 3
 FDEPTH: 20 20 GearCond.code:
 BDEPTH: 32 32 Validity code:
 Towing dir: 270° Wire out: 90 m Speed: 32 kn*10
 Sorted: 40 Kg Total catch: 190.44 CATCH/HOUR: 380.88

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP. NO.
	weight	numbers		
Sardinella aurita	208.44	852	54.73	1026
Sardina pilchardus	150.12	1512	39.41	1027
Sarda sarda	16.10	10	4.23	
Scomber japonicus	3.12	24	0.82	
Camogramma glaycos	3.10	2	0.81	
Total	380.88		100.00	

PROJECT STATION: 519
 DATE: 24/11/96 GEAR TYPE: BT No:1 POSITION: Lat N 2341 Long W 1608
 start stop duration
 TIME :21:50:00 22:01:00 11 (min) Purpose code: 1
 LOG :2820.70 2821.30 0.60 Area code : 3
 FDEPTH: 30 31 GearCond.code:
 BDEPTH: 30 31 Validity code:
 Towing dir: 270° Wire out: 150 m Speed: 34 kn*10
 Sorted: 37 Kg Total catch: 937.20 CATCH/HOUR: 5112.00

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP. NO.
	weight	numbers		
Sardina pilchardus	4738.64	47389	92.70	1028
Scomber japonicus	203.18	2864	3.97	1029
Camogramma glaycos	103.64	136	2.03	
Decapterus rhonchus	20.45	136	0.40	
Trachinus draco	20.45	409	0.40	
Chelidonichthys obscurus	13.64	545	0.27	
Pomatomus saltatrix	9.27	5	0.18	
Microchirus sp.	2.73	273	0.05	
Total	5112.00		100.00	

PROJECT STATION: 520
 DATE: 25/11/96 GEAR TYPE: BT No:1 POSITION: Lat N 2334 Long W 1610
 start stop duration
 TIME :02:31:00 02:41:00 10 (min) Purpose code: 1
 LOG :2860.90 2861.40 0.50 Area code : 3
 FDEPTH: 27 26 GearCond.code:
 BDEPTH: 27 26 Validity code:
 Towing dir: 84° Wire out: 150 m Speed: 30 kn*10
 Sorted: 66 Kg Total catch: 591.75 CATCH/HOUR: 3550.50

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP. NO.
	weight	numbers		
Sardina pilchardus	3337.20	37206	93.99	1030
Pagellus bellottii	120.42	2322	3.39	
Raja undulata	27.00	54	0.76	
Scomber japonicus	25.92	324	0.73	
Loligo vulgaris	24.30	162	0.68	
Trachinus draco	11.88	270	0.33	
Spondyliosoma cantharus	2.70	54	0.08	
Monoichirus sp.	1.08	108	0.03	
Total	3550.50		99.99	

PROJECT STATION: 521
 DATE: 25/11/96 GEAR TYPE: BT No:1 POSITION: Lat N 2349 Long W 1603
 start stop duration
 TIME :05:38:00 05:46:00 8 (min) Purpose code: 1
 LOG :2885.16 2885.53 0.37 Area code : 3
 FDEPTH: 28 28 GearCond.code:
 BDEPTH: 28 28 Validity code:
 Towing dir: 90° Wire out: 150 m Speed: 30 kn*10
 Sorted: 36 Kg Total catch: 3058.71 CATCH/HOUR: 22940.33

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP. NO.
	weight	numbers		
Sardina pilchardus	22511.25	242078	98.13	1031
Chelidonichthys obscurus	215.33	653	0.94	
Scomber japonicus	163.13	2610	0.71	
Trachinus armatus	45.68	653	0.20	
Loligo vulgaris	4.95	15	0.02	
Total	22940.34		100.00	

PROJECT STATION: 522
 DATE: 25/11/96 GEAR TYPE: PT No:7 POSITION: Lat N 2401 Long W 1559
 start stop duration
 TIME :19:33:00 20:03:00 30 (min) Purpose code: 1
 LOG :3022.80 3024.40 1.60 Area code : 3
 FDEPTH: 25 25 GearCond.code:
 BDEPTH: 32 31 Validity code:
 Towing dir: 40° Wire out: 100 m Speed: 32 kn*10
 Sorted: 35 Kg Total catch: 977.89 CATCH/HOUR: 1955.78

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP. NO.
	weight	numbers		
Sardina pilchardus	1839.60	24360	94.06	1033
Scomber japonicus	61.04	1400	3.12	1032
Trachinus draco	16.24	280	0.83	
Pagellus bellottii	11.20	280	0.57	
Chelidonichthys obscurus	7.28	280	0.37	
Torpedo marmorata	6.98	2	0.36	
Microchirus sp.	5.04	504	0.26	
Sepia officinalis hierredda	4.48	56	0.23	
Synchiropus phaeton	2.80	168	0.14	
Microchirus boscanion	1.12	112	0.06	
Total	1955.78		100.00	

PROJECT STATION: 523
 DATE:26/11/96 GEAR TYPE: BT No.1 POSITION:Lat N 2409
 start stop duration Long W 1603
 TIME :00:10:00 00:25:00 15 (min) Purpose code: 1
 LOG :3057.80 3058.40 0.60 Area code : 3
 FDEPTH: 37 38 GearCond.code:
 BDEPTH: 37 38 Validity code:
 Towing dir: 110° Wire out: 170 m Speed: 25 kn*10
 Sorted: 70 Kg Total catch: 86.68 CATCH/HOUR: 346.72

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP.NO.
	weight	numbers		
Sardina pilchardus	169.00	1944	48.74	1034
Scomber japonicus	116.76	2820	33.68	1035
Trachinus draco	37.00	684	10.67	
Pomadasys incisus	11.44	56	3.30	
Chelidonichthys obscurus	5.20	128	1.50	
Trachurus trachurus	3.92	64	1.13	
Loligo vulgaris	1.08	4	0.31	
Pagellus acarne	0.80	12	0.23	
Pagellus bellottii	0.76	4	0.22	
Sepia officinalis hierredda	0.24	8	0.07	
Dicologlossa cuneata	0.24	4	0.07	
Microchirus boscanion	0.20	32	0.06	
Microchirus hispidus	0.08	8	0.02	
Total	346.72		100.00	

PROJECT STATION: 524
 DATE:26/11/96 GEAR TYPE: PT No:9 POSITION:Lat N 2427
 start stop duration Long W 1630
 TIME :05:20:00 05:50:00 30 (min) Purpose code: 1
 LOG :3100.60 3102.10 1.50 Area code : 3
 FDEPTH: 40 40 GearCond.code:
 BDEPTH: 420 513 Validity code:
 Towing dir: 214° Wire out: 200 m Speed: 30 kn*10
 Sorted: 500 Kg Total catch: 500.00 CATCH/HOUR: 1000.00

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP.NO.
	weight	numbers		
MYCTOPHIDAE	1000.00		100.00	
Total	1000.00		100.00	

PROJECT STATION: 525
 DATE:26/11/96 GEAR TYPE: PT No:7 POSITION:Lat N 2414
 start stop duration Long W 1539
 TIME :13:39:00 13:54:00 15 (min) Purpose code: 1
 LOG :3175.12 3175.88 0.76 Area code : 3
 FDEPTH: 10 10 GearCond.code:
 BDEPTH: 23 24 Validity code:
 Towing dir: 335° Wire out: 150 m Speed: 30 kn*10
 Sorted: 71 Kg Total catch: 1137.44 CATCH/HOUR: 4549.76

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP.NO.
	weight	numbers		
Sardina pilchardus	4508.80	81216	99.10	1036
Scomber japonicus	40.96	1472	0.90	1037
Total	4549.76		100.00	

PROJECT STATION: 526
 DATE:26/11/96 GEAR TYPE: PT No:7 POSITION:Lat N 2425
 start stop duration Long W 1521
 TIME :05:20:00 05:50:00 30 (min) Purpose code: 1
 LOG :3314.00 3315.55 1.55 Area code : 3
 FDEPTH: 5 5 GearCond.code:
 BDEPTH: 21 21 Validity code:
 Towing dir: 15° Wire out: 150 m Speed: 31 kn*10
 Sorted: 35 Kg Total catch: 495.32 CATCH/HOUR: 990.64

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP.NO.
	weight	numbers		
Sardina pilchardus	938.00	18228	94.69	1038
Scomber japonicus	30.80	1092	3.11	1039
Sardinella aurita	10.64	140	1.07	
Spondylosoma cantharus	6.16	168	0.62	
Trachurus trachurus	5.04	140	0.51	
Total	990.64		100.00	

PROJECT STATION: 527
 DATE:26/11/96 GEAR TYPE: PT No:7 POSITION:Lat N 2435
 start stop duration Long W 1527
 TIME :08:35:00 09:05:00 30 (min) Purpose code: 1
 LOG :3338.70 3340.50 1.80 Area code : 3
 FDEPTH: 20 20 GearCond.code:
 BDEPTH: 28 31 Validity code:
 Towing dir: 284° Wire out: 110 m Speed: 36 kn*10
 Sorted: 1 Kg Total catch: 1.16 CATCH/HOUR: 2.32

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP.NO.
	weight	numbers		
Sardinella aurita	2.32	10	100.00	1040
Total	2.32		100.00	

PROJECT STATION: 528
 DATE:27/11/96 GEAR TYPE: PT No:9 POSITION:Lat N 2448
 start stop duration Long W 1511
 TIME :22:08:00 22:38:00 30 (min) Purpose code: 1
 LOG :3467.60 3469.30 1.70 Area code : 3
 FDEPTH: 5 5 GearCond.code:
 BDEPTH: 34 33 Validity code:
 Towing dir: 125° Wire out: 160 m Speed: 32 kn*10
 Sorted: 33 Kg Total catch: 392.04 CATCH/HOUR: 784.08

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP.NO.
	weight	numbers		
Sardina pilchardus	744.48	6748	94.95	1041
Sardinella aurita	39.60	312	5.05	1042
Total	784.08		100.00	

PROJECT STATION: 529
 DATE:28/11/96 GEAR TYPE: PT No:8 POSITION:Lat N 2511
 start stop duration Long W 1507
 TIME :07:02:00 07:14:00 12 (min) Purpose code: 1
 LOG :3549.20 3550.00 0.80 Area code : 3
 FDEPTH: 25 25 GearCond.code:
 BDEPTH: 56 54 Validity code:
 Towing dir: 140° Wire out: 120 m Speed: 40 kn*10
 Sorted: Kg Total catch: CATCH/HOUR:

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP.NO.
	weight	numbers		
N O C A T C H	0.00			
Total				

PROJECT STATION: 530
 DATE:28/11/96 GEAR TYPE: PT No:8 POSITION:Lat N 2514
 start stop duration Long W 1510
 TIME :08:40:00 09:29:00 49 (min) Purpose code: 1
 LOG :3559.00 3561.80 2.80 Area code : 3
 FDEPTH: 32 30 GearCond.code:
 BDEPTH: 63 58 Validity code:
 Towing dir: 140° Wire out: 120 m Speed: 35 kn*10
 Sorted: Kg Total catch: CATCH/HOUR:

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP.NO.
	weight	numbers		
N O C A T C H	0.00			
Total				

PROJECT STATION: 531
 DATE:28/11/96 GEAR TYPE: PT No:8 POSITION:Lat N 2513
 start stop duration Long W 1509
 TIME :10:25:00 10:55:00 30 (min) Purpose code: 1
 LOG :3566.80 3568.90 2.10 Area code : 3
 FDEPTH: 35 35 GearCond.code:
 BDEPTH: 69 67 Validity code:
 Towing dir: 107° Wire out: 200 m Speed: 42 kn*10
 Sorted: Kg Total catch: CATCH/HOUR:

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP.NO.
	weight	numbers		
N O C A T C H	0.00			
Total				

PROJECT STATION: 532
 DATE:10/12/96 GEAR TYPE: PT No:8 POSITION:Lat N 3159
 start stop duration Long W 944
 TIME :09:56:00 10:26:00 30 (min) Purpose code: 1
 LOG :4595.60 4597.40 1.80 Area code : 3
 FDEPTH: 25 25 GearCond.code:
 BDEPTH: 47 49 Validity code:
 Towing dir: 280° Wire out: 150 m Speed: 36 kn*10
 Sorted: Kg Total catch: CATCH/HOUR:

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP.NO.
	weight	numbers		
N O C A T C H	0.00			
Total				

PROJECT STATION: 533
 DATE:10/12/96 GEAR TYPE: PT No:1 POSITION:Lat N 3159
 start stop duration Long W 945
 TIME :11:03:00 11:09:00 6 (min) Purpose code: 1
 LOG :4599.50 4599.80 0.30 Area code : 3
 FDEPTH: 20 20 GearCond.code:
 BDEPTH: 51 47 Validity code:
 Towing dir: 110° Wire out: 100 m Speed: 30 kn*10
 Sorted: 42 Kg Total catch: 3000.00 CATCH/HOUR: 30000.00

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP.NO.
	weight	numbers		
Sardina pilchardus	26850.70	1422520	89.50	1043
Engraulis encrasicolus	3085.00	250650	10.28	1044
Scomber japonicus	64.30	710	0.21	
Total	30000.00		99.99	

PROJECT STATION: 534
 DATE:10/12/96 GEAR TYPE: PT No:1 POSITION:Lat N 3135 Long W 950
 start stop duration
 TIME :19:25:00 19:55:00 30 (min) Purpose code: 1
 LOG :4687.00 4688.80 1.80 Area code : 3
 FDEPTH: 20 20 GearCond.code:
 BDEPTH: 47 54 Validity code:
 Towing dir: 220° Wire out: 80 m Speed: 36 kn*10
 Sorted: 40 Kg Total catch: 176.85 CATCH/HOUR: 353.70

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP.NO.
	weight	numbers		
Engraulis encrasicolus	184.72	12108	52.23	1045
Sardina pilchardus	95.26	18456	26.93	1046
Lepidopus caudatus	70.70	48	19.99	
Allotheutis subulata	3.02	834	0.85	
Total	353.70		100.00	

PROJECT STATION: 535
 DATE:11/12/96 GEAR TYPE: BT No:1 POSITION:Lat N 3024 Long W 943
 start stop duration
 TIME :16:52:00 17:22:00 30 (min) Purpose code: 1
 LOG :4831.40 4832.85 1.45 Area code : 3
 FDEPTH: 41 45 GearCond.code:
 BDEPTH: 41 45 Validity code:
 Towing dir: 360° Wire out: 150 m Speed: 29 kn*10
 Sorted: 2 Kg Total catch: 69.85 CATCH/HOUR: 139.70

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP.NO.
	weight	numbers		
Lepidopus caudatus	66.20	40	47.39	
Engraulis encrasicolus	26.50	3814	18.97	1048
Chelidonichthys lucerna	12.14	54	8.69	
Trisopterus luscus	8.28	268	5.93	
Zeus faber	5.04	6	3.61	
Allotheutis subulata	4.14	1450	2.96	
Dicologlossa cuneata	3.88	146	2.78	
Liocarcinus corrugatus	2.08	170	1.49	
Maja squinado	1.70	2	1.22	
Loligo vulgaris	1.60	34	1.15	
Sardina pilchardus	1.56	80	1.12	1047
Parapenaeus longirostris	1.26	612	0.90	
Trachurus trachurus	1.10	48	0.79	
Diplodus vulgaris	0.98	4	0.70	
Umbrina canariensis	0.88	6	0.63	
Merluccius merluccius	0.84	10	0.60	
Squilla mantis	0.50	14	0.36	
Pagellus acarne	0.36	14	0.26	
Penaeus kerathurus	0.26	4	0.19	
Conger conger	0.24	2	0.17	
Sepiolla rondeleti	0.16	78	0.11	
Total	139.70		100.02	

PROJECT STATION: 536
 DATE:12/12/96 GEAR TYPE: PT No:1 POSITION:Lat N 3013 Long W 941
 start stop duration
 TIME :11:16:00 11:35:00 19 (min) Purpose code: 1
 LOG :5014.10 5015.30 1.20 Area code : 3
 FDEPTH: 25 25 GearCond.code:
 BDEPTH: 48 52 Validity code:
 Towing dir: 200° Wire out: 120 m Speed: 36 kn*10
 Sorted: 59 Kg Total catch: 177.28 CATCH/HOUR: 559.83

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP.NO.
	weight	numbers		
Sardina pilchardus	320.84	16298	57.31	1049
Engraulis encrasicolus	174.95	16683	31.25	1050
Lepidopus caudatus	53.56	35	9.57	
Diplodus sargus *	7.96	9	1.42	
Boops boops	2.12	3	0.38	
Scomber japonicus	0.41	6	0.07	
Total	559.84		100.00	

PROJECT STATION: 537
 DATE:12/12/96 GEAR TYPE: BT No:1 POSITION:Lat N 3005 Long W 1000
 start stop duration
 TIME :14:30:00 15:00:00 30 (min) Purpose code: 1
 LOG :5043.70 5045.20 1.50 Area code : 3
 FDEPTH: 184 214 GearCond.code:
 BDEPTH: 184 214 Validity code:
 Towing dir: 360° Wire out: 600 m Speed: 30 kn*10
 Sorted: 91 Kg Total catch: 116.17 CATCH/HOUR: 232.34

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP.NO.
	weight	numbers		
Capros aper	97.20	14856	41.84	
Lepidopus caudatus	91.90	98	39.55	
Merluccius merluccius	12.14	152	5.23	
Lepidopus caudatus	7.60	98	3.27	
Dentex macrophthalmus	6.52	30	2.81	
Maja squinado	3.38	2	1.45	
Zeus faber	3.02	42	1.30	
Loligo vulgaris	2.90	8	1.25	
Conger conger	2.48	4	1.07	
Allotheutis subulata	2.00	1220	0.86	
Macrorhamphosus scolopax	1.84	88	0.79	
Illex coindetii	0.88	20	0.38	
Todaropsis eblanae	0.28	8	0.12	
Liocarcinus corrugatus	0.16	16	0.07	
Parapenaeus longirostris	0.04	4	0.02	
Total	232.34		100.01	

PROJECT STATION: 538
 DATE:12/12/96 GEAR TYPE: PT No:1 POSITION:Lat N 2957 Long W 949
 start stop duration
 TIME :17:50:00 18:20:00 30 (min) Purpose code: 1
 LOG :5070.30 5072.10 1.80 Area code : 3
 FDEPTH: 20 20 GearCond.code:
 BDEPTH: 50 60 Validity code:
 Towing dir: 15° Wire out: 120 m Speed: 36 kn*10
 Sorted: 49 Kg Total catch: 526.78 CATCH/HOUR: 1053.56

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP.NO.
	weight	numbers		
Trachurus trachurus	493.80	446	46.87	1051
Lepidopus caudatus	392.10	258	37.22	
Diplodus vulgaris	74.50	258	7.07	
Engraulis encrasicolus	39.56	2830	3.75	1052
Sardina pilchardus	31.74	1136	3.01	1053
Sarpa salpa	16.70	40	1.59	
Sparus aurata	1.90	2	0.18	
Loligo vulgaris	1.78	10	0.17	
Liza ramada	1.48	2	0.14	
Total	1053.56		100.00	

PROJECT STATION: 539
 DATE:12/12/96 GEAR TYPE: PT No:8 POSITION:Lat N 2938 Long W 1022
 start stop duration
 TIME :01:30:00 02:00:00 30 (min) Purpose code: 1
 LOG :5144.40 5146.00 1.60 Area code : 3
 FDEPTH: 80 82 GearCond.code:
 BDEPTH: 103 101 Validity code:
 Towing dir: 303° Wire out: 350 m Speed: 32 kn*10
 Sorted: 142 Kg Total catch: 142.34 CATCH/HOUR: 284.68

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP.NO.
	weight	numbers		
Lepidopus caudatus	225.40	200	79.18	
Pagellus acarne	35.90	110	12.61	
Dentex macrophthalmus	15.10	82	5.30	
Chelidonichthys lastoviza	2.82	68	0.99	
Pagellus erythrinus	1.42	2	0.50	
Chelidonichthys obscurus	1.24	4	0.44	
Chelidonichthys lucerna	0.72	2	0.25	
Diplodus vulgaris	0.48	2	0.17	
Scomber japonicus	0.46	6	0.16	
Allotheutis subulata	0.30	76	0.11	
Solenocera africana	0.30	158	0.11	
Sepiolla rondeleti	0.20	158	0.07	
Sepia elegans	0.16	16	0.06	
Sardina pilchardus	0.10	2	0.04	
GOBIIDAE	0.06	48	0.02	
Citharus linguatula	0.02	6	0.01	
Total	284.68		100.02	

PROJECT STATION: 540
 DATE:13/12/96 GEAR TYPE: PT No:8 POSITION:Lat N 2925 Long W 1014
 start stop duration
 TIME :07:11:00 07:21:00 10 (min) Purpose code: 1
 LOG :5186.70 5187.30 0.60 Area code : 3
 FDEPTH: 20 20 GearCond.code:
 BDEPTH: 40 42 Validity code:
 Towing dir: 310° Wire out: 150 m Speed: 36 kn*10
 Sorted: 39 Kg Total catch: 1004.60 CATCH/HOUR: 6027.60

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP.NO.
	weight	numbers		
Engraulis encrasicolus	4168.92	321180	69.16	1055
Sardina pilchardus	1800.00	66948	29.86	1054
Scomber japonicus	31.08	312	0.52	
Lepidopus caudatus	27.60	18	0.46	
Total	6027.60		100.00	

PROJECT STATION: 541
 DATE:13/12/96 GEAR TYPE: PT No:8 POSITION:Lat N 2948 Long W 953
 start stop duration
 TIME :11:09:00 11:39:00 30 (min) Purpose code: 1
 LOG :5220.00 5221.90 1.90 Area code : 3
 FDEPTH: 15 15 GearCond.code:
 BDEPTH: 32 32 Validity code:
 Towing dir: 330° Wire out: 120 m Speed: 38 kn*10
 Sorted: 24 Kg Total catch: 24.07 CATCH/HOUR: 48.14

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP.NO.
	weight	numbers		
Sardina pilchardus	24.50	2782	50.89	1056
Engraulis encrasicolus	19.90	1276	41.34	1057
Lepidopus caudatus	3.30	2	6.86	
Scomber japonicus	0.44	6	0.91	
Total	48.14		100.00	

PROJECT STATION: 542
 DATE:14/12/96 GEAR TYPE: PT No:8 POSITION:Lat N 2911 Long W 1033
 start stop duration
 TIME :05:23:00 05:53:00 30 (min) Purpose code: 1
 LOG :5392.10 5393.60 1.50 Area code : 3
 FDEPTH: 20 20 GearCond.code:
 BDEPTH: 47 47 Validity code:
 Towing dir: 270° Wire out: 150 m Speed: 30 kn*10
 Sorted: Kg Total catch: 99.73 CATCH/HOUR: 199.46

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP. NO.
	weight	numbers		
Diplodus vulgaris	88.90	418	44.57	
Engraulis encrasicolus	51.10	4980	25.62	1059
Lepidopus caudatus	31.90	18	15.99	
Pagellus acarne	13.70	48	6.87	
Sardina pilchardus	6.04	230	3.03	1058
Trachurus trachurus	5.70	38	2.86	1060
Dentex maroccanus	1.80	2	0.90	
Allotheutis subulata	0.26	46	0.33	
Merluccius merluccius	0.04	2	0.02	
Sepiola rondeleti	0.02	4	0.01	
Total	199.46		100.00	

PROJECT STATION: 543
 DATE:14/12/96 GEAR TYPE: PT No:1 POSITION:Lat N 2901 Long W 1040
 start stop duration
 TIME :09:42:00 09:56:00 14 (min) Purpose code: 1
 LOG :5429.50 5430.40 0.90 Area code : 3
 FDEPTH: 20 20 GearCond.code:
 BDEPTH: 50 43 Validity code:
 Towing dir: 120° Wire out: 120 m Speed: 35 kn*10
 Sorted: 41 Kg Total catch: 1242.60 CATCH/HOUR: 5325.43

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP. NO.
	weight	numbers		
Engraulis encrasicolus	5007.86	677829	94.04	1062
Sardina pilchardus	201.86	9257	3.79	1061
Lepidopus caudatus	47.14	30	0.89	
Scomber japonicus	32.57	514	0.61	
MOLIDAR	24.64	4	0.46	
Chelidonichthys lucerna	6.64	17	0.12	
Trachurus trachurus	4.71	4	0.09	
Total	5325.42		100.00	

PROJECT STATION: 544
 DATE:14/12/96 GEAR TYPE: PT No:1 POSITION:Lat N 2854 Long W 1051
 start stop duration
 TIME :13:33:00 13:48:00 15 (min) Purpose code: 1
 LOG :5466.10 5467.00 0.90 Area code : 3
 FDEPTH: 20 30 GearCond.code:
 BDEPTH: 47 54 Validity code:
 Towing dir: 346° Wire out: 150 m Speed: 33 kn*10
 Sorted: 74 Kg Total catch: 1302.48 CATCH/HOUR: 5209.92

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP. NO.
	weight	numbers		
Engraulis encrasicolus	3063.60	223140	58.80	1064
Sardina pilchardus	1875.60	66532	36.00	1063
Scomber japonicus	131.04	2016	2.52	1065
Trachurus trachurus	117.60	2592	2.26	1066
Pagellus acarne	22.08	48	0.42	
Total	5209.92		100.00	

PROJECT STATION: 545
 DATE:15/12/96 GEAR TYPE: PT No:8 POSITION:Lat N 2825 Long W 1128
 start stop duration
 TIME :12:39:00 13:09:00 30 (min) Purpose code: 1
 LOG :5720.70 5722.20 1.50 Area code : 3
 FDEPTH: 10 10 GearCond.code:
 BDEPTH: 25 25 Validity code:
 Towing dir: 19° Wire out: 120 m Speed: 30 kn*10
 Sorted: 92 Kg Total catch: 91.58 CATCH/HOUR: 183.16

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP. NO.
	weight	numbers		
Sardina pilchardus	181.60	6368	99.15	1067
Scomber japonicus	1.56	32	0.85	1068
Total	183.16		100.00	

PROJECT STATION: 546
 DATE:15/12/96 GEAR TYPE: BT No:1 POSITION:Lat N 2820 Long W 1147
 start stop duration
 TIME :17:51:00 18:21:00 30 (min) Purpose code: 1
 LOG :5770.30 5771.90 1.60 Area code : 3
 FDEPTH: 47 46 GearCond.code:
 BDEPTH: 47 46 Validity code:
 Towing dir: 74° Wire out: 200 m Speed: 32 kn*10
 Sorted: 65 Kg Total catch: 233.33 CATCH/HOUR: 466.66

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP. NO.
	weight	numbers		
Trachurus trachurus	189.00	2310	40.50	1069
Sardina pilchardus	71.40	1274	15.30	1070
Pagellus acarne	67.20	372	14.40	
Diplodus bellottii	23.52	100	5.04	
Scomber japonicus	21.92	316	4.70	1071
Chelidonichthys gabonensis	14.50	70	3.11	
Trachinus draco	12.18	890	2.61	
Lepidopus caudatus	12.10	6	2.59	
Pomadasys incisus	10.58	112	2.27	
Merluccius senegalensis	8.00	36	1.71	
Dicologlossa cuneata	5.82	112	1.25	
Engraulis encrasicolus	5.74	316	1.23	1072
Diplodus vulgaris	5.26	36	1.13	
Boops boops	5.26	56	1.13	
Umbrina canariensis	4.98	42	1.07	
Pagellus bellottii	4.28	98	0.92	
Allotheutis subulata	3.08	924	0.66	
Spondyliosoma cantharus	0.98	14	0.21	
Trisopterus luscus	0.78	8	0.17	
Mullus surmuletus	0.08	8	0.02	
Total	466.66		100.02	

PROJECT STATION: 547
 DATE:16/12/96 GEAR TYPE: PT No:8 POSITION:Lat N 2814 Long W 1150
 start stop duration
 TIME :07:21:00 07:37:00 16 (min) Purpose code: 1
 LOG :5909.40 5910.40 1.00 Area code : 3
 FDEPTH: 10 10 GearCond.code:
 BDEPTH: 30 30 Validity code:
 Towing dir: 245° Wire out: 130 m Speed: 39 kn*10
 Sorted: 36 Kg Total catch: 731.00 CATCH/HOUR: 2741.25

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP. NO.
	weight	numbers		
Sardina pilchardus	2711.25	75150	98.91	1073
Scomber japonicus	30.00	525	1.09	1074
Total	2741.25		100.00	

PROJECT STATION: 548
 DATE:16/12/96 GEAR TYPE: BT No:1 POSITION:Lat N 2812 Long W 1158
 start stop duration
 TIME :09:36:00 09:56:00 20 (min) Purpose code: 1
 LOG :5927.60 5928.80 1.20 Area code : 3
 FDEPTH: 33 37 GearCond.code:
 BDEPTH: 33 37 Validity code:
 Towing dir: 104° Wire out: 150 m Speed: 36 kn*10
 Sorted: 33 Kg Total catch: 789.90 CATCH/HOUR: 2369.70

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP. NO.
	weight	numbers		
Engraulis encrasicolus	1404.15	101274	59.25	1076
Sardina pilchardus	627.90	28635	26.50	1075
Pagellus acarne	70.38	276	2.97	
Diplodus bellottii	68.31	1242	2.88	
Trachurus trachurus	53.82	966	2.27	1077
Arygrosomus regius	49.95	3	2.11	
Scomber japonicus	42.09	897	1.78	1078
Umbrina canariensis	26.22	483	1.11	
Chelidonichthys gabonensis	8.28	69	0.35	
Octopus vulgaris	7.56	3	0.32	
Diplodus vulgaris	6.90	69	0.29	
Merluccius merluccius	4.14	621	0.17	
Total	2369.70		100.00	

PROJECT STATION: 549
 DATE:16/12/96 GEAR TYPE: PT No:8 POSITION:Lat N 2808 Long W 1205
 start stop duration
 TIME :11:40:00 12:00:00 20 (min) Purpose code: 1
 LOG :5943.70 5944.90 1.20 Area code : 3
 FDEPTH: 10 10 GearCond.code:
 BDEPTH: 28 31 Validity code:
 Towing dir: 319° Wire out: 150 m Speed: 36 kn*10
 Sorted: 78 Kg Total catch: 392.10 CATCH/HOUR: 1176.30

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP. NO.
	weight	numbers		
Sardina pilchardus	1024.50	29820	87.10	1079
Engraulis encrasicolus	123.75	10275	10.52	1080
Scomber japonicus	24.75	360	2.10	1081
Diplodus bellottii	3.30	45	0.28	
Total	1176.30		100.00	

PROJECT STATION: 550
 DATE:16/12/96 GEAR TYPE: BT No:1 POSITION:Lat N 2811
 start stop duration Long W 1217
 TIME :14:25:00 14:55:00 30 (min) Purpose code: 1
 LOG :5967.80 5969.30 1.50 Area code : 3
 FDEPTH: 44 41 GearCond.code:
 BDEPTH: 44 41 Validity code:
 Towing dir: 195° Wire out: 200 m Speed: 30 kn*10

Sorted: 93 Kg Total catch: 172.83 CATCH/HOUR: 345.66

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP.NO.
	weight	numbers		
Engraulis encrasicolus	220.20	40936	63.70	1082
Trachurus trachurus	31.28	540	9.05	1084
Sardina pilchardus	23.40	1344	6.77	1083
Pagellus acarne	15.80	96	4.57	
Lepidopus caudatus	11.30	6	3.27	
Raja microocellata	7.40	2	2.14	
Pomadasys inciaus	6.48	68	1.87	
Trachinus draco	5.08	180	1.47	
Allotheutis subulata	4.96	1260	1.43	
Diplodus bellottii	3.92	64	1.13	
Psetta maxima	3.82	2	1.11	
Loligo vulgaris	3.26	12	0.94	
Umbrina canariensis	3.16	24	0.91	
Chelidonichthys lucerna	1.60	16	0.46	
Argyrosomus regius	1.52	4	0.44	
Pagellus bellottii	1.12	20	0.32	
Merluccius senegalensis	0.80	8	0.23	
Dicologlossa cuneata	0.56	8	0.16	
Total	345.66		99.97	

PROJECT STATION: 554
 DATE:17/12/96 GEAR TYPE: PT No:1 POSITION:Lat N 2806
 start stop duration Long W 1247
 TIME :23:08:00 23:30:00 22 (min) Purpose code: 1
 LOG :6271.10 6272.50 1.40 Area code : 3
 FDEPTH: 30 30 GearCond.code:
 BDEPTH: 56 56 Validity code:
 Towing dir: 240° Wire out: 130 m Speed: 40 kn*10

Sorted: 88 Kg Total catch: 87.69 CATCH/HOUR: 239.15

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP.NO.
	weight	numbers		
Sardina pilchardus	125.59	3461	52.52	1091
Engraulis encrasicolus	59.86	3824	25.03	1092
Pagellus acarne	29.10	150	12.17	
Scomber japonicus	19.36	371	8.10	1093
Lepidopus caudatus	4.50	3	1.88	
Pagellus bellottii	0.74	5	0.31	
Total	239.15		100.01	

PROJECT STATION: 555
 DATE:18/12/96 GEAR TYPE: BT No:1 POSITION:Lat N 2753
 start stop duration Long W 1307
 TIME :07:21:00 07:39:00 18 (min) Purpose code: 1
 LOG :6354.40 6355.30 0.90 Area code : 3
 FDEPTH: 50 50 GearCond.code:
 BDEPTH: 50 50 Validity code:
 Towing dir: 210° Wire out: 250 m Speed: 30 kn*10

Sorted: 36 Kg Total catch: 5000.00 CATCH/HOUR: 16666.67

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP.NO.
	weight	numbers		
Sardina pilchardus	16666.67	470133	100.00	1094
Total	16666.67		100.00	

PROJECT STATION: 551
 DATE:16/12/96 GEAR TYPE: BT No:1 POSITION:Lat N 2819
 start stop duration Long W 1223
 TIME :20:32:00 20:33:00 1 (min) Purpose code: 1
 LOG :6022.40 6022.50 0.10 Area code : 3
 FDEPTH: 55 55 GearCond.code:
 BDEPTH: 55 55 Validity code:
 Towing dir: 42° Wire out: 300 m Speed: 30 kn*10

Sorted: 18 Kg Total catch: 18.10 CATCH/HOUR: 1086.00

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP.NO.
	weight	numbers		
Diplodus vulgaris	654.00	4380	60.22	
Pagellus acarne	219.00	1440	20.17	
Umbrina canariensis	118.80	540	10.94	
Trachurus trachurus	40.80	480	3.76	1085
Spondyliosoma cantharus	28.20	180	2.60	
Pagellus bellottii	11.40	240	1.05	
Loligo vulgaris	5.40	60	0.50	
Scorpaena stephanica	3.60	120	0.33	
Seranus cabrilla	3.00	60	0.28	
Trachinus draco	1.20	120	0.11	
SYNGNATHIDAE	0.60	60	0.06	
Total	1086.00		100.02	

PROJECT STATION: 556
 DATE:18/12/96 GEAR TYPE: BT No:1 POSITION:Lat N 2728
 start stop duration Long W 1322
 TIME :14:07:00 14:22:00 15 (min) Purpose code: 1
 LOG :6422.10 6422.90 0.80 Area code : 3
 FDEPTH: 41 41 GearCond.code:
 BDEPTH: 41 41 Validity code:
 Towing dir: 200° Wire out: 180 m Speed: 32 kn*10

Sorted: 75 Kg Total catch: 511.88 CATCH/HOUR: 2047.52

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP.NO.
	weight	numbers		
Sardina pilchardus	1570.80	27580	76.72	1095
Pagellus acarne	159.60	1008	7.79	
Engraulis encrasicolus	64.40	6244	3.15	1096
Campogramma glaycos	63.00	56	3.08	
Pomadasys inciaus	36.12	476	1.76	
Allotheutis subulata	29.12	3892	1.42	
Trachurus trachurus	28.84	700	1.41	1098
Scomber japonicus	28.28	672	1.38	1097
Diplodus sargus *	22.96	28	1.12	
Umbrina canariensis	14.56	112	0.71	
Diplodus bellottii	11.76	308	0.57	
Loligo vulgaris	9.96	20	0.49	
Pagellus bellottii	4.76	56	0.23	
Boops boops	1.96	28	0.10	
Sepia officinalis hierredra	1.40	28	0.07	
Total	2047.52		100.00	

PROJECT STATION: 552
 DATE:17/12/96 GEAR TYPE: PT No:8 POSITION:Lat N 2803
 start stop duration Long W 1235
 TIME :09:21:00 09:33:00 12 (min) Purpose code: 1
 LOG :6150.60 6151.40 0.80 Area code : 3
 FDEPTH: 10 10 GearCond.code:
 BDEPTH: 38 45 Validity code:
 Towing dir: 9° Wire out: 200 m Speed: 40 kn*10

Sorted: 39 Kg Total catch: 1015.87 CATCH/HOUR: 5079.35

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP.NO.
	weight	numbers		
Sardina pilchardus	3435.75	133785	67.64	1086
Engraulis encrasicolus	1620.00	144450	31.89	1087
Scomber japonicus	14.85	270	0.23	
Pagellus acarne	8.75	25	0.17	
Total	5079.35		99.99	

PROJECT STATION: 557
 DATE:18/12/96 GEAR TYPE: PT No:8 POSITION:Lat N 2710
 start stop duration Long W 1328
 TIME :19:38:00 19:51:00 13 (min) Purpose code: 1
 LOG :6475.90 6476.80 0.90 Area code : 3
 FDEPTH: 10 10 GearCond.code:
 BDEPTH: 30 29 Validity code:
 Towing dir: 10° Wire out: 100 m Speed: 38 kn*10

Sorted: 34 Kg Total catch: 87.99 CATCH/HOUR: 406.11

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP.NO.
	weight	numbers		
Trachurus trachurus	307.11	1195	75.62	1099
Diplodus bellottii	31.20	785	7.68	
Sardinella aurita	15.09	120	3.72	1100
Boops boops	13.52	277	3.33	
Scomber japonicus	13.43	120	3.31	1101
Loligo vulgaris	10.52	411	2.59	
Sardina pilchardus	9.92	895	2.44	1102
Allotheutis subulata	2.91	448	0.72	
Umbrina canariensis	2.40	23	0.59	
Total	406.10		100.00	

PROJECT STATION: 553
 DATE:17/12/96 GEAR TYPE: PT No:8 POSITION:Lat N 2803
 start stop duration Long W 1242
 TIME :11:53:00 12:23:00 30 (min) Purpose code: 1
 LOG :6169.80 6171.40 1.60 Area code : 3
 FDEPTH: 20 34 GearCond.code:
 BDEPTH: 42 49 Validity code:
 Towing dir: 16° Wire out: 250 m Speed: 32 kn*10

Sorted: 108 Kg Total catch: 533.63 CATCH/HOUR: 1067.26

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP.NO.
	weight	numbers		
Sardina pilchardus	615.10	16810	57.63	1088
Engraulis encrasicolus	412.50	29360	38.65	1089
Pagellus acarne	13.50	60	1.26	
Chelidonichthys lucerna	13.40	20	1.26	
Scomber japonicus	6.10	140	0.57	1090
Sarda sarda	3.46	2	0.32	
Trichiurus lepturus	3.20	10	0.30	
Total	1067.26		99.99	

Annex III Instruments and fishing gear used

The Simrad EK-500/38kHz scientific sounder was used during the survey for fish abundance estimation. The Bergen Echo Integrator system (BEI) was used to scrutinize the acoustic records from the 38kHz echo sounder, and to allocate integrator values to fish species.

The details of the settings of the 38kHz echo sounder were as follows:

Tranceiver-1 menu (38 kHz lowering keel)

Transducer depth	5.00 m
Absorption coeff.	10 dB/km
Pulse length	medium (1ms)
Bandwidth	wide
Max power	2000 Watt
2-way beam angle	-21.0 dB
SV transducer gain	27.7 dB
TS transducer gain	27.8 dB
Angle sensitivity	21.9
3 dB beamwidth	6.8 dg
Alongship offset	0.00 "
Athwardship offset	0.04 "

Display menu

Echogram	1 (38 kHz)
Bottom range	12 m
Bottom range start	10 m
Sv colour min	-67 dB

Printer- menu

Echogram	1 (38 kHz)
Range	100, 250 and 500 m
Range start	0
Bottom range	12 m
Bottom range start	10 m
Sv colour min	-67 dB
TVG	20 log R

Bottom detection menu Minimum level -45 dB

Fishing gear

The vessel has two different sized "Åkrahamn" pelagic trawls and one 'Gisund super bottom trawl'. All three trawls were used during the survey.

The bottom trawl has a headline of 31 m, footrope of 47 m and 20 mm meshsize in the codend with an inner net of 10 mm meshsize. The estimated opening is 6 m (observed 5.7) and distance between wings during towing about 18 m. The sweeps are 40 m long. The trawl is equipped with a 12" rubber bobbins gear. The doors are of 'Thyborøn' combi type, 7.81 m², 1670 kg, their distance while trawling about 46 m in average.

The pelagic trawl is equipped with a trawleye that provides information on the trawl opening and the distance of the footrope to the bottom.